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NORTH DAKOTA
PUBLIC SERVICE COMMISSION

EDF renewables

Merricourt Wind Farm
6510 88th St SE
Kulm, ND 58456
701-269-4405

March 12, 2021

John G Hamre
Administrative Assistant
North Dakota Public Service Commission
600 E Boulevard Ave.
Department 408
Bismarck, ND 58505-0480

RE: Case No. PU-08-932

Dear Mr. Hamre,

Please see enclosed documents and flash drive containing as built files for Merricourt Wind Farm project and GIS files. These documents are being filed in accordance with certification provision #34. I have enclosed two hard copies of the following sets of plans, and a flash drive with electronic copies of the following:

1) Merricourt As Built Overview (2)
2) Merricourt As Built Civil Plans (2)
3) Merricourt As Built O&M Building Plans (2)
4) Merricourt As Built Gen-Tie Plans (2)
5) Merricourt As Built Substation Physical Plans (2)
6) Merricourt As Built Collection System Plans (2)
7) One Flash Drive
8) Merricourt Layout As Built GIS Files– Electronic Only

Please let me know if you require anything else.

Thank you,

Tammy Schwenn

Tammy Schwenn, Construction Coordinator
Tammy.schwenn@edf-re.com (701) 269-4405
Enclosures: 13

272 PU-08-932 Filed: 3/17/2021 Pages: 277
Letter enclosing As-Built maps and drawings

EDF Renewable Development, Inc.

Tammy Schwenn

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Record Civil Plans

for

Wind Turbines, Access Roads, and Drainage

for

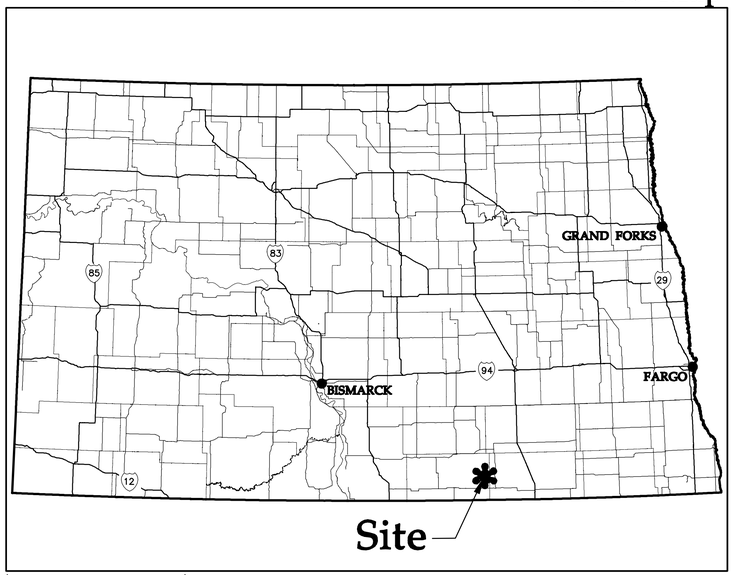
Merricourt Wind Project

McIntosh County, North Dakota

RECORD CIVIL PLANS

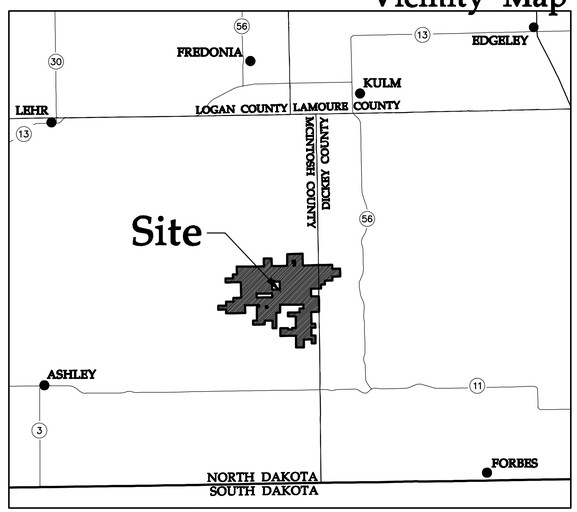
CONFORMING TO CONSTRUCTION RECORDS PROVIDED BY WANZEK AND FIELD SURVEY, PROVIDED BY WESTWOOD PROFESSIONAL SERVICES, COMPLETED OCTOBER 2020.

State Map



(NOT TO SCALE)

Vicinity Map



(NOT TO SCALE)

Sheet List Table

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3	Delivery Flow Plan
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5	Construction Details
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12	Civil Site Plan T–32
13	Civil Site Plan T–1 – T–2, T–5
14	Civil Site Plan T–14 – T–15, T–27 – T–28
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16	Civil Site Plan T–30 – T–31, T–34, T–80
17	Civil Site Plan T–54, T–56, ALT–79
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27	Civil Site Plan T–8 – T–9
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29	Civil Site Plan T–25, ALT–44
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38	Civil Site Plan T–65, T–67 – T–69
39	Civil Site Plan T–53
40–118	Access Road Plan & Profiles
119	O&M Grading Plan

DATA SET INFORMATION

BASE FILE	FILE NAME / NOTES	PROVIDER	DATE
AERIAL IMAGE	World_IMG_DL_2014_09_17.jp2	World Imagery	9/17/2014
LAND CONTROL	Layout_v91b_Merricourt_20170425.kmz	Wanzek	4/1/2019
ALTA SURVEY	Merricourt2019_BASE.dwg	KLJ	6/20/2019
TOPOGRAPHY	ND_Lidar_With_10meter_data_exproted_at_10ftgrid.xyz	ND Lidar	11/1/2016
TURBINE ARRAY	2020-08-26 Merricourt Turbines.xlsx	Westwood	8/26/2020
UNDERGROUND COLLECTION	0004641-01RECO.dwg	Westwood	10/28/2020
STREAMS/WETLANDS	Wetlands_Delineations_v16_Merricourt_fromKLJ.shp	Wanzek	7/29/2019
CULTURAL RESOURCES	ArcheologicalSites_v15_Merricourt_AVOID.shp, ArcheologicalSites_v15_Merricourt_NoAvoidanceNecessary.shp, Merricourt_NewSites_20191007.shp, Merricourt_NewSites_20191009.shp, KLJMWSAS1_50Avoidance.shp, KLJMWSAS2_50Avoidance.shp	Wanzek/EDF	10/26/2019
RECORD SURVEY	0004641-01RECO.dwg	Westwood	10/28/2020

Westwood

Phone (952) 937-5150 12701 Whitewater Drive, Suite #300
Fax (952) 937-5822 Minnetonka, MN 55343
Toll Free (888) 937-5150 westwoodps.com

Westwood Professional Services, Inc.

Designed: SNK
Checked: DJN
Drawn: SNK
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
2	01/21/20	CUT & FILL ADD TO TURBINE TABLE
3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Cover

Record Plans

Date: 11/20/2020
Sheet: 1 OF 119

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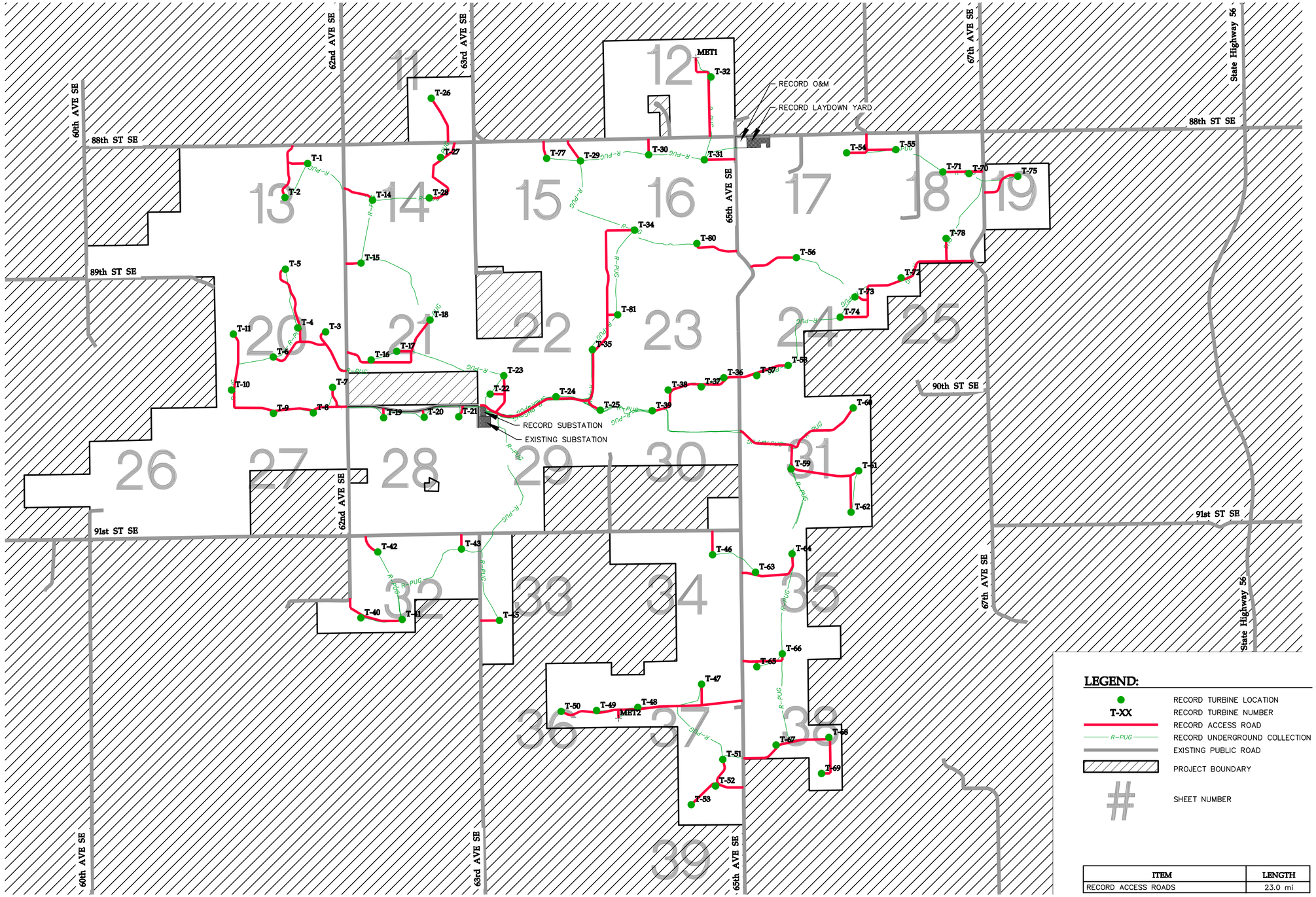

LEGEND:

- RECORD TURBINE LOCATION
- T-XX — RECORD TURBINE NUMBER
- RECORD ACCESS ROAD
- R-PUG — RECORD UNDERGROUND COLLECTION
- EXISTING PUBLIC ROAD
- PROJECT BOUNDARY
- # — SHEET NUMBER

ITEM	LENGTH
RECORD ACCESS ROADS	23.0 mi

0' 2000' 4000' 6000'

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Prepared for:

WANZEK a MasTec company

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West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Overall Site Plan

Record Plans

Date: 11/20/2020
Sheet: 2 OF 119

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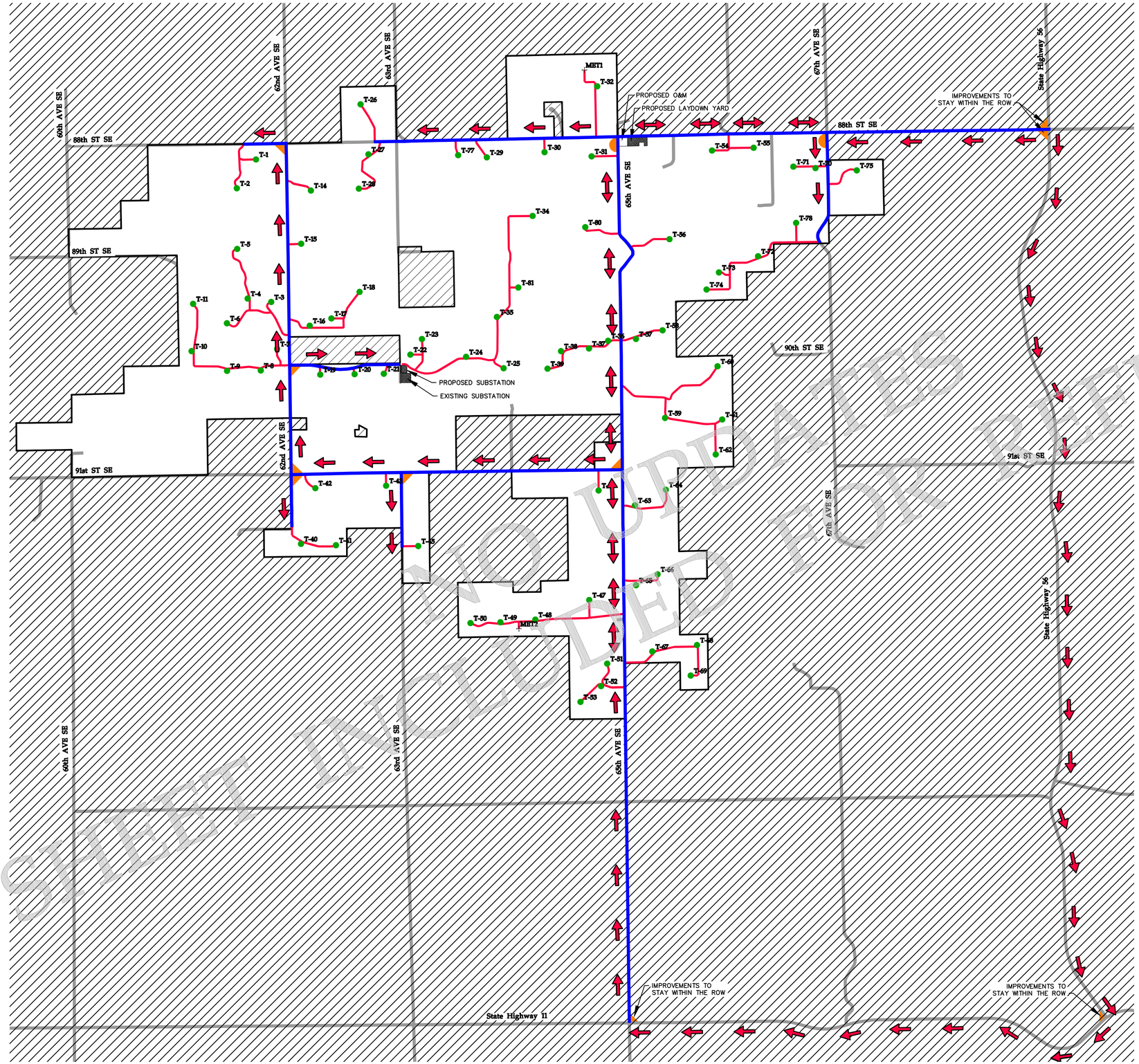

SHEET INCLUDED IN UPDATED FOR REFERENCE

LEGEND:

- RECORD TURBINE LOCATION
- T-XX RECORD TURBINE NUMBER
- RECORD ACCESS ROAD
- EXISTING PUBLIC ROAD
- GRAVEL DELIVERY ROUTE
- PROJECT BOUNDARY
- TURBINE DELIVERY FLOW DIRECTION
- INTERSECTION IMPROVEMENT

ITEM	LENGTH
GRAVEL DELIVERY ROUTE	21.50 mi

N

0' 2500' 5000' 7500'

Merricourt Wind Project

McIntosh County, North Dakota

Delivery Flow Plan

Westwood

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Prepared for:

WANZEK a MasTec company

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West Fargo, ND 58078

Record Plans

Date: 11/20/2020
Sheet: 3 OF 119

0004641-01DFP01.dwg

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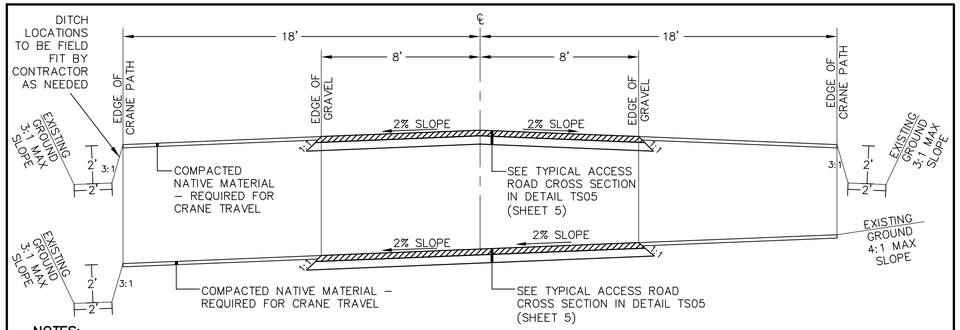
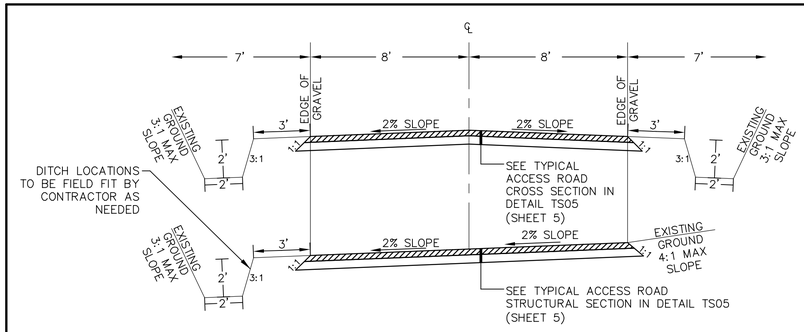


NOTES:

1. CONTRACTOR SHALL CONSTRUCT CROSS–SLOPE ROAD SECTION WHERE ACCESS ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT ROADS AND SHOULDERS REMAIN WELL DRAINED AT ALL TIMES.
2. MAXIMUM CROSS SLOPE FOR CRANE TRAVEL IS 2.0%
3. WHEN CRANE PATH IS NOT NEEDED, MATCH THE ACCESS ROAD DIRECTLY INTO EXISTING GROUND SURFACE
4. ROADS TO GENERALLY FOLLOW EXISTING CONTOURS EXCEPT IF GRADES EXCEED TURBINE DELIVERY VEHICLE CAPABILITIES, IF THIS OCCURS GENERAL CONTRACTOR MAY MODIFY GRADES BUT NOT EXCEED CLEARED LIMITS

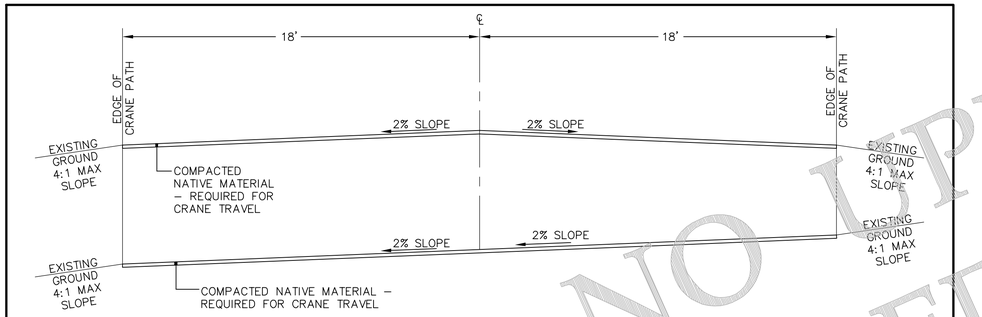
Westwood	TYPICAL TURBINE ACCESS ROAD AND CRANE PATH	LAST REVISED: 04/20/11 RD01–A



NOTES:

1. CONTRACTOR SHALL CONSTRUCT CROSS–SLOPE ROAD SECTION WHERE ACCESS ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT ROADS AND SHOULDERS REMAIN WELL DRAINED AT ALL TIMES.
2. ROADS TO GENERALLY FOLLOW EXISTING CONTOURS EXCEPT IF GRADES EXCEED TURBINE DELIVERY VEHICLE CAPABILITIES, IF THIS OCCURS GENERAL CONTRACTOR MAY MODIFY GRADES BUT NOT EXCEED CLEARED LIMITS

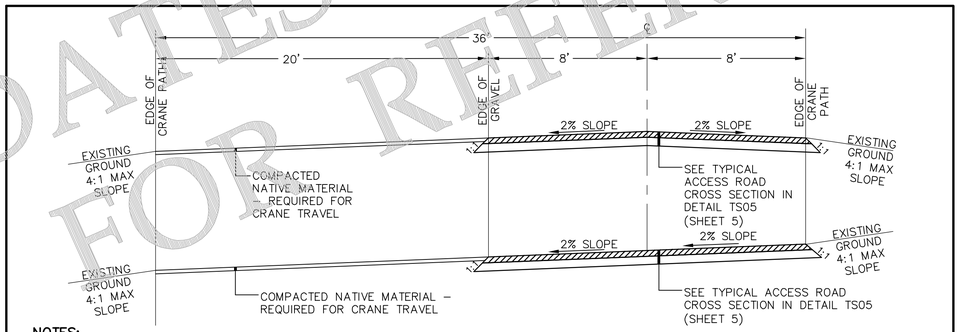
Westwood	TYPICAL TURBINE ACCESS ROAD SECTION	LAST REVISED: 3/19/12 RD01–B



NOTES:

1. CONTRACTOR SHALL CONSTRUCT CROSS–SLOPE WHERE CRANE PATHS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT CRANE PATH REMAINS WELL DRAINED AT ALL TIMES.
2. MAXIMUM CROSS SLOPE FOR CRANE TRAVEL IS 2.0%.

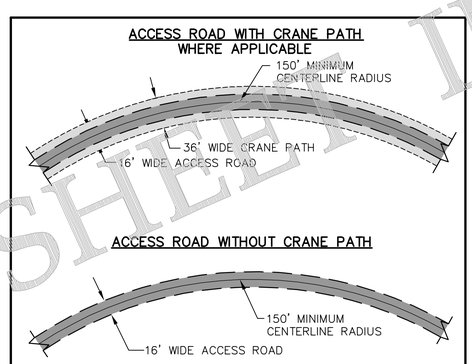
Westwood	TYPICAL CRANE PATH	LAST REVISED: 04/20/11 RD01–C



NOTES:

1. CONTRACTOR SHALL CONSTRUCT CROSS–SLOPE ROAD SECTION WHERE ACCESS ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT ROADS AND SHOULDERS REMAIN WELL DRAINED AT ALL TIMES.
2. MAXIMUM CROSS SLOPE FOR CRANE TRAVEL IS 2.0%
3. WHEN CRANE PATH IS NOT NEEDED, MATCH THE EDGE OF COMPACTED SHOULDER DIRECTLY INTO EXISTING GROUND SURFACE
4. ROADS TO GENERALLY FOLLOW EXISTING CONTOURS EXCEPT IF GRADES EXCEED TURBINE DELIVERY VEHICLE CAPABILITIES, IF THIS OCCURS GENERAL CONTRACTOR MAY MODIFY GRADES BUT NOT EXCEED CLEARED LIMITS

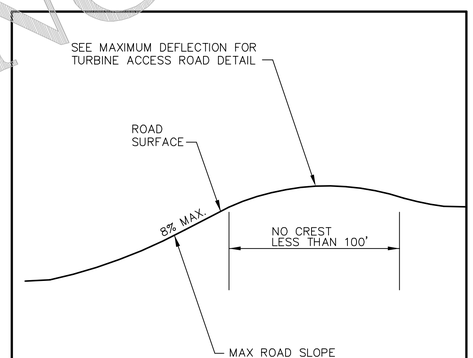
Westwood	TYPICAL TURBINE ACCESS ROAD AND OFFSET CRANE PATH	LAST REVISED: 04/29/11 RD01–D



NOTE:

1. SOME RADII MAY REQUIRE ADDITIONAL SOIL COMPACTION OR GRAVEL OUTSIDE OF THE WIDTH SHOWN ABOVE TO ACCOMMODATE TRACTORS OR TRAILERS TRACKING OFF THE ACCESS ROAD.

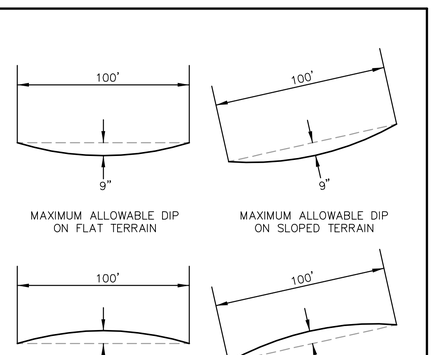
Westwood	MINIMUM RADIUS FOR TURBINE ACCESS ROAD	LAST REVISED: 04/20/11 RD02



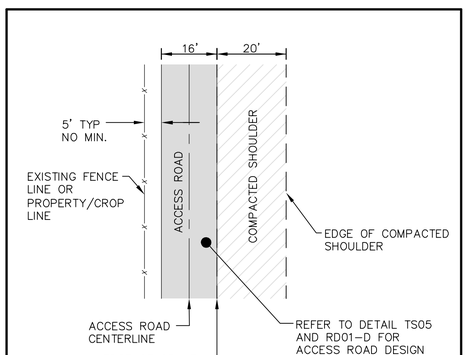
NOTES:

1. ROAD SLOPE SHALL NOT EXCEED 8% WITHOUT OWNER APPROVAL

Westwood	MAXIMUM VERT. SLOPE FOR TURBINE ACCESS ROAD/CRANE TRAVEL PATH	LAST REVISED: 3/19/12 RD03



Westwood	MAXIMUM DEFLECTION FOR TURBINE ACCESS ROAD	LAST REVISED: 01/02/08 RD04



NOTE:

1. COMPACTED SHOULDER SHALL BE RETURNED TO NATIVE CONDITION FOLLOWING TURBINE GENERATOR CONSTRUCTION.
2. THE ACCESS ROAD MAY NEED TO BE CONSTRUCTED FARTHER FROM THE PROPERTY LINE IF OBSTRUCTIONS SUCH AS TREES FOLLOW THE PROPERTY LINE.

Westwood	TURBINE ACCESS ROAD ALONG FENCE/PROPERTY/CROP LINE	LAST REVISED: 3/19/12 RD05

SHEET INCLUDED
NO UPDATES
FOR REFERENCE

Westwood

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Westwood Professional Services, Inc.

Designed: SNK
Checked: DJN
Drawn: SNK
As-Built Drawing:

Revisions:

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Construction Details

Record Plans

Date: 11/20/2020
Sheet: 4 OF 119

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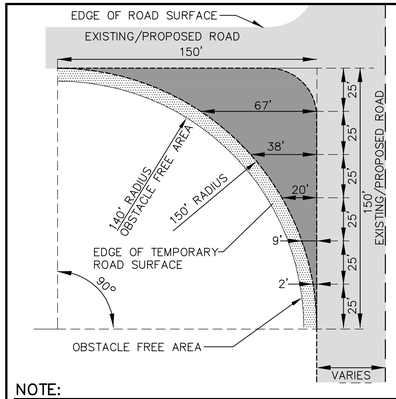
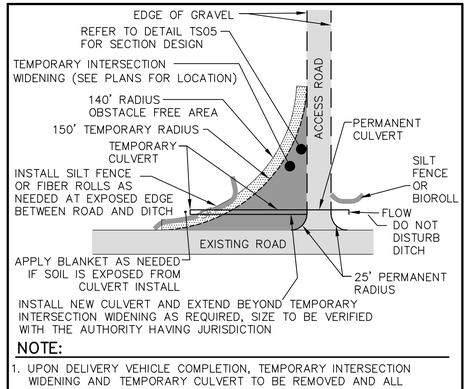


NOTE:

1. UPON DELIVERY VEHICLE COMPLETION, TEMPORARY INTERSECTION WIDENING TO BE REMOVED AND ALL DISTURBED AREA RESTORED.

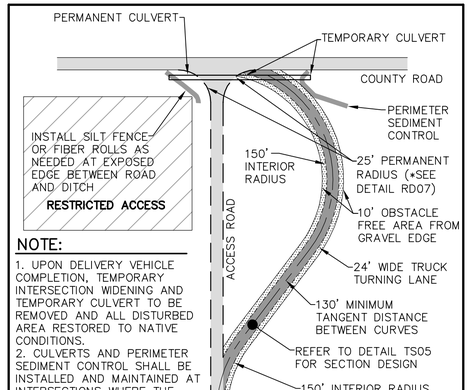
Westwood	INTERSECTION WIDENING DIMENSIONS	LAST REVISED: 3/19/12 RD06



NOTE:

1. UPON DELIVERY VEHICLE COMPLETION, TEMPORARY INTERSECTION WIDENING AND TEMPORARY CULVERT TO BE REMOVED AND ALL DISTURBED AREA RESTORED TO NATIVE CONDITIONS.
2. CULVERTS AND SILT FENCE SHALL BE INSTALLED AND MAINTAINED AT INTERSECTIONS WHERE THE ACCESS ROAD IS CROSSING AN EXISTING COUNTY DITCH.

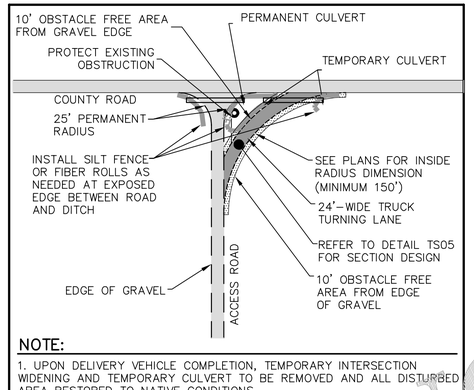
Westwood	TURBINE ACCESS ROAD TYPICAL INTERSECTION WIDENING	LAST REVISED: 3/19/12 RD07



NOTE:

1. UPON DELIVERY VEHICLE COMPLETION, TEMPORARY INTERSECTION WIDENING AND TEMPORARY CULVERT TO BE REMOVED AND ALL DISTURBED AREA RESTORED TO NATIVE CONDITIONS.
2. CULVERTS AND PERIMETER SEDIMENT CONTROL SHALL BE INSTALLED AND MAINTAINED AT INTERSECTIONS WHERE THE ACCESS ROAD IS CROSSING AN EXISTING COUNTY DITCH.

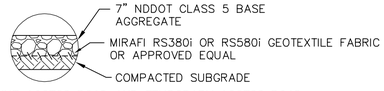
Westwood	TRUCK TRAFFIC TURNING LANE A	LAST REVISED: 11/18/14 RD08–A



NOTE:

1. UPON DELIVERY VEHICLE COMPLETION, TEMPORARY INTERSECTION WIDENING AND TEMPORARY CULVERT TO BE REMOVED AND ALL DISTURBED AREA RESTORED TO NATIVE CONDITIONS.
2. CULVERTS AND SILT FENCE SHALL BE INSTALLED AND MAINTAINED AT INTERSECTIONS WHERE THE ACCESS ROAD IS CROSSING AN EXISTING COUNTY DITCH.

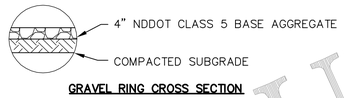
Westwood	TRUCK TRAFFIC TURNING LANE B	LAST REVISED: 3/19/12 RD08–B



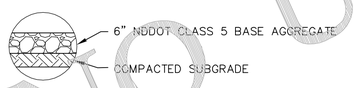
TURBINE ACCESS ROAD AND TEMPORARY ACCESS ROAD CROSS SECTION* (MIN CBR=3.0)

*MUST PASS THE FOLLOWING:

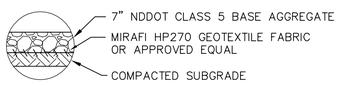
- SUBGRADE DCP VALUES EQUAL TO OR EXCEEDING 4 BLOWS PER 6 INCHES TO A TOTAL DEPTH OF 2 FEET (FOLLOW TESTING FREQUENCY SPECIFIED IN TABLE 2 ON SHEET 10)
- SUBGRADE PASSES PROOF ROLL



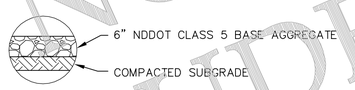
GRAVEL RING CROSS SECTION



TEMPORARY TURNING IMPROVEMENTS



MET/SPUR ROAD CROSS SECTION

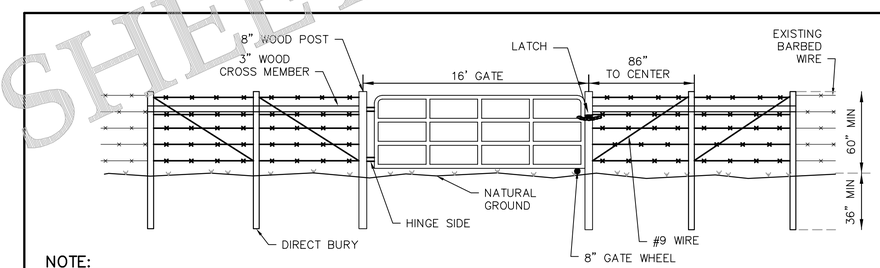


LAYDOWN YARD CROSS SECTION

NOTE:

STRUCTURAL SECTIONS SHOWN ARE THE MINIMUM THICKNESS REQUIREMENTS DURING NORMAL FIELD CONDITIONS. THE SECTIONS MAY NEED TO BE INCREASED BASED ON ACTUAL FIELD CONDITIONS AT THE TIME OF CONSTRUCTION. CONDITIONS INCLUDE BUT ARE NOT LIMITED TO CONSTRUCTION DURING THE FREEZE/THAW CYCLE, UNUSUALLY WET PERIODS, OR IN LOW/WET AREAS. SEE SHEET 10 FOR TESTING REQUIREMENTS AND SPECIFICATIONS.

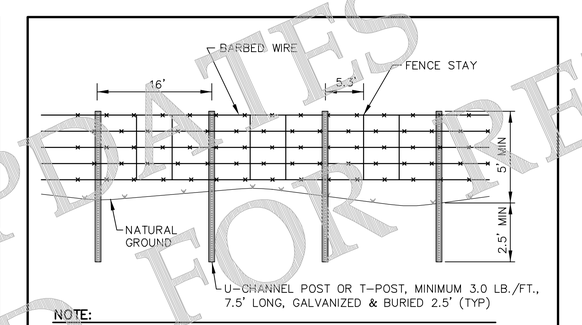
Westwood	TYPICAL STRUCTURAL CROSS SECTIONS	LAST REVISED: 10/02/18 TS05



NOTE:

1. DOUBLE H–BRACING SHALL BE CONSTRUCTED ON EACH END OF THE GATE.
2. GATES ARE ONLY REQUIRED TO CONTAIN LIVESTOCK.

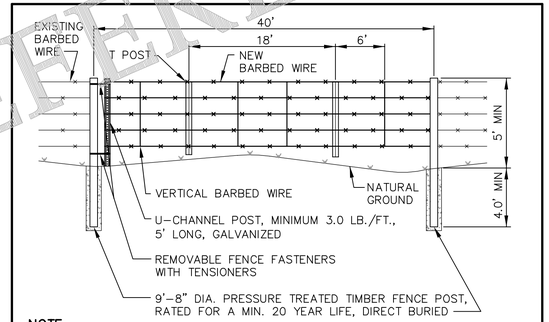
Westwood	TYPICAL SINGLE GATE	LAST REVISED: 04/08/09 GA04



NOTE:

1. BARBED WIRE SHALL BE 3, 4, 5 OR 6 STRAND WIRE FENCE. MATCH EXISTING IF APPLICABLE.
2. ALL FENCES SHALL BE TIED BACK TO MAINTAIN TENSION ON EXISTING FENCE PRIOR TO CUTTING OF THE EXISTING FENCE.
3. CONTRACTOR SHALL VERIFY ELECTRIC FENCE CROSSING LOCATIONS PRIOR TO CONSTRUCTION AND REPLACE ANY DISTURBED ELECTRIC FENCE TO MATCH EXISTING CONDITIONS.

Westwood	PERMANENT FENCE	LAST REVISED: 05/14/09 FN02



NOTE:

1. TO BE USED AT CROSS COUNTRY CRANE PATH AND ELECTRICAL FENCE CROSSINGS.
2. ALL FITTINGS, HARDWARE AND OTHER APPURTENANCES SHALL BE FABRICATED AND FITTED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL DIRECT BURIED POSTS SHALL BE BACKFILLED WITH TWO BAGS OF UNMIXED, NO WATER ADDED, QUICKRETE℠, OR APPROVED EQUAL, FOLLOWED BY NATIVE SOIL.
4. BARBED WIRE SHALL MATCH EXISTING 4, 5, OR 6 WIRE FENCE.

Westwood	TEMPORARY FENCE CROSSING	LAST REVISED: 05/14/09 FN04

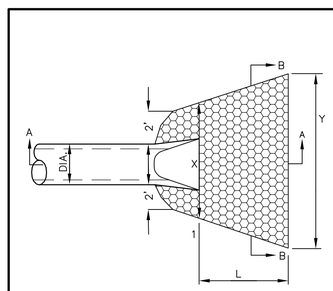
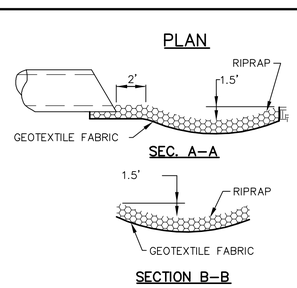


TABLE OF QUANITIES
RIPRAP AT OUTLETS

Dia. Round Pipe (in.)	L (Ft.)	X (Ft.)	Y (Ft.)	D_{50}(in)	Rock Depth (Ft.)
24	8	4.0	11	9	2.0
30	10	4.5	14	9	2.0
36	15	5.0	19	12	2.5
42	18	5.5	22	12	2.5
48	20	6.0	25	12	2.5
54	27	6.5	31.5	12	2.5
60	30	7.0	35	12	2.5



NOTE:

1. THE CONTRACTOR SHALL PLACE RIP RAP, PULVERIZED TOPSOIL, SEED AND WOODFIBER BLANKET IMMEDIATELY AFTER PIPE IS INSTALLED, EXTEND AREA TO MATCH UNDISTURBED SOIL.
2. CULVERTS LARGER THAN 60" SHALL HAVE STILLING BASINS INSTALLED.
3. RIP RAP NOT REQUIRED FOR CULVERTS 24" OR SMALLER IF CULVERTS DRAIN INTO AN UNDISTURBED VEGETATED AREA.
4. CULVERTS WITHIN THE ROW SHALL BE INSTALLED PER THE COUNTY REQUIREMENTS.
5. THE OUTLET PROTECTION SIZING RECOMMENDATION WAS TAKEN FROM HEC–14 CHAPTER 10.2 ISSUED BY THE US DEPARTMENT OF TRANSPORTATION.

Westwood	PERMANENT RIP RAP OUTLETS	LAST REVISED: 05/01/17 ER05

NO UPDATES FOR REFERENCE
SHEET INCLUDED

Westwood
Phone (952) 937-5150 12701 Whitewater Drive, Suite #300
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Toll Free (888) 937-5150 westwoodps.com
Westwood Professional Services, Inc.

Designed: SNK
Checked: DJN
Drawn: SNK
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
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4	11/05/20	LWC DETAIL UPDATE
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Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Construction Details

Record Plans

Date: 11/20/2020
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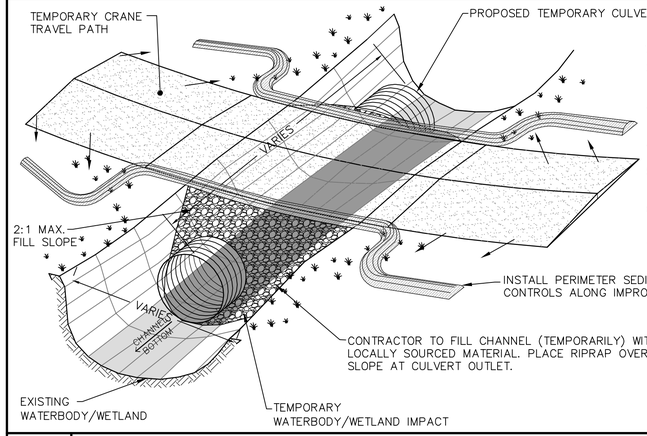
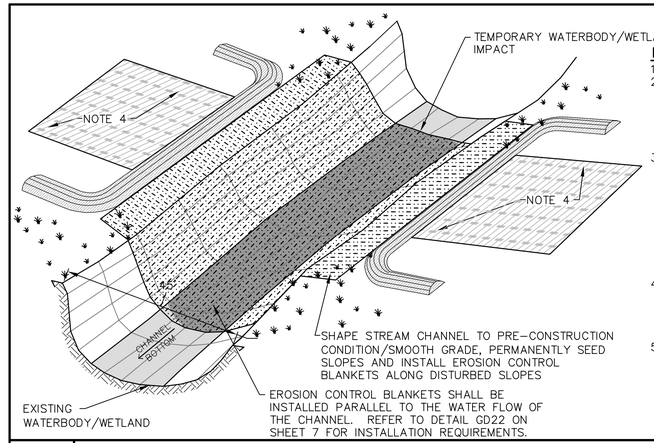


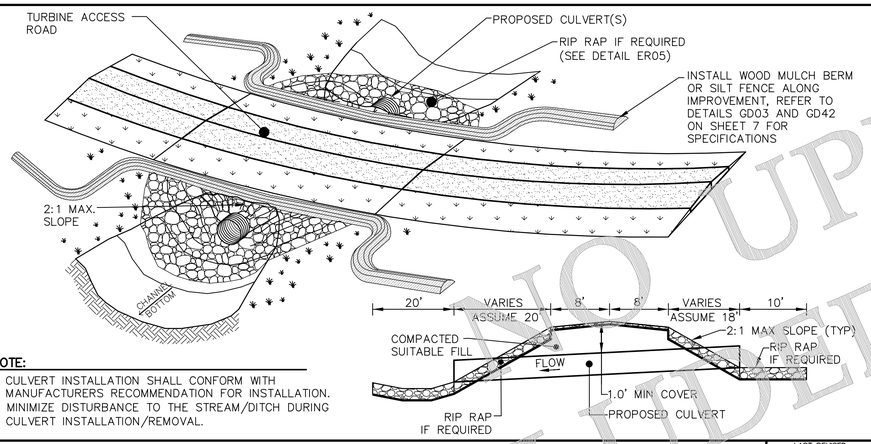
NOTES:
1. DRAWING IS NOT TO SCALE.
2. CULVERT INSTALLATION SHALL CONFORM WITH MANUFACTURERS RECOMMENDATION FOR INSTALLATION WITH MINIMUM 12 INCH COVER.
3. TEMPORARY BRIDGING AND MATTING MAY BE SUBSTITUTED IN THE FIELD WITH APPROVAL FROM THE OWNER AND ENGINEER.
4. MINIMIZE DISTURBANCE TO THE STREAM/DITCH DURING CULVERT INSTALLATION/REMOVAL.
5. REFER TO THE MERRICOURT WIND PROJECT SWPPP FOR ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES.
6. CROWN TEMPORARY CRANE PATH TO PROMOTE LATERAL DRAINAGE FROM ROADWAY TOWARDS PERIMETER SEDIMENT CONTROLS.
7. SEE DETAIL RD09–2 FOR STREAM RESTORATION.

Westwood	TYPICAL TEMPORARY STREAM CROSSING WITH CULVERT – CRANE CROSSING	LAST REVISED: 11/30/17
		RD09–1



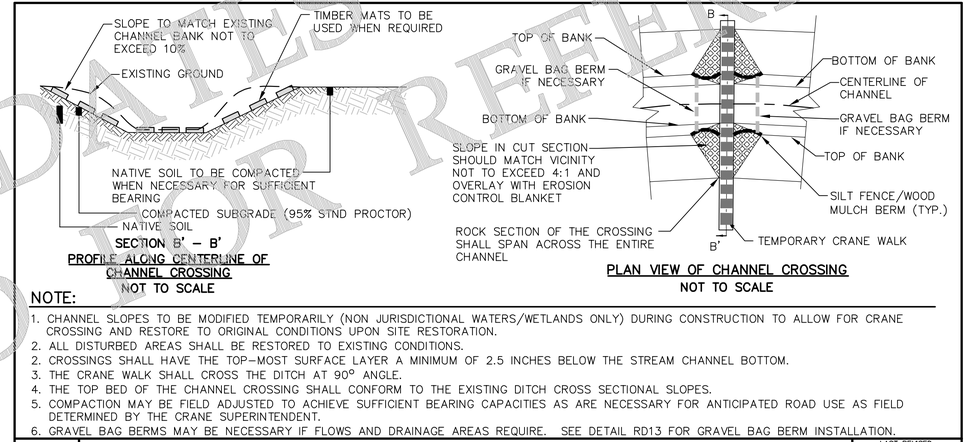
NOTES:
1. DRAWING IS NOT TO SCALE.
2. UPON REMOVAL OF TEMPORARY STREAM CROSSING, THE DISTURBED AREA SHALL BE RESTORED TO PRE–CONSTRUCTION CONDITIONS. REFER TO THE MERRICOURT WIND PROJECT CIVIL PLAN SET SWPPP FOR RESTORATION AND SEEDING SPECIFICATIONS.
3. REMOVE RIP RAP, FILL MATERIAL AND SHAPE CHANNEL TO PRE–CONSTRUCTION CONDITION. PERMANENTLY SEED ALL DISTURBED SLOPES IN CONFORMANCE WITH THE MERRICOURT WIND PROJECT CIVIL PLAN SET SWPPP. INSTALL EROSION CONTROL BLANKETS, ADEQUATE FOR FLOW CONDITIONS, ON ALL DISTURBED SLOPES GREATER THAN 4:1, WHERE ANY FLOWS ARE CONCENTRATED AND WITHIN THE DITCHES WETTED PERIMETER.
4. DECOMPACT, REAPPLY TOPSOIL AND TILL DISTURBED AREA TO RESTORE TO PRE–CONSTRUCTION AGRICULTURAL CONDITION AND RESTORE ANY VEGETATED BUFFER THAT EXISTED PRE–CONSTRUCTION.
5. REMOVE WOOD MULCH BERM OR SILT FENCE ONCE FINAL STABILIZATION HAS OCCURRED WITH A MINIMUM OF 70% VEGETATION UPSTREAM OF SILT FENCE.

Westwood	TYPICAL TEMPORARY STREAM CROSSING RESTORATION	LAST REVISED: 3/19/12
		RD09–2



NOTE:
1. CULVERT INSTALLATION SHALL CONFORM WITH MANUFACTURERS RECOMMENDATION FOR INSTALLATION.
2. MINIMIZE DISTURBANCE TO THE STREAM/DITCH DURING CULVERT INSTALLATION/REMOVAL.

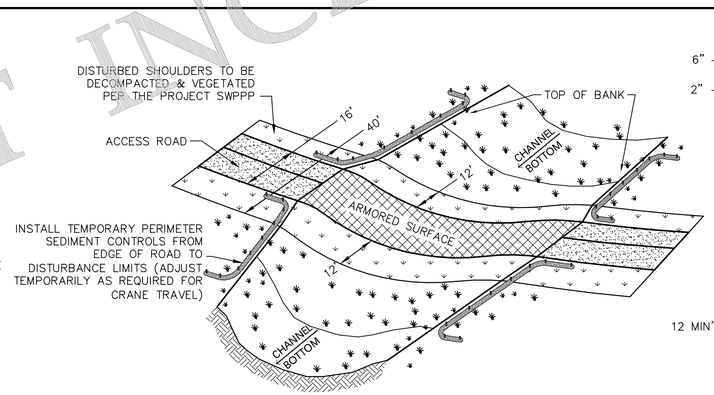
Westwood	TYPICAL PERMANENT TURBINE ACCESS ROAD STREAM CROSSING	LAST REVISED: 3/19/12
		RD10

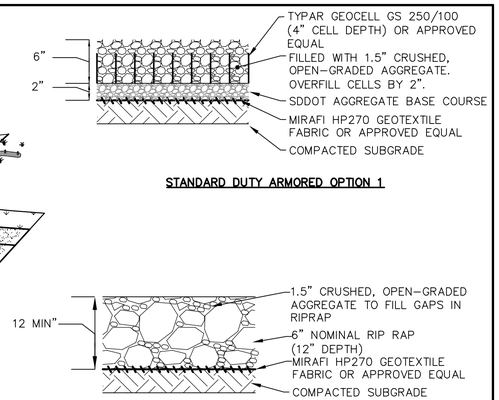


NOTE:
1. CHANNEL SLOPES TO BE MODIFIED TEMPORARILY (NON JURISDICTIONAL WATERS/WETLANDS ONLY) DURING CONSTRUCTION TO ALLOW FOR CRANE CROSSING AND RESTORE TO ORIGINAL CONDITIONS UPON SITE RESTORATION.
2. ALL DISTURBED AREAS SHALL BE RESTORED TO EXISTING CONDITIONS.
3. CROSSINGS SHALL HAVE THE TOP–MOST SURFACE LAYER A MINIMUM OF 2.5 INCHES BELOW THE STREAM CHANNEL BOTTOM.
4. THE CRANE WALK SHALL CROSS THE DITCH AT 90° ANGLE.
5. THE TOP BED OF THE CHANNEL CROSSING SHALL CONFORM TO THE EXISTING DITCH CROSS SECTIONAL SLOPES.
6. COMPACTION MAY BE FIELD ADJUSTED TO ACHIEVE SUFFICIENT BEARING CAPACITIES AS ARE NECESSARY FOR ANTICIPATED ROAD USE AS FIELD DETERMINED BY THE CRANE SUPERINTENDENT.
7. GRAVEL BAG BERMS MAY BE NECESSARY IF FLOWS AND DRAINAGE AREAS REQUIRE. SEE DETAIL RD13 FOR GRAVEL BAG BERM INSTALLATION.

Westwood	STREAM/WATERBODY/DRAINAGE SWALE TIMBER MAT CRANE CROSSING	LAST REVISED: 11/30/17
		RD12

NOTES:
1. CHANNEL SIDE SLOPES MAY REQUIRE MODIFICATION TO CONSTRUCT THE ACCESS ROAD THROUGH THE CHANNEL TO MEET TURBINE COMPONENT DELIVERY REQUIREMENTS.
2. THE ACCESS ROAD SHALL CROSS THE CHANNEL AS CLOSE TO 90–DEGREES AS POSSIBLE.
3. ENSURE APPROPRIATE SUBGRADE ELEVATION SO THAT THE FINISHED ACCESS ROAD SURFACE ALLOWS WATER TO FLOW THROUGH THE CHANNEL UNIMPEDED AND WITHOUT PONDING UPSTREAM OF ROAD OR ON THE ROAD SURFACE.
4. ARMORED SURFACE TREATMENT OF THE ROAD SURFACE SHALL EXTEND THROUGH THE CHANNEL BOTTOM AND UP THE CHANNEL SIDE SLOPES TO THE OBSERVED TOP OF BANK OF THE CHANNEL, UNLESS OTHERWISE NOTED.
5. PERIMETER SEDIMENT CONTROL MAY CONSIST OF FIBERLOGS (BIOROLLS), WOOD MULCH BERMS, OR TOPSOIL BERMS. REFER TO APPROPRIATE DETAIL FOR INSTALLATION REQUIREMENTS.
6. REFER TO DRAINAGE CROSSING SCHEDULE FOR ADDITIONAL INFORMATION.





STANDARD DUTY ARMORED OPTION 1

STANDARD DUTY ARMORED OPTION 2

Westwood	ACCESS ROAD LOW WATER CROSSING	LAST REVISED: 09/29/2020
		RD11

SHEET INCLUDED
NO UPDATES
FOR REFERENCE

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Phone (952) 937-5150 12701 Whitewater Drive, Suite #300
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Toll Free (888) 937-5150 westwoodps.com
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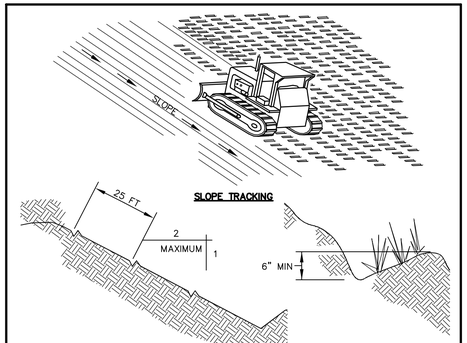


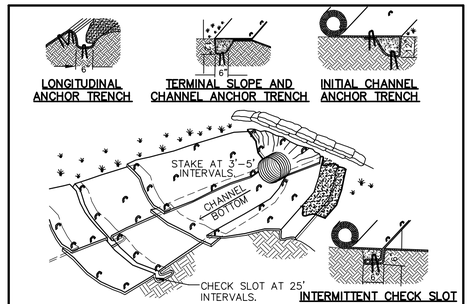
SLOPE TRACKING

TEMPORARY CONTOUR FURROWS

NOTE:

1. GROOVES WILL CATCH SEED, FERTILIZER, MULCH, RAINFALL AND DECREASE RUNOFF RATE.
2. USE SLOPE TRACKING FOR SLOPES 4:1 AND 50 FEET LONG OR STEEPER/LONGER.
3. USE TEMPORARY CONTOUR FURROWS FOR SLOPES 3:1 AND 75 FEET LONG OR STEEPER/LONGER.

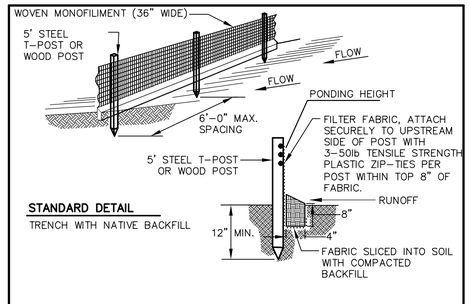
Westwood	SURFACE ROUGHENING FOR ALL SLOPES GREATER THAN 4:1	LAST REVISED: 03/03/08 GD09



NOTE:

1. REFER TO THE PROJECT SWPPP FOR IMPLEMENTATION REQUIREMENTS.
2. CHECK SLOTS TO BE CONSTRUCTED PER MANUFACTURERS SPECIFICATIONS.
3. STAKING OR STAPLING LAYOUT PER MANUFACTURERS SPECIFICATIONS.
4. MINIMUM OF 3.5 STAPLES/YARD.
5. BLANKET TYPE AND WEIGHT MUST BE CHOSEN BASED ON SITE CONDITIONS AND MANUFACTURERS RECOMMENDATIONS.
6. STAPLE LENGTHS SHALL CONFORM TO MANUFACTURERS RECOMMENDATIONS.
7. EROSION CONTROL BLANKETS SHALL EXTEND TO THE EDGE OF THE DISTURBANCE LIMITS.

Westwood	TEMPORARY EROSION BLANKETS TURF REINFORCEMENT MATS FOR CHANNELS	LAST REVISED: 03/03/08 GD22



STANDARD DETAIL

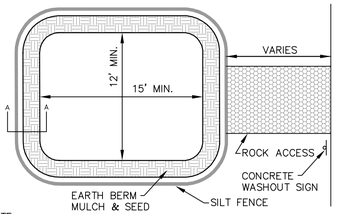
TRENCH WITH NATIVE BACKFILL

NOTE:

1. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED TO 1/3 THE HEIGHT OF THE FABRIC OR MORE.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
4. ALL ENDS OF THE SILT FENCE SHALL BE WRAPPED UPSLOPE SO THE ELEVATION OF THE BOTTOM OF FABRIC IS HIGHER THAN "PONDING HEIGHT".
5. FIBER ROLLS MAY BE SUBSTITUTED FOR SILT FENCE, SEE DETAIL GD42.

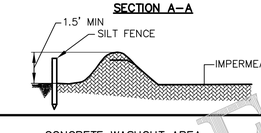
Westwood	SILT FENCE	LAST REVISED: 11/24/08 GD03

AN APPROVED ALTERNATE MAY BE USED

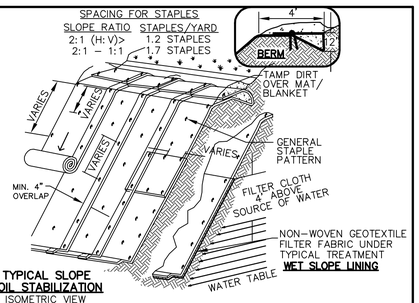


NOTE:
CONCRETE WASHOUT AREAS WILL HAVE AN IMPERMEABLE LINER TO PREVENT CONCRETE WASHOUT WATER FROM INFILTRATING/CONTACTING WITH SOIL. IMPERMEABLE LINER INCLUDES 10 MIL POLYLINER OR COMPACTED CLAY LINER. WASHOUT SYSTEMS CAN BE USED AS ALTERNATE WASHOUT AREAS.

SECTION A-A



Westwood	CONCRETE WASHOUT AREA	LAST REVISED: 11/24/08 GD08

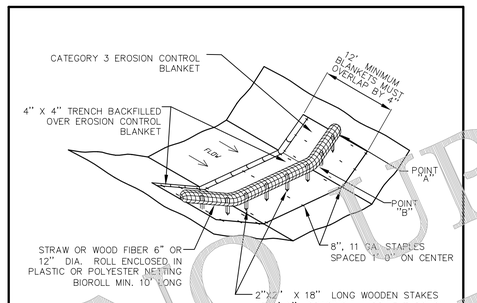


TYPICAL SLOPE SOIL STABILIZATION
ISOMETRIC VIEW

NOTE:

1. REFER TO THE PROJECT SWPPP FOR IMPLEMENTATION REQUIREMENTS.
2. MATS/BLANKETS SHOULD BE INSTALLED VERTICALLY DOWNSLOPE.
3. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICK AND GRASS.
4. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
5. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL.
6. DO NOT STRETCH.
7. BLANKET TYPE AND WEIGHT MUST BE CHOSEN BASED ON SITE CONDITIONS, NDDOT PERFORMANCE FACTORS AND MANUFACTURERS RECOMMENDATIONS.
8. STAPLE LENGTHS SHALL CONFORM TO MANUFACTURERS RECOMMENDATIONS.

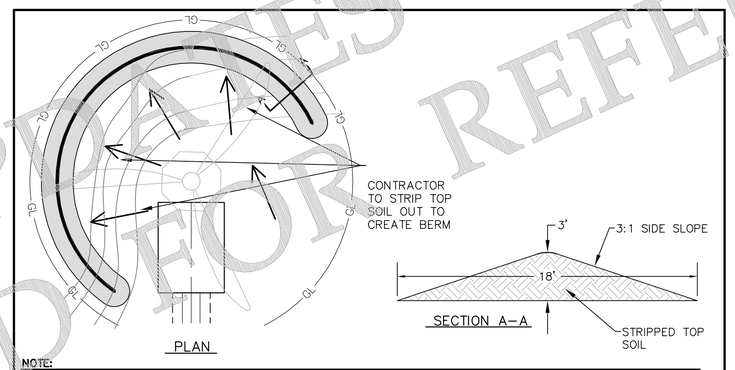
Westwood	TYPICAL SLOPE STABILIZATION – TEMPORARY EROSION BLANKETS TURF REINFORCEMENT MATS FOR SLOPES	LAST REVISED: 5/22/13 GD21



NOTE:

1. POINT "A" MUST BE HIGHER THAN POINT "B" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.

Westwood	TEMPORARY BIOROLL BLANKET SYSTEM (DITCH APPLICATION)	LAST REVISED: 03/03/08 GD23



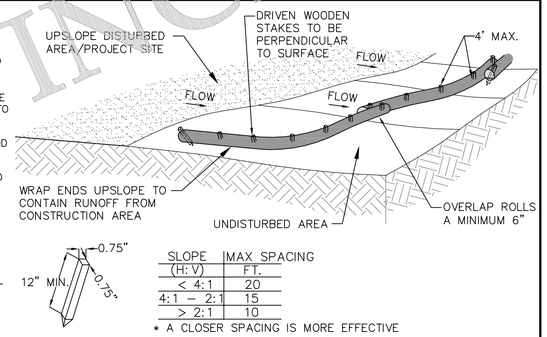
NOTE:

1. BERMS SHOULD BE PLACED AROUND DOWN GRADE PERIMETER OF PAD AREA TO PROVIDE PERIMETER SEDIMENT CONTROL.
2. TERMINAL ENDS OF BERM SHOULD BE HIGHER IN ELEVATION THAN THE TOP OF BERM.
3. TEMPORARY STABILIZATION OF TOP SOIL BERM COULD CONSIST OF HYDROMULCH OR STRAW MULCH (WEED FREE) AS NECESSARY.

Westwood	TYPICAL SOIL STOCKPILE BERM	LAST REVISED: 7/2/18 GD24

NOTES:

1. FIBER ROLLS SHALL BE INSTALLED PRIOR TO UPSLOPE DISTURBANCE ACTIVITIES COMMENCE.
2. FIBER ROLLS SHALL BE PREFABRICATED AND MADE FROM WEED FREE RICE STRAW, FLAX, OR A SIMILAR AGRICULTURAL MATERIAL BOUND INTO A TIGHT TUBULAR ROLL BY NETTING. USE A 6" OR 12" DIA. ROLL.
3. TRENCHES SHALL BE CREATED ALONG THE SLOPE OF THE PERIMETER. THE TRENCH DEPTH SHOULD BE 1/4 TO 1/3 OF THE THICKNESS OF THE ROLL, AND THE WIDTH SHOULD EQUAL THE ROLL DIAMETER, IN ORDER TO PROVIDE AREA TO BACKFILL THE TRENCH.
4. STAKE FIBER ROLLS INTO THE TRENCH. DRIVE STAKES AT THE END OF EACH FIBER ROLL AND SPACED 4 FEET MAXIMUM ON CENTER. USE WOOD STAKES WITH NOMINAL CLASSIFICATION OF 0.75 IN BY 0.75 IN. AND A MINIMUM LENGTH OF 24 IN.
5. ROLLS SHALL BE INSTALLED PERPENDICULAR TO WATER MOVEMENT, AND PARALLEL TO THE SLOPE CONTOUR.
6. TURN THE ENDS OF THE FIBER ROLLS UP SLOPE TO PREVENT RUNOFF FROM GOING AROUND THE ROLL. THE UPSLOPE POINT SHOULD BE A MINIMUM 6" HIGHER IN ELEVATION THAN THE LOW POINT.
7. IF MORE THAN ONE FIBER ROLL IS PLACED IN A ROW, THE ROLLS SHOULD BE OVERLAPPED A MINIMUM OF 6 INCHES, NOT ABUTTED.
8. FIBER ROLLS ENCASED WITH PLASTIC NETTING ARE USED FOR A TEMPORARY APPLICATION ONLY AND SHOULD BE REMOVED FOLLOWING STABILIZATION. FIBER ROLLS USED IN A PERMANENT APPLICATION SHALL BE ENCASED WITH A BIODEGRADABLE MATERIAL AND MAY BE LEFT IN.
9. TEMPORARY INSTALLATIONS SHOULD ONLY BE REMOVED WHEN UP GRADIENT AREAS ARE STABILIZED PER GENERAL PERMIT REQUIREMENTS, AND/OR POLLUTANT SOURCES NO LONGER PRESENT A HAZARD. BUT, THEY SHOULD ALSO BE REMOVED BEFORE VEGETATION BECOMES TOO MATURE SO THAT THE REMOVAL PROCESS DOES NOT DISTURB MORE SOIL AND VEGETATION THAN IS NECESSARY
10. FIBER ROLLS MUST BE INSPECTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT AT A MINIMUM, THE BMPS BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.

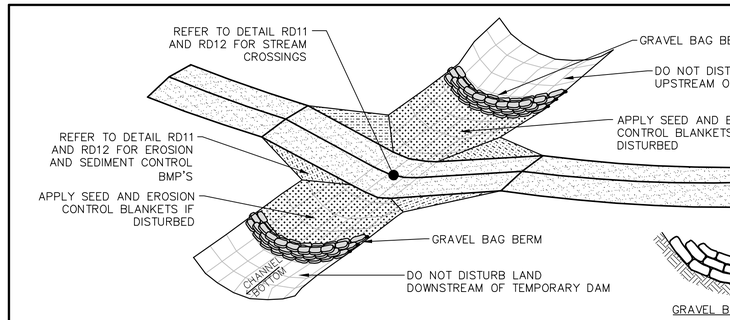


SLOPE (H:V)	MAX SPACING FT.
< 4:1	20
4:1 – 2:1	15
> 2:1	10

* A CLOSER SPACING IS MORE EFFECTIVE

12. REPAIR OR REPLACE SPLIT, TORN, UNRAVELING, OR SLUMPING FIBER ROLLS.
13. SEDIMENT THAT ACCUMULATES UPSLOPE OF THE BMP SHOULD BE PERIODICALLY REMOVED IN ORDER TO MAINTAIN BMP EFFECTIVENESS. SEDIMENT SHOULD BE REMOVED WHEN SEDIMENT ACCUMULATION REACHES ONE-THIRD THE DESIGNATED SEDIMENT STORAGE DEPTH.
14. RILLS OR GULLIES MAY BEGIN TO FORM FOLLOWING MAJOR STORM EVENTS WHERE RUNOFF HAS OVERTOPPED THE FIBER ROLLS. THESE RILLS OR GULLIES SHOULD BE PROMPTLY REPAIRED.

Westwood	TYPICAL FIBER ROLLS FOR PERIMETER CONTROL OF CONSTRUCTION AREA LIMIT	LAST REVISED: 09/09/13 GD42



NOTE:

1. REFER TO DETAIL RD11 AND RD12 FOR STREAM CROSSINGS.
2. MINIMIZE DISTURBANCE TO THE STREAM/DITCH DURING GRAVEL BAG BERM INSTALLATION.
3. GRAVEL USED WITHIN THE BAGS SHALL BE PEA ROCK.
4. GRAVEL BAG BERMS SHALL SPAN LATERALLY ACROSS THE STREAM FROM TOP OF BANK TO TOP OF BANK.
5. UPON CRANE TRAVEL COMPLETION, REMOVE GRAVEL BAG BERM AND RESTORE TO ORIGINAL CONDITION.
6. GRAVEL BAG BERMS MAY BE NECESSARY IF FLOWS AND DRAINAGE AREAS REQUIRE.

Westwood	TEMPORARY GRAVEL BAG BERM AT DRAINAGE CROSSING LOCATIONS	LAST REVISED: 3/19/12 RD13

NOT INCLUDED IN PLANS
NOT APPROVED FOR CONSTRUCTION
FOR REFERENCE

Westwood

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Westwood Professional Services, Inc.

Designed: SNK
Checked: DJN
Drawn: SNK
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
2	01/21/20	CUT & FILL ADD TO TURBINE TABLE
3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Construction Details

Record Plans

Date: 11/20/2020
Sheet: 7 OF 119

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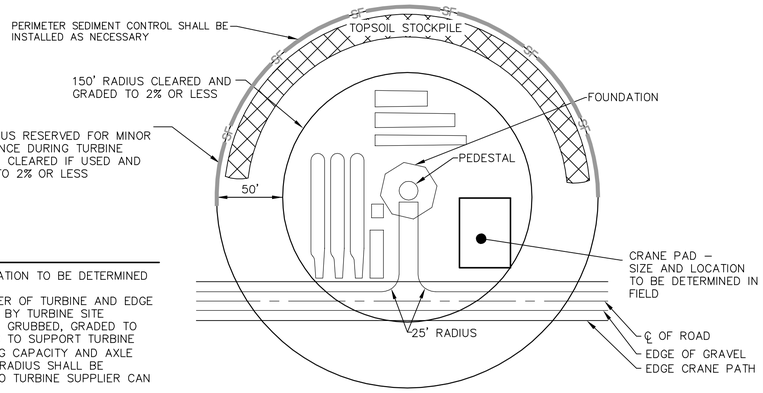
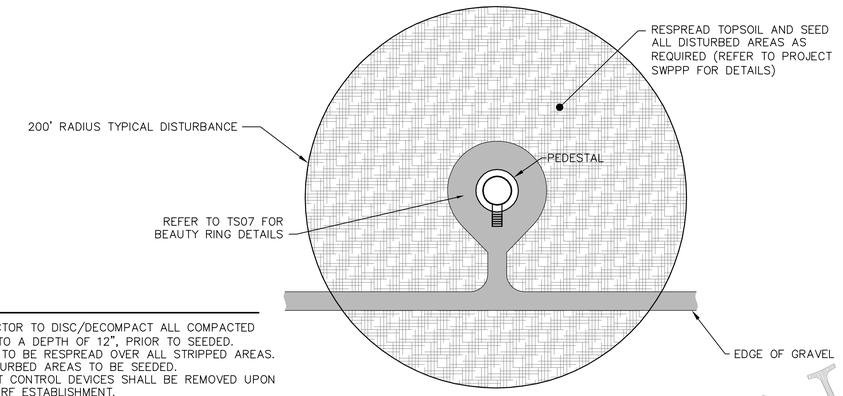


NOTE:

1. ACTUAL CRANE PAD LOCATION TO BE DETERMINED BY CONTRACTOR.
2. DISTANCE BETWEEN CENTER OF TURBINE AND EDGE OF GRAVEL ROAD VARIES BY TURBINE SITE
3. RADIUS TO BE CLEARED, GRUBBED, GRADED TO 2% MAX AND COMPACTED TO SUPPORT TURBINE MANUFACTURER'S BEARING CAPACITY AND AXLE LOADING REQUIREMENTS. RADIUS SHALL BE GRUBBED AND GRADED SO TURBINE SUPPLIER CAN UNLOAD AND DRIVE OUT.
4. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AS DETERMINED IN THE FIELD

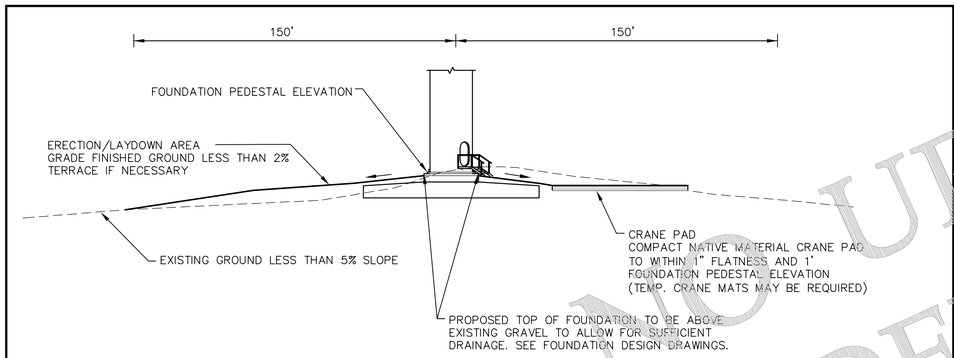
Westwood	TYPICAL WTG ERECTION AREA – PLAN VIEW	LAST REVISED: 11/30/17 TS01



NOTES:

1. CONTRACTOR TO DISC/DECOMPACT ALL COMPACTED AREAS, TO A DEPTH OF 12", PRIOR TO SEEDED.
2. TOPSOIL TO BE RESPREAD OVER ALL STRIPPED AREAS.
3. ALL DISTURBED AREAS TO BE SEEDED.
4. SEDIMENT CONTROL DEVICES SHALL BE REMOVED UPON FINAL TURF ESTABLISHMENT.
5. DISTURBED CROPLAND MUST BE RETURNED TO A FARMABLE CONDITION.

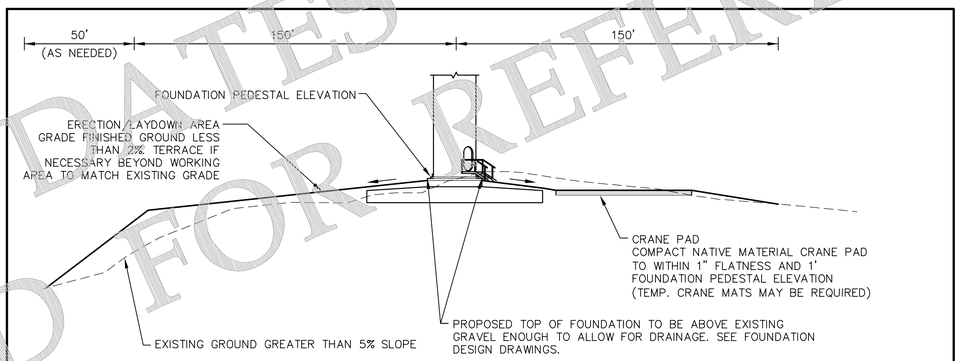
Westwood	POST–CONSTRUCTION WTG ERECTION AREA – RESTORATION	LAST REVISED: 05/23/18 TS02



NOTE:

1. RADIUS TO BE CLEARED, GRUBBED, GRADED TO 2% MAX AND COMPACTED TO SUPPORT TURBINE MANUFACTURER'S BEARING CAPACITY AND AXLE LOADING REQUIREMENTS.
2. PROVISIONS MAY BE MADE FOR DEAD–END TURNAROUNDS AT TURBINE SITES TO ACCOMMODATE DELIVERY VEHICLES. REFER TO THE VESTAS CIVIL WORKS SPECIFICATIONS.

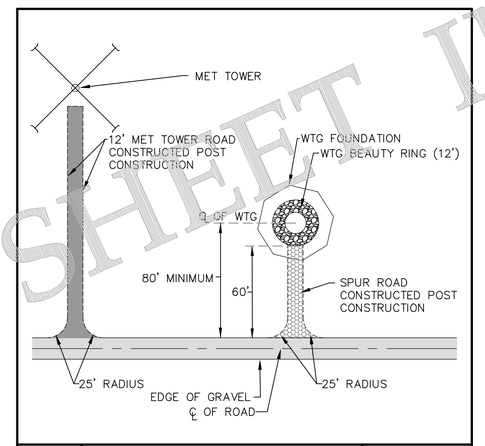
Westwood	TYPICAL WTG ERECTION AREA – PROFILE VIEW	LAST REVISED: 07/24/18 TS03



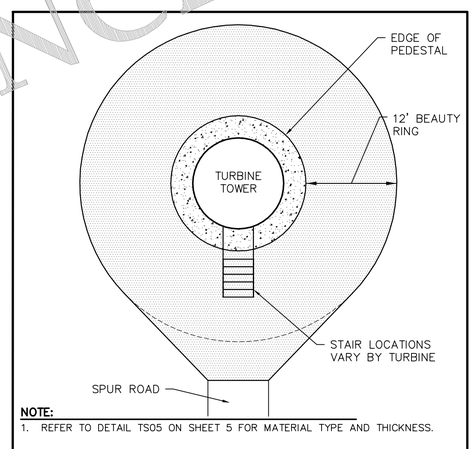
NOTE:

1. RADIUS TO BE CLEARED, GRUBBED, GRADED TO 2% MAX AND COMPACTED TO SUPPORT TURBINE MANUFACTURER'S BEARING CAPACITY AND AXLE LOADING REQUIREMENTS.
2. PROVISIONS MAY BE MADE FOR DEAD–END TURNAROUNDS AT TURBINE SITES TO ACCOMMODATE DELIVERY VEHICLES. REFER TO THE VESTAS CIVIL WORKS SPECIFICATIONS.

Westwood	TYPICAL WTG ERECTION AREA, EXISTING GROUND GREATER THAN 5% – PROFILE VIEW	LAST REVISED: 07/24/18 TS04



Westwood	TYPICAL SPUR ROAD	LAST REVISED: 11/30/17 TS06



NOTE:

1. REFER TO DETAIL TS05 ON SHEET 5 FOR MATERIAL TYPE AND THICKNESS.

Westwood	BEAUTY RING DETAIL	LAST REVISED: 06/23/15 TS07

SHEET INCLUDED FOR REFERENCE
NO UPDATES

Westwood

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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RECORD DRAINAGE CROSSING SCHEDULE

Crossing Number	Recommended Crossing Type	Size	Min. CMP Length	Road	Station	Site Plan Sheet	Plan & Profile Sheet	Crossing Facility	Size Installed
1	CMP	2-18"	35'	Road 2	4+00	13	41	Access Road	1-18"
2	CMP	1-18"	55'	Road 2	11+00	13	41	Access Road, Crane Path	
3	CMP	1-18"	55'	Road 2	13+40	13	41	Access Road, Crane Path	1-18"
4	CMP	1-18"	60'	Road 2	21+50	13	41	Access Road, Crane Path	
5	CMP	1-18"	60'	Road 5	29+60	13	44	Access Road, Crane Path	
6	CMP	1-18"	50'	Road 14	7+70	14	52	Access Road, Crane Path	1-18"
7	CMP	1-18"	35'	Road 15	4+00	14	53	Access Road	
8	CMP	1-18"	35'	Road 30	0+70	16	65	Access Road	
9	CMP	1-18"	65'	Road 34	113+50	16	72	Access Road, Crane Path	1-18"
10	CMP	1-18"	55'	Road 80	9+10	16	114	Access Road, Crane Path	1-18"
11	CMP	1-18"	55'	Road 80	15+00	16	114	Access Road, Crane Path (offset)	1-18"
12	CMP	1-18"	40'	Road 56	10+20	17	92	Access Road	1-18"
13	CMP	1-18"	45'	Road 54	0+75	17	90	Access Road	
14	CMP	1-18"	35'	Road 71	0+40	18	106	Access Road	
15	CMP	1-18"	50'	Road 75	11+40	19	111	Access Road, Crane Path	
16	CMP	1-18"	55'	Road 75	13+80	19	111	Access Road, Crane Path	
17	CMP	1-18"	55'	Road 3	19+90	20	42	Access Road, Crane Path	
18	CMP	2-30"	60'	Road 6	14+40	20	46	Access Road, Crane Path	
19	CMP	1-18"	55'	Road 6	20+60	20	46	Access Road, Crane Path	1-18"
20	CMP	1-18"	75'	Road 11	3+20	20	47	Access Road, Crane Path	
21	CMP	1-18"	85'	Road 11	6+80	20	48	Access Road, Crane Path	
22	CMP	1-18"	60'	Road 11	17+40	20	48	Access Road, Crane Path	
23	CMP	1-18"	65'	Road 11	29+50	20	49	Access Road, Crane Path	
24	CMP	1-18"	45'	Road 11	62+50	20	50	Access Road, Crane Path	
25	CMP	1-24" or 2-18"	50'	Road 11	68+10	20	51	Access Road, Crane Path	1-18"
26	CMP	1-18"	50'	Road 18	15+70	21	55	Access Road, Crane Path	1-18"
27	CMP	1-18"	60'	Road 18	19+85	21	55	Access Road, Crane Path	
28	CMP	1-18"	60'	Road 18	21+65	21	55	Access Road, Crane Path	
29	CMP	1-18"	70'	Road 18	31+45	21	56	Access Road, Crane Path	1-18"
30	CMP	1-18"	60'	Road 18	33+30	21	56	Access Road, Crane Path	
31	CMP	1-24" or 2-18"	60'	Road 18	36+25	21	56	Access Road, Crane Path	1-18"
32	CMP	1-18"	70'	Road 18	37+85	21	56	Access Road, Crane Path	
33	CMP	1-18"	55'	Road 18	41+20	21	56	Access Road, Crane Path	1-18"
34	CMP	1-18"	80'	Road 18	45+70	21	56	Access Road, Crane Path	
35	CMP	1-18"	60'	Road 17	5+25	21	54	Access Road, Crane Path	
36	CMP	1-18"	65'	Road 23	5+20	22	59	Access Road, Crane Path	
37	CMP	1-18"	75'	Road 23	6+40	22	59	Access Road, Crane Path	
38	CMP	1-18"	50'	Road 34	30+00	22	69	Access Road, Crane Path	1-18"
39	CMP	1-18"	55'	Road 34	31+50	22	69	Access Road, Crane Path	
40	CMP	1-18"	60'	Road 34	34+70	22	69	Access Road, Crane Path	
41	CMP	1-18"	55'	Road 34	41+40	22	69	Access Road, Crane Path	1-18"
42	CMP	1-18"	55'	Road 34	53+85	22	70	Access Road, Crane Path	1-18"
43	CMP	1-36" or 2-30" or 3-24"	45'	Road 34	76+00	22	71	Access Road, Crane Path	
44	CMP	1-18"	50'	Road 34	78+00	22	71	Access Road, Crane Path	1-18"
45	CMP	1-18"	55'	Road 39	10+20	23	74	Access Road, Crane Path	1-18"
46	CMP	1-18"	60'	Road 39	12+35	23	74	Access Road, Crane Path	
47	CMP	1-18"	65'	Road 39	17+25	23	74	Access Road, Crane Path	
48	CMP	1-18"	55'	Road 39	26+25	23	75	Access Road, Crane Path	
49	CMP	1-18"	55'	Road 39	28+25	23	75	Access Road, Crane Path	
50	CMP	1-18"	65'	Road 58	4+05	24	93	Access Road, Crane Path	1-18"
51	CMP	1-18"	55'	Road 58	9+20	24	93	Access Road, Crane Path	1-18"
52	CMP	1-18"	70'	Road 58	15+30	24	93	Access Road, Crane Path	1-18"
53	CMP	1-18"	50'	Road 73	0+55	24	107	Access Road, Crane Path	
54	CMP	1-18"	50'	Road 74	29+60	25	109	Access Road, Crane Path	
55	CMP	1-18"	60'	Road 74	40+20	25	109	Access Road, Crane Path	1-18"
56	CMP	1-18"	50'	Road 74	43+20	25	109	Access Road, Crane Path	1-18"
57	CMP	1-18"	70'	Road 34	11+65	29	68	Access Road, Crane Path	1-18"
58	CMP	1-18"	80'	Road 34	13+20	29	68	Access Road, Crane Path	1-18"
59	CMP	1-18"	60'	Road 34	15+25	29	68	Access Road, Crane Path	1-18"
60	CMP	1-18"	75'	Road 34	18+40	29	68	Access Road, Crane Path	1-18"
61	CMP	1-18"	70'	Road 25	5+55	29	60	Access Road, Crane Path	
62	CMP	1-18"	60'	Road 39	36+65	30	75	Access Road, Crane Path	
63	CMP	1-24" or 2-18"	65'	Road 60	1+20	31	94	Access Road, Crane Path	
64	CMP	1-18"	60'	Road 60	19+90	31	94	Access Road, Crane Path	1-18"
65	CMP	1-18"	50'	Road 60	25+75	31	95	Access Road, Crane Path	1-18"
66	CMP	1-18"	60'	Road 60	41+00	31	95	Access Road, Crane Path	1-18"
67	CMP	1-18"	45'	Road 60	50+20	31	96	Access Road, Crane Path	1-18"
68	CMP	1-24" or 2-18"	75'	Road 61	28+55	31	98	Access Road, Crane Path	1-18"
69	CMP	1-18"	60'	Road 61	31+30	31	98	Access Road, Crane Path	1-18"
70	CMP	1-18"	45'	Road 62	4+15	31	99	Access Road, Crane Path	1-18"
71	CMP	1-18"	60'	Road 62	12+60	31	99	Access Road, Crane Path	1-18"
72	CMP	1-24"or 2-18"	55'	Road 41	5+65	32	76	Access Road	1-18"
73	CMP	1-18"	45'	Road 41	12+75	32	76	Access Road, Crane Path	
74	CMP	1-18"	35'	Road 42	7+00	32	78	Access Road	
75	CMP	1-18"	35'	Road 43	4+35	32	79	Access Road	
76	CMP	1-18"	40'	Road 46	0+85	34	81	Access Road, Crane Path	
77	CMP	1-18"	55'	Road 64	12+70	35	100	Access Road, Crane Path	1-18"
78	CMP	1-18"	65'	Road 50	60+25	36	85	Access Road, Crane Path	
79	CMP	1-18"	50'	Road 50	22+30	37	84	Access Road, Crane Path	1-18" PLASTIC
80	CMP	1-18"	55'	Road 50	25+60	37	84	Access Road, Crane Path	
81	CMP	1-24" or 2-18"	60'	Road 50	32+35	37	84	Access Road, Crane Path	1-18" PLASTIC
82	CMP	1-18"	45'	Road 50	46+80	37	85	Access Road, Crane Path	
83	CMP	1-24" or 2-18"	55'	Road 50	51+60	37	85	Access Road, Crane Path	
84	CMP	1-18"	55'	Road 69	3+40	38	103	Access Road, Crane Path	1-18"
85	CMP	1-18"	40'	Road 69	13+20	38	103	Access Road, Crane Path	1-18"
86	CMP	1-18"	55'	Road 69	21+80	38	104	Access Road, Crane Path	1-18"
87	CMP	1-18"	60'	Road 69	39+20	38	104	Access Road, Crane Path (offset)	1-18"
88	CMP	1-18"	60'	Road 69	45+40	38	105	Access Road, Crane Path	1-18"
95	CMP	1-18"	70'	Road 51	10+50	37	90	Access Road, Crane Path	
96	CMP	1-18"	60'	Road 51	4+75	37	90	Access Road, Crane Path	
100	CMP	1-18"		Road 60	32+60	31	95	Access Road, Crane Path	1-18"
101	CMP	1-18"		Road 41	1+30	32	76	Access Road	1-18"
102		2-18"		Road 74	19+10	25	109	Access Road, Crane Path	2-18"

DRAINAGE CROSSING SCHEDULE NOTES:
1. A 10-YR HYDRAULIC ANALYSIS WAS USED FOR CULVERT SIZING AND A 50-YR HYDRAULIC ANALYSIS WAS USED FOR LOW WATER CROSSINGS.
2. WHERE MULTIPLE CULVERT SIZES ARE CALLED OUT, CONTRACTOR MAY CHOOSE THE BEST FIT BASED OFF FIELD CONDITION. EITHER SIZING IS ACCEPTABLE.
3. EITHER CULVERT OR LWC IS ACCEPTABLE WHERE NOTED IN THE DRAINAGE CROSSING SCHEDULE.

RECORD TURBINE COORDINATES
(HARN/NORTH DAKOTA STATE PLANE - SOUTH ZONE, US FOOT)

Record Turbine Number	Northing	Easting	Pedestal Elevation
T-1	176009.6877	2325243.5784	2016.34
T-2	174636.7158	2324328.2464	2019.38
T-3	169213.9748	2325967.4325	2169.93
T-4	169377.7071	2324843.4127	2168.51
T-5	171743.6858	2324345.6301	2111.72
T-6	168199.1018	2323856.8384	2192.94
T-7	166975.7862	2326250.0948	2220.63
T-8	165947.1754	2325471.9066	2240.96
T-9	165926.0555	2323861.9770	2225.26
T-10	166870.0955	2322171.9154	2207.32
T-11	169123.9714	2322243.6287	2170.5
T-14	174527.7858	2327860.8528	2025.99
T-15	171989.7885	2327396.9414	2068.01
T-16	168083.8232	2327804.6791	2186.67
T-17	168429.1618	2328837.6416	2176.56
T-18	169694.1672	2330180.5798	2119.7
T-19	165749.8255	2328307.6963	2232.4
T-20	165771.4560	2329944.4822	2210.37
T-21	165790.7442	2331337.7231	2204.34
T-22	166703.8220	2332604.1590	2184.35
T-23	167446.4418	2333155.2237	2157.84
T-24	166597.3227	2335259.5165	2222.55
T-25	166054.1511	2337050.0745	2204.81
T-26	178640.0490	2330228.1427	1990.54
T-27	176254.6461	2330602.8451	2003.76
T-28	174617.4953	2330148.0541	2010.97
T-29	176111.3375	2336249.4264	1951.55
T-30	176357.6718	2339000.6323	1946.35
T-31	176157.2680	2341244.7400	1966.55
T-32	179497.3845	2341513.0475	1954.63
T-34	173317.0919	2338433.2047	1980.54
T-35	168497.9000	2336729.8821	2096.82
T-36	167363.1232	2342032.4201	2092.36
T-37	166996.8394	2341120.8181	2124.99
T-38	166869.2244	2339786.2409	2148.04
T-39	166032.9216	2339143.1024	2123.03
T-40	157678.0374	2327389.0380	2051.27
T-41	157613.6495	2329056.2549	2049.77
T-43	160453.1735	2331448.0617	2049.62
T-45	157573.9700	2332980.4373	2054.18
T-46	160223.8714	2341576.5514	1991.96
T-47	155000.9312	2341133.1304	2001.46
T-48	154065.6426	2338561.5847	2015.21
T-49	153940.3917	2336898.9704	2041.15
T-50	153902.1964	2335469.8119	2060.36
T-51	151966.3005	2341990.3063	2066.96
T-52	150894.1392	2341698.8757	2088.78
T-53	150141.8365	2340715.6679	2086.48
T-54	176436.7951	2346986.1927	1958.01
T-55	176567.3050	2348972.5790	1991.28
T-56	172209.0383	2344958.6105	1994.54
T-57	167450.6800	2343359.8734	2090.05
T-58	167862.9433	2344627.9126	2084.08
T-59	163682.5269	2344748.2335	2018.72
T-60	166146.7814	2347250.2281	2023.74
T-61	163609.9965	2347472.8575	2020.64
T-62	161941.8657	2347164.6534	2010.62
T-63	159517.1645	2343309.9299	2007.43
T-64	160260.6909	2344784.0822	1998.75
T-65	155704.6597	2343362.2819	1996.15
T-66	156227.5579	2344391.1304	1998.32
T-67	152547.3405	2344139.9404	2037.53
T-68	152853.3772	2346271.2470	2016.03
T-69	151398.1239	2345972.1422	2046.76
T-70	175599.1338	2351920.9058	2024.89
T-71	175667.1612	2350865.6590	2006.55
T-72	171395.3291	2349182.4472	2005.51
T-73	170622.1605	2347316.6877	2021.48
T-74	169806.9833	2346725.8609	2034.65
T-75	175489.3661	2353890.1001	2010.07
T-77	176213.7296	2334882.4375	1946.06
T-78	172986.0446	2350997.7497	1962.58
T-80	172780.2441	2340943.1485	1979.88
T-81	169903.5435	2337750.9031	2031.92
MET1	180278.2673	2340904.5617	1947.24
MET2	153630.0457	2337783.1793	2026.81

RECORD ENTRANCE CULVERT SCHEDULE

Entrance Culvert Number	10-year Culvert Sizing	Access Road	Site Plan Sheet	Plan & Profile Sheet	Size Installed
EC-1	1-18"	Road 26	11	61	1-18"
EC-2	1-18"	Road 32	12	67	1-18"
EC-3	1-18"	Road 2	13	41	
EC-4	1-18"	Road 14	14	52	
EC-5	1-18"	Road 15	14	53	1-18"
EC-6	1-24"	Road 77	15	112	
EC-7	1-18"	Road 30	16	65	1-18"
EC-8	1-18"	Road 31	16	66	1-18"
EC-9	1-18"	Road 74	18	108	
EC-10	1-36" or 2-30" or 3-24"	Road 18	21	55	
EC-11	1-18"	Road 39	23	74	1-18"
EC-12	1-18"	Road 58	24	93	1-18"
EC-13	1-18"	Road 60	31	94	
EC-14	1-18"	Road 42	32	78	1-18"
EC-15	1-18"	Road 43	32	79	1-18"
EC-16	1-18"	Road 45	33	80	1-18"
EC-17	1-18"	Road 46	34	81	1-18"
EC-18	1-18"	Road 50	37	83	1-18"
EC-20	1-18"	Road 69	38	103	1-18"

ENTRANCE CULVERT SCHEDULE NOTES:
1. ENTRANCE CULVERTS HAVE BEEN SIZED TO A 10-YEAR HYDRAULIC ANALYSIS.
2. CULVERTS WITHIN PUBLIC RIGHT-OF-WAY SHALL BE VERIFIED WITH THE LOCAL JURISDICTION PRIOR TO INSTALLATION.
3. WHERE MULTIPLE CULVERT SIZES ARE CALLED OUT, CONTRACTOR MAY CHOOSE THE BEST FIT BASED OFF FIELD CONDITION. EITHER SIZING IS ACCEPTABLE.

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Designed: SNK
Checked: DJN
Drawn: SNK
As-Built Drawing:

Revisions:

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Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

REVISION 1 & 2 NOTES:
1. DRAINAGE CROSSINGS 93-96 WERE ADDED.
2. ENTRANCE CULVERT 19 WAS REMOVED.
3. THE FOLLOWING TURBINES HAVE MOVED: T-7, T-20, T-56, AND T-51 – T-53.
4. EXISTING GRADE ELEVATIONS AND MAX/MIN CUT AND FILLS WERE ADDED TO THE TURBINE COORDINATES TABLE.

Merricourt Wind Project

McIntosh County, North Dakota

Construction Details

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ROAD DESIGN PARAMETERS

1. ACCESS ROADS HAVE BEEN DESIGNED TO ACCOMMODATE LIGHT DUTY TRUCKS (PICKUP TRUCKS AND MAINTENANCE VEHICLES) FOR LOW VOLUME USE IN NORMAL OPERATING CONDITIONS AS WELL AS HEAVY DUTY CONSTRUCTION TRAFFIC UNDER DRY CONDITIONS . THE ROAD DESIGN SPECIFIED IS NOT INTENDED FOR ALL WEATHER USE FOR HEAVY DUTY CONSTRUCTION LOADS.
2. ROAD MAINTENANCE CAN BE EXPECTED OVER THE LIFE OF THE PERMANENT FACILITY.

PRODUCTS

1. AGGREGATE BASE SHALL CONSIST OF NDDOT SPECIFICATION 302 AND 816 (AND IN CONFORMANCE WITH THE GRADATION TABLE 1), AGGREGATE MAY BE CRUSHER RUN UPON ENGINEERS APPROVAL. AGGREGATE GRADATIONS SHALL BE SUBMITTED TO ENGINEER FOR REVIEW.
2. ROAD SHOULDERS AND CRANE PADS SHALL CONSIST OF COMPACTED NATIVE SOILS.
3. CULVERTS: ACCESS ROAD CULVERTS SHALL MEET THE MINIMUM SPECIFICATIONS SET FORTH BY THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND/OR MCINTOSH COUNTY. ALL CULVERTS ARE PLANNED TO BE A MINIMUM 18" DIAMETER AND MANUFACTURED OF 16–GAGE CORRUGATED METAL PIPE WITH NO END TREATMENTS UNLESS NOTED OTHERWISE.
4. GEOTEXTILE FABRIC: MIRAFI RS380i OR RS580i OR APPROVED EQUAL.
5. FILL PLACEMENT: NATIVE SOIL USED TO CONSTRUCT FILL PLACEMENT BELOW ROADS, CRANE WALKS, TEMPORARY TURNING IMPROVEMENTS, LAYDOWN YARD AND WTG ERECTION AREAS.

EXECUTION

1. CLEARING AND GRUBBING
   A. THE CONTRACTOR SHALL BE REQUIRED TO GRUB ALL TREES, STUMPS, BRUSH, AND DEBRIS WITHIN THE GRADING AREAS SHOWN ON THE PLANS. GRUBBING INCLUDES REMOVAL OF ALL PLANT MATERIAL GREATER THAN 2" INCLUDING STUMPS, BRANCHES, ROOTS, ETC. TO A DEPTH BELOW THE FINAL SUBGRADE. THE CONTRACTOR IS TO REMOVE ONLY THOSE TREES WHICH ARE DESIGNATED BY THE OWNER'S REPRESENTATIVE FOR REMOVAL, AND SHALL EXERCISE EXTREME CARE AROUND EXISTING TREES TO BE SAVED.
2. TOPSOIL STRIPPING
   A. TOPSOIL, INCLUDING ROOTS LARGER THAN 2" AND LARGE ROOT MASSES, SHALL BE STRIPPED FROM ALL ROADWAY AND FOUNDATION AREAS UP TO 8". TOPSOIL SHALL NOT BE STRIPPED OUTSIDE OF THE DESIGNATED DISTURBANCE AREAS.
   B. ANY TOPSOIL THAT HAS BEEN STRIPPED SHALL BE STOCKPILED FOR POST CONSTRUCTION REVEGETATION. ALL TOPSOIL SHALL BE REDISTRIBUTED TO THE LAND OWNER'S PROPERTY OF WHERE IT ORIGINATED FROM.
3. FILL PLACEMENT
   A. FILL PLACEMENT SHALL CONSIST OF THE PLACING OF SUITABLE FILL MATERIAL, AFTER TOPSOIL STRIPPING, ABOVE THE EXISTING GRADE. GENERALLY, SIDE SLOPES SHALL BE CONSTRUCTED AT FOUR FOOT HORIZONTAL TO ONE FOOT VERTICAL, WITH SOME LOCATIONS THROUGHOUT THE PROJECT WITH SLOPES OF TWO FEET HORIZONTAL TO ONE FOOT VERTICAL. THE MATERIAL FOR FILL CONSTRUCTION SHALL BE OBTAINED FROM THE ACCESS ROAD/TURBINE EXCAVATION (SEE GEOTECHNICAL REPORT FOR RESTRICTIONS), OR ANY SUITABLE, APPROVED SOIL OBTAINED ONSITE/OFFSITE BY CONTRACTOR, AS DIRECTED OR APPROVED BY THE ENGINEER. THIS MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 12" AND CONSTRUCTED TO 95% OF THE MAXIMUM DRY DENSITY AND WITHIN 3% OF OPTIMUM MOISTURE CONTENT, AS DETERMINED BY THE STANDARD PROCTOR (AASHTO T99).
   B. SIDE SLOPES GREATER THAN 4:1 WILL NOT BE PERMITTED, UNLESS OTHERWISE NOTED ON THE PLAN.
   C. FILL SLOPES SHALL BE BENCHED INTO THE EXISTING SLOPE TO PREVENT MOVEMENT BETWEEN THE FILL AND NATIVE SOILS. BENCHES SHOULD BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO FILL PLACEMENT. POSITIVE DRAINAGE IS REQUIRED AT BENCHED AREAS AND AT THE TOE OF FILL SLOPES TO REMOVE SURFACE WATER.
4. SUBGRADE
   A. SUBGRADE PREPARED AT GRADE OR IN CUT REQUIRES SCARIFICATION AND RECOMPACTION TO A DEPTH OF 12" OR MORE.
   B. ACCESS ROAD CROSS SLOPES SHOWN IN THE PLANS ARE MEANT AS A GUIDE. ACCESS ROAD CROSS SLOPES MAY RANGE FROM 1% – 2%, CHECK WITH THE ENGINEER IF THE CROSS SLOPE FALLS OUTSIDE OF THIS RANGE. ACCESS ROADS BEING UTILIZED FOR CRANE TRAVEL SHOULD HAVE A MAX CROSS SLOPE OF 2%.

STORM WATER DESIGN PARAMETERS

1. SEE SHEET 9 FOR CULVERT SIZING AND DESIGN PARAMETERS. CULVERTS SHALL BE MINIMUM 18" CORRUGATED METAL PIPE. ALL TEMPORARY PORTIONS OF THE INSTALLED CULVERTS SHALL BE REMOVED UPON COMPLETION OF THE PROJECT.
2. IT IS EXPECTED THAT CULVERTS WILL BE OVERTOPPED DURING SOME STORMS AND MAINTENANCE WILL BE REQUIRED THROUGH THE LIFE OF THE PROJECT.
3. WHEN INSTALLING DRAINAGE CULVERTS THE CONTRACTOR SHALL USE JUDGMENT IN SETTING THE FLOW LINE ELEVATIONS AND CULVERT LONGITUDINAL SLOPE. TYPICALLY THE FLOW LINE ELEVATIONS AND LONGITUDINAL SLOPE OF THE CULVERT SHOULD MATCH THE NATURAL GROUND ELEVATIONS AND SLOPE TO ENSURE POSITIVE DRAINAGE. WHEN POSSIBLE, ALL CULVERTS SHOULD BE PLACED AT A MINIMUM 0.5% GRADE.
4. ANTICIPATED CULVERT CROSSINGS ARE SHOWN ON THE CONSTRUCTION PLAN, ADDITIONAL CULVERTS MAY NEED TO BE INSTALLED IN AREAS WHERE CONCENTRATED FLOW IS EXPECTED DUE TO CONSTRUCTION ACTIVITIES.
5. CONSTRUCTION DRAINAGE CROSSINGS TO MAINTAIN EXISTING FLOW CHARACTERISTICS OF THE FEATURES. FEATURES SHALL BE GRADED TO PRECONSTRUCTION CONTOURS.

TESTING:

1. TESTING SHALL BE PERFORMED BY A DESIGNATED INDEPENDENT TESTING AGENCY.
2. SUBMIT ONE SET OF TESTING AND INSPECTION RECORDS SPECIFIED TO THE CIVIL ENGINEER OF RECORD.

DEFINITIONS:

1. PROOF ROLLING:
   SHALL BE PERFORMED IN THE PRESENCE OF THE GEOTECHNICAL ENGINEER OR QUALIFIED GEOTECHNICAL REPRESENTATIVE USING A FULLY LOADED TANDEM AXLE DUMP TRUCK OR WATER TRUCK WITH A MINIMUM GROSS WEIGHT OF 25 TONS OR A FULLY LOADED BELLY DUMP WITH AN EQUIVALENT AXLE LOADING. PROOF–ROLLING ACCEPTANCE STANDARDS INCLUDE NO RUTTING GREATER THAN 1.5 INCHES, AND NO "PUMPING" OF THE SOIL BEHIND THE LOADED TRUCK.
2. SIEVE ANALYSIS:
   SHALL BE CONDUCTED IN ACCORDANCE WITH AASHTO T27
3. PROCTORS:
   SHALL BE DETERMINED IN ACCORDANCE WITH AASHTO T99
4. ATTERBERG LIMITS:
   SHALL BE DETERMINED IN ACCORDANCE WITH AASHTO T89 AND T90
5. MOISTURE DENSITY (NUCLEAR DENSITY):
   SHALL BE DONE IN ACCORDANCE WITH AASHTO T310
6. DYNAMIC CONE PENETROMETER (DCP) TESTING:
   SHALL BE DONE IN ACCORDANCE WITH ASTM D6951–03

REQUIREMENTS:

1. FILL PLACEMENT:
   A. SOILS USED AS FILL MATERIAL SHALL BE TESTED FOR MOISTURE CONTENT, AND PROCTOR TESTS.
   B. WHERE FILL CONSTRUCTION REQUIRES MORE THAN 12 INCHES OF FILL PLACEMENT, COMPACT EACH LIFT TO A MINIMUM OF 95 PERCENT OF THE MATERIAL'S MAXIMUM STANDARD PROCTOR DRY DENSITY.
2. COMPACTED SUBGRADE:
   A. THE ENTIRE SUBGRADE SHALL BE PROOF–ROLLED PRIOR TO THE PLACEMENT OF THE AGGREGATE BASE TO IDENTIFY AREAS OF UNSTABLE SUBGRADE
   B. PERFORM A MINIMUM OF 3 DYNAMIC CONE PENETROMETER (DCP) TESTS PER ACCESS ROAD, OR ONE FOR EVERY 1,000 L.F. OF ROAD, WHICHEVER IS GREATER. ADDITIONAL DCP TESTING MAY BE REQUIRED IN AREAS OF FAILING PROOF ROLL. PRIMARY ACCESS ROAD CROSS SECTION REQUIRES A MINIMUM DCP OF 4 BLOWS PER 6" TO A TOTAL DEPTH OF 2' (MINIMUM CBR=3.0).
   C. IF EITHER THE PROOF ROLL OR DCP REQUIREMENTS CANNOT BE ACHIEVED THE FOLLOWING ALTERNATIVES MAY BE IMPLEMENTED:
      a. SCARIFY, DRY, AND RECOMPACT SUBGRADE AND PERFORM ADDITIONAL PROOF ROLL AND DCP.
      b. REMOVE UNSUITABLE MATERIAL AND REPLACE WITH 3 INCH MINUS CRUSHED AGGREGATE BASE.
3. AGGREGATE BASE:
   A. AGGREGATE BASE SHALL BE PROOF–ROLLED OVER THE ENTIRE LENGTH. IF PROOF ROLLING DETERMINES THAT THE ROAD IS UNSTABLE, ADDITIONAL AGGREGATE SHALL BE ADDED UNTIL THE UNSTABLE SECTION IS ABLE TO PASS A PROOF ROLL.
   B. PROVIDE 1 SIEVE ANALYSIS PER 2500 CY OF ROAD BASE PLACED AND LA ABRASION TEST.
4. CRANE PADS AND CRANE PATHS:
   A. TESTING REQUIREMENTS ARE PENDING BASED ON CANE PICK PLANS PROVIDED BY THE CONTRACTOR.

GENERAL NOTES:

1. THE GROUND SURFACE CONTOURS (AT TWO–FOOT VERTICAL INTERVALS) AND ELEVATIONS ARE BASED ON LIDAR DATA OBTAINED FROM THE STATE OF NORTH DAKOTA. THE ELEVATIONS AND CONTOURS BASED ON THE LIDAR DATA WERE PREPARED FROM AERIAL PHOTOGRAPHY DATA, AND NOT ACTUAL FIELD SURVEYING. AS SUCH, THE ACCURACY OF THE ELEVATIONS AND CONTOURS IS NOT AS HIGH AS INFORMATION GATHERED USING CONVENTIONAL FIELD SURVEYING PROCEDURES. THE CONTRACTOR MAY FIND THAT GROUND ELEVATIONS DETERMINED DURING FIELD STAKING WILL VARY FROM THE GROUND ELEVATIONS SHOWN ON THE DRAWINGS. IF MAJOR DISCREPANCIES ARE FOUND, THE OWNER AND ENGINEER SHALL BE NOTIFIED.
2. WHERE SECTION OR SUBSECTION MONUMENTS ARE ENCOUNTERED, THE OWNER SHALL BE NOTIFIED BEFORE SUCH MONUMENTS ARE REMOVED. THE CONTRACTOR SHALL PROTECT AND CAREFULLY PRESERVE ALL PROPERTY MARKERS AND MONUMENTS UNTIL THE OWNER, AN AUTHORIZED SURVEYOR OR AGENT HAS WITNESSED OR OTHERWISE REFERENCED THEIR LOCATION.
3. EFFORTS SHALL BE MADE TO MINIMIZE SOIL DISTURBANCE TO AREAS OUTSIDE OF THE ROAD GRADING LIMITS, CRANE PATHS, AND TURBINE SITES. TYPICAL DISTURBANCE SHALL BE LIMITED TO 10 LF FROM THE EDGE OF PROPOSED GRADING.
4. FINALIZE GRADING AROUND THE BASE OF TURBINES IN ACCORDANCE WITH DETAIL TS–03 AND TS–04.
5. GRADE ALL PROPOSED ROADS TO A MAXIMUM SLOPE OF 8%. IF 8% SLOPE CANNOT BE ACHIEVED, THE CONTRACTOR MAY UTILIZE ASSIST VEHICLES FOR THE PURPOSE OF DELIVERIES. GRADE ALL PROPOSED CRANE PATHS TO A MAXIMUM OF 8% UNLESS OTHERWISE NOTED IN PLAN SHEETS.
6. ANY FACILITIES REMOVED TO ALLOW FOR CONSTRUCTION (MAILBOXES, SIGNS, FENCES, ETC.) SHALL BE REPLACED BY THE CONTRACTOR IN A CONDITION AS GOOD AS EXISTING.
7. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING DRAINAGE THROUGHOUT THE CONSTRUCTION OF THIS PROJECT. CONSTRUCTION ACTIVITIES SHALL NOT BLOCK THE NATURAL OR MANMADE CREEKS OR DRAINAGE SWALES CAUSING RAINWATER TO POND. DEPENDING ON FIELD CONDITIONS, ADDITIONAL CULVERTS IN EXCESS OF THOSE ON THE PLANS MAY BE REQUIRED.
8. WHILE BUILDING THE ROADS AND EXCAVATING THE TURBINE FOUNDATIONS, EXCESS SOIL WILL RESULT. THE CONTRACTOR SHALL DISPOSE OF THIS EXCESS SOIL IN AN APPROVED MANNER. EXCESS TOPSOIL SHALL BE DISTRIBUTED INTO A THIN LAYER ON LAND IMMEDIATELY ADJACENT TO WHERE THE TOPSOIL ORIGINATED. ALL EXCESS TOPSOIL TO BE WASTED ONSITE. WHILE DOING SO THE CONTRACTOR SHALL AVOID CAUSING RIDGES OR MOUNDS THAT WOULD MAKE IT DIFFICULT FOR STORM WATER RUNOFF TO DRAIN. THE FINAL SURFACE OF THE DISTURBED TOPSOIL SHALL BE SMOOTH AND FOLLOW THE NATURAL CONTOUR OF THE LAND.
9. THE CONTRACTOR SHALL NOTIFY NORTH DAKOTA 811 AT LEAST 48 HOURS BEFORE EXCAVATION ACTIVITIES COMMENCE.
10. TEMPORARY INTERSECTION WIDENING SHALL, UPON COMPLETION OF ALL PROJECT CONSTRUCTION OR UPON NOTIFICATION OF THE ENGINEER, BE REMOVED AND THE AREA RESTORED TO ITS ORIGINAL LINES AND GRADES WITH TOPSOIL REPLACED, EXCEPT WHERE REQUESTED BY THE TOWNSHIP OR COUNTY TO PERMANENTLY REMAIN. DISTURBED AREAS OUTSIDE OF THE FINAL ROADWAY SHALL BE SEEDED AND MULCHED.
11. TURBINE SETBACKS ARE NOT IDENTIFIED ON THE CONSTRUCTION PLANS. IT SHALL BE THE RESPONSIBILITY OF THE OWNER AND CONTRACTOR TO ENSURE THAT ALL TURBINE SETBACKS MEET PROJECT REQUIREMENTS.
12. GEOTECHNICAL REPORTS WITH RECOMMENDATIONS HAVE BEEN PROVIDED BY THE OWNER. ALL GRADING SHALL CONFORM TO THE GEOTECHNICAL ENGINEERING REPORT AND RECOMMENDATIONS.
13. FIELD SURVEY WETLAND INFORMATION HAS BEEN PROVIDED BY THE OWNER. ALL WETLAND DELINEATIONS AND PERMITTING SHALL BE THE RESPONSIBILITY OF OTHERS AND BE COMPLETED PRIOR TO CONSTRUCTION COMMENCING. THE OWNER AND GENERAL CONTRACTOR SHALL VERIFY THAT ALL WETLAND PERMITS HAVE BEEN SUBMITTED AND APPROVED PRIOR TO CONSTRUCTION COMMENCING.
14. CULTURAL RESOURCE REPORTS HAS BEEN PROVIDED BY THE OWNER. CULTURAL RESOURCE LOCATIONS ARE SHOWN ON THE PLANS. INFORMATION WILL BE THE RESPONSIBILITY OF THE OWNER AND GENERAL CONTRACTOR. THE LOCATIONS OF CULTURAL RESOURCE SITES MAY BE CONFIDENTIAL AND PROTECTED BY STATE OR FEDERAL LAW. PUBLIC RELEASE OF SPECIFIC INFORMATION REGARDING THESE RESOURCES MAY BE RESTRICTED.
15. AN ENVIRONMENTAL ASSESSMENT HAS NOT BEEN PROVIDED. THE CONTRACTOR SHALL BE FAMILIAR WITH THE REPORT AND REVIEW ALL RECOMMENDATIONS.
16. ELECTRICAL INFORMATION SHOWN ON THE PLANS IS FOR REFERENCE ONLY. REFER TO ELECTRICAL CONSULTANT'S PLANS FOR SPECIFIC LOCATIONS AND CONSTRUCTION DETAILS FOR THE UNDERGROUND POWER COLLECTION SYSTEM AND SUBSTATION.
17. CRANE PATHS ARE SHOWN ON THE CONSTRUCTION PLANS. IF THE CONTRACTOR PROPOSES ALTERNATE CRANE PATHS, THEY SHALL ENSURE THAT WETLAND AND CULTURAL RESOURCE CORRIDORS ARE NOT DISTURBED. FINAL CRANE PATH ALIGNMENTS SHALL BE DETERMINED BY THE CONTRACTOR BASED ON FIELD CONDITIONS WITHIN THE WETLAND AND CULTURAL RESOURCE CORRIDORS, SPECIAL LANDOWNER AGREEMENTS AND THE PROJECT BOUNDARY.
18. EFFORTS SHALL BE MADE TO MINIMIZE SOIL DISTURBANCE TO AREAS OUTSIDE OF THE ROAD GRADING LIMITS, CRANE PATHS, AND TURBINE SITES. DISTURBANCE SHALL BE LIMITED TO 100 LF WIDTH FOR PROPOSED ACCESS ROADS AND 100 LF FOR CRANE PATHS, AND SHALL BE LIMITED TO A 200 LF RADIUS FOR PROPOSED WIND TURBINE GENERATORS. THE GRADING LIMITS SHALL BE CENTERED ON THE ROADWAYS AND WIND TURBINES. THE CONTRACTOR SHALL MAKE ALL EFFORTS TO KEEP ACTIVITIES WITHIN THE ERECTION AREAS SHOWN ON THE PLANS BUT IT IS UNDERSTOOD THAT SOME ACTIVITIES THAT WILL NOT REQUIRE GRADING OR SOIL DISTURBANCE MAY EXTEND BEYOND THE DEFINED LIMITS. DURING ERECTION OF THE ROTOR, TRUCKS AND/OR FORKLIFTS MAY EXTEND BEYOND THESE LIMITS. SEE DETAIL TS01 FOR TYPICAL ERECTION AREAS.
19. TRUCK TURNAROUNDS ARE NOT SHOWN ON THE PLANS. GENERAL CONTRACTOR TO COORDINATE AND ASSIST WITH TRUCK TURNAROUNDS WHERE NECESSARY.
20. AN ALTA SURVEY HAS BEEN PROVIDED BY THE OWNER. CONTRACTOR AND OWNER ARE RESPONSIBLE FOR LOCATING ALL UTILITIES AND VERIFYING LOCATION OF CONSTRUCTION ACTIVITIES PRIOR TO COMMENCING WORK. PARCEL LINES, LAND OWNER INFORMATION AND OVERALL PROJECT BOUNDARY WAS NOT PROVIDED IN THE ALTA.
21. OFF SITE TEMPORARY INTERSECTION IMPROVEMENTS ARE NOT SHOWN ON THE PLANS.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):

1. THE CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES AS PLANNED AND SPECIFIED FOLLOWING BEST MANAGEMENT PRACTICES AS OUTLINED BY THE NORTH DAKOTA DEPARTMENT OF HEALTH AND BEING IN CONFORMANCE WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL STORMWATER PERMIT.
2. REFER TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) FOR THE MERRICOURT WIND PROJECT, PREPARED BY WESTWOOD PROFESSIONAL SERVICES, FOR EROSION CONTROL AND RESTORATION SPECIFICATIONS, SEDIMENT AND EROSION CONTROL PROCEDURES, LOCATIONS OF BMPs, DETAILS, AND INSPECTION INFORMATION.
3. ALL PASTURES AND DRAINAGE SWALES DISTURBED DURING CONSTRUCTION ACTIVITIES AND NOT COVERED BY ROAD SURFACING MATERIALS, SHALL BE SEEDED IN ACCORDANCE WITH THE SWPP PLAN.
4. TEMPORARY EROSION CONTROL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE TEMPORARY EROSION CONTROL PLAN SHALL BE IN ACCORDANCE WITH THE NORTH DAKOTA DEPARTMENT OF HEALTH AND THE MERRICOURT WIND PROJECT STORMWATER POLLUTION PREVENTION PLAN ON FILE.

TABLE 1: NDDOT CLASS 5 BASE AGGREGATE – LOCALLY SOURCED

SIEVE SIZE	PERCENT PASSING
1"	100
3/4"	90–100
NO. 4	35–70
NO. 30	16–40
NO. 200	4–10

MEET FOLLOWING REQUIREMENTS FOR NDDOT CLASS 5 BASE AGGREGATE:

AT LEAST 10 PERCENT BY WEIGHT OF THE AGGREGATE RETAINED ON THE NO. 4 SIEVE HAS AT LEAST ONE MECHANICALLY FRACTURED FACE FOR CLASS 5.

SHALE (MAX %) = 12.0%
L.A ABRASION (% MAX) = 50%

MAXIMUM PI = 10 – ((% PASSING NO. 40)/10)

GRADATION HAS BEEN OBTAINED FROM THE 2014 NORTH DAKOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION BOOK, SECTION 816.02

TABLE 2: TESTING SCHEDULE SUMMARY

LOCATION	TEST	FREQUENCY
FILL PLACEMENT	PROCTOR	1 PER MAJOR SOIL TYPE
	MOISTURE DENSITY	PER LIFT PER 5,000 SF OF FILL PLACED OR 1 PER LIFT PER 500 LF OF ROAD OR CRANE WALK
COMPACTED SUBGRADE	PROOF–ROLL	ENTIRE LENGTH
	DCP	1 PER 1000 FT OR MIN. 3 PER ROAD
AGGREGATE BASE	PROOF–ROLL	ENTIRE AREA
	SIEVE ANALYSIS, LL, PL, AND LA ABRASION	1 PER 2,500 CY

PROJECT CONTACT INFORMATION:

TITLE	COMPANY	NAME	CONTACT NUMBER
OWNER (PRIMARY)	EDF	CRAIG MOLLER	774–270–1198
PROJECT MANAGER	WESTWOOD	DANI NYGREN	952–906–7493
ENGINEER OF RECORD	WESTWOOD	ROB COPOULS	952–906–7470
CONTRACTOR	WANZEK	TJ BIRD	701–492–1311
NDDOH			701–328–5150

SHEET INCLUDED FOR REFERENCE ONLY - NO UPDATES

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Construction Notes

Record Plans

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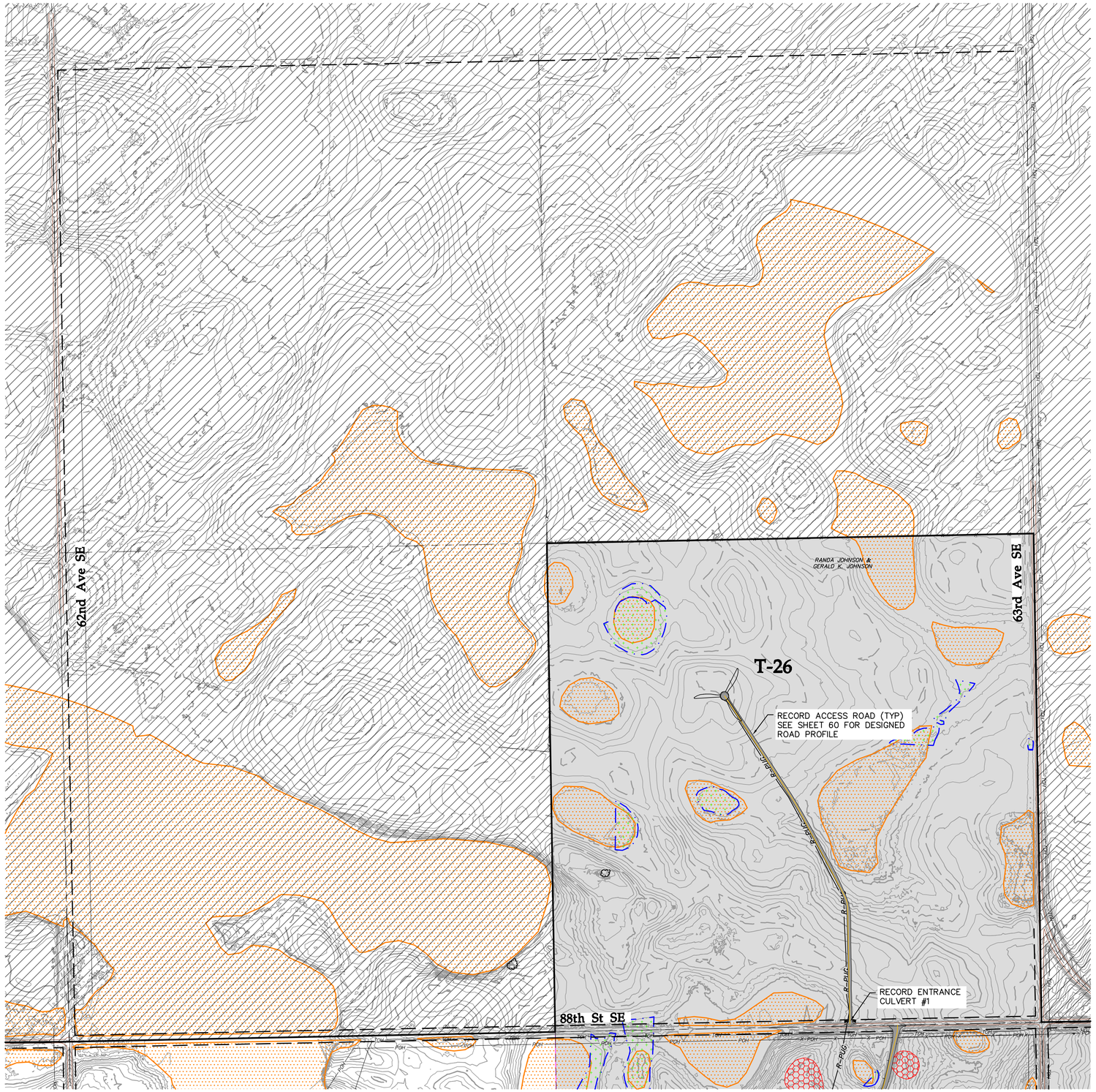
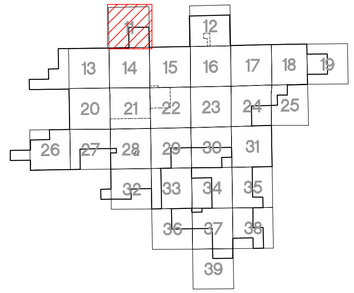


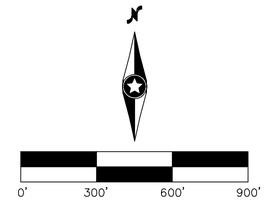
SEE SHEET 14

LEGEND:

- RECORD TURBINE LOCATION
- T-XX — RECORD TURBINE NUMBER
- DESIGNED ACCESS ROAD CENTERLINE
- RECORD ACCESS ROAD
- R–PUG — RECORD UNDERGROUND COLLECTION
- EXISTING ROAD
- EXISTING GRAVEL ROAD
- EXISTING RIGHT–OF–WAY
- EXISTING PARCEL LINES
- EXISTING FENCE
- PUG — EXISTING UNDERGROUND POWER
- PDH — EXISTING OVERHEAD POWER
- TUG — EXISTING TELEPHONE LINE
- EXISTING VEGETATION
- 980 — EXISTING 10' CONTOURS
- EXISTING 2' CONTOURS
- USFWS PROTECTED BASINS
- DELINEATED WETLANDS
- ARCHEOLOGICAL SITE
- ARCHEOLOGICAL SITE – NO IMPACTS
- POTENTIAL WHOOPING CRANE HABITAT
- PIPING PLOVER HABITAT BUFFER
- FLOOD EASEMENT
- USFWS EASEMENT
- OUT OF PROJECT BOUNDARY
- RECORD DRAINAGE CROSSING
- RECORD CULVERT
- RECORD FENCE GATE



KEY MAP



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Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-26

Record Plans

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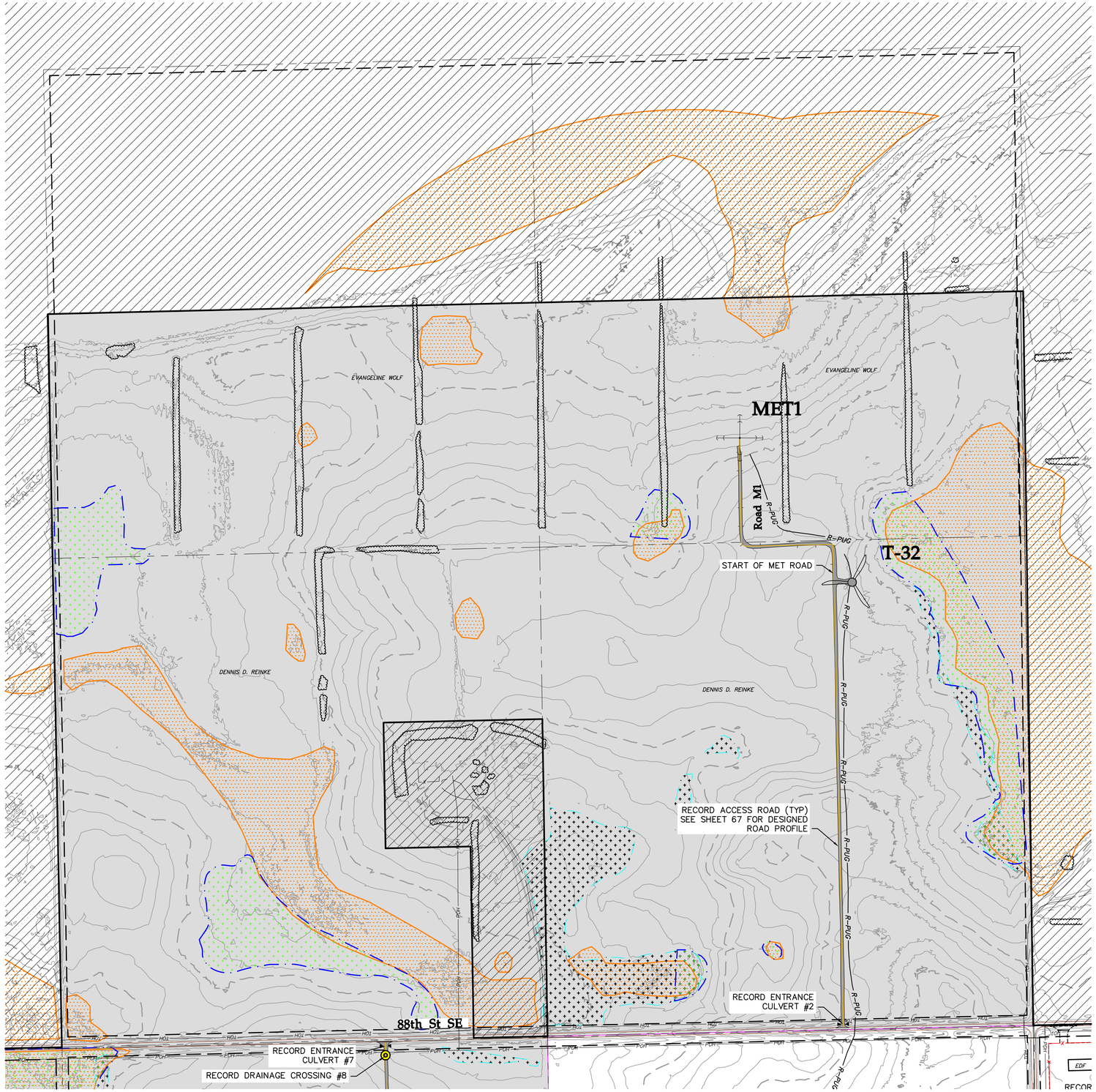

SEE SHEET 16

LEGEND:

- RECORD TURBINE LOCATION
- T-XX — RECORD TURBINE NUMBER
- DESIGNED ACCESS ROAD CENTERLINE
- RECORD ACCESS ROAD
- R-PUG — RECORD UNDERGROUND COLLECTION
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- EXISTING GRAVEL ROAD
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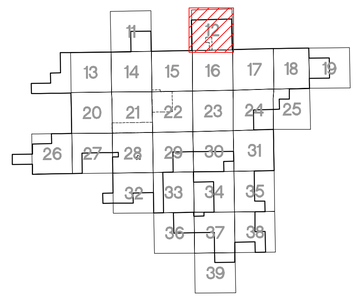
- RECORD CULVERT
- RECORD FENCE GATE



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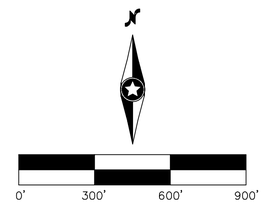

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Revisions:

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-32

Record Plans

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Sheet: 12 OF 119

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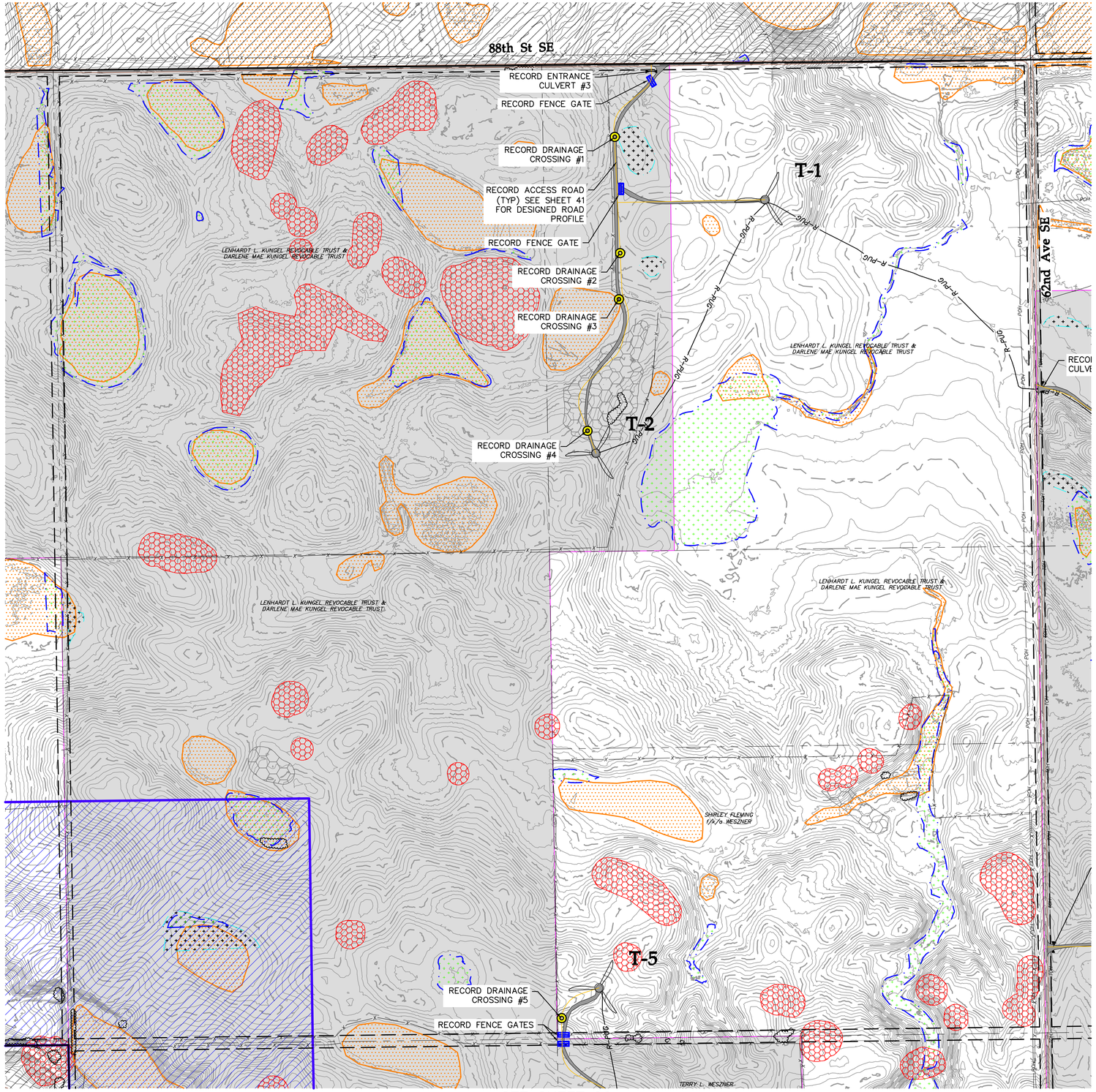

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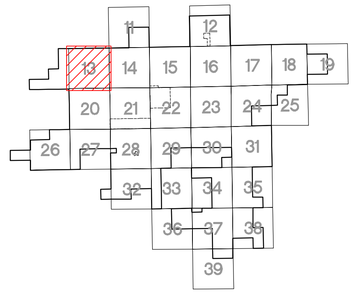

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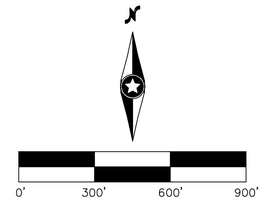

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-1 - T-2, T-5

Record Plans

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Sheet: 13 OF 119

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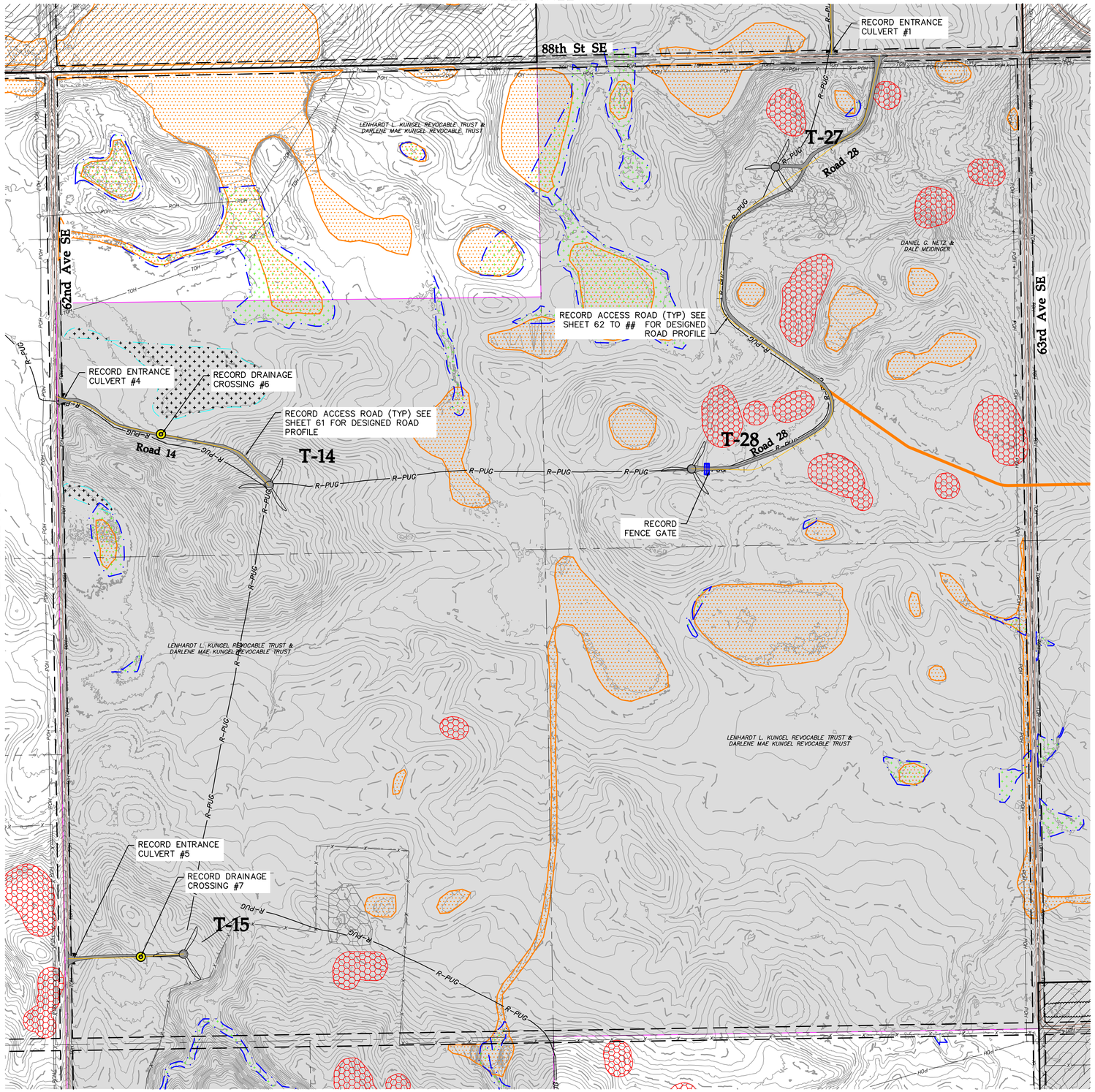

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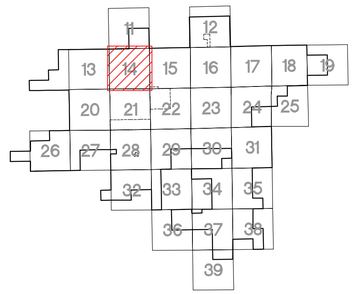
0' 300' 600' 900'



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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-14 - T-15, T-27 - T-28

Record Plans

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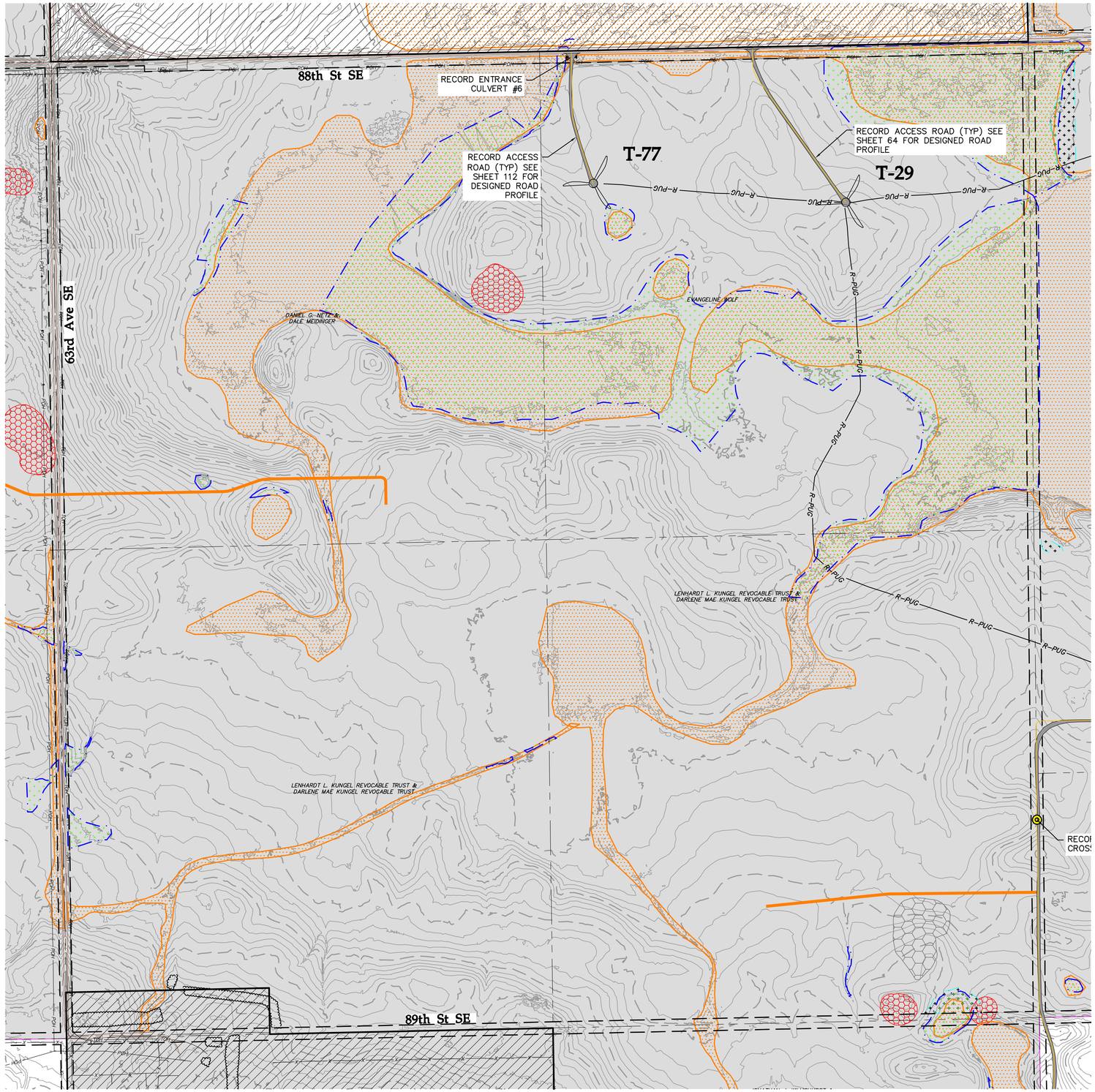

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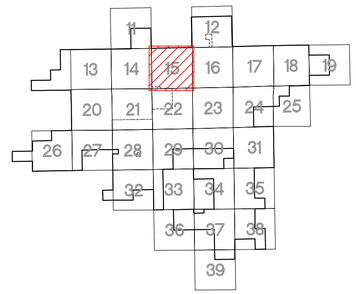

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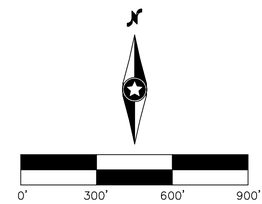

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Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-29, ALT-33, ALT-76, T-77

Record Plans

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Sheet: 15 OF 119

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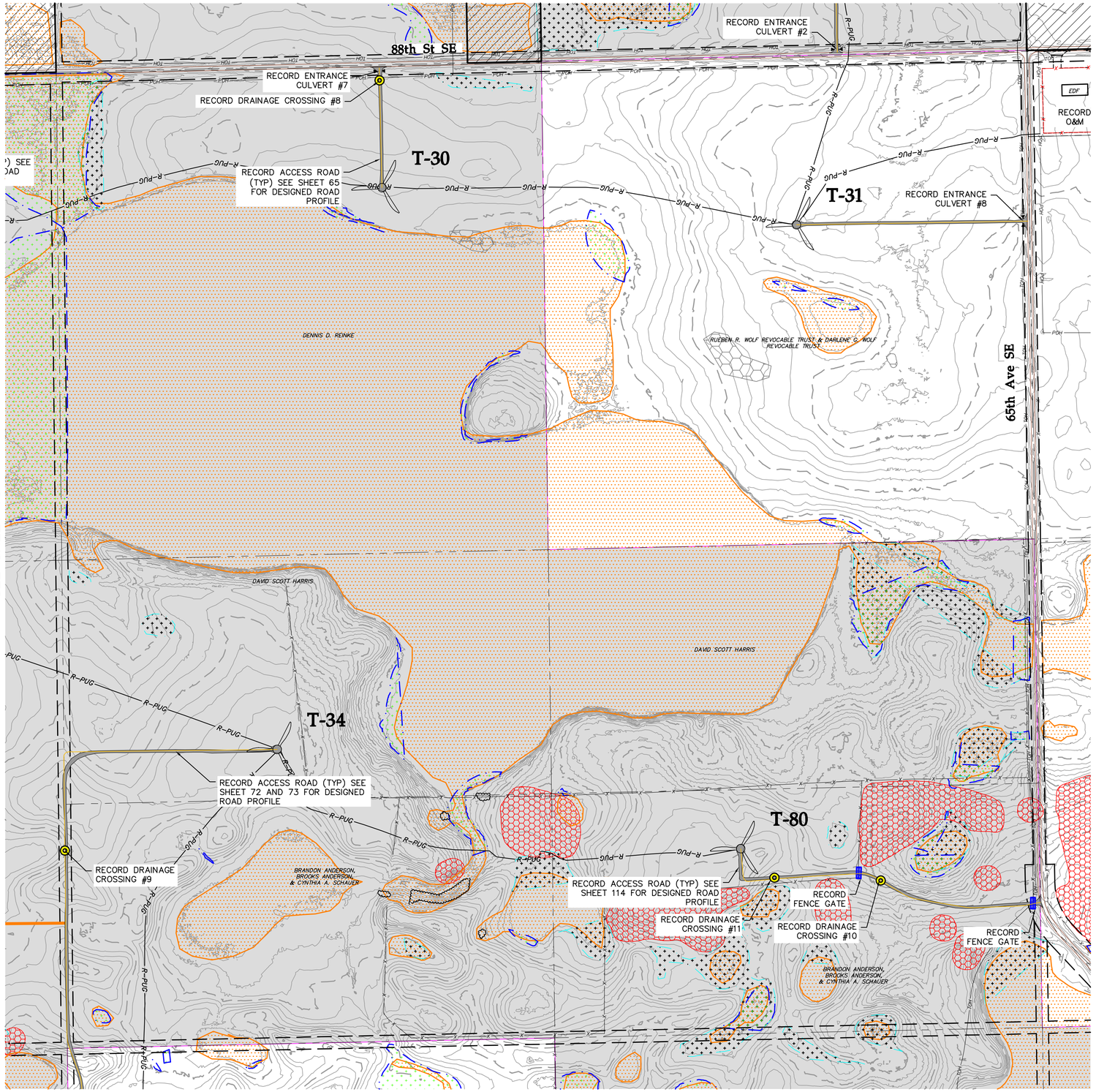

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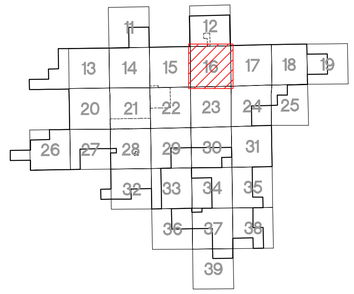

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-30 - T-31, T-34, T-80

Record Plans

Date: 11/20/2020
Sheet: 16 OF 119

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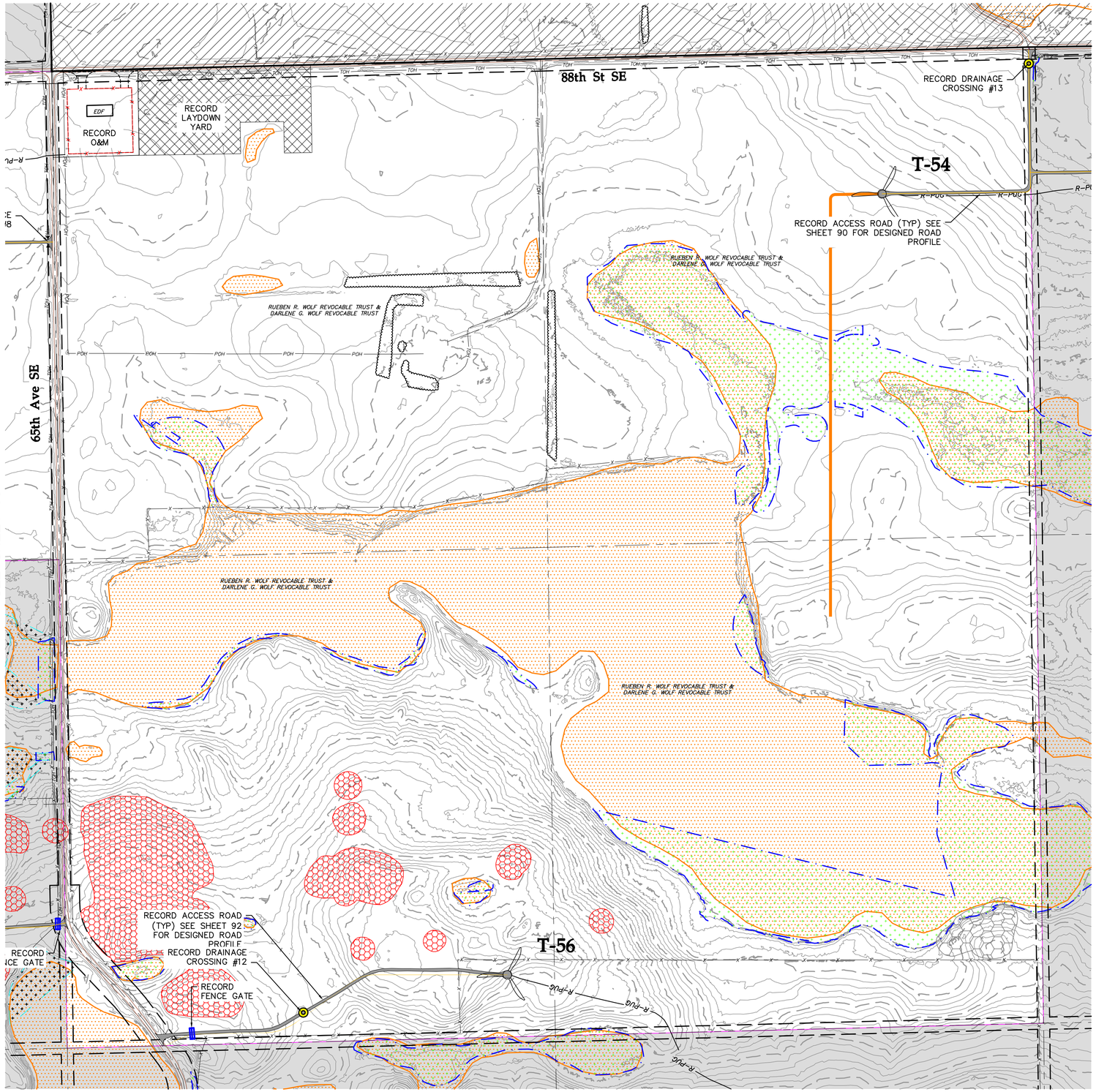

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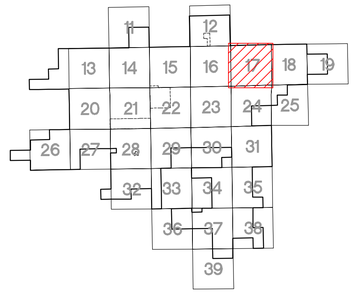

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Prepared for:

WANZEK a MasTec company

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West Fargo, ND 58078

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0' 300' 600' 900'

Merricourt Wind Project

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Civil Site Plan T-54, T-56, ALT-79

Record Plans

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Sheet: 17 OF 119

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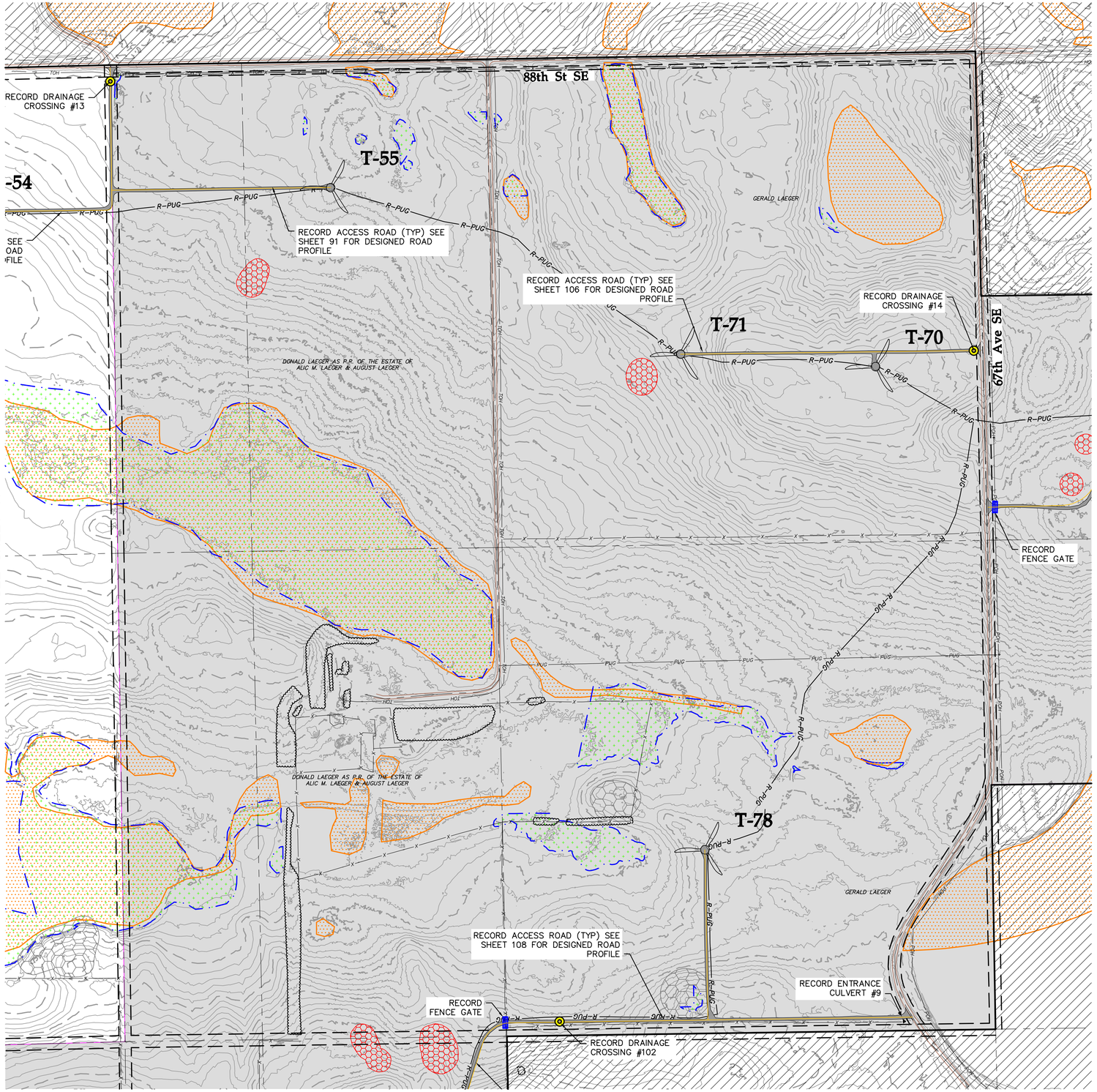

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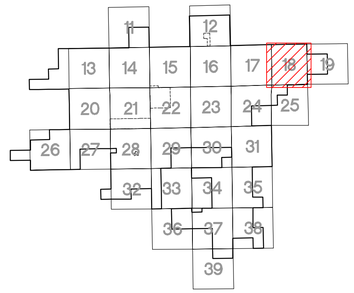

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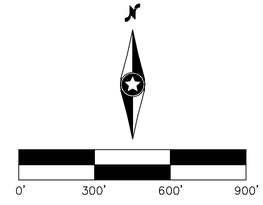

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Prepared for:

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Merricourt Wind Project

McIntosh County, North Dakota

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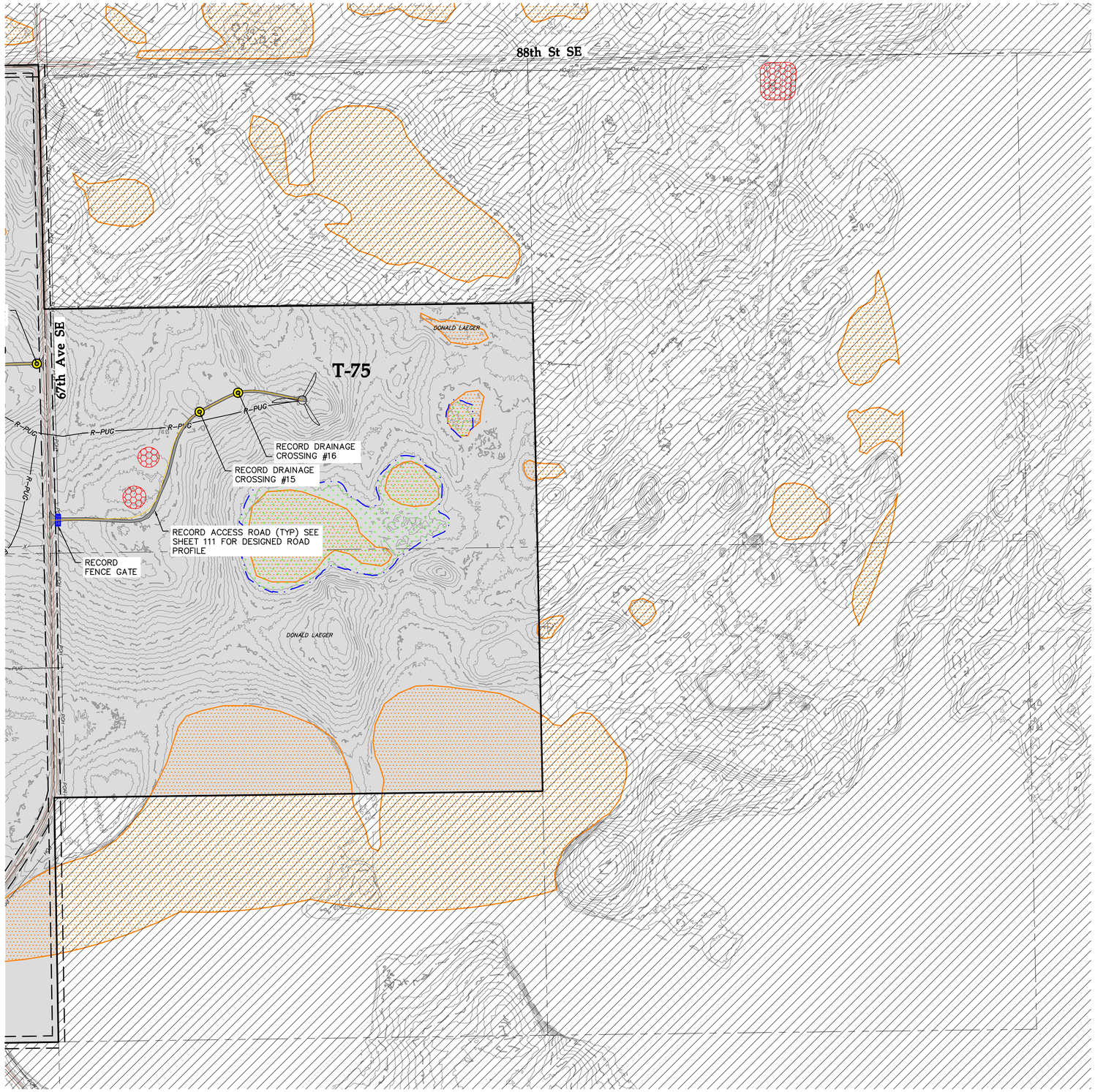

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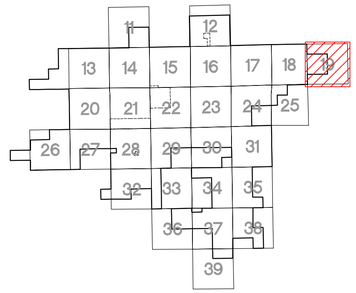

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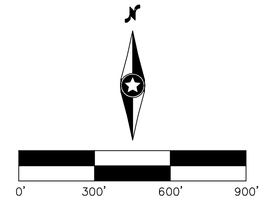

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Prepared for:

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Civil Site Plan T-75

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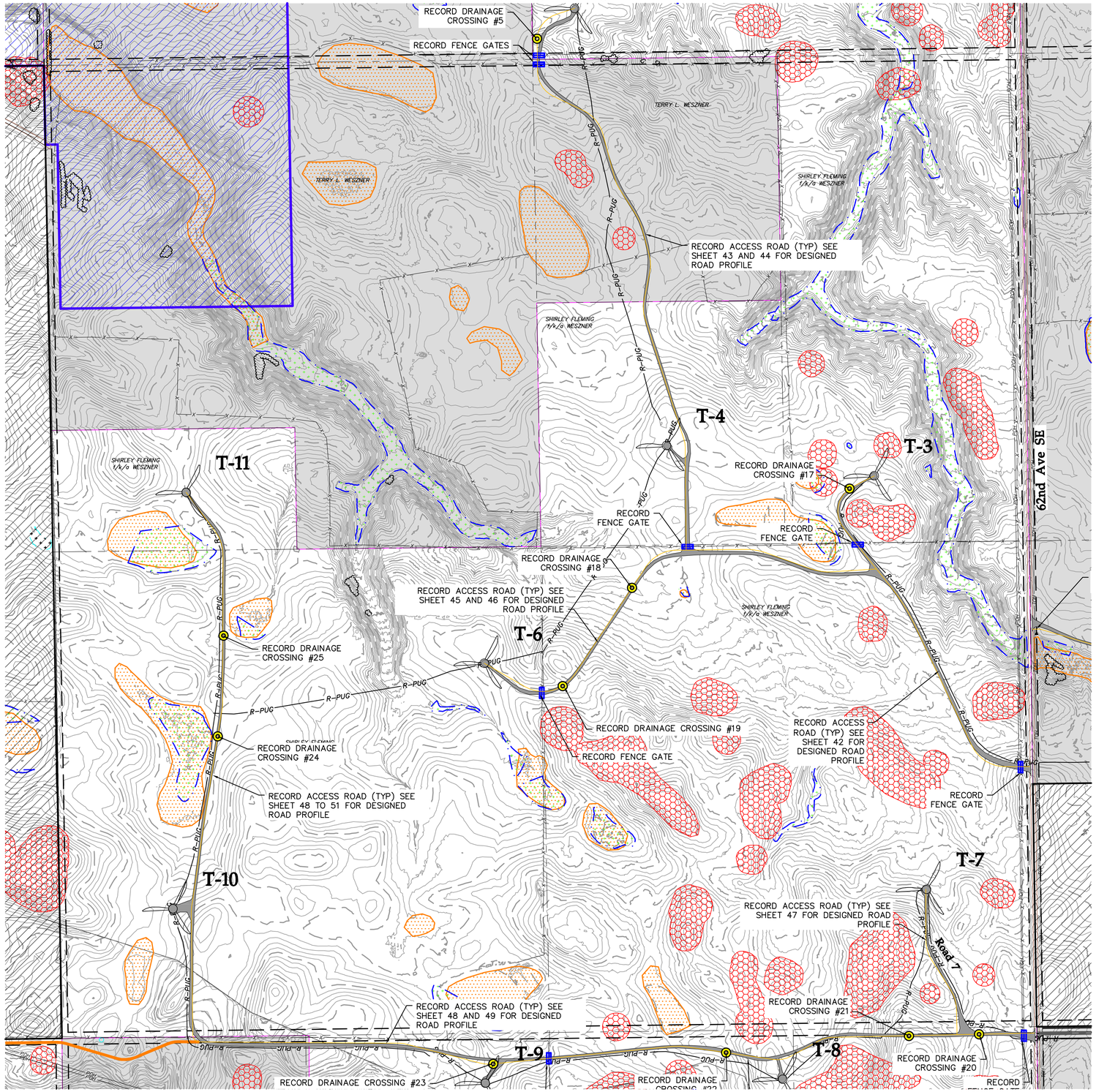

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Revisions:

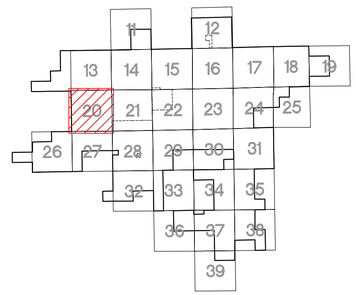
#	DATE	DESCRIPTION
0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
2	01/21/20	CUT & FILL ADD TO TURBINE TABLE
3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'



KEY MAP

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-3 - T-4, T-6 - T-7, T-10 - T-11

Record Plans

Date: 11/20/2020
Sheet: 20 OF 119

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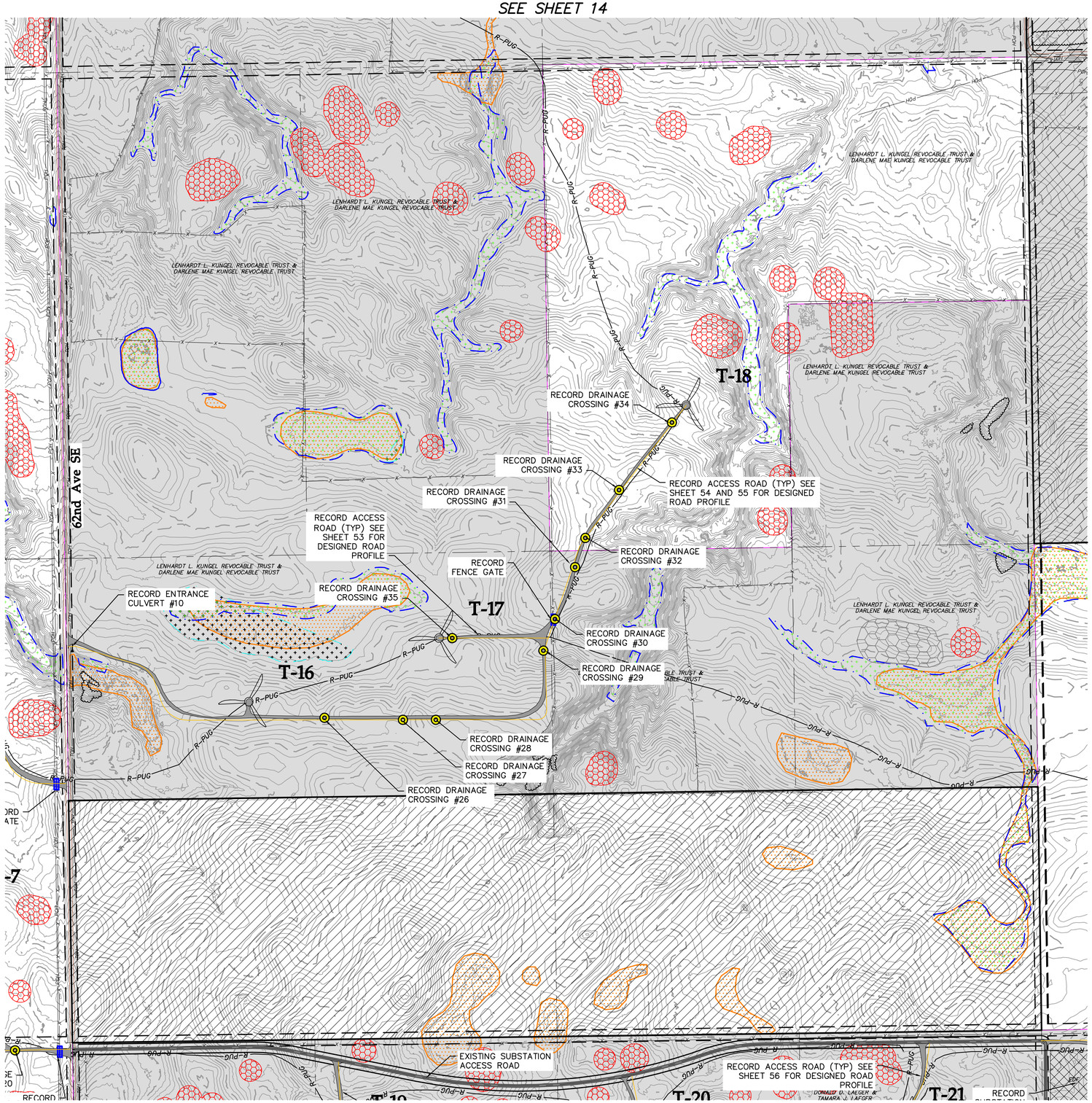

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- ARCHEOLOGICAL SITE – NO IMPACTS
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- PIPING PLOVER HABITAT BUFFER
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- USFWS EASEMENT
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- RECORD DRAINAGE CROSSING
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Prepared for:

WANZEK a MasTec company

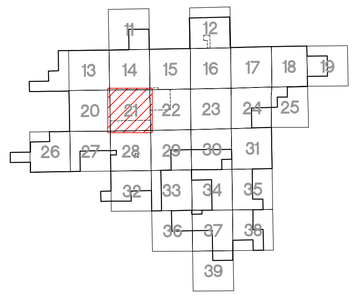
2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-16 - T-18



KEY MAP

Record Plans

Date: 11/20/2020
Sheet: 21 OF 119

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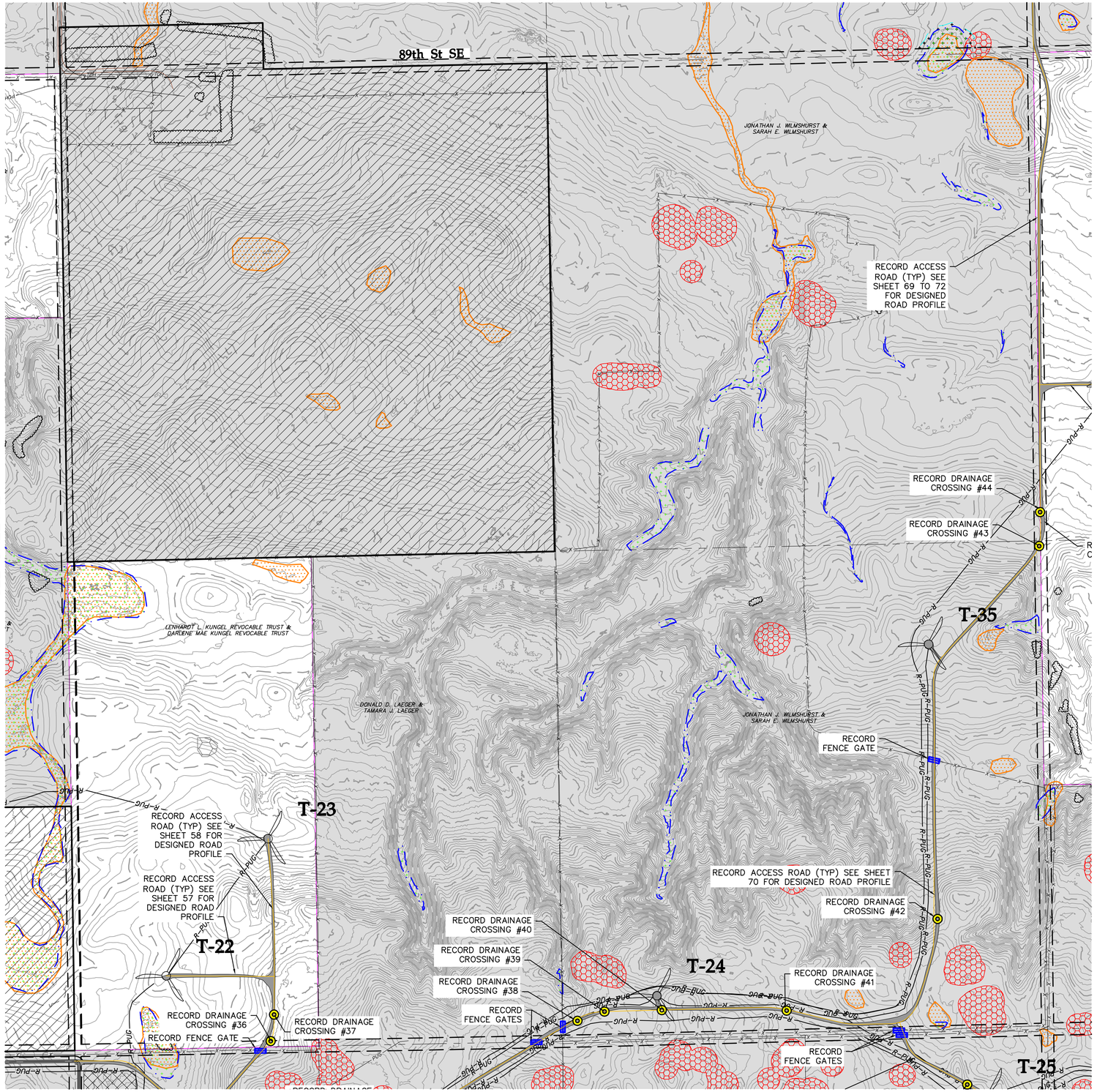

SEE SHEET 29

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Prepared for:

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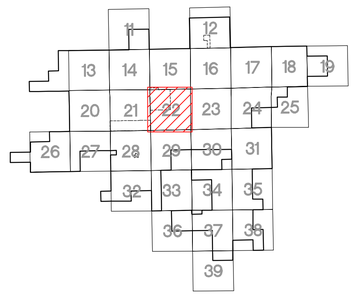
Merricourt Wind Project

McIntosh County, North Dakota



KEY MAP

Civil Site Plan T-22 - T-24, T-35

Record Plans

Date: 11/20/2020
Sheet: 22 OF 119

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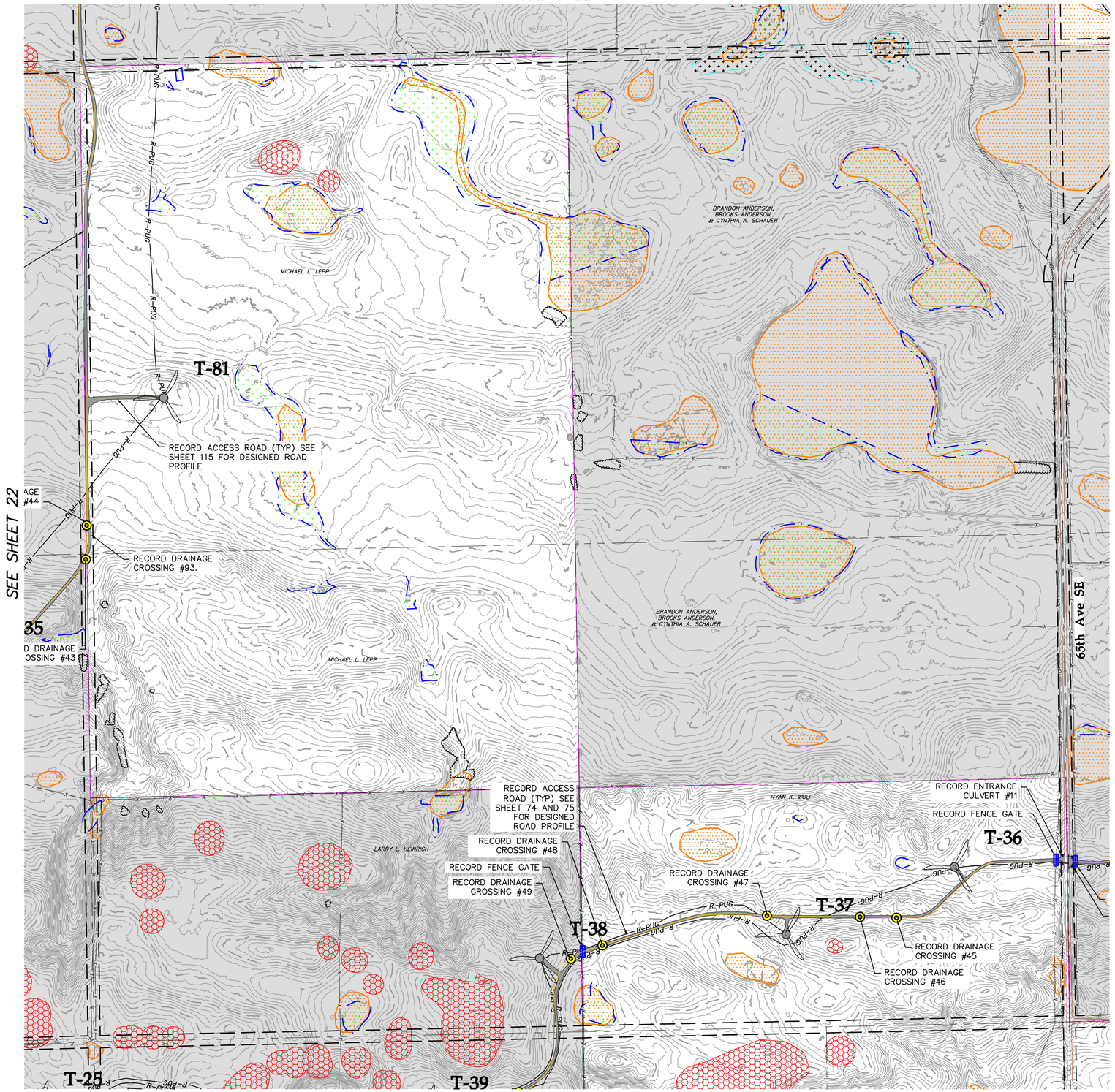

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Prepared for:

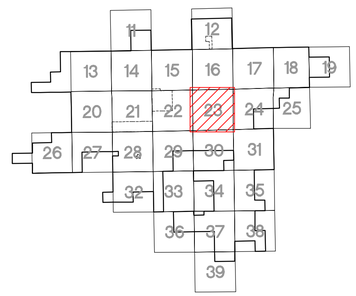
WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota



KEY MAP

Civil Site Plan T-36 - T-38, T-81

Record Plans

Date: 11/20/2020
Sheet: 23 OF 119

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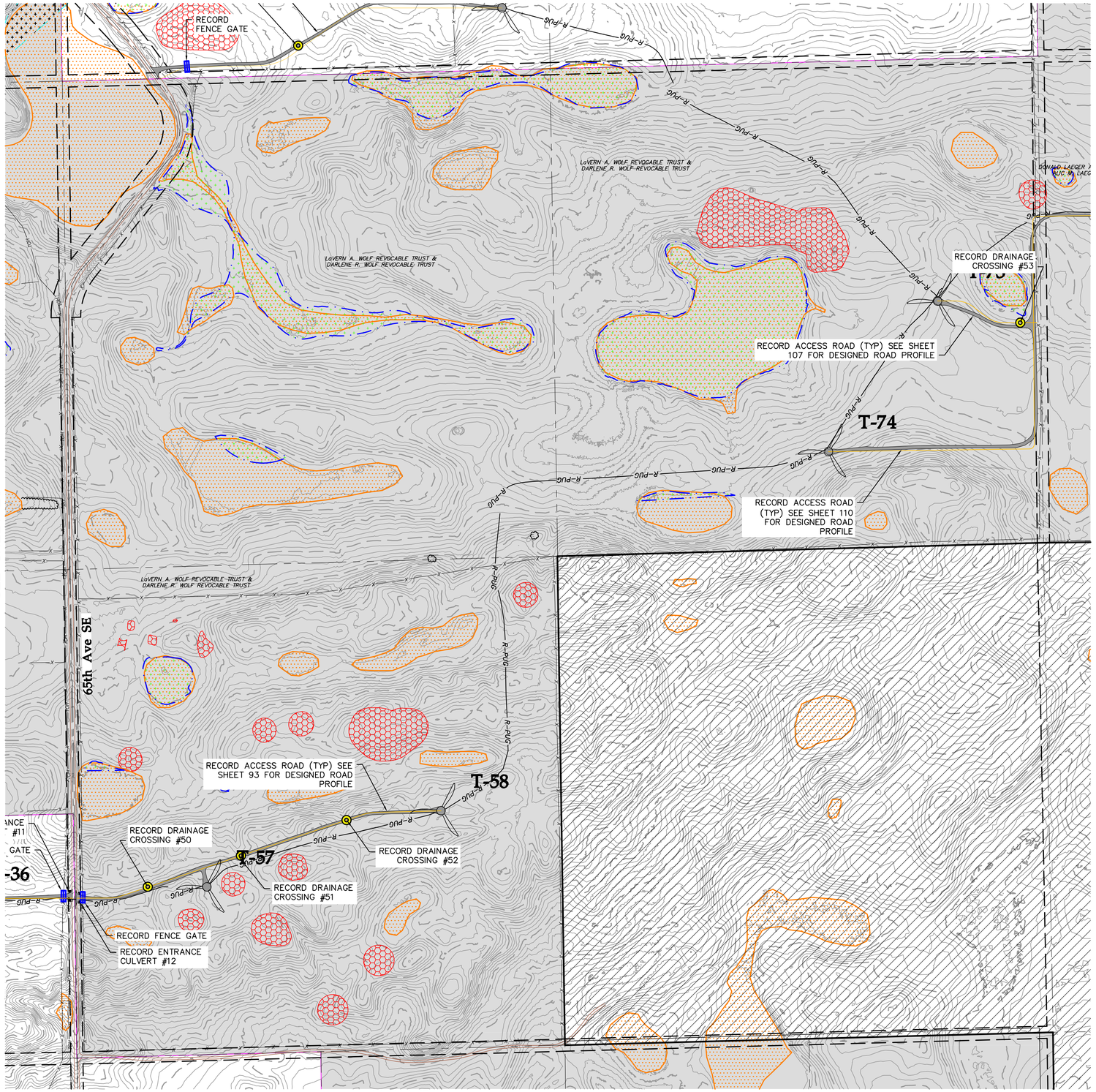

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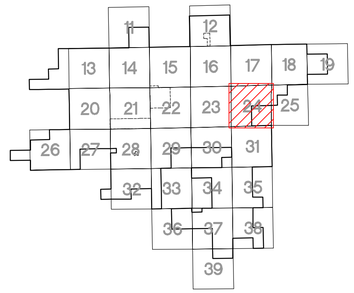

KEY MAP

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-57 - T-58, T-73 - T-74

Record Plans

Date: 11/20/2020
Sheet: 24 OF 119

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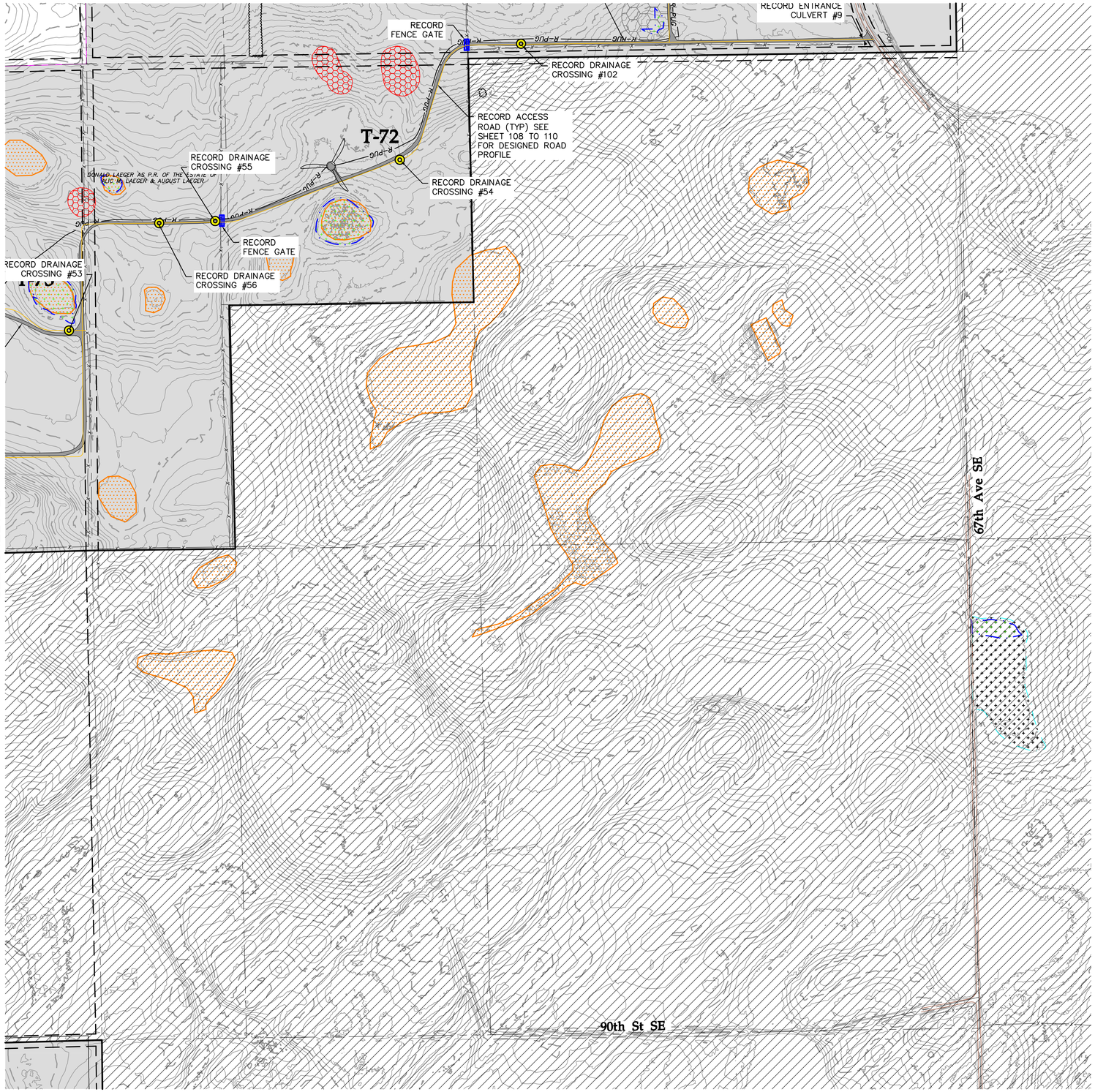

SEE SHEET 24

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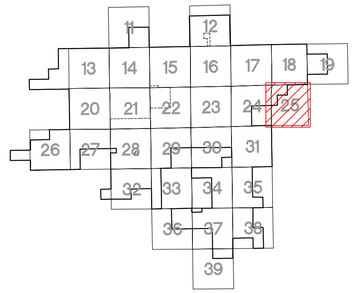

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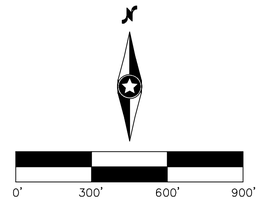

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-72

Record Plans

Date: 11/20/2020
Sheet: 25 OF 119

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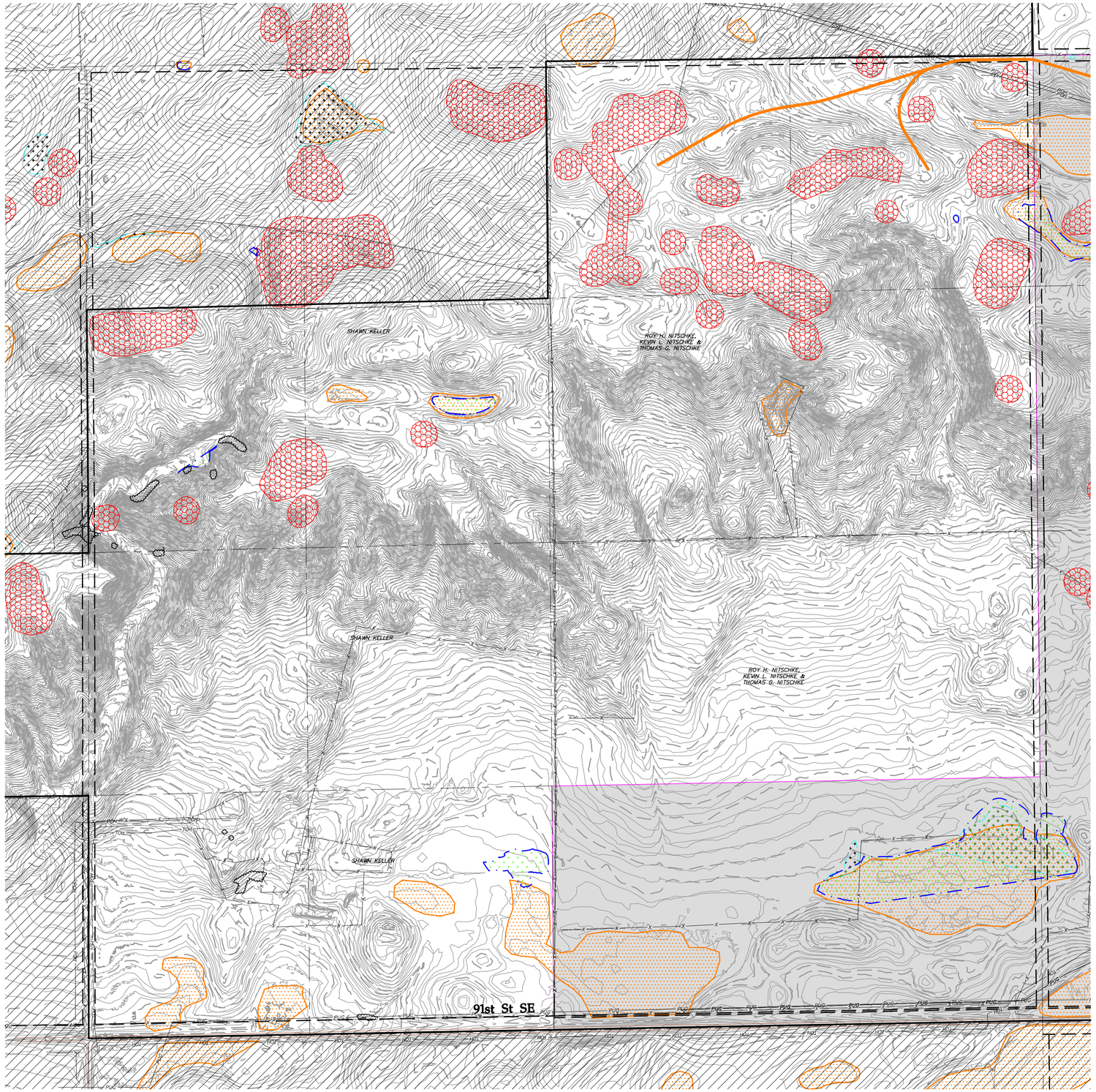

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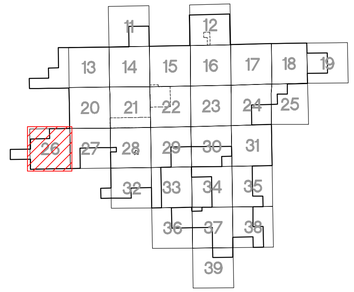

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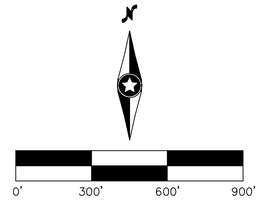

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan ALT-12 - ALT-13

Record Plans

Date: 11/20/2020
Sheet: 26 OF 119

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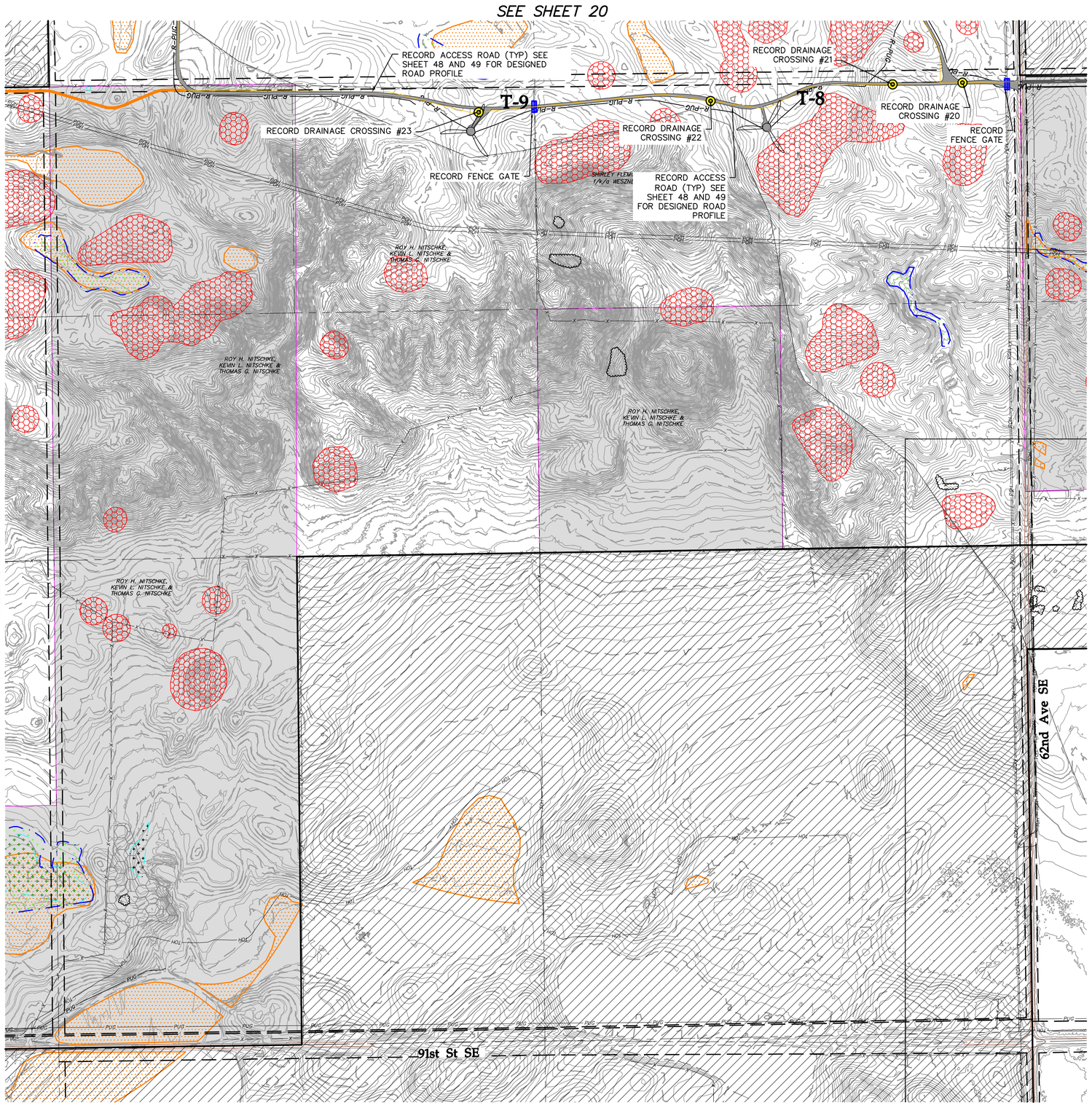

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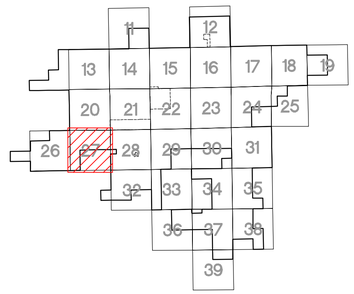

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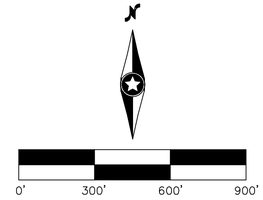

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-8 - T-9

Record Plans

Date: 11/20/2020
Sheet: 27 OF 119

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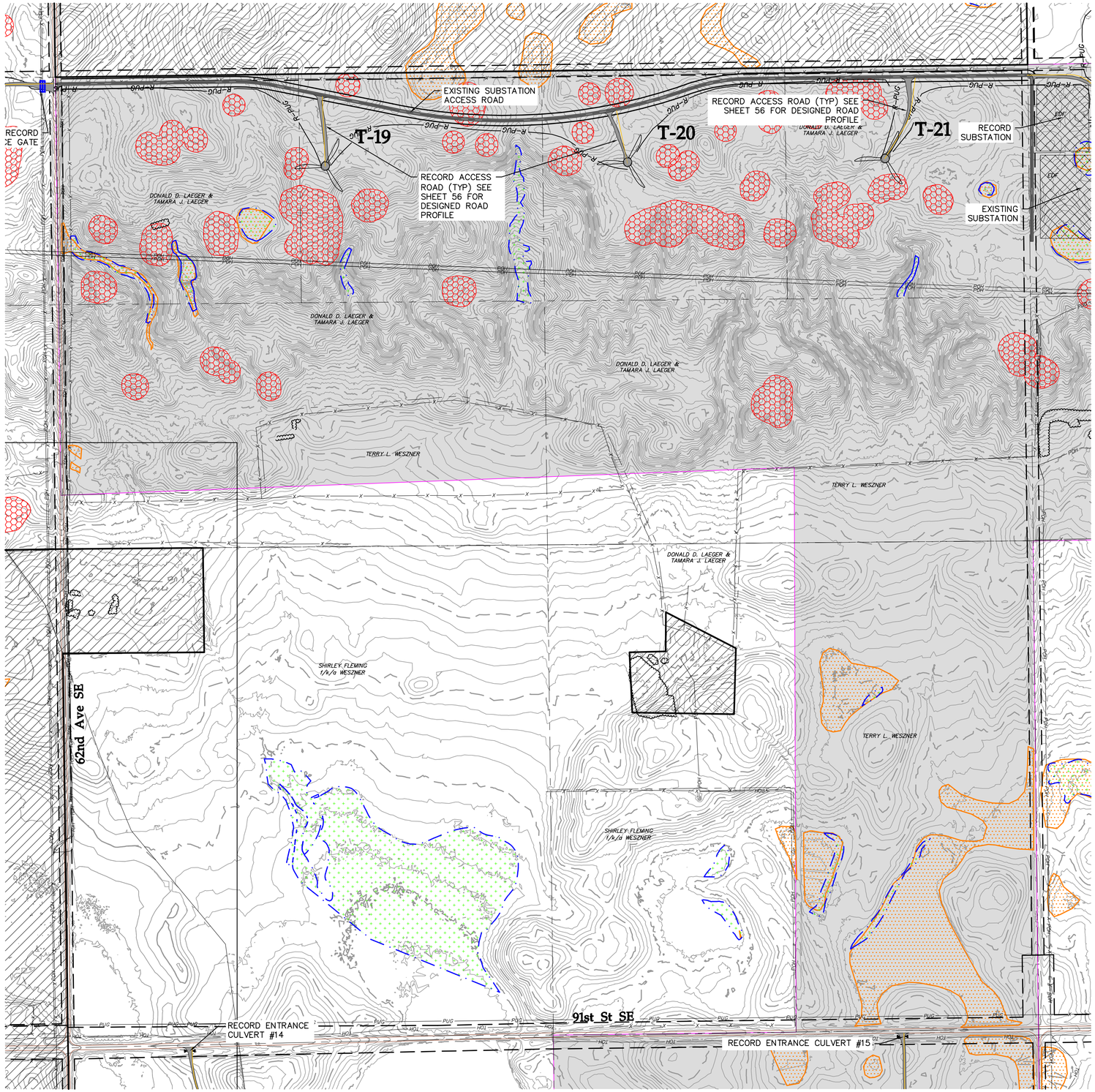

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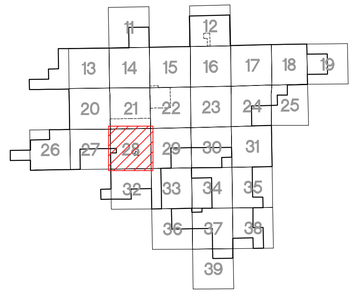

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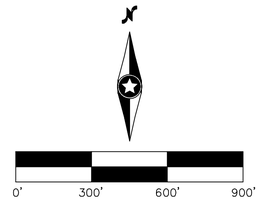

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Drawn: SNK
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Revisions:

#	DATE	DESCRIPTION
0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
2	01/21/20	CUT & FILL ADD TO TURBINE TABLE
3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-19 - T-21

Record Plans

Date: 11/20/2020
Sheet: 28 OF 119

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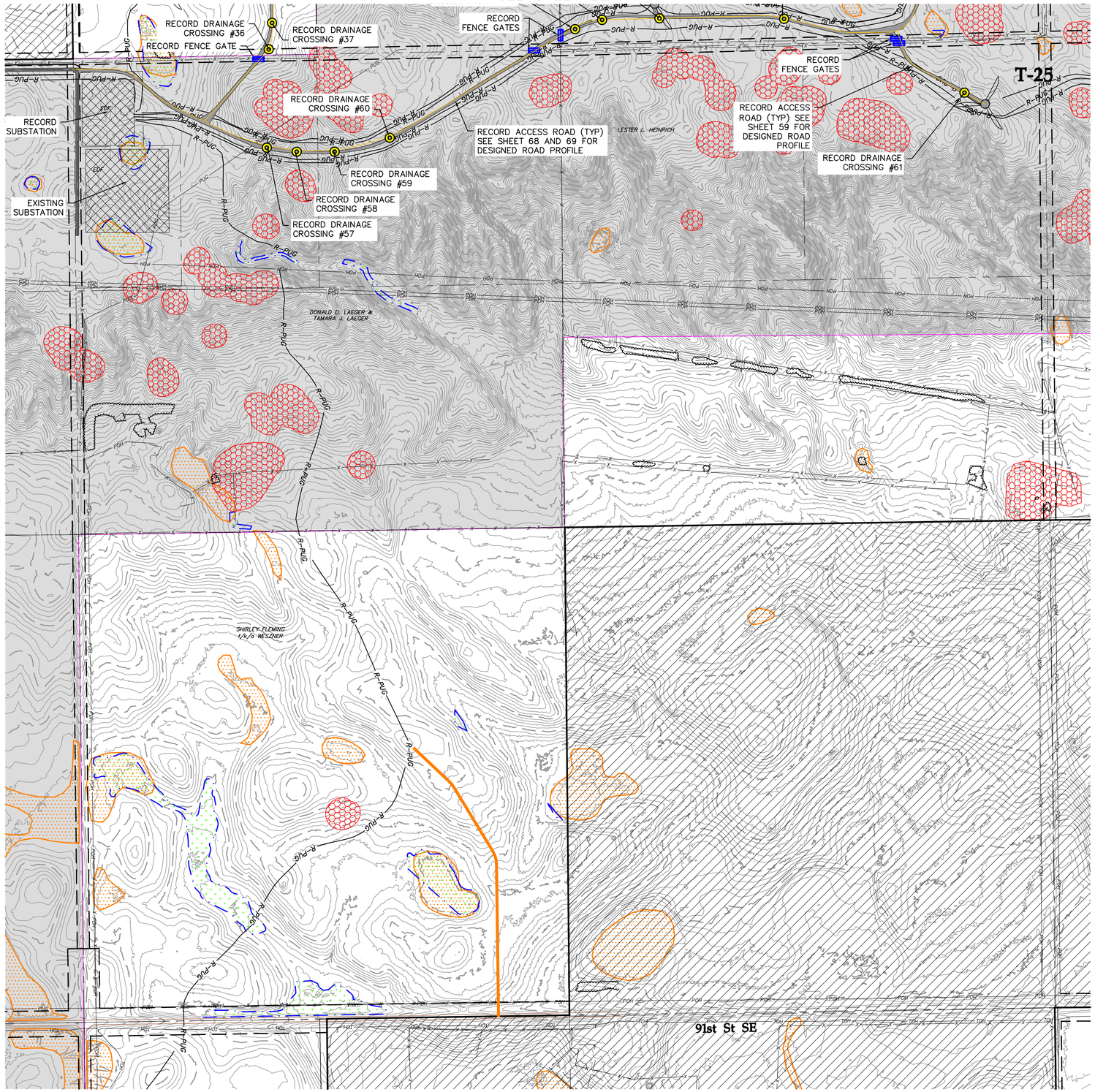

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- ARCHEOLOGICAL SITE – NO IMPACTS
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- FLOOD EASEMENT
- USFWS EASEMENT
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- RECORD CULVERT
- RECORD FENCE GATE

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Prepared for:

WANZEK a MasTec company

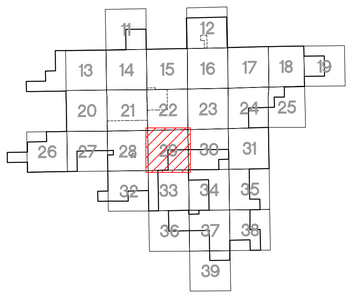
2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-25, ALT-44



KEY MAP

Record Plans

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Sheet: 29 OF 119

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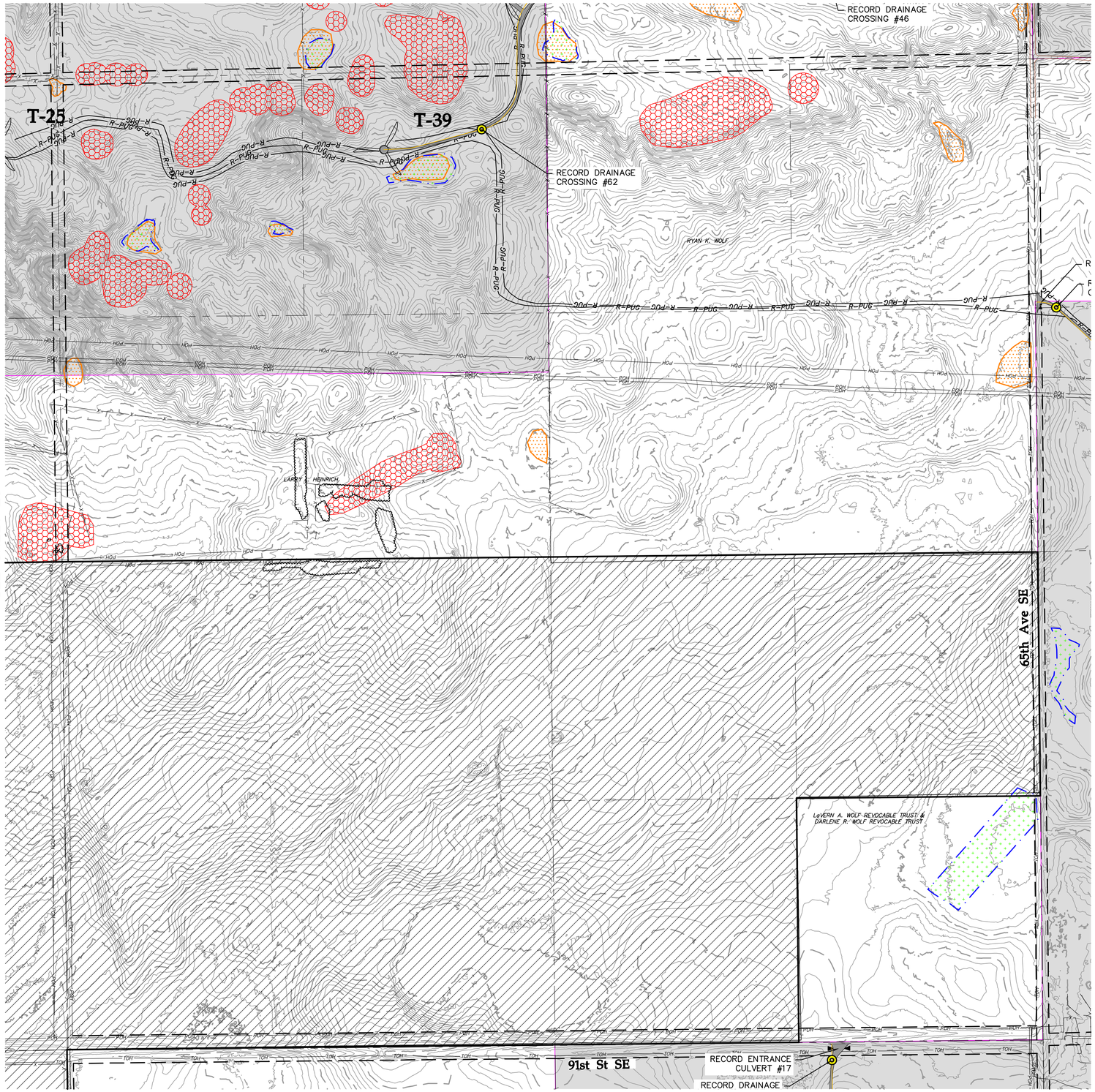

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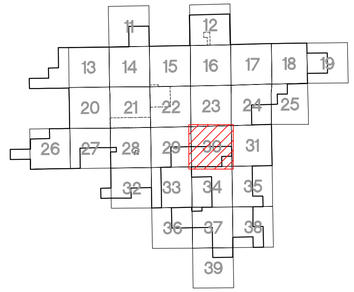

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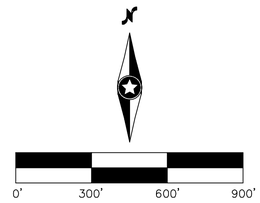

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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McIntosh County, North Dakota

Civil Site Plan T-39

Record Plans

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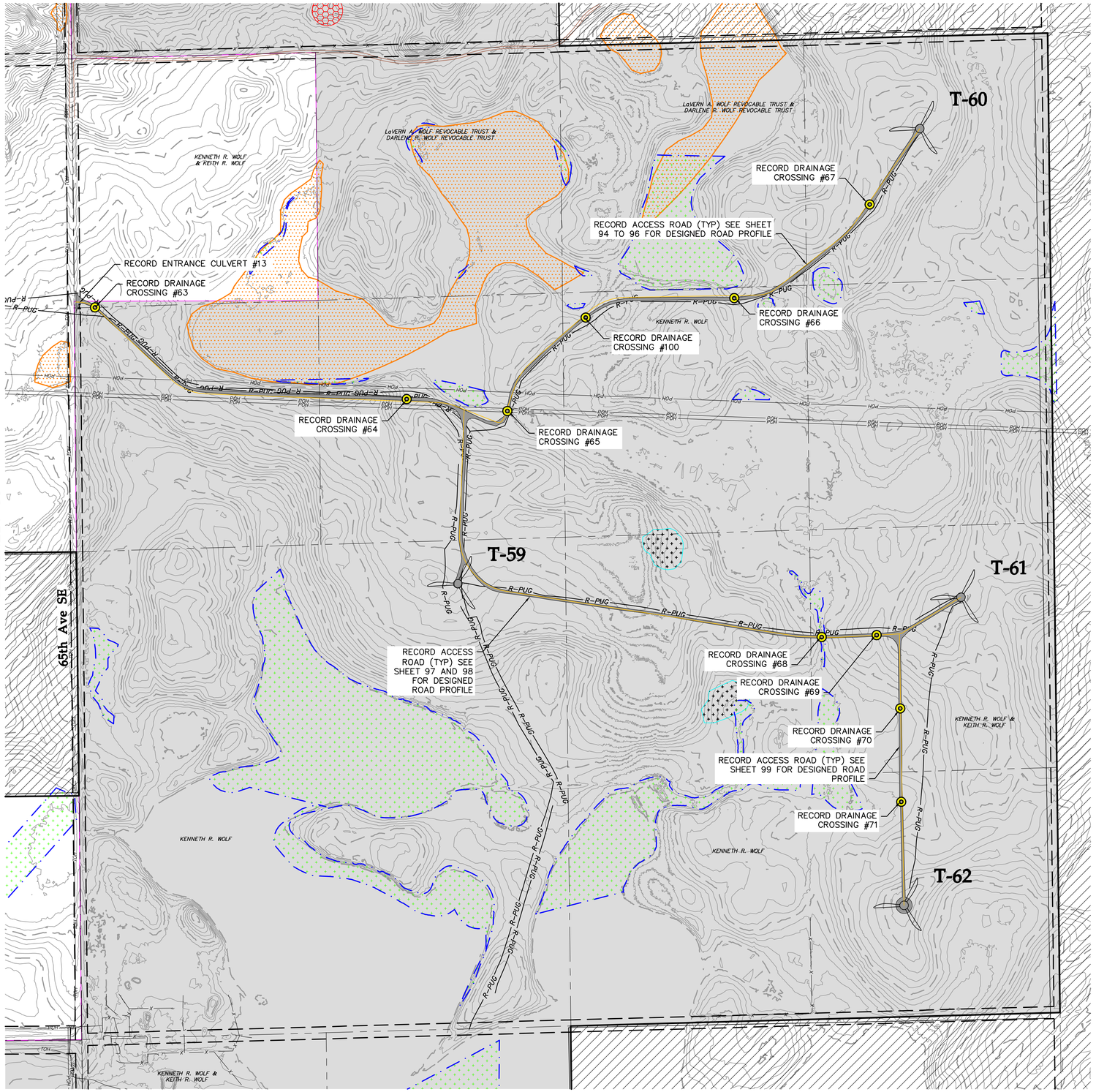

SEE SHEET 30

SEE SHEET 35

LEGEND:

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Prepared for:

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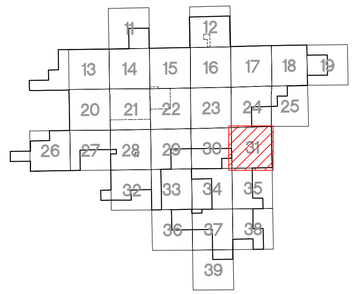
0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-59 - T-62



KEY MAP

Record Plans

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Sheet: 31 OF 119

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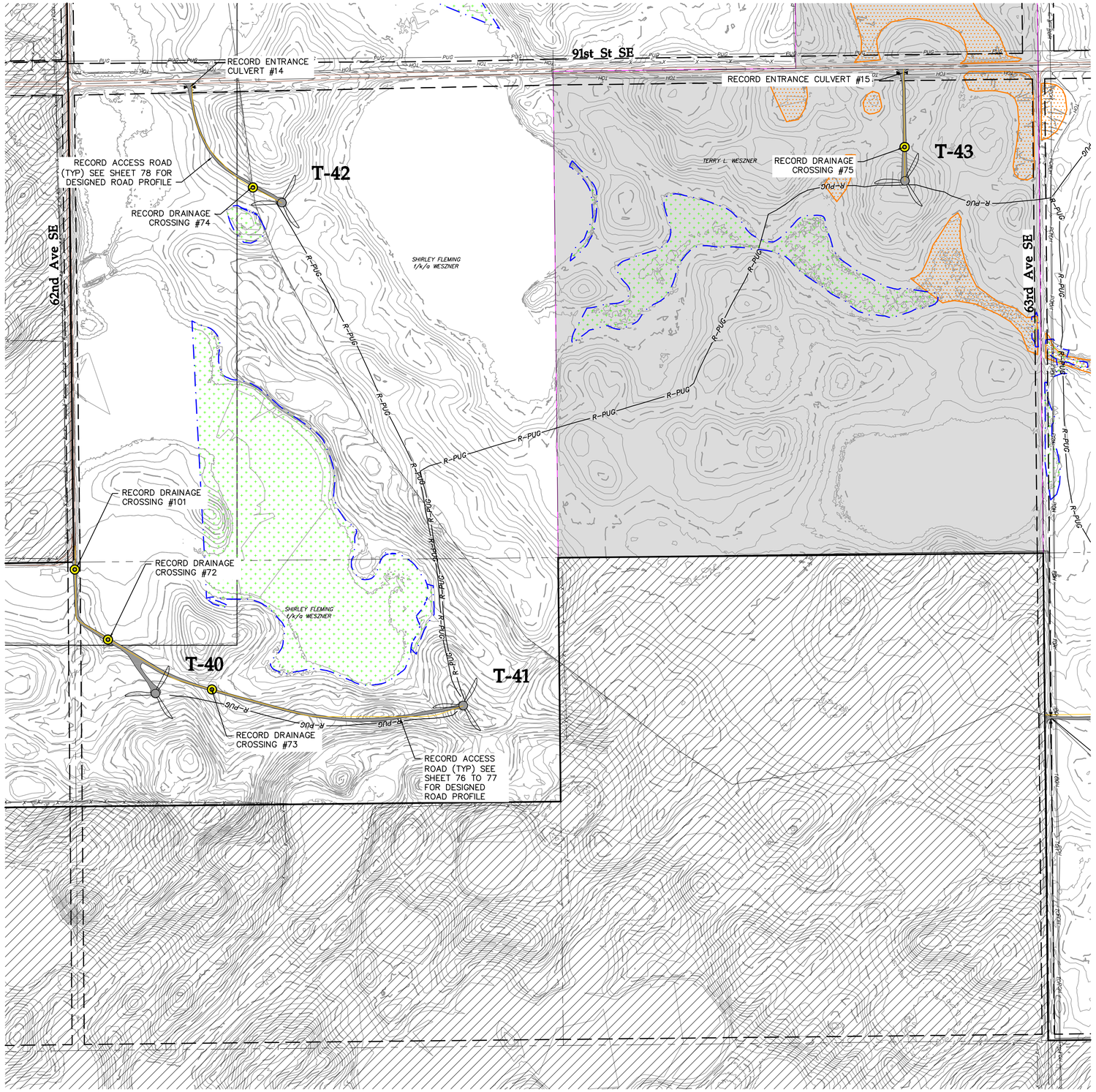

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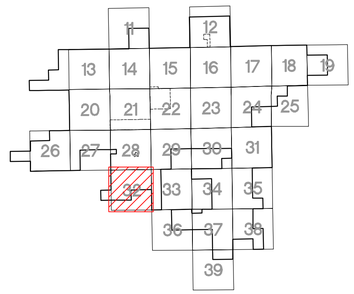

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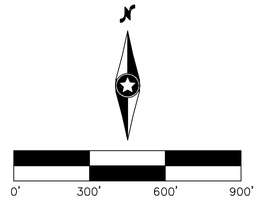

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2028 2nd Avenue NW
West Fargo, ND 58078

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McIntosh County, North Dakota

Civil Site Plan T-40 - T-43

Record Plans

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Sheet: 32 OF 119

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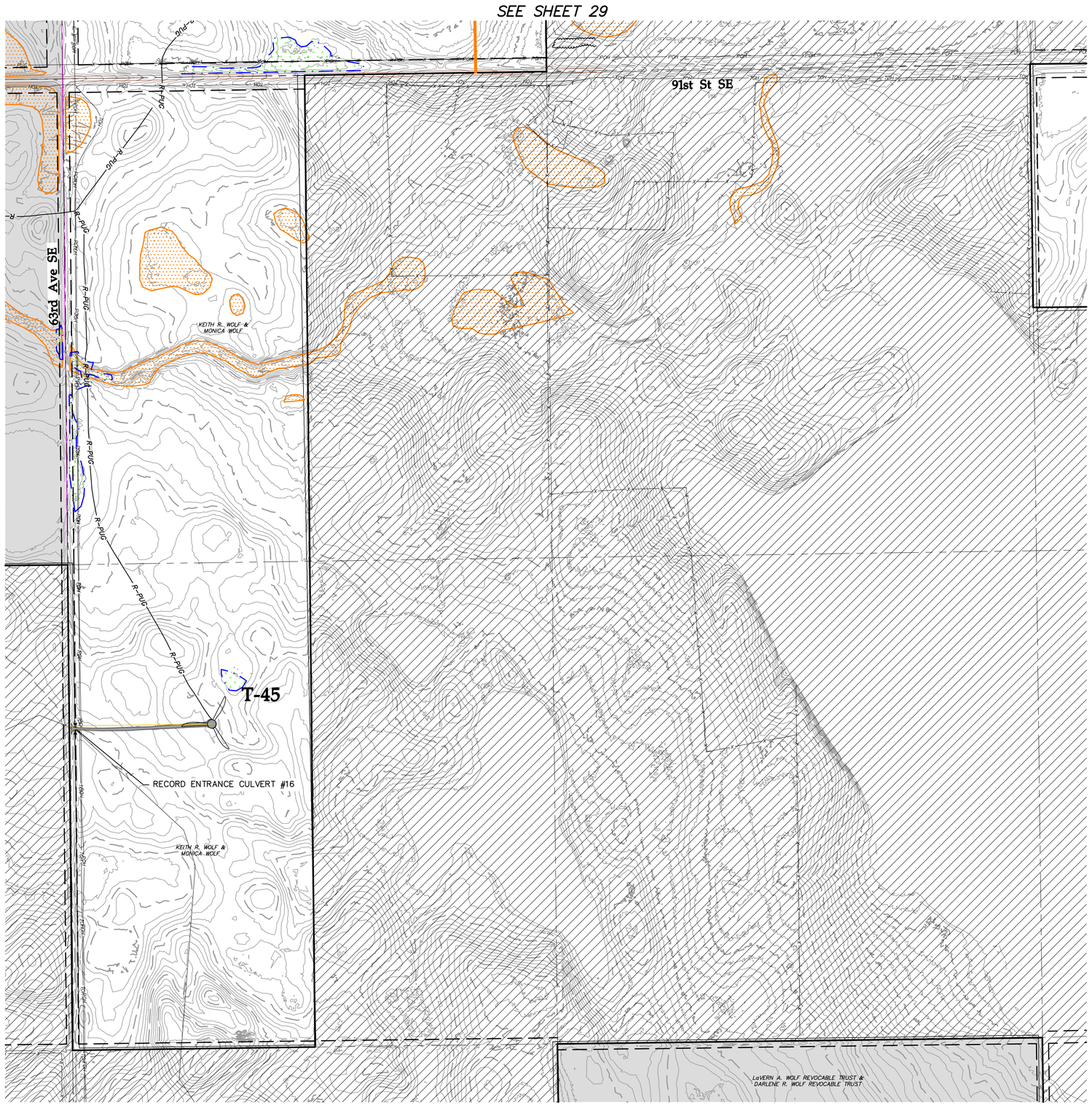

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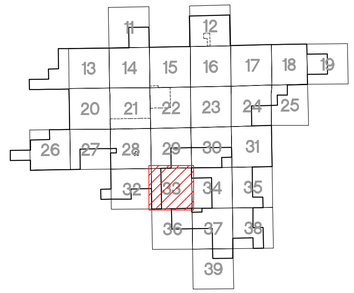

KEY MAP

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Prepared for:

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2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-45

Record Plans

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Sheet: 33 OF 119

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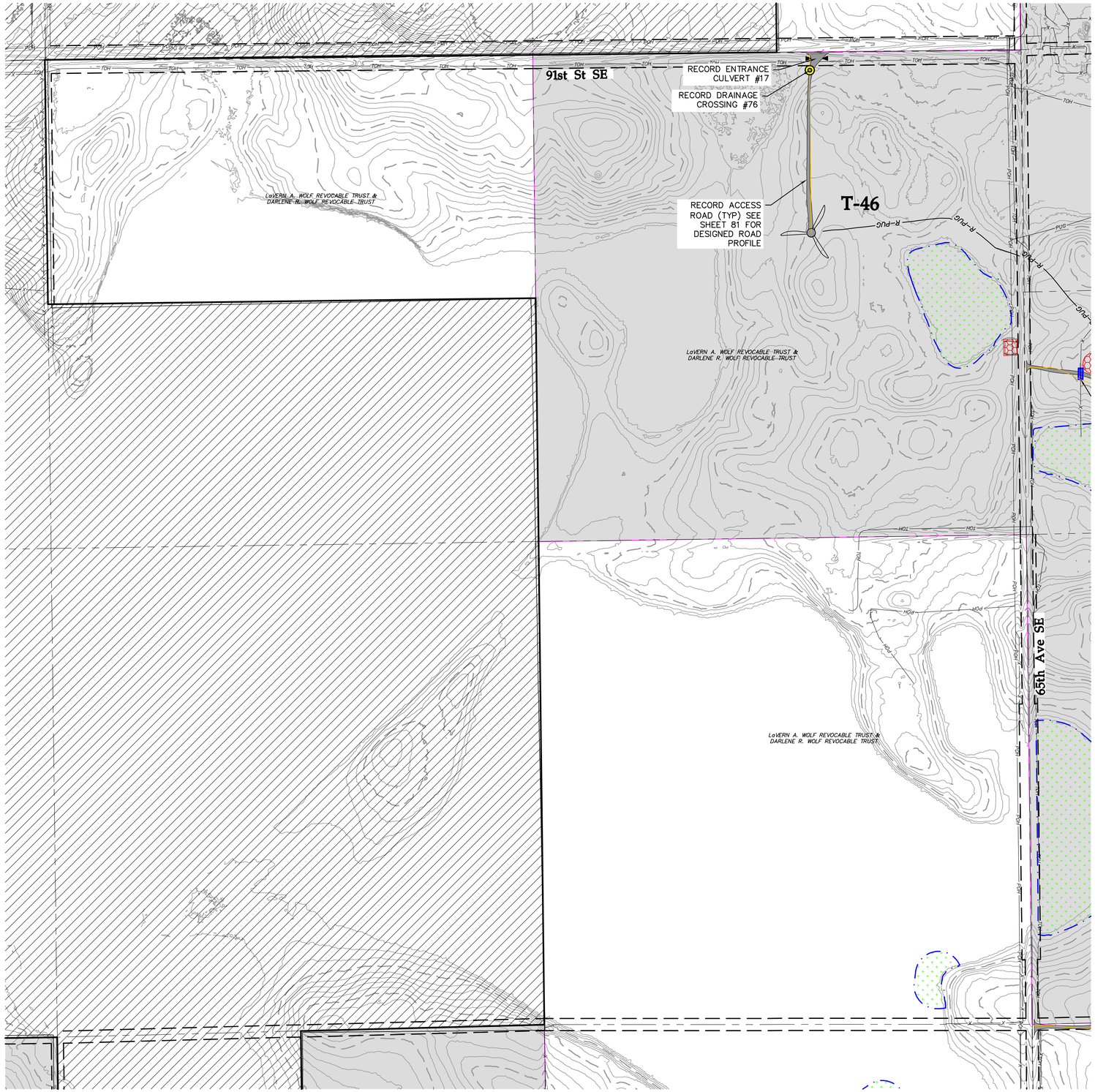

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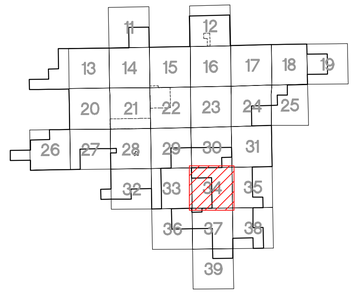

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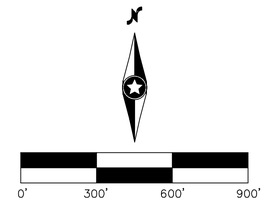

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Civil Site Plan T-46

Record Plans

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Sheet: 34 OF 119

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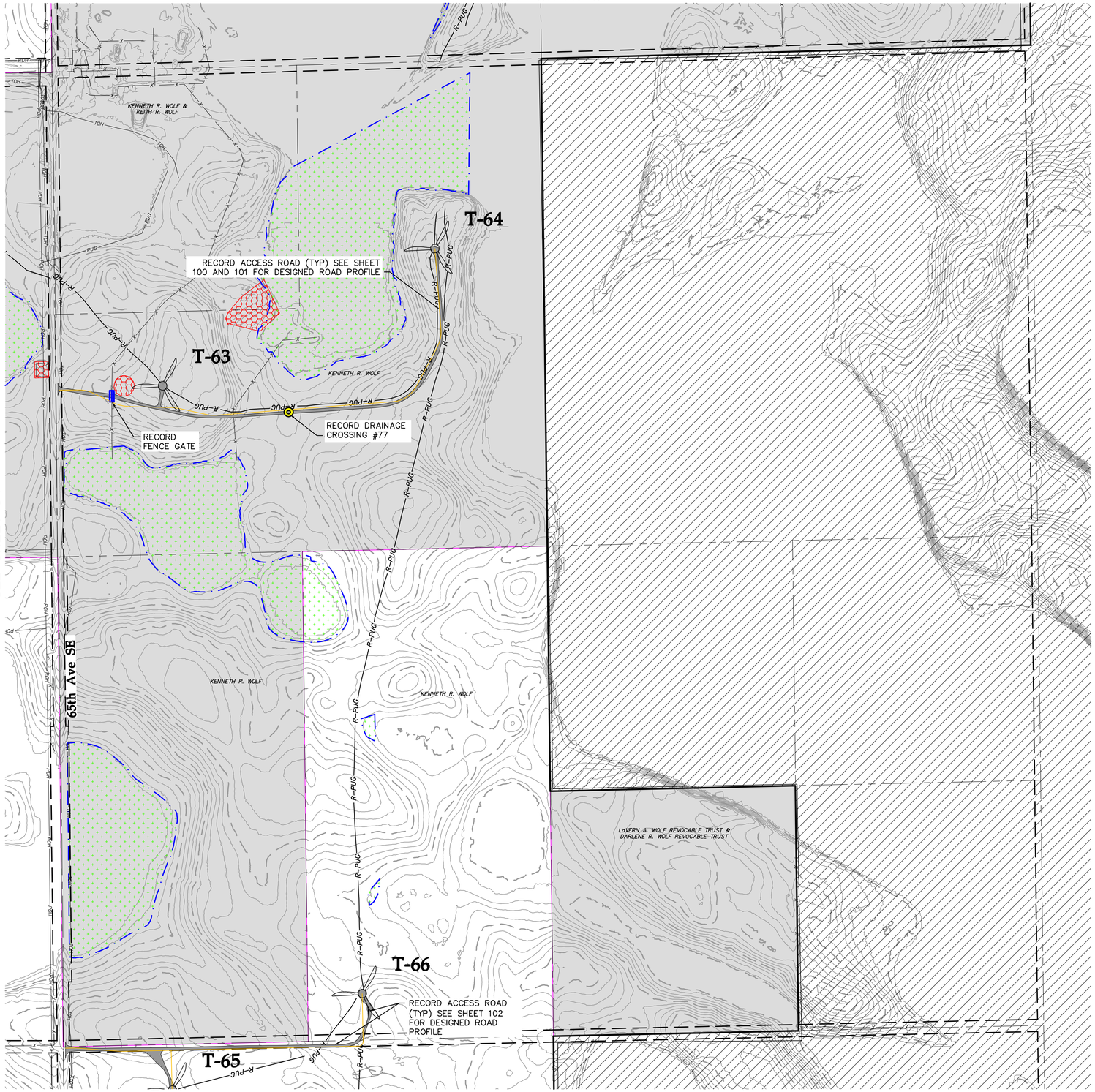

SEE SHEET 34

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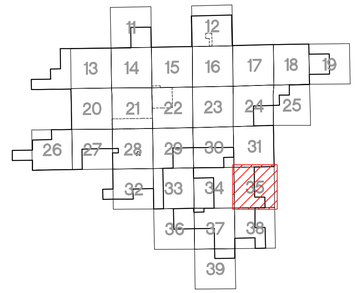

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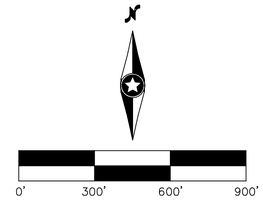

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Prepared for:

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West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-63 - T-64, T-66

Record Plans

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Sheet: 35 OF 119

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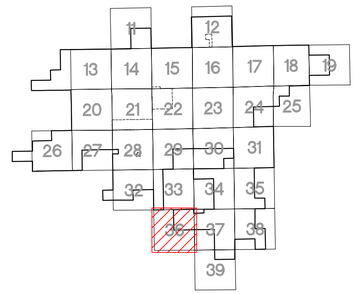

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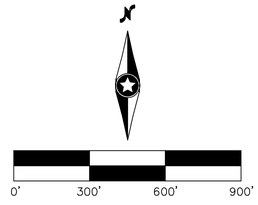

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Revisions:

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0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
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3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-49 - T-50

Record Plans

Date: 11/20/2020
Sheet: 36 OF 119

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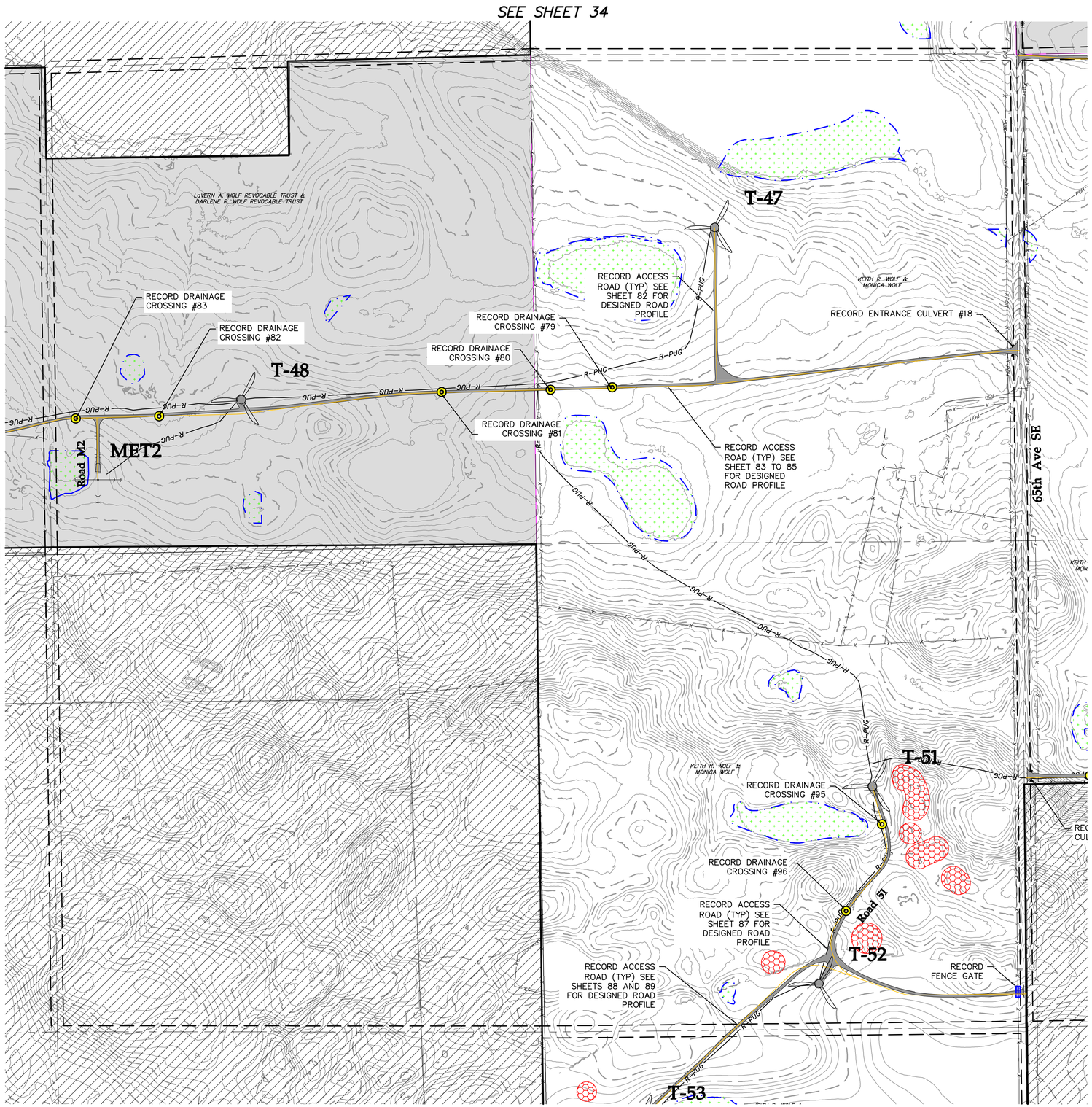

LEGEND:

- RECORD TURBINE LOCATION
- T-XX — RECORD TURBINE NUMBER
- DESIGNED ACCESS ROAD CENTERLINE
- RECORD ACCESS ROAD
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- EXISTING ROAD
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- EXISTING PARCEL LINES
- EXISTING FENCE
- PUG — EXISTING UNDERGROUND POWER
- POH — EXISTING OVERHEAD POWER
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- DELINEATED WETLANDS
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- ARCHEOLOGICAL SITE – NO IMPACTS
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- PIPING PLOVER HABITAT BUFFER
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- OUT OF PROJECT BOUNDARY
- RECORD DRAINAGE CROSSING
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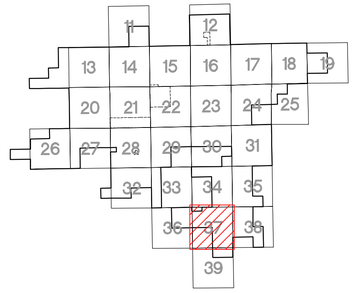

KEY MAP

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

0' 300' 600' 900'

Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-47 - T-48, T-51 - T-52

Record Plans

Date: 11/20/2020
Sheet: 37 OF 119

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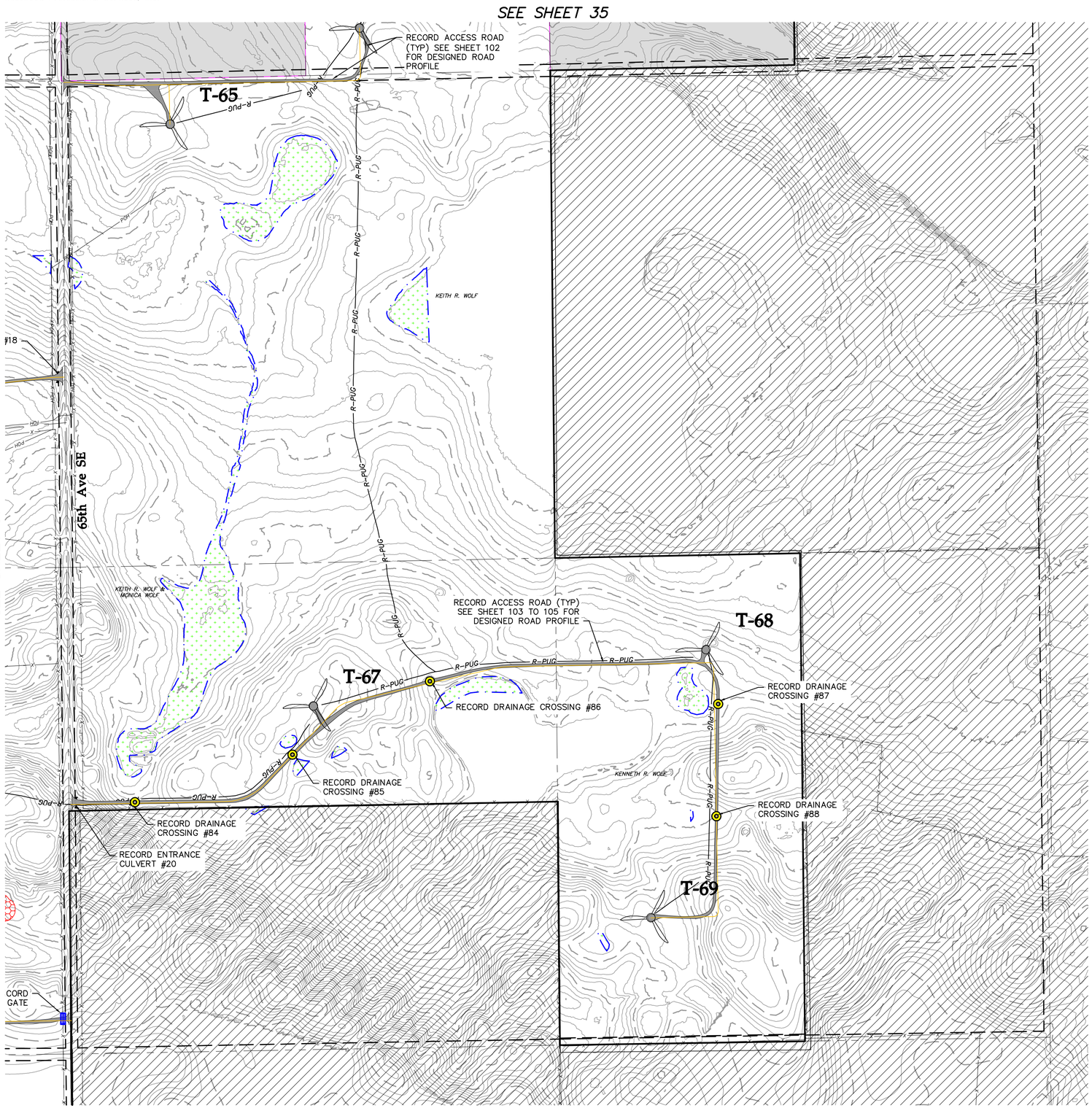

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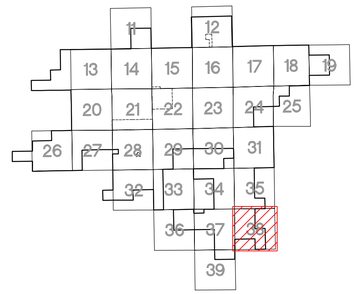

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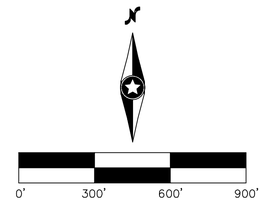

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Prepared for:

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2028 2nd Avenue NW
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Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-65, T-67 - T-69

Record Plans

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Sheet: 38 OF 119

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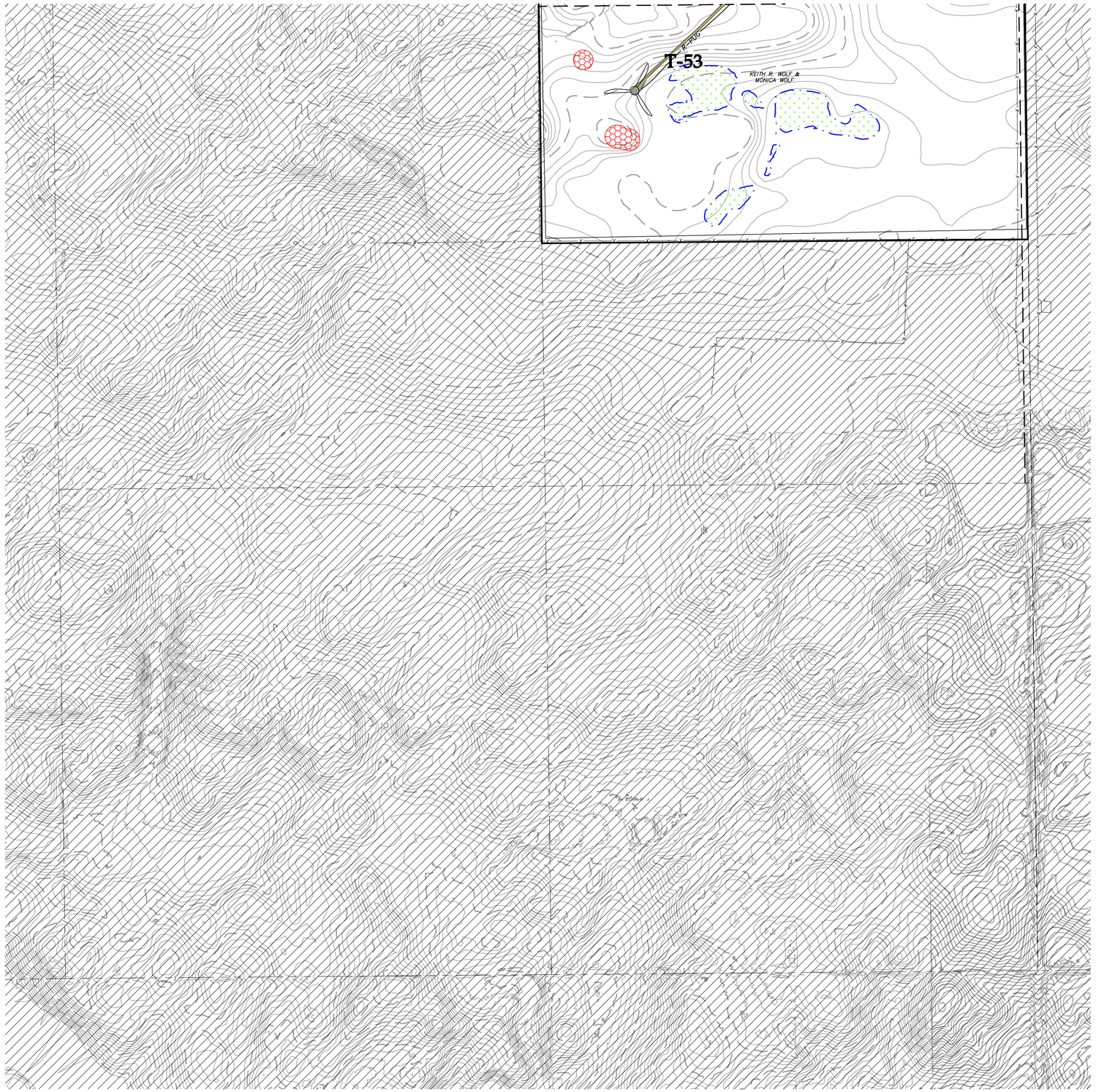

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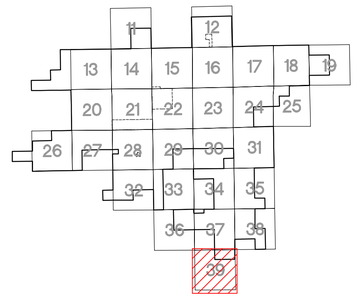

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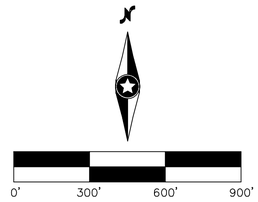

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2028 2nd Avenue NW
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Merricourt Wind Project

McIntosh County, North Dakota

Civil Site Plan T-53

Record Plans

Date: 11/20/2020
Sheet: 39 OF 119

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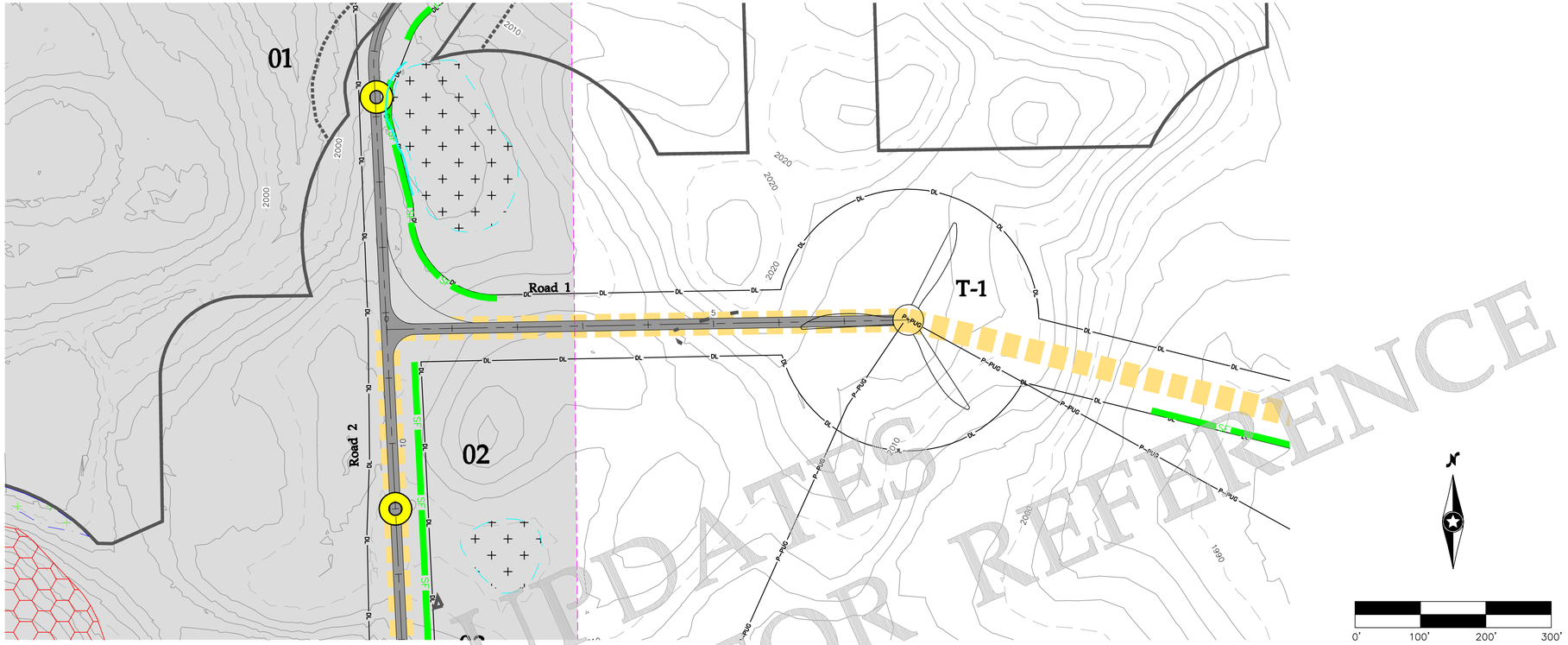

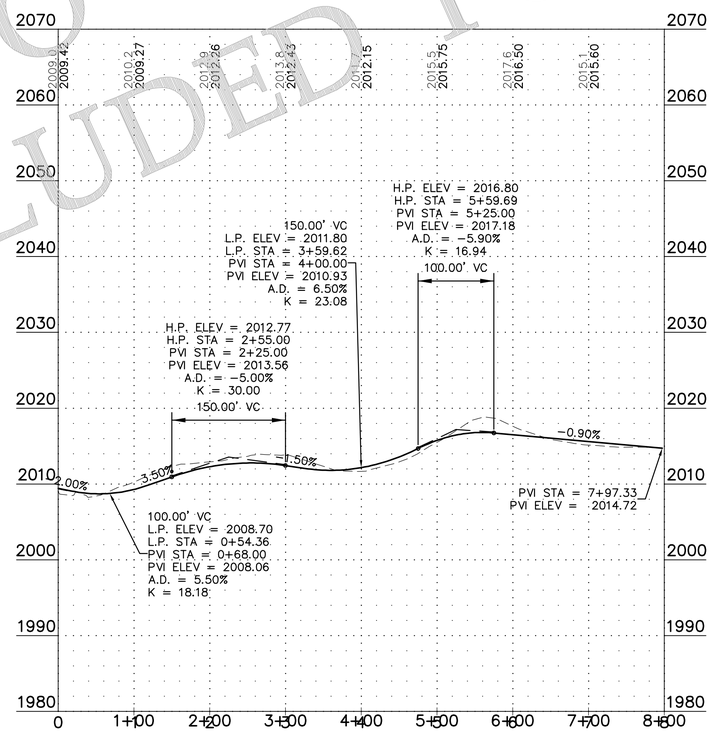

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West Fargo, ND 58078

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- USFWS EASMENT
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- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 1 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020

Sheet: 40 OF 119

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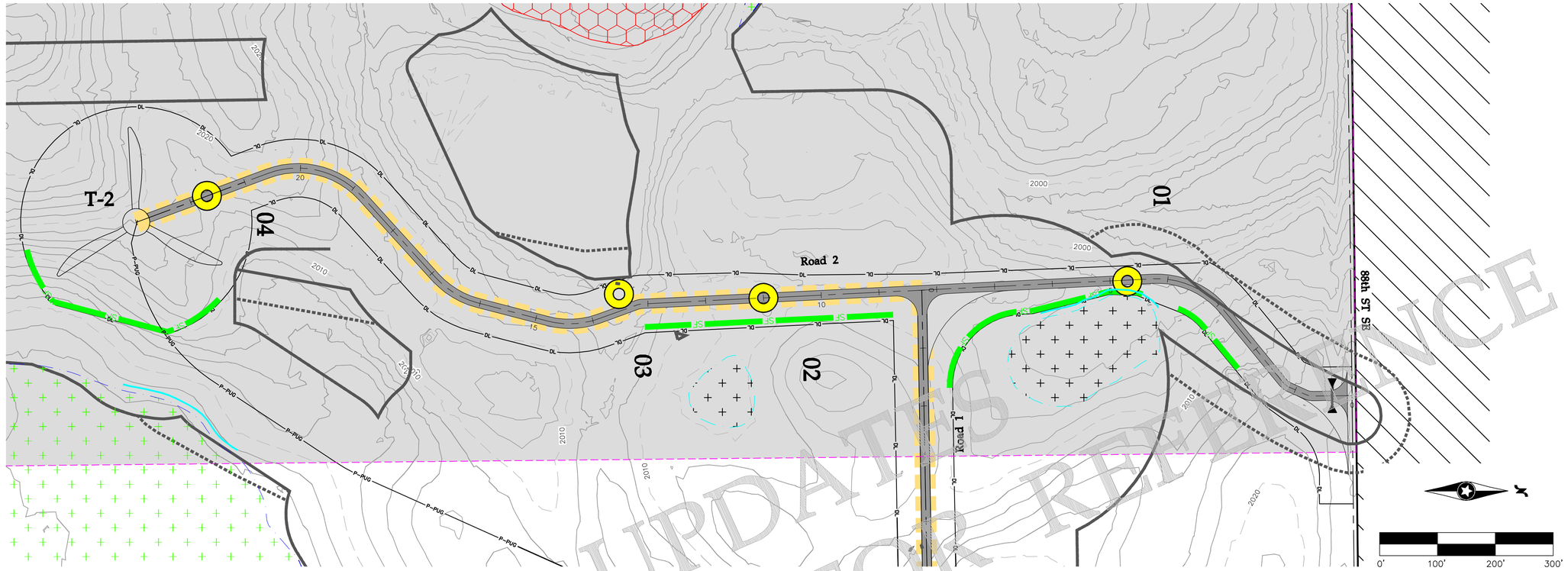

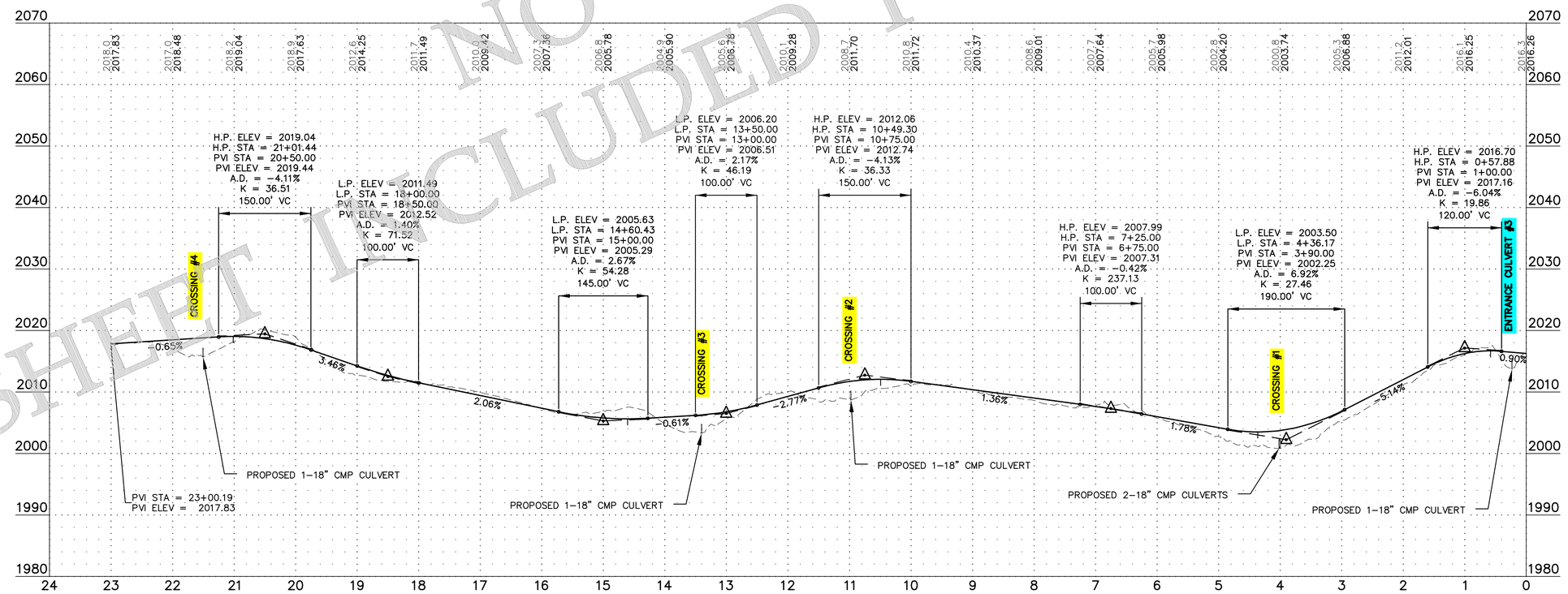

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Prepared for:

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2028 2nd Avenue NW
West Fargo, ND 58078

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McIntosh County, North Dakota

Road 2 - Sta. 0+00 to End

Record Plans

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Sheet: 41 OF 119

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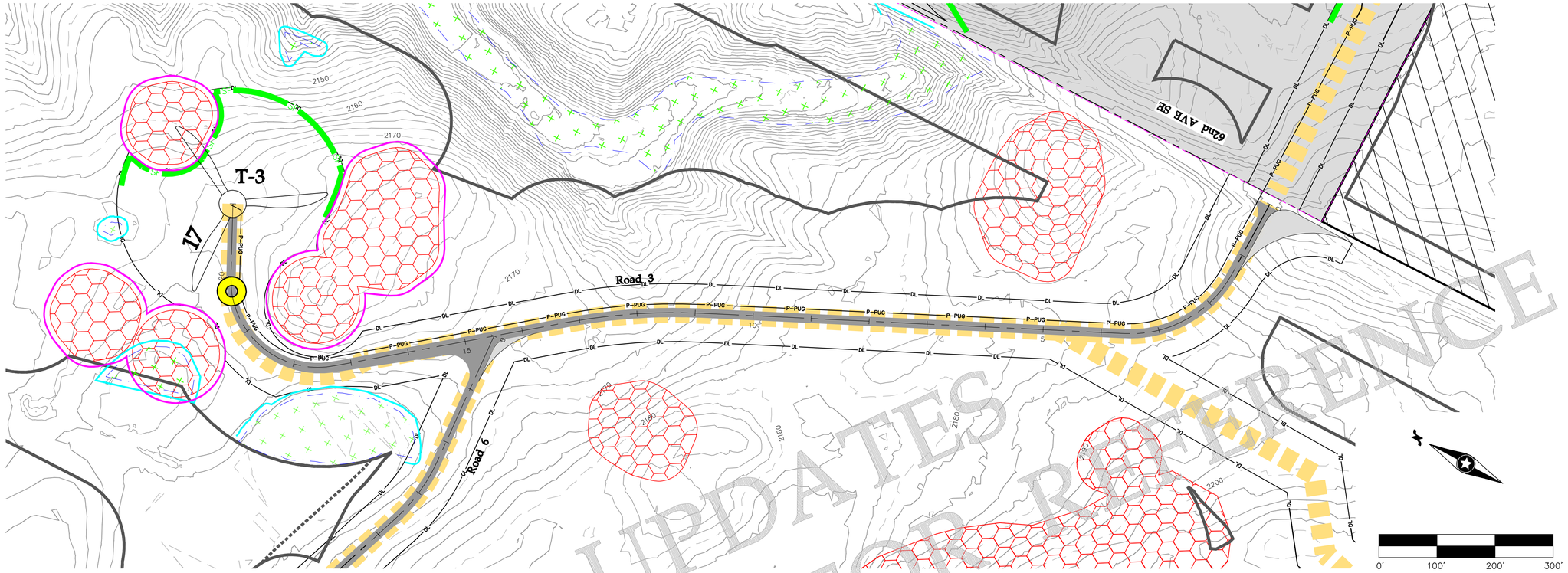

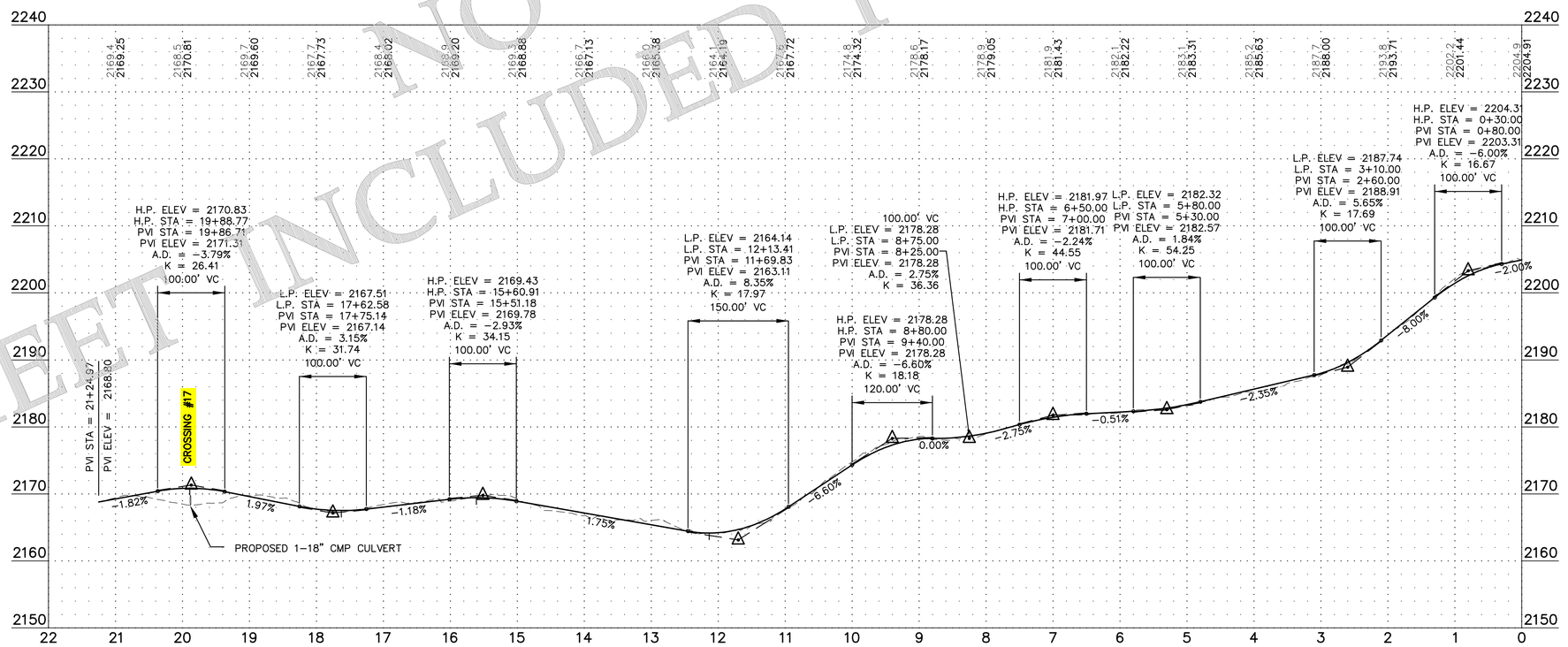

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West Fargo, ND 58078

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- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 3 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020

Sheet: 42 OF 119

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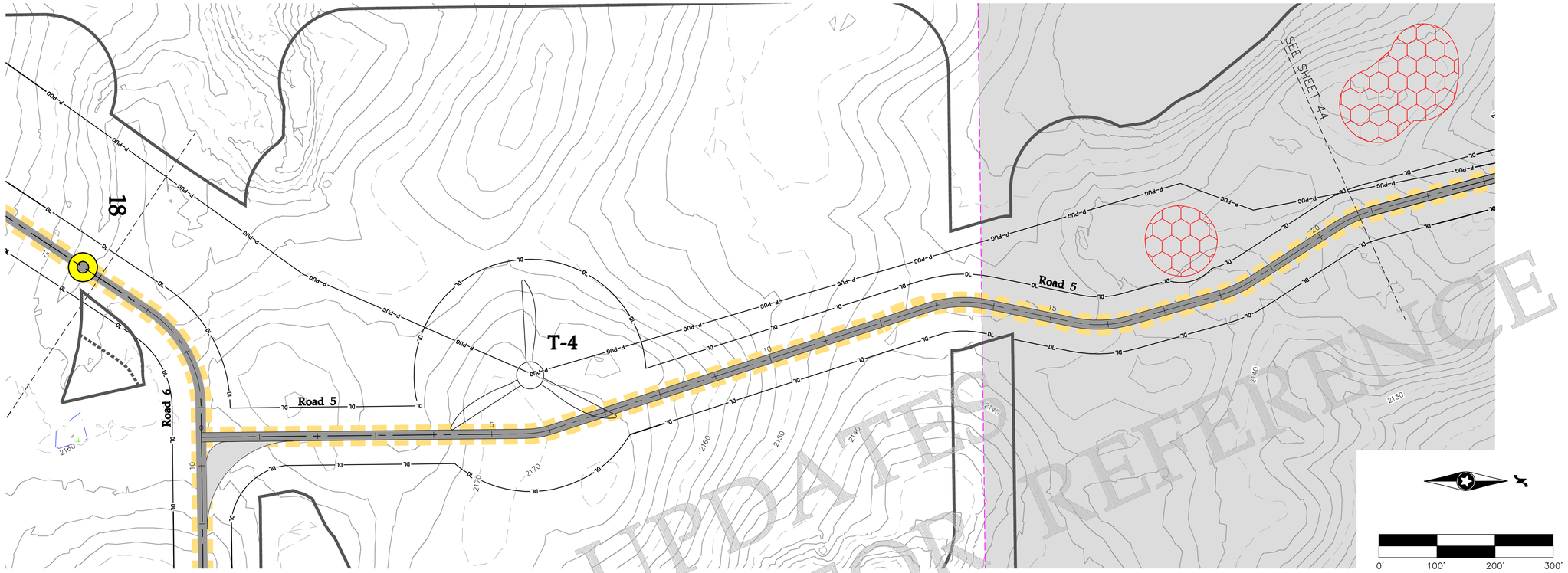

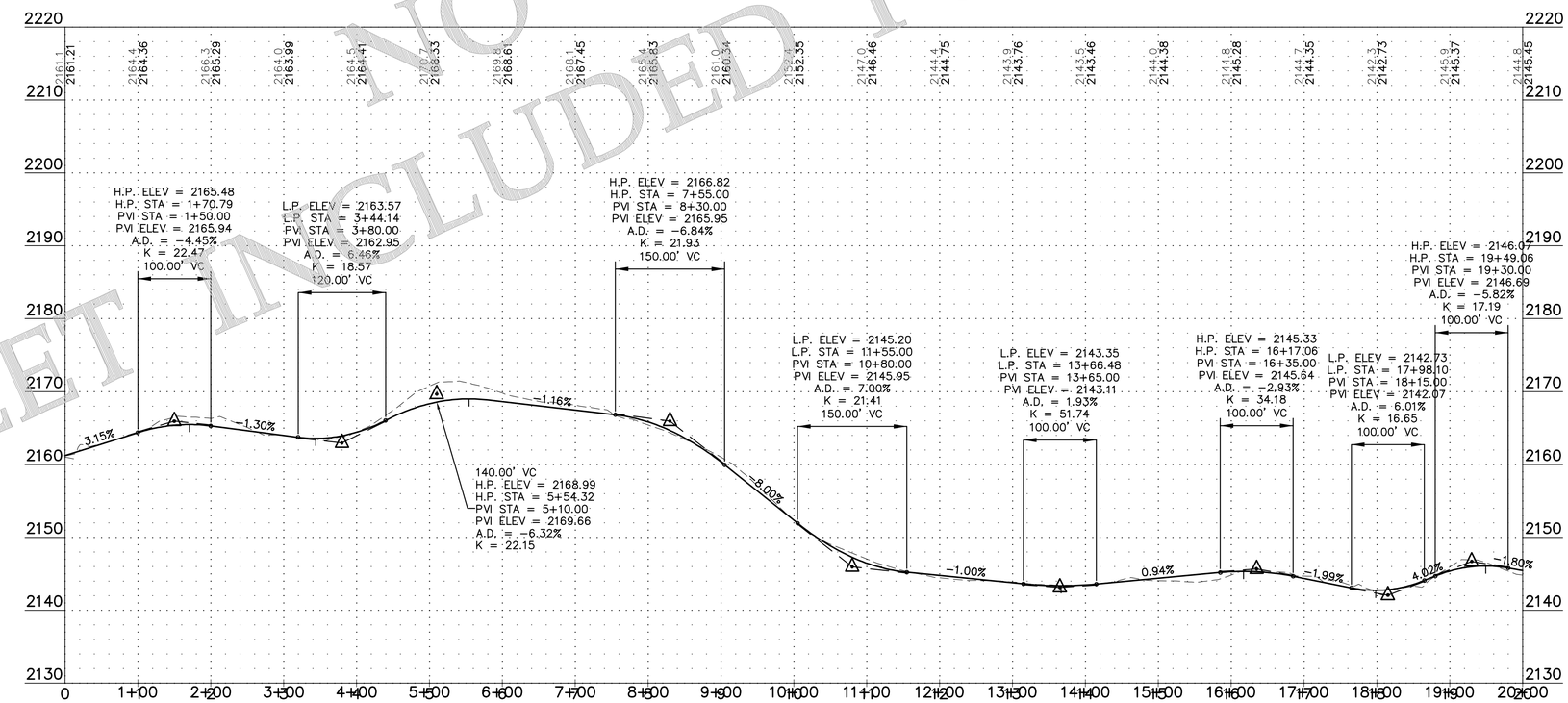

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Merricourt Wind Project

McIntosh County, North Dakota

Road 5 - Sta. 0+00 to 20+00

Record Plans

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Sheet: 43 OF 119

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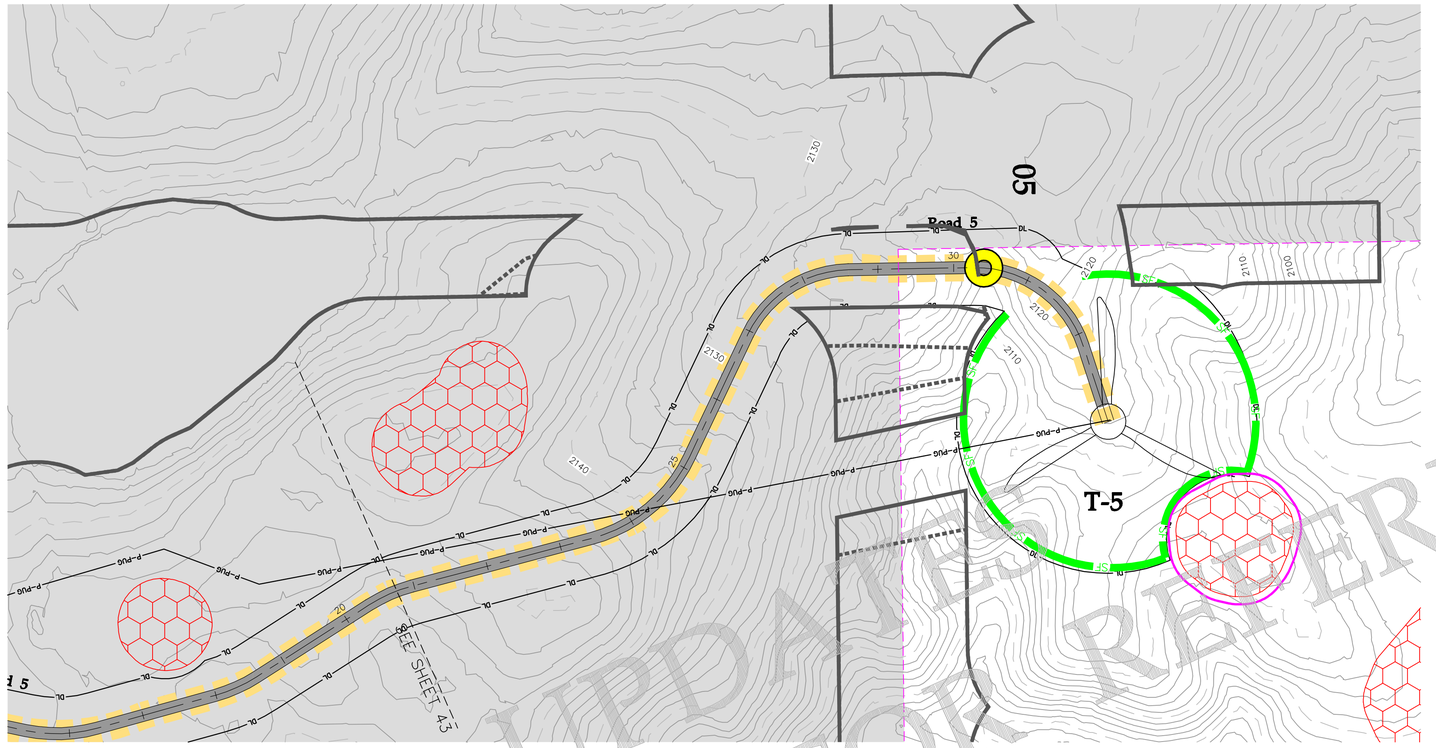

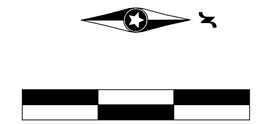

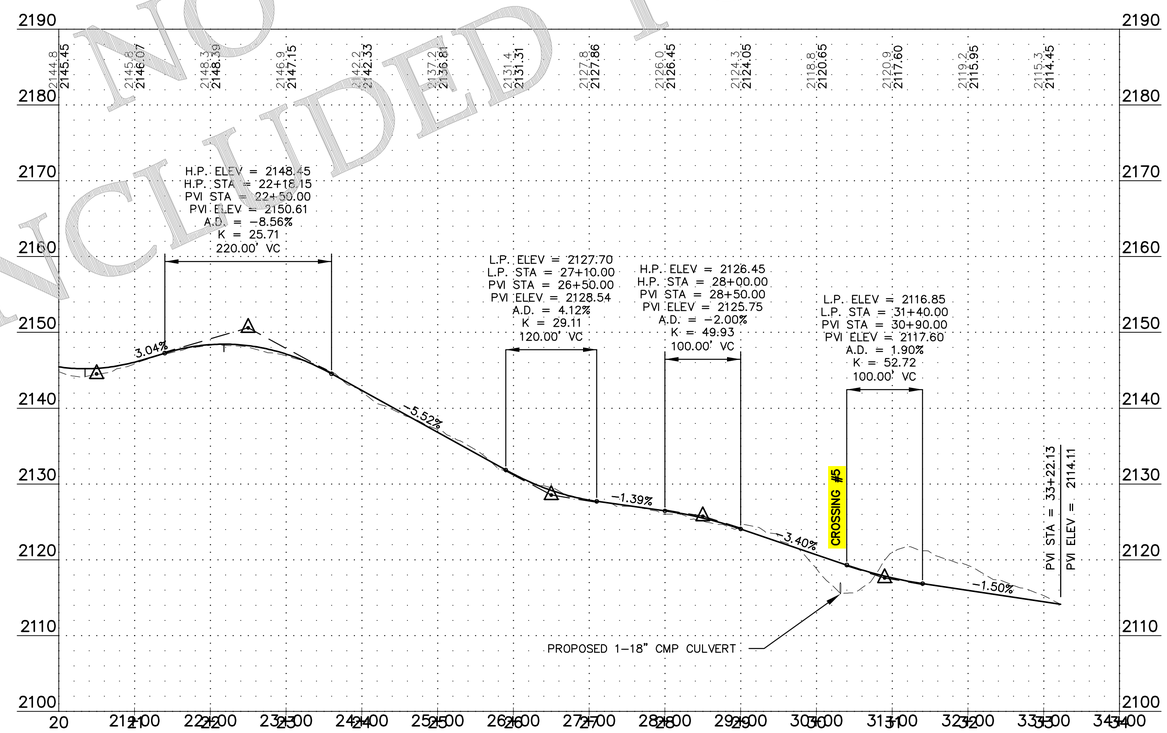

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 5 - Sta. 20+00 to End

Record Plans

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Sheet: 44 OF 119

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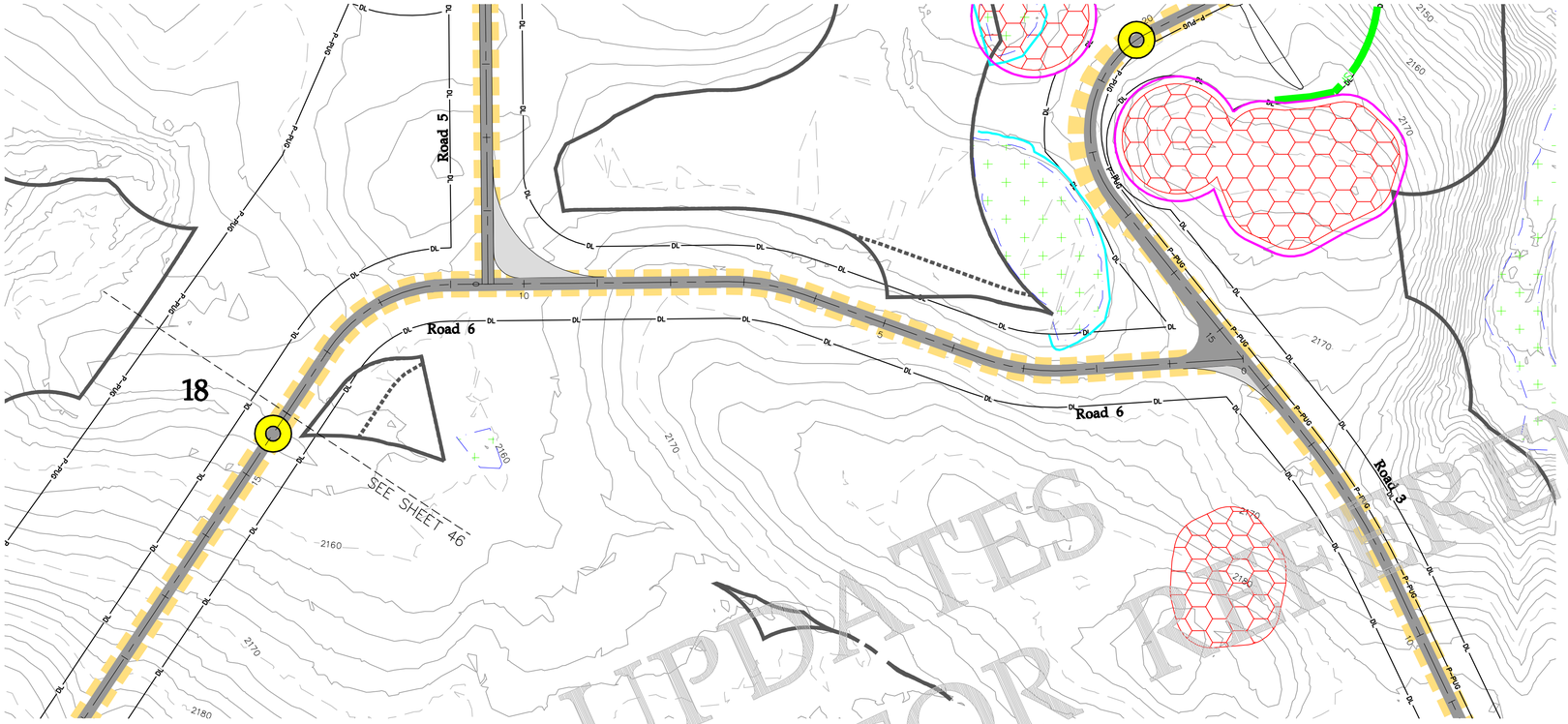

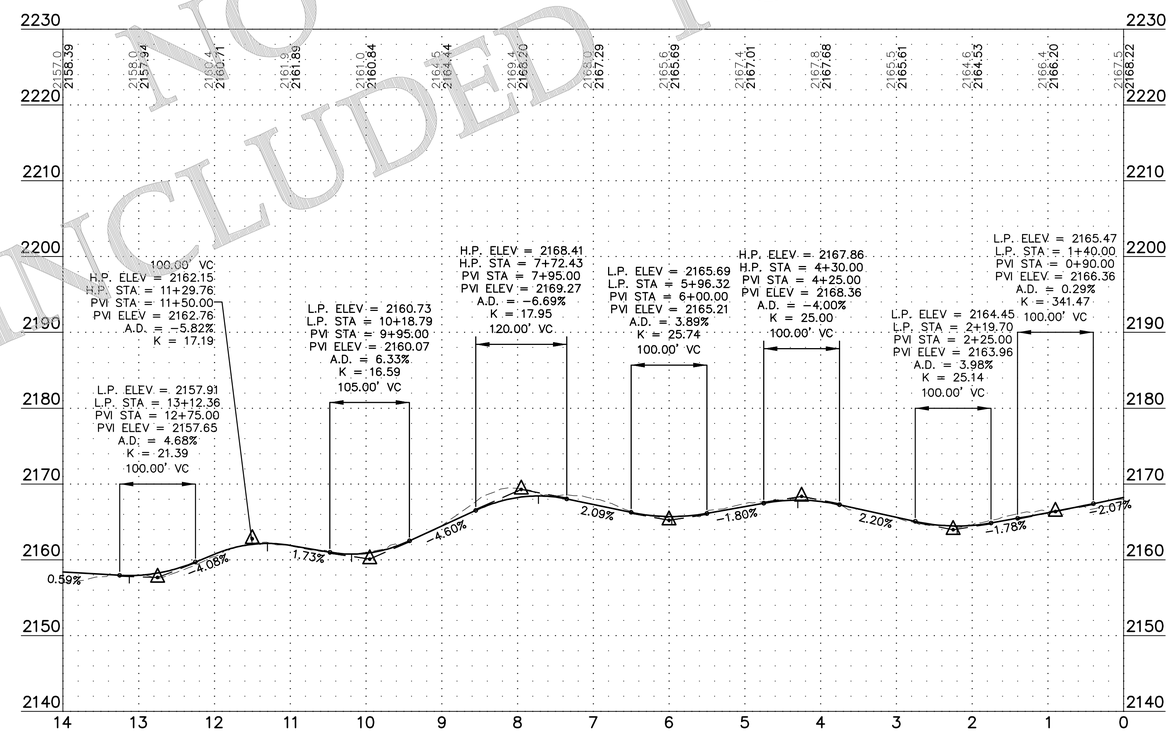

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4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

LEGEND:

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- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 6 - Sta. 0+00 to 14+00

Record Plans

Date: 11/20/2020
Sheet: 45 OF 119

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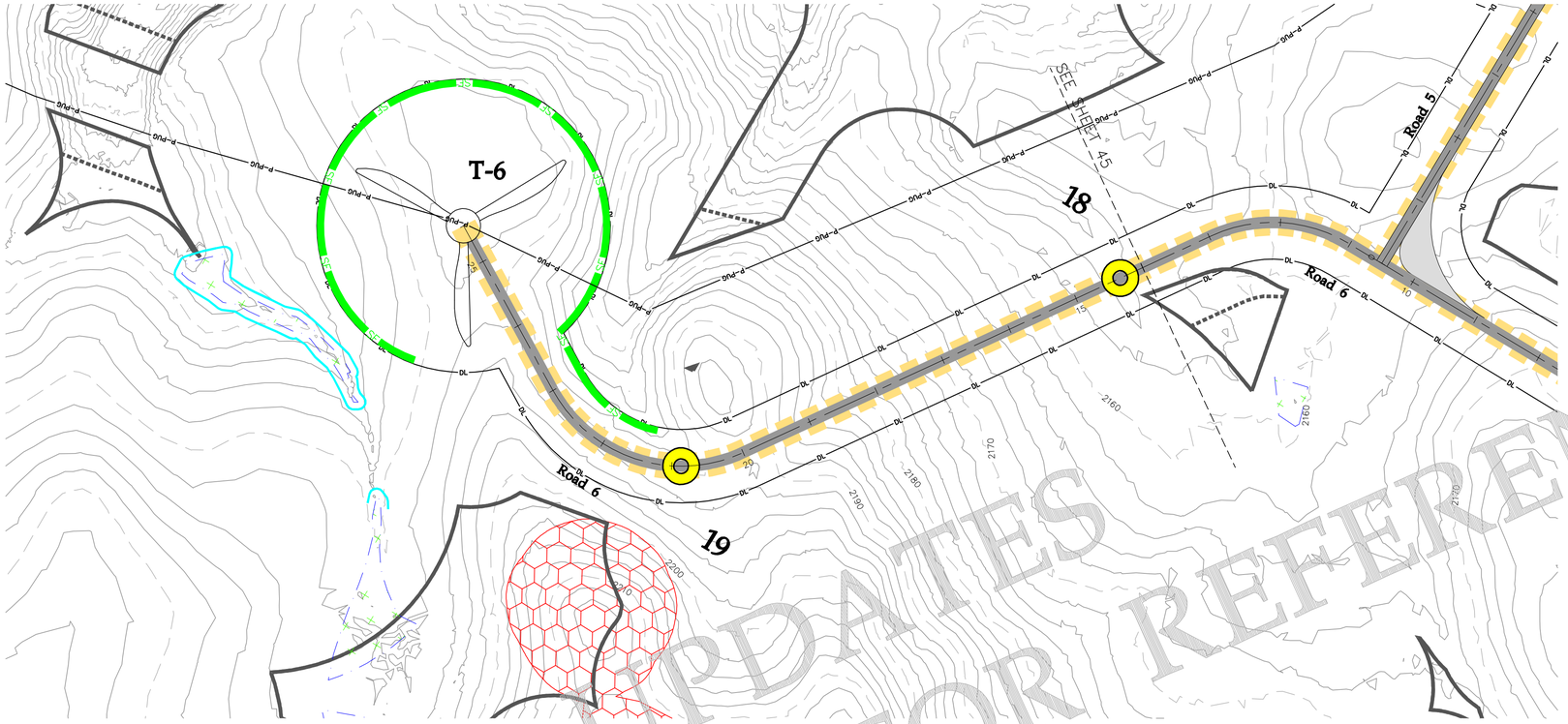

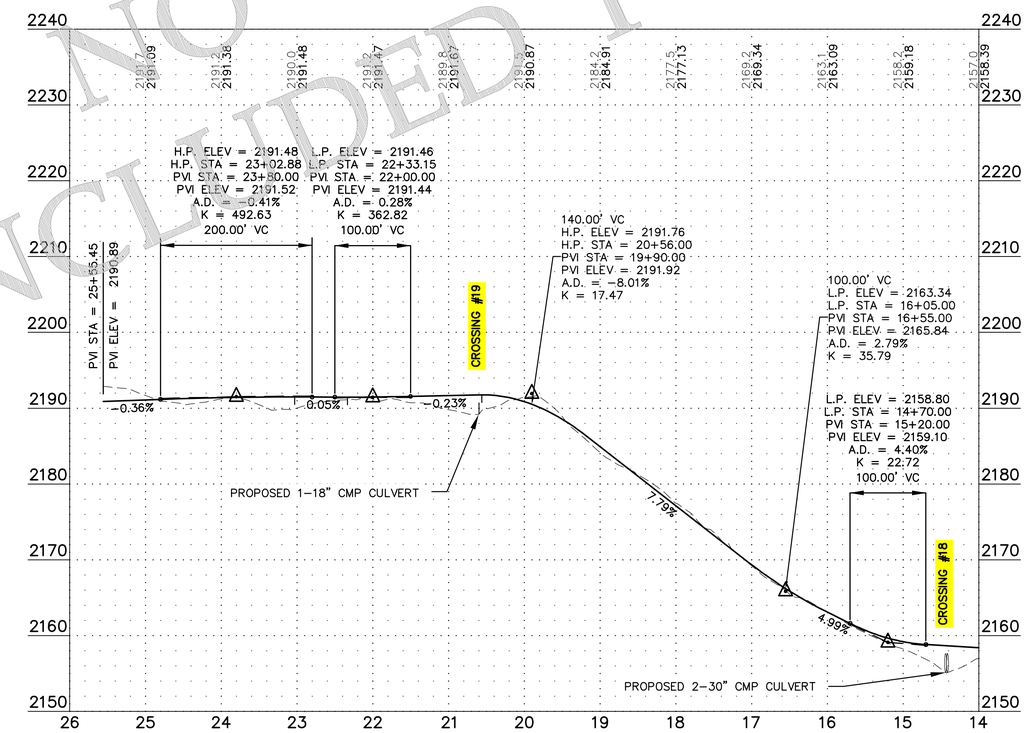

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NO UPDATES

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Merricourt Wind Project

McIntosh County, North Dakota

Road 6 - Sta. 14+00 to End

Record Plans

Date: 11/20/2020
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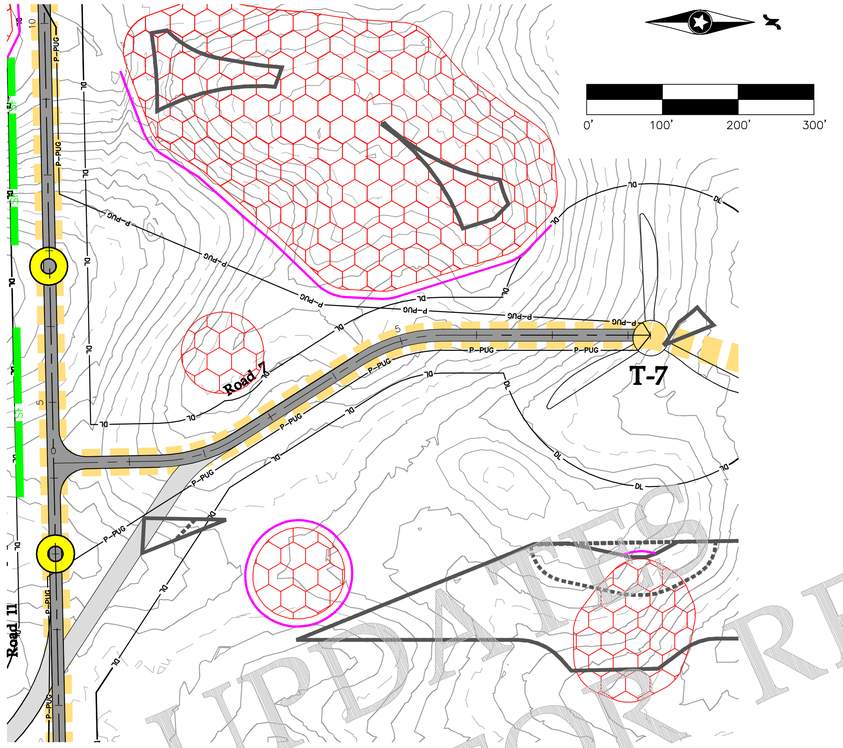

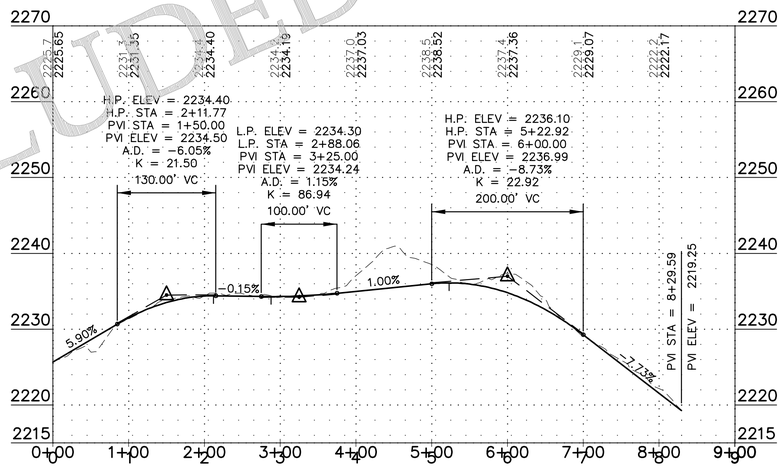

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2028 2nd Avenue NW
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McIntosh County, North Dakota

Road 7 - Sta. 0+00 to End

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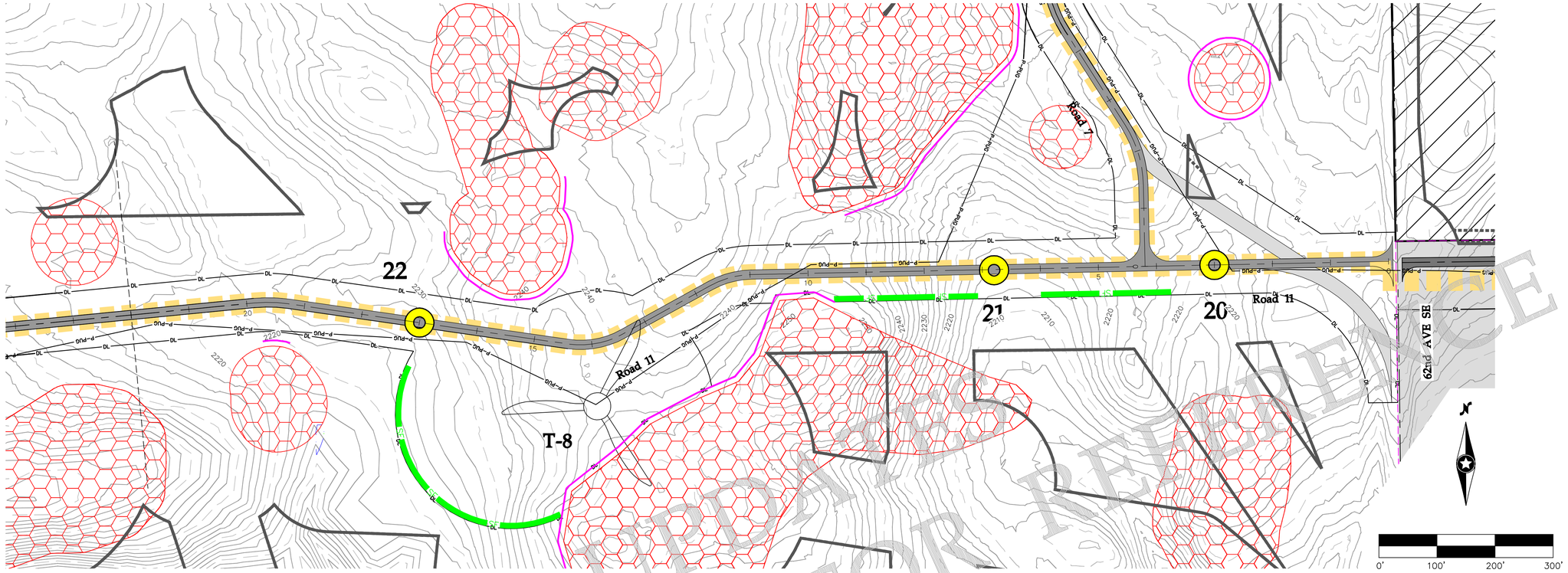

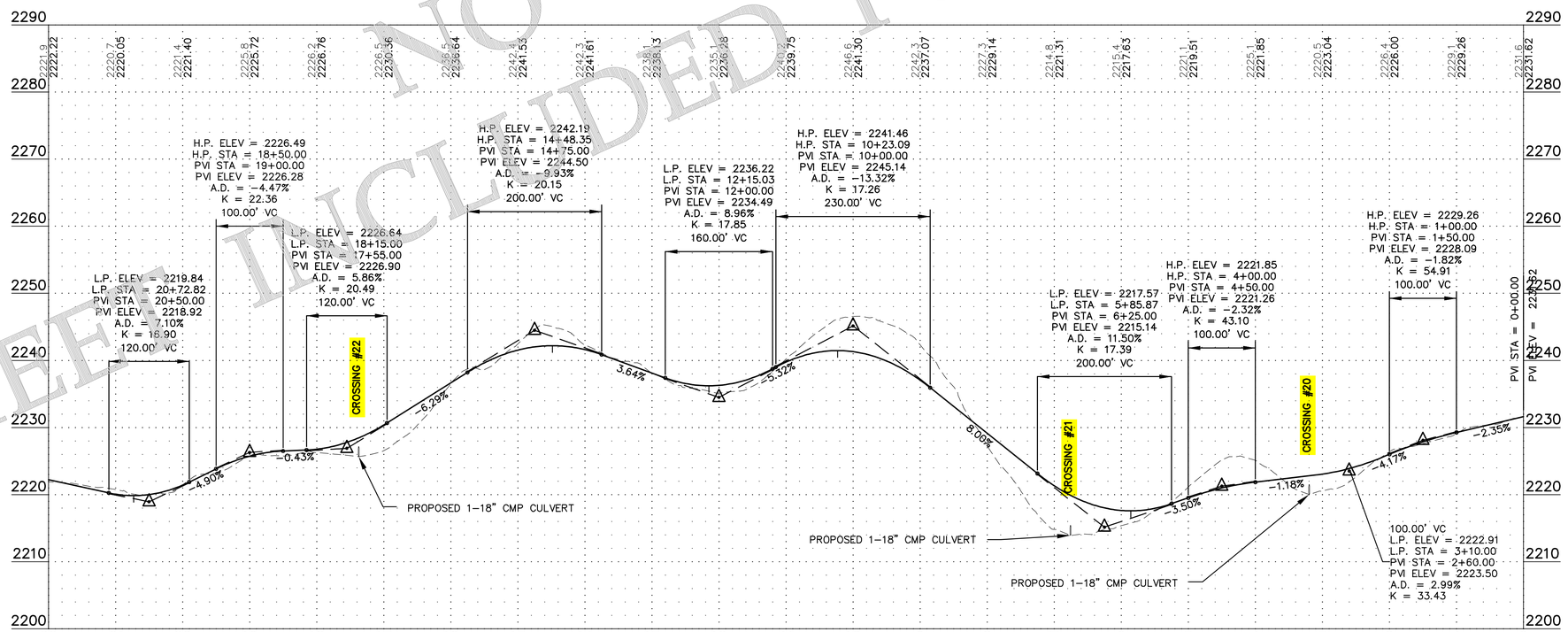

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Merricourt Wind Project

McIntosh County, North Dakota

Road 11 - Sta. 0+00 to 22+00.00

Record Plans

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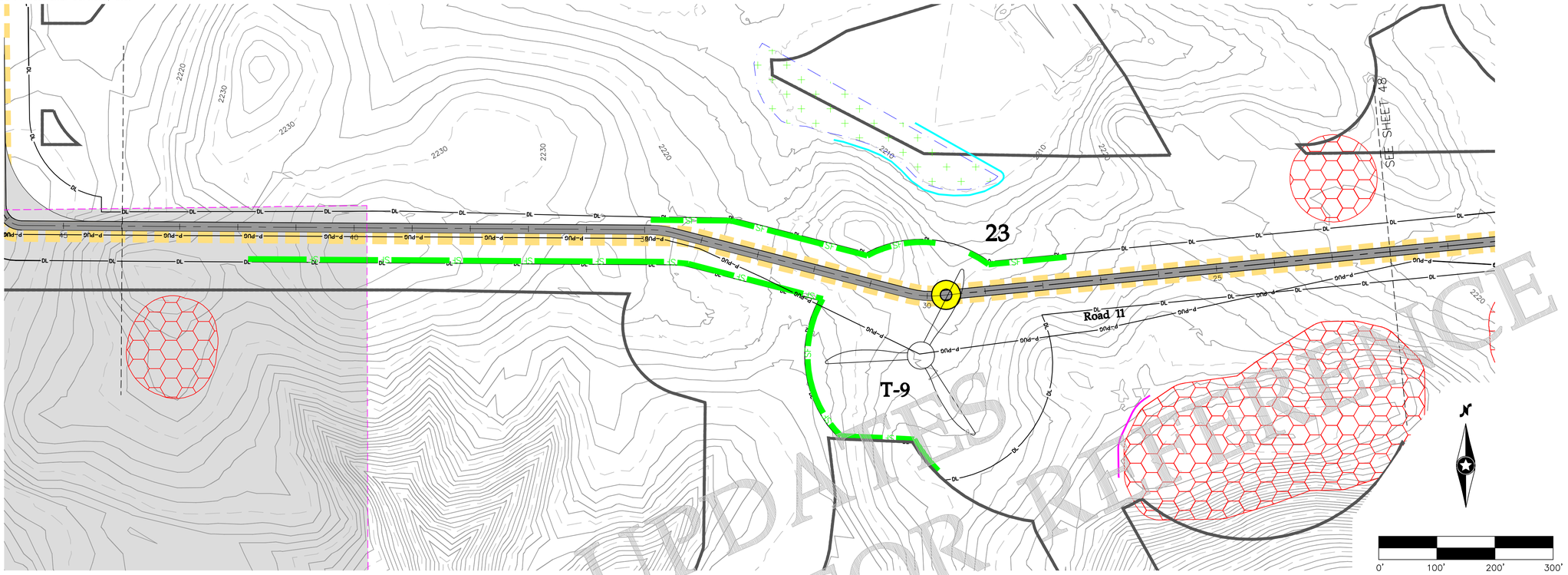

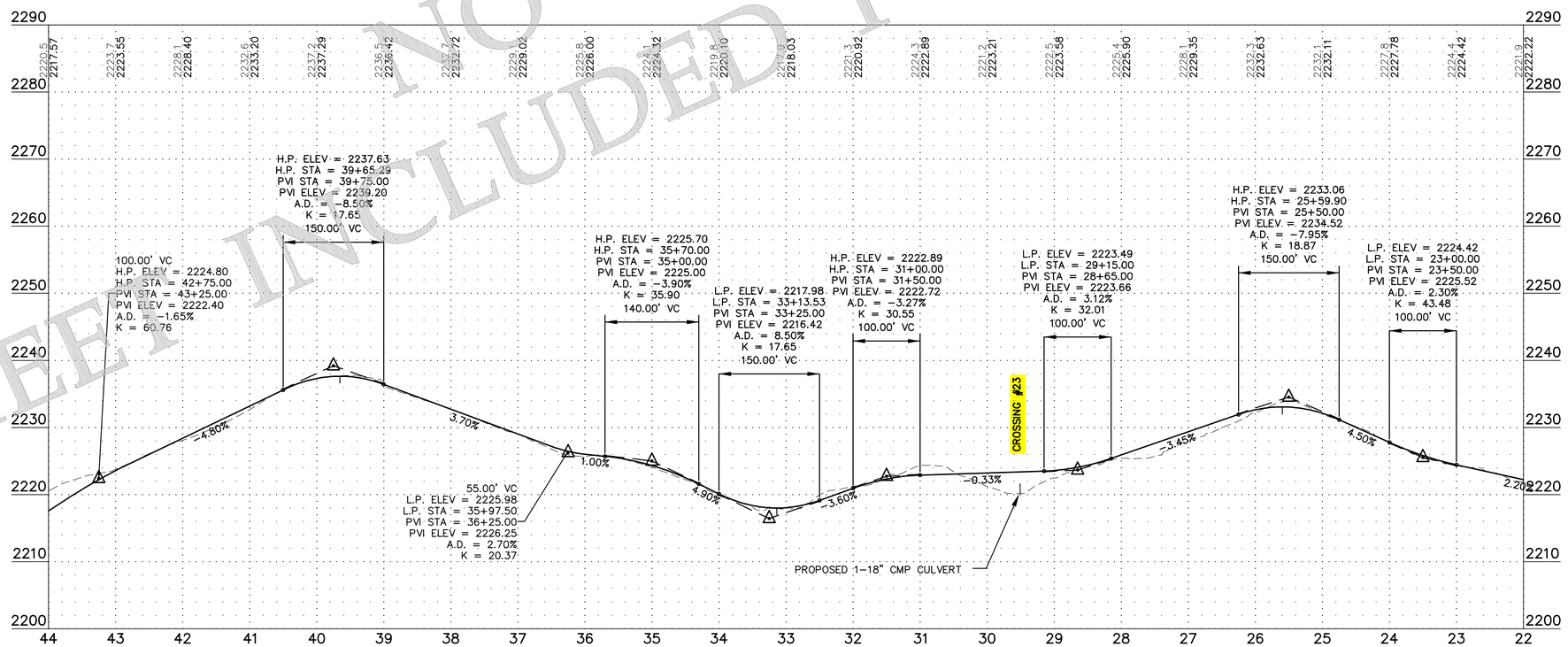

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McIntosh County, North Dakota

Road 11 - Sta. 22+00 to 44+00

Record Plans

Date: 11/20/2020
Sheet: 49 OF 119

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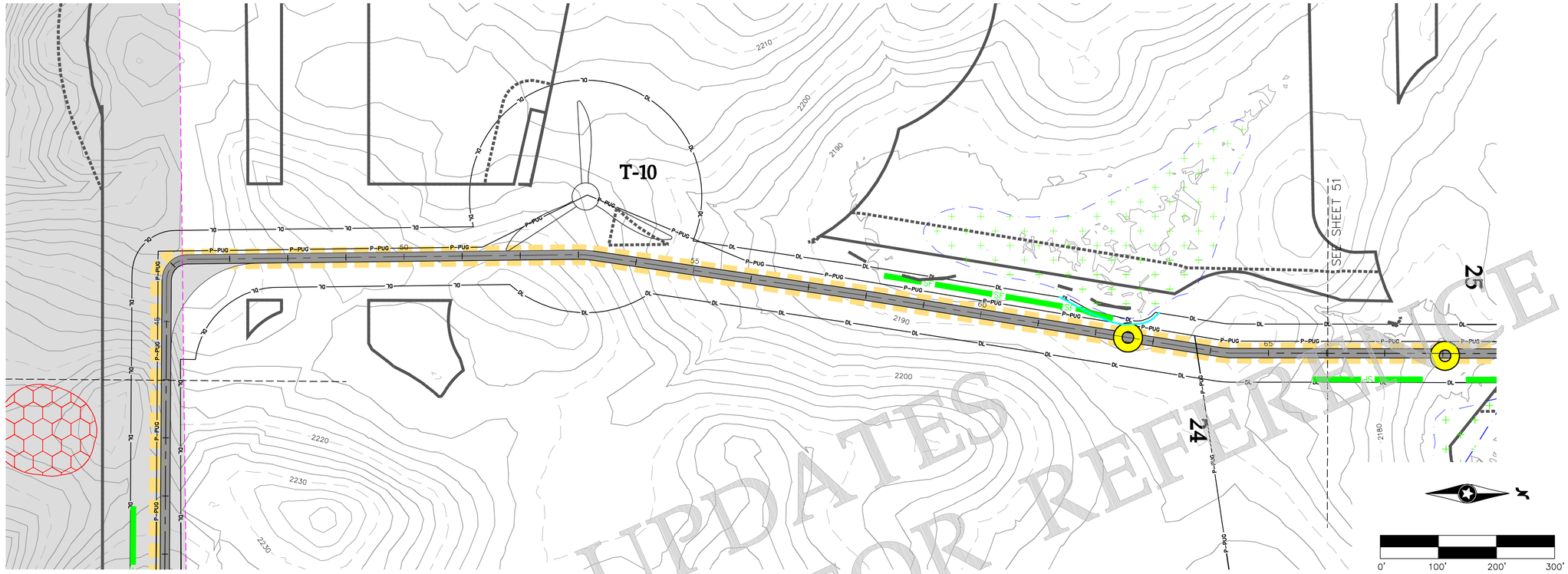

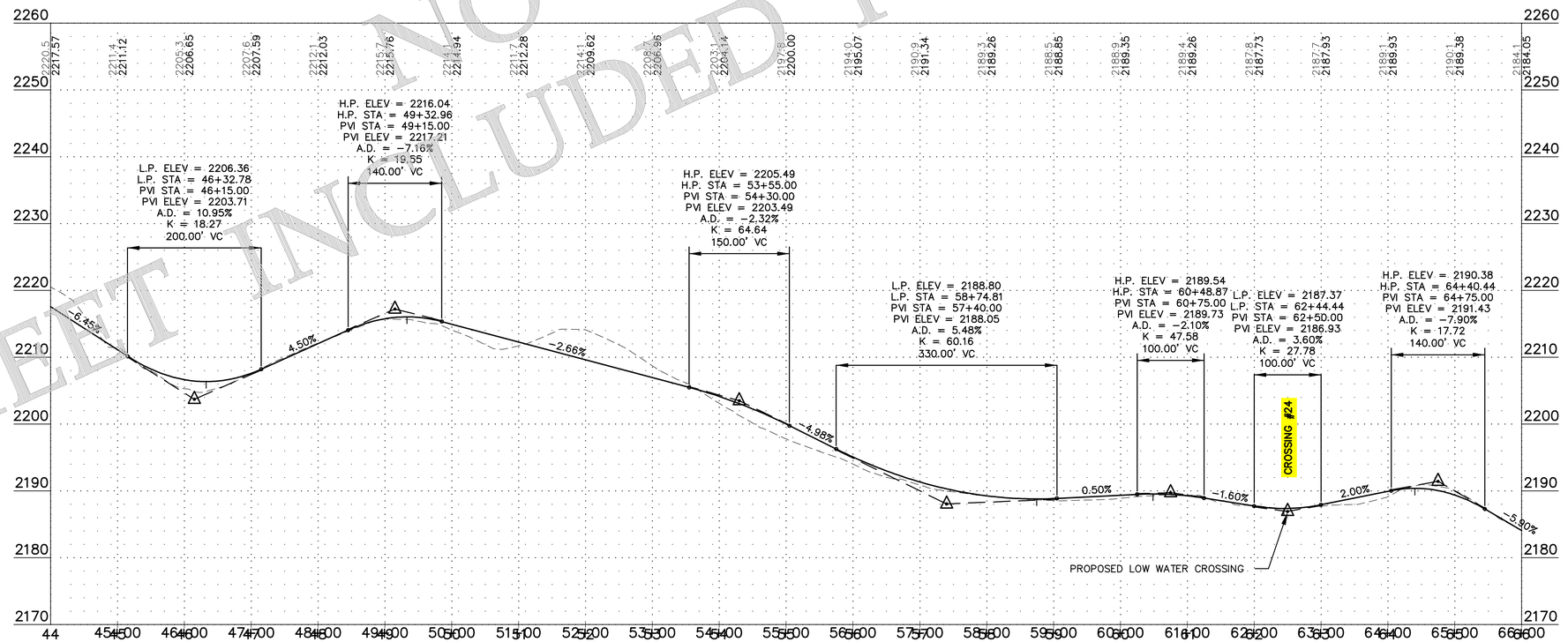

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Merricourt Wind Project

McIntosh County, North Dakota

Road 11 - Sta. 44+00 to 66+00

Record Plans

Date: 11/20/2020

Sheet: 50 OF 119

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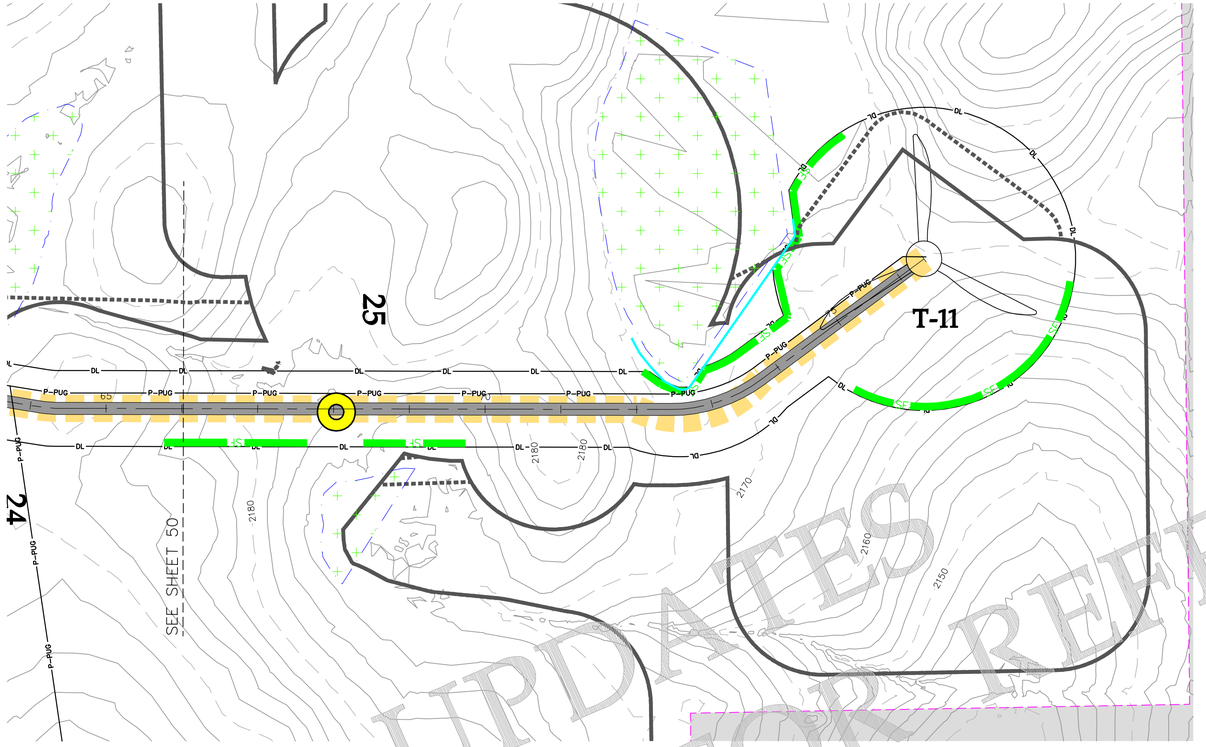

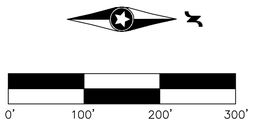

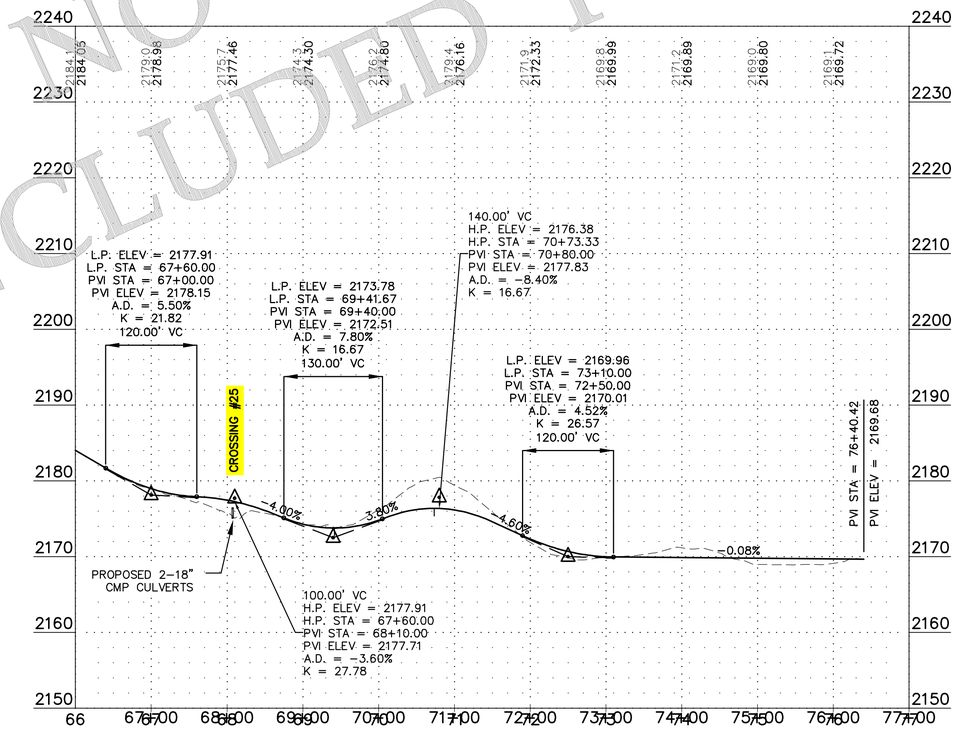

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Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 11 - Sta. 66+00 to End

Record Plans

Date: 11/20/2020
Sheet: 51 OF 119

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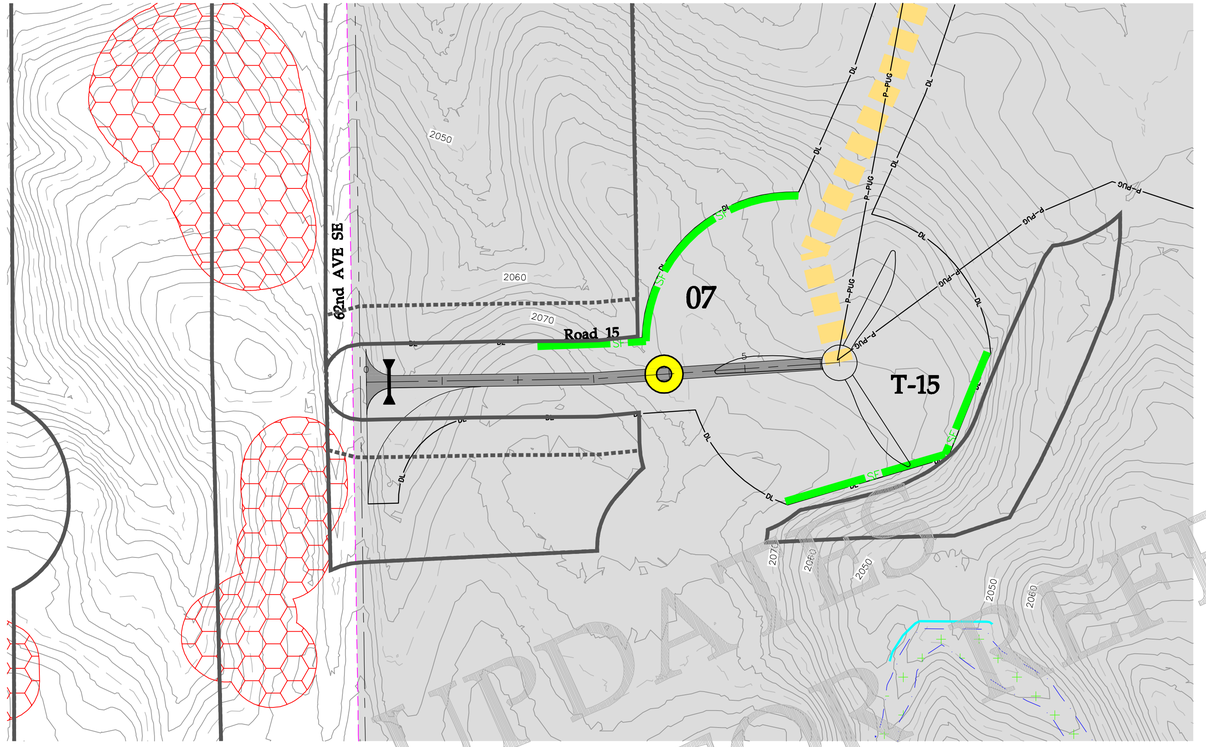

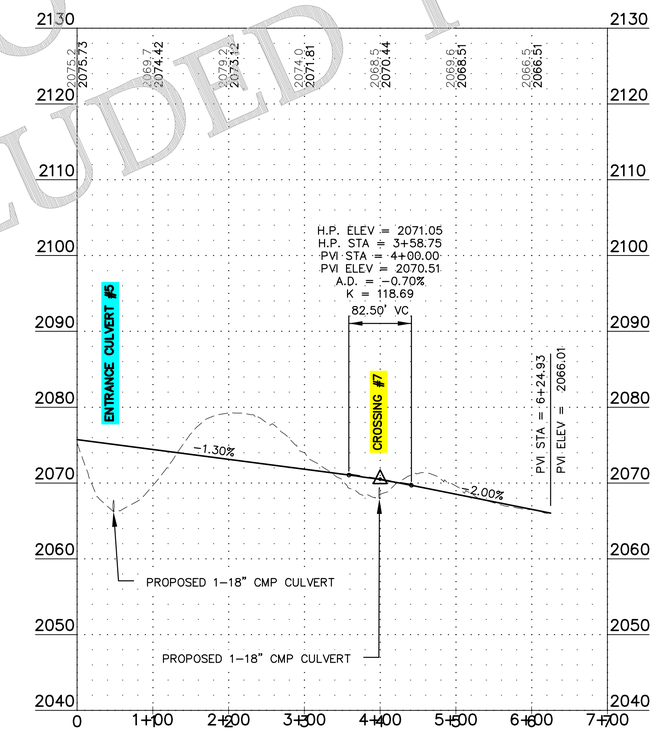

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Merricourt Wind Project

McIntosh County, North Dakota

Road 15 - Sta. 0+00 to End

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Sheet: 52 OF 119

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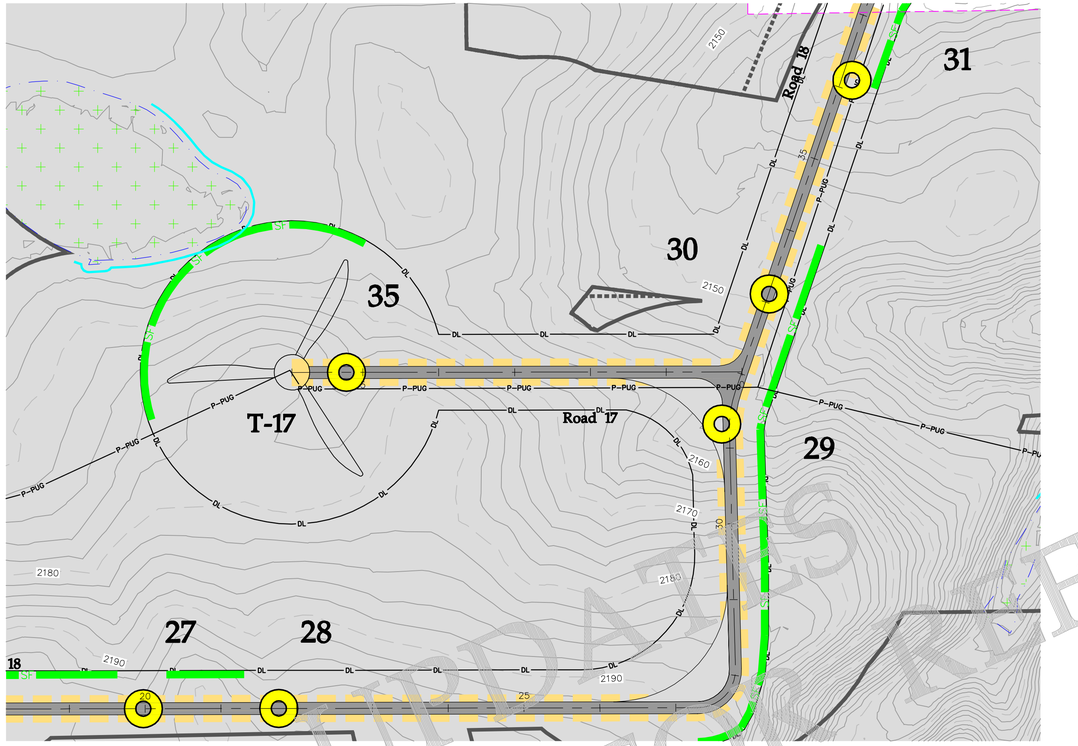

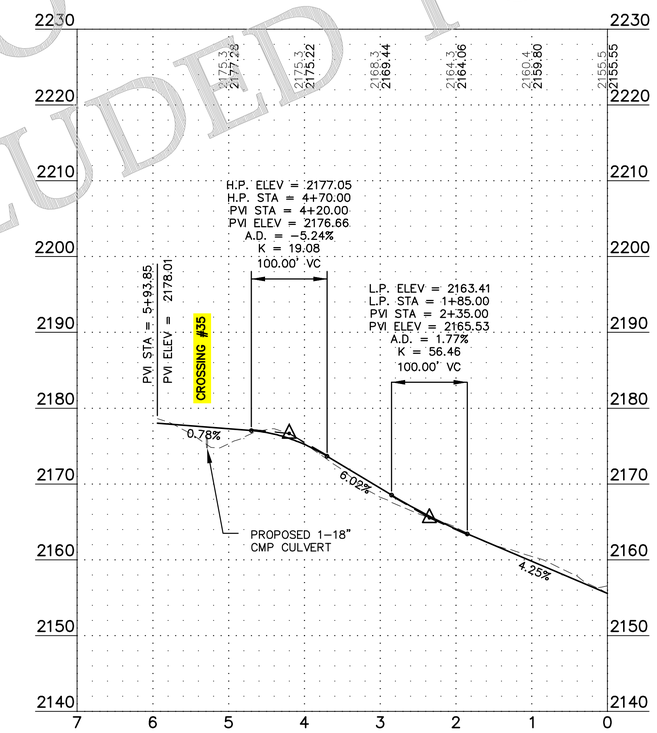

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McIntosh County, North Dakota

Road 17 - Sta. 0+00 to End

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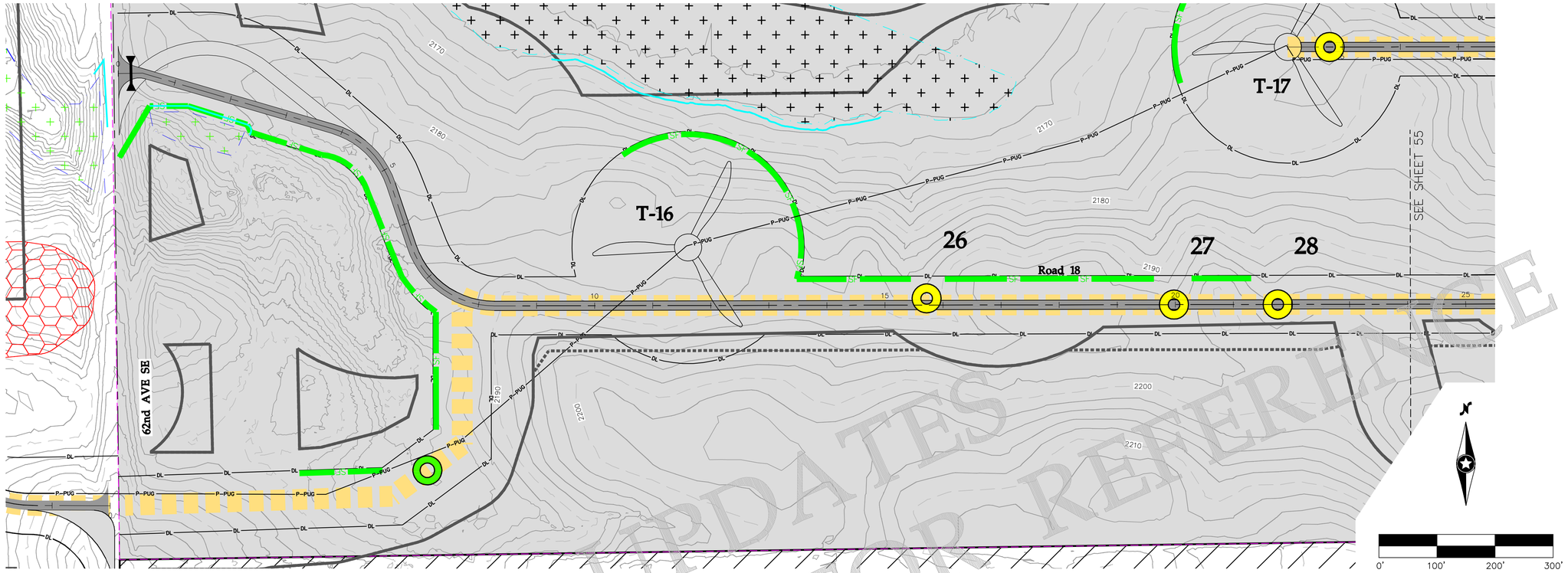

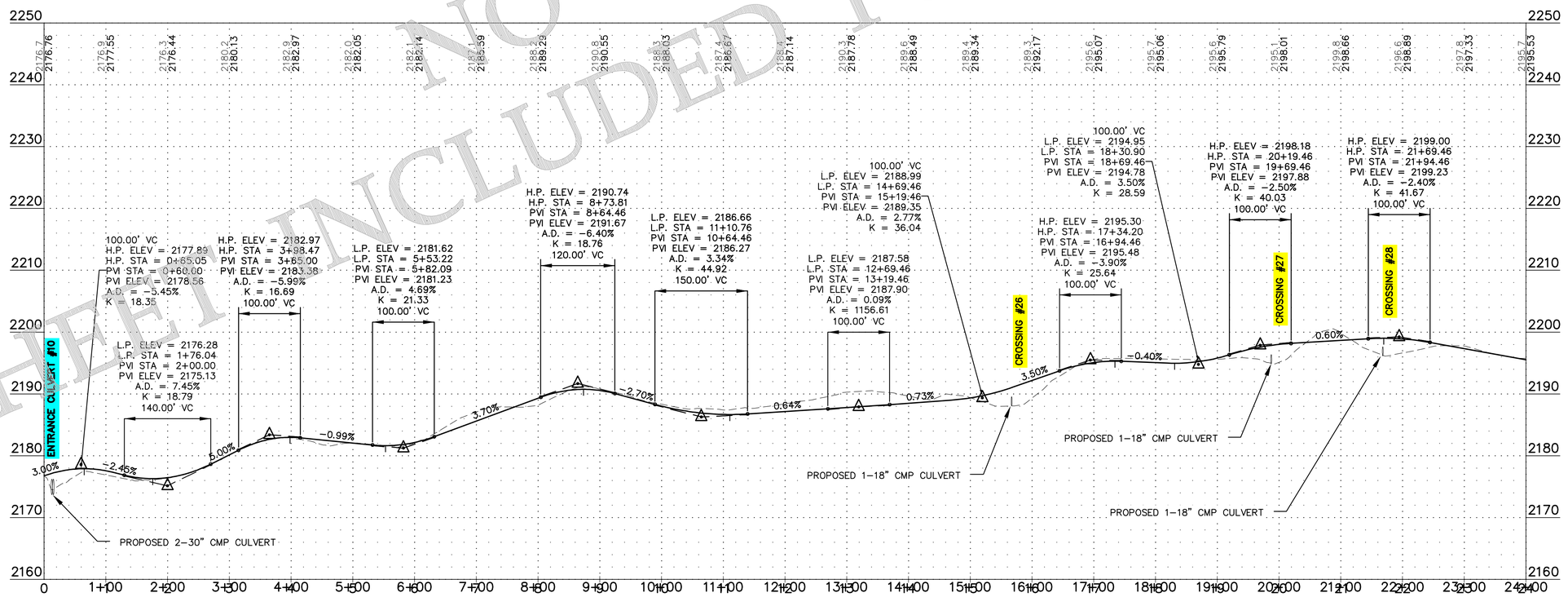

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Road 18 - Sta. 0+00 to 24+00

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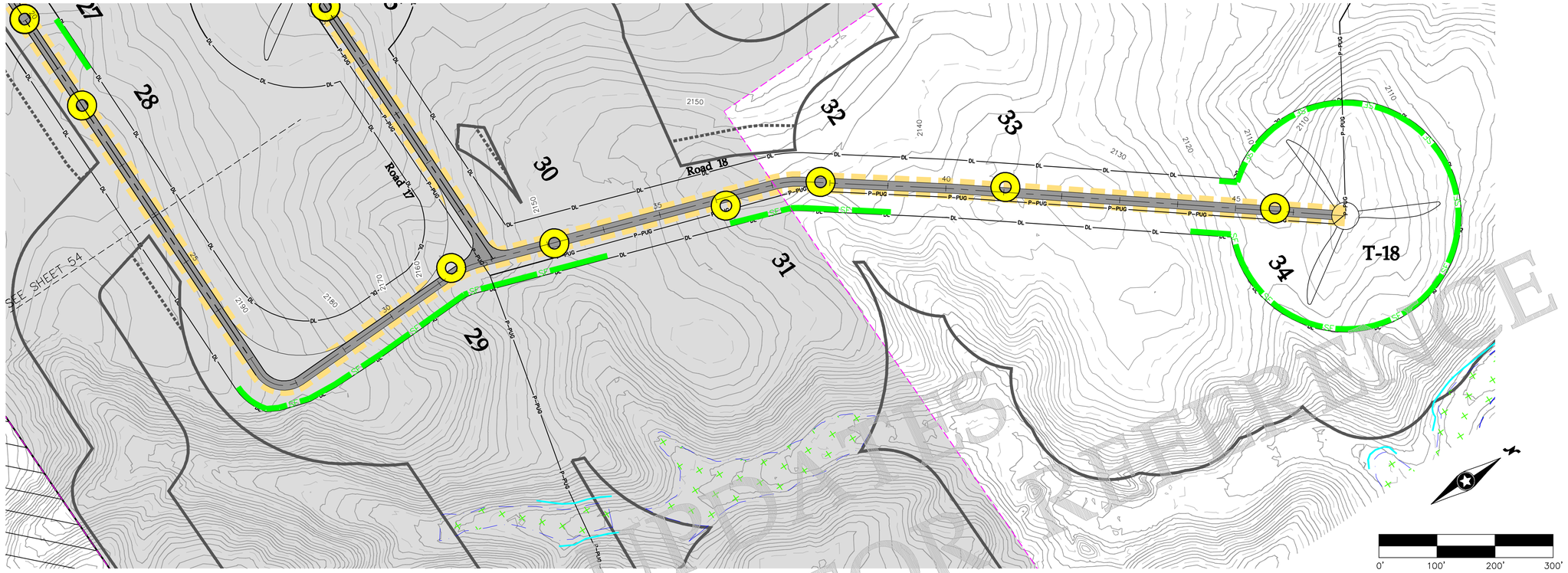

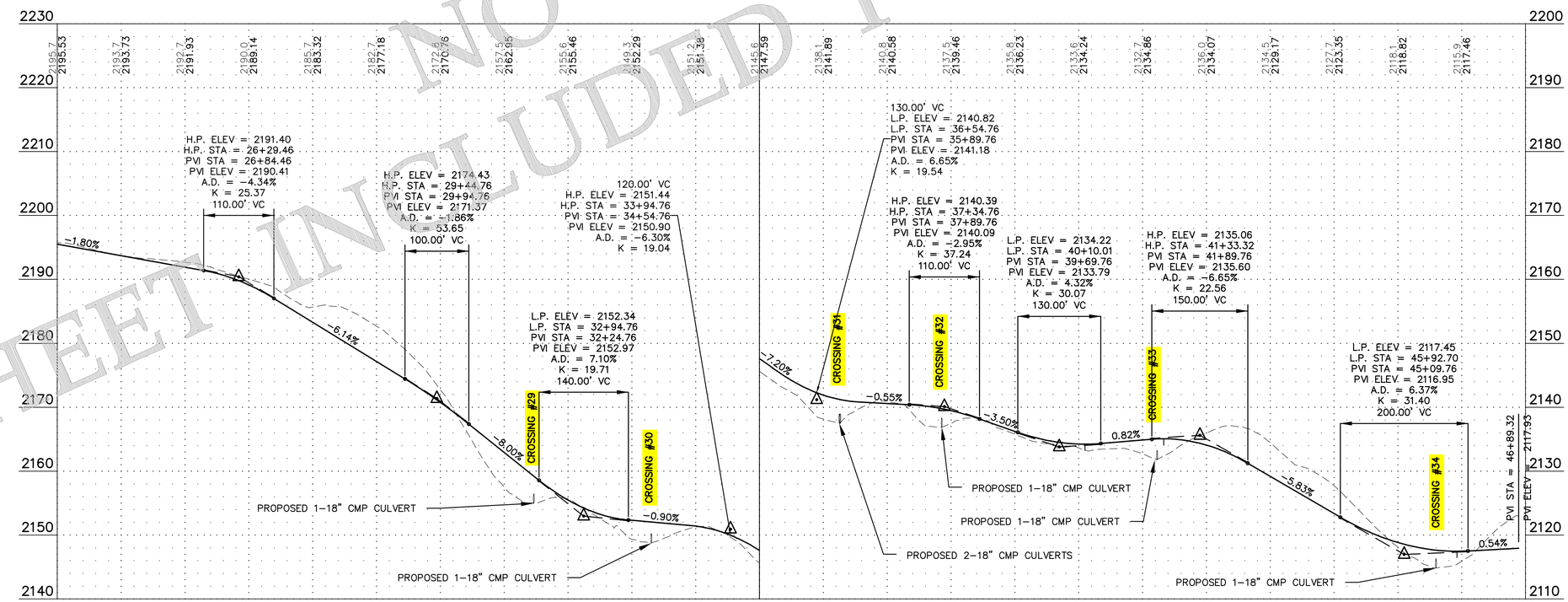

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Checked:	DJN
Drawn:	SNK
As-Built Drawing:	

Revisions:

#	DATE	DESCRIPTION
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4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

LEGEND:

- PROPOSED TURBINE LOCATION
- T-XX — PROPOSED TURBINE NUMBER
- PROPOSED ACCESS ROAD
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- WETLAND SURVEY CORRIDOR
- USFWS PROTECTED BASINS
- DELINEATED WETLAND – KLJ
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- USFWS EASMENT
- OUT OF PROJECT BOUNDARY
- PROPOSED DRAINAGE CROSSING
- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 18 - Sta. 24+00 to End

Record Plans

Date: 11/20/2020

Sheet: 55 OF 119

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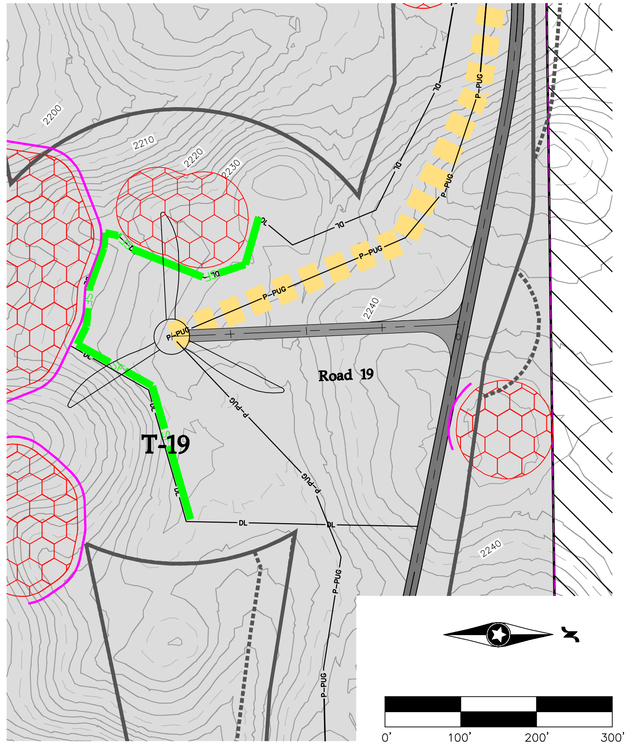

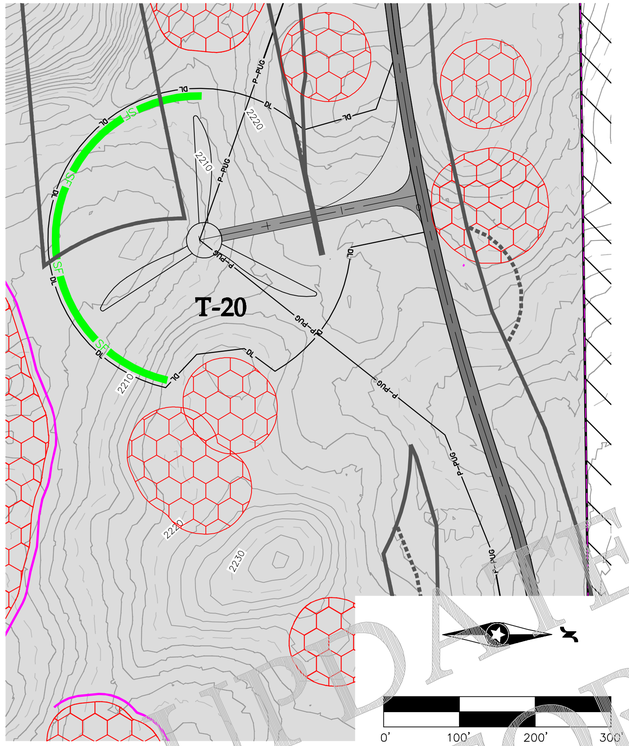

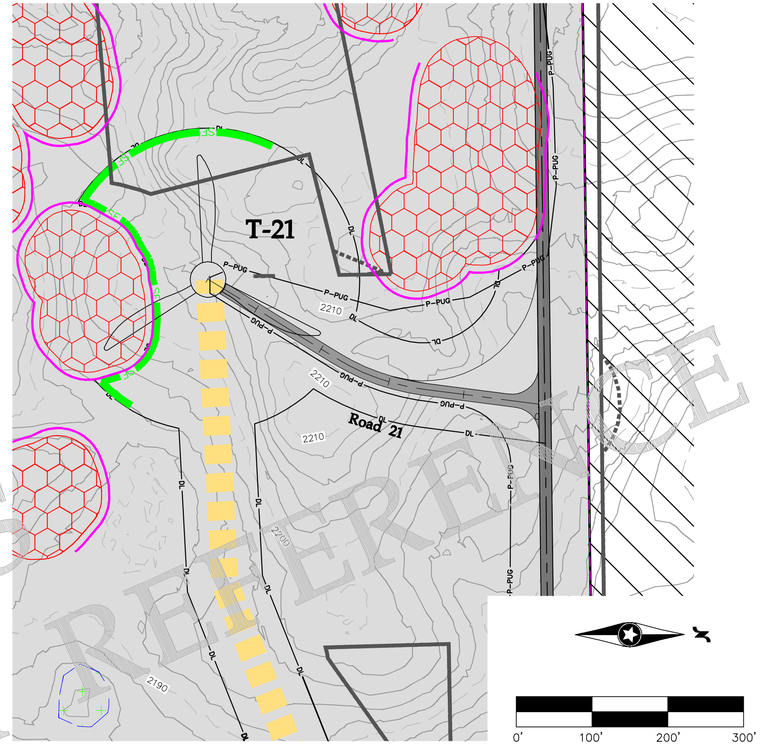

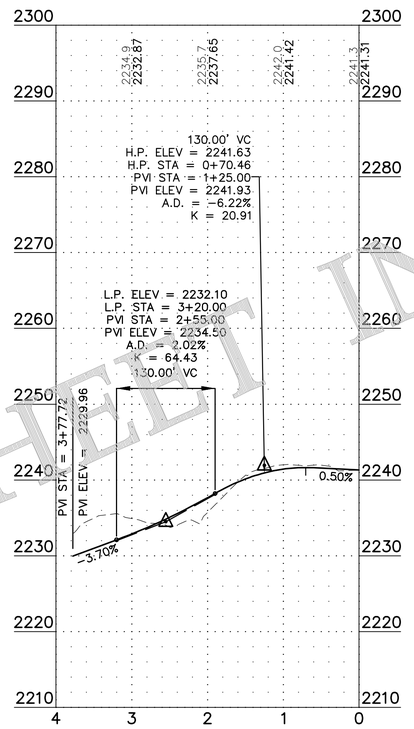

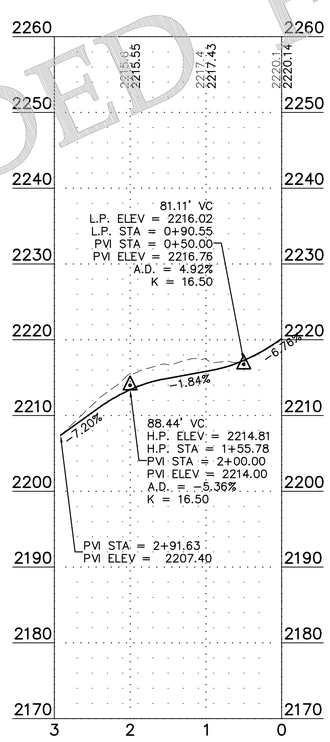

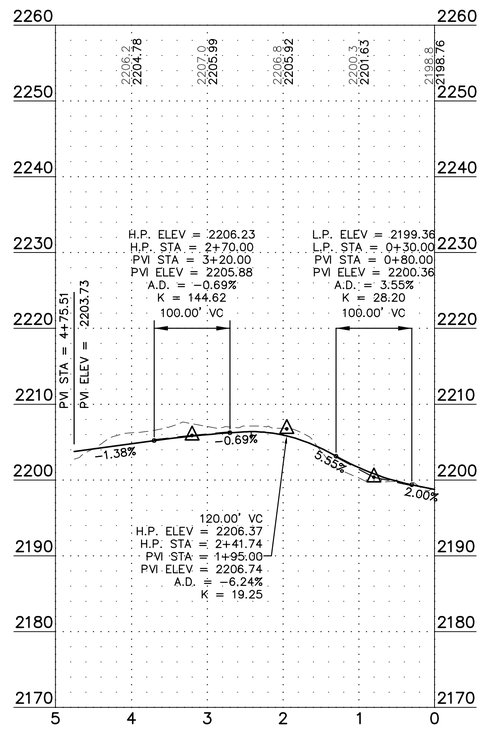

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Roads 19, 20 & 21 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020

Sheet: 56 OF 119

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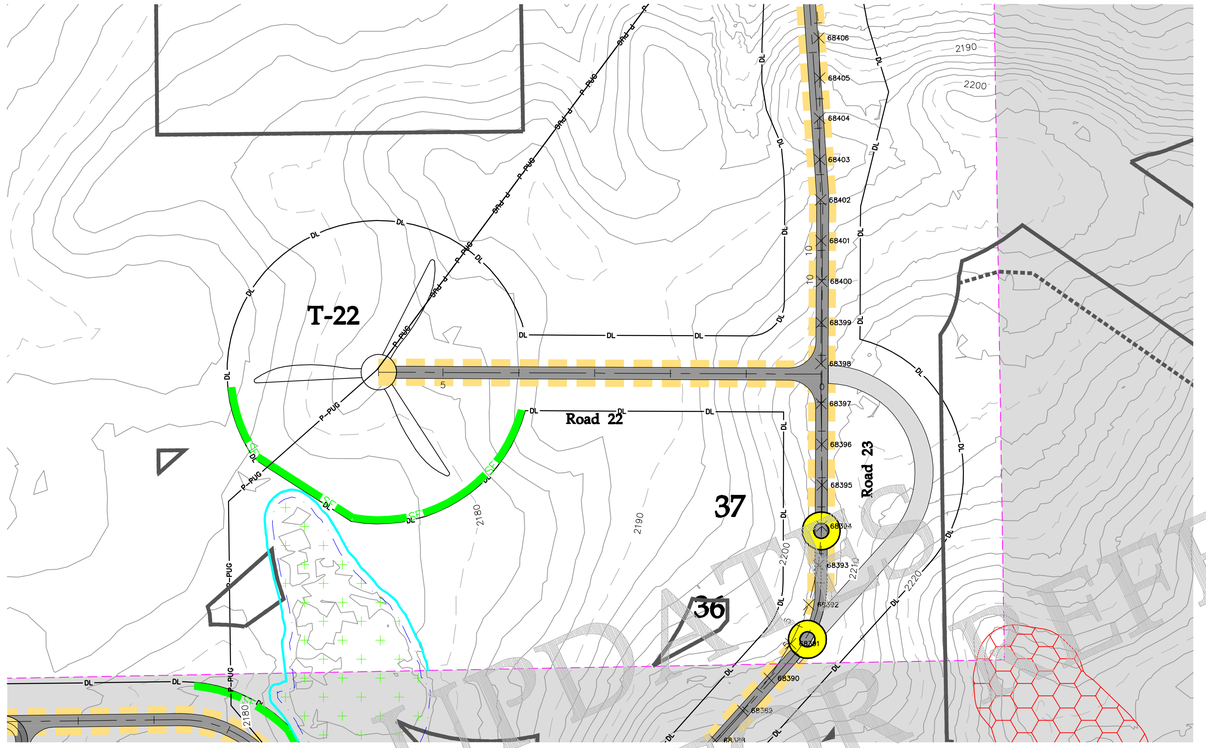

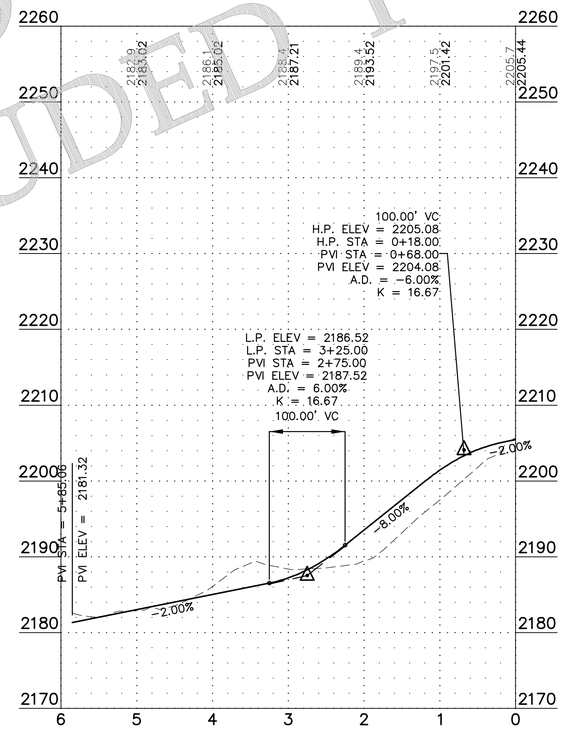

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Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

0' 100' 200' 300'

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Merricourt Wind Project

McIntosh County, North Dakota

Road 22 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 57 OF 119

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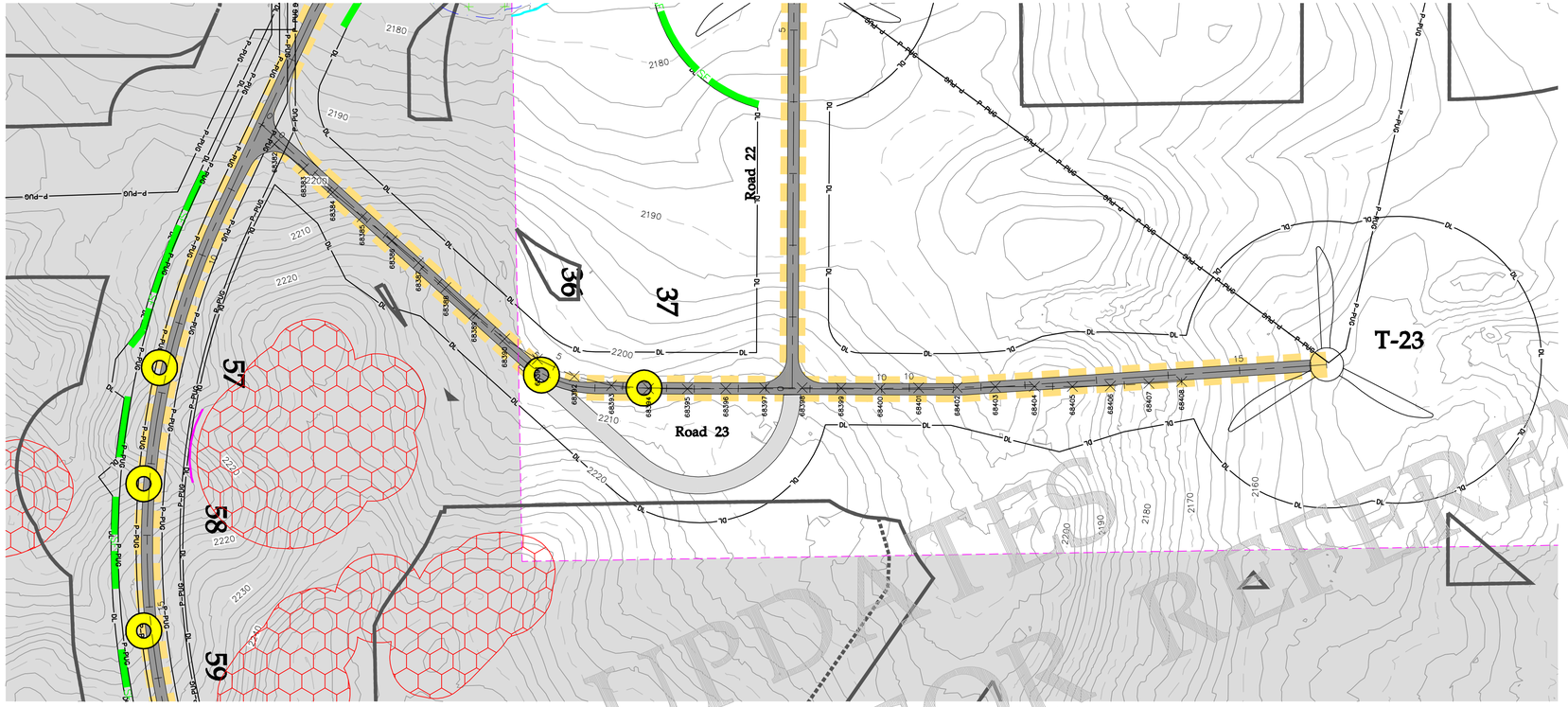

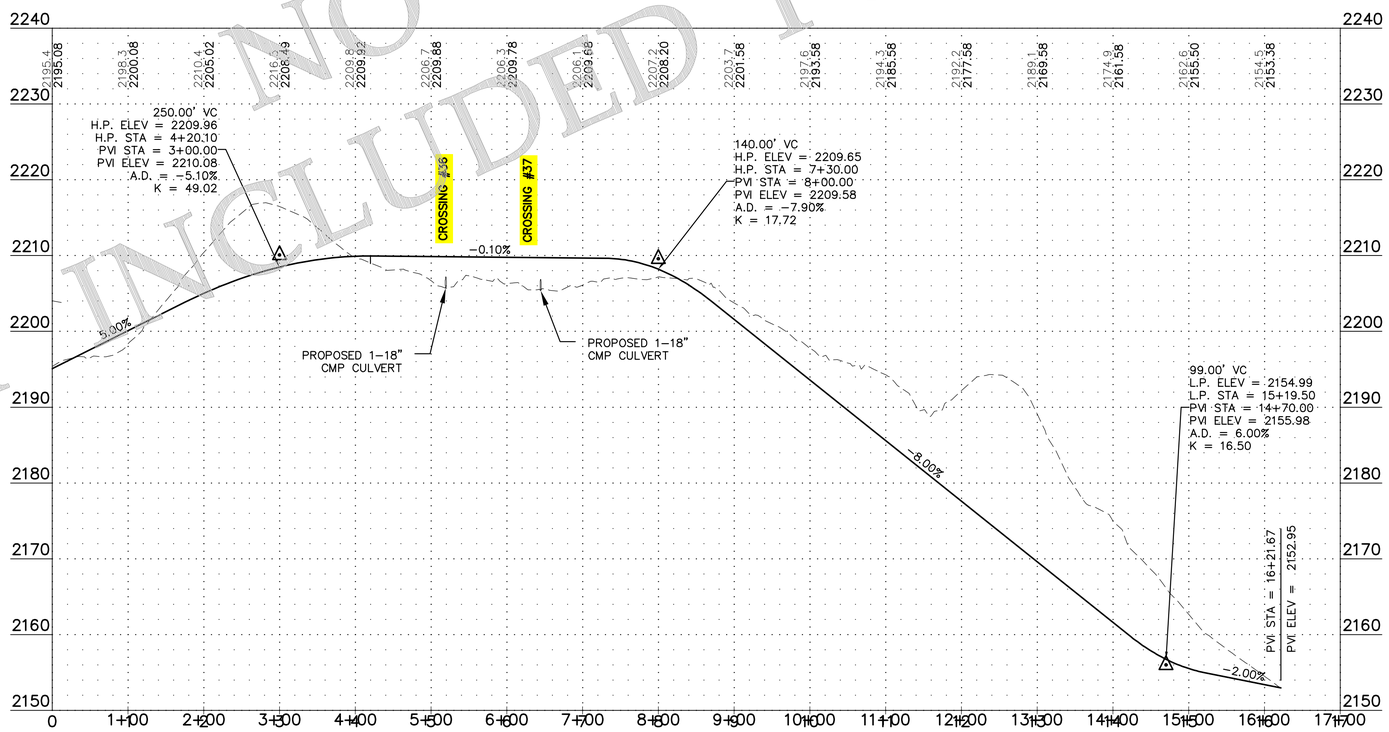

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 23 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 58 OF 119

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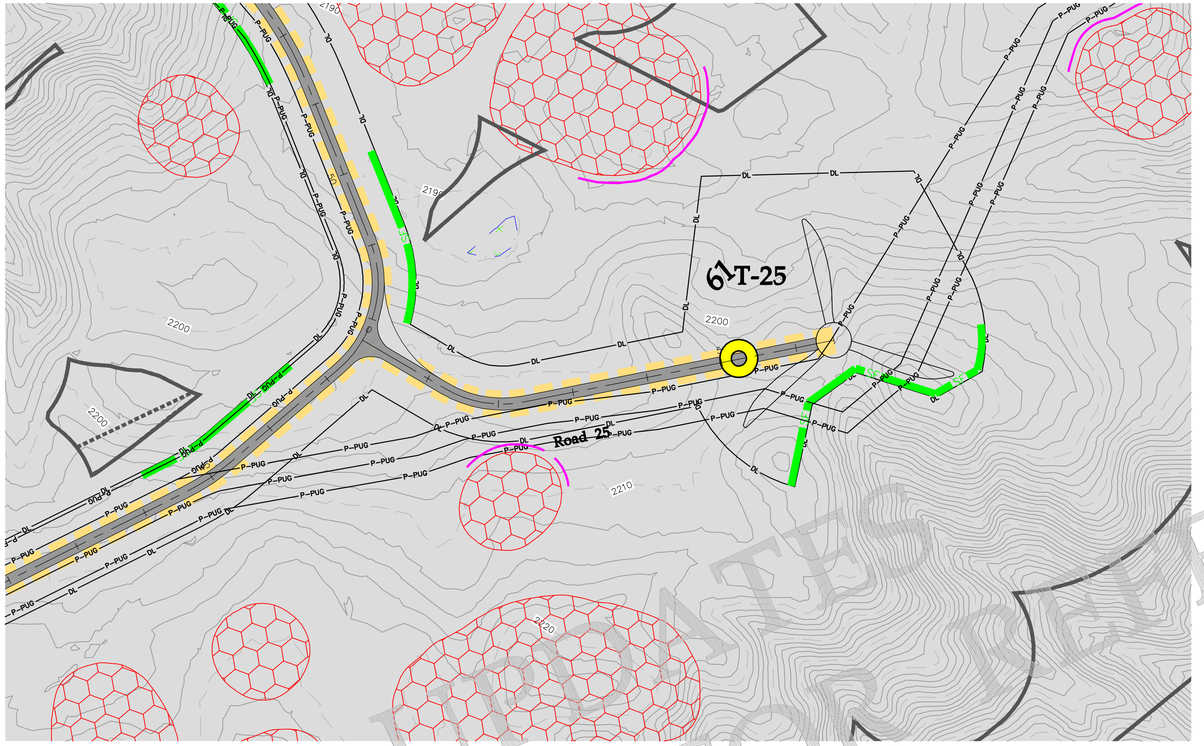

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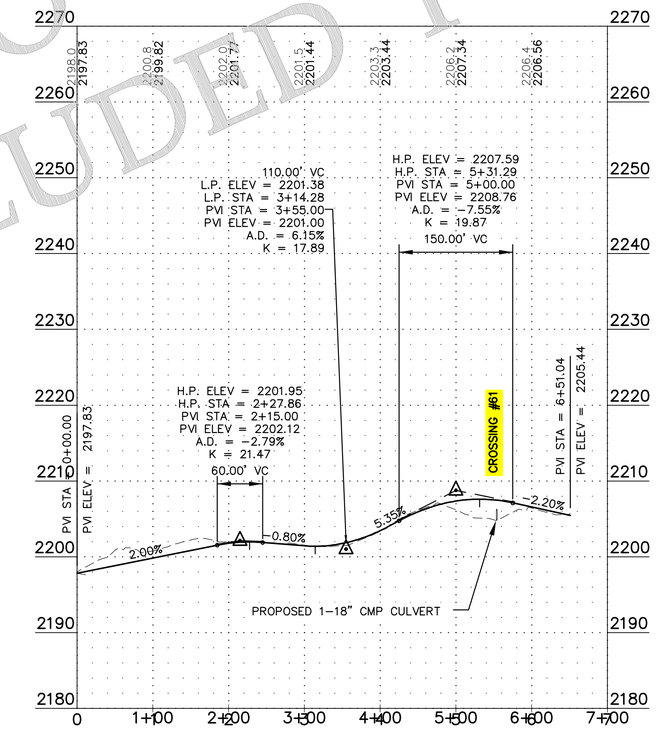

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2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 25 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 59 OF 119

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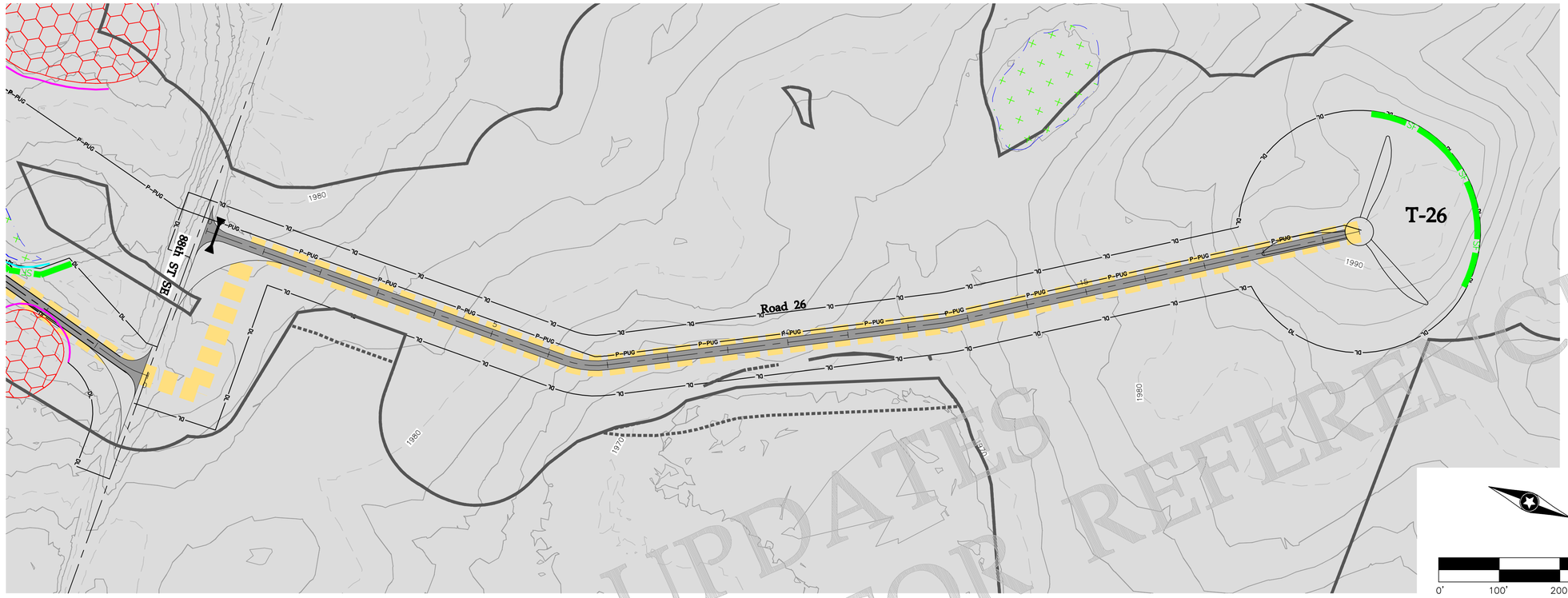

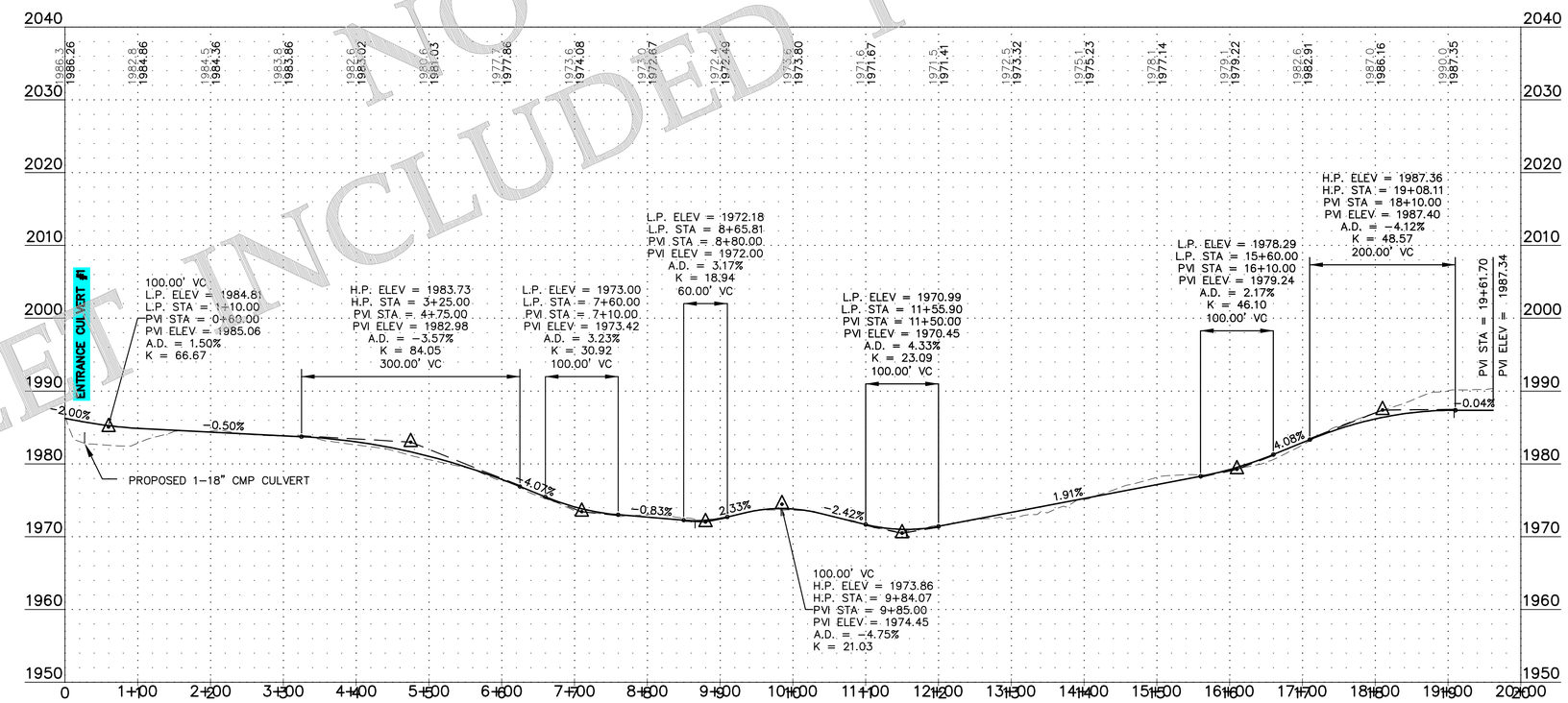

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Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 26 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 60 OF 119

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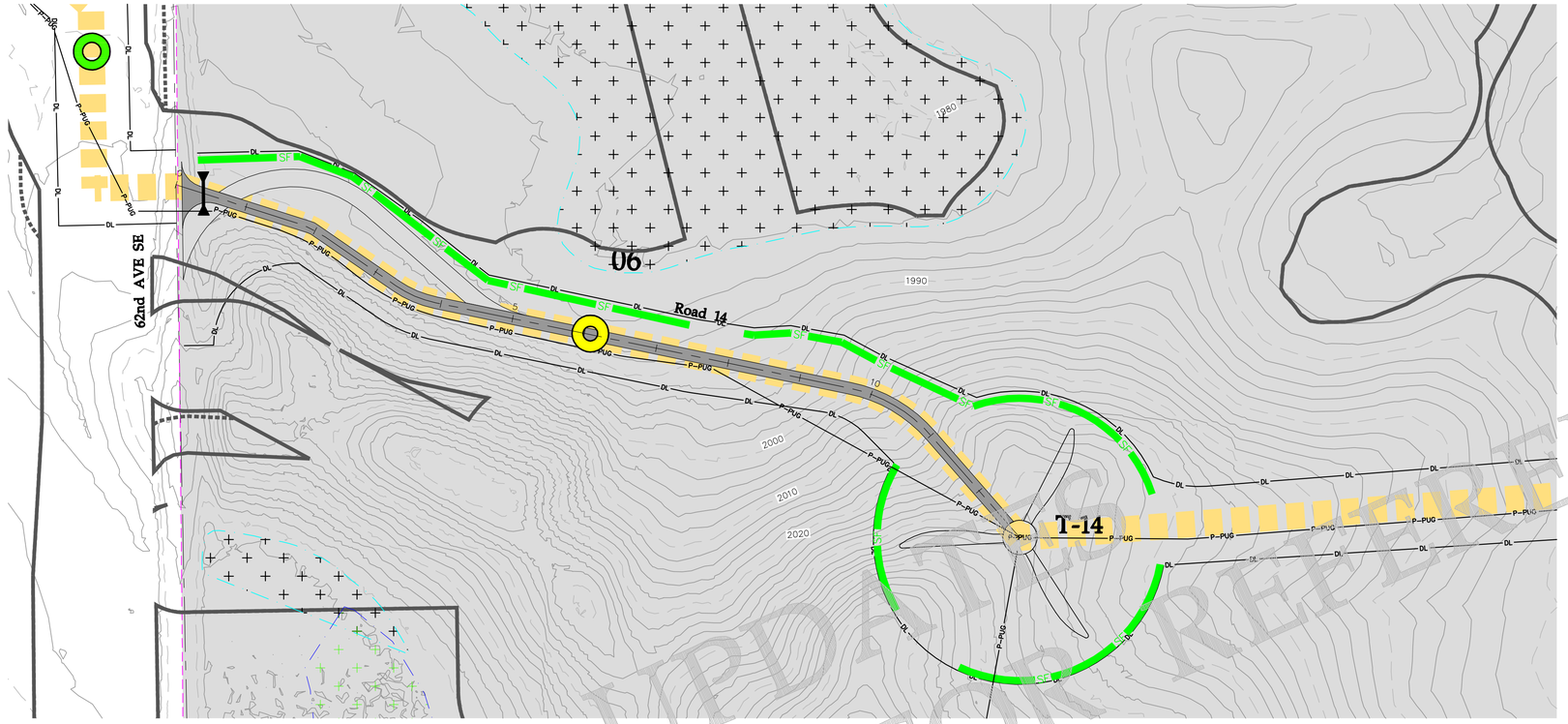

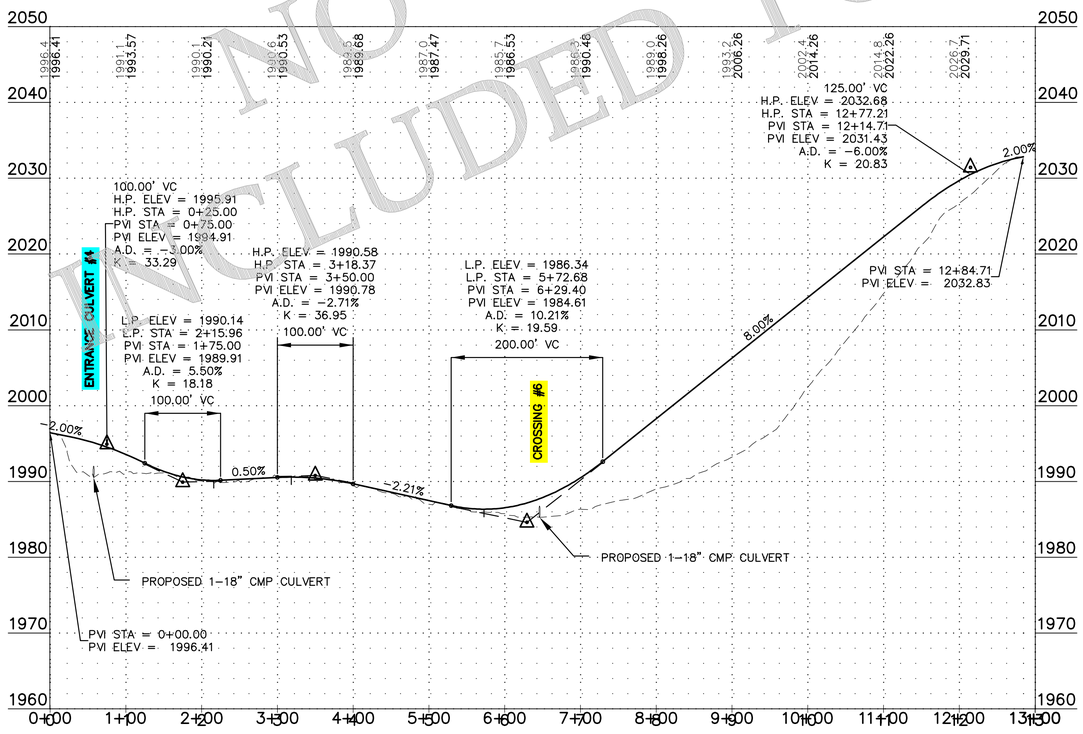

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2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 14 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020

Sheet: 61 OF 119

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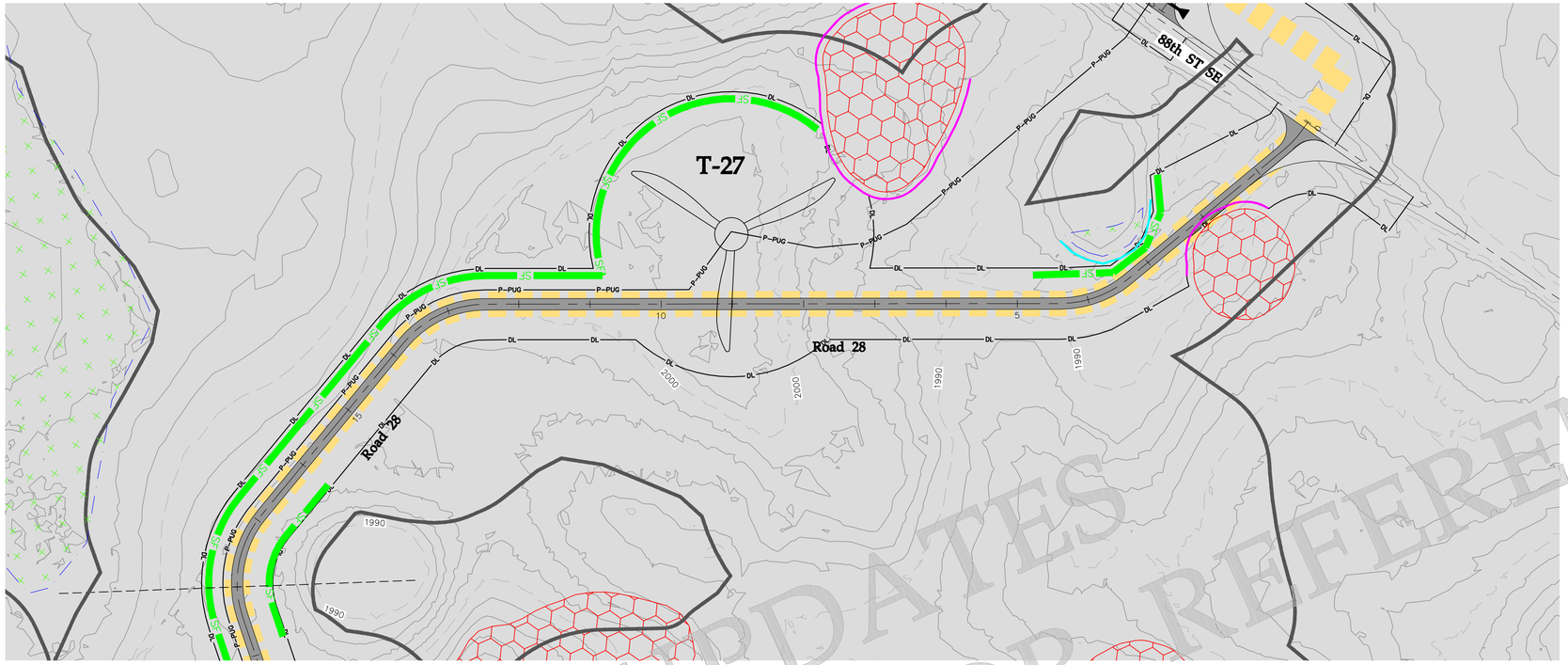

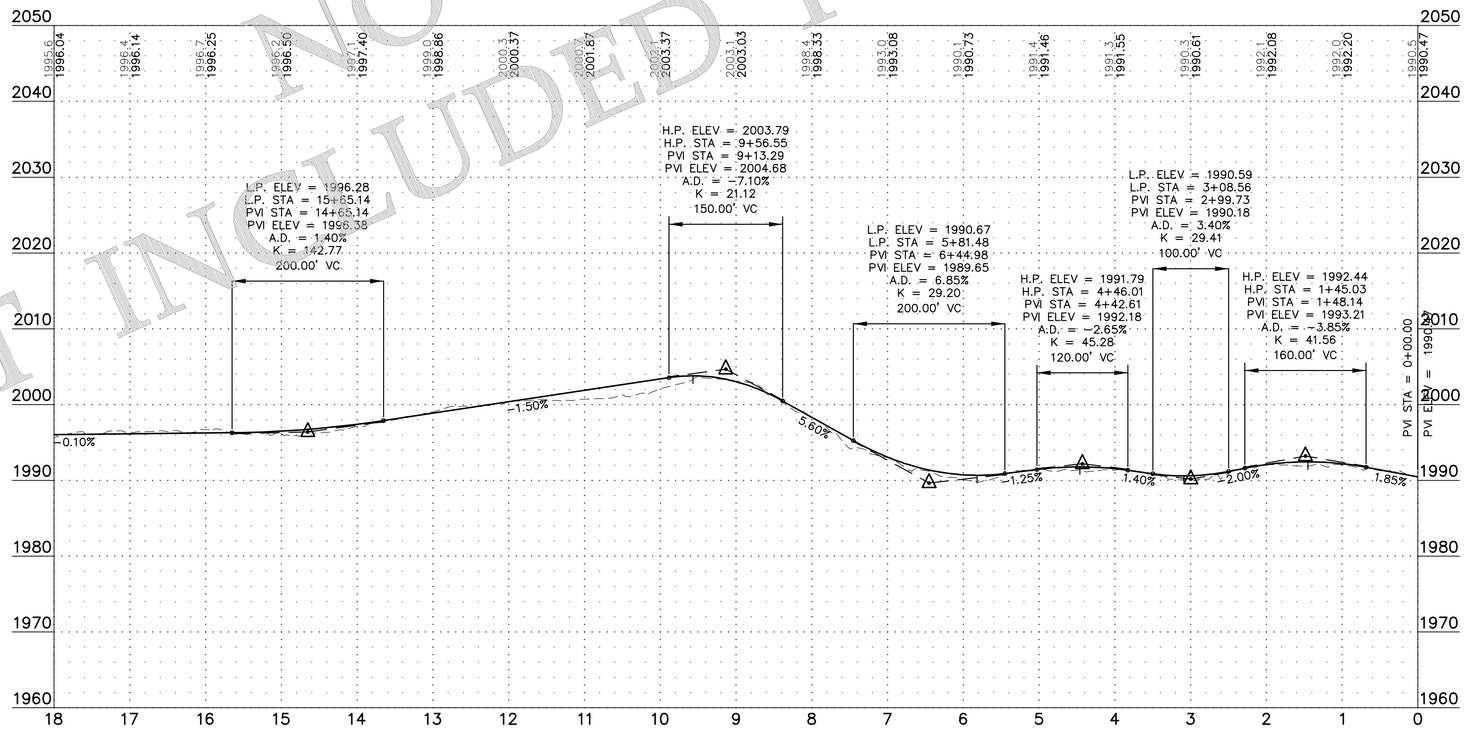

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West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 28 - Sta. 0+00 to 18+00

Record Plans

Date: 11/20/2020
Sheet: 62 OF 119

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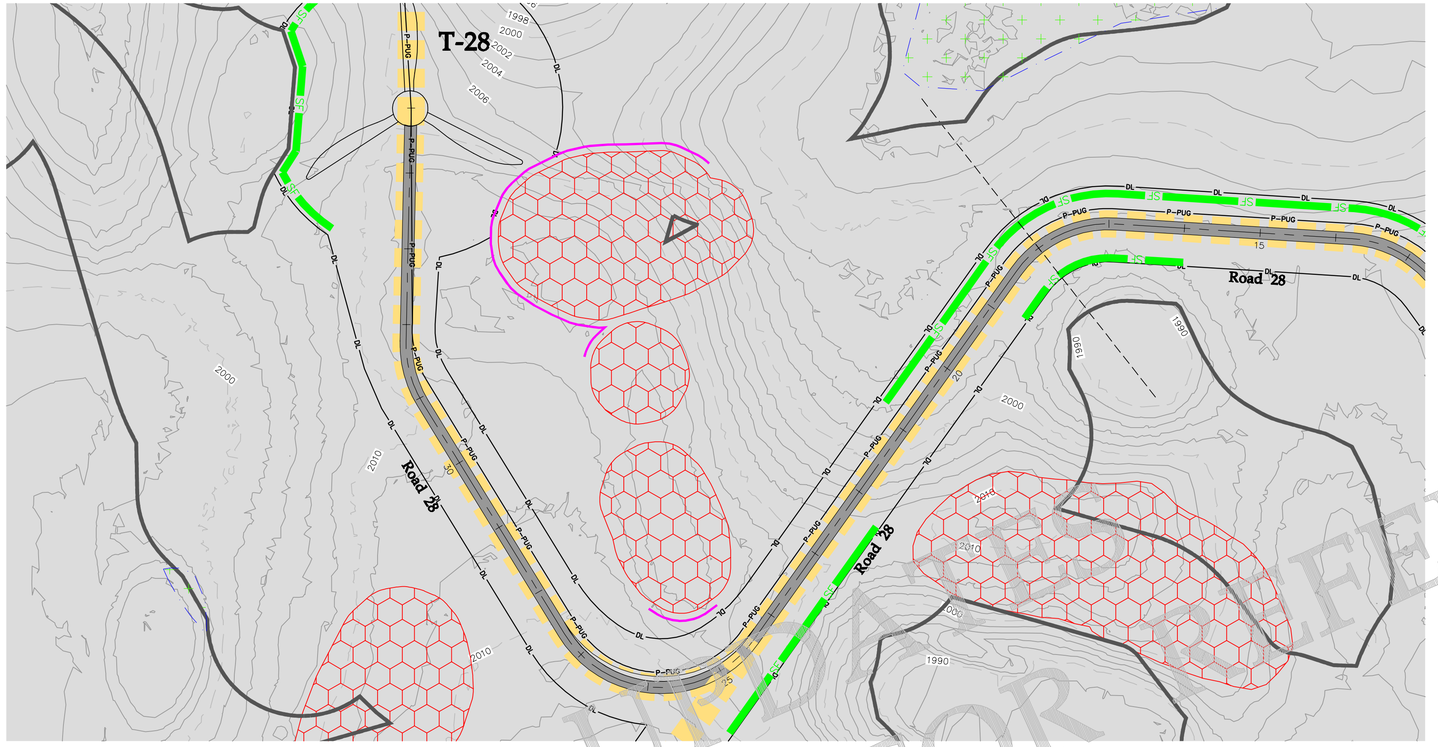

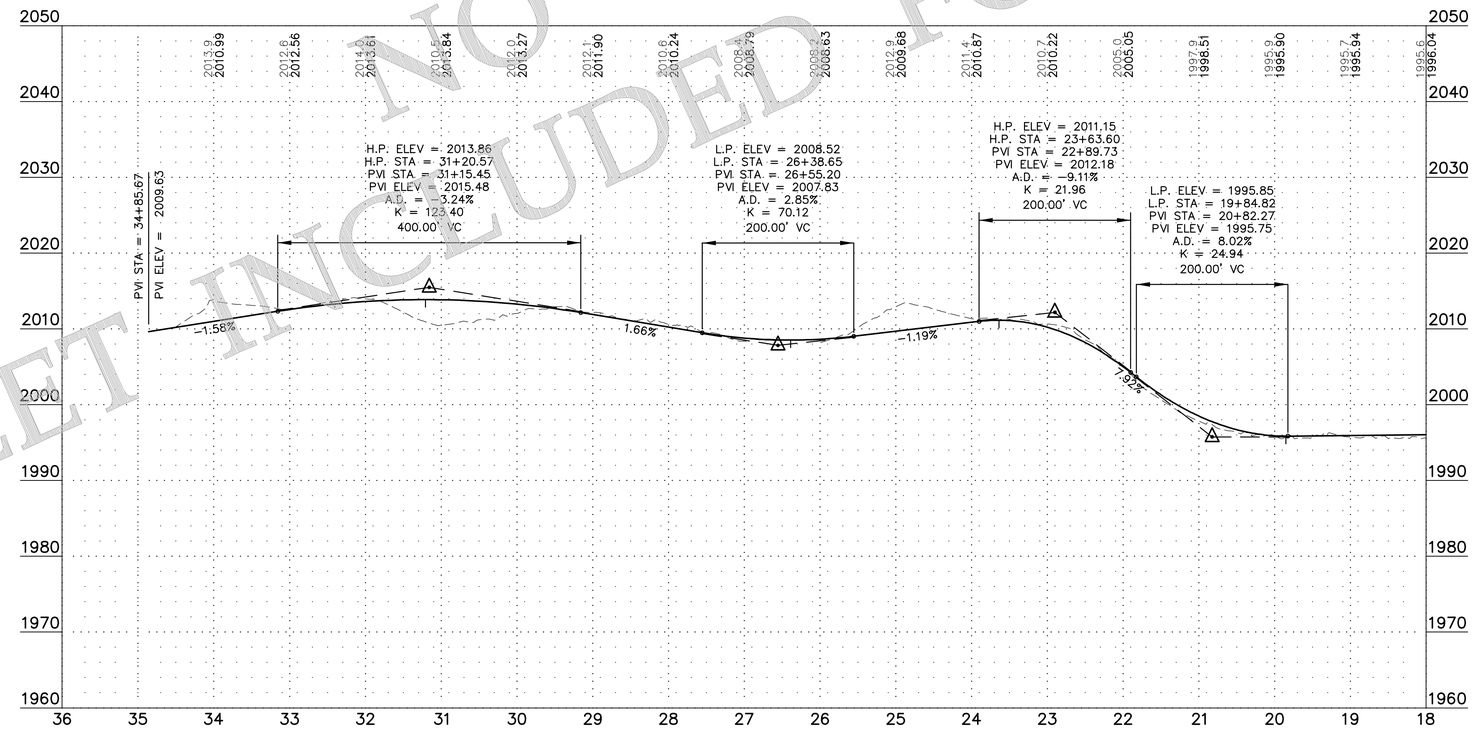

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0' 100' 200' 300'

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Road 28 - Sta. 18+00 to End

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Sheet: 63 OF 119

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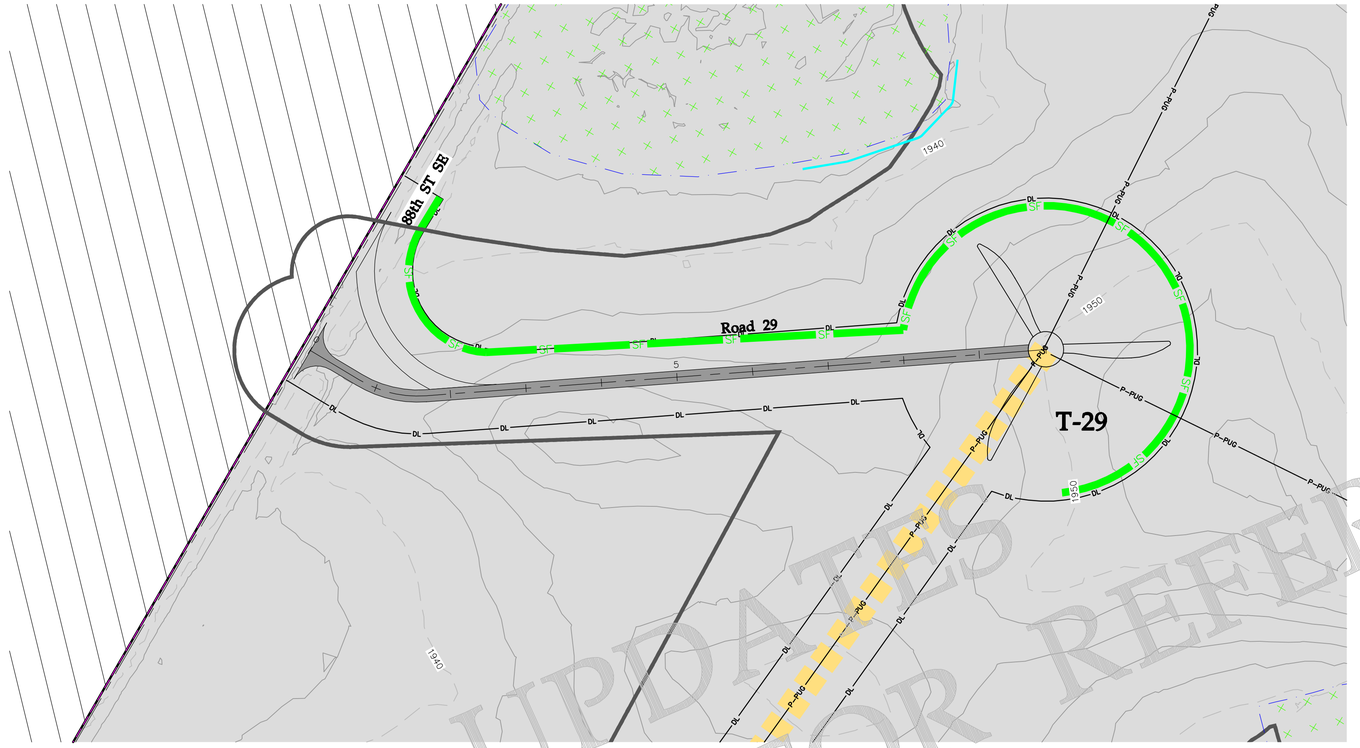

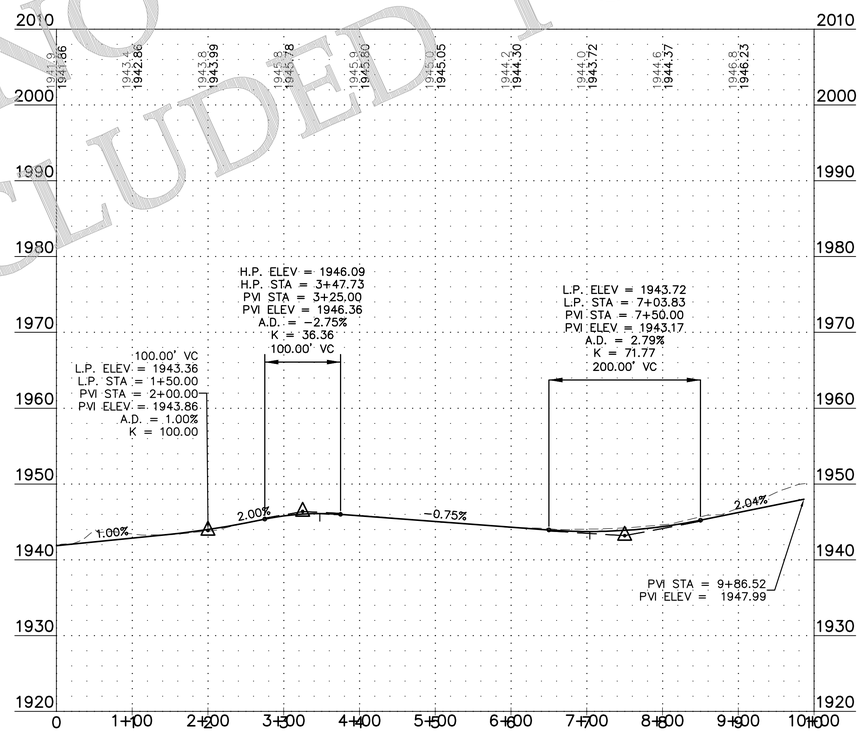

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0' 100' 200' 300'

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As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
2	01/21/20	CUT & FILL ADD TO TURBINE TABLE
3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

LEGEND:

- PROPOSED TURBINE LOCATION
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- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 29 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 64 OF 119

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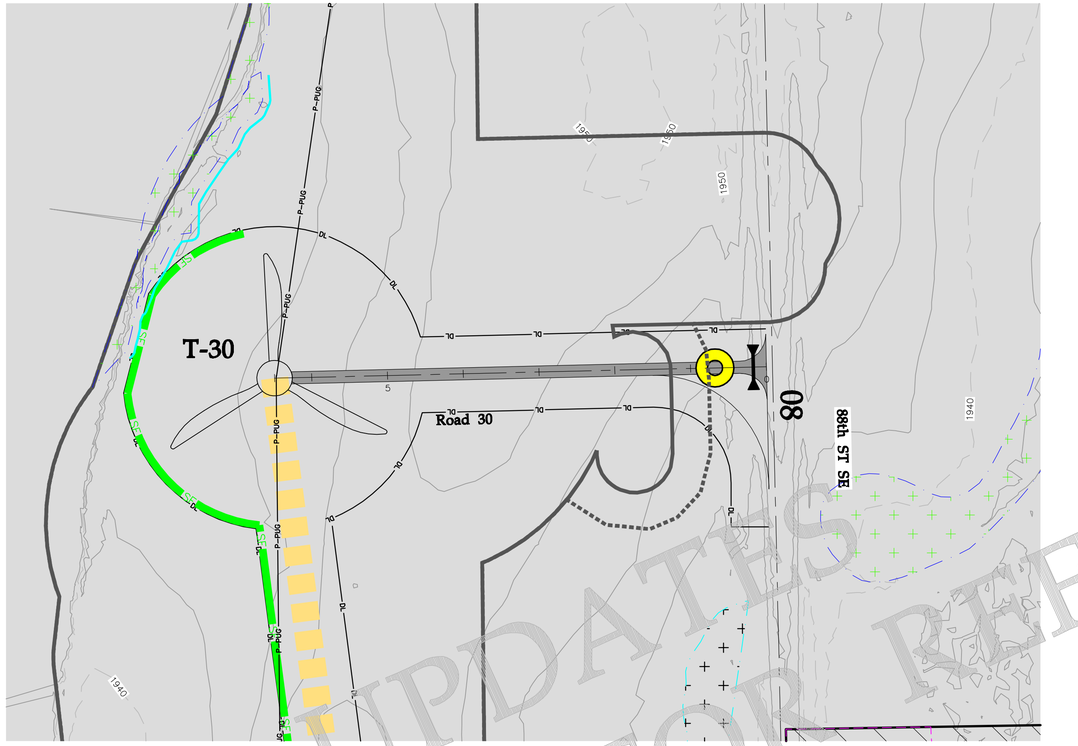

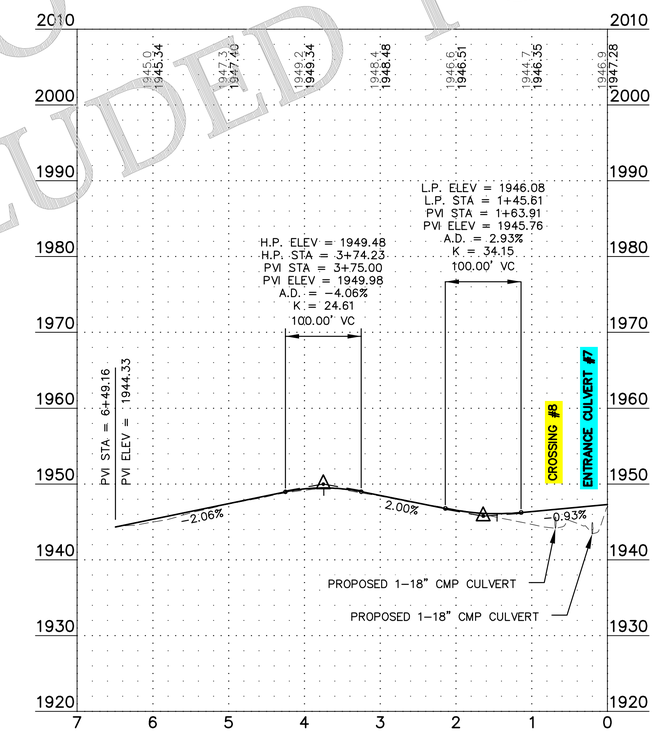

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Merricourt Wind Project

McIntosh County, North Dakota

Road 30 - Sta. 0+00 to End

Record Plans

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Sheet: 65 OF 119

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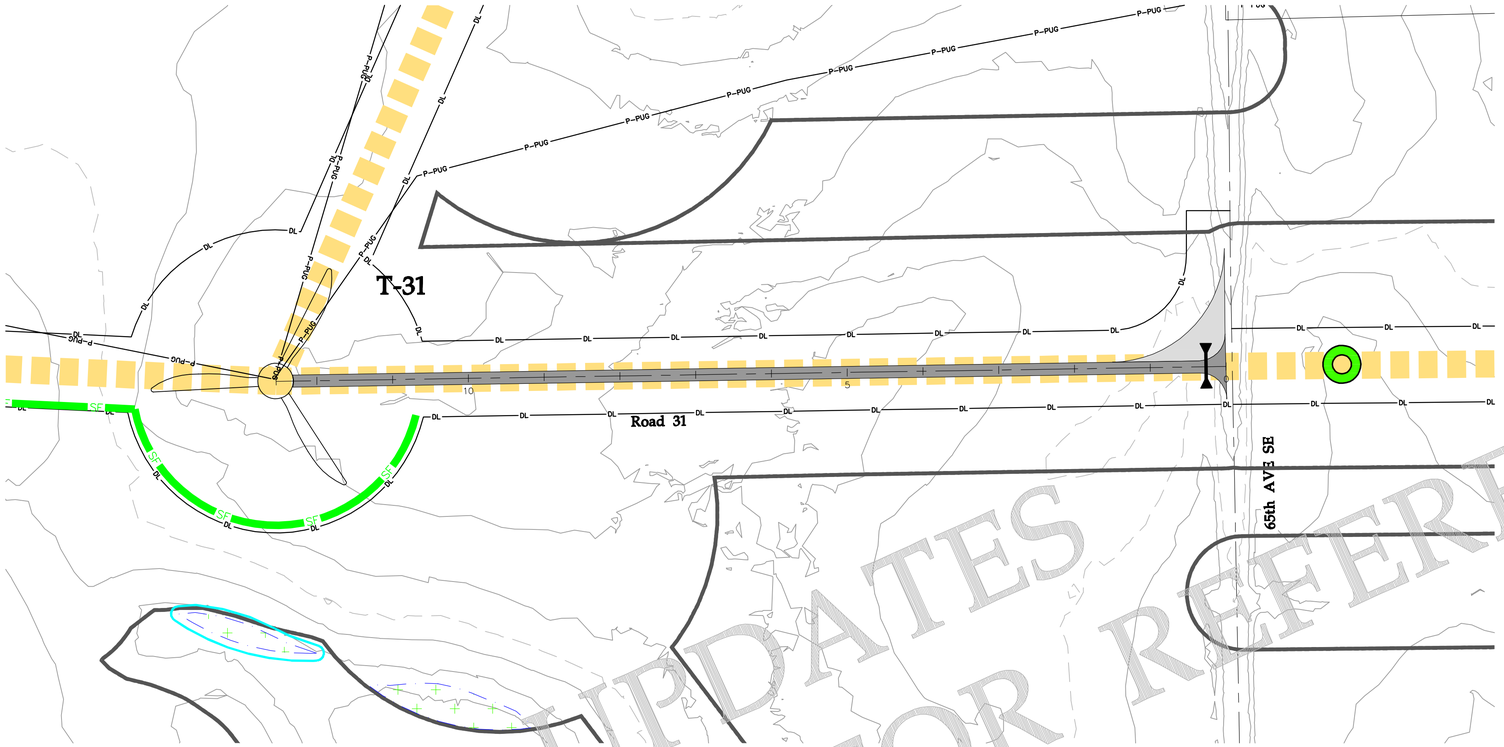

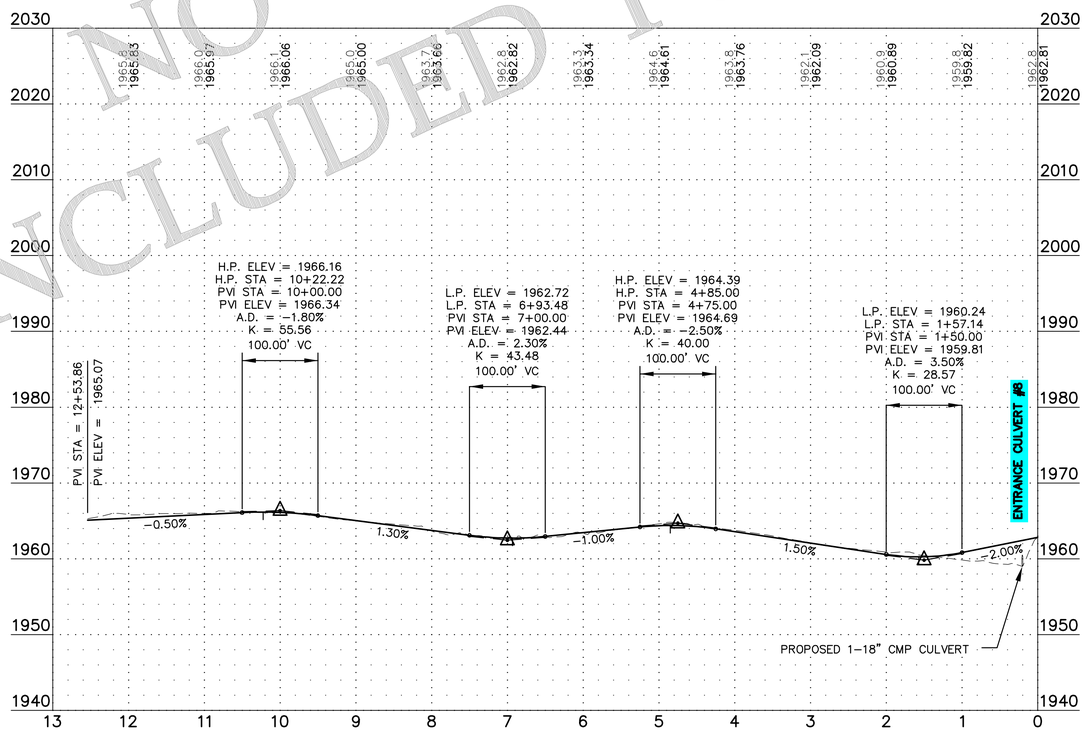

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Merricourt Wind Project

McIntosh County, North Dakota

Road 31 - Sta. 0+00 to End

Record Plans

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Sheet: 66 OF 119

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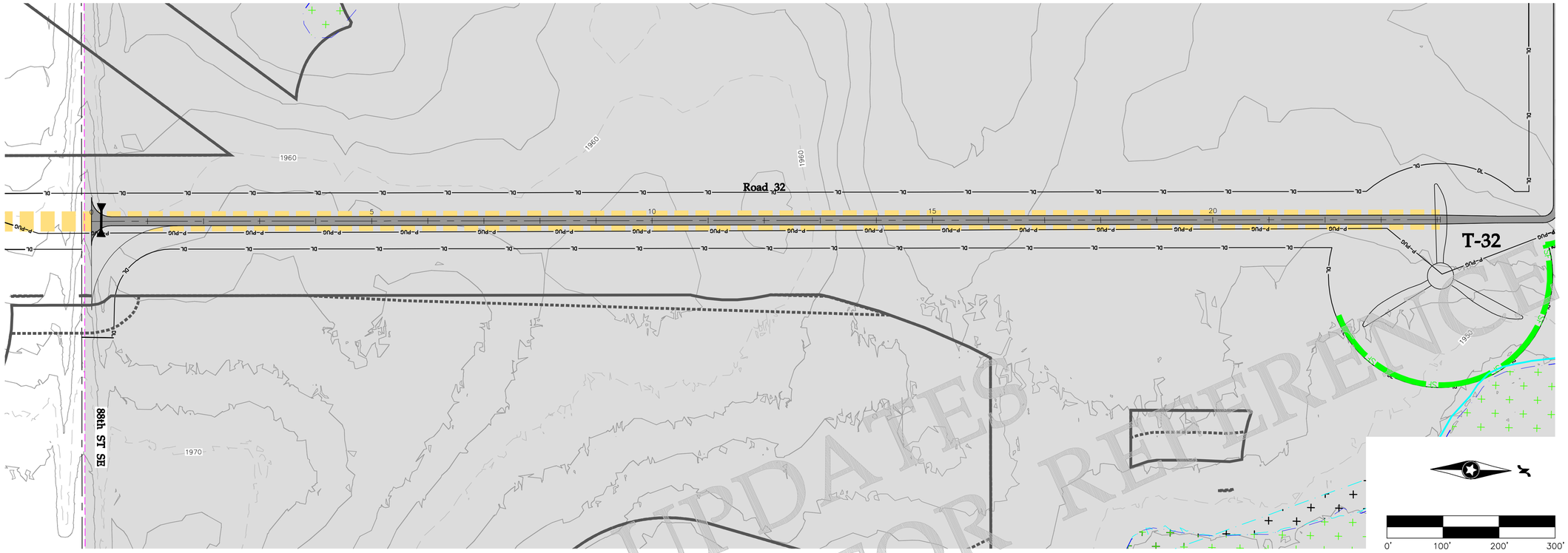

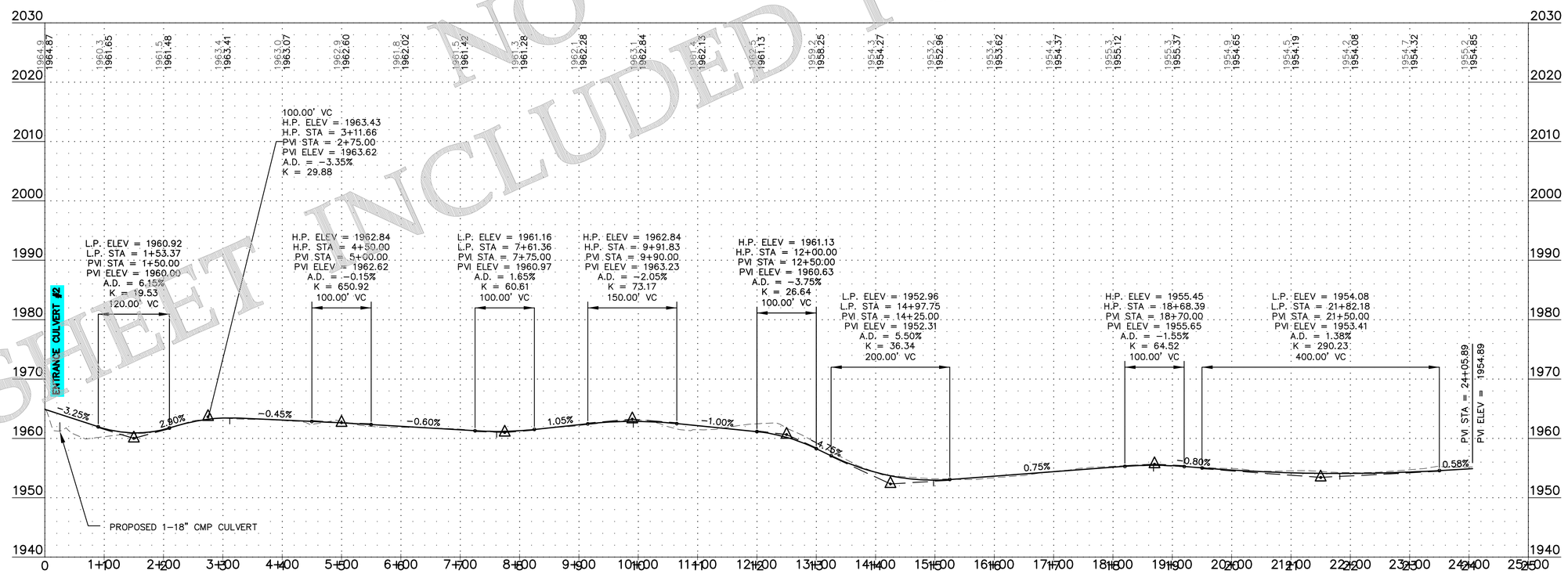

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Merricourt Wind Project

McIntosh County, North Dakota

Road 32 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020

Sheet: 67 OF 119

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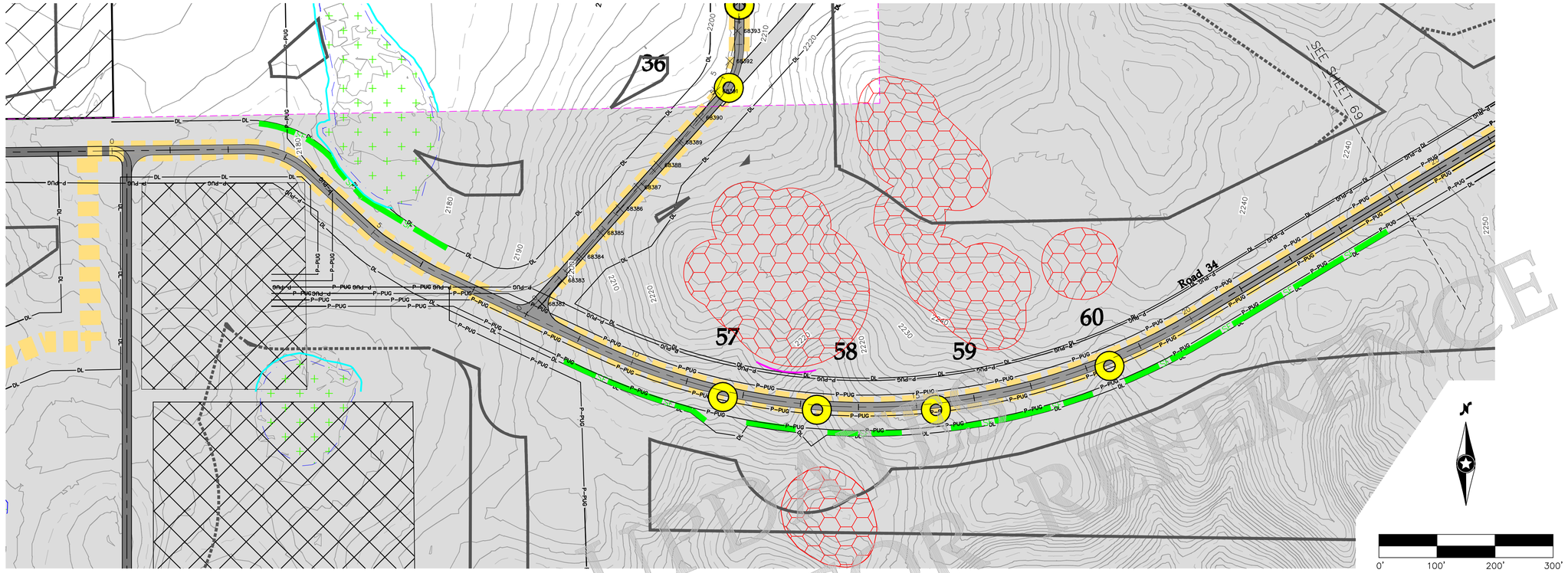

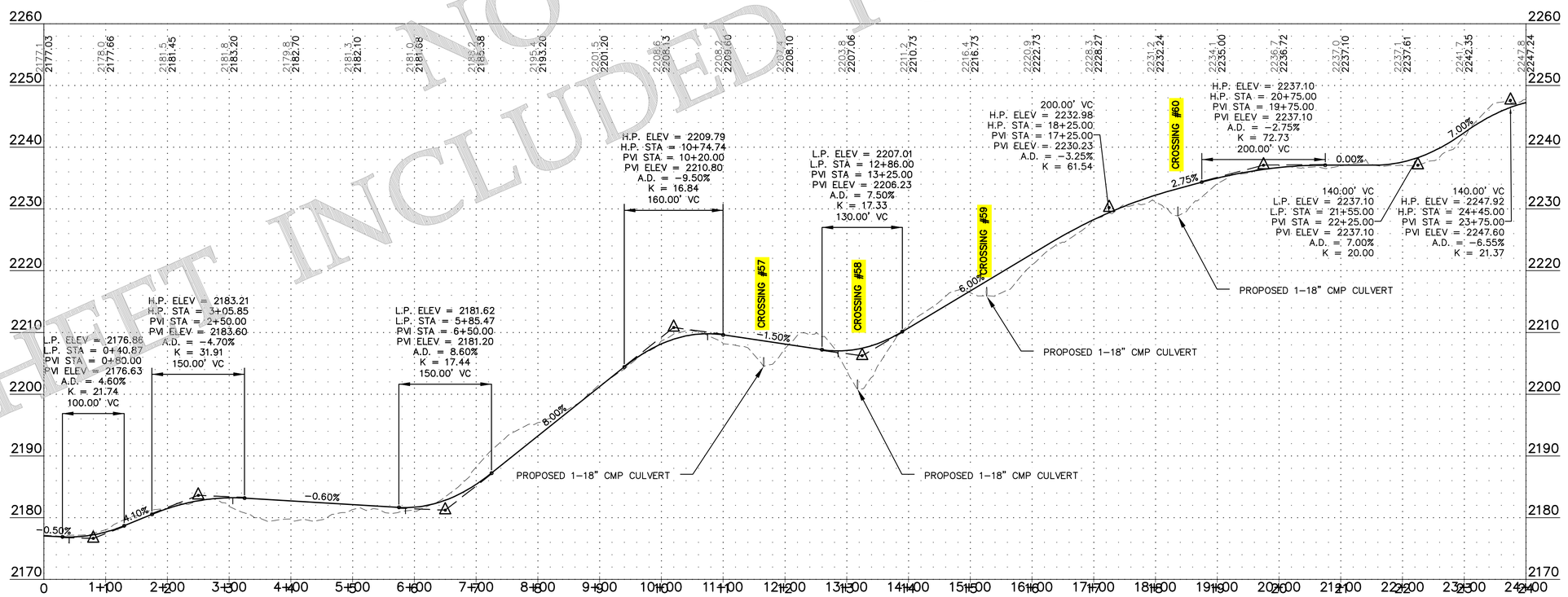

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Merricourt Wind Project

McIntosh County, North Dakota

Road 34 - Sta. 0+00 to 24+00

Record Plans

Date: 11/20/2020

Sheet: 68 OF 119

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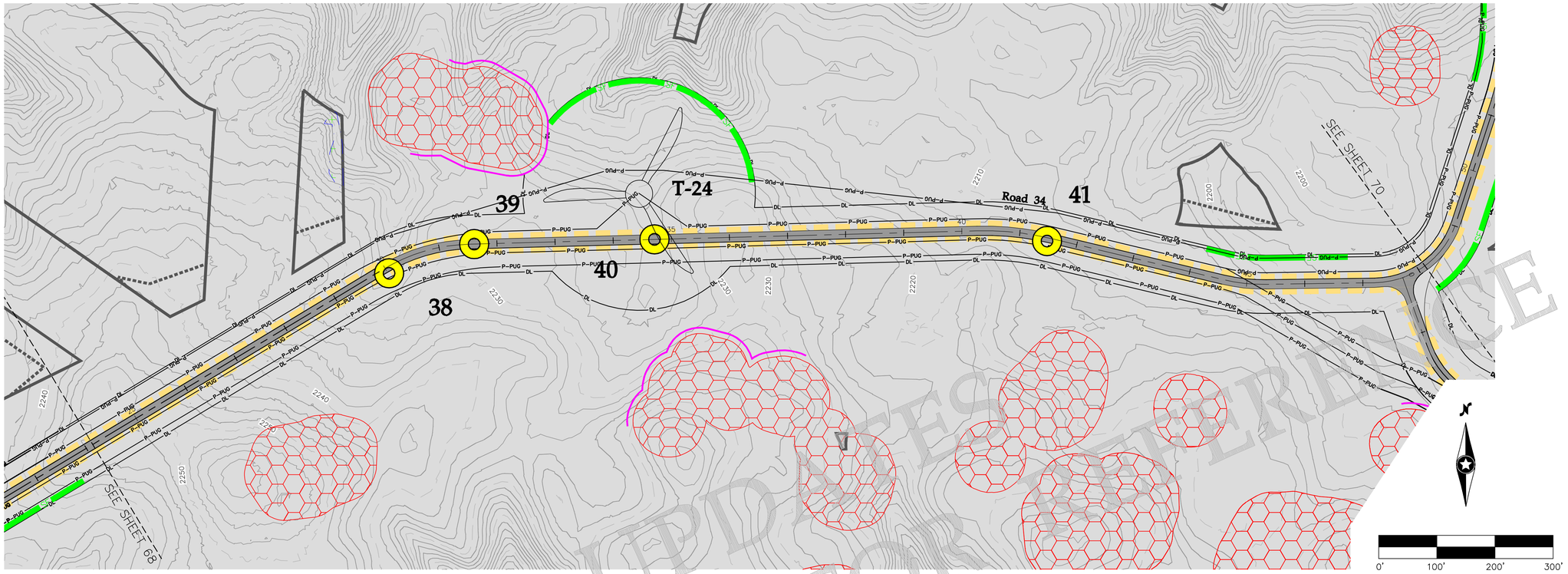

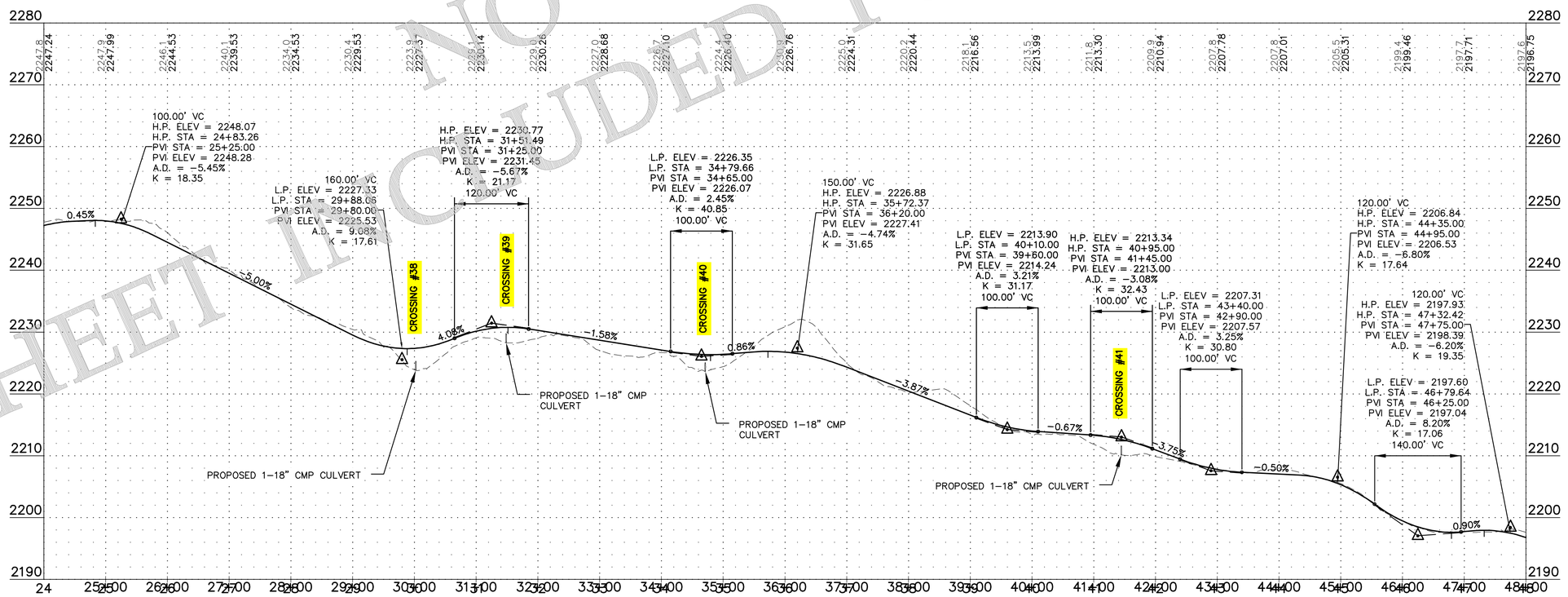

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Prepared for:

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2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 34 - Sta. 24+00 to 48+00

Record Plans

Date: 11/20/2020
Sheet: 69 OF 119

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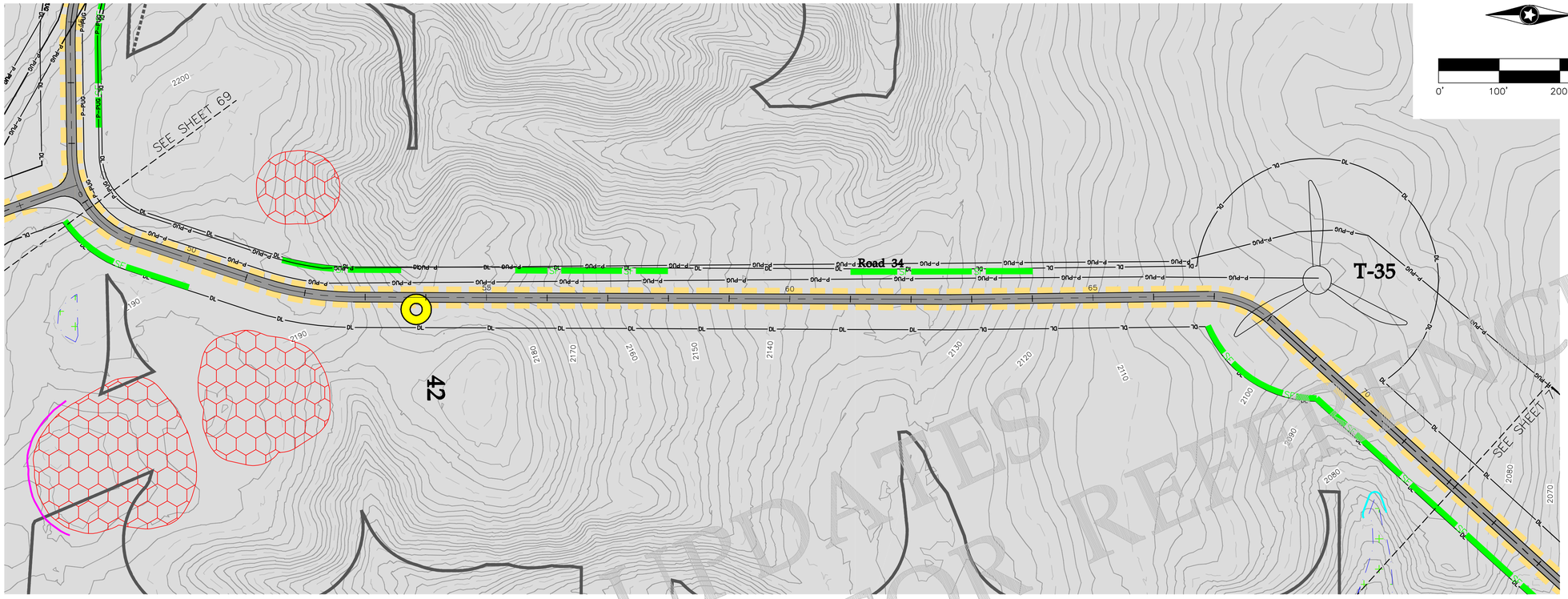

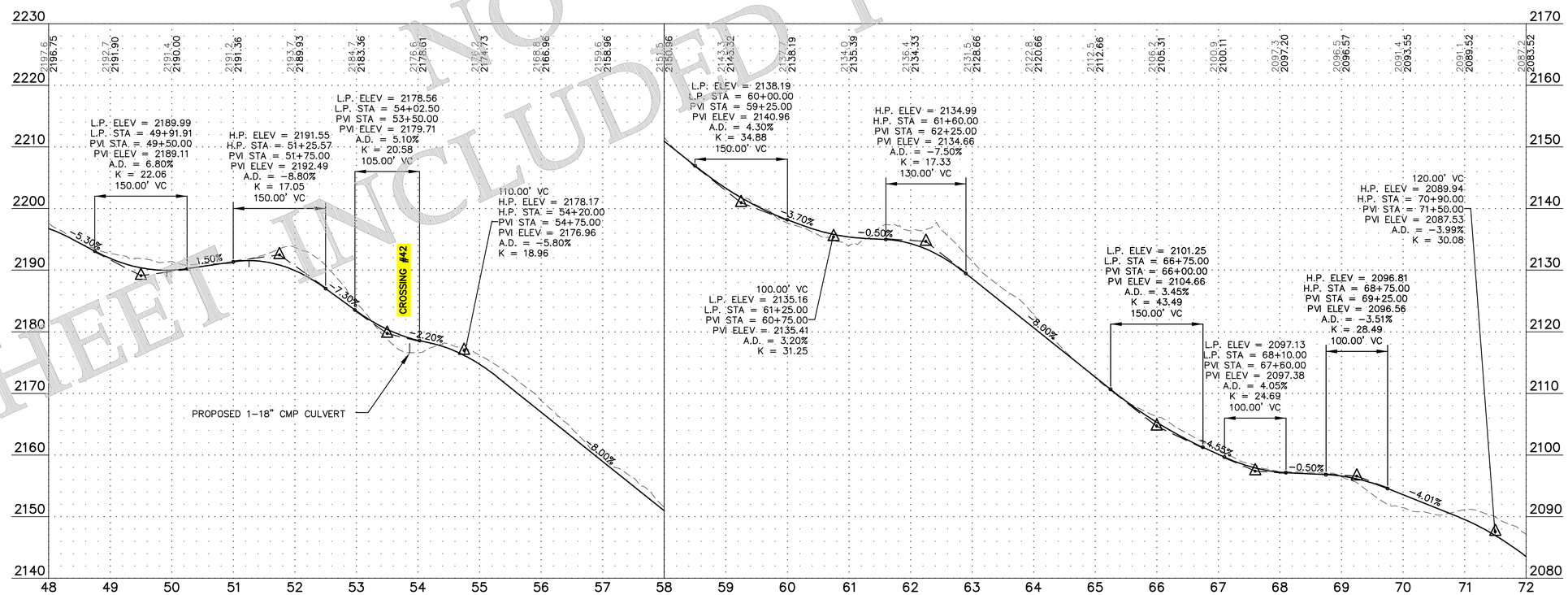

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Merricourt Wind Project

McIntosh County, North Dakota

Road 34 - Sta. 48+00 to 72+00

Record Plans

Date: 11/20/2020
Sheet: 70 OF 119

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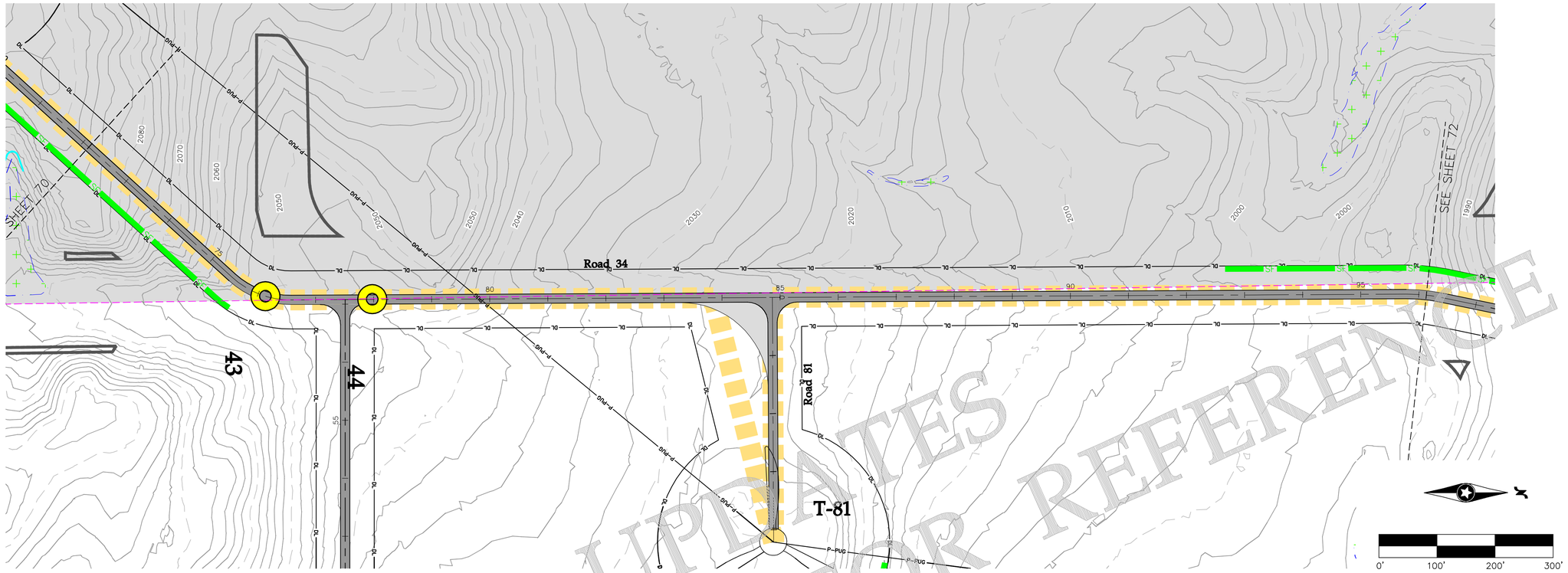

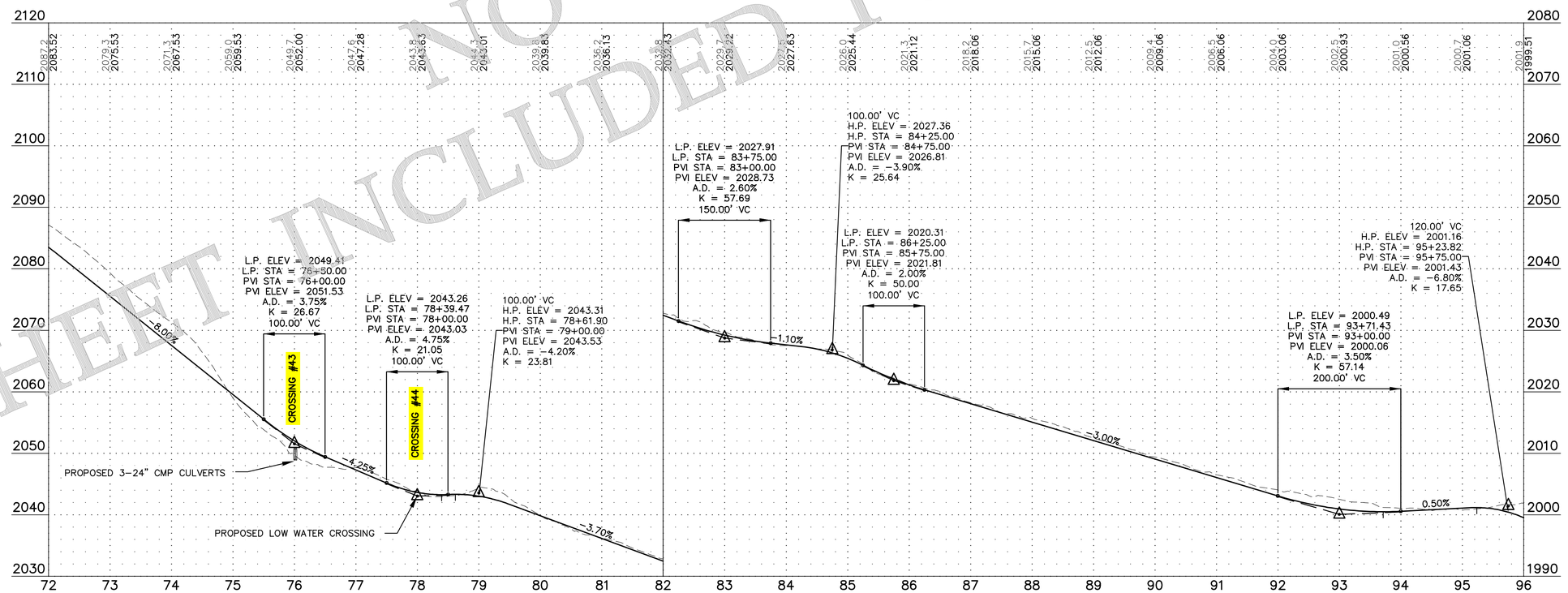

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Merricourt Wind Project

McIntosh County, North Dakota

Road 34 - Sta. 72+00 to 96+00

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Sheet: 71 OF 119

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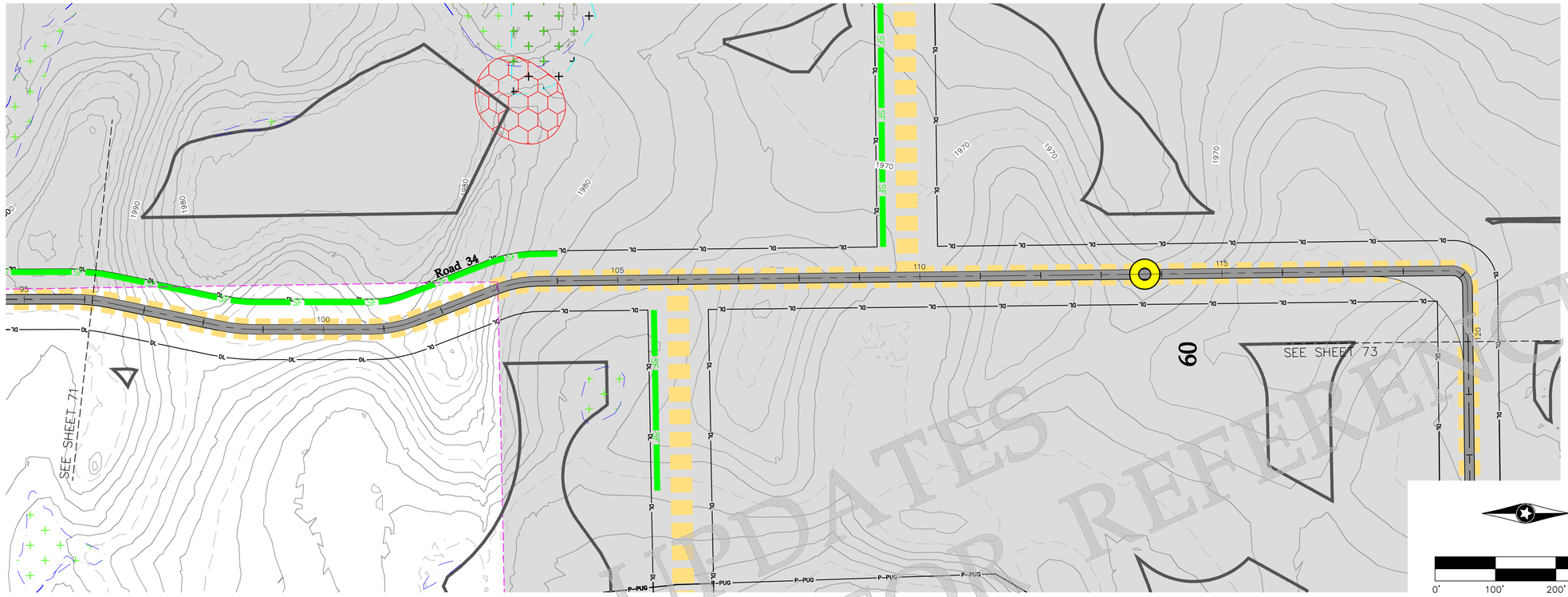

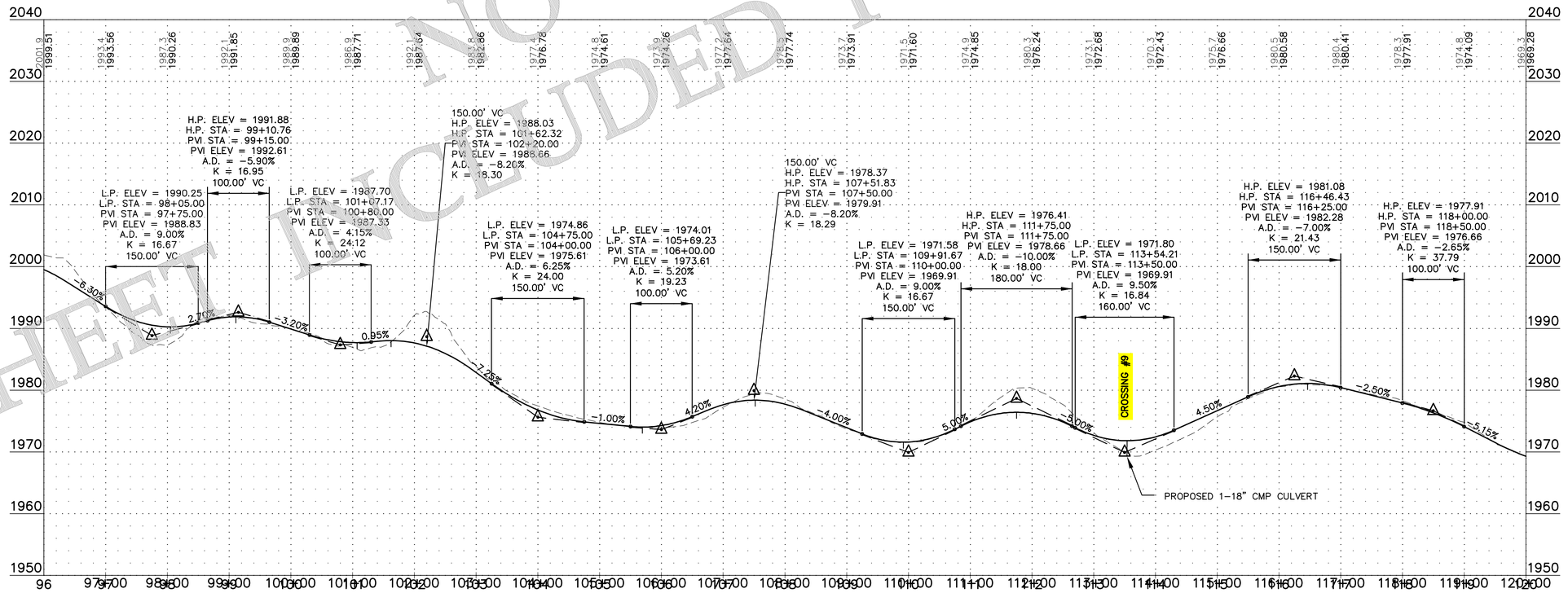

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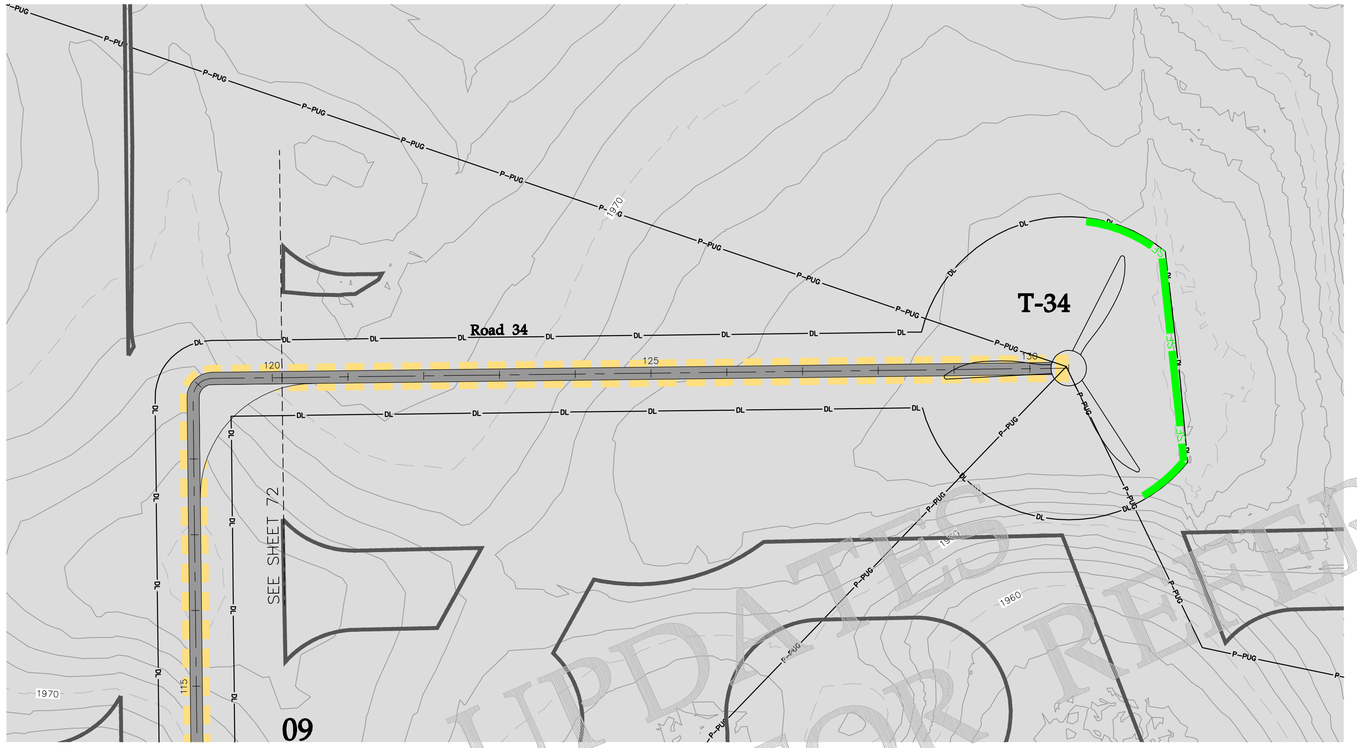

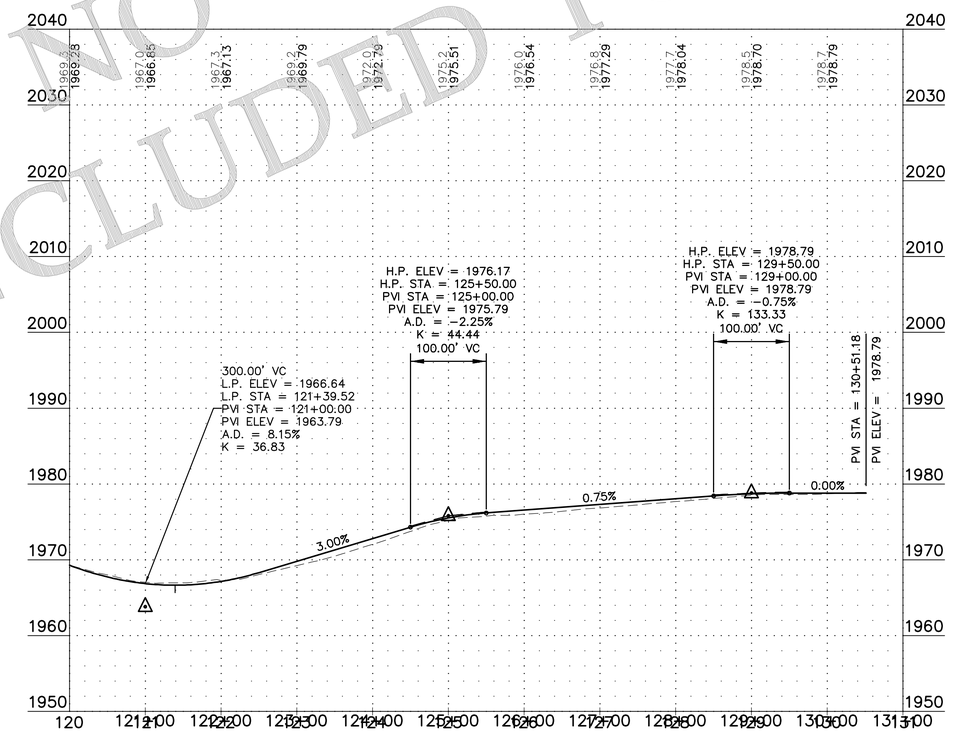

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0' 100' 200' 300'

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- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 34 - Sta. 120+00 to End

Record Plans

Date: 11/20/2020

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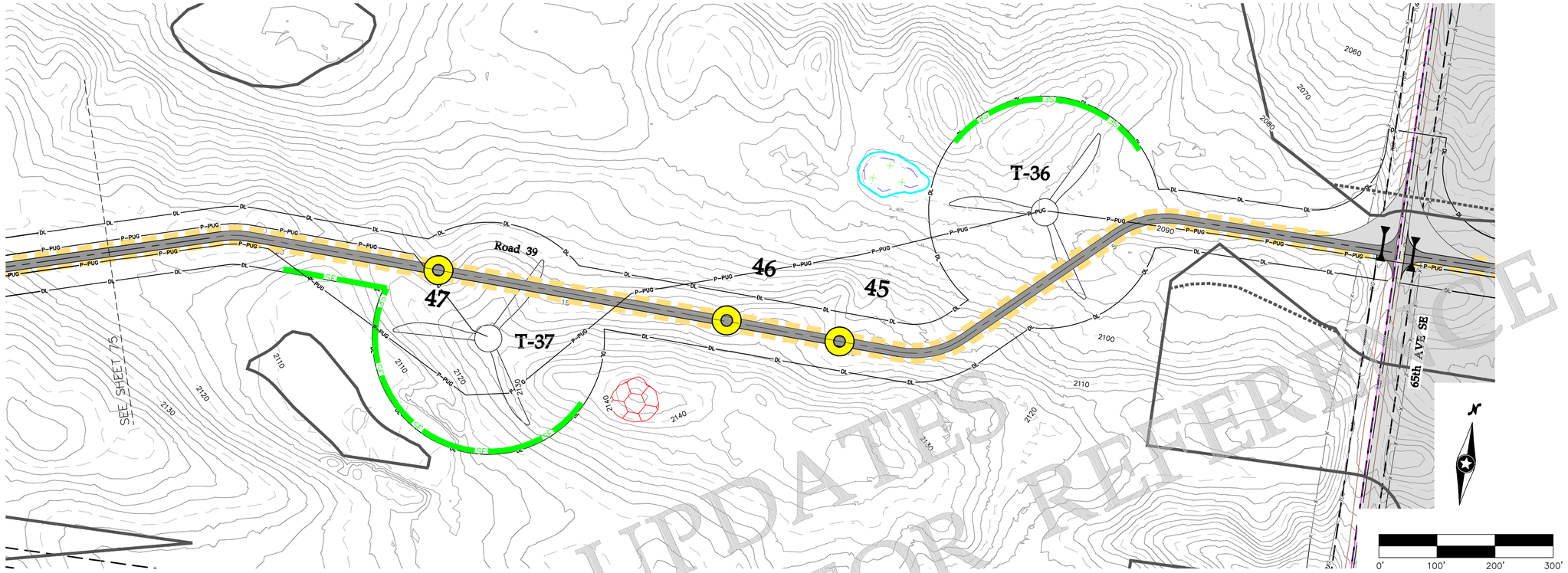

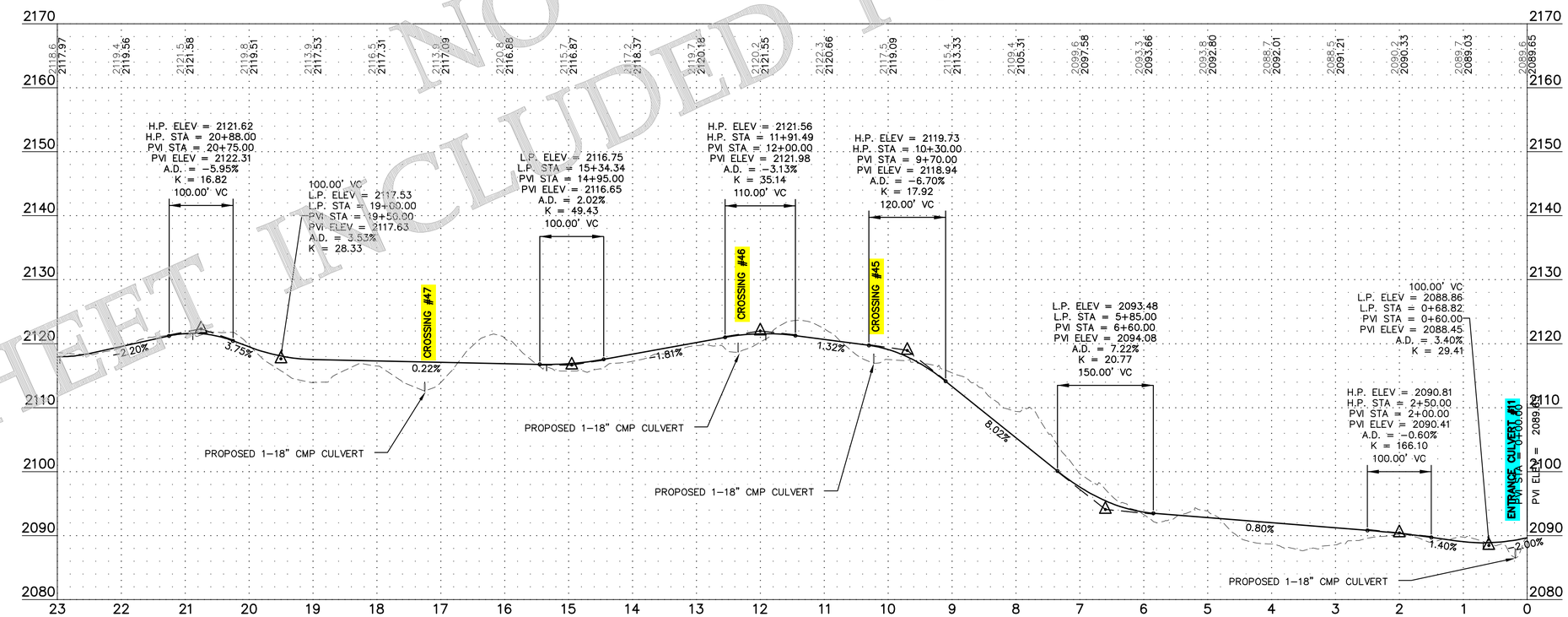

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Checked:	DJN
Drawn:	SNK
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Revisions:

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5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 39 - Sta. 0+00 to 23+00

Record Plans

Date: 11/20/2020

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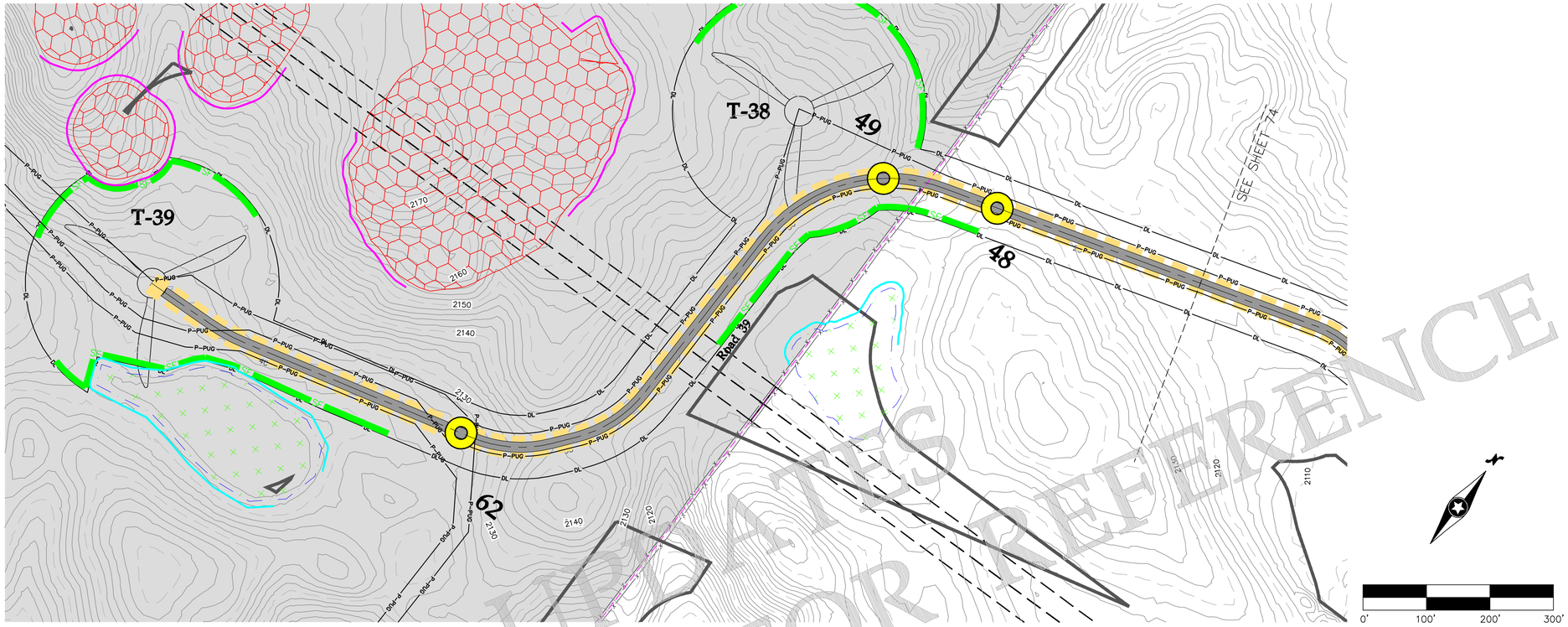

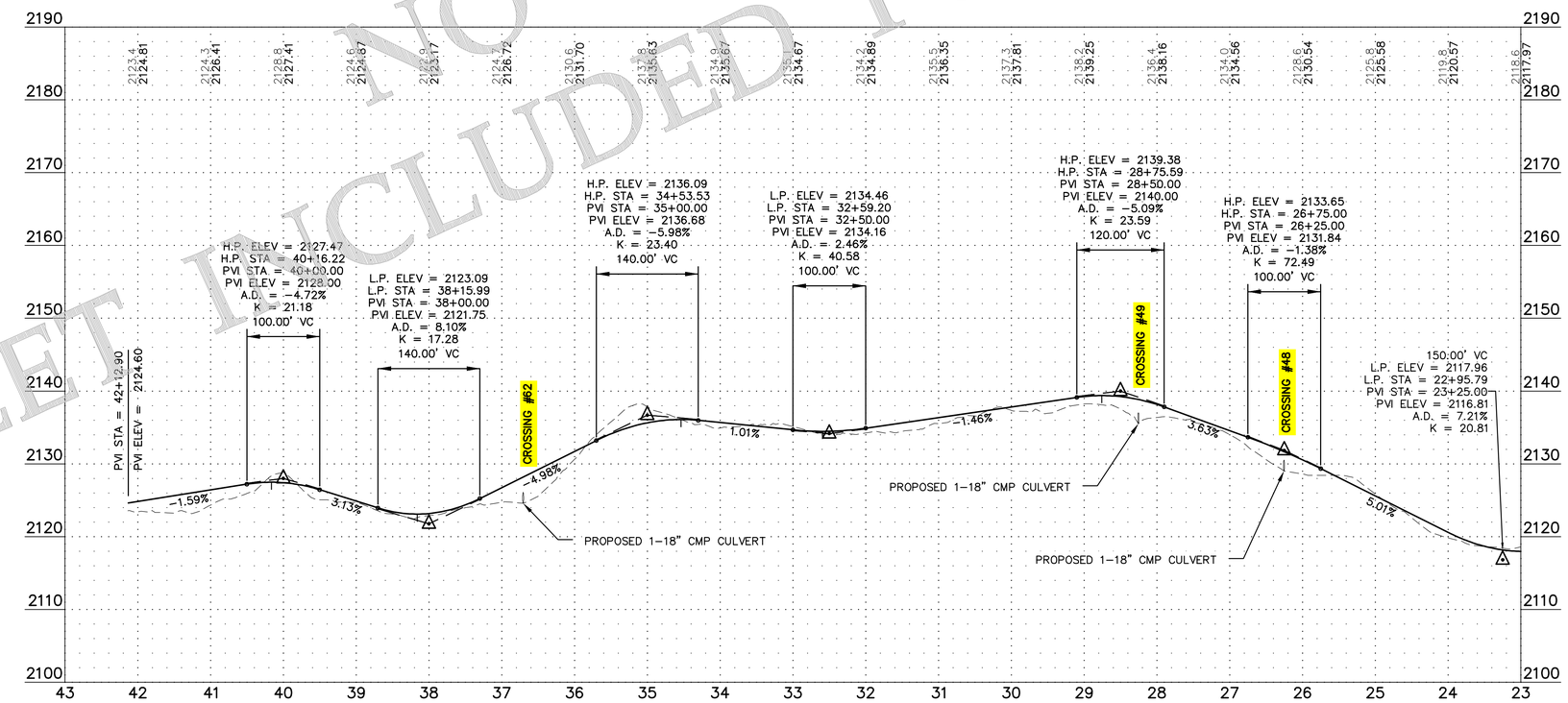

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McIntosh County, North Dakota

Road 39 - Sta. 23+00 to End

Record Plans

Date: 11/20/2020
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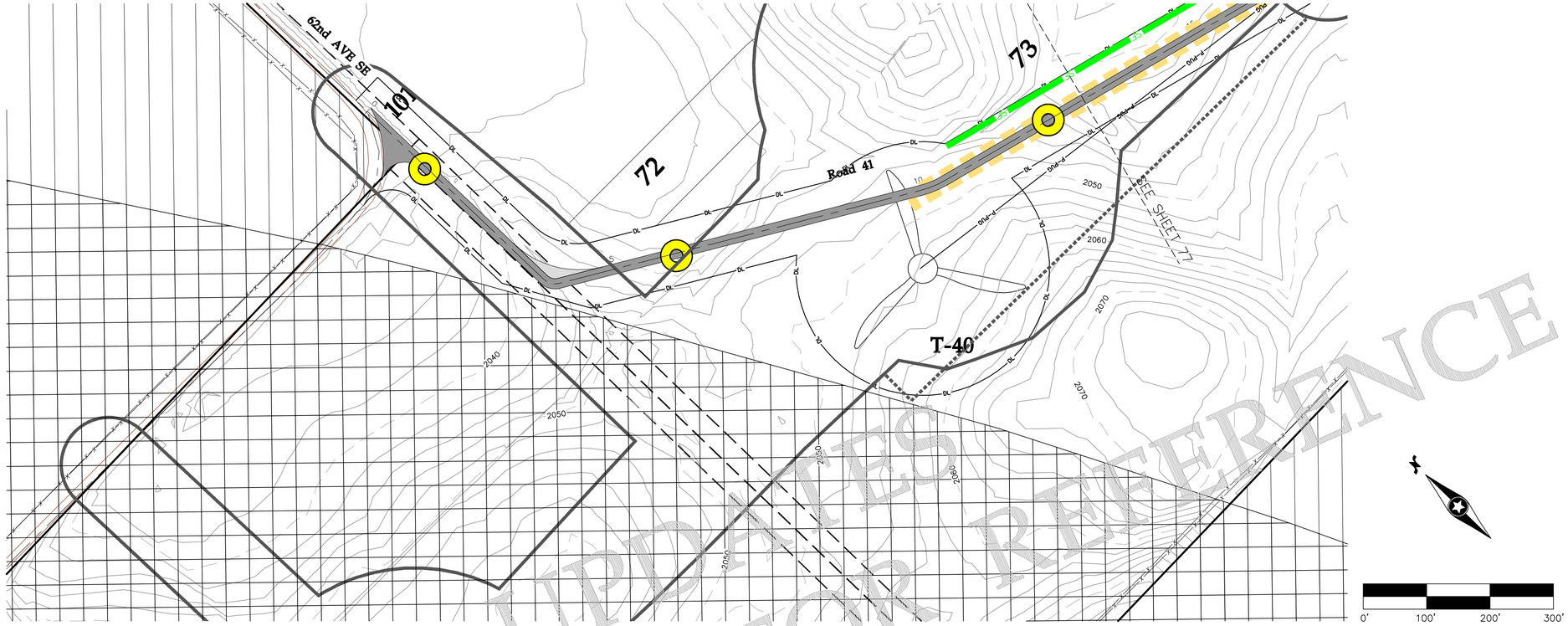

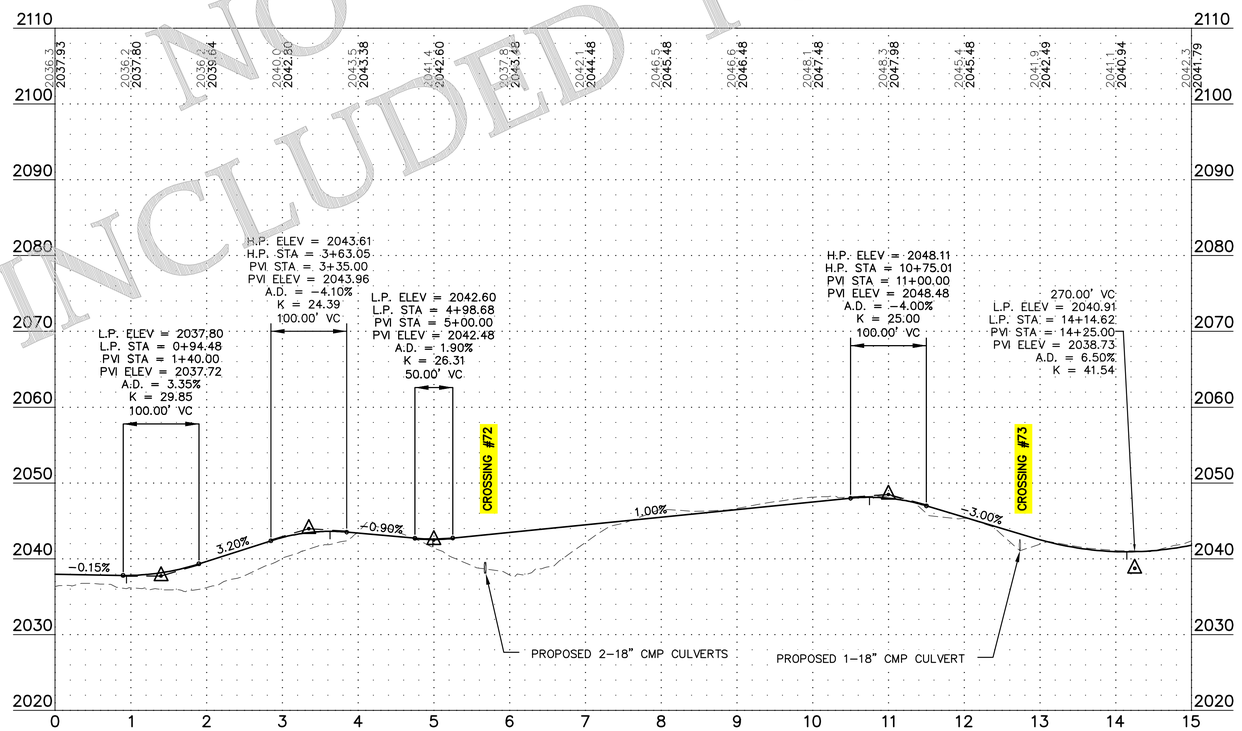

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Merricourt Wind Project

McIntosh County, North Dakota

Road 41 - Sta. 0+00 to 15+00

Record Plans

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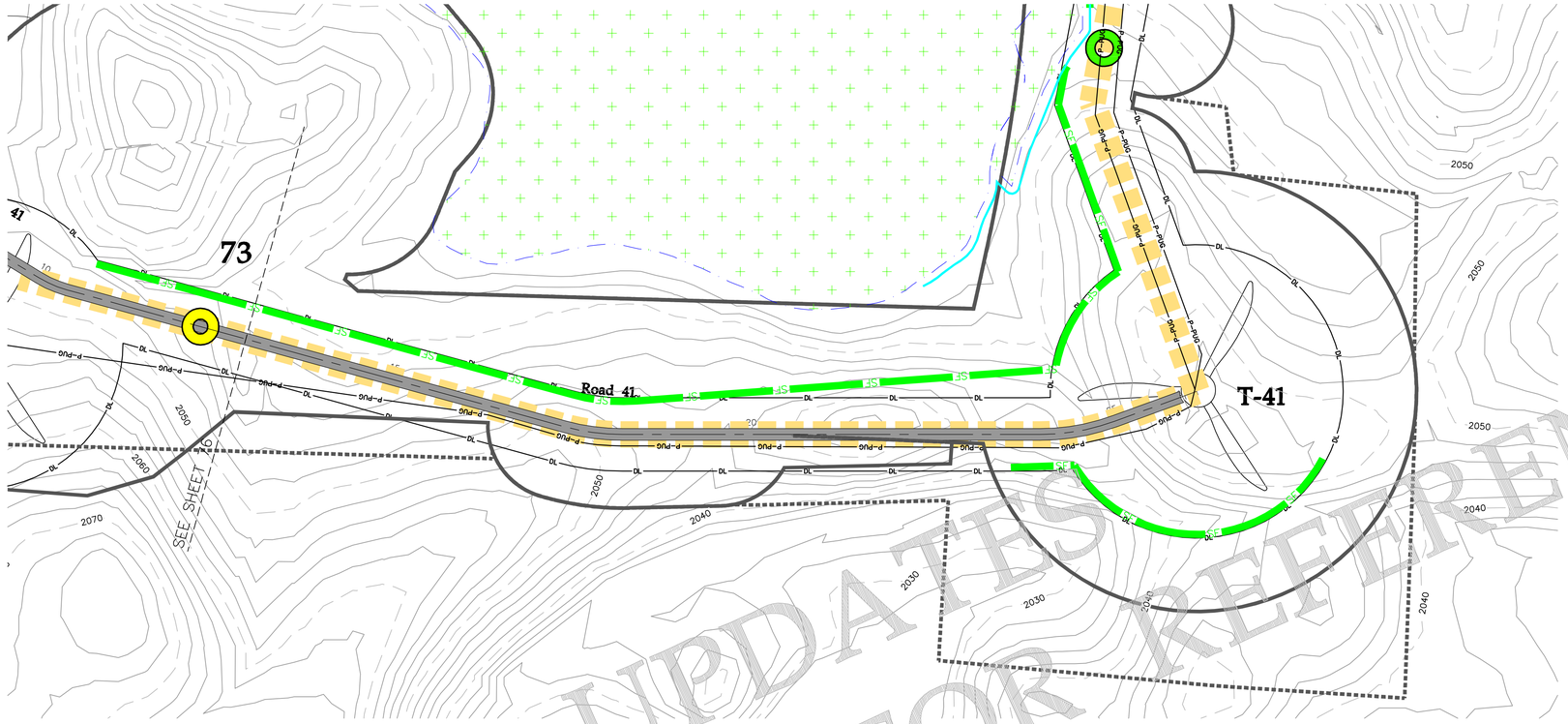

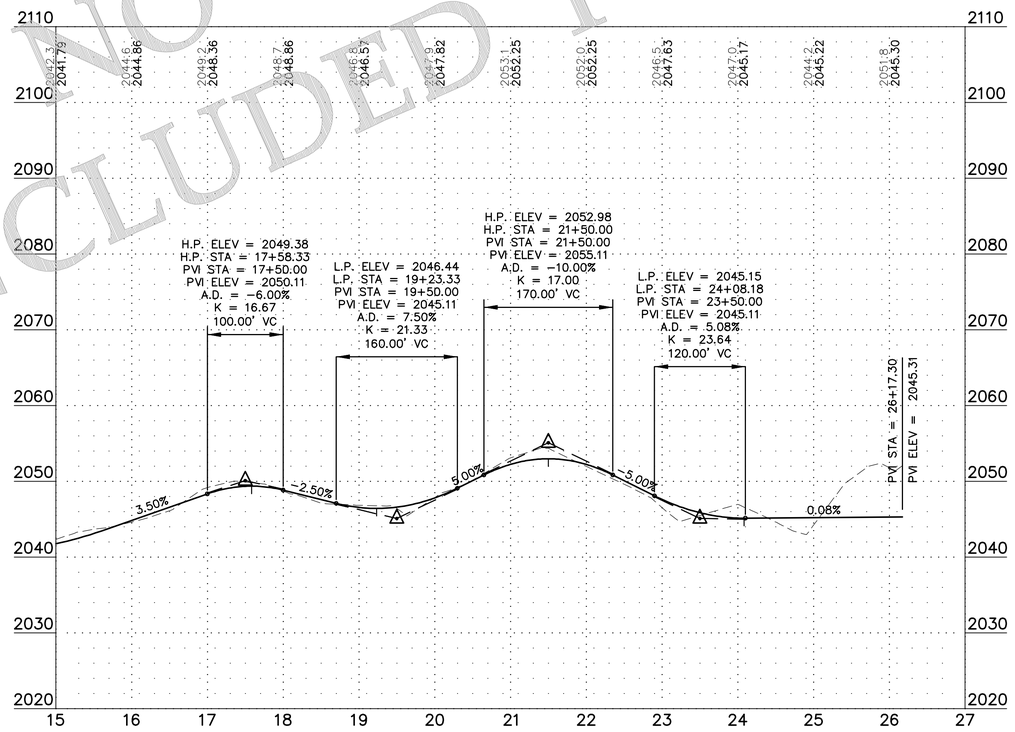

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McIntosh County, North Dakota

Road 41 - Sta. 15+00 to End

Record Plans

Date: 11/20/2020

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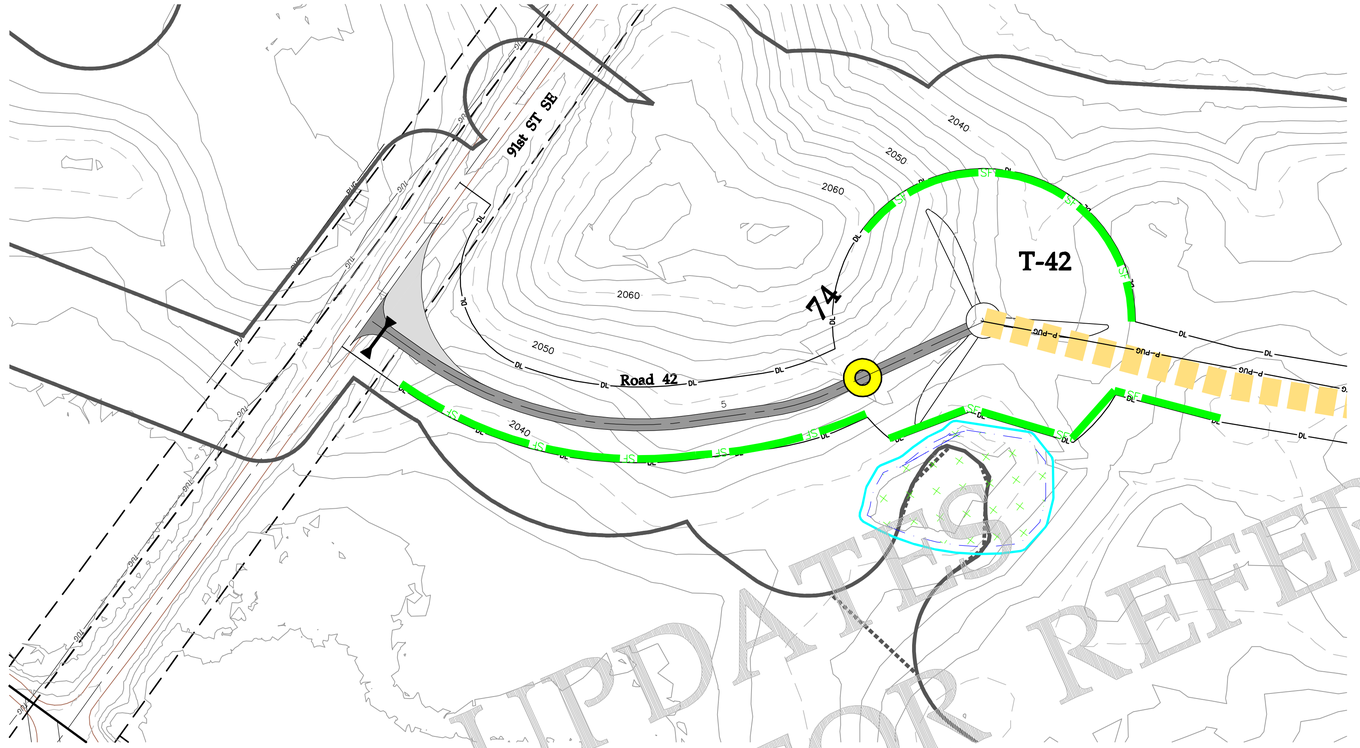

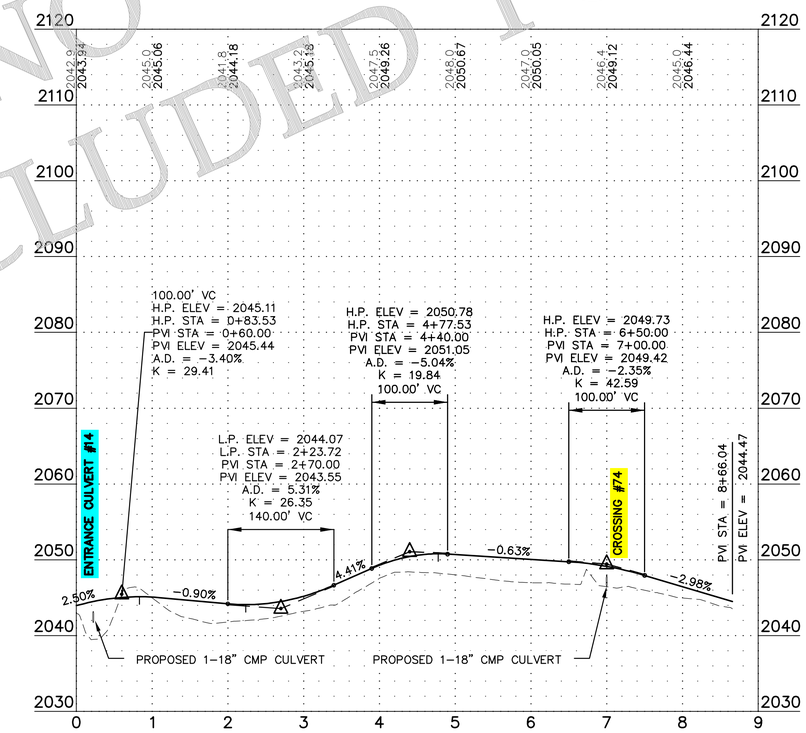

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Merricourt Wind Project

McIntosh County, North Dakota

Road 42 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 78 OF 119

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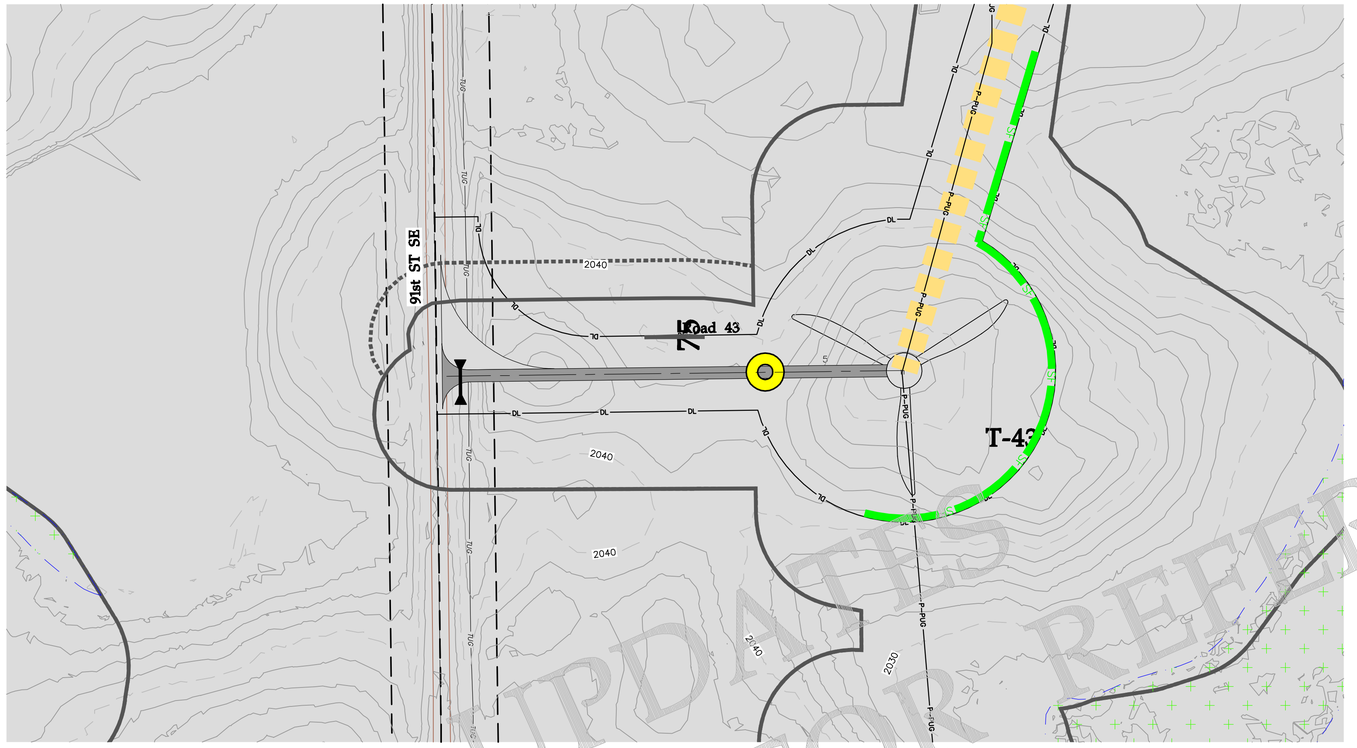

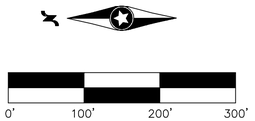

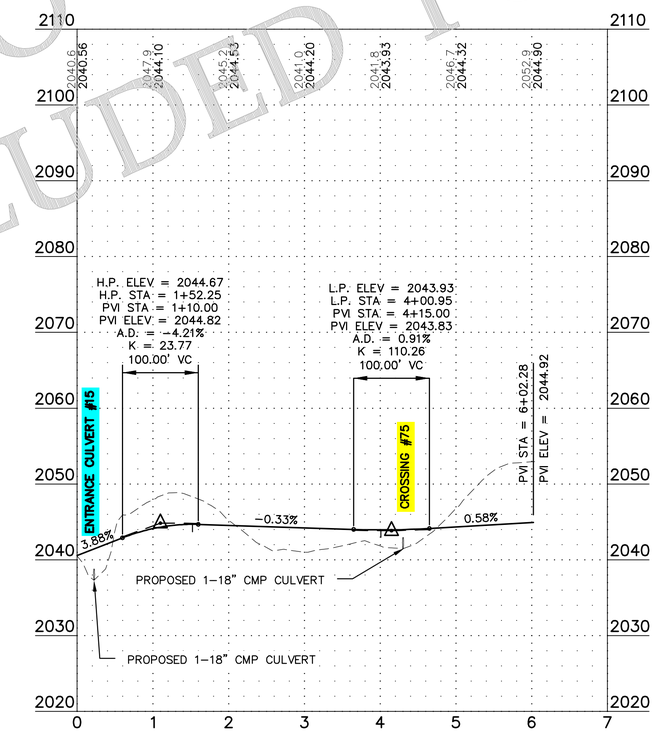

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 43 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 79 OF 119

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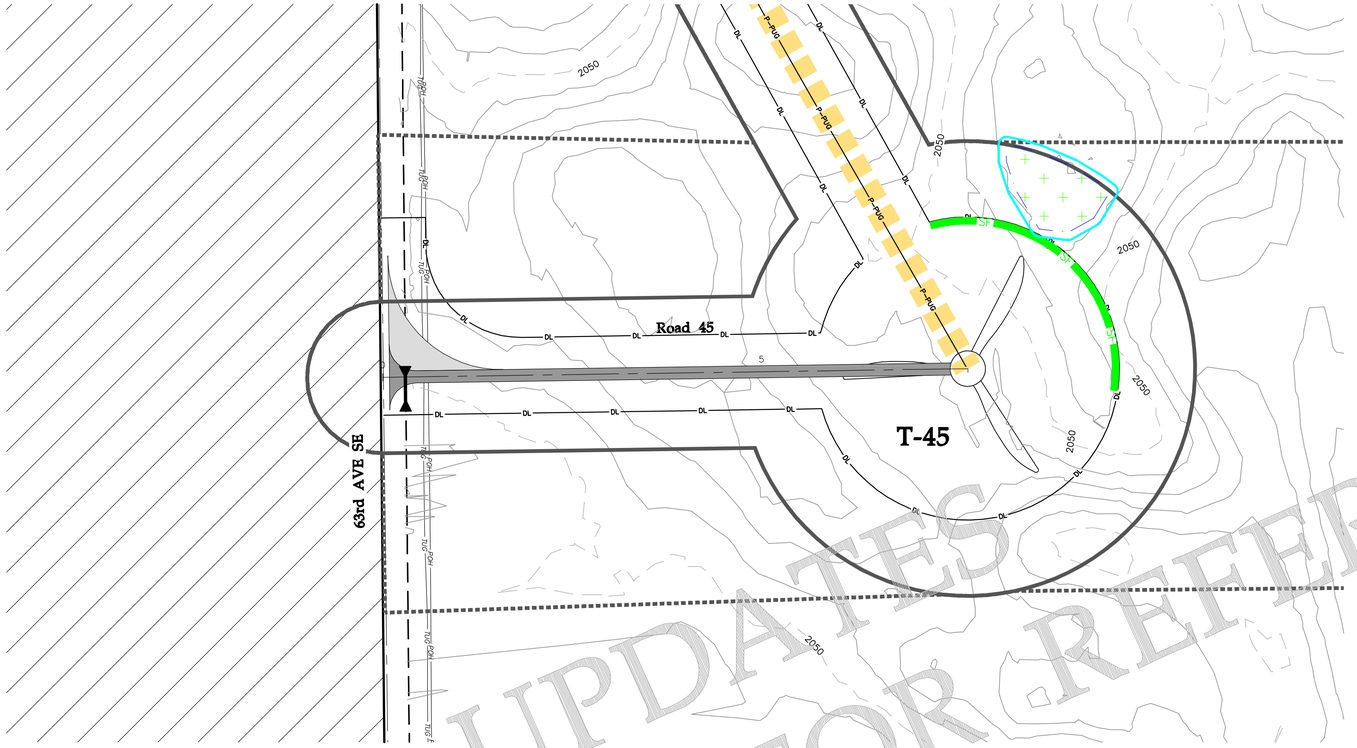

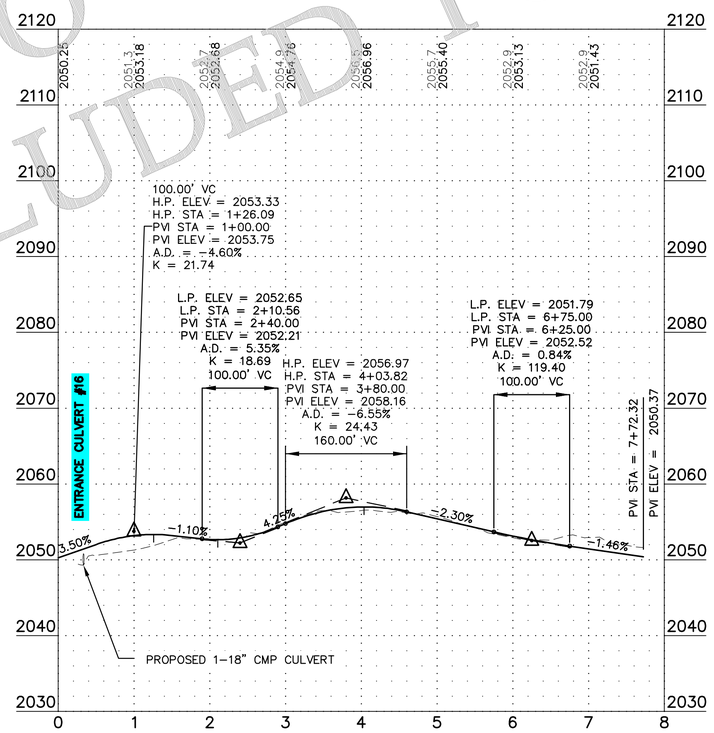

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Merricourt Wind Project

McIntosh County, North Dakota

Road 45 - Sta. 0+00 to End

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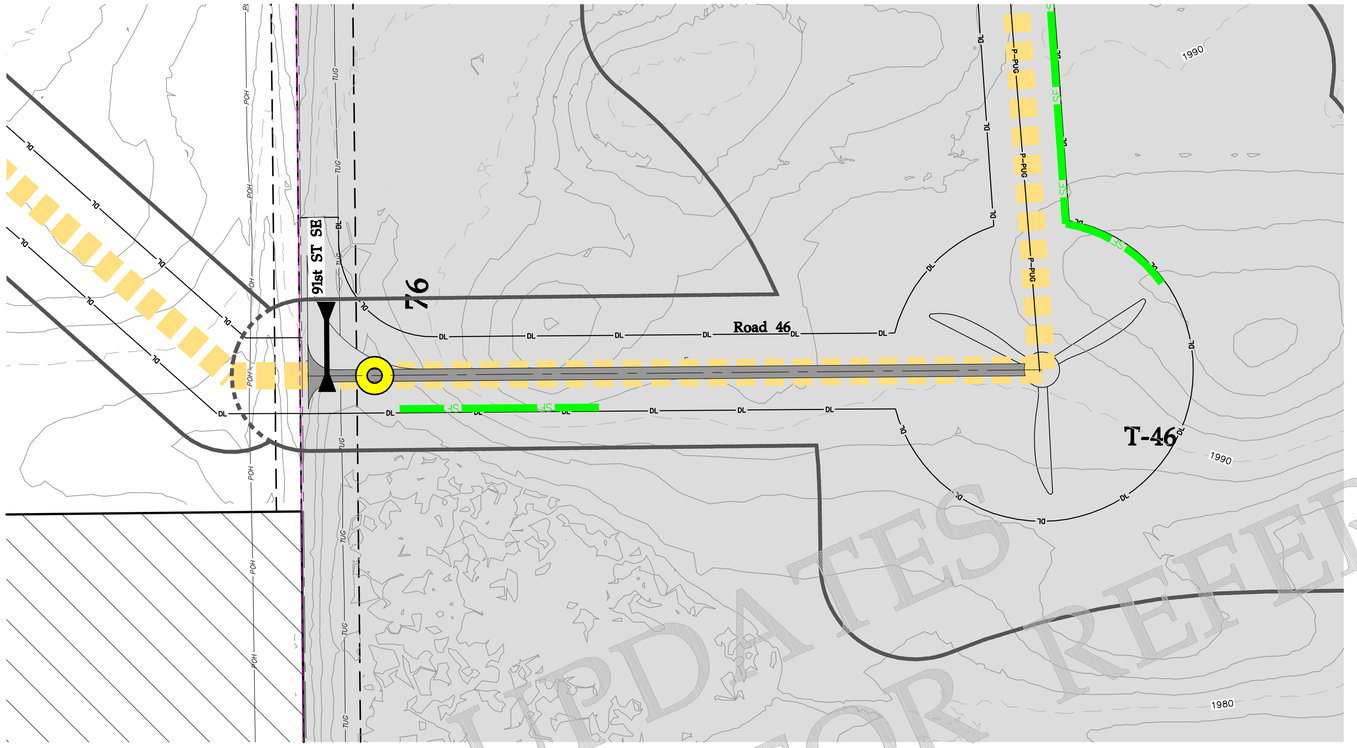

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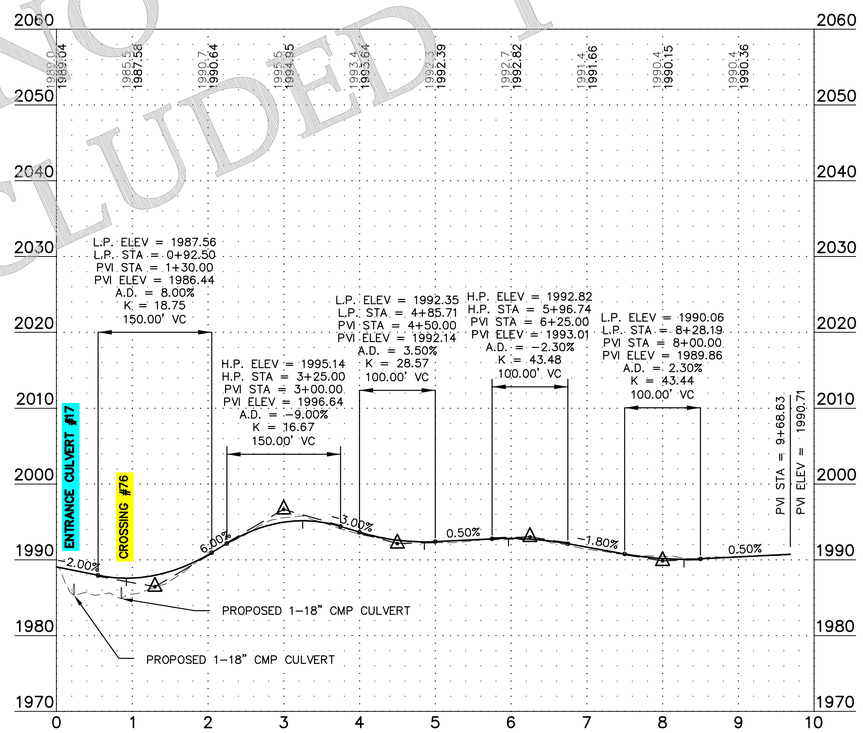

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Merricourt Wind Project

McIntosh County, North Dakota

Road 46 - Sta. 0+00 to End

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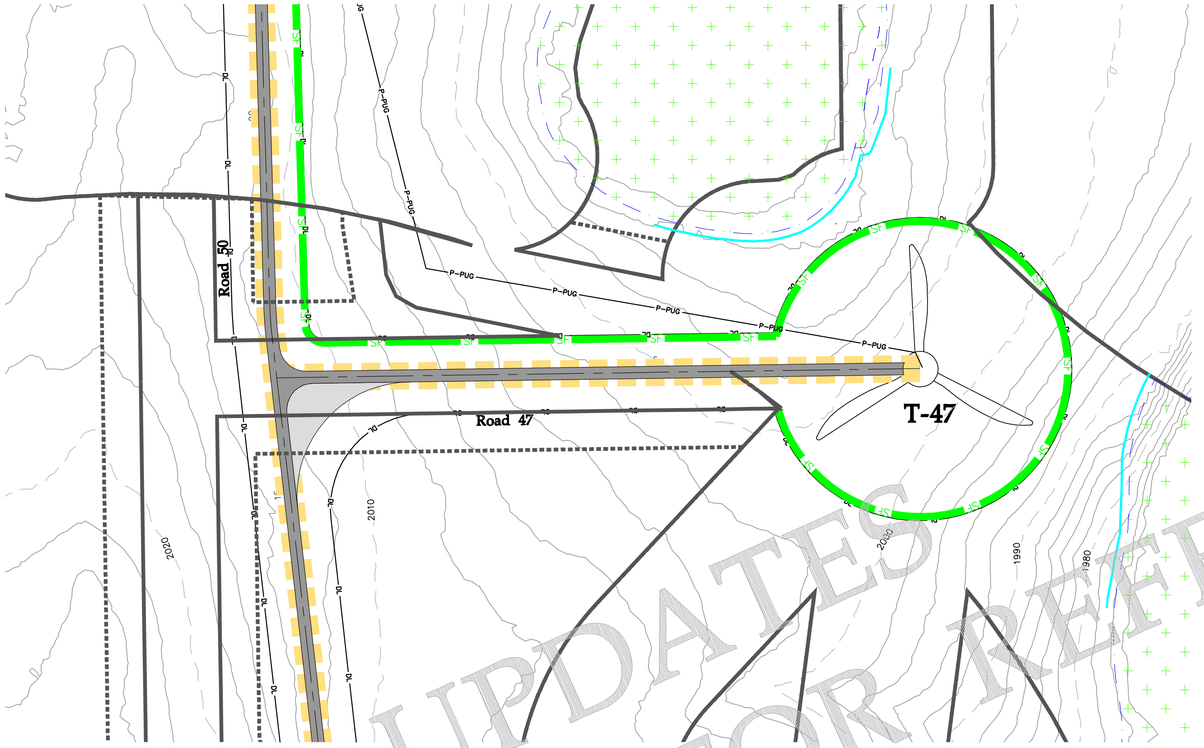

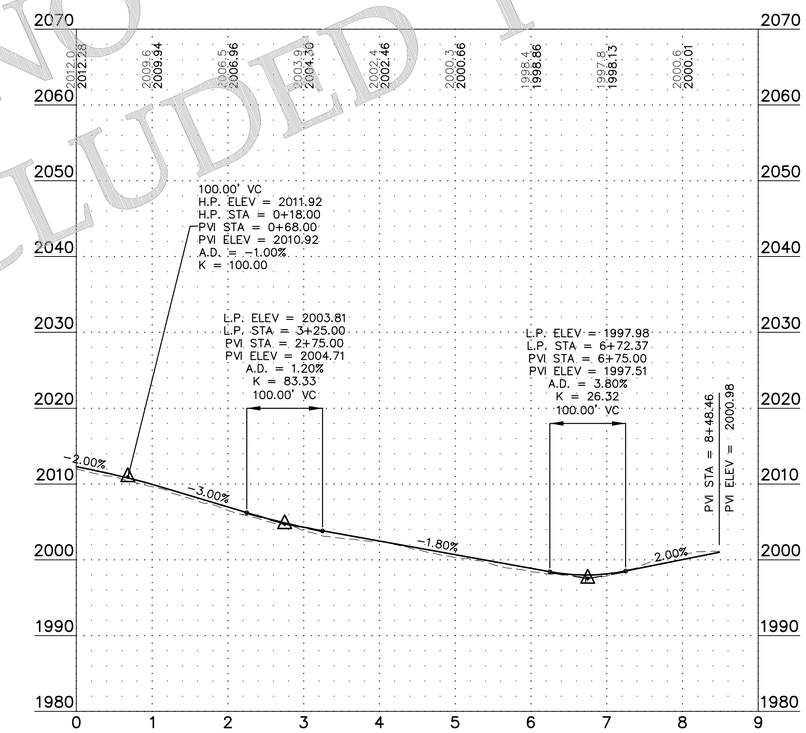

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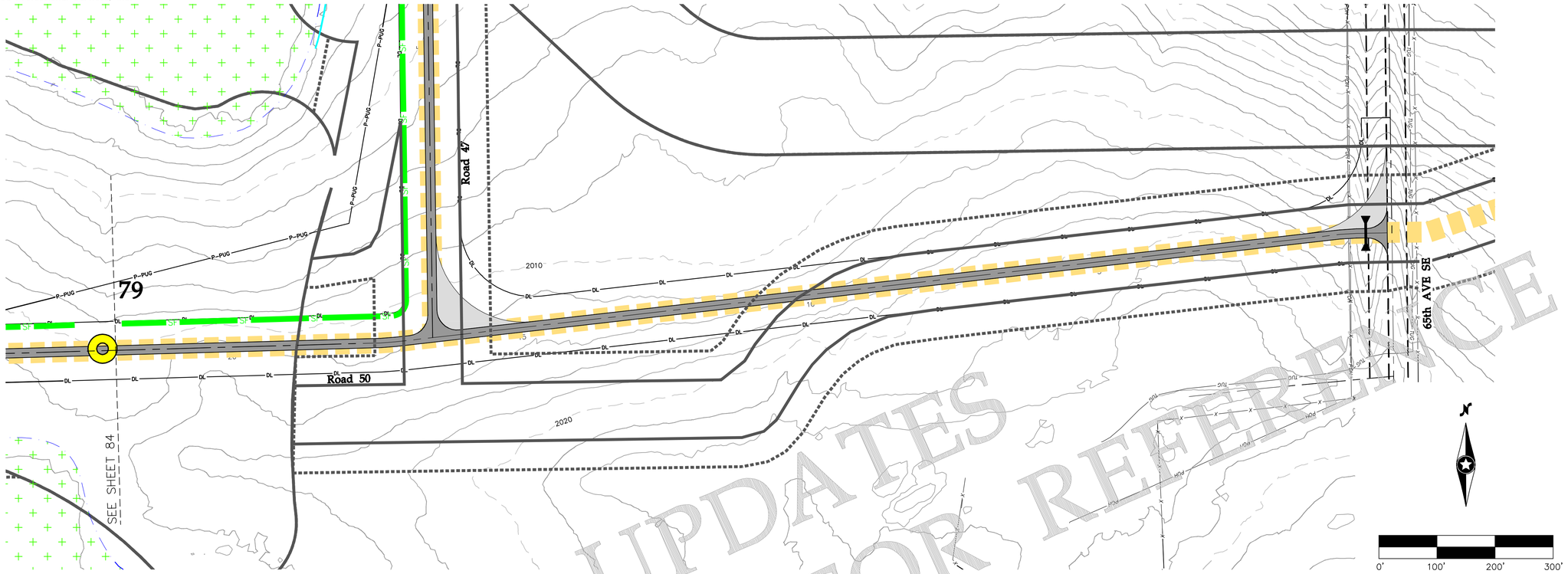

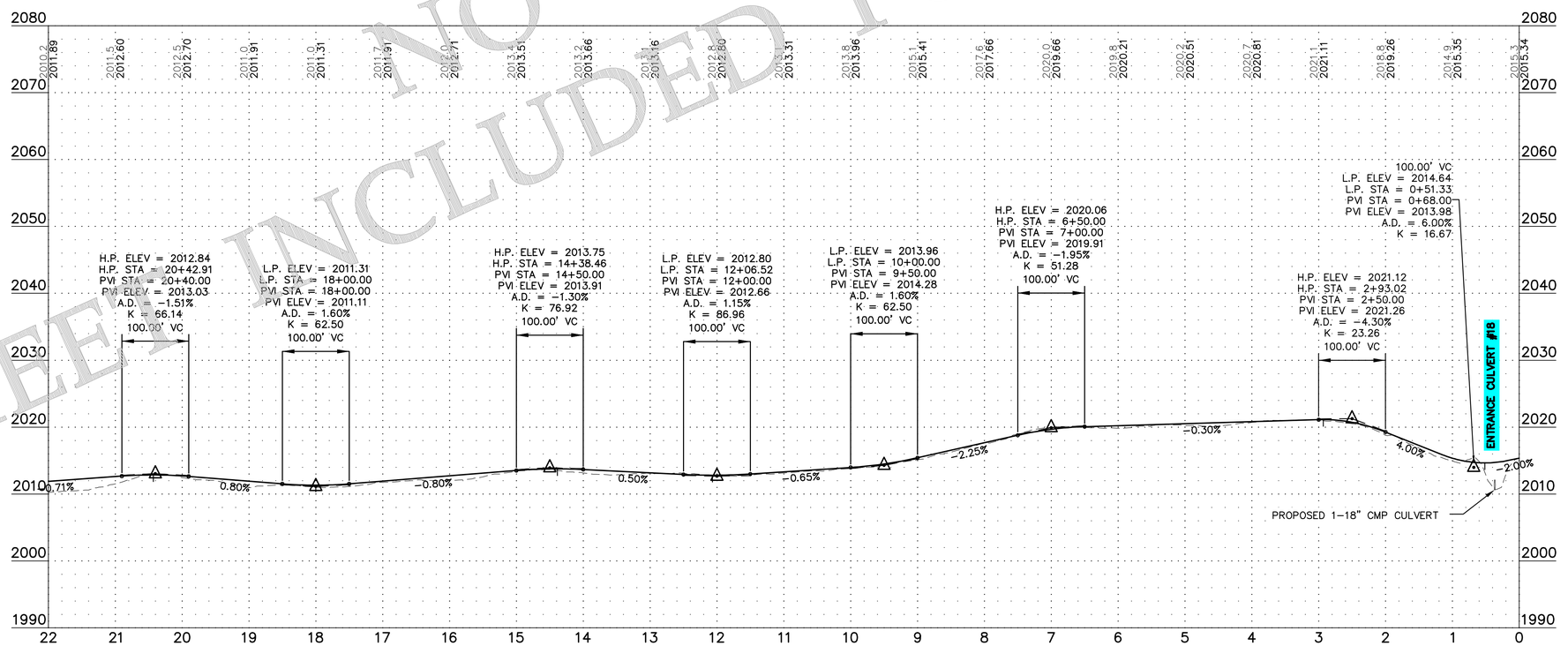

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5	11/20/20	RECORD PLANS

Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

LEGEND:

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Merricourt Wind Project

McIntosh County, North Dakota

Road 50 - Sta. 0+00 to 22+00

Record Plans

Date: 11/20/2020
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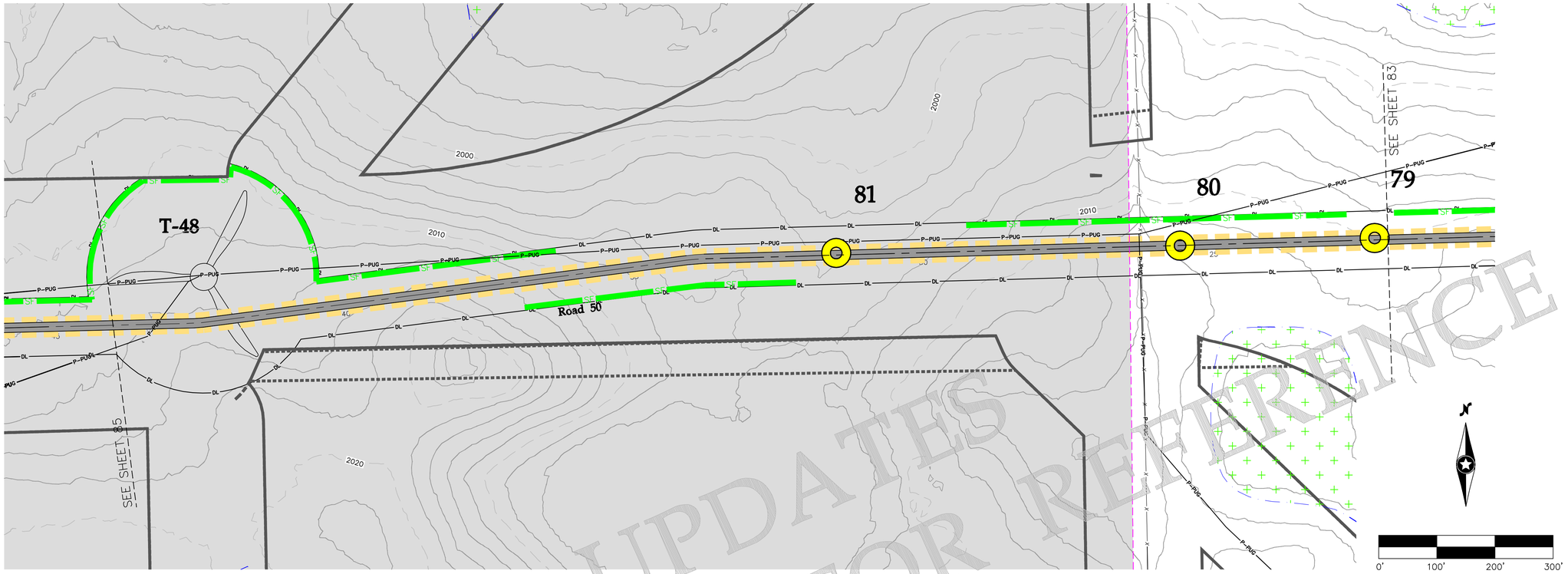

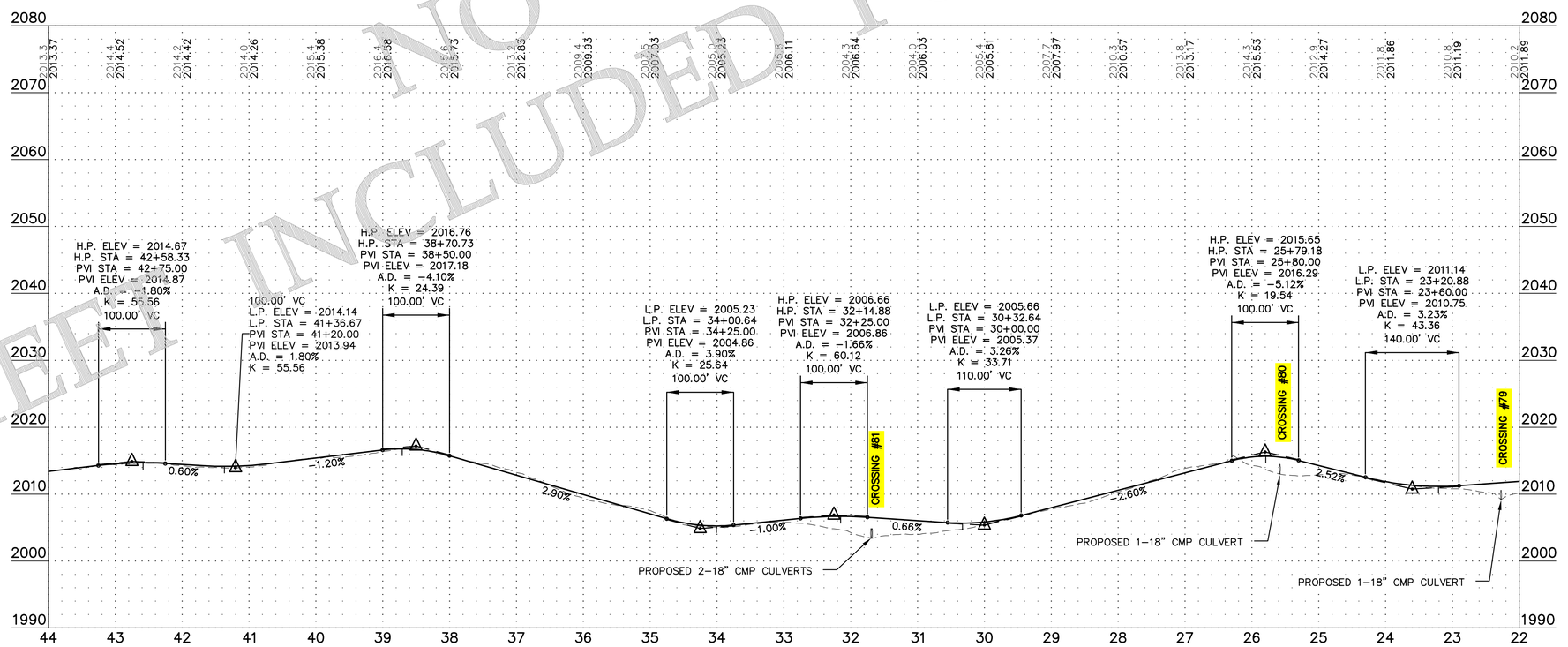

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McIntosh County, North Dakota

Road 50 - Sta. 22+00 to 44+00

Record Plans

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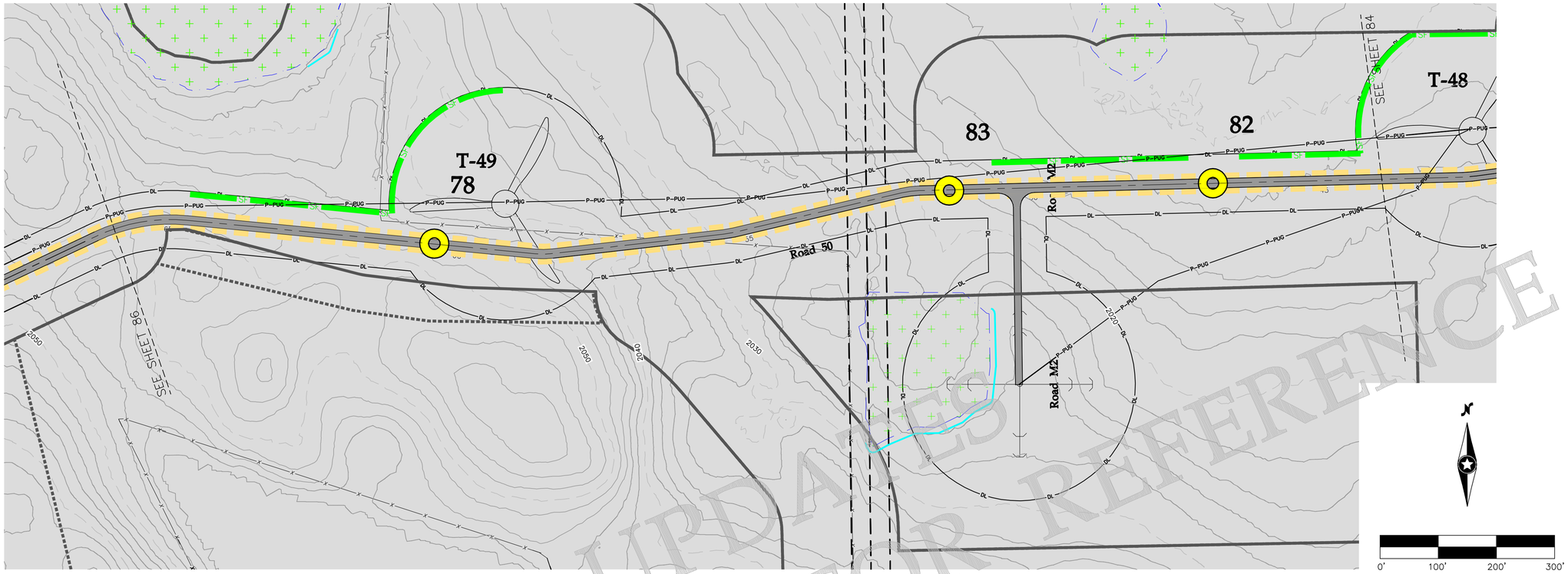

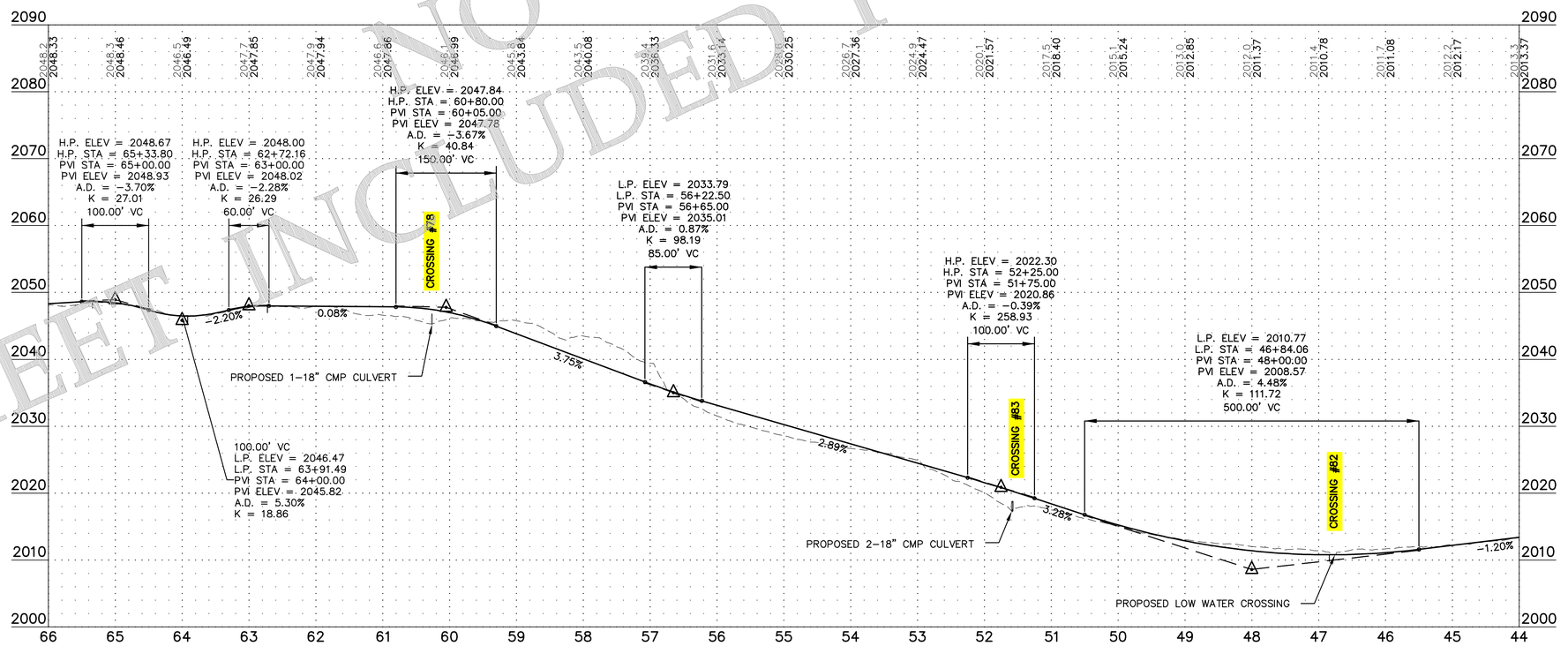

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Road 50 - Sta. 44+00 to 66+00

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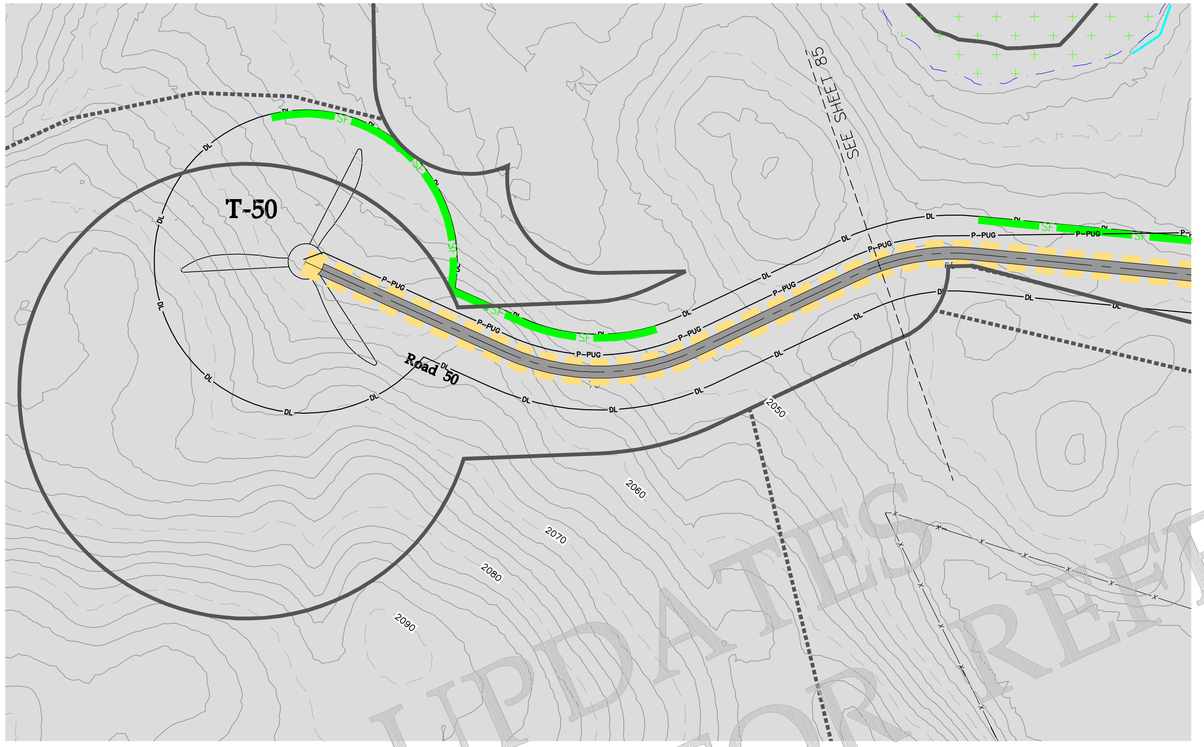

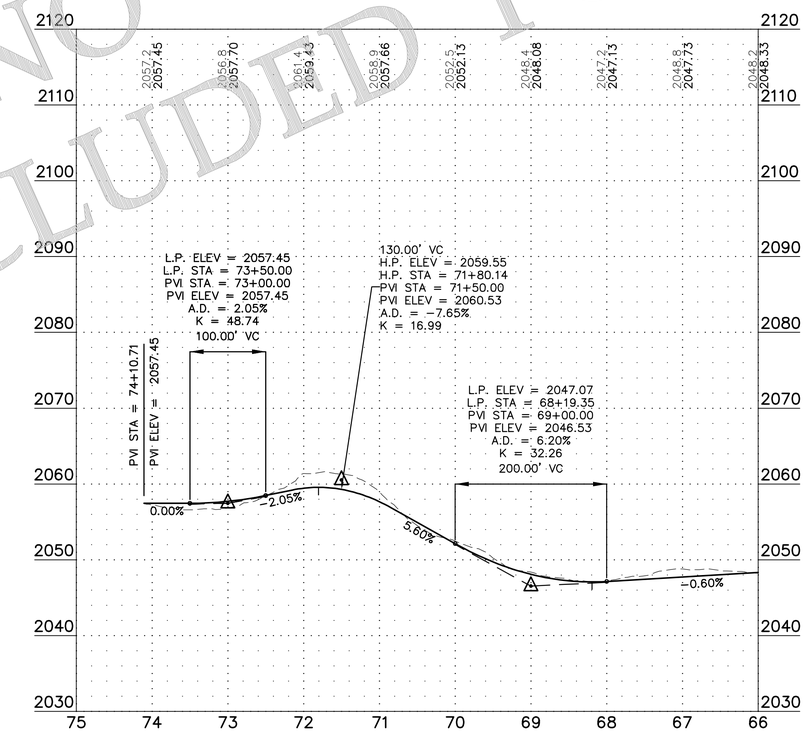

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0' 100' 200' 300'

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Road 50 - Sta. 66+00 to End

Record Plans

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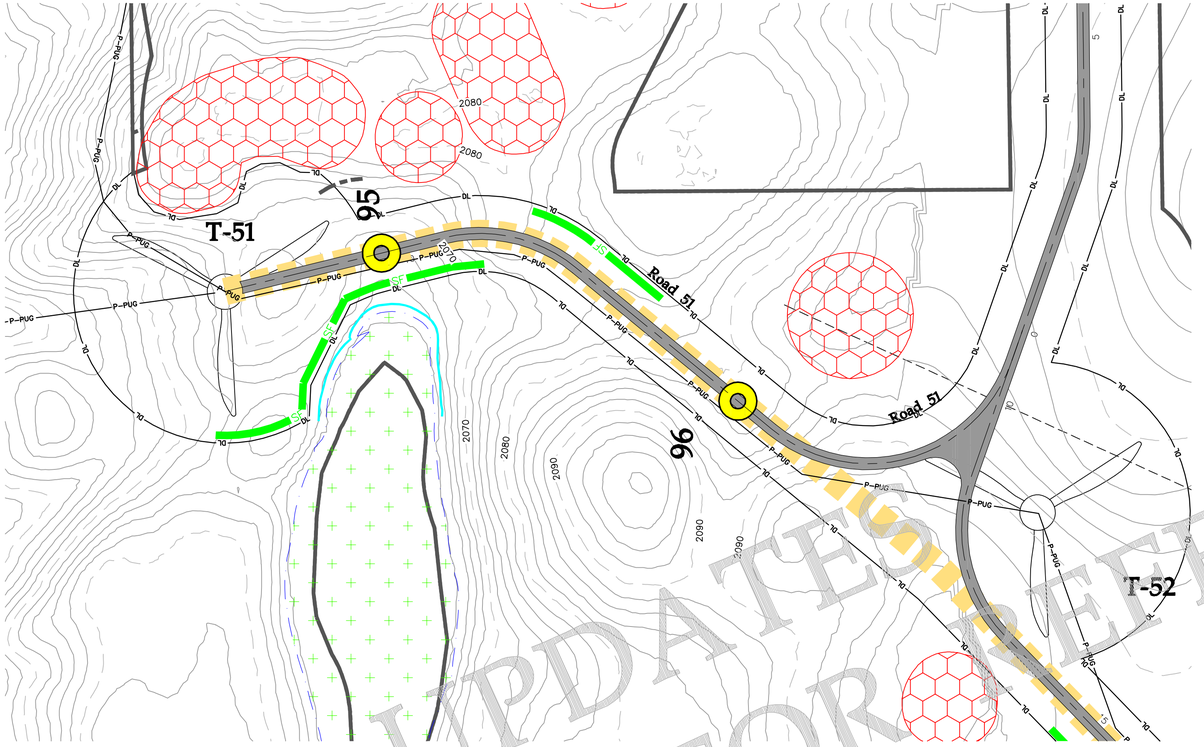

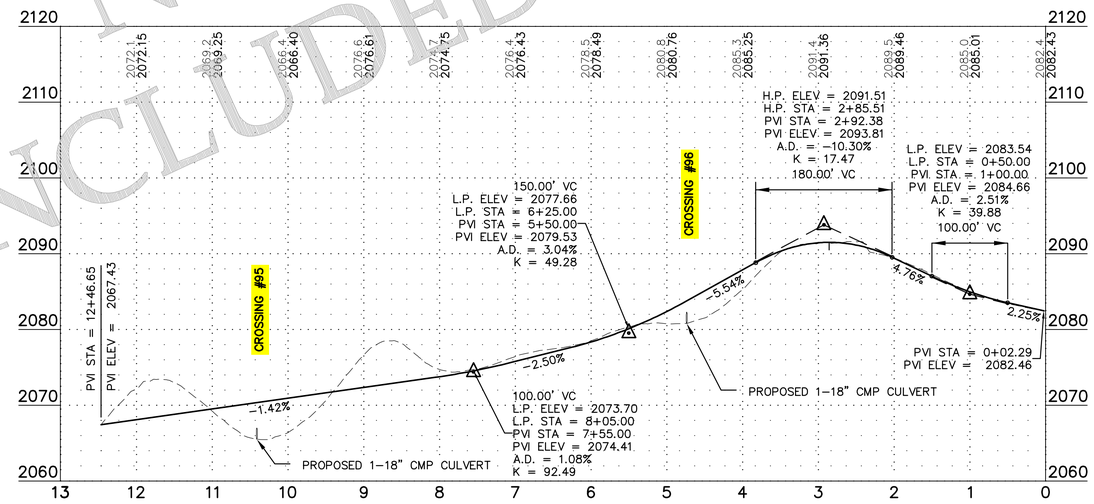

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Road 51 - Sta. 0+00 to End

Record Plans

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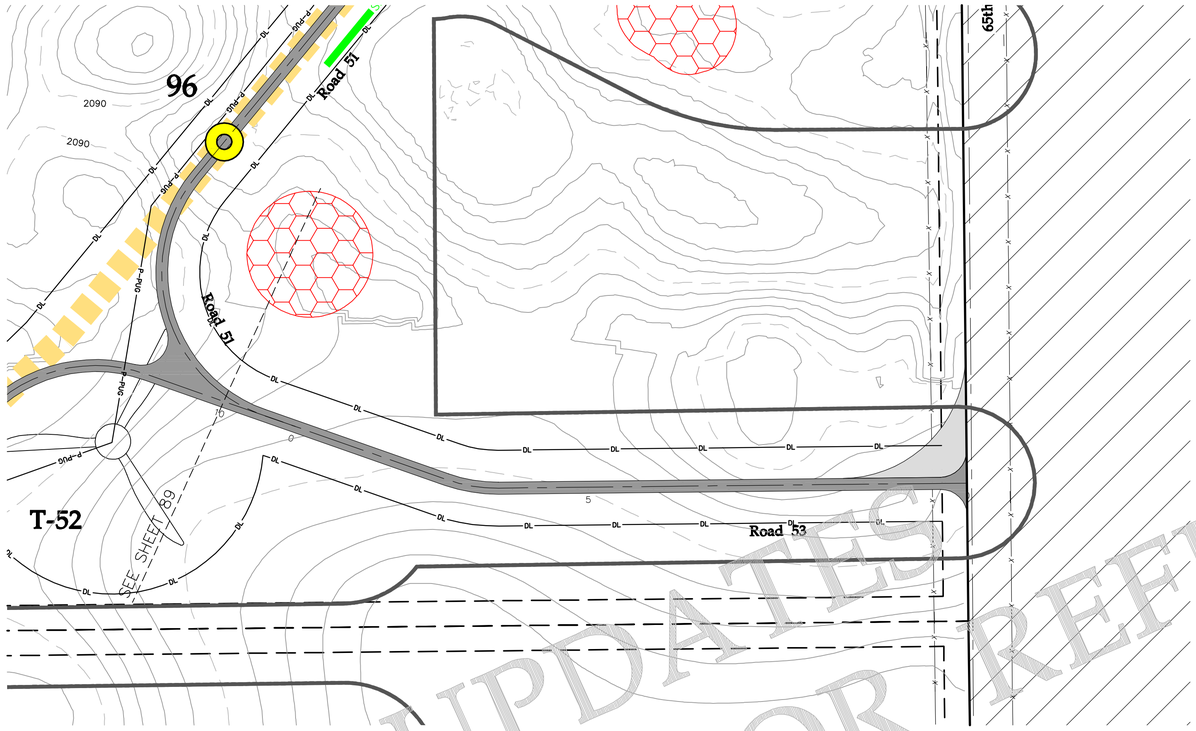

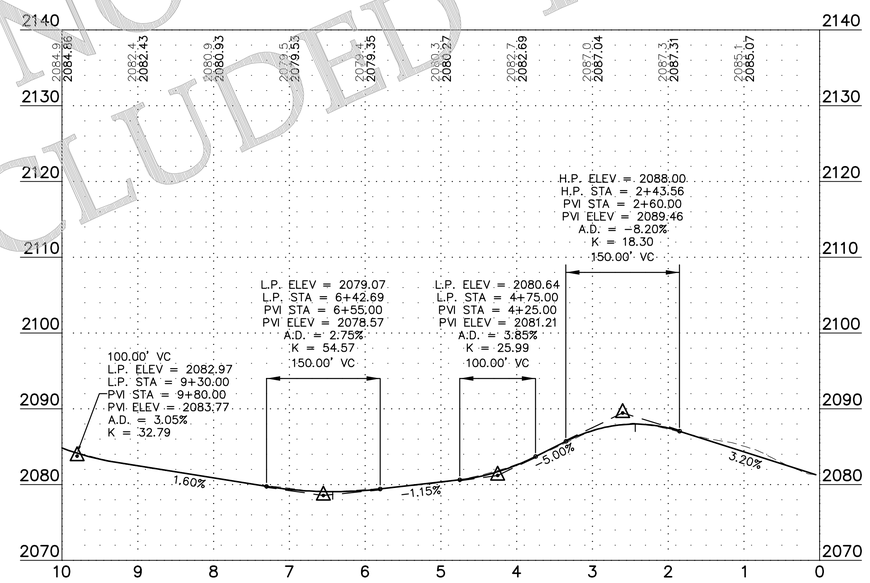

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Merricourt Wind Project

McIntosh County, North Dakota

Road 53 - Sta. 0+00 to 10+00

Record Plans

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Sheet: 88 OF 119

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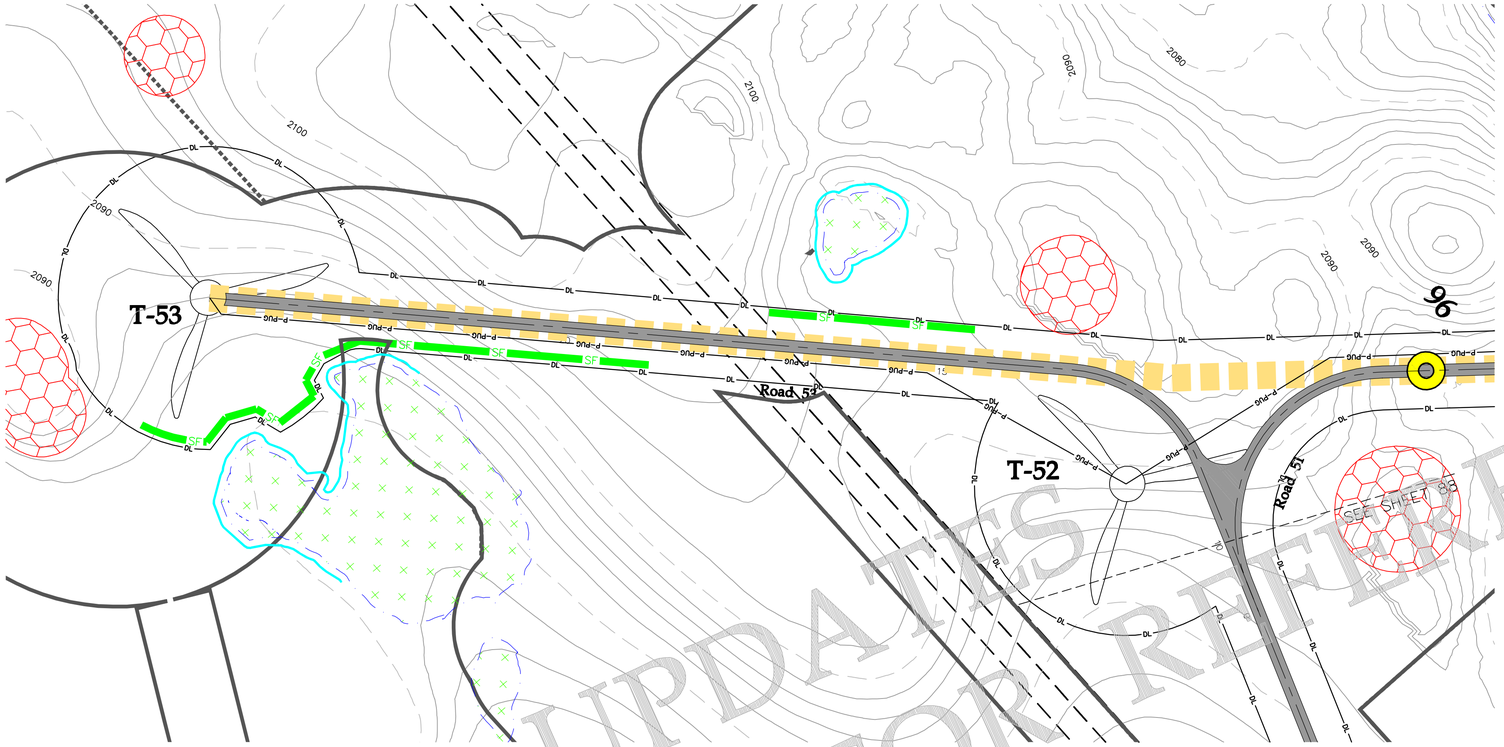

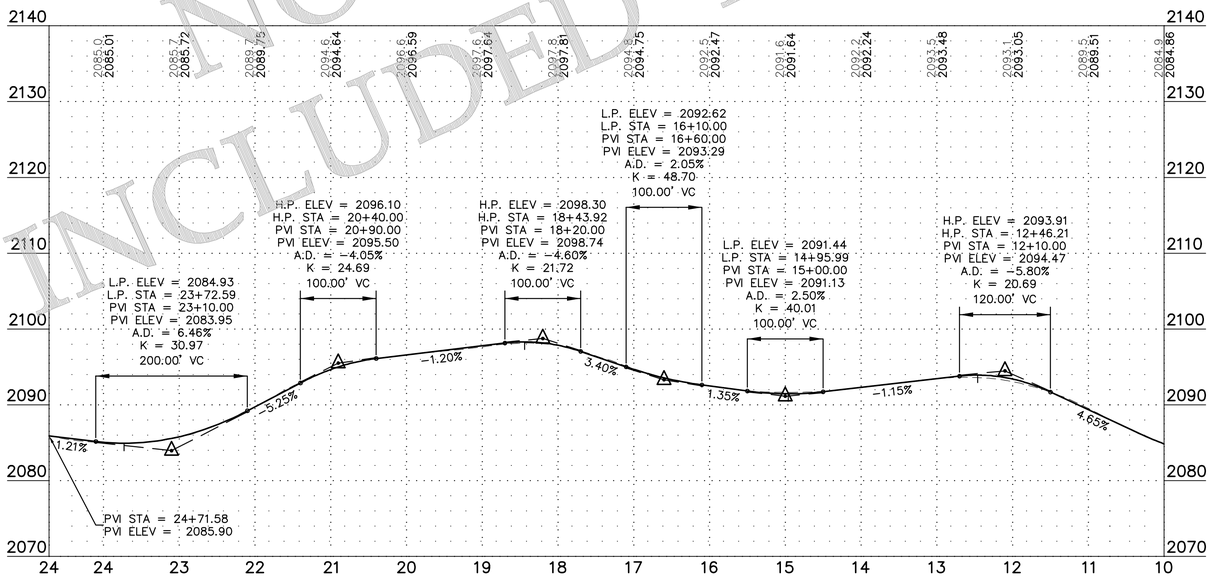

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McIntosh County, North Dakota

Road 53 - Sta. 10+00 to End

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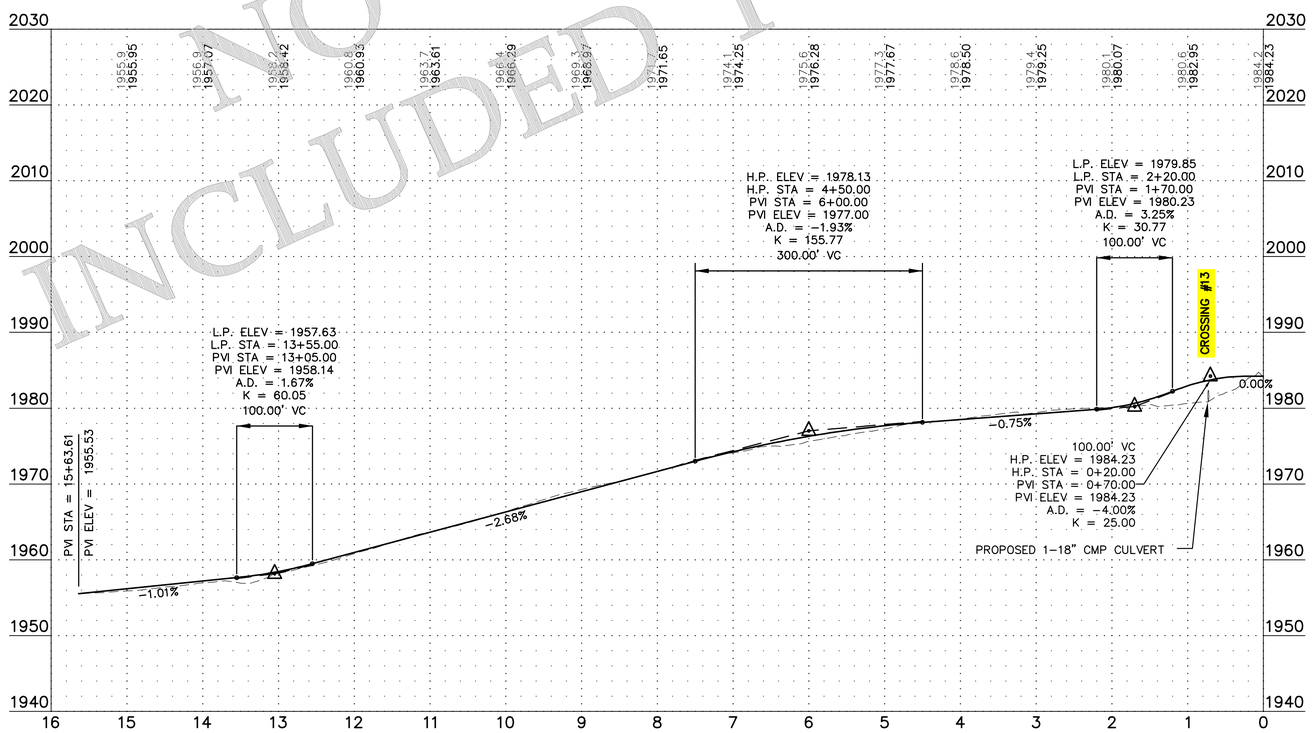

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McIntosh County, North Dakota

Road 54 - Sta. 0+00 to End

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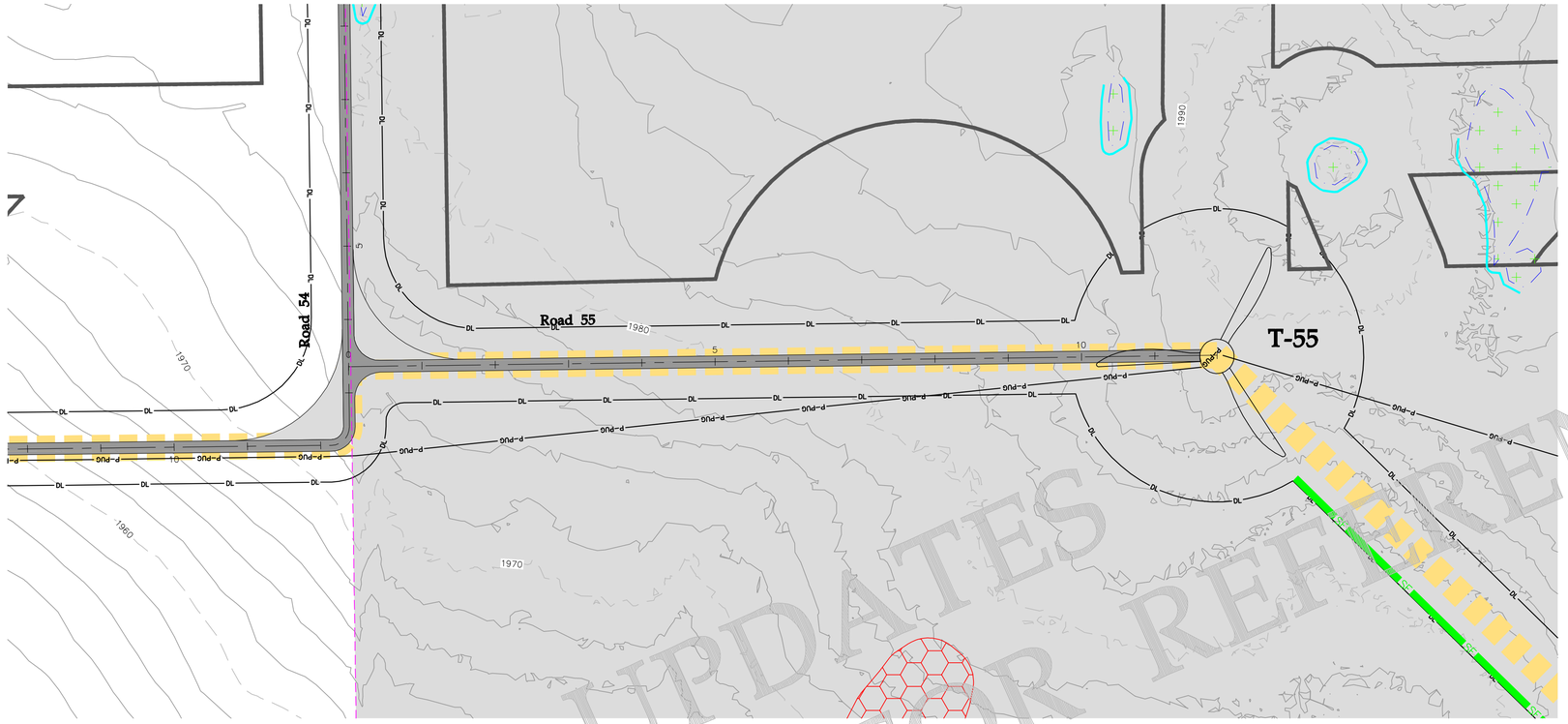

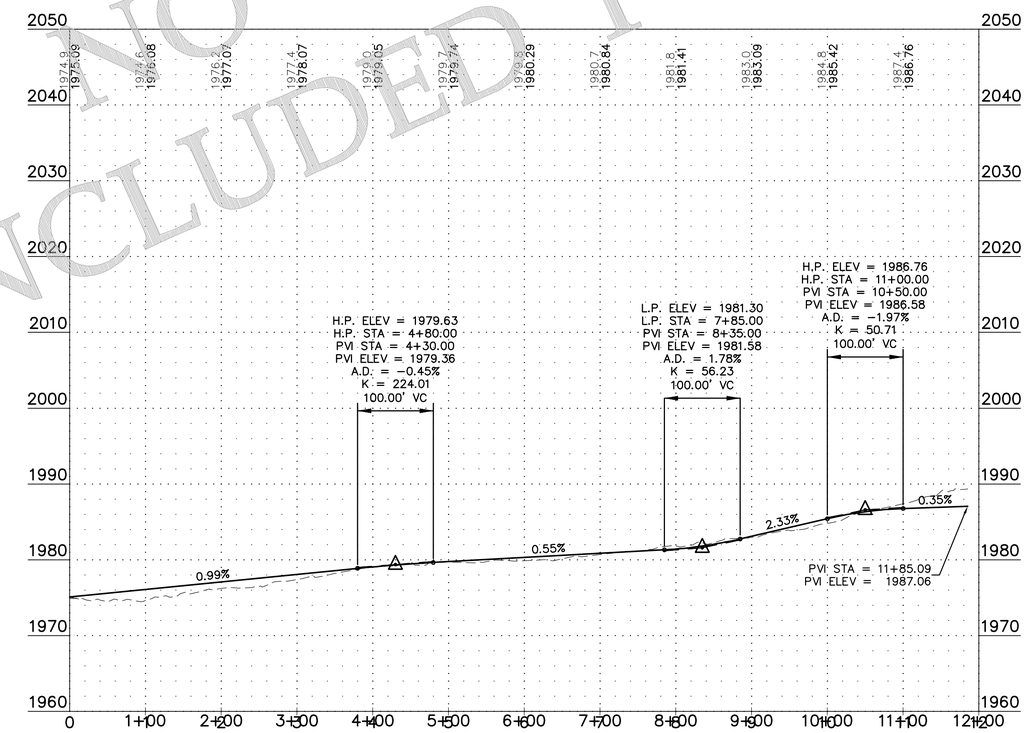

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McIntosh County, North Dakota

Road 55 - Sta. 0+00 to End

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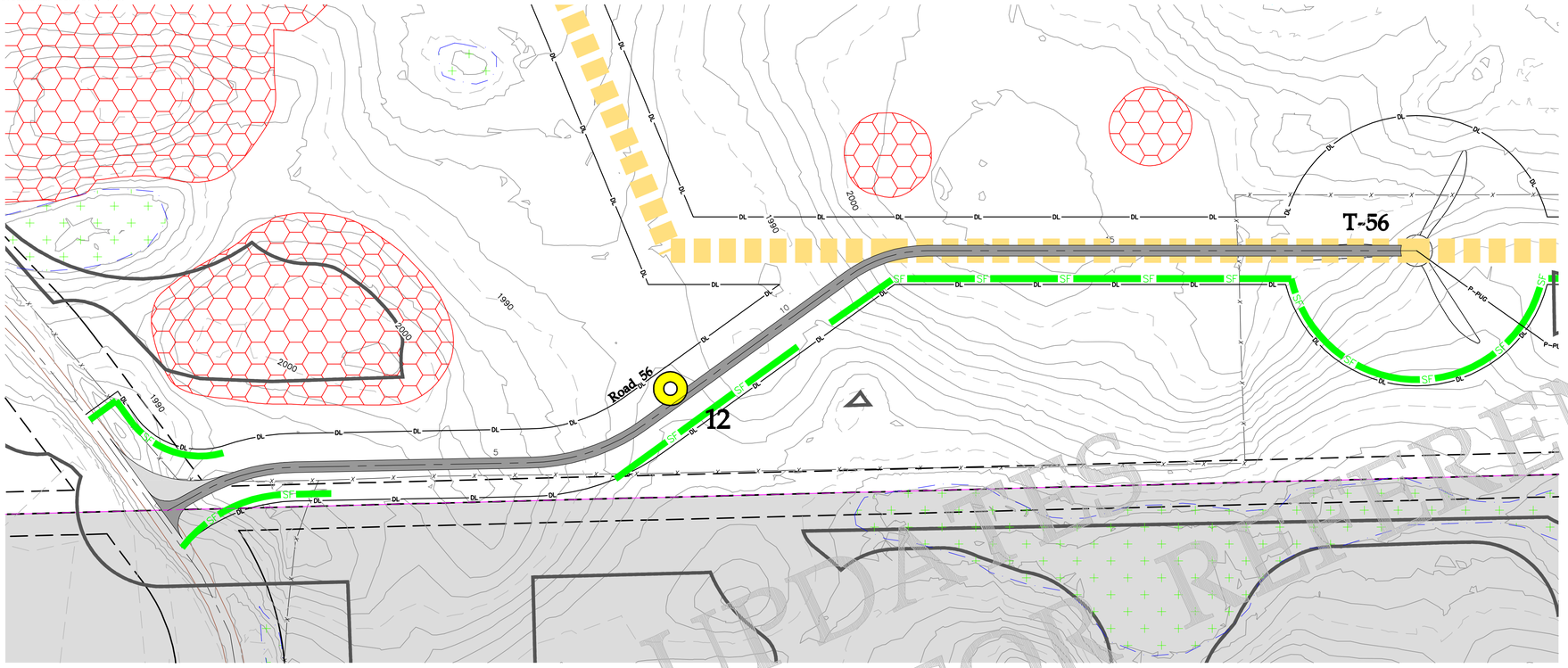

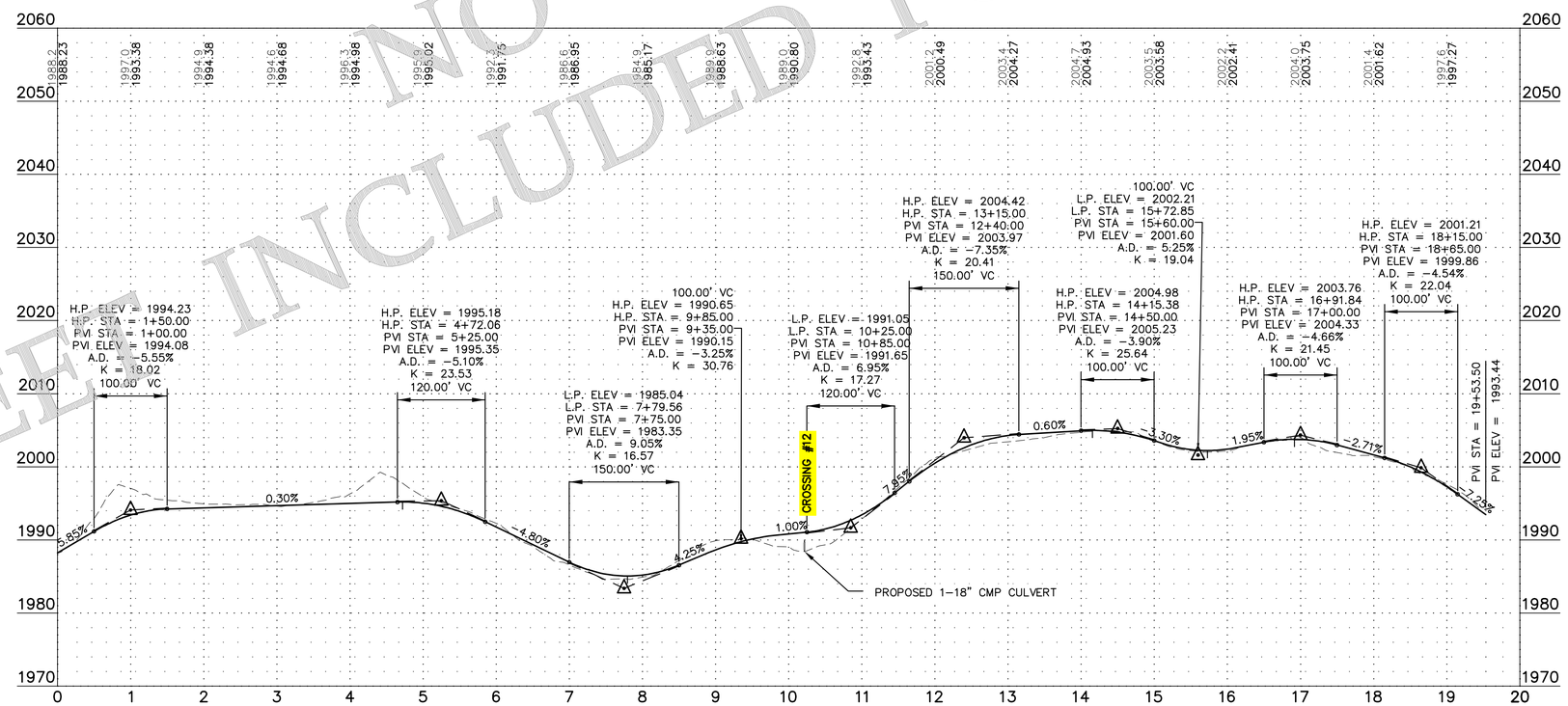

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- USFWS EASMENT
- OUT OF PROJECT BOUNDARY
- PROPOSED DRAINAGE CROSSING
- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 56 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 92 OF 119

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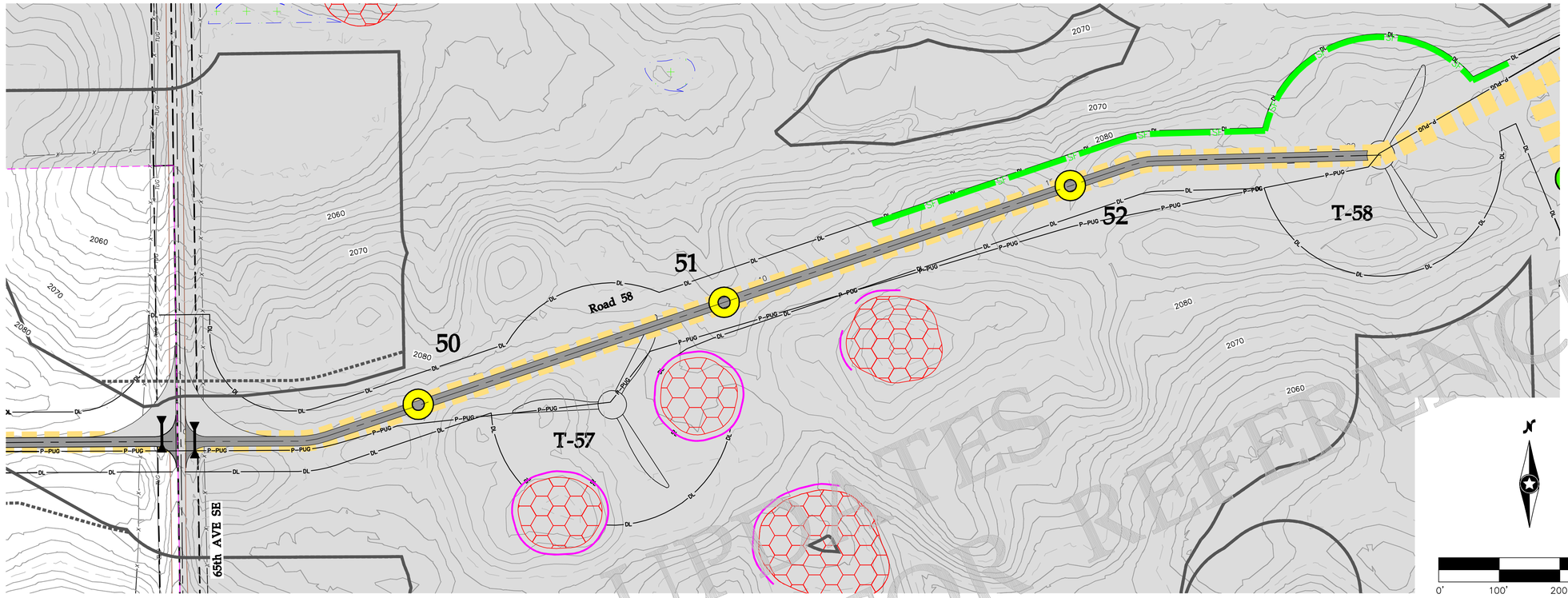

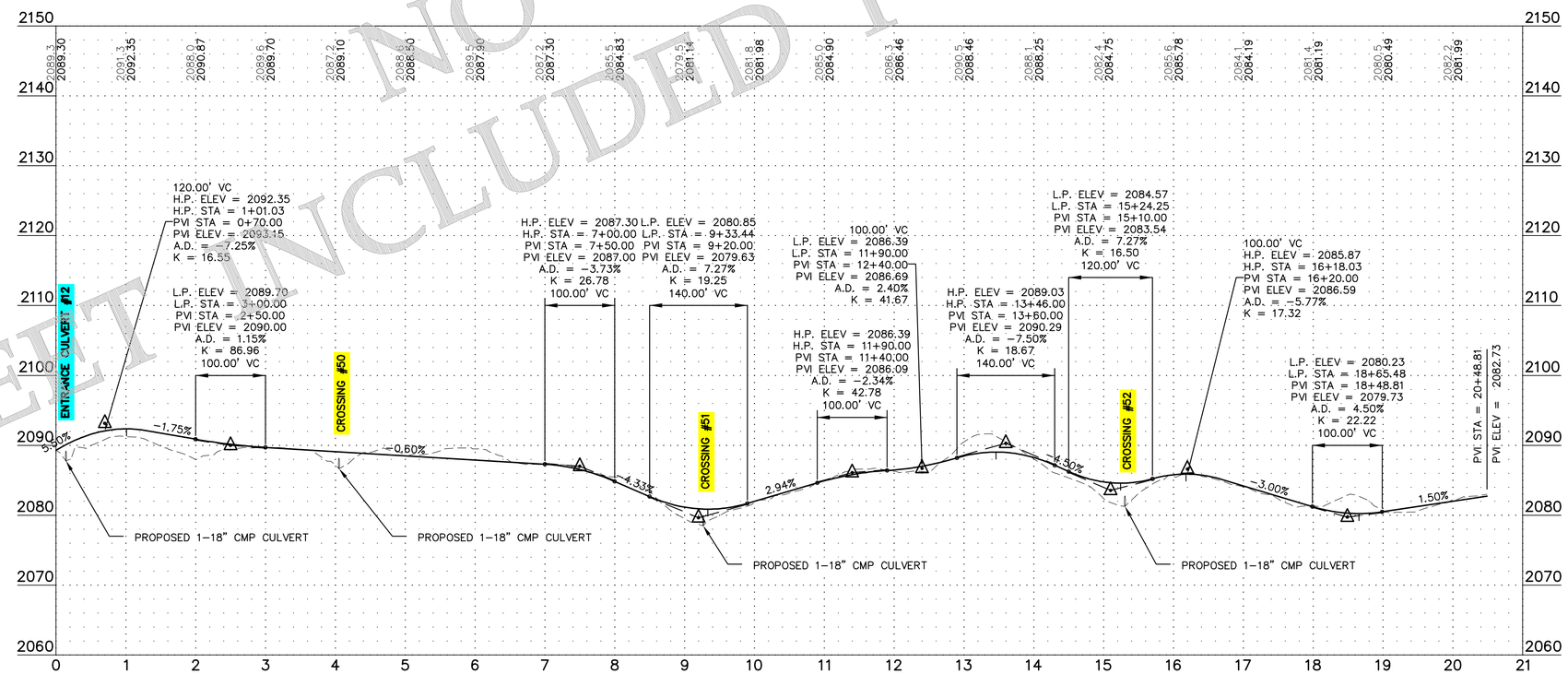

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Revisions:

#	DATE	DESCRIPTION
0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
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4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

LEGEND:

- PROPOSED TURBINE LOCATION
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Merricourt Wind Project

McIntosh County, North Dakota

Road 58 - Sta. 0+00 to End

Record Plans

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Sheet: 93 OF 119

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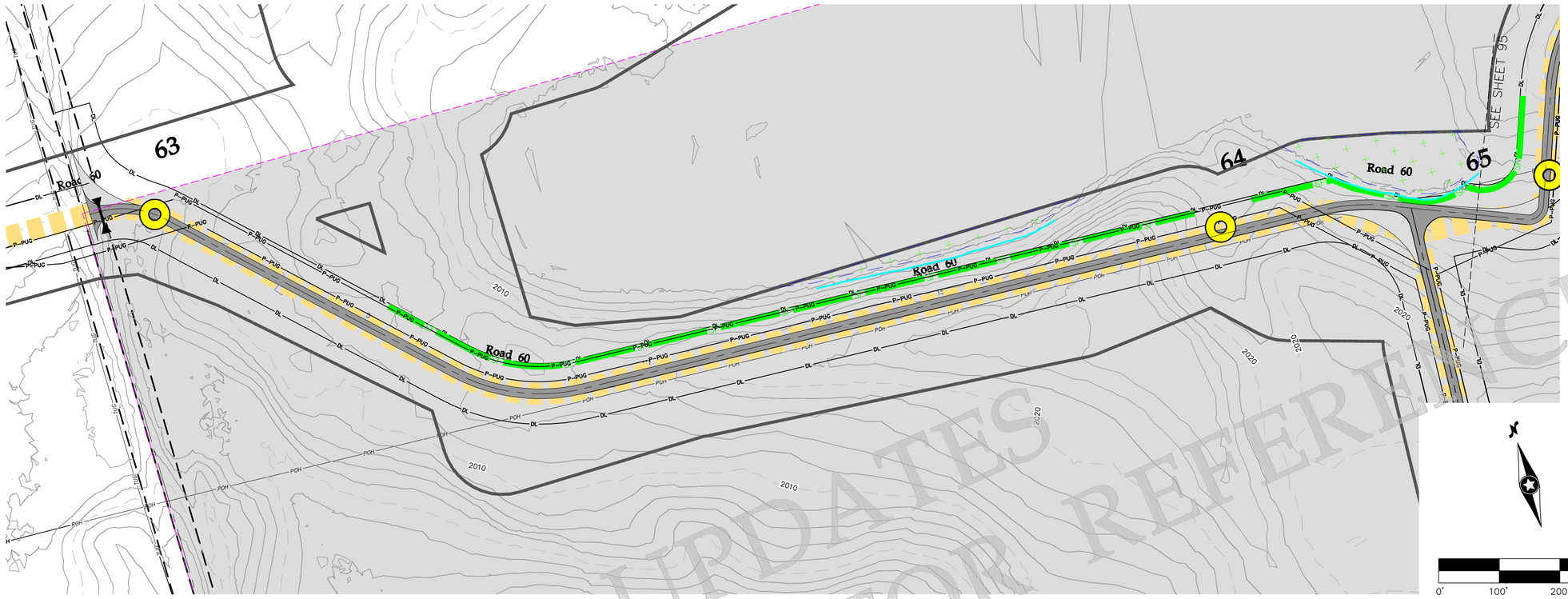

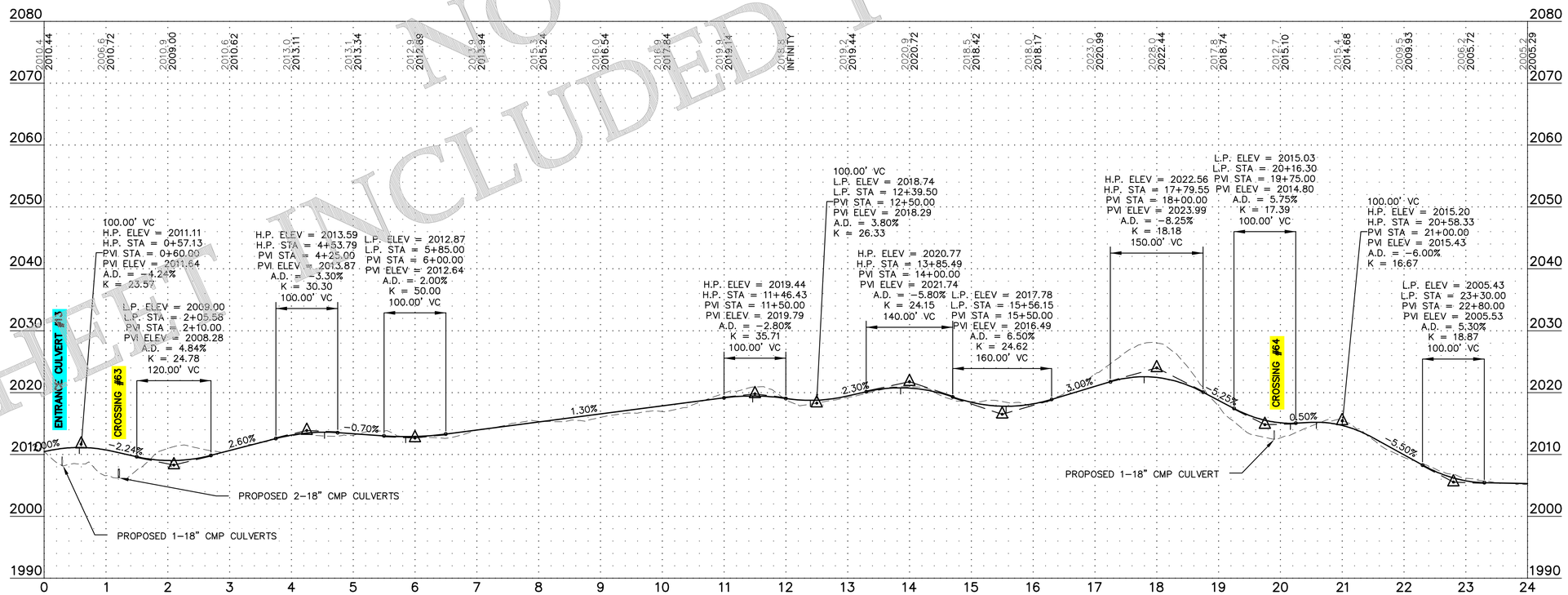

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Merricourt Wind Project

McIntosh County, North Dakota

Road 60 - Sta. 0+00 to 24+00

Record Plans

Date: 11/20/2020

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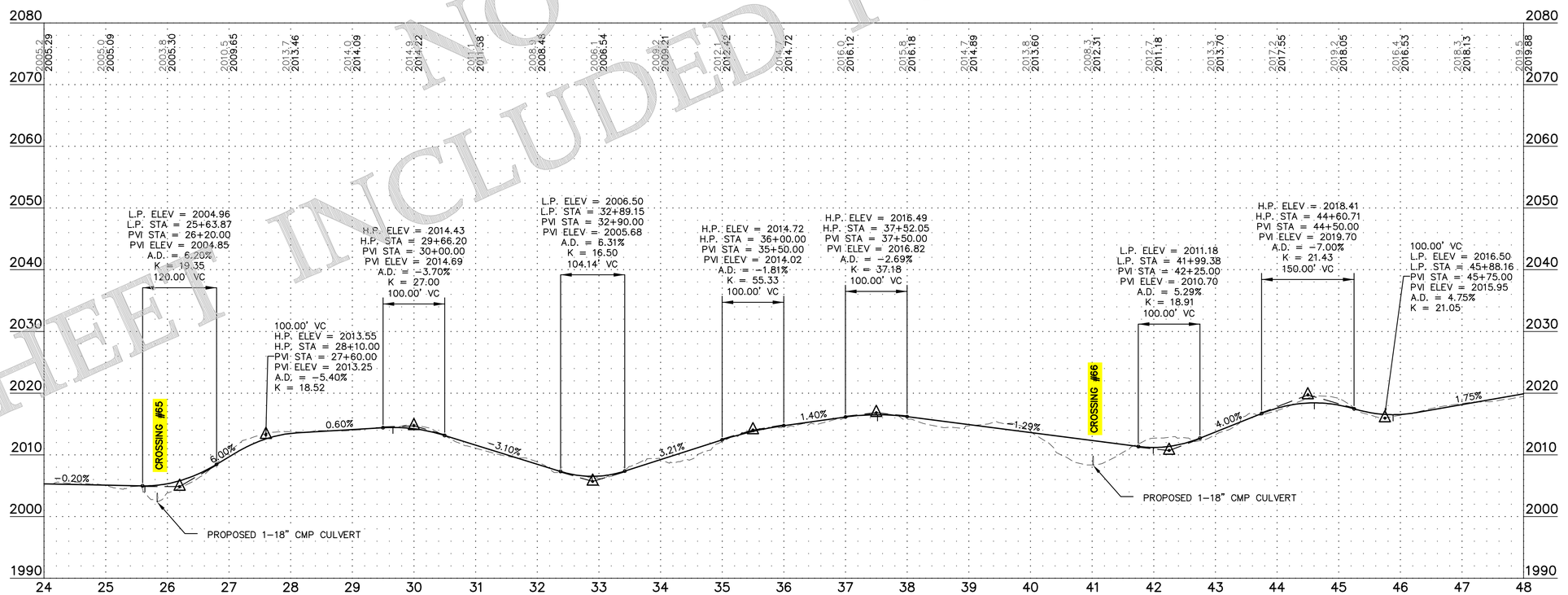

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2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 60 - Sta. 24+00 to 48+00

Record Plans

Date: 11/20/2020
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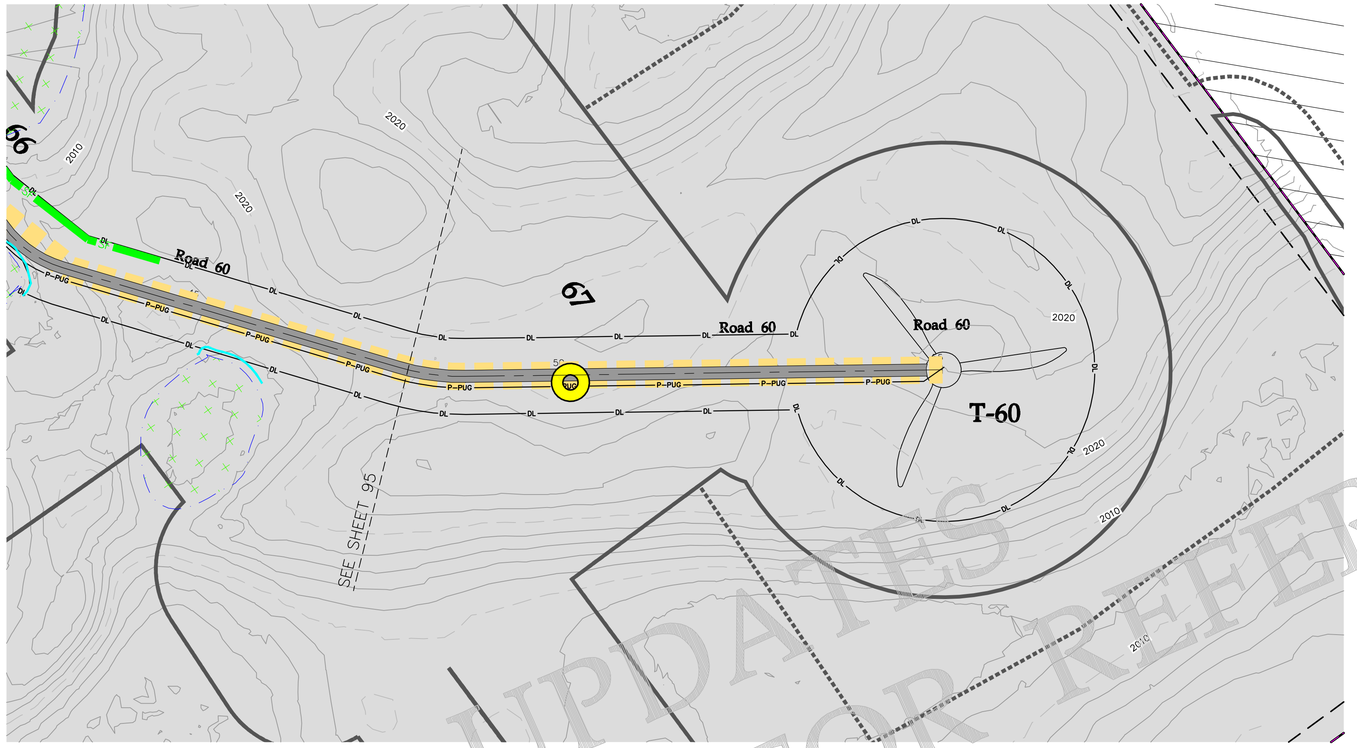

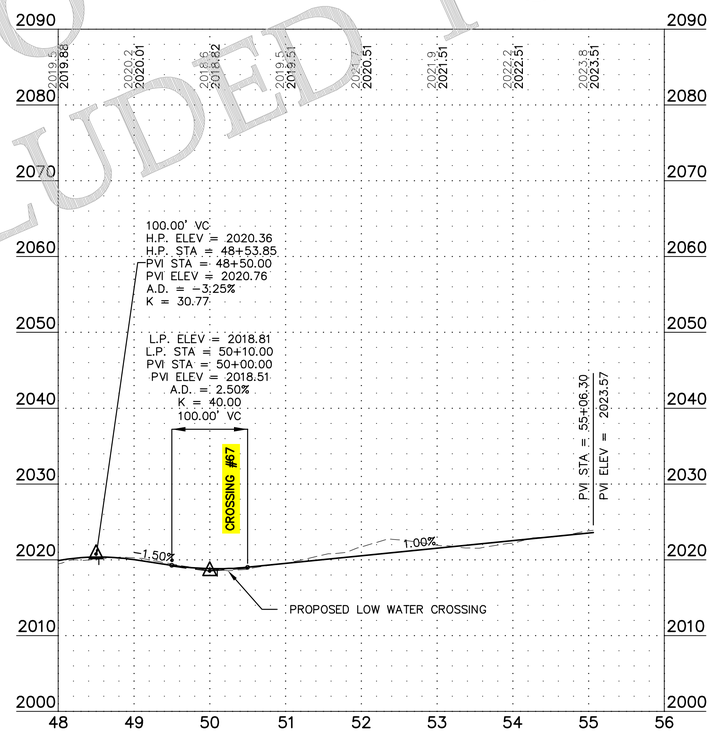

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0' 100' 200' 300'

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Merricourt Wind Project

McIntosh County, North Dakota

Road 60 - Sta. 48+00 to End

Record Plans

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Sheet: 96 OF 119

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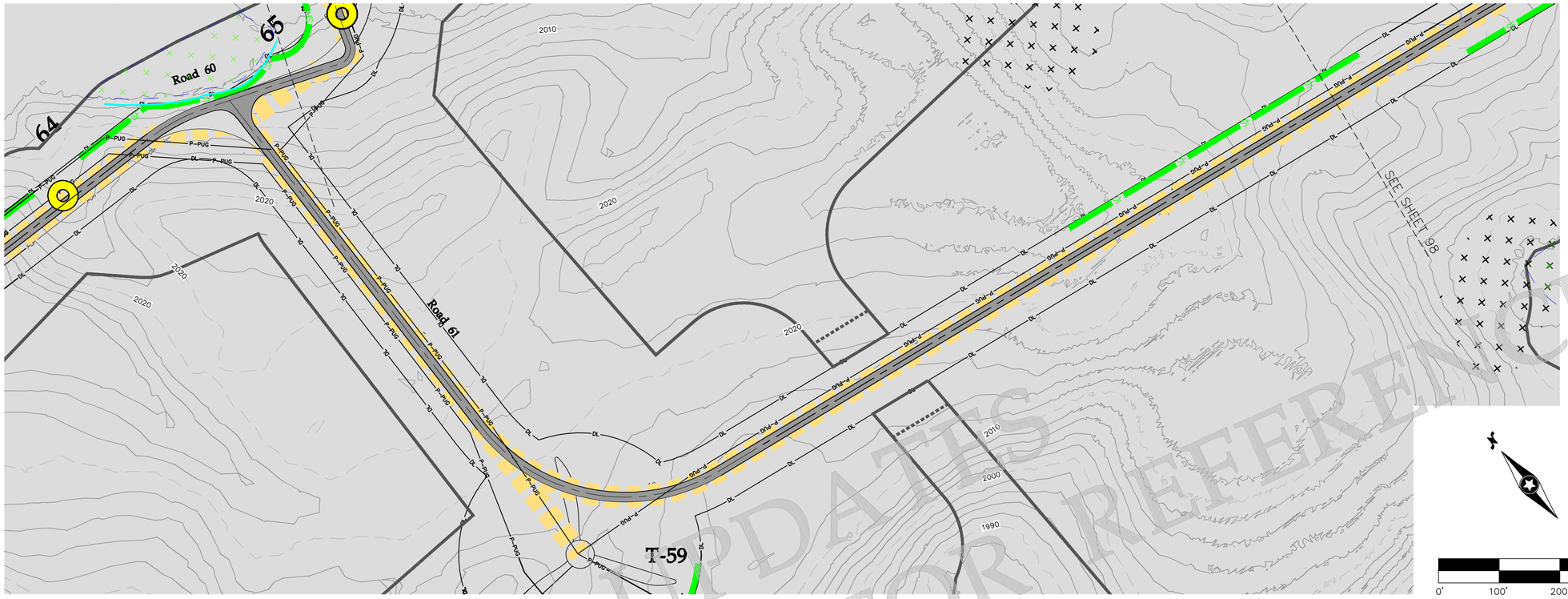

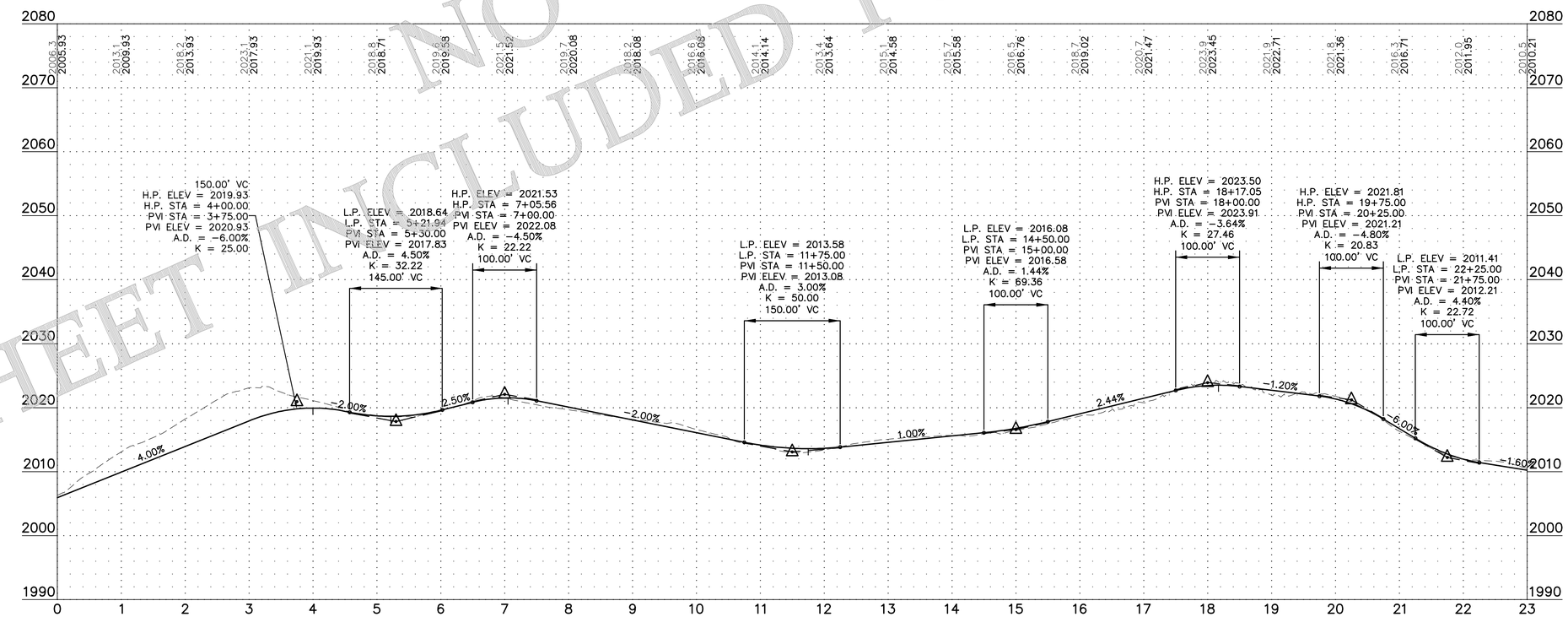

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West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 61 - Sta. 0+00 to 23+00

Record Plans

Date: 11/20/2020
Sheet: 97 OF 119

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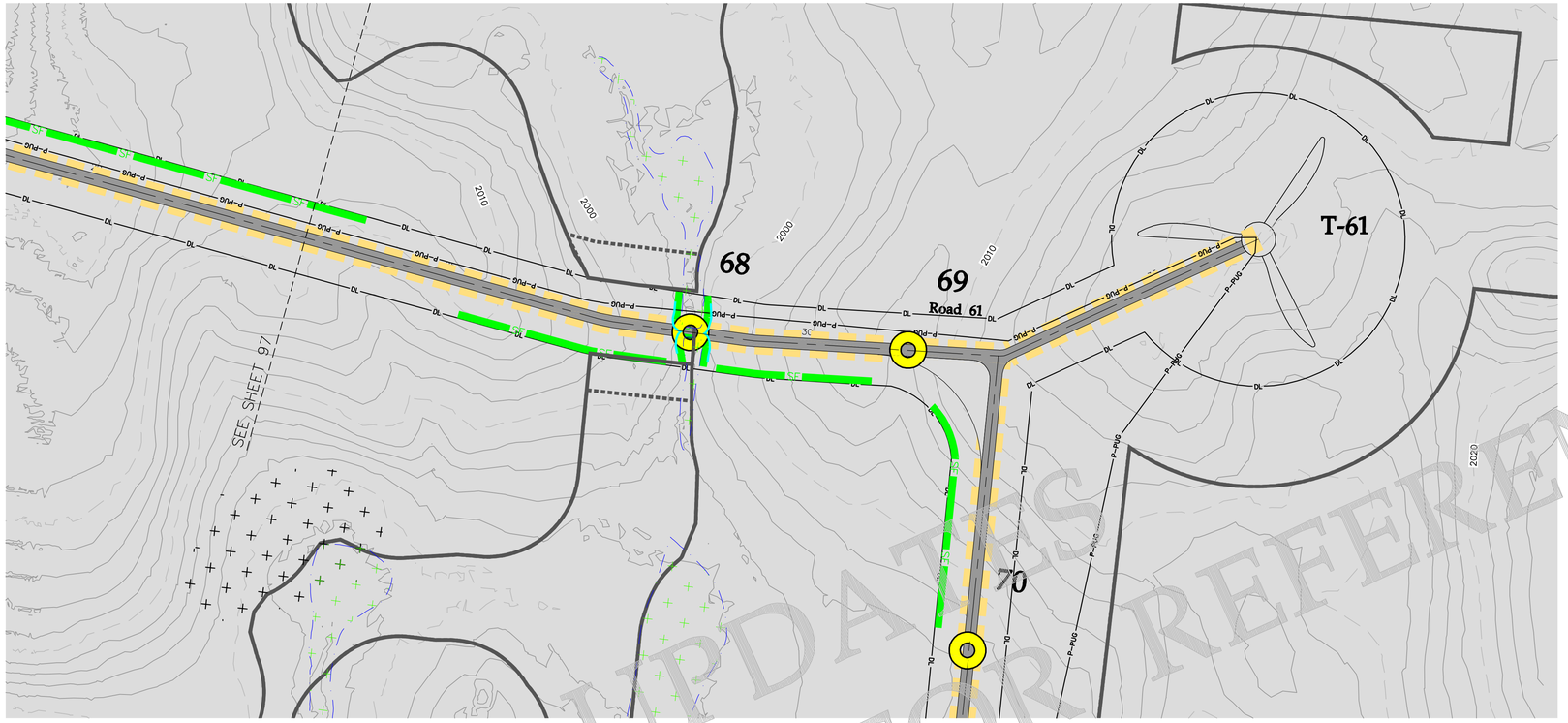

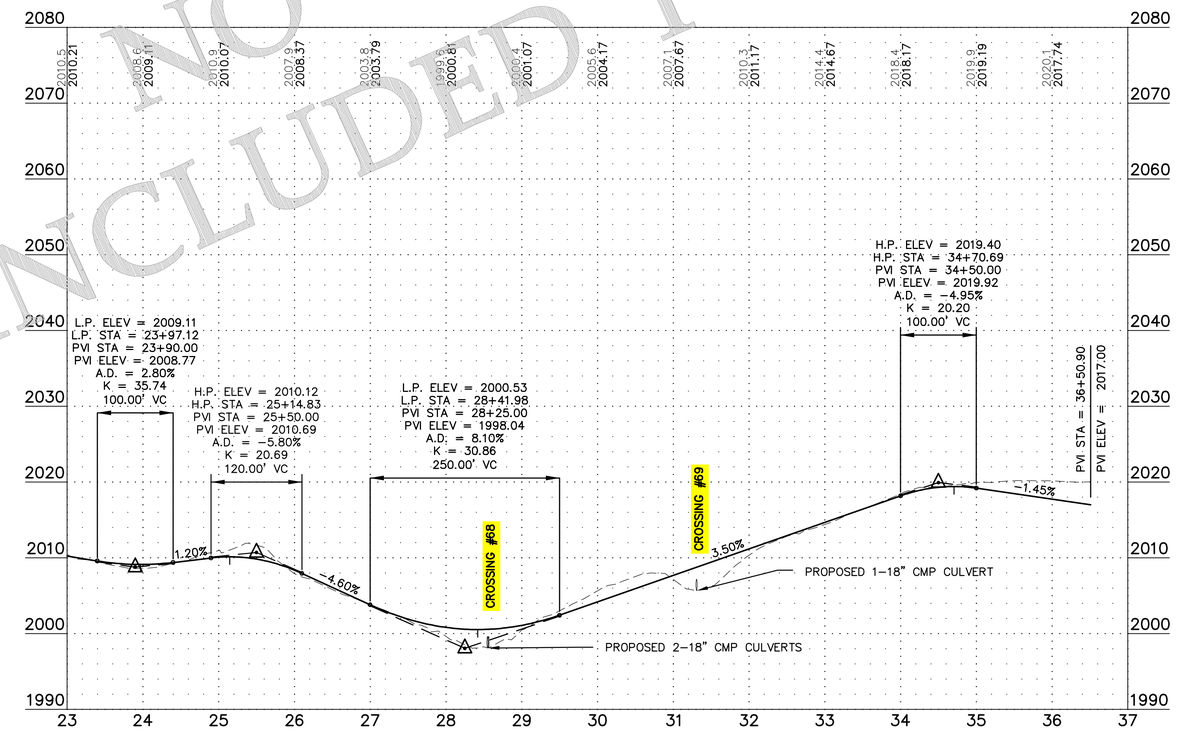

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2028 2nd Avenue NW
West Fargo, ND 58078

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McIntosh County, North Dakota

Road 61 - Sta. 23+00 to End

Record Plans

Date: 11/20/2020
Sheet: 98 OF 119

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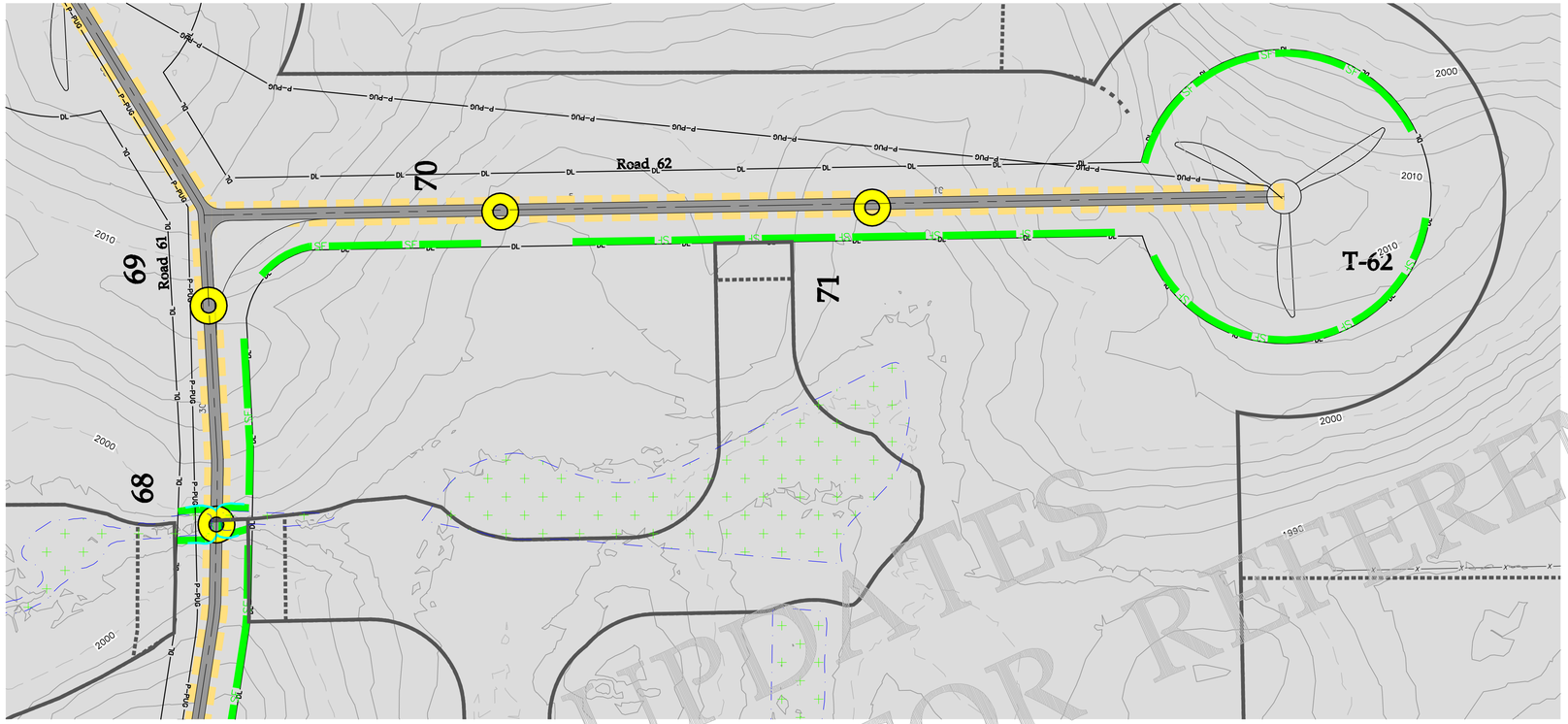

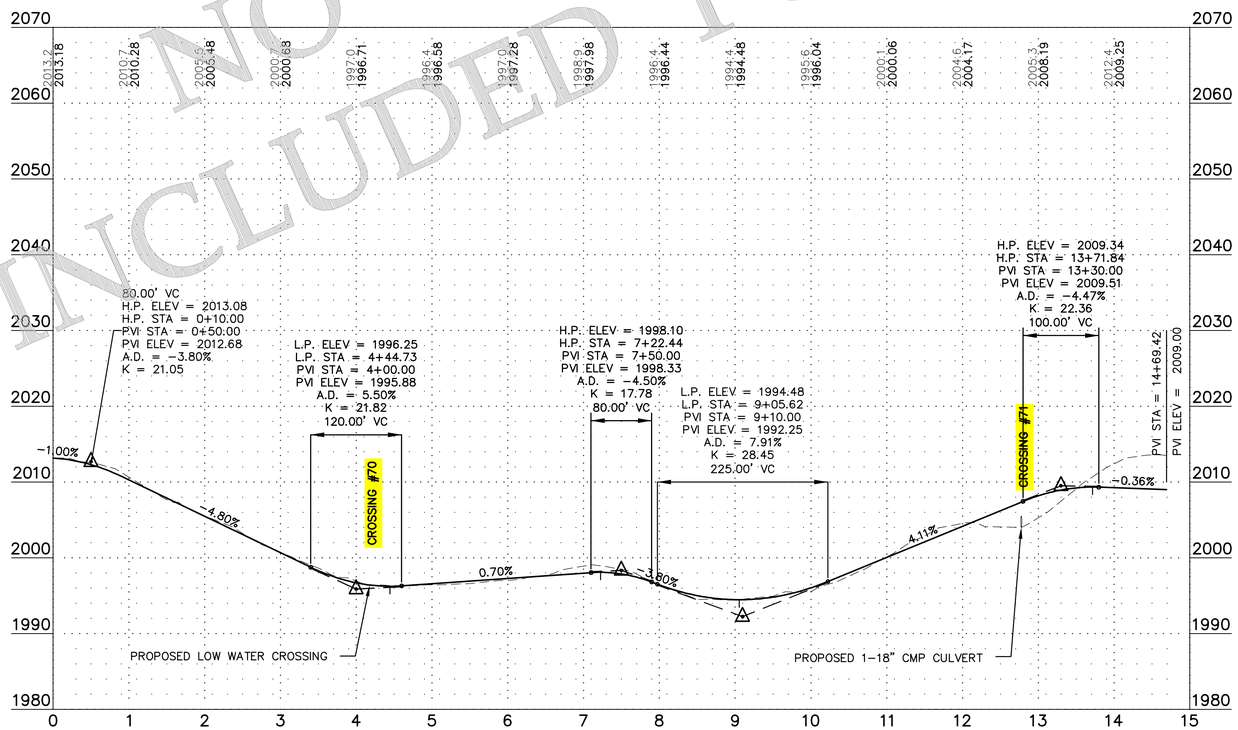

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Merricourt Wind Project

McIntosh County, North Dakota

Road 62 - Sta. 0+00 to End

Record Plans

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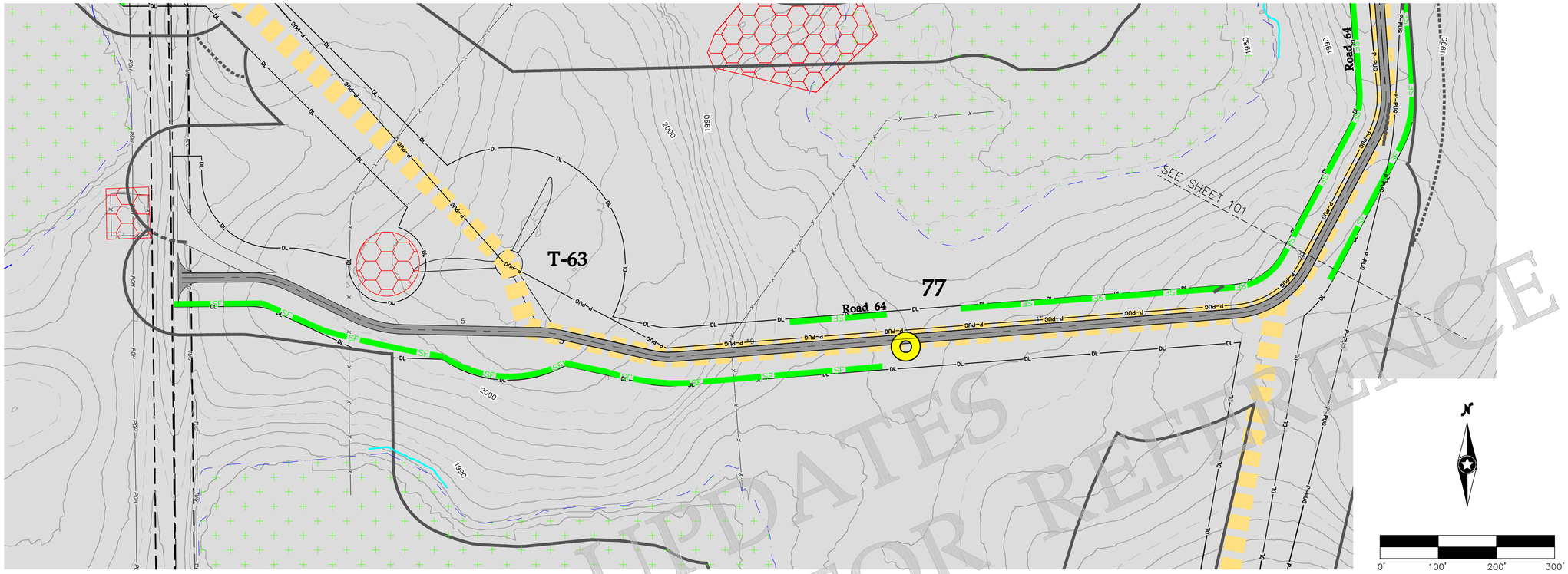

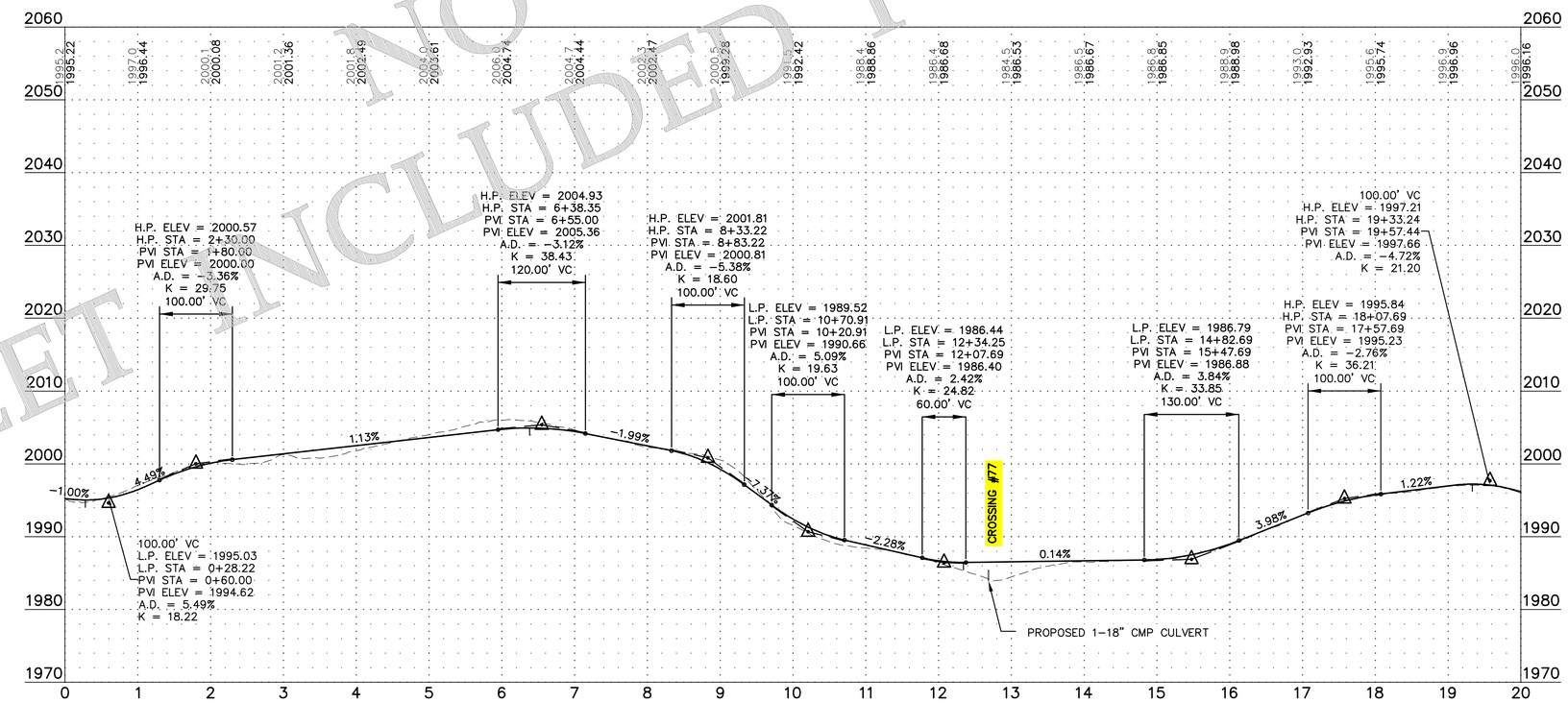

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Merricourt Wind Project

McIntosh County, North Dakota

Road 64 - Sta. 0+00 to 20+00

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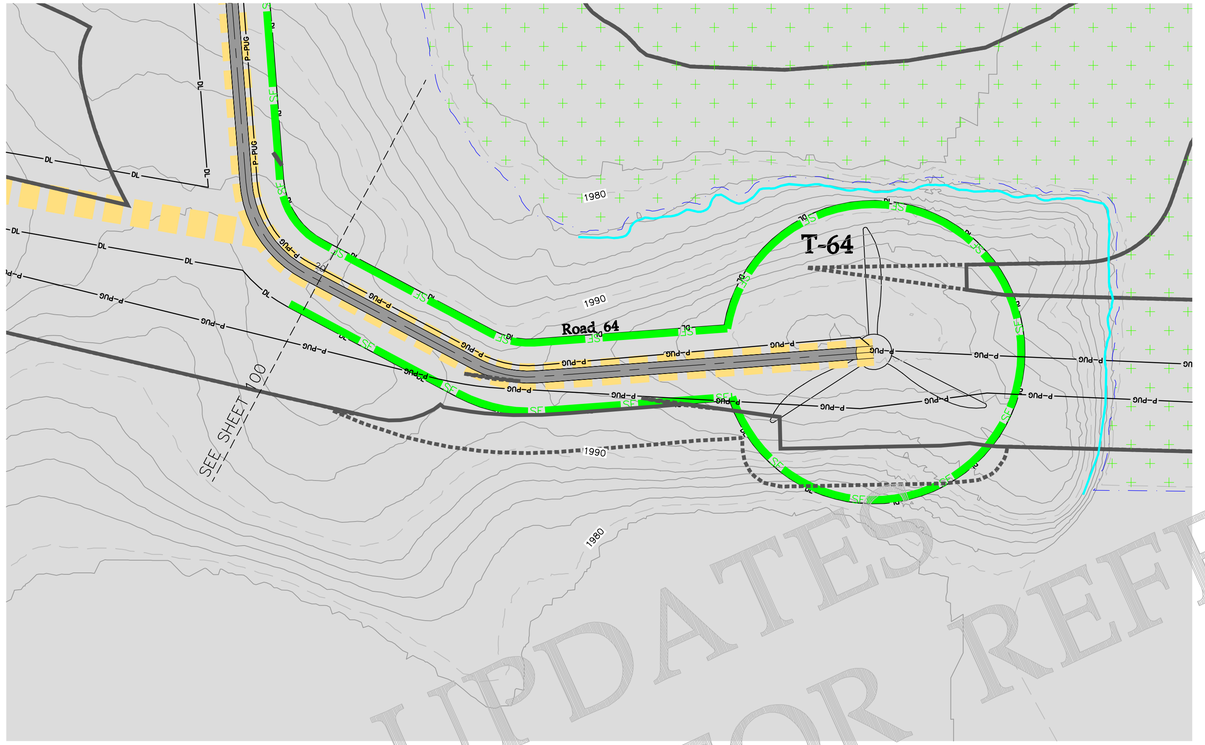

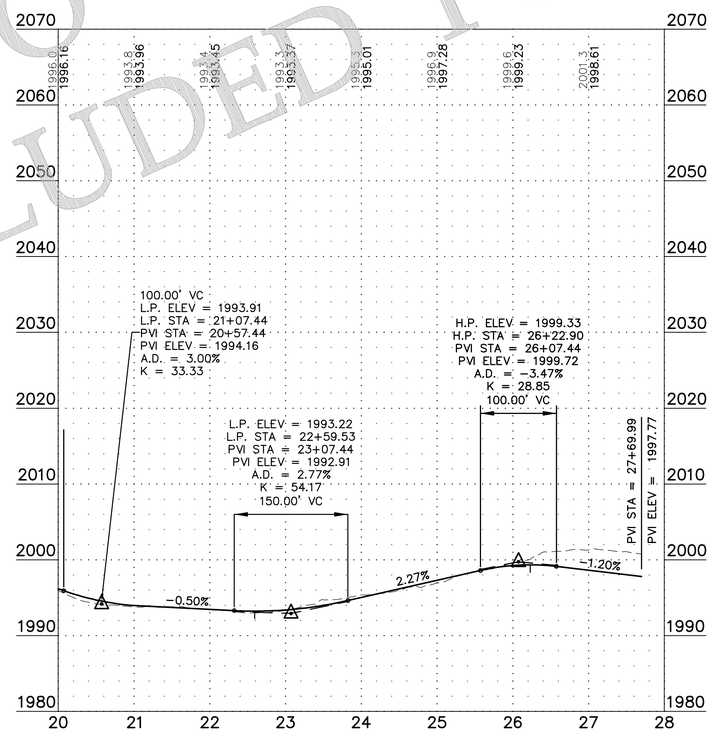

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Merricourt Wind Project

McIntosh County, North Dakota

Road 64 - Sta. 20+00 to End

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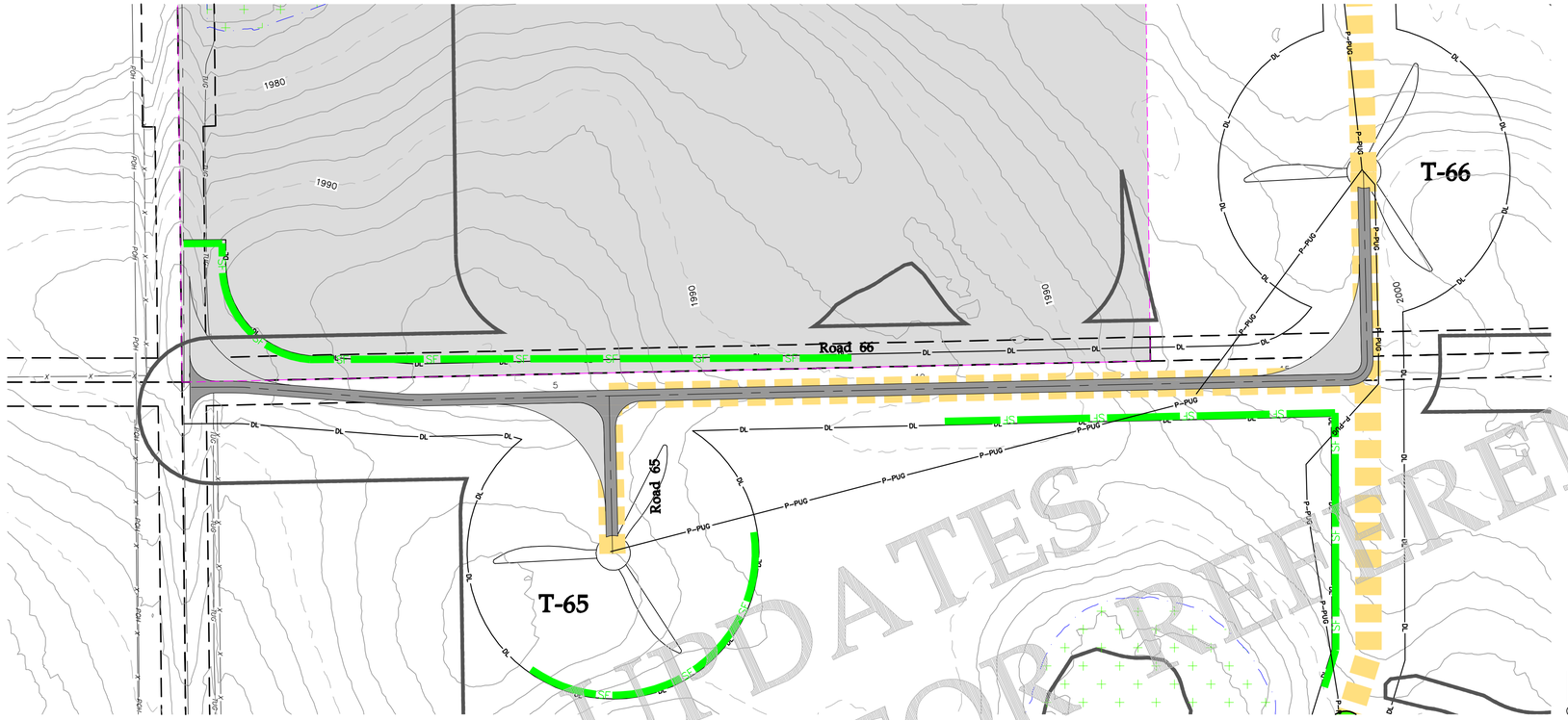

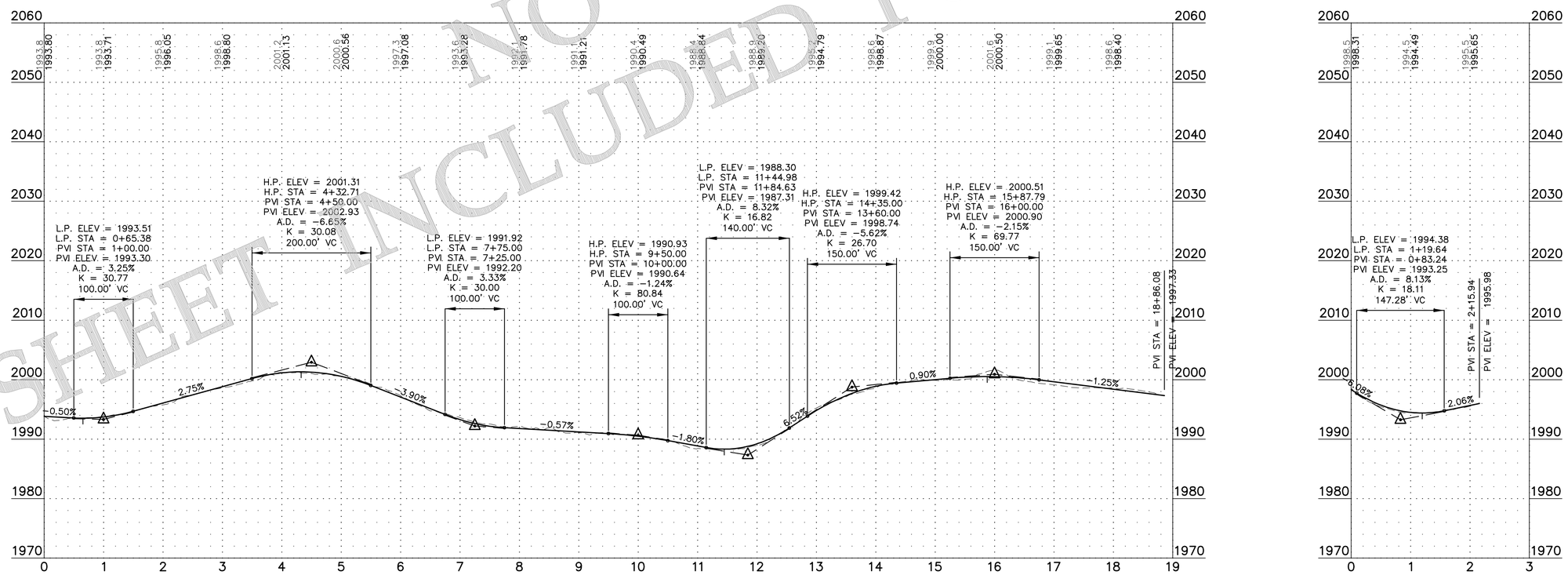

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- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 66 & 65 - Sta. 0+00 to End

Record Plans

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Sheet: 102 OF 119

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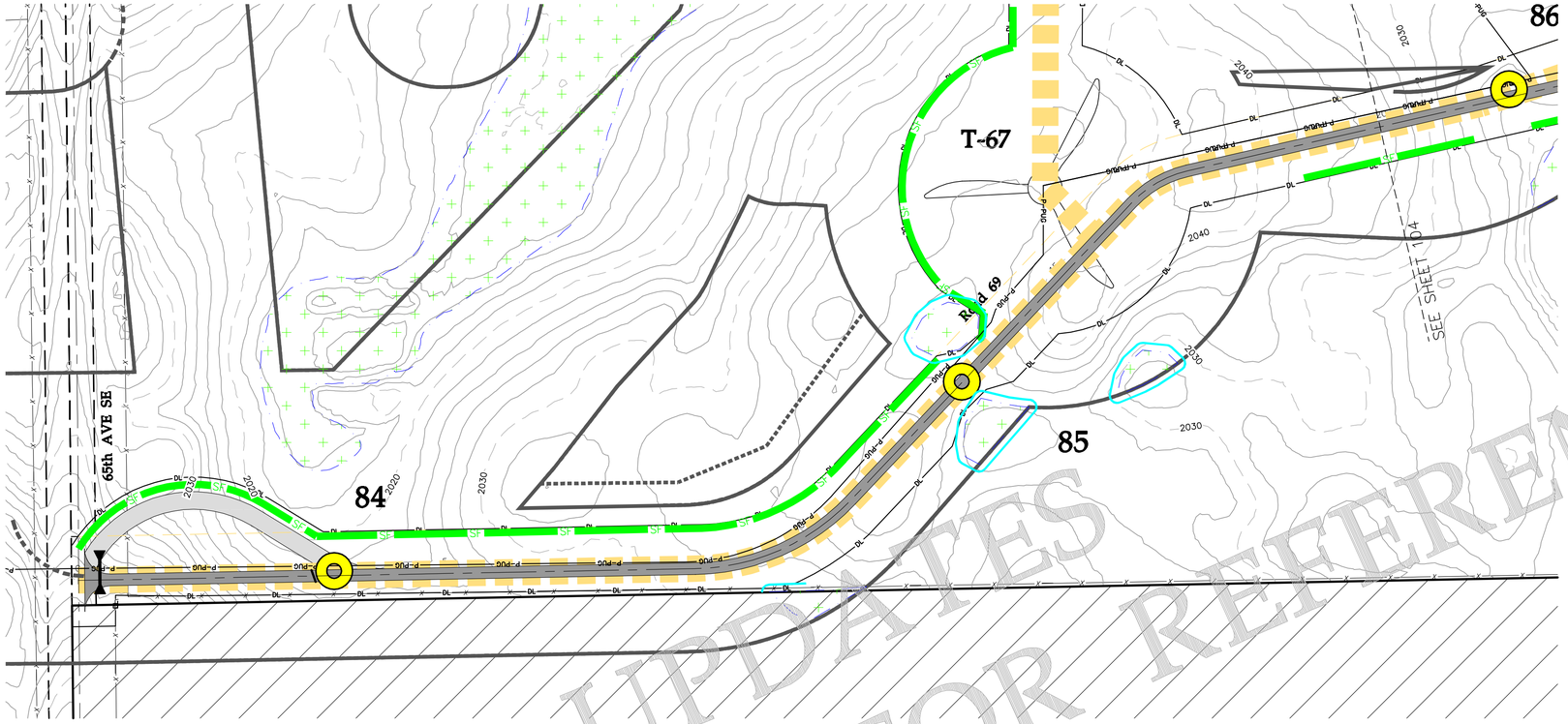
86
T-67
Road 69
85
84
65th AVE SE
SEE SHEET 104
2030
2040
2020
2030
2030
2030

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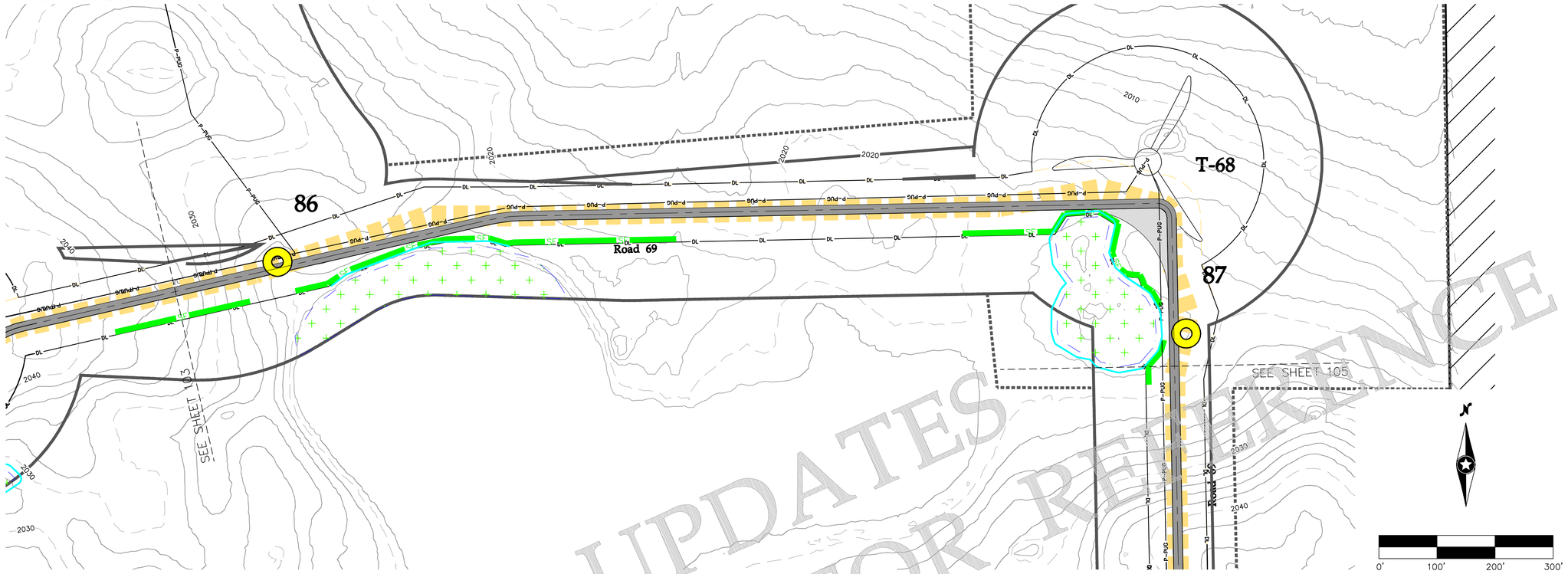

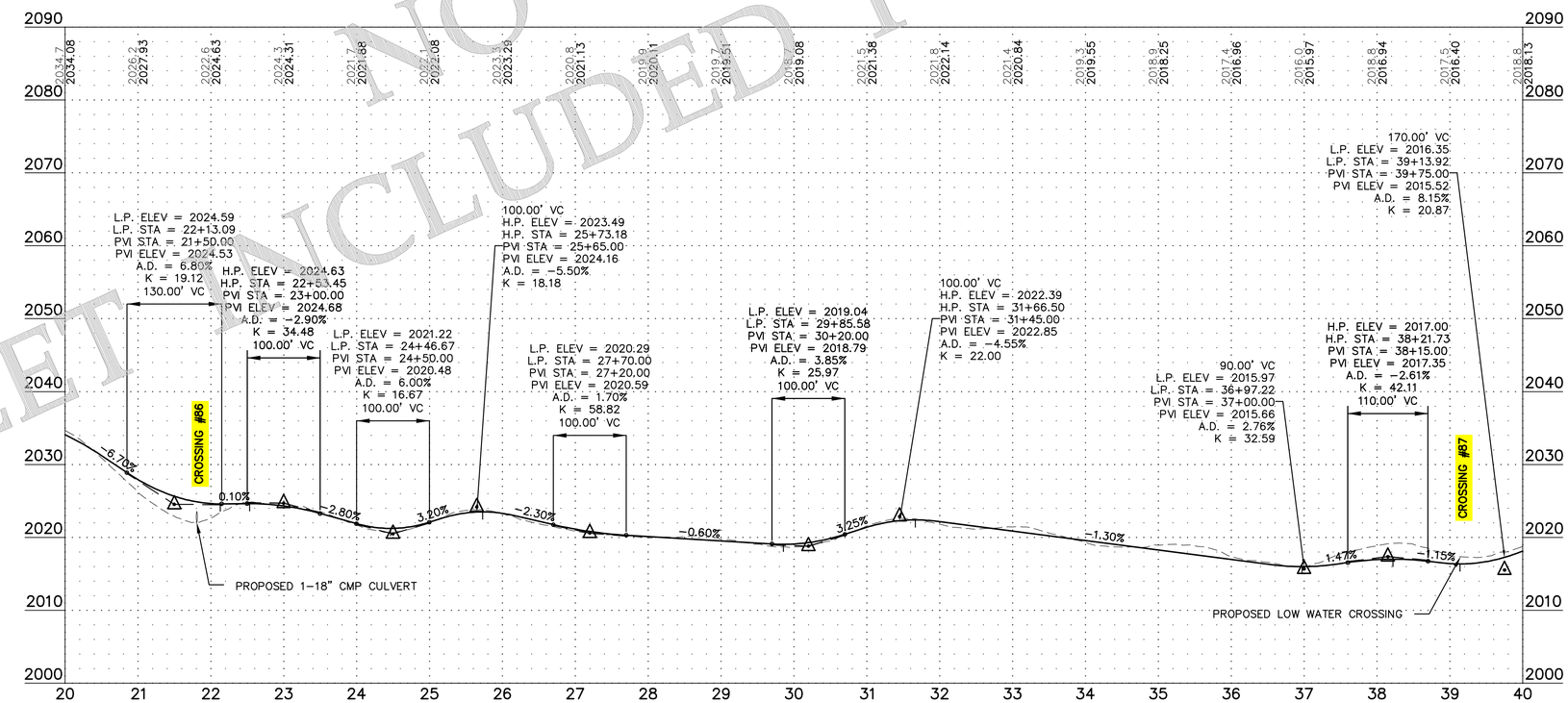

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Checked: DJN
Drawn: SNK
As-Built Drawing:

Revisions:

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0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
2	01/21/20	CUT & FILL ADD TO TURBINE TABLE
3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

LEGEND:

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- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 69 - Sta. 20+00 to 40+00

Record Plans

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Sheet: 104 OF 119

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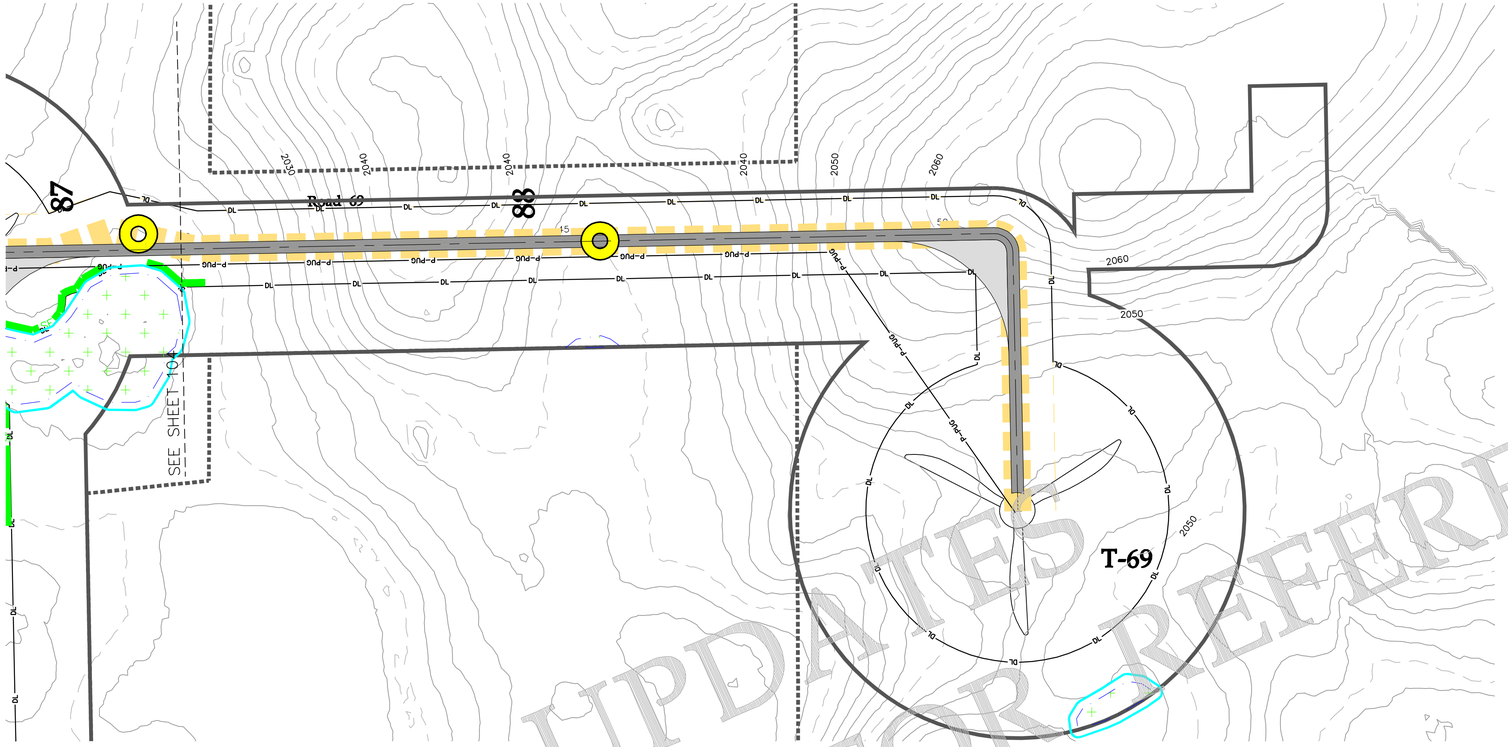

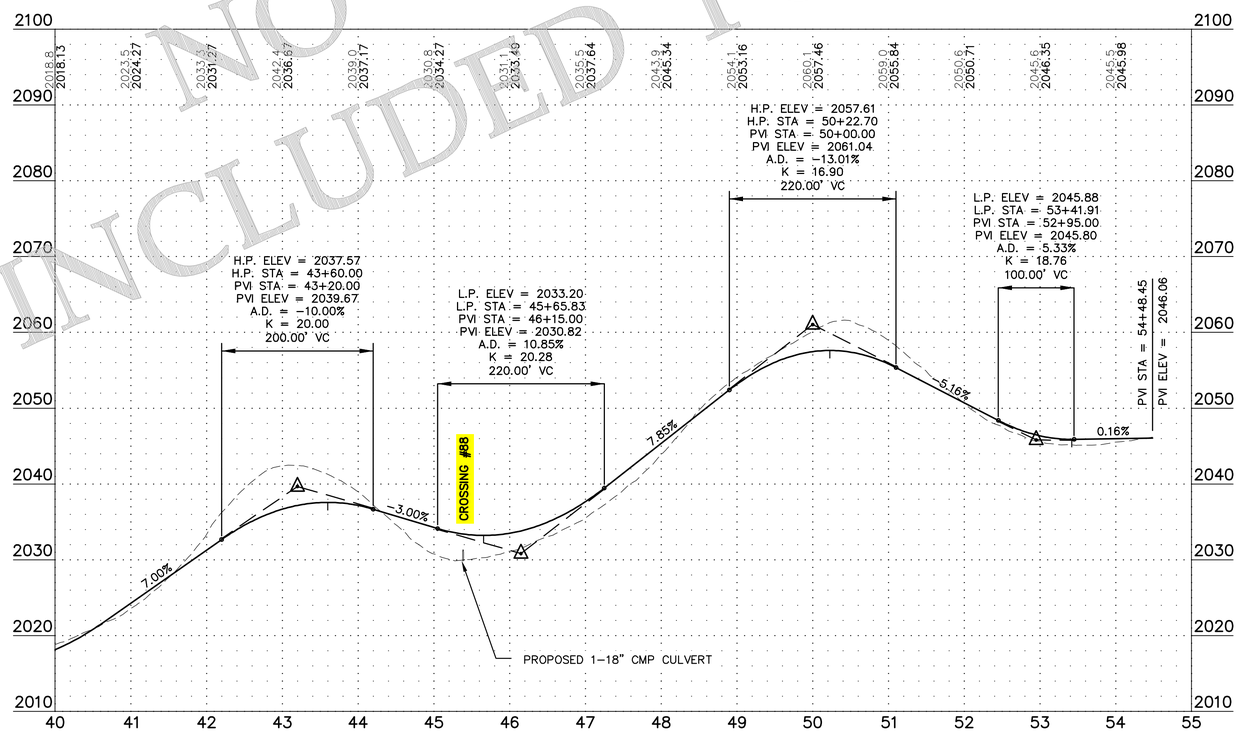

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McIntosh County, North Dakota

Road 69 - Sta. 40+00 to End

Record Plans

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Sheet: 105 OF 119

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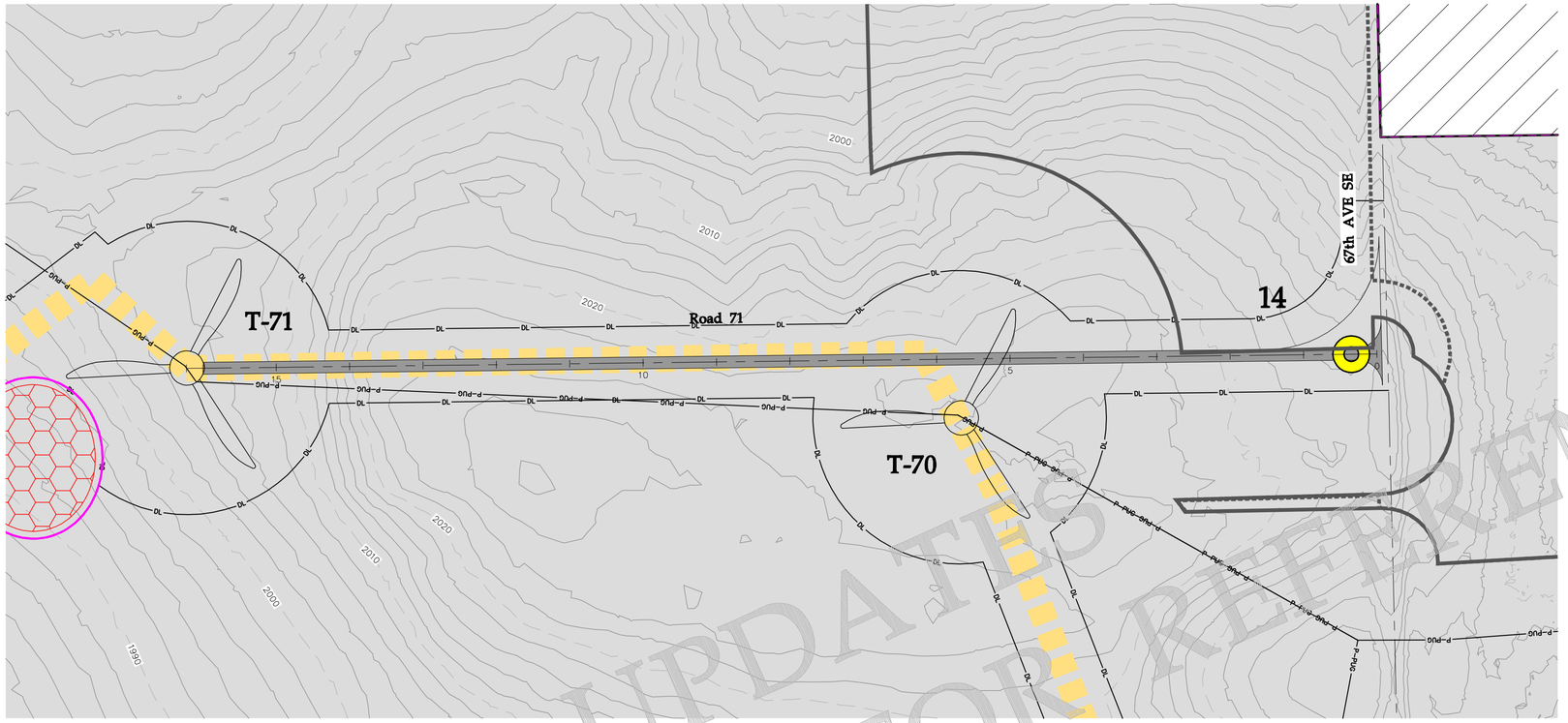

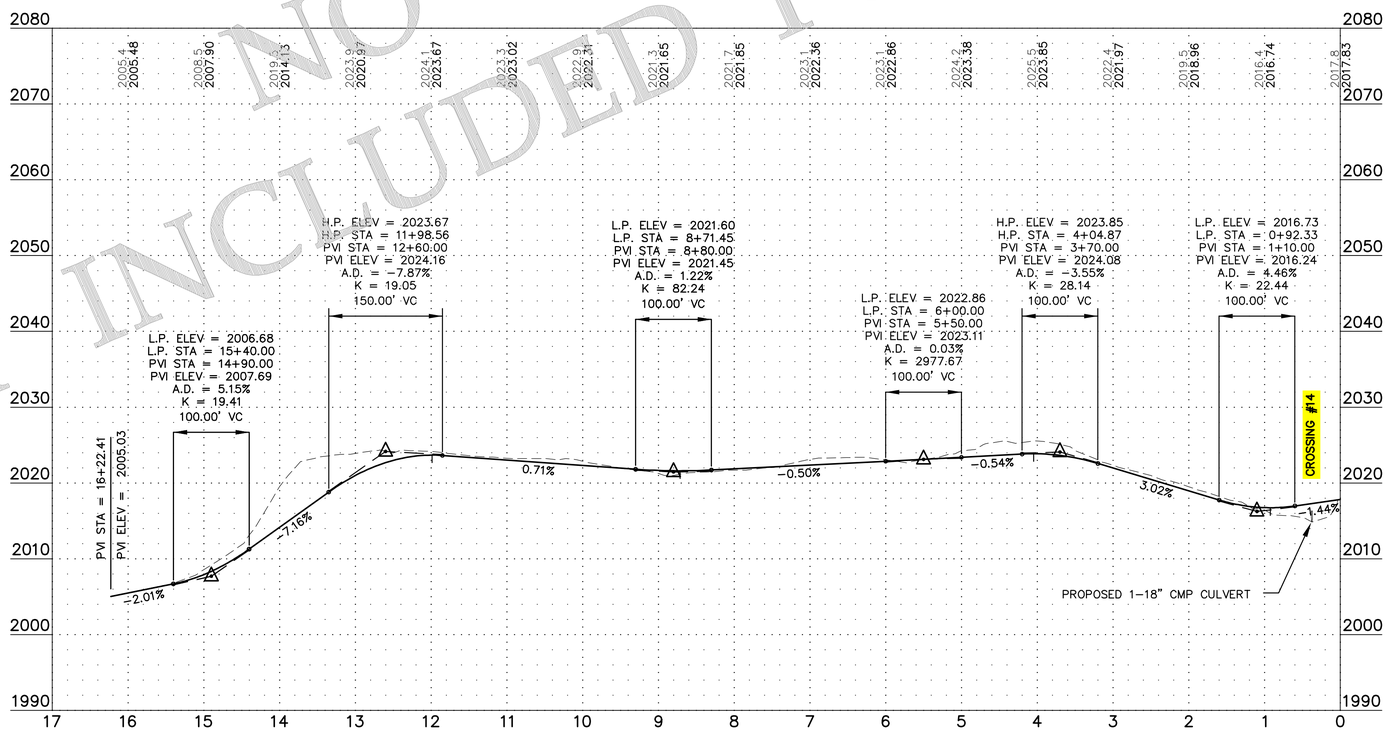

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Merricourt Wind Project

McIntosh County, North Dakota

Road 71 - Sta. 0+00 to End

Record Plans

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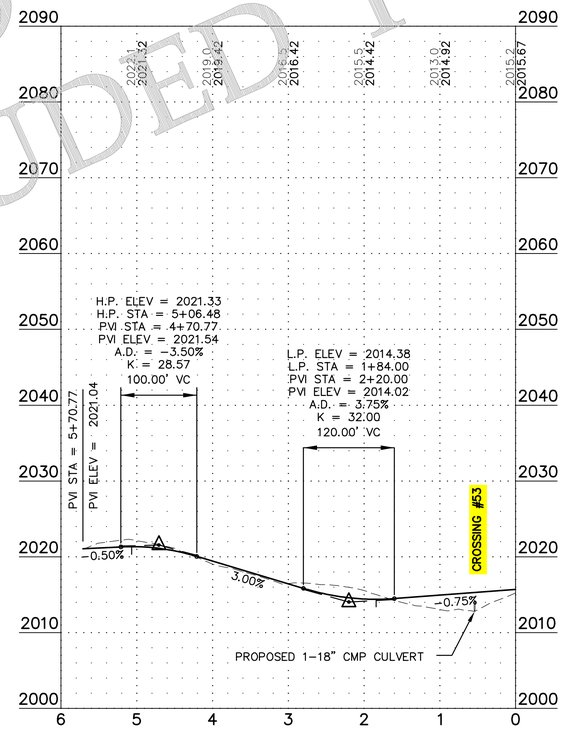

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Merricourt Wind Project

McIntosh County, North Dakota

Road 73 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 107 OF 119

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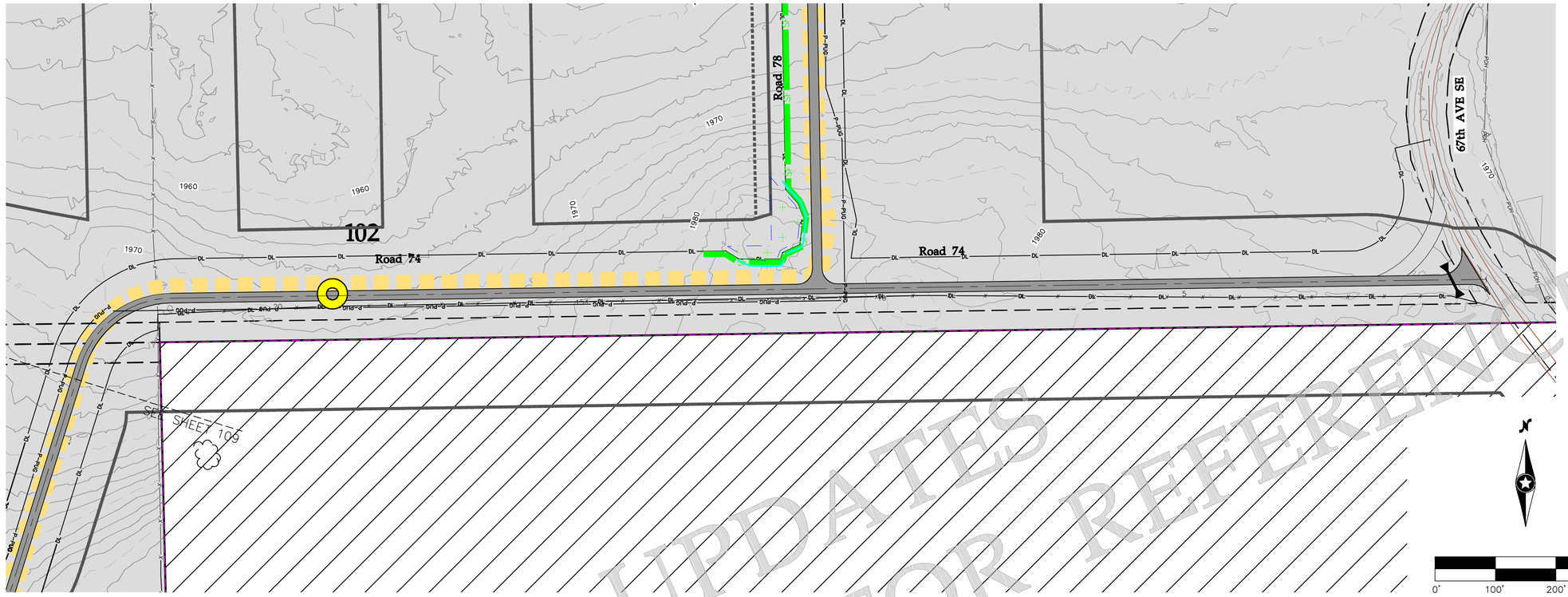

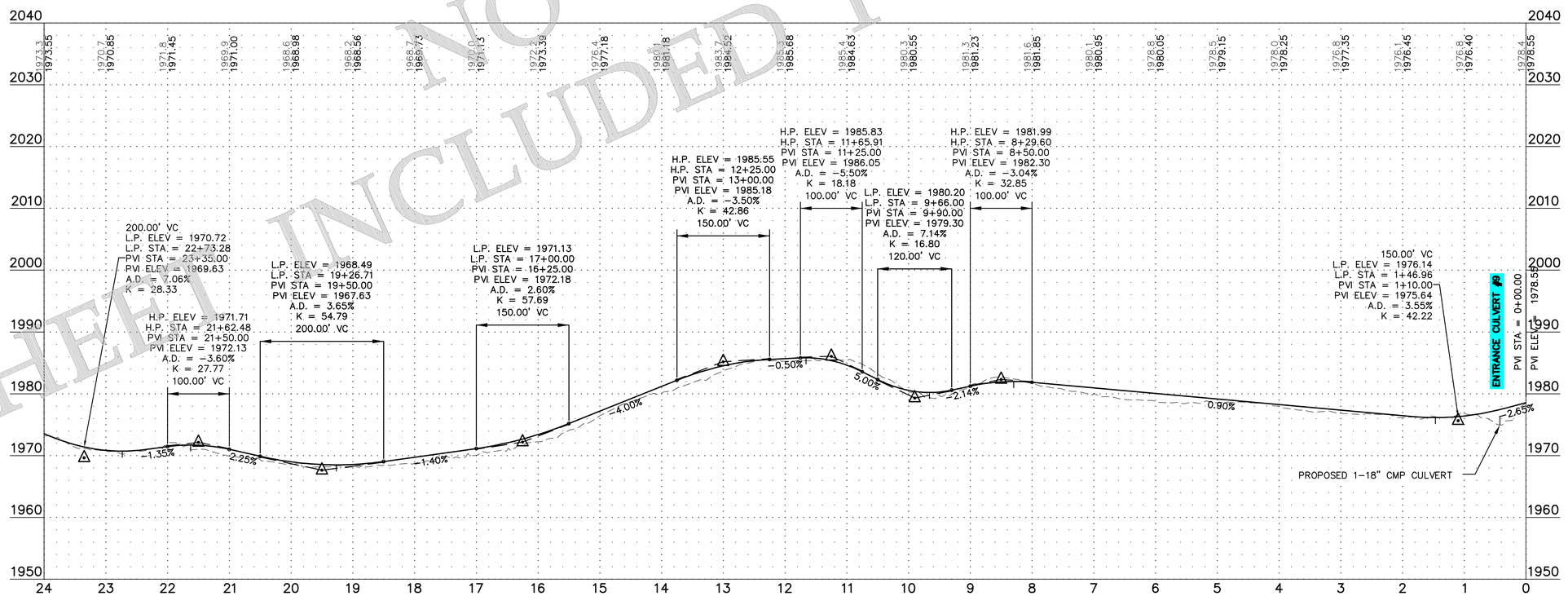

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WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 74 - Sta. 0+00 to 24+00

Record Plans

Date: 11/20/2020

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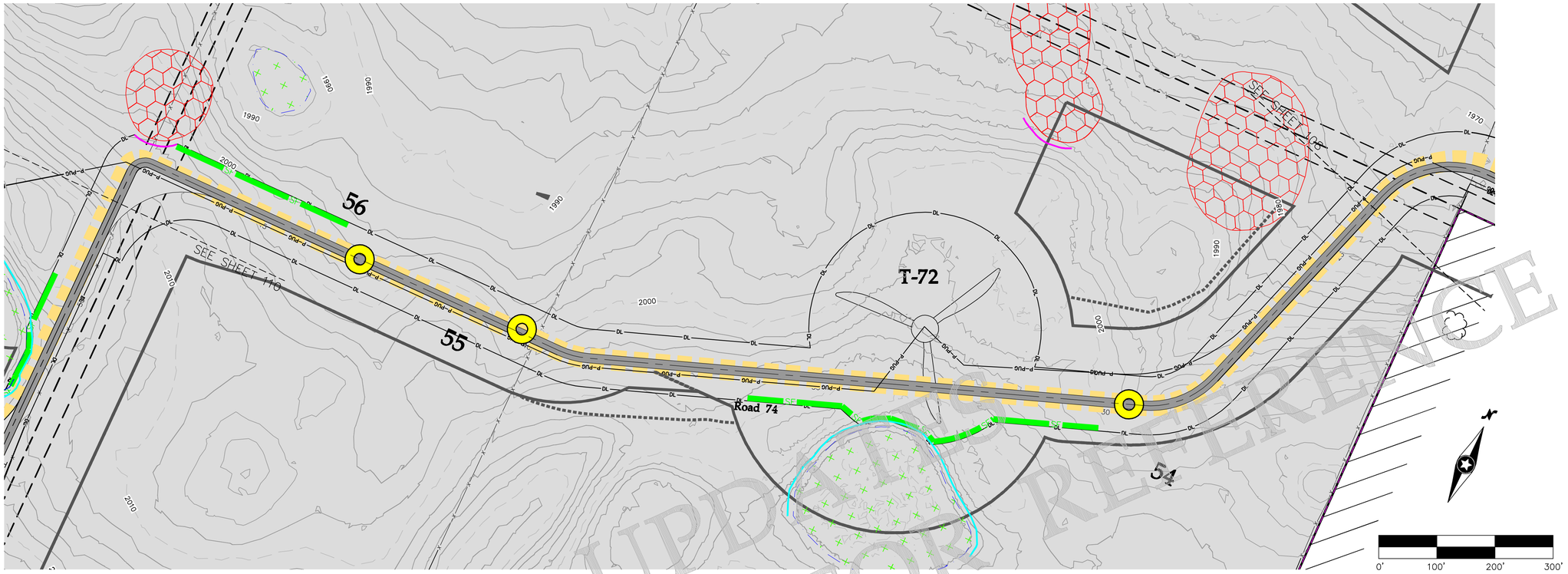

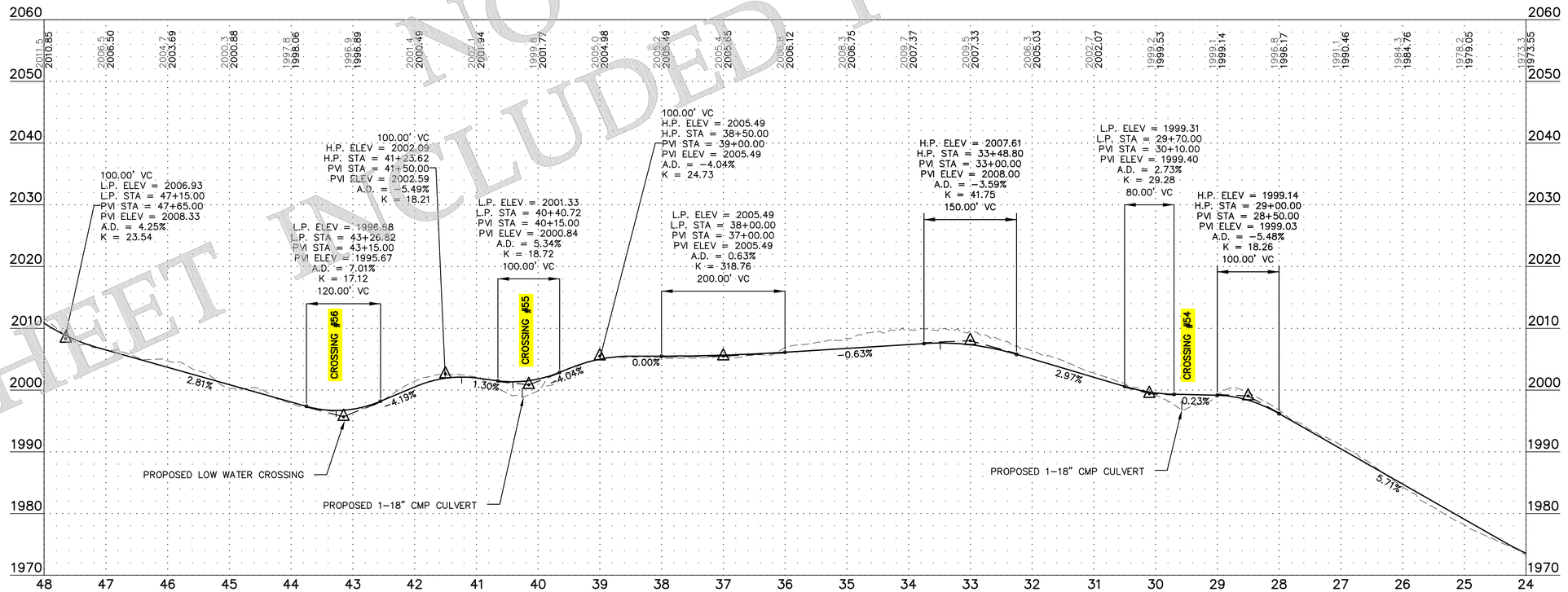

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2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 74 - Sta. 24+00 to 48+00

Record Plans

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Sheet: 109 OF 119

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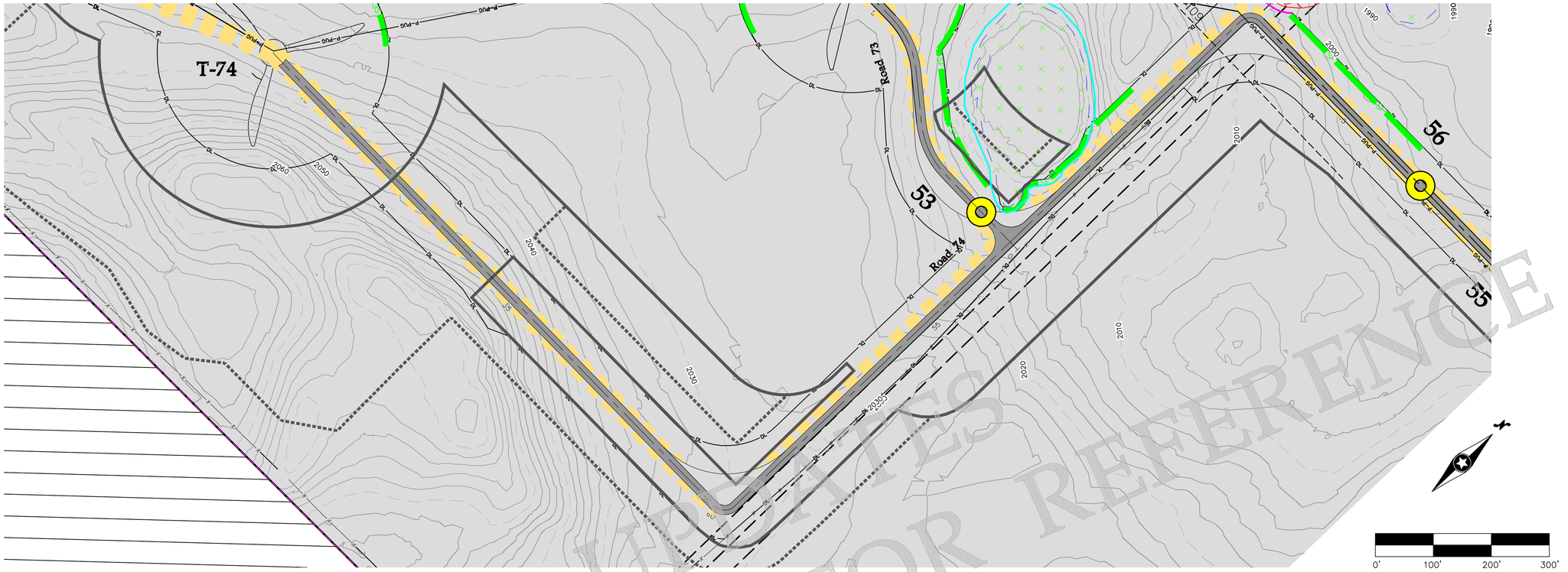

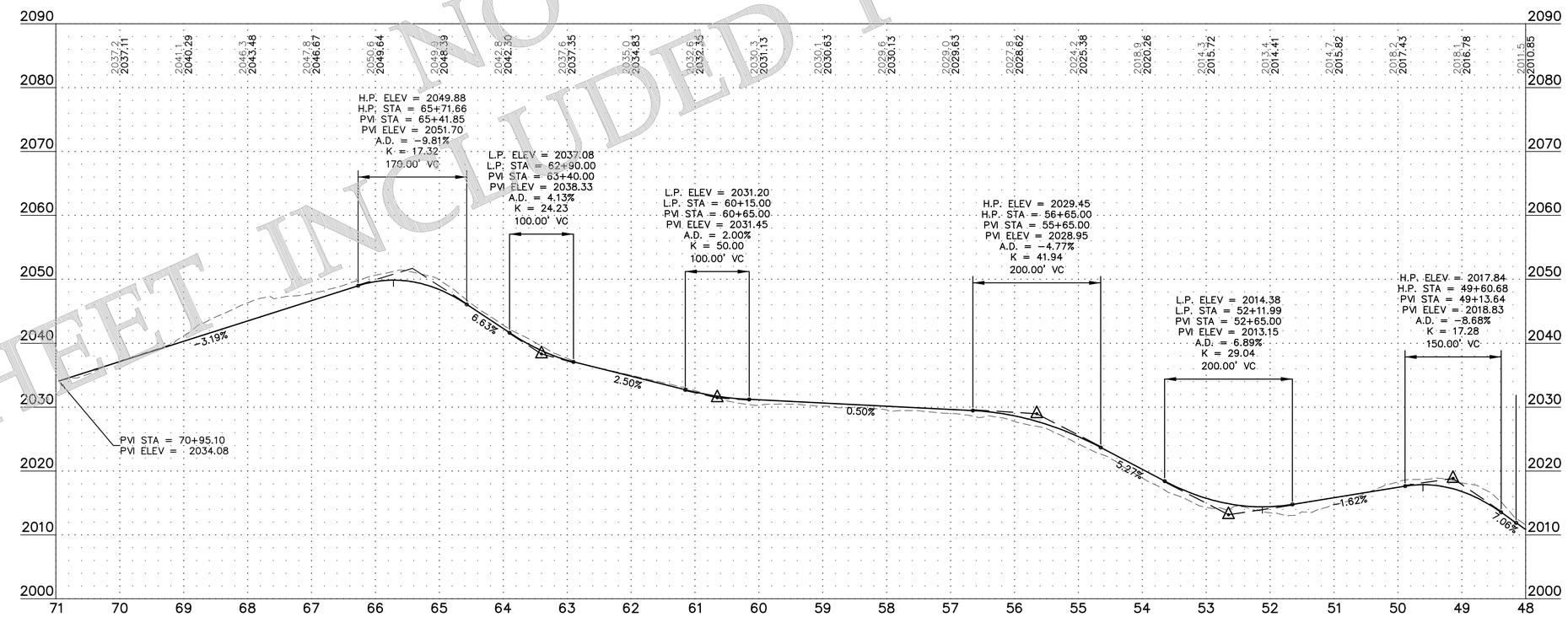

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Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

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Merricourt Wind Project

McIntosh County, North Dakota

Road 74 - Sta. 48+00 to End

Record Plans

Date: 11/20/2020
Sheet: 110 OF 119

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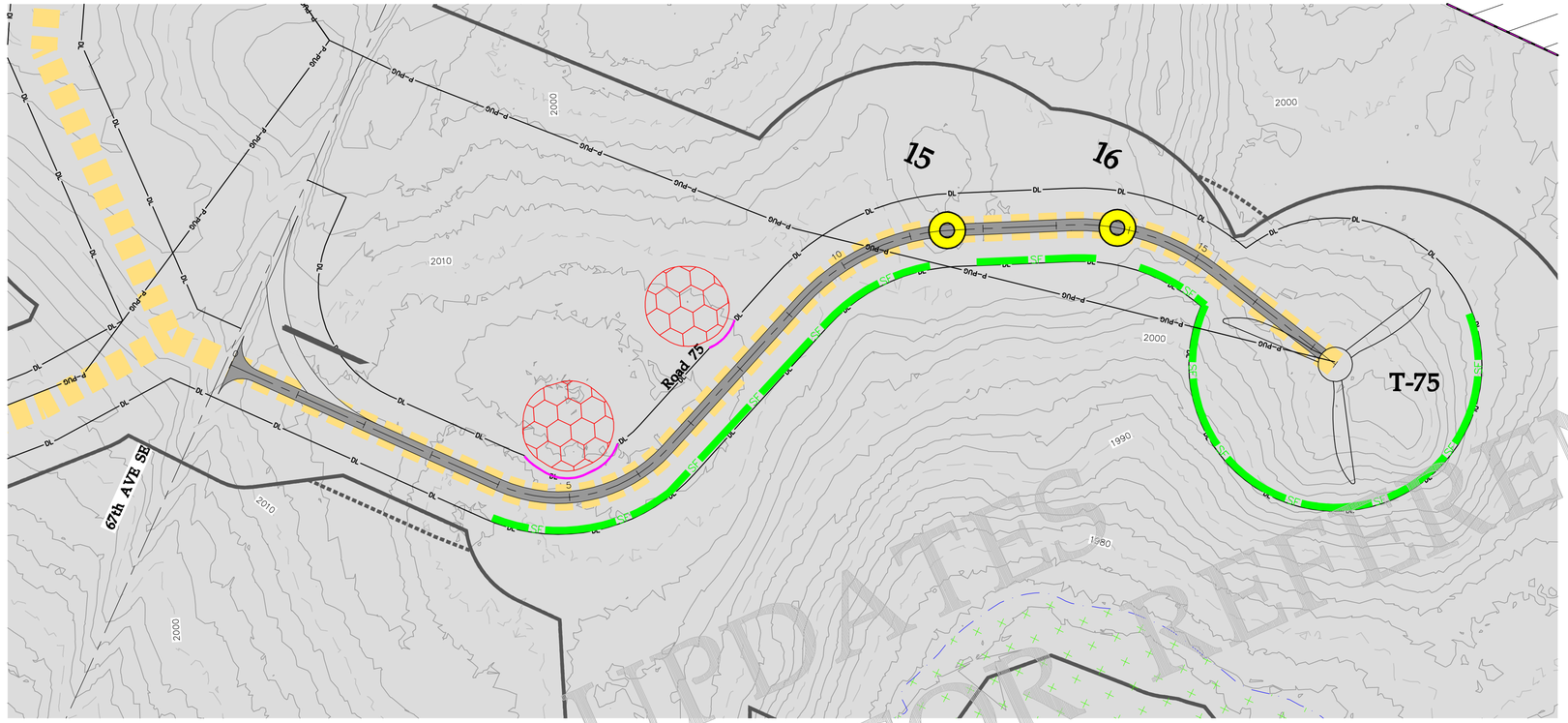

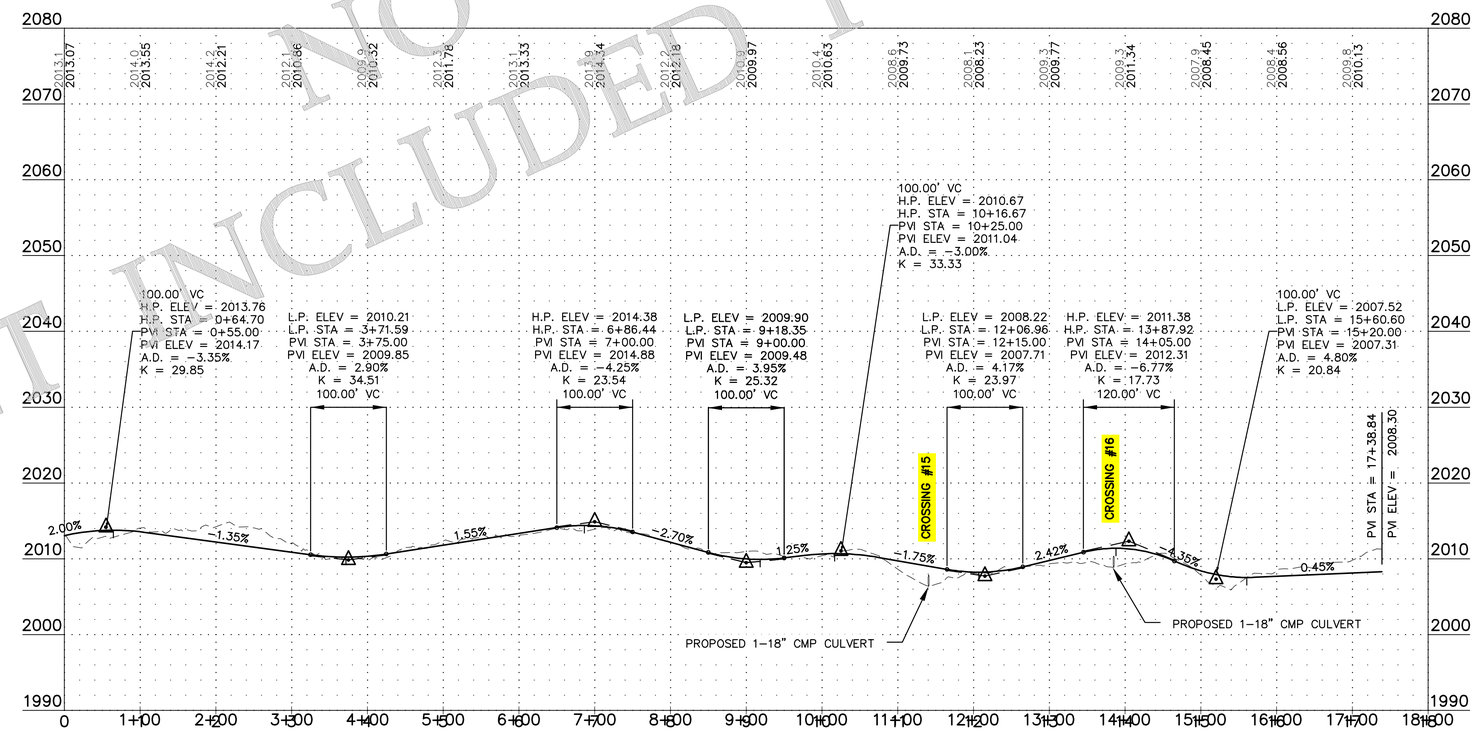

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Merricourt Wind Project

McIntosh County, North Dakota

Road 75 - Sta. 0+00 to End

Record Plans

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Sheet: 111 OF 119

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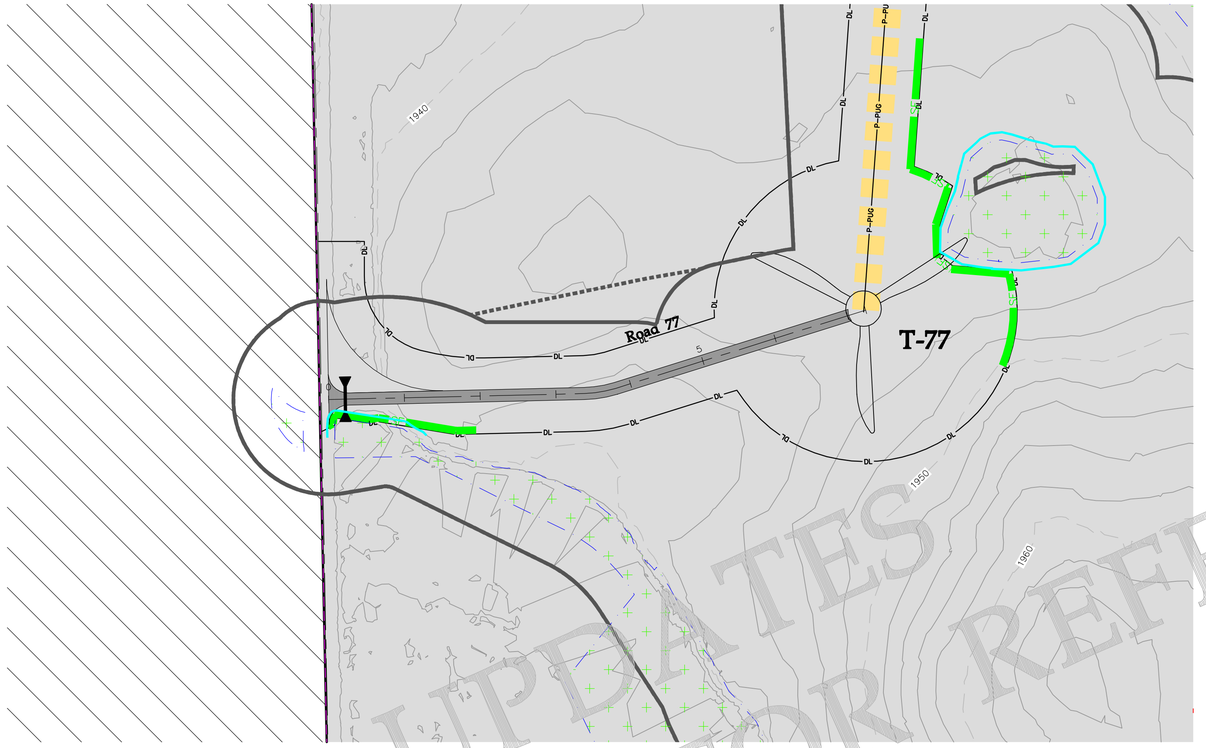

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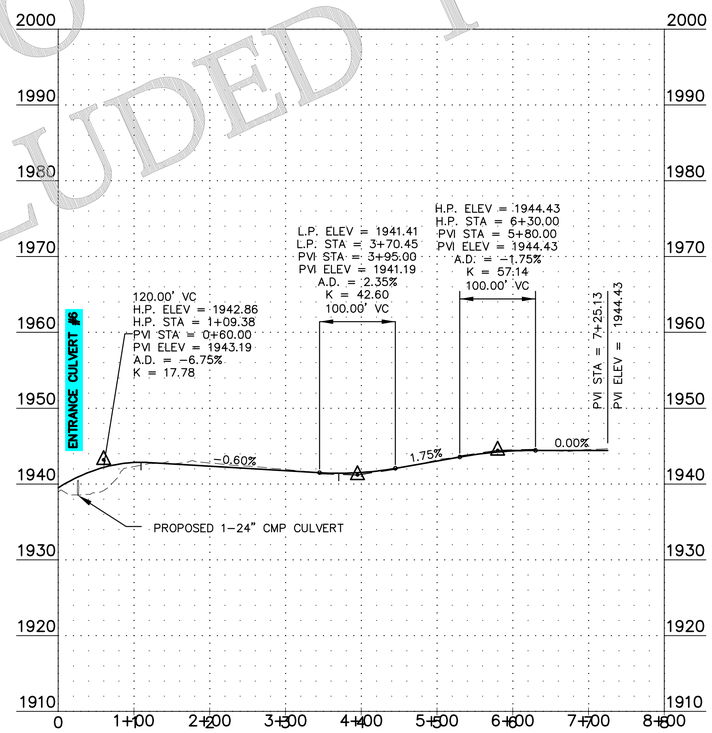

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Merricourt Wind Project

McIntosh County, North Dakota

Road 77 - Sta. 0+00 to End

Record Plans

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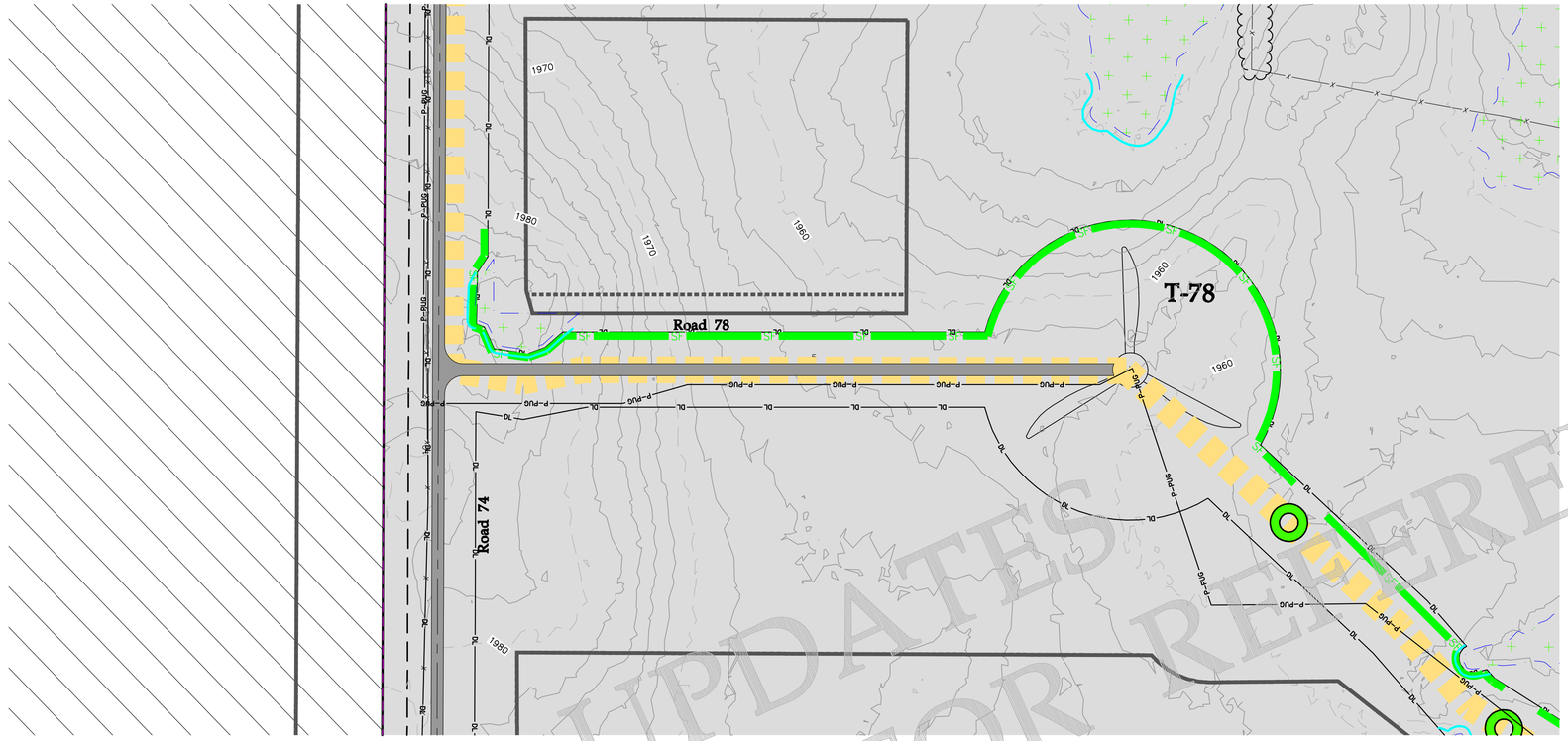

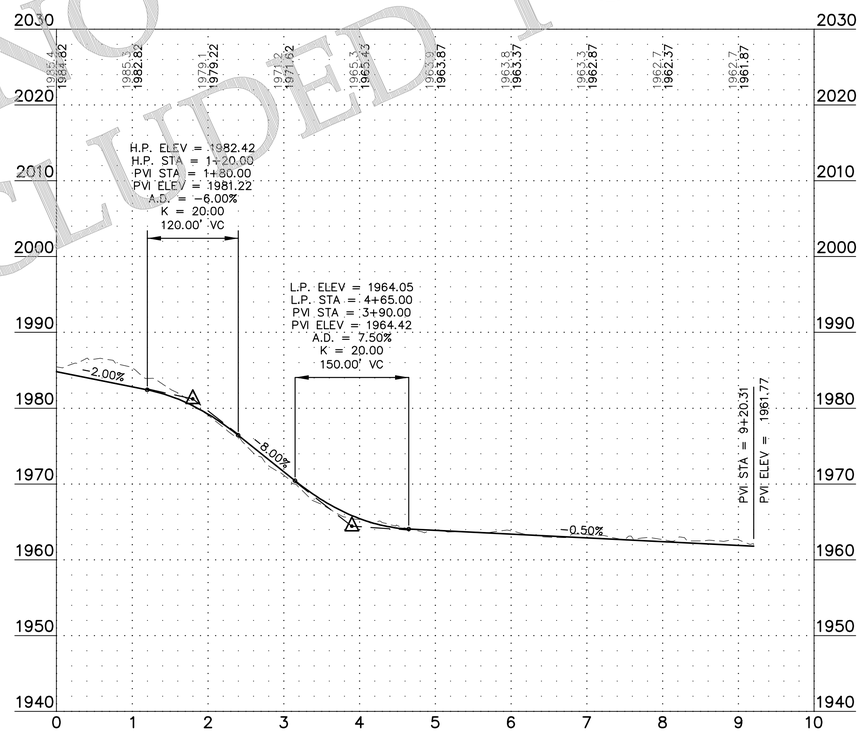

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Westwood

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Checked: DJN
Drawn: SNK
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
0	08/02/19	ISSUED FOR CONSTRUCTION
1	11/25/19	TURBINE ADJUSTMENTS
2	01/21/20	CUT & FILL ADD TO TURBINE TABLE
3	03/18/20	ACCESS ROAD ADJUSTMENTS
4	11/05/20	LWC DETAIL UPDATE
5	11/20/20	RECORD PLANS

Prepared for:

WANZEK a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

LEGEND:

- PROPOSED TURBINE LOCATION
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- PROPOSED CRANE PATH
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- OUT OF PROJECT BOUNDARY
- PROPOSED DRAINAGE CROSSING
- PROPOSED CULVERT

Merricourt Wind Project

McIntosh County, North Dakota

Road 78 - Sta. 0+00 to End

Record Plans

Date: 11/20/2020
Sheet: 113 OF 119

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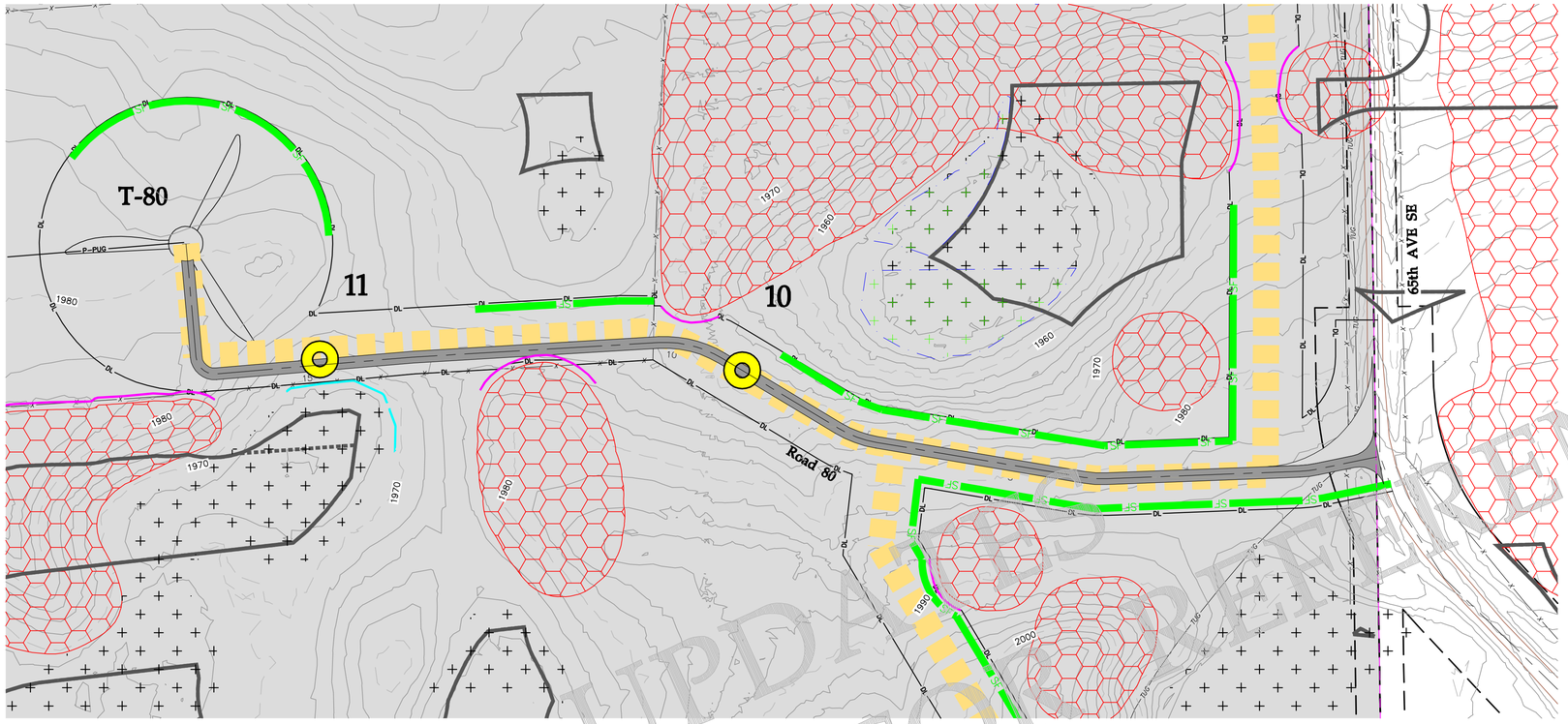

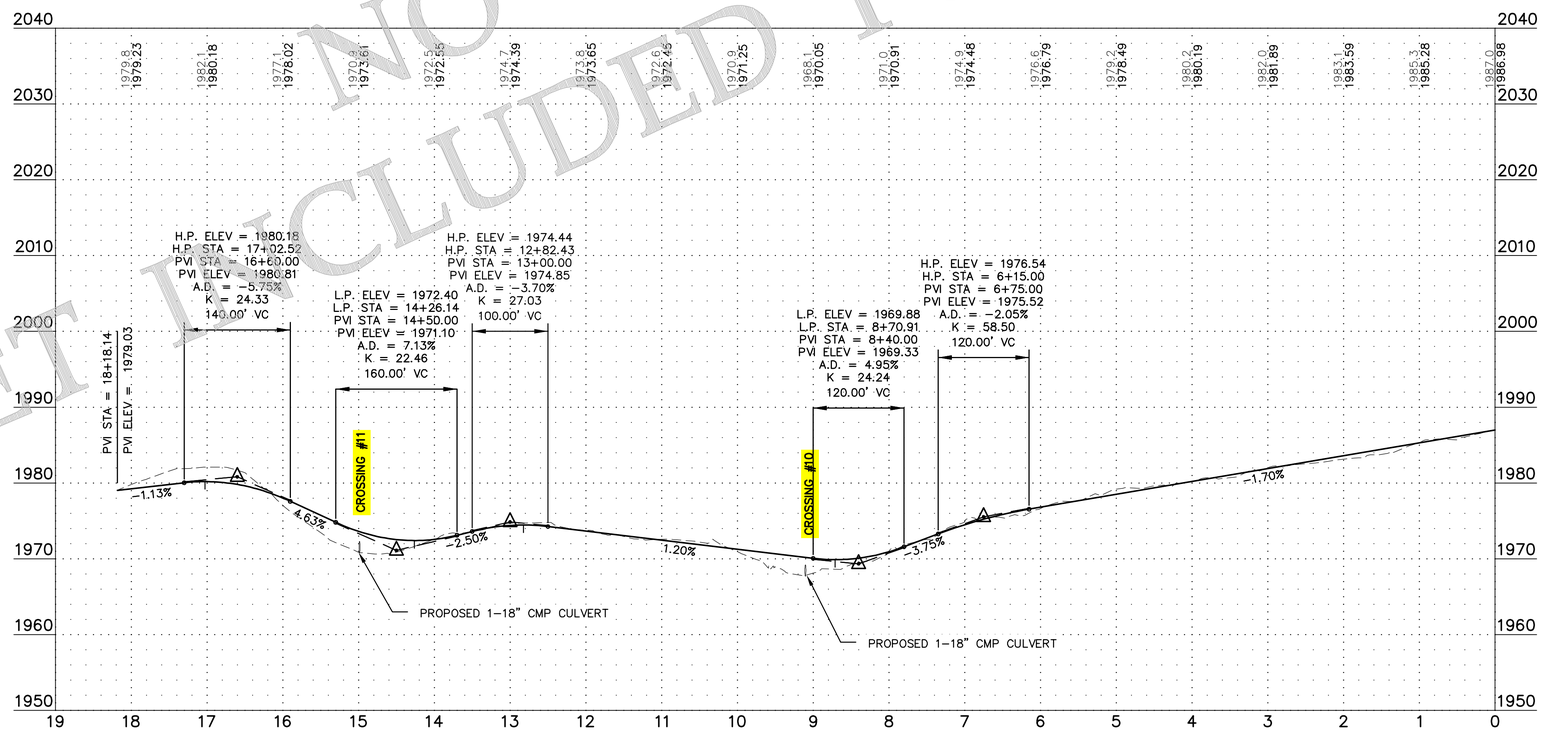

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Merricourt Wind Project

McIntosh County, North Dakota

Road 80 - Sta. 0+00 to End

Record Plans

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Sheet: 114 OF 119

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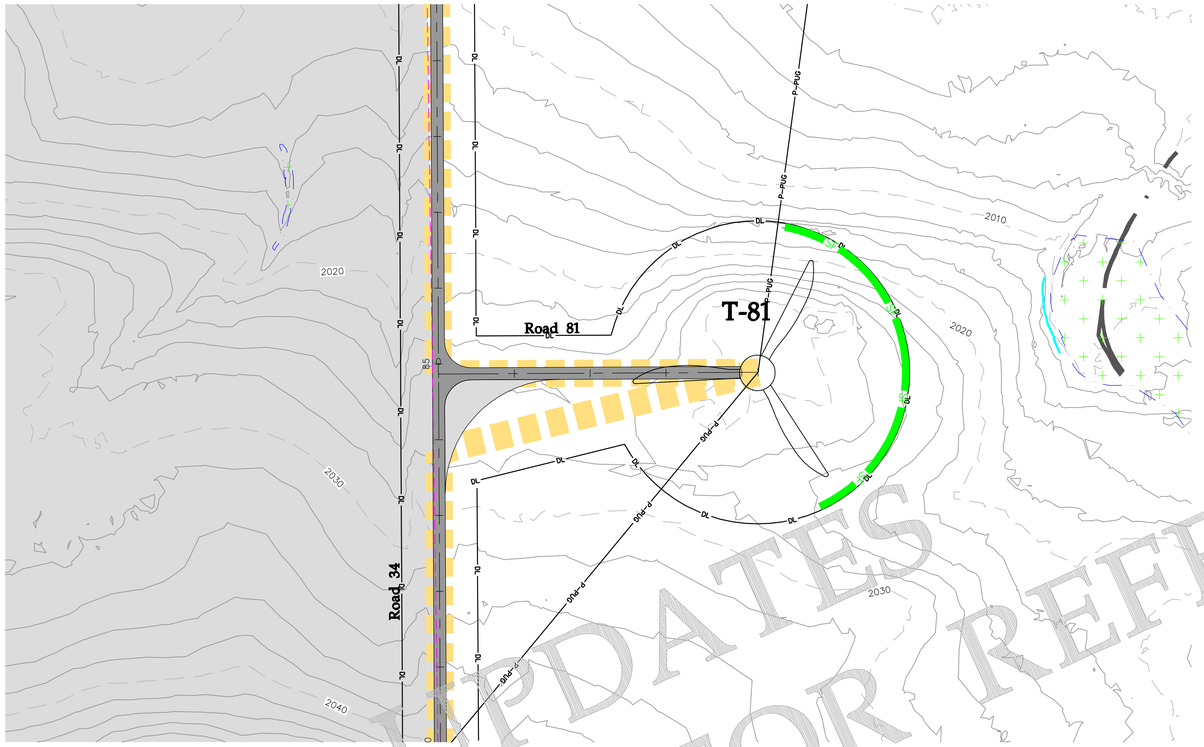

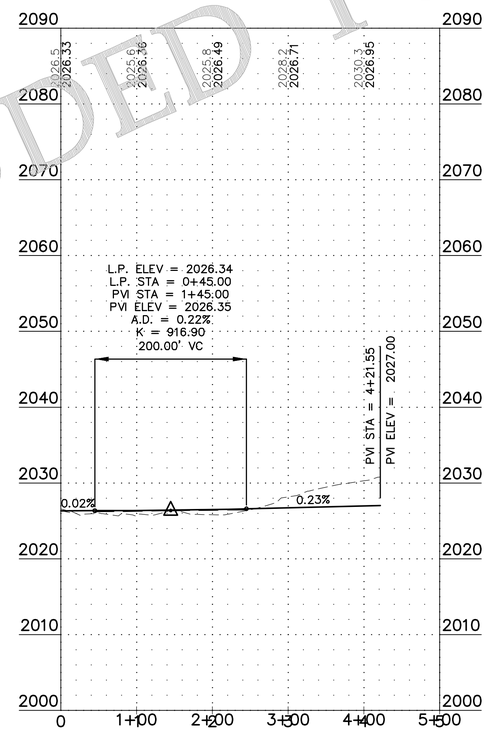

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Merricourt Wind Project

McIntosh County, North Dakota

Road 81 - Sta. 0+00 to End

Record Plans

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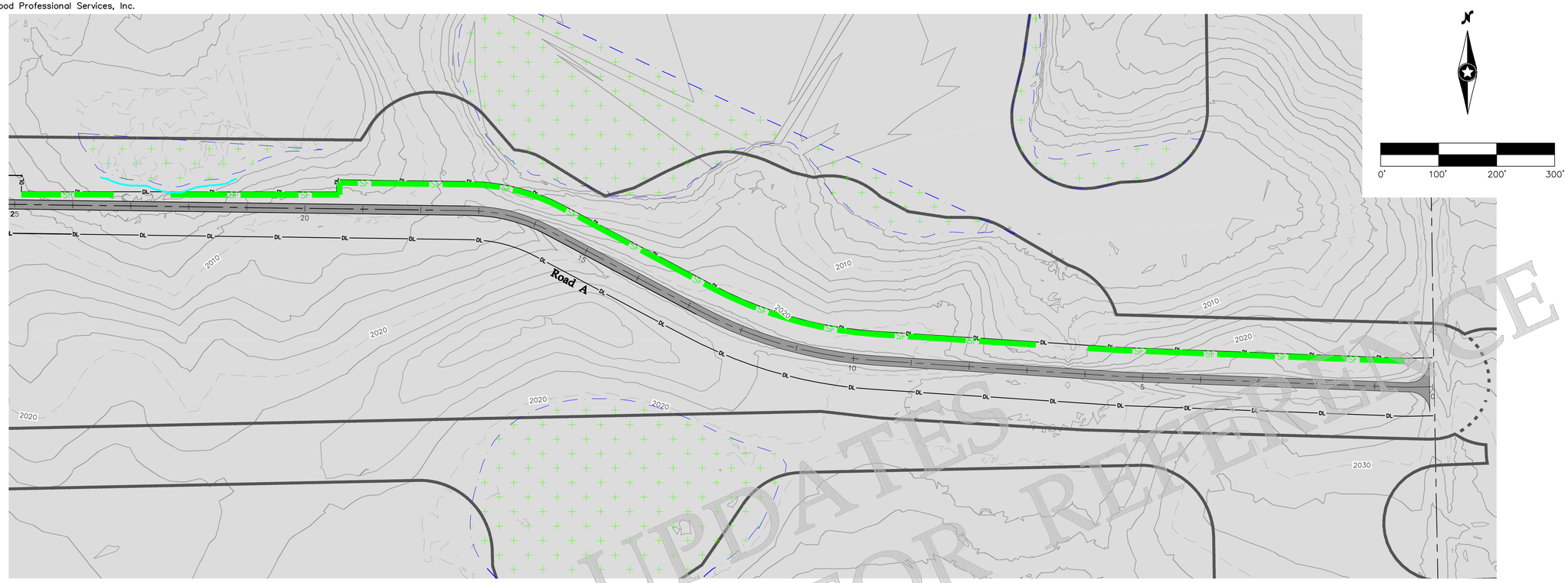

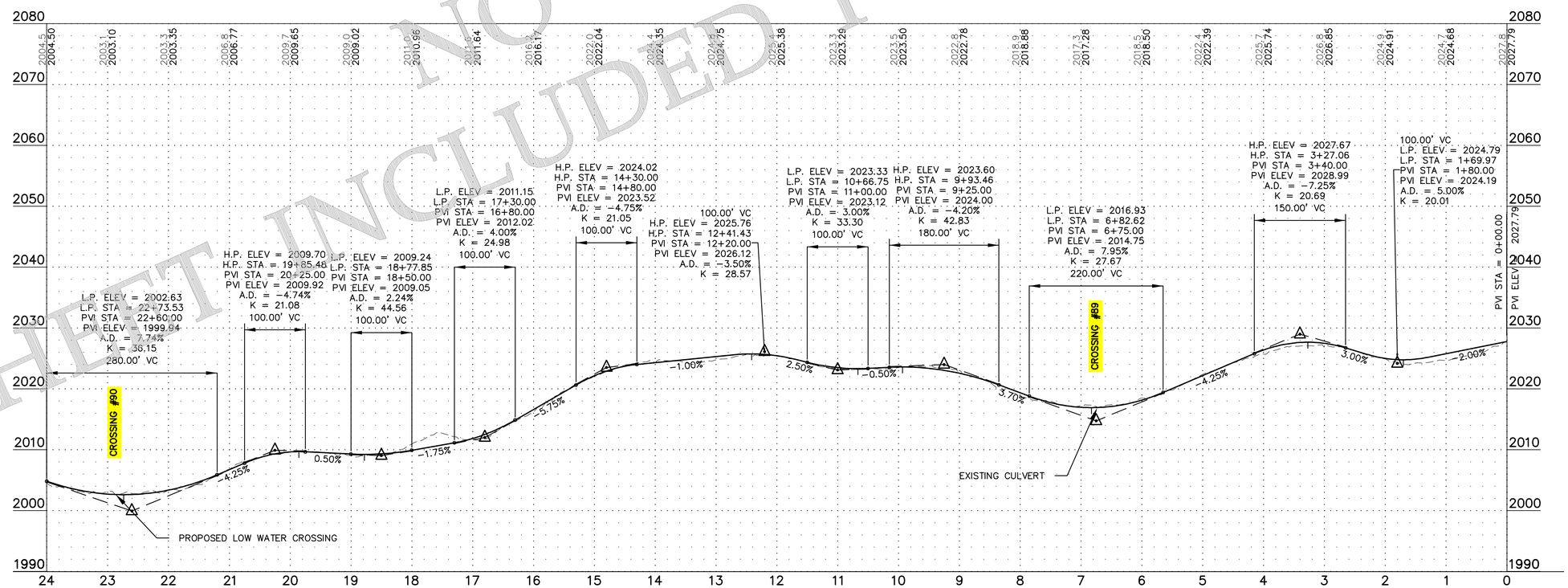

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Merricourt Wind Project

McIntosh County, North Dakota

Road A - Sta. 0+00 to 24+00

Record Plans

Date: 11/20/2020
Sheet: 116 OF 119

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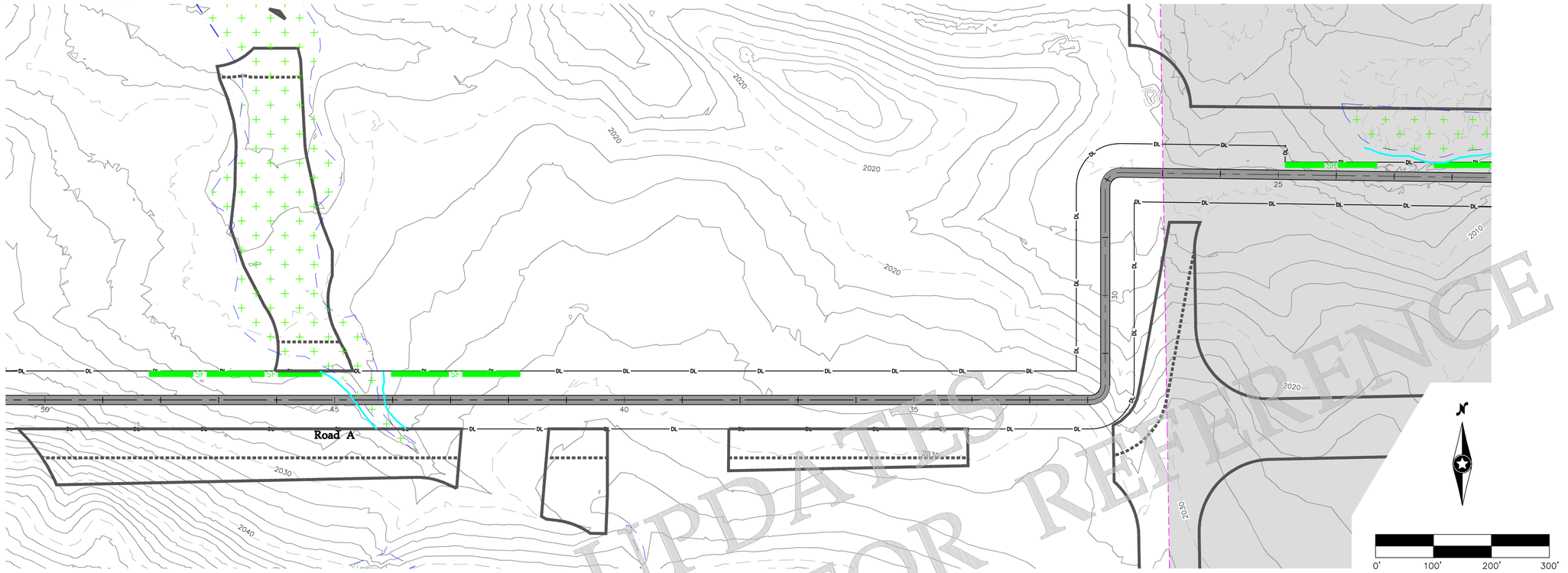

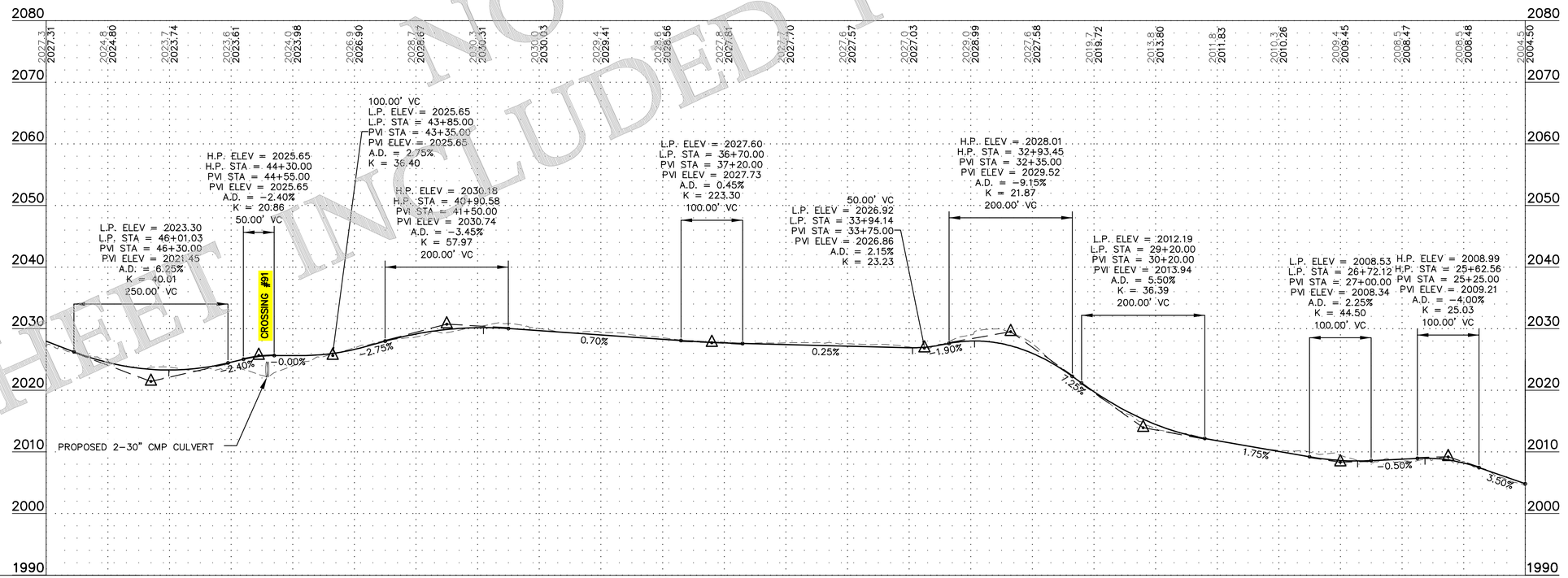

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Merricourt Wind Project

McIntosh County, North Dakota

Road A - Sta. 24+00 to 48+00

Record Plans

Date: 11/20/2020
Sheet: 117 OF 119

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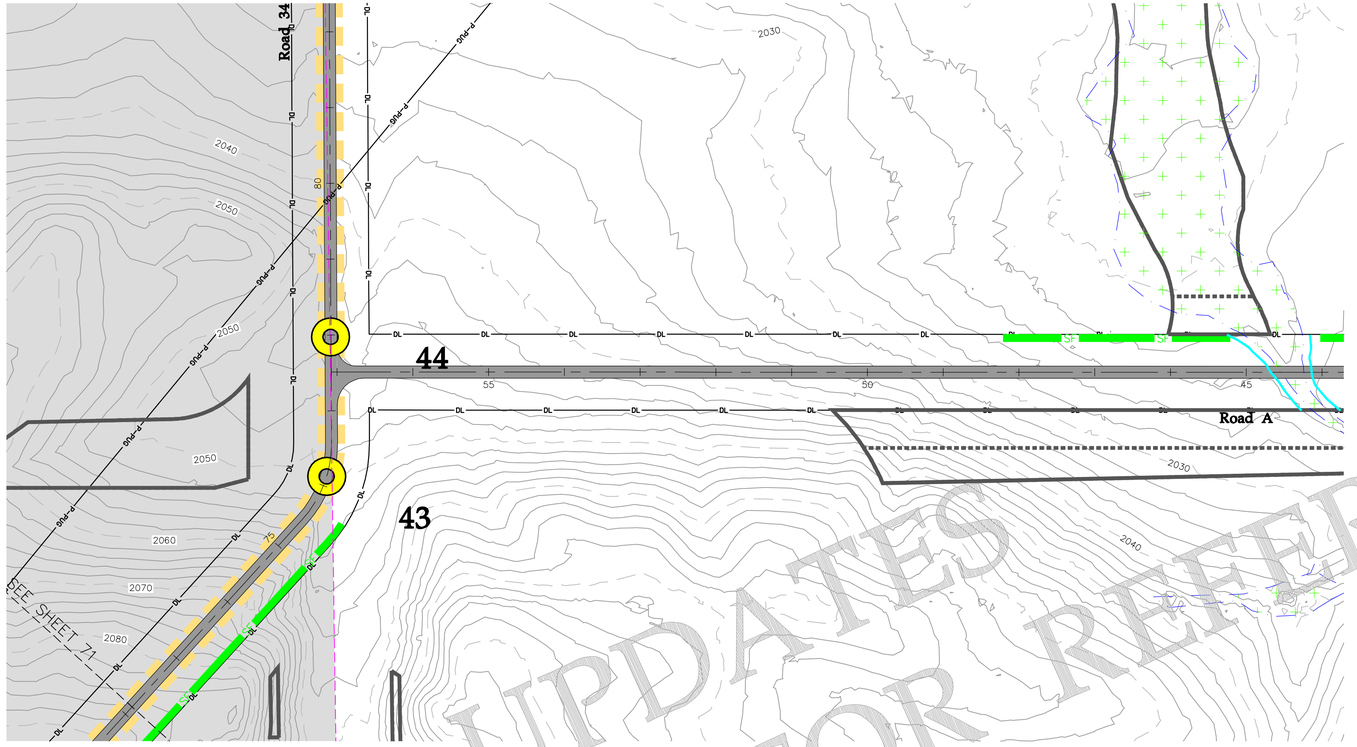

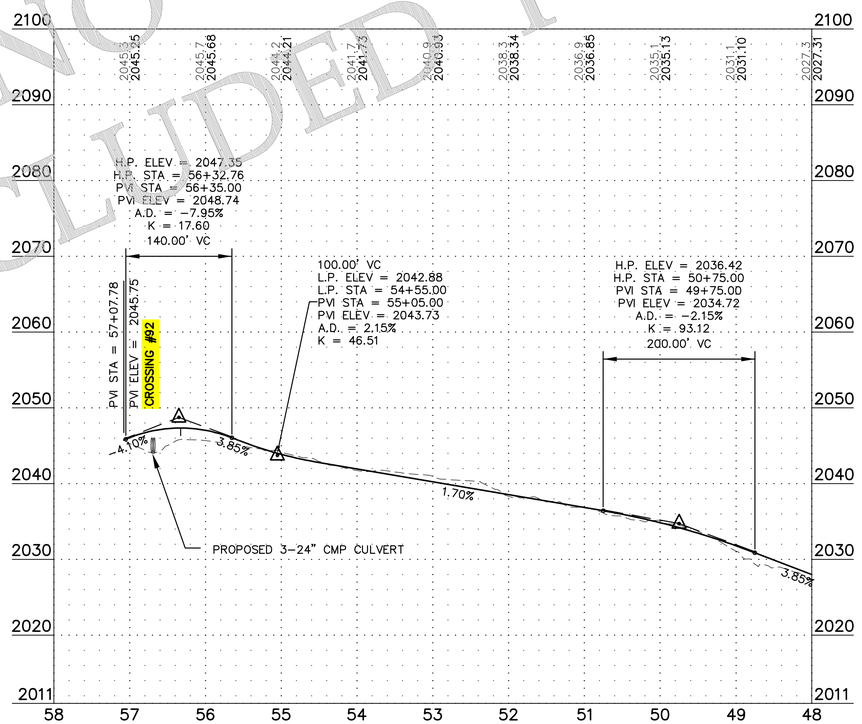

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0' 100' 200' 300'

Merricourt Wind Project

McIntosh County, North Dakota

Road A - Sta. 48+00 to End

Record Plans

Date: 11/20/2020
Sheet: 118 OF 119

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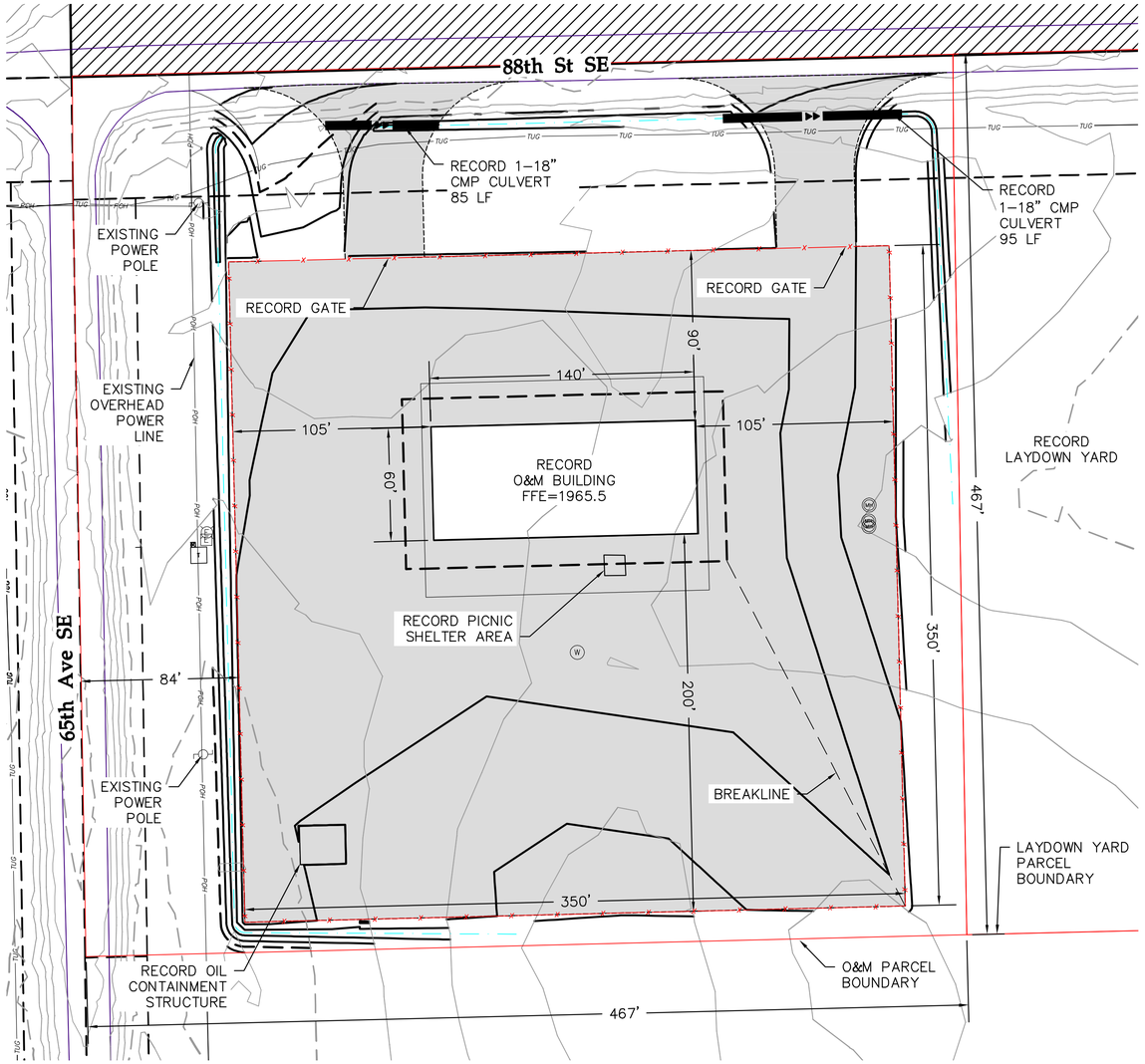
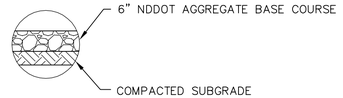


LEGEND:

- EXISTING 1' CONTOURS
- EXISTING 5' CONTOURS
- EXISTING BITUMINOUS EDGE
- EXISTING FENCE LINE
- EXISTING OVERHEAD POWER
- EXISTING RIGHT OF WAY
- EXISTING PARCEL LINE
- RECORD GRAVEL EDGE
- DESIGNED DITCH CENTERLINE
- DESIGNED 1' CONTOURS
- DESIGNED 5' CONTOURS
- RECORD FENCE LINE
- OUT OF PROJECT BOUNDARY
- GRADED PAD AREA
- RECORD ELECTRIC METER
- RECORD ELECTRIC BOX
- RECORD UTILITY MANHOLE
- RECORD TELEPHONE PEDESTAL
- RECORD WELL



O&M YARD CROSS SECTION

O&M SITE

AGGREGATE AREA FOOTPRINT = 132,295 SF

AGGREGATE IMPORT = 2450 CY
(6" DEPTH AGGREGATE AREA)

EARTHWORK

TOPSOIL STRIP (8") = 2450 CY

COMPACTED SUBGRADE

RAW CUT = 460 CY
RAW FILL = 6655 CY
RAW NET = 6195 CY (SHORT)

NOTES:

1. APPROXIMATE EARTHWORK BALANCE IS AFTER THE TOPSOIL HAS BEEN STRIPPED.
2. GRADING ELEVATIONS ARE MEASURED TO FINISH GRADE LEVEL. SUB-GRADE ELEVATION SHALL BE 6" BELOW FINISH GRADE OF THE AREA.
3. QUANTITIES ARE IN-PLACE ESTIMATES NO SHRINK OR SWELL IS ASSUMED
4. REFER TO PROJECT SWPPP NARRATIVE BY WESTWOOD FOR ADDITIONAL BMP'S

FOR REFERENCE ONLY

GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO LOCAL, STATE AND FEDERAL RULES INCLUDING THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL STORMWATER PERMIT REQUIREMENTS. REFER TO THE STORM WATER POLLUTION PREVENTION PLAN PREPARED FOR THE MERRICOURT WIND PROJECT FOR DETAILS.
2. REFER TO ARCHITECTURAL PLANS AND SITE PLAN BY OTHERS FOR DETAILED DIMENSIONS FOR BUILDING FOOTPRINT AND EXACT LOCATIONS/DIMENSIONS OF FEATURES (I.E. FENCE, GATES, UTILITIES, SEPTIC, VESTIBLE, SLOPED PAVING, RAMPS, TRUCK DOCKS, UTILITY ENTRANCES AND DOWNSPOUT LOCATIONS).
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO AVOID PROPERTY DAMAGE TO ADJACENT PROPERTIES DURING THE CONSTRUCTION PHASES OF THIS PROJECT. THE CONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR ANY DAMAGES TO THE ADJACENT PROPERTIES OCCURRING DURING THE CONSTRUCTION PHASES OF THIS PROJECT.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING TRAFFIC CONTROL DEVICES SUCH AS BARRICADES, WARNING SIGNS, DIRECTIONAL SIGNS, FLAGGERS AND LIGHTS TO CONTROL THE MOVEMENT OF TRAFFIC WHERE NECESSARY. PLACEMENT OF THESE DEVICES SHALL BE APPROVED BY THE COUNTY AND ENGINEER PRIOR TO PLACEMENT. TRAFFIC CONTROL DEVICES SHALL CONFORM TO APPROPRIATE NORTH DAKOTA HIGHWAY DEPARTMENT STANDARDS.
5. ALL SLOPES SHALL BE GRADED TO 4:1 OR FLATTER, UNLESS OTHERWISE INDICATED ON THE PLAN. ALL SLOPES 4:1 OR GREATER SHALL BE SEEDED AND STABILIZED WITH FIBER BLANKET.
6. SPOT ELEVATIONS AND RECORD CONTOURS INDICATE FINISH GRADE SURFACE. SUB-GRADE ELEVATIONS ARE 6" LOWER THAN THE SPOT ELEVATIONS SHOWN.
7. AFTER THE SITE GRADING IS COMPLETED, IF EXCESS SOIL MATERIAL EXISTS, THE CONTRACTOR SHALL DISPOSE OF ALL EXCESS SOIL MATERIAL IN A MANNER ACCEPTABLE TO THE OWNER AND THE REGULATING AGENCIES INVOLVED.
8. PROVIDE EROSION CONTROL SILT FENCE AT THE PERIMETER OF ALL TEMPORARY STOCKPILES. LOCATIONS TO BE DETERMINED BY SEQUENCE OF GRADING OPERATIONS.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EXISTING DRAINAGE PATTERNS.
10. THE CONTRACTOR SHALL NOTIFY NORTH DAKOTA 811 AT LEAST 48 HOURS BEFORE EXCAVATION ACTIVITIES COMMENCE.

EXECUTION

1. TOPSOIL:
   - A. TOPSOIL, INCLUDING ROOTS LARGER THAN 2" AND ROOT MASSES SHALL BE STRIPPED FROM THE ENTIRE O&M PAD. A TOPSOIL STRIP OF 8" WAS ASSUMED.
   - B. TOPSOIL TO BE STOCKPILED IN A DESIGNATED AREA AND SPREAD WITHIN PARCEL AFTER GRADING AND COMPACTED WITHOUT ADVERSELY AFFECTING THE DRAINAGE PATTERN.
2. FILL MATERIAL:
   - A. SOILS USED AS FILL MATERIAL SHALL BE TESTED FOR MOISTURE CONTENT, ATTERBERG LIMITS, AND PROCTOR TESTS IN ACCORDANCE WITH THE GEOTECHNICAL REPORT RECOMMENDATIONS.
   - B. ALL FILL MATERIAL SHALL BE FREE OF ORGANIC MATERIALS INCLUDING ROOTS AND VEGETATIVE MATERIAL.
   - C. FILL MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 12".
3. SUBGRADE TESTING:
   - A. PROVIDE 3 MOISTURE DENSITY COMPACTION TESTS PER LIFT. COMPACTED SUBGRADE MUST BE COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
   - B. THE FINAL SUBGRADE SHALL BE PROOF-ROLLED PRIOR TO THE PLACEMENT OF THE AGGREGATE BASE TO IDENTIFY AREAS OF UNSTABLE SUBGRADE.
4. AGGREGATE BASE TESTING:
   - A. AGGREGATE BASE SHALL BE PROOF-ROLLED OVER THE ENTIRE O&M PAD.
   - B. PROVIDE 1 SIEVE ANALYSIS.

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0' 40' 80' 120'

Merricourt Wind Project

McIntosh County, North Dakota

O&M Grading Plan

Record Plans

Date: 11/20/2020
Sheet: 119 OF 119

Project Substation
As Built Turbine
As Built Access Road
As Built Underground Collection
Merricourt Project Boundary

0 1 2 Miles

0 2 4 Kilometers

Source: WSB, Wanzek, ESRI | G:\Projects\USA_NorthMerricourt\05_GIS\052_MapDocs\AsBuilt_NDPSC.mxd | Last Updated 2/3/2021 by Rachel.Clement

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

MERRICOURT WIND PROJECT AS BUILT LAYOUT

Merricourt Wind Project I McIntosh & Dickey Counties, North Dakota

F-1

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
A	04/24/2019	30% SUBMITTAL	CM
B	06/06/2019	60% SUBMITTAL	CM
C	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

RECORD DRAWING

DRAWINGS ARE BASED UPON CONSTRUCTION CONTRACTOR REDLINES WHICH HAVE NOT BEEN FIELD VERIFIED BY ENGINEER OF RECORD.

LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- FEEDER 1
- FEEDER 2
- FEEDER 3
- FEEDER 4
- FEEDER 5
- FEEDER 6
- FIBER TO O&M
- MET TOWER
- JUNCTION BOX
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- BORE WITH ID (XXX)
- ACCESS ROADS

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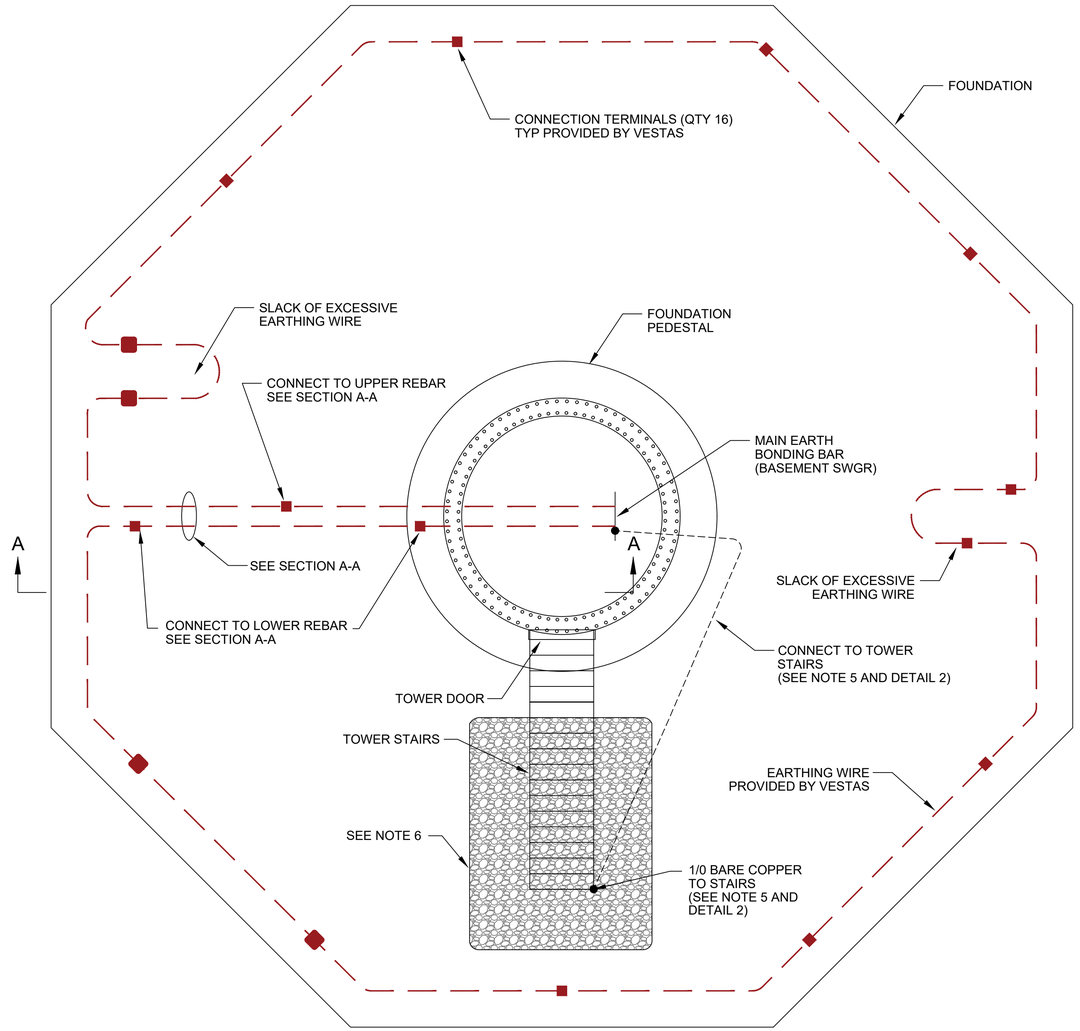
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.3191
www.ulteig.com
Bismarck - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul

Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM OVERALL LAYOUT

DWG #: MCW-COL-C1

REVISION: 2



1 WTG GROUNDING PLAN

NOT TO SCALE

NOTES:

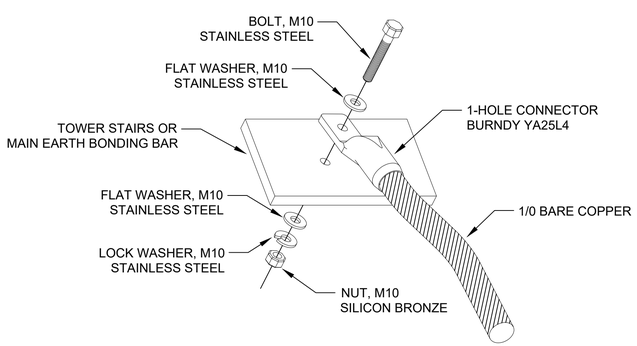
1. INSTALLATION OF SUPPLIED EARTHING SYSTEM SHALL FOLLOW THE VESTAS DOCUMENTS.
2. LEAVE SUFFICIENT SLACK ON ALL GROUNDING CONDUCTORS TO ALLOW CONNECTION TO EQUIPMENT.
3. SEE FOUNDATION DRAWING PACKAGE FOR STRUCTURAL DESIGN.
4. TWO HORIZONTAL EARTHING ELECTRODES/TRENCH GROUNDS (CONNECTED TO THE MAIN EARTH BONDING BAR) ARE TO BE RUN IN DIFFERENT DIRECTIONS WITH A MINIMUM ANGULAR SEPARATION OF 90° AND TO A MINIMUM DISTANCE OF 263 FEET. THIS REQUIRES AN ADDITIONAL TRENCH GROUND (PROVIDED BY ELECTRICAL CONTRACTOR) IF A TURBINE IS AT THE END OF A LINE/TAP. SEE ONE LINE FOR LOCATIONS. SEE NOTE 7.
5. ADDITIONAL GROUNDING RUN IS REQUIRED TO BOND THE TOWER STAIRS. THE FOLLOWING MATERIAL SHALL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR:

   1/0 BARE COPPER FOR STAIR GROUND- APPROXIMATELY 40 FEET
   (2) ONE-HOLE LUG (1/0 TO GROUND BAR AND STAIRS)
   (2) M10 BOLT
   (2) LOCK WASHER
   (2) SILICON BRONZE NUT
   (4) FLAT WASHER

   DESCRIPTION OF THE ADDITIONAL GROUNDING: 1/0 BARE COPPER CONNECTED FROM THE MAIN EARTH BONDING BAR TO THE TURBINE STAIR LANDING. GROUNDING RUN SHALL USE THE TRENCH GROUND CONDUIT AND BE BURIED A MINIMUM OF 18 INCHES BELOW FINAL GRADE.
6. A SURFACE MATERIAL OF 5,500 OHM-M OR GREATER, 6 INCHES THICK, SHALL ENCAPSULATE A MINIMUM OF 5 FEET AROUND THE STAIR LANDING AREA AT ALL TURBINE LOCATIONS.
7. THE FOLLOWING RADIAL TURBINES REQUIRE THREE ADDITIONAL TRENCH GROUND COUNTERPOISES, OR "WHIPS", INSTALLED AT A DEPTH OF FOUR FEET AND IN THE THREE CARDINAL DIRECTIONS OTHER THAN THE ONE IN WHICH THE INCOMING TRENCH GROUND IS INSTALLED. THE VESTAS REQUIRED COUNTERPOISE OPPOSITE THE INCOMING TRENCH GROUND IS TO BE 263 FEET LONG AND THE OTHER TWO ARE TO BE 100 FEET LONG. CONTACTOR TO PROVIDE THE FOLLOWING MATERIAL.

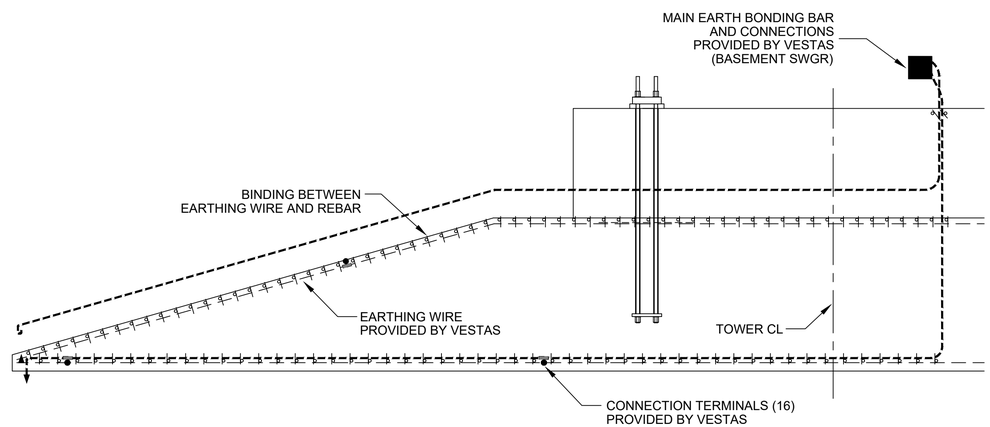
   (463 FT) 7-#8 COPPERCLAD STEEL GROUND
   (3) ONE-HOLE LUG (TRENCH GROUND TO GROUND BAR)
   (3) M10 BOLT
   (3) FLAT WASHER
   (3) LOCK WASHER
   (3) SILICON BRONZE NUT

Feeder 1	Feeder 2	Feeder 3	Feeder 4	Feeder 5	Feeder 6
WTG 65	WTG 56	WTG 35	WTG 45	WTG 3	WTG 11
WTG 69	WTG 75	WTG 37	WTG 42	WTG 26	WTG 5
WTG 53	WTG 54	WTG 60	WTG 40	WTG 2	
WTG 47		WTG 62	WTG 80		
WTG 50		WTG 46	WTG 77		
			WTG 32		



2 1-HOLE LUG CONNECTION

NOT TO SCALE



3 SECTION A-A

NOT TO SCALE

MERRICOURT
WIND PROJECT

DICKEY AND MCINTOSH COUNTIES,
NORTH DAKOTA

Rev.	Date	Description	By
A	07/01/2019	60% SUBMITTAL	CM
0	08/28/2019	ISSUED FOR CONSTRUCTION	CM
1	03/05/2020	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

RECORD DRAWING

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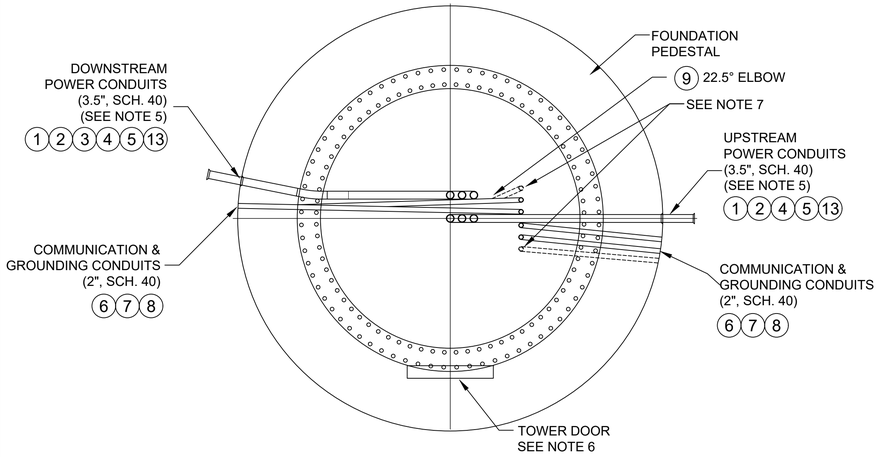
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM
WTG GROUNDING PLAN

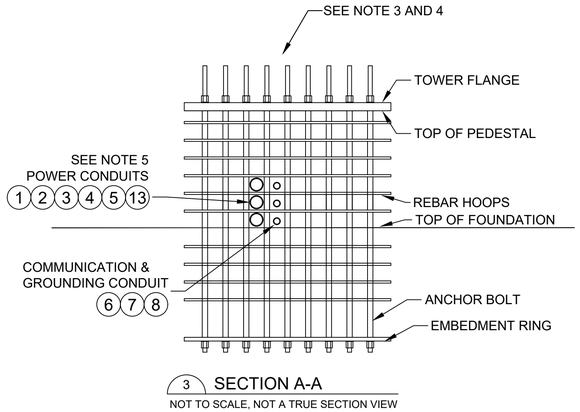
DWG #: MCW-COL-D1

REVISION: 2



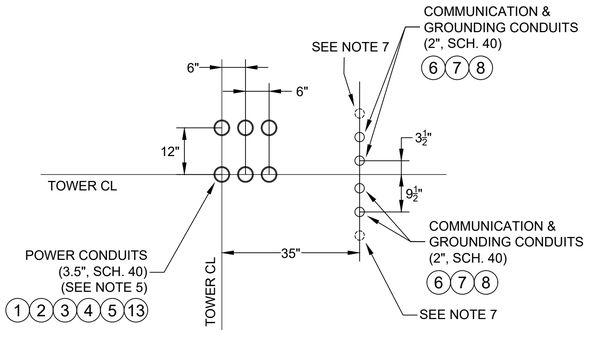
1 WTG PEDESTAL CONDUIT PLAN (72 BOLTS)

NOT TO SCALE



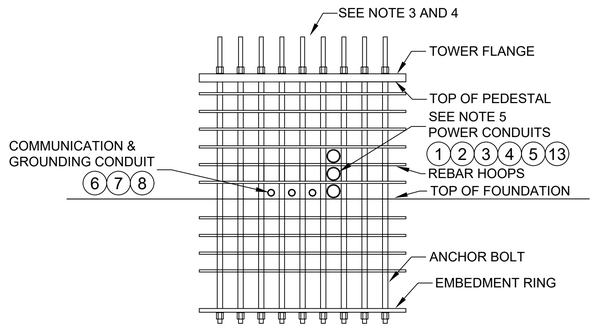
3 SECTION A-A

NOT TO SCALE, NOT A TRUE SECTION VIEW



2 CONDUIT DIMENSIONS

NOT TO SCALE



4 SECTION B-B

NOT TO SCALE, NOT A TRUE SECTION VIEW

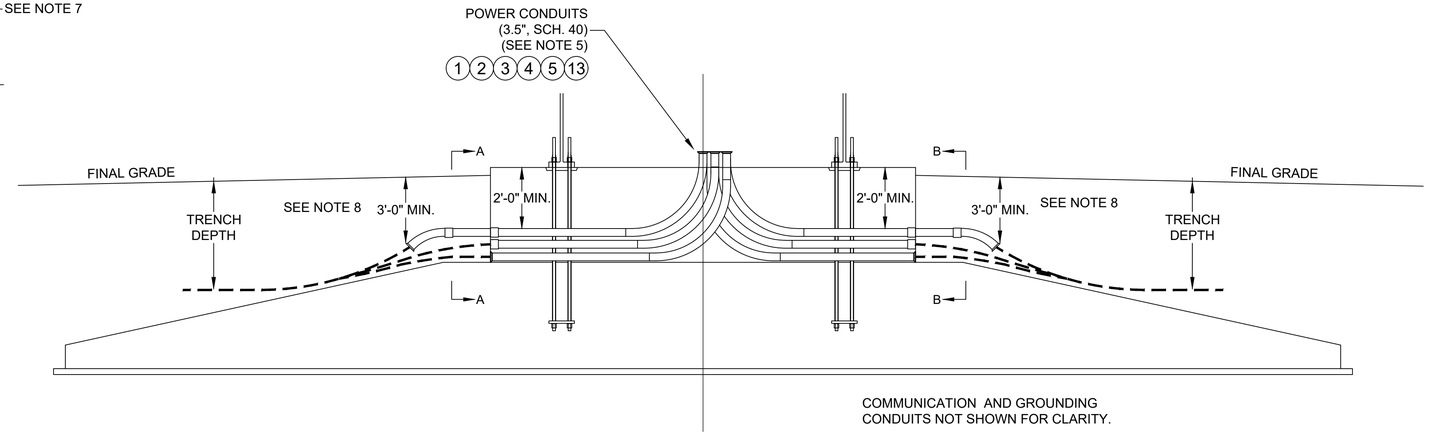
ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION
1	80	FT	3.5", SCH. 40 CONDUIT
2	6	EA	3.5", SCH. 40, 90° ELBOW, 36" RADIUS
3	3	EA	3.5", SCH. 40, 11.25° ELBOW, 36" RADIUS
4	18	EA	3.5", SCH. 40, COUPLING
5	12	EA	3.5", SCH. 40, END BELL
6	40	FT	2", SCH. 40 CONDUIT
7	4	EA	2", SCH. 40, 90° ELBOW, 24" RADIUS
8	2	EA	2", SCH. 40, COUPLING
9	1(AS REQ'D)	EA	2", SCH. 40, 22.5° ELBOW
10	AS REQ'D	EA	PVC CLEANER
11	AS REQ'D	EA	PVC GLUE
12	AS REQ'D	EA	TIE WIRE
13	2(AS REQ'D)	EA	3.5", SCH. 40, 45° ELBOW, 36" RADIUS

NOTES:

1. ALL POWER CONDUITS SHALL TERMINATE WITH END BELLS ON BOTH ENDS. CONDUIT SHALL BE A MINIMUM OF 6" ABOVE THE CONCRETE INSIDE TOWER.
2. CONDUITS SHALL BE COVERED/CAPPED DURING CONSTRUCTION TO MINIMIZE THE ENTRANCE OF DEBRIS.
3. MINOR FIELD ADJUSTMENT OF CONDUIT IS ACCEPTABLE.
4. SEE FOUNDATION DRAWING PACKAGE FOR STRUCTURAL DESIGN INCLUDING REBAR.
5. CONTRACTOR TO VERIFY PHASING PRIOR TO INSTALLATION OF CABLE INTO THE CONDUIT. UPSTREAM POWER CABLES FROM SUB/TURBINE/JBOX TO ENTER THE UPSTREAM CONDUITS AT EVERY TURBINE LOCATION. DOWN STREAM POWER CABLES FROM TURBINE/JBOX EXITING TURBINE SHALL USE THE DOWNSTREAM POWER CONDUITS AT EVERY TURBINE LOCATION.
6. COORDINATE THE ORIENTATION OF THE WIND TURBINE TOWER DOOR WITH THE OWNER.
7. A THIRD 2 INCH CONDUIT IS NEEDED AT THE FOLLOWING TURBINES:

FDR 1	FDR 2	FDR 3	FDR 4	FDR 5	FDR 6
WTG 66	WTG 73	WTG 25	WTG 81	WTG 17	WTG 10
WTG 67	WTG 70	WTG 39	WTG 43	WTG 14	
WTG 51		WTG 59	WTG 41		
WTG 48			WTG 34		
			WTG 29		

8. CABLE PROTECTION REQUIRED UNTIL CABLE BURIAL DEPTH REACHES A MINIMUM OF 36 INCHES (NEC 300.50). INSTALL EXTENDED CONDUIT SWEEP PAST PEDESTAL TO MEET A CABLE BURIAL DEPTH OF 36 INCHES OR INSTALL A MINIMUM OF 4 INCH THICK 24 INCH WIDE PROTECTIVE CONCRETE CAP EXTENDING OUT TILL BURIAL DEPTH IS MET, SEE DETAIL 5.



5 WTG PEDESTAL SECTION PLAN

NOT TO SCALE, NOT A TRUE SECTION VIEW

MERRICOURT
WIND PROJECT

DICKEY AND MCINTOSH COUNTIES,
NORTH DAKOTA

Rev.	Date	Description	By
A	06/06/2019	60% SUBMITTAL	CM
B	07/18/2019	90% SUBMITTAL	CM
0	08/28/2019	ISSUED FOR CONSTRUCTION	CM
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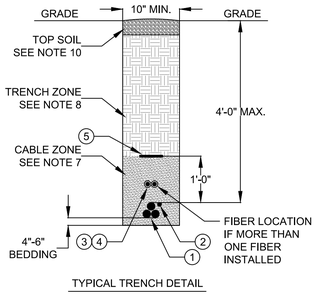
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM
WTG CONDUIT PLAN

DWG #: MCW-COL-D2

REVISION: 1

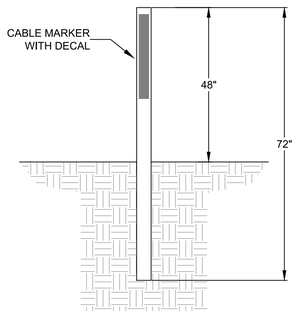


TYPICAL TRENCH DETAIL

ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION	MANUFACTURER (OR EQUAL)
1	SEE ONE LINE	FT	1/0 AWG AL, 35KV, TRXLPE, 100% INSULATION, 8-#14 ROUND CONCENTRIC, XLPE JACKET	SOUTHWIRE
	SEE ONE LINE	FT	4/0 AWG AL, 35KV, TRXLPE, 100% INSULATION, 12-#14 ROUND CONCENTRIC, XLPE JACKET	SOUTHWIRE
	SEE ONE LINE	FT	500 MCM AL, 35KV, TRXLPE, 100% INSULATION, 12-#12 ROUND CONCENTRIC, XLPE JACKET	SOUTHWIRE
	SEE ONE LINE	FT	750 MCM AL, 35KV, TRXLPE, 100% INSULATION, 14-#14 ROUND CONCENTRIC, XLPE JACKET	SOUTHWIRE
	SEE ONE LINE	FT	1000 MCM AL, 35KV, TRXLPE, 100% INSULATION, 12-#12 ROUND CONCENTRIC, XLPE JACKET	SOUTHWIRE
	SEE ONE LINE	FT	1250 MCM AL, 35KV, TRXLPE, 100% INSULATION, 15-#12 ROUND CONCENTRIC, XLPE JACKET	SOUTHWIRE
2	SEE ONE LINE	FT	7-#8 COPPERCLAD STEEL (40% CONDUCTIVITY)	AWG
3	SEE ONE LINE	FT	12-STRAND SINGLE MODE FIBER	WTEC
4	SEE ONE LINE	FT	FIBER INNERDUCT, 1.5", SDR 13.5	DURALINE
5	SEE ONE LINE	FT	6" CABLE WARNING TAPE, RED, NON-DETECTABLE	3M

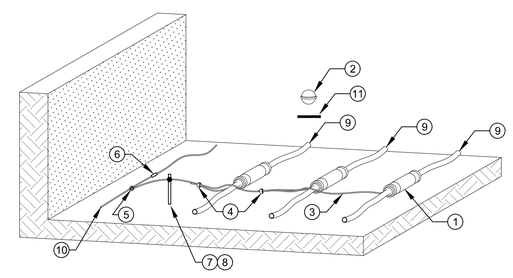
NOTES:
1. THE 35KV CABLE SHALL BE INSTALLED AND MAINTAIN A TRIANGULAR CONFIGURATION. CONTRACTOR SHALL USE CABLE TIES AS NEEDED TO ENSURE TREFOIL FORMATION OF CABLE. CABLE SHALL BE INSTALLED 4 FEET FROM GRADE.
2. FIBER OPTIC CABLE AND/OR DUCT SHALL NOT CONTAIN ANY METAL COMPONENT IF TRENCHED JOINTLY WITH POWER CABLE.
3. IF NOTES 1 & 2 ARE MET, THE FIBER CABLE, TRENCH GROUND, AND 35KV CABLES DO NOT REQUIRE DELIBERATE SEPARATION WHEN FIBER OPTIC CABLE IS IN INNERDUCT.
4. TRENCHING IN OF CABLE IN SOIL CONTAINING ROCK OR OTHER SOLID MATERIAL SHOULD BE DONE IN SUCH A MANNER THAT THE SOLID MATERIAL SHALL NOT DAMAGE THE CABLE, EITHER DURING THE TRENCHING OPERATION, BACKFILLING, OR AFTERWARD.
5. THE DESIGN OF THE CABLE TRENCHING EQUIPMENT AND THE TRENCHING IN OPERATION SHOULD BE SUCH THAT THE CABLE SHALL NOT BE DAMAGED BY BENDING, SIDEWALL PRESSURE, OR EXCESSIVE CABLE TENSION.
6. PROPER CARE SHALL BE TAKEN TO PROTECT THE CABLES FROM DAMAGE DUE TO DEBRIS IN THE TRENCH. INSPECT THE SPOIL PILE AND THE BOTTOM OF TRENCH FOR ROCK AND DEBRIS AND REMOVE ANY LARGE/SHARP ROCKS AND/OR LARGE/SHARP DEBRIS THAT MAY CAUSE DAMAGE TO THE CABLE. 4 TO 6 INCHES OF BEDDING SHALL BE PLACED IN BOTTOM OF TRENCH.
7. CABLE ZONE - NATIVE MATERIAL, SCREENED AND FREE OF FOREIGN MATERIAL, DEBRIS, ORGANIC MATERIAL, SHARP OBJECTS, AND ROCKS GREATER THAN 3/8 INCH. ONE LIFT COMPACTED TO 85% STANDARD PROCTOR DENSITY OR BETTER.
8. TRENCH ZONE - COMPACTED (85% OR BETTER), NATIVE BACKFILL, SCREENED AND FREE OF FOREIGN MATERIAL, DEBRIS, ORGANIC MATERIAL, AND ROCKS GREATER THAN 4 INCHES.
9. A MINIMUM SEPARATION OF 25 FEET IS REQUIRED BETWEEN PARALLEL CIRCUIT RUNS EXCEPT WHERE NOTED ELSEWHERE ON THE DRAWINGS.
10. STRIP, STOCKPILE, AND REPLACE TOPSOIL IF REQUIRED BY LANDOWNER. DO NOT MIX TOPSOIL WITH SUB SOIL.

1 TRENCH DETAILS
NOT TO SCALE



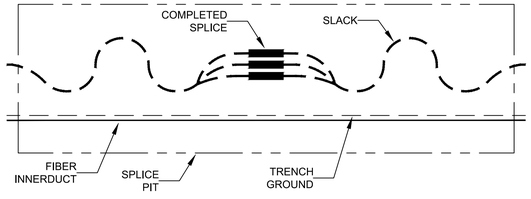
NOTES:
1. INSTALL CABLE ROUTE MARKERS IN INTERVALS OF NOT MORE THAN 500 FEET, AT ALL ROAD CROSSINGS, UTILITY CROSSINGS, WETLAND CROSSINGS AND AT CHANGES IN DIRECTION. DO NOT INSTALL IN THE MIDDLE OF A FARMED FIELD.

2 CABLE MARKER DETAIL
NOT TO SCALE



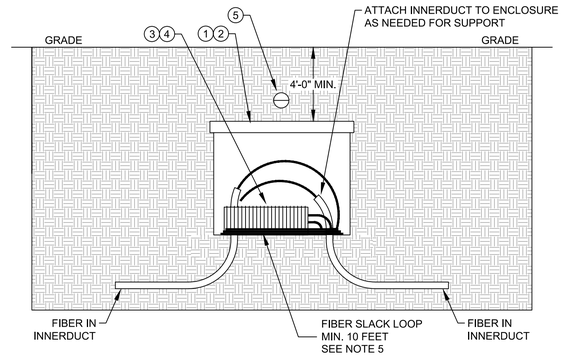
ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART NUMBER (OR EQUAL)
1	3	EA	CABLE SPLICE KIT, 35KV, SHEARBOLT	3M	-----
2	1	EA	EMS BALL MARKER	3M	80611161144
3	15	FT	#2 SOLID BARE COPPER	SOUTHWIRE	-----
4	2	EA	CONNECTOR, #2 CU TO #2 CU	BURNDY	YGHC26C26
5	1	EA	CONNECTOR, #2 CU TO TRENCH GROUND	BURNDY	YGHC26C26
6	1	EA	TRENCH GROUND TO TRENCH GROUND	BURNDY	YGHS25
7	1	EA	CONNECTOR, #2 CU TO GROUND ROD	BURNDY	YGHC29C26
8	1	EA	5/8" X 10' COPPERBONDED GROUND ROD	ERITECH	615803
9	-----	-----	35KV CABLE	-----	-----
10	-----	-----	TRENCH GROUND	-----	-----
11	-----	-----	WARNING TAPE	-----	-----

NOTES:
1. CABLES TO BE LAID SLACK IN HORIZONTAL ARRANGEMENT WITH A MINIMUM OF 7.5 INCHES OF SEPARATION.
2. SEAL #2 SOLID BARE COPPER WITHIN SPLICE (IN MASTIC) BEFORE INSTALLING COLD SHRINK COVER.
3. GPS LOCATES SHALL BE TAKEN AT ALL UNDERGROUND CABLE SPLICE LOCATIONS.
4. PLACE MARKER BALL 24-30 INCHES BELOW SURFACE.
5. SPLICE KITS SHALL BE INSTALLED PER THE MANUFACTURER'S INSTRUCTIONS BY QUALIFIED PERSONNEL.
6. WARNING TAPE SHALL BE PLACED 12 INCHES ABOVE CABLES.
7. FIBER OPTIC DUCT SHALL BE PLACED NEAR TRENCH GROUND, FIBER DUCT NOT SHOWN FOR CLARITY.
8. SPLICE KIT MANUFACTURER TO INCLUDE CONCENTRIC TO CONCENTRIC CONNECTOR AND CONCENTRIC TO #2 SOLID BARE COPPER CONNECTOR.
9. COMPACT SPLICE PIT TO 85% STANDARD PROCTOR DENSITY OR BETTER WHEN INSTALLATION IS COMPLETE.
10. SUPPLY ENOUGH SLACK WITHIN THE SPLICE PIT THAT PROVIDES FOR A MINIMUM OF TWO ADDITIONAL SPLICES.
11. GROUND ROD MUST GO AT LEAST 8 FEET INTO UNDISTURBED SOIL. IF DENSE SOIL OR ROCK IS ENCOUNTERED DURING VERTICAL GROUND ROD INSTALLATION THEN CONTRACTOR MAY INSTALL GROUND ROD AT 45 DEGREE ANGLE. IF GROUND ROD IS STILL UNABLE TO BE INSTALLED THEN CONTRACTOR MAY INSTALL HORIZONTALLY INTO EXCAVATION WALL OR LAY GROUND ROD WITHIN TRENCH.



CABLE SIZE	MIN. BENDING RADIUS (12X OUTER DIAMETER)
1250 MCM	30 INCHES
1000 MCM	28 INCHES
750 MCM	26 INCHES
500 MCM	24 INCHES
4/0 AWG	19 INCHES
1/0 AWG	18 INCHES

3 CABLE SPLICE DETAIL
NOT TO SCALE



ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART NUMBER (OR EQUAL)
1	1	EA	HANDHOLE ENCLOSURE	QUAZITE	PG2436BG30
2	1	EA	HANDHOLE ENCLOSURE COVER	QUAZITE	PG2436HG00
3	1	EA	SPLICE CLOSURE	PLP	8006671
4	1	EA	SPLICE TRAY	PLP	80806033
5	1	EA	EMS BALL MARKER	3M	80611161144

NOTES:
1. GPS LOCATES SHALL BE TAKEN AT ALL FIBER SPLICE LOCATIONS. EMA MARKER BALL SHALL BE PLACED PER MANUFACTURER'S INSTRUCTIONS.
2. VERIFY HANDHOLE ENCLOSURE LOCATION WITH OWNER PRIOR TO INSTALLATION.
3. INSTALL HANDHOLE ENCLOSURE AND FIBER SPLICES PER MANUFACTURER'S INSTRUCTIONS.
4. FIBER SPLICE HANDHOLE ENCLOSURE SHALL BE BURIED AT TRENCH DEPTH IF NOT LOCATED NEAR A WIND TURBINE, ROAD, OR JUNCTION BOX.
5. THE LONG TERM MINIMUM BENDING RADIUS SHALL BE 10X THE OUTER DIAMETER UNLESS OTHERWISE SPECIFIED BY THE MANUFACTURER.

4 FIBER SPLICE HANDHOLE ENCLOSURE DETAIL
NOT TO SCALE

MERRICOURT
WIND PROJECT
DICKEY AND MCINTOSH COUNTIES,
NORTH DAKOTA

eDF renewable energy

WANZEK
a MasTec company

Rev.	Date	Description	By
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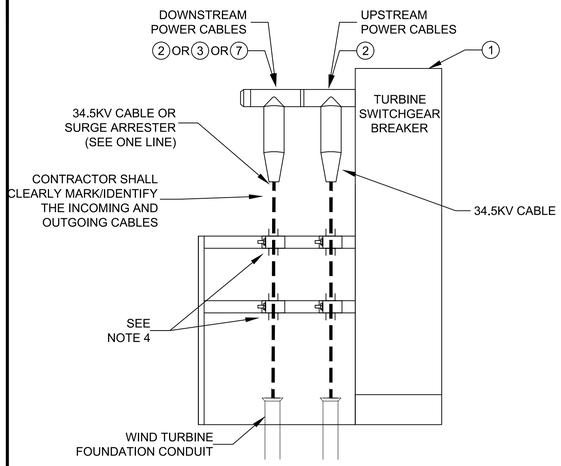
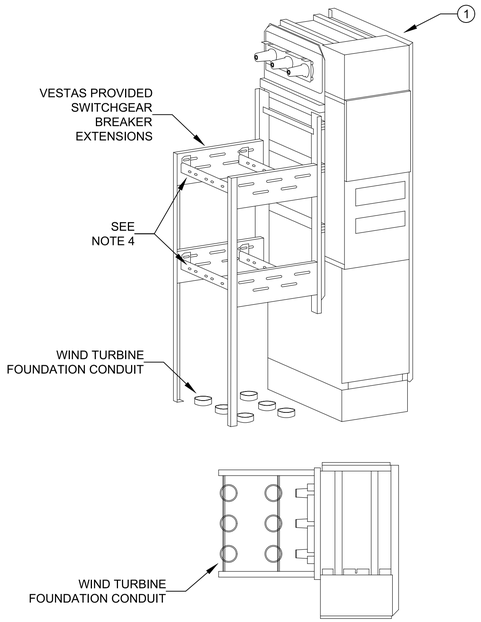
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM TRENCH, CABLE MARKER, CABLE SPLICE, FIBER HANDHOLE DETAILS

DWG #: MCW-COL-D3
REVISION: 1





1 WTG SWITCHGEAR DETAIL

NOT TO SCALE

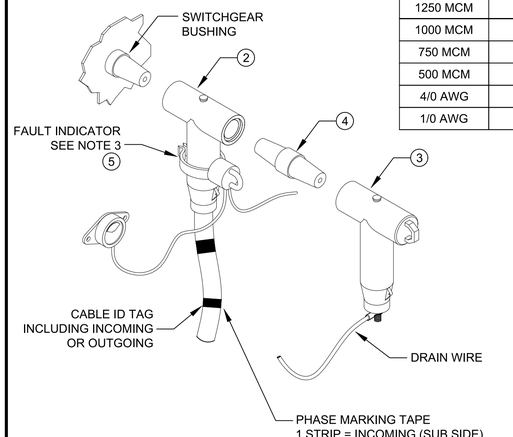
ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART NUMBER (OR EQUAL)
1	1	EA	VESTAS "BASIC" SWITCHGEAR	BY VESTAS	BY VESTAS
2	3 OR 6	EA	DEADBREAK ELBOWS, SEE ELBOW TERMINATION DETAIL	COOPER	(SEE TABLE)
3	0 OR 3	EA	SURGE ARRESTER, SEE ELBOW TERMINATION DETAIL	COOPER	DCEA638M30
4	3	EA	DEADBREAK CONNECTING PLUG, SEE ELBOW TERMINATION DETAIL	COOPER	DCP638A
5	0 OR 1	EA	FAULT INDICATOR	SEL	3TPRV1200IRDTJ6
5	0 OR 3	EA	BOL-T REDUCING TAP PLUG W/STUD (600A TO 200A)	COOPER	BLRTP638
5	0 OR 3	EA	PROTECTIVE CAP, 200A	COOPER	LPC238

NOTES:

1. INSTALL SWITCHGEAR PER THE VESTAS DOCUMENTS AND THE MANUFACTURER INSTALLATION INSTRUCTIONS.
2. CONFIRM CABLE CONNECTIONS/PHASE ROTATION WITH THE SWITCHGEAR MANUFACTURER PRIOR TO TERMINATING.
3. SEE ONE LINE FOR FAULT INDICATOR LOCATIONS. COORDINATE LOCATION OF FAULT INDICATOR REMOTE DISPLAY WITH OWNER.
4. SUPPORT CABLES USING CABLE VESTAS SUPPLIED SUSPENSION CLAMPS SO THAT THERE WILL BE NO EXCESS STRESS PLACED ON THE WTG SWITCHGEAR BUSHINGS OR T-BODIES.
5. SEAL CONDUITS WITH A CLOSED CELL FOAM APPROVED FOR ELECTRICAL APPLICATION TO KEEP OUT RODENTS, DEBRIS, AND WATER .
6. SUPPLY CABLE SLACK (S-CURVE), 15-20 FEET MINIMUM LEADING UP TO THE TURBINE PEDESTAL. SOIL COMPACTION REQUIREMENT WITHIN FOUNDATION FOOTPRINT SHALL BE A MINIMUM OF 95% STANDARD PROCTOR DENSITY AND 85% OUTSIDE OF FOUNDATION FOOTPRINT.
7. CONTRACTOR TO VERIFY PHASING PRIOR TO INSTALLATION OF CABLE INTO THE CONDUIT. UPSTREAM POWER CABLES FROM SUB/TURBINE/JBOX TO ENTER THE UPSTREAM CONDUITS AT EVERY TURBINE LOCATION. DOWN STREAM POWER CABLES FROM TURBINE/JBOX EXITING TURBINE SHALL USE THE DOWNSTREAM POWER CONDUITS AT EVERY TURBINE LOCATION.

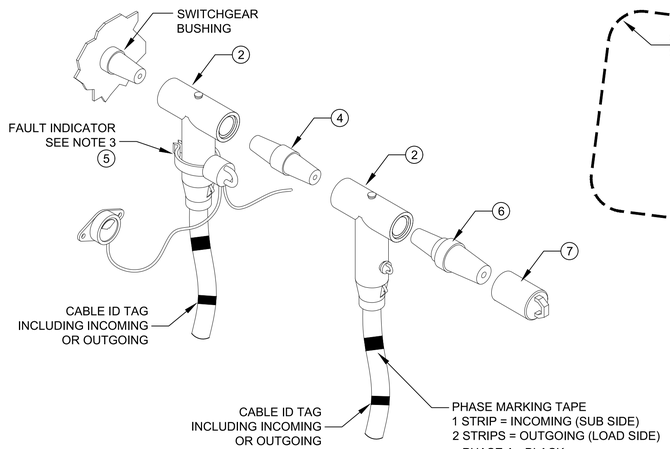
CABLE SIZE	MIN. BENDING RADIUS (12X OUTER DIAMETER)
1250 MCM	30 INCHES
1000 MCM	28 INCHES
750 MCM	26 INCHES
500 MCM	24 INCHES
4/0 AWG	19 INCHES
1/0 AWG	18 INCHES

CABLE SIZE	ITEM PART NO.
1250 MCM	BT638US6A1T
1000 MCM	BT638TS6A1T
750 MCM	BT638RS4A1T
500 MCM	BT638NS3A1T
4/0 AWG	BT638JS1A1T
1/0 AWG	BT638GS1A1T



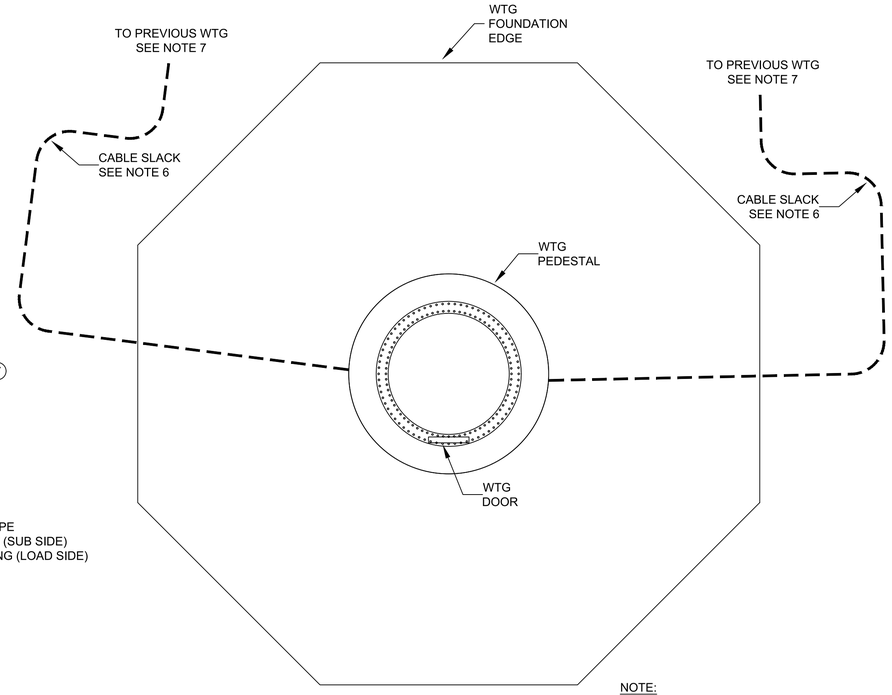
2 SURGE ARRESTER TERMINATION

NOT TO SCALE



3 ELBOW TERMINATION

NOT TO SCALE



NOTE:

1. CABLE SLACK LOCATIONS ARE SHOWN FOR INFORMATION PURPOSES ONLY AND CAN BE FIELD ADJUSTED BASED ON THE CABLE ROUTING AND SITE CONDITIONS.

4 CABLE SLACK DETAIL

NOT TO SCALE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/21/2020	ISSUED FOR RECORD	CM

RECORD DRAWING

DRAWINGS ARE BASED UPON CONSTRUCTION CONTRACTOR REDLINES WHICH HAVE NOT BEEN FIELD VERIFIED BY ENGINEER OF RECORD.

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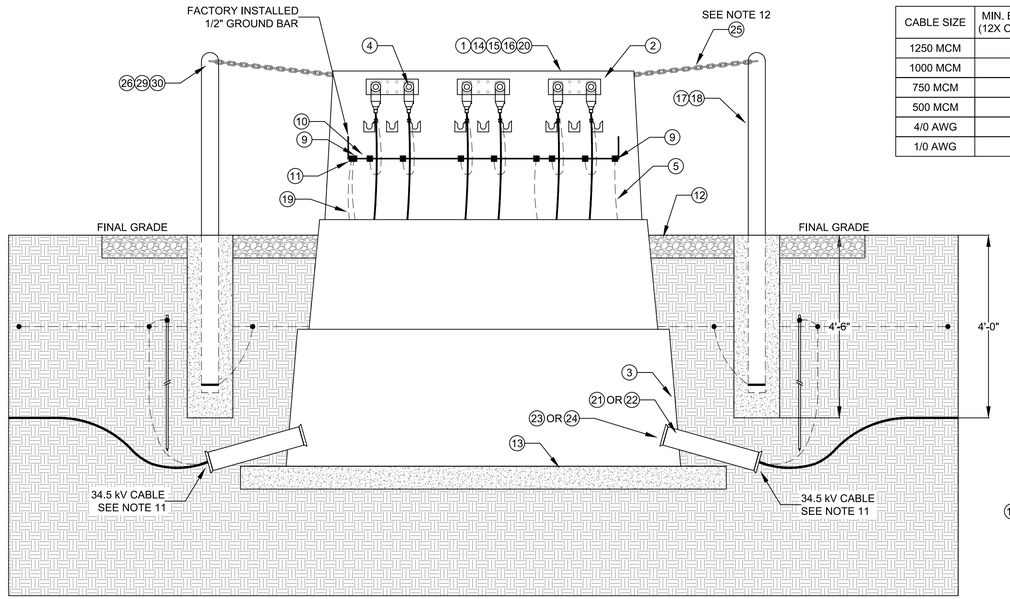
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM WIND TURBINE SWITCHGEAR DETIALS

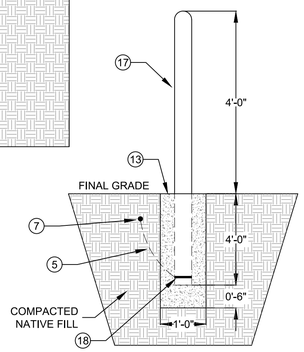
DWG #: MCW-COL-D4

REVISION: 1

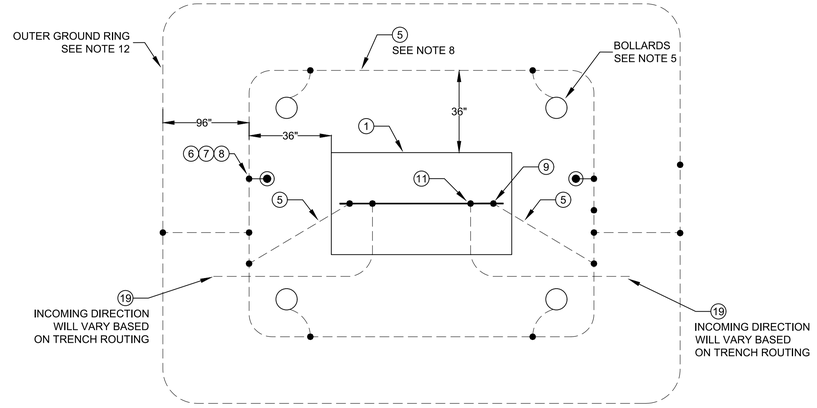


CABLE SIZE	MIN. BENDING RADIUS (12X OUTER DIAMETER)
1250 MCM	30 INCHES
1000 MCM	28 INCHES
750 MCM	26 INCHES
500 MCM	24 INCHES
4/0 AWG	19 INCHES
1/0 AWG	18 INCHES

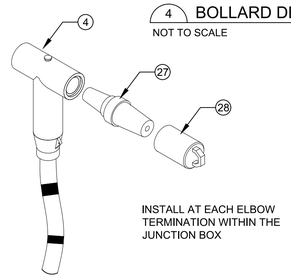
1 TYPICAL JUNCTION BOX DETAIL
NOT TO SCALE



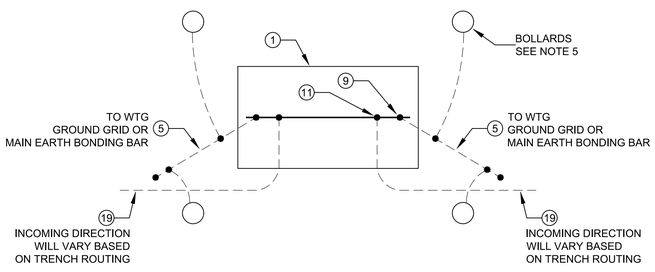
4 BOLLARD DETAIL
NOT TO SCALE



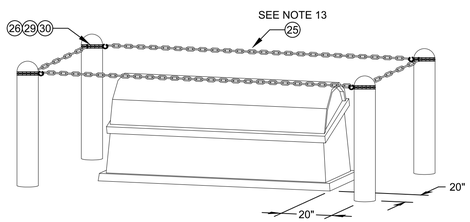
2 JUNCTION BOX GROUNDING NOT ADJACENT TO WTG
NOT TO SCALE



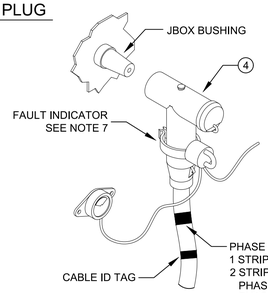
5 LOADBREAK REDUCING TAP PLUG
NOT TO SCALE



3 JUNCTION BOX GROUNDING ADJACENT TO WTG
NOT TO SCALE



6 BOLLARD PLACEMENT
NOT TO SCALE



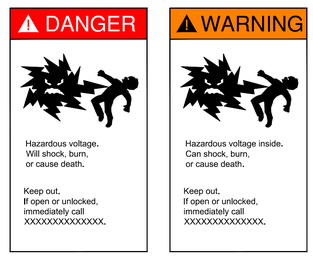
CABLE SIZE	ITEM (4) PART NO.
1250 MCM	BT638US6A1T
1000 MCM	BT638TS6A1T
750 MCM	BT638RS4A1T
500 MCM	BT638NS3A1T
4/0 AWG	BT638JS1A1T
1/0 AWG	BT638GS1A1T

7 ELBOW TERMINATION
NOT TO SCALE

ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART NUMBER (OR EQUAL)
1	1	EA	JUNCTION BOX, 35KV, 2-WAY, WITH GROUNDING	HIGHLINE PRODUCTS	FSC7953DGJXXXB
2	3	EA	JUNCTION (200KV BIL), 2-WAY, 600 AMP, 35KV	COOPER	DJ638A2U
3	1	EA	JUNCTION BOX GROUND SLEEVE, 36" EXTENSION	HIGHLINE PRODUCTS	FGS924236DRSC7
4	6	EA	DEADBREAK ELBOWS (200KV BIL), SEE ELBOW TERMINATION DETAIL	COOPER	(SEE TABLE)
5	125	FT	#4/0 BARE STRANDED COPPER	SOUTHWIRE	-----
6	0 OR 2	EA	CONNECTOR, #4/0 CU TO GROUND ROD	BURNDY	YGHC29C29
7	6 OR 12	EA	CONNECTOR, #4/0 CU TO #4/0 CU OR 250 CU	BURNDY	YGHC29C29
8	0 OR 2	EA	5/8" X 10' COPPERBONDED GROUND ROD	ERITECH	615803
9	2	EA	CONNECTOR, #4/0 CU TO JBOX GROUNDING	BURNDY	YGHC29C29
10	6	EA	CONNECTOR, CONCENTRICS TO JBOX GROUNDING	BURNDY	-----
11	2	EA	CONNECTOR, TRENCH GROUND TO JBOX GROUNDING	BURNDY	YGHC29C26
12	AS REQ'D	YD	CRUSHED ROCK, 3000 OHM-M MINIMUM	-----	-----
13	AS REQ'D	YD	CONCRETE	-----	-----
14	AS REQ'D	EA	JUNCTION BOX LABEL, MIN. 1 INCH LETTERS ON FRONT COVER	-----	-----
15	1	EA	DANGER LABEL, 4.5" X 8", INSTALL ON INSIDE OF JBOX	-----	-----
16	1	EA	WARNING LABEL, 4.5" X 8", INSTALL ON OUTSIDE OF JBOX	-----	-----
17	4	EA	4" SCH. 40 STEEL, 8' LONG, FILLED WITH CONCRETE, YELLOW	-----	-----
18	4	EA	PIPE GROUNDING	BURNDY	GAR3905-BU
19	-----	-----	TRENCH GROUND	-----	-----
20	1	EA	ARC FLASH LABEL, 4" X 6", INSTALL ON OUTSIDE OF JBOX	-----	-----
21	AS REQ'D	EA	6" SCH. 40 PVC, 45° ELBOW, 36" RADIUS (1/0AWG-750MCM)	CARLON	UA7FR
22	AS REQ'D	EA	8" SCH. 40 PVC, 45° ELBOW, 36" RADIUS (1000MCM-1250MCM)	CARLON	UA7FT
23	AS REQ'D	EA	6" SCH. 40 PVC, BELL END	CARLON	E997R
24	AS REQ'D	EA	8" SCH. 40 PVC, BELL END	CARLON	E997T
25	AS REQ'D	FT	3/8" GALVANIZED CHAIN	-----	-----
26	AS REQ'D	EA	3/8" GALVANIZED EYEBOLT AND MOUNTING HARDWARE	-----	-----
27	6	EA	BOL-T REDUCING TAP PLUG W/STUD (600A TO 200A)	COOPER	BLRTP638
28	6	EA	PROTECTIVE CAP, 200A	COOPER	LPC238
29	AS REQ'D	EA	3/8" CONNECTING LINK	-----	-----
30	AS REQ'D	EA	3/8" MISSING LINK	-----	-----

NOTES:
1. COORDINATE PLACEMENT OF JUNCTION BOXES WITH OWNER PRIOR TO INSTALLATION.
2. OVER-EXCAVATE AND PLACE 6 INCHES OF LEAN CONCRETE SLURRY ON COMPACTED NATIVE SOIL. CONCRETE SLURRY SHALL INCASE THE GROUND SLEEVE FLANGE.
3. JUNCTION BOX FINISHED GRADE SHALL BE 6 INCHES BELOW LOCKING SYSTEM ON JUNCTION BOX.
4. BACKFILL (NATIVE) AROUND JUNCTION BOX IN 12 INCH LIFTS AND COMPACT TO 85% STANDARD PROCTOR DENSITY OR 95% IF WITHIN TURBINE FOUNDATION FOOTPRINT.
5. VERIFY BOLLARD LOCATION PRIOR TO INSTALLATION. BOLLARDS SHALL BE IN PLACE PRIOR TO THE CABLE BEING ENERGIZED. INSTALL ALL BOLLARDS AT THE SAME FINISHED HEIGHT.
6. FIBER CABLES SHALL NOT ENTER THE POWER CABLE JUNCTION BOXES.
7. SEE ONE LINE FOR FAULT INDICATOR LOCATIONS. COORDINATE LOCATION OF FAULT INDICATOR REMOTE DISPLAY WITH OWNER.
8. INSTALL JUNCTION BOX GROUND RING AT ALL JUNCTION BOXES NOT ADJACENT TO WIND TURBINE. FOR LOCATIONS ADJACENT TO THE WIND TURBINE INSTALL TWO GROUND TAILS AND CONNECT TO WTG GROUND GRID OR MAIN EARTH BONDING BAR.
9. GROUND GRID SHALL BE PLACED 24 INCHES BELOW FINISHED GRADE.
10. DANGER AND WARNING SIGNS SHALL CONFORM TO ANSI Z535. COORDINATE WITH OWNER FOR CONTACT INFORMATION TO BE PLACED ON THE SIGNS.
11. SUPPLY A CABLE S-CURVE LEADING UP TO THE JUNCTION BOX THAT PROVIDES ENOUGH CABLE SLACK FOR A MINIMUM OF TWO ADDITIONAL TERMINATIONS (MINIMUM 35 FEET).
12. AN ADDITIONAL OUTER GROUND RING APPROXIMATELY 8 FEET OUTSIDE THE INNER GROUND RING AT A DEPTH OF 2.5 FEET IS REQUIRED AT ALL JUNCTION BOX LOCATIONS.
13. ALL JUNCTION BOXES SHALL HAVE SIX INCH THICK CRUSHED ROCK (MINIMUM 3,000 OHM/M) FROM JUNCTION BOX EXTENDING OUT FIVE FEET PAST METALLIC OBJECTS (BOLLARDS/CHAINS).

EXTERIOR SIGN (20)
4" X 6"



INTERIOR SIGN (15)
4.5" X 8"

EXTERIOR SIGN (16)
4.5" X 8"

8 EQUIPMENT SIGNAGE DETAIL
NOT TO SCALE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	03/05/2020	ISSUED FOR CONSTRUCTION	CM
2	05/28/2020	UPDATED CHAIN SIZE	CM
3	12/21/2020	ISSUED FOR RECORD	CM

RECORD DRAWING
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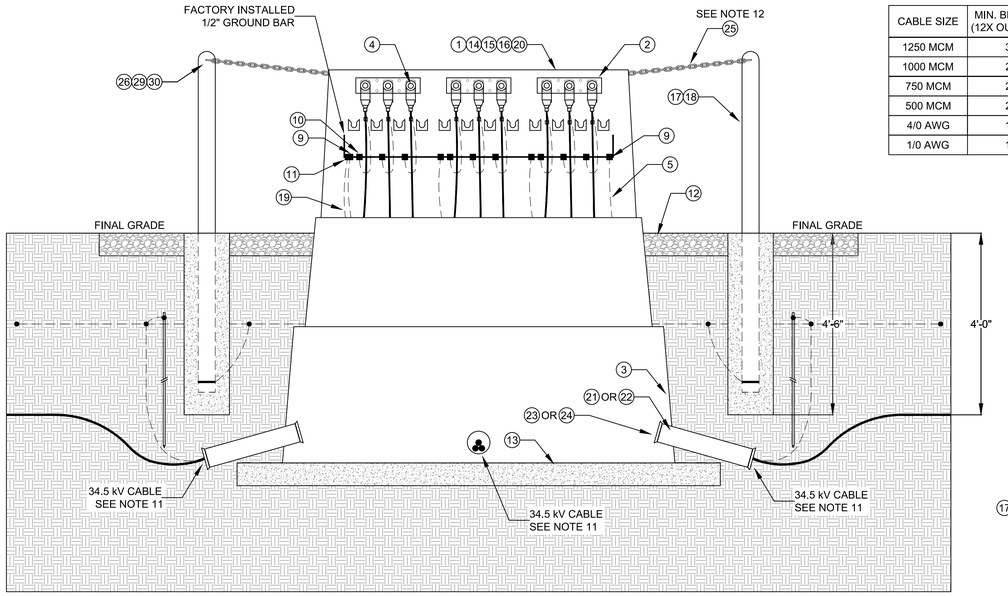
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

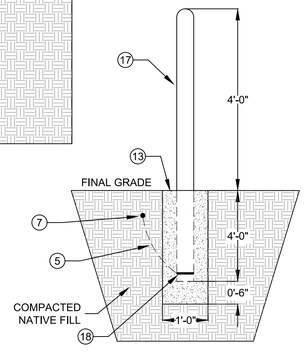
COLLECTION SYSTEM JUNCTION BOX (2-WAY) DETAILS

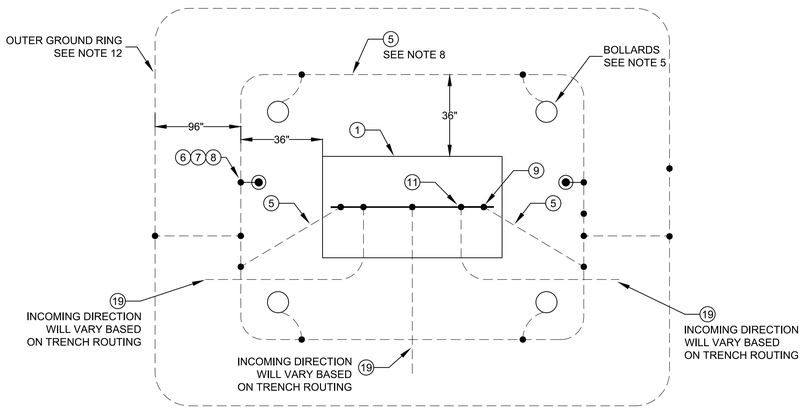
DWG #: MCW-COL-D5
REVISION: 3



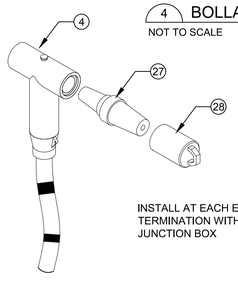
CABLE SIZE	MIN. BENDING RADIUS (12X OUTER DIAMETER)
1250 MCM	30 INCHES
1000 MCM	28 INCHES
750 MCM	26 INCHES
500 MCM	24 INCHES
4/0 AWG	19 INCHES
1/0 AWG	18 INCHES

1 TYPICAL JUNCTION BOX DETAIL
NOT TO SCALE





2 JUNCTION BOX GROUNDING NOT ADJACENT TO WTG
NOT TO SCALE



4 BOLLARD DETAIL
NOT TO SCALE

5 LOADBREAK REDUCING TAP PLUG
NOT TO SCALE

ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART NUMBER (OR EQUAL)
1	1	EA	JUNCTION BOX, 35KV, 2-WAY, WITH GROUNDING	HIGHLINE PRODUCTS	FSC7953DGJXXXB
2	3	EA	JUNCTION (200KV BIL), 2-WAY, 600 AMP, 35KV	COOPER	DJ638A3U
3	1	EA	JUNCTION BOX GROUND SLEEVE, 36" EXTENSION	HIGHLINE PRODUCTS	FGS924236DRSC7
4	9	EA	DEADBREAK ELBOWS (200KV BIL), SEE ELBOW TERMINATION DETAIL	COOPER	(SEE TABLE)
5	125	FT	#4/0 BARE STRANDED COPPER	SOUTHWIRE	-----
6	0 OR 2	EA	CONNECTOR, #4/0 CU TO GROUND ROD	BURNDY	YGHC29C29
7	6 OR 12	EA	CONNECTOR, #4/0 CU TO #4/0 CU OR 250 CU	BURNDY	YGHC29C29
8	0 OR 2	EA	5/8" X 10' COPPERBONDED GROUND ROD	ERITECH	615803
9	2	EA	CONNECTOR, #4/0 CU TO JBOX GROUNDING	BURNDY	YGHC29C29
10	9	EA	CONNECTOR, CONCENTRICS TO JBOX GROUNDING	BURNDY	-----
11	3	EA	CONNECTOR, TRENCH GROUND TO JBOX GROUNDING	BURNDY	YGHC29C26
12	AS REQ'D	YD	CRUSHED ROCK, 3000 OHM-M MINIMUM	-----	-----
13	AS REQ'D	YD	CONCRETE	-----	-----
14	AS REQ'D	EA	JUNCTION BOX LABEL, MIN. 1 INCH LETTERS ON FRONT COVER	-----	-----
15	1	EA	DANGER LABEL, 4.5" X 8", INSTALL ON INSIDE OF JBOX	-----	-----
16	1	EA	WARNING LABEL, 4.5" X 8", INSTALL ON OUTSIDE OF JBOX	-----	-----
17	4	EA	4" SCH. 40 STEEL, 8' LONG, FILLED WITH CONCRETE, YELLOW	-----	-----
18	4	EA	PIPE GROUNDING	BURNDY	GAR3905-BU
19	-----	-----	TRENCH GROUND	-----	-----
20	1	EA	ARC FLASH LABEL, 4" X 6", INSTALL ON OUTSIDE OF JBOX	-----	-----
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22	AS REQ'D	EA	8" SCH. 40 PVC, 45° ELBOW, 36" RADIUS (1000MCM-1250MCM)	CARLON	UA7FT
23	AS REQ'D	EA	6" SCH. 40 PVC, BELL END	CARLON	E997R
24	AS REQ'D	EA	8" SCH. 40 PVC, BELL END	CARLON	E997T
25	AS REQ'D	FT	3/8" GALVANIZED CHAIN	-----	-----
26	AS REQ'D	EA	3/8" GALVANIZED EYEBOLT AND MOUNTING HARDWARE	-----	-----
27	9	EA	BOL-T REDUCING TAP PLUG W/STUD (600A TO 200A)	COOPER	BLRTP638
28	9	EA	PROTECTIVE CAP, 200A	COOPER	LPC238
29	AS REQ'D	EA	3/8" CONNECTING LINK	-----	-----
30	AS REQ'D	EA	3/8" MISSING LINK	-----	-----

NOTES:
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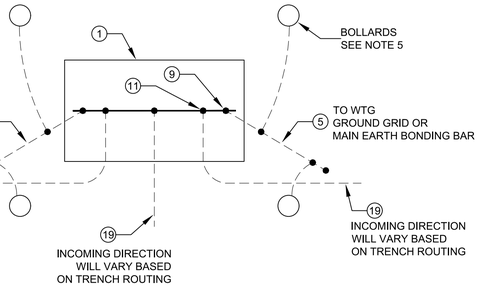
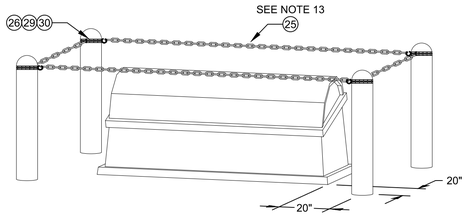
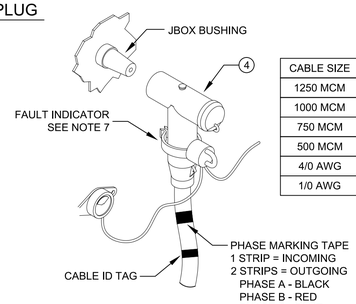
13. ALL JUNCTION BOXES SHALL HAVE SIX INCH THICK CRUSHED ROCK (MINIMUM 3,000 OHM/M) FROM JUNCTION BOX EXTENDING OUT FIVE FEET PAST METALLIC OBJECTS (BOLLARDS/CHAINS).



3 JUNCTION BOX GROUNDING ADJACENT TO WTG



6 BOLLARD PLACEMENT
NOT TO SCALE



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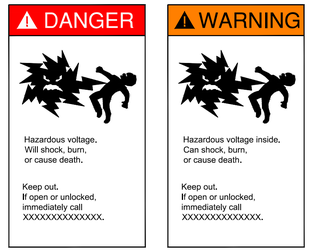
750 MCM	BT638RS4A1T
500 MCM	BT638NS3A1T
4/0 AWG	BT638JS1A1T
1/0 AWG	BT638GS1A1T

6 ELBOW TERMINATION
NOT TO SCALE

EXTERIOR SIGN (20)
4" X 6"



INTERIOR SIGN (15)
4.5" X 8"

EXTERIOR SIGN (16)
4.5" X 8"

8 EQUIPMENT SIGNAGE DETAIL
NOT TO SCALE

MERRICOURT
WIND PROJECT
DICKEY AND MCINTOSH COUNTIES,
NORTH DAKOTA

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Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM
JUNCTION BOX (3-WAY)
DETAILS

DWG #: MCW-COL-D6
REVISION: 3

CABLE SIZE	MIN. BENDING RADIUS (12X OUTER DIAMETER)
1250 MCM	30 INCHES
1000 MCM	28 INCHES
750 MCM	26 INCHES
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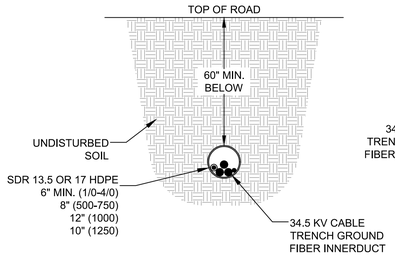
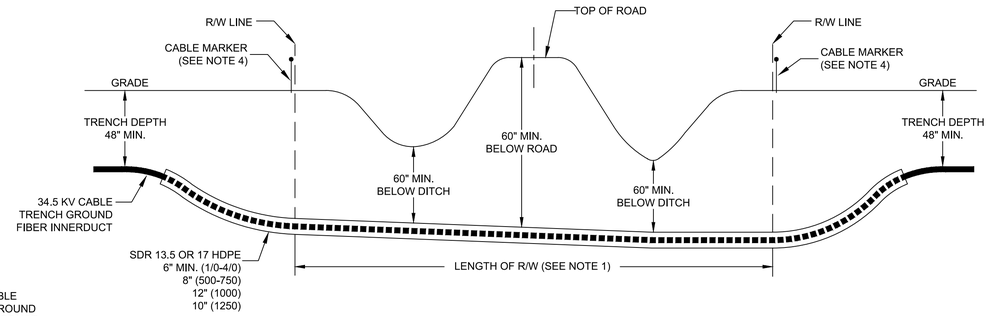
1/0 AWG	18 INCHES



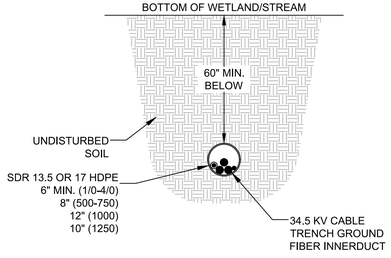


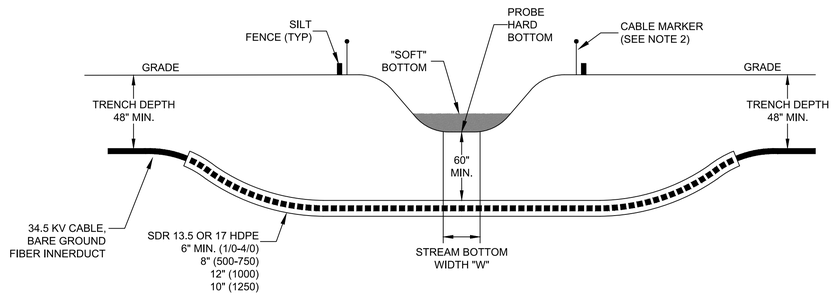
1 TYPICAL ROAD CROSSING DETAIL

NOT TO SCALE

NOTES:
1. MAINTAIN MINIMUM DEPTH BELOW EACH SIDE OF DITCH WHILE WITHIN RIGHT-OF-WAY.
2. DO NOT EXCEED THE MINIMUM BENDING RADIUS OF THE CABLE. REFER TO TABLE. CABLE SHALL BE IN TREFOIL FORMATION.
3. ALL CROSSINGS SHALL BE A MINIMUM OF 5 FEET BELOW HARD BOTTOM OF DITCH.
4. PLACE CABLE MARKER AT EDGE OF RIGHT-OF-WAY. SEE CABLE MARKER DETAIL. GPS MARKER BALLS SHALL BE AT BORE PIPE ENDS.
5. SEE SITE SPECIFIC SWPPP FOR MORE INFORMATION.
6. CONTACT APPROPRIATE LOCAL AUTHORITIES PRIOR TO BEGINNING OF BORING.
7. GPS COORDINATES SHALL BE RECORDED.
8. REAM OR CHAMFER BORE PIPE ENDS OR USE BELL ENDS.
9. SEE APPROVED ROAD CROSSING PERMITS FOR MORE INFORMATION.
10. USE PROPER PULLING LUBRICANT DURING CABLE INSTALLATION.
11. PARALLEL FEEDER BORE SEPARATION SHALL BE A MINIMUM OF 50 FEET UNLESS NOTED ELSEWHERE ON THE DRAWINGS.
12. MAXIMUM BORE DEPTH FROM GRADE SHALL BE 8 FEET.

CABLE SIZE	MIN. BENDING RADIUS (12X OUTER DIAMETER)
1250 MCM	30 INCHES
1000 MCM	28 INCHES
750 MCM	26 INCHES
500 MCM	24 INCHES
4/0 AWG	19 INCHES
1/0 AWG	18 INCHES



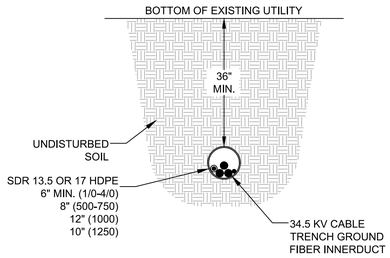


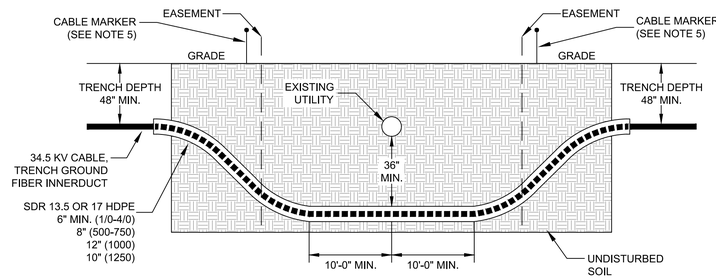
2 TYPICAL WETLAND/STREAM CROSSING DETAIL

NOT TO SCALE

NOTES:
1. DO NOT EXCEED THE MINIMUM BENDING RADIUS OF THE CABLE. REFER TO TABLE. CABLE SHALL BE IN TREFOIL FORMATION.
2. PLACE CABLE MARKER AT EDGE OF RIGHT-OF-WAY. SEE CABLE MARKER DETAIL. GPS MARKER BALLS SHALL BE AT BORE PIPE ENDS.
3. ALL CROSSINGS SHALL BE A MINIMUM OF 60 INCHES BELOW BOTTOM OF STREAM.
4. SEE SITE SPECIFIC SWPPP FOR MORE INFORMATION.
5. CONTACT APPROPRIATE LOCAL AUTHORITIES PRIOR TO BEGINNING OF BORING.
6. REAM OR CHAMFER BORE PIPE ENDS OR USE BELL ENDS.
7. GPS COORDINATES SHALL BE RECORDED.
8. USE PROPER PULLING LUBRICANT DURING CABLE INSTALLATION.
9. PARALLEL FEEDER BORE SEPARATION SHALL BE A MINIMUM OF 50 FEET UNLESS NOTED ELSEWHERE ON THE DRAWINGS.
10. MAXIMUM BORE DEPTH FROM GRADE SHALL BE 8 FEET.

CABLE SIZE	MIN. BENDING RADIUS (12X OUTER DIAMETER)
1250 MCM	30 INCHES
1000 MCM	28 INCHES
750 MCM	26 INCHES
500 MCM	24 INCHES
4/0 AWG	19 INCHES
1/0 AWG	18 INCHES

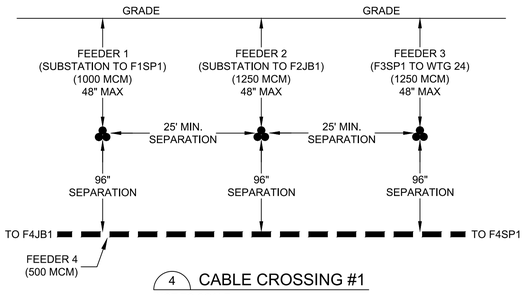




3 UTILITY CROSSING DETAIL

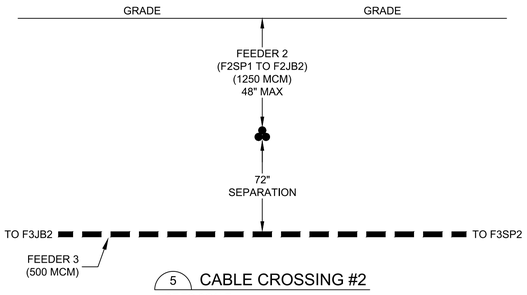
NOT TO SCALE

NOTES:
1. DO NOT EXCEED THE MINIMUM BENDING RADIUS OF THE CABLE. REFER TO TABLE. CABLE SHALL BE IN TREFOIL FORMATION.
2. GPS COORDINATES SHALL BE RECORDED.
3. ALL CROSSINGS SHALL BE A MINIMUM OF 36 INCHES BELOW BOTTOM OF UTILITY.
4. VERIFY CROSSING AGREEMENT REQUIREMENTS OF THE OWNER.
5. PLACE CABLE MARKER AT EDGE OF RIGHT-OF-WAY. SEE CABLE MARKER DETAIL. GPS MARKER BALLS SHALL BE AT BORE PIPE ENDS.
6. POTHOLE EXISTING UTILITY DEPTH USING HYDRO-VACUUM IF REQUIRED.
7. REAM OR CHAMFER BORE PIPE ENDS OR USE BELL ENDS.
8. PARALLEL FEEDER BORE SEPARATION SHALL BE A MINIMUM OF 50 FEET UNLESS NOTED ELSEWHERE ON THE DRAWINGS.
9. MAXIMUM BORE DEPTH FROM GRADE SHALL BE 8 FEET.
10. MAINTAIN MINIMUM DEPTH BELOW THE UTILITY. MINIMUM DEPTH SHALL EXTEND A MINIMUM OF 10 FEET ON EACH SIDE OF THE UTILITY . THE ENTIRE UTILITY EASEMENT SHALL BE BORED.



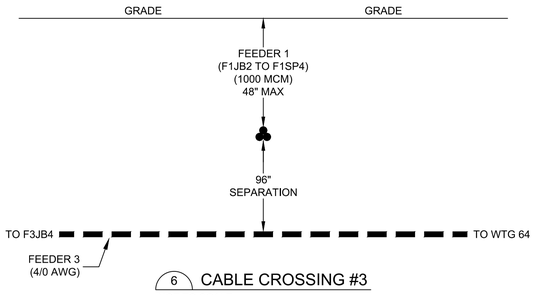
4 CABLE CROSSING #1

NOT TO SCALE



5 CABLE CROSSING #2

NOT TO SCALE



6 CABLE CROSSING #3

NOT TO SCALE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	08/28/2019	ISSUED FOR CONSTRUCTION	CM
1	09/13/2019	IFC UPDATES	CM
2	12/21/2020	ISSUED FOR RECORD	CM

RECORD DRAWING

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Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM CABLE CROSSING DETAILS

DWG #: MCW-COL-D7

REVISION: 2

CROSSING ID	CROSSING TYPE	FEEDER	FROM	TO	CABLE SIZE	BORE PIPE SIZE
100	ROAD (65TH AVE SE) & UG UTILITY	1	F1SP3	F1JB2	1000 MCM	12"
101	WETLAND/STREAM	1	F1SP4	F1SP5	1000 MCM	12"
102	ROAD (65TH AVE SE)	1	WTG 67	F1JB5	500 MCM	8"
200	ROAD (65TH AVE SE) & UG UTILITY	2	WTG 36	WTG 57	1000 MCM	12"
201	ROAD (67TH AVE SE)	2	F2JB4	WTG 75	1/0 AWG	6"
202	ROAD (PRIVATE) & UG UTILITY	2	WTG 71	WTG 55	1/0 AWG	6"
300	ROAD (65TH AVE SE) & UG UTILITY	3	F3SP2	F3JB3	500 MCM	8"
301	WETLAND/STREAM	3	F3JB4	WTG 64	4/0 AWG	6"
302	ROAD (65TH AVE SE) & UG UTILITY	3	WTG 63	WTG 46	1/0 AWG	6"
303	WETLAND/STREAM	3	WTG 61	WTG 62	1/0 AWG	6"
400	WETLAND/STREAM	4	WTG 34	WTG 80	4/0 AWG	6"
401	WETLAND/STREAM	4	F4JB4	F4SP4	4/0 AWG	6"
402	WETLAND/STREAM	4	F4SP4	F4JB5	4/0 AWG	6"
403	WETLAND/STREAM	4	F4JB5	WTG 30	1/0 AWG	6"
404	ROAD (88TH ST SE) & UG UTILITY	4	WTG 31	WTG 32	1/0 AWG	6"
405	WETLAND/STREAM	4	F4JB1	F4SP1	500 MCM	8"
406	WETLAND/STREAM	4	F4SP1	F4SP2	500 MCM	8"
407	ROAD (91ST ST SE) & UG UTILITY	4	F4SP2	F4JB2	500 MCM	8"
408	WETLAND/STREAM	4	F4JB2	WTG 45	4/0 AWG	6"
409	ROAD (63RD AVE SE)	4	F4JB2	WTG 43	4/0 AWG	6"
410	WETLAND/STREAM	4	WTG 43	F4JB3	4/0 AWG	6"
500	WETLAND/STREAM	5	WTG 23	F5SP1	1000 MCM	12"
501	WETLAND/STREAM	5	F5SP1	F5JB1	1000 MCM	12"
502	ROAD (62ND AVE SE) & UG UTILITY	5	WTG 16	WTG 3	4/0 AWG	6"
503	ROAD (62ND AVE SE) & UG UTILITY	5	WTG 14	F5SP2	4/0 AWG	6"
504	WETLAND/STREAM	5	F5SP2	WTG 1	4/0 AWG	6"
505	WETLAND/STREAM	5	F5JB2	WTG 28	4/0 AWG	6"
506	ROAD (88TH ST SE) & UG UTILITY	5	WTG 27	WTG 26	1/0 AWG	6"
600	ROAD (62ND AVE SE) & UG UTILITY	6	WTG 19	WTG 7	500 MCM	8"
1000	ROAD (65TH AVE SE) & UG UTILITY	O&M	WTG 31	O&M BLDG	12-STRAND	6"

MERRICOURT
WIND PROJECT

DICKEY AND MCINTOSH COUNTIES,
NORTH DAKOTA

eDF renewable energy

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a MasTec company

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	08/28/2019	ISSUED FOR CONSTRUCTION	CM
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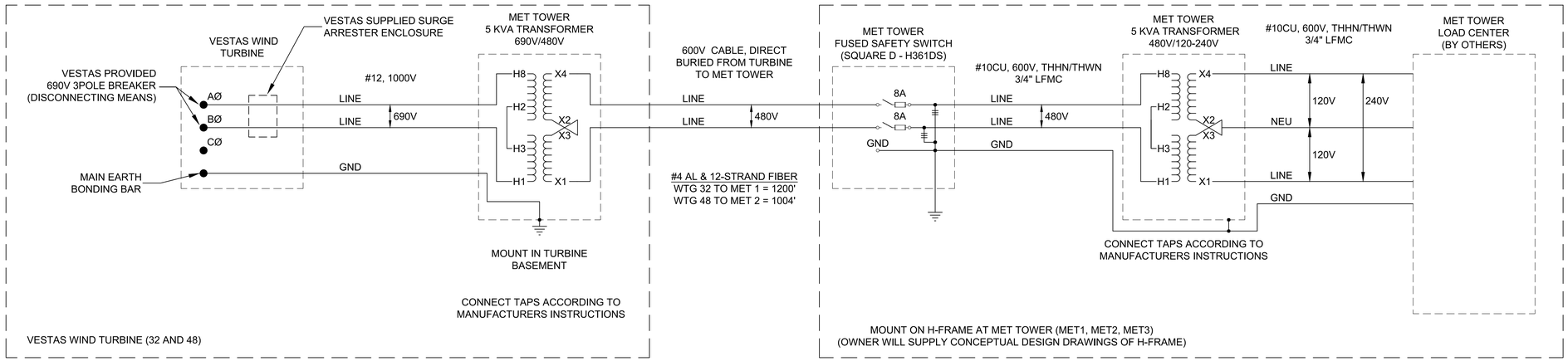
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

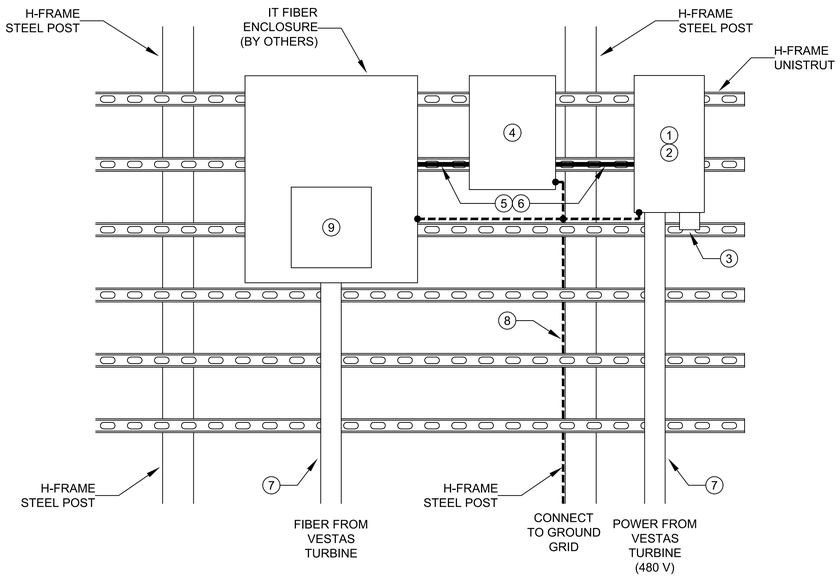
COLLECTION SYSTEM
CABLE CROSSING
SCHEDULE

DWG #: MCW-COL-D8
REVISION: 3



1 MET TOWER CABLE AND GROUNDING DETAIL

NOT TO SCALE



ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION
1	1	EA	FUSED SAFETY SWITCH,NEMA 4 ENCLOSURE, 600V, 30A (SQUARE D H361DS)
2	2	EA	SAFETY SWITCH FUSE (8A)
3	1	EA	SURGE PROTECTION DEVICE, 650V MCOV AC PHASE TO GROUND MAX (COOPER ASZ650B31)
4	1	EA	5KVA, 1Ø, 480V/120-240V, DRY TYPE, NEMA 3R ENCLOSURE
5	AS REQ'D	FT	600V RATED CONDUCTORS, #10 CU, THHN/THWN
6	AS REQ'D	LOT	3/4" LFMC, FITTINGS, AND ACCESSORIES
7	AS REQ'D	LOT	2", SCH. 80 CONDUIT, FITTINGS, & ACCESSORIES
8	AS REQ'D	FT	BARE GROUND, 7-#8 COPPERCLAD STEEL (40% CONDUCTIVITY) & CONNECTIONS
9	1	EA	WALL MOUNT FIBER ENCLOSURE & ACCESSORIES, PANDUIT FWME2

2 MET TOWER H-FRAME ELECTRICAL EQUIPMENT

NOT TO SCALE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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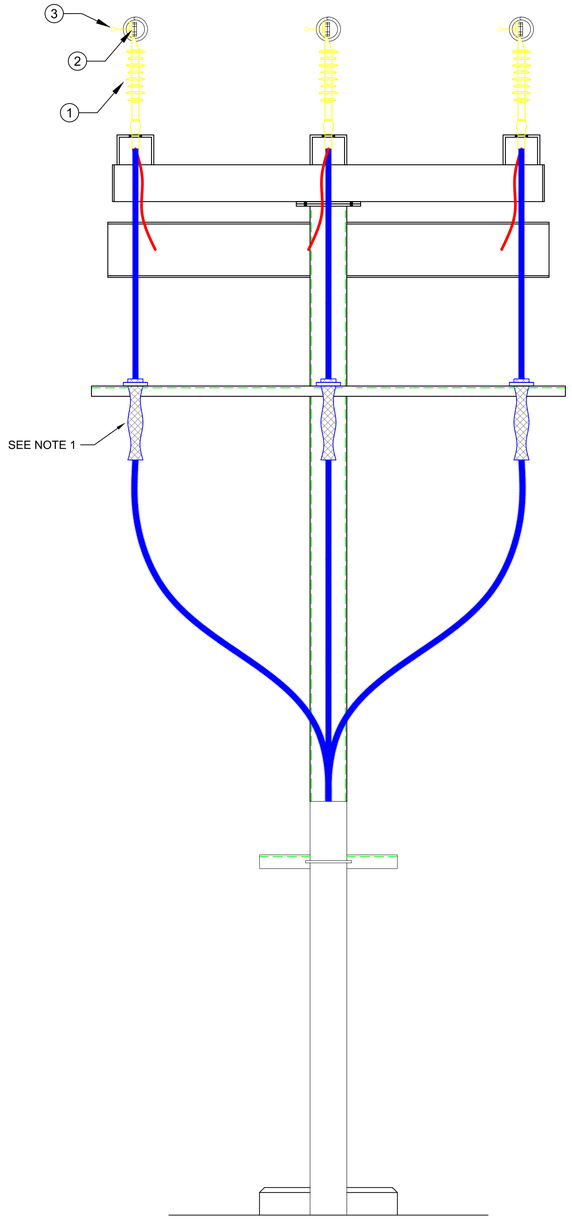
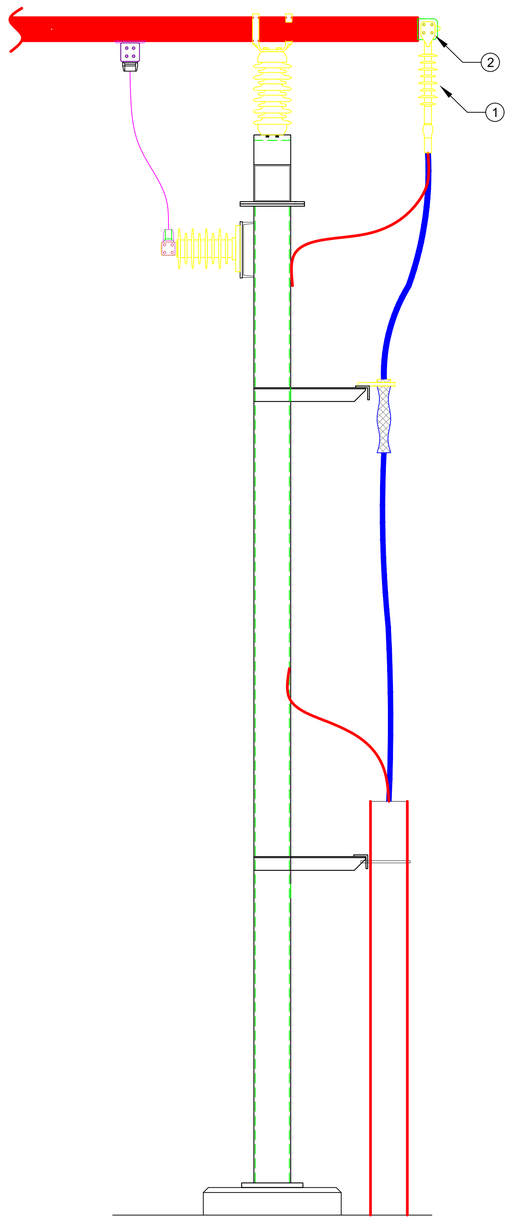
Project Number: 17.02016

COLLECTION SYSTEM MET TOWER DETAILS

DWG #: MCW-COL-D9

REVISION: 1





ITEM	ESTIMATED QUANTITY	UNIT	DESCRIPTION	MANUFACTURER	PART NUMBER
1	18	EA	750MCM-1250MCM TERMINATION KIT	3M	7666-S-8
2	18	EA	TERMINAL PAD, SHEAR BOLT, (1) 1000-1250 MCM TO 2-HOLE PAD (USED WITH ITEM 1)	3M	QL2-A-1000-1250
3	18	EA	34.5KV GROUNDING STUD TO ALUM. BUS, BOLTED OVER 4-HOLE PAD, 90 DEGREES	SEFCOR	WTS-4B-90

NOTES:
1. INSTALL CABLE SUPPORTS SO THAT THERE WILL BE NO EXCESS STRESS PLACED ON THE TERMINATIONS.
2. SEAL WITH CLOSED CELL FOAM APPROPRIATE FOR ELECTRICAL EXTERIOR USE AND UV EXPOSURE.
3. SUBSTATION RISER STRUCTURE AND DETAILS ARE SHOWN FOR REFERENCE ONLY. COORDINATE SUBSTATION TERMINATION WITH SUBSTATION CONTRACTOR.

MERRICOURT
WIND PROJECT

DICKEY AND MCINTOSH COUNTIES,
NORTH DAKOTA

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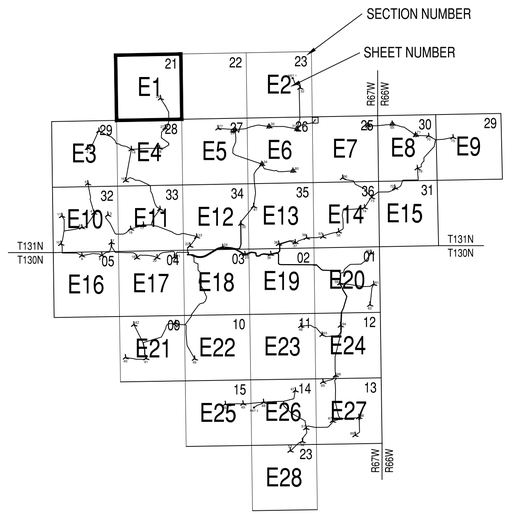
Project Number: 17.02016

COLLECTION SYSTEM SUBSTATION TERMINATION DETAILS

DWG #: MCW-COL-D10
REVISION: 1

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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GENERAL NOTES:

1. CALL FOR LOCATES PRIOR TO CONSTRUCTION.
2. DO NOT PLACE JUNCTION BOXES IN LOW AREAS THAT MAY FLOOD OR COLLECT WATER. COORDINATE JUNCTION BOX LOCATIONS WITH OWNER.

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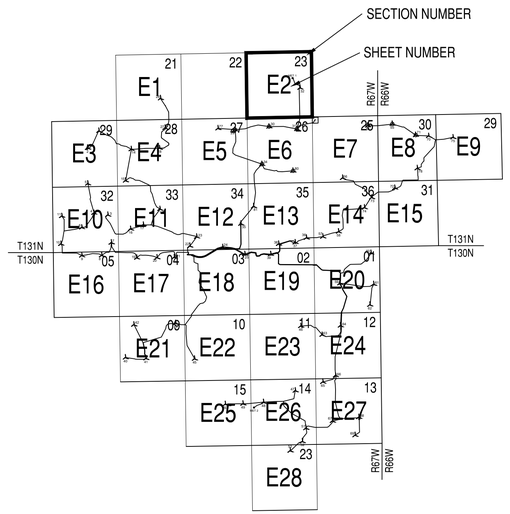
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 21, T131N, R67W

DWG #: MCW-COL-E1

REVISION: 1

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- FEEDER 1
- FEEDER 2
- FEEDER 3
- FEEDER 4
- FEEDER 5
- FEEDER 6
- FIBER TO O&M
- MET TOWER
- JUNCTION BOX
- UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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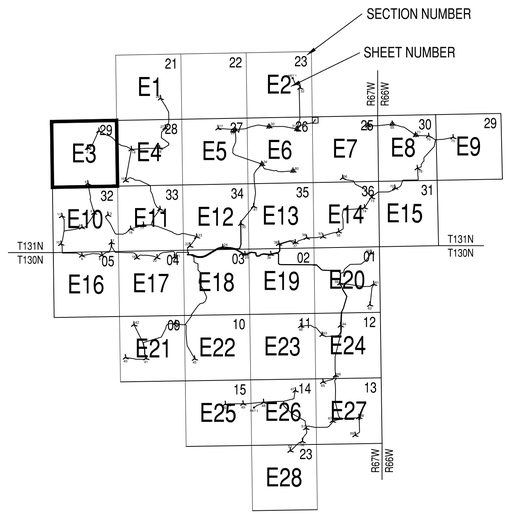
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 23, T131N, R67W

DWG #: MCW-COL-E2

REVISION: 1

KEY MAP



LEGEND

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- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
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- F6 FEEDER 6
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- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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GENERAL NOTES:

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2. DO NOT PLACE JUNCTION BOXES IN LOW AREAS THAT MAY FLOOD OR COLLECT WATER. COORDINATE JUNCTION BOX LOCATIONS WITH OWNER.

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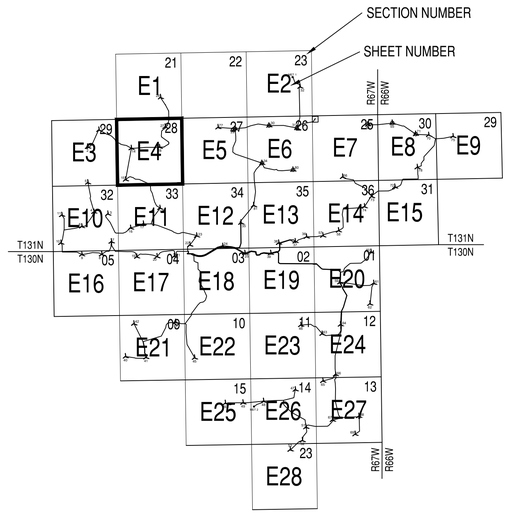
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 29, T131N, R67W

DWG #: MCW-COL-E3

REVISION: 1

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

GENERAL NOTES:

1. CALL FOR LOCATES PRIOR TO CONSTRUCTION.
2. DO NOT PLACE JUNCTION BOXES IN LOW AREAS THAT MAY FLOOD OR COLLECT WATER. COORDINATE JUNCTION BOX LOCATIONS WITH OWNER.

RECORD DRAWING

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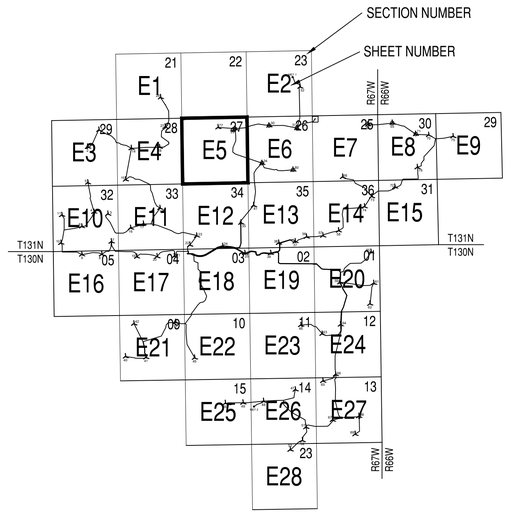
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 28, T131N, R67W

DWG #: MCW-COL-E4

REVISION: 2

KEY MAP



LEGEND

- XX — VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- XX — VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 — FEEDER 1
- F2 — FEEDER 2
- F3 — FEEDER 3
- F4 — FEEDER 4
- F5 — FEEDER 5
- F6 — FEEDER 6
- O&M — FIBER TO O&M
- MET TOWER
- FXJBX — JUNCTION BOX
- UT — UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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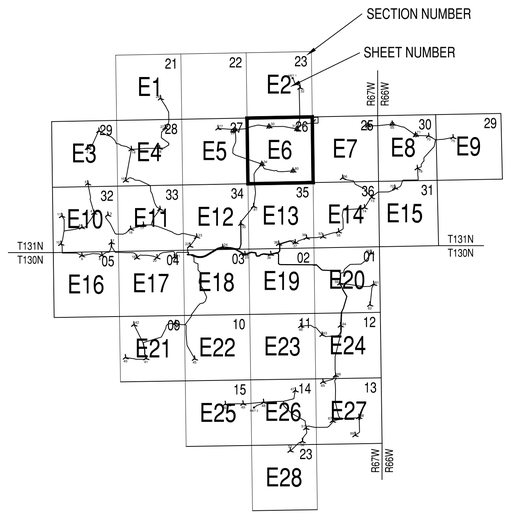
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 27, T131N, R67W

DWG #: MCW-COL-E5

REVISION: 1

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- FEEDER 1
- FEEDER 2
- FEEDER 3
- FEEDER 4
- FEEDER 5
- FEEDER 6
- FIBER TO O&M
- MET TOWER
- JUNCTION BOX
- UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

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2	12/21/2020	ISSUED FOR RECORD	CM

GENERAL NOTES:

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Drawn By: A. SATHER
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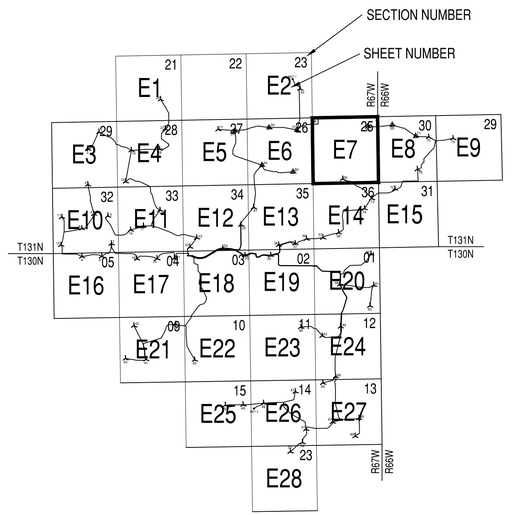
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 26, T131N, R67W

DWG #: MCW-COL-E6

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

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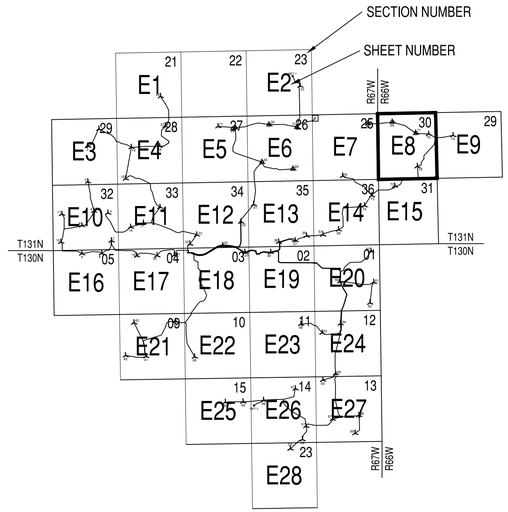
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 25, T131N, R67W

DWG #: MCW-COL-E7

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

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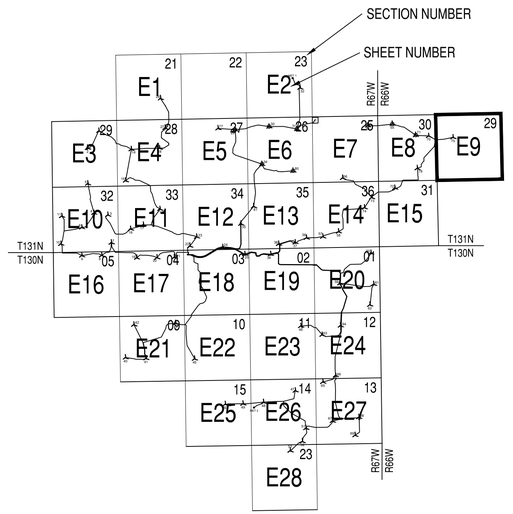
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 30, T131N, R66W

DWG #: MCW-COL-E8

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 — FEEDER 1
- F2 — FEEDER 2
- F3 — FEEDER 3
- F4 — FEEDER 4
- F5 — FEEDER 5
- F6 — FEEDER 6
- O&M — FIBER TO O&M
- MET TOWER
- FXJBX — JUNCTION BOX
- UT — UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- XSPX — CABLE SPLICE
- XFSPX — FIBER SPLICE

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1	12/21/2020	ISSUED FOR RECORD	CM

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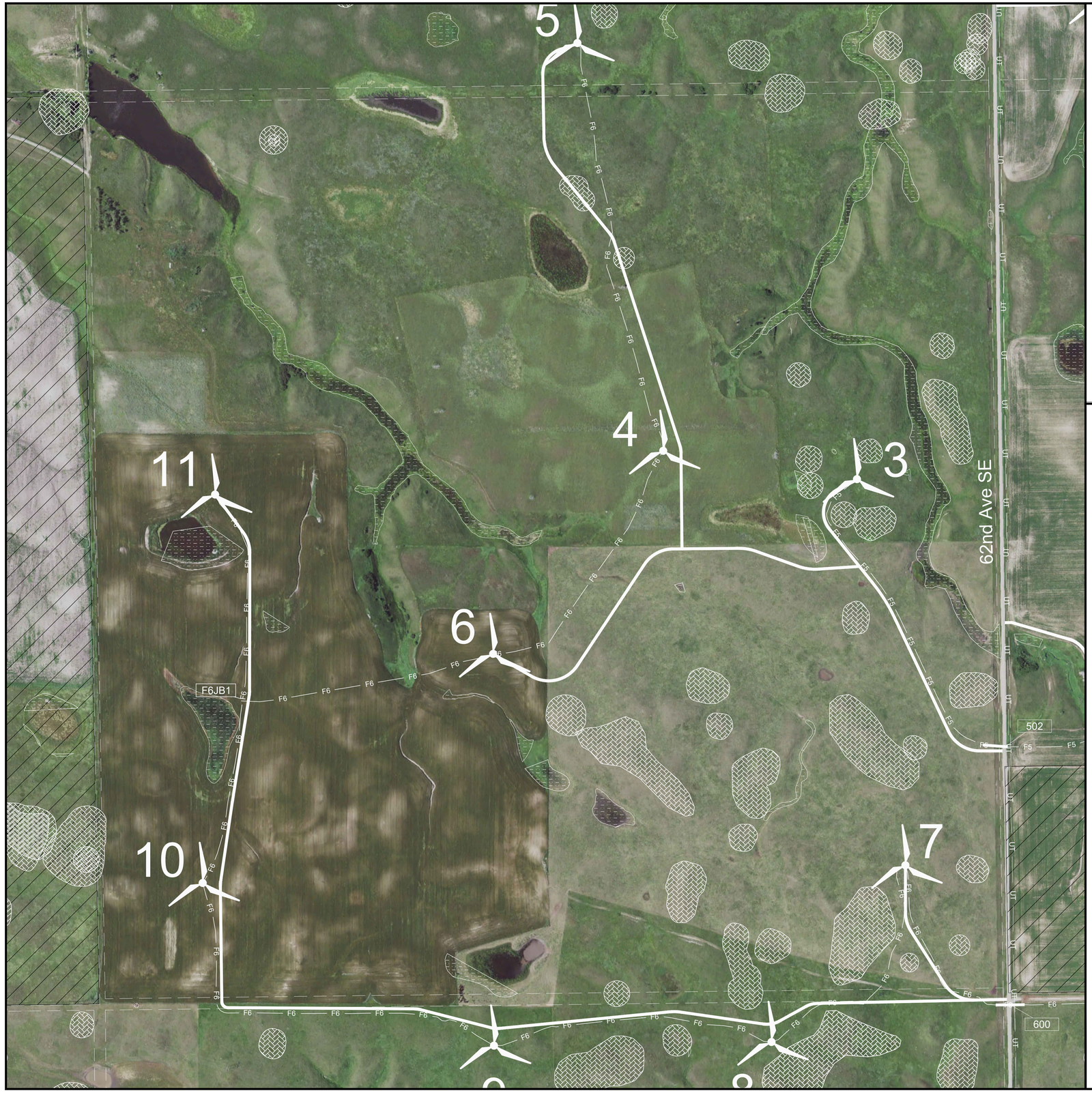
Approved By: C. MATHSON
Project Number: 17.02016

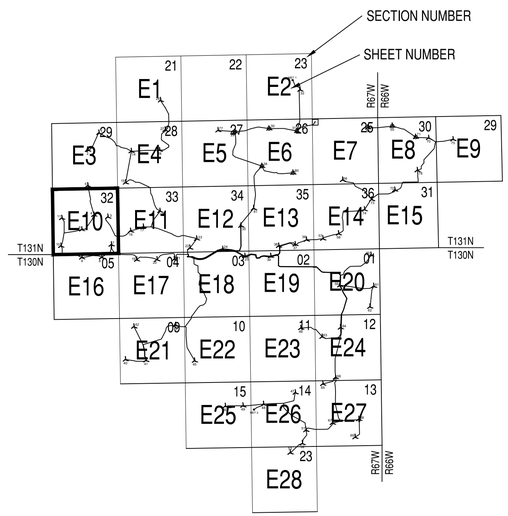
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 29, T131N, R66W

DWG #: MCW-COL-E9

REVISION: 1



KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 — FEEDER 1
- F2 — FEEDER 2
- F3 — FEEDER 3
- F4 — FEEDER 4
- F5 — FEEDER 5
- F6 — FEEDER 6
- O&M — FIBER TO O&M
- MET TOWER
- FXJBX — JUNCTION BOX
- UT — UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

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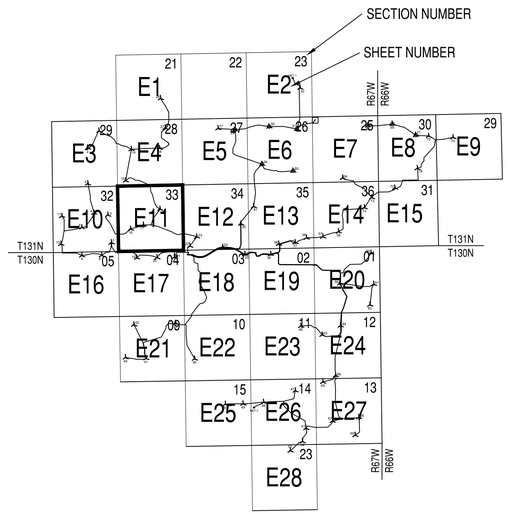
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 32, T131N, R67W

DWG #: MCW-COL-E10

REVISION: 2

KEY MAP



LEGEND

XX	VESTAS WIND TURBINE V110 MK10C - 2.0 MW
XX	VESTAS WIND TURBINE V110 MK10D - 2.0 MW
F1	FEEDER 1
F2	FEEDER 2
F3	FEEDER 3
F4	FEEDER 4
F5	FEEDER 5
F6	FEEDER 6
O&M	FIBER TO O&M
	MET TOWER
FXJBX	JUNCTION BOX
UT	UG UTILITY
	ROAD R.O.W.
	NON LEASED
	ARCHEOLOGICAL SITES
	WETLAND DELINEATION
	USFWS EASEMENTS
	BORE WITH ID (XXX)
	ACCESS ROADS
FXSPX	CABLE SPLICE
FXFSPX	FIBER SPLICE

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1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

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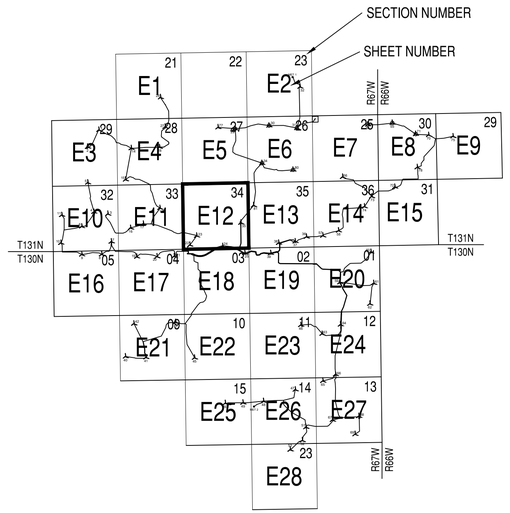
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 33, T131N, R67W

DWG #: MCW-COL-E11

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- FEEDER 1
- FEEDER 2
- FEEDER 3
- FEEDER 4
- FEEDER 5
- FEEDER 6
- FIBER TO O&M
- MET TOWER
- JUNCTION BOX
- UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
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0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

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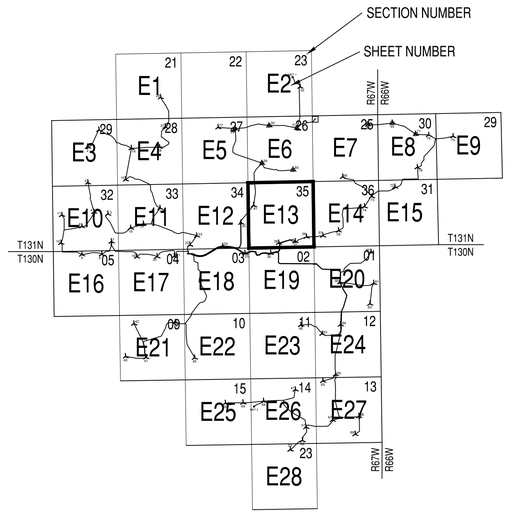
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 34, T131N, R67W

DWG #: MCW-COL-E12

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- FEEDER 1
- FEEDER 2
- FEEDER 3
- FEEDER 4
- FEEDER 5
- FEEDER 6
- FIBER TO O&M
- MET TOWER
- JUNCTION BOX
- UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

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1	12/21/2020	ISSUED FOR RECORD	CM

GENERAL NOTES:

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RECORD DRAWING

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Approved By: C. MATHSON
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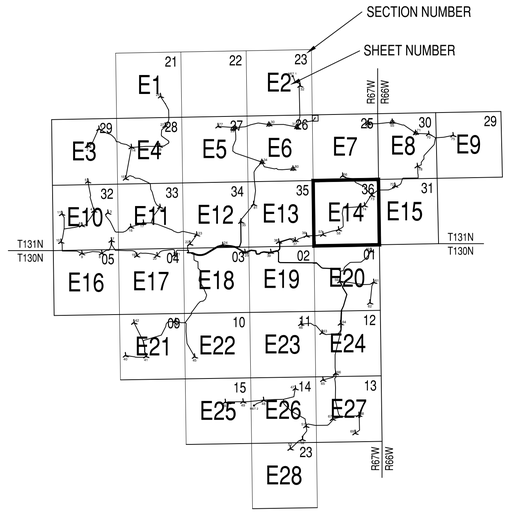
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 35, T131N, R67W

DWG #: MCW-COL-E13

REVISION: 1

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- XXSPX CABLE SPLICE
- XXFSPX FIBER SPLICE

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DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

GENERAL NOTES:

1. CALL FOR LOCATES PRIOR TO CONSTRUCTION.
2. DO NOT PLACE JUNCTION BOXES IN LOW AREAS THAT MAY FLOOD OR COLLECT WATER. COORDINATE JUNCTION BOX LOCATIONS WITH OWNER.

RECORD DRAWING

DRAWINGS ARE BASED UPON CONSTRUCTION CONTRACTOR REDLINES WHICH HAVE NOT BEEN FIELD VERIFIED BY ENGINEER OF RECORD.

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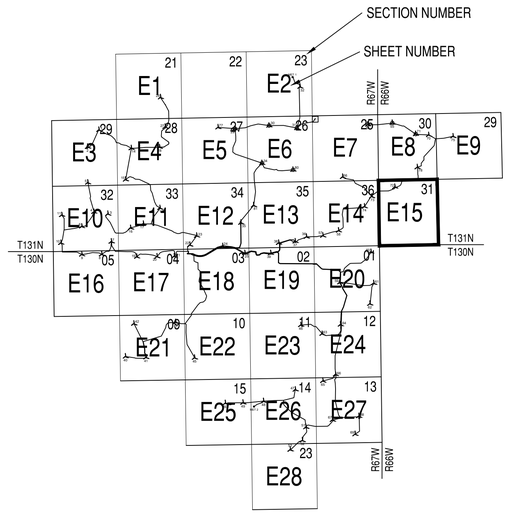
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 36, T131N, R67W

DWG #: MCW-COL-E14

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
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2	12/21/2020	ISSUED FOR RECORD	CM

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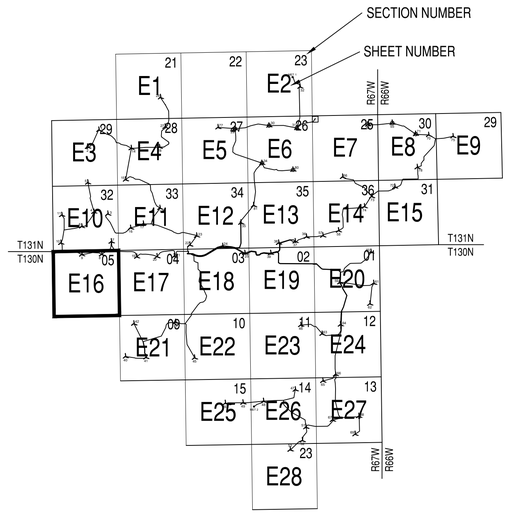
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 31, T131N, R66W

DWG #: MCW-COL-E15

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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1	12/21/2020	ISSUED FOR RECORD	CM

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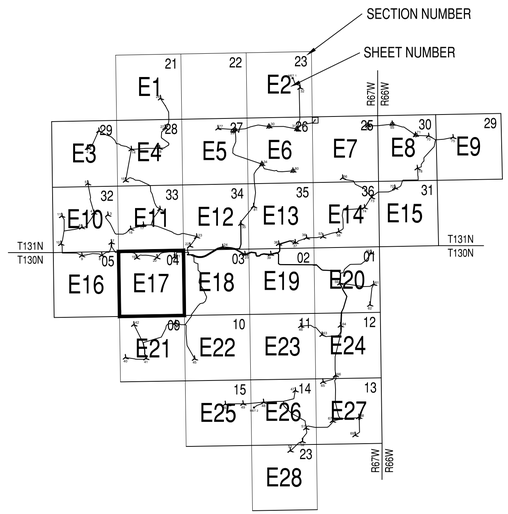
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 05, T130N, R67W

DWG #: MCW-COL-E16

REVISION: 1

KEY MAP



LEGEND

XX	VESTAS WIND TURBINE V110 MK10C - 2.0 MW
XX	VESTAS WIND TURBINE V110 MK10D - 2.0 MW
F1	FEEDER 1
F2	FEEDER 2
F3	FEEDER 3
F4	FEEDER 4
F5	FEEDER 5
F6	FEEDER 6
O&M	FIBER TO O&M
	MET TOWER
FXJBX	JUNCTION BOX
UT	UG UTILITY
	ROAD R.O.W.
	NON LEASED
	ARCHEOLOGICAL SITES
	WETLAND DELINEATION
	USFWS EASEMENTS
	BORE WITH ID (XXX)
	ACCESS ROADS
XXSPX	CABLE SPLICE
XXFSPX	FIBER SPLICE

MERRICOURT WIND PROJECT

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Design By: J. HERMANSON
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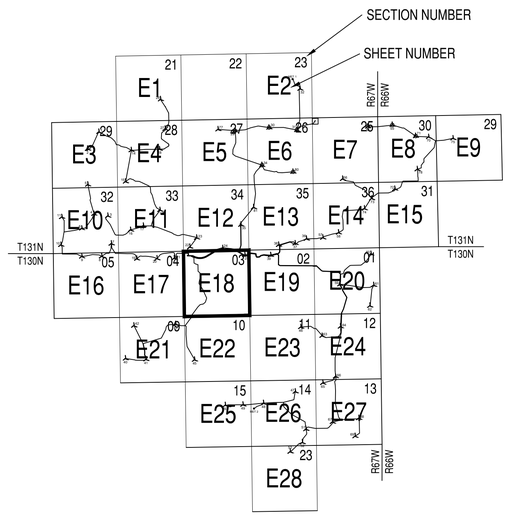
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 04, T130N, R67W

DWG #: MCW-COL-E17

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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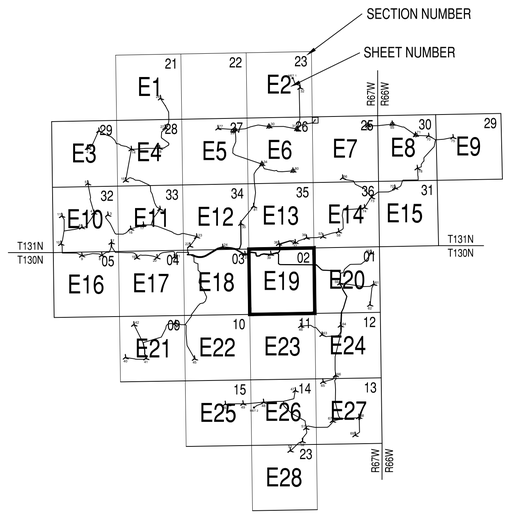
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 03, T130N, R67W

DWG #: MCW-COL-E18

REVISION: 2

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 FEEDER 1
- F2 FEEDER 2
- F3 FEEDER 3
- F4 FEEDER 4
- F5 FEEDER 5
- F6 FEEDER 6
- O&M FIBER TO O&M
- MET TOWER
- FXJBX JUNCTION BOX
- UT UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

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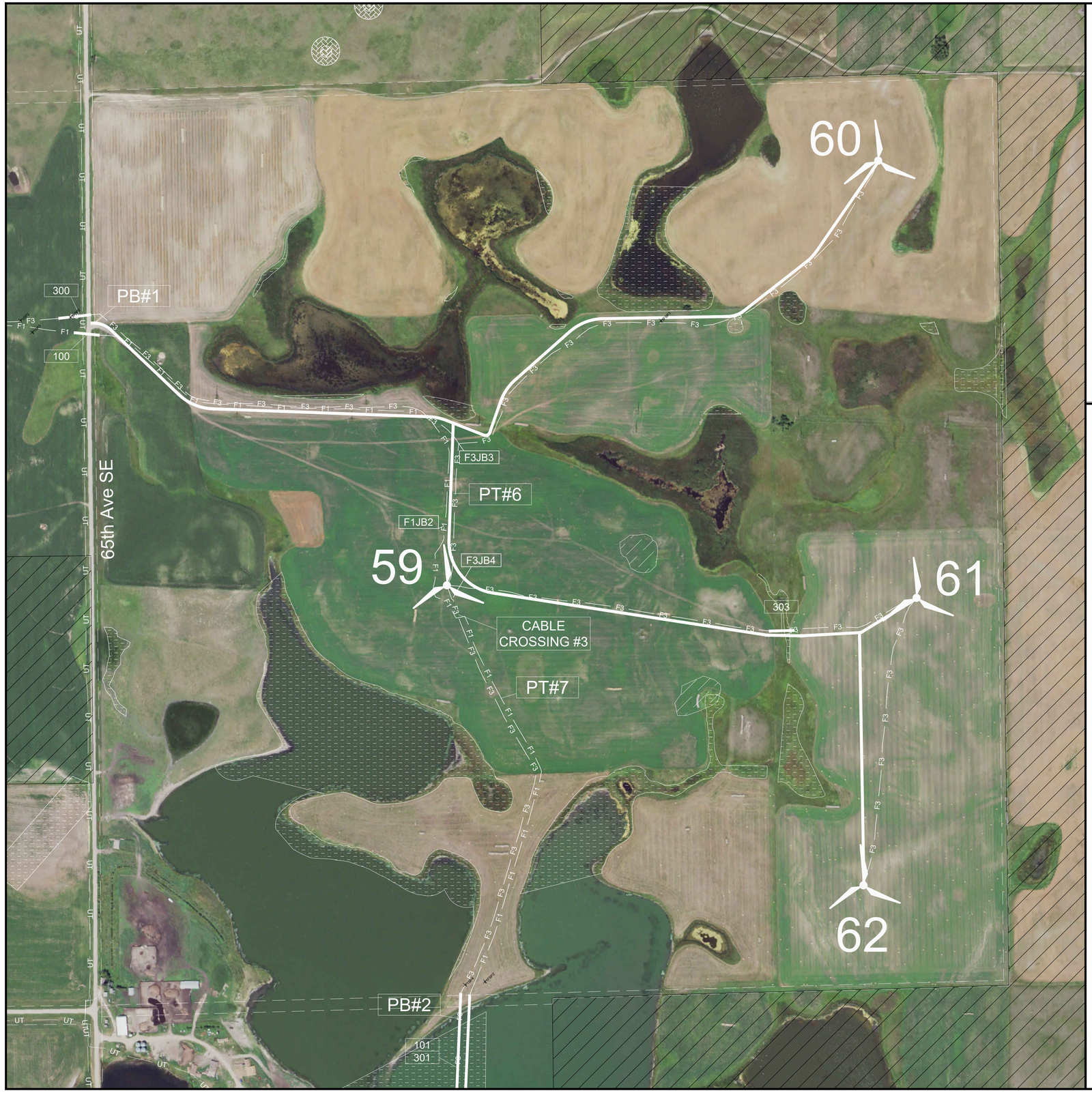
Approved By: C. MATHSON
Project Number: 17.02016

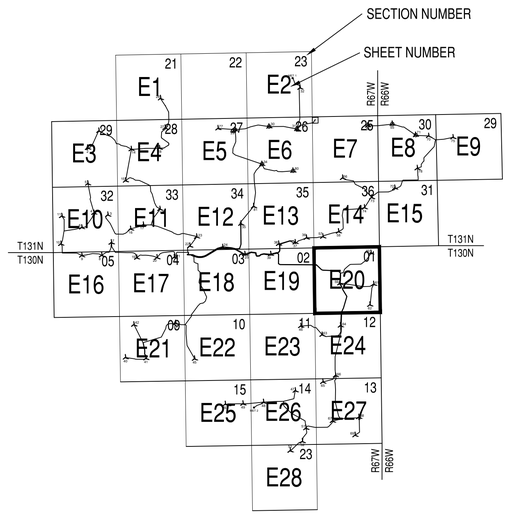
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 02, T130N, R67W

DWG #: MCW-COL-E19

REVISION: 1



KEY MAP



LEGEND

- XX — VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- XX — VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 — FEEDER 1
- F2 — FEEDER 2
- F3 — FEEDER 3
- F4 — FEEDER 4
- F5 — FEEDER 5
- F6 — FEEDER 6
- O&M — FIBER TO O&M
- MET TOWER
- FXJBX — JUNCTION BOX
- UT — UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- XXSPX — CABLE SPLICE
- XXFSPX — FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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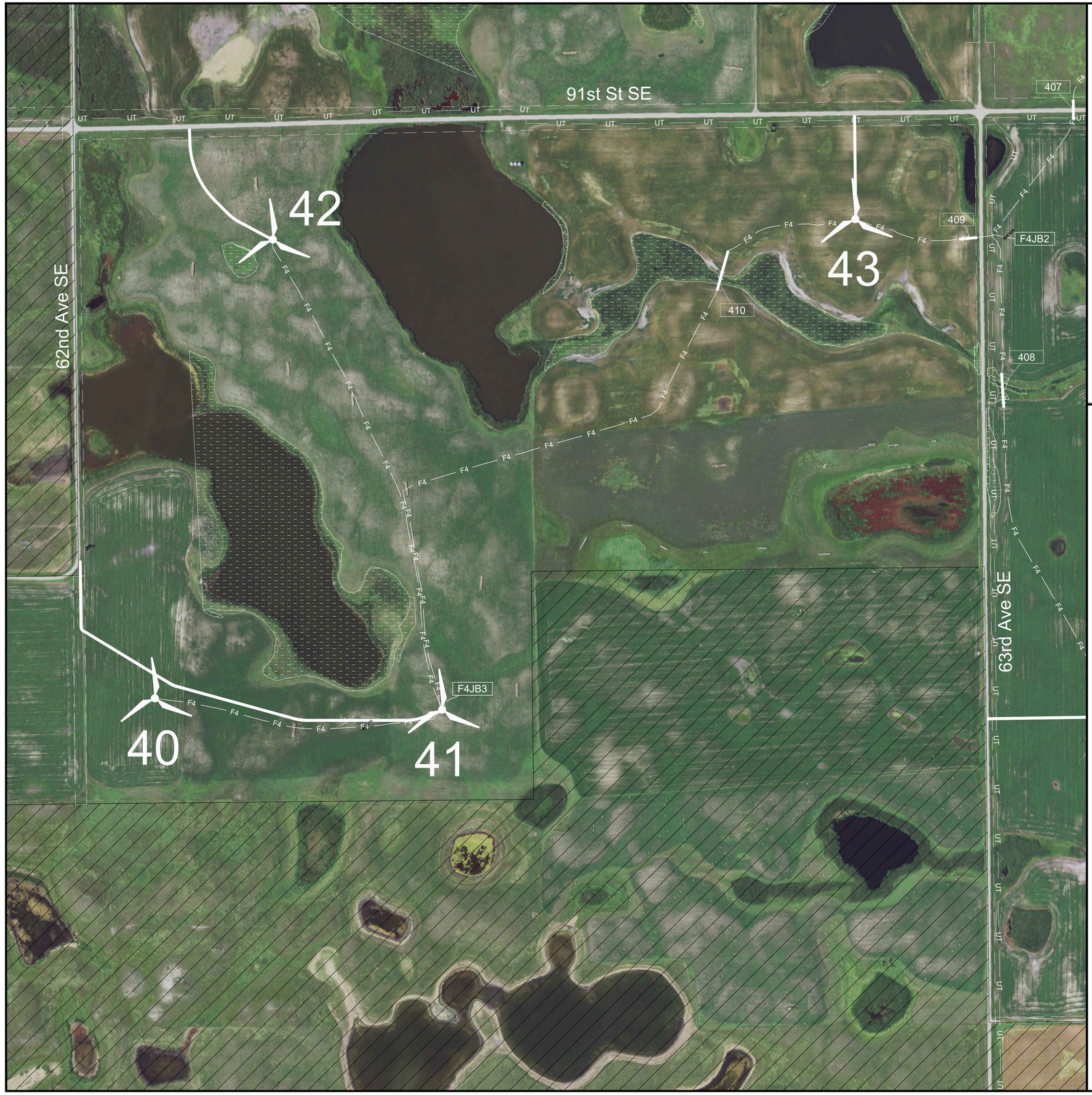
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

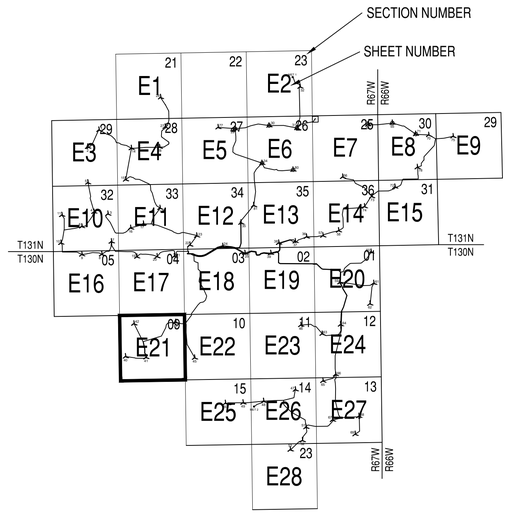
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 01, T130N, R67W

DWG #: MCW-COL-E20

REVISION: 1



KEY MAP



LEGEND

XX	VESTAS WIND TURBINE V110 MK10C - 2.0 MW
XX	VESTAS WIND TURBINE V110 MK10D - 2.0 MW
F1	FEEDER 1
F2	FEEDER 2
F3	FEEDER 3
F4	FEEDER 4
F5	FEEDER 5
F6	FEEDER 6
O&M	FIBER TO O&M
	MET TOWER
FXJBX	JUNCTION BOX
UT	UG UTILITY
	ROAD R.O.W.
	NON LEASED
	ARCHEOLOGICAL SITES
	WETLAND DELINEATION
	USFWS EASEMENTS
	BORE WITH ID (XXX)
	ACCESS ROADS
XSPX	CABLE SPLICE
XFSPX	FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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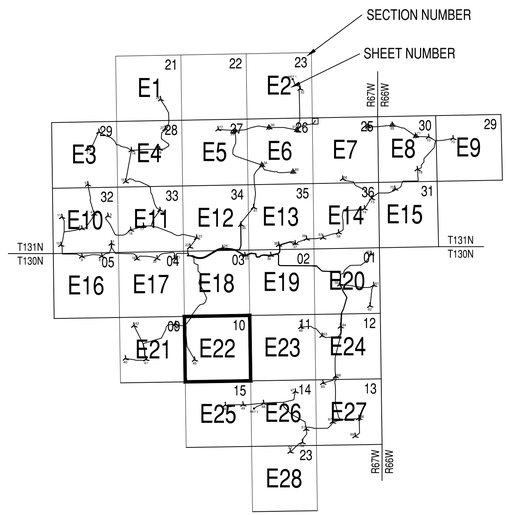
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 09, T130N, R67W

DWG #: MCW-COL-E21
REVISION: 1

KEY MAP



LEGEND

- VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- FEEDER 1
- FEEDER 2
- FEEDER 3
- FEEDER 4
- FEEDER 5
- FEEDER 6
- FIBER TO O&M
- MET TOWER
- JUNCTION BOX
- UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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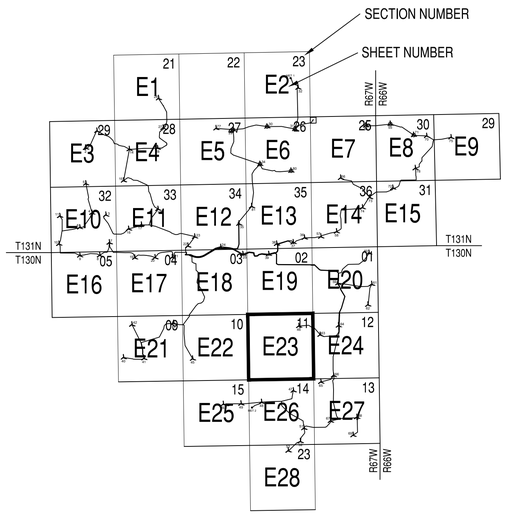
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 10, T130N, R67W

DWG #: MCW-COL-E22

REVISION: 1

KEY MAP



LEGEND

XX	VESTAS WIND TURBINE V110 MK10C - 2.0 MW
XX	VESTAS WIND TURBINE V110 MK10D - 2.0 MW
F1	FEEDER 1
F2	FEEDER 2
F3	FEEDER 3
F4	FEEDER 4
F5	FEEDER 5
F6	FEEDER 6
O&M	FIBER TO O&M
	MET TOWER
FXJBX	JUNCTION BOX
UT	UG UTILITY
	ROAD R.O.W.
	NON LEASED
	ARCHEOLOGICAL SITES
	WETLAND DELINEATION
	USFWS EASEMENTS
	BORE WITH ID (XXX)
	ACCESS ROADS
XXSPX	CABLE SPLICE
XXFSPX	FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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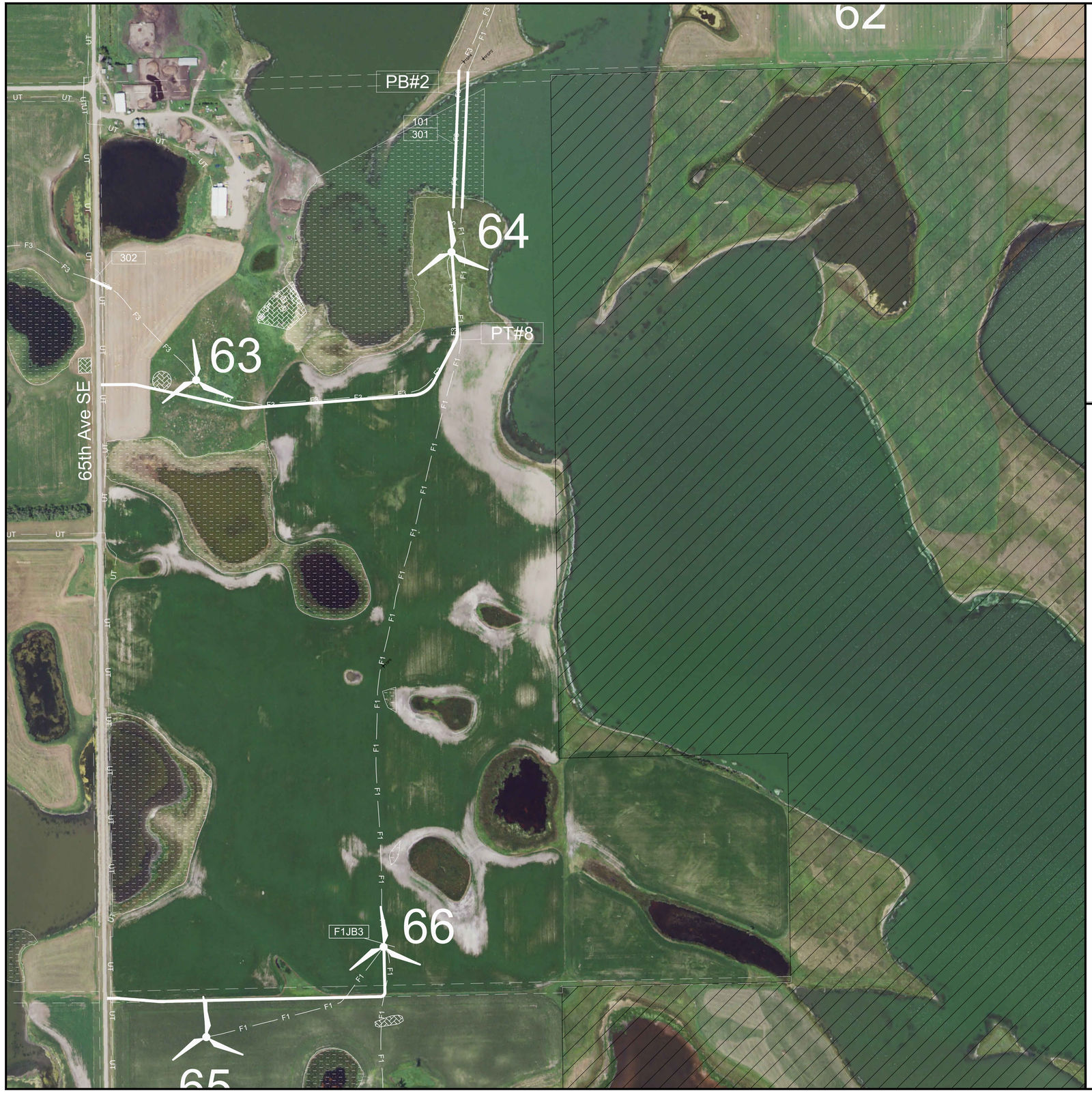
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

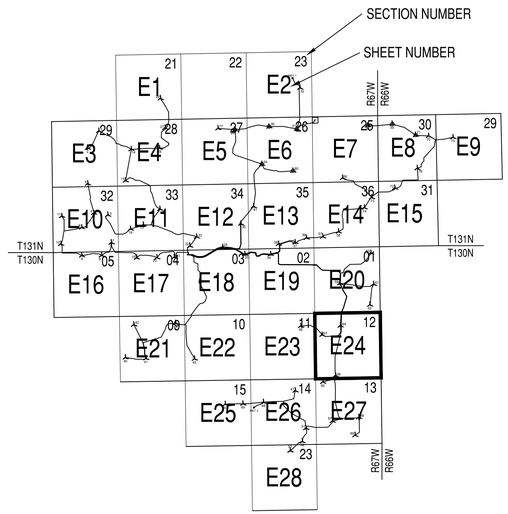
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 11, T130N, R67W

DWG #: MCW-COL-E23

REVISION: 1



KEY MAP



LEGEND

XX	VESTAS WIND TURBINE V110 MK10C - 2.0 MW
XX	VESTAS WIND TURBINE V110 MK10D - 2.0 MW
F1	FEEDER 1
F2	FEEDER 2
F3	FEEDER 3
F4	FEEDER 4
F5	FEEDER 5
F6	FEEDER 6
O&M	FIBER TO O&M
	MET TOWER
FXJBX	JUNCTION BOX
UT	UG UTILITY
	ROAD R.O.W.
	NON LEASED
	ARCHEOLOGICAL SITES
	WETLAND DELINEATION
	USFWS EASEMENTS
	BORE WITH ID (XXX)
	ACCESS ROADS
XSPX	CABLE SPLICE
XFSPX	FIBER SPLICE

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2. DO NOT PLACE JUNCTION BOXES IN LOW AREAS THAT MAY FLOOD OR COLLECT WATER. COORDINATE JUNCTION BOX LOCATIONS WITH OWNER.

RECORD DRAWING

DRAWINGS ARE BASED UPON CONSTRUCTION CONTRACTOR REDLINES WHICH HAVE NOT BEEN FIELD VERIFIED BY ENGINEER OF RECORD.

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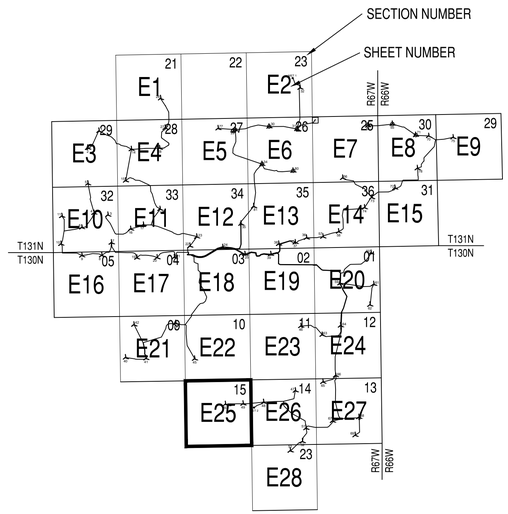
Design By: J. HERMANSON
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 12, T130N, R67W

DWG #: MCW-COL-E24

REVISION: 2

KEY MAP



LEGEND

XX	VESTAS WIND TURBINE V110 MK10C - 2.0 MW
XX	VESTAS WIND TURBINE V110 MK10D - 2.0 MW
F1	FEEDER 1
F2	FEEDER 2
F3	FEEDER 3
F4	FEEDER 4
F5	FEEDER 5
F6	FEEDER 6
O&M	FIBER TO O&M
	MET TOWER
FXJBX	JUNCTION BOX
UT	UG UTILITY
	ROAD R.O.W.
	NON LEASED
	ARCHEOLOGICAL SITES
	WETLAND DELINEATION
	USFWS EASEMENTS
	BORE WITH ID (XXX)
	ACCESS ROADS
XSPX	CABLE SPLICE
XFSPX	FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/21/2020	ISSUED FOR RECORD	CM

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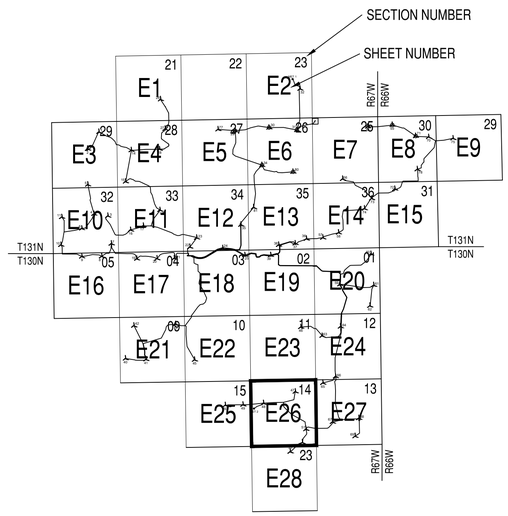
COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 15, T130N, R67W

DWG #: MCW-COL-E25
REVISION: 1

KEY MAP



LEGEND

- XX — VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- XX — VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 — FEEDER 1
- F2 — FEEDER 2
- F3 — FEEDER 3
- F4 — FEEDER 4
- F5 — FEEDER 5
- F6 — FEEDER 6
- O&M — FIBER TO O&M
- MET TOWER
- FXJBX — JUNCTION BOX
- UT — UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- XSPX — CABLE SPLICE
- XFSPX — FIBER SPLICE

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
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1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

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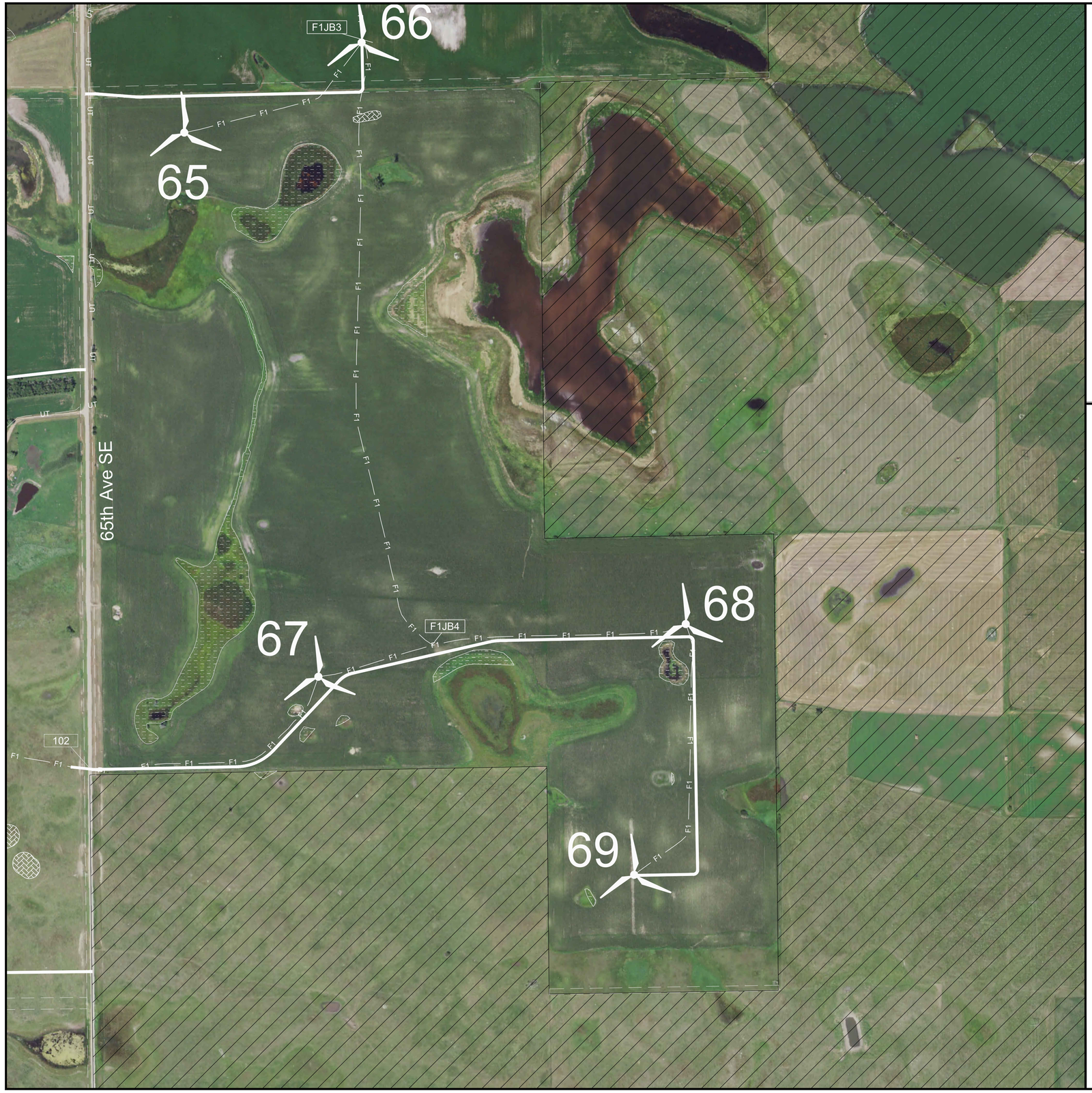
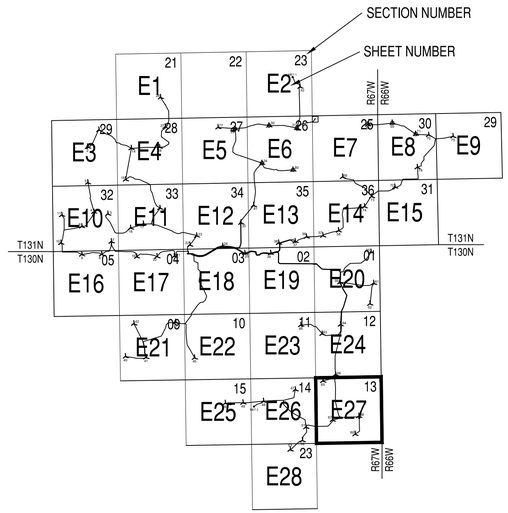
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 14, T130N, R67W

DWG #: MCW-COL-E26
REVISION: 2



KEY MAP



LEGEND

XX	VESTAS WIND TURBINE V110 MK10C - 2.0 MW
XX	VESTAS WIND TURBINE V110 MK10D - 2.0 MW
F1	FEEDER 1
F2	FEEDER 2
F3	FEEDER 3
F4	FEEDER 4
F5	FEEDER 5
F6	FEEDER 6
O&M	FIBER TO O&M
	MET TOWER
FXJBX	JUNCTION BOX
UT	UG UTILITY
	ROAD R.O.W.
	NON LEASED
	ARCHEOLOGICAL SITES
	WETLAND DELINEATION
	USFWS EASEMENTS
	BORE WITH ID (XXX)
	ACCESS ROADS
FXSPX	CABLE SPLICE
FXFSPX	FIBER SPLICE

N

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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WANZEK a MasTec company

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

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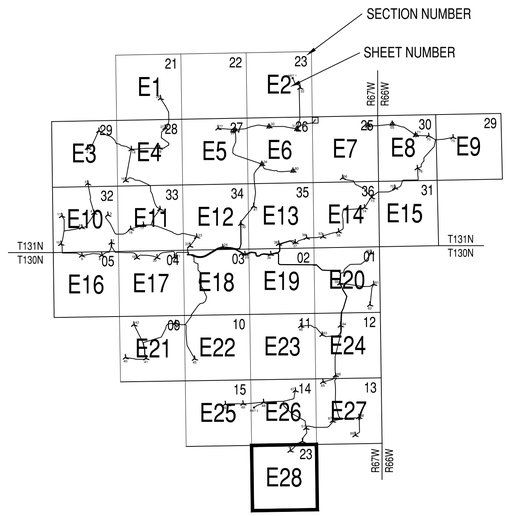
Drawn By: A. SATHER
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 13, T130N, R67W

DWG #: MCW-COL-E27
REVISION: 2

KEY MAP



LEGEND

- XX — VESTAS WIND TURBINE V110 MK10C - 2.0 MW
- XX — VESTAS WIND TURBINE V110 MK10D - 2.0 MW
- F1 — FEEDER 1
- F2 — FEEDER 2
- F3 — FEEDER 3
- F4 — FEEDER 4
- F5 — FEEDER 5
- F6 — FEEDER 6
- O&M — FIBER TO O&M
- MET TOWER
- FXJBX — JUNCTION BOX
- UT — UG UTILITY
- ROAD R.O.W.
- NON LEASED
- ARCHEOLOGICAL SITES
- WETLAND DELINEATION
- USFWS EASEMENTS
- BORE WITH ID (XXX)
- ACCESS ROADS
- CABLE SPLICE
- FIBER SPLICE

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MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

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WANZEK a MasTec company

Rev.	Date	Description	By
A	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
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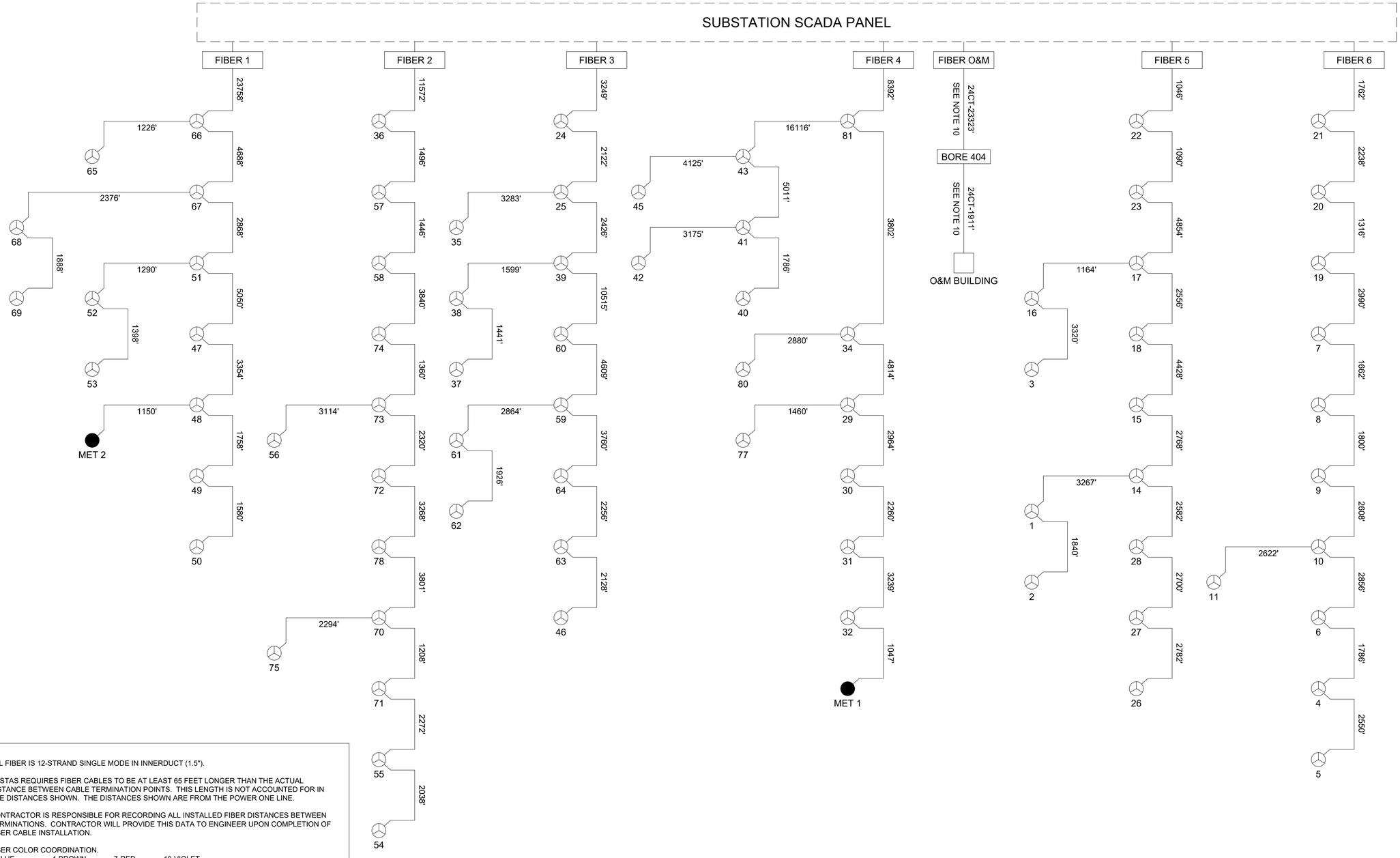
Project Number: 17.02016

COLLECTION SYSTEM FEEDER ROUTING DIAGRAMS SEC. 23, T130N, R67W

DWG #: MCW-COL-E28

REVISION: 2



NOTES:

1. ALL FIBER IS 12-STRAND SINGLE MODE IN INNERDUCT (1.5").
2. VESTAS REQUIRES FIBER CABLES TO BE AT LEAST 65 FEET LONGER THAN THE ACTUAL DISTANCE BETWEEN CABLE TERMINATION POINTS. THIS LENGTH IS NOT ACCOUNTED FOR IN THE DISTANCES SHOWN. THE DISTANCES SHOWN ARE FROM THE POWER ONE LINE.
3. CONTRACTOR IS RESPONSIBLE FOR RECORDING ALL INSTALLED FIBER DISTANCES BETWEEN TERMINATIONS. CONTRACTOR WILL PROVIDE THIS DATA TO ENGINEER UPON COMPLETION OF FIBER CABLE INSTALLATION.
4. FIBER COLOR COORDINATION.

1-BLUE	4-BROWN	7-RED	10-VIOLET
2-ORANGE	5-SLATE	8-BLACK	11-ROSE
3-GREEN	6-WHITE	9-YELLOW	12-AQUA

5. UNLESS SPLICING FOR INDIVIDUAL STRANDS ARE SHOWN, ALL STRANDS WITHIN CABLES/TUBES SHALL BE SPLICED TO THE SAME COLOR STRAND ON THE DESTINATION CABLE/TUBE.
6. TERMINATE ALL FIBERS USING A FUSION SPLICER WITH PRE-TERMINATED PIGTAILS OR MECHANICAL CONNECTORS WITH FANOUT KITS.
7. DO NOT EXCEED MINIMUM BENDING RADIUS AND AVOID CABLE TWISTS AT ALL TIMES INCLUDING WHEN THE CABLE IS REMOVED FROM THE SPOOL.
8. WHEN PULLING, PULL ONLY BY THE STRONG CENTRAL MEMBER. DO NOT EXCEED THE MAXIMUM TENSION WHEN PULLING.
9. UPON ERECTION OF THE LOWER TOWER SECTION, THE FIBER CABLE SHALL BE REMOVED FROM THE TOWER FLOOR. IF POSSIBLE, THE CABLE SHOULD BE ROUTED AROUND THE POWER PANEL TO AVOID DAMAGE DURING THE ELECTRICAL INSTALLATION.
10. FIBER TO O&M SHALL BE 24-STRAND IN 1.5" INNERDUCT. THE FIBER WILL SHARE FEEDER 4 TRENCH UNTIL BORE 404 AND THEN WILL BE INSTALLED IN ITS OWN TRENCH TO THE O&M BUILDING. FIBER SHALL BE FUSION SPLICED IN TOWERS 81, 34, 29, 30, AND 31.

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

Rev.	Date	Description	By
A	06/06/2019	60% SUBMITTAL	CM
B	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
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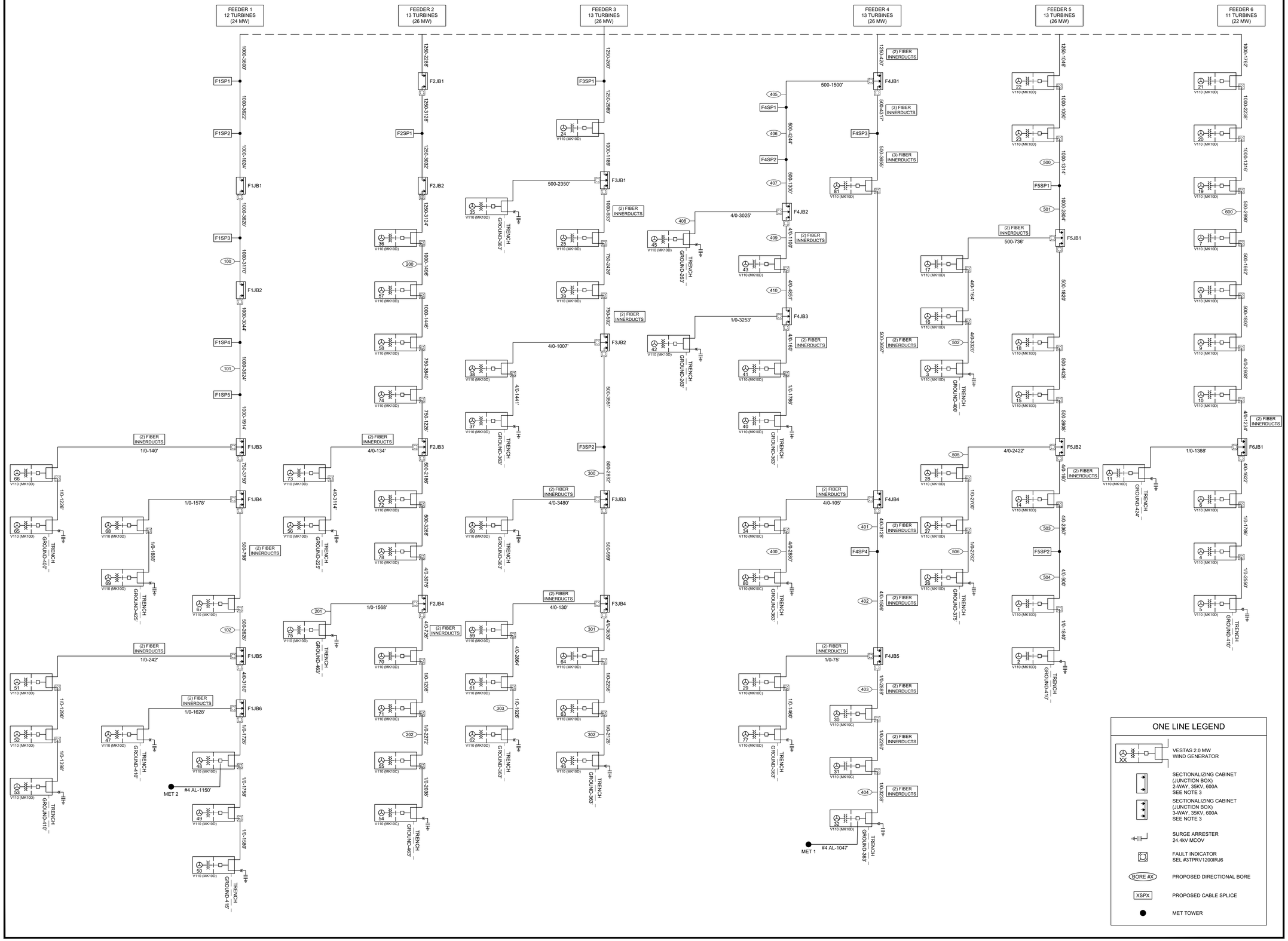
Approved By: C. MATHSON
Project Number: 17.02016

COLLECTION SYSTEM FIBER ONE LINE DIAGRAM

DWG #: MCW-COL-FOL1

REVISION: 2



ONE LINE LEGEND

- VESTAS 2.0 MW WIND GENERATOR
- SECTIONALIZING CABINET (JUNCTION BOX) 2-WAY, 35KV, 600A SEE NOTE 3
- SECTIONALIZING CABINET (JUNCTION BOX) 3-WAY, 35KV, 600A SEE NOTE 3
- SURGE ARRESTER 24.4kV MCOV
- FAULT INDICATOR SEL #3TPRV1200IRJ6
- BORE #X — PROPOSED DIRECTIONAL BORE
- XSPX — PROPOSED CABLE SPLICE
- MET TOWER

MERRICOURT WIND PROJECT

DICKEY AND MCINTOSH COUNTIES, NORTH DAKOTA

eDF renewable energy

WANZEK a MasTec company

Rev.	Date	Description	By
C	05/16/2019	UPDATED TURBINE ARRAY	CM
D	05/22/2019	DESIGN UPDATE	CM
E	07/18/2019	90% SUBMITTAL	CM
0	09/13/2019	ISSUED FOR CONSTRUCTION	CM
1	12/06/2019	ISSUED FOR CONSTRUCTION	CM
2	12/21/2020	ISSUED FOR RECORD	CM

NOTES:

1. CABLE LENGTHS LISTED ARE STRAIGHT LINE DISTANCES WITH 50 FOOT TAILS ADDED TO EACH END.
2. AS SPECIFIED IN VESTAS DOCUMENTATION, TWO HORIZONTAL EARTHING ELECTRODES/TRENCH GROUNDS (CONNECTED TO THE MAIN EARTH BONDING BAR) ARE TO BE RUN IN DIFFERENT DIRECTIONS WITH A MINIMUM ANGULAR SEPARATION OF 90° AND TO A MINIMUM DISTANCE OF 263 FEET. THIS REQUIRES AN ADDITIONAL TRENCH GROUND (PROVIDED BY ELECTRICAL CONTRACTOR) IF A TURBINE IS AT THE END OF A LINE/TAP.
3. EACH JUNCTION BOX TERMINATION SHALL HAVE 200A REDUCING TAP PLUG AND CAP ON EVERY ELBOW.

UNDERGROUND CABLE (35kV) (MV-105):
1/0 AWG AL, 8-#14 CONCENTRIC (8,500' REEL)
4/0 AWG AL, 12-#14 CONCENTRIC (8,000' REEL)
500 MCM AL, 12-#12 CONCENTRIC (4,500' REEL)
750 MCM AL, 14-#14 CONCENTRIC (4,500' REEL)
1000 MCM AL, 12-#12 CONCENTRIC (3,500' REEL)
1250 MCM AL, 15-#12 CONCENTRIC (3,200' REEL)

TRENCH GROUND:
7-#8 COPPERCLAD STEEL (40%)

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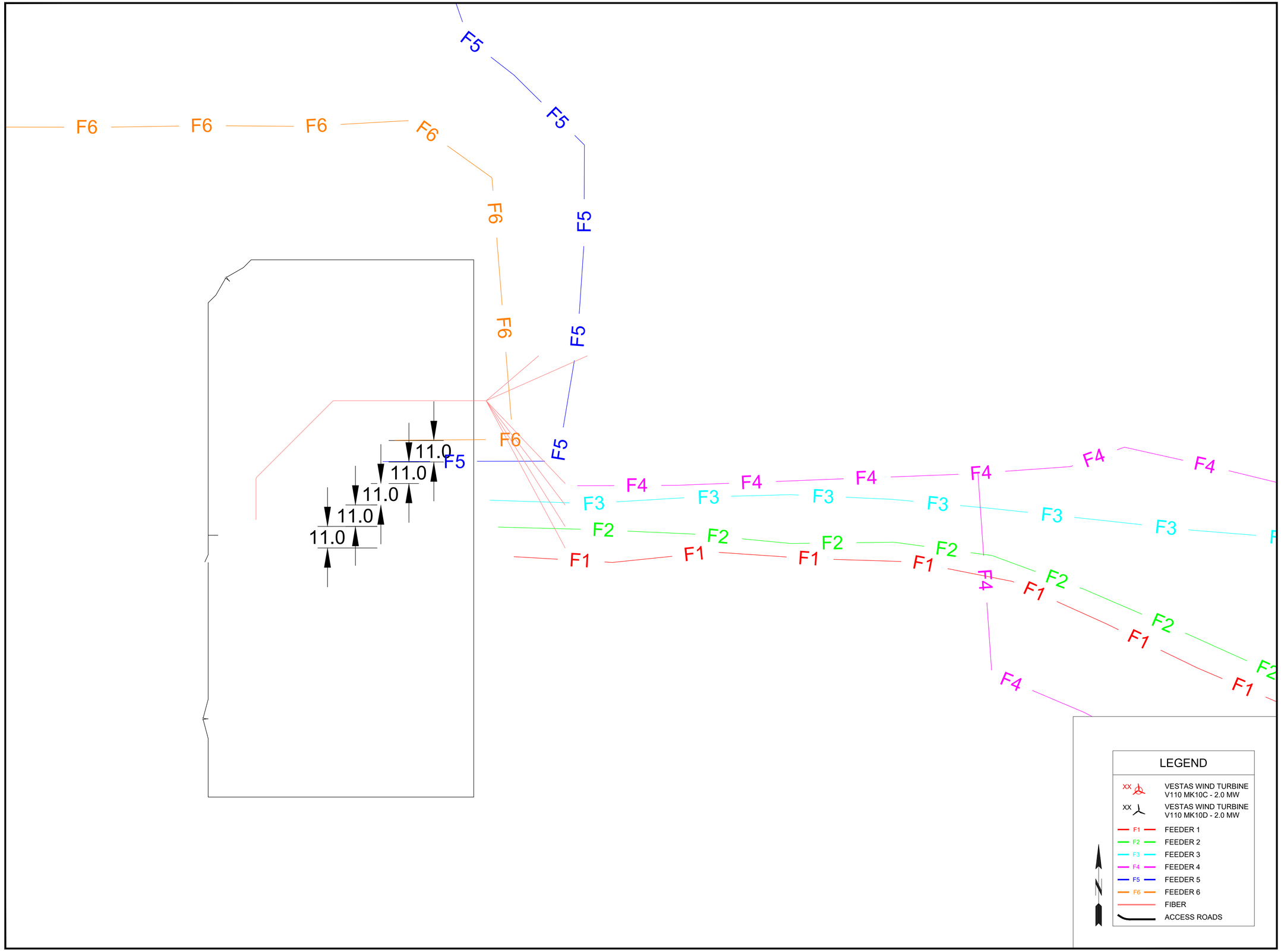
COLLECTION SYSTEM ONE LINE DIAGRAM FEEDERS 1-6

DWG #: MCW-COL-OL1

REVISION: 2



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COLLECTION SYSTEM SUB/COLLECTION INTERFACE

DWG #: MCW-COL-SC1

REVISION: 1

COLLECTION SYSTEM

Drawing Number	Revision	Title	Issued Date	Comment	Attached
MCW-COL-C1	2	Overall Layout	12/21/2020	Issued For Record	X
MCW-COL-OL1	2	One Line Diagram	12/21/2020	Issued For Record	X
MCW-COL-FOL1	2	Fiber Optic One Line Diagram	12/21/2020	Issued For Record	X
MCW-COL-E1	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E2	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E3	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E4	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E5	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E6	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E7	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E8	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E9	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E10	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E11	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E12	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E13	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E14	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E15	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E16	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E17	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E18	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E19	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E20	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E21	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E22	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E23	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E24	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E25	1	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E26	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E27	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-E28	2	Feeder Routing Diagram	12/21/2020	Issued For Record	X
MCW-COL-D1	2	WTG Grounding Plan	12/21/2020	Issued For Record	X
MCW-COL-D2	1	WTG Conduit Plan	12/21/2020	Issued For Record	X

Merricourt Wind Project - Drawing, Specification, Reports List

December 21, 2020

COLLECTION SYSTEM

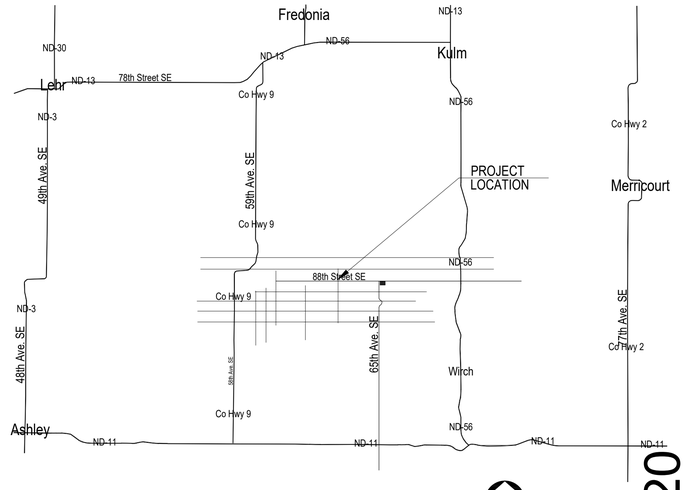
Drawing Number	Revision	Title	Issued Date	Comment	Attached
MCW-COL-D3	1	Trench, Cable Marker, Cable Splice, & Fiber Handhole Details	12/21/2020	Issued For Record	X
MCW-COL-D4	1	Wind Turbine Switchgear Details	12/21/2020	Issued For Record	X
MCW-COL-D5	2	Junction Box (2-Way) Details	12/21/2020	Issued For Record	X
MCW-COL-D6	2	Junction Box (3-Way) Details	12/21/2020	Issued For Record	X
MCW-COL-D7	2	Cable Crossing Details	12/21/2020	Issued For Record	X
MCW-COL-D8	3	Cable Crossing Schedule	12/21/2020	Issued For Record	X
MCW-COL-D9	1	Met Tower Details	12/21/2020	Issued For Record	X
MCW-COL-D10	1	Substation Termination Details	12/21/2020	Issued For Record	X
MCW-COL-SC1	1	Sub/Collection Interface	12/21/2020	Issued For Record	X
MCW-COL-IMP	0	Collection System Electrical Model Impedances	12/06/2019	Issued For Construction	
MCW-COL-SHP	1	Collection System Route Shape File	12/06/2019	Issued For Construction	
MCW-COL-KMZ	1	Collection System Google Earth File	12/06/2019	Issued For Construction	
MCW-COL-CBL	1	Collection System Cable Lengths	12/06/2019	Issued For Construction	
MCW-COL-SPC	0	Underground Collection Specification	09/13/2019	Issued For Construction	
MCW-COL-MVC	2	Medium Voltage Cable Ampacity Report	04/17/2020	Issued For Construction	
MCW-COL-SHC	0	Short Circuit Report	12/06/2019	Issued For Construction	
MCW-COL-PEL	1	Power and Energy Loss Report	03/06/2020	Issued For Construction	
MCW-COL-TGG	2	WTG Ground Grid Report	04/17/2020	Issued For Construction	
MCW-COL-INS	1	Insulation Coordination Report	03/06/2020	Issued For Construction	
MCW-COL-EFG	0	Effectively Grounded Report	12/06/2019	Issued For Construction	
MCW-COL-LFL	1	Load Flow Report	03/06/2020	Issued For Construction	
MCW-COL-CIV	1	Concentric Shield Wire Induced Voltage Report	03/06/2020	Issued For Construction	

MERRICOURT O&M BUILDING

Kulm, ND 58456

LOCATION MAP

NOT TO SCALE



PLAN NORTH

AS-BUILTS 11/19/2020

PROJECT DATA

OWNER:	EDF RENEWABLE ENERGY MERRICOURT O&M BUILDING WIND FARM
PROJECT ADDRESS:	88th Street, SE KULM, NORTH DAKOTA 58456
ARCHITECT: CONTACT: OFFICE:	SAM GRESHAM ARCHITECT PROJECT ARCHITECT: FRANCIS KUBIER 400 N.W. 23rd STREET, SUITE B OKLAHOMA CITY, OKLAHOMA 73103 405-226-4619
PROJECT DESCRIPTION:	THE BUILDING IS A PRE-ENGINEERED INSULATED METAL BUILDING
LEGAL DESCRIPTION:	

PRIMARY BUILDING CODES

This project has been designed in accordance with the following:

North Dakota State Building Code (Current Edition) and Amendments
2015 International Building Code (IBC) and Amendments
2015 International Mechanical code (IMC) and Amendments
2015 International Energy conservation Code (IECC) and Amendments
2015 National Electrical Code (NEC) and Amendments
North Dakota State Plumbing Code (Current Edition)
2015 International Fuel Gas Code (IFGC) and Amendments
The National Fire Protection Association Standards (NFPA)

GENERAL NOTES

1. THIS PROJECT'S DESIGN AND CONSTRUCTION DOCUMENTS, IN PART OR IN TOTAL, SHALL NOT BE USED FOR ANY PROJECT OTHER THAN THIS PROJECT, UNLESS AGREED TO IN WRITING BY THIS PROJECT'S ARCHITECT.

2. ALL CONSTRUCTION SHALL MEET ALL APPLICABLE NATIONAL, STATE AND LOCAL BUILDING CODES, LATEST EDITIONS AS WELL AS SPECIAL ORDINANCES AND/OR REFULATIONS.

3. DO NOT SCALE OFF PLANS!

4. CALL NORTH DAKOTA CALL-BEFORE-YOU-DIG (811) FOR EXACT LOCATION OF ALL UTILITIES PRIOR TO START OF CONSTRUCTION.

5. THE CONTRACTOR IS TO VISIT THE SITE TO UNDERSTAND THE PROJECT'S SCOPE AND EXISTING CONDITIONS. IF THE EXISTING CONDITIONS DIFFER FROM THE ARCHITECT'S PLANS, CONTACT THE ARCHITECT IN WRITING PRIOR TO THE BID OPENING AND IN TIME FOR THE ARCHITECT TO ISSUE AN ADDENDUM.

6. WHEN THERE ARE CONFLICTS BETWEEN ANY SECTIONS OF THE SPECIFICATIONS AND THE PLANS OR BETWEEN THE PLANS AND SPECIFICATIONS, THE MOST STRICT SHALL APPLY. FOR CLARIFICATIONS, PLEASE CONTACT THE ARCHITECT IN WRITING PRIOR TO THE BID OPENING AND IN TIME FOR THE ARCHITECT TO ISSUE AN ADDENDUM.

7. NO WORK SHALL BE STARTED AT THE SITE UNTIL PROPER PERMITS ARE IN PLACE, SHOP DRAWINGS/SUBMITTALS HAVE BEEN APPROVED, AND A PRE-CONSTRUCTION MEETING WITH OWNER, CONTRACTOR, AND ARCHITECT ARE IN ATTENDENCE.

8. THE CONTRACTOR SHALL GIVE THE ARCHITECT 48 HOURS PRIOR NOTICE IN WRITING THAT THE PROJECT IS READY FOR EACH INSPECTION.

9. THE CONTRACTOR IS TO PROVIDE EMERGENCY FIRE EXTINGUISHERS READILY AVAILABLE AND PROPERLY MAINTAINED AS PER LOCAL FIRE PROTECTION REGULATIONS.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING PROPER SAFETY PRECAUTIONS IN COMPLETING THE WORK.

11. REVIEW ANY CONFLICTS OR POTENTIAL PROBLEM AREAS WITH THE ARCHITECT PRIOR TO PROCEEDING WITH THE WORK. IF WORK IS IN PROGRESS WHEN CONFLICTS OR PROBLEMS ARE DISCOVERED, STOP WORK ON THE AREA IN QUESTION UNTIL A SOLUTION HAS BEEN WORKED OUT WITH THE ARCHITECT OR OWNER.

12. THE PROFESSIONAL SERVICES OF THE ARCHITECT ARE UNDERTAKEN FOR AND ARE PERFORMED IN THE INTEREST OF THE OWNER AT THE SITE SHOWN ON THE PLANS AND IN THE SPECIFICATIONS ONLY. NO CONTRACTUAL OBLIGATION IS ASSUMED BY THE ARCHITECT FOR THE BENEFIT OF ANY OTHER PERSONS INVOLVED IN THE PROJECT.

ABBREVIATIONS

A	AMP
ABV	ABOVE
A/C	AIR CONDITIONING
ACOUS	ACOUSTICAL
ACT	ACOUSTICAL TILE
ADD	ADDENDUM
ADJ	ADJACENT/ADJUSTABLE
AFF	ABOVE FINISH FLOOR
ALT	ALTERNATE
ALUM	ALUMINUM
ANOD	ANODIZED
APPROX	APPROXIMATE
ARCH	ARCHITECT(URAL)
BD	BOARD
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM / BENCH MARK
BRG	BEARING
BSMT	BASEMENT
BTM	BOTTOM
CAB	CABINET
CER	CERAMIC
CFLASH	COUNTER FLASHING
CI	CAST IRON
CIP	CAST IN PLACE
CJ	CONSTRUCTION JOINT
CLG	CELING
CLR	CLEAR/CLEARANCE
CMU	CONCRETE MASONRY UNIT
CNTR	COUNTER
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CORR	CORROGATED
CRPT	CARPET
CT	CERAMIC TILE
CTR	CENTER
CU FT	CUBIC FOOT
CU YD	CUBIC YARD
CW	COLD WATER
D	DEEP/DEPTH
DBL	DOUBLE
DEMO	DEMOLITION
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DISP	DISPENSER
DIV	DIVISION
DL	DEAD LOAD
DN	DOWN
DR	DOOR
DS	DOWNSPOUT
DTL	DETAIL
E	EAST
EA	EACH
EC	ELECTRICAL CONTRACTOR
EJ	EXPANSION JOINT
ELEC	ELECTRIC(AL)
ELEV	ELEVATOR/ELEVATION
EMER	EMERGENCY
ENG	ENGINEER
EQ	EQUAL
EST	ESTIMATE
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
(E) EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR
FA	FIRE ALARM
FD	FLOOR DRAIN
FE	FIRE EXTINGUSHER
FEC	FIRE EXTINGUSHER CABINET
FF	FINISH FLOOR
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FLASH'G	FLASHING
FLUOR	FLUORESCENT
FOUND	FOUNDATION
FT	FOOT
FTG	FOOTING
FURR	FURRING
GA	GAUGE
GALV	GALVANIZED
GB	GRAB BAR
GC	GENERAL CONTRACTOR
GEN	GENERAL
GL	GLASS/GLAZING
GL BL	GLASS BLOCK
GR	GRADE
GYP	GYPSUM
GWB	GYPSUM WALL BOARD
HB	HOSE BIB
HC	HOLLOW CORE
HDR	HEADER
HDCP	HANDICAPPED
HDW	HARDWARE
HDWD	HARDWOOD
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HR	HOUR
HT	HEIGHT
HVAC	HEATING VENELATING & AIR CONDITIONING
HW	HOT WATER
ID	INSIDE DIAMETER
IN	INCH
INCAN	INCANDESCENT
INCL	INCLUDE
INSUL	INSULATION
INT	INTERIOR
JT	JOINT
JST	JOIST
KIT	KITCHEN
LAV	LAVATORY
LT	LIGHT
LTWT	LIGHTWEIGHT
LVR	LOUVER
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MBR	MEMBER
MC	MECHANICAL CONTRACTOR
MECH	MECHANICAL
MEMB	MEMBRANE
MFR	MANUFACTURER
MH	MAN HOLE
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
MTD	MOUNT(ED)
MO	MASONRY OPENING
MOD	MODULAR
MTL	METAL
MUL	MULLION
N	NORTH
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
OA	OVERALL
O/C	ON CENTER
OD	OUTSIDE DIAMETER
OVHD	OVERHEAD
OPNG	OPENING
OPP	OPPOSITE
PART	PARTITION
PERF	PERFORATED
PER	PERIMETER
PCKT	POCKET
PL	PLATE
PLAM	PLASTIC LAMINATE
PLAS	PLASTER
PLYWD	PLYWOOD
PNL	PANEL
PR	PAIR
PRCST	PRE-CAST
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	PRESSURE TREATED
PTD	PAPER TOWEL DISPENSER
PNT	POINT
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
R	RISER/RADIUS
RA	RETURN AIR
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
RECD	RECESSED
RE:	REFER
REF	REFRIGERATOR
REINF	REINFORCING
REQD	REQUIRED
REV	REVISION
RH	ROBE HOOK
RM	ROOM
RO	ROUGH OPENING
R&S	ROD & SHELF
S	SOUTH
SA	SUPPLY AIR
SC	SOLID CORE
SCHED	SCHEDULE
SD	SOAP DISPENSER
SEC	SECTION
SHT	SHEET
SIM	SIMILAR
SJ	SCORED JOINT
SNP	SANITARY NAPKIN DISPENSER
SPECS	SPECIFICATIONS
SPKR	SPEAKER
SQ	SQUARE
SS	SANITARY SEWER
STD	STANDARD
STL	STEEL
SSTL	STAINLESS STEEL
STO	STORAGE
STRUCT	STRUCTURE
SUSP	SUSPENDED
SUR	SURFACE
T	TREAD
TELE	TELEPHONE
TEMP	TEMPERED, TEMPORARY
T&B	TOP AND BOTTOM
T&G	TOUNGE AND GROOVE
THK	THICKNESS
TOC	TOP OF CURB
TOS	TOP OF STEEL
TOW	TOP OF WALK
TPH	TOILET PAPER HOLDER
TRS	TRANSITION STRIP
TS	TUBE STEEL
TYP	TYPICAL
UC	UNDERCUT
UON	UNLESS OTHERWISE NOTED
VERT	VERTICAL
VCT	VINYL COMPOSITION TILE
VIF	VERIFY IN FIELD, FIELD VERIFY
VWC	VINYL WALL COVERING
W	WEST
WD	WOOD
WDW	WINDOW
WH	WATER HEATER
WP	WATERPROOF
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH
XFMR	TRANSFORMER

DRAWING INDEX

GENERAL

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SH.2	CODE INFORMATION & EGRESS PLAN
SH.3	GENERAL NOTES
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SH.5	PARTITION TYPES
SH.6	SITE PLAN
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SH.8	REFLECTED CEILING PLAN
SH.9	EXTERIOR ELEVATIONS
SH.10	BUILDING SECTIONS
SH.11	DOOR SCHEDULE AND ROOM FINISH SCHEDULE
SH.12	DOOR TYPES, FRAME ELEVATIONS AND WINDOW ELEVATIONS
SH.13	DETAILS

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405.842.2998

LICENSED ARCHITECT
FRANCIS JOSEPH KUBIER
2923
DATE 10.03.2019
STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
1	ISSUED FOR CONSTRUCTION		05/08/19	KM	MS	MS

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

edf renewable energy

MERRICOURT O&M BUILDING WIND PROJECT

DWN: FK	DATE:07/01/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

DRAWING INDEX, CONTACT INFORMATION & ABBREVIATIONS

SH.1

REV 1

CODE INFORMATION

USE GROUP

Existing Use Group(s) -NA-
Designed Use Group(s) Group B

FIRE SUPPRESSION

The building is not sprinklered.

BUILDING CONFIGURATION

	Gross	Renovation	Addition
1st Floor	8,426 s.f.	-	-
Total	8,426 s.f.	-	-

AREA CALCULATION: TABLE 506.2 (IBC 2015)

Allowable: Group B, Non-Sprinklered, Construction Type VB = 2 floors @ 9,000 s.f./floor = 18,000 Total Building. s.f.
Actual: 1 floor @ 8,426 Total Building s.f.

OCCUPANT LOADING: TABLE 1004.1.1 (IBC 2015)

OCCUPANCY	Floor Area per Occupant
B - Business	100 gross
A - Assembly without fixed seating (unconcentrated)	15 net
S1 - Warehouse	500 gross

OCCUPANT LOAD

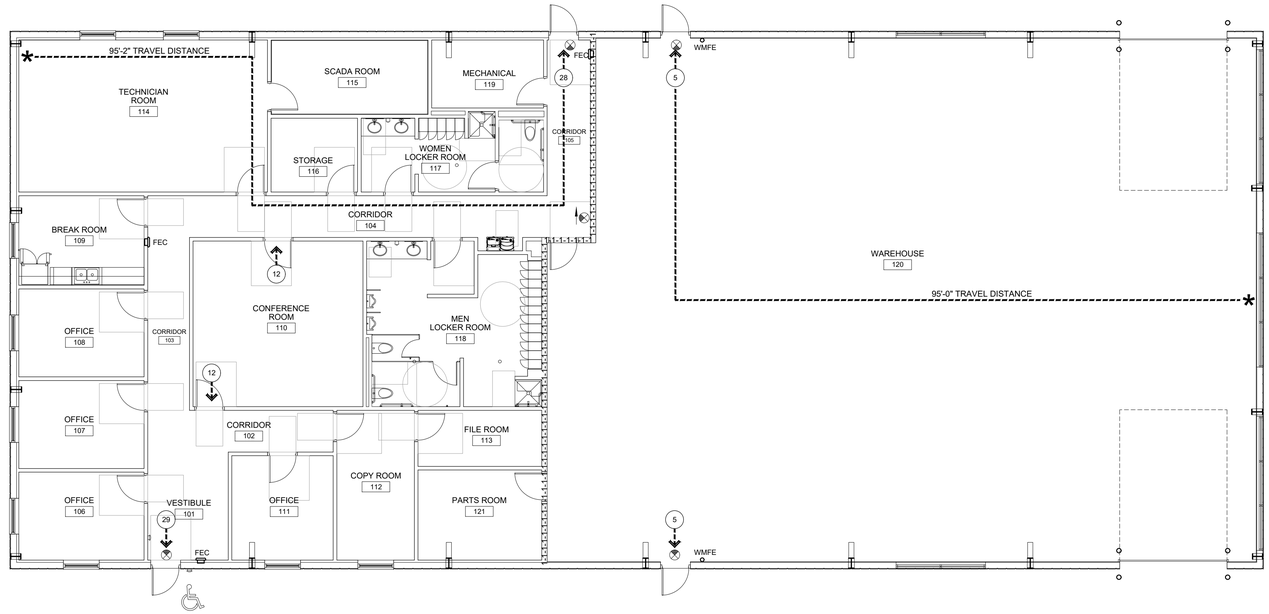
First Floor	B - Business 3,228 s.f. @ 100 sf gross per occupant =	33
	A - Assembly 352 s.f. @ 15 net per occupant =	24
	S1 - Warehouse 4,846 s.f .@ 500 s.f. gross per occupant =	10
	Total Design Occupant =	67
	Total Overall Design Occupant =	67

MINIMUM PLUMBING FACILITIES

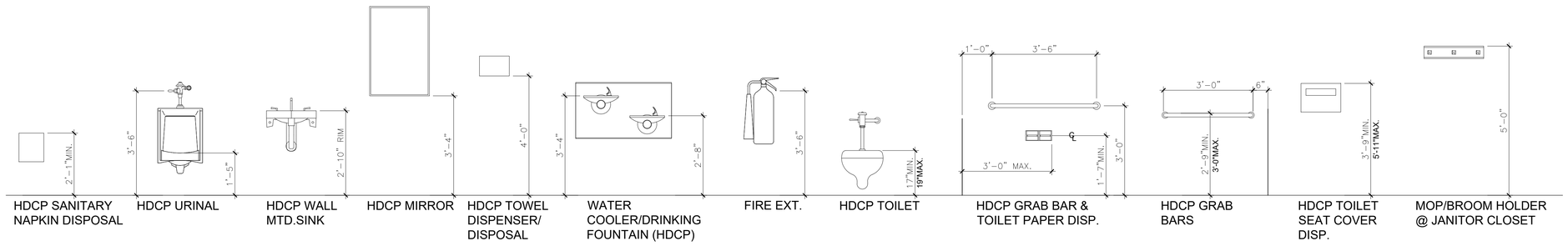
IBC 2015 Table 2902.1 Minimum Number of Required Plumbing Fixtures.

Water Closets		
Required	B = 57 /25	= 2.28 (3)
	S = 10 /40	= 0.25 (1)
Male -	2 WC & 2 Urinals provided	
Female -	1 WC provided	
Lavatories -	4 provided	
Bathtubs or Showers -	0 required, 2 provided	
Drinking Fountains -	0 required, 1 provided	
Service Sink -	1 required, 1 provided	

EGRESS PLAN



ACCESSIBILITY DETAILS



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CODE INFORMATION & EGRESS PLAN

DCYROO-51MB-511-SH.2 REV 1

GENERAL NOTES

OFFICE AREA

1. ALL HEATING, VENTILATING, AND AIR CONDITIONING SHALL BE CENTRALLY CONTROLLED IN OFFICE AREA.
2. OFFICE AREA SHALL BE SEPARATELY PARTITIONED SECTION OF THE PREMISIES THAT IS SECURE AND ACCESSIBLE ONLY THROUGH A LOCKABLE DOOR(S).
3. OFFICE AREA FURNITURE SHALL BE FURNISHED BY BUYER TO ENSURE CONSISTENCY.
4. OFFICE AREA, LIKE THE ENTIRE PREMISES, SHALL BE COMPLIANT WITH ALL FIRE AND SAFETY CODES WHICH INCLUDE BUT ARE LIMITED TO PROPERLY POSTED EMERGENCY EVACUATION PLANS, PROPERLY POSTED AND PROMINENTL DISPLAYED EXIT SIGNS, AND FIRE EXTINGUISHERS PROPERLY MOUNTED AND MAINTAINED ON A REQUIRED BASIS BASED ON LOCAL CODE REGULATIONS. IF OFFICE AREA IS LOCATED HIGHER THAN GROUND FLOOR, THEN A DUAL EMERGENCY EVACUATION ACCESS SHALL BE INCLUDED.
5. THE ENTIRE OFFICE SPACE SHALL HAVE A SECURITY ALARM AND CONTROL SYSTEMS WITH CAMERAS UTILIZING OWNER SECURITY VENDOR.
6. OFFICE AREA SHALL BE EQUIPPED WITH A DEDICATED COMMUNICATIONS ("COMM") ROOM FOR OWNER EQUIPMENT AND SHALL MEET THE FOLLOWING REQUIREMENTS:
   a. ON ATLEAST ONE DEDICATED 20A 120V DUPLEX ELECTRICAL OUTLET
   b. ONE DEDICATED POTS (PLAIN OLD TELEPHONE SERVICE) LINE IN COMM ROOM
   c. CLIMATE CONTROLLED
   d. SECURED WITH LOCKS AND CARD KEY ACCESS
   e. 24X7 ACCESS FOR AUTHORIZED SUPPLIER EMPLOYEES
   f. 4'8' ¾ PLYWOOD BACKBOARD MOUNTED ON WALL TO SUPPORT OWNER NETWORK CABINET ENCLOSURE
   g. LADDER RACK OR CABLE TROUGH TO BE INSTALLED IN SUCH A WAY AS TO PROVIDE A PATH FOR PATCH CABLES FROM STATION CABLE PATCH PANEL(S) TO OWNER NETWORK CABINET ENCLOSURE
   h. DEDICATED CONDUIT FROM BUILDING TELECOMM DEMARCATION POINT TO SUPPLIER NETWORK CABINET. CONDUIT TO CONTAIN TWO CAT5E CABLES TERMINATED ON RJ45 JACKS.
7. DATA CABLING
   a. CATEGORY 5 ENHANCED (CATE5E) OR BETTER TO BE USED THROUGHOUT
   b. 2 DATA JACKS PER DESK/EMPLOYEE LOCATION
   c. ALL CABLE RUNS TO BE LABELED AT STATION AND PATCH PANEL ENDS
   d. ALL CABLE RUNS TO TERMINATE ON RJ45 PATCH PANEL IN COMM ROOM
   e. T568B WIRING SCHEME TO BE USED THROUGHOUT
   f. LOCATION OF STATION CABLE TERMINATIONS TO BE DETERMINED BY OWNER
   g. 120V ELECTRICAL OUTLET TO BE LOCATED NEXT TO EACH STATION TERMINATION

WAREHOUSE AREA

1. ALL HEATING AND VENTILATING SHALL BE ABLE TO BE SEPARATELY CONTROLLED IN THE WAREHOUSE AREA.
2. AREAS IN THE WAREHOUSE AREA DESIGNATED BY OWNER ON BUILDING FLOOR PLANS AS "TOOL CRIB" AND "SMALL PARTS" SHALL BE SECURED AND LOACKABLE.
3. WAREHOUSE SHALL BE USED EXCLUSIVELY BY OWNER AND WAREHOUSE AREA SHALL HAVE ITS OWN, INDEPENDENT SECURITY ALARM SYSTEM.
4. WAREHOUSE INTERIOR CLEARANCE HEIGHT AT A MINIMUM OF 18FT

FOUNDATION AND DESIGN REQUIREMENTS

1. THE CONCRETE SLAB-ON-GROUND OF THE WAREHOUSE SHALL BE DESIGNED TO SUPPORT TYPICAL OPERATIONAL LOADS FOR SUCJ STRUCTURES.
2. MINIMUM REINFORCEMENT: #4 @ 12'E.E. (WIRE MESH ARE NOT ALLOWED).
3. MINIMUM THICKNESS OF THE CONCRETE SLAB: 6 INCHES IN THE OFFICE AREA; 8 INCHES IN THE WAREHOUSE.
4. A STRUCTURAL JOINT SHALL BE REALIZED BETWEEN THE THICK PORTION (WAREHOUSE) AND THE THIN PORTION (OFFICE) OF THE CONCRETE SLAB-ON-GROUND. COLD JOINTS MUST BE DESIGNED AND REVIEWED BY EOR AND SHOWN ON DRAWINGS. HIGH STRENGTH BOLTS (A325, A490) SHALL BE PRETENSIONED BY THE TURN-ON-THE-NUT OR EQUIVALENT METHOD.
5. MOISTURE BARRIER SHALL BE INSTALLED BELOW THE FLOOR SLAB.
6. FOOTING: MINIMUM WIDTH= 12 INCHES; EXTEND STIRRUPS FROM BOTTOM FOOTING TO TOP CONCRETE (@24" MINIMUM)
7. A LOADING APRON WITH AN ADEQUATE WIDTH TO ACCOMMODATE LOADING OPERATIONS FOR FORKLIFT TRUCK SHALL BE CONSTRUCTED OUTSIDE THE OVERHEAD DOOR. A MINIMUM 30FTX30 FT LOADING APRON SHOULD BE ASSUMED. THE CONCRETE THICKNESS OF THE LOADING APRON SHALL BE THE SAME AS THE CONCRETE SLAB OF THE WAREHOUSE.

GENERAL NOTES

GRADING AND CIVIL REQUIREMENTS

1. SURFACE RUNOFF AND ROOF STORM WATER SHALL BE DIRECTED AWAY FROM THE BUILDING. FINISH GRADE SHOULD SLOPE AWAY FROM THE BUILDING FOR AT LEAST 15 FEET AND SHOULD NOT CONTAIN LOW SPOTS THAT WILL MAKE WATER PONDS.
2. BUILDING FINISH FLOOR ELEVATION SHOULD BE A MINIMUM OF 6 INCHES HIGHER THAN THE FINISH GRADE OF THE EXTERIOR YARD AT A DIS TANCE OF 15 FEET FROM THE BUILDING SO THAT A 2.5% SLOPE OF FINISH GRADE CAN BE ACHIEVED NEAR THE SIDEWALK.
3. A 4 FEET SIDEWALK SHOULD BE CONSTRUCTED AROUND THE FULL PERIMETER OF THE BUILDING.

PARKING AND ENTRANCE GATES

1. PARKING AREAS FOR A NUMBER OF "ONE TON" SERVICE TRUCKS EQUIVALENT TO THE TOTAL OCCUPANCY OF THE BUILDING PLUS THREE ADDITIONAL VISITORS SHALL BE PROVIDED. ONE ADA PARKING AND ONE TON SERVICE TRUCK VEHICLE CONCRETE SPACES SHALL BE PLACED NEAR THE OFFICE ENTRANCE. THE PARKING AREA SHALL BE SURROUNDED BY A CHAIN LINK FENCE AND IN ACCORDANCE WITH LAYOUT SHOWN IN EDF DRAWING "C101."
2. TWO LOCKABLE 40 FT SWING GATES (2X20 FT LEAVES EACH) SAHLL BE INSTALLED TO PROVIDE ENTRANCE TO THE O&M YARD. ONE MAIN GATE SHALL BE INCLUDED IN ONE OF THE TWO 20 FT LEAVES ON EACH GATE.

CONSTRUCTION REQUIREMENTS

1. PARTITIONS:

   FURNISH AND INSTALL BUILDING STANDARD 5/8" DRY WALL PARTITIONS IN ACCORDANCE WITH OWNER'S PLANS. PARTITIONING WILL EXTEND FROM FLOOR TO TWO INCHES ABOVE CEILING, EXCEPT WHERE SUPPLIER'S PLAN INDICATE THAT PARTITIONS ARE TO EXTEND TO THE UNDERSIDE OF THE EXISTING FLOOR SLAB. ALL OFFICE AND CONFERENCE ROOMS SHALL RECEIVE SOUND ATTENUATING BLANKETS, AND SHEET ROCK SHALL EXTEND ON ONE SIDE TO SLAB AND BE PENETRATED WITH OPENINGS TO PROVIDE THE VEHICLE FOR RETURN AIR FROM THE SPACE TO THE AIR HANDLING EQUIPMENT. ALL DEMISING PARTITIONING WILL MEET CODE REQUIREMENTS. ALL INTERIOR PARTITIONING SHALL BE SOUND INSULATED. SHEET ROCK WILL BE LAID UP VERTICALLY ON BOTH SIDES (EXCEPT ABOVE THE CEILING AS NOTED ABOVE) WITH ALL JOINTS, TAPED AND SANDED. ALL COLUMNS SHALL BE FIREPROOFED, ENCASED IN DRYWALL, TAPED, AND SANDED SMOOTH.

   CONTRACTOR SHALL NOTIFY OWNER'S SECURITY VENDOR FOUR (4) WEEKS PRIOR TO DRY-WALL INSTALLATION TO ALLOW FOR INSTALLATION OF THE CONDUITS, HANGERS AND APPURANCES (COMPONENTS) OF THE SECURITY ALARM AND CONTROL SYSTEMS. ALL SECURITY VENDOR INSTALLED COMPONENTS REMAIN RESERVED FOR OWNER'S SECURITY VENDOR FINAL INSTALLATION COMPLETION AND SHALL NOT BE USED BY CONTRACTOR'S ELECTRICAL SUB-CONTRACTOR. BEFORE O&M BUILDING ENERGIZATION CONTRACTOR SHALL COORDINATE WITH OWNER'S SECURITY VENDOR SO THAT THE SECURITY AND ALARM CONTROL SYSTEMS CAN BE COMPLETED AND TESTED.

2. CEILING:

   FURNISH AND INSTALL A 9'-0" HEIGHT BUILDING STANDARD CONCEALED SPLINE 1'X1' ACOUSTICAL CEILING THROUGHOUT OFFICE AND PERSONNEL SPACES IN THE PREMISES.

3. DOORS:

   FURNISH AND INSTALL WHERE DESIGNATED ON OWNER'S PLANS, ONE (1) FULL HEIGHT DOOR WITH LOCK SET HARDWARE FOR EACH, AND DOOR BUCKS. CONTRACTOR SHALL ALSO FURNISH STEEL OR ALUMINUM ENTRANCE DOORS WITH BUCK AND LATCH SET HARDWARE AT MAIN ENTRANCE OF THE PREMISES, AS SPECIFIED BY OWNER. INSULATED AND FIRE RATED DEMISING WALLS SHALL HAVE FIRE RATED DOORS COMPLETE AND READY FOR PAINTING. OFFICE ENTRANCE DOORS SHALL HAVE A SMALL FRAMED GLASS WINDOW TO ALLOW SIGHT AND ICE AND SNOW DEFLECTORS INSTALLED ABOVE.

   FURNISH AND INSTALL TWO HIGH LIFT BAY DOORS THAT ARE AT LEAST 16 FEET HIGH, INCLUDING AUTOMATIC A LIFTING SYSTEM. TWO BOLLARDS SHALL BE INSTALLED NEAR THE TWO SIDES OF EACH BAY DOOR.

4. SEPTIC TANK:

   INSTALL A SEPTIC TANK FOR THE FACILITY SEWAGE TREATMENT SYSTEM. THE SEPTIC TANK SHALL BE ADEQUATE FOR O&M OCCUPANCY WITH SOLIDS PIMPING FREQUENCY NO LESS THAN THREE YEARS. AS A MINIMUM THE SEPTIC TANK SHALL ALLOW A RETENTION OF THE RAW SEWAGE FOR AT LEAST 48 HOURS. SEPTIC TANK AND LEACHING FIELD SHALL BE LOCATED OUTSIDE THE O&M YARD FENCE.

5. OIL CONTAINMENT:

   OIL CONTAINMENT SHALL BE DESIGNED AND INSTALLED OUTSIDE THE O&M BUILDING, NEAR ONE OF THE TWO BACK CORNERS. ASSUME CLOSED WALLS ON FOUR SIDES AND ROOF, AN OVERHEAD AND WALK-IN DOOR, ELECTRICAL LIGHT AND OUTLET, CONCRETE SLAB ON GROUND WITH A CURB.

GENERAL NOTES

6. TORNADO SHELTER:

   CONTRACTOR TO INSTALL A TORNADO SHELTER OUTSIDE THE BUILDING. SHELTERS SHALL MEET STANDARD CRITERIA ON FEMA P-361 AND NATIONAL STORM SHELTER ASSOCIATION, AND SHALL BE SIZED FOR THE FULL OCCUPANCY OF THE BUILDING (20 PERSONS MINIMUM).

7. KITCHEN:

   KITCHEN SHOULD BE EQUIPPED WITH ELECTRICAL STOVE, MICROWAVE, DISHWASHER, FULL SIZE REFRIGERATOR.

8. LIGHTING:

   FURNISH AND INSTALL ONE BUILDING STANDARD 2'X4' FOUR-LIGHT 40 WATT FLUORESCENT LIGHTING FIXTURE FOR EACH 65 SQUARE FEET AND BUILDING STANDARD LENSES. FURNISH AND INSTALL EXIT LIGHTS AS REQUIRED. FURNISH AND INSTALL SILENT TYPE LIGHT SWITCHES FOR EACH PRIVATE OFFICE AND CONFERENCE ROOM.

9. ELECTRICAL FACILITIES AND OUTLETS:

   INSTALL AT LEAST ONE DEDICATED 20 AMP-120 VOLT DUPLEX ELECTRICAL OUTLET. INSTALL AN ELECTRICAL PANEL BOX WITHIN THE PREMISES, FULLY CIRCUITED FOR SIX (6) WATTS PER SQUARE FOOT INSTALLED AND OPERATIONAL. FURNISH AND INSTALL ONE 15 AMP-120 VOLT SINGLE PHASE DUPLEX ELECTRICAL OUTLET AT LOCATIONS DESIGNATED BY OWNER ON PLANS, FOR EACH 125 SQUARE FEET OF SPACE. CONVENIENCE OUTLETS, OTHER THAN SEPARATE CIRCUITS, SHALL BE CIRCUITED SEPARATELY FROM LIGHTING WITH NO MORE THAN EIGHT OUTLETS INCLUDED IN ONE CIRCUIT. FINISH FOR SUCH OUTLETS AND PLATES SHALL BE CHROME COLOR. A REASONABLE NUMBER OF SPECIAL ELECTRICAL CIRCUITS AND OUTLETS (FOR TECHNICIAN ROOM MINIMUM 12 DUPLEX OUTLETS, AND 12 DATA OUTLETS) SHALL ALSO BE FURNISHED AND INSTALLED.

   INSTALL AND FURNISH TWO 120 VOLT ELECTRICAL OUTLET TO BE LOCATED NEXT TO EACH STATION TERMINATION. INSTALL FLOOR POWER OUTLETS IN THE CONFERENCE ROOM.

10. TELEPHONE OUTLETS:

    FURNISH AND INSTALL ONE DEDICATED PLAIN OLD TELEPHONE SERVICE (POTS) LINE IN THE COMM ROOM AT THE LOCATION INDICATED BY OWNER, TELEPHONE OUTLETS AT LOCATIONS DESIGNATED BY OWNER, AND ONE TELEPHONE OUTLET PER 125 SQUARE FEET OF RENTABLE AREA. INSTALL FLOOR TELEPHONE OUTLETS IN THE CONFERENCE ROOM.

11. PAINTING:

    ALL PARTITIONS, PLASTER CEILINGS AND COVES TO BE PAINTED SHALL RECEIVE A MINIMUM OF THREE (3) COATS, ONE (1) PRIMER AND TWO (2) FINISH COATS TO COVER THE SURFACES COMPLETELY. EXPOSED METAL SURFACES SHALL BE PAINTED ONE (1) COAT ENAMEL PRIMER AND ONE (1) COAT SEMI-GLOSS.

12. FLOORING:

    FLOOR TO BE SMOOTH AND LEVEL AND FINISHED WITH VCT TILES IN OFFICE AND PERSONNEL AREAS (CERAMIC TILES IN BREAK ROOM) AND SEALED CONCRETE IN THE WAREHOUSE. NO CARPET IS ALLOWED ANYWHERE.

13. WINDOWS:

    ALL WINDOWS SHALL BE OPERABLE 4'X4' MINIMUM SIZE AND EQUIPPED WITH COVERINGS THAT WILL ALLOW FOR PRIVACY AND SHADE. CONTINUOUS CLERESTORY WINDOWS SHALL BE INSTALLED ATOP OF WAREHOUSE WALLS.

14. HEATING, VENTILATING AND AIR CONDITIONING:

    A FIRST CLASS CENTRAL AIR CONDITIONING SYSTEM SHALL BE PROVIDED. THE SYSTEM SHALL BE DESIGNED TO FURNISH TO THE PREMISES, ON AN ALL YEAR ROUND BASIS, AIR CONDITIONING, VENTILATION AND HEATING REASONABLE REQUIRED FOR COMFORTABLE OCCUPANCY OF THE PREMISES.

15. DUCTS AND CONDUITS:

    ONE DEDICATED CONDUIT FROM BUILDING TELECOMMUNICATION DEMARCATION POINT TO SUPPLIER'S NETWORK CABINET (SEE PARAGRAPH 18 WALLS) SHALL BE PROVIDED. THIS DEDICATED CONDUIT SHALL CONTAIN TWO CATEGORY 5 ENHANCED (CAT5E) CABLES TERMINATED ON RJ45 JACKS. ALL CEILING AIR HANDLERS, VAV BOXES, HEAT PUMPS OR AIR DISTRIBUTION BOXES ARE TO BE IN PLACE AND HOOKED UP IN ACCORDANCE WITH ENGINEER'S LAYOUT.

16. DOWNSPOUTS:

    THE DOWNSPOUT SHALL BE TERMINATED TO A (STAINLESS STEEL) GRATED CONCRETE DRAIN BELOW THE SIDEWALK TOP LEVEL WHICH ENTERS AN UNDERGROUND SYSTEM AFTER THE 4 FT SIDEWALK AND DISCHARGES OUTSIDE THE 15 FT ELEVATED AREA OF THE YARD.

GENERAL NOTES

17. WALLS:

    THE INSIDE FACE OF THE INTERIOR SHALL BE COMPLETED INCLUDING, BUT NOT LIMITED TO WINDOWS, MULLIONS, AND CONVECTORS INSTALLED AND FINISHED; THE PERIMETER WALL SHALL BE ENCASED IN INSULATED DRYWALL, TAPED, AND SANDED SMOOTH; THE INTERIOR CORE WALL SHALL BE ENCASED IN DRYWALL, TAPED, AND SANDED SMOOTH. AT LEAST ONE INTERIOR WALL SHALL HAVE A 4 FEET BY 8.75 FEET PLYWOOD BACKBOARD MOUNTED ON THE WALL TO SUPPORT SUPPLIER'S NETWORK CABINET ENCLOSURE. IN CONJUNCTION WITH THE NETWORK CABLE, A LADDER RACK OR CABLE TROUGH SHALL BE INSTALLED AND ACHIEVE THE PURPOSE OF PROVIDING A PATH FOR PATCH CABLES FROM THE STATION CABLE PATCH PANEL(S) TO THE SUPPLIER'S NETWORK CABINET ENCLOSURE.

1. THERMAL INSULATION IS REQUIRED ON ROOFS AND WALLS. R-VALUES AND U-FACTOR VALUES SHALL BE ADEQUATE TO THE CLIMATE ZONE OF THE BUILDING SITE.
2. ALARM AND FIRE DETECTION

   ALL ALARM, SECURITY CAMERAS AND AUTOMATIC FIRE DETECTION SYSTEMS SHALL BE INSTALLED TO PREMISES. AS A MINIMUM, WIRED AND INTERCONNECTED HEAT, SMOKE AND FLAME SENSORS (OR DUAL SMOKE ALARM: IONIZATION AND PHOTOELECTRIC). CARBON MONOXIDE SENSOR SHALL BE INSTALLED IN THE WAREHOUSE AND OFFICE AREAS.

3. INSTALL A WATER WELL INCLUDING ALL APPURTENANCES IN ONE ONE THE FRONT CORNER OF THE FENCED O&M YARD. A REMOVABLE HOUSE FOR THE WATER WELL PUMP SHALL BE INSTALLED ON TOP OF A SMALL (6'X6') CONCRETE SLAB LOCATED AT THE WATER WELL LOCATION. TYPICALLY THE LITTLE CONCRETE SLAB GETS POURED WHEN THE O&M BUILDING SIDEWALK BUILDING IS BEING POURED.
4. RESTROOMS

   EACH RESTROOM SHALL BE EQUIPPED WITH SHOWER AND LOCKERS, AND HAVE AT LEAST ONE TOILET ACCESSIBLE TO WHEELCHAIR.

   MEN RESTROOM MINIMUM REQUIREMENTS: TWO SINKS, TWO URINALS, TWO TOILETS (ONE WHEELCHAIR ACCESSIBLE), ONE TO TWO SHOWERS, AND LOCKERS FOR TOTAL OCCUPANCY. WOMEN RESTROOM MINIMUM REQUIREMENTS: ONE SINK, ONE TOILET (WHEELCHAIR ACCESSIBLE), THREE LOCKERS, ONE SHOWER.

   ONE MOP SINK WITH FAUCET SHALL BE INSTALLED IN THE WAREHOUSE.

5. UTILITIES:

   ALL UTILITIES, INCLUDING TELEPHONE AND PLUMBING, TO BE STUBBED OUT TO PREMISES. UTILITY CONNECTIONS SHALL INCLUDE RECEPTACLE(S) TO ALLOW ATTACHMENT OF A PORTABLE GENERATOR TO THE BUILDING TO POWER THE ENTIRE O&M BUILDING. ALL BASE BUILDING CONSTRUCTION COMPONENTS SUCH AS CEILING GRID, TILES, DOORS, FRAMES, SIDELIGHT ASSEMBLIES AND LIGHT FIXTURES TO BE STACKED ON FLOOR IN SUFFICIENT QUANTITIES FOR SUPPLIER PLAN BUILD OUT.

   A 6-INCH OR 5-INCH PIPE SHALL BE USED FOR MAIN SEWER LINE. SEPTIC TANK SHALL BE SHOWN ON THE DESIGN DRAWINGS.

6. DATA CABLING AND WIRING:

   ALL DATA CABLING THROUGHOUT THE PREMISES SHALL BE CATEGORY 5 ENHANCED (CAT5E) OR BETTER. EACH OFFICE DESK OR LOCATION, OR EMPLOYEES DESK OR LOCATION, SHALL BE EQUIPPED WITH 2 DATA JACKS. ALL CABLE RUNS SHALL BE LABELED AT THE STATIONS AN PATCH PANEL ENDS. ALL CABLE RUNS SHALL TERMINATE ON RJ45 PATCH PANEL IN COMM ROOM.T568B WIRING SCHEME SHALL BE USED FOR CABLING THROUGHOUT THE ENTIRE PREMISES.

   OWNER WILL DETERMINE THE LOCATION OF STATION CABLE TERMINATIONS.

   ALL OF TURBINE MANUFACTURER TELECOMMUNICATION INFRASTRUCTURE SHALL BE SEPARATED FROM ANY OTHER TELECOMMUNICATION INFRASTRUCTURE.

   A T1 DATA GRADE LINE (OR ITS EQUIVALENT) SHARED WITH THE TURBINE MANUFACTURER SHALL HAVE A ROUTER CAPABLE OF ALLOCATING BANDWIDTH BETWEEN AND OWNER AND MANUFACTURER IN A MANNER THAT PERMITS EACH TO MAKE COMMERCIALLY REASONABLE USE OF THE T1 LINE; PROVIDED, HOWEVER THAT SUFFICIENT BANDWIDTH SHALL BE AVAILABLE AT ALL TIMES TO (I) PERMIT SUPPLIER TO PERFORM THE EQUIPMENT SUPPLY OBLIGATIONS AND (II) MAINTAIN AN UPTIME ADEQUATE FOR TURBINE MANUFACTURER TO MONITOR THE TURBINE EQUIPMENT ON A REAL-TIME BASIS.

GENERAL NOTES

COMMUNICATIONS (WHERE CONFLICTS ARISE FOR IT AND SCADA REQUIREMENTS, SCADA SPECIFICATIONS PREVAIL(S)

1. CONTRACTOR TO INSTALL ONE (1) SPARE 2" CONDUIT FOR COMMUNICATIONS AT EACH WTG LOCATION ADJACENT TO A METEOROLOGICAL TOWER.
2. ALL UNDERGROUND PVC CONDUIT TO BE SCHEDULED 40 OR GREATER.
3. CONTRACTOR TO INSTALL THE COMMUNICATION CABLE FOR THE COLLECTION SYSTEM PER THE WTG MANUFACTURER'S AND OWNER'S SPECIFICATIONS. FIBER OPTIC CABLE SHALL BE INSTALLED IN A RADIAL FASHION FROM THE WTGS TO THE SUBSTATION. THE FIBER OPTIC CABLE WILL BE LABELED AND TERMINATED AT A PATCH PANEL IN THE SUBSTATION, PATCH PANEL AND TERMINATIONS TO BE PROVIDED BY THE CONTRACTOR. ALL FIBER OPTIC CABLE SHALL BE SINGLE MODE, INNER-DUCT TYPE. ALL FIBER OPTIC CABLES MUST BE INSTALLED IN 1.5" NOMINAL DIAMETER INNER-DUCT. CONTRACTOR IS RESPONSIBLE FOR TESTING OF ANY FIBER INSTALLED AND TERMINATED BY CONTRACTOR.
4. CONTRACTOR TO INSTALL CABLE ROUTE MARKERS, A MINIMUM OF 4' ABOVE-GRADE, IN INTERVALS OF NOT MORE THAN 500 FEET, AT ROAD CROSSINGS AND AT CHANGES OF DIRECTION.
5. ALL NON-ENERGIZED LINES WILL HAVE TRACER WIRE OR MARKER BILLS INSTALLED.
6. OWNER TO APPLY FOR AND COORDINATE THE INSTALLATION OF TELEPHONE/DATA SERVICE THE SITE, O&M BUILDING AND SUBSTATION CONTROL BUILDING, AS REQUIRED. THE SERVICE SHALL BE OF SUFFICIENT SIZE TO HANDLE THE PROJECT COMMUNICATION NEEDS DURING OPERATION.
7. CONTRACTOR IS TO PERFORM AN OPTICAL TIME-DOMAIN REFLECTOMETER (OTDR) TEST ON EACH FIBER OPTIC CABLE. THE TEST RESULTS SHALL CONTAIN LOSSES MEASURED AS WELL AS THE LENGTH OF EACH FIBER PER THE WTG MANUFACTURER'S REQUIREMENTS AND INDUSTRY STANDARDS.

IT REQUIREMENTS

1. THE SCADA SYSTEM SHALL INTEGRATE AND COMPLY WITH OWNER'S EXISTING NETWORK, INFRASTRUCTURE AND IP SCHEME. ALL SERVERS, ROUTERS, FIREWALLS AND SWITCHES MUST BE APPROVED BY OWNER PRIOR TO PURCHASE AND IS THE RESPONSIBILITY OF THE CONTRACTOR, EXCEPT WHERE EXPLICITLY NOTED.
2. CONTRACTOR TO SUPPLY ONE (1) FOUR (4) POST COMPUTER SERVER RACK (HPAF003A WITH DOORS BOTH FRONT AND BACK AND SIDE PANELS BOTH LEFT AND RIGHT). THE SERVER RACK IS TO BE LOCATED IN THE O&M BUILDING.
3. TWO (2) 110V 20 AMP NEMATODE 5-20R CIRCUITS WILL BE PROVIDED BY CONTRACTOR WITHIN SIX FET (6') OF THE FOUR (4) POST COMPUTER RACK TERMINATED ON L6-30R OUTLETS PROVIDED BY THE CONTRACTOR.
4. CONTRACTOR WILL PROVIDE OWNER APPROVED TELECOMMUNICATION TERMINAL EQUIPMENT FOR THE RTU.
5. CONTRACTOR TO SUPPLY AND INSTALL, IN A LOCATION APPROVED BY OWNER, A 4'X8'X3/4" SHEET OF FIRED RATED PLYWOOD FOR LEC NIU TERMINATIONS.
6. METEOROLOGICAL TOWER NETWORK CONNECTIONS AND EQUIPMENT, WHICH MUST COMPLY WITH OWNER'S EXISTING NETWORK AND IP SCHEME, TO BE APPROVED BY OWNER PRIOR TO PURCHASE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN, PROCURE, INSTALL, TERMINATE AND TEST THIS EQUIPMENT.
7. CONTRACTOR SHALL INSTALL AND TEST ALL CAT 6 TO MEET OR EXCEED TIA/EIA-568-B.
8. CONTRACTOR SHALL INSTALL AND TEST ALL SINGLE MODE/MULTI-MODE FIBER TO MEET OR EXCEED NECA/FOA301.
9. NETWORK ETHERNET CABLE TO BE CAT 6 CABLING AND SHALL BE TERMINATED ON PATCH PANELS USING 568B OR WALL JACKS USING 568B AND LABELED AS FOLLOWS:

   PANEL LOCATION (SS-SUBSTATION, OM-O&M BUILDING)- PANEL NUMBER-CABLE/PORT NUMBER E.G. SS 01-07 OR OM-01-07

10. SCADA/OPERATIONS ROOM SHALL BE EQUIPPED WITH LOCKED SECURE DOOR AND DEDICATED HVAC SYSTEM ADEQUATE AGAINST THE HEAT GENERATED BY THE SERVERS AND OTHER EQUIPMENT INSTALLED.
11. FURNISH AND INSTALL AN UPS SYSTEM SIZED TO POWER ALL TELECOMMUNICATIONS EQUIPMENT FOR 8 HOURS ONCE UTILITY POWER IS LOST.

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LICENSED ARCHITECT — FRANCIS JOSEPH KOLKER — 2923 — DATE 10/03/2019 — STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
1	ISSUED FOR CONSTRUCTION		05/08/19	KM	MS	MS

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

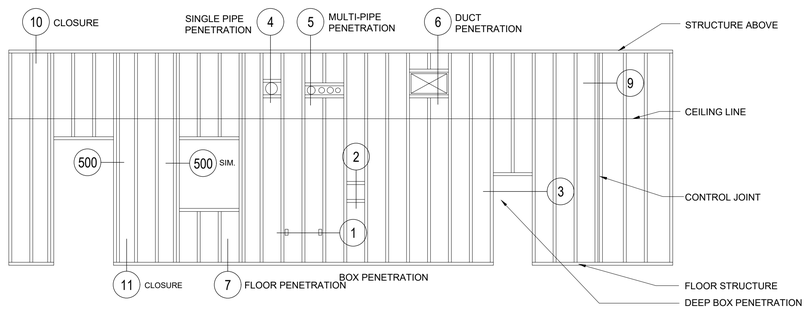
edf renewable energy

MERRICOURT O&M BUILDING WIND PROJECT

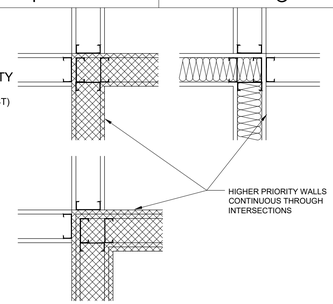
DWN: FK	DATE:07/01/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

GENERAL NOTES

SH.3 — REV 1



PARTITION RATING	PRIORITY
2 HOUR FIRE/SMOKE BARRIER	1 (HIGHEST)
2 HOUR FIRE WALL OR SHAFTWALL	2
1 HOUR FIRE/SMOKE BARRIER	3
1 HOUR FIRE WALL	4
NON-RATED SMOKE PARTITION	5
NON-RATED ACOUSTICAL WALL	6
NON-RATED NON-ACOUSTICAL 7 (LOWEST)	7



NOTES

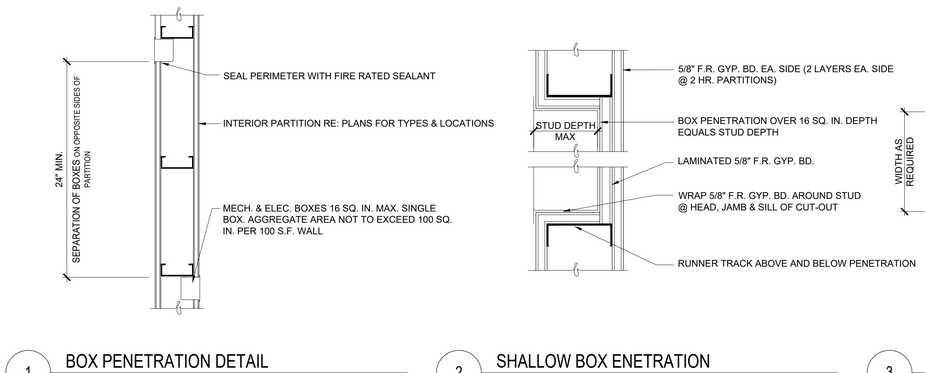
1. PENETRATION DETAILS 1 THROUGH 9 ARE FOR CONDUIT, PIPE, DUCT, ETC. PENETRATIONS THROUGH FIRE RATED PARTITIONS AND ARE GENERIC IN NATURE. THE CONTRACTOR IS REQUIRED TO SUBMIT FOR APPROVAL, TO THE ARCHITECT, DETAILS SPECIFIC TO THE SEALANT AND FIRE-PROOFING MATERIAL MANUFACTURER'S TESTED AND APPROVED SYSTEMS INCLUDING SPECIFIC TEST DATA.

2. CLOSURE DETAILS 10 & 11 ARE TYPICAL FOR ALL FULL-HEIGHT RATED & NON-RATED PARTITIONS (REFER PARTITION TYPES).

3. DETAILS & U.L. DESIGN NUMBERS SHOWN ARE REPRESENTATIVE OF THE MOST TYPICAL CONDITIONS ONLY AND OTHER ASSEMBLIES MAY BE REQUIRED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SELECT, SUBMIT & INSTALL U.L. DESIGNS THAT ARE APPROPRIATE FOR ANY GIVEN CONDITION TO ACHIEVE THE REQUIRED FIRE-RESISTANCE RATING.

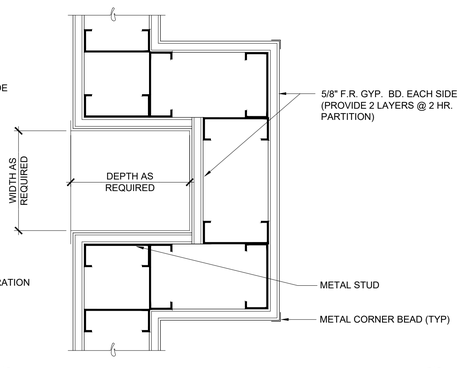
FIRE RATED PARTITION DETAIL REFERENCE ELEVATION

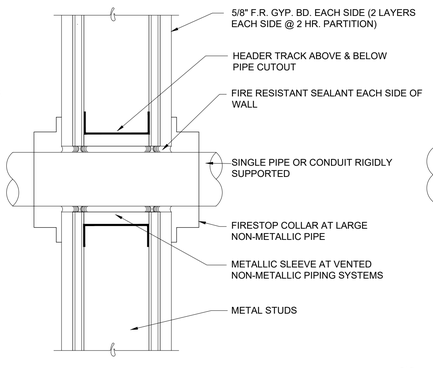
1/4" = 1'-0"

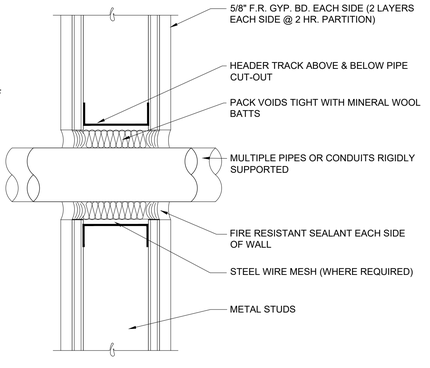


TYPICAL WALL PRIORITIES LEGEND

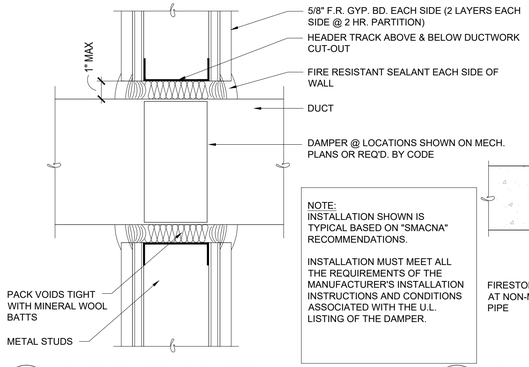
N.T.S.



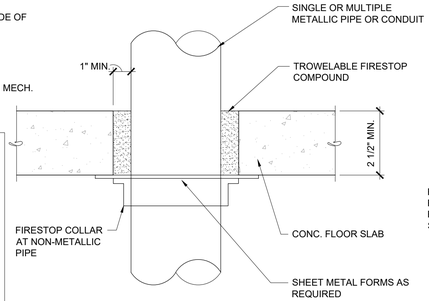




1 BOX PENETRATION DETAIL
1 1/2" = 1'-0" — UL# - U425



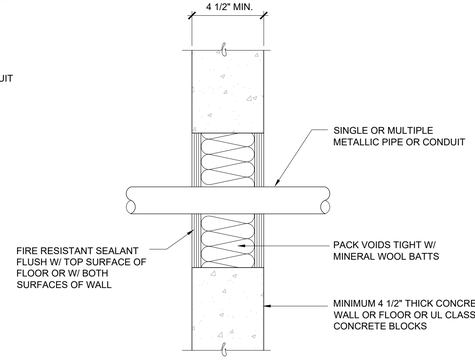
2 SHALLOW BOX ENETRATION
3" = 1'-0" — UL# - U425



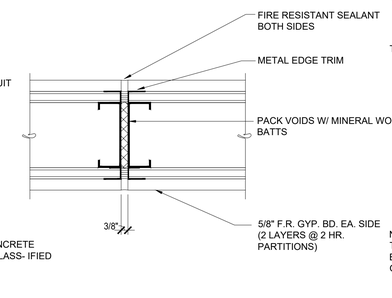
NOTE:
INSTALLATION SHOWN IS TYPICAL BASED ON "SMACNA" RECOMMENDATIONS.

INSTALLATION MUST MEET ALL THE REQUIREMENTS OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND CONDITIONS ASSOCIATED WITH THE U.L. LISTING OF THE DAMPER.

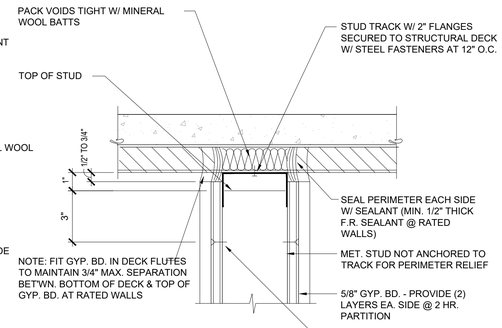
3 DEEP BOX PENETRATION
3" = 1'-0" — UL# - U425



4 SINGLE PIPE PENETRATION
3" = 1'-0" — UL# - WL2098, UL# - WL2128, UL# - WL2078, UL# - WL1085



5 MULTI PIPE PENETRATION
3" = 1'-0" — UL# - WL8004, UL# - WL1057



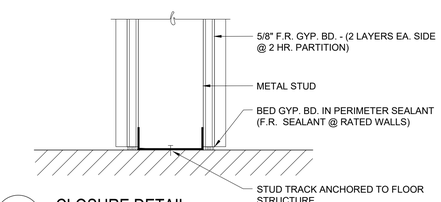
6 DUCT PENETRATION DETAIL
3" = 1'-0" — UL# - WL7007

7 PIPE PENETRATION DETAIL
3" = 1'-0" — UL# - CAJ1140, UL# - FA2025

8 PIPE PENETRATION DETAIL
3" = 1'-0" — UL# - CAJ1149, UL# - CAJ8041

9 WALL CONTROL JOINT
3" = 1'-0" — UL# - WWS0003

10 CLOSURE DETAIL
3" = 1'-0" — UL# - HWD0063



11 CLOSURE DETAIL
3" = 1'-0" — 1-HOUR UL# - U425, 2-HOUR UL# - U411

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LICENSED ARCHITECT — MARCUS JOSEPH KAUTZ — 2923 — DATE 10.03.2019 — STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
1	ISSUED FOR CONSTRUCTION		05/08/19	KM	MS	MS

REFERENCE DRAWINGS		
DWG NO.	MANUFACTURER	DESCRIPTION

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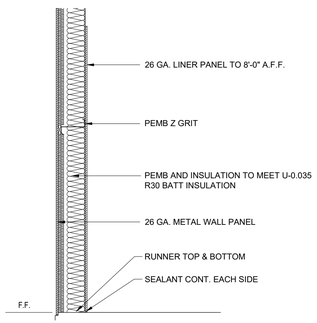
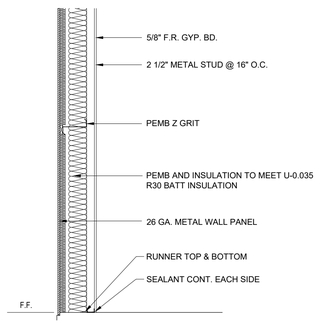
APVD:	DATE:	SCALE: AS NOTED	

PENETRATION DETAILS

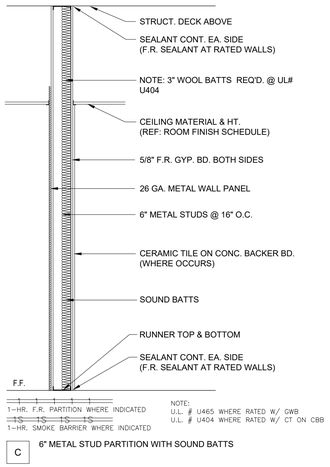
SH.4 — REV 1



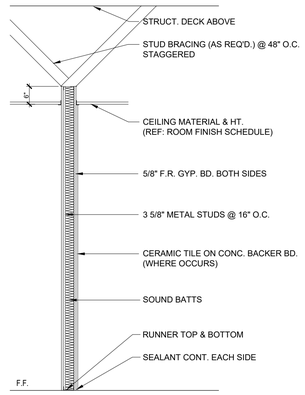
A EXTERIOR WALL (SKYLINER SYSTEM)



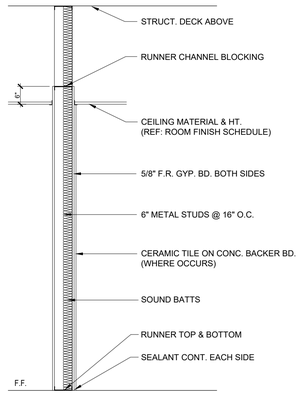
B EXTERIOR WALL (SKYLINER SYSTEM)



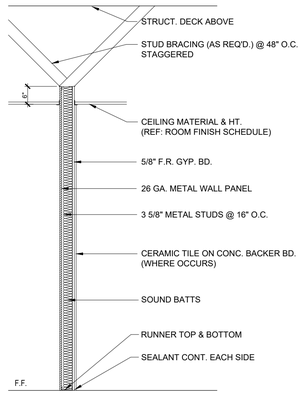
C 6" METAL STUD PARTITION WITH SOUND BATTS



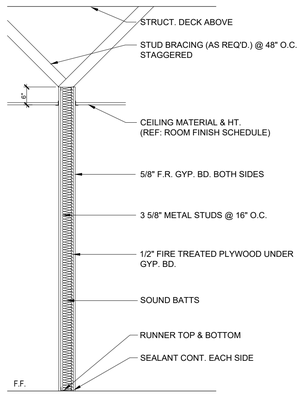
D 3 5/8" METAL STUD PARTITION WITH SOUND BATTS



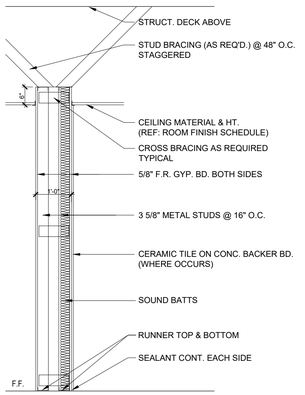
E 6" METAL STUD PARTITION WITH SOUND BATTS



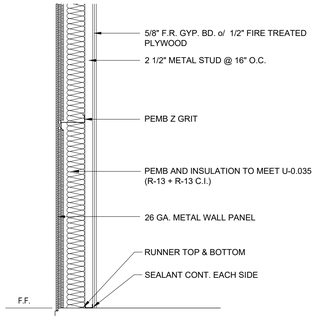
F 3 5/8" METAL STUD PARTITON WITH SOUND BATTS



G 3 5/8" METAL STUD PARTITON WITH SOUND BATTS



H METAL STUD PLUMBING PARTITION WITH SOUND BATTS



J EXTERIOR WALL (SKYLINER SYSTEM)

GENERAL NOTES:

1. PARTITION TYPES ARE STANDARD AND NOT ALL MAY BE USED FOR THIS PROJECT.
2. REFER FLOOR PLANS FOR WHERE CORRIDOR, SMOKE, 1-HOUR, 2-HOUR & RATED SMOKE BARRIER PARTITION TYPES ARE INDICATED.
3. ALL GYP. BOARD TO BE FIRE-RATED. CONSTRUCT FIRE-RATED PARTITIONS IN FULL ACCORDANCE W/ U.L. NUMBERS INDICATED.
4. STENCIL ABOVE SCHEDULED CEILNGS THE FIRE RESISTANT RATING ON ALL RATED WALLS/PARTITIONS/BULKHEADS. TEXT SHALL READ APPROPRIATELY "SMOKE WALL", "1HR WALL", "1HR SMOKE WALL", "2HR WALL" OR "2 HR SMOKE WALL" WITH PAINTED 3" RED LETTERS. TEXT SHALL NOT BE VISIBLE FROM BELOW CEILING; SPACED 48" O.C. IN THE CEILING CAVITY AND WILL BE LOCATED ON BOTH SIDES OF THE PARTITION IF APPROPRIATE.
5. ALL WET WALLS, JANITOR CLOSETS & FIRE RISER ROOMS TO RECEIVE CONCRETE BACKER BOARD - MATCH GYPSUM BOARD THICKNESS.

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LICENSED ARCHITECT
AMANDA JOSEPH KNOX
2923
DATE 10.03.2019
STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
1	ISSUED FOR CONSTRUCTION		05/08/19	KM	MS	MS

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

eDF renewable energy

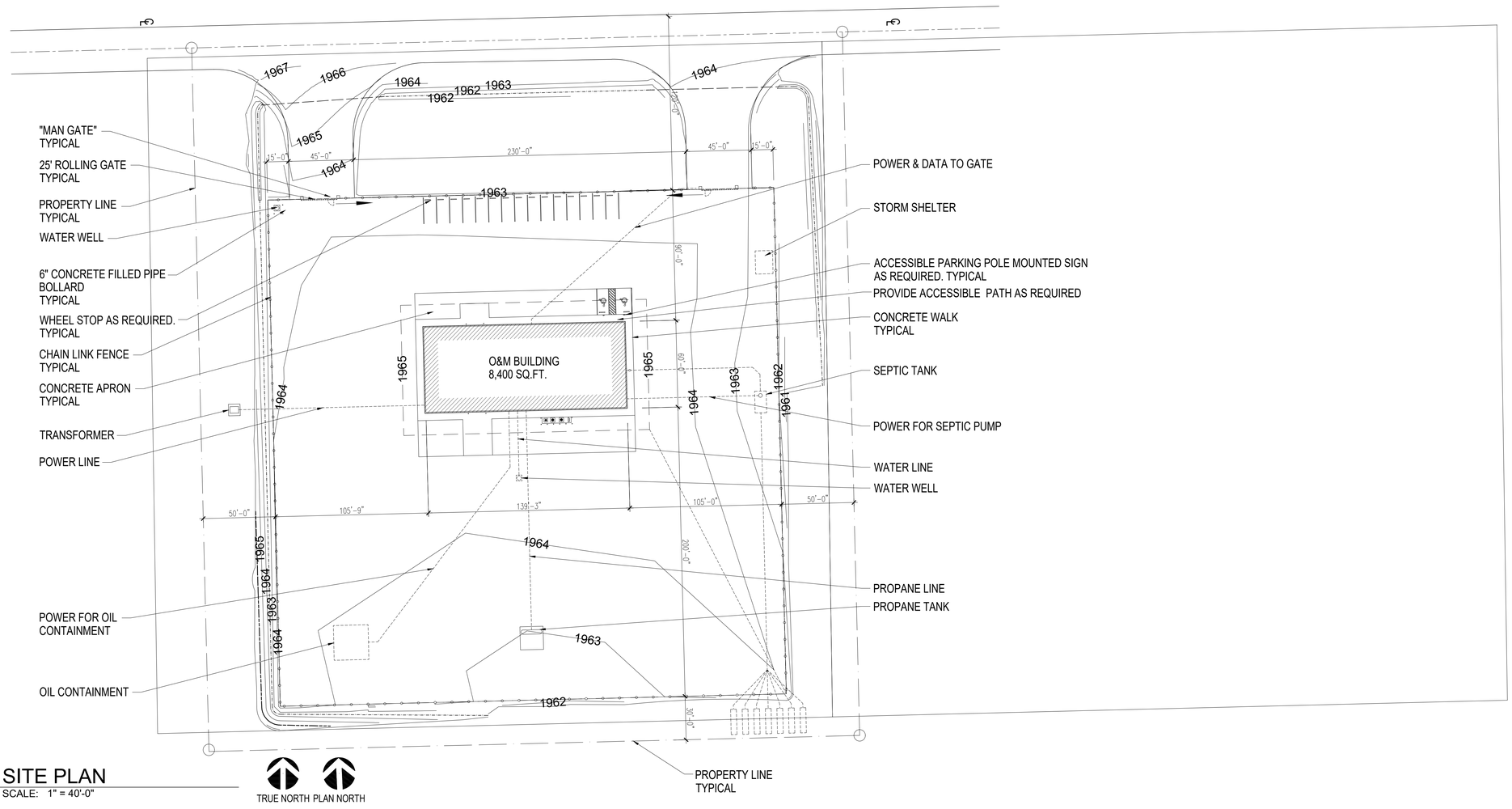
MERRICOURT O&M BUILDING WIND PROJECT

DWN: FK	DATE:07/01/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

PARTITION TYPES

SH.5

REV 1



1 SITE PLAN
SCALE: 1" = 40'-0"

TRUE NORTH PLAN NORTH

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LICENSED ARCHITECT
JACOB JOSEPH KUHN
2923
DATE 10.03.2019
STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	
AB	AS-BUILTS SITE REVISIONS		11/19/2020	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

edf renewable energy

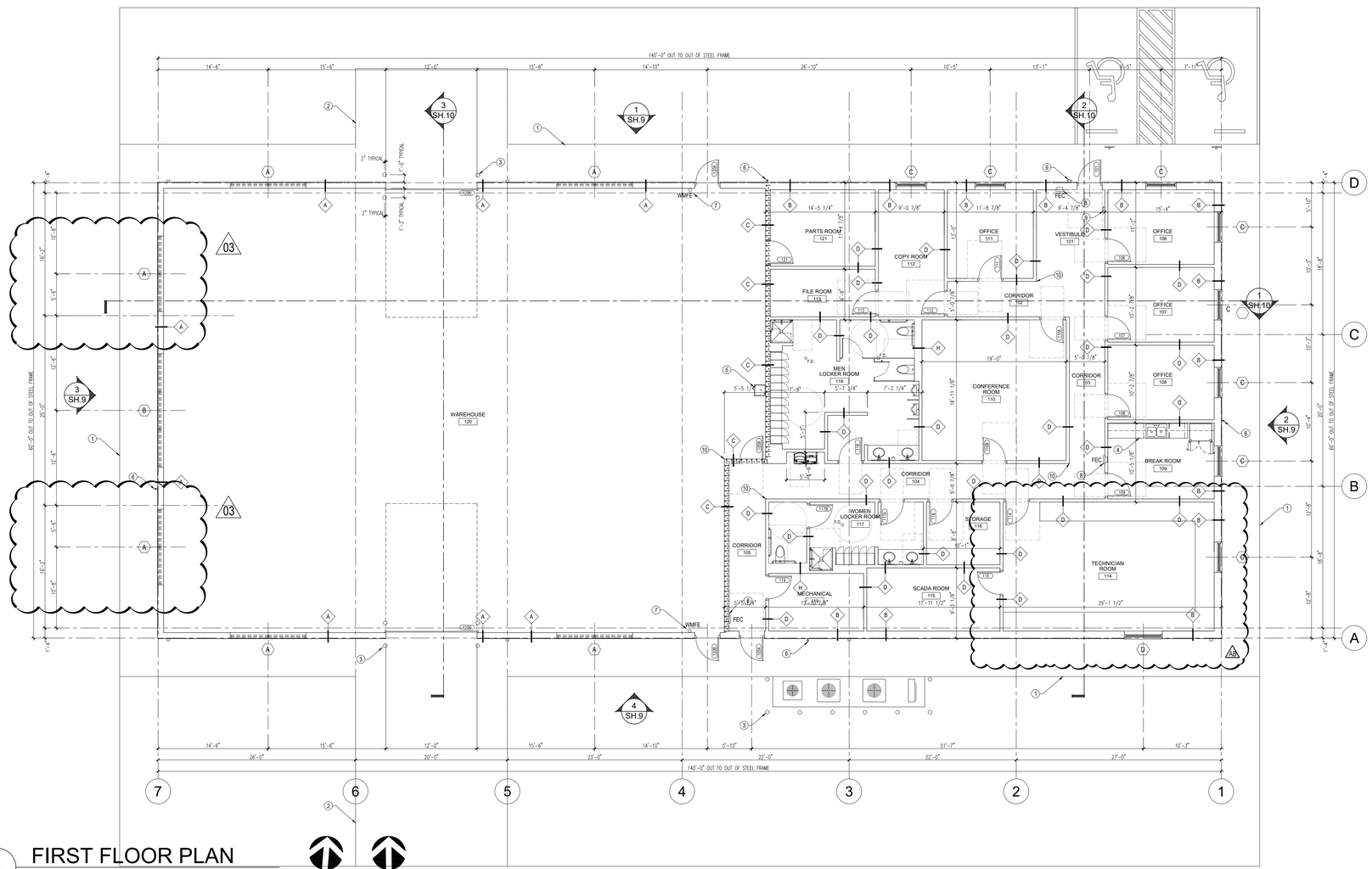
MERRICOURT O&M BUILDING WIND PROJECT

DWN: FK	DATE:08/13/2019	CHK:	DATE:
ENG:	DATE:10/03/2019	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

SITE PLAN

SH.6

REV 1



1 FIRST FLOOR PLAN
SCALE: 1/8" = 1'-0"

TRUE NORTH PLAN NORTH

PLAN KEY NOTES

1. 5' WIDE x4" CONCRETE SIDEWALK. REFER STRUCTURAL
2. 8" REINFORCED CONCRETE APRON
3. CONCRETE FILLED 6" BOLLARD.
4. 2'-0" DEEP BASE AND UPPER LAMINATED CABINETS
5. 24"x24" UTILITY SINK, INSTALL FRP BOARD ON 3 /4" EXTERIOR GRADE PLYWOOD 4'-0" WIDE x 8'-0" HIGH BEHIND SINK.
6. FREEZE PROOF HOSE BIB, FOUR EXTERIOR AND ONE INTERIOR
7. WALL MOUNTED 3A-40B-C FIRE EXTINGUISHER
8. SEMI RECESSED FIRE EXTINGUISHER CABINET w/ 3A-40B-C FIRE EXTINGUISHER
9. POWER ASSIST DOOR SWITCH
10. CORNER GUARDS (4'-0" HIGH, CLEAR PLASTIC)

GENERAL FLOOR PLAN NOTES

NOTE: THESE GENERAL NOTES APPLY TO ALL ARCHITECTURAL FLOOR PLANS

1. ALL DIMENSIONS ARE FROM FINISHED WALL TO FINISHED WALL UNLESS NOTED OTHERWISE.
2. REFER TO THE MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR ADDITIONAL NOTES AND WORK THAT MAY NOT BE INDICATED ON THIS DRAWING.
3. ALL EQUIPMENT, FINISHES AND TOILET ACCESSORIES TO BE INSTALLED ARE TO COMPLY WITH ANSI A117.1, AMERICAN WITH DISABILITIES ACT AND OTHER SPECIFIC STANDARDS, CODES AND REGULATIONS ESTABLISHED BY LOCAL AUTHORITIES HAVING JURISDICTION.
4. ANGLES ARE AT 45° UNLESS OTHERWISE INDICATED.
5. VERIFY ALL DIMENSIONS AND CLEARANCES.
6. ALL MASONRY DIMENSIONS ARE SHOWN AS NOMINAL (±3/8"), UNLESS NOTED OTHERWISE.
7. DO NOT SCALE OFF PLANS. CONTACT ARCHITECT WITH DIMENSION QUESTIONS.
8. EQUIPMENT ROOMS ARE DESIGNED TO BE USED FOR STORAGE OF EQUIPMENT AND ARE NOT TO BE USED FOR STORAGE OF ANY COMBUSTIBLE MATERIALS.
9. GENERAL CONTRACTOR TO COORDINATE CONSTRUCTION PHASING WITH OWNER.
10. THE GENERAL CONTRACTOR IS RESPONSIBLE TO PROVIDE AND INSTALL ALL BLOCKING AND GROUNDS AS REQUIRED FOR THE INSTALLATION OF MILLWORK AND ANY HANGING OBJECTS AS REQUIRED.
11. DOORS WITH WALL STOP TO BE 4" FROM WALL TYPICAL UNO.
12. THE CONTRACTOR SHALL TAKE OUT ALL NECESSARY PERMITS, INSURANCE, LICENSEES AND CERTIFICATES AND PAY ALL FEES CONNECTED THEREWITH.
13. THE CONTRACTOR AT ALL TIMES SHALL KEEP THE PREMISES FREE FROM WASTE MATERIALS AND RUBBISH CAUSED BY THE WORK.
14. ALL DOORS AND HARDWARE SHALL BE IN COMPLIANCE WITH APPLICABLE ACCESSIBILITY CODES AND ORDINANCES. ALL WORK TO BE DONE IN COMPLIANCE WITH THE LATEST LOCAL AND STATE BUILDING CODES AND ORDINANCES.
15. PROVIDE 5/8" CEMENT BOARD IN LIEU OF GYPSUM BOARD AT ALL TILE AND WET WALLS.
16. VERIFY ALL SLEEVE LOCATIONS THROUGH FOUNDATION WALL AND ALL UTILITY LOCATIONS WITH MEP AND CIVIL DESIGN.
17. PROVIDE RIGID INSULATION FLASHED TO METAL BUILDING AND DOWN TO FOOTING.
18. VERIFY CODE REQUIREMENTS FOR FIRE EXTINGUISHER.

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LICENSED ARCHITECT JACQUES JOSEPH KLEIN 2923 DATE 10/03/2019 STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	
02	BOLLARD DIMENSIONS		10/23/2019	FK	FK	
03	WINDOW REVISIONS		11/23/2019	FK	FK	
AB	AS-BUILTS MILLWORK REVISIONS		11/19/2020	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

EDF renewable energy

MERRICOURT O&M BUILDING WIND PROJECT

DWN: FK	DATE:10/03/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
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FLOOR PLAN

SH.7

REV 1

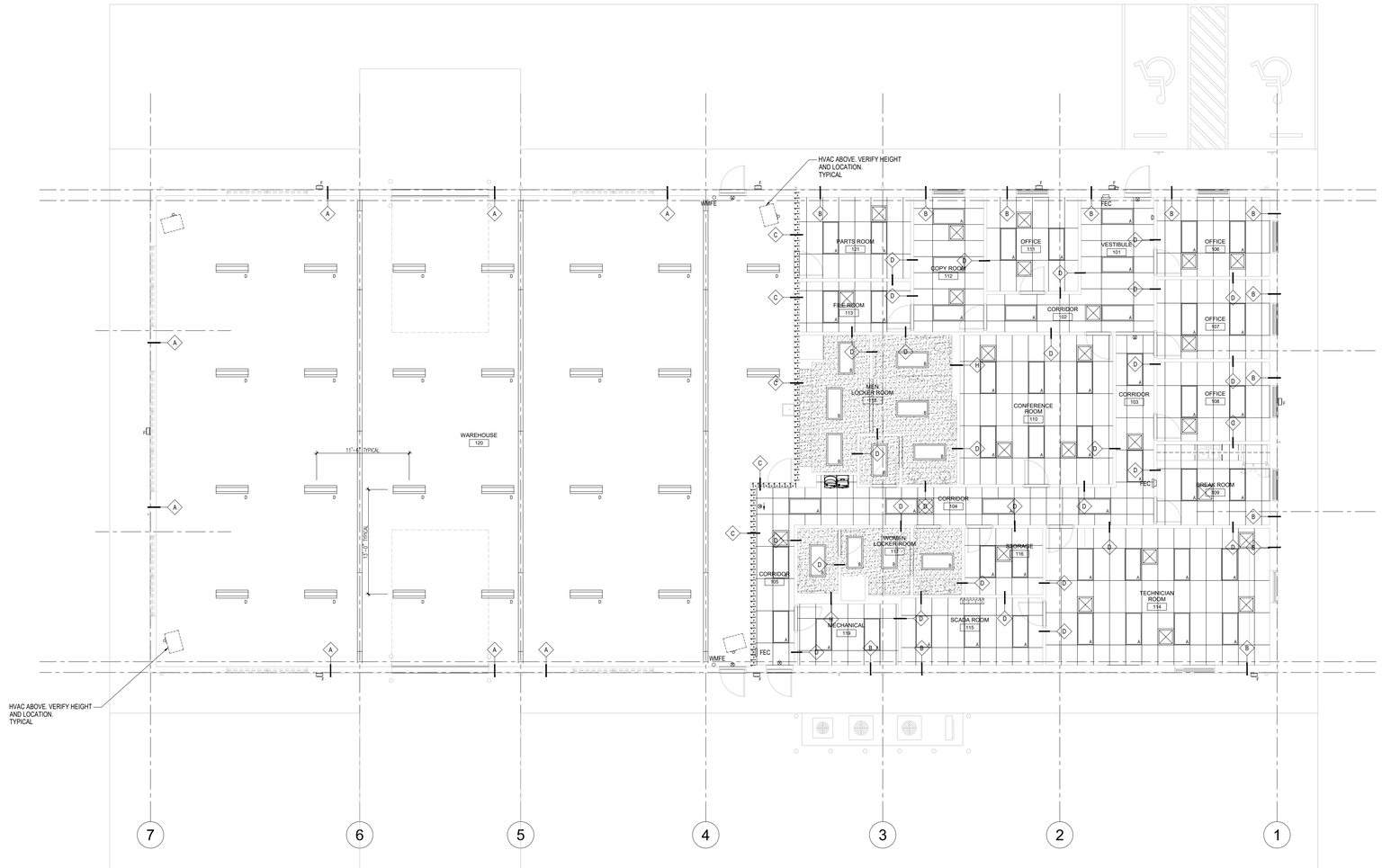
REFLECTED CEILING LEGEND

- SUPPLY AIR GRILL
- RETURN AIR GRILL
- EXHAUST AIR GRILL
- LIGHT STRIP
- DOWN/CAN LIGHT
- LIGHTED EXIT SIGN
- 2x2 FLUORESCENT LIGHT
- 2x4 FLUORESCENT LIGHT
- 1x4 FLUORESCENT LIGHT

REFLECTED CEILING PLAN NOTES

1. DO NOT SCALE OFF PLANS. CONTACT ARCHITECT WITH DIMENSION QUESTIONS.
2. ALL EXIT LIGHTS TO HAVE DEDICATED EMERGENCY POWER.
3. REFER M.E.P. FOR SPECIFICATIONS AND CONFIGURATION OF MECHANICAL, ELECTRICAL & PLUMBING ITEMS.
4. MECHANICAL, ELECTRICAL AND PLUMBING CONTRACTOR TO COORDINATE WITH OWNER REQUIREMENTS AND BUILD AS REQUIRED.
5. VERIFY ALL REQUIRED ACCESS PANEL SIZES AND LOCATIONS AT GYP. BD. CEILINGS. PROVIDE FLUSH ACCESS PANELS AT ALL EQUIPMENT, VALUES, DAMPER, CONTROLS, CLEANOUTS, ETC.. PAINT TO MATCH CEILING FINISH.
6. ALL CIRCUIT BREAKERS AND LIGHT SWITCHES TO BE LABELED.
7. ELECTRICAL CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO ORDERING FIXTURES.
8. ALL CEILING MATERIAL MUST HAVE CLASS "C" FIRE RATING.
9. SUPPORT WIRES FOR CEILING SUSPENSION SHALL BE ANCHORED TO STRUCTURE ABOVE AND AS REQUIRED BY LANDLORD. SUPPORT WIRES SHALL NOT BE CONNECTED TO ANY MECHANICAL, ELECTRICAL, PLUMBING OR FIRE PROTECTION PIPING OR EQUIPMENT.
10. SEAL ALL PENETRATIONS.
11. ALL EXPOSED GYP. BD. CEILINGS &AND SOFFITS SHALL HAVE LEVEL 5 FINISH & SHALL BE PAINTED. ALL CONCEALED CEILINGS AND SOFFITS SHALL HAVE FIRE TAPE FINISH LEVEL 2.
12. CENTER CEILING GRID AND LIGHTS IN ROOM UNLESS NOTED OTHERWISE.
13. ELECTRICAL CONTRACTOR TO COORDINATE LIGHTING ZONES w/ DESIGNER.
14. PROVIDE ACRYLIC EDGE RED EXIT SIGNS. EMERGENCY LIGHTING WITH BATTERY BACKUP. EMERGENCY EGRESS PATH MUST REMAIN LIT BY MINIMUM 1 FC AT POWER OUTAGE. THREE NIGHT LIGHTS REQUIRED IN PRODUCTION AREA.
15. SUBMIT CUT SHEETS FOR REVIEW BY OWNER, DESIGNER AND ARCHITECT.
16. REFER ELECTRICAL FOR FIXTURE INFORMATION.

NOTE: THIS DRAWING INDICATES GENERAL LAYOUT AND DESIGN OF LIGHTING SYSTEMS. REVIEW BY QUALIFIED ENGINEERS IS NECESSARY TO ASSURE SAFETY AND CODE COMPLIANCE.



1 REFLECTED CEILING PLAN
SCALE: 1/8" = 1'-0"

TRUE NORTH PLAN NORTH

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LICENSED ARCHITECT FRANCIS JOSEPH KOLB 2923 DATE 10.03.2019 STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	
AB	AS-BUILTS EXTERIOR LIGHTING REVISIONS		11/19/2020	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

edf renewable energy

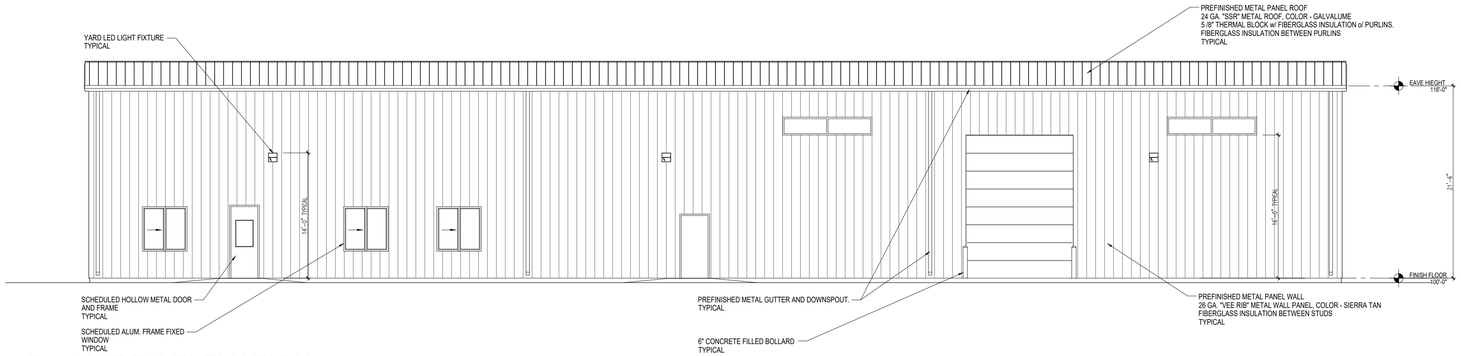
MERRICOURT O&M BUILDING WIND PROJECT

DWN: FK	DATE:10/03/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

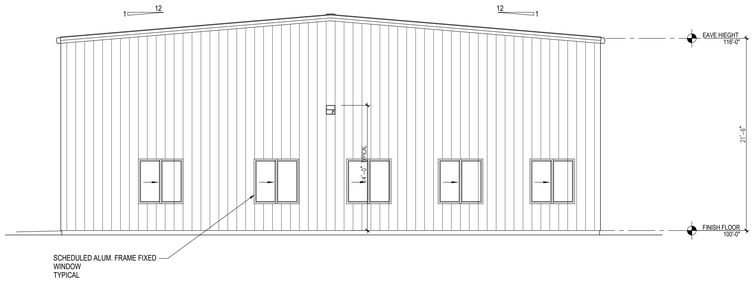
REFLECTED CEILING PLAN

SH.8

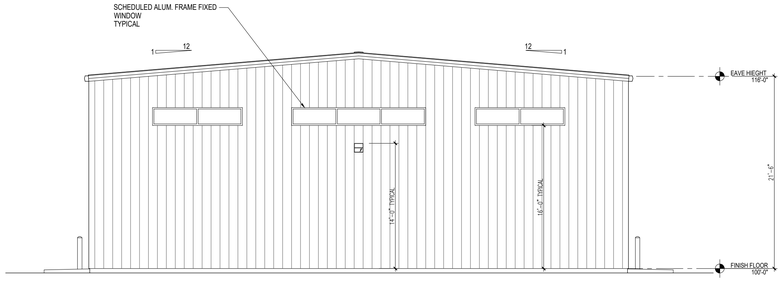
REV 1



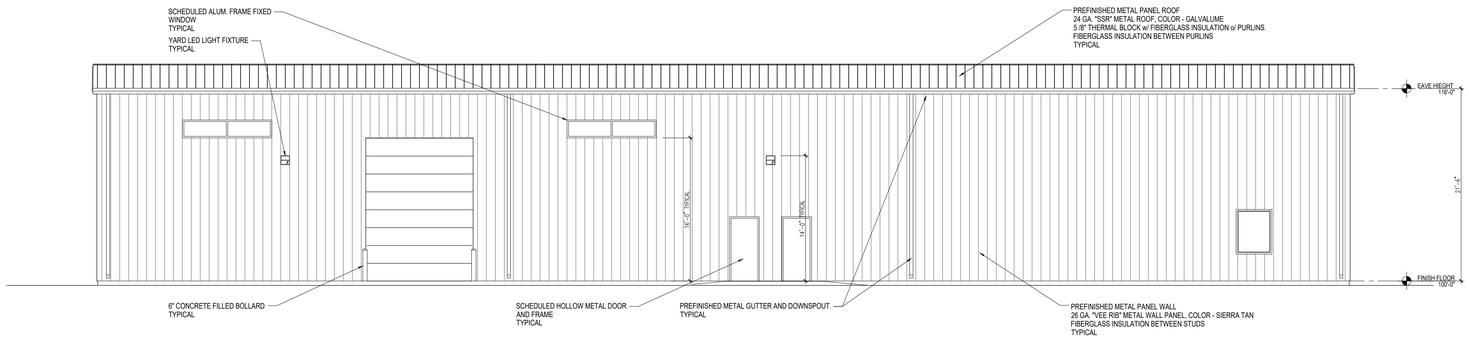
1 NORTH ELEVATION
SCALE: 1/8" = 1'-0"



2 EAST ELEVATION
SCALE: 1/8" = 1'-0"



3 WEST ELEVATION
SCALE: 1/8" = 1'-0"



4 SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

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LICENSED ARCHITECT
SAMUEL JOSEPH KRESHAM
2923
DATE 10/03/2019
STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	
02	REVISED EXTERIOR DOOR TYPE		10/23/2019	FK	FK	
03	WINDOW REVISION		11/23/2019	FK	FK	
AB	AS-BUILTS EXTERIOR LIGHTS REVISION		11/19/2020	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS		
DWG NO.	MANUFACTURER	DESCRIPTION

edf renewable energy

MERRICOURT O&M BUILDING WIND PROJECT

DWN: FK	DATE:10/03/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
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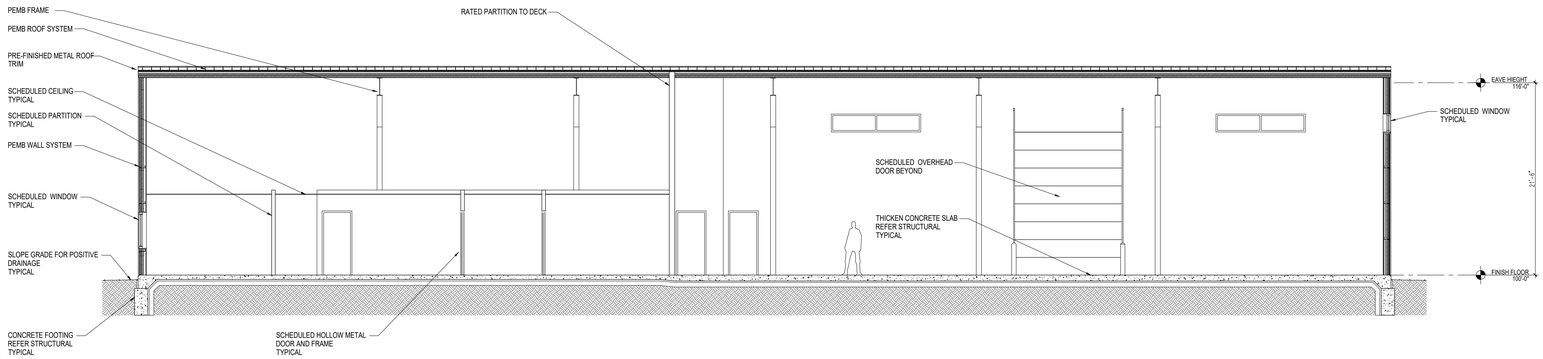
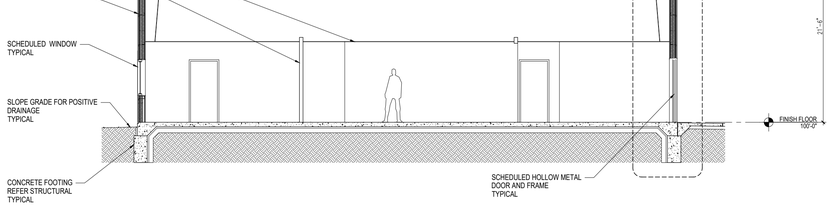
EXTERIOR ELEVATIONS AND
BUILDING SECTIONS

SH.9

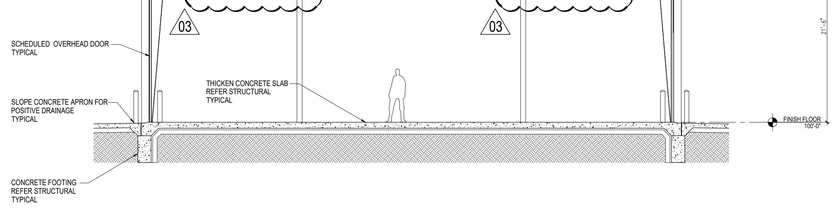
REV 1



1 BUILDING SECTION
SCALE: 1/8" = 1'-0"



2 BUILDING SECTION
SCALE: 1/8" = 1'-0"



3 BUILDING SECTION
SCALE: 1/8" = 1'-0"

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LICENSED ARCHITECT
FRANCIS JOSEPH KUHN
2923
DATE 10.03.2019
STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	
02	REVISED EXTERIOR DOOR TYPE		10/23/2019	FK	FK	
03	WINDOW REVISIONS		11/23/2019	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

EDF renewable energy

MERRICOURT O&M BUILDING WIND PROJECT

DWN: FK	DATE:10/03/2019	CHK:	DATE:
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EXTERIOR ELEVATIONS AND BUILDING SECTIONS

SH.10

REV 1

DOOR SCHEDULE

DOOR NO.	DOOR SIZE	DOOR TYPE	FRAME TYPE	LABEL	GLAZING TYPE	DOOR DETAILS			HARDWARE SET	REMARKS
						HEAD	JAMB	SILL		
101	3'-0"x7'-0"	5	A	-	-	-	-		#1	1, 2, 3
105A	3'-0"x7'-0"	4	A	-	-	-	-	-	#1	1, 2
105B	3'-0"x7'-0"	3	B	45 MIN	-	2/SH11	3/SH11	-	#2	1, 2
106	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
107	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
108	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
109	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#6	-
110A	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
110B	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
111	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
112	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#6	-
113	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
114	3'-0"x8'-0"	2	A	-	-	2/SH11	3/SH11	-	#5	-
115	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#7	-
116	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#4	-
117A	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#3	-
117B	3'-0"x4'-6"	8	A	-	-	2/SH11	3/SH11	-	#8	-
118	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#3	-
119	3'-0"x7'-0"	2	A	-	-	2/SH11	3/SH11	-	#4	-
120A	3'-0"x7'-0"	4	A	-	-	-	-	-	#1	1, 2
120B	3'-0"x7'-0"	4	A	-	-	-	-	-	#1	1, 2
120C	12'-0"x16'-0"	9	-	-	-	-	-	-	-	5
120D	12'-0"x16'-0"	9	-	-	-	-	-	-	-	5
121	3'-0"x7'-0"	1	A	-	-	2/SH11	3/SH11	-	#4	-

REMARKS
1. CARD SWIPE KEYCARD ACCESS
2. PANIC HARDWARE
3. ADA POWER ASSIST DOOR
4. EXISTING DOOR AND FRAME TO REMAIN. DOOR AND FRAME TO BE PAINTED
5. DOOR HEAD AND JAMB AS PER PEMB MANUFACTURER SPECIFICATIONS

GENERAL DOOR NOTES

1. COORDINATE THE FITTING OF ALL DOORS PER THE SPECIFIC AREA AS WELL AS THE ACTUAL FINISH FLOOR LEVEL.
2. FIELD MEASURE OPENING TO ASSURE PROPER FIT.
3. AT THE HINGE SIDE, LOCATE THE FACE OF THE DOOR JAMB SO THAT THE FACE OF THE DOOR IN THE OPEN POSITION IS NO CLOSER THAN 5" FROM THE NEAREST RETURNING PARTITION & ALLOW FOR A 90 DEGREE SWING, UNLESS NOTED OTHERWISE.
4. PROVIDE ALL TRIM ATTACHMENTS & FASTING REQUIRED FOR A PROPER & COMPLETE INSTALLATION.
5. INSTALL HARDWARE ACCORDING TO THE STANDARD 7 REQUIREMENTS OF THE APPROVED MANUFACTURER.
6. HARDWARE SUBMITTALS ARE REQUIRED FOR APPROVAL PRIOR TO ORDER & PLACEMENT OR INSTALLATION. PROVIDE A.B. SYSTEMS INC. WITH TWO COPIES FOR REVIEW.
7. LATCHING & LOCKING DOORS THAT ARE HAND ACTIVATED & WHICH ARE A REQUIRED EGRESS, SHALL BE OPERABLE WITH A SINGLE EFFORT BY LEVER TYPE HARDWARE, PANIC BARS, PUSH PULL OR OTHER APPROVED HARDWARE. NO SPECIAL KNOWLEDGE OF DOOR OPERATION WILL BE APPRPVED. MOUNT DOOR OPENING HARDWARE BETWEEN 30" AND 44" ABOVE FINISH FLOOR.
8. MAXIMUM PULL OR PUSH EFFORT TO OPERATE DOORS SHALL NOT EXCEED 8.5 LBS. FOR EXTERIOR DOORS AND 5 LBS. FOR INTERIOR DOORS, MEASURED AT RIGHT ANGLES TO HINGED DOORS.

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS				CEILING	HEIGHT	REMARKS
				NORTH	EAST	SOUTH	WEST			
101	VESTIBULE	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
102	CORRIDOR	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
103	CORRIDOR	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
104	CORRIDOR	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
105	CORRIDOR	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
106	OFFICE	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
107	OFFICE	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
108	OFFICE	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
109	BREAK ROOM	CT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
110	CONFERENCE ROOM	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
111	OFFICE	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
112	COPY ROOM	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
113	FILE ROOM	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
114	TECHNICIAN ROOM	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
115	SCADA ROOM	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	PROVIDE F.T. 4'x8'x3/4" WALL MOUNTED PLYWOOD FOR EQUIPMENT (PAINT)
116	STORAGE	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	-
117	WOMEN LOCKER ROOM	VCT	RCB	FRP	FRP	FRP	FRP	GB	9'-0"	-
118	MEN LOCKER ROOM	VCT	RCB	FRP	FRP	FRP	FRP	GB	9'-0"	
119	MECHANICAL	VCT	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	
120	WAREHOUSE	CS	NPLP	NPLP	NPLP	NPLP	NPLP	-	-	
121	PARTS ROOM	CS	RCB	PT1	PT1	PT1	PT1	ACT1	9'-0"	

ABBREVIATIONS

ACT1	ACOUSTICAL LAY-IN CEILING w/ WHITE GRID (2'x4')	NPLP	NON-PERFORATED LINER PANEL
ACT2	ACOUSTICAL LAY-IN CEILING w/ WHITE GRID (2'x4' WASHABLE)	PF	PREFINISHED
CONC	CONCRETE	PP	PERFORATED PANEL
CPT	CARPET	PT1	PAINT (LATEX-BASED EGGSHELL FINISH)
CS	CONCRETE SEALER (EPOXY COATING)	PT2	PAINT (LATEX-BASED SEMI-GLOSS FINISH)
CT	CERAMIC TILE	QT	QUARRY TILE
CTW	CERAMIC WAINSCOT	RCB	RUBBER COVE BASE
EPOXY	EPOXY PAINT	VB	VINYL BASE
FRP	FIBERGLASS REINFORCED PLASTIC PANEL	VCT	VINYL COMPOSITION TILE
GB	GYPSUM BOARD (AS NOTED ON DRAWINGS)	ES	EXPOSED STRUCUTRAL
IN	EXPOSED VINYL FACED INSULATION		

AB

DOOR HARDWARE SETS

NOTE: PROVIDE MORTISE LEVER LOCK SETS ON ALL DOORS

HARDWARE SET #1
2 EA. HINGE
1 EA. ELECTRIC HINGE
1 EA. RIM EXIT DEVICE
1 EA. SURFACE CLOSER
1 EA. KICK PLATE
1 EA. THRESHOLD
1 EA. GASKETING
1 EA. DRIP STRIP
1 EA. SWEEP
1 EA. CARD READER

HARDWARE SET #2
1 EA. RIM EXIT DEVICE
3 EA. HINGES
1 EA. CLOSER
1 EA. STOP

HARDWARE SET #3
1 EA. PUSH PLATE
1 EA. PULL
3 EA. HINGES
1 EA. CLOSER
1 EA. STOP

HARDWARE SET #4
1 EA. STORAGE LEVER LOCK SET
3 EA. HINGES
1 EA. STOP

HARDWARE SET #5
1 EA. OFFICE LEVEL LOCK SET
3 EA. HINGES
1 EA. STOP

HARDWARE SET #6
1 EA. PASSAGE LEVEL LOCK SET
3 EA. HINGES
1 EA. STOP

HARDWARE SET #7
1 EA. LEVER LATCH (ELECTRICAL BY OTHERS)
3 EA. HINGES - ELECTRIC
1 EA. CLOSER w/ STOP
1 EA. POWER SUPPLY
1 EA. CARD READER
1 EA. STOP

HARDWARE SET #8
1 EA. PRIVACY LEVER LOCK SET
3 EA. HINGES
1 EA. CLOSER
1 EA. STOP

SAM GRESHAM ARCHITECTURE
400 NW 23rd St., Suite B
Oklahoma City, OK 73103
405.842.2998

LICENSED ARCHITECT MANOJ JOSEPH KURIAN 2923 DATE 10.03.2019 STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	
02	DOOR SCHEDULE REVISION		10/23/2019	FK	FK	
03	DOOR SCHEDULE & ROOM FINISH SCHEDULE REVISION		11/23/2019	FK	FK	
AB	AS-BUILTS ROOM FINISH SCHEDULE REVISION		11/18/2020	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

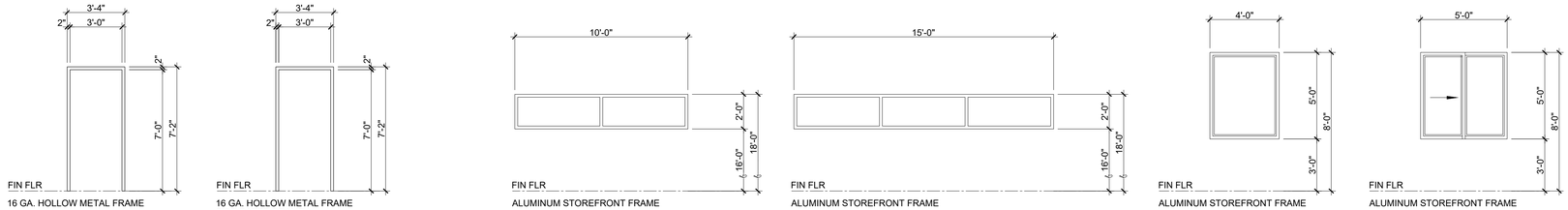
DWG NO.	MANUFACTURER	DESCRIPTION

DWN: FK	DATE:10/03/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

DOOR SCHEDULE AND ROOM FINISH SCHEDULE

SH.11

REV 1

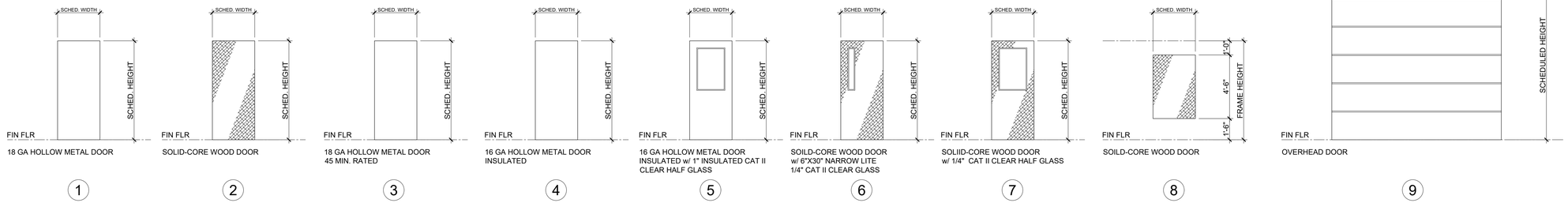


FRAME ELEVATIONS

SCALE: 1/4" = 1'-0"

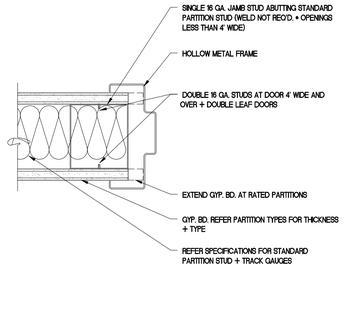
WINDOW ELEVATIONS

SCALE: 1/4" = 1'-0"



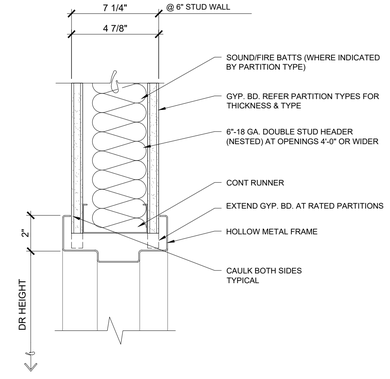
DOOR TYPES

SCALE: 1/4" = 1'-0"



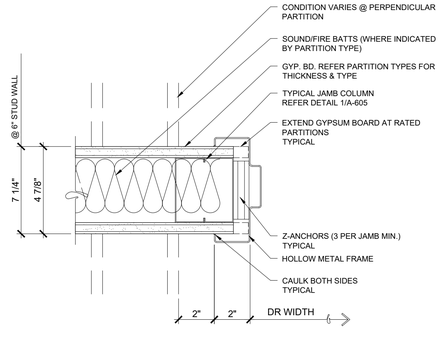
1 TYPICAL JAMB COLUMN

SCALE: 3"=1'-0"



2 TYPICAL HEAD DETAIL

SCALE: 3"=1'-0"



3 TYPICAL JAMB DETAIL

SCALE: 3"=1'-0"

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ARCHITECTURE
400 NW 23rd St., Suite B
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405.842.2998

LICENSED ARCHITECT
FRANCIS JOSEPH KUHLMAN
2923
DATE 10.03.2019
STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	
02	REVISED DOOR TYPE		10/23/2019	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

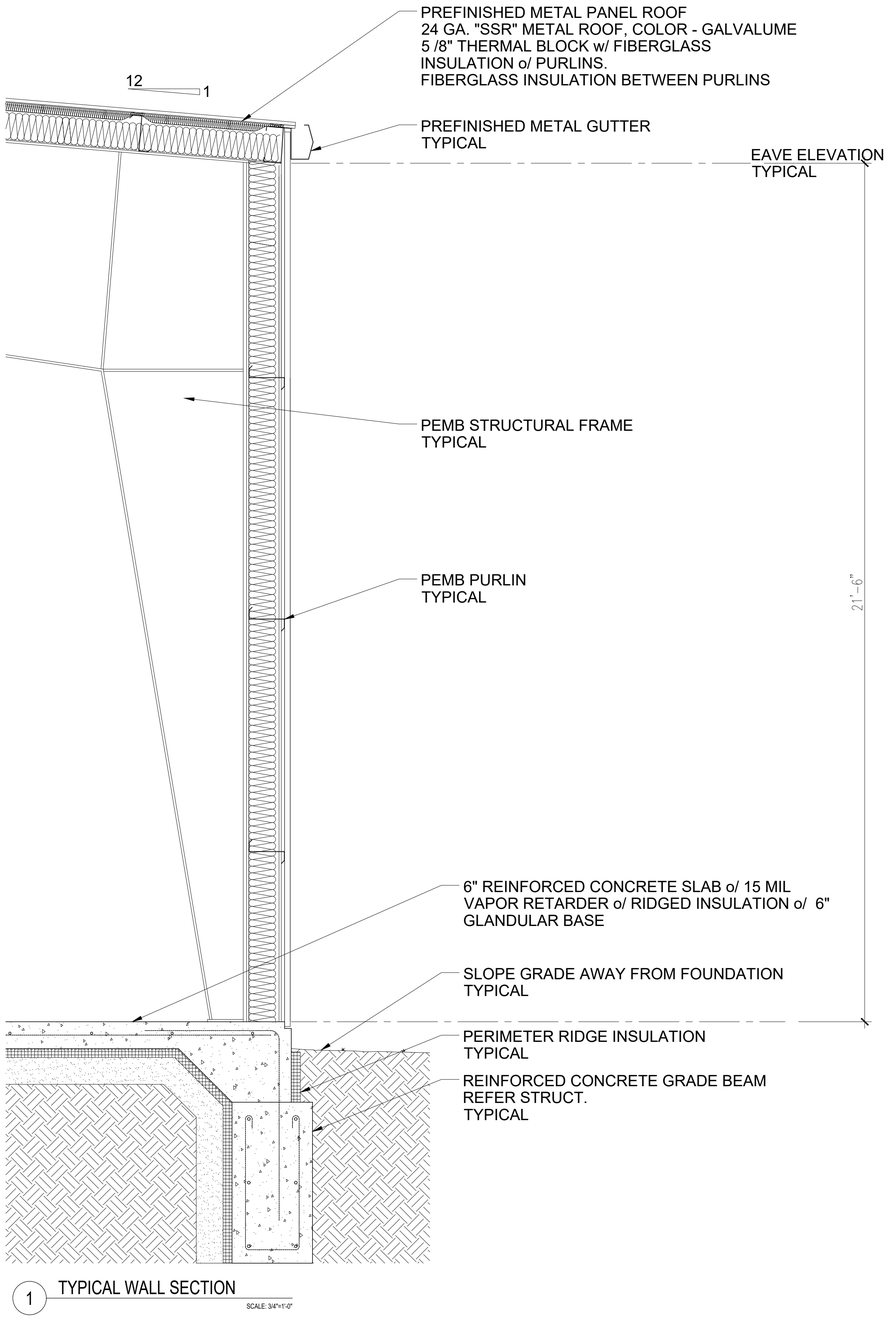
DWG NO.	MANUFACTURER	DESCRIPTION

DWN: FK	DATE:10/03/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

DOOR TYPE, FRAME ELEVATIONS AND WINDOW ELEVATIONS

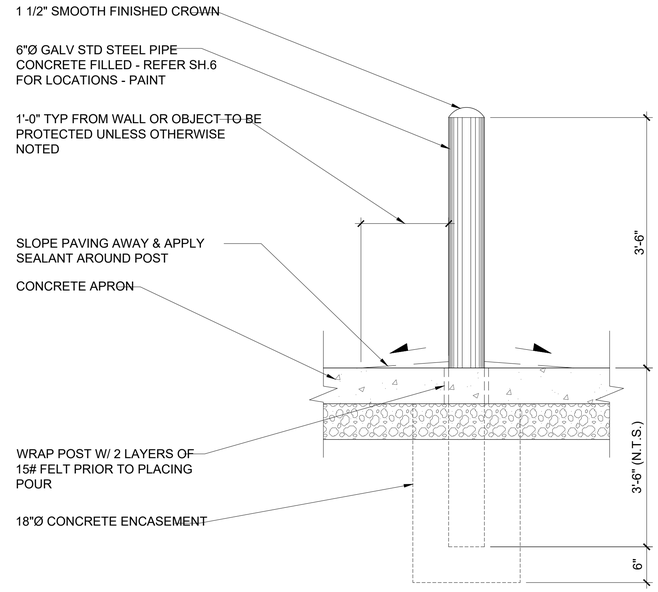
SH.12

REV 1



1 TYPICAL WALL SECTION

SCALE: 3/4"=1'-0"



2 PIPE BOLLARD DETAIL

SCALE: 3/4"=1'-0"

SAM **GRESHAM**
ARCHITECTURE
400 NW 23rd St., Suite B
Oklahoma City, OK 73103
405.842.2998

LICENSED ARCHITECT
FRANCIS JOSEPH KUHN
2923
DATE 10.03.2019
STATE OF NORTH DAKOTA

NO	REVISION	ZONE	DATE	BY	CHK	ENG
01	ISSUED FOR PERMIT		10/03/2019	FK	FK	

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS		
DWG NO.	MANUFACTURER	DESCRIPTION

DWN: FK	DATE:10/03/2019	CHK:	DATE:
ENG:	DATE: 05/08/19	CHK:	DATE:
PM:	DATE:	PROJ. NO: 19141011	
APVD:	DATE:	SCALE: AS NOTED	

DOOR TYPE, FRAME ELEVATIONS
AND WINDOW ELEVATIONS

SH.13

REV 1

MERRICOURT WIND 230 kV TRANSMISSION LINE

DRAWING INDEX	TYPE	DESCRIPTION	REV	DATE	REVISION PURPOSE
MCW-B-T002-01	DRAWING INDEX	DRAWING INDEX	01	10/20/20	AS-BUILT
STRUCTURE DRAWINGS	**TYPE**	**DESCRIPTION**	**REV**	**DATE**	**REVISION PURPOSE**
MCW-B-T003-01	TM-DEA-COLLECTOR	SUBSTATION DEADEND - COLLECTOR	01	10/20/20	AS-BUILT
MCW-B-T003-02	TM-DEA-MDU POI	SUBSTATION DEADEND - MDU POI	01	10/20/20	AS-BUILT
MCW-B-T003-03	TM-SFD	SWAN-FLIGHT DIVERTER	01	10/20/20	AS-BUILT
PLAN & PROFILE DRAWINGS	**TYPE**	**DESCRIPTION**	**REV**	**DATE**	**REVISION PURPOSE**
MCW-D-T004-00	PLAN AND PROFILE	COVER SHEET	01	10/20/20	AS-BUILT
MCW-D-T004-01	PLAN AND PROFILE	STATION 0+00 TO 1+17	01	10/20/20	AS-BUILT
SAG CHART DRAWINGS	**TYPE**	**DESCRIPTION**	**REV**	**DATE**	**REVISION PURPOSE**
MCW-B-T006-01	SAG CHARTS	SAG CHARTS	01	10/20/20	AS-BUILT
MATERIAL LIST DRAWINGS	**TYPE**	**DESCRIPTION**	**REV**	**DATE**	**REVISION PURPOSE**
MCW-B-T010-01	MATERIAL LIST	MATERIAL LIST	01	10/20/20	AS-BUILT

AS BUILT

FILE LOCATION: O:\PROPOSALS\2018\PR18-905 EDF RENEWABLE PROJECTS\BG002 -ND-MERRICOURT 150MW-19\BILLINGS SUPPORT\600 CADD\620 WORKING\622 DRAWING INDEX\MCW-B-T002-01.DWG LAST SAVED BY: mrkestler 10/20/2020 9:37 AM PLOTTED BY: Matthias R. Kestler 10/20/2020 11:07 AM Tab:01

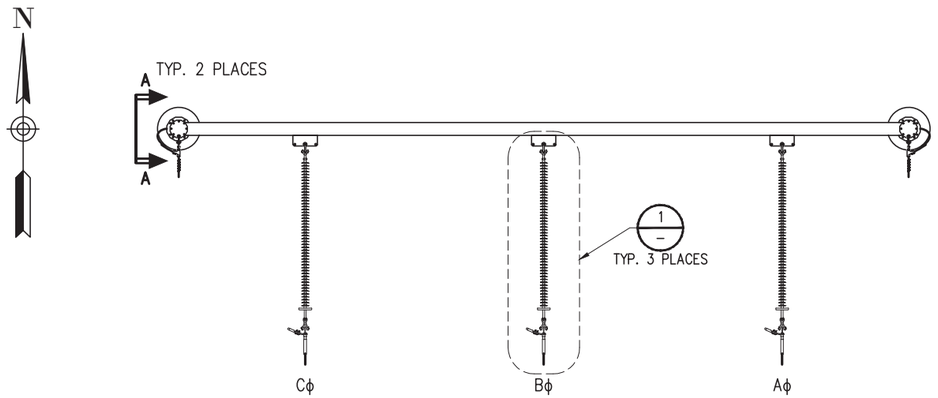
"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

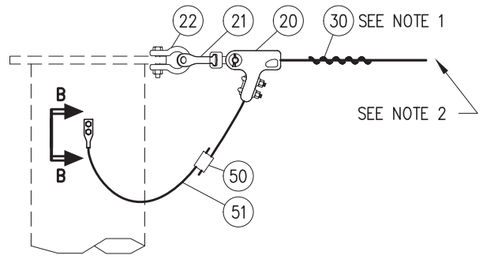
ENGINEERING RECORD		DATE
DRAWN	*M. KESTLER*	10/20/20
DESIGNED	*B. FRANKO*	10/20/20
CHECKED	*D. EVANS*	10/20/20
APPROVED	*C. JOBES*	10/20/20
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND 230 kV TRANSMISSION LINE
DRAWING INDEX

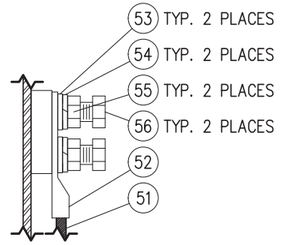
DWG. NAME: MCW-B-T002-01 | REVISION NO : 01



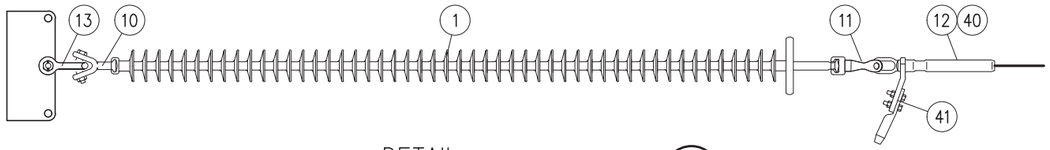
PLAN VIEW



SECTION
SHIELD WIRE ASSEMBLY — A–A



SECTION
SHIELD WIRE GROUNDING — B–B



DETAIL
CONDUCTOR ASSEMBLY — 1

ITEM	QTY	MATERIAL DESCRIPTION FOR TM-DEA-COLLECTOR	VENDOR	PART NO.
1	3	230 KV STRAIN INSULATOR, W/ 8" CORONA RING	MPS	S27080089VASS031
10	3	Y-CLEVIS/BALL, 50K	MPS	YCB-78
11	3	SOCKET/Y-CLEVIS, 50K	MPS	SYC-87
12	3	CLAMP, DEADEND, COMPRESSION, FOR 1590 KCMIL 45/7 ACSR "LAPWING"	AFL	E33173
13	3	SHACKLE, ANCHOR, 50K	MPS	ASH-66
20	2	CLAMP, DEADEND, QUADRANT, FOR 3/8" STEEL SW	HPS	SWDE46S
21	2	Y-CLEVIS/BALL, 35K	MPS	YCB-65A
22	2	SHACKLE, ANCHOR, 30K	MPS	ASH-55
30	2	DAMPER, SPIRAL, FOR 3/8" STEEL SW	PLP	5050104
40	4	FILLER COMPOUND (AFC), 1 LB TUBE	AFL	AFC10T
41	1	NO. 2 ELECTRICAL JOINT COMPOUND (EJC), 7.94 OZ TUBE	AFL	EJC10T
50	2	BONDING CLAMP, 3/8" STEEL SW TO #4 COPPER	MPS	J8300
51	4	#4 SOLID COPPER CONDUCTOR, FT	TBD	TBD
52	2	COMPRESSION TERMINAL, 2-HOLE FOR #4 COPPER	BURNDY	YA4C2N
53	4	WASHER, ROUND, 1/2", SILICON BRONZE	HPS	HFB500
54	4	WASHER, BELLEVILLE, 1/2", STAINLESS STEEL	HPS	BW500
55	4	NUT, HEX, 1/2", SILICON BRONZE	HPS	HNB500
56	4	BOLT, 1/2" X 1-1/2", SILICON BRONZE	HPS	HBB150

GENERAL NOTES

1. INSTALL ONE (1) SPIRAL DAMPER ADJACENT TO EACH SHIELD WIRE DEADEND CLAMP.
2. SEE TM-SFD FOR SWAN FLIGHT DIVERTER INSTALLATION DETAILS.

AS BUILT

FILE LOCATION: O:\PROPOSALS\2018\PR18-905 EDF RENEWABLE PROJECTS\BG002 -ND-MERRICOURT 150MW-19\BILLINGS SUPPORT\600 CADD\620 WORKING\623 STRUCTURE FRAMING\MCW-B-T003-01.DWG LAST SAVED BY: cfellis 1/6/2020 10:13 AM PLOTTED BY: Matthias R. Kestler 10/20/2020 9:43 AM Tab: TM-DEA-COLLECTOR

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

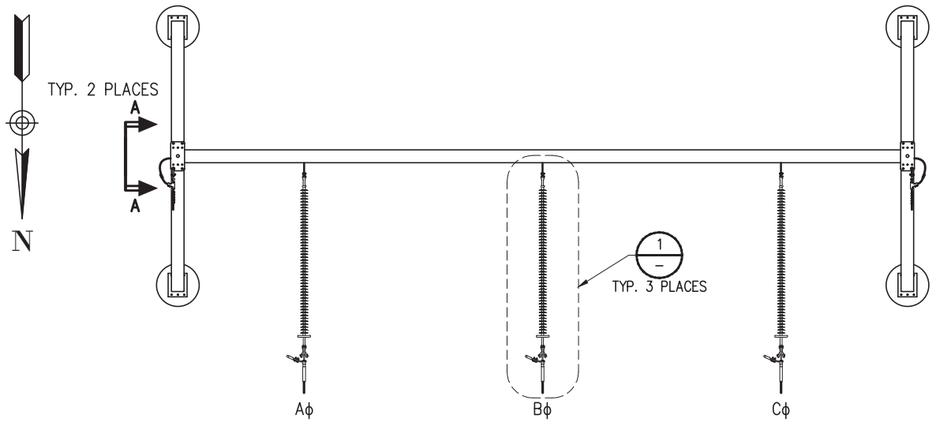
NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

edf renewables

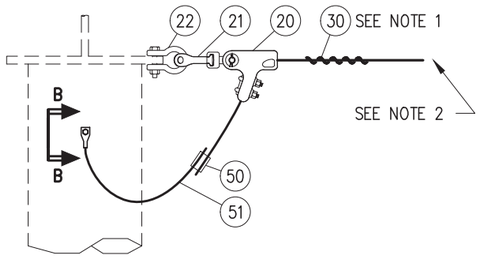
ENGINEERING RECORD		DATE
DRAWN	M. KESTLER	10/20/20
DESIGNED	B. FRANKO	10/20/20
CHECKED	D. EVANS	10/20/20
APPROVED	C. JOBES	10/20/20
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND 230 kV TRANSMISSION LINE
SUBSTATION DEADEND – COLLECTOR
TM-DEA-COLLECTOR

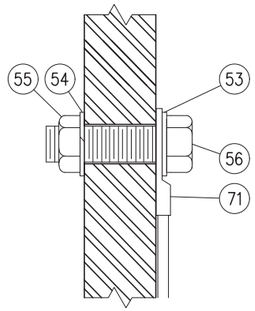
DWG. NAME: MCW-B-T003-01 | REVISION NO : 01



PLAN VIEW



SECTION
SHIELD WIRE ASSEMBLY — A–A

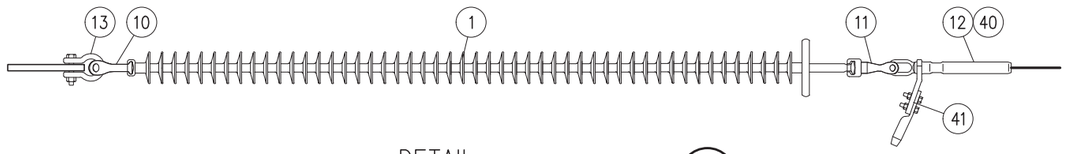


SECTION
SHIELD WIRE GROUNDING — B–B

ITEM	QTY	MATERIAL DESCRIPTION FOR TM-DEA-MDU POI	VENDOR	PART NO.
1	3	230 KV STRAIN INSULATOR, W/ 8" CORONA RING	MPS	S27080089VASS031
10	3	Y-CLEVIS/BALL, 50K	MPS	YCB-78
11	3	SOCKET/Y-CLEVIS, 50K	MPS	SYC-87
12	3	CLAMP, DEADEND, COMPRESSION, FOR 1590 KCMIL 45/7 ACSR "LAPWING"	AFL	E33173
13	3	SHACKLE, ANCHOR, 50K	MPS	ASH-66
20	2	CLAMP, DEADEND, QUADRANT, FOR 3/8" STEEL SW	HPS	SWDE46S
21	2	Y-CLEVIS/BALL, 35K	MPS	YCB-65A
22	2	SHACKLE, ANCHOR, 30K	MPS	ASH-55
30	2	DAMPER, SPIRAL, FOR 3/8" STEEL SW	PLP	5050104
40	4	FILLER COMPOUND (AFC), 1 LB TUBE	AFL	AFC10T
41	1	NO. 2 ELECTRICAL JOINT COMPOUND (EJC), 7.94 OZ TUBE	AFL	EJC10T
50	2	BONDING CLAMP, 3/8" STEEL SW TO #4 COPPER	MPS	J8300
51	4	#4 SOLID COPPER CONDUCTOR, FT	TBD	TBD
53	2	WASHER, ROUND, 1/2", SILICON BRONZE	HPS	HFB500
54	2	WASHER, BELLEVILLE, 1/2", STAINLESS STEEL	HPS	BW500
55	2	NUT, HEX, 1/2", SILICON BRONZE	HPS	HNB500
56	2	BOLT, 1/2" X 1-1/2", SILICON BRONZE	HPS	HBB150
71	2	COMPRESSION TERMINAL, 1-HOLE FOR #4 COPPER	BURNDY	YA4CN

GENERAL NOTES

1. INSTALL ONE (1) SPIRAL DAMPER ADJACENT TO EACH SHIELD WIRE DEADEND CLAMP.
2. SEE TM-SFD FOR SWAN FLIGHT DIVERTER INSTALLATION DETAILS.



DETAIL
CONDUCTOR ASSEMBLY — 1

AS BUILT

FILE LOCATION: C:\PROPOSALS\2018\PR18-905 EDF RENEWABLE PROJECTS\BG002 -ND-MERRICOURT 150MW-19\BILLINGS SUPPORT\600 CADD\620 WORKING\623 STRUCTURE FRAMING\MCW-B-T003-02.DWG LAST SAVED BY: mrkestler 10/20/2020 10:05 AM PLOTTED BY: Matthias R. Kestler 10/20/2020 10:09 AM Tab:TM-DEA-MDU POI

"Engineering with Distinction"
ECI ELECTRICAL CONSULTANTS, INC. BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

EDF renewables

ENGINEERING RECORD		DATE
DRAWN	M. KESTLER	10/20/20
DESIGNED	B. FRANKO	10/20/20
CHECKED	D. EVANS	10/20/20
APPROVED	C. JOBES	10/20/20
DWG SCALE: NONE	PLT SCALE: 1:1	

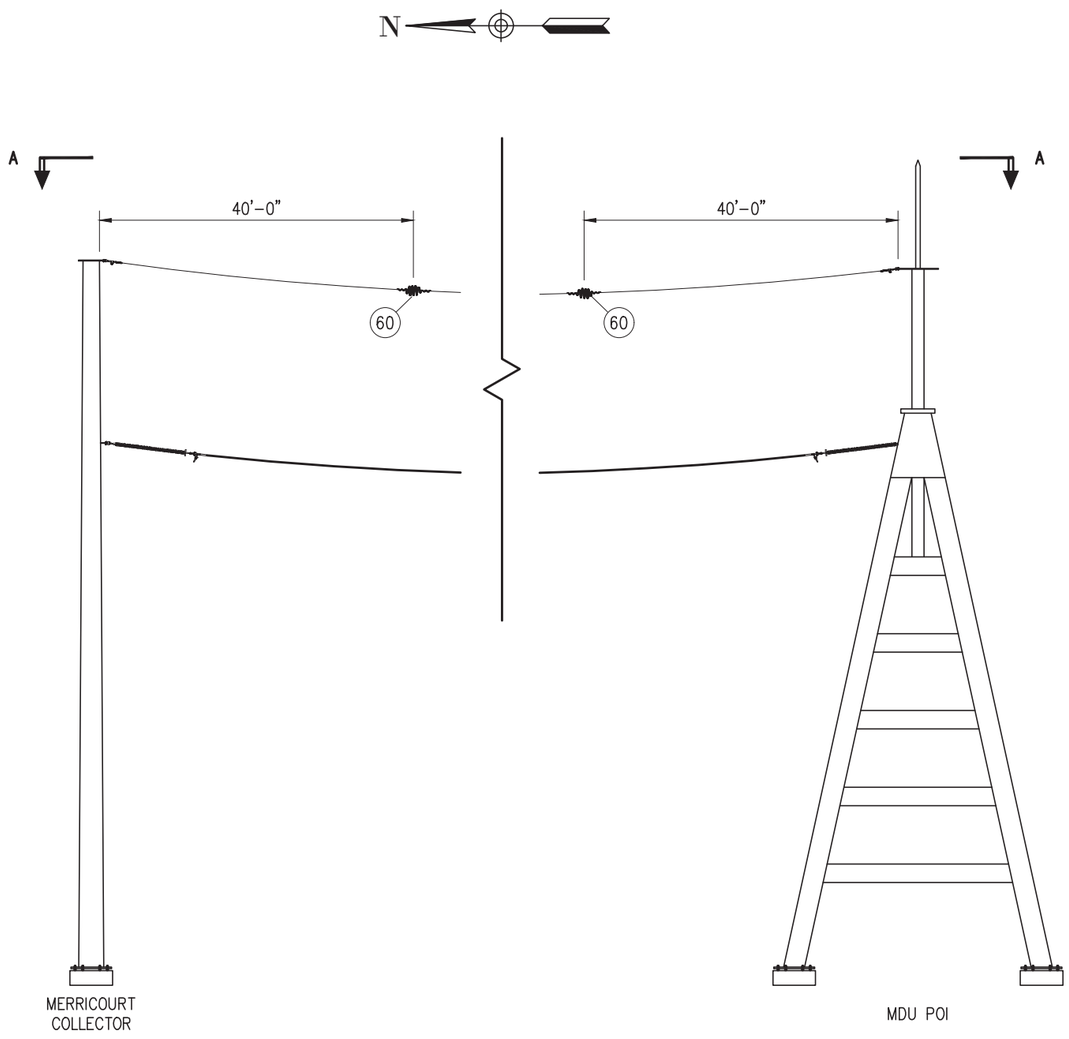
MERRICOURT WIND 230 kV TRANSMISSION LINE
SUBSTATION DEADEND – MDU POI
TM-DEA-MDU POI

DWG. NAME: MCW-B-T003-02 | REVISION NO : 01

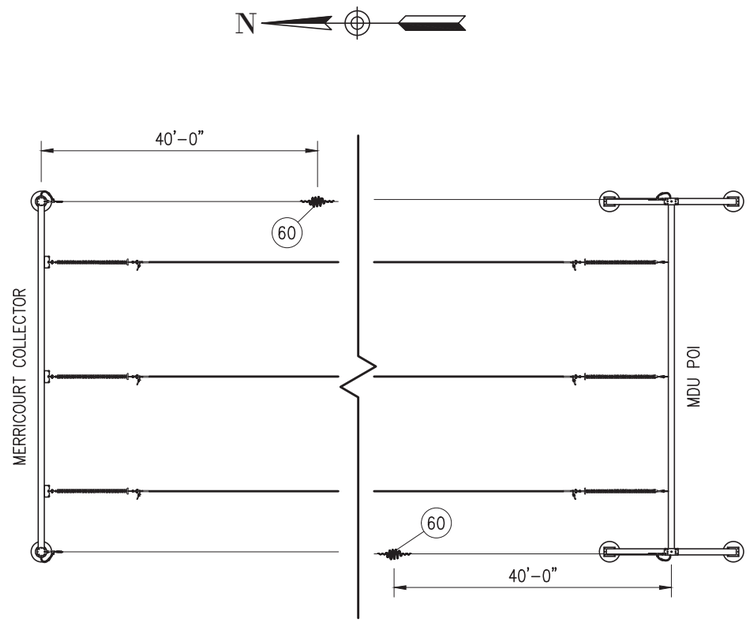
ITEM	QTY	MATERIAL DESCRIPTION FOR TM-SFD	VENDOR	PART NO.
60	2	SWAN-FLIGHT DIVERTER, FOR 3/8" STEEL SW	PLP	SFD-0890

GENERAL NOTES

1. INSTALL TWO (2) SWAN FLIGHT DIVERTERS IN SPAN, ONE ON EACH SHIELD WIRE, SPACED AT 40' FROM DEADEND STRUCTURE.



DETAIL 1 — SWAN–FLIGHT DIVERTER – ELEVATION



SECTION A–A — SWAN–FLIGHT DIVERTER – PLAN

AS BUILT

FILE LOCATION: O:\PROPOSALS\2018\PR18-905 EDF RENEWABLE PROJECTS\BG002 -ND-MERRICOURT 150MW-19\BILLINGS SUPPORT\600 CADD\620 WORKING\623 STRUCTURE FRAMING\MCW-B-T003-03.DWG LAST SAVED BY: mrkestler 10/20/2020 10:14 AM PLOTTED BY: Matthias R. Kestler 10/20/2020 10:16 AM Tab: TM-SFD

"Engineering with Distinction" ECI ELECTRICAL CONSULTANTS, INC. BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

EDF renewables

ENGINEERING RECORD		DATE
DRAWN	M. KESTLER	10/20/20
DESIGNED	B. FRANKO	10/20/20
CHECKED	D. EVANS	10/20/20
APPROVED	C. JOBES	10/20/20
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND 230 kV TRANSMISSION LINE

SWAN–FLIGHT DIVERTER

TM–SFD

DWG. NAME: MCW-B-T003-03 | REVISION NO : 01

EDF RENEWABLES

MERRICOURT WIND
230 kV TRANSMISSION LINE

AS BUILT

PLAN AND PROFILE

MCW-D-T004-00 COVER SHEET
MCW-D-T004-01 0+00 – 1+17

CONDUCTOR INFORMATION

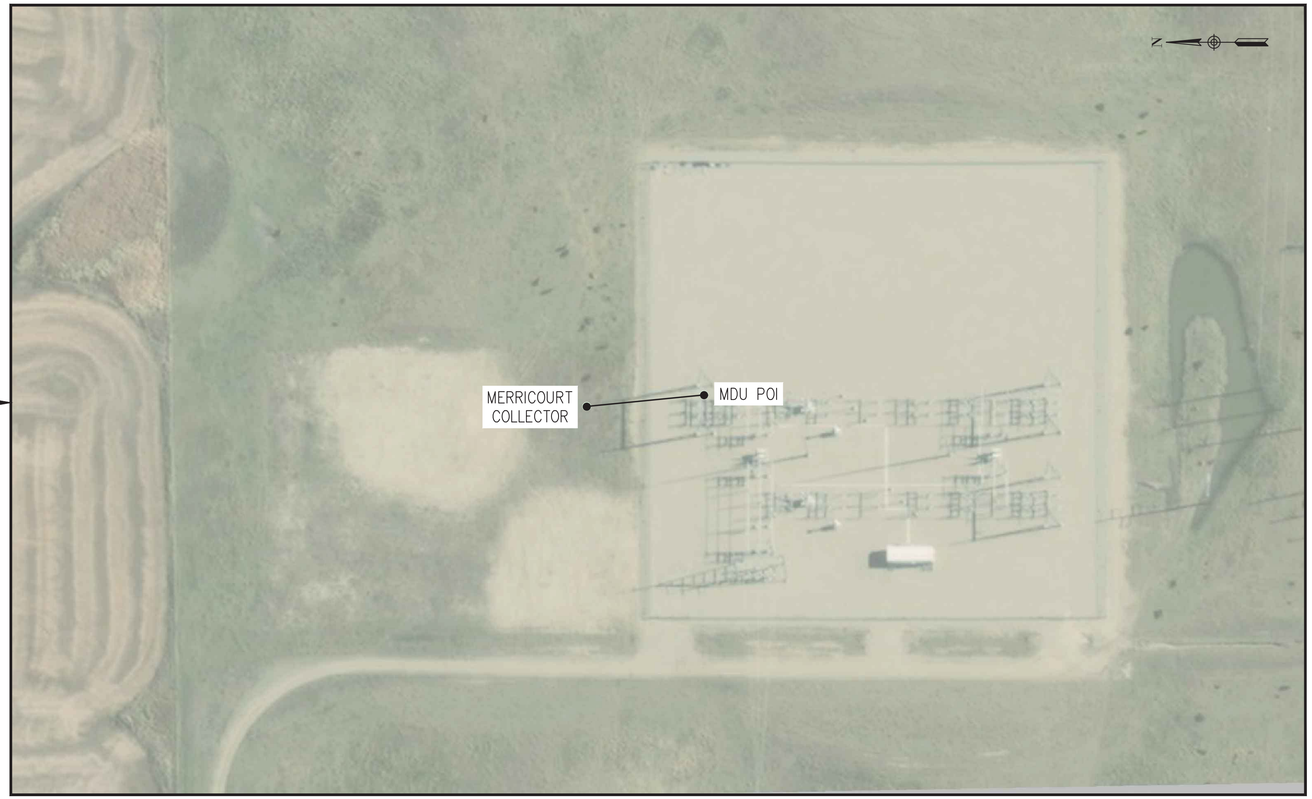
TRANSMISSION CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"

SHIELD WIRE: ⅜" EHS STEEL

GENERAL NOTES

G1. CONTRACTOR RESPONSIBLE FOR COORDINATING DISTRIBUTION CROSSINGS WITH CROSSING UTILITY OWNER.
G2. CONTRACTOR RESPONSIBLE FOR COORDINATING CONNECTION TO THE MERRICOURT WIND AND MDU OWNED SUBSTATION.
G3. PHASE ORIENTATION IS LOCATED ON THE PLAN AND PROFILE IN ADDITION TO DRAWINGS MCW-B-T003-01 AND MCW-B-T003-02.
G4. TRANSMISSION LINE MEETS MINIMUM REQUIREMENTS AS SET FORTH BY THE 2017 NATIONAL ELECTRICAL SAFETY CODE (NESC) SPECIFICATIONS.
G5. MAXIMUM DESIGN OPERATION TEMPERATURE IS 212° F (DEGREES FAHRENHEIT).
G6. CLEARANCE LINE SHOWN AT 25'.
G7. PROJECT IS LOCATED IN MCINTOSH COUNTY, NORTH DAKOTA.
G8. COORDINATE SYSTEM IS STATE PLANE NORTH DAKOTA SOUTH NAD83, US SURVEY FEET.

INSET



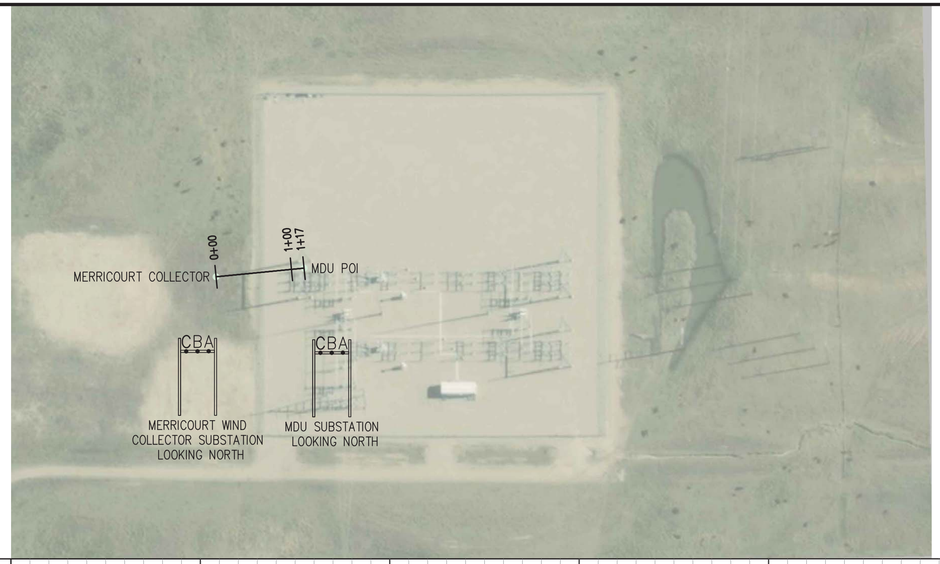
"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

eDF renewables

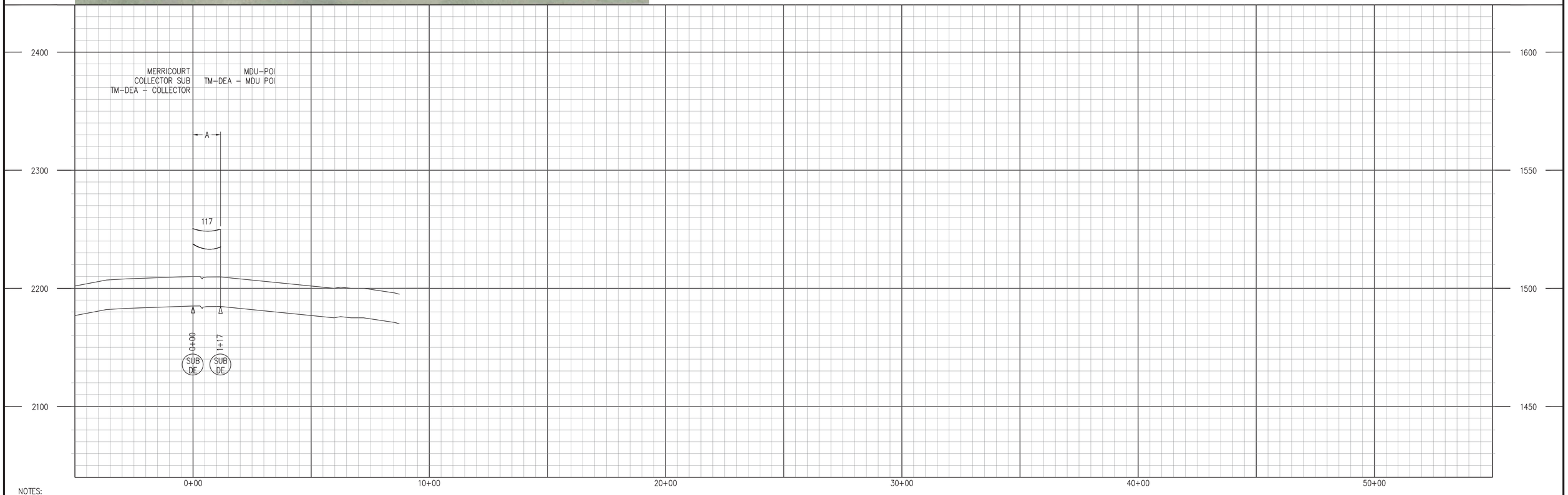
ENGINEERING RECORD		DATE
DRAWN	M. KESTLER	10/20/20
DESIGNED	B. FRANKO	10/20/20
CHECKED	D. EVANS	10/20/20
APPROVED	C. JOBES	10/20/20
VERT. SCALE:	HORZ. SCALE:	

MERRICOURT WIND 230 kV TRANSMISSION LINE
PLAN AND PROFILE
COVER SHEET
MCW-D-T004-00 REVISION NO : 01



MCINTOSH COUNTY, NORTH DAKOTA

AS BUILT



NOTES:

SECTION A: MERRICOURT COLLECTOR SUB TO MDU POI
SHIELD WIRE: ⅜" EHS STEEL SW
RULING SPAN: 117'
DESIGN TENSION: 350 LBS @ 60°F, INITIAL
CONDUCTOR DISPLAYED AT: 120°

SECTION A: MERRICOURT COLLECTOR SUB TO MDU POI
CONDUCTOR: 1590 KCMIL 45/7 ACSR "LAPWING"
RULING SPAN: 117'
DESIGN TENSION: 1500 LBS @ 60°F, INITIAL
CONDUCTOR DISPLAYED AT: 212°

NOTES:
1. CLEARANCE LINE SHOWN AT 25'.

FILE LOCATION: O:\PROPOSALS\2018\PR18-905 EDF RENEWABLE PROJECTS\BG002 -ND-MERRICOURT 150MW-19\BILLINGS SUPPORT\600 CADD\620 WORKING\624 PLAN AND PROFILE\MCW-D-T004.DWG LAST SAVED BY: mrkestler 10/20/2020 10:32 AM PLOTTED BY: Matthias R. Kestler 10/20/2020 10:33 AM Tab:01

PLOT SCALE: 1:1

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	*M. KESTLER*	10/20/20
DESIGNED	*B. FRANKO*	10/20/20
CHECKED	*D. EVANS*	10/20/20
APPROVED	*C. JOBES*	10/20/20
VERT. SCALE: 1" = 20'	HORZ. SCALE: 1" = 200'	

MERRICOURT WIND 230 kV TRANSMISSION LINE

PLAN AND PROFILE
STATION 0+00 TO 1+17

MCW-D-T004-01 | REVISION NO : 01

Sag Sheet		Section		A	From:	MERRICOURT COLLECTOR	To:	MDU POI	Conductor:		1590 kcmil 45/7 "Lapwing" ACSR		RS (Feet):		117		Table Reference No.		
																	1		
Structure Number	A-O-L Span Length (Feet)	10° F		20° F		30° F		40° F		50° F		60° F		70° F		80° F		90° F		100° F		Point of Support Difference (Feet)
		Horizontal Tension (Lbs) 1,969		Horizontal Tension (Lbs) 1,841		Horizontal Tension (Lbs) 1,723		Horizontal Tension (Lbs) 1,635		Horizontal Tension (Lbs) 1,561		Horizontal Tension (Lbs) 1,495		Horizontal Tension (Lbs) 1,435		Horizontal Tension (Lbs) 1,379		Horizontal Tension (Lbs) 1,330		Horizontal Tension (Lbs) 1,288		
		Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	
MERRICOURT COLLECTOR	117	1.65		1.76		1.88		1.98		2.07		2.17		2.25		2.34		2.43		2.51		-2.39
MDU POI																						

Sag Sheet		Section		A	From:	MERRICOURT COLLECTOR	To:	MDU POI	Conductor:		3/8" EHS 7 Strands Steel		RS (Feet):		117		Table Reference No.		
																	2		
Structure Number	A-O-L Span Length (Feet)	10° F		20° F		30° F		40° F		50° F		60° F		70° F		80° F		90° F		100° F		Point of Support Difference (Feet)
		Horizontal Tension (Lbs) 529		Horizontal Tension (Lbs) 482		Horizontal Tension (Lbs) 440		Horizontal Tension (Lbs) 404		Horizontal Tension (Lbs) 374		Horizontal Tension (Lbs) 349		Horizontal Tension (Lbs) 327		Horizontal Tension (Lbs) 309		Horizontal Tension (Lbs) 292		Horizontal Tension (Lbs) 278		
		Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	Mid Span Sag (Feet)	3rd Wave Time (Sec)	
MERRICOURT COLLECTOR	117	0.89		0.97		1.07		1.16		1.25		1.34		1.43		1.52		1.60		1.69		-0.39
MDU POI																						

AS BUILT

FILE LOCATION: C:\PROPOSALS\2018\PR18-905 EDF RENEWABLE PROJECTS\BG002 -ND-MERRICOURT 150MW-19\BILLINGS SUPPORT\600 CADD\620 WORKING\631 SAG AND TENSION\MCW-B-T006.DWG LAST SAVED BY: cfellis 1/6/2020 10:19 AM PLOTTED BY: Matthias R. Kestler 10/20/2020 10:21 AM Tab:01

"Engineering with Distinction"
ECI ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

EDF renewables

ENGINEERING RECORD		DATE
DRAWN	M. KESTLER	10/20/20
DESIGNED	B. FRANKO	10/20/20
CHECKED	D. EVANS	10/20/20
APPROVED	C. JOBES	10/20/20
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND 230 kV TRANSMISSION LINE
SAG CHARTS

DWG. NAME: MCW-B-T006-01 | REVISION NO : 01

NOTE:

1. WIRE QUANTITIES DO NOT ACCOUNT FOR CONSTRUCTION ADDERS.

PROJECT STOCK NUMBER	MATERIAL ITEM TOTALS	MASTER MATERIAL LIST			UNITS / MATERIAL REQUIRED		
					TM-DEA-COLLECTOR	TM-DEA-MDU POI	TM-SFD
		UNIT DESCRIPTION	VENDOR	PART NO.	1	1	1
1	6	230 KV STRAIN INSULATOR, W/ 8" CORONA RING	MPS	S27080089VASS031	3	3	--
10	6	Y-CLEVIS/BALL, 50K	MPS	YCB-78	3	3	--
11	6	SOCKET/Y-CLEVIS, 50K	MPS	SYC-87	3	3	--
12	6	CLAMP, DEADEND, COMPRESSION, FOR 1590 KCMIL 45/7 ACSR "LAPWING"	AFL	E33173	3	3	--
13	6	SHACKLE, ANCHOR, 50K	MPS	ASH-66	3	3	--
20	4	CLAMP, DEADEND, QUADRANT, FOR 3/8" STEEL SW	HPS	SWDE46S	2	2	--
21	4	Y-CLEVIS/BALL, 35K	MPS	YCB-65A	2	2	--
22	4	SHACKLE, ANCHOR, 30K	MPS	ASH-55	2	2	--
30	4	DAMPER, SPIRAL, FOR 3/8" STEEL SW	PLP	5050104	2	2	--
40	8	FILLER COMPOUND (AFC), 1 LB TUBE	AFL	AFC10T	4	4	--
41	2	NO. 2 ELECTRICAL JOINT COMPOUND (EJC), 7.94 OZ TUBE	AFL	EJC10T	1	1	--
50	4	BONDING CLAMP, 3/8" STEEL SW TO #4 COPPER	MPS	J8300	2	2	--
51	8	#4 SOLID COPPER CONDUCTOR, FT	TBD	TBD	4	4	--
52	2	COMPRESSION TERMINAL, 2-HOLE FOR #4 COPPER	BURNDY	YA4C2N	2	--	--
53	6	WASHER, ROUND, 1/2", SILICON BRONZE	HPS	HFB500	4	2	--
54	6	WASHER, BELLEVILLE, 1/2", STAINLESS STEEL	HPS	BW500	4	2	--
55	6	NUT, HEX, 1/2", SILICON BRONZE	HPS	HNB500	4	2	--
56	6	BOLT, 1/2" X 1-1/2", SILICON BRONZE	HPS	HBB150	4	2	--
60	2	SWAN-FLIGHT DIVERTER, FOR 3/8" STEEL SW	PLP	SFD-0890	--	--	2
71	2	COMPRESSION TERMINAL, 1-HOLE FOR #4 COPPER	BURNDY	YA4CN	--	2	--
-	450'	1590 KCMIL 45/7 ACSR "LAPWING"	TBD	TBD	--	--	--
-	300'	3/8" EHS STEEL SW	TBD	TBD	--	--	--

AS BUILT

FILE LOCATION: O:\PROPOSALS\2018\PR18-905 EDF RENEWABLE PROJECTS\BG002 -ND-MERRICOURT 150MW-19\BILLINGS SUPPORT\600 CADD\620 WORKING\630 BILL OF MATERIAL\MCW-B-T010.DWG LAST SAVED BY: cfellis 1/6/2020 12:34 PM PLOTTED BY: Matthias R. Kestler 10/20/2020 10:24 AM Tab:01

"Engineering with Distinction"
ECI ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
01	AS-BUILT	10/20/20	MRK	CAJ
00	ISSUED FOR CONSTRUCTION	01/06/20	MRK	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	M. KESTLER	10/20/20
DESIGNED	B. FRANKO	10/20/20
CHECKED	D. EVANS	10/20/20
APPROVED	C. JOBES	10/20/20
DWG SCALE: NONE	PLT SCALE: 1:1	

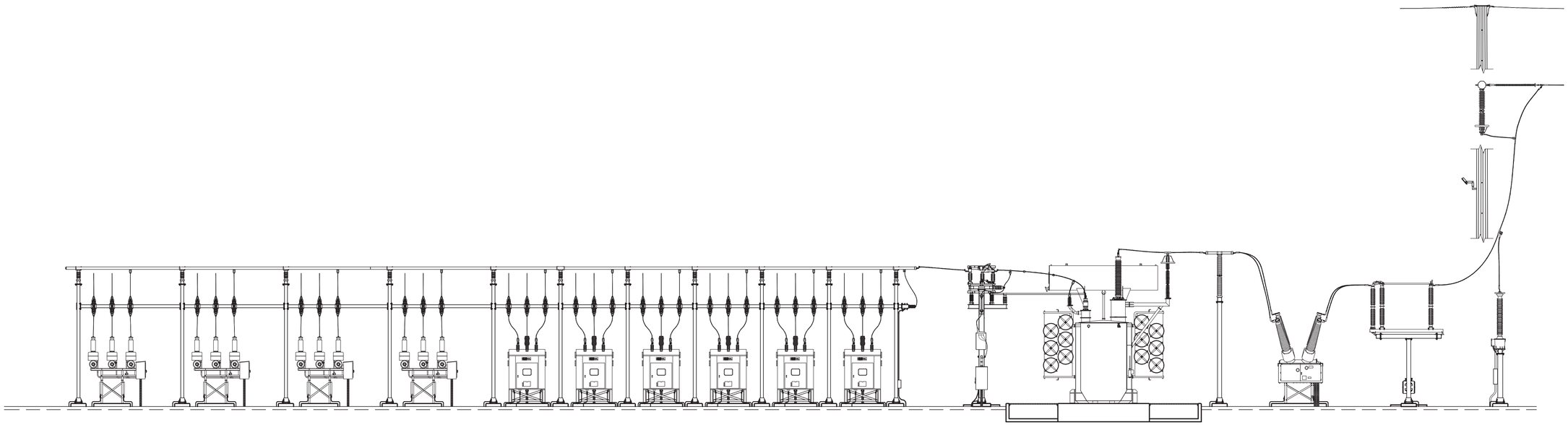
MERRICOURT WIND 230 kV TRANSMISSION LINE

MATERIAL LIST

DWG. NAME: MCW-B-T010-01 REVISION NO : 01

MERRICOURT WIND PROJECT

34.5 - 230 kV SUBSTATION



"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

MCW-D-P000-1

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P000-1.DWG LAST SAVED BY: tjwilcox 12/3/2019 8:34 AM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:32 AM Tab:MCW-D-P000-1

PHYSICAL DRAWING INDEX

ITEM No.	DRAWING TITLE	DRAWING No.	REV.	DWG. TYPE
1	COVER SHEET	MCW-D-P000-1	1	E
2	PHYSICAL DRAWING INDEX	MCW-D-P001-1	6	E
3	SITE DIMENSION PLAN	MCW-D-P002-1	1	E
4	SITE GRADING PLAN	MCW-D-P002-2	1	E
5	SITE GRADING SECTIONS	MCW-D-P002-3	1	E
6	SITE GRADING DETAILS	MCW-D-P002-4	1	E
7	GENERAL ARRANGEMENT	MCW-D-P003-1	3	E
8	EQUIPMENT LABEL DIAGRAM	MCW-D-P003-2	3	E
9	ELEVATIONS	MCW-D-P004-1	2	E
10	ELEVATIONS	MCW-D-P004-2	3	E
11	ELEVATIONS	MCW-D-P004-3	1	E
12	ELEVATIONS	MCW-D-P004-4	1	E
13	BUS DETAILS	MCW-D-P005-1	1	E
14	BUS DETAILS	MCW-D-P005-2	2	E
15	BUS DETAILS	MCW-D-P005-3	1	E
16	FOUNDATION PLAN	MCW-D-P006-1	3	E
17	FOUNDATION PLAN – TOP OF CONCRETE	MCW-D-P006-2	3	E
18	FOUNDATION DETAILS – AF1 & AF2	MCW-D-P007-1	1	E
19	FOUNDATION DETAILS – AF3 & AF4	MCW-D-P007-2	3	E
20	FOUNDATION DETAILS – AF5 & AF6	MCW-D-P007-3	2	E
21	FOUNDATION DETAILS – BKR1 & BKR2	MCW-D-P007-4	1	E
22	FOUNDATION DETAILS – BKR3	MCW-D-P007-5	1	E
23	FOUNDATION DETAILS – CB1	MCW-D-P007-6	1	E
24	FOUNDATION DETAILS – DV1	MCW-D-P007-7	1	E
25	FOUNDATION DETAILS – TF1	MCW-D-P007-8	1	E
26	FOUNDATION DETAILS – TF2	MCW-D-P007-9	1	E
27	FOUNDATION DETAILS – RF1	MCW-D-P007-10	1	E
28	FENCE PLAN AND DETAILS	MCW-D-P008-1	2	E
29	CABLE TRENCH PLAN	MCW-D-P009-1	3	E
30	CABLE TRENCH DETAILS	MCW-D-P009-2	1	E
31	CONDUIT PLAN	MCW-D-P010-1	3	E
32	CONDUIT DETAILS	MCW-D-P011-1	2	E
33	CONDUIT DETAILS	MCW-D-P011-2	1	E
34	CONDUIT DETAILS	MCW-D-P011-3	3	E
35	PULL PIT DETAILS	MCW-D-P011-4	1	E
36	GROUNDING PLAN	MCW-D-P012-1	3	E
37	GROUNDING DETAILS	MCW-D-P013-1	1	E
38	GROUNDING DETAILS	MCW-D-P013-2	1	E
39	GROUNDING DETAILS	MCW-D-P013-3	1	E
40	GROUNDING DETAILS	MCW-D-P013-4	3	E
41	GROUNDING DETAILS	MCW-D-P013-5	1	E
42	GROUNDING DETAILS	MCW-D-P013-6	1	E
43	STEEL KEY LOCATION PLAN	MCW-D-P014-1	1	E
44	230 kV DEADEND TOWER – DE1	MCW-D-P015-1	1	E
45	STATIC MAST – SM1	MCW-D-P015-2	1	E
46	230 kV 3ø TRANSITIONAL BUS SUPPORT – BS36	MCW-D-P016-1	1	E
47	34.5 kV COLLECTION STRUCTURE – CS5A (SH.1)	MCW-D-P016-2	1	E
48	34.5 kV COLLECTION STRUCTURE – CS5A (SH.2)	MCW-D-P016-3	1	E
49	34.5 kV COLLECTION STRUCTURE – CS5A (SH.3)	MCW-D-P016-4	1	E
50	34.5 kV COLLECTION STRUCTURE – CS5A (SH.4)	MCW-D-P016-5	1	E
51	34.5 kV COLLECTION STRUCTURE – CS5A (SH.5)	MCW-D-P016-6	1	E
52	34.5 kV COLLECTION STRUCTURE – CS5B (SH.1)	MCW-D-P016-7	1	E
53	34.5 kV COLLECTION STRUCTURE – CS5B (SH.2)	MCW-D-P016-8	1	E
54	34.5 kV COLLECTION STRUCTURE – CS5B (SH.3)	MCW-D-P016-9	1	E
55	34.5 kV COLLECTION STRUCTURE – CS5B (SH.4)	MCW-D-P016-10	1	E
56	34.5 kV COLLECTION STRUCTURE – CS5B (SH.5)	MCW-D-P016-11	1	E
57	34.5 kV COLLECTION STRUCTURE – CS5D (SH.1)	MCW-D-P016-12	1	E
58	34.5 kV COLLECTION STRUCTURE – CS5D (SH.2)	MCW-D-P016-13	1	E
59	34.5 kV COLLECTION STRUCTURE – CS5D (SH.3)	MCW-D-P016-14	1	E
60	34.5 kV COLLECTION STRUCTURE – CS5D (SH.4)	MCW-D-P016-15	1	E
61	34.5 kV COLLECTION STRUCTURE – CS5D (SH.5)	MCW-D-P016-16	1	E
62	230 kV 3ø CVT SUPPORT – CVT3A	MCW-D-P016-17	1	E
63	34.5 kV NGR STAND – RE1	MCW-D-P016-18	1	E
64	SWITCH OPERATOR PLATFORM – GG1	MCW-D-P016-19	1	E
65	34.5 kV DISC. SWITCH STAND W/SSVT – SS3D (SH.1)	MCW-D-P016-20	1	E
66	34.5 kV DISC. SWITCH STAND W/SSVT – SS3D (SH.2)	MCW-D-P016-21	1	E
67	230 kV LOW SWITCH STAND – SS8A (SH.1)	MCW-D-P016-22	1	E
68	230 kV LOW SWITCH STAND – SS8A (SH.2)	MCW-D-P016-23	1	E
69	TRANSFORMER PLATFORM GRATING – TP1 (SH.1)	MCW-D-P016-24	1	E
70	TRANSFORMER PLATFORM GRATING – TP1 (SH.2)	MCW-D-P016-25	1	E
71	TRANSFORMER PLATFORM GRATING – TP1 (SH.3)	MCW-D-P016-26	1	E
72	DVAR PLATFORM GRATING – DP1 (SH.1)	MCW-D-P016-27	1	E
73	DVAR PLATFORM GRATING – DP1 (SH.2)	MCW-D-P016-28	1	E
74	34.5 kV 3ø BUS SUPPORT – BS1	MCW-D-P016-29	1	E
75	34.5 kV 1ø BUS SUPPORT – BS2	MCW-D-P016-30	1	E
76	34.5 kV 1ø CT SUPPORT – CT1	MCW-D-P016-31	1	E
77	CONTROL ENCLOSURE LAYOUT	MCW-D-P017-1	2	E
78	CONTROL ENCLOSURE INTERIOR ELEVATIONS	MCW-D-P017-2	2	E
79	CONTROL ENCLOSURE INTERIOR ELEVATIONS	MCW-D-P017-3	2	E
80	BILL OF MATERIALS	MCW-B-Z001	4	E
81				
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NOTE:
THIS INDEX DRAWING AND REVISION SHEET IS PROVIDED FOR THE CONVENIENCE OF THE INTENDED RECIPIENT; THIS DOCUMENT PROVIDES REVISION STATUS DOCUMENTATION FOR DRAWINGS RELATED TO THE FABRICATION OF COMPONENTS AND CONSTRUCTION OF THE SUBJECT PROJECT. THE RECIPIENT SHALL BE FULLY RESPONSIBLE FOR MAINTAINING AN UP-TO-DATE CONTRACT DRAWING SET. THE MOST CURRENT REVISION FOR EACH DRAWING IS IDENTIFIED HEREIN. THE RECIPIENT SHALL BE RESPONSIBLE FOR REMOVING FROM THE PROJECT SITE AND DESTROYING ALL PREVIOUSLY ISSUED DRAWING REVISIONS TO PREVENT POSSIBLE CONSTRUCTION ERRORS. IN THE EVENT THAT THE RECIPIENT DOES NOT POSSESS THE MOST CURRENT REVISION OF EITHER THIS DRAWING OR DRAWING(S) REFERENCED TO HEREIN, THE RECIPIENT SHALL IMMEDIATELY OBTAIN A COPY OF THE UPDATED DRAWING FROM THE ENGINEER PRIOR TO PROCEEDING WITH ANY ACTIVITY. ANY WORK, ORDERING OF MATERIALS OR OTHER ACTIVITIES PERFORMED AS A RESULT OF REFERENCING OUT-OF-DATE DRAWING(S) SHALL BE AT THE RECIPIENT'S RISK. INFORMATION CONTAINED HEREIN IS CONFIDENTIAL AND LEGALLY PRIVILEGED. ANY DISCLOSURE, COPYING, DISTRIBUTION OR ACTION TAKEN BY AN UNAUTHORIZED INDIVIDUAL IS PROHIBITED.

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P001-1.DWG LAST SAVED BY: tjwilcox 10/29/2020 4:48 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:33 AM Tab:MCW-D-P001-1

"Engineering with Distinction"
ECI ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

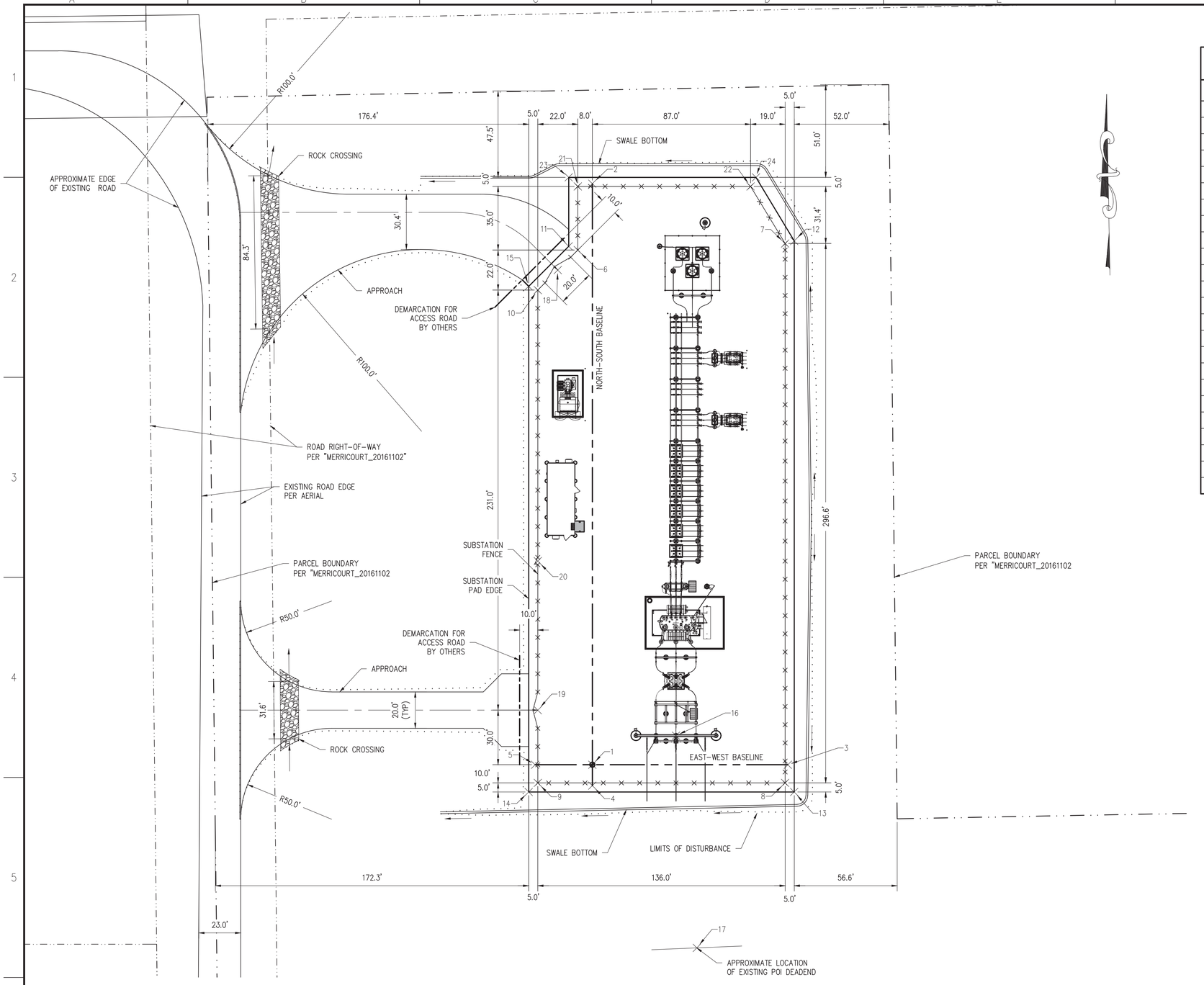
NO	REVISION	DATE	BY	APR
6	AS BUILT	10/30/20	TJW	MAG
5	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
4	ISSUED FOR CONSTRUCTION	12/20/19	TJW	MAG
3	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG
2	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG

edf renewables

ENGINEERING RECORD		DATE
DRAWN	*WILCOX*	06/19
DESIGNED	*WILCOX*	06/19
CHECKED	*GROFF*	08/19
APPROVED	*JOBES*	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
PHYSICAL DRAWING INDEX

DWG. NAME: MCW-D-P001-1 | REVISION NO : 6



NORTHING EASTING POINT TABLE

Point Table			
Point #	Raw Description	Northing	Easting
1	BASELINE INTERSECTION	165857.7879	2332318.9871
2	BASELINE ENDPOINT	166177.2899	2332318.9871
3	BASELINE ENDPOINT	165857.7879	2332426.4871
4	BASELINE ENDPOINT	165846.2879	2332318.9871
5	BASELINE ENDPOINT	165857.7879	2332287.4871
6	FENCE CORNER	166140.7899	2332310.9871
7	FENCE CORNER	166144.4036	2332424.9871
8	FENCE CORNER	165847.7879	2332424.9871
9	FENCE CORNER	165847.7879	2332288.9871
10	FENCE CORNER	166118.7899	2332288.9871
11	PAD EDGE	166142.8610	2332305.9871
12	PAD EDGE	166145.7899	2332429.9871
13	PAD EDGE	165842.7879	2332429.9871
14	PAD EDGE	165842.7879	2332283.9871
15	PAD EDGE	166120.8610	2332283.9872
16	SUBSTATION DEADEND CL	165873.7879	2332364.9822
17	APPROX. POI DEADEND CL	165757.0621	2332376.3970
18	VEHICLE GATE CENTER	166129.7899	2332299.9871
19	VEHICLE GATE CENTER	165887.7879	2332288.9871
20	MAN GATE CENTER	165969.7879	2332288.9871
21	FENCE CORNER	166175.7899	2332310.9871
22	FENCE CORNER	166175.7899	2332405.9871
23	PAD EDGE	166180.7899	2332305.9871
24	PAD EDGE	166180.7899	2332408.9621

VICINITY MAP

LEGEND

- 1 — NORTHING/EASTING LOCATION POINT (SEE POINT TABLE)
- PROPERTY BOUNDARY
- CHAINLINK FENCE
- SUBSTATION BASELINE

NOTES

1. FOR GENERAL NOTES SEE SHEET P002-2
2. COORDINATES ARE NORTH DAKOTA SOUTH ZONE, US FOOT, HARN/ND.ND-SF

AS BUILT

NOTE:
AS-BUILT SURVEY DATA WAS NOT PROVIDED. AS-BUILT DRAWINGS ARE BASED ON ORIGINAL DESIGN.

0 10FT 30FT 60FT
SCALE: 1"=30'

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\300 DESIGN\320 CIVIL & STRUCTURAL\322 SITE DESIGN\MERRICOURT C3D2019 2020-10-21 AB.DWG LAST SAVED BY: rtharper 10/30/2020 8:53 AM PLOTTED BY: Rob T. Harper 10/30/2020 8:54 AM Tab:Site Dimension Plan

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

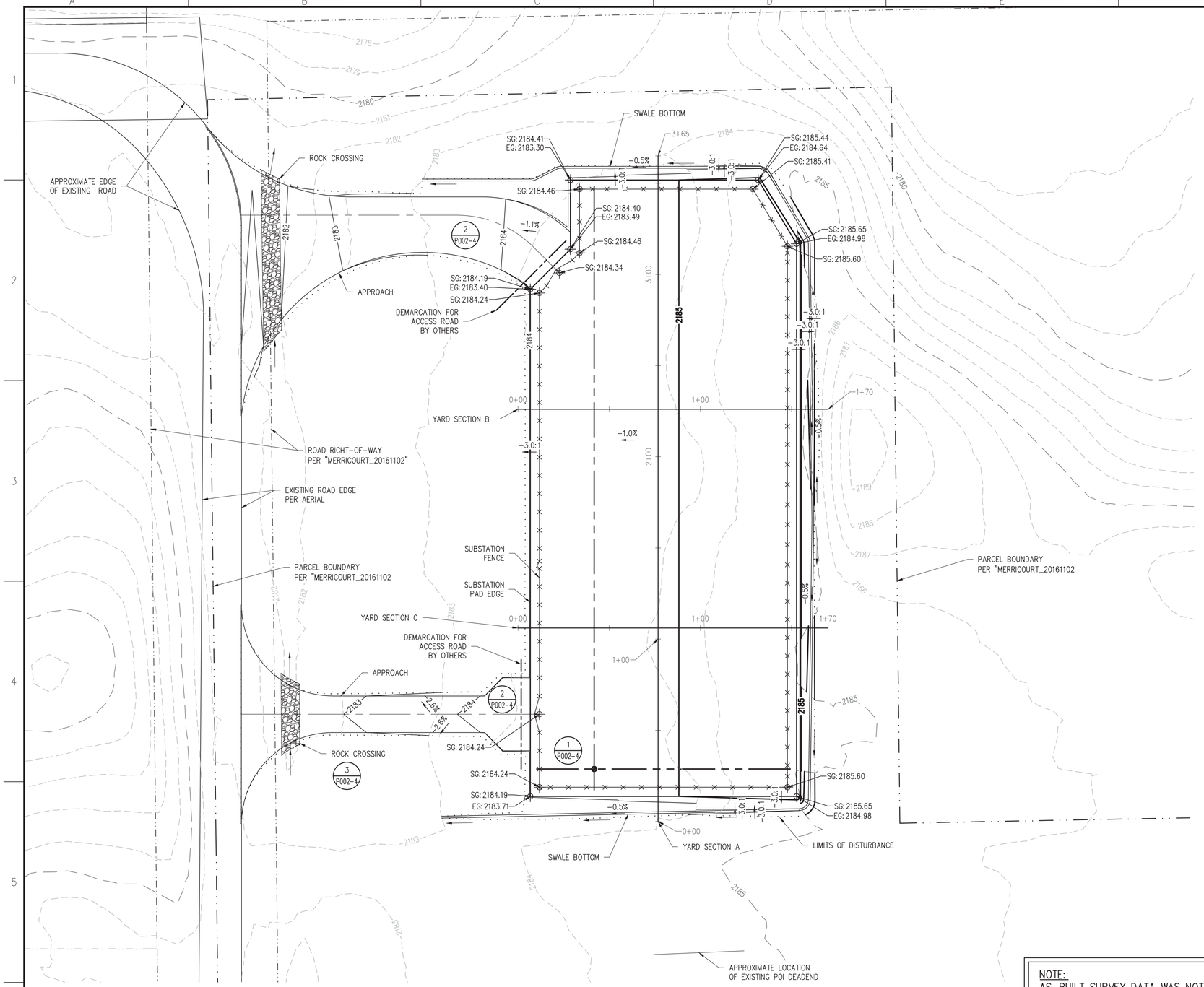
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	RTH	CAJ
0	ISSUED FOR CONSTRUCTION	08/28/19	BP	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	R. HARPER	04/11/19
DESIGNED	C. JOBES	04/11/19
CHECKED	N. FOSTER	06/18/19
APPROVED	C. JOBES	08/28/19
DWG SCALE: 1"=30'	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
SITE DIMENSION PLAN

DWG. NAME: MCW-D-P002-1 | REVISION NO : 1



NOTE:
AS-BUILT SURVEY DATA WAS NOT PROVIDED. AS-BUILT DRAWINGS ARE BASED ON ORIGINAL DESIGN.

ORIGINAL

APPROXIMATE EARTHWORK QUANTITIES

TOTAL DISTURBED AREA	1.6	ACRES		
TOPSOIL				
REMOVAL	AREA (SF)	DEPTH (IN)	VOL (CY)	
YARD	45,739	4	565	
APPROACH	16569	4	205	
TOTALS	1.4	ACRES	769	CY
RE-USED ON SITE	0	4	0	
EXPORT / STOCKPILED / WASTED			769	CY

CUT/FILL QUANTITIES*	CUT	FILL	NET	
YARD	0	870	870	FILL
APPROACH	179	12	167	CUT
NET CUT/FILL TO R.G.	179	882	703	FILL
ONSITE MATERIAL IS SUITABLE AS FILL				
CUT AVAILABLE FOR FILL			179	CY
STRUCTURAL FILL REQUIRED			703	CY

SELECT IMPORT**	AREA (SF)	DEPTH (IN)	VOL (CY)
YARD-FLEXIBLE BASE	43928	8	1085
YARD-SURFACING	43928	6	813
APPROACH-FLEXIBLE BASE	13175	8	325
APPROACH-SURFACING	13175	6	244
RIP RAP	1292	12	48
		TOTAL	2515

SUMMARY		
TOTAL CUT (TOPSOIL + NET CUT)	948	CY
TOTAL FILL (SELECT IMPORT + NET FILL)	3397	CY
TOTAL EXPORT / STOCKPILED / WASTED	769	CY
TOTAL IMPORT (SELECT IMPORT + STRUCTURAL FILL)	3218	CY

*TOPSOIL STRIPPED SURFACE COMPARED TO ROUGH GRADE
**ABOVE ROUGH GRADE

EXPANSION

APPROXIMATE EARTHWORK QUANTITIES

TOTAL DISTURBED AREA	< 0.1	ACRES		
TOPSOIL				
REMOVAL	AREA (SF)	DEPTH (IN)	VOL (CY)	
YARD	4,970	4	61	
APPROACH	2,540	4	31	
TOTALS	0.2	ACRES	93	CY
RE-USED ON SITE	0	4	0	
EXPORT / STOCKPILED / WASTED			93	CY

CUT/FILL QUANTITIES*	CUT	FILL	NET	
YARD	0	139	139	FILL
APPROACH	65	673	608	FILL
NET CUT/FILL TO R.G.	65	812	747	FILL
ONSITE MATERIAL IS SUITABLE AS FILL				
CUT AVAILABLE FOR FILL			65	CY
STRUCTURAL FILL REQUIRED			747	CY

SELECT IMPORT**	AREA (SF)	DEPTH (IN)	VOL (CY)
YARD-FLEXIBLE BASE	3975	8	98
YARD-SURFACING	3975	6	74
APPROACH-FLEXIBLE BASE	25	8	1
APPROACH-SURFACING	25	6	0
RIP RAP	0	12	0
		TOTAL	173

SUMMARY		
TOTAL CUT (TOPSOIL + NET CUT)	158	CY
TOTAL FILL (SELECT IMPORT + NET FILL)	985	CY
TOTAL EXPORT / STOCKPILED / WASTED	93	CY
TOTAL IMPORT (SELECT IMPORT + STRUCTURAL FILL)	920	CY

*TOPSOIL STRIPPED SURFACE COMPARED TO ROUGH GRADE
**ABOVE ROUGH GRADE

LEGEND

- EXISTING MAJOR CONTOUR LINE
- EXISTING MINOR CONTOUR LINE
- MAJOR CONTOUR LINE (SUBGRADE)
- MINOR CONTOUR LINE (SUBGRADE)
- SUBSTATION BASELINE
- PROPERTY BOUNDARY
- RIGHT-OF-WAY
- CHAINLINK FENCE
- SG: SUBGRADE (TOP OF FLEXIBLE BASE)
- EG: EXISTING GRADE

GENERAL NOTES

1. Cut and fill volumes are raw volumes with no allowances for shrinkage where applicable.
2. Contractor shall strip approximately 4 inches of soils from the working area; stripped top soil shall be used for embankments and slopes outside of the immediate area of the pad.
3. Suitable excess fill including waste top soils may be used for embankments and slopes outside of the immediate area of the pad.
4. Site and roadway to be covered by a 8 inch road base gravel as a working surface.
5. Slope access roads for drainage.
6. New contours indicate subgrade and do not include crushed rock surfacing.
7. All areas not receiving crushed rock surfacing or road mix (Flexible Base) shall be filled with topsoil and re-seeded.
8. Crushed rock surfacing shall not be placed until all subgrade conduit, grounding and utilities are complete.
9. Subgrade includes Flexible Base material.
10. The earthwork contractor shall furnish and install compacted non-expansive backfill.

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\300 DESIGN\320 CIVIL & STRUCTURAL\322 SITE DESIGN\MERRICOURT C3D2019 2020-10-21 AB.DWG LAST SAVED BY: rtharper 10/30/2020 8:53 AM PLOTTED BY: Rob T. Harper 10/30/2020 8:54 AM Tab:Site Grading Plan

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

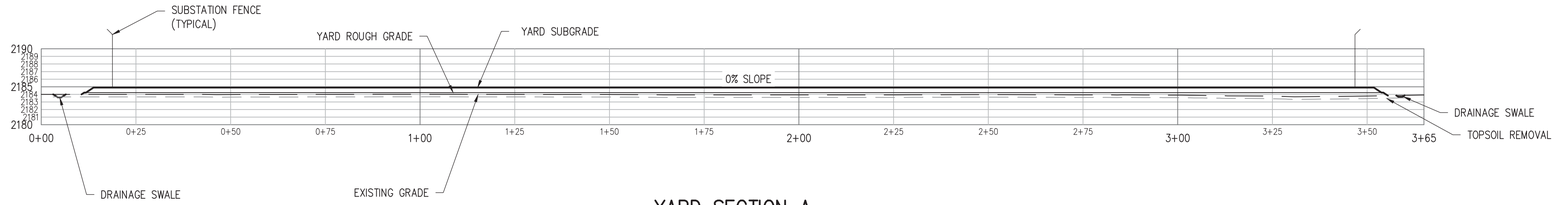
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	RTH	CAJ
0	ISSUED FOR CONSTRUCTION	08/28/19	BP	CAJ

edF renewables

ENGINEERING RECORD		DATE
DRAWN	R. HARPER	06/11/19
DESIGNED	C. JOBES	06/18/19
CHECKED	N. FOSTER	06/18/19
APPROVED	C. JOBES	08/28/19
DWG SCALE: 1"=30'	PLT SCALE: 1:1	

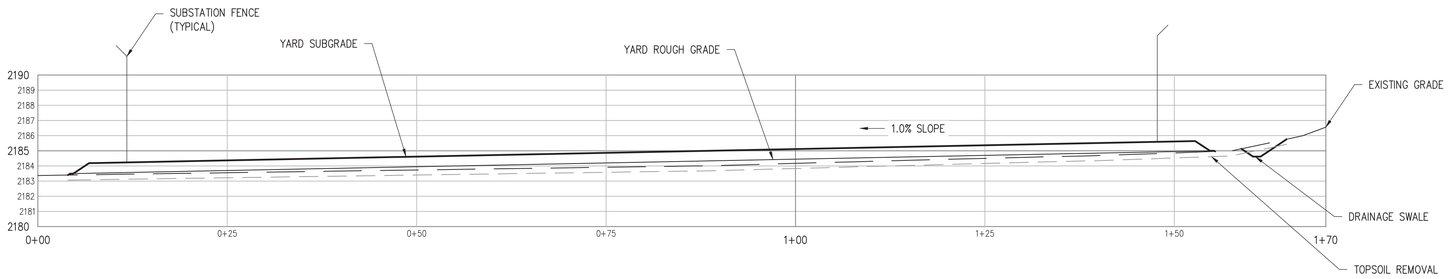
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
SITE GRADING PLAN

DWG. NAME: MCW-D-P002-2 | REVISION NO : 1



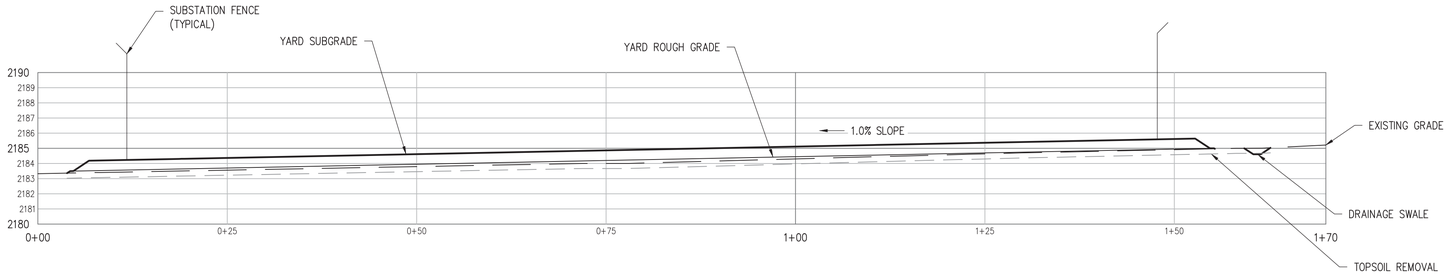
YARD SECTION A

SCALE: 1"=20' HORIZONTAL
1"=10' VERTICAL



YARD SECTION B

SCALE: 1"=10' HORIZONTAL
1"=5' VERTICAL



YARD SECTION C

SCALE: 1"=10' HORIZONTAL
1"=5' VERTICAL

LEGEND

- EXISTING GRADE
- TOPSOIL REMOVAL
- SUBGRADE
- ROUGH GRADE

NOTES

1. FOR GENERAL NOTES SEE SHEET P002-2

AS BUILT

NOTE:
AS-BUILT SURVEY DATA WAS NOT PROVIDED. AS-BUILT DRAWINGS ARE BASED ON ORIGINAL DESIGN.

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\300 DESIGN\320 CIVIL & STRUCTURAL\322 SITE DESIGN\MERRICOURT C3D2019 2020-10-21 AB.DWG LAST SAVED BY: rtharper 10/30/2020 8:53 AM PLOTTED BY: Rob T. Harper 10/30/2020 8:54 AM Tab:Site Grading Sections

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

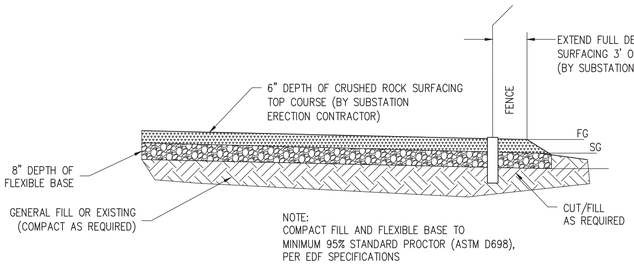
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	RTH	CAJ
0	ISSUED FOR CONSTRUCTION	08/28/19	BP	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	D. JOHNSON	08/12/19
DESIGNED	N. FOSTER	08/12/19
CHECKED	C. JOBES	08/16/19
APPROVED	C. JOBES	08/28/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

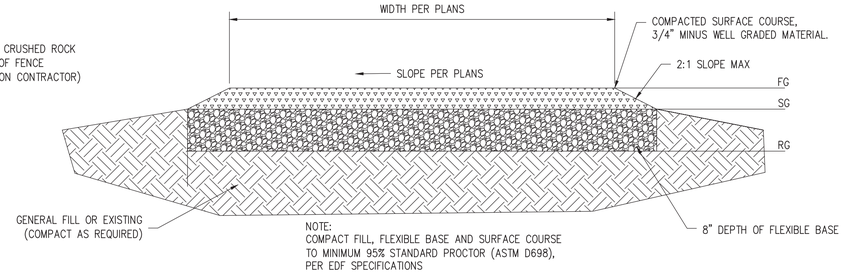
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
SITE GRADING SECTIONS

DWG. NAME: MCW-D-P002-3 | REVISION NO : 1



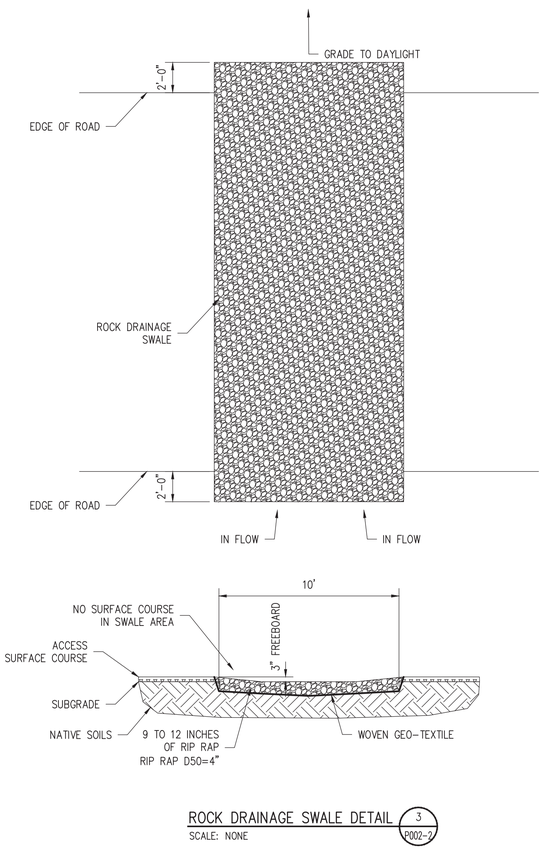
GENERAL YARD SURFACING DETAIL (1 / P002-2)

SCALE: NONE



ACCESS ROAD AND APPROACH DETAIL (BY BELOW GRADE CONTRACTOR) (2 / P002-2)

SCALE: NONE



ROCK DRAINAGE SWALE DETAIL (3 / P002-2)

SCALE: NONE

NOTE:
AS-BUILT SURVEY DATA WAS NOT PROVIDED. AS-BUILT DRAWINGS ARE BASED ON ORIGINAL DESIGN.

NOTES

1. FOR GENERAL NOTES SEE SHEET P002-2

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\300 DESIGN\320 CIVIL & STRUCTURAL\322 SITE DESIGN\MERRICOURT C3D2019 2020-10-21 AB.DWG LAST SAVED BY: rtharper 10/30/2020 8:53 AM PLOTTED BY: Rob T. Harper 10/30/2020 8:55 AM Tab:Site Grading Details Sh 1

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

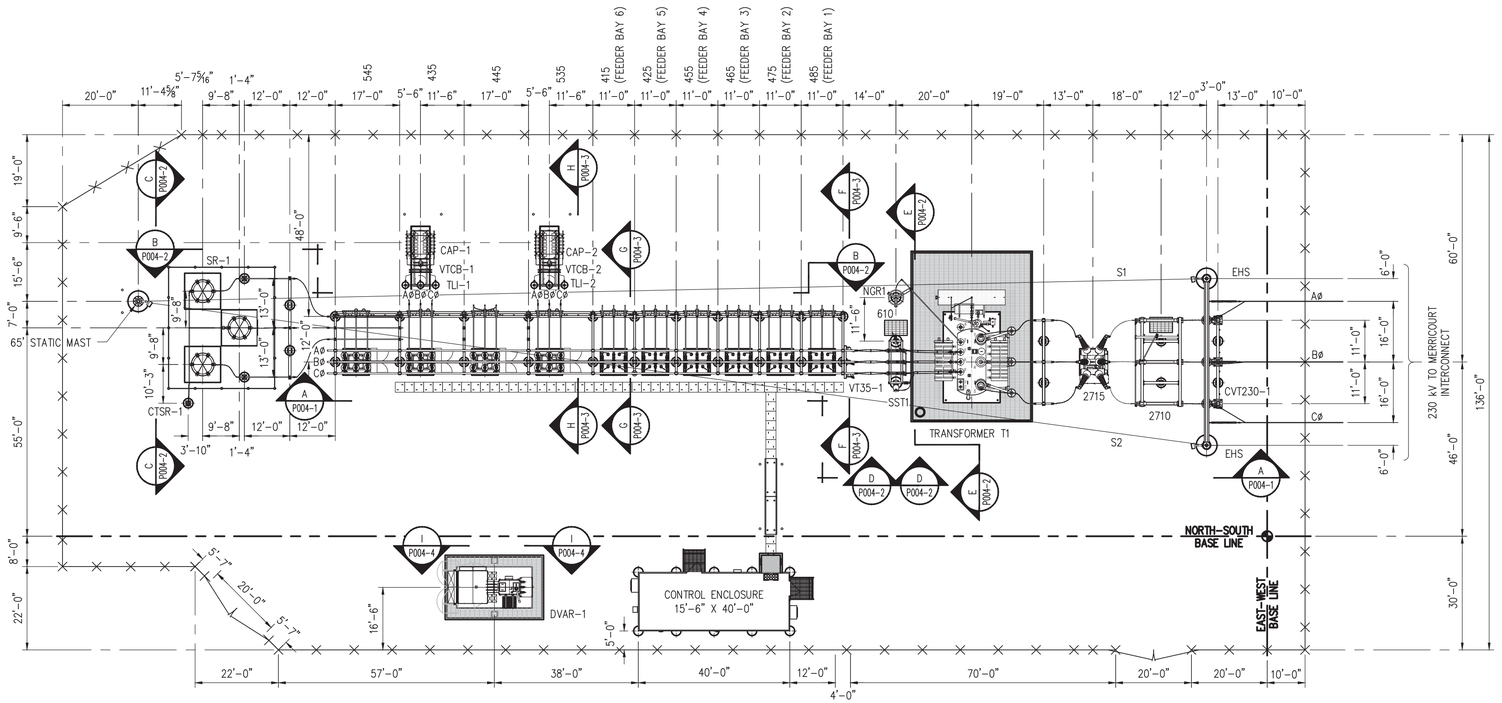
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	RTH	CAJ
0	ISSUED FOR CONSTRUCTION	08/28/19	BP	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	D. JOHNSON	08/12/19
DESIGNED	N. FOSTER	08/12/19
CHECKED	C. JOBES	08/16/19
APPROVED	C. JOBES	08/28/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
SITE GRADING DETAILS

DWG. NAME: MCW-D-P002-4 | REVISION NO : 1



[S1] - (1) 3/8" EHS 1950 LB. INITIAL TENSION AT NESC 250B-0 DEG 251' SPAN		
TEMP. F	SAG FT	TENSION LBS
20	3.18	676
30	3.34	644
40	3.5	615
50	3.66	589
60	3.81	565
70	3.96	543
80	4.11	523
90	4.26	505
100	4.41	488

[S2] - (1) 3/8" EHS 2050 LB. INITIAL TENSION AT NESC 250B-0 DEG 256' SPAN		
TEMP. F	SAG FT	TENSION LBS
20	2.97	753
30	3.13	715
40	3.29	679
50	3.45	648
60	3.62	619
70	3.77	593
80	3.93	569
90	4.09	548
100	4.24	528

AS BUILT

STRUCTURE DESIGN CRITERIA

230 kV CLEARANCE (900 kV BIL):

LIVE PARTS: MIN ∅-G=71"
MIN ∅-∅=89"

TO GRADE: 15'-0" (BUS)
27'-0" (DRIVEWAY)

34.5 kV CLEARANCE (200 kV BIL):

LIVE PARTS: MIN ∅-G=13"
MIN ∅-∅=18"

TO GRADE: 10'-0" (BUS)
22'-0" (DRIVEWAY)

0 10FT 20FT 40FT
SCALE: 1"=20'-0"

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P003-1.DWG LAST SAVED BY: tjwilcox 10/9/2020 2:06 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:33 AM Tab:MCW-D-P003-1

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

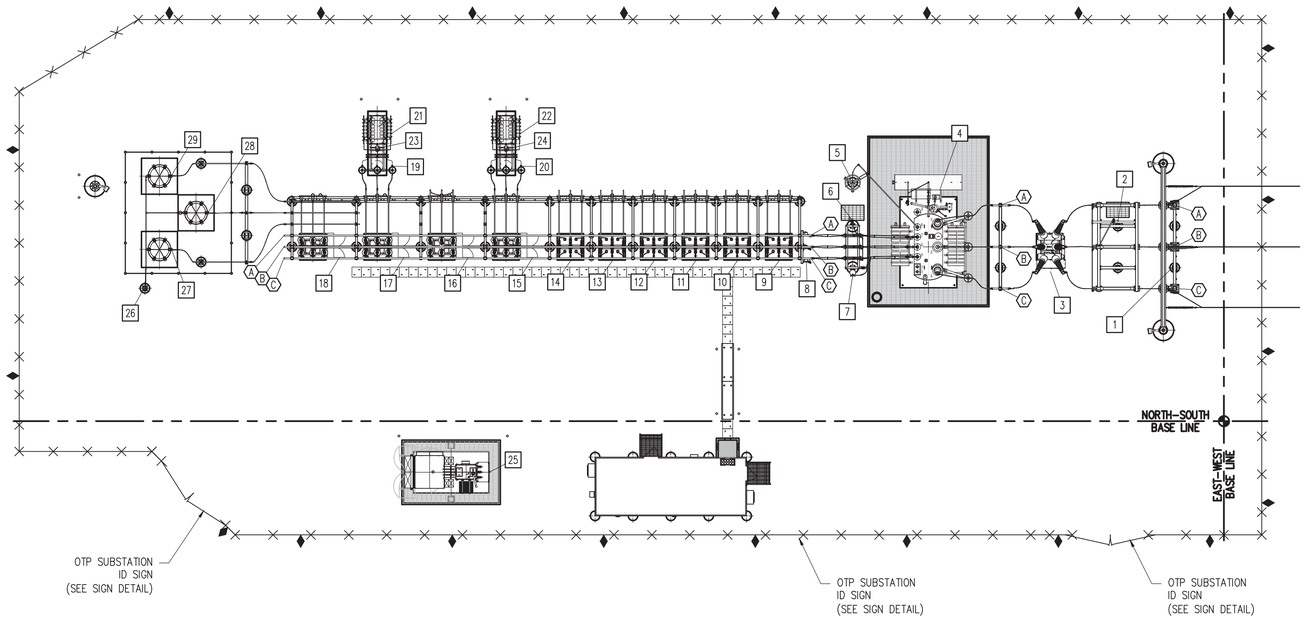
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	12/20/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

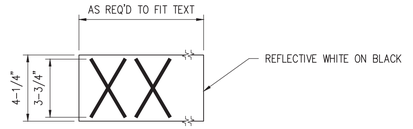
EDF renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: 1"=20'-0"	PLT SCALE: 1:1	

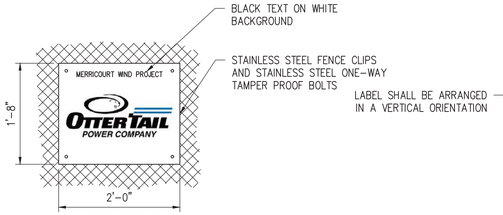
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
GENERAL ARRANGEMENT

DWG. NAME: MCW-D-P003-1 | REVISION NO : 3





LABEL DETAIL
EDF RENEWABLE ENERGY LABEL DESIGN



SIGN DETAIL
(PROVIDED BY OWNER)

EQUIPMENT LABEL TABLE

ITEM	QTY	DESCRIPTION
1	1	CVT230–1
2	1	2710
3	1	2715
4	1	TRANSFORMER T1
5	1	NGR1
6	1	610
7	1	SST1
8	1	VT35–1
9	1	485
10	1	475
11	1	465
12	1	455
13	1	425
14	1	415
15	1	535
16	1	445
17	1	435
18	1	545
19	1	TLI–1
20	1	TLI–2
21	1	CAP–1
22	1	CAP–2
23	1	VTCB–1
24	1	VTCB–2
25	1	DVAR–1
26	1	CTSR–1
27	1	SR–1 Aø
28	1	SR–1 Bø
29	1	SR–1 Cø
A	4	øA
B	4	øB
C	4	øC

NOTES

1. STATIC WIRES NOT SHOWN FOR CLARITY.

LEGEND

⟨#⟩ – PHASE LABEL

[#] – EQUIPMENT LABEL, REFER TO TABLE

♦ –10"x14", STEEL, BILINGUAL ELECTRICAL SAFETY SIGN EMEDCO CAT. # 40633

0 10FT 20FT 40FT
SCALE: 1"=20'–0"

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P003–2.DWG LAST SAVED BY: tjwilcox 10/7/2020 4:54 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:33 AM Tab:MCW–D–P003–2

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

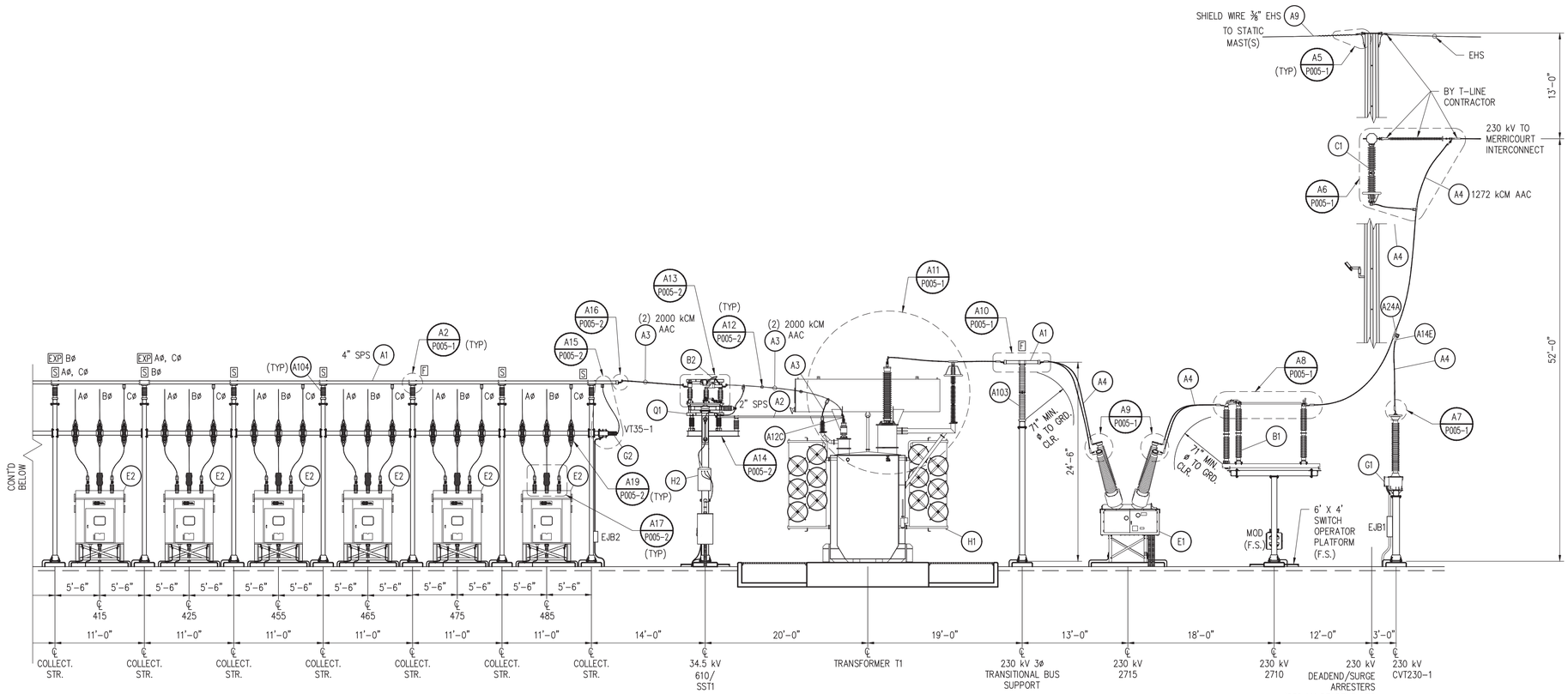
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	12/20/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

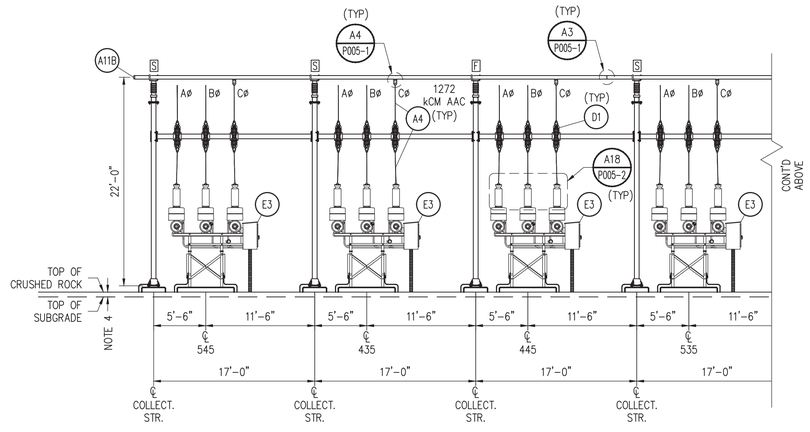
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: 1"=20'–0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
EQUIPMENT LABEL DIAGRAM

DWG. NAME: MCW–D–P003–2 | REVISION NO : 3





ELEVATION
SCALE: 1/8"=1'-0"
A-A P003-1

AS BUILT

STRUCTURE DESIGN CRITERIA

230 kV CLEARANCE (900 kV BIL):

LIVE PARTS: MIN ø–G=71"
MIN ø–ø=89"

TO GRADE: 15'–0" (BUS)
27'–0" (DRIVEWAY)

34.5 kV CLEARANCE (200 kV BIL):

LIVE PARTS: MIN ø–G=13"
MIN ø–ø=18"

TO GRADE: 10'–0" (BUS)
22'–0" (DRIVEWAY)

NOTES

1. REFER TO DRAWING MCW–B–Z001 FOR BILL OF MATERIALS.
2. SUBSTATION CONTRACTOR TO PROVIDE BOLTS, NUTS AND WASHERS AS REQUIRED FOR BUS FITTINGS AND TO MOUNT EQUIPMENT TO STRUCTURES.
3. PLACE ALL BUS SUPPORT STANDS, SWITCH STANDS, DEAD ENDS AND STATIC MASTS ON LEVELING NUTS. BUS HEIGHTS ARE FROM BOTTOM OF BASE PLATE.
4. 4" TO 6" OF SURFACE ROCK, 4" MINIMUM, SHALL BE INSTALLED OVER SUBSTATION SURFACE, EXTENDING 5' BEYOND FENCE.

LEGEND

A1 / – — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
A1 — MATERIAL ITEM NUMBER ON BILL OF MATERIALS (NOTE 1)
F S EXP — BUS SUPPORT FITTINGS: FIXED, SLIP, EXPANSION
N.S. — NEAR SIDE OF STRUCTURE
F.S. — FAR SIDE OF STRUCTURE

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P004–1.DWG LAST SAVED BY: tjwilcox 10/8/2020 3:08 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:33 AM Tab:MCW–D–P004–1

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

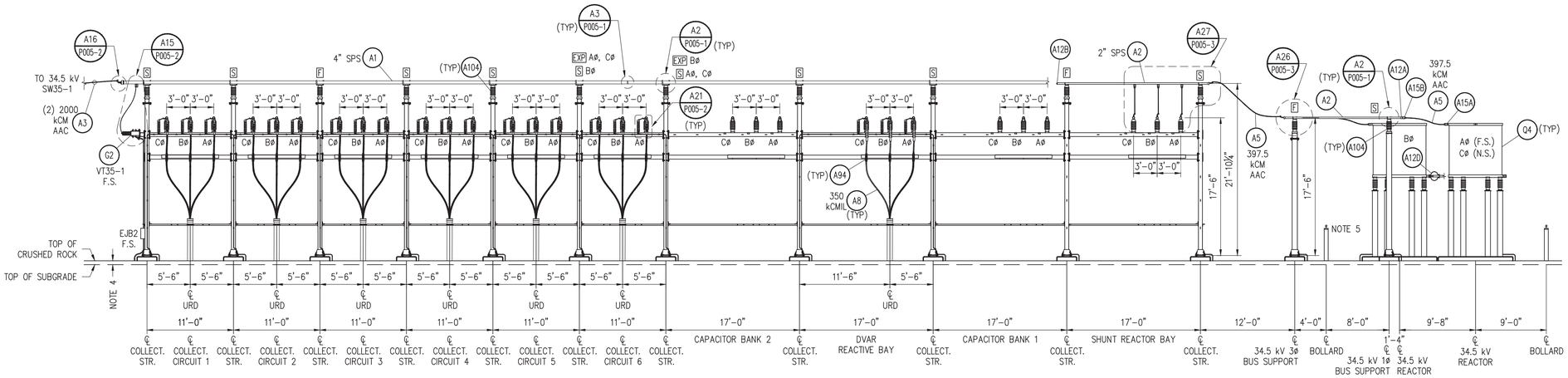
NO	REVISION	DATE	BY	APR
2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	12/20/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

EDF renewables

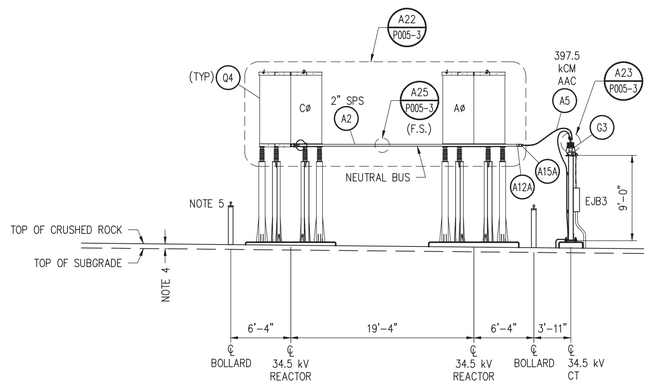
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION ELEVATIONS

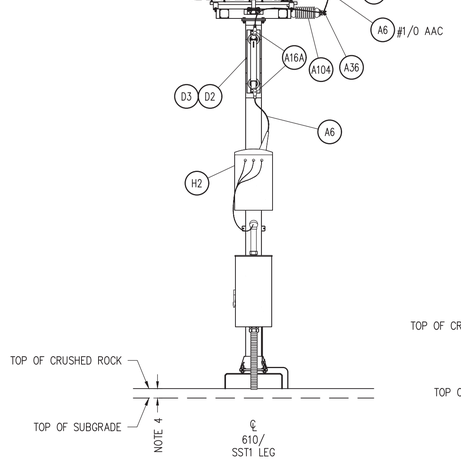
DWG. NAME: MCW–D–P004–1 | REVISION NO : 2



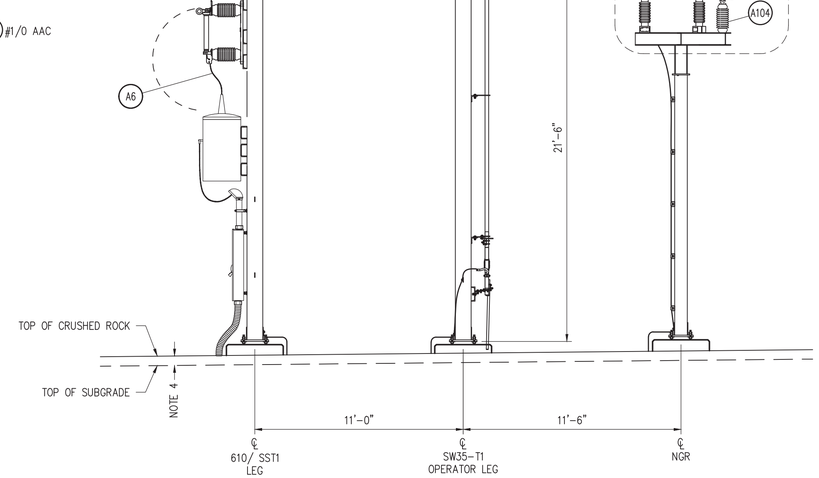
ELEVATION B–B P003–1
SCALE: 1/8"=1'–0"



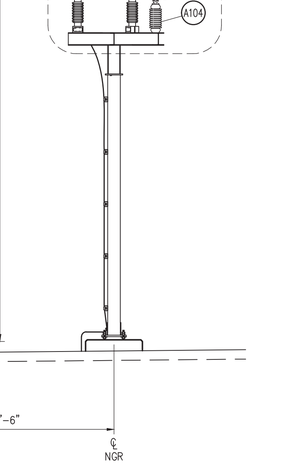
ELEVATION C–C P003–1
SCALE: 1/8"=1'–0"



ELEVATION D–D P003–1
SCALE: 1/4"=1'–0"



ELEVATION E–E P003–1
SCALE: 1/4"=1'–0"



AS BUILT

STRUCTURE DESIGN CRITERIA

230 kV CLEARANCE (900 kV BIL):

LIVE PARTS: MIN ø–G=71"
MIN ø–ø=89"

TO GRADE: 15'–0" (BUS)
27'–0" (DRIVEWAY)

34.5 kV CLEARANCE (200 kV BIL):

LIVE PARTS: MIN ø–G=13"
MIN ø–ø=18"

TO GRADE: 10'–0" (BUS)
22'–0" (DRIVEWAY)

NOTES

1. REFER TO DRAWING MCW–B–Z001 FOR BILL OF MATERIALS.
2. SUBSTATION CONTRACTOR TO PROVIDE BOLTS, NUTS AND WASHERS AS REQUIRED FOR BUS FITTINGS AND TO MOUNT EQUIPMENT TO STRUCTURES.
3. PLACE ALL BUS SUPPORT STANDS, SWITCH STANDS, DEAD ENDS AND STATIC MASTS ON LEVELING NUTS. BUS HEIGHTS ARE FROM BOTTOM OF BASE PLATE.
4. 4" TO 6" OF SURFACE ROCK, 4" MINIMUM, SHALL BE INSTALLED OVER SUBSTATION SURFACE, EXTENDING 5' BEYOND FENCE.
5. CHAIN NOT SHOWN FOR CLARITY.

LEGEND

A1 / –	INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
(A1)	MATERIAL ITEM NUMBER ON BILL OF MATERIALS (NOTE 1)
F S EXP	BUS SUPPORT FITTINGS: FIXED, SLIP, EXPANSION
N.S.	NEAR SIDE OF STRUCTURE
F.S.	FAR SIDE OF STRUCTURE

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P004–2.DWG LAST SAVED BY: tjwilcox 10/9/2020 2:08 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:34 AM Tab:MCW–D–P004–2

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BILLINGS, MONTANA

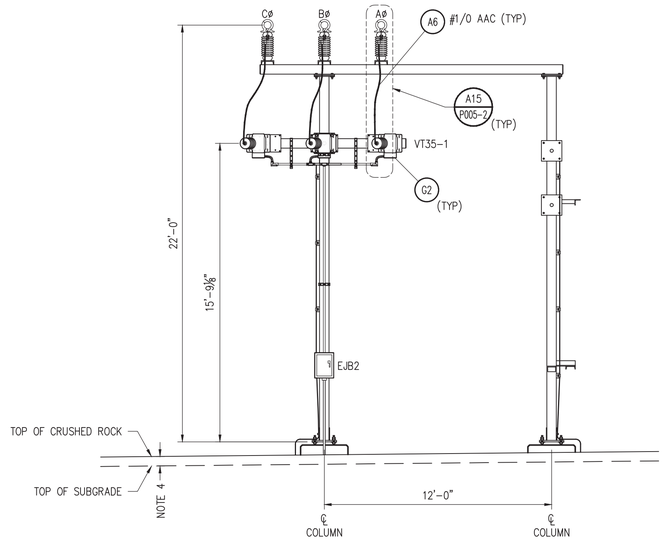
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION: DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	12/20/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

edf renewables

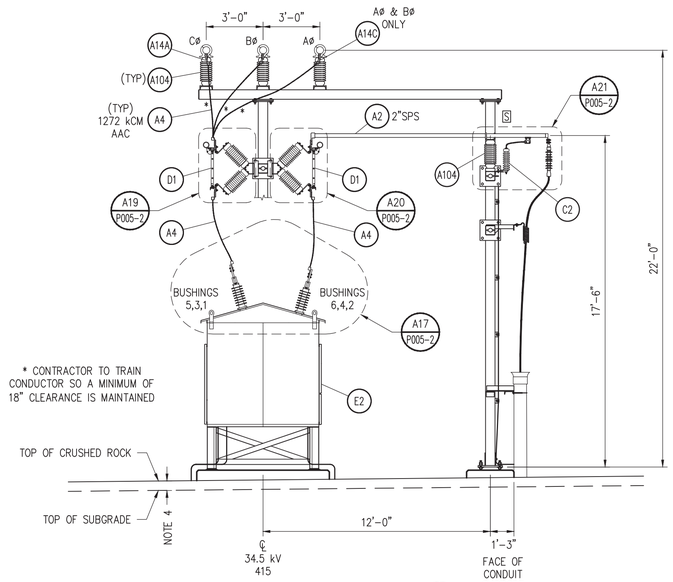
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION ELEVATIONS

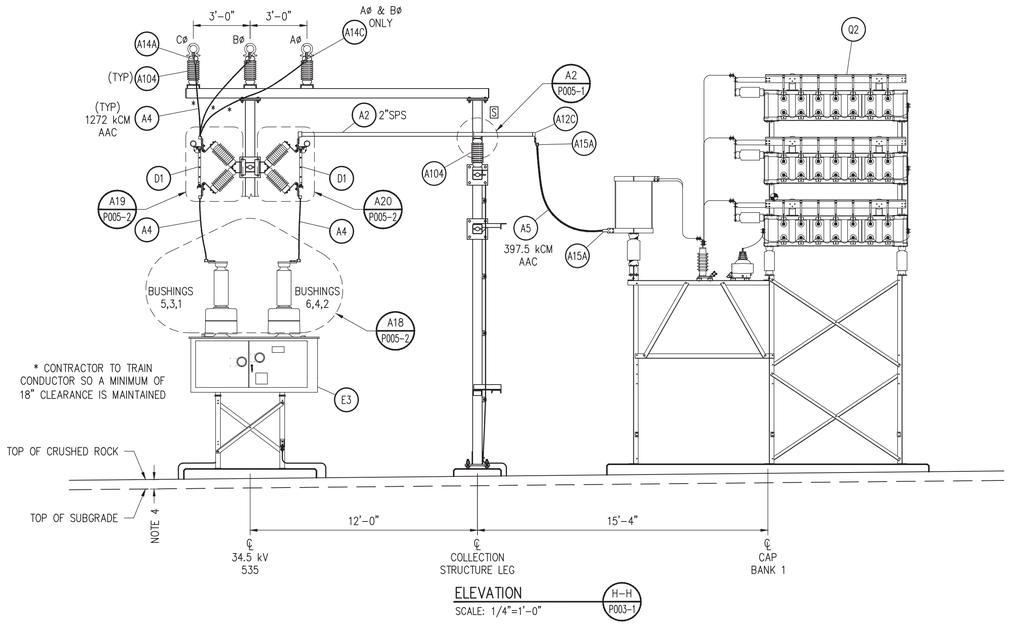
DWG. NAME: MCW–D–P004–2 | REVISION NO : 3



ELEVATION F-F P003-1
SCALE: 1/4"=1'-0"



ELEVATION G-G P003-1
SCALE: 1/4"=1'-0"



ELEVATION H-H P003-1
SCALE: 1/4"=1'-0"

STRUCTURE DESIGN CRITERIA

230 kV CLEARANCE (900 kV BIL):

LIVE PARTS: MIN ø-G=71"
MIN ø-ø=89"

TO GRADE: 15'-0" (BUS)
27'-0" (DRIVEWAY)

34.5 kV CLEARANCE (200 kV BIL):

LIVE PARTS: MIN ø-G=13"
MIN ø-ø=18"

TO GRADE: 10'-0" (BUS)
22'-0" (DRIVEWAY)

NOTES

1. REFER TO DRAWING MCW-B-Z001 FOR BILL OF MATERIALS.
2. SUBSTATION CONTRACTOR TO PROVIDE BOLTS, NUTS AND WASHERS AS REQUIRED FOR BUS FITTINGS AND TO MOUNT EQUIPMENT TO STRUCTURES.
3. PLACE ALL BUS SUPPORT STANDS, SWITCH STANDS, DEAD ENDS AND STATIC MASTS ON LEVELING NUTS. BUS HEIGHTS ARE FROM BOTTOM OF BASE PLATE.
4. 4" TO 6" OF SURFACE ROCK, 4" MINIMUM, SHALL BE INSTALLED OVER SUBSTATION SURFACE, EXTENDING 5' BEYOND FENCE.

LEGEND

A1 / – INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
A1 MATERIAL ITEM NUMBER ON BILL OF MATERIALS (NOTE 1)
F S EXP BUS SUPPORT FITTINGS: FIXED, SLIP, EXPANSION
N.S. NEAR SIDE OF STRUCTURE
F.S. FAR SIDE OF STRUCTURE

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P004-3.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:39 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:34 AM Tab:MCW-D-P004-3

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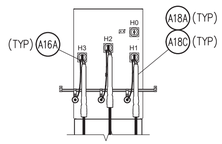
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

edf renewables

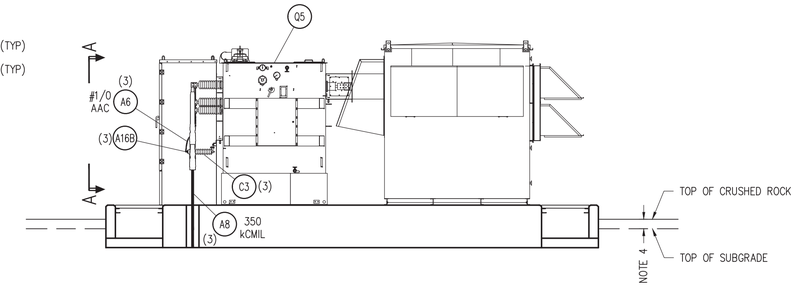
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION ELEVATIONS

DWG. NAME: MCW-D-P004-3 | REVISION NO : 1



SECTION A-A



ELEVATION
SCALE: 1/4"=1'-0"
I-I
P003-1

STRUCTURE DESIGN CRITERIA

230 kV CLEARANCE (900 kV BIL):

LIVE PARTS: MIN ø-G=71"
MIN ø-ø=89"

TO GRADE: 15'-0" (BUS)
27'-0" (DRIVEWAY)

34.5 kV CLEARANCE (200 kV BIL):

LIVE PARTS: MIN ø-G=13"
MIN ø-ø=18"

TO GRADE: 10'-0" (BUS)
22'-0" (DRIVEWAY)

NOTES

1. REFER TO DRAWING MCW-B-Z001 FOR BILL OF MATERIALS.
2. SUBSTATION CONTRACTOR TO PROVIDE BOLTS, NUTS AND WASHERS AS REQUIRED FOR BUS FITTINGS AND TO MOUNT EQUIPMENT TO STRUCTURES.
3. PLACE ALL BUS SUPPORT STANDS, SWITCH STANDS, DEAD ENDS AND STATIC MASTS ON LEVELING NUTS. BUS HEIGHTS ARE FROM BOTTOM OF BASE PLATE.
4. 4" TO 6" OF SURFACE ROCK, 4" MINIMUM, SHALL BE INSTALLED OVER SUBSTATION SURFACE, EXTENDING 5' BEYOND FENCE.

LEGEND

A1 / – — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

A1 — MATERIAL ITEM NUMBER ON BILL OF MATERIALS (NOTE 1)

F S EXP — BUS SUPPORT FITTINGS: FIXED, SLIP, EXPANSION

N.S. — NEAR SIDE OF STRUCTURE

F.S. — FAR SIDE OF STRUCTURE

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P004-4.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:40 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:34 AM Tab:MCW-D-P004-4

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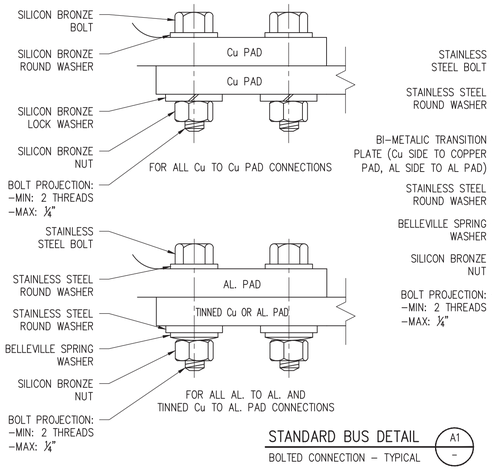
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG

edf renewables

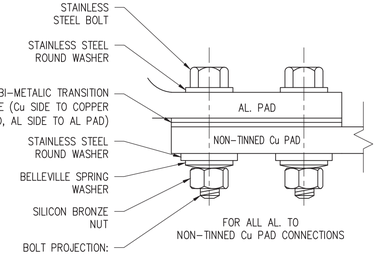
ENGINEERING RECORD		DATE
DRAWN	WILCOX	03/20
DESIGNED	WILCOX	03/20
CHECKED	GROFF	03/20
APPROVED	GROFF	04/20
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

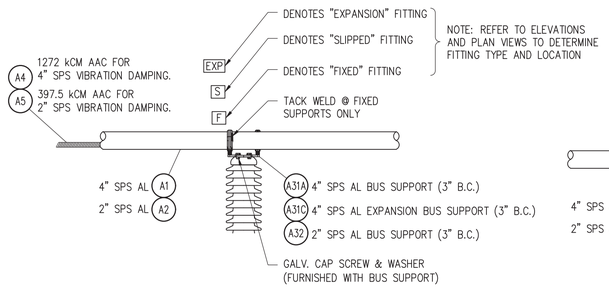
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION ELEVATIONS

DWG. NAME: MCW-D-P004-4 | REVISION NO : 1

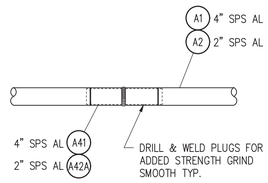


STANDARD BUS DETAIL A1 –
BOLTED CONNECTION – TYPICAL

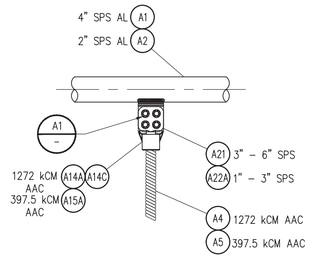




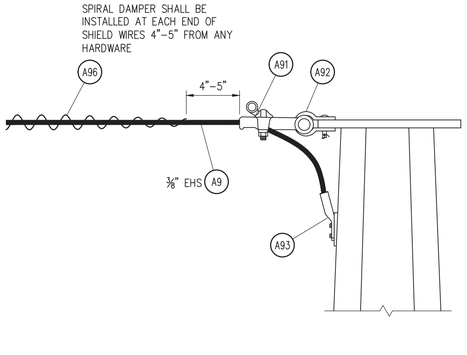
STANDARD BUS DETAIL A2 –
TYPICAL BUS SUPPORT



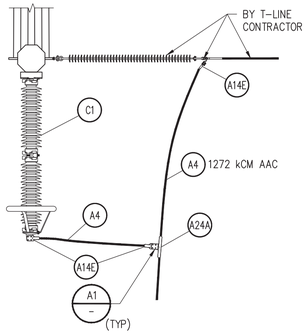
STANDARD BUS DETAIL A3 –
WELDED BUS SPLICE



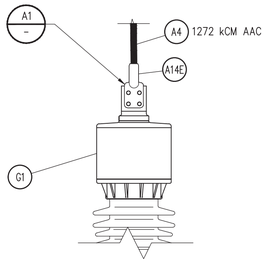
STANDARD BUS DETAIL A4 –
TEE TAP TO CABLE – TYPICAL



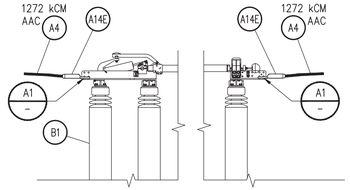
STANDARD BUS DETAIL A5 –
STATIC WIRE TERMINATION



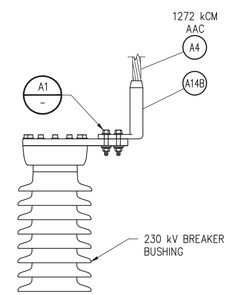
STANDARD BUS DETAIL A6 –
230 kV UNDERHUNG SURGE ARRESTOR



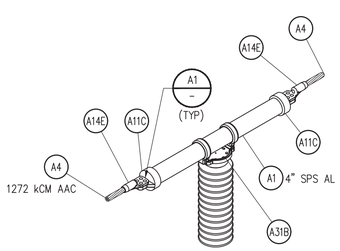
STANDARD BUS DETAIL A7 –
230 kV CVT CONNECTION



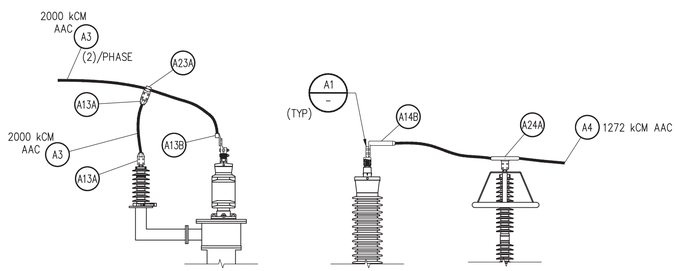
STANDARD BUS DETAIL A8 –
230 kV SWITCH



STANDARD BUS DETAIL A9 –
230 kV BREAKER CONNECTIONS



STANDARD BUS DETAIL A10 –
230 kV CABLE JUMPER BUS SUPPORT



STANDARD BUS DETAIL A11 –
TRANSFORMER BUSHING & ARRESTER CONNECTION

AS BUILT

LEGEND

A1 – INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS

A1 – MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW–B–Z001

GENERAL INSTRUCTIONS

A. WELDING ALUMINUM ELECTRICAL CONNECTORS

1. ALL WELDING SHALL BE DONE USING EITHER OF THE INERT GAS METHODS; TUNGSTEN–ARC (TIG), OR METALLIC–ARC (MIG), BOTH OF WHICH EMPLOY AN ARGON OR HELIUM GAS OR MIXTURE OF THE TWO AS A SHIELD AROUND THE ARC TO PREVENT OXIDATION OF THE ALUMINUM.
2. THE FILLER WIRES, OR RODS, SHALL BE OF 4043 ALUMINUM ALLOY OF THE PROPER DIAMETERS TO SUIT THE VARIOUS APPLICATIONS.
3. PARTS TO BE JOINED SHALL BE CLEAN AND FREE OF HEAVY OXIDE. IF OIL, GREASE OR OTHER IMPURITIES ARE PRESENT, CLEAN WITH A GOOD SOLVENT. HEAVY OXIDE MAY BE REMOVED BY WIRE BRUSHING.
4. WELDMENTS SHALL BE MADE WITH FULL PENETRATION AND ABSENCE OF VOIDS TO ENSURE AN ELECTRICAL RESISTANCE NO GREATER THAN THAT OF THE CONDUCTOR. DUE TO THE DIFFERENCE IN THE ELECTRICAL CONDUCTIVITY OF THE CONDUCTOR ALLOY (6063) AND THE FILLER ALLOY (4043) THE WELDMENT SHALL HAVE A MINIMUM SECTIONAL AREA OF NOT LESS THAN 120% OF THAT OF THE SMALLER CONDUCTOR BEING JOINED.
5. SPECIAL PRECAUTIONS SHALL BE TAKEN TO AVOID EXCESSIVE HEATING, THEREBY ANNEALING THE CONDUCTOR TO THE EXTENT THAT UNDUE DEFLECTION MAY RESULT.

B. INSTALLATION INSTRUCTIONS FOR COMPRESSION TERMINALS

1. INSERT CONDUCTOR FULL DEPTH INTO TERMINAL BORE AND MARK CONDUCTOR AT END OF BARREL. REMOVE CONDUCTOR AFTER MARKING.
2. INJECT SUFFICIENT FILLER COMPOUND IN THE END OF THE TERMINAL BORE (IF NOT PRE–FILLED) AND ON THE CONDUCTOR TO ENSURE THAT EXCESS COMPOUND WILL BE VISIBLE AT TERMINAL END WHEN BARREL IS COMPLETELY COMPRESSED.
3. INSERT CLEANED END OF THE CONDUCTOR INTO THE TERMINAL BARREL TO MARK ON THE CONDUCTOR.
4. SELECT DIE SIZE WHICH IS IDENTICAL TO DIE SIZE MARKED ON THE TERMINAL.
5. MAKE INITIAL COMPRESSION STARTING AT START KNURL. CONTINUE MAKING COMPRESSIONS TO THE MOUTH OF THE TERMINAL OVERLAPPING THE PREVIOUS COMPRESSION BY APPROXIMATELY 1/4 DIE BITE. COMPRESSED PORTION OF THE TERMINAL SHOULD HAVE A SMOOTH UNIFORM APPEARANCE. REMOVE FLASH, IF PRESENT, WITH FILE OR EMERY CLOTH.
6. CLEAN CONTACT SURFACE OF TERMINAL AND OF DEAD–END PAD BY WIRE BRUSHING THROUGH ELECTRICAL JOINT COMPOUND. DO NOT USE FILLER COMPOUND.
7. BOLT TERMINAL TO DEAD END PAD. PARTIALLY TIGHTEN ALL BOLTS AND THEN RE–TIGHTEN EACH BOLT TO RECOMMENDED TORQUE.

C. BOLTED ELECTRICAL CONNECTIONS

1. REMOVE OXIDE FILM FROM CONTACT SURFACE:
   ALUMINUM – APPLY OXIDE–BREAKING, CORROSION–INHIBITING ELECTRICAL JOINT COMPOUND AND WIRE BRUSH.
   COPPER – RUB WITH AN EMERY CLOTH AND IMMEDIATELY COAT WITH AN OXIDE–BREAKING, CORROSION INHIBITING ELECTRICAL JOINT COMPOUND.
2. APPLY A GENEROUS COATING OF ELECTRICAL JOINT COMPOUND TO THE CONTACT SURFACES AND MAKE THE CONNECTION.
3. FOR ALUMINUM TO ALUMINUM AND ALUMINUM TO COPPER CONNECTIONS, THE BOLTS AND NUTS SHALL BE 1/2" DIA. STAINLESS STEEL AND THE NUTS SHALL BE 1/2" DIA. SILICON BRONZE. TIGHTEN THE BOLTS JUST ENOUGH TO FLATTEN THE BELLEVILLE WASHER, (APPROX. 40 FOOT POUNDS). AS THE BOLTS ARE TIGHTENED, EXCESS COMPOUND WILL BE EXTRUDED. SMEAR THE SURPLUS COMPOUND ALONG THE EDGES OF THE JOINT TO GIVE IT FURTHER PROTECTION.
4. FOR COPPER TO COPPER CONNECTIONS THE BOLTS SHALL BE 1/2" DIA. SILICON BRONZE. TIGHTEN THE BOLTS WITH A TORQUE WRENCH TO 40 FOOT POUNDS. NOTE: STAINLESS STEEL BOLT ASSEMBLIES MAY BE USED FOR COPPER TO COPPER CONNECTIONS.

D. VIBRATION DAMPING

1. INSTALL ACSR OR AAC CONDUCTORS IN ALL HORIZONTAL TUBULAR BUS RUNS OVER 9'–0" FOR 2" BUS AND 17'–0" FOR 4" BUS.
2. THE WIRE PLACED IN THE BUS TO DAMPEN VIBRATION SHALL BE STRAIGHTENED AS IT COMES FROM THE REEL SO THAT IT WILL LAY FREELY WITHIN THE PIPE TO PERMIT VERTICAL MOVEMENT, THEREBY RESTRAINING THE RESONANT VIBRATION OF THE PIPE.
3. BOTH ENDS OF THE HORIZONTAL BUSES SHALL BE CLOSED WHEN DAMPING WIRE HAS BEEN PLACED WITHIN THE BUS.

E. TUBULAR BUS

1. ALL TUBING SHALL BE CUT IN THE FIELD TO THE EXACT LENGTH REQUIRED. THE BUS LENGTHS SHOWN IN THE BUS CUTTING SCHEDULE (IF PROVIDED) ARE PURPOSELY LONGER THAN REQUIRED TO ALLOW FOR SLIGHT ERRORS IN CONSTRUCTION.
2. TUBING ENDS SHALL BE CUT SQUARE AND ALL BURRS REMOVED. ANY DEFORMATION OF THE CUT EDGE OF THE TUBING SHALL BE CORRECTED.
3. HORIZONTAL TUBULAR BUS SPANS SHALL BE INSTALLED WITH A SLIGHT UPWARD DEFLECTION WHICH WILL TEND TO NEUTRALIZE THE DEFLECTION (SAG) DUE TO THE WEIGHT OF THE BUS AND TAPS. INSTALLED BUS SHALL DEFLECT NO MORE THAN 1/300 OF SPAN.
4. WELDS SHALL BE FINISHED TO PROVIDE A SMOOTH, CORONA–FREE SURFACE. ONLY FINE TOOTH FILES OR ABRASIVE MAY BE USED TO REMOVE WELD SPATTER AND SMOOTH WELDS.
5. A 1/4" HOLE SHALL BE DRILLED AT THE LOWEST POINT IN ALL THE HORIZONTAL BUS RUNS FOR DRAINAGE.

F. GENERAL

1. REFER TO WRITTEN SPECIFICATIONS FOR ADDITIONAL INSTRUCTIONS.

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P005–1.DWG LAST SAVED BY: tjwilcox 10/7/2020 4:02 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:34 AM Tab:MCW–D–P005–1

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

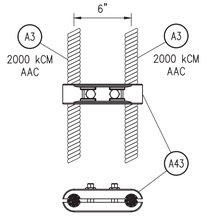
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

edf renewables

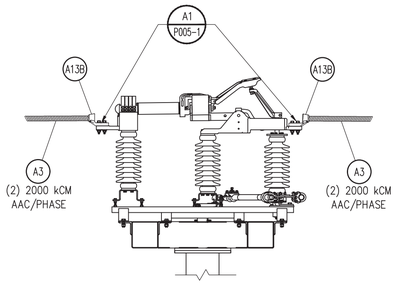
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
BUS DETAILS

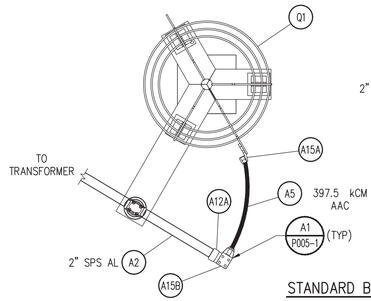
DWG. NAME: MCW–D–P005–1 | REVISION NO : 1

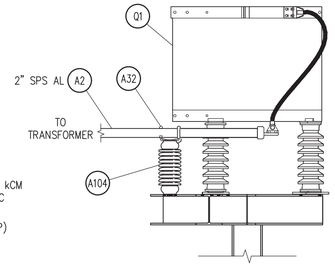


STANDARD BUS DETAIL A12
6" CABLE SPACER

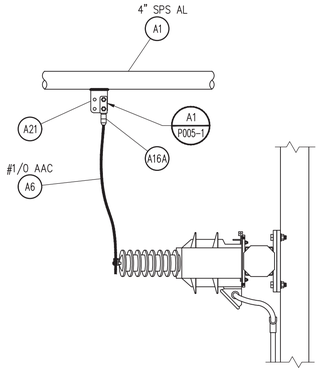


STANDARD BUS DETAIL A13
34.5 kV DISCONNECT SWITCH

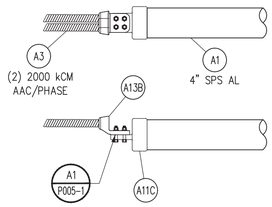




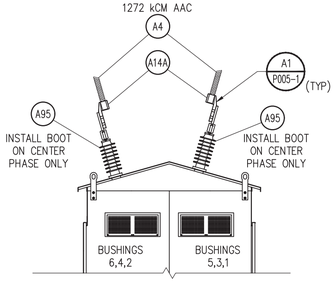
STANDARD BUS DETAIL A14
NGR CONNECTIONS



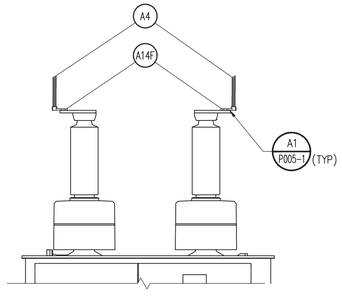
STANDARD BUS DETAIL A15
34.5 kV VT INSTALLATION



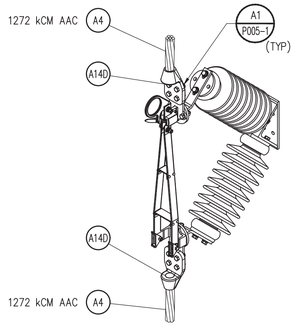
STANDARD BUS DETAIL A16
34.5 kV RIGID TO JUMPER



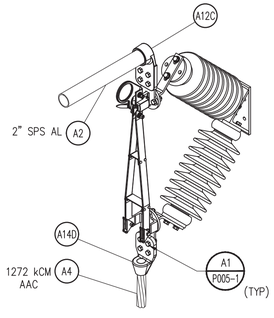
STANDARD BUS DETAIL A17
34.5 kV EMA BREAKER BUSHING



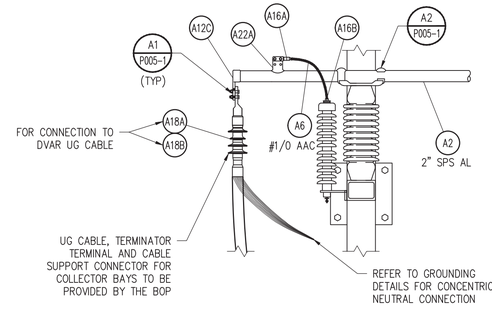
STANDARD BUS DETAIL A18
72 kV GE BREAKER BUSHING



STANDARD BUS DETAIL A19
34.5 kV HOOK SWITCH DISCONNECT



STANDARD BUS DETAIL A20
34.5 kV HOOK SWITCH DISCONNECT



STANDARD BUS DETAIL A21
34.5 kV COLLECTOR CIRCUIT TERMINATION

AS BUILT

LEGEND

A1 / – : INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

A1 : MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P005-2.DWG LAST SAVED BY: tjwilcox 10/8/2020 2:48 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:34 AM Tab:MCW-D-P005-2

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

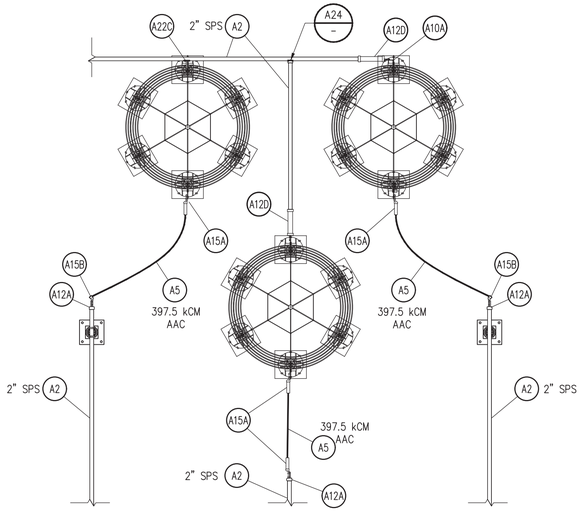
NO	REVISION	DATE	BY	APR
2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: NONE	PLT SCALE: 1:1	

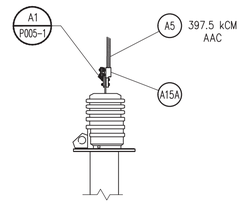
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
BUS DETAILS

DWG. NAME: MCW-D-P005-2 | REVISION NO : 2



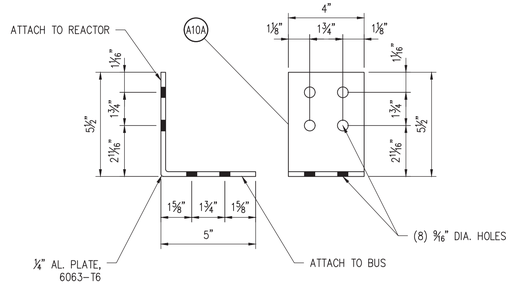
STANDARD BUS DETAIL A22 –

REACTOR BUS



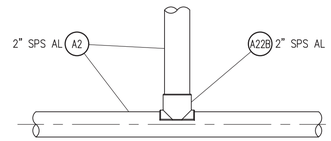
STANDARD BUS DETAIL A23 –

34.5 kV REACTOR CT



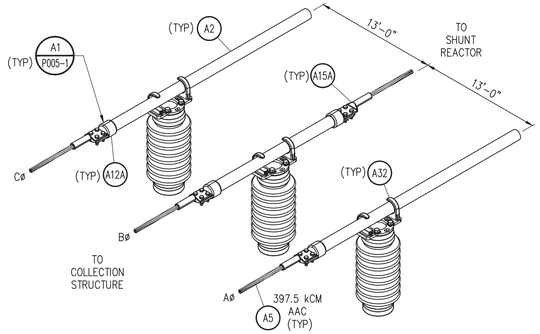
STANDARD BUS DETAIL A24 –

BENT PLATE 6063-T6 ALUMINUM



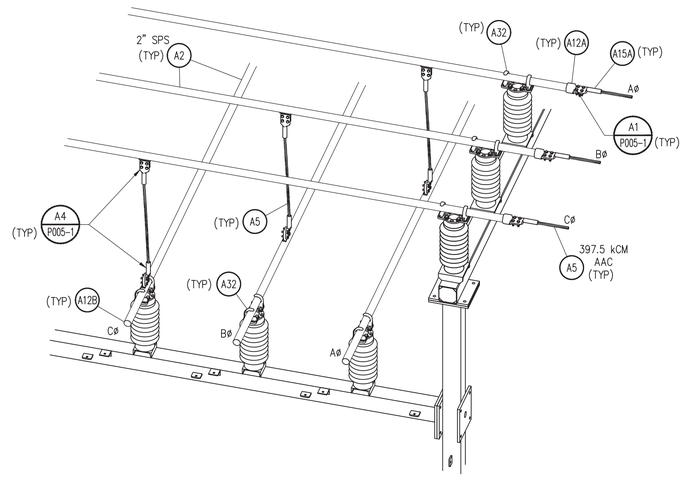
STANDARD BUS DETAIL A25 –

34.5 kV BUS CONNECTION



STANDARD BUS DETAIL A26 –

34.5 kV BUS CONNECTION



STANDARD BUS DETAIL A27 –

34.5 kV BUS CONNECTION

AS BUILT

LEGEND

A1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS

A1 — MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P005-3.DWG LAST SAVED BY: tjwilcox 10/8/2020 2:49 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:34 AM Tab:MCW-D-P005-3

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.

BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/20/19	TJW	MAG

edF renewables

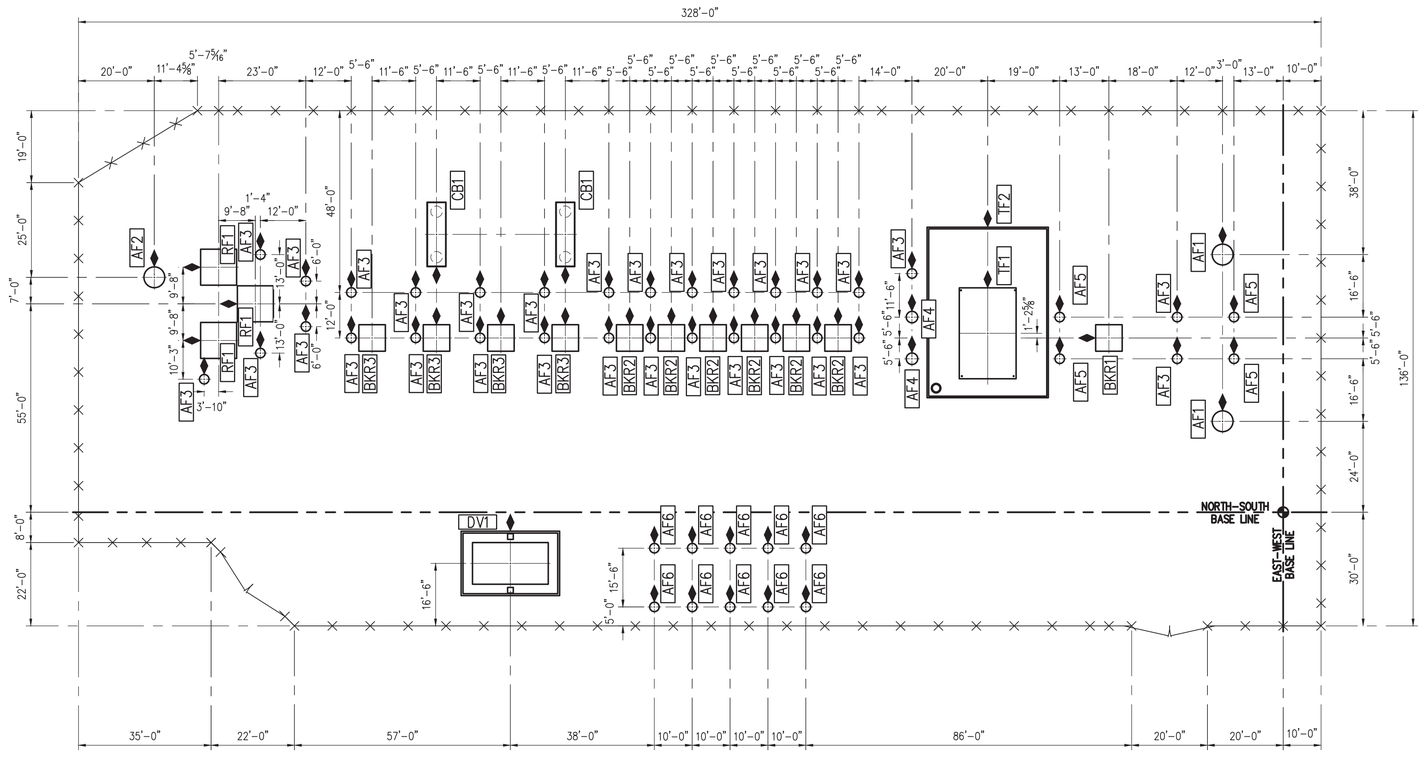
ENGINEERING RECORD		DATE
DRAWN	WILCOX	12/19
DESIGNED	WILCOX	12/19
CHECKED	GROFF	12/19
APPROVED	GROFF	12/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
BUS DETAILS

DWG. NAME: MCW-D-P005-3 | REVISION NO : 1

FOUNDATION SCHEDULE

ID	TOTAL QUANTITY	DESCRIPTION	DRAWING
AF1	2	230 kV DEADEND TOWER DE1	MCW-D-P007-1
AF2	1	STATIC MAST SM1	MCW-D-P007-1
AF3	30	34.5 kV 1ø BUS SUPPORT FOUNDATION, 34.5 kV 3ø BUS SUPPORT FOUNDATION, 34.5 kV 1ø CT SUPPORT FOUNDATION, 34.5 kV NGR STAND, 34.5 kV COLLECTION STRUCTURE, 230 kV 3ø LOW SWITCH STAND	MCW-D-P007-2
AF4	2	34.5 kV DISCONNECT SWITCH STAND W/SSVT	MCW-D-P007-2
AF5	4	230 kV 3ø CVT STAND, 230 kV 3ø BUS SUPPORT	MCW-D-P007-3
AF6	10	CONTROL ENCLOSURE	MCW-D-P007-3
BKR1	1	230 kV CIRCUIT BREAKER	MCW-D-P007-4
BKR2	6	34.5 kV CIRCUIT BREAKER	MCW-D-P007-4
BKR3	4	72 kV CIRCUIT BREAKER	MCW-D-P007-5
CB1	2	34.5 kV CAP BANK FOUNDATION	MCW-D-P007-6
DV1	1	4 MVAR DVAR PAD FOUNDATION WITH OIL CONTAINMENT	MCW-D-P007-7
RF1	3	34.5 kV REACTOR SLAB FOUNDATION	MCW-D-P007-10
TF1	1	34.5 kV – 230 kV TRANSFORMER PAD	MCW-D-P007-8
TF2	1	34.5 kV – 230 kV TRANSFORMER OIL CONTAINMENT	MCW-D-P007-9



AS BUILT

NOTES

1. ELEVATIONS WILL BE CONFIRMED BY THE ENGINEER, AND BASELINES AND BENCHMARK ESTABLISHED PRIOR TO CONSTRUCTION.
2. REFER TO FOUNDATION DETAILS AND THE WRITTEN SPECIFICATION FOR SPECIAL CONSTRUCTION CONSIDERATIONS.

LEGEND

- AF1 — FOUNDATION IDENTIFICATIOIN
- ABOVE GRADE FOUNDATION
- BASELINE MARKER
- ORIENTATION MARK
- SUBSTATION FENCE
- BASELINE

0 10FT 20FT 40FT
SCALE: 1"=20'-0"

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P006-1.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:35 AM Tab:MCW-D-P006-1

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

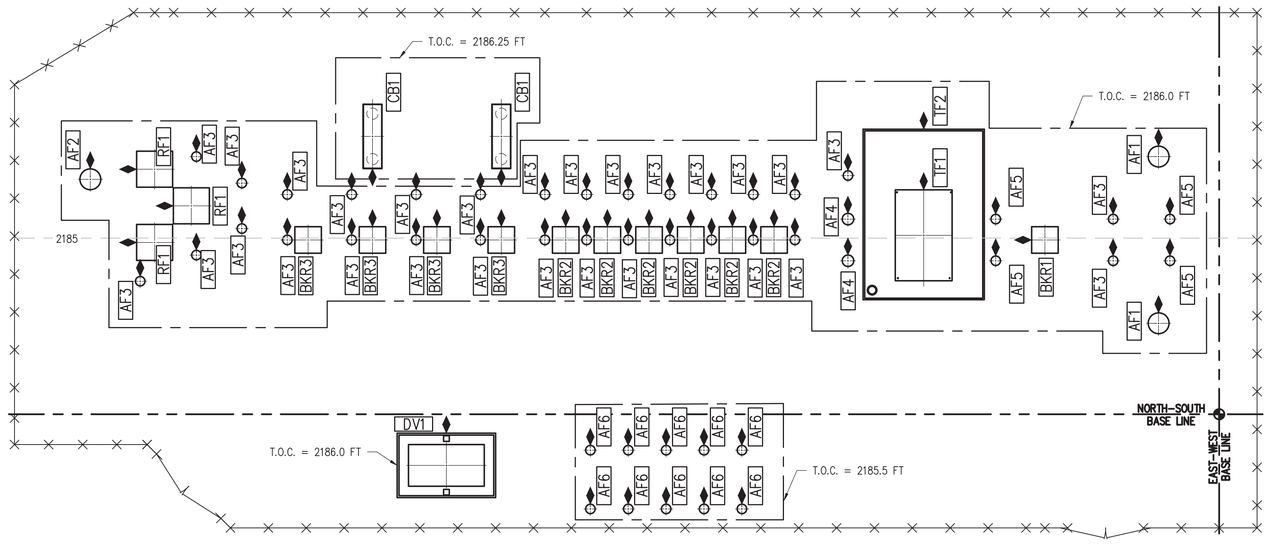
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION	11/26/19	TJW	CAJ
1	ISSUED FOR CONSTRUCTION	10/23/19	TJW	CAJ
0	ISSUED FOR CONSTRUCTION	09/25/19	TJW	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	JOBES	09/19
DWG SCALE: 1"=20'-0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION FOUNDATION PLAN

DWG. NAME: MCW-D-P006-1 | REVISION NO : 3



AS BUILT

NOTES

1. ELEVATIONS WILL BE CONFIRMED BY THE ENGINEER, AND BASELINES AND BENCHMARK ESTABLISHED PRIOR TO CONSTRUCTION.
2. "T.O.C." INDICATES TOP OF CONCRETE ELEVATION.
3. REFER TO FOUNDATION DETAILS AND THE WRITTEN SPECIFICATION FOR SPECIAL CONSTRUCTION CONSIDERATIONS.

LEGEND

- AF1 — FOUNDATION IDENTIFICATIOIN
- ABOVE GRADE FOUNDATION
- BASELINE MARKER
- ORIENTATION MARK
- SUBSTATION FENCE
- BASELINE
- T.O.C. ELEVATION

0 10FT 20FT 40FT
SCALE: 1"=20'-0"

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P006-2.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:42 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:35 AM Tab:MCW-D-P006-2

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

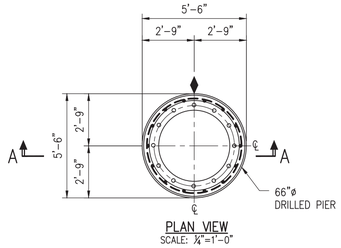
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION	11/26/19	TJW	CAJ
1	ISSUED FOR CONSTRUCTION	10/23/19	TJW	CAJ
0	ISSUED FOR CONSTRUCTION	09/25/19	TJW	CAJ

edf renewables

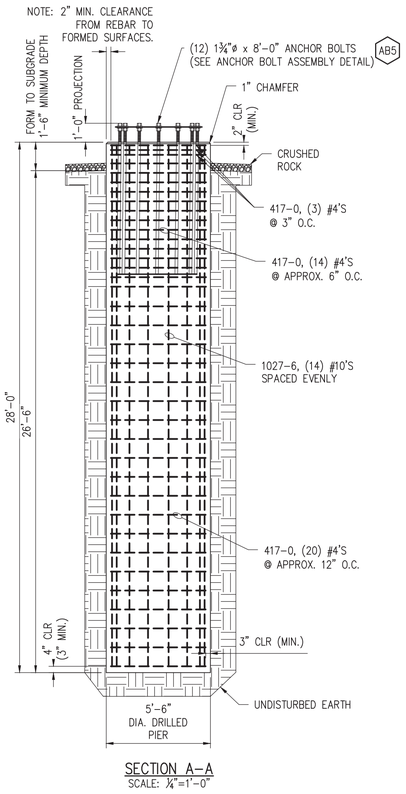
ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	JOBES	09/19
DWG SCALE: 1"=20'-0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION PLAN – TOP OF CONCRETE

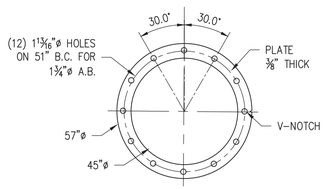
DWG. NAME: MCW-D-P006-2 | REVISION NO : 3



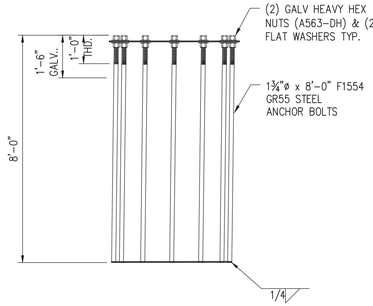
PLAN VIEW
SCALE: ¼"=1'-0"

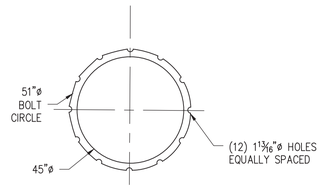


SECTION A-A
SCALE: ¼"=1'-0"



TOP TEMPLATE
SCALE: ⅜"=1'-0"





BOTTOM TEMPLATE
SCALE: ⅜"=1'-0"

ANCHOR BOLT ASSEMBLY DETAIL – AB5

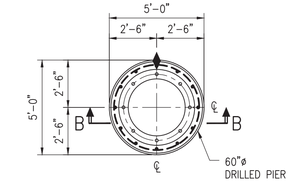
(1) REQUIRED FOR EACH DRILLED PIER
ANCHOR BOLT CAGE PROVIDED
BY STEEL VENDOR

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
417-0	37	#4	17'-0"	HOOP	5'-0"	1'-3"	
1027-6	14	#10	27'-6"	STRAIGHT	27'-6"		

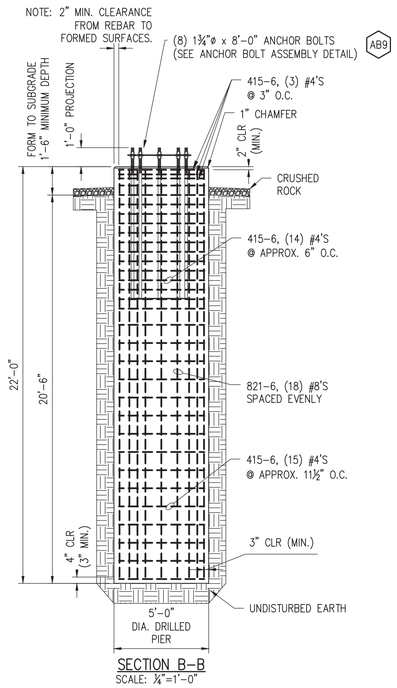
MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 24.6 CU. YDS.
TOTAL REINFORCING:
#4 – 629.0 FT., 420.2 LBS.
#10 – 385.0 FT., 1656.7 LBS.
TOTAL WEIGHT = 2076.9 LBS.
ANCHOR BOLTS:
(12) AB5 1¾"ø x 8'-0"
CAGED W/2 NUTS PER BOLT

AUGERED FOUNDATION AF1 – 230 kV DEADEND TOWER DE1



PLAN VIEW
SCALE: ¼"=1'-0"



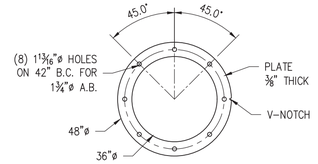
SECTION B-B
SCALE: ¼"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
415-6	32	#4	15'-6"	HOOP	4'-6"	1'-3"	
821-6	18	#8	21'-6"	STRAIGHT	21'-6"		

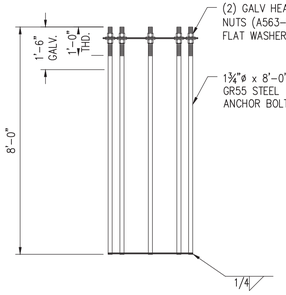
MATERIAL SUMMARY (EACH)

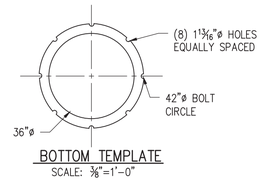
TOTAL CONCRETE: 16.0 CU. YDS.
TOTAL REINFORCING:
#4 – 496.0 FT., 331.3 LBS.
#8 – 387.0 FT., 1033.3 LBS.
TOTAL WEIGHT = 1364.6 LBS.
ANCHOR BOLTS:
(8) AB9 1¾"ø x 8'-0"
CAGED W/2 NUTS PER BOLT

AUGERED FOUNDATION AF2 – STATIC MAST SM1



TOP TEMPLATE
SCALE: ⅜"=1'-0"



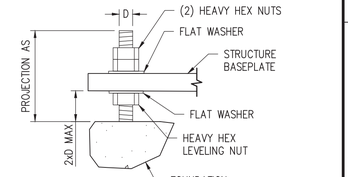


BOTTOM TEMPLATE
SCALE: ⅜"=1'-0"

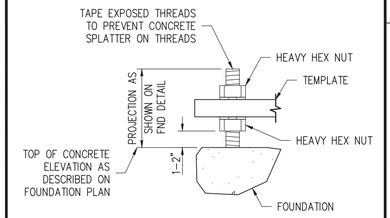
ANCHOR BOLT ASSEMBLY DETAIL – AB9

(1) REQUIRED FOR EACH DRILLED PIER
ANCHOR BOLT CAGE PROVIDED
BY STEEL VENDOR

AS BUILT



TYP. STRUCTURE BASE PLATE
SCALE: NONE



TYPICAL CONSTRUCTION UTILIZING TEMPLATE
SCALE: NONE

NOTES

1. PROJECTION OF CONCRETE ABOVE SUBGRADE WILL VARY DEPENDING ON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION PLAN (SEE REFERENCE DRAWINGS FOR DRAWING IDENTIFICATION). EXCAVATE AND FORM AS REQUIRED.
2. ALL BACKFILL AROUND SLABS AND CONTROL ENCLOSURE FOUNDATION SHALL BE SLOPED TO DIRECT RUNOFF AWAY FROM FOUNDATION.
3. ENGINEERED FILL SHALL BE COMPACTED TO 98% OF THE ASTM D698 DRY DENSITY IN UNIFORM LIFTS OF MAXIMUM 8-INCH LOOSE THICKNESS.
4. BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D698.
5. SEE WRITTEN SPECIFICATION FOR CONCRETE MIX, CONCRETE PLACEMENT AND REBAR PLACEMENT.

LEGEND

AB1 – INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST BELOW)
A A – INDICATES ELEVATION VIEW "A-A"
1 / – – INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
◆ – ORIENTATION SYMBOL

ANCHOR BOLT LIST

ITEM	QUAN. PER FOUNDATION	TOTAL QUAN	DESCRIPTION
AB5	12 AF1	24	1¾"ø X 8'-0" (SEE DETAIL)
AB9	8 AF2	8	1¾"ø X 8'-0" (SEE DETAIL)

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	a b	a b	a b	a b c	a b c

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-1.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:42 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:35 AM Tab:MCW-D-P007-1

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

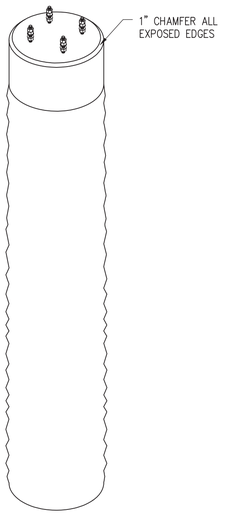
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	09/25/19	SEM	CAJ

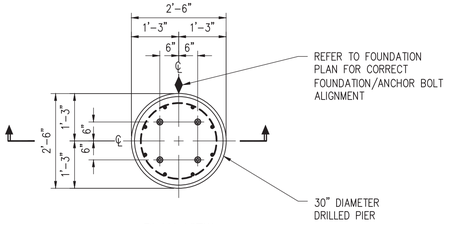
edf renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	MOHR	07/19
CHECKED	JOBES	08/19
APPROVED	JOBES	09/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

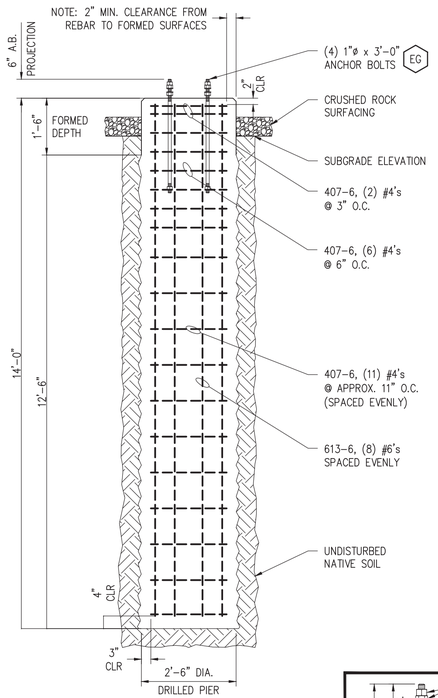
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – AF1 & AF2

DWG. NAME: MCW-D-P007-1
REVISION NO : 1

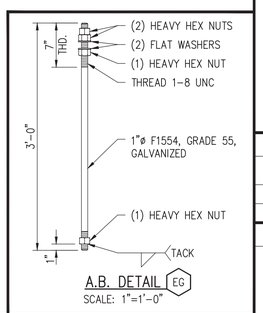




PLAN VIEW
SCALE: ½"=1'-0"



SECTION
SCALE: ½"=1'-0"



A.B. DETAIL EG
SCALE: 1"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
407-6	19	#4	7'-6"	HOOP	2'-0"	1'-3"	
613-6	8	#6	13'-6"	STRAIGHT	13'-6"		

MATERIAL SUMMARY (EACH)

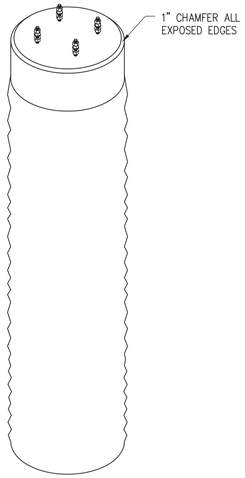
TOTAL CONCRETE: 2.6 CU. YDS.

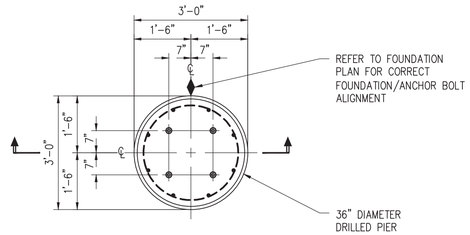
TOTAL REINFORCING:
#4 - 142.5 FT., 95.2 LBS.
#6 - 108.0 FT., 163 LBS.
TOTAL WEIGHT: 258.2 LBS.

ANCHOR BOLTS:
(4) 1"ø x 3'-0" SEE A.B. DETAIL EG

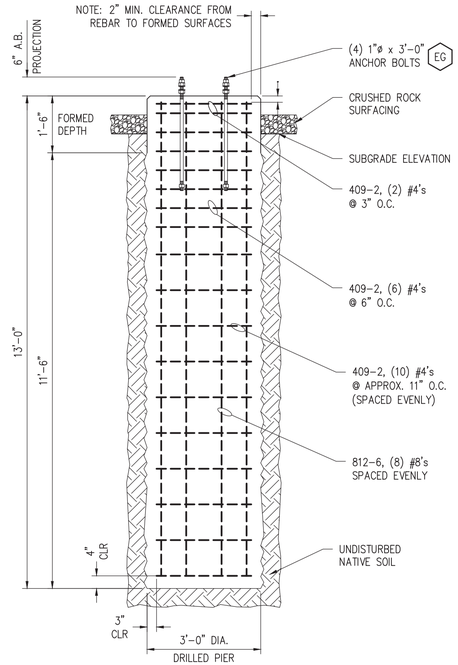
AUGERED FOUNDATION AF3

34.5 kV 1ø BUS SUPPORT, 34.5 kV 3ø BUS SUPPORT,
34.5 kV 1ø CT SUPPORT, 34.5 kV COLLECTION STRUCTURE,
34.5 kV NGR STAND & 230 kV 3ø LOW SWITCH STAND

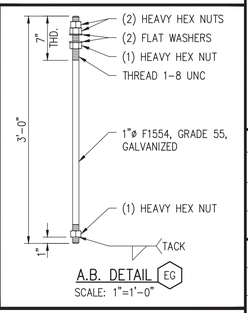




PLAN VIEW
SCALE: ½"=1'-0"



SECTION
SCALE: ½"=1'-0"



A.B. DETAIL EG
SCALE: 1"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
409-2	18	#4	9'-2"	HOOP	2'-6"	1'-3"	
812-6	8	#8	12'-6"	STRAIGHT	12'-6"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 3.5 CU. YDS.

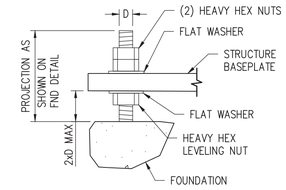
TOTAL REINFORCING:
#4 - 165.1 FT., 110.3 LBS.
#8 - 100.0 FT., 267 LBS.
TOTAL WEIGHT: 377.3 LBS.

ANCHOR BOLTS:
(4) 1"ø x 3'-0" SEE A.B. DETAIL EG

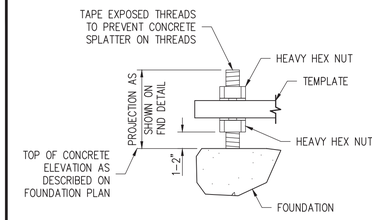
AUGERED FOUNDATION AF4

34.5 kV DISCONNECT SWITCH STAND W/ SSVT

AS BUILT



TYP. STRUCTURE BASE PLATE
SCALE: NONE



TYPICAL CONSTRUCTION UTILIZING TEMPLATE
SCALE: NONE

NOTES

1. PROJECTION OF CONCRETE ABOVE SUBGRADE WILL VARY DEPENDING ON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION PLAN (SEE REFERENCE DRAWINGS FOR DRAWING IDENTIFICATION). EXCAVATE AND FORM AS REQUIRED.
2. ALL BACKFILL AROUND SLABS AND CONTROL ENCLOSURE FOUNDATION SHALL BE SLOPED TO DIRECT RUNOFF AWAY FROM FOUNDATION.
3. ENGINEERED FILL SHALL BE COMPACTED TO 98% OF THE ASTM D698 DRY DENSITY IN UNIFORM LIFTS OF MAXIMUM 8-INCH LOOSE THICKNESS.
4. BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D698.
5. SEE WRITTEN SPECIFICATION FOR CONCRETE MIX, CONCRETE PLACEMENT AND REBAR PLACEMENT.

LEGEND

AB1 — INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST BELOW)
A A — INDICATES ELEVATION VIEW "A-A"
1 / -- — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
ORIENTATION SYMBOL

ANCHOR BOLT LIST

ITEM	QUAN. PER FOUNDATION	TOTAL QUAN.	DESCRIPTION
EG	4 AF3	92	1"ø x 3'-0" (SEE DETAIL)
EG	4 AF4	8	1"ø x 3'-0" (SEE DETAIL)

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	b a	b a b	a b	c a b c	c a b

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-2.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:42 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:35 AM Tab:MCW-D-P007-2

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

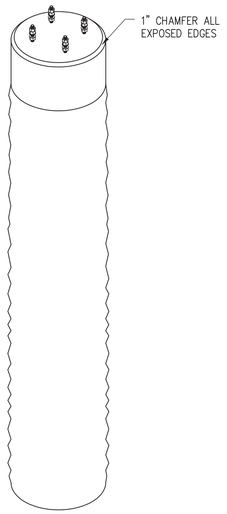
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION	11/26/19	SEM	CAJ
1	ISSUED FOR CONSTRUCTION	10/23/19	SEM	CAJ
0	ISSUED FOR CONSTRUCTION	09/25/19	SEM	CAJ

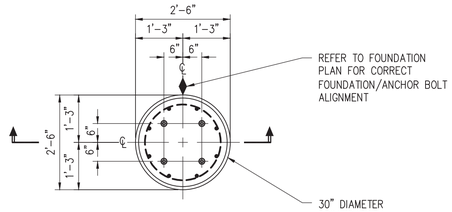
edF renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	MOHR	07/19
CHECKED	JOBES	08/19
APPROVED	JOBES	09/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

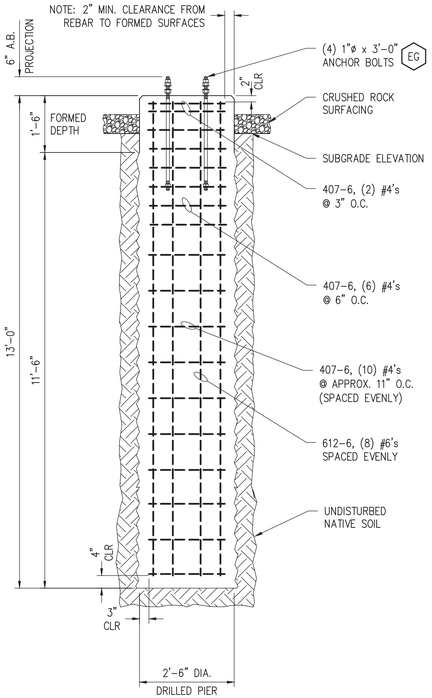
MERRICOURT WIND PROJECT
34.5 - 230 kV SUBSTATION
FOUNDATION DETAILS - AF3 & AF4

DWG. NAME: MCW-D-P007-2 | REVISION NO : 3

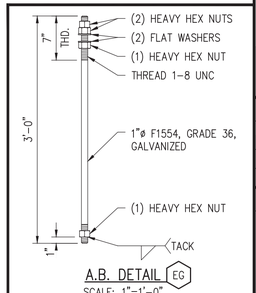




PLAN VIEW
SCALE: ½"=1'-0"



SECTION
SCALE: ½"=1'-0"



A.B. DETAIL EG
SCALE: 1"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
407-6	18	#4	7'-6"	HOOP	2'-0"	1'-3"	
612-6	8	#6	12'-6"	STRAIGHT	12'-6"		

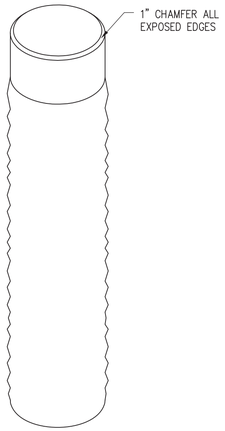
MATERIAL SUMMARY (EACH)

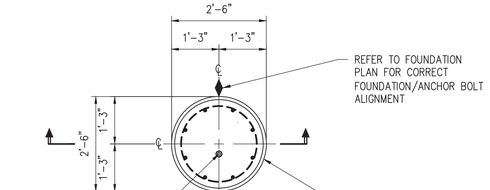
TOTAL CONCRETE: 2.4 CU. YDS.

TOTAL REINFORCING:
#4 – 135.0 FT., 90.2 LBS.
#6 – 100.0 FT., 151.0 LBS.
TOTAL WEIGHT: 241.2 LBS.

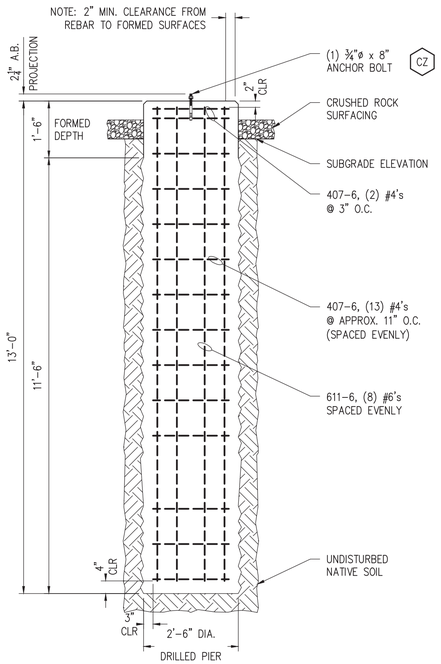
ANCHOR BOLTS:
(4) 1"ø x 3'-0" SEE A.B. DETAIL EG

AUGERED FOUNDATION AF5 –
230 kV 3ø CVT STAND, 230 kV 3ø BUS SUPPORT





PLAN VIEW
SCALE: ½"=1'-0"



SECTION
SCALE: ½"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
407-6	15	#4	7'-6"	HOOP	2'-0"	1'-3"	
611-6	8	#6	11'-6"	STRAIGHT	11'-6"		

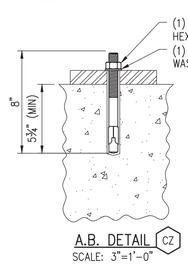
MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 2.4 CU. YDS.

TOTAL REINFORCING:
#4 – 112.5 FT., 75.2 LBS.
#6 – 100.0 FT., 151.0 LBS.
TOTAL WEIGHT: 226.2 LBS.

ANCHOR BOLTS:
(1) ¾"ø x 8" HILTI KWIK BOLT CZ

AUGERED FOUNDATION – CONTROL HOUSE

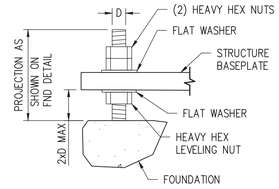


A.B. DETAIL CZ
SCALE: 3"=1'-0"

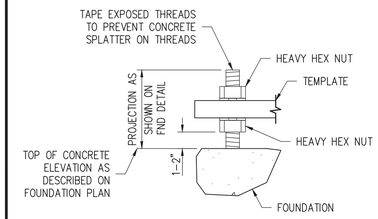
30"ø x 13'-0"

AF6

AS BUILT



TYP. STRUCTURE BASE PLATE
SCALE: NONE



TYPICAL CONSTRUCTION UTILIZING TEMPLATE
SCALE: NONE

NOTES

1. PROJECTION OF CONCRETE ABOVE SUBGRADE WILL VARY DEPENDING ON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION PLAN (SEE REFERENCE DRAWINGS FOR DRAWING IDENTIFICATION). EXCAVATE AND FORM AS REQUIRED.
2. ALL BACKFILL AROUND SLABS AND CONTROL ENCLOSURE FOUNDATION SHALL BE SLOPED TO DIRECT RUNOFF AWAY FROM FOUNDATION.
3. FOUNDATIONS SHALL BEAR ON STRUCTURAL FILL MEETING GEOTECHNICAL REPORT REQUIREMENTS.
4. BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D698.
5. SEE WRITTEN SPECIFICATION FOR CONCRETE MIX, CONCRETE PLACEMENT AND REBAR PLACEMENT.

LEGEND

AB1 – INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST BELOW)
A A – INDICATES ELEVATION VIEW "A-A"
1 / – INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
ORIENTATION SYMBOL

ANCHOR BOLT LIST

ITEM	QUAN. PER FOUNDATION	TOTAL QUAN.	DESCRIPTION
EG	4 AF5	16	1"ø X 3'-0" (SEE DETAIL)
CZ	4 AF6	10	¾"ø X 8" (SEE DETAIL)

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	b a	b a	a b	a b c	a b c

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-3.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:42 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:35 AM Tab:MCW-D-P007-3

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

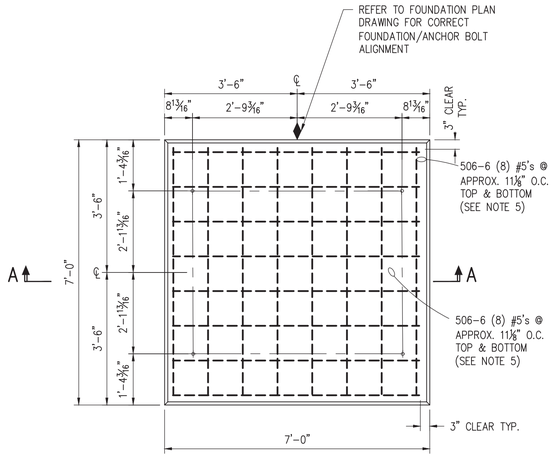
NO	REVISION	DATE	BY	APR
2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	10/23/19	SEM	CAJ
0	ISSUED FOR CONSTRUCTION	09/25/19	SEM	CAJ

EDF renewables

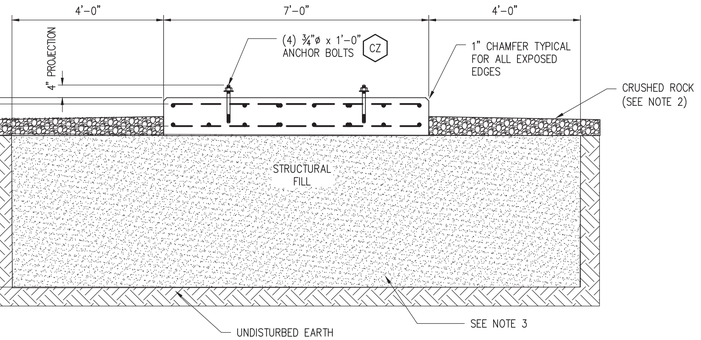
ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	MOHR	07/19
CHECKED	JOBES	08/19
APPROVED	JOBES	09/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – AF5 & AF6

DWG. NAME: MCW-D-P007-3 | REVISION NO : 2



PLAN VIEW
SCALE: ½"=1'-0"



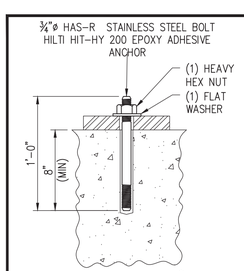
SECTION A–A
SCALE: ½"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
506-6	32	#5	6'-6"	STRAIGHT	6'-6"		

MATERIAL SUMMARY (EACH)

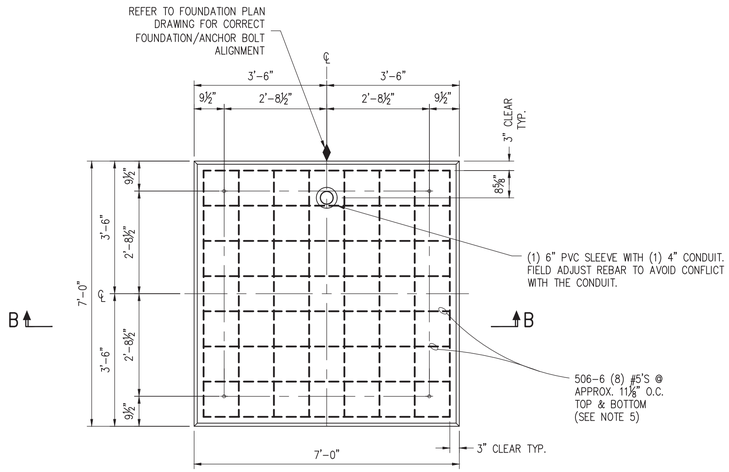
TOTAL CONCRETE: 1.8 CU. YDS.
TOTAL REINFORCING:
#5 – 208.0 FT., 217 LBS. — TOTAL WEIGHT = 217 LBS.

ANCHOR BOLTS:
(4) CZ ¾" ø x 1'-0" — PROVIDED BY SUBSTATION CONTRACTOR



A.B. DETAIL CZ
SCALE: 3"=1'-0"

BREAKER FOUNDATION BKR1 – 230 kV CIRCUIT BREAKER



PLAN VIEW
SCALE: ½"=1'-0"

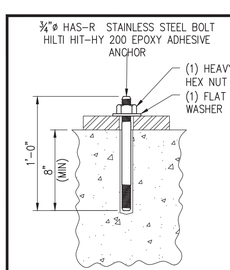
SECTION B–B
SCALE: ½"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
506-6	32	#5	6'-6"	STRAIGHT	6'-6"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 1.8 CU. YDS.
TOTAL REINFORCING:
#5 – 208.0 FT., 217.0 LBS. — TOTAL WEIGHT = 217.0 LBS.

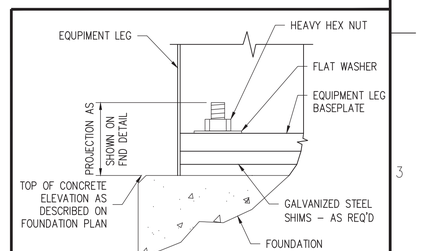
ANCHOR BOLTS:
(4) CZ ¾" ø x 1'-0" — PROVIDED BY SUBSTATION CONTRACTOR



A.B. DETAIL CZ
SCALE: 3"=1'-0"

BREAKER FOUNDATION BKR2 – 34.5 kV CIRCUIT BREAKER

AS BUILT



TYPICAL EQUIPMENT BASE DETAIL
SCALE: NONE

NOTES

1. PROJECTION OF CONCRETE ABOVE SUBGRADE WILL VARY DEPENDING ON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION PLAN (SEE REFERENCE DRAWINGS FOR DRAWING IDENTIFICATION). EXCAVATE AND FORM AS REQUIRED.
2. ALL BACKFILL AROUND SLABS AND CONTROL ENCLOSURE FOUNDATION SHALL BE SLOPED TO DIRECT RUNOFF AWAY FROM FOUNDATION.
3. FOUNDATIONS SHALL BEAR ON STRUCTURAL FILL MEETING GEOTECHNICAL REPORT REQUIREMENTS.
4. BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D698.
5. CONTRACTOR TO INSTALL REBAR REINFORCEMENT WITH ANCHOR BOLT LOCATIONS IN MIND TO AVOID INTERFERENCE.

LEGEND

AB1 — INDICATES ITEM NUMBER ON BOLT LIST
A A — INDICATES ELEVATION VIEW "A–A"
INDICATES DETAIL ID
INDICATES DRAWING ON WHICH DETAIL APPEARS
ORIENTATION SYMBOL

ANCHOR BOLT LIST

ITEM	QUAN. PER FOUNDATION	TOTAL QUANTITY	DESCRIPTION
CZ	4 BKR1 4 BKR2	4 24	¾"ø x 1'-0" (SEE DETAIL)

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	b a	b a b	a b	c a c b	c a b

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	09/25/19	SEM	CAJ

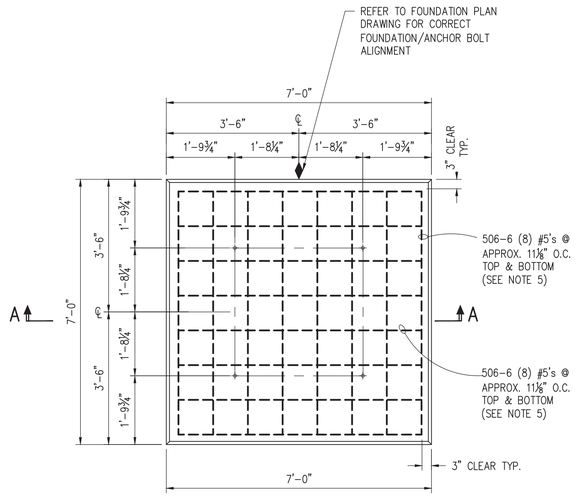
edf renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	MOHR	07/19
CHECKED	JOBES	08/19
APPROVED	JOBES	09/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

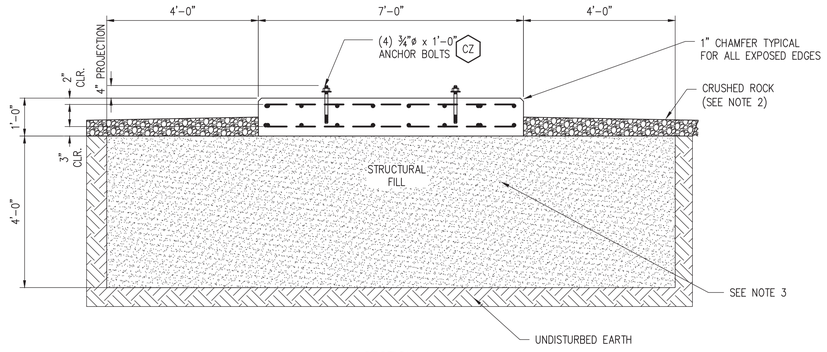
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – BKR1 & BKR2

DWG. NAME: MCW-D-P007-4 | REVISION NO : 1

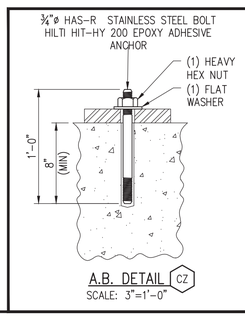
FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-4.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:50 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:36 AM Tab:MCW-D-P007-4



PLAN VIEW
SCALE: ½"=1'-0"



SECTION A–A
SCALE: ½"=1'-0"



A.B. DETAIL CZ
SCALE: 3"=1'-0"

REINFORCING SCHEDULE

MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
506-6	32	#5	6'-6"	STRAIGHT	6'-6"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 1.8 CU. YDS.

TOTAL REINFORCING:

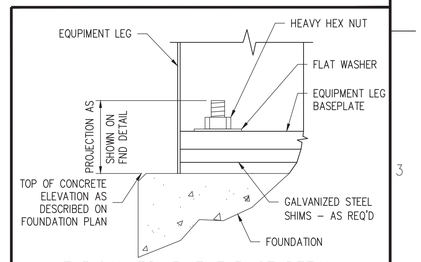
#5 –208.0 FT., 217 LBS. ⊢ TOTAL WEIGHT: 217 LBS.

ANCHOR BOLTS:

(4) CZ ¾"ø X 1'-0" ⊢ PROVIDED BY SUBSTATION CONTRACTOR

BREAKER FOUNDATION BKR3 – 72 kV CIRCUIT BREAKER

AS BUILT



TYPICAL EQUIPMENT BASE DETAIL
SCALE: NONE

NOTES

1. PROJECTION OF CONCRETE ABOVE SUBGRADE WILL VARY DEPENDING ON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION PLAN (SEE REFERENCE DRAWINGS FOR DRAWING IDENTIFICATION). EXCAVATE AND FORM AS REQUIRED.
2. ALL BACKFILL AROUND SLABS AND CONTROL ENCLOSURE FOUNDATION SHALL BE SLOPED TO DIRECT RUNOFF AWAY FROM FOUNDATION.
3. FOUNDATIONS SHALL BEAR ON STRUCTURAL FILL MEETING GEOTECHNICAL REPORT REQUIREMENTS.
4. BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D698.
5. CONTRACTOR TO INSTALL REBAR REINFORCEMENT WITH ANCHOR BOLT LOCATIONS IN MIND TO AVOID INTERFERENCE.

LEGEND

AB1 INDICATES ITEM NUMBER ON BOLT LIST

A A INDICATES ELEVATION VIEW "A–A"

INDICATES DETAIL ID
INDICATES DRAWING ON WHICH DETAIL APPEARS

ORIENTATION SYMBOL

ANCHOR BOLT LIST

ITEM	QUAN. PER FOUNDATION	TOTAL QUANTITY	DESCRIPTION
CZ	4	12	¾"ø x 1'-0" (SEE DETAIL)

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	b a	b a	a b	c a b	c a b

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-5.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:51 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:36 AM Tab:MCW-D-P007-5

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

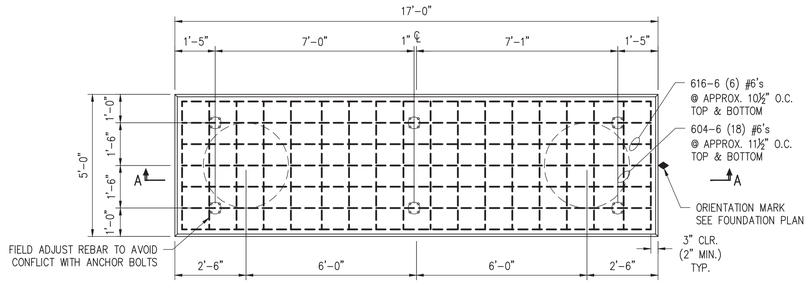
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	SEM	CAJ

edf renewables

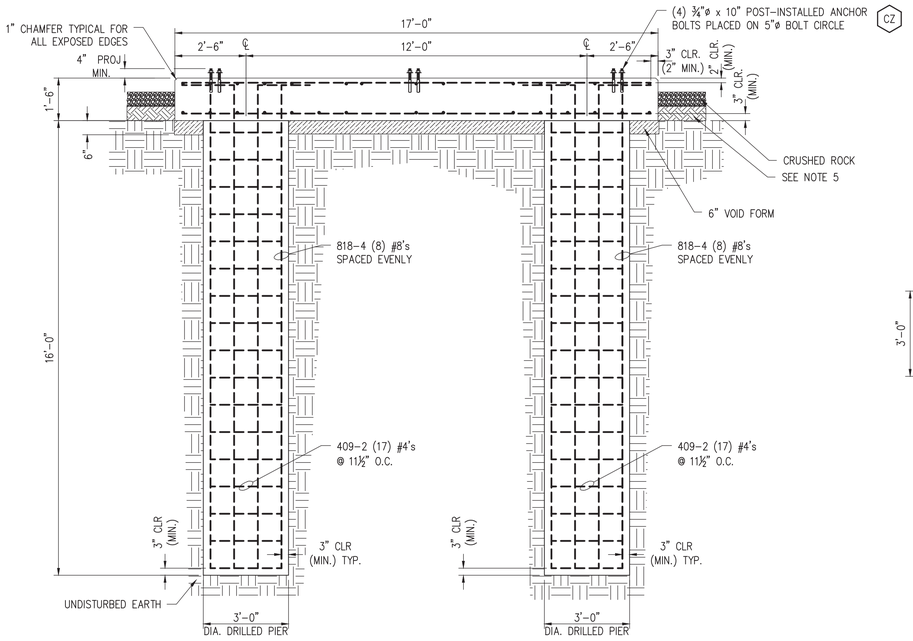
ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	MOHR	07/19
CHECKED	McDEVITT	09/19
APPROVED	JOBES	10/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – BKR3

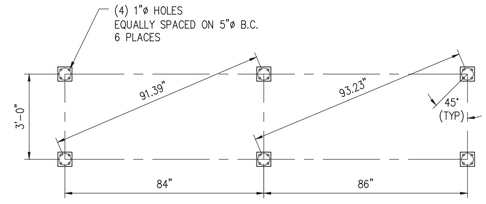
DWG. NAME: MCW-D-P007-5 REVISION NO : 1



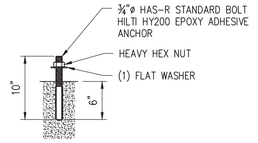
PLAN VIEW
SCALE: ⅜"=1'-0"



SECTION A-A
SCALE: ⅜"=1'-0"



ANCHOR BOLT PLAN
SCALE: ⅜"=1'-0"



ANCHOR BOLT DETAIL - CZ
SCALE: 1"=1'-0"

REINFORCING SCHEDULE

MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
409-2	34	#4	9'-2"	HOOP	2'-6"	1'-4"	
604-6	36	#6	4'-6"	STRAIGHT	4'-6"		
616-6	12	#6	16'-6"	STRAIGHT	16'-6"		
818-4	16	#8	18'-4"	HOOK	17'-0"	1'-4"	

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 13.1 CU. YDS.

TOTAL REINFORCING:

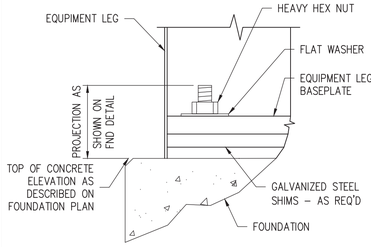
#4 - 311.7 FT., 208.2 LBS.
#6 - 360.0 FT., 540.3 LBS.
#8 - 293.3 FT., 783.2 LBS.

TOTAL WEIGHT: 1533 LBS.

ANCHOR BOLTS:

(24) CZ ¾"ø X 0'-10"

AS BUILT



TYPICAL EQUIPMENT BASE DETAIL
SCALE: NONE

NOTES

1. PROJECTION OF CONCRETE ABOVE SUBGRADE WILL VARY DEPENDING ON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION PLAN (SEE REFERENCE DRAWINGS FOR DRAWING IDENTIFICATION). EXCAVATE AND FORM AS REQUIRED.
2. ALL BACKFILL AROUND SLABS AND CONTROL BUILDING FOUNDATION SHALL BE SLOPED TO DIRECT RUNOFF AWAY FROM FOUNDATION.
3. ENGINEERED FILL SHALL BE COMPACTED TO 98% OF THE ASTM D698 DRY DENSITY IN UNIFORM LIFTS OF MAXIMUM 8-INCH LOOSE THICKNESS.
4. BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D698.
5. SEE WRITTEN SPECIFICATION FOR CONCRETE MIX, CONCRETE PLACEMENT AND REBAR PLACEMENT.

LEGEND

- AB1 — INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST BELOW)
- A — INDICATES ELEVATION VIEW "A-A"
- INDICATES DETAIL ID / INDICATES DRAWING ON WHICH DETAIL APPEARS
- ◆ ORIENTATION SYMBOL

ANCHOR BOLT LIST

ITEM	QUAN. PER FOUNDATION	TOTAL QUANTITY	DESCRIPTION
CZ	24 CB1	48	¾"ø x 10" (SEE DETAIL)

STANDARD BAR TYPES

STRAIGHT | HOOK | STIRRUP | HOOP | SQ. HOOP | RECT. TIE

STANDARD FOUNDATION - CB1

34.5 kV CAPACITOR BANK

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-6.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:55 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:36 AM Tab:MCW-D-P007-6

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

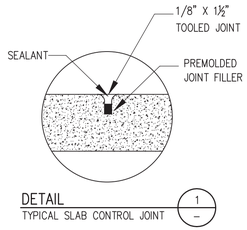
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	SEM	CAJ

edF renewables

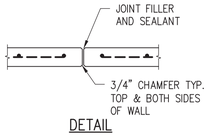
ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	09/19
DESIGNED	MOHR	09/19
CHECKED	McDEVITT	09/19
APPROVED	JOBES	10/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 - 230 kV SUBSTATION
FOUNDATION DETAILS - CB1

DWG. NAME: MCW-D-P007-6 | REVISION NO : 1

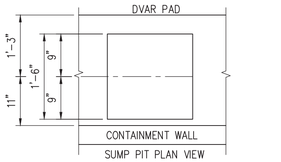


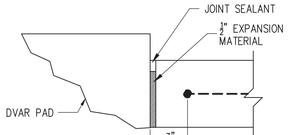
DETAIL
TYPICAL SLAB CONTROL JOINT — 1



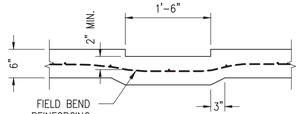
DETAIL
TYPICAL WALL CONTROL JOINT

DETAIL
TYPICAL WALL CONTROL JOINT — 2

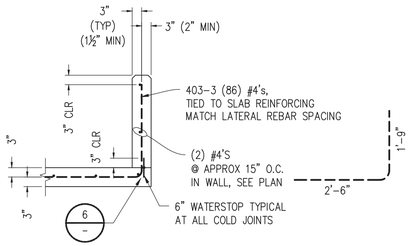




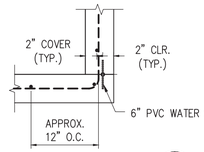
DETAIL
TYPICAL EXPANSION JOINT — 3



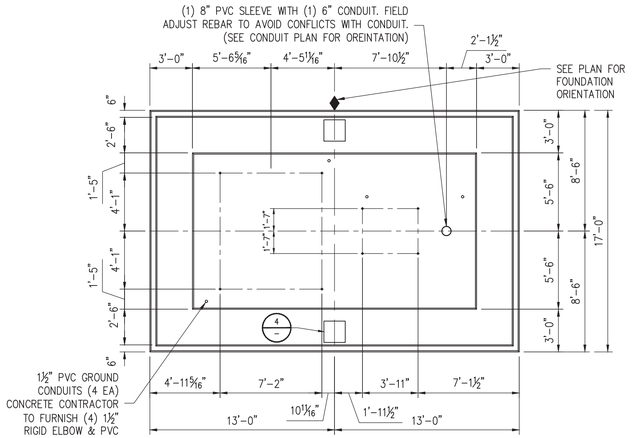
DETAIL
TYPICAL SUMP PIT — 4



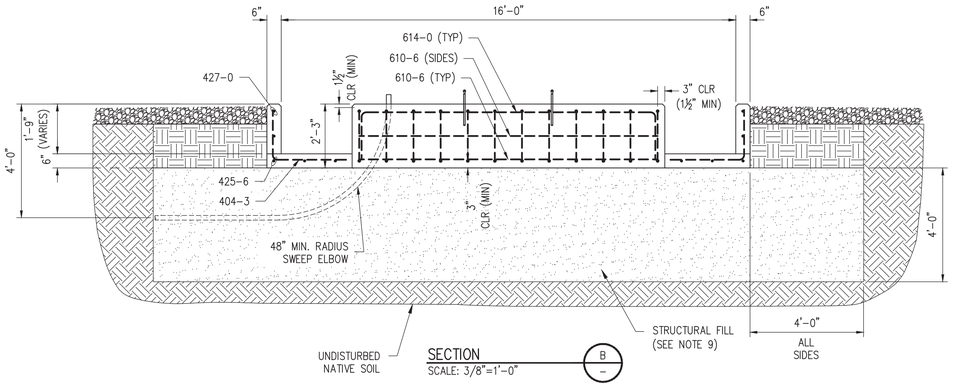
DETAIL
TYPICAL FOUNDATION WALL — 5



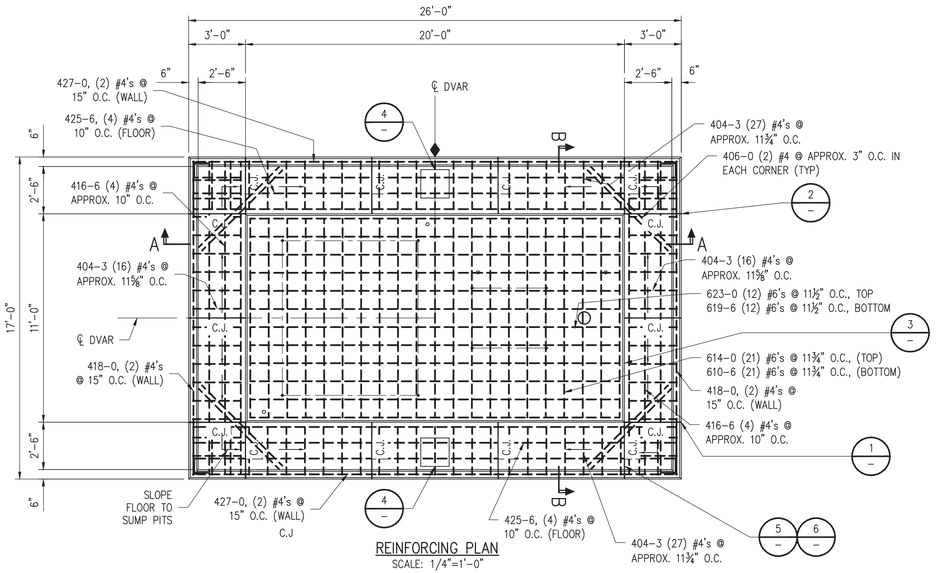
DETAIL
TYPICAL WALL/SLAB CONSTRUCTION JOINT — 6



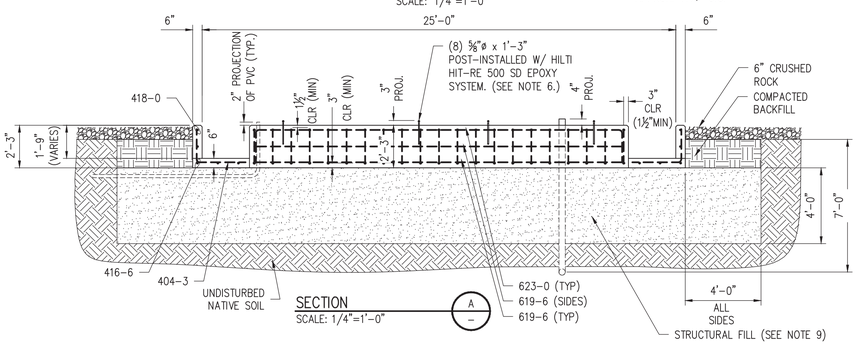
ANCHOR BOLT & CONDUIT PLAN
SCALE: 3/16"=1'-0"



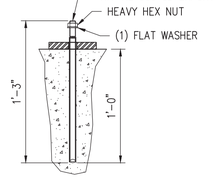
SECTION
SCALE: 3/8"=1'-0" — B



REINFORCING PLAN
SCALE: 1/4"=1'-0"



SECTION
SCALE: 1/4"=1'-0" — A



ANCHOR BOLT DETAIL – BZ
1 1/2"=1'-0"

AS BUILT

NOTES

1. THE CONTRACTOR SHALL PROVIDE FIELD MOLDED JOINT SEALANTS TO PROVIDE A LIQUID TIGHT CONTAINMENT BASIN.
2. RISERS SHALL BE PLUMB PRIOR TO AND AFTER FOUNDATION INSTALLATION.
3. CONDUIT SHALL BE INSTALLED WITHIN THE ENGINEERED FILL AS SHOWN.
4. CONTRACTOR SHALL CLEAN THE SURFACE AND APPLY CONCRETE BONDING AGENT IN ACCORDANCE TO THE MANUFACTURER'S INSTRUCTIONS FOR ALL COLD JOINTS.
5. ALL CONDUIT CONNECTIONS TO BE WATER TIGHT.
6. PVC SHALL BE CLEANED AND DRY PRIOR TO APPLICATION OF SOLVENT AND GLUE.
7. CONTRACTOR TO VERIFY ALL QUANTITIES OF REINFORCING AND CONCRETE PRIOR TO BID.
8. SUB ERECTION CONTRACTOR TO INSTALL (4) 1½" CONDUITS WHERE SHOWN FOR GROUNDING CONDUCTORS.
9. FOUNDATIONS SHALL BEAR ON STRUCTURAL FILL MEETING GEOTECHNICAL REPORT REQUIREMENTS.
10. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 4500 psi.
11. JOINT SEALANT = SIKA DUOFLEX NS/DUOFLEX SL

ANCHOR BOLT LIST

ITEM	QUAN. PER STRUCTURE	TOTAL QUANTITY	DESCRIPTION
BZ	8	8	⅝"ø x 1'-3" (SEE DETAIL)

LEGEND

- AB1 — INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST ABOVE)
- A — A — INDICATES SECTION VIEW "A–A"
- — / — — INDICATES DETAIL ID / INDICATES DRAWING ON WHICH DETAIL APPEARS
- ORIENTATION SYMBOL
- XFRM FOUNDATION CENTER

STANDARD BAR TYPES

STRAIGHT | HOOK | STIRRUP | HOOP | SQ. HOOP | RECT. TIE

REINFORCING SCHEDULE

MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
404–3	86	#4	4'–3"	HOOK	2'–6"	1'–9"	
406–0	8	#4	6'–0"	STRAIGHT	6'–0"		
416–6	8	#4	16'–6"	STRAIGHT	16'–6"		
418–0	4	#4	18'–0"	DBL. HOOK	16'–6"	9"	
425–6	8	#4	25'–6"	STRAIGHT	25'–6"		
427–0	4	#4	27'–0"	DBL. HOOK	25'–6"	9"	
610–6	23	#6	10'–6"	STRAIGHT	10'–6"		
614–0	21	#6	14'–0"	DBL. HOOK	10'–6"	1'–9"	
619–6	14	#6	19'–6"	STRAIGHT	19'–6"		
623–0	12	#6	23'–0"	DBL. HOOK	19'–6"	1'–9"	

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 25.2 CU. YD.

TOTAL REINFORCING:

#4 – 929.5 FT., 620.9 LBS.
#6 – 1084.5 FT., 1628.9 LBS.
— TOTAL WEIGHT: 2249.4 LBS.

ANCHOR BOLTS:

(8) BZ ⅝"ø x 1'–3" STAINLESS STEEL GR 316 POST INSTALLED W/ HILTI HIT–RE 500–SD EPOXY SYSTEM. (BZ)

SLAB FOUNDATION – DV1

4 MVAR DVAR TRANSFORMER PAD FOUNDATION WITH OIL CONTAINMENT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-7.DWG LAST SAVED BY: tjwilcox 10/29/2020 4:48 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:36 AM Tab:MCW-D-P007-7

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

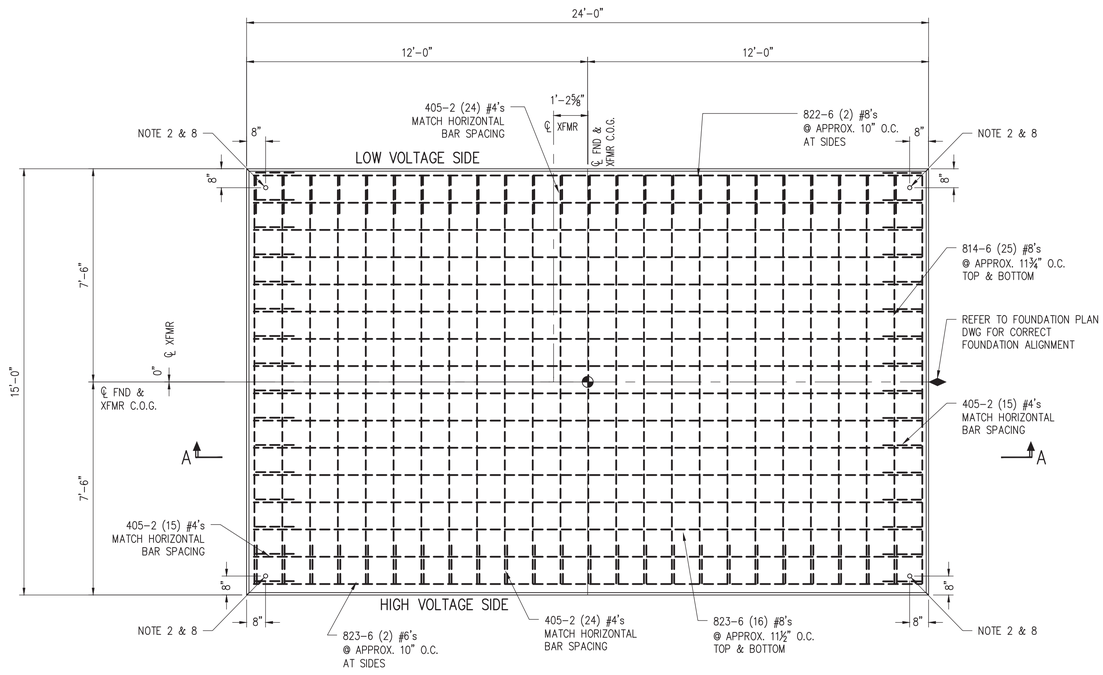
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	11/26/19	CJS	CAJ

edF renewables

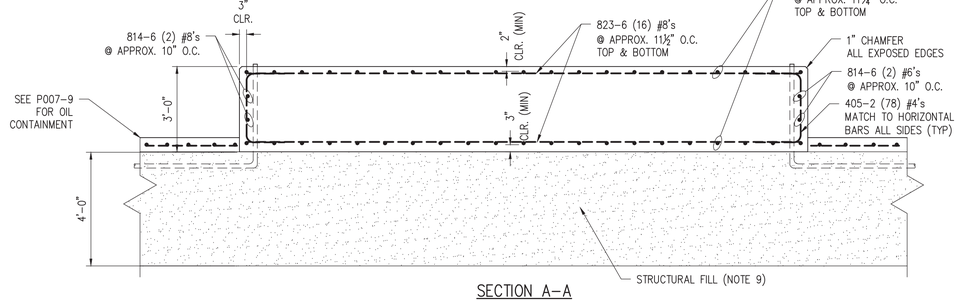
ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	KOEHLER	10/19
CHECKED	McDEVITT	10/19
APPROVED	JOBES	11/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – DV1

DWG. NAME: MCW–D–P007–7 | REVISION NO : 1



PLAN VIEW
SCALE: 3/8"=1'-0"



SECTION A-A
SCALE: 3/8"=1'-0"

REINFORCING SCHEDULE							
MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
405-2	78	#4	5'-2"	DOUBLE HOOK	2'-6"	1'-4"	
814-6	54	#8	14'-6"	STRAIGHT	14'-6"		
823-6	36	#8	23'-6"	STRAIGHT	23'-6"		

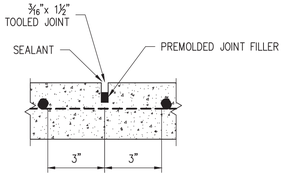
MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 40.0 CU. YDS.

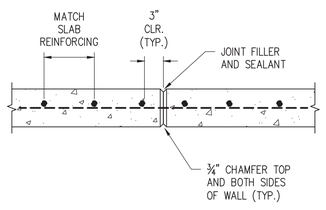
TOTAL REINFORCING:

#4 – 403.0 FT., 269.2 LBS.
#8 – 1629.0 FT., 4349.4 LBS.
} TOTAL WEIGHT: 4618.6 LBS.

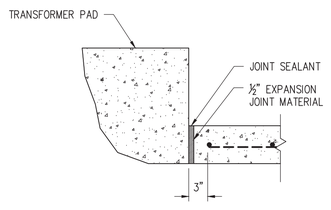
ANCHOR BOLTS:
NONE



DETAIL 1 P007-9
TYPICAL SLAB CONTROL JOINT



DETAIL 2 P007-9
WALL VERTICAL CONTROL JOINT



DETAIL 3 P007-9
TYPICAL EXPANSION JOINT

AS BUILT

NOTES

1. THE CONTRACTOR SHALL PROVIDE FIELD MOLDED JOINT SEALANTS AND PREMOLDED JOINT SEALANTS TO PROVIDE A LIQUID TIGHT CONTAINMENT BASIN.
   JOINT SEALANT = SIKA DUOFLEX NS/DUOFLEX SL
2. RISERS SHALL BE PLUMB PRIOR TO AND AFTER FOUNDATION INSTALLATION.
3. CONDUIT SHALL BE INSTALLED WITHIN THE ENGINEERED FILL AS SHOWN.
4. CONTRACTOR SHALL CLEAN THE SURFACE AND APPLY CONCRETE BONDING AGENT IN ACCORDANCE TO THE MANUFACTURER'S INSTRUCTIONS FOR ALL COLD JOINTS.
5. ALL CONDUIT CONNECTIONS TO BE WATER TIGHT.
6. PVC SHALL BE CLEANED AND DRY PRIOR TO APPLICATION OF SOLVENT AND GLUE.
7. CONTRACTOR TO VERIFY ALL QUANTITIES OF REINFORCING AND CONCRETE PRIOR TO BID.
8. SUB ERECTION CONTRACTOR TO INSTALL (4) 1½" CONDUITS WHERE SHOWN FOR GROUNDING CONDUCTORS.
9. FOUNDATIONS SHALL BEAR ON STRUCTURAL FILL MEETING GEOTECHNICAL REPORT REQUIREMENTS.
10. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 4500 psi.

LEGEND

INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST BELOW)
INDICATES SECTION VIEW "A-A"
INDICATES DETAIL ID
INDICATES DRAWING ON WHICH DETAIL APPEARS
ORIENTATION SYMBOL
XFRM CENTER OF GRAVITY

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	b a	b a b	a b	c a c b	c a c b

STANDARD FOUNDATION – TF1

34.5 – 230 kV TRANSFORMER PAD

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-8-9.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:55 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:36 AM Tab:MCW-D-P007-8

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

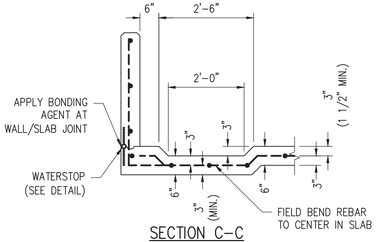
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	09/25/19	SEM	CAJ

edf renewables

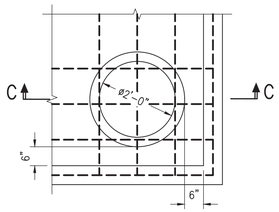
ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	SMITH	07/19
CHECKED	JOBES	08/19
APPROVED	JOBES	09/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – TF1

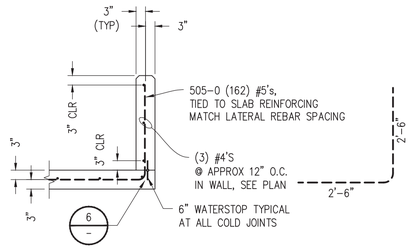
DWG. NAME: MCW-D-P007-8
REVISION NO : 1



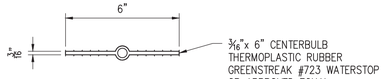
SECTION C–C



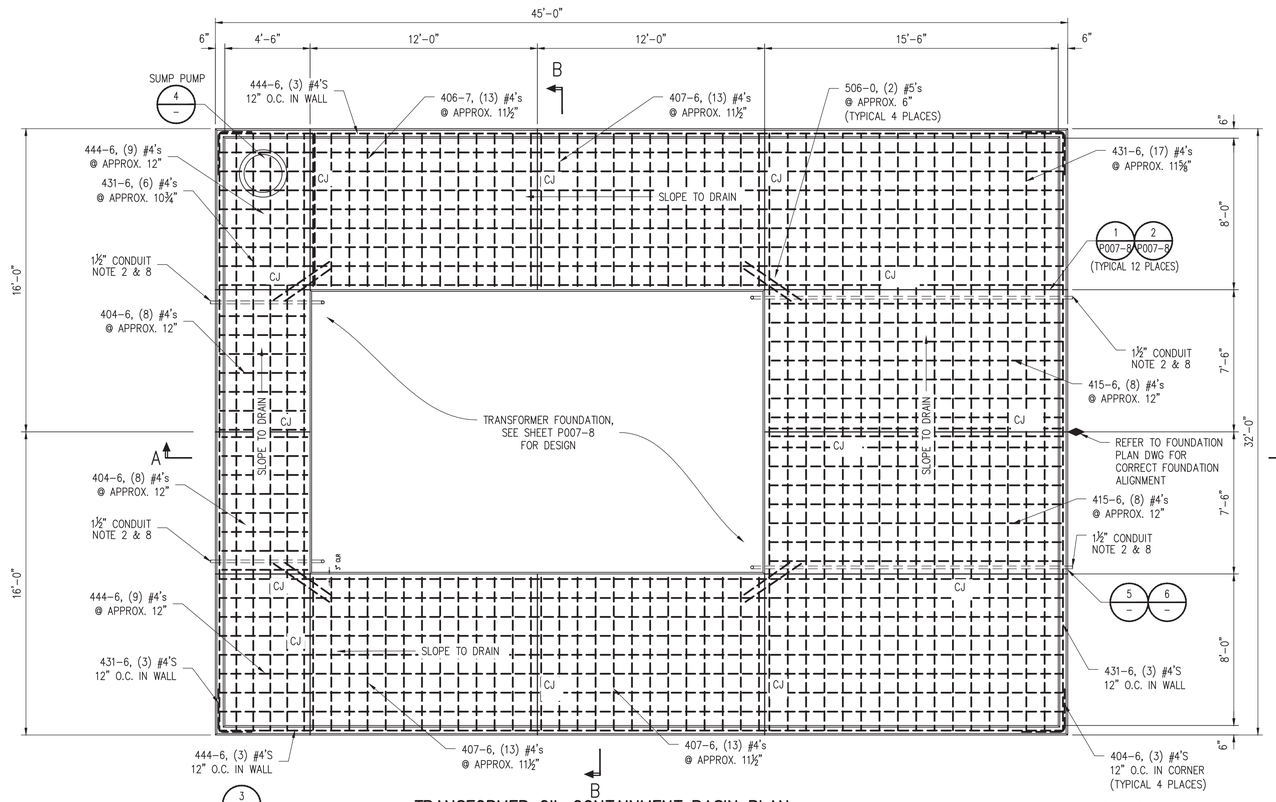
DETAIL
SUMP PUMP DETAIL (4)



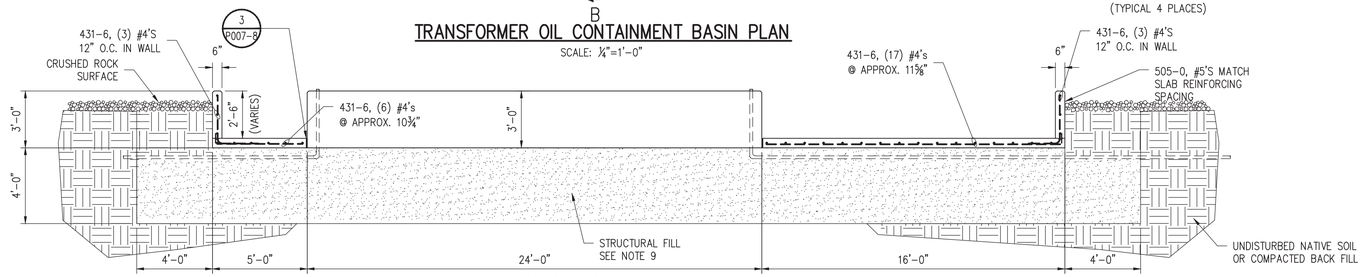
DETAIL
TYPICAL FOUNDATION WALL (5)



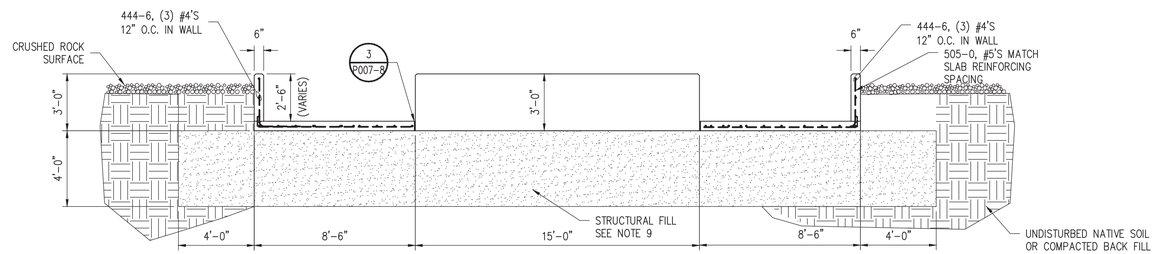
DETAIL
TYPICAL WATERSTOP



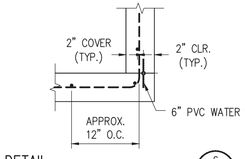
TRANSFORMER OIL CONTAINMENT BASIN PLAN
SCALE: ¼"=1'–0"



SECTION A–A
SCALE: ¼" = 1'–0"



SECTION B–B
SCALE: ¼" = 1'–0"



DETAIL
TYPICAL WALL/SLAB CONSTRUCTION JOINT (6)

AS BUILT

NOTES

1. THE CONTRACTOR SHALL PROVIDE FIELD MOLDED JOINT SEALANTS AND PREMOLDED JOINT SEALANTS TO PROVIDE A LIQUID TIGHT CONTAINMENT BASIN.
   JOINT SEALANT = SIKA DUOFLEX NS/DUOFLEX SL
2. RISERS SHALL BE PLUMB PRIOR TO AND AFTER FOUNDATION INSTALLATION.
3. CONDUIT SHALL BE INSTALLED WITHIN THE ENGINEERED FILL AS SHOWN.
4. CONTRACTOR SHALL CLEAN THE SURFACE AND APPLY CONCRETE BONDING AGENT IN ACCORDANCE TO THE MANUFACTURER'S INSTRUCTIONS FOR ALL COLD JOINTS.
5. ALL CONDUIT CONNECTIONS TO BE WATER TIGHT.
6. PVC SHALL BE CLEANED AND DRY PRIOR TO APPLICATION OF SOLVENT AND GLUE.
7. CONTRACTOR TO VERIFY ALL QUANTITIES OF REINFORCING AND CONCRETE PRIOR TO BID.
8. SUB ERECTION CONTRACTOR TO INSTALL (4) 1½" CONDUITS WHERE SHOWN FOR GROUNDING CONDUCTORS.
9. FOUNDATIONS SHALL BEAR ON STRUCTURAL FILL MEETING GEOTECHNICAL REPORT REQUIREMENTS.
10. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 4500 psi.

LEGEND

- AB1 — INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST BELOW)
- A A — INDICATES ELEVATION VIEW "A–A"
- – – — INDICATES DETAIL ID / INDICATES DRAWING ON WHICH DETAIL APPEARS
- ♦ — ORIENTATION SYMBOL (SEE FOUNDATION PLAN)

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	b a	b a b	a b	c a b c	c a b

REINFORCING SCHEDULE

MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
404–6	12	#4	4'–6"	HOOK	2'–3"	2'–3"	
404–6	16	#4	4'–6"	STRAIGHT	4'–6"		
407–6	52	#4	7'–6"	STRAIGHT	7'–6"		
415–6	16	#4	15'–6"	STRAIGHT	15'–6"		
431–6	29	#4	31'–6"	STRAIGHT	31'–6"		
444–6	24	#4	44'–6"	STRAIGHT	44'–6"		
505–0	162	#5	5'–0"	HOOK	2'–6"	2'–6"	
506–0	8	#5	6'–0"	STRAIGHT	6'–0"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 27.0 CU. YDS.

TOTAL REINFORCING:

#4 – 2745.5 FT., 1834.0 LBS.
#5 – 858.0 FT., 894.9 LBS.
} TOTAL WEIGHT: 2728.9 LBS.

ANCHOR BOLTS:
NONE

STANDARD FOUNDATION – TF2

34.5–230 kV TRANSFORMER OIL CONTAINMENT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-8-9.DWG LAST SAVED BY: tjwilcox 10/7/2020 1:55 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:36 AM Tab:MCW-D-P007-9

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BILLINGS, MONTANA

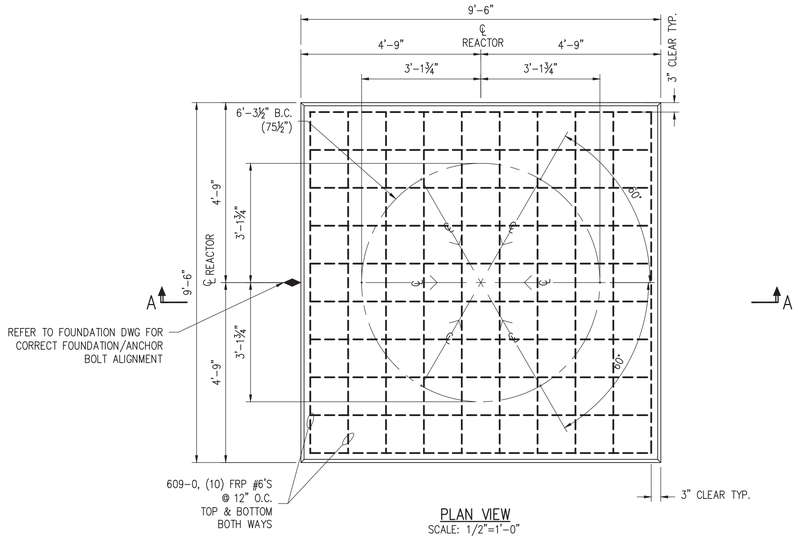
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	09/25/19	SEM	CAJ

edf renewables

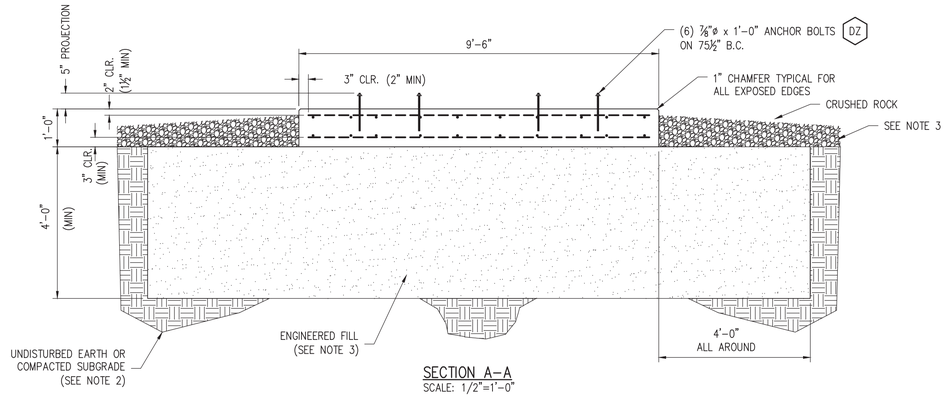
ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	07/19
DESIGNED	SMITH	07/19
CHECKED	JOBES	08/19
APPROVED	JOBES	09/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – TF2

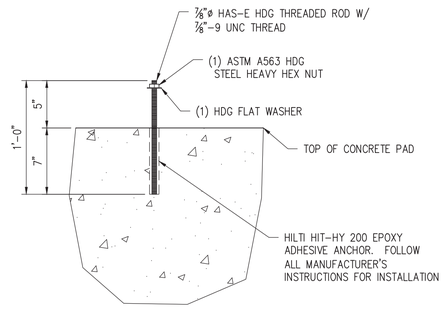
DWG. NAME: MCW–D–P007–9 | REVISION NO : 1



PLAN VIEW
SCALE: 1/2"=1'-0"



SECTION A–A
SCALE: 1/2"=1'-0"



ANCHOR BOLT DETAIL – DZ
SCALE: 1½" = 1'-0"

REINFORCING SCHEDULE

MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
609-0	40	#6	9'-0"	STRAIGHT	9'-0"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 3.3 CU. YDS.

TOTAL REINFORCING:

#6 –360.0 FT., 148.7 LBS. FIBER REINFORCEMENT (SEE NOTE 6) — TOTAL WEIGHT: 148.7 LBS.

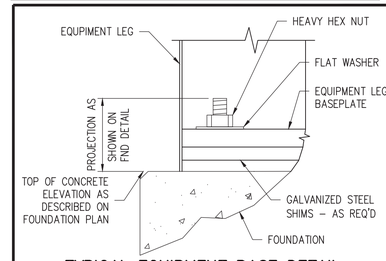
ANCHOR BOLTS: DZ

(6) DZ 7/8" DIA. x 1'-0" ADHESIVE SET HOT DIPPED GALVANIZED ANCHOR BOLTS

SLAB FOUNDATION – RF1

34.5 kV REACTOR SLAB FOUNDATION

AS BUILT



TYPICAL EQUIPMENT BASE DETAIL
SCALE: NONE

NOTES

1. PROJECTION OF CONCRETE ABOVE SUBGRADE WILL VARY DEPENDING ON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION PLAN (SEE REFERENCE DRAWINGS FOR DRAWING IDENTIFICATION). EXCAVATE AND FORM AS REQUIRED.
2. ALL BACKFILL AROUND SLABS AND CONTROL ENCLOSURE FOUNDATION SHALL BE SLOPED TO DIRECT RUNOFF AWAY FROM FOUNDATION.
3. FOUNDATIONS SHALL BEAR ON STRUCTURAL FILL MEETING GEOTECHNICAL REPORT REQUIREMENTS.
4. BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D698.
5. CONTRACTOR TO INSTALL REBAR REINFORCEMENT WITH ANCHOR BOLT LOCATIONS IN MIND TO AVOID INTERFERENCE.
6. REINFORCING BAR FOR RF1 SHALL BE FIBER REINFORCED POLYMER (FRP).

LEGEND

AB1 — INDICATES ITEM NUMBER ON BOLT LIST (SEE ANCHOR BOLT LIST BELOW)

A A — INDICATES ELEVATION VIEW "A–A"

1 / – — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

ORIENTATION SYMBOL

ANCHOR BOLT LIST

ITEM	QUAN. PER STRUCTURE	TOTAL QUAN.	DESCRIPTION
DZ	6 RF1	18	⅞"ø x 1'-0" (SEE DETAIL)

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUP	HOOP	SQ. HOOP	RECT. TIE
a	b a	b a b	a b	c a c b	c a b

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P007-10.DWG LAST SAVED BY: tjwilcox 10/7/2020 4:17 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:35 AM Tab:MCW-D-P007-10

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BILLINGS, MONTANA

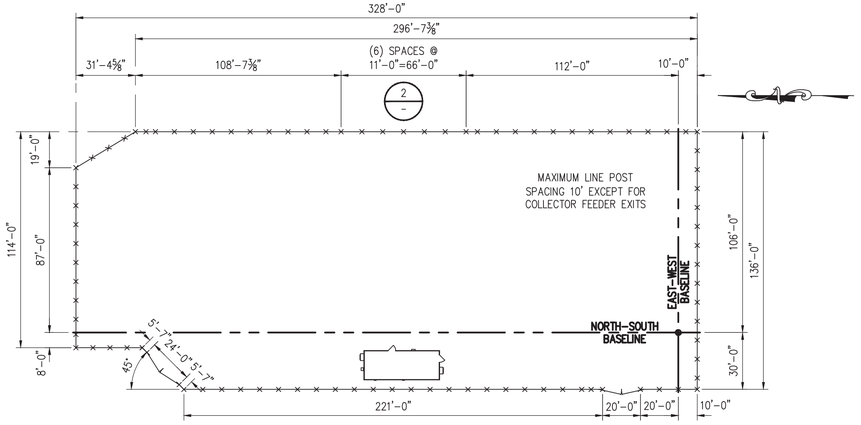
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	11/26/19	JDK	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	10/19
DESIGNED	KOEHLER	10/19
CHECKED	McDEVITT	10/19
APPROVED	JOBES	11/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

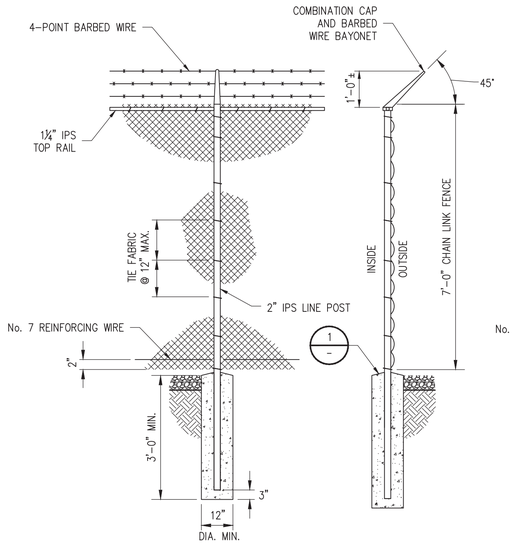
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
FOUNDATION DETAILS – RF1

DWG. NAME: MCW-D-P007-10 | REVISION NO : 1

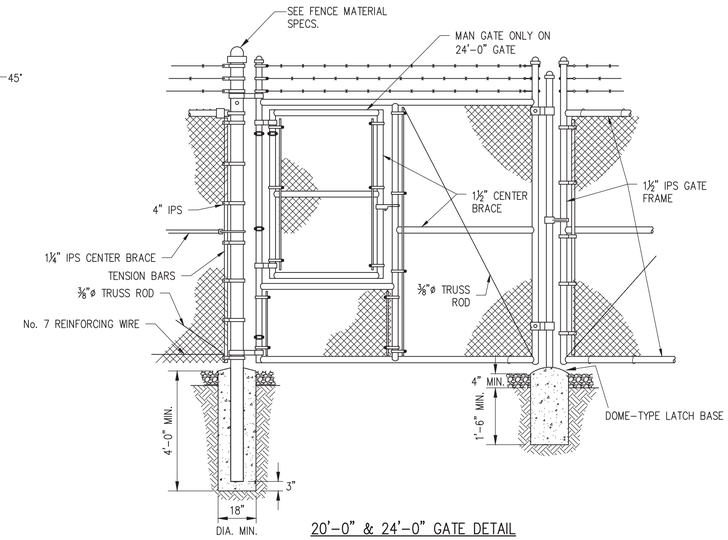


SUBSTATION FENCE PLAN

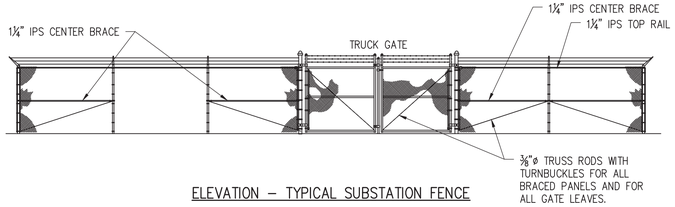
SCALE: 1"=40'-0"



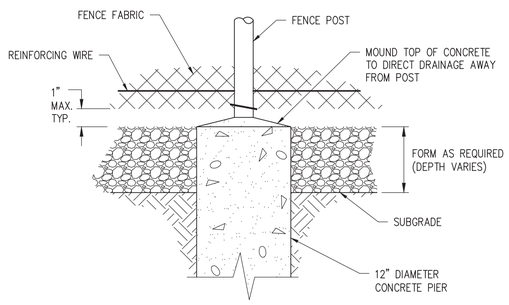
TYPICAL LINE POST



20'-0" & 24'-0" GATE DETAIL



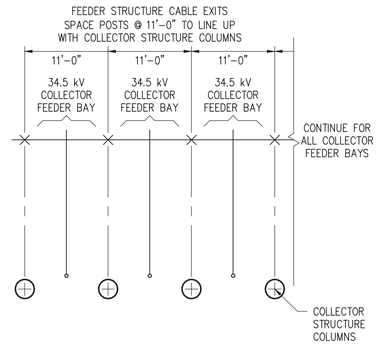
ELEVATION – TYPICAL SUBSTATION FENCE



TYPICAL PIER INSTALLATION

DETAIL 1 –

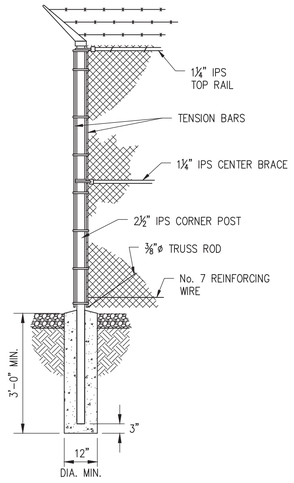
SCALE: NONE



COLLECTOR EXITS POST SPACING

2 –

SCALE: NONE



TYPICAL CORNER POST

AS BUILT

FENCE POSTS & PIPE SIZES

ITEM	POST	FRAME
TRUCK GATES TO 12'-0" (SINGLE PANEL)	4" IPS	1½" IPS
TRUCK GATES OVER 12'-0" (SINGLE PANEL)	6" IPS	2" IPS
MAN GATE	2½" IPS	1½" IPS
CORNER POSTS	2½" IPS	-----
LINE POSTS	2" IPS	-----
TOP RAIL & CORNER BRACE	-----	1¼" IPS

FABRIC & HARDWARE SPECIFICATIONS

ITEM	DESCRIPTION
FABRIC	2" MESH, 9 GAUGE GALV STEEL
STRETCHER BAR	⅜" x ¾" MINIMUM EQUIV. AREA
BARBED WIRE	2 STRAND, 12½ GAUAGE TWISTED, WITH 4-PT BARBS @ 5" O.C.
LATCH	VERTICAL PLUNGER ROD WITH SLOTTED DOME LATCH BASE
TIE WIRE	ALUMINUM, 6 GAUGE
CONCRETE	3200 PSI 28 DAY COMPRESSIVE STRENGTH

NOTES & DETAILS

1. ALL JOINTS BETWEEN TUBULAR GATE FRAME MEMBERS SHALL BE WELDED.
2. LATCHES, STOPS AND KEEPERS TO BE PROVIDED FOR ALL GATES UNLESS OTHERWISE SPECIFIED. LATCHES FOR TRUCK GATES SHALL BE PLUNGER TYPE AND OF FULL GATE HEIGHT. A FORKED LATCH SHALL BE PROVIDED FOR ALL WALK GATES. ALL LATCHES SHALL HAVE PROVISIONS FOR PADLOCKS ACCESSIBLE FROM BOTH SIDES OF GATE.
3. GATE HINGES SHALL BE SOCKET TYPE WITH LARGE BEARING SURFACES FOR CLAMPING IN POSITION AND SHALL HAVE 150° SWING.
4. FENCE SIGN REQUIREMENTS ON DRAWING MCW-D-P003-2.

LEGEND

1 – INDICATES DETAIL NUMBER

INDICATES DRAWING ON WHICH DETAIL APPEARS

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P008-1.DWG LAST SAVED BY: tjwilcox 10/7/2020 2:10 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:37 AM Tab:MCW-D-P008-1

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ELECTRICAL CONSULTANTS, INC.

BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	09/25/19	TJW	CAJ

edF renewables

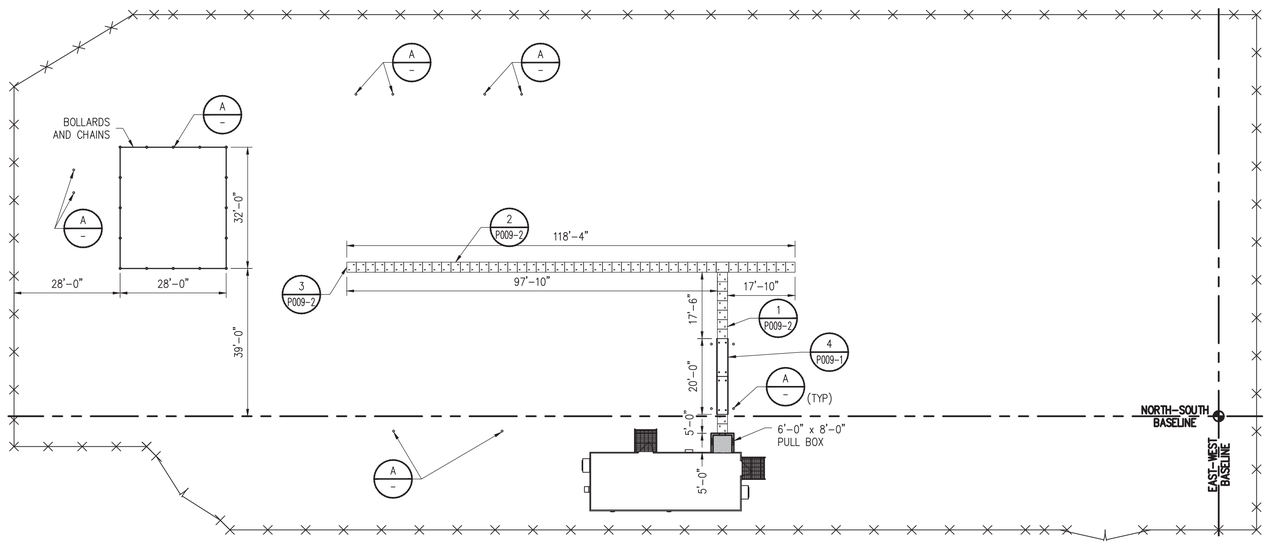
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	JOBES	09/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

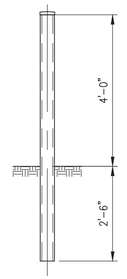
MERRICOURT WIND PROJECT

34.5 – 230 kV SUBSTATION

FENCE PLAN AND DETAILS

DWG. NAME: MCW-D-P008-1 REVISION NO : 2





TRENWA GUARD POST DETAIL

GUARD POST
MATERIAL: HIGH DENSITY
POLYETHYLENE PIPE (YELLOW)
0.333" WALL THICKNESS
& INCLUDES CAP
≤ 10'–0" POST SPACING

GUARD POST DETAIL (A –)
SCALE: 1/2" = 1'–0"

AS BUILT

LEGEND

- BASELINE MARKER
- SUBSTATION FENCE
- BASELINE
- 1 / – INDICATES DETAIL NUMBER
- INDICATES DRAWING ON WHICH DETAIL APPEARS

0 10FT 20FT 40FT
SCALE: 1"=20'–0"

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P009–1.DWG LAST SAVED BY: tjwilcox 10/7/2020 2:09 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:37 AM Tab:MCW–D–P009–1

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

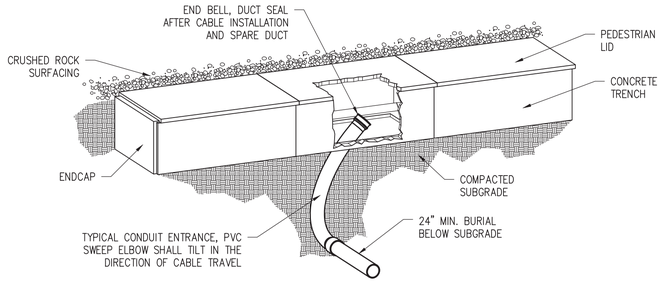
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edf renewables

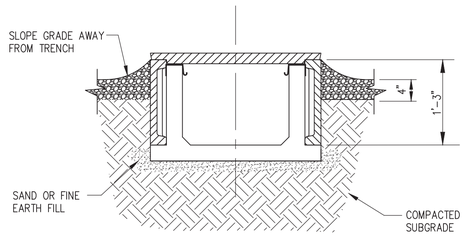
ENGINEERING RECORD		DATE
DRAWN	*WILCOX*	09/19
DESIGNED	*WILCOX*	09/19
CHECKED	*GROFF*	09/19
APPROVED	*SAUNDERS*	10/19
DWG SCALE: 1"=20'–0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CABLE TRENCH PLAN

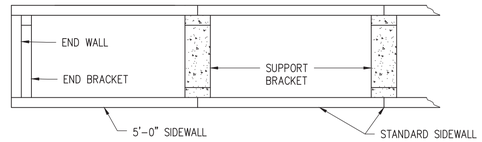
DWG. NAME: MCW–D–P009–1 | REVISION NO : 3



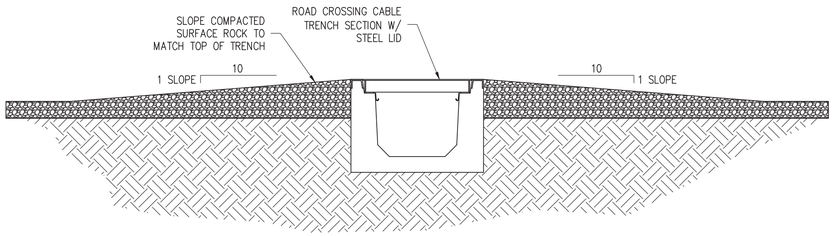
STANDARD TRENCH DETAIL 1 / P009-1
TYPICAL CONDUIT ENTRANCE



STANDARD TRENCH DETAIL 2 / P009-1
TYPICAL CROSS SECTION



STANDARD TRENCH DETAIL 3 / P009-1
TYPICAL TRENCH END



STANDARD TRENCH DETAIL 4 / P009-1
TYPICAL ROAD CROSSING

AS BUILT

LEGEND

1 / – INDICATES DETAIL NUMBER
INDICATES DRAWING ON WHICH DETAIL APPEARS

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P009-2.DWG LAST SAVED BY: tjwilcox 10/7/2020 2:09 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:37 AM Tab:MCW-D-P009-2

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edf renewables

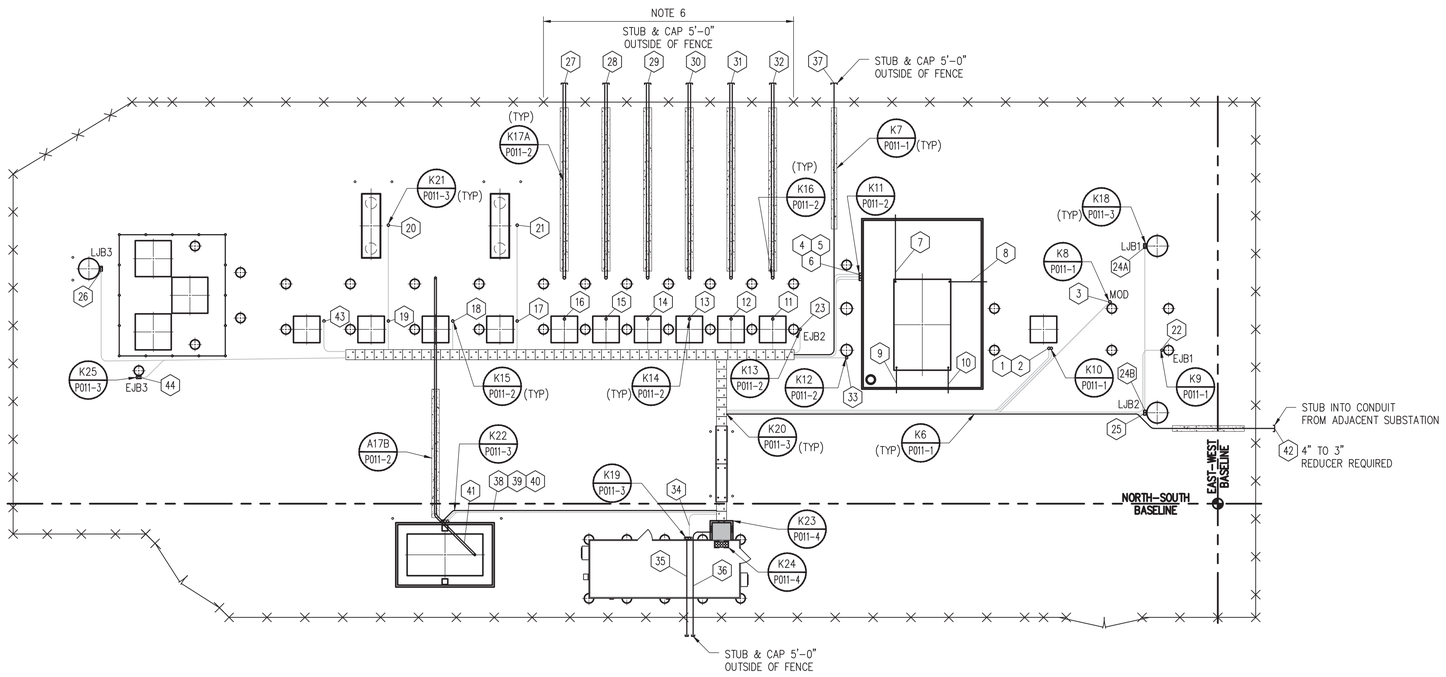
ENGINEERING RECORD		DATE
DRAWN	WILCOX	09/19
DESIGNED	WILCOX	09/19
CHECKED	GROFF	09/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CABLE TRENCH DETAILS

DWG. NAME: MCW-D-P009-2 | REVISION NO : 1

CONDUIT SCHEDULE

NO.	SIZE TYPE	FROM	TO	CABLE CONTENTS
1	4"	230 kV 2715	STUB BELOW GRADE	P1, P2, P3, P4, P5
2	4"	230 kV 2715	STUB BELOW GRADE	C1, C2, C3, C4, C5, C6, C7
3	2 1/2"	2710	STUB BELOW GRADE	P6, P7, C8, C9
4	4"	230/34.5 kV XFMR T1	STUB BELOW GRADE	P8, P9
5	4"	230/34.5 kV XFMR T1	STUB BELOW GRADE	C10, C11, C12, C13, C14, C15, C16, C17, C19, C20
6	4"	230/34.5 kV XFMR T1	STUB BELOW GRADE	C21
7	1 1/2"	XFMR T1 GROUND BUS BAR	STUB TO GROUND GRID	(2) BARE #4/0 Cu
8	1 1/2"	XFMR T1 GROUND BUS BAR	STUB TO GROUND GRID	(2) BARE #4/0 Cu
9	1 1/2"	XFMR T1 GROUND BUS BAR	STUB TO GROUND GRID	(2) BARE #4/0 Cu
10	1 1/2"	XFMR T1 GROUND BUS BAR	STUB TO GROUND GRID	(2) BARE #4/0 Cu
11	4"	34.5 kV 485	STUB BELOW GRADE	P25, P26, P27, C53, C54, C55, C56, C57
12	4"	34.5 kV 475	STUB BELOW GRADE	P22, P23, P24, C47, C48, C49, C50, C51
13	4"	34.5 kV 465	STUB BELOW GRADE	P19, P20, P21, C41, C42, C43, C44, C45
14	4"	34.5 kV 455	STUB BELOW GRADE	P16, P17, P18, C35, C36, C37, C38, C39
15	4"	34.5 kV 425	STUB BELOW GRADE	P13, P14, P15, C29, C30, C31, C32, C33
16	4"	34.5 kV 415	STUB BELOW GRADE	P10, P11, P12, C23, C24, C25, C26, C27
17	4"	34.5 kV 535	STUB BELOW GRADE	P34, P35, P36, C73, C74, C75, C76, C77
18	4"	34.5 kV 445	STUB BELOW GRADE	P31, P32, P33, C66, C67, C68, C69, C70
19	4"	34.5 kV 435	STUB BELOW GRADE	P28, P29, P30, C59, C60, C61, C62, C63
20	2 1/2"	VTCB-1	STUB BELOW GRADE	C87
21	2 1/2"	VTCB-2	STUB BELOW GRADE	C89
22	2 1/2"	EJB1 (CVT230-1)	STUB BELOW GRADE	P48, C93, C94
23	2 1/2"	EJB2 (VT35-1)	STUB BELOW GRADE	P49, C99, C100
24A	2"	LJB1	STUB BELOW GRADE	P52
24B	2"	LJB2	STUB BELOW GRADE	P52
25	2"	LJB2	STUB BELOW GRADE	P51
26	2"	LJB3	STUB BELOW GRADE	P53
27	8"	FEEDER BAY 6	STUB 5'-0" OUTSIDE FENCE	COLLECTOR (BY B.O.P.)
28	8"	FEEDER BAY 5	STUB 5'-0" OUTSIDE FENCE	COLLECTOR (BY B.O.P.)
29	8"	FEEDER BAY 4	STUB 5'-0" OUTSIDE FENCE	COLLECTOR (BY B.O.P.)
30	8"	FEEDER BAY 3	STUB 5'-0" OUTSIDE FENCE	COLLECTOR (BY B.O.P.)
31	8"	FEEDER BAY 2	STUB 5'-0" OUTSIDE FENCE	COLLECTOR (BY B.O.P.)
32	8"	FEEDER BAY 1	STUB 5'-0" OUTSIDE FENCE	COLLECTOR (BY B.O.P.)
33	4"	STATION SERVICE XFMR	STUB BELOW GRADE	P59
34	4"	ATS	STUB BELOW GRADE	P59
35	4"	ATS	STUB 5'-0" OUTSIDE FENCE	P60
36	4"	PULL PIT	STUB 5'-0" OUTSIDE FENCE	-
37	4"	CABLE TRENCH	STUB 5'-0" OUTSIDE FENCE	FIBER (BY B.O.P.)
38	2"	DVAR-1	TRENCH	C108
39	2"	DVAR-1	STUB BELOW GRADE	P41, C109
40	2"	DVAR-1	STUB BELOW GRADE	P42, C107
41	6"	DVAR-1	DVAR REACTIVE BAY	(3) 34.5 kV 350 kCM 1/2 NEUTRAL
42	4"	CABLE TRENCH	ADJACENT STATION	C105
43	4"	34.5 kV 545	STUB BELOW GRADE	P37, P38, P39, C80, C81, C82, C83, C84
44	2"	EJB3 (CTSR-1)	STUB BELOW GRADE	P50, C91



NOTES

1. PROVIDE WEEP HOLES IN CONDUIT AT EACH CONDUIT RISER POSITION AND AT THE LOW POINT IN EACH CONDUIT RUN.
2. ALL BELOW GRADE POWER AND CONTROL CONDUITS SHALL BE SCHEDULE 40 PVC UL RATED WITH EXCEPTION OF 8" PVC. CONDUITS SHALL BE BURIED AND BEDDED WITH COMPACTED FINE EARTH COVER.
3. CONTRACTOR SHALL INSTALL BELOW GRADE AND ABOVE GRADE CONDUIT SYSTEM AS SHOWN ON THIS CONDUIT PLAN AND DETAILS AND PER THE WRITTEN SPECIFICATION. MATERIALS WILL BE FURNISHED BY CONTRACTOR.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING THE JUNCTION BOXES AND ACCESSORIES AS SHOWN ON CONDUIT DETAIL DRAWING. NUTS, BOLTS & WASHERS WILL BE FURNISHED BY CONTRACTOR.
5. CONDUITS SHALL BE INSTALLED IN A WORKMANLIKE MANNER, FREE FROM OBSTRUCTIONS AND SHARP CORNERS.
6. FENCE POST ARE SPREAD AT 11'-0" O.C. TO ALLOW FOR FEEDER AND UTILITIES.

LEGEND

- CONCRETE COVER
- CONDUIT RISER
- EJBX / LJBX / FOJBX — EQUIPMENT/LIGHTING JUNCTION BOX NO., OUTDOOR NEMA 3R JUNCTION BOX
- (1) — INDICATES CONDUIT NO. IN CONDUIT SCHEDULE
- DIRECT BURIED CABLE
- (K1 / -) — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

AS BUILT

0 10FT 20FT 40FT
SCALE: 1"=20'-0"

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P010-1.DWG LAST SAVED BY: tjwilcox 10/30/2020 8:14 AM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:37 AM Tab:MCW-D-P010-1

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
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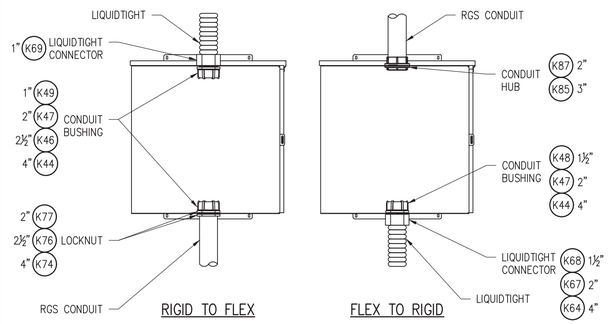
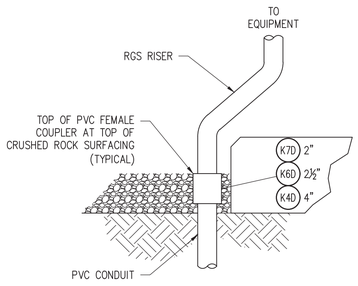
APPROVED	SAUNDERS	10/19
DWG SCALE: 1"=20'-0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CONDUIT PLAN

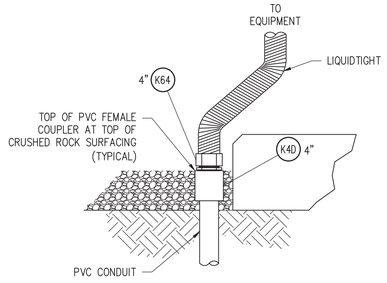
DWG. NAME: MCW-D-P010-1 | REVISION NO : 3



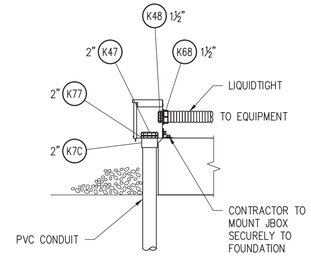
STANDARD CONDUIT DETAIL K1
TYPICAL CONTROL & JUNCTION BOX CONNECTION



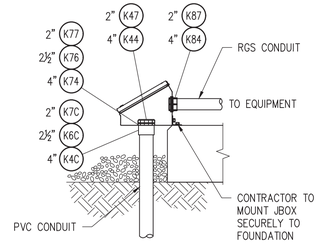
STANDARD CONDUIT DETAIL K2
PVC TO RIGID TRANSITION



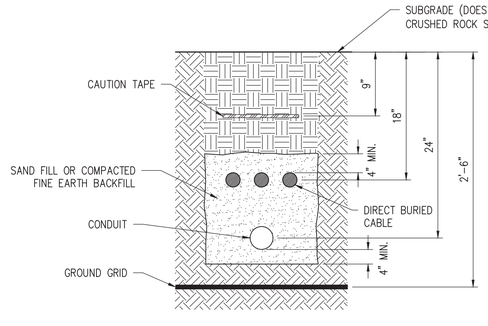
STANDARD CONDUIT DETAIL K3
PVC TO LIQUIDTIGHT TRANSITION



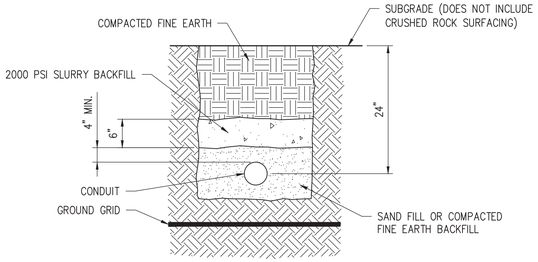
STANDARD CONDUIT DETAIL K4
PVC TO LIQUIDTIGHT CONDUIT THROUGH PULL BOX



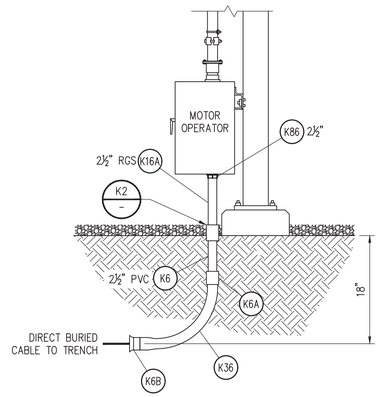
STANDARD CONDUIT DETAIL K5
PVC TO RIGID CONDUIT THROUGH GUTTER BOX



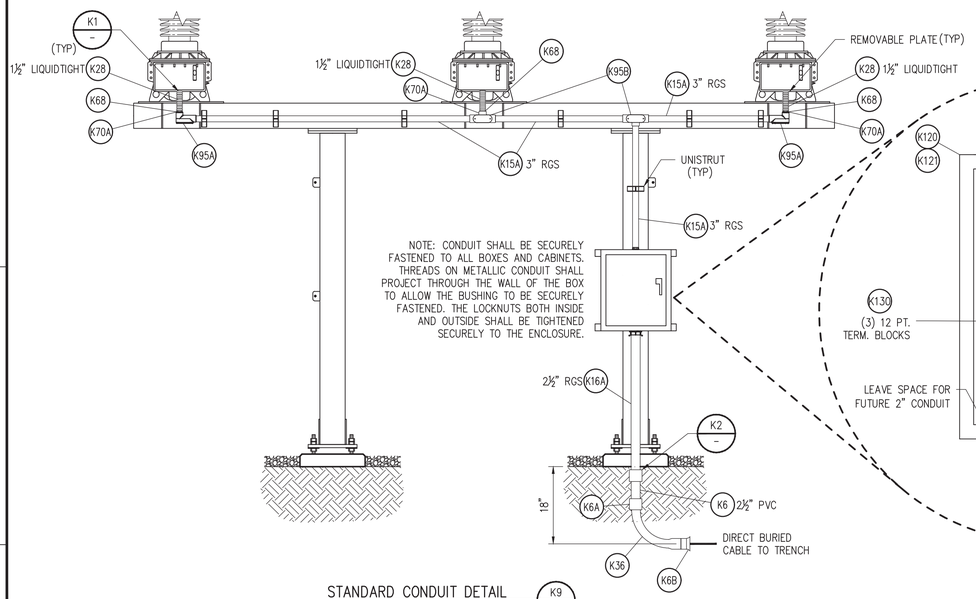
STANDARD CONDUIT DETAIL K6
EARTH COVERED CONDUIT & CABLE



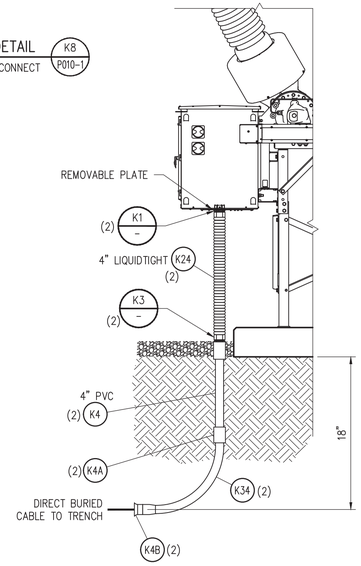
STANDARD CONDUIT DETAIL K7
CONCRETE COVERED CONDUIT



STANDARD CONDUIT DETAIL K8
230 kV MOTOR OPERATED DISCONNECT



STANDARD CONDUIT DETAIL K9
230 kV CAPACITIVE VOLTAGE TRANSFORMER



STANDARD CONDUIT DETAIL K10
230 kV BREAKER

AS BUILT

NOTES

1. ALL CONTROL CONDUIT SHALL BE SCHEDULE 40 PVC AND SHALL BE BURIED AND BEDDED WITH A MINIMUM OF 4" SAND OR COMPACTED FINE EARTH COVER.
2. CONTRACTOR SHALL PROVIDE WEATHER TIGHT CONDUIT ENTRANCES INTO ALL JUNCTION BOXES.
3. IF CONDUIT BENDING ABOVE GRADE IS REQUIRED, CONTRACTOR MAY SUBSTITUTE AN LB.
4. FIELD BEND CONDUITS AS REQUIRED.
5. FIELD DRILL STEEL AS REQUIRED TO MOUNT UNIVERSAL CHANNELS FOR CABINET MOUNTING. ANY HOLES DRILLED IN GALVANIZED STEEL SHALL BE COATED WITH ZINC RICH GALVANIZING PAINT.
6. PROVIDE CONDUIT STRAPS AS REQUIRED TO SUPPORT CONDUIT A MINIMUM OF EVERY 3 FEET. CONTRACTOR TO PROVIDE BOLTS, NUTS, WASHERS, LOCKWASHER, AND SCREWS AS REQUIRED FOR MOUNTING CONDUITS, CABINETS AND EQUIPMENT TO THE STEEL STANDS. FIELD DRILL STEEL AS REQUIRED.
7. RIGID CONDUIT IS REQUIRED FROM THE GROUND TO THE CABINET. LIQUID TIGHT CONDUIT MAY BE USED FROM THE CABINET TO THE EQUIPMENT.
8. FIELD DRILL OPENING IN GLAND PLATE TO ACCOMMODATE CONDUIT ENTRANCE.
9. DRILL THROUGH END CAP AND INSERT WEATHER TIGHT CONNECTOR (DO NOT INITIALLY GLUE END CAP ON TO PVC).
10. CONTRACTOR SHALL APPLY OXIDE PROHIBITOR TO CABLE TIE PRIOR TO ASSEMBLY.
11. CONTRACTOR SHALL ACHIEVE 92% DENSITY COMPACTION OF SELECT NATIVE BACKFILLS THROUGH MECHANICAL MEANS. COMPACT IN LIFTS AS NECESSARY TO ACHIEVE COMPLETED TRENCH WITH REASONABLE EXPECTED FUTURE SETTLEMENT.
12. CONDUCTOR ARRANGEMENTS ARE SHOWN FOR REFERENCE ONLY. SEE COLLECTOR SYSTEM DRAWINGS FOR DETAILED INSTALLATION.

LEGEND

K1 / – : INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

K1 : MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P011-1.DWG LAST SAVED BY: tjwilcox 10/29/2020 4:48 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:37 AM Tab:MCW-D-P011-1

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BILLINGS, MONTANA

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2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG
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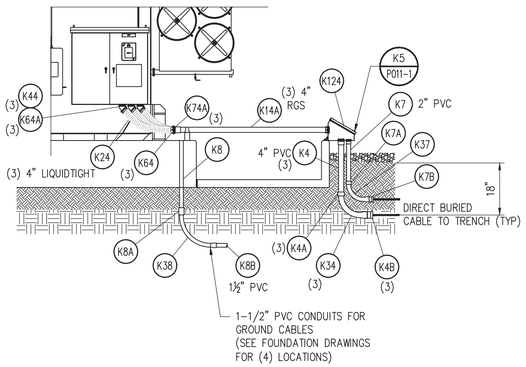
edF renewables

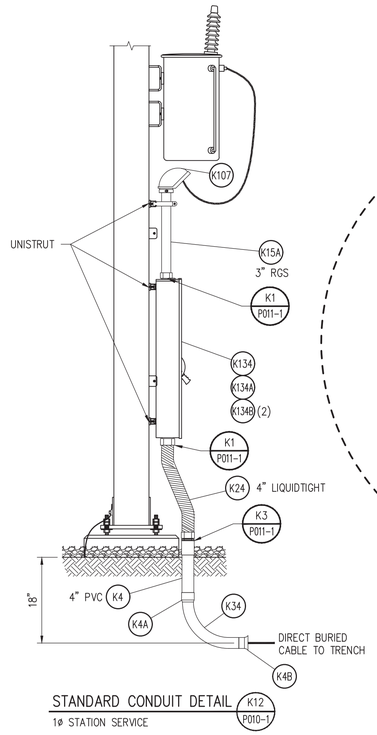
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CONDUIT DETAILS

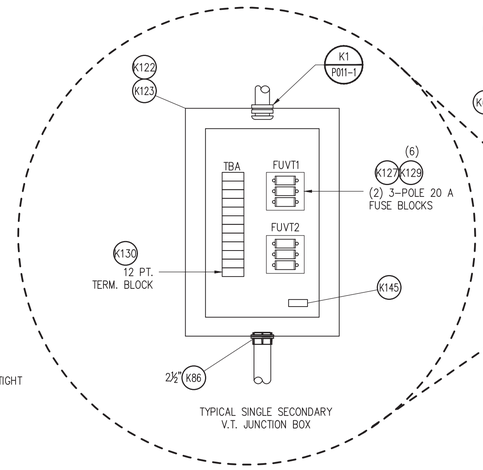
DWG. NAME: MCW-D-P011-1 | REVISION NO : 2

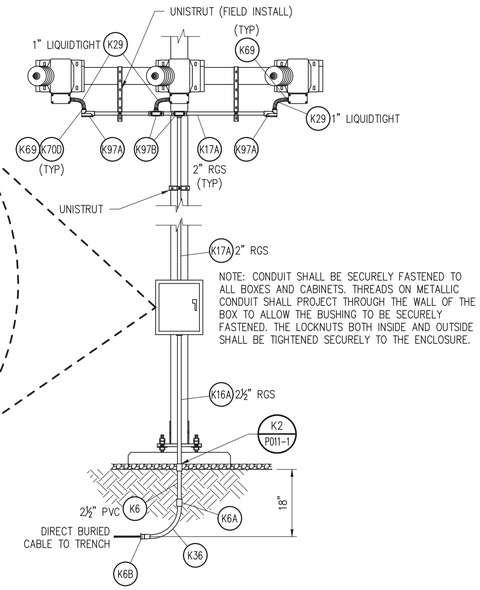


STANDARD CONDUIT DETAIL K11 / P010-1
POWER TRANSFORMER

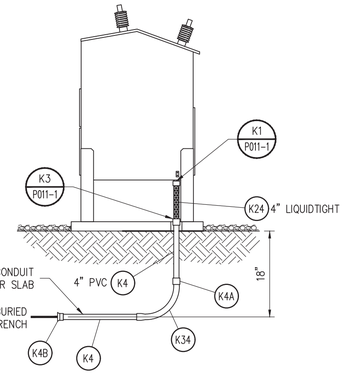


STANDARD CONDUIT DETAIL K12 / P010-1
1ø STATION SERVICE

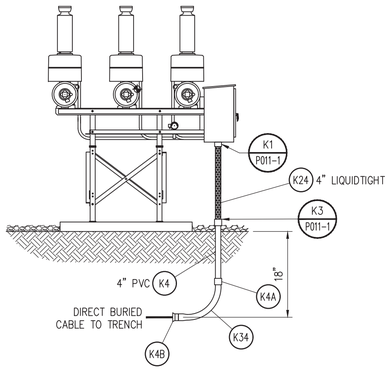




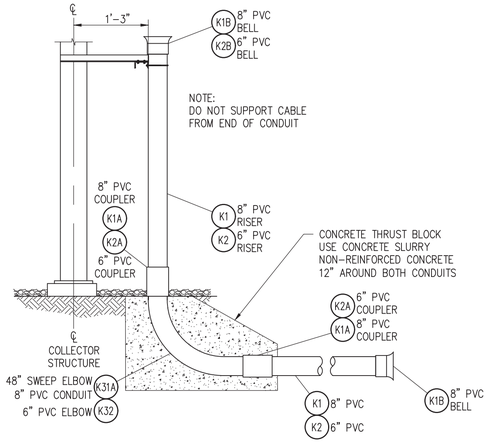
STANDARD CONDUIT DETAIL K13 / P010-1
34.5 kV VT



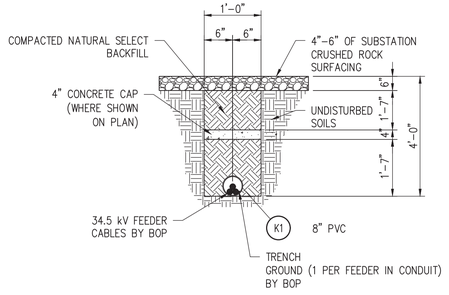
STANDARD CONDUIT DETAIL K14 / P010-1
34.5 kV EMA BREAKER



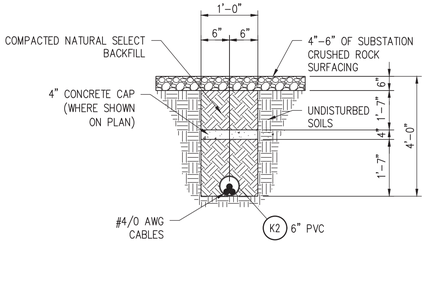
STANDARD CONDUIT DETAIL K15 / P010-1
72 kV GE BREAKER



STANDARD CONDUIT DETAIL K16 / P010-1
34.5 kV RISER



STANDARD CONDUIT DETAIL K17A / P010-1
FEEDER CONDUIT CABLE TRENCH



STANDARD CONDUIT DETAIL K17B / P010-1
DVAR CONDUIT CABLE TRENCH

AS BUILT

NOTES

1. SEE CONSTRUCTION NOTES ON MCW-D-P011-1

LEGEND

K1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS

K1 — MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

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edf renewables

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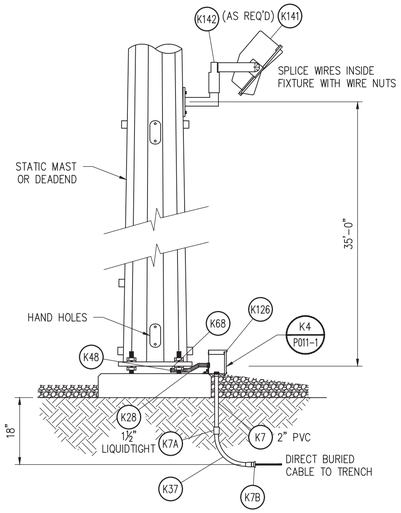
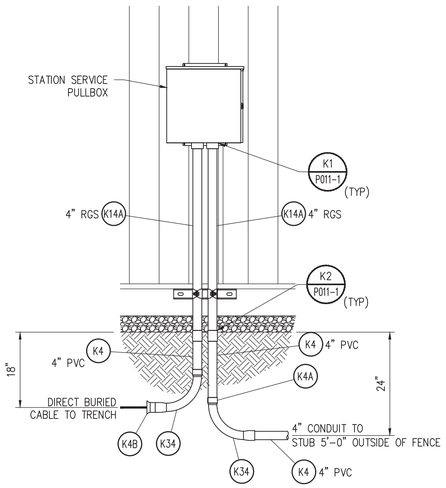
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CONDUIT DETAILS

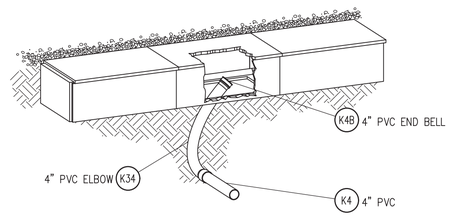
DWG. NAME: MCW-D-P011-2 | REVISION NO : 1



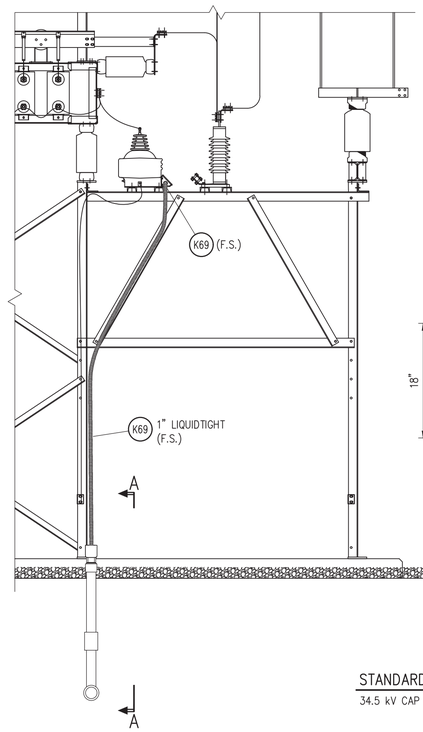
STANDARD CONDUIT DETAIL K18 P010-1
DEADEND/STATIC MAST YARD LIGHTS

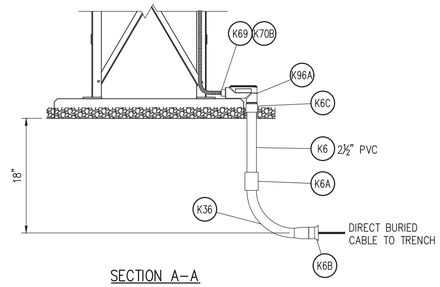


STANDARD CONDUIT DETAIL K19 P010-1
STATION SERVICE PULL BOX



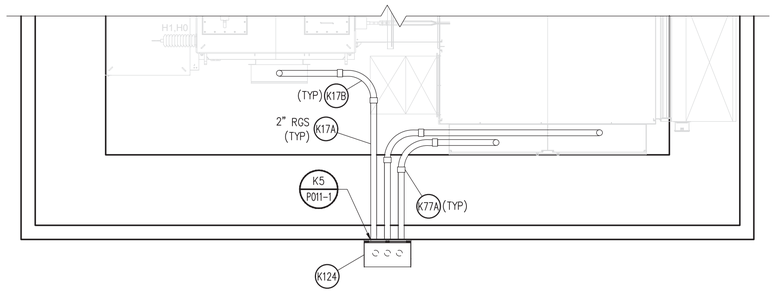
STANDARD CONDUIT DETAIL K20 P010-1
CONDUIT TO CABLE TRENCH ENTRANCE

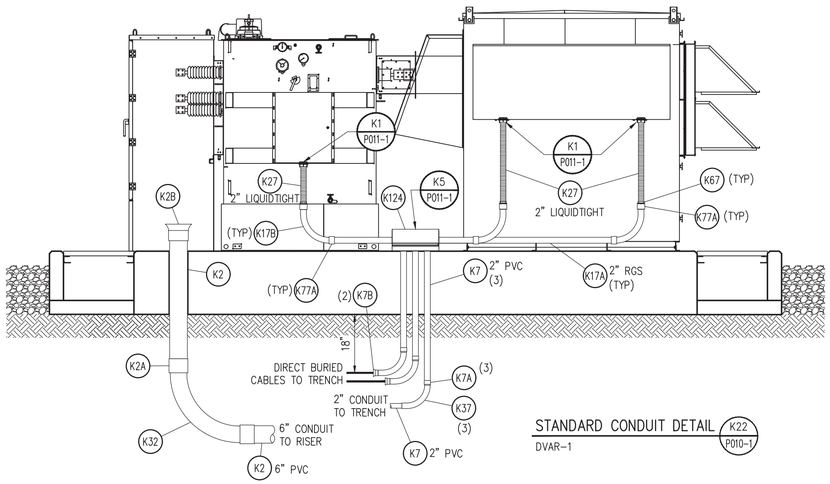




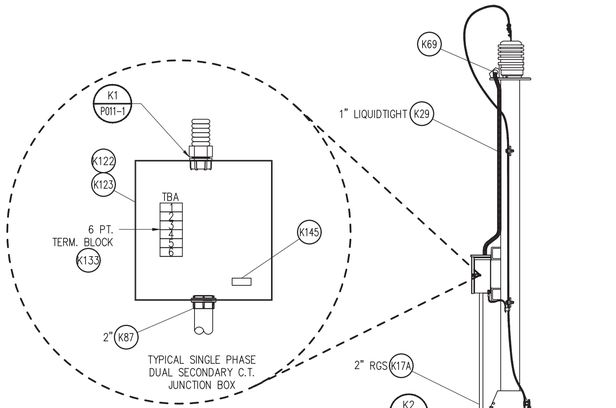
SECTION A–A

STANDARD CONDUIT DETAIL K21 P010-1
34.5 kV CAP BANK VT





STANDARD CONDUIT DETAIL K22 P010-1
DVAR–1



STANDARD CONDUIT DETAIL K25 P010-1
REACTOR NEUTRAL CT

AS BUILT

NOTES

1. SEE CONSTRUCTION NOTES ON MCW–D–P011–1

LEGEND

K1 – INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

K1 – MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW–B–Z001

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P011–3.DWG LAST SAVED BY: tjwilcox 10/29/2020 4:47 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:38 AM Tab:MCW–D–P011–3

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

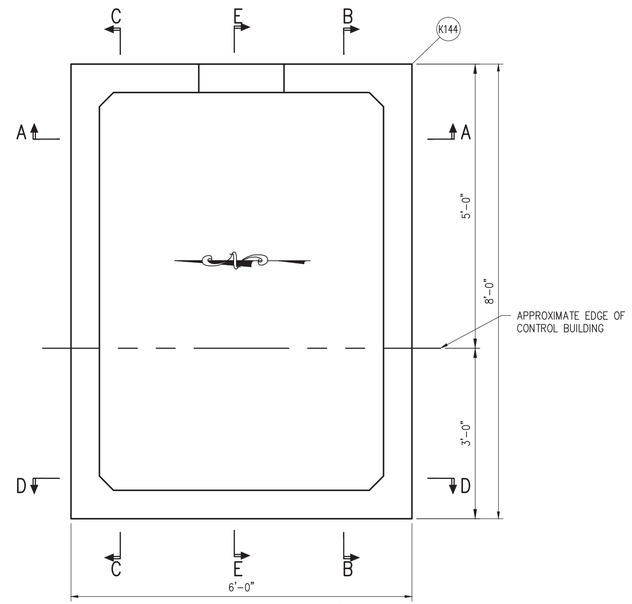
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

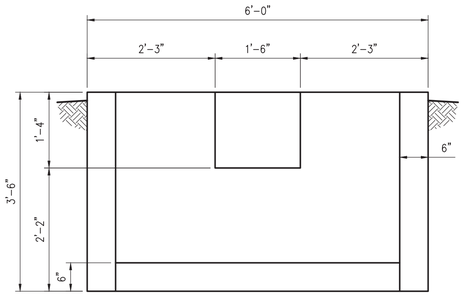
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CONDUIT DETAILS

DWG. NAME: MCW–D–P011–3 | REVISION NO : 3

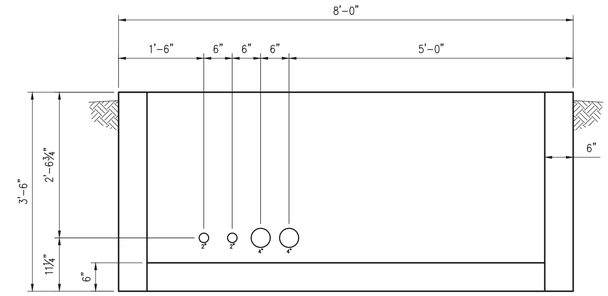


STANDARD CONDUIT DETAIL (K23 / P010-1)

CONTROL ENCLOSURE PULL PIT

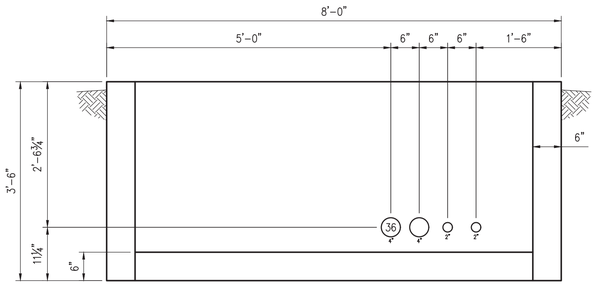


SECTION A–A



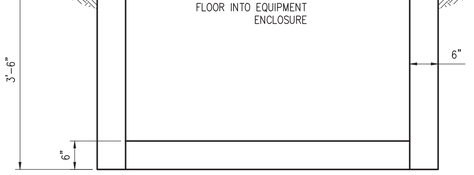
NOTE: 1" MIN. SEPARATION BETWEEN CONDUITS, TYP.

SECTION B–B

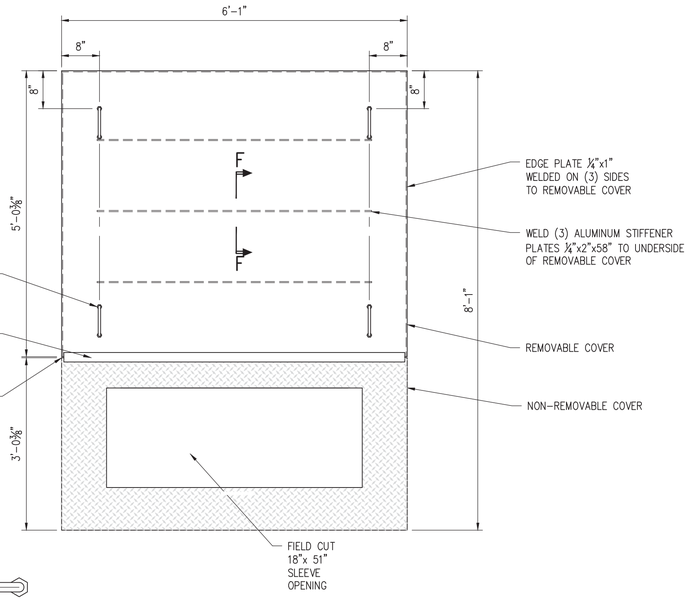


NOTE: 1" MIN. SEPARATION BETWEEN CONDUITS, TYP.

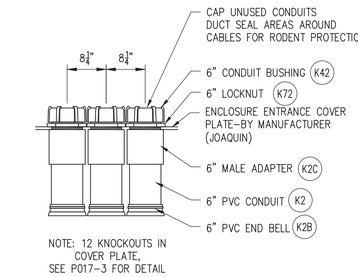
SECTION C–C



SECTION D–D



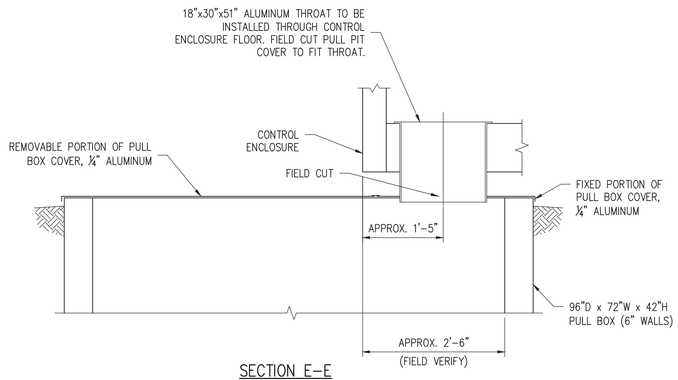
REMOVABLE ALUMINUM PULL PIT COVER



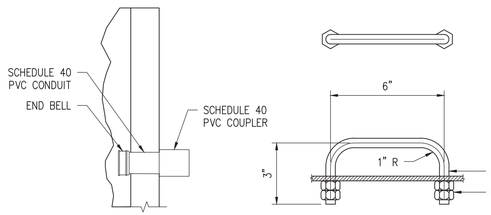
NOTE: 12 KNOCKOUTS IN COVER PLATE, SEE P017–3 FOR DETAIL

STANDARD CONDUIT DETAIL (K24 / P010-1)

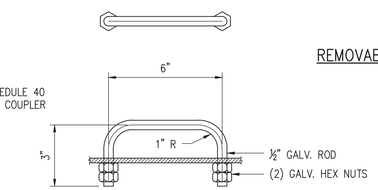
CONTROL ENCLOSURE PVC CONDUIT ENTRANCE



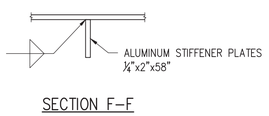
SECTION E–E



CONDUIT ENTRANCE DETAIL



HANDLE DETAIL



SECTION F–F

NOTES

1. SEE CONSTRUCTION NOTES ON DRAWING MCW–D–P011–1
2. CONTRACTOR SHALL PROCURE OR POUR IN PLACE PULL PIT.

LEGEND

K1 – INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

(K1) – MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW–B–Z001

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P011–4.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:29 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:38 AM Tab:MCW–D–P011–4

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BILLINGS, MONTANA

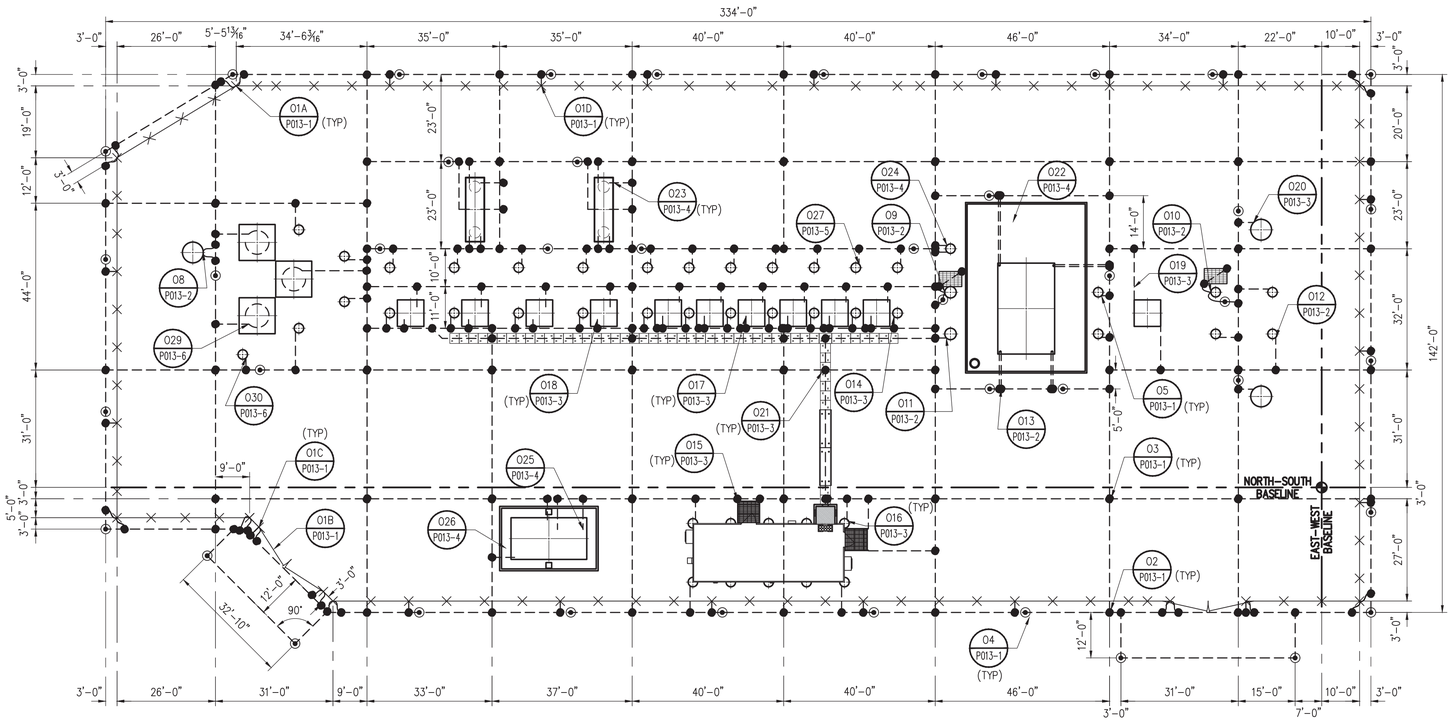
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
PULL PIT DETAILS

DWG. NAME: MCW–D–P011–4 | REVISION NO : 1



AS BUILT

GROUND GRID CRITERIA

GROUNDING SYSTEM DESIGN IS BASED ON THE FOLLOWING PARAMETERS:

- 15,000 AMP, 34.5 kV SINGLE PHASE TO GROUND FAULT
- 0.25 SECOND FAULT CLEARING TIME
- MAINTAINED 4 INCHES OF 3000 OHM-METER SURFACING MATERIAL
- 80 INCHES OF FROZEN EARTH (10 TIMES NATIVE)
- TWO LAYER SOIL MODEL
- X/R RATIO: 20

	RESISTIVITY	THICKNESS
TOP LAYER:	189.82 OHM-METERS	1.6838 FEET
BOTTOM LAYER:	12.636 OHM-METERS	INFINITE

UPON COMPLETION OF STATION GROUNDING SYSTEM, THE RESISTANCE OF MAT TO EARTH WAS MEASURED AT 0.098 OHMS WHEN ISOLATED FROM THE COLLECTION SYSTEM AND STATIC WIRES(S).

NOTES

1. #4/0 COPPER GROUND CONDUCTOR SHALL BE ROUTED THROUGH CONDUITS INSTALLED IN THE TRANSFORMER FOUNDATION AND ATTACHED TO GROUND BUS BARS PROVIDED AT THE BASE OF THE TRANSFORMER. INDEPENDENT GROUND WIRE SHALL BE INSTALLED TO THE X0 BUSHING, H0 BUSHING, HIGH SIDE ARRESTORS AND LOW SIDE ARRESTORS.
2. #4/0 COPPER GROUND CONDUCTORS SHALL BE ROUTED UP THE 35 kV STRUCTURES TO EACH SURGE ARRESTOR AND CABLE TERMINATOR AND RUN DOWN THE OTHER LEG FORMING TWO CONTINUOUS PATHS TO GROUND FOR FAULT CURRENT.
3. #4/0 COPPER GROUND CONDUCTORS SHALL BE BROUGHT INTO CONTROL ENCLOSURE THROUGH THE CABLE ENTRANCE AND BONDED TO THE GROUND CONDUCTOR INSTALLED IN THE OVERHEAD CABLE TRAY. A #4/0 COPPER GROUND CONDUCTOR SHALL BE INSTALLED IN THE OVERHEAD CABLE TRAY FOR THE PURPOSE OF GROUNDING THE CABLE TRAY, RELAY PANEL GROUNDING BUSSES AND STATION SERVICE POWER EQUIPMENT. EACH RELAY AND CONTROL PANEL SHALL BE BONDED WITH A MINIMUM OF #1/0 COPPER TO THE #4/0 COPPER GROUND CONDUCTOR.
4. GROUND CONDUCTOR ON COLLECTOR CIRCUITS TO BE GROUNDED AT THE CLOSEST STEEL STRUCTURE LEG.
5. IF APPLICABLE, CONTRACTOR TO INSTALL SEPARATE CONNECTION TO GROUND GRID FOR FEEDER BREAKER GROUND SWITCH (IN ADDITION TO FRAME GROUNDING).
6. GROUND CONTROL ENCLOSURE STAIRS SEPARATELY FROM ENCLOSURE.
7. #4/0 BARE COPPER CONDUCTOR IS TO BE USED FOR THE MAIN GROUND SYSTEM, BURIED 30 INCHES BELOW SUBGRADE.
8. DO NOT FORM CLOSED LOOPS AROUND INDIVIDUAL REACTORS. GROUND BASE OF REACTORS WITH RADIAL CONNECTORS TO LOOP AROUND REACTOR GROUP.

LEGEND

- #4/0 S.D. COPPER GROUND CONDUCTOR
- X — 3/4" x 10' COPPER CLAD GROUND ROD ("X" INDICATES LENGTH OTHER THAN 10.)
- GROUND CONDUCTOR BOND CONNECTION, CADWELL OR EQUAL
- SWITCH OPERATOR PLATFORM (6'x4')
- 01 / - — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

0 10FT 20FT 40FT
SCALE: 1"=20'-0"

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P012-1.DWG LAST SAVED BY: tjwilcox 10/29/2020 4:58 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:38 AM Tab:MCW-D-P012-1

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BILLINGS, MONTANA

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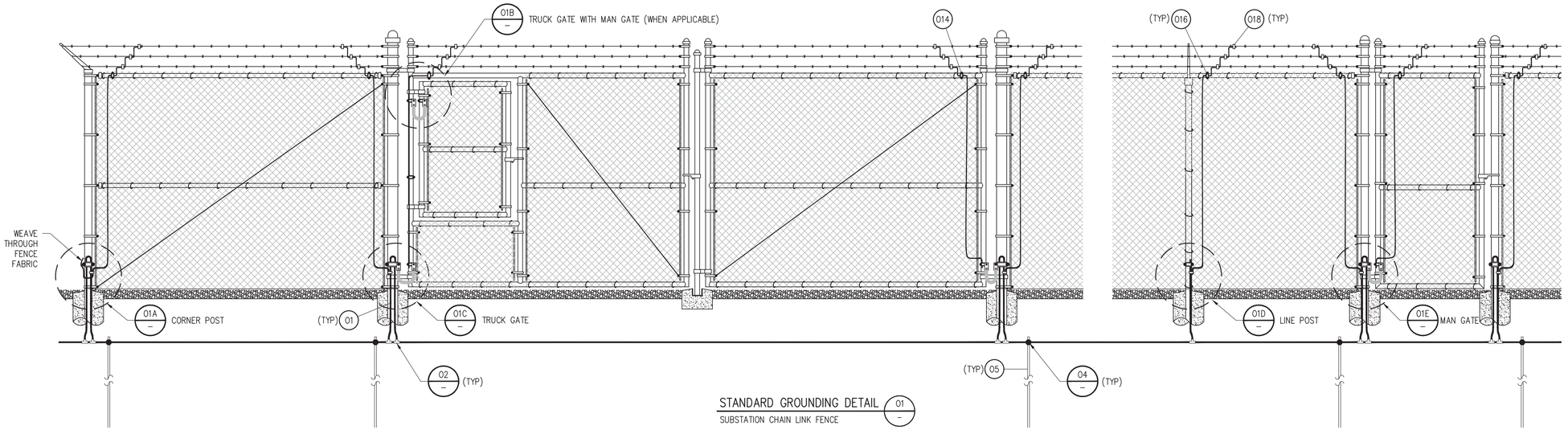
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edF renewables

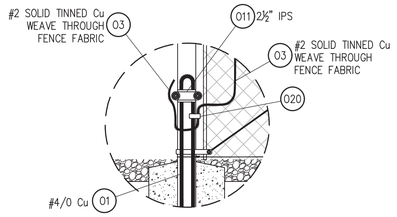
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: 1"=20'-0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
GROUNDING PLAN

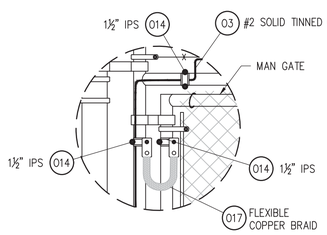
DWG. NAME: MCW-D-P012-1 | REVISION NO : 3



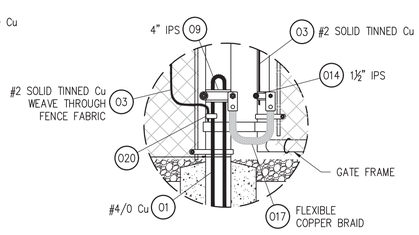
STANDARD GROUNDING DETAIL 01 – SUBSTATION CHAIN LINK FENCE



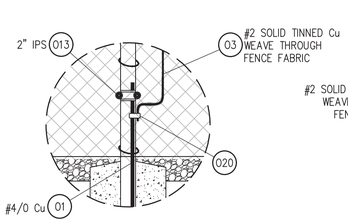
STANDARD GROUNDING DETAIL 01A – TYPICAL CORNER POST



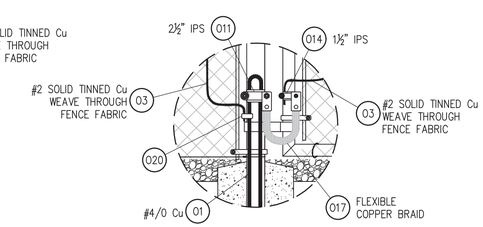
STANDARD GROUNDING DETAIL 01B – TYPICAL TRUCK GATE WITH MAN GATE



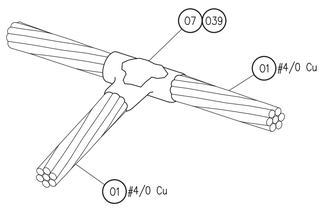
STANDARD GROUNDING DETAIL 01C – TYPICAL TRUCK GATE BOTTOM



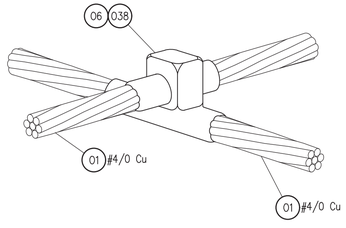
STANDARD GROUNDING DETAIL 01D – TYPICAL LINE POST



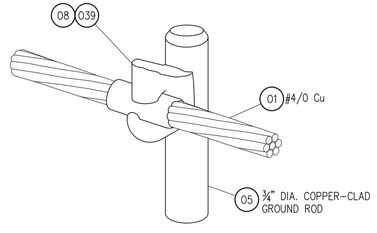
STANDARD GROUNDING DETAIL 01E – TYPICAL MAN GATE BOTTOM



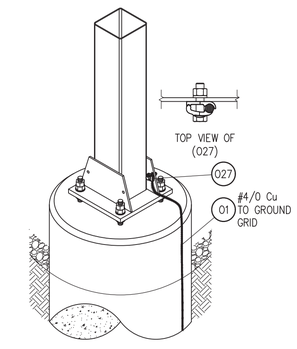
STANDARD GROUNDING DETAIL 02 – #4/0 COPPER TO #4/0 COPPER TAP



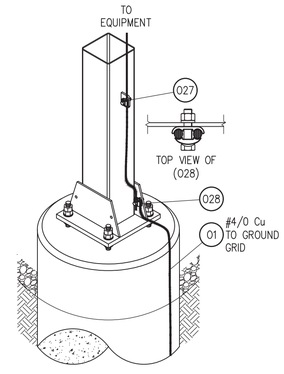
STANDARD GROUNDING DETAIL 03 – #4/0 COPPER TO #4/0 COPPER CROSS



STANDARD GROUNDING DETAIL 04 – GROUND ROD CONNECTION



STANDARD GROUNDING DETAIL 05 – STRUCTURE LEGS – SINGLE GROUND WIRE



STANDARD GROUNDING DETAIL 06 – STRUCTURE LEGS – GROUND WITH RISER

AS BUILT

SUBSTATION GROUNDING NOTES

A. MAIN GROUND SYSTEM

1. PROVIDE A CONTINUOUS GROUNDING SYSTEM TO EFFECTIVELY GROUND ALL STRUCTURES AND EQUIPMENT.
2. ALL SUBGRADE GRID CONDUCTOR CONNECTIONS, AS WELL AS CONNECTIONS TO EACH GROUND ROD, ARE TO BE EXOTHERMIC.
3. #4/0 BARE COPPER WIRE IS TO BE USED FOR THE MAIN GROUND SYSTEM. GROUND GRID SHALL BE BURIED 30 INCHES BELOW SUBGRADE.
4. GROUND RODS SHALL BE LOCATED AND INTER-TIED TO GROUNDING SYSTEM AS SHOWN ON THE GROUNDING PLAN. GROUND RODS SHALL BE FULLY DRIVEN BELOW THE SUBGRADE SURFACE. IF POSSIBLE, THE TOPS OF GROUND RODS SHOULD BE APPROXIMATEY 18 INCHES BELOW SUBGRADE.

B. CONNECTIONS TO STEEL STRUCTURES AND EQUIPMENT

1. CONNECTIONS OF GROUND CABLES TO STEEL STRUCTURES AND EQUIPMENT SHALL BE SECURELY MADE WITH BOLTED CONNECTORS AND ELECTRICAL JOINT COMPOUND.
2. GROUND LEADS SHALL BE RUN UP OVER THE FOOTINGS, AS INDICATED, AND UP THE STRUCTURES IN A NEAT AND ORDERLY FASHION.
3. HOLES NECESSARY FOR ATTACHING CONNECTORS SHALL BE FIELD DRILLED AND TAPPED, IF NECESSARY.
4. WHERE GROUND MAT TAILS ARE INSTALLED AT EQUIPMENT FOOTINGS PRIOR TO EQUIPMENT INSTALLATION, CARE SHALL BE TAKEN THAT SUFFICIENT LENGTH OF CABLE PLUS A REASONABLE MARGIN IS LEFT SO THE LEAD MAY BE NEATLY FORMED TO MATCH ALL SURFACES CLOSELY IN ROUTING CABLE TO THE POINT OF CONNECTIONS.
5. GROUND CABLES SHALL BE SUPPORTED APPROXIMATELY EVERY FOUR FEET WHEN EXTENDED UP THE STRUCTURE.

C. FENCE GROUNDING

1. CHAIN LINK FENCING SHALL BE SECURELY BONDED TO MAIN GROUND SYSTEM AT EACH FENCE CORNER, AND AT INTERMEDIATE INTERVALS, AS DETAILED ON THE GROUNDING PLAN OR A MINIMUM OF EVERY FOURTH POST.
2. THE PERIMETER CONDUCTOR OF THE MAIN GROUND GRID SHALL BE LOCATED 3 FEET OUTSIDE AND PARALLEL TO RETAINING WALLS AND/OR CHAIN LINK FENCE.
3. GROUND RODS FOR PERIMETER SHALL BE INSTALLED AT LOCATIONS ALONG FENCE AT INTERVALS SHOWN ON THE GROUNDING PLAN.

LEGEND

01 – INDICATES DETAIL NUMBER
– INDICATES DRAWING ON WHICH DETAIL APPEARS

01 – MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P013-1.DWG LAST SAVED BY: tjwilcox 10/8/2020 3:00 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:38 AM Tab:MCW-D-P013-1

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edf renewables

ENGINEERING RECORD		DATE
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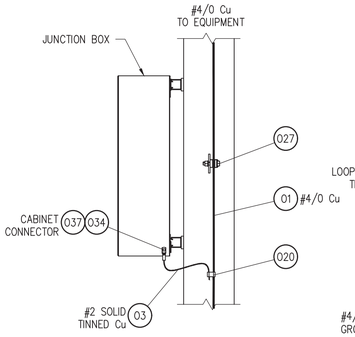
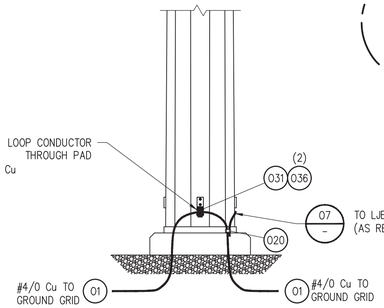
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION GROUNDING DETAILS

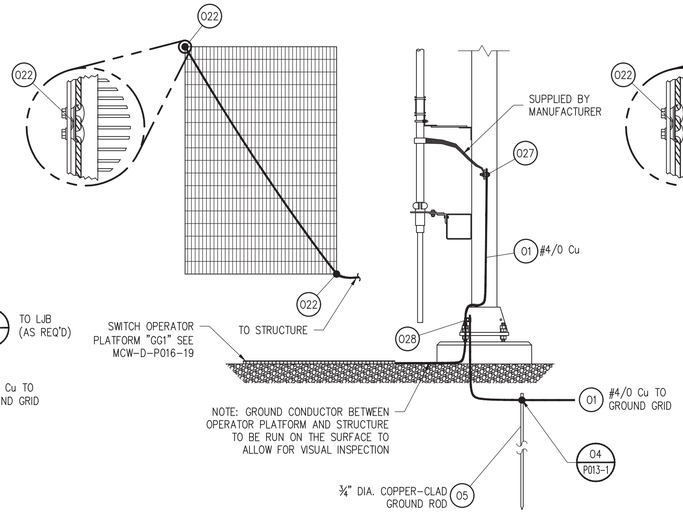
DWG. NAME: MCW-D-P013-1 | REVISION NO : 1



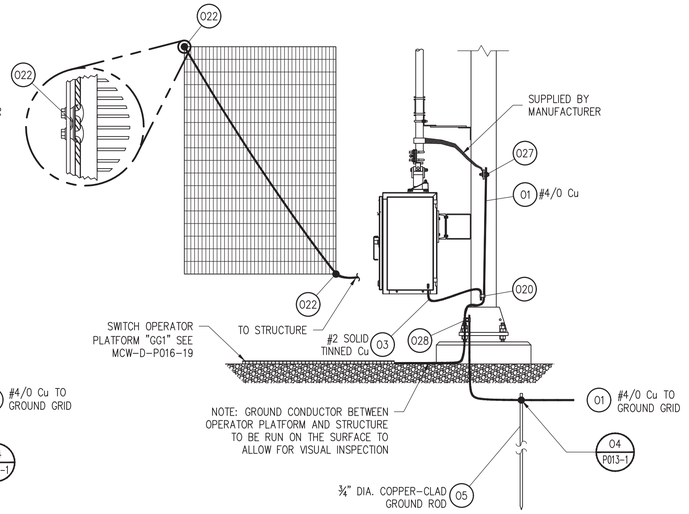
STANDARD GROUNDING DETAIL 07 –
EQUIPMENT JUNCTION BOX



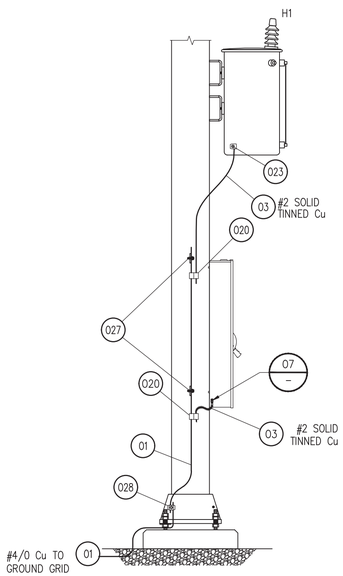
STANDARD GROUNDING DETAIL 08 –
STATIC MAST



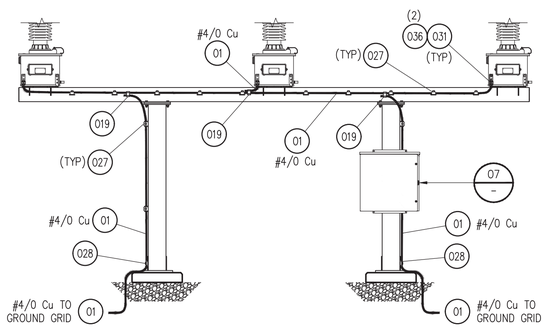
STANDARD GROUNDING DETAIL 09 –
SWITCH OPERATOR PLATFORM – SWING HANDLE



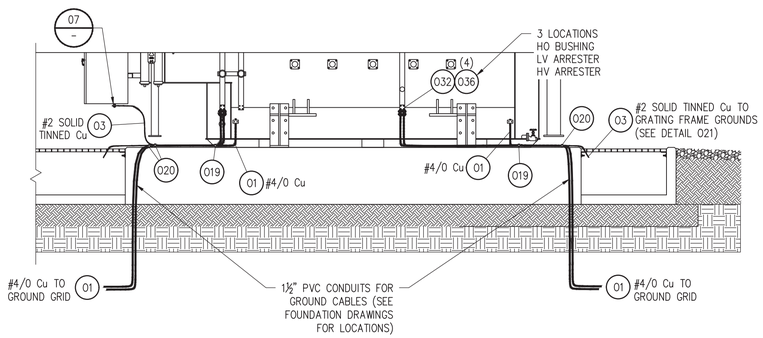
STANDARD GROUNDING DETAIL 010 –
SWITCH OPERATOR PLATFORM – MOTOR OPERATOR



STANDARD GROUNDING DETAIL 011 –
STATION SERVICE



STANDARD GROUNDING DETAIL 012 –
230 kV CAPACITIVE VOLTAGE TRANSFORMER



STANDARD GROUNDING DETAIL 013 –
34.5–230 kV POWER TRANSFORMER

SUBSTATION GROUNDING NOTES

A. CONNECTIONS TO EQUIPMENT COMPARTMENTS, CONDUIT & CABLES

1. ALL EQUIPMENT COMPARTMENTS AND DOORS SHALL BE GROUNDED.
2. LOOP #4/0 Cu UP TRANSFORMER WALLS AND THROUGH SURGE ARRESTERS, HO AND XO BUSHINGS WITHOUT SPLICES EXCEPT AT BASE GROUNDING PADS AS SHOWN IN DETAIL.
3. ROUTE #4/0 COPPER GROUND CONDUCTOR INTO CONTROL ENCLOSURE THROUGH THE CABLE ENTRANCE. GROUND ALL TRAY, RELAY PANEL GROUND BUSSES AND POWER EQUIPMENT. EACH RELAY AND CONTROL PANEL SHALL BE BONDED WITH A MINIMUM OF #1/0 COPPER TO THE #4/0 COPPER GROUND CONDUCTOR.
4. ALL STEEL CONDUITS SHALL BE EFFECTIVELY GROUNDED EITHER BY DIRECT GROUNDS OR BY ATTACHMENT TO METAL ENCLOSURES WHICH ARE ADEQUATELY GROUNDED.
5. METALLIC POWER CABLE SHIELDS MUST BE SOLIDLY GROUNDED. (SEE WRITTEN SPECIFICATIONS).

B. SWITCH OPERATORS AND POWER EQUIPMENT CABINETS

1. ALL MANUAL OR MOTORIZED GROUP-OPERATED SWITCH OPERATOR PIPES SHALL BE GROUNDED WITH SWITCH PLATFORM AND GROUND ROD AS SHOWN IN DETAIL.
2. CONNECTIONS TO SWITCH OPERATOR AND PLATFORM MUST CONSIST OF ONE PATH TO THE MAIN GROUND GRID.
3. SWITCH PLATFORMS SHALL BE CENTERED UNDER THE SWITCH CONTROL ROD AND PLACED ON TOP OF FINISH GRAVEL SURFACE.

C. CONNECTIONS TO STEEL STRUCTURES AND EQUIPMENT

1. CONNECTIONS OF GROUND CABLES TO STEEL STRUCTURES AND EQUIPMENT SHALL BE SECURELY MADE WITH BOLTED CONNECTORS AND ELECTRICAL JOINT COMPOUND.
2. GROUND LEADS SHALL BE RUN UP OVER THE FOOTINGS, AS INDICATED, AND UP THE STRUCTURES IN A NEAT AND ORDERLY FASHION.
3. HOLES NECESSARY FOR ATTACHING CONNECTORS SHALL BE FIELD DRILLED AND TAPPED, IF NECESSARY.
4. WHERE GROUND MAT TAILS ARE INSTALLED AT EQUIPMENT FOOTINGS PRIOR TO EQUIPMENT INSTALLATION, CARE SHALL BE TAKEN THAT SUFFICIENT LENGTH OF CABLE PLUS A REASONABLE MARGIN IS LEFT SO THE LEAD MAY BE NEATLY FORMED TO MATCH ALL SURFACES CLOSELY IN ROUTING CABLE TO THE POINT OF CONNECTIONS.
5. GROUND CABLES SHALL BE SUPPORTED APPROXIMATELY EVERY FOUR FEET WHEN EXTENDED UP THE STRUCTURE.

LEGEND

01 / – : INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

01 : MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P013-2.DWG LAST SAVED BY: tjwilcox 10/8/2020 2:00 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:38 AM Tab:MCW-D-P013-2

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

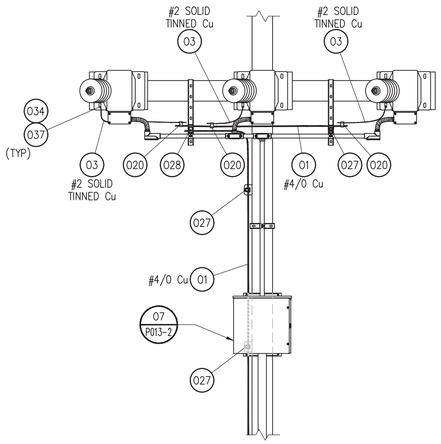
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edf renewables

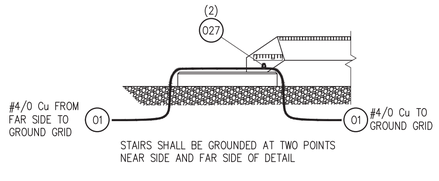
ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION GROUNDING DETAILS

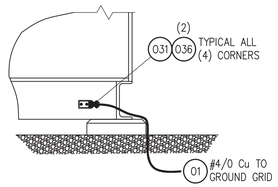
DWG. NAME: MCW-D-P013-2 | REVISION NO : 1



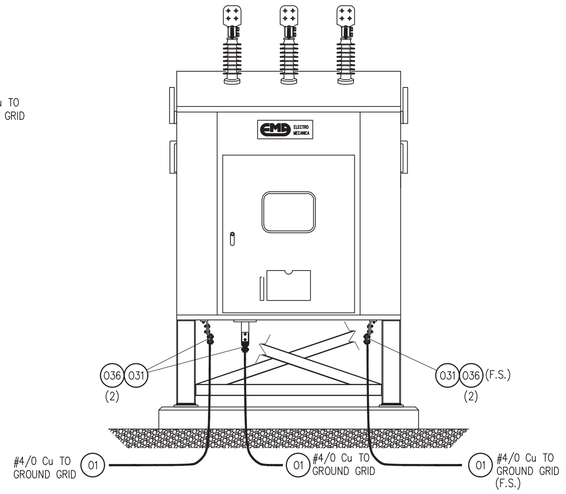
STANDARD GROUNDING DETAIL 014
34.5 kV BUS VT



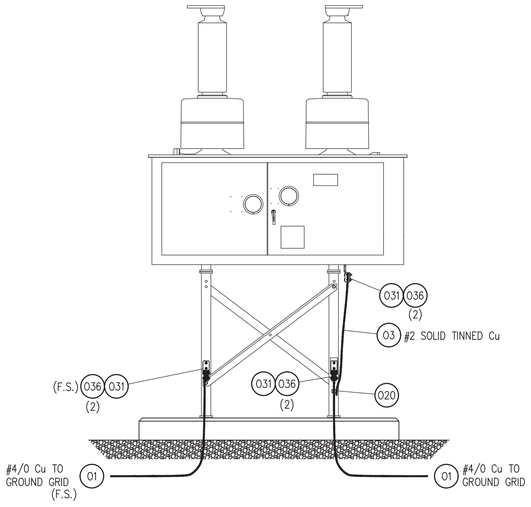
STANDARD GROUNDING DETAIL 015
CONTROL ENCLOSURE STAIRS



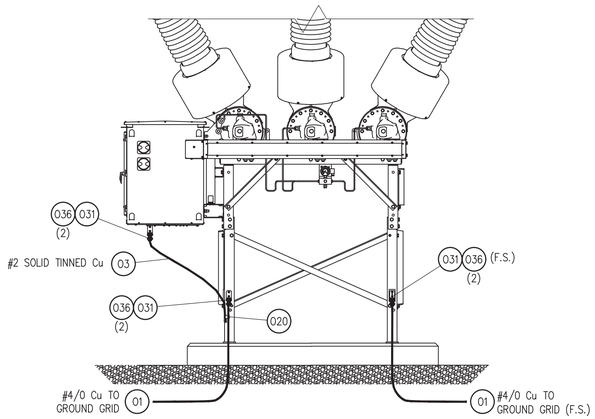
STANDARD GROUNDING DETAIL 016
CONTROL ENCLOSURE



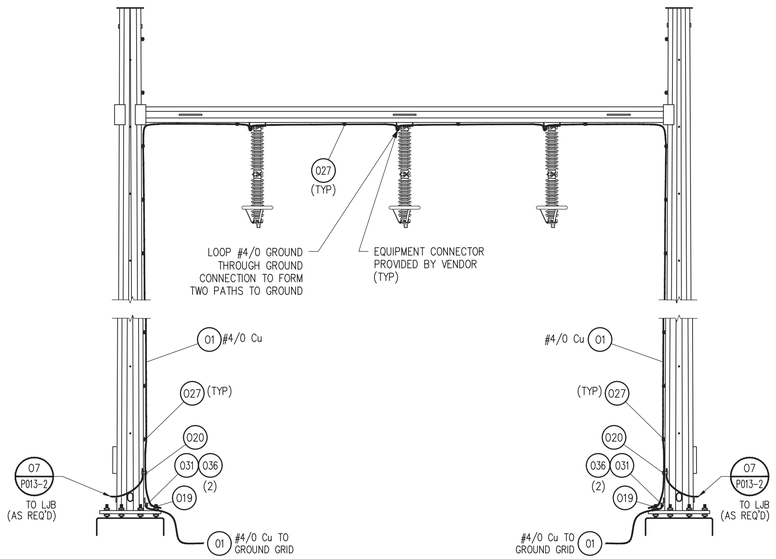
STANDARD GROUNDING DETAIL 017
34.5 kV EMA GROUNDING BREAKER



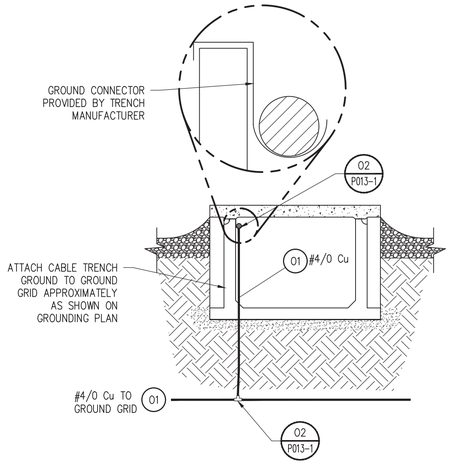
STANDARD GROUNDING DETAIL 018
72 kV GE BREAKER



STANDARD GROUNDING DETAIL 019
230 kV CIRCUIT BREAKER



STANDARD GROUNDING DETAIL 020
DEADEND TOWER W/ UNDERHUNG SURGE ARRSTERS



STANDARD GROUNDING DETAIL 021
CABLE TRENCH GROUNDING

SUBSTATION GROUNDING NOTES

A. CONNECTIONS TO EQUIPMENT COMPARTMENTS, CONDUIT & CABLES

1. ALL EQUIPMENT COMPARTMENTS AND DOORS SHALL BE GROUNDED.
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5. GROUND CABLES SHALL BE SUPPORTED APPROXIMATELY EVERY FOUR FEET WHEN EXTENDED UP THE STRUCTURE.

LEGEND

01 / – — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

01 — MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P013-3.DWG LAST SAVED BY: tjwilcox 10/29/2020 4:48 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:38 AM Tab:MCW-D-P013-3

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

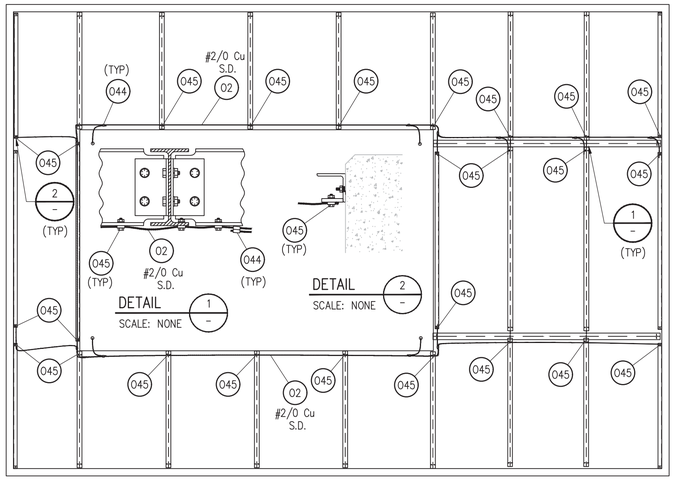
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

edf renewables

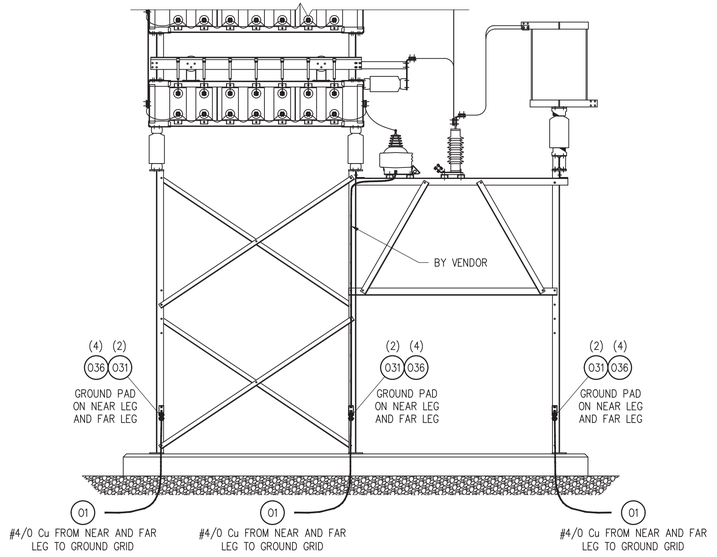
ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION GROUNDING DETAILS

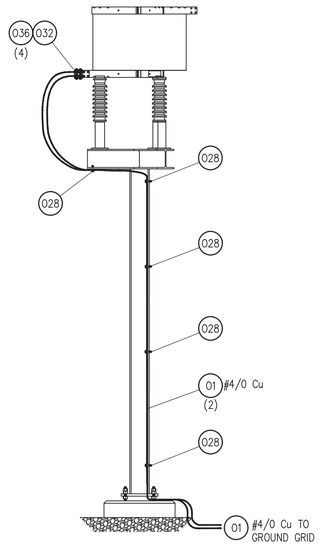
DWG. NAME: MCW-D-P013-3 | REVISION NO : 1



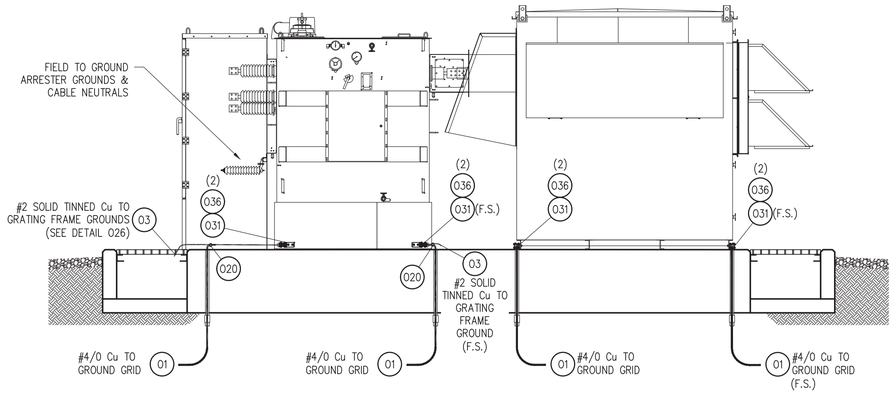
STANDARD GROUNDING DETAIL 022
TRANSFORMER GRATING



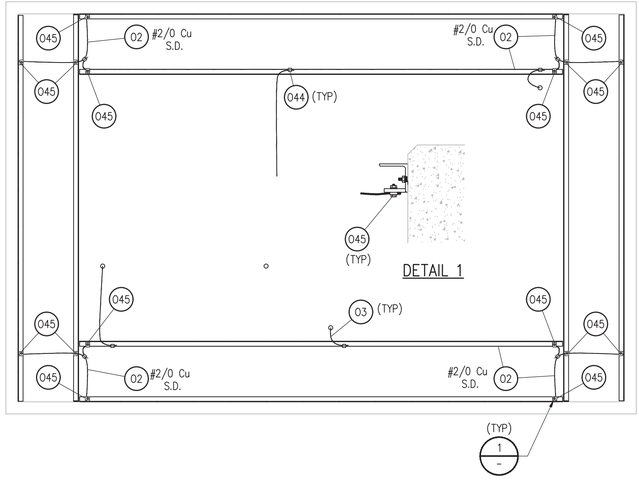
STANDARD GROUNDING DETAIL 023
CAP BANK STRUCTURE



STANDARD GROUNDING DETAIL 024
NEUTRAL GROUND REACTOR



STANDARD GROUNDING DETAIL 025
DVAR



STANDARD GROUNDING DETAIL 026
DVAR-1 GRATING

SUBSTATION GROUNDING NOTES

A. CONNECTIONS TO EQUIPMENT COMPARTMENTS, CONDUIT & CABLES

1. ALL EQUIPMENT COMPARTMENTS AND DOORS SHALL BE GROUNDED.
2. LOOP #4/0 Cu UP TRANSFORMER WALLS AND THROUGH SURGE ARRESTERS, H0 AND X0 BUSHINGS WITHOUT SPLICES EXCEPT AT BASE GROUNDING PADS AS SHOWN IN DETAIL.
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LEGEND

01 — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

01 — MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P013-4.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:36 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:39 AM Tab:MCW-D-P013-4

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

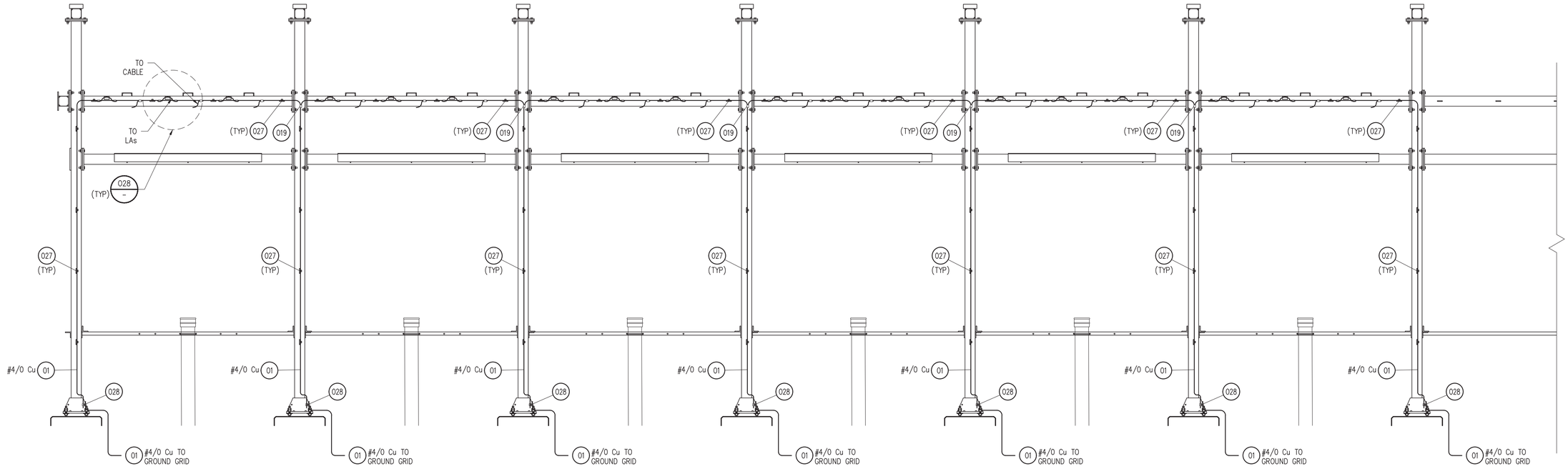
NO	REVISION	DATE	BY	APR
3	AS BUILT	10/30/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

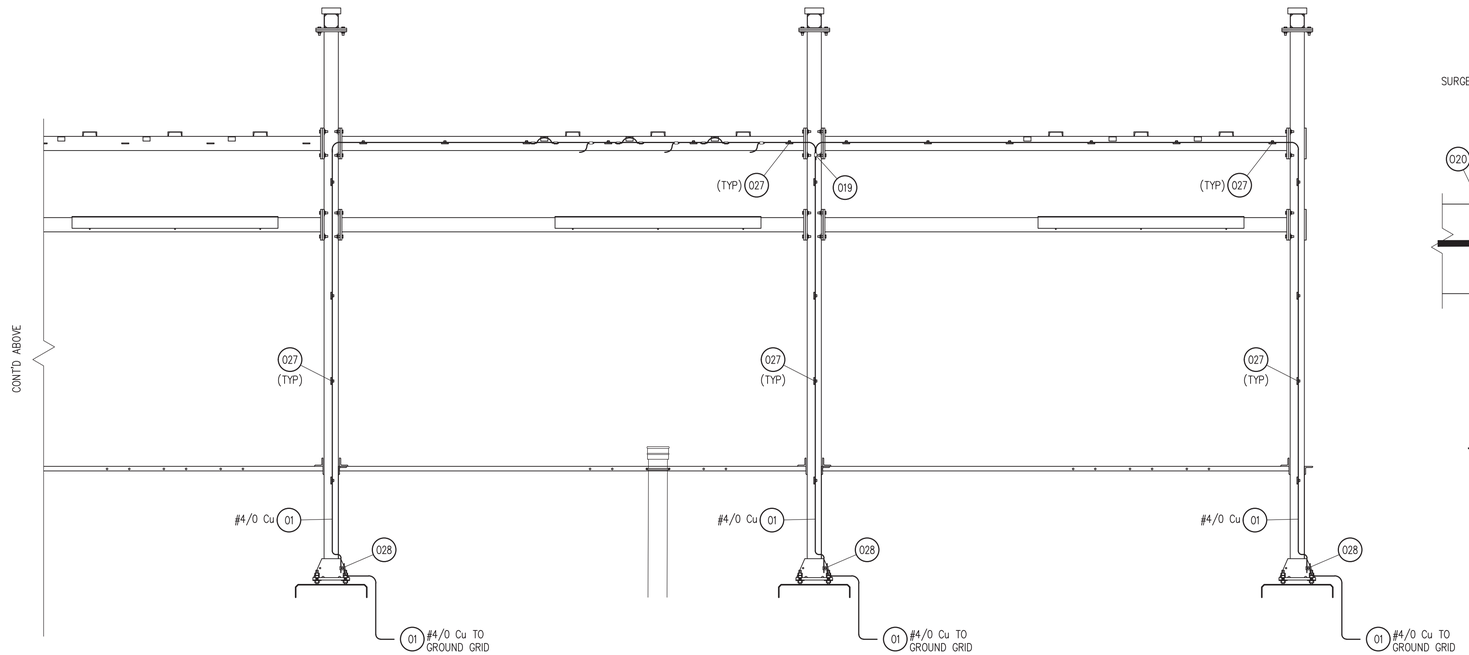
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

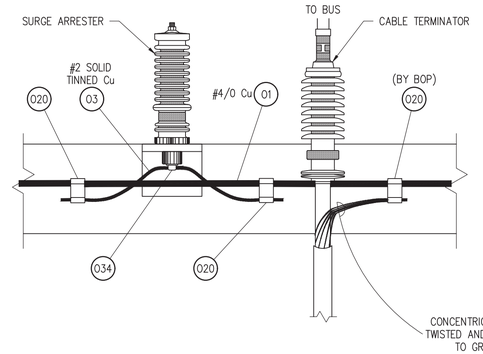
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
GROUNDING DETAILS

DWG. NAME: MCW-D-P013-4 | REVISION NO : 3





STANDARD GROUNDING DETAIL 027
EQUIPMENT ON COLLECTION FEEDER RISER



STANDARD GROUNDING DETAIL 028
COLLECTION BAY ARRESTER & CABLE TERMINAL

AS BUILT

LEGEND

- 01 / – : INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
- 01 : MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

SUBSTATION GROUNDING NOTES

A. CONNECTIONS TO EQUIPMENT COMPARTMENTS, CONDUIT & CABLES

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FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P013-5.DWG LAST SAVED BY: tjwilcox 10/8/2020 1:05 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:39 AM Tab:MCW-D-P013-5

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

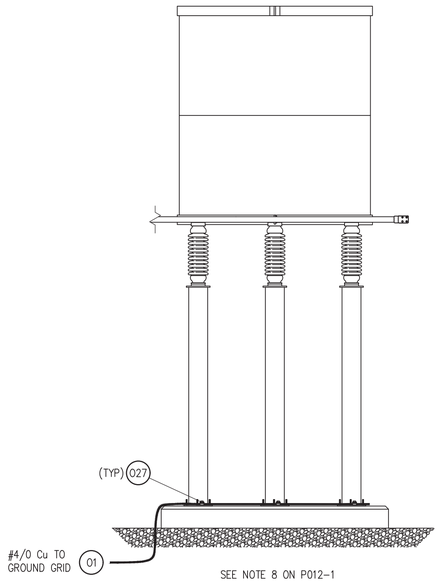
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	10/23/19	TJW	TAS

EDF renewables

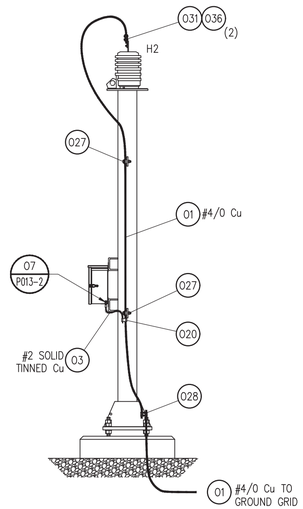
ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	SAUNDERS	10/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION GROUNDING DETAILS

DWG. NAME: MCW-D-P013-5 | REVISION NO : 1



STANDARD GROUNDING DETAIL 029
34.5 kV REACTOR



STANDARD GROUNDING DETAIL 030
34.5 kV REACTOR CT

SUBSTATION GROUNDING NOTES

A. CONNECTIONS TO EQUIPMENT COMPARTMENTS, CONDUIT & CABLES

1. ALL EQUIPMENT COMPARTMENTS AND DOORS SHALL BE GROUNDED.
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B. CONNECTIONS TO STEEL STRUCTURES AND EQUIPMENT

1. CONNECTIONS OF GROUND CABLES TO STEEL STRUCTURES AND EQUIPMENT SHALL BE SECURELY MADE WITH BOLTED CONNECTORS AND ELECTRICAL JOINT COMPOUND.
2. GROUND LEADS SHALL BE RUN UP OVER THE FOOTINGS, AS INDICATED, AND UP THE STRUCTURES IN A NEAT AND ORDERLY FASHION.
3. HOLES NECESSARY FOR ATTACHING CONNECTORS SHALL BE FIELD DRILLED AND TAPPED, IF NECESSARY.
4. WHERE GROUND MAT TAILS ARE INSTALLED AT EQUIPMENT FOOTINGS PRIOR TO EQUIPMENT INSTALLATION, CARE SHALL BE TAKEN THAT SUFFICIENT LENGTH OF CABLE PLUS A REASONABLE MARGIN IS LEFT SO THE LEAD MAY BE NEATLY FORMED TO MATCH ALL SURFACES CLOSELY IN ROUTING CABLE TO THE POINT OF CONNECTIONS.
5. GROUND CABLES SHALL BE SUPPORTED APPROXIMATELY EVERY FOUR FEET WHEN EXTENDED UP THE STRUCTURE.

LEGEND

01 / – — INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS

01 — MATERIAL ITEM NUMBER ON MATERIAL LIST DRAWING MCW-B-Z001

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P013-6.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:39 AM Tab:MCW-D-P013-6

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG

edf renewables

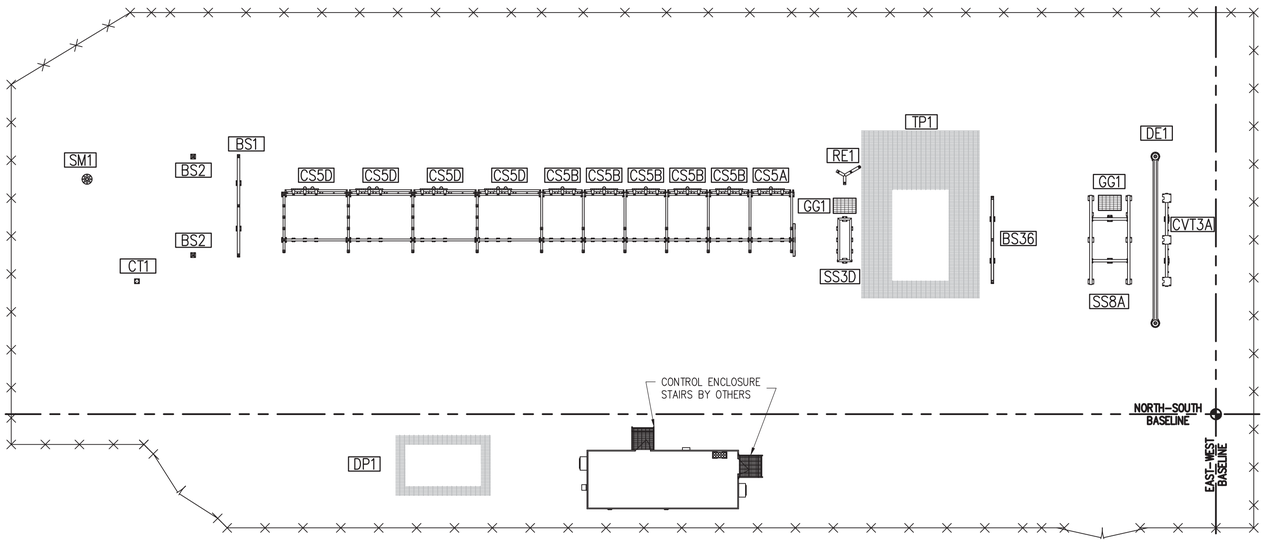
ENGINEERING RECORD		DATE
DRAWN	WILCOX	11/19
DESIGNED	WILCOX	11/19
CHECKED	GROFF	11/19
APPROVED	GROFF	11/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION GROUNDING DETAILS

DWG. NAME: MCW-D-P013-6 | REVISION NO : 1

STEEL STRUCTURE TABLE

STR	COUNT	DESCRIPTION	DRAWING
BS36	1	230 kV 3ø TRANSITIONAL BUS SUPPORT	MCW-D-P016-1
CS5A	1	34.5 kV COLLECTION STRUCTURE – BASE SINGLE FEEDER BAY	MCW-D-P016-2 THRU 6
CS5B	5	34.5 kV COLLECTION STRUCTURE – ADD ON SINGLE FEEDER BAY	MCW-D-P016-7 THRU 11
CS5D	4	34.5 kV COLLECTION STRUCTURE – ADD ON CAP BAY	MCW-D-P016-12 THRU 16
CVT3A	1	230 kV 3ø CVT SUPPORT	MCW-D-P016-17
DE1	1	230 kV DEADEND TOWER	MCW-D-P015-1
GG1	2	SWITCH OPERATOR PLATFORM	MCW-D-P016-19
RE1	1	34.5 kV NEUTRAL GROUND REACTOR STAND	MCW-D-P016-18
SM1	1	STATIC MAST	MCW-D-P015-2
SS3D	1	34.5 kV DISC. SWITCH STAND W/ SSVT	MCW-D-P016-20 & 21
SS8A	1	230 kV LOW SWITCH STAND	MCW-D-P016-22 & 23
TP1	1	TRANSFORMER PLATFORM GRATING	MCW-D-P016-24 THRU 26
DP1	1	DVAR PLATFORM GRATING	MCW-D-P016-27 & 28
BS1	1	34.5 kV 3ø BUS SUPPORT	MCW-D-P016-29
BS2	2	34.5 kV 1ø BUS SUPPORT	MCW-D-P016-30
CT1	1	34.5 kV 1ø CT SUPPORT	MCW-D-P016-31



0 10FT 20FT 40FT

SCALE: 1"=20'-0"

AS BUILT

NOTES

DE1 STEEL STRUCTURE IDENTIFICATOIN

CHAIN LINK FENCE

BASELINE

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P014-1.DWG LAST SAVED BY: tjwilcox 10/8/2020 3:04 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:39 AM Tab:MCW-D-P014-1

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BILLINGS, MONTANA

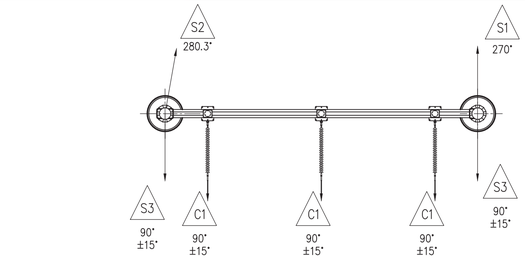
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	CAJ

edf renewables

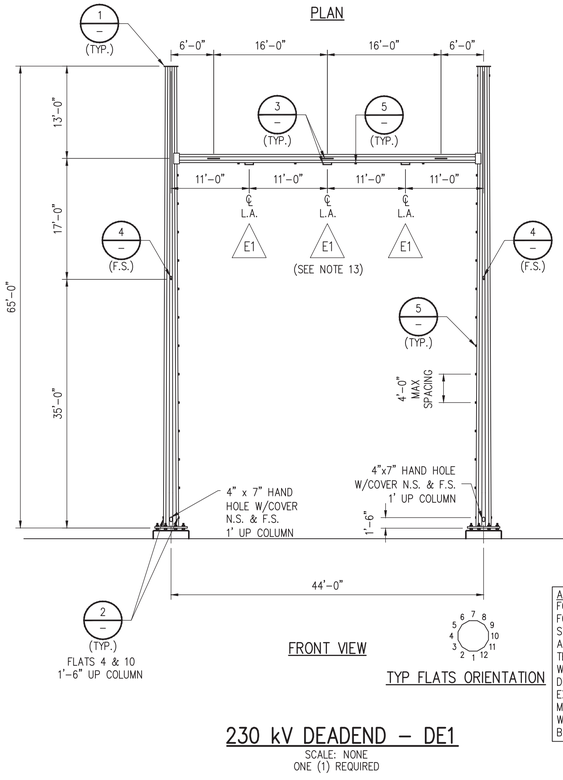
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	08/19
APPROVED	JOBES	12/19
DWG SCALE: 1"=20'-0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
STEEL KEY LOCATION PLAN

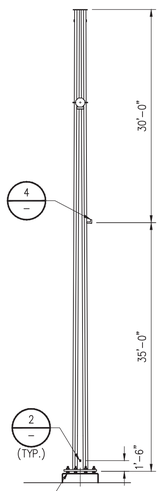
DWG. NAME: MCW-D-P014-1 REVISION NO : 1



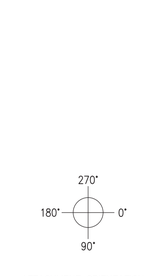
PLAN



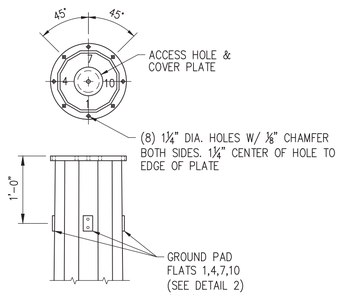
FRONT VIEW



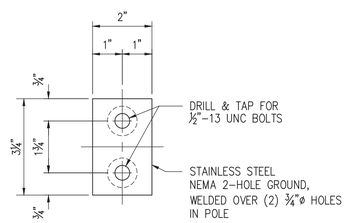
SIDE VIEW



ATTACHMENT ORIENTATION



DETAIL
POLE TOP & SHIELD WIRE ATTACHMENT — 1



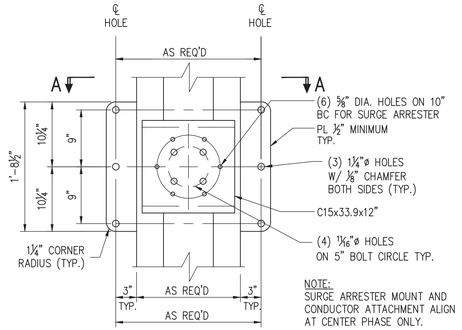
DETAIL
GROUND PAD — 2

ANCHOR BOLT CAGES (2 REQ'D)
FOUNDATIONS WILL CONSIST OF SPREAD FOOTING OR DRILLED PIER FOUNDATIONS, STEEL POLE SUPPLIER SHALL FURNISH ANCHOR BOLTS WITH TOP AND BOTTOM TEMPLATES AS REQUIRED. REINFORCING STEEL WILL BE FURNISHED BY OTHERS. OUTSIDE DIAMETER OF BOTTOM TEMPLATE NOT TO EXCEED A BOLT CIRCLE DIAMETER. PROVIDE A MINIMUM OF 8 ANCHOR BOLTS PER COLUMN WITH 3 NUTS & 2 WASHERS PER ANCHOR BOLT.

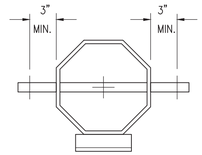
TYP FLATS ORIENTATION

230 kV DEADEND – DE1

SCALE: NONE
ONE (1) REQUIRED

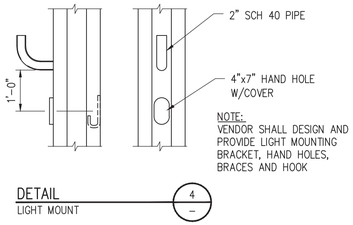


BOTTOM VIEW

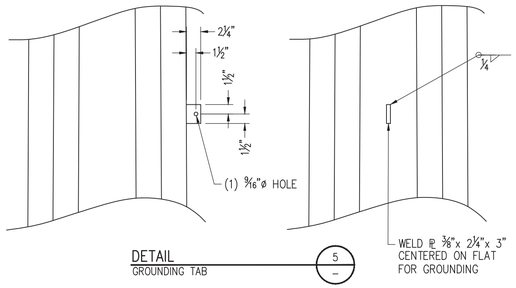


SECTION A–A

DETAIL
PHASE DEADEND ATTACHMENT & SURGE ARRESTOR MOUNTING — 3



DETAIL
LIGHT MOUNT — 4



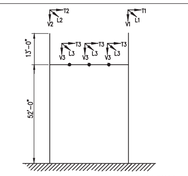
DETAIL
GROUNDING TAB — 5

STRUCTURE LOADING CRITERIA

LOADING TREE

T – Transverse (lbs)+ to right
V – Vertical (lbs)+ downward
L – Longitudinal (lbs)+ out of paper

ARROW INDICATES + DIRECTION



ELEVATION

LOADING CRITERIA:

1. Actual loads at their respective pulloff locations have been transformed into transverse, vertical and longitudinal components at the locations shown on the loading tree. The "***Max. Resultant Loads***" for tension and wind shown below include all applicable overload capacity factors prescribed by NESC section 26, unless noted otherwise.
2. Wind loading included in the "***Max. Resultant Loads***" applies only to wind on conductors. Manufacturer shall include wind on structure of the magnitude listed (lb/ft^2) for the applicable loading condition, with direction to result in maximum member loads.
3. Structures shall be designed to limit leg deflection at top to no more than 1% of total height at maximum loading without overload factors. Conductor beam horizontal deflection shall be limited to 1.0% of length and the vertical deflection shall be limited to 0.5% of length at maximum loading without overload factors.
4. Tabulated values do not include equipment loads. Fabricator shall include equipment loading at the correct locations in their analysis. Based on dimensions described for E1.

MAXIMUM RESULTANT LOADS (Including OCF's)

STRESS LOADING CONDITIONS

LOADING COMPONENTS	NESC HEAVY 1/2 IN. ICE, 4 PSF WIND 0°F. INITIAL	HIGH WIND 0 IN. ICE, 20.7 PSF WIND 60°F. INITIAL	WIND & ICE 1/2 IN. ICE, 9.2 PSF WIND 15°F. INITIAL	LOW TEMP 0 IN. ICE, 0 PSF WIND -20°F. INITIAL	EVERYDAY 0 IN. ICE, 0 PSF WIND 60°F. FINAL	NESC HEAVY DEAD END 1/2 IN. ICE, 4 PSF WIND 0°F. INITIAL	
T1	1,531	749	1,087	784	505	1,384	
L1	695	552	390	1,155	904	4,798	
V1	383	110	281	110	110	167	
T2	-760	-424	-560	-468	-330	-1,372	
L2	794	599	467	1,183	920	4,811	
V2	383	110	281	110	110	167	
T3	2,268	1,268	1,519	986	724	2,268	
L3	8,047	4,144	5,248	3,680	2,699	8,047	
V3	870	457	638	457	457	870	
WIND LOAD ON POLE	10.0 PSF	22.77 PSF	10.12 PSF	0.0 PSF	0.0 PSF	10.0 PSF	

MAXIMUM RESULTANT LOADS (Not Including OCF's)

DEFLECTION LOADING CONDITIONS

LOADING COMPONENTS	NESC HEAVY 1/2 IN. ICE, 4 PSF WIND 0°F. INITIAL	HIGH WIND 0 IN. ICE, 20.7 PSF WIND 60°F. INITIAL	WIND & ICE 1/2 IN. ICE, 9.2 PSF WIND 15°F. INITIAL	LOW TEMP 0 IN. ICE, 0 PSF WIND -20°F. INITIAL	EVERYDAY 0 IN. ICE, 0 PSF WIND 60°F. FINAL	NESC HEAVY DEAD END 1/2 IN. ICE, 4 PSF WIND 0°F. INITIAL	
T1	877	681	988	713	459	818	
L1	414	502	355	1,050	822	2,905	
V1	255	100	255	100	100	111	
T2	-416	-386	-509	-425	-300	-813	
L2	467	544	425	1,076	836	2,910	
V2	255	100	255	100	100	111	
T3	1,347	1,152	1,381	897	658	1,347	
L3	4,861	3,767	4,771	3,346	2,454	4,861	
V3	580	416	580	416	416	580	
WIND LOAD ON POLE	4.0 PSF	20.7 PSF	9.2 PSF	0.0 PSF	0.0 PSF	4.0 PSF	

OCF (FOR PURPOSES OF RESULTANT LOAD VERIFICATION ONLY)

OVERLOAD CAPACITY FACTORS	NESC HEAVY	HIGH WIND	WIND & ICE	LOW TEMP	EVERYDAY	NESC HEAVY DEAD END
WIND	2.50	1.10	1.10	1.10	1.10	2.50
TENSION	1.65	1.10	1.10	1.10	1.10	1.65
VERTICAL	1.50	1.10	1.10	1.10	1.10	1.50

DEFLECTION OCF

OVERLOAD CAPACITY FACTORS	NESC HEAVY	HIGH WIND	WIND & ICE	LOW TEMP	EVERYDAY	NESC HEAVY DEAD END
WIND	1.00	1.00	1.00	1.00	1.00	1.00
TENSION	1.00	1.00	1.00	1.00	1.00	1.00
VERTICAL	1.00	1.00	1.00	1.00	1.00	1.00

CONDUCTOR IDENTIFICATION	SW1	SW2	SW	C1
NAME	Shield Wire	Shield Wire	Shield Wire	Conductor
SIZE/TYPE	3/8" EHS	3/8" EHS	3/8" EHS	1590 ACSR
STRANDING	7 STR	7 STR	7 STR	69/37 Str
DIAMETER (IN)	0.3600	0.3600	0.3600	1.6190
BARE WT. (LBS/FT)	0.2730	0.2730	0.2730	2.5210
SPAN (FT)	265	265	200	200
ORIENTATION (DEG)	270	280.3	75	75
ALCOA SAG10 FILE	SW1	SW2	SW3	C1
NESC Load Case (LBS)	2500	2500	3000	5000

GENERAL NOTES

1. GROUND LINE DIAMETERS WHEN SHOWN ARE APPROXIMATE AND ARE TO BE USED ONLY AS A GUIDELINE FOR DESIGN. THE MANUFACTURER SHALL TAKE ALL REASONABLE STEPS TO MINIMIZE THE POLE WEIGHTS BY ADJUSTING THE SECTION LENGTHS AND THICKNESSES AND POLE TAPER IN ORDER TO PROVIDE AN AESTHETICALLY PLEASING STRUCTURE AS WELL AS ONE THAT WILL SUPPORT THE APPLIED LOADS AS SHOWN ON SHEET 2. FABRICATOR SHALL BE RESPONSIBLE FOR THE STRUCTURAL ADEQUACY AND PROPER FIT-UP OF ALL PARTS OF THE STRUCTURE.
2. ALL STRUCTURAL STEEL SHALL COMPLY WITH THE LATEST REVISIONS OF ASTM SPECIFICATIONS A-36, A-572, A-633 OR A-871. OTHER STEELS MAY BE USED ONLY WITH THE SPECIFIC WRITTEN APPROVAL OF THE OWNER AND THE ENGINEER.
3. LOCAL BUCKLING RESISTANCE FOR POLYGONAL AND CIRCULAR MEMBERS SHALL BE DETERMINED ACCORDING TO ASCE 48-11 "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES".
4. ERECTION BOLTS AND HARDWARE SHALL COMPLY WITH THE LATEST REVISION OF ASTM SPECIFICATIONS A-325 AND A-354 GR BC.
5. HOLES MAY BE PUNCHED IF THE MATERIAL THICKNESS DOES NOT EXCEED THE DIAMETER OF THE HOLE. HOLES SHALL BE DRILLED WHEN THE DIAMETER OF THE HOLE IS LESS THAN THE MATERIAL THICKNESS. HOLES MUST BE SHARP AND CYLINDRICAL WITHOUT EXCESSIVE TEAR-OUTS OR DEPRESSIONS.
6. GROUND ATTACHMENTS SHALL BE PROVIDED ON ALL STEEL STRUCTURES AS AN INTEGRAL PART OF THE POLE TO PROVIDE A CONTINUOUS METALLIC CIRCUIT AND SHALL CONSIST OF UNPAINTED NEMA-2 STYLE GROUNDING PADS FURNISHED WITH REUSABLE THREADED PLUGS.
7. THE POLE AND ALL ATTACHMENTS EXCEPT THE GROUND PAD SHALL HAVE A GALVANIZED FINISH. FINISH SHALL BE APPLIED BY THE HOT-DIP PROCESS IN ACCORDANCE WITH THE LATEST REVISION OF ASTM SPECIFICATIONS A-123 AND A-143.
8. EACH PART OR PIECE OF THE POLE STRUCTURE SHALL BE DISTINCTLY MARKED WITH LETTERS AND NUMBERS TO IDENTIFY THE TYPE OF STRUCTURE AND THE POSITION OF THE PIECE IN THE STRUCTURE. THE MARKING SHALL BE 3/4" HIGH AND CAN BE MADE BY EITHER STAMPING OR THE ADDITION OF WELD METAL. THE TYPE AND SIZE OF EACH POLE SHALL BE MARKED ON ONE FACE FIVE (5) FEET UP FROM THE BASE PLATE FOR ALL DEADEND STRUCTURES TO BE INSTALLED ON FOUNDATIONS. ALL MARKS SHALL BE PLACED PRIOR TO GALVANIZING AND SHALL BE VISIBLE AFTER THE STRUCTURE IS ASSEMBLED.
9. STRUCTURE LEGS SHALL BE 12 SIDE MINIMUM.
10. CONDUCTOR ATTACHMENTS AND DETAILING TO BE PERFORMED BY FABRICATOR.
11. DETAILS SHOWN HERE ON ARE ONLY TYPICAL OF THE SHAPES AND DIMENSIONS DESIRED.
12. FABRICATOR SHALL BE RESPONSIBLE FOR THE STRUCTURE ADEQUACY AND PROPER FIT-UP OF ALL PARTS OF THE STRUCTURE.
13. FABRICATOR TO INCLUDE SURGE ARRESTOR LOADING BASED ON THE FOLLOWING PARAMETERS:

    DL = 200 LBS/ PHASE
    HEIGHT = 70 INCHES
    WIDTH = 10 INCHES

SYMBOL LEGEND

A ← INDICATES ELEVATION VIEW "A–A"

1 / P016-6 ← INDICATES DETAIL 1; INDICATES DRAWING ON WHICH DETAIL APPEARS

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P015-1.DWG LAST SAVED BY: tjwilcox 10/8/2020 3:06 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:39 AM Tab:MCW-D-P015-1

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

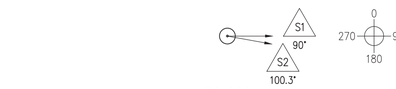
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	CJS	CAJ

edF renewables

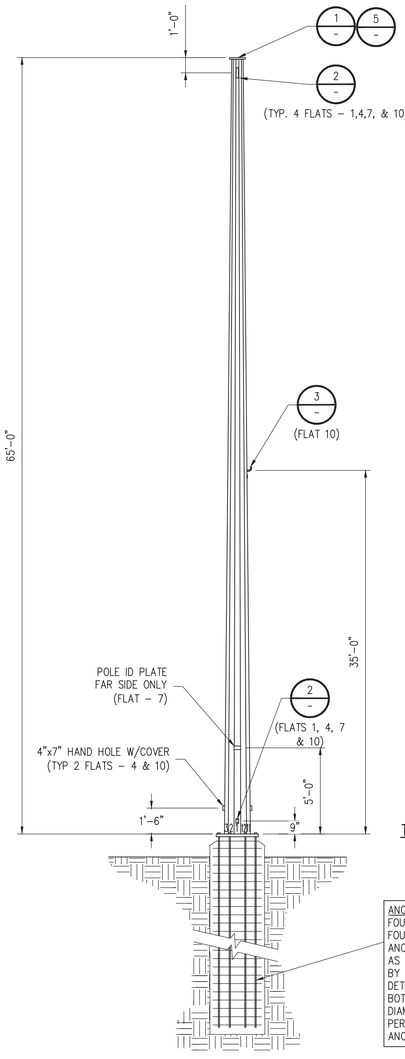
ENGINEERING RECORD		DATE
DRAWN	*WILCOX*	06/19
DESIGNED	*SOWDEN*	06/19
CHECKED	*JOBES*	06/19
APPROVED	*JOBES*	12/19
DWG SCALE: NONE	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
230 kV DEADEND TOWER – DE1

DWG. NAME: MCW-D-P015-1 | REVISION NO : 1

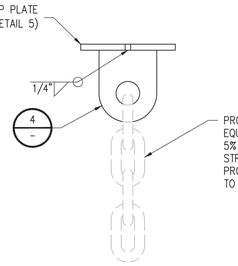


PLAN

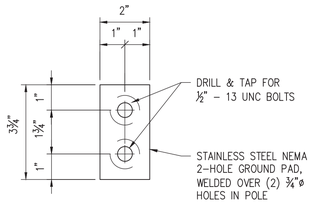


STEEL POLE SHIELD MAST – SM1

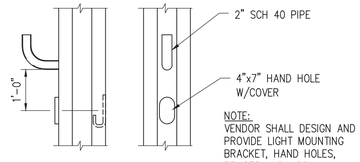
ONE (1) REQUIRED
SCALE: NONE



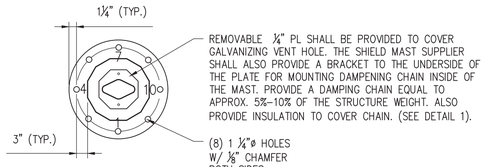
DETAIL
TOP PLATE 1



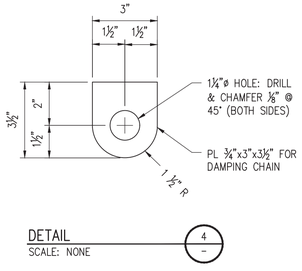
DETAIL
GROUND PLATE (NEMA SPACING) 2



DETAIL
LIGHT MOUNT 3



DETAIL
SCALE: NONE 5



DETAIL
SCALE: NONE 4

TYP FLATS ORIENTATION

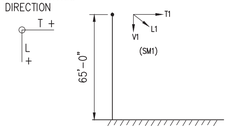
ANCHOR BOLT CAGES (1 REQ'D):
FOUNDATIONS WILL CONSIST OF DRILLED PIER FOUNDATIONS, STEEL POLE SUPPLIER SHALL FURNISH ANCHOR BOLTS WITH TOP AND BOTTOM TEMPLATES AS REQUIRED. REINFORCING STEEL WILL BE FURNISHED BY OTHERS. A.BOLTS PROJECTION SHALL BE DETERMINED BY VENDOR. OUTSIDE DIAMETER OF BOTTOM TEMPLATE NOT TO EXCEED A.BOLT CIRCLE DIAMETER. PROVIDE A MINIMUM OF 8 ANCHOR BOLTS PER COLUMN WITH 3 NUTS & 2 WASHERS PER ANCHOR BOLT.

AS BUILT

STRUCTURE LOADING CRITERIA

LOADING TREE

T – Transverse (LBS)+ to right
V – Vertical (LBS)+ downward
L – Longitudinal (LBS)+ out of paper



ELEVATION

LOADING CRITERIA:

1. Actual loads at their respective pulloff locations have been transformed into transverse, vertical and longitudinal components at the locations shown on the loading tree. "The Resultant Loads" for tension and wind shown below include all applicable overload capacity factors prescribed by NESC Section 26.
2. Wind loading included in the "Resultant Loads" applies only to wind on conductors. Manufacturer shall include wind on structure of the magnitude listed (lb/ft²) for the applicable loading condition, with direction to result in maximum member loads.
3. Structures shall be designed to limit deflection to no more than 2% of height for deflection cases.

MAXIMUM RESULTANT LOADS (Including OCF's)

STRESS LOADING CONDITIONS

LOADING COMPONENTS	NESC HEAVY 1/2 IN. ICE, 4 PSF WIND 0°F. INITIAL	HIGH WIND 0 IN. ICE, 20.7 PSF WIND 60°F. INITIAL	WIND & ICE 1/2 IN. ICE, 9.2 PSF WIND 15°F. INITIAL	LOW TEMP 0 IN. ICE, 0 PSF WIND -20°F. INITIAL	EVERYDAY 0 IN. ICE, 0 PSF WIND 60°F. FINAL	
T1	-598	-221	-353	-317	-175	
L1	8,347	3,479	5,647	3,512	1,941	
V1	432	122	317	122	122	
WIND LOAD ON POLE	10.0 PSF	22.77 PSF	10.12 PSF	0.0 PSF	0.0 PSF	

MAXIMUM RESULTANT LOADS (Not Including OCF's)

DEFLECTION LOADING CONDITIONS

LOADING COMPONENTS	NESC HEAVY 1/2 IN. ICE, 4 PSF WIND 0°F. INITIAL	HIGH WIND 0 IN. ICE, 20.7 PSF WIND 60°F. INITIAL	WIND & ICE 1/2 IN. ICE, 9.2 PSF WIND 15°F. INITIAL	LOW TEMP 0 IN. ICE, 0 PSF WIND -20°F. INITIAL	EVERYDAY 0 IN. ICE, 0 PSF WIND 60°F. FINAL	
T1	-391	-201	-321	-288	-159	
L1	5,025	3,163	5,134	3,193	1,764	
V1	288	111	288	111	111	
WIND LOAD ON POLE	4.0 PSF	20.7 PSF	9.2 PSF	0.0 PSF	0.0 PSF	

OCF (FOR PURPOSES OF RESULTANT LOAD VERIFICATION ONLY)

OVERLOAD CAPACITY FACTORS	NESC HEAVY	HIGH WIND	WIND & ICE	LOW TEMP	EVERYDAY
WIND	2.50	1.10	1.10	1.10	1.10
TENSION	1.65	1.10	1.10	1.10	1.10
VERTICAL	1.50	1.10	1.10	1.10	1.10

DEFLECTION OCF

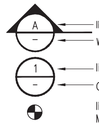
OVERLOAD CAPACITY FACTORS	NESC HEAVY	HIGH WIND	WIND & ICE	LOW TEMP	EVERYDAY
WIND	1.00	1.00	1.00	1.00	1.00
TENSION	1.00	1.00	1.00	1.00	1.00
VERTICAL	1.00	1.00	1.00	1.00	1.00

CONDUCTOR IDENTIFICATION	SW1	SW2
NAME	Shield Wire	Shield Wire
SIZE/TYPE	3/8" EHS	3/8" EHS
STRANDING	7 STR	7 STR
DIAMETER (IN)	0.3600	0.3600
BARE WT. (LBS/FT)	0.2730	0.2730
SPAN (FT)	265	265
ORIENTATION (DEG)	90	100.3
ALCOA SAG10 FILE	SW1	SW2
NESC Load Case (LBS)	2500	2500

GENERAL NOTES

1. GROUND LINE DIAMETERS WHEN SHOWN ARE APPROXIMATE AND ARE TO BE USED ONLY AS A GUIDELINE FOR DESIGN. THE MANUFACTURER SHALL TAKE ALL REASONABLE STEPS TO MINIMIZE THE POLE WEIGHTS BY ADJUSTING THE SECTION LENGTHS AND THICKNESSES AND POLE TAPER IN ORDER TO PROVIDE AN AESTHETICALLY PLEASING STRUCTURE AS WELL AS ONE THAT WILL SUPPORT THE APPLIED LOADS AS SHOWN ABOVE. FABRICATOR SHALL BE RESPONSIBLE FOR THE STRUCTURAL ADEQUACY AND PROPER FIT–UP OF ALL PARTS OF THE STRUCTURE.
2. ALL STRUCTURAL STEEL SHALL COMPLY WITH THE LATEST REVISIONS OF ASTM SPECIFICATIONS A–36, A–572, A–633 OR A–871. OTHER STEELS MAY BE USED ONLY WITH THE SPECIFIC WRITTEN APPROVAL OF THE OWNER AND THE ENGINEER.
3. LOCAL BUCKLING RESISTANCE FOR POLYGONAL AND CIRCULAR MEMBERS SHALL BE DETERMINED ACCORDING TO ASCE 48–11 "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES".
4. ERECTION BOLTS AND HARDWARE SHALL COMPLY WITH THE LATEST REVISION OF ASTM SPECIFICATIONS A–325 AND A–354 GR BC.
5. HOLES MAY BE PUNCHED IF THE MATERIAL THICKNESS DOES NOT EXCEED THE DIAMETER OF THE HOLE. HOLES SHALL BE DRILLED WHEN THE DIAMETER OF THE HOLE IS LESS THAN THE MATERIAL THICKNESS. HOLES MUST BE SHARP AND CYLINDRICAL WITHOUT EXCESSIVE TEAR–OUTS OR DEPRESSIONS.
6. GROUND ATTACHMENTS SHALL BE PROVIDED ON ALL STEEL STRUCTURES AS AN INTEGRAL PART OF THE POLE TO PROVIDE A CONTINUOUS METALLIC CIRCUIT AND SHALL CONSIST OF UNPAINTED NEMA–2 STYLE GROUNDING PADS FURNISHED WITH REUSABLE THREADED PLUGS.
7. THE POLE AND ALL ATTACHMENTS EXCEPT THE GROUND PAD SHALL HAVE A GALVANIZED FINISH. FINISH SHALL BE APPLIED BY THE HOT–DIP PROCESS IN ACCORDANCE WITH THE LATEST REVISION OF ASTM SPECIFICATIONS A–123 AND A–143.
8. EACH PART OR PIECE OF THE POLE STRUCTURE SHALL BE DISTINCTLY MARKED WITH LETTERS AND NUMBERS TO IDENTIFY THE TYPE OF STRUCTURE AND THE POSITION OF THE PIECE IN THE STRUCTURE. THE MARKING SHALL BE 3/4" HIGH AND CAN BE MADE BY EITHER STAMPING OR THE ADDITION OF WELD METAL. THE TYPE AND SIZE OF EACH POLE SHALL BE MARKED ON ONE FACE FIVE (5) FEET UP FROM THE BASE PLATE FOR ALL DEADEND STRUCTURES TO BE INSTALLED ON FOUNDATIONS. ALL MARKS SHALL BE PLACED PRIOR TO GALVANIZING AND SHALL BE VISIBLE AFTER THE STRUCTURE IS ASSEMBLED.
9. STRUCTURE SHALL BE 12 SIDE MINIMUM.
10. CONDUCTOR ATTACHMENTS AND DETAILING TO BE PERFORMED BY FABRICATOR.
11. DETAILS SHOWN HERE ON ARE ONLY TYPICAL OF THE SHAPES AND DIMENSIONS DESIRED.
12. FABRICATOR SHALL BE RESPONSIBLE FOR THE STRUCTURE ADEQUACY AND PROPER FIT–UP OF ALL PARTS OF THE STRUCTURE.

SYMBOL LEGEND



INDICATES SECTION "A" DRAWING ON WHICH SECTION APPEARS

INDICATES DETAIL NUMBER INDICATES DRAWING ON WHICH DETAIL APPEARS

INDICATES APPROXIMATE LOCATION FOR STAMPING MARK NUMBERS ON STEEL MEMBERS.

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P015–2.DWG LAST SAVED BY: tjwilcox 10/8/2020 3:07 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:39 AM Tab:MCW–D–P015–2

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

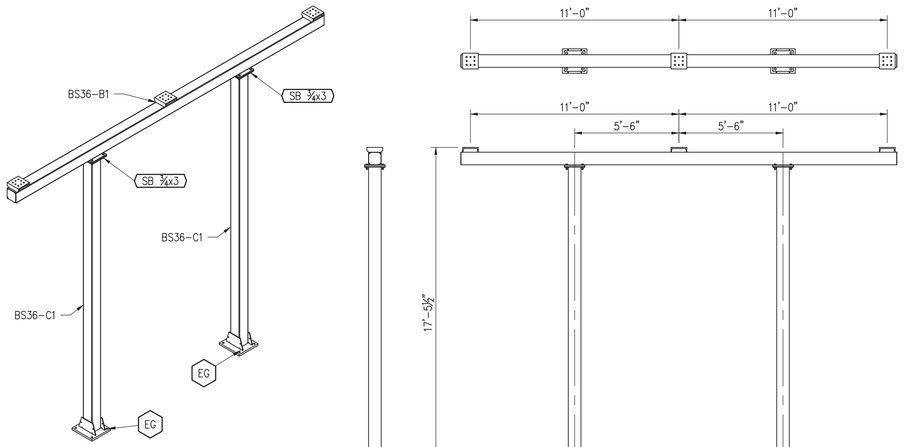
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	CJS	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	SOWDEN	06/19
CHECKED	JOBES	06/19
APPROVED	JOBES	12/19
DWG SCALE: NONE	PLT SCALE: 1:1	

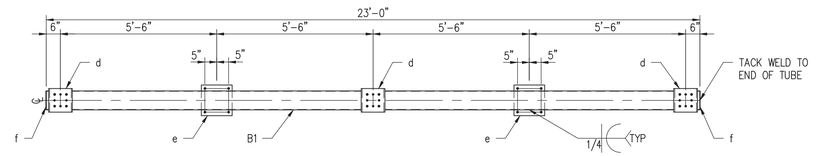
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
STATIC MAST – SM1

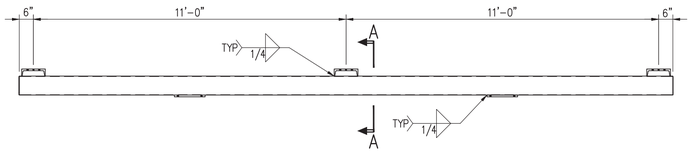
DWG. NAME: MCW–D–P015–2 | REVISION NO : 1



230 kV 3ø TRANSITIONAL BUS SUPPORT – BS36

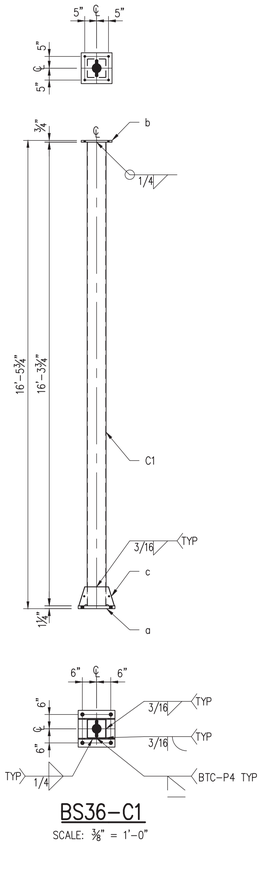
SCALE: ¼" = 1'-0"

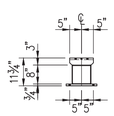




BS36-B1

SCALE: ⅜" = 1'-0"

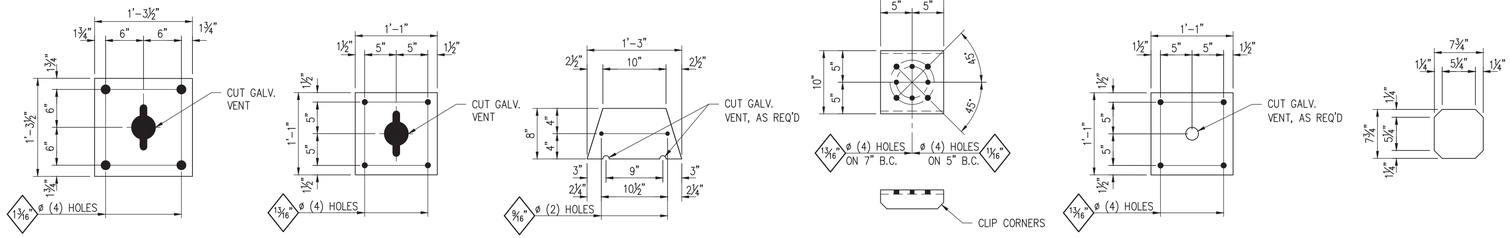




SECTION A-A

BS36-C1

SCALE: ⅜" = 1'-0"



PROJECT SPECIFIC NOTES:
INSULATOR = LAPP, TR304, 900 kV BIL, STANDARD STRENGTH

DESIGN NOTES

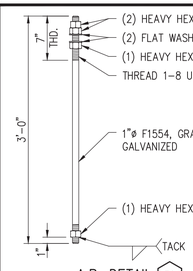
BUS HEIGHT = 24'-6"
INSULATOR = LAPP, TR308, 900 kV BIL, HIGH STRENGTH
WELDMENT = TRAVIS, 19-1240 (4½" BUS CENTER)
BUS = 4 INCH S.P.S. ALUMINUM

LEGEND

A A	INDICATES SECTION VIEW "A-A"
A / SH.1	INDICATES ELEVATION NUMBER / INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / –	INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
13/16 ø (4) HOLES	HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½	INDICATES ITEM ON STRUCTURE BOLT LIST
EG	INDICATES ITEM ON ANCHOR BOLT LIST
BS1-C1	INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	8	(2) HEAVY HEX NUTS; (2) FLAT WASHERS; (1) HEAVY HEX NUT; THREAD 1-8 UNC; 1"ø F1554, GRADE 55, GALVANIZED; (1) HEAVY HEX NUT; TACK



A.B. DETAIL EG

SCALE: 1"=1'-0"

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM 992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13/16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	2	FOR ONE COLUMN BS36-C1			
C1	ONE	HSS8x8x5/16	16	3¾	
a	ONE	PL 1¼x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
	ONE	FOR ONE BEAM BS36-B1			
B1	ONE	HSS8x8x5/16	23	0	
d	3	C10x30	0	10	(WELD)
e	2	PL ¾x13	1	1	(WELD)
f	2	PL ½x7¾	0	7¾	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=1514	GALV WEIGHT=1567

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	9	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
A	ORIGINAL ISSUE	CJS	CAJ	11/07/18

STANDARD DRAWING: (BS36) 230BS-3-17.4583-11.0-A

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-1.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:40 AM Tab:MCW-D-P016-1

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

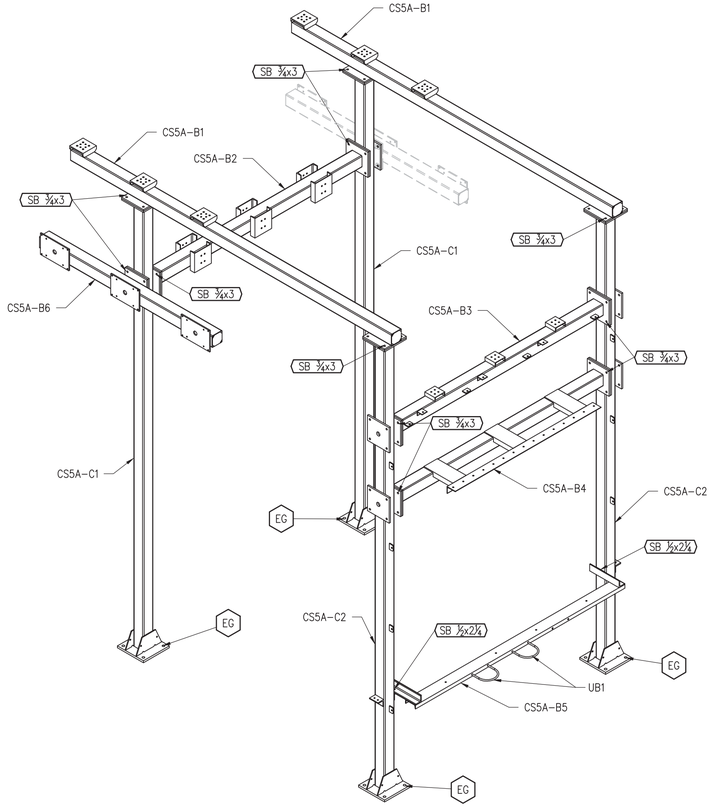
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

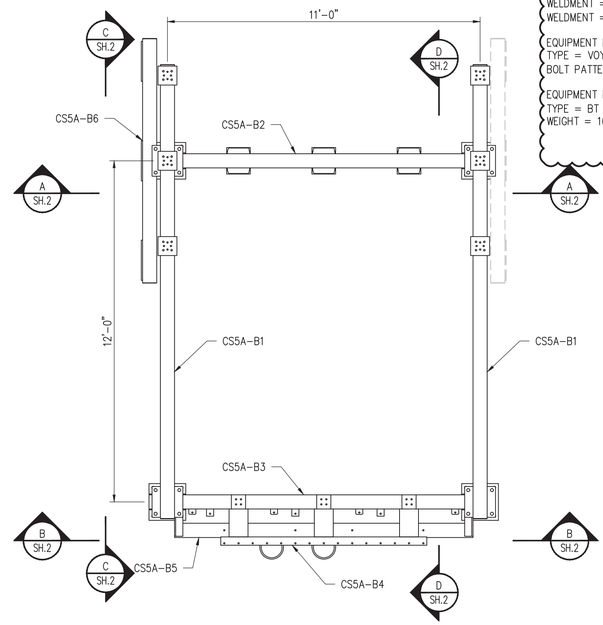
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
230 kV 3ø TRANSITIONAL BUS SUPPORT – BS36

DWG. NAME: MCW-D-P016-1 | REVISION NO : 1





34.5 kV COLLECTION STRUCTURE – CS5A

SCALE: ⅜" = 1'-0"

PROJECT SPECIFIC NOTES:

BUS HEIGHT = 22'-0"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-353 (4½" BUS CENTER)
BUS = 4" S.P.S. ALLUMINUM
BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
WELDMENT = TRAVIS 18-118-E-90-SP (4½" BUS CENTER TO PAD CENTER)

EQUIPMENT MANUFACTURE = ABB
TYPE = VOY-206 VOLTAGE TRANSFORMER, WEIGHT = 120 LBS.
BOLT PATTERN = 10"X8⅝" W/ 7/16"øX11/16" SLOTS

EQUIPMENT MANUFACTURE = ROYAL SWITCH
TYPE = BT LOW-PROFILE SWITCH, 16⅜" ℄ BEAM TO ℄ 4 HOLE PAD
WEIGHT = 169 LBS.

DESIGN NOTES

BUS HEIGHT = 21'-11½"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-351 (4" BUS CENTER)
BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
WELDMENT = TRAVIS 18-118-E-90-SP (4½" BUS CENTER TO PAD CENTER)
BUS = 2" S.P.S. ALUMINUM

EQUIPMENT MANUFACTURE = ABB
TYPE = VOZ-20 VOLTAGE TRANSFORMER, WEIGHT = 125 LBS.
BOLT PATTERN = 12"X12⅞" W/ 7/16"øX11⅛" SLOTS

EQUIPMENT MANUFACTURE = ROYAL SWITCH
TYPE = BT LOW-PROFILE SWITCH, 16⅜" ℄ BEAM TO ℄ 4 HOLE PAD
WEIGHT = 169 LBS.

LEGEND

- A ⟷ A — INDICATES SECTION VIEW "A-A"
- A / SH.1 — INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
- 1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
- 13/16ø (4) HOLES — HOLE DIAMETER AND QUANTITY SYMBOL
- SB ¾x3½ — INDICATES ITEM ON STRUCTURE BOLT LIST
- EG — INDICATES ITEM ON ANCHOR BOLT LIST
- BS1-C1 — INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	16	(2) HEAVY HEX NUTS; (2) FLAT WASHERS; (1) HEAVY HEX NUT; THREAD 1-8 UNC; 7" THD.; 3'-0"; 1"ø F1554, GRADE 55, GALVANIZED; (1) HEAVY HEX NUT; TACK

A.B. DETAIL EG

SCALE: 1"=1'-0"

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	2	FOR ONE COLUMN CS5A-C1			
C1	ONE	HSS6x6x¼	19	2½	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	2	PL ¾x13	1	1	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)
	2	FOR ONE COLUMN CS5A-C2			
C2	ONE	HSS6x6x¼	19	2½	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	4	PL ¾x13	1	1	(WELD)
e	2	L3½x3½x½	0	5	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)
	2	FOR ONE BEAM CS5A-B1			
B1	ONE	HSS6x6x5/16	15	11½	
d	2	PL ¾x13	1	1	(WELD)
h	2	PL ⅛x5¾	0	5¾	(WELD)
i	3	C8x18.75	0	8	(WELD)

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE BEAM CS5A-B2			
B2	ONE	HSS6x6x5/16	10	2⅞	
b	2	PL ¾x13	1	1	(WELD)
j	6	C10x15.3	0	9¾	(WELD)
	ONE	FOR ONE BEAM CS5A-B3			
B3	ONE	HSS6x6x5/16	10	2⅞	
b	2	PL ¾x13	1	1	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)
g	3	C6x8.2	0	6	(WELD)
k	3	L3x2x¼	0	3	(WELD)
	ONE	FOR ONE BEAM CS5A-B4			
B4	ONE	HSS6x6x5/16	10	2⅞	
b	2	PL ¾x13	1	1	(WELD)
n	3	PL ⅜x5	0	5	(WELD)
o	ONE	L3½x3½x¼	7	3	(WELD)
q	3	C8x18.75	1	5¼	(WELD)
	ONE	FOR ONE BEAM CS5A-B5			
B5	ONE	C6x8.2	10	5	
l	ONE	L3½x3½x½	1	5½	(WELD)
m	ONE	L3½x3½x½	1	5½	(WELD)

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE BEAM CS5A-B6			
B6	ONE	HSS6x6x5/16	8	7	
d	ONE	PL ¾x13	1	1	(WELD)
h	2	PL ⅛x5¾	0	5¾	(WELD)
p	3	PL ½x11	1	5	(WELD)
	2	FOR ONE BOLT UB1			
UB1	ONE	⅝"ø AISI A304 STAINLESS STEEL	2	4⅞	(BENT)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=4389	GALV WEIGHT=4543

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13/16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	47	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.
SB ⅞x2¼	5	⅞"ø x 2¼" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS-1-A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-2-6.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:41 AM Tab:MCW-D-P016-2

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

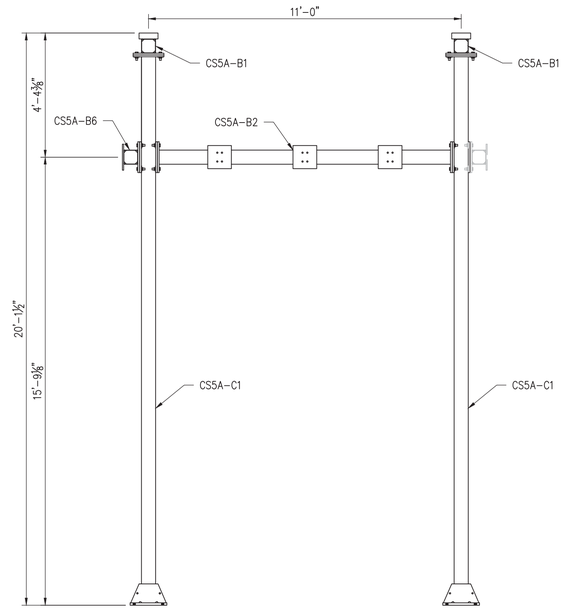
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

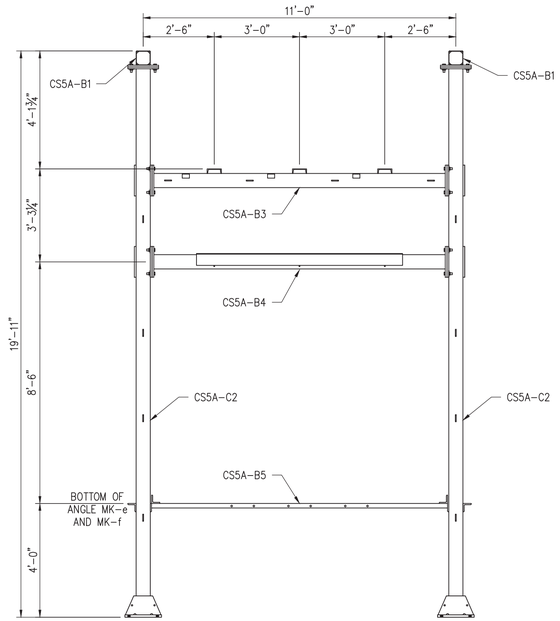
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5A (SH.1)

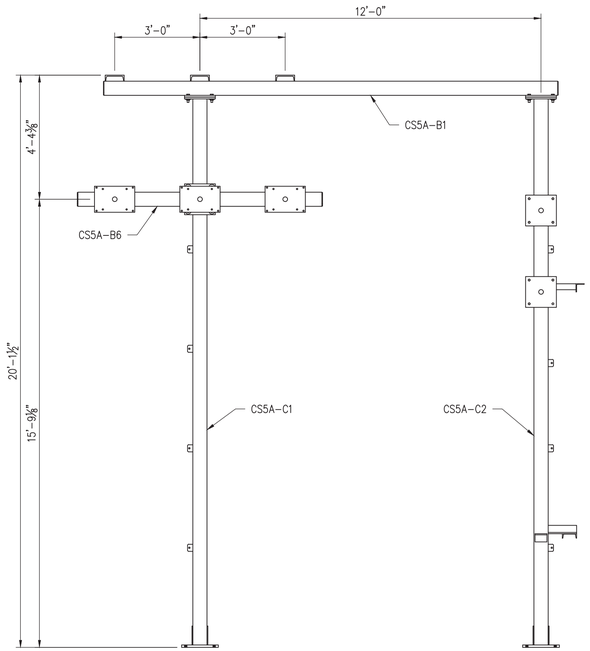
DWG. NAME: MCW-D-P016-2 | REVISION NO : 1



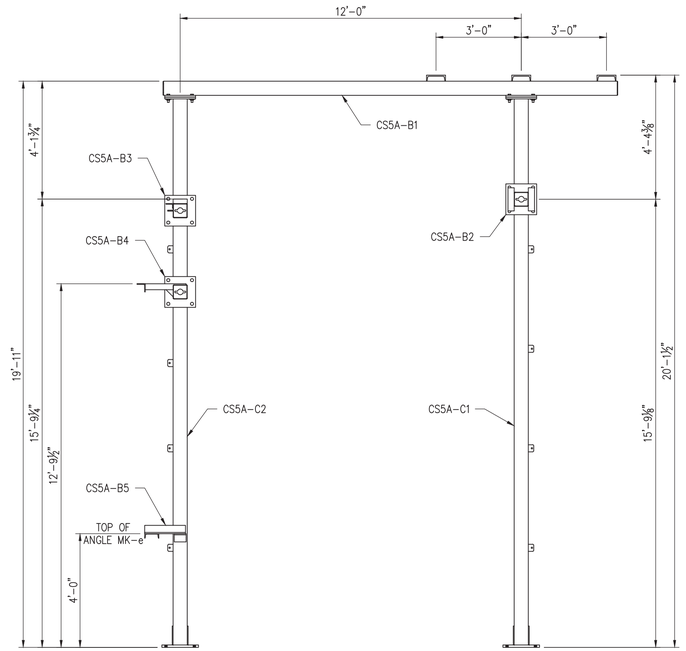
ELEVATION A
SCALE: 3/8" = 1'-0" SH.1



ELEVATION B
SCALE: 3/8" = 1'-0" SH.1



ELEVATION C
SCALE: 3/8" = 1'-0" SH.1



ELEVATION D
SCALE: 3/8" = 1'-0" SH.1

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS-1-A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-2-6.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:43 AM Tab:MCW-D-P016-3

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

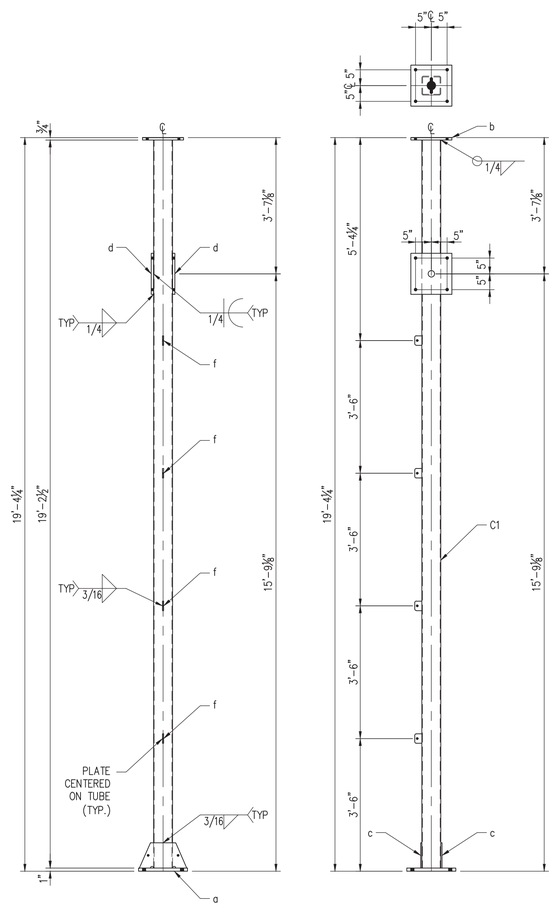
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

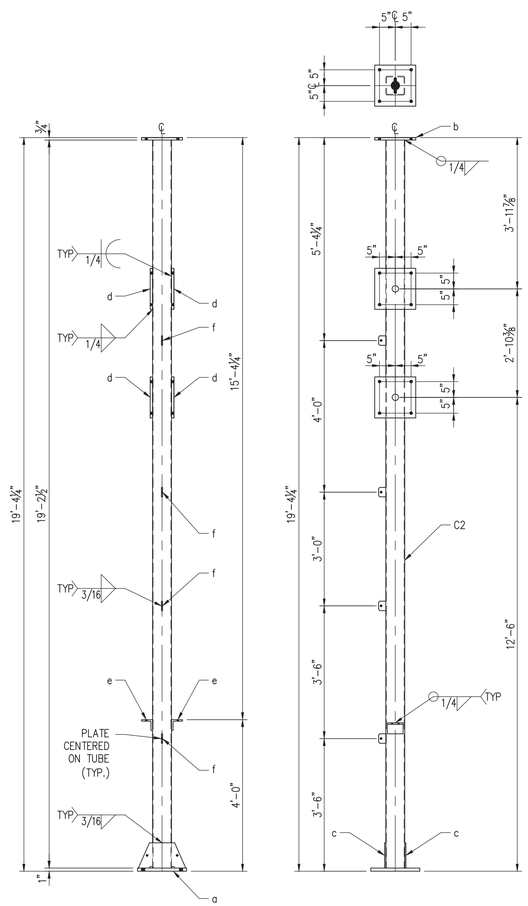
edF renewables

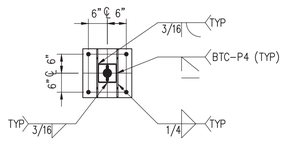
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5A (SH.2)

DWG. NAME: MCW-D-P016-3 | REVISION NO : 1

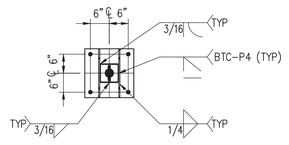






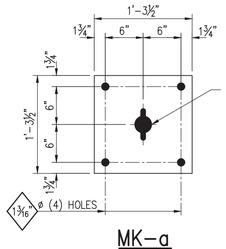
CS5A–C1

SCALE: ½" = 1'-0"



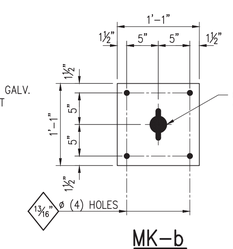
CS5A–C2

SCALE: ½" = 1'-0"



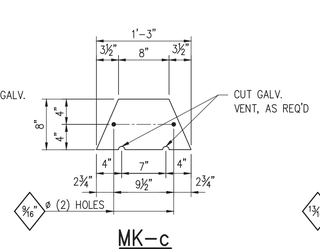
MK–a

SCALE: 1" = 1'-0"



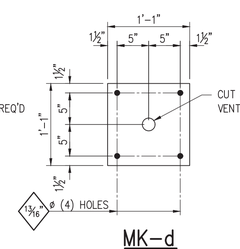
MK–b

SCALE: 1" = 1'-0"



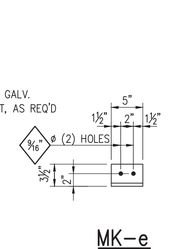
MK–c

SCALE: 1" = 1'-0"



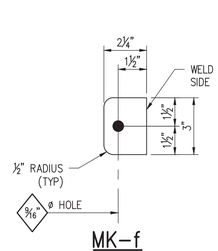
MK–d

SCALE: 1" = 1'-0"



MK–e

SCALE: 1" = 1'-0"



MK–f

SCALE: 3" = 1'-0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS–1–A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–2–6.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:44 AM Tab:MCW–D–P016–4

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

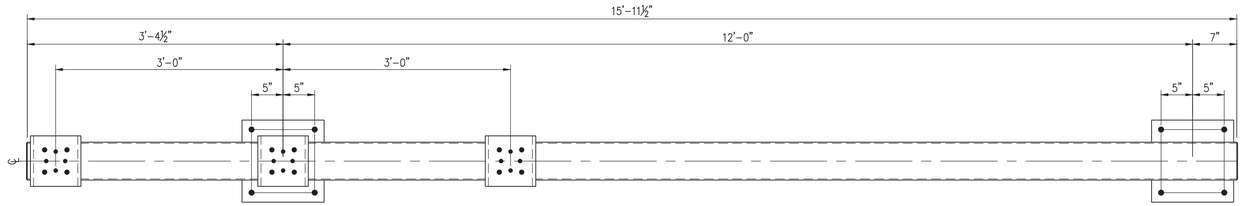
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

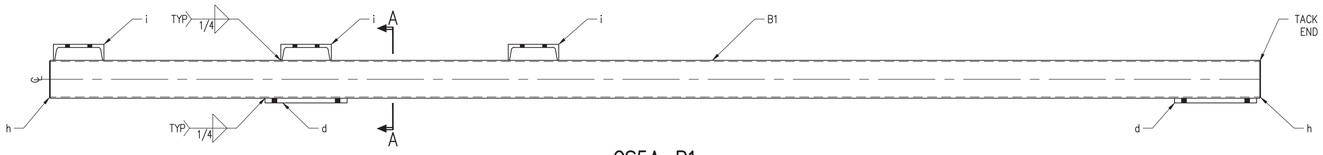
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5A (SH.3)

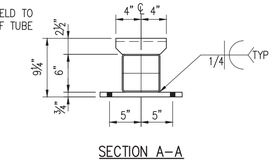
DWG. NAME: MCW–D–P016–4 | REVISION NO : 1



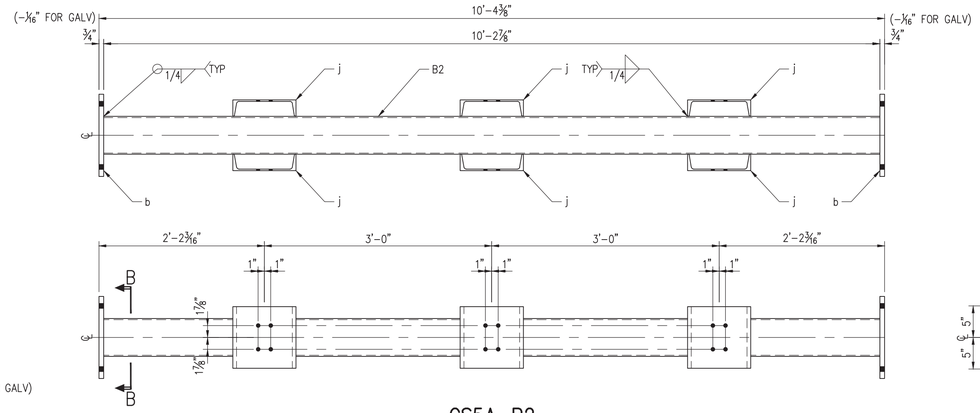


CS5A–B1

SCALE: 1" = 1'–0"

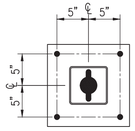


SECTION A–A

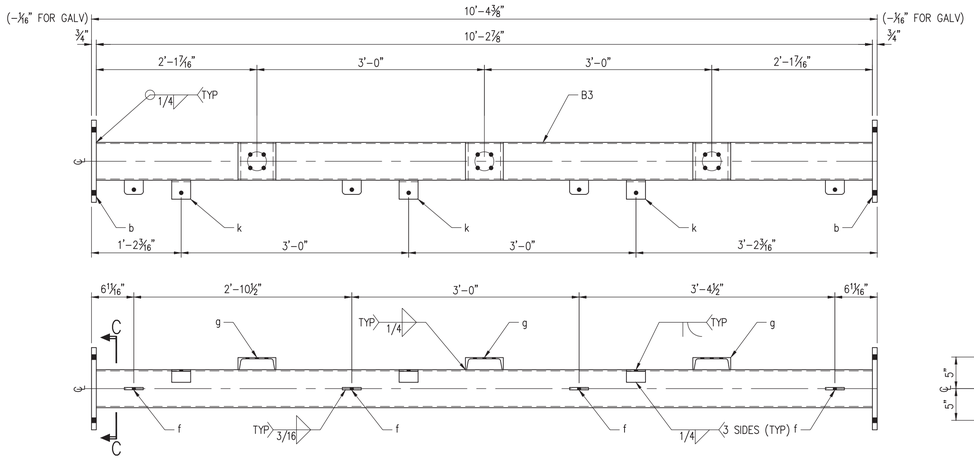


CS5A–B2

SCALE: 1" = 1'–0"

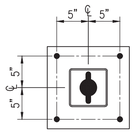


SECTION B–B

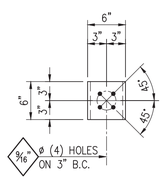


CS5A–B3

SCALE: 1" = 1'–0"

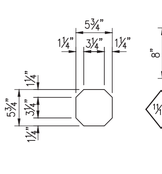


SECTION C–C



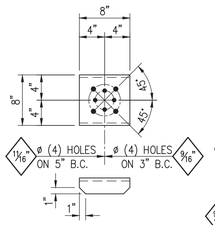
MK–g

SCALE: 1" = 1'–0"



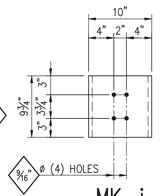
MK–h

SCALE: 1" = 1'–0"



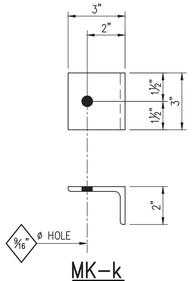
MK–i

SCALE: 1" = 1'–0"



MK–j

SCALE: 1" = 1'–0"



MK–k

SCALE: 3" = 1'–0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS–1–A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–2–6.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:44 AM Tab:MCW–D–P016–5

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

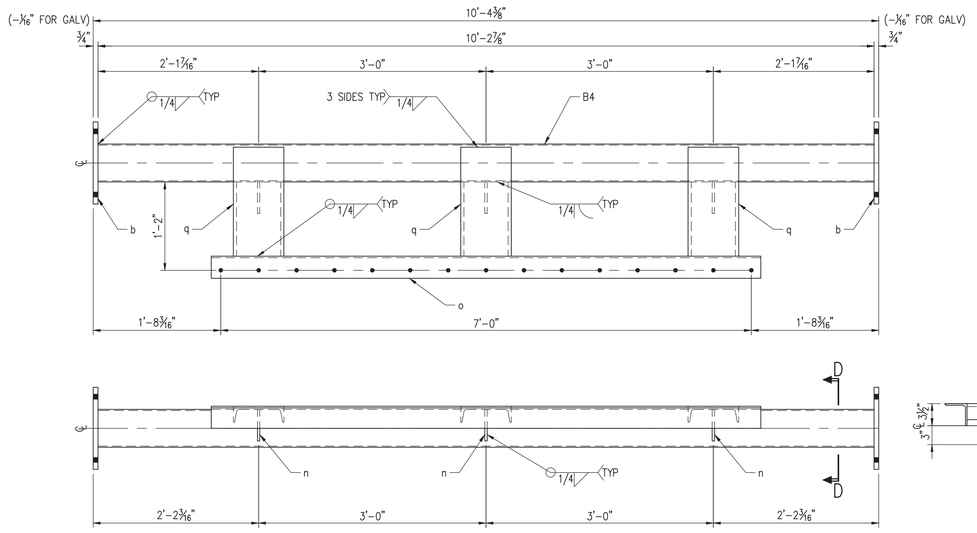
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

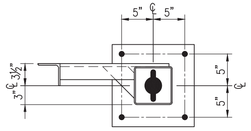
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5A (SH.4)

DWG. NAME: MCW–D–P016–5 | REVISION NO : 1





SECTION D-D

CS5A-B4
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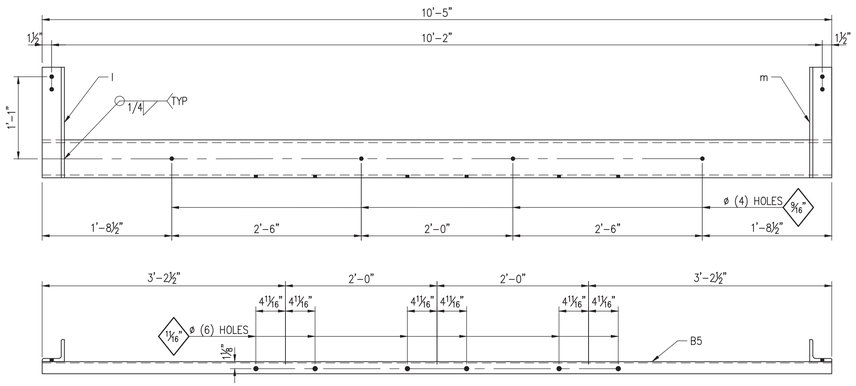
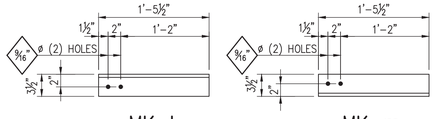
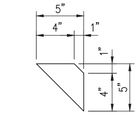


CS5A-B5
SCALE: 1" = 1'-0"

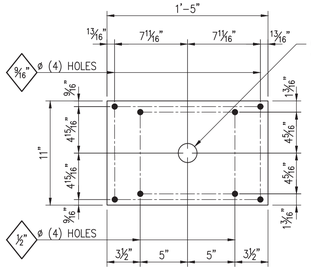


MK-l
SCALE: 1" = 1'-0"

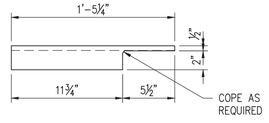
MK-m
SCALE: 1" = 1'-0"



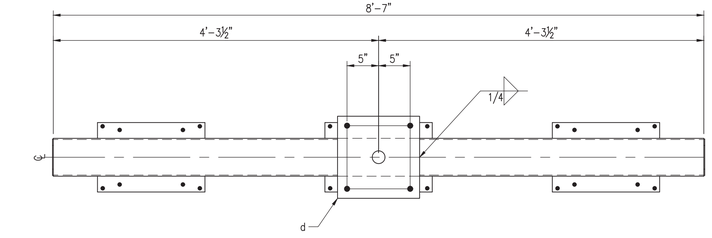
MK-n
SCALE: 1½" = 1'-0"



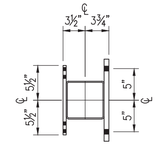
MK-p
SCALE: 1½" = 1'-0"



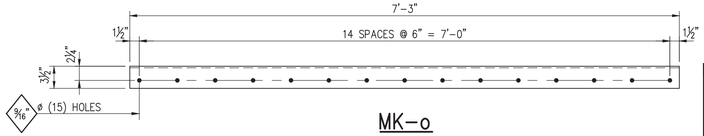
MK-q
SCALE: 1½" = 1'-0"



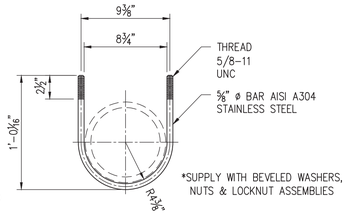
CS5A-B6
SCALE: 1" = 1'-0"



SECTION E-E



MK-o
SCALE: 1" = 1'-0"



UB1
SCALE: 1½"=1'-0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS-1-A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-2-6.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:41 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:44 AM Tab:MCW-D-P016-6

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

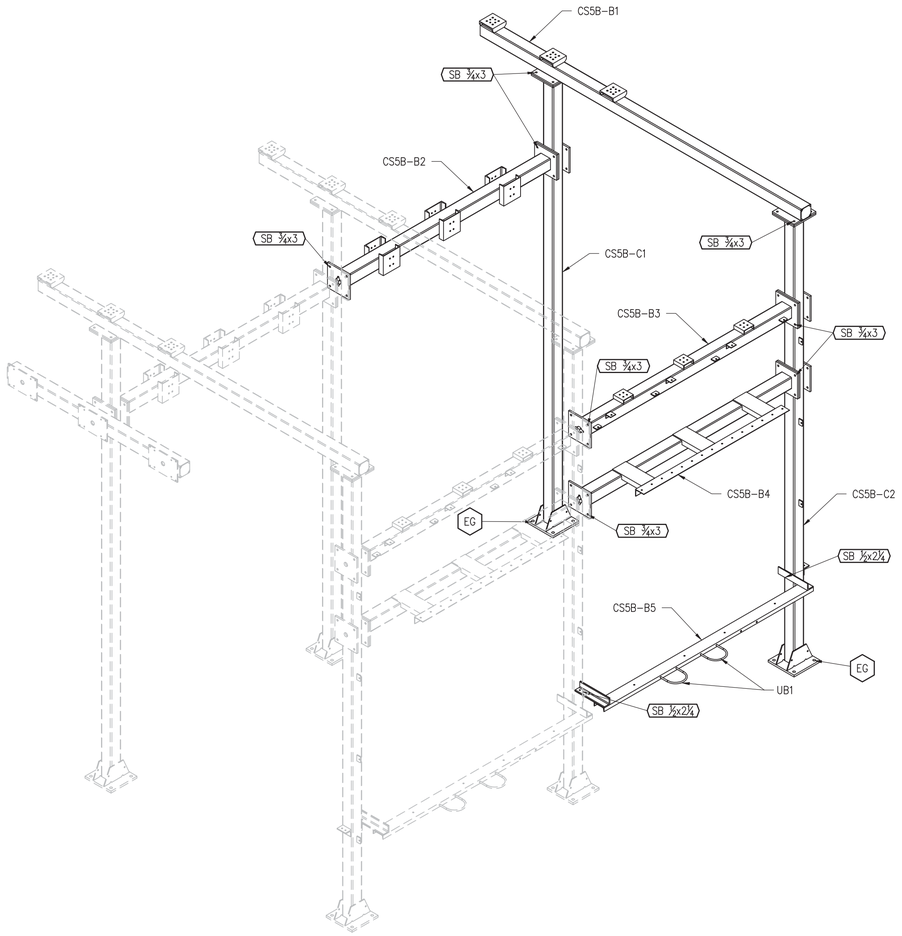
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

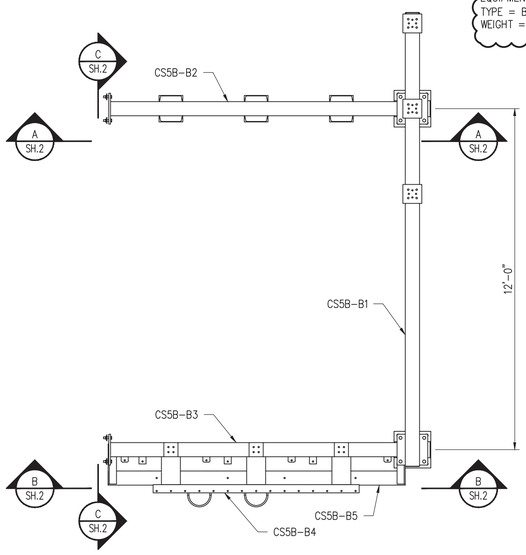
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5A (SH.5)

DWG. NAME: MCW-D-P016-6 | REVISION NO : 1





34.5 kV COLLECTION STRUCTURE – CS5B

SCALE: ⅜" = 1'-0"

PROJECT SPECIFIC NOTES:

BUS HEIGHT = 22'-0"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-353 (4½" BUS CENTER)
BUS = 4" S.P.S. ALLUMINUM
BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
WELDMENT = TRAVIS 18-118-E-90-SP (4½" BUS CENTER TO PAD CENTER)

EQUIPMENT MANUFACTURE = ROYAL SWITCH
TYPE = BT LOW-PROFILE SWITCH, 16⅜" ℄ BEAM TO ℄ 4 HOLE PAD
WEIGHT = 169 LBS.

DESIGN NOTES

BUS HEIGHT = 21'-11½"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-351 (4" BUS CENTER)
BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
WELDMENT = TRAVIS 18-118-E-90-SP (4½" BUS CENTER TO PAD CENTER)
BUS = 2" S.P.S. ALUMINUM

EQUIPMENT MANUFACTURE = ABB
TYPE = VOZ-20 VOLTAGE TRANSFORMER, WEIGHT = 125 LBS.
BOLT PATTERN = 12"X12⅞" W/ 7⁄16"øX1⅛" SLOTS

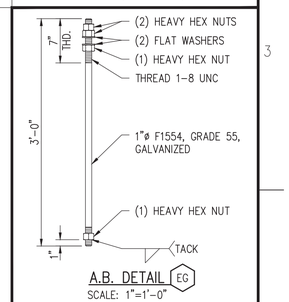
EQUIPMENT MANUFACTURE = ROYAL SWITCH
TYPE = BT LOW-PROFILE SWITCH, 16⅜" ℄ BEAM TO ℄ 4 HOLE PAD
WEIGHT = 169 LBS.

LEGEND

A ⇆ A — INDICATES SECTION VIEW "A-A"
A / SH.1 — INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
13⁄16ø (4) HOLES — HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½ — INDICATES ITEM ON STRUCTURE BOLT LIST
EG — INDICATES ITEM ON ANCHOR BOLT LIST
BS1-C1 — INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	8	



A.B. DETAIL EG
SCALE: 1"=1'-0"

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13⁄16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	34	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.
SB ½x2¼	5	½"ø x 2¼" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS-1-B.DWG

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE COLUMN CS5B-C1			
C1	ONE	HSS6x6x¼	19	2½	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	2	PL ¾x13	1	1	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)
	ONE	FOR ONE COLUMN CS5B-C2			
C2	ONE	HSS6x6x¼	19	2½	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	4	PL ¾x13	1	1	(WELD)
e	2	L3½x3½x½	0	5	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE BEAM CS5B-B1			
B1	ONE	HSS6x6x⅜	15	11½	
d	2	PL ¾x13	1	1	(WELD)
h	2	PL ⅛x5¾	0	5¾	(WELD)
i	3	C8x18.75	0	8	(WELD)
	ONE	FOR ONE BEAM CS5B-B2			
B2	ONE	HSS6x6x⅜	10	2⅞	
b	2	PL ¾x13	1	1	(WELD)
j	6	C10x15.3	0	9¾	(WELD)
	ONE	FOR ONE BEAM CS5B-B3			
B3	ONE	HSS6x6x⅜	10	2⅞	
b	2	PL ¾x13	1	1	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)
k	3	C6x8.2	0	6	(WELD)
l	3	L3x2x¼	0	3	(WELD)

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE BEAM CS5B-B4			
B4	ONE	HSS6x6x⅜	10	2⅞	
b	2	PL ¾x13	1	1	(WELD)
n	3	PL ⅜x5	0	5	(WELD)
o	ONE	L3½x3½x¼	7	3	(WELD)
q	3	C8x18.75	1	5¾	(WELD)
	ONE	FOR ONE BEAM CS5B-B5			
B5	ONE	C6x8.2	10	5	
p	ONE	L3½x3½x½	1	5½	(WELD)
m	ONE	L3½x3½x½	1	5½	(WELD)
	2	FOR ONE BOLT UB1			
UB1	ONE	⅝"ø AISI A304 STAINLESS STEEL	2	4⅞	(BENT)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=2585	GALV WEIGHT=2675

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-7-11.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:43 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:44 AM Tab:MCW-D-P016-7

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

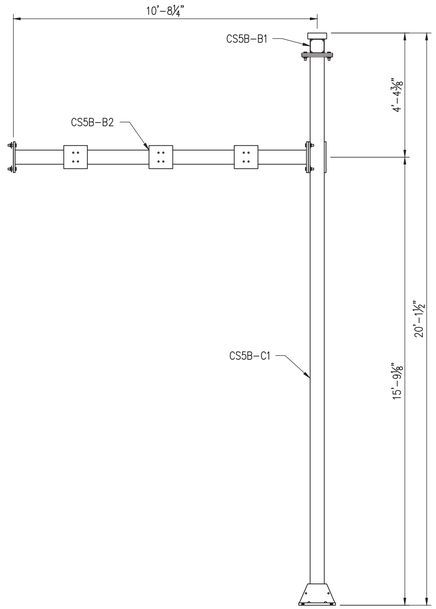
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edF renewables

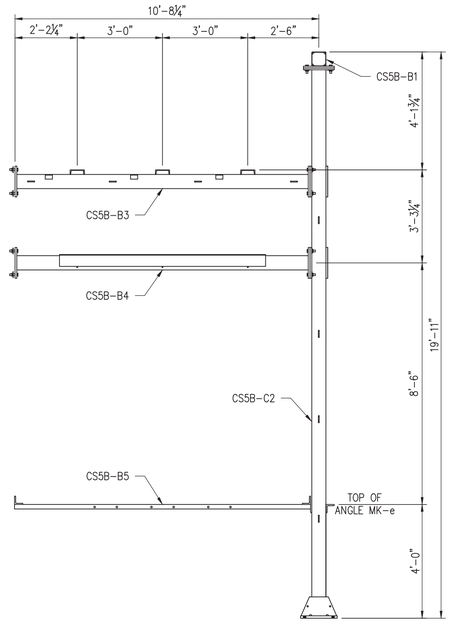
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5B (SH.1)

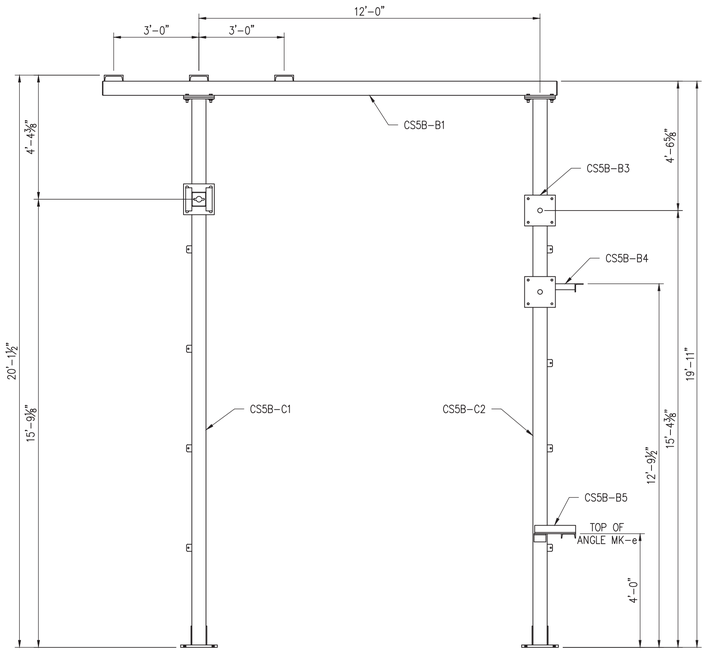
DWG. NAME: MCW-D-P016-7 | REVISION NO : 1



ELEVATION
SCALE: 3/8" = 1'-0"
A
SH.1



ELEVATION
SCALE: 3/8" = 1'-0"
B
SH.1



ELEVATION
SCALE: 3/8" = 1'-0"
C
SH.1

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
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1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS-1-B.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-7-11.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:43 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:44 AM Tab:MCW-D-P016-8

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

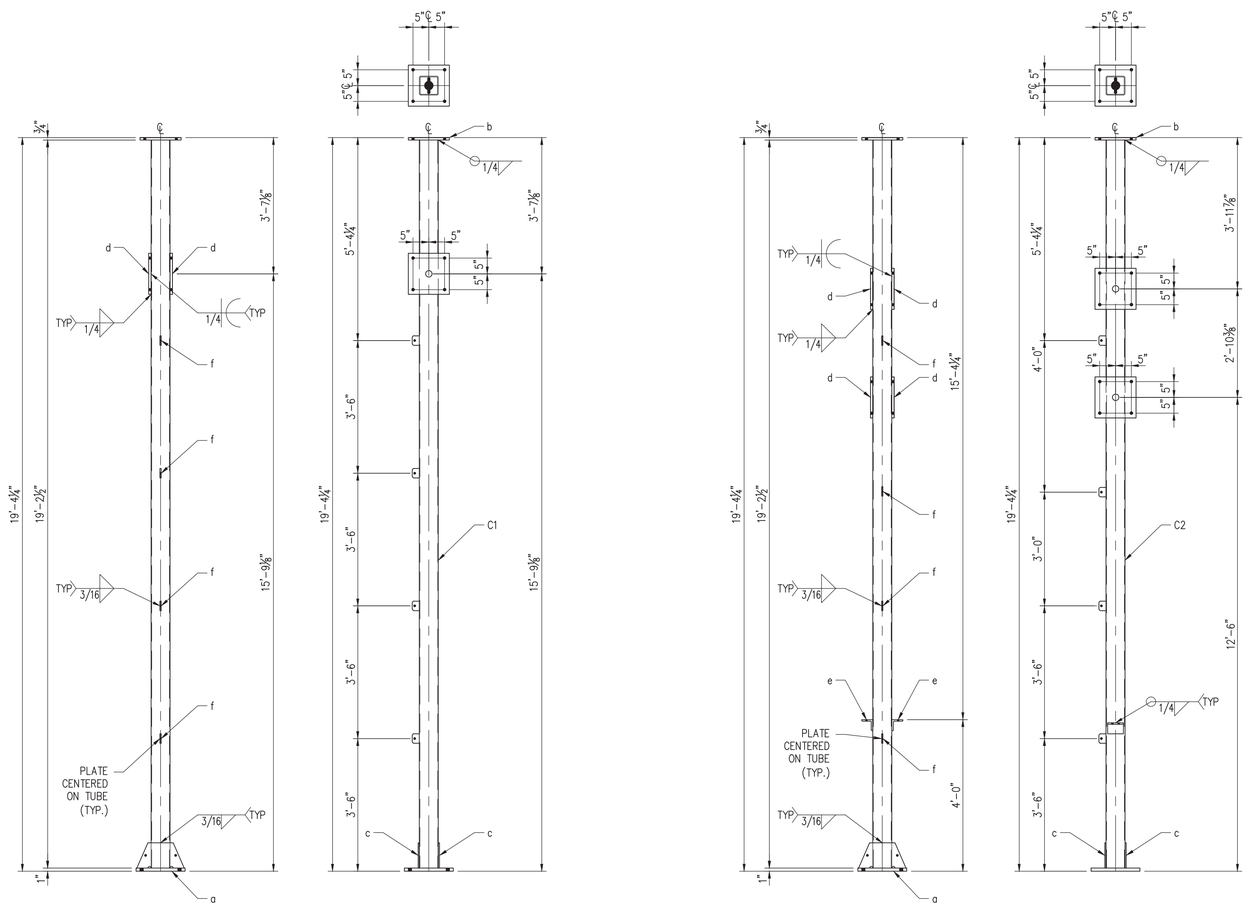
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

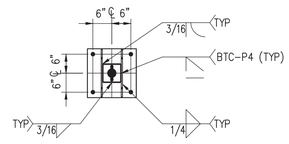
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5B (SH.2)

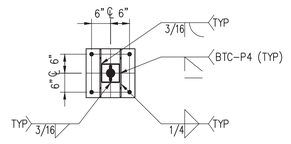
DWG. NAME: MCW-D-P016-8
REVISION NO : 1





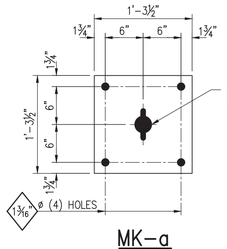
CS5B–C1

SCALE: ½" = 1'–0"



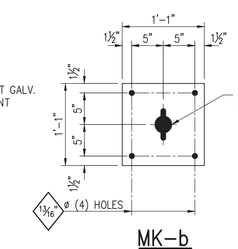
CS5B–C2

SCALE: ½" = 1'–0"



MK–a

SCALE: 1" = 1'–0"



MK–b

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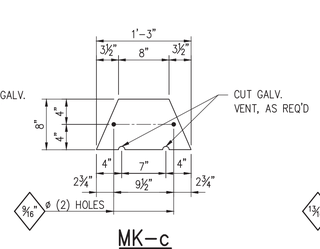
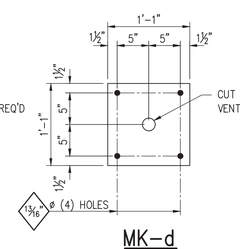


MK–c

SCALE: 1" = 1'–0"



MK–d

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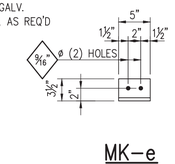

MK–e

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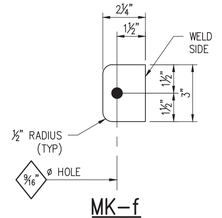

MK–f

SCALE: 3" = 1'–0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS–1–B.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–7–11.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:43 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:45 AM Tab:MCW–D–P016–9

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

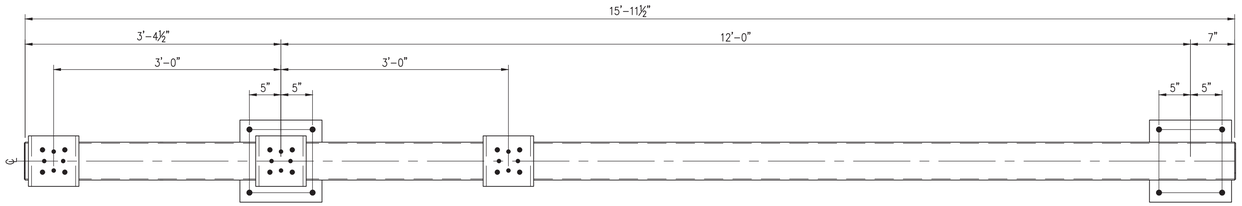
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

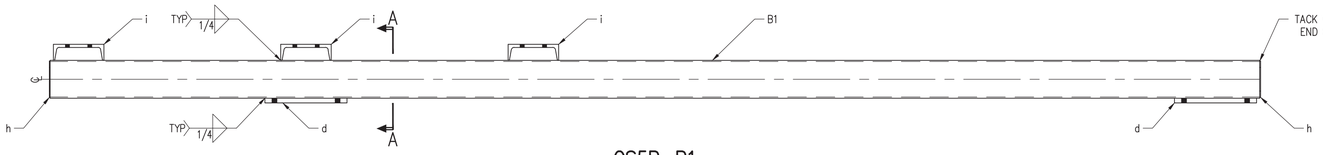
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5B (SH.3)

DWG. NAME: MCW–D–P016–9 | REVISION NO : 1





CS5B–B1
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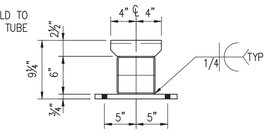
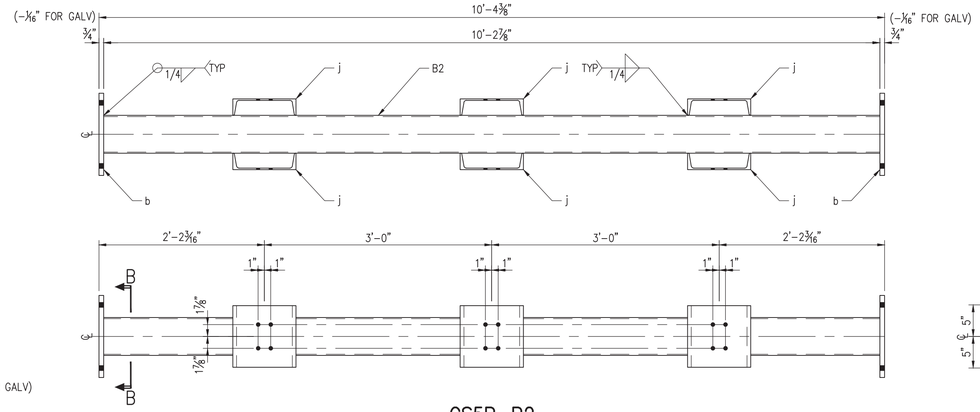
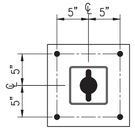


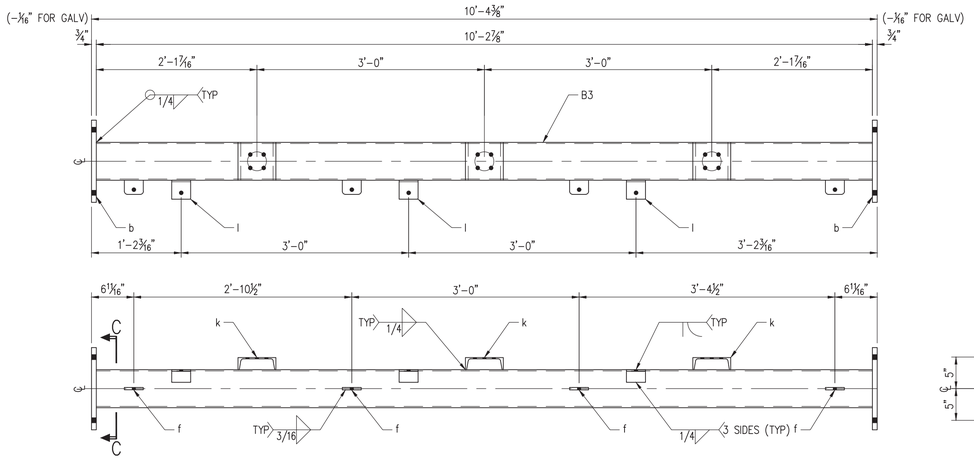
SECTION A–A



CS5B–B2
SCALE: 1" = 1'-0"



SECTION B–B



CS5B–B3
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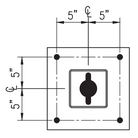
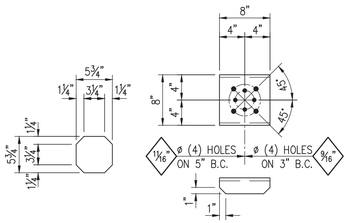
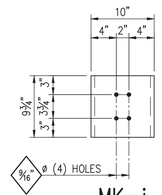


SECTION C–C



MK–h
SCALE: 1" = 1'-0"

MK–i
SCALE: 1" = 1'-0"



MK–j
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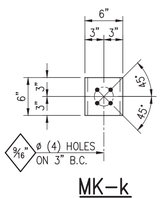

MK–k
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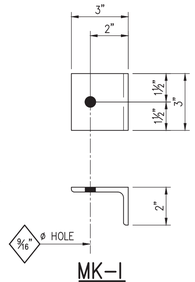


MK–l
SCALE: 3" = 1'-0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS–1–B.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–7–11.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:43 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:40 AM Tab:MCW–D–P016–10

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

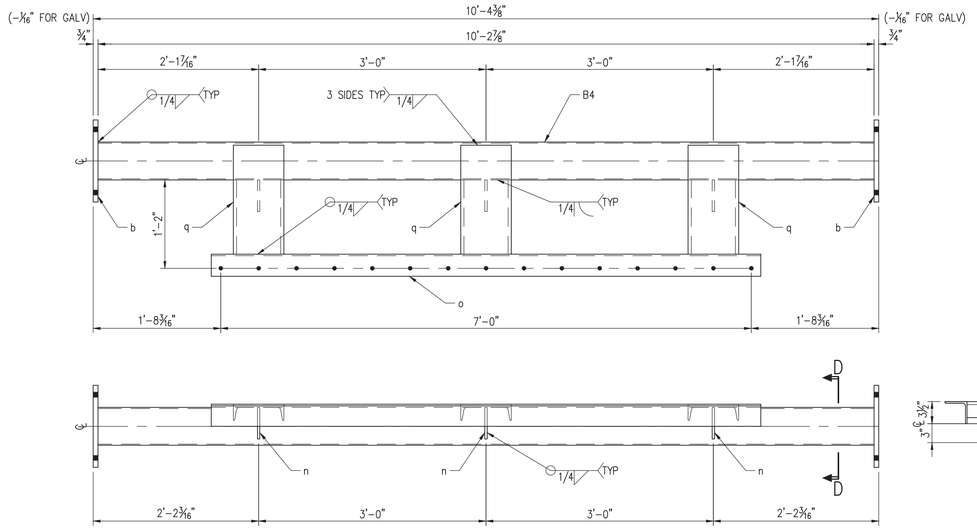
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edF renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

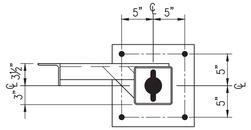
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5B (SH.4)

DWG. NAME: MCW–D–P016–10 | REVISION NO : 1

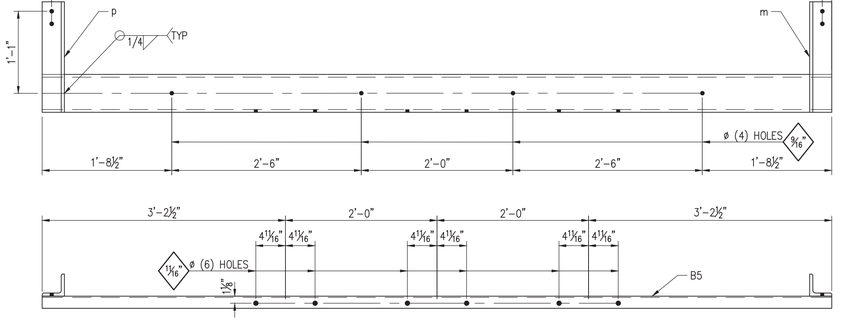


CS5B–B4

SCALE: 1" = 1'-0"

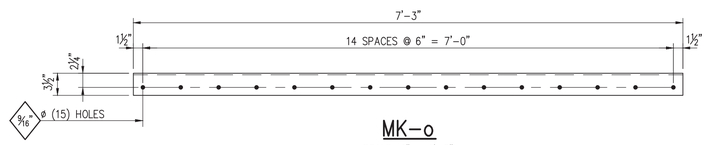


SECTION D–D



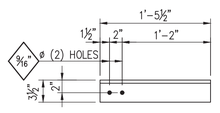
CS5B–B5

SCALE: 1" = 1'-0"



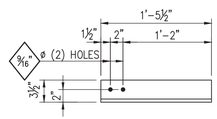
MK–o

SCALE: 1" = 1'-0"



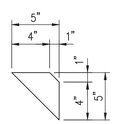
MK–p

SCALE: 1" = 1'-0"



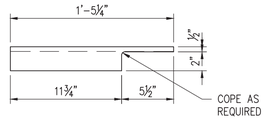
MK–m

SCALE: 1" = 1'-0"



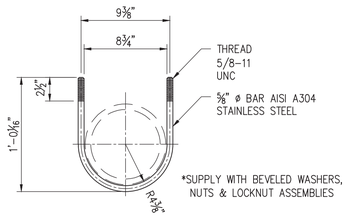
MK–n

SCALE: 1½" = 1'-0"



MK–q

SCALE: 1½" = 1'-0"



UB1

SCALE: 1½"=1'-0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	01/03/19
1	REVISED C2 AND B5	CAJ	DMB	05/14/19

STANDARD DRAWING: 35CS-1-B.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-7-11.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:43 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:40 AM Tab:MCW-D-P016-11

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

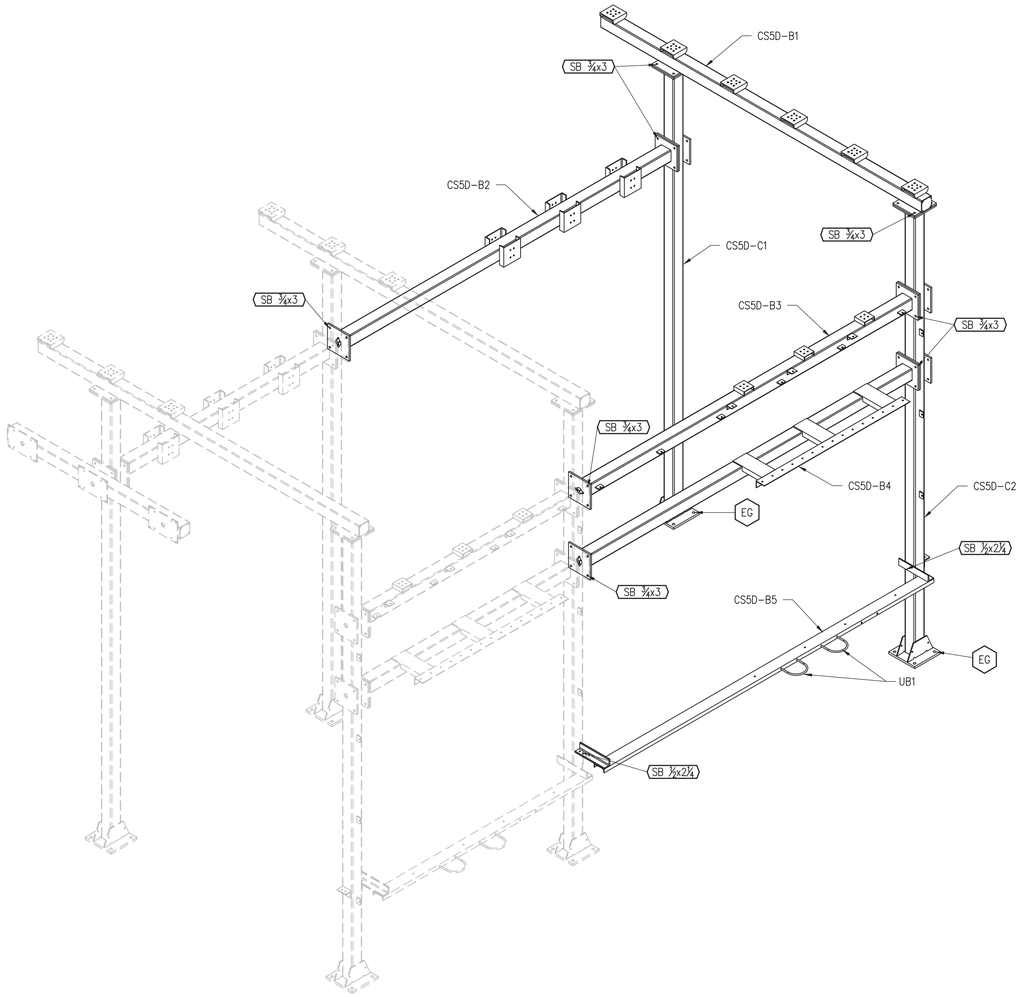
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

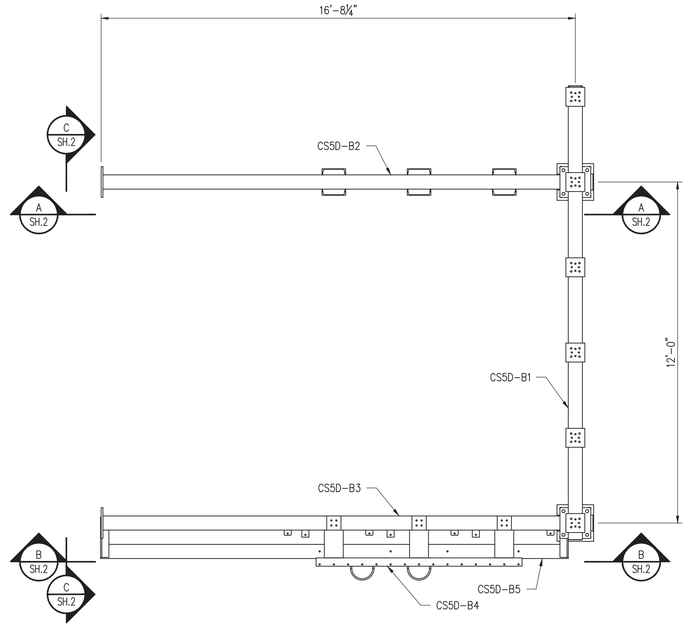
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5B (SH.5)

DWG. NAME: MCW-D-P016-11 | REVISION NO : 1





34.5 kV COLLECTION STRUCTURE – CS5D

SCALE: ⅜" = 1'-0"

DESIGN NOTES

BUS HEIGHT = 21'-11½"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-351 (4" BUS CENTER)
BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
WELDMENT = TRAVIS 18-118-E-90-SP (4½" BUS CENTER TO PAD CENTER)
BUS = 2" S.P.S. ALUMINUM

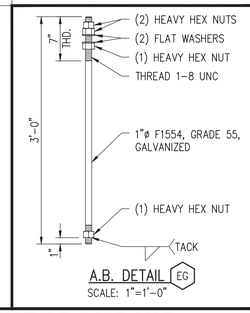
EQUIPMENT MANUFACTURE = ABB
TYPE = VOZ-20 VOLTAGE TRANSFORMER, WEIGHT = 125 LBS.
BOLT PATTERN = 12"X12⅞" W/ 7/16"øx1 1/16" SLOTS

EQUIPMENT MANUFACTURE = ROYAL SWITCH
TYPE = BT LOW-PROFILE SWITCH, 16⅜" ℄ BEAM TO ℄ 4 HOLE PAD
WEIGHT = 169 LBS.

LEGEND

A ⌐ ¬ A	INDICATES SECTION VIEW "A-A"
A / SH.1	INDICATES ELEVATION NUMBER / INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / –	INDICATES DETAIL NUMBER / INDICATES DRAWING ON WHICH DETAIL APPEARS
13/16 ø (4) HOLES	HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½	INDICATES ITEM ON STRUCTURE BOLT LIST
EG	INDICATES ITEM ON ANCHOR BOLT LIST
BS1-C1	INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	8	

A.B. DETAIL EG
SCALE: 1"=1'-0"

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13/16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	34	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.
SB ½x2¼	5	½"ø x 2¼" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	XX/XX/XX

STANDARD DRAWING: 35CS-1-F.DWG

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE COLUMN CS5D-C1			
C1	ONE	HSS6x6x¼	19	2½	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	2	PL ¾x13	1	1	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)
	ONE	FOR ONE COLUMN CS5D-C2			
C2	ONE	HSS6x6x¼	19	2½	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	4	PL ¾x13	1	1	(WELD)
e	2	L3½x3½x½	0	5	(WELD)
f	4	PL ⅜x2¼	0	3	(WELD)

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE BEAM CS5D-B1			
B1	ONE	HSS6x6x5/16	15	11½	
d	2	PL ¾x13	1	1	(WELD)
h	2	PL 1/16x5¾	0	5¾	(WELD)
i	6	C8x18.75	0	8	(WELD)
	ONE	FOR ONE BEAM CS5D-B2			
B2	ONE	HSS6x6x5/16	16	2⅞	
b	2	PL ¾x13	1	1	(WELD)
j	6	C10x15.3	0	9¾	(WELD)
	ONE	FOR ONE BEAM CS5D-B3			
B3	ONE	HSS6x6x5/16	16	2⅞	
b	2	PL ¾x13	1	1	(WELD)
f	6	PL ⅜x2¼	0	3	(WELD)
k	3	C6x8.2	0	6	(WELD)
l	3	L3x2x¼	0	3	(WELD)

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE BEAM CS5D-B4			
B4	ONE	HSS6x6x5/16	16	2⅞	
b	2	PL ¾x13	1	1	(WELD)
n	3	PL ⅜x5	0	5	(WELD)
o	ONE	L3½x3½x¼	7	3	(WELD)
q	3	C8x18.75	1	5¼	(WELD)
	ONE	FOR ONE BEAM CS5D-B5			
B5	ONE	C6x8.2	16	5	
p	ONE	L3½x3½x½	1	5½	(WELD)
m	ONE	L3½x3½x½	1	5½	(WELD)
	2	FOR ONE BOLT UB1			
UB1	ONE	⅝"ø AISI A304 STAINLESS STEEL	2	4⅞	(BENT)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=2885	GALV WEIGHT=2986

PROJECT SPECIFIC NOTES:
BUS HEIGHT = 22'-0"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-353 (4½" BUS CENTER)
BUS = 4" S.P.S. ALLUMINUM
BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
WELDMENT = TRAVIS 18-118-E-90-SP (4½" BUS CENTER TO PAD CENTER)

EQUIPMENT MANUFACTURE = ROYAL SWITCH
TYPE = BT LOW-PROFILE SWITCH, 16⅜" ℄ BEAM TO ℄ 4 HOLE PAD
WEIGHT = 169 LBS.

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-12-16.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:46 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:40 AM Tab:MCW-D-P016-12

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

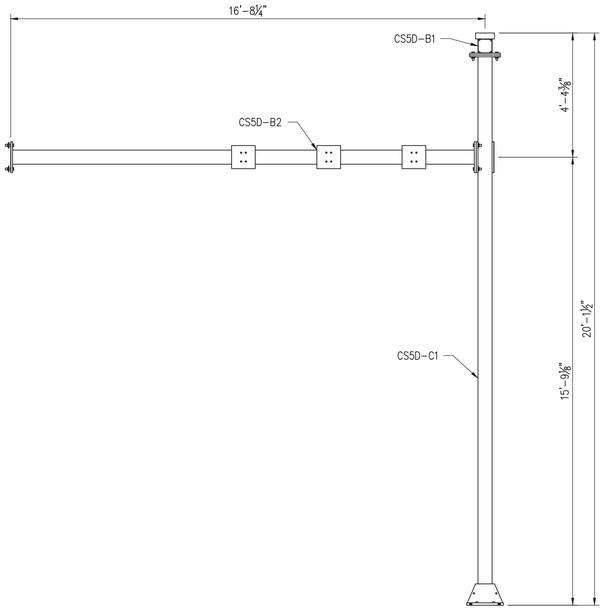
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

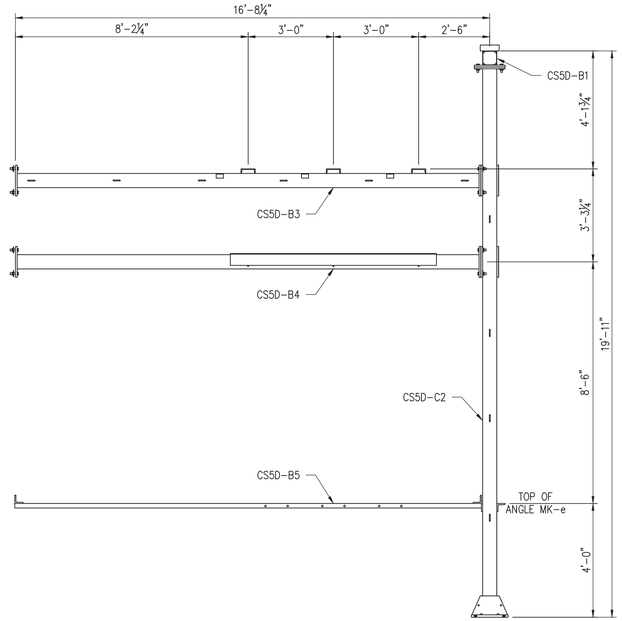
ENGINEERING RECORD		DATE
DRAWN	WILCOX	08/13
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5D (SH.1)

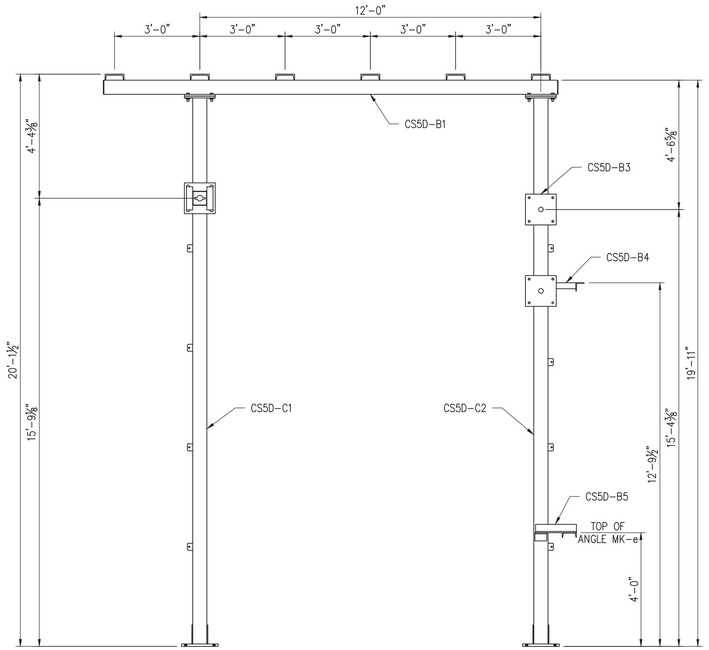
DWG. NAME: MCW-D-P016-12 | REVISION NO : 1



ELEVATION A
SCALE: 3/8" = 1'-0" SH.1



ELEVATION B
SCALE: 3/8" = 1'-0" SH.1



ELEVATION C
SCALE: 3/8" = 1'-0" SH.1

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	XX/XX/XX

STANDARD DRAWING: 35CS-1-F.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-12-16.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:46 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:40 AM Tab:MCW-D-P016-13

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BILLINGS, MONTANA

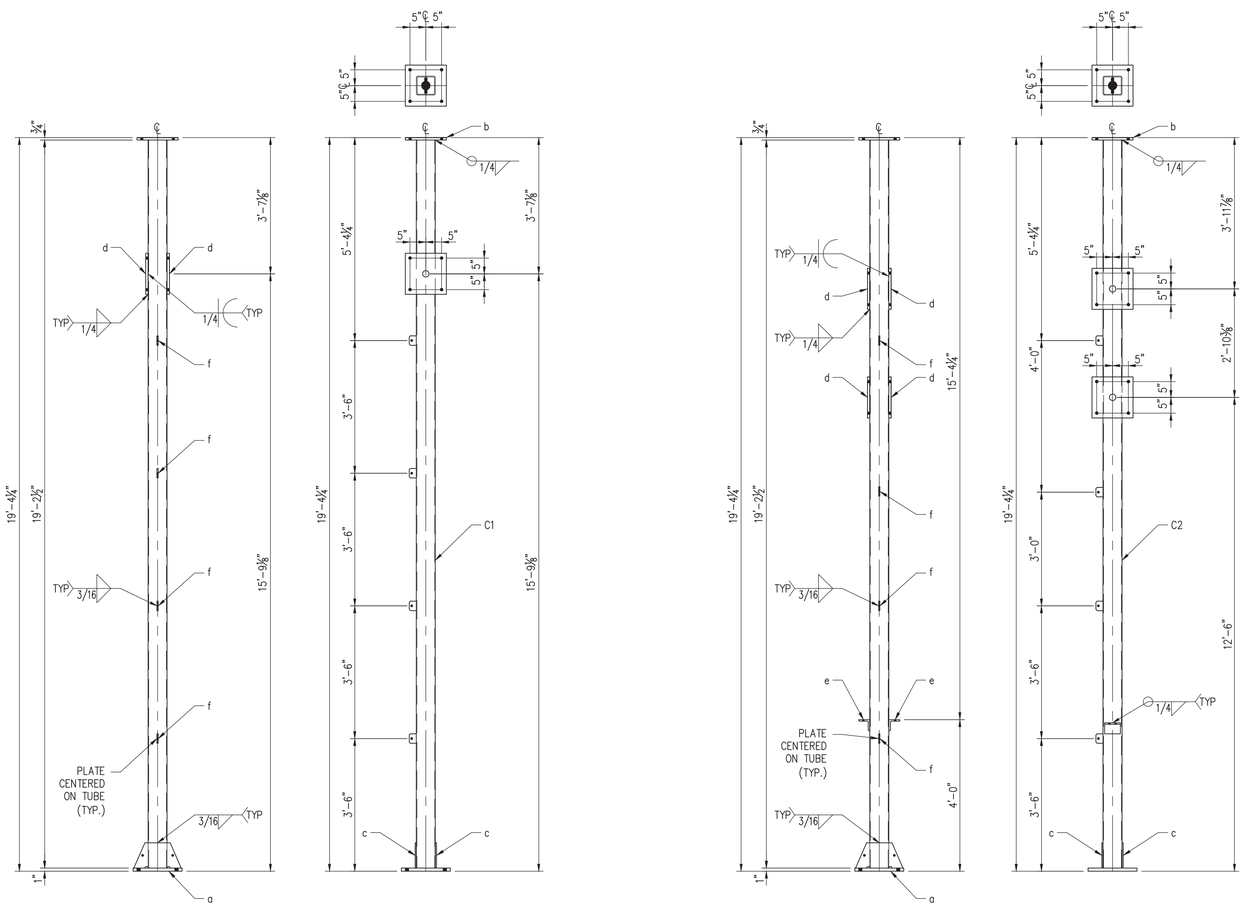
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

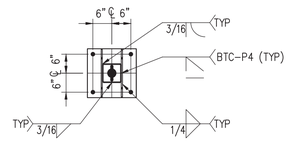
edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	08/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5D (SH.2)

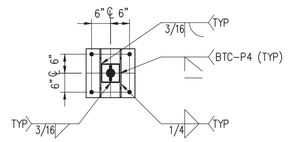
DWG. NAME: MCW-D-P016-13 REVISION NO : 1





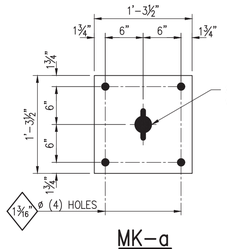
CS5D–C1

SCALE: ½" = 1'–0"



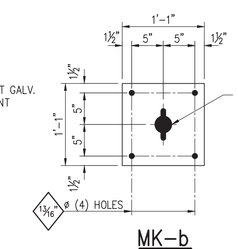
CS5D–C2

SCALE: ½" = 1'–0"



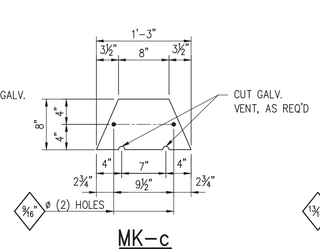
MK–a

SCALE: 1" = 1'–0"



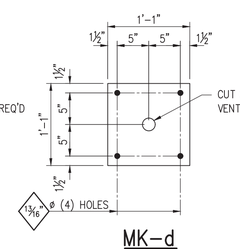
MK–b

SCALE: 1" = 1'–0"



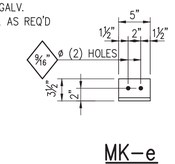
MK–c

SCALE: 1" = 1'–0"



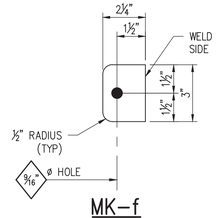
MK–d

SCALE: 1" = 1'–0"



MK–e

SCALE: 1" = 1'–0"



MK–f

SCALE: 3" = 1'–0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	XX/XX/XX

STANDARD DRAWING: 35CS–1–F.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–12–16.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:46 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:40 AM Tab:MCW–D–P016–14

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BILLINGS, MONTANA

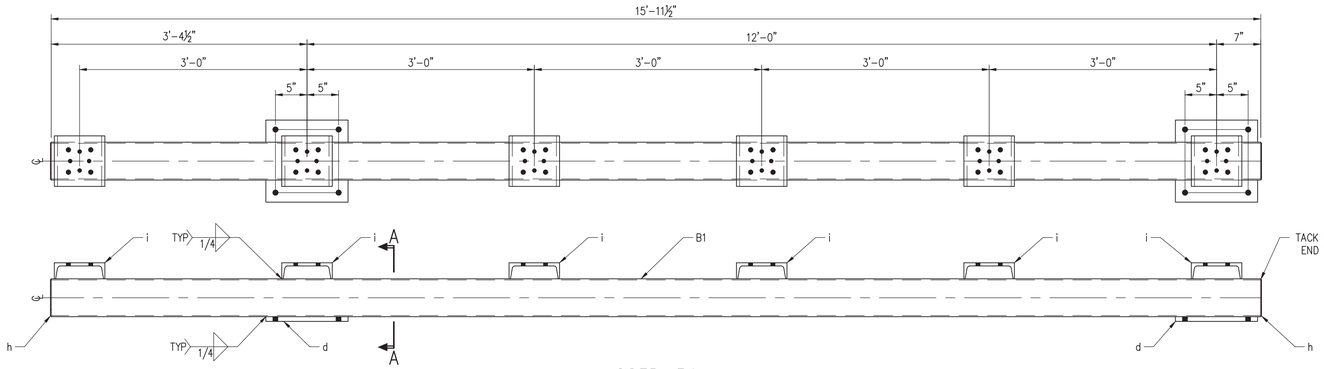
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	08/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

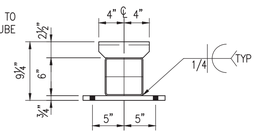
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5D (SH.3)

DWG. NAME: MCW–D–P016–14 | REVISION NO : 1

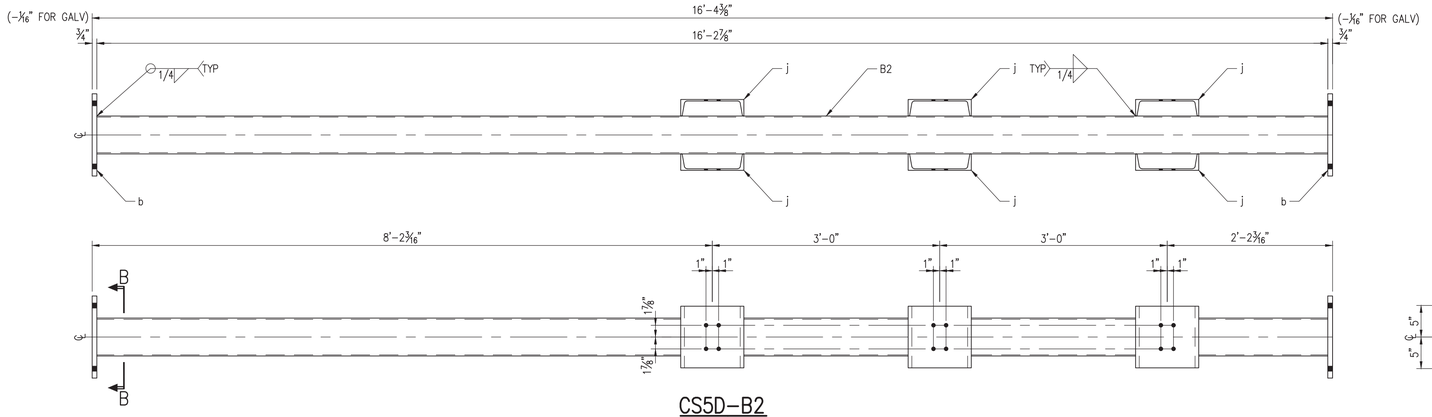


CS5D–B1

SCALE: 1" = 1'-0"



SECTION A–A



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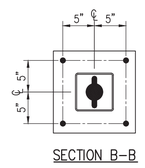
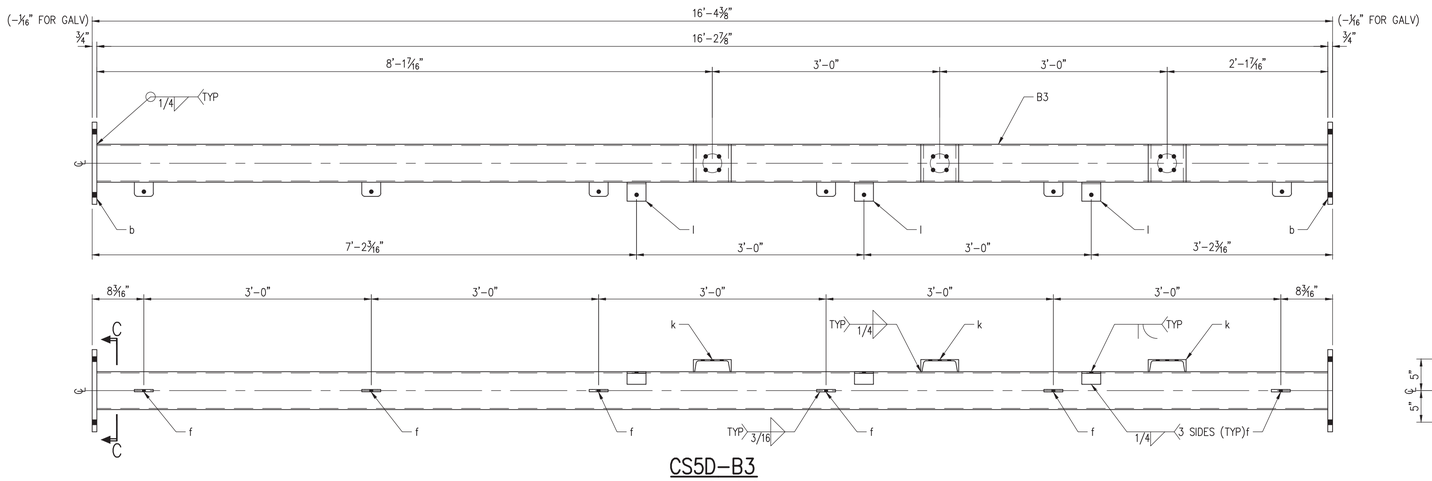


SECTION B–B



CS5D–B3

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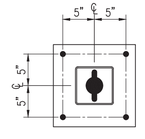
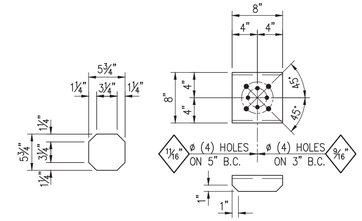


SECTION C–C

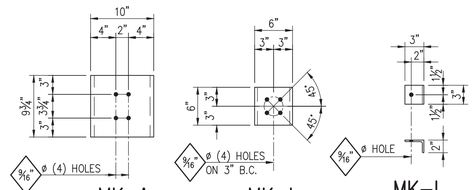


MK–h

SCALE: 1" = 1'-0"

MK–i

SCALE: 1" = 1'-0"



MK–j

SCALE: 1" = 1'-0"

MK–k

SCALE: 1" = 1'-0"

MK–l

SCALE: 1" = 1'-0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	XX/XX/XX

STANDARD DRAWING: 35CS–1–F.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–12–16.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:46 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:41 AM Tab:MCW–D–P016–15

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

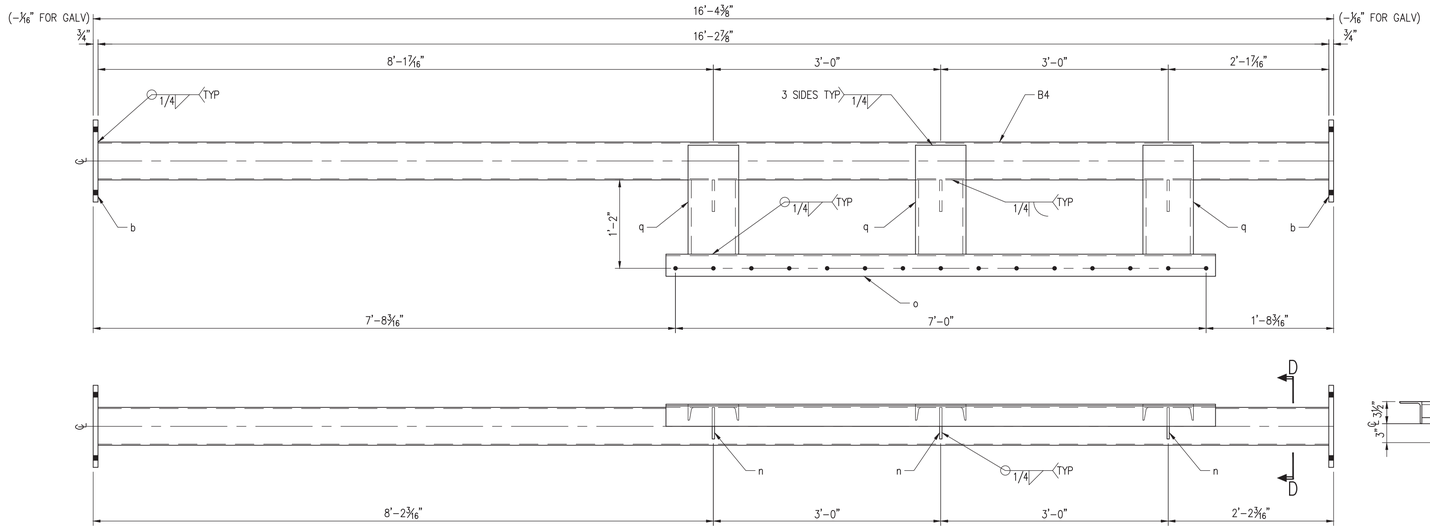
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edF renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	08/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5D (SH.4)

DWG. NAME: MCW–D–P016–15 | REVISION NO : 1



CS5D–B4

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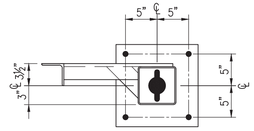
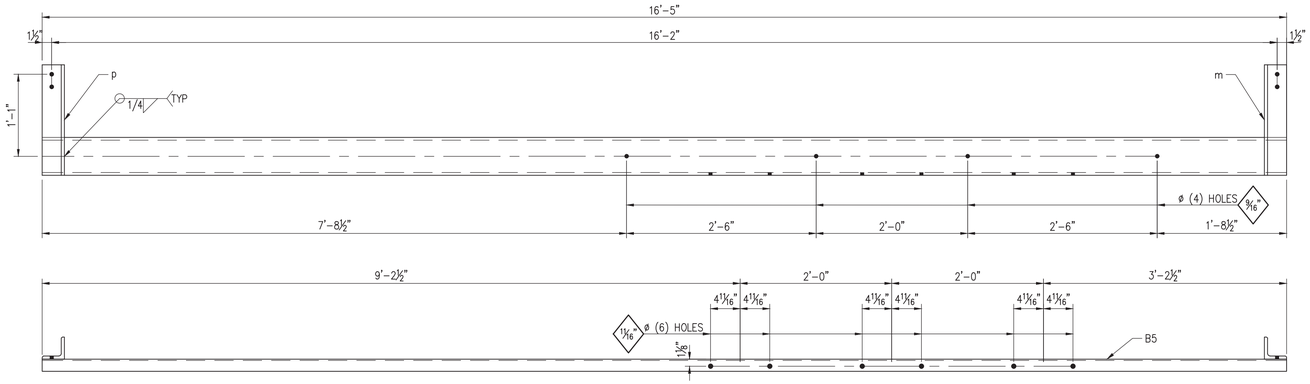


SECTION D–D



CS5D–B5

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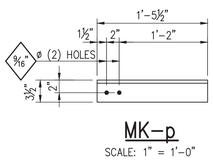
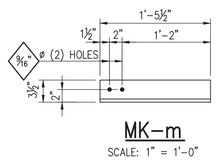


MK–p

SCALE: 1" = 1'–0"



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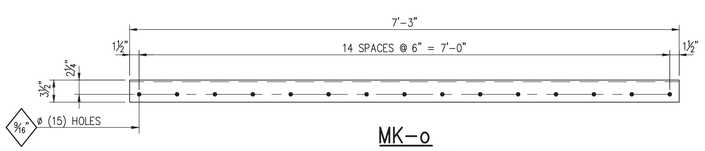

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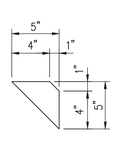

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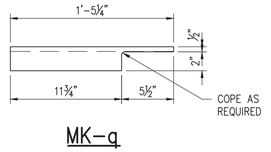

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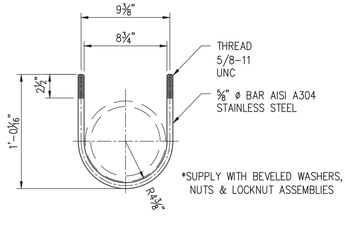
SCALE: 1½" = 1'–0"



UB1

SCALE: 1½"=1'–0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	XX/XX/XX

STANDARD DRAWING: 35CS–1–F.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–12–16.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:46 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:41 AM Tab:MCW–D–P016–16

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

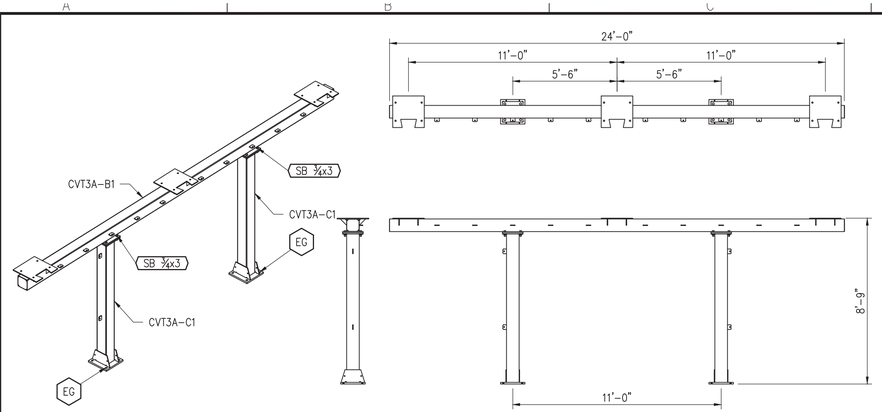
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	08/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

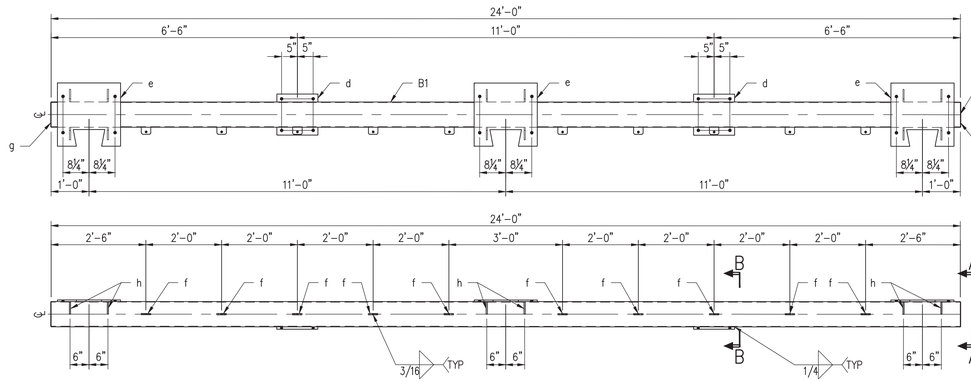
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV COLLECTION STRUCTURE – CS5D (SH.5)

DWG. NAME: MCW–D–P016–16 | REVISION NO : 1



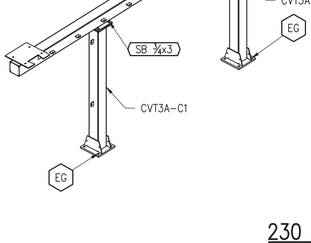
230 kV 3Ø CVT SUPPORT – CVT3A

SCALE: ½" = 1'-0"



CVT3A–B1

SCALE: ½" = 1'-0"



MK–a

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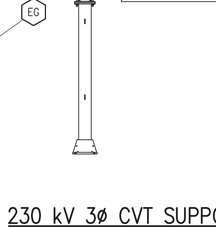

MK–b

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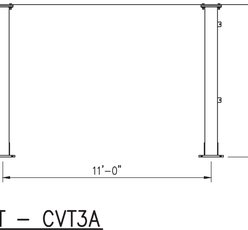

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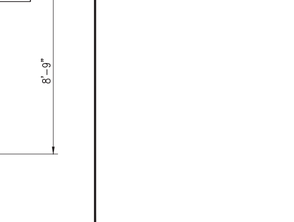

MK–d

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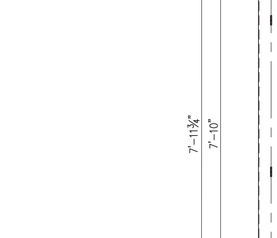
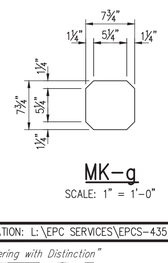


MK–e

SCALE: 1" = 1'-0"

MK–f

SCALE: 3" = 1'-0"



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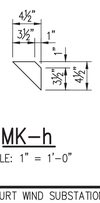

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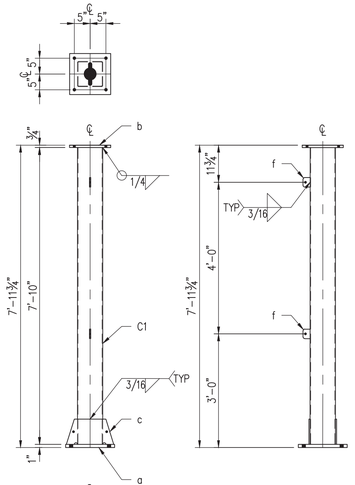
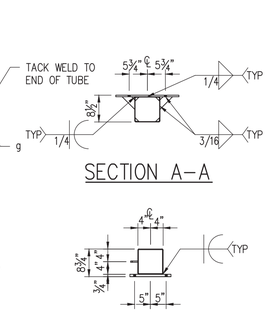
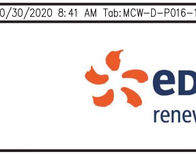




SECTION A–A



SECTION B–B

CVT3A–C1

SCALE: ½" = 1'-0"

DESIGN NOTES

EQUIPMENT MANUFACTURER = GE
TYPE = 230kV CLASS, 900 kV BIL, CVT
WEIGHT = 774 LBS.
BOLT PATTERN = 11½ x 16½ W/⅞"ø HOLES
PAD HEIGHT = APPROX. 10'-4"

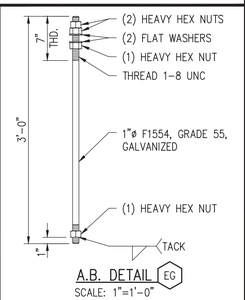
PROJECT SPECIFIC NOTES:
EQUIPMENT MANUFACTURER = TRENCH
WEIGHT = 870 LBS.
BOLT PATTERN = 16½x11½ W/⅞ø HOLES
PAD HEIGHT = 9'-6¾"

LEGEND

- A A — INDICATES SECTION VIEW "A–A"
- A / SH.1 — INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
- 1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
- 13/16 ø (4) HOLES — HOLE DIAMETER AND QUANTITY SYMBOL
- SB ¾x3½ — INDICATES ITEM ON STRUCTURE BOLT LIST
- EG — INDICATES ITEM ON ANCHOR BOLT LIST
- BS1–C1 — INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	8	1"ø F1554, GRADE 55, GALVANIZED



A.B. DETAIL EG

SCALE: 1"=1'-0"

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM 992
2. TUBING AND PIPE ASTM A500 GRADE B (FY–46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM–A123.
4. WELDING ELECTRODE GRADE–70X.
5. ALL HOLES 13/16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	2	FOR ONE COLUMN CVT3A–C1			
C1	ONE	HSS8x8x3/16	7	10	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
f	2	PL ⅜x2¼	0	3	(WELD)
	ONE	FOR ONE BEAM CVT3A–B1			
B1	ONE	HSS8x8x3/16	24	0	
d	2	PL ¾x13	1	1	(WELD)
e	3	PL ½x20	1	8	(WELD)
f	10	PL ⅜x2¼	0	3	(WELD)
g	2	PL ⅜x7¾	0	7¾	(WELD)
h	12	PL ⅜x4½	0	4½	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=1303	GALV WEIGHT=1348

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	9	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	02/28/18

STANDARD DRAWING: 230IT–3–8.75–11.0–A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–17.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:46 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:41 AM Tab:MCW–D–P016–17

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

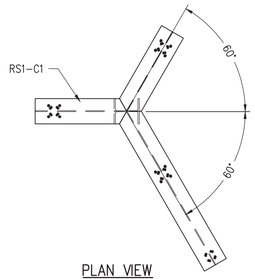
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

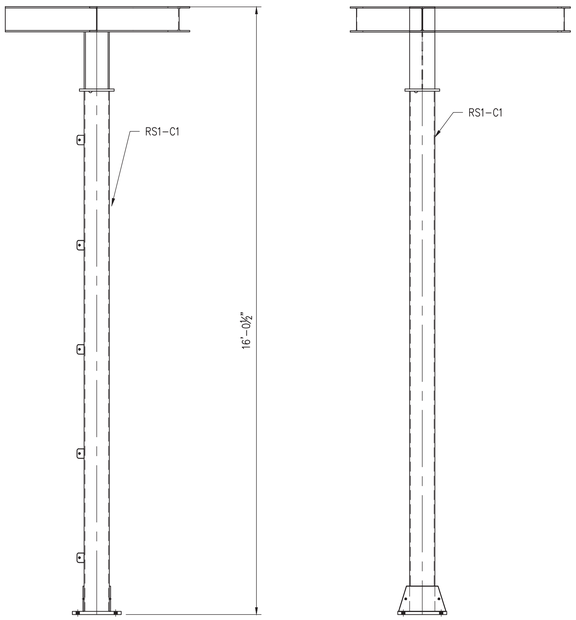
ENGINEERING RECORD		DATE
DRAWN	WILCOX	08/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
230 kV 3Ø CVT SUPPORT – CVT3A

DWG. NAME: MCW–D–P016–17 | REVISION NO : 1



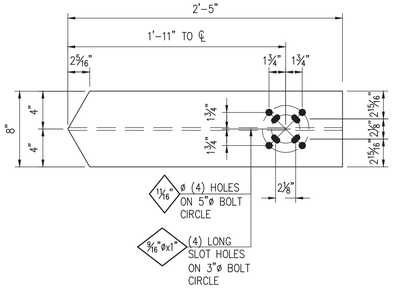
PLAN VIEW



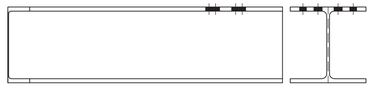
FRONT VIEW SIDE VIEW

34.5 kV NGR STAND – RE1

SCALE: ½"=1'-0"
ONE (1) REQUIRED



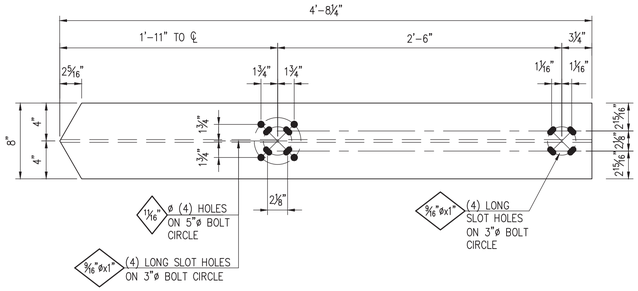
PLAN VIEW



FRONT VIEW END VIEW

MK–b

SCALE: 1½"=1'-0"

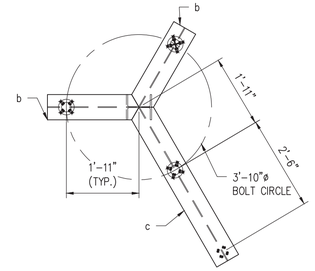


PLAN VIEW

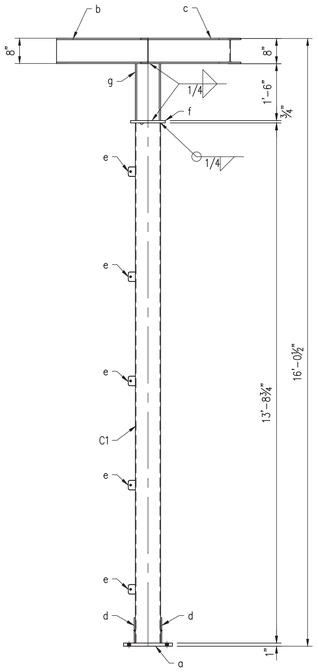
FRONT VIEW END VIEW

MK–c

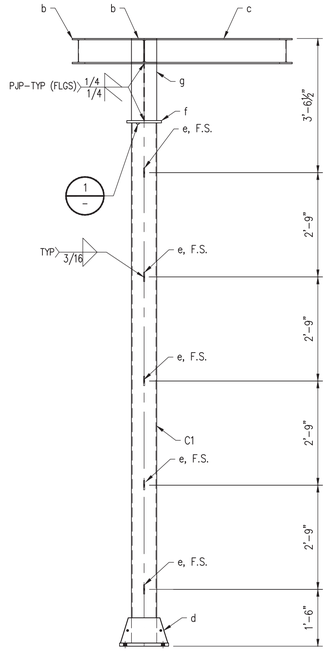
SCALE: 1½"=1'-0"



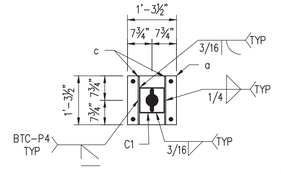
PLAN VIEW



FRONT VIEW

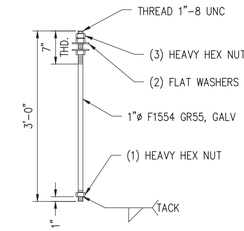


SIDE VIEW



RS1–C1

SCALE: ½"=1'-0"



ANCHOR BOLT DETAIL – EG

3/4"=1'-0"

MARK	QTY.	DESCRIPTION	LENGTH FT.	LENGTH INS.	REMARKS
	ONE	FOR ONE COLUMN - RS1-C1			
C1	ONE	HSS8x8x3/16	13	8 1/4	
a	ONE	PL 1x15 1/2	1	3 1/2	(WELD)
b	2	W8x31	2	5	(WELD)
c	ONE	W8x31	4	8 1/4	(WELD)
d	2	PL 3/8x8	1	3	(WELD)
e	5	PL 3/8x2 1/4	0	3	(WELD)
f	ONE	PL 3/4x11	0	11	(WELD)
g	ONE	W8x40	1	6	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WT. = 816	GALV. WT. = 845

FABRICATION NOTES

A. SHAPES AND PLATES ASTM A36 U.N.
B. TUBING AND PIPE ASTM A500 GRADE B (FY–46 KSI).
C. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM–A123.
D. WELDING ELECTRODE GRADE–70.
E. ALL HOLES 1³⁄₁₆"ø FOR ¾"ø GALV. BOLTS A325 WITH ONE H.F.W. AND ONE M.F. LOCKNUT, UNLESS NOTED.
F. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
G. GA=GAGE.

LEGEND

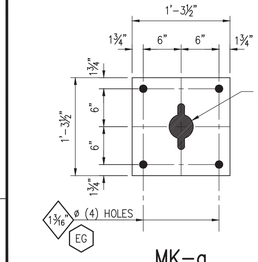
- A ⟷ A — INDICATES SECTION VIEW "A–A"
- A / SH 2 — INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
- 1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
- 3/16" ø (4) HOLES — HOLE DIAMETER AND NUMBER SYMBOL
- AB1 — INDICATES ITEM NUMBER ON BOLT LIST – MATERIAL GROUP "A" (SEE ERECTION BOLT & ANCHOR BOLT LIST BELOW)
- INDICATES APPROXIMATE LOCATION FOR STAMPING MARK NUMBERS ON STEEL MEMBERS.
- C1 — INDICATES STRUCTURAL MEMBER MARK NUMBER.

ANCHOR BOLT LIST

ITEM	QUAN. PER STRUCTURE	TOTAL QUANTITY	DESCRIPTION
EG	4	4	1"ø x 3'-0" (SEE DETAIL)

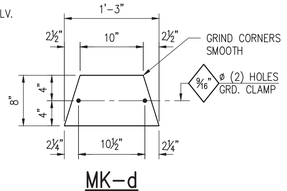
NOTES

1. ALL ERECTION BOLTS & NUTS SHALL BE GALVANIZED HEAVY HEX ASTM A325 AND ASTM A563 GRADE DH RESPECTIVELY.
2. ALL ANCHOR BOLTS & HARDWARE SHALL BE F1554 GR. 36 GALVANIZED.
3. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
4. PLUG ALL TAPPED HOLES PRIOR TO GALVANIZING.
5. TOTAL QUANTITY EQUALS QUANTITY PER STRUCTURE TIMES NUMBER OF STRUCTURES PLUS 5%.
6. CONTRACTOR SHALL SUPPLY ALL EQUIPMENT CONNECTION BOLTS.



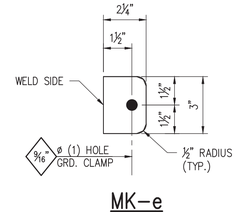
MK–a

SCALE: 1"=1'-0"



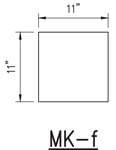
MK–d

SCALE: 1"=1'-0"



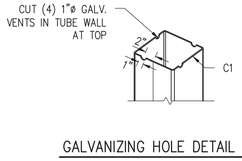
MK–e

SCALE: 3"=1'-0"



MK–f

SCALE: 1"=1'-0"



GALVANIZING HOLE DETAIL 1/–

SCALE: N.T.S.

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–18.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:47 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:41 AM Tab:MCW–D–P016–18

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

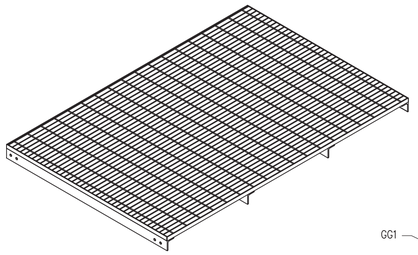
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

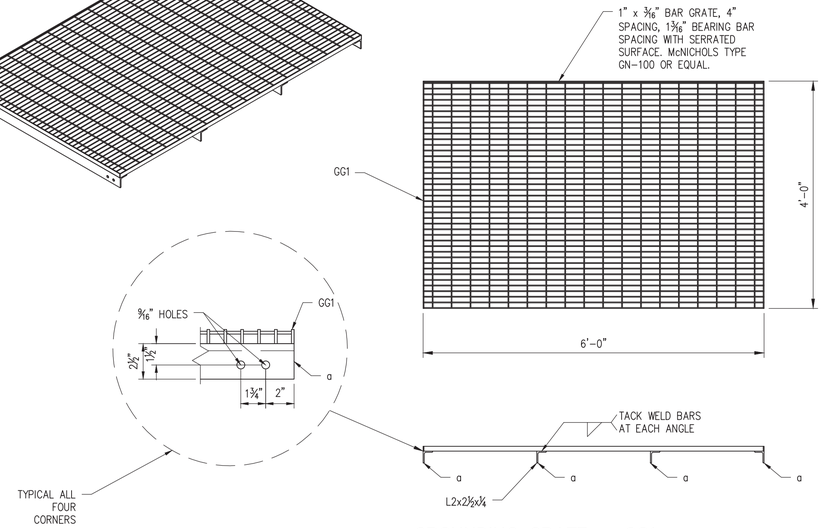
edf renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	09/19
DESIGNED	MOHR	08/19
CHECKED	McDEVITT	09/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV NGR STAND – RE1

DWG. NAME: MCW–D–P016–18 | REVISION NO : 1





GROUNDING GRATE – GG1

SCALE: ¾" = 1'-0"

DESIGN NOTES

.

LEGEND

A ⌐ ¬ A	INDICATES SECTION VIEW "A-A"
A / SH.1	INDICATES ELEVATION NUMBER INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / –	INDICATES DETAIL NUMBER INDICATES DRAWING ON WHICH DETAIL APPEARS
13/16 ø (4) HOLES	HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½	INDICATES ITEM ON STRUCTURE BOLT LIST
EG	INDICATES ITEM ON ANCHOR BOLT LIST
BS1–C1	INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13/16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE GRATE – GG1			
GG1	ONE	1x3/16x48	6	0	
a	4	L2x2½x¼	4	0	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=238	GALV WEIGHT=246

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	BGP	DMB	09/30/16

STANDARD DRAWING: GG-STD-6.0X4.0-A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-19.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:48 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:41 AM Tab:MCW-D-P016-19

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

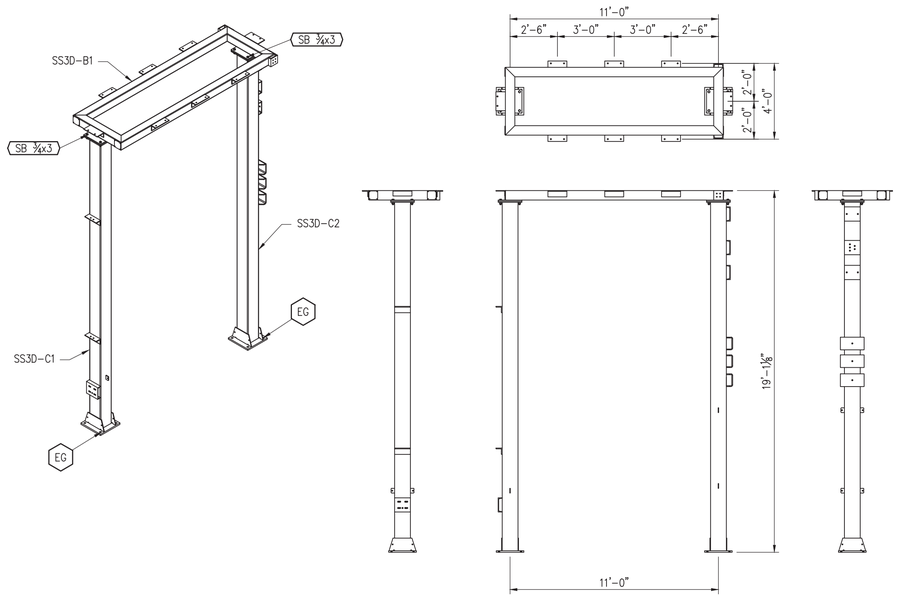
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

EDF renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
SWITCH OPERATOR PLATFORM – GG1

DWG. NAME: MCW-D-P016-19 | REVISION NO : 1



34.5 kV DISC. SWITCH STAND W/ SSVT – SS3D

SCALE: ¼" = 1'-0"

PROJECT SPECIFIC NOTES:
EQUIPMENT MANUFACTURER = ROYAL
TYPE = "AVT",34.5 kV, 3000 AMP, 200 kV BIL, HORIZONTAL MOUNT
BUS HEIGHT = 21'-6"
BUS = N/A
SWITCH TERMINAL HEIGHT = 2'4⅞"
FUSE TYPE = SM-5 POWER FUSE 190604R2

DESIGN NOTES

EQUIPMENT MANUFACTURER = SOUTHERN STATES
TYPE = "EV-2H", 34.5 kV, 4000 AMP, 200 kV BIL, HORIZONTAL MOUNT
BUS HEIGHT = 22'-0"
BUS = 6" S.P.S. ALUMINUM
SWITCH TERMINAL HEIGHT = 2'-10⅞"
FUSE TYPE = SMD-20 POWER FUSE 192234R3

LEGEND

A ⟷ A	INDICATES SECTION VIEW "A-A"
A / SH.1	INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / –	INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
1⅛" ø (4) HOLES	HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½	INDICATES ITEM ON STRUCTURE BOLT LIST
EG	INDICATES ITEM ON ANCHOR BOLT LIST
BS1-C1	INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	8	(2) HEAVY HEX NUTS; (2) FLAT WASHERS; (1) HEAVY HEX NUT; THREAD 1-8 UNC; 1"ø F1554, GRADE 55, GALVANIZED; (1) HEAVY HEX NUT; TACK

7" THD.; 3'-0"

A.B. DETAIL EG
SCALE: 1"=1'-0"

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE COLUMN SS3D-C1			
C1	ONE	HSS10x10x5/16	18	4⅝	
a	ONE	PL 1x17½	1	5½	(WELD)
b	ONE	PL ¾x15	1	3	(WELD)
c	2	PL ⅜x8	1	5	(WELD)
d	ONE	C9x15	0	10	(WELD)
e	2	PL ⅜x2¼	0	3	(WELD)
f	2	L4x4x½	0	10	(WELD)
	ONE	FOR ONE COLUMN SS3D-C2			
C2	ONE	HSS10x10x5/16	18	4⅝	
a	ONE	PL 1x17½	1	5½	(WELD)
b	ONE	PL ¾x15	1	3	(WELD)
c	2	PL ⅜x8	1	5	(WELD)
e	4	PL ⅜x2¼	0	3	(WELD)
g	3	HSS8x8x½ (SPLIT)	1	3	(WELD)
h	ONE	C9x15	0	10	(WELD)
n	2	C9x15	0	10	(WELD)
	ONE	FOR ONE BEAM SS3D-B1			
B1a	2	HSS6x6x5/16	11	6	(WELD)
B1b	2	HSS6x6x5/16	3	7	(WELD)
i	2	PL ¾x15	1	3	(WELD)
j	6	L4x4x½	1	0	(WELD)
k	2	L6x3½x⅜	0	8	(WELD)
l	2	C6x13	0	6	(WELD)
m	4	PL ¼x5½	0	5½	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=2053	GALV WEIGHT=2125

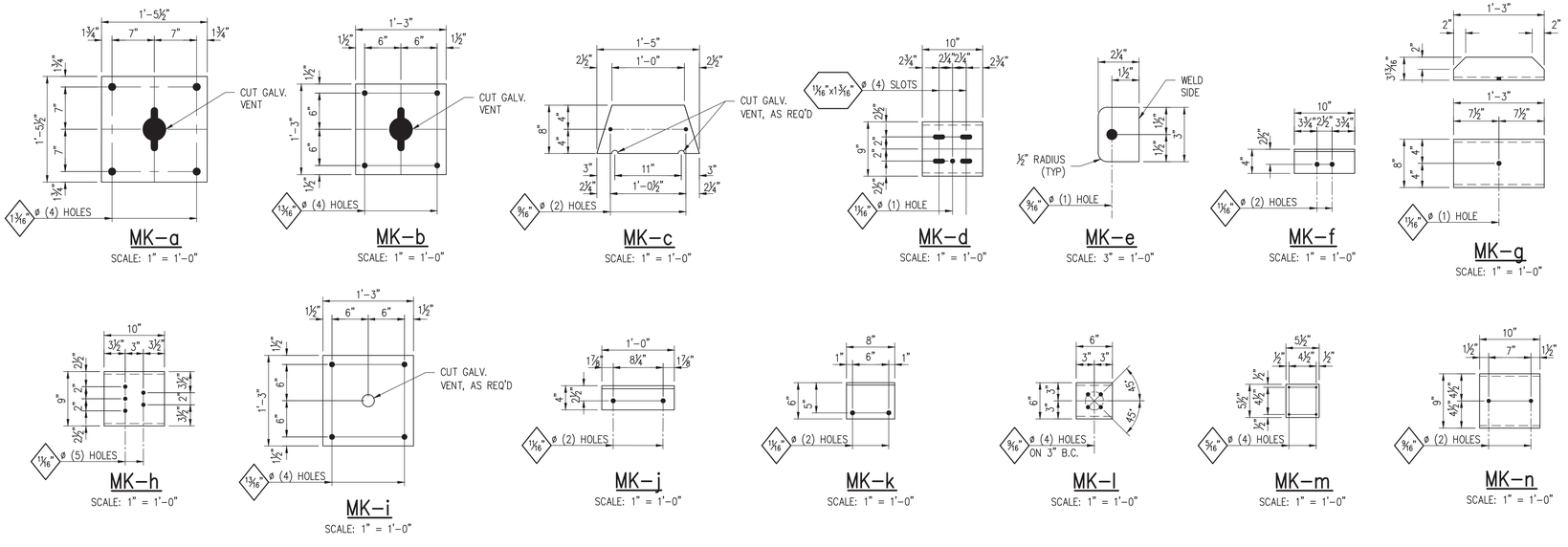
STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	9	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.
SB ¼x1	17	¼"ø x 1" SELF TAPPING SCREW

AS BUILT

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13⁄16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.



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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

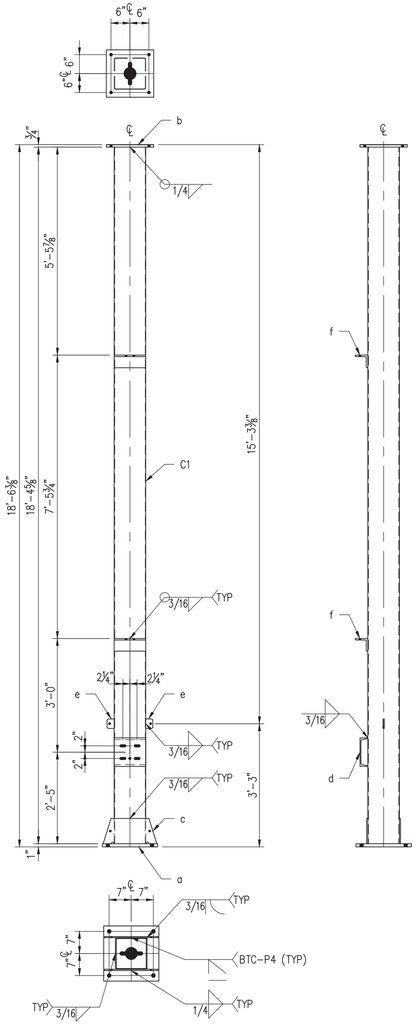
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

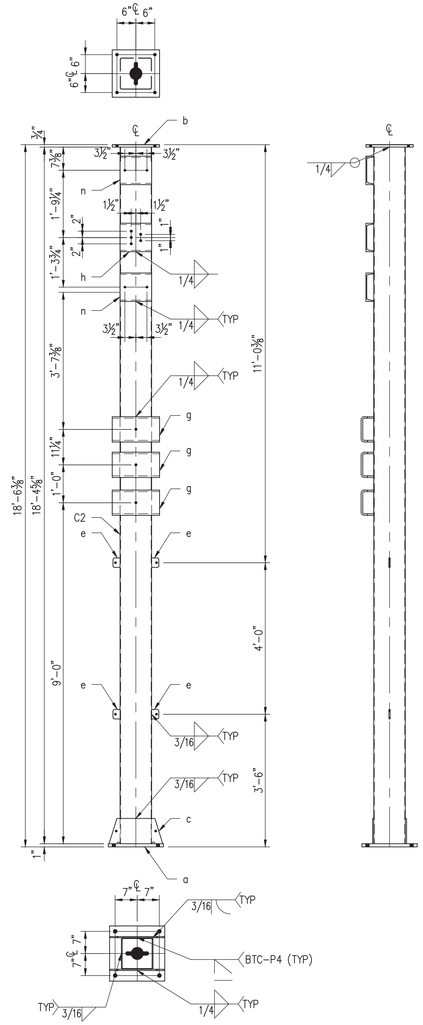
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV DISC. SWITCH STAND W/SSVT – SS3D (SH.1)

DWG. NAME: MCW-D-P016-20 | REVISION NO : 1



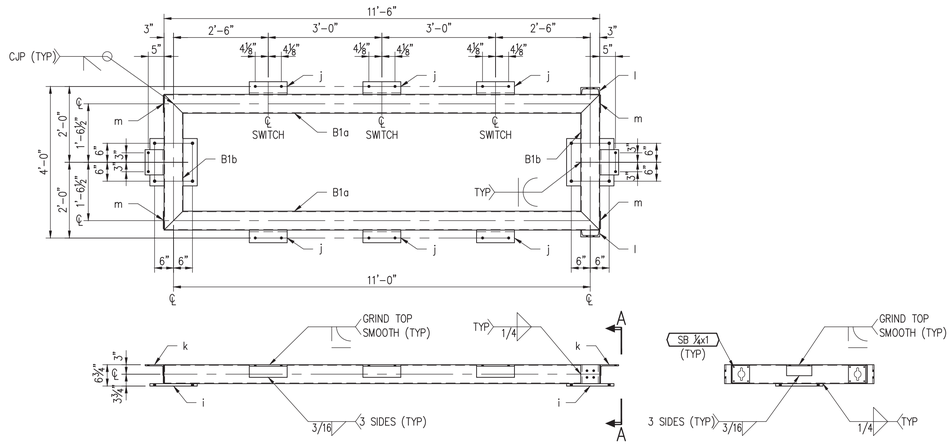
SS3D-C1

SCALE: ½" = 1'-0"



SS3D-C2

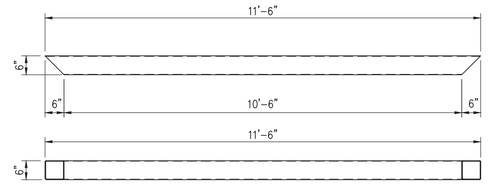
SCALE: ½" = 1'-0"



SS3D-B1

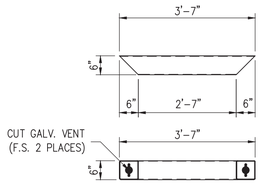
SCALE: ½" = 1'-0"

SECTION A-A



MK-B1a

SCALE: ½" = 1'-0"



MK-B1b

SCALE: ½" = 1'-0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-20-21.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:49 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:42 AM Tab:MCW-D-P016-21

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

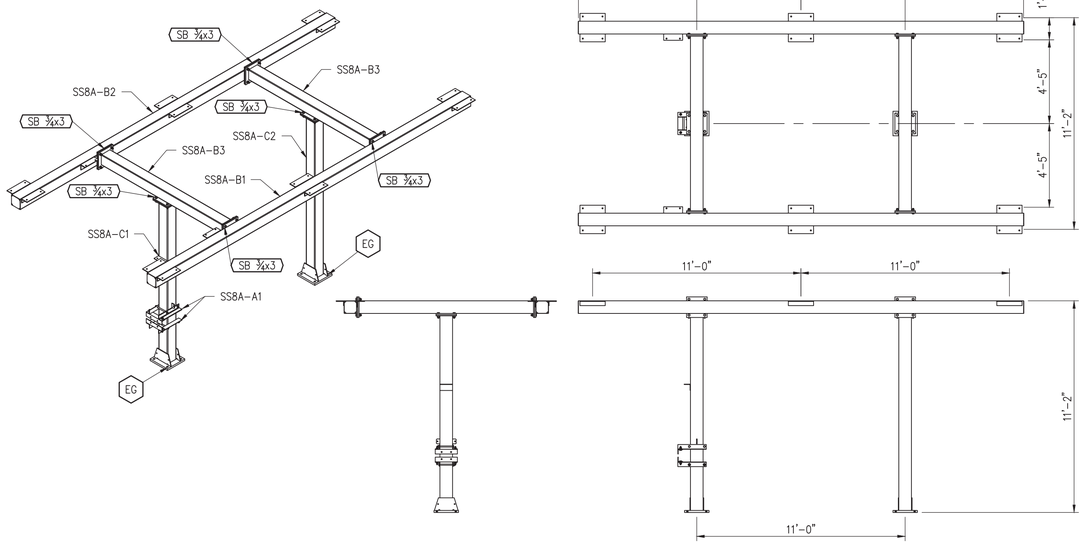
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV DISC. SWITCH STAND W/SSVT – SS3D (SH.2)

DWG. NAME: MCW-D-P016-21 | REVISION NO : 1



230 kV LOW SWITCH STAND – SS8A

SCALE: ¼" = 1'-0"

PROJECT SPECIFIC NOTES:
TYPE = "VBPA", 230 kV, 1200 AMP, 900 kV BIL, HORIZONTAL MOUNT
BUS = N/A

DESIGN NOTES

EQUIPMENT MANUFACTURER = PASCOR
TYPE = "VBPA", 230 kV, 2000 AMP, 900 kV BIL, HORIZONTAL MOUNT
BUS HEIGHT = 19'-0"
BUS = 6" S.P.S. ALUMINUM
SWITCH TERMINAL HEIGHT = 7'-10"

LEGEND

A ↓ ↓ A	INDICATES SECTION VIEW "A-A"
A / SH.1	INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / –	INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
13/16 ø (4) HOLES	HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½	INDICATES ITEM ON STRUCTURE BOLT LIST
EG	INDICATES ITEM ON ANCHOR BOLT LIST
BS1-C1	INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	8	(2) HEAVY HEX NUTS; (2) FLAT WASHERS; (1) HEAVY HEX NUT; THREAD 1-8 UNC; 1"ø F1554, GRADE 55, GALVANIZED; (1) HEAVY HEX NUT; TACK

7" THD.; 3'-0"; 6"

A.B. DETAIL EG

SCALE: 1"=1'-0"

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE COLUMN SS8A-C1			
C1	ONE	HSS8x8x¼	10	3¼	
a	ONE	PL 1¼x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
e	ONE	L4x4x¼	0	8	(WELD)
i	2	PL ⅜x2¼	0	3	(WELD)
	ONE	FOR ONE COLUMN SS8A-C2			
C2	ONE	HSS8x8x¼	10	3¼	
a	ONE	PL 1¼x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
	ONE	FOR ONE BEAM SS8A-B1			
B1	ONE	HSS8x8x5/16	23	6	
d	6	L5x3x⅜	1	4	(WELD)
f	ONE	L4x4x⅜	1	0	(WELD)
g	2	PL ⅜x7¾	0	7¾	(WELD)
h	2	PL ¾x13	1	1	(WELD)
	ONE	FOR ONE BEAM SS8A-B2			
B2	ONE	HSS8x8x5/16	23	6	
d	6	L5x3x⅜	1	4	(WELD)
f	ONE	L4x4x⅜	1	0	
g	2	PL ⅜x7¾	0	7¾	(WELD)
h	2	PL ¾x13	1	1	(WELD)
	2	FOR ONE BEAM SS8A-B3			
B3	ONE	HSS8x8x5/16	9	⅞	
b	2	PL ¾x13	1	1	(WELD)
h	ONE	PL ¾x13	1	1	(WELD)
	2	FOR ONE ASSEMBLY SS8A-A1			
j	ONE	L3x3x¼	1	2	(BOLT)
k	ONE	L3x3x¼	1	6	(BOLT)
l	ONE	L3x3x¼	1	6	(BOLT)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=2696	GALV WEIGHT=2791

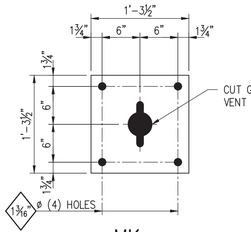
STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	26	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.
SB ¾x10	5	¾"ø x 10" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.
SB ¾x2	5	¾"ø x 2" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.

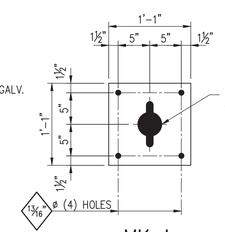
AS BUILT

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13/16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.



MK-a
SCALE: 1" = 1'-0"



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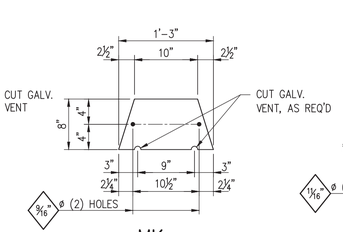

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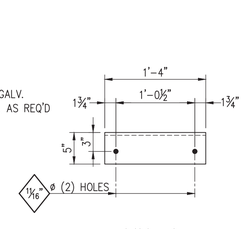

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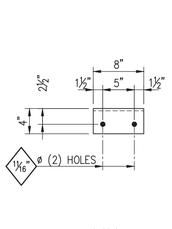

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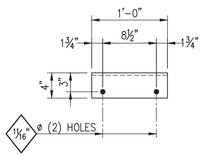

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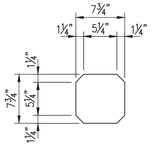

MK-g
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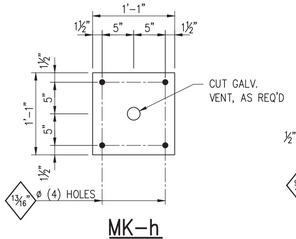
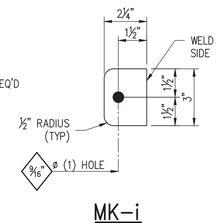


MK-h
SCALE: 1" = 1'-0"



MK-i
SCALE: 3" = 1'-0"

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
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STANDARD DRAWING: 230SS-3-11.1667-11.0-A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-22-23.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:51 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:42 AM Tab:MCW-D-P016-22

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

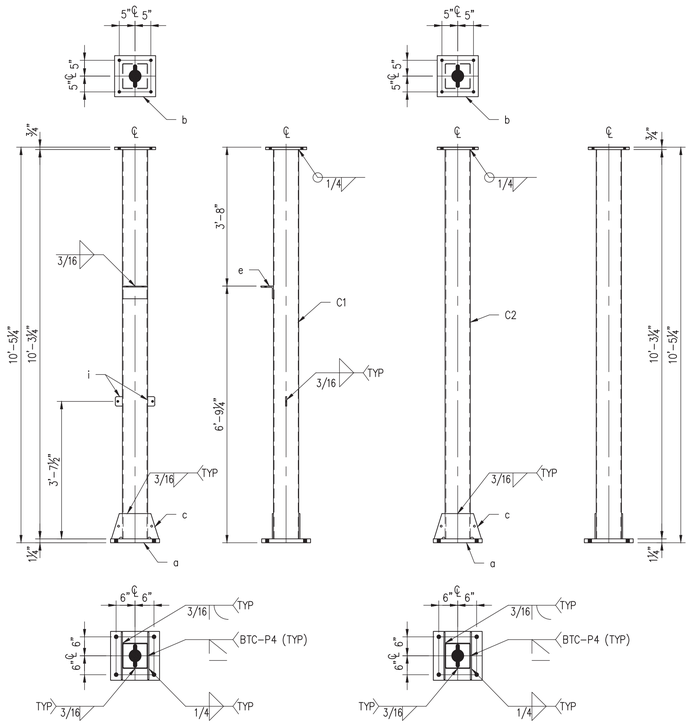
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edF renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	08/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
230 kV LOW SWITCH STAND – SS8A (SH.1)

DWG. NAME: MCW-D-P016-22 | REVISION NO : 1

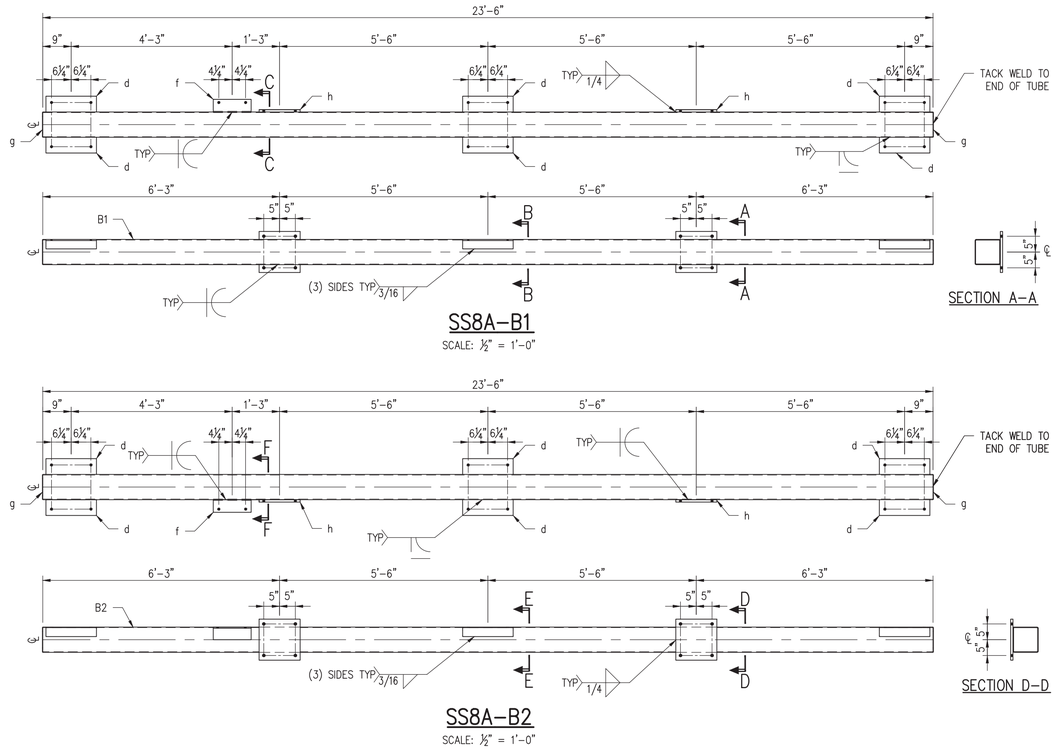


SS8A–C1

SCALE: ½" = 1'–0"

SS8A–C2

SCALE: ½" = 1'–0"

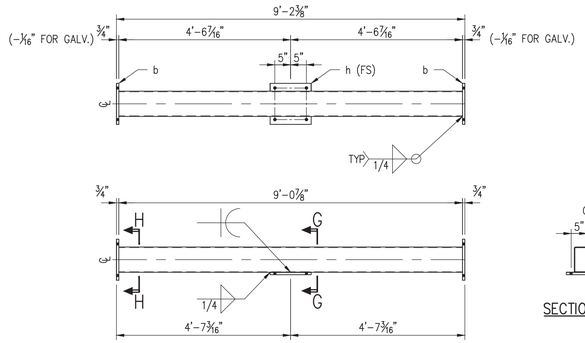


SS8A–B1

SCALE: ½" = 1'–0"

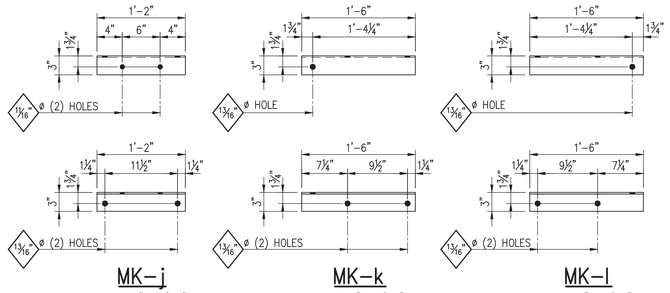
SS8A–B2

SCALE: ½" = 1'–0"



SS8A–B3

SCALE: ½" = 1'–0"



MK–j

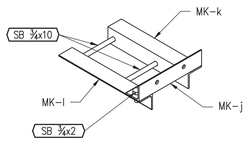
SCALE: 1" = 1'–0"

MK–k

SCALE: 1" = 1'–0"

MK–l

SCALE: 1" = 1'–0"



SS8A–A1

SCALE: 1" = 1'–0"

NOTES

1. SEE SHEET 1 FOR LEGEND, STRUCTURE BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	CAJ	DMB	03/2/19

STANDARD DRAWING: 230SS–3–11.1667–11.0–A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–22–23.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:51 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:42 AM Tab:MCW–D–P016–23

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

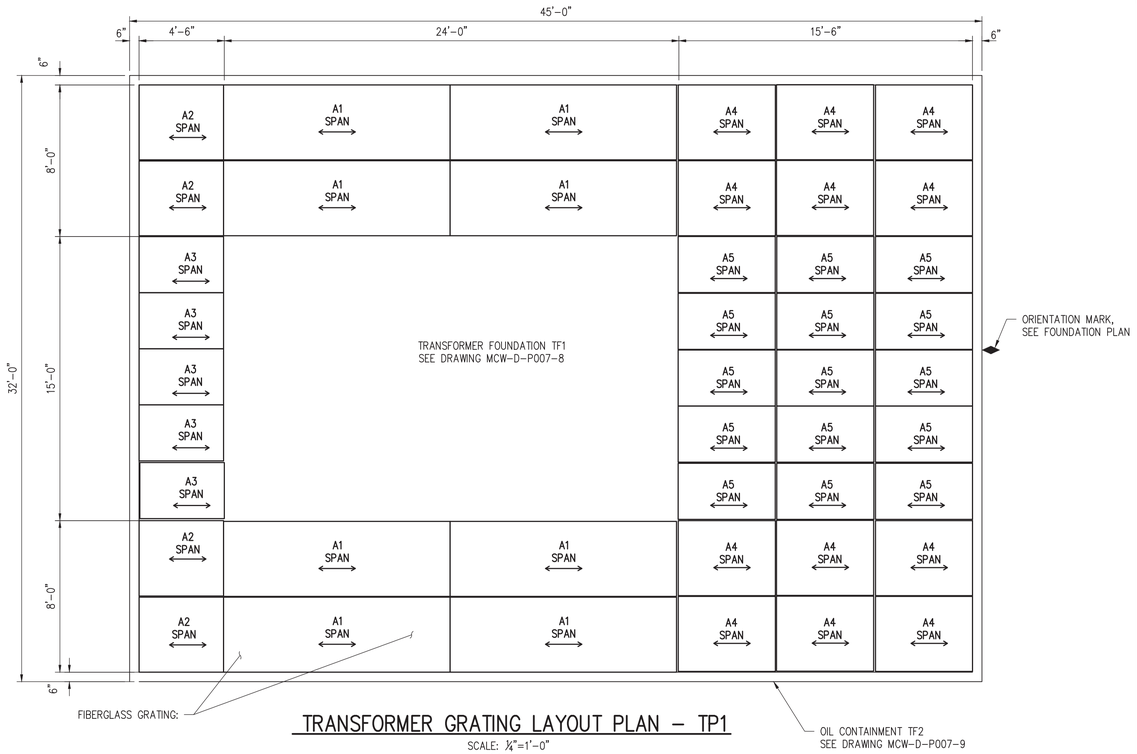
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edF renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	08/19
DESIGNED	MOHR	08/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

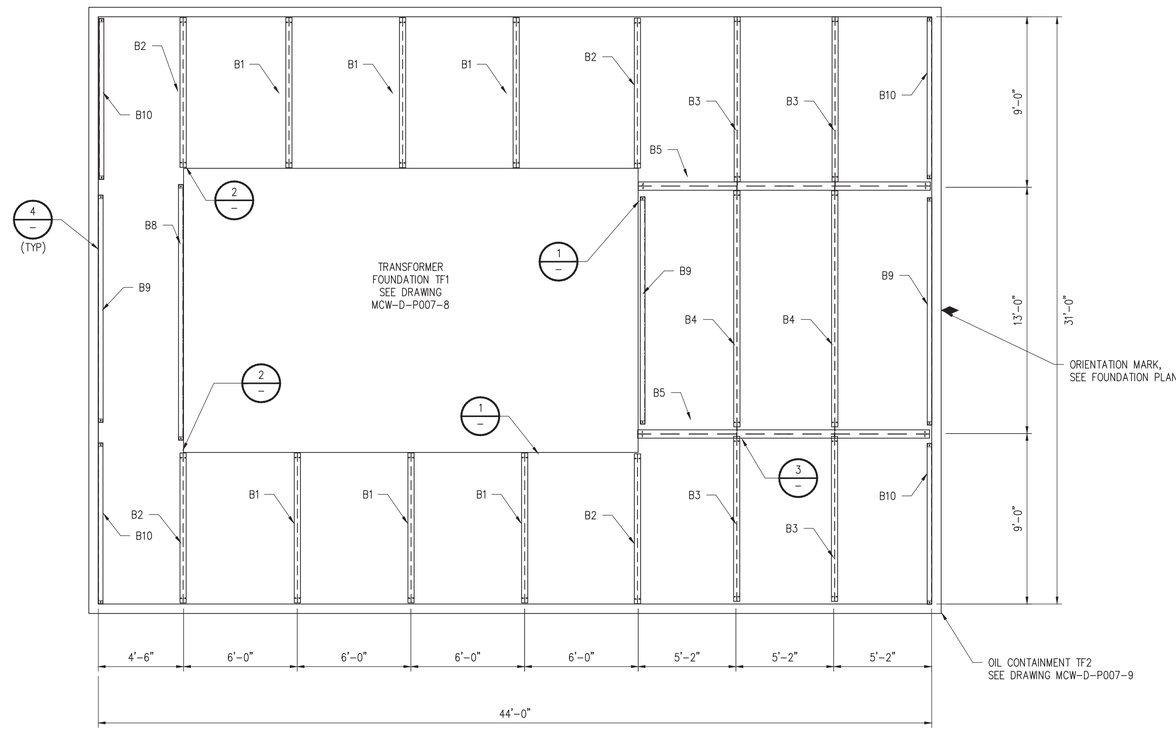
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
230 kV LOW SWITCH STAND – SS8A (SH.2)

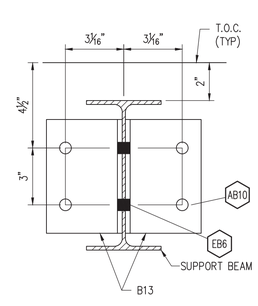
DWG. NAME: MCW–D–P016–23 | REVISION NO : 1



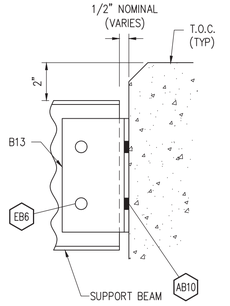
TRANSFORMER GRATING LAYOUT PLAN – TP1

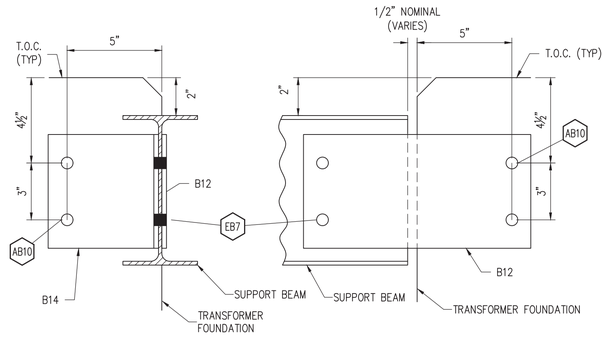
SCALE: ¼"=1'-0"
ONE (1) REQUIRED



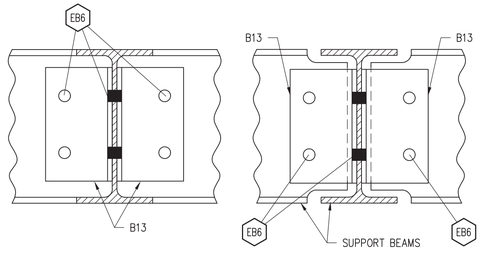


DETAIL 1 –
SCALE: 3"=1'-0"

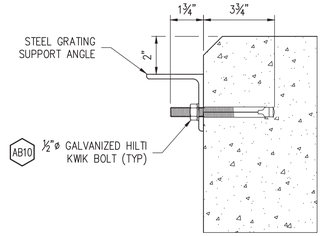




DETAIL 2 –
SCALE: 3"=1'-0"



DETAIL 3 –
SCALE: 3"=1'-0"



DETAIL 4 –
SCALE: 3"=1'-0"

AS BUILT

ERECTION BOLT LIST (SEE NOTE 2, 3 & 4)

ITEM	QUAN. PER FOUNDATION	TOTAL QUAN	DESCRIPTION
EB6	80	84	½"ø x 1¾" WITH NUT & LOCKNUT
EB7	8	9	½"ø x 2¼" WITH NUT & LOCKNUT

ANCHOR BOLT LIST

ITEM	QUAN. PER FOUNDATION	TOTAL QUAN	DESCRIPTION
AB10	186	186	½"ø x 5½" HILTI KWIK BOLT 3 (HDG)

NOTES

1. ALL GRATING SHALL BE T5020 FIBERGLASS BY ROBERTSON GRATING PRODUCTS OR APPROVED EQUAL.
2. ALL ERECTION BOLTS & NUTS SHALL BE GALVANIZED HEAVY HEX ASTM A325 AND ASTM A563 GRADE DH RESPECTIVELY.
3. TOTAL QUANTITY EQUALS QUANTITY PER STRUCTURE TIMES THE NUMBER OF STRUCTURES PLUS 5%.
4. FASTEN GRATING TO SUPPORT PER MANUFACTURER'S RECOMMENDATIONS.
5. BILL OF MATERIAL IS LOCATED ON SHEET MCW-B-Z001.

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-24-26.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:53 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:42 AM Tab:MCW-D-P016-24

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

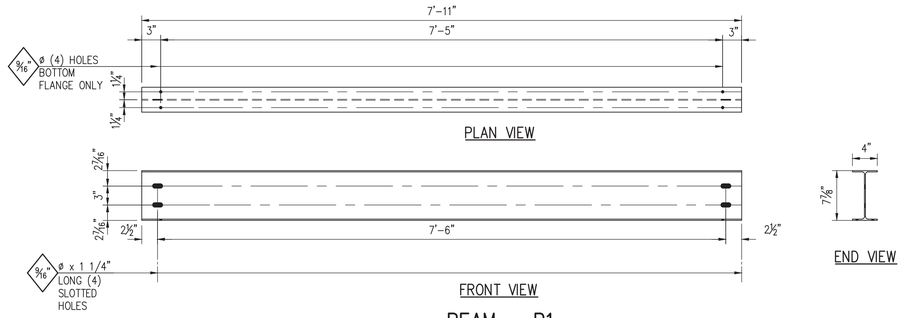
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	GMS	CAJ

EDF renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	08/19
DESIGNED	SMITH	06/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

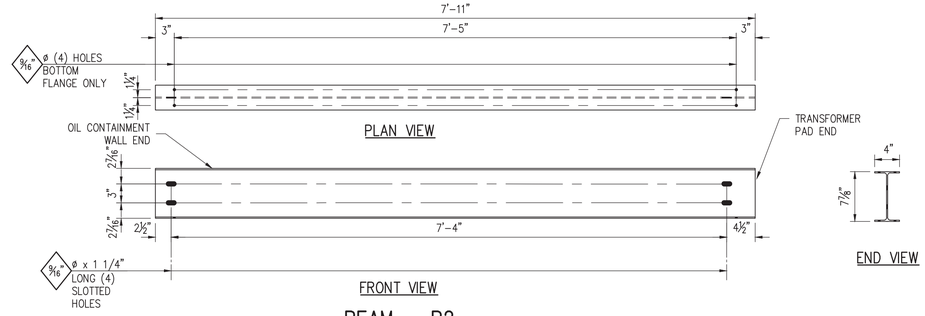
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
TRANSFORMER PLATFORM GRATING – TP1 (SH.1)

DWG. NAME: MCW-D-P016-24 | REVISION NO : 1



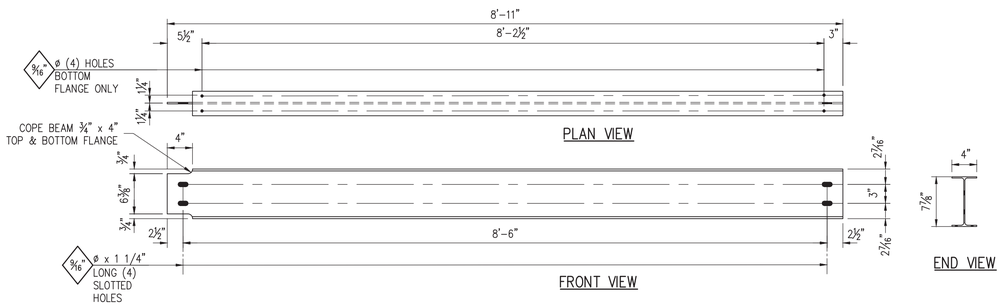
BEAM – B1

SCALE: 1"=1'-0"



BEAM – B2

SCALE: 1"=1'-0"



BEAM – B3

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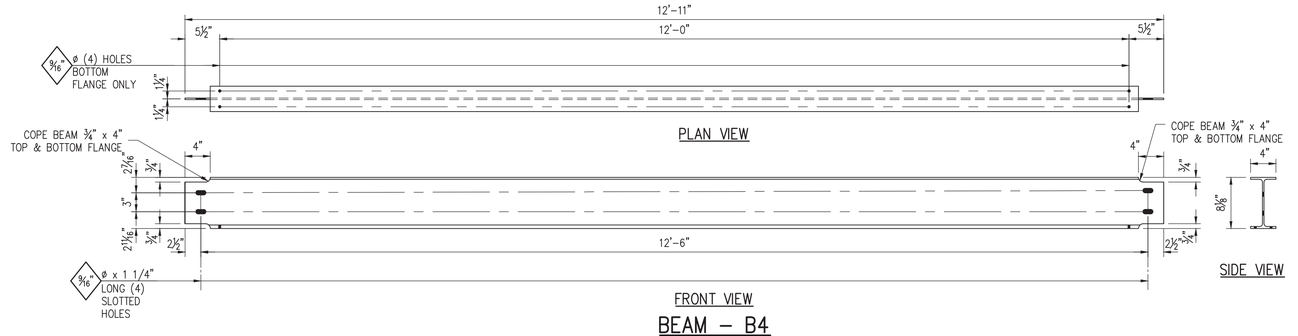
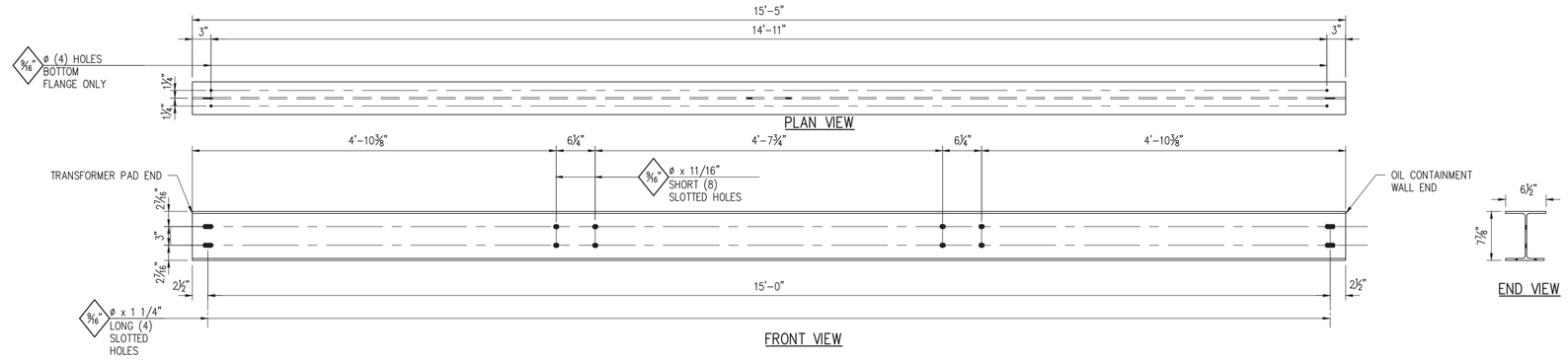


BEAM – B4

SCALE: 1"=1'-0"

AS BUILT



BEAM – B5

SCALE: 1"=1'-0"

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-24-26.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:53 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:42 AM Tab:MCW-D-P016-25

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

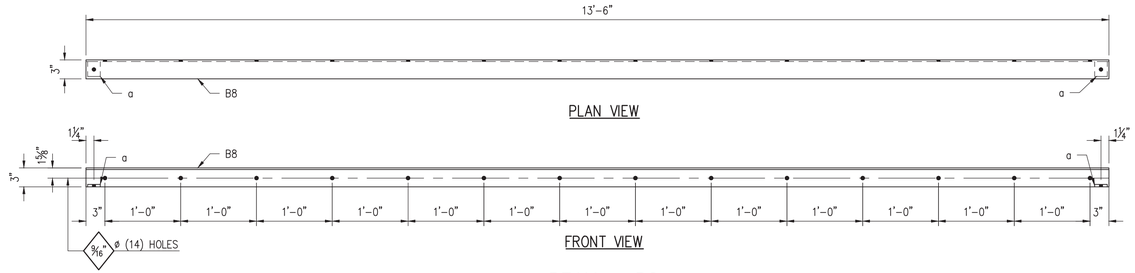
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	GMS	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	08/19
DESIGNED	SMITH	06/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

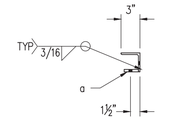
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
TRANSFORMER PLATFORM GRATING – TP1 (SH.2)

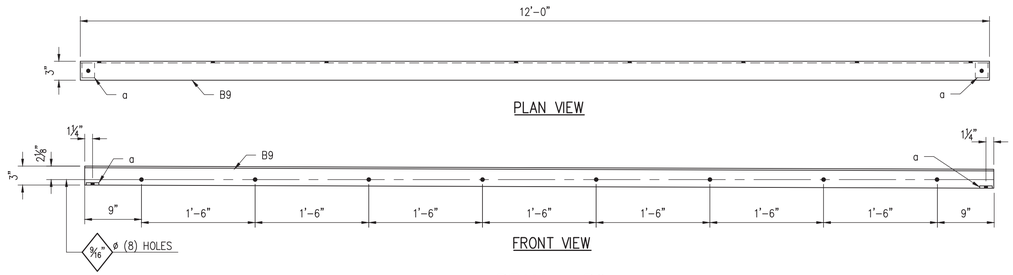
DWG. NAME: MCW-D-P016-25 | REVISION NO : 1



BEAM – B8

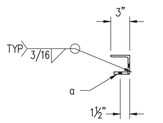
SCALE: 1"=1'-0"

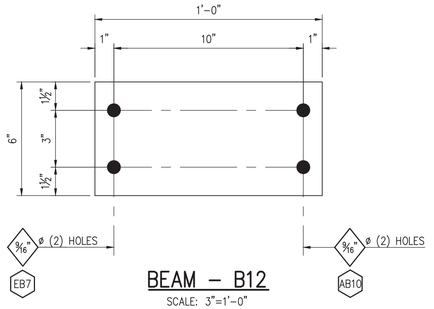




BEAM – B9

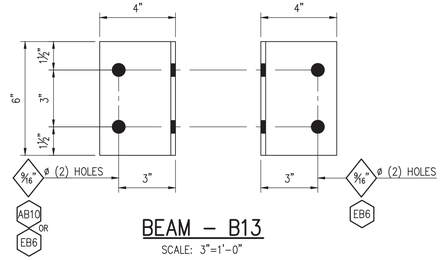
SCALE: 1"=1'-0"





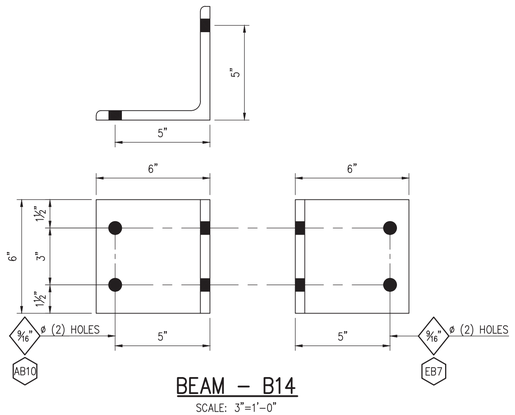
BEAM – B12

SCALE: 3"=1'-0"



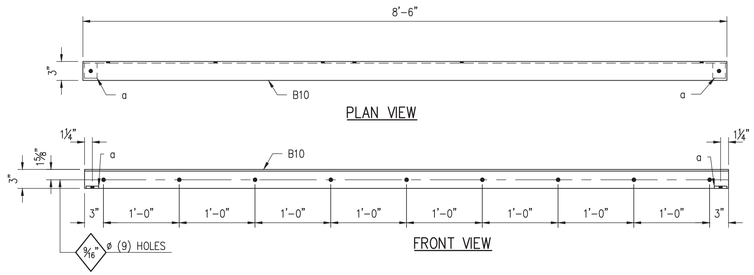
BEAM – B13

SCALE: 3"=1'-0"



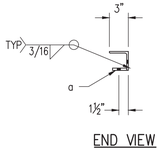
BEAM – B14

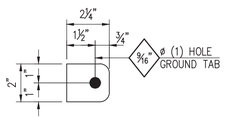
SCALE: 3"=1'-0"



BEAM – B10

SCALE: 1"=1'-0"





MK–a

SCALE: 3"=1'-0"

MARK	QTY.	DESCRIPTION	LENGTH FT.	LENGTH INS.	REMARKS
	6	FOR ONE BEAM-B1			
B1	ONE	W8x10	7	11	
	4	FOR ONE BEAM-B2			
B2	ONE	W8x10	7	11	
	4	FOR ONE BEAM-B3			
B3	ONE	W8x10	8	11	
	2	FOR ONE BEAM-B4			
B4	ONE	W8x15	12	11	
	2	FOR ONE BEAM-B5			
B5	ONE	W8x24	15	5	
	ONE	FOR ONE BEAM B8			
B8	ONE	L3x3x1/4	13	6	
a	2	PL 3/8 x 2	0	2 1/4	
	3	FOR ONE BEAM B9			
B9	ONE	L3x3x1/4	12	0	
a	2	PL 3/8 x 2	0	2 1/4	
	4	FOR ONE BEAM B10			
B10	ONE	L3x3x1/4	8	6	
a	2	PL 3/8 x 2	0	2 1/4	
	4	FOR ONE BEAM-B12			
B12	ONE	PL 1/2 x 6	1	0	
	64	FOR ONE BEAM-B13			
B13	ONE	L4x4x1/4	0	6	
	4	FOR ONE BEAM-B14			
B14	ONE	L6x6x1/2	0	6	
		PULTRUDED FIBERGLASS GRATING			
A1	8	T5020 - 2" x 47 1/2"	11	11 1/2	COMPOSITE
A2	4	T5020 - 2" x 47 1/2"	4	5 1/2	COMPOSITE
A3	5	T5020 - 2" x 35 1/2"	4	5 1/2	COMPOSITE
A4	12	T5020 - 2" x 471/2"	5	1 1/2	COMPOSITE
A5	15	T5020 - 2" x 351/2"	5	1 1/2	COMPOSITE

TOTAL WEIGHT FOR SUPPORT SYSTEM (LBS)
TOTAL BLACK WT = 2670
TOTAL GALV WT = 2763
TOTAL WEIGHT FOR FIBERGLASS GRATING (LBS)
TOTAL WT = 421

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-24-26.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:53 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:43 AM Tab:MCW-D-P016-26

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

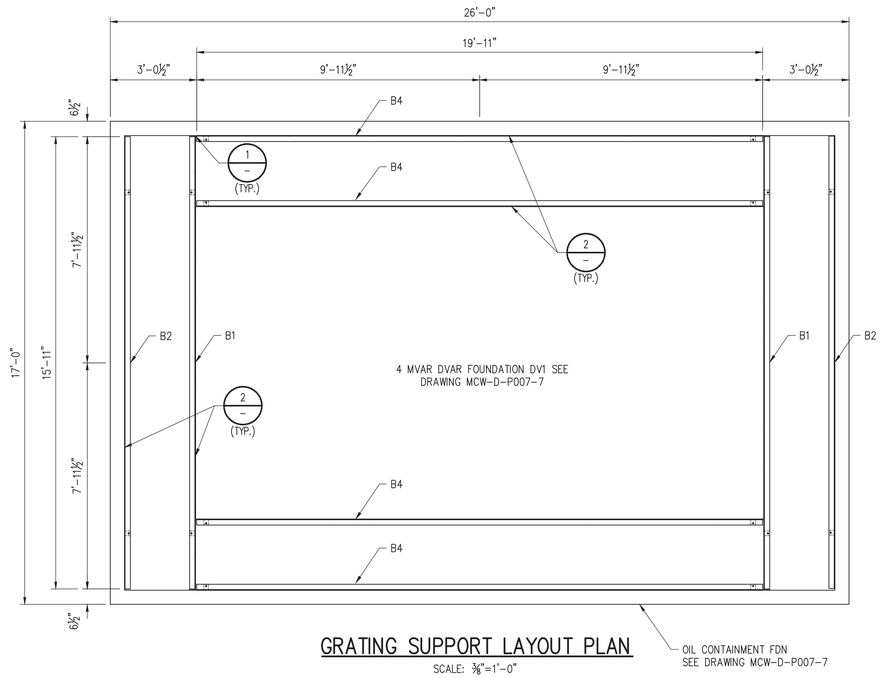
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	GMS	CAJ

edF renewables

ENGINEERING RECORD		DATE
DRAWN	BOUCHARD	08/19
DESIGNED	SMITH	06/19
CHECKED	JOBES	08/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

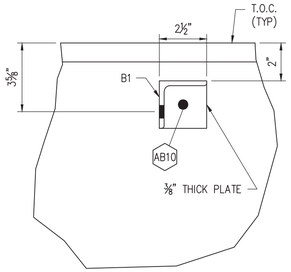
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
TRANSFORMER PLATFORM GRATING – TP1 (SH.3)

DWG. NAME: MCW-D-P016-26 | REVISION NO : 1

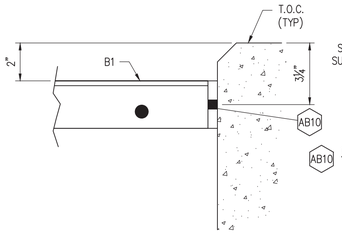


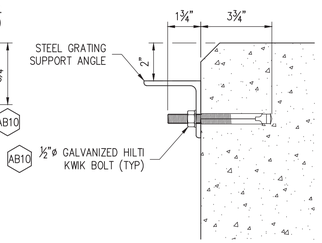
GRATING SUPPORT LAYOUT PLAN

SCALE: ⅜"=1'-0"



DETAIL 1 –
SCALE: 3"=1'-0"

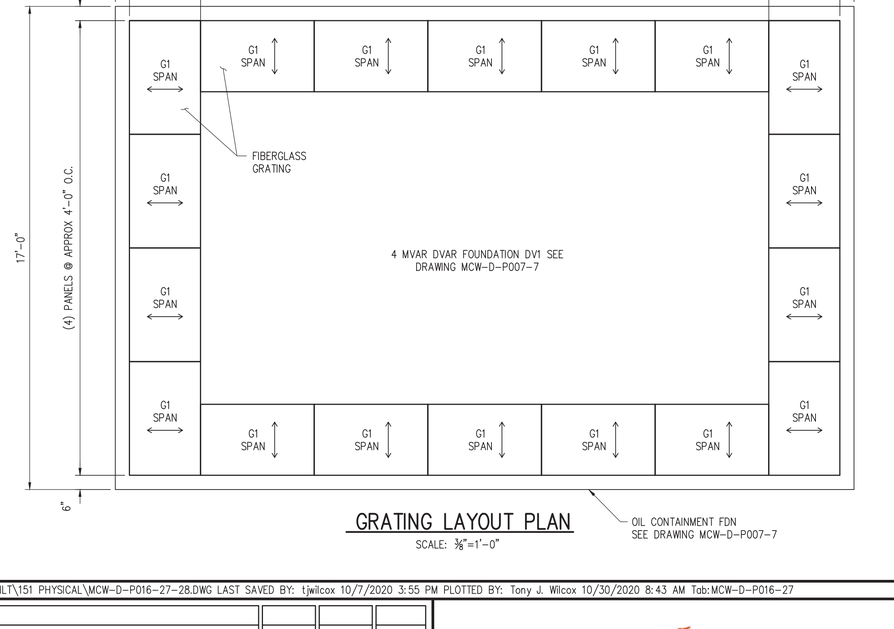




DETAIL 2 –
SCALE: 3"=1'-0"

MARK	QTY.	DESCRIPTION	LENGTH FT.	LENGTH INS.	REMARKS
	2	FOR ONE BEAM-B1			
B1	ONE	L 2 1/2" x 2 1/2" x1/4	15	11	
a	2	PL 3/8" x 2"	0	2 1/4	(WELD)
b	2	PL 3/8" x 2 1/2"	0	2 1/2	(WELD)
	2	FOR ONE BEAM-B1			
B2	ONE	L 2 1/2" x 2 1/2" x1/4	15	11	
a	2	PL 3/8" x 2"	0	2 1/4	(WELD)
	4	FOR ONE BEAM-B4			
B4	ONE	L 2 1/2" x 2 1/2" x1/4	19	11	
a	2	PL 3/8" x 2"	0	2 1/4	(WELD)
		PULTRUDED FIBERGLASS GRATING			
G1	18	T-5020 - 2" x 47 1/2"	2	5 1/2	COMPOSITE

TOTAL WEIGHT FOR SUPPORT SYSTEM (LBS)
TOTAL BLACK WT = 548
TOTAL GALV WT = 567
TOTAL WEIGHT FOR FIBERGLASS GRATING (LBS)



GRATING LAYOUT PLAN

SCALE: ⅜"=1'-0"

LEGEND

- A / A — INDICATES SECTION VIEW "A–A"
- A / SH 2 — INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
- 1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
- 9/16" ø (4) HOLES — HOLE DIAMETER AND NUMBER SYMBOL
- AB1 — INDICATES ITEM NUMBER ON BOLT LIST – MATERIAL GROUP "A" (SEE ERECTION BOLT & ANCHOR BOLT LIST BELOW)
- INDICATES APPROXIMATE LOCATION FOR STAMPING MARK NUMBERS ON STEEL MEMBERS.
- C1 — INDICATES STRUCTURAL MEMBER MARK NUMBER.

ANCHOR BOLT LIST (SEE NOTE 2)

ITEM	QUAN. PER STRUCTURE	TOTAL QUANTITY	DESCRIPTION
AB10	104	104	½"ø x 5½" HILTI KWIK BOLT (GALVANIZED)

NOTES

1. ALL ERECTION BOLTS & NUTS SHALL BE GALVANIZED HEAVY HEX ASTM A325 AND ASTM A563 GRADE DH RESPECTIVELY.
2. TOTAL QUANTITY EQUALS QUANTITY PER STRUCTURE TIMES THE NUMBER OF STRUCTURES PLUS 5%.
3. FASTEN GRATING TO SUPPORT PER MANUFACTURER'S RECOMMENDATIONS.

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-27-28.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:55 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:43 AM Tab:MCW-D-P016-27

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

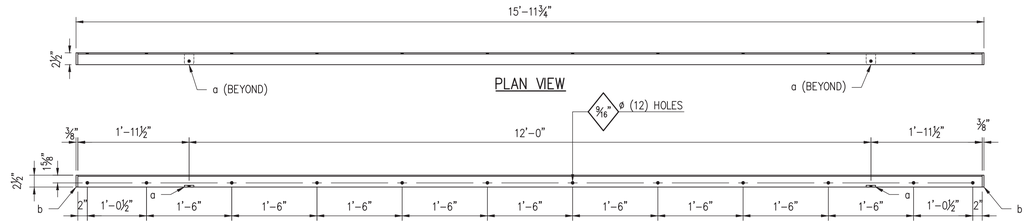
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	JDK	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	12/19
DESIGNED	KOEHLER	12/19
CHECKED	JOBES	12/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

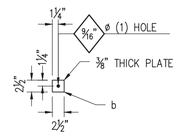
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
DVAR PLATFORM GRATING – DP1 (SH.1)

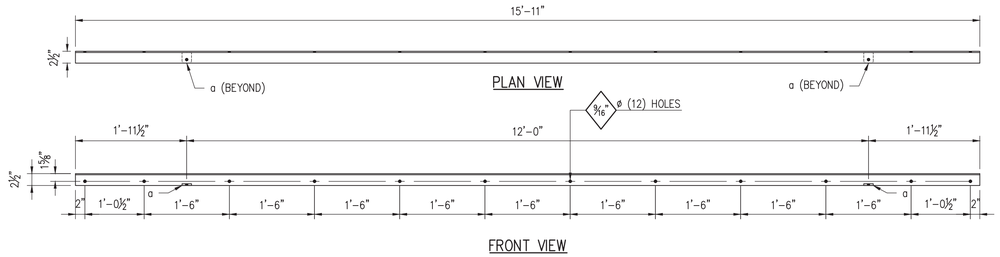
DWG. NAME: MCW-D-P016-27 | REVISION NO : 1



BEAM – B1

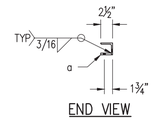
SCALE: 3/4"=1'-0"

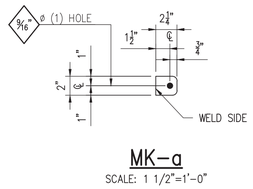




BEAM – B2

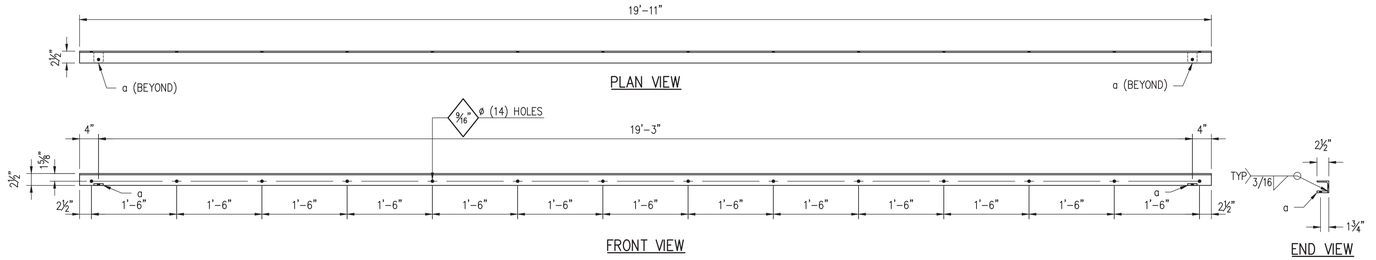
SCALE: 3/4"=1'-0"





MK–a

SCALE: 1 1/2"=1'-0"



BEAM – B4

SCALE: 3/4"=1'-0"

AS BUILT

NOTES

1. SEE DRAWING MCW-D-P016-27 FOR LEGEND, ERECTION BOLTS, ANCHOR BOLTS, NOTES AND BILL OF MATERIALS

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-27-28.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:55 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:43 AM Tab:MCW-D-P016-28

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

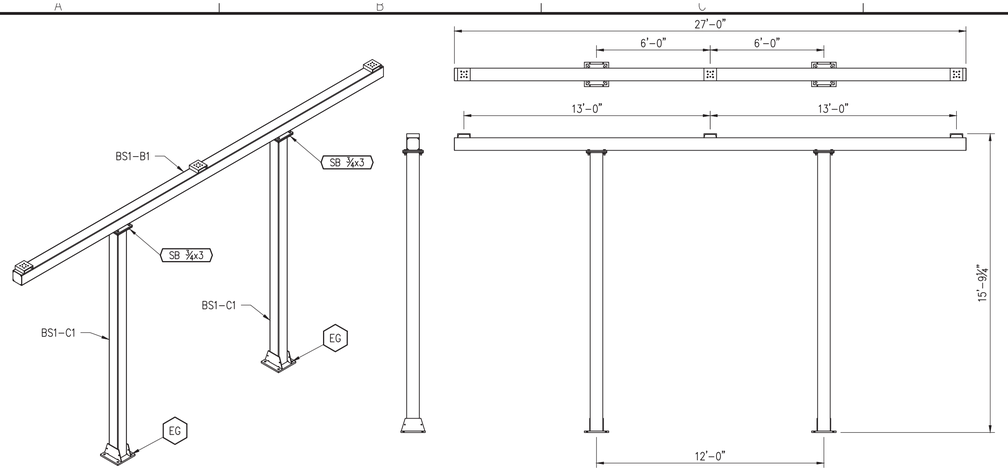
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	JDK	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	12/19
DESIGNED	KOEHLER	12/19
CHECKED	JOBES	12/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

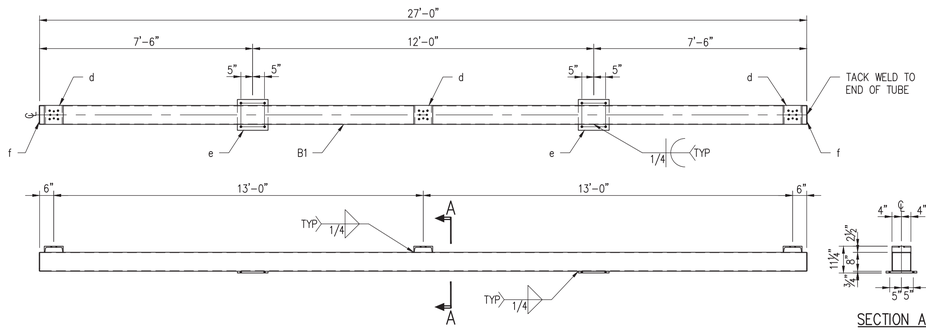
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
DVAR PLATFORM GRATING – DP1 (SH.2)

DWG. NAME: MCW-D-P016-28 | REVISION NO : 1



34.5 kV 3ø BUS SUPPORT – BS1

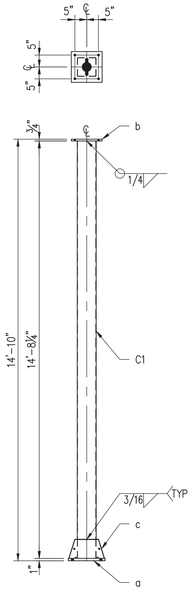
SCALE: ¼" = 1'-0"

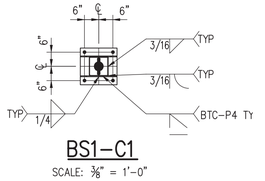


SECTION A-A

BS1-B1

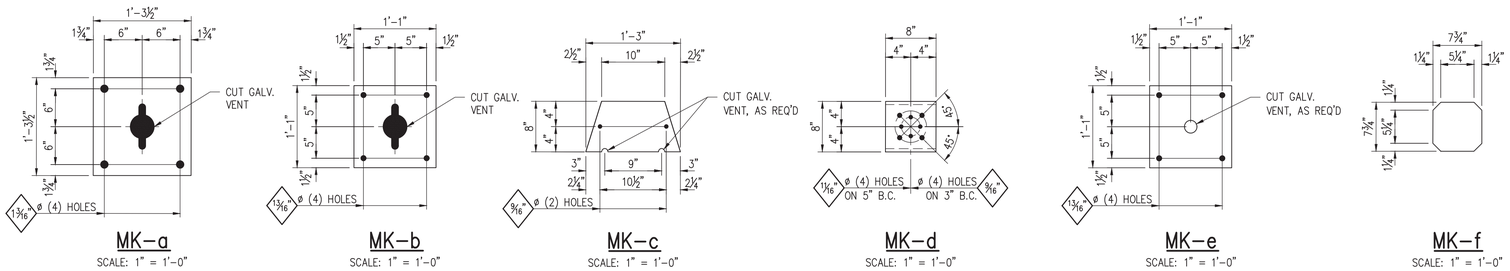
SCALE: ⅜" = 1'-0"





BS1-C1

SCALE: ⅜" = 1'-0"



MK-a SCALE: 1" = 1'-0"

MK-b SCALE: 1" = 1'-0"

MK-c SCALE: 1" = 1'-0"

MK-d SCALE: 1" = 1'-0"

MK-e SCALE: 1" = 1'-0"

MK-f SCALE: 1" = 1'-0"

DESIGN NOTES

BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
BUS = 2" S.P.S. ALUMINUM

LEGEND

- A–A — INDICATES SECTION VIEW "A-A"
- A / SH.1 — INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
- 1 / – — INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
- 1⅜6" ø (4) HOLES — HOLE DIAMETER AND QUANTITY SYMBOL
- SB ¾x3½ — INDICATES ITEM ON STRUCTURE BOLT LIST
- EG — INDICATES ITEM ON ANCHOR BOLT LIST
- BS1-C1 — INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	8	(2) HEAVY HEX NUTS; (2) FLAT WASHERS; (1) HEAVY HEX NUT; THREAD 1-8 UNC; 1"ø F1554, GRADE 55, GALVANIZED; (1) HEAVY HEX NUT; TACK

7" THD. — 3'-0" — 1"

A.B. DETAIL EG

SCALE: 1"=1'-0"

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 1³⁄₁₆"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	2	FOR ONE COLUMN BS1-C1			
C1	ONE	HSS8x8x⅜6	14	8¼	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
	ONE	FOR ONE BEAM BS1-B1			
B1	ONE	HSS8x8x⅜6	27	0	
d	3	C8x18.75	0	8	(WELD)
e	2	PL ¾x13	1	1	(WELD)
f	2	PL 1⁄6x7¾	0	7¾	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=1478	GALV WEIGHT=1530

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)
SB ¾x3	9	¾"ø x 3" WITH NUT, F/W, TENSION INDICATING WASHER AND LOCKNUT.

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USEAGE	BGP	DMB	09/30/16

STANDARD DRAWING: 35BS-3-17.5-15.0-A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-29.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:55 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:43 AM Tab:MCW-D-P016-29

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC. BILLINGS, MONTANA

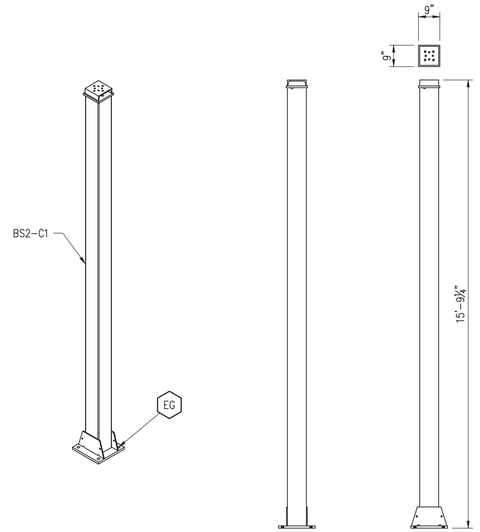
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edF renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	10/19
DESIGNED	MOHR	10/19
CHECKED	McDEVITT	11/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

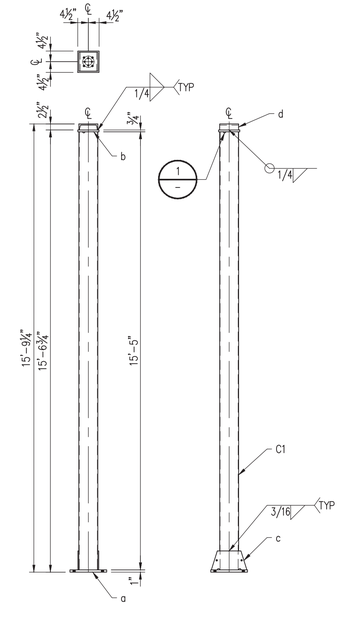
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV 3ø BUS SUPPORT – BS1

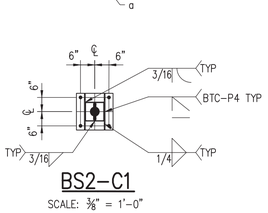
DWG. NAME: MCW-D-P016-29 REVISION NO : 1



34.5 kV 1ø BUS SUPPORT – BS2

SCALE: ⅜" = 1'-0"





BS2-C1

SCALE: ⅜" = 1'-0"

DESIGN NOTES

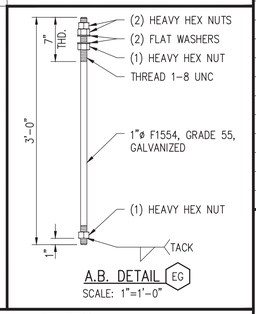
BUS HEIGHT = 17'-6"
INSULATOR = LAPP, TR210, 200 kV BIL, STANDARD STRENGTH, 3" B.C.
WELDMENT = TRAVIS 19-345 (2¾" BUS CENTER)
BUS = 2" S.P.S. ALUMINUM

LEGEND

A ⌐ ⌐ A	INDICATES SECTION VIEW "A-A"
A / SH.1	INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / –	INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
13/16 ø (4) HOLES	HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½	INDICATES ITEM ON STRUCTURE BOLT LIST
EG	INDICATES ITEM ON ANCHOR BOLT LIST
BS1-C1	INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	4	



A.B. DETAIL EG

SCALE: 1"=1'-0"

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY-46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM-A123.
4. WELDING ELECTRODE GRADE-70X.
5. ALL HOLES 13/16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE COLUMN BS2-C1			
C1	ONE	HSS8x8x5/16	15	5	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ¾x9	0	9	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	ONE	C8x18.75	0	8	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=426	GALV WEIGHT=441

STRUCTURE BOLT LIST

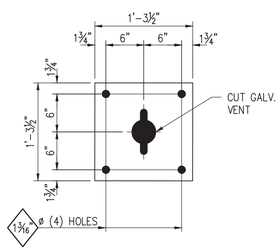
ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)

AS BUILT

STANDARD DRAWING REVISION

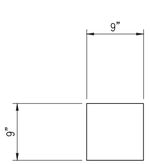
NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	BGP	DMB	09/30/16

STANDARD DRAWING: 35BS-1-15.7708-A.DWG



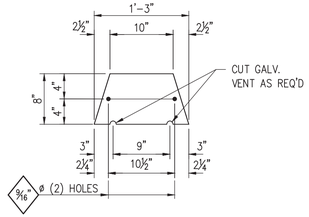
MK-a

SCALE: 1" = 1'-0"



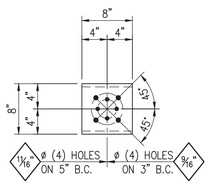
MK-b

SCALE: 1" = 1'-0"



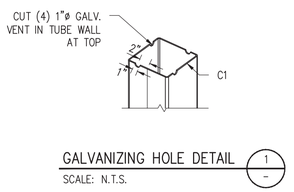
MK-c

SCALE: 1" = 1'-0"



MK-d

SCALE: 1" = 1'-0"



GALVANIZING HOLE DETAIL 1/–

SCALE: N.T.S.

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P016-30.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:56 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:43 AM Tab:MCW-D-P016-30

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

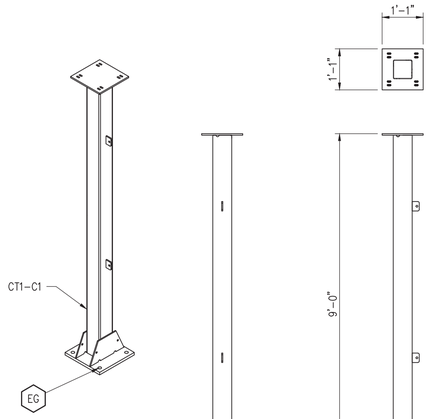
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

edf renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	10/19
DESIGNED	MOHR	10/19
CHECKED	McDEVITT	11/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

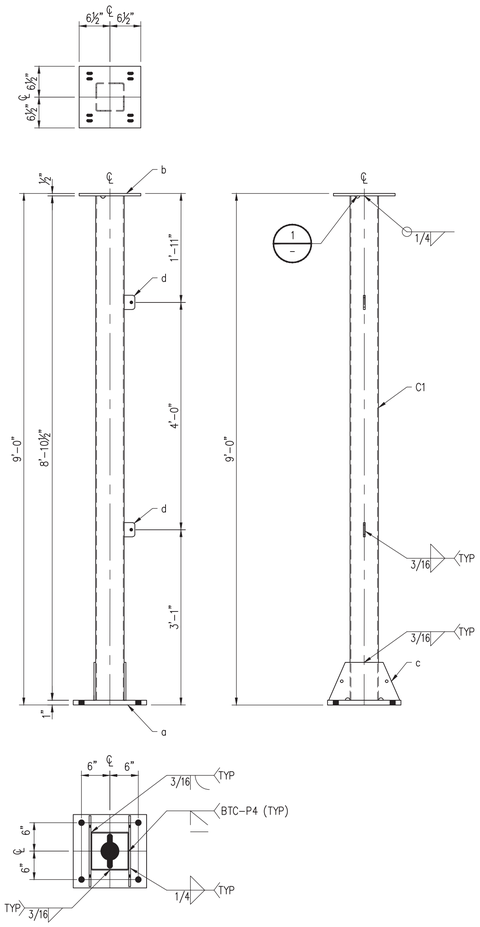
MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV 1ø BUS SUPPORT – BS2

DWG. NAME: MCW-D-P016-30 | REVISION NO : 1



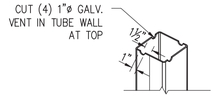
34.5 kV 1ø CT SUPPORT – CT1

SCALE: ½" = 1'-0"



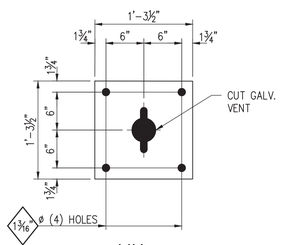
CT1–C1

SCALE: ¾" = 1'-0"



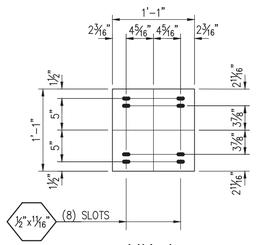
GALVANIZING HOLE DETAIL 1

SCALE: N.T.S.



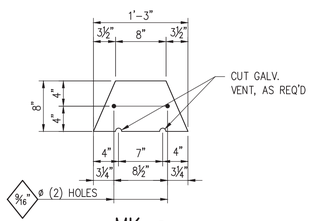
MK–a

SCALE: 1" = 1'-0"



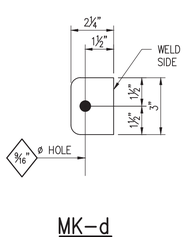
MK–b

SCALE: 1" = 1'-0"



MK–c

SCALE: 1" = 1'-0"



MK–d

SCALE: 3" =1'-0"

DESIGN NOTES

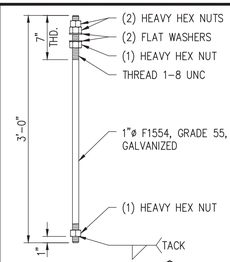
EQUIPMENT MANUFACTURE = ABB
TYPE = KOR–20 OUTDOOR CURRENT TRANSFORMER
WEIGHT = 110 LBS.
BOLT PATTERN = 8⅝"X10" W/ 7⁄16"øX⅞"ø SLOTS
BUS HEIGHT = 10'–7½"

LEGEND

A ⇂ ↧ A	INDICATES SECTION VIEW "A–A"
A / SH.1	INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS
1 / –	INDICATES DETAIL NUMBER; INDICATES DRAWING ON WHICH DETAIL APPEARS
13⁄16 ø (4) HOLES	HOLE DIAMETER AND QUANTITY SYMBOL
SB ¾x3½	INDICATES ITEM ON STRUCTURE BOLT LIST
EG	INDICATES ITEM ON ANCHOR BOLT LIST
BS1–C1	INDICATES STRUCTURE AND MEMBER MARK NUMBER

ANCHOR BOLT REQUIREMENTS

ITEM	QUANTITY	DETAIL (SEE NOTE 9)
EG	4	(2) HEAVY HEX NUTS; (2) FLAT WASHERS; (1) HEAVY HEX NUT; THREAD 1–8 UNC; 1"ø F1554, GRADE 55, GALVANIZED; (1) HEAVY HEX NUT; TACK



A.B. DETAIL EG

SCALE: 1"=1'-0"

NOTES

1. SHAPES AND PLATES ASTM A36 U.N, WIDE FLANGES ASTM A992
2. TUBING AND PIPE ASTM A500 GRADE B (FY–46 KSI).
3. ALL STEEL HOT DIP GALV. AFTER FAB. ASTM–A123.
4. WELDING ELECTRODE GRADE–70X.
5. ALL HOLES 13⁄16"ø FOR ¾"ø GALV. A325 BOLTS, UNLESS NOTED.
6. PIECE MARKS STAMPED INTO METAL WITH NOT LESS THAN ⅜" HIGH CHARACTERS BEFORE GALV.
7. BENT PLATES OF EQUAL THICKNESS AND DIMENSIONS MAY BE SUBSTITUTED FOR C AND MC SHAPES, WITH ENGINEERS APPROVAL.
8. FABRICATOR SHALL PROVIDE GALVANIZING VENTILATION OPENINGS AS REQUIRED.
9. ALL ANCHOR BOLTS & NUTS SHALL BE GALVANIZED F1554 GR55 AND ASTM A563 GRADE DH RESPECTIVELY.
10. ALL STRUCTURE BOLTS & NUTS SHALL BE GALVANIZED A325 AND HEAVY HEX, ASTM A563 GRADE DH RESPECTIVELY.
11. STRUCTURE BOLT QUANTITIES INCLUDE 5% OVERAGE, MINIMUM 1 EXTRA.
12. REFER TO WRITTEN SPECIFICATIONS FOR MATERIALS & FABRICATION REQUIREMENTS.
13. CONTRACTOR SHALL USE THREAD LUBRICATION PRODUCTS, FASTENAL "SLICK STICK", OR SIMILAR, ON ALL STRUCTURE BOLTS. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR TENSION INDICATING WASHER INSTALLATION.

BILL OF MATERIALS

MARK	QTY	DESCRIPTION	LENGTH FT.	LENGTH IN.	REMARKS
	ONE	FOR ONE COLUMN CT1–C1			
C1	ONE	HSS6x6x3⁄16	8	10½	
a	ONE	PL 1x15½	1	3½	(WELD)
b	ONE	PL ½x13	1	1	(WELD)
c	2	PL ⅜x8	1	3	(WELD)
d	2	PL ⅜x2¼	0	3	(WELD)

TOTAL STEEL WEIGHT FOR THIS STRUCTURE	
BLACK WEIGHT=248	GALV WEIGHT=256

STRUCTURE BOLT LIST

ITEM	QUANTITY (SEE NOTE 11)	DESCRIPTION (SEE NOTE 10)

AS BUILT

STANDARD DRAWING REVISION

NO	DESCRIPTION	ENG	APR	DATE
0	STANDARDS USAGE	BGP	DMB	09/30/16

STANDARD DRAWING: 35IT–1–9.0–A.DWG

FILE LOCATION: L:\EPC SERVICES\EPCS–435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW–D–P016–31.DWG LAST SAVED BY: tjwilcox 10/7/2020 3:56 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:44 AM Tab:MCW–D–P016–31

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

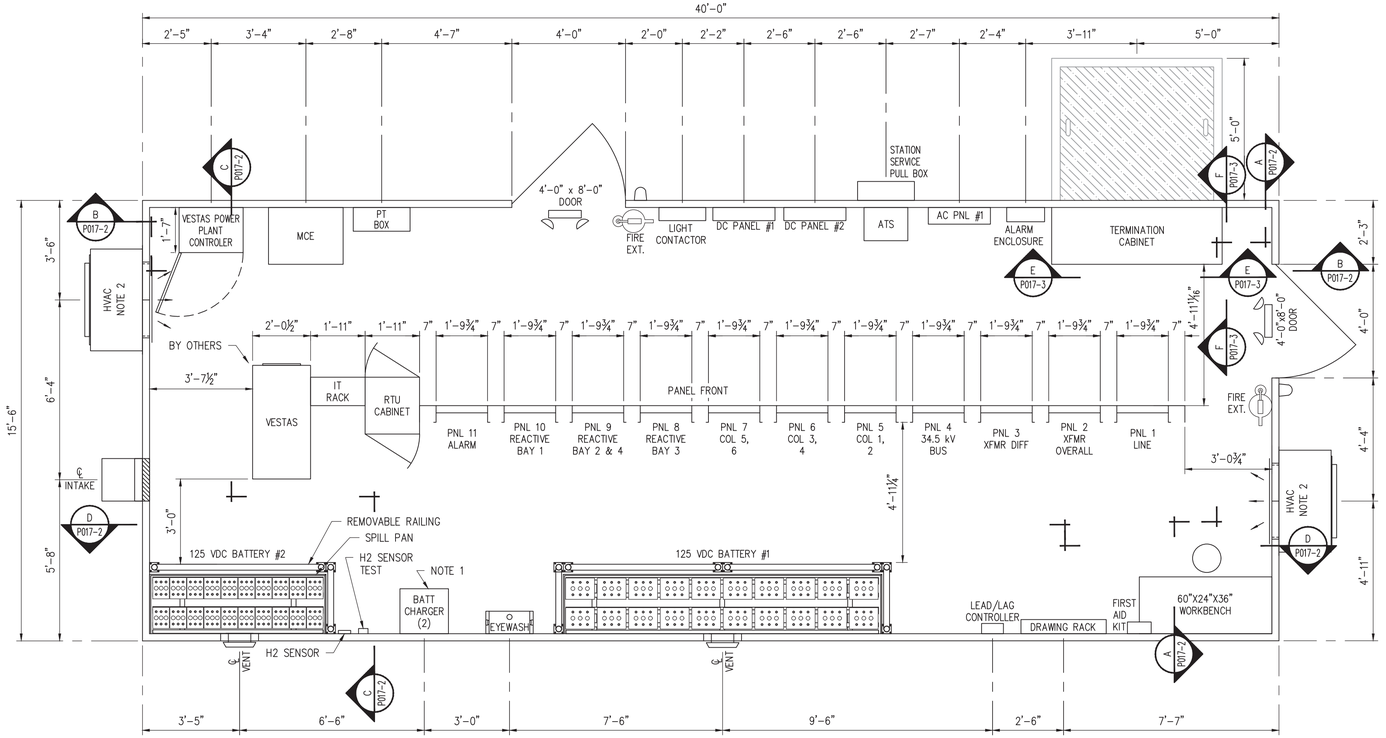
NO	REVISION	DATE	BY	APR
1	AS BUILT	10/30/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	SEM	CAJ

EDF renewables

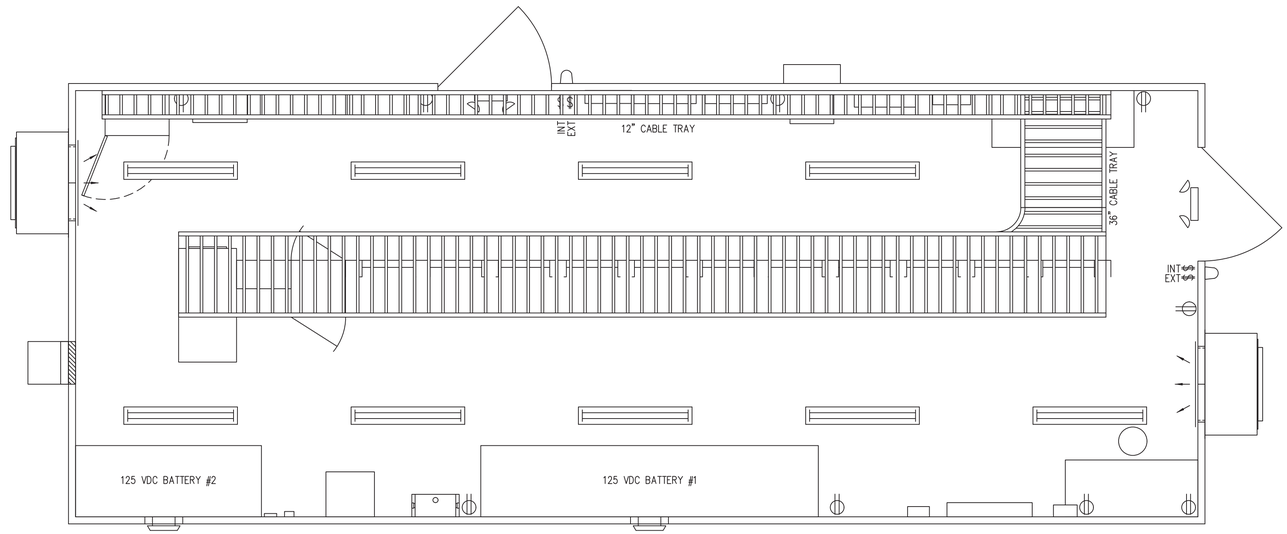
ENGINEERING RECORD		DATE
DRAWN	WILCOX	10/19
DESIGNED	MOHR	10/19
CHECKED	McDEVITT	11/19
APPROVED	JOBES	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
34.5 kV 1ø CT SUPPORT – CT1

DWG. NAME: MCW–D–P016–31 | REVISION NO : 1



CONTROL ENCLOSURE EQUIPMENT LAYOUT



CONTROL ENCLOSURE CABLE TRAY & LIGHTING PLAN

AS BUILT

NOTES

1. STACKED BATTERY CHARGERS.
2. DIRECT HVAC CONDENSATE LINE AWAY FROM PIER FOUNDATIONS AND ENCLOSURE.

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P017-1.DWG LAST SAVED BY: tjwilcox 10/8/2020 3:08 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:45 AM Tab:MCW-D-P017-1

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

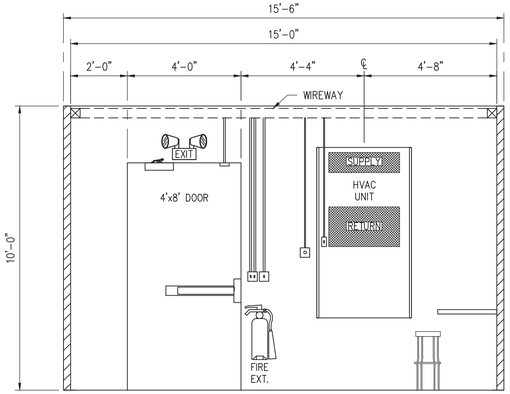
NO	REVISION	DATE	BY	APR
2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

edf renewables

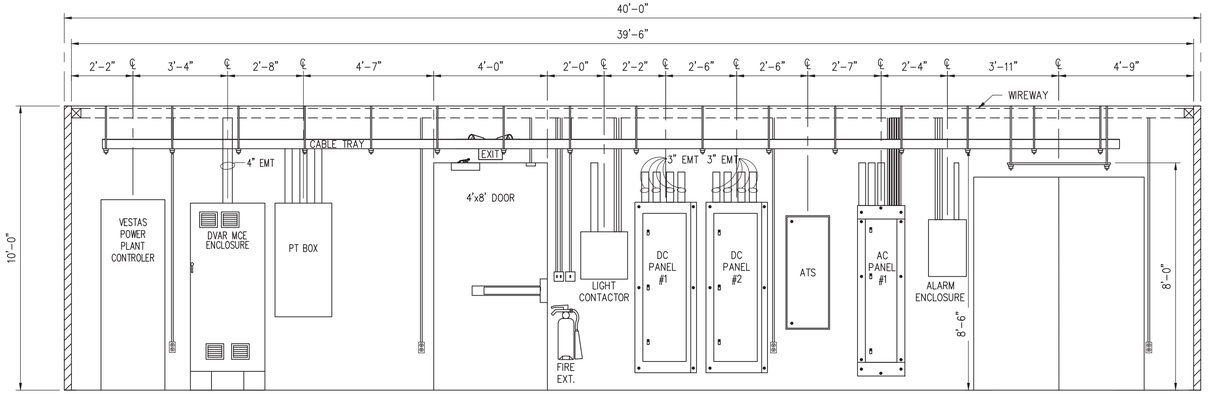
ENGINEERING RECORD		DATE
DRAWN	WILCOX	06/19
DESIGNED	WILCOX	06/19
CHECKED	GROFF	06/19
APPROVED	GROFF	12/19
DWG SCALE: 3/8" = 1'-0"	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CONTROL ENCLOSURE LAYOUT

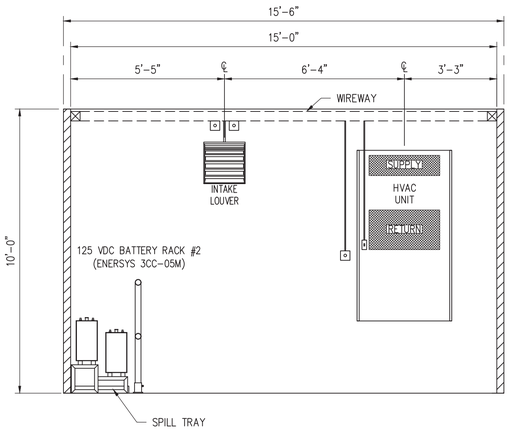
DWG. NAME: MCW-D-P017-1 | REVISION NO : 2



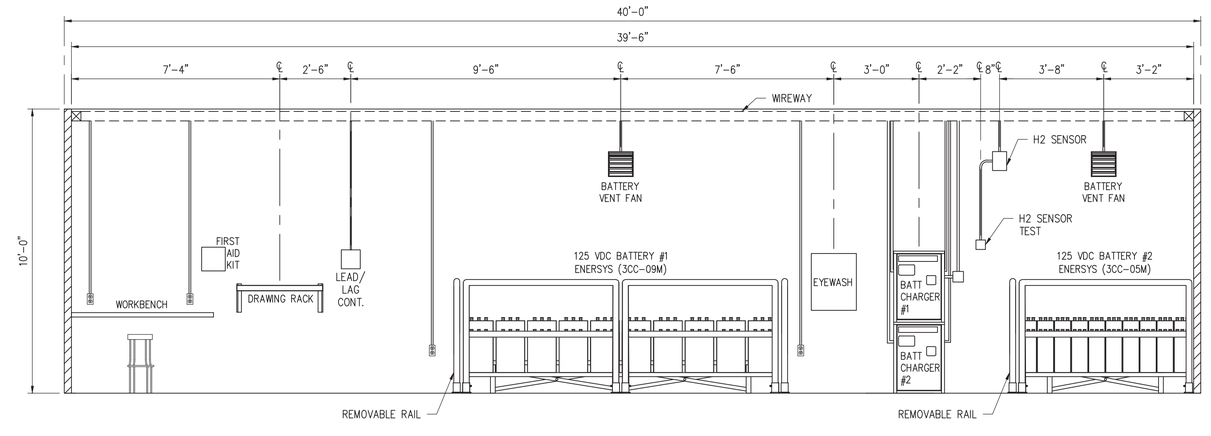
ELEVATION A–A
SCALE: 3/8"=1'-0"
P017-1



ELEVATION B–B
SCALE: 3/8"=1'-0"
P017-1



ELEVATION C–C
SCALE: 3/8"=1'-0"
P017-1



ELEVATION D–D
SCALE: 3/8"=1'-0"
P017-1

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P017-2.DWG LAST SAVED BY: tjwilcox 10/7/2020 4:00 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:45 AM Tab:MCW-D-P017-2

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

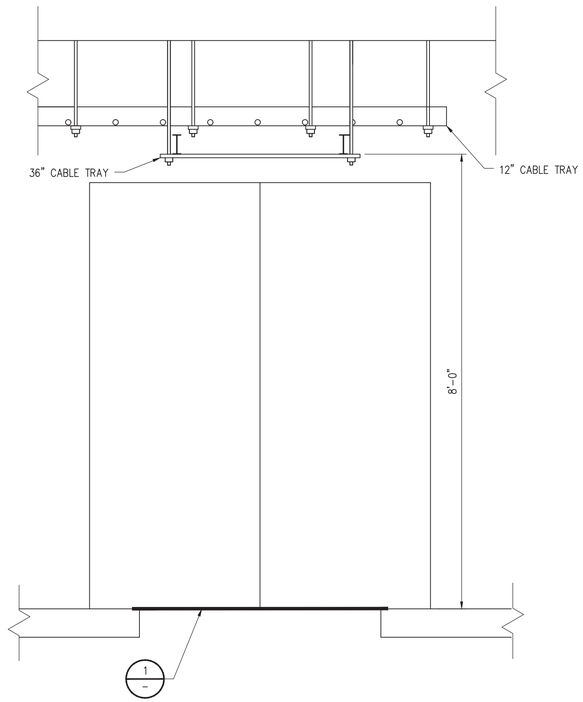
NO	REVISION	DATE	BY	APR
2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

EDF renewables

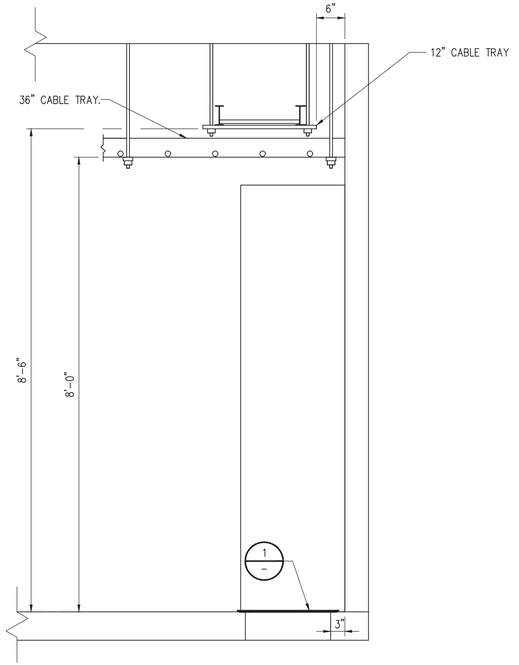
ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CONTROL ENCLOSURE INTERIOR ELEVATIONS

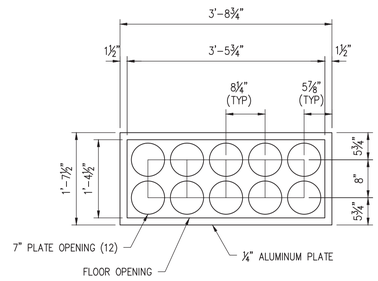
DWG. NAME: MCW-D-P017-2
REVISION NO : 2



ELEVATION — E-E (P017-1)
SCALE: 3/4"=1'-0"



ELEVATION — F-F (P017-1)
SCALE: 3/4"=1'-0"



DETAIL — 1 / –
COVER PLATE DETAIL
SCALE: ¾"=1'-0"

AS BUILT

FILE LOCATION: L:\EPC SERVICES\EPCS-435 EDF MERRICOURT WIND SUBSTATION\100 CADD\150 AS BUILT\151 PHYSICAL\MCW-D-P017-3.DWG LAST SAVED BY: tjwilcox 10/7/2020 4:01 PM PLOTTED BY: Tony J. Wilcox 10/30/2020 8:45 AM Tab:MCW-D-P017-3

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
2	AS BUILT	10/30/20	TJW	MAG
1	ISSUED FOR CONSTRUCTION; DVAR ADDITION	04/20/20	TJW	MAG
0	ISSUED FOR CONSTRUCTION	12/04/19	TJW	MAG

EDF renewables

ENGINEERING RECORD		DATE
DRAWN	WILCOX	07/19
DESIGNED	WILCOX	07/19
CHECKED	GROFF	08/19
APPROVED	GROFF	12/19
DWG SCALE: AS NOTED	PLT SCALE: 1:1	

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
CONTROL ENCLOSURE INTERIOR ELEVATIONS

DWG. NAME: MCW-D-P017-3 | REVISION NO : 2

ITEM	MFGR	CATALOG NO.	DESCRIPTION
A100	CHM	-	TAPERED TUBULAR STEEL STRUCTURES WITH ANCHOR BOLTS (SM1, DE1)
A101	TBD	-	STANDARD SHAPE STEEL STRUCTURES WITH ANCHOR BOLTS (BS36, CS5A, CS5B, CS5D, CVT3A, GG1, RE1, SS3D, SS8A, TP1, DP1)
A102			ELECTRICAL BUS HARDWARE AND EQUIPMENT
(A1)	AFL/ALCOA or EQUAL	400S40YT6B	4" SPS SCHEDULE 40 ALUMINUM TUBE, (6063-T6 ALLOY) 40' LENGTH
(A2)	AFL/ALCOA or EQUAL	200S40YT6B	2" SPS SCHEDULE 40 ALUMINUM TUBE, (6063-T6 ALLOY) 40' LENGTH
(A3)	SOUTHWIRE or EQUAL	COWSLIP	CONDUCTOR, BARE, 2000 kCM AAC "COWSLIP", 91 STRAND
(A4)	SOUTHWIRE or EQUAL	NARCISSUS	CONDUCTOR, BARE, 1272 kCM AAC "NARCISSUS", 61 STRAND
(A5)	SOUTHWIRE or EQUAL	CANNA	CONDUCTOR, BARE, 397.5 kCM AAC " CANNA", 19 STRAND
(A6)	SOUTHWIRE or EQUAL	POPPY	CONDUCTOR, BARE, #1/0 AAC "POPPY", 7 STRAND
(A8)	GENERAL CABLE or EQUAL	EmPowr Link CL	CONDUCTOR, UNDERGROUND 35 kV XLPE, 350 kCMIL ALUMINUM, 26 STRAND, 1/2 NEUTRAL, TRXLPE INSULATION CONCENTRIC NEUTRAL XLPE JACKET, UL TYPE MV-105
(A9)	GENERAL CABLE or EQUAL	--	3/8" EHS STATIC SHIELD WIRE, 7 STRAND
(A10A)			BENT PLATE PER DETAIL A24 MCW-D-P005-3
(A11B)	TRAVIS or EQUAL	111-145	END BELL, DRIVE FIT INTERNAL ALUMINUM, 4" SPS
(A11C)	TRAVIS or EQUAL	18-130-CFE	TERMINAL CONNECTOR, WELDMENT EXTERNAL ALUMINUM, 4" SPS TO CENTER-FORMED NEMA "D" PAD
(A12A)	TRAVIS or EQUAL	18-117-CFE	TERMINAL CONNECTOR, WELDMENT EXTERNAL ALUMINUM, 2" SPS TO CENTER-FORMED NEMA "C" PAD
(A12B)	TRAVIS or EQUAL	111-137	END BELL, DRIVE FIT ALUMINUM, 2" SPS
(A12C)	TRAVIS or EQUAL	18-117-E-90-SP	TERMINAL CONNECTOR, WELDMENT EXTERNAL ALUMINUM, 2" SPS TO CENTER-FORMED NEMA "C" PAD, 90 DEGREES, 4-1/2" CL BUS TO CL PAD, ****NO SUBSTITUTIONS
(A12D)	TRAVIS or EQUAL	18-1133-90	TERMINAL CONNECTOR, WELDMENT EXPANSION ALUMINUM, 2" SPS TO NEMA "C" PAD, 90 DEGREES

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NO	REVISION	DATE	BY	APR
4	AS BUILT	10/30/20	TJW	MAG
3	IFC: DVAR ADDITION	04/20/20	TJW	MAG
2	ISSUED FOR CONSTRUCTION	12/20/19	TJW	MAG
1	ISSUED FOR CONSTRUCTION	11/26/19	TJW	MAG

EDF renewables

ENGINEERING RECORD		DATE
DRAWN	TJW	07/19
DESIGNED	TJW	07/19
CHECKED	MAG	08/19
APPROVED	MAG	10/19

MERRICOURT WIND PROJECT
34.5 – 230 kV SUBSTATION
BILL OF MATERIALS

DWG NAME: MCW-B-Z001 REV. NO.: 4

ITEM	MFGR	CATALOG NO.	DESCRIPTION
(A13A)	TRAVIS or EQUAL	18-724-SP(2000AAC)	TERMINAL CONNECTOR, WELDMENT ALUMINUM, CABLE TO FLAT PAD, 2000 kCM AAC TO NEMA “D” PAD
(A13B)	TRAVIS or EQUAL	18-787-SP(2000AAC)	TERMINAL CONNECTOR, WELDMENT ALUMINUM, DUAL CABLE TO FLAT PAD, 2000 kCM AAC TO NEMA “D” PAD
(A14A)	TRAVIS or EQUAL	18-712	TERMINAL CONNECTOR, WELDMENT ALUMINUM, CABLE TO FLAT PAD, 1272 kCM AAC TO NEMA “D” PAD
(A14B)	TRAVIS or EQUAL	16-165D-90	TERMINAL CONNECTOR, COMPRESSION ALUMINUM, CABLE TO FLAT PAD, 1272 kCM AAC TO NEMA “D” PAD, 90 DEGREES
(A14C)	TRAVIS or EQUAL	18-712-45	TERMINAL CONNECTOR, WELDMENT ALUMINUM, CABLE TO FLAT PAD, 1272 kCM AAC TO NEMA “D” PAD, 45 DEGREES
(A14D)	TRAVIS or EQUAL	18-711	TERMINAL CONNECTOR, WELDMENT ALUMINUM, CABLE TO FLAT PAD, 1272 kCM AAC TO NEMA “C” PAD
(A14E)	TRAVIS or EQUAL	16-165D	TERMINAL CONNECTOR, COMPRESSION ALUMINUM, CABLE TO FLAT PAD, 1272 kCM AAC TO NEMA “D” PAD
(A14F)	TRAVIS or EQUAL	18-712-90	TERMINAL CONNECTOR, WELDMENT ALUMINUM, CABLE TO FLAT PAD, 1272 kCM AAC TO NEMA “D” PAD, 90 DEGREES
(A15A)	TRAVIS or EQUAL	18-681	TERMINAL CONNECTOR, WELDMENT ALUMINUM, CABLE TO FLAT PAD, 397.5 kCM AAC TO NEMA “C” PAD
(A15B)	TRAVIS or EQUAL	18-681-45	TERMINAL CONNECTOR, WELDMENT ALUMINUM, CABLE TO FLAT PAD, 397.5 kCM AAC TO NEMA “C” PAD, 45 DEGREES
(A16A)	TRAVIS or EQUAL	18-662	TERMINAL CONNECTOR, WELDMENT ALUMINUM, #1/0 AAC TO NEMA “B” PAD
(A16B)	BURNDY or EQUAL	YA25A3	TERMINAL CONNECTOR, COMPRESSION ALUMINUM, #1/0 AAC TO (1) 3/8” DIA. HOLE
(A18A)	3M or EQUAL	40156	TERMINAL, COMPRESSION COPPER/ALUMINUM, 350 kCMIL CABLE TO NEMA “B” PAD
(A18B)	3M or EQUAL	7665-S-8	TERMINATION KIT, OUTDOOR, 35 kV, SILICONE RUBBER, COLD SHRINK, #3/0 AWG - 600 kCMIL
(A18C)	3M or EQUAL	7655-T-150	TERMINATION KIT, INDOOR, 35 kV, SILICONE RUBBER, COLD SHRINK, #3/0 AWG - 600 kCMIL
(A21)	TRAVIS or EQUAL	18-642-WR	TEE CONNECTOR, WELDMENT ALUMINUM, 3” – 6” SPS TUBE TO NEMA “D” PAD
(A22A)	TRAVIS or EQUAL	18-624-WR	TEE CONNECTOR, WELDMENT ALUMINUM, 1” – 3” SPS TUBE TO NEMA “D” PAD
(A22B)	TRAVIS or EQUAL	18-160	TEE CONNECTOR, WELDMENT ALUMINUM, 2” SPS MAIN TO 2” SPS TAP
(A22C)	TRAVIS or EQUAL	18-623-WR-90	TEE CONNECTOR, WELDMENT ALUMINUM, 1” – 3” SPS TUBE TO NEMA “C” PAD, 90 DEGREES
(A24A)	TRAVIS or EQUAL	16-165D-T	CABLE TEE CONNECTOR, COMPRESSION ALUMINUM, 1272 kCM AAC TO NEMA “D” PAD
(A31A)	TRAVIS or EQUAL	19-353	BUS SUPPORT, HOOK-ON ALUMINUM, 4” SPS TO 3” BOLT CIRCLE
(A31B)	TRAVIS or EQUAL	19-1240	BUS SUPPORT, WELDMENT ALUMINUM, 4” SPS TO 5” BOLT CIRCLE
(A31C)	TRAVIS or EQUAL	18-1096	BUS SUPPORT, EXPANSION ALUMINUM, 4” SPS TO 3” BOLT CIRCLE
(A32)	TRAVIS or EQUAL	19-345	BUS SUPPORT, HOOK-ON ALUMINUM, 2” SPS TO 3” BOLT CIRCLE

ITEM	MFGR	CATALOG NO.	DESCRIPTION
(A36)	TRAVIS or EQUAL	19-399	BUS SUPPORT, BOLTED ALUMINUM, #4-954 kCM AAC TO 3” BOLT CIRCLE
(A41)	TRAVIS or EQUAL	18-572	CONNECTOR, COUPLER, 4” SPS TO 4” SPS
(A42A)	TRAVIS or EQUAL	18-538	CONNECTOR, COUPLER, 2” SPS TO 2” SPS
(A43)	TRAVIS or EQUAL	110-123-CS-6	CABLE SPACER, BOLTED ALUMINUM, DUAL 2000 kCM AAC, 6” SPACING
(A91)	HUBBELL or EQUAL	MDE40C	DEADEND, STRAIN CLAMP, CLEVIS TYPE, STRAIGHT LINE DEAD END FOR 3/8” EHS
(A92)	HUBBELL or EQUAL	AS25	ANCHOR, SHACKLE, FORGED STEEL 30,000 LBS ULTIMATE STRENGTH, ½” SHANK, 5/8” DIA. PIN
(A93)	HUBBELL or EQUAL	301225SW	STATIC TERMINAL, COMPRESSION, 3/8” EHS TO NEMA “B” PAD, 15 DEGREE
(A94)	HUBBELL	CCS820	CABLE POSITIONER
(A95)	TE CONNECTIVITY	BCAC-G-IC-8D/18	BUSHING INSULATING COVER, GRAY, INSULATOR CORE RANGE 3 ½” – 6 ¼”, INSULATOR SHED RANGE 4” – 8”
(A96)	PLP	5050104	EHS SPIRAL DAMPER, STANDARD SPAN LENGTH 0’-800’, DIAMETER .327-.461” , LENGTH 51”
A103	LAPP	315304-70	230 kV, PORCELAIN, STATION POST INSULATOR, TR 304, 900 kV BIL, STANDARD STRENGTH, 5” B.C. TOP, 5” B.C. BOTTOM
A104	LAPP	315210-70	34.5 kV, PORCELAIN, STATION POST INSULATOR, TR210, 200 kV BIL, STANDARD STRENGTH, 3” B.C.
B1	PASCOR	VBPA	DISCONNECT SWITCH, 230 kV 1200 AMP THREE-POLE, VERTICAL BREAK STYLE, MOTOR OPERATOR
B2	ROYAL	AVT3430	DISCONNECT SWITCH, 34.5 kV, 3000 AMP THREE-POLE, VERTICAL BREAK
C1	HUBBELL	SVN192UA152AA	SURGE ARRESTER, STATION CLASS, POLYMER HOUSED, 192 kV DUTY CYCLE, 152 kV MCOV, UNDERHUNG MOUNT
C2	HUBBELL	221629-7314	SURGE ARRESTER, RISER CLASS, POLYMER HOUSED, 36 kV DUTY CYCLE, 29 kV MCOV, NORMAL MOUNT

ITEM	MFGR	CATALOG NO.	DESCRIPTION
C3	EATON	UNS36140A1A1A1A	SURGE ARRESTER, DISTRIBUTION CLASS, NORMAL DUTY, POLYMER HOUSED, 36 kV DUTY CYCLE, 29 kV MCOV, INSULATED HANGAR W/ 1/2" HOLE FOR MOUNTING
D1	ROYAL	19813	HOOK OPERATED VEE SWITCH, VERTICAL MTG, 34.5 kV, 1200 AMP, BT STYLE
D2	S&C	SM-5 (190604R2, 86154R2)	FUSED DISCONNECT SWITCH, 34.5 kV NOMINAL, 38 kV MAX, 200 kV BIL, RIGHT-ANGLE STYLE, STATION POST INSULATORS, TINNED NEMA TWO HOLE PAD, WITH FUSE HOLDER
D3	S&C	134007R4	FUSE UNIT FOR SM-5 FUSED DISCONNECT, 5E, 34.5 kV, STANDARD SPEED
E1	GE	DT1-245P- F1	POWER CIRCUIT BREAKER, 230 kV, 1200 AMP, 40 kAIC, 3 CYCLE, 125 VDC CONTROL, 120/240 VAC, W/ (12) 1200:5 C400 MR BCTs AND (3) 500:5 0.3% B 1.8 SR BCTs
E2	EMA	VDH/GSMI	GROUNDING POWER CIRCUIT BREAKER, 38 kV, 1200 AMP, 31.5 kAIC, 125 VDC CONTROL & MOTOR, 120/240 VAC, W/(6) 1200:5 C400 MR BCTs AND (3) 3000:5 C800 MR BCTs
E3	GE	DT1-72.5FK F1	POWER CIRCUIT BREAKER, 72.5 kV, 2000 AMP, 40 kAIC, 3 CYCLE, 125 VDC CONTROL, 120/240 VAC, W/(6) 1200:5 C400 MR BCTs AND (3) 3000:5 C800 MR BCTs
G1	TRENCH	TEMP 245	CAPACTIVE VOLTAGE TRANSFORMER, 230 kV CLASS, 1050 kV BIL, OIL FILLED, 138,000 – 115/69 VOLT, 1200/2000:1 RATIO, DUAL SECONDARY 0.15 W THROUGH Z ACCURACY, 1000 VA, FOUR HOLE PAD
G2	ABB	VOY-20G	VOLTAGE TRANSFORMER, 34.5 kV CLASS, 200 kV BIL, 20,125 – 115/67 VOLT, GND WYE, 175/300:1 RATIO, SINGLE SECONDARY, 1000 VA, SINGLE BUSHING OUTDOOR VT, ACCURACY 0.3% W THROUGH Y, PRI. TERM ACCEPTS #10 AWG TO 250 kCMIL.
G3	ABB	KOR-20	CURRENT TRANSFORMER, 34.5 KV CLASS, 200 kV BIL, 150/300 – 5 AMP, SINGLE SECONDARY, DOUBLE BUSHING OUTDOOR CT, ACCURACY 0.3% B 0.1 THROUGH 1.8 X1-X3, 0.3% B 0.1 THROUGH 0.9 X2-X3, NEMA "B" PAD
H1	ILJIN	--	MAIN POWER TRANSFORMER, 34.5 – 230 kV, 100/134/167 MVA @ 65 DEGREES, ONAN/ONAF1/ONAF2, Z=9.0 PERCENT, 900 kV BIL PRIMARY WINDING, 200 kV BIL SECONDARY WINDING, 110 kV BIL TERTIARY WINDING, SIX (6) 1200:5 C800 PRIMARY MRBCTs, THREE (3) 500:5 PRIMARY SRBCTs 0.3% B 1.8, ONE (1) 1200:5 C800 PRIMARY NEUTRAL MRBCT, NINE (9) 3000:5 C800 SECONDARY MRBCTs, ONE (1) 3000:5 C800 SECONDARY NEUTRAL MRBCT, TWO (2) 1200:5 C800 TERTIARY MRBCTS
H2	CENTRAL MALONEY	--	TRANSFORMER, STATION SERVICE 75 kVA, 19.92 kV L-N GRD Y – 120/240 V, 1 BUSHING, NO TAPS, ONAN @ 65°C

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ITEM	MFGR	CATALOG NO.	DESCRIPTION
K100			CONDUIT AND CABLE
			PLASTIC CONDUIT
(K1)	CARLON or EQUAL	59618-010	CONDUIT, 8” PVC, W/BELL END, 10 FT. LENGTH, SCH 40
(K1A)	CARLON or EQUAL	E442T	COUPLING, 8” PVC
(K1B)	CARLON or EQUAL	E997T	END BELL, 8” PVC
(K2)	CARLON or EQUAL	49017-010	CONDUIT, 6” PVC, W/BELL END, 10 FT. LENGTH, SCH 40
(K2A)	CARLON or EQUAL	E940R	COUPLING, 6” PVC
(K2B)	CARLON or EQUAL	E997R	END BELL, 6” PVC
(K2C)	CARLON or EQUAL	E943R	ADAPTER, MALE, 6” THREAD TO 6” PVC
(K4)	CARLON or EQUAL	49015-010	CONDUIT, 4” PVC W/BELL END, 10 FT. LENGTH, SCH 40
(K4A)	CARLON or EQUAL	E940N	COUPLING, 4” PVC
(K4B)	CARLON or EQUAL	E997N	END BELL, 4” PVC
(K4C)	CARLON or EQUAL	E943N	ADAPTER, MALE, 4” THREAD TO 4” PVC
(K4D)	CARLON or EQUAL	E942N	ADAPTER, FEMALE, 4” THREAD TO 4” PVC
(K6)	CARLON or EQUAL	49012-010	CONDUIT, 2-1/2” PVC, W/BELL END, 10 FT. LENGTH, SCH 40
(K6A)	CARLON or EQUAL	E940K	COUPLING, 2-1/2” PVC
(K6B)	CARLON or EQUAL	E997K	END BELL, 2-1/2” PVC
(K6C)	CARLON or EQUAL	E943K-CAR	ADAPTER, MALE, 2-1/2” THREAD TO 2-1/2” PVC
(K6D)	CARLON or EQUAL	E942K	ADAPTER, FEMALE, 2-1/2” THREAD TO 2-1/2” PVC
(K7)	CARLON or EQUAL	49011-010	CONDUIT, 2” PVC, W/BELL END, 10 FT. LENGTH, SCH 40
(K7A)	CARLON or EQUAL	E940J	COUPLING, 2” PVC
(K7B)	CARLON or EQUAL	E997J	END BELL, 2” PVC
(K7C)	CARLON or EQUAL	E943J	ADAPTER, MALE, 2” THREAD TO 2” PVC
(K7D)	CARLON or EQUAL	E942J	ADAPTER, FEMALE, 2” THREAD TO 2” PVC
(K8)	CARLON or EQUAL	49010-010	CONDUIT, 1-1/2” PVC, W/BELL END, 10 FT. LENGTH, SCH 40
(K8A)	CARLON or EQUAL	E490H	COUPLING, 1-1/2” PVC

ITEM	MFGR	CATALOG NO.	DESCRIPTION
			METALLIC CONDUIT
(K14A)	JMC STEEL GROUP or EQUAL	4” RMC	CONDUIT, 4” RIGID GALV. STEEL (RGS), THREAD BOTH ENDS, 10 FT. LENGTH
(K15A)	JMC STEEL GROUP or EQUAL	3” RMC	CONDUIT, 3” RIGID GALV. STEEL (RGS), THREAD BOTH ENDS, 10 FT. LENGTH
(K16A)	JMC STEEL GROUP or EQUAL	2-1/2” RMC	CONDUIT, 2-1/2” RIGID GALV. STEEL (RGS), THREAD BOTH ENDS, 10 FT. LENGTH
(K17A)	JMC STEEL GROUP or EQUAL	2” RMC	CONDUIT, 2” RIGID GALV. STEEL (RGS), THREAD BOTH ENDS, 10 FT. LENGTH
(K17B)	JMC STEEL GROUP or EQUAL	2” RMC ELBOW	ELBOW, 2” RIGID GALV. STEEL (RGS), THREAD BOTH ENDS
			METALLIC LIQUIDTIGHT CONDUIT
(K24)	SOUTHWIRE or EQUAL	TYPE UL	CONDUIT, 4” LIQUIDTIGHT, FLEXIBLE, METALLIC
(K27)	SOUTHWIRE or EQUAL	TYPE UL	CONDUIT, 2” LIQUIDTIGHT, FLEXIBLE, METALLIC
(K28)	SOUTHWIRE or EQUAL	TYPE UL	CONDUIT, 1-1/2” LIQUIDTIGHT, FLEXIBLE, METALLIC
(K29)	SOUTHWIRE or EQUAL	TYPE UL	CONDUIT, 1” LIQUIDTIGHT, FLEXIBLE, METALLIC
			PVC CONDUIT FITTINGS
(K31A)	CARLON or EQUAL	UA9HT	8” PVC ELBOW, 48” RADIUS, 90 DEGREE SWEEP, SCH40
(K32)	CARLON or EQUAL	UA9ARB	6” PVC ELBOW, STANDARD RADIUS, 90 DEGREE SWEEP, BELLED END, SCH40
(K34)	CARLON or EQUAL	UA9ANB	4” PVC ELBOW, STANDARD RADIUS, 90 DEGREE SWEEP, BELLED END, SCH40
(K34B)	CARLON or EQUAL	UA7ANB	4” PVC ELBOW, STANDARD RADIUS, 45 DEGREE SWEEP, BELLED END, SCH40
(K36)	CARLON or EQUAL	UA9AKB-CAR	2-1/2” PVC ELBOW, STANDARD RADIUS, 90 DEGREE SWEEP, BELLED END, SCH40
(K37)	CARLON or EQUAL	UA9AJB	2” PVC ELBOW, STANDARD RADIUS, 90 DEGREE SWEEP, BELLED END, SCH40
(K38)	CARLON or EQUAL	UA9AHB	1-1/2” PVC ELBOW, STANDARD RADIUS, 90 DEGREE SWEEP, BELLED END, SCH40

ITEM	MFGR	CATALOG NO.	DESCRIPTION
(K42)	T & B or EQUAL	BU-512	INSULATING BUSHING, 6” PLASTIC
(K44)	T & B or EQUAL	BU-510	INSULATING BUSHING, 4” PLASTIC
(K46)	T & B or EQUAL	BU-507	INSULATING BUSHING, 2-1/2” PLASTIC
(K47)	T & B or EQUAL	BU-506	INSULATING BUSHING, 2” PLASTIC
(K48)	T & B or EQUAL	BU-505	INSULATING BUSHING, 1-1/2” PLASTIC
(K49)	F & B or EQUAL	BU-503	INSULATING BUSHING, 1” PLASTIC
			METALLIC LIQUIDTIGHT CONDUIT FITTINGS
(K64)	T & B or EQUAL	5340	LIQUIDTIGHT CONDUIT CONNECTOR, 4” MALE
(K64A)	T & B or EQUAL	5350	LIQUIDTIGHT CONDUIT CONNECTOR, 4” MALE, 45 DEGREE
(K67)	T & B or EQUAL	5337	LIQUIDTIGHT CONDUIT CONNECTOR, 2” MALE
(K68)	T & B or EQUAL	5336	LIQUIDTIGHT CONDUIT CONNECTOR, 1-1/2” MALE
(K69)	T & B or EQUAL	5334-TB	LIQUIDTIGHT CONDUIT CONNECTOR, 1” MALE
(K70A)	EATON or EQUAL	RE85	BUSHING REDUCER, 3” MALE TO 1 1/2” FEMALE, IRON ALLOY
(K70B)	EATON or EQUAL	RE73	BUSHING REDUCER, 2 1/2” MALE TO 1” FEMALE, IRON ALLOY
(K70D)	EATON or EQUAL	RE63	BUSHING REDUCER, 2” MALE TO 1” FEMALE, IRON ALLOY
			METALLIC CONDUIT COMPONENTS & FITTINGS
(K72)	T & B or EQUAL	LN-112	LOCKNUT, 6” GALV. STEEL
(K74)	T & B or EQUAL	LN-110	LOCKNUT, 4” GALV. STEEL
(K74A)	T & B or EQUAL	4” STEEL COUPLER	COUPLING, 4” STEEL FOR RIGID OR IMC CONDUIT
(K76)	T & B or EQUAL	LN-107	LOCKNUT, 2-1/2” GALV. STEEL

ITEM	MFGR	CATALOG NO.	DESCRIPTION
(K77)	T & B or EQUAL	LN-106	LOCKNUT, 2” GALV. STEEL
(K77A)	T & B or EQUAL	2” STEEL COUPLER	COUPLING, 2” GALV. STEEL FOR RIGID OR IMC CONDUIT
(K84)	T & B or EQUAL	H400-SC	SEALING HUB, 4” INSULATED THROAT
(K85)	T & B or EQUAL	H300-SC	SEALING HUB, 3” INSULATED THROAT
(K86)	T & B or EQUAL	H250-SC	SEALING HUB, 2-1/2” INSULATED THROAT
(K87)	T & B or EQUAL	H200-SC	SEALING HUB, 2” INSULATED THROAT
(K95A)	CROUSE HINDS or EQUAL	LB888	3” CONDUIT OUTLET, TYPE LB, GALV. FORM 8, ORDER W/GASKET (GASK808N) AND COVER (880)
(K95B)	CROUSE HINDS or EQUAL	T88	3” CONDUIT OUTLET, TYPE T, GALV. FORM 8, ORDER W/GASKET (GASK808N) AND COVER (880)
(K96A)	CROUSE HINDS or EQUAL	LB78	2 1/2” CONDUIT OUTLET, TYPE LB, GALV. FORM 8, ORDER W/GASKET (GASK808N) AND COVER (880)
(K97A)	CROUSE HINDS or EQUAL	LB68	2” CONDUIT OUTLET, TYPE LB, GALV. FORM 8, ORDER COVER W/ INTEGRAL GASKET (680G)
(K97B)	CROUSE HINDS or EQUAL	T68	2” CONDUIT OUTLET, TYPE TEE, GALV. FORM 8, ORDER COVER W/ INTEGRAL GASKET (680G)
			MISCELLANEOUS CONDUIT COMPONENTS & FITTINGS
(K107)	CROUSE HINDS or EQUAL	F866	WEATHER HEAD, 3” STEEL, THREADED
			BOXES, LIGHTING & OTHER
(K120)	HOFFMAN	A30R248HCLO	NEMA 3R ENCLOSURE, 30” x 24” x 8”, HINGED COVER, ORDER WITH ITEM (K121)
		APMK3RL014	PANEL MOUNTING KIT
		AMFK3RL014	MOUNTING BRACKET KIT
(K121)	HOFFMAN	A30P24C	REAR PANEL FOR K120 ENCLOSURE. DIMENSIONS: 27” X 21”
(K122)	HOFFMAN	A16R126HCLO	NEMA 3R ENCLOSURE, 16” x 12” x 6”, HINGED COVER, ORDER WITH ITEM (K123)
		APMK3RL016	PANEL MOUNTING KIT
		AMFK3RL016	MOUNTING BRACKET KIT

ITEM	MFGR	CATALOG NO.	DESCRIPTION
(K123)	HOFFMAN	A14P12	REAR PANEL FOR K122 ENCLOSURE. DIMENSIONS: 12.75” x 10.88”
(K124)	SAGINAW CONTROL & ENG.	SCE-12C20ELJ	CONSOLET, NEMA 4, 12” X 20” X 9”
(K126)	HOFFMAN	A8R84	PULLBOX, NEMA 3R, 8”L x 8”H x 4”D
(K127)	BUSSMANN	H25030-3S	3-POLE FUSE BLOCKS, 250 V
(K129)	BUSSMANN	NON-20	ONE-TIME CONTROL FUSES, 20 AMP
(K130)	GE or EQUAL	EB25B12	12 POINT TERM BLOCK, 600 VOLT, 30 AMP, NON-SHORTING
(K133)	GE or EQUAL	EB27B06S	6 POINT TERM BLOCK, 600 VOLT, 30 AMP, SHORTING
(K134)	EATON	DG225NRK	SAFETY SWITCH, 2-POLE, 240 VAC, 400 AMP, FUSIBLE WITH NEUTRAL
(K134A)	EATON	DS400NK	SAFETY SWITCH NEUTRAL KIT
(K134B)	BUSSMAN	FRN-R-300	300 A FUSE
(K141)	GE	EMF1010EE65730NAS1G RAYP	FLOOD LIGHT, LED, 3000K COLOR TEMPERATURE, 525 mA DRIVER, AUTO-SENSING VOLTAGE (120 – 277 VAC), TENON SLIPFITTER , GRAY, 6’ CORD, #14 AWG 3 CONDUCTOR
(K144)	----	----	6’ x 8’ x 4’ CONCRETE PULL BOX WITH COVER, SEE DRAWING (MCW-D-P011-4)
(K145)	OHMITE	D25K1K0E	HEATER, 25 W RESISTOR W/ BRACKET #9, 1,000 OHMS, 10% TOLERANCE
N100	----	----	FENCE (SEE DRAWING MCW-D-P008-1 FOR DETAILS)
O100			STATION GROUNDING
(O1)	SOUTHWIRE or EQUAL	Cu WIRE	#4/0 COPPER WIRE, BARE, CONCENTRIC LAY, 7-STRAND, SOFT DRAWN
(O2)	SOUTHWIRE or EQUAL	Cu WIRE	#2/0 COPPER WIRE, BARE, CONCENTRIC LAY, 7-STRAND, SOFT DRAWN
(O3)	REPUBLIC WIRE or EQUAL	Cu WIRE	#2 AWG COPPER, SOLID, TINNED

ITEM	MFGR	CATALOG NO.	DESCRIPTION
(O5)	GALVIN or EQUAL	7510S	GROUND ROD, COPPER CLAD, ¾" X 10'-0" THREADED ENDS
(O6)	ERICO	XBQ2Q2Q	MOLD, EXOTHERMIC WELD, LAPPED HORIZONTAL CROSS, #4/0 BARE CU RUN TO #4/0 BARE CU TAP, REQUIRES #250 WELD METAL
(O7)	ERICO	TAC2Q2Q	MOLD, EXOTHERMIC WELD, HORIZONTAL TEE, #4/0 BARE CU RUN TO #4/0 BARE CU TAP, REQUIRES #150 WELD METAL
(O8)	ERICO	GYE182Q	MOLD, EXOTHERMIC WELD, 3/4" GROUND ROD TO #4/0 BARE CU, REQUIRES #150 WELD METAL
(O9)	BURNDY or EQUAL	GD2229	CONNECTOR, 4" IPS PIPE TO TWO (2) COPPER CABLES, #2/0 AWG SOL –250 kCM
(O11)	BURNDY or EQUAL	GD1929	CONNECTOR, 2-1/2" IPS PIPE TO TWO (2) COPPER CABLES, #2/0 AWG SOL –250 kCM
(O13)	BURNDY or EQUAL	GAR1829	CONNECTOR, 2" IPS PIPE TO ONE (1) COPPER CABLE, #2/0 AWG SOL – 250 kCM
(O14)	BURNDY or EQUAL	GAR1726	CONNECTOR, 1-1/2" IPS PIPE TO ONE (1) COPPER CABLE, #4 AWG SOL –#2/0 AWG STR
(O16)	BURNDY or EQUAL	GAR1626	CONNECTOR, 1-1/4" IPS PIPE TO ONE (1) COPPER CABLE, #4 AWG SOL –#2/0 AWG STR
(O17)	BURNDY or EQUAL	BG18N	FLEXIBLE COPPER BRAID, 2 HOLE PAD TO 2 HOLE PAD, 18 INCHES LONG
(O18)	BURNDY or EQUAL	KSU23	CONNECTOR, COPPER SPLIT BOLT W/ SPACER, RUN #2 AWG TO #8 AWG STR, TAP: #2 AWG TO #8 AWG STR
(O19)	BURNDY or EQUAL	YGHC29C29	CONNECTOR, HYTAP COMPRESSION, TYPE "C", RUN: #3/0 AWG STR. TO 250 kCM, TAP: #3/0 AWG STR. TO 250 kCM
(O20)	BURNDY or EQUAL	YGHC29C26	CONNECTOR, HYTAP COMPRESSION, TYPE "C", RUN: #3/0 AWG STR. TO 250 kCM, TAP: #6 AWG SOLID TO #2/0 STR. CU
(O22)	ANDERSON or EQUAL	TLD52	CONNECTOR, BOLTED BRONZE, ONE (1) OR TWO (2) CABLE(S), #2 AWG SOL CU – 350 kCM TO SWITCHING PLATFORM GROUND GRATE
(O23)	ANDERSON or EQUAL	GTCS34A	CONNECTOR, BOLTED BRONZE, ⅜" STUD, CONDUCTOR TO TRANSFORMER TANK, #8 SOLID CU TO #2/0 AWG CU
(O27)	BURNDY or EQUAL	GB29T4	TOWER CLAMP, SINGLE #2/0 AWG SOL – 250 kCM CU TO ½" THICK PLATE, SINGLE BOLT

ITEM	MFGR	CATALOG NO.	DESCRIPTION
(O28)	BURNDY or EQUAL	GC2929T4	TOWER CLAMP, TWO (2) COPPER CABLES, #2/0 AWG SOL – 250 kCM COPPER CONDUCTOR TO ½" THICK PLATE, SINGLE BOLT
(O31)	TRAVIS or EQUAL	11-218	TERMINAL, UNIVERSAL CROSS, BOLTED BRONZE LUG, #2 AWG – 800 kCM BARE COPPER TO NEMA 2-HOLE "B" PAD
(O32)	TRAVIS or EQUAL	11-231-2EY	TERMINAL, DOUBLE EYE, BOLTED BRONZE LUG, #1/0 AWG-500 kCM COPPER TO NEMA 4-HOLE "C" PAD
(O34)	BURNDY or EQUAL	YA2CL4-BOX	TERMINAL, COMPRESSION, SINGLE HOLE FOR ⅜" STUD, #2 AWG SOLID CU
(O36)	ANDERSON or EQUAL		1/2" BOLT ASSEMBLY:
		HBB-175	BOLT, ½" X 1-¾" X 16 NC SILICON BRONZE
		HNB-500	NUT, ½" FULL, SILICON BRONZE
		BW-500	ONE (1) BELLEVILLE WASHER, ½", FLAT, STAINLESS STEEL
		HFB-500	TWO (2) WASHER, ½", FLAT, SILICON BRONZE
(O37)	BURNDY or EQUAL		STAINLESS STEEL BOLT ASSEMBLY:
		38X125HSSB	BOLT, ⅜" X 1-¼" X 13 NC STAINLESS STEEL
		38HSSN	NUT, ⅜" FULL, STAINLESS STEEL
		38X75BWSS	ONE (1) BELLEVILLE WASHER, ⅜", FLAT, STAINLESS STEEL
		38FWSS	TWO (2) WASHER, ⅜", FLAT, STAINLESS STEEL
(O38)	ERICO	250	WELD METAL SHOT, #250
(O39)	ERICO	150	WELD METAL SHOT, #150
(O44)	BURNDY or EQUAL	YGHC26C26	CONNECTOR, HYTAP COMPRESSION, TYPE "C", RUN: #1 AWG TO #2/0 STR. CU, TAP: #1 AWG TO #2/0 STR. CU
(O45)	BURNDY or EQUAL	GB26T4	TOWER CLAMP, SINGLE #4 AWG SOLID TO #2/0 STR. CU TO ½" THICK PLATE, SINGLE BOLT
P100	JOAQUIN	-	MODULAR CONTROL ENCLOSURE, 15'-6" x 40'-0"
Q1	TRENCH	-	NEUTRAL GROUNDING REACTOR 0.8 OHM
Q2	ABB	-	EXTERNALY FUSED CAPACITOR BANK 17.55 MVAR, EXPANDABLE TO 2.16 MVAR INTERNAL GROUND SWITCH, TLI & NEUTRAL VT

ITEM	MFGR	CATALOG NO.	DESCRIPTION
Q4	TRENCH	-	SHUNT POWER REACTOR, 34.5 kV, 1.984 MVAR, 526.19 mH, 100 AMP
Q5	AMSC		DVAR, 2MVAR
R100			SUBSTATION SIGNAGE
(R1)	TBD	-	SUBSTATION IDENTIFICATION SIGNS (SEE MCW-D-P003-2 FOR DETAILS)
(R2)	TBD	-	SUBSTATION WARNING SIGNS (SEE MCW-D-P003-2 FOR DETAILS)
(R3)	TBD	-	SUBSTATION EQUIPMENT LABEL (SEE MCW-D-P003-2 FOR EQUIPMENT LABEL TABLE WITH QUANTITIES AND DESCRIPTIONS)