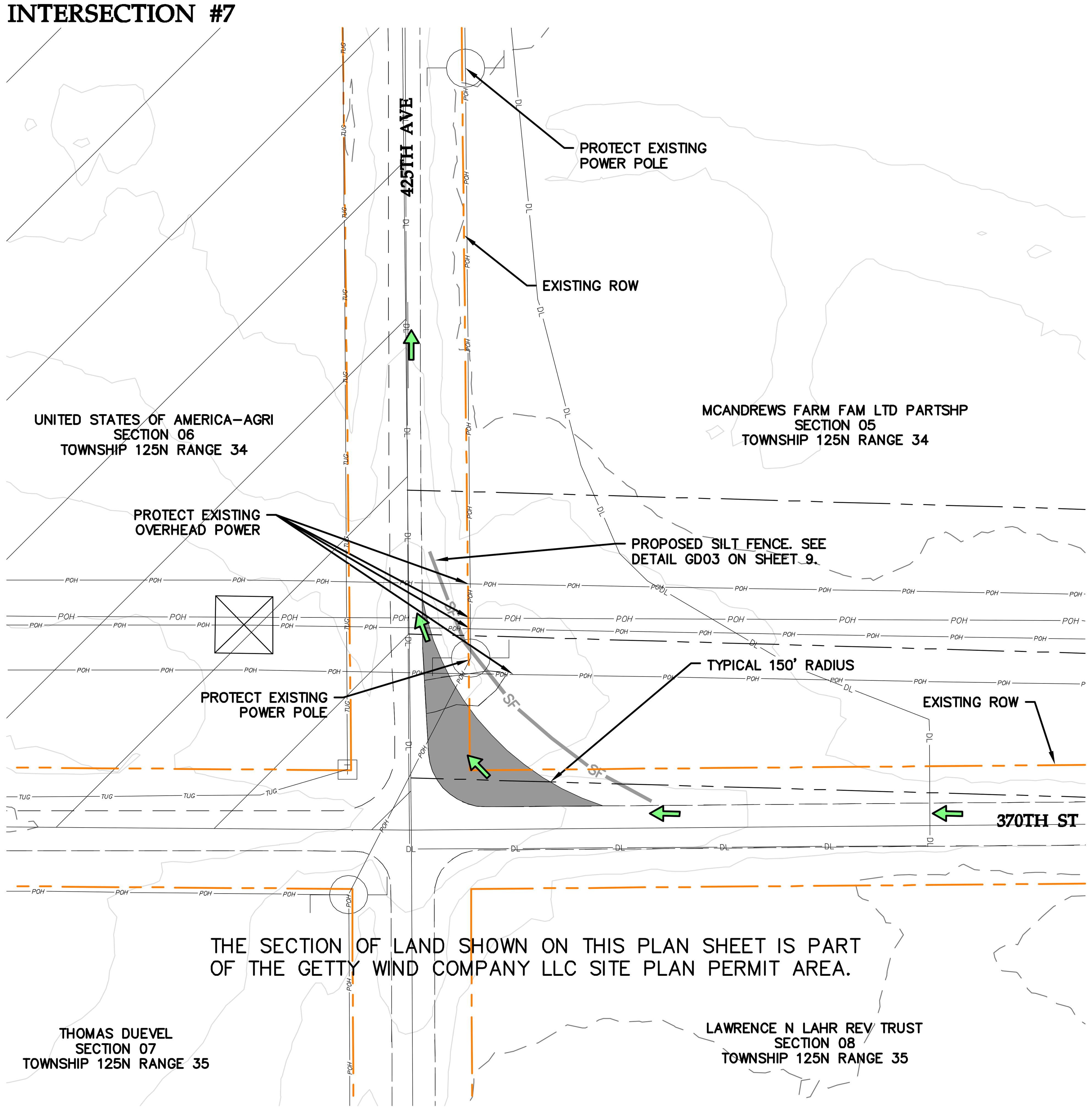
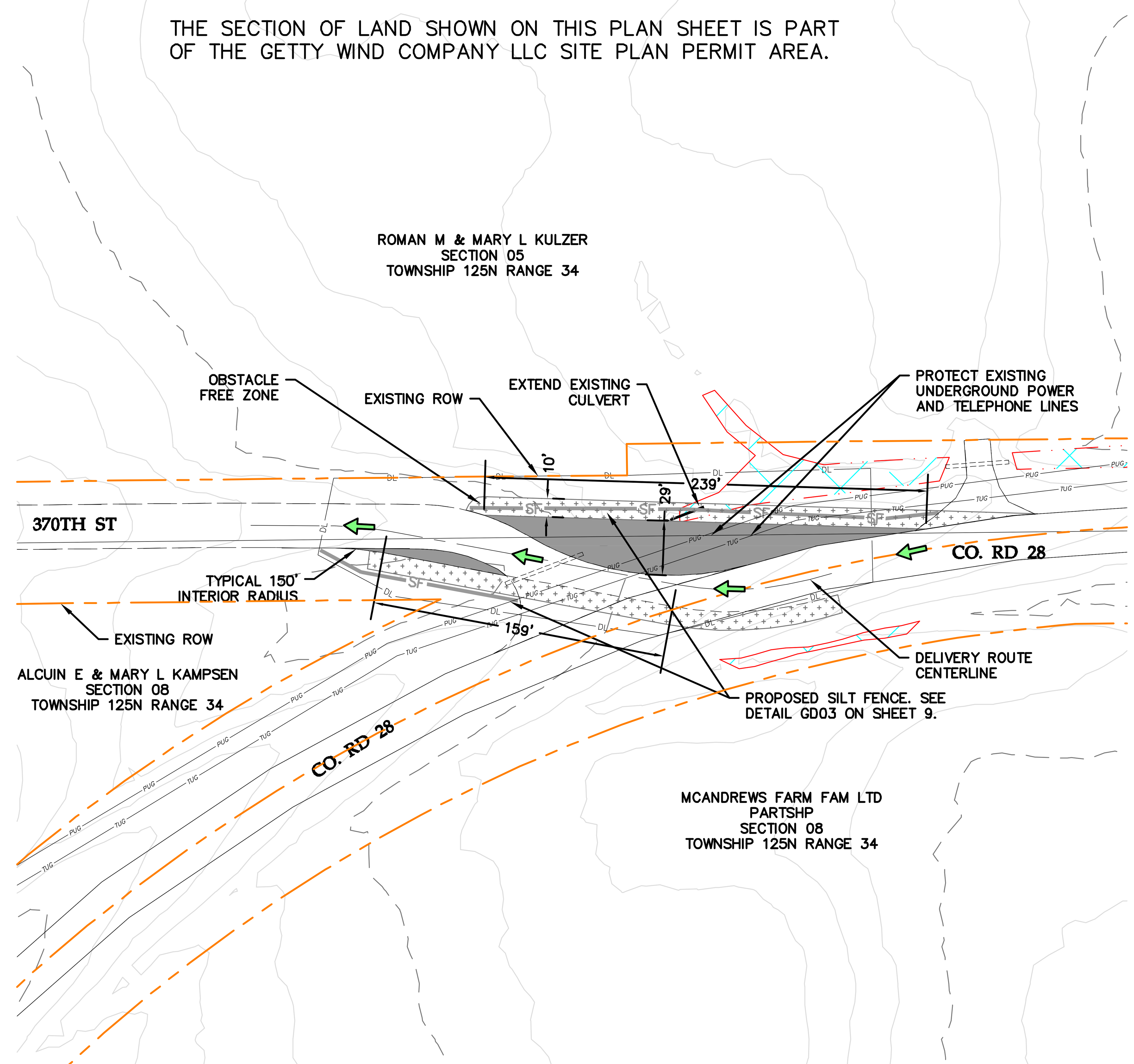
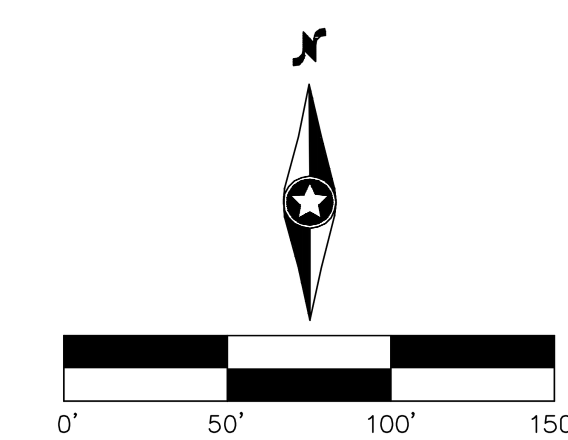
INTERSECTION #7



INTERSECTION #8

NOTE:
INTERSECTION #8 IS BASED ON ENGINEER'S EXPERIENCE AND NOT BASED ON THE VESTAS DELIVERY MANUAL, DUE TO THE MANUAL NOT INCLUDING ENOUGH INFORMATION FOR THIS TYPE OF INTERSECTION IMPROVEMENT. ADDITIONAL GRAVEL, CLEARING, GRADING MAY BE REQUIRED BEYOND WHAT IS SHOWN ON THE PLAN.





LEGEND:

- OBSTACLE FREE ZONE
- TYPICAL 150' RADIUS
- PROPOSED TEMPORARY CULVERT
- PROPOSED DISTURBANCE LIMIT
- EXISTING ROW LINE
- EXISTING BITUMINOUS ROAD
- EXISTING GRAVEL ROAD
- EXISTING FENCE
- EXISTING CULVERT
- EXISTING OVERHEAD POWER
- EXISTING UNDERGROUND POWER
- EXISTING TELEPHONE LINE
- EXISTING DRAIN TILE
- EXISTING 10' CONTOURS
- EXISTING 2' CONTOURS
- EXISTING WETLANDS
- DELIVERY INGRESS

NOTES:

1. ALL CUT AND FILL SLOPES SHALL BE 4:1 OR FLATTER
2. UPON COMPLETION OF ALL PROJECT CONSTRUCTION, TEMPORARY INTERSECTION WIDENING SHALL BE REMOVED UNLESS OTHERWISE DIRECTED BY OWNER. THE DISTURBED AREA SHALL BE RESTORED TO ORIGINAL LINES AND GRADES WITH THE UPPER FOOT OF THE RESTORED GROUND TO BE TOPSOIL.
3. ALL DISTURBED AREAS NOT COVERED WITH GRAVEL SHALL BE STABILIZED IN ACCORDANCE WITH BLACK OAK/GETTY STORMWATER POLLUTION PREVENTION PLAN AND CONFORM WITH THE MINNESOTA POLLUTION CONTROL AGENCY SPECIFICATIONS.
4. CONTRACTOR TO PROTECT EXISTING UTILITIES AND MAINTAIN EXISTING DRAINAGE PATTERNS AT ALL TIMES.
5. CULVERTS SHALL HAVE A MINIMUM 1' OF COVER OVER TOP OF PIPE AND BE INSTALLED PER MINNESOTA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.
6. CONTRACTOR TO PROVIDE TRAFFIC CONTROL PER MINNESOTA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MN–MUTCD) AND RELOCATE ALL IMPACTED SIGNAGE AS REQUIRED BY COUNTY OFFICIALS.
7. EXISTING FIELD ACCESS POINTS IN THE VICINITY OF TEMPORARY INTERSECTION IMPROVEMENTS SHALL REMAIN POST–CONSTRUCTION.
8. CONTRACTOR SHALL CONTACT THE AREA MAINTENANCE ENGINEER AFTER WORK HAS BEEN COMPLETED FOR FINAL INSPECTION AND ACCEPTANCE BY MNDOT
9. ALL WORK WITHIN MNDOT ROW SHALL BE DONE TO MN DOT SPECIFICATIONS. REFER TO MNDOT SPECIFICATIONS 2105 FOR EXCAVATION AND EMBANKMENT, 2211 FOR AGGREGATE BASES, 221 FOR AGGREGATE SHOULDERING, 2451 FOR EXCAVATION AND BACKFILLS, 2112 FOR SUBGRADE PREPARATION, 2501 FOR PIPE CULVERTS AND OTHERS AS REQUIRED TO COMPLETE THE WORK
10. CONTRACTOR TO REFER TO STANDARD CONDITIONS OF PERMIT FOR ADDITIONAL REQUIREMENTS

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344
PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150
www.westwoodps.com

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly licensed PROFESSIONAL ENGINEER under the laws of the State of Minnesota.

Robert Stanley Copouls
Date: 1/18/16 License No. 47876

Designed: KLM
Checked: RSC
Drawn: IJH
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
A	5/30/14	30% CIVIL CONSTRUCTION PLAN
B	8/15/14	60% CIVIL CONSTRUCTION PLAN
C	8/26/14	ISSUED FOR PERMITTING
D	9/08/14	ISSUED FOR PERMITTING
E	9/24/14	ISSUED FOR PERMITTING
F	10/22/14	ISSUED FOR PERMITTING
G	11/13/14	ISSUED FOR PERMITTING
H	6/11/15	ISSUED FOR PERMITTING
I	7/10/15	ISSUED FOR BID
J	8/07/15	ISSUED FOR PERMITTING
K	1/18/16	ISSUED FOR PERMITTING

Prepared for:
Black Oak Getty Wind
488 8th Avenue, HQ11,
San Diego, CA 92101

Black Oak/Getty Wind Farm

Stearns County, Minnesota

Intersection Improvements 7 & 8

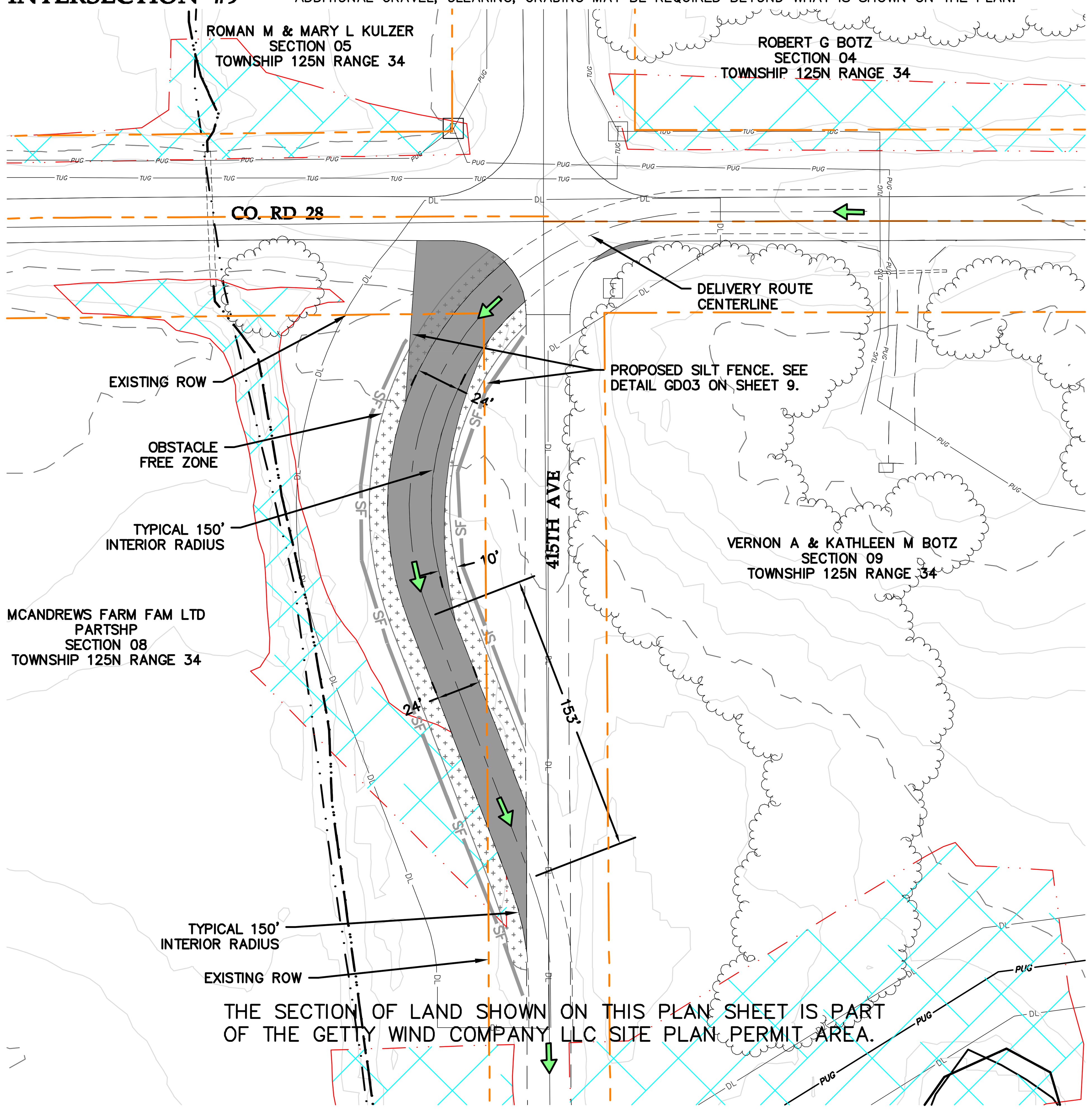
ISSUED FOR PERMITTING

Turbine Array: ~~BOGY_39xV110-80mHH_20140718_r1~~
Date: 1/18/16
Sheet: 39 OF 43

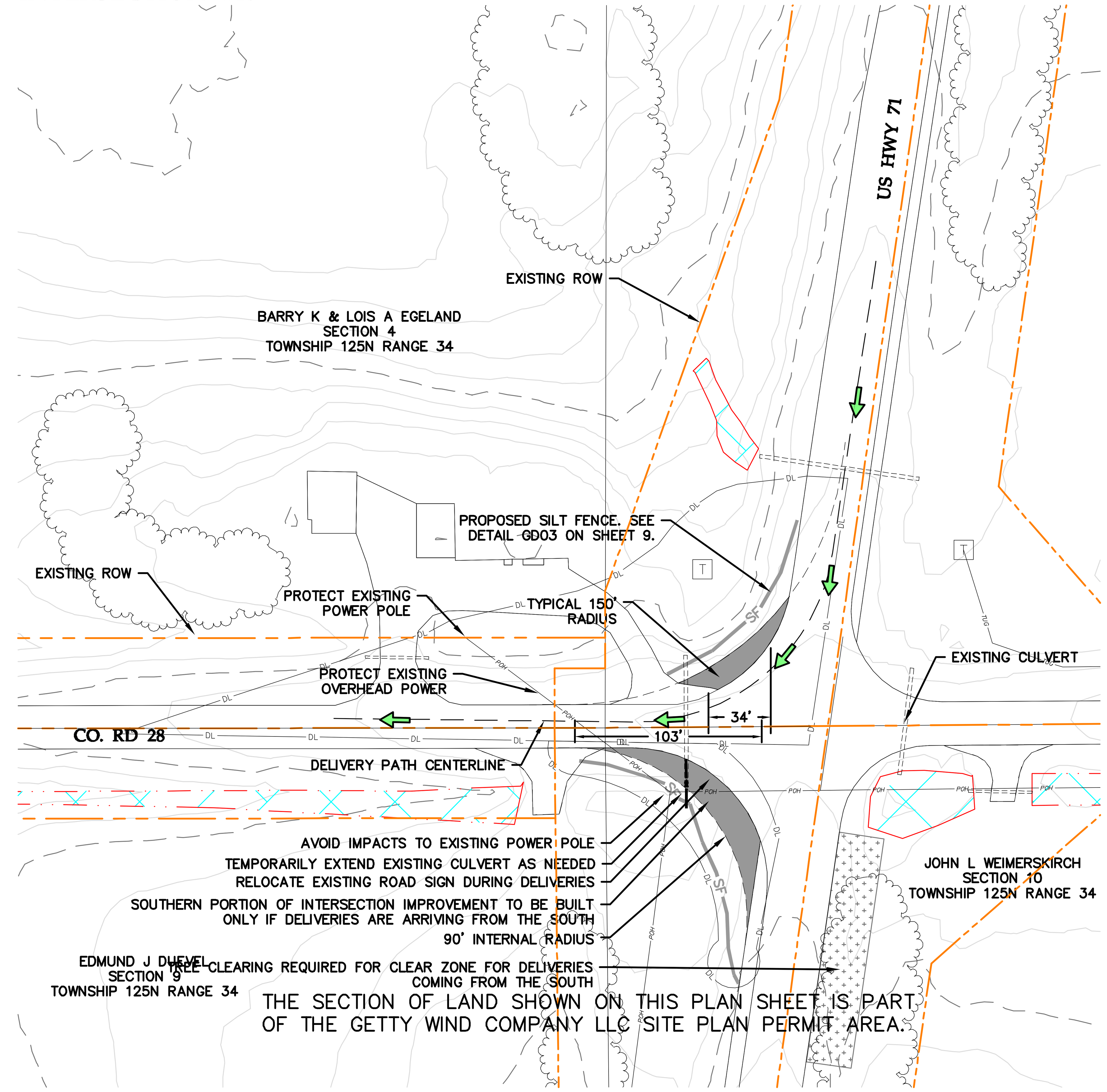
20111239–01SPF06.dwg

INTERSECTION #9

NOTE:
INTERSECTION #9 IS BASED ON ENGINEER'S EXPERIENCE AND NOT BASED ON THE VESTAS DELIVERY MANUAL, DUE TO THE MANUAL NOT INCLUDING ENOUGH INFORMATION FOR THIS TYPE OF INTERSECTION IMPROVEMENT. ADDITIONAL GRAVEL, CLEARING, GRADING MAY BE REQUIRED BEYOND WHAT IS SHOWN ON THE PLAN.



INTERSECTION #10



LEGEND:

OBSTACLE FREE ZONE	EXISTING DRAIN TILE
TYPICAL 150' RADIUS	EXISTING 10' CONTOURS
PROPOSED TEMPORARY CULVERT	EXISTING 2' CONTOURS
PROPOSED DISTURBANCE LIMIT	EXISTING WETLANDS
EXISTING ROW LINE	DELIVERY INGRESS
EXISTING BITUMINOUS ROAD	
EXISTING GRAVEL ROAD	
EXISTING FENCE	
EXISTING CULVERT	
EXISTING OVERHEAD POWER	
EXISTING UNDERGROUND POWER	
EXISTING TELEPHONE LINE	

NOTES:
1. ALL CUT AND FILL SLOPES SHALL BE 4:1 OR FLATTER

2. UPON COMPLETION OF ALL PROJECT CONSTRUCTION, TEMPORARY INTERSECTION WIDENING SHALL BE REMOVED UNLESS OTHERWISE DIRECTED BY OWNER. THE DISTURBED AREA SHALL BE RESTORED TO ORIGINAL LINES AND GRADES WITH THE UPPER FOOT OF THE RESTORED GROUND TO BE TOPSOIL.

3. ALL DISTURBED AREAS NOT COVERED WITH GRAVEL SHALL BE STABILIZED IN ACCORDANCE WITH BLACK OAK/GETTY STORMWATER POLLUTION PREVENTION PLAN AND CONFORM WITH THE MINNESOTA POLLUTION CONTROL AGENCY SPECIFICATIONS.

4. CONTRACTOR TO PROTECT EXISTING UTILITIES AND MAINTAIN EXISTING DRAINAGE PATTERNS AT ALL TIMES.

5. CULVERTS SHALL HAVE A MINIMUM 1' OF COVER OVER TOP OF PIPE AND BE INSTALLED PER MINNESOTA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.

6. CONTRACTOR TO PROVIDE TRAFFIC CONTROL PER MINNESOTA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MN-MUTCD) AND RELOCATE ALL IMPACTED SIGNAGE AS REQUIRED BY COUNTY OFFICIALS.

7 EXISTING FIELD ACCESS POINTS IN THE VICINITY OF TEMPORARY INTERSECTION IMPROVEMENTS SHALL REMAIN POST-CONSTRUCTION.

8. CONTRACTOR SHALL CONTACT THE AREA MAINTENANCE ENGINEER AFTER WORK HAS BEEN COMPLETED FOR FINAL INSPECTION AND ACCEPTANCE BY MNDOT

9. ALL WORK WITHIN MNDOT ROW SHALL BE DONE TO MN DOT SPECIFICATIONS. REFER TO MNDOT SPECIFICATIONS 2105 FOR EXCAVATION AND EMBANKMENT, 2211 FOR AGGREGATE BASES, 221 FOR AGGREGATE SHOULDERING, 2451 FOR EXCAVATION AND BACKFILLS, 2112 FOR SUBGRADE PREPARATION, 2501 FOR PIPE CULVERTS AND OTHERS AS REQUIRED TO COMPLETE THE WORK

10. CONTRACTOR TO REFER TO STANDARD CONDITIONS OF PERMIT FOR ADDITIONAL REQUIREMENTS

Westwood
Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344
PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150
www.westwoodps.com

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly licensed PROFESSIONAL ENGINEER under the laws of the State of Minnesota.
Robert Stanley Copouls
Date: 1/18/16 License No. 47876

Designed: KLM
Checked: RSC
Drawn: IJH
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
A	5/30/14	30% CIVIL CONSTRUCTION PLAN
B	8/15/14	60% CIVIL CONSTRUCTION PLAN
C	8/26/14	ISSUED FOR PERMITTING
D	9/08/14	ISSUED FOR PERMITTING
E	9/24/14	ISSUED FOR PERMITTING
F	10/22/14	ISSUED FOR PERMITTING
G	11/13/14	ISSUED FOR PERMITTING
H	6/11/15	ISSUED FOR PERMITTING
I	7/10/15	ISSUED FOR BID
J	8/07/15	ISSUED FOR PERMITTING
K	1/18/16	ISSUED FOR PERMITTING

Prepared for:
Black Oak Getty Wind
488 8th Avenue, HQ11,
San Diego, CA 92101

0' 50' 100' 150'

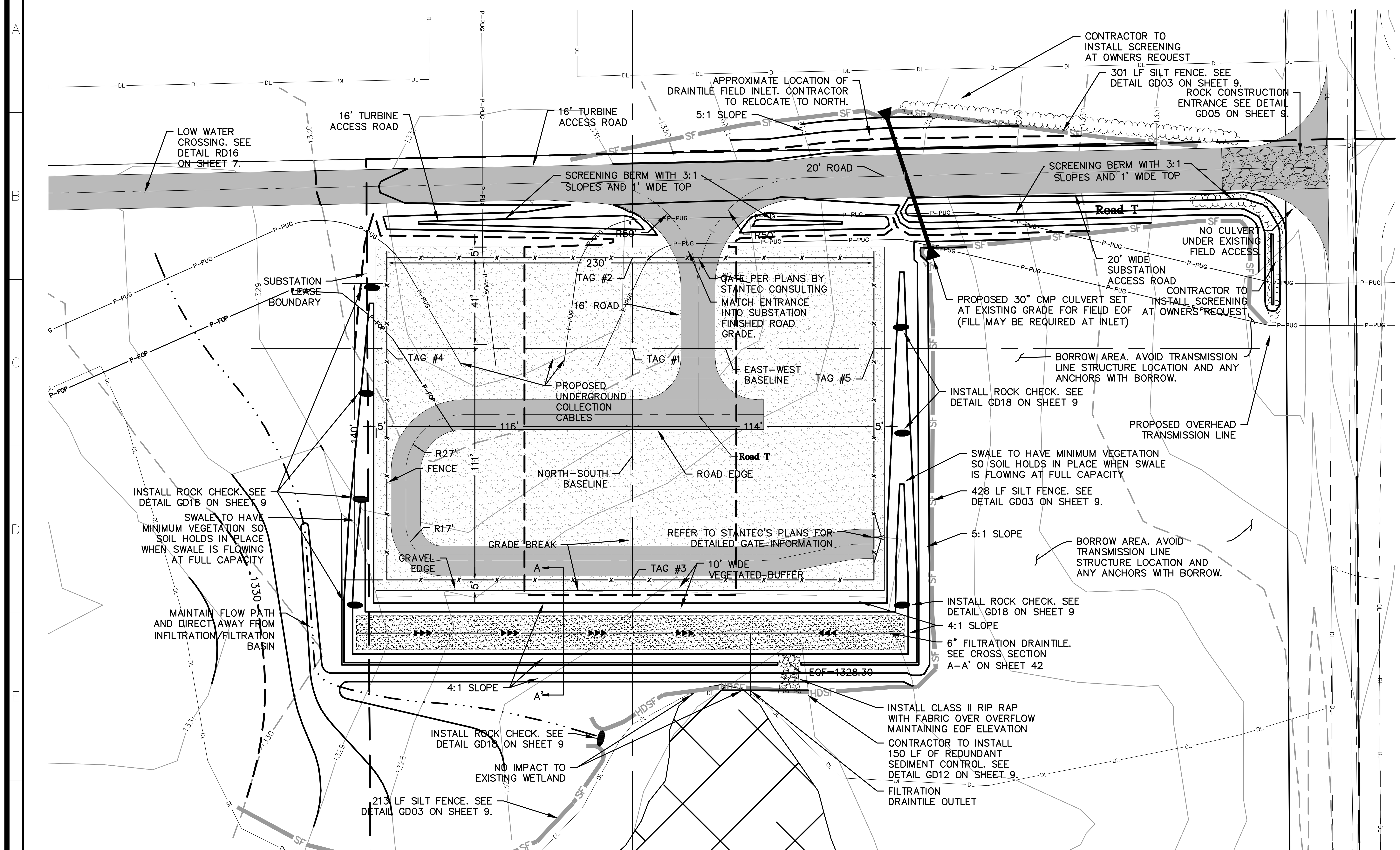
Black Oak/Getty Wind Farm
Stearns County, Minnesota

Intersection Improvements 9 & 10

ISSUED FOR PERMITTING

Turbine Array: ~~BOGY_39xV110-80mHH_20140718_r1~~
Date: 1/18/16
Sheet: 40 OF 43

20111239-01SPF06.dwg



LEGEND:

- PROPOSED ACCESS ROADS
- PROPOSED SUBSTATION PAD GRAVEL
- PROPOSED 5' CONTOURS
- PROPOSED 1' CONTOURS
- PROPOSED FENCE
- PROPOSED COLLECTION SYSTEM
- PROPOSED TRANSMISSION LINE
- PROJECT DISTURBANCE LIMITS
- PROPOSED SILT FENCE
- PROPOSED CULVERT
- PROPOSED FLOW LINES LINES
- EXISTING CULVERT
- EXISTING FENCE
- EXISTING TELEPHONE LINE
- EXISTING OVERHEAD POWER
- EXISTING WATER LINE
- EXISTING GAS PIPELINE
- EXISTING FIBER OPTIC LINE
- EXISTING EASEMENT
- EXISTING PARCEL LINE
- EXISTING RIGHT OF WAY
- EXISTING GRAVEL EDGE
- EXISTING BITUMINOUS EDGE
- EXISTING VEGETATION
- EXISTING 5' CONTOURS
- EXISTING 1' CONTOURS
- DELINEATED WETLAND
- NWI WETLAND
- OUTSIDE PROJECT BOUNDARY
- EXISTING DRAIN TILE

NOTE:
PROPOSED CONTOURS ARE FINISHED GRADE EXCEPT SUBSTATION GRAVEL AREA WHICH IS TOP OF SUBGRADE.

SUBSTATION COORDINATES			
COORDINATES PROVIDED IN STEARNS COUNTY, MINNESOTA (FT) COORDINATE SYSTEM			
TAG NUMBER	DESCRIPTION	NORTHING	EASTING
01	BASELINE ORIGIN	236724.08	534036.38
02	N/S BASELINE @ NORTH FENCE LINE	236767.08	534036.38
03	N/S BASELINE @ SOUTH FENCE LINE	236615.08	534036.38
04	E/W BASELINE @ WEST FENCE LINE	236724.08	533920.38
05	E/W BASELINE @ EAST FENCE LINE	236724.08	534150.38

CONTRACTOR SHOULD NOTIFY ENGINEER IMMEDIATELY IF THERE APPEARS TO BE A DIFFERENCE BETWEEN INFORMATION SHOWN ON THESE PLANS AND THE PLANS BY STANTEC CONSULTING

NOTE:
THE SUBSTATION PAD HAS BEEN ROUGH GRADED. THE EXISTING CONDITIONS SHOWN ON THIS DRAWING ARE NOT CORRECT DUE TO THE GRADING THAT HAS OCCURRED. THE CONTRACTOR SHALL VERIFY THAT THE CURRENT PAD MEETS THE PROJECT SPECIFICATIONS. IF THE PAD DOES NOT MEET SPECIFICATIONS, CONTACT ENGINEER FOR RECOMMENDATIONS.

Westwood
Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344
PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150
www.westwoodps.com

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly licensed PROFESSIONAL ENGINEER under the laws of the State of Minnesota.

Robert Stanley Copouls
Date: 1/18/16 License No. 47876

Designed: KLM
Checked: RSC
Drawn: IJH
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
A	5/30/14	30% CIVIL CONSTRUCTION PLAN
B	8/15/14	60% CIVIL CONSTRUCTION PLAN
C	8/26/14	ISSUED FOR PERMITTING
D	9/08/14	ISSUED FOR PERMITTING
E	9/24/14	ISSUED FOR PERMITTING
F	10/22/14	ISSUED FOR PERMITTING
G	11/13/14	ISSUED FOR PERMITTING
H	6/11/15	ISSUED FOR PERMITTING
I	7/10/15	ISSUED FOR BID
J	8/07/15	ISSUED FOR PERMITTING
K	1/18/16	ISSUED FOR PERMITTING

Prepared for:

Black Oak Getty Wind
488 8th Avenue, HQ11,
San Diego, CA 92101

0' 30' 60' 90'

Black Oak/Getty Wind Farm
Stearns County, Minnesota

Substation Grading Plan

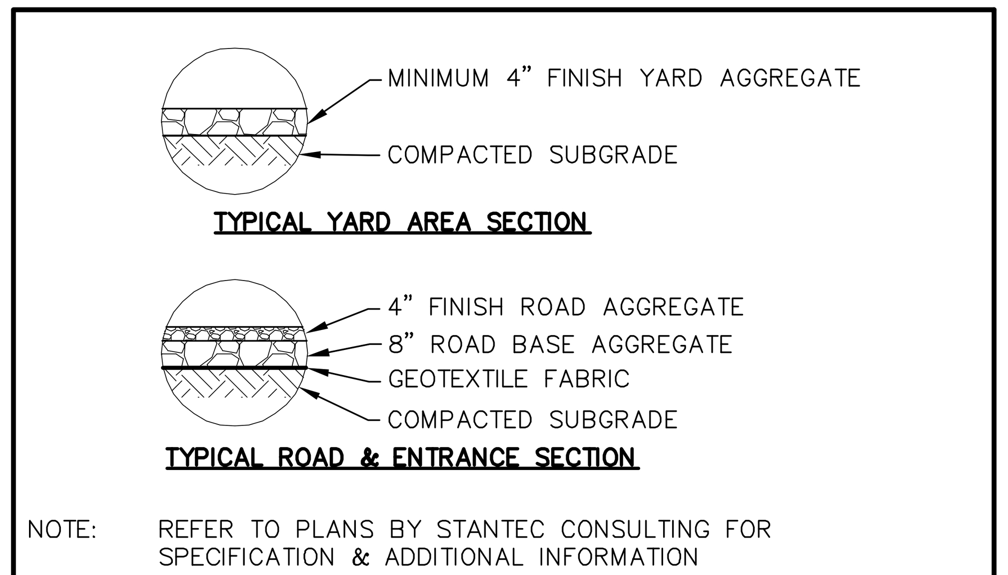
ISSUED FOR PERMITTING

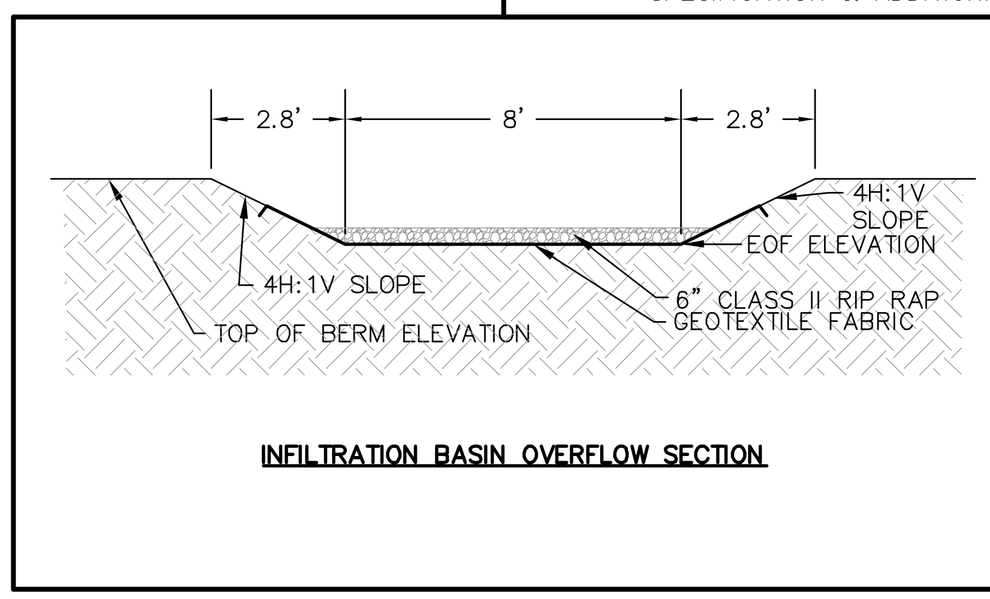
Turbine Array:
~~BOGY_39xV110-80mHH_20140718_r1~~

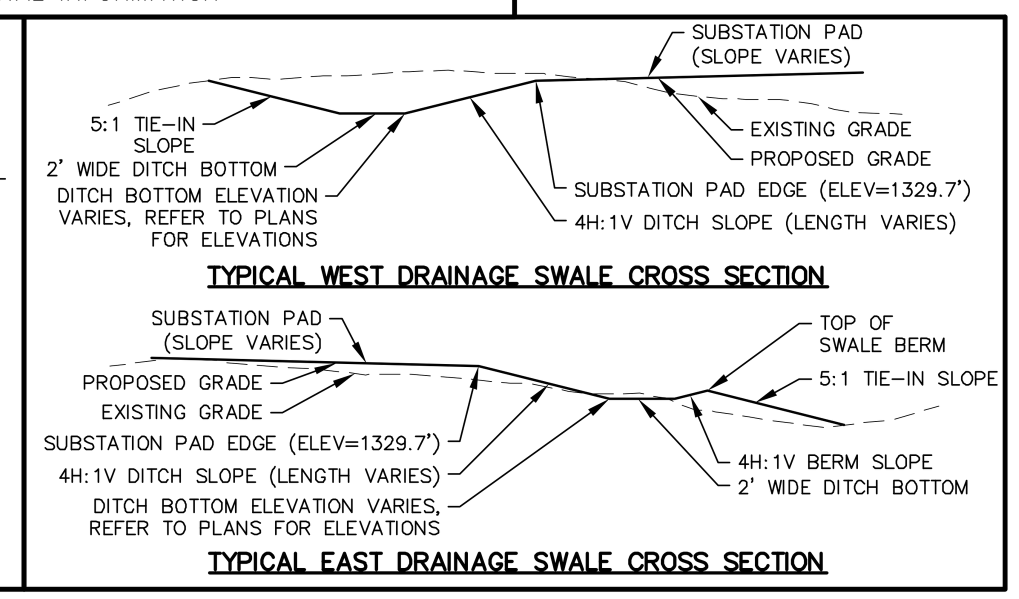
Date: 1/18/16

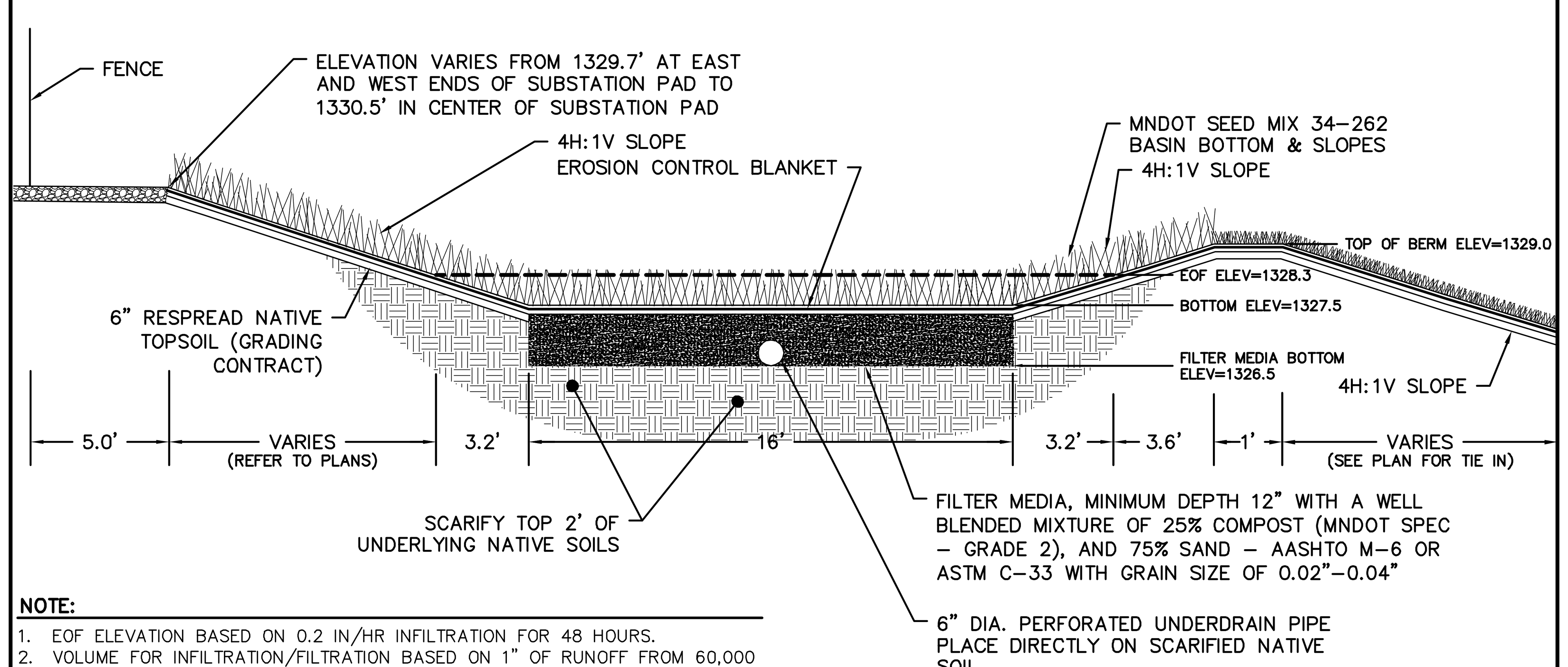
Sheet: 41 OF 43

20111239-01SPF02.dwg





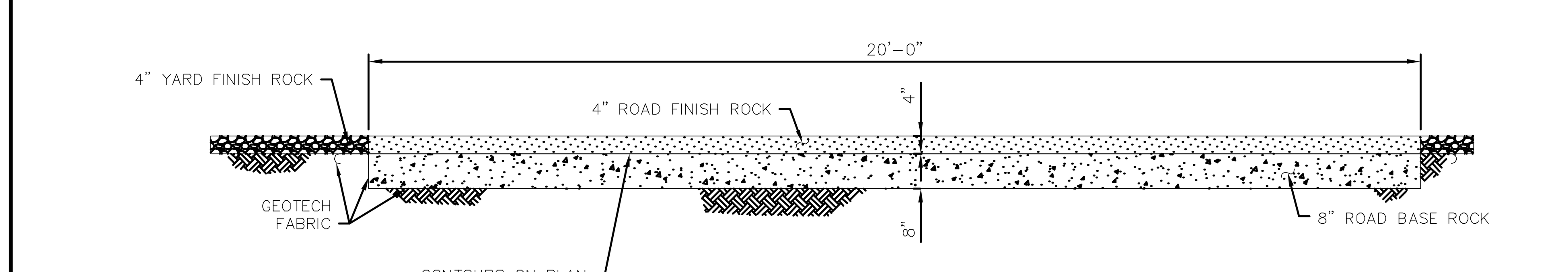




NOTE:

1. EOF ELEVATION BASED ON 0.2 IN/HR INFILTRATION FOR 48 HOURS.
2. VOLUME FOR INFILTRATION/FILTRATION BASED ON 1" OF RUNOFF FROM 60,000 SF OF IMPERVIOUS FROM SUBSTATION.

Westwood | **INFILTRATION/FILTRATION BASIN SECTION A-A'** N.T.S. | LAST REVISED: 09/24/14 SW-1



NOTE:

1. DETAIL PER STANTEC CONSULTING

Westwood | 2B ROAD DETAIL SCALE: N.T.S. | LAST REVISED: 08/25/14 SUB-1

Grading, Drainage & Erosion Control Notes

A. REFER TO STANTEC CONSULTING PLANS FOR ALL SPECIFICATION INFORMATION INCLUDING AGGREGATE, FABRIC, FENCE, GATE, AND SUBGRADE PREPARATION & TESTING REQUIREMENTS.

B. FOR THE YARD GRAVEL AREA AND THE ROAD GRAVEL AREA, THE SPOT ELEVATIONS AND CONTOURS SHOWN ARE FOUR (4) INCHES BELOW TOP OF YARD FINISH ROCK OR FOUR (4) INCHES BELOW TOP OF ROAD FINISH ROCK ELEVATION. FOR THE ENTRANCE GRAVEL AREA, FINISH GRADE CONTOURS SHOWN ARE THE TOP OF ROAD FINISH ROCK ELEVATION.

C. DIMENSIONS SHOWN ON PLANS ARE APPROXIMATE, REFER TO ELECTRICAL PLANS FOR DETAILED DIMENSIONS. CONTRACTORS SHALL REFER TO ELECTRICAL PLANS FOR EXACT LOCATIONS AND DIMENSIONS OF GRAVEL EDGE, FENCE, AND ALL ELECTRICAL COMPONENTS.

D. 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.

E. SAFETY NOTICE TO CONTRACTORS: IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS ON THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK, THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. THE DUTY OF THE ENGINEER OR THE DEVELOPER TO CONDUCT CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONSTRUCTION SITE.

F. THE CONTRACTOR SHALL COMPLETE THE SITE GRADING IN ACCORDANCE WITH THE REQUIREMENTS OF THE OWNER'S SOILS ENGINEER AND STANTEC CONSULTING SPECIFICATION. DESIGN IS BASED OFF OF PRELIMINARY SOIL BORINGS PROVIDED BY RENEWABLE RESOURCE CONSULTANTS. A REPORT WITH RECOMMENDATIONS WAS NOT PROVIDED FOR DESIGN PURPOSES. THE CONTRACTOR SHALL REVIEW THE FINAL REPORT AND NOTIFY ENGINEER IF THERE ARE ANY CONFLICTS BETWEEN REPORT AND DESIGN PRIOR TO CONSTRUCTION BEGINNING.

G. ALL THE SLOPES ARE TO BE GRADED TO 4:1 OR FLATTER, UNLESS OTHERWISE INDICATED ON THIS PLAN. ALL SLOPES 4:1 OR GREATER SHALL BE SEEDED AND STABILIZED WITH EROSION CONTROL BLANKET.

H. SILTATION AND EROSION CONTROL: THE CONTRACTOR SHALL ASSUME COMPLETE RESPONSIBILITY FOR CONTROLLING ALL SILTATION AND EROSION OF THE PROJECT AREA. THE CONTRACTOR SHALL USE WHATEVER MEANS NECESSARY TO CONTROL THE EROSION AND SILTATION INCLUDING BUT NOT LIMITED TO STAKED STRAW BALES AND/OR SILTATION FABRIC FENCES. CONTROL SHALL COMMENCE WITH GRADING AND CONTINUE THROUGHOUT THE PROJECT UNTIL ACCEPTANCE OF THE WORK BY THE OWNER. THE CONTRACTOR'S RESPONSIBILITY INCLUDES ALL IMPLEMENTATION AS REQUIRED TO PREVENT EROSION AND THE DEPOSITING OF SILT. THE OWNER MAY, AT HIS OPTION, DIRECT THE CONTRACTOR IN HIS METHODS AS DEEMED FIT TO PROTECT PROPERTY AND IMPROVEMENTS. ANY DEPOSITING OF SILT OR MUD ON NEW OR EXISTING PAVEMENT OR IN EXISTING STORM SEWERS OR SWALES SHALL BE REMOVED AFTER EACH RAIN AND EFFECTED AREAS CLEANED TO THE SATISFACTION OF THE OWNER, ALL AT THE EXPENSE OF THE CONTRACTOR. THE SILT FENCES SHALL BE REMOVED BY THE CONTRACTOR AFTER THE TURF IS ESTABLISHED.

I. SPOT ELEVATIONS SHOWN INDICATE TOP OF SUBGRADE UNLESS OTHERWISE NOTED.

J. FINISHED GRADING SHALL BE COMPLETED. THE CONTRACTOR SHALL UNIFORMLY GRADE AREAS WITHIN LIMITS OF GRADING, INCLUDING ADJACENT TRANSITION AREAS. PROVIDE A SMOOTH FINISHED SURFACE WITHIN SPECIFIED TOLERANCES, WITH UNIFORM LEVELS OR SLOPES BETWEEN POINTS, WHERE ELEVATIONS ARE SHOWN, OR BETWEEN SUCH POINTS, AND EXISTING GRADES. AREAS THAT HAVE BEEN FINISH GRADED SHALL BE PROTECTED FROM SUBSEQUENT CONSTRUCTION OPERATIONS.

K. THE CONTRACTOR SHALL DISPOSE OF ALL EXCESS SOIL MATERIAL IN A MANNER ACCEPTABLE TO THE OWNER, LAND OWNER, AND THE REGULATING AGENCIES INVOLVED.

L. A TEMPORARY OR PERMANENT STORM WATER BASIN IS NOT NEEDED PER STATE AND COUNTY REQUIREMENTS.

M. EXISTING GROUND CONTOURS SHOWN ON THE PLAN ARE BASED ON FIELD SURVEY INFORMATION PERFORMED BY WESTWOOD PROFESSIONAL SERVICES.

N. TURNING RADII PROVIDED BY STANTEC CONSULTING. RADII HAVE NOT BEEN VERIFIED BY WESTWOOD PROFESSIONAL SERVICES.

O. DIMENSIONS SHOWN ARE TO THE FENCE. REFER TO PLANS BY STANTEC CONSULTING FOR SUBSTATION ARRANGEMENT.

FILTRATION BASIN MAINTENANCE SCHEDULE

ACTIVITY	SCHEDULE
INSPECT BASIN FOLLOWING FIRST THREE STORM EVENTS TO VERIFY THAT THE BASIN IS PROPERLY FUNCTIONING AND THAT THERE ARE NOT ANY MAJOR ISSUES.	FOLLOWING SITE STABILIZATION
PRUNE AND WEED TO MAINTAIN APPEARANCE. REMOVE TRASH AND DEBRIS. MOW AROUND BASIN.	AS NEEDED
REMOVE SEDIMENT FROM INFLOW POINTS. (OFF-LINE SYSTEMS) SHRUBS SHOULD BE INSPECTED TO EVALUATE HEALTH. REMOVE DEAD AND DISEASED VEGETATION.	SEMI-ANNUALLY
INSPECT AND REMOVE ANY SEDIMENT AND DEBRIS BUILD-UP IN PRE-TREATMENT AREAS. INSPECT INFLOW POINTS AND BIORETENTION SURFACE FOR BUILD UP OF ROAD SAND ASSOCIATED WITH SPRING MELT PERIOD. REMOVE AND REPLANT AS NECESSARY. CONDUCT INSPECTION AFTER THE REGRADING OF THE PARKING LOT AND ALSO THE FIRST RAIN EVENT AFTER THE REGRADING OF THE PARKING LOT.	ANNUALLY
TEST pH OF PLANTING SOILS. IF pH IS BELOW 5.2, ADD LIMESTONE. IF pH IS 7.0 TO 8.0, ADD IRON SULFATE PLUS SULFUR. TEST INFILTRATION/FILTRATION RATE. MINIMUM RATE IS 0.2 INCH PER HOUR. REPLACE FILTER MEDIA IF RATE IS NOT MET.	2 TO 3 YEARS

Filtration/Infiltration Basin Notes

1. BASIN CONSTRUCTION MUST WAIT UNTIL FINAL SITE LANDSCAPING. REMOVE SEDIMENT FROM EXCAVATED BASIN PRIOR TO PLACEMENT OF FILTER MEDIA.
2. BASIN EXCAVATION SHALL BE WITH TOOTHED-BUCKETS TO SCARIFY THE BOTTOM.
3. PLACE SILT FENCE AROUND BASINS IMMEDIATELY AFTER BASIN CONSTRUCTION.
4. BASINS MUST BE TESTED FOR INFILTRATION RATE AFTER TOTAL SITE STABILIZATION. A DUAL RING INFILTROMETER SHALL BE USED FOR TESTING. MINIMUM INFILTRATION RATE IS 0.2-INCH PER HOUR. IF BASIN DOES NOT MEET INFILTRATION RATE, CONTRACTOR MUST TAKE CORRECTIVE ACTION UNTIL MINIMUM INFILTRATION RATE IS MET. CORRECTIVE ACTION MAY INCLUDE REMOVING PLUG IN DRAIN TILE. ALL TESTING AND CORRECTIVE ACTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE INCIDENTAL TO THE CONTRACT, WITH NO DIRECT COMPENSATION MADE.
5. NOTIFY THE SAUK RIVER WATERSHED DISTRICT 48 HOURS PRIOR TO TESTING.

Grading Construction Sequencing

1. NO SEDIMENT BASINS WILL BE NEEDED.
2. INSTALL PERIMETER CONTROLS PRIOR TO EARTHMOVING ACTIVITIES COMMENCING.
3. SITE GRADING SHALL BE PHASED, AS BEST PRACTICAL, TO MINIMIZE SOILS LOSS.
4. GRADE INFILTRATION/FILTRATION AREA.
5. AREAS NOT COVERED BY GRAVEL SHALL BE SEEDED AND MULCHED AFTER SITE GRADING IS COMPLETE ACCORDING TO TIMELINE IN SWPPP.

Westwood

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly licensed PROFESSIONAL ENGINEER under the laws of the State of Minnesota.

Robert Stanley Copouls
Date: 1/18/16 License No. 47876

Designed: KLM
Checked: RSC
Drawn: IJH
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
A	5/30/14	30% CIVIL CONSTRUCTION PLAN
B	8/15/14	60% CIVIL CONSTRUCTION PLAN
C	8/26/14	ISSUED FOR PERMITTING
D	9/08/14	ISSUED FOR PERMITTING
E	9/24/14	ISSUED FOR PERMITTING
F	10/22/14	ISSUED FOR PERMITTING
G	11/13/14	ISSUED FOR PERMITTING
H	6/11/15	ISSUED FOR PERMITTING
I	7/10/15	ISSUED FOR BID
J	8/07/15	ISSUED FOR PERMITTING
K	1/18/16	ISSUED FOR PERMITTING

Prepared for:

Black Oak Getty Wind
488 8th Avenue, HQ11,
San Diego, CA 92101

Black Oak/Getty Wind Farm
Stearns County, Minnesota

Substation Grading Notes

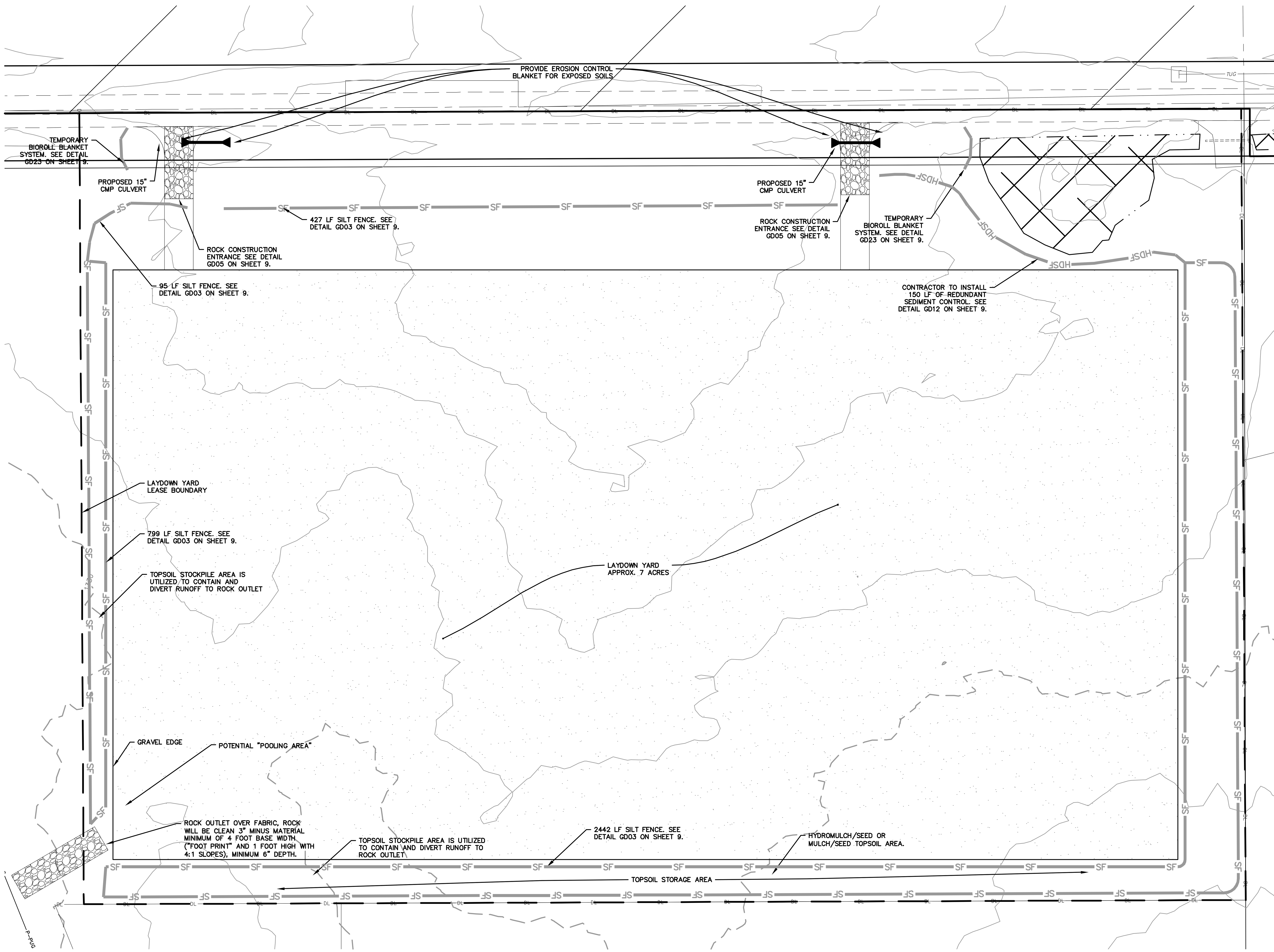
ISSUED FOR PERMITTING

Turbine Array: ~~BOGY_39xV110-80mHH_20140718_r1~~

Date: 1/18/16

Sheet: 42 OF 43

20111239-01SPF02.dwg



LEGEND:

- PRIMARY TURBINE LOCATION
- T-XX PRIMARY TURBINE NUMBER
- ACCESS ROAD
- ALTERNATE ACCESS ROAD
- CRANE PATH
- ALTERNATE CRANE PATH
- TEMPORARY GRAVEL AREA
- GATE
- FENCE
- UNDERGROUND COLLECTION SYSTEM
- UNDERGROUND COLLECTION SYSTEM
- TRANSMISSION LINE
- DISTURBANCE LIMITS
- SILT FENCE
- CULVERT
- EXISTING CULVERT
- EXISTING FENCE
- EXISTING TELEPHONE LINE
- EXISTING OVERHEAD POWER
- EXISTING WATER LINE
- EXISTING GAS PIPELINE
- EXISTING FIBER OPTIC LINE
- EXISTING EASEMENT
- EXISTING RIGHT OF WAY
- EXISTING GRAVEL EDGE
- EXISTING BITUMINOUS EDGE
- EXISTING VEGETATION
- EXISTING 10' CONTOURS
- EXISTING 2' CONTOURS
- EXISTING DELINEATED DITCH LINES
- DELINEATED WETLAND
- NWI WETLAND
- OUTSIDE PROJECT BOUNDARY
- EXISTING DRAIN TILE
- EXISTING MICROWAVE BEAM PATH

- NO CHANGE FROM THE PREVIOUSLY APPROVED PLANS (REV G PLAN SET FROM 11/13/14)
- ADDED TO THE PREVIOUSLY APPROVED PLANS
- REMOVED FROM THE PREVIOUSLY APPROVED PLANS

* ANTICIPATED DRAINAGE CROSSINGS ARE SHOWN ON THE PLANS BASED LARGELY ON OBSERVATION OF DRAINAGE CHANNELS/DRAINAGE EROSION FROM THE AERIAL IMAGERY, SUPPLEMENTED BY GIS STREAM LINEWORK AND EXISTING CONTOUR DATA AVAILABLE. ADDITIONAL CROSSINGS (LOW WATER CROSSINGS/CULVERTS) MAY NEED TO BE INSTALLED IN AREAS WHERE CONCENTRATED FLOW IS EXPECTED DUE TO CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL USE DISCRETION IF A LOW WATER CROSSING OR CULVERT (REFER TO DETAILS ON SHEET 7) IS NEEDED BASED ON THE TOPOGRAPHY OF THE DRAINAGE CROSSING. IF CONTRACTOR DETERMINES THAT ADDITIONAL CULVERTS ARE NEEDED, THE ENGINEER SHALL BE NOTIFIED AND WILL PROVIDE A DESIGN CONSISTENT WITH THE REST OF THE PROJECT. THE SAUK RIVER WATERSHED DISTRICT SHALL BE NOTIFIED.

** UTILITY CROSSINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE ENCROACHMENT AGREEMENT OR REQUIREMENTS OF THE UTILITY OWNER.

*** UNDERGROUND COLLECTION LINES ARE SHOWN FOR REFERENCE ONLY. SEE ELECTRICAL CONSULTANT PLANS FOR CONSTRUCTION DETAILS, INCLUDING BORING LOCATIONS.

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344
PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150
www.westwoodps.com

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly licensed PROFESSIONAL ENGINEER under the laws of the State of Minnesota.

Robert Stanley Copouls
Date: 1/18/16 License No. 47876

Designed: KLM
Checked: RSC
Drawn: IJH
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
A	5/30/14	30% CIVIL CONSTRUCTION PLAN
B	8/15/14	60% CIVIL CONSTRUCTION PLAN
C	8/26/14	ISSUED FOR PERMITTING
D	9/08/14	ISSUED FOR PERMITTING
E	9/24/14	ISSUED FOR PERMITTING
F	10/22/14	ISSUED FOR PERMITTING
G	11/13/14	ISSUED FOR PERMITTING
H	6/11/15	ISSUED FOR PERMITTING
I	7/10/15	ISSUED FOR BID
J	8/07/15	ISSUED FOR PERMITTING
K	1/18/16	ISSUED FOR PERMITTING

Prepared for:

Black Oak Getty Wind
488 8th Avenue, HQ11,
San Diego, CA 92101

0' 40' 80' 120'

Black Oak/Getty Wind Farm
Stearns County, Minnesota

Laydown Area Site Plan

ISSUED FOR PERMITTING

Turbine Array: ~~BOGY_39xV110-80mHH_20140718_r1~~
Date: 1/18/16
Sheet: 43 OF 43

20111239-01SPF02.dwg

Noise Technical Report

Black Oak Getty Wind Farm

Stearns County, Minnesota

January 19, 2016

Prepared for:
Black Oak Wind, LLC

Prepared by:
HDR Engineering, Inc.
701 Xenia Avenue South,
Suite 600
Minneapolis, MN 55416

Black Oak Getty Wind Farm Noise Technical Report

Executive Summary

HDR Engineering, Inc. (HDR) performed a noise analysis in support of the proposed Black Oak Getty Wind project. The analysis modeled all proposed wind turbines operating simultaneously at their highest noise emission operating condition and calculated project-related noise levels at 205 noise-sensitive receptors within the study area.

Analysis results indicate the following:

- The noise analysis was conducted in accordance with the accepted environmental noise assessment practices in the industry and in accordance with methods accepted by the State of Minnesota.
- The maximum (calculated) project-related noise level from all wind turbines operating simultaneously at their highest rated operating speed is 45 dBA L_{eq} at the nearest noise-sensitive receptor. This is based on the proposed Vestas V110 2.0 MW wind turbine generator.
- The average (calculated) project-related noise level at residences is 33 dBA, on an hourly L_{eq} basis.[1]
- Cumulative noise levels including wind turbine noise levels and standards-based assumed background noise levels at all residences are compatible with Minnesota Pollution Control Agency (MPCA) Noise Standards located in Minnesota Rules 7030.0040.
- Maximum calculated L_{eq} levels for project-related noise are at least 5 dB below the MPCA nighttime L_{50} noise limit of 50 dBA.[1]

NOISE PERCEPTION

Noise is defined as unwanted sound. Sound is made up of tiny fluctuations in air pressure. Sound, within the range of human hearing, can vary in pressure by over one million units. Therefore, a logarithmic scale, known as the decibel scale (dB), is used to quantify sound pressure and to compress the scale to a more manageable range.

Sound is characterized by both its amplitude (how loud it is) and frequency (or pitch). The human ear does not hear all frequencies equally. In fact, the human hearing organs of the inner ear deemphasize very low and very high frequencies. The A-weighted scale (dBA) is used to reflect the selective sensitivity of human hearing. This scale puts more weight on the range of frequencies that the average human ear perceives, and less weight on those that we do not hear as well such as very high and very low frequencies. The C-weighted scale (dBC) is used to reflect human sensitivity at louder levels. This scale puts more weight on the lower frequencies than does the A-weighted scale; it is also considered an indicator of the potential presence of low-frequency noise.

[1] Based on the proposed Vestas V110 2.0 MW turbine model.

The human range of hearing extends from approximately 3 dBA to around 140 dBA. Table 1 shows a range of typical noise levels from common activities.

Table 1. Common Noise Sources and Levels

Sound Pressure Level, dBA	Noise Source
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night
Source: Environmental Impact Analysis Handbook, ed. By Rau and Wooten, 1980	

Environmental noise is often expressed as a sound level occurring over a stated period of time, typically one hour. When the acoustic energy is averaged over the stated period of time, the resulting equivalent sound level represents the energy-based average sound level. This is called the equivalent level, or L_{eq}. Therefore, the L_{eq} represents a constant sound that, over the specified period, has the same acoustic energy as the time-varying sound.

EVALUATION CRITERIA

Project-related noise was assessed by comparing modeling results with the MPCA noise standards for residential land uses. The daytime and nighttime noise limits are an L_{50} of 60 and 50 dBA respectively and an L_{10} of 65 and 55 respectively. The L_{50} is the noise level exceeded 50% of the time and the L_{10} is the noise level exceeded 10% of the time.

The Cadna-A model used for this analysis calculates an L_{eq} occurring in the stated time period (one hour). The L_{eq} is a mean (average) noise level. The MPCA L_{50} descriptor represents the noise level exceeded 50% of the time, which – by inspection, is a statistical median noise level. For a constant noise source, the L_{eq} and the L_{50} will be equal. Most noise sources, including wind turbines, exhibit some fluctuation, resulting in a statistical distribution of noise levels over time. Even with a fluctuating noise source, the L_{eq} is a close approximation or even a conservative overestimate of the L_{50}. For purposes of this analysis, the L_{eq} calculated by Cadna-A is considered a reasonable, appropriate, and conservative estimate of the L_{50}.

METHODOLOGY

HDR used Cadna-A, a commercially-available acoustical analysis software designed for evaluating environmental noise from stationary and mobile sources, to calculate the project-related noise levels. Cadna-A is a three-dimensional noise model based on ISO 9613, “Attenuation of Sound during Propagation Outdoors,” adopted by the International Standards Organization (ISO) in 1996. This standard provides a widely-accepted engineering method for the calculation of outdoor environmental noise levels from sources of known sound emission. Sound propagation is a product of several attenuation terms including geometric divergence, ground effect, atmospheric absorptions, screening by obstacles, and meteorological conditions.

In order to provide cumulative noise analysis results, Cadna-A calculated noise emissions from all proposed turbines operating simultaneously (the turbine layout shape file was imported into Cadna-A). The Cadna-A modeling done for this project did not utilize project-specific terrain. By eliminating terrain, the Cadna-A model assumes flat ground and reduces the opportunity for terrain to potentially block the line-of-sight between turbines and receptors, generally resulting in a more conservative, overestimated, calculated sound level.

In lieu of specific state and county specifications for ground absorption, a ground absorption factor of 0.7 was used as suggested in the “Noise Guidelines for Wind Farms” document published by the Ontario Ministry of the Environment. This ground absorption factor takes into account the majority of cultivated terrain in the project area; in effect it assumes 70% of the ground cover is porous, or acoustically absorptive, and 30% of the ground is an exposed hard surface, or acoustically reflective.

A 0% acoustical absorption means that the surface is perfectly reflective. Smooth, debris-free ice, mirrors, and paved parking lots are examples of surfaces that approach perfect reflective surfaces. Even during the winter, the ground surface characteristics in the project area are not representative of a paved parking lot or other perfect acoustical reflectors. During the winter ground surfaces in the project area vary and can include soft powdered snow cover, sleet, and small areas of ice, many of which may be interrupted by vegetation. Thus, a 0% absorption rate, although conservative, would not be appropriate to use in the noise model. Therefore the guidelines published by the Ontario Ministry of the Environment were employed.

Additionally, by eliminating wind rose data from the model, Cadna-A conservatively calculates noise levels at all receptors by assuming that each receptor is downwind from every turbine at the same time. Use of these assumptions and the loudest sound power level provided by the manufacturer means the analysis provides a conservatively high estimate of wind turbine noise levels.

Wind turbine noise emissions vary with the operating speed of the turbine. Sound is generated from the wind turbine at points near the hub or nacelle, 80 meters (262.5 feet) in the air, and from the blade tips as they rotate. Sound power levels (L_W) of the wind turbines used in this analysis were provided by the wind turbine manufacturer and are based on results of standardized measurement procedures. The noise emissions data provided by Vestas accounts for all sound generating elements associated with wind turbines. The Cadna-A model utilized the noise emission level at the highest rated operating speed as shown in Table 2.

Table 2. Vestas V110 Noise Emissions Data

Octave Band Sound Power Level, dBA									Total Lw, dBA
31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
80.5	88.6	93.9	98.1	100.8	101.7	101.6	96.7	85.6	107.5

The Vestas V110 2.0 MW turbine was modeled to determine project-related noise levels at residences throughout the project area. This is the proposed turbine model.

EXISTING ENVIRONMENT

The term ambient acoustic environment refers to the all encompassing sound in a given environment or community. The outdoor ambient acoustic environment is a composite of sound from many sources from varying distances and directions. Common sound sources within an agricultural and/or rural environment include, but are not limited to, sound from farm equipment such as tractors and combines, sound generated from traffic on roadways, sounds from wildlife, and wind rustling through the vegetation.

Typically, the ambient acoustic environment of a rural or agriculturally-oriented community has average sound levels ranging from 30 dBA to 60 dBA L_{eq}. This range is based on HDR's extensive and qualified experience in reviewing noise levels in rural settings with high wind resources. In agricultural and/or rural communities, higher sound levels typically exist near roadways and near areas that experience greater human activities such as farming. In addition, compared with similar environments with lower quality wind resources, those environments with higher wind resources generally experience higher sound levels.

Preconstruction noise monitoring activities are underway, and detailed results will be included with the post-construction noise measurement report.

NOISE ASSESSMENT

Project-related noise levels, from all proposed turbines, were calculated at residences using Cadna-A. Figure 1 depicts project turbines and modeled residences. All residences within the project area were included in the noise model. Additionally residences outside of the project area but within one mile of a project turbine were also included in the noise model as shown in Figure 1.

Figure 1. Modeled Residences and Project Turbines

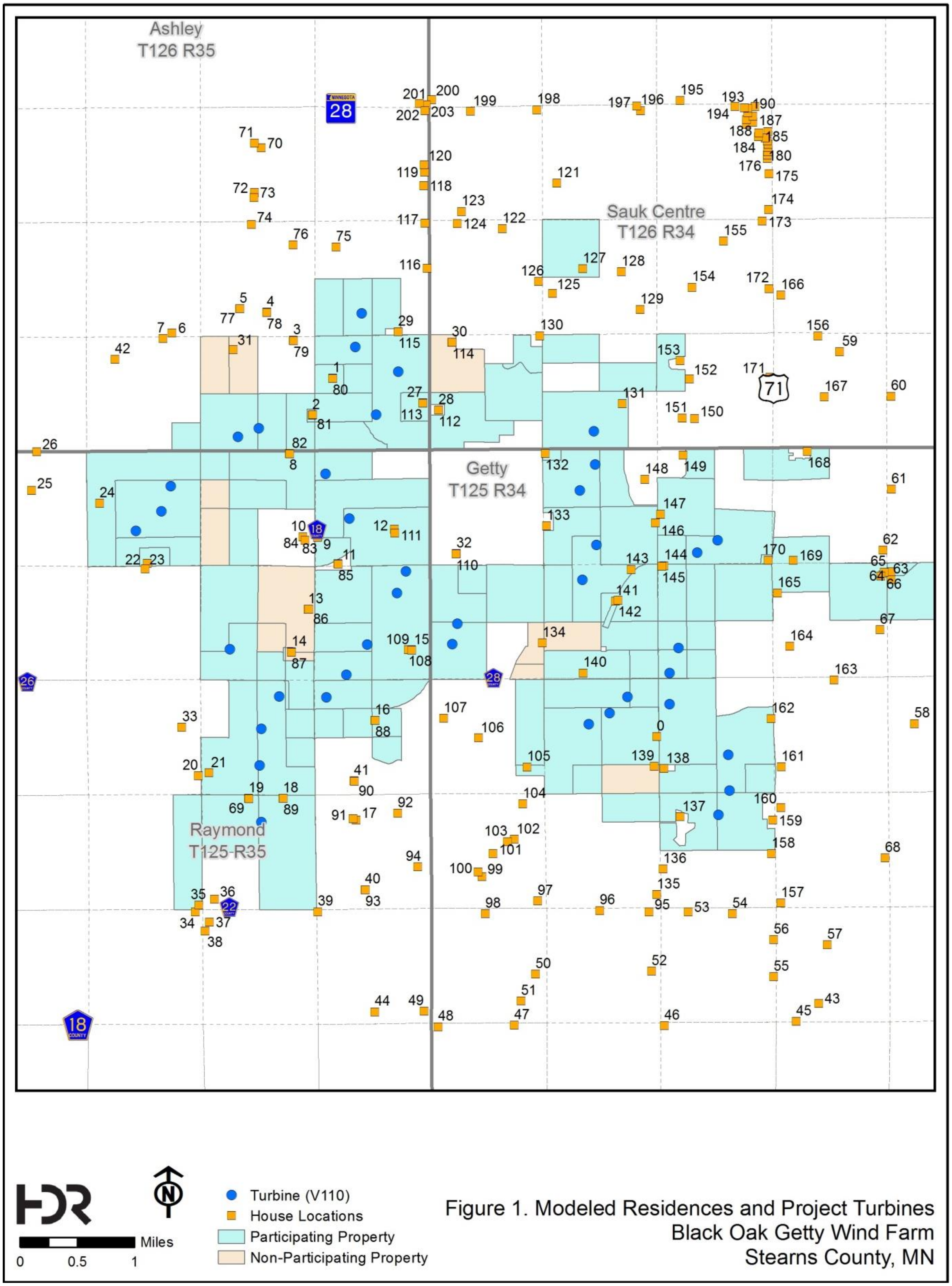


Table 3 presents a summary of the noise analysis results. Calculated noise levels are based on the Vestas V110 2.0 MW turbine as proposed for the Black Oak Getty wind farm. Cumulative noise levels, representative of project-related noise levels in addition to non-project related noise levels, were estimated based on an assumed background noise level.

Table 3. Summary of Noise Analysis

	Project-Related Noise Level,	**Background Noise Level**[a]		**Cumulative Noise Level**	
	Day and Night L_{eq} dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
Maximum noise level across residences	45	43	37	47	45
Arithmetic mean noise level across residences	33	43	37	43	38

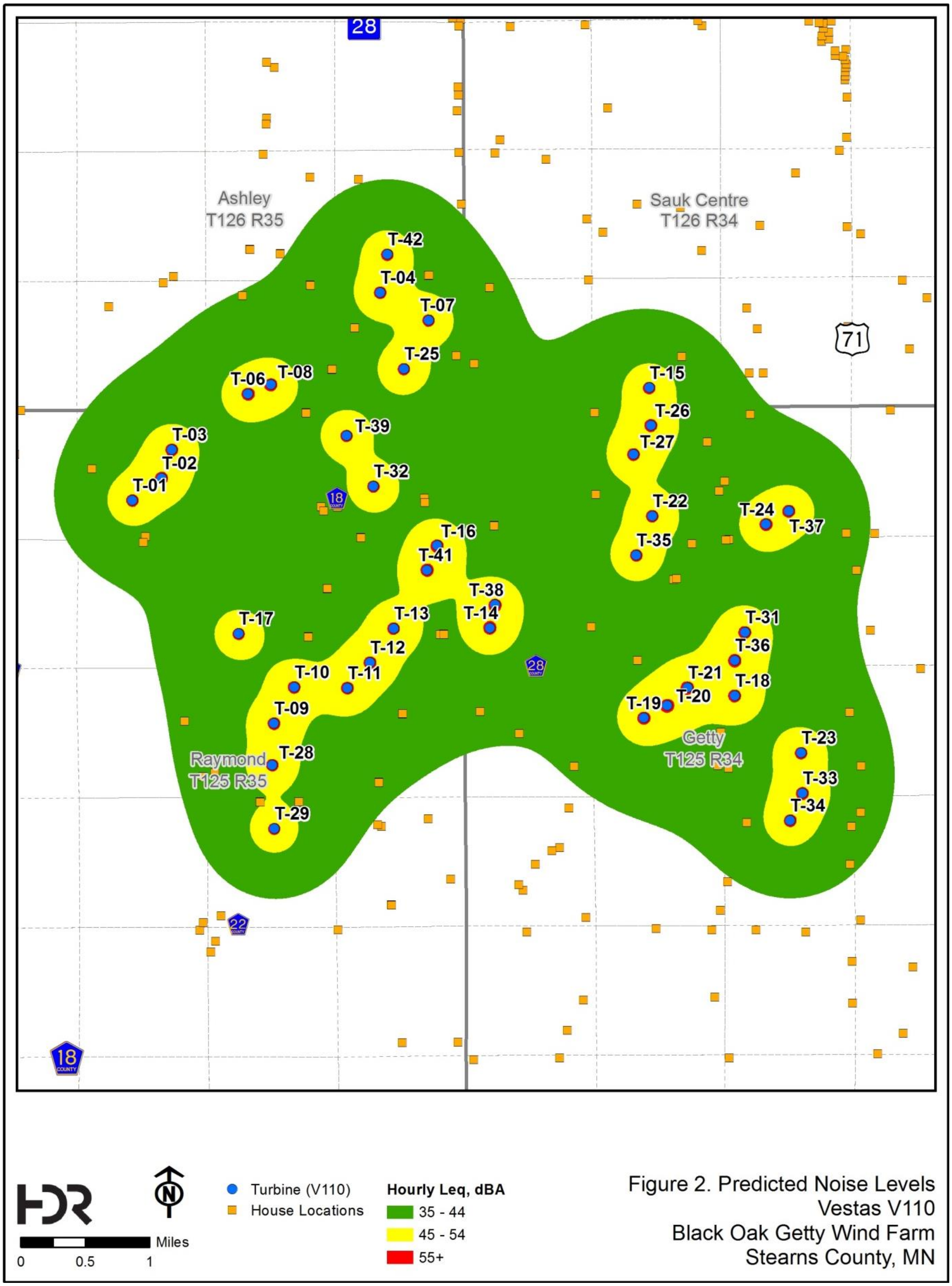
[a] Preconstruction noise level surveys and data processing for the project area have not been completed at this time. Assumed daytime and nighttime background noise levels are based on America National Standards Institute ANSI / ASA S12.9 Part 3 (2008) typical noise levels for very quiet suburban and rural residential land uses.

Analysis results indicate that the maximum (calculated) hourly L_{eq} due to project-related noise is 45 dBA L_{eq} at the nearest noise-sensitive receptor. The average (arithmetic mean) across the residences of the hourly L_{eq} due to project-related noise is 33 dBA. Based on the final turbine layout the maximum (calculated) project-related noise level is at least 5 dB below the MPCA nighttime L_{50} noise limit of 50 dBA. Project-related (calculated) noise levels at all occupied residences in the project study area are predicted to meet the L_{50} noise threshold of 45 dBA, based upon the nighttime L_{50} noise limit of 50 dBA with a 5 dB buffer as a surrogate for low-frequency noise as suggested by the Minnesota Department of Health (MDH). Figure 2 below shows the project-related noise isopleths (a line or curve of equal values). Analysis results depicted in the multi-turbine constraint maps show that project-related noise complies with MPCA noise guidelines.

Additionally cumulative noise levels at all residences are predicted to meet the MPCA noise limits of 60 dBA and 50 dBA L_{50} during daytime and nighttime hours respectively. The maximum predicted cumulative daytime noise level in the study area is 47 dBA, 13 dB below the daytime noise limit. The maximum cumulative nighttime noise level is 45 dBA, 5 dB below the nighttime noise limit.

Noise modeling results for all noise-sensitive land uses in the project study area are presented in Appendix A.

Figure 2. Predicted Project-Related Noise Levels



LOW FREQUENCY NOISE

The MDH white paper also recommended an evaluation of the low-frequency component of turbine noise, as a possible additional cause of irritation. Noise emissions from modern wind turbines pose no risk of hearing loss or any other nonauditory effect (Ising and Kruppa 2004). While subaudible, low frequency sound and infrasound are most commonly associated with noise complaints about wind turbines, there is a consensus among acoustic experts that these frequencies are of no consequence to health (Colby et al. 2009). Although some people may be annoyed at the presence of sound from wind turbines, annoyance is a highly-individualized phenomenon, and is not an identified medical condition (Colby et al. 2009). The primary concern about wind turbine sound is its fluctuating nature, which can occur under certain circumstances such as turbulent wind conditions. A small number of individuals with particular sensitivities may find this sound annoying, but the reaction depends primarily on the personal characteristics of the listener, as opposed to the intensity of the sound level (Colby et al. 2009). The substantial body of peer-reviewed literature on the subject of wind turbine noise indicates that there is nothing unique about the sounds and vibrations emitted by wind turbines, and that there is no evidence that the audible or subaudible sounds emitted by wind turbines have any direct adverse physiological effects (Colby et al. 2009).

Geoff Leventhall, an acoustic and vibration expert from the United Kingdom who was cited in the MDH white paper for two of his earlier works on low frequency sound, conducted a study in 2006 on infrasound from wind turbines. According to Leventhall, there is now agreement among peer-reviewed acousticians that infrasound from wind turbines is not a public health issue (Colby et al. 2009).

When studying 1.5 MW wind turbines from a distance of 65 meters (213 feet), Levanthall found that modern upwind turbines produce pulses which are considered infrasound, but only at low levels, typically 50 to 70 dB, which are well below the hearing threshold. Based on his study, Levanthall further concludes that infrasound is inaudible at frequencies below 16 Hz. The threshold which is audible varies by individuals, but Levanthall states that "…it is most unlikely that an individual will be able to hear sound at any frequency which is more than 20 dB below the median threshold for hearing" (Colby, et al. 2009).

Project-specific field studies conducted by Epsilon Associates, Inc. and previously submitted to the PUC in document 20099-41923-01 of docket 09-845 reached similar conclusions (O'Neal, et al, 2009). Epsilon studied the two turbine models most frequently installed – the GE 1.5sle (1.5 MW) and Siemens SWT-2.3-93 (2.3 MW). These field studies consisted of outdoor measurements at various reference distances, and concurrent indoor/outdoor measurements at residences within the wind farm. Epsilon determined all means, methods, and the testing protocol without interference or direction from wind energy industry participants.

Based on field measurements and an extensive literature review, Epsilon concluded that wind farms consisting of GE 1.5sle and Siemens SWT 2.3-93 wind turbines (similar to those to be used at the Black Oak Getty Wind Farm) sited at distances beyond 1,000 feet from residences (i) meet the American National Standards Institute (ANSI) standard for low frequency sound in bedrooms, classrooms, and hospitals, (ii) meet the ANSI standard for thresholds of annoyance from low frequency sound, and (iii) caused no window rattles or perceptible vibration of light weight walls or ceilings within homes (O'Neal et al. 2009). In homes, there may be slightly audible low frequency sound (depending on other sources of low frequency sound); however, the levels are below criteria and recommendations for low frequency sound within homes (O'Neal et al, 2009). There is no audible infrasound either outside or inside the homes at any of the measurement sites. (O'Neal et al, 2009) Epsilon concluded there should be no adverse public health effects from low frequency sound or infrasound at distances greater than 1,000 feet (O'Neal et al, 2009).

CONCLUSIONS

Analysis results indicate the following:

- The noise analysis was conducted in accordance with the accepted environmental noise assessment practices in the industry and in accordance with methods used on projects approved by the State of Minnesota.
- Analysis results indicate that the maximum (calculated) project-related noise level from all wind turbines operating simultaneously at their highest rated operating speed is 45 dBA (L_{eq}) at the nearest noise-sensitive receptor. This is based on the proposed Vestas V110 2.0 MW wind turbine generator.
- Analysis results also indicate that the average (calculated) project-related noise level at residences is 33 dBA, on an hourly L_{eq} basis.
- Cumulative noise levels including wind turbine noise levels and assumed background noise levels at all residences are compatible with criteria from Minnesota State Noise Pollution Control Rules 7030.0040 for acceptable levels of noise within residential land uses.
- Analysis results indicate that the maximum calculated noise levels are at least 5 dB below the nighttime L_{50} standard of 50 dBA.

In conclusion, analysis results indicate that project-related noise is expected to comply with MPCA noise standards.

References

America National Standards Institute. ANSI / ASA S12.9 Part 3. Quantities and Procedures for Description and Measurement of Environmental Sound. Part 3: *Short-term measurements with an observer present.* 2008.

Colby et al. *Wind Turbine Sound and Health Effects, An Expert Panel*; Prepared for the American and Canadian Wind Energy Associations. December 2009.

International Organization for Standardization (ISO). ISO 9613-2 *Acoustics – Attenuation of sound during propagation outdoors- Part 2: General method of calculation*. 1996.

Ising H, Kruppa B. Health effects caused by noise: Evidence in the literature from the past 25 years. Noise Health 2004;6:5-13.

Ministry of the Environment (Ontario). Noise Guidelines for Wind Farms: Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities. October 2008.

Minnesota Administrative Rules. Chapter 7030, *Noise Pollution Control*.

Minnesota Department of Health Environmental Health Division. Public Health Impact of Wind Turbines. May 22, 2009.

O'Neal et al. Epsilon Associates, Inc. A Study of Low Frequency Noise and Infrasound from Wind Turbines. July 2009.

Rau and Wooten. Environmental Impact Analysis Handbook. 1980.

Appendix A

Black Oak Getty Wind Farm

Cadna-A Modeling Results

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
0	45.6361	-94.9745	T-18	1599	43	37	44	44	46	45
1	45.6815	-95.0331	T-04	1788	43	37	42	42	45	43
2	45.6768	-95.0367	T-08	2565	43	37	41	41	45	42
3	45.6864	-95.0402	T-04	2898	43	37	38	38	44	40
4	45.6899	-95.0449	T-42	4380	43	37	35	35	44	39
5	45.6903	-95.0499	T-08	5595	43	37	33	33	43	38
6	45.6873	-95.0621	T-06	5689	43	37	32	32	43	38
7	45.6866	-95.0637	T-06	5719	43	37	32	32	43	38
8	45.6720	-95.0409	T-08	1840	43	37	43	43	46	44
9	45.6614	-95.0358	T-32	1678	43	37	42	42	45	43
10	45.6614	-95.0385	T-32	2300	43	37	40	40	45	42
11	45.6580	-95.0322	T-32	2152	43	37	41	41	45	42
12	45.6624	-95.0219	T-16	2000	43	37	42	42	45	43
13	45.6522	-95.0376	T-13	3181	43	37	39	39	45	41
14	45.6469	-95.0406	T-10	2146	43	37	42	42	45	43
15	45.6471	-95.0189	T-14	1908	43	37	43	43	46	44
16	45.6382	-95.0255	T-12	2478	43	37	40	40	45	42
17	45.6256	-95.0289	T-29	4389	43	37	34	34	44	39
18	45.6283	-95.0422	T-29	1476	43	37	43	43	46	44
19	45.6283	-95.0484	T-29	1250	43	37	45	45	47	45
20	45.6312	-95.0575	T-28	2883	43	37	38	38	44	40
21	45.6316	-95.0555	T-28	2372	43	37	39	39	44	41
22	45.6581	-95.0667	T-01	1574	43	37	42	42	45	43
23	45.6574	-95.0670	T-01	1788	43	37	41	41	45	42

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
24	45.6657	-95.0752	T-01	2102	43	37	39	39	45	41
25	45.6673	-95.0875	T-01	5161	43	37	31	31	43	38
26	45.6723	-95.0866	T-01	5866	43	37	31	31	43	38
27	45.6784	-95.0168	T-07	1840	43	37	41	41	45	43
28	45.6775	-95.0139	T-07	2574	43	37	39	39	44	41
29	45.6874	-95.0212	T-07	1835	43	37	43	43	46	44
30	45.6860	-95.0115	T-07	2829	43	37	37	37	44	40
31	45.6852	-95.0511	T-08	3826	43	37	35	35	44	39
32	45.6593	-95.0108	T-16	2475	43	37	40	40	45	42
33	45.6374	-95.0604	T-09	3662	43	37	36	36	44	40
34	45.6139	-95.0580	T-29	5151	43	37	30	30	43	38
35	45.6148	-95.0574	T-29	4815	43	37	31	31	43	38
36	45.6156	-95.0546	T-29	4176	43	37	32	32	43	38
37	45.6127	-95.0554	T-29	5203	43	37	30	30	43	38
38	45.6115	-95.0562	T-29	5671	43	37	29	29	43	38
39	45.6140	-95.0359	T-29	4896	43	37	31	31	43	38
40	45.6168	-95.0274	T-29	5716	43	37	31	31	43	38
41	45.6305	-95.0293	T-11	4062	43	37	37	37	44	40
42	45.6839	-95.0724	T-03	6387	43	37	31	31	43	38
43	45.6022	-94.9454	T-34	9859	43	37	26	26	43	37
44	45.6013	-95.0256	T-29	10214	43	37	26	26	43	37
45	45.5999	-94.9495	T-34	10191	43	37	25	25	43	37
46	45.5995	-94.9733	T-34	10039	43	37	26	26	43	37
47	45.5995	-95.0005	T-34	13558	43	37	26	26	43	37

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
48	45.5994	-95.0142	T-29	12495	43	37	26	26	43	37
49	45.6013	-95.0167	T-29	11534	43	37	26	26	43	37
50	45.6060	-94.9966	T-34	11216	43	37	27	27	43	37
51	45.6026	-94.9992	T-34	12537	43	37	27	27	43	37
52	45.6063	-94.9756	T-34	7851	43	37	28	28	43	38
53	45.6139	-94.9690	T-34	4694	43	37	32	32	43	38
54	45.6136	-94.9610	T-34	4603	43	37	32	32	43	38
55	45.6056	-94.9535	T-34	7894	43	37	27	27	43	37
56	45.6103	-94.9536	T-34	6303	43	37	29	29	43	38
57	45.6097	-94.9438	T-34	7824	43	37	27	27	43	37
58	45.6376	-94.9280	T-23	8719	43	37	28	28	43	38
59	45.6848	-94.9413	T-37	10387	43	37	26	26	43	37
60	45.6791	-94.9321	T-37	10429	43	37	26	26	43	37
61	45.6673	-94.9320	T-37	8389	43	37	28	28	43	37
62	45.6596	-94.9336	T-37	7655	43	37	29	29	43	38
63	45.6559	-94.9322	T-37	8216	43	37	29	29	43	38
64	45.6568	-94.9322	T-37	8147	43	37	29	29	43	38
65	45.6568	-94.9334	T-37	7846	43	37	29	29	43	38
66	45.6563	-94.9340	T-37	7722	43	37	29	29	43	38
67	45.6495	-94.9342	T-37	8570	43	37	29	29	43	38
68	45.6206	-94.9334	T-33	7842	43	37	28	28	43	38
69	45.6283	-95.0483	T-29	1228	43	37	45	45	47	45
70	45.7107	-95.0459	T-42	8939	43	37	27	27	43	37
71	45.7113	-95.0471	T-42	9288	43	37	26	26	43	37

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
72	45.7051	-95.0471	T-42	7458	43	37	28	28	43	38
73	45.7044	-95.0472	T-42	7287	43	37	29	29	43	38
74	45.7010	-95.0477	T-42	6531	43	37	30	30	43	38
75	45.6982	-95.0324	T-42	3283	43	37	35	35	44	39
76	45.6984	-95.0402	T-42	4471	43	37	32	32	43	38
77	45.6903	-95.0498	T-08	5588	43	37	33	33	43	38
78	45.6898	-95.0450	T-42	4383	43	37	35	35	44	39
79	45.6863	-95.0401	T-04	2873	43	37	38	38	44	40
80	45.6815	-95.0330	T-04	1787	43	37	42	42	45	43
81	45.6769	-95.0367	T-08	2583	43	37	41	41	45	42
82	45.6720	-95.0409	T-08	1854	43	37	43	43	46	44
83	45.6614	-95.0359	T-32	1705	43	37	42	42	45	43
84	45.6610	-95.0381	T-32	2278	43	37	40	40	45	42
85	45.6580	-95.0321	T-32	2170	43	37	41	41	45	42
86	45.6523	-95.0374	T-13	3154	43	37	39	39	45	41
87	45.6468	-95.0405	T-10	2126	43	37	42	42	46	43
88	45.6382	-95.0255	T-12	2481	43	37	40	40	45	42
89	45.6283	-95.0421	T-29	1501	43	37	43	43	46	44
90	45.6305	-95.0293	T-11	4086	43	37	36	36	44	40
91	45.6257	-95.0295	T-29	4245	43	37	35	35	44	39
92	45.6264	-95.0214	T-11	6287	43	37	33	33	43	38
93	45.6167	-95.0273	T-29	5735	43	37	31	31	43	38
94	45.6196	-95.0178	T-29	7522	43	37	31	31	43	38
95	45.6139	-94.9760	T-34	5506	43	37	31	31	43	38

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
96	45.6141	-94.9849	T-34	7043	43	37	30	30	43	38
97	45.6153	-94.9961	T-19	8493	43	37	30	30	43	38
98	45.6137	-95.0056	T-19	9980	43	37	29	29	43	38
99	45.6184	-95.0062	T-19	8607	43	37	30	30	43	38
100	45.6190	-95.0069	T-19	8521	43	37	30	30	43	38
101	45.6213	-95.0042	T-19	7445	43	37	31	31	43	38
102	45.6231	-95.0004	T-19	6331	43	37	32	32	43	38
103	45.6228	-95.0016	T-19	6601	43	37	32	32	43	38
104	45.6276	-94.9988	T-19	4784	43	37	34	34	43	39
105	45.6322	-94.9980	T-19	3473	43	37	36	36	44	39
106	45.6360	-95.0068	T-14	4489	43	37	36	36	44	39
107	45.6384	-95.0130	T-14	3444	43	37	37	37	44	40
108	45.6471	-95.0195	T-13	1913	43	37	43	43	46	44
109	45.6471	-95.0189	T-14	1904	43	37	43	43	46	44
110	45.6593	-95.0108	T-16	2463	43	37	40	40	45	42
111	45.6619	-95.0219	T-16	1830	43	37	42	42	46	43
112	45.6775	-95.0139	T-07	2581	43	37	39	39	44	41
113	45.6784	-95.0168	T-07	1847	43	37	41	41	45	43
114	45.6860	-95.0114	T-07	2837	43	37	37	37	44	40
115	45.6874	-95.0212	T-07	1839	43	37	43	43	46	44
116	45.6954	-95.0159	T-42	3671	43	37	34	34	44	39
117	45.7012	-95.0163	T-42	5089	43	37	31	31	43	38
118	45.7059	-95.0165	T-42	6543	43	37	29	29	43	38
119	45.7076	-95.0164	T-42	7139	43	37	28	28	43	38

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
120	45.7086	-95.0165	T-42	7442	43	37	28	28	43	38
121	45.7062	-94.9924	T-42	10844	43	37	27	27	43	37
122	45.7004	-95.0023	T-42	7578	43	37	29	29	43	38
123	45.7026	-95.0097	T-42	6592	43	37	30	30	43	38
124	45.7011	-95.0105	T-42	6054	43	37	30	30	43	38
125	45.6922	-94.9933	T-15	6640	43	37	31	31	43	38
126	45.6937	-94.9958	T-15	7367	43	37	30	30	43	38
127	45.6954	-94.9878	T-15	7530	43	37	29	29	43	38
128	45.6950	-94.9808	T-15	7487	43	37	29	29	43	38
129	45.6901	-94.9774	T-15	6014	43	37	30	30	43	38
130	45.6869	-94.9956	T-15	5066	43	37	33	33	43	38
131	45.6782	-94.9807	T-15	1841	43	37	40	40	45	42
132	45.6720	-94.9946	T-27	2341	43	37	41	41	45	42
133	45.6628	-94.9944	T-27	2248	43	37	41	41	45	42
134	45.6479	-94.9952	T-35	3459	43	37	39	39	44	41
135	45.6161	-94.9746	T-34	4652	43	37	32	32	43	38
136	45.6193	-94.9735	T-34	3579	43	37	35	35	44	39
137	45.6259	-94.9704	T-34	1786	43	37	41	41	45	42
138	45.6320	-94.9733	T-18	2971	43	37	40	40	45	42
139	45.6323	-94.9750	T-18	2942	43	37	40	40	45	42
140	45.6441	-94.9878	T-20	2223	43	37	42	42	45	43
141	45.6532	-94.9820	T-35	1823	43	37	42	42	45	43
142	45.6533	-94.9815	T-35	1905	43	37	42	42	45	43
143	45.6572	-94.9791	T-22	1974	43	37	42	42	45	43

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
144	45.6577	-94.9732	T-24	1640	43	37	42	42	46	43
145	45.6576	-94.9736	T-24	1755	43	37	42	42	45	43
146	45.6631	-94.9747	T-24	2356	43	37	41	41	45	42
147	45.6642	-94.9738	T-24	2445	43	37	40	40	45	42
148	45.6686	-94.9766	T-26	2394	43	37	40	40	45	42
149	45.6717	-94.9697	T-26	4080	43	37	36	36	44	40
150	45.6763	-94.9676	T-15	4707	43	37	34	34	44	39
151	45.6764	-94.9698	T-15	4142	43	37	35	35	44	39
152	45.6813	-94.9685	T-15	5039	43	37	32	32	43	38
153	45.6837	-94.9702	T-15	5160	43	37	32	32	43	38
154	45.6930	-94.9681	T-15	8054	43	37	28	28	43	38
155	45.6988	-94.9623	T-15	10631	43	37	26	26	43	37
156	45.6867	-94.9452	T-37	10518	43	37	27	27	43	37
157	45.6149	-94.9522	T-34	4991	43	37	31	31	43	38
158	45.6212	-94.9538	T-34	3039	43	37	36	36	44	40
159	45.6255	-94.9536	T-33	2422	43	37	39	39	44	41
160	45.6270	-94.9521	T-33	2514	43	37	38	38	44	41
161	45.6322	-94.9520	T-23	2522	43	37	39	39	44	41
162	45.6383	-94.9539	T-23	2588	43	37	38	38	44	41
163	45.6432	-94.9425	T-23	5993	43	37	32	32	43	38
164	45.6475	-94.9505	T-31	5144	43	37	34	34	44	39
165	45.6542	-94.9527	T-37	3684	43	37	36	36	44	39
166	45.6919	-94.9519	T-15	10710	43	37	26	26	43	37
167	45.6791	-94.9441	T-37	8275	43	37	28	28	43	38

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
168	45.6721	-94.9472	T-37	5845	43	37	30	30	43	38
169	45.6583	-94.9498	T-37	3622	43	37	35	35	44	39
170	45.6584	-94.9544	T-37	2507	43	37	38	38	44	40
171	45.6815	-94.9540	T-37	7909	43	37	29	29	43	38
172	45.6928	-94.9541	T-15	10452	43	37	27	27	43	37
173	45.7013	-94.9553	T-15	12442	43	37	25	25	43	37
174	45.7028	-94.9541	T-15	13054	43	37	25	25	43	37
175	45.7073	-94.9540	T-15	14389	43	37	24	24	43	37
176	45.7093	-94.9544	T-15	14943	43	37	24	24	43	37
177	45.7097	-94.9543	T-15	15081	43	37	24	24	43	37
178	45.7101	-94.9543	T-15	15222	43	37	23	23	43	37
179	45.7107	-94.9543	T-15	15384	43	37	23	23	43	37
180	45.7110	-94.9542	T-15	15511	43	37	23	23	43	37
181	45.7115	-94.9543	T-15	15635	43	37	23	23	43	37
182	45.7126	-94.9543	T-15	16009	43	37	23	23	43	37
183	45.7119	-94.9547	T-15	15701	43	37	23	23	43	37
184	45.7120	-94.9560	T-15	15582	43	37	23	23	43	37
185	45.7125	-94.9559	T-15	15748	43	37	23	23	43	37
186	45.7136	-94.9581	T-15	15838	43	37	23	23	43	37
187	45.7138	-94.9570	T-15	16058	43	37	23	23	43	37
188	45.7142	-94.9581	T-15	16042	43	37	23	23	43	37
189	45.7146	-94.9570	T-15	16308	43	37	23	23	43	37
190	45.7150	-94.9579	T-15	16341	43	37	23	23	43	37
191	45.7158	-94.9565	T-15	16760	43	37	23	23	43	37

Residence ID[a]	Location		Nearest Turbine		Background Noise Level[c]		Modeled Project-Related Noise Level		Cumulative Noise Level, Project + Background	
	Latitude	Longitude	Turbine ID[b]	Distance to Turbine, ft.	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
192	45.7156	-94.9579	T-15	16526	43	37	23	23	43	37
193	45.7157	-94.9585	T-15	16484	43	37	23	23	43	37
194	45.7159	-94.9601	T-15	16370	43	37	23	23	43	37
195	45.7166	-94.9701	T-15	15785	43	37	23	23	43	37
196	45.7153	-94.9773	T-15	14968	43	37	24	24	43	37
197	45.7159	-94.9779	T-15	15147	43	37	24	24	43	37
198	45.7155	-94.9960	T-42	12409	43	37	25	25	43	37
199	45.7153	-95.0080	T-42	10604	43	37	26	26	43	37
200	45.7168	-95.0151	T-42	10382	43	37	26	26	43	37
201	45.7161	-95.0160	T-42	10074	43	37	26	26	43	37
202	45.7163	-95.0173	T-42	10036	43	37	26	26	43	37
203	45.7154	-95.0163	T-42	9788	43	37	26	26	43	37
204	45.7165	-95.0318	T-42	9819	43	37	26	26	43	37

[a] Residence ID as shown on Figure 1

[b] Turbine ID shown in Figure 2

[c] Preconstruction noise level surveys for the project area have not been completed at this time. Assumed daytime and nighttime background noise levels are based on America National Standards Institute ANSI / ASA S12.9 Part 3 (2008) typical noise levels for very quiet suburban and rural residential land uses