SAINT MARY'S, ALASKA
WIND TURBINE PROJECT
65% DESIGN SUBMITTAL
OCTOBER 2011
EARTHWORK

GENERAL

A. NOTIFY Owner of any discrepancies between contract documents and site conditions prior to start of work.
B. Maintain Subsurface, Structural and Environment areas of lift(s) during testing. All parameters and testing requirements are met, if not, testing is re-scheduled by the owner.
C. Any work covered up prior to testing completion and achieving testing requirements, or work that has been completed outside testing parameters, is inspected and approved by the contractor.
D. Work in accordance with all environmental guidelines.
E. Any hazards which render unstable all subsurface areas of lift(s) shall be investigated by the owner and approved by the contractor.

EMERGENCY

F. EGRET and EAGLE parental animals shall be investigated in accordance with emergency procedures. All personnel shall be kept in a safe distance while work is being performed.
G. The contractor shall provide the necessary equipment to monitor and control all subsurface areas of lift(s) during testing.

SUBMITTAL

H. Contractor shall submit the following earthwork submittals:
A. Submit one original analysis and report (contractor copy) to the owner for all material used on all tests in accordance with testing requirements.
B. SubmitFINAL SUBMITTED TEST RESULTS IN APPROVED FORMAT PROVIDE 1 TEST PER 100 CY OF PLACED MATERIAL AND 1 TEST PER LP.

EMERGENCY FILL

C. EMERGENCY FILL SHALL BE LOCAL MATERIAL, 2-WAY MAZE, COMPACT COMPOSTABLE MATERIAL. THE MATERIAL SHALL BE PLACED IN AN INSTANT, SHELTERED, DRY AREA, AND DETERRENT MATERIALS, SUCH AS SOD, SEEDS, AND COMPOST MATERIALS. EMERGENCY MATERIALS SHALL BE COMBINED.

EMERGENCY FILL CONSTRUCTION

D. GROUND SURFACE PREPARATION
1. Clearing debris and within emergency footprint to human conditions.
2. Place work emergency (2016) or equal directly over existing surface, extend perimeter a minimum of 50 feet from all sides of the area to be tested in accordance with manufacturer recommendations. Work emergency should not be allowed.

EMERGENCY FILL

E. EMERGENCY FILL
1. The specified material shall be placed at the elevations and to the levels and grades specified on the contractor's drawings. The material shall be placed and spread uniformly in successive lifts to a minimum of 6 inches. The material shall be tested to maximum 6 inches. The material shall be tested to maximum 6 inches. The material shall be compacted to a minimum of 6 inches from the bottom of the fill. Each layer shall be compacted in accordance with the specifications.
2. Screening, scalping, and testing shall continue until the surface elevation in each lift is from 6 inches to 12 inches from the adjacent lift. The material shall be compacted to a minimum of 6 inches from the bottom of the fill. Each layer shall be compacted in accordance with the specifications.
3. Compaction materials shall be removed from any areas to which the emergency material. Back-graded segments shall be re-graded and re-tested with sufficient material.

COMPACTION

F. COMPACTION
1. Conduct early compaction tests to determine final density as prescribed by necessary testing standards. Record all density tests as prescribed by necessary testing standards.
2. Conduct appropriate compacted areas of lift(s) as specified by the contractor. All density tests require immediate compaction.
3. The contractor shall be responsible for performing the quality and type of compaction equipment and for selecting the proper method of operating said equipment to attain the required compaction density.

CONTRACTOR PROVIDED TESTING

THE CONTRACTOR SHALL PROVIDE LABORATORY TESTING AND ON-SITE COMPACTION TESTING SERVICES AS REQUIRED. THE RESULTS OF EACH EARTH TEST SHALL BE REQUIRED ON A TEST SHEET. THE FOLLOWING INFORMATION SHALL BE REQUIRED:
1. SITE PLAN SHOWING HORIZONTAL AND VERTICAL LOCATION OF THE TESTS.
2. DENSITY MEASUREMENT AND PERCENT OF REFLECTED STANDARD COMPACTED.
3. COPY OF COMPACTIVE CURVES SHOWING MAXIMUM DENSITY.
4. MATERIAL DESCRIPTION AND APPROPRIATE COMPACTION CONTROL STANDARDS.

MAINTENANCE

H. AS NEEDED, CONTRACTOR SHALL ENTER THE SITE WHILE WORKING TO PROTECT THE BACKFILL DURING THE CONSTRUCTION PERIOD.
2. CONTRACTOR SHALL PROTECT ALL SIDES, EDGES, AND ROOFS OF TRENCHES AND HOLES TO PROTECT THE WORK.
3. CONTRACTOR SHALL PROTECT ALL EXISTING DRAINAGE SYSTEMS AND COMPACT TO REQUIRED DESIGN PRIOR TO FURTHER CONSTRUCTION.
4. ALL GRADES, EARTHWORK, AND EARTHWORK oluşa shall be protected during the construction period.

NOTES:

A. MATERIAL IS TO BE PLACED IN LAYERS NOT TO EXCEED 6 INCHES IN THICKNESS. MATERIAL IS TO BE COMPACTED TO A MINIMUM OF 6 INCHES FROM THE BOTTOM OF THE FILL. EACH LAYER SHALL BE COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS.

B. MATERIALS SHALL BE PLACED AT THE ELEVATIONS AND TO THE LEVELS AND GRADES SPECIFIED ON THE CONTRACTOR'S DRAWINGS. THE MATERIAL SHALL BE PLACED AND SPREAD UNIFORM IN SUCCESSIVE LIFTS TO A MINIMUM OF 6 INCHES. THE MATERIAL SHALL BE TESTED TO A MAXIMUM OF 6 INCHES. THE MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 6 INCHES FROM THE BOTTOM OF THE FILL. EACH LAYER SHALL BE COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS.
GENERAL STRUCTURAL NOTES

THE FOLLOWING NOTES APPLY UNLESS INDICATED OTHERWISE.

GENERAL:
TOWER DESIGN AND REACTIONS BY NORTHERN POWER. SEE NORTHERN
POWER DRAWINGS AND INSTALLATION INSTRUCTIONS FOR ADDITIONAL INFORMATION
AND INSTALLATION REQUIREMENTS.

LOAD CONDITIONS:
SUSTAINED LOADS = 3600 PSF WIND DEAD + LIVE LOAD
SHORT TERM LOADS = 4000 PSF WIND DEAD + LIVE LOAD
CAST FOOTINGS ON COMPACTED GRANULAR FILL OVER COMPACTED SUBGRADE,
COMPRESSED SOILS REPORT BY SEIDLER ASSOCIATES, DATED AUGUST 15, 2011,
AND MODIFYING TECHNICAL NOTES DATED MARCH 3, 2011, FOR FOUNDATION
AND ERECTION INFORMATION.

REMARKS:
WIND = 133 MPH 3-SECOND GUST

RECOMMEND:
Fx = 5000 PSI MAXIMUM W/C = 0.45 MINIMUM 6 SACs OF CEMENT PER CUBIC YARD.
ENHANCED AN 6X PLUS OR MINUS 1% SUBMIT MX DESIGN. SPECIAL INSPECTION REQUIRED.
ALL COMPONENTS SHALL BE NOTCH CAST.
UNLESS OTHERWISE NOTED, REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60,
PROVIDE CRUISE B SPACE. SUBMIT REINFORCING STEEL SHOP DRAWINGS WITH DETAILS
PER ACI 318-96 MANNALE OF STANDARD PRACTICE.
CONCRETE COVER 1 1/2".
LIFTING INSERTS TO BE DESIGNED BY PRECAST SUPPLIER. SUBMIT SHOP DRAWINGS
SHOWING EMBEDDED NUTS, BOLTS, LOCKNUTS, ADDOT REINFORCING REQUIRED FOR LIFTING,
AND TYPE AND LOCATION OF ALL LIFTING DEVICES. FABRICATION, TRANSPORTATION,
AND ERUPTION PER API STANDARDS.

GROUT - 10,000 PSI MINIMUM 7-DAY CUBE STRENGTH PER ASTM C1101. GROUT TO BE HOMOGENEOUS,
NON-SHRINKAGE, HARDENING GROUT PER ASTM C1101. USE SPECIFIC GROUT MIX
RECOMMENDED BY MANUFACTURER FOR EACH GROUT APPLICATION AND FOLLOW MANUFACTURER'S
INSTRUCTIONS.

PRE-STRESSED TENDON OUTLOOK:
MILLING FORM ENGINEERING 1/2" DIAMETER ALL-TREAD BAR. HOT OF GALVANIZED.
PRE-STRESS ALL ANS TO 110 KIPS LOCK OFF LOAD. DIRECT ANGULAR SPACE AFTER BAR
IS STRESSED. USE NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH
OF 2000 PSI.

ANCHOR ROOD:
ANCHOR ROODS, ASTM A320 L7, 105 KSI MIN YIELD STRENGTH, 125 KSI MIN TENSILE STRENGTH.

STRUCTURAL STEEL:
ALL STEEL ASTM A572-50 MINIMUM YIELD STRENGTH. DRAWING PLATES TO BE HOT OF
GALVANIZED. FABRICATION PER ASC SPECIFICATIONS. SUBMIT SHOP DRAWINGS.
WELDING PER AWS D1.1. WELDERS CERTIFIED PER AMERICAN WELDING SOCIETY FOR ROD
AND POSITIVE ELECTRODES SHALL BE 100% RAY, WITH MINIMUM CHAFT V-NOTCH
TOUGHNESS OF 20 FT-LB AT -20 F.

DRAWINGS SHOW GENERAL AND TYPICAL DETAILS OF CONSTRUCTION. WHERE CONDITIONS ARE NOT
SPECIFICALLY INDICATED BUT ARE OF SIGNIFICANT IMPACT TO ENSURE SHOWN, DRAWING DETAILS
OF CONSTRUCTION SHALL BE SUBMITTED TO REVIEW AND APPROVAL BY THE ARCHITECT AND STRUCTURAL
ENGINEER.

REFER TO ELECTRICAL DRAWINGS FOR SIZE AND LOCATION OF CONDUCTS, ETC. NOT SHOWN.
SHOP DRAWINGS SHALL BE SUBMITTED AND REVIEWED PRIOR TO FABRICATION.

UNPRESTRESSED DESIGN LOADS SUPPLIED BY
NORTHERN POWER FOR M.V.E. TOWER,
120 (17 TON TOWERS: 65'-6" (31 WATTS),
45 KIPS) ROOD. DESIGN WIND SPEED 133 MPH,
3 SECOND GUST, 50 YEAR RETURN PERIOD.

DESIGN LOADS:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>LOAD (KIPS)</th>
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<tbody>
<tr>
<td>Horizontal at Tower Base</td>
<td>28.0 Kips</td>
</tr>
<tr>
<td>Vertical at Tower Base</td>
<td>43.6 Kips</td>
</tr>
<tr>
<td>Overturning at Tower Base</td>
<td>247.1 Kips</td>
</tr>
<tr>
<td>Torsion at Tower Base</td>
<td>23.2 Kips</td>
</tr>
</tbody>
</table>
**FOUNDATION PLAN**

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

1. PRE-CAST JOINT MATCH CAST
2. PRE-CAST CONC RISER AND CAP
3. 20'-0" SQx2'-6" DP
4. PRE-CAST CONC FTG 3 SEGMENTS
5. P/T DUCT GROUT VENT TUBE TYP 14 PLACES SEE 3/S2
6. 10'-0"
7. 5'-11" 8'-2" 5'-11"
8. 10'-0" 10'-0" 10'-0"
9. 20'-0"

**SECTION**

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

1. 10'-0" 10'-0" 10'-0"
2. 4'-1" 4'-1" 3/S3
3. 1 1/4"x5/8" SHEAR KEY FTG
4. 4 TIES @ 24" 12-#8 BOT 6-#8 TOP
5. PRE-CAST JOINT MATCH CAST
6. CAP
7. 10'-0" 10'-0" 10'-0"
8. 1 1/4"x5/8" SHEAR KEY FTG
9. 4 TIES @ 24" 3/S4 5-#8 BOT 5-#6 TOP
10. SEE NOTE (3 PLACES)
11. RISER
12. 8'-0" 4'-1"
13. 3/S3

**NOTE:**

- DENOTES 2/0 COPPER WIRE PIGTAIL WITH ELECTRICAL BOND TO #8 BAR, TYP 1 LOCATION AT EACH FTG SEGMENT.
- EACH P/T ROD TO BE SUPPLIED IN 3 SECTIONS WITH COUPLER AT EACH PRE-CAST JOINT.

**GROUT VENT TUBE AT CENTERLINE OF CENTER PRE-CAST SECTION TYP EACH P/T DUCT**
1. **RISER / CAP PLAN**
   - Scale: 3/4" = 1'-0".
   - 3/4" wide notch at top of penetration to align with keyhole.
   - 16-2 1/8" penetrations.
   - 100 bolt sleeves.

2. **SLAB PENETRATION**
   - Scale: 1/2" = 1'-0".
   - 3/4" wide notch to allow for grout tube access through keyhole.
   - Williams RFS hex nut and Williams R73 hardened washer.
   - BRG #1 1/2x8" sq.
   - Keyhole for grout tube (see 4/53).
   - TYP at all P/T rod anchors.
   - Stirrup.
   - Add 2-1/4" hairpins at 6" OC centered on ea P/T rod.

3. **FOOTING DETAIL**
   - Scale: 1 1/2" = 1'-0".
   - Coat exposed steel with bitumastic.
   - Footing plan and detail.

4. **KEYHOLE**
   - Scale: 1/2" = 1'-0".
   - 1 1/2" centered in BRG #1.
   - Galvanized steel grating, 3/4" x 3/8".
   - Bearing bars at 1 3/16" OC, cross bars at 4" OC.
   - 6" conc slabs.

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1. **FOOTING DETAIL**
   - 1 1/2" conc cover.
   - #8 bar.
SECTION

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

1. SLOPE CONCRETE SURFACE AWAY FROM TOWER EXCEPT AT BEARING PLATE WHERE A HORIZONTAL SURFACE IS REQUIRED.

2. 2/0 COPPER WIRE PIGTAIL, ELECTRICAL BOND TO #5 BAR, TYP 1 LOCATION ON OUTSIDE OF RISER AND CAP.

ANCHOR BOLT AND ANCHOR BOLT SLEEVE DETAIL

SCALE: 1 1/2" = 1'-0"

NOTES:

1. USE 1 LEVELING NUTS IN EQUALLY SPACED INTERVALS. GROUT UNDER TOWER AT ALL LEVELING NUTS. AFTER GROUT HAS REACHED 2500 PSI, BACK DOWN LEVELING NUTS TO TOP RING. PLACE FOAM WASHER ABOVE LEVELING NUTS AND COMPLETE GROUTING. SEE NORTHWOOD INSTALLATION INSTRUCTIONS SECTION 3.7 FOR MORE DETAILED DESCRIPTION. SEE 2/S5 FOR TIGHTENING SEQUENCE.
NOTES:
1. TOP RING PLATE THICKNESS = 3/4".
2. BOTTOM RING PLATE THICKNESS = 1 1/2".

NOTE:
TIGHTEN ALL AB TO SNUG TIGHT, THEN FULLY TIGHTEN TO 42 KIP TENSION IN SEQUENCE SHOWN.

1. EMBEDMENT RING
SCALE: 1/2" = 1'-0"

2. ANCHOR BOLT TIGHTENING SEQUENCE
SCALE: 1/2" = 1'-0"
1.LAYOUT PLAN
SCALE: 1/4" = 1'-0"

PRE-CAST JOINT
TOWER DOOR
PRE-CAST CONC RISER AND CAP
ELECTRICAL CABINET
2 1/2" CONDUIT
1 S7
20'-0" SQX2'-6" DP
PRE-CAST CONC FTG

20'-0" 10'-0" 10'-0" 20'-0"
1. ALL STEEL HOT DIP GALVANIZED.
2. ANCHOR TO BE STAINLESS STEEL.
GENERAL NOTES:
1. ALL WORK SHALL COMPLY WITH THE MOST RECENT EDITION OF THE NEC.
2. PROJECT SCOPE OF THE ELECTRICAL DISTRIBUTION IMPROVEMENTS WILL BE TO PROVIDE THREE PHASE POWER TO THE NEW WIND TURBINE SITE SOUTH OF EXISTING AVEC POLE 62X. EXISTING AVEC POLE 2DX IN SAINT MARYS IS THE CLOSEST THREE PHASE POLE TO THE SITE. FROM POLE 2DX TO POLE 62X, THE CIRCUIT IS AN EXISTING TWO PHASE CIRCUIT. BETWEEN THOSE POLES, PROVIDE A FOURTH CONDUCTOR ON THE EXISTING POLE LINE TO CONVERT IT TO THREE PHASE FRAMING; AND FROM POLE 62X, EXTEND A NEW THREE PHASE POLE LINE TO THE WIND TURBINES AND PROVIDE TRANSFORMER BANKS AND SECONDARY CIRCUITS TO THE WIND TOWERS AS INDICATED.
3. NUMBER NEW POLES PER M52-2.
DISTRIBUTION LINE THIS SHEET ADD FOURTH CONDUCTOR TO CONVERT TWO PHASE CIRCUIT TO THREE PHASE. CHANGE ANGLE PILE PLACING FROM 85 TO 82. CHANGE TANKERT PILE PLACING FROM 50 TO 54. SEE GENERAL NOTES.