Stoney Corners Wind Farm McBain, Michigan

- **Barton Malow was the design-builder / general contractor for Stoney Corners Wind Farm.**
- **We self-performed civil road work, sitework, foundation installation and turbine erection.**

Phase I

- 19 MW
- 2 - 100M 2.5MW Furhlander Turbines
- 7 - 80M 2.0MW REpower Turbines

Phase II

- 20.2 MW
- 9 - 100M 2.0MW REpower Turbines
- 1 - Northern Power Prototype Turbine

Local Economic Stimulus

- Phase I: Over $3 million
- At completion of Phase II: Anticipated Total of $7 million
- Surrounding Area Union Labor
- Equipment, Concrete & Aggregate
- Lodging
- Engineering

Determining A Turbine Site

- Assist owner on locating most cost effective sites based on wind studies, leasing and constructability
- Perform geotechnical borings and determine if soils are cost effective to build

Barton Malow

Determining A Turbine Site

- After the borings, our engineer determines what type of ground improvement is required, if any.
- The foundation design begins based on the turbine manufacturer's specifications and geotechnical borings. One common design is desirable.

Barton Malow

Site Design Begins

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- Road
- Turbine Construction Pad

Road Construction

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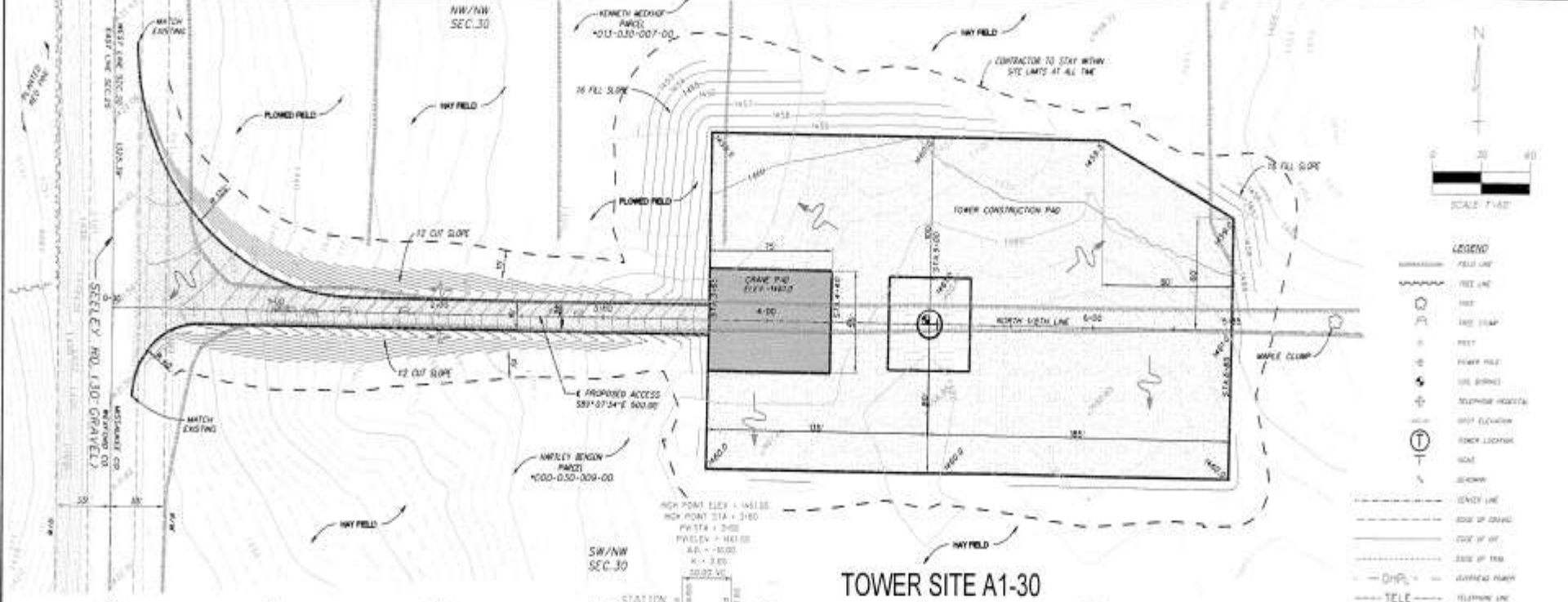
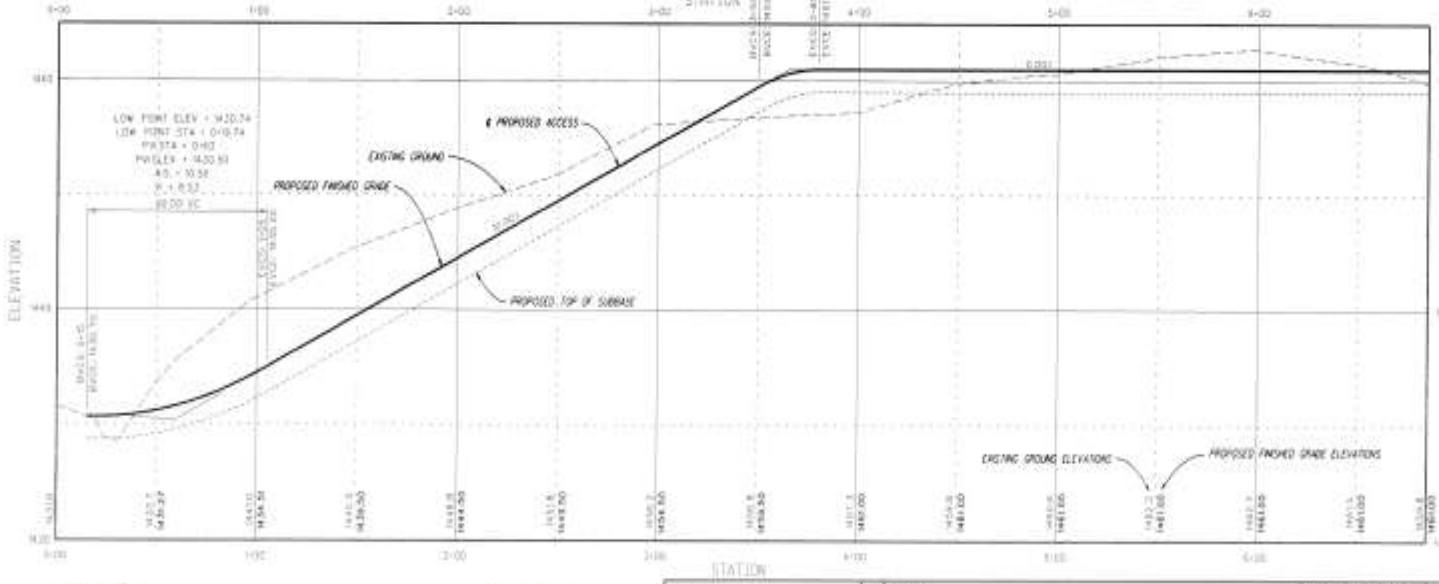
- Road is 16’ wide and has 12” of stone to accommodate the weight of the turbine and crane components



TOWER SITE A1-30



A1-30 PROPOSED SITE LOCATION
NORTHING: 320014.68
EASTING: 1943542.50
LAT: 44.190298334
LONG: 85.33312523

EARTH WORK QUANTITIES
HCM REFERENCE ONLY
5080 cyd cut SUBBASE
5020 cyd fill SUBBASE
420 cyd finish SUBBASE
3230 cyd TOPSOIL EXC.
SUBBASE CUT/FILL DOES NOT INCLUDE FOUNDATION EXCAVATION

GRADING NOTES
SUBBASE QUANTITIES ARE BALANCED FROM STA 0+00 TO STA 3+60 INCLUDING TOWER CONSTRUCTION PAD
HIGH VELOCITY EROSION MULCH BLANKET SHOULD BE USED IN DITCH AREAS ALONG ACCESS DRIVE AS NEEDED

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 800-482-7171

Wilcox Professional Services

NO	REVISION	BY	CHKD	DATE	APP.	APP.
A	CONSTRUCTION PLAN					

ENGINEER
SURVEY
DESIGN
CHECKED
APP'D
SCALE 1"=60'

HERITAGE SUSTAINABLE ENERGY, LLC
STONEY CORNERS WIND FARM PROJECT
TOWER SITE A1-30
SITE PLAN & GRADING PLAN

PROJECT NUMBER 11822.00005.11
SHEET 2 OF 5

Barton Malow

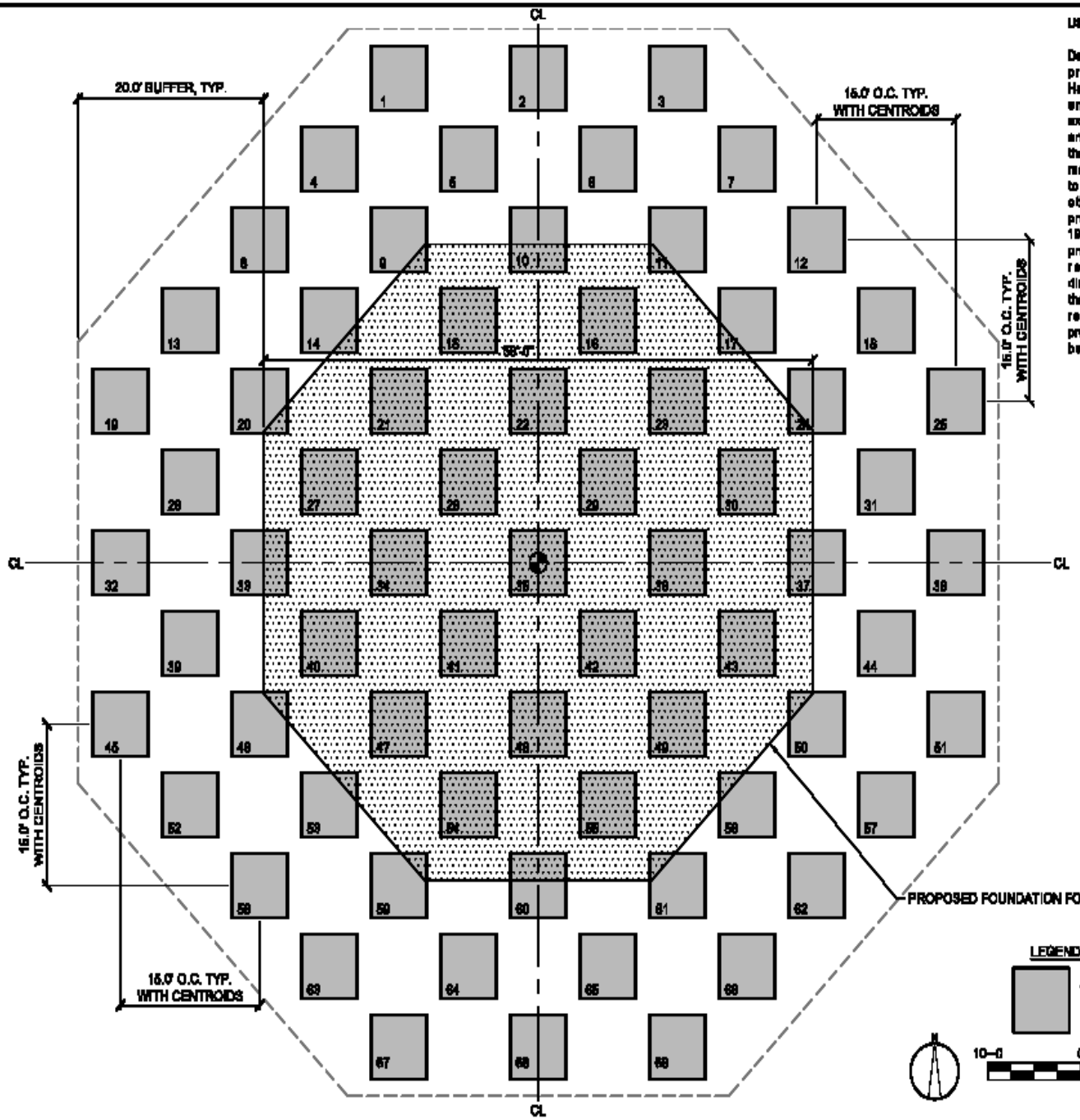
- **Challenging site due to rolling areas**


DANGER
KEEP OUT
AUTHORIZED
PERSONNEL
ONLY

- Each site has a crane pad constructed with 12” of stone to support the 660-ton Manitowoc 18000 crane
- The pad measures 75’ x 55’

Barton Malow

- **Site prepared for Deep Dynamic Compaction (DDC)**



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HAYWARD BAKER

KELLER

Midwest Region
1360 West Lake Street
Roselle, Illinois 60172
630-339-4300
www.haywardbaker.com

DYNAMIC COMPACTION PLAN
STONEY CORNERS WIND FARM
PHASE 2
McBAIN, MI

REFERENCES

013-01 HDR 03/01/2010

REVISIONS

ISSUE DATE
03/26/2010

PROJECT NUMBER
15923

SHEET NUMBER
HBI-1

- The weight is 16 tons and is dropped an average of 50 feet
- 690 High Energy
- 140 Low Energy: 15’


LIEBHERR


LIEBHERR

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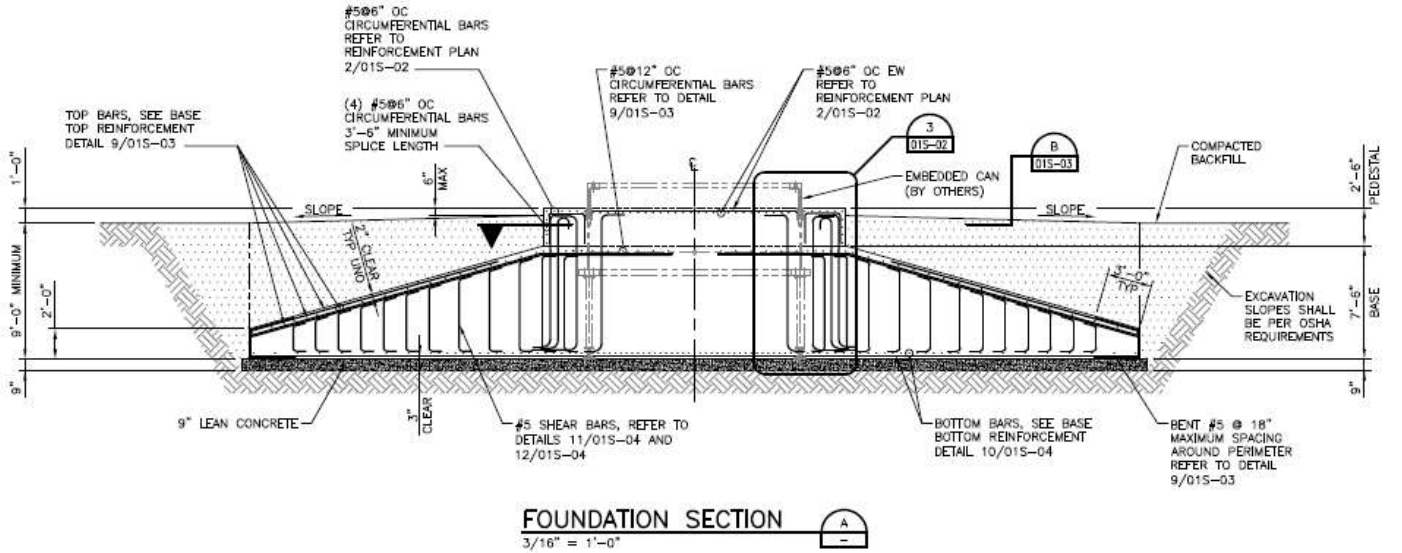
- **Foundation Excavation**

Barton Malow

- **Layout for mud mat and foundation**



FOUNDATION SECTION
3/16" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION OR RECORDING

Heritage Sustainable Energy
Barton Malow Rigging/Millwright Services

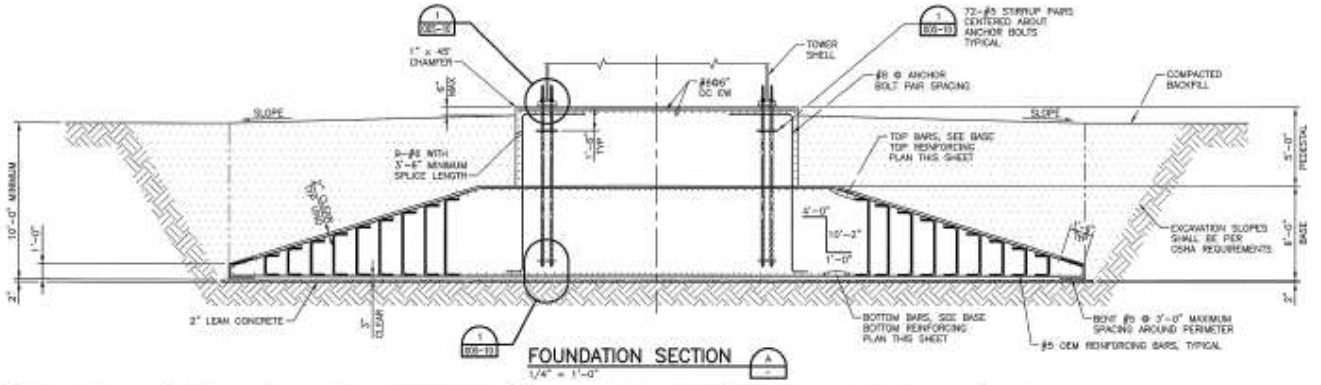
STONEY CORNERS WIND FARM PHASE II
MISSAUKEE COUNTY, MICHIGAN

RePower MM92 2,0MW IEC IIA 100mm HH
FOUNDATION PLAN AND SECTION
4,000 PSF WITHOUT GROUND WATER
DESIGN 01

0 1" 2"

FILENAME	01S-01.dwg
SCALE	AS NOTED

SHEET 01S-01



FOUNDATION SECTION
1/4" = 1'-0"

HDR

ISSUE	DATE	DESCRIPTION
-	6/12/09	ISSUED FOR CONSTRUCTION

PROJECT MANAGER	RANDY GJEDA
DESIGNED BY	E. TAN
CHECKED BY	R. HYLAND
DRAWN BY	T. PETERSON
PROJECT NUMBER	0000000001110637

Heritage Sustainable Energy
Barton Malow Rigging/Millwright Services

STONEY CORNERS WIND FARM PROJECT
MISSAUKEE COUNTY, MICHIGAN

Barton Malow

- **Pouring the mud mat**

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- **Bottom mat reinforcing**

- **The turbine anchor cage is assembled**

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- **Resteel installation for the top mat and pedestal**

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- This 80M design contains 400 yards of concrete.
- Our 100M design incorporates 500 yards.

- The 6’ thick base mat is considered mass concrete.
- A 50% slag replacement mix was used to reduce heat of hydration.
- Thermal insulating blankets were used to maintain a relatively constant internal temperature prior to backfill.

Barton Malow

- 70% strength is required prior to backfilling.
- The 5,000 psi mix achieved 3,500 psi in approximately 3 days.
- The concrete reaches the design strength in approximately 7 days.

- The 80M foundation is octagonal in shape and measures 55’ x 55’.
- The 80M base is 11’ tall.

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- The native soils are used for backfill or overburden.
- The soil is compacted in 1’ lifts using a vibratory roller.

- **Assembling the Manitowoc 18000 is a 3-day process.**

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- This track weighs 90,000 pounds.
- The assist crane is a 130-ton RT.


Barton
Malow

Barton Malow

- **The car body counterweights weigh 44,000 pounds.**


Burton Malow


Barton
Malow

Barton Malow

- **Each counterweight is 18,000 pounds.**

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- Hook ready

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- **12 – 4x4 stainless steel shims are installed and leveled within + - .008”**

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- **The platform and converter are installed prior to installation of the base tower section.**


Night Train, Inc.
EDGAR WI


Heritage

Barton Malow

- **The base section weights 137,000 pounds.**

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- Aligning the base section over 144 anchor bolts

Barton Malow

- **Rechecking and documenting the levelness of the tower section**

Barton Malow

- **The base section is then grouted and cured for 24 hours to achieve 5000 psi.**

- The rotor is assembled while the grout cures.
- All base section bolts are post-tensioned and the tower is rechecked for levelness again.

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- **The rotor is assembled, and torque on the ground is completed before the unit is lifted.**

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- Middle tower section

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- Top tower section

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- The nacelle weighs 155,000 pounds.


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- **Two cranes are utilized until the rotor is vertical.**
- **Blade socks with ropes are also used to guide the other two blades.**

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- The crew cuts loose the assist crane.
- The blade socks with ropes are now guiding the rotor.

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- **Transformer sends power to the substation.**

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- **Substation foundation work**

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- **Stoney Corners substation sends power into the regional grid.**

We Build **EXCELLENT** Solutions

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