

GENERAL NOTES APPLICABLE TO WIND TURBINE GENERATOR (WTG) FOUNDATION – PHASE 1B

GENERAL NOTES – WIND TURBINE FOUNDATIONS

1.0 GENERAL NOTES

1.1 APPLICABLE FOUNDATIONS
DRAWINGS PROVIDED IN THIS DESIGN PACKAGE ARE FOR PHASE 1B FOUNDATIONS. TURBINE SITES FOR PHASE 1B ARE LISTED IN THE FOLLOWING:
–PHASE 1B CONSISTS OF 15 SITES INCLUDING TURBINES NUMBERED 1, 2, 6, 7, 9, 10, 11, 15, 17, 20, 25, 26, 27, 28 AND 30.

1.2 DIMENSIONS
ALL DIMENSIONS ARE IN FEET AND INCHES. TURBINE FOUNDATIONS SHALL BE FOUNDED AT THE ELEVATIONS/LEVELS SHOWN ON THE DRAWINGS. FOUNDATIONS SHALL NOT EXTEND ABOVE GRADE MORE THAN THE DIMENSIONS SHOWN ON THE PLANS.

1.3 FOUNDATION DESIGN IS IN ACCORDANCE WITH THE FOLLOWING CODES AND REPORTS:
–INTERNATIONAL BUILDING CODE – IBC 2006
–BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE – ACI 318-08
–NORTH DAKOTA STATE BUILDING CODE AND APPLICABLE OLIVER AND WORTH COUNTY BUILDING REQUIREMENTS.
–GEOTECHNICAL DATA REPORT "BISON WIND PROJECT, GEOTECHNICAL DATA REPORT, REV 1", DATED OCTOBER 9, 2009, PREPARED BY BLACK & VEATCH.
–GEOTECHNICAL DESIGN REPORT "BISON WIND PROJECT, GEOTECHNICAL DESIGN REPORT, REV 0", DATED SEPTEMBER 17, 2009, PREPARED BY BLACK & VEATCH.

2.0 EXCAVATION, BACKFILL AND COMPACTION

2.1 ACCEPTABLE FOUNDATION BEARING MATERIALS
ACCEPTABLE BEARING MATERIALS INCLUDE ROCK, WEATHERED "SOFT" ROCK, MEDIUM DENSE SILT, MEDIUM DENSE SAND, GRAVEL, STIFF TO HARD CLAY, AND COMPACTED STRUCTURAL FILL. THE MINIMUM ALLOWABLE BEARING CAPACITY FOR THE WIND TURBINE FOUNDATION DESIGN, IS 9,000 PSF PER THE GEOTECHNICAL DESIGN REPORT. THE FOUNDATION SHALL NOT REST ON:
–VARIABLE OR DISTURBED SOIL CONDITIONS
–SOFT, WEAK OR HIGHLY COMPRESSIBLE SOILS
–LIGNITE
–DELETERIOUS MATERIALS SUCH AS ORGANIC SOILS, STUMPS, ROOTS, ETC.
–ANY OTHER MATERIAL DEEMED UNSUITABLE BY THE PURCHASER'S REPRESENTATIVE.

TO ENSURE UNIFORM BEARING CONDITIONS ARE PROVIDED FOR THE FOUNDATION, THE SUITABILITY OF FOUNDATION MATERIAL SHALL BE ASSESSED BY PROFFROLLING THE FOUNDATION EXCAVATION BASE. THE FOUNDATION BASE SHALL BE PROFFROLLED USING LOADED RUBBER Tired EQUIPMENT WEIGHING MORE THAN 25 TONS AND OPERATED BY COMPETENT PERSONNEL. IF ANY OF THE AFOREMENTIONED MATERIALS ARE ENCOUNTERED, THESE MATERIALS SHALL BE EXCAVATED TO A MAXIMUM DEPTH OF 2 FEET BELOW THE BASE ELEVATION OF THE FOUNDATION, OR TO A STABLE ZONE, WHICHEVER IS SHALLOWER. IF A STABLE ZONE IS NOT REACHED WITHIN 2 FEET, CONTACT THE PURCHASER'S REPRESENTATIVE. OVEREXCAVATED UNSUITABLE MATERIALS SHALL BE REPLACED WITH COMPACTED STRUCTURAL FILL. THE FOUNDATION SUBGRADE AT EVERY TURBINE LOCATION SHALL BE APPROVED BY THE PURCHASER'S REPRESENTATIVE PRIOR TO MUD MAT PLACEMENT.

2.2 BLASTING
BLASTING WILL NOT BE ALLOWED AT THE SITE.

2.3 STRUCTURAL FILL REQUIREMENTS
OVEREXCAVATION AT TURBINE LOCATION 20 TO A DEPTH OF 18 FEET BELOW EXISTING GRADE IS REQUIRED FOR THE REMOVAL OF UNSUITABLE MATERIALS. THESE MATERIALS SHALL BE REMOVED AND REPLACED WITH STRUCTURAL FILL. ACCEPTABLE STRUCTURAL FILL MATERIALS ARE SOILS WITH CLASSIFICATION SYMBOLS OF GW, SW AND CL BASED ON STRUCTURAL FILL SHALL BE PLACED WITHIN THE OVEREXCAVATED AREAS AND SHALL BE COMPACTED IN 8 INCH LOOSE LIFTS TO 75% RELATIVE DENSITY OR WITHIN 98% OF THE MAXIMUM DRY DENSITY AND WITHIN 2 PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT (STANDARD PROCTOR, ASTM D698). THE PURCHASER'S REPRESENTATIVE SHALL APPROVE ALL FILL MATERIALS. A MINIMUM OF FOUR (4) NUCLEAR DENSITY TESTS, ASTM D6938 SHALL BE PERFORMED ON EACH LIFT TO ENSURE PROPER PLACEMENT. AS AN ALTERNATIVE, A CONTROLLED LOW-STRENGTH MATERIAL (CLSM) CAN BE USED AS A FLOWABLE FILL IN LIEU OF COMPACTING SOIL BACKFILL. CLSM SHALL HAVE AN UNCONFINED COMPRESSIVE STRENGTH OF AT LEAST 500 PSI BUT NOT MORE THAN 1000 PSI AT 28 DAYS. ALL OVEREXCAVATED AREAS SHOULD BE PROTECTED FROM EXCESS WATER AND PONDING OF WATER. IF WATER SATURATES THE EXCAVATION, THE WATER SHALL BE REMOVED, AND THE FOUNDATION SUBGRADE SHALL PASS A PROFF-ROLL TEST OR BE REWORKED AT PURCHASER'S REPRESENTATIVE'S DISCRETION, PRIOR TO STRUCTURAL FILL OR MUD MAT PLACEMENT.

AS AN ALTERNATIVE TO OVEREXCAVATION AND STRUCTURAL FILL, GEOPIER FOUNDATION COMPANY HAS PREPARED A PROPRIETARY GROUND IMPROVEMENT DESIGN USING RAMMED AGGREGATE PIERS. THE GEOPIER SYSTEM OR AN ALTERNATIVE GROUND IMPROVEMENT DESIGN SHALL BE SUBMITTED WITH THE BID PACKAGE FOR TURBINE LOCATION 20. ALTERNATE GROUND IMPROVEMENT DESIGNS ARE SUBJECT TO PURCHASER'S APPROVAL.

2.4 BACKFILLING OF SOIL ABOVE TURBINE BASES
TURBINE BASES SHALL BE BACKFILLED UP TO THE ELEVATION OF THE EXISTING GROUND SURFACE AS SHOWN ON CONSTRUCTION DRAWINGS. A FINISHED GRADE SHALL SLOPE 3% AWAY FROM THE FOUNDATION FOR 20'-0" TO AID SURFACE WATER RUN-OFF AND TRANSITION TO A MAXIMUM OF 1%. THE TOP 3 FEET OF BACKFILL SHALL BE INSTALLED AFTER CONNECTION OF THE GROUNDING MAT.
–WELL GRADED 4-INCH MINUS CRUSHED ROCK MAY BE USED AS BACKFILL MATERIAL. IF SUCH MATERIALS ARE USED, TYPICAL BACKFILL GRADATION CURVES SHALL BE SUBMITTED FOR APPROVAL BY THE PURCHASER'S REPRESENTATIVE. CRUSHED ROCK SHALL HAVE A MINIMUM IN-PLACE MOIST DENSITY OF 120 PCF AS DETERMINED BY NUCLEAR DENSITY (ASTM D6938) TESTS. A MINIMUM OF TWO (2) TESTS SHALL BE PERFORMED ON EACH LIFT. BACKFILL MAY ALSO BE FINE GRAINED SOILS, EXCLUDING TOPSOIL, PLACED IN 8 INCH LIFTS, AND COMPACTED TO 95% STANDARD PROCTOR (ASTM D698) TO ENSURE A MOIST DENSITY OF 120 PCF. LIFTS UP TO 12 INCHES THICK MAY BE USED IF THE CONTRACTOR CAN DEMONSTRATE UNIFORMITY OF COMPACTION MEETS THE MINIMUM REQUIREMENTS OF THE DENSITY SPECIFICATIONS.
–BACKFILL SHALL BE COMPACTED WITH MANUALLY-OPERATED EQUIPMENT OR LIGHT DRUM ROLLER AS DIRECTED BY THE PURCHASER'S REPRESENTATIVE.
–THE UPPER 36 INCH LAYER SHALL CONSIST OF A LEAN CLAY OR SIMILAR FINE-GRAINED SEAL TO PREVENT RUNOFF WATER FROM INFILTRATING THE FOUNDATION BACKFILL. THE FINE-GRAINED SEAL SHALL HAVE A MINIMUM IN-PLACE MOIST DENSITY OF 120 PCF AND WITHIN ±2 PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT. A MINIMUM OF TWO NUCLEAR DENSITY TESTS (ASTM D6938) SHALL BE IN EACH LIFT. A WORK PLAN SHALL BE SUBMITTED BY THE FOUNDATION CONTRACTOR AND ACCEPTED BY THE PURCHASER'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF FOUNDATION BACKFILLING. THE WORK PLAN SHALL INCLUDE COMPACTION EQUIPMENT, SURFACE WATER CONTROL, GROUND WATER CONTROL, AND EXCAVATION LAYOUT AND DESIGN.

2.5 GROUNDWATER CONTROL
GROUNDWATER CONTROL, IF NEEDED DUE TO PERCHED WATER CONDITIONS OR RAIN EVENTS, MAY BE ACHIEVABLE IN COHESIVE SOILS (CL, CH) BY ASTM 2488, THROUGH COLLECTION SUMPS AT THE CORNERS OR ALONG THE PERIMETER OF THE EXCAVATION. ALL DRAINAGE SHALL BE DAYLIGHTED OR COLLECTED AT THE COLLECTION SUMP AND PUMPED OUT AWAY FROM THE FOUNDATION. BOTTOM OF EXCAVATION SHALL REMAIN FREE OF STANDING WATER AND THE MUD MAT SHALL BE DRY WHEN FOUNDATION CONCRETE IS POURED. FOR GRANULAR SOILS (GW, GP, GM, GC, SW, SP, SM, SC) BY ASTM 2488, VACUUM WELL POINTS SHALL BE USED TO LOWER GROUNDWATER AT LEAST 1.0 FOOT BELOW THE PREVAILING EXCAVATION LEVEL.

2.6 FILL FOR THE ROAD SHOULDER FOR THE CRANE
ACCEPTABLE FILL MATERIALS FOR THE ROAD SHOULDER FOR THE CRANE SHALL HAVE A MINIMUM UNDRAINED SHEAR STRENGTH OF 1800 PSF. THE FILL SHALL BE COMPACTED IN 8 INCH LOOSE LIFTS TO WITHIN 98% OF THE MAXIMUM DRY DENSITY AND WITHIN 2 PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT (STANDARD PROCTOR, ASTM D698).

2.7 RESTORE THE SITE IN ACCORDANCE WITH PURCHASER REQUIREMENTS

3.0 CAST-IN-PLACE CONCRETE

3.1 MUD MAT CONCRETE
NON-STRUCTURAL CONCRETE (MUD MAT CONCRETE) SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 1000 PSI AT 28 DAYS. REFER TO ACI AND RELATED STANDARDS. MUD MAT CONCRETE FILL IS TO BE PLACED TO THE LINES AND LEVELS INDICATED ON THE DRAWING. IT IS RECOMMENDED THAT THE CONCRETE SURFACE BE PLACED AS LEVEL AS PRACTICAL TO FACILITATE PLACEMENT OF THE REINFORCING STEEL AND THE ANCHOR BOLT EMBEDMENT RING.

3.2 STRUCTURAL CONCRETE
STRUCTURAL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 5000 PSI FOR THE BASE AND PEDESTAL. "SEVERE-SULFATE" CONDITIONS ARE DEEMED PRESENT AT THIS SITE. ASTM C150 TYPE V CEMENT SHALL BE USED.
MINIMUM CEMENT CONTENT SHALL BE DETERMINED BASED ON TRIAL TESTS BY BATCH PLANT AND APPROVED BY THE PURCHASER'S REPRESENTATIVE.

3.3 MIXING WATER
WATER FOR FOUNDATION CONCRETE SHALL BE CLEAN, REASONABLY CLEAR, POTABLE AND FREE FROM INJURIOUS AMOUNTS OF OILS, ORGANIC MATTER OR MINERAL SALTS. NO WATER IS TO BE ADDED TO ANY TRUCK LOAD OF CONCRETE WITHOUT WRITTEN PERMISSION FROM THE PURCHASER'S REPRESENTATIVE.

3.4 COARSE AGGREGATE
COARSE AGGREGATE SHALL CONFORM TO ASTM C33. MAXIMUM COARSE AGGREGATE SIZE SHALL BE 1.5 INCHES AND SHALL CONSIST OF GRAVEL, CRUSHED GRAVEL OR STONE, AIR-COOLED BLAST FURNACE SLAG OR COMBINATION THEREOF.

3.5 FINE AGGREGATE
FINE AGGREGATE SHALL CONFORM TO ASTM C33. FINE AGGREGATE SHALL CONSIST OF NATURAL SAND, MANUFACTURED SAND, OR A COMBINATION THEREOF.

3.6 AIR ENTRAINMENT
AIR-ENTRAINING AGENTS SHALL MEET THE REQUIREMENTS OF ASTM C260 AND SHALL NOT CONTAIN CHLORIDE.

3.7 ADMIXTURES
–HIGH RANGE WATER-REDUCING ADMIXTURE (SUPERPLASTICIZER) SHALL CONFORM TO ASTM C494, TYPE F.
–WATER-REDUCING ADMIXTURES SHALL CONFORM TO ASTM C494, TYPE A, AND CONTAIN NO MORE THAN 1% CHLORIDE IONS.
–CALCIUM CHLORIDE SHALL NOT BE USED.
–POZZOLANS (FLY ASH) SHALL CONFORM TO ASTM C618, CLASS F, AND THE LOSS OF IGNITION (LOI) SHALL BE LESS THAN 6%.

3.8 CURING COMPOUND
CURING COMPOUND SHALL COMPLY WITH ASTM C309, TYPE I, CLASS A.

3.9 CONCRETE MIX DESIGN
CONTRACTOR SHALL SUPPLY A MIX DESIGN, CERTIFIED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH DAKOTA, FOR THE CONCRETE TO BE USED ON THIS PROJECT. FOR APPROVAL BY THE PURCHASER'S REPRESENTATIVE, PRIOR TO PLACING CONCRETE. AN INDEPENDENT CONCRETE TESTING LABORATORY SHALL GATHER SAMPLES OF ALL MATERIALS AND WATER THAT WILL ACTUALLY BE USED IN THE PREPARATION OF THE CONCRETE REQUIRED FOR THIS PROJECT AND SHALL PERFORM CONCRETE BATCH TEST TO ASCERTAIN THE FINAL PROPORTIONS OF THE SPECIFIED INGREDIENTS TO ACHIEVE THE DESIRED COMPRESSIVE STRENGTH. NO SUBSTITUTIONS OF ANY MATERIAL OR ANY MAJOR VARIATIONS OF QUALITY OF SPECIFIED MATERIALS SHALL BE MADE EXCEPT BY WRITTEN PERMISSION FROM THE PURCHASER'S REPRESENTATIVE. THE MAXIMUM W/C RATIO SHALL BE 0.45.

3.10 SLUMP
SLUMP CRITERIA SHALL BE IN ACCORDANCE WITH THE CONTRACT MIX DESIGN, AT THE POINT OF DEPOSITION WITH THE ADDITION OF ADMIXTURES.

3.11 REINFORCING MATERIALS
ALL REINFORCING STEEL SHALL BE ASTM A615 GRADE 60.

3.12 FORM WORK
FORMS SHALL BE CONSTRUCTED SO THAT CONCRETE WILL CONFORM TO SHAPE, LINES, GRADES, AND DIMENSIONS INDICATED ON THE DRAWINGS WITHOUT DEFORMATION OR DEFLECTION. FORMS SHALL NOT BE REMOVED UNTIL CONCRETE HAS HARDENED SUFFICIENTLY TO SUPPORT ITS OWN WEIGHT AND ANY LOADS DUE TO CONSTRUCTION WHICH MAY OCCUR UPON IT. FORMS SHALL NOT BE REMOVED IN ANY CASE LESS THAN 24 HOURS AFTER PLACING CONCRETE. FORMS SHALL NOT PERMIT EXCESS LEAKAGE OF MORTAR. FORM WORK SHALL COMPLY WITH ACI SP-4 "FORM WORK FOR CONCRETE". UNLESS SPECIFIED OTHERWISE, TOLERANCES ARE PER ACI 117.

3.13 COLD AND HOT WEATHER CONCRETING
SHOULD IT BE NECESSARY TO POUR CONCRETE IN TEMPERATURES BELOW 37°F, A COLD-WEATHER CONCRETING PROCEDURE THAT COMPLIES WITH ACI 306R "COLD WEATHER CONCRETING" SHALL BE AGREED IN ADVANCE BETWEEN THE CONTRACTOR AND THE PURCHASER'S REPRESENTATIVE.
DURING HOT WEATHER, TEMPERATURES ABOVE 85°F (AS DEFINED IN ACI 305R), THE CONTRACTOR SHALL PROVIDE A HOT WEATHER CONCRETING PROCEDURE THAT COMPLIES WITH ACI 305R "HOT WEATHER CONCRETING" FOR APPROVAL BY THE PURCHASER'S REPRESENTATIVE PRIOR TO POURING ANY FOUNDATIONS.

4.0 GROUT

4.1 GROUT UNDER TOWER FLANGE
GROUT AT THE INTERFACE BETWEEN THE TOWER BOTTOM FLANGE AND THE CONCRETE PEDESTAL SHALL BE NON-SHRINK GROUT CONFORMING TO THE REQUIREMENTS OF ASTM C1107, CAPABLE OF DEVELOPING A MINIMUM COMPRESSIVE STRENGTH OF 6,800 PSI IN THREE DAYS AND 10,000 PSI IN 28 DAYS. THE GROUT SHALL BE MIXED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. A TRIAL MIX OF GROUT SHALL BE PREPARED AND TRIAL CUBES TESTED TO VERIFY SUFFICIENT COMPRESSIVE STRENGTH PRIOR TO TOWER GROUTING.

5.0 ANCHOR BOLTS AND EMBEDDED PLATES

5.1 ANCHOR BOLTS
ANCHOR BOLTS SHALL BE #11 DYSON GRADE 90, ALL THREAD REBAR AS SHOWN ON THE DRAWINGS (MINIMUM YIELD STRENGTH 140 KIPS, MINIMUM ULTIMATE STRENGTH 187 KIPS). NUTS (ASTM A194-GR 2H) AND WASHERS (ASTM F436-PLAIN FINISH) SHALL BE SUPPLIED WITH THE BOLTS AS SHOWN ON THE DRAWINGS, OR APPROVED EQUAL. ANCHOR BOLTS SHALL BE PROVIDED WITH DYSON CORROSION INHIBITING WAX OR GREASE COMPOUND, APPLIED OVER THE FULL LENGTH OF THE BOLTS.

5.2 ANCHOR BOLT SLEEVE
ALL BOLTS FOR WIND TURBINE FOUNDATIONS SHALL BE SUPPLIED WITH FULL LENGTH RIGID PVC SLEEVES CONFORMING TO ASTM D1784, CLASS 10000 AND MANUFACTURED TO ASTM D2241 REQUIREMENTS. THE MINIMUM SLEEVE WALL THICKNESS SHALL BE 0.09 INCHES (SDR =21). SLEEVES SHALL BE INSTALLED OVER THE BOLTS AND CORROSION INHIBITING COMPOUND PRIOR TO SHIPMENT.

5.3 EMBEDMENT PLATES
BOTTOM ANCHOR RING PLATE AND TOP TEMPLATE PLATE SHALL CONFORM TO ASTM A36, PLAIN FINISH. WELD ELECTRODES SHALL BE E70XX.
PERFORM STRUCTURAL WELDING WORK IN ACCORDANCE WITH AWS D1.1, STRUCTURAL WELDING CODE.

5.4 CONTRACTOR SHALL CONSULT WITH THE TURBINE MANUFACTURER ON THE INSTALLATION OF CAST-IN-PLACE PLATES IN THE TOP OF THE PEDESTAL, BETWEEN SETS OF ANCHOR BOLTS FOR TOWER INSTALLATION, AND LEVELING.

6.0 FOUNDATION INSTALLATION AND TOLERANCES

6.1 FORM WORK
FORM WORK DRAWINGS AND CALCULATIONS SHALL BE PREPARED FOR REVIEW AND APPROVAL BY THE PURCHASER'S REPRESENTATIVE.
FORM WORK SHALL BE CONSTRUCTED WITHIN THE TOLERANCES SHOWN ON THE FORM WORK DRAWINGS.
ALL FORMS SHALL BE STRAIGHT AND PLUMB, RIGID, AND MORTAR TIGHT. ALL FORMS SHALL BE BRACED, TIED AND SUPPORTED SUFFICIENTLY TO MAINTAIN THEIR REQUIRED POSITION DURING AND AFTER THE PLACEMENT OF THE CONCRETE.
USE FACTORY FABRICATED FORM TIES, ADJUSTABLE LENGTH, REMOVABLE OR SNAPOFF METAL FORM TIES, DESIGNED TO PREVENT FORM DEFLECTION, AND TO PREVENT SPALLING CONCRETE SURFACE UPON REMOVAL, UNLESS OTHERWISE INDICATED. PROVIDE TIES SO THAT PORTIONS REMAINING WITHIN CONCRETE AFTER REMOVAL WILL NOT BE WITHIN 1 INCH OF ANY EXPOSED CONCRETE SURFACE.
PROVIDE OPENINGS IN CONCRETE FORM WORK TO ACCOMMODATE THE INSTALLATION OF EMBEDDED CONDUIT.
ALL FORM WORK CONTACT SURFACES SHALL BE COATED WITH A FORM COATING COMPOUND BEFORE REINFORCEMENT IS PLACED. DO NOT ALLOW FORM COATING COMPOUND TO COME INTO CONTACT WITH REINFORCEMENT OR WITH CONCRETE SURFACES AGAINST WHICH FRESH CONCRETE WILL BE PLACED.
INSPECT AND CHECK THE FORM WORK BEFORE THE REINFORCING STEEL IS PLACED TO CONFIRM THAT THE DIMENSIONS AND LOCATION OF THE CONCRETE FOUNDATIONS WILL CONFORM TO THE WTG FOUNDATION DESIGN DRAWINGS.

6.2 PLACING REINFORCEMENT AND EMBEDDED ITEMS
PROVIDE BARS, WIRE FABRIC, WIRE TIES, SUPPORTS, AND OTHER DEVICES NECESSARY TO INSTALL AND SECURE REINFORCEMENT.
REINFORCEMENT SHALL NOT HAVE SCALE, OIL, GREASE, CLAY, OR FOREIGN SUBSTANCES THAT WOULD REDUCE THE BOND. RUSTING OF REINFORCEMENT IS A BASIS OF REJECTION IF THE EFFECTIVE CROSS-SECTIONAL AREA OR THE NOMINAL WEIGHT PER UNIT LENGTH HAS BEEN REDUCED. REMOVE LOOSE RUST PRIOR TO PLACING STEEL.
TACK WELDING TO REINFORCEMENT IS PROHIBITED.
PLACEMENT OF REINFORCEMENT SHALL BE ACCURATELY POSITIONED, POSITIONED SECURELY, AND WILL NOT INTERFERE WITH PLACING CONCRETE. NOTIFY PURCHASER'S REPRESENTATIVE FOR INSPECTION.

6.3 PLACEMENT OF ANCHOR BOLTS
ALL ANCHOR BOLTS SHALL BE INSTALLED WITH A SUPPORT FRAME SUPPLIED BY THE CONTRACTOR. ASSEMBLIES SHALL BE CAPABLE OF ALLOWING ADJUSTMENTS TO ANCHOR BOLT IN BOTH THE HORIZONTAL AND VERTICAL DIRECTIONS. ONCE ALL ADJUSTMENTS HAVE BEEN MADE THE SUPPORT SHALL BE RIGIDLY FIXED IN ALL DIRECTIONS TO ENSURE CORRECT POSITIONING OF THE BOLTS DURING PLACEMENT OF THE CONCRETE. THE SUPPORT FRAME FEET SHALL BE FIXED TO THE MUD MAT IN A MINIMUM OF FOUR LOCATIONS.
THE ANCHOR BOLTS SHALL BE SET TO THE FOLLOWING TOLERANCES:
–ANCHOR BOLT LOCATION IN EMBEDMENT AND TEMPLATE PLATES, 1/16 INCH, AS MEASURED FROM THE EMBEDMENT RING CENTER AND BETWEEN ADJACENT HOLES. TOLERANCE IS NOT CUMULATIVE AROUND THE BOLT CIRCLE AND THE ABSOLUTE POSITION OF THE BOLT HOLES IN PLAN SHALL BE NO MORE THAN 1/10 INCHES OUT OF POSITION IN ANY DIRECTION.
–ANCHOR BOLT PLUMBNESS (VERTICAL), LESS THAN 1/16 INCH IN 1 FOOT
–HORIZONTAL ANGULAR ALIGNMENT (ROTATION) OF ANCHOR BOLT GROUP, 1 DEGREE.
–EMBEDMENT RING PLATE ELEVATION: 1/2 INCH
–EMBEDMENT RING PLATE DIMENSIONS: 1/16 INCH
–EMBEDMENT AND TEMPLATE RING DEVIATION FROM THE HORIZONTAL, ± 1/4 INCH.
–ANCHOR BOLT LENGTH: 1 INCH
ENSURE THE BOTTOM ANCHOR RING PLATE IS PROPERLY SECURED TO PREVENT MOVEMENT DURING PLACEMENT OF CONCRETE. EMBEDMENT AND TEMPLATE PLATES SHALL BE FABRICATED WITH SPLICE CONNECTIONS TO FACILITATE TRUE REASSEMBLY ON SITE.
AFTER PLACEMENT OF THE PEDESTAL, PREVENT WATER FROM ENTERING THE SLEEVE ANNULUS PRIOR TO ERECTION OF WIND TURBINE TOWER BOTTOM T-FLANGE BY SEALING WITH SILICON.

6.4 CONCRETE PLACEMENT
NOTIFY PURCHASER'S REPRESENTATIVE A MINIMUM 24 HOURS PRIOR TO COMMENCEMENT OF CONCRETE OPERATIONS.
THE PURCHASER'S REPRESENTATIVE SHALL INSPECT THE COMPLETED FORM WORK, REINFORCING STEEL, AND ITEMS TO BE EMBEDDED PRIOR TO CONCRETE PLACEMENT. HOWEVER, THIS DOES NOT RELEASE THE CONTRACTOR FROM RESPONSIBILITY FOR ACCEPTABLE AND SATISFACTORILY COMPLETED WORK.
PLACE CONCRETE AND REINFORCING IN ACCORDANCE WITH THE FOLLOWING DIMENSIONAL TOLERANCES:
–REINFORCING PLAN SPACING: PLUS OR MINUS 2 INCHES.
–REINFORCING VERTICAL SPACING: PLUS OR MINUS 1 INCH.
–FOOTING CLEAR CONCRETE COVER: MINUS 0 OR PLUS 3 INCHES
–PEDESTAL CLEAR CONCRETE COVER: MINUS 0 OR PLUS 2 INCHES
–FOOTING PLAN DIMENSIONS: MINUS 0 OR PLUS 3 INCHES
–FOOTING THICKNESS: MINUS 0 OR PLUS 2 INCHES
–PEDESTAL PLAN DIMENSIONS: MINUS 1 OR PLUS 0 INCHES
–PEDESTAL HEIGHT:
READY-MIX CONCRETE SHALL BE IN ACCORDANCE WITH ACI 301 AND ASTM C94.
FURNISH CONCRETE BATCH TICKETS TO THE PURCHASER'S REPRESENTATIVE WITH EACH BATCH OF CONCRETE BEFORE UNLOADING AT THE SITE. THE BATCH TICKET SHALL CONTAIN THE FOLLOWING INFORMATION:
–NAME OF READY-MIX CONCRETE COMPANY
–SERIAL NUMBER OF TICKET
–DATE
–TRUCK NUMBER
–NAME OF PURCHASER
–AMOUNT OF CONCRETE IN CUBIC YARDS
–MAXIMUM SIZE OF AGGREGATE
–INGREDIENTS CERTIFIED AS BEING PREVIOUSLY APPROVED
–SIGNATURE OF PRODUCER'S REPRESENTATIVE
–TIME THE BATCH WAS PLACED IN THE TRUCK
PLACE CONCRETE AS SOON AS PRACTICAL AFTER THE FORMS AND THE REINFORCEMENT HAVE BEEN INSPECTED AND APPROVED.
DO NOT PLACE CONCRETE WHEN WEATHER CONDITIONS PREVENT PROPER PLACEMENT, CONSOLIDATION, AND CURING; IN UNCOVERED AREAS DURING PERIODS OF PRECIPITATION; OR IN STANDING WATER.
PRIOR TO PLACING CONCRETE, REMOVE DIRT, CONSTRUCTION DEBRIS, WATER, SNOW, AND ICE FROM WITHIN THE FORMS.
DEPOSIT CONCRETE AS CLOSE AS PRACTICABLE TO THE FINAL POSITION IN THE FORMS. DO NOT EXCEED A FREE VERTICAL DROP OF 5 FEET FROM THE POINT OF DISCHARGE.
PLACE CONCRETE IN 18 INCH MAXIMUM VERTICAL LIFTS.
CONSOLIDATE CONCRETE IN ACCORDANCE WITH ACI 301. CONSOLIDATE CONCRETE FOUNDATION WITH HIGH FREQUENCY, INTERNAL MECHANICAL VIBRATING EQUIPMENT SUPPLEMENTED BY HAND SPADING AND TAMPING. OPERATE VIBRATORS WITH VIBRATORY ELEMENT SUBMERGED IN THE CONCRETE, WITH A MINIMUM FREQUENCY OF NOT LESS THAN 6000 IMPULSES PER MINUTE WHEN SUBMERGED. DO NOT USE VIBRATORS TO TRANSPORT THE CONCRETE IN THE FORMS. INSERT AND WITHDRAW VIBRATORS AT A SPACING RECOMMENDED BY THE MANUFACTURER. PENETRATE THE PREVIOUSLY PLACED LIFT WITH THE VIBRATOR WHEN MORE THAN ONE LIFT IS REQUIRED. EXTERNAL VIBRATORS MAY BE USED ON THE EXTERIOR SURFACE OF THE FORMS WHEN INTERNAL VIBRATORS DO NOT PROVIDE ADEQUATE CONSOLIDATION OF THE CONCRETE.
DO NOT INTERRUPT SUCCESSIVE PLACEMENT OF CONCRETE. COLD CONSTRUCTION JOINTS SHALL BE AVOIDED EXCEPT WHERE DICTATED BY CONSTRUCTION SEQUENCING SUCH AS THE JOINT BETWEEN THE PEDESTAL AND THE BASE, WHERE ABSOLUTELY NECESSARY, DUE TO A DISRUPTION OF CONCRETE DELIVERY, THE PURCHASER'S REPRESENTATIVE SHALL BE CONTACTED IMMEDIATELY TO IDENTIFY ANY LAST MINUTE MEASURES. THE FOLLOWING ARE THE REQUIREMENTS FOR THE COLD JOINTS:
–JOINT SHALL BE LEVEL AND REASONABLY FLAT
–EXCESS WATER AND LAITANCE SHALL BE REMOVED FROM HORIZONTAL SURFACES BEFORE THE CONCRETE HAS HARDENED BY BRUSHING WITH A STIFF BRUSH OR SPRAYING WITH A FINE WATER SPRAY OR COMPRESSED AIR TO EXPOSE, WITHOUT DISTURBANCE, THE LARGER AGGREGATES.
–WHEN WORK IS RESUMED ON A SURFACE THAT HAS HARDENED, IT SHALL BE WELL ROUGHENED TO EXPOSE THE LARGER AGGREGATES USING A NEEDLE GUN, BUSH HAMMER OR SAND BLASTING. POWERFUL HAMMERS, WHICH MAY DISLODGE AGGREGATE PARTICLES, SHALL NOT BE USED.
–THE JOINT SURFACE SHALL BE CLEANED BY SWEEPING, COMPRESSED AIR OR OTHER MEASURES BEFORE CONCRETE IS PLACED AGAINST IT AND IT SHALL BE THOROUGHLY WETTED AT LEAST 1 HOUR BEFORE THE NEXT POUR.
–PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT CONCRETE PLACED CLOSE TO THE JOINT HAS ADEQUATE FINES CONTENT AND IS FULLY COMPACTED.
THE TOP SURFACE OF THE FOUNDATION BASE SHALL HAVE A TAMPED, FLOATED OR BRUSHED FINISH. TOP SURFACE OF THE PEDESTAL SHALL HAVE A TROWEL AND BROOM FINISH. FORMED SURFACES SHALL HAVE A SMOOTH FORM FINISH.
NOTIFY PURCHASER'S REPRESENTATIVE TO INSPECT CONCRETE SURFACES IMMEDIATELY UPON REMOVAL OF FORMS.
SURFACE DEFECTS AND TIE HOLES IN FORMED CONCRETE SHALL BE REPAIRED WHEN THE FORMS ARE REMOVED. HONEYCOMB THAT IS POROUS, UNCONFINED, OR OTHERWISE DEFECTIVE TO A DEPTH IN EXCESS OF 1 INCH SHALL BE CUT OUT AND REMOVED TO SMOOTH CONCRETE. EDGES SHALL BE SQUARE CUT TO AVOID FEATHERING. PATCH DEFECTS WITH NON-SHRINK GROUT. CONCRETE WITH EXTENSIVE HONEYCOMB INCLUDING EXPOSED STEEL REINFORCEMENT, COLD JOINTS, ENTRAPPED DEBRIS, SEPARATED AGGREGATE, OR OTHER DEFECTS, WHICH AFFECT THE SERVICEABILITY OR STRUCTURAL STRENGTH, WILL BE REJECTED, UNLESS CORRECTION OF DEFECTS IS APPROVED BY THE PURCHASER'S REPRESENTATIVE. OBTAIN APPROVAL OF CORRECTIVE ACTION PRIOR TO REPAIR. EXPOSED SURFACES SHALL BE UNIFORM IN APPEARANCE AND FINISHED TO MATCH ADJACENT SURFACES.
SHRINKAGE CRACKS SHALL BE EVALUATED AND SEALED PER ACI 224 IF DEEMED NECESSARY BY THE PURCHASER'S REPRESENTATIVE.
MAINTAIN RECORDS OF CONCRETE PLACEMENT. RECORD DATE, LOCATION, QUANTITY, AIR TEMPERATURE, AND TEST SAMPLES TAKEN. CONTRACTOR SHALL ALSO KEEP DUPLICATE RECORDS.

6.5 CURING AND PROTECTION
CURE AND PROTECT CONCRETE FROM DAMAGING ACTIONS BY SUN, RAIN, WIND, FLOWING WATER, MECHANICAL DAMAGE AND PREMATURE DRYING FOR NOT LESS THAN SEVEN CONSECUTIVE DAYS AFTER PLACEMENT IN ACCORDANCE WITH ACI 301. BEGIN CURING FORMED SURFACES IMMEDIATELY FOLLOWING FORM REMOVAL. IF A CURING MEMBRANE IS USED, APPLY CURING MEMBRANE AS SOON AS BLEEDING HAS STOPPED AND FREE WATER HAS DISAPPEARED FROM THE SURFACE.
IN COLD WEATHER, PROTECT CONCRETE BY PROVIDING ADEQUATE COVER AND HEATING SOURCE TO MAINTAIN CONCRETE TEMPERATURE SPECIFIED IN ACI 306.1 OR AS APPROVED BY THE PURCHASER'S REPRESENTATIVE.
IN HOT WEATHER, THE CONCRETE SURFACES SHALL BE KEPT BELOW 85°F FOR THE CURING PERIOD. PROVIDE WINDBREAKS, SHADING, FOG SPRAYING, SPRINKLING, PONDING, OR WET COVERING, AS REQUIRED, IN ACI 305 OR AS APPROVED BY THE PURCHASER'S REPRESENTATIVE TO PREVENT MOISTURE LOSS DURING CURING PERIOD.

6.6 PLACING GROUT
MIX, PLACE, AND CURE GROUT IN ACCORDANCE WITH APPROVED MANUFACTURER'S INSTRUCTIONS.
PROVIDE GROUT IN ACCORDANCE WITH DESIGN DRAWINGS. DO NOT ALLOW GROUT TO BE PLACED AGAINST THE SIDE OF THE WIND TURBINE TOWER BOTTOM T-FLANGE.
PLACE GROUT WITHIN THREE DAYS OF NOTIFICATION BY THE TURBINE MANUFACTURER.

7.0 TOWER ERECTION

7.1 TOWER BASE ERECTION
AFTER THE FOUNDATION HAS BEEN PROPERLY CURED FOR A PERIOD OF NO LESS THAN 7 DAYS AND THE FOUNDATION HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI, THE TOWER BASE MAY BE INSTALLED.
IF CAST-IN PLATES ARE NOT REQUIRED THE TURBINE MANUFACTURER WILL INSTALL SHIM PACKS ON HIGH STRENGTH GROUT SUPPLIED BY THE TURBINE MANUFACTURER.
CONCRETE SURFACE THAT WILL RECEIVE GROUT UNDER THE TURBINE FLANGE SHALL BE ROUGHENED AS INDICATED ON THE DRAWINGS.
AFTER THE TOWER BASE IS LEVELED THE TURBINE MANUFACTURER WILL TORQUE THE BOLTS TO 295 FT-LBS (400NM). THE TURBINE MANUFACTURER WILL NOTIFY CONTRACTOR FOR INSTALLATION OF GROUT UNDER THE TURBINE BASE FLANGE.
THE SECOND TOWER SECTION MAY BE INSTALLED PRIOR TO POST-TENSIONING ANCHOR BOLTS WITH APPROVAL FROM THE ENGINEER.
POST-TENSIONING OF ANCHOR BOLTS IS NOT TO BE PERFORMED UNTIL THE GROUT STRENGTH HAS EXCEEDED 6,800 PSI AND THE CONCRETE STRENGTH OF THE FOUNDATION (SPREAD FOOTING AND PEDESTAL) HAS REACHED 4,000 PSI.
PERFORM POST-TENSIONING FOR ANCHOR BOLTS BY THE JACKING PROCEDURE USING HYDRAULIC TENSIONING EQUIPMENT; TO ACHIEVE A MINIMUM POST-TENSION FORCE OF 90 KIPS. THE TENSIONING EQUIPMENT SHOULD BE CALIBRATED IN ACCORDANCE WITH THE APPROVED PROCEDURE ON A REGULAR BASIS TO ENSURE THE REQUIRED TENSIONS ARE ACHIEVED.
THE TOLERANCE FOR ANCHOR POST-TENSION SHALL BE ± 2 KIPS
IMMEDIATELY AFTER ALL BOLTS HAVE BEEN POST-TENSIONED, A MINIMUM OF 16 RANDOMLY SELECTED BOLTS (10% OF THE TOTAL BOLTS INSTALLED PER FOUNDATION) SHALL BE TESTED TO VERIFY THAT A 90 KIP TENSION VALUE (LESS THE IMMEDIATE TRANSFER LOSSES) HAS BEEN ACHIEVED AND MAINTAINED BY USE OF AN APPROVED TESTING PROCEDURE. IF ANY OF THE BOLTS DO NOT MEET THE REQUIRED POST-TENSION TEST REQUIREMENTS, THEN ALL BOLTS OF THE TOWER MUST BE RETENSIONED, AND THE POST-TENSION TEST REPEATED. REPEAT THE PROCEDURE UNTIL ALL THE POST-TENSION TESTS PASS.
ANCHOR BOLTS IN AREAS DIRECTLY IN CONTACT WITH CONCRETE OR GROUT SHALL BE FIT WITH SHRINK TUBING PER THE TURBINE MANUFACTURER'S REQUIREMENTS.
ANCHOR BOLT PROJECTIONS ABOVE THE WTG BOTTOM T-FLANGE SHALL BE LUBRICATED WITH NEVER-SEEZ AS REQUIRED BY THE TURBINE MANUFACTURER.
EXTERIOR ANCHOR BOLT PROJECTIONS SHALL BE CAPPED WITH PLASTIC CAPS. CAPS SHALL BE SIZED TO BE WATER TIGHT.

7.2 COMPLETION OF TOWER ERECTION
THE FINAL SECTIONS OF THE TOWER, NACELLE AND ROTOR MAY BE INSTALLED AFTER ALL BOLTS HAVE BEEN POST-TENSIONED. THE GROUT AND CONCRETE COMPRESSIVE STRENGTHS SHALL BE AT DESIGN STRENGTHS.

8.0 TESTING AND INSPECTION REQUIREMENTS
TESTING AND INSPECTION SHALL BE PERFORMED BY AN INDEPENDENT TESTING AND INSPECTION FIRM. COPIES OF ALL THE FOLLOWING TESTING AND INSPECTION REPORTS WILL BE PROVIDED TO THE CONTRACTOR FOR THEIR QUALITY CONTROL RECORDS.

8.1 EXCAVATION, BACKFILL AND COMPACTION
–SAMPLES OF STRUCTURAL FILL AND COMMON FILL MATERIALS WILL BE OBTAINED AND GRAIN SIZE ANALYSIS, MOISTURE CONTENT, ATTERBERG LIMITS, PROCTOR AND/OR RELATIVE DENSITY TESTS WILL BE PERFORMED
–FOR PLACED AND COMPACTED STRUCTURAL AND COMMON FILLS, PROVIDE ONE DENSITY TEST PER LIFT INDICATING TEST LOCATION, DRY DENSITY AND MOISTURE CONTENT TO BE PERFORMED
–A SUBGRADE INSPECTION REPORT COMPLETED BY A GEOTECHNICAL ENGINEER WILL BE PROVIDED.

8.2 CAST-IN-PLACE CONCRETE
THE NECESSARY TESTING AND MONITORING SERVICES NEEDED TO CONTROL OR MONITOR THE PRODUCTION, TRANSPORTATION, PLACEMENT, PROTECTION, AND CURING OF THE CONCRETE WILL BE PERFORMED. SAMPLING AND TESTING FOR QUALITY CONTROL DURING PLACEMENT WILL BE CONDUCTED AND SHALL INCLUDE THE FOLLOWING:
–CONCRETE SAMPLES WILL BE OBTAINED FOR TESTING IN ACCORDANCE WITH ASTM C172.
–SLUMP OF THE SAMPLED CONCRETE WILL BE TESTED IN ACCORDANCE WITH ASTM C143. THE MAXIMUM SLUMP MAY BE INCREASED AS SPECIFIED WITH THE ADDITION OF AN APPROVED ADMIXTURE PROVIDED THAT THE WATER-CEMENT RATIO IS NOT EXCEEDED. PERFORM TESTS AT COMMENCEMENT OF CONCRETE PLACEMENT, WHEN TEST CYLINDERS ARE MADE, AND FOR EACH BATCH (MINIMUM) OR EVERY 150 CUBIC YARDS (MAXIMUM) OF CONCRETE TESTS WILL BE PERFORMED.
–AIR CONTENT OF THE SAMPLED CONCRETE WILL BE TESTED IN ACCORDANCE WITH ASTM C231. AIR CONTENT WILL BE TESTED AT THE SAME FREQUENCY AS SPECIFIED FOR SLUMP TESTS.
–CONCRETE TEMPERATURES WILL BE TESTED WHEN AIR TEMPERATURE IS BELOW 40°F OR WHEN ABOVE 80°F. CONCRETE WILL BE TESTED AS DELIVERED AND WHILE IN THE FORMS DURING CURING PERIOD.
TESTING FIRM WILL MAKE A MINIMUM OF 6 COMPRESSION TEST CYLINDERS FOR EACH SET OF TESTS IN ACCORDANCE WITH ASTM C31. PRECAUTIONS WILL BE TAKEN TO PREVENT EVAPORATION AND LOSS OF WATER FROM THE SPECIMEN. LABORATORY WILL PERFORM COMPRESSION TESTING OF CONCRETE CYLINDERS IN ACCORDANCE WITH ASTM C39. TWO CYLINDERS WILL BE TESTED AT 7 DAYS, TWO CYLINDERS AT 28 DAYS, AND TWO CYLINDERS WILL BE HELD IN RESERVE. FOR STRENGTH TESTS SAMPLES WILL BE TAKEN FOR EACH 150 CUBIC YARDS OR FRACTION THEREOF, OF EACH CONCRETE MIX PLACED. STRENGTH LEVEL OF CONCRETE SHALL BE CONSIDERED SATISFACTORY IF BOTH THE FOLLOWING REQUIREMENTS ARE MET:
–NO INDIVIDUAL TEST RESULT IS 500 PSI LESS THAN THE 7-DAY OR 28-DAY STRENGTH AS APPLICABLE.
–THE AVERAGE OF THE COMPRESSIVE TESTS EQUALS OR EXCEEDS THE 7-DAY OR 28-DAY STRENGTH AS APPLICABLE.
IN THE EVENT OF UNSATISFACTORY COMPRESSIVE TEST RESULTS, THE PURCHASER'S REPRESENTATIVE WILL BE NOTIFIED FOR RESOLUTION.

8.3 GROUT
MINIMUM OF 4 GROUT CUBES WILL BE CAST, AND LABORATORY STRENGTH TESTING WILL BE PERFORMED AT 3 DAYS (AVERAGE OF TWO BREAKS) AND 28 DAYS (AVERAGE OF TWO BREAKS).

9.0 QUALITY CONTROL
THE CONTRACTOR SHALL KEEP COPIES OF ALL CERTIFICATES RELATING TO QUALITY CONTROL, INSPECTION AND TESTING OF MATERIALS AND WORKMANSHIP IN A QUALITY ASSURANCE FILE, WHICH SHALL BE AVAILABLE FOR INSPECTION BY THE PURCHASER'S REPRESENTATIVE. IN ADDITION, COPIES OF TEST CERTIFICATES ISSUED BY THE TESTING AGENCY SHALL BE SENT TO THE PURCHASER'S REPRESENTATIVE.

10.0 SUBMITTALS

10.1 SUBMITTAL SUMMARY
THE FOLLOWING IS A SUMMARY OF SUBMITTALS REQUIRED ON THIS PROJECT. THE PURCHASER'S REPRESENTATIVE MAY REQUEST ADDITIONAL SUBMITTALS IF DIFFERENT CONSTRUCTION METHODS ARE USED OR AS DEEMED NECESSARY:
–ALTERNATE GROUND IMPROVEMENT DESIGN, IF PROVIDED. (PROVIDE WITH BID)
–BACKFILL WORK PLAN
–WRITTEN REQUEST FOR ANY DESIGN CHANGE
–FOUNDATION EXCAVATION RECORDS
–FOUNDATION BACKFILLING – LABORATORY SOIL TEST RESULTS
–FOUNDATION SUBGRADE INSPECTION AND APPROVAL RECORDS
–PLACEMENT, COMPACTION AND QC RECORDS FOR STRUCTURAL FILL AND BACKFILL
–CONCRETE MIX DESIGN
–CONCRETE PLACEMENT PROCEDURES AND QC RECORDS INCLUDING COLD WEATHER AND/OR HOT WEATHER CONCRETING PROCEDURES
–CONCRETE BREAK TEST RESULTS
–GROUT MIX DESIGN AND RESULTS OF BATCH MIX BREAKS
–GROUT BREAK TEST RESULTS
–MILL CERTIFICATES FOR ALL STEEL: REINFORCING STEEL, ANCHOR BOLTS, EMBEDMENT AND TEMPLATE PLATES, AND ALL STEEL BOLTS
–ANCHOR BOLT TENSIONING RECORDS

10.2 SUBMITTAL REQUIREMENTS
SUBMIT ONE ELECTRONIC COPY OF THE SUBMITTALS SPECIFIED TO THE PURCHASER'S REPRESENTATIVE.
THE PURCHASER'S REPRESENTATIVE WILL REVIEW THE SUBMITTALS FOR PERFORMANCE AND COMPLIANCE WITH THE DESIGN DRAWINGS AND TECHNICAL SPECIFICATIONS.
THE REVIEW DOES NOT RELIEVE THE CONSTRUCTION CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN CONSTRUCTION OF THE WORK DUE TO ERRORS CONTAINED IN THE SUBMITTALS.

NO.	DATE	REVISION DESCRIPTION	BY	APPROVED	NO.	DATE	REVISION DESCRIPTION	BY	APPROVED
1	2-9-12	CONSTRUCTION REVISIONS, W.O.#17480	NJG	[Signature]	1	2-9-12	CONSTRUCTION REVISIONS, W.O.#17480	NJG	[Signature]
0	03-09-11	ISSUED APPROVED FOR CONSTRUCTION	SJU	[Signature]	0	03-09-11	ISSUED APPROVED FOR CONSTRUCTION	SJU	[Signature]

BLACK & VEATCH
CORPORATION
ENGINEER

DATE: 03-10-11
DRAWN: [Signature]
CHECKED: [Signature]
SCALE: AS SHOWN

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA.

RONALD E. GULLICKS
2890
DATE: 2-13-2012
REV: 1

MINNESOTA POWER

BISON WIND
GENERATING FACILITY
NEW SALEM, ND

BISON WIND ENERGY PROJECT PHASE 1B
WIND TURBINE FOUNDATION
SPECIFICATIONS AND GENERAL NOTES

SHEET 165233-1TGU-S5008

REV. 1

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