1. ROAD DESIGN PARAMETERS

A. ROAD DESIGN

THE ROAD DESIGN IS BASED ON THE ASSUMPTIONS LISTED BELOW:

1. SUBGRADE CBR VALUE OF 1.8

2. AGGREGATE CBR VALUE OF 9.0

3. 25,000 LB MAXIMUM AXLE LOAD FOR CONSTRUCTION TRAFFIC AND 3,500 LB MAXIMUM AXLE LOAD FOR MAINTENANCE TRAFFIC.

4. 80 PSI TIRE PRESSURE FOR CONSTRUCTION TRAFFIC AND 65 PSI TIRE PRESSURE FOR MAINTENANCE TRAFFIC.

5. 800 AXLE PASSES FOR CONSTRUCTION TRAFFIC AND 2000 AXLE PASSES FOR MAINTENANCE TRAFFIC.

6. 3 INCH RUT DEPTH.

B. MAINTENANCE

A PROGRAM OF ROAD MAINTENANCE WILL BE REQUIRED TO REPAIR RUTS CREATED BY TRAFFIC USE. THIS MAINTENANCE COULD INCLUDE REGULAR GRADING, ADDITION OF CRUSHED TOP SURFACING AND REDRESSING AFTER SEVERE RAIN EVENTS.

2. ROAD EXCAVATION, BACKFILL, & COMPACTION

A. GENERAL

1. GENERAL SOIL CONDITIONS AND RECOMMENDATIONS ARE DESCRIBED IN GEOTECHNICAL REPORT.

B. SUBMITTALS

1. SUBMIT ONE ELECTRONIC COPY OF THE SPECIFIED SUBMITTALS TO THE CIVIL ENGINEER OF RECORD.

2. THE CIVIL ENGINEER OF RECORD WILL REVIEW THE SUBMITTALS FOR CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS.

3. THE REVIEW DOES NOT RELIEVE THE CONSTRUCTION CONTRACTOR OF THE RESPONSIBILITY FOR CORRECTING DEFECTIVE CONSTRUCTION.

4. FOR EACH TYPE OF SUBGRADE SOILS THAT ARE ENCOUNTERED IN CONSTRUCTION OF THE ROADS. SUBMIT ONE GRAIN SIZE ANALYSIS, NATURAL MOISTURE CONTENT AND STANDARD PROCTOR MAXIMUM DRY DENSITY TEST.

5. FOR ROAD BASE MATERIAL, SUBMIT ONE GRAIN SIZE ANALYSIS, NATURAL MOISTURE CONTENT AND STANDARD PROCTOR MAXIMUM DRY DENSITY TEST DATA FOR EVERY 10,000 LINEAR FEET OF ROAD BASE THAT IS PLACED.

C. PRODUCTS

1. ROAD BASE: ROAD BASE SHALL CONSIST OF NDDOT AGGREGATE SURFACE CLASS 13 OR CLASS 5 MEETING THE REQUIREMENTS OF SECTION 716.03.

2. ROAD SUBGRADE: COMPACTED NATIVE SOIL.

3. CULVERTS: CORRUGATED POLYETHYLENE CULVERTS SHALL MEET THE REQUIREMENTS OF NDDOT SECTION 830.03.

4. GEOTEXTILE: GEOTEXTILE FABRIC SHOULD CONSIST OF SEPARATION AND STABILIZATION WOVEN FABRIC MEETING REQUIREMENTS OF AASHTO M288 CLASS 3.

5. RIPRAP: RIPRAP SHALL CONSIST OF FIELD STONE OR QUARRY STONE MEETING THE REQUIREMENTS OF NDDOT SECTION 708.04.

5. SEED: SEED SHALL BE CLASS IV FOR CROP AREAS AND SHALL BE CLASS II FOR ANY OTHER AREAS. SEED SHALL MEET THE REQUIREMENTS OF NDDOT SECTION 708.02.

D. EXECUTION

1. SCRAPE THE ROOT ZONE AND ORGANICS FROM THE ROAD AREA AND STORE FOR RESTORATION. ACTUAL STRIPPING DEPTHS WILL VARY AND SHOULD BE EVALUATED BY A GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION. SOFT, ORGANIC, AND OTHER UNACCEPTABLE MATERIAL SHALL BE REMOVED FROM THE SUBGRADE AND REPLACED.

2. SUBGRADE COMPACTION: THE ENTIRE ROADWAY LENGTH AND WIDTH SHOULD BE COMPACTED A DEPTH OF 12 INCHES TO A MINIMUM OF 98% STANDARD PROCTOR MAXIMUM DRY DENSITY AT ±2% OF OPTIMUM MOISTURE CONTENT. IN AREAS WITH HIGH GROUNDWATER VIBRATORY COMPACTION SHOULD BE AVOIDED. IF THE SPECIFIED DENSITY AND STABILITY CANNOT BE OBTAINED BY MANIPULATING AND DRYING BECAUSE OF EXCESSIVE MOISTURE, WORK SHALL BE SUSPENDED TO ALLOW THE SUBGRADE TO RECOVER ITS STRENGTH. NO ADDITIONAL PAYMENTS SHALL BE MADE TO THE CONTRACTOR DUE TO SUSPENSION OF WORK.

3. PROOF-ROLLING: THE ENTIRE ROADWAY LENGTH SHALL BE PROOF-ROLLED PRIOR TO THE PLACEMENT OF GEOTEXTILE AND BASE MATERIAL TO IDENTIFY AREAS OF UNSTABLE SUBGRADE. PROOF-ROLLING SHOULD BE PERFORMED IN THE PRESENCE OF GEOTECHNICAL ENGINEER OR QUALIFIED TECHNICIAN USING A FULLY LOADED TANDEM AXLE DUMP TRUCK WITH A MINIMUM GROSS WEIGHT OF 25 TONS. PROOF-ROLLING ACCEPTANCE STANDARDS INCLUDE NO RUTTING GREATER THAN 1.5 INCHES, AND NO "PUMPING" OF THE SOIL BEHIND LOADED TRUCK.

4. ROAD BASE COMPACTION: COMPACT ROAD BASE TO MINIMUM THICKNESS SPECIFIED AND TO A MINIMUM OF 98% STANDARD PROCTOR MAXIMUM DRY DENSITY AT ±2% OF OPTIMUM MOISTURE CONTENT. CROWN AND CROSS GRADE THE ROAD TO PROVIDE POSITIVE LATERAL DRAINAGE AND PREVENT PONDING OF WATER ON THE ROAD SURFACE.

a. IF COMPACTED SUBGRADE SOIL CONDITIONS DO NOT MEET THE REQUIRED FIELD DENSITY, CONTRACTOR SHALL HAVE THE FOLLOWING OPTIONS:
   i. ROAD BASE THICKNESS MAY BE ADDED
   ii. REMOVE THE DEFICIENT MATERIALS AND REPLACE WITH ROAD BASE MATERIAL.
   iii. SCARIFY AND RECOMPACT SUBGRADE

5. SHOULDERS: CONTRACTOR TO DETERMINE MEANS NECESSARY FOR PREPARATION OF SHOULDERS FOR SUPPORT OF CRANE TRAVEL.

6. CRANE PADS: CRANE PAD SUBGRADE AND AGGREGATE SHALL MEET SAME SPECIFICATIONS OF ROADWAYS.

7. CONTRACTOR IS RESPONSIBLE FOR PREPARING THE GROUND SURFACE AT THE TURBINE SITES FOR STORAGE OF MATERIALS, OPERATION OF EQUIPMENT AND OTHER ACTIVITIES NECESSARY TO CONSTRUCT THE PROJECT.

8. SHOULDERS AND CRANE ASSEMBLY AREAS SHALL MEET AT A MINIMUM UNDRAINED SHEAR STRENGTH OF 1800 PSI.

9. SEED: SEED SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF NDDOT SECTION 708.02.

10. CONTRACTOR IS RESPONSIBLE FOR DECOMPACTION OF CRANE PATHS AT COMPLETION OF THE PROJECT. DECOMPACTION WILL BE ACCOMPLISHED WITH A SINGLE PASS OF A 18" RIPPER, PROCESSING THE TOP 6" OF SOIL.

11. RESTORATION: RESTORE ALL DISTURBED AREAS AT COMPLETION OF THE PROJECT. THIS INCLUDES ALL OPERATIONS NECESSARY TO REESTABLISH VEGETATION.

E. TESTING AND INSPECTION (TESTING INSPECTION FIRM TO BE HIRED BY MN POWER)

1. SUBMIT ONE ELECTRONIC COPY OF THE SPECIFIED TESTING AND INSPECTION RECORDS TO THE CIVIL ENGINEER OF RECORD.

2. THE CIVIL ENGINEER WILL REVIEW THE TESTING AND INSPECTION RECORDS TO CHECK CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS. THIS REVIEW DOES NOT RELIEVE THE CONSTRUCTION CONTRACTOR FROM THE RESPONSIBILITY FOR CORRECTING DEFECTIVE WORK.

3. COPIES OF ALL INSPECTIONS AND TEST REPORTS THAT ARE SUBMITTED SHALL BE PROVIDED TO OWNER AND SHOULD BE MADE AVAILABLE FOR REVIEW ON SITE.

4. FOR EACH TYPE OF SUBGRADE SOILS THAT ARE ENCOUNTERED IN CONSTRUCTION OF THE ROADS. PERFORM ONE GRAIN SIZE ANALYSIS, NATURAL MOISTURE CONTENT, AND STANDARD PROCTOR MAXIMUM DRY DENSITY TEST.

5. FOR ROAD BASE/TOP MATERIAL, PERFORM ONE GRAIN SIZE ANALYSIS, NATURAL MOISTURE CONTENT AND STANDARD PROCTOR MAXIMUM DRY DENSITY TEST DATA FOR EVERY 10,000 LINEAR FEET OF ROAD BASE/TOP THAT IS PLACED.

6. FOR ROAD SUBGRADE FILLS THAT ARE PLACED, PERFORM ONE COMPACTION TEST RESULT INDICATING LOCATION OF TEST, DRY DENSITY AND MOISTURE CONTENT PER 8" LIFT/250' LENGTH THAT IS PLACED. NO STANDARD PROCTOR TEST COLLECTED 3000' OR GREATER FROM THE CURRENT TEST LOCATION MAY BE USED.

7. FOR COMPACTED ROAD SUBGRADE, PERFORM ONE FIELD DENSITY TEST FOR EVERY 500 FEET OF ROAD WITH NOT LESS THAN TWO (2) TESTS PER TURBINE ACCESS ROAD THAT IS PREPARED.

8. FOR COMPACTED ROAD BASE, PERFORM ONE FIELD DENSITY TEST FOR EVERY 500 FEET OF ROAD WITH NOT LESS THAN TWO (2) TESTS PER TURBINE ACCESS ROAD THAT IS PREPARED.

JOEL E. BAHMA REGISTERED PROFESSIONAL ENGINEER PE-4904 NORTH DAKOTA

09/30/11 FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
A	KKB	CAD	JXB	07/15/11	60 PERCENT SUBMITTAL
B	CAD	CAD	JXB	09/02/11	90 PERCENT SUBMITTAL
0	CAD	CAD	JXB	09/30/11	ISSUED FOR CONSTRUCTION

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT 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 NORTH DAKOTA.

SIGNATURE Joel E Bahma

PRINTED NAME JOEL E. BAHMA

DATE 09/30/2011 REG. NO. 4904

CLIENT	07/15/11	09/02/11						
BID								
CONSTRUCTION				09/30/11				
PERMITTING								
RELEASED TO/FOR	A	B	C	0	1	2	3	
DATE RELEASED								

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Scale	AS SHOWN
Date	07/05/11
Drawn	KKB
Checked	JXB
Designed	CAD
Approved	JXB

minnesota power AN ALLETE COMPANY

Bison

A WIND ENERGY INITIATIVE OF MINNESOTA POWER IN NORTH DAKOTA

BISON 3 WIND PROJECT
MORTON & OLIVER COUNTIES, NORTH DAKOTA

SPECIFICATIONS

BARR PROJECT No.	34/30-1006
CLIENT PROJECT No.	
DWG. No.	C-06
REV. No.	0

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