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| In the Matter of the Application of Xcel Energy      | ) | STIPULATION |
| For a Construction Permit to Build 9.65 Miles of the | ) |             |
| Buffalo Ridge to Brookings County 115 kV             | ) |             |
| Transmission Line, Two 0.4 Mile Brookings County     | ) |             |
| to White 345 KV Transmission Lines, the Brookings    | ) |             |
| County Substation and to Add Facilities to the       | ) |             |
| White Substation                                     | ) | EL05-028    |

It is hereby stipulated and agreed by and between the Northern States Power Company, d/b/a Xcel Energy (“Applicant”), the Staff of the South Dakota Public Utilities Commission (“Staff”), and the Brookings County Commission (the “County”), that the following Findings of Fact and Conclusions of Law, and an appropriate Order consistent with said Findings and Conclusions may be adopted by the South Dakota Public Utilities Commission (the “Commission”) in the above-captioned matter. In support of its Application, the Applicant does hereby offer this Stipulation, the Application filed December 1, 2005, and all responses submitted by the Applicant to the Staff’s data requests. Staff offers no answering testimony or exhibits conditioned upon the Commission accepting the following Findings of Fact and Conclusions of Law.

**FINDINGS OF FACT**

**1. INTRODUCTION**

The proposed project (“Project”) will be comprised of the following components:

- ◆ Two new 0.4-mile 345 kilovolt (kV) transmission lines connecting the Western Area Power Administration (Western) White Substation located southeast of White, South Dakota, and a new Xcel Energy Brookings County Substation;
- ◆ A new 345 kV/115 kV Brookings County Substation located approximately 0.4 miles northeast of the White Substation;
- ◆ A new 9.65 mile 115 kV transmission line from the Brookings County Substation to the Minnesota/South Dakota Border; and
- ◆ Improvements to the White Substation to accommodate the new 345 kV lines.

The transmission line and substation facilities are all designed to one hundred fifteen kilovolts or more.

## 2. PURPOSE OF FACILITY

The purpose of the Facility is to enhance the transmission system in and around the Buffalo Ridge area in order to provide transmission outlet capacity for existing and additional wind generation. There is a significant amount of wind generation in the MISO Interconnection Queue requesting interconnections at the Yankee Substation located in Lincoln County, Minnesota. Those wind generation projects cannot be built unless this Facility is constructed. The majority of the initial wind development in this area has occurred on the portion of the Buffalo Ridge land formation that extends from the western half of northern Iowa through southwest Minnesota. The majority proposed or potential wind generation resources in the Upper Midwest are also located on or near the Buffalo Ridge where it extends into eastern South Dakota. The Facility is part of an orderly development of the transmission system necessary over the coming years to allow for the expansion of additional wind generation in and around the Buffalo Ridge.

The transmission system in and around Buffalo Ridge currently has authorized generator outlet capability of approximately 260 megawatts (MW) and is fully subscribed. More transmission capacity is needed to allow for increased wind generation in the area. This project is part of a series of transmission improvements that are designed to address this need.

A delay or termination of the Facility would constrain the ability of wind-generated electricity from eastern South Dakota and the Buffalo Ridge area to connect to the transmission system, and therefore hinder development of future wind power in eastern South Dakota and the Buffalo Ridge region.

## 3. DESCRIPTION OF FACILITY

The Project will be comprised of four (4) primary components:

- 1) Two new 0.4-mile 345kV transmission lines connecting the Western White Substation located southeast of White, South Dakota, and a new Xcel Energy Brookings County Substation;
  - 2) A new 345 kV/115 kV Brookings County Substation located approximately 0.4 miles northeast of the White Substation;
  - 3) A new 9.65 mile 115 kV transmission line from the Brookings County Substation to the Minnesota/South Dakota Border; and
  - 4) Improvements to the White Substation to accommodate the new 345 kV lines.
- a. **Two 345 kV Transmission Lines.** Two new 345 kV transmission lines would exit the north side of the White Substation and then proceed approximately 0.4 miles to the north and east to Xcel Energy's new Brookings County Substation. The lines would span the Deer Creek tributary that separates the White Substation from the Brookings County Substation. The landscape in this area is grassland, including native prairie remnants, particularly along the slopes leading into the Deer Creek tributary.

The two 345 kV transmission lines will be constructed on parallel steel single pole structures. The combined ROW for the 345 kV transmission lines will be 250 feet wide, 75 feet outside of each line's centerline and 100 feet between the centerlines of each line. The single pole structures will be approximately 80-100 feet tall with an average span of 950 feet between structures. The construction of the 345 kV lines will be staged, with the northernmost 345 kV line constructed first and the southernmost 345 kV line constructed within five years. A schematic showing the route of the 345 kV transmission lines is set forth in the plan and profile provided in Exhibit 1 to this Stipulation.

**b. The Brookings County Substation.** The new Brookings County Substation will be developed on approximately 12 acres of a 40-acre parcel, which is located approximately 0.4 miles northeast of the White Substation in the southeast quarter of section 25 of Sherman Township (T 111 N, R 48 W). Xcel Energy has purchased the 40 acres for the substation. The substation site is shown on an aerial photograph in Exhibit 1 (pages 10 and 11). The site has been tilled and is currently used for agricultural purposes.

Xcel Energy anticipates that the Brookings County substation will be constructed in phases to meet the need for additional transmission improvements in the area. It is expected that within the next five years additional improvements will be made at the substation to support development of wind generation in the area. Preliminary substation layouts are shown in Exhibit C.3 and Exhibit C.4 of the Applicant's Permit Application. All anticipated improvements would be made within the 12-acre fenced area.

**c. The 115 kV Transmission Line.** The 115 kV transmission line will exit the east side of the Brookings County Substation and then proceed south along the east side of 484<sup>th</sup> Avenue for approximately 2.5 miles before crossing to the west side of 484<sup>th</sup> Avenue for approximately one and one-quarter miles and then cross back to the east side of 484<sup>th</sup> Avenue for approximately three-quarters of a mile to 211<sup>th</sup> Street. The line will then turn east along the north side of the 211<sup>th</sup> Street alignment for approximately three miles to 487<sup>th</sup> Avenue. Approximately one mile of this portion of the route would be cross-country where the road has been abandoned along the 211<sup>th</sup> Street alignment along the south side of the SE ¼ of Section 18 and the SW ¼ of Section 17, T110N, R47W, in Brookings County. At 487<sup>th</sup> Avenue, the line turns south for one mile on the west side of 487<sup>th</sup> Avenue to 212<sup>th</sup> Street. The line then crosses 212<sup>th</sup> Street and proceeds eastward for approximately three-quarters of a mile to the Minnesota border. A schematic showing the route of the 115 kV transmission line is set forth in the plan and profile drawings provided in Exhibit 1 to this Stipulation.

The line passes through an agricultural area of rolling hills with a mixture of land cover: cropped fields, pasture, planted grasslands and native prairie remnants. Approximately one mile crosses overland through a mixture of replanted grasslands, row crops and pastureland.

**d. Improvements to the White Substation.** Western's White Substation site occupies approximately 24 acres in the southern half of Section 25 of Sherman Township (T 111 N, R48 W), in Brookings County. The substation site is shown on an aerial photograph in Exhibit C.1 of the Application, and a schematic of the improvements is shown in Exhibit C.2 of the Application. The entire substation site is graded and covered in gravel. The area surrounding

the substation is characterized as grassland, including portions of remnant prairie. Immediately to the east and southeast of the White Substation, the elevation drops off rapidly into an area a few hundred feet wide, created by an intermittent stream, which connects to Deer Creek. To the north of the Substation, the elevation rises about 15 to 20 feet over a distance of a few hundred feet.

The White Substation improvements will be entirely within the fenced area of the White Substation and will be performed by Western. Areas outside of the fenced area or the existing substation access road will not be disturbed. Modifications to the White Substation will include expansion of the existing 345 kV ring bus to a breaker-and-a-half configuration and the addition of six SF6 gas-insulated 345 kV breakers.

**4. DEVIATIONS FROM DESCRIBED CENTERLINE**

The specific location of the centerline of the transmission lines is provided on the preliminary plan and profile drawings set forth in Exhibit 1 (pages 1 to 10) to this Stipulation. It might be necessary to deviate slightly from the described centerline to accommodate engineering and applicable safety and construction requirements based upon actual conditions encountered during construction.

**5. ESTIMATED COST OF FACILITY**

The estimated total cost of the South Dakota portion of this Project is \$19.0 million, with the cost of separate project components estimated as follows:

| Route                          | Transmission Line Costs | Right-of-way Costs | Total Cost   |
|--------------------------------|-------------------------|--------------------|--------------|
| 115 kV line (9.7 miles)        | \$6,300,000             | \$163,000          | \$6,463,000  |
| 345 kV line (0.4 miles)        | \$470,000               | \$7,000            | \$477,000    |
| White Substation Modifications |                         |                    | \$6,100,000  |
| Brookings County Substation    |                         |                    | \$6,000,000  |
| Total Facility Costs           |                         |                    | \$19,040,000 |

**6. DEMAND FOR THE FACILITIES**

This project is specifically designed to address transmission outlet capacity issues that have limited the amount of wind generation that can be carried on the transmission system in this region. The immediate demand for the Project is necessitated by existing and proposed wind development in the region, primarily on Buffalo Ridge in Southwest Minnesota and Northeast South Dakota around the Brookings area.

To address this need, Xcel Energy filed an application with the Minnesota Public Utilities Commission (MPUC) on December 28, 2001, for a Certificate of Need to construct a series of transmission projects in southwestern Minnesota. On March 11, 2003, the MPUC concluded that Xcel Energy had demonstrated the need for transmission facilities to move 825 MW of wind generation from Buffalo Ridge and authorized Xcel to construct four new transmission lines. The 115 kV transmission line from Buffalo Ridge to the White Substation is one of the four lines.

A delay or termination of the Facility would prohibit currently proposed wind generation projects from connecting to the proposed Yankee substation. This development includes wind turbines in South Dakota that will provide approximately 50 MW of electricity. A delay or denial would also therefore hinder development of future wind power in eastern South Dakota and the Buffalo Ridge.

## **7. SITE DESCRIPTION**

The plan and profile for the 345 kV transmission lines and the 115 kV transmission line are shown in Exhibit 1. The South Dakota portion of the Project, for which this stipulation is being made, will be located entirely in Brookings County. The Minnesota portion of the Project will be located in Lincoln County and is not part of this stipulation.

The area in which the Brookings County Substation, White Substation and the two 345 kV transmission lines is located is a combination of grassland and agricultural land. The area surrounding the White substation is characterized as grassland, including portions of remnant prairie. Immediately to the east and southeast of the White Substation, the elevation drops off rapidly and follows an area created by an intermittent streambed that is a few hundred feet wide and then rises towards the Brookings County substation site. To the north of the White substation, the elevation rises about 15 to 20 feet over a distance of a few hundred feet.

The property for the new Brookings County Substation is currently used for agricultural purposes. Access to the substation will be created by developing a road off 484<sup>th</sup> Avenue.

The two new 345 kV transmission lines would exit the north side of the White Substation and then proceed approximately 0.4 miles to the northeast to Xcel Energy's new Brookings County Substation. The lines would span the Deer Creek tributary that separates the White Substation from the proposed Brookings County Substation. The landscape in this area is grassland, including native prairie remnants, particularly along the slopes leading into the Deer Creek tributary. The transmission lines will cross three parcels of land, which are owned by one landowner.

The 115 kV transmission line passes through an agricultural area of rolling hills with a mixture of land cover: cropped fields, pasture, planted grasslands and native prairie remnants. Approximately one mile of the route crosses overland through a mixture of replanted grasslands, row crops and pastureland. The transmission line will cross 20 parcels of land, which are owned by 18 separate landowners.

## 8. ALTERNATIVE SITES

Applicant did an extensive review of alternative routes for the transmission line from the Minnesota border to the Brookings County Substation, and considered three alternative sites for the Brookings County Substation. Various considerations were included such as cost, landowner issues, topographic features, environmental considerations, regulations, and engineering. A discussion of the alternative evaluation is provided in Section 10.0 of the Applicant's Permit Application.

The assessment of alternatives, coupled with efforts to address specific landowner issues, established the centerline proposed for the transmission lines, as shown in Exhibit 1. Applicant believes the proposed project represents the best alternative in terms of meeting customer, landowner, legal and regulatory concerns, while minimizing impacts to the environment and existing land use.

## 9. ENVIRONMENTAL FACTORS AND PHYSICAL ENVIRONMENT

Applicant has provided environmental information as part of its Permit Application. The existing environment and estimates of changes and impacts to the existing environment are found in sections 11.1 to 18.2 of the Permit Application.

The proposed alignment for the transmission line would minimize changes and impacts to the existing environment by following existing property boundaries, paralleling township and County roads, siting in areas with compatible land use and minimizing the need to cross environmentally sensitive or significant features. The Application demonstrates that the proposed project will have an insignificant impact on all factors evaluated. It is not anticipated that this project will create any significant direct, cumulative or synergistic hazards to the health and welfare of human, plant or animal communities.

- a. **Topography.** The topography through this area is flat to rolling; elevations range from 1,900 feet above mean sea level (amsl) at the state border to approximately 1,770 to 1,780 feet amsl near the White Substation. The topographic features in this area are influenced by many ephemeral washes and small streams. The proposed transmission corridor passes over Deer Creek just south of Xcel Energy's proposed Brookings County Substation.
- b. **Geologic Features.** The surficial geology of the corridor consists of unconsolidated glacial materials deposited during the Wisconsin glacial advance. These materials generally consist of till intermixed with outwash deposits. The till is made up of mostly calcareous clay and silt with inclusions of rock fragments. Outwash materials consist of sands and gravels deposited by glacial melt water. Unconsolidated glacial materials are generally over 400 feet thick in the Facility area.

The bedrock geology of this area consists of the Upper Cretaceous Pierre Shale and Niobara Formation, and the Precambrian Sioux Formation. The Sioux Formation

underlies most of the surficial deposits in the Facility area. The Pierre Shale and the Niobara Formation underlie sediments in the northern portion of the Facility area near the White and Brookings County Substations. The Pierre Shale and Niobara Formation lie unconformably over the Sioux Quartzite in the northern portion of the Facility area.

- c. **Economic Deposits.** The primary economic mineral deposits in Brookings County, South Dakota, consist of sand and gravel. There are a few gravel pits present in the area but none appear to be active.
- d. **Soil Type.** Soils in the Facility area consist primarily of loam, silty loam, silty clay loam, clay loam, and sandy clay loam. The Facility crosses 27 soil units; Buse-Barnes loams and the Vienna Buse Complex are the most common. Slopes range from nearly flat to up to 40 percent, which is characteristic of the rolling topography. Approximately 57 percent of the soils within the Facility area are listed as prime farmland; approximately 16 percent of the soil is listed as prime farmland when drained (USDA 2004).
- e. **Potential for Erosion and Sedimentation.** Impacts to soils from the proposed project would be insignificant. Approximately 27.4 acres of surface soil could be temporarily disturbed during construction of pole foundations for the transmission lines, and approximately 40 acres of soil could be temporarily disturbed for construction of the Brookings County Substation. The majority of the landscape within which the Facility is located is relatively flat with some areas of rolling hills. In general, surficial soils on flat areas are less prone to erosion than soils in slope areas. Erosion control measures will be implemented to ensure that drainage ways and streams are not impacted by sediment runoff from exposed soils during significant precipitation events. Excavation activities will be avoided or minimized in steep slope areas.

Along the proposed transmission corridor, the areas with greatest potential for erosion are the banks of Deer Creek and the tributaries to Deer Creek and Medary Creek, where slopes are relatively steeper. No construction will occur within the banks of Deer Creek or the tributaries to Deer Creek and Medary Creek. When construction near the banks is unavoidable, the area will be stabilized to minimize erosion. This may include protecting exposed soil, installing silt fencing and stabilizing restored soil through re-vegetation where necessary. Construction equipment will not be driven in the streambeds. If a streambed crossing is necessary, it will only occur in the winter months when the ground is frozen, and Xcel Energy will coordinate with the appropriate agencies to obtain any necessary permits.

Decisions on the appropriateness of the implementation of various erosion control measures are determined by site-specific conditions. Contractors will be working on the project that have experience in determining which types of measures work best for the transmission line construction. The *EPA Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices*, (US EPA, 1993) and the guidance provided in the "General Permit for Storm Water Discharges Associated with Construction Activities" for South Dakota (Effective July 1, 2002) will also be consulted.

Once construction is complete, the cultivated areas will be de-compacted and smoothed. Final restoration efforts will be coordinated with the landowners. Where necessary in non-cultivated areas, rough grading will be conducted to reasonably resemble preconstruction contours. Non-cultivated vegetated areas disturbed by construction will be seeded with similar vegetation as was disturbed and mulched as necessary to stabilize seeds during germination.

No significant impacts related to the increase in potential for erosion are therefore expected because of construction of the Facility if these measures are implemented.

- f. **Seismic Risks, Subsidence Potential and Slope Instability.** Seismic hazards in the study area are rated as very low. The seismic activity in South Dakota, especially in the eastern portions of the state, is low. Two earthquakes have been recorded approximately 25 miles south of the proposed facility in Moody County. One earthquake, registering 2.5 on the Richter Scale, occurred in November 1935. The second occurred in July 1982 and had a measured magnitude between 3.5 to 4.0.

The proposed transmission facilities will be designed and constructed in accordance with all applicable codes and will incorporate state-of-the-art standards to address potential structural difficulties associated with seismic, subsidence or slope instability. In general, soils in the project area are expected to provide adequate foundation for transmission line structures without concern of subsidence and the Brookings County Substation is located in a flat area where slope instability will not be an issue.

- g. **Geological Constraints.** There do not appear to be any geological characteristics that present unusual constraints to the design, construction or operation of the proposed facilities. Xcel Energy does not expect that the area geology will impose significant constraints on the design or operation of the Project.
- h. **Hydrology.** Exhibit 2 to the Stipulation shows surface water drainage patterns and the floodplains associated with each drainage. An intermittent section of Deer Creek flows west and south across the proposed Facility alignment. The proposed transmission line also crosses several intermittent tributaries to Deer Creek and Medary Creek. Southwest of the city of Aurora, Deer Creek flows into Medary Creek; this ultimately flows into the Big Sioux River at the Brookings/Moody County border.

Construction equipment will not cross streams. Alternate access points to the project area will be identified to avoid stream and wetland crossings. Xcel Energy will avoid major disturbance of individual wetlands and drainage systems during construction. All wetlands along the Facility corridor can be spanned by the transmission lines.

If a streambed crossing is necessary, it will only occur in the winter months when the ground is frozen, and Xcel Energy will coordinate with the appropriate agencies to obtain any necessary permits.



- i. **Effect on Current Planned Water Uses.** The proposed transmission facilities would not use either municipal or private water and therefore would have no impacts on planned water uses by communities, agriculture, recreation, fish or wildlife.
- j. **Surface and Groundwater Use by Proposed Facility.** The proposed transmission facilities would not require consumptive use of or discharge to any surface water body or groundwater. However, should groundwater be encountered during foundation installation a minimal amount of groundwater would be discharged to the surface. Appropriate permits will be obtained for dewatering activities.
- k. **Aquifer Use by Proposed Facility.** The proposed transmission facilities would not require the use of groundwater as a source of potable water supply or process water.
- l. **Water Storage, Reprocessing and Cooling by Proposed Facility.** No water storage or reprocessing will be required for the construction or operation of the proposed transmission facilities.
- m. **Deep Well Injection Use by Proposed Facility.** No deep well injection would be required for the construction or operation of the proposed transmission facilities.
- n. **Effect on Terrestrial Ecosystems.** Detailed information resulting from biological field surveys conducted to identify and quantify the terrestrial fauna and flora potentially affected by the proposed transmission facilities are contained in Section 13.0 and Exhibit E of the Permit Application. It is anticipated that construction and operation of the proposed Project will have little, if any significant adverse impact on the terrestrial biotic environment.
- o. **Effect on Terrestrial Fauna.** The proposed project construction is not expected to significantly disrupt wildlife in the area. The area in and around the proposed transmission Project is dominated by cropland habitats. Wildlife in these habitats is made up of species adapted to grassland and riparian areas such as deer, pheasant, grouse, ducks, geese, hawks, eagles and songbirds. Domesticated animals raised in the region include cattle, sheep and hogs.

The Biological survey conducted in August 2005 identified suitable habitat for Dakota Skipper in Section 6 of Richland Township (T 110N, R47W), Sections 30 and 31 of Richland Township (T111N, R47W), and Sections 25 and 36 of Sherman Township (T111N, R 48W). A survey conducted during the Dakota Skipper flight time between July 3<sup>rd</sup> and July 6<sup>th</sup>, 2006, determined that Dakota Skippers are present in a pasture that extends from Section 6 of T110N, R47W into Section 30 of T111N, R47W. In order to avoid adversely impacting this species, the Applicant will minimize the numbers of poles placed in this area, and will not construct during the Dakota Skipper flight time from mid-June to mid-July. Placement of the structures will avoid areas of highest plant diversity. Movement of construction equipment will be minimized to the extent practicable. When possible, construction will occur during the winter when the ground is frozen, to avoid disturbing soils and Dakota Skipper habitat. Disturbed areas will be

revegetated as soon as possible, and seed mixes will be coordinated with the private landowner. No Dakota Skippers were found in any of the other potential sites. The Applicant will submit the results of this survey to Western and the USFWS and work with the agency to ensure that the project does not adversely affect the species.

Xcel Energy has been working with various state and federal agencies over the past twenty years to address avian issues. Company personnel work to address problem areas as quickly and efficiently as possible. In 2002, Xcel Energy, Inc.'s operating companies, including Xcel Energy, entered into a voluntary memorandum of understanding (MOU) to work together to address avian issues throughout its territory. This includes the development of avian protection plans (APP) for each state Xcel Energy serves. Xcel Energy has completed the APP for Colorado and has begun work on the APPs for Northern States Power.

Additionally, Xcel Energy will work with the USFWS and GFP to determine if there are areas that should be marked with Swan Flight Diverters when the line is constructed. Because the 345 kV lines will be constructed on parallel structures, the parallel wires will be easier for birds to see and reduce the potential for avian collisions.

There are no other endangered or protected wildlife species identified in the area that may be affected by the transmission lines.

- p. **Effect on Terrestrial Flora.** Impacts to vegetation in the project area are anticipated to be minor. Short-term impacts (that affect vegetation for one (1) year or less) could include disturbance or removal of vegetation and soil compaction caused by preparing equipment yards and construction trailer sites, construction of foundations and installation of transmission poles.

Long-term impacts would be limited to excluding tall trees in the transmission line ROW. The vast majority of the ROW is currently cropland and prairie; therefore, the long-term impact would be minimal.

The USFWS requested evaluation of the existing habitat in the Facility area to determine if potential habitat exists for the Western prairie fringed orchid (*Platanthera praeclara*). During the field survey in August 2005, several wet prairie habitats and remnant mesic prairie sites were identified and no Western prairie fringed orchids were observed. The probability was determined to be low due to the high occurrence of grazing in the area. A survey for the orchid was conducted in late June and early July 2006, during the flowering period. No orchids were found along the proposed route or substation site. The results of the field survey were submitted to the USFWS for concurrence that the Project is not likely to adversely affect the Western prairie fringed orchid.

Cumulative impacts to vegetation are anticipated to be minor and include the effects from farming and ranching. The primary land uses in the project area are residential and agricultural. These practices have been changing the landscape for many years.

Construction would be sequenced to limit disruption to any area at one time to reduce the impact of construction on vegetation. After construction is complete, any compacted soil would be tilled and the area would be reseeded, with permission of the landowner.

There are no other endangered or protected plant species identified in the area that may be affected by the transmission lines.

q. **Effect on Aquatic Ecosystems.**

The primary aquatic ecosystems within the Project area are Deer Creek and the tributaries to Deer Creek and Medary Creek. These creeks are primarily grassed waterways with low flows and have records of Topeka shiners (*Notropis topeka*) within these waters.

During construction, there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading and construction traffic. Once the transmission line is completed, it will have no impact on surface water quality. Maintaining water quality along the Project corridor will minimize potential impacts to rare and common aquatic organisms and the aquatic environment.

Xcel Energy will avoid major disturbance of individual wetlands and drainage systems during construction. All wetlands along the Facility corridor can be spanned by the transmission lines; spans will be approximately 950 feet between structures in the 345 kV segment and approximately 600 feet in the 115 kV segment.

No construction will occur within Deer Creek or the tributaries to Deer Creek and Medary Creek since the transmission lines will span these waterways. In order to avoid impacts to the Topeka shiner, Xcel Energy will avoid construction within 100 feet of Deer Creek and the tributaries to Deer Creek and Medary Creek between May 15<sup>th</sup> and July 31<sup>st</sup>, the spawning period for Topeka shiners. Xcel Energy will also implement appropriate BMPs to minimize the amount of erosion and sedimentation that could potentially affect wetlands and waterways. Temporary erosion and sediment control methods will be properly placed, monitored and maintained adjacent to water resources. These erosion control methods will remain in place until work areas become re-vegetated or are stable and may include silt fencing, mulching, seeding, and hay bales. Where appropriate, Xcel Energy will re-vegetate disturbed areas.

r. **Water Quality.** Construction of the proposed transmission lines would comply with all applicable federal, state and local permits required for alteration of wetlands, streams or rivers resulting from the project. The following are specific measures that would be taken to protect water quality in the proposed project corridor:

- Erosion control measures would be implemented to minimize erosion and sedimentation, runoff and surface instability during construction.
- Construction would be conducted to minimize disturbances around surface water bodies to the extent possible.

- A storm water permit will be obtained from the State of South Dakota for the work at the Brookings County Substation.
- Current drainage patterns in areas affected by construction would be maintained to the extent possible.
- Staging areas for project-related construction equipment would be located in areas that are not environmentally sensitive to control erosion.
- Staging and laydown yards for project-related construction would be established at least 100 feet from waterways or wetlands, if permitted by topography. No vegetation would be cleared between the yard and the waterway or wetland.
- Construction equipment would not be serviced within 100 feet of waterways or wetlands. Equipment would not be fueled within 100 feet of the waterways or wetlands.
- Any spills of fuels or other hazardous materials during construction or system maintenance would be promptly contained and cleaned up.
- Any herbicides used in ROW maintenance would be approved by the U.S. Environmental Protection Agency and applied by licensed professionals. Application of herbicides would be limited to the extent necessary for regular maintenance of the transmission system.

Once the Project is completed, it will have no impact on surface water quality. Maintaining water quality throughout the Project will minimize potential impacts to rare and common aquatic organisms and the aquatic environment.

- s. **Air Quality.** Particulate emissions associated with construction of the utility lines and substation would be mitigated using dust-suppression techniques. Examples of measures for control of particulates are, if necessary:

- Covering open haul trucks with tarps both on site and off site.
- Ensuring that construction vehicles use paved roads wherever possible to access the construction ROW.
- Removing any soil or mud deposited by construction equipment on paved roads and near the egress from unpaved areas, when necessary.
- Stabilizing disturbed areas in compliance with the revegetation plan after construction is complete.

With implementation of these mitigation measures, particulate emissions from construction would be substantially reduced. Accordingly, particulate emissions from construction of the project, as mitigated, will not be significant. No significant emissions are expected from the operation of the transmission facilities.

## 10. LAND USE

- a. **Existing Land Use.** The Project will be located primarily on private land that is zoned as agricultural and regulated by Brookings County land use plans and ordinances. The setback distance of the 115 kV transmission line is increased by 17 feet to accommodate

planned future widening of Brookings County roads in the area (approximately 0.8 miles along Brookings County Road 32/212<sup>th</sup> Street where the line enters South Dakota, and approximately 0.5 miles along Brookings County Road 36/484<sup>th</sup> Avenue just before the line turns into the Brookings County Substation).

The Facility is compatible with the existing land uses in the area. There are already several high voltage transmission lines in the area. Approximately 86 percent of the 115 kV transmission line will parallel roads. The only areas requiring cross-country ROW are the 0.4 miles between the White and Brookings County Substations and approximately one mile of abandoned road along 211<sup>th</sup> Street.

Impacts to agricultural land uses adjacent to the 115 kV transmission line will be minimized by using single, steel poles located adjacent to road ROW. The utilization of existing linear corridors also helps to minimize impacts to land uses along the route. Agricultural impacts are discussed in greater detail in Section 20.1.2 of the Applicant's Permit Application.

- b. **Homes, Businesses and Persons Displaced.** No homes, businesses or persons will be displaced as a result of the construction, operation or maintenance of the proposed transmission lines. There are no homes along the Proposed Route that meet the threshold for displacement due to the construction of the transmission lines. There are no homes within 100 feet of the proposed transmission lines. There are three homes within 300 feet of the transmission lines; the closest home to the 115 kV transmission line is approximately 180 feet. The closest home to the Brookings County Substation is approximately 2,900 feet north of the substation site.
- c. **Land Use Compatibility.** The proposed transmission facilities are compatible with the present land uses of the surrounding area. The majority of the proposed transmission lines traverse private land that is zoned agricultural. The project area is characterized by relative flat landscapes to the east and rolling hills on the west side of the project. The addition of power lines to the area would have minimal direct or indirect impacts on the already linear features of the landscape, including the existing transmission lines, roads, fencing and power lines that transect the area.
- d. **Effect on Land Use.** The proposed project would have a minimal impact on land use. The majority of the proposed transmission lines traverse private land that is zoned agricultural and is regulated by Brookings County land use plans and ordinances. Approximately 86 percent of the transmission lines will parallel existing linear corridors. The only areas requiring cross-country ROW are the 0.4 miles between the White and Brookings County Substations and approximately one mile of abandoned road along 211<sup>th</sup> Street. Impacts to land uses adjacent to the 115 kV transmission line will be minimized by using single, steel poles.

The short-term impacts would include disruption of vegetation and farming caused by:

- Preparing equipment yards and construction trailer sites. It is expected that these sites will all be located at the Brookings County Substation site.
- Grading for construction of the Brookings County Substation.
- Drilling hole foundations for installation of transmission poles and clearing vegetation where necessary.
- Temporary closure of access to livestock and farm irrigation, tilling and harvesting operations.

With the exception of the Brookings County Substation, the short-term disturbances to vegetation would be repaired soon after construction is completed. Active construction at each pole location will be of short duration. However, there will be a time lag (up to several months) between the time the foundations are installed and the towers are erected. The Applicant does not expect that steel poles would be left on the ROW for long periods of time, but would be brought to the foundation location at the time they will be erected. When crews do need to access the site, the disturbances to farming would be expected to be infrequent and last only a few days per disruption. Closure of access to livestock and farm irrigation, tilling and harvesting operations will be minimized to reduce local occupational disruption.

The long-term impacts would include disruption of vegetation and farming caused by:

- Ongoing maintenance along the route of the power line, although this is expected to be infrequent given the lack of trees and use of steel poles
- Loss of crops, hay or livestock forage within the ROW

The cumulative impact of the construction and operation of the Project will have minimal effect on land use. The primary land use in this project area consists of farming: these practices have been changing the landscape for many years. Future practices may continue to change land use. This project should have minimal impacts on land use.

- e. **Noise.** The proposed transmission line and substation projects will not noticeably increase the noise level at nearby residences. Noise levels from the Brookings County substation transformer are not expected to be audible at any potential receptor location. The nearest residence to the site is approximately 2900 feet from the Brookings County substation.

The 345/115 kV transformers rated at 448 MVA have a design guarantee maximum noise level of 89 dBA and the 115/34.5 kV transformers rated at 120 MVA have a design guarantee maximum noise level of 81 dBA. The predicted noise levels at the Brookings County substation fence line are near the low range of outdoor background noise levels as follows: Northeast corner-41dBA, Southeast corner-43dBA, Northwest corner-44dBA, and Southwest corner-42dBA. The predicted noise level at the nearest residence is well below normal outdoor background noise levels at 29dBA.

- f. **Local Land Use Controls.** The proposed transmission facilities are located predominantly on private land that is zoned agricultural and is regulated by Brookings County land use plans and ordinances. There are no rezoning permits required by Brookings County for the construction, use and maintenance of the proposed transmission facilities.

A Brookings County conditional use permit is required for the construction of the Brookings County Substation. This permit will be acquired after the Facilities Permit is issued.

- g. **Radio and Television Interference.** The proposed transmission and substation facilities are not expected to cause any radio or television interference. If it is determined that the presence or operation of the facilities may be causing a problem, the Applicant will investigate the concern and correct those problems caused by Xcel Energy facilities, in accord with Federal Communications Commission (FCC) Rules regarding operation of such facilities.
- h. **Aesthetics.** The 345 kV transmission lines and Brookings County substation site are located in an area already visually dominated by the White Substation and Western 345 kV line. The Brookings County substation and associated facilities will not have a major impact on the aesthetics of the area. The landscape along the 115 kV transmission line route is currently characterised by farmlands and rolling hills. Wind turbines located across the border in Minnesota are visible in the landscape. There are several wind farm projects underway that will result in wind turbines placed along the proposed route.

There are no unique aesthetic resources in the area that would be impacted by this project.

## 11. TIME SCHEDULE

Xcel Energy proposes an in-service date of December 2007 for the Project. The construction of the Buffalo Ridge to Brookings County 115 kV transmission line will begin in October 2006. The project completion is expected by December 2007. Currently project design, right-of-way acquisition and material procurement are underway. A table showing the proposed project schedule is included as Exhibit 3 to the Stipulation.

## 12. COMMUNITY IMPACT

- a. **Forecast of Socioeconomic Impact.** No significant adverse socioeconomic impacts to the local communities and governmental facilities or services are anticipated as a result of the construction and maintenance of the proposed transmission facilities. This Project will improve the capability of local wind generators to transport energy generated in the region. This in turn may increase the amount of wind development in the area and will

contribute to the local economy through easement dollars and taxes generated due to wind farm construction and operation. The Project will not have a significant short-term impact on population, income, occupational distribution or the integration or cohesion of communities in the Project area.

- b. **Forecast of Taxation Impacts.** No significant immediate or long-term adverse impact on property and other taxes of the affected taxing jurisdictions are anticipated because of the construction and maintenance of the proposed transmission facilities. Although Xcel Energy will pay taxes on the Project and the Project will increase Brookings County's tax base, the Project will not result in any significant impact to the affected taxing jurisdiction. The estimated annual dollar value impact of the project in South Dakota on property taxes is \$125,000.
- c. **Forecast of Agricultural Impacts.** Short-term impacts to agriculture are minimal and will occur primarily due to foundation construction and pole erection. These impacts are not expected to last no more than a few days per disruption and would primarily influence access to farm tilling and harvesting operations. During construction, temporary impacts such as soil compaction and crop damages within the ROW are likely to occur. Up to 67 acres of agricultural land could be impacted temporarily by the Project. Permanent impacts to agricultural lands resulting from the Brookings County Substation are estimated at 12 acres. Permanent impacts to agricultural lands will also result in areas where poles are placed and are estimated at approximately 0.2 acres. The Project will have minimal impact on the overall crop production within the proposed project corridor.
- d. **Forecast of Population and Community Impacts.** The proposed transmission project is not expected to substantially affect the population, income, occupational distribution or the integration and cohesion of the adjacent communities. The population of Brookings County in 2004 was estimated at 28,159 (Census 2004) and is not expected to change on a short-term basis because of this project.
- e. **Forecast of Transportation Impacts.** Impacts to the local transportation system will be minimal. The Facility will require a new drive off 484<sup>th</sup> Avenue to access the new substation. The majority of the route will parallel existing roadway. There will be some short-term temporary impacts to traffic along these roadways from construction during the construction phase of this Facility. These impacts may include minor traffic delays when the poles are installed and the conductors are strung. As discussed in Sections 20.2.2, 20.2.3 and 23.3 of the Applicant's Permit Application, Xcel Energy will accommodate Brookings County's plans to upgrade those roads referenced in Section 20.2.2 of the Application along the proposed 115 kV route.
- f. **Forecast of Cultural Resource Impacts.** The Applicant has conducted a records search and an on-site cultural resources inventory of the project area. The results of the cultural resources study are discussed in Section 20.1.4 of the Applicant's PUC Permit Application. The proposed project corridor contains 12 previously recorded archaeological sites within one mile of the transmission line route and substation site.



Five of the sites have been determined not eligible for listing on the National Record of Historic Places (NRHP). The remaining seven archaeological resources have not been evaluated for NRHP eligibility.

The cultural resources survey was completed in the spring of 2006. A Class III Cultural Resources report was compiled and was sent to Western for review. Western sent the report to the State Historical Preservation Office (SHPO) for concurrence on July 12, 2006. The survey identified four previously unidentified potential cultural resource sites in South Dakota: three lithic sites and one farmstead with historic artifact scatter.

These site locations have been reviewed in the field by Xcel Energy personnel to assess whether the sites could be avoided. Only one site, Site 9, cannot be avoided due to the length of the area under review. Site 9 is an artifact scatter site delineated to be approximately 1200 feet long. Currently structures 219 and 220 would be constructed within the delineated scatter area. As recommended in the Cultural Resources Survey Report, Xcel Energy will coordinate additional investigation with the SD SHPO and Western Area Power Administration.

The proposed project is expected to have minimal impact on the cultural resources of the area as long as construction does not disturb the two of the three lithic sites discussed in the Class III Cultural Resources report and further investigation of Site 9 results in pole placement that is acceptable to the resource agencies.

If it becomes necessary to modify the route of the proposed transmission lines to avoid the three sites, the applicant will notify the Commission five days before the change occurs. All changes must be approved by the Commission.

### **13. EMPLOYMENT ESTIMATES**

Transmission line and substation construction would employ 37 to 49 workers for a period of 6 to 12 months. According to the South Dakota Governor's Office of Economic Development, in 2004 there were 827 workers employed in the mining and construction industry in Brookings County. An additional 50 workers for one year would be approximately a six percent increase in the mining and construction industry sector. It is expected that only a small portion of the construction work force will be native to the Brookings County area. Xcel Energy employees will maintain the proposed substation and transmission Project. No permanent additional employment is expected.

### **14. FUTURE ADDITIONS AND MODIFICATIONS**

Xcel Energy is currently in the process of assessing the construction of additional facilities in the area to support the inclusion of additional wind generation in the area as well as improving the overall transmission grid. The projects that are under consideration include:

- ◆ The construction of a second 115 kV transmission line between the Brookings County substation and the Yankee substation to support outlet capability for wind generation. This transmission line would need to be on separate ROW from the proposed Facility since it would be built to support the system if there was an outage of the Facility proposed in the Applicant's Permit Application. This project is under consideration to support the addition of wind generation in both South Dakota and Minnesota.
- ◆ Initial planning studies are also considering the addition of other 115 kV transmission lines connecting the Brookings County Substation to the existing transmission system in the Toronto vicinity, northeast of the Facility proposed in the Permit Application. The project would support additional wind development in that area. Those plans are in the preliminary stages and no specific plans have been developed yet.
- ◆ Xcel Energy, along with the other four largest Minnesota transmission-owning utilities initiated the CAPX 2020 study project to ensure the backbone transmission system is developed and available to serve the growing needs of the region. Information on this endeavor can be found at [www.capx2020.com](http://www.capx2020.com). The group has developed a vision of the infrastructure needs out to the year 2020 and recently completed a technical study that identified several 345 kV lines that should be pursued. One of the transmission projects identified in the technical study is a new 345 kV transmission line from the Brookings County Substation to a new substation on the southeast side of the Minneapolis/St Paul Metro area. Currently Great River Energy has initiated the Certificate of Need process for this project by filing a draft notice plan with the Minnesota Public Utilities Commission in May 2006. The notice plan is currently under review. A Certificate of Need filing is expected to be submitted by the end of 2007 or early 2008 for this project, along with two other 345 kV transmission lines.

Given these potential future projects, the Brookings County substation will be designed and graded to accommodate the future 115 kV and 345 kV transmission line connections discussed above. The Brookings County substation is also designed to accommodate up to twelve 34.5 kV wind feeder lines to support wind generation that may be built in the area and tied into the system through this substation.

## 15. TRANSMISSION FACILITY LAYOUT AND CONSTRUCTION

- a. **Vegetation Clearing.** Xcel Energy does not anticipate significant vegetation clearing will be required for the Facility since it was sited in order to minimize clearing of windbreaks. During the ROW acquisition phase, individual property owners will be advised as to the construction schedules, needed access to the site and any vegetation clearing required for the Facility. The ROW will be cleared of the amount of vegetation necessary to construct, operate and maintain the proposed transmission line. It is standard practice to remove any vegetation that would be a danger to the line at a mature height. In addition, any vegetation that is in the way of construction equipment may have to be removed. Wood from the clearing operation will be offered to the landowner or removed from the site. Brush will be removed from the ROW and disposed of in a licensed landfill unless other disposal arrangements have been made with the landowner.

- b. **Soils.** Excavated soils from drilled pier foundations for the transmission line structures will be hauled off-site to a licensed landfill unless other arrangements have been made with the landowner for onsite disposal. After construction is complete, any compacted soil locations will be addressed as desired by the landowners. Reseeding areas disturbed by construction activities will be done with vegetation similar to what was removed. In cases of agricultural lands, no reseeded will occur unless specified by the landowner. During the several months interval between the time the foundations are installed and the towers are erected, the Applicant will ensure that all areas disturbed by construction and construction access are stabilized to prevent erosion of soils.

Approximately twelve acres of land will be graded to construct the Brookings County Substation. Xcel Energy implements erosion control methods to minimize runoff during substation construction. Xcel Energy will acquire a National Pollutant Discharge Elimination System (NPDES) permit, including development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) for the Brookings County Substation. Improvements at the White Substation will occur entirely within the existing substation.

Upon completion of construction activities, Xcel Energy will restore the areas around the substation site. Post-construction reclamation activities will include the removing and disposing of debris, dismantling all temporary facilities (including staging areas), employing appropriate erosion control measures and reseeded areas disturbed by construction activities with vegetation similar to that which was removed. Where appropriate, Xcel Energy will incorporate methods to screen the final site.

- c. **Herbicides and Sterilants (Weed Control).** Because the primary land use along the transmission line corridor is cropland, it would not be necessary to use herbicides or sterilants for construction of the proposed transmission line. All areas within the Brookings County Substation fence line would be surfaced with a six-inch layer of gravel. Upon completion of construction of the work at the substation, a soil-applied herbicide would be applied to all gravel surfacing for vegetation control. Any herbicides used in ROW maintenance will be approved by the U.S. Environmental Protection Agency and applied by licensed professionals. Application of herbicides will be limited to the extent necessary for regular maintenance of the transmission system and only in those areas where written approval has been received from the landowner.
- d. **Construction Site Access.** Access to the Brookings County Substation will be off 484<sup>th</sup> Avenue. All other access would be on existing approaches or existing roads. Measures will be implemented to minimize erosion and sedimentation, runoff and surface instability during access road construction. All approvals from the County required for the construction of this road will be obtained before commencement of construction thereof.
- e. **Waste Disposal.** All waste generated during the construction of the project will be disposed of in an approved landfill on a regular basis. Trash and scrap will be deposited in waste containers or otherwise controlled and managed on site prior to ultimate

disposal. Personal litter, including bottles, cans and paper from construction activities shall be removed on a daily basis.

- f. **Restoration and Revegetation.** All disturbed areas will be seeded, mulched and revegetated as soon as possible after construction has been completed in any particular area. In cases of agricultural lands, no reseeded will occur unless specified by the landowner. Landowner desires will be considered in determining seed type depending on the adjacent land use.

## 16. INFORMATION CONCERNING TRANSMISSION FACILITIES

- a. **Configuration of Poles.** Xcel Energy proposes to use steel single pole structures for the two 345 kV transmission lines. These structures will be erected on concrete foundations approximately four to six feet in diameter, and approximately 20 to 30 feet in depth. Structures will have a height of 80-100 feet and an average span of 950 feet between structures. Exhibit 4 of the Stipulation shows a steel single pole 345 kV structure of the type that may be used for the 345 kV lines.

Single pole, galvanized steel, davit arm structures will be used for the 115 kV transmission line. These structures will be erected on concrete foundations approximately four to six feet in diameter, and approximately 20 to 30 feet in depth. The structures will have an average height of 70 to 120 feet and an average span of approximately 650 to 850 feet between structures.

Exhibit 4 of the Stipulation shows a davit arm 115 kV structure of the type that would be used for the 115 kV line.

- b. **Conductor Configuration.** For the 115 kV line, Xcel Energy proposes using a double bundled (two conductors) 795 thousand circular mils (kcmil) 26/7 (Drake) aluminum conductor steel supported (ACSS) conductor for the transmission line. A bundled conductor configuration consists of two conductors spaced approximately 18 inches apart at the end of each insulator string. The bundled 795 ACSS conductors are rated for 600 MVA. The capacity of the bundled conductors is 3000 amps. For lightning protection, Xcel Energy will use 3/8-inch EHS 7 stranded steel shield wire.

For the 345 kV line, Xcel Energy plans to use double bundled 795 kcmil 26/7 ACSS for each phase of the three-phase configuration. The conductor capacity of each line will be 3160 amps or 1890 MVA.

- c. **Reliability and Safety.** As discussed in Section 24.4 of the Applicant's Permit Application, the Project facilities will be constructed in full compliance with all applicable National Electrical Safety Code electrical performance and safety codes and will not present significant impacts posed by safety or electrical hazard to the general public.

Transmission line facilities in this area need to be designed to handle stresses created by high winds or heavy ice loadings. Since icing conditions in southeastern South Dakota exceed that of other parts of the Xcel Energy territory, the criteria “Heavy ice with reduced wind condition” has been modified to provide additional pole and wire attachment strength. Xcel Energy’s typical heavy ice case is for a 40 mph wind and 0.5 inches of ice. For this project, Xcel Energy will design for a 50 mph wind and 1.5 inches of ice. The Applicant’s criteria to address these stresses to the transmission structures are more conservative than the typical criteria used for transmission line design and will address this issue.

The flow of electricity produces electric and magnetic fields (commonly referred to as EMF). Numerous sources of EMF exist in nature and in the occupational and residential environment. In nearly all instances, these fields pose no obvious threat to human health or safety. Certain epidemiological investigations have indicated potential risk factors from exposure to EMF. However, many similar studies report no statistically significant correlation.

Thus, although a substantial amount of research on EMF has been completed and is continuing, the body of research on health effects is still preliminary and inconclusive. However, there is general scientific consensus that there is little evidence that magnetic fields from transmission lines negatively impact human or animal health. Nevertheless, it is difficult to prove conclusively that there is no impact.

The tables below provide modeled magnetic fields at certain line loadings for the 115 kV and 345 kV transmissions lines and modeled electric fields. The information provided includes the expected levels under the lines and at various increments from the centerline.

**CALCULATED ELECTRIC FIELDS (KV/M) FOR THE BUFFALO RIDGE TO  
BROOKINGS COUNTY 345 KV TRANSMISSION LINE DESIGNS  
(3 FEET ABOVE GROUND)**

| Structure Type      | Distance to Proposed Centerline<br>KV/meter |      |      |      |      |      |
|---------------------|---|------|------|------|------|------|
|                     | 300'  | 200' | 150' | 100' | 70'  | 0'   |
| <b>H-Frame</b>      | 0.31  | 0.11 | 0.23 | 0.74 | 1.92 | 3.51 |
| <b>Two H-Frames</b> | 0.06  | 0.26 | 0.79 | 3.91 | 4.69 | 2.48 |

**CALCULATED ELECTRIC FIELDS (KV/M) FOR THE BUFFALO RIDGE TO  
BROOKINGS COUNTY 115 KV TRANSMISSION LINE DESIGNS  
(3 FEET ABOVE GROUND)**

| Type   |   | Voltage              | Distance to Proposed Centerline |       |       |      |      |      |      |      |      |
|--|---|----------------------|---------------------------------|-------|-------|------|------|------|------|------|------|
|  |   |                      | -300'                           | -200' | -100' | -50' | 0'   | 50'  | 100' | 200' | 300' |
| Single<br>Circuit<br>Single<br>Steel Pole<br>Davit Arm | 115 kV  | 120 kV               | .009                            | 0.02  | 0.1   | 0.4  | 0.8  | 0.5  | 0.1  | 0.03 | 0.01 |
|  | 115kV<br>w/Single Circuit<br>34.5 kV Underbuild       | 120/36kV             | .01                             | 0.03  | 0.10  | 0.31 | 0.40 | 0.12 | 0.12 | 0.03 | 0.01 |
|  | 115 kV<br>w/Double Circuit<br>34.5 kV Underbuild      | 120/36/36kV          | 0.01                            | 0.02  | 0.11  | 0.36 | 0.15 | 0.39 | 0.13 | 0.03 | 0.01 |
| Double<br>Circuit<br>Single<br>Steel Pole<br>Davit Arm | 115/115 kV<br>Single Steel Pole<br>Davit Arm          | 120/120 kV           | .01                             | .02   | .04   | 0.13 | 0.87 | 0.1  | .01  | .01  | .01  |
|  | 115/115 kV w/<br>Single circuit<br>34.5 kV Underbuild | 120/120/36<br>kV     | .01                             | .01   | .03   | .17  | .39  | .14  | .01  | .01  | .01  |
|  | 115/115 kV w/<br>Double Circuit<br>34.5 kV Underbuild | 120/120/<br>36/36 kV | .01                             | .02   | .03   | .12  | .18  | .10  | .01  | .01  | .01  |

**CALCULATED MAGNETIC FLUX DENSITY (MILLIGAUSS) FOR PROPOSED  
345 KV TRANSMISSION LINE DESIGNS (3 FEET ABOVE GROUND)**

| Structure Type |                    | Condition | Amps | Distance to Proposed Centerline |     |     |
|----------------|--------------------|-----------|------|---------------------------------|-----|-----|
|                |                    |           |      | 75'                             | 0'  | 75' |
| H-<br>Frame    | 345 kV             | Average   | 768  | 64                              | 237 | 64  |
|                |                    | Peak      | 1200 | 42                              | 152 | 42  |
|                | Parallel<br>345 kV | Average   | 385  | 70                              | 24  | 70  |
|                |                    | Peak      | 600  | 109                             | 38  | 109 |

**CALCULATED MAGNETIC FLUX DENSITY (MILLIGAUSS) FOR PROPOSED  
115 KV TRANSMISSION LINE DESIGNS (3 FEET ABOVE GROUND)**

| Structure Type   |  | Condition | Amps           | Distance to Proposed Centerline |       |       |      |     |      |      |      |      |
|--|--|-----------|----------------|---------------------------------|-------|-------|------|-----|------|------|------|------|
|  |  |           |                | -300'                           | -200' | -100' | -50' | 0'  | 50'  | 100' | 200' | 300' |
| Single<br>Circuit<br>Single<br>Steel Pole<br>Davit Arm | 115 kV   | Average   | 540            | 1.1                             | 2.6   | 10    | 30   | 87  | 32   | 11   | 3.1  | 1.4  |
|  |  | Peak      | 900            | 1.9                             | 4.3   | 16    | 50   | 146 | 53   | 18   | 5.2  | 2.4  |
|  | 115kV<br>w/Single<br>Circuit<br>34.5 kV<br>Underbuild      | Average   | 540/350        | 0.8                             | 1.7   | 6.3   | 20   | 73  | 18.4 | 6.1  | 1.6  | 0.7  |
|  |  | Peak      | 900/700        | 1.3                             | 2.9   | 11    | 36   | 134 | 32   | 10   | 2.8  | 1.3  |
|  | 115 kV<br>w/Double<br>Circuit<br>34.5 kV<br>Underbuild     | Average   | 540/350/350    | 0.8                             | 1.7   | 5.9   | 17   | 49  | 16   | 6.0  | 1.7  | 0.8  |
|  |  | Peak      | 900/700/700    | 1.3                             | 2.9   | 10    | 29   | 89  | 28   | 10   | 2.9  | 1.3  |
| Double<br>Circuit<br>Single<br>Steel Pole<br>Davit Arm | 115/115 kV   | Average   | 540/46         | 0.8                             | 1.8   | 6.8   | 21   | 50  | 13   | 4.9  | 1.5  | 0.7  |
|  |  | Peak      | 900/76         | 1.3                             | 2.9   | 11    | 36   | 83  | 22   | 8.2  | 2.4  | 1.1  |
|  | 115/115 kV<br>w/Single<br>circuit<br>34.5 kV<br>Underbuild | Average   | 540/46/350     | 0.8                             | 1.8   | 7.2   | 23   | 61  | 11   | 4.5  | 1.4  | 0.7  |
|  |  | Peak      | 900/76/700     | 1.3                             | 3.1   | 12    | 40   | 112 | 19   | 7.5  | 2.4  | 1.1  |
|  | 115/115 kV w/<br>Double Circuit<br>34.5 kV<br>Underbuild   | Average   | 540/46/350/350 | 0.8                             | 1.7   | 6.5   | 18   | 31  | 11   | 4.4  | 1.4  | 0.6  |
|  |  | Peak      | 900/76/350/350 | 1.3                             | 2.9   | 11    | 30   | 59  | 18   | 7.3  | 2.3  | 1.1  |

Currently there are no federal or state health-based exposure standards for magnetic fields. This is due to the fact that there is inadequate scientific evidence to develop a health-based standard.

Two states, (Florida and New York), have set standards for magnetic field strengths at the edges of ROW. Five states, (Florida, Minnesota, Montana, New Jersey, New York, and Oregon), have established standards for electric field strengths on the ROW and at the Edge of the ROW. The following table lists those standards. Additionally, the SDPUC has recognized that a magnetic field strength of 150 mG and electric field strength of 1 kV/m are acceptable at the edge of a 115-kV transmission line ROW (SDPUC Docket EL04-009).

| State Transmission Line Standards and Guidelines |  |                     |                |   |
|--|--|---------------------|----------------|---|
| State  | Electric Field   |                     | Magnetic Field |   |
|  | On ROW*  | Edge ROW            | On ROW         | Edge ROW  |
| Florida  | 8 kV/m <sup>a</sup><br>10 kV/m <sup>b</sup>                  | 2 kV/m              | -              | 150 mG <sup>a</sup> (max. load)<br>200 mG <sup>b</sup> (max. load)<br>250 mG <sup>c</sup> (max. load) |
| Minnesota  | 8 kV/m   | -                   | -              | -   |
| Montana  | 7 kV/m   | 1 kV/m <sup>e</sup> | -              | -   |
| New Jersey                                       | -  | 3 kV/m              | -              | -   |
| New York   | 11.8 kV/m<br>11.0 kV/m <sup>f</sup><br>7.0 kV/m <sup>d</sup> | 1.6 kV/m            | -              | 200 mG (max. load)  |
| Oregon   | 9 kV/m   | -                   | -              | -   |
| South Dakota                                     | -  | 1 kV/m <sup>g</sup> | -              | 150 mG <sup>a,g</sup>   |

\*ROW = right-of-way (or in the Florida standard, certain additional areas adjoining the right-of-way).  
kV/m = kilovolt per meter. One kilovolt = 1,000 volts.  
<sup>a</sup> For lines of 69-230 kV.  
<sup>b</sup> For 500 kV lines.  
<sup>c</sup> For 500 kV lines on certain existing ROW  
<sup>d</sup> Maximum for highway crossings.  
<sup>e</sup> May be waived by the landowner.  
<sup>f</sup> Maximum for private road crossings.  
<sup>g</sup> Found acceptable for a 115 kV transmission line by the SDPUC.

The proposed transmission lines will meet the electric and magnetic field design standards adopted by these other states, and will meet the levels found acceptable by the South Dakota PUC. Xcel Energy will provide measurements for landowners, customers and employees who request them.

- d. **Right of Way or Condemnation Requirements.** Xcel Energy has previously contacted landowners along the Project route to discuss route proposals. In addition, the Applicant has already purchased the Brookings County Substation site (no additional property is required for the White Substation work). Xcel Energy has contacted all the landowners for the 115 kV line. Landowners will also be provided information on the Facility as it proceeds through the Facilities permitting process, through periodic newsletters. As the design of the line is further developed, contacts with the owners of affected properties will continue and the negotiation and acquisition phase will begin for Xcel Energy to obtain the necessary land or easement rights for the facilities.

During the acquisition phase, individual property owners will be advised as to the construction schedules, needed access to the site and any vegetation clearing required for the Facility. The ROW will be cleared of the amount of vegetation necessary to construct, operate and maintain the proposed transmission lines as discussed in Section



23.1 of the Applicant's Permit Application and the requirements contained in this Stipulation.

Many structure locations will require soil investigation to assist with the design of the foundations. Xcel Energy will inform the landowners at the initial survey consultation that soil borings may occur. An independent geotechnical testing company will take and analyze these borings. Survey crews also work with local utilities and the South Dakota One-Call system to identify underground utilities along the route. This minimizes conflicts or impacts to existing utilities along the route.

Where possible, staging and lay down areas will be located within the ROW and limited to previously disturbed or developed areas. When additional property is temporarily required for construction, temporary limited easements (TLE) may be obtained from landowners for the duration of construction. TLEs will be limited to special construction access needs or additional staging or lay down areas required outside of the proposed transmission line ROW.

- e. **Necessary Clearing Activities.** Xcel Energy anticipates minimal tree clearing will need to be performed for this Facility. The 115 kV transmission line has been sited to minimize the need to remove trees along the route.
- f. **Configuration of Underground Facilities.** No underground transmission facilities would be required for the proposed Facility.

## **AMENDMENT OF AND ADDITION TO PERMIT APPLICATION**

**Amendments.** The Application filed December 1, 2005, is hereby amended as follows:

1. The transmission line route attached to the Application as Exhibit C.1 is hereby amended to conform to the details set forth on Exhibit 1 to this Stipulation.

## **CONCLUSIONS OF LAW**

1.

The Commission has jurisdiction over the subject matter and parties to this proceeding pursuant to SDCL Chapter 49-41B and ARSD 20:10:22. Subject to the findings made on the four elements of proof under SDCL 49-41B-22, the Commission has authority to grant, deny or grant upon such terms, conditions or modifications of the construction, operation and maintenance of the transmission facility as it may deem appropriate.

2.

2.1. The proposed transmission line is a “transmission facility” as defined in SDCL 49-41B-

3.

The Applicant’s Permit Application, as amended and supplemented by responses to Staff data requests, complies with the applicable requirements of SDCL Chapter 49-41B and ARSD 20:10:22.

4.

The Project as defined herein will comply with all applicable laws and rules, including all requirements of SDCL Chapter 49-41B and ARSD 20:10:22.

5.

The Project, if constructed in accordance with the terms and conditions of this permit, will not pose a threat of serious injury to the environment nor to the social and economic conditions of inhabitants or expected inhabitants in the siting area.

6.

The Project, if constructed in accordance with the terms and conditions of this permit, will not substantially impair the health, safety and welfare of the inhabitants of the siting area.

7.

The Project, if constructed in accordance with the terms and conditions of this permit, will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

8.

The Commission has the authority to revoke or suspend any permit granted under the South Dakota Energy Facility Permit Act for failure to comply with the terms and conditions of the permit pursuant to SDCL 49-41B-33.

9.

Northern States Power Company d/b/a Xcel Energy will be the permitted owner of the Project.

10.

The Applicant has met its burden of proof pursuant to SDCL 49-41B-22 and is entitled to a permit as provided in SDCL 49-41B-24, subject to the following:

**STIPULATE TO THE FOLLOWING TERMS AND CONDITIONS:**

1.

The Applicant will obtain all governmental permits that may be required by any township, county, state or federal agency or any other governmental unit for construction activity covered by that permit. Copies of any permits obtained by the Applicant shall be sent to the Commission.

2.

If it becomes necessary to deviate from the described centerline to accommodate engineering and applicable safety and construction requirements based upon actual conditions encountered during construction, all landowners affected by the deviation and the Commission must be notified in writing five working days before the deviation may occur. All deviations must be approved by the Commission.

3.

In order to ensure compliance with the terms and conditions of this permit pursuant to SDCL 49-41B-33, it is necessary for the enforcement of this Order that all employees, contractors and agents of the Applicant, to the extent of its interest, involved in this transmission line project be made aware of the terms and conditions of this permit.

The Applicant shall ensure that its employees, contractors and agents involved in right-of-way negotiations and acquisitions, right-of-way clearing, line construction and right-of-way and line maintenance understand fully and comply with the terms and conditions of this permit.

4.

If during construction, the Applicant or its agents discover what may be an archaeological resource, the Applicant or its agents shall immediately cease work at that portion of the site and notify the Commission and the State Archaeologist. If such an archaeological resource is discovered, the Applicant shall develop a plan that is acceptable to the State Archaeologist to salvage, avoid or protect the archaeological resource. If such a plan would require a different route than that approved by the Commission, the Applicant must seek Commission approval for the new route before proceeding with any further construction.

5.

In order to mitigate interference with agricultural operations during and after construction, the Applicant shall locate all structures, to the extent feasible and prudent, to minimize adverse impact and interferences with agricultural operations, shelterbelts and other land uses or activities. The Applicant shall take appropriate precautions to protect livestock and crops during construction. The Applicant shall repair all fences and gates removed or damaged during construction or maintenance unless negotiated with the landowner or designee. The

Applicant shall be responsible for the repair of private roads and lanes damaged when moving equipment or when obtaining access to the right-of-way.

6.

The Applicant shall provide each landowner across whose property the facility is to be constructed with the following information:

- A copy of the Commission's Order.
- Detailed safety information describing (a) reasonable safety precautions for existing activities on or near the right-of-way; (b) known activities or uses that are presently prohibited within the right-of-way; and (c) other potential dangers or limitations within the right-of-way.
- Construction/maintenance damage compensation policies and procedures.
- The Commission's address and phone number.

The Applicant shall also comply with all other terms and conditions as set forth in the Findings of Fact.

7.

The terms and conditions of the permit shall be made a uniform condition of construction, subject only to an affirmative written request for an exemption addressed to the Commission. A request for an exemption shall clearly state which particular condition should not be applied to the property in question and the reason for the requested exemption. The Commission shall evaluate such requests on a case-by-case basis.

8.

The Applicant will be expected to conform to the Avian Protection Plan Guidelines prepared by the Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service.

9.

Before commencing construction, the Applicant shall furnish an indemnity bond in the amount of Fifty Thousand Dollars (\$50,000.00) to comply with the requirements of SDCL 49-41B-38.

10.

If the presence or operation of the transmission lines or substation causes interference with radio, television or any legal communication device, the Applicant shall take all appropriate

action to minimize any such interference and make a good faith effort to restore or provide reception levels equivalent to reception levels in the immediate areas just prior to construction of the transmission facility and substation. This mitigation requirement shall apply to homes or other structures in place at the time of construction but shall not apply to any dwellings or other structures built after construction of the transmission facilities and substation approved in this Permit have been completed.

11.

The Applicant will comply with all recommendations of the Final Environmental Assessment.

12.

If construction of any portion of the proposed facility commences more than four years after the date the permit is granted, Applicant must certify to the Commission before construction that such facilities continue to meet the permit conditions.

Dated Oct. 20, 2006

Northern States Power Company, a Minnesota Corporation, d/b/a Xcel Energy

By: Doug Jaeger by Robert  
Doug Jaeger  
Vice President, Transmission

Karen E. Cremer  
Karen Cremer  
Staff Attorney  
South Dakota Public Utilities Commission



Dennis Falken  
Chairperson  
Brookings County Commission

## Exhibit 1

# Buffalo Ridge to White Transmission Line Plan and Profile Maps



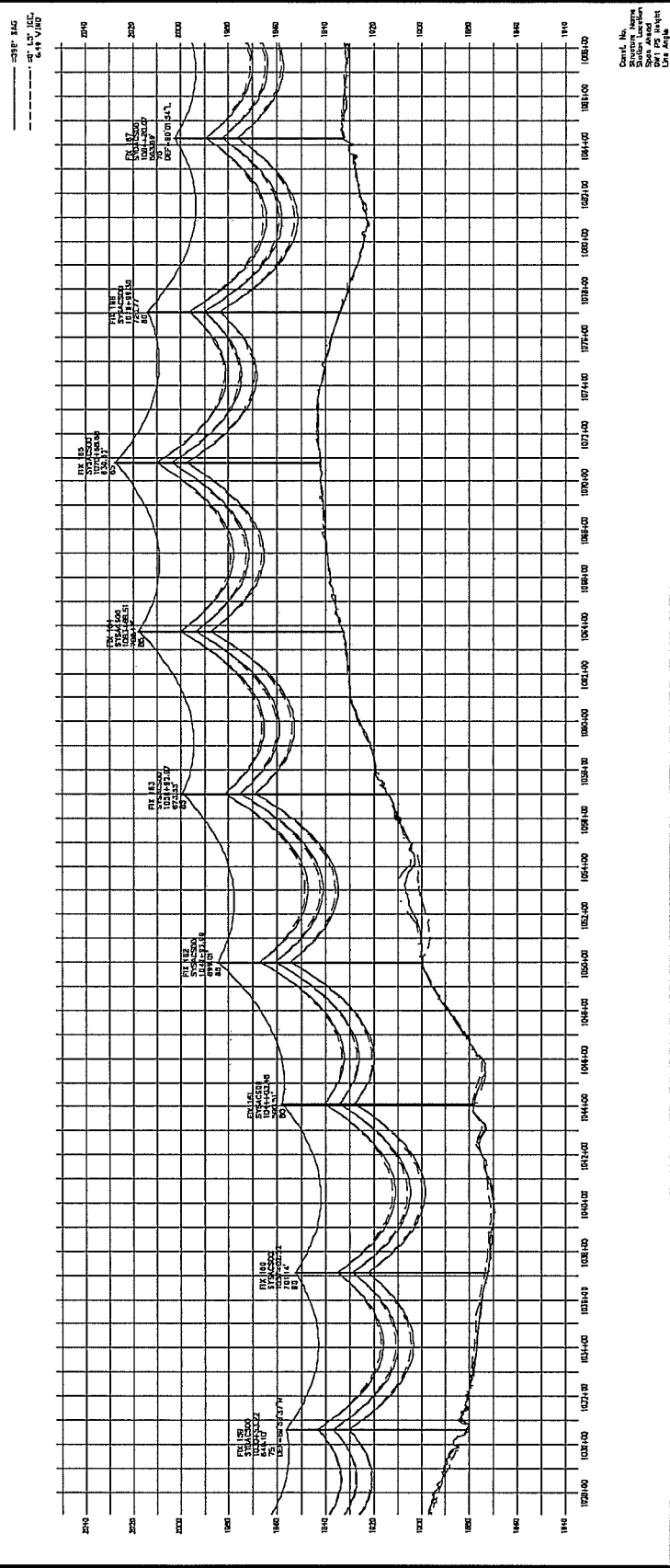
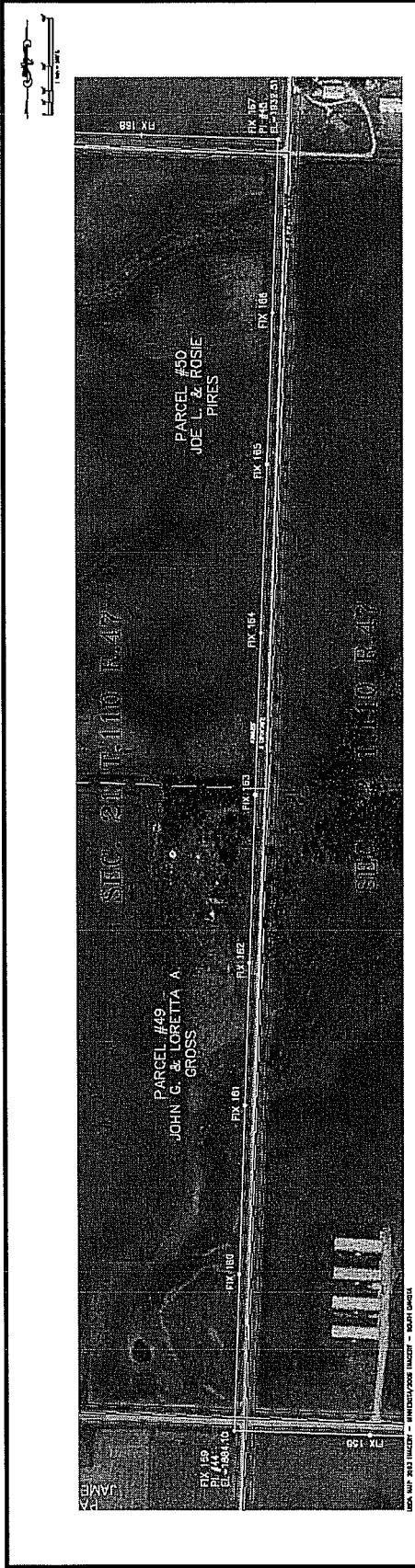


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| 9   | 08/29/08 | REVISED     |
| 10  | 08/29/08 | REVISED     |

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| DATE        | 08/29/08     |
| SCALE       | AS SHOWN     |
| BY          | ...          |
| CHECKED     | ...          |
| APPROVED    | ...          |

**Key Energy**  
 1000 RILEY, BUREAU-RODNEY'S YANFEE SUB  
 PROJECT NO. 1000000000  
 SHEET 21 OF 23  
 DATE 08/29/08

Contract No.  
 Division  
 Station  
 Date



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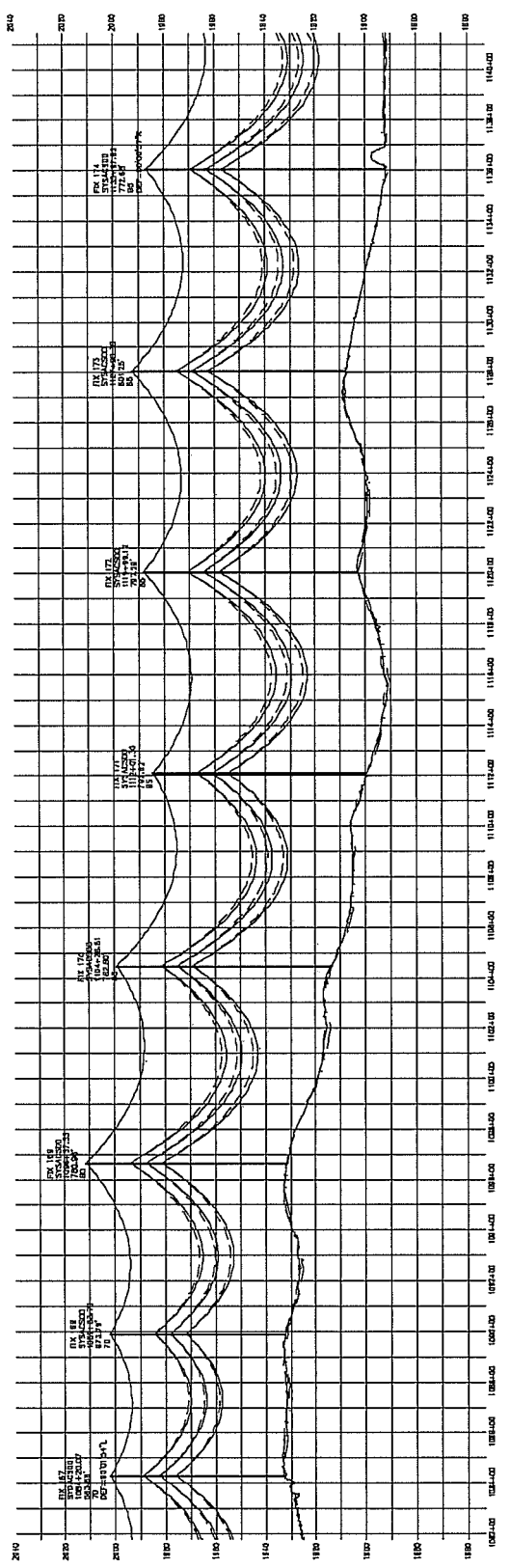
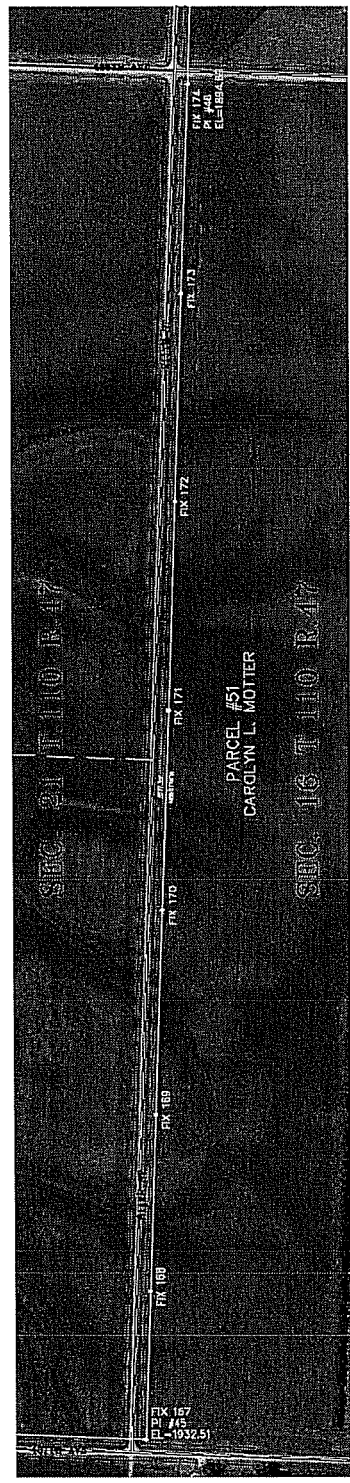
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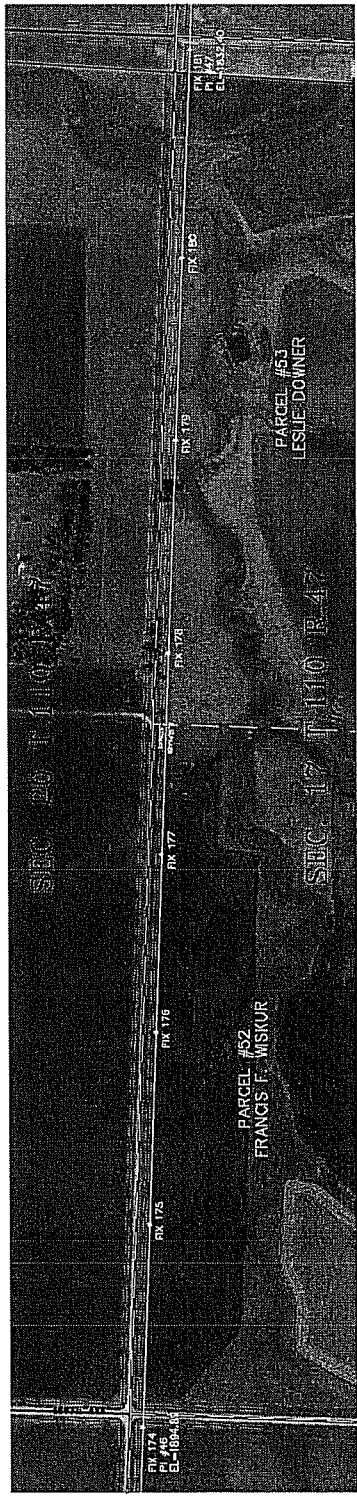
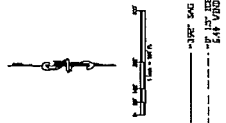
**Xcel Energy**  
 Project Engineering Department  
 1318-2-23

Sheet No.  
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 Date  
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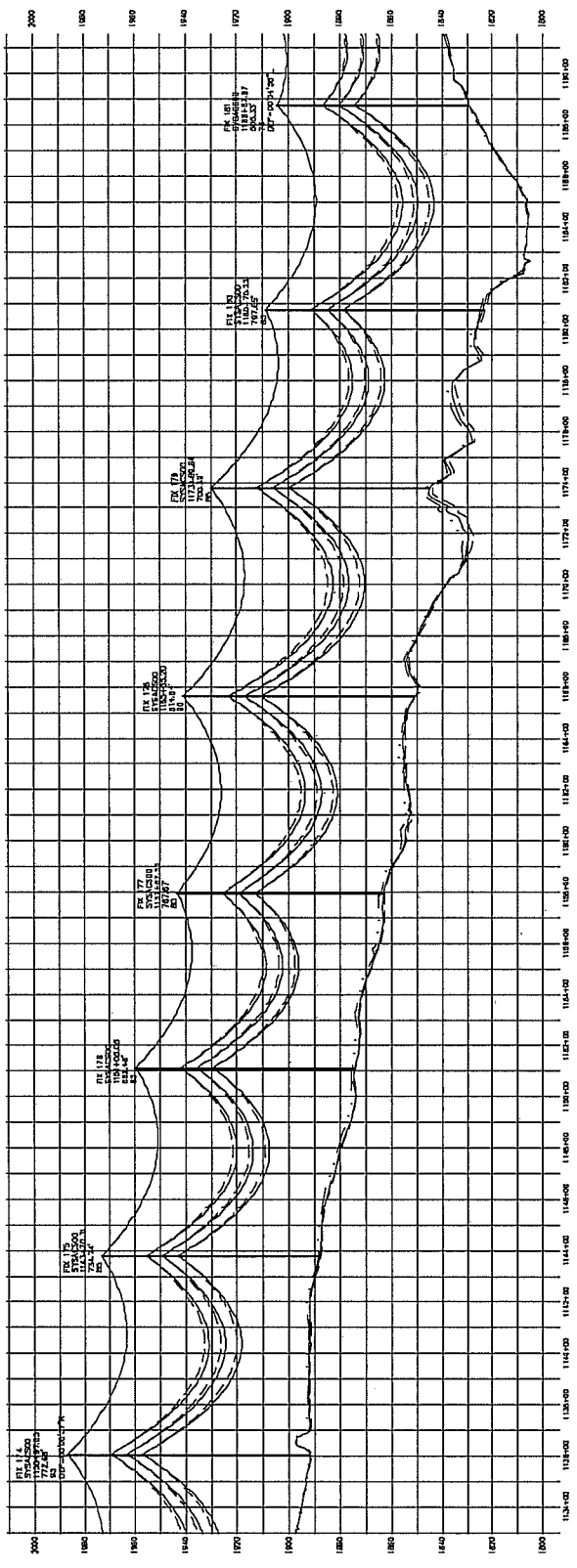


Vertical Curve  
 1:1  
 1318-2-23

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| PROJECT: RAILROAD | DATE: 10/29/08 | SCALE: 1" = 40' |
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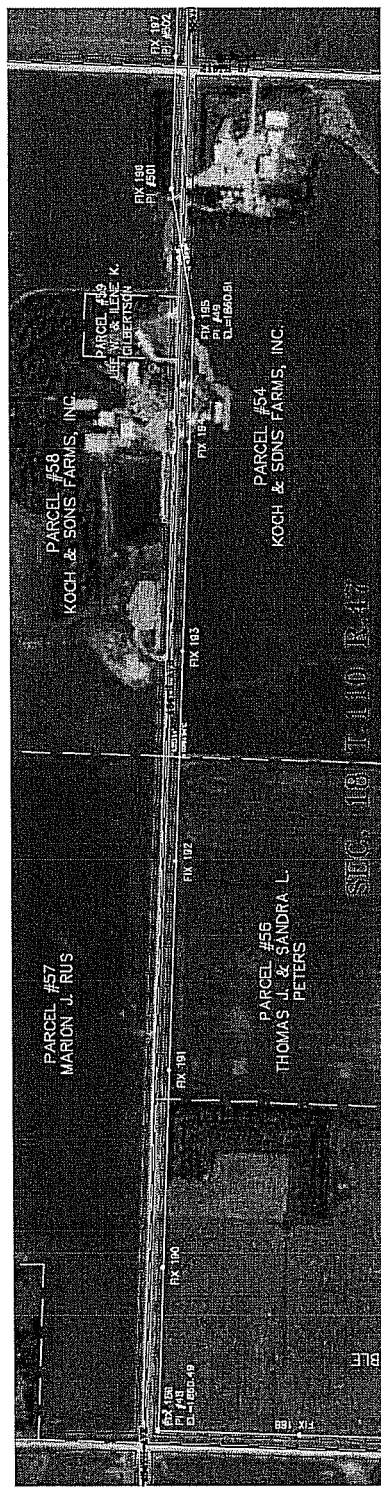


Central, Inc.  
 Station Engineer  
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 1319-2-23

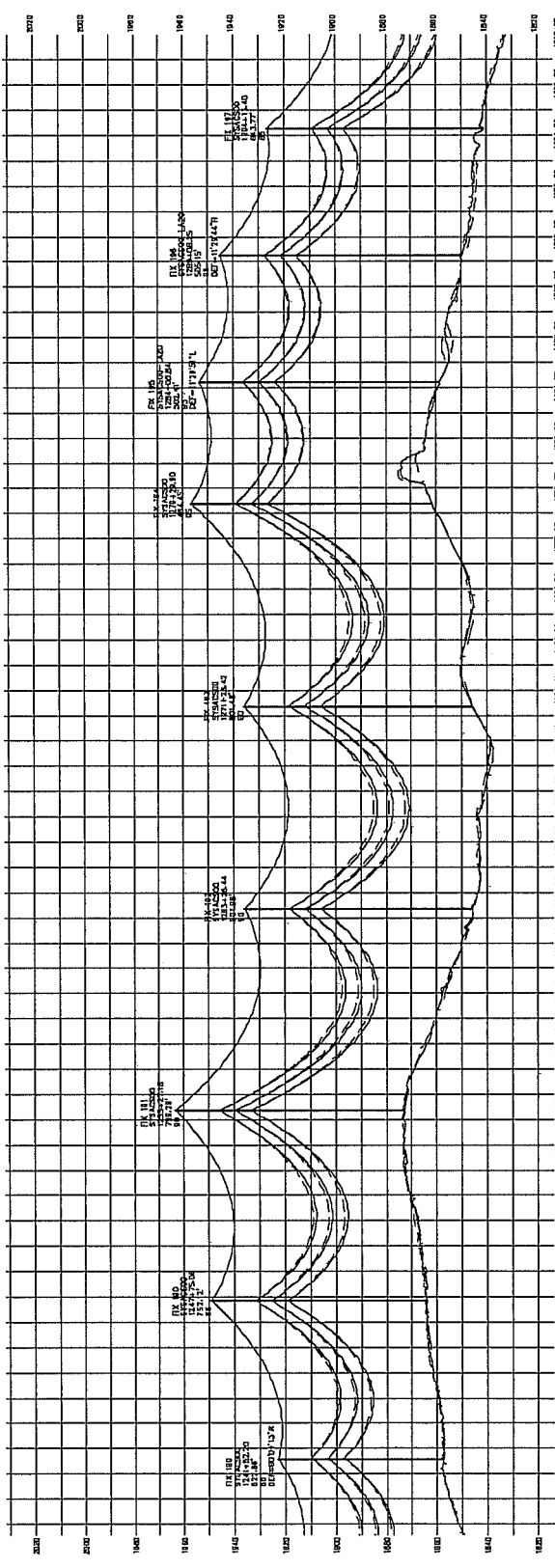


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| DESIGNER     | ADRIAN M. DE LUCA |
| CHECKED      | ANDREW J. WYSE    |
| APPROVED     | ANDREW J. WYSE    |
| DATE         | 12/11/08          |
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| GPS          | NO                |
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| COUNTY       | ELKHART           |
| TOWN         | LIBERTY           |
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| APPROVED    | ANDREW J. WYSE    |
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| COUNTY      | ELKHART           |
| TOWN        | LIBERTY           |
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| HEIGHT      | NO                |



UTM MAP USE ONLY - MUNICIPALITY ZONE SAFETY - SOUTH DIRECT



Contract No. 1310-2-23  
 Project Name: Koch Energy  
 Date: 12/11/08  
 Scale: As Shown  
 Designer: Adrian M. De Luca  
 Checked: Andrew J. Wyse  
 Approved: Andrew J. Wyse

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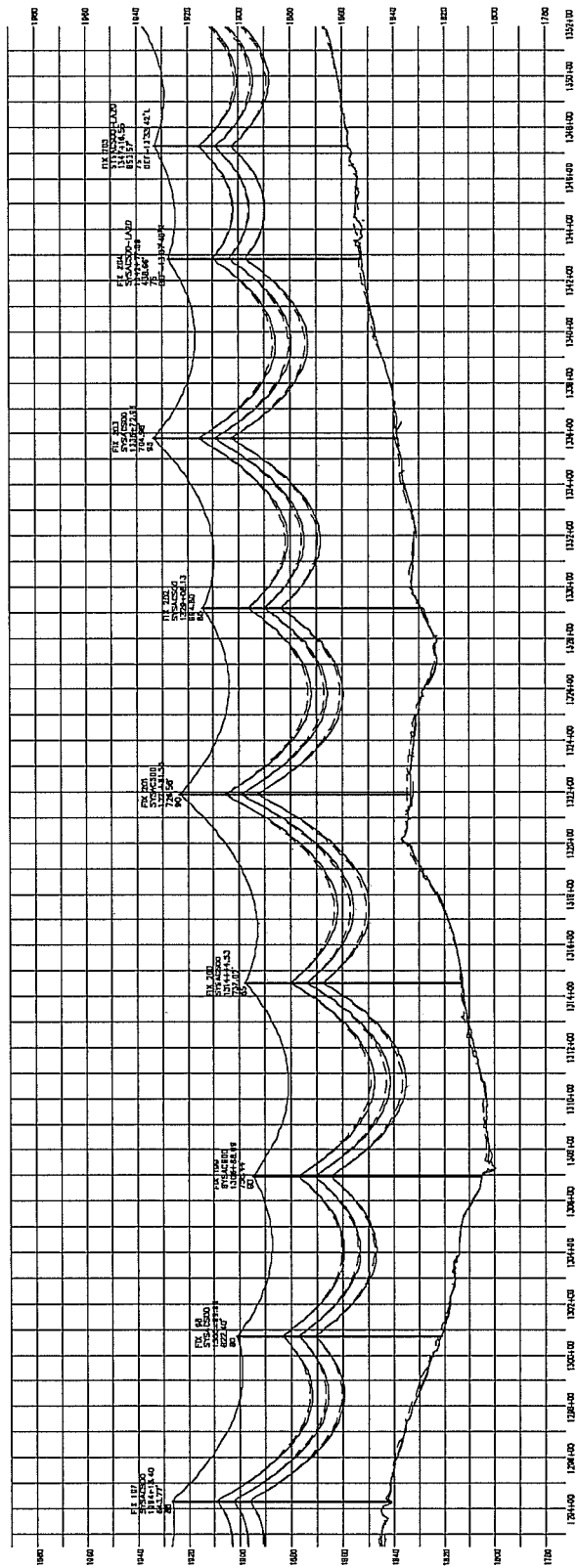
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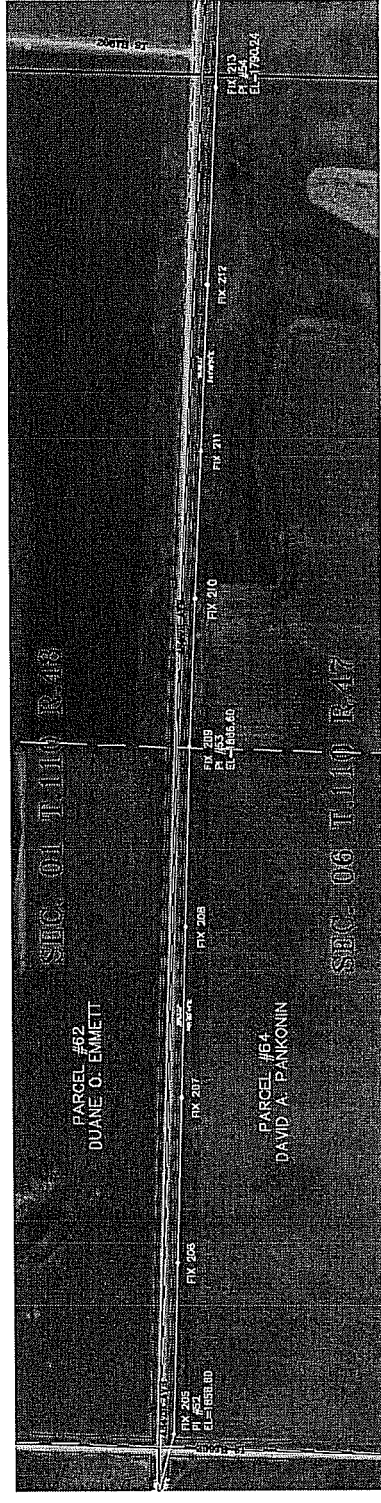
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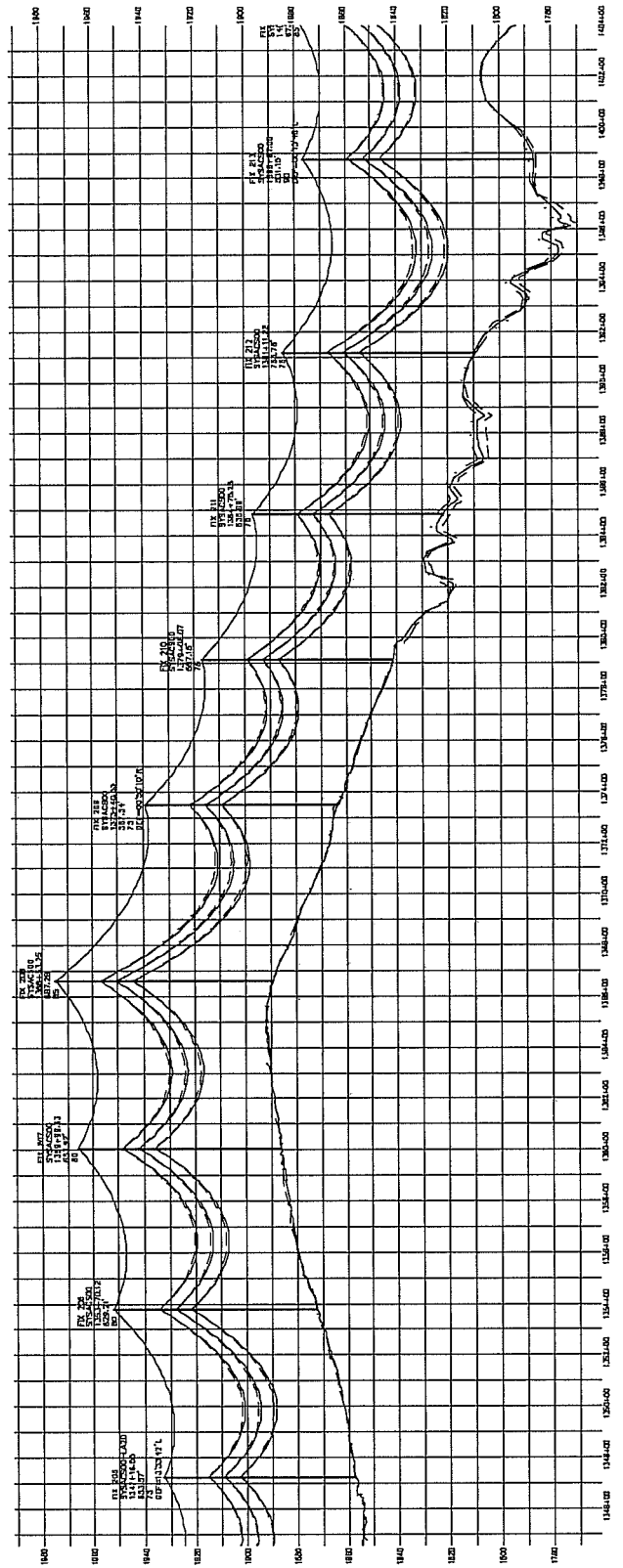
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USDA, NIP, BELL MOUNTAIN, MANISTIQUE, VALLEY, SOUTH DAKOTA



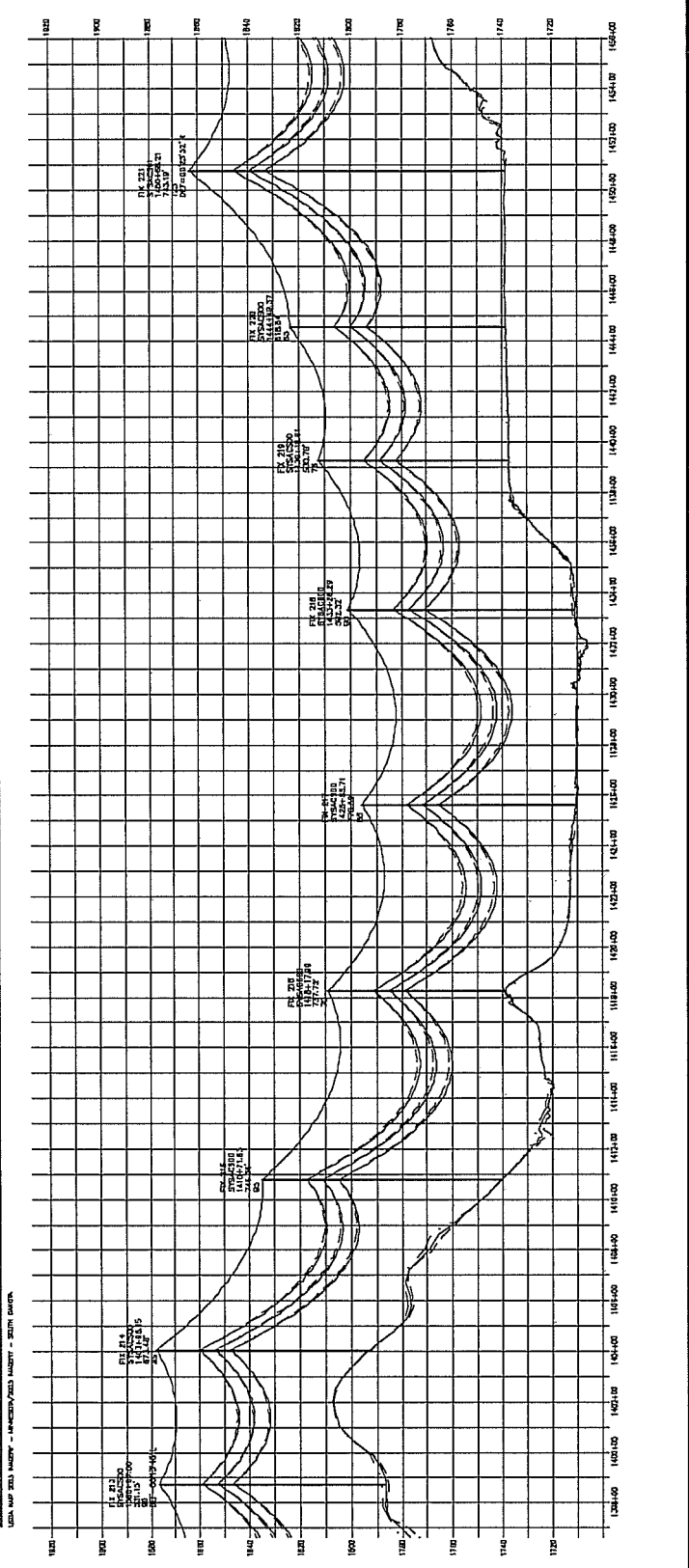
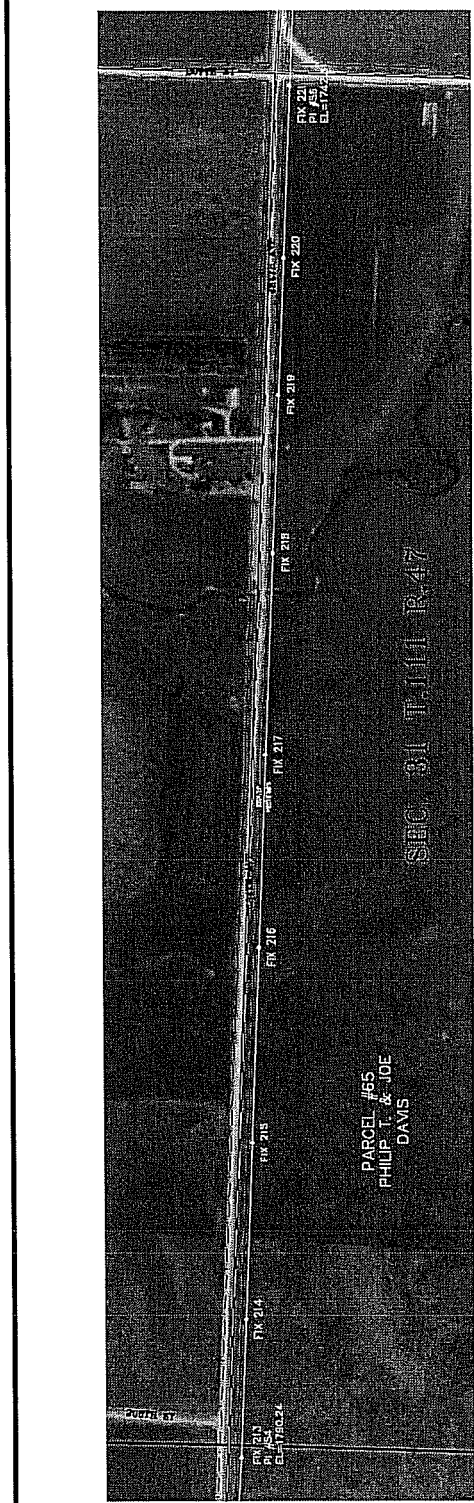
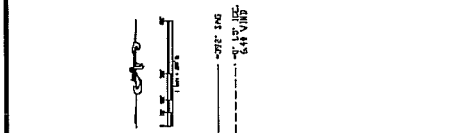
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| BY          | CHECKED      |
| APP'D       | DATE         |

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|---------|--------------|
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| CLIENT  | DATE         |
| SCALE   | BY           |
| CHECKED | DATE         |

**Keel Energy**  
 Geotechnical Engineering  
 1318 - 228  
 1111 10th St NW  
 Silver Spring, MD 20910  
 Tel: 301-441-4444  
 Fax: 301-441-4444



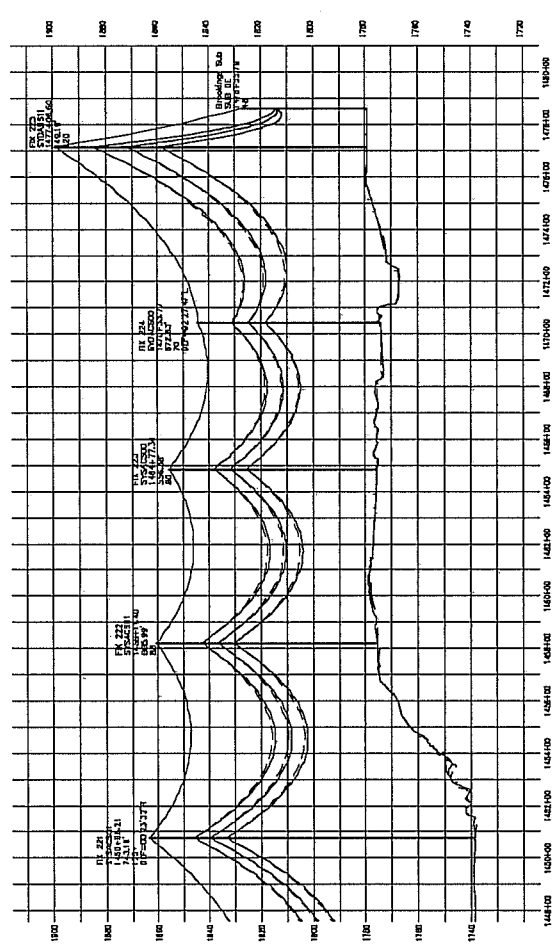
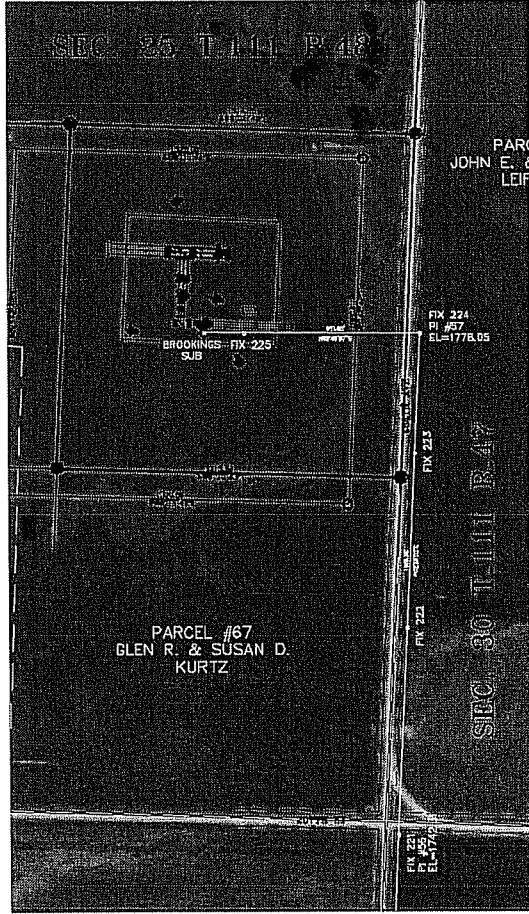


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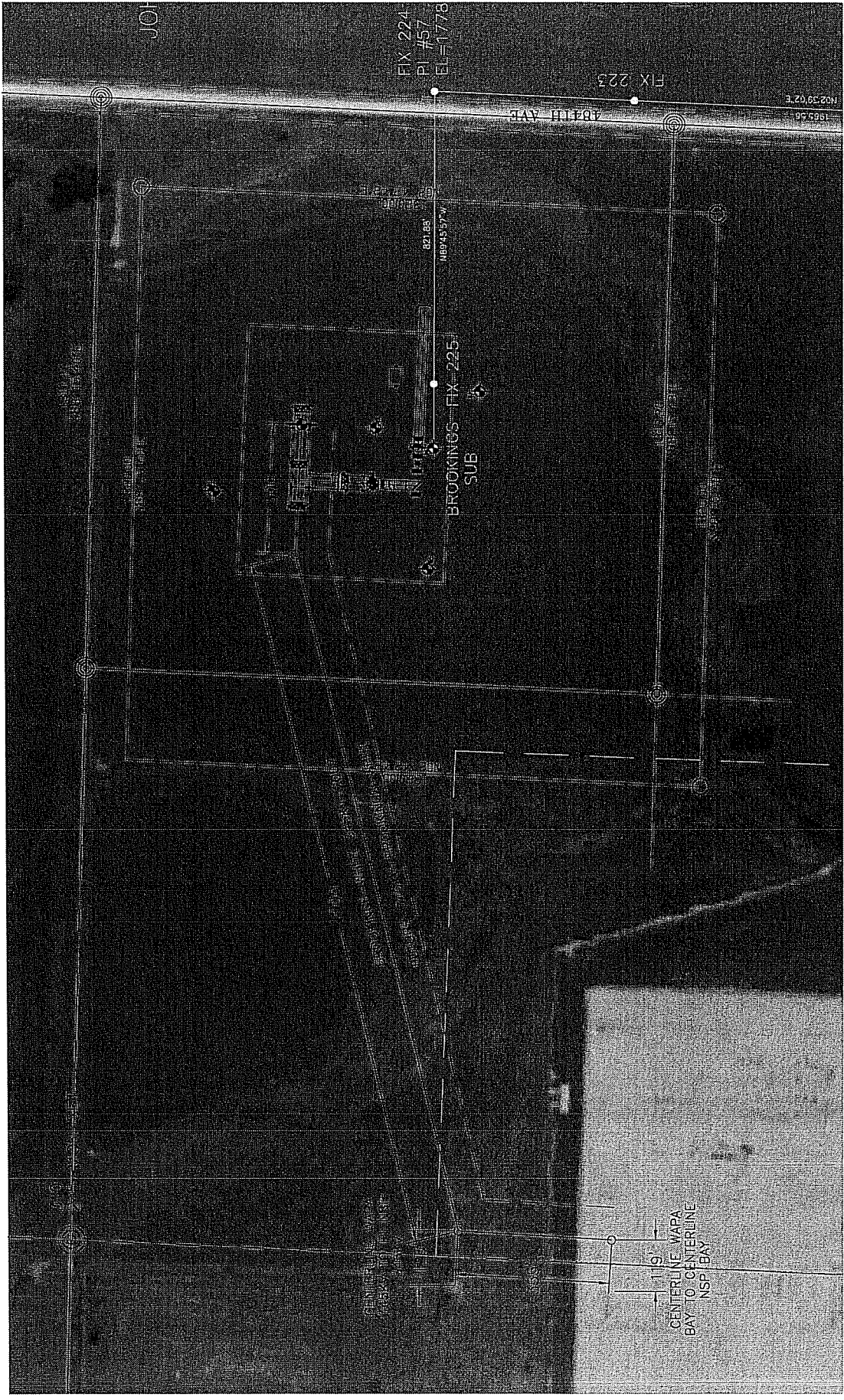
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| CHECKED BY  | W. J. BROWN                             |
| APPROVED BY | W. J. BROWN                             |
| DATE        | 06/29/08                                |

|             |   |
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| SHEET NO.   | 24 OF 23                                |
| DATE        | 06/29/08                                |
| PROJECT NO. | 103 T.M.F. BUTTALO-ROODMAN'S YANKEE SUB |
| DESCRIPTION | 103 T.M.F. BUTTALO-ROODMAN'S YANKEE SUB |

**West Energy**  
 Electrical Engineering  
 1000 West 10th Street  
 Suite 100  
 Lincoln, NE 68502  
 Phone: 402-478-1111  
 Fax: 402-478-1112  
 Email: info@westenergy.com

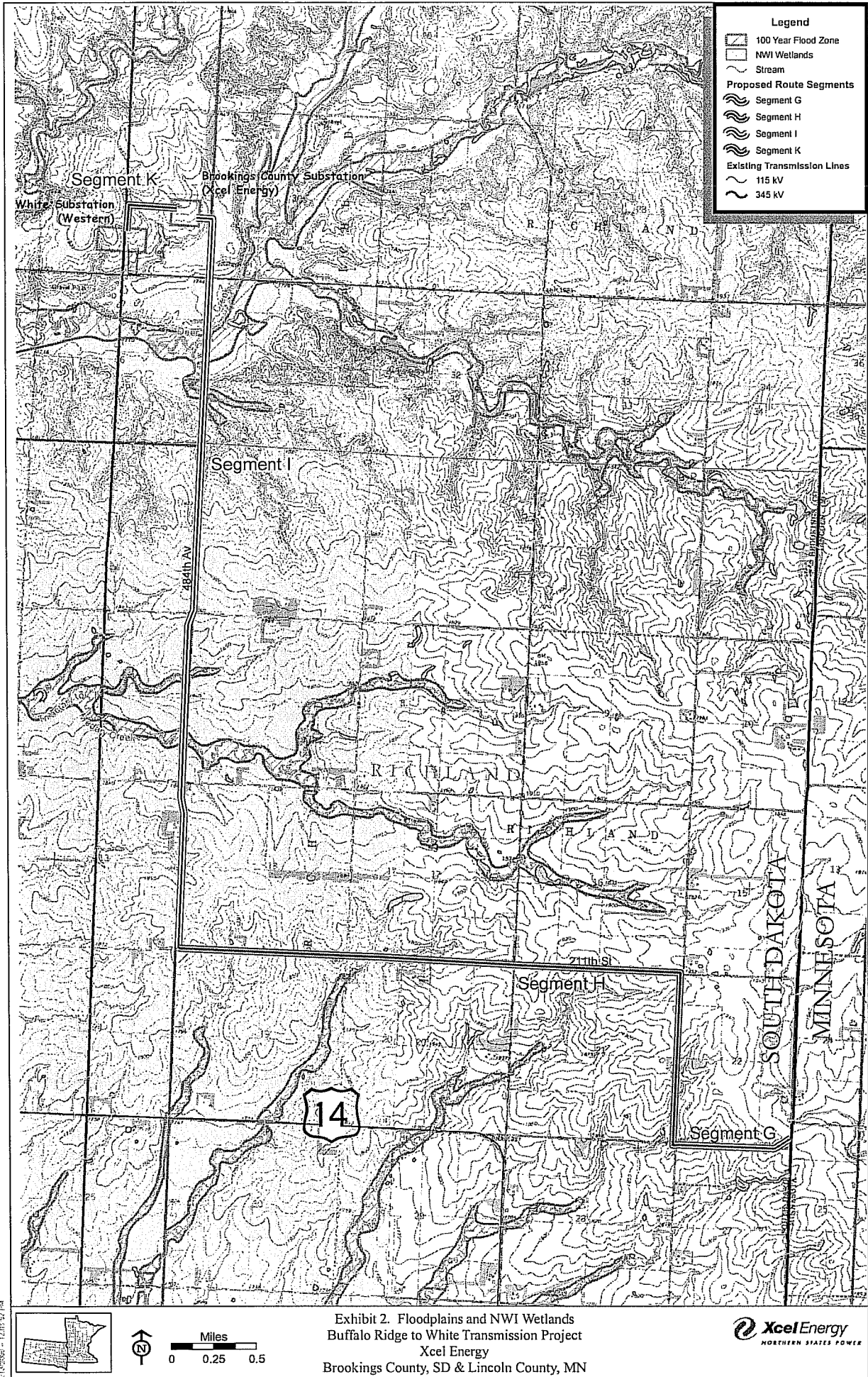


SECTION 25 T.141N R.41E  
 SECTION 30 T.141N R.41E  
 PARCEL #67  
 GLEN R. & SUSAN D. KURTZ  
 BROOKINGS-FIX-225 SUB  
 FIX 224  
 PI #57  
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 FIX 221  
 EL=1778.85  
 FIX 222  
 EL=1778.85  
 FIX 223  
 EL=1778.85  
 FIX 224  
 PI #57  
 EL=1778.85  
 DRAINAGE DITCH  
 DRAINAGE DITCH



## Exhibit 2

# Hydrology Maps



Map Document: H:\Projects\1467714677\1467714677\1467714677\1467714677\1467714677.mxd  
 Date: 11/07/14



Exhibit 2. Floodplains and NWI Wetlands  
 Buffalo Ridge to White Transmission Project  
 Xcel Energy  
 Brookings County, SD & Lincoln County, MN



## Exhibit 3

# Project Schedule

Xcel Energy  
Buffalo Ridge to White Transmission Line  
Brookings County Substation  
Schedule Roll-up

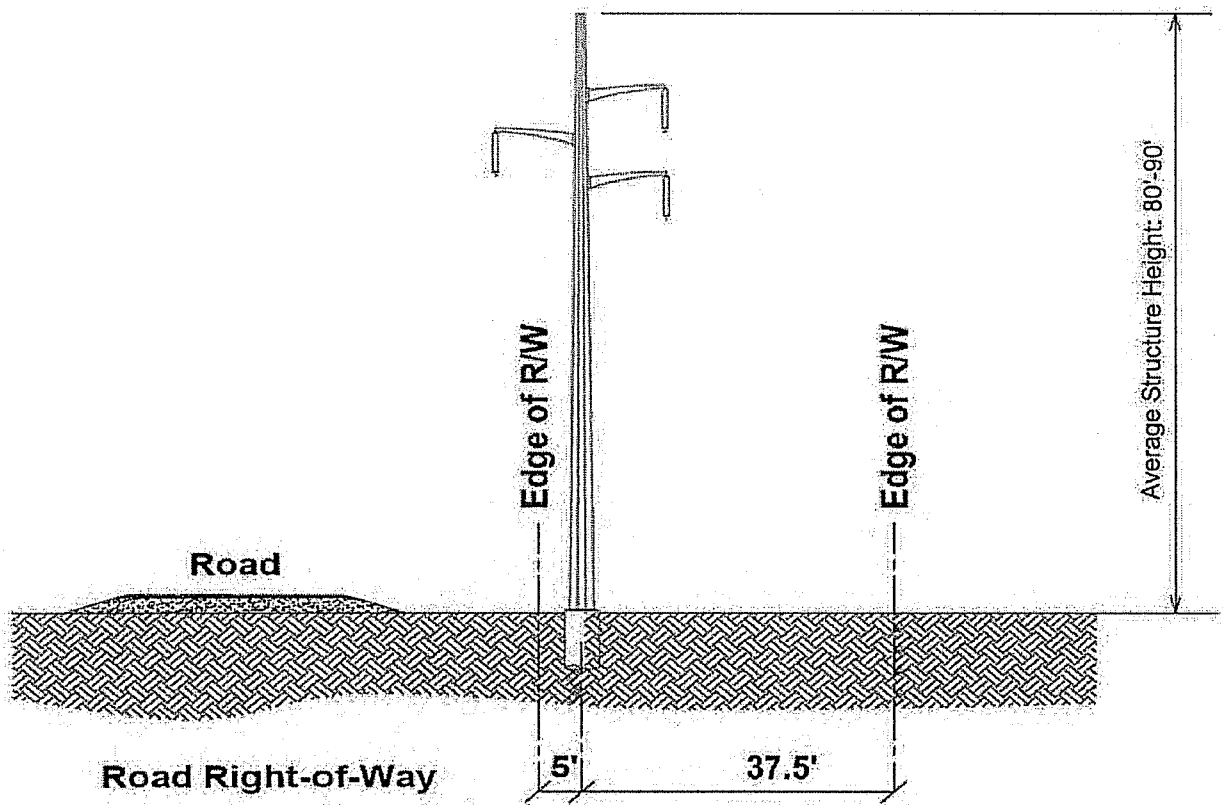
EXHIBIT 3

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| 1  |   |                    |                     |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 2  | <b>Buffalo Ridge to White Transmission Line -- MN and S</b> | <b>Mon 4/3/06</b>  | <b>Fri 5/30/08</b>  |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 3  | Engineering and Design                                      | Mon 4/3/06         | Thu 11/30/06        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 4  | Right of Way Acquisition                                    | Mon 7/10/06        | Thu 11/30/06        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 5  | Foundation Construction                                     | Mon 10/23/06       | Fri 12/29/06        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 6  | Material Procurement  | Mon 7/17/06        | Fri 3/2/07          |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 7  | Line Construction   | Mon 12/4/06        | Fri 11/30/07        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 8  | Final Right of Way Restoration (if necessary)               | Tue 4/1/08         | Fri 5/30/08         |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 9  |   |                    |                     |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 10 |   |                    |                     |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 11 | <b>Brookings County Substation</b>                          | <b>Mon 9/18/06</b> | <b>Fri 12/14/07</b> |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 12 | Grading and Site Prep                                       | Mon 9/18/06        | Fri 11/10/06        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 13 | Foundations   | Mon 11/13/06       | Fri 12/29/06        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 14 | Electrical Construction                                     | Thu 3/29/07        | Wed 9/26/07         |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |
| 15 | Final Testing and Checkout                                  | Mon 12/3/07        | Fri 12/14/07        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |   |   |   |   |   |

|   |          |  |                 |  |                    |  |
|---|----------|--|-----------------|--|--------------------|--|
| Project: roll up schedule SD PUC 2006<br>Date: Fri 9/1/06 | Task     |  | Milestone       |  | External Tasks     |  |
|   | Split    |  | Summary         |  | External Milestone |  |
|   | Progress |  | Project Summary |  | Deadline           |  |

## Exhibit 4

# Transmission Pole Figures



**115 kV Line  
Typical Span 500'  
42.5' Typical Right of Way  
(Parallel to Road)**



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SINGLE CIRCUIT 345 KV STRUCTURE

