ITC Midwest LLC • 444 Cedar Street, Suite 1020 • St. Paul, MN 55101

December 6, 2013

Raymond Kirsch
Minnesota Department of Commerce
Suite 500
85 Seventh Place East
St. Paul, MN 55101

**Re: In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minnesota – Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties**
**MPUC Docket No. ET6675/TL-12-1337**

Dear Mr. Kirsch:

I write in response to your November 1, 7, and 25, 2013 emails requesting additional information from ITC Midwest LLC ("ITCM") for the Environmental Impact Statement for the Minnesota-Iowa 345 kV Project. Each question, numbered 1-12, is listed below along with ITCM's response.

**Question:**

1. **Costs of alternatives.** We will need additional information on costs of alternatives. I would like to have costs based on specific project alternatives in total, e.g,. the cost of Huntley substation options 1-4, the costs of crossing Fox Lake; as well as costs per mile. Thus, costs per mile for:

   a. Constructing the 345 kV line where there is already a 161 kV line (Route A); where there is not a 345 kV line (part of Route A and most of Route B). Some of this is in the Route Permit Application (RPA), Section 2.6.

   b. Constructing I-90-R where the existing 161 kV line is already in place.

   c. We will also need costs per mile for 161 kV lines and 161/69 lines built to 161 kV standards.

**Response:**

ITCM has evaluated the alternatives, particularly the line configuration options, and developed per mile cost estimates for your use. These per mile costs are provided in Table 1 below and include only the transmission line facilities. Table 1 costs also include real estate acquisition and

surveying estimates. They do not include costs related to property acquisition, materials, and construction for substations.

Also not included in the per mile estimates are overall project management and development costs which are estimated at $5.4 million ($2011).

Overall project management and development costs include routing, design and surveying, regulatory costs, and environmental studies. These costs apply to any overall route, including associated transmission lines, and would need to be added after calculating the total miles of the alternative multiplied by the applicable per mile costs for each line configuration length within the route.

Adding 345 kV crossings to either Fox Lake or Lake Charlotte is estimated in the magnitude of $2.4 million per crossing.

The Lakefield Junction Substation costs are estimated at $6 million ($2011). The Huntley Substation costs are estimated at $33 million for either the proposed location or the south location by I-90, and includes the estimated cost to remove the Winnebago Junction Substation infrastructure.

**Table 1: Per Mile Cost for Transmission Line Construction**

| Design Configuration | Cost/Mile (Millions, $2011) |
|---|---|
| 345 kV/161 kV (Route A), where co-located with existing 161 kV line | $2.4 (includes removal costs for wood or concrete poles) |
| 345 kV/161 kV (future) (Route A & B), where Project will not be co-located with existing 161 kV[1] line | $2.1 |
| I-90-R where 161 kV is in place (and would be co-located with 345 kV line) | $2.5 (includes removal costs for steel on concrete foundations) |
| 345 kV/161 kV Double Circuit at Fox Lake | $3.1 ((includes removal costs for steel on concrete foundations |

[1] The request states 345 kV, but it appears to be in error.

| Design Configuration | Cost/Mile (Millions, $2011) |
|---|---|
| 345 kV with 69 kV Underbuild and designed for future 161 kV | $2.4 (includes removal costs for wood poles) |
| 161 kV single circuit | $1.0 |
| 161 kV/161 kV (operate at 69 kV) | $1.2 |

**Question:**

2. **Lake Crossings.** I'd like to have discussion / drawings / figures / schematics / cross sections on how Fox Lake and Lake Charlotte might be crossed - e.g., paralleling the existing 161 line; double circuiting**.** What kind of 'flat profile' can be designed to minimize avian impacts? What is the clearance over the lake? (wasn't this clearance recently raised to meet new standards?)

**Response:**

ITCM is developing structure designs for the lake crossings and will include vertical and horizontal (flat) profile design options**.** The structures are specialty structures due to the spans necessary to accommodate the long water body crossings.

The current clearance for the 161 kV line at the Fox Lake crossings are 40.9 feet and 41.4 feet and is 42.6 feet at Lake Charlotte. The clearance requirements for minimum conductor height at the lakes would be different than those identified in the Route Permit Application for 345 kV over ground (minimum 35 feet between ground and the lowest point of the conductor for 345 kV conductor and 25 feet for 161 kV conductor). Over Fox Lake, the minimum clearance to the 345 kV conductor would be 38.8 feet and to the 161 kV conductor would be 35.1 feet. Over Lake Charlotte, the minimum clearance to the 345 kV conductor would be 32.8 feet and to the 161 kV conductor would be 29.1 feet. We are currently anticipating that our specialty structure drawings will be available by December 13, 2013. We will submit them to EERA when they are available.

We will provide photographic comparisons of what the lake crossings may look for both vertical and horizontal (flat) structure configurations. To provide you an opportunity to review a sample simulation before we complete the other simulations you have requested, we will provide the Fox Lake crossing simulations to you by December 13, 2013. Depending on whether you

have any additional revisions you need to the simulation, we anticipate that we will be able to get you the Lake Charlotte crossing by December 20, 2013.

**Question:**

3. **Electrical System Reliability.** I'd like to have discussion of reliability relative to the alternatives, particularly the Huntley substation options**.** What are the standards involved? NERC standards? What do these say? Do all of the alternatives meet these standards? - from our early conversations the answer seems to be yes**.** If so, what reliability concerns does ITCM perceive outside these standards? What do these concerns mean? More costs? Less reliable power? More difficult to maintain and operate?

**Response:**

The proposed Huntley Substation and transmission line configurations necessary to support the alternatives along I-90 create certain common tower contingencies that must be evaluated as a Category C (system performance following loss of two or more bulk electric system elements). ITCM notes that for the proposed south Huntley Substation location, there will be several ROWs to accommodate the 161 kV and 69 kV connections with the Winnebago Substation. Because the ROWs are proposed to be separate, NERC Category D (transmission lines on a common ROW) does not apply. To avoid Category D, however, these rights-of-way must be separate and distinct and not overlapping.

To avoid NERC Category D for the proposed south Huntley Substation location with I-90-R, the 161 kV and 69 kV associated facilities would have to be constructed on parallel rights-of-way, totaling 450 feet in width for the entire length from 170$^{th}$ Street south to the proposed substation site. A 300-foot right-of-way would be required from the Winnebago Junction Substation south to 170$^{th}$ Street. To avoid Category D for the proposed north Huntley Substation location with I-90-R, the 345 kV facilities would have to be constructed on parallel rights-of-way, totaling 400 feet in width for nearly four miles from I-90 to the substation location.

The electrical system must be designed to meet customer needs and firm transmission service in the event of a Category C contingency**.** ITCM evaluated the two 69/161 kV lines that would be required to support the Huntley Substation alternative site for I-90-R as well as the double-circuit 345 kV option for the I-90-R alternative with the proposed Huntley Substation site and determined that the Category C requirements would be met without degrading the performance of the Project**.**

The I-90-R alternatives nevertheless present reliability concerns because of the resulting concentration of transmission facilities in a common corridor**.** When facilities are located in close proximity, there is a greater risk that a single event, e.g. storm, can take out multiple lines**.** In such case, customers connected to the 20-mile long Winnebago-Garden City 69 kV Line north of

the Winnebago Substation could lose power. To enhance overall system reliability, ITCM disfavors constructing so many lines in parallel rights-of-way for five miles of length. Therefore, the options for I-90-R that provide greater separation are preferred**.** Although not a NERC requirement, ITCM believes it is particularly desirable to separate circuits to the extent possible in this area given the landscape, the overall system support, typical weather conditions and the significant impacts of an outage.

**Question:**

4. **Agricultural Impact Mitigation Plan (AIMP).** Has ITCM worked on an AIMP with the Minnesota Department of Agriculture? I would like to have something like Appendix E of the Hampton-Rochester-La Crosse EIS in this EIS.

**Response:**

The final Minnesota Department of Agriculture ("MDA") approved AIMP for the Hampton-Rochester-La Crosse Project was submitted as part of the Route Permit application and, as you noted, included in the EIS for that project. ITCM is working cooperatively with the MDA to develop an AIMP, but has not been finalized. ITCM will provide a copy of the AIMP once approved by the MDA, but approval is not expected until the time testimony is submitted. This timing is similar to the Brookings-Hampton Project.

**Question:**

5. **Structure Removal / Decommissioning.** In the discussion of the Huntley Substation, the RPA notes that some sections of 161 kV line, in the reconfiguration, will be "abandoned." What does this mean? Will the structures be removed? Foundations? Reclamation? Similarly, what if the 161 kV line were removed from Fox Lake? What would happen to the line north of the lake that is no longer needed? Would it be removed? Abandoned? What does this mean?

Related, what are ITCM's plans, if any, for decommissioning the line? What would happen if the line were no longer needed? Who would / how would the structures and foundations be removed? I realize this may be a very low probability event… but it is a topic raised directly at the scoping meetings. It's not clear to me what happens, generally, to concrete that is "left" in the ground by any infrastructure project.

**Response:**

Existing facilities that will be retired from service will be removed**.** For transmission line structures that do not have footings, ITCM will extract the pole from the ground if possible. In the event a pole cannot be extracted by pulling, ITCM will excavate an area to uncover approximately 60 percent of the buried pole and an attempt will be made to extricate an excavated pole entirely. If an excavated pole cannot be removed in its entirety, the pole will

either be cut off at the excavated depth (in the range of approximately five feet) or pushed over if the pole cannot be cut.

If an existing transmission structure to be removed for purposes of the Project has a concrete footing, ITCM's standard practice will be to excavate to five feet below grade, remove the concrete and cut off any exposed reinforcing steel and anchor bolts. ITCM will take extra measures as necessary to ensure that farming operations can continue on tillable land.

If ITCM removes an existing pole, all support anchors for the structure will be removed. In these instances, ITC Midwest will work with the landowners to identify any tile lines located near anchors prior to removal of the anchors.

This request also requests information about the 161 kV Fox Lake-Rutland line north of Fox Lake**.** If this line were removed from Fox Lake, the portion south of the lake to the Fox Lake Substation would need to be rerouted**.** The existing line segments would be removed in accordance with the steps outlined above. Although not requested, if the line were required to be removed from Lake Charlotte, the removal would be in accordance with the steps outlined above.

**Question:**

6. **Substation Area.** For the Huntley substation, the RPA says that the fenced area will be approximately 9 acres**.** And that ITCM has purchased 40 acres to site the substation**.** How much land does the substation need total? That is, fenced area and non-fenced area? Access roads, drainage, grading and all**.** Assume that ITCM is not buying a large parcel of land, but buying or getting an easement for only that land needed for the substation**.**

Related, can the area for an alternative southern Huntley substation site be better defined? Smaller?

**Response:**

The minimum size necessary for the Huntley Substation is 32 acres to accommodate the fenced area, setback, line clearances, grading and ponding requirements**.** The initial proposed fenced area was 9 acres, but since the Route Permit was filed, ITCM identified a need for reactors at the substation, which requires an additional 3 acres, for a total of 12 acres, fenced and a rectangular configuration. ITCM anticipates the fenced-in area of the substation to be approximately 650 feet x 800 feet (12 acres). A 200-foot buffer along the front and either side will allow for setbacks and line clearances. A 250-foot buffer along the rear property line will allow for retention, line clearances, and rear setback requirements**.** With these buffers, the overall property dimensions are 1,050 feet x 1,350 feet, or 32 acres.

The proposed south Huntley Substation site was identified in response to the scoping route alternative I-90-R**.** ITCM's practice and preference is to voluntarily acquire the land necessary for substation sites**.** At this time, based on analyses to date and pending specific site investigation, the substation could be located in multiple locations within Section 2, T102N R28W**.** ITCM requests that the alternative siting location remain unchanged to allow for flexibility in identifying a willing seller should the I-90-R alternative be selected for the Project.

**Question:**

7. **EMF.** I commented on the draft RPA regarding EMF tables**.** Those comments apply here**.**

   a. I would like to have calculated EMF levels for 2017 and 2042 (25 years from initial operation; approximately the ½ life of the transmission line) - at projected median current levels and peak current levels - with "peak" defined statistically, e.g., 80th percentile**.** If the distribution of current levels is approximately normal such that the average = median, then I'd like that discussed**.** And if you can discuss the distribution further - normal with a mean and average - then we may not need "peak" values, as they would flow from the distribution.

   b. I'd like discussion of the assumptions regarding the 2017 and 2042 EMF numbers**.** There is some discussion of this in Chapter 4 of the CN application**.** What does the energy/transmission landscape look like in 2042… such that the current levels are anticipated to be X? I'd like the assumptions to be discussed so that we can make sure that the EMF levels are conservative projections.

   c. By way of comparison to other 345 kV lines and recent EISs… in the draft EIS for the Hampton - Rochester - La Crosse project, amperages and EMF levels are reported for 2015 and 2025 and for a "highest anticipated loading at some point in the future." These amperages are in the range of 200 - 800 amps**.** In the final EIS for the Fargo to St. Could project, EMF levels were presented for amperage levels of 1,000 and 2,500 amps**.**

**Response:**

Magnetic field levels are dependent on structure geometry and load flows on the transmission line. To develop magnetic field calculations for the Project, ITCM used loading assumptions contained in the 2012 Midwest Reliability Organization Series Model for years 2017 and 2023. These models contain anticipated load information from all load-serving entities in the MISO footprint. Loading information for the year 2042 is not available. The 2023 model is currently the farthest out-year model available. ITCM included this information in Tables 8 and 9 in the Route Permit Application.

Each transmission line structure design will experience different magnetic field levels. Levels also typically further vary between substations due to changes in loading which is affected by generation dispatch, contingencies and customer demand. The level of magnetic fields is also variable throughout the line due to variability in loading levels that change throughout the day and hour.

In the Hampton-Rochester-La Crosse and Fargo-St. Cloud 345 kV Projects that are referenced in the request, certain future loading assumptions were made regarding the specific system topology and loading levels that resulted in the amperages identified in the question. Based on ITCM's analysis, amperages set forth in Tables 8 and 9 of the Route Permit Application are reasonable estimates of the peak and average (2/3 of peak) for the years 2013 and 2023 for the designs shown in the application. ITCM will be proposing changes to some structure designs that will change the distances between the arms and the insulator length. ITCM is preparing magnetic field calculations for these new designs and for the I-90-R alternative. ITCM will submit them to EERA as soon as they are available. These calculations should be completed for your review by the end of December 2013.

Proponents of transmission projects are sometimes asked to calculate magnetic fields based on the capacity of a line**.** Such calculations are unrepresentative of the typical operating characteristics of a line**.** High voltage transmission lines are designed with a capacity that provides the ability to support unusual loads that might be experienced due to emergency or contingency situations for only very brief periods of time. Should EERA desire magnetic field calculations for specific amperages for any of the structure types, ITCM will prepare the tables upon EERA's request.

**Question:**

8. **Cross Sections.** I would like to have figures / schematics of select cross sections for routes**.** At this time, these include the lake crossings (noted above) and:

a. The lines coming into the Huntley substation from the north, i.e., what does the view northward from the proposed Huntley substation look like - structures, voltages, ROW width, route width?

b. What does the view look like for Huntley substation option #2 --- looking northward from the proposed alternative southern site for the Huntley substation?

**Response:**

The requested cross sections will be provided when completed. As previously stated, we intend to provide a sample cross section/simulation for your review by December 13, 2013.

Based on your feedback, we anticipate that we will be able to provide the other simulations by December 20, 2013.

**Question:**

9. **Existing H-frames.** What is the distance between the H-frame poles of a single structure on the existing 161 kV line? What is the span between structures, on average? I'm trying to evaluate the difference – e.g., to farmers working fields – between the existing H-frames and the proposed monopole structures**.** Some folks noted that this change would be welcome, as monopoles would "take up less room" than H-frames. I'm trying to get a handle on what this "less room" might be.

**Response:**

On the existing Fox Lake-Lakefield Junction 161 kV line, the distance between the center of the poles is 15.5 feet**.** The typical span length between structures is 600 to 700 feet.

**Question:**

10. **Damage Compensation.** Related to the Ag Mitigation Plan, a Mr. Ahrenstorff submitted a comment during scoping about his dealings with ITCM. He included in his comment a "policy statement concerning settlement of damage claims" (see attached). By way of describing ag impacts and mitigation, is this ITCM's proposed policy for the Minnesota to Iowa project? That is, do you envision this policy, or something very much like it, being in effect for the project? Is this a policy that we could include in the EIS, e.g., as an appendix, so that folks understand how mitigation (at least one mitigation strategy) would work?

**Response:**

ITCM applies a common damages policy for projects to ensure predictable and comparable treatment for all landowners. ITCM will provide a damages policy to landowners when acquiring rights-of-way for the Project. The policy is under review and is expected to be finalized after the Route Permit is issued.

**Question:**

11. **CN Alternatives.** In Section 6.2.3 of the CN application, it discusses three transmission alternatives with different endpoints. Could you provide maps of these alternatives? And, if you have it, any analysis or evaluation of these alternatives, other than electrical analysis. I realize that you were not routing these alternatives, but rather looking at them from a big-picture-electrical perspective; however, if routing ideas were discussed, these would be helpful.

(11) A**.** Would the 161 rebuild alternative (discussed in Section 5 and Section 6.2.1 of the CN application) eliminate the Special Protection Systems that are currently in place? Yes? No? Maybe?

(11) B**.** Is there a MISO study comparing MVP #3 to the 161 kV rebuild**.** It appears that there is solely an ITC study (Appendix J of the CN application).

**Response:**

As noted in my December 4, 2013 email to you, no route analysis was undertaken for any of the alternatives described in Section 6.2.3**.** A conceptual map attached to the email showed the Spencer-Hazelton and Lakefield Junction – Mitchell County 345 kV lines, the Lakefield Junction – Rutland 345 kV line and the Lakefield Junction – Adams 345 kV line, as they have been represented in past studies.

11(A): No studies have been conducted to determine whether the 161 kV rebuild alternative could eliminate the Special Protection Schemes currently in place.

11(B): No, to the best of ITCM's knowledge, MISO has not performed such a study.

**Question:**

12. **Bird Diverters.** From the DNR comment letter during scoping – "Please include a discussion in the EIS of the criteria the project developer proposes for choosing bird diverter locations."

Could you please send me your thoughts on bird diverter locations? Have you developed or do you have criteria for this project? For ITC's projects in general?

**Response:**

Based on early coordination efforts between ITCM, USFWS and the Minnesota Department of Natural Resources ("MDNR"), ITCM intends to mark the transmission line shield wires in several areas. We intend to install bird diverters at the Des Moines and Blue Earth river crossings, through the wildlife refuge, south of Lake Charlotte, over the Pilot Grove Lake WPA (including 500 feet outside the boundary based on the earlier feedback we got from USFWS), and across other open water crossings**.** We will continue to consult with agencies to identify any wildlife migration pathways, particularly those of waterfowl, crossed by the final route and to identify areas where the line should be marked to avoid avian interactions**.** ITCM will likely use a device similar to that shown in **Figure 1** for marking the shield wires for the Project as identified above or through coordination meetings with the MnDNR and USFWS.

**Figure 1. Bird Flight Diverter Example**

**<u>Conclusion</u>**

Thank you for your questions and for providing us time to gather the requested information. We will provide the additional information identified in our individual responses as we have it gathered and will send it to your attention.

Sincerely,

David B. Grover

David B. Grover

ITC Midwest LLC • 444 Cedar Street, Suite 1020 • St. Paul, MN 55101

December 13, 2013

Raymond Kirsch
Minnesota Department of Commerce
Suite 500
85 Seventh Place East
St. Paul, MN 55101

**Re: In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minnesota – Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties**
**MPUC Docket No. ET6675/TL-12-1337**
**EIS Development – Second Response**

Dear Mr. Kirsch:

I write to provide supplemental information to our First Response to your November 1, 7, and 25, 2013 emails requesting additional information from ITC Midwest LLC ("ITCM") for the Environmental Impact Statement for the Minnesota-Iowa 345 kV Project. Each question for which a supplement is provided, is listed below along with ITCM's response. I also write in follow up to your December 10, 2013 request for additional information.

**Question:**

2. **Lake Crossings.** I'd like to have discussion / drawings / figures / schematics / cross sections on how Fox Lake and Lake Charlotte might be crossed - e.g., paralleling the existing 161 line; double circuiting**.** What kind of 'flat profile' can be designed to minimize avian impacts? What is the clearance over the lake? (wasn't this clearance recently raised to meet new standards?)

**Response:**

Enclosed are drawings of the specialty structures for the lake crossings. **Attachment 2-1**. ITCM has continued to evaluate the two lake crossing alternatives included in the Scoping Decision. On initial review this fall, ITCM requested that the EIS analyze these crossings as both parallel configuration (existing 161 kV with a new 345 kV) and double-circuit configuration (345 kV/161 kV). The request to include parallel configuration was primarily because these crossings had been recently reconstructed at significant expense. Upon further review, ITCM has concluded that a parallel configuration at Fox Lake is not a reasonable alternative. To accommodate new 345 kV structures in the area of Fox Lake, the existing 161 kV structures would need to be removed both north and south of Fox Lake. Because removal of the 161 kV structures would be required even for a parallel construction, ITCM believes that a double-circuit

configuration is the appropriate configuration to include in the EIS for the Fox Lake Scoping Decision alternative (M4-R). In contrast, the conditions are different at Lake Charlotte where the existing 161 kV line can remain in place. Accordingly, for Lake Charlotte ITCM continues to request that both a parallel configuration and a double-circuit configuration be included in the EIS for that Scoping Decision alternative (M10-R). Please see the response to Question 8, below, regarding photo simulations of the lake crossing alternatives.

**Question:**

8. **Cross Sections.** I would like to have figures / schematics of select cross sections for routes**.** At this time, these include the lake crossings (noted above) and:

a. The lines coming into the Huntley substation from the north, i.e., what does the view northward from the proposed Huntley substation look like - structures, voltages, ROW width, route width?

b. What does the view look like for Huntley substation option #2 --- looking northward from the proposed alternative southern site for the Huntley substation?

**Response:**

As a follow up to our response on December 6, 2013, **Attachment 8-1** is a sample cross section/simulation for your review. This is the simulation of a double-circuit 345 kV/161 kV crossing at Fox Lake prepared for Scoping Decision alternative (M4-R). Please let us know if you have suggestions on display or dimension identifications that we should incorporate into the other simulations we are preparing in response to your request. Based on your feedback, we anticipate that we will be able to provide the other simulations by December 20, 2013.

**Question:**

12/10/13-1. I would like to have EMF calculations, as in the Hampton – Rochester – La Crosse EIS, for a "highest anticipated loading at some point in the future" (see attached). In the HRL EIS, the assumptions for this scenario included high line loading conditions, additions of generation, and an unplanned outage of a 345 kV line.

I do not know what the flows / amperages are for such a scenario on this project, but I would like you to construct such a scenario for a highest anticipated loading and estimate, to the best of your ability, the amperages and related EMF levels. The text describing the scenario and the uncertainties in making an estimate would be included in the EIS.

As possible, I would like these estimates, and the changes that you are making to your EMF tables based on new structure designs by December 30.

**Response:**

ITCM is constructing new scenarios to respond to this request and will attempt to get the requested text and updated tables to you by the end of December 2013. However, because additional system assumptions must be made to develop the model to determine the line loadings on which the calculations will be based, the complete response may not be available until early January 2014.

**Question:**

12/10/13-2. With respect to the AIMP, is it possible to get a draft of the AIMP that MDA is reviewing? Even a draft would aid our development of the EIS. Or, if it's possible to say that the draft is "very similar" to what was adopted for the CapX projects that would be helpful.

You note that MDA approval is not expected until the time testimony is submitted. What would this date be – that is, when is testimony submitted? In January 2014? In February 2014? Other?

**Response:**

The AIMP that ITCM is working on for the Project closely follows the format of the AIMP approved for the CapX projects. We intend to include a copy of our AIMP with our direct testimony, provided it has received approval from the Minnesota Department of Agriculture by the time it is due (January or February, depending on the Judge's revised prehearing order). If it is not approved at the time direct testimony is due to be filed, it will be included with rebuttal testimony or as soon as approved thereafter.

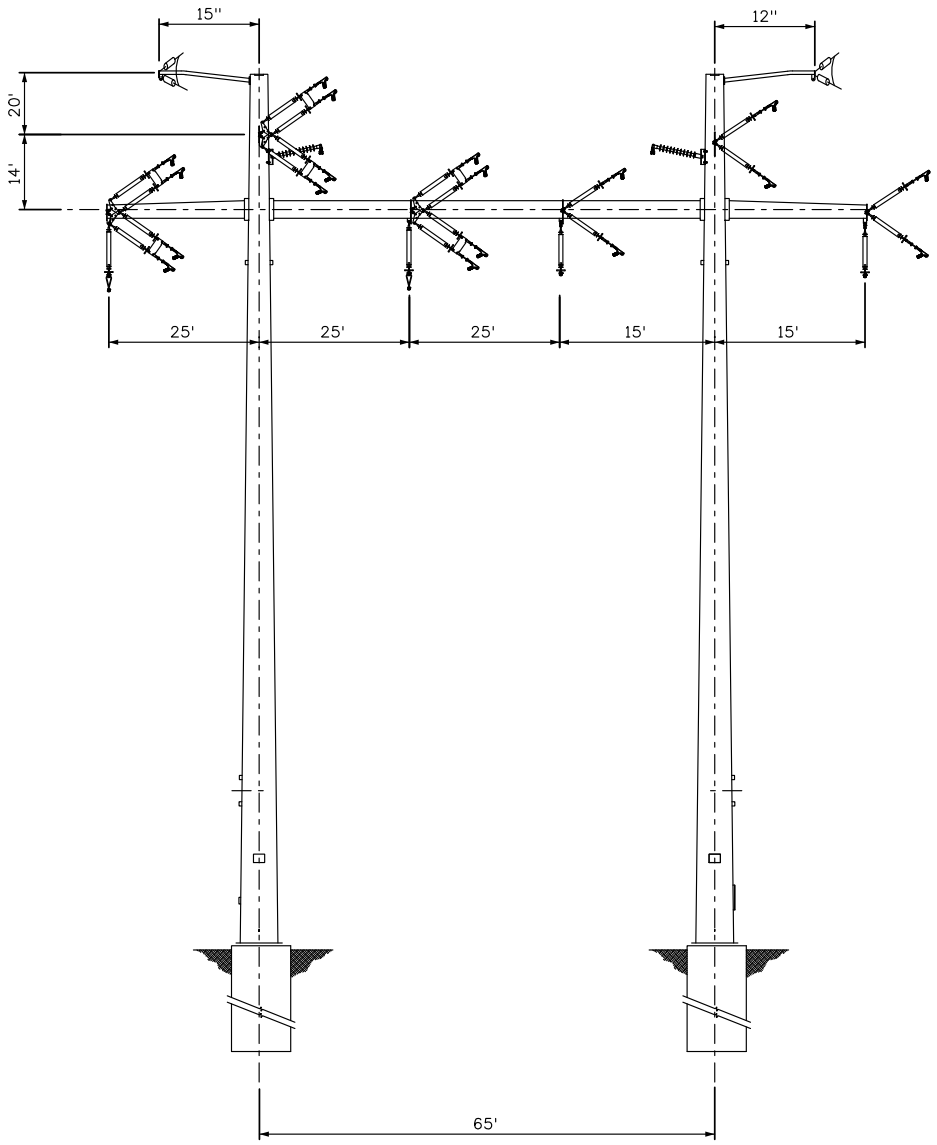
**Conclusion**

Thank you for your questions and for providing us time to gather the requested information. We will provide the additional information identified in our individual responses as we have it gathered and will send it to your attention.

Sincerely,

David B. Grover

Attachment 2-1

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ITC Midwest

| NO. | DATE | REVISION | BY | CHK'D | APV'D |
|---|---|---|---|---|---|
| 0 | 11/25/13 | ORIGINAL ISSUE [ ] | | | |

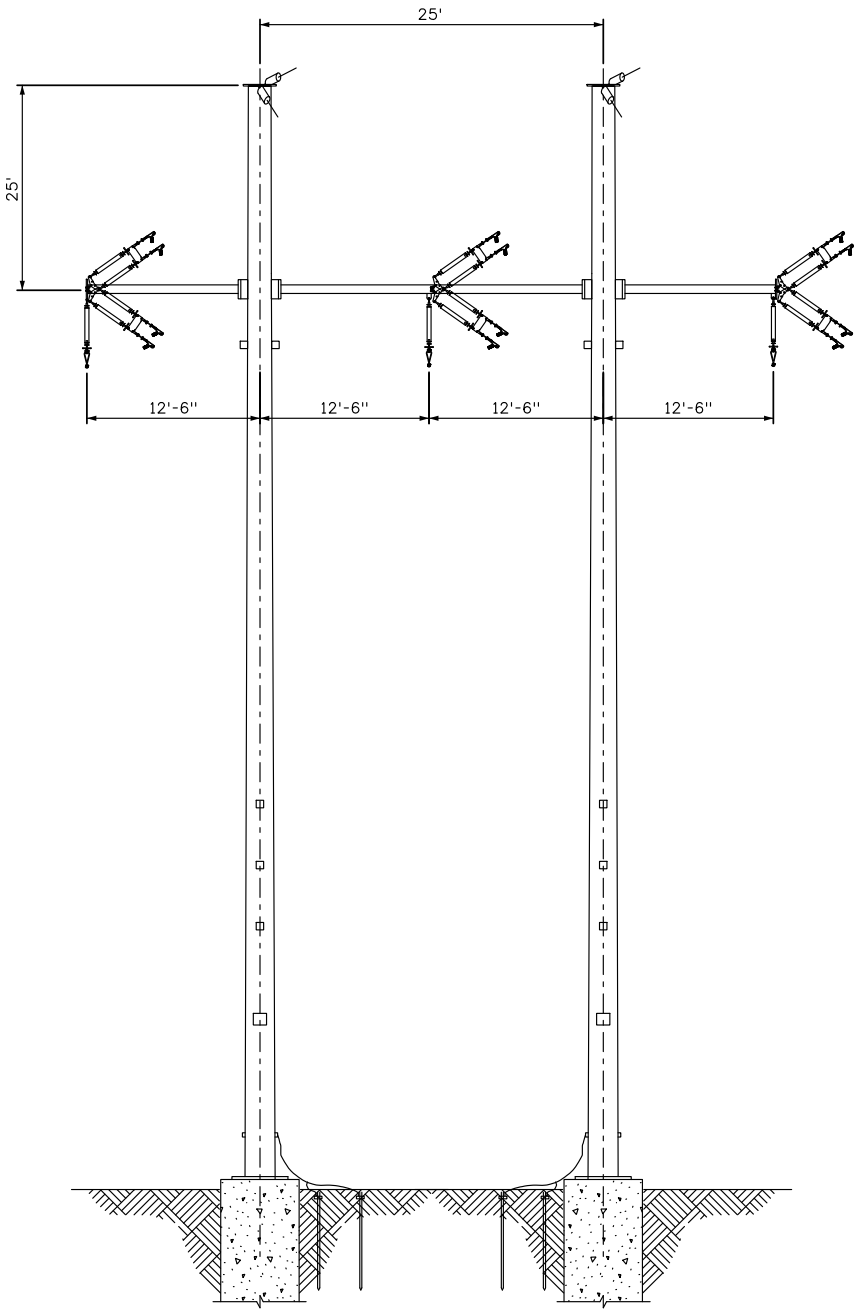
HUNTLEY-LAKEFIELD JCT 345/161kV

DOUBLE CIRCUIT STEEL H-FRAME
WATER CROSSING STRUCTURE

Scale:NONE

DWG. NO. 345-161DDNH5S

Attachment 2-1

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ITC Midwest

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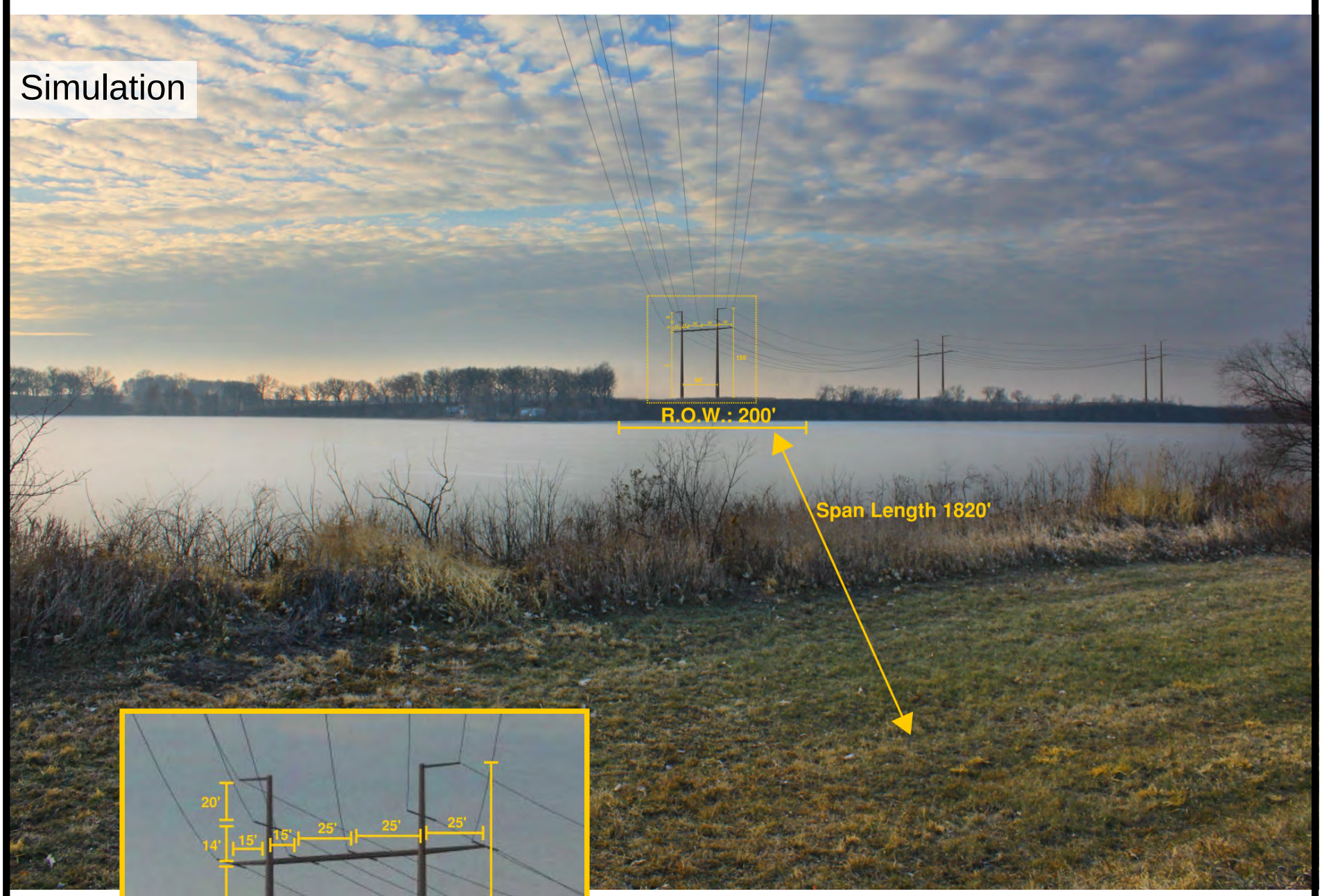
| 0 | 12/10/13 | ORIGINAL ISSUE [ ] | | | |

JACKSON, MARTIN, AND FARIBAULT COUNTY, MN 345kV

SINGLE CIRCUIT STEEL H-FRAME
WATER CROSSING STRUCTURE

Scale:NONE

DWG. NO. 345-DNH5S



Preliminary as of Dec 13, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 kV Project
Docket # ET6675/TL-12-1337
Fox Lake Crossing
Visual Simulation - Looking South
Double Circuit Configuration

ITC Midwest LLC • 444 Cedar Street, Suite 1020 • St. Paul, MN 55101

December 19, 2013

Raymond Kirsch
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**Re: In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minnesota – Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties**
**MPUC Docket No. ET6675/TL-12-1337**
**EIS Development – Third Response**

Dear Mr. Kirsch:

I write to provide supplemental information to our Second Response to your November 1, 7, and 25, 2013 emails requesting additional information from ITC Midwest LLC ("ITCM") for the Environmental Impact Statement for the Minnesota-Iowa 345 kV Project. Each question for which a supplement is provided, is listed below along with ITCM's response.

**Question:**

2. **Lake Crossings.** I'd like to have discussion / drawings / figures / schematics / cross sections on how Fox Lake and Lake Charlotte might be crossed - e.g., paralleling the existing 161 line; double circuiting**.** What kind of 'flat profile' can be designed to minimize avian impacts? What is the clearance over the lake? (wasn't this clearance recently raised to meet new standards?)

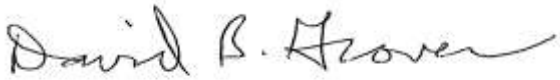
**Response:**

Enclosed are cross sections/photo simulations of possible configurations at Fox Lake and Lake Charlotte. These incorporate your suggested revisions on the December 13, 2013 draft. These can be made available to you in higher resolution images, but will need to be transferred via other means. Please let me know if the resolution of the attached simulations is adequate.

**Conclusion**

We expect that cross sections/photo simulations for the Huntley Substation alternative sites and the associated facilities configurations will be provided to you tomorrow, December 20, 2013. Please call me with any questions.

Sincerely,



David B. Grover

ITC Midwest LLC
651-222-1000, ext. 2308 (office)
612-581-7832 (cell)

Attachments

Preliminary as of
Dec 17, 2013 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 kV Project
Docket # ET6675/TL-12-1337
Fox Lake Crossing
Visual Simulation - Looking South
Double Circuit Configuration

Preliminary as of
Dec 18, 2013 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 kV Project
Docket # ET6675/TL-12-1337
Lake Charlotte Crossing
Visual Simulation - Looking West
Double Circuit Configuration

Preliminary as of
Dec 18, 2013 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 kV Project
Docket # ET6675/TL-12-1337
Lake Charlotte Crossing
Visual Simulation - Looking West
Parallel Circuit Configuration

ITC Midwest LLC • 444 Cedar Street, Suite 1020 • St. Paul, MN 55101

December 20, 2013

Raymond Kirsch
Minnesota Department of Commerce
Suite 500
85 Seventh Place East
St. Paul, MN 55101

**Re: In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minnesota – Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties**
**MPUC Docket No. ET6675/TL-12-1337**
**EIS Development – Fourth Response**

Dear Mr. Kirsch:

I write to provide supplemental information to our Second Response to your November 1, 7, and 25, 2013 emails requesting additional information from ITC Midwest LLC ("ITCM") for the Environmental Impact Statement for the Minnesota-Iowa 345 kV Project. Each question for which a supplement is provided, is listed below along with ITCM's response.

**Question:**

8. **Cross Sections.** I would like to have figures / schematics of select cross sections for routes**.** At this time, these include the lake crossings (noted above) and:

a. The lines coming into the Huntley substation from the north, i.e., what does the view northward from the proposed Huntley substation look like - structures, voltages, ROW width, route width?

b. What does the view look like for Huntley substation option #2 --- looking northward from the proposed alternative southern site for the Huntley substation?

**Response:**

Enclosed are cross sections/photo simulations of the scoping decision alternatives from 160th Street and from Interstate 90. Each figure identifies the viewpoint and point of reference. These can be made available to you in higher resolution images, but will need to be transferred via other means. Please let me know if the resolution of the attached simulations is adequate.

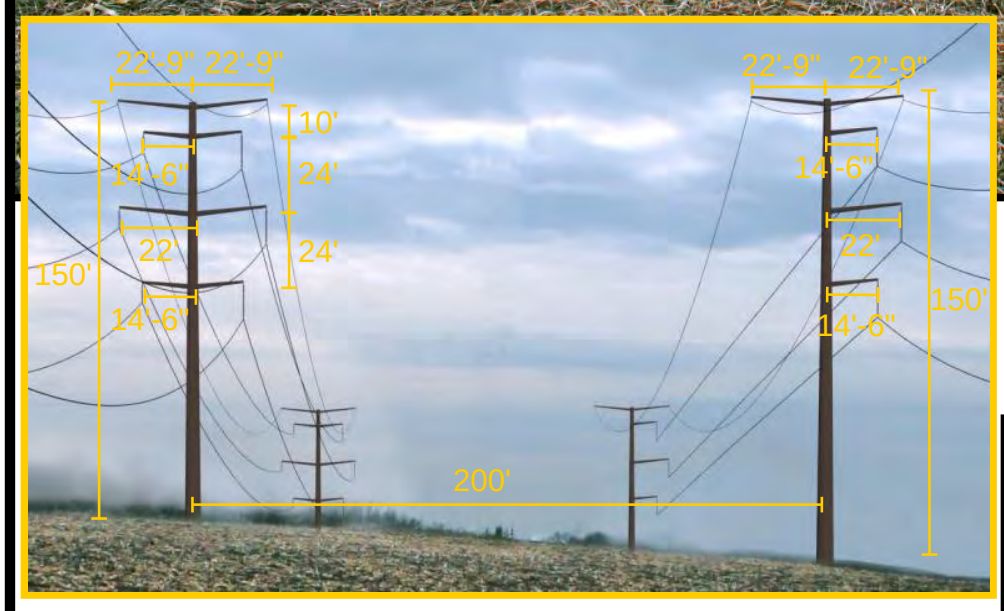
**Conclusion**

We expect that we will be able to provide you with updated magnetic field calculations for the 2017, 2023, and additional loading scenarios you requested by December 31, 2013. Please call me with any questions.

Sincerely,
*/s/ David B. Grover (by A. Ashbacker)*
David B. Grover

ITC Midwest LLC
651-222-1000, ext. 2308 (office)
612-581-7832 (cell)

Attachments




Preliminary as of
Dec 19, 2013 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 4
Looking South from 160th Street

Preliminary as of Dec 20, 2013 and Subject to Change

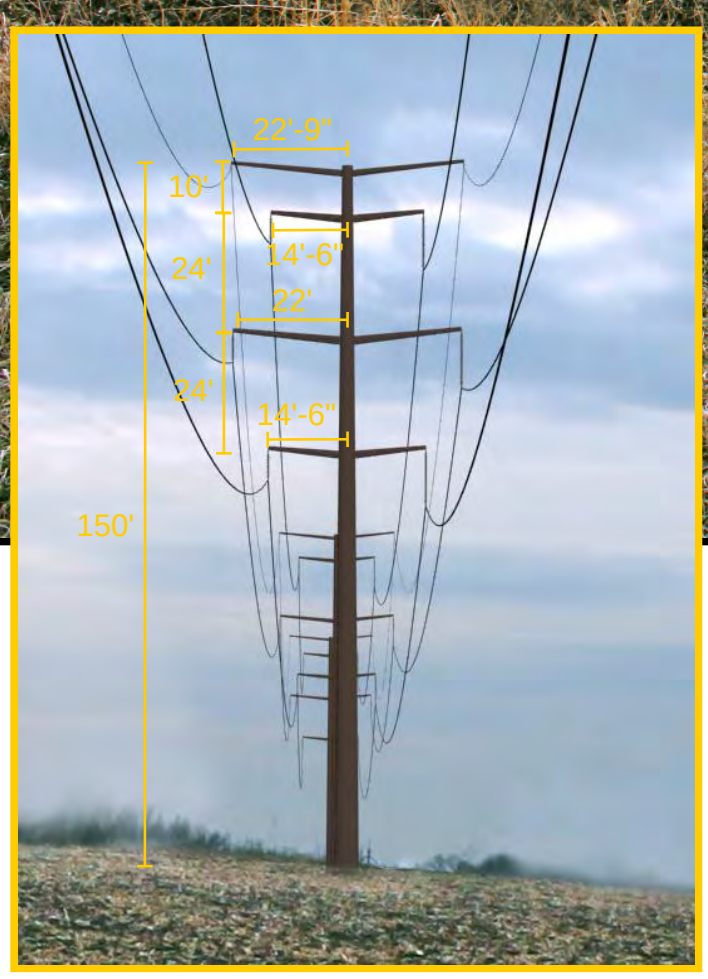
ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 2
Looking South from 160th Street

Preliminary as of Dec 20, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
Route A and Route B
Associated Facilities
Looking North from 160th Street

Preliminary as of Dec 20, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 1
Looking North from 160th Street




Preliminary as of Dec 20, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
Route A
Looking South from 160th Street

Preliminary as of Dec 20, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 2
Looking North from I-90

Preliminary as of Dec 20, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 4
Looking North from I-90

Preliminary as of Dec 20, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 2
Looking South from 170th Street

Preliminary as of Dec 20, 2013 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 1
Looking North from I-90

ITC Midwest LLC • 444 Cedar Street, Suite 1020 • St. Paul, MN 55101

December 30, 2013

Raymond Kirsch
Minnesota Department of Commerce
Suite 500
85 Seventh Place East
St. Paul, MN 55101

**Re: In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minnesota – Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties**
**MPUC Docket No. ET6675/TL-12-1337**
**EIS Development – Fifth Response**

Dear Mr. Kirsch:

I write to provide supplemental information to our First and Second Responses to your emails requesting additional information from ITC Midwest LLC ("ITCM") for the Environmental Impact Statement for the Minnesota-Iowa 345 kV Project. Attached are updated versions of Tables 7, 8, and 9 from the Route Permit Application to reflect the updated structure configurations.

You also requested that magnetic fields be estimated for a higher loading scenario. We developed a model to reflect the generation additions that will be enabled by the Project and MVP #3 to calculate these magnetic fields. These calculations are based on 2,000 MW of new generation additions in southwest Minnesota and other assumptions which load the 345 kV system to the point where a single contingency would overload other facilities. Loading above this level could not occur without additional facility additions.

This scenario is just one of many possible future scenarios. The resultant calculations for this scenario are shown on a new table, labeled 9A, which is also attached.

Thank you for your questions and for providing us time to gather the requested information. Please contact me if you have any further questions.

Sincerely,

David B. Grover

David B. Grover

## Table 7. Estimated Electric Fields (kV/m) Update 12/30/2013

| Structure Type | Maximum Conductor Voltage | Distance to Proposed Centerline | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -300′ | -200′ | -100′ | -75′ | -50′ | -25′ | 0′ | 25′ | 50′ | 75′ | 100′ | 200′ | 300′ |
| Single Pole Davit Arm 345 kV/ 161 kV | 362.25 kV/ 169.05 kV | 0.04 | 0.09 | 0.30 | 0.58 | 1.60 | 4.28 | 3.35 | 0.74 | 0.35 | 0.20 | 0.13 | 0.04 | 0.02 |
| Single Pole Davit Arm 345 kV/ 161 kV at Initial 345 kV/69 kV Operation | 362.25 kV/ 72.45 kV | 0.05 | 0.10 | 0.31 | 0.58 | 1.65 | 4.48 | 3.90 | 1.00 | 0.13 | 0.09 | 0.10 | 0.06 | 0.04 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service | 362.25 kV | 0.07 | 0.14 | 0.31 | 0.54 | 1.63 | 4.57 | 4.22 | 1.35 | 0.27 | 0.21 | 0.23 | 0.12 | 0.07 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV | 362.25 kV/ 169.05 kV | 0.03 | 0.09 | 0.83 | 2.00 | 4.36 | 3.55 | 2.46 | 0.27 | 0.92 | 0.51 | 0.21 | 0.03 | 0.02 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV with only 345 kV circuit | 362.25 kV | 0.05 | 0.11 | 0.82 | 1.97 | 4.34 | 3.66 | 3.32 | 1.68 | 0.89 | 0.57 | 0.39 | 0.13 | 0.06 |
| Single Pole Braced Post 161 kV/ 161 kV | 169.05 kV/ 169.05 kV | 0.00 | 0.01 | 0.03 | 0.02 | 0.12 | 0.96 | 1.38 | 0.96 | 0.12 | 0.02 | 0.03 | 0.01 | 0.00 |
| Single Pole Braced Post 161 kV/161 kV with 161 kV/69 kV Initial Operation | 169.05 kV 72.45 kV | 0.01 | 0.02 | 0.06 | 0.05 | 0.12 | 1.14 | 1.61 | 0.20 | 0.05 | 0.03 | 0.02 | 0.01 | 0.01 |
| Single Pole Braced Post 161 kV | 169.05 kV | 0.01 | 0.03 | 0.12 | 0.22 | 0.45 | 0.92 | 1.96 | 1.35 | 0.37 | 0.19 | 0.12 | 0.03 | 0.01 |
| Single Pole Davit Arm 345 kV/161 kV/ 161 kV | 362.25 kV/ 169.05 kV/ 169.05 kV | 0.07 | 0.11 | 0.09 | 0.29 | 1.11 | 2.95 | 0.66 | 2.32 | 0.67 | 0.23 | 0.15 | 0.09 | 0.06 |

| Structure Type | Maximum Conductor Voltage | Distance to Proposed Centerline | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -300′ | -200′ | -100′ | -75′ | -50′ | -25′ | 0′ | 25′ | 50′ | 75′ | 100′ | 200′ | 300′ |
| Single Pole Davit Arm 345 kV/161 kV with 69kV Underbuild at Initial 345kV with 69kV Underbuild Operation | 362.25 kV/ 169.05 kV/ 72.45 kV | 0.10 | 0.19 | 0.18 | 0.17 | 1.21 | 3.06 | 2.08 | 1.10 | 0.40 | 0.12 | 0.24 | 0.16 | 0.10 |
| Two Pole H-Frame 345 kV/161 kV | 362.25 kV/ 169.05 kV | 0.09 | 0.23 | 1.75 | 3.97 | 5.25 | 1.49 | 4.59 | 2.40 | 1.84 | 1.29 | 0.64 | 0.15 | 0.07 |
| Two Pole H-Frame 345 kV Parallel with Existing Two Pole H-Frame 161 kV | 362.25 kV Parallel 169.05 kV | 0.06 | 0.21 | 2.31 | 4.68 | 3.84 | 2.72 | 3.52 | 1.02 | 1.51 | 1.37 | 0.71 | 0.08 | 0.02 |
| Existing Single Pole Davit Arm 161 kV/161 kV Parallel With Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service | 169.05 kV/ 169.05 kV Parallel 362.25 kV | 0.08 | 0.16 | 0.56 | 1.64 | 4.55 | 3.97 | 0.85 | 1.24 | 1.42 | 0.14 | 0.14 | 0.10 | 0.06 |
| Single Pole Braced Post 161 kV at 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation | 72.45 kV Parallel 72.45 kV/ 169.05 kV | 0.01 | 0.03 | 0.35 | 0.74 | 0.51 | 0.14 | 0.08 | 0.08 | 0.22 | 1.61 | 1.14 | 0.05 | 0.02 |

| Structure Type | Maximum Conductor Voltage | Distance to Proposed Centerline | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -300′ | -200′ | -100′ | -75′ | -50′ | -25′ | 0′ | 25′ | 50′ | 75′ | 100′ | 200′ | 300′ |
| Single Pole Braced Post 161 kV/161 kV at 161 kV/ 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation Parallel with Single Pole Braced Post 161 kV at 69 kV Initial Operation | 169.05 kV/ 72.45 kV Parallel 72.45 kV/ 169.05 kV Parallel 72.45 kV | 0.06 | 0.11 | 0.04 | 0.08 | 0.10 | 0.22 | 1.60 | 1.15 | 0.18 | 0.20 | 0.44 | 0.37 | 0.05 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service Parallel with Single Pole Davit Arm 345 kV/ 161 kV | 362.25 kV Parallel 362.25 kV/ 169.05 kV | 0.10 | 0.30 | 4.27 | 1.43 | 0.32 | 0.05 | 0.24 | 0.63 | 1.83 | 4.98 | 5.29 | 0.08 | 0.08 |

# Table 8. Estimated Magnetic Fields in 2017 (mG) Update 12/30/2013

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Davit Arm 345 kV/161 kV | Peak | 215/20 | 0.9 | 1.8 | 6.0 | 9.3 | 15.2 | 23.3 | 21.7 | 12.9 | 7.5 | 4.8 | 3.3 | 1.2 | 0.6 |
| | Average | 144/13 | 0.6 | 1.2 | 4.0 | 6.2 | 10.2 | 15.6 | 14.5 | 8.6 | 5.0 | 3.2 | 2.2 | 0.8 | 0.4 |
| Single Pole Davit Arm 345 kV/161 kV at Initial 345 kV/69 kV Operation | Peak | 215/75 | 0.7 | 1.5 | 5.1 | 8.1 | 13.7 | 21.5 | 20.6 | 11.7 | 5.8 | 3.3 | 2.2 | 0.8 | 0.5 |
| | Average | 144/50 | 0.5 | 1.0 | 3.4 | 5.5 | 9.2 | 14.4 | 13.8 | 7.8 | 3.9 | 2.2 | 1.5 | 0.5 | 0.3 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit | Peak | 215 | 0.9 | 1.9 | 6.3 | 9.7 | 15.8 | 23.9 | 22.2 | 13.8 | 8.4 | 5.5 | 3.8 | 1.3 | 0.7 |
| | Average | 144 | 0.6 | 1.3 | 4.2 | 6.5 | 10.6 | 16.0 | 14.9 | 9.2 | 5.6 | 3.7 | 2.5 | 0.9 | 0.5 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV | Peak | 215/29 | 0.9 | 1.8 | 7.0 | 12.0 | 21.8 | 28.6 | 21.2 | 10.6 | 5.0 | 3.2 | 2.3 | 0.7 | 0.4 |
| | Average | 144/19 | 0.6 | 1.2 | 4.7 | 8.1 | 14.6 | 19.2 | 14.2 | 7.1 | 3.4 | 2.2 | 1.5 | 0.5 | 0.2 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV with only 345 kV circuit | Peak | 215 | 0.9 | 1.9 | 7.3 | 12.5 | 22.6 | 29.8 | 22.3 | 12.5 | 7.1 | 4.3 | 2.8 | 0.9 | 0.4 |
| | Average | 144 | 0.6 | 1.3 | 4.9 | 8.4 | 15.1 | 19.9 | 14.9 | 8.4 | 4.7 | 2.9 | 1.9 | 0.6 | 0.3 |
| Single Pole Braced Post 161 kV/161 kV | Peak | 55/68 | 0.0 | 0.1 | 0.2 | 0.4 | 0.9 | 3.3 | 8.2 | 4.9 | 1.9 | 0.9 | 0.5 | 0.1 | 0.1 |
| | Average | 37/46 | 0.0 | 0.0 | 0.1 | 0.2 | 0.6 | 2.2 | 5.5 | 3.3 | 1.3 | 0.6 | 0.3 | 0.1 | 0.0 |
| Single Pole Braced Post 161 kV/161 kV with 161 kV/69 kV Initial Operation | Peak | 55/191 | 0.3 | 0.5 | 1.6 | 2.4 | 4.1 | 9.3 | 24.2 | 18.3 | 8.2 | 4.2 | 2.5 | 0.6 | 0.3 |
| | Average | 37/128 | 0.2 | 0.3 | 1.0 | 1.6 | 2.8 | 6.2 | 16.2 | 12.3 | 5.5 | 2.8 | 1.6 | 0.4 | 0.2 |
| Single Pole Braced Post 161 kV | Peak | 94 | 0.2 | 0.4 | 1.2 | 2.0 | 3.7 | 7.9 | 14.6 | 9.6 | 4.2 | 2.2 | 1.3 | 0.3 | 0.1 |
| | Average | 63 | 0.1 | 0.2 | 0.8 | 1.3 | 2.5 | 5.3 | 9.8 | 6.4 | 2.8 | 1.4 | 0.9 | 0.2 | 0.1 |
| Single Pole Davit Arm 345 kV/161 kV/161 kV | Peak | 215/29/20 | 0.7 | 1.5 | 4.1 | 5.6 | 8.0 | 11.3 | 9.3 | 5.1 | 3.3 | 3.0 | 2.5 | 1.0 | 0.5 |
| | Average | 144/19/13 | 0.5 | 1.0 | 2.7 | 3.7 | 5.3 | 7.5 | 6.2 | 3.4 | 2.3 | 2.0 | 1.6 | 0.7 | 0.4 |

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Davit Arm 345 kV/161 kV with 69kV Underbuild at Initial 345kV with 69kV Underbuild Operation | Peak | 215/0/109 | 0.7 | 1.7 | 5.9 | 9.1 | 14.8 | 23.6 | 33.9 | 30.0 | 10.1 | 4.8 | 3.2 | 1.1 | 0.6 |
| | Average | 144/0/73 | 0.5 | 1.1 | 4.0 | 6.1 | 9.9 | 15.8 | 22.7 | 20.1 | 6.8 | 3.2 | 2.2 | 0.8 | 0.4 |
| Two Pole H-Frame 345 kV/161 kV | Peak | 215/211 | 1.3 | 3.1 | 13.4 | 23.3 | 35.0 | 34.3 | 23.5 | 17.6 | 25.2 | 19.4 | 12.0 | 2.9 | 1.3 |
| | Average | 144/141 | 0.9 | 2.1 | 9.0 | 15.6 | 23.4 | 23.0 | 15.8 | 11.8 | 16.8 | 13.0 | 8.0 | 2.0 | 0.9 |
| Two Pole H-Frame 345 kV Parallel with Existing Two Pole H-Frame 161 kV | Peak | 215 Parallel 211 | 1.2 | 2.8 | 14.4 | 26.5 | 37.5 | 33.2 | 13.9 | 19.4 | 27.2 | 20.2 | 12.1 | 2.9 | 1.3 |
| | Average | 144 Parallel 141 | 0.8 | 1.9 | 9.7 | 17.8 | 25.1 | 22.3 | 9.3 | 13.0 | 18.2 | 13.5 | 8.1 | 1.9 | 0.9 |
| Existing Single Pole Davit Arm 161 kV/161 kV Parallel With Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service | Peak | 29/20 Parallel 215 | 1.0 | 2.3 | 9.6 | 15.6 | 23.7 | 22.1 | 13.4 | 4.3 | 6.4 | 4.7 | 3.2 | 1.1 | 0.6 |
| | Average | 19/13 Parallel 144 | 0.7 | 1.5 | 6.4 | 10.4 | 15.9 | 14.8 | 9.0 | 3.0 | 4.3 | 3.1 | 2.1 | 0.7 | 0.4 |
| Single Pole Braced Post 161 kV at 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation | Peak | 110 Parallel 191/120 | 0.3 | 0.9 | 9.0 | 17.1 | 12.1 | 6.0 | 4.6 | 7.0 | 15.8 | 22.6 | 7.3 | 0.4 | 0.2 |
| | Average | 74 Parallel 128/80 | 0.2 | 0.6 | 6.0 | 11.5 | 8.1 | 4.0 | 3.1 | 4.7 | 10.6 | 15.1 | 4.9 | 0.3 | 0.1 |

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Braced Post 161 kV/161 kV at 161 kV/ 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation Parallel with Single Pole Braced Post 161 kV at 69 kV Initial Operation | Peak | 88/110 Parallel 191/120 Parallel 55 | 0.2 | 1.3 | 4.4 | 4.1 | 6.8 | 15.2 | 21.9 | 7.9 | 2.8 | 1.8 | 2.4 | 2.6 | 0.4 |
| | Average | 59/74 Parallel 128/80 Parallel 37 | 0.1 | 0.9 | 2.9 | 2.7 | 4.6 | 10.2 | 14.7 | 5.3 | 1.9 | 1.2 | 1.6 | 1.7 | 0.3 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service Parallel with Single Pole Davit Arm 345 kV/ 161 kV | Peak | 215 Parallel 85/68 | 1.9 | 6.3 | 22.0 | 13.4 | 8.0 | 4.9 | 3.0 | 1.7 | 2.4 | 6.3 | 8.7 | 0.9 | 0.5 |
| | Average | 144 Parallel 57/46 | 1.3 | 4.2 | 14.7 | 9.0 | 5.3 | 3.3 | 2.0 | 1.1 | 1.6 | 4.2 | 5.9 | 0.6 | 0.3 |

# Table 9. Estimated Magnetic Fields in 2023 (mG) Update 12/30/2013

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Davit Arm 345 kV/161 kV | Peak | 310/20 | 1.3 | 2.6 | 8.7 | 13.6 | 22.2 | 33.8 | 31.5 | 18.9 | 11.2 | 7.2 | 5.0 | 1.8 | 0.9 |
| | Average | 208/13 | 0.8 | 1.7 | 5.9 | 9.1 | 14.9 | 22.7 | 21.1 | 12.7 | 7.5 | 4.8 | 3.3 | 1.2 | 0.6 |
| Single Pole Davit Arm 345 kV/161 kV at Initial 345 kV/69 kV Operation | Peak | 310/92 | 1.1 | 2.2 | 7.6 | 12.1 | 20.1 | 31.5 | 29.9 | 17.0 | 8.8 | 5.1 | 3.4 | 1.3 | 0.7 |
| | Average | 208/62 | 0.7 | 1.5 | 5.1 | 8.1 | 13.5 | 21.2 | 20.1 | 11.4 | 5.9 | 3.4 | 2.3 | 0.9 | 0.5 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit | Peak | 310 | 1.3 | 2.7 | 9.0 | 14.0 | 22.7 | 34.5 | 32.1 | 19.9 | 12.1 | 7.9 | 5.4 | 1.9 | 1.0 |
| | Average | 208 | 0.9 | 1.8 | 6.1 | 9.4 | 15.3 | 23.1 | 21.5 | 13.3 | 8.1 | 5.3 | 3.6 | 1.3 | 0.7 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV | Peak | 310/48 | 1.2 | 2.6 | 10.0 | 17.3 | 31.3 | 41.0 | 30.3 | 14.9 | 6.9 | 4.4 | 3.1 | 1.1 | 0.5 |
| | Average | 208/32 | 0.8 | 1.7 | 6.7 | 11.6 | 21.0 | 27.6 | 20.4 | 10.0 | 4.6 | 3.0 | 2.1 | 0.7 | 0.3 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV with only 345 kV circuit | Peak | 310 | 1.3 | 2.7 | 10.5 | 18.0 | 32.6 | 42.9 | 32.2 | 18.1 | 10.2 | 6.2 | 4.1 | 1.2 | 0.6 |
| | Average | 208 | 0.9 | 1.8 | 7.0 | 12.1 | 21.9 | 28.8 | 21.6 | 12.1 | 6.9 | 4.2 | 2.7 | 0.8 | 0.4 |
| Single Pole Braced Post 161 kV/161 kV | Peak | 132/84 | 0.2 | 0.3 | 1.2 | 2.1 | 4.3 | 10.3 | 15.3 | 5.3 | 1.6 | 0.8 | 0.5 | 0.2 | 0.1 |
| | Average | 88/56 | 0.1 | 0.2 | 0.8 | 1.4 | 2.9 | 6.8 | 10.2 | 3.5 | 1.1 | 0.5 | 0.4 | 0.2 | 0.1 |
| Single Pole Braced Post 161 kV/161 kV with 161 kV/69 kV Initial Operation | Peak | 132/56 | 0.2 | 0.4 | 1.5 | 2.6 | 5.2 | 11.7 | 15.7 | 5.5 | 2.3 | 1.3 | 0.9 | 0.3 | 0.2 |
| | Average | 88/38 | 0.1 | 0.3 | 1.0 | 1.7 | 3.4 | 7.7 | 10.5 | 3.6 | 1.5 | 0.9 | 0.6 | 0.2 | 0.1 |
| Single Pole Braced Post 161 kV | Peak | 132 | 0.2 | 0.5 | 1.7 | 2.8 | 5.2 | 11.1 | 20.4 | 13.5 | 5.9 | 3.0 | 1.8 | 0.5 | 0.2 |
| | Average | 88 | 0.2 | 0.3 | 1.2 | 1.9 | 3.5 | 7.4 | 13.6 | 9.0 | 2.9 | 2.0 | 1.2 | 0.3 | 0.1 |
| Single Pole Davit Arm 345 kV/161 kV/161 kV | Peak | 310/48/20 | 1.0 | 2.2 | 6.0 | 8.3 | 12.0 | 17.3 | 13.7 | 7.9 | 5.6 | 4.7 | 3.8 | 1.6 | 0.8 |
| | Average | 208/32/13 | 0.7 | 1.5 | 4.1 | 5.6 | 8.0 | 11.6 | 9.2 | 5.3 | 3.8 | 3.2 | 2.5 | 1.1 | 0.5 |

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Davit Arm 345 kV/161 kV with 69kV Underbuild at Initial 345kV with 69kV Underbuild Operation | Peak | 310/0/118 | 1.0 | 2.3 | 8.3 | 12.7 | 20.4 | 31.9 | 43.0 | 36.1 | 12.8 | 6.8 | 4.7 | 1.7 | 0.8 |
| | Average | 208/0/79 | 0.7 | 1.6 | 5.6 | 8.5 | 13.7 | 21.4 | 28.8 | 24.2 | 8.6 | 4.6 | 3.1 | 1.1 | 0.5 |
| Two Pole H-Frame 345 kV/161 kV | Peak | 310/258 | 1.8 | 4.3 | 18.9 | 33.1 | 50.2 | 50.0 | 35.3 | 22.4 | 31.6 | 24.8 | 15.6 | 3.9 | 1.7 |
| | Average | 208/173 | 1.2 | 2.9 | 12.7 | 22.2 | 33.7 | 33.6 | 23.7 | 15.0 | 21.2 | 16.6 | 10.4 | 2.6 | 1.1 |
| Two Pole H-Frame 345 kV Parallel with Existing Two Pole H-Frame 161 kV | Peak | 310 Parallel 258 | 1.6 | 3.9 | 20.4 | 37.8 | 54.2 | 49.2 | 22.2 | 22.4 | 33.4 | 25.4 | 15.4 | 3.7 | 1.7 |
| | Average | 208 Parallel 173 | 1.1 | 2.6 | 13.7 | 25.4 | 36.4 | 33.0 | 14.9 | 15.0 | 22.4 | 17.0 | 10.3 | 2.5 | 1.1 |
| Existing Single Pole Davit Arm 161 kV/161 kV Parallel With Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service | Peak | 48/20 Parallel 310 | 1.5 | 3.4 | 13.9 | 22.6 | 34.1 | 31.3 | 18.2 | 6.5 | 10.5 | 7.4 | 5.0 | 1.7 | 0.9 |
| | Average | 32/13 Parallel 208 | 1.0 | 2.3 | 9.3 | 15.2 | 22.9 | 21.0 | 12.2 | 4.4 | 7.0 | 5.0 | 3.3 | 1.1 | 0.6 |
| Single Pole Braced Post 161 kV at 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation | Peak | 99 Parallel 177/128 | 0.3 | 0.8 | 8.1 | 15.3 | 10.8 | 5.3 | 4.0 | 6.0 | 13.9 | 21.0 | 7.4 | 0.3 | 0.2 |
| | Average | 66 Parallel 119/86 | 0.2 | 0.5 | 5.4 | 10.2 | 7.2 | 3.5 | 2.7 | 4.0 | 9.4 | 14.1 | 5.0 | 0.2 | 0.1 |

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Braced Post 161 kV/161 kV at 161 kV/ 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation Parallel with Single Pole Braced Post 161 kV at 69 kV Initial Operation | Peak | 128/99 Parallel 177/128 Parallel 132 | 0.6 | 3.7 | 2.7 | 2.9 | 5.3 | 12.7 | 20.5 | 8.8 | 3.8 | 3.3 | 5.3 | 6.0 | 0.9 |
| | Average | 86/66 Parallel 119/86 Parallel 88 | 0.4 | 2.5 | 1.8 | 1.9 | 3.6 | 8.5 | 13.8 | 5.9 | 2.5 | 2.2 | 3.6 | 4.0 | 0.6 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service Parallel with Single Pole Davit Arm 345 kV/ 161 kV | Peak | 310 Parallel 130/84 | 2.3 | 8.4 | 33.6 | 21.9 | 14.3 | 10.7 | 9.7 | 11.1 | 15.2 | 20.9 | 19.4 | 3.6 | 0.8 |
| | Average | 208 Parallel 87/56 | 1.5 | 5.6 | 22.6 | 14.7 | 9.6 | 7.2 | 6.5 | 7.4 | 10.2 | 14.0 | 13.0 | 2.4 | 0.6 |

# Table 9A. Estimated Magnetic Fields Maximum (mG)

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Davit Arm 345 kV/161 kV | Peak | 975/132 | 3.8 | 7.7 | 26.4 | 41.1 | 67.7 | 104.1 | 97.2 | 56.8 | 32.1 | 20.2 | 14.0 | 5.1 | 2.7 |
| | Average | 653/88 | 2.5 | 5.2 | 17.7 | 27.6 | 45.4 | 69.7 | 65.1 | 38.0 | 21.5 | 13.6 | 9.4 | 3.4 | 1.8 |
| Single Pole Davit Arm 345 kV/161 kV at Initial 345 kV/69 kV Operation | Peak | 975/92 | 3.9 | 8.0 | 27.0 | 42.0 | 68.9 | 105.4 | 98.3 | 58.8 | 34.2 | 21.8 | 15.0 | 5.3 | 2.8 |
| | Average | 653/62 | 2.6 | 5.3 | 18.1 | 28.1 | 46.1 | 70.6 | 65.8 | 39.4 | 22.9 | 14.6 | 10.0 | 3.6 | 1.9 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit | Peak | 975 | 4.1 | 8.4 | 28.4 | 43.9 | 71.5 | 108.4 | 100.8 | 62.5 | 38.1 | 24.7 | 17.1 | 5.9 | 3.1 |
| | Average | 653 | 2.7 | 5.7 | 19.0 | 29.4 | 47.9 | 72.6 | 67.5 | 41.9 | 25.5 | 16.6 | 11.4 | 4.0 | 2.1 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV | Peak | 975/190 | 3.8 | 8.0 | 31.2 | 53.6 | 97.3 | 127.7 | 94.2 | 45.1 | 19.5 | 12.8 | 9.3 | 3.2 | 1.6 |
| | Average | 653/127 | 2.5 | 5.4 | 20.9 | 35.9 | 65.2 | 85.5 | 63.1 | 30.2 | 13.0 | 8.6 | 6.3 | 2.2 | 1.1 |
| Single Pole Davit Arm Low Profile 345 kV/161 kV with only 345 kV circuit | Peak | 975 | 4.0 | 8.5 | 33.0 | 56.6 | 102.5 | 134.9 | 101.1 | 56.8 | 32.1 | 19.6 | 12.9 | 3.8 | 1.8 |
| | Average | 653 | 2.7 | 5.7 | 22.1 | 37.9 | 68.7 | 90.4 | 67.7 | 38.1 | 21.5 | 13.1 | 8.6 | 2.6 | 1.2 |
| Single Pole Braced Post 161 kV/161 kV | Peak | 390/126 | 0.7 | 1.4 | 5.1 | 8.6 | 16.7 | 36.9 | 48.5 | 18.3 | 8.4 | 5.0 | 3.3 | 1.2 | 0.7 |
| | Average | 261/84 | 0.5 | 1.0 | 3.4 | 5.8 | 11.2 | 24.7 | 32.4 | 12.2 | 5.6 | 3.3 | 2.2 | 0.8 | 0.5 |
| Single Pole Braced Post 161 kV/161 kV with 161 kV/69 kV Initial Operation | Peak | 390/79 | 0.8 | 1.6 | 5.6 | 9.4 | 18.1 | 39.2 | 51.0 | 21.6 | 10.4 | 6.1 | 4.0 | 1.3 | 0.7 |
| | Average | 261/53 | 0.5 | 1.1 | 3.8 | 6.3 | 12.1 | 26.2 | 34.1 | 14.5 | 7.0 | 4.1 | 2.7 | 0.9 | 0.5 |
| Single Pole Braced Post 161 kV | Peak | 390 | 0.7 | 1.4 | 5.1 | 8.3 | 15.4 | 32.8 | 60.4 | 39.8 | 17.4 | 8.9 | 5.2 | 1.3 | 0.6 |
| | Average | 261 | 0.5 | 1.0 | 3.4 | 5.6 | 10.3 | 22.0 | 40.4 | 26.6 | 11.7 | 6.0 | 3.5 | 0.9 | 0.4 |
| Single Pole Davit Arm 345 kV/161 kV/161 kV | Peak | 975/190/132 | 3.2 | 6.8 | 19.3 | 26.8 | 39.3 | 60.6 | 49.7 | 24.8 | 12.7 | 12.7 | 10.7 | 4.7 | 2.4 |
| | Average | 653/127/88 | 2.1 | 4.5 | 12.9 | 17.9 | 26.7 | 40.6 | 33.2 | 16.6 | 8.5 | 8.5 | 7.2 | 3.2 | 1.6 |

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Davit Arm 345 kV/161 kV with 69kV Underbuild at Initial 345kV with 69kV Underbuild Operation | Peak | 975/0/118 | 3.1 | 7.1 | 24.4 | 37.0 | 58.3 | 86.7 | 97.5 | 71.1 | 34.6 | 22.2 | 15.6 | 5.4 | 2.6 |
| | Average | 653/0/79 | 2.1 | 4.7 | 16.3 | 24.8 | 39.1 | 58.1 | 65.3 | 47.6 | 23.1 | 14.9 | 10.5 | 3.6 | 1.7 |
| Two Pole H-Frame 345 kV/161 kV | Peak | 975/496 | 5.1 | 12.2 | 56.4 | 100.9 | 157.0 | 161.7 | 122.7 | 61.4 | 69.5 | 56.7 | 36.8 | 9.8 | 4.4 |
| | Average | 653/332 | 3.4 | 8.2 | 37.8 | 67.6 | 105.1 | 108.3 | 82.2 | 41.1 | 46.6 | 38.0 | 24.6 | 6.5 | 2.9 |
| Two Pole H-Frame 345 kV Parallel with Existing Two Pole H-Frame 161 kV | Peak | 975 Parallel 496 | 4.7 | 11.5 | 61.6 | 116.1 | 171.5 | 163.8 | 89.3 | 41.7 | 66.6 | 54.5 | 34.3 | 8.8 | 4.0 |
| | Average | 653 Parallel 332 | 3.1 | 7.7 | 41.2 | 77.8 | 114.9 | 109.7 | 59.8 | 27.9 | 44.6 | 36.5 | 23.0 | 5.9 | 2.7 |
| Existing Single Pole Davit Arm 161 kV/161 kV Parallel With Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service | Peak | 190/132 Parallel 975 | 4.6 | 10.5 | 43.3 | 70.5 | 107.0 | 99.8 | 60.3 | 12.5 | 32.8 | 23.2 | 15.4 | 5.1 | 2.6 |
| | Average | 127/88 Parallel 653 | 3.1 | 7.0 | 29.0 | 47.3 | 71.7 | 66.9 | 40.4 | 8.4 | 21.9 | 15.6 | 10.3 | 3.4 | 1.8 |
| Single Pole Braced Post 161 kV at 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation | Peak | 99 Parallel 236/141 | 0.3 | 0.8 | 8.0 | 15.4 | 11.3 | 5.9 | 5.2 | 8.6 | 19.7 | 27.9 | 9.0 | 0.6 | 0.3 |
| | Average | 66 Parallel 158/94 | 0.2 | 0.5 | 5.3 | 10.3 | 7.5 | 3.9 | 3.5 | 5.8 | 13.2 | 18.7 | 6.0 | 0.4 | 0.2 |

| Structure Type | System Condition | Current (Amps) | Distance to Proposed Centerline (feet) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -300 | -200 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 200 | 300 |
| Single Pole Braced Post 161 kV/161 kV at 161 kV/ 69 kV Initial Operation Parallel with Single Pole Braced Post 161 kV/161 kV at 69 kV/ 161 kV Initial Operation Parallel with Single Pole Braced Post 161 kV at 69 kV Initial Operation | Peak | 370/99 Parallel 236/141 Parallel 390 | 2.7 | 16.7 | 7.9 | 5.2 | 6.5 | 15.7 | 26.9 | 12.9 | 7.7 | 8.9 | 15.3 | 18.0 | 2.7 |
| | Average | 248/66 Parallel 158/94 Parallel 261 | 1.8 | 11.2 | 5.3 | 3.5 | 4.4 | 10.5 | 18.0 | 8.7 | 5.1 | 6.0 | 10.3 | 12.1 | 1.8 |
| Single Pole Davit Arm 345 kV/161 kV with only one 345 kV circuit in service Parallel with Single Pole Davit Arm 345 kV/ 161 kV | Peak | 975 Parallel 761/126 | 6.7 | 25.7 | 107.9 | 71.6 | 48.5 | 38.3 | 37.9 | 47.3 | 69.4 | 99.0 | 88.4 | 13.9 | 3.9 |
| | Average | 653 Parallel 510/84 | 4.5 | 17.2 | 72.2 | 47.9 | 32.5 | 25.7 | 25.4 | 31.7 | 46.5 | 66.4 | 59.3 | 9.3 | 2.6 |

ITC Midwest LLC • 444 Cedar Street, Suite 1020 • St. Paul, MN 55101

January 9, 2014

**VIA EMAIL**

Raymond Kirsch
Minnesota Department of Commerce
Suite 500
85 Seventh Place East
St. Paul, MN 55101

**Re: In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minnesota – Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties**
**MPUC Docket No. ET6675/TL-12-1337**
**EIS Development – Sixth Response**

Dear Mr. Kirsch:

I write to provide a response to your December 30, 2013 request for ITC Midwest LLC to revise the photo simulations previously provided to you on December 19 and 20, 2013. The attached simulations have been revised to include the requested existing easement width identified on each figure. The simulations will be emailed in four batches to accommodate email size limits.

Thank you for your questions and for providing us time to gather the requested information. Please contact me if you have any further questions.

Sincerely,

David B. Grover

David B. Grover
651 222-1000; ext. 2308

Preliminary as of Jan 9, 2014 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 1
Looking North from I-90

Preliminary as of Jan 9, 2014 and Subject to Change

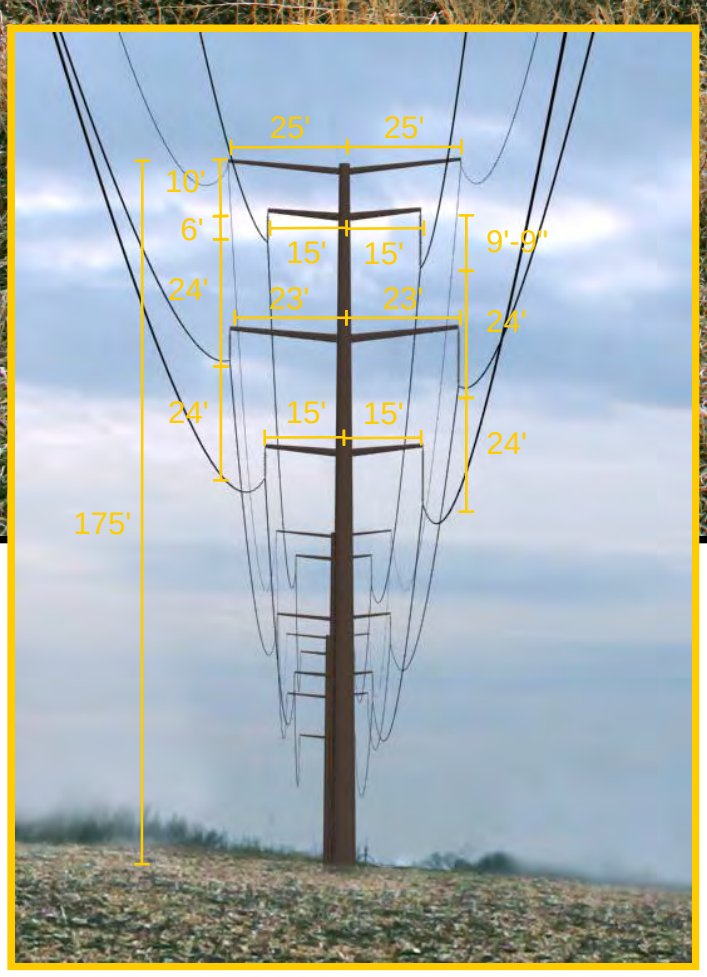
ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 2
Looking South from 170th Street

Preliminary as of Jan 9, 2014 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 4
Looking North from I-90

Preliminary as of Jan 9, 2014 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 2
Looking North from I-90




Preliminary as of Jan 9, 2014 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
Route A
Looking South from 160th Street

Preliminary as of Jan 9, 2014 and Subject to Change

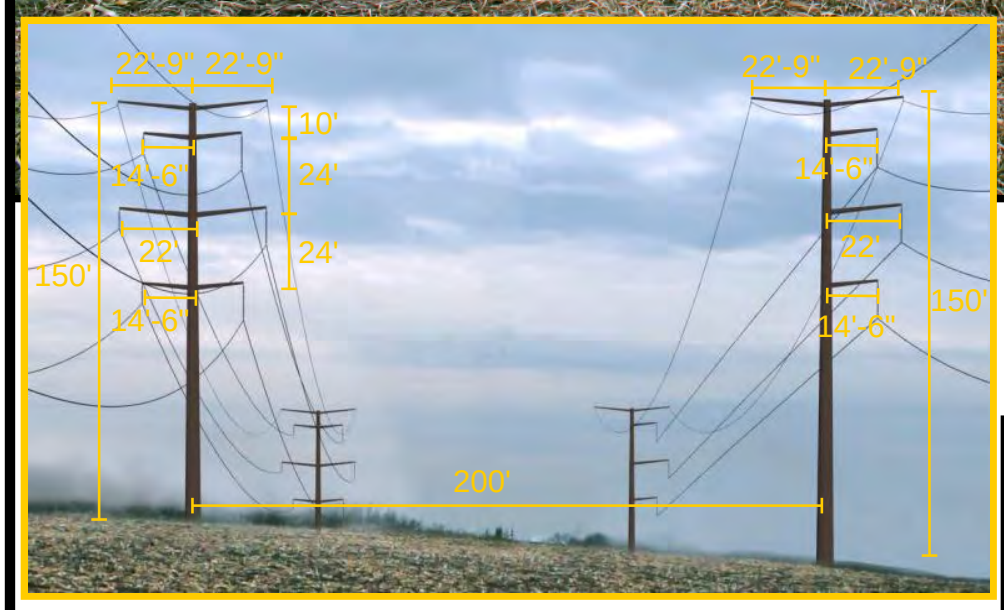
ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 1
Looking North from 160th Street

Preliminary as of Jan 9, 2014 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
Route A and Route B
Associated Facilities
Looking North from 160th Street

Preliminary as of Jan 9, 2014 and Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 2
Looking South from 160th Street




Preliminary as of
Jan 9, 2014 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 KV Project
Docket #ET6675/TL-12-1337
I-90-R
Huntley Substation Option 4
Looking South from 160th Street

Preliminary as of
Jan 9, 2014 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 kV Project
Docket # ET6675/TL-12-1337
Lake Charlotte Crossing
Visual Simulation - Looking West
Parallel Circuit Configuration

Preliminary as of
Jan 9, 2014 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 kV Project
Docket # ET6675/TL-12-1337
Lake Charlotte Crossing
Visual Simulation - Looking West
Double Circuit Configuration

Preliminary as of
Jan 9, 2014 and
Subject to Change

ITC Midwest
Minnesota to Iowa 345 kV Project
Docket # ET6675/TL-12-1337
Fox Lake Crossing
Visual Simulation - Looking South
Double Circuit Configuration

ITC Midwest LLC • 444 Cedar Street, Suite 1020 • St. Paul, MN 55101

January 27, 2014

**VIA EMAIL**

Raymond Kirsch
Minnesota Department of Commerce
Suite 500
85 Seventh Place East
St. Paul, MN 55101

**Re: In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minnesota – Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties**
**MPUC Docket No. ET6675/TL-12-1337**
**EIS Development – Seventh Response**

Dear Mr. Kirsch:

ITC Midwest LLC ("ITC Midwest") prepared the estimates in this spreadsheet in response to a request from the Department of Commerce, Energy Environmental Review and Analysis ("EERA") to provide cost estimates for route alternatives identified in documents provided by email on January 7, 2014. The routes for which cost estimates have been provided were developed by EERA. ITC Midwest prepared these cost estimates for each route using per-mile estimates based on the general structure type (single circuit, double circuit, or triple circuit) for the transmission line plus the cost of associated facilities, including substation facilities. ITC Midwest notes that more precise assumptions were made with respect to costs included in the Route Permit and Certificate of Need applications. This same level of precision was not possible in development of cost estimates for these Scoping Decision alternatives because ITC Midwest has not studied these alternatives in the necessary detail to do so. The cost estimates for the routes you identified are provided with this letter at **Exhibit A**.

ITC Midwest also notes the following assumptions made in these estimates:

- Building the 345 kV circuit along any of the I-90-R alternate routes will have higher construction costs due to more limited options for access and more restrictions for the interstate crossings. An estimate for this additional cost ($30,000 per mile) has been included in the I-90-R alternate routes 1 through 5 and DNR1 as well as A-LH. Also, this additional cost was given consideration in the Fox Lake route variations with the exception of Var-5 and Var-6, which have no segments along I-90.

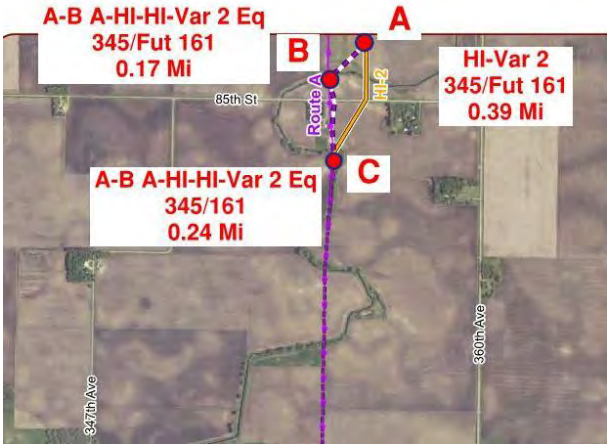
- The cost estimates for I-90-3 through I-90-5 include the estimated cost to remove the existing 161 kV transmission line west of Sherburn and rebuild it to a 345 kV/161 kV transmission line.

Raymond Kirsch
January 27, 2014
Page 2

- Building the 345 kV circuit across Fox Lake would require replacing the existing 161 kV circuit with a double circuit 345 kV/161 kV configuration due to corridor width restraints on both sides of the lake. The lake crossing removal and construction is estimated at a lump sum of $3 million.

- Building the 345 kV circuit across Lake Charlotte could be accomplished by either adding a parallel 345 kV circuit alongside the existing 161 kV line or building a 345 kV/161 kV configuration. While it is less costly to leave the 161 kV in place, the estimate includes the higher cost estimate of a double circuit lake crossing at $3 million.

- Alternate route HI-Var 2 and the equivalent Route A segment are just south of the Faribault Substation. The existing 161 kV circuit terminations must remain and, therefore, ITC Midwest has presumed HI-Var 2 is 345 kV circuit construction only. The Route A segment used for comparison has only a 345 kV circuit on the diagonal portion and 345 kV/161 kV configuration along the existing 161 kV circuit route. Please see the illustration below.




Thank you for your questions and for providing us time to gather the requested information. Please contact me if you have any further questions.

Sincerely,

David B. Grover

David B. Grover

**Exhibit A**
**January 27, 2014**
**Subject to Assumptions Identified in Cover Letter**

## Routes and Route Alternatives

| Lakefield to Huntley Substation | | | | Estimated Costs ($ millions) | | | | Description |
|---|---|---|---|---|---|---|---|---|
| *GIS Route ID* | *Scoping Nomenclature* | *Type* | *Length (mi)* | *Line* | *Substation(s)* | *Associated Facilities* | *Total* | |
| A-LH | A | Full - LH | 57.62 | 139.7 | 39 | 3 | 181.7 | |
| B-LH | B | Full - LH | 55.47 | 122.6 | 39 | 3 | 164.6 | |
| I90-1 | A+I-90+I-90(M5)+I-90(M6)+M12+A | Full - LH | 57.03 | 141.1 | 39 | 3 | 183.1 | Drops down to I-90 at Jackson Airport connector east; double circuit with existing 161 along I-90. |
| I90-2 | A+I-90(M5)+I-90(M6)+M12+A | Full - LH | 55.55 | 135.9 | 39 | 3 | 177.9 | |
| I90-3 | A+I-90+I-90(M5)+I-90(M6)+I-90+New | Full - LH | | 140.6 | 39 | 4.3 | 183.9 | Drops down to I-90 at Jackson Airport connector east; Huntley Substation Option 3 from scoping decision |
| I90-4 | A+I-90+I-90(M5)+I-90(M6)+I-90+A | Full - LH | | 140.9 | 39 | 5.4 | 185.3 | Drops down to I-90 at Jackson Airport connector east; Huntley Substation Option 4 from scoping decision; going north on Route A |
| I90-5 Opt1* | A+I-90+I-90(M5)+I-90(M6)+I-90 | Full - LH | | 133.5 | 39.6 | 23.7 | 196.8 | Drops down to I-90 at Jackson Airport connector east; Huntley Substation Option1 |
| I90-5 Opt2* | A+I-90+I-90(M5)+I-90(M6)+I-90 | Full - LH | | 133.5 | 39.6 | 18.6 | 191.7 | Drops down to I-90 at Jackson Airport connector east; Huntley Substation Option 2 |
| I90-DNR1 | Removal of 161 kV across lakes and relocation along 345 kV line | Relocate 161kv | | 135.9 | 39.2 | 10.6 | 185.7 | Same as I90-2, except pick up 161 at Fox Lake, double circuit with 345 until intersection of Route B and M-12, where 161 hops off and goes to Rutland substation. 161 then rejoins 345 at Route A heading to Huntley. |
| | | | | | | | | |
| **Huntley Substation to Iowa Border** | | | | | | | | |
| *GIS Route ID* | *Scoping Nomenclature* | *Type* | *Length (mi)* | *Line* | *Substation(s) - I* | *Associated Facilities* | *Total* | |
| A1-HI | A | Full - HI | 15.59 | 36.7 | 0 | 0 | 36.7 | |
| B1-HI | B | Full - HI | 17.58 | 37.2 | 0 | 0 | 37.2 | |
| A2-HI* | A* | Full - HI | 12.05 | 28.5 | 0 | 0 | 28.5 | |
| B2-HI* | B* | Full - HI | 13.42 | 28.3 | 0 | 0 | 28.3 | |

*These shortened HI routes are to be only used if the southern Huntley Substation along I-90 (via I90-5) is chosen.

## Route Variations

| Jackson Airport Variations | | | | Estimated Costs ($ millions) | | | Description |
|---|---|---|---|---|---|---|---|
| *GIS Route ID* | *Scoping Nomenclature* | *Type* | *Length (mi)* | *Line* | *Associated Facilites* | *Total* | |
| JA-Var1 | A+JMAW+B+JMAE | Variation | 9.58 | 20.3 | 0 | 20.3 | |
| JA-Var2 | A+J1/J3+J2/J4+A | Variation | 8.22 | 19.2 | 0 | 19.2 | |
| JA-Var3 | A+J2/J4+A | Variation | 8.24 | 19.2 | 0 | 19.2 | |
| A-LH - JA Eq | A | Equivalent | 7.71 | 18.1 | 0 | 18.1 | |
| | | | | | | | |
| **Fox Lake Variations** | | | | | | | |
| *GIS Route ID* | *Scoping Nomenclature* | *Type* | *Length (mi)* | *Line* | *Associated Facilites* | *Total* | |
| FL-Var1 | A+M4+M3+A | Variation | 12.57 | 33.7 | 0 | 33.7 | Double circuit crossing; specialty structures |
| FL-Var2 | A+M7+A | Variation | 12.88 | 28.8 | 0 | 28.8 | |
| FL-Var3 | A+M5+A | Variation | 12.91 | 29.6 | 0 | 29.6 | |
| FL-Var4 | A+M5+B+M2 | Variation | 12.91 | 29.2 | 0 | 29.2 | |
| FL-Var5 | M1+B+M3+A | Variation | 13.83 | 30.7 | 0 | 30.7 | |
| FL-Var6 | A+FLW+B+M3+A | Variation | 13.04 | 30.1 | 0 | 30.1 | |
| A-LH - FL Eq | A | Equivalent | 13.19 | 29.5 | 0 | 29.5 | |
| FL-DNR1 | Removal of 161 kV across Fox Lake and relocation along 345 kV line | Relocate 161kv | | 29.6 | 3 | 32.6 | Same as FL-Var3 except pickup 161 line at Fox Lake and double circuit with 345 to Route A |
| FL-DNR2 | Removal of 161 kV across Fox Lake and relocation along 345 kV line | Relocate 161kv | | 29.2 | 3.4 | 32.6 | Same as FL-Var4 except pickup 161 line at Fox Lake and double circuit with 345 to Route A |
| | | | | | | | |
| **Lake Charlotte Variations** | | | | | | | |
| *GIS Route ID* | *Scoping Nomenclature* | *Type* | *Length (mi)* | *Line* | *Associated Facilites* | *Total* | |
| LC-Var1 | A+M11 | Variation | 5.07 | 11.6 | 0 | 11.6 | |
| LC-Var2 | A+M13 | Variation | 5.27 | 12.1 | 0 | 12.1 | |
| LC-Var3 | A+M8+B+A | Variation | 5.87 | 12.6 | 0 | 12.6 | |
| LC-Var4 | A+M10 | Variation | 4.36 | 13.6 | 0 | 13.6 | Parallel or double circuit crossing; double circuit would require specialty structures |
| LC-Var5 | M9 | Variation | 5.28 | 11.9 | 0 | 11.9 | |
| A-LH - LC Eq | A | Equivalent | 5.87 | 12.9 | 0 | 12.9 | |
| LC-DNR1 | Removal of 161 from Lake Charlotte, A + M14 | Relocate 161kv | | 12.9 | 2.7 | 15.6 | Same as Route A, but 161 follows A, double circuit with 345, until M-14, where 161 proceeds north to Rutland substation. 161 rejoins A after Rutland. |
| LC-DNR2 | Removal of 161 from Lake Charlotte, A + M13+M14 | Relocate 161kv | | 12.1 | 2.5 | 14.6 | Same as LC-Var2, but 161 is double circuit with 345 until M-14, where 161 proceeds north to Rutland. 161 rejoins A after Rutland. |
| | | | | | | | |
| **Center Creek WMA Variations** | | | | | | | |
| *GIS Route ID* | *Scoping Nomenclature* | *Type* | *Length (mi)* | *Line* | *Associated Facilites* | *Total* | |
| CC-Var1 | M17 | Variation | 0.78 | 1.7 | 0 | 1.7 | |
| B-LH - CC Eq | B | Equivalent | 0.78 | 1.7 | 0 | 1.7 | |

**Exhibit A**
**January 27, 2014**
**Subject to Assumptions Identified in Cover Letter**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Huntley Substation to Iowa Border Variations** | | | | | | |
| *GIS Route ID* | *Scoping Nomenclature* | *Type* | *Length (mi)* | *Line* | *Associated Facilites* | *Total* |
| HI-Var1 | F1 | Variation | 1.19 | 2.8 | 0 | 2.8 |
| A-HI - HI-Var1 Eq | A | Equivalent | 1.01 | 2.4 | 0 | 2.4 |
| HI-Var2 | F2 | Variation | 0.39 | 0.8 | 0 | 0.8 |
| A-HI - HI-Var2 Eq | A | Equivalent | 0.41 | 0.9 | 0 | 0.9 |
| HI-Var3 | F3 | Variation | 0.76 | 1.7 | 0 | 1.7 |
| B-HI - HI-Var3 Eq | B | Equivalent | 0.77 | 1.7 | 0 | 1.7 |
| HI-Var4 | PGLN+B+PGLS | Variation | 2.97 | 7.1 | 0 | 7.1 |
| A-HI - HI-Var4 Eq | A | Equivalent | 1.00 | 2.4 | 0 | 2.4 |
| HI-Var5 | F4 | Variation | 2.50 | 5.9 | 0 | 5.9 |
| A-HI - HI-Var5 Eq | A | Equivalent | 2.46 | 5.9 | 0 | 5.9 |

**From:** Grover, David
**Sent:** Tuesday, January 07, 2014 10:18 AM
**To:** 'Kirsch, Raymond (COMM)'
**Subject:** RE: Electronic Interference Question

Hi Ray,

We are agreeable to the following commitment, which simply adds a few qualifiers to the statement you sent us before Christmas. Let me know if it works. Thanks.

ITCM indicates that should electronic interference occur as a result of the project, it will work with affected landowners on a case-by-case basis to assess the cause of the interference and, to the extent practicable, restore electronic reception to pre-project quality.

Also – regarding your request last week for assistance with cost estimates, when we spoke about it, you indicated that you were expecting some maps and tables from Barr Engineering that illustrate the alternatives where you would want us to develop cost estimates. Have you received those? Our internal folks would like more definition of the request before we determine if we can provide this information.

Dave

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**From:** Kirsch, Raymond (COMM) [mailto:raymond.kirsch@state.mn.us]
**Sent:** Friday, December 20, 2013 11:05 AM
**To:** Grover, David
**Cc:** Kirsch, Raymond (COMM)
**Subject:** Electronic Interference Question

Dave,

In preparing the EIS, we are describing potential impacts to electronic devices in the project area, including radio, TV, wireless, GPS.

Typically, though not always, applicants include in their route permit applications discussion of their commitment to correct electronic interference issues caused by the project. And we include this commitment in the EIS in the discussion of mitigating such interference.

I do not see, in your application, any statements regarding this topic (see, e.g. Section 6.5.10). I may be missing it. If I'm not, would you be agreeable to the following commitment:

> ITCM indicates that should electronic interference occur as a result of the project, it work with affected landowners to restore electronic reception to pre-project quality.

Let me know. You may certainly suggest edits or modifications.

Thanks,

Ray

Ray Kirsch
Energy Environmental Review and Analysis
Minnesota Department of Commerce
651-539-1841 | raymond.kirsch@state.mn.us

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Please consider the planet before you print.

**From:** Grover, David
**Sent:** Friday, January 24, 2014 9:58 AM
**To:** 'Kirsch, Raymond (COMM)'
**Cc:** Jack Middleton (jmiddleton@burnsmcd.com)
**Subject:** RE: Routing Clarification at Jackson Airport

Hi Ray – I have discussed this question with others, and ITC Midwest would not propose to remove the existing 161 kV line as part of the project if this configuration (the west and east connectors and Route B) were chosen as the option around the Jackson airport. Let me know if you have any other questions.

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**From:** Kirsch, Raymond (COMM) [mailto:raymond.kirsch@state.mn.us]
**Sent:** Wednesday, January 22, 2014 12:44 PM
**To:** Grover, David
**Cc:** Kirsch, Raymond (COMM); Jack Middleton (jmiddleton@burnsmcd.com)
**Subject:** Routing Clarification at Jackson Airport

Dave,

As we are working on the EIS, this question came up about routing at the Jackson Municipal airport….

If route A were selected from Lakefield and the Jackson west and east connectors were used to jump up to route B and back down to route A, would the existing 161 kV line be removed and double circuited with the 345 for this stretch or would it remain in place?

It seems clear to us that the 161 line would be removed and double circuited for route A and small variations on route A. But not so clear what would happen if the connectors were used in conjunction with route B.

Your thoughts on this much appreciated,

Ray

Ray Kirsch
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