

**PUB MFR 181**

**MMTP**

**Provide the Capital Project Justification for the MMTP and any addenda.**

Please find as Attachments to this response the Capital Project Justifications and Addenda with respect to the Manitoba-Minnesota Transmission Project (previously known as the Dorsey – U.S. Border 500kV Transmission Line).

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REVIEWED BY EXECUTIVE COMMITTEE  
MINUTE # 1236.04

DATE: 2008 10 07  
Accounting Research & Capital Department

CAPITAL PROJECT JUSTIFICATION  
FOR

Dorsey – US Border New 500 kV Transmission Line

REVIEWED BY:  
(Owning Dept Manager)

NOTED BY:  
(if applicable)

Coordinating Division:

Constructing Division:

Financial Department:  
(if over \$1 million)

RECOMMENDED FOR IMPLEMENTATION:

Owning Div. Manager: *[Signature]*

Business Unit V.P.: *[Signature]*  
09 09 23.

BUDGET \$: (Total Net Cost)	\$204,764,000
START DATE: (1 <sup>st</sup> Cost Flow)	2011 04
IN-SERVICE DATE: (Last Major In-service Date)	2018 05
RISK MATRIX/ BUSINESS CASE TIER:	N/A
INVESTMENT REASON:	C1.02 New Load – Interconnections

OWNING DIVISION: Power Planning

LM NODE NUMBER: 1.5.1.5.2.1

W.B.S. NUMBER: P-14684

MAJOR ITEM ☒ DOMESTIC ITEM ☐

PREPARED BY: C.R. Winston

DATE PREPARED: 2008-09-18

REPORT NUMBER:

FILE NUMBER (Optional):

## MANITOBA HYDRO CAPITAL PROJECT JUSTIFICATION

### Project Name

Dorsey – US Border New 500 kV Transmission Line

### Recommendation

To design and construct the 500 kV transmission interconnection line to the US border.

### Project Scope

The project scope consists of transmission between Riel and Dorsey stations and transmission between Riel Station and the US border as well as any costs associated with terminating the line in Manitoba. Other activities include acquiring property, conducting environmental impact assessment, consulting with communities, obtaining licenses and performing environmental monitoring for all facilities.

### Background

This project is included in the 2008/09 Power Resource Plan to meet export sales to Wisconsin Public Service and Minnesota Power. An allowance of \$150 million (in 2008 dollars) was used, based on feasibility level estimates from T&D and consultants.

## JUSTIFICATION—BUSINESS CASE ANALYSIS (SUMMARY):

### Justification and Link to Corporate/Business Unit Goals

### ANALYSIS OF ALTERNATIVES:

#### Economic Analysis

##### Discount Rate

For current corporate rates see G911

%

For clarification on hurdle rates, contact the Economic Analysis Department

##### Recommended Option

**NPV**  
(= PV of BENEFITS - PV of COSTS)

##### Other Alternatives Considered

**NPV**  
(= PV of BENEFITS - PV of COSTS)

### Risk Analysis

Capital Project Justification

**RESOURCE REQUIREMENTS AND CAPITAL BUDGET ESTIMATE:**

**Resource Requirements**

Resource requirements have not been detailed.

**Total Budget**

The impact on annual budget requirements is as follows (in thousands of dollars):

Fiscal Year	Proposed Budget
2011/12	\$ 843
2012/13	\$ 1,784
2013/14	\$ 10,738
2014/15	\$ 11,769
2015/16	\$ 56,745
2016/17	\$ 58,464
2017/18	\$ 60,986
2018/19	\$ 3,435
Total	\$ 204,764

**Proposed Schedule**

Construction start date is April 2011.

**Related Projects**

**Reference Documents**

2008/09 Power Resource Plan Report PPD #08-07

CEN11 Rev. 07-12

# **CAPITAL EXPENDITURE REVISION** (IN THOUSANDS OF DOLLARS)

Title <b>DORSEY-US BORDER NEW 500KV TRANS- T/L</b>					Investment Management Node: <b>9.5.1.5.2.1</b>	
Owning Division <b>TRANSMISSION PLANNING &amp; DESIGN</b>			Coordinating Division <b>TRANS CONST &amp; LINE MTCE</b>			
					Project Number: <b>P14684</b>	
<p><b>DESCRIPTION:</b> DESIGN AND CONSTRUCT ONE 63-KM 500-KV TRANSMISSION LINE BETWEEN THE RIEL AND DORSEY STATIONS. DESIGN AND CONSTRUCT ONE 125-KM 500-KV TRANSMISSION LINE BETWEEN THE DORSEY STATION AND THE U.S. BORDER. ACQUIRE PROPERTY FOR THE RIGHT OF WAY. CONDUCT ENVIRONMENTAL IMPACT ASSESSMENT, CONSULT WITH COMMUNITIES, OBTAIN LICENSING AND PERFORM ENVIRONMENTAL MONITORING FOR ALL FACILITIES.</p> <p><b>JUSTIFICATION:</b> MANITOBA HYDRO HAS RECEIVED TRANSMISSION SERVICE REQUESTS FOR MORE THAN 750 MW OF NEW IMPORT AND EXPORT SERVICE BETWEEN THE U.S. AND MANITOBA. TERM SHEETS HAVE BEEN SIGNED FOR A POTENTIAL 500 MW POWER SALE TO WISCONSIN AND A 250 MW POWER SALE TO MINNESOTA. THESE ADDITIONAL POWER SALES REQUIRE THE CONSTRUCTION OF A NEW HIGH VOLTAGE TIE LINE BETWEEN MANITOBA AND THE U.S.</p> <p><b>INVESTMENT CATEGORIZATION:</b> EXPORT POWER - TRANSMISSION SERVICE DELIVERY - NEW ASSET ADDITION 50% RELIABILITY - TRANSMISSION SERVICE DELIVERY - NEW ASSET ADDITION 50%</p> <p><b>REVISION:</b> NEW ITEM.</p>						
IN SERVICE DATES						
2018/05/31		204785				Base estimate 2008/04/01 CLASS 1
						Work start date 2011/04/01
REV. AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date (Overhead expend)						
<b>V-HAP TOTAL</b>						
REV. AMOUNTS:						
Actual cost to date (Overhead expend)						
Auth 2011/12	762	54	27			843
Reg 2012/13	1524	141	119			1784
2013/14	9144	1043	551			10738
2014/15	9144	1247	1328			11719
2015/16	45720	7275	3750			56745
2016/17	42672	7780	8012			58464
2017/18	40272	8295	12418			60985
2018/19	782	175	2490			3435
<b>V-HLD TOTAL</b>	<b>150900</b>	<b>26011</b>	<b>23783</b>			<b>204784</b>
Prepared By: <i>[Signature]</i> 2008/09/18 1:19PM	Approved By: <i>[Signature]</i> 09/19	Approved By: <i>[Signature]</i> 09/19	Approved By: <i>[Signature]</i> 09/19	Approved By: <i>[Signature]</i> 09/19	Approved By: <i>[Signature]</i> 09/19	Approved By: <i>[Signature]</i> 09/19

### CAPITAL EXPENDITURE REVISION

Phone: 54234

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Forecasted Monthly Exp.	GROSS	ESCALATION	INTEREST CAP.	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulated
2008/09 Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							
TOTAL							
2009/10 Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							
TOTAL							

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018/04

# CAPITAL PROJECT JUSTIFICATION ADDENDUM FOR

Dorsey – US Border New 500 kV Transmission

Addendum Number 01

APPROVED BY EXECUTIVE COMMITTEE  
MINUTE # 1453.03

DATE: 2013 08 20  
Financial Planning

REVIEWED BY:  
(Owning Dept Manager)

NOTED BY:  
(If applicable)

Coordinating Division:

Constructing Division:

Financial Department:  
(if over \$1 million)

RECOMMENDED FOR IMPLEMENTATION:

Owning Div. Manager:

Business Unit V.P.:

PRIMARY JUSTIFICATION:  
Indicate key project driver(s):

- |   |   |
|---|---|
| <input type="checkbox"/> Safety                   | <input type="checkbox"/> Customer Service |
| <input checked="" type="checkbox"/> System Supply | <input type="checkbox"/> Efficiency       |
| <input type="checkbox"/> System Reliability       | <input type="checkbox"/> Environmental    |

NERC COMPLIANCE\*: ☒ YES ☐ NO

\*Determine if the project requires compliance with North American  
Electric Reliability Corporation (NERC) CIP Cyber Security Standards.

PREV. APPROVED BUDGET \$:  
(Use \$ value from approved CPI  
or last approved CPI Addendum) \$204,754,000

REVISED BUDGET \$:  
(Total Net Cost) \$350,346,000

START DATE:  
(1<sup>st</sup> Cost Flow) 2010 03

PREV. APPROVED ISD:  
(Use In-service Date from approved  
CPI or last approved CPI Addendum) 2018 05

REVISED ISD:  
(Last Major In-service Date) 2019 10

RISK MATRIX/  
BUSINESS CASE TIER:  
(Optional)

INVESTMENT REASONS:  
(Optional)

OWNING DIVISION: Power Planning

LM NODE NUMBER: 1.5.2.4.2.1

W.B.S. NUMBER: P:16957, P:16958, P:16959,  
P:16961, P:16962, P:21180, P:21616

MAJOR ITEM ☒ DOMESTIC ITEM ☐

PREPARED BY: C.R. Winstone

DATE PREPARED: 2013 07 31

REPORT NUMBER:

FILE NUMBER (Optional):

001	2013 05 13	Update Costs for Manitoba Portion of new line	CRW	
ADDENDUM NUMBER	DATE (yyyy mm dd)	REVISION	REVISED BY	APPROVED BY

## MANITOBA HYDRO CAPITAL PROJECT JUSTIFICATION ADDENDUM

<b>Project Name</b> (This section is required for all Addendums).
Dorsey – US Border New 500 kV Transmission Line

<b>Recommendation</b> (This section is required for all Addendums).
Increase the budget from \$204.8 M to \$350.3 M to reflect updated costs for equipment to terminate line at Riel and Dorsey and communication equipment.

<b>Project Scope</b> (This section is to be filled out only if there is a change to the scope).
A change in scope includes a Phase Shifting transformer at the Glenboro station to control North Dakota-Manitoba loop flow.

<b>Background</b> (This section is to be filled out only if there is information relevant to the recommendation).
The need for phase shifting transformers has only recently been identified, and is a \$21.5 M increase in scope from the original CPJ. The project in-service date has changed from 2018 05 to 2019 10 reflecting the current sales negotiations with Minnesota Power and Wisconsin Public Service.

<b>Justification</b> (This section is required for all addendums).
This project has been included in resource plans since the 2008/09 Power Resource Plan. It is required to meet export sales to Wisconsin Public Service and Minnesota Power.

**ANALYSIS OF ALTERNATIVES:** (This section is to be filled out only if there is a change to which alternative is being recommended).

<b>Economic Analysis</b>		
<b>Discount Rate</b>	For current corporate rates see G911	For clarification on hurdle rates, contact Economic Analysis Department

Recommended Option	NPV Benefits/(Costs)

Other Alternatives Considered	NPV Benefits/(Costs)
List each alternative considered as well as its calculated NPV.	

<b>Risk Analysis –</b> (This section is to be filled out only if there is a change to the project risk).
The design of the transmission line is dependent on the final negotiations of potential sales with Wisconsin Public Service and Minnesota Power, and potentially others. Final design could consist of only 230 kV line.



Capital Project Justification Addendum

**Risk Analysis –** (This section is to be filled out only if there is a change to the project risk).

if only Minnesota Power consummates the sale. Conversely, Manitoba Hydro may be required to own a share of the US portion of the line if a 500 kV line is constructed.

Not constructing this line in time for the WPS Sale would result in either a smaller 230 kV line being constructed to serve only the 250 MW MP Sale, or potentially result in no new interconnection. Either result would affect the long-term development plan currently recommended in the Power Resource Plan.

The proposed line in both Canada and the US will incur ongoing operation and maintenance costs, and the US portion will require annual management fees.

**Total Budget –** (This section is required for all Addendums).

The impact on annual budget requirements is as follows (in thousands of dollars):

Fiscal Year	Prev. Approved CPJ/Addendum	Proposed CPJ Addendum	Increase (Decrease)
Prev. Actuals	\$ 2,627	\$ 1,321	\$ (1,306)
2013/14	\$ 10,738	\$ 444	\$ (10,294)
2014/15	\$ 11,769	\$ 3,763	\$ (8,006)
2015/16	\$ 56,745	\$ 29,706	\$ (27,039)
2016/17+	\$ 122,885	\$ 315,112	\$ 192,227
Total	\$ 204,764	\$ 350,346	\$ 145,582

**Proposed Schedule** (This section is to be filled out only if there is a change to the project schedule).

The proposed In-Service Date is 2020, coincident with the start of the MP Sale.

**Related Projects** (This section is to be filled out only if changed).

**Reference Documents** (This section is to be filled out only if changed).

2012/13 Power Resource Plan.

CDR11 Rev. 07/12

**CAPITAL EXPENDITURE REVISION**  
(IN THOUSANDS OF DOLLARS)

<b>Title</b> DORSEY-U.S. 500KV TIE LINE		<b>Investment Management Node:</b> 1.5.2.4.2.1	
<b>Operating Division</b> Transmission Planning & Design		<b>Coordinating Division</b> Transmission Construction & Line Mgmt	
		<b>Project Number:</b> P:16957	

**DESCRIPTION:**  
Acquire property rights for and design, construct and commission a 235km 500kv AC single-circuit transmission line from Dorsey Station to the US border. The first portion of the line from Dorsey is assumed to be located on the south corridor, heading south and then east on the southside of Winnipeg, and then turning southward to the US border. The line conductor will be triple bundle 1272 MCM 54/19 ACSSR Pheasant type. In addition, the line will have two shield conductors, one of which will include an optical fibre (OPGW).

**JUSTIFICATION:**  
Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 1100 MW. The project will be completely funded by the Eligible Customer - Power Supply.

**CAPITAL INVESTMENT CATEGORIZATION:**  
Reliability Import/Export Related - Transmission Service Delivery - New Asset Addition - 100%

**REFERENCE:**  
MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request

**REVISION:**  
2013 07 04: Projects P:16957, P:16958, P:16959, P:16961, P:16962, P:21180 and P:21616 are replacing project P:14684. The sum of the Total Net Cost for the new WBSs is \$350.3M, which is \$145.5M higher than the previously approved CPJ. This increase reflects changes to scope, as follows:  
- A change to the routing of the line, which increased the length by 110km.  
- An expansion of the Glenboro Station to include a new phase shifting transformer.

The sum of \$350.3M matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.

Contingency: 423368

IN SERVICE DATES						Base estimate 2013/04/01 CLASS 2 Work start date 2010/04/01
2016/02/28	6210					
2019/10/01	202591					
<b>PREV AUTHORITY</b>	<b>GROSS</b>	<b>ESCALATION</b>	<b>INT. CAPITALIZED</b>	<b>SALVAGE</b>	<b>CONTRIBUTION</b>	<b>TOTAL NET COST</b>
Actual cost to date:	1128		192			1320
(Over/under expense)	-1128		-192			-1320
<b>V-CPJ TOTAL</b>						
<b>REV. AMOUNTS:</b>						
Actual cost to date:	1128		192			1320
(Over/under expense)						
Auth 2013/14	1		82			83
Rev 2014/15	1630	41	93			1764
2015/16	7143	267	376			7786
2016/17	64837	4345	1930			71115
2017/18	33350	2891	5476			41717
2018/19	21349	2258	7968			31575
2019/20	42414	6574	6370			55358
2020/21	74	11				85
<b>V-CEO TOTAL</b>	121926	15360	21497			206803

Prepared by 13/08/14 TRANSMISSION DIVISION	Reviewed by 13/08/20 TRANSMISSION DIVISION	Approved by 13/08/14 VICE-PRESIDENT
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### CAPITAL EXPENDITURE REVISION

Project Number:  
P: 16057

2013/08/14 09:50AM

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### CAPITAL EXPENDITURE REVISION

Project Number  
P.16958

2013/08/14 09:50AM

<b>RIEL 230/500 KV STN-AUTO TRANSFMR INSTAL</b>		<b>Investment Management Node:</b> 1.5.2.4.2.1
<b>Driving Division</b> Transmission Planning & Design	<b>Coordinating Division</b> Transmission Construction & Line Mctce	<b>Project Number:</b> P:16959

**DESCRIPTION:**  
 Design, install and commission two 500 kV breakers, one 230kV breaker, two double wye undergrounded 46kV 73.4MVAR shunt capacitor banks & 1200MVA 230-500kV auto transformer and associated equipment.  
 Design, install and commission, one 230 kV breaker w/3 phase CT's for the Riel 230 kV Station as well as a bay modification. At the Riel 500 kV Station suggested equipment will include 500 kV (4000A) bus extension and bay modification, one 500 kV breaker w/3 phase CT's, and 3 x 230-500 kV (230/320/400 MVA) single phase autotransformers with 3-73.4 MVAR tertiary capacitors complete with reactors and breaker for bank 72.

**JUSTIFICATION:**  
 Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 1100 MW. The project will be completely funded by the Eligible Customer - Power Supply.

**CAPITAL INVESTMENT CATEGORIZATION:**  
 Reliability Import/Export Related - Transmission Service Delivery - New Asset Addition - 100%

**REFERENCE:**  
 MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request

**REVISION:**  
 2013 07 04: Projects P:16967, P:16958, P:16953, P:16951, P:16952, P:21180 and P:21616 are replacing project P:14694. The sum of the Total Net Cost for the new WBSs is \$350.3M, which is \$145.5M higher than the previously approved CPJ. This increase reflects changes to scope, as follows:  
 - A change to the routing of the line, which increased the length by 110km.  
 - An expansion of the Glenboro Station to include a new phase shifting transformer.

The sum of \$350.3M matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.

Contingency: 18946

20130814



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**CAPITAL EXPENDITURE REVISION**  
(IN THOUSANDS OF DOLLARS)

Title <b>XXDORSEY-US BORDER NEW 500KV TRANS- T/L</b>		Investment Management Model: <b>1.5.2.4.2.1</b>
Planning Division <b>Transmission Planning &amp; Design</b>	Coordinating Division <b>Transmission Construction &amp; Line Mgmt</b>	Project Number: <b>P-14684</b>

**DESCRIPTION:**

Design and construct one 125km 500kV transmission line between the Dorsey Station and the U.S. border. Acquire property for the right of way. Conduct environmental impact assessment, consult with communities, obtain licensing and perform environmental monitoring for all facilities.

**JUSTIFICATION:**

Manitoba Hydro has received transmission service requests for more than 750 MW of new import and export service between the U.S. and Manitoba. Term sheets have been signed for a potential 500 MW power sale to Wisconsin and a 250 MW power sale to Minnesota. These additional power sales require the construction of a new high voltage tie line between Manitoba and the U.S.

**CAPITAL INVESTMENT CATEGORIZATION:**

Reliability - Import/Export - Transmission Service Delivery - New Asset Addition

**REVISION:**

2013 07 04: Project P-14684 is cancelled and replaced with projects P-16957, P-16958, P-16959, P-16961, P-16962, P-21180 and P-21616. The sum of the Total Net Cost for the new WBSs is \$250.3M, which is \$145.6M higher than the previously approved CPJ. This increase reflects changes to scope, as follows:

- A change to the routing of the line, which increased the length by 110km.
- An expansion of the Glenboro Station to include a new phase shifting transformer.

IN SERVICE DATES						Base estimate 2010/04/01 CLASS 1
						Work start date 2010/03/01
PREV AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date:						
(Over/under spend):	2286	195	146			2627
2013/14	9144	1063	581			10738
2014/15	9144	1247	1376			11767
2015/16	45720	7275	3750			56745
2016/17	42672	7780	8012			58464
2017/18	40272	8096	12418			60986
2018/19	762	175	2436			3473
<b>V-CPJ TOTAL</b>	<b>150000</b>	<b>26011</b>	<b>28753</b>			<b>204764</b>
REV. AMOUNTS:						
Actual cost to date:						
(Over/under spend):						
Auth: 2013/14						
Req: 2014/15						
2015/16						
2016/17						
2017/18						
2018/19						
<b>V-CEG TOTAL</b>						

2013/08/14

09:48AM

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### CAPITAL EXPENDITURE REVISION

2013/08/14 09:49AM

CDR/10 Rev. 07-12

**CAPITAL EXPENDITURE REVISION**  
(IN THOUSANDS OF DOLLARS)

Title: <b>MB-US 500 kV FACILITIES-COMMUNICATION</b>						Investment Management Node: <b>1.5.2.4.2.1</b>
Owning Division: Transmission Planning & Design			Coordinating Division: Transmission System Operations			Project/Number: <b>P-16861</b>

**DESCRIPTION:**  
Design, install and commission communication systems additions (including power line carrier, wave traps and associated equipment) required for the teleprotection and control and telemetry of the new Dorsey-US Border 500kV Tie Line.

**JUSTIFICATION:**  
Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 1100 MW. The project will be completely funded by the Eligible Customer - Power Supply.

**CAPITAL INVESTMENT CATEGORIZATION:**  
Reliability Import/Export Related - Transmission Service Delivery - New Asset Addition - 100%

**REFERENCE:**  
MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request

**REVISION:**  
2013-07-04: Projects P-16857, P-16858, P-16859, P-16861, P-16862, P-21180 and P-21616 are replacing project P-14684. The sum of the Total Net Cost for the new WBSs is \$350.3M, which is \$145.5M higher than the previously approved CPJ. This increase reflects changes to scope, as follows:  
- A change to the routing of the line, which increased the length by 110km.  
- An expansion of the Glenboro Station to include a new phase shifting transformer.

The sum of \$350.3M matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.

Contingency: \$500

IN SERVICE DATES						Base estimate 2013/04/01 CLASS 1
2019/10/31	4251					Work start date 2018/01/01
PREV. AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date: (Over/under expend)						
V-CPJ TOTAL						
REV. AMOUNTS:						
Actual cost to date: (Over/under expend)						
Auth: 2013/14						
Rev: 2014/15						
2015/16	12	1				13
2016/17	132	10	2			144
2017/18	1268	111	46			1425
2018/19	1360	149	137			1646
2019/20	802	104	121			1027
2020/21	4	1				5
V-CED TOTAL	3579	376	308			4261

Prepared by: <i>[Signature]</i> 13/08/14	Reviewed by: <i>[Signature]</i> 13/08/20	Approved by: <i>[Signature]</i> 18/05/14	Vice President
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2013/08/14 09:51AM

### CAPITAL EXPENDITURE REVISION

Project Number  
P: 16361

Forecast Month-Year	GROSS	ESCALATION	INTEREST CAP.	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulated
2013/14							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							
TOTAL							
2014/15							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							
TOTAL							

09:51AM

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Project Number  
P-16962

2013/08/14 09:51 AM

CEN11 Rev. 07-12

# CAPITAL EXPENDITURE REVISION

(IN THOUSANDS OF DOLLARS)

Title <b>Glenboro Phase Shifter</b>	Investment Management Node: <b>1.5.2.4.2.1</b>
Owning Division <b>Transmission Planning &amp; Design</b>	Coordinating Division <b>Transmission Construction &amp; Line Mctg</b>
	Project Number: <b>P-21180</b>

**DESCRIPTION:**

Design, procurement and installation of a new 300MVA phase shifter at Glenboro South Station.

**JUSTIFICATION:**

Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 1100 MW. The project will be completely funded by the Eligible Customer - Power Supply.

Study results show that a phase shifting transformer is needed to control the power flow distributions on the MH-US interface. The following are the major justifications for the G82R phase shifting transformer:

1. To control North Dakota-Manitoba loop flow for exporting power to US
2. To restrict flow on G82R for power importing from US to MH
3. To offload line R50M for prior outage conditions

**CAPITAL INVESTMENT CATEGORIZATION:**

Reliability Import/export Related - Transmission Service Delivery - New Asset Addition - 100%

**REVISION:**

2013-07-04: Projects P-16957, P-16958, P-16959, P-16961, P-16962, P-21180 and P-21616 are replacing project P14654. The sum of the Total Net Cost for the new W80s is \$390.3M, which is \$145.5M higher than the previously approved CPJ. This increase reflects changes to scope, as follows:

- A change to the routing of the line, which increased the length by 110km.
- An expansion of the Glenboro Station to include a new phase shifting transformer.

The sum of \$390.3M matches the estimate submitted for inclusion in System Planning's study report entitled "MB-HM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.

CONTINGENCY: \$2826

IN SERVICE DATES						Base estimate 2013/04/01 - CLASS 2
2013/10/31	19277					Work start date 2013/04/01
PREL. AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date: (Over/under expend)						
<b>V-CPJ TOTAL</b>						
<b>REV. AMOUNTS:</b>						
Actual cost to date: (Over/under expend)						
Auth. 2013/14	72		2			74
Rev. 2014/15	72	1	6			79
2015/16	132	5	11			148
2016/17	380	22	24			426
2017/18	384	30	58			472
2018/19	11241	1188	442			12871
2019/20	4145	516	532			5193
2020/21	13	2				15
<b>V-CEG TOTAL</b>	16439	1764	1075			19278
Prepared by <i>[Signature]</i>	13-08-14	13-08-20	13-08-20	13-08-20	13-08-20	13-08-20
Checked by <i>[Signature]</i>	13-08-14	13-08-20	13-08-20	13-08-20	13-08-20	13-08-20
Approved by <i>[Signature]</i>	13-08-14	13-08-20	13-08-20	13-08-20	13-08-20	13-08-20
2013/08/14	09:51 AM					



### CAPITAL EXPENDITURE REVISION

2013/08/14 09:51AM

CMR11 Rev. 07/12

**CAPITAL EXPENDITURE REVISION**  
IN THOUSANDS OF DOLLARS

Title <b>Glenboro Transmission Line Re-Alignment</b>		Investment Management Node: 1.0.2.4.2.1
Operating Division Transmission Planning & Design	Coordinating Division Transmission Construction & Line Mntce	Project Number: P-21616

**DESCRIPTION:**

Re-alignment of the transmission lines at the Glenboro South Station to accommodate a new phase shifting transformer.

**JUSTIFICATION:**

Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 1100 MW. The project will be completely funded by the Eligible Customer - Power Supply.

Study results show that a phase shifting transformer is needed to control the power flow distributions on the MN-US interface. The following are the major justifications for the G&R phase shifting transformer:

1. To control North Dakota-Manitoba loop flow for exporting power to US
2. To restrict flow on G&R for power importing from US to MN
3. To offload line R&OM for prior outage conditions

**CAPITAL INVESTMENT CATEGORIZATION:**

Reliability Import/Export Related - Transmission Service Delivery - New Asset Addition - 100%

**REVISION REASON:**

2013 07 04: Projects P-16957, P-16958, P-16959, P-16961, P-16962, P-21180 and P-21616 are replacing project P14684. The sum of the Total Net Cost for the new WBSs is \$350.3M, which is \$145.5M higher than the previously approved CPJ. This increase reflects changes to scope, as follows:

- A change to the routing of the line, which increased the length by 110km.
- An expansion of the Glenboro Station to include a new phase shifting transformer.

The sum of \$350.3M matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.

CONTINGENCY: \$465

IN SERVICE DATES						Base estimate 2013/04/01 CLASS 2 Work start date 2014/11/01
2018/10/31	2365					
REV. AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date: (Over/under expend)						
<b>V-CPJ TOTAL</b>						
REV. AMOUNTS:						
Actual cost to date: (Over/under expend)						
Auth 2014/15	4					4
Req 2015/16	129	5	3			136
2016/17	306	14	11			330
2017/18	739	61	53			853
2018/19	364	37	88			489
2019/20	523	68	62			653
2020/21						
<b>V-CEO TOTAL</b>	1964	185	216			2365
Prepared by <i>[Signature]</i> 13.08.14	by mm ad 13.08.20	Approved by <i>[Signature]</i> 13.08.14	by mm ad 13.08.14	Approved by <i>[Signature]</i> 13.08.14	by mm ad 13.08.14	Approved by <i>[Signature]</i> 13.08.14
2013/08/14	09:52AM					



[illegible]

D1876(A)

APPROVED BY EXECUTIVE COMMITTEE  
MINUTE # 1607.03

DATE: 2017 01 18  
Financial Planning

**CAPITAL PROJECT JUSTIFICATION ADDENDUM  
FOR**

**Dorsey – US Border 500kV Transmission  
renamed to Manitoba to Minnesota Transmission Project  
Addendum Number 02**

**REVIEWED BY:**  
(Requesting Dept Manager)

*David Jacobson*  
2016/08/09

**NOTED BY:**  
(if applicable)

Responsible Division:

*[Signature]*

Constructing Division:

Designing Division:

Financial:

**RECOMMENDED FOR IMPLEMENTATION**

Requesting Div. Manager

Business Unit V.P.:

**PRIMARY JUSTIFICATION:**  
Indicate key project driver(s):

- |   |   |
|---|---|
| <input type="checkbox"/> Safety                   | <input type="checkbox"/> Customer Service |
| <input checked="" type="checkbox"/> System Supply | <input type="checkbox"/> Efficiency       |
| <input type="checkbox"/> System Reliability       | <input type="checkbox"/> Environmental    |

**NERC COMPLIANCE\*:** ☒ YES ☐ NO

\* Determine if the project requires compliance with North American Electric Reliability Corporation (NERC) CIP Cyber Security Standards.

**PREV. APPROVED BUDGET \$:** \$350,346,000  
(Use \$ value from approved CPJ or last approved CPJ Addendum)

**REVISED BUDGET \$:** \$453,209,000  
(Total Net Cost)

**START DATE:** 2010 03  
(1<sup>st</sup> Cost Flow)

**PREV. APPROVED ISD:** 2019 10  
(Use In-service Date from approved CPJ or last approved CPJ Addendum)

**REVISED ISD:** 2020 05  
(Last Major In-service Date)

**RISK MATRIX/  
BUSINESS CASE TIER:** Mandatory

**REQUESTING DIVISION:** Transmission Planning & Design

**I.M. NODE NUMBER** 1.5.2.4.2.1

**W.B.S. NUMBERS:** P:16957, P:16958, P:16959, P:16961, P:16962, P:21180, P:21616, P:25309

**MAJOR ITEM** ☒

**DOMESTIC ITEM** ☐

**PREPARED BY:**

Eryn Brown, Project Manager  
David Jacobson, Project Owner

**DATE PREPARED:**

2016 06 15

**REPORT NUMBER:**

**FILE NUMBER (Optional):**

ADDENDUM NUMBER	DATE (yyyy mm dd)	REVISION	REVISED BY	APPROVED BY
01	2013 07 31	Increase budget by \$145M to reflect updated equipment costs to terminate the line at Riel and Dorsey, and for communications equipment	C.R. Winstone	Executive Committee Minute #1453.03
-	2008 09 18	Original CPJ	C.R. Winstone	Executive Committee Minute #1326.04



## MANITOBA HYDRO CAPITAL PROJECT JUSTIFICATION ADDENDUM

### **Project Name** (This section is required for all Addendums).

Manitoba to Minnesota Transmission Project

### **Recommendation** (This section is required for all Addendums).

Increase the budget by \$102.9M, from \$350.3M to \$453.2M, to reflect updated costs for transmission line construction, licensing and environmental assessment work, station improvements, and project contingency including management reserve and funding for Indigenous opportunities. Adjust the in-service date from October 2019 to May 2020 to match the Power Sales Agreements.

### **Project Scope** (This section is to be filled out only if there is a change to the scope).

The increase of \$102.9M may be attributed to the following major changes:

1. Contingency (formerly planned within each project, now all in P:25309) – increase of \$47.4M  
In 2015, a risk analysis and contingency review was conducted by an independent consultant to help determine the appropriate level of risk funding to include in the project. The consultant identified a range of contingency amounts that the project should carry corresponding to different levels of estimate accuracy. Those results were reviewed by senior management and led to the determination that the project should reflect a P75 estimate, which represents a statistical confidence of 75% that actual costs will not exceed the estimate. A P75 estimate for this project equates to risk funding of 23.5% of the base estimate or \$73.0M. In addition to this risk funding, senior management advised that \$15.0M be included for Indigenous opportunities, bringing the total contingency cost to \$88.0M. The contingency amount planned in the former estimate under CPJ Addendum #02 was \$40.6M or 16% of the base estimate at that time.
2. 500kV Tie Line (P:16957) – increase of \$37.6M  
This increase is due mainly to updated market pricing for transmission line construction. Pricing of construction work has increased industry-wide within Manitoba and Canada since this estimate was last updated in early 2013. The revised estimate reflects contract pricing received more recently on other major transmission line projects. Another contributing factor to the higher cost is the greater requirements for environmental protection and agriculture bio-security during construction.
3. Licensing & Environmental Assessment (P:16962) – increase of \$17.0M  
An increase was required as more detail became available on the scope of work for licensing and environmental approvals required for the project. In addition, there was a further refinement of environmental assessment consulting work plans that included the addition of rural land use, municipality and property value consulting services, elk monitoring, and Aboriginal Traditional Knowledge validation monitoring.
4. Glenboro Phase Shifting Transformers (P:21180) – increase of \$10.0M  
Ongoing studies by System Planning determined that a second phase shifting transformer will be required at Glenboro Station in order to fully control the loop flow through the system. A second transformer means higher material costs (up by \$5.5M) and higher electrical installation costs (up by \$1.8M), as well as higher civil construction costs (up by \$2.0M) for the associated yard expansion that's needed to fit the second transformer within the station.

**Capital Project Justification Addendum**

**Project Scope** (This section is to be filled out only if there is a change to the scope).

5. **Escalation and Interest (across all projects) – decrease of \$9.0M**  
Escalation has decreased by \$5.2M as a result of the Base Date for the estimate being revised from 2013 dollars under the previous CPJ Addendum (#01) to 2016 dollars under this Addendum (#02). As well, capitalised interest has decreased by \$3.8 due to lower borrowing rates and revised cost flows which have expenditures occurring closer to the in-service date and therefore incurring less cumulative interest before being placed into service.

Previous project planning assumed an in-service date of October 2019 based on the study work and discussions with the customer. The revised in-service date of May 2020 matches the terms of the Power Sales Agreement that have since been signed.

**Background** (This section is to be filled out only if there is information relevant to the recommendation).

Various activities have taken place since the previous CPJ Addendum was prepared in July 2013, which have further defined the project requirements. These include public consultations, line routing, environmental licensing and property acquisition, additional planning studies, and detailed design, along with a risk analysis for Contingency planning. In addition, market pricing for construction labour has been monitored for variation from the standard escalation provided within Manitoba Hydro's Capital Expenditure Forecasting process. The project estimate was updated accordingly to capture the realized and/or potential impacts of these various factors, and a proposed budget with contingency range was presented to the Major Projects Executive Committee (MPEC) on April 12. The Committee provided guidance on the target budget to assume for the Capital Expenditure Forecast CEF16. A follow-up presentation was made to MPEC on June 21 at which time the Committee endorsed the proposed budget pending preparation and approval of a CPJ Addendum, per this submission.

**JUSTIFICATION—BUSINESS CASE ANALYSIS (SUMMARY):**

**Justification and Link to Corporate/Business Unit Goals** (This section is required for all Addendums)

This project has been included in the Power Resource Plan since 2008/09 as a requirement to meet potential export sales contracts. Since then, Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff, to increase the Manitoba to United States export and import capability by 883MW. A new 500kV transmission line, upgrades at Dorsey Station to terminate the transmission line, the addition of two phase shifting transformers at Glenboro Station and the associated site expansion, and the addition of an auto transformer at Riel Station, plus associated licensing, environmental assessment and property acquisition, were identified as the new and upgraded facilities needed to meet this increase. The project will be funded entirely by the Eligible Customer, namely Manitoba Hydro Export Power Marketing.

In addition to these contractual commitments, the 500kV transmission line and associated station upgrades will improve system reliability and allow electricity to be imported during emergency situations.

**Capital Project Justification Addendum**

**ANALYSIS OF ALTERNATIVES:** (This section is to be filled out only if there is a change to which alternative is being recommended).

**Economic Analysis**

**Discount Rate**

§ For current corporate rates see P911  
For clarification on hurdle rates, contact the Economic Analysis Department

**Recommended Option**

**NPV Benefits (Costs)**

No change.

**Other Alternatives Considered**

**NPV Benefits (Costs)**

**Project Risk Analysis** (This section is to be filled out only if there is a change to the project risk)

The current risks associated with the project are schedule delays that may impact the in-service date, such as unfavourable weather during construction seasons, extended timelines for the regulatory review process which could delay receipt of license, difficulties acquiring property rights, changes to the transmission line route which would require completion of additional public engagement, stakeholder protests causing disruptions to field work, and recommendations from the Clean Environment Commission that would extend schedule timelines. Other risks include fluctuations in market pricing for transmission line construction and station equipment. A total of \$40.0M of Contingency (13% of the base cost) and \$33.0M of Management Reserve (10.5% of the base cost) are included in the project estimate. These amounts are being held in a separate Contingency project, to be managed collectively throughout the life of the project. Amounts will be drawn upon if and when a project-specific risk is realized, or eliminated if and when a risk has passed.

The Contingency project also includes \$15M for funding of Indigenous opportunities.

**Capital Budget Estimate** (This section is required for all Addendums)

The impact on annual budget requirements is as follows (in thousands of dollars):

Fiscal Year	Previous CPJ / CPJ Addendum	Proposed CPJ Addendum	Increase (Decrease)
Prev. Actuals	\$ 1,321	\$ 1,321	\$ -
2013/14	\$ 444	\$ 1,069	\$ 625
2014/15	\$ 3,764	\$ 6,913	\$ 3,150
2015/16	\$ 29,706	\$ 6,155	\$ (23,551)
2016/17	\$ 101,102	\$ 11,754	\$ (89,348)
2017/18	\$ 58,728	\$ 125,313	\$ 66,585
2018/19	\$ 63,483	\$ 114,336	\$ 50,853
2019/20	\$ 91,663	\$ 82,874	\$ (8,788)
2020/21	\$ 137	\$ 103,474	\$ 103,338
Total	\$ 350,346	\$ 453,209	\$ 102,863

**Capital Project Justification Addendum**

**Proposed Schedule** (This section is to be filled out only if there is a change to the project schedule)

The current scheduling of key milestones is as follows:

<b>Receipt of licences *</b> <ul style="list-style-type: none"> <li>Provincial</li> <li>Federal</li> </ul>	April 2017 July 2017
<b>500kV Tie Line</b> <ul style="list-style-type: none"> <li>Design</li> <li>Delivery of material</li> <li>Construction</li> </ul>	Ongoing – May 2017 August 2017 – January 2018 October 2017 – April 2020
<b>Terminate Tie Line @ Dorsey</b> <ul style="list-style-type: none"> <li>Design</li> <li>Delivery of material</li> <li>Construction</li> </ul>	Ongoing – Feb 2018 March 2017 – October 2018 September 2017 – February 2020
<b>Riel Auto Transformer</b> <ul style="list-style-type: none"> <li>Design</li> <li>Delivery of material</li> <li>Construction</li> </ul>	Ongoing – May 2018 March 2017 – July 2019 July 2018 – March 2020
<b>Glenboro Phase Shifter</b> <ul style="list-style-type: none"> <li>Design</li> <li>Delivery of material</li> <li>Construction</li> </ul>	Ongoing – October 2018 August 2017 – September 2019 October 2017 – January 2020
<b>All facilities in-service</b>	May 2020

\* The timing for receipt of licences is tentative and may require adjustments based on feedback from the regulatory agencies.

**Related Projects** (This section is to be filled out only if changed)

No change.

**Reference Documents** (This section is to be filled out only if changed)

No change.

Capital Project Justification Addendum  
Estimate Summary - Internal Labour

Manitoba-Minnesota Transmission Project  
(I.M. Node 1 5.2.4.2.1)

Internal Labour (Hours)	Revised Estimate vs. Last Approved		Revised Estimate vs. LTD Actual		Planned for 2016/17
	CPJA #01 JUL 2013	CPJA #02 JUN 2016	Actuals as of 2016-07-29	CPJA #02 JUN 2016	
Apparatus Maintenance Div	2,891	2,597	20	2,597	192
Commissioning Dept	3,185	2,905	47	2,905	15
Dorsey CS Dept	514	3,429	9	3,429	138
Electrical Construction Dept	26,963	49,915	39	49,915	453
HVDC Engineering Dept	-	-	-	-	-
Lic. & Env. Assessment Dept	240	40,165	30,326	40,165	3,096
Radisson/Henday CS Dept	-	-	-	-	-
Station Design Dept-Apparatus QC	3,078	6,559	1,018	6,559	3,614
Station Design Dept-Automation & Ctrls Eng.	15,614	38,779	350	38,779	141
Station Design Dept-Contracts	-	15	15	15	-
Station Design Dept-Protection	2,989	6,669	2,231	6,669	3,767
Station Design Dept-Structures & Equip & Grndg	4,992	8,120	1,203	8,120	1,458
System Performance Dept	263	2,723	19	2,723	986
System Support Dept	1,662	4,263	217	4,263	31
Telecommunications Dept-planning	264	6,004	49	6,004	1,145
Telecommunications Dept-mtce & ops	121	4,877	18	4,877	918
Trans Line & Civil Constr Dept-construction	81,951	141,602	336	141,602	1,688
Trans Line & Civil Constr Dept-site services	10,560	47,519	296	47,519	59
Trans Line Mtce North & South Depts	-	440	6	440	3
Trans & Civil Design Dept-Civil Design	23,981	31,216	2,901	31,216	8,354
Trans & Civil Design Dept-T/L Design	11,589	13,861	5,766	13,861	4,568
Transmission Projects Dept	10,363	20,002	5,078	20,002	3,452
Other Transmission BU Resources	911	21,534	12,777	21,534	-
<b>Subtotal - Transmission BU Resources</b>	<b>202,132</b>	<b>453,196</b>	<b>62,719</b>	<b>453,196</b>	<b>34,078</b>
Corporate Relations BU	-	4,203	2,924	4,203	332
CS&D BU-Distr Eng & Constr - engineering	297	317	121	317	-
CS&D BU-Distr Eng & Constr - construction	23,518	520	-	520	69
Generation Ops BU	2,861	1,657	642	1,657	113
HR & Corporate Services BU - Materials Mgmt	-	-	3	-	-
HR & Corporate Services BU - Property	13,143	9,173	3,363	9,173	3,090
Other Resources from other Business Units	50	5,906	1,837	5,906	9,256
<b>Total Resource Requirements</b>	<b>242,001</b>	<b>474,971</b>	<b>71,608</b>	<b>474,971</b>	<b>46,939</b>

2016.07.29





**Capital Project Justification Addendum**  
**Estimate Summary - Cost Type**

**Lake Winnipeg East System Improvements**  
(I M Node 1 10 2 3 2 1)

Cost (Thousands of Dollars)	Revised Estimate vs. Last Approved		Revised Estimate vs. LTD Actual		Planned for 2016/17
	CPJA #01 JUL 2013	CPJA #02 JUN 2016	Actuals as of 2016-07-29	CPJA #02 JUN 2016	Remaining (Over)
Property	\$ 4,656	\$ 8,687	\$ 192	\$ 8,687	\$ 8,494
Internal Labour - Eng. Proj Mgmt & Admin	\$ 7,270	\$ 18,922	\$ 6,064	\$ 18,922	\$ 12,858
Internal Labour - Construction	\$ 11,639	\$ 22,867	\$ 93	\$ 22,867	\$ 22,774
Consulting	\$ 944	\$ 18,829	\$ 8,501	\$ 18,829	\$ 10,328
Material	\$ 117,119	\$ 101,764	\$ 9	\$ 101,764	\$ 101,755
Contracted Construction Services	\$ 66,591	\$ 136,648	\$ 96	\$ 136,648	\$ 136,551
Contingency	\$ 40,601	\$ 88,000	\$ -	\$ 88,000	\$ 88,000
Overhead (on labour & material)	\$ 1,113	\$ 2,642	\$ 509	\$ 2,642	\$ 2,134
General High Level / Other	\$ 37,756	\$ 1,184	\$ 176	\$ 1,184	\$ 1,008
Subtotal - Gross	\$ 287,688	\$ 399,543	\$ 15,641	\$ 399,543	\$ 383,903
Escalation & Interest	\$ 62,658	\$ 53,666	\$ 1,524	\$ 53,666	\$ 52,142
<b>Total Net Cost</b>	<b>\$ 350,346</b>	<b>\$ 453,209</b>	<b>\$ 17,165</b>	<b>\$ 453,209</b>	<b>\$ 436,045</b>

2016 07 29



CER(11) Rev. 97 12

**CAPITAL EXPENDITURE REVISION**  
(IN THOUSANDS OF DOLLARS)

<b>Title</b> Dorsey-U S 500kv Tie Line						<b>Investment Management Node:</b> 1.3.1.4.1	
<b>Responsible Division</b> Transmission Construction & Line Mtce			<b>Requesting Division</b> Transmission Planning & Design			<b>Project Number:</b> P:16957	
<p><b>DESCRIPTION:</b> Acquire property rights for and design, construct and commission a 215km 500kv AC single circuit transmission line from Dorsey Station to the US border. The first portion of the line from Dorsey is to be located on the south corridor, heading south and then east on the south side of Winnipeg, and then turning southward to the US border. The line conductor will be triple bundle 1192.5 MCM 45/7 ACSR Bunting type. In addition, the line will have one shield conductor, which will include an optical fibre (OPGW).</p> <p><b>JUSTIFICATION:</b> Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer - Manitoba Hydro Export Power Marketing.</p> <p><b>CAPITAL INVESTMENT CATEGORY:</b> Growth - Grid Interconnections-Import/Export High Voltage Direct Current (HVDC)</p> <p><b>REFERENCE:</b> MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request</p> <p><b>REVISION:</b> 2016 07 07: The total net cost increased by \$4751 mainly due to updated market pricing for transmission line construction costs and field inspection requirements (\$37631), which was offset by the transfer of Contingency to new WBS P:25309 (\$23368) and a decrease in interest and escalation (\$9511).</p> <p>ISD for the transmission line adjusted from Oct 2019 to May 2020 to match the Power Sales Agreement.</p> <p>Contingency: \$0</p>							
<b>IN SERVICE DATES</b>							
2016/03/31		721					Base estimate
2017/04/30		7531					2016/04/01 CLASS 2
2020/05/31		205301					Work start date 2010/04/01
<b>PREV. AUTHORITY</b>	<b>GROSS</b>	<b>ESCALATION</b>	<b>INT. CAPITALIZED</b>	<b>SALVAGE</b>	<b>CONTRIBUTION</b>	<b>TOTAL NET COST</b>	
Actual cost to date	2457		243			2700	
(Over/under expend	7445	308	500			8253	
2016/17	64837	4348	1930			71115	
2017/18	33350	2891	5476			41717	
2018/19	21349	2258	7968			31575	
2019/20	42414	5574	5370			53358	
2020/21	74	11				85	
<b>V CPJ TOTAL</b>	<b>171926</b>	<b>15390</b>	<b>21487</b>			<b>208803</b>	
<b>REV. AMOUNTS:</b>							
Actual cost to date.	2457		243			2700	
(Over/under expend.							
Auth 2016/17	2994	12	159			3165	
Req: 2017/18	101037	3480	1253			105770	
2018/19	57932	2683	7109			67724	
2019/20	17841	1147	9283			28271	
2020/21	3926	299	1698			5923	
<b>V-CEO TOTAL</b>	<b>186187</b>	<b>7621</b>	<b>19745</b>			<b>213553</b>	
Prepared by 16 03 17	Approved by 16 03 17	RESPONSIBLE DIVISION 16 03 17	Approved by 16 03 17	REQUESTING DIVISION 16 03 17	Approved by 16 03 17	VICE-PRESIDENT 16 03 17	

2016/08/03 07:15AM

CER(1) Re - 97 12

## CAPITAL EXPENDITURE REVISION

FORECAST STORY		n thousands of dollars)		Project Number P:16957			
Approved yy mm	TO A	AMOUNT	COMMENTS				
2015 11		73138	2015 09 24: The total net cost decreased by \$35,666 mainly due to contingency (\$23,368 being moved to P 25309, as well as a decrease in interest and escalation \$8,642)				
2014 11		96055	2014 07 24: Total Gross estimate decreased by \$14746 to offset increases elsewhere in the complex, such that the overall Total Net cost is unchanged from \$350.3M. SD changed from Oct 20 9 to May 2020 to match the Power Sales Agreements.				
2013 11		208803	2013 07 04: The total Gross estimate increased by \$88257 due to a restructuring of projects within the complex. This WBS was originally meant to cover the costs of a transmission line from Dorsey straight south to the border. It now covers a transmission line that runs from Dorsey through the south loop to near Riel and then south to the US border. As a result, the line length has increased from 23km to 234km. Costs for the Dorsey to Riel section were previously estimated under P.16960, which has now been cancelled. The sum of the Total Net cost for this project along with all of the others in the complex matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.				
2012 11		86699	2012 06 20 The decrease of \$1751 to Gross is primarily a result of changes to activity and overhead rates. In addition, there was a reduction in the total plan required for the facilities study.				
2011 11		92467	Gross estimate escalated from 2010 base dollars to 2011 base dollars. Plan for 2011/12 and 2012/13 updated for the addition of the Group Facilities Studies by System Planning, at an estimated cost of \$750. SD for the property acquisition deferred from 2018.04.30 to 2018.09.30, and SD for the new line deferred from 2019.05.31 to 2019.10.31, to match the 2011 Power Resource Plan.				
2010 11		90859	2010.08.06 New item, formerly covered by P14684. ISD for the new line deferred by one year from May 2018 to May 2019, as requested by Power Supply. ISD added for the property rights acquisition, which should be completed by April 2018. Spending in 2010/11 reflects transfer of actual costs (\$811) from old WBS P14684, which in turn were transferred from the Facility Studies budget item (1.5.1.1 51.5, P16369) to this complex, as directed by the Corporate Controller Division. Costs were incurred as part of the Facilities Study Agreement with MISO to facilitate the building of new transmission in the United States.				

2016/08/03 07:15AM

CER(1) Rev. 97 12

**CAPITAL EXPENDITURE REVISION**  
(IN THOUSANDS OF DOLLARS)

Title <b>Dorsey 500kV Stn - Terminate Tie Line</b>		Investment Management Node: 1.5.2.4.2.1	
Responsible Division Transmission Construction & Line Mtce		Requesting Division Transmission Planning & Design	
		Project Number: P:16958	

**DESCRIPTION:**  
Design, install and commission a new 500kV Line Termination including one 500kV breaker and associated current transformers, one 500kV Shunt Reactor, as well as upgrades to the 230kV switchyard and modifications to the HVDC reduction and protection systems. This project also includes expanding the station site to accommodate the new equipment.

**JUSTIFICATION:**  
Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer - Manitoba Hydro Export Power Marketing.

**CAPITAL INVESTMENT CATEGORY:**  
Growth - Grid Interconnections-Import/Export-High Voltage Direct Current (HVDC)

**REFERENCE:**  
MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request

**REVISION:**  
2016 07 07: The total net cost decreased by \$3477 due mainly to a decrease in estimates for major apparatus required (\$4464), transfer of Contingency to new WBS P:25309 (\$3697), and a decrease in interest and escalation (\$2197), offset by increases for civil construction (\$5312) and electrical construction (\$1985) due to updating the scope of work for the station modifications.

ISD adjusted from Oct 2019 to May 2020 to match the Power Sales Agreement.

Contingency: \$0

IN SERVICE DATES						Base estimate 2016/04/01 CLASS 2
2020/05/31	27508					Work start date 2013/07/01
PREV. AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date	168		15			183
(Over)/under expend	4041	188	97			4326
2016/17	7188	477	451			8116
2017/18	4890	418	930			6238
2018/19	2508	252	1249			4009
2019/20	6422	838	819			8079
2020/21	29	4				33
2021/22						
<b>V-CPJ TOTAL</b>	<b>25246</b>	<b>2177</b>	<b>3561</b>			<b>30984</b>
REV. AMOUNTS						
Actual cost to date	168		15			183
(Over)/under expend						
Auth 2016/17	1566	11	31			1608
Req 2017/18	5625	158	228			6011
2018/19	14385	687	776			15848
2019/20	1937	106	1283			3326
2020/21	286	19	228			533
2021/22						
<b>V-CEO TOTAL</b>	<b>23967</b>	<b>981</b>	<b>2561</b>			<b>27509</b>

Prepared by 16 08 17	Approved by 16 08 17	Requested by 16 08 17	Approved by 16 08 17
SPONSOR BLENDING	REQUESTED	DESIGN	VICE PRESIDENT

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## CAPITAL EXPENDITURE REVISION

FORECAST HISTORY (in thousands of dollars)		Project Number P-16958					
Approved yy mm	TOTAL AMOUNT	COMMENTS					
2015 11	25848	2015 09 24: The total net cost decreased by \$5,137 due to contingency (\$3,697) being moved to P-25309 as well as a decrease in interest and escalation (\$1,981).					
2014 11	31637	2014 06 19: Total Gross estimate increased by \$153 as a result of changes to activity rates (\$90) and the addition of \$63 of preliminary engineering efforts. SD changed from Oct 2019 to May 2020 to match the Power Sales Agreements.					
2013 11	30984	2013 07 04: The total Gross estimate decreased by \$9700 as a result of the elimination of the termination work (\$10867) for the previously planned Dorsey to Riel line, which has been removed from the complex entirely. This was offset by a high-level adjustment (\$947) to account for market increases to pricing on material and construction that have occurred since this project was last estimated, in 2010.  The sum of the Total Net cost for this project along with all of the others in the complex matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.					
2012 11	45531	2012 06 20: No change to base estimate. Item recalculated for change to activity, overhead, interest and escalation.					
2011 11	45034	ISD for termination of the new 500kV Dorsey-US Border tie line deferred from 2019.05.31 to 2019.10.31, and ISD for termination of the new 500kV Dorsey-Riel transmission line deferred from 2019.10.31 to 2020.05.31, per the 2011 Power Resource Plan.					
2010 11	5435	2010.08.06 New item, formerly covered by P-4685. ISD for termination of the Dorsey-US Border line deferred by seventeen months from May 2018 to Oct 2019, and ISD for the termination of the Dorsey Riel line deferred by twelve months from May 2018 to May 2019, both as requested by Power Supply.					

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### CAPITAL EXPENDITURE REVISION

(IN THOUSANDS OF DOLLARS)

<b>Title</b> Riel 230/500kV Sln-A to Transform Instal						<b>Investment Management Node:</b> 1.5.2.4.2.1
<b>Responsible Division</b> Transmission Construction & Line Mtce			<b>Requesting Division</b> Transmission Planning & Design		<b>Project Number:</b> P:16959	

**DESCRIPTION**  
 Design, install and commission a new 500kV to 230kV bank addition, including a 500kV 400MVA Auto Transformer, one 500kV breaker and associated current transformers, one 230kV breaker and associated current transformers as well as modifications to the HVDC reduction.

**JUSTIFICATION:**  
 Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer Manitoba Hydro Export Power Marketing.

**CAPITAL INVESTMENT CATEGORY:**  
 Growth- Grid Interconnections-Import/Export - High Voltage Direct Current (HVDC)

**REFERENCE:**  
 MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request

**REVISION:**  
 2016 07 07: The total net cost decreased by \$19,859 mainly due to contingency (\$8,946) being moved to P:25309 and a decrease in interest and escalation (\$7,832).

ISD deferred from Oct 2019 to May 2020 to match Power Sales Agreement.

Contingency: \$0

  

IN SERVICE DATES						Base estimate 2016/04/01 CLASS 2
2020/05/31	52818					Work start date 2013/07/01
<b>PREV. AUTHORITY</b>	<b>GROSS</b>	<b>ESCALATION</b>	<b>INT. CAPITALIZED</b>	<b>SALVAGE</b>	<b>CONTRIBUTION</b>	<b>TOTAL NET COST</b>
Actual cost to date:	199		23			222
(Over)under expend:	14162	645	371			15178
2016/17	16658	1089	1407			19154
2017/18	3792	305	2274			6371
2018/19	7400	803	2655			10858
2019/20	16821	2188	1897			20906
2020/21						
2021/22						
<b>V-CPJ TOTAL</b>	<b>59032</b>	<b>5030</b>	<b>8627</b>			<b>72689</b>
<b>REV. AMOUNTS:</b>						
Actual cost to date	199		23			222
(Over)under expend.	1					1
Auth 2016/17	513	4	21			538
Req 2017/18	2878	63	108			3049
2018/19	16972	783	583			18338
2019/20	26184	1667	2083			29934
2020/21	280	18	440			738
2021/22						
<b>V-CEO TOTAL</b>	<b>47027</b>	<b>2535</b>	<b>3258</b>			<b>52820</b>

Prepared by Y 16 08 17	Approved by M. Colman	Approved by 16 08 11	Approved by 16 08 19	Approved by 16 08 19	Approved by 16 08 19
RESPONSIBLE DIVISION	REQUESTING DIVISION	VISIO			

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## CAPITAL EXPENDITURE REVISION

FORECAST STORY (in thousands of dollars)		ProjectNumber P:16959					
Approved yymm	TOTAL AMOUNT	COMMENTS					
2015 11	58230	2015 09 24: The total net cost decreased by \$14,461 mainly due to contingency (\$8,946) being moved to P:25309 and a decrease in interest and escalation (\$5,770).					
2014 11	72278	2014 07 24: Total Gross estimate decreased by \$1347 to offset increases elsewhere in the complex, such that the overall Total Net cost is unchanged from \$350.3M. ISD changed from Oct 2019 to May 2020 to match the Power Sales Agreements.					
2013 11	72689	2013 07 04: The total Gross estimate increased by \$2273 as a result of high-level adjustment(\$1915) to account for market increases to pricing on material and construction that have occurred since this project was last estimated, in 2010, plus accounting changes that impacted activity and overhead rates (\$358).  The sum of the Total Net cost for this project along with all of the others in the complex matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750 250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.					
2012 11	73282	2012 06 20: No change to base estimate. Item recalculated for changes to activity, overhead, interest and escalation.					
2011 11	71890	ISD deferred from 2019.10.31 to 2020.05.31 to match the 2011 Power Resource Plan.					
2010 11	71832	2010.08.06: New item, formerly covered by P14685. ISD deferred by seventeen months from May 2018 to Oct 2019, as requested by Power Supply.					
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### CAPITAL EXPENDITURE REVISION

(IN THOUSANDS OF DOLLARS)

<b>Title</b> <b>MB-US 500kV Facilities - Communication</b>						<b>Investment Management Node:</b> 1.1.1.2.1	
<b>Responsible Division</b> Transmission Construction & Line Mtce			<b>Requesting Division</b> Transmission Planning & Design			<b>Project Number:</b> P:16961	
<b>DESCRIPTION</b> Design, install and commission communication system additions (including OPGW and associated carrier equipment) required for the teleprotection and control and telemetry of the new Dorsey US Border 500kV Tie Line.							
<b>JUSTIFICATION:</b> Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer - Manitoba Hydro Export Power Marketing.							
<b>CAPITAL INVESTMENT CATEGORY:</b> Growth - Grid Interconnections Import/Export - Telecommunications & System Control Centres							
<b>REFERENCE:</b> MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request							
<b>REVISION:</b> 2016 07 07: Total net cost decreased by \$765 due to the transfer of Contingency to new WBS P:25309 (\$500), plus lower escalation (\$283). ISD adjusted from Oct 2019 to May 2020 to match the Power Sales Agreement.							
Contingency: \$0							
<b>IN SERVICE DATES</b>							
2020/05/31		3496				Base estimate 2016/04/01 CLASS 1 Work start date 2016/09/01	
<b>PREV AUTHORITY</b>	<b>GROSS</b>	<b>ESCALATION</b>	<b>INT. CAPITALIZED</b>	<b>SALVAGE</b>	<b>CONTRIBUTION</b>	<b>TOTAL NET COST</b>	
Actual cost to date							
(Over)/under expend	12	1				13	
2016/17	132	10	2			144	
2017/18	1269	111	46			1426	
2018/19	1360	149	137			1646	
2019/20	802	104	121			1027	
2020/21	4	1				5	
<b>V CPJ TOTAL</b>	<b>3579</b>	<b>376</b>	<b>306</b>			<b>4261</b>	
<b>REV. AMOUNTS:</b>							
Actual cost to date							
(Over)/under expend							
Auth 2016/17	565	4	8			577	
Req 2017/18	998	21	55			1074	
2018/19	1044	43	111			1198	
2019/20	430	24	164			618	
2020/21			29			29	
<b>V CEO TOTAL</b>	<b>3037</b>	<b>92</b>	<b>367</b>			<b>3496</b>	
Prepared by	yy mm dd	Approved by	yy mm dd	Approved by	yy mm dd	Approved by	
10	16 08 17	16 08 17	16 08 17	16 08 17	16 08 17	16 08 17	
RESPONSIBLE DIVISION		REVISION		V C PRESIDENT			
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## CAPITAL EXPENDITURE REVISION

FORECAST HISTORY (in thousands of dollars)		Project Number P:16961					
Approved y m	TOTAL AMOUNT	COMMENTS					
2015 11	3827	2015 09 24: Total net cost decreased by \$433 due to the transfer of contingency (\$500) to P:25309. 2014 07 02: No change in base estimate. Item recalculated for changes in overhead, activity, interest and escalation rates. SD changed from Oct 2019 to May 2020 to match the Power Sales Agreements.					
2014 11	4334						
2013 11	4261	2013 07 04: The total Gross estimate increased by \$216 as a result of a high level adjustment to account for market increases to pricing on material and construction that have occurred since this project was last estimated, in 2010.  The sum of the Total Net cost for this project along with all of the others in the complex matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750 250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.					
2012 11	4486	2012 06 20: No change to base estimate. Item recalculated for interest and escalation.					
2011 11	4277	ISD for communications associated with the new 500kV Dorsey-US Border tie line deferred from 2019.05.31 to 2019.10.31, and ISD for communications associated with the new 500kV Dorsey Riel transmission line deferred from 2019.10.31 to 2020.05.31, per the 2011 Power Resource Plan.					
2010 11	4280	2010.08.06: New item, formerly covered by P14685. ISD for communication system additions associated with the new Dorsey US Tie Line deferred by seventeen months from May 2018 to Oct 2019, and ISD for the communication system additions associated with the new Dorsey Riel Line deferred by twelve months from May 2018 to May 2019, both as requested by Power Supply.					
Forecasted Mthly. Ex.	GROSS	ESCALATION	INTEREST CAP	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulated
2016/17 Apr							
May							
Jun							
Jul							
Aug							
Sep	80					80	80
Oct	80					80	160
Nov	84	1	1			86	246
Dec	76	1	1			78	324
Jan	80	1	1			82	406
Feb	76	1	2			79	485
Mar	89		3			92	577
TOTAL	565	4	8			577	577
2017/18 Apr	76	1	2			79	79
May	89	1	3			93	172
Jun	85	1	3			89	261
Jul	89	1	4			85	346
Aug	89	2	4			95	441
Sep	77	2	4			83	524
Oct	85	2	5			92	616
Nov	90	2	5			97	713
Dec	74	2	6			82	795
Jan	87	2	6			95	890
Feb	78	2	6			86	976
Mar	88	3	7			98	1074
TOTAL	998	21	55			1074	1074

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### CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

<b>Title</b> <b>MB-US 500kV Facilities-Lic. &amp; Env</b>						<b>Investment Management Node:</b> 1.2.2.2.1	
<b>Responsible Division</b> Transmission Construction & Line Mtce				<b>Requesting Division</b> Transmission Planning & Design		<b>Project Number:</b> P:16962	

**DESCRIPTION:**  
 Conduct environmental impact assessment, consult with communities, obtain licensing (including a National Energy Board permit) and perform environmental monitoring for all transmission line facilities associated with the Manitoba-US 1100 MW transmission service.  
 This includes:  
 1. Dorsey - U.S. Border Tie Line  
 2. Glenboro station expansion

**JUSTIFICATION:**  
 Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer - Manitoba Hydro Export Power Marketing.

**CAPITAL INVESTMENT CATEGORY:**  
 Growth - Grid Interconnections-Import/Export - High Voltage Direct Current (HVDC)

**REFERENCE:**  
 MH-US 1100 MW Facility Study

**REVISION:**  
 2016 07 07: The total net cost increased by \$19574 largely due to a refinement of estimates for licensing and environmental approvals as more detail became available as to the scope of environmental and licensing requirements (\$8530), refinement of environmental assessment consulting work plans that included the addition of rural land use, municipality and property value consulting services (\$1900), the addition of anticipated elk monitoring and collaring requirements (\$1500), the addition of Aboriginal Traditional Knowledge validation monitoring (\$1500) as well as an increase in interest (\$3758).

ISD adjusted from Oct 2019 to May 2020 to match the Power Sales Agreement.

Contingency: \$0

IN SERVICE DATES						Base estimate 2010/04/01 CLASS 2
2020/05/31		31537				Work start date 2010/05/01
PREV. AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date	11288		787			12075
(Over)/under expend	7721	118	556			8159
2016/17	1528	98	290			1916
2017/18	1161	103	385			1649
2018/19	1388	152	496			2036
2019/20	1856	241	351			2448
2020/21						
<b>V-CPJ TOTAL</b>	<b>9500</b>	<b>712</b>	<b>1753</b>			<b>11965</b>
<b>REV. AMOUNTS:</b>						
Actual cost to date:	11288		787			12075
(Over)/under expend						
Auth 2016/17	4671	56	738			5465
Req. 2017/18	3850	87	1060			4997
2018/19	2643	131	1215			3989
2019/20	2912	194	1449			4555
2020/21	180	14	263			457
<b>V-CEO TOTAL</b>	<b>25544</b>	<b>482</b>	<b>5512</b>			<b>31538</b>

prepare by: *for* 16 08 17  
 APPROVAL: *[Signature]* 16 08 17  
 ESPO - BLE - ISON

Approved by: *[Signature]*  
 REQUESTING DIV: *[Signature]*  
 16 08 17

Approved by: *[Signature]*  
 VICE PRESIDENT: *[Signature]*  
 16 08 17

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## CAPITAL EXPENDITURE REVISION

FORECAST HISTORY in thousands of dollars

Project Number  
P:16962

Approved yy mm	TOTAL AMOUNT	COMMENTS
2015 11	28005	2015 09 24: The total net cost increased by \$16,040 due to a refinement of estimates (\$8,530) for licensing and environmental approvals as more detail became available as to the scope of environmental and licensing requirements, refinement of Environmental Assessment consulting work plans (\$1,900) that included the addition of rural land use, municipality and property value consulting services, the addition of anticipated elk monitoring and collaring requirements (\$1,500) as well as an increase in interest and escalation (\$3,661) offset by contingency (\$1,000) being moved to P:25309.
2014 11	23839	2014 07 02: Total Gross estimate increased by \$8532 as a result of a detailed refinement of estimates for licensing and environmental approvals given that the efforts have already begun and more detail became available as to the scope of requirements (i.e. the number of rounds of public consultations and the types of aboriginal engagement strategies). Contingency reduced by \$900 due to the improvement of estimate detailed in the budget. ISD changed from Oct 2019 to May 2020 to match the Power Sales Agreements.
2013 11	11965	2013 07 04: The total Gross estimate increased by \$1900 as a result of a high-level adjustment (\$900) to account for market increases to pricing on material and construction that have occurred since this project was last estimated, in 2010, plus the first-time inclusion of Contingency at a rate of approximately 2% of the base estimate.  The sum of the Total Net cost for this project along with all of the others in the complex matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.
2012 11	11488	2012 06 20: No change to base estimate. Item recalculated for interest and escalation.
2011 11	11070	ISD deferred from 2019.10.31 to 2020.05.31 to match the revision to the final ISD for the complex, per the 2011 Power Resource Plan.
2010 11	11494	2010 08 06: New item, formerly covered by P14684. ISD deferred by seventeen months from May 2018 to Oct 2019, as requested by Power Supply.
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# CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Title <b>Glenboro Phase Shifter</b>		Investment Management Node: 1. . . . 4. 2 1	
Responsible Division Transmission Construction & Line Mtce		Requesting Division Transmission Planning & Design	
		Project Number: P:21180	

**DESCRIPTION:**  
Design, procurement and installation of two 300MVA phase shifting transformers at Glenboro South Station and site expansion.

**JUSTIFICATION:**  
Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer Manitoba Hydro Export Power Marketing.

Study results show that a phase shifting transformer is needed to control the power flow distributions on the MH-US interface. The following are the major justifications for the G82R phase shifting transformers:  
 1. To control North Dakota-Manitoba loop flow for exporting power to US  
 2. To restrict flow on G82R for power importing from US to MH  
 3. To offload line R50M for prior outage conditions

**CAPITAL INVESTMENT CATEGORY:**  
Growth-Grid Interconnections-Import/Export Transmission Stations

**REVISION:**  
2016 07 07: The total net cost increased by \$7427. This was due to an increase of \$9228 from the addition of a second phase shifting transformer and associated equipment required as a result of a more detailed system analysis, changes in site expansion layout as well as a change in contracting plan for overhead and civil construction. These increases were offset by the transfer of Contingency to new WBS P:25309 (\$2624).

ISD adjusted from Oct 2019 to May 2020 to match Power Sales Agreement.

Contingency: \$0

IN SERVICE DATES						Base estimate 2016/04/01 CLASS 2
2020/05/31	26704					Work start date 2013/03/01
PREV. AUTHORITY	GROSS	ESCALATION	INT. CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date	260		17			277
(Over/under expend	16	6	2			24
2016/17	380	22	24			426
2017/18	384	30	58			472
2018/19	11241	1188	442			12871
2019/20	4145	516	532			5193
2020/21	13	2				15
<b>V-CPJ TOTAL</b>	<b>16439</b>	<b>1784</b>	<b>1075</b>			<b>19278</b>
REV. AMOUNTS:						
Actual cost to date	260		17			277
(Over/under expend						
Auth 2016/17	272		21			293
Req 2017/18	2971	97	53			3121
2018/19	5926	277	332			6535
2019/20	14143	942	913			15998
2020/21	242	16	221			479
2021/22						
<b>V CEO TOTAL</b>	<b>23814</b>	<b>1332</b>	<b>1557</b>			<b>26703</b>

Prepared by J.D.	yy mm 16 0 17	Approved by M. [Signature]	yy mm 16 08 11	Approved by [Signature]	yy mm 16 08 01	Approved by [Signature]	yy mm 16 08 19
RESPONSIBLE DIVISION		REQUESTING DIVISION		VICE PRESIDENT			

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## CAPITAL EXPENDITURE REVISION

FORECAST HISTORY (in thousands of dollars)

Project Number  
P.21180

Approved yy/mm	TOTAL AMOUNT	COMMENTS					
2015 11	26069	<p>2015 09 24: The total net cost increased overall by \$6,793. This was due to an increase of \$9,228 from the addition of a phase shifting transformer and associated equipment required as a result of a more detailed system analysis, changes in site expansion layout as well as a change in contracting plan for overhead construction which was offset by a decrease of \$2,625 in contingency which was moved to P.25309.</p> <p>2014 07 02: Total Gross estimate increased by \$179 as a result of changes to activity rates.</p> <p>SD changed from Oct 2019 to May 2020 to match the Power Sale Agreements.</p> <p>2013 07 04: New item.</p> <p>The sum of the Total Net cost for this project along with all of the others in the complex matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.</p>					
2014 11	19799						
2013 11	19278						
Forecasted Month	GROSS	ESCALATION	INTEREST CAP.	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulated
2016/17 Apr	11		1			12	12
May	12		1			13	25
Jun	13		1			14	39
Jul	12		1			13	52
Aug	34		2			36	88
Sep	31		2			33	121
Oct	28		2			30	151
Nov	27		2			29	180
Dec	24		2			26	206
Jan	27		2			29	235
Feb	28		2			30	265
Mar	25		3			28	293
TOTAL	271		21			293	293
2017/18 Apr	18		2			20	20
May	21		3			24	44
Jun	23		3			26	70
Jul	24		3			27	97
Aug	60	1	3			64	161
Sep	41	1	3			45	206
Oct	244	7	3			254	460
Nov	259	7	4			270	730
Dec	221	6	6			233	963
Jan	279	8	7			294	1257
Feb	262	8	7			267	1524
Mar	1529	59	9			1597	3121
TOTAL	2971	97	53			3121	3121

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CER(1) Rev. 97 12

# CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

<b>Title</b> <b>Glenboro Transmission Line Re-Alignment</b>		<b>Investment Management Node:</b> 1 5.2.4.2.1	
<b>Responsible Division</b> Transmission Construction & Line Mtce		<b>Requesting Division</b> Transmission Planning & Design	
<b>Project Number:</b> P:21616			

**DESCRIPTION:**  
 Re-alignment of the transmission lines at the Glenboro South Station to accommodate a new phase shifting transformer.

**JUSTIFICATION:**  
 Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer - Manitoba Hydro Export Power Marketing.

Study results show that a phase shifting transformer is needed to control the power flow distributions on the MH-US interface. The following are the major justifications for the G82R phase shifting transformer:  
 1. To control North Dakota-Manitoba loop flow for exporting power to US  
 2. To restrict flow on G82R for power importing from US to MH  
 3. To offload line R50M for prior outage conditions

**CAPITAL INVESTMENT CATEGORY:**  
 Growth - Grid Interconnections-Import/Export - Transmission Stations

**REVISION REASON:**  
 2016 07 07: No significant change to total net cost. Item recalculated for changes to overhead, activity, interest and escalation rates.  
 ISD adjusted from Oct 2019 to May 2020 to match Power Sales Agreement.

Contingency: \$0

IN SERVICE DATES						Base estimate 2016/04/01 CLASS 2
2020/05/31	2299					Work start date 2016/04/01
<b>PREV. AUTHORITY</b>	<b>GROSS</b>	<b>ESCALATION</b>	<b>INT. CAPITAL</b>	<b>SALVAGE</b>	<b>CONTRIBUTION</b>	<b>TOTAL NET COST</b>
Actual cost to date						
(Over)/under expend	133	5	2			140
2016/17	205	14	11			230
2017/18	739	61	53			853
2018/19	364	37	88			489
2019/20	523	68	62			653
2020/21						
<b>V-CPJ TOTAL</b>	<b>1964</b>	<b>185</b>	<b>216</b>			<b>2365</b>
<b>REV. AMOUNTS:</b>						
Actual cost to date						
(Over)/under expend						
Auth 2016/17	104		4			108
Req 2017/18	1215	32	45			1292
2018/19	589	26	92			707
2019/20	60	3	110			173
2020/21	2		19			21
<b>V-CEO TOTAL</b>	<b>1970</b>	<b>61</b>	<b>270</b>			<b>2301</b>

Prepare by	yy mm dd	approve	yy mm dd	approve	yy mm dd	approve	yy mm dd
JD	16 08 17	M. Edmunds	16 08 11	[Signature]	16 08 11	[Signature]	16 08 11
2016/08/03		07:15AM		REQUESTING DIVISION		IC	



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**CAPITAL EXPENDITURE REVISION**

FORECAST HISTORY (in thousands of dollars)		Project Number P:21616					
Approved yy/mm	TOTAL AMOUNT	COMMENTS					
2015/11	2361	2015 09 24: No Change in base estimate. Item recalculated for changed to overhead, activity, interest and escalation rates. 2014 07 02: No change in base estimate. Item recalculated for changes to overhead, activity, interest and escalation rates. SD changed from Oct 2019 to May 2020 to match the Power Sales Agreements.					
2014/11	2401						
2013/11	2365						
		2013 07 04: New item. The sum of the Total Net cost for this project along with all of the others in the complex matches the estimate submitted for inclusion in System Planning's study report entitled "MHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.					
Forecasted Mth/Ex	GROSS	ESCALATION	INTEREST CAP	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulated
2016/17 Apr	37					37	37
May	5					5	42
Jun	17					17	59
Jul	8					8	67
Aug	8					8	75
Sep	7					7	82
Oct	5					5	87
Nov	5					5	92
Dec	4					4	96
Jan	3					3	99
Feb	2					2	101
Mar	3		4			7	108
TOTAL	104		4			101	108
2017/18 Apr	44	1				45	45
May	235	5	1			241	286
Jun	326	8	2			336	622
Jul	79	2	3			84	706
Aug	103	3	4			110	816
Sep	70	2	4			76	892
Oct	94	3	4			101	993
Nov	95	3	5			103	1096
Dec	63	2	5			70	1166
Jan	58	2	6			66	1232
Feb	24	1	5			30	1262
Mar	24		6			30	1292
TOTAL	1215	32	45			1292	1292

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**CAPITAL EXPENDITURE REVISION**  
(IN THOUSANDS OF DOLLARS)

Title <b>MMTP Contingency</b>		Investment Management Node: <b>1.1.4.1</b>			
Responsible Division <b>Transmission Construction &amp; Line Mtce</b>		Requesting Division <b>Transmission Planning &amp; Design</b>		Project Number: <b>P:25309</b>	
<p><b>DESCRIPTION:</b> This project was created to capture the allocation of project contingency for the "Manitoba Minnesota Transmission Project" complex.</p> <p><b>JUSTIFICATION:</b> Transmission Service Requests have been made under the Manitoba Hydro Open Access Transmission Tariff to increase the Manitoba to US export and import capability by 883 MW. The project will be completely funded by the Eligible Customer Manitoba Hydro Export Power Marketing.</p> <p><b>CAPITAL INVESTMENT CATEGORY:</b> Growth - Grid Interconnections-Import/Export High Voltage Direct Current (HVDC)</p> <p><b>REVISION REASON:</b> 2016 07 07: New item under CPJ Addendum #02. Contingency totalling \$40 here, and increased by \$47,399 to reflect a P75 estimate (\$40,000 for Contingency and \$33,000 for Management Reserve) plus \$15,000 for potential funding of Indigenous opportunities.</p> <p>Contingency: \$88,000</p>					
IN SERVICE DATES					
2020/05/31		95294		Base estimate 2016/04/01 CLASS 2	
				Work start date 2020/05/01	
PREV. AUTHORITY	GROSS	ESCALATION	INT CAPITALIZED	SALVAGE	CONTRIBUTION
Actual cost to date (Over/under expend)					TOTAL NET COST
V CPJ TOTAL					
REV. AMOUNTS:					
Actual cost to date (Over/under expend)					
Auth 2016/17					
Req 2017/18					
2018/19					
2019/20					
2020/21	88000	7294			95294
V-CEO TOTAL	88000	7294			95294
Prepared by y 40	yy mm dd 16 06 17	Approved by y 40	yy mm dd 16 06 17	Approved by y 40	yy mm dd 16 06 17
RESPONSIBLE VISION		REQUESTING DIVISION		IC PRE	
2016/08/03		07:15AM			

### CAPITAL EXPENDITURE REVISION

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FORECAST HISTORY (in thousands of dollars)

Project Number  
P:25309

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