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).

June 21, 2017 Page 1 of 1

-) OHEFE(A)

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: BUDGET 5: \$204,764,000 (Owning Dept Manager) (Total Net Cost) START DATE: 2011 64 (I" Cest Flow) NOTED BY: IN-SERVICE DATE: (if applicable) 2018 05 (Last Major In-service Date) RISK MATRIX Coordinating Division: BUSINESS CASE TIER: N/A Constructing Division: C1.02 New Load - Interconnections ENVESTMENT HEASON: Financial Department: OWNING BUYISION: Power Planning (if over \$1 million) LML NODE NUMBER: 1.5.1.5.2.1 RECOMMENDED FOR IMPLEMENTATION: During Div. Manager: Dilyanos Unit VI HACK of 09 09 23. W.B.S. NUMBERS P:14684 DOMESTIC ITEM MAJOR ITEM PREPARED BY: C.R. Winstone DATE PREPARED: 2008-09-18 REPORT NUMBER:

FILE NUMBER (Optional):

June 21, 2017 Page 1 of 50

MANITOBA HYDRO CAPITAL PROJECT JUSTIFICATION

	CAPITAL PROJECT JUSTIFIC	LATION
Project Name		
Dorsey - US Border New 5	00 kV Transmission Line	
Recommendation		
To design and construct the	500 kV transmission interconnection line	to the US border.
Project Scope	N. C.	BAN HARRIST WALL STORY
Station and the US border a activities include acquiring	of transmission between Riel and Dorsey of well as any costs associated with termin property, conducting environmental impa- mess and performing environmental moni-	ating the line in Manitoba. Other et assessment, consulting with
Background	e-villyeppenetyle	
This project is included in t Service and Minnesota Pow feasibility level estimates for	he 2008/09 Power Resource Plan to meet ver. An allowance of \$150 million (in 200 com T&D and consultants.	export sales to Wisconsin Public 28 dollars) was used, based on
JUSTIFICATION—BU	SINESS CASE ANALYSIS (SUMN	MARY):
Justification and Link t	o Corporate/Business Unit Goals	
ANALYSIS OF ALTERN	ATIVES:	0-0-9
Economic Analysis		A A
Discount Rate	For current corporate rates see 0911	For clarification on hurdle rates, contact the Economic Analysis Department
Recommended Option		(= PV of BENEFITS - PV of COSTS)
Other Alternatives Con	sidered	NPV (= PV of BENEFITS - PV of COSTS)

Page 1 of 2

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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):

		Proposed
Fiscal Year	1	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

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OSNI1 Rev. 87 13

CAPITAL EXPENDITURE REVISION IN THOUSANDS OF DOLLARS)

		Contract of the Contract of th
Title DORSEY-US BORDER NEW 500KV T	RANS- T/L	Investment Management Node: 1,5,1,5,2,1
Owning Division TRANSMISSION PLANNING & DESIGN	Coordinating Division TRANS CONST & LINE MTCE	ProjectNumber P:14684

DESCRIPTION:

DESIGN AND CONSTRUCT ONE 63-KM SOC-KY TRANSMISSION LINE BETWEN THE REL AND DORSEY STATIONS. DESIGN AND CONSTRUCT ONE 125-KM SOC-KY TRANSMISSION LINE BETWEEN THE DORSEY STATION AND THE U.S. BORDER. ADQUITE PROPERTY FOR THE RIGHT OF WAY. CONDUCT ENVIRONMENTAL IMPACT ASSESSMENT, CONSULT WITH COMMUNITIES, ORTAIN LICENSING AND PERFORM ENVIRONMENTAL MONITORING FOR ALL FACILITIES.

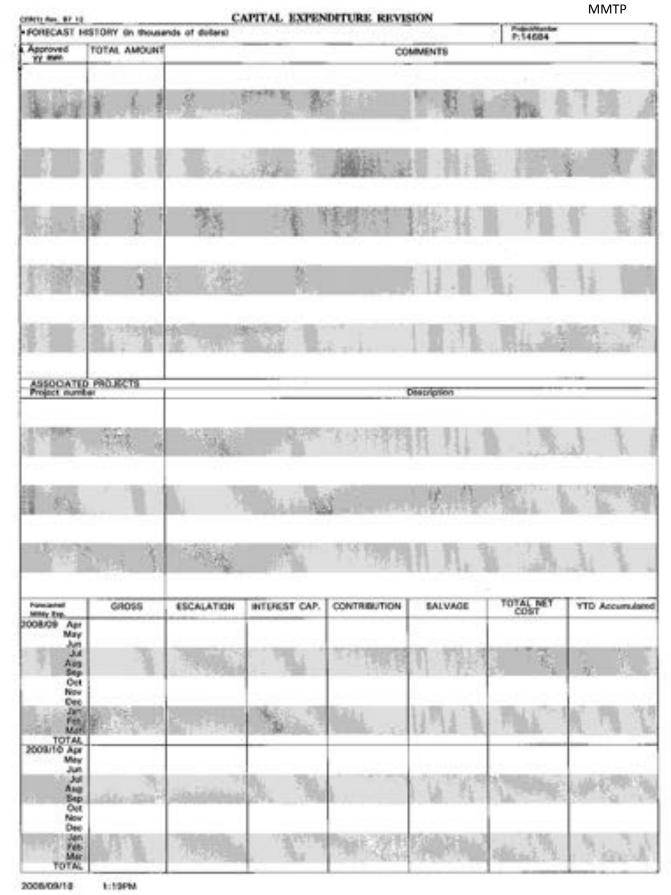
JUSTIFICATION.
MANIFORA HYDRO HAS RECEIVED TRANSMISSION SERVICE REQUESTS FOR MORE THAN 750 MW OF NEW IMPORT AND EXPORT SERVICE BETWEEN THE U.S. AND MANIFORA. TERM SHEETS HAVE BEEN SIGNED FOR A POTENTIAL 500 MW POWER SALE TO WISCONSIN AND A 250 MW POWER SALE TO MINNESOTA. THESE ADDITIONAL POWER SALES REQUIRE THE CONSTRUCTION OF A NEW HIGH VOLTAGE TIE LINE BETWEEN MANITORA AND THE U.S.

INVESTMENT CATEDORIZATION: EXPORT POWER - TRANSMISSION SERVICE DELIVERY - NEW ASSET ADDITION 50% RELIABILITY - TRANSMISSION SERVICE DELIVERY - NEW ASSET ADDITION 50%

REVISION-NEW ITEM.

2018/05/31	204765		SERVICE DATES	8	2004	Bose estimate 2008/04/01 CLASS 1 Work start data
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CAPITAL PROJECT JUSTIFICATION ADDENDUM FOR

				/ N.			
	- 1	D	US Borden No	w 500 kV Tr	nemledon.	\neg	
		Dorsey -		Number 01			TIVE COMMITTEE
	1		٥		DATE: 201		
REVIEWED BY Owning Dept N				PREV. APPROVE (Use 5 value from a or less approved CP	D BUDGET S:	\$204,764,000	
				REVISED BUDGE (Total Not Cost)		\$350,346,000	
NOTED BY: Sf applicable)				START DATE: ()" Cost Flow)		2010 03	
Coordinating	g Division:			PREV. APPROVE (Use In-service Data CPI or last approve	flow approved	2018 05	
Constructing Financial De (if over \$1 mi	opartment:			REVISED ISD: (Lest Major In-servi RISK MATRIXU BUSENESS CASE (Optional)	ice Date) TRER:	2019 10	
RECOMMEND	ED FOR DAPLES	MENTATION:		(Optional)			
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	1111	11/11/1	1	LM. NODE NEMI	MER:	152421	
Business Un	avs: po	Tursu	BOSI	W.B.S. NUMBER		P.16957, P.160 P.16961, P.160	ISB, P:10939, IGZ, P:21180, P:2161
PRIMARY JUS indicate key pr	PHYTCATION: oject driver(x):		1,000	MAJOR ITEM	3	DOMESTIC II	ем 🔲
Sufety System	n Supply	Customer Serv	vice	PREPARED BY:		C.R. Winstone	
System	n Reliability	☐ Environmenta	6	DATE PREPARE	D ₁	2013 07 31	
	he project require	YES NO to compliance with Nort (NERC) CIP Cyber Se		PELE NUMBER (
700	2013 05 13	Update Costs for Mar	nitoba Portion of ne	w linu	CRW		
ADDENDUM NUMBER	DATE (yyyy rum dd)	REVISION			REVISED	ву	APPROVED BY

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MANITOBA HYDRO CAPITAL PROJECT JUSTIFICATION ADDENDUM

Project Name (This section	in is required for all Addendums).	
Dorsey - US Border New	500 kV Transmission Line	
Recommendation (This	section is required for all Addendums).	
Increase the budget from S Riel and Dorsey and come	\$204.8 M to \$350.3 M to reflect updated co nunication equipment.	sts for equipment to terminate line at
Project Scope (This section	on is be filled out only if there is a change to the sco	pe).
A change in scope include Manitoba loop flow.	s a Phase Shifting transformer at the Gleap	oro station to control North Dakota-
Background (This section	is be filled out only if there is information relevant to	the recommendation).
scope from the original CI	g transformers has only recently been ident PJ. The project in-service date has changed one with Minnesota Power and Wisconsin	from 2018 05 to 2019 10 reflecting
Justification (This section	is required for all addendums).	
	oded in resource plans since the 2008/09 Pronsin Public Service and Minnesota Power.	
ANALYSIS OF ALTERI	NATIVES: (This section is be filled out only if the	ere is a change to which alternative is being
Economic Analysis		(0) 1 To 1 T
Discount Rate	For current corporate rates see 0911	For clarification on hurdle rates, contact Economic Analysis Department
Recommended Option	1	NPV Benefita/(Costs)
Other Alternatives Co.		NPV Benefits/(Costs)
List each alternative consi	dered as well as its calculated NPV.	

Page 1 of 2

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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,

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

Risk Analysis - (This section is 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 Addandums).

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

Fiscal Year		v. Approved I/Addendum		Proposed CPJ Addendum		Increase (Decrease)	
Prev. Actuals	\$	2,627	\$	1,321	\$	(1,306)	
2013/14	. 8	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	. 5	315,112	\$	192,227	
Total	\$	204,764		350,346	\$	145,582	

Proposed Schedule (This section is 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 be titled out only if changed).

Reference Documents (This section is be filled out only it changed).

2012/13 Power Resource Plan.

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DERTIFIER STIE

CAPITAL EXPENDITURE REVISION IIN THOUSANDS OF DOLLARS)

DORSEY-U.S 500KV TIE LINE		Investment Management Node: 1,5,2,4,2,1
Durning Division Transmission Planning & Design	Coordinating Division Transmission Construction & Line Moce	ProjectNumber: P:16957

DESCRIPTION:

ObsOCHEP'S ON:
Aboute 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 ACSR 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 Manitobs Hydro Open Access Transmission Tariff to increase the Manitobs 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 1100/790/250 MW Export/Report Firm Point to Point Group Transmission Service Request.

7013 07 D4: 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 WISSs is \$350.3M, which is \$145.5M higher than the previously approved CPU. This increase reflects changes to scope, as follows:

A change to the routing of the line, which increased the length by 110km.

An expension of the Glenboro Station to include a new phase shifting transformer.

The sum of 4350.3M matches the estimate submitted for inclusion in System Planning's study report entitled "WHEM 1100/750/250 MW Export/Import Firm Point to Point Group Transmission Service Request" dated July 2013.

Contingency: 423368

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2013/08/14 09:50AM

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CSR(1) Pey, 97-12

CAPITAL EXPENDITURE REVISION IN THOUSANDS OF DOLLARS)

/		
DORSEY 500kV STN- TERMINATE	TIE LINE	Investment Menagement Node: 1.5.2.4.2.1
Zwring Division Transmission Planning & Design	Coordinating Division Transmission Construction & Line More	ProjectNumber: P.18958

DESCRIPTION.
Terminate the new Dessey to US Border 500 kV transmission line in the existing ring bus at Dessey. Design, install and commission one 500 kV breaker, one 150-MVAR 500-kV shunt reactor, and one double-way ungrounded 46 kV 73.4 MVAr shunt capacitar bank including associated equipment such as protection. The scope includes installation of major communication equipment such as power line carrier equipment including wavetraps.

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 Eigible Customer-Power Supply.

CARITAL INVESTMENT CATEGORIZATION: Reliability Import/export Related : Transmission Service Delivery - New Asset Addison - 100%

REFERENCE: MHEM 1100/750/250 MW Expont/import Firm Point to Point Group Transmission Service Request

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 W83s 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 expension of the Genboro 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 Foint Group Transmission Service Request" dated July 2013.

2018/10/31	30494	7-20	N SERVICE DATES			Base setimate 2013/04/01 CLASS 1 Work start date 2014/11/01
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V-CEO TOTAL	25245	4 A 2077	2661			30984

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CORE11 Rev. 97:12

CAPITAL EXPENDITURE REVISION

IN THOUSANDS OF DOLLARS!

RIEL 230/500 kV STN-AUTO TRA	NSFMR INSTAL	Investment Management Node: 1.5.2.4.2.1
Title RUEL 230/500 kV STN-AUTO TRA Dwining Division Transmission Planning & Design	Coordinating Division Transmission Construction & Line Misce	ProjectNumber: Prinspin

DESCRIPTION:

Design, instell and commission two 500 kV breakers, one 230kV breaker, two double was undergrounded 66kV 73.4MVAr shurt capacitor banks a 1200fVA 230-500kV sate transformer and associated equipment.

Design, instell 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 supported equipment w/8 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 supported extension and breaker w/h 3-73.4 MVAR tentary depositions complete with reactors and breaker for least 73 km/s/r tentary depositions.

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 -

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

MHSM 1100/750/250 MW Expert/Import Firm Point to Point Group Transmission Service Request

2013/07/04: Projects P.16967, P.16968, P.16969, P.16969, P.16963, P.16962, P.21190 and P.21616 are replacing project P14694. The sum of the Total Net Cost for the new WISSs 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 longth by 110km.

An expension of the Glenboro Station to include a new phase shifting transformer.

The sum of 4350.3M 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: #8946

2019/10/21	72890	pulcueso Here	N SERVICE DATES			Bose estimate 2013/04/D1 - CLASS 1 Work start date 2014/11/01
PREV AUTHORITY Actual cost to dam (Overlander expend)	0NOSS	ERCALATION	INT, CAPITAL DED	SALVAGE	CONTRIBUTION	TOTAL NET COST
V-CPJ TOTAL						
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June 21, 2017 Page 14 of 50

CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

THE XXDORSEY-US BORDER NEW 50	OKV TRANS-TA	Investment Management Node: 1,5,2,4,2,1
Owning Division Transmission Planning & Design.	OKV TRANS- T/L Coordinating Division Transmission Construction & Line Mice	ProjectVumber: P:14684

DESCRIPTION.

Design and constituct 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 enough to all facilities.

JUSTIFICATION:
Markholds Hydre has reteived transmission service requests for more than 750 MW of new import and export service between the U.S. and Markholds. Term sheets have been signed for a potential 500 MW power sale to Wisconsin and a 250 MW power sale to Wisconsin and a 250 MW power sale to Wisconsin and a 250 MW power sale to Wisconsin and the U.S.

CAPITAL INVESTMENT CATEGORIZATION: Reflebility - Import/Export - Transmission Service Delivery - New Asset Addition

The sum of the Total Net Cost for the new William's \$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.

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June 21, 2017 Page 15 of 50

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	Ben.		
		MP 13	

CAPITAL EXPENDENCEDE DEVISION

CONTRACTOR OF	(IN THOUSANDS OF DOLLARS))
Title MB-US 500 kV FACILITIES Owning Division Transmission Planning & Design	COMMUNICATION Coordinating Division Transmission. System Operations	Investment Management Node: 1,5,2,4,2,1 Project Plantier: P.16961
DESCRIPTION. Design, instell and commission come the teleprotection and control and tel	surfaction system additions finaluding power line carrier, wave traps emetry of the new Darsey US Border 500kV Tie Line.	s and associated equipment) required for
JUSTIFICATION: Transmission Service Requests here Manistrips to US export and import of Power Supply.	been made under the Manitoba Hydro Open Access Transmission To publify by 1100 MW. The project will be completely funded by the	ariff to increese the Eligible Customer -
CAPITAL INVESTMENT CATEGORIZ. Reliability Import/export Related - Tra	ATION: namission Service Delivery - New Asset Addition - 100%	
mercensus.		

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 P14684. The sum of the Total Nat Cost for the new WillSe is 9250.3M, which is 9145.5M higher than the previously approved CPJ. This increase reflects changes to scope, as follows:

- A change to the nouting 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

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CEATS No. 87.12

CAPITAL EXPENDITURE REVISION

MB-US 500 KV FACILITIES-LIC & EN	v.	Investment Management Node:
Ownering Division Transmission Construction & Line Mice	Coordinating Olylaign Transmission Planning & Deelgn	ProjectNumber: P:16962
DESCRIPTION: Conduct environmental impact assessment, corus environmental monitorino for all transmission line	uit with communities, obtain licensing (including a Nation facilities associated with the Manicola-LIS 1100 MW to	nal Energy Board parmits and perform

This includes: 1. Dorsey - U.S. Border Tie Lino 2. Glenboro station expension

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

CAPITAL INVESTMENT CATEGORIZATION: Reliability Impert/export Related - Transmission Service Delivery - New Asset Addition - 100%.

REFERENCE: MH-US 1100 MW Fealthy Study

REVISION:

2013 07 04: Projects P:16957, P:16958, P:16969, P:16961, P:16962, P:21180 and P:21616 are registing project P:16964. The sum of the Total Net Cost for the new YMSSs 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 \$100m.

- An expension of the Gloriboro Station to include a new phase shifting transformer.

The sum of 4350.3M matches the estimats 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.

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Contingency: \$1000

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June 21, 2017 Page 19 of 50

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CEN(1) Nov. 97 12

CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Tide Glenboro Phase Shifter		Investment Management Node: 1.5.2.4.2.1
Owning Division Transmission Planning & Design	Coordinating Division Transmission Construction & Line Mape	ProjectNumber Pr21180

DESCRIPTION.
Design, procurement and inetaliation of a new 300MFVA phase shifter at Glenbors South Station.

JUSTIFICATION.

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

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 G82fl phase shifting transformer:

1. To control North Delects-Manitobs loop flow for exporting power to US

2. To restrict flow on G82fl for power importing from US to MH

3. To orthoad line R50M for prior outage conditions

CAPITAL INVESTMENT CATEGORIZATION: Reliability Import/export Related - Transmission Service Delivery - New Assot Addition - 100%

REVISION.
2013 07 Ok: 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 W60s is \$350.3M, which is \$145.5M higher than the previously approved CPJ. This increase reflects changes to

icope, as retoves:

A sharpe to the routing of the line, which incressed the length by 110km.

An expension of the Glenboro Station to include a new phase shifting transfermer.

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 Frem Point to Point Group Transmission Service Request" dated July 2013.

CONTINGENCY: #2825

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CARPLAL EVERNMENTER DESIGNAL

CONTINUE BY 12	IN THOUSANDS OF DOLLARS	
Title Glenboro Transmission Line Re- Owning Division Transmission Planning & Design	Alignment Coordinating Division Transmission Construction & Line Maps	Investment Management Node: 1.5.2.4.2.1 ProjectNumber: F:21616
DESCRIPTION: Re-alignment of the transmission lines at the	no Glenboro South Station to accommodate a new phase shifting	transformer,
JUSTIFICATION: Transmission Service Requests have been Manitoba to US export and import capability	made under the Manitobs Hydro Open Access Transmission Tarifit to by 1100 MW. The populat will be correlated for the Rio	

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 GR2R phase shifting transformer:

1. To control North Distorts Mentions lies flow for exporting power to US

2. To restrict flow on GR2R for power importing from US to MH

3. To officed line RSOM for prior outage conditions

CAPITAL INVESTMENT CATEGORIZATION: Refletifity Import/export Related - Transmission Service Delivery - New Asset Addison - 100%

REVISION REASON:
2013 07 04: Projects P:16957, P:16958, P:16969, P:16961, P:16962, P:21180 and P:21616 are replacing project P14684. The sum of the Total Net Cost for the new William 4350.3M, which is \$145.5M higher than the previously approved CPJ. This increase reflects shanges to scope, as follows:

- A change to the routing of the line, which increased the length by 110km.

- An expansion of the Genboro 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

2019/10/31	2366		SERVICE DATES	CONTRACTOR OF THE PARTY OF THE		Bess estimate 2013/04/01 CLASS 2 Work start data 2014/11/01
Mely AUTHORITY Return your to date: Eventurater expends	GROSS	ESCALATION	INT.CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
V-CPJ TOTAL						
NOV. AMDUSTE:						
2014/15 2015/15 2018/17 2018/17 2017/18 2018/19 2019/20 2020/21	4 129 206 239 364 523	5 14 61 37 68	2 11 53 60 62			134 238 851 481 651
ACEO TOTAL	1964	M 105	210	Markey is		2341

June 21, 2017 Page 23 of 50

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Approved yy rom	TOTAL AMOUNT			co	MMENTS	- 3119112	
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2013/08/14 09:52AM

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APPROVED BY EXECUTIVE COMMITTEE MINUTE # 1607.03

DATE: 2017 01 18 **Financial Planning**

CAPITAL PROJECT JUSTIFICATION ADDENDUM FOR

		renamed to Manitoba to	rder 500kV Transı Minnesota Transı dum Number 02		ject	
	1			_		
REVIEWED BY (Requesting Dep	Manager)	000-159-076K	PREV. APPROV (Use \$ value from or last approved C	approved CPJ PJ Addendum)	\$350,346	5,000
			(Total Net Cost)	GET \$:	\$453,209	0,000
NOTED BY: (if applicable)			START DATE: (1" Cost Flow)		2010 03	
Responsible	Division:	Pen X	PREV. APPROV (Use In-service Da		2019 10	
Constructing	g Division:		REVISED ISD: (Last Major In-ser		2020 05	
Designing D	rivision:		RISK MATRIX/ BUSINESS CASE		Mandator	у
Financial:	Lubano .	206.08.09				
RECOMMEND Requesting I	ED FOR I	MENTATION 1	REQUESTING D	OIVISION:	Transmiss	ion Planning & Design
requesting t	orv. Ivranager	The fire dug 1/16	I.M. NODE NUM	IBER	1.5.2.4.2.1	
Business Un	it V.P.:	Larly 2016-08-19	W.B.S. NUMBER	ts:		:16958, P:16959, P:16961, :21180, P:21616, P:25309
PRIMARY JUST			MAJOR ITEM	\boxtimes	DOMESTI ITEM	IC
Safety	Supply	Customer Service Efficiency	PREPARED BY:		Eryn Brow	vn, Project Manager obson, Project Owner
=	Reliability	Environmental	DATE PREPARE	ED:	2016 06 1	יי אשא ביכר
			REPORT NUMB	ER:		
* Determine if t		YES NO res compliance with North American (NERC) CIP Cyber Security Standa		Optional):		
		,				
01	2013 07 31	Increase budget by \$145M to reflectosts to terminate the line at Riel arcommunications equipment	ct updated equipment nd Dorsey, and for	C.R. Winst	tone	Executive Committee Minute #1453.03
•	2008 09 18	Original CPJ		C.A. Winst	tone	Executive Committee Minute #1326.04
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
ADDENDUM NUMBER	DATE (yyyy mm dd)	REVISION	REVISED BY	APPROVED BY

June 21, 2017 Page 25 of 50 Manitoba Hydro 2017/18 & 2018/19 General Rate Application PUB MFR 181 MMTP

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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 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. <u>500kV Tie Line (P:16957)</u> 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. <u>Licensing & Environmental Assessment (P:16962) increase of \$17.0M</u>
 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.

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Capital Project Justification Addendum

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

5. Escalation and Interest across al 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 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.

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Capital Project Justification Addendum

ANALYSIS OF ALTERNATIVES: (This section is 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 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		vious CPJ / J Addendum	oposed 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	ş	(89,348)
2017/18	\$	58,728	\$ 125,313	\$	66,585
2018/19	ş	63,483	\$ 114,336	\$	50,853
2019/20	ş	91,663	\$ 82,874	\$	(8,788)
2020/21	\$	137	\$ 103,474	\$	103,338
Total	\$	350,346	\$ 453,209	\$	102,863

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Capital Project Justification Addendum

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

The current scheduling of key milestones is as follows:

Receipt of licences * Provincial Federal	April 2017 July 2017
500kV Tie Line Design Delivery of material Construction	Ongoing – May 2017 August 2017 – January 2018 October 2017 – April 2020
Terminate Tie Line @ Dorsey Design Delivery of material Construction	Ongoing - Feb 2018 March 2017 - October 2018 September 2017 - February 2020
Riel Auto Transformer Design Delivery of material Construction	Ongoing – May 2018 March 2017 – July 2019 July 2018 – March 2020
Glenboro Phase Shifter Design Delivery of material Construction	Ongoing October 2018 August 2017 – September 2019 October 2017 – January 2020
All facilities in-service	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 be filled out only if changed)

No change.

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

No change.

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2016.07.29

Capital Project Justification Addendum Estimate Summary - Internal Labour

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

	Revised Es	Revised Estimate vs. Last Approved	t Approved	Revised E	Revised Estimate vs. LTD Actual	rD Actual	Planned
	CPJA #01	CPJA #02	Increase	Actuals as of	CPJA #02	Remaining	for
Internal Labour (Hours)	JUL 2013	JUN 2016	(Decrease)	2016-07-29	JUN 2016	(Over)	2016/17
Apparatus Maintenance Div	2,891	2,597	(293)	20	2,597	2,577	192
Commissioning Dept	3,185	2,905	(280)	47	2,905	2,858	15
Dorsey CS Dept	514	3,429	2,914	6	3,429	3,420	138
Electrical Construction Dept	26,963	49,915	22,952	39	49,915	49,876	453
HVDC Engineering Dept	1	1	1	ì	ŧ	1	'
Lic. & Env. Assessment Dept	240	40,165	39,926	30,326	40,165	9,839	3,096
Radisson/Henday CS Dept	1	1	1	ì	1	1	'
Station Design Dept-Apparatus QC	3,078	6,559	3,481	1,018	6,559	5,541	3,614
Station Design Dept-Automation & Ctrls Eng.	15,614	38,779	23,165	350	38,779	38,429	. 141
Station Design Dept-Contracts	ı	15	15	15	15	(0)	'
Station Design Dept-Protection	2,989	699 '9	3, 680	2,231	699 '9	4,438	3,767
Station Design Dept-Structures & Equip & Grndg	4,992	8,120	3,129	1,203	8,120	6,917	1,458
System Performance Dept	263	2,723	2,460	19	2,723	2,704	986
System Support Dept	1,662	4,263	2,601	217	4,263	4,047	31
Telecommunications Dept-planning	264	6,004	5,740	49	6,004	5,956	1,145
Telecommunications Dept-mtce & ops	121	4,877	4,756	18	4,877	4,859	918
Trans Line & Civil Constr Dept-construction	81,951	141,602	59,651	336	141,602	141,266	1,688
	10,560	47,519	36,959	296	47,519	47,223	69
	1	440	440	9	440	434	3
Trans & Civil Design Dept-Civil Design	23,981	31,216	7,235	2,901	31,216	28,316	8,354
Trans & Civil Design Dept-T/L Design	11,589	13,861	2,272	5,766	13,861	8,095	4,568
Transmission Projects Dept	10,363	20,002	9, 639	5,078	20,002	14,924	3,452
Other Transmission BU Resources	911	21,534	20,624	12,777	21,534	8,757	1
Subtotal - Transmission BU Resources	202, 132	453,196	251,064	62,719	453,196	390,477	34,078
Corporate Relations BU	'	4,203	4,203	2,924	4,203	1,280	332
CS&D BU-Distr Eng & Constr - engineering	297	317	20	121	317	196	'
CS&D BU-Distr Eng & Constr - construction	23,518	520	(22, 998)	•	520	520	69
Generation Ops BU	2,861	1,657	(1,204)	642	1,657	1,015	113
HR & Corporate Services BU - Materials Mgmt	1	1	1	3	t	(3)	-
HR & Corporate Services BU - Property	13,143	9,173	(3,969)	. 3,363	9,173	5,810	3,090
Other Resources from other Business Units	50	906'5	5,855	1,837	5,906	4,069	9,256
Total Resource Requirements	242,001	474,971	232,970	71,608	474,971	403,364	46,939

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2016 07.29

Capital Project Justification Addendum Estimate Summary - Cost Type

Lake Winnipeg East System Improvements (IM Node 1 10 2 3 2 1)

(11111111111111111111111111111111111111			ı		ı										Ì
	Ľ	evised Es	stima	Revised Estimate vs. Last Approved	t Ap	proved		Revised B	stin	Revised Estimate vs. LTD Actual	₽ 8	ctual	Ø	Planned	Œ
	טֿ	CPJA #01	ပိ	CPJA #02	Ĺ	ncrease	٢	Actuals as of	ᅝ	CPJA #02	٣	Remaining	Œ.	for	20
Cost (Thousands of Dollars)	= 	JUL 2013	5	IUN 2016	<u>e</u>	(Decrease)	_	2016-07-29	₹	JUN 2016		(Over)		2016/17	sii
Property	ဟ	4,656	s	8,687	S.	4,030	S	192	vs-	8,687	ς÷	8,494	ι'n	2,206	L
Internal Labour - Eng., Proj Mgmt & Admin	s	7,270	(A)	18,922	o	11,652	s.	6,064	v	18,922	v	12,858	v.	3,928	
Internal Labour - Construction	ψ	11,639	s.	22,867	e/s-	11,228	S.	5 93	()	22,867	υ	22,774	()	328	
Consulting	s	944	v.	18,829	s)	17,885	s	8,501	w	18,829	v)·	10,328	S	2,776	
Material	ςş	117,119	()	101,764	v)·	(15, 355)	v.	6	s.	101,764	v)·	101,755	v.	1,078	
Contracted Construction Services	s	66,591	v	136,648	s	70,057	co-	96	s,	136,648	v)·	136,551	v)·	17	_
Contingency	v	40,601	(A)	88,000	s	47,399	S.	1	()	88,000	s	88,000	o.	•	_
Overhead (on labour & material)	v)·	1,113	(A)	2,642	S	1,530	o.	509	V)·	2,642	v)·	2,134	W.	213	
General High Level / Other	S	37,756	o	1,184	v)·	(36,572)	()	176	₩.	1,184	s	1,008	v)·	138	_
Subtotal - Gross	s	287,688	υį٠	399,543	s	11,85	S	15,641	s	399,543	'n	383, 903	(J)	10,685	Г
Escalation & Interest	တ	62,658	S.	53,666		(8,992)	L	1,524	ŝ	53,666	L	52,142	თ	1,069	L
Total Net Cost	S)	350,346	\$	453,209	¢	102,863	L _S	\$ 17,165	w	453,209		\$ 436,045	S.	11,754	

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CER(1) Rev. 97 12

CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Title Dorsey-U S 500 Tie L'e		Investment Management Node:
Responsible Division Transmission Construction & Line Mtce	Requesting D v s on Transmission Plannin & Desi n	ProjectNumber: P:16957

DESCRIPTION:

DESCRIPTION:
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).

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 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).

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

Contingency: \$0

			N SERVICE DATES			Base estimate
2016/03/31 2017/04/30 2020/05/31	721 7531 205301					Work start date 2010/04/01
PREV.AUTHOR TY	GROSS	ESCALATI N	INT.CAPITALIZED	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date	2457		243			2700
(Over)under expend	7445	308	500			8253
2016/17	64837	4348	1930			7111!
2017/18	33350	2891	5476			41717
2018/19	21349	2258	7968			31575
2019/20	42414	5574	5370			53358
2020/21	74	11				85
V CPJ TOTAL	171926	15390	21487			208803
REV. AMOUNTS:	2457		243		_	0704
Actual cost to date. (Over)under expend.	2457		243			2700
Auth 2016/17	2994	12	159		1.	3168
Reg: 2017/18	101037	3480	1253			105770
2018/19	57932	2683	7109			67724
2019/20	17841	1147	9283			28271
2020/21	3926	299	1698			5923
V-CEO TOTAL	186187	7621	19745		,	213553

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	STORY In thousand	ds of dollars)				ProjectNumber P:16957	
Approved yy mm	TO A AMOUNT			CO	MMENTS		
2015 11	173138	contingency (\$23	368 being moved	eased by \$35,666 m I to P 25309, as we			
2014 11	96055	e sewhere in the unchanged from	a Gross est mate d comp ex such that \$350 3M	ecreased by \$14746 the overall Total Net	cost is		
		Agreements.	1 Oct 20 9 to May	2020 to match the F	o er sa es		
2013 11	208803	restructuring of p meant to cover th south to the bord Dorsey through the border. As a rest Costs for the Dor P.16960, which The sum of the T others in the com System Planning	rojects with nithe of the costs of a transmer. I now covers a ne south oop to neit, the ine ength his say to Rie section has now been cancotal Net cost for the pex matches the estudy report entity mont to Point Green	te increased by \$882 tomp ex. This WBS wission ine from Dors transmission I ne that ar R el and then sout as increased from 2 were previously est reled. I project a ong with stimate submitted of the led. I mate submitted of the mate submitted of the led.	vas or g nal y se straght it runs from h o the US 23km to 234km neted under al of the to rinc us on n 50 250 MW		
2012 11	86699	changes to activ	ty and overhead rat	1 to Gross s p mar es. n add t on, the e or the faci t es study	was a		
2011 11	92467	P an for 2011/12 Facilities Studies SD for the prope 2018.09.30, and	2 and 2012/13 updable System Planning by System Planning arty acquisition defe	base dollars to 201 ated for the add tion g, at an estimated co erred from 2018, 04.3 te deferred from 201 wer Resource Plan.	of the Group st of \$750 30 to		
20 0 11	90859	deferred by one y Supply. ISD adde completed by Ap actual costs (\$81 from the Fac lity! complex, as direc ncurred as part of	ear rom May 2018 of for the property 2018. Spend ng 1) from o d WBS P Stud es budget tem ed by the Corpora f the Fac t es Stud	vered by P14684 IS 3 to May 2019 es re rghts acqu sit on, wh in 2010/11 reflects 14684, which in turn 15.1.1 51 5, P16 te Cont ofer Division by Agreement with M ss on in the United S	quested by Power nich should be transfer of a were transferred 369) to this Costs were		
Forecasted Mthl Ex	GROSS	ESCALATION	NTEREST CAP	CONTR BUT ON	SALVAGE	TOTAL NET	YTD Accumulate

2016/08/03 07:15AM

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CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Title Dorsey 500kV S n - Terminate Tie Li	nė.	Investment Management Node: 1,5,2,4,2,1
Responsible Division	Requesting Division	FrojectNumber:
Transmission Construction & Line Mtce	Transmission Plannin & Design	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

2016 07 O7: 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

GROSS 168 4041 7188	ESCALATION	INT.CAPITALIZED	SALVAGE		Work start date 2013/07/01
168 4041			GALLIANS.		
4041			SWEARING	CONTRIBUTION	TOTAL NET COST
		15			183
7188	188	97			4326
	477	451			8116
4890	418	930			6238
2508	252	1249			4009
		819			8079
29	4				33
25246	2177	3561			30984
160		15		_	183
100		10			183
1566	11	31			1608
	158				6011
14385	687	776			15848
1937	106	1283			3326
286	19	228			533
23967	981	2561			27509
approved by	yy m			m Approv y	yy mm 🐇
7 R SPONS	BLE SION 14	P QUESTI D	SON 16	as of Vrees	SIDILT 16-091
	168 1566 5625 14385 1937 286	25246 168 1566 11 5625 158 14385 687 1937 106 286 19 23967 981 P V YY mi	25246 3561 168 15 1566 11 31 5625 158 228 14385 687 776 1937 106 1283 286 19 228 23967 981 2561 P V	25246 3561 168 15 1566 11 31 5625 158 228 14385 687 776 1937 106 1283 286 19 228 23967 981 2561 7 R SPONS BLE SION 16 00 R QUESTI* D S ON 66	25246 3561 168 15 1566 11 31 5625 158 228 14385 687 776 1937 106 1283 286 19 228 23967 981 2561 P V

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	HSTORY (in thousand	is o do ars)				ProjectNumber P•16958	
Approved yy mm	TOTAL AMOUNT			cor	MMENTS		
2015 11	25848		oved to P:25309 a	eased by \$5 37 due s we as decrease			
2014 11	31637	2014 06 19. Total changes to activit engineering effort	Gross est mate in rates (\$90) and t s	creased by \$153 as he add t on of \$63 of 2020 to match the P	f prel minary		
	1 -	Agreements.			0.1.0.		
2013 11	30984	the el m nation o p anned Dorsey to ent rely. Th s was fo market increas	the term nation wo Re Ine, which ha o fse by a high-e ses to pricing on ma	e decreased by \$97(ork (\$ 0867 for the as been removed f on ve adjustment (\$947 eter al and constructi estimated in 2010.	prev ously n the complex 7) to account		
		others in the com System Planning's	plex matches the e s study report ent n Po nt to Po nt Gro	s project a ong w th st mate subm tted o led MHEM 1100/75 oup Trans ss on Sei	rinc us on in 60/250 MW		
2012 11	45531		change to base es and interest and es	imate. tem reca cu a ca ation.	ated for change		
2011 11	45034	ISD for terminat of from 2019 05.31 Dorsey-Riel transi	n of the new 500k to 2019.10 31, s	V Dorsey- S Border nd SD for termination d from 20 9.10.31 to	n of the new 500k	v	
2010 11	- 5435	of the Dorsey US to Oct 2019, and	Border ne deferre SD or the term no e months from Mar	vered by P 4685. S d by seventeen mont at on o the Dorsey R y 2018 to May 2019	hs from May 2018 ie I ne		
		241					
Forecasted	GROSS	ESCALATION	INTEREST CAP	CONTRIBUTION	SALVAGE	TOTAL NET	YTD Accumulate
Mthl Ex . 016/17 Ap		ESCALATION	1	CONTRIBUTION	SALVAGE	COST 63	6:
Mthi Ex .	62 y 65 n 66 ul 54 g 52 47 st 53 v 66 c 93 n 300 b 147	ESCALATION 3 8 1 1		CONTRIBUTION	SALVAGE	COST	

2016/08/03 07·15AM

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CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Title Riel 230/500kV Stn-Auto Transform	nstal	Investment Management Node: 1.5.2 4.2.1
Responsi e D v sion	equesting Division	ProjectNumber:
Transmission Construction & Line Mtce	Transmission Plannin & Design	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.

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).

IN SERVICE DATES

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

Contingency: \$0

2016/08/03

07:15AM

2020/05/31	52818		K SEPVICE DATES			Base estimate Work start date 2013/07/01
PREV.AUTHOR TY	GROSS	ESCALATION	INT. APIT L ZED	SALVAGE	CO TRIBUTION	TOTAL NET COST
Actual cost to date: (Overlunder expend: 2016/17 2017/18	199 14162 16658 3792	645 1089 305	23 371 1407 2274		Mets.	222 15178 19154 6371
2018/19 2019/20 2020/21 2021/22	7400 16821	803 2188	2655 1897			10858 20906
V-CPJ TOTAL	59032	5030	8627			72689
Actual cost to date (Over)under expend.	199 1		23			222 1
Auth 2016/17 leq 2017/18 2018/19	513 2878 16972	4 63 783	21 108 583			538 3049 18338
2019/20 2020/21 2021/22	26184 280	1667 18	2083 440			29934 738
V CEO TOTAL	47027	2535	3258			52820
7 pare yy m Y #0 16 0	17 M. RESPONSI	BLE ISION 16	Appr APPR APPR APPR APPR APPR APPR APPR APP	VISIO	grog / health	6 19

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	STORY (III thousand	is of do ars)				ProjectNumber P:16959	
Approved y mm	TOTAL AMOUNT			CON	MMENTS		
2015 11	58230		946) being moved	eased by \$14,461 m o P:25309 and a dec			
2014 11	72278	2014 07 24: Total e sewhere in the unchanged from	al Gross est mate d comp ex, such that \$350.3M.	ecreased by \$1347 to the overal Total Net 2020 to match the P	cost is		
2013 11	72689	high-level adjustn on material and c	tota Gross est ma nent(\$1915 to acc onstruction that ha 2010, p us accour as (\$358)				
		others in the com System Planning	plex matches the e s study report ent i m Point to Point Gre	s pro ect a ong with a st mate submitted fo ed "MHEM 1100/75 oup Transmission Ser	r inclusion in 10 250 MW		
2012 11	73282		change to base est ead interest and es	mate tem recalculi scalation.	ated for changes		
2011 11	71890	ISD deferred from Resource Plan.	2019.10.31 to 20	020 05.31 to match t	the 20 1 Power		
2010 11	71832			vered by P14685. IS o Oct 2019 as reque			
		W-					
Forecasted	GROSS	ESCALATION	INTEREST CAP.	CONTRIBUTION	SALVAGE	TOTA NET	YTD Accumulate
Mthl Ex 016/17 Api	r 30	ESCALATION	INTEREST CAP.	CONTRIBUTION	SALVAGE	COST 31	YTD Accumulate
Forecasted Mthl Ex O16/17 Apr May Jun	r 30	ESCALATION	1 1	CONTRIBUTION	SALVAGE	COST 31 34	31 65 93
Mthi Ex 016/17 Apr May Jun Ju Aug	30 7 33 3 27 1 37 3 31	ESCALATION	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34	3° 6!
Mth Ex D16/17 Apr May Jun Ju Aug Sep Oct	30 7 33 3 27 1 37 3 31	ESCALATION	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 33 30	3 6: 9: 13 16: 19: 22:
oth Ex D16/17 Apr May Jun Jul Aug Sep Oct Nov Dec	30 33 37 37 37 31 31 28 4 28 4 29	ESCALATION	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 33 30	3 6: 9: 13 16: 19: 22:
Mth Ex 016/17 Apr May Jun Jul Aug Sep Oct Nov Dec Jar Feb	30 33 37 37 37 31 28 28 29 29 18 18		1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 33 30	3 6! 9: 13' 16' 194 22'
Mthl Ex 016/17 Apr May Jun Jul Aug Serp Oct Nov Dec Jer Feb Mai	30 33 37 37 37 31 31 32 31 28 4 29 18 18 21 21 21 21 21	ESCALATION 4 4	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 30 30 31 20 23 220 538	3 6! 9: 13' 16' 194 22'
MIN Ex 016/17 Apr May Jun Jul Aug Ser Oct Nov Dec Jar Fet Mai TO AL	30 33 37 37 37 37 31 28 28 28 4 29 18 18 18 21 35 35 31 28 29 31 31 28 4 29 4 29 4 31 31 31 31 31 31 31 31 31 31 31 31 31	4	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 30 30 30 20 20 23 220 538 11 13	3 6 9: 13: 18- 199 22- 25: 27: 29: 31: 53: 53:
Mibl Ex O16/17 App May Jun Jul Aug Sep Oct Nov Dec Jer Feb Mai TO AL 2017/18 App May Jur Ju	30 33 37 37 37 37 31 31 28 28 4 29 18 18 18 21 35 35 31 31 28 18 18 18 18 18 18 18 18 18 18 19 21 31 31 31 41 41 41 41 41 41 41 41 41 41 41 41 41	4	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 39 30 30 31 20 20 23 220 538 11 13 13 1144 57	33 68 90 133 184 199 222 255 277 299 314 538 538
MINI Ex O16/17 App May Jun Ju Aug Sep Oct Nov Dec Jer Fet Mai TOT AL 2017/18 App May Jur Ju Aug Sep	30 33 37 37 37 37 31 38 28 29 29 18 18 21 21 213 513 8 4 10 110 1112 48	4 4 28	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 39 30 30 31 20 20 23 220 538 11 13 13 1144 57 136	33 68 90 133 184 199 222 255 277 299 314 538 538
MIN Ex O16/17 Apr May Jun Jul Aug Ser Oct Nov Dec Jer Fet Mai TO AL 2017/18 Apr May Jur Jul Aug Ser Oct Nov Nov Nov Nov Nov Nov Nov	30 33 31 37 37 37 37 38 31 28 28 29 18 18 18 29 21 213 513 513 8 7 10 10 1112 48 48 48 48 48 48 48 48 48 48 48 48 48	4 4 28 1 188 2	1 1 1 1 2 2 2 2 2 2 2 2 2 3 3 3 4 9 9 9	CONTRIBUTION	SALVAGE	COST 31 34 28 38 39 30 30 31 20 20 538 11 13 13 134 57 136 717 212	31 68 93 137 186 194 224 255 275 295 311 536 538 538 124 33 118 123 1374 2099
Mthl Ex D16/17 Apr May Jun Ju Aug Sep Oct Nov Dec Jer Fet Mai TO AL O17/18 Apr May Jur Ju Aug Sep	30 33 37 37 37 31 31 32 31 32 32 32 32 32 33 31 32 32 32 33 31 32 32 32 32 32 33 31 31 32 32 32 32 32 32 32 32 32 32 32 32 32	4 4 28	1 1 1	CONTRIBUTION	SALVAGE	COST 31 34 28 38 39 30 30 31 20 20 23 220 538 11 13 13 1144 57 136	3 6 9: 13 18- 199 22- 25: 27: 29: 31: 53: 53:

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CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Title
MB-US 500kV Facili lies - Communication
Responsi le Division
Transmission Construction & Line Mtce Investment Management Node: 1. . . 2 1 Project umber: P:16961 Requesting Division Transmission Planning & Desi in

DESCRIPTION
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.

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 Telecommunications & System Control Centres

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

REVISION: 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

PREV AUTHORITY Actual cost to date (Overlunder expend 2016/17 2017/18 2018/19	GROSS 12 132 1269	ESCALATIO 1	INT. A TALIZED	SALVAGE	CONTRIBUTION	2016/09/01
Over)under expend 2016/17 2017/18 2018/19	132				CHALLUDGLIGIA	TOTAL NET COST
2016/17 2017/18 2018/19	132				100	
2017/18 2018/19		10				13
2018/19		111	2 46			144
	1360	149	137			1426
2019/20	802	104	137			1646
2019/20	4		121			1027
2020/21		1				
V CPJ TOTAL	3579	376	306			4261
REV AMOUNTS.						
Actual cost to date						
Overlunder expend						
Auth 2016/17	565	4	8			577
leq 2017/18	998	21	55			1074
2018/19	1044	43	111			1198
2019/20	430	24	164			618
2020/21	-		29			29
/ CEO TOTAL	3037	92	367		1 1 2	3496
repared yy mm	Apr ve y	yy mr		MAN TO THE REAL PROPERTY OF THE PERTY OF THE	m Approve	ya, mm &F
\$0 16 0817	His Lattern		A // REJESTINATE	- A-	CZP V C PRE	Market 116 /102 /

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FORECAST HI	STORY In thousand	is of do lars)				ProjectNumber P:16961			
Approved y m	TOTAL AMOUNT			CON	MMENTS				
2015 11	3827	20 5 09 24: Tota	a net cost decrease	ed by \$433 due to the	e transfer of				
2014 11	4334	ove head, activ ty	c ange in base esting interest and esca	mate Item recalculat lat on rates. 2020 to match the P	- 111				
2013 11	4261	high level adjustr	nent to account for struction that have	te increased by \$216 market increases to poccurred since this po	pricing on				
		others in the com System Planning	plex matches the e s study report entit m Point to Point Gre	s project a ong with a st mate submitted fo led "MHEM 1100/75 oup Transmission Sei	r nc us on in iO 250 MW				
2012 1	4486	2012 06 20: No nterest and esca		mate. tem reca cu	ated for				
2011 11	4277	tie I ne deferred f communications	ISD for communications associated with the new 500kV Dorsey-US Border tie I ne 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. 0 31 to 2020 05 31, per the 2011 Power Resource						
2010 11	4280	system additions seventeen month communication s	associated with the is from May 2018 to system additions assove months from Ma	vered by P14685. Se new Dorsey US Te o Oct 2019, and ISD sociated with the new y 2018 to May 2019	Ine deferred by for the V Dorsey Rie Line				
Forecasted Mthl Ex .	GROSS	ESCALATION	INTEREST CAP	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulate		
016/17 Apr May Jun Jul Aug Sep					00	80	80		
Oct Nov Dec Jan Feb Mar	80 84 76 80 76	1 1 1	1 1 1 2 3			80 86 78 82 79 92 5 7	160 246 324 406 486 577 57		
TOTAL 2017/18 Apr May Jun Jul Aug Sep Oct	76 89 85 8 89 77	1 1 1 2 2 2 2 2 2 2 2 2 2 3	2 3 8 2 3 3 4 4 4 5			93 89 85 95 83	79 17: 26 34! 44: 52: 61:		
Nov		2	4 5 5 6 6 7			92 97 82 95	71: 79: 890		

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CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Investment Management Node: 1. 2.1 Pro ectNumber. P:16962 equesting Division
Transmission Plannin & Desi n

Title MB-US 500kV Facilities-Lic. & E v Responsi le Division Transmission Construction & Line Mtce

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

MEVISION: 2016 07 O7: 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

				Base estimate
31537				Work start data 2010/05/01
ESCALATION	INT.CAP TALIZED	SALVAGE	CONTRI U ON	TOTAL NET COST
11288	787			12075
7721 118	-556			8159
1528 98	290			1916
1161 103	385			1649
1388 152	496			2036
1856 241	351			2448
9500 712	1753			11965
11288	787			12075
4671 56	738			5465
3850 87	1060			4997
2643 131	1215			3989
2912 194	1449			4555
180 14	263			457
25544 482	5512	A.a		31538
Verily	-A-7 VV	yy mm Approve y	yy mm Approve y	yy mm Approve y y mm Approve y

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FORECAST H	S ORY n thousand	is of dollars				ProjectNumber P:16962	
Approved yy mm	TOTAL AMOUNT		-	cor	MMENTS		
2015 11	28005	of estimates (\$8, deta became av requirements, ref plans (\$1,900) the municipality and anticipated elk mas an increase in (\$1,000) being m 2014 07 02: Tot detailed refineme approvals given the became available rounds of public strategies). Ciniest mate detailed	530) for licensing a ailable is to the soci inement of Envi on net included the add property value cons onitoring and collar nterest and escala loved to P:25309. al Gross estimate in nt of estimates for hat the efforts have as to the scope of consultations and the ingency reduced by in the budget.	eased by \$ 6 040 due and environmental ap- appe o environmental ition of rural land use sulting services, the a and requirements (\$1 and (\$3,661) offset be acreased y \$8532 as licensing and environ a already begun and a requirements (i.e. the te types of abor gina y \$900 due to the mi	provels as more and censing consulting work a ddit on of 500) as well by contingency as a result of a mental more detail e number of engagement provement of		
2013 11	11965	h gh- evel adjustr on material and d last estimated, in	nent \$900) to acci onstruction that ha	e increased by \$190 ount for ma ket incre ve occurred since thi t-time inclusion of Co pase estimate.	ases to pricing s project was		
	4.50	others in the com System Planning	ip ex matches the e 's study report entit m Po n to Point Gr	is project along with a simale submitted for all simale submitted for all simale makes with the simale with the simale simale simale simale with the simale	r inc us on in i0/250 MW		
2012 1	11488	2012 06 20: No interest and esca		imate. tem recalcul	ated for		
2011 11	11070			020 05 31 to maich i Power Resource I			
201011	11494			vered by P14684. IS o Oct 2019, as reque			
Forecasted	GROSS	ESCALAT ON	NTEREST CAP	CONTRIBUTION	SALVAGE	TOTAL NET	YTĐ Accumu at
016/17 Ap	r 104 y 106		54 56			158 162	158

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CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Title Ph Sh' er
Responsi le Division
Transmission Construction & Line Mtce Investment Management Node: 1. . .4. 1 Pro ect umber: P:21180 equesting vivision Transmission Planning & Desi n

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 Dakote-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

						2016/DE01 CLASS 2
						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
V-CPJ TOTAL	16439	1764	1075			19278
IEV. AMOUNTS:	260				_	
etual cost to date bneque rebnultavO	260		17			277
Auth 2016/17	272		21			293
leg 2017/18	2971	97	53			3121
2018/19	5926	277	332			6538
2019/20	14143	942	913			15998
2020/21 2021/22	242	16	221			479
V CEO TOTAL	23814	1332	1557	u\.		26703

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ER(1) Rev 97 12 FORECAST HI	S ORY in thousand			DITURE REVISI		Projec Number P.21180	
Approved yy mm	TOTA AMOUNT			col	MMENTS		
2015 11 2014 11	26069 19799	to an increase of transformer and detalled system a change in contralled a decrease of \$2 2014 07 02: To changes to activities.	\$9.228 from the acassoc ated equipme analysis changes in cting plan for ove his 625 in contingency al Grossiest in a ein ty rates.	eased overall by \$6,7 dd t on of a phase shi ent required as a resu is te expans on layou ead construction whi y which was moved to creased by \$179 as	ifting It of a more It es well as a ich was of set It es P 25309. It es a result o		
2013 11	19278	2013 07 04 Nev	w tem.				
		others in the com System Planning	np ex matches the e s study report ent i m Point to Po nt Gr	is pro ect a ong with stimate submitted fo tied "MHEM 1100/75 oup Transmiss on Se	r inclus on in 50/250 MW		
orecasted	GROSS	ESCALATION	INTEREST CAP.	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulate
Mh x . O16/17 Apr May Jun Jul Aug Sep Oct Nov Dec Jan	12 13 12 34 31 28 27 24 27 24		1 1 1 1 1 1 2 2 2 2 2 2 2 2 3 3 3 3 3 3			12 13 14 13 36 33 30 29 26 29 30 28 293 20 24 24 26 27 64	12 25 39 52 88 121 151 180 206 235 265 293 93 20 44 70 97 161 206
Feb Mar TOTAL 2017/18 Apr May	18					24	

2016/08/03 07 15AM

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CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

Title Glenboro Tr n mi io Lin R - Al' ment esponsible Division		Investment Management Node: 1 5.22.1
esponsible Division Transmission Construction & Line Mtce	Requesting ivision Transmission Plannin & Design	FrojectNumber: 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.

IN SERVICE BATTLE

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

Contingency: \$0

2020/05/31	2299		N SEPVICE DATES			Base estimate
						Work start date 2016/04/01
PREV.AUTHOR TY	GROSS	ESCALATION	INT.CAPITALIL D	SALVAGE	CONTRIBUTION	TOTAL NET COST
Actual cost to date:		_				
Over)under expend 2016/17	133 205	5 14	2			140
2017/18	739	61	53			230 853
2018/19	364	37	88			489
2019/20	523	68	62			653
2020/21	020		0.2			000
V-CPJ TOTAL REV AMOUNTS:	1964	185	216			2365
Actual cost to date Overlunder exp. nd 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
/-CEO TOTAL	1970	61	270	NA.		2301

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	STORY (n thousand	is of do ars				ProjectNumber P:21616	
Approved yy mm	TOTAL AMOUNT			COI	MMENTS		
2015 1 1	2361			mate. tem recalcu a	ted for changed to		7.1
20 4 11	2401	2014 07 02: No overhead, activ to	y, interest and esca	mate. Item recalculat			
2013 1	2365	a ong w th all of t submitted for inc 1 00/750/250 M	the others in the co us on in System Pi	the Tota Net cost fo mplex matches the e ann ng's study report irm Point to Point Gro	stimate t entit ed "MHEM		
Forecast d Mithl Ex O16/17 Apr	GROSS 37	ESCALATION	NTEREST CAP	CONTRIBUTION	SALVAGE	TOTAL NET	YTD Accumulat
May Jun Aug Sep Oct Nov Dec Jan Feb Mar T TA 2017/18 Apr	3 2	1	4			37 5 17 8 8 7 5 5 4 3 2 7 10 45 241 336	37 42 55 67 75 82 82 96 96 101 108 45 286 622 706 81 893 1096 1166 1232 1292
May Jun Ju Aug Sep Oct	235 326 79 103 70	.5823233221	1 2 3 4 4 4 5 5 6 5 6 6 5 6 4 5			241 336 84 110 76 101 103 70 66	28 62 70 81 89 99

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CAPITAL EXPENDITURE REVISION (IN THOUSANDS OF DOLLARS)

esponsible Divis on	ency		Requesting D v sion			estment Management Node: 1 4 ect umber:
Transmission Cons	struction & Line N	Atce	Transmission Plannir	a & Desi n		P:25309
· ·	•	e allocation of proje	ct contingency for the *	Manitoba Minneso	ota Transmission Proj	ect" complex.
USTIFICATION: ransmission Service fanitoba to US expo fanitoba Hydro Expo	Requests have b	ability by 883 MW.	a Manitoba Hydro Open The project will be com	Access Transmiss pletely funded by	ion Tariff to increase the Eligible Customer	the
APITAL INVESTME rowth - Grid Interco	NT CATEGORY: innections-Import	t/Export - High Volta	age Direct Current (HVD	C)		
EVISION REAS 016 07 07: New ite or Contingency and	ON: em under CPJ Adi \$33.000 for Man	dendum #02. Contir agement Reserve) r	ngency totalling \$40 her	e, and increased b	y \$47,399 to reflect	a P75 estimate (\$40,000
ontingency: \$88,00		go		or randing or many	onodo opportantios.	
2020/05/31	95294		N SERVICE DATES			Base estimate
2020/05/31	95294		N SERVICE DATES			Work start date
EV.AUTHORITY	95294 GROSS	ESCALATION	INT CAPITALIZED	SALVAGE	CONTRIBUTION	2016/04/01 CLASS 2
IEV.AUTHORITY				SALVAGE	CONTRIBUTION	Work start date 2020/05/01
IEV.AUTHORITY				SALVA	CONTRIBUTION	Work start date 2020/05/01
IEV.AUTHORITY				SALVAGE	CONTRIBUTION	Work start date 2020/05/01
REV.AUTHORITY				SALVAGE	CONTRIBUTION	Work start date 2020/05/01
REV.AUTHORITY				SALVA	O NT WITON	Work start date 2020/05/01
NEV.AUTHORITY studicost to data lverjunder expend				SALVA	CONTRIBUTION	Work start date 2020/05/01
REV.AUTHORITY citual cost to date liverjunder expend				SALVAGE	CONTREUTION	Work start date 2020/05/01
CPJ TOTAL CV. AMOUNTS: ctual cost to late				SALVA	O NT WUTION	Work start date 2020/05/01
CPJ TOTAL V. AMOUNTS: tuel cost to ate verlunder expend				SALVA	CONTRIBUTION	Work start date 2020/05/01
EV.AUTHORITY Itual cost to date verlunder expend CPJ TOTAL V. AMOUNTS: tual cost to late verlunder expend th 2016/17 q 2017/18 2018/19				SALVA	CONTRIBUTION	Work start date 2020/05/01
CPJ TOTAL V. AMOUNTS: stuel cost to late verlunder expend CPJ TOTAL V. AMOUNTS: stuel cost to late verlunder expend sth 2016/17 q 2017/18 2018/19 2019/20		ESCALATION		SALVA	CONTRIBUTION	Work start date 2020/05/01 TOTAL NET C
CPJ TOTAL EV. AMOUNTS: ctual cost to ate EV. AMOUNTS: ctual cost to ate verlunder expend uth 2016/17 pg 2017/18 2018/19	GROSS			SALVA	CONTRIBUTION	Work start date 2020/05/01 TOTAL NET C
2017/18 2018/19 2019/20	GROSS	ESCALATION		SALVA	CONTRIBUTION	Work start date 2020/05/01
CPJ TOTAL CV. AMOUNTS: ctual cost to ate everlunder expend 2016/17 eq 2018/19 2019/20	GROSS	ESCALATION		SALVAGE	CONTREUTION	Work start date 2020/05/01 TOTAL NET C

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FORECAS HIS	STORY (in thousand	ds of dol ars)				ProjectNumber P:25309			
Approved yy mm	TOTAL AMOUNT	i i	COMMENTS						
2015 11	36118	2015 10 02: Nev and contingency Manitoba Hydro	w tem. An externa review of the proje- carry \$32 6 million	consultant complete ct, and it was recomn n contingency	ed a r sk ana ys s mended that				
		6							
		11111							
Fo ecast d Mt Ex	GROSS	ESCALATION	INTEREST CAP	CONTRIBUTION	SALVAGE	TOTAL NET COST	YTD Accumulated		
May Jun Jul									
Aug Sep Oct		1 1195	1						
Nov									
Dec									
Dec Jan Feb Mar TOTAL									
Mt Ex O16/17 Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar TOTAL 2017/18 Apr May Jun									
TOPAL 2017/18 Apr May 2017/18 Apr May Jun Ju Aug Sep									
2017/18 Apr May Jun Jul Aug Sep Oct Nov	2								
Dec Jan Feb Mar TOTAL 017/18 Apr Jun Jun Aug Sep Oct Nov Dec Jan Feb Mar	2								

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