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GEOCRES No.: 41H-243

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***"This Technical Memorandum is for
internal information purposes only
and was not reviewed by the
MTO Foundations Office"***

Dear Mr. Doyon

**Technical Memorandum No. Sett-33C-1-1
Addendum to Foundation Design Report
Swamp 315 (Ojibway Canyon)
Highway 69 Four-Laning, Phase 3
From 3.8 km North of Hwy 522 to 11.9 km North of Hwy 522 Township of Mowat
G .W.P. 5203-06-00, Agreement Number 5005-E-0031**

This technical memorandum provides recalculated rockfill settlements in swamp 315 (Sta. 20+775 to 20+837.5) of the above project. The settlements calculated in accordance with the MTO memorandum titled *"Post-Construction Rock Fill Settlement and Guidelines For Estimating Rock Fill Quantity"* (April 12, 2010) are provided in Table 3, appended.

Further, the magnitude of the post-construction settlements were checked for conformance with the criteria outlined in the MTO memorandum *"Embankment Settlement Criteria For Design"* (March 2, 2010). The results of the analysis are presented in Table 8, attached. The analysis indicates that the criteria were met for the recommended embankment construction. It is noted that two sections over steep rock faces (Sta. 20+772 to 20+777 NBL and Sta. 20+832 to 20+834 SBL) will require extended preloading periods of 12 months to conform with the March 2, 2010 criteria, as noted in Table 8.

As a result of the settlement calculations and analyses, the minimum recommended preloading periods were revised from those in the Final Foundation Design Report, PML Ref. No. 06TF033C-1 and GEOCRES No. 41H-243 dated November 19, 2009. Reference is made to the attached tables for the recommended preloading periods and magnitude of settlement of the embankment surface for swamp 315.



This technical memorandum was prepared by Mrs. N. Balakumaran, P.Eng., and reviewed by Mr. C.M.P. Nascimento, P.Eng. Mr. B.R. Gray, MEng, P.Eng., MTO Designated Principal Contact, conducted an independent review of the document.

We trust that the foregoing is sufficient for your present requirements.

Sincerely,

Peto MacCallum Ltd.



Carlos Nascimento, P.Eng.
Senior Project Engineer



Brian R. Gray, MEng, P. Eng.
MTO Designated Principal Contact

Enclosure(s):

Table 3 – Computed Settlement of Embankment Surface Due to Settlement of
Table 8 – Post-Construction Settlement Checks

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TABLE 3
COMPUTED SETTLEMENT OF EMBANKMENT SURFACE
DUE TO SETTLEMENT OF ROCKFILL
AS PER THE MTO 'POST-CONSTRUCTION ROCK FILL SETTLEMENT
AND GUIDELINES FOR ESTIMATING ROCK FILL QUANTITY' (APRIL 12, 2010)

SWAMP No.	RECOMMENDED TREATMENT OPTION	FILL HEIGHT (m)	TOTAL ROCKFILL SETTLEMENT (mm)	RECOMMENDED SURCHARGE PERIOD (months)	SETTLEMENT DUE TO SURCHARGE (mm)	ESTIMATED SETTLEMENT (mm)				MINIMUM RECOMMENDED DURATION OF PRELOADING (months)
						DURING FIRST 6 MONTHS FOLLOWING FILL PLACEMENT	DURING FIRST 12 MONTHS FOLLOWING FILL PLACEMENT	REMAINING AFTER 6 MONTHS	REMAINING AFTER 12 MONTHS	
315 SBL Sta. 20+775 To 20+820	Removal of peat/topsoil and organic soils	10.0 – 19.5	85 – 220	N/A	N/A	65 – 180	75 – 200	20 – 40	10 – 20	6
Sta. 20+820 To 20+837.5 Township of Mowat		5.5 – 9.5	50 – 215	N/A	N/A	35 – 175	40 – 195	15 – 40	10 – 20	12 (Note 4)
315 NBL Sta. 20+772 (*) to 20+790	Removal of peat/topsoil and organic soils	5.0 – 19.5	45 – 225	N/A	N/A	35 – 185	40 – 205	10 – 40	5 – 20	12 (Note 4)
Sta. 20+790 to 20+837.5 (**) Township of Mowat		12.0 – 19.5	130 – 225	N/A	N/A	105 – 185	120 – 205	25 – 40	10 – 20	6

Notes:

1. Fill height over original grade referenced to Drawings 13 and 14 of Construction Drawings dated December 9, 2009.
2. (*) Differential settlement computations fill height was considered from Sta. 20+772.
3. (**) Differential settlement computation fill height was considered to Sta. 20+842.
4. Preloading period increased to 12 months to mitigate differential longitudinal settlements (refer to Table 8 for details).



TABLE 8
POST-CONSTRUCTION SETTLEMENT CHECKS
AS PER MTO MEMORANDUM "EMBANKMENT SETTLEMENT CRITERIA FOR DESIGN" (MARCH 2, 2010)

SWAMP NO.	RECOMMENDED TREATMENT	RECOMMENDED SURCHARGE LOCATIONS	EMBANKMENT FILL HEIGHT AT CRITICAL SECTION FOR MAX. TOTAL SETTLEMENT (m)	CRITICAL SECTION FOR MAX. TOTAL SETTLEMENT	TRANSITION TREATMENTS AT STRUCTURES		TRANSVERSE DIFFERENTIAL SETTLEMENT		LONGITUDINAL DIFFERENTIAL SETTLEMENT		REMARKS AND REVISED RECOMMENDATIONS
					SECTION	WITHIN CRITERIA?	CRITICAL SECTION CHECKED	WITHIN CRITERIA?	CRITICAL SECTION CHECKED	WITHIN CRITERIA?	
315 Sta. 20+775 to 20+820	Removal of peat/topsoil and organic soils and preloading for 6 months	N/A	19.5	Sta. 20+790	N/A	N/A	Sta. 20+780	Yes	Sta. 20+772 to 20+782	Yes	No change in recommendations
Sta. 20+820 to 20+837.5 Township of Mowat			19.5	Sta. 20+820			Sta. 20+830	Yes	Sta. 20+832 to 20+834	No for 6 months Preloading Yes for 12 months preloading	
315 Sta. 20+772 to 20+790	Removal of peat/topsoil and organic soils and preloading for 12 months	N/A	19.5	Sta. 20+780	N/A	N/A	Sta. 20+775	Yes	Sta 20+772 to 20+777	No for 6 months Preloading Yes for 12 months preloading	Note 2
Sta. 20+790 to 20+837.5 Township of Mowat			19.5	Sta. 20+810			Sta. 20+820	Yes	Sta. 20+835 to 20+842	Yes	No change in recommendations

- Notes: 1. Fill height increases by 17.5 m between Sta. 20+832 and 20+834. Estimated differential settlements after 6 months of preloading are about 25 mm which exceeds the maximum allowable differential settlement of 10 mm. It is recommended to increase the preloading period in this section from 6 to 12 months to mitigate the magnitude of the differential settlement.
2. Fill height increases by 13.5 m between Sta. 20+772 and 20+777. Estimated differential settlements after 6 months of preloading are about 28 mm which exceeds the maximum allowable differential settlement of 25 mm. It is recommended to increase the preloading period in this section from 6 to 12 months to mitigate the magnitude of the differential settlement.