

## APPENDIX C

### GROUND TEMPERATURE PROFILES

Table 4: DCP-5 Horizontal Ground Temperature Cables (HGTCs) Bead Locations

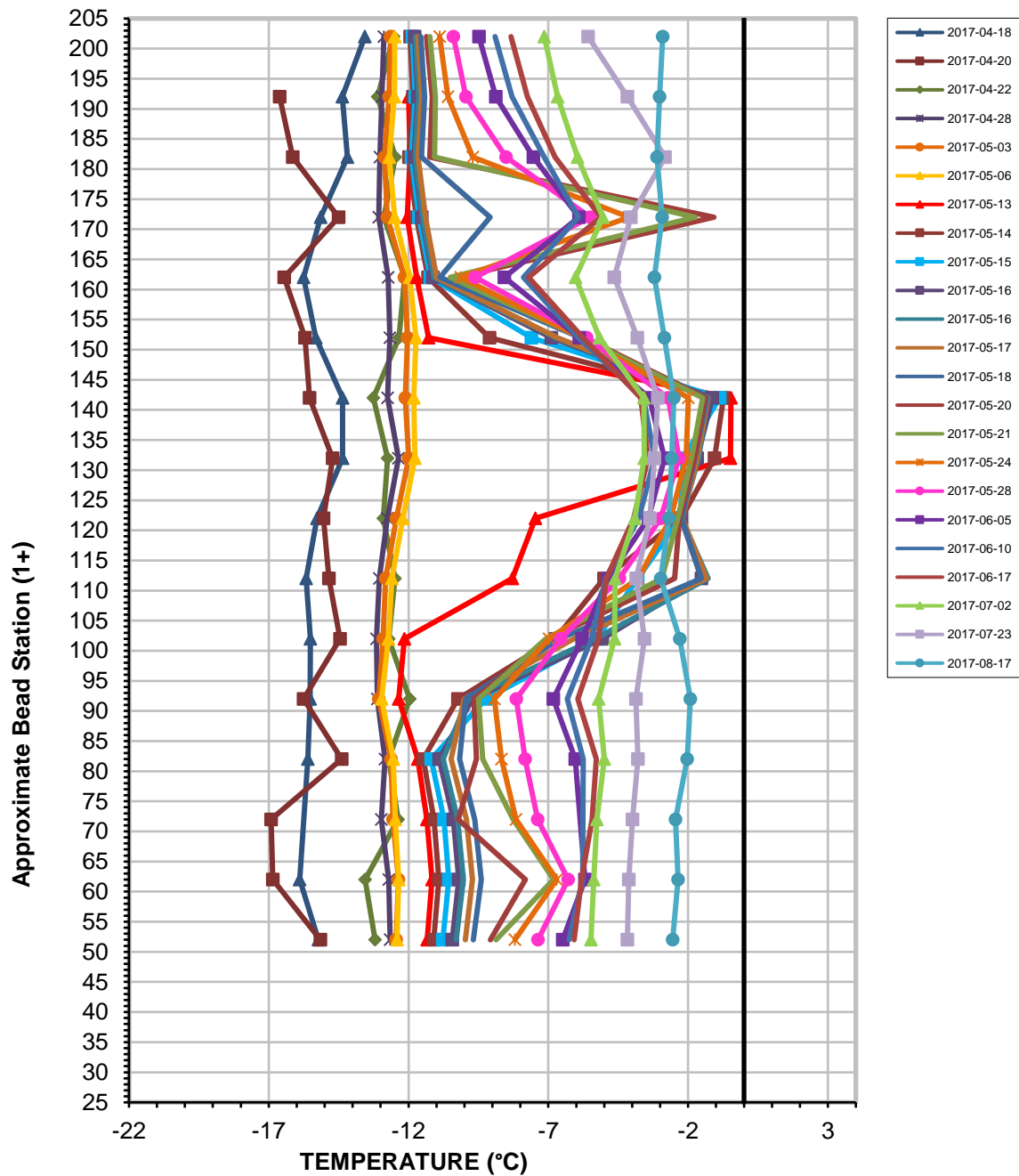
Point ID	Bead Number	Easting (m)	Northing (m)	Point Elevation (m)	Station
HGTC1-1	1	540178.64	6988479.94	65.01	1+052
HGTC1-2	2	540186.40	6988486.24	65.05	1+062
HGTC1-3	3	540194.24	6988492.45	65.06	1+072
HGTC1-4	4	540201.95	6988498.81	64.86	1+082
HGTC1-5	5	540209.55	6988505.30	64.62	1+092
HGTC1-6	6	540217.09	6988511.87	64.41	1+102
HGTC1-7	7	540224.67	6988518.38	64.21	1+112
HGTC1-8	8	540232.16	6988525.00	63.97	1+122
HGTC1-9	9	540239.75	6988531.51	63.81	1+132
HGTC1-10	10	540247.49	6988537.84	63.79	1+142
HGTC1-11	11	540255.41	6988543.94	63.72	1+152
HGTC1-12	12	540263.12	6988550.29	63.64	1+162
HGTC1-13	13	540270.48	6988557.06	63.56	1+172
HGTC1-14	14	540278.14	6988563.48	63.42	1+182
HGTC1-15	14	540285.93	6988569.76	63.41	1+192
HGTC1-16	14	540293.87	6988575.81	63.33	1+202
HGTC-2-1	1	540370.67	6988642.18	68.14	1+304
HGTC-2-2	2	540376.40	6988635.00	64.29	1+304
HGTC-2-3	3	540368.36	6988629.14	63.86	1+294
HGTC-2-4	4	540360.08	6988623.54	63.49	1+284
HGTC-2-5	5	540351.78	6988617.98	63.34	1+274
HGTC-2-6	6	540343.36	6988612.59	63.30	1+264
HGTC-2-7	7	540335.06	6988607.01	63.43	1+254
HGTC-2-8	8	540327.06	6988601.02	63.53	1+244
HGTC-2-9	9	540318.75	6988595.52	63.68	1+234
HGTC-2-10	10	540310.34	6988590.12	63.72	1+224
HGTC-2-11	11	540301.77	6988585.06	63.54	1+214
HGTC-2-12	12	540293.55	6988579.38	63.38	1+204
HGTC-2-13	13	540285.63	6988573.34	63.38	1+194
HGTC-2-14	14	540277.99	6988566.91	63.38	1+184
HGTC-2-15	15	540270.33	6988560.48	63.45	1+174
HGTC-2-16	16	540262.47	6988554.34	63.56	1+164

Table 5: DCP-5 Vertical Ground Temperature Cables (VGTCs) Bead Locations

Cable : VGTC1	
Easting: 540269.65	
Northing: 6988572.39	
Station: 1+181	
Bead Number	Point Elevation (m)
1	68.10
2	67.60
3	67.10
4	66.60
5	66.10
6	65.60
7	65.10
8	64.60
9	64.10
10	63.10
11	62.10
12	61.10
13	60.10
14	59.10
15	58.10
16	57.10

Cable : VGTC2	
Easting: 540274.74	
Northing: 6988571.99	
Station: 1+185	
Bead Number	Point Elevation (m)
1	68.00
2	67.50
3	67.00
4	66.50
5	66.00
6	65.50
7	65.00
8	64.50
9	64.00
10	63.00
11	62.00
12	61.00
13	60.00
14	59.00
15	58.00
16	57.00

Cable : VGTC3	
Easting: 540282.05	
Northing: 6988562.81	
Station: 1+185	
Bead Number	Point Elevation (m)
1	65.40
2	64.90
3	64.40
4	63.90
5	63.40
6	62.90
7	62.40
8	61.90
9	61.40
10	60.40
11	59.40
12	58.40
13	57.40
14	56.40
15	55.40
16	54.40

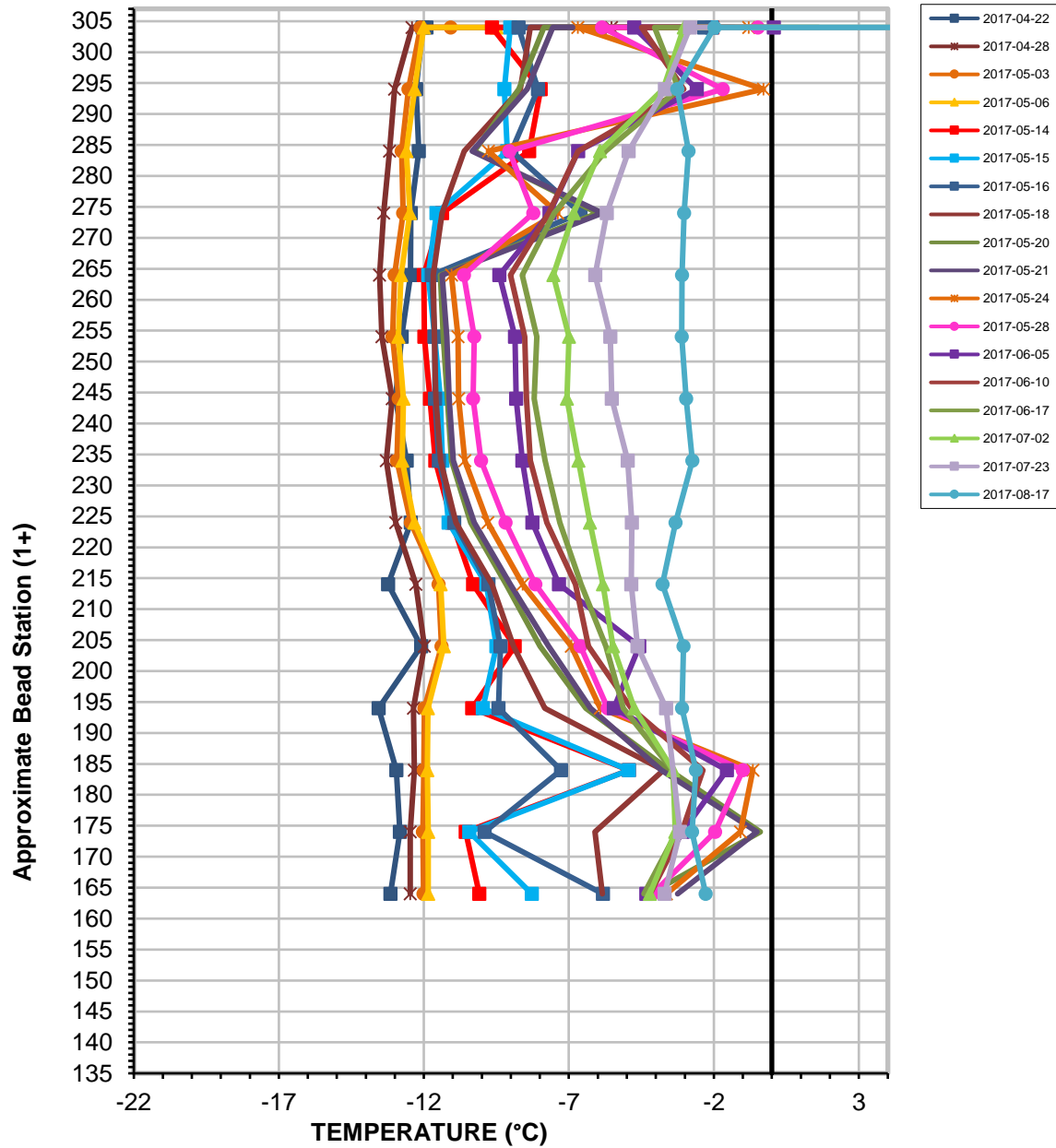


Serial No.: 2600  
Date Installed: April 15, 2017

EBA File No:  
E14103230.01-023

### Horizontal Ground Temperature Profile for Cable #1 (HGTC-01) Dike D-CP5



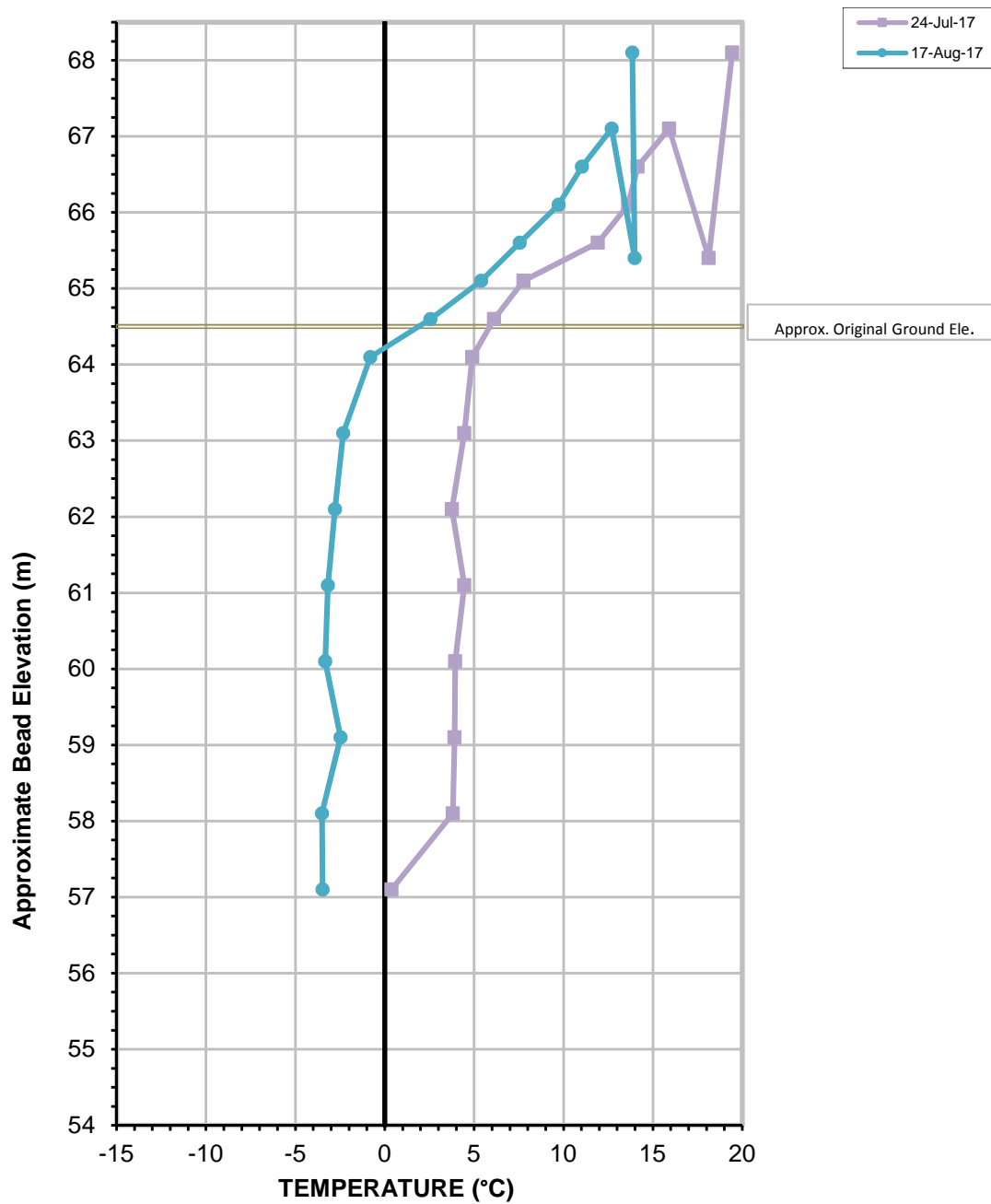


Serial No.: 2601  
Date Installed: April 20, 2017

EBA File No:  
E14103230.01-023

**Horizontal Ground Temperature Profile for Cable #2 (HGTC-02)  
Dike D-CP5**



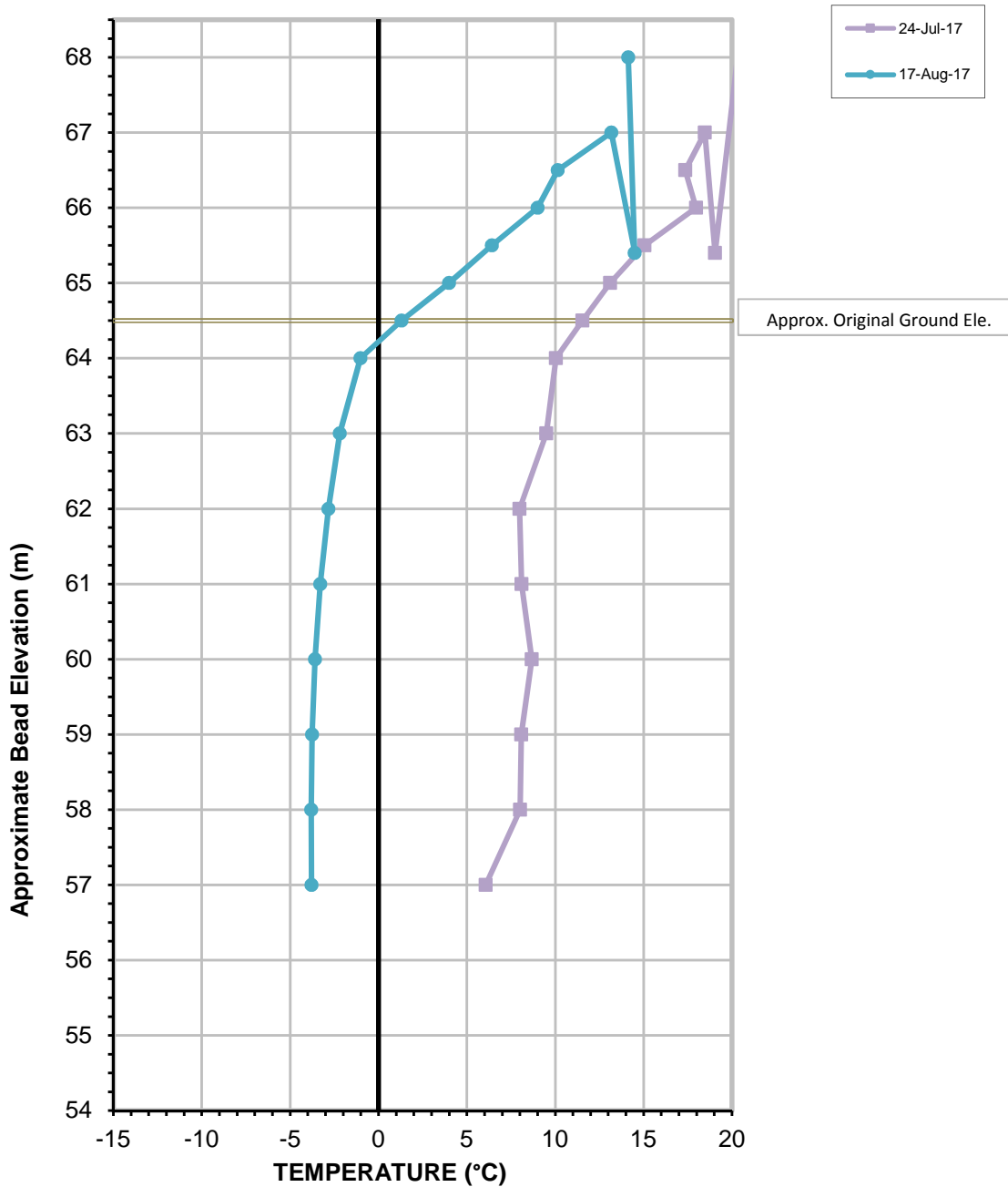


Serial No.: 2631  
Date Installed: July 24, 2017

EBA File No: E14103230.01-023

**Vertical Ground Temperature Profile for Cable VGTC-01  
Dike D-CP5**



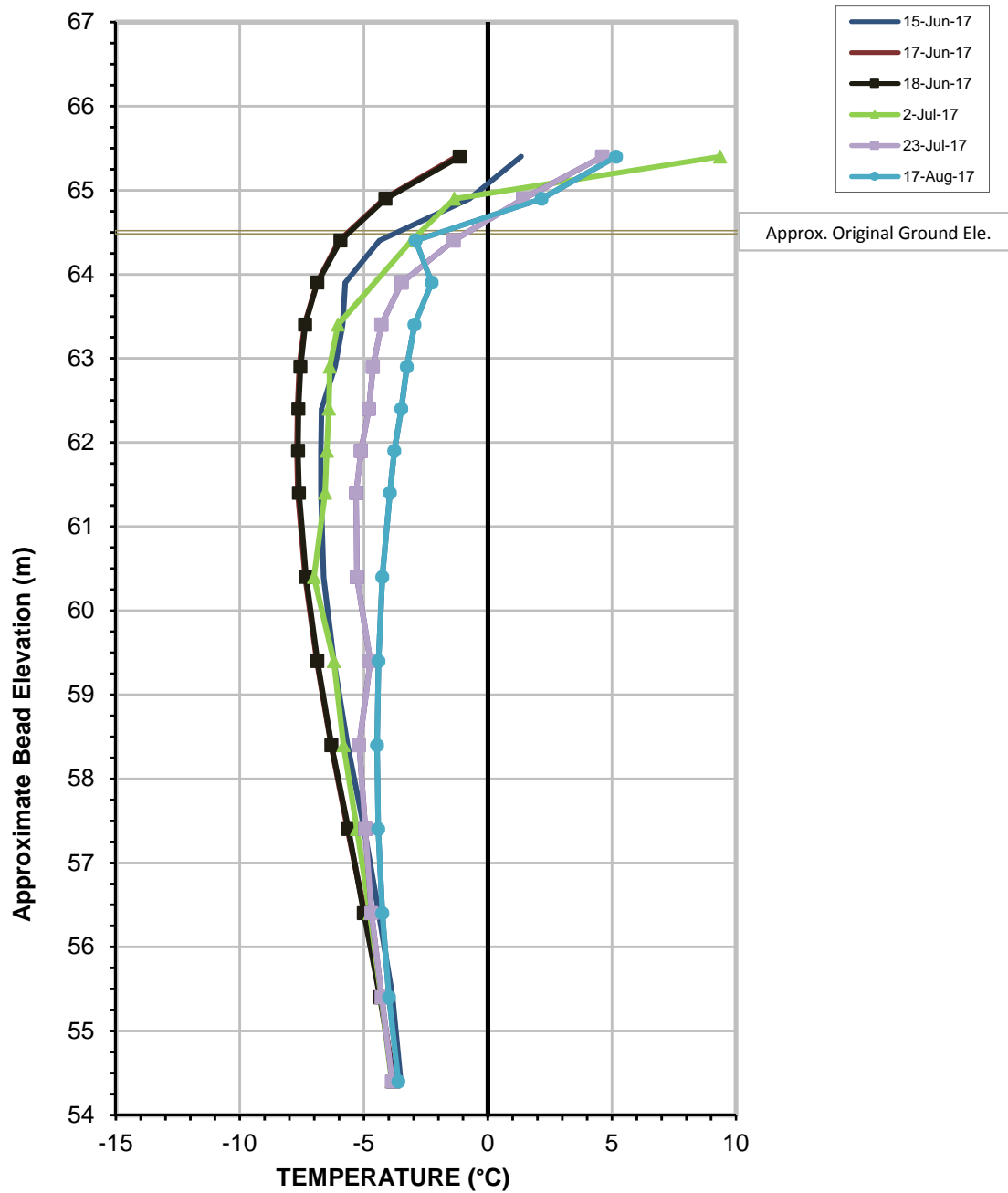


Serial No.: 2632  
Date Installed: July 24, 2017

EBA File No: E14103230.01-023

**Vertical Ground Temperature Profile for Cable VGTC-02  
Dike D-CP5**





**Vertical Ground Temperature Profile for Cable VGTC-03  
Dike D-CP5**





## APPENDIX D1

### REQUEST FOR INFORMATION (RFI)

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_004 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: Matt Gallant Date: 2016-10-11

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
		0

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND CONTRACTOR'S PROPOSED SOLUTION :

Please Specify the horizontal tolerances that will be acceptable for lift placement.

Prepared by: Matt Gallant Signature: *Matt Gallant* Date: 2016-10-11

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

In general, the acceptable horizontal tolerances are from -0.1 m to +0.1 m for fill lift placement during dike construction. However, the compacted liner bedding layer that is immediately below the liner should have smooth surface without sudden slope changes.

Engineering : Gordon Zhang Signature: \_\_\_\_\_ Date: October 12, 2016

## 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			



## Ndofor, Fai

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**From:** Zhang, Guangwen (Gordon)  
**Sent:** Monday, October 17, 2016 12:01 PM  
**To:** 'Duy Nguyen'  
**Cc:** Jack Dutil; Pyliuk, Jennifer; Ndofor, Fai; Construction Regional; EBA.Tt.Meliadine.Block007  
**Subject:** Responses - RE: 6515-C-230-007-RFI-005\_materiel  
**Importance:** High

Hi Duy,

Our responses to 6515-C-230-007-RFI-005 are summarized below:

- 1) **3D models to show all crests and surfaces:** Tetra Tech originally developed the dike drawings based on Civil3D modelling. However, based on AEM's drawing procedures, the CAD drawings to AEM should be in CAD format but not Civil3D format. To meet AEM's drawing procedures, we purposely exploded the Civil3D modelling in generating the CAD drawings submitted to AEM. As a result, all the Civil 3D features were gone after these modifications. Therefore, the CAD drawings that the Contractor received from AEM are not the right format for the Contractor to generate 3D drawings. We plan to send a complete set of dike drawings in Civil3D format to the Contractor so that they can have all 3D features including all crest lines and 3D surfaces. Before I send the drawings to you and the Contractor through our large file transfer system, **could you please send me a distribution list of emails for the Civil3D drawing?**
- 2) **Key Trench Excavation and Liner:** First of all, I do not fully understand what the Contractor is planning to do. Do they plan to over-excavate the key trench to a further 30 m wide beyond the design key trench? If this is the case. This is absolutely NO. I need to know exactly the Contractor is planning to do and need drawings or detail plans to show their proposed key trench excavation for my approval. Before the start of the key trench excavation with any changes proposed by the Contractor, I need to review their plan and make decision (approval or rejection) thereafter. I believe that the Contractor will have a better understanding on the design details of the key trench and liner installation after they receive and review our Civil3D drawings.

Regards

Gordon

**Guangwen (Gordon) Zhang, Ph.D., P.Eng.** | Principal Specialist, Arctic Region  
Direct +1 (780) 451-2130 x501 | Business +1 (780) 451-2121 | Mobile +1 (587) 985-2371 | [GuangwenGordon.Zhang@tetrattech.com](mailto:GuangwenGordon.Zhang@tetrattech.com)

### Tetra Tech EBA

14940 - 123 Ave., Edmonton, AB, T5V 1B4 | [tetrattech.com](http://tetrattech.com) | [eba.ca](http://eba.ca) [Please consider the environment before printing. Read More.](#)

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**From:** Duy Nguyen [<mailto:duy.nguyen@agnicoeagle.com>]  
**Sent:** Sunday, October 16, 2016 7:08 PM  
**To:** Zhang, Guangwen (Gordon) <[GuangwenGordon.Zhang@tetrattech.com](mailto:GuangwenGordon.Zhang@tetrattech.com)>  
**Cc:** Jack Dutil <[jack.dutil@agnicoeagle.com](mailto:jack.dutil@agnicoeagle.com)>; Pyliuk, Jennifer <[Jennifer.Pyliuk@tetrattech.com](mailto:Jennifer.Pyliuk@tetrattech.com)>  
**Subject:** FW: 6515-C-230-007-RFI-005\_materiel

Hi Gord,

Could you provide these answer for MT KSL,

Thank you

Duy Nguyen

---

**From:** Yan Bergeron [<mailto:Yanb@nunalogistics.com>]

**Sent:** Friday, October 14, 2016 2:23 PM

**To:** Duy Nguyen

**Subject:** RE: 6515-C-230-007-RFI-005\_materiel

For example

I need the crest of type h materiel because I don't know where it start it's between cross section 1+050 and 1+075. And I don't know where the direction change for the crest, we don't have the line for each materiel on the plan view, we just have the final slope of the dyke and the key trench.

It's the same for each materiel. For the type B I need to have crest point because I don't have the information where to adjust, because I always start from the alignment.

I know that we are going to adjust the liner in the field to have the liner to be the most straight at possible, because we can't have it moving to mush to make the welding possible.

We plane to excavate may be 30 m further to correct the slope before install the liner.

You can call me at 3973 and we can discuss with the pdf.

Yan Bergeron

Project coordinator

Meliadine

Site 819-759-3555 ext 3973

**Kivalliq Services Ltd.**

19– 41 Street South, PO Box 809

**NUNA LOGISTICS LIMITED**

9839 – 31 Avenue, Edmonton, AB. T6N 1C5

[MeliadineSurvey@nunalogistics.com](mailto:MeliadineSurvey@nunalogistics.com)

[www.nunalogistics.com](http://www.nunalogistics.com)

[www.Kivalliqservices.com](http://www.Kivalliqservices.com)

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**From:** Duy Nguyen [<mailto:duy.nguyen@agnicoeagle.com>]

**Sent:** Friday, October 14, 2016 12:58 PM

**To:** Yan Bergeron <[Yanb@nunalogistics.com](mailto:Yanb@nunalogistics.com)>

**Subject:** RE: 6515-C-230-007-RFI-005\_materiel

Could you send me a pdf what you want to build so I can help

**Duy Nguyen, MPM, MBA, Eng.**

**Concrete, Civil and Structural Lead**

C: 819 355 0425

T: 819.759.3555 Ext 8067

Agnico Eagle Mines Limited

1075, 3e Avenue Est



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**From:** Yan Bergeron [<mailto:Yanb@nunalogistics.com>]

**Sent:** Friday, October 14, 2016 1:39 PM

**To:** Duy Nguyen

**Cc:** Mike Price; Boyd Barstad; Jack Dutil; Mark Long; Gramoz Rexhepi; Michael Love; Larry Chabot; Sylvain Chartier; Greg Smith; Daniel Seguin; Matt Gallant

**Subject:** RE: 6515-C-230-007-RFI-005\_materiel

Hi Duy

I forgot to send you the explanation

I try to build 3d model with the cross section and I have not enough information on the plan to do it, and the cross section are at each 25 m, so I can just made straight line between each cross section

Yan Bergeron  
Project coordinator  
Meliadine  
Site 819-759-3555 ext 3973

**Kivalliq Services Ltd.**

19– 41 Street South, PO Box 809

**NUNA LOGISTICS LIMITED**

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[MeliadineSurvey@nunalogistics.com](mailto:MeliadineSurvey@nunalogistics.com)

[www.nunalogistics.com](http://www.nunalogistics.com)

[www.Kivalliqservices.com](http://www.Kivalliqservices.com)

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**From:** Yan Bergeron

**Sent:** Friday, October 14, 2016 12:16 PM

**To:** 'Duy Nguyen' <[duy.nguyen@agnicoeagle.com](mailto:duy.nguyen@agnicoeagle.com)>

**Cc:** Mike Price <[mikepr@nunalogistics.com](mailto:mikepr@nunalogistics.com)>; Boyd Barstad <[boydb@nunalogistics.com](mailto:boydb@nunalogistics.com)>; 'Jack Dutil' <[jack.dutil@agnicoeagle.com](mailto:jack.dutil@agnicoeagle.com)>; 'Mark Long' <[mark.long@agnicoeagle.com](mailto:mark.long@agnicoeagle.com)>; Gramoz Rexhepi <[GramozR@nunalogistics.com](mailto:GramozR@nunalogistics.com)>; Michael Love <[MichaelLove@nunalogistics.com](mailto:MichaelLove@nunalogistics.com)>; 'Larry Chabot' <[larry.chabot@agnicoeagle.com](mailto:larry.chabot@agnicoeagle.com)>; 'Sylvain Chartier' <[sylvain.chartier@agnicoeagle.com](mailto:sylvain.chartier@agnicoeagle.com)>; Greg Smith <[GregS@nunalogistics.com](mailto:GregS@nunalogistics.com)>; 'Daniel Seguin' <[daniel.seguin@agnicoeagle.com](mailto:daniel.seguin@agnicoeagle.com)>; Matt Gallant <[mattg@nunalogistics.com](mailto:mattg@nunalogistics.com)>

**Subject:** 6515-C-230-007-RFI-005\_materiel

Hi Duy,  
See attached RFI.

Yan Bergeron  
Project coordinator  
Meliadine  
Site 819-759-3555 ext 3973

**Kivalliq Services Ltd.**

19– 41 Street South, PO Box 809

**NUNA LOGISTICS LIMITED**

9839 – 31 Avenue, Edmonton, AB. T6N 1C5

[MeliadineSurvey@nunalogistics.com](mailto:MeliadineSurvey@nunalogistics.com)

[www.nunalogistics.com](http://www.nunalogistics.com)

[www.Kivalliqservices.com](http://www.Kivalliqservices.com)

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_006 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: Mike Price Date: 2016-10-24

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
Geotechnical Specifications for Construction of Dike D-CP1	6515-E-132-SPT-002	0

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND CONTRACTOR'S PROPOSED SOLUTION :

The specifications for Nearly –Saturated Backfill (Type –C) call for 85% - 95% saturation after its placement and compaction. MTKSL has concern that the Type C material properties will not allow for the level of saturation specified to be achieved following placement and compaction.

Please confirm / advise;

- Has the mix design been validated to ensure that the saturation level of sandy material (0.20mm) can be maintained during placement and compaction as per multi-lift construction methods?
- Has testing been conducted on the Type C material to verify that this is achievable?
- If the properties of the Type C material do not allow for the level of saturation to be achieved is it foresee that blending of materials or an alternate material will be required?

Prepared by: Mike Price Signature: Mike Price Date: 2016-10-24

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :



## Request For Information

So far no confirmation or validation testing has been conducted on the Nearly-Saturated Backfill. This confirmation or validation testing is better to be conducted in the field conditions by the Contractor, before starting the backfilling operation using the Nearly-Saturated Backfill in the key trench. Nevertheless, 20 mm minus materials with similar specified gradation limits of Type C material had been successfully used in the past for construction of nearly-saturated cores of frozen core dikes/dams in the Arctic. Therefore, if Type C meets the specified gradation and placed in relatively thin, horizontal lifts over relatively level surfaces, the required saturation after compaction is likely achievable.

It is strongly recommended that trial mixing (Type C material and hot water), placing and compacting testing of the Nearly-Saturated Backfill be conducted in the field by the Contractor to confirm whether the required saturation can be maintained after its placement and compaction. This trial program should be done well ahead of the backfilling operation.

If the field trial testing indicates that the required saturation cannot be maintained after the placement and compaction of the Nearly-Saturated Backfill, one of the following alternative source materials can then be used to produce the Nearly-Saturated Backfill, instead of using the originally specified Type C material with 4% to 10% of a fines content:

- 1) Option 1: using rejected Type C (20 mm minus) that has a higher fines (<0.075 mm) content of 15% to 30%;
- 2) Option 2: using rejected natural esker sand and gravel with higher fines content (15% to 30%) as a source for crusher feed to produce the 20 mm minus material having a final fines content of 15% to 30%; or
- 3) Option3: using selected natural till material (with a fines content of 20% to 50%) as a source for crusher feed to produce the 20 mm minus till, and then blending it with the originally specified Type C to produce a targeted material having a final fines content of 15% to 30%.

We are updating the construction specifications for D-CP1 and D-CP5 to include additional sections for the Nearly-Saturated Backfill. The updated construction specifications will be available this week.

Engineering : Gordon Zhang

Signature:

Date: November 7, 2016

#### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_007 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: Gramoz Rexhepi Date: 2016-10-26

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
D-CP5 Profiles	65-685-230-216	0
D-CP5 Thermal Cover Layout Plan and Profiles	65-685-230-217	0
Geotechnical Specifications for Construction of Dike D-CP5	6515-E-132-SPT-002	0

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND CONTRACTOR'S PROPOSED SOLUTION :

Regarding initial rock placement into the footprint of DCP-5, the maximum fill thickness for Type A and Type A1 is 900mm. The current water elevation is 65.41masl which equates to approximately 900mm above current OG at the deepest points. This will prevent us from placing the first lift as per the designed fill thickness.

MTKSL proposes to exceed the maximum thickness in areas were 900mm cannot be maintained above current water elevation. In addition, clarity on how to compact the first lift once the material has been placed in the water is required. Furthermore, we are looking for clarity on how to manage the water within the footprint of DCP5. MTKSL proposes the upstream and downstream platforms are placed and then water can be pumped upstream of the working platform to drain the key trench area between the two platforms.

Prepared by: Gramoz Rexhepi Signature: Gramoz Rexhepi Date: 2016-10-26

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

The D-CP5 design had based on the assumption of completely dewatering Lake A54 (South A54 only where D-CP5 will be constructed) before the dike construction. Therefore, underwater construction is not planned and not allowed, even for placing initial lift of Type A or Type A1 materials. Without completely dewatering A54, using the waste rock (Type A Material) to control water from flowing into the key trench is questionable and is expected to be not working. It is strongly recommended to completely dewatering A54 before the start of D-CP5 construction.

The water management during construction may include pumping the water in A54 to H17, as originally planned. However, any water management plan during construction should be approved by Agnico Eagle.

Alternatively the construction will need to be delayed until the water turning into ice and the contractor can excavate out the ice within the footprint of D-CP5, before placing any fills and key trench excavation. However, this will introduce more issues for dike construction, including drill/blast operation for key trench excavation (especially over dike abutment areas where the active layer will freeze back into frozen ground due to construction delay), more fills for backfilling key trench due to over-blasting, and additional foundation preparation due to uneven surfaces.

Engineering : Gordon Zhang

Signature:

Date: October 26, 2016

## 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION



# Request For Information

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
	Name	Signature	Date
Superintendent:			
c.c. Contract Administrator:			

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_009 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: David Morley Date: 2016-11-01

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
Geotechnical Specifications for Construction of Dike D-CP1, Meliadine Gold Project, NU, September 28,2016	AEM Document Number: 6515-E-132-SPT-002	0

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND CONTRACTOR'S PROPOSED SOLUTION :

Section 1006: General Fill Placement

1.1.7 reads:

"All fills shall be placed and compacted in horizontal lifts from the bottom up over the slope."

The contractor proposes to modify this section to read as follows:

"All fills shall be placed and compacted in horizontal lifts from the bottom up over the slope, with the exception of the Type B and Type C material under the Geomembrane Liner, and the Type C material over the Geomembrane liner, which may be placed parallel to the Geomembrane Liner as shown in the attached sketches."

Please see attached sketches.

Prepared by: David Morley Signature: David Morley Date: 2016-11-01

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

If the Contractor can properly place the Type C and Type B materials under the geomembrane liner from bottom up over the 2.5:1 slope for each lift without material segregation, and compact each lift of the materials to meet the required density, it is OK to construct the Type C and Type B materials under the geomembrane liner in lifts that are parallel to the 2.5:1 slope, as proposed by the Contractor. However, for each lift, the Type C or Type B material should be placed from bottom up. The materials should not be dumped on the top and pushed down over the slope.

We do NOT agree with the construction method proposed by the Contractor for the Type C layer above the geomembrane liner (Dike Construction Part2 – Place Type C in parallel lifts to the Coletanche). To protect the geomembrane liner from damage during construction, no direct mechanical compaction of the Type C layer above the liner is required. The Type C should be placed from bottom up and in horizontal lifts slightly ahead of the placement of the upstream Type H and Type A lifts. The Type C material will be indirectly compacted when the nearby Type H lifts are compacted.

In summary, we agree ""All fills shall be placed and compacted in horizontal lifts from the bottom up over the slope, with the exception of the Type B and Type C material under the Geomembrane Liner, which may be placed from bottom up in each lift that can be parallel to the slope, as long as the materials meet the specifications after placement and compaction."



## Request For Information

Engineering : Gordon Zhang  
\_\_\_\_\_

Signature: \_\_\_\_\_

Date: November  
2, 2016

### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
	Name	Signature	Date
Superintendent:			
c.c. Contract Administrator:			

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_010 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: David Morley Date: 2016-11-01

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
Definitions for D-CP1 and D-CP5 Construction	"To AEM_Definitions and Key Trench Excavation Details for D-CP1 and D-CP5 Construction_Sep07_2016.pdf"	0

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND CONTRACTOR'S PROPOSED SOLUTION :

MTKSL is requesting further clarification on Scenario 3B & 3C: Key Trench Excavation (2.8m, Ice Rich Soil)

### Proposed Solution:

In areas where excavation depth greater than 1.8 m is required, MTKSL is proposing to sub-excavate to the required depth with vertical walls from the design 1.8m trench toes (see attached sketch).

Please confirm that this approach for sub-excavation is acceptable.

Prepared by: Matt Gallant Signature: Matt Gallant Date: 2016-11-04

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

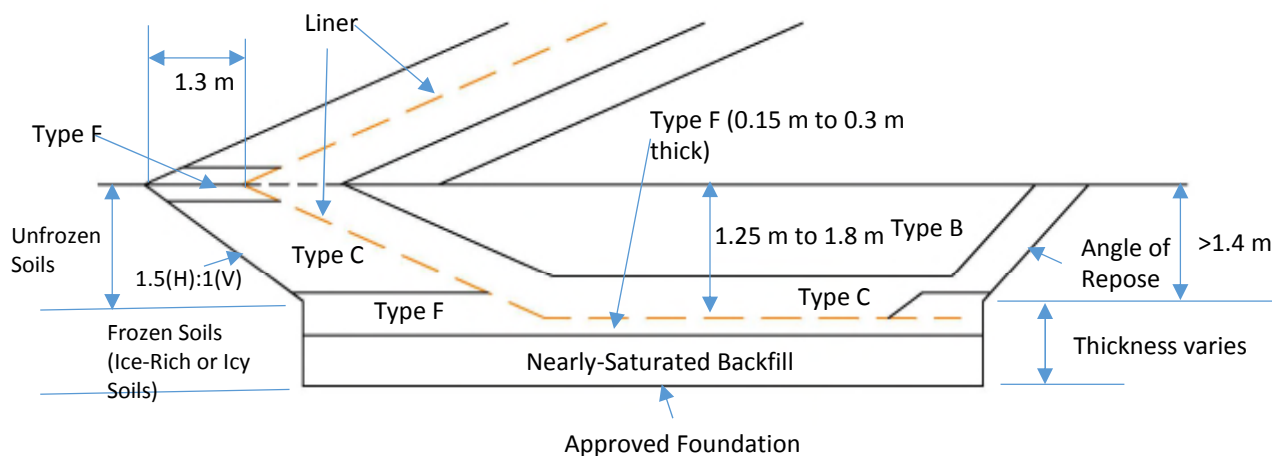
## Request For Information

We do NOT agree with the upstream side slope of 2.5(H):1(V) for the key trench that was proposed by the Contractor. This slope is too flat and is not consistent with the design intent.

The designed key trench side slopes (both upstream and downstream) were "angle of repose". In the construction drawings, the key trench side slopes with "angle of repose" were assumed to be 1.5(H):1(V). Based on the current field conditions, the actual "angle of repose" is steeper than 1.5(H):1(V). To reduce overall key trench excavation and backfill, we propose the following:

- 1) 1.5(H):1(V) for upstream key trench side slope, which is the same as shown in the construction drawings; it is also acceptable if the upstream key trench side slope is slightly steeper than 1.5(H):1(V).
- 2) The actual "angle of repose" for the downstream key trench side slope, which is steeper than 1.5(H):1(V), as proposed by the Contractor.
- 3) Nearly vertical wall excavation below the toes of the upstream and downstream key trench slopes within the unfrozen active layer zone (1.4 to 1.8 m). This is generally consistent with the plan proposed by the Contractor.

The sketch below presents the general key trench excavation and backfill concept for D-CP1 and D-CP5:



Please see other details (liner, liner bedding, Type F, etc.) in the construction drawings and specifications.

Engineering : Gordon Zhang

Signature: \_\_\_\_\_

Date: November 8, 2016

#### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes			
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			

# Request For Information

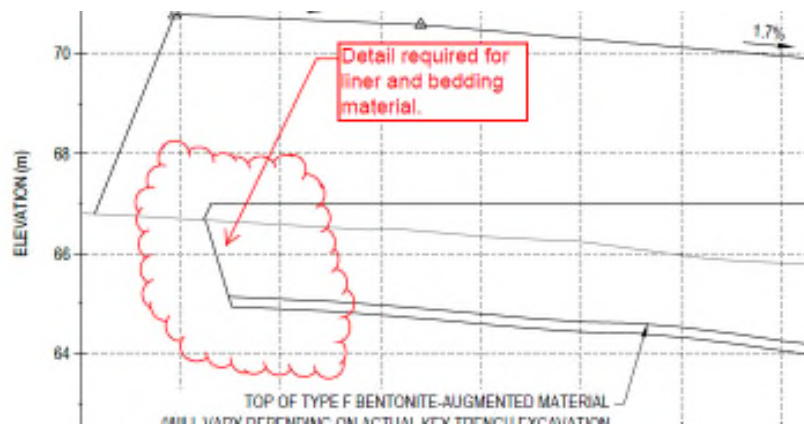
Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_011 Rev: 0  
Meliadine Project  
Site RFI Initiator: Mike Price Date: 2016-11-16

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
D-CP1 and D-CP5 IFC Drawings Package		

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND CONTRACTOR'S PROPOSED SOLUTION :

MTKSL is requesting tie in details for the termination points at either end of the key trench for DCP 1 and 5, more specifically related to requirements for the liner and bedding material in the area.



Prepared by: Mike Price Signature: *Mike Price* Date: 2016-11-016

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :



## Request For Information

For either end of the key trench for D-CP1 and D-CP5, the following construction details should be followed:

- 1) Place a liner bedding layer of Type F (mixture of Type C and bentonite) over the entire excavated slope at the end of the key trench and compact the Type F layer to form a smooth surface for liner installation over the end slope. The minimum thickness of the compacted Type F over the key trench end slope would be 0.2 m;
- 2) Place and compact extra Type F over the key trench (upstream side) end corner to form a rounded corner for liner installation;
- 3) Extend the typical liner in the key trench towards the key trench (upstream side) end corner, curve (wrap) over the key trench (upstream side) end corner, and then further extend a minimum of 3 m downstream over the compacted Type F layer on the end slope of the key trench. The liner over the key trench end slope should be welded together with the liner at the key trench bottom;
- 4) Place a layer of Type C as an upper bedding over the completed liner area at the end of the key trench. The thickness (perpendicular to the slope) of Type C should be about 0.5 m. No mechanical compaction is required for the Type C layer immediately over the liner; and
- 5) Backfill the remaining key trench end area with Type B, similar to the typical section.

A hand sketch is attached for information.

Engineering : Gordon Zhang

Signature:

Date: November 17, 2016

#### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			

Upstream  
End corner

Key Trench  
End slope

3m

Upstream

Downstream

Plan View

key trench

key trench bottom

Downstream

**Liner**

Upstream

Upstream  
End corner

Key trench end slope

3.0m

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_012 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: Matt Gallant Date: 2016-11-29

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
D-CP1 and D-CP5 Material Specifications		

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND CONTRACTOR'S PROPOSED SOLUTION :

MTKSL is requesting Confirmation of Material Acceptance for all the materials produced to date from contract 6515-C-235-003 for the Water Management Dikes will be suitable for construction of the D-CP1 and D-CP5.

Specifically:

- Type B1: Transition Rockfill (150mm Minus) produced by processing material obtained from the saline pond excavation.
- Type C: Granular Fill or Esker Sand (20mm Minus) produced by processing material obtained from the esker borrow sources
- Type H: Esker Sand and Gravel (75mm Minus) produced by processing material obtained from the esker borrow sources.

Prepared by: Matt Gallant Signature: Matt Gallant Date: 2016-11-29

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

## Request For Information

Type B1: a total of 4 sieve tests were conducted by the dike earthwork QC team during the period of November 9 to 13, 2016. The results (a summary table and a chart) are attached with this file. The average gradation of Type B1 produced so far generally meets the requirements. The percentages passing a sieve size of 5 mm for the last three tests slightly exceed the specifications but is tolerable.

Type C: a total of 40 sieve tests were conducted by the dike earthwork QC team during the period of October 22 to December 5, 2016. The results (a summary table and a chart) are attached with this file. The average gradation of Type C produced so far generally meets the requirements, except for 6 samples that were significantly outside of the specifications. The 6 out-of-spec samples included three samples with higher fines content (<0.08 mm) of 18% to 23% and three samples with higher percentage passing 0.63 mm sieve (48% to 77%). After the tests, the dike QA/QC team had instructed the Contractor to stockpile the rejected Type C in a separate area for other site uses. It is also noted that the recently produced Type C had high natural moisture content of up to 14.4% because the esker source reached the permafrost table. This is not acceptable. The source esker should be excavated well above the permafrost table to have a relatively low natural moisture content. It is understand that more Type C will be produced for the dike construction. It is strongly recommended that the esker source for Type C should be excavated in shallow depths well above the permafrost table to have a relatively low natural moisture content.

Type H: a total of 5 sieve tests were conducted by the dike earthwork QC team during the period of October 22 to December 1, 2016. The results (a summary table and a chart) are attached with this file. The average gradation of Type H produced so far generally meets the requirements. . It is understand that very limited quantity of Type H has been produced so far and a significant volume of Type H is to be produced for the dike construction. It is strongly recommended that the esker source for Type H should be excavated in shallow depths well above the permafrost table to have a relatively low natural moisture content.

Engineering : Gordon Zhang

Signature:

Date: December 9, 2016

#### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_014 Rev: 0  
Meliadine Project  
Site RFI Initiator: Jennifer Pyliuk Date: 2016-12-09

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
D-CP1 Typical Section and Quantities	65-685-230-208	1
D-CP5 Typical Section and Quantities	65-685-230-218	1
Geotechnical Specifications for Construction of DCP-1 (Tetra Tech EBA, Issued for Use November 9, 2016)	6515-E-132-007-132-SPT-002	1
Geotechnical Specifications for Construction of DCP-5 (Tetra Tech EBA, Issued for Use November 9, 2016)	6515-E-132-007-SPT-003	1

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND PROPOSED SOLUTION :

The estimated material quantities of Type A1 (sourced from Saline Water Pond) required to complete construction of both dikes (in place plus the recommended 25% to account for material wasting, overbuild, bulking factor and potential foundation settlement) are 27,044 m<sup>3</sup> (D-CP1) and 3,850 m<sup>3</sup> (D-CP5), for a total of 30,894 m<sup>3</sup>.

Current placed quantities of Type A1 material are 4,985 m<sup>3</sup> (D-CP1) and 1,071 m<sup>3</sup> (D-CP5), for a total of 6,056 m<sup>3</sup>. When the placed quantities are subtracted from the estimated required amounts, the remaining quantities are 22,059 m<sup>3</sup> (D-CP1) and 2,779 m<sup>3</sup> (D-CP5), for a total of 24,838 m<sup>3</sup>.

The latest stockpile survey of Type A1 material (conducted November 13) by Hamel Arpentage calculated volume of 28,550 m<sup>3</sup>. However, this volume does not account for the presence of oversize material within the stockpile, believed to be in the range of 15% to 40%. The total remaining volume of Type A1 material is expected to be in the range of 24,268 m<sup>3</sup> (15% oversize in pile) to 17,130 m<sup>3</sup> (40% oversize). It is therefore highly probable that there will not be sufficient quantities of Type A1 material to complete the construction of both dikes to design.

Possible design solutions to optimize the remaining quantities of Type A1 material are proposed to include elimination of further Type A1 material at D-CP5; placement of only two lifts (1.8 m) of Type A1 at D-CP1 and strategic placement of remaining Type A1 around most critical key trench locations of D-CP-1 based on encountered ground conditions within the key trench (ie. where no bedrock encountered). An examination of the design placement of the Type A1 material is requested in order to appropriately use the expected remaining quantities.

Prepared by: Jennifer Pyliuk Signature: \_\_\_\_\_ Date: 2016-12-09

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

## Request For Information

Instead of using Type A rockfill (waste rock from underground operation), Type A1 rockfill (clean rockfill from saline pond excavation) was designed to be used in the dike downstream zone over the key trench area for each of D-CP1 and D-CP5. The design intent was to reduce the risk of potential salts from the Type A rockfill to get into the key trench and increase the pore water salinity of the soils in the key trench and underneath foundations.

If all of the rock (without oversize issue) from the saline pond excavation could be used for the dike construction, the rock quantity would be adequate for the Type A1 rockfill to be used for both D-CP1 and D-CP5 construction. Unfortunately, poor blasting operation during the saline pond excavation generated 15% to 40% of oversized boulders that cannot be used as Type A1 rockfill.

At this stage of dike construction, opening a new quarry to obtain additional clean rockfill is not feasible, which leaves one practical option – using the Type A rockfill to balance the material quantity for the dike construction. Of course, this will increase the risk of the potential salts from the Type A rockfill to get into the key trench and underneath foundations. The potential consequence would be that the risk of the seepage through the dike foundation soils could be increased.

To minimize the risk, the Type A rockfill can be used in the less critical dike (D-CP5) and less sensitive zone (higher elevation away from the key trench) in the dikes. Table below presents the overall plan, depending on the percentage of the oversize boulders in the Type A1 stockpile:

Type A1 Stockpile Volume (m3)	Percentage of Oversize Boulders (%)	Useable Type A1 for Dike Construction (m3)	Balance of Type A1 to be Used for D-CP1 (m3)	Balance of Type A1 to be Used for D-CP5 (m3)	Additional Type A to be Used for D-CP1 (m3)	Additional Type A to be Used for D-CP5 (m3)
28,550	15%	24,268	22,059	2,209	0	571
28,550	20%	22,840	22,059	781	0	1,998
28,550	25%	21,413	21,413	0	647	2,779
28,550	30%	19,985	19,985	0	2,074	2,779
28,550	35%	18,558	18,558	0	3,502	2,779
28,550	40%	17,130	17,130	0	4,929	2,779

The overall plan is to place as much as possible of Type A1 in the bottom zone of D-CP1 (high priority) or D-CP5 until no more useable Type A1 is available; and then place the balance of the required Type A in the upper zone over the placed Type A1, if applicable. This plan is easy for construction.

For example, for the 30% oversize case, the Type A1 rockfill can be placed to an estimated top elevation of 66.2 m for the entire dike length in the design Type A1 zone of D-CP1. After that only a final lift of Type A material can be placed in the upper zone from 66.2 m to 67.0 elevations over the placed Type A1 zone. Similarly, for the extreme 40% oversize case, the Type A1 rockfill can be placed to an estimated elevation of 65.5 m for the entire dike length in the design Type A1 zone of D-CP1. The remaining upper zone from 65.5 m to 67.0 m can be placed using Type A material.

Engineering : Gordon Zhang

Signature: \_\_\_\_\_

Date: December 22, 2016

#### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes		
Name	Signature	Date

## Request For Information

Superintendent:			
c.c. Contract Administrator:			

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_016 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: Michael Love Date: Jan 5, 2017

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
Geotechnical Specifications for Construction of DCP-1 (Tetra Tech EBA, Issued for Use November 9, 2016)	6515-E-132-007-132-SPT-002	R1

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND PROPOSED SOLUTION :

On Dec 20, 2016 Type C was mixed with heated water from Orbit's water heating system in a mixing pit at the south end of DCP-1 to produce Type K. Due to the winter conditions the material was frozen before it reached the key trench excavation of DCP-1 (3 loads of Type K mixed using this method were placed at DCP-1 and had to be removed).

This demonstrates our current methodology for producing Type K is insufficient in temperatures at -36C and below. Type K was previously manufactured using this methodology successfully in temperatures ranging from -2C to -15C from Nov 26, 2016 to Dec 5, 2016 (with an average temperature of -6C). Forecasted temperatures are approximately -30C over the next 14 days and MTKSL do not believe our current methodology will achieve acceptable results in those temperatures.

During preliminary discussions on site with AEM and Tetra Tech between Dec 20 and 23 mention was made of heating the aggregate. MTKSL do not believe the infrastructure is available to support this method of producing Type K in a manner which supports productive placement.

We suggest placing the Type C in specified lift thicknesses, adding the required amount of heated water to achieve "Nearly Saturated Backfill" and compacting the "Nearly Saturated Backfill" immediately after the heated water is applied. Similar material was placed successfully using this method in similar temperatures last March - during construction of the P1 Dikes at Meliadine. This would require a variance to the specification as Section 1005 1.4.7.b states:

"The Type K material shall be pre-mixed with water and Type C material or other approved material (20 mm minus) before being placed and compacted. It is preferred that pre-mixing be done in a pug mill. If not available, pre-mixing in a dedicated pit or container close to the construction site can be done after approval from the Engineer. **It is not allowed that in situ mixing of the Type K material is done in the area where the material is to be placed.**"

Be advised Type K placement is presently our only available work front and until a plan is in place – or other work fronts become available – we will not be remobilizing our dike construction crews to site.

Prepared by: Michael Love Signature: Michael Love Date: Jan 5, 2017

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :



## Unsuccessful Past Experience for In-situ Mixing to Produce Nearly-saturated Backfill

As I know, our Edmonton Arctic Group has involved in the design and construction QA/QC for the majority (if not all) of the frozen core dikes/dams that have been constructed in Northern Canada. Similar to the Type K material (nearly-saturated backfill) for the dike (D-CP1) construction at the Meliadine site, unfrozen nearly-saturated backfill was used to construct the frozen cores of these dikes/dams in cold winter conditions. During the early stage of construction for some of the frozen cores, trials with in-situ mixing to produce nearly-saturated backfill proved to be unsuccessful. As a result, the in-situ mixing method was not adopted in construction of these frozen cores. The major issues with the in-situ mixing include the following:

- Water ponding on the lift surface and not being able to penetrate down to the bottom of the lift before the water froze; as a result, ice layers formed on the surface and the under-saturated bottom lift had low ice/water saturation;
- Difficulty in controlling final water content of the material; tending to generate either ice-rich or under-saturated material with various saturation conditions, which does not meet the design intent and requirements;
- Under cold air temperatures, sprayed water tended to freeze quickly before mixing and compaction.

Based on this past experience, we specified in the D-CP1 Construction Specifications that in-situ mixing method should be avoided for mixing the Type K Material.

Regarding the "frozen core" construction of the P1 Area temporary dikes (DP1-A, DP1-B, DP2-A and DP3-A) at the Meliadine site, the "frozen core" construction of the P1 Area temporary dikes cannot be referred to justify using the in-situ mixing method for the D-CP1 dike Type K material for the following reasons:

- The P1 Area dikes were constructed to temporarily control the water in the P1 area during the 2016 spring freshet and had much less stringent engineering requirements than those for the permanent dikes (D-CP1 and D-CP5);
- Many unsuccessful trials using the in-situ mixing method were made during the early stage of the "frozen core" construction, which resulted in loss of some valuable construction time and partially led to final cancellation of using nearly-saturated fill as construction material for the dike cores. In the end, only several lifts of the bottom cores in DP1-A and DP3-A were constructed using the nearly-saturated backfill. The remaining majority of the cores in DP1-A and DP3-A were constructed using the 0 – 30 mm material only – no mixing with water. The entire cores for DP1-B and DP2-A were constructed using the 0 – 30 mm material only – no mixing with water. Therefore, the P1 Area temporary dikes are not "frozen core" dikes.
- The core construction for the P1 Area dikes started on March 26, 2016 when the air temperatures ranged from -10°C to -25°C. Under these relatively mild temperatures, I would say that pre-mixing in a pit may achieve a better result.
- The core material for the P1 Area dikes was the crushed 0-30 mm rockfill, which had low natural ice/water content (about 3%), which is different from the Type C (0-20mm) used for the D-CP1 construction. The latter (Type C) has a high natural moisture content of 7% to 14%, which would need more heat to thaw the existing ice during mixing.

## Construction Schedule and Plan

As noted in Construction Drawing 65-685-230-208 for Dike D-CP1, it was assumed during the design that the key trench excavation and backfill would be conducted from late September to November 2016 for D-CP1 to avoid the extreme cold temperatures in December to February. Unfortunately, this was not achieved due to the late start of the D-CP1 construction and slow progress in construction.

It is understood that the Contractor together with AEM is responsible for developing proper construction schedules/plans and adopting relevant construction techniques and methodology to meet the design intent and final completion schedule of D-CP1 and D-CP5.

## Request For Information

The following preliminary construction plan is provided for further consideration and discussion:

- Focus on excavation of the key trenches for D-CP1 and D-CP5 during the extreme cold weather period;
- Temporarily suspend the Type K material placement during the extreme cold weather period;
- Further re-adjust the current in-pit mixing method to produce unfrozen Type K material under cold weather conditions; consideration can be given to increasing the water temperature for mixing, selecting the Type C material with less natural moisture content as the source for mixing, pre-heating the Type C material before mixing, stockpiling the selected Type C in a warming tent, pre-heating the mixing pit, or covering the mixing pit with a heated tent, etc.

Based on the discussions mentioned earlier, it is not recommended to adopt the in-situ mixing method that was proposed by the Contractor. Nevertheless, if the Contractor together with AEM would like to take time and effort to investigate the in-situ mixing method, they can first conduct a trial mixing/placement in a test strip at a selected site away from the dike key trench:

- Remove snow/ice and other non-suitable surface material to form a relatively level base for the trial mixing;
- Place the Type C in a loose lift (no compaction) with a maximum lift thickness of 75 mm or 100 mm;
- Spray hot water uniformly over the lift surface to target the desired water saturation after compaction;
- Compact the Type C before the water freezing;
- Take several core samples from the test strip to determine the water saturation and its variation over depth.

If the trial mixing and test results suggest that the in-situ mixing is working, the Contractor may conduct more trials to develop final procedures to be used for mixing and placing the Type K material for the dike construction:

- Follow the procedures developed during the trial mixing;
- Take core samples after compaction to verify the water saturation and its variation over depth for each lift;
- If the placed Type K does not meet the design requirements, the lift should be removed.

Engineering : Gordon Zhang

Signature: \_\_\_\_\_

Date: January 9, 2017

#### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_018 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: Fai Ndofor Date: 2017-01-19

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
D-CP1 Typical Section and Quantities	65-685-230-208	1
Geotechnical Specifications for Construction of DCP-1 (Tetra Tech EBA, Issued for Use November 9, 2016)	6515-E-132-007-132-SPT-002	1

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND PROPOSED SOLUTION :

Since the unsuccessful attempt at mixing/placing Type K material occurred on December 20, 2016, two further attempts to mix/place Type K within the key trench at D-CP1 have been made. A summary of the QA/QC observations from these attempts is as follows:

- January 17: Ambient temperature = -12°C; Mix water temperature = ~40°C; Aggregate temperature = -35°C; Temperature of Type K after mixing = -6°C to -8°C; Amount of aggregate = 6 level 345 buckets; Amount of added water = 13 minutes (approximately 2,200 L); Mix time = 5 minutes. The mix moisture content was 14.2%, it was observed as dry and frozen and was not placed within the key trench.
- January 18:
  - Mix water temperatures = ~63°C; Aggregate temperature = -24°C; Temperature of Type K after mixing = -7°C to -8°C; Amount of aggregate = 6 level 345 buckets; Amount of added water = 19 minutes (approximately 3,150 L); Mix time = 5 minutes. The mix moisture content was 17.5%, it was observed as damp, frozen and was not placed within the key trench. The mix was spread in a 200 mm thick lift close to the mix station and compacted (2 static and 5 vibrating passes) with the 10 ton compactor. Cracks and loose material were observed on most of the compacted surface indicating non-saturated and frozen material.
  - Heating aggregate will not be possible until mid-February at the earliest using the on-site batch plant facilities.
  - Recommend placing 0.15 to 0.30 m thick Type F directly on base of key trench at the approved depths (approximately 2.8 m) and lowering the liner for remainder of D-CP1 from Stations 0+310 to 0+580 – all other overliner design elements will remain.
  - This will increase liner, Type B, Type F (bentonite mix) and Type C materials quantities. The changes in materials quantities have not been quantified to date.

Prepared by: Fai Ndofor Signature: Fai Ndofor Date: 2017-01-19

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

# Request For Information

It is understood that the Contractor could not produce the Type K material (nearly-saturated backfill by mixing the Type C with hot water) that meets the required specifications under the current climate conditions and available facilities at the site:

- 1) The maximum water temperature for mixing is limited to about 60 C and could not be higher due to limitation of the available water heating facility;
- 2) Cold temperature (as cold as -35 C) of the Type C material for mixing;
- 3) Relatively high natural ice content in the Type C material for mixing;
- 4) No facility or equipment is available to pre-heat the Type C for mixing;
- 5) Cold air temperatures in January; and
- 6) Mixing in a cold pit in the natural ground that is open to cold ambient air temperatures.

The option to lower the liner bottom elevation in the key trench is a technically feasible solution to eliminate the use of the Type K material in the remaining portion of the D-CP1 key trench. This option will result in the following changes and associated construction cost increases:

- a) Additional liner is required and may need to be shipped in by air;
- b) Additional excavation in the key trench downstream side is required to meet the design liner bottom length in the key trench; and
- c) More backfill materials (Type B, Type F (including bentonite), and Type C) are required.

Sketches to compare the original design and the option are attached with this file.

Based on the sketches (typical sections with 2.8 m key trench depth), the material quantity changes are roughly estimated for planning, assuming the changes for the option will be applied to Stations 0+310 to 0+580 (about 270 m):

Estimated in-place quantity changes:

Type B: 2,940 m<sup>3</sup> (increase);  
 Type C: 1,690 m<sup>3</sup> (increase);  
 Type F: 210 m<sup>3</sup> (increase); therefore, bentonite increase: approximately 42 tonnes  
 Type K: -2,170 m<sup>3</sup> (decrease); therefore, the total Type C will slightly decrease (1690+210-2170 = -270 m<sup>3</sup>);  
 Liner (ES3): 909 m<sup>2</sup> (increase), including overlapping; and  
 Key trench excavation: 2,670 m<sup>3</sup> (increase).

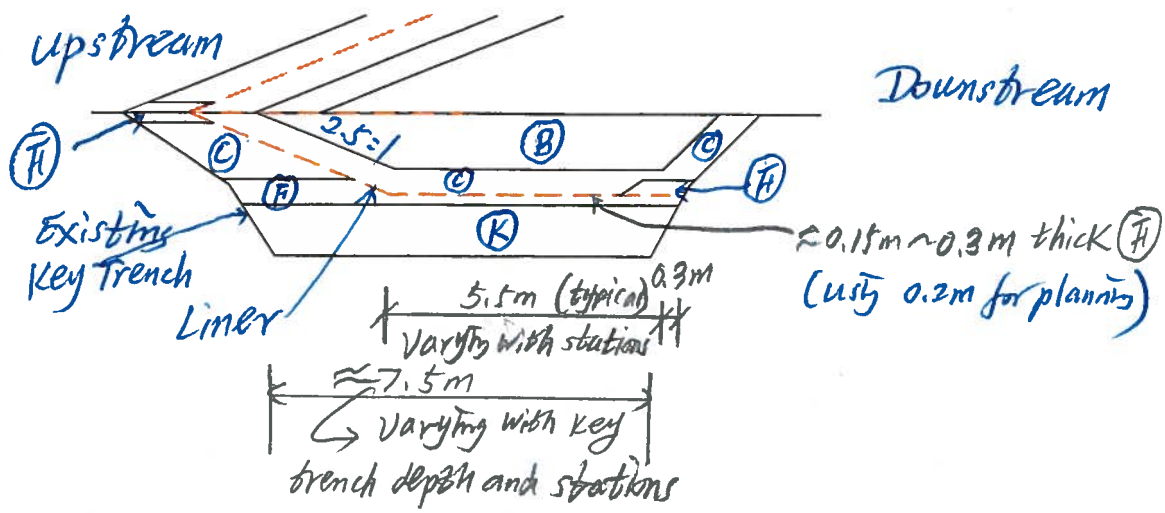
The estimated quantity changes are provided for AEM's planning and decision making. The actual quantities will depend on the actual construction details and could be different.

Prepared by:	Gordon Zhang	Signature:	Date: January 20, 2017
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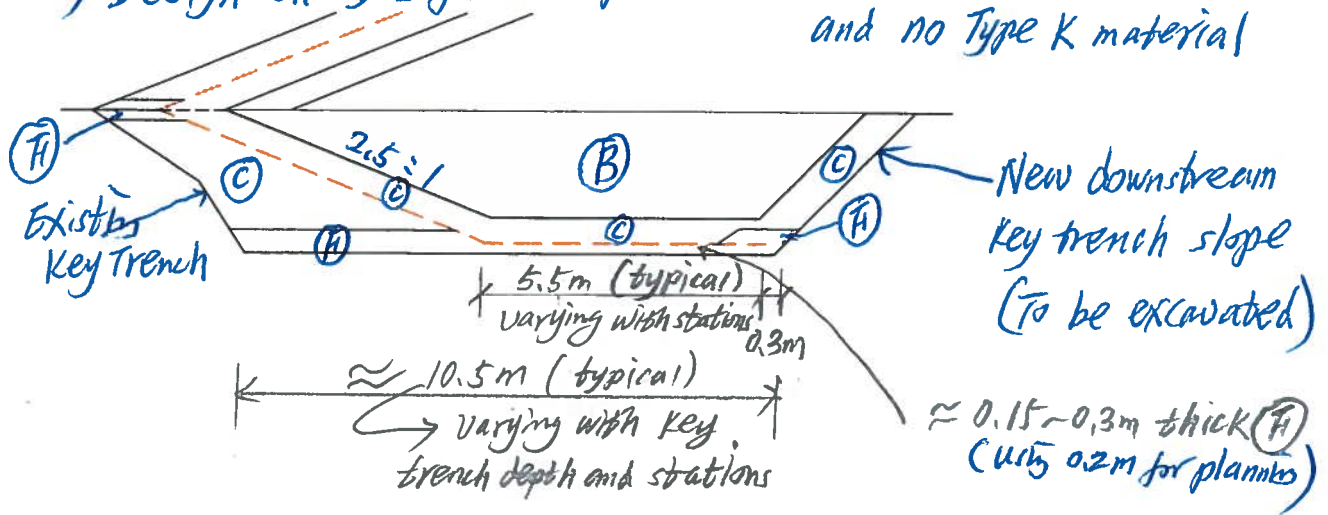
## 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name	Signature	Date	
<b>Superintendent:</b>			
<b>c.c. Contract Administrator:</b>			

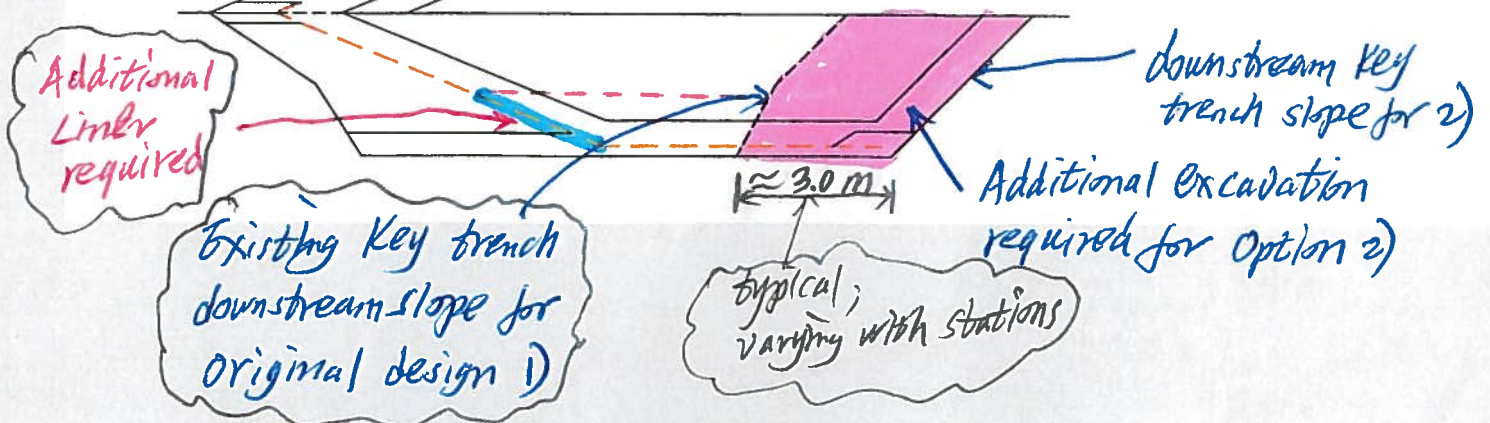
1) Original Design in Dike Key Trench for D-CP1



2) Design changes for the option with lower Liner bottom elevation and no Type K material



### 3) Comparison of Key trench excavation for 1) and 2)



# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_019 Rev: 0  
 Meliadine Project  
 Site RFI Initiator: Michael Price Date: Jan 22, 2017

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
RFI No: 6515-C-230-007_018		

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND PROPOSED SOLUTION :

The original volume MTKSL calculated and provided for the additional excavation required to incorporate lowering the liner at DCP01 was based on the assumption that the vertical box cut would be held from -2.8 to -1.8m and the 1:1 slope would begin from that point. Upon review of RFI 018 response the details appear to have a 1:1 slope projected back from the new toe location. The attached detail outlines the additional volumes associated with the different slope options, proceeding with the 1:1 slope from the new toe location would result in an increase of approximately 550m<sup>3</sup> and 4 days of duration to the excavation activity.

Please confirm the required slope for the DS face of the additional excavation.

- Option 1 = 1:1 slope down to -1.8m transition to box cut down to final toe.
- Option 2 = 1:1 Slope beginning at the new toe location.

Prepared by: Michael Price Signature: *Mike Price* Date: Jan 22, 2017

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

The Option 2 (downstream slope beginning at the new toe location) was shown in the sketch in the responses to the RFI 018 to illustrate the general concept of lowering the liner in the key trench of D-CP1. This is just a preferred option that has a uniform downstream slope. Nevertheless, other excavation options, such as Option 1 proposed by MTKSL, can be considered.

Instead of a uniform sloping wall, Option 1 adopts a vertical downstream side wall in the lower portion (from -1.8 m to the final bottom) of the downstream key trench, which would result in less key trench excavation/backfill. Since Option 1 would result in lower dike construction cost and still meet the overall dike design intent, this option is acceptable.

Engineering : Gordon Zhang

Signature: \_\_\_\_\_

Date: January 22, 2017

## 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			



# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_020 Rev: 0  
Meliadine Project  
Site RFI Initiator: Michael Love Date: Jan 23, 2017

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
RFI No: 6515-C-230-007_018		
RFI No: 6515-C-230-007_019		

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND PROPOSED SOLUTION :

Does RFI 18 and the pending response to RFI 19 apply to DCP-5 also?

Prepared by: Michael Love Signature: *Michael Love* Date: Jan 23, 2017

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

Engineering : \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			

# Request For Information

Project No: 6515 Contract No: C-007 RFI No: 6515-C-230-007\_022 Rev: 0

Meliadine Project

Site RFI Initiator: Michael Price

Date: Jan 27, 2017

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
------------------	----------------	------------------

## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND PROPOSED SOLUTION :

For areas of D-CP05 where the excavation is required to extend down to -2.8m, please confirm that the upstream slope will continue at the slope of 1.5:1.

As an alternate option to reduce the excavation and Type F quantity MTKSL is proposing to use the existing minimum cover and slope parameters from the IFC design to create a step in the slope at the 1.8m elevation where the design key trench floor was planned to be encountered. (per attached detail) potential saving = 1.1m<sup>3</sup>/Ln.m of excavation and 0.5 m<sup>3</sup>/Ln.m Type F.

Please confirm approved up stream slope detail for D-CP05.

Prepared by: Michael Price Signature: *Mike Price* Date: Jan 26, 2017

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

First of all, none of the final key trench depths for the stations excavated so far at D-CP5 has reached 2.8 m from the original ground surface. Actually, almost all of the final key trench depths that have been approved by the QA/QC team are around 1.8 m or less:

Stations 0+000 to 0+020: final depth around 1.8 m (see daily report on January 24);

Stations 0+140 to 0+200: bedrock encountered at 1.3 m to 1.8m (see daily report on January 24);

Stations 0+070 to 0+080: positive results from jar test results at 1.8 m; may be approved after the QA inspection today.

Based on the two boreholes drilled in the 2016 geotechnical site investigation, shallow bedrock (about 1.5 m from ground surface) was encountered in areas around Station 0+170 and Station 0+220. Note that the D-CP5 is shorter and key trench is about 290 m (0+000 to 0+0290).

In summary, with possibly no or limited length of the D-CP5 key trench that needs to be excavated beyond a depth of 1.8 m, the potential saving of excavation for the scheme proposed by MTKSL is limited.

Technically, we do not recommend the key trench excavation option that was proposed by MTKSL in this RFI for the following reasons:

- 1) If the key trench needs to be excavated below 1.8 m to up to 2.8 m, that means the foundation soils below the 1.8 m depth must be either ice-rich or icy soils. If these soils are thawed, potential thaw induced settlements would be relatively great.
- 2) To reduce the potential risk of detrimental thaw settlement below the critical portion of the line, the ice-rich or icy soils below the critical portion of the liner system should be removed and replaced with thaw-stable backfill.

Based on MTKSL's original sketch, notes are made in the attached sketch to show the recommended excavation plan for the case with a required key trench depth of up to 2.8 m.



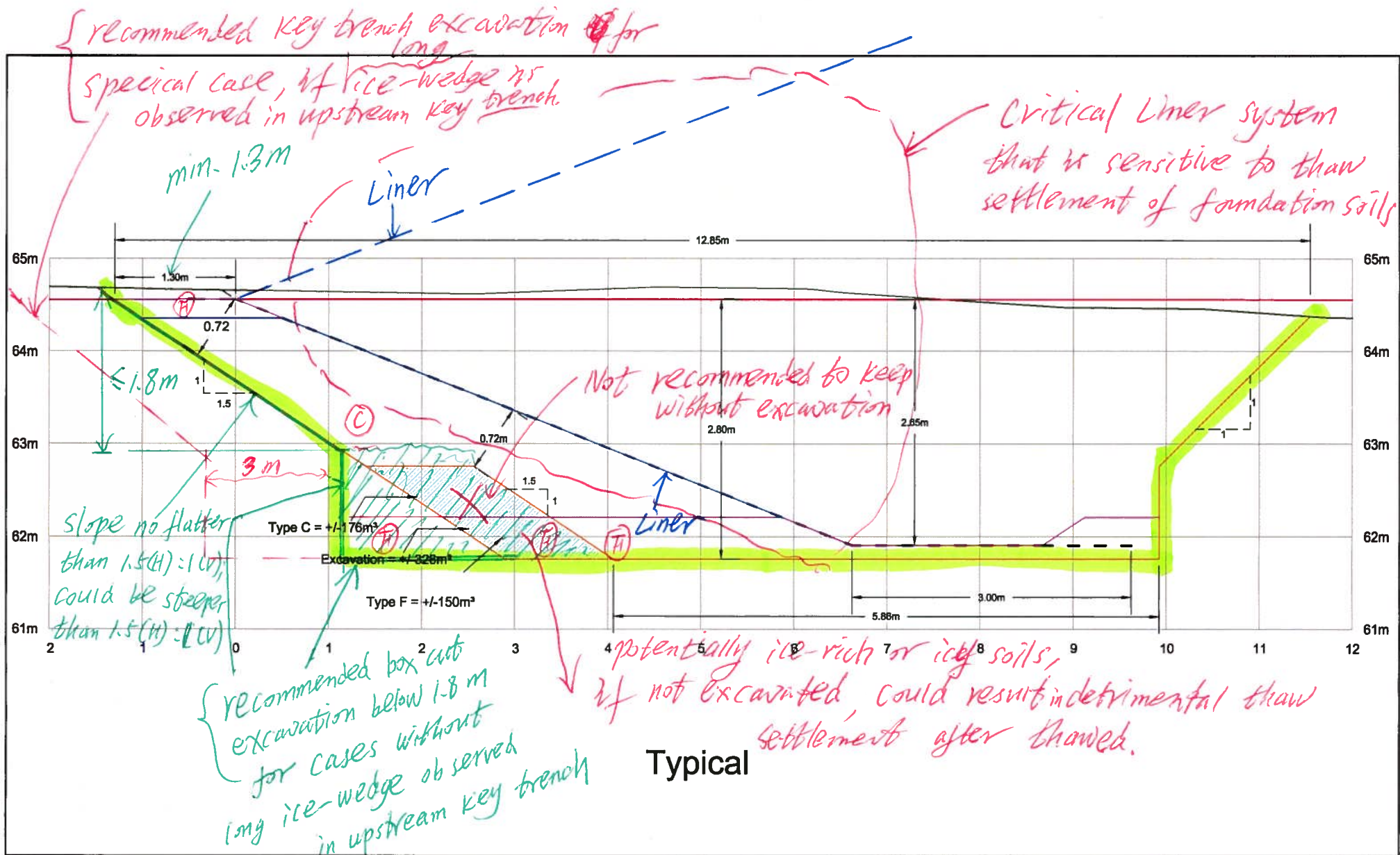
## Request For Information

Engineering : Gordon Zhang  
\_\_\_\_\_

Signature: \_\_\_\_\_

Date: January 27,  
2017**4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION**

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes		
Name		Signature		Date
Superintendent:				
c.c. Contract Administrator:				



NOTES:

- Type F
- Type C
- Excavation
- Original Ground
- Hinge Point Elevation
- Liner

CLIENT:

AGNICO EAGLE  
Melladine Gold Project

PROJECT:

Agnico Eagle Melladine Civil Works  
Dike Construction 2016-2017

PREPARED BY:

MTKSL Contracting Joint Venture  
19-41 Street South PO Box 809  
Rankin Inlet, Nunavut  
Y0C 0G0

DRAWN BY:  
JLR

**MTKSL**  
CONTRACTING JOINT VENTURE

SCALE:  
NTS

DATE:  
Jan 23 2017

Work Area

DRAWING TITLE:

DCP 5 Excavation Proposal 2

DRAWING NAME (FILENAME):

CA 170121 D5 KT Excavation.dwg

# Request For Information

Project No: 6515

Contract No: C-007

RFI No: 6515-C-230-007\_024 Rev: 0

Meliadine Project

Site RFI Initiator: Michael Price

Date: Feb 20, 2017

## 1. REFERENCE DOCUMENTS :

<u>Title(s):</u>	<u>Number:</u>	<u>Revision:</u>
Geotechnical Specifications for Construction of D-CP1 (Tetra Tech EBA, Issued for Use November 9, 2016)	6515-E-132-007-132-SPT-002	1

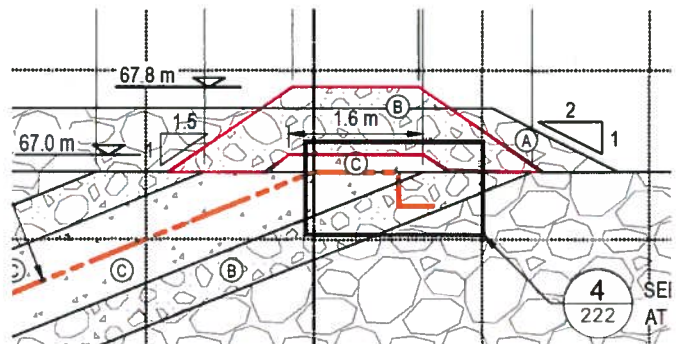
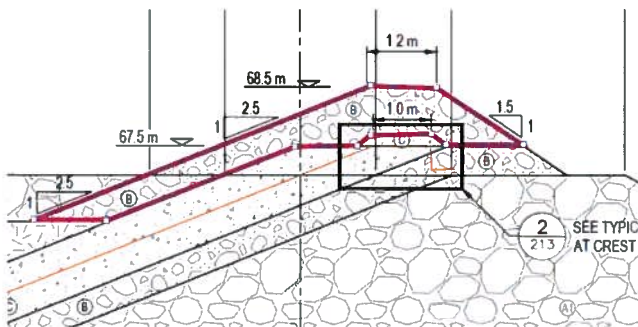
## 2. DESCRIPTION , JUSTIFICATION OF THE RFI AND PROPOSED SOLUTION :

Based on survey data and approved design changes MTKSL has calculated the neat line volume of Type B to be 16,191 m<sup>3</sup>. This volume considers D-CP1 to be constructed with no substitutions where Type B is required (including the additional excavation) and D-CP5 to maintain Type B as per design above OG and a minimum thickness of 300mm from OG down within the Key Trench. The remainder of D-CP5 Key Trench Type B will be substituted with Type H.

The current stockpile of Type B = 15,100 m<sup>3</sup> leaving us short of material which would require the substitution of Type H within the D-CP01 Key Trench. The current supply of Type H material on hand is not acceptable for the key due to high moisture content and the production of additional Type H is delayed pending a blasting program to produce the feed material as ripping will not produce material in the time frame required.

In an effort to prevent any delay MTKSL is proposing / requesting one of 3 options;

1. Replace the Type B material within the very top cover portion of the Dikes with Type B material produced from UG ROM as this location is already adjacent to Type A material. ( see below)
2. Replace the Type B material within the very top cover portion of the Dikes with the 0-125mm Type H ( see below)
3. Produce an additional quantity of clean Type B from the A1 supply which is not ideal as the quantities are already tight for this material.



Prepared by: Michael Price

Signature: *Mike Price*

Date: Feb 20, 2017

## 3. TECHNICAL RESPONSE FROM ENGINEERING AND/OR VALIDATION OF PROPOSED SOLUTION :

## Request For Information

As indicated by MTKSL, Option 3 to produce Type B from Type A1 (ROM from the saline pond excavation) is not practical because of a shortage of qualified Type A1 due to a large percentage of oversized boulders produced during the saline pond excavation. Depending on the percentage of oversized boulders in the Type A1 ROM, the estimated quantity of the actual Type A1 (after removing oversized boulders) that is currently available at the site may not be adequate for the required quantity of Type A1 for construction of D-CP1 and D-CP5. Therefore, Option 3 is not feasible.

Option 2 to replace Type B with Type H (esker sand and gravel) has two issues. The esker sand and gravel (Type H) is susceptible to surface erosion and therefore, is not a suitable material to be placed over the dike crest. Secondly, the majority of Type H required for construction of D-CP1 has not been produced at this stage. The availability of additional, qualified Type H is uncertain.

Option 1 to use the UG ROM to produce an alternative of Type B is not ideal but is a practical option. The UG ROM contains salts that would increase the pore water salinity of the dike fills. Nevertheless, since the material will be placed over the dike crest (as shown within the red lines in MTKSL's sketches above) that is relatively away from the critical component (key trench) of the dikes, the potential risk of the salt impacts to the dike's overall performance is manageable. Option 1 is a practical solution since the UG ROM quantity is adequate and readily available at site.

In summary, Option 1 is the most practical option among the three options proposed by MTKSL. At this stage and tight construction schedule, we have no other practical alternatives but to adopt Option 1.

It should be emphasized that the Type B using the UG ROM as a source should be only placed within the dike crest zones as shown within the red lines in MTKSL's sketches above. The Type B in other dike zones should use the rockfill without salts (from the saline pond excavation).

Engineering : Gordon Zhang

Signature:



Date: February 21, 2017

#### 4. IF NOT TECHNICAL RFI VALIDATION OF PROPOSED SOLUTION BY SITE SUPERVISION

		Deviation Request: <input type="checkbox"/> No <input type="checkbox"/> Yes	
Name		Signature	
Date			
Superintendent:			
c.c. Contract Administrator:			

## APPENDIX D2

### ENGINEERING CHANGE NOTICES (ECNS)

**AGNICO EAGLE**

MELIADINE GOLD MINE PROJECT

**ENGINEERING CHANGE NOTICE**

Contract No: OL-459893-L

Contract Title: Block 007 - Water Management Infrastructure

Contractor: Tetra Tech EBA Inc.

Date: 10-Nov-16

ECN No: 6515-C-235-007-ECN-001\_RA

ECN Title: Revision 1 for Construction Specifications of D-CP1 and D-CP5

**ECN Description:**

We have updated the construction specifications (from Revision 0 into Revision 1) for D-CP1 and D-CP5 to include additional information for clarification:

- 1) Add a new section for dike instrumentation installation
- 2) Add additional details for material preparation and placement for Nearly-Saturated Backfill
- 3) Add additional details for liner QC/QA testing and reporting for the liner installation

**Justification:**

To add more details and increase clarifications for construction specifications of D-CP1 and D-CP5

List of Deleted, Revised or Added Documents (Add a page to list more if needed )

Item	Document Number	Rev
1	6515-E-132-007-132-SPT-002	R1
1	6515-E-132-007-132-SPT-003	R1

Item	Document Number	Rev

**Potential Impacts:**On Schedule: Yes ☒ No ☐On Cost: Yes ☒ No ☐

Action Record	TITLE	NAME	Signature	Date
Prepared by:	Package Engineer			
Reviewed by:	Lead Discipline	Duy Nguyen		
Accepted by:	Engineering Manager	Daniel Seguin		
Accepted by:	Project Manager	Jean Routhier		

**Notes:**

1	Contractor has 10 days to return the Impact on Cost (on the attached Price Breakdown) and Schedule			
2	Contractor is not to proceed with any work until authorized to do so			
Contractor Acknowledgment				
Received by:		Contractor Repres.		

Attachments Forming Part of This Specification:

<b>Section</b>	<b>Rev.</b>	<b>Title of Section</b>
<b>General Specification Section</b>		
6515-C-235-007-230-MTX-001	R2	Documents and Drawings Index
6515-C-235-007-230-SOW-001	R2	Summary of Work
6515-E-132-007-132-SPT-002	R1	Specifications for Dike D-CP1
6515-E-132-007-132-SPT-003	R1	Specifications for Dike D-CP5
6515-C-235-007-230-VDT-001	R1	Vendor Data Requirements Table

**Standard Datasheet Section**

N/A

**Standard Specification Section**

<b>Drawing No.</b>	<b>Rev.</b>	<b>Title</b>
6515-GGD-03	R0	Site Information and Design Coefficients
6515-000-133-VDR-001	R0	Vendor Data Requirements

**Drawings Forming Part of This Specification:**

<b>Drawing No.</b>	<b>Rev.</b>	<b>Title</b>
65-685-230-204	R1	D-CP1 GENERAL LOCATION PLAN
65-685-230-205	R1	D-CP1 KEY TRENCH AND DIKE LAYOUT PLAN
65-685-230-206	R1	D-CP1 PROFILES
65-685-230-207	R1	D-CP1 THERMAL COVER LAYOUT PLAN AND PROFILES
65-685-230-208	R1	D-CP1 TYPICAL SECTIONS AND QUANTITIES
65-685-230-209-01	R1	D-CP1 SECTIONS STATION 0+025 TO 0+200
65-685-230-209-02	R1	D-CP1 SECTIONS STATION 0+225 TO 0+400
65-685-230-209-03	R1	D-CP1 SECTIONS STATION 0+400 TO 0+575
65-685-230-210	R1	D-CP1 DOWNSTREAM WATER COLLECTION CHANNEL AND SUMP LAYOUT PLAN AND PROFILES
65-685-230-211	R1	D-CP1 INSTRUMENTATION PLAN AND DETAILS FOR GROUND TEMPERATURE CABLES
65-685-230-212	R1	D-CP1 INSTRUMENTATION PLAN AND DETAILS FOR GROUND TEMPERATURE CABLES AND SETTLEMENT SURVEY MONUMENT POINTS
65-685-230-213	R1	D-CP1 TYPICAL DETAILS
65-685-230-214	R0	D-CP5 GENERAL LOCATION PLAN
65-685-230-215	R0	D-CP5 KEY TRENCH AND DIKE LAYOUT PLAN



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## Documents and Drawings Index

Agnico Eagle Mines Limited: Meliadine Project  
 6515-C-235-007-MTX-001  
 Civil Works – Water Management

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65-685-230-216	R0	D-CP5 PROFILES
65-685-230-217	R0	D-CP5 THERMAL COVER LAYOUT PLAN AND PROFILES
65-685-230-218	R0	D-CP1 TYPICAL SECTIONS AND QUANTITIES
65-685-230-219-01	R0	D-CP5 SECTIONS STATION 0+030 TO 0+170
65-685-230-219-02	R0	D-CP5 SECTIONS STATION 0+170 TO 0+310
65-685-230-220	R0	D-CP5 INSTRUMENTATION PLAN AND DETAILS FOR GROUND TEMPERATURE CABLES
65-685-230-221	R0	D-CP5 INSTRUMENTATION PLAN AND DETAILS FOR GROUND TEMPERATURE CABLES AND SETTLEMENT SURVEY MONUMENT POINTS
65-685-230-222	R0	D-CP5 TYPICAL DETAILS
65-000-230-212	R3	CIVIL WORKS 2016 – PLAN VIEW
65-417-230-207	RA	JETTY CP1 – PLAN / CROSS SECTION
65-417-230-208	RA	JETTY CP5 – PLAN / CROSS SECTION
65-695-265-200	R4	PUMPING STATION CP1 – PLAN, ELEVATION, DETAILS
65-695-265-203	R4	PUMPING STATION CP5 – PLAN, ELEVATION, DETAILS

2016-11-10	2	For review	G. Zhang	G. Zhang	G. Zhang	
2016-08-26	1	For Review	M. Ricard	G. Zhang	G. Zhang	D. Nguyen
2016-06-13	0	For Tender	M. Ricard	G. Zhang	G. Zhang	S. Guay
<b>Date</b>	<b>Rev.</b>	<b>Status</b>	<b>Prepared By</b>	<b>Checked By</b>	<b>Approved By</b>	<b>Approved By</b>
						<b>Client</b>

**END OF SECTION**

**AGNICO EAGLE****MELIADINE GOLD MINE PROJECT****ENGINEERING CHANGE NOTICE**

Contract No: OL-459893-L

Contract Title: Block 007 - Water Management Infrastructure

Contractor: Tetra Tech EBA Inc.

Date: 10-Nov-16

ECN No: 6515-C-235-007-ECN-002\_RA

ECN Title: Design Change of Dike Liner Key-in Detail at Crest for D-CP1 and D-CP5

**ECN Description:**

In the meeting with Luciano and Duy on October 28, 2016, Luciano suggested some changes to avoid sharp corners of the liner in anchoring the liner over the dike crest. As directed, we have prepared two drawings (see attached) to show the proposed design changes for your review:

- 1) Proposed dike crest design change No.1 for D-CP1.
- 2) Proposed dike crest design change No.1 For D-CP5.

**Justification:**

As suggested by the extremal reviewer (Luciano), minor changes to the dike liner key-in at crest were made to avoid sharp corners of the liner in anchoring the liner over the dike crest.

**List of Deleted, Revised or Added Documents (Add a page to list more if needed )**

Item	Document Number	Rev
1	Proposed Design Change No1 for D-CP1	RA
1	Proposed Design Change No1 for D-CP5	RA

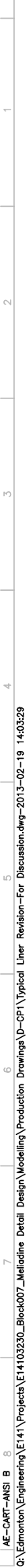
Item	Document Number	Rev

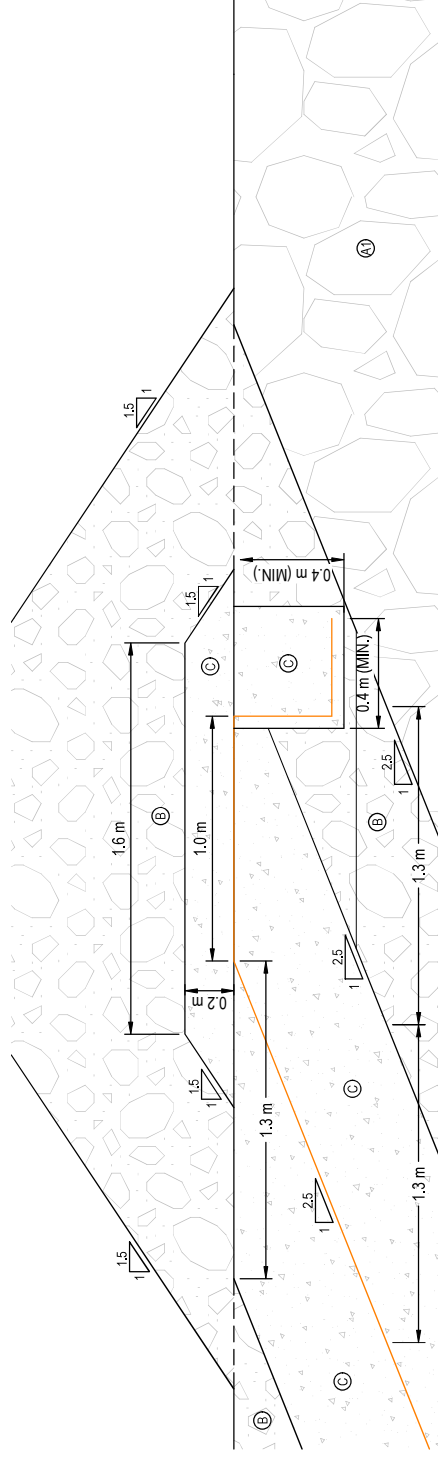
**Potential Impacts:**On Schedule: Yes ☒ No ☐On Cost: Yes ☒ No ☐

Action Record	TITLE	NAME	Signature	Date
Prepared by:	Package Engineer	Gordon Zhang		Nov. 14, 2016
Reviewed by:	Lead Discipline	Duy Nguyen	Duy Nguyen	
Accepted by:	Engineering Manager	Daniel Seguin		
Accepted by:	Project Manager	Marcel Beaudoin		

**Notes:**

1	Contractor has 10 days to return the Impact on Cost (on the attached Price Breakdown) and Schedule		
2	Contractor is not to proceed with any work until authorized to do so		
<b>Contractor Acknowledgment</b>			
Received by:		Contractor Repres.	





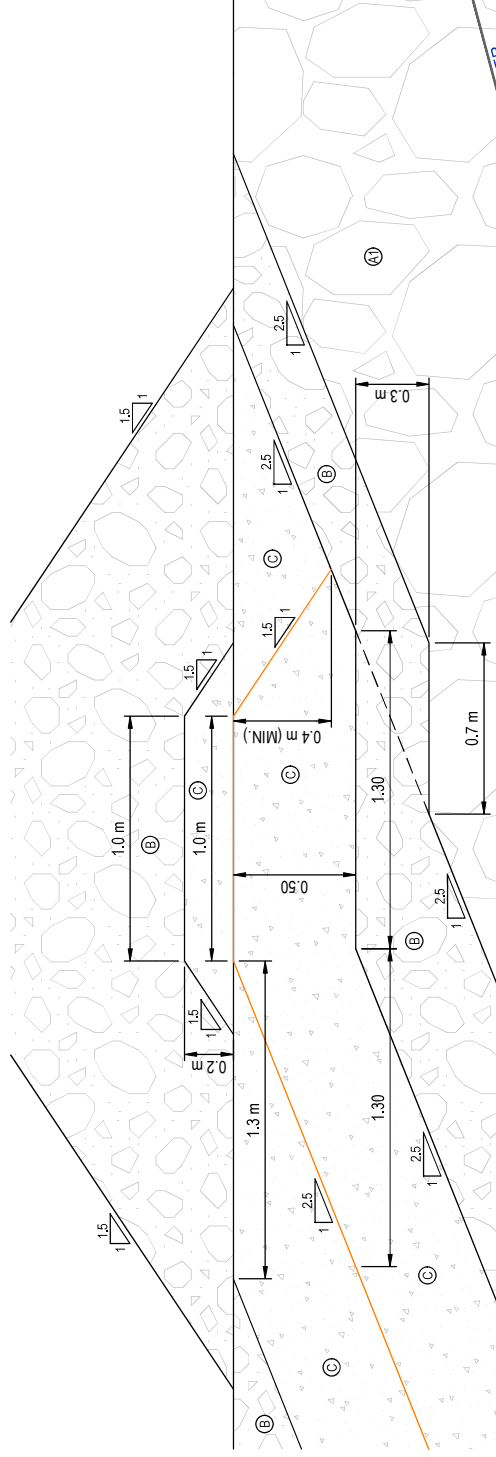
TYPICAL LINER KEY-IN AT CREST - PREVIOUS DESIGN

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NOT TO SCALE

4

 (65-685-230-222 R0)



TYPICAL LINER KEY-IN AT CREST - REVISED DESIGN

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NOT TO SCALE

4

218

NOTE:  
ADDITIONAL MATERIAL 'C' CROSS-SECTIONAL AREA = 0.330 m<sup>2</sup>  
ADDITIONAL MATERIAL 'B' CROSS-SECTIONAL AREA = 0.110 m<sup>2</sup>

NE PAS UTILISER  
POUR CONSTRUCTION  
NOT FOR CONSTRUCTION

DATE : 2016-10-28

 **peterson**

[illegible]