2. Attachment A-1.1 MC6 G4-G7 Slope Stability Analysis

Original Submittal			
	Page	Revised Submittal	
A-1	10	A-1.1	MC VI-G4 through -G7 Slope Stability Analysis
A-1.1	14	A-1.1.1	C-C' Foundation Stability
A-1.2	19	A-1.1.2	G-G' Foundation Stability
A-1.3	24	A-1.1.3	C-C' Liner Stability under Final Conditions with zero adhesion
A-1.4	29	A-1.1.4	G-G' Liner Stability under Final Conditions with zero adhesion
A-1.5	34	A-1.1.5	C-C' Liner Stability under Final Conditions with non-zero adhesion (previously tested values)
A-1.6	39	A-1.1.6	G-G' Liner Stability under Final Conditions with non-zero adhesion (previously tested values)
A-1.7	44	A-1.1.7	C-C' Liner Stability under Interim Conditions (example interim stability calculation)

Attachment A-1.1

MC VI-G4 through -G7 Slope Stability Analysis

Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification	Client:	Wayne Disposal, Inc.
Project Number:	1208070039.004	Project Manager:	Chris Backus
Project Location:	Belleville, Michigan	QA Manager:	

Calculation Sheet Information

Calculation Medium: ☒ Electronic
☐ Hard copy Number of pages (including cover sheet):

Title of Calculation:	Slope Stability Analyses
Calculation Originator:	Mohammad Kabalan
Calculation Contributors:	Kazuhisa Matsuda, Rajan Ramya
Calculation Checker:	James Moseley, Kevin Foye

Calculation Objective

This calculation evaluates the stability of the proposed MC-VI-G at Wayne Disposal, Inc. (WDI) Landfill. The analyses include consideration of global slope stability for failures through the waste mass, along the liner system, and/or through the foundation soils at interim and final conditions. The analyses also determined the minimum required interface friction angle to attain a satisfactory factor of safety against failure at the liner system interface. Cross sections that are the most critical for analysis and design include cross sections with the steepest slopes and highest embankment (waste or soil) heights. The following critical cross sections were examined:

1. Cross Section C-C' oriented East-West and going through Cell MC VI-G4.
2. Cross Section G-G' oriented North-South and going through Cell MC VI-G6.

Assumptions and Open Items

1. Representative total and effective stress shear strength parameters were used for all layers in the profile. Material properties were retrieved from existing site data (NTH 2012) and are presented in Table 1. For slow-draining clay soils, undrained shear strength (total stress analysis) was used because pore pressures accumulating during shear will not be able to dissipate in these soils. In contrast, drained strength parameters (effective stress analysis) were used for waste and granular soil layers because these materials will dissipate excess pore pressures during shear. Therefore, both undrained and drained shear strength parameters are used in the same slope stability analysis, depending on the layer being modeled. Strength properties for the lower clay were modeled as a relationship of undrained shear strength to vertical effective stress. An undrained shear strength to vertical effective stress ratio of 0.22 was used to calculate undrained shear strength for the lower clay in accordance with existing analyses (NTH 2012) to account for increases in clay shear strength resulting from increased overburden pressure.

Table 1: Material Properties

Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover (total stress analysis)	Orange	135	0	1500
2	Existing Waste (effective stress analysis)	Teal	91	34	0
3	New Waste (effective stress analysis)	Light Green	103[A]	30	0
4	Upper Clay (total stress analysis)	Brown	130	0	1325
5	Middle Clay (total stress analysis)	Yellow	136	0	3000
6	Lower Clay (total stress analysis)	Maroon	128	$0.22\sigma_v$	
7	Silt (effective stress analysis)	Blue	125	28	0
8	Sand (effective stress analysis)	Red	115	32	0
9	Liner (floor) (effective stress analysis)	Magenta	120	13.2	0
10	Liner (sideslope) (effective stress analysis)	Magenta	120	9	0

Notes:
[A] conservative (high) value of unit weight of waste was estimated from site survey data (see table below). Note that higher values of waste unit weight result in a lower FS because newly-placed waste imposes a greater driving load.
All other properties obtained from NTH (2012)

2. For liner system stability cases, the domain of the slip surfaces are defined so that a portion of the failure surface conforms to the liner system.
3. Applicable data used in the analysis that was provided by third parties is assumed to be accurate.

Site Waste Survey Data

Survey Years	2014 to 2021
Tons received into the landfill	3,905,856
Cubic yards airspace consumed	2,869,499
Average Unit Weight (tons/cy)	1.36
Average Unit Weight (pcf)	100.83

Design Criteria/Design Basis

1. The minimum allowable factor-of-safety (FS) against slope stability failures is 1.50 for final conditions and 1.30 for interim conditions.
2. The analyses were conducted using the computer program SLOPE/W within the software package GeoStudio 2021 by GEOSLOPE International Ltd. This program performs an automatic search to identify a critical failure surface that has the lowest FS value.
3. The analyses were conducted using the Morgenstern-Price method, which considers both moment and force equilibrium.
4. The geometry of the cross sections was derived from the engineering drawing set submitted as part of the permit mod package.
5. The required/assumed interface friction angles shall be met by considering peak strength values for the cell floor and large-displacement strength values for the cell sideslopes.

Design Criteria/Design Basis
6. The required minimum interface friction angle for the liner system components is determined under the final conditions (after final cover is installed). 7. Due to the complex nature of the waste fill phasing during operation, the liner stability shall be evaluated based on the actual measurements of the interface friction angle for the liner system components and the design waste filling geometry for each phase. An example one such calculation was prepared to illustrate how to evaluate required minimum interface friction angle for the liner system components. This example analysis was performed on cross section C-C' assuming an interim waste slope of 3H:1V. 8. The example interim slope stability calculation performed for cross section C-C' is considered a worst-case for translational slides on the cell floor because the analysis does not take credit for the stabilizing effect of any cell side slope or toe buttress resisting movement along the liner system. Therefore, for the conditions presented, interim slopes that are constructed no steeper than 3H:1V and with a bottom width no less than 370 feet (measured from the toe of intercell berm to the interim face of the waste slope) shall be considered acceptable for waste filling operations. If tested values of the cell floor liner system interface strength vary from those presented, or the filling geometry deviates from this case, the interim slope shall be reevaluated according to this example to determine if the alternative waste filling geometry meets the stability criterion. Interim filling geometries that do meet the interim stability criterion shall be adjusted and reevaluated until acceptable FS values are obtained.

Results/Conclusions
1. Global slope stability analyses of the waste and foundation for each cross section determined that filling to proposed final grades yields acceptable factors of safety. a. Cross Section C-C': Factor of Safety =1.6 b. Cross Section G-G': Factor of Safety = 1.5 2. Under the final conditions (after installation of final cover, the liner system analyses determined the minimum required interface friction angle for geosynthetics in the floor and sideslope liner systems to yield a factor of safety = 1.5. These values are **13.2 degrees for the floor (peak) and 9 degrees for the sideslope (large-displacement) with zero adhesion** . a. Cross Section C-C': Factor of Safety = 1.5 (used to evaluate minimum friction angle) b. Cross Section G-G': Factor of Safety = 1.6 3. The above values are minimum acceptable secant friction angles. Any combination of adhesion and friction angle resulting in comparable shear strength under representative normal stresses to final site conditions are also acceptable. Stability analysis using lab interface shear strength tests results from previous products used on site show that a combination of **$C_{\alpha,peak}$=164 psf / ϕ_{peak}=11.1° and $C_{\alpha,large\ displacement}$=110 psf / $\phi_{large\ displacement}$=7.3°** achieves an acceptable factor of safety. **Conformance testing of the selected geosynthetics shall be performed to confirm that the interface shear strength of the actual liner system components is sufficient to ensure the stability of the liner system.** a. Cross Section C-C': Factor of Safety = 1.5 b. Cross Section G-G': Factor of Safety = 1.6 4. An example calculation of liner stability for an interim waste filling conditions is presented in Attachment A-1.1.7. The required interface friction angle for the floor liner system was determined to be 13 degrees (peak). Actual interim phasing plan slopes and tested liner system interface properties shall be evaluated for each phase of fill per this example. Cross-section C-C' was selected for this analysis since it represents the worst case for interim stability as follows: 1) steepest floor slope sloping outward from the waste slope and 2) narrowest floor width.

5. Interim slopes that are constructed no steeper than 3H:1V and with a bottom width no less than 370 feet shall be considered acceptable for waste filling operations. If tested values of the cell floor liner system interface strength vary from those presented, or the filling geometry deviates from this case, the interim slope shall be reevaluated according to this example.

Source Documents and References
NTH (2012). WDI Operating License Application Master Cells VI F & G Volume III – Basis of Design Report Qian, X., Gray, D.H., and Koerner, R.M. (2002) *Geotechnical Aspects of Landfill Design and Construction.*

Attachments	
A-1.1.1.	C-C' Foundation Stability
A-1.1.2.	G-G' Foundation Stability
A-1.1.3.	C-C' Liner Stability under Final Conditions with zero adhesion
A-1.1.4.	G-G' Liner Stability under Final Conditions with zero adhesion
A-1.1.5.	C-C' Liner Stability under Final Conditions with non-zero adhesion (previously tested values)
A-1.1.6.	G-G' Liner Stability under Final Conditions with non-zero adhesion (previously tested values)
A-1.1.7.	C-C' Liner Stability under Interim Conditions (example interim stability calculation)

Attachment A-1.1.1

C-C’ Foundation Stability

SLOPE STABILITY ANALYSIS REPORT FORM

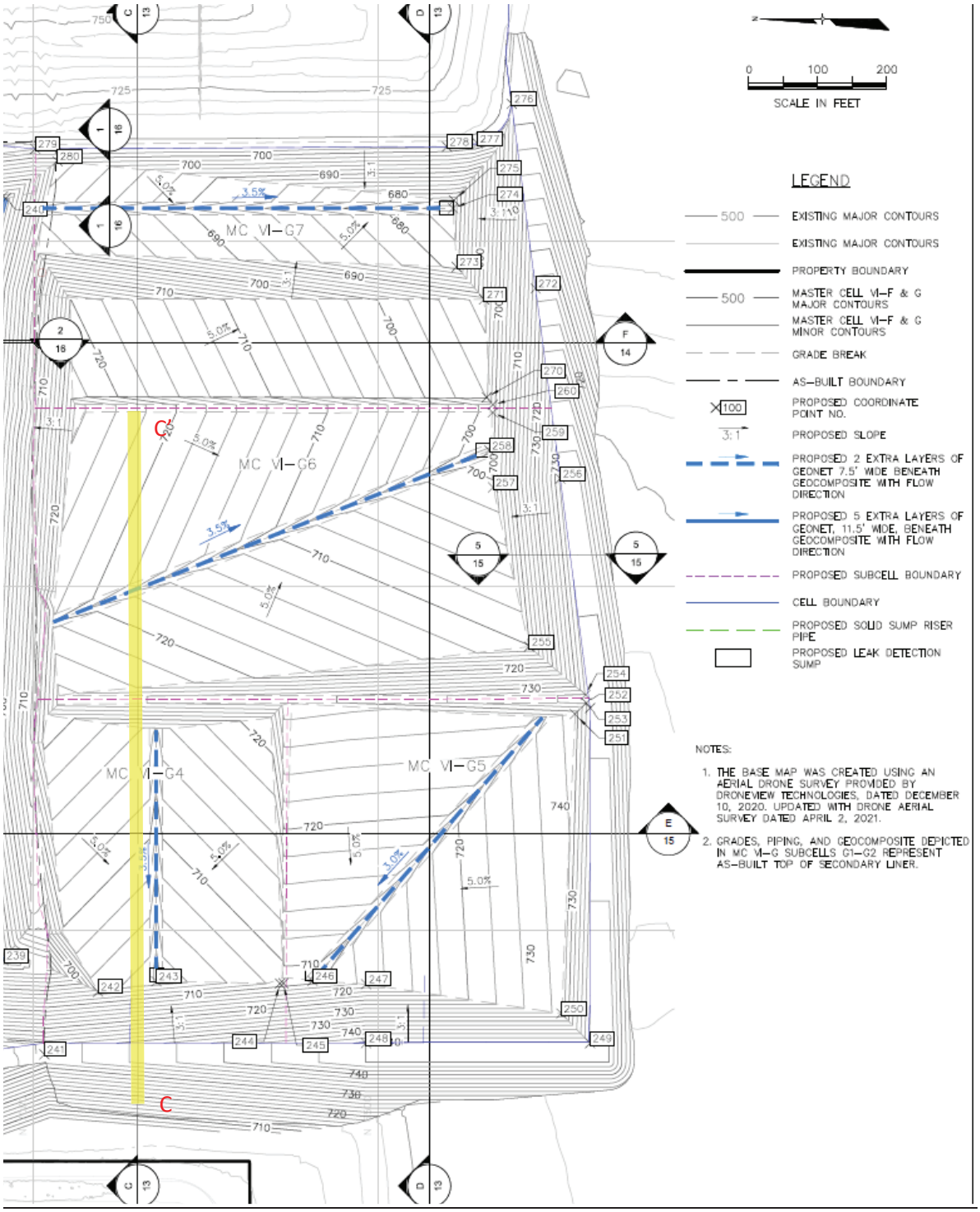
Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification						
Project Number:	1208070039.004			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	C-C' Foundation Stability				**File name:**	MC-VI-G_CrossSection_C_Foundation.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section C-C'. This case considers a west-facing slope, with fill to the final permitted grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The friction angle of the liner system was set equal to the required minimum interface friction angle determined from the liner stability analysis performed on Cross Section C. The groundwater level was set at elevation 655ft based on historical borings as documented in the Basis of Design Report (NTH 2012). Drained strength parameters were used for material with a relatively high permeability where excess pore-pressure conditions are not expected due to loading. Undrained strength parameters were used for low-permeability materials (clays) since excess pore pressure conditions may occur after loading. This is considered a conservative approach for this scenario.		

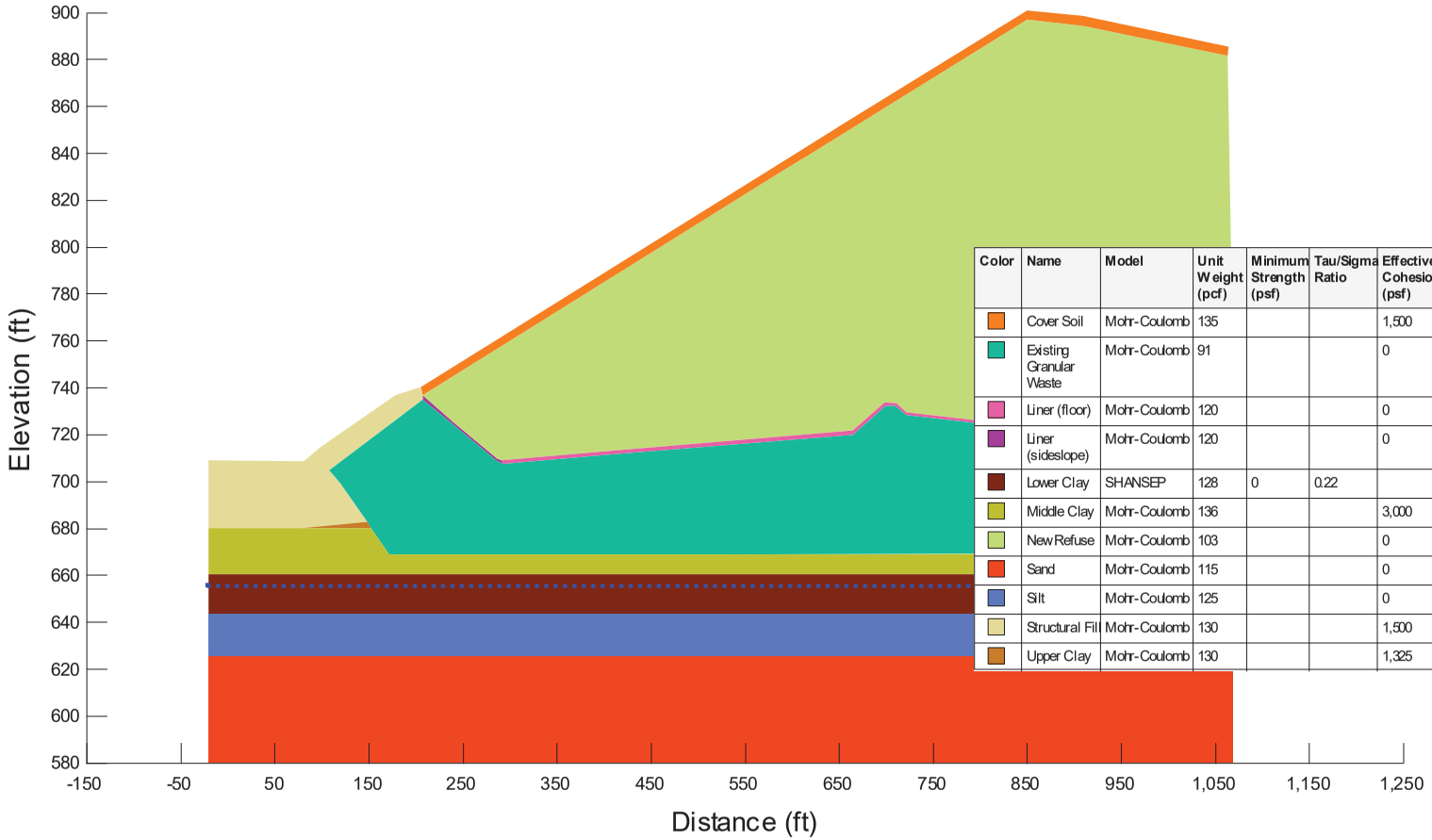
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0

Source of Geometry:	Engineering Drawing Set
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section C-C'

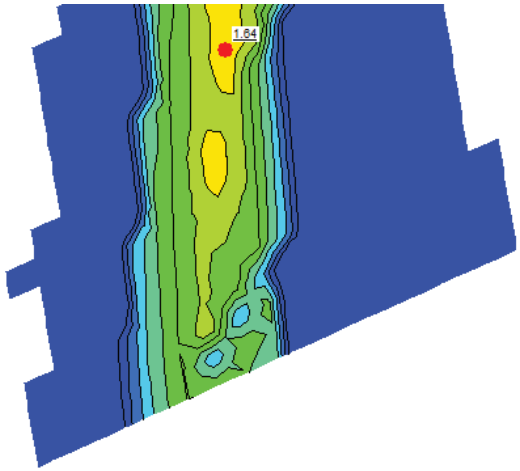
Plan View:

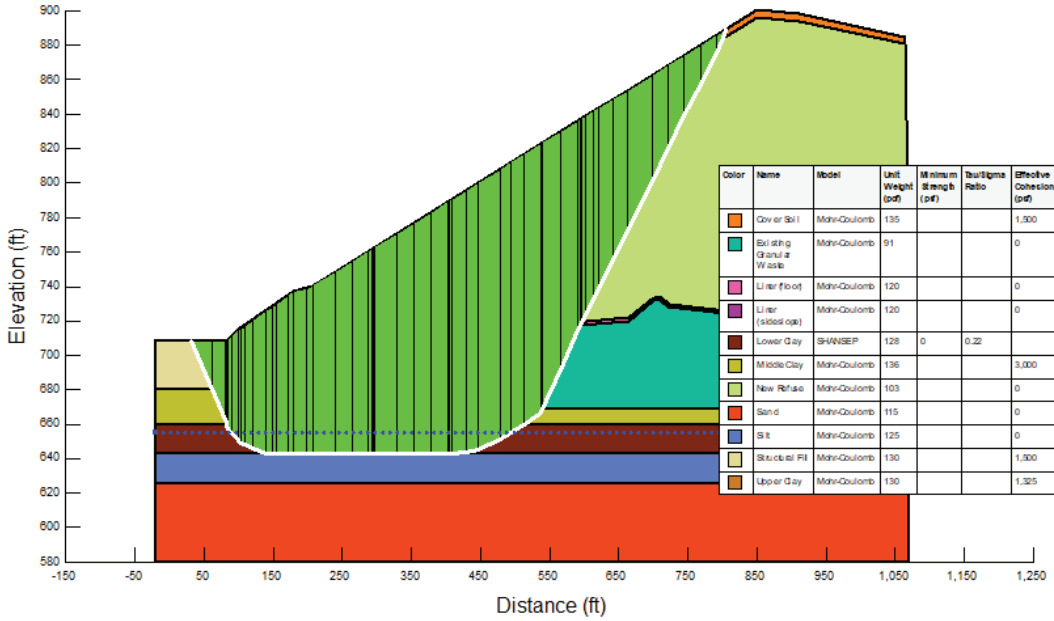


Factor of Safety:	1.6	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Structural Fill	Mohr-Coulomb	130			1,500	0	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-100	0	1	0	No





Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Structural Fill	Mohr-Coulomb	130			1,500	0	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-100	0	1	0	No

Attachment A-1.1.2

G-G’ Foundation Stability

SLOPE STABILITY ANALYSIS REPORT FORM

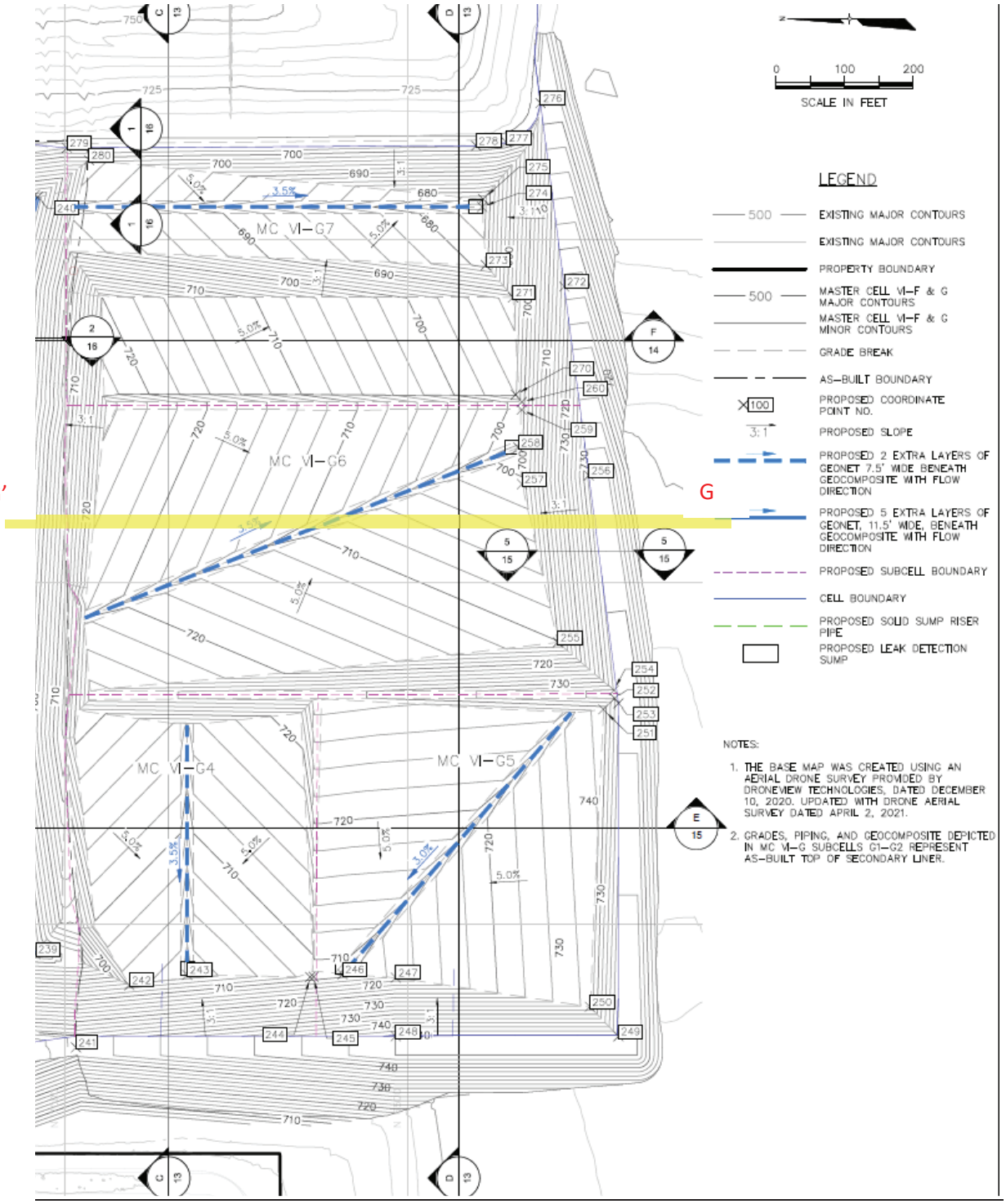
Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification						
Project Number:	1208070039.004			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	G-G' Foundation Stability				**File name:**	MC-VI-G_CrossSection_G_Foundation.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section G-G'. This case considers a south-facing slope, with fill to the final permitted grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The friction angle of the liner system was set equal to the required minimum interface friction angle determined from the liner stability analysis performed on Cross Section C. The groundwater level was set at elevation 655ft based on historical borings as documented in the Basis of Design Report (NTH 2012). Drained strength parameters were used for material with a relatively high permeability where excess pore-pressure conditions are not expected due to loading. Undrained strength parameters were used for low-permeability materials (clays) since excess pore pressure conditions may occur after loading. This is considered a conservative approach for this scenario.		

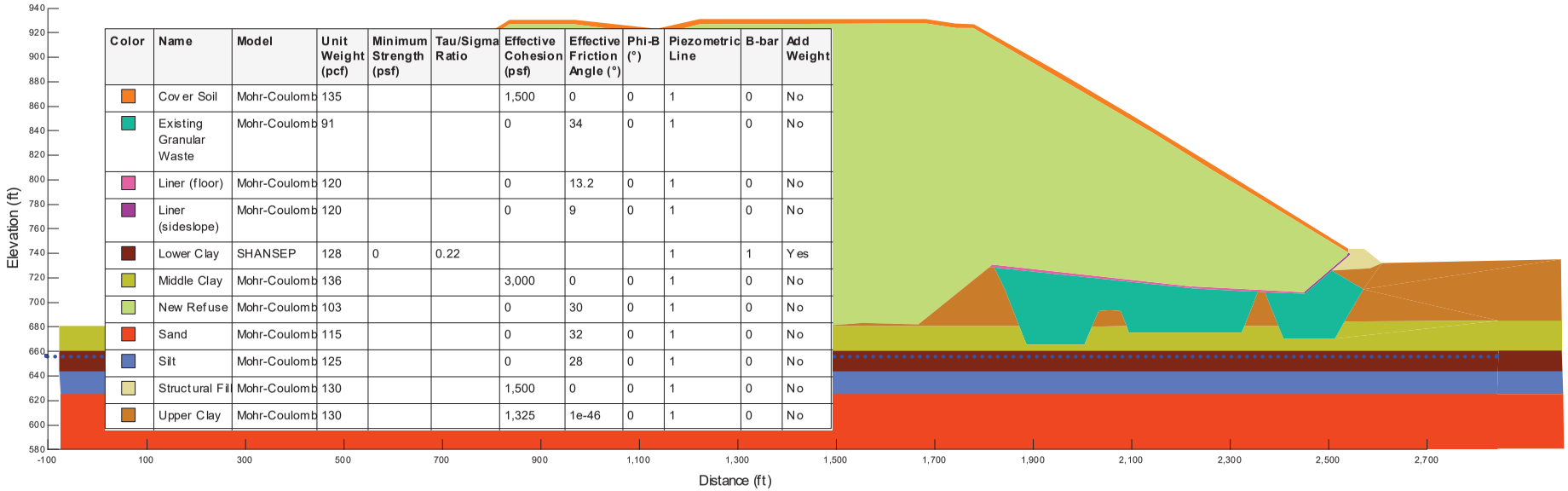
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0

Source of Geometry:	Engineering Drawing Set
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section G-G'

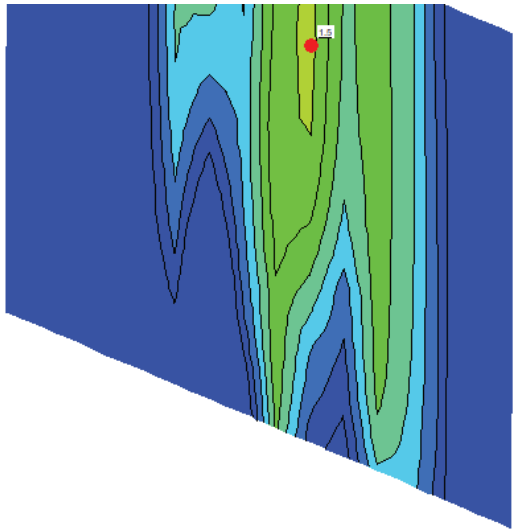
Plan View:



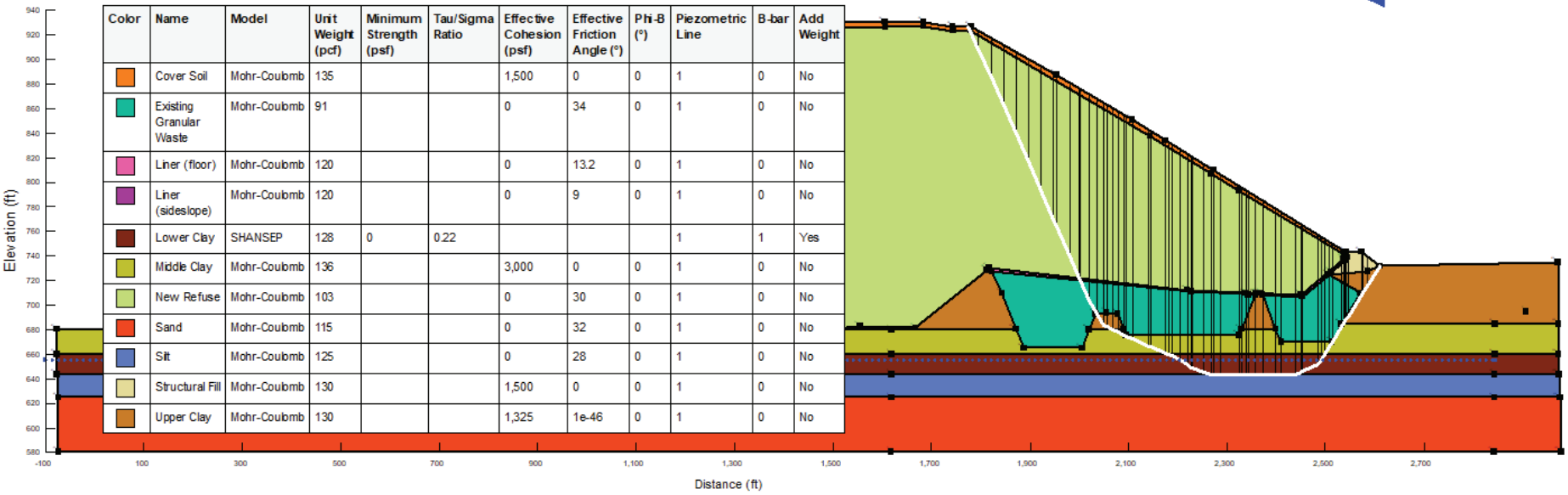
Factor of Safety:	1.5	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Structural Fill	Mohr-Coulomb	130			1,500	0	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-46	0	1	0	No



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Structural Fill	Mohr-Coulomb	130			1,500	0	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-46	0	1	0	No



Attachment A-1.1.3

C-C’ Liner Stability under Final Conditions with zero adhesion

SLOPE STABILITY ANALYSIS REPORT FORM

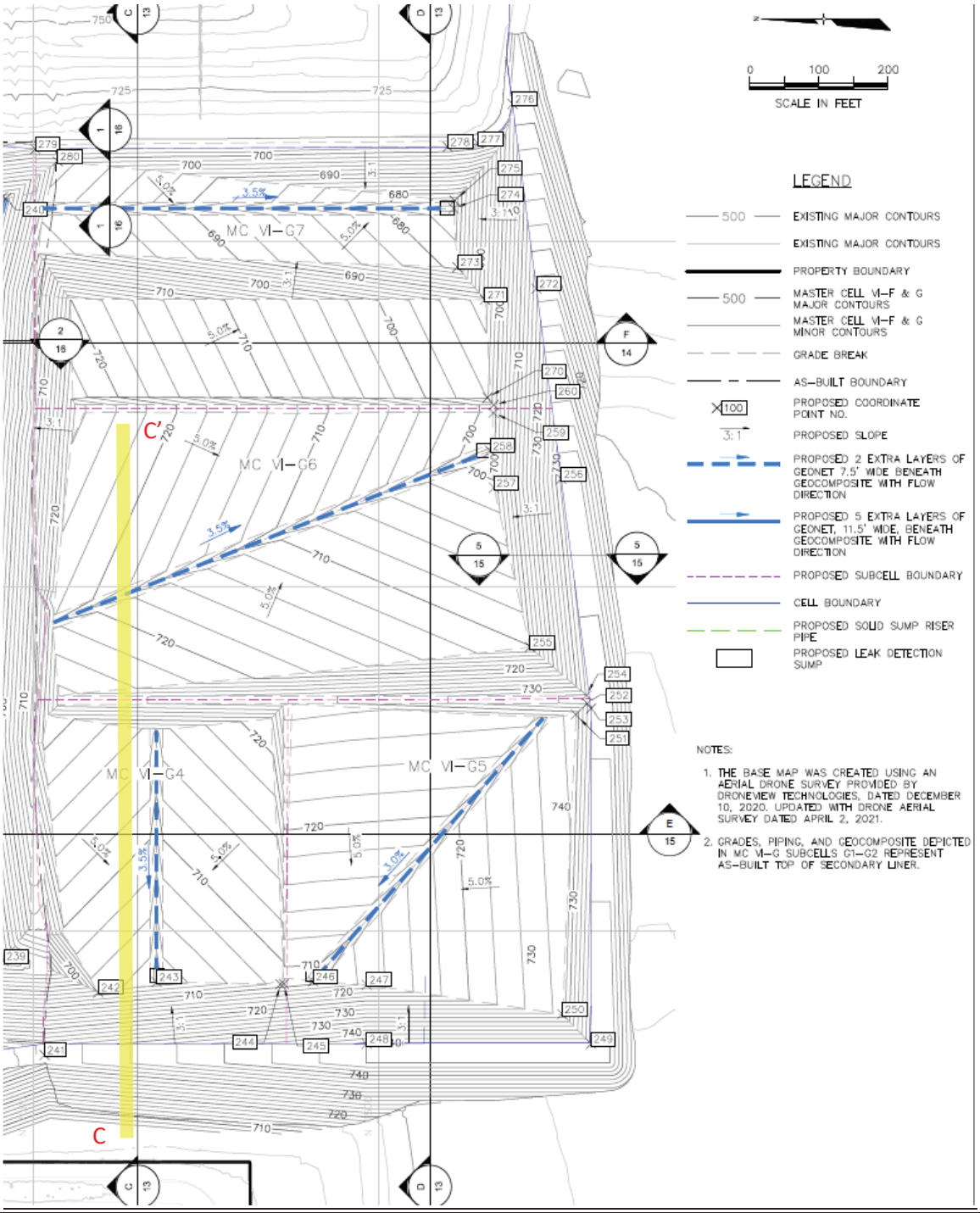
Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification						
Project Number:	1208070039.004			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	C-C' Liner Stability				**File name:**	MC-VI-G_CrossSection_C_Liner.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the minimum required liner interface friction angle to achieve an acceptable factor of safety of the proposed final waste grades using cross-section C-C'. This case considers a west-facing slope, with fill to the final permitted grade elevations under undrained conditions.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The liner system was modeled in 2 sections (floor and sideslope) to allow use of Peak and Large-Displacement strength parameters appropriately. The friction angle of the sideslope was set at 9° corresponding to commonly achievable large-displacement interface secant friction angle. The friction angle of the floor liner system was varied to determine the required peak interface secant friction angle to achieve the required factor of safety of 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

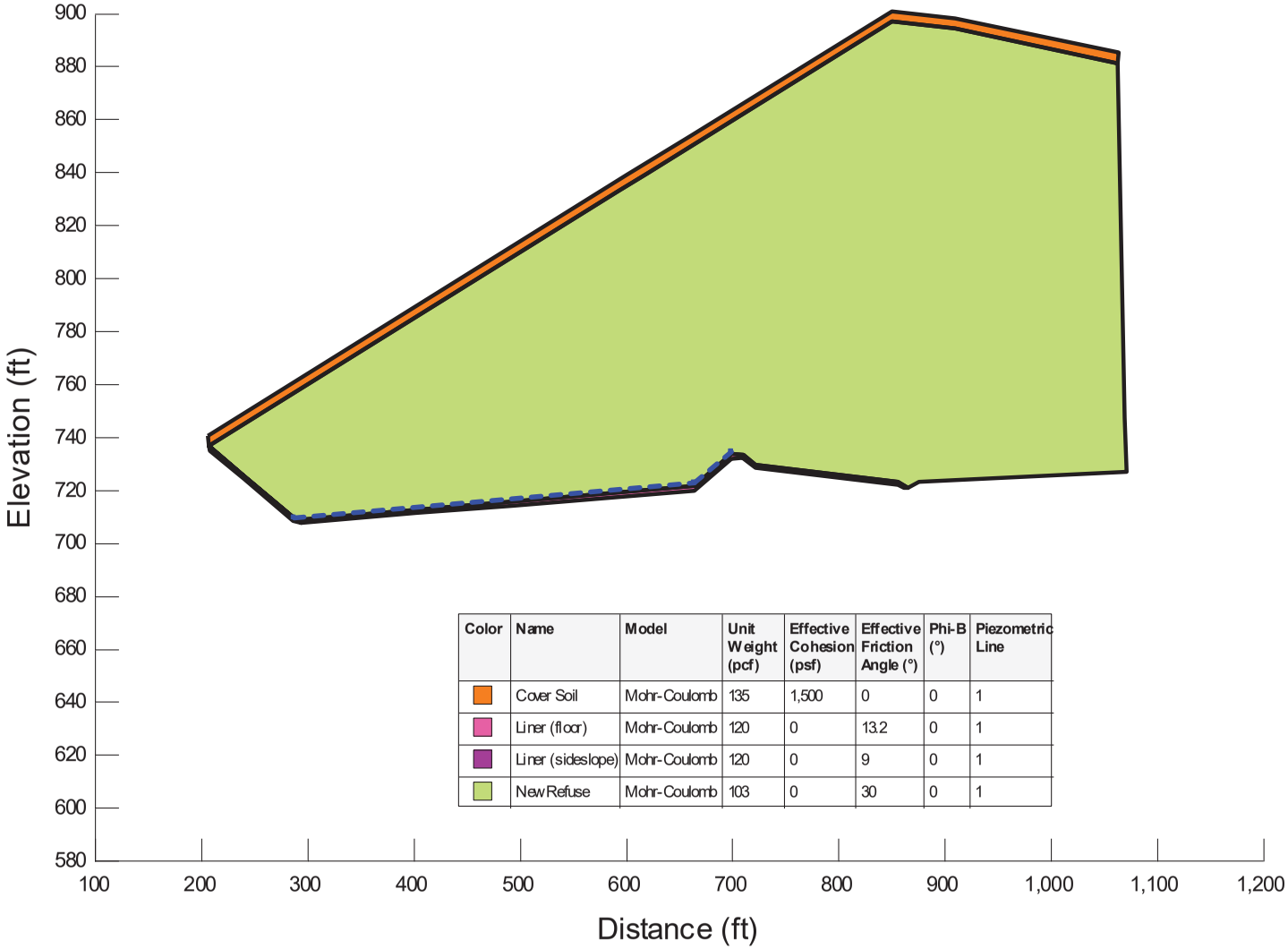
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	?	0
10	Liner (sideslope)	Magenta	120	9	0

Source of Geometry:	Engineering Drawing Set
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section C-C'

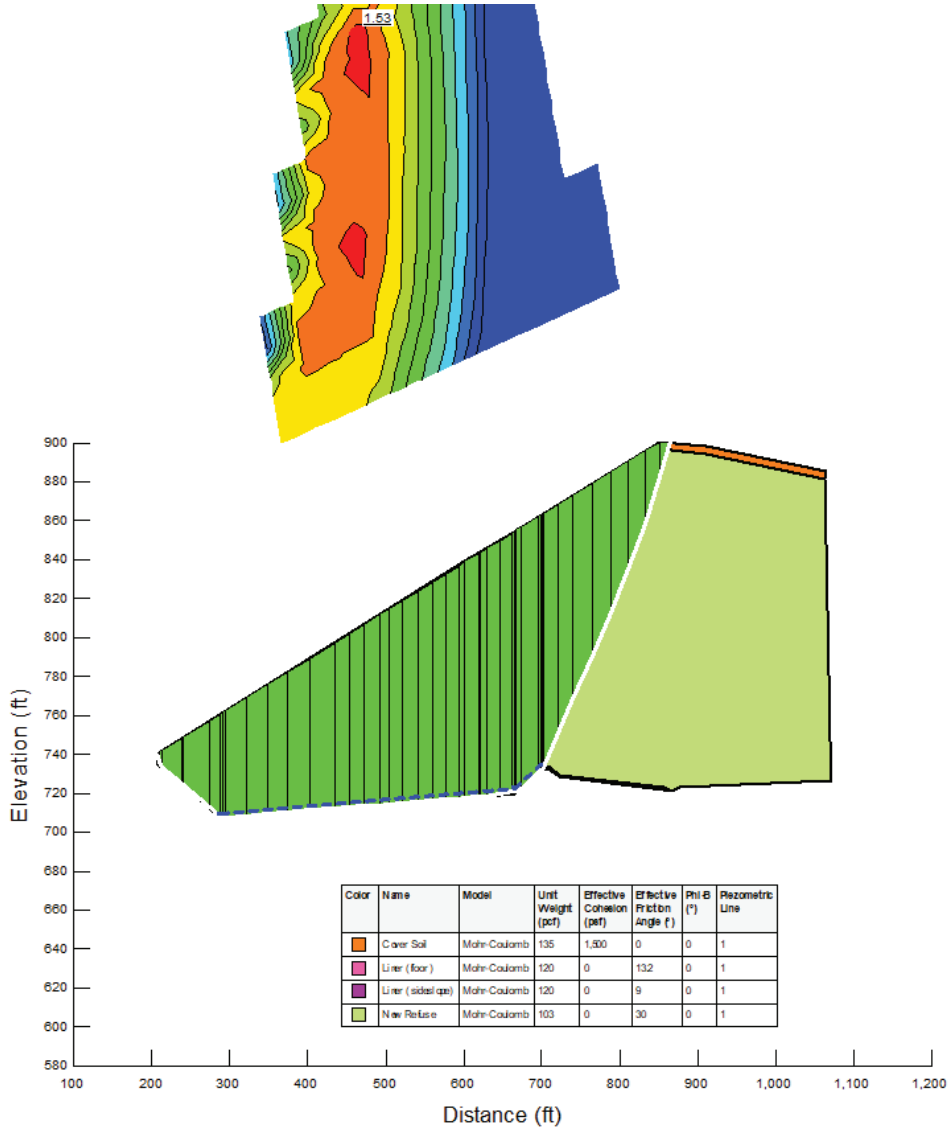
Plan View:



Factor of Safety:	1.5	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:	The required peak interface friction for the floor liner system was determined to be 13.2°.	
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1
	New Refuse	Mohr-Coulomb	103	0	30	0	1



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1
	Liner (sides/ops)	Mohr-Coulomb	120	0	9	0	1
	New Refuse	Mohr-Coulomb	103	0	30	0	1

Attachment A-1.1.4

G-G’ Liner Stability under Final Conditions with zero adhesion

SLOPE STABILITY ANALYSIS REPORT FORM

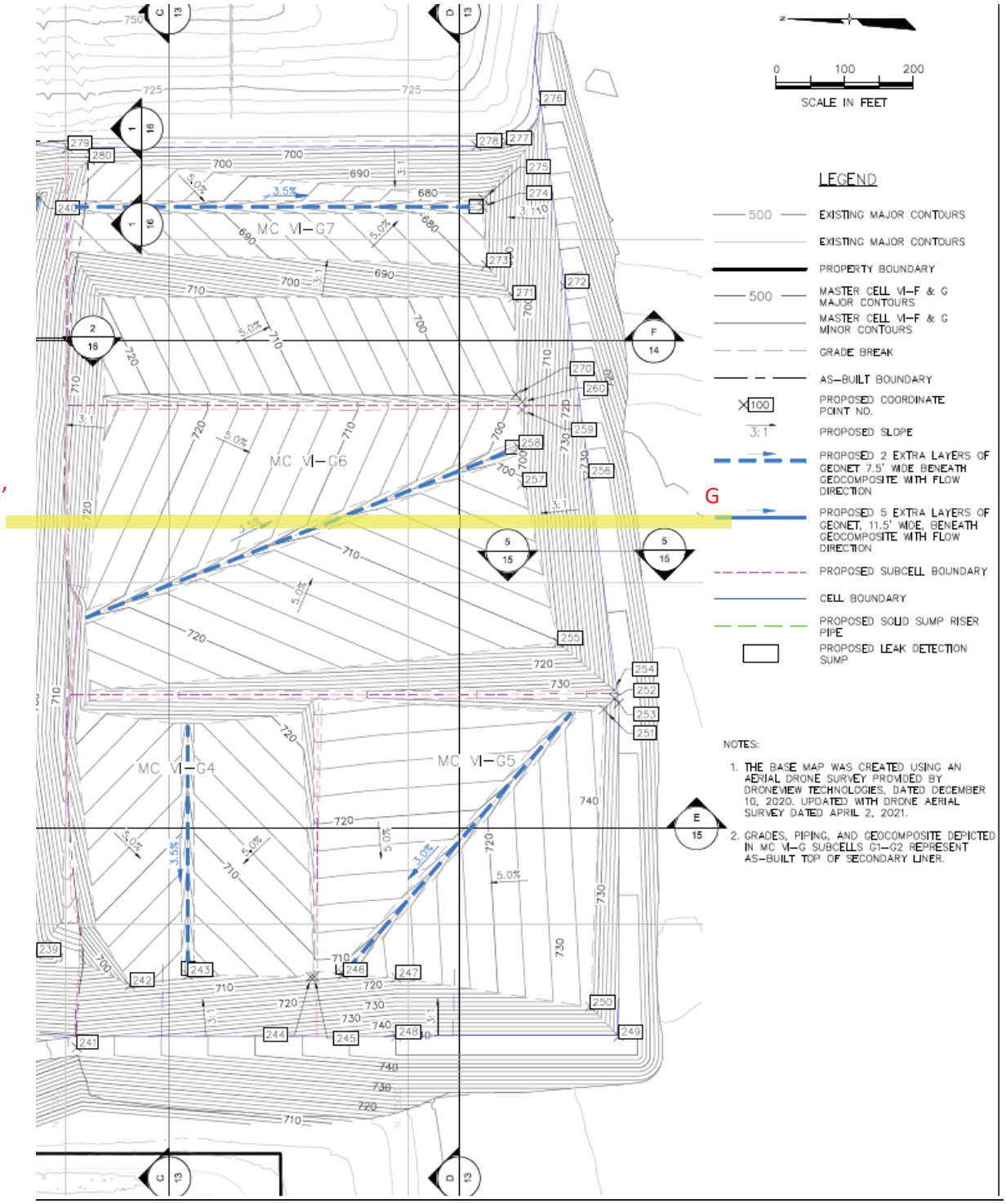
Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification						
Project Number:	1208070039.004			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	G-G' Liner Stability				**File name:**	MC-VI-G_CrossSection_G_Liner.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section G-G'. This case considers a south-facing slope, with fill to the final permitted grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The friction angle of the liner system was set equal to the required minimum interface friction angle determined from the liner stability analysis performed on Cross Section C. The required factor of safety is 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

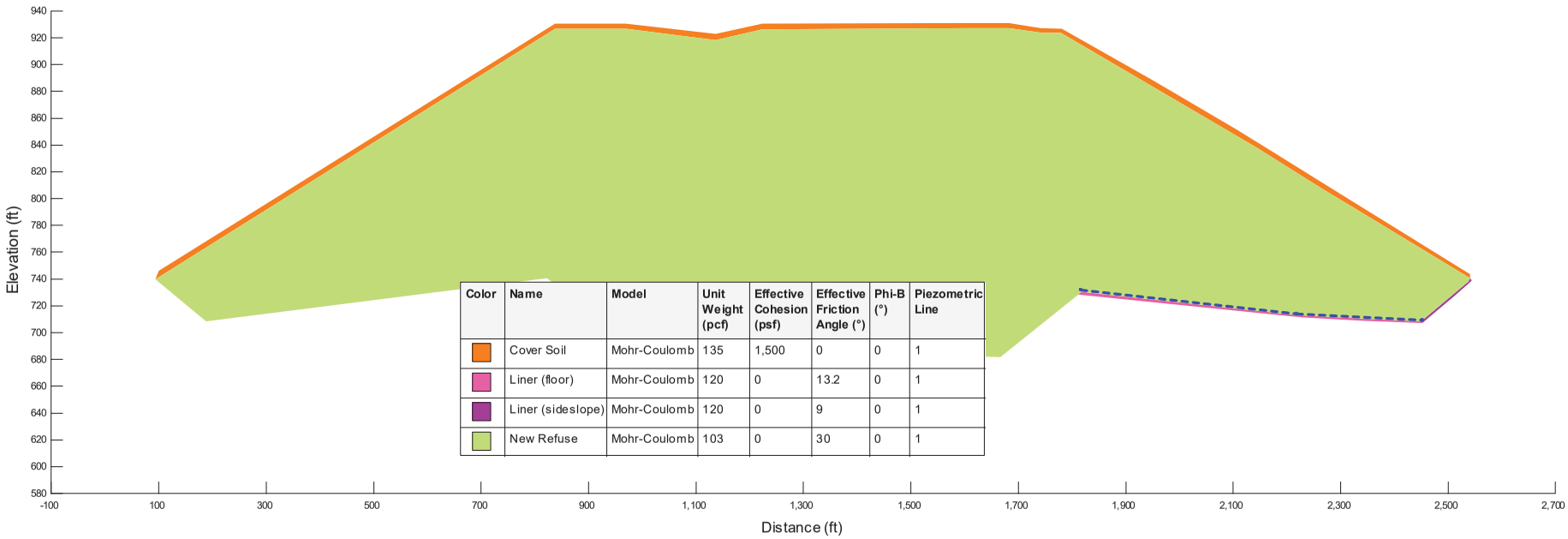
Material	**Name**	**Color in Profile**	**Unit Wt(s) (pcf)**	**Strength ϕ or δ (deg.)**	**Strength C or Ca (psf)**
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0

Source of Geometry:	Engineering Drawing Set
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section G-G'

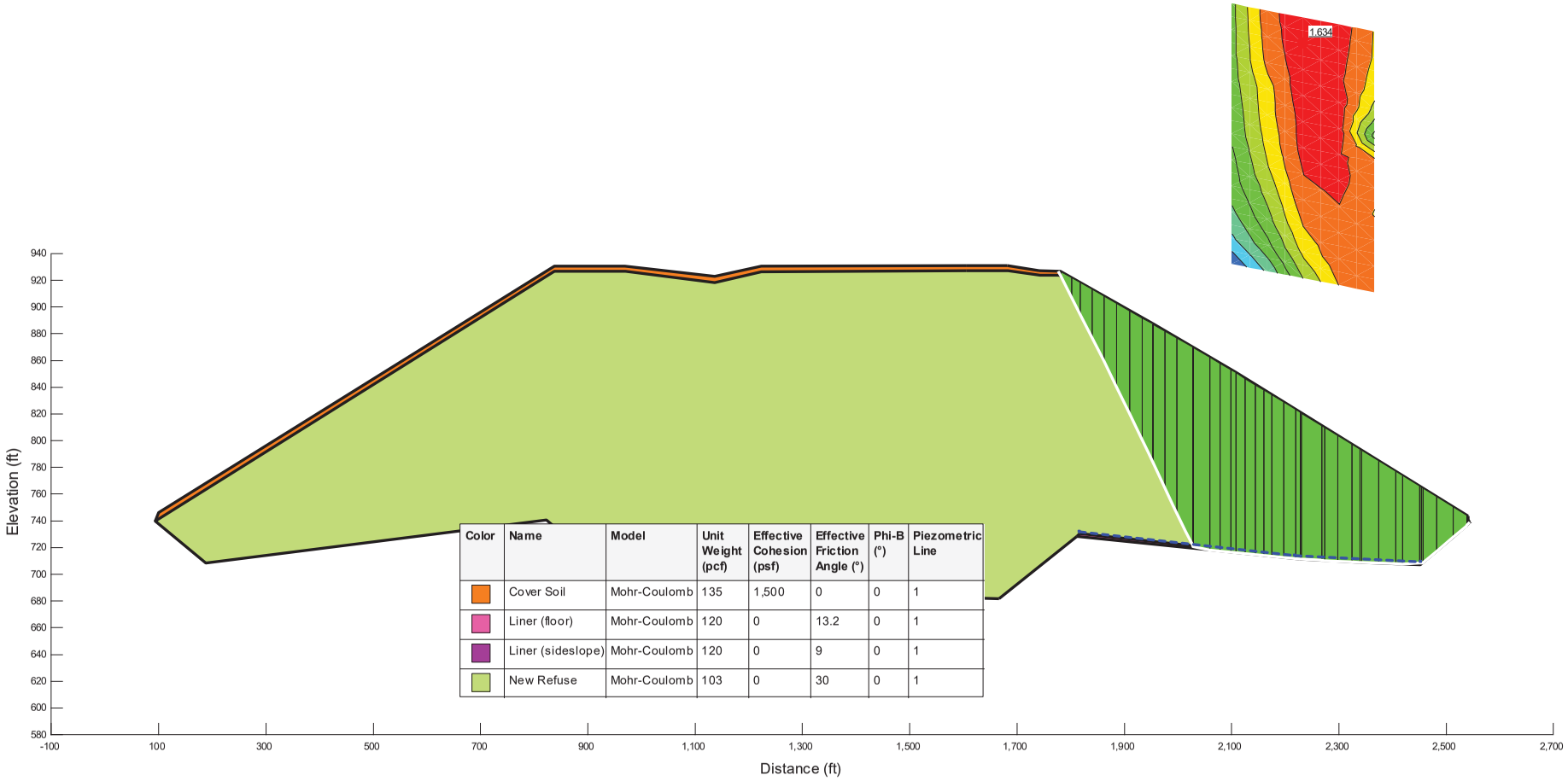
Plan View:



Factor of Safety:	1.6	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1
	New Refuse	Mohr-Coulomb	103	0	30	0	1



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1
	New Refuse	Mohr-Coulomb	103	0	30	0	1

Attachment A-1.1.5

C-C’ Liner Stability under Final Conditions with non-zero adhesion (previously tested values)

SLOPE STABILITY ANALYSIS REPORT FORM

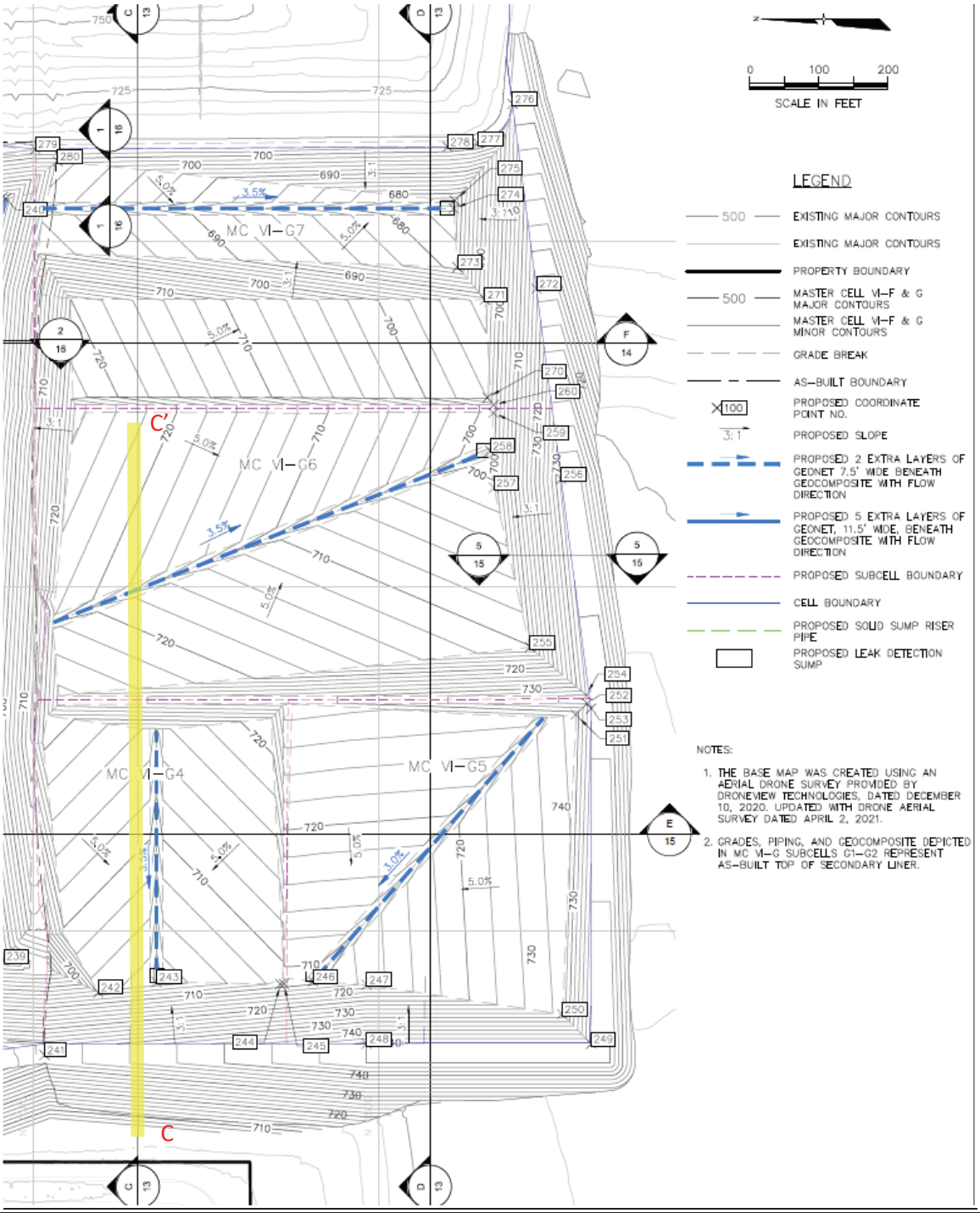
Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification						
Project Number:	1208070039.004			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	C-C' Liner Stability				**File name:**	MC-VI-G_CrossSection_C_Liner_tested_values.gsz	
Revision:	1	**Originated:**	MK	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the minimum required liner interface friction angle to achieve an acceptable factor of safety of the proposed final waste grades using cross-section C-C'. This case considers a west-facing slope, with fill to the final permitted grade elevations under undrained conditions.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The liner system was modeled in 2 sections (floor and sideslope) to allow use of Peak and Large-Displacement strength parameters appropriately. The liner interface strength properties are based on interface strength test results of a similar liner system installed on site. The required factor of safety of 1.5.		

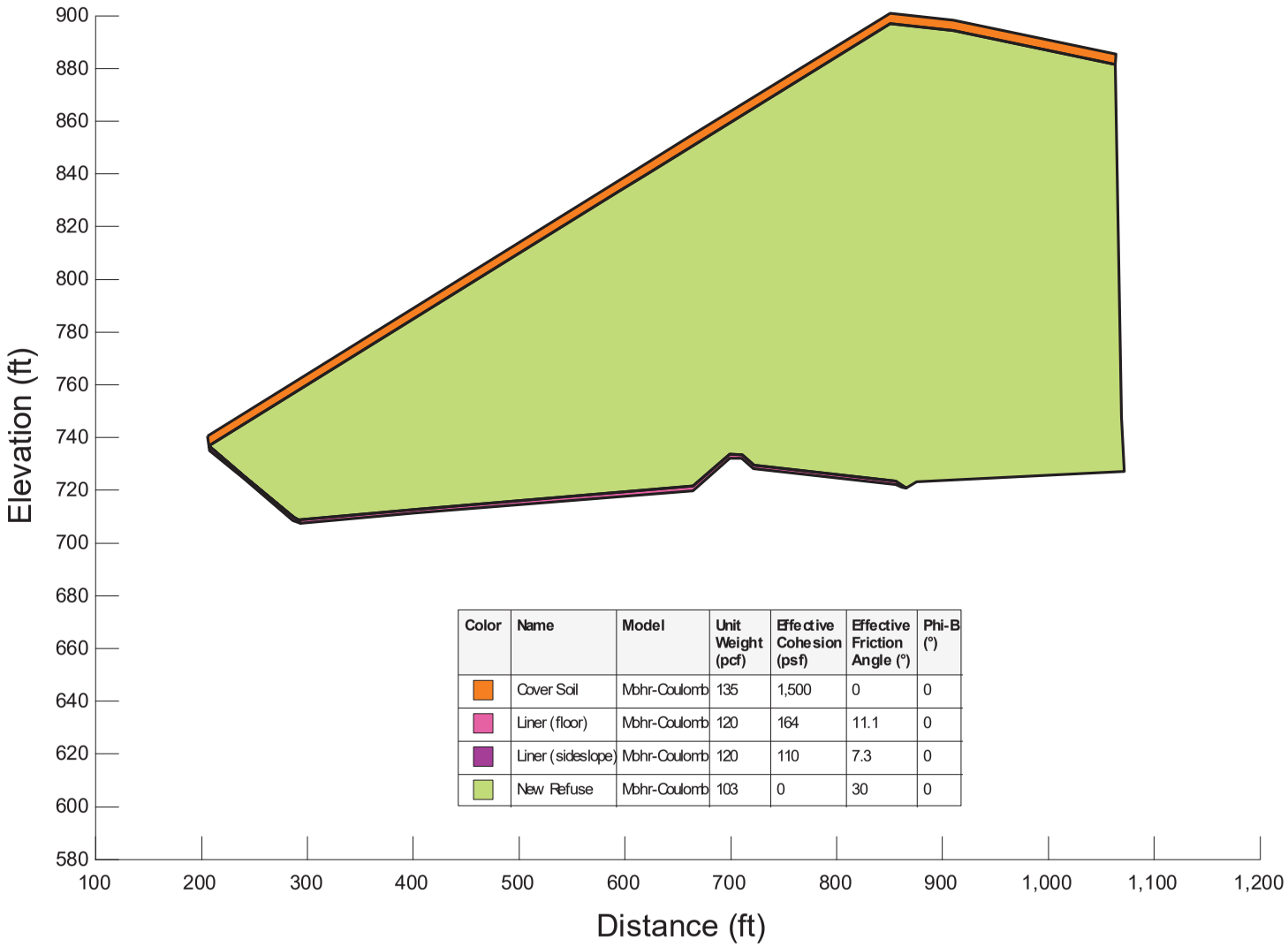
Material	**Name**	**Color in Profile**	**Unit Wt(s) (pcf)**	**Strength ϕ or δ (deg.)**	**Strength C or Ca (psf)**
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	11.1	164
10	Liner (sideslope)	Magenta	120	7.3	110

Source of Geometry:	Engineering Drawing Set
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section C-C'

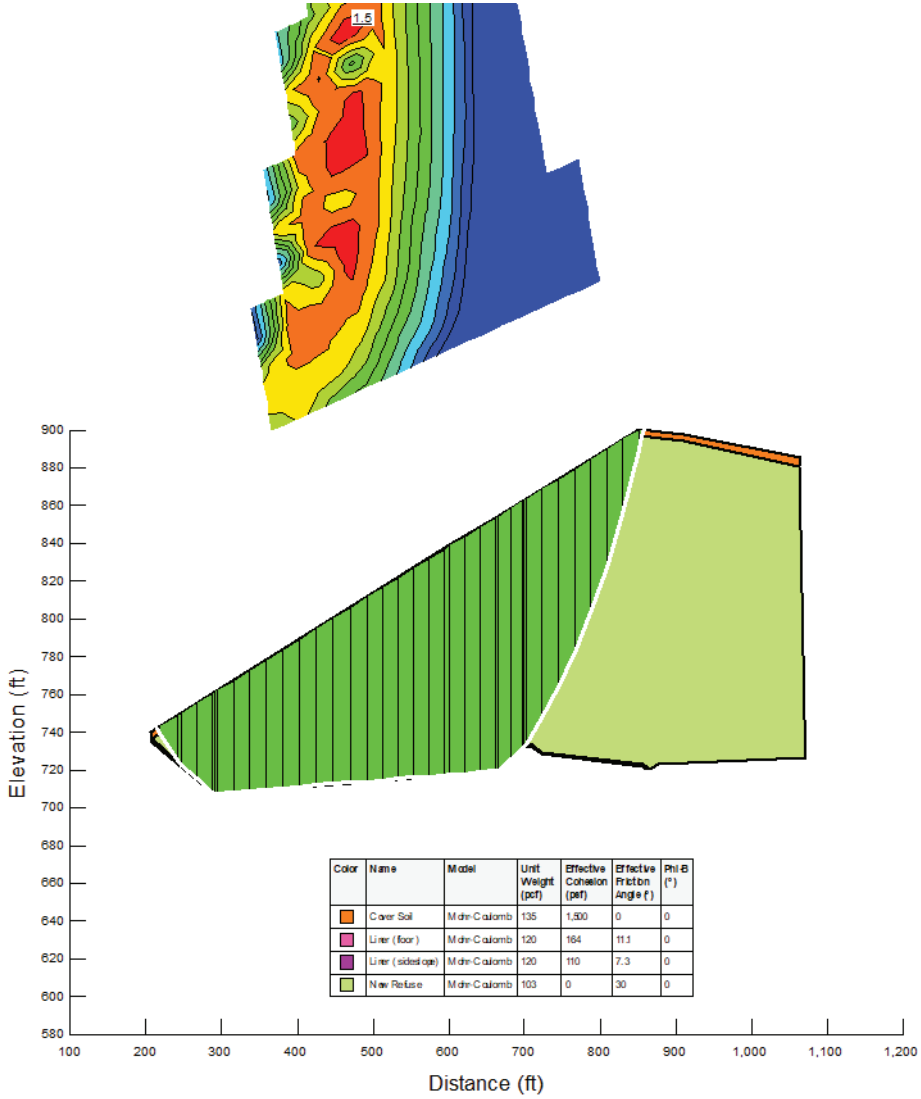
Plan View:



Factor of Safety:	1.5	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)
	Cover Soil	Mohr-Coulomb	135	1,500	0	0
	Liner (floor)	Mohr-Coulomb	120	164	11.1	0
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0
	New Refuse	Mohr-Coulomb	103	0	30	0



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)
	Cover Soil	Mohr-Coulomb	135	1,500	0	0
	Liner (floor)	Mohr-Coulomb	120	164	11.1	0
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0
	New Refuse	Mohr-Coulomb	103	0	30	0

Attachment A-1.1.6

G-G’ Liner Stability under Final Conditions with non-zero adhesion (previously tested values)

SLOPE STABILITY ANALYSIS REPORT FORM

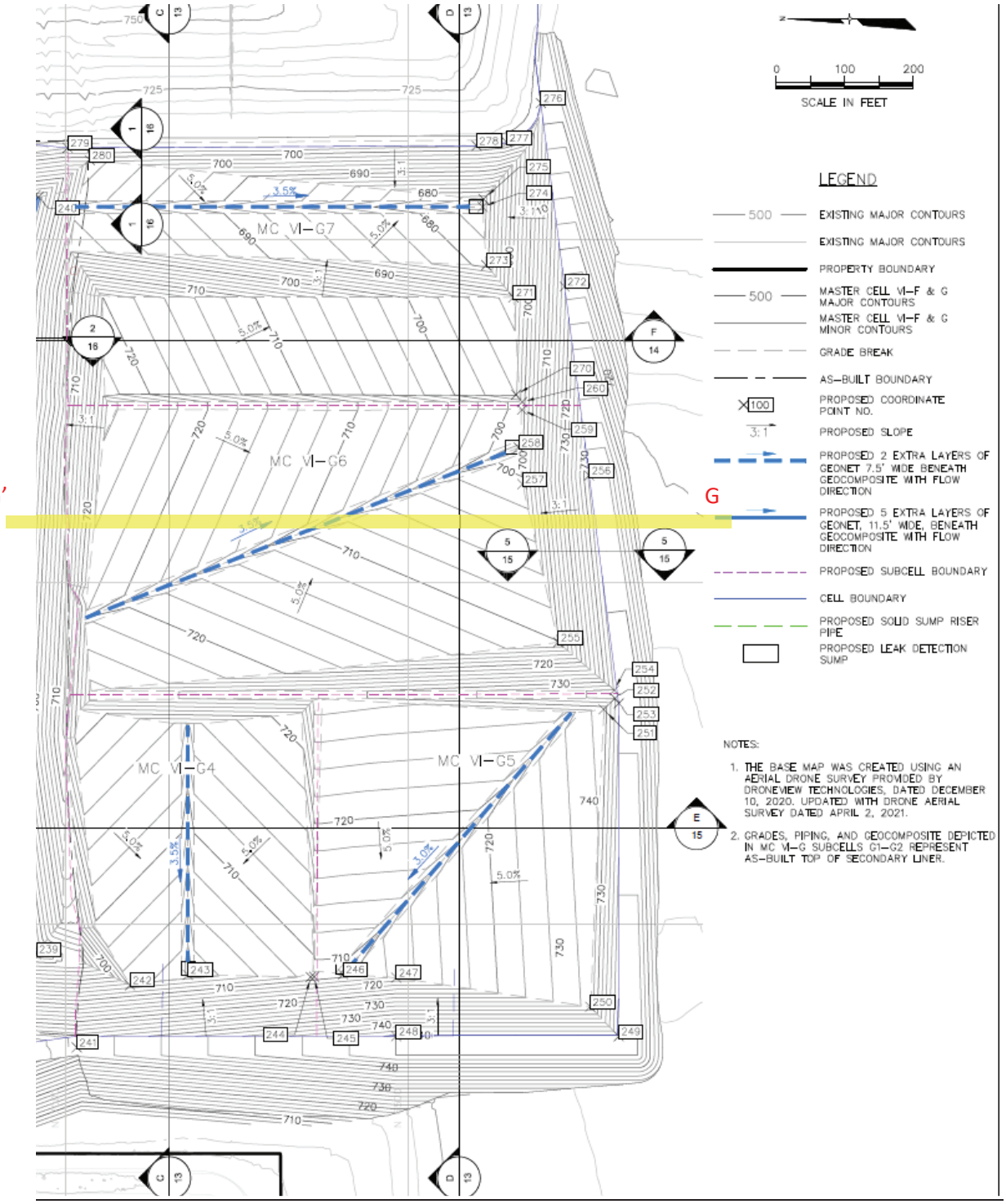
Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification						
Project Number:	1208070039.004			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	G-G' Liner Stability				**File name:**	MC-VI-G_CrossSection_G_Liner _tested_values.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section G-G'. This case considers a south-facing slope, with fill to the final permitted grade elevations.		
	☒ Static ☐ Seismic	☐ Pore Pressure	☒ Optimized Surface
Additional Details:	The liner system was modeled in 2 sections (floor and sideslope) to allow use of Peak and Large-Displacement strength parameters appropriately. The liner interface strength properties are based on interface strength test results of a similar liner system installed on site. The required factor of safety of 1.5.		

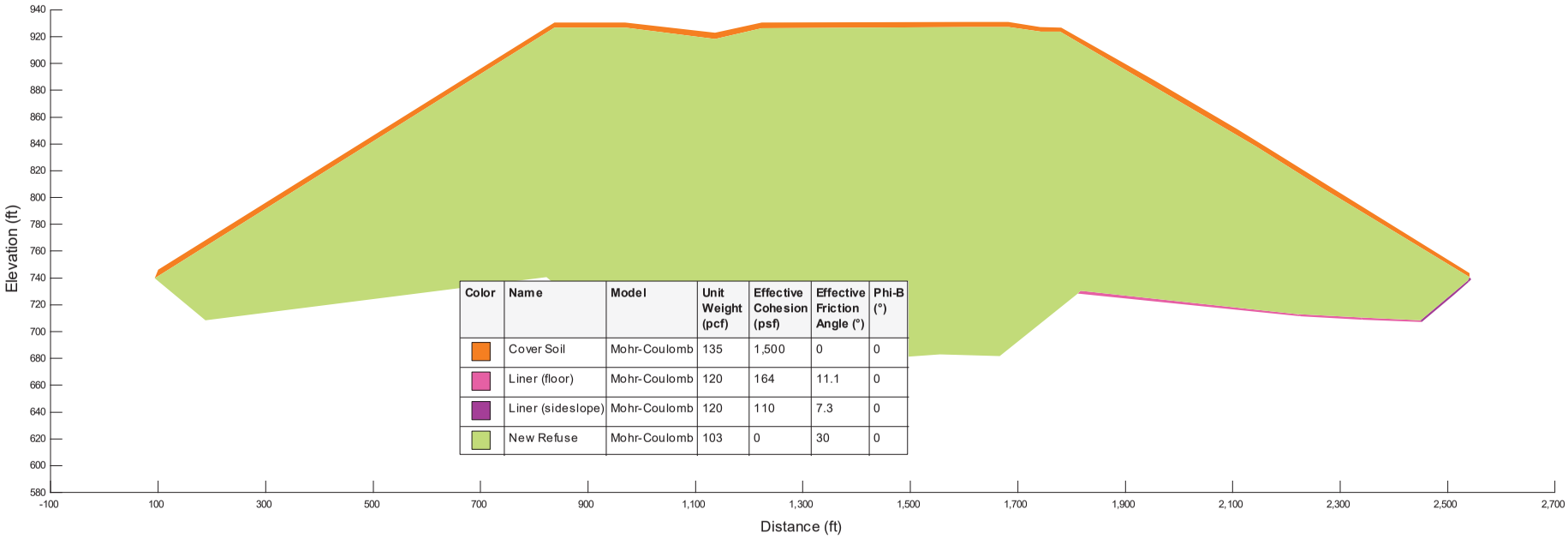
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	11.1	164
10	Liner (sideslope)	Magenta	120	7.3	110

Source of Geometry:	Engineering Drawing Set
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section G-G'

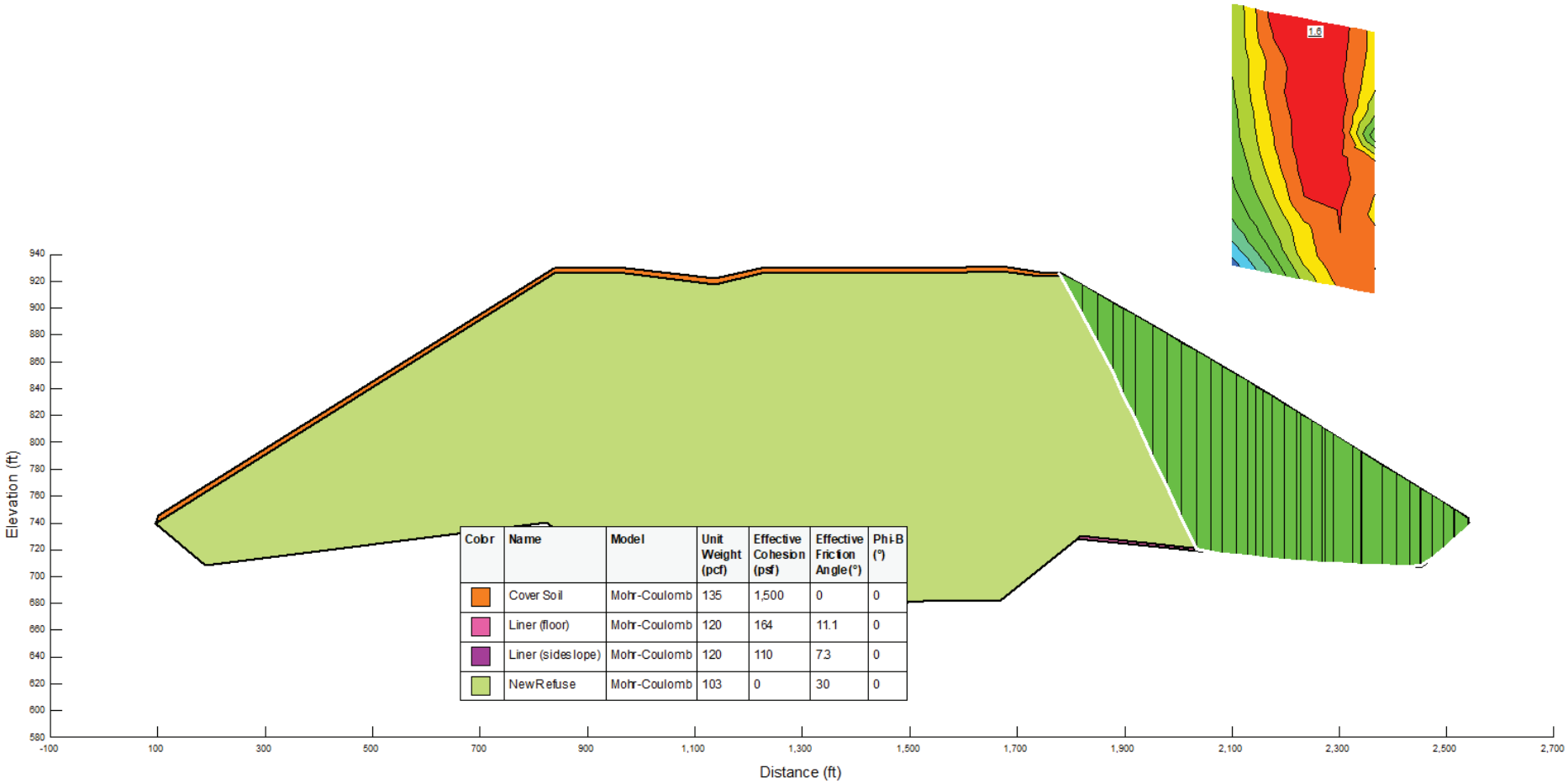
Plan View:



Factor of Safety:	1.6	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)
	Cover Soil	Mohr-Coulomb	135	1,500	0	0
	Liner (floor)	Mohr-Coulomb	120	164	11.1	0
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0
	New Refuse	Mohr-Coulomb	103	0	30	0



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)
	Cover Soil	Mohr-Coulomb	135	1,500	0	0
	Liner (floor)	Mohr-Coulomb	120	164	11.1	0
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0
	NewRefuse	Mohr-Coulomb	103	0	30	0

Attachment A-1.1.7

C-C’ Liner Stability under Interim Conditions (example interim stability calculation)

SLOPE STABILITY ANALYSIS REPORT FORM

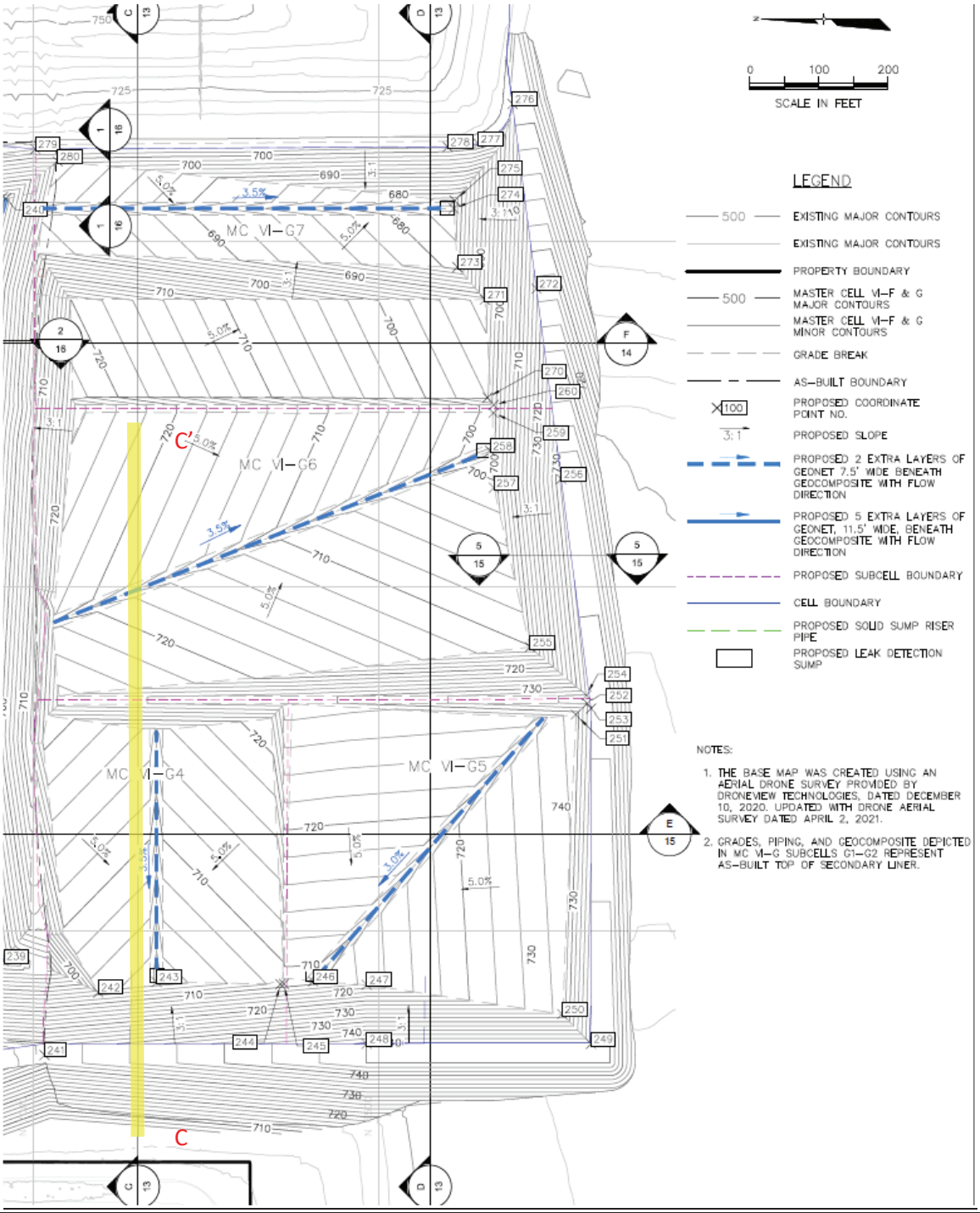
Project Name:	WDI MC-VI-G4 through G7 Liner Grade Modification						
Project Number:	1208070039.004			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	C-C' Liner Stability				**File name:**	MC-VI-G_CrossSection_C_InterimSlope.gsz	
Revision:	2	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the required interface friction angle of the liner system to achieve an acceptable interim factor of safety of 1.3 using cross-section C-C'. This case considers a west-facing slope, with fill to a design interim grade elevation of 840 ft at an interim slope of 3H:1V. The failure surface is defined such that failure occurs in the underlying liner in order to evaluate the stability of the liner system.		
	☒ Static ☐ Seismic	☐ Pore Pressure	☒ Optimized Surface
Additional Details:			

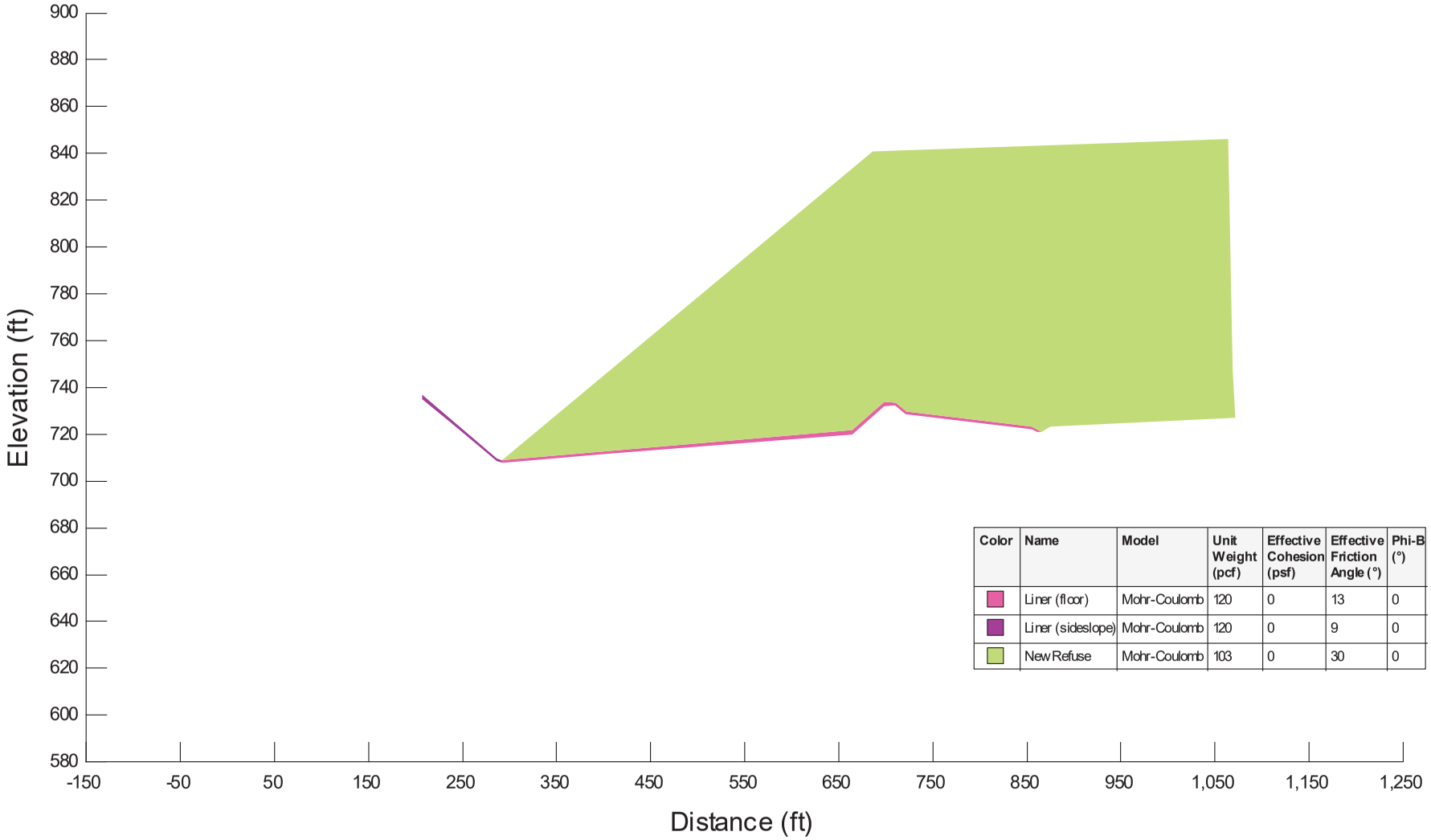
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	?	
10	Liner (sideslope)	Magenta	120		

Source of Geometry:	Engineering Drawing Set
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☒ Interim ☐ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Interim Waste Filling
Other Geometry Notes:	Cross Section C-C'

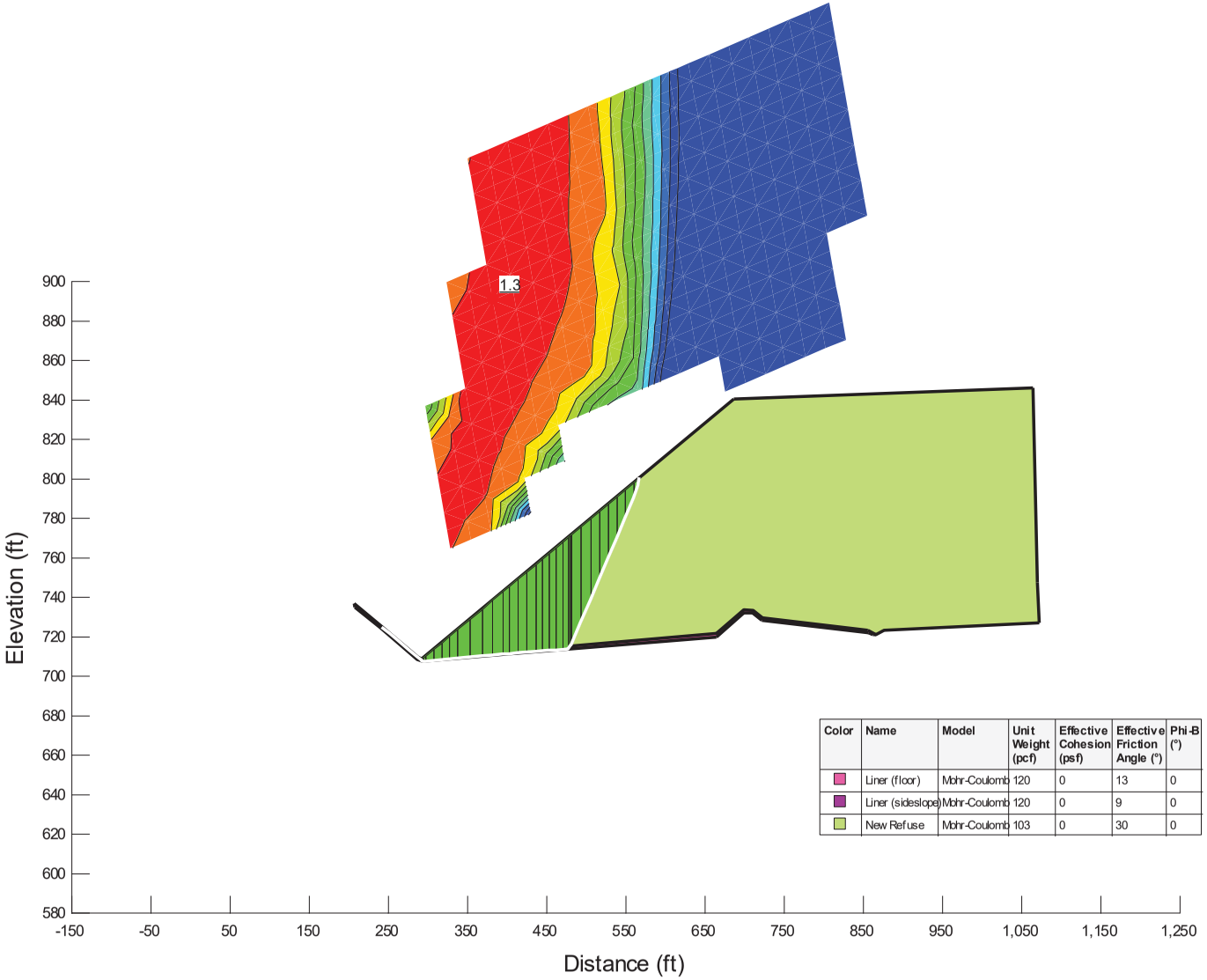
Plan View:



Factor of Safety:	1.3	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:	The required interface friction angle is 13 degrees (peak). Any combination of adhesion and friction angle that yields a comparable shear strength under modeled site conditions is acceptable.	
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)
	Liner (floor)	Mohr-Coulomb	120	0	13	0
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0
	New Refuse	Mohr-Coulomb	103	0	30	0



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)
	Liner (floor)	Mohr-Coulomb	120	0	13	0
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0
	New Refuse	Mohr-Coulomb	103	0	30	0

3. Attachment A-1.2 MC6 E and F Slope Stability Analysis

Original Submittal			
	Page	Revised Submittal	
		A-1.2	MC VI-E and -F Slope Stability Analysis
A-1.1	53	A-1.2.1	Traces of Cross Sections
A-1.2	57	A-1.2.2	G-G' Foundation Stability
A-1.3	62	A-1.2.3	H-H' Foundation Stability
A-1.4	67	A-1.2.4	I-I' Foundation Stability
A-1.5	72	A-1.2.5	J-J' Foundation Stability
A-1.6	77	A-1.2.6	G-G' Liner Stability under Final Conditions with Zero Adhesion
A-1.7	82	A-1.2.7	H-H' Liner Stability under Final Conditions with Zero Adhesion
A-1.8	87	A-1.2.8	I-I' Liner Stability under Final Conditions with Zero Adhesion
A-1.9	92	A-1.2.9	J-J' Liner Stability under Final Conditions with Zero Adhesion
A-1.10	97	A-1.2.10	I-I' Liner Stability under Final Conditions with non-Zero Adhesion (previously tested values)
A-1.11	102	A-1.2.11	J-J' Liner Stability under Final Conditions with non-Zero Adhesion (previously tested values)
A-1.12	107	A-1.2.12	I-I' Liner Stability under Interim Conditions (example interim stability calculation)

Attachment A-1.2

MC VI-E and -F Slope Stability Analysis

Project Name:	WDI Final Cover Grading Modification	Client:	Wayne Disposal, Inc.
Project Number:	1208070017.003	Project Manager:	Chris Backus
Project Location:	Belleville, Michigan	QA Manager:	

Calculation Sheet Information

Calculation Medium: ☒ Electronic
☐ Hard copy Number of pages (including cover sheet):

Title of Calculation:	Slope Stability Analyses
Calculation Originator:	Mohammad Kabalan
Calculation Contributors:	Rajan Ramya, Kazuhisa Matsuda
Calculation Checker:	Kevin Foye

Calculation Objective

This calculation evaluates the stability of the Wayne Disposal, Inc. (WDI) landfill under the proposed modification to the final cover grading. The analyses include consideration of global slope stability for failures through the waste mass, along the liner system, and/or through the foundation soils at interim and final conditions. The analyses also determined the minimum required interface friction angle to attain a satisfactory factor of safety against failure at the liner system interface. Cross sections that are the most critical for analysis and design include cross sections with the steepest slopes and highest embankment (waste or soil) heights. The following critical cross sections were examined and traces of each cross section is provided in Attachment 1:

1. Cross Section G-G' oriented North-South passing through Cell MC-VI-F.
2. Cross Section H-H' oriented North-South at Easting 5300 and going through Cell MC VI-E and existing MC IV.
3. Cross Section I-I' oriented East-West and going through Cell MC VI-G, Sub Cell G1.
4. Cross Section J-J' oriented East-West and going through Cell MC VI-G, Sub Cell G2.

Assumptions and Open Items

1. Representative total and effective stress shear strength parameters were used for all layers in the profile. Material properties were retrieved from existing site data (NTH 2012) and are presented in Table 1. For slow-draining clay soils, undrained shear strength (total stress analysis) was used because pore pressures accumulating during shear will not be able to dissipate in these soils. In contrast, drained strength parameters (effective stress analysis) were used for waste and granular soil layers because these materials will dissipate excess pore pressures during shear. Therefore, both undrained and drained shear strength parameters are used in the same slope stability analysis, depending on the layer being modeled. Strength properties for the lower clay were modeled as a relationship of undrained shear strength to vertical effective stress. An undrained shear strength to vertical effective stress ratio of 0.22 was used to calculate undrained shear strength for the lower clay in accordance with existing analyses (NTH 2012) to account for increases in clay shear strength resulting from increased overburden pressure.

Table 1: Material Properties

Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover (total stress analysis)	Orange	135	0	1500
2	Existing Waste (effective stress analysis)	Teal	91	34	0
3	New Waste (effective stress analysis)	Light Green	103[A]	30	0
4	Upper Clay (total stress analysis)	Brown	130	0	1325
5	Middle Clay (total stress analysis)	Yellow	136	0	3000
6	Lower Clay (total stress analysis)	Maroon	128	$0.22\sigma'_v$	
7	Silt (effective stress analysis)	Blue	125	28	0
8	Sand (effective stress analysis)	Red	115	32	0
9	Liner (floor) (effective stress analysis)	Magenta	120	13.2	0
10	Liner (sideslope) (effective stress analysis)	Magenta	120	9	0
11	Existing MC V Waste (effective stress analysis)	Teal	120	28[B]	0

Notes:
[A] conservative (high) value of unit weight of waste was estimated from site survey data (see table below). Note that higher values of waste unit weight result in a lower FS because newly-placed waste imposes a greater driving load.
[B] MC V waste properties as reported in NTH (2008).
All other properties obtained from NTH (2012).

2. For liner system stability cases, the domain of the slip surfaces are defined so that a portion of the failure surface conforms to the liner system.
3. Applicable data used in the analysis that was provided by third parties is assumed to be accurate.

Site Waste Survey Data

Survey Years	2014 to 2021
Tons received into the landfill	3,905,856
Cubic yards airspace consumed	2,869,499
Average Unit Weight (tons/cy)	1.36
Average Unit Weight (pcf)	100.83

Design Criteria/Design Basis
1. The minimum allowable factor-of-safety (FS) against slope stability failures is 1.5 for final conditions and 1.3 for interim conditions. 2. The analyses were conducted using the computer program SLOPE/W within the software package GeoStudio 2021 by GEOSLOPE International Ltd. This program performs an automatic search to identify a critical failure surface that has the lowest FS value. 3. The analyses were conducted using the Morgenstern-Price method, which considers both moment and force equilibrium. 4. The geometry of the cross sections was derived from the engineering drawing set submitted as part of the permit mod package. 5. The required/assumed interface friction angles shall be met by considering peak strength values for the cell floor and large-displacement strength values for the cell sideslopes. 6. The required minimum interface friction angle for the liner system components is determined under the final conditions (after final cover is installed). 7. Due to the complex nature of the waste fill phasing during operation, the liner stability shall be evaluated based on the actual measurements of the interface friction angle for the liner system components and the design waste filling geometry for each phase. An example one such calculation was prepared to illustrate how to evaluate required minimum interface friction angle for the liner system components. This example analysis was performed on cross section J-J' assuming an interim waste slope of 3H:1V. 8. The example interim slope stability calculation performed for cross section J-J' is considered a worst-case for translational slides on the cell floor because the analysis does not take credit for the stabilizing effect of any cell side slope or toe buttress resisting movement along the liner system. Therefore, for the conditions presented, interim slopes that are constructed no steeper than 3H:1V and with a bottom width no less than 450 feet (measured from the toe of intercell berm to the interim face of the waste slope) shall be considered acceptable for waste filling operations. If tested values of the cell floor liner system interface strength vary from those presented, or the filling geometry deviates from this case, the interim slope shall be reevaluated according to this example to determine if the alternative waste filling geometry meets the stability criterion. Interim filling geometries that do meet the interim stability criterion shall be adjusted and reevaluated until acceptable FS values are obtained.

Results/Conclusions

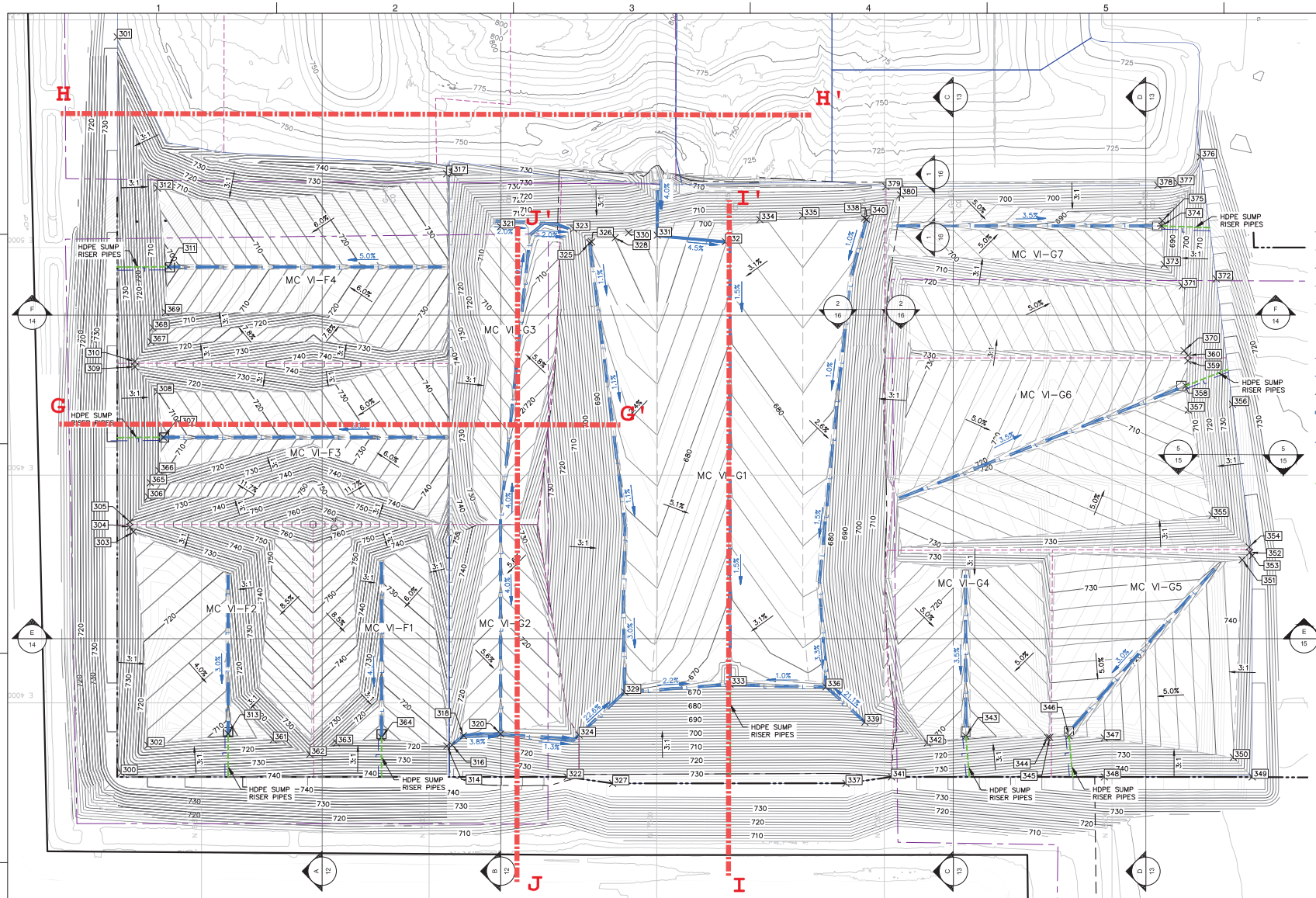
1. Global slope stability analyses of the waste and foundation for each cross section determined that filling to proposed final grades yields acceptable factors of safety.
    a. Cross Section G-G': Factor of Safety = 1.7
    b. Cross Section H-H': Factor of Safety = 1.6
    c. Cross Section I-I': Factor of Safety = 1.5
    d. Cross Section J-J': Factor of Safety = 1.5
2. Under the final conditions (after installation of final cover), the stability of the landfill along the liner system was analyzed. The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. These parameters are shown in Table 1 and are considered values that could be typically achieved with commercial geosynthetic products. Any combination of adhesion and friction angle resulting in comparable shear strength under representative normal stresses to final site conditions are also acceptable. Conformance testing of the selected geosynthetics shall be performed to confirm that the interface shear strength of the actual liner system components is sufficient to ensure the stability of the liner system.
    a. Cross Section G-G': Factor of Safety = 1.7
    b. Cross Section H-H': Factor of Safety = 1.8
    c. Cross Section I-I': Factor of Safety = 1.8
    d. Cross Section J-J': Factor of Safety = 1.7
3. For Cells that have already been constructed, A stability analysis using lab interface shear strength tests results from previous products used on site was performed. The analyses show that a combination of **$C_{\alpha,peak}$=164 psf / ϕ_{peak}=11.1° and $C_{\alpha,large\ displacement}$=110 psf / $\phi_{large\ displacement}$=7.3°** achieves an acceptable factor of safety.
    a. Cross Section I-I': Factor of Safety = 1.7
    b. Cross Section J-J'': Factor of Safety = 1.5
4. An example calculation of liner stability for an interim waste filling conditions is presented in Attachment A-1.2.12. The required interface friction angle for the floor liner system was determined to be 14 degrees (peak). Actual interim phasing plan slopes and tested liner system interface properties shall be evaluated for each phase of fill per this example.
5. Interim slopes that are constructed no steeper than 3H:1V and with a bottom width no less than 450 feet shall be considered acceptable for waste filling operations. If tested values of the cell floor liner system interface strength vary from those presented, or the filling geometry deviates from this case, the interim slope shall be reevaluated according to this example.

Source Documents and References
NTH (2008). Basis of Design Report. *Master Cell VI E Design Modification*
NTH (2012). *WDI Operating License Application Master Cells VI F & G Volume III – Basis of Design Report*
Qian, X., Gray, D.H., and Koerner, R.M. (2002) *Geotechnical Aspects of Landfill Design and Construction.*

Attachments	
A-1.2.1.	Traces of Cross Sections
A-1.2.2.	G-G' Foundation Stability
A-1.2.3.	H-H' Foundation Stability
A-1.2.4.	I-I' Foundation Stability
A-1.2.5.	J-J' Foundation Stability
A-1.2.6.	G-G' Liner Stability under Final Conditions with zero adhesion
A-1.2.7.	H-H' Liner Stability under Final Conditions with zero adhesion
A-1.2.8.	I-I' Liner Stability under Final Conditions with zero adhesion
A-1.2.9.	J-J' Liner Stability under Final Conditions with zero adhesion
A-1.2.10.	I-I' Liner Stability under Final Conditions with non-zero adhesion (previously tested values)
A-1.2.11.	J-J' Liner Stability under Final Conditions with non-zero adhesion (previously tested values)
A-1.2.12.	I-I' Liner Stability under Interim Conditions (example interim stability calculation)

Attachment A-1.2.1

Traces of Cross Sections



NOTES:

1. THE BASE MAP WAS CREATED USING AN AERIAL DRONE SURVEY PROVIDED BY DRONEVIEW TECHNOLOGIES, DATED DECEMBER 10, 2020. UPDATED WITH DRONE AERIAL SURVEY DATED APRIL 2, 2021.
2. GRADES, PIPING, AND GEOCOMPOSITE DEPICTED IN MC VI-G SUBCELLS G1-G2 REPRESENT AS-BUILT TOP OF SECONDARY LINER.

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
300	8676.40	3846.28	734.54
301	8685.01	5462.64	728.25
302	8617.38	3906.71	712.94
303	8649.60	4375.66	727.86
304	8657.24	4386.11	730.42
305	8657.19	4397.62	730.43
306	8616.71	4452.40	717.06
307	8583.27	4583.16	706.16
308	8597.12	4683.16	709.89
309	8646.14	4738.22	725.58
310	8646.48	4749.72	725.56

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
311	8572.76	4957.47	697.64
312	8596.51	5130.39	703.29
313	8441.35	3932.29	707.95
314	7960.91	3905.27	719.50
315	7961.26	5161.96	736.10
316	7949.75	3907.70	718.61
317	7949.45	5164.97	738.31
318	7924.50	3928.02	711.75
319	7904.56	5051.05	703.11
320	7842.87	3931.97	708.82
321	7842.87	5045.77	700.84

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
322	7696.73	3837.32	733.74
323	7682.58	5040.91	697.50
324	7670.57	3929.29	702.88
325	7647.35	5010.49	687.00
326	7642.85	5012.25	688.18
327	7596.74	3823.09	738.60
328	7591.06	5021.51	690.24
329	7570.10	4023.55	671.56
330	7561.67	5032.75	691.59
331	7498.71	5027.05	693.52
332	7349.00	5012.85	686.42

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
333	7338.74	4040.74	666.42
334	7273.49	5061.28	687.73
335	7179.18	5070.45	689.94
336	7128.04	4035.19	668.55
337	7084.38	3823.30	739.24
338	7043.49	5064.48	687.10
339	7042.63	3957.62	692.90
340	7038.96	5061.69	685.79
341	6984.38	3837.32	732.38
342	6905.54	3911.96	710.13
343	6821.02	3927.03	707.63

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
344	6641.59	3923.81	713.92
345	6636.63	3924.19	713.94
346	6594.37	3927.75	714.00
347	6516.74	3922.88	717.86
348	6516.74	3837.32	746.00
349	6191.88	3837.32	746.00
350	6233.58	3880.28	731.87
351	6214.04	4314.26	734.09
352	6197.41	4330.56	739.73
353	6191.88	4323.06	741.29
354	6198.61	4342.06	739.71

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
355	6280.17	4412.07	715.30
356	6235.08	4655.62	738.04
357	6332.61	4642.95	705.70
358	6337.83	4696.24	703.34
359	6333.17	4751.42	704.26
360	6332.82	4762.92	704.25
361	8342.16	3918.88	713.80
362	8261.82	3887.00	725.54
363	8203.29	3912.03	718.03
364	8104.44	3924.55	713.57
365	8612.28	4483.38	715.64

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
366	8592.85	4509.67	709.22
367	8610.47	4793.01	713.10
368	8606.52	4823.99	711.44
369	8578.86	4857.57	701.75
370	6341.76	4773.54	701.15
371	6345.63	4915.50	698.23
372	6270.86	4931.07	722.96
373	6385.28	4962.52	684.48
374	6390.87	5047.34	681.65
375	6389.40	5058.83	682.01
376	6305.65	5198.88	708.30

PRIMARY COORDINATE POINTS			
Point #	Northing	Easting	Elevation
377	6355.11	5141.16	707.90
378	6399.40	5136.66	707.80
379	6996.47	5133.58	710.19
380	6964.50	5115.83	704.17

REV	DATE	REVISION DESCRIPTION	DRN	APP
I	10/08/21	SUBCELLS G4-G7 REVISIONS; FINAL GRADE MODIFICATIONS; MISCELLANEOUS CHANGES	WRG	XZ
H	8/25/21	RESPONSE TO EGLE COMMENTS	LEH	XZ
G	7/14/21	REVISED LINER GRADES IN F1-F4 AND OTHER MINOR COMMENTS	LEH	XZ
F	06/28/21	F1-F4 REVISIONS AND RESPONSE TO EGLE COMMENTS	WRG	XZ
E	5/27/18	ADDENDUM	PAA	XZ
D	5/25/18	MC VI-G2 AND G3 REVISIONS	PAA	XZ
B	9/23/11	PER MDEQ COMMENTS		DRL
A	6/10/11	PHASING DESIGNATIONS		DRL

DATE: 10/08/21
DESIGNED BY: LEH
DRAWN BY: WRG
CHECKED BY: CAB
APPROVED BY: XZ

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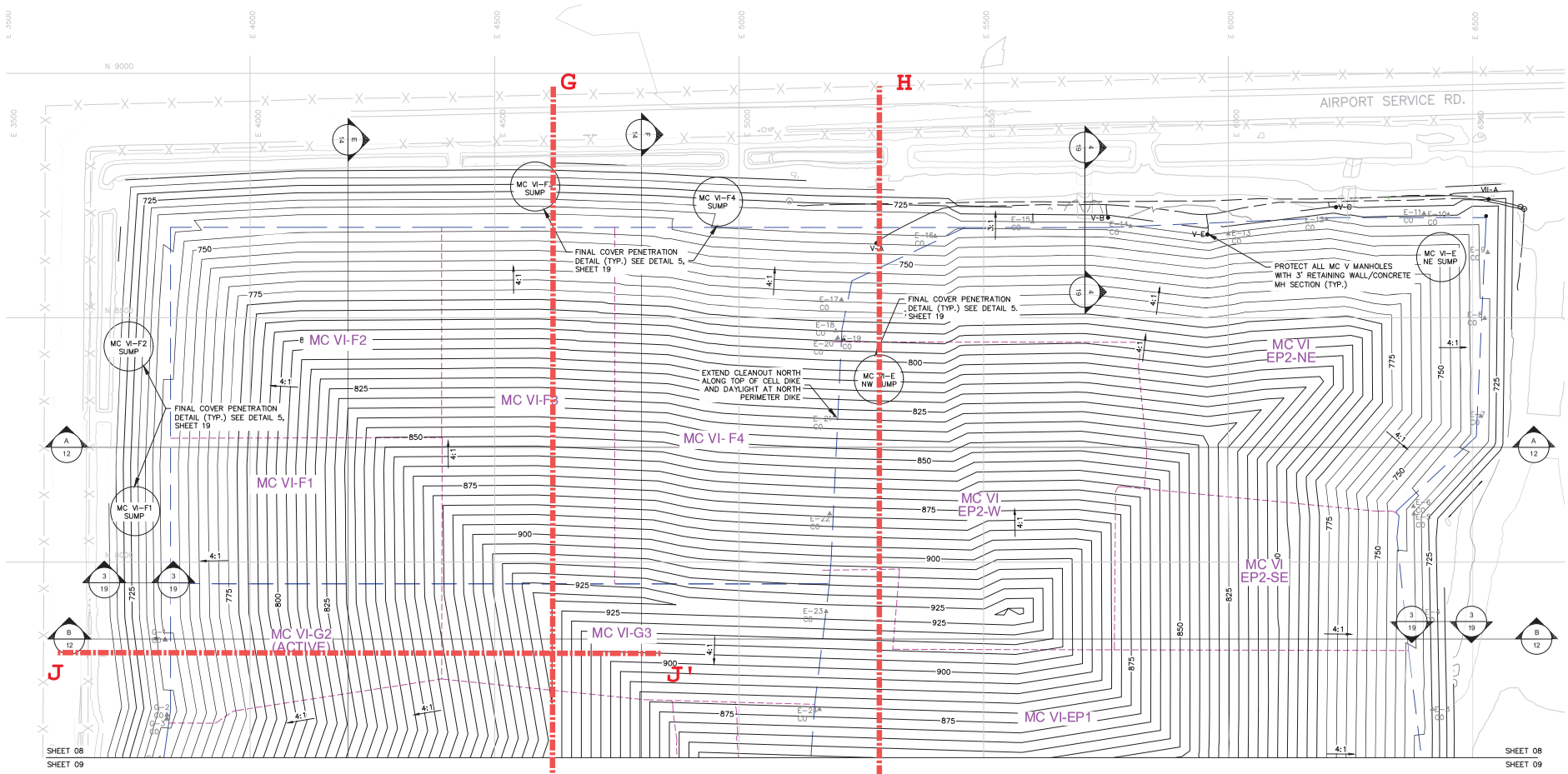
WAYNE DISPOSAL, INC. SITE NO. 2, MASTER CELL VI, REV I
VAN BUREN TOWNSHIP, WAYNE COUNTY, MICHIGAN

TOP OF PRIMARY LINER GRADING PLAN

PROJECT NUMBER: 1218070017
SCALE: 1" = 100'
DRAWING NO: 06



LEGEND

- 500 — EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- 500 — PERMITTED TOP OF FINAL COVER MAJOR CONTOURS
- PERMITTED TOP OF FINAL COVER MINOR CONTOURS
- EXISTING GRADE BREAKLINES
- EXISTING LEACHATE FORCEMAIN
- SUBCELL BOUNDARY
- CELL BOUNDARY
- G-6 CO — LEACHATE COLLECTION SYSTEM CLEANOUTS
- V-A — EXISTING MANHOLES
- PROPOSED SUMP LOCATION AND COVER PENETRATION

N

0 100 200
SCALE IN FEET

NOTES:

1. THE BASE MAP WAS CREATED USING AN AERIAL DRONE SURVEY PROVIDED BY DRONEVIEW TECHNOLOGIES, DATED DECEMBER 10, 2020. UPDATED WITH DRONE AERIAL SURVEY DATED APRIL 2, 2021.

REV	DATE	REVISION DESCRIPTION	DRN	APP
I	10/08/21	SUBCELLS G4-G7 REVISIONS; FINAL GRADE MODIFICATIONS; MISCELLANEOUS CHANGES	WRG	XZ
H	9/24/21	RESPONSE TO EGLE COMMENTS	LEH	XZ
G	7/14/21	INCORPORATE MC VI-F4 AND OTHER MINOR CORRECTIONS	CAB	XZ
F	05/17/21	H-F4 REVISIONS AND RESPONSE TO EGLE COMMENTS	WRG	XZ
C	5/02/18	SUBCELLS G2 AND G3 REVISIONS	PAA	XZ

DATE: 10/08/21
DESIGNED BY: LEH
DRAWN BY: WRG
CHECKED BY: CAB
APPROVED BY: XZ

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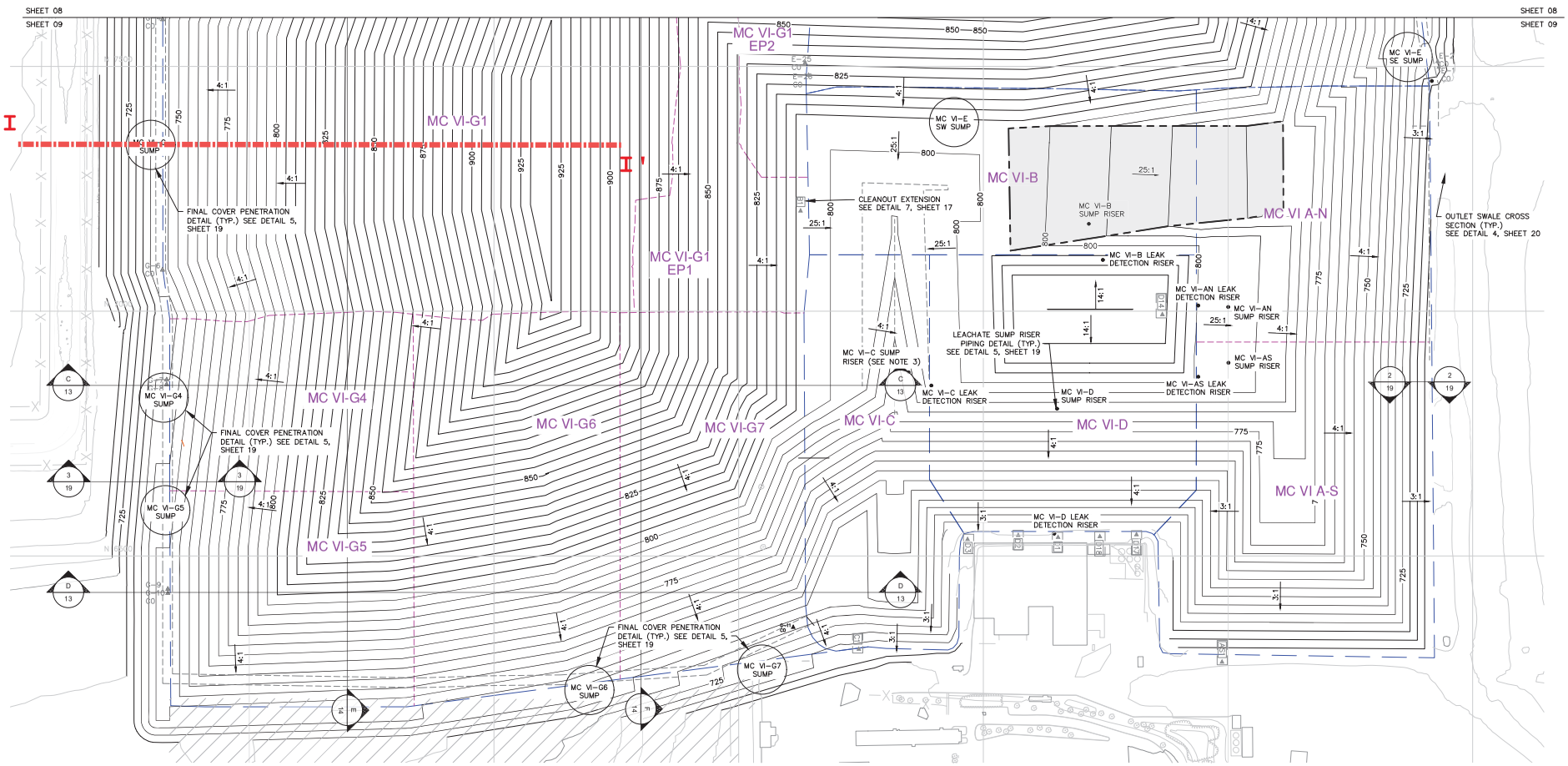
WAYNE DISPOSAL, INC. SITE NO. 2, MASTER CELL VI, REV I
VAN BUREN TOWNSHIP, WAYNE COUNTY, MICHIGAN

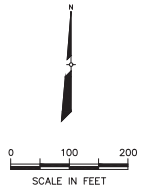
FINAL COVER GRADING PLAN (1 OF 2)

PROJECT NUMBER
1218070017

SCALE
1" = 100'

DRAWING NO
08





LEGEND

- 500 — EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- 500 — PERMITTED TOP OF FINAL COVER MAJOR CONTOURS
- PERMITTED TOP OF FINAL COVER MINOR CONTOURS
- EXISTING VEGETATION
- EXISTING GRADE BREAKLINES
- EXISTING LEACHATE FORCEMAIN
- SUBCELL BOUNDARY
- CELL BOUNDARY
- PROPOSED GEOCOMPOSITE (TRANSMISSIVITY 5.0 X 10^{-4} M^2/S)
- G-6 CO — LEACHATE COLLECTION SYSTEM CLEANOUTS
- EXISTING LEAK DETECTION OR SUMP RISERS
- PROPOSED SUMP LOCATION AND COVER PENETRATION

NOTES:

1. THE BASE MAP WAS CREATED USING AN AERIAL DRONE SURVEY PROVIDED BY DRONEVIEW TECHNOLOGIES, DATED DECEMBER 10, 2020. UPDATED WITH DRONE AERIAL SURVEY DATED APRIL 2, 2021.
2. CLEANOUTS IN MC VI-AN, AS, B, C, AND D ARE TO BE ABANDONED EXCEPT B1, C1, D1 THROUGH D3, D14, D17, D18, AND AS1.
3. BEFORE PLACING WASTE AROUND MC VI-C SUMP RISER, A MONITORING PROGRAM SHOULD BE IMPLEMENTED TO MONITOR ITS FUNCTIONALITY.
4. PRIOR TO PLACING WASTE AROUND CLEANOUTS E-22 THROUGH E-26, THE CLEANOUTS SHOULD BE EVALUATED TO DETERMINE IF THE LEACHATE COLLECTION LINE CAN BE CLEANED BY A SINGLE ACCESS POINT. IF NOT, THE CLEANOUT SHOULD BE EXTENDED.

REV	DATE	REVISION DESCRIPTION	DRN	APP
I	10/08/21	SUBCELLS G4-G7 REVISIONS; FINAL GRADE MODIFICATIONS; MISCELLANEOUS CHANGES	WRG	XZ
H	8/25/21	RESPONSE TO EGLE COMMENTS	LEH	XZ
G	7/14/21	REVISED LINER GRADES IN F1-F4 AND OTHER MINOR CORRECTIONS	LEH	XZ
F	04/04/21	F1-F4 LINER GRADES; MISCELLANEOUS TO EGLE COMMENTS	WRG	XZ
E	5/02/18	SUBCELLS G2 AND G3 REVISIONS	PAA	XZ
A	6/10/11	PHASING DESIGNATIONS	DRL	

DATE: 10/08/21
DESIGNED BY: LEH
DRAWN BY: WRG
CHECKED BY: CAB
APPROVED BY: XZ

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This drawing was prepared by CT1 & Associates, Inc. (CTI), on behalf of and for the use of Wayne Disposal, Inc. (WDI). CTI makes no representations or warranties of any kind, express or implied, with respect to the suitability of this drawing for any purpose other than that for which it was prepared by CTI. Any use of this drawing by WDI or its employees, agents, or representatives for purposes other than those for which it was prepared by CTI is at WDI's own risk and CTI shall not be liable for any damages, losses, or expenses arising out of WDI's use of this drawing.

WAYNE DISPOSAL, INC. SITE NO. 2, MASTER CELL VI, REV I
VAN BUREN TOWNSHIP, WAYNE COUNTY, MICHIGAN

FINAL COVER GRADING PLAN (2 OF 2)

PROJECT NUMBER: 1218070017
SCALE: 1" = 100'
DRAWING NO: 09

Attachment A-1.2.2

G-G’ Foundation Stability

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	G-G' Foundation Stability				**File name:**	MC-VI-F_CrossSection_G_Foundation.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section G-G'. This case considers a north-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. The groundwater level was set at elevation 655 based on historical borings as documented in the Basis of Design report (NTH 2012). Drained strength parameters were used for material with a relatively high permeability where excess pore-pressure conditions are not expected due to loading. Undrained strength parameters were used for low-permeability materials (clays) since excess pore pressure may accumulate after loading. This is considered a conservative approach for this scenario.		

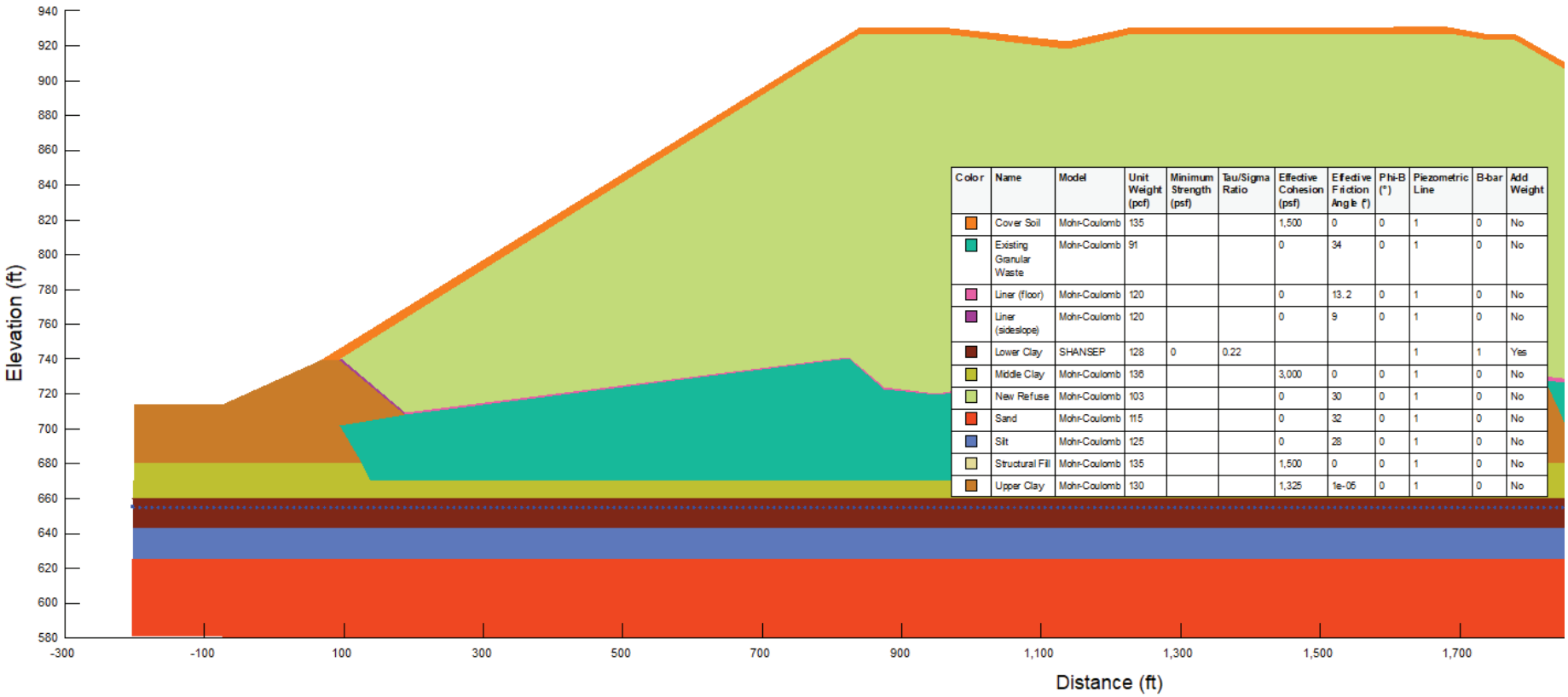
Material	**Name**	**Color in Profile**	**Unit Wt(s) (pcf)**	**Strength ϕ or δ (deg.)**	**Strength C or Ca (psf)**
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	

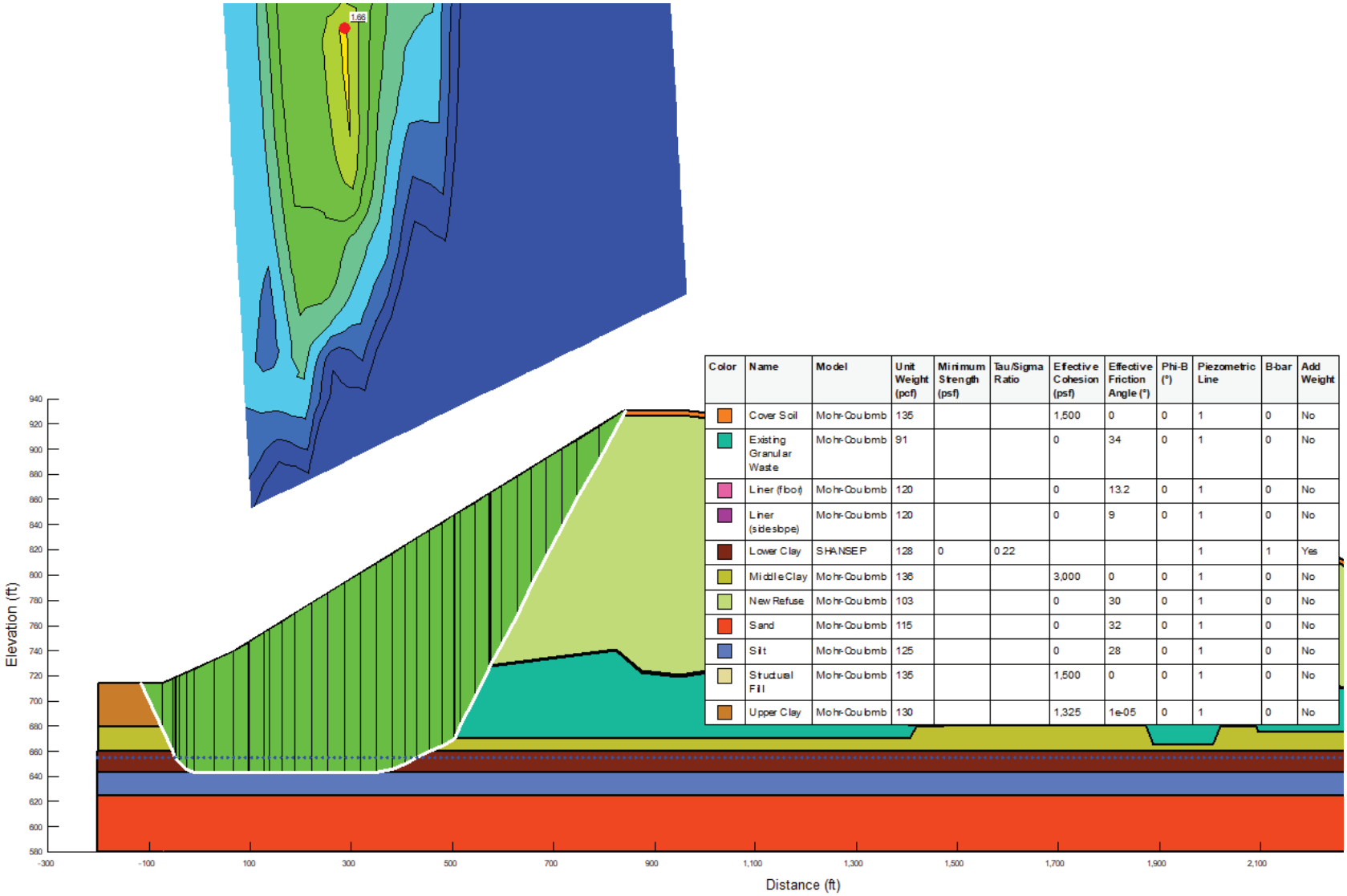
SLOPE STABILITY ANALYSIS REPORT FORM

Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section G-G’

Factor of Safety:	1.7	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Structural Fill	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-05	0	1	0	No



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Structural Fill	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-05	0	1	0	No

Attachment A-1.2.3

H-H’ Foundation Stability

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	H-H' Foundation Stability				**File name:**	MC-VI-E_CrossSection_H_Foundation.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section H-H'. This case considers a north-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. The groundwater level was set at elevation 655 based on historical borings as documented in the Basis of Design report (NTH 2012). Drained strength parameters were used for material with a relatively high permeability where excess pore-pressure conditions are not expected due to loading. Undrained strength parameters were used for low-permeability materials (clays) since excess pore pressures may accumulate after loading. This is considered a conservative approach for this scenario.		

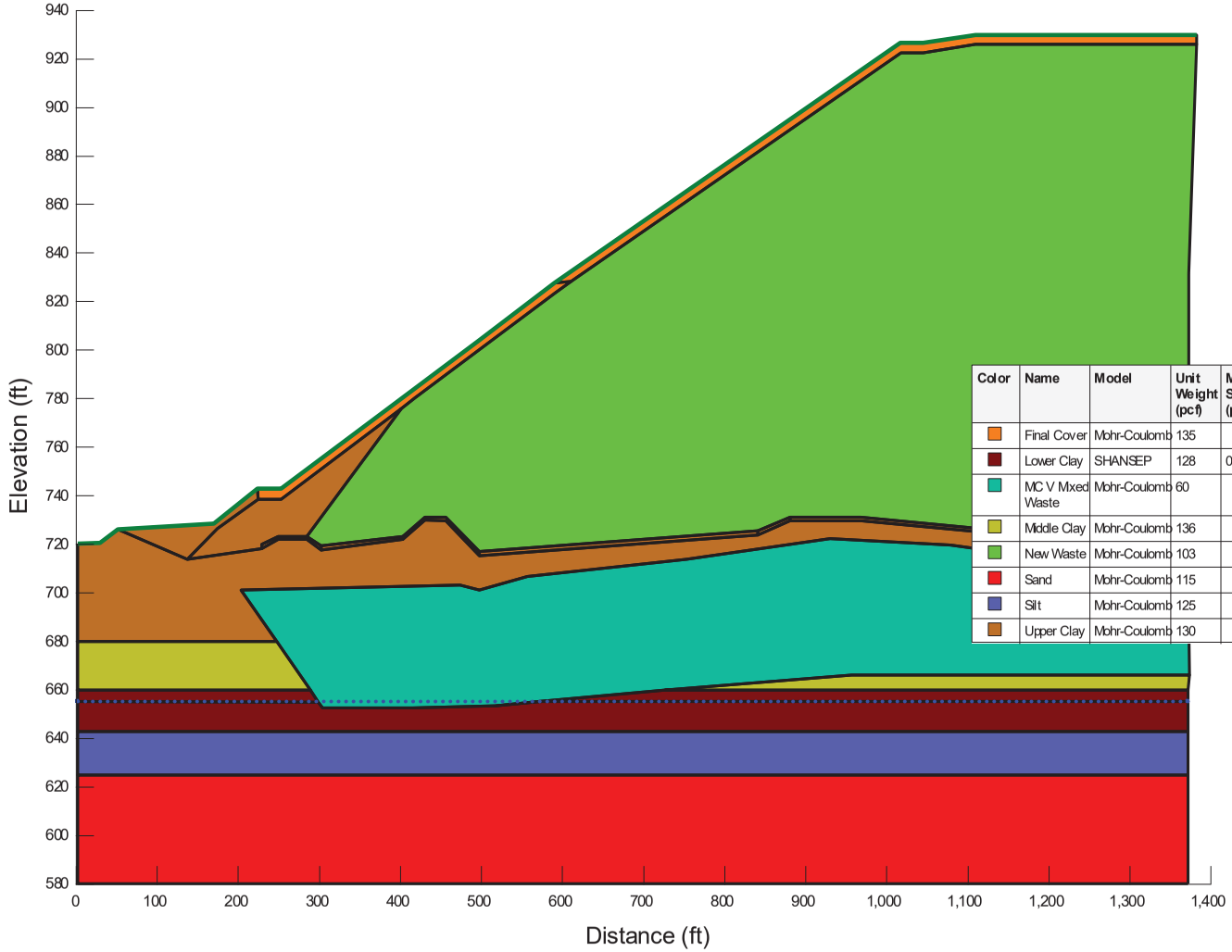
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

Source of Geometry:	The overfill liner elevations are from Master Cell VI-E Design Modification Plans, Wayne Disposal Inc., Site No. 2 by NTH Consultants (2011) and Master Cell VI Design Modification Plans. Wayne Disposal, Inc. Site No. 2 by NTH Consultants (2008).

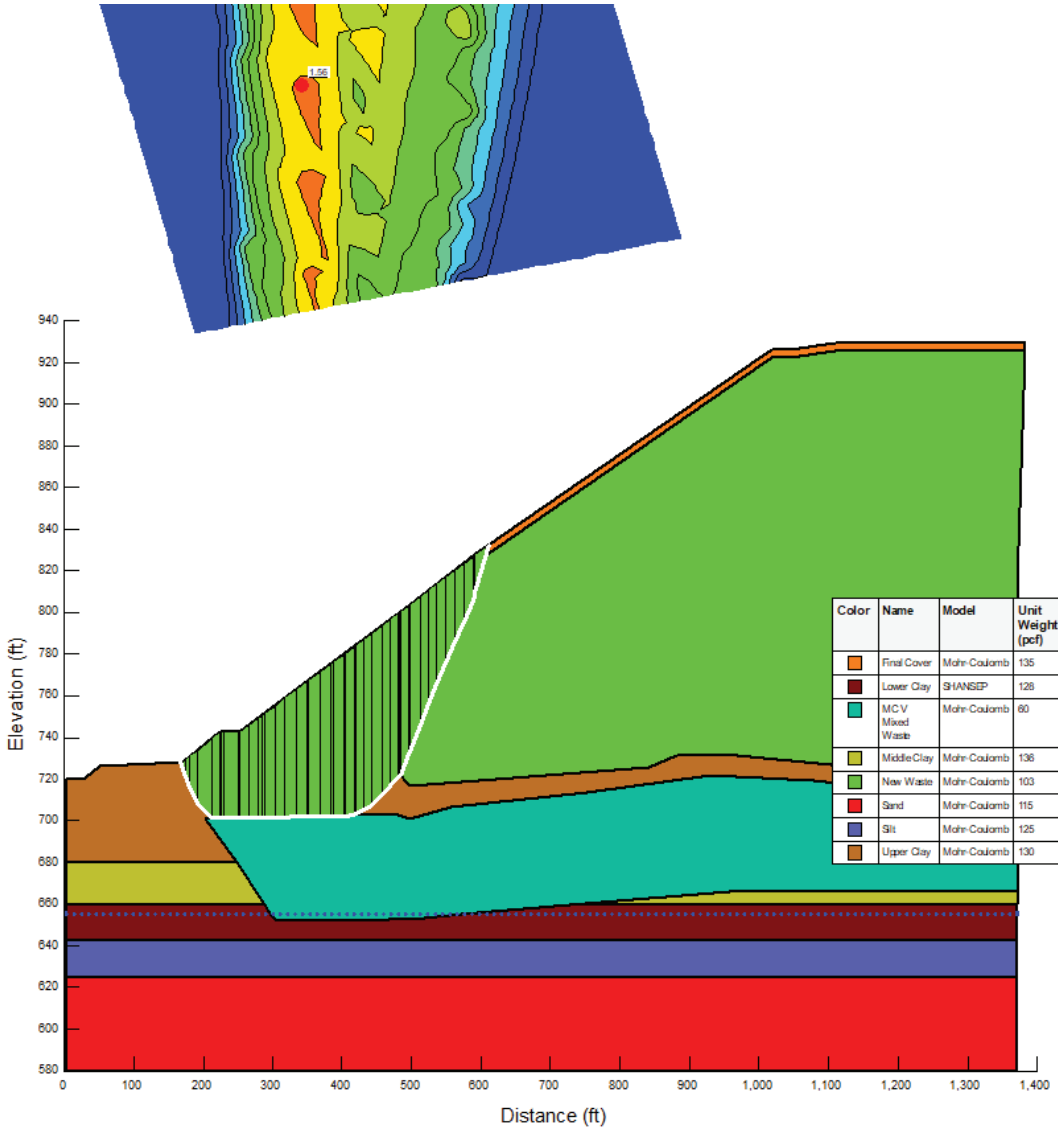
SLOPE STABILITY ANALYSIS REPORT FORM

	The elevations for bottom and top of existing waste are from Appendix A Settlement Analysis, WDI MC VI-E Major Design Modification by NTH Consultants (2008). The proposed final cover elevations are from WDI MCVI-E/F Final Cover Proposed Grading Plan by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section H-H’

Factor of Safety:	1.6	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Final Cover	Mohr-Coulomb	135			1,500	1e-05	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	MC V Mxed Waste	Mohr-Coulomb	60			0	28	0	1	0	No
	Middle Clay	Mohr-Coulomb	136			3,000	1e-05	0	1	0	No
	New Waste	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-06	0	1	0	No



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Final Cover	Mohr-Coulomb	135			1,500	1e-05	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	MCV Mixed Waste	Mohr-Coulomb	60			0	28	0	1	0	No
	Middle Clay	Mohr-Coulomb	136			3,000	1e-05	0	1	0	No
	New Waste	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-06	0	1	0	No

Attachment A-1.2.4

I-I’ Foundation Stability

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	I-I' Foundation Stability				**File name:**	MC-VI-G1_CrossSection_I_Foundation.gsz	
Revision:	1	**Originated:**	MK	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section I-I'. This case considers a west-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. The groundwater level was set at elevation 655 based on historical borings as documented in the Basis of Design report (NTH 2012). Drained strength parameters were used for material with a relatively high permeability where excess pore-pressure conditions are not expected due to loading. Undrained strength parameters were used for low-permeability materials (clays) since excess pore pressures may accumulate after loading. This is considered a conservative approach for this scenario.		

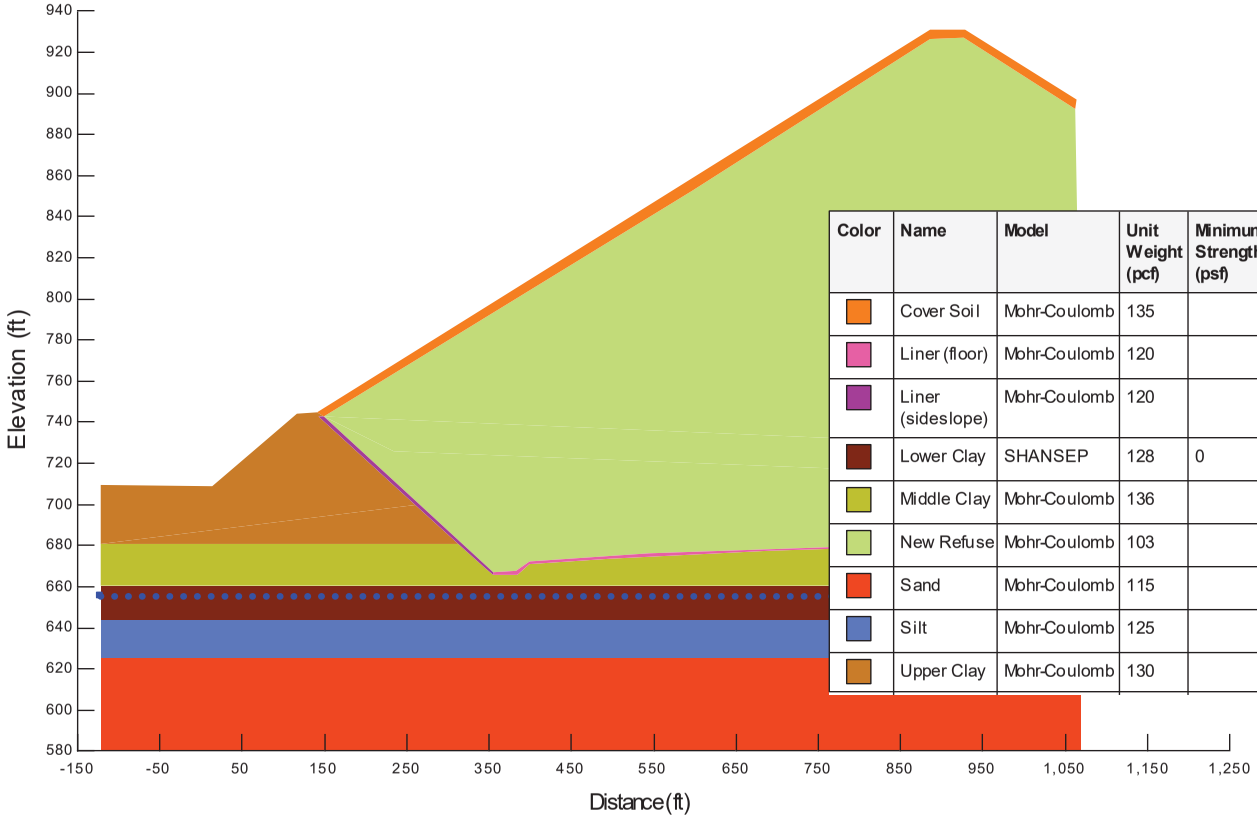
Material	**Name**	**Color in Profile**	**Unit Wt(s) (pcf)**	**Strength ϕ or δ (deg.)**	**Strength C or Ca (psf)**
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	

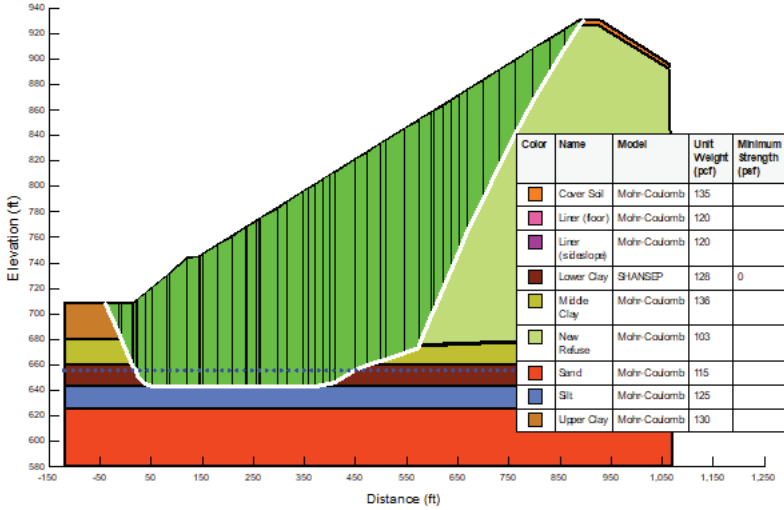
SLOPE STABILITY ANALYSIS REPORT FORM

Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section I-I’

Factor of Safety:	1.5	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-05	0	1	0	No



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	126	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	1e-05	0	1	0	No

Attachment A-1.2.5

J-J’ Foundation Stability

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	J-J' Foundation Stability				**File name:**	MC-VI-G2_CrossSection_J_Foundation.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section J-J'. This case considers a west-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. The groundwater level was set at elevation 655 based on historical borings as documented in the Basis of Design report (NTH 2012). Drained strength parameters were used for material with a relatively high permeability where excess pore-pressure conditions are not expected due to loading. Undrained strength parameters were used for low-permeability materials (clays) since excess pore pressures may accumulate after loading. This is considered a conservative approach for this scenario.		

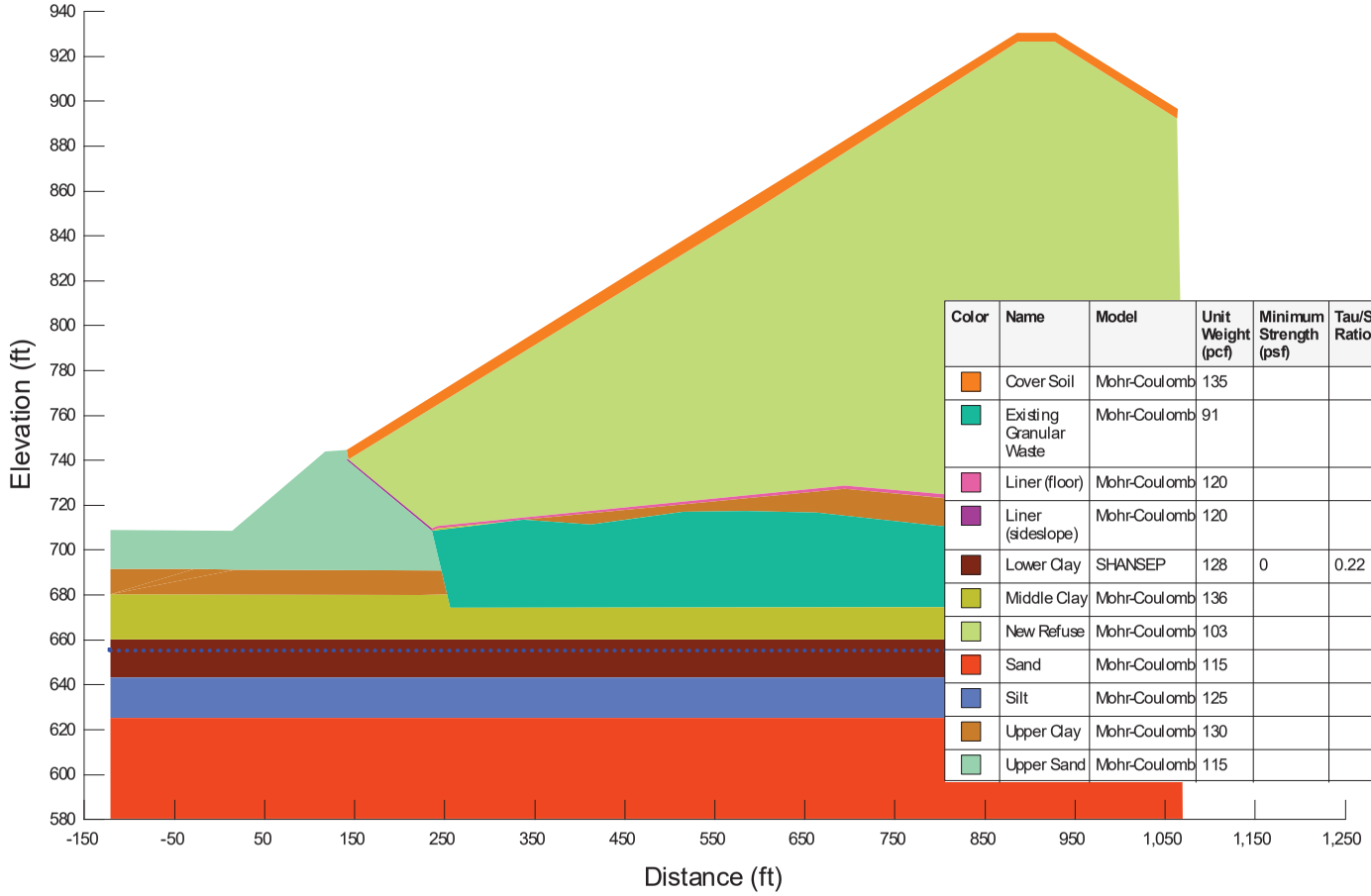
Material	**Name**	**Color in Profile**	**Unit Wt(s) (pcf)**	**Strength ϕ or δ (deg.)**	**Strength C or Ca (psf)**
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand/aqua	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	

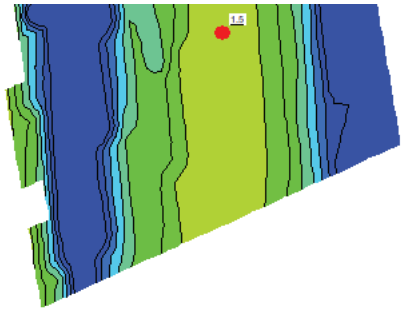
SLOPE STABILITY ANALYSIS REPORT FORM

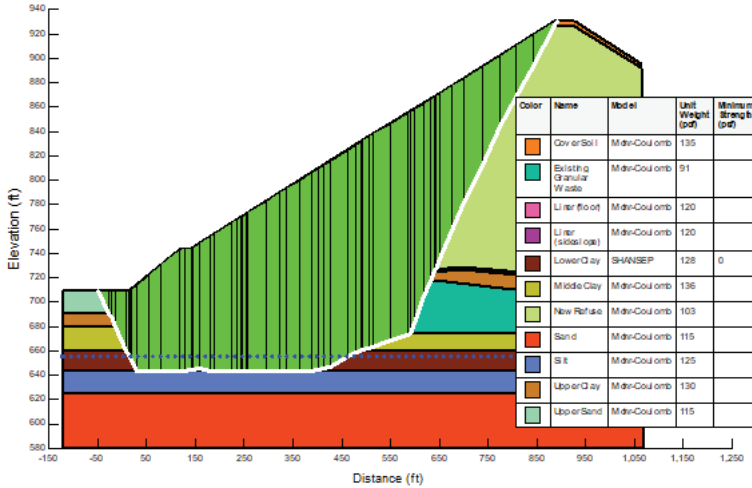
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section J-J’

Factor of Safety:	1.5	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	0.0001	0	1	0	No
	Upper Sand	Mohr-Coulomb	115			0	32	0	1	0	No





Color	Name	Model	Unit Weight (pcf)	Minimum Strength (psf)	Tau/Sigma Ratio	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135			1,500	0	0	1	0	No
	Existing Granular Waste	Mohr-Coulomb	91			0	34	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120			0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120			0	9	0	1	0	No
	Lower Clay	SHANSEP	128	0	0.22				1	1	Yes
	Middle Clay	Mohr-Coulomb	136			3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103			0	30	0	1	0	No
	Sand	Mohr-Coulomb	115			0	32	0	1	0	No
	Silt	Mohr-Coulomb	125			0	28	0	1	0	No
	Upper Clay	Mohr-Coulomb	130			1,325	0.0001	0	1	0	No
	Upper Sand	Mohr-Coulomb	115			0	32	0	1	0	No

Attachment A-1.2.6

G-G’ Liner Stability under Final Conditions with Zero Adhesion

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	G-G' Liner Stability				**File name:**	MC-VI-F_CrossSection_G_Liner.gsz	
Revision:	1	**Originated:**	MK	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section G-G'. This case considers a north-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. These values are achievable using available geosynthetic materials. The required factor of safety is 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

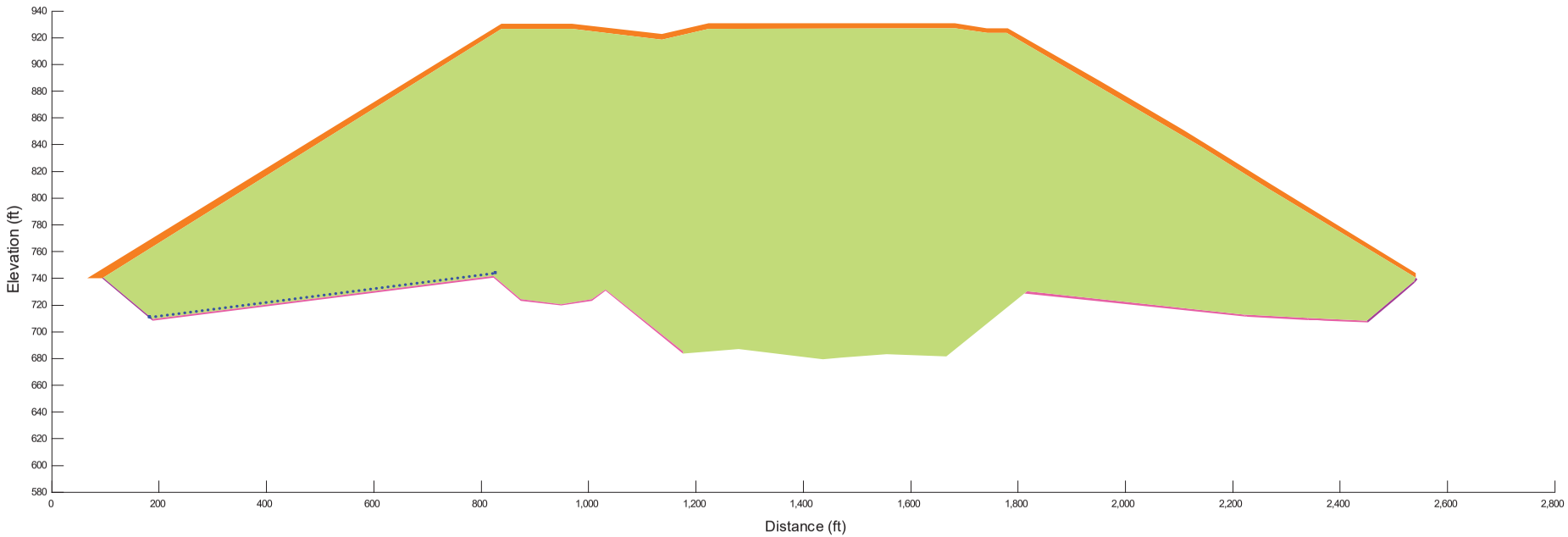
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

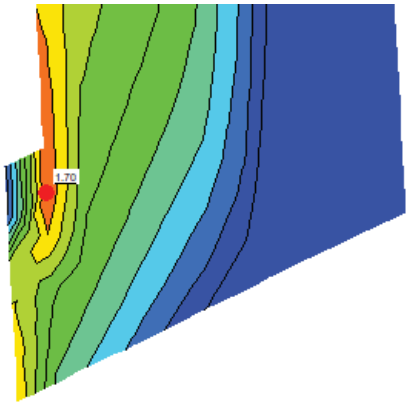
Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section G-G'

SLOPE STABILITY ANALYSIS REPORT FORM

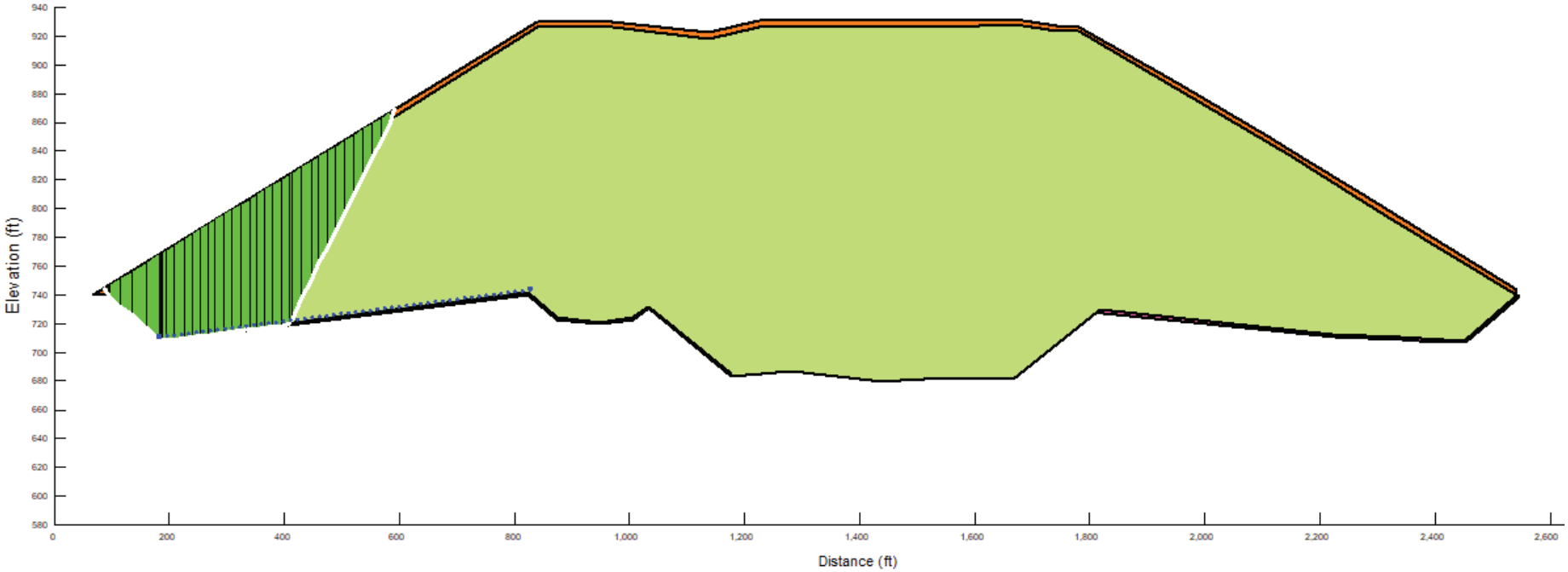
Factor of Safety:	1.7	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	

Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No





Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No



Attachment A-1.2.7

H-H’ Liner Stability under Final Conditions with Zero Adhesion

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	H-H' Foundation Stability				**File name:**	MC-VI-E_CrossSection_H_Liner.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section H-H'. This case considers a north-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. These values are achievable using available geosynthetic materials. Available data from interface testing performed on the liner system during installation suggests the interface friction angle may be as high as 22.5 degrees. This analysis was performed using a lower value which is a conservative approach. The required factor of safety is 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

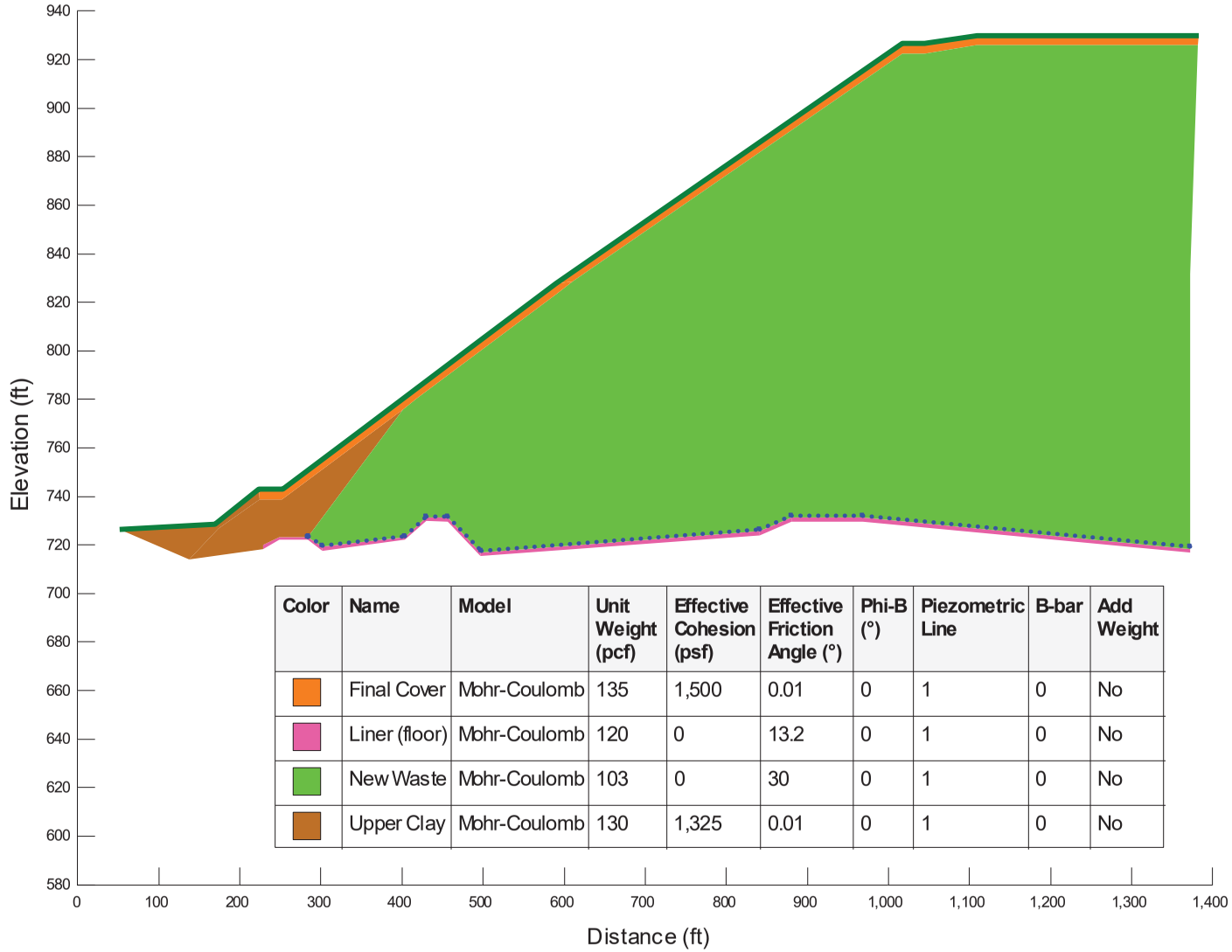
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

Source of Geometry:	The overfill liner elevations are from Master Cell VI-E Design Modification Plans, Wayne Disposal Inc., Site No. 2 by NTH Consultants (2011) and Master Cell VI Design Modification Plans. Wayne Disposal, Inc. Site No. 2 by NTH Consultants (2008).

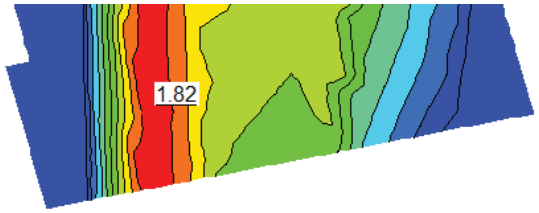
SLOPE STABILITY ANALYSIS REPORT FORM

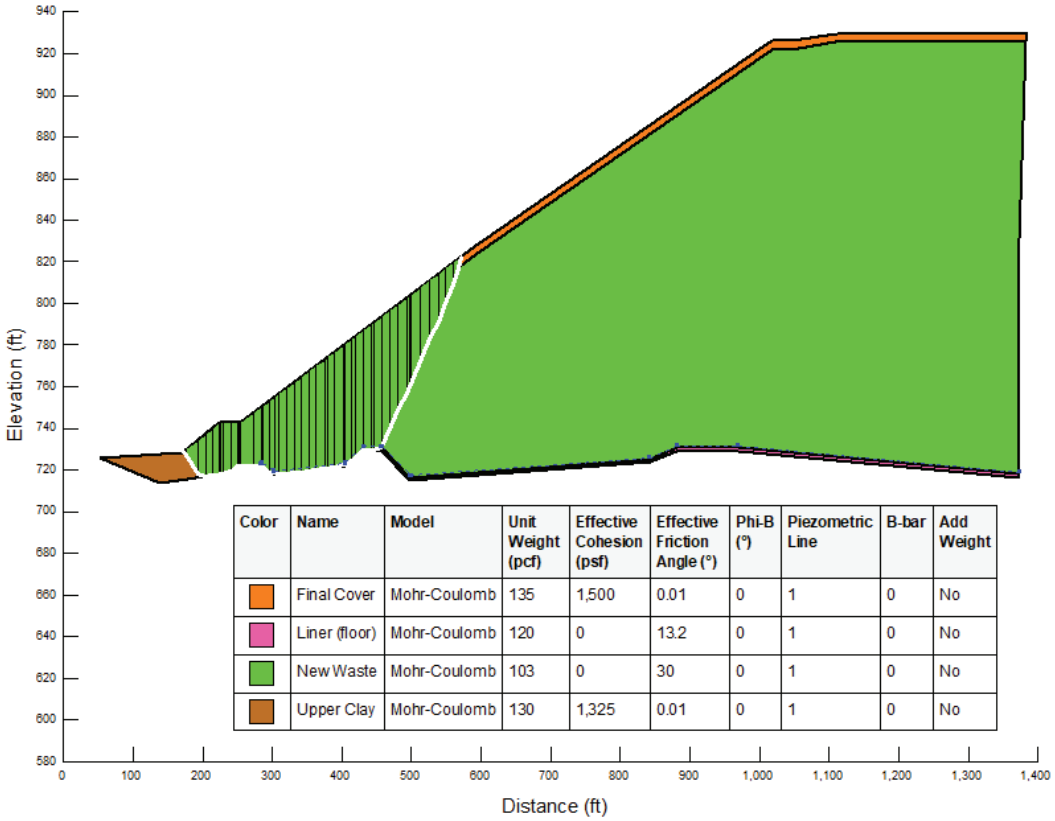
	The proposed final cover elevations are from WDI MCVI-E/F Final Cover Proposed Grading Plan by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section H-H’

Factor of Safety:	1.8	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Final Cover	Mohr-Coulomb	135	1,500	0.01	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	New Waste	Mohr-Coulomb	103	0	30	0	1	0	No
	Upper Clay	Mohr-Coulomb	130	1,325	0.01	0	1	0	No





Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Final Cover	Mohr-Coulomb	135	1,500	0.01	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	New Waste	Mohr-Coulomb	103	0	30	0	1	0	No
	Upper Clay	Mohr-Coulomb	130	1,325	0.01	0	1	0	No

Attachment A-1.2.8

I-I’ Liner Stability under Final Conditions with Zero Adhesion

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	I-I' Liner Stability				**File name:**	MC-VI-G1_CrossSection_I_Liner.gsz	
Revision:	1	**Originated:**	MK	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

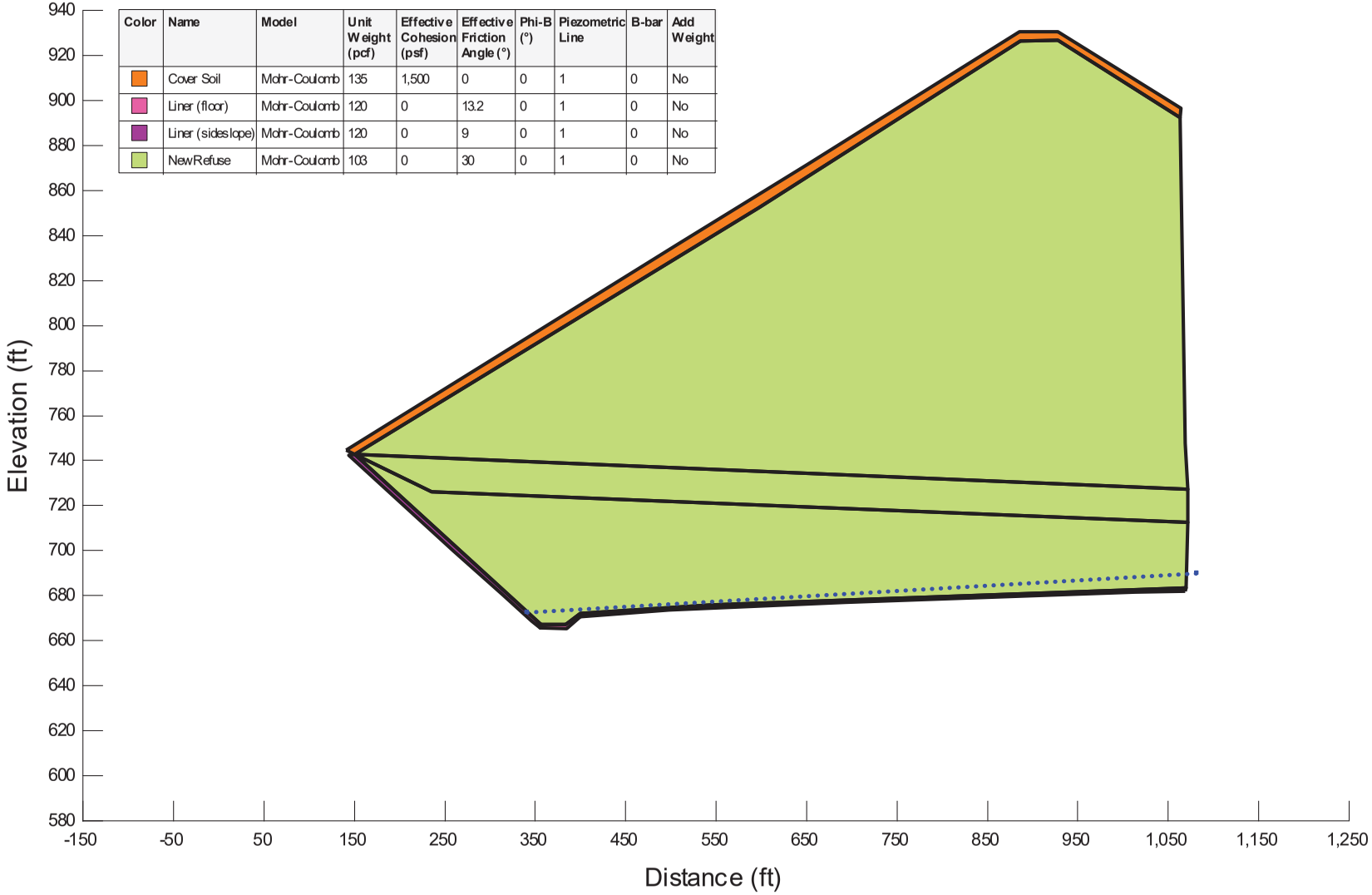
Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section I-I'. This case considers a north-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. These values are achievable using available geosynthetic materials. The required factor of safety is 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

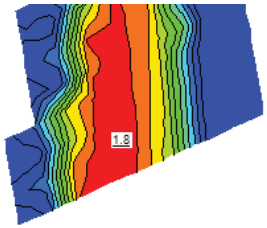
Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section I-I'

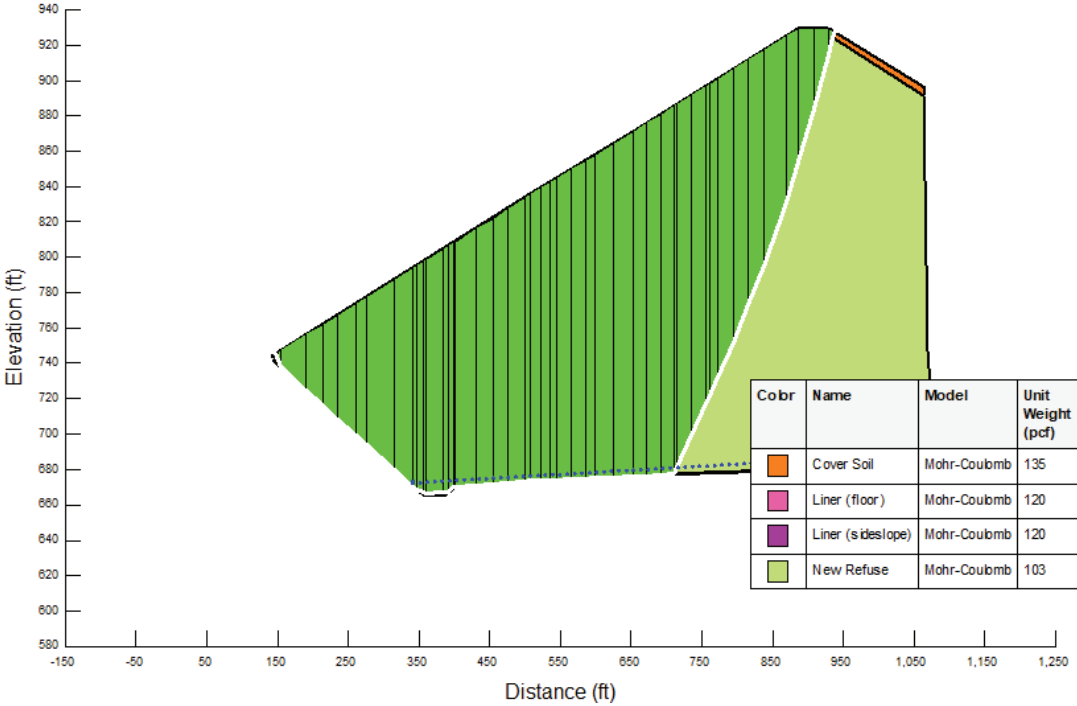
SLOPE STABILITY ANALYSIS REPORT FORM

Factor of Safety:	1.8	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	NewRefuse	Mohr-Coulomb	103	0	30	0	1	0	No





Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No

Attachment A-1.2.9

J-J’ Liner Stability under Final Conditions with Zero Adhesion

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	J-J' Liner Stability				**File name:**	MC-VI-G2_CrossSection_J_Liner.gsz	
Revision:	1	**Originated:**	MK	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

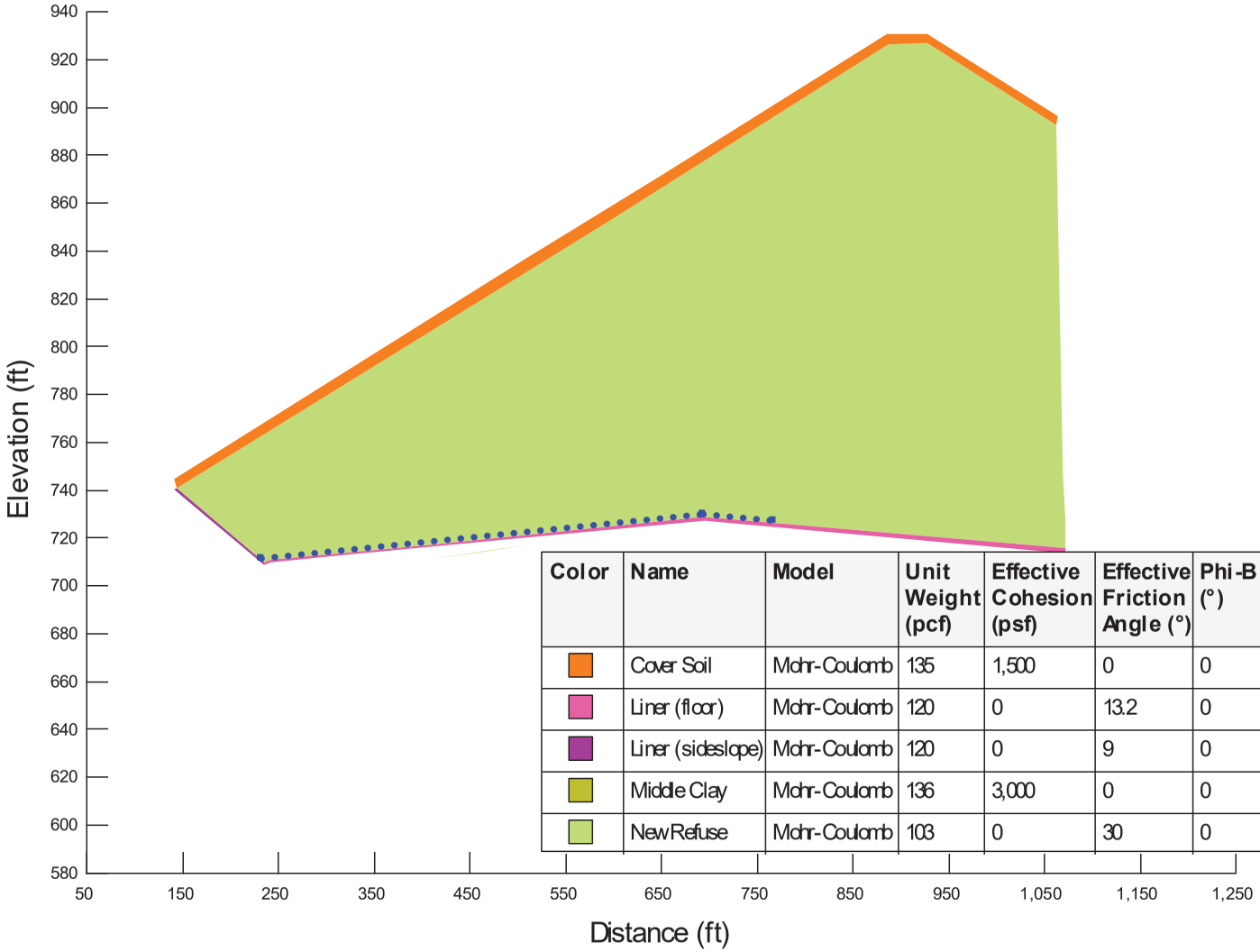
Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section J-J'. This case considers a north-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were those determined from the slope stability analysis of MC-VI-G, Sub Cell G4. These values are achievable using available geosynthetic material. The required factor of safety is 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	13.2	0
10	Liner (sideslope)	Magenta	120	9	0
11	Existing MC V Waste	Teal	120	28	0

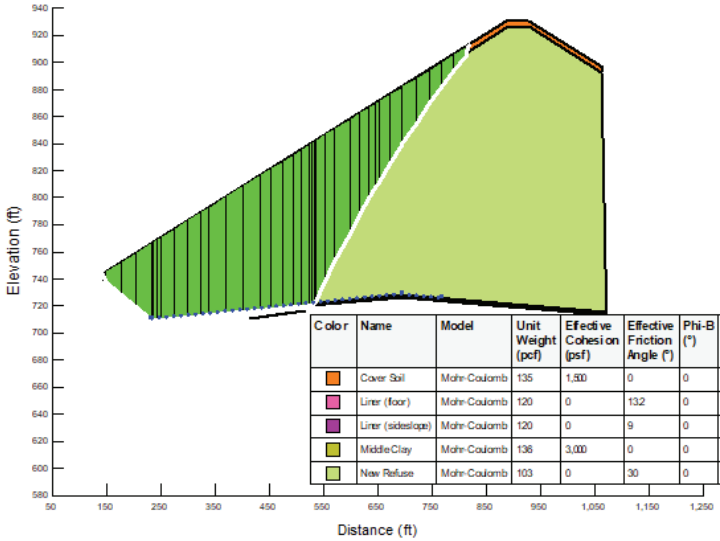
Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section J-J'

SLOPE STABILITY ANALYSIS REPORT FORM

Factor of Safety:	1.7	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	Middle Clay	Mohr-Coulomb	136	3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	0	13.2	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	Middle Clay	Mohr-Coulomb	136	3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No

Attachment A-1.2.10

I-I’ Liner Stability under Final Conditions with non-Zero Adhesion (previously tested values)

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	I-I' Liner Stability				**File name:**	MC-VI-G1_CrossSection_I_Liner_Tested_Values.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section I-I'. This case considers a west-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were determined from existing interface strength testing performed on existing similar liner system materials at WDI. The required factor of safety is 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

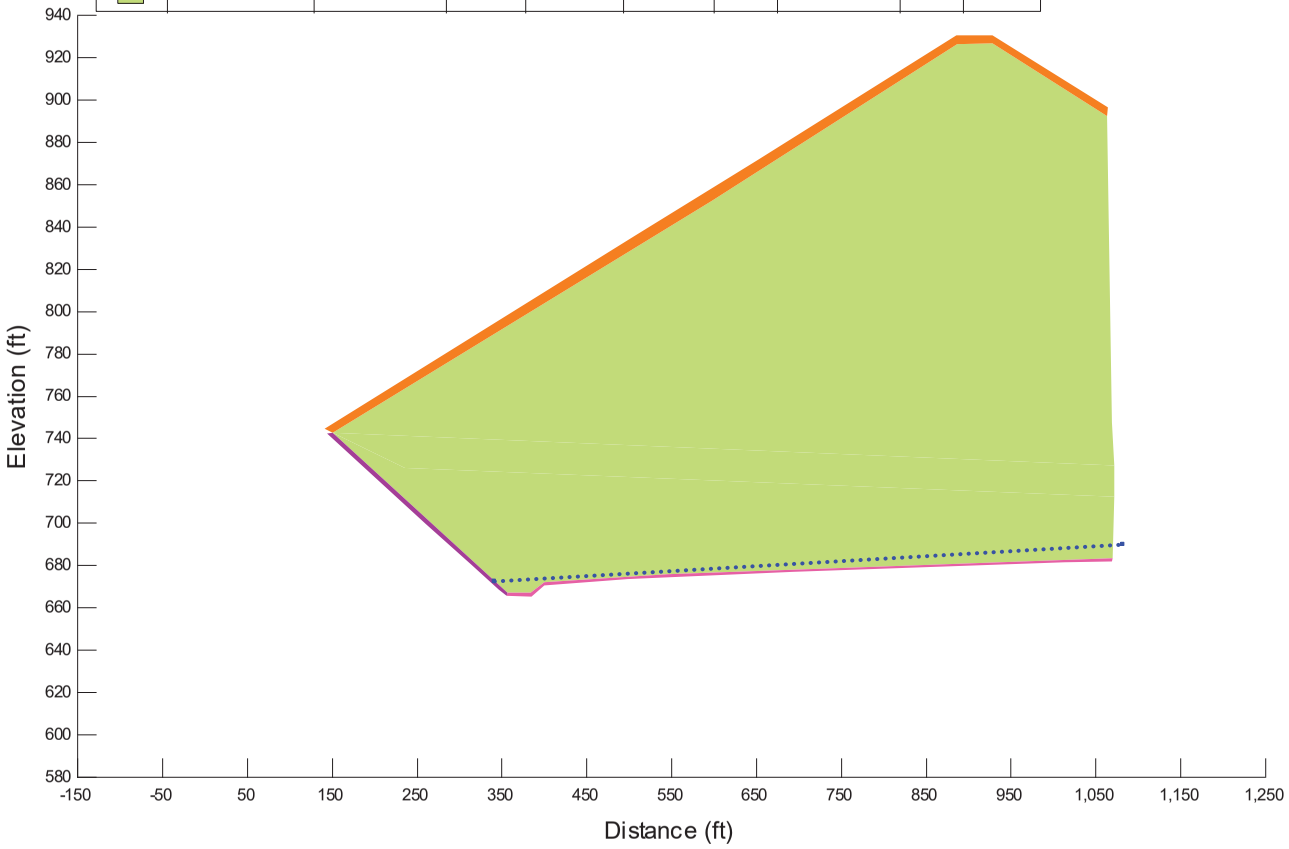
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	11.1	164
10	Liner (sideslope)	Magenta	120	7.3	110
11	Existing MC V Waste	Teal	120	28	0

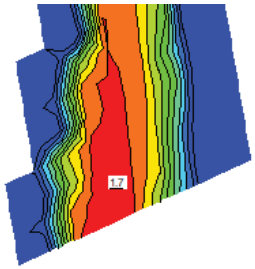
Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section I-I'

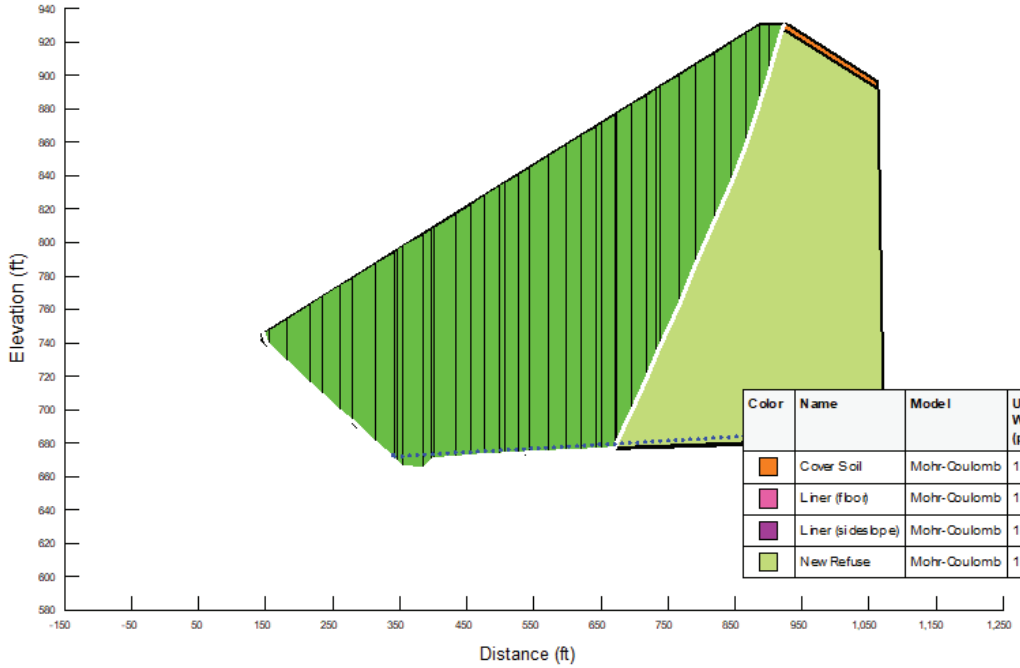
SLOPE STABILITY ANALYSIS REPORT FORM

Factor of Safety:	1.7	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	

Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	164	11.1	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No







Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	164	11.1	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No

Attachment A-1.2.11

J-J’ Liner Stability under Final Conditions with non-Zero Adhesion (previously tested values)

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	J-J' Liner Stability				**File name:**	MC-VI-G2_CrossSection_J_Liner_Tested_Values.gsz	
Revision:	1	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

Purpose of Analysis:	To determine the factor of safety of the proposed final waste grades using cross-section J-J'. This case considers a north-facing slope, with fill to the final proposed grade elevations.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The strength parameters used to model the interface strength of the liner system were determined from existing interface strength testing performed on existing similar liner system materials at WDI. The required factor of safety is 1.5. A scenario of leachate build up in the leachate collection layer (to a height of 12 inches) is modeled in this analysis.		

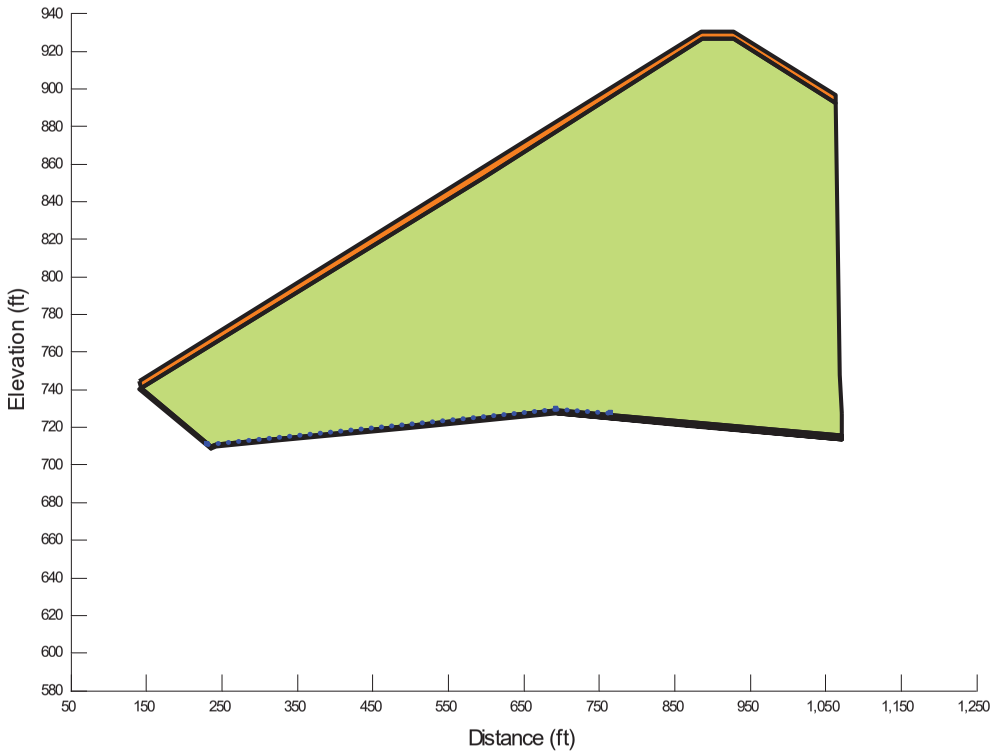
Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	11.1	164
10	Liner (sideslope)	Magenta	120	7.3	110
11	Existing MC V Waste	Teal	120	28	0

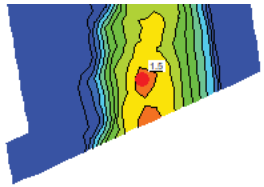
Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☐ Interim ☒ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Final Build out
Other Geometry Notes:	Cross Section J-J'

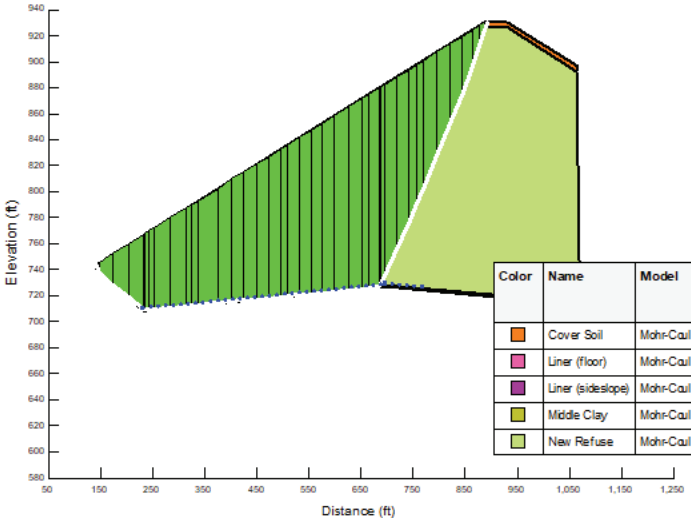
SLOPE STABILITY ANALYSIS REPORT FORM

Factor of Safety:	1.5	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded
Comments:		
Attachments:	Slope/W Cross Section and Results	

Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	164	11.1	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0	1	0	No
	Middle Clay	Mohr-Coulomb	136	3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No







Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Cover Soil	Mohr-Coulomb	135	1,500	0	0	1	0	No
	Liner (floor)	Mohr-Coulomb	120	184	11.1	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	110	7.3	0	1	0	No
	Middle Clay	Mohr-Coulomb	136	3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No

Attachment A-1.2.12

I-I’ Liner Stability under Interim Conditions (example interim stability calculation)

SLOPE STABILITY ANALYSIS REPORT FORM

Project Name:	WDI Final Cover Grading Modification						
Project Number:	1218070017.003			**Client:**	Wayne Disposal, Inc.		
Analysis Short Name:	J-J' Liner Stability				**File name:**	MC-VI-G2_CrossSection_J_Liner_Interim.gsz	
Revision:	2	**Originated:**	KM	**Checked:**	RR	**Approved:**	
Date:	3/28/22	**Date:**	3/28/22	**Date:**	3/29/22	**Date:**	

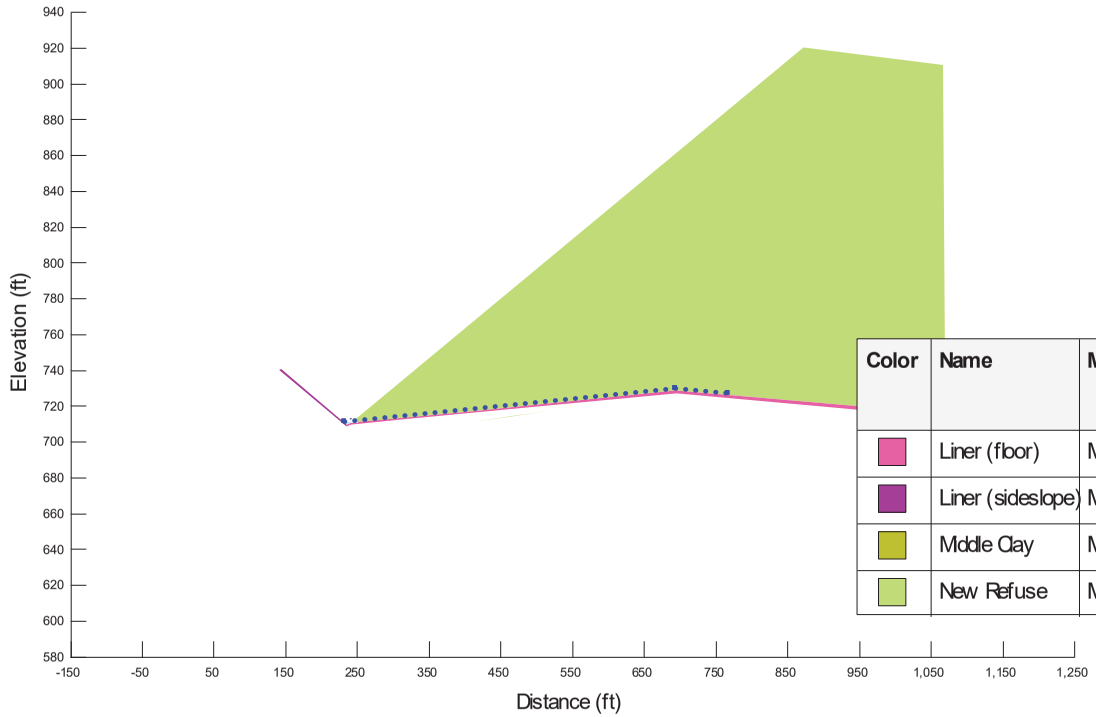
Purpose of Analysis:	To determine the required interface friction angle of the liner system to achieve an acceptable interim factor of safety of 1.3 using cross-section J-J'. This case considers a west-facing slope, with fill to the final permitted grade elevations at an interim slope of 3H:1V. The failure surface is defined such that failure occurs in the underlying liner in order to evaluate the stability of the liner system.		
	☒ Static ☐ Seismic	☒ Pore Pressure	☒ Optimized Surface
Additional Details:	The required factor of safety is 1.3 for temporary conditions.		

Material	Name	Color in Profile	Unit Wt(s) (pcf)	Strength ϕ or δ (deg.)	Strength C or Ca (psf)
1	Final Cover	Orange	135	0	1500
2	Existing Waste	Teal	91	34	0
3	New Waste	Light Green	103	30	0
4	Upper Clay	Brown	130	0	1325
5	Middle Clay	Yellow	136	0	3000
6	Lower Clay	Maroon	128	$0.22\sigma'_v$	
7	Silt	Blue	125	28	0
8	Sand	Red	115	32	0
9	Liner (floor)	Magenta	120	?	0
10	Liner (sideslope)	Magenta	120	n/a	n/a
11	Existing MC V Waste	Teal	120	28	0

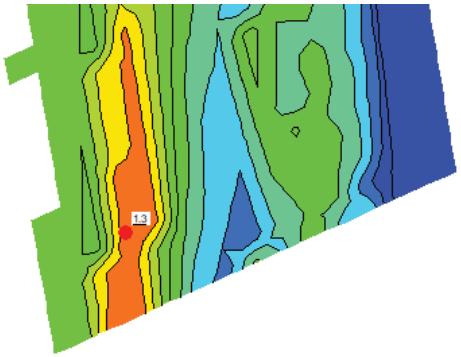
Source of Geometry:	The proposed final cover elevations are from WDI Final Cover Grades Modification Engineering Drawings by CTI and Associates, Inc.
Source of Subsurface Profile:	Basis of Design Report - NTH (2012)
☐ Preconstruction ☐ Construction ☒ Interim ☐ Final ☐ Existing ☐ Back-Analysis	
Construction Phase Represented:	Interim Waste Filling to max height at 3H:1V
Other Geometry Notes:	Cross Section J-J'

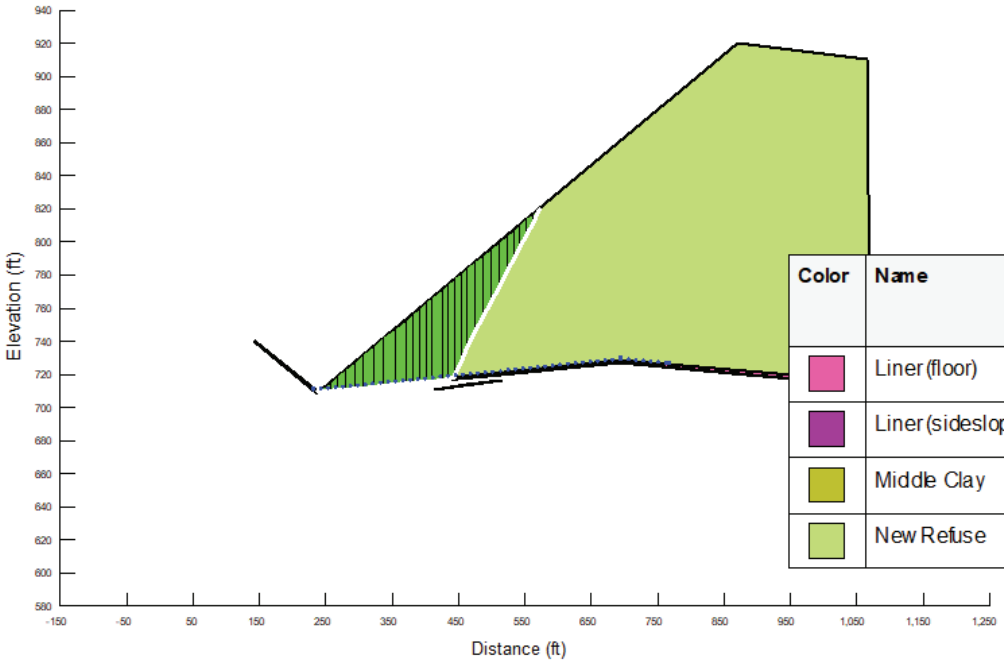
Factor of Safety:	1.3	☒ Acceptable ☐ Not Acceptable ☐ Follow-up ☐ Superseded

Comments:	The required interface friction angle for the liner system is 14 degrees (Peak). Any combination of adhesion and friction angle that yields a comparable shear strength under modeled site conditions is acceptable.
Attachments:	Slope/W Cross Section and Results



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Liner (floor)	Mohr-Coulomb	120	0	14	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	Middle Clay	Mohr-Coulomb	136	3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No





Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line	B-bar	Add Weight
	Liner (floor)	Mohr-Coulomb	120	0	14	0	1	0	No
	Liner (sideslope)	Mohr-Coulomb	120	0	9	0	1	0	No
	Middle Clay	Mohr-Coulomb	136	3,000	0	0	1	0	No
	New Refuse	Mohr-Coulomb	103	0	30	0	1	0	No

4. Attachment A-2.1 MC6_G4-G7 Settlement Analysis

Original Submittal			
	Page	Revised Submittal	
A-2	112	A-2.1	Settlement Analysis for MC VI-G4 to G7
A-2.1	120	A-2.1.1	Settlement Analysis Points
A-2.2	122	A-2.1.2	Cross-section Profiles and Settlement Calculation Spreadsheets

Attachment A-2.1

G4-G7 Liner Grade Modification Settlement Analysis

LEACHATE COLLECTION SYSTEM SETTLEMENT ANALYSIS

OBJECTIVE

This calculation evaluates the post-settlement slopes of the leachate collection pipe and cell floor cross slopes for proposed Master Cell VI-G (MC VI-G4 through G7), at Wayne Disposal, Inc. (WDI). This evaluation is based on the estimated settlement of the existing waste and soil underlying the proposed cells due to additional overburden stresses induced by waste placement and the impact of such settlement on the post settlement cell floor slopes. The purpose of this calculation is to determine the minimum required design slopes.

DESIGN CRITERIA AND ASSUMPTIONS

- The post-settlement slope of each leachate collection pipe should be at least 1% and each cell floor cross slope should be at least 2% per Rule 299.9620 (4) (EGLE 2020).
- Pipe flowline analysis points were selected along the leachate collection pipe flowlines within MC-VI-G (Attachment A-2.1.1). The specific locations of these points were selected to correspond to the cell floor high point, low point, changes in final cover slope, and locations of existing intracell dikes in the Master Cell I (MC-I). Total settlement is estimated for each point, allowing an assessment of the post-settlement slope(s) along the flowline.
- Cross slope analysis points (Attachment A-2.1.1) were selected at the location following the most critical post-settlement path including the impact of the existing dikes in MC-I.
- Maximum settlement is expected to occur at the completion of the cap construction when the foundation is subjected to the maximum overburden pressure. Under the worst-case scenario modeled, maximum load is applied (in full) to the foundation instantaneously during settlement analysis for a conservative (i.e., greater than anticipated) estimate of total settlement. In reality, loads would be applied incrementally as waste is placed gradually during the active life of the landfill. Additionally, the resulting settlement is assumed to occur immediately, conservatively accounting for the maximum settlement at the end of foundation soil consolidation.
- Existing information about the existing landfill below Subcells G4, G5, G6, and G7 indicate that it was a trench fill type of landfill. The precise configuration of the trenches is unknown. It is believed that each trench is bounded by an intracell dike. Using available subsurface information (MASW surveys and Geoprobe boring logs – see Figures 1 through 3), CTI has considered the profile of known existing dikes in these settlement analyses by placing additional settlement calculation points at the estimated crests and toes of these dikes. Differential settlement estimates are accordingly greater at the transitions between these points than between points without difference in subgrade. As a result, CTI proposes enhanced floor grades with steeper slopes in portions of the cell floor to counteract the effect of differential settlement on post-settlement slopes. CTI also proposes that the location of these enhanced floor grade zones be adjusted if MC VI- G4, G5, G6,

and G7 construction activities reveal additional information about the location of the corresponding dikes.

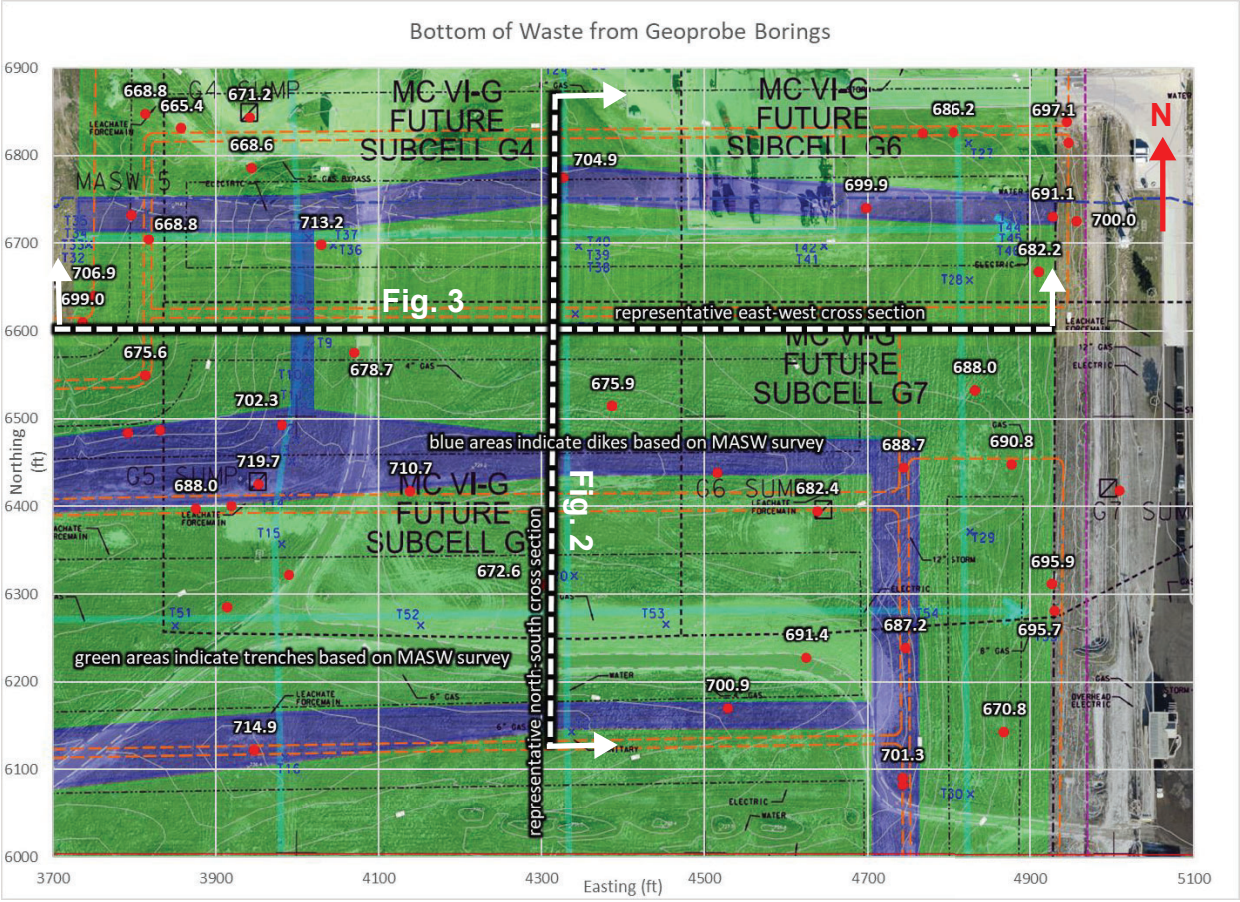


Figure 1. Map of Bottom of Existing Waste Elevations Below MC VI-G4 through G7 as Determined from Geoprobe Boring Logs. (blue areas indicate the approximate location of intracell dikes)

CALCULATION SHEET

Client: Wayne Disposal, Inc.	Project No.:	1218070017.003		
Project: WDI MC VI-G4 through G7 Liner Grade Modification	Calculated By:	RR	Date:	5/16/2022
Calculation: Leachate Collection System Settlement Analysis	Checked By:	KF	Date:	5/17/2022
	Approved By:	XZ	Date:	5/17/2022

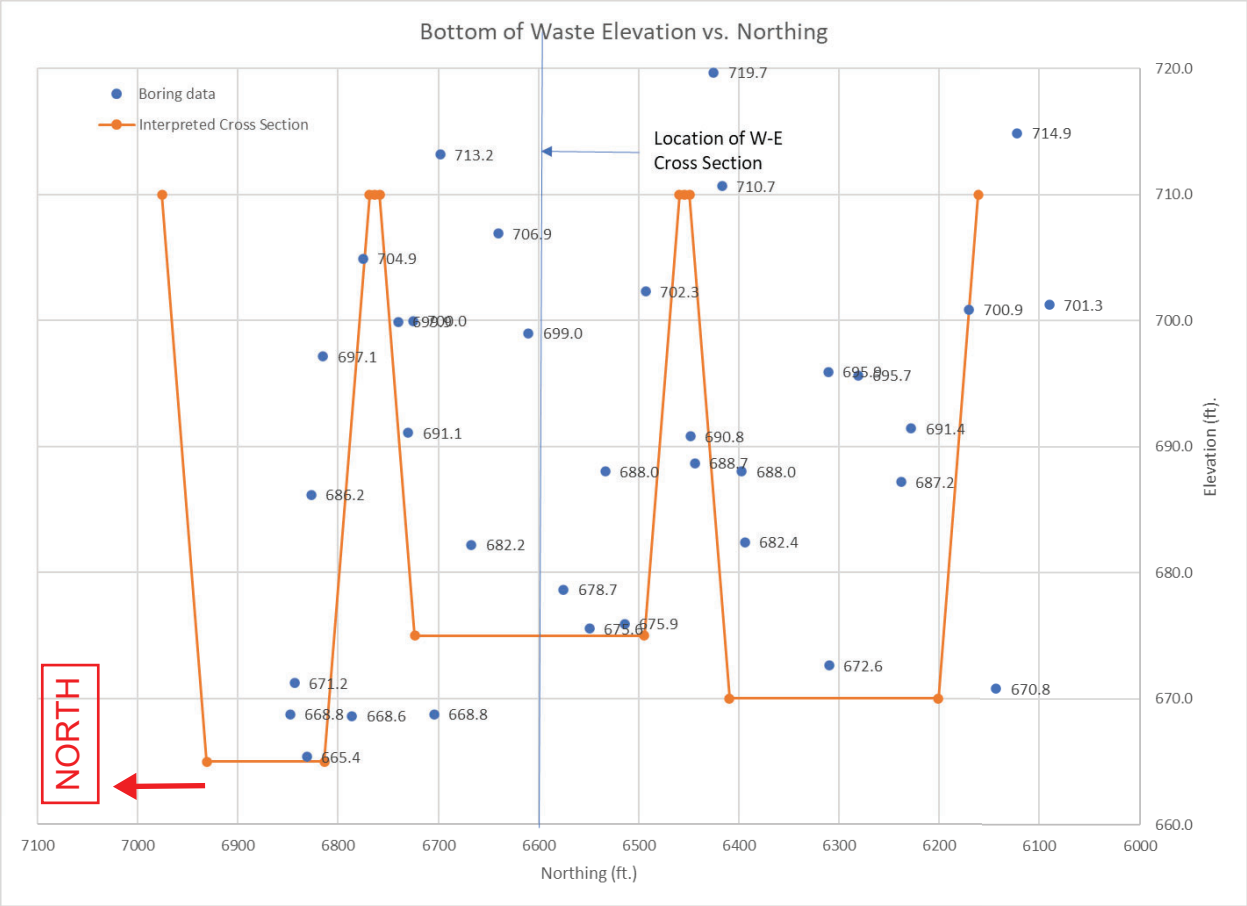


Figure 2. Interpreted North-South Cross Section Depicting Bottom of Existing Waste Elevations Below MC VI-G4 through G7 as Determined from Geoprobe Boring Logs.

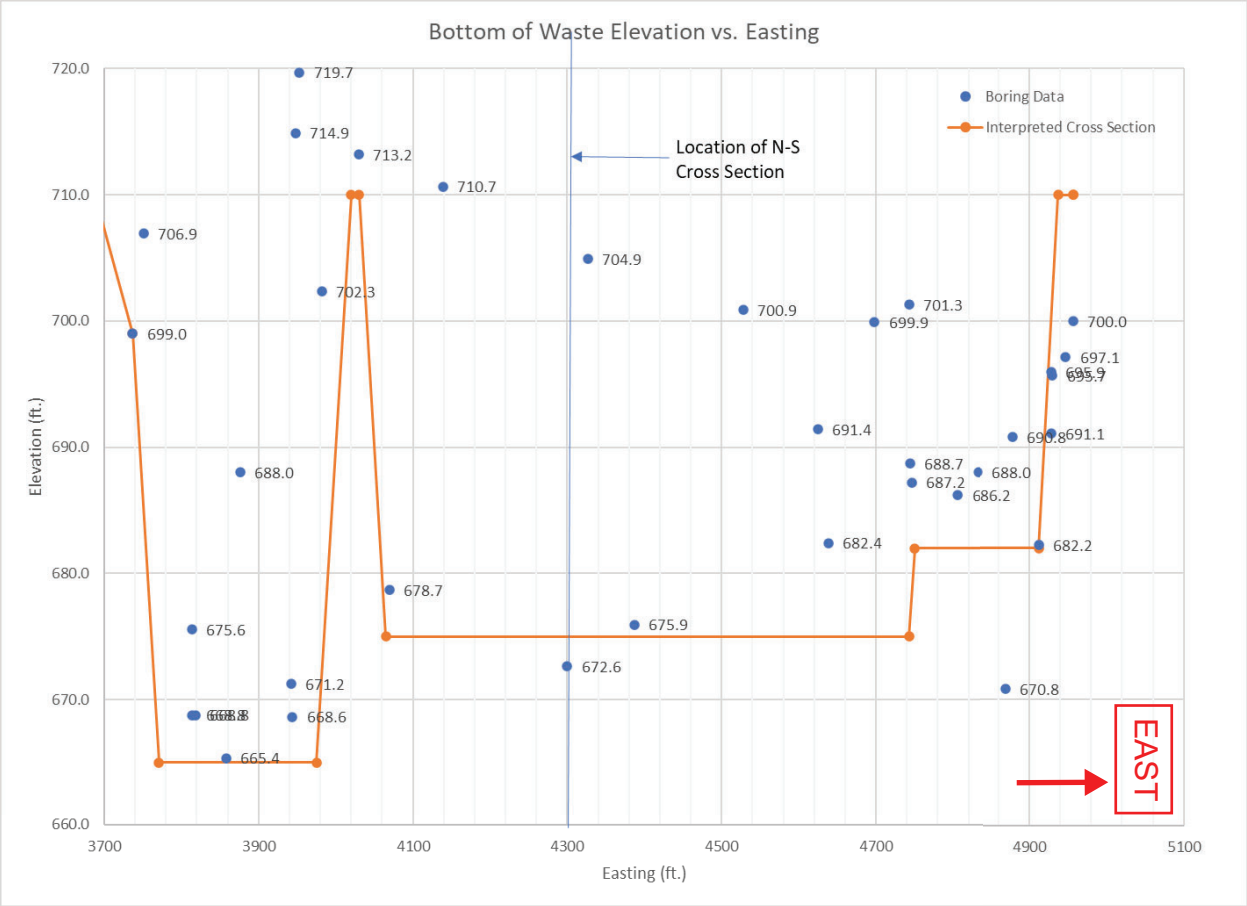


Figure 3. Interpreted West-East Cross Section Depicting Bottom of Existing Waste Elevations Below MC VI-G4 through G7 as Determined from Geoprobe Boring Logs.

- Table 1A lists the material typical thicknesses and unit weights used for the settlement analysis. Note that a value of 103 pounds per cubic foot (pcf) was conservatively selected for the unit weight of newly-placed waste. This value of unit weight is conservative because it is greater than the representative value obtained from survey records. Greater values of waste unit weight result in larger calculated settlement values. Table 1B provides supporting survey information used to evaluate the unit weight of newly placed waste.
- Table 2 summarizes the compressibility parameters used in the settlement analysis. The compacted clay liner is only very slightly compressible relative to the in-situ clay layer due to the much greater thickness of the insitu clay. Considering the insignificant magnitude of the settlement of the compacted clay liner, it was not included in the analysis.

Table 1A. Soil Properties for Settlement Analysis

Soil Type	Thickness [ft]	Moist Unit Weight [pcf]
Final cover soil	4	135
New waste	Varies	103*
Existing cover soil	Varies	135
Existing waste	Varies	91
In-situ middle clay	Varies	136
Attenuation Layer	5	135
Structural Fill	2	135
Venting Layer	1	135
Leachate Collection Sand	1	135
In-situ middle clay	Varies	136
In-situ lower clay (moist)	5	128
In-situ lower clay (saturated)	12	128
In-situ silt (saturated)	18	125
In-situ sand (saturated)	45	115

** Conservative (high) Value - see Table 1B.*

Table 1B. Supporting Survey Information Used to Evaluate the Unit Weight of Newly Placed Waste

Survey Years	2014 to 2021
Tons waste received into the landfill	3,905,856
Cubic yards airspace consumed	2,869,499
Average Unit Weight (tons/cy)	1.36
Average Unit Weight (pcf)	101

Table 2. Compressibility Parameters of Waste and Soils

Soil Type	Primary Compression Ratio $C_c/(1+e_0)$	Secondary Compression Ratio $C_\alpha/(1+e_0)$	Recompression Ratio $C_r/(1+e_0)$
Existing cover	0.102[B]	0.005[B]	0.017[A]
Existing waste	0.08[C]	0.024[C]	0.0133[A]
In-situ middle clay	0.102	0.005	0.017[A]
In-situ lower clay	0.171	0.009	0.0285[A]
In-situ silt	0.15[B]	0[B]	0[B]
In-situ sand	0.1[B]	0[B]	0[B]

[A] Estimated from $C_r = C_c/6$.

[B] Assumed values.

[C] From Attachment A-2.3

The information for subsurface soils is based on MCIV General Profiles (South), Appendix A Subsurface Soil/Waste Profiles & Corresponding Physical Properties, Volume III – WDI Operating License Application Master Cells VI F & G by NTH Consultants (2011a). Specifically, subsurface investigation boring logs, cross section profiles, and laboratory test results were used to assess the subgrade soil profile and its properties. Note that some uncertainty may exist in the interpretation of hydrogeological data due to natural soil's inherent variability, conservative assumptions have been applied to ensure a conservative estimate of settlement in this analysis.

METHODOLOGY

Total settlement is estimated using the 1-D consolidation equations (Coduto 1999), with primary consolidation being the critical component. Total settlement is calculated as:

$$S = S_c + S_s \tag{1}$$

Where:

S = total settlement [ft]
S_c = primary consolidation settlement due to load application [ft]
S_s = secondary compression settlement due to creep effects [ft]

Settlement caused by primary consolidation for a given layer of soil with uniform properties is calculated as:

$$S_c = \frac{h_0}{1+e_0}\left(C_r \log\frac{\sigma_c}{\sigma_0} + C_c \log\frac{\sigma_i}{\sigma_c}\right) \tag{2}$$

Where:

C_c = primary compression index
C_r = recompression index
h_0 = initial compressible layer thickness [ft]
e_0 = initial void ratio of the clay subgrade
σ_0 = initial overburden pressure acting on the compressible layer [psf]
σ_i = final overburden pressure acting on the compressible layer [psf]
σ_c = preconsolidation stress [psf], calculated using Equation 4.

Settlement due to secondary compression is calculated using Equation 3 below:

$$S_s = h_0 \frac{C_\alpha}{1+e_0} \log\left(\frac{t_2}{t_1}\right) \tag{3}$$

Where:

C_α = secondary compression index
H = layer thickness [ft]
t_2 = time after application of load (assumed 70 years)
t_1 = time required to complete primary consolidation (assumed 40 years)

- The elevations in this report are referenced to Mean Sea Level (MSL).
- The initial ground elevation (prior to initial development) was assumed to be approximately 705 ft. This value was inferred from the cross section profile from Engineering Drawings, Wayne Disposal, Inc. Site No.2 MC VI-F&G by NTH Consultants (2011b).

- The preconsolidation pressure of the middle clay and lower clay, the major contributing compressible layers below the existing waste, was set equal to the initial effective overburden pressure acting on them prior to development. This value is used in Equation 2 to estimate settlement resulting from an initial load less than the preconsolidation pressure. The net settlement between construction of the overfill liner and the proposed final conditions is calculated with the soils in either a normally-consolidated state (i.e., compression is calculated using C'_c) or over-consolidated state (i.e., compression is calculated using C'_r and C'_c) depending on whether the initial stress is greater than the preconsolidation stress or not, respectively. Note that in most cases, both layers of soil have experienced a higher overburden pressure since initial development of the site. This value is calculated using Equation 4.

- Calculation of settlement following MC-VI-G construction accounts for changes in overburden pressure resulting from construction activities and landfill operations.

- At each point selected along the leachate collection pipe system, the elevations for the existing ground, proposed MC-VI-G liner system, final cover, and the foundation soils are determined and used to compute the initial and final overburden pressures at each settlement point within the analysis using Equation 4 similarly to the preconsolidation pressure. Calculation spreadsheets for the settlement points in Cells MC-VI-G4 through MC-VI-G7 are presented in Attachment A-2.1.2.

$$\sigma_{c,0,f} = \sum_{i=0}^{n} \gamma_i \times h_i \tag{4}$$

Where:

$\sigma_{c,0,f}$ = σ_c: preconsolidation stress [psf]
σ_0: initial stress [psf]
σ_f: final stress [psf]

γ_i = Unit weight of soil layer i [psf]

h_i = Thickness of layer i [ft] at settlement point as follows:
For σ_c use thicknesses of layers prior to development
For σ_0 use thicknesses of layers up to existing elevations
For σ_f use thicknesses of layers up to proposed final elevations

- Soil layers are identified using subsurface soil profiles provided in MCIV General Profiles (South), Appendix A Subsurface Soil/Waste Profiles & Corresponding Physical Properties, Volume III – WDI Operating License Application Master Cells VI F & G by NTH Consultants (2011a). These layers include in-situ clay with varying degrees of compressibility (see Table 2).

- The MC-VI-G liner system grades were determined from the design drawings. The respective pre-settlement slopes are shown in Tables 3 through 11 below.

- Attachment A-2.1.1 presents the plan locations of the settlement analysis points within MC-VI-G with respect to proposed cell floor grades.

CALCULATION SHEET

Client: Wayne Disposal, Inc.	Project No.:	1218070017.003			
Project: WDI MC VI-G4 through G7 Liner Grade Modification	Calculated By:	RR	Date:	5/16/2022	
Calculation: Leachate Collection System Settlement Analysis	Checked By:	KF	Date:	5/17/2022	
	Approved By:	XZ	Date:	5/17/2022	

CALCULATIONS:

Equations 1 through 4 were incorporated into a spreadsheet to conduct the settlement calculations. The settlement calculation output and resulting post-settlement slope(s) for the leachate collection pipes within MC-VI-G are presented in Table 3 through Table 6. The settlement calculation output and resulting post-settlement slope(s) for each analyzed cross slope within MC-VI-G are presented in Table 7 through Table 11. Attachment A-2.1.2 presents the cross-section profiles of the leachate collection pipe flowlines and cell floor cross slopes, and the settlement calculation spreadsheets for the individual points.

Table 3. MC-VI-G4 Leachate Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-01	6821.02	3927.03	707.63	3.77	125	703.87	3.5%	2.3%	1.0%
SP-02	6821.20	4051.75	712.00	5.27		706.73			
SP-02	6821.20	4051.75	712.00	5.27	114	706.73	3.5%	2.7%	1.0%
SP-03	6821.37	4166.03	716.00	6.19		709.81			
SP-03	6821.37	4166.03	716.00	6.19	123	709.81	3.5%	2.2%	1.0%
SP-04	6821.55	4289.37	720.32	7.81		712.51			

Table 4. MC-VI-G5 Leachate Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-07	6591.09	3931.50	712.86	3.69	109	709.17	3.5%	2.9%	1.0%
SP-08	6519.07	4013.94	716.69	4.36		712.33			
SP-08	6519.07	4013.94	716.69	4.36	86	712.33	3.5%	4.7%	1.0%
SP-09	6462.73	4078.42	719.69	3.37		716.32			
SP-09	6462.73	4078.42	719.69	3.37	87	716.32	5.0%	2.8%	1.0%
SP-10	6405.19	4144.28	724.06	5.29		718.77			
SP-10	6405.19	4144.28	724.06	5.29	170	718.77	3.5%	3.8%	1.0%
SP-11	6293.54	4272.06	730.00	4.77		725.23			
SP-11	6293.54	4272.06	730.00	4.77	48	725.23	3.5%	4.1%	1.0%
SP-12	6261.89	4308.31	731.68	4.49		727.19			

CALCULATION SHEET

Client: Wayne Disposal, Inc.
Project: WDI MC VI-G4 through G7 Liner Grade Modification
Calculation: Leachate Collection System Settlement Analysis

Project No.: 1218070017.003
Calculated By: RR Date: 5/16/2022
Checked By: KF Date: 5/17/2022
Approved By: XZ Date: 5/17/2022

Table 5. MC-VI-G6 Leachate Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-15	6345.33	4693.30	700.88	2.99	47	697.89	3.5%	1.9%	1.0%
SP-16	6389.25	4676.09	702.53	3.75		698.77			
SP-16	6389.25	4676.09	702.53	3.75	70	698.77	3.5%	4.7%	1.0%
SP-16b	6454.30	4650.58	704.97	2.90		702.07			
SP-16b	6454.30	4650.58	704.97	2.90	55	702.07	9.5%	5.1%	1.0%
SP-16c	6505.08	4630.68	710.15	5.31		704.84			
SP-16c	6505.08	4630.68	710.15	5.31	215	704.84	3.5%	2.4%	1.0%
SP-17b	6704.95	4552.33	717.67	7.71		709.96			
SP-17b	6704.95	4552.33	717.67	7.71	65	709.96	3.5%	1.8%	1.0%
SP-17c	6765.08	4528.76	719.93	8.81		711.12			
SP-17c	6765.08	4528.76	719.93	8.81	89	711.12	3.5%	2.5%	1.0%
SP-18	6847.70	4496.37	723.03	9.68		713.35			
SP-18	6847.70	4496.37	723.03	9.68	63	713.35	3.5%	4.0%	1.0%
SP-18b	6906.30	4473.40	725.24	9.35		715.89			
SP-18b	6906.30	4473.40	725.24	9.35	69	715.89	3.5%	3.9%	1.0%
SP-19	6970.25	4448.33	727.64	9.07		718.57			

Table 6. MC-VI-G7 Leachate Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-22	6393.49	5048.84	681.79	2.14	141	679.65	3.5%	2.4%	1.0%
SP-23	6534.01	5048.84	686.71	3.72		682.99			
SP-23	6534.01	5048.84	686.71	3.72	253	682.99	3.5%	2.8%	1.0%
SP-24	6787.25	5048.84	695.57	5.42		690.15			
SP-24	6787.25	5048.84	695.57	5.42	168	690.15	3.5%	3.1%	1.0%
SP-25	6954.90	5048.84	701.44	6.12		695.32			

CALCULATION SHEET

Client: Wayne Disposal, Inc.
Project: WDI MC VI-G4 through G7 Liner Grade Modification
Calculation: Leachate Collection System Settlement Analysis

Project No.: 1218070017.003
Calculated By: RR Date: 5/16/2022
Checked By: KF Date: 5/17/2022
Approved By: XZ Date: 5/17/2022

Table 7. MC-VI-G4 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-04	6821.55	4289.37	720.32	7.82	162	712.50	3.6%	4.4%	2.0%
SP-05	6983.40	4289.34	726.10	6.53		719.58			
SP-04	6821.55	4289.37	720.32	7.82	62	712.50	3.6%	7.2%	2.0%
SP-04b	6759.99	4289.38	722.51	5.55		716.96			
SP-04b	6759.99	4289.38	722.51	5.55	110	716.96	6.0%	3.1%	2.0%
SP-06	6649.78	4289.40	729.15	8.76		720.39			

Table 8. MC-VI-G5 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-09	6462.73	4078.42	719.69	3.36	297	716.33	3.6%	3.7%	2.0%
SP-14	6237.97	3884.80	730.38	2.97		727.42			
SP-10	6405.19	4144.28	724.06	5.47	64	718.60	4.0%	6.5%	2.0%
SP-10b	6453.73	4185.24	726.62	3.92		722.70			
SP-10b	6453.73	4185.24	726.62	3.92	51	722.70	8.9%	2.5%	2.0%
SP-10c	6491.13	4219.37	731.14	7.19		723.94			
SP-10c	6491.13	4219.37	731.14	7.19	174	723.94	3.9%	2.7%	2.0%
SP-13	6625.09	4329.82	737.83	9.16		728.68			

Table 9. MC-VI-G6 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-16	6389.25	4676.09	702.53	3.75	273	698.78	3.6%	3.7%	2.0%
SP-21	6290.21	4421.30	712.32	3.30		709.02			
SP-18	6847.70	4496.37	723.03	10.62	270	712.41	3.4%	3.5%	2.0%
SP-20	6937.43	4751.42	732.34	10.50		721.84			

Table 10. MC-VI-G7 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-23	6534.01	5048.84	686.71	3.72	81	682.99	3.4%	2.9%	2.0%
SP-26	6532.88	4967.83	689.46	4.08		685.38			
SP-25	6954.90	5048.84	701.44	6.12	62	695.32	3.6%	4.3%	2.0%
SP-27	6955.68	5111.30	703.70	5.68		698.02			
SP-25	6954.90	5048.84	701.44	6.12	63	695.32	3.4%	2.7%	2.0%
SP-28	6954.65	4986.17	703.56	6.52		697.04			

Table 11. MC-VI-G7 "Shelf" Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-20b	6944.94	4776.06	730.10	10.11	122	719.99	5.0%	4.0%	2.0%
SP-28b	6950.57	4897.93	724.00	8.94		715.06			

CONCLUSIONS

The post-settlement slope of the leachate collection pipe should be at least 1% and each cell floor cross slope should be at least 2% per Rule 299.9620 (4) (EGLE 2020). This calculation estimated the settlement at points along the leachate collection pipe and the cross slopes within MC-VI-G. The settlement of each of these points was used to calculate the post-settlement slopes of the MC-VI-G floor. This settlement analysis determined that all design leachate collection pipe slopes and resultant cross slopes within MC-VI-G meet the required minimum post-settlement slopes. Several zones along the pipe flowlines and cross slopes require steeper slopes than adjacent areas of the cell floors to meet the design criteria due to the influence of existing intracell dikes on differential settlement. These areas include:

- MCVI-G5 pipe flowline between SP-09 and SP-10
- MCVI-G6 pipe flowline between SP-16b and SP-16c
- MCVI-G4 cross slope between SP-04b and SP-06
- MCVI-G5 cross slope between SP-10b and SP-10c

The precise configuration of the intracell dikes is unknown. Using available subsurface information, CTI has considered the profile of known existing dikes in these settlement analyses. The location of these enhanced floor grade zones should be adjusted if MC VI- G4, G5, G6, and G7 construction activities reveal additional information about the location of the corresponding dikes. Adjustment of the enhanced floor grade zones should proceed as follows:

- During excavation of the cell floor subgrade, the materials encountered at the bottom of excavation within 30 feet of the mapped intracell dike locations shall be logged.
- Upon discovery of an intracell soil dike, its limits shall be surveyed across the width of the intersecting subgrade excavation bottom.
- The location of the discovered intracell dike shall be plotted in plan view and in cross section view and compared to Figures 1 to 3.
- If the waste-to-soil transition differs in horizontal location from that presented in Figures 1 to 3, the corresponding zone of enhanced floor grade (applicable to G5 pipe flowline, G6 pipe flowline, G4 cross slope, and G5 cross slope) shall be moved so that its boundaries align with the projected toe of sideslope for the corresponding dike.

REFERENCES

Coduto, D.P. (1999) *Geotechnical Engineering: Principles and Practices*, Prentice-Hall Inc., New Jersey

EGLE (2020) *Part 111 Administrative Rules,* Department of Environment, Great Lakes, and Energy *Hazardous Waste Management*, Materials Management Division.

NTH Consultants, Ltd. (2011a) *Volume III – WDI Operating License Application Master Cells VI F & G.*

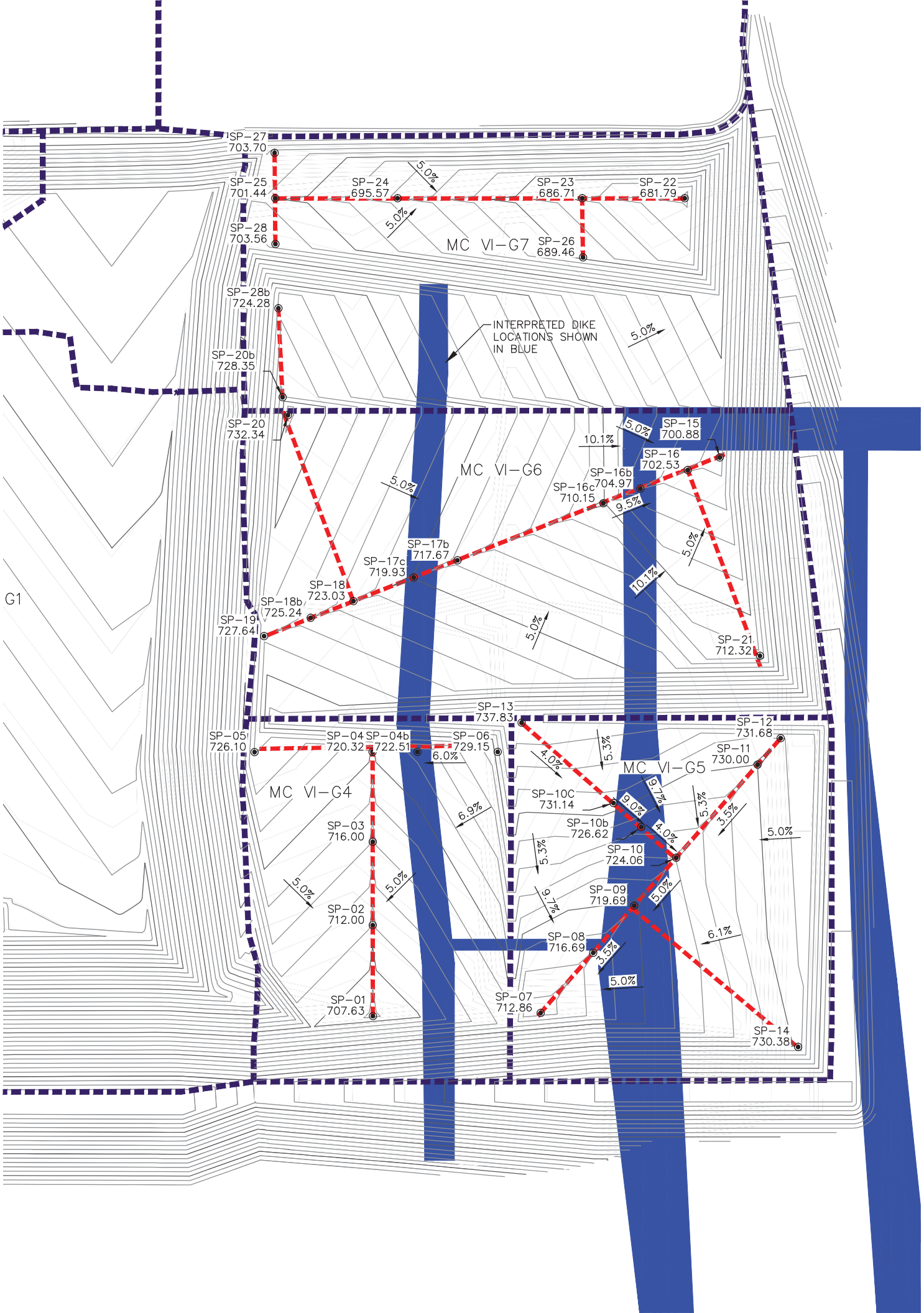
NTH Consultants, Ltd. (2011b) Engineering Drawings. *Wayne Disposal, Inc. Site No. 2 Master Cell VI-F&G.*

NTH Consultants, Ltd. (2008) Master Cell VI Design Modification Plans. *Wayne Disposal, Inc. Site No. 2.*

Attachment A-2.1.1

Settlement Analysis Points

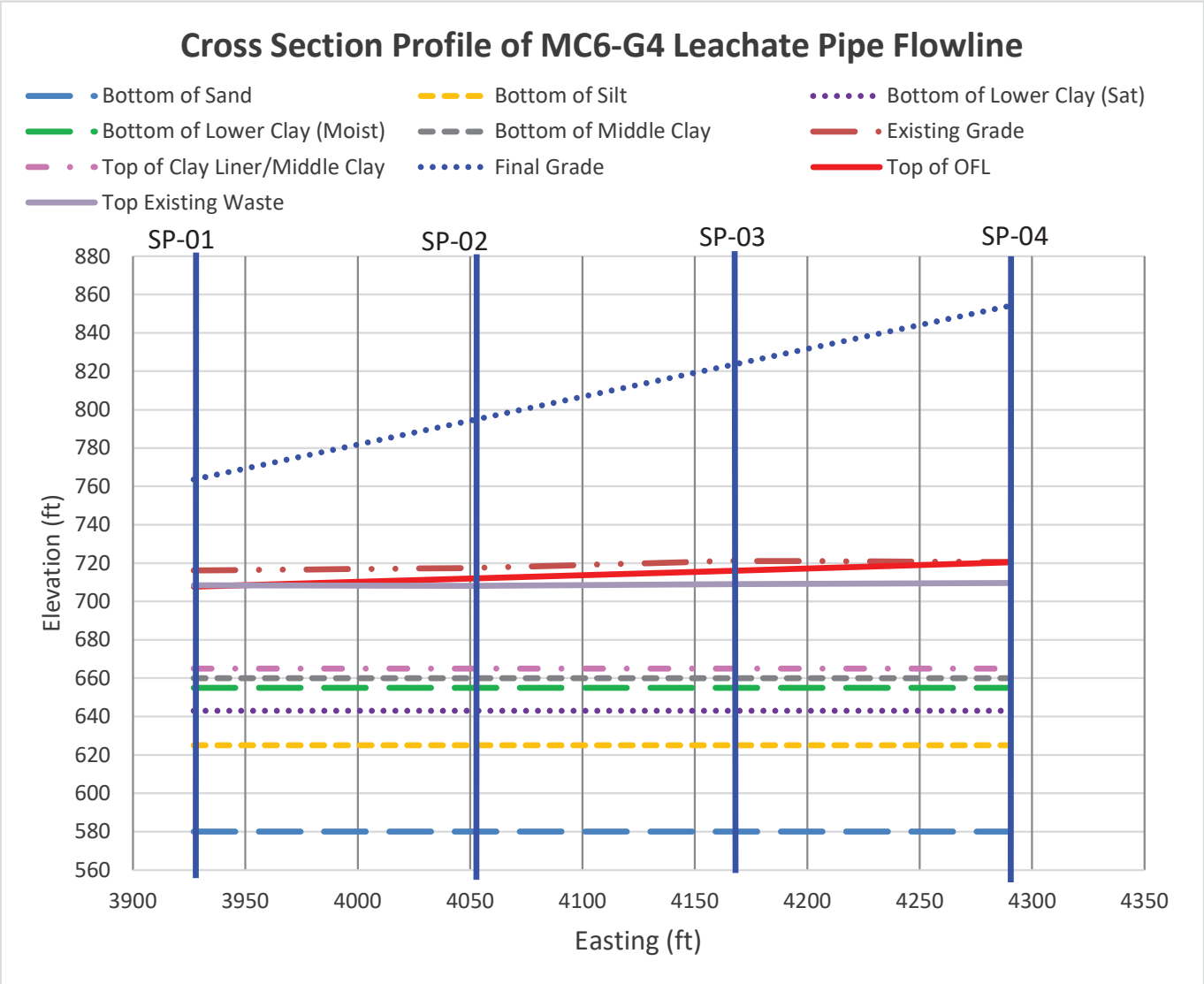
G4-G7 Liner Grade Modification


SP-27
703.70
SP-25
701.44
SP-24
695.57
SP-23
686.71
SP-22
681.79
SP-28
703.56
SP-26
689.46
MC VI-G7
5.0%
5.0%
SP-28b
724.28
INTERPRETED DIKE
LOCATIONS SHOWN
IN BLUE
5.0%
SP-20b
728.35
SP-20
732.34
SP-15
700.88
10.1%
5.0%
SP-16
702.53
MC VI-G6
SP-16b
704.97
SP-16c
710.15
9.5%
5.0%
SP-17b
717.67
SP-17c
719.93
10.1%
5.0%
SP-18
723.03
SP-18b
725.24
SP-19
727.64
5.0%
SP-21
712.32
G1
SP-13
737.83
SP-12
731.68
SP-05
726.10
SP-04
720.32
SP-04b
722.51
SP-06
729.15
6.0%
4.0%
5.3%
SP-11
730.00
MC VI-G5
MC VI-G4
SP-10C
731.14
9.0%
6.7%
5.3%
3.5%
6.9%
SP-10b
726.62
4.0%
5.0%
SP-03
716.00
5.3%
SP-10
724.06
5.0%
5.0%
SP-09
719.69
5.0%
SP-02
712.00
6.7%
SP-08
716.69
6.1%
3.5%
5.0%
SP-01
707.63
SP-07
712.86
SP-14
730.38

Attachment A-2.1.2

Cross-section Profiles and Settlement Calculation Spreadsheets

G4-G7 Liner Grade Modification


Cross Section Profile of MC6-G4 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-01
SP-02
SP-03
SP-04
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
3900
3950
4000
4050
4100
4150
4200
4250
4300
4350
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-01	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6821.02	3927.03	707.63	763.56	716.13	660.00	655.00	643.00	625.00	580.00	665.00	708.33

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	51.92	103.0	0	5348.0									
	3	OFL	7.80	135.0	1	-1053.0									
	4	Existing Waste	7.70	91.0	1	-700.3									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1753.3	1753.3	6833.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1753.3	1753.3	6833.0	NC	-	-
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	1956.0	1956.0	7035.7	NC	0.198	0.027
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	2361.3	2361.3	7441.1	NC	0.178	0.027
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	2766.7	2766.7	7846.4	NC	0.161	0.027
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	3172.0	3172.0	8251.7	NC	0.148	0.027
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	3577.4	3577.4	8657.1	NC	0.137	0.027
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	3982.7	3982.7	9062.4	NC	0.127	0.027
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	4388.1	4388.1	9467.8	NC	0.119	0.027
	4	Existing Waste	4.45	91.0	0	405.3	0.080	0.013	0.024	4793.4	4793.4	9873.1	NC	0.112	0.027
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5166.1	4780.0	10245.8	NC	0.076	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5506.1	5120.0	10585.8	NC	0.072	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5996.1	5610.0	11075.8	NC	0.228	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6512.9	6126.8	11592.6	NC	0.257	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6906.5	6520.4	11986.2	NC	0.246	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7385.0	6998.9	12464.7	NC	0.307	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7948.4	7562.3	13028.1	NC	0.290	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8466.8	8080.7	13546.5	NC	0.184	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8940.2	8554.1	14019.9	NC	0.176	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9413.6	9027.5	14493.3	NC	0.169	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9887.0	9500.9	14966.7	NC	0.162	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10360.4	9974.3	15440.1	NC	0.156	-
														3.501	0.264
													Total Settlement [ft]	**3.77**	

Variables & Constants	
Point Name	SP-01
Settlement Layer [ft]	120.6
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-02	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6821.20	4051.75	712.00	794.68	717.43	660.00	655.00	643.00	625.00	580.00	665.00	708.07

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	78.68	103.0	0	8104.0									
	3	OFL	9.36	135.0	1	-1263.2									
	4	Existing Waste	3.07	91.0	1	-279.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1542.5	1542.5	9589.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1542.5	1542.5	9589.0	NC	-	-
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	1770.0	1770.0	9816.5	NC	0.298	0.031
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	2225.0	2225.0	10271.5	NC	0.266	0.031
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	2680.0	2680.0	10726.5	NC	0.241	0.031
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	3135.0	3135.0	11181.5	NC	0.221	0.031
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	3590.0	3590.0	11636.5	NC	0.204	0.031
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	4045.0	4045.0	12091.5	NC	0.190	0.031
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	4500.0	4500.0	12546.5	NC	0.178	0.031
	4	Existing Waste	5.00	91.0	0	455.0	0.080	0.013	0.024	4955.0	4955.0	13001.5	NC	0.168	0.031
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5352.5	4780.0	13399.0	NC	0.102	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5692.5	5120.0	13739.0	NC	0.098	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6182.5	5610.0	14229.0	NC	0.310	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6699.3	6126.8	14745.8	NC	0.352	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7092.9	6520.4	15139.4	NC	0.338	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7571.4	6998.9	15617.9	NC	0.425	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8134.8	7562.3	16181.3	NC	0.403	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8653.2	8080.7	16699.7	NC	0.257	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9126.6	8554.1	17173.1	NC	0.247	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9600.0	9027.5	17646.5	NC	0.238	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10073.4	9500.9	18119.9	NC	0.229	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10546.8	9974.3	18593.3	NC	0.222	-
														4.984	0.291
													Total Settlement [ft]	**5.27**	

Variables & Constants	
Point Name	SP-02
Settlement Layer [ft]	125.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	OP EXISTING WASTE
SP-03	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6821.37	4166.03	716.00	823.22	721.16	660.00	655.00	643.00	625.00	580.00	665.00	709.13

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	103.22	103.0	0	10631.2									
	3	OFL	12.03	135.0	1	-1624.6									
	4	Existing Waste	0.13	91.0	1	-11.8									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1636.4	1636.4	12116.2	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1636.4	1636.4	12116.2	NC	-	-
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	1886.6	1886.6	12366.5	NC	0.359	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	2387.1	2387.1	12867.0	NC	0.322	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	2887.6	2887.6	13367.5	NC	0.293	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	3388.1	3388.1	13868.0	NC	0.269	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	3888.6	3888.6	14368.5	NC	0.250	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4389.1	4389.1	14869.0	NC	0.233	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4889.6	4889.6	15369.5	NC	0.219	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	5390.1	5390.1	15870.0	NC	0.206	0.034
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5810.4	4780.0	16290.2	NC	0.114	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	6150.4	5120.0	16630.2	NC	0.110	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6640.4	5610.0	17120.2	NC	0.352	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7157.2	6126.8	17637.0	NC	0.402	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7550.8	6520.4	18030.6	NC	0.388	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8029.3	6998.9	18509.1	NC	0.490	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8592.7	7562.3	19072.5	NC	0.467	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9111.1	8080.7	19590.9	NC	0.299	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9584.5	8554.1	20064.3	NC	0.289	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10057.9	9027.5	20537.7	NC	0.279	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10531.3	9500.9	21011.1	NC	0.270	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11004.7	9974.3	21484.5	NC	0.261	-
														5.873	0.315
													Total Settlement [ft]	6.19	

Variables & Constants	
Point Name	SP-03
Settlement Layer [ft]	129.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

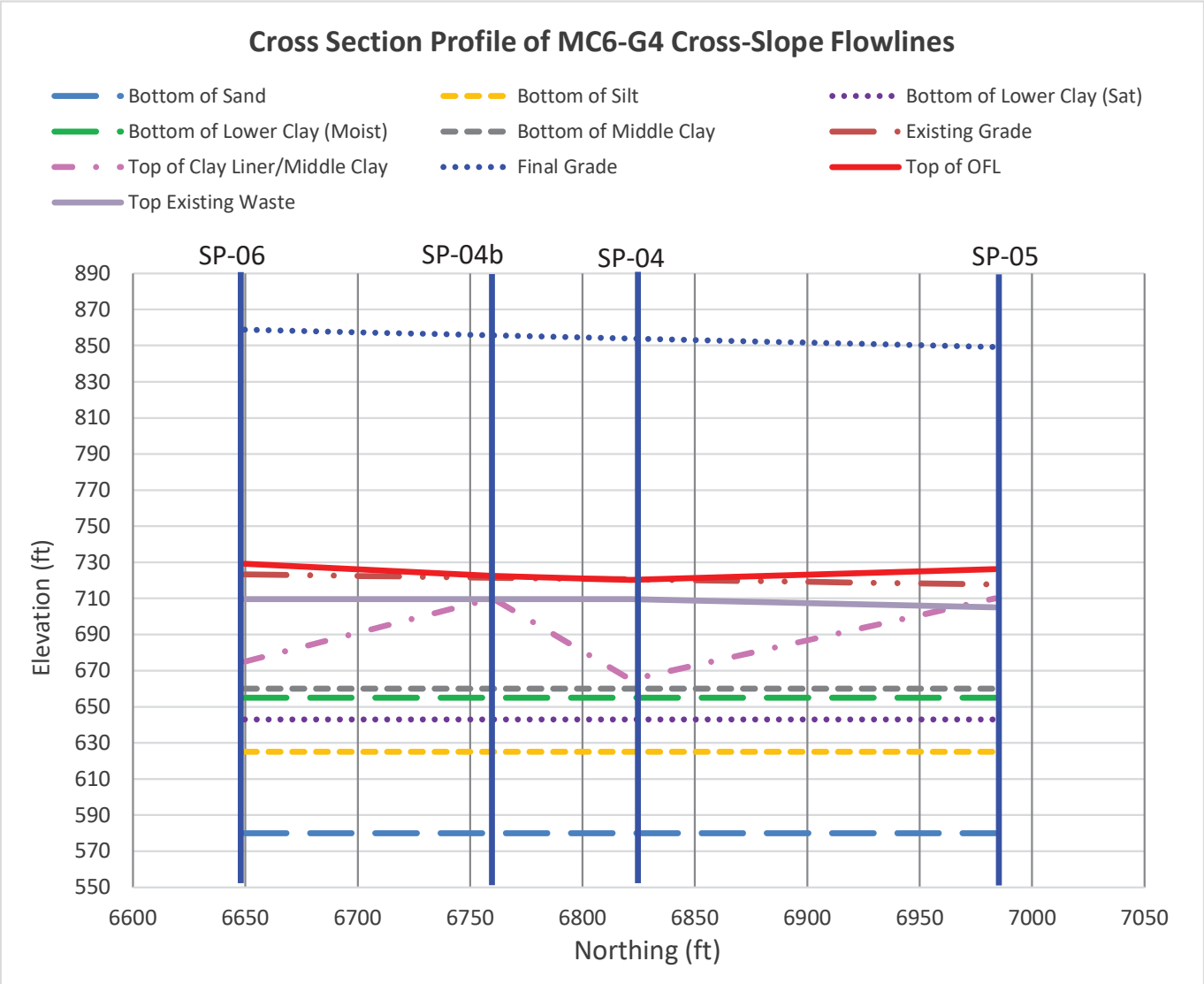
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	OP EXISTING WASTE
SP-04	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6821.55	4289.37	720.32	853.90	720.61	660.00	655.00	643.00	625.00	580.00	665.00	709.55

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	129.59	103.0	0	13347.4									
	3	OFL	7.30	135.0	1	-985.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	1.88	135.0	0	254.2	0.102	0.017	0.005	1112.2	1112.2	14959.5	NC	0.217	0.002
	3	OFL	1.88	135.0	0	254.2	0.102	0.017	0.005	1366.4	1366.4	15213.7	NC	0.201	0.002
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	1746.9	1746.9	15594.2	NC	0.424	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	2253.7	2253.7	16101.0	NC	0.380	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	2760.4	2760.4	16607.7	NC	0.347	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	3267.2	3267.2	17114.5	NC	0.320	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	3773.9	3773.9	17621.3	NC	0.298	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	4280.7	4280.7	18128.0	NC	0.279	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	4787.4	4787.4	18634.8	NC	0.263	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	5294.2	5294.2	19141.5	NC	0.249	0.034
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5717.6	4780.0	19564.9	NC	0.136	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	6057.6	5120.0	19904.9	NC	0.132	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6547.6	5610.0	20394.9	NC	0.422	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7064.4	6126.8	20911.7	NC	0.484	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7458.0	6520.4	21305.3	NC	0.468	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7936.5	6998.9	21783.8	NC	0.592	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8499.9	7562.3	22347.2	NC	0.567	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9018.3	8080.7	22865.6	NC	0.364	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9491.7	8554.1	23339.0	NC	0.352	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9965.1	9027.5	23812.4	NC	0.340	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10438.5	9500.9	24285.8	NC	0.330	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10911.9	9974.3	24759.2	NC	0.320	-
														7.484	0.323
											Total Settlement [ft]			7.81	

Variables & Constants	
Point Name	SP-04
Settlement Layer [ft]	133.3
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G4 Cross-Slope Flowlines
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-06
SP-04b
SP-04
SP-05
Elevation (ft)
890
870
850
830
810
790
770
750
730
710
690
670
650
630
610
590
570
550
6600
6650
6700
6750
6800
6850
6900
6950
7000
7050
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-04	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6821.55	4289.37	720.32	853.90	720.55	660.00	655.00	643.00	625.00	580.00	665.00	709.55

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	129.59	103.0	0	13347.4									
	3	OFL	7.23	135.0	1	-976.5									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	1.88	135.0	0	254.2	0.102	0.017	0.005	1103.6	1103.6	14959.5	NC	0.217	0.002
	3	OFL	1.88	135.0	0	254.2	0.102	0.017	0.005	1357.9	1357.9	15213.7	NC	0.202	0.002
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	1738.4	1738.4	15594.2	NC	0.424	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	2245.1	2245.1	16101.0	NC	0.381	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	2751.9	2751.9	16607.7	NC	0.348	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	3258.6	3258.6	17114.5	NC	0.321	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	3765.4	3765.4	17621.3	NC	0.299	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	4272.2	4272.2	18128.0	NC	0.280	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	4778.9	4778.9	18634.8	NC	0.263	0.034
	4	Existing Waste	5.57	91.0	0	506.8	0.080	0.013	0.024	5285.7	5285.7	19141.5	NC	0.249	0.034
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5709.1	4780.0	19564.9	NC	0.136	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	6049.1	5120.0	19904.9	NC	0.132	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6539.1	5610.0	20394.9	NC	0.422	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7055.9	6126.8	20911.7	NC	0.484	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7449.5	6520.4	21305.3	NC	0.468	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7928.0	6998.9	21783.8	NC	0.593	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8491.4	7562.3	22347.2	NC	0.567	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9009.8	8080.7	22865.6	NC	0.364	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9483.2	8554.1	23339.0	NC	0.352	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9956.6	9027.5	23812.4	NC	0.341	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10430.0	9500.9	24285.8	NC	0.330	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10903.4	9974.3	24759.2	NC	0.321	-
														7.495	0.323
													Total Settlement [ft]	**7.82**	

Variables & Constants	
Point Name	SP-04
Settlement Layer [ft]	133.3
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-04b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6759.99	4289.38	722.51	855.67	721.53	660.00	655.00	643.00	625.00	580.00	710.00	709.55

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	129.16	103.0	0	13303.5									
	3	OFL	6.02	135.0	1	-812.2									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	2.98	135.0	0	402.4	0.102	0.017	0.005	1013.4	1013.4	14989.7	NC	0.356	0.004
	3	OFL	2.98	135.0	0	402.4	0.102	0.017	0.005	1415.9	1415.9	15392.2	NC	0.315	0.004
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1617.1	1617.1	15593.4	NC	-	-
	6	Middle Clay	24.78	136.0	0	3369.4	0.102	0.017	0.005	3301.8	6294.7	17278.1	OC-2	1.226	0.032
	6	Middle Clay	24.78	136.0	0	3369.4	0.102	0.017	0.005	6671.2	9664.1	20647.5	OC-2	0.901	0.032
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8675.9	11668.8	22652.2	OC-2	0.265	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9192.7	12185.6	23169.0	OC-2	0.307	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9586.3	12579.2	23562.6	OC-2	0.300	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10064.8	13057.7	24041.1	OC-2	0.358	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10628.2	13621.1	24604.5	OC-2	0.347	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11146.6	14139.5	25122.9	OC-2	0.225	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11620.0	14612.9	25596.3	OC-2	0.219	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12093.4	15086.3	26069.7	OC-2	0.214	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12566.8	15559.7	26543.1	OC-2	0.209	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13040.2	16033.1	27016.5	OC-2	0.204	-
														5.445	0.110
													Total Settlement [ft]	**5.55**	

Variables & Constants	
Point Name	SP-04b
Settlement Layer [ft]	135.5
ERROR	0.0
# of Layers	14
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-05	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6983.40	4289.34	726.10	849.25	717.70	660.00	655.00	643.00	625.00	580.00	710.00	705.03

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	119.15	103.0	0	12272.2									
	3	OFL	8.40	135.0	0	1134.4									
	4	Existing Waste	0.00	91.0	1	-									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	6.34	135.0	0	855.2	0.102	0.017	0.005	427.6	427.6	14374.2	NC	0.986	0.008
	3	OFL	6.34	135.0	0	855.2	0.102	0.017	0.005	1282.8	1282.8	15229.4	NC	0.694	0.008
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	1710.5	1710.5	15657.0	NC	-	-
	6	Middle Clay	22.52	136.0	0	3062.0	0.102	0.017	0.005	3241.5	6141.0	17188.1	OC-2	1.133	0.029
	6	Middle Clay	22.52	136.0	0	3062.0	0.102	0.017	0.005	6303.5	9203.1	20250.1	OC-2	0.849	0.029
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8154.5	11054.1	22101.1	OC-2	0.276	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8671.3	11570.9	22617.9	OC-2	0.320	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9064.9	11964.5	23011.5	OC-2	0.312	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9543.4	12443.0	23490.0	OC-2	0.373	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10106.8	13006.4	24053.4	OC-2	0.360	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10625.2	13524.8	24571.8	OC-2	0.233	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11098.6	13998.2	25045.2	OC-2	0.227	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11572.0	14471.6	25518.6	OC-2	0.222	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12045.4	14945.0	25992.0	OC-2	0.216	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12518.8	15418.4	26465.4	OC-2	0.211	-
														6.414	0.113
													Total Settlement [ft]	**6.53**	

Variables & Constants	
Point Name	SP-05
Settlement Layer [ft]	137.7
ERROR	0.0
# of Layers	14
t / t_p [ratio]	1.8

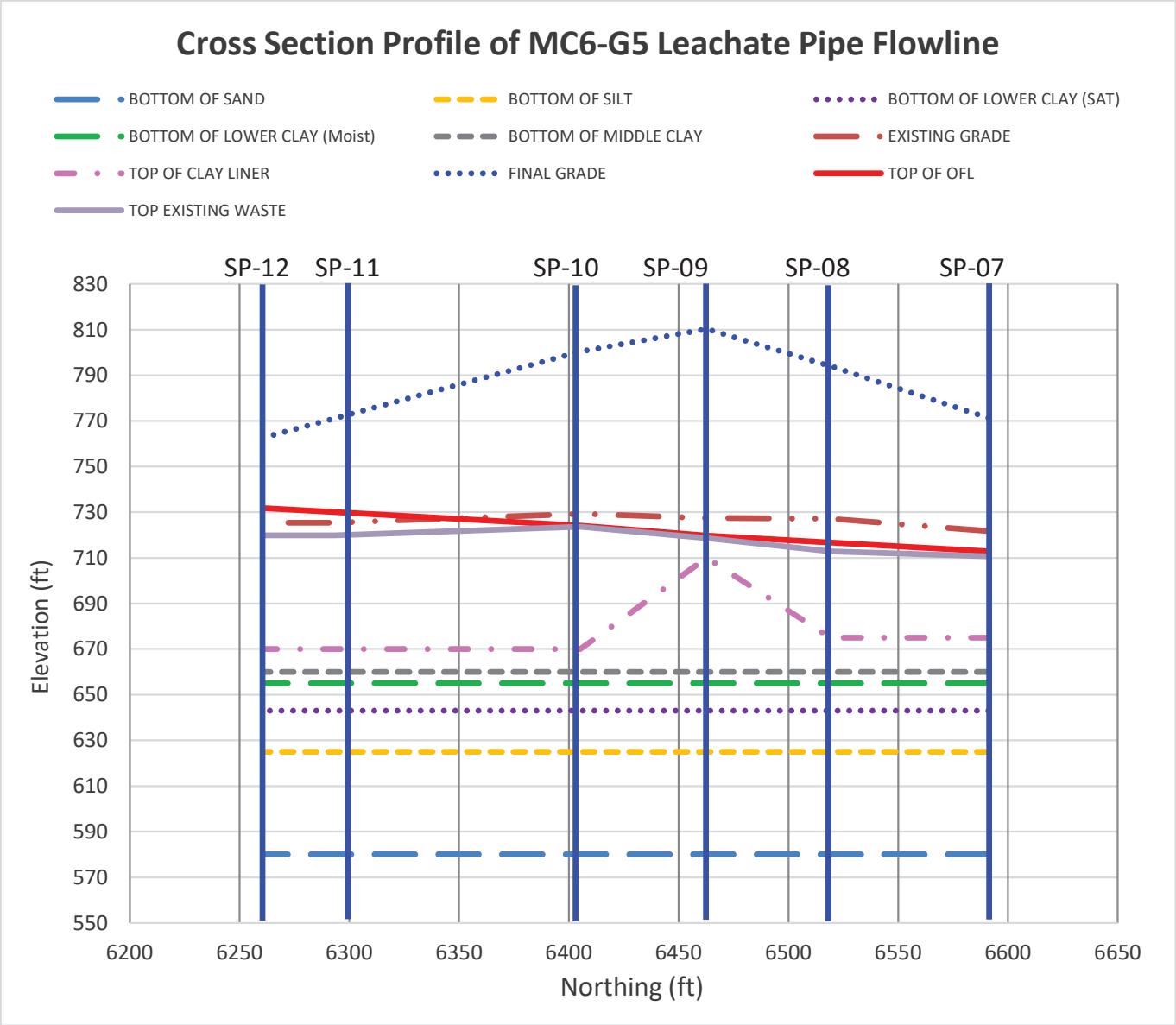
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-06	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6649.78	4289.40	729.15	858.84	723.28	660.00	655.00	643.00	625.00	580.00	675.00	709.56

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	125.69	103.0	0	12946.3									
	3	OFL	1.13	135.0	1	-152.7									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	6.29	135.0	0	849.8	0.102	0.017	0.005	577.6	577.6	14856.2	NC	0.905	0.008
	3	OFL	6.29	135.0	0	849.8	0.102	0.017	0.005	1427.3	1427.3	15706.0	NC	0.669	0.008
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	2048.8	2048.8	16327.4	NC	0.312	0.026
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	2441.9	2441.9	16720.5	NC	0.289	0.026
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	2835.0	2835.0	17113.7	NC	0.270	0.026
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	3228.1	3228.1	17506.8	NC	0.254	0.026
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	3621.2	3621.2	17899.9	NC	0.240	0.026
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	4014.4	4014.4	18293.0	NC	0.228	0.026
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	4407.5	4407.5	18686.1	NC	0.217	0.026
	4	Existing Waste	4.32	91.0	0	393.1	0.080	0.013	0.024	4800.6	4800.6	19079.3	NC	0.207	0.026
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	5507.2	5120.0	19785.8	NC	0.425	0.010
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	6527.2	6140.0	20805.8	NC	0.385	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7357.2	6970.0	21635.8	NC	0.401	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7874.0	7486.8	22152.6	NC	0.461	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8267.6	7880.4	22546.2	NC	0.447	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8746.1	8358.9	23024.7	NC	0.568	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9309.5	8922.3	23588.1	NC	0.545	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9827.9	9440.7	24106.5	NC	0.351	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10301.3	9914.1	24579.9	NC	0.340	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10774.7	10387.5	25053.3	NC	0.330	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11248.1	10860.9	25526.7	NC	0.320	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11721.5	11334.3	26000.1	NC	0.311	-
														8.473	0.286
													Total Settlement [ft]	**8.76**	

Variables & Constants	
Point Name	SP-06
Settlement Layer [ft]	142.1
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G5 Leachate Pipe Flowline
BOTTOM OF SAND
BOTTOM OF SILT
BOTTOM OF LOWER CLAY (SAT)
BOTTOM OF LOWER CLAY (Moist)
BOTTOM OF MIDDLE CLAY
EXISTING GRADE
TOP OF CLAY LINER
FINAL GRADE
TOP OF OFL
TOP EXISTING WASTE
SP-12
SP-11
SP-10
SP-09
SP-08
SP-07
Elevation (ft)
830
810
790
770
750
730
710
690
670
650
630
610
590
570
550
6200
6250
6300
6350
6400
6450
6500
6550
6600
6650
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-07	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6591.09	3931.50	712.86	771.35	721.72	660.00	655.00	643.00	625.00	580.00	675.00	710.70

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	54.49	103.0	0	5612.2									
	3	OFL	11.02	135.0	1	-1487.7									
	4	Exisitng Waste	4.84	91.0	1	-440.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1928.1	1928.1	7097.2	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1928.1	1928.1	7097.2	NC	-	-
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	2103.7	2103.7	7272.8	NC	0.166	0.024
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	2454.7	2454.7	7623.8	NC	0.152	0.024
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	2805.7	2805.7	7974.8	NC	0.140	0.024
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	3156.8	3156.8	8325.9	NC	0.130	0.024
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	3507.8	3507.8	8676.9	NC	0.121	0.024
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	3858.8	3858.8	9027.9	NC	0.114	0.024
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	4209.9	4209.9	9379.0	NC	0.107	0.024
	4	Existing Waste	3.86	91.0	0	351.0	0.080	0.013	0.024	4560.9	4560.9	9730.0	NC	0.102	0.024
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	5246.4	5120.0	10415.5	NC	0.228	0.010
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	6266.4	6140.0	11435.5	NC	0.200	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7096.4	6970.0	12265.5	NC	0.203	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7613.2	7486.8	12782.3	NC	0.231	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8006.8	7880.4	13175.9	NC	0.222	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8485.3	8358.9	13654.4	NC	0.279	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9048.7	8922.3	14217.8	NC	0.265	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9567.1	9440.7	14736.2	NC	0.169	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10040.5	9914.1	15209.6	NC	0.162	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10513.9	10387.5	15683.0	NC	0.156	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10987.3	10860.9	16156.4	NC	0.151	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11460.7	11334.3	16629.8	NC	0.146	-
														3.444	0.247
													Total Settlement [ft]	**3.69**	

Variables & Constants	
Point Name	SP-07
Settlement Layer [ft]	125.9
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-08	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6519.07	4013.94	716.69	794.05	727.13	660.00	655.00	643.00	625.00	580.00	675.00	712.76

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	73.36	103.0	0	7556.1									
	3	OFL	14.37	135.0	1	-1940.0									
	4	Existing Waste	3.07	91.0	1	-279.2									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2219.2	2219.2	9041.1	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2219.2	2219.2	9041.1	NC	-	-
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	2416.5	2416.5	9238.4	NC	0.202	0.027
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	2811.1	2811.1	9633.0	NC	0.186	0.027
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	3205.7	3205.7	10027.6	NC	0.172	0.027
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	3600.3	3600.3	10422.2	NC	0.160	0.027
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	3995.0	3995.0	10816.8	NC	0.150	0.027
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	4389.6	4389.6	11211.5	NC	0.141	0.027
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	4784.2	4784.2	11606.1	NC	0.134	0.027
	4	Existing Waste	4.34	91.0	0	394.6	0.080	0.013	0.024	5178.8	5178.8	12000.7	NC	0.127	0.027
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	5886.1	5120.0	12708.0	NC	0.256	0.010
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	6906.1	6140.0	13728.0	NC	0.228	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7736.1	6970.0	14558.0	NC	0.235	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8252.9	7486.8	15074.8	NC	0.268	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8646.5	7880.4	15468.4	NC	0.259	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9125.0	8358.9	15946.9	NC	0.327	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9688.4	8922.3	16510.3	NC	0.313	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10206.8	9440.7	17028.7	NC	0.200	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10680.2	9914.1	17502.1	NC	0.193	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11153.6	10387.5	17975.5	NC	0.187	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11627.0	10860.9	18448.9	NC	0.180	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12100.4	11334.3	18922.3	NC	0.175	-
														4.092	0.271
													Total Settlement [ft]	**4.36**	

Variables & Constants	
Point Name	SP-08
Settlement Layer [ft]	129.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-09	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6462.73	4078.42	719.69	810.28	727.41	660.00	655.00	643.00	625.00	580.00	710.00	718.59

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	86.59	103.0	0	8918.5									
	3	OFL	8.82	135.0	1	-1190.7									
	4	Existing Waste	5.90	91.0	1	-537.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1727.8	1727.8	10403.5	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1727.8	1727.8	10403.5	NC	-	-
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1743.1	1743.1	10418.8	NC	0.021	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1773.6	1773.6	10449.4	NC	0.021	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1804.2	1804.2	10479.9	NC	0.021	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1834.8	1834.8	10510.5	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1865.4	1865.4	10541.1	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1895.9	1895.9	10571.7	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1926.5	1926.5	10602.3	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1957.1	1957.1	10632.8	NC	0.020	0.002
	6	Middle Clay	25.00	136.0	0	3400.0	0.102	0.017	0.005	3672.4	6310.0	12348.1	OC-2	0.843	0.032
	6	Middle Clay	25.00	136.0	0	3400.0	0.102	0.017	0.005	7072.4	9710.0	15748.1	OC-2	0.594	0.032
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	9092.4	11730.0	17768.1	OC-2	0.170	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9609.2	12246.8	18284.9	OC-2	0.197	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	10002.8	12640.4	18678.5	OC-2	0.191	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10481.3	13118.9	19157.0	OC-2	0.222	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	11044.7	13682.3	19720.4	OC-2	0.214	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11563.1	14200.7	20238.8	OC-2	0.138	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12036.5	14674.1	20712.2	OC-2	0.135	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12509.9	15147.5	21185.6	OC-2	0.131	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12983.3	15620.9	21659.0	OC-2	0.128	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13456.7	16094.3	22132.4	OC-2	0.125	-
														3.251	0.119
													Total Settlement [ft]	**3.37**	

Variables & Constants	
Point Name	SP-09
Settlement Layer [ft]	132.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6405.19	4144.28	724.06	800.34	729.30	660.00	655.00	643.00	625.00	580.00	670.00	723.59

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	72.28	103.0	0	7445.1									
	3	OFL	5.71	135.0	1	-770.8									
	4	Exisitng Waste	6.53	91.0	1	-594.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1365.0	1365.0	8930.1	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1365.0	1365.0	8930.1	NC	-	-
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	1632.6	1632.6	9197.8	NC	0.353	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	2168.0	2168.0	9733.1	NC	0.307	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	2703.3	2703.3	10268.5	NC	0.273	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	3238.6	3238.6	10803.8	NC	0.246	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	3773.9	3773.9	11339.1	NC	0.225	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	4309.2	4309.2	11874.4	NC	0.207	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	4844.6	4844.6	12409.7	NC	0.192	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	5379.9	5379.9	12945.1	NC	0.179	0.036
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5987.5	4950.0	13552.7	NC	0.181	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6667.5	5630.0	14232.7	NC	0.168	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7327.5	6290.0	14892.7	NC	0.263	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7844.3	6806.8	15409.5	NC	0.301	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8237.9	7200.4	15803.1	NC	0.290	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8716.4	7678.9	16281.6	NC	0.366	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9279.8	8242.3	16845.0	NC	0.350	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9798.2	8760.7	17363.4	NC	0.224	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10271.6	9234.1	17836.8	NC	0.216	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10745.0	9707.5	18310.2	NC	0.208	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11218.4	10180.9	18783.6	NC	0.201	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11691.8	10654.3	19257.0	NC	0.195	-
														4.946	0.340
													Total Settlement [ft]	**5.29**	

Variables & Constants	
Point Name	SP-10
Settlement Layer [ft]	137.1
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-11	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6293.54	4272.06	730.00	771.20	725.40	660.00	655.00	643.00	625.00	580.00	670.00	719.82

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	37.20	103.0	0	3831.4									
	3	OFL	2.40	135.0	1	-323.9									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	1.59	135.0	0	214.7	0.102	0.017	0.005	431.3	431.3	5423.7	NC	0.178	0.002
	3	OFL	1.59	135.0	0	214.7	0.102	0.017	0.005	646.0	646.0	5638.4	NC	0.153	0.002
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	1036.7	1036.7	6029.1	NC	0.381	0.038
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	1603.4	1603.4	6595.8	NC	0.306	0.038
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	2170.1	2170.1	7162.5	NC	0.258	0.038
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	2736.8	2736.8	7729.2	NC	0.225	0.038
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	3303.5	3303.5	8295.9	NC	0.199	0.038
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	3870.2	3870.2	8862.6	NC	0.179	0.038
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	4436.9	4436.9	9429.3	NC	0.163	0.038
	4	Existing Waste	6.23	91.0	0	566.7	0.080	0.013	0.024	5003.6	5003.6	9996.0	NC	0.150	0.038
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5626.9	4950.0	10619.4	NC	0.141	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6306.9	5630.0	11299.4	NC	0.129	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6966.9	6290.0	11959.4	NC	0.201	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7483.7	6806.8	12476.2	NC	0.228	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7877.3	7200.4	12869.8	NC	0.219	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8355.8	7678.9	13348.3	NC	0.275	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8919.2	8242.3	13911.7	NC	0.261	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9437.6	8760.7	14430.1	NC	0.166	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9911.0	9234.1	14903.5	NC	0.159	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10384.4	9707.5	15376.9	NC	0.153	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10857.8	10180.9	15850.3	NC	0.148	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11331.2	10654.3	16323.7	NC	0.143	-
														4.414	0.361
													Total Settlement [ft]	**4.77**	

Variables & Constants	
Point Name	SP-11
Settlement Layer [ft]	143.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

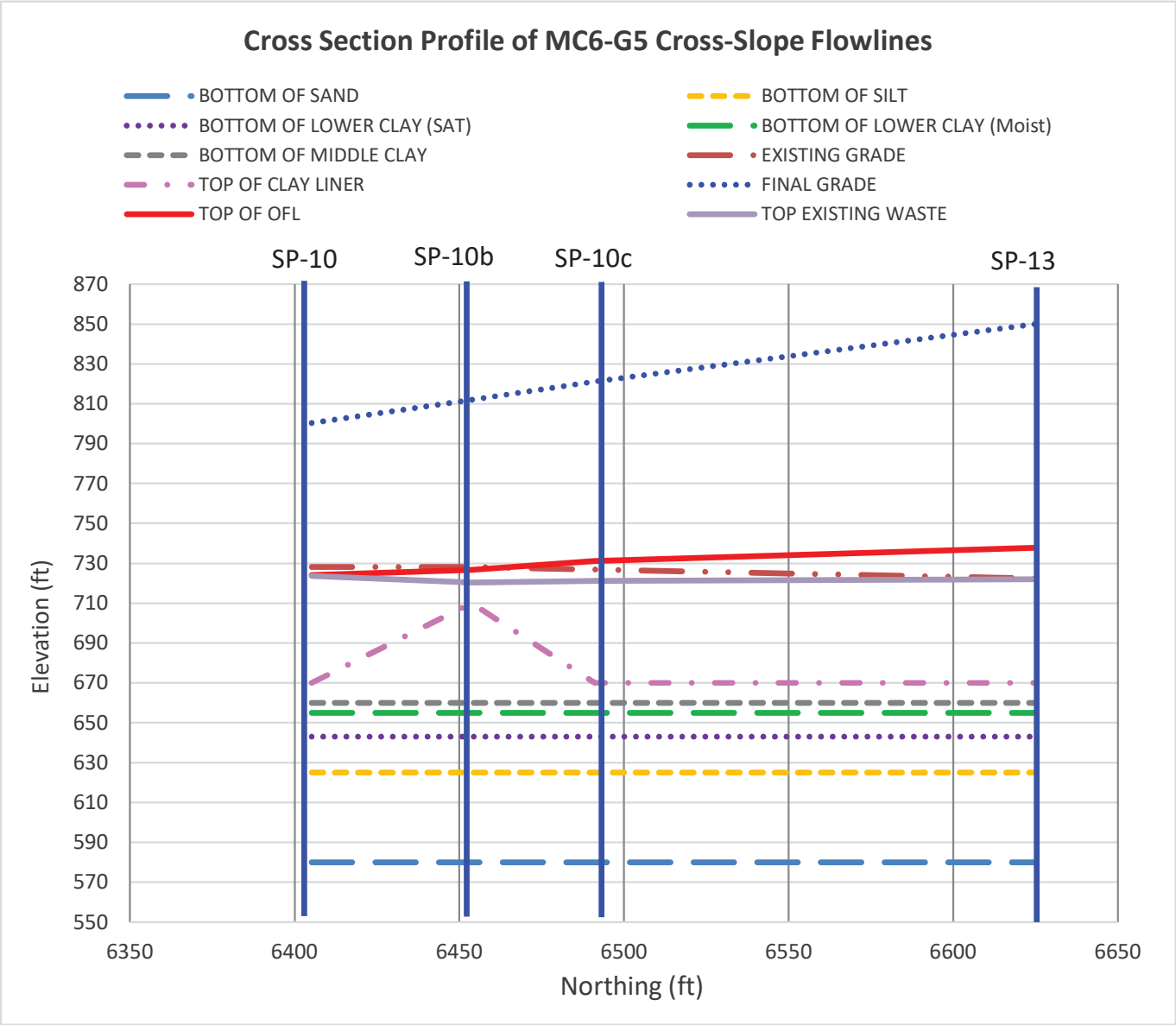
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-12	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6261.89	4308.31	731.68	762.93	725.44	660.00	655.00	643.00	625.00	580.00	670.00	719.91

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	27.25	103.0	0	2806.6									
	3	OFL	0.76	135.0	1	-102.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	2.39	135.0	0	322.3	0.102	0.017	0.005	263.1	263.1	4452.8	NC	0.299	0.003
	3	OFL	2.39	135.0	0	322.3	0.102	0.017	0.005	585.4	585.4	4775.1	NC	0.222	0.003
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	1030.4	1030.4	5220.1	NC	0.352	0.038
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	1598.1	1598.1	5787.8	NC	0.279	0.038
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	2165.9	2165.9	6355.5	NC	0.233	0.038
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	2733.6	2733.6	6923.2	NC	0.201	0.038
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	3301.3	3301.3	7491.0	NC	0.178	0.038
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	3869.0	3869.0	8058.7	NC	0.159	0.038
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	4436.8	4436.8	8626.4	NC	0.144	0.038
	4	Existing Waste	6.24	91.0	0	567.7	0.080	0.013	0.024	5004.5	5004.5	9194.1	NC	0.132	0.038
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5628.4	4950.0	9818.0	NC	0.123	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6308.4	5630.0	10498.0	NC	0.113	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6968.4	6290.0	11158.0	NC	0.175	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7485.2	6806.8	11674.8	NC	0.198	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7878.8	7200.4	12068.4	NC	0.190	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8357.3	7678.9	12546.9	NC	0.238	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8920.7	8242.3	13110.3	NC	0.226	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9439.1	8760.7	13628.7	NC	0.144	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9912.5	9234.1	14102.1	NC	0.138	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10385.9	9707.5	14575.5	NC	0.132	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10859.3	10180.9	15048.9	NC	0.128	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11332.7	10654.3	15522.3	NC	0.123	-
														4.126	0.364
													Total Settlement [ft]	**4.49**	

Variables & Constants	
Point Name	SP-12
Settlement Layer [ft]	144.7
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G5 Cross-Slope Flowlines
BOTTOM OF SAND
BOTTOM OF SILT
BOTTOM OF LOWER CLAY (SAT)
BOTTOM OF LOWER CLAY (Moist)
BOTTOM OF MIDDLE CLAY
EXISTING GRADE
TOP OF CLAY LINER
FINAL GRADE
TOP OF OFL
TOP EXISTING WASTE
SP-10
SP-10b
SP-10c
SP-13
870
850
830
810
790
770
750
730
710
690
670
650
630
610
590
570
550
Elevation (ft)
6350
6400
6450
6500
6550
6600
6650
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-09	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6462.73	4078.42	719.69	810.28	727.92	660.00	655.00	643.00	625.00	580.00	710.00	718.59

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	86.59	103.0	0	8918.5									
	3	OFL	9.33	135.0	1	-1259.0									
	4	Existing Waste	5.90	91.0	1	-537.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1796.1	1796.1	10403.5	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1796.1	1796.1	10403.5	NC	-	-
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1811.3	1811.3	10418.8	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1841.9	1841.9	10449.4	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1872.5	1872.5	10479.9	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1903.1	1903.1	10510.5	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1933.7	1933.7	10541.1	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1964.2	1964.2	10571.7	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	1994.8	1994.8	10602.3	NC	0.020	0.002
	4	Existing Waste	0.34	91.0	0	30.6	0.080	0.013	0.024	2025.4	2025.4	10632.8	NC	0.019	0.002
	6	Middle Clay	25.00	136.0	0	3400.0	0.102	0.017	0.005	3740.7	6310.0	12348.1	OC-2	0.840	0.032
	6	Middle Clay	25.00	136.0	0	3400.0	0.102	0.017	0.005	7140.7	9710.0	15748.1	OC-2	0.592	0.032
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	9160.7	11730.0	17768.1	OC-2	0.169	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9677.5	12246.8	18284.9	OC-2	0.196	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	10071.1	12640.4	18678.5	OC-2	0.191	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10549.6	13118.9	19157.0	OC-2	0.222	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	11113.0	13682.3	19720.4	OC-2	0.214	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11631.4	14200.7	20238.8	OC-2	0.138	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12104.8	14674.1	20712.2	OC-2	0.135	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12578.2	15147.5	21185.6	OC-2	0.131	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13051.6	15620.9	21659.0	OC-2	0.128	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13525.0	16094.3	22132.4	OC-2	0.125	-
														3.241	0.119
													Total Settlement [ft]	3.36	

Variables & Constants	
Point Name	SP-09
Settlement Layer [ft]	132.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6405.19	4144.28	724.06	800.34	728.10	660.00	655.00	643.00	625.00	580.00	670.00	723.59

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	72.28	103.0	0	7445.1									
	3	OFL	4.51	135.0	1	-609.4									
	4	Exisitng Waste	6.53	91.0	1	-594.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1203.5	1203.5	8930.1	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1203.5	1203.5	8930.1	NC	-	-
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	1471.1	1471.1	9197.8	NC	0.375	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	2006.5	2006.5	9733.1	NC	0.323	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	2541.8	2541.8	10268.5	NC	0.285	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	3077.1	3077.1	10803.8	NC	0.257	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	3612.4	3612.4	11339.1	NC	0.234	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	4147.8	4147.8	11874.4	NC	0.215	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	4683.1	4683.1	12409.7	NC	0.199	0.036
	4	Existing Waste	5.88	91.0	0	535.3	0.080	0.013	0.024	5218.4	5218.4	12945.1	NC	0.186	0.036
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5826.1	4950.0	13552.7	NC	0.187	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6506.1	5630.0	14232.7	NC	0.173	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7166.1	6290.0	14892.7	NC	0.272	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7682.9	6806.8	15409.5	NC	0.310	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8076.5	7200.4	15803.1	NC	0.299	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8555.0	7678.9	16281.6	NC	0.377	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9118.4	8242.3	16845.0	NC	0.360	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9636.8	8760.7	17363.4	NC	0.230	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10110.2	9234.1	17836.8	NC	0.222	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10583.6	9707.5	18310.2	NC	0.214	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11057.0	10180.9	18783.6	NC	0.207	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11530.4	10654.3	19257.0	NC	0.200	-
														5.125	0.340
											Total Settlement [ft]			5.47	

Variables & Constants	
Point Name	SP-10
Settlement Layer [ft]	137.1
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

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- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6453.73	4185.24	726.62	811.97	728.13	660.00	655.00	643.00	625.00	580.00	710.00	720.29

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	81.35	103.0	0	8379.5									
	3	OFL	7.85	135.0	1	-1059.5									
	4	Exisitng Waste	0.67	91.0	1	-60.9									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1120.4	1120.4	9864.5	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1120.4	1120.4	9864.5	NC	-	-
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1175.1	1175.1	9919.2	NC	0.089	0.007
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1284.5	1284.5	10028.6	NC	0.086	0.007
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1393.9	1393.9	10138.0	NC	0.083	0.007
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1503.3	1503.3	10247.4	NC	0.080	0.007
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1612.7	1612.7	10356.8	NC	0.078	0.007
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1722.0	1722.0	10466.2	NC	0.075	0.007
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1831.4	1831.4	10575.6	NC	0.073	0.007
	4	Existing Waste	1.20	91.0	0	109.4	0.080	0.013	0.024	1940.8	1940.8	10685.0	NC	0.071	0.007
	6	Middle Clay	25.00	136.0	0	3400.0	0.102	0.017	0.005	3695.5	6310.0	12439.7	OC-2	0.850	0.032
	6	Middle Clay	25.00	136.0	0	3400.0	0.102	0.017	0.005	7095.5	9710.0	15839.7	OC-2	0.600	0.032
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	9115.5	11730.0	17859.7	OC-2	0.172	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9632.3	12246.8	18376.5	OC-2	0.199	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	10025.9	12640.4	18770.1	OC-2	0.193	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10504.4	13118.9	19248.6	OC-2	0.225	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	11067.8	13682.3	19812.0	OC-2	0.217	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11586.2	14200.7	20330.4	OC-2	0.140	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12059.6	14674.1	20803.8	OC-2	0.136	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12533.0	15147.5	21277.2	OC-2	0.133	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13006.4	15620.9	21750.6	OC-2	0.129	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13479.8	16094.3	22224.0	OC-2	0.126	-
														3.756	0.162
											Total Settlement [ft]			3.92	

Variables & Constants	
Point Name	SP-10b
Settlement Layer [ft]	139.6
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10c	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6491.13	4219.37	731.14	821.11	726.85	660.00	655.00	643.00	625.00	580.00	670.00	721.14

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	85.97	103.0	0	8854.9									
	3	OFL	2.72	135.0	1	-366.6									
	4	Exisitng Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	1.50	135.0	0	202.1	0.102	0.017	0.005	467.6	467.6	10440.9	NC	0.206	0.002
	3	OFL	1.50	135.0	0	202.1	0.102	0.017	0.005	669.7	669.7	10643.0	NC	0.183	0.002
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	1061.6	1061.6	11034.9	NC	0.520	0.039
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	1643.4	1643.4	11616.7	NC	0.434	0.039
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	2225.2	2225.2	12198.4	NC	0.378	0.039
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	2806.9	2806.9	12780.2	NC	0.337	0.039
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	3388.7	3388.7	13361.9	NC	0.305	0.039
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	3970.4	3970.4	13943.7	NC	0.279	0.039
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	4552.2	4552.2	14525.4	NC	0.258	0.039
	4	Existing Waste	6.39	91.0	0	581.8	0.080	0.013	0.024	5133.9	5133.9	15107.2	NC	0.240	0.039
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5764.8	4950.0	15738.1	NC	0.222	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6444.8	5630.0	16418.1	NC	0.207	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7104.8	6290.0	17078.1	NC	0.326	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7621.6	6806.8	17594.9	NC	0.373	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8015.2	7200.4	17988.5	NC	0.360	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8493.7	7678.9	18467.0	NC	0.455	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9057.1	8242.3	19030.4	NC	0.435	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9575.5	8760.7	19548.8	NC	0.279	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10048.9	9234.1	20022.2	NC	0.269	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10522.3	9707.5	20495.6	NC	0.261	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10995.7	10180.9	20969.0	NC	0.252	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11469.1	10654.3	21442.4	NC	0.245	-
														6.824	0.369
											Total Settlement [ft]			7.19	

Variables & Constants	
Point Name	SP-10c
Settlement Layer [ft]	144.1
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-13	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6625.09	4329.82	737.83	850.00	722.36	660.00	655.00	643.00	625.00	580.00	670.00	722.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	108.17	103.0	0	11141.1									
	3	OFL	15.47	135.0	0	2089.1									
	4	Existing Waste	0.00	91.0	1	-									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.18	135.0	0	24.2	0.102	0.017	0.005	12.1	12.1	13782.3	NC	0.056	0.000
	3	OFL	0.18	135.0	0	24.2	0.102	0.017	0.005	36.3	36.3	13806.6	NC	0.047	0.000
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	344.2	344.2	14114.4	NC	0.839	0.040
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	935.7	935.7	14705.9	NC	0.622	0.040
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	1527.2	1527.2	15297.4	NC	0.520	0.040
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	2118.7	2118.7	15888.9	NC	0.455	0.040
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	2710.2	2710.2	16480.4	NC	0.408	0.040
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	3301.7	3301.7	17071.9	NC	0.371	0.040
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	3893.2	3893.2	17663.4	NC	0.342	0.040
	4	Existing Waste	6.50	91.0	0	591.5	0.080	0.013	0.024	4484.7	4484.7	18254.9	NC	0.317	0.040
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5120.5	4950.0	18890.7	NC	0.289	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5800.5	5630.0	19570.7	NC	0.269	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6460.5	6290.0	20230.7	NC	0.424	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6977.3	6806.8	20747.5	NC	0.486	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7370.9	7200.4	21141.1	NC	0.470	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7849.4	7678.9	21619.6	NC	0.594	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8412.8	8242.3	22183.0	NC	0.568	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8931.2	8760.7	22701.4	NC	0.365	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9404.6	9234.1	23174.8	NC	0.353	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9878.0	9707.5	23648.2	NC	0.341	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10351.4	10180.9	24121.6	NC	0.331	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10824.8	10654.3	24595.0	NC	0.321	-
														8.786	0.371
											Total Settlement [ft]			9.16	

Variables & Constants	
Point Name	SP-13
Settlement Layer [ft]	142.4
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

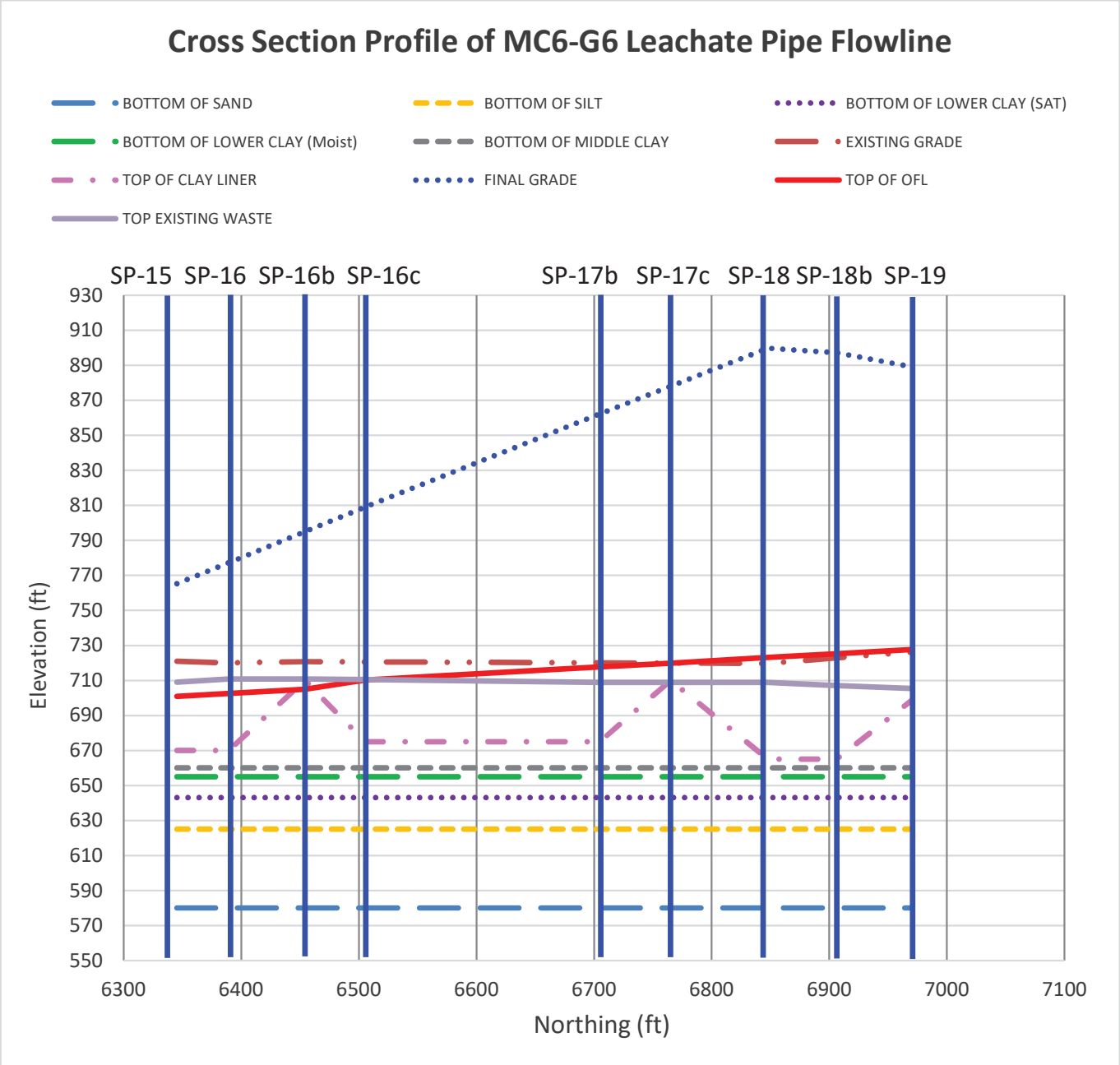
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	OP EXISTING WASTE
SP-14	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6237.97	3884.80	730.38	761.06	731.36	660.00	655.00	643.00	625.00	580.00	670.00	708.76

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	26.68	103.0	0	2747.6									
	3	OFL	7.98	135.0	1	-1077.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	7.31	135.0	0	987.2	0.102	0.017	0.005	1570.7	1570.7	4726.1	NC	0.357	0.009
	3	OFL	7.31	135.0	0	987.2	0.102	0.017	0.005	2557.8	2557.8	5713.3	NC	0.260	0.009
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	3271.9	3271.9	6427.3	NC	0.114	0.030
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	3712.7	3712.7	6868.2	NC	0.104	0.030
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	4153.6	4153.6	7309.1	NC	0.095	0.030
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	4594.5	4594.5	7750.0	NC	0.088	0.030
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	5035.4	5035.4	8190.9	NC	0.082	0.030
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	5476.3	5476.3	8631.8	NC	0.077	0.030
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	5917.2	5917.2	9072.7	NC	0.072	0.030
	4	Existing Waste	4.85	91.0	0	440.9	0.080	0.013	0.024	6358.1	6358.1	9513.6	NC	0.068	0.030
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6918.6	4950.0	10074.0	NC	0.083	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	7598.6	5630.0	10754.0	NC	0.077	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8258.6	6290.0	11414.0	NC	0.120	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8775.4	6806.8	11930.8	NC	0.137	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9169.0	7200.4	12324.4	NC	0.132	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9647.5	7678.9	12802.9	NC	0.166	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10210.9	8242.3	13366.3	NC	0.158	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10729.3	8760.7	13884.7	NC	0.101	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11202.7	9234.1	14358.1	NC	0.097	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11676.1	9707.5	14831.5	NC	0.094	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12149.5	10180.9	15304.9	NC	0.090	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12622.9	10654.3	15778.3	NC	0.087	-
														2.657	0.308
													Total Settlement [ft]	**2.97**	

Variables & Constants	
Point Name	SP-14
Settlement Layer [ft]	143.4
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G6 Leachate Pipe Flowline
BOTTOM OF SAND
BOTTOM OF SILT
BOTTOM OF LOWER CLAY (SAT)
BOTTOM OF LOWER CLAY (Moist)
BOTTOM OF MIDDLE CLAY
EXISTING GRADE
TOP OF CLAY LINER
FINAL GRADE
TOP OF OFL
TOP EXISTING WASTE
SP-15
SP-16
SP-16b
SP-16c
SP-17b
SP-17c
SP-18
SP-18b
SP-19
Elevation (ft)
930
910
890
870
850
830
810
790
770
750
730
710
690
670
650
630
610
590
570
550
6300
6400
6500
6600
6700
6800
6900
7000
7100
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6345.33	4693.30	700.88	765.25	720.96	660.00	655.00	643.00	625.00	580.00	670.00	708.90

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	60.37	103.0	0	6217.9									
	3	OFL	12.06	135.0	1	-1628.1									
	4	Exisitng Waste	15.02	91.0	1	-1367.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2995.2	2995.2	7702.9	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2995.2	2995.2	7702.9	NC	-	-
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	3131.0	3131.0	7838.7	NC	0.095	0.018
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	3402.6	3402.6	8110.3	NC	0.090	0.018
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	3674.2	3674.2	8381.9	NC	0.086	0.018
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	3945.8	3945.8	8653.5	NC	0.081	0.018
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	4217.4	4217.4	8925.1	NC	0.078	0.018
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	4489.0	4489.0	9196.7	NC	0.074	0.018
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	4760.6	4760.6	9468.3	NC	0.071	0.018
	4	Existing Waste	2.98	91.0	0	271.6	0.080	0.013	0.024	5032.2	5032.2	9739.9	NC	0.068	0.018
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5508.0	4950.0	10215.7	NC	0.137	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6188.0	5630.0	10895.7	NC	0.125	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6848.0	6290.0	11555.7	NC	0.194	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7364.8	6806.8	12072.5	NC	0.220	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7758.4	7200.4	12466.1	NC	0.211	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8236.9	7678.9	12944.6	NC	0.265	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8800.3	8242.3	13508.0	NC	0.251	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9318.7	8760.7	14026.4	NC	0.160	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9792.1	9234.1	14499.8	NC	0.153	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10265.5	9707.5	14973.2	NC	0.148	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10738.9	10180.9	15446.6	NC	0.142	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11212.3	10654.3	15920.0	NC	0.137	-
														2.788	0.198
													Total Settlement [ft]	**2.99**	

Variables & Constants	
Point Name	SP-15
Settlement Layer [ft]	113.9
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-16	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6389.25	4676.09	702.53	777.25	720.12	660.00	655.00	643.00	625.00	580.00	670.00	710.77

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	70.73	103.0	0	7284.8									
	3	OFL	9.35	135.0	1	-1262.3									
	4	Existing Waste	15.24	91.0	1	-1387.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2649.3	2649.3	8769.8	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2649.3	2649.3	8769.8	NC	-	-
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	2794.5	2794.5	8915.0	NC	0.129	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3084.9	3084.9	9205.4	NC	0.121	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3375.2	3375.2	9495.8	NC	0.115	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3665.6	3665.6	9786.1	NC	0.109	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3956.0	3956.0	10076.5	NC	0.104	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	4246.4	4246.4	10366.9	NC	0.099	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	4536.8	4536.8	10657.3	NC	0.095	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	4827.1	4827.1	10947.7	NC	0.091	0.020
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5312.3	4950.0	11432.9	NC	0.170	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5992.3	5630.0	12112.9	NC	0.156	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6652.3	6290.0	12772.9	NC	0.242	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7169.1	6806.8	13289.7	NC	0.275	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7562.7	7200.4	13683.3	NC	0.264	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8041.2	7678.9	14161.8	NC	0.332	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8604.6	8242.3	14725.2	NC	0.315	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9123.0	8760.7	15243.6	NC	0.201	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9596.4	9234.1	15717.0	NC	0.193	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10069.8	9707.5	16190.4	NC	0.186	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10543.2	10180.9	16663.8	NC	0.179	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11016.6	10654.3	17137.2	NC	0.173	-
														3.546	0.208
													Total Settlement [ft]	**3.75**	

Variables & Constants	
Point Name	SP-16
Settlement Layer [ft]	115.5
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-16b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6454.30	4650.58	704.97	795.01	720.67	660.00	655.00	643.00	625.00	580.00	710.00	710.80

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	86.04	103.0	0	8862.2									
	3	OFL	9.87	135.0	1	-1331.9									
	4	Existing Waste	0.80	91.0	1	-72.8									
	6	Middle Clay	12.03	136.0	1	-1635.6									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3040.2	3040.2	10347.2	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3040.2	3040.2	10347.2	NC	-	-
	6	Middle Clay	18.99	136.0	0	2582.2	0.102	0.017	0.005	4331.3	5901.1	11638.3	OC-2	0.615	0.024
	6	Middle Clay	18.99	136.0	0	2582.2	0.102	0.017	0.005	6913.5	8483.3	14220.6	OC-2	0.463	0.024
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8524.7	10094.4	15831.7	OC-2	0.178	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9041.5	10611.2	16348.5	OC-2	0.204	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9435.1	11004.8	16742.1	OC-2	0.198	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9913.6	11483.3	17220.6	OC-2	0.238	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10477.0	12046.7	17784.0	OC-2	0.228	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10995.4	12565.1	18302.4	OC-2	0.147	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11468.8	13038.5	18775.8	OC-2	0.143	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11942.2	13511.9	19249.2	OC-2	0.138	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12415.6	13985.3	19722.6	OC-2	0.134	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12889.0	14458.7	20196.0	OC-2	0.131	-
														2.817	0.088
													Total Settlement [ft]	**2.90**	

Variables & Constants	
Point Name	SP-16b
Settlement Layer [ft]	118.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-16c	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6505.08	4630.68	710.15	808.95	720.54	660.00	655.00	643.00	625.00	580.00	675.00	710.39

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	94.80	103.0	0	9764.3									
	3	OFL	10.15	135.0	1	-1370.1									
	4	Exisitng Waste	7.24	91.0	1	-658.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2028.5	2028.5	11249.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2028.5	2028.5	11249.3	NC	-	-
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	2188.6	2188.6	11409.4	NC	0.202	0.022
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	2508.9	2508.9	11729.7	NC	0.189	0.022
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	2829.2	2829.2	12050.0	NC	0.177	0.022
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	3149.4	3149.4	12370.2	NC	0.167	0.022
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	3469.7	3469.7	12690.5	NC	0.159	0.022
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	3789.9	3789.9	13010.7	NC	0.151	0.022
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	4110.2	4110.2	13331.0	NC	0.144	0.022
	4	Existing Waste	3.52	91.0	0	320.3	0.080	0.013	0.024	4430.4	4430.4	13651.2	NC	0.138	0.022
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	5100.6	5120.0	14321.4	OC-2	0.342	0.010
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	6120.6	6140.0	15341.4	OC-2	0.304	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6950.6	6970.0	16171.4	OC-2	0.313	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7467.4	7486.8	16688.2	OC-2	0.357	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7861.0	7880.4	17081.8	OC-2	0.345	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8339.5	8358.9	17560.3	OC-2	0.435	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8902.9	8922.3	18123.7	OC-2	0.415	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9421.3	9440.7	18642.1	OC-2	0.266	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9894.7	9914.1	19115.5	OC-2	0.257	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10368.1	10387.5	19588.9	OC-2	0.248	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10841.5	10860.9	20062.3	OC-2	0.240	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11314.9	11334.3	20535.7	OC-2	0.232	-
														5.080	0.231
													Total Settlement [ft]	**5.31**	

Variables & Constants	
Point Name	SP-16c
Settlement Layer [ft]	123.2
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-17b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6704.95	4552.33	717.67	862.24	720.03	660.00	655.00	643.00	625.00	580.00	675.00	708.75

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	140.58	103.0	0	14479.3									
	3	OFL	9.36	135.0	1	-1264.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.96	135.0	0	129.5	0.102	0.017	0.005	1328.8	1328.8	16029.0	NC	0.106	0.001
	3	OFL	0.96	135.0	0	129.5	0.102	0.017	0.005	1458.3	1458.3	16158.5	NC	0.102	0.001
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	1715.0	1715.0	16415.2	NC	0.331	0.026
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	2098.9	2098.9	16799.1	NC	0.305	0.026
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	2482.8	2482.8	17183.0	NC	0.284	0.026
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	2866.7	2866.7	17566.9	NC	0.266	0.026
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	3250.6	3250.6	17950.8	NC	0.250	0.026
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	3634.5	3634.5	18334.8	NC	0.237	0.026
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	4018.4	4018.4	18718.7	NC	0.226	0.026
	4	Existing Waste	4.22	91.0	0	383.9	0.080	0.013	0.024	4402.3	4402.3	19102.6	NC	0.215	0.026
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	5104.3	5120.0	19804.5	OC-2	0.450	0.010
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	6124.3	6140.0	20824.5	OC-2	0.406	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6954.3	6970.0	21654.5	OC-2	0.421	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7471.1	7486.8	22171.3	OC-2	0.484	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7864.7	7880.4	22564.9	OC-2	0.469	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8343.2	8358.9	23043.4	OC-2	0.595	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8906.6	8922.3	23606.8	OC-2	0.570	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9425.0	9440.7	24125.2	OC-2	0.367	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9898.4	9914.1	24598.6	OC-2	0.355	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10371.8	10387.5	25072.0	OC-2	0.344	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10845.2	10860.9	25545.4	OC-2	0.334	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11318.6	11334.3	26018.8	OC-2	0.325	-
														7.441	0.267
													Total Settlement [ft]	**7.71**	

Variables & Constants	
Point Name	SP-17b
Settlement Layer [ft]	130.7
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-17c	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6765.08	4528.76	719.93	878.05	719.88	660.00	655.00	643.00	625.00	580.00	710.00	708.80

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	154.12	103.0	0	15874.9									
	3	OFL	6.95	135.0	1	-938.3									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	1.46	135.0	0	197.7	0.102	0.017	0.005	1037.2	1037.2	17458.7	NC	0.183	0.002
	3	OFL	1.46	135.0	0	197.7	0.102	0.017	0.005	1234.9	1234.9	17656.4	NC	0.173	0.002
	6	Middle Clay	8.33	136.0	0	1133.3	0.102	0.017	0.005	1900.4	1900.4	18321.9	NC	0.837	0.011
	6	Middle Clay	8.33	136.0	0	1133.3	0.102	0.017	0.005	3033.7	3033.7	19455.2	NC	0.686	0.011
	6	Middle Clay	8.33	136.0	0	1133.3	0.102	0.017	0.005	4167.1	4167.1	20588.6	NC	0.590	0.011
	6	Middle Clay	8.33	136.0	0	1133.3	0.102	0.017	0.005	5300.4	5300.4	21721.9	NC	0.521	0.011
	6	Middle Clay	8.33	136.0	0	1133.3	0.102	0.017	0.005	6433.7	6433.7	22855.2	NC	0.468	0.011
	6	Middle Clay	8.33	136.0	0	1133.3	0.102	0.017	0.005	7567.1	7567.1	23988.6	NC	0.426	0.011
	-		0.00		0	-	-	-	-	-	0.0	-	-	-	-
	-		0.00		0	-	-	-	-	-	0.0	-	-	-	-
	-		0.00		0	-	-	-	-	-	4610.0	-	-	-	-
	-		0.00		0	-	-	-	-	-	4610.0	-	-	-	-
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	320.0	4930.0	16741.5	OC-2	0.623	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	836.8	5446.8	17258.3	OC-2	0.653	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	1230.4	5840.4	17651.9	OC-2	0.609	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	1708.9	6318.9	18130.4	OC-2	0.618	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	2272.3	6882.3	18693.8	OC-2	0.586	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	2790.7	7400.7	19212.2	OC-2	0.373	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	3264.1	7874.1	19685.6	OC-2	0.358	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	3737.5	8347.5	20159.0	OC-2	0.345	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	4210.9	8820.9	20632.4	OC-2	0.332	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	4684.3	9294.3	21105.8	OC-2	0.321	-
														8.699	0.107
													Total Settlement [ft]	**8.81**	

Variables & Constants	
Point Name	SP-17c
Settlement Layer [ft]	132.9
ERROR	0.0
# of Layers	18
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-18	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6847.70	4496.37	723.03	899.78	719.67	660.00	655.00	643.00	625.00	580.00	665.00	708.85

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	172.74	103.0	0	17792.5									
	3	OFL	3.64	135.0	1	-490.8									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.59	135.0	0	485.0	0.102	0.017	0.005	733.2	733.2	19520.0	NC	0.522	0.005
	3	OFL	3.59	135.0	0	485.0	0.102	0.017	0.005	1218.2	1218.2	20005.0	NC	0.445	0.005
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	1710.1	1710.1	20496.9	NC	0.473	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	2208.9	2208.9	20995.6	NC	0.429	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	2707.7	2707.7	21494.4	NC	0.395	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	3206.5	3206.5	21993.2	NC	0.367	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	3705.3	3705.3	22492.0	NC	0.343	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	4204.1	4204.1	22990.8	NC	0.324	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	4702.9	4702.9	23489.6	NC	0.306	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	5201.7	5201.7	23988.4	NC	0.291	0.034
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5621.0	4780.0	24407.8	NC	0.163	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5961.0	5120.0	24747.8	NC	0.158	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6451.0	5610.0	25237.8	NC	0.507	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6967.8	6126.8	25754.6	NC	0.583	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7361.4	6520.4	26148.2	NC	0.565	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7839.9	6998.9	26626.7	NC	0.717	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8403.3	7562.3	27190.1	NC	0.688	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8921.7	8080.7	27708.5	NC	0.443	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9395.1	8554.1	28181.9	NC	0.429	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9868.5	9027.5	28655.3	NC	0.417	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10342.0	9500.9	29128.7	NC	0.405	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10815.4	9974.3	29602.1	NC	0.394	-
														9.362	0.323
													Total Settlement [ft]	**9.68**	

Variables & Constants	
Point Name	SP-18
Settlement Layer [ft]	136.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-18b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6906.30	4473.40	725.24	897.18	722.93	660.00	655.00	643.00	625.00	580.00	665.00	707.13

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	167.94	103.0	0	17297.7									
	3	OFL	4.69	135.0	1	-632.8									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	5.55	135.0	0	749.8	0.102	0.017	0.005	1007.7	1007.7	19157.6	NC	0.725	0.007
	3	OFL	5.55	135.0	0	749.8	0.102	0.017	0.005	1757.4	1757.4	19907.3	NC	0.597	0.007
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	2371.9	2371.9	20521.8	NC	0.395	0.032
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	2851.2	2851.2	21001.0	NC	0.365	0.032
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	3330.4	3330.4	21480.3	NC	0.341	0.032
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	3809.6	3809.6	21959.5	NC	0.320	0.032
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	4288.9	4288.9	22438.7	NC	0.303	0.032
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	4768.1	4768.1	22917.9	NC	0.287	0.032
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	5247.3	5247.3	23397.2	NC	0.274	0.032
	4	Existing Waste	5.27	91.0	0	479.2	0.080	0.013	0.024	5726.5	5726.5	23876.4	NC	0.261	0.032
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	6136.2	4780.0	24286.0	NC	0.152	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	6476.2	5120.0	24626.0	NC	0.148	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6966.2	5610.0	25116.0	NC	0.476	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7483.0	6126.8	25632.8	NC	0.549	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7876.6	6520.4	26026.4	NC	0.533	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8355.1	6998.9	26504.9	NC	0.677	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8918.5	7562.3	27068.3	NC	0.651	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9436.9	8080.7	27586.7	NC	0.419	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9910.3	8554.1	28060.1	NC	0.407	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10383.7	9027.5	28533.5	NC	0.395	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10857.1	9500.9	29006.9	NC	0.384	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11330.5	9974.3	29480.3	NC	0.374	-
														9.033	0.318
													Total Settlement [ft]	**9.35**	

Variables & Constants	
Point Name	SP-18b
Settlement Layer [ft]	138.2
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

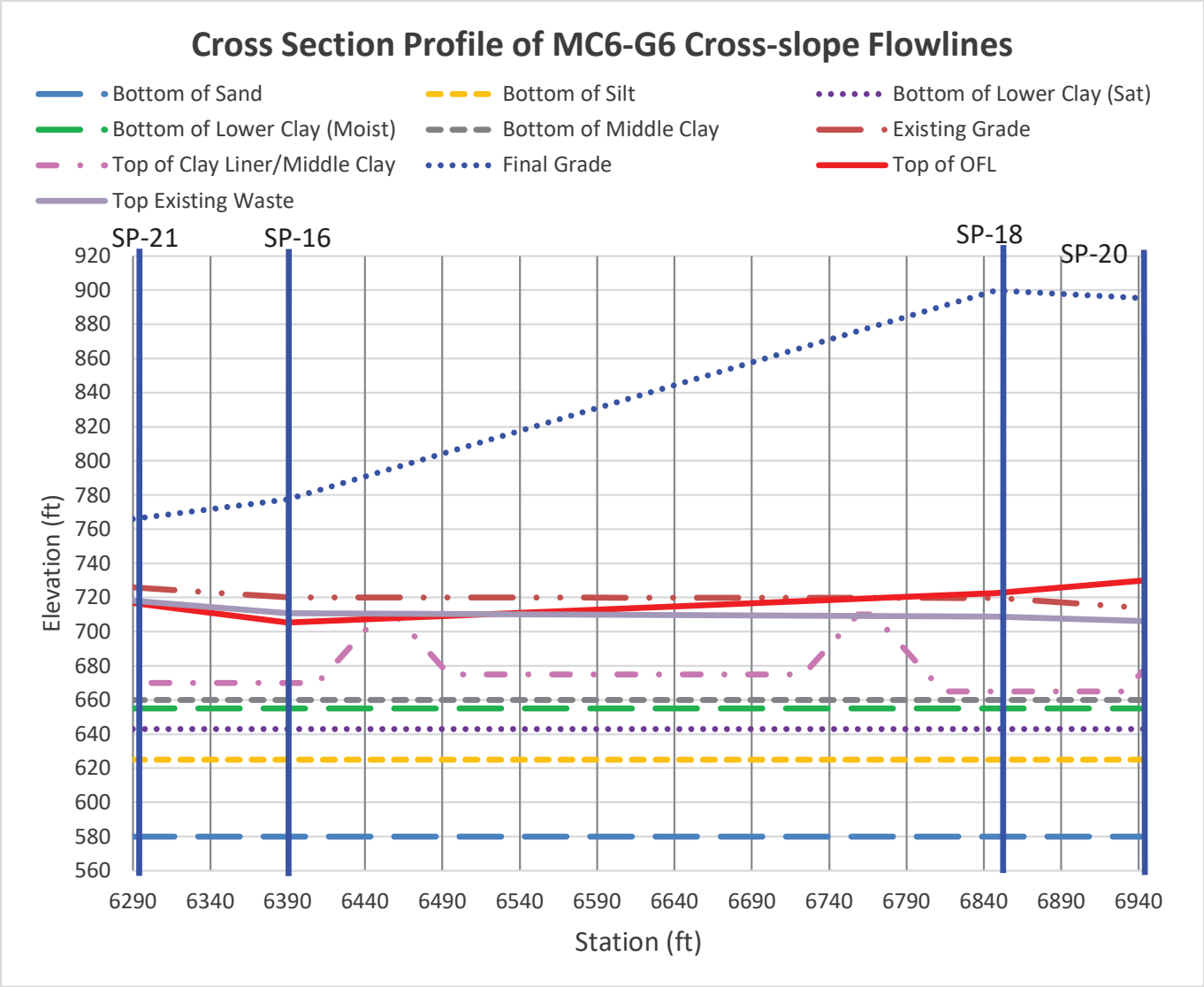
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-19	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6970.25	4448.33	727.64	889.11	726.18	660.00	655.00	643.00	625.00	580.00	698.74	705.41

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	157.47	103.0	0	16219.6									
	3	OFL	5.54	135.0	1	-747.6									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	7.62	135.0	0	1028.2	0.102	0.017	0.005	1261.7	1261.7	18218.7	NC	0.901	0.010
	3	OFL	7.62	135.0	0	1028.2	0.102	0.017	0.005	2289.9	2289.9	19246.9	NC	0.718	0.010
	4	Existing Waste	1.33	91.0	0	121.4	0.080	0.013	0.024	2864.6	2864.6	19821.7	NC	0.090	0.008
	4	Existing Waste	1.33	91.0	0	121.4	0.080	0.013	0.024	2986.0	2986.0	19943.0	NC	0.088	0.008
	4	Existing Waste	1.33	91.0	0	121.4	0.080	0.013	0.024	3107.4	3107.4	20064.4	NC	0.086	0.008
	4	Existing Waste	1.33	91.0	0	121.4	0.080	0.013	0.024	3228.8	3228.8	20185.8	NC	0.085	0.008
	4	Existing Waste	1.33	91.0	0	121.4	0.080	0.013	0.024	3350.2	3350.2	20307.2	NC	0.084	0.008
	6	Middle Clay	7.75	91.0	0	705.1	0.102	0.017	0.005	3763.5	3763.5	20720.5	NC	0.585	0.010
	6	Middle Clay	7.75	91.0	0	705.1	0.102	0.017	0.005	4468.5	4468.5	21425.5	NC	0.538	0.010
	6	Middle Clay	7.75	91.0	0	705.1	0.102	0.017	0.005	5173.6	5173.6	22130.6	NC	0.499	0.010
	6	Middle Clay	7.75	136.0	0	1053.7	0.102	0.017	0.005	6053.0	5136.9	23010.0	NC	0.458	0.010
	6	Middle Clay	7.75	136.0	0	1053.7	0.102	0.017	0.005	7106.7	6190.6	24063.7	NC	0.419	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7953.6	7037.5	24910.6	NC	0.424	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8470.4	7554.3	25427.4	NC	0.490	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8864.0	7947.9	25821.0	NC	0.476	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9342.5	8426.4	26299.5	NC	0.607	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9905.9	8989.8	26862.9	NC	0.585	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10424.3	9508.2	27381.3	NC	0.377	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10897.7	9981.6	27854.7	NC	0.367	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11371.1	10455.0	28328.1	NC	0.357	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11844.5	10928.4	28801.5	NC	0.347	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12317.9	11401.8	29274.9	NC	0.338	-
														8.919	0.149
													Total Settlement [ft]	**9.07**	

Variables & Constants	
Point Name	SP-19
Settlement Layer [ft]	140.6
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G6 Cross-slope Flowlines
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-21
SP-16
SP-18
SP-20
Elevation (ft)
920
900
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
6290
6340
6390
6440
6490
6540
6590
6640
6690
6740
6790
6840
6890
6940
Station (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-16	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6389.25	4676.09	702.53	777.25	720.13	660.00	655.00	643.00	625.00	580.00	670.00	710.77

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	70.73	103.0	0	7284.8									
	3	OFL	9.36	135.0	1	-1264.3									
	4	Existing Waste	15.24	91.0	1	-1387.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2651.3	2651.3	8769.8	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2651.3	2651.3	8769.8	NC	-	-
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	2796.5	2796.5	8915.0	NC	0.129	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3086.9	3086.9	9205.4	NC	0.121	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3377.2	3377.2	9495.8	NC	0.115	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3667.6	3667.6	9786.1	NC	0.109	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	3958.0	3958.0	10076.5	NC	0.104	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	4248.4	4248.4	10366.9	NC	0.099	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	4538.8	4538.8	10657.3	NC	0.095	0.020
	4	Existing Waste	3.19	91.0	0	290.4	0.080	0.013	0.024	4829.1	4829.1	10947.7	NC	0.091	0.020
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5314.3	4950.0	11432.9	NC	0.170	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5994.3	5630.0	12112.9	NC	0.156	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6654.3	6290.0	12772.9	NC	0.242	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7171.1	6806.8	13289.7	NC	0.275	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7564.7	7200.4	13683.3	NC	0.264	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8043.2	7678.9	14161.8	NC	0.332	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8606.6	8242.3	14725.2	NC	0.315	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9125.0	8760.7	15243.6	NC	0.201	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9598.4	9234.1	15717.0	NC	0.193	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10071.8	9707.5	16190.4	NC	0.186	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10545.2	10180.9	16663.8	NC	0.179	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11018.6	10654.3	17137.2	NC	0.173	-
														3.544	0.208
													Total Settlement [ft]	3.75	

Variables & Constants	
Point Name	SP-16
Settlement Layer [ft]	115.5
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-18	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6847.70	4496.37	723.03	899.78	719.66	660.00	655.00	643.00	625.00	580.00	665.00	708.85

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	172.74	103.0	0	17792.5									
	3	OFL	3.62	135.0	FALSE	489.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.59	135.0	0	485.0	0.102	0.017	0.005	242.5	242.5	20009.0	NC	0.702	0.005
	3	OFL	3.59	135.0	0	485.0	0.102	0.017	0.005	727.5	727.5	20493.9	NC	0.531	0.005
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	1219.3	1219.3	20985.8	NC	0.542	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	1718.1	1718.1	21484.6	NC	0.481	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	2216.9	2216.9	21983.4	NC	0.437	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	2715.7	2715.7	22482.2	NC	0.403	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	3214.5	3214.5	22981.0	NC	0.375	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	3713.3	3713.3	23479.8	NC	0.351	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	4212.1	4212.1	23978.6	NC	0.331	0.034
	4	Existing Waste	5.48	91.0	0	498.8	0.080	0.013	0.024	4710.9	4710.9	24477.4	NC	0.314	0.034
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5130.3	4780.0	24896.8	NC	0.175	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5470.3	5120.0	25236.8	NC	0.169	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5960.3	5610.0	25726.8	NC	0.543	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6477.1	6126.8	26243.6	NC	0.623	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6870.7	6520.4	26637.2	NC	0.604	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7349.2	6998.9	27115.7	NC	0.765	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7912.6	7562.3	27679.1	NC	0.734	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8431.0	8080.7	28197.5	NC	0.472	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8904.4	8554.1	28670.9	NC	0.457	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9377.8	9027.5	29144.3	NC	0.443	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9851.2	9500.9	29617.7	NC	0.430	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10324.6	9974.3	30091.1	NC	0.418	-
														10.301	0.323
													Total Settlement [ft]	10.62	

Variables & Constants	
Point Name	SP-18
Settlement Layer [ft]	136.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-20	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6937.43	4751.42	732.34	896.46	713.90	660.00	655.00	643.00	625.00	580.00	665.00	706.12

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	160.12	103.0	0	16492.1									
	3	OFL	11.44	135.0	0	1544.7									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.89	135.0	0	525.3	0.102	0.017	0.005	262.6	262.6	19784.4	NC	0.745	0.005
	3	OFL	3.89	135.0	0	525.3	0.102	0.017	0.005	787.9	787.9	20309.7	NC	0.560	0.005
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	1284.4	1284.4	20806.2	NC	0.497	0.031
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	1752.2	1752.2	21274.0	NC	0.446	0.031
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	2219.9	2219.9	21741.7	NC	0.407	0.031
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	2687.6	2687.6	22209.5	NC	0.377	0.031
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	3155.4	3155.4	22677.2	NC	0.352	0.031
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	3623.1	3623.1	23144.9	NC	0.331	0.031
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	4090.9	4090.9	23612.7	NC	0.313	0.031
	4	Existing Waste	5.14	91.0	0	467.7	0.080	0.013	0.024	4558.6	4558.6	24080.4	NC	0.297	0.031
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	4962.5	4780.0	24484.3	NC	0.177	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	5302.5	5120.0	24824.3	NC	0.171	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5792.5	5610.0	25314.3	NC	0.548	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6309.3	6126.8	25831.1	NC	0.628	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6702.9	6520.4	26224.7	NC	0.608	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7181.4	6998.9	26703.2	NC	0.770	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7744.8	7562.3	27266.6	NC	0.738	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8263.2	8080.7	27785.0	NC	0.474	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8736.6	8554.1	28258.4	NC	0.459	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9210.0	9027.5	28731.8	NC	0.445	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9683.4	9500.9	29205.2	NC	0.431	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10156.8	9974.3	29678.6	NC	0.419	-
														10.194	0.307
													Total Settlement [ft]	10.50	

Variables & Constants	
Point Name	SP-20
Settlement Layer [ft]	133.9
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

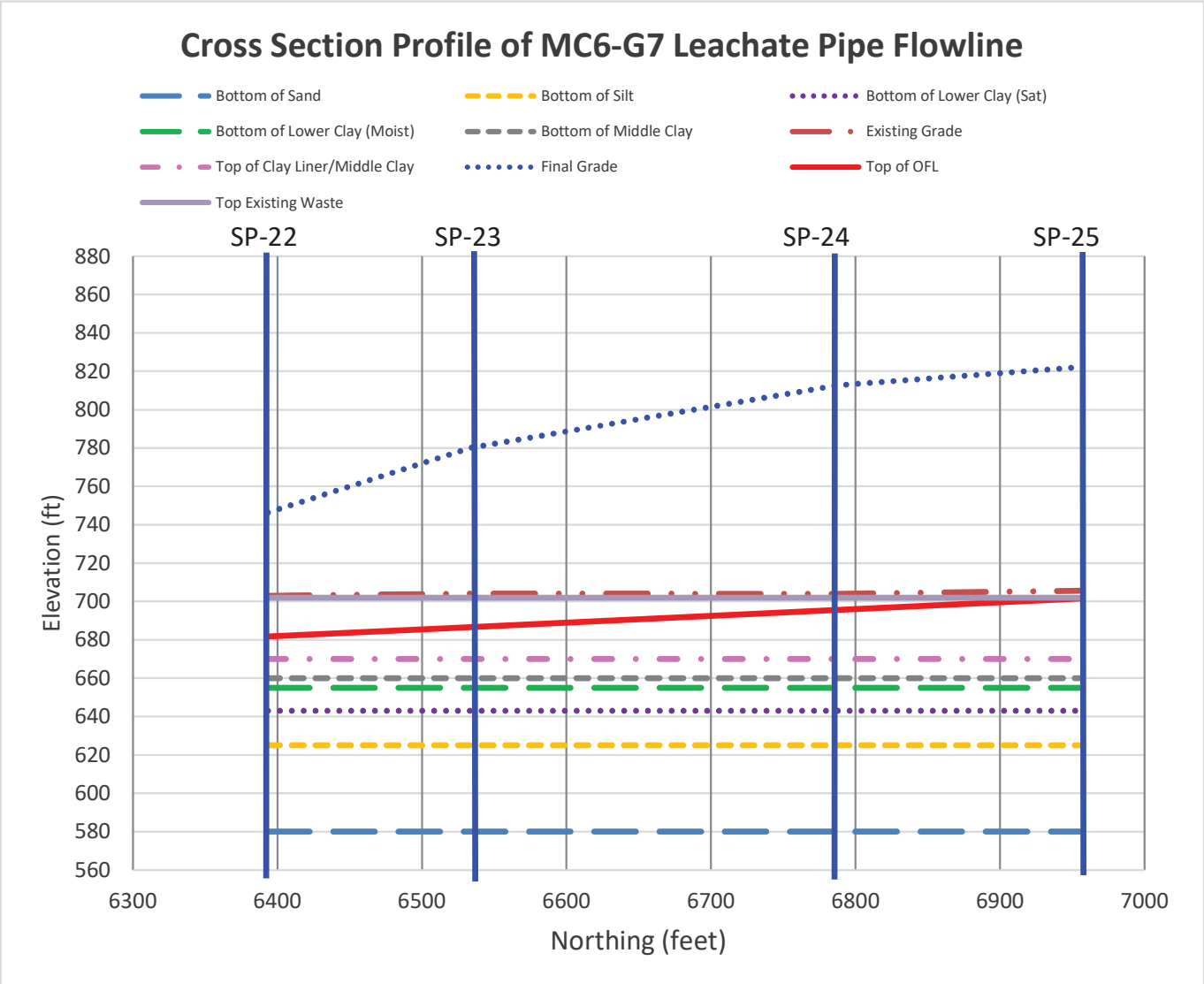
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	OP EXISTING WASTE
SP-21	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6290.21	4421.30	712.32	765.45	724.94	660.00	655.00	643.00	625.00	580.00	670.00	718.10

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	49.13	103.0	0	5060.8									
	3	OFL	6.84	135.0	TRUE	-922.9									
	4	Existing Waste	12.78	91.0	1	-1163.3									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2086.2	2086.2	6545.8	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2086.2	2086.2	6545.8	NC	-	-
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	2287.1	2287.1	6746.6	NC	0.166	0.027
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	2688.8	2688.8	7148.3	NC	0.150	0.027
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	3090.5	3090.5	7550.1	NC	0.137	0.027
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	3492.3	3492.3	7951.8	NC	0.126	0.027
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	3894.0	3894.0	8353.5	NC	0.117	0.027
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	4295.7	4295.7	8755.2	NC	0.109	0.027
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	4697.4	4697.4	9156.9	NC	0.102	0.027
	4	Existing Waste	4.41	91.0	0	401.7	0.080	0.013	0.024	5099.1	5099.1	9558.7	NC	0.096	0.027
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5640.0	4950.0	10099.5	NC	0.129	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6320.0	5630.0	10779.5	NC	0.118	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6980.0	6290.0	11439.5	NC	0.183	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7496.8	6806.8	11956.3	NC	0.208	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7890.4	7200.4	12349.9	NC	0.200	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8368.9	7678.9	12828.4	NC	0.250	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8932.3	8242.3	13391.8	NC	0.237	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9450.7	8760.7	13910.2	NC	0.151	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9924.1	9234.1	14383.6	NC	0.145	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10397.5	9707.5	14857.0	NC	0.140	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10870.9	10180.9	15330.4	NC	0.134	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11344.3	10654.3	15803.8	NC	0.130	-
														3.030	0.268
													Total Settlement [ft]	**3.30**	

Variables & Constants	
Point Name	SP-21
Settlement Layer [ft]	125.3
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G7 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-22
SP-23
SP-24
SP-25
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
6300
6400
6500
6600
6700
6800
6900
7000
Northing (feet)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-22	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6393.49	5048.84	681.79	746.37	702.92	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	60.58	103.0	0	6239.6									
	3	OFL	0.92	135.0	1	-123.6									
	4	Existing Waste	27.21	91.0	1	-2476.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2599.8	2599.8	7724.6	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2599.8	2599.8	7724.6	NC	-	-
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	2627.0	2627.0	7751.9	NC	0.023	0.004
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	2681.5	2681.5	7806.4	NC	0.022	0.004
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	2736.0	2736.0	7860.9	NC	0.022	0.004
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	2790.5	2790.5	7915.3	NC	0.022	0.004
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	2844.9	2844.9	7969.8	NC	0.021	0.004
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	2899.4	2899.4	8024.3	NC	0.021	0.004
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	2953.9	2953.9	8078.8	NC	0.021	0.004
	4	Existing Waste	0.60	91.0	0	54.5	0.080	0.013	0.024	3008.4	3008.4	8133.3	NC	0.021	0.004
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3375.6	4950.0	8500.5	OC-2	0.134	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4055.6	5630.0	9180.5	OC-2	0.120	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	4715.6	6290.0	9840.5	OC-2	0.184	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5232.4	6806.8	10357.3	OC-2	0.207	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5626.0	7200.4	10750.9	OC-2	0.197	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6104.5	7678.9	11229.4	OC-2	0.223	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6667.9	8242.3	11792.8	OC-2	0.210	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7186.3	8760.7	12311.2	OC-2	0.133	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7659.7	9234.1	12784.6	OC-2	0.127	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8133.1	9707.5	13258.0	OC-2	0.122	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8606.5	10180.9	13731.4	OC-2	0.117	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9079.9	10654.3	14204.8	OC-2	0.112	-
														2.059	0.081
													Total Settlement [ft]	**2.14**	

Variables & Constants	
Point Name	SP-22
Settlement Layer [ft]	94.8
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-23	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6534.01	5048.84	686.71	780.22	704.19	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	89.51	103.0	0	9219.9									
	3	OFL	2.19	135.0	1	-296.2									
	4	Existing Waste	22.29	91.0	1	-2028.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2324.6	2324.6	10704.9	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2324.6	2324.6	10704.9	NC	-	-
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2379.8	2379.8	10760.2	NC	0.064	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2490.2	2490.2	10870.6	NC	0.062	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2600.7	2600.7	10981.1	NC	0.061	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2711.1	2711.1	11091.5	NC	0.059	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2821.6	2821.6	11202.0	NC	0.058	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2932.0	2932.0	11312.4	NC	0.057	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	3042.5	3042.5	11422.9	NC	0.056	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	3152.9	3152.9	11533.3	NC	0.055	0.007
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3548.2	4950.0	11928.5	OC-2	0.207	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4228.2	5630.0	12608.5	OC-2	0.189	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	4888.2	6290.0	13268.5	OC-2	0.293	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5405.0	6806.8	13785.3	OC-2	0.332	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5798.6	7200.4	14178.9	OC-2	0.318	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6277.1	7678.9	14657.4	OC-2	0.379	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6840.5	8242.3	15220.8	OC-2	0.360	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7358.9	8760.7	15739.2	OC-2	0.229	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7832.3	9234.1	16212.6	OC-2	0.220	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8305.7	9707.5	16686.0	OC-2	0.212	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8779.1	10180.9	17159.4	OC-2	0.204	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9252.5	10654.3	17632.8	OC-2	0.197	-
														3.610	0.111
													Total Settlement [ft]	**3.72**	

Variables & Constants	
Point Name	SP-23
Settlement Layer [ft]	99.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-24	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6787.25	5048.84	695.57	812.70	703.99	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	113.13	103.0	0	11652.4									
	3	OFL	1.99	135.0	1	-268.6									
	4	Existing Waste	13.43	91.0	1	-1222.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1490.8	1490.8	13137.4	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1490.8	1490.8	13137.4	NC	-	-
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	1596.4	1596.4	13243.0	NC	0.171	0.014
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	1807.6	1807.6	13454.3	NC	0.162	0.014
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	2018.9	2018.9	13665.5	NC	0.154	0.014
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	2230.1	2230.1	13876.7	NC	0.147	0.014
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	2441.3	2441.3	14088.0	NC	0.141	0.014
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	2652.6	2652.6	14299.2	NC	0.136	0.014
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	2863.8	2863.8	14510.4	NC	0.131	0.014
	4	Existing Waste	2.32	91.0	0	211.2	0.080	0.013	0.024	3075.0	3075.0	14721.7	NC	0.126	0.014
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3520.6	4950.0	15167.3	OC-2	0.261	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4200.6	5630.0	15847.3	OC-2	0.240	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	4860.6	6290.0	16507.3	OC-2	0.374	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5377.4	6806.8	17024.1	OC-2	0.426	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5771.0	7200.4	17417.7	OC-2	0.410	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6249.5	7678.9	17896.2	OC-2	0.496	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6812.9	8242.3	18459.6	OC-2	0.473	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7331.3	8760.7	18978.0	OC-2	0.302	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7804.7	9234.1	19451.4	OC-2	0.291	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8278.1	9707.5	19924.8	OC-2	0.281	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8751.5	10180.9	20398.2	OC-2	0.272	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9224.9	10654.3	20871.6	OC-2	0.263	-
														5.257	0.166
													Total Settlement [ft]	**5.42**	

Variables & Constants	
Point Name	SP-24
Settlement Layer [ft]	108.6
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

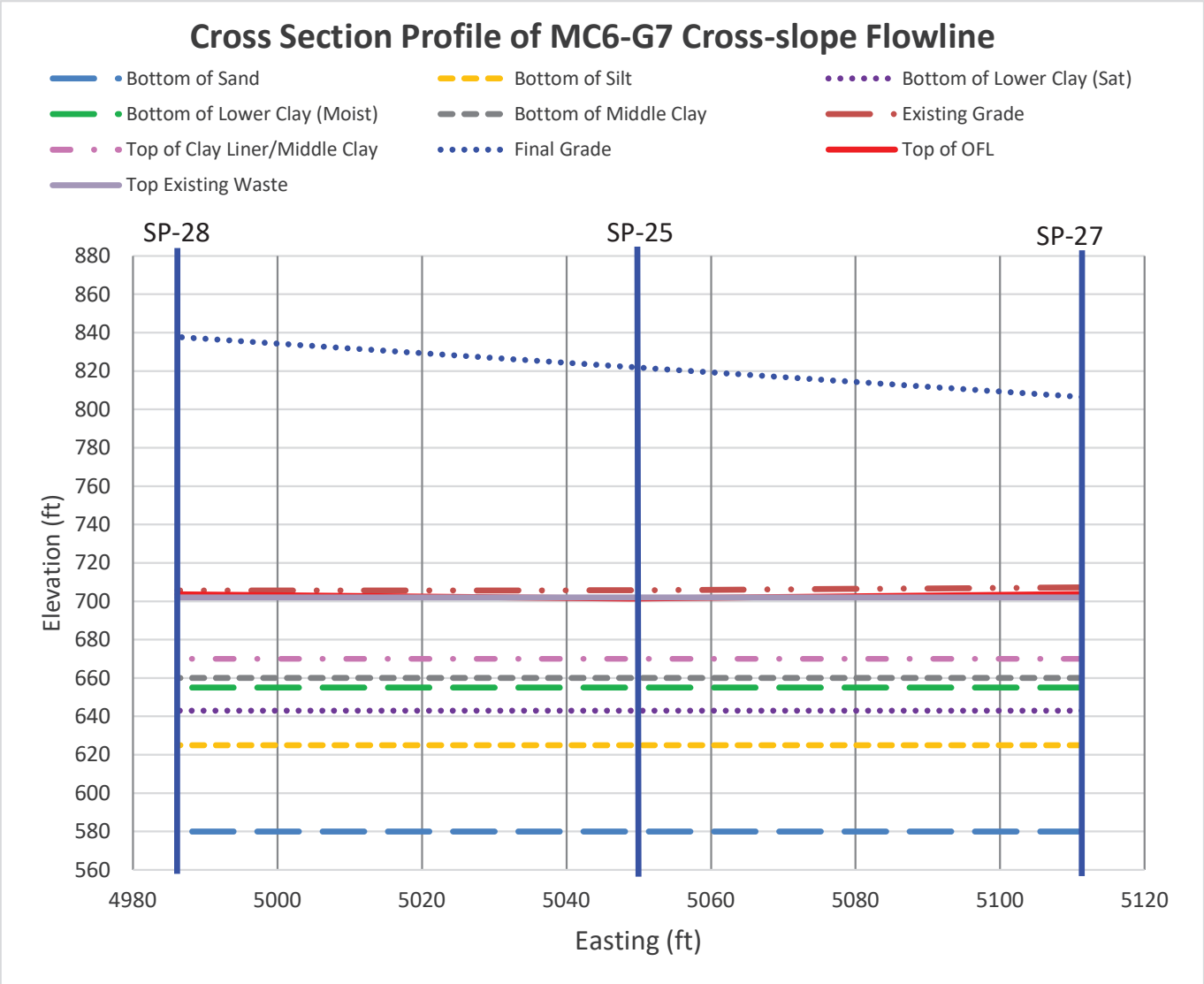
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

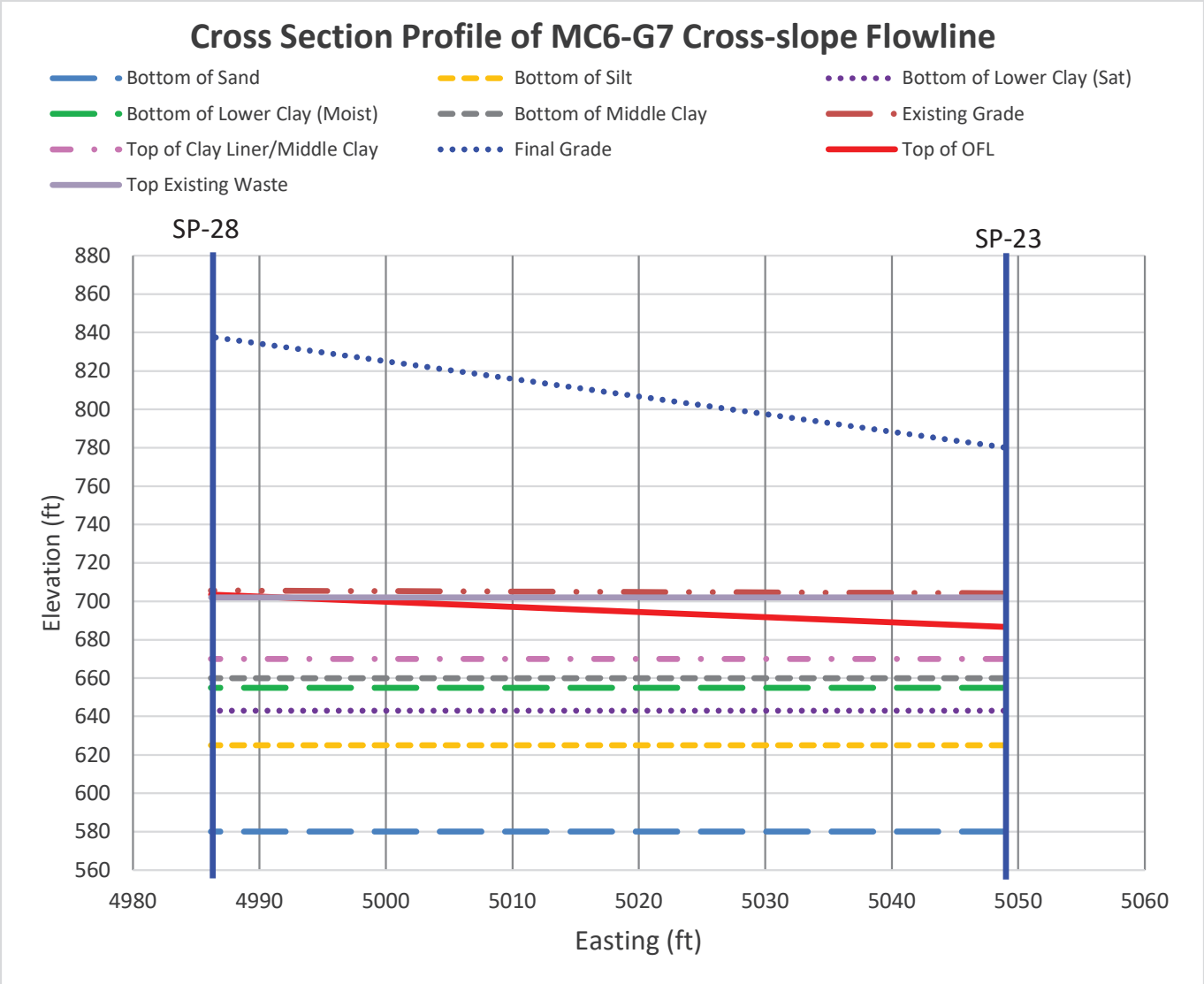
SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-25	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6954.90	5048.84	701.44	822.11	705.63	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	116.67	103.0	0	12016.7									
	3	OFL	3.63	135.0	1	-490.1									
	4	Existing Waste	7.56	91.0	1	-688.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1178.1	1178.1	13501.7	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1178.1	1178.1	13501.7	NC	-	-
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	1317.1	1317.1	13640.7	NC	0.248	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	1595.1	1595.1	13918.7	NC	0.230	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	1873.1	1873.1	14196.7	NC	0.215	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2151.1	2151.1	14474.7	NC	0.202	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2429.1	2429.1	14752.7	NC	0.191	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2707.1	2707.1	15030.7	NC	0.182	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2985.1	2985.1	15308.7	NC	0.174	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	3263.1	3263.1	15586.7	NC	0.166	0.019
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3742.1	4950.0	16065.8	OC-2	0.271	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4422.1	5630.0	16745.8	OC-2	0.250	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5082.1	6290.0	17405.8	OC-2	0.391	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5598.9	6806.8	17922.6	OC-2	0.446	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5992.5	7200.4	18316.2	OC-2	0.430	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6471.0	7678.9	18794.7	OC-2	0.525	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7034.4	8242.3	19358.1	OC-2	0.501	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7552.8	8760.7	19876.5	OC-2	0.320	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8026.2	9234.1	20349.9	OC-2	0.309	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8499.6	9707.5	20823.3	OC-2	0.298	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8973.0	10180.9	21296.7	OC-2	0.288	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9446.4	10654.3	21770.1	OC-2	0.279	-
														5.917	0.202
													Total Settlement [ft]	**6.12**	

Variables & Constants	
Point Name	SP-25
Settlement Layer [ft]	114.4
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G7 Cross-slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-28
SP-25
SP-27
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
4980
5000
5020
5040
5060
5080
5100
5120
Easting (ft)


Cross Section Profile of MC6-G7 Cross-slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-28
SP-23
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
4980
4990
5000
5010
5020
5030
5040
5050
5060
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-23	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6534.01	5048.84	686.71	780.22	704.20	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	89.51	103.0	0	9219.5									
	3	OFL	2.20	135.0	TRUE	-297.0									
	4	Existing Waste	22.29	91.0	1	-2028.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2325.4	2325.4	10704.5	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2325.4	2325.4	10704.5	NC	-	-
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2380.6	2380.6	10759.8	NC	0.064	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2491.1	2491.1	10870.2	NC	0.062	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2601.5	2601.5	10980.7	NC	0.061	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2712.0	2712.0	11091.1	NC	0.059	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2822.4	2822.4	11201.6	NC	0.058	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	2932.9	2932.9	11312.0	NC	0.057	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	3043.3	3043.3	11422.5	NC	0.056	0.007
	4	Existing Waste	1.21	91.0	0	110.5	0.080	0.013	0.024	3153.8	3153.8	11532.9	NC	0.055	0.007
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3549.0	4950.0	11928.1	OC-2	0.207	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4229.0	5630.0	12608.1	OC-2	0.189	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	4889.0	6290.0	13268.1	OC-2	0.293	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5405.8	6806.8	13784.9	OC-2	0.332	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5799.4	7200.4	14178.5	OC-2	0.318	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6277.9	7678.9	14657.0	OC-2	0.379	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6841.3	8242.3	15220.4	OC-2	0.360	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7359.7	8760.7	15738.8	OC-2	0.229	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7833.1	9234.1	16212.2	OC-2	0.220	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8306.5	9707.5	16685.6	OC-2	0.212	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8779.9	10180.9	17159.0	OC-2	0.204	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9253.3	10654.3	17632.4	OC-2	0.197	-
														3.610	0.111
											Total Settlement [ft]			3.72	

Variables & Constants	
Point Name	SP-23
Settlement Layer [ft]	99.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-25	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6954.90	5048.84	701.44	822.11	705.63	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	116.67	103.0	0	12017.0									
	3	OFL	3.63	135.0	TRUE	-490.0									
	4	Existing Waste	7.56	91.0	1	-688.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1178.0	1178.0	13502.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1178.0	1178.0	13502.0	NC	-	-
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	1317.0	1317.0	13641.0	NC	0.248	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	1595.0	1595.0	13919.0	NC	0.230	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	1873.0	1873.0	14197.0	NC	0.215	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2151.0	2151.0	14475.0	NC	0.202	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2429.0	2429.0	14753.0	NC	0.191	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2707.0	2707.0	15031.0	NC	0.182	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	2985.0	2985.0	15309.0	NC	0.174	0.019
	4	Existing Waste	3.06	91.0	0	278.0	0.080	0.013	0.024	3263.0	3263.0	15587.0	NC	0.166	0.019
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3742.1	4950.0	16066.1	OC-2	0.271	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4422.1	5630.0	16746.1	OC-2	0.250	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5082.1	6290.0	17406.1	OC-2	0.391	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5598.9	6806.8	17922.9	OC-2	0.446	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5992.5	7200.4	18316.5	OC-2	0.430	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6471.0	7678.9	18795.0	OC-2	0.525	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7034.4	8242.3	19358.4	OC-2	0.501	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7552.8	8760.7	19876.8	OC-2	0.320	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8026.2	9234.1	20350.2	OC-2	0.309	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8499.6	9707.5	20823.6	OC-2	0.298	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8973.0	10180.9	21297.0	OC-2	0.288	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9446.4	10654.3	21770.4	OC-2	0.279	-
														5.917	0.202
													Total Settlement [ft]	**6.12**	

Variables & Constants	
Point Name	SP-25
Settlement Layer [ft]	114.4
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	OP EXISTING WASTE
SP-26	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6532.88	4967.83	689.46	786.92	705.55	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	93.46	103.0	0	9626.4									
	3	OFL	3.55	135.0	TRUE	-479.2									
	4	Existing Waste	19.54	91.0	1	-1778.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2257.4	2257.4	11111.4	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	2257.4	2257.4	11111.4	NC	-	-
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	2328.3	2328.3	11182.2	NC	0.085	0.010
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	2470.0	2470.0	11324.0	NC	0.082	0.010
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	2611.7	2611.7	11465.7	NC	0.080	0.010
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	2753.5	2753.5	11607.4	NC	0.078	0.010
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	2895.2	2895.2	11749.2	NC	0.076	0.010
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	3036.9	3036.9	11890.9	NC	0.074	0.010
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	3178.7	3178.7	12032.6	NC	0.072	0.010
	4	Existing Waste	1.56	91.0	0	141.7	0.080	0.013	0.024	3320.4	3320.4	12174.4	NC	0.070	0.010
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3731.2	4950.0	12585.2	OC-2	0.217	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4411.2	5630.0	13265.2	OC-2	0.199	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5071.2	6290.0	13925.2	OC-2	0.308	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5588.0	6806.8	14442.0	OC-2	0.350	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5981.7	7200.4	14835.6	OC-2	0.336	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6460.2	7678.9	15314.1	OC-2	0.405	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7023.5	8242.3	15877.5	OC-2	0.384	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7541.9	8760.7	16395.9	OC-2	0.245	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8015.3	9234.1	16869.3	OC-2	0.236	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8488.7	9707.5	17342.7	OC-2	0.227	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8962.1	10180.9	17816.1	OC-2	0.219	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9435.5	10654.3	18289.5	OC-2	0.211	-
														3.954	0.128
											Total Settlement [ft]			4.08	

Variables & Constants	
Point Name	SP-26
Settlement Layer [ft]	102.5
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	OP EXISTING WASTE
SP-27	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6955.68	5111.30	703.70	806.49	707.17	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	98.79	103.0	0	10175.4									
	3	OFL	5.17	135.0	TRUE	-697.9									
	4	Existing Waste	5.30	91.0	1	-482.3									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1180.2	1180.2	11660.4	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1180.2	1180.2	11660.4	NC	-	-
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	1332.1	1332.1	11812.2	NC	0.253	0.020
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	1635.8	1635.8	12115.9	NC	0.232	0.020
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	1939.5	1939.5	12419.7	NC	0.215	0.020
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	2243.2	2243.2	12723.4	NC	0.201	0.020
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	2547.0	2547.0	13027.1	NC	0.189	0.020
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	2850.7	2850.7	13330.8	NC	0.179	0.020
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	3154.4	3154.4	13634.5	NC	0.170	0.020
	4	Existing Waste	3.34	91.0	0	303.7	0.080	0.013	0.024	3458.1	3458.1	13938.2	NC	0.162	0.020
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3949.9	4950.0	14430.1	OC-2	0.245	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4630.0	5630.0	15110.1	OC-2	0.226	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5290.0	6290.0	15770.1	OC-2	0.352	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5806.8	6806.8	16286.9	OC-2	0.401	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6200.4	7200.4	16680.5	OC-2	0.385	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6678.9	7678.9	17159.0	OC-2	0.471	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7242.3	8242.3	17722.4	OC-2	0.449	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7760.7	8760.7	18240.8	OC-2	0.287	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8234.1	9234.1	18714.2	OC-2	0.276	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8707.5	9707.5	19187.6	OC-2	0.266	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9180.8	10180.9	19661.0	OC-2	0.257	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9654.2	10654.3	20134.4	OC-2	0.249	-
														5.466	0.215
											Total Settlement [ft]			5.68	

Variables & Constants	
Point Name	SP-27
Settlement Layer [ft]	116.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

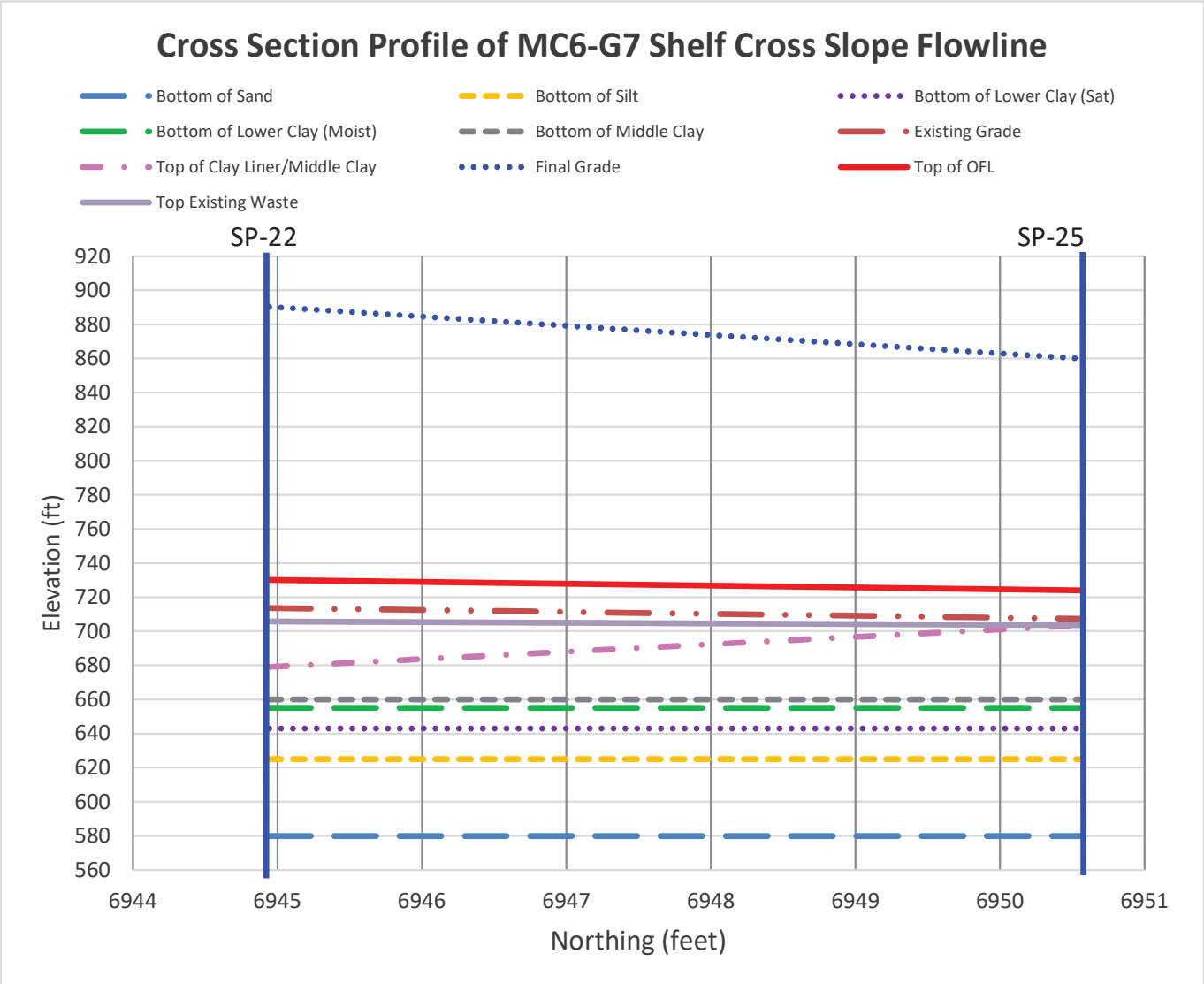
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	OP EXISTING WASTE
SP-28	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6954.65	4986.17	703.56	837.77	705.62	660.00	655.00	643.00	625.00	580.00	670.00	702.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress (midpoint of layer)	Consolidation Stress (midpoint of layer)	Final Stress (midpoint of layer)	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	130.21	103.0	0	13411.6									
	3	OFL	3.62	135.0	TRUE	-488.7									
	4	Existing Waste	5.44	91.0	1	-495.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	983.7	983.7	13951.6	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	983.7	983.7	13951.6	NC	-	-
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	1134.8	1134.8	14102.7	NC	0.291	0.020
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	1436.9	1436.9	14404.8	NC	0.266	0.020
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	1739.0	1739.0	14706.9	NC	0.246	0.020
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	2041.2	2041.2	15009.1	NC	0.230	0.020
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	2343.3	2343.3	15311.2	NC	0.217	0.020
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	2645.4	2645.4	15613.3	NC	0.205	0.020
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	2947.5	2947.5	15915.4	NC	0.195	0.020
	4	Existing Waste	3.32	91.0	0	302.1	0.080	0.013	0.024	3249.6	3249.6	16217.5	NC	0.185	0.020
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3740.7	4950.0	16708.6	OC-2	0.280	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4420.7	5630.0	17388.6	OC-2	0.259	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5080.7	6290.0	18048.6	OC-2	0.405	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5597.5	6806.8	18565.4	OC-2	0.462	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5991.1	7200.4	18959.0	OC-2	0.445	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6469.6	7678.9	19437.5	OC-2	0.545	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7033.0	8242.3	20000.9	OC-2	0.520	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7551.4	8760.7	20519.3	OC-2	0.333	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8024.8	9234.1	20992.7	OC-2	0.321	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8498.2	9707.5	21466.1	OC-2	0.310	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8971.6	10180.9	21939.5	OC-2	0.300	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9445.0	10654.3	22412.9	OC-2	0.291	-
														6.303	0.215
											Total Settlement [ft]			6.52	

Variables & Constants	
Point Name	SP-28
Settlement Layer [ft]	116.6
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G7 Shelf Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-22
SP-25
Elevation (ft)
920
900
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
6944
6945
6946
6947
6948
6949
6950
6951
Northing (feet)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-20b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6944.94	4776.06	730.10	890.30	713.68	660.00	655.00	643.00	625.00	580.00	670.00	705.76

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	156.20	103.0	0	16088.8									
	3	OFL	16.42	135.0	0	2217.0									
	4	Existing Waste	0.00	91.0	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.96	135.0	0	534.3	0.102	0.017	0.005	267.1	267.1	19113.0	NC	0.749	0.005
	3	OFL	3.96	135.0	0	534.3	0.102	0.017	0.005	801.4	801.4	19647.3	NC	0.561	0.005
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	1272.0	1272.0	20117.8	NC	0.429	0.027
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	1678.8	1678.8	20524.6	NC	0.389	0.027
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	2085.5	2085.5	20931.4	NC	0.358	0.027
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	2492.3	2492.3	21338.2	NC	0.334	0.027
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	2899.1	2899.1	21745.0	NC	0.313	0.027
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	3305.9	3305.9	22151.8	NC	0.295	0.027
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	3712.7	3712.7	22558.6	NC	0.280	0.027
	4	Existing Waste	4.47	91.0	0	406.8	0.080	0.013	0.024	4119.5	4119.5	22965.4	NC	0.267	0.027
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4662.9	4950.0	23508.8	OC-2	0.347	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5342.9	5630.0	24188.8	OC-2	0.325	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6002.9	6290.0	24848.8	OC-2	0.513	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6519.7	6806.8	25365.6	OC-2	0.589	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6913.3	7200.4	25759.2	OC-2	0.571	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7391.8	7678.9	26237.7	OC-2	0.720	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7955.2	8242.3	26801.1	OC-2	0.691	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8473.6	8760.7	27319.5	OC-2	0.445	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8947.0	9234.1	27792.9	OC-2	0.431	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9420.4	9707.5	28266.3	OC-2	0.418	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9893.8	10180.9	28739.7	OC-2	0.406	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10367.2	10654.3	29213.1	OC-2	0.394	-
														9.824	0.281
													Total Settlement [ft]	10.11	

Variables & Constants	
Point Name	SP-20b
Settlement Layer [ft]	133.7
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-28b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	6950.57	4897.93	724.00	859.83	707.33	660.00	655.00	643.00	625.00	580.00	670.00	703.58

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	131.83	103.0	0	13579.0									
	3	OFL	16.67	135.0	0	2250.5									
	4	Existing Waste	0.00	91.0	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	1.87	135.0	0	253.1	0.102	0.017	0.005	126.5	126.5	16496.0	NC	0.404	0.002
	3	OFL	1.87	135.0	0	253.1	0.102	0.017	0.005	379.6	379.6	16749.1	NC	0.314	0.002
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	697.2	697.2	17066.7	NC	0.466	0.026
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	1079.1	1079.1	17448.6	NC	0.406	0.026
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	1461.1	1461.1	17830.6	NC	0.365	0.026
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	1843.1	1843.1	18212.6	NC	0.334	0.026
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	2225.1	2225.1	18594.6	NC	0.310	0.026
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	2607.0	2607.0	18976.5	NC	0.289	0.026
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	2989.0	2989.0	19358.5	NC	0.272	0.026
	4	Existing Waste	4.20	91.0	0	382.0	0.080	0.013	0.024	3371.0	3371.0	19740.5	NC	0.258	0.026
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3902.0	4950.0	20271.5	OC-2	0.321	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4582.0	5630.0	20951.5	OC-2	0.299	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5242.0	6290.0	21611.5	OC-2	0.470	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5758.8	6806.8	22128.3	OC-2	0.538	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6152.4	7200.4	22521.9	OC-2	0.520	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6630.9	7678.9	23000.4	OC-2	0.643	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7194.3	8242.3	23563.8	OC-2	0.616	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7712.7	8760.7	24082.2	OC-2	0.395	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8186.1	9234.1	24555.6	OC-2	0.382	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8659.5	9707.5	25029.0	OC-2	0.370	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9132.9	10180.9	25502.4	OC-2	0.359	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9606.3	10654.3	25975.8	OC-2	0.348	-
														8.680	0.262
													Total Settlement [ft]	**8.94**	

Variables & Constants	
Point Name	SP-28b
Settlement Layer [ft]	127.3
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

5. Attachment A-2.2 MC6_E_F_G1-G3 Settlement Analysis

Original Submittal			
	Page	Revised Submittal	
	125	A-2.2	Settlement Analysis for MC VI-E, F and G1 to G3
A-2.1	136	A-2.2.1	Settlement Analysis Points
A-2.2	139	A-2.2.2	Cross-section Profiles and Settlement Calculation Spreadsheets

Attachment A-2.2

Final Cover Grading Modification Settlement Analysis

LEACHATE COLLECTION PIPE SETTLEMENT ANALYSIS

OBJECTIVE

This calculation evaluates the post-settlement slopes of the leachate collection pipe and cell floor cross slopes for cells affected by the proposed Final Cover Grading Modification at Wayne Disposal, Inc. (WDI). This calculation evaluates the following Cells:

- Master Cell-VI-E (MC6E)
- Master Cell-VI-F (MC6F): Subcells F1, F2, F3, and F4
- Master Cell VI-G (MC6G): Subcells G1, G2, and G3

This evaluation is based on the estimated settlement of the existing waste and soil underlying the proposed cells due to additional overburden stresses induced by waste placement and the impact of such settlement on the post settlement cell floor slopes.

DESIGN CRITERIA AND ASSUMPTIONS

- The slope of each leachate collection pipe should be at least 1% and each cell floor cross slope should be at least 2% per Rule 299.9620 (4) (EGLE 2020).
- Maximum settlement is expected to occur at the completion of the cap construction when the foundation is subjected to the maximum overburden pressure. Under the worst-case scenario, maximum load is applied (in full) to the foundation instantaneously during settlement analysis for a conservative (i.e., greater than anticipated) estimate of total settlement. In reality, loads would be applied incrementally as waste is placed gradually during the active life of the landfill. Additionally, the resulting settlement is assumed to occur immediately, conservatively accounting for the maximum settlement at the end of foundation soil consolidation.
- Existing information about the existing landfill (MC-IV) below Subcells F1, F2, F3, F4, G2, and G3 indicate that it was a trench fill type of landfill. The precise configuration of the trenches is unknown. It is believed that each trench is bounded by an intracell dike. Using available subsurface information (Geoprobe boring logs and MC-IV construction drawings – see Attachment A-2.2.1 and Figure 1), CTI has considered the profile of existing dikes in these settlement analyses by placing additional settlement calculation points at the estimated crests and toes of these dikes in Subcells F1 through F4, G2 and G3.
- Pipe flowline analysis points were selected within the analyzed cells as shown in Attachment A-2.2.1. The specific locations of these points were selected to correspond to the cell floor high point, low point, changes in final cover slope, maximum fill height, the location of the existing dikes in MC-IV and additional points. Total settlement is estimated for each point, allowing an assessment of the post-settlement slope(s) along the flowline.
- Differential settlement estimates are greater at the dike crest-toe transitions than between points without much difference in subgrade.

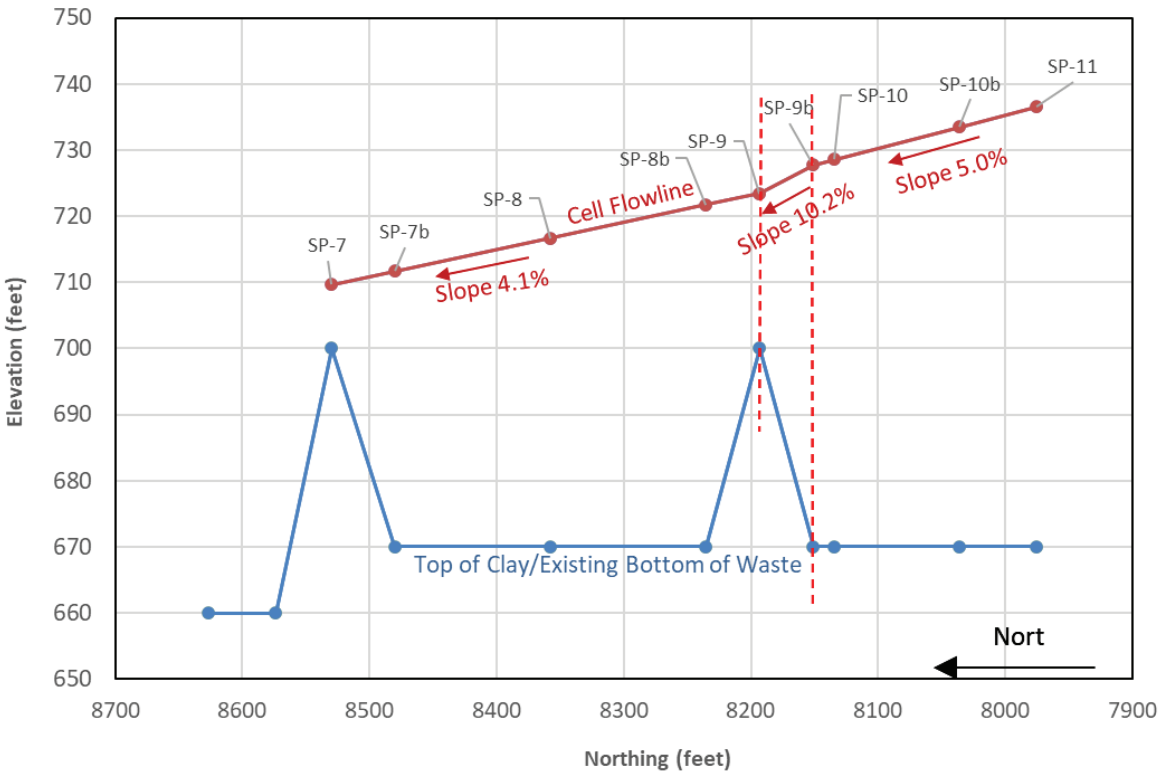


Figure 1. Estimated Cross-section Depicting Bottom of Existing Waste Elevations Below MC VI-F as Determined from Geoprobe Boring Logs and Proposed Cell Flowline in MCVI-F3

- Table 1A lists the material typical thicknesses and unit weights used for the settlement analysis. Note that a value of 103 pounds per cubic foot (pcf) was conservatively selected for the unit weight of newly-placed waste. This value of unit weight is conservative because it is greater than the representative value obtained from survey records. Greater values of waste unit weight result in larger calculated settlement values. Table 1B provides supporting survey information used to evaluate the unit weight of newly placed waste.
- Table 2 summarizes the compressibility parameters used in the settlement analysis. The compacted clay liner is only very slightly compressible relative to the in-situ clay layer due to the much greater thickness of the in-situ clay. Considering the insignificant magnitude of the settlement of the compacted clay liner, it was not included in the analysis. The methodology presented in Attachment A-2.3 was used to estimate a modified compression index (C'_c) and a modified secondary compression index (C'_α) suitable for calculating the settlement of the existing in-place waste at WDI under the effect of increasing overburden pressures.

Table 1A. Soil Properties for Settlement Analysis

Soil Type	Thickness [ft]	Moist Unit Weight [pcf]
Final cover soil	4	135
New waste	Varies	103*
Existing cover soil	Varies	135
Existing waste	Varies	91
In-situ middle clay	Varies	136
In-situ lower clay (moist)	Varies	128
In-situ lower clay (saturated)	Varies	128
In-situ silt (saturated)	18	125
In-situ sand (saturated)	45	115

** Conservative (high) Value - see Table 1B.*

Table 1B. Supporting Survey Information Used to Evaluate the Unit Weight of Newly Placed Waste

Survey Years	2014 to 2021
Tons waste received into the landfill	3,905,856
Cubic yards airspace consumed	2,869,499
Average Unit Weight (tons/cy)	1.36
Average Unit Weight (pcf)	101

Table 2. Compressibility Parameters of Waste and Soils

Soil Type	Primary Compression Ratio $C_c/(1+e_0)$	Secondary Compression Ratio $C_\alpha/(1+e_0)$	Recompression Ratio $C_r/(1+e_0)$
Existing cover	0.102[B]	0.005[B]	0.017[A]
Existing waste	0.08[C]	0.024[C]	0.0133[A]
In-situ middle clay	0.102	0.005	0.017[A]
In-situ lower clay	0.171	0.009	0.0285[A]
In-situ silt	0.15[B]	0[B]	0[B]
In-situ sand	0.1[B]	0[B]	0[B]

[A] Estimated from $C_r = C_c/6$.
[B] Assumed values.
[C] From Attachment A-2.3

- The information for subsurface soils is based on General Profiles presented in Appendix A, Subsurface Soil/Waste Profiles & Corresponding Physical Properties, Volume III – WDI Operating License Application Master Cells VI F & G by NTH Consultants (2011a). The same general profile

was used in the current MC VI permits for MC-VI-E, MC-VI-F, and MC-VI-G. Note that some uncertainty may exist in the interpretation of hydrogeological data due to natural soil's inherent variability, conservative assumptions have been applied to produce a conservative estimate of settlement in this analysis.

METHODOLOGY

Total settlement is estimated using the 1-D compression equations (Coduto 1999). Total settlement is calculated as:

$$S = S_c + S_s \tag{1}$$

Where:

S = total settlement [ft]
S_c = primary compression settlement due to load application [ft]
S_s = secondary compression settlement due to creep effects [ft]

Settlement caused by primary compression for a given layer of soil with uniform properties is calculated as:

$$S_c = \frac{h_0}{1+e_0}\left(C_r \log\frac{\sigma_c}{\sigma_0} + C_c \log\frac{\sigma_i}{\sigma_c}\right) \tag{2}$$

Where:

C_c = primary compression index
C_r = recompression index
h_0 = initial compressible layer thickness [ft]
e_0 = initial void ratio of the clay subgrade
σ_0 = initial overburden pressure acting on the compressible layer [psf]
σ_i = final overburden pressure acting on the compressible layer [psf]
σ_c = preconsolidation stress [psf], calculated using Equation 4.

Settlement due to secondary compression is calculated using Equation 3 below:

$$S_s = h_0 \frac{C_\alpha}{1+e_0} \log\left(\frac{t_2}{t_1}\right) \tag{3}$$

Where:

C_α = secondary compression index
H = layer thickness [ft]

t_2 = time after application of load (assumed 70 years)
t_1 = time required to complete primary consolidation (assumed 40 years)

- The elevations in this calculation sheet are referenced to Mean Sea Level (MSL).
- The initial ground elevation (prior to initial development) was assumed to be approximately 705 ft. This value was inferred from the cross section profile from Engineering Drawings, Wayne Disposal, Inc. Site No.2 MC VI-F&G by NTH Consultants (2011b).
- The preconsolidation pressure of the middle clay and lower clay, the major contributing compressible layers below the existing waste, was set equal to the initial effective overburden pressure acting on them prior to development. This value is used in Equation 2 to estimate settlement resulting from an initial load less than the preconsolidation pressure. The net settlement between construction of the overfill liner and the proposed final conditions is calculated with the soils in either a normally-consolidated state (i.e., compression is calculated using C'_c) or over-consolidated state (i.e., compression is calculated using C'_r and C'_c) depending on whether the initial stress is greater than the preconsolidation stress or not, respectively. Note that in most cases, both layers of soil have experienced a higher overburden pressure since initial development of the site. This value is calculated using Equation 4.
- When applicable, calculation of settlement following cell construction accounts for changes in overburden pressure resulting from construction activities and landfill operations.
- At each point selected along the leachate collection pipe system, the elevations for the existing ground, proposed or existing liner system, final cover, and the foundation soils are determined and used to compute the initial and final overburden pressures at each settlement point within the analysis using Equation 4 similarly to the preconsolidation pressure. Calculation spreadsheets for the settlement points in Cells MC-VI-E, MC-VI-F, MC-VI-G (Sub cells G1, G2, and G3) are presented in Attachment A-2.2.2.

$$\sigma_{c,0,f} = \sum_{i=0}^{n} \gamma_i \times h_i \tag{4}$$

Where:

$\sigma_{c,0,f}$ = σ_c: preconsolidation stress [psf]
σ_0: initial stress [psf]
σ_f: final stress [psf]

γ_i = Unit weight of soil layer i [psf]

h_i = Thickness of layer i [ft] at settlement point as follows:
For σ_c use thicknesses of layers prior to development
For σ_0 use thicknesses of layers up to existing elevations

For σ_f use thicknesses of layers up to proposed final elevations

- Soil layers are identified using subsurface soil profiles provided in "General Profiles" presented in Appendix A, Subsurface Soil/Waste Profiles & Corresponding Physical Properties, Volume III – WDI Operating License Application Master Cells VI F & G by NTH Consultants (2011a). These layers include in-situ clay with varying degrees of compressibility (see Table 2).
- Attachment A-2.2.1 presents the plan locations of the settlement analysis points within the cells. When the same point was used both for the leachate pipe flowline and cross-slope analyses, the liner elevation of the settlement point was raised by 1 foot in the cross-slope analysis to account for the leachate pipe trench depth in Subcells F1 through F4.

CALCULATIONS

Equations 1 through 4 were incorporated into a spreadsheet to conduct the settlement calculations. The settlement calculation output and resulting post-settlement slope(s) for the leachate collection pipes and cross slopes within the cells are presented in Tables 3 through 19 below. Attachment A-2.2.2 presents the cross-section profiles of the leachate collection pipe flowlines and cell floor cross slopes, and the settlement calculation spreadsheets for the individual points.

Table 3. MC6E Leachate Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
P514	8641.95	6454.04	701.00	0.23	229	700.77	1.8%	1.7%	1.0%
P512	8666.18	6226.32	705.21	0.59		704.62			
P512	8666.18	6226.32	705.21	0.59	276	704.62	1.5%	1.6%	1.0%
P510	8599.09	5958.86	709.36	0.25		709.11			
P510	8599.09	5958.86	709.36	0.25	216	709.11	1.3%	1.0%	1.0%
P508	8649.05	5748.66	712.17	0.80		711.37			
P508	8649.05	5748.66	712.17	0.80	281	711.37	1.4%	1.3%	1.0%
P506	8657.89	5468.01	716.07	1.03		715.04			
P506	8657.89	5468.01	716.07	1.03	240	715.04	1.5%	1.0%	1.0%
P505	8565.19	5246.41	719.62	2.18		717.44			

CALCULATION SHEET

Client: Wayne Disposal, Inc.
Project: WDI Final Cover Grading Modification
Calculation: Settlement Analysis

Project No.: 1208070015.005
Calculated By: RR Date: 5/16/2022
Checked By: KF Date: 5/17/2022
Approved By: XZ Date: 5/17/2022

Table 4. MC6E E5300 Cross Slope Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-84	8581.38	5296.64	719.00	5.43	48	713.57	4.2%	6.7%	2.0%
SP-85	8533.44	5296.64	721.00	4.23		716.77			
SP-85	8533.44	5296.64	721.00	4.23	45	716.77	4.4%	3.6%	2.0%
SP-86	8488.08	5296.64	723.00	4.62		718.38			

Table 5. MC6E Phase II-NE Cross Slope Settlement Calculation Summary

			Elevation			Liner Grade	Cross Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
P-512	8666.18	6226.32	705.21	3.15	99	702.06	8.9%	9.9%	2.0%
SP-66	8566.99	6221.70	714.00	2.13		711.87			
SP-66	8566.99	6221.70	714.00	2.13	103	711.87	7.8%	5.8%	2.0%
SP-67	8464.52	6211.68	722.00	4.11		717.89			
SP-67	8464.52	6211.68	722.00	4.11	57	717.89	5.3%	4.2%	2.0%
SP-68	8408.01	6206.15	725.00	4.72		720.28			
SP-68	8408.01	6206.15	725.00	4.72	54	720.28	3.7%	5.7%	2.0%
SP-69	8354.03	6200.87	727.00	3.64		723.36			
SP-69	8354.03	6200.87	727.00	3.64	97	723.36	4.1%	2.3%	2.0%
SP-70	8257.04	6191.39	731.00	5.35		725.65			
SP-70	8257.04	6191.39	731.00	5.35	98	725.65	4.1%	5.5%	2.0%
SP-71	8159.20	6181.82	735.00	3.92		731.08			

Table 6. MC6G – G1 Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	**Length**	Post-Settlement	Pre-Settlement	Post-Settlement	**Min. Slope**
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-13	7339.00	4082.84	668.00	3.40	38	664.60	5.2%	4.3%	1.0%
SP-14	7339.00	4120.94	670.00	3.75		666.25			
SP-14	7339.00	4120.94	670.00	3.75	208	666.25	2.4%	2.0%	1.0%
SP-15	7339.00	4329.23	675.00	4.62		670.38			
SP-15	7339.00	4329.23	675.00	4.62	242	670.38	1.7%	1.4%	1.0%
SP-16	7339.00	4571.07	679.00	5.11		673.89			
SP-16	7339.00	4571.07	679.00	5.11	257	673.89	1.2%	1.2%	1.0%
SP-17	7338.93	4827.73	682.00	5.13		676.87			
SP-17	7338.93	4827.73	682.00	5.13	141	676.87	1.4%	1.4%	1.0%
SP-18	7338.96	4968.72	684.00	5.14		678.86			

CALCULATION SHEET

Client: Wayne Disposal, Inc.
Project: WDI Final Cover Grading Modification
Calculation: Settlement Analysis

Project No.: 1208070015.005
Calculated By: RR Date: 5/16/2022
Checked By: KF Date: 5/17/2022
Approved By: XZ Date: 5/17/2022

Table 7. MC6G – G2 Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-07	7843.09	4381.18	726.82	6.96	120	719.86	4.0%	1.5%	1.0%
SP-08	7842.87	4261.26	722.00	3.91		718.09			
SP-08	7842.87	4261.26	722.00	3.91	101	718.09	4.0%	3.2%	1.0%
SP-09	7842.87	4160.67	718.00	3.14		714.86			
SP-09	7842.87	4160.67	718.00	3.14	151	714.86	4.0%	4.1%	1.0%
SP-10	7842.87	4009.79	712.00	3.30		708.70			
SP-10	7842.87	4009.79	712.00	3.30	70	708.70	4.0%	4.7%	1.0%
SP-11	7842.87	3939.91	709.22	3.83		705.39			

Table 8. MC6G – G3 Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-01	7842.77	4394.77	726.99	6.91	209	720.08	4.0%	4.2%	1.0%
SP-02	7822.70	4603.12	718.57	7.35		711.22			
SP-02	7822.70	4603.12	718.57	7.35	211	711.22	4.1%	4.2%	1.0%
SP-03	7800.62	4813.09	710.00	7.67		702.33			
SP-03	7800.62	4813.09	710.00	7.67	233	702.33	4.0%	4.2%	1.0%
SP-04	7776.87	5044.82	700.70	8.10		692.60			

Table 9. MC6G – G1 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-15	7339.00	4329.23	675.00	4.62	159	670.38	2.5%	2.3%	2.0%
SP-20	7180.19	4317.03	678.98	4.87		674.11			
SP-17	7338.93	4827.73	682.00	5.13	160	676.87	2.5%	2.3%	2.0%
SP-19	7179.21	4823.35	686.00	5.44		680.56			
SP-17	7338.93	4827.73	682.00	5.13	154	676.87	5.0%	4.6%	2.0%
SP-21	7493.33	4826.63	689.69	5.74		683.95			

Table 10. MC6G – G2 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-10	7842.87	4009.79	712.00	3.30	129	708.70	4.5%	6.8%	2.0%
SP-12	7714.37	4002.92	717.80	0.39		717.41			

CALCULATION SHEET

Client: Wayne Disposal, Inc.
Project: WDI Final Cover Grading Modification
Calculation: Settlement Analysis

Project No.: 1208070015.005
Calculated By: RR Date: 5/16/2022
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Approved By: XZ Date: 5/17/2022

Table 11. MC6G – G3 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-02	7822.70	4603.12	718.57	7.35	76	711.22	6.1%	5.9%	2.0%
SP-05	7898.60	4609.46	723.20	7.46		715.74			
SP-02	7822.70	4603.12	718.57	7.35	58	711.22	9.3%	9.2%	2.0%
SP-06	7764.39	4602.88	724.00	7.44		716.56			

Table 12. MC6F – F1 Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-18	8104.44	3986.36	716.35	5.41	81	710.94	4.5%	3.4%	1.0%
SP-19	8104.44	4067.43	720.00	6.30		713.70			
SP-19	8104.44	4067.43	720.00	6.30	133	713.70	4.5%	3.4%	1.0%
SP-20	8104.44	4200.76	726.00	7.83		718.17			
SP-20	8104.44	4200.76	726.00	7.83	110	718.17	4.5%	3.9%	1.0%
SP-21	8104.44	4310.91	730.96	8.46		722.50			

Table 13. MC6F – F2 Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Pipe Flowline Slope		
Point	North	East	Flowline Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-14	8441.35	3991.88	709.74	5.38	140	704.36	3.0%	2.2%	1.0%
SP-15	8441.35	4131.87	713.94	6.54		707.40			
SP-15	8441.35	4131.87	713.94	6.54	149	707.40	3.0%	3.1%	1.0%
SP-16	8441.35	4280.39	718.40	6.43		711.97			

CALCULATION SHEET

Client: Wayne Disposal, Inc.
Project: WDI Final Cover Grading Modification
Calculation: Settlement Analysis

Project No.: 1208070015.005
Calculated By: RR Date: 5/16/2022
Checked By: KF Date: 5/17/2022
Approved By: XZ Date: 5/17/2022

Table 14. MC6F – F3 Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Floor/Pipe Slope		
Point	North	East	Pipe Invert Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-7	8529.72	4583.16	709.66	3.70	50	705.97	4.1%	2.4%	1.0%
SP-7b	8480.14	4583.16	711.70	4.54		707.15			
SP-7b	8480.14	4583.16	711.70	4.54	122	707.15	4.1%	4.9%	1.0%
SP-8	8357.69	4583.16	716.72	3.52		713.19			
SP-8	8357.69	4583.16	716.72	3.52	122	713.19	4.1%	2.2%	1.0%
SP-8b	8235.24	4583.16	721.74	5.84		715.90			
SP-8b	8235.24	4583.16	721.74	5.84	42	715.90	4.1%	4.3%	1.0%
SP-9	8193.03	4583.16	723.47	5.73		717.73			
SP-9	8193.03	4583.16	723.47	5.73	42	717.73	10.2%	5.0%	1.0%
SP-9b	8150.83	4583.16	727.78	7.92		719.86			
SP-9b	8150.83	4583.16	727.78	7.92	17	719.86	5.0%	3.8%	1.0%
SP-10	8134.31	4583.16	728.61	8.11		720.50			
SP-10	8134.31	4583.16	728.61	8.11	98	720.50	5.0%	3.9%	1.0%
SP-10b	8035.92	4583.16	733.53	9.22		724.31			
SP-10b	8035.92	4583.16	733.53	9.22	60	724.31	5.0%	4.4%	1.0%
SP-11	7975.92	4583.16	736.53	9.56		726.97			

Table 15. MC6F – F4 Pipe Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Floor/Pipe Slope		
Point	North	East	Pipe Invert Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-1	8515.67	4957.47	700.50	3.49	35	697.01	5.0%	2.1%	1.0%
SP-1b	8481.11	4957.47	702.23	4.49		697.73			
SP-1b	8481.11	4957.47	702.23	4.49	121	697.73	5.0%	3.7%	1.0%
SP-2	8360.25	4957.47	708.27	6.06		702.21			
SP-2	8360.25	4957.47	708.27	6.06	121	702.21	5.0%	3.9%	1.0%
SP-2b	8239.39	4957.47	714.31	7.39		706.92			
SP-2b	8239.39	4957.47	714.31	7.39	49	706.92	5.0%	6.8%	1.0%
SP-3	8190.21	4957.47	716.77	6.51		710.27			
SP-3	8190.21	4957.47	716.77	6.51	49	710.27	5.0%	5.0%	1.0%
SP-3b	8141.04	4957.47	719.23	6.52		712.71			
SP-3b	8141.04	4957.47	719.23	6.52	105	712.71	5.0%	1.4%	1.0%
SP-4	8035.92	4957.47	724.49	10.34		714.15			
SP-4	8035.92	4957.47	724.49	10.34	60	714.15	5.0%	6.0%	1.0%
SP-4b	7975.92	4957.47	727.49	9.76		717.73			

CALCULATION SHEET

Client: Wayne Disposal, Inc.
Project: WDI Final Cover Grading Modification
Calculation: Settlement Analysis

Project No.: 1208070015.005
Calculated By: RR Date: 5/16/2022
Checked By: KF Date: 5/17/2022
Approved By: XZ Date: 5/17/2022

Table 16. MC6F – F1 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Floor/Pipe Slope		
Point	North	East	Pipe Invert Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-19b	8154.60	4063.30	735.96	6.62	27	729.34	5.9%	8.0%	2.0%
SP-19d	8181.85	4063.30	737.57	6.06		731.51			
SP-19d	8181.85	4063.30	737.57	6.06	34	731.51	5.9%	5.7%	2.0%
SP-19a	8215.56	4063.30	739.57	6.14		733.42			
SP-19a	8215.56	4063.30	739.57	6.14	41	733.42	5.9%	6.5%	2.0%
SP-19c	8256.70	4063.30	742.00	5.91		736.09			

Table 17. MC6F – F2 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Floor/Pipe Slope		
Point	North	East	Pipe Invert Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-15	8441.35	4131.87	715.04	7.29	35	707.75	2.6%	3.9%	2.0%
SP-15c	8476.72	4131.87	715.98	6.85		709.12			
SP-15c	8476.72	4131.87	715.98	6.85	49	709.12	2.6%	5.3%	2.0%
SP-15b	8525.36	4131.87	717.26	5.59		711.67			
SP-15b	8525.36	4131.87	717.26	5.59	49	711.67	2.6%	3.3%	2.0%
SP-15a	8574.00	4131.87	718.55	5.27		713.28			
SP-15a	8574.00	4131.87	718.55	5.27	53	713.28	2.6%	5.1%	2.0%
SP-15d	8626.95	4131.87	719.95	3.94		716.01			

Table 18. MC6F – F3 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Floor/Pipe Slope		
Point	North	East	Pipe Invert Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-10b	8035.92	4583.16	734.63	9.39	155	725.24	3.3%	3.9%	2.0%
SP-12	8035.92	4738.22	739.78	8.56		731.22			
SP-10b	8035.92	4583.16	734.63	9.39	158	725.24	3.3%	2.7%	2.0%
SP-13	8035.92	4425.42	739.86	10.33		729.53			

Table 19. MC6F – F4 Cross Slope Flowline Settlement Calculation Summary

			Elevation			Liner Grade	Floor/Pipe Slope		
Point	North	East	Pipe Invert Elevation	Settlement	Length	Post-Settlement	Pre-Settlement	Post-Settlement	Min. Slope
	[ft]	[ft]	[ft]	[ft]	[ft]	[ft]	[%]	[%]	[%]
SP-4	8035.92	4957.47	725.59	10.34	183	715.24	3.3%	5.2%	2.0%
SP-5	8035.92	4774.37	731.66	6.97		724.68			
SP-4	8035.92	4957.47	725.59	10.34	185	715.24	3.3%	3.9%	2.0%
SP-6	8035.92	5142.88	731.74	9.22		722.51			

CONCLUSIONS

The post-settlement slope of the leachate collection pipe should be at least 1% and each cell floor cross slope should be at least 2% per Rule 299.9620 (4) (EGLE 2020). This calculation estimated the settlement at points along the leachate collection pipe and cross slopes within cells affected by the proposed revised final grades. The settlement of each of these points was used to calculate the post-settlement slopes of the liner system in these cells. This settlement analysis determined that all leachate collection pipes and cross slopes within MC VI-E, MC-VI-F, and MC-VI-G sub cells G1, G2, and G3 meet the required minimum post-settlement slopes.

REFERENCES

Coduto, D.P. (1999) *Geotechnical Engineering: Principles and Practices*, Prentice-Hall Inc., New Jersey

EGLE (2020) *Part 111 Administrative Rules,* Department of Environment, Great Lakes, and Energy *Hazardous Waste Management*, Materials Management Division.

NTH Consultants, Ltd. (2011a) *Volume III – WDI Operating License Application Master Cells VI F & G.*

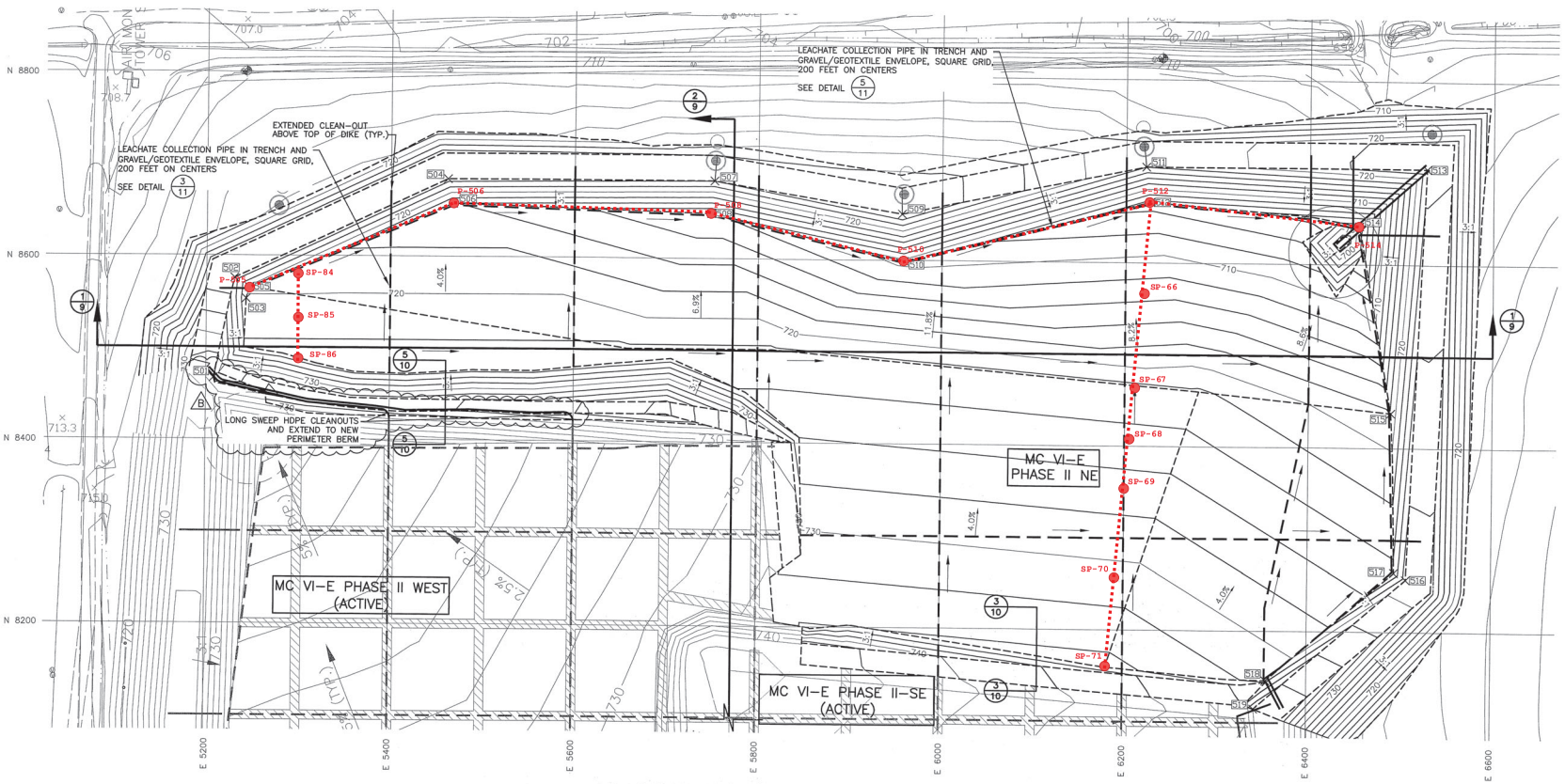
NTH Consultants, Ltd. (2011b) Engineering Drawings. *Wayne Disposal, Inc. Site No. 2 Master Cell VI-F&G.*

NTH Consultants, Ltd. (2008) Master Cell VI-E Design Modification Plans. *Wayne Disposal, Inc. Site No. 2.*

Attachment A-2.2.1

Settlement Analysis Points

Final Cover Grading Modification



LEGEND:

- —730— PROPOSED TOP OF DIKE/ PRIMARY CLAY LINER CONTOURS
- —730— EXISTING CONTOUR
- PROPOSED GRADE BREAK
- 520 PROPOSED PRIMARY CLAY LINER POINT NUMBER ID
- PROPOSED LEACHATE COLLECTION SUMP LOCATION SEE DETAIL 1/11
- EXISTING LEACHATE COLLECTION SUMP LOCATION
- PROPOSED LEACHATE COLLECTION PIPE AND FLOW DIRECTION
- EXISTING LEACHATE COLLECTION PIPE AND FLOW DIRECTION
- EXISTING 2 EXTRA LAYERS OF GEONET, 7.5' WIDE, BENEATH GEOCOMPOSITE IN SQUARE GRID 100 FEET ON CENTERS
- ±8% FLOOR SLOPE
- EXISTING LEACHATE SUMP
- EXISTING LEACHATE SUMP VALVE PIT
- EXISTING CLEANOUT
- PROPOSED CLEANOUT

N

0 30' 60' 120'
SCALE

PRIMARY CLAY LINER COORDINATES

POINT NO.	NORTHING	EASTING	ELEVATION
501	8466.47	5208.11	732.36
502	8575.56	5230.55	725.00
503	8552.98	5243.24	720.23
504	8684.58	5461.79	725.00
505	8565.19	5246.41	719.62
506	8657.89	5468.01	716.07
507	8684.58	5752.00	724.00
508	8649.05	5748.66	712.17
509	8650.52	5956.38	726.00
510	8599.09	5958.86	709.36
511	8704.86	6221.78	718.00
512	8666.18	6226.32	705.21
513	8704.86	6587.36	723.50
514	8641.95	6454.04	701.00
515	8437.99	6489.67	718.29
516	8257.01	6507.34	729.00
517	8264.46	6494.44	724.51
518	8146.02	6355.69	731.45
519	8115.19	6342.71	737.66

B

A B

DRAFT

NTH Consultants, Ltd.
Infrastructure Engineering and Environmental Services

Northville, MI	248.553.6300
Detroit, MI	313.237.3900
Lansing, MI	517.484.6900
Grand Rapids, MI	616.957.3690
Exton, PA	610.524.2300
Lehigh Valley, PA	484.893.1440
Cleveland, OH	216.334.4040
Indianapolis, IN	317.735.7649

SUBMITTAL

REV	DESCRIPTION	DATE	BY
A	PER MDEQ COMMENTS	1/21/09	JHL
B	MODIFY FLOOR TIE IN	8/1/11	DRL

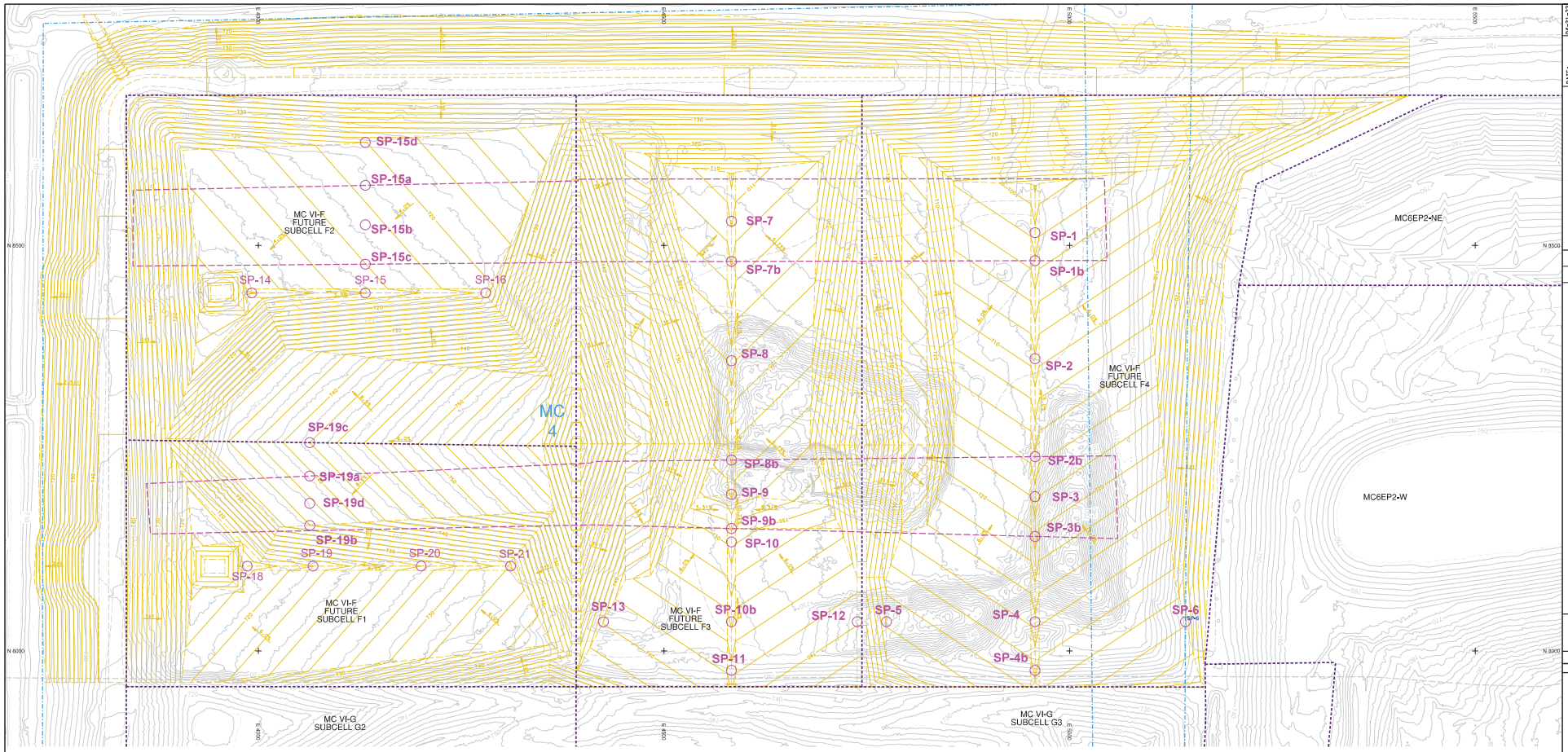
PROJECT NAME:
MASTER CELL VI-E DESIGN MODIFICATION

PROJECT LOCATION:
WDI SITE NO. 2
VAN BUREN TWP., WAYNE COUNTY, MICHGAN

NTH PROJECT NO.: 13-070804-05	CAD FILE NAME: SHEET 5
DESIGNED BY: JHL	INCEP DATE: 1/21/08
DRAWN BY: DRL	DRAWING SCALE: AS SHOWN
CHECKED BY: ISS	SUBMITTED DATE: 8/1/2011

SHEET TITLE:
TOP OF PRIMARY LINER ELEVATION PLAN

SHEET REFERENCE NUMBER:
5



LEGEND

- PHASE BOUNDARY
- OLD CELL BOUNDARY
- N 6500 + GRID COORDINATES
- 710 EXISTING TOPO CONTOURS (2 FT INTERVAL)
- 710 EXISTING TOP OF WASTE CONTOURS (2 FT INTERVAL)
- 710 PROPOSED TOP OF PRIMARY LINER CONTOUR (2 FT INTERVAL)
- 710 PROPOSED EXPANSION FINAL GRADE CONTOURS (2 FT INTERVAL)
- SETTLEMENT PLATE
- APPROXIMATE INTERCELL DIKES IN MC4

N

0 25' 50' 100'
SCALE

REV. 09

DRAWING SIZE: 30" x 42"

REV	DATE	REVISION DESCRIPTION
0	04-21-22	ISSUED FOR REVIEW

REVISIONS

DATE: 04-21-22
DESIGNED BY: RR
DRAWN BY: PAA
CHECKED BY:
APPROVED BY:

CTI and Associates, Inc.
28001 Cabot Drive, Ste. 250
Novi, Michigan 48377
248.486.5100 (fax)248.486.5050
www.ctiandassociates.com

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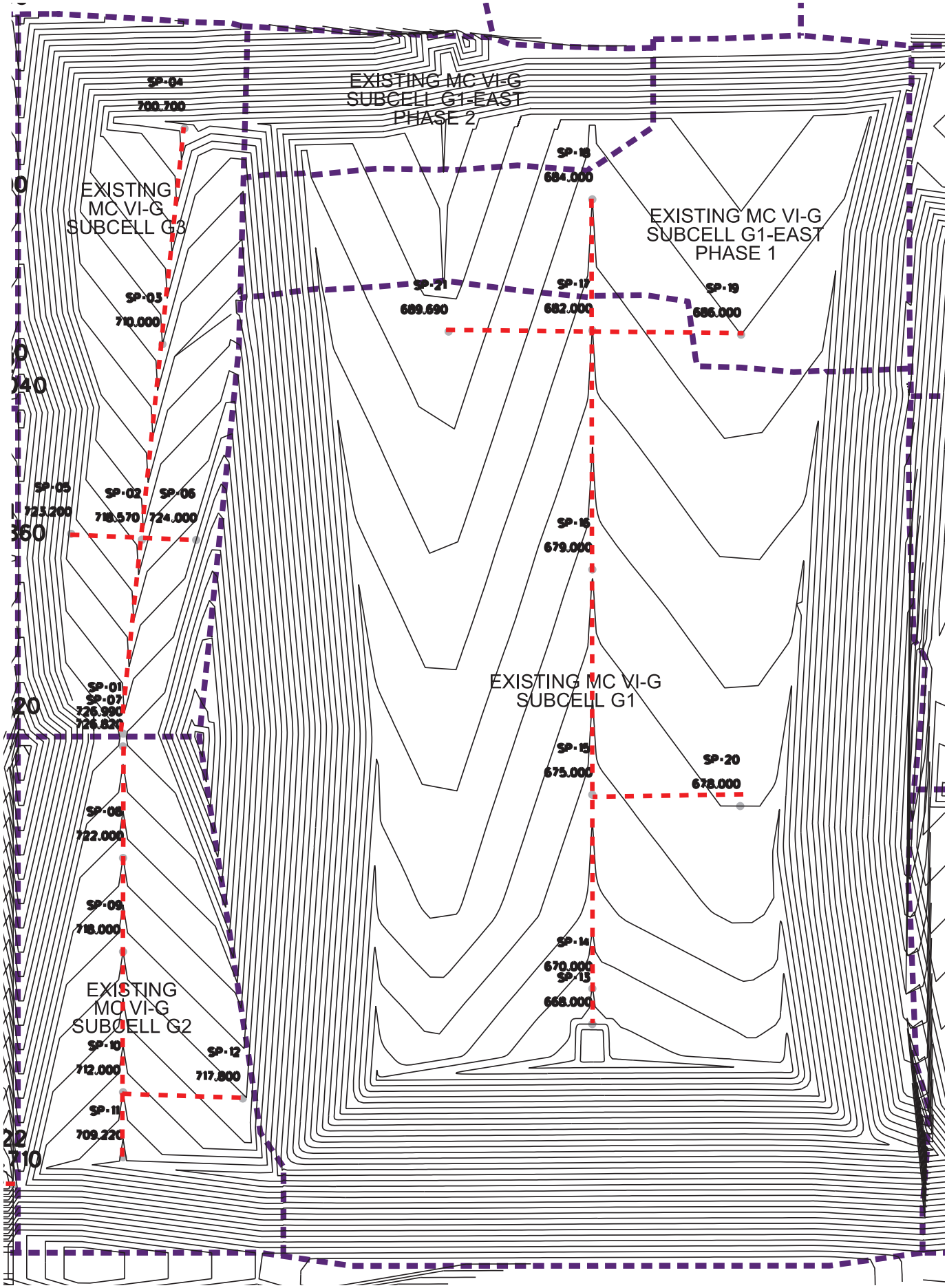
PAA RR
DN APP

WAYNE DISPOSAL, INC. SITE NO. 2
VAN BUREN TOWNSHIP, WAYNE COUNTY, MICHIGAN

F1-F4 SETTLEMENT POINT PLAN

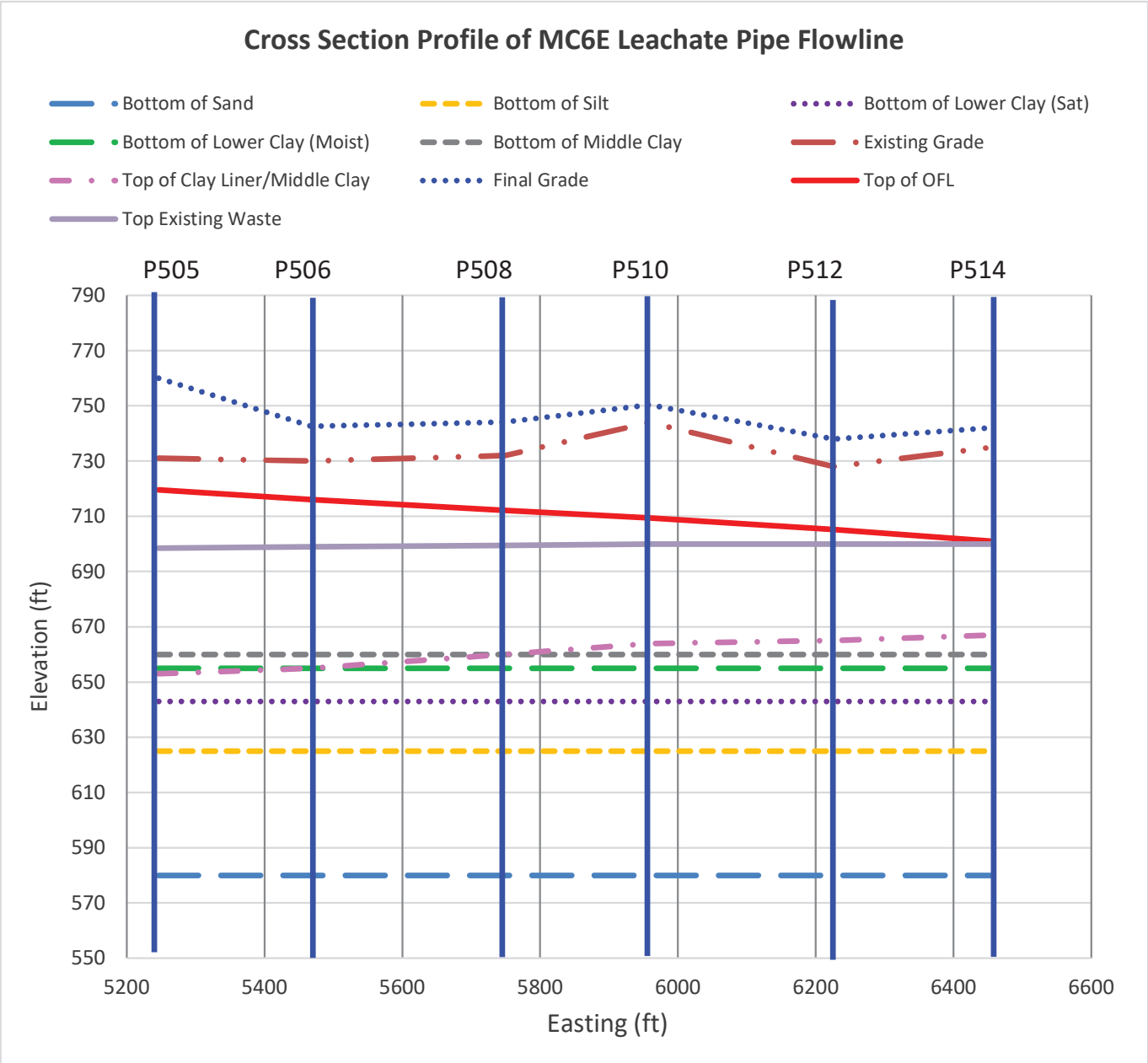
PROJECT NUMBER
119807004 7
SCALE
1" = 50'
DRAWING NO


EXISTING MC VI-G
SUBCELL G1-EAST
PHASE 2
EXISTING
MC VI-G
SUBCELL G3
EXISTING MC VI-G
SUBCELL G1-EAST
PHASE 1
EXISTING MC VI-G
SUBCELL G1
EXISTING
MC VI-G
SUBCELL G2
SP-04
700.700
SP-18
684.000
SP-03
710.000
SP-21
689.690
SP-17
682.000
SP-19
686.000
SP-05
723.200
SP-02
718.570
SP-06
724.000
SP-16
679.000
SP-01
726.990
SP-07
726.820
SP-15
675.000
SP-20
678.000
SP-08
722.000
SP-09
718.000
SP-14
670.000
SP-13
668.000
SP-10
712.000
SP-12
717.800
SP-11
709.220

Attachment A-2.2.2

Cross-section Profiles and Settlement Calculation Spreadsheets

Final Cover Grading Modification


Cross Section Profile of MC6E Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
P505
P506
P508
P510
P512
P514
790
770
750
730
710
690
670
650
630
610
590
570
550
Elevation (ft)
5200
5400
5600
5800
6000
6200
6400
6600
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
P505	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8565.19	5246.41	719.62	760.00	731.00	660.00	655.00	643.00	625.00	580.00	653.00	698.50

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	36.38	103.0	0	3747.1									
	3	OFL	18.38	135.0	1	-2481.3									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	7.06	135.0	0	953.1	0.102	0.017	0.005	2957.9	2957.9	5708.7	NC	0.206	0.009
	3	OFL	7.06	135.0	0	953.1	0.102	0.017	0.005	3911.0	3911.0	6661.8	NC	0.167	0.009
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	4646.3	4646.3	7397.1	NC	0.092	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	5163.8	5163.8	7914.7	NC	0.084	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	5681.4	5681.4	8432.2	NC	0.078	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	6199.0	6199.0	8949.8	NC	0.073	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	6716.5	6716.5	9467.4	NC	0.068	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	7234.1	7234.1	9984.9	NC	0.064	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	7751.7	7751.7	10502.5	NC	0.060	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	8269.2	8269.2	11020.1	NC	0.057	0.035
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	8528.0	4610.0	11278.8	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	8528.0	4610.0	11278.8	NC	-	-
	7	Lower Clay (Moist)	0.00	128.0	0	-	0.171	0.029	0.009	8528.0	4610.0	11278.8	NC	-	-
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	8692.0	4774.0	11442.8	NC	0.102	0.011
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	9020.0	5102.0	11770.8	NC	0.099	0.011
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9465.7	5547.7	12216.5	NC	0.150	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10029.1	6111.1	12779.9	NC	0.142	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10547.5	6629.5	13298.3	NC	0.091	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11020.9	7102.9	13771.7	NC	0.087	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11494.3	7576.3	14245.1	NC	0.084	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11967.7	8049.7	14718.5	NC	0.081	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12441.1	8523.1	15191.9	NC	0.078	-
														1.860	0.320
													Total Settlement [ft]	**2.18**	

Variables & Constants	
Point Name	P505
Settlement Layer [ft]	132.6
ERROR	0.0
# of Layers	19
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
P506	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8657.89	5468.01	716.07	742.65	730.00	660.00	655.00	643.00	625.00	580.00	655.00	699.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	22.58	103.0	0	2325.7									
	3	OFL	20.93	135.0	1	-2825.5									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	5.04	135.0	0	679.7	0.102	0.017	0.005	3165.4	3165.4	4150.6	NC	0.060	0.006
	3	OFL	5.04	135.0	0	679.7	0.102	0.017	0.005	3845.1	3845.1	4830.3	NC	0.051	0.006
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4435.3	4435.3	5420.4	NC	0.038	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4935.8	4935.8	5920.9	NC	0.035	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	5436.3	5436.3	6421.4	NC	0.032	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	5936.8	5936.8	6921.9	NC	0.029	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	6437.3	6437.3	7422.4	NC	0.027	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	6937.8	6937.8	7922.9	NC	0.025	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	7438.3	7438.3	8423.4	NC	0.024	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	7938.8	7938.8	8923.9	NC	0.022	0.034
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	8189.0	4610.0	9174.2	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	8189.0	4610.0	9174.2	NC	-	-
	7	Lower Clay (Moist)	0.00	128.0	0	-	0.171	0.029	0.009	8189.0	4610.0	9174.2	NC	-	-
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8385.8	4806.8	9371.0	NC	0.049	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8779.4	5200.4	9764.6	NC	0.047	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9257.9	5678.9	10243.1	NC	0.059	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9821.3	6242.3	10806.5	NC	0.056	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10339.7	6760.7	11324.9	NC	0.036	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10813.1	7234.1	11798.3	NC	0.034	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11286.5	7707.5	12271.7	NC	0.033	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11759.9	8180.9	12745.1	NC	0.031	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12233.3	8654.3	13218.5	NC	0.030	-
														0.721	0.310
													Total Settlement [ft]	**1.03**	

Variables & Constants	
Point Name	P506
Settlement Layer [ft]	129.1
ERROR	0.0
# of Layers	19
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
P508	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8649.05	5748.66	712.17	744.14	732.00	660.00	655.00	643.00	625.00	580.00	660.00	699.50

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
											(midpoint of layer)				
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	27.97	103.0	0	2880.9									
	3	OFL	26.83	135.0	1	-3622.1									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	2.83	135.0	0	382.7	0.102	0.017	0.005	3813.4	3813.4	4557.3	NC	0.022	0.004
	3	OFL	2.83	135.0	0	382.7	0.102	0.017	0.005	4196.1	4196.1	4940.0	NC	0.020	0.004
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	4612.2	4612.2	5356.0	NC	0.026	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	5061.5	5061.5	5805.3	NC	0.024	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	5510.8	5510.8	6254.6	NC	0.022	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	5960.1	5960.1	6704.0	NC	0.020	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	6409.4	6409.4	7153.3	NC	0.019	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	6858.7	6858.7	7602.6	NC	0.018	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	7308.0	7308.0	8051.9	NC	0.017	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	7757.3	7757.3	8501.2	NC	0.016	0.030
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7982.0	4610.0	8725.9	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7982.0	4610.0	8725.9	NC	-	-
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8302.0	4930.0	9045.9	NC	0.032	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8818.8	5446.8	9562.7	NC	0.036	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9212.4	5840.4	9956.3	NC	0.035	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9690.9	6318.9	10434.8	NC	0.043	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10254.3	6882.3	10998.2	NC	0.041	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10772.7	7400.7	11516.6	NC	0.026	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11246.1	7874.1	11990.0	NC	0.025	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11719.5	8347.5	12463.4	NC	0.024	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12192.9	8820.9	12936.8	NC	0.023	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12666.3	9294.3	13410.2	NC	0.022	-
														0.510	0.288
													Total Settlement [ft]	**0.80**	

Variables & Constants	
Point Name	P508
Settlement Layer [ft]	125.2
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
P510	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8599.09	5958.86	709.36	750.38	744.00	660.00	655.00	643.00	625.00	580.00	664.00	700.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	37.02	103.0	0	3813.1									
	3	OFL	41.64	135.0	1	-5621.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	1.18	135.0	0	159.3	0.102	0.017	0.005	5701.1	5701.1	5377.7	OC-1	-0.001	0.002
	3	OFL	1.18	135.0	0	159.3	0.102	0.017	0.005	5860.4	5860.4	5537.0	OC-1	-0.000	0.002
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	6144.8	6144.8	5821.4	OC-1	-0.001	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	6554.3	6554.3	6230.9	OC-1	-0.001	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	6963.8	6963.8	6640.4	OC-1	-0.001	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	7373.3	7373.3	7049.9	OC-1	-0.001	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	7782.8	7782.8	7459.4	OC-1	-0.001	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	8192.3	8192.3	7868.9	OC-1	-0.001	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	8601.8	8601.8	8278.4	OC-1	-0.001	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	9011.3	9011.3	8687.9	OC-1	-0.001	0.028
	6	Middle Clay	2.00	136.0	0	272.0	0.102	0.017	0.005	9352.0	9352.0	9028.7	OC-1	-0.001	0.003
	6	Middle Clay	2.00	136.0	0	272.0	0.102	0.017	0.005	9624.0	9624.0	9300.7	OC-1	-0.001	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	10080.0	10080.0	9756.7	OC-1	-0.002	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	10596.8	10596.8	10273.5	OC-1	-0.002	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	10990.4	10990.4	10667.1	OC-1	-0.002	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	11468.9	11468.9	11145.6	OC-1	-	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	12032.3	12032.3	11709.0	OC-1	-	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12550.7	12550.7	12227.4	OC-1	-	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13024.1	13024.1	12700.8	OC-1	-	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13497.5	13497.5	13174.2	OC-1	-	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13970.9	13970.9	13647.6	OC-1	-	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	14444.3	14444.3	14121.0	OC-1	-	-
														-0.018	0.268
													Total Settlement [ft]	**0.25**	

Variables & Constants	
Point Name	P510
Settlement Layer [ft]	122.4
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
P512	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8666.18	6226.32	705.21	737.98	728.00	660.00	655.00	643.00	625.00	580.00	665.00	700.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	28.77	103.0	0	2963.3									
	3	OFL	28.00	135.0	1	-3780.0									
	4	Existing Waste	1.79	91.0	1	-162.9									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3942.9	3942.9	4448.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3942.9	3942.9	4448.3	NC	-	-
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	4131.8	4131.8	4637.2	NC	0.017	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	4509.5	4509.5	5015.0	NC	0.015	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	4887.3	4887.3	5392.7	NC	0.014	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	5265.1	5265.1	5770.5	NC	0.013	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	5642.8	5642.8	6148.2	NC	0.012	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	6020.6	6020.6	6526.0	NC	0.012	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	6398.4	6398.4	6903.8	NC	0.011	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	6776.1	6776.1	7281.5	NC	0.010	0.025
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	7135.0	4780.0	7640.4	NC	0.008	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	7475.0	5120.0	7980.4	NC	0.007	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7965.0	5610.0	8470.4	NC	0.023	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8481.8	6126.8	8987.2	NC	0.026	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8875.4	6520.4	9380.8	NC	0.025	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9353.9	6998.9	9859.3	NC	0.031	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9917.3	7562.3	10422.7	NC	0.029	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10435.7	8080.7	10941.1	NC	0.018	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10909.1	8554.1	11414.5	NC	0.018	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11382.5	9027.5	11887.9	NC	0.017	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11855.9	9500.9	12361.3	NC	0.016	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12329.3	9974.3	12834.7	NC	0.016	-
														0.338	0.249
													Total Settlement [ft]	**0.59**	

Variables & Constants	
Point Name	P512
Settlement Layer [ft]	118.2
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

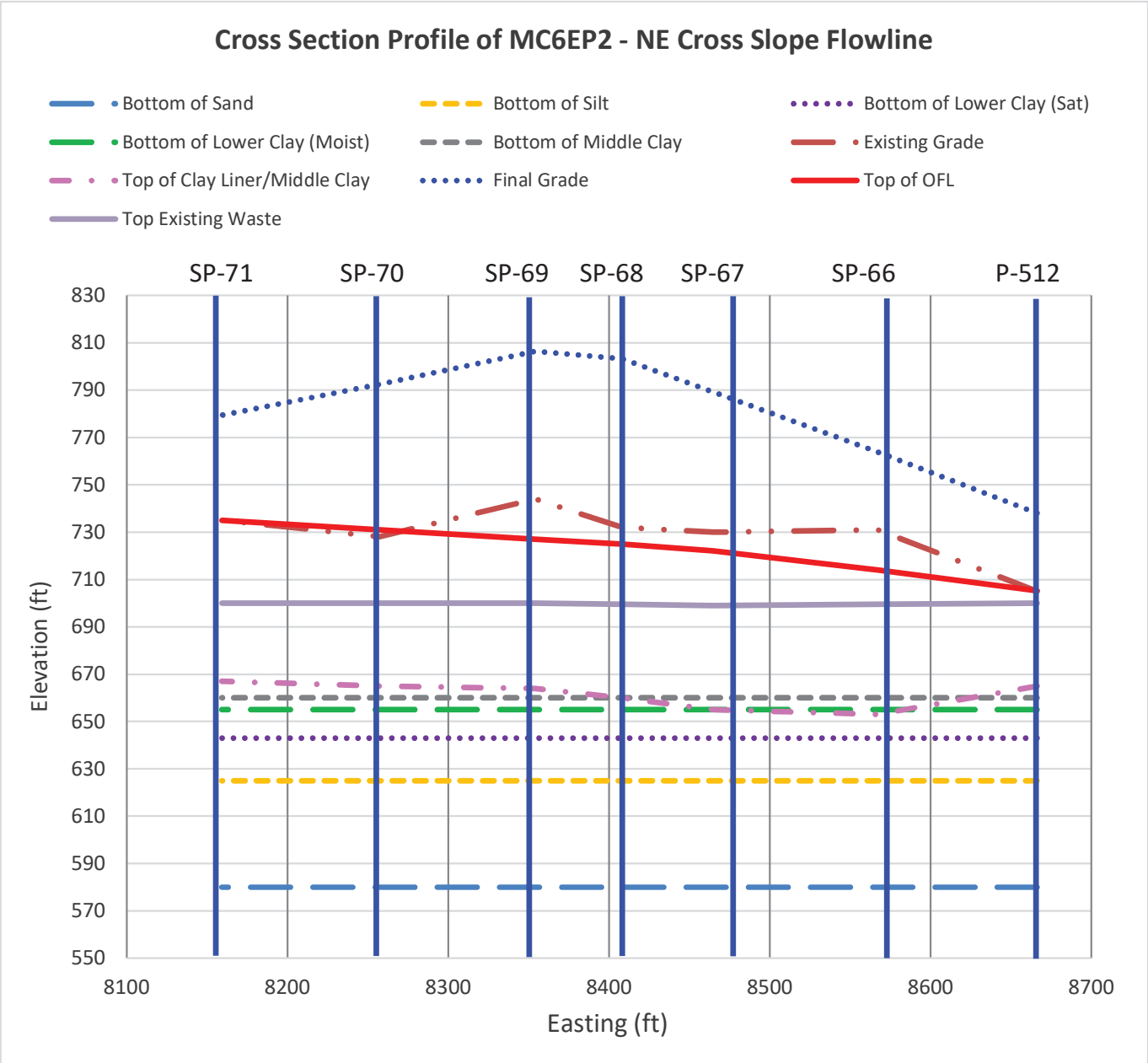
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
P514	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8641.95	6454.04	701.00	742.00	735.00	660.00	655.00	643.00	625.00	580.00	667.00	700.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	37.00	103.0	0	3811.0									
	3	OFL	35.00	135.0	1	-4725.0									
	4	Existing Waste	6.00	91.0	1	-546.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5271.0	5271.0	5296.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5271.0	5271.0	5296.0	NC	-	-
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	5424.6	5424.6	5449.6	NC	0.001	0.021
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	5731.7	5731.7	5756.7	NC	0.001	0.021
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	6038.8	6038.8	6063.8	NC	0.000	0.021
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	6345.9	6345.9	6370.9	NC	0.000	0.021
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	6653.1	6653.1	6678.1	NC	0.000	0.021
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	6960.2	6960.2	6985.2	NC	0.000	0.021
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	7267.3	7267.3	7292.3	NC	0.000	0.021
	4	Existing Waste	3.38	91.0	0	307.1	0.080	0.013	0.024	7574.4	7574.4	7599.4	NC	0.000	0.021
	6	Middle Clay	3.50	136.0	0	476.0	0.102	0.017	0.005	7966.0	7966.0	7991.0	NC	0.000	0.004
	6	Middle Clay	3.50	136.0	0	476.0	0.102	0.017	0.005	8442.0	8442.0	8467.0	NC	0.000	0.004
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	9000.0	9000.0	9025.0	NC	0.001	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9516.8	9516.8	9541.8	NC	0.001	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9910.4	9910.4	9935.4	NC	0.001	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10388.9	10388.9	10413.9	NC	0.001	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10952.3	10952.3	10977.3	NC	0.001	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11470.7	11470.7	11495.7	NC	0.001	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11944.1	11944.1	11969.1	NC	0.001	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12417.5	12417.5	12442.5	NC	0.001	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12890.9	12890.9	12915.9	NC	0.001	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13364.3	13364.3	13389.3	NC	0.001	-
														0.015	0.213
													Total Settlement [ft]	**0.23**	

Variables & Constants	
Point Name	P514
Settlement Layer [ft]	114.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6EP2 - NE Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-71
SP-70
SP-69
SP-68
SP-67
SP-66
P-512
830
810
790
770
750
730
710
690
670
650
630
610
590
570
550
Elevation (ft)
8100
8200
8300
8400
8500
8600
8700
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
P-512	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8666.18	6226.32	705.21	737.98	705.00	660.00	655.00	643.00	625.00	580.00	665.00	700.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	28.77	103.0	0	2963.3									
	3	OFL	5.00	135.0	1	-675.0									
	4	Existing Waste	1.79	91.0	1	-162.9									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	837.9	837.9	4448.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	837.9	837.9	4448.3	NC	-	-
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	1026.8	1026.8	4637.2	NC	0.217	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	1404.5	1404.5	5015.0	NC	0.184	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	1782.3	1782.3	5392.7	NC	0.160	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	2160.1	2160.1	5770.5	NC	0.142	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	2537.8	2537.8	6148.2	NC	0.128	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	2915.6	2915.6	6526.0	NC	0.116	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	3293.4	3293.4	6903.8	NC	0.107	0.025
	4	Existing Waste	4.15	91.0	0	377.8	0.080	0.013	0.024	3671.1	3671.1	7281.5	NC	0.099	0.025
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	3860.0	4610.0	7470.4	OC-2	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	3860.0	4610.0	7470.4	OC-2	-	-
	7	Lower Clay (Moist)	0.00	128.0	0	-	0.171	0.029	0.009	3860.0	4610.0	7470.4	OC-2	-	-
	8	Lower Clay (Sat)	11.00	65.6	0	721.6	0.171	0.029	0.009	4220.8	4970.8	7831.2	OC-2	0.394	0.025
	8	Lower Clay (Sat)	11.00	65.6	0	721.6	0.171	0.029	0.009	4942.4	5692.4	8552.8	OC-2	0.352	0.025
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	5584.9	6334.9	9195.3	OC-2	0.218	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6148.3	6898.3	9758.7	OC-2	0.203	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	6666.7	7416.7	10277.1	OC-2	0.127	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7140.1	7890.1	10750.5	OC-2	0.121	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7613.5	8363.5	11223.9	OC-2	0.115	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8086.9	8836.9	11697.3	OC-2	0.110	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8560.3	9310.3	12170.7	OC-2	0.105	-
														2.897	0.254
													Total Settlement [ft]	**3.15**	

Variables & Constants	
Point Name	P-512
Settlement Layer [ft]	118.2
ERROR	0.0
# of Layers	17
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-66	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8566.99	6221.70	714.00	763.83	731.00	660.00	655.00	643.00	625.00	580.00	653.00	699.50

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	45.83	103.0	0	4720.5									
	3	OFL	24.00	135.0	1	-3240.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.75	135.0	0	506.3	0.102	0.017	0.005	3493.1	3493.1	6458.6	NC	0.102	0.005
	3	OFL	3.75	135.0	0	506.3	0.102	0.017	0.005	3999.4	3999.4	6964.9	NC	0.092	0.005
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	4517.0	4517.0	7482.5	NC	0.102	0.036
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	5045.9	5045.9	8011.4	NC	0.093	0.036
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	5574.8	5574.8	8540.3	NC	0.086	0.036
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	6103.8	6103.8	9069.3	NC	0.080	0.036
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	6632.7	6632.7	9598.2	NC	0.075	0.036
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	7161.7	7161.7	10127.1	NC	0.070	0.036
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	7690.6	7690.6	10656.1	NC	0.066	0.036
	4	Existing Waste	5.81	91.0	0	528.9	0.080	0.013	0.024	8219.5	8219.5	11185.0	NC	0.062	0.036
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	8484.0	4610.0	11449.5	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	8484.0	4610.0	11449.5	NC	-	-
	7	Lower Clay (Moist)	0.00	128.0	0	-	0.171	0.029	0.009	8484.0	4610.0	11449.5	NC	-	-
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	8648.0	4774.0	11613.5	NC	0.109	0.011
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	8976.0	5102.0	11941.5	NC	0.106	0.011
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9421.7	5547.7	12387.2	NC	0.160	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9985.1	6111.1	12950.6	NC	0.152	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10503.5	6629.5	13469.0	NC	0.097	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10976.9	7102.9	13942.4	NC	0.093	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11450.3	7576.3	14415.8	NC	0.090	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11923.7	8049.7	14889.2	NC	0.087	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12397.1	8523.1	15362.6	NC	0.084	-
														1.808	0.317
													Total Settlement [ft]	**2.13**	

Variables & Constants	
Point Name	SP-66
Settlement Layer [ft]	127.0
ERROR	0.0
# of Layers	19
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-67	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8464.52	6211.68	722.00	789.22	730.00	660.00	655.00	643.00	625.00	580.00	655.00	699.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	63.22	103.0	0	6511.7									
	3	OFL	15.00	135.0	1	-2025.0									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	8.00	135.0	0	1080.0	0.102	0.017	0.005	2565.0	2565.0	8536.7	NC	0.426	0.010
	3	OFL	8.00	135.0	0	1080.0	0.102	0.017	0.005	3645.0	3645.0	9616.7	NC	0.344	0.010
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4435.3	4435.3	10406.9	NC	0.163	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4935.8	4935.8	10907.4	NC	0.152	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	5436.3	5436.3	11407.9	NC	0.142	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	5936.8	5936.8	11908.4	NC	0.133	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	6437.3	6437.3	12408.9	NC	0.125	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	6937.8	6937.8	12909.4	NC	0.119	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	7438.3	7438.3	13409.9	NC	0.113	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	7938.8	7938.8	13910.4	NC	0.107	0.034
	6	Middle Clay	-2.50	136.0	0	-340.0	0.102	0.017	0.005	8019.0	4440.0	13990.7	NC	-0.062	-0.003
	6	Middle Clay	-2.50	136.0	0	-340.0	0.102	0.017	0.005	7679.0	4100.0	13650.7	NC	-0.064	-0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7829.0	4250.0	13800.7	NC	0.210	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8345.8	4766.8	14317.5	NC	0.240	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8739.4	5160.4	14711.1	NC	0.232	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9217.9	5638.9	15189.6	NC	0.293	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9781.3	6202.3	15753.0	NC	0.279	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10299.7	6720.7	16271.4	NC	0.179	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10773.1	7194.1	16744.8	NC	0.172	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11246.5	7667.5	17218.2	NC	0.166	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11719.9	8140.9	17691.6	NC	0.161	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12193.3	8614.3	18165.0	NC	0.156	-
														3.787	0.323
													Total Settlement [ft]	**4.11**	

Variables & Constants	
Point Name	SP-67
Settlement Layer [ft]	135.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-68	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8408.01	6206.15	725.00	803.24	732.00	660.00	655.00	643.00	625.00	580.00	660.00	699.50

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	74.24	103.0	0	7646.7									
	3	OFL	14.00	135.0	1	-1890.0									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	9.25	135.0	0	1248.8	0.102	0.017	0.005	2514.4	2514.4	9756.1	NC	0.556	0.012
	3	OFL	9.25	135.0	0	1248.8	0.102	0.017	0.005	3763.1	3763.1	11004.8	NC	0.440	0.012
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	4612.2	4612.2	11853.9	NC	0.162	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	5061.5	5061.5	12303.2	NC	0.152	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	5510.8	5510.8	12752.5	NC	0.144	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	5960.1	5960.1	13201.8	NC	0.136	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	6409.4	6409.4	13651.1	NC	0.130	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	6858.7	6858.7	14100.4	NC	0.124	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	7308.0	7308.0	14549.8	NC	0.118	0.030
	4	Existing Waste	4.94	91.0	0	449.3	0.080	0.013	0.024	7757.3	7757.3	14999.1	NC	0.113	0.030
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7982.0	4610.0	15223.7	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7982.0	4610.0	15223.7	NC	-	-
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8302.0	4930.0	15543.7	NC	0.233	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8818.8	5446.8	16060.5	NC	0.267	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9212.4	5840.4	16454.1	NC	0.258	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9690.9	6318.9	16932.6	NC	0.327	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10254.3	6882.3	17496.0	NC	0.313	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10772.7	7400.7	18014.4	NC	0.201	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11246.1	7874.1	18487.8	NC	0.194	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11719.5	8347.5	18961.2	NC	0.188	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12192.9	8820.9	19434.6	NC	0.182	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12666.3	9294.3	19908.0	NC	0.177	-
														4.416	0.305
													Total Settlement [ft]	**4.72**	

Variables & Constants	
Point Name	SP-68
Settlement Layer [ft]	138.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-69	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8354.03	6200.87	727.00	806.37	744.00	660.00	655.00	643.00	625.00	580.00	664.00	700.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	75.37	103.0	0	7763.1									
	3	OFL	24.00	135.0	1	-3240.0									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	10.00	135.0	0	1350.0	0.102	0.017	0.005	3915.0	3915.0	9923.1	NC	0.412	0.013
	3	OFL	10.00	135.0	0	1350.0	0.102	0.017	0.005	5265.0	5265.0	11273.1	NC	0.337	0.013
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	6144.8	6144.8	12152.9	NC	0.107	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	6554.3	6554.3	12562.4	NC	0.102	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	6963.8	6963.8	12971.9	NC	0.097	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	7373.3	7373.3	13381.4	NC	0.093	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	7782.8	7782.8	13790.9	NC	0.089	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	8192.3	8192.3	14200.4	NC	0.086	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	8601.8	8601.8	14609.9	NC	0.083	0.028
	4	Existing Waste	4.50	91.0	0	409.5	0.080	0.013	0.024	9011.3	9011.3	15019.4	NC	0.080	0.028
	6	Middle Clay	2.00	136.0	0	272.0	0.102	0.017	0.005	9352.0	4746.0	15360.1	NC	0.044	0.003
	6	Middle Clay	2.00	136.0	0	272.0	0.102	0.017	0.005	9624.0	5018.0	15632.1	NC	0.043	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	10080.0	5474.0	16088.1	NC	0.174	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	10596.8	5990.8	16604.9	NC	0.200	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	10990.4	6384.4	16998.5	NC	0.194	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	11468.9	6862.9	17477.0	NC	0.247	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	12032.3	7426.3	18040.4	NC	0.237	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12550.7	7944.7	18558.8	NC	0.153	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13024.1	8418.1	19032.2	NC	0.148	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13497.5	8891.5	19505.6	NC	0.144	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13970.9	9364.9	19979.0	NC	0.140	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	14444.3	9838.3	20452.4	NC	0.136	-
														3.346	0.290
													Total Settlement [ft]	**3.64**	

Variables & Constants	
Point Name	SP-69
Settlement Layer [ft]	140.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-70	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8257.04	6191.39	731.00	792.47	728.00	660.00	655.00	643.00	625.00	580.00	665.00	700.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	57.47	103.0	0	5919.4									
	3	OFL	4.00	135.0	1	-540.0									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	12.00	135.0	0	1620.0	0.102	0.017	0.005	1350.0	1350.0	8214.4	NC	0.960	0.015
	3	OFL	12.00	135.0	0	1620.0	0.102	0.017	0.005	2970.0	2970.0	9834.4	NC	0.636	0.015
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	3979.1	3979.1	10843.5	NC	0.152	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	4377.2	4377.2	11241.6	NC	0.143	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	4775.3	4775.3	11639.7	NC	0.135	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5173.4	5173.4	12037.8	NC	0.128	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5571.6	5571.6	12436.0	NC	0.122	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5969.7	5969.7	12834.1	NC	0.116	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	6367.8	6367.8	13232.2	NC	0.111	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	6765.9	6765.9	13630.3	NC	0.106	0.027
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	7135.0	4780.0	13999.4	NC	0.075	0.003
	6	Middle Clay	2.50	136.0	0	340.0	0.102	0.017	0.005	7475.0	5120.0	14339.4	NC	0.072	0.003
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7965.0	5610.0	14829.4	NC	0.231	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8481.8	6126.8	15346.2	NC	0.264	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8875.4	6520.4	15739.8	NC	0.255	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9353.9	6998.9	16218.3	NC	0.323	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9917.3	7562.3	16781.7	NC	0.308	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10435.7	8080.7	17300.1	NC	0.198	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10909.1	8554.1	17773.5	NC	0.191	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11382.5	9027.5	18246.9	NC	0.184	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11855.9	9500.9	18720.3	NC	0.179	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12329.3	9974.3	19193.7	NC	0.173	-
														5.064	0.291
													Total Settlement [ft]	**5.35**	

Variables & Constants	
Point Name	SP-70
Settlement Layer [ft]	144.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

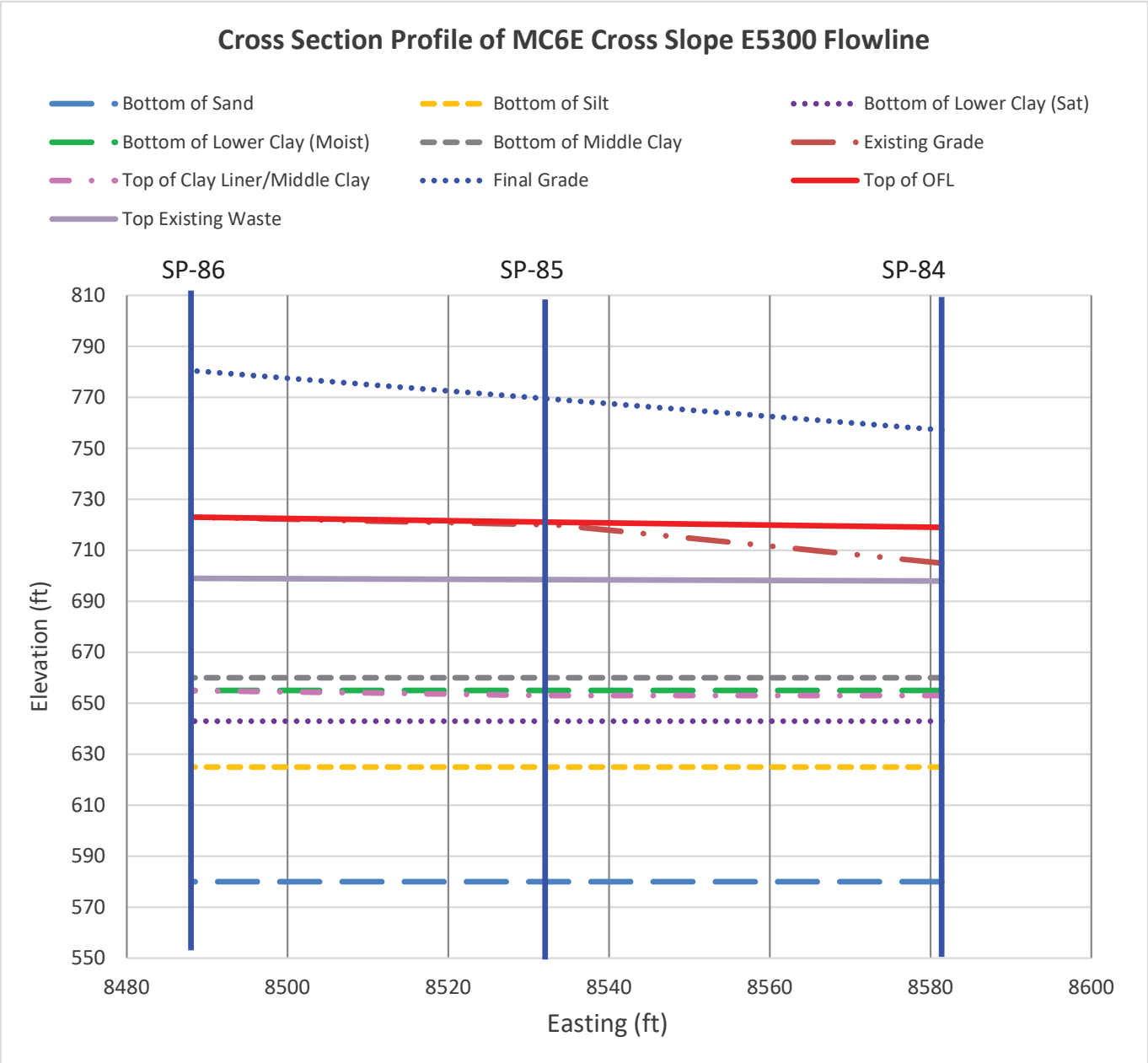
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-71	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8159.20	6181.82	735.00	779.45	735.00	660.00	655.00	643.00	625.00	580.00	667.00	700.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	40.45	103.0	0	4166.4									
	3	OFL	7.00	135.0	1	-945.0									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	14.00	135.0	0	1890.0	0.102	0.017	0.005	1890.0	1890.0	6596.4	NC	0.775	0.018
	3	OFL	14.00	135.0	0	1890.0	0.102	0.017	0.005	3780.0	3780.0	8486.4	NC	0.502	0.018
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	4912.7	4912.7	9619.0	NC	0.096	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	5288.1	5288.1	9994.4	NC	0.091	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	5663.4	5663.4	10369.8	NC	0.087	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	6038.8	6038.8	10745.2	NC	0.083	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	6414.2	6414.2	11120.5	NC	0.079	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	6789.6	6789.6	11495.9	NC	0.075	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	7164.9	7164.9	11871.3	NC	0.072	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	7540.3	7540.3	12246.7	NC	0.070	0.025
	6	Middle Clay	3.50	136.0	0	476.0	0.102	0.017	0.005	7966.0	4848.0	12672.4	NC	0.072	0.004
	6	Middle Clay	3.50	136.0	0	476.0	0.102	0.017	0.005	8442.0	5324.0	13148.4	NC	0.069	0.004
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	9000.0	5882.0	13706.4	NC	0.156	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9516.8	6398.8	14223.2	NC	0.179	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9910.4	6792.4	14616.8	NC	0.173	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10388.9	7270.9	15095.3	NC	0.219	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10952.3	7834.3	15658.7	NC	0.210	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11470.7	8352.7	16177.1	NC	0.134	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11944.1	8826.1	16650.5	NC	0.130	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12417.5	9299.5	17123.9	NC	0.126	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12890.9	9772.9	17597.3	NC	0.122	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13364.3	10246.3	18070.7	NC	0.118	-
														3.637	0.286
													Total Settlement [ft]	**3.92**	

Variables & Constants	
Point Name	SP-71
Settlement Layer [ft]	148.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6E Cross Slope E5300 Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-86
SP-85
SP-84
Elevation (ft)
810
790
770
750
730
710
690
670
650
630
610
590
570
550
8480
8500
8520
8540
8560
8580
8600
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-84	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8581.38	5296.64	719.00	757.19	705.00	660.00	655.00	643.00	625.00	580.00	653.00	698.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	34.19	103.0	0	3521.6									
	3	OFL	14.00	135.0	0	1890.0									
	4	Existing Waste	0.00	91.0	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.50	135.0	0	472.5	0.102	0.017	0.005	236.3	236.3	6187.8	NC	0.506	0.004
	3	OFL	3.50	135.0	0	472.5	0.102	0.017	0.005	708.8	708.8	6660.3	NC	0.347	0.004
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	1200.9	1200.9	7152.5	NC	0.349	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	1712.8	1712.8	7664.4	NC	0.293	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	2224.7	2224.7	8176.3	NC	0.254	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	2736.6	2736.6	8688.1	NC	0.226	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	3248.4	3248.4	9200.0	NC	0.203	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	3760.3	3760.3	9711.9	NC	0.185	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	4272.2	4272.2	10223.8	NC	0.171	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	4784.1	4784.1	10735.6	NC	0.158	0.034
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	5040.0	4610.0	10991.6	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	5040.0	4610.0	10991.6	NC	-	-
	7	Lower Clay (Moist)	0.00	128.0	0	-	0.171	0.029	0.009	5040.0	4610.0	10991.6	NC	-	-
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	5204.0	4774.0	11155.6	NC	0.283	0.011
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	5532.0	5102.0	11483.6	NC	0.271	0.011
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	5977.7	5547.7	11929.3	NC	0.405	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6541.1	6111.1	12492.7	NC	0.379	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7059.5	6629.5	13011.1	NC	0.239	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7532.9	7102.9	13484.5	NC	0.228	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8006.3	7576.3	13957.9	NC	0.217	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8479.7	8049.7	14431.3	NC	0.208	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8953.1	8523.1	14904.7	NC	0.199	-
														5.122	0.308
													Total Settlement [ft]	**5.43**	

Variables & Constants	
Point Name	SP-84
Settlement Layer [ft]	125.0
ERROR	0.0
# of Layers	19
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-85	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8533.44	5296.64	721.00	769.16	720.00	660.00	655.00	643.00	625.00	580.00	653.00	698.50

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	44.16	103.0	0	4548.5									
	3	OFL	6.00	135.0	1	-810.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	7.75	135.0	0	1046.3	0.102	0.017	0.005	1333.1	1333.1	6556.6	NC	0.547	0.010
	3	OFL	7.75	135.0	0	1046.3	0.102	0.017	0.005	2379.4	2379.4	7602.9	NC	0.399	0.010
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	3161.3	3161.3	8384.8	NC	0.193	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	3678.8	3678.8	8902.3	NC	0.175	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	4196.4	4196.4	9419.9	NC	0.160	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	4714.0	4714.0	9937.4	NC	0.147	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	5231.5	5231.5	10455.0	NC	0.137	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	5749.1	5749.1	10972.6	NC	0.128	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	6266.7	6266.7	11490.1	NC	0.120	0.035
	4	Existing Waste	5.69	91.0	0	517.6	0.080	0.013	0.024	6784.2	6784.2	12007.7	NC	0.113	0.035
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7043.0	4610.0	12266.5	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7043.0	4610.0	12266.5	NC	-	-
	7	Lower Clay (Moist)	0.00	128.0	0	-	0.171	0.029	0.009	7043.0	4610.0	12266.5	NC	-	-
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	7207.0	4774.0	12430.5	NC	0.202	0.011
	8	Lower Clay (Sat)	5.00	65.6	0	328.0	0.171	0.029	0.009	7535.0	5102.0	12758.5	NC	0.196	0.011
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7980.7	5547.7	13204.2	NC	0.295	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8544.1	6111.1	13767.6	NC	0.280	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9062.5	6629.5	14286.0	NC	0.178	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9535.9	7102.9	14759.4	NC	0.171	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10009.3	7576.3	15232.8	NC	0.164	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10482.7	8049.7	15706.2	NC	0.158	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10956.1	8523.1	16179.6	NC	0.152	-
														3.913	0.322
													Total Settlement [ft]	**4.23**	

Variables & Constants	
Point Name	SP-85
Settlement Layer [ft]	134.0
ERROR	0.0
# of Layers	19
t / t_p [ratio]	1.8

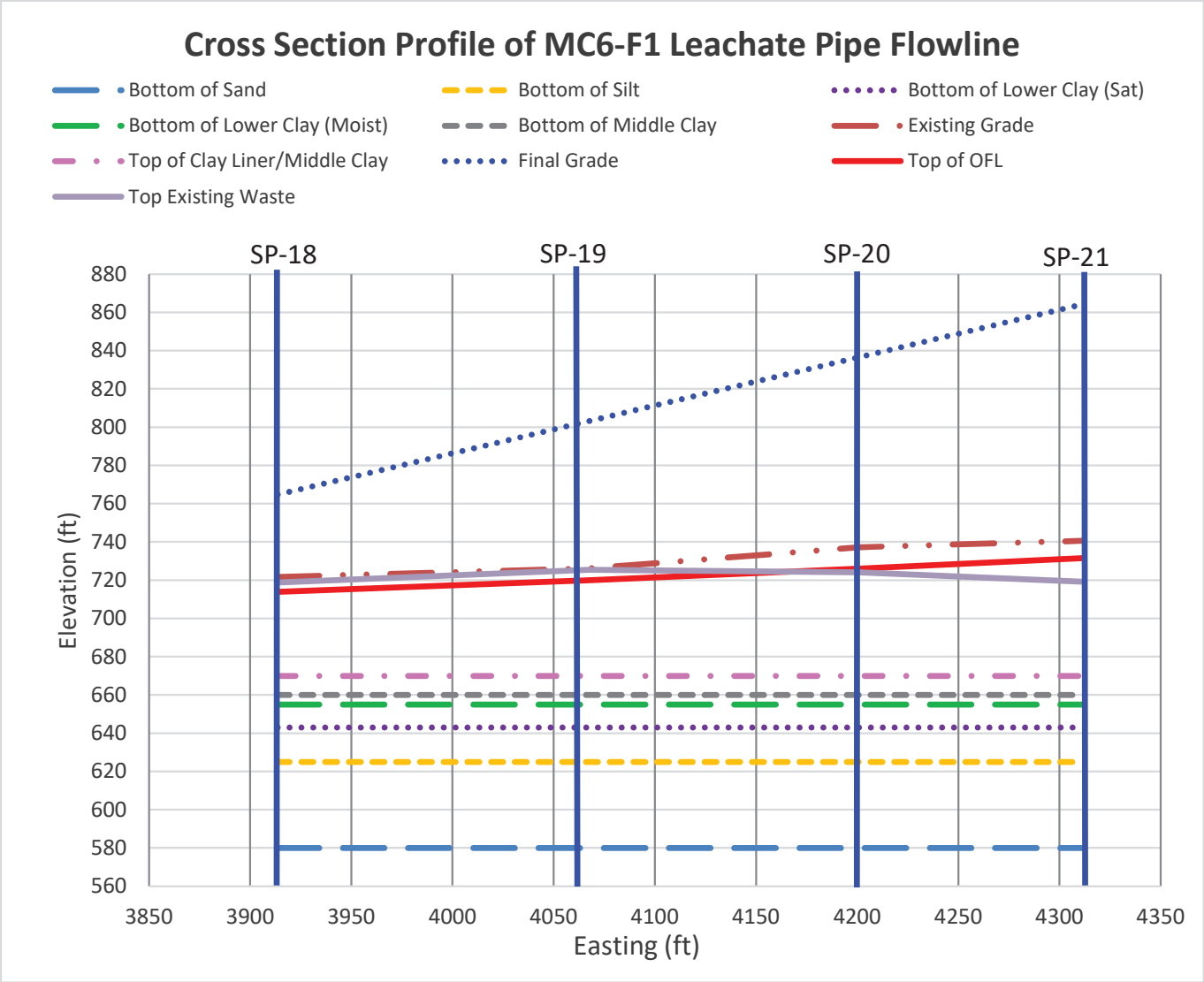
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-86	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8488.08	5296.64	723.00	780.49	723.00	660.00	655.00	643.00	625.00	580.00	655.00	699.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	53.49	103.0	0	5509.5									
	3	OFL	7.00	135.0	1	-945.0									
	4	Existing Waste	0.00	91.0	0	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	8.50	135.0	0	1147.5	0.102	0.017	0.005	1518.8	1518.8	7568.2	NC	0.605	0.011
	3	OFL	8.50	135.0	0	1147.5	0.102	0.017	0.005	2666.3	2666.3	8715.7	NC	0.446	0.011
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	3490.3	3490.3	9539.7	NC	0.192	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	3990.8	3990.8	10040.2	NC	0.176	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4491.3	4491.3	10540.7	NC	0.163	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	4991.8	4991.8	11041.2	NC	0.152	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	5492.3	5492.3	11541.7	NC	0.142	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	5992.8	5992.8	12042.2	NC	0.133	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	6493.3	6493.3	12542.7	NC	0.126	0.034
	4	Existing Waste	5.50	91.0	0	500.5	0.080	0.013	0.024	6993.8	6993.8	13043.2	NC	0.119	0.034
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7244.0	4610.0	13293.5	NC	-	-
	6	Middle Clay	0.00	136.0	0	-	0.102	0.017	0.005	7244.0	4610.0	13293.5	NC	-	-
	7	Lower Clay (Moist)	0.00	128.0	0	-	0.171	0.029	0.009	7244.0	4610.0	13293.5	NC	-	-
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7440.8	4806.8	13490.3	NC	0.265	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7834.4	5200.4	13883.9	NC	0.255	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8312.9	5678.9	14362.4	NC	0.321	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8876.3	6242.3	14925.8	NC	0.305	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9394.7	6760.7	15444.2	NC	0.194	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9868.1	7234.1	15917.6	NC	0.187	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10341.5	7707.5	16391.0	NC	0.180	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10814.9	8180.9	16864.4	NC	0.174	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11288.3	8654.3	17337.8	NC	0.168	-
														4.302	0.319
													Total Settlement [ft]	**4.62**	

Variables & Constants	
Point Name	SP-86
Settlement Layer [ft]	136.0
ERROR	0.0
# of Layers	19
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F1 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-18
SP-19
SP-20
SP-21
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
3850
3900
3950
4000
4050
4100
4150
4200
4250
4300
4350
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-18	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8104.44	3986.36	716.35	782.96	716.06	660.00	655.00	643.00	625.00	580.00	670.00	716.06

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	62.61	103.0	0	6448.8									
	3	OFL	0.00	135.0	1	-									
	4	Existing Waste	6.71	91.0	1	-610.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	610.4	610.4	7933.8	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	610.4	610.4	7933.8	NC	-	-
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	834.2	834.2	8157.6	NC	0.390	0.030
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	1281.8	1281.8	8605.3	NC	0.325	0.030
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	1729.4	1729.4	9052.9	NC	0.283	0.030
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	2177.1	2177.1	9500.5	NC	0.252	0.030
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	2624.7	2624.7	9948.1	NC	0.228	0.030
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	3072.3	3072.3	10395.8	NC	0.208	0.030
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	3519.9	3519.9	10843.4	NC	0.192	0.030
	4	Existing Waste	4.92	91.0	0	447.6	0.080	0.013	0.024	3967.6	3967.6	11291.0	NC	0.179	0.030
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4531.4	4950.0	11854.8	OC-2	0.197	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5211.4	5630.0	12534.8	OC-2	0.180	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5871.4	6290.0	13194.8	OC-2	0.279	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6388.2	6806.8	13711.6	OC-2	0.317	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6781.8	7200.4	14105.2	OC-2	0.304	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7260.3	7678.9	14583.7	OC-2	0.376	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7823.7	8242.3	15147.1	OC-2	0.357	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8342.1	8760.7	15665.5	OC-2	0.227	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8815.5	9234.1	16138.9	OC-2	0.218	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9288.9	9707.5	16612.3	OC-2	0.210	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9762.3	10180.9	17085.7	OC-2	0.202	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10235.7	10654.3	17559.1	OC-2	0.195	-
														5.120	0.293
													Total Settlement [ft]	**5.41**	

Variables & Constants	
Point Name	SP-18
Settlement Layer [ft]	129.4
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-19	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8104.44	4067.43	720.00	803.23	716.08	660.00	655.00	643.00	625.00	580.00	670.00	716.08

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	79.23	103.0	0	8160.4									
	3	OFL	0.00	135.0	1	-									
	4	Existing Waste	3.08	91.0	1	-280.1									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	280.1	280.1	8700.4	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	280.1	280.1	8700.4	NC	-	-
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	524.7	524.7	8945.0	NC	0.530	0.033
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	1013.8	1013.8	9434.1	NC	0.417	0.033
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	1502.9	1502.9	9923.2	NC	0.352	0.033
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	1992.0	1992.0	10412.4	NC	0.309	0.033
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	2481.2	2481.2	10901.5	NC	0.276	0.033
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	2970.3	2970.3	11390.6	NC	0.251	0.033
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	3459.4	3459.4	11879.7	NC	0.230	0.033
	4	Existing Waste	5.38	91.0	0	489.1	0.080	0.013	0.024	3948.6	3948.6	12368.9	NC	0.213	0.033
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4533.1	4950.0	12953.4	OC-2	0.216	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5213.1	5630.0	13633.4	OC-2	0.199	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5873.1	6290.0	14293.4	OC-2	0.309	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6389.9	6806.8	14810.2	OC-2	0.351	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6783.5	7200.4	15203.8	OC-2	0.337	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7262.0	7678.9	15682.3	OC-2	0.419	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7825.4	8242.3	16245.7	OC-2	0.398	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8343.8	8760.7	16764.1	OC-2	0.254	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8817.2	9234.1	17237.5	OC-2	0.244	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9290.6	9707.5	17710.9	OC-2	0.235	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9764.0	10180.9	18184.3	OC-2	0.227	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10237.4	10654.3	18657.7	OC-2	0.219	-
														5.986	0.315
													Total Settlement [ft]	**6.30**	

Variables & Constants	
Point Name	SP-19
Settlement Layer [ft]	133.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-20	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8104.44	4200.76	726.00	836.56	721.70	660.00	655.00	643.00	625.00	580.00	670.00	721.70

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	106.56	103.0	0	10975.3									
	3	OFL	0.00	135.0	FALSE	-									
	4	Existing Waste	2.70	91.0	1	-245.6									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	245.6	245.6	11515.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	245.6	245.6	11515.3	NC	-	-
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	524.3	524.3	11794.0	NC	0.663	0.038
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	1081.6	1081.6	12351.4	NC	0.518	0.038
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	1639.0	1639.0	12908.8	NC	0.439	0.038
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	2196.4	2196.4	13466.2	NC	0.386	0.038
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	2753.8	2753.8	14023.5	NC	0.346	0.038
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	3311.1	3311.1	14580.9	NC	0.315	0.038
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	3868.5	3868.5	15138.3	NC	0.290	0.038
	4	Existing Waste	6.13	91.0	0	557.4	0.080	0.013	0.024	4425.9	4425.9	15695.7	NC	0.269	0.038
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5044.6	4950.0	16314.3	NC	0.260	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5724.6	5630.0	16994.3	NC	0.241	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6384.6	6290.0	17654.3	NC	0.378	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6901.4	6806.8	18171.1	NC	0.431	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7295.0	7200.4	18564.7	NC	0.416	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7773.5	7678.9	19043.2	NC	0.525	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8336.9	8242.3	19606.6	NC	0.501	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8855.3	8760.7	20125.0	NC	0.321	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9328.7	9234.1	20598.4	NC	0.310	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9802.1	9707.5	21071.8	NC	0.299	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10275.5	10180.9	21545.2	NC	0.289	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10748.9	10654.3	22018.6	NC	0.280	-
														7.480	0.352
													Total Settlement [ft]	**7.83**	

Variables & Constants	
Point Name	SP-20
Settlement Layer [ft]	139.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

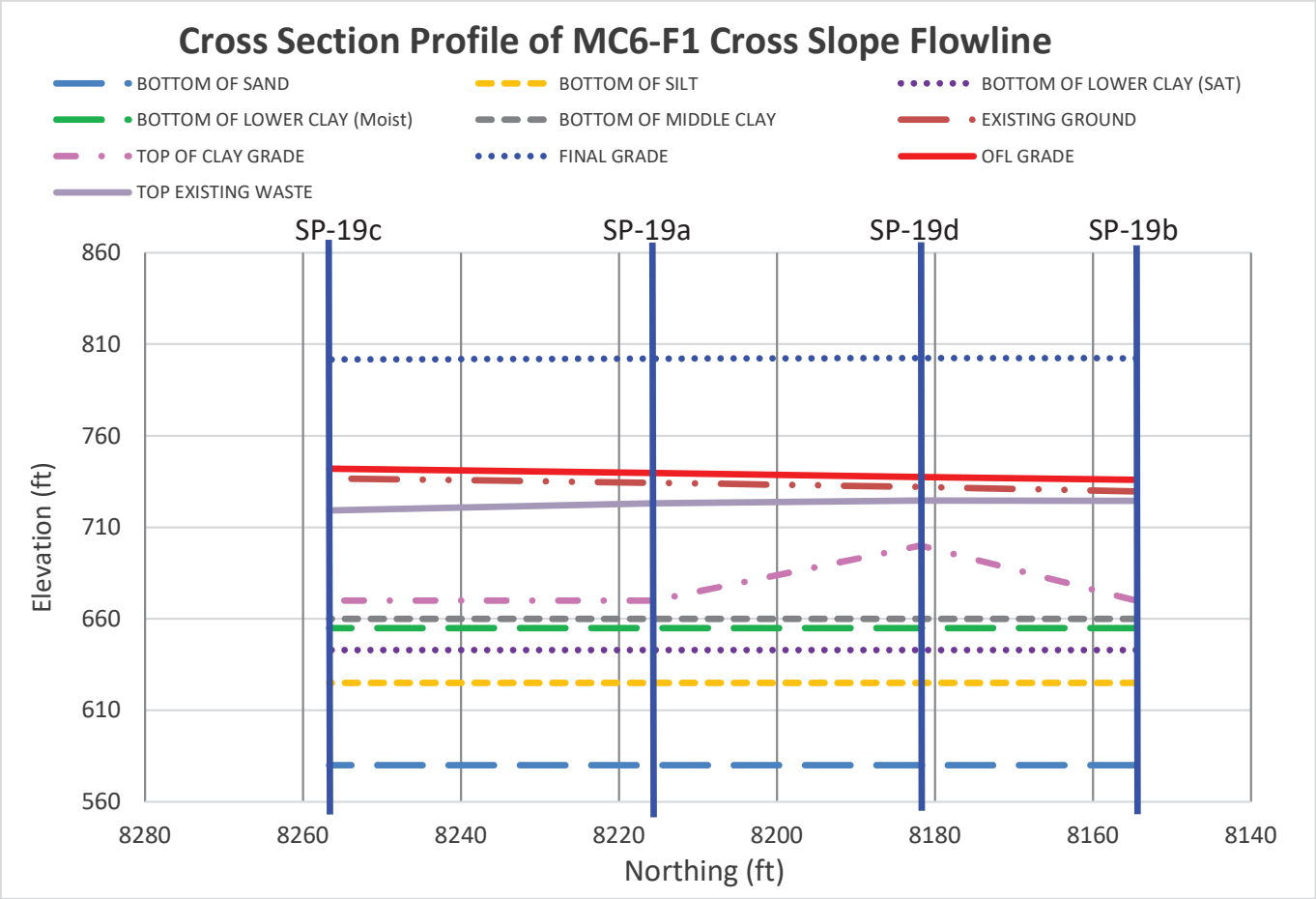
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-21	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8104.44	4310.91	730.96	864.09	728.55	660.00	655.00	643.00	625.00	580.00	670.00	728.55

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	129.14	103.0	0	13300.9									
	3	OFL	0.00	135.0	FALSE	-									
	4	Existing Waste	4.59	91.0	1	-417.6									
		<none>		-	0	-									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	417.6	417.6	13840.9	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	417.6	417.6	13840.9	NC	-	-
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	724.5	724.5	14147.8	NC	0.696	0.041
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	1338.2	1338.2	14761.6	NC	0.563	0.041
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	1952.0	1952.0	15375.3	NC	0.484	0.041
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	2565.7	2565.7	15989.1	NC	0.429	0.041
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	3179.5	3179.5	16602.9	NC	0.387	0.041
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	3793.3	3793.3	17216.6	NC	0.354	0.041
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	4407.0	4407.0	17830.4	NC	0.328	0.041
	4	Existing Waste	6.74	91.0	0	613.8	0.080	0.013	0.024	5020.8	5020.8	18444.1	NC	0.305	0.041
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5667.7	4950.0	19091.0	NC	0.269	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6347.7	5630.0	19771.0	NC	0.252	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7007.7	6290.0	20431.0	NC	0.397	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7524.5	6806.8	20947.8	NC	0.456	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7918.1	7200.4	21341.4	NC	0.442	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8396.6	7678.9	21819.9	NC	0.560	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8960.0	8242.3	22383.3	NC	0.537	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9478.4	8760.7	22901.7	NC	0.345	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9951.8	9234.1	23375.1	NC	0.334	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10425.2	9707.5	23848.5	NC	0.323	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10898.6	10180.9	24321.9	NC	0.314	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11372.0	10654.3	24795.3	NC	0.305	-
														8.079	0.382
													Total Settlement [ft]	**8.46**	

Variables & Constants	
Point Name	SP-21
Settlement Layer [ft]	144.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F1 Cross Slope Flowline
BOTTOM OF SAND
BOTTOM OF SILT
BOTTOM OF LOWER CLAY (SAT)
BOTTOM OF LOWER CLAY (Moist)
BOTTOM OF MIDDLE CLAY
EXISTING GROUND
TOP OF CLAY GRADE
FINAL GRADE
OFL GRADE
TOP EXISTING WASTE
SP-19c
SP-19a
SP-19d
SP-19b
860
810
760
710
660
610
560
Elevation (ft)
8280
8260
8240
8220
8200
8180
8160
8140
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-19a	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8215.56	4063.30	739.57	802.24	734.24	660.00	655.00	643.00	625.00	580.00	670.00	723.18

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	58.7	103.0	0	6043.3	-	-	-	-	-	-		-	-
	3	OFL	1.7	135.0	1	-225.9	-	-	-	-	-	-		-	-
	4	Existing Waste	-	91.0	1	0.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	4.7	135.0	0	633.6	0.102	0.017	0.005	542.7	542.7	7845.0	NC	0.555	0.006
	3	OFL	4.7	135.0	0	633.6	0.102	0.017	0.005	1176.2	1176.2	8478.6	NC	0.411	0.006
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	1795.5	1795.5	9097.8	NC	0.375	0.041
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	2400.4	2400.4	9702.8	NC	0.323	0.041
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	3005.3	3005.3	10307.7	NC	0.285	0.041
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	3610.2	3610.2	10912.6	NC	0.255	0.041
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	4215.2	4215.2	11517.5	NC	0.232	0.041
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	4820.1	4820.1	12122.5	NC	0.213	0.041
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	5425.0	5425.0	12727.4	NC	0.197	0.041
	4	Existing Waste	6.6	91.0	0	604.9	0.080	0.013	0.024	6029.9	6029.9	13332.3	NC	0.183	0.041
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6672.4	6672.4	13974.8	NC	0.164	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7352.4	7352.4	14654.8	NC	0.153	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8012.4	8012.4	15314.8	NC	0.241	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8529.2	8529.2	15831.6	NC	0.276	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8922.8	8922.8	16225.2	NC	0.266	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9401.3	9401.3	16703.7	NC	0.337	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9964.7	9964.7	17267.1	NC	0.322	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10483.1	10483.1	17785.5	NC	0.207	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10956.5	10956.5	18258.9	NC	0.200	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11429.9	11429.9	18732.3	NC	0.193	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11903.3	11903.3	19205.7	NC	0.187	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12376.7	12376.7	19679.1	NC	0.181	-
														5.755	0.390
													Total Settlement [ft]	**6.14**	

Variables & Constants	
Point Name	SP-19a
Settlement Layer [ft]	152.6
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-19b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8154.60	4063.30	735.96	802.36	729.64	660.00	655.00	643.00	625.00	580.00	670.00	724.59

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	62.4	103.0	0	6427.4	-	-	-	-	-	-		-	-
	3	OFL	0.7	135.0	1	-91.9	-	-	-	-	-	-		-	-
	4	Existing Waste	-	91.0	1	0.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	2.2	135.0	0	295.0	0.102	0.017	0.005	239.4	239.4	8059.9	NC	0.340	0.003
	3	OFL	2.2	135.0	0	295.0	0.102	0.017	0.005	534.4	534.4	8354.8	NC	0.266	0.003
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	992.3	992.3	8812.8	NC	0.518	0.042
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	1613.3	1613.3	9433.7	NC	0.419	0.042
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	2234.2	2234.2	10054.7	NC	0.357	0.042
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	2855.2	2855.2	10675.7	NC	0.313	0.042
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	3476.2	3476.2	11296.6	NC	0.279	0.042
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	4097.1	4097.1	11917.6	NC	0.253	0.042
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	4718.1	4718.1	12538.5	NC	0.232	0.042
	4	Existing Waste	6.8	91.0	0	621.0	0.080	0.013	0.024	5339.0	5339.0	13159.5	NC	0.214	0.042
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5989.5	5989.5	13810.0	NC	0.185	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6669.5	6669.5	14490.0	NC	0.172	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7329.5	7329.5	15150.0	NC	0.270	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7846.3	7846.3	15666.8	NC	0.308	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8239.9	8239.9	16060.4	NC	0.297	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8718.4	8718.4	16538.9	NC	0.375	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9281.8	9281.8	17102.3	NC	0.358	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9800.2	9800.2	17620.7	NC	0.229	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10273.6	10273.6	18094.1	NC	0.221	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10747.0	10747.0	18567.5	NC	0.214	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11220.4	11220.4	19040.9	NC	0.207	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11693.8	11693.8	19514.3	NC	0.200	-
														6.227	0.392
											Total Settlement [ft]			6.62	

Variables & Constants	
Point Name	SP-19b
Settlement Layer [ft]	149.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-19c	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8256.70	4063.30	742.00	801.66	736.69	660.00	655.00	643.00	625.00	580.00	670.00	719.14

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	55.7	103.0	0	5733.3	-	-	-	-	-	-		-	-
	3	OFL	1.7	135.0	1	-228.6	-	-	-	-	-	-		-	-
	4	Existing Waste	-	91.0	1	0.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	7.9	135.0	0	1070.6	0.102	0.017	0.005	763.9	763.9	7753.6	NC	0.814	0.010
	3	OFL	7.9	135.0	0	1070.6	0.102	0.017	0.005	1834.5	1834.5	8824.2	NC	0.552	0.010
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	2649.3	2649.3	9638.9	NC	0.276	0.038
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	3208.2	3208.2	10197.9	NC	0.247	0.038
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	3767.2	3767.2	10756.9	NC	0.224	0.038
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	4326.2	4326.2	11315.8	NC	0.205	0.038
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	4885.1	4885.1	11874.8	NC	0.190	0.038
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	5444.1	5444.1	12433.8	NC	0.176	0.038
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	6003.1	6003.1	12992.7	NC	0.165	0.038
	4	Existing Waste	6.1	91.0	0	559.0	0.080	0.013	0.024	6562.0	6562.0	13551.7	NC	0.155	0.038
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7181.5	7181.5	14171.2	NC	0.151	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7861.5	7861.5	14851.2	NC	0.141	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8521.5	8521.5	15511.2	NC	0.222	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9038.3	9038.3	16028.0	NC	0.255	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9431.9	9431.9	16421.6	NC	0.247	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9910.4	9910.4	16900.1	NC	0.313	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10473.8	10473.8	17463.5	NC	0.300	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10992.2	10992.2	17981.9	NC	0.192	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11465.6	11465.6	18455.3	NC	0.186	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11939.0	11939.0	18928.7	NC	0.180	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12412.4	12412.4	19402.1	NC	0.175	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12885.8	12885.8	19875.5	NC	0.169	-
														5.534	0.373
													Total Settlement [ft]	**5.91**	

Variables & Constants	
Point Name	SP-19c
Settlement Layer [ft]	155.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

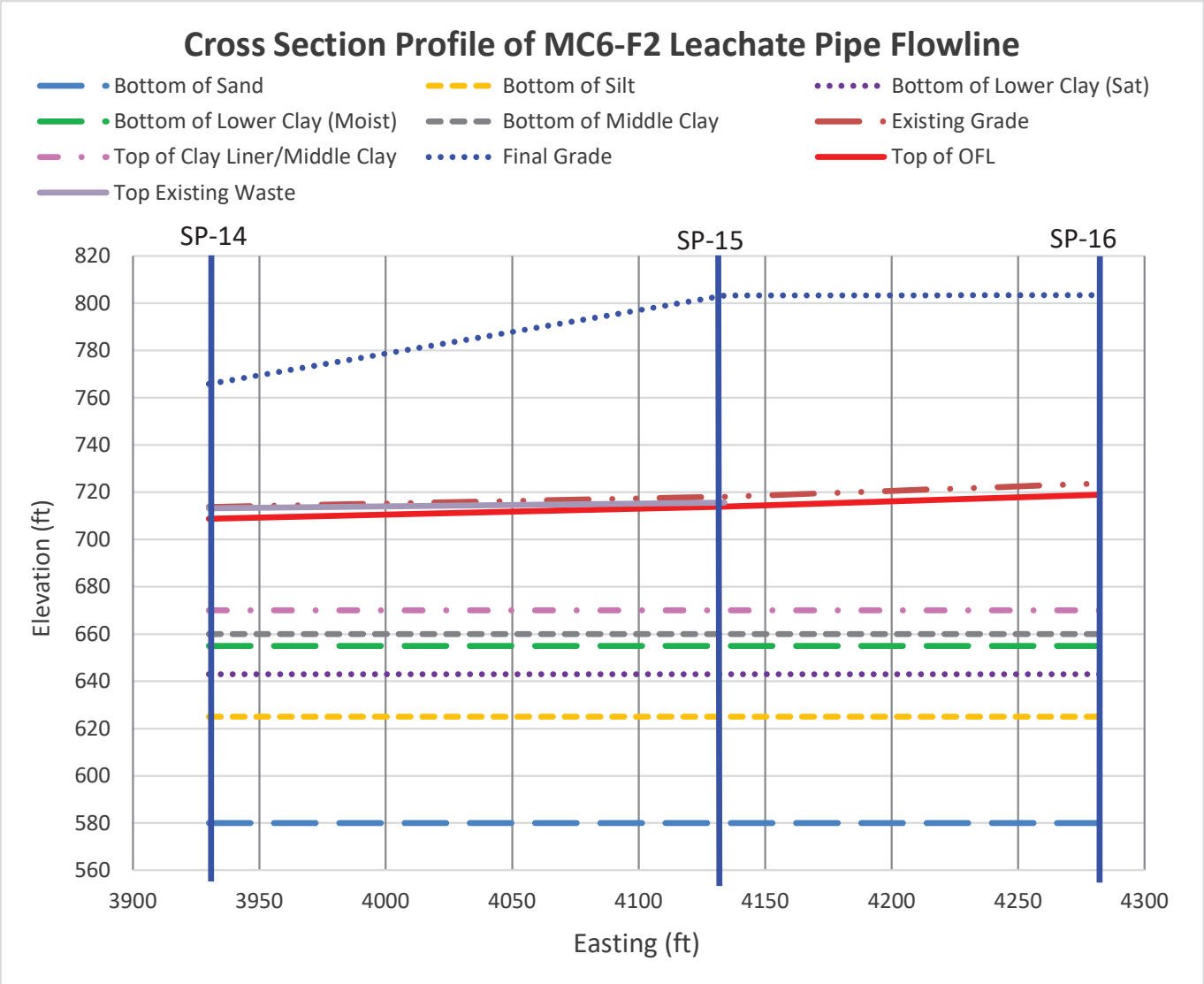
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-19d	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8181.85	4063.30	737.57	802.45	732.11	660.00	655.00	643.00	625.00	580.00	700.00	724.70

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	60.9	103.0	0	6270.7	-	-	-	-	-	-		-	-
	3	OFL	1.5	135.0	1	-207.7	-	-	-	-	-	-		-	-
	4	Existing Waste	-	91.0	1	0.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	2.9	135.0	0	396.6	0.102	0.017	0.005	406.0	406.0	7953.9	NC	0.387	0.004
	3	OFL	2.9	135.0	0	396.6	0.102	0.017	0.005	802.6	802.6	8350.5	NC	0.305	0.004
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	1141.3	1141.3	8689.3	NC	0.218	0.019
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	1422.3	1422.3	8970.2	NC	0.198	0.019
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	1703.2	1703.2	9251.1	NC	0.182	0.019
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	1984.1	1984.1	9532.0	NC	0.168	0.019
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	2265.0	2265.0	9812.9	NC	0.157	0.019
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	2546.0	2546.0	10093.9	NC	0.148	0.019
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	2826.9	2826.9	10374.8	NC	0.139	0.019
	4	Existing Waste	3.1	91.0	0	280.9	0.080	0.013	0.024	3107.8	3107.8	10655.7	NC	0.132	0.019
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	4608.3	4608.3	12156.2	NC	0.859	0.026
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	7328.3	7328.3	14876.2	NC	0.627	0.026
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	9008.3	9008.3	16556.2	NC	0.226	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9525.1	9525.1	17073.0	NC	0.260	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9918.7	9918.7	17466.6	NC	0.252	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10397.2	10397.2	17945.1	NC	0.320	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10960.6	10960.6	18508.5	NC	0.307	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11479.0	11479.0	19026.9	NC	0.198	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11952.4	11952.4	19500.3	NC	0.191	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12425.8	12425.8	19973.7	NC	0.186	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12899.2	12899.2	20447.1	NC	0.180	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13372.6	13372.6	20920.5	NC	0.175	-
														5.815	0.249
													Total Settlement [ft]	**6.06**	

Variables & Constants	
Point Name	SP-19d
Settlement Layer [ft]	150.6
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F2 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top Existing Waste
SP-14
SP-15
SP-16
820
800
780
760
740
720
700
680
660
640
620
600
580
560
Elevation (ft)
3900
3950
4000
4050
4100
4150
4200
4250
4300
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-14	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8441.35	3991.88	709.74	781.25	706.84	660.00	655.00	643.00	625.00	580.00	670.00	706.84

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	67.51	103.0	0	6953.7									
	3	OFL	0.00	135.0	1	-									
	4	Existing Waste	4.10	91.0	1	-373.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	373.4	373.4	8438.7	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	373.4	373.4	8438.7	NC	-	-
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	559.6	559.6	8624.9	NC	0.389	0.025
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	932.1	932.1	8997.3	NC	0.322	0.025
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	1304.5	1304.5	9369.7	NC	0.280	0.025
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	1676.9	1676.9	9742.1	NC	0.250	0.025
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	2049.3	2049.3	10114.5	NC	0.227	0.025
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	2421.7	2421.7	10487.0	NC	0.208	0.025
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	2794.1	2794.1	10859.4	NC	0.193	0.025
	4	Existing Waste	4.09	91.0	0	372.4	0.080	0.013	0.024	3166.6	3166.6	11231.8	NC	0.180	0.025
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3692.8	4950.0	11758.0	OC-2	0.202	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4372.8	5630.0	12438.0	OC-2	0.185	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5032.8	6290.0	13098.0	OC-2	0.286	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5549.6	6806.8	13614.8	OC-2	0.324	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5943.2	7200.4	14008.4	OC-2	0.311	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6421.7	7678.9	14486.9	OC-2	0.372	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6985.1	8242.3	15050.3	OC-2	0.353	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7503.5	8760.7	15568.7	OC-2	0.225	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7976.9	9234.1	16042.1	OC-2	0.216	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8450.3	9707.5	16515.5	OC-2	0.208	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8923.7	10180.9	16988.9	OC-2	0.200	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9397.1	10654.3	17462.3	OC-2	0.193	-
														5.125	0.252
													Total Settlement [ft]	**5.38**	

Variables & Constants	
Point Name	SP-14
Settlement Layer [ft]	122.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8441.35	4131.87	713.94	803.30	709.96	660.00	655.00	643.00	625.00	580.00	670.00	709.96

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	85.36	103.0	0	8792.3									
	3	OFL	0.00	135.0	1	-									
	4	Existing Waste	3.02	91.0	1	-274.6									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	274.6	274.6	10277.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	274.6	274.6	10277.3	NC	-	-
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	484.7	484.7	10487.4	NC	0.493	0.028
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	904.9	904.9	10907.6	NC	0.399	0.028
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	1325.1	1325.1	11327.7	NC	0.344	0.028
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	1745.3	1745.3	11747.9	NC	0.306	0.028
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	2165.4	2165.4	12168.1	NC	0.277	0.028
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	2585.6	2585.6	12588.3	NC	0.254	0.028
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	3005.8	3005.8	13008.5	NC	0.235	0.028
	4	Existing Waste	4.62	91.0	0	420.2	0.080	0.013	0.024	3426.0	3426.0	13428.7	NC	0.219	0.028
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3976.1	4950.0	13978.8	OC-2	0.238	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4656.1	5630.0	14658.8	OC-2	0.219	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5316.1	6290.0	15318.8	OC-2	0.341	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5832.9	6806.8	15835.6	OC-2	0.388	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6226.5	7200.4	16229.2	OC-2	0.373	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6705.0	7678.9	16707.7	OC-2	0.456	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7268.4	8242.3	17271.1	OC-2	0.434	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7786.8	8760.7	17789.5	OC-2	0.277	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8260.2	9234.1	18262.9	OC-2	0.267	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8733.6	9707.5	18736.3	OC-2	0.257	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9207.0	10180.9	19209.7	OC-2	0.248	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9680.4	10654.3	19683.1	OC-2	0.240	-
														6.264	0.278
													Total Settlement [ft]	**6.54**	

Variables & Constants	
Point Name	SP-15
Settlement Layer [ft]	126.9
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

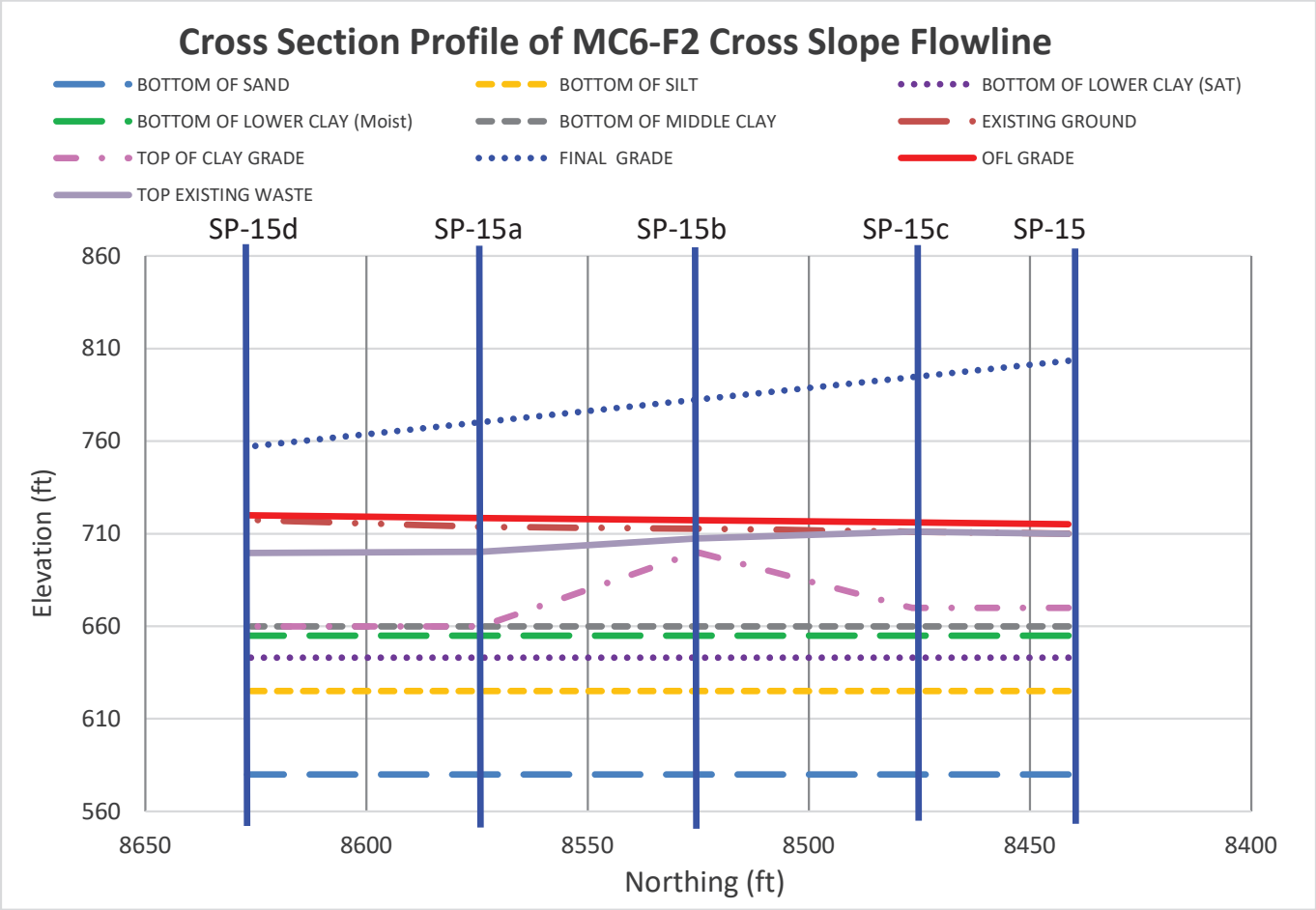
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-16	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8441.35	4280.39	718.40	803.53	715.93	660.00	655.00	643.00	625.00	580.00	670.00	712.67

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	81.13	103.0	0	8356.4									
	3	OFL	3.26	135.0	1	-440.5									
	4	Existing Waste	1.27	91.0	1	-115.6									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	556.1	556.1	9841.4	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	556.1	556.1	9841.4	NC	-	-
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	791.5	791.5	10076.8	NC	0.457	0.032
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	1262.4	1262.4	10547.7	NC	0.382	0.032
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	1733.3	1733.3	11018.6	NC	0.333	0.032
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	2204.2	2204.2	11489.5	NC	0.297	0.032
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	2675.1	2675.1	11960.3	NC	0.269	0.032
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	3145.9	3145.9	12431.2	NC	0.247	0.032
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	3616.8	3616.8	12902.1	NC	0.229	0.032
	4	Existing Waste	5.17	91.0	0	470.9	0.080	0.013	0.024	4087.7	4087.7	13373.0	NC	0.213	0.032
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4663.1	4950.0	13948.4	OC-2	0.232	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5343.1	5630.0	14628.4	OC-2	0.213	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6003.1	6290.0	15288.4	OC-2	0.333	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6519.9	6806.8	15805.2	OC-2	0.379	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6913.5	7200.4	16198.8	OC-2	0.364	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7392.0	7678.9	16677.3	OC-2	0.455	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7955.4	8242.3	17240.7	OC-2	0.433	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8473.8	8760.7	17759.1	OC-2	0.276	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8947.2	9234.1	18232.5	OC-2	0.266	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9420.6	9707.5	18705.9	OC-2	0.256	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9894.0	10180.9	19179.3	OC-2	0.248	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10367.4	10654.3	19652.7	OC-2	0.239	-
														6.120	0.305
													Total Settlement [ft]	**6.43**	

Variables & Constants	
Point Name	SP-16
Settlement Layer [ft]	131.4
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F2 Cross Slope Flowline
BOTTOM OF SAND
BOTTOM OF SILT
BOTTOM OF LOWER CLAY (SAT)
BOTTOM OF LOWER CLAY (Moist)
BOTTOM OF MIDDLE CLAY
EXISTING GROUND
TOP OF CLAY GRADE
FINAL GRADE
OFL GRADE
TOP EXISTING WASTE
SP-15d
SP-15a
SP-15b
SP-15c
SP-15
860
810
760
710
660
610
560
Elevation (ft)
8650
8600
8550
8500
8450
8400
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8441.35	4131.87	715.04	803.30	709.96	660.00	655.00	643.00	625.00	580.00	670.00	709.96

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	84.3	103.0	0	8679.0	-	-	-	-	-	-		-	-
	3	OFL	-	135.0	1	0.0	-	-	-	-	-	-		-	-
	4	Existing Waste	1.9	91.0	1	-174.5	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	174.5	174.5	10164.0	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	174.5	174.5	10164.0	NC	-	-
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	390.9	390.9	10380.3	NC	0.542	0.029
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	823.6	823.6	10813.0	NC	0.425	0.029
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	1256.3	1256.3	11245.7	NC	0.362	0.029
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	1689.0	1689.0	11678.4	NC	0.319	0.029
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	2121.6	2121.6	12111.1	NC	0.288	0.029
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	2554.3	2554.3	12543.8	NC	0.263	0.029
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	2987.0	2987.0	12976.5	NC	0.243	0.029
	4	Existing Waste	4.8	91.0	0	432.7	0.080	0.013	0.024	3419.7	3419.7	13409.2	NC	0.226	0.029
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	3976.1	3976.1	13965.6	NC	0.278	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	4656.1	4656.1	14645.6	NC	0.254	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	5316.1	5316.1	15305.6	NC	0.393	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	5832.9	5832.9	15822.4	NC	0.445	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6226.5	6226.5	16216.0	NC	0.427	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	6705.0	6705.0	16694.5	NC	0.535	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7268.4	7268.4	17257.9	NC	0.507	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	7786.8	7786.8	17776.3	NC	0.323	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8260.2	8260.2	18249.7	NC	0.310	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8733.6	8733.6	18723.1	NC	0.298	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9207.0	9207.0	19196.5	NC	0.287	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9680.4	9680.4	19669.9	NC	0.277	-
														7.000	0.285
											Total Settlement [ft]			7.29	

Variables & Constants	
Point Name	SP-15
Settlement Layer [ft]	128.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15d	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8626.95	4131.87	719.95	756.90	717.45	660.00	655.00	643.00	625.00	580.00	660.00	699.50

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	33.0	103.0	0	3394.1	-	-	-	-	-	-		-	-
	3	OFL	4.5	135.0	1	-607.4	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	6.7	135.0	0	907.7	0.102	0.017	0.005	1061.3	1061.3	5333.0	NC	0.481	0.009
	3	OFL	6.7	135.0	0	907.7	0.102	0.017	0.005	1969.0	1969.0	6240.7	NC	0.344	0.009
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	2647.6	2647.6	6919.3	NC	0.165	0.030
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	3096.9	3096.9	7368.6	NC	0.149	0.030
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	3546.3	3546.3	7818.0	NC	0.136	0.030
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	3995.6	3995.6	8267.3	NC	0.125	0.030
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	4444.9	4444.9	8716.7	NC	0.116	0.030
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	4894.3	4894.3	9166.0	NC	0.108	0.030
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	5343.6	5343.6	9615.3	NC	0.101	0.030
	4	Existing Waste	4.9	91.0	0	449.3	0.080	0.013	0.024	5793.0	5793.0	10064.7	NC	0.095	0.030
	6	Middle Clay	-	136.0	0	-	0.102	0.017	0.005	6017.7	6017.7	10289.4	NC	-	-
	6	Middle Clay	-	136.0	0	-	0.102	0.017	0.005	6017.7	6017.7	10289.4	NC	-	-
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	6337.7	6337.7	10609.4	NC	0.191	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6854.5	6854.5	11126.2	NC	0.216	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7248.1	7248.1	11519.8	NC	0.206	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7726.6	7726.6	11998.3	NC	0.258	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8290.0	8290.0	12561.7	NC	0.244	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8808.4	8808.4	13080.1	NC	0.155	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9281.8	9281.8	13553.5	NC	0.148	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9755.2	9755.2	14026.9	NC	0.142	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10228.6	10228.6	14500.3	NC	0.136	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10702.0	10702.0	14973.7	NC	0.131	-
														3.645	0.298
											Total Settlement [ft]			3.94	

Variables & Constants	
Point Name	SP-15d
Settlement Layer [ft]	133.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15a	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8574.00	4131.87	718.55	770.14	713.73	660.00	655.00	643.00	625.00	580.00	660.00	700.30

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	47.6	103.0	0	4901.9	-	-	-	-	-	-		-	-
	3	OFL	2.2	135.0	1	-295.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	5.6	135.0	0	759.6	0.102	0.017	0.005	674.8	674.8	6766.7	NC	0.575	0.007
	3	OFL	5.6	135.0	0	759.6	0.102	0.017	0.005	1434.4	1434.4	7526.3	NC	0.413	0.007
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	2043.4	2043.4	8135.3	NC	0.242	0.031
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	2501.7	2501.7	8593.6	NC	0.216	0.031
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	2960.1	2960.1	9052.0	NC	0.196	0.031
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	3418.5	3418.5	9510.4	NC	0.179	0.031
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	3876.8	3876.8	9968.7	NC	0.165	0.031
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	4335.2	4335.2	10427.1	NC	0.154	0.031
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	4793.6	4793.6	10885.5	NC	0.144	0.031
	4	Existing Waste	5.0	91.0	0	458.4	0.080	0.013	0.024	5252.0	5252.0	11343.9	NC	0.135	0.031
	6	Middle Clay	-	136.0	0	-	0.102	0.017	0.005	5481.1	5481.1	11573.0	NC	-	-
	6	Middle Clay	-	136.0	0	-	0.102	0.017	0.005	5481.1	5481.1	11573.0	NC	-	-
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	5801.1	5801.1	11893.0	NC	0.267	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6317.9	6317.9	12409.8	NC	0.301	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6711.5	6711.5	12803.4	NC	0.288	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7190.0	7190.0	13281.9	NC	0.360	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7753.4	7753.4	13845.3	NC	0.340	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8271.8	8271.8	14363.7	NC	0.216	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8745.2	8745.2	14837.1	NC	0.207	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9218.6	9218.6	15310.5	NC	0.198	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9692.0	9692.0	15783.9	NC	0.191	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10165.4	10165.4	16257.3	NC	0.184	-
														4.967	0.300
												Total Settlement [ft]		5.27	

Variables & Constants	
Point Name	SP-15a
Settlement Layer [ft]	131.5
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8525.36	4131.87	717.26	782.30	712.63	660.00	655.00	643.00	625.00	580.00	700.00	707.54

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	61.0	103.0	0	6286.9	-	-	-	-	-	-		-	-
	3	OFL	2.4	135.0	1	-319.6	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	1.4	135.0	0	183.8	0.102	0.017	0.005	411.5	411.5	7863.8	NC	0.178	0.002
	3	OFL	1.4	135.0	0	183.8	0.102	0.017	0.005	595.2	595.2	8047.5	NC	0.157	0.002
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	730.0	730.0	8182.3	NC	0.079	0.006
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	815.8	815.8	8268.1	NC	0.076	0.006
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	901.5	901.5	8353.8	NC	0.073	0.006
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	987.3	987.3	8439.6	NC	0.070	0.006
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	1073.1	1073.1	8525.4	NC	0.068	0.006
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	1158.8	1158.8	8611.1	NC	0.066	0.006
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	1244.6	1244.6	8696.9	NC	0.064	0.006
	4	Existing Waste	0.9	91.0	0	85.8	0.080	0.013	0.024	1330.4	1330.4	8782.7	NC	0.062	0.006
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	2733.3	2733.3	10185.6	NC	1.165	0.026
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	5453.3	5453.3	12905.6	NC	0.763	0.026
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7133.3	7133.3	14585.6	NC	0.266	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7650.1	7650.1	15102.4	NC	0.303	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8043.7	8043.7	15496.0	NC	0.292	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8522.2	8522.2	15974.5	NC	0.368	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9085.6	9085.6	16537.9	NC	0.351	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9604.0	9604.0	17056.3	NC	0.224	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10077.4	10077.4	17529.7	NC	0.216	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10550.8	10550.8	18003.1	NC	0.209	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11024.2	11024.2	18476.5	NC	0.202	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11497.6	11497.6	18949.9	NC	0.195	-
														5.448	0.140
													Total Settlement [ft]	**5.59**	

Variables & Constants	
Point Name	SP-15b
Settlement Layer [ft]	130.3
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

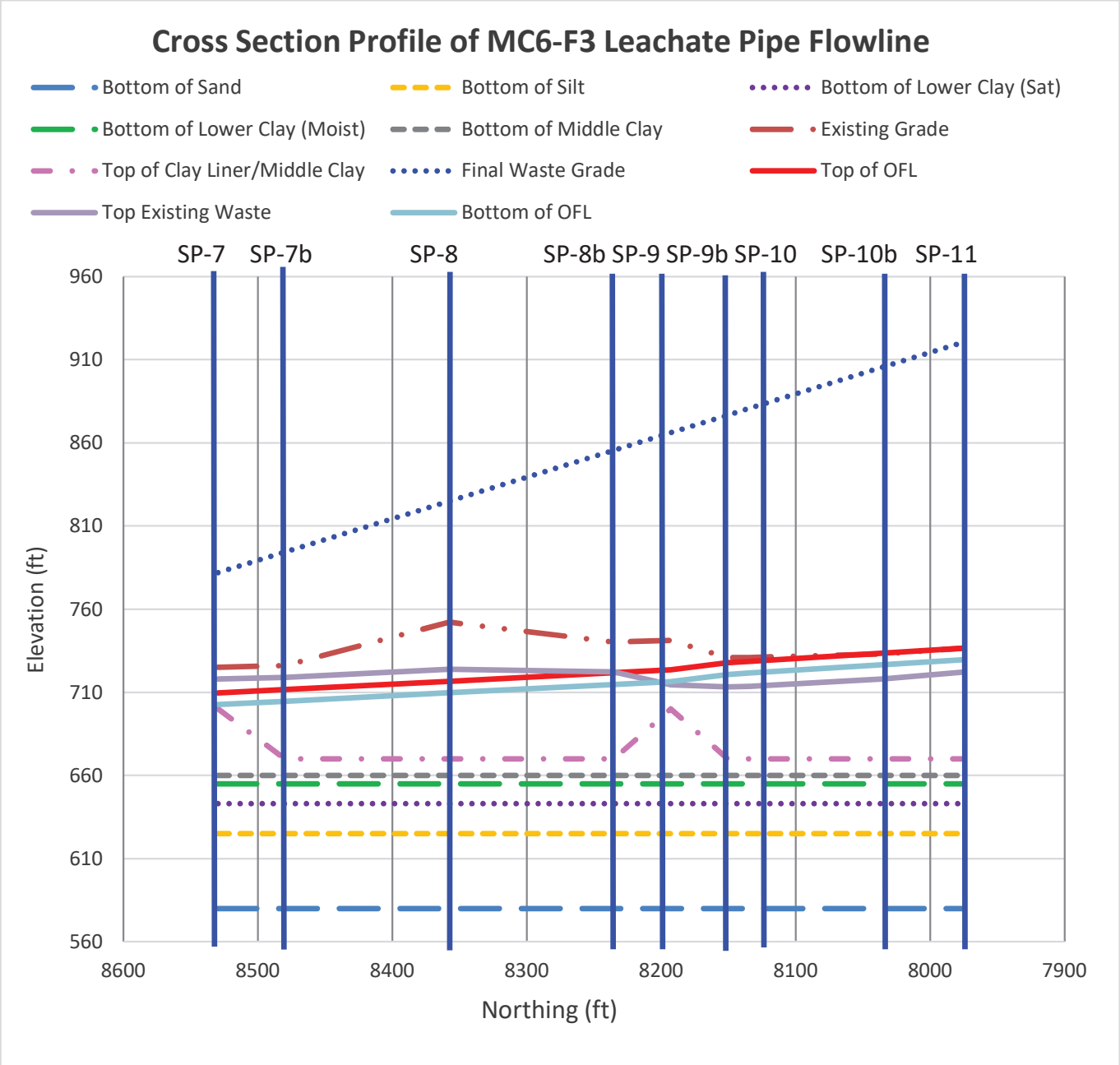
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15c	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8476.72	4131.87	715.98	794.46	711.06	660.00	655.00	643.00	625.00	580.00	670.00	711.06

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	74.5	103.0	0	7671.9	-	-	-	-	-	-		-	-
	4	Existing Waste	2.1	91.0	1	-190.1	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	190.1	190.1	9156.9	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	190.1	190.1	9156.9	NC	-	-
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	411.8	411.8	9378.6	NC	0.529	0.030
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	855.1	855.1	9821.9	NC	0.413	0.030
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	1298.4	1298.4	10265.3	NC	0.350	0.030
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	1741.8	1741.8	10708.6	NC	0.307	0.030
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	2185.1	2185.1	11151.9	NC	0.276	0.030
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	2628.5	2628.5	11595.3	NC	0.251	0.030
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	3071.8	3071.8	12038.6	NC	0.231	0.030
	4	Existing Waste	4.9	91.0	0	443.3	0.080	0.013	0.024	3515.2	3515.2	12482.0	NC	0.214	0.030
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	4076.8	4076.8	13043.6	NC	0.258	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	4756.8	4756.8	13723.6	NC	0.235	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	5416.8	5416.8	14383.6	NC	0.363	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	5933.6	5933.6	14900.4	NC	0.410	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6327.2	6327.2	15294.0	NC	0.393	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	6805.7	6805.7	15772.5	NC	0.493	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7369.1	7369.1	16335.9	NC	0.467	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	7887.5	7887.5	16854.3	NC	0.297	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8360.9	8360.9	17327.7	NC	0.285	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8834.3	8834.3	17801.1	NC	0.274	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9307.7	9307.7	18274.5	NC	0.264	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9781.1	9781.1	18747.9	NC	0.254	-
														6.564	0.291
											Total Settlement [ft]			6.85	

Variables & Constants	
Point Name	SP-15c
Settlement Layer [ft]	129.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F3 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Waste Grade
Top of OFL
Top Existing Waste
Bottom of OFL
SP-7
SP-7b
SP-8
SP-8b
SP-9
SP-9b
SP-10
SP-10b
SP-11
960
910
860
810
760
710
660
610
560
Elevation (ft)
8600
8500
8400
8300
8200
8100
8000
7900
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-7	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8529.72	4583.16	709.66	781.96	725.04	660.00	655.00	643.00	625.00	580.00	700.00	718.02

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	68.3	103.0	0	7034.7	-	-	-	-	-	-		-	-
	3	OFL	7.0	135.0	1	-947.2	-	-	-	-	-	-		-	-
	4	Existing Waste	15.4	91.0	1	-1397.8	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	2345.0	2345.0	8519.7	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	2345.0	2345.0	8519.7	NC	-	-
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2360.1	2360.1	8534.8	NC	0.015	0.002
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2390.4	2390.4	8565.1	NC	0.015	0.002
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2420.7	2420.7	8595.4	NC	0.015	0.002
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2451.0	2451.0	8625.7	NC	0.015	0.002
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2481.3	2481.3	8655.9	NC	0.014	0.002
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2511.6	2511.6	8686.2	NC	0.014	0.002
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2541.9	2541.9	8716.5	NC	0.014	0.002
	4	Existing Waste	0.3	91.0	0	30.3	0.080	0.013	0.024	2572.1	2572.1	8746.8	NC	0.014	0.002
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	3947.3	3947.3	10122.0	NC	0.834	0.026
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	6667.3	6667.3	12842.0	NC	0.581	0.026
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8347.3	8347.3	14522.0	NC	0.206	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8864.1	8864.1	15038.8	NC	0.236	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9257.7	9257.7	15432.4	NC	0.228	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9736.2	9736.2	15910.9	NC	0.288	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10299.6	10299.6	16474.3	NC	0.275	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10818.0	10818.0	16992.7	NC	0.177	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11291.4	11291.4	17466.1	NC	0.171	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11764.8	11764.8	17939.5	NC	0.165	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12238.2	12238.2	18412.9	NC	0.160	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12711.6	12711.6	18886.3	NC	0.155	-
														3.590	0.106
													Total Settlement [ft]	**3.70**	

Variables & Constants	
Point Name	SP-7
Settlement Layer [ft]	122.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-7b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8480.14	4583.16	711.70	794.35	726.02	660.00	655.00	643.00	625.00	580.00	670.00	718.97

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	78.7	103.0	0	8101.9	-	-	-	-	-	-		-	-
	3	OFL	7.1	135.0	1	-952.2	-	-	-	-	-	-		-	-
	4	Existing Waste	14.3	91.0	1	-1299.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	2251.2	2251.2	9586.9	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	2251.2	2251.2	9586.9	NC	-	-
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	2448.6	2448.6	9784.2	NC	0.209	0.027
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	2843.2	2843.2	10178.9	NC	0.192	0.027
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	3237.9	3237.9	10573.5	NC	0.178	0.027
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	3632.5	3632.5	10968.2	NC	0.167	0.027
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	4027.2	4027.2	11362.9	NC	0.156	0.027
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	4421.9	4421.9	11757.5	NC	0.147	0.027
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	4816.5	4816.5	12152.2	NC	0.139	0.027
	4	Existing Waste	4.3	91.0	0	394.7	0.080	0.013	0.024	5211.2	5211.2	12546.8	NC	0.132	0.027
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5748.5	5748.5	13084.2	NC	0.182	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6428.5	6428.5	13764.2	NC	0.169	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7088.5	7088.5	14424.2	NC	0.264	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7605.3	7605.3	14941.0	NC	0.301	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7998.9	7998.9	15334.6	NC	0.290	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8477.4	8477.4	15813.1	NC	0.366	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9040.8	9040.8	16376.5	NC	0.348	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9559.2	9559.2	16894.9	NC	0.223	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10032.6	10032.6	17368.3	NC	0.215	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10506.0	10506.0	17841.7	NC	0.207	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10979.4	10979.4	18315.1	NC	0.200	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11452.8	11452.8	18788.5	NC	0.193	-
														4.278	0.264
											Total Settlement [ft]			4.54	

Variables & Constants	
Point Name	SP-7b
Settlement Layer [ft]	124.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-8	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8357.69	4583.16	716.72	824.97	752.20	660.00	655.00	643.00	625.00	580.00	670.00	723.92

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	104.3	103.0	0	10737.8	-	-	-	-	-	-		-	-
	3	OFL	28.3	135.0	1	-3817.2	-	-	-	-	-	-		-	-
	4	Existing Waste	14.2	91.0	1	-1292.7	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	5109.9	5109.9	12222.8	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	5109.9	5109.9	12222.8	NC	-	-
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	5335.8	5335.8	12448.7	NC	0.146	0.030
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	5787.6	5787.6	12900.4	NC	0.138	0.030
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	6239.4	6239.4	13352.2	NC	0.131	0.030
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	6691.1	6691.1	13804.0	NC	0.125	0.030
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	7142.9	7142.9	14255.7	NC	0.119	0.030
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	7594.7	7594.7	14707.5	NC	0.114	0.030
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	8046.4	8046.4	15159.3	NC	0.109	0.030
	4	Existing Waste	5.0	91.0	0	451.8	0.080	0.013	0.024	8498.2	8498.2	15611.1	NC	0.105	0.030
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	9064.1	9064.1	16176.9	NC	0.128	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	9744.1	9744.1	16856.9	NC	0.121	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	10404.1	10404.1	17516.9	NC	0.193	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	10920.9	10920.9	18033.7	NC	0.223	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	11314.5	11314.5	18427.3	NC	0.217	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	11793.0	11793.0	18905.8	NC	0.277	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	12356.4	12356.4	19469.2	NC	0.267	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12874.8	12874.8	19987.6	NC	0.172	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13348.2	13348.2	20461.0	NC	0.167	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13821.6	13821.6	20934.4	NC	0.162	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	14295.0	14295.0	21407.8	NC	0.158	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	14768.4	14768.4	21881.2	NC	0.154	-
														3.228	0.295
											Total Settlement [ft]			3.52	

Variables & Constants	
Point Name	SP-8
Settlement Layer [ft]	129.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

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- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-8b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8235.24	4583.16	721.74	855.58	740.25	660.00	655.00	643.00	625.00	580.00	670.00	722.35

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	129.8	103.0	0	13373.7	-	-	-	-	-	-		-	-
	3	OFL	17.9	135.0	1	-2417.1	-	-	-	-	-	-		-	-
	4	Existing Waste	7.6	91.0	1	-692.4	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	3109.6	3109.6	14858.7	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	3109.6	3109.6	14858.7	NC	-	-
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	3364.0	3364.0	15113.1	NC	0.292	0.034
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	3872.9	3872.9	15622.0	NC	0.271	0.034
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	4381.8	4381.8	16130.9	NC	0.253	0.034
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	4890.6	4890.6	16639.7	NC	0.238	0.034
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	5399.5	5399.5	17148.6	NC	0.225	0.034
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	5908.4	5908.4	17657.5	NC	0.213	0.034
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	6417.3	6417.3	18166.4	NC	0.202	0.034
	4	Existing Waste	5.6	91.0	0	508.9	0.080	0.013	0.024	6926.1	6926.1	18675.3	NC	0.193	0.034
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7520.6	7520.6	19269.7	NC	0.208	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	8200.6	8200.6	19949.7	NC	0.197	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8860.6	8860.6	20609.7	NC	0.313	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9377.4	9377.4	21126.5	NC	0.362	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9771.0	9771.0	21520.1	NC	0.352	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10249.5	10249.5	21998.6	NC	0.448	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10812.9	10812.9	22562.0	NC	0.431	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11331.3	11331.3	23080.4	NC	0.278	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11804.7	11804.7	23553.8	NC	0.270	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12278.1	12278.1	24027.2	NC	0.262	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12751.5	12751.5	24500.6	NC	0.255	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13224.9	13224.9	24974.0	NC	0.248	-
														5.512	0.326
													Total Settlement [ft]	**5.84**	

Variables & Constants	
Point Name	SP-8b
Settlement Layer [ft]	134.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

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- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-9	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8193.03	4583.16	723.47	866.13	741.21	660.00	655.00	643.00	625.00	580.00	700.00	714.49

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	138.7	103.0	0	14282.1	-	-	-	-	-	-		-	-
	3	OFL	24.7	135.0	1	-3340.9	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	1.0	135.0	0	133.2	0.102	0.017	0.005	3407.5	3407.5	15833.7	NC	0.067	0.001
	3	OFL	1.0	135.0	0	133.2	0.102	0.017	0.005	3540.7	3540.7	15966.9	NC	0.066	0.001
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	3689.8	3689.8	16116.0	NC	0.093	0.011
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	3854.6	3854.6	16280.8	NC	0.091	0.011
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	4019.5	4019.5	16445.7	NC	0.089	0.011
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	4184.4	4184.4	16610.6	NC	0.087	0.011
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	4349.2	4349.2	16775.4	NC	0.085	0.011
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	4514.1	4514.1	16940.3	NC	0.083	0.011
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	4679.0	4679.0	17105.2	NC	0.082	0.011
	4	Existing Waste	1.8	91.0	0	164.9	0.080	0.013	0.024	4843.8	4843.8	17270.0	NC	0.080	0.011
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	6286.3	6286.3	18712.5	NC	0.966	0.026
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	9006.3	9006.3	21432.5	NC	0.768	0.026
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	10686.3	10686.3	23112.5	NC	0.286	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	11203.1	11203.1	23629.3	NC	0.333	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	11596.7	11596.7	24022.9	NC	0.325	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	12075.2	12075.2	24501.4	NC	0.415	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	12638.6	12638.6	25064.8	NC	0.401	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13157.0	13157.0	25583.2	NC	0.260	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13630.4	13630.4	26056.6	NC	0.253	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	14103.8	14103.8	26530.0	NC	0.247	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	14577.2	14577.2	27003.4	NC	0.241	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	15050.6	15050.6	27476.8	NC	0.235	-
														5.552	0.181
											Total Settlement [ft]			5.73	

Variables & Constants	
Point Name	SP-9
Settlement Layer [ft]	136.5
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-9b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8150.83	4583.16	727.78	876.68	730.80	660.00	655.00	643.00	625.00	580.00	670.00	713.30

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	144.9	103.0	0	14924.7	-	-	-	-	-	-		-	-
	3	OFL	10.0	135.0	1	-1353.1	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	3.7	135.0	0	504.8	0.102	0.017	0.005	1605.5	1605.5	16662.1	NC	0.388	0.005
	3	OFL	3.7	135.0	0	504.8	0.102	0.017	0.005	2110.4	2110.4	17167.0	NC	0.347	0.005
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	2609.0	2609.0	17665.7	NC	0.360	0.033
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	3101.6	3101.6	18158.2	NC	0.332	0.033
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	3594.1	3594.1	18650.8	NC	0.310	0.033
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	4086.7	4086.7	19143.3	NC	0.290	0.033
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	4579.2	4579.2	19635.8	NC	0.274	0.033
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	5071.8	5071.8	20128.4	NC	0.259	0.033
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	5564.3	5564.3	20620.9	NC	0.246	0.033
	4	Existing Waste	5.4	91.0	0	492.5	0.080	0.013	0.024	6056.8	6056.8	21113.5	NC	0.235	0.033
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6643.1	6643.1	21699.7	NC	0.262	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7323.1	7323.1	22379.7	NC	0.247	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7983.1	7983.1	23039.7	NC	0.394	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8499.9	8499.9	23556.5	NC	0.454	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8893.5	8893.5	23950.1	NC	0.441	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9372.0	9372.0	24428.6	NC	0.562	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9935.4	9935.4	24992.0	NC	0.541	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10453.8	10453.8	25510.4	NC	0.349	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10927.2	10927.2	25983.8	NC	0.339	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11400.6	11400.6	26457.2	NC	0.329	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11874.0	11874.0	26930.6	NC	0.320	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12347.4	12347.4	27404.0	NC	0.312	-
														7.590	0.327
											Total Settlement [ft]			7.92	

Variables & Constants	
Point Name	SP-9b
Settlement Layer [ft]	140.8
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8134.31	4583.16	728.61	880.81	731.03	660.00	655.00	643.00	625.00	580.00	670.00	713.56

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	148.2	103.0	0	15264.5	-	-	-	-	-	-		-	-
	3	OFL	9.4	135.0	1	-1271.2	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	4.0	135.0	0	543.0	0.102	0.017	0.005	1542.8	1542.8	17021.0	NC	0.428	0.005
	3	OFL	4.0	135.0	0	543.0	0.102	0.017	0.005	2085.8	2085.8	17564.0	NC	0.380	0.005
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	2605.1	2605.1	18083.3	NC	0.367	0.033
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	3100.7	3100.7	18578.9	NC	0.339	0.033
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	3596.2	3596.2	19074.4	NC	0.316	0.033
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	4091.8	4091.8	19570.0	NC	0.296	0.033
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	4587.3	4587.3	20065.5	NC	0.279	0.033
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	5082.9	5082.9	20561.1	NC	0.264	0.033
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	5578.4	5578.4	21056.6	NC	0.251	0.033
	4	Existing Waste	5.4	91.0	0	495.5	0.080	0.013	0.024	6074.0	6074.0	21552.2	NC	0.240	0.033
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6661.7	6661.7	22139.9	NC	0.266	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7341.7	7341.7	22819.9	NC	0.251	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8001.7	8001.7	23479.9	NC	0.400	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8518.5	8518.5	23996.7	NC	0.461	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8912.1	8912.1	24390.3	NC	0.449	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9390.6	9390.6	24868.8	NC	0.571	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9954.0	9954.0	25432.2	NC	0.550	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10472.4	10472.4	25950.6	NC	0.355	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10945.8	10945.8	26424.0	NC	0.344	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11419.2	11419.2	26897.4	NC	0.335	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11892.6	11892.6	27370.8	NC	0.326	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12366.0	12366.0	27844.2	NC	0.317	-
														7.784	0.329
											Total Settlement [ft]			8.11	

Variables & Constants	
Point Name	SP-10
Settlement Layer [ft]	141.6
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	4583.16	733.53	905.39	733.05	660.00	655.00	643.00	625.00	580.00	670.00	717.99

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	167.9	103.0	0	17289.9	-	-	-	-	-	-		-	-
	3	OFL	6.5	135.0	1	-880.7	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	4.3	135.0	0	576.7	0.102	0.017	0.005	1169.1	1169.1	19063.3	NC	0.528	0.005
	3	OFL	4.3	135.0	0	576.7	0.102	0.017	0.005	1745.8	1745.8	19639.9	NC	0.458	0.005
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	2307.0	2307.0	20201.2	NC	0.452	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	2852.9	2852.9	20747.1	NC	0.413	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	3398.7	3398.7	21292.9	NC	0.382	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	3944.6	3944.6	21838.8	NC	0.357	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	4490.4	4490.4	22384.6	NC	0.335	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	5036.3	5036.3	22930.5	NC	0.316	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	5582.1	5582.1	23476.3	NC	0.299	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	6128.0	6128.0	24022.2	NC	0.285	0.037
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6740.9	6740.9	24635.1	NC	0.287	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7420.9	7420.9	25315.1	NC	0.272	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8080.9	8080.9	25975.1	NC	0.434	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8597.7	8597.7	26491.9	NC	0.501	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8991.3	8991.3	26885.5	NC	0.488	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9469.8	9469.8	27364.0	NC	0.622	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10033.2	10033.2	27927.4	NC	0.600	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10551.6	10551.6	28445.8	NC	0.388	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11025.0	11025.0	28919.2	NC	0.377	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11498.4	11498.4	29392.6	NC	0.367	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11971.8	11971.8	29866.0	NC	0.357	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12445.2	12445.2	30339.4	NC	0.348	-
														8.867	0.357
												Total Settlement [ft]		9.22	

Variables & Constants	
Point Name	SP-10b
Settlement Layer [ft]	146.5
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

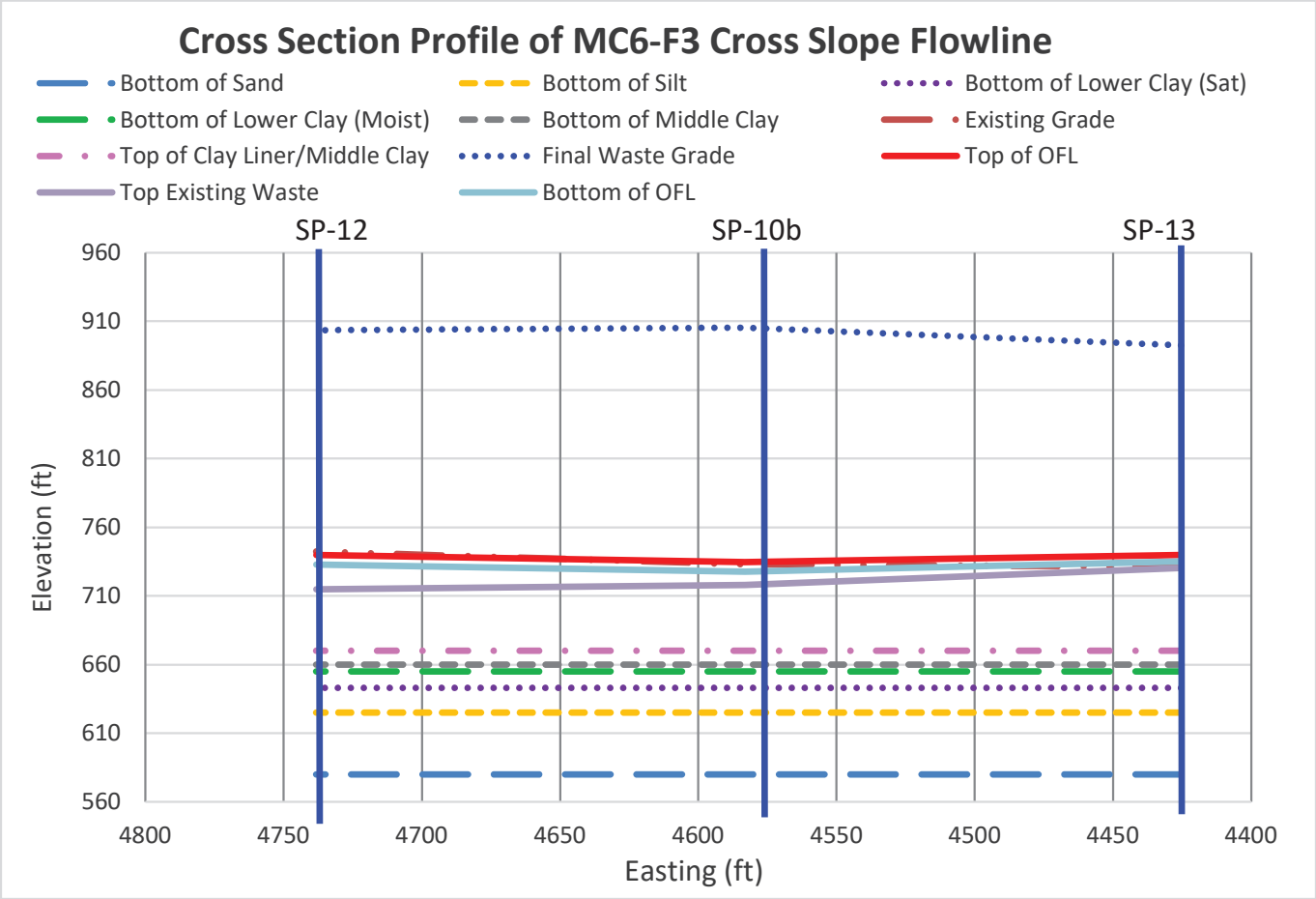
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
SP-11	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7975.92	4583.16	736.53	920.38	736.50	660.00	655.00	643.00	625.00	580.00	670.00	722.12

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	179.8	103.0	0	18524.3	-	-	-	-	-	-		-	-
	3	OFL	7.0	135.0	1	-940.4	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	3.7	135.0	0	499.9	0.102	0.017	0.005	1190.3	1190.3	20259.2	NC	0.465	0.005
	3	OFL	3.7	135.0	0	499.9	0.102	0.017	0.005	1690.1	1690.1	20759.1	NC	0.411	0.005
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	2236.5	2236.5	21305.5	NC	0.510	0.040
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	2829.5	2829.5	21898.4	NC	0.463	0.040
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	3422.4	3422.4	22491.3	NC	0.426	0.040
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	4015.3	4015.3	23084.2	NC	0.396	0.040
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	4608.2	4608.2	23677.1	NC	0.371	0.040
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	5201.1	5201.1	24270.1	NC	0.349	0.040
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	5794.1	5794.1	24863.0	NC	0.330	0.040
	4	Existing Waste	6.5	91.0	0	592.9	0.080	0.013	0.024	6387.0	6387.0	25455.9	NC	0.313	0.040
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7023.4	7023.4	26092.4	NC	0.291	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7703.4	7703.4	26772.4	NC	0.276	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8363.4	8363.4	27432.4	NC	0.441	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8880.2	8880.2	27949.2	NC	0.511	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9273.8	9273.8	28342.8	NC	0.498	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9752.3	9752.3	28821.3	NC	0.635	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10315.7	10315.7	29384.7	NC	0.614	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10834.1	10834.1	29903.1	NC	0.397	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11307.5	11307.5	30376.5	NC	0.386	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11780.9	11780.9	30849.9	NC	0.376	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12254.3	12254.3	31323.3	NC	0.367	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12727.7	12727.7	31796.7	NC	0.358	-
														9.183	0.381
											Total Settlement [ft]			9.56	

Variables & Constants	
Point Name	SP-11
Settlement Layer [ft]	149.5
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F3 Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Waste Grade
Top of OFL
Top Existing Waste
Bottom of OFL
SP-12
SP-10b
SP-13
960
910
860
810
760
710
660
610
560
Elevation (ft)
4800
4750
4700
4650
4600
4550
4500
4450
4400
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grades	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	4583.16	734.63	905.39	733.05	660.00	655.00	643.00	625.00	580.00	670.00	717.99

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	166.8	103.0	0	17176.6	-	-	-	-	-	-		-	-
	3	OFL	5.4	135.0	1	-732.2	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	4.8	135.0	0	650.9	0.102	0.017	0.005	1057.7	1057.7	18987.1	NC	0.617	0.006
	3	OFL	4.8	135.0	0	650.9	0.102	0.017	0.005	1708.6	1708.6	19638.0	NC	0.522	0.006
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	2307.0	2307.0	20236.4	NC	0.453	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	2852.9	2852.9	20782.3	NC	0.414	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	3398.7	3398.7	21328.1	NC	0.383	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	3944.6	3944.6	21874.0	NC	0.357	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	4490.4	4490.4	22419.8	NC	0.335	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	5036.3	5036.3	22965.7	NC	0.316	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	5582.1	5582.1	23511.5	NC	0.300	0.037
	4	Existing Waste	6.0	91.0	0	545.9	0.080	0.013	0.024	6128.0	6128.0	24057.4	NC	0.285	0.037
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6740.9	6740.9	24670.3	NC	0.287	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7420.9	7420.9	25350.3	NC	0.272	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8080.9	8080.9	26010.3	NC	0.434	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8597.7	8597.7	26527.1	NC	0.502	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8991.3	8991.3	26920.7	NC	0.489	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9469.8	9469.8	27399.2	NC	0.623	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10033.2	10033.2	27962.6	NC	0.601	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10551.6	10551.6	28481.0	NC	0.388	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11025.0	11025.0	28954.4	NC	0.377	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11498.4	11498.4	29427.8	NC	0.367	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11971.8	11971.8	29901.2	NC	0.358	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12445.2	12445.2	30374.6	NC	0.349	-
														9.028	0.358
											Total Settlement [ft]			9.39	

Variables & Constants	
Point Name	SP-10b
Settlement Layer [ft]	147.6
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grades	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-12	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	4738.22	739.78	903.60	742.32	660.00	655.00	643.00	625.00	580.00	670.00	714.91

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	159.8	103.0	0	16461.0	-	-	-	-	-	-		-	-
	3	OFL	9.5	135.0	1	-1288.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	8.9	135.0	0	1206.4	0.102	0.017	0.005	1891.2	1891.2	18549.2	NC	0.904	0.011
	3	OFL	8.9	135.0	0	1206.4	0.102	0.017	0.005	3097.6	3097.6	19755.6	NC	0.733	0.011
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	3956.2	3956.2	20614.3	NC	0.322	0.034
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	4467.1	4467.1	21125.1	NC	0.303	0.034
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	4977.9	4977.9	21636.0	NC	0.287	0.034
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	5488.8	5488.8	22146.8	NC	0.272	0.034
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	5999.7	5999.7	22657.7	NC	0.259	0.034
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	6510.5	6510.5	23168.6	NC	0.248	0.034
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	7021.4	7021.4	23679.4	NC	0.237	0.034
	4	Existing Waste	5.6	91.0	0	510.9	0.080	0.013	0.024	7532.2	7532.2	24190.3	NC	0.228	0.034
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	8127.7	8127.7	24785.7	NC	0.247	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	8807.7	8807.7	25465.7	NC	0.235	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	9467.7	9467.7	26125.7	NC	0.377	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9984.5	9984.5	26642.5	NC	0.437	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	10378.1	10378.1	27036.1	NC	0.427	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10856.6	10856.6	27514.6	NC	0.545	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	11420.0	11420.0	28078.0	NC	0.527	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11938.4	11938.4	28596.4	NC	0.341	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12411.8	12411.8	29069.8	NC	0.333	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12885.2	12885.2	29543.2	NC	0.324	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13358.6	13358.6	30016.6	NC	0.316	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13832.0	13832.0	30490.0	NC	0.309	-
														8.212	0.350
													Total Settlement [ft]	**8.56**	

Variables & Constants	
Point Name	SP-12
Settlement Layer [ft]	152.8
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

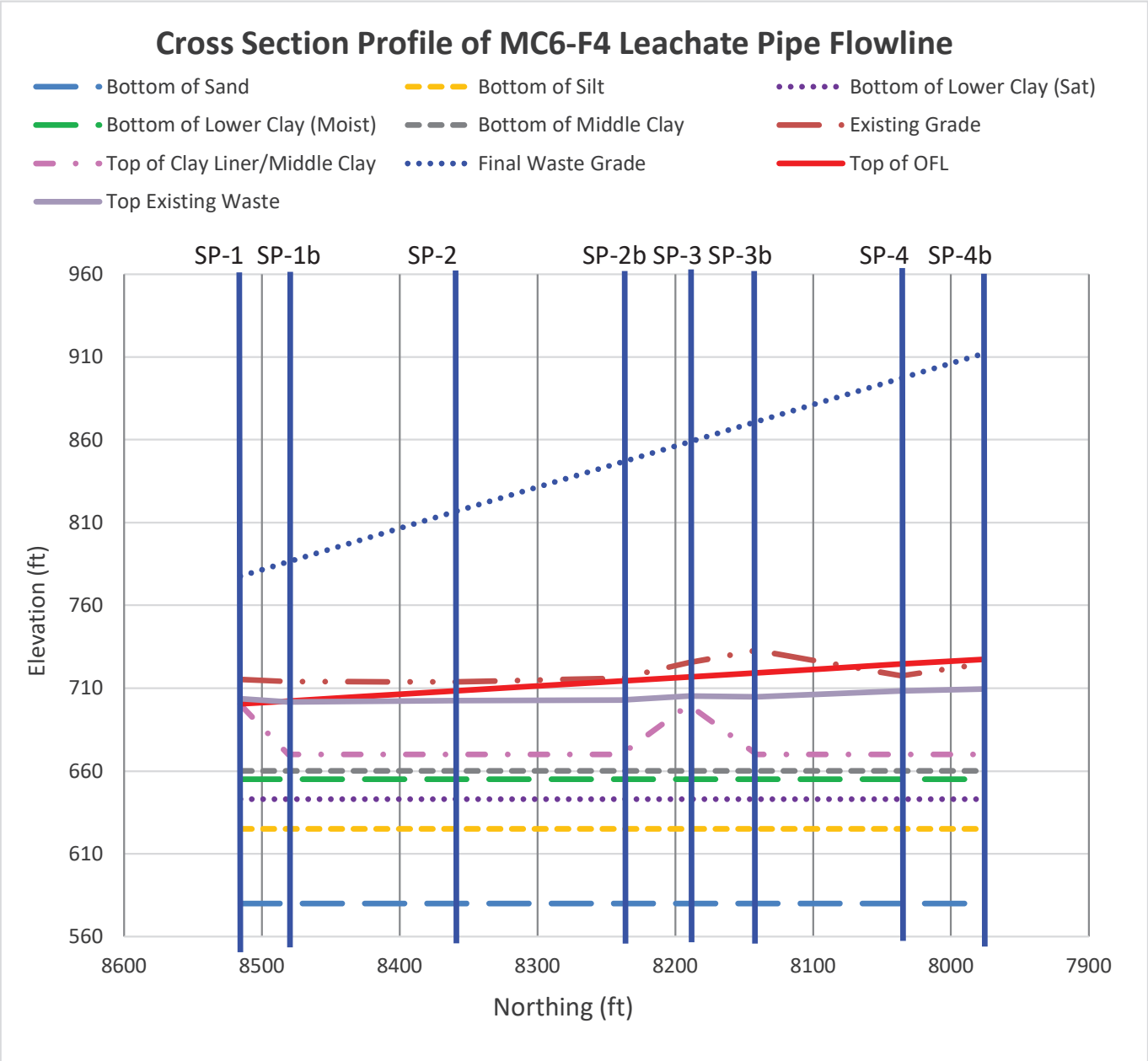
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grades	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-13	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	4425.42	739.86	892.49	731.21	660.00	655.00	643.00	625.00	580.00	670.00	730.27

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	148.6	103.0	0	15308.6	-	-	-	-	-	-		-	-
	3	OFL	8.7	135.0	0	1168.7	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	0.5	135.0	0	63.3	0.102	0.017	0.005	31.6	31.6	17048.9	NC	0.131	0.001
	3	OFL	0.5	135.0	0	63.3	0.102	0.017	0.005	94.9	94.9	17112.2	NC	0.108	0.001
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	469.4	469.4	17486.6	NC	0.947	0.046
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	1154.9	1154.9	18172.2	NC	0.721	0.046
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	1840.5	1840.5	18857.7	NC	0.609	0.046
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	2526.0	2526.0	19543.3	NC	0.536	0.046
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	3211.5	3211.5	20228.8	NC	0.482	0.046
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	3897.1	3897.1	20914.4	NC	0.440	0.046
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	4582.6	4582.6	21599.9	NC	0.406	0.046
	4	Existing Waste	7.5	91.0	0	685.5	0.080	0.013	0.024	5268.2	5268.2	22285.5	NC	0.377	0.046
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5951.0	5951.0	22968.2	NC	0.299	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6631.0	6631.0	23648.2	NC	0.282	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7291.0	7291.0	24308.2	NC	0.447	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7807.8	7807.8	24825.0	NC	0.515	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8201.4	8201.4	25218.6	NC	0.501	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8679.9	8679.9	25697.1	NC	0.636	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9243.3	9243.3	26260.5	NC	0.612	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9761.7	9761.7	26778.9	NC	0.394	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10235.1	10235.1	27252.3	NC	0.383	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10708.5	10708.5	27725.7	NC	0.372	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11181.9	11181.9	28199.1	NC	0.362	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11655.3	11655.3	28672.5	NC	0.352	-
														9.911	0.422
											Total Settlement [ft]			10.33	

Variables & Constants	
Point Name	SP-13
Settlement Layer [ft]	151.2
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F4 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Waste Grade
Top of OFL
Top Existing Waste
SP-1
SP-1b
SP-2
SP-2b
SP-3
SP-3b
SP-4
SP-4b
960
910
860
810
760
710
660
610
560
Elevation (ft)
8600
8500
8400
8300
8200
8100
8000
7900
Northing (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-1	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8515.67	4957.47	700.50	777.57	715.28	660.00	655.00	643.00	625.00	580.00	700.00	703.57

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	73.1	103.0	0	7526.5	-	-	-	-	-	-		-	-
	3	OFL	11.7	135.0	1	-1581.0	-	-	-	-	-	-		-	-
	4	Existing Waste	3.6	91.0	1	-324.7	-	-	-	-	-	-		-	-
	6	Middle Clay	6.5	136.0	1	-884.2	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	2790.0	2790.0	9011.5	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	4	Existing Waste	-	91.0	0	-	0.080	0.013	0.024	2790.0	2790.0	9011.5	NC	-	-
	6	Middle Clay	16.7	136.0	0	2277.9	0.102	0.017	0.005	3928.9	3928.9	10150.5	NC	0.704	0.021
	6	Middle Clay	16.7	136.0	0	2277.9	0.102	0.017	0.005	6206.8	6206.8	12428.4	NC	0.515	0.021
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7665.8	7665.8	13887.3	NC	0.221	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8182.6	8182.6	14404.1	NC	0.252	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8576.2	8576.2	14797.7	NC	0.243	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9054.7	9054.7	15276.2	NC	0.307	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9618.1	9618.1	15839.6	NC	0.292	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10136.5	10136.5	16358.0	NC	0.187	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10609.9	10609.9	16831.4	NC	0.180	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11083.3	11083.3	17304.8	NC	0.174	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11556.7	11556.7	17778.2	NC	0.168	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12030.1	12030.1	18251.6	NC	0.163	-
														3.407	0.082
											Total Settlement [ft]			3.49	

Variables & Constants	
Point Name	SP-1
Settlement Layer [ft]	113.5
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-1b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8481.11	4957.47	702.23	786.30	713.96	660.00	655.00	643.00	625.00	580.00	670.00	701.70

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	80.1	103.0	0	8247.4	-	-	-	-	-	-		-	-
	3	OFL	12.3	135.0	1	-1655.3	-	-	-	-	-	-		-	-
	4	Existing Waste	6.5	91.0	1	-588.7	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	2244.0	2244.0	9732.4	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	2244.0	2244.0	9732.4	NC	-	-
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	2387.4	2387.4	9875.9	NC	0.156	0.019
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	2674.4	2674.4	10162.8	NC	0.146	0.019
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	2961.3	2961.3	10449.8	NC	0.138	0.019
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	3248.3	3248.3	10736.8	NC	0.131	0.019
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	3535.2	3535.2	11023.7	NC	0.125	0.019
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	3822.2	3822.2	11310.7	NC	0.119	0.019
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	4109.2	4109.2	11597.6	NC	0.114	0.019
	4	Existing Waste	3.2	91.0	0	287.0	0.080	0.013	0.024	4396.1	4396.1	11884.6	NC	0.109	0.019
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	4879.6	4879.6	12368.1	NC	0.206	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5559.6	5559.6	13048.1	NC	0.189	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	6219.6	6219.6	13708.1	NC	0.293	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6736.4	6736.4	14224.9	NC	0.333	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7130.0	7130.0	14618.5	NC	0.320	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7608.5	7608.5	15097.0	NC	0.402	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8171.9	8171.9	15660.4	NC	0.381	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8690.3	8690.3	16178.8	NC	0.243	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9163.7	9163.7	16652.2	NC	0.233	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9637.1	9637.1	17125.6	NC	0.225	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10110.5	10110.5	17599.0	NC	0.217	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10583.9	10583.9	18072.4	NC	0.209	-
														4.288	0.206
													Total Settlement [ft]	**4.49**	

Variables & Constants	
Point Name	SP-1b
Settlement Layer [ft]	115.2
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

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- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-2	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8360.25	4957.47	708.27	816.46	713.79	660.00	655.00	643.00	625.00	580.00	670.00	702.48

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	104.2	103.0	0	10731.3	-	-	-	-	-	-		-	-
	3	OFL	11.3	135.0	1	-1526.9	-	-	-	-	-	-		-	-
	4	Existing Waste	1.2	91.0	1	-109.8	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	1636.7	1636.7	12216.3	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	1636.7	1636.7	12216.3	NC	-	-
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	1814.5	1814.5	12394.2	NC	0.261	0.024
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	2170.2	2170.2	12749.9	NC	0.240	0.024
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	2525.9	2525.9	13105.6	NC	0.224	0.024
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	2881.6	2881.6	13461.3	NC	0.209	0.024
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	3237.3	3237.3	13817.0	NC	0.197	0.024
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	3593.0	3593.0	14172.7	NC	0.186	0.024
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	3948.7	3948.7	14528.4	NC	0.177	0.024
	4	Existing Waste	3.9	91.0	0	355.7	0.080	0.013	0.024	4304.4	4304.4	14884.0	NC	0.168	0.024
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	4822.2	4822.2	15401.9	NC	0.257	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5502.2	5502.2	16081.9	NC	0.238	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	6162.2	6162.2	16741.9	NC	0.371	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6679.0	6679.0	17258.7	NC	0.423	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7072.6	7072.6	17652.3	NC	0.408	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7551.1	7551.1	18130.8	NC	0.514	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8114.5	8114.5	18694.2	NC	0.489	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8632.9	8632.9	19212.6	NC	0.313	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9106.3	9106.3	19686.0	NC	0.301	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9579.7	9579.7	20159.4	NC	0.291	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10053.1	10053.1	20632.8	NC	0.281	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10526.5	10526.5	21106.2	NC	0.272	-
														5.820	0.243
											Total Settlement [ft]			6.06	

Variables & Constants	
Point Name	SP-2
Settlement Layer [ft]	121.3
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-2b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8239.39	4957.47	714.31	846.44	715.96	660.00	655.00	643.00	625.00	580.00	670.00	702.95

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	128.1	103.0	0	13197.2	-	-	-	-	-	-		-	-
	3	OFL	8.6	135.0	1	-1167.6	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	2.2	135.0	0	294.7	0.102	0.017	0.005	1314.9	1314.9	14829.5	NC	0.234	0.003
	3	OFL	2.2	135.0	0	294.7	0.102	0.017	0.005	1609.7	1609.7	15124.3	NC	0.217	0.003
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	1944.4	1944.4	15459.0	NC	0.297	0.025
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	2319.2	2319.2	15833.8	NC	0.275	0.025
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	2694.0	2694.0	16208.6	NC	0.257	0.025
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	3068.7	3068.7	16583.3	NC	0.241	0.025
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	3443.5	3443.5	16958.1	NC	0.228	0.025
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	3818.3	3818.3	17332.8	NC	0.216	0.025
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	4193.0	4193.0	17707.6	NC	0.206	0.025
	4	Existing Waste	4.1	91.0	0	374.8	0.080	0.013	0.024	4567.8	4567.8	18082.4	NC	0.197	0.025
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5095.2	5095.2	18609.8	NC	0.287	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5775.2	5775.2	19289.8	NC	0.267	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	6435.2	6435.2	19949.8	NC	0.420	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6952.0	6952.0	20466.6	NC	0.481	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7345.6	7345.6	20860.2	NC	0.465	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7824.1	7824.1	21338.7	NC	0.588	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8387.5	8387.5	21902.1	NC	0.563	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8905.9	8905.9	22420.5	NC	0.361	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9379.3	9379.3	22893.9	NC	0.349	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9852.7	9852.7	23367.3	NC	0.338	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10326.1	10326.1	23840.7	NC	0.327	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10799.5	10799.5	24314.1	NC	0.317	-
														7.131	0.259
												Total Settlement [ft]		7.39	

Variables & Constants	
Point Name	SP-2b
Settlement Layer [ft]	127.3
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-3	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8190.21	4957.47	716.77	858.66	725.49	660.00	655.00	643.00	625.00	580.00	700.00	705.26

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	137.9	103.0	0	14202.8	-	-	-	-	-	-		-	-
	3	OFL	15.7	135.0	1	-2122.1	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	2.3	135.0	0	304.6	0.102	0.017	0.005	2274.4	2274.4	15840.1	NC	0.194	0.003
	3	OFL	2.3	135.0	0	304.6	0.102	0.017	0.005	2579.0	2579.0	16144.7	NC	0.183	0.003
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	2761.2	2761.2	16326.9	NC	0.041	0.004
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	2821.0	2821.0	16386.7	NC	0.040	0.004
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	2880.8	2880.8	16446.5	NC	0.040	0.004
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	2940.6	2940.6	16506.4	NC	0.039	0.004
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	3000.5	3000.5	16566.2	NC	0.039	0.004
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	3060.3	3060.3	16626.0	NC	0.039	0.004
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	3120.1	3120.1	16685.8	NC	0.038	0.004
	4	Existing Waste	0.7	91.0	0	59.8	0.080	0.013	0.024	3179.9	3179.9	16745.7	NC	0.038	0.004
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	4569.8	4569.8	18135.6	NC	1.221	0.026
	6	Middle Clay	20.0	136.0	0	2720.0	0.102	0.017	0.005	7289.8	7289.8	20855.6	NC	0.931	0.026
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8969.8	8969.8	22535.6	NC	0.342	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9486.6	9486.6	23052.4	NC	0.396	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9880.2	9880.2	23446.0	NC	0.385	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10358.7	10358.7	23924.5	NC	0.491	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10922.1	10922.1	24487.9	NC	0.473	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11440.5	11440.5	25006.3	NC	0.306	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11913.9	11913.9	25479.7	NC	0.297	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12387.3	12387.3	25953.1	NC	0.289	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12860.7	12860.7	26426.5	NC	0.281	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13334.1	13334.1	26899.9	NC	0.274	-
														6.378	0.128
													Total Settlement [ft]	**6.51**	

Variables & Constants	
Point Name	SP-3
Settlement Layer [ft]	129.8
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

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- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-3b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8141.04	4957.47	719.23	870.94	732.81	660.00	655.00	643.00	625.00	580.00	670.00	704.77

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	147.7	103.0	0	15213.7	-	-	-	-	-	-		-	-
	3	OFL	20.6	135.0	1	-2778.7	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	3.7	135.0	0	503.5	0.102	0.017	0.005	3030.4	3030.4	16950.4	NC	0.284	0.005
	3	OFL	3.7	135.0	0	503.5	0.102	0.017	0.005	3533.9	3533.9	17453.9	NC	0.264	0.005
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	3983.4	3983.4	17903.4	NC	0.227	0.027
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	4379.0	4379.0	18298.9	NC	0.216	0.027
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	4774.5	4774.5	18694.5	NC	0.206	0.027
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	5170.0	5170.0	19090.0	NC	0.197	0.027
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	5565.5	5565.5	19485.5	NC	0.189	0.027
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	5961.0	5961.0	19881.0	NC	0.182	0.027
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	6356.6	6356.6	20276.5	NC	0.175	0.027
	4	Existing Waste	4.3	91.0	0	395.5	0.080	0.013	0.024	6752.1	6752.1	20672.1	NC	0.169	0.027
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7289.8	7289.8	21209.8	NC	0.237	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	7969.8	7969.8	21889.8	NC	0.224	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	8629.8	8629.8	22549.8	NC	0.357	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9146.6	9146.6	23066.6	NC	0.412	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	9540.2	9540.2	23460.2	NC	0.401	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10018.7	10018.7	23938.7	NC	0.511	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	10582.1	10582.1	24502.1	NC	0.492	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11100.5	11100.5	25020.5	NC	0.318	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11573.9	11573.9	25493.9	NC	0.309	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12047.3	12047.3	25967.3	NC	0.300	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12520.7	12520.7	26440.7	NC	0.292	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12994.1	12994.1	26914.1	NC	0.285	-
														6.246	0.274
											Total Settlement [ft]			6.52	

Variables & Constants	
Point Name	SP-3b
Settlement Layer [ft]	132.2
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

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- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-4	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	4957.47	724.49	897.17	717.38	660.00	655.00	643.00	625.00	580.00	670.00	708.31

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	168.7	103.0	0	17374.3	-	-	-	-	-	-		-	-
	3	OFL	7.1	135.0	0	959.8	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	4.5	135.0	0	612.2	0.102	0.017	0.005	306.1	306.1	19180.2	NC	0.831	0.006
	3	OFL	4.5	135.0	0	612.2	0.102	0.017	0.005	918.3	918.3	19792.4	NC	0.617	0.006
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	1442.3	1442.3	20316.4	NC	0.440	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	1878.0	1878.0	20752.1	NC	0.400	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	2313.8	2313.8	21187.9	NC	0.368	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	2749.5	2749.5	21623.6	NC	0.343	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	3185.3	3185.3	22059.4	NC	0.322	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	3621.0	3621.0	22495.1	NC	0.304	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	4056.7	4056.7	22930.8	NC	0.288	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	4492.5	4492.5	23366.6	NC	0.274	0.029
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5050.4	5050.4	23924.5	NC	0.345	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5730.4	5730.4	24604.5	NC	0.323	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	6390.4	6390.4	25264.5	NC	0.510	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6907.2	6907.2	25781.3	NC	0.587	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7300.8	7300.8	26174.9	NC	0.569	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7779.3	7779.3	26653.4	NC	0.722	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8342.7	8342.7	27216.8	NC	0.693	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8861.1	8861.1	27735.2	NC	0.446	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9334.5	9334.5	28208.6	NC	0.432	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9807.9	9807.9	28682.0	NC	0.419	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10281.3	10281.3	29155.4	NC	0.407	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10754.7	10754.7	29628.8	NC	0.396	-
														10.038	0.298
											Total Settlement [ft]			10.34	

Variables & Constants	
Point Name	SP-4
Settlement Layer [ft]	137.4
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

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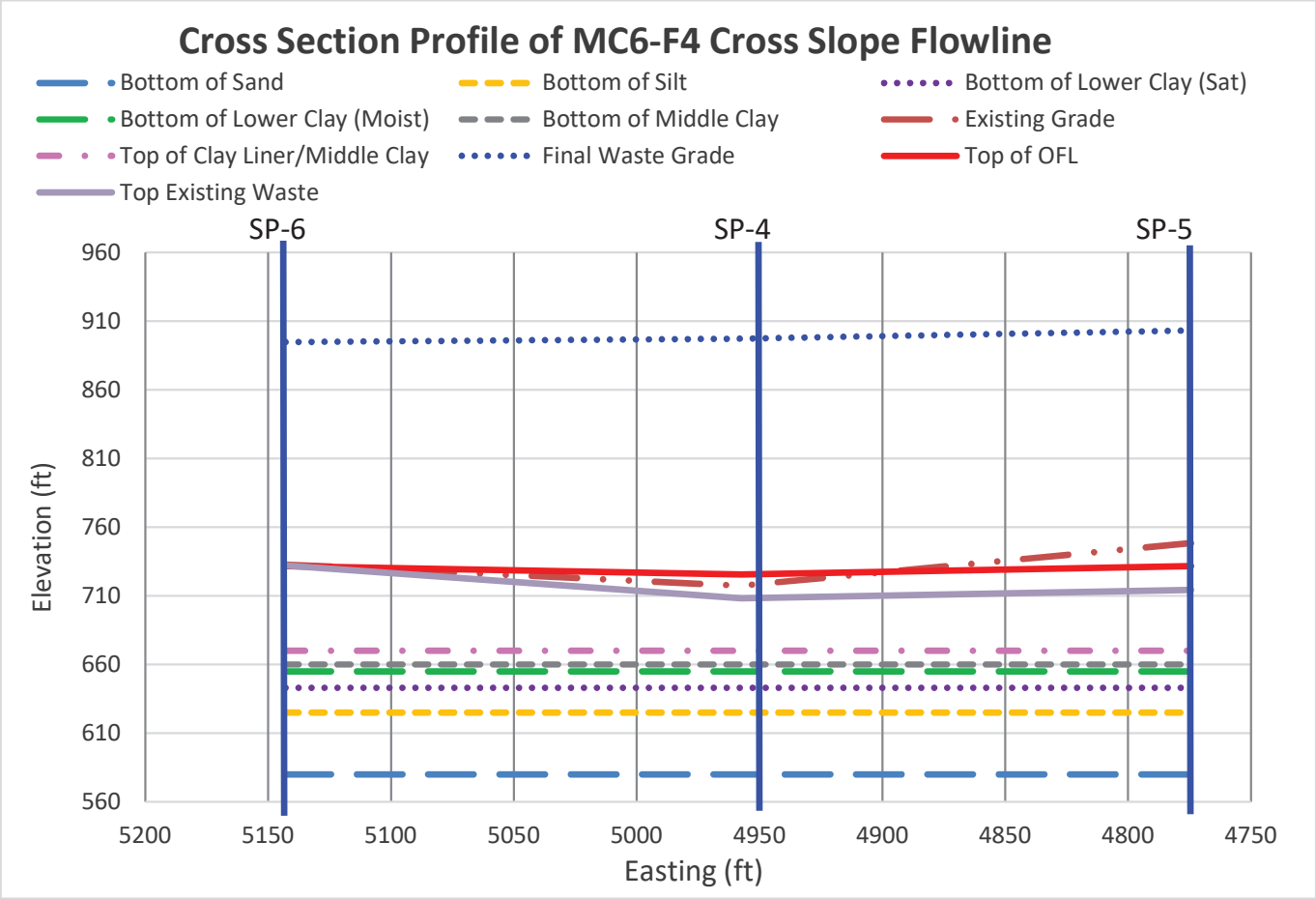
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-4b	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7975.92	4957.47	727.49	912.14	724.87	660.00	655.00	643.00	625.00	580.00	670.00	709.53

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	180.7	103.0	0	18607.7	-	-	-	-	-	-		-	-
	3	OFL	4.4	135.0	1	-592.3	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	5.5	135.0	0	739.3	0.102	0.017	0.005	962.0	962.0	20462.3	NC	0.742	0.007
	3	OFL	5.5	135.0	0	739.3	0.102	0.017	0.005	1701.3	1701.3	21201.7	NC	0.612	0.007
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	2295.8	2295.8	21796.2	NC	0.386	0.030
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	2745.5	2745.5	22245.9	NC	0.359	0.030
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	3195.2	3195.2	22695.6	NC	0.337	0.030
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	3644.9	3644.9	23145.2	NC	0.317	0.030
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	4094.6	4094.6	23594.9	NC	0.301	0.030
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	4544.3	4544.3	24044.6	NC	0.286	0.030
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	4994.0	4994.0	24494.3	NC	0.273	0.030
	4	Existing Waste	4.9	91.0	0	449.7	0.080	0.013	0.024	5443.7	5443.7	24944.0	NC	0.261	0.030
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6008.5	6008.5	25508.8	NC	0.320	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6688.5	6688.5	26188.8	NC	0.302	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7348.5	7348.5	26848.8	NC	0.481	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7865.3	7865.3	27365.6	NC	0.556	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8258.9	8258.9	27759.2	NC	0.540	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8737.4	8737.4	28237.7	NC	0.688	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9300.8	9300.8	28801.1	NC	0.663	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9819.2	9819.2	29319.5	NC	0.428	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10292.6	10292.6	29792.9	NC	0.415	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10766.0	10766.0	30266.3	NC	0.404	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11239.4	11239.4	30739.7	NC	0.393	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11712.8	11712.8	31213.1	NC	0.383	-
														9.448	0.308
											Total Settlement [ft]			9.76	

Variables & Constants	
Point Name	SP-4b
Settlement Layer [ft]	140.5
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-F4 Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Waste Grade
Top of OFL
Top Existing Waste
SP-6
SP-4
SP-5
960
910
860
810
760
710
660
610
560
Elevation (ft)
5200
5150
5100
5050
5000
4950
4900
4850
4800
4750
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-4	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	4957.47	725.59	897.17	717.38	660.00	655.00	643.00	625.00	580.00	670.00	708.31

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	167.6	103.0	0	17261.0	-	-	-	-	-	-		-	-
	3	OFL	8.2	135.0	0	1108.3	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	4.5	135.0	0	612.2	0.102	0.017	0.005	306.1	306.1	19215.4	NC	0.832	0.006
	3	OFL	4.5	135.0	0	612.2	0.102	0.017	0.005	918.3	918.3	19827.6	NC	0.617	0.006
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	1442.3	1442.3	20351.6	NC	0.440	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	1878.0	1878.0	20787.3	NC	0.400	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	2313.8	2313.8	21223.1	NC	0.369	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	2749.5	2749.5	21658.8	NC	0.343	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	3185.3	3185.3	22094.6	NC	0.322	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	3621.0	3621.0	22530.3	NC	0.304	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	4056.7	4056.7	22966.0	NC	0.288	0.029
	4	Existing Waste	4.8	91.0	0	435.7	0.080	0.013	0.024	4492.5	4492.5	23401.8	NC	0.275	0.029
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5050.4	5050.4	23959.7	NC	0.345	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	5730.4	5730.4	24639.7	NC	0.323	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	6390.4	6390.4	25299.7	NC	0.511	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	6907.2	6907.2	25816.5	NC	0.587	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7300.8	7300.8	26210.1	NC	0.570	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	7779.3	7779.3	26688.6	NC	0.723	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8342.7	8342.7	27252.0	NC	0.694	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	8861.1	8861.1	27770.4	NC	0.446	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9334.5	9334.5	28243.8	NC	0.433	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9807.9	9807.9	28717.2	NC	0.420	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10281.3	10281.3	29190.6	NC	0.408	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10754.7	10754.7	29664.0	NC	0.397	-
														10.047	0.298
											Total Settlement [ft]			10.34	

Variables & Constants	
Point Name	SP-4
Settlement Layer [ft]	137.4
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-5	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	4774.37	731.66	903.18	748.37	660.00	655.00	643.00	625.00	580.00	670.00	714.26

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	167.5	103.0	0	17254.7	-	-	-	-	-	-		-	-
	3	OFL	23.7	135.0	1	-3201.0	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	5.2	135.0	0	701.7	0.102	0.017	0.005	3551.9	3551.9	19090.6	NC	0.387	0.007
	3	OFL	5.2	135.0	0	701.7	0.102	0.017	0.005	4253.6	4253.6	19792.3	NC	0.354	0.007
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	4856.2	4856.2	20394.9	NC	0.276	0.034
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	5359.7	5359.7	20898.4	NC	0.262	0.034
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	5863.2	5863.2	21401.9	NC	0.249	0.034
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	6366.7	6366.7	21905.4	NC	0.238	0.034
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	6870.2	6870.2	22408.9	NC	0.227	0.034
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	7373.7	7373.7	22912.4	NC	0.218	0.034
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	7877.2	7877.2	23415.9	NC	0.209	0.034
	4	Existing Waste	5.5	91.0	0	503.5	0.080	0.013	0.024	8380.7	8380.7	23919.4	NC	0.202	0.034
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	8972.4	8972.4	24511.1	NC	0.223	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	9652.4	9652.4	25191.1	NC	0.212	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	10312.4	10312.4	25851.1	NC	0.341	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	10829.2	10829.2	26367.9	NC	0.397	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	11222.8	11222.8	26761.5	NC	0.387	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	11701.3	11701.3	27240.0	NC	0.495	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	12264.7	12264.7	27803.4	NC	0.480	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	12783.1	12783.1	28321.8	NC	0.311	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13256.5	13256.5	28795.2	NC	0.303	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	13729.9	13729.9	29268.6	NC	0.296	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	14203.3	14203.3	29742.0	NC	0.289	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	14676.7	14676.7	30215.4	NC	0.282	-
														6.638	0.336
											Total Settlement [ft]			6.97	

Variables & Constants	
Point Name	SP-5
Settlement Layer [ft]	144.7
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

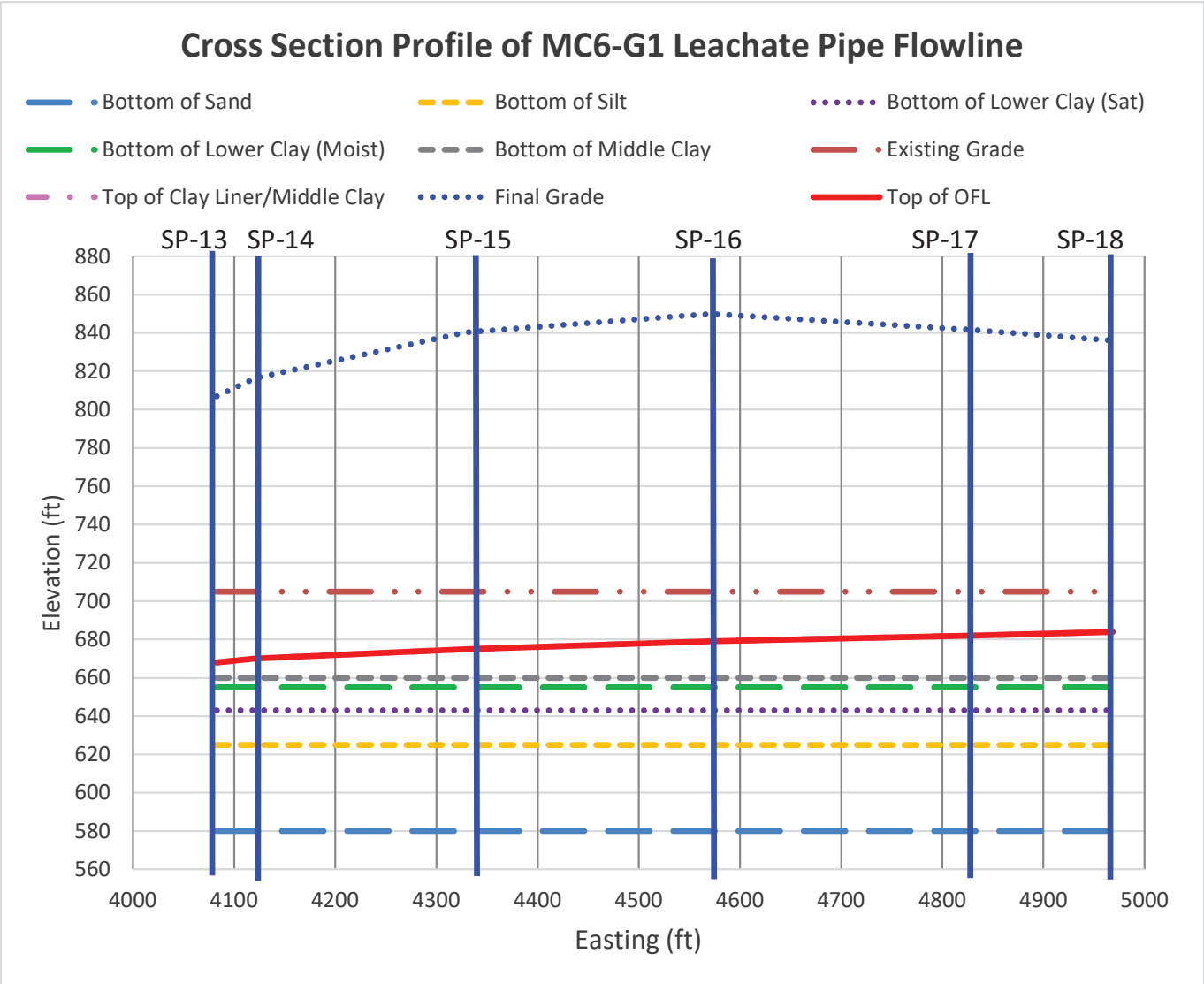
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final Grade	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-6	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	8035.92	5142.88	731.74	894.72	732.72	660.00	655.00	643.00	625.00	580.00	670.00	732.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	p_0' [psf]	p_c' [psf]	p_f' [psf]		S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0	-	-	-	-	-	-		-	-
	2	New Waste	159.0	103.0	0	16375.7	-	-	-	-	-	-		-	-
	3	OFL	0.7	135.0	1	-96.9	-	-	-	-	-	-		-	-
	4	Existing Waste	7.3	91.0	1	-661.1	-	-	-	-	-	-		-	-
	3	OFL	7.00	135.0	0	945.0	-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
		#N/A		#N/A	0		-	-	-	-	-	-		-	-
Consolidation	3	OFL	-	135.0	0	0.0	0.102	0.017	0.005	758.0	758.0	17860.7	NC	-	-
	3	OFL	-	135.0	0	-	0.102	0.017	0.005	758.0	758.0	17860.7	NC	-	-
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	1069.3	1069.3	18172.0	NC	0.673	0.042
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	1691.9	1691.9	18794.6	NC	0.572	0.042
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	2314.5	2314.5	19417.2	NC	0.506	0.042
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	2937.1	2937.1	20039.8	NC	0.456	0.042
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	3559.8	3559.8	20662.4	NC	0.418	0.042
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	4182.4	4182.4	21285.0	NC	0.387	0.042
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	4805.0	4805.0	21907.6	NC	0.361	0.042
	4	Existing Waste	6.8	91.0	0	622.6	0.080	0.013	0.024	5427.6	5427.6	22530.3	NC	0.338	0.042
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6078.9	6078.9	23181.6	NC	0.296	0.006
	6	Middle Clay	5.0	136.0	0	680.0	0.102	0.017	0.005	6758.9	6758.9	23861.6	NC	0.279	0.006
	7	Lower Clay (Moist)	5.0	128.0	0	640.0	0.171	0.029	0.009	7418.9	7418.9	24521.6	NC	0.444	0.011
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	7935.7	7935.7	25038.4	NC	0.512	0.014
	8	Lower Clay (Sat)	6.0	65.6	0	393.6	0.171	0.029	0.009	8329.3	8329.3	25432.0	NC	0.497	0.014
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	8807.8	8807.8	25910.5	NC	0.633	-
	9	Silt	9.0	62.6	0	563.4	0.150	-	-	9371.2	9371.2	26473.9	NC	0.609	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	9889.6	9889.6	26992.3	NC	0.392	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10363.0	10363.0	27465.7	NC	0.381	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	10836.4	10836.4	27939.1	NC	0.370	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11309.8	11309.8	28412.5	NC	0.360	-
	10	Sand	9.0	52.6	0	473.4	0.100	-	-	11783.2	11783.2	28885.9	NC	0.350	-
														8.836	0.387
												Total Settlement [ft]		**9.22**	

Variables & Constants	
Point Name	SP-6
Settlement Layer [ft]	144.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G1 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
SP-13
SP-14
SP-15
SP-16
SP-17
SP-18
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
4000
4100
4200
4300
4400
4500
4600
4700
4800
4900
5000
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-13	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7339.00	4082.84	668.00	806.93	705.00	660.00	655.00	643.00	625.00	580.00	668.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	134.93	103.0	0	13897.8									
	3	OFL	44.00	135.0	1	-5940.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5940.0	5940.0	15382.8	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5940.0	5940.0	15382.8	NC	-	-
	6	Middle Clay	0.50	136.0	0	68.0	0.102	0.017	0.005	5974.0	5974.0	15416.8	NC	0.021	0.001
	6	Middle Clay	0.50	136.0	0	68.0	0.102	0.017	0.005	6042.0	6042.0	15484.8	NC	0.021	0.001
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6396.0	6396.0	15838.8	NC	0.337	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6912.8	6912.8	16355.6	NC	0.384	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7306.4	7306.4	16749.2	NC	0.370	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7784.9	7784.9	17227.7	NC	0.466	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8348.3	8348.3	17791.1	NC	0.444	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8866.7	8866.7	18309.5	NC	0.283	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9340.1	9340.1	18782.9	NC	0.273	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9813.5	9813.5	19256.3	NC	0.263	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10286.9	10286.9	19729.7	NC	0.255	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10760.3	10760.3	20203.1	NC	0.246	-
														3.362	0.040
													Total Settlement [ft]	**3.40**	

Variables & Constants	
Point Name	SP-13
Settlement Layer [ft]	81.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-14	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7339.00	4120.94	670.00	816.46	705.00	660.00	655.00	643.00	625.00	580.00	670.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	142.46	103.0	0	14673.4									
	3	OFL	42.00	135.0	1	-5670.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5670.0	5670.0	16158.4	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	5670.0	5670.0	16158.4	NC	-	-
	6	Middle Clay	1.50	136.0	0	204.0	0.102	0.017	0.005	5772.0	5772.0	16260.4	NC	0.069	0.002
	6	Middle Clay	1.50	136.0	0	204.0	0.102	0.017	0.005	5976.0	5976.0	16464.4	NC	0.067	0.002
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6398.0	6398.0	16886.4	NC	0.360	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6914.8	6914.8	17403.2	NC	0.411	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7308.4	7308.4	17796.8	NC	0.397	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7786.9	7786.9	18275.3	NC	0.500	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8350.3	8350.3	18838.7	NC	0.477	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8868.7	8868.7	19357.1	NC	0.305	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9342.1	9342.1	19830.5	NC	0.294	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9815.5	9815.5	20303.9	NC	0.284	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10288.9	10288.9	20777.3	NC	0.275	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10762.3	10762.3	21250.7	NC	0.266	-
														3.706	0.043
													Total Settlement [ft]	**3.75**	

Variables & Constants	
Point Name	SP-14
Settlement Layer [ft]	83.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7339.00	4329.23	675.00	840.32	705.00	660.00	655.00	643.00	625.00	580.00	675.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	161.32	103.0	0	16616.0									
	3	OFL	37.00	135.0	1	-4995.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4995.0	4995.0	18101.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	6	Middle Clay	4.00	136.0	0	544.0	0.102	0.017	0.005	5267.0	5267.0	18373.0	NC	0.221	0.005
	6	Middle Clay	4.00	136.0	0	544.0	0.102	0.017	0.005	5811.0	5811.0	18917.0	NC	0.209	0.005
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6403.0	6403.0	19509.0	NC	0.414	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6919.8	6919.8	20025.8	NC	0.473	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7313.4	7313.4	20419.4	NC	0.458	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7791.9	7791.9	20897.9	NC	0.578	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8355.3	8355.3	21461.3	NC	0.553	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8873.7	8873.7	21979.7	NC	0.355	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9347.1	9347.1	22453.1	NC	0.343	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9820.5	9820.5	22926.5	NC	0.331	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10293.9	10293.9	23399.9	NC	0.321	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10767.3	10767.3	23873.3	NC	0.311	-
														4.567	0.049
													Total Settlement [ft]	**4.62**	

Variables & Constants	
Point Name	SP-15
Settlement Layer [ft]	88.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-16	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7339.00	4571.07	679.00	849.99	705.00	660.00	655.00	643.00	625.00	580.00	679.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	166.99	103.0	0	17200.0									
	3	OFL	33.00	135.0	1	-4455.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4455.0	4455.0	18685.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4455.0	4455.0	18685.0	NC	-	-
	6	Middle Clay	6.00	136.0	0	816.0	0.102	0.017	0.005	4863.0	4863.0	19093.0	NC	0.364	0.008
	6	Middle Clay	6.00	136.0	0	816.0	0.102	0.017	0.005	5679.0	5679.0	19909.0	NC	0.333	0.008
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6407.0	6407.0	20637.0	NC	0.434	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6923.8	6923.8	21153.8	NC	0.498	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7317.4	7317.4	21547.4	NC	0.481	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7795.9	7795.9	22025.9	NC	0.609	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8359.3	8359.3	22589.3	NC	0.583	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8877.7	8877.7	23107.7	NC	0.374	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9351.1	9351.1	23581.1	NC	0.362	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9824.5	9824.5	24054.5	NC	0.350	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10297.9	10297.9	24527.9	NC	0.339	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10771.3	10771.3	25001.3	NC	0.329	-
														5.056	0.054
													Total Settlement [ft]	**5.11**	

Variables & Constants	
Point Name	SP-16
Settlement Layer [ft]	92.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-17	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7338.93	4827.73	682.00	841.74	705.00	660.00	655.00	643.00	625.00	580.00	682.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	155.74	103.0	0	16041.2									
	3	OFL	30.00	135.0	1	-4050.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4050.0	4050.0	17526.2	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	4560.0	4560.0	18036.2	NC	0.457	0.010
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	5580.0	5580.0	19056.2	NC	0.408	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6410.0	6410.0	19886.2	NC	0.420	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6926.8	6926.8	20403.0	NC	0.481	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7320.4	7320.4	20796.6	NC	0.465	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7798.9	7798.9	21275.1	NC	0.588	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8362.3	8362.3	21838.5	NC	0.563	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8880.7	8880.7	22356.9	NC	0.361	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9354.1	9354.1	22830.3	NC	0.349	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9827.5	9827.5	23303.7	NC	0.337	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10300.9	10300.9	23777.1	NC	0.327	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10774.3	10774.3	24250.5	NC	0.317	-
														5.074	0.058
													Total Settlement [ft]	**5.13**	

Variables & Constants	
Point Name	SP-17
Settlement Layer [ft]	95.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

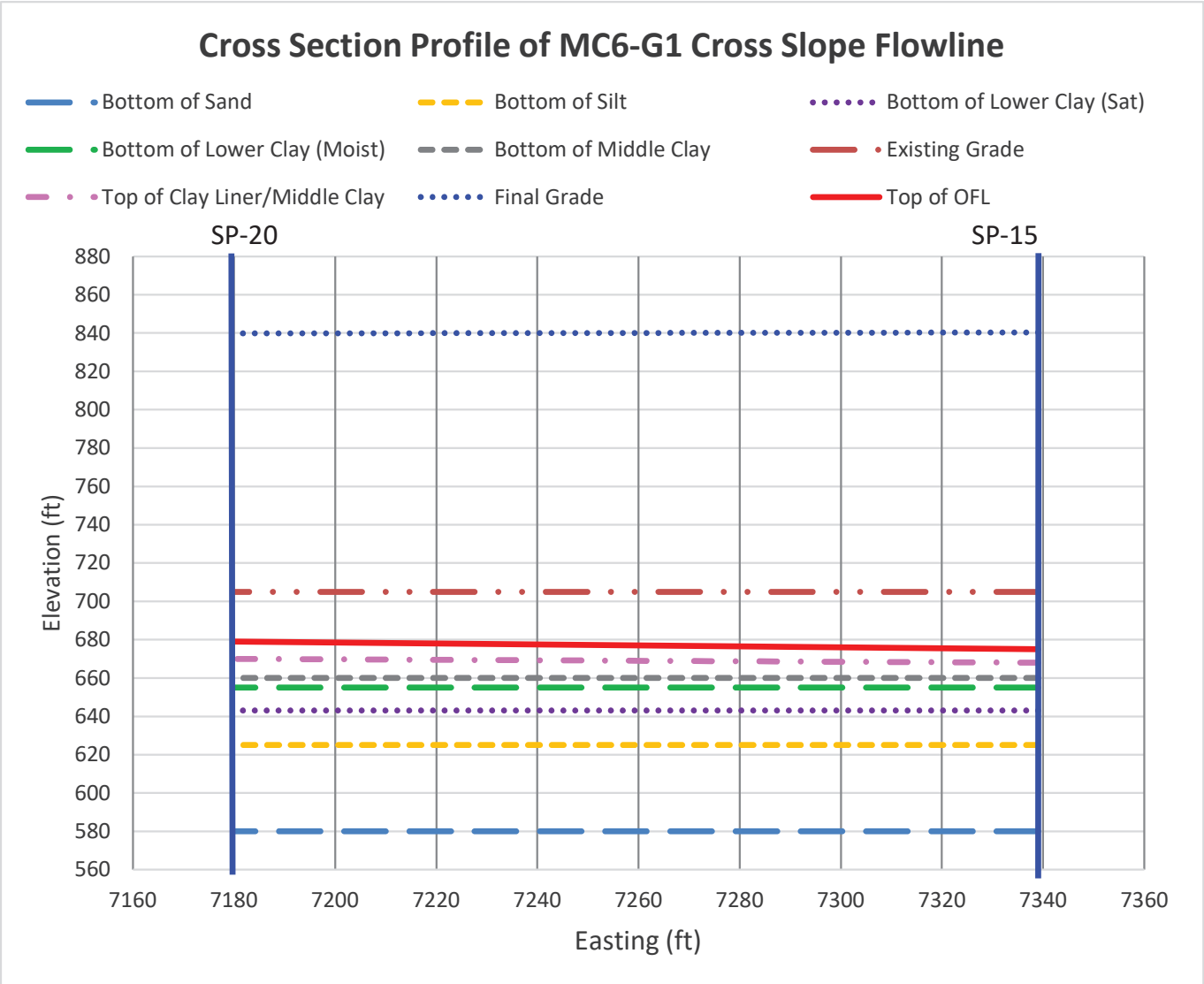
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

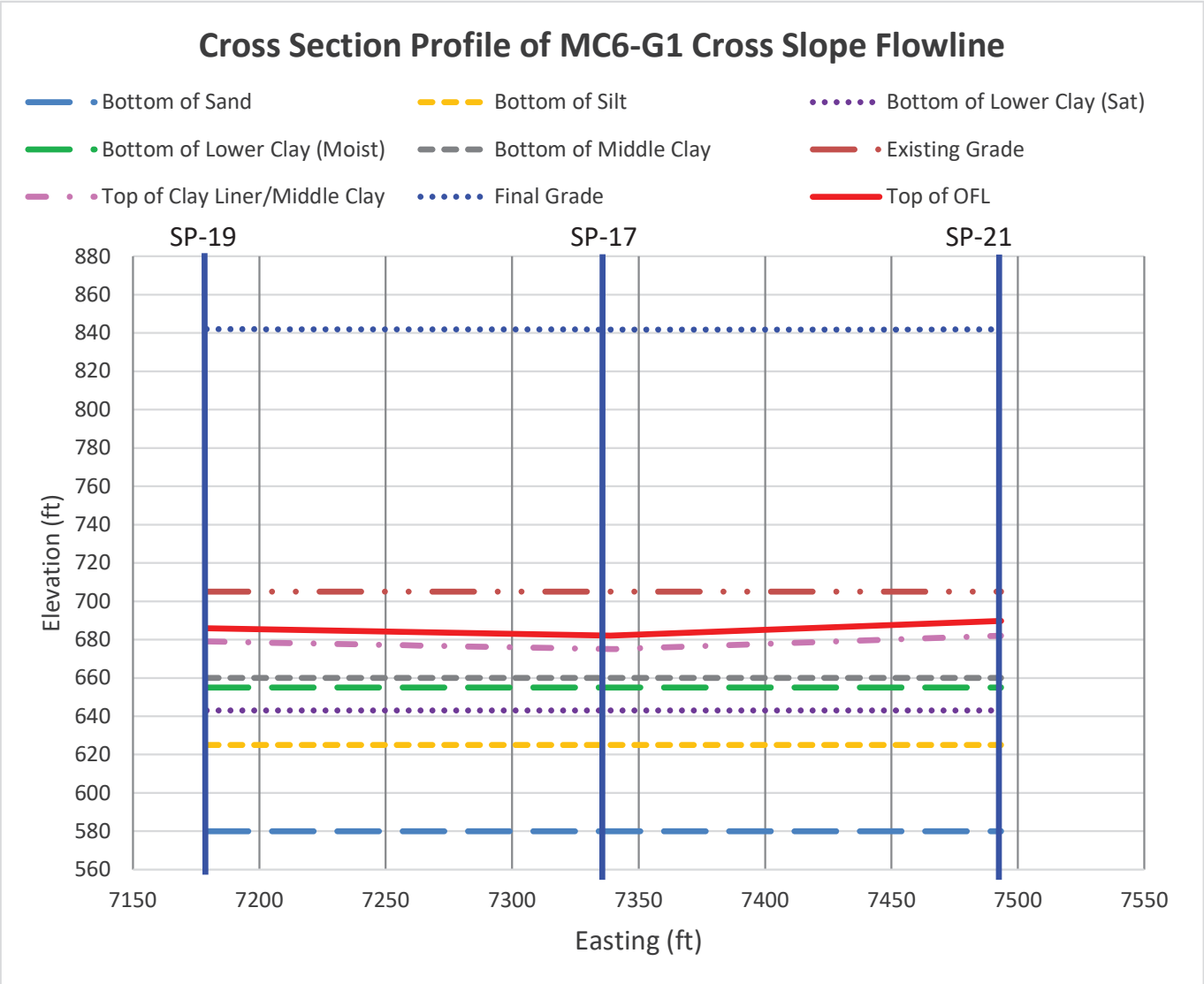
SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-18	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7338.96	4968.72	684.00	836.10	705.00	660.00	655.00	643.00	625.00	580.00	684.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	148.10	103.0	0	15254.3									
	3	OFL	28.00	135.0	1	-3780.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3780.0	3780.0	16739.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3780.0	3780.0	16739.3	NC	-	-
	6	Middle Clay	8.50	136.0	0	1156.0	0.102	0.017	0.005	4358.0	4358.0	17317.3	NC	0.520	0.011
	6	Middle Clay	8.50	136.0	0	1156.0	0.102	0.017	0.005	5514.0	5514.0	18473.3	NC	0.455	0.011
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6412.0	6412.0	19371.3	NC	0.411	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6928.8	6928.8	19888.1	NC	0.470	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7322.4	7322.4	20281.7	NC	0.454	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7800.9	7800.9	20760.2	NC	0.574	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8364.3	8364.3	21323.6	NC	0.549	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8882.7	8882.7	21842.0	NC	0.352	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9356.1	9356.1	22315.4	NC	0.340	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9829.5	9829.5	22788.8	NC	0.329	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10302.9	10302.9	23262.2	NC	0.318	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10776.3	10776.3	23735.6	NC	0.309	-
														5.079	0.061
													Total Settlement [ft]	**5.14**	

Variables & Constants	
Point Name	SP-18
Settlement Layer [ft]	97.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G1 Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
SP-20
SP-15
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
7160
7180
7200
7220
7240
7260
7280
7300
7320
7340
7360
Easting (ft)


Cross Section Profile of MC6-G1 Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
SP-19
SP-17
SP-21
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
7150
7200
7250
7300
7350
7400
7450
7500
7550
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-15	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7339.00	4329.23	675.00	840.32	705.00	660.00	655.00	643.00	625.00	580.00	668.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
											(midpoint of layer)				
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	161.32	103.0	0	16616.0									
	3	OFL	37.00	135.0	1	-4995.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4995.0	4995.0	18101.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4995.0	4995.0	18101.0	NC	-	-
	6	Middle Clay	4.00	136.0	0	544.0	0.102	0.017	0.005	5267.0	5267.0	18373.0	NC	0.221	0.005
	6	Middle Clay	4.00	136.0	0	544.0	0.102	0.017	0.005	5811.0	5811.0	18917.0	NC	0.209	0.005
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6403.0	6403.0	19509.0	NC	0.414	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6919.8	6919.8	20025.8	NC	0.473	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7313.4	7313.4	20419.4	NC	0.458	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7791.9	7791.9	20897.9	NC	0.578	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8355.3	8355.3	21461.3	NC	0.553	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8873.7	8873.7	21979.7	NC	0.355	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9347.1	9347.1	22453.1	NC	0.343	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9820.5	9820.5	22926.5	NC	0.331	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10293.9	10293.9	23399.9	NC	0.321	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10767.3	10767.3	23873.3	NC	0.311	-
														4.567	0.049
													Total Settlement [ft]	**4.62**	

Variables & Constants	
Point Name	SP-15
Settlement Layer [ft]	88.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-17	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7338.93	4827.73	682.00	841.74	705.00	660.00	655.00	643.00	625.00	580.00	675.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	155.74	103.0	0	16041.2									
	3	OFL	30.00	135.0	1	-4050.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4050.0	4050.0	17526.2	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4050.0	4050.0	17526.2	NC	-	-
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	4560.0	4560.0	18036.2	NC	0.457	0.010
	6	Middle Clay	7.50	136.0	0	1020.0	0.102	0.017	0.005	5580.0	5580.0	19056.2	NC	0.408	0.010
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6410.0	6410.0	19886.2	NC	0.420	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6926.8	6926.8	20403.0	NC	0.481	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7320.4	7320.4	20796.6	NC	0.465	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7798.9	7798.9	21275.1	NC	0.588	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8362.3	8362.3	21838.5	NC	0.563	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8880.7	8880.7	22356.9	NC	0.361	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9354.1	9354.1	22830.3	NC	0.349	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9827.5	9827.5	23303.7	NC	0.337	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10300.9	10300.9	23777.1	NC	0.327	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10774.3	10774.3	24250.5	NC	0.317	-
														5.074	0.058
													Total Settlement [ft]	**5.13**	

Variables & Constants	
Point Name	SP-17
Settlement Layer [ft]	95.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-19	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7179.21	4823.35	686.00	841.92	705.00	660.00	655.00	643.00	625.00	580.00	679.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	151.92	103.0	0	15647.8									
	3	OFL	26.00	135.0	1	-3510.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3510.0	3510.0	17132.8	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3510.0	3510.0	17132.8	NC	-	-
	6	Middle Clay	9.50	136.0	0	1292.0	0.102	0.017	0.005	4156.0	4156.0	17778.8	NC	0.612	0.012
	6	Middle Clay	9.50	136.0	0	1292.0	0.102	0.017	0.005	5448.0	5448.0	19070.8	NC	0.527	0.012
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6414.0	6414.0	20036.8	NC	0.423	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6930.8	6930.8	20553.6	NC	0.484	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7324.4	7324.4	20947.2	NC	0.468	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7802.9	7802.9	21425.7	NC	0.592	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8366.3	8366.3	21989.1	NC	0.567	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8884.7	8884.7	22507.5	NC	0.363	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9358.1	9358.1	22980.9	NC	0.351	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9831.5	9831.5	23454.3	NC	0.340	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10304.9	10304.9	23927.7	NC	0.329	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10778.3	10778.3	24401.1	NC	0.319	-
														5.376	0.063
													Total Settlement [ft]	**5.44**	

Variables & Constants	
Point Name	SP-19
Settlement Layer [ft]	99.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-20	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7180.19	4317.03	678.98	839.83	705.00	660.00	655.00	643.00	625.00	580.00	670.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	156.85	103.0	0	16155.3									
	3	OFL	33.02	135.0	1	-4457.4									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4457.4	4457.4	17640.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	4457.4	4457.4	17640.3	NC	-	-
	6	Middle Clay	5.99	136.0	0	814.8	0.102	0.017	0.005	4864.8	4864.8	18047.7	NC	0.348	0.008
	6	Middle Clay	5.99	136.0	0	814.8	0.102	0.017	0.005	5679.6	5679.6	18862.5	NC	0.319	0.008
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6407.0	6407.0	19589.9	NC	0.415	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6923.8	6923.8	20106.7	NC	0.475	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7317.4	7317.4	20500.3	NC	0.459	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7795.9	7795.9	20978.8	NC	0.580	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8359.3	8359.3	21542.2	NC	0.555	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8877.7	8877.7	22060.6	NC	0.356	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9351.1	9351.1	22534.0	NC	0.344	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9824.5	9824.5	23007.4	NC	0.333	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10297.9	10297.9	23480.8	NC	0.322	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10771.3	10771.3	23954.2	NC	0.312	-
														4.818	0.054
													Total Settlement [ft]	**4.87**	

Variables & Constants	
Point Name	SP-20
Settlement Layer [ft]	92.0
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

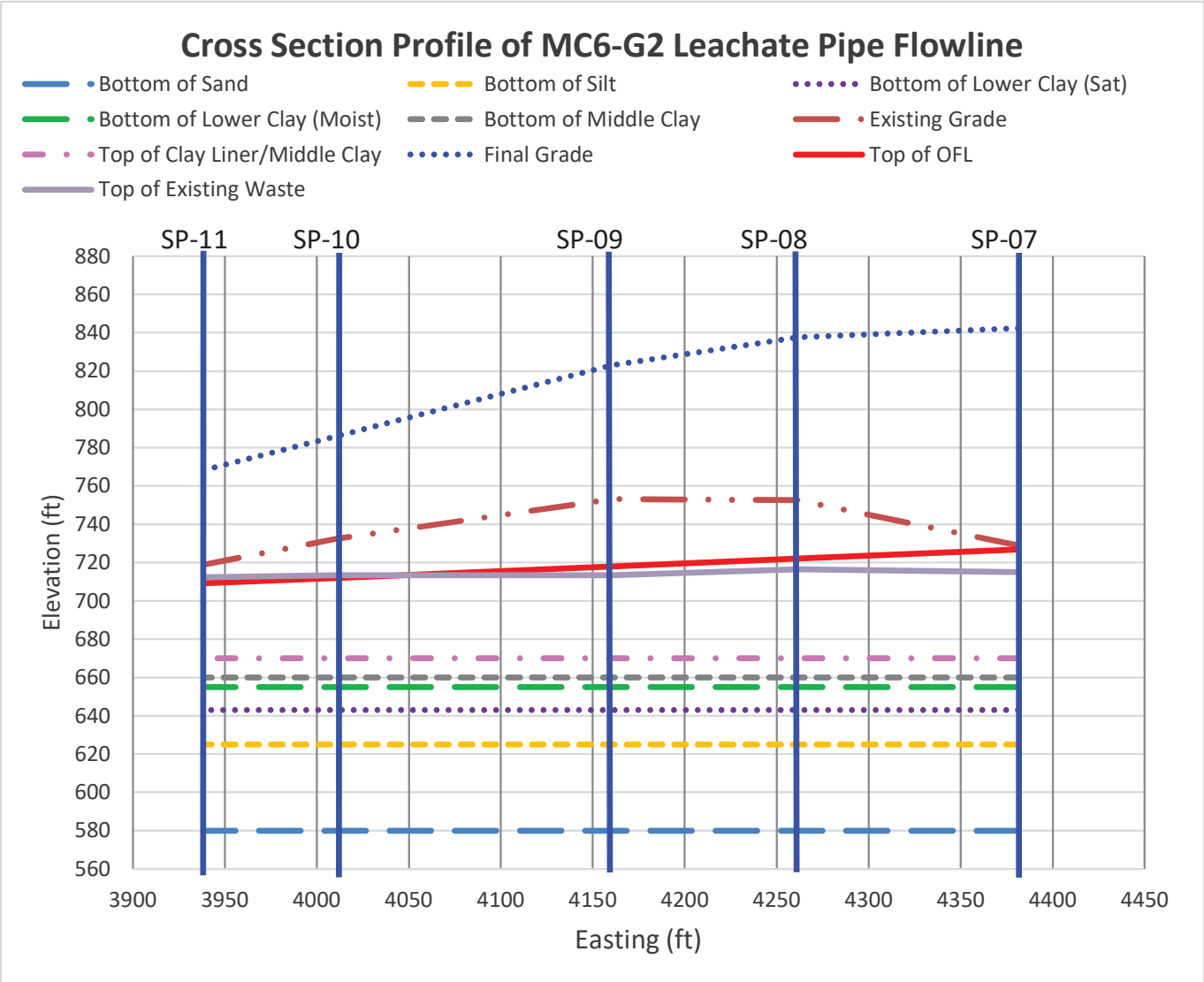
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-21	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7493.33	4826.63	689.69	841.78	705.00	660.00	655.00	643.00	625.00	580.00	682.00	0.00

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
										(midpoint of layer)					
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	148.09	103.0	0	15253.3									
	3	OFL	22.31	135.0	1	-3011.8									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3011.8	3011.8	16738.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	4	Existing Waste	0.00	91.0	0	-	0.080	0.013	0.024	3011.8	3011.8	16738.3	NC	-	-
	6	Middle Clay	11.35	136.0	0	1542.9	0.102	0.017	0.005	3783.3	3783.3	17509.7	NC	0.770	0.014
	6	Middle Clay	11.35	136.0	0	1542.9	0.102	0.017	0.005	5326.2	5326.2	19052.7	NC	0.641	0.014
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6417.7	6417.7	20144.1	NC	0.425	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6934.5	6934.5	20660.9	NC	0.486	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7328.1	7328.1	21054.5	NC	0.470	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7806.6	7806.6	21533.0	NC	0.595	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8370.0	8370.0	22096.4	NC	0.569	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8888.4	8888.4	22614.8	NC	0.365	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9361.8	9361.8	23088.2	NC	0.353	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9835.2	9835.2	23561.6	NC	0.341	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10308.6	10308.6	24035.0	NC	0.331	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10782.0	10782.0	24508.4	NC	0.321	-
														5.667	0.068
													Total Settlement [ft]	**5.74**	

Variables & Constants	
Point Name	SP-21
Settlement Layer [ft]	102.7
ERROR	0.0
# of Layers	12
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G2 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top of Existing Waste
SP-11
SP-10
SP-09
SP-08
SP-07
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
3900
3950
4000
4050
4100
4150
4200
4250
4300
4350
4400
4450
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-07	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7843.09	4381.18	726.82	842.39	729.06	660.00	655.00	643.00	625.00	580.00	670.00	714.96

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	111.57	103.0	0	11491.7									
	3	OFL	9.24	135.0	1	-1247.4									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	2.43	135.0	0	328.1	0.102	0.017	0.005	1411.4	1411.4	13140.7	NC	0.240	0.003
	3	OFL	2.43	135.0	0	328.1	0.102	0.017	0.005	1739.5	1739.5	13468.8	NC	0.220	0.003
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	2159.2	2159.2	13888.5	NC	0.363	0.034
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	2670.6	2670.6	14399.9	NC	0.329	0.034
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	3182.0	3182.0	14911.4	NC	0.302	0.034
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	3693.5	3693.5	15422.8	NC	0.279	0.034
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	4204.9	4204.9	15934.2	NC	0.260	0.034
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	4716.3	4716.3	16445.6	NC	0.244	0.034
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	5227.7	5227.7	16957.0	NC	0.230	0.034
	4	Existing Waste	5.62	91.0	0	511.4	0.080	0.013	0.024	5739.1	5739.1	17468.5	NC	0.217	0.034
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6334.9	6334.9	18064.2	NC	0.232	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	7014.9	7014.9	18744.2	NC	0.218	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7674.9	7674.9	19404.2	NC	0.344	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8191.7	8191.7	19921.0	NC	0.396	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8585.3	8585.3	20314.6	NC	0.384	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9063.8	9063.8	20793.1	NC	0.487	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9627.2	9627.2	21356.5	NC	0.467	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10145.6	10145.6	21874.9	NC	0.300	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10619.0	10619.0	22348.3	NC	0.291	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11092.4	11092.4	22821.7	NC	0.282	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11565.8	11565.8	23295.1	NC	0.274	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12039.2	12039.2	23768.5	NC	0.266	-
														6.625	0.333
													Total Settlement [ft]	**6.96**	

Variables & Constants	
Point Name	SP-07
Settlement Layer [ft]	139.8
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-08	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7842.87	4261.26	722.00	837.60	752.63	660.00	655.00	643.00	625.00	580.00	670.00	716.45

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	111.60	103.0	0	11494.8									
	3	OFL	36.18	135.0	1	-4884.3									
	4	Existing Waste	1.45	91.0	1	-132.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5016.3	5016.3	12979.8	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5016.3	5016.3	12979.8	NC	-	-
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	5272.2	5272.2	13235.7	NC	0.180	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	5784.1	5784.1	13747.6	NC	0.169	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	6295.9	6295.9	14259.5	NC	0.160	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	6807.8	6807.8	14771.4	NC	0.151	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	7319.7	7319.7	15283.2	NC	0.144	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	7831.6	7831.6	15795.1	NC	0.137	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	8343.4	8343.4	16307.0	NC	0.131	0.034
	4	Existing Waste	5.63	91.0	0	511.9	0.080	0.013	0.024	8855.3	8855.3	16818.9	NC	0.125	0.034
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	9451.3	9451.3	17414.8	NC	0.135	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	10131.3	10131.3	18094.8	NC	0.128	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	10791.3	10791.3	18754.8	NC	0.205	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	11308.1	11308.1	19271.6	NC	0.238	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	11701.7	11701.7	19665.2	NC	0.231	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	12180.2	12180.2	20143.7	NC	0.295	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	12743.6	12743.6	20707.1	NC	0.285	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13262.0	13262.0	21225.5	NC	0.184	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13735.4	13735.4	21698.9	NC	0.179	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	14208.8	14208.8	22172.3	NC	0.174	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	14682.2	14682.2	22645.7	NC	0.169	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	15155.6	15155.6	23119.1	NC	0.165	-
														3.586	0.328
													Total Settlement [ft]	**3.91**	

Variables & Constants	
Point Name	SP-08
Settlement Layer [ft]	135.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-09	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7842.87	4160.67	718.00	823.02	753.15	660.00	655.00	643.00	625.00	580.00	670.00	713.41

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	101.02	103.0	0	10405.1									
	3	OFL	39.74	135.0	1	-5364.9									
	4	Existing Waste	2.41	91.0	1	-219.3									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5584.2	5584.2	11890.1	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	5584.2	5584.2	11890.1	NC	-	-
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	5817.4	5817.4	12123.2	NC	0.131	0.031
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	6283.8	6283.8	12589.6	NC	0.124	0.031
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	6750.1	6750.1	13056.0	NC	0.117	0.031
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	7216.5	7216.5	13522.4	NC	0.112	0.031
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	7682.9	7682.9	13988.7	NC	0.107	0.031
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	8149.3	8149.3	14455.1	NC	0.102	0.031
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	8615.6	8615.6	14921.5	NC	0.098	0.031
	4	Existing Waste	5.13	91.0	0	466.4	0.080	0.013	0.024	9082.0	9082.0	15387.9	NC	0.094	0.031
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	9655.2	9655.2	15961.1	NC	0.111	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	10335.2	10335.2	16641.1	NC	0.105	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	10995.2	10995.2	17301.1	NC	0.168	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	11512.0	11512.0	17817.9	NC	0.195	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	11905.6	11905.6	18211.5	NC	0.189	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	12384.1	12384.1	18690.0	NC	0.241	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	12947.5	12947.5	19253.4	NC	0.233	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13465.9	13465.9	19771.8	NC	0.150	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	13939.3	13939.3	20245.2	NC	0.146	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	14412.7	14412.7	20718.6	NC	0.142	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	14886.1	14886.1	21192.0	NC	0.138	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	15359.5	15359.5	21665.4	NC	0.134	-
														2.838	0.303
													Total Settlement [ft]	**3.14**	

Variables & Constants	
Point Name	SP-09
Settlement Layer [ft]	131.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7842.87	4009.79	712.00	785.83	732.26	660.00	655.00	643.00	625.00	580.00	670.00	713.45

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	69.83	103.0	0	7192.5									
	3	OFL	18.81	135.0	1	-2539.3									
	4	Existing Waste	8.45	91.0	1	-769.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3308.3	3308.3	8677.5	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3308.3	3308.3	8677.5	NC	-	-
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	3507.4	3507.4	8876.6	NC	0.141	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	3905.5	3905.5	9274.7	NC	0.131	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	4303.6	4303.6	9672.8	NC	0.123	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	4701.7	4701.7	10070.9	NC	0.116	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5099.9	5099.9	10469.1	NC	0.109	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5498.0	5498.0	10867.2	NC	0.104	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5896.1	5896.1	11265.3	NC	0.098	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	6294.2	6294.2	11663.4	NC	0.094	0.027
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6833.3	6833.3	12202.5	NC	0.128	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	7513.3	7513.3	12882.5	NC	0.119	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8173.3	8173.3	13542.5	NC	0.188	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8690.1	8690.1	14059.3	NC	0.214	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9083.7	9083.7	14452.9	NC	0.207	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9562.2	9562.2	14931.4	NC	0.261	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10125.6	10125.6	15494.8	NC	0.249	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10644.0	10644.0	16013.2	NC	0.160	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11117.4	11117.4	16486.6	NC	0.154	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11590.8	11590.8	16960.0	NC	0.149	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12064.2	12064.2	17433.4	NC	0.144	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12537.6	12537.6	17906.8	NC	0.139	-
														3.030	0.266
													Total Settlement [ft]	**3.30**	

Variables & Constants	
Point Name	SP-10
Settlement Layer [ft]	125.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

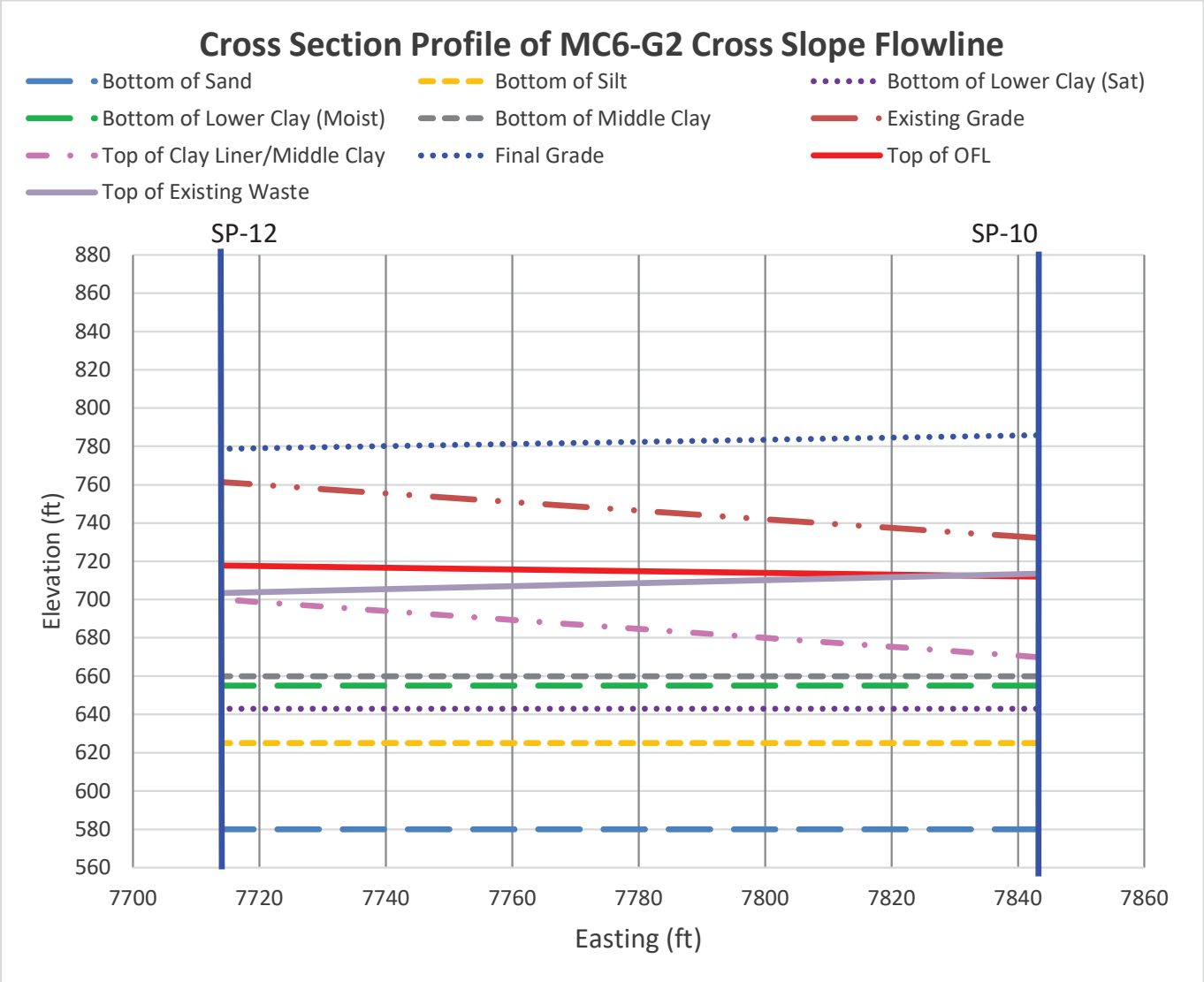
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-11	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7842.87	3939.91	709.22	768.61	719.14	660.00	655.00	643.00	625.00	580.00	670.00	712.34

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	55.39	103.0	0	5705.2									
	3	OFL	6.80	135.0	1	-918.0									
	4	Existing Waste	10.12	91.0	1	-920.9									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1838.9	1838.9	7190.2	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1838.9	1838.9	7190.2	NC	-	-
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	2022.2	2022.2	7373.4	NC	0.181	0.025
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	2388.7	2388.7	7739.9	NC	0.165	0.025
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	2755.2	2755.2	8106.4	NC	0.151	0.025
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	3121.7	3121.7	8472.9	NC	0.140	0.025
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	3488.2	3488.2	8839.4	NC	0.130	0.025
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	3854.7	3854.7	9205.9	NC	0.122	0.025
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	4221.2	4221.2	9572.4	NC	0.115	0.025
	4	Existing Waste	4.03	91.0	0	366.5	0.080	0.013	0.024	4587.7	4587.7	9938.9	NC	0.108	0.025
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5110.9	5110.9	10462.2	NC	0.159	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5790.9	5790.9	11142.2	NC	0.145	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6450.9	6450.9	11802.2	NC	0.224	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6967.7	6967.7	12319.0	NC	0.254	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7361.3	7361.3	12712.6	NC	0.243	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7839.8	7839.8	13191.1	NC	0.305	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8403.2	8403.2	13754.5	NC	0.289	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8921.6	8921.6	14272.9	NC	0.184	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9395.0	9395.0	14746.3	NC	0.176	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9868.4	9868.4	15219.7	NC	0.169	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10341.8	10341.8	15693.1	NC	0.163	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10815.2	10815.2	16166.5	NC	0.157	-
														3.580	0.249
													Total Settlement [ft]	**3.83**	

Variables & Constants	
Point Name	SP-11
Settlement Layer [ft]	122.2
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G2 Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top of Existing Waste
SP-12
SP-10
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
7700
7720
7740
7760
7780
7800
7820
7840
7860
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-10	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7842.87	4009.79	712.00	785.83	732.26	660.00	655.00	643.00	625.00	580.00	670.00	713.45

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	69.83	103.0	0	7192.5									
	3	OFL	18.81	135.0	1	-2539.3									
	4	Existing Waste	8.45	91.0	1	-769.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3308.3	3308.3	8677.5	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	3308.3	3308.3	8677.5	NC	-	-
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	3507.4	3507.4	8876.6	NC	0.141	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	3905.5	3905.5	9274.7	NC	0.131	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	4303.6	4303.6	9672.8	NC	0.123	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	4701.7	4701.7	10070.9	NC	0.116	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5099.9	5099.9	10469.1	NC	0.109	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5498.0	5498.0	10867.2	NC	0.104	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	5896.1	5896.1	11265.3	NC	0.098	0.027
	4	Existing Waste	4.38	91.0	0	398.1	0.080	0.013	0.024	6294.2	6294.2	11663.4	NC	0.094	0.027
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6833.3	6833.3	12202.5	NC	0.128	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	7513.3	7513.3	12882.5	NC	0.119	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	8173.3	8173.3	13542.5	NC	0.188	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8690.1	8690.1	14059.3	NC	0.214	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	9083.7	9083.7	14452.9	NC	0.207	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9562.2	9562.2	14931.4	NC	0.261	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	10125.6	10125.6	15494.8	NC	0.249	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10644.0	10644.0	16013.2	NC	0.160	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11117.4	11117.4	16486.6	NC	0.154	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11590.8	11590.8	16960.0	NC	0.149	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12064.2	12064.2	17433.4	NC	0.144	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12537.6	12537.6	17906.8	NC	0.139	-
														3.030	0.266
													Total Settlement [ft]	**3.30**	

Variables & Constants	
Point Name	SP-10
Settlement Layer [ft]	125.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

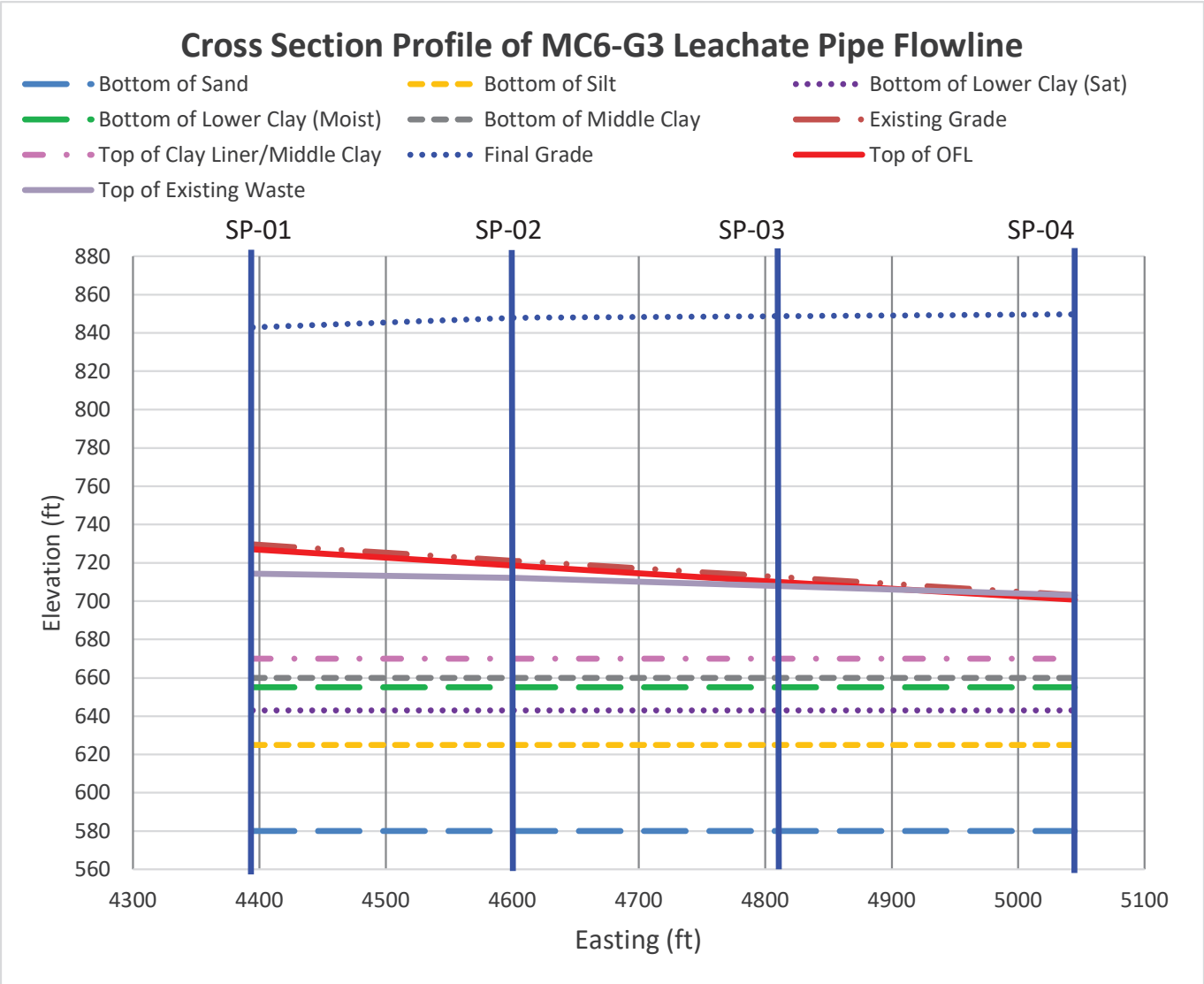
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-12	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7714.37	4002.92	717.80	778.73	761.23	660.00	655.00	643.00	625.00	580.00	700.00	703.41

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	56.93	103.0	0	5863.8									
	3	OFL	50.43	135.0	1	-6808.1									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.69	135.0	0	498.8	0.102	0.017	0.005	7057.5	7057.5	7598.2	NC	0.012	0.005
	3	OFL	3.69	135.0	0	498.8	0.102	0.017	0.005	7556.3	7556.3	8097.0	NC	0.011	0.005
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	7825.1	7825.1	8365.8	NC	0.001	0.003
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	7863.9	7863.9	8404.6	NC	0.001	0.003
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	7902.7	7902.7	8443.4	NC	0.001	0.003
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	7941.5	7941.5	8482.2	NC	0.001	0.003
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	7980.2	7980.2	8521.0	NC	0.001	0.003
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	8019.0	8019.0	8559.8	NC	0.001	0.003
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	8057.8	8057.8	8598.6	NC	0.001	0.003
	4	Existing Waste	0.43	91.0	0	38.8	0.080	0.013	0.024	8096.6	8096.6	8637.4	NC	0.001	0.003
	6	Middle Clay	20.00	136.0	0	2720.0	0.102	0.017	0.005	9476.0	9476.0	10016.8	NC	0.049	0.026
	6	Middle Clay	20.00	136.0	0	2720.0	0.102	0.017	0.005	12196.0	12196.0	12736.8	NC	0.038	0.026
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	13876.0	13876.0	14416.8	NC	0.014	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	14392.8	14392.8	14933.6	NC	0.016	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	14786.4	14786.4	15327.2	NC	0.016	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	15264.9	15264.9	15805.7	NC	0.020	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	15828.3	15828.3	16369.1	NC	0.020	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	16346.7	16346.7	16887.5	NC	0.013	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	16820.1	16820.1	17360.9	NC	0.012	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	17293.5	17293.5	17834.3	NC	0.012	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	17766.9	17766.9	18307.7	NC	0.012	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	18240.3	18240.3	18781.1	NC	0.011	-
														0.266	0.120
													Total Settlement [ft]	**0.39**	

Variables & Constants	
Point Name	SP-12
Settlement Layer [ft]	130.8
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G3 Leachate Pipe Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top of Existing Waste
SP-01
SP-02
SP-03
SP-04
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
4300
4400
4500
4600
4700
4800
4900
5000
5100
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-01	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7842.77	4394.77	726.99	842.94	729.59	660.00	655.00	643.00	625.00	580.00	670.00	714.35

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	111.95	103.0	0	11530.9									
	3	OFL	9.60	135.0	1	-1296.0									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	2.82	135.0	0	380.7	0.102	0.017	0.005	1486.4	1486.4	13206.2	NC	0.273	0.004
	3	OFL	2.82	135.0	0	380.7	0.102	0.017	0.005	1867.1	1867.1	13586.9	NC	0.248	0.004
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	2309.6	2309.6	14029.5	NC	0.347	0.034
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	2814.1	2814.1	14534.0	NC	0.316	0.034
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	3318.6	3318.6	15038.5	NC	0.291	0.034
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	3823.1	3823.1	15542.9	NC	0.270	0.034
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	4327.6	4327.6	16047.4	NC	0.252	0.034
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	4832.0	4832.0	16551.9	NC	0.237	0.034
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	5336.5	5336.5	17056.4	NC	0.224	0.034
	4	Existing Waste	5.54	91.0	0	504.5	0.080	0.013	0.024	5841.0	5841.0	17560.9	NC	0.212	0.034
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6433.3	6433.3	18153.1	NC	0.230	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	7113.3	7113.3	18833.1	NC	0.216	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7773.3	7773.3	19493.1	NC	0.341	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8290.1	8290.1	20009.9	NC	0.393	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8683.7	8683.7	20403.5	NC	0.381	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9162.2	9162.2	20882.0	NC	0.483	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9725.6	9725.6	21445.4	NC	0.464	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10244.0	10244.0	21963.8	NC	0.298	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10717.4	10717.4	22437.2	NC	0.289	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11190.8	11190.8	22910.6	NC	0.280	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11664.2	11664.2	23384.0	NC	0.272	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	12137.6	12137.6	23857.4	NC	0.264	-
														6.581	0.331
													Total Settlement [ft]	**6.91**	

Variables & Constants	
Point Name	SP-01
Settlement Layer [ft]	140.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-02	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7822.70	4603.12	718.57	847.89	721.01	660.00	655.00	643.00	625.00	580.00	670.00	712.11

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	125.32	103.0	0	12908.0									
	3	OFL	8.90	135.0	1	-1201.5									
	4	Existing Waste	0.54	91.0	1	-49.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1250.6	1250.6	14393.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1250.6	1250.6	14393.0	NC	-	-
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	1487.1	1487.1	14629.4	NC	0.413	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	1959.9	1959.9	15102.2	NC	0.369	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	2432.8	2432.8	15575.1	NC	0.335	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	2905.6	2905.6	16048.0	NC	0.309	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	3378.5	3378.5	16520.8	NC	0.287	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	3851.4	3851.4	16993.7	NC	0.268	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	4324.2	4324.2	17466.5	NC	0.252	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	4797.1	4797.1	17939.4	NC	0.238	0.032
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5373.5	5373.5	18515.8	NC	0.274	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6053.5	6053.5	19195.8	NC	0.256	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6713.5	6713.5	19855.8	NC	0.403	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7230.3	7230.3	20372.6	NC	0.462	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7623.9	7623.9	20766.2	NC	0.446	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8102.4	8102.4	21244.7	NC	0.565	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8665.8	8665.8	21808.1	NC	0.541	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9184.2	9184.2	22326.5	NC	0.347	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9657.6	9657.6	22799.9	NC	0.336	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10131.0	10131.0	23273.3	NC	0.325	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10604.4	10604.4	23746.7	NC	0.315	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11077.8	11077.8	24220.1	NC	0.306	-
														7.045	0.307
													Total Settlement [ft]	**7.35**	

Variables & Constants	
Point Name	SP-02
Settlement Layer [ft]	131.6
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-03	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7800.62	4813.09	710.00	848.78	712.66	660.00	655.00	643.00	625.00	580.00	670.00	707.78

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	134.78	103.0	0	13882.3									
	3	OFL	4.88	135.0	1	-658.8									
	4	Existing Waste	4.78	91.0	1	-435.0									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1093.8	1093.8	15367.3	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1093.8	1093.8	15367.3	NC	-	-
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	1281.5	1281.5	15555.0	NC	0.358	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	1656.8	1656.8	15930.4	NC	0.324	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	2032.2	2032.2	16305.8	NC	0.298	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	2407.6	2407.6	16681.2	NC	0.277	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	2783.0	2783.0	17056.5	NC	0.260	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	3158.3	3158.3	17431.9	NC	0.245	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	3533.7	3533.7	17807.3	NC	0.232	0.025
	4	Existing Waste	4.13	91.0	0	375.4	0.080	0.013	0.024	3909.1	3909.1	18182.7	NC	0.220	0.025
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4436.8	4436.8	18710.3	NC	0.319	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5116.8	5116.8	19390.3	NC	0.295	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	5776.8	5776.8	20050.3	NC	0.462	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6293.6	6293.6	20567.1	NC	0.528	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	6687.2	6687.2	20960.7	NC	0.509	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7165.7	7165.7	21439.2	NC	0.643	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	7729.1	7729.1	22002.6	NC	0.613	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8247.5	8247.5	22521.0	NC	0.393	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8720.9	8720.9	22994.4	NC	0.379	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9194.3	9194.3	23467.8	NC	0.366	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9667.7	9667.7	23941.2	NC	0.354	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10141.1	10141.1	24414.6	NC	0.343	-
														7.419	0.254
													Total Settlement [ft]	**7.67**	

Variables & Constants	
Point Name	SP-03
Settlement Layer [ft]	123.0
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

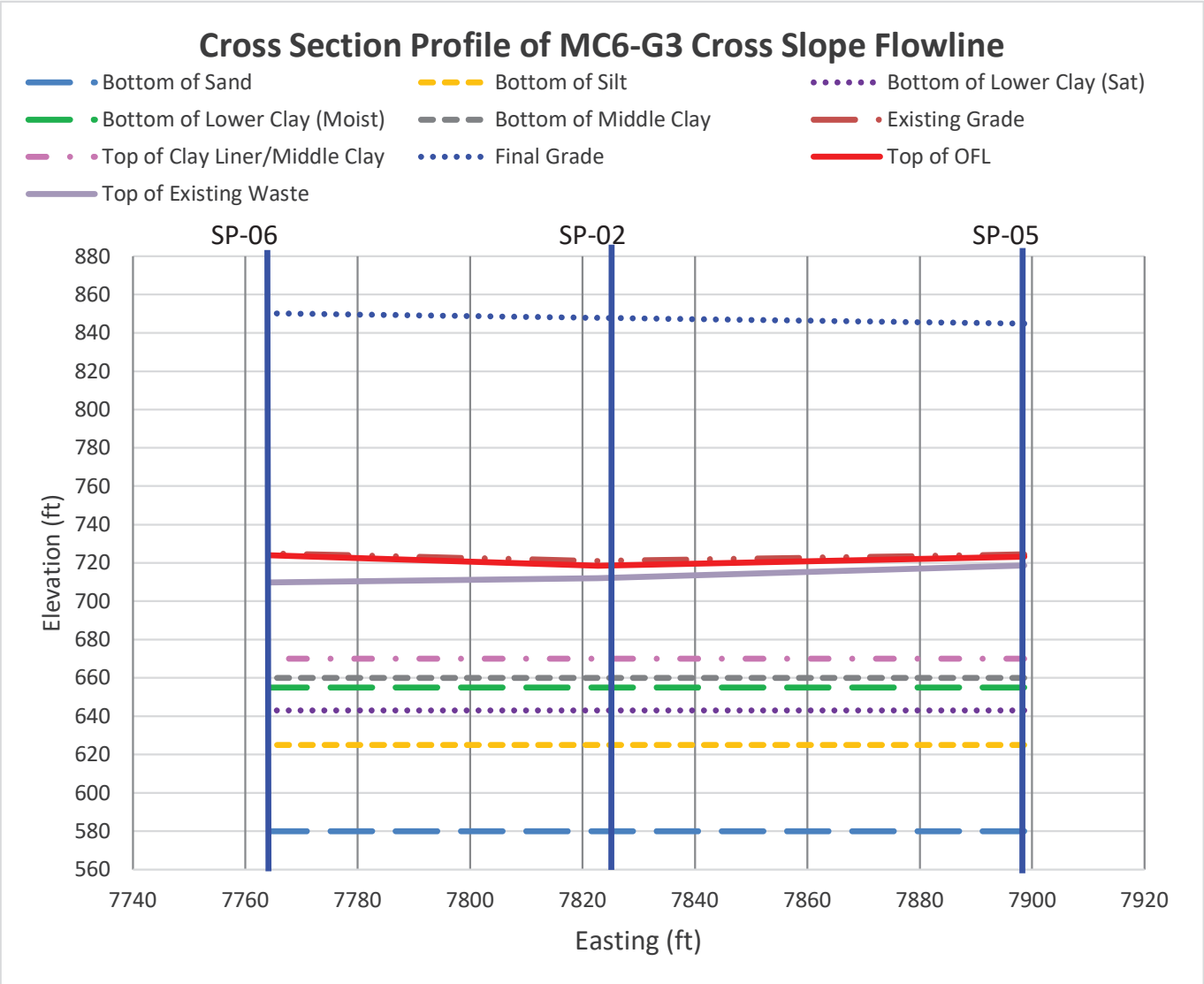
- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-04	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7776.87	5044.82	700.70	849.73	703.09	660.00	655.00	643.00	625.00	580.00	670.00	703.09

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	145.03	103.0	0	14938.1									
	3	OFL	0.00	135.0	1	-									
	4	Existing Waste	9.39	91.0	1	-854.5									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	854.5	854.5	16423.1	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	854.5	854.5	16423.1	NC	-	-
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	989.3	989.3	16557.9	NC	0.290	0.018
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	1258.9	1258.9	16827.5	NC	0.267	0.018
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	1528.5	1528.5	17097.1	NC	0.249	0.018
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	1798.0	1798.0	17366.6	NC	0.233	0.018
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	2067.6	2067.6	17636.2	NC	0.221	0.018
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	2337.2	2337.2	17905.8	NC	0.210	0.018
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	2606.8	2606.8	18175.4	NC	0.200	0.018
	4	Existing Waste	2.96	91.0	0	269.6	0.080	0.013	0.024	2876.4	2876.4	18445.0	NC	0.191	0.018
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	3351.2	3351.2	18919.8	NC	0.383	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	4031.2	4031.2	19599.8	NC	0.350	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	4691.2	4691.2	20259.8	NC	0.543	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5208.0	5208.0	20776.6	NC	0.617	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	5601.6	5601.6	21170.2	NC	0.592	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6080.1	6080.1	21648.7	NC	0.745	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	6643.5	6643.5	22212.1	NC	0.708	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7161.9	7161.9	22730.5	NC	0.451	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	7635.3	7635.3	23203.9	NC	0.434	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8108.7	8108.7	23677.3	NC	0.419	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	8582.1	8582.1	24150.7	NC	0.404	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9055.5	9055.5	24624.1	NC	0.391	-
														7.898	0.197
													Total Settlement [ft]	**8.10**	

Variables & Constants	
Point Name	SP-04
Settlement Layer [ft]	113.7
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.


Cross Section Profile of MC6-G3 Cross Slope Flowline
Bottom of Sand
Bottom of Silt
Bottom of Lower Clay (Sat)
Bottom of Lower Clay (Moist)
Bottom of Middle Clay
Existing Grade
Top of Clay Liner/Middle Clay
Final Grade
Top of OFL
Top of Existing Waste
SP-06
SP-02
SP-05
Elevation (ft)
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
7740
7760
7780
7800
7820
7840
7860
7880
7900
7920
Easting (ft)

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-02	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7822.70	4603.12	718.57	847.89	721.01	660.00	655.00	643.00	625.00	580.00	670.00	712.11

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	125.32	103.0	0	12908.0									
	3	OFL	8.90	135.0	1	-1201.5									
	4	Existing Waste	0.54	91.0	1	-49.1									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1250.6	1250.6	14393.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1250.6	1250.6	14393.0	NC	-	-
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	1487.1	1487.1	14629.4	NC	0.413	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	1959.9	1959.9	15102.2	NC	0.369	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	2432.8	2432.8	15575.1	NC	0.335	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	2905.6	2905.6	16048.0	NC	0.309	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	3378.5	3378.5	16520.8	NC	0.287	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	3851.4	3851.4	16993.7	NC	0.268	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	4324.2	4324.2	17466.5	NC	0.252	0.032
	4	Existing Waste	5.20	91.0	0	472.9	0.080	0.013	0.024	4797.1	4797.1	17939.4	NC	0.238	0.032
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5373.5	5373.5	18515.8	NC	0.274	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6053.5	6053.5	19195.8	NC	0.256	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6713.5	6713.5	19855.8	NC	0.403	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7230.3	7230.3	20372.6	NC	0.462	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7623.9	7623.9	20766.2	NC	0.446	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8102.4	8102.4	21244.7	NC	0.565	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8665.8	8665.8	21808.1	NC	0.541	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9184.2	9184.2	22326.5	NC	0.347	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9657.6	9657.6	22799.9	NC	0.336	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10131.0	10131.0	23273.3	NC	0.325	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10604.4	10604.4	23746.7	NC	0.315	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11077.8	11077.8	24220.1	NC	0.306	-
														7.045	0.307
													Total Settlement [ft]	**7.35**	

Variables & Constants	
Point Name	SP-02
Settlement Layer [ft]	131.6
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-05	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7898.60	4609.46	723.20	844.86	724.47	660.00	655.00	643.00	625.00	580.00	670.00	718.71

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	117.66	103.0	0	12119.0									
	3	OFL	5.76	135.0	1	-777.6									
	4	Existing Waste	2.51	91.0	1	-228.4									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1006.0	1006.0	13604.0	NC	-	-
	3	OFL	0.00	135.0	0	-	0.102	0.017	0.005	1006.0	1006.0	13604.0	NC	-	-
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	1268.8	1268.8	13866.7	NC	0.480	0.035
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	1794.3	1794.3	14392.3	NC	0.418	0.035
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	2319.8	2319.8	14917.8	NC	0.373	0.035
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	2845.3	2845.3	15443.3	NC	0.339	0.035
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	3370.9	3370.9	15968.8	NC	0.312	0.035
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	3896.4	3896.4	16494.4	NC	0.290	0.035
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	4421.9	4421.9	17019.9	NC	0.270	0.035
	4	Existing Waste	5.78	91.0	0	525.5	0.080	0.013	0.024	4947.4	4947.4	17545.4	NC	0.254	0.035
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	5550.2	5550.2	18148.2	NC	0.262	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6230.2	6230.2	18828.2	NC	0.245	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	6890.2	6890.2	19488.2	NC	0.386	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7407.0	7407.0	20005.0	NC	0.443	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7800.6	7800.6	20398.6	NC	0.428	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8279.1	8279.1	20877.1	NC	0.542	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8842.5	8842.5	21440.5	NC	0.519	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9360.9	9360.9	21958.9	NC	0.333	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9834.3	9834.3	22432.3	NC	0.322	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10307.7	10307.7	22905.7	NC	0.312	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10781.1	10781.1	23379.1	NC	0.303	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11254.5	11254.5	23852.5	NC	0.294	-
														7.126	0.335
													Total Settlement [ft]	**7.46**	

Variables & Constants	
Point Name	SP-05
Settlement Layer [ft]	136.2
ERROR	0.0
# of Layers	20
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

SETTLEMENT POINT	Coordinates		Elevations									
	North	East	OFL	Final	Existing	BOTTOM MC	BOTTOM LC (DRY)	BOTTOM LC (SAT)	BOTTOM SILT	BOTTOM SAND	TOP CLAY	TOP EXISTING WASTE
SP-06	[ft]	[ft]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]	[ft MSL]
	7764.39	4602.88	724.00	850.23	724.93	660.00	655.00	643.00	625.00	580.00	670.00	709.76

	Layer Type	Layer	Layer Height	Eff. Unit Weight	Cut Layer	Inc. Layer Stress	Compression Parameters			Initial Stress	Consolidation Stress (midpoint of layer)	Final Stress	Consolidation Case	Primary Settlement	Secondary Settlement
			H [ft]	γ' [pcf]	1 = yes 0 = no	σ_i [psf]	$\frac{C_c}{1+e_0}$	$\frac{C_r}{1+e_0}$	$\frac{C_\alpha}{1+e_0}$	σ_0' [psf]	σ_c' [psf]	σ_f' [psf]	-	S_c [ft]	S_s [ft]
Overburden	1	Cover	4.00	135.0	0	540.0									
	2	New Waste	122.23	103.0	0	12589.7									
	3	OFL	7.93	135.0	1	-1070.5									
	4	Existing Waste	0.00	91.0	1	-									
	3	OFL	7.00	135.0	0	945.0									
		<none>		-	0	-									
		<none>		-	0	-									
Consolidation	3	OFL	3.62	135.0	0	488.7	0.102	0.017	0.005	1314.9	1314.9	14319.0	NC	0.383	0.005
	3	OFL	3.62	135.0	0	488.7	0.102	0.017	0.005	1803.6	1803.6	14807.7	NC	0.338	0.005
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	2274.1	2274.1	15278.2	NC	0.329	0.030
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	2726.4	2726.4	15730.5	NC	0.303	0.030
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	3178.6	3178.6	16182.8	NC	0.281	0.030
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	3630.9	3630.9	16635.0	NC	0.263	0.030
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	4083.2	4083.2	17087.3	NC	0.247	0.030
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	4535.4	4535.4	17539.6	NC	0.234	0.030
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	4987.7	4987.7	17991.8	NC	0.222	0.030
	4	Existing Waste	4.97	91.0	0	452.3	0.080	0.013	0.024	5440.0	5440.0	18444.1	NC	0.211	0.030
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6006.1	6006.1	19010.3	NC	0.255	0.006
	6	Middle Clay	5.00	136.0	0	680.0	0.102	0.017	0.005	6686.1	6686.1	19690.3	NC	0.239	0.006
	7	Lower Clay (Moist)	5.00	128.0	0	640.0	0.171	0.029	0.009	7346.1	7346.1	20350.3	NC	0.378	0.011
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	7862.9	7862.9	20867.1	NC	0.435	0.014
	8	Lower Clay (Sat)	6.00	65.6	0	393.6	0.171	0.029	0.009	8256.5	8256.5	21260.7	NC	0.421	0.014
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	8735.0	8735.0	21739.2	NC	0.535	-
	9	Silt	9.00	62.6	0	563.4	0.150	-	-	9298.4	9298.4	22302.6	NC	0.513	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	9816.8	9816.8	22821.0	NC	0.330	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10290.2	10290.2	23294.4	NC	0.319	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	10763.6	10763.6	23767.8	NC	0.310	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11237.0	11237.0	24241.2	NC	0.301	-
	10	Sand	9.00	52.6	0	473.4	0.100	-	-	11710.4	11710.4	24714.6	NC	0.292	-
														7.137	0.305
													Total Settlement [ft]	**7.44**	

Variables & Constants	
Point Name	SP-06
Settlement Layer [ft]	137.0
ERROR	0.0
# of Layers	22
t / t_p [ratio]	1.8

- Use the master "Material Properties" sheet to input the correct "Layer Type" into column C. This will auto-populate the density and compression parameters. Coordinates and elevations are referenced from the "Points" sheet for comparison to the total consolidation layer.
- Split layers greater than 10 feet thick.
- Existing layers that are to be removed are to be marked with a "1" in the "Cut Layer" column.

6. Attachment A-2.3 Waste Compression Index Estimation

Attachment A-2.3

Estimation of In-Place Waste Compression Index

ESTIMATION OF IN-PLACE WASTE COMPRESSION INDEX

OBJECTIVE

The purpose of this calculation is to estimate a modified compression index (C'_c) and a modified secondary compression index (C'_α) suitable for calculating the settlement of the existing in-place waste at WDI under the effect of increasing overburden pressures.

METHODOLOGY AND RESULTS

Existing solid waste layers in-place in Master Cells (MC) I, IV, and V at WDI are expected to compress when subjected to additional overburden pressure resulting from cell construction and landfill operations. Credible estimates of settlement resulting from this compression are needed to evaluate potential settlement effects of overlying cells and to mitigate those effects through engineering design. Compression due to changes in overburden pressure is termed primary compression. Modified compression index C'_c is defined with respect to primary compression settlement (S_c *[ft]*) as

$$S_c = C'_c h_0 \left(log \frac{\sigma_i}{\sigma_0} \right) \quad (1)$$

Where:

C'_c = modified compression index
h_0 = initial compressible layer thickness [ft]
σ_0 = initial overburden pressure acting on the compressible layer [psf]
σ_i = final overburden pressure acting on the compressible layer [psf]

The modified compression index for existing waste at WDI was estimated using three methods:

- McDougall (2011, see Attachment A-2.3.1) reports values of C'_c between 0.08 and 0.26 for old waste, including one example where C'_c = 0.08 for a landfill with waste 15-20 years old. The age of the waste in MC I, IV, and V are above 40 years (Att. A). Therefore, C'_c = 0.08 is accepted as representative for WDI.
- NTH (2008, see Attachment A-2.3.2) monitored settlement profiler conduits embedded beneath MC VI-E and above MC V to measure changes in elevation from the time the MC VI-E floor was constructed above MC V. Table 1 presents the results of relevant data collected from the "North-South" profiler. These data were selected for analysis due to their completeness, the relative length of the profiler conduit compared to others at the site, and the relatively high MC-VI waste fill above the profilers. These attributes make these data more relevant to the objective of this calculation than other profiler data collected. Using the available data about the in-place waste thickness and the thickness of new waste overburden, NTH (2008) calculated values of C'_c from these data. NTH (2008) assumed values of unit weight and layer thickness for various components of the system as

shown in Table 2. NTH (2008) Calculated values of C'_c between 0.04 to 0.17 from these data (Table 1). The median of these calculated C'_c values is 0.07.

Table 1. Estimates of Modified Compression Index from North-South Profiler, March 2007 Monitoring Event Reported by NTH (2008).

Estimation of Modified Compression Index North-South Profiler March 2007 Monitoring Event					
Station	**Baseline Measured Pipe Elevation (ft)**	**Measured Settlement (ft)**	**MC V Waste Thick (ft)**	**MC VI-E Waste Thick (ft)**	**Estimated Mod. Compression Index**
120	736.85	0.51	36.8	13.7	0.07
140	736.51	0.44	36.5	18.1	0.05
160	735.89	0.45	35.9	25.2	0.04
180	736.49	0.63	36	29.5	0.05
200	735.13	0.69	34.1	30.9	0.05
220	734.53	0.49	33	27.7	0.04
240	734.23	0.64	32.2	23.1	0.06
260	733.59	0.55	31.6	21.2	0.06
280	733.08	0.48	31.1	21.3	0.05
300	732.83	0.77	30.3	21.5	0.08
320	732.48	0.62	29.5	21.8	0.07
340	731.61	0.52	29.6	23.2	0.05
360	731.39	0.7	30.4	24	0.07
380	730.9	0.74	30.4	24.2	0.07
400	730.32	0.7	30.3	24.1	0.07
420	729.76	0.66	29.8	21.6	0.07
440	729.33	1.02	29.3	18.8	0.13
460	728.77	0.92	35.8	17.9	0.1
480	729.14	0.8	36.1	17.6	0.09
500	728.29	1.34	35.3	15.1	0.17
520	727.1	1.26	34.1	15.2	0.16
540	726.44	1.09	33.4	14.8	0.15
560	726.08	1.18	33.1	13.5	0.17
580	725.6	1.09	32.6	12.7	0.17
600	724.9	1.08	31.9	12.5	0.17

Table 2. Layer Unit Weights and Thicknesses Assumed by NTH (2008).

Layer	Thickness (ft)	Unit Weight (pcf)
MC VI-E Waste	Varies	111
MC VI-E Liner System	10	135
MC V Gas Venting Layer	1	120
MC V Waste	Varies	60

- NTH (2011a, Attachment A-2.3.3) conducted a full-scale settlement test within the MC IV footprint using a soil stockpile with buried settlement plates.
    a. The settlement plates were positioned such that surveys at the top of the settlement plates reported the elevation at the bottom of the stockpile. By surveying the settlement plates before and after fill placement, NTH (2011a) were able to estimate settlement of the subgrade under the increased overburden from the soil stockpile
    b. Calculations provided by NTH (2011a) assumed an in-place value of C'_c = 0.236 for MC IV waste and compared the resulting estimated settlement to measured values.
    c. CTI conducted an additional evaluation of these settlement data. CTI's calculations differ from NTH (2011a) in two respects: 1) CTI estimated consolidation and the corresponding compression of the underlying clay subgrade and 2) CTI used the 2:1 method to estimate the influence of the stockpile loading on increases in vertical stress within the underlying compressible waste and soil layers. A summary of this evaluation is presented in Table 3. Detailed intermediate calculation steps and equations are provided in Attachment A-2.3.4.
    d. Applying the 2:1 method (Holtz et al., 2011) where the stress at depth q_z is calculated as $q_z = q_0 BL / [(B + z)(L + z)]$ where q_0 is the overburden stress at the ground surface, B is the loaded area width, L is the loaded area length, and z is the depth from ground surface to the layer considered.
        i. CTI subdivided the waste into three layers and the underlying clay into six layers. The purpose of the six clay layers was to calculate different degrees of consolidation relative to the bottom of clay so that a conservative estimate (i.e., reasonably high estimate) of compression at the time the settlement plates were surveyed could be made.
        ii. For the three waste layers, the effective stress at the midpoint of each layer was computed for the following time steps: 1) just prior to stockpile placement (30 years after initial waste placement) and 2) 57 days after stockpile placement, corresponding to the available survey data.
        iii. The incremental change in effective vertical stress for each waste layer due to stockpile placement was then input to Eq. 1 with an assumed trial value of C'_c to estimate the compression of that layer. This value of C'_c was revised until the sum

of the clay and waste layer compression due to the stockpile equaled the measured value.

iv. For the six clay layers, the effective stress at the midpoint of each layer was computed for the following time steps: 1) just prior to stockpile placement (30 years after initial waste placement) and 2) 57 days after stockpile placement, corresponding to the available survey data. The effective stress calculation for each point considers both the excess pore pressure and degree of consolidation from initial waste placement and the excess pore pressure and degree of consolidation from the stockpile placement at the time of the survey measurement. To estimate the remaining excess pore pressure for these two load increments, a degree of consolidation U was computed for each point assuming double drainage of the clay (i.e., excess pore pressure can dissipate to both the MC IV waste and the underlying aquifer). Degree of consolidation for each point was computed numerically using Eq. 2, 3, and 4:

$$U = \frac{u_0 - u_z}{u_0} \tag{2}$$

Where:

u_0 = Excess pore pressure prior to consolidation [psf]
u_z = Excess pore pressure following consolidation [psf], calculated using Eq. 3

$$u_z = \sum_{m=0}^{m=25} \left[\frac{2u_0}{M} sin\left(\frac{Mz}{H_{dr}}\right)\right] e^{-M^2 T_v} \tag{3}$$

Where:

m = Integer used to numerically evaluate series
z = Depth to point where consolidation is being calculated [ft] relative to drainage face
M = (π/2)(2m + 1)
H_{dr} = Drainage length [ft]
T_v = Time factor, calculated using Eq. 4

$$T_v = \frac{c_v t}{H_{dr}^2} \tag{4}$$

Where:

c_v = Coefficient of vertical consolidation [ft^2/day]
t = Elapsed time since excess pore pressure (from load) was applied [days]
σ_i = final overburden pressure acting on the compressible layer [psf]

v. Because the incremental increase in effective stress due to overburden pressure for a given time increment is equal to the total stress minus the remaining excess pore

pressure, the contribution of overburden pressure is equal to the product of the increase in total stress from that increment and the *U* for the same increment.

vi. The compression of each of the six clay layers was computed as shown in Attachment A-2.3.4 using Eq. 1, where the initial effective stress and final effective stress correspond to the values computed prior to and 57 days after stockpile placement, respectively.

vii. Following the calculation of waste and clay layer compression for each layer, the total estimated settlement was computed as the sum of these values and compared to the measured total settlement. The trial value of waste C'c was then adjusted and settlement recomputed until the estimated value matched the measured value.

viii. A summary of the above calculations appears in Table 3. Table 3 reports the total settlement calculated for the clay layers as well as the compression estimated for each waste layer and the corresponding overburden pressure. Finally, Table 3 reports the estimated value of C'_c that yields the measured total settlement. CTI's estimates of C'_c from the settlement plate data are between 0.01 and 0.10. The median value is 0.08.

Table 3. CTI Interpretation of Settlement Plate Data from NTH (2011a)

Settlement Plate	1	2	3	4	5	6	7	8	9	10
Total Settlement (ft)	0.13	0.71	0.73	0.63	0.79	0.78	0.78	0.78	0.79	0.30
Clay Settlement (ft)	0.06	0.06	0.05	0.04	0.05	0.05	0.05	0.06	0.06	0.06
Waste Settlement Upper Layer (ft)	0.03	0.28	0.31	0.27	0.35	0.30	0.36	0.31	0.31	0.10
Surcharge Load (psf)	1488	1488	1471	1454	1506	1488	1471	1471	1488	1488
Waste Settlement Middle Layer (ft)	0.02	0.20	0.20	0.17	0.21	0.22	0.21	0.21	0.22	0.07
Surcharge Load (psf)	1287	1273	1222	1209	1315	1260	1247	1247	1260	1260
Waste Settlement Lower Layer (ft)	0.02	0.17	0.17	0.14	0.17	0.21	0.17	0.20	0.20	0.07
Surcharge Load (psf)	1128	1117	1045	1026	1173	1095	1075	1075	1085	1095
Waste C'c	0.01	0.09	0.09	0.08	0.09	0.10	0.09	0.08	0.08	0.03

Table 4. Layer Unit Weights and Thicknesses Assumed by CTI.

Layer	Thickness (ft)	Unit Weight (pcf)
Stockpile	Varies	111
Existing Cover Soil	Varies [A]	120
MC IV Waste	Varies [B]	77
Clay Subgrade	Varies (Bottom Elevation = 641) [B]	128.1 – 135.7

Notes:

[A] existing cover soil estimated as the difference between the top of waste elevation obtained from prior intercell dike investigations and the surface topo elevation at the time of the test

[B] bottom of waste elevation estimated from prior intercell dike investigations; bottom of clay elevation obtained from hydrogeological investigation cross sections.

Existing solid waste layers in-place in Master Cells (MC) I, IV, and V at WDI are expected to compress over time independently of overburden stress increments, termed secondary compression. Modified secondary compression index C'_α is defined with respect to secondary compression settlement (S_α *[ft]*) as

$$S_\alpha = C'_\alpha h_0 \left(log \frac{t_2}{t_1} \right) \quad (5)$$

Where:

h_0 = initial compressible layer thickness [ft]

t_2 = Time at end of time increment for which secondary compression is being estimated [days]

t_1 = Time at beginning of time increment for which secondary compression is being estimated [days]

The modified secondary compression index for existing waste at WDI was estimated using two methods:

- McDougall (2011, see Attachment A-2.3.1) reports values of C'_α between 0.001 and 0.24 for old waste. The range of values illustrates the uncertainty in this parameter and the difficulty of calculating it relative of other factors affecting measurement of landfill settlement.
- NTH (2011b, see Attachment A-2.3.5) applied a value of $C'_\alpha = 0.024$ in its calculations based on and examination of site investigation data. Based on the values reported by McDougall (2011), this value is accepted as a conservative estimate for settlement calculation purposes.

CONCLUSIONS

- Full-scale measurements of settlement above existing waste in-place are preferred to laboratory measurements due to the inherent heterogeneity of waste. However, obtaining reliable values of C'_c from these measurements requires methods to extract estimates of waste compression from settlement cause by other factors, such as compression of the underlying soil.
- Based on data from three sources – a published article, a settlement profiler survey of MC V waste, and a stockpile settlement study of MC IV waste – CTI estimates that $C'_c = 0.08$ is a representative value to use when calculating settlement of existing waste at WDI. These three sources of data show good agreement with each other and represent measurements of settlement that are relevant to the problem of compression due to additional overburden pressure considered for analysis and design of cell floors at WDI.
- Based on available data, a value of $C'_\alpha = 0.024$ is proposed for use to estimate secondary compression settlement of existing waste.

REFERENCES

Coduto, D.P. (1999) *Geotechnical Engineering: Principles and Practices*, Prentice-Hall Inc., New Jersey

Holtz et al. (2011). An Introduction to Geotechnical Engineering. (2nd ed). Pearson Education, Inc.

McDougall, John (2011) "Settlement - The Short and the Long of it", *Geotechnical Characterization, Field Measurement, and Laboratory Testing of Municipal Solid Waste - Proceedings of the 2008 International Symposium on Waste Mechanics*, Geotechnical Special Publication No. 209, American Society of Civil Engineering, Reston, Virginia.

NTH Consultants, Ltd. (2008) *Settlement Monitoring Report: Master Cell VI-E – Phase I.* Introduction and Appendix B Part II.

NTH Consultants, Ltd. (2011a) *Volume III: Basis of Design Report – WDI Operating License Application Master Cells VI F & G.* Stockpile Test.

NTH Consultants, Ltd. (2011b) *Volume III: Basis of Design Report – WDI Operating License Application Master Cells VI F & G.* Section 2.2 – Settlement Analysis.

Attachment A-2.3.1

McDougall, John (2011) “Settlement - The Short and the Long of it”, *Geotechnical Characterization, Field Measurement, and Laboratory Testing of Municipal Solid Waste - Proceedings of the 2008 International Symposium on Waste Mechanics*, Geotechnical Special Publication No. 209, American Society of Civil Engineering, Reston, Virginia.

Chapter 3

Settlement: the short and the long of it.

John McDougall[1]

[1]Reader, School of Engineering & Built Environment, Edinburgh Napier University, U.K.

3.1 INTRODUCTION

Total settlement in municipal solid waste (MSW) landfills can be considerable, from 25% to 50% of original fill thickness (Bjarngard and Edgers, 1990). Some occurs very quickly, i.e. during the filling phase (or short term), but there remains a significant amount of long-term settlement. Deformations of this magnitude and duration impact on the design, operation, closure and future use of landfills. Long-term settlement defines the pre-closure fill level and hence chargeable void space. If the eventual settlement is excessive or unforeseen, the integrity of the capping layer and any infrastructure for the collection of gas or recirculation of leachate may be compromised. Even if the capping layer remains intact it is necessary to avoid depressions on the upper surface where rainwater could pond. Finally, since settlement can continue for many years, it will pose a constraint on future development, including vertical expansion of the site. So, for engineers charged with the design of a landfill facility or site restoration, an understanding of, and ability to analyse, landfill settlement is required.

It is well known that landfill settlement is the product of a combination of processes, including load and biodegradation-related phenomena. Whilst existing geotechnical settlement models can handle load effects, they are limited in their ability to deal with biodegradation. There already exist a number of good reviews of the form and capability of these models, see for example, El-Fadel and Khoury (2000); Elagroudy et al. (2008). In this chapter conventional methods of geotechnical settlement analysis are reviewed as the background to recent work to develop a more fundamental approach to landfill settlement analysis. In addition to the review papers, there are a number of research papers that have contributed to the preparation of this chapter but which have not been expressly cited; these papers are collected in the bibliography.

It should also be noted that this chapter reports on a state of knowledge during and immediately following the International Symposium on Waste Mechanics, which was held in New Orleans following GeoCongress 2008. Papers published in 2009 and 2010 have not been included in this review.

3.2 GENERAL FEATURES

In general, landfill settlement is a combination of short-term load-related displacement and long-term displacement under constant load. The magnitude of short term settlement can be large but is adequately explained by conventional geotechnical techniques. The magnitude and nature of long-term landfill settlement were first elucidated nearly 50 years ago. Merz and Stone (1962) reported that test cells in which biodegradation had been enhanced showed settlement three times greater than that occurring in a control cell. Sowers (1973) concluded that the rate of long-term or secondary settlement is related to the organic content. He gave mathematical interpretations of load and long-term settlement. Yen and Scanlon (1975), from data extending over a 9 year period, observed a logarithmic relationship between rate of settlement and time. The influence of these early studies has been long-lasting, especially Sowers' model, probably due to its simplicity.

Some 15 years later the existence of two distinct phases of secondary settlement was recognised, first by Bjarngard and Edgers (1990) who investigated a large field data set, and later by König, et al. (1996), see Figs. 1 and 2. Explanations were given in terms of settlement mechanisms of the kind first put forward by Sowers. In the first phase settlement occurs at a relatively slow rate and is dominated by mechanical processes whereas in the second phase there is a higher rate of settlement attributed to decomposition.

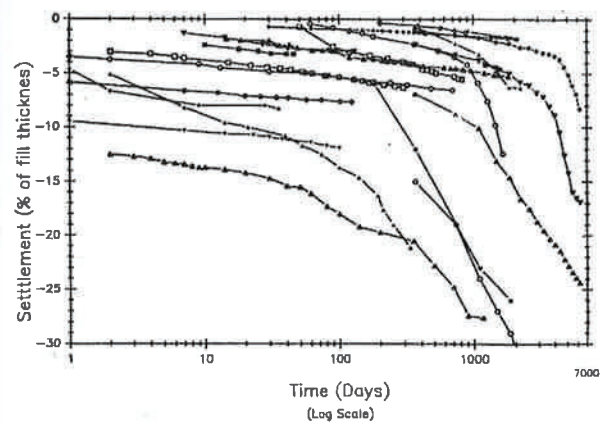


FIG 1. Landfill settlement vs. log time from field case histories (Bjarngard and Edgers (1990)

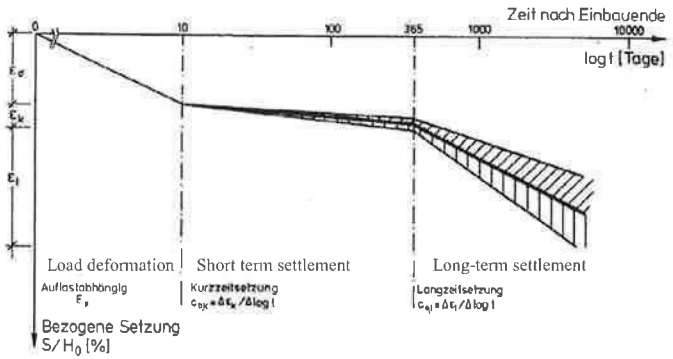


FIG. 2 Idealisation of settlement over time (from König et al, 1996)

3.2.1 Mechanisms of settlement & temporal classification

Settlement in landfilled waste is commonly described in terms of the five mechanisms identified by Sowers (1973):

- Mechanical: distortion, bending and crushing
- Ravelling: erosion, sifting of fines
- Physico-chemical: corrosion, oxidation and combustion
- Bio-chemical decay: fermentation & decay, aerobic and anaerobic
- Interactions, between the four other mechanisms.

Yen and Scanlon (1975) also identified five mechanisms of long-term settlement, which correspond closely to Sowers:

- Movement of fines into large voids
- Strength loss due to chemical & biological reactions
- Material loss due to biodegradation and methane production
- Creep processes
- Consolidation processes.

It is evident from these lists that there are mechanisms contributing to settlement in waste refuse that do not occur in engineering or inert soils. In fact only creep and consolidation would be recognised as conventional settlement mechanisms and the existence of consolidation in MSW has been questioned since (i) waste is less than fully saturated, especially at the time of placement, and (ii) even if saturated, has a permeability that is too high to allow any persistent build up of excess pore water pressure (Bjarngard and Edgers, 1990; Wall and Zeiss, 1995).

The likely incidence of settlement mechanisms during the life of a landfill site is shown in Fig. 3. Settlement following load, which may be due to self-weight or

surcharge, e.g. capping, is generally regarded as complete within about a month of application. Mechanical creep is usually regarded as occurring at a gradually decreasing rate, *ceteris paribus*, throughout the life of the site although between one and 30 days creep effects are probably masked by load-related effects. According to Bjarngard and Edgers (1990) and König et al. (1996), biodegradation-related effects rise to prominence after about one year. Physico-chemical/corrosion effects and ravelling are probably the least well understood mechanisms. The former is shown as a rising then falling rate trend but of smaller magnitude than biodegradation; in the absence of better information, the latter is assumed to be constant throughout.

Not surprisingly, the variability of the waste stream, over time and between locations, means that the influence, if not the existence, of individual mechanisms will differ from site to site. A universal interpretation of landfill settlement behaviour has therefore proved elusive; however, there is some consensus on its temporal classification.

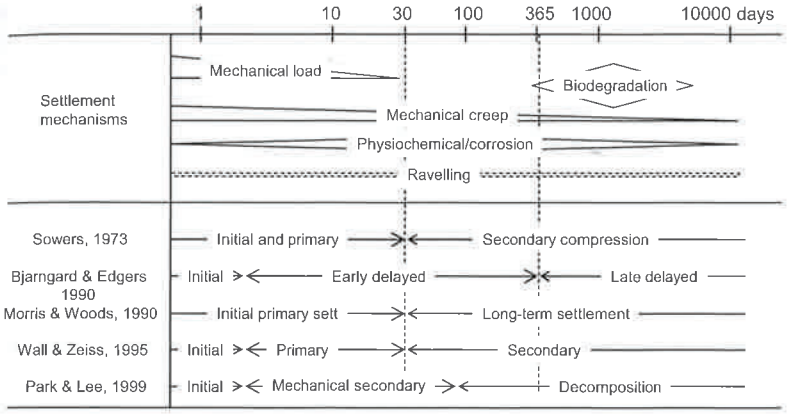


FIG. 3 Occurrence of settlement mechanisms and temporal classifications adopted by selected publications.

The bottom part of Fig. 3 shows the temporal classification of settlement as proposed by several researchers. There is consensus about the sequence of mechanisms. Load-related effects, commonly referred to as *Initial* and *Primary* settlement are thought to occur over the first month by Sowers (1973), Morris and Woods (1990) and Wall and Zeiss (1995). After one month, mechanical creep, physico-chemical/corrosion and biodegradation related effects dominate in what is collectively referred to as either the *Secondary* or *Long-term* phase. This phase can continue for 30 or more years. Bjarngard and Edgers (1990) and Park and Lee (1997), use different terminologies and time frames but their interpretations are consistent with others and the general sequence of settlement mechanisms.

Hence a combination of *primary* and *secondary* settlement conveniently classifies the mechanisms contributing to landfill settlement. Primary settlement occurs very quickly by comparison to the life of the landfill and can be adequately described by load-induced settlement models. Secondary settlement, driven by biodegradation effects, creep and physicochemical corrosion is a long-term phenomenon, which has for some time relied on time-dependent methods.

Before taking a closer look at existing and the newly developing more fundamental landfill settlement models, it is instructive to recognize the range of influencing factors that the input parameters of landfill settlement models strive to represent.

3.2.2 Influencing factors

Figure 4 shows a range of factors influencing landfill settlement feeding into a simplified suite of primary and secondary settlement mechanisms. Influencing factors can be viewed as (i) factors defining the condition of the waste within a landfill cell, i.e. internal to the landfill (the boxed factors), and (ii) factors or site operations and controls or initial conditions which influence the internal conditions. Some of the factors influencing biodegradation, namely moisture, leachate and gas composition, are not readily or explicitly incorporated into conventional settlement models. Moreover, during the period under investigation, the influence of these factors can change and in a way that is neither gradual nor predictable. Indeed, Landva et al. (1984) concluded that decomposition effects are too complex to predict.

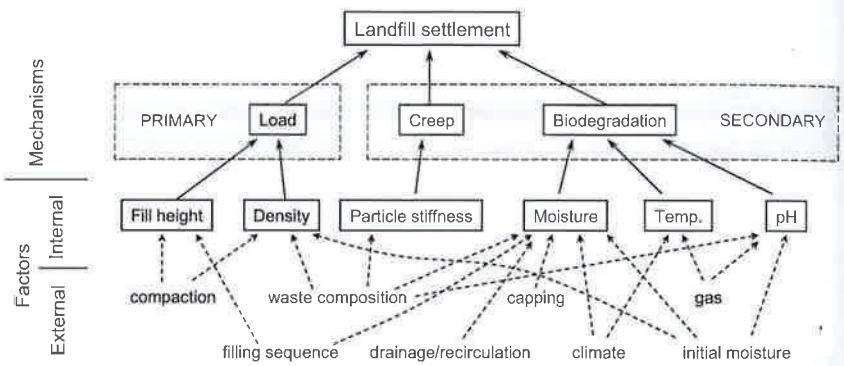


FIG. 4 Mechanisms and factors influencing landfill settlement.

Factors controlling the chemical and (micro)biological processes were considered in the very earliest investigations into landfill settlement. Watering and aerobic conditions were observed to be responsible for settlement some three times greater than that occurring in a dry anaerobic cell (Merz and Stone, 1962). Sowers (1973) noted that keeping a site dry may halt decomposition. He also recognised the complex role of moisture noting that flooding with no opportunity for water circulation may also halt decomposition because of (microbial) product inhibition. El-Fadel (1999)

reported on factors such as moisture, sludge and buffer addition and their impact on biodegradation in a series of test cells at the Mountain View Controlled Landfill Project. Significant increases in the amount and rate of settlement were observed when biodegradation is enhanced (as indicated in the data presented in Fig. 5) and was shown by Benson et al. (2007). A fundamental understanding of the factors controlling waste decomposition elucidated by environmental engineers and others with expertise in microbiology is now well established, e.g. Farquhar and Rovers (1973); Leckie et al. (1979); Barlaz et al. (1989).

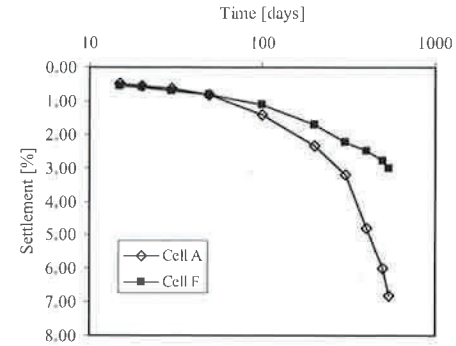


FIG 5. Effect of leachate recirculation on settlement magnitude [Cell A]; adapted from El Fadel (1999) [Cell F = control]

3.3 PRIMARY (LOAD-RELATED) COMPRESSION MODELS

Primary or load-related compression analysis and prediction has a long history in geotechnical analysis. The landfill settlement analysis described here is one dimensional, in the vertical direction, and occurs in response to changes in vertical stress. The relationship between stress and strain is assumed, for the purposes of monotonic loading, to be adequately described by a compression index, compression ratio, or one-dimensional (constrained) modulus.

3.3.1 Compression index

The compression index is the slope of the void ratio-log vertical stress relationship, i.e.

$$de = C_C \log\left(\frac{\sigma_{V0} + d\sigma_V}{\sigma_{V0}}\right) \quad (1)$$

where

e = void ratio
C_C = compression index [dimensionless]
σ_{V0} = the initial vertical stress
$d\sigma_V$ = change in vertical stress

Sowers (1973) and Morris and Woods (1990) proposed the use of a compression index, concluding that its value was related to initial void ratio. Sowers indicates that C_C is $0.15e_0$ for fills low in organic and $0.55e_0$ for fills high in organic content. Use of the compression index is hindered by the difficulty of determining the void ratio in waste.

3.3.2 Compression ratio

The compression ratio, also referred to as the modified compression index, is the slope of the vertical strain-log vertical stress. It avoids the need to determine the void ratio.

$$d\varepsilon = \frac{dH}{H_0} = C_R \log\left(\frac{\sigma_{V0} + d\sigma_V}{\sigma_{V0}}\right) \qquad (2)$$

where

$d\varepsilon$ = vertical strain increment
dH = change in height
H_0 = initial height
C_R = compression ratio [dimensionless]

Oweis and Khera (1998) summarise C_R and C_C values for a range of waste types; for example C_R values range between 0.08 (for 15 to 20 year old waste) to 0.41 (waste with high organic content).

Kavazanjian et al. (1999) also reported compression ratio values for a number of waste samples tested in a large laboratory (460 mm diameter by 460 mm high) oedometer. Their results (Fig. 6) indicate virgin compression ratios of between 0.121 and 0.247; they also reveal irreversibility in the load-strain behaviour.

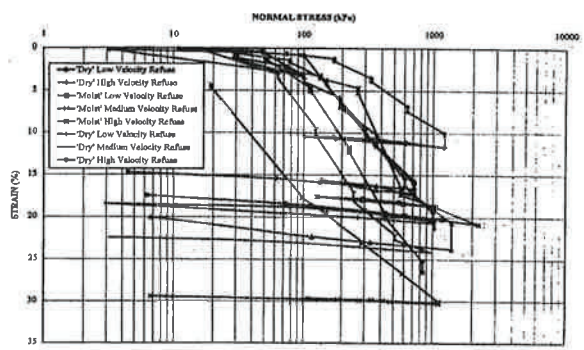


FIG. 6 Large scale laboratory compression data from Kavazanjian et al. (1999)

3.3.3 One-dimensional (Constrained) modulus

The one-dimensional (or constrained) modulus is defined as:

$$d\varepsilon = \frac{dH}{H_0} = \frac{d\sigma_V}{D} \qquad (3)$$

where

D = one-dimensional modulus [kN/m^2]

The magnitude of the constrained modulus is dependent on the applied stress level, whereas the compression index and compression ratio values are constant with the logarithm of stress. Watts & Charles (1990, 1999) measured constrained modulus values for a range of waste types and sites finding values ranging between 550 and 6000 kN/m^2. Beaven and Powrie (1995) and Jessberger and Kockel (1995) also used the constrained modulus.

3.3.4 Compressibility: primary compression ratios and one dimensional moduli

Compression ratios can be converted to an equivalent constrained modulus by combining Eqs. 2 & 3,

$$C_R \log\left(\frac{\sigma_V + d\sigma_V}{\sigma_V}\right) = \frac{d\sigma_V}{D}$$

From which we can deduce that for a unit increment of vertical stress $d\sigma_V$ at stress level σ_V,

$$D = \frac{1}{C_R \log\left(1 + \frac{1}{\sigma_V}\right)} \qquad (4)$$

Figure 7 shows a selection of measured compression ratio values (converted to constrained modulus values using Eq. 4) is presented together with directly measured constrained modulus values. Some of the outlying values, such as the high modulus values reported by Watts and Charles (1999), are known to be obtained from 40 year old refuse having a high bulk unit weight, i.e. 18 kN/m^3, with noted ash and rubble content. Notwithstanding the outliers, directly measured constrained modulus values, both in the laboratory and in the field, lie within the range of compression ratios reported by Oweis and Khera (1998), i.e. from 0.08 to 0.41. There is no clear influence of age on compressibility; the compressibility of the aged waste tested by Beaven (1999) reveals a compressibility closer to the high organic content waste in conditions

favourable to decomposition reported by Oweis and Khera, rather than the 15-20 year old waste (also reported by Oweis and Khera).

It should be borne in mind however, that the physical condition of aged waste in the laboratory is usually different to that in the field. The decomposition process will produce a waste structure that is destroyed by sampling and subsequent placement in a laboratory cell. Compaction will probably produce a denser matrix with lower porosity in the laboratory compared to the in situ condition.

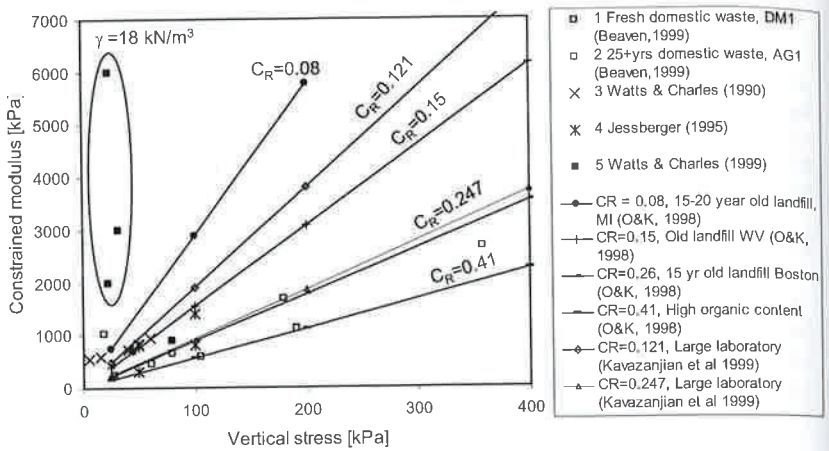


Fig. 7 Measured waste compressibility shown as constrained modulus values. Data points measured as constrained modulus; connected data calculated as constrained modulus from compression ratio values as denoted.

3.4 TIME-DEPENDENT SETTLEMENT MODELS

The complexity of the factors controlling the full range of secondary settlement mechanisms and the difficulty of their measurement, especially in the field, encouraged considerable interest in time-dependent methods. Simple in form, these models relate surface settlement to time and may be expeditious if the landfill milieu evolves in a gradual and predictable way. Several functions have been used:

3.4.1 Logarithmic (or 'soil mechanics')

Originally proposed by Sowers (1973), this form of settlement model is familiar as the soil mechanics secondary compression model,

$$de = C_\alpha \log\left(\frac{t_2}{t_1}\right) \tag{5}$$

where

C_α = secondary compression index [dimensionless]
t_1 = initial time of interest
t_2 = later time of interest

Morris and Woods (1990) and Wall and Zeiss (1995) avoid determination of void ratio by using a secondary compression ratio,

$$d\varepsilon = \frac{dH}{H_0} = C'_\alpha \log\left(\frac{t_2}{t_1}\right) \tag{6}$$

where C'_α is the modified secondary compression index or secondary compression ratio, i.e.

$$C'_\alpha = \frac{C_\alpha}{1+e_0} \tag{7}$$

3.4.2 Exponential (or Rheological)

Originally proposed by Gibson and Lo (1971) for long-term settlement of peat, the rheological model was first applied to waste refuse by Edil et al. (1990). It is a combination of a Hookean spring representing primary stiffness and a Kelvin element representing long-term settlement. This model can also account for primary settlement, although for the purposes of this review, only the time-dependent component is considered.

$$s(t) = H \cdot \Delta\sigma\left\{a + b\left(1 - \exp^{\left(-\frac{\lambda}{b}t\right)}\right)\right\} \tag{7}$$

where

s = settlement
$\Delta\sigma$ = vertical stress increment
a = primary stiffness parameter
b = secondary stiffness parameter
λ = compression rate parameter
H= initial height of refuse

3.4.3 Power creep

Also presented by Edil et al (1990), the power creep model is given by,

$$s(t) = H \cdot \Delta\sigma.m\left(\frac{t}{t_r}\right)^n \tag{8}$$

where

m = model parameter (compressibility)
n = model parameter (rate of compression)
t_r = reference time (taken to be 1 day)
H= initial height of refuse

3.4.4 Hyperbolic

The hyperbolic model was first applied to MSW by Ling et al.(1998). It utilises the ultimate settlement magnitude and initial rate of settlement as key parameters in its formulation.

$$s(t) = \frac{t}{1/\rho_0 + t/s_{ult}} \tag{9}$$

where

ρ_0 = initial rate of settlement
s_{ult} = ultimate settlement

3.4.5 Form and limitations of simple time-dependent functions

The performance of the time-dependent settlement functions depends on their ability to match data and the inherent shape of the function. Figure 8a shows the shape of the four functions over a two year period. Model parameters have been contrived to force the functions to follow similar paths. It would appear that any of the functions might be tuned to a field data set over the short period in question. Indeed, efforts to match these functions to field data have lead to the following observations:

- The combination of mechanical secondary compression, physico-chemical action and biochemical decay follows a linear settlement-log time relationship when there has been no drastic change in the [landfill] environment – Sowers (1973)
- Back calculation of parameters from field data shows better fit for the power creep model than the rheological model – Edil et al (1990)
- Hyperbolic model performed better than either power creep or logarithmic model, with correlation coefficients greater than 0.97, when fitted to three field scale data sets – Ling et al (1998)

Consider now the long-term predictive capability of the simple models, i.e. of the functions themselves. Figure 8b indicates final settlement magnitudes to a logarithmic time scale. The rheological and hyperbolic models become asymptotic to a final settlement value and would seem to offer some realistic long-term settlement prediction. In contrast, logarithmic and power models predict ongoing settlement. In the case of the power law model, deceleration in the rate of settlement is slow and settlement has fallen off the scale in less than 3 years. Clearly, the choice of model has a dramatic influence on the prediction of ultimate settlement.

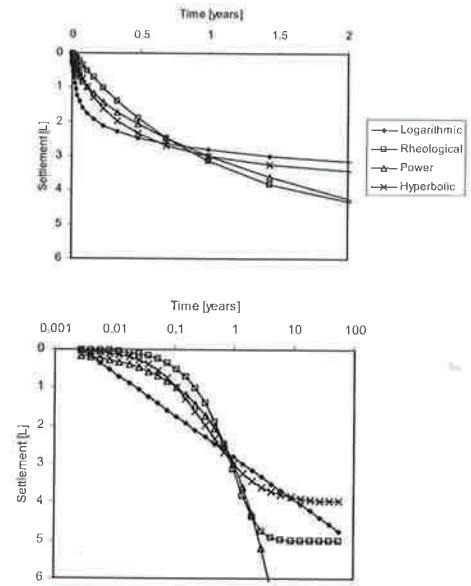


FIG. 8 Form of time-dependent functions over (a) two year period (a) and (b) much longer period (< 100 years)

Work to improve the long term fit of the time-dependent model functions has turned to two-stage secondary settlement models.

3.4.6 Two-stage secondary settlement models

Bjarngard and Edgers (1990) and König et al (1996) highlighted the existence of two identifiable stages of secondary settlement. The first is attributable to mechanical phenomena whereas the second is due to the onset of biodegradation and associated mass loss. Work by Hossain et al. (2003) on the settlement of degraded waste samples also points to a two-stage secondary process. However, care must be exercised in the interpretation of laboratory tests where degraded samples are remoulded into an oedometer as (already noted) the in situ fabric is inevitably lost. The simulation of

secondary settlement including an accelerated phase of settlement improves the capability of time-dependent approaches. A number of models that expressly account for a second accelerated stage have been developed.

Edgers, Noble and Williams (1992)

Edgers et al. (1992) state that mass loss leads to a weakened matrix, increased compressibility and changed permeability. They also highlight the relevance of gas generation to secondary settlement. Indeed the kinetics of microbial growth is described as background to their two stage model but caution that the settlement mechanism is not at all clear. They idealised secondary settlement as a combination of (i) mechanical creep in the first stage described by a logarithmic model and (ii) bio-settlements in the second stage. In the first stage vertical strain is given by,

$$\varepsilon = \varepsilon_1 + \frac{A\exp^{(\alpha D)} t_1}{1-m}\left(\left(\frac{t}{t_1}\right)^{1-m} - 1\right) \quad \text{for } m \neq 1 \tag{10a}$$

$$\varepsilon = \varepsilon_1 + A\exp^{(\alpha D)} t_1 \ln\left(\frac{t}{t_1}\right) \quad \text{for } m = 1 \tag{10b}$$

where

ε = strain
D = stress level
ε_1 and t_1 are known reference values
A, α and m are rate process parameters.

The combination of Eq. 10 allows for non-linear ε-log t relationships, i.e. $m \neq 1$.

In the second stage,

$$\varepsilon_{bio} = B\left(\exp^{\beta(t-t_k)} - 1\right) \tag{11}$$

where

B = scale factor corresponding to decomposition settlement
β = parameter reflecting microbial activity
t_k = time at which bio-settlements begin.

Excellent agreement for the model is claimed with four field cases for which B, β, and t_k could be back calculated.

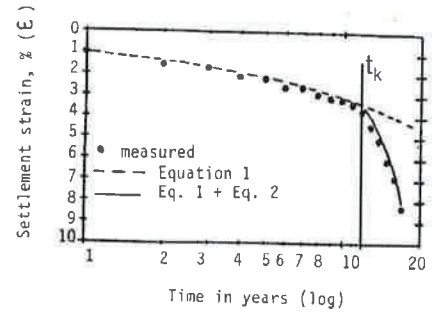


FIG. 9 Comparison of settlements including effects of decomposition using two stage secondary settlement model; modified from Edgers et al., 1992. Eqs. 1 & 2 in the figure refer to Eqs. 10a & 11 above.

Park and Lee (1997, 2002)

Park and Lee highlight the importance of biodegradation and the difficulty that soil mechanics has in accounting for biodegradation effects. They proposed a mechanical secondary compression stage using a combination of logarithmic and first order kinetic models. The logarithmic model is applied to the first stage,

$$\Delta\varepsilon(t)_{mec} = C_\alpha \log\left(\frac{t+\Delta t}{t}\right) \tag{12}$$

where C_α is the compression ratio (strictly C'_α according to the notation of Eqs. 5 & 6), followed by secondary compression due to decomposition depicted by first order kinetics,

$$\Delta\varepsilon(t)_{dec} = \varepsilon_{tot-dec}\left(1 - \exp^{(-kt_{bio})}\right) \tag{13}$$

where

$\varepsilon_{tot-dec}$ = total settlement due to decomposition
t_{bio} = time since decomposition settlement commenced.

Park and Lee are well aware of the microbial circumstances of the landfill environment, noting that the decomposition process is first methanogen-limited then, once methanogenesis is established, becomes hydrolysis-limited. Microbiological evolution and the associated decomposition can then be considered to reflect the progress of secondary settlement. They also highlight the importance of moisture availability in decomposition process.

El-Fadel, Shazbak, Saliby and Leckie (1999)

El-Fadel et al (1999) postulated an increase in void ratio and weakened structure due to biodegradation. They correlated settlement in six large field cells with three models, the power, Gibson & Lo (exponential) and 1-D consolidation (logarithmic) models, where the 1-D consolidation model is implemented as a two stage model.

The field cells, actually the Mountain View Controlled Landfill Project (Halvadakis et al. 1988), were configured to investigate a number of the factors controlling biodegradation, e.g. leachate recirculation and combinations of sludge, buffer and water addition. Secondary settlement in the logarithmic model was broken down into two separate stages defined by secondary compression ratios $C_{\alpha 1}$ and $C_{\alpha 2}$, where the ratio of $C_{\alpha 2}/C_{\alpha 1} \approx 10$ (strictly C'_{α} according to the notation of Eqs. 5 & 6). The distinction between the two stages is fixed by the time at which the slope of the stress-strain curve changes. Figure 10 shows the modelling and field results for cell B, which had sludge and buffer addition. Over the period and for all cells, it was noted that the two-stage 1-D consolidation model out-performed both the exponential (Gibson & Lo) and power models although the exponential model performed acceptably in all cases.

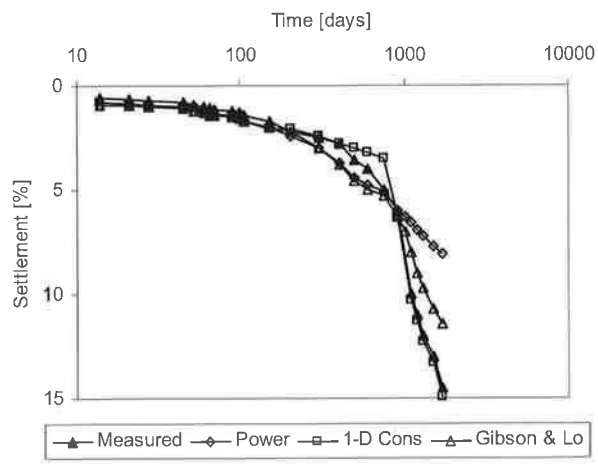


FIG. 10 Comparison of models with measured settlement data for cell B, Mountain View Controlled Landfill Project, after El Fadel et al. (1999)

Marques, Filz and Vilar (2003)

Marques et al. proposed a variant on Park and Lee's two stage model. They have first a mechanical creep stage (ε_C) followed by a biological decomposition (ε_B) stage. Mechanical creep is based on the exponential model,

$$\varepsilon = b\Delta\sigma\left(1 - \exp^{-ct'}\right) \tag{14}$$

where

b = creep coefficient
$\Delta\sigma$ = stress increment
c = compression rate parameter
t' = time since application of the stress increment.

Biological decomposition is also given by an exponential model,

$$\varepsilon = E_{DG}\left(1 - \exp^{-dt''}\right) \tag{15}$$

where

E_{DG} = total strain due to decomposition
d = decomposition rate parameter
t'' = time since placement of the waste in the landfill

In the models described so far, model parameters defined cell-averaged or site-wide conditions. Marques et al. point out that the implementation of their two stage model is on a layer basis, i.e. they model the filling phase. This is a matter which is addressed in more detail later in this chapter. Using model parameters obtained by regression analysis, surface settlements predicted by the model were found to be in good agreement with field data.

Hossain and Gabr (2005)

The model presented by Hossain and Gabr extends the two stage logarithmic model adopted by El Fadel et al. to three stages. An initial early stage of decomposition is proposed, when the landfill environment is predominantly acidogenic (or pre-methanogenic). Settlement is dominated by creep. In the next stage, biological decomposition is added. In the third stage, biological effects are exhausted but there remains some creep settlement.

Eq. 6 is used,

$$d\varepsilon = \frac{dH}{H_0} = C_R \log\left(\frac{t_2}{t_1}\right) \tag{6}$$

where three secondary compression ratios, corresponding to the early creep, biodegradation and final creep stages are $C_{\alpha i}$, C_{β} and $C_{\alpha f}$ respectively, are input into Eq. 6. There are four times, t_1 to t_4, corresponding to the start and end of the settlement stages as denoted in Fig. 11.

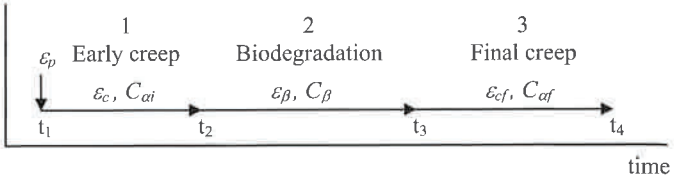


FIG. 11 Time dependent secondary settlement model extending to three stages as proposed by Hossain & Gabr (2005)

Small-scale laboratory compression tests provided values of $C_{\alpha i}$ and C_β ; the final creep stage was not considered so the comparison is of a two stage model only. A number of field projects, including the Mountain View Controlled Landfill Project (Halvadakis, 1988) and Yolo County landfill, were simulated. The test data was well matched by the model holding stage 1 and stage 2 compressibility ratios constant and manipulating only t_2 values, as can be seen in Fig. 12.

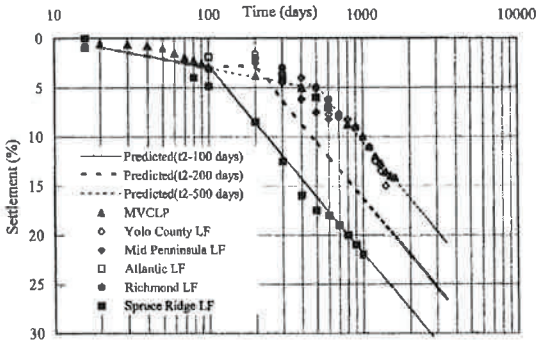


FIG. 12 Comparison of predicted and observed field settlement for bioreactor landfills, from Hossain and Gabr (2005)

3.4.7 Summary of two stage secondary settlement model and parameter values

The two stage models are a sequential combination of secondary settlement functions, as summarised in Table 1. Parameter value ranges, where provided, are also given.

3.4.8 Performance and limitations of time-dependent models

Time-dependent models appear to capture well the main landfill settlement features over sometimes considerable periods of time. However, in all cases model parameters have been tuned to fit model output to the data. The models have not yet been proven successful in the *a priori* prediction of either the magnitude or the timing of final settlement. Indeed, this may be an unrealistic expectation. It has been shown that different settlement models follow similar paths over short time frames but later diverge to quite different ultimate settlement magnitudes. Even if the choice of model

is easy, the meaning of the model parameters and their determination is not. Biodegradation contributes significantly to total settlement and is a function of a complex set of conditions that extend beyond the normal geotechnical remit. Mapping both the biodegradation process and its manifestation as settlement onto a simple time-dependent function results in a highly empirical treatment of the phenomenon. The parameters in such a model lose physical meaning and can only be determined in an observational manner.

Nevertheless, some consistency has been found in secondary compression ratio values. Oweis and Khera (1998) reported secondary compression ratio values ranging between 0.001 for old landfills with high soil contents to 0.02 – 0.24 for old (15-20 yr) waste. Parameter values range over more than an order of magnitude. However, it is difficult to associate these data with particular wastes. Normal soil descriptions do not account for the state of decomposition and simple age descriptors may not give an adequate description. For example, a 1 or 2 year old waste at a site where decomposition has been allowed or even encouraged may be more degraded that 15 year old waste lying in a 'dry tomb' site. If biodegradation effects are to be accounted for in a predictive manner, a more fundamental treatment is required.

Table 1: Summary of functions used in two stage secondary settlement models and reported parameter values

	First stage	Second stage
Edgers, Noble and Williams (1992)	logarithmic	Exponential β = 0.1622 to 1.267 yr^{-1}
Park and Lee (1997, 2002)	logarithmic Fresh, field: C_α =0.02 Fresh, lab: C_α = 0.037 15 yrs, lab: C_α = 0.01 15~30 yrs, lab: C_α = 0.008	Exponential Fresh, field: $\varepsilon_{tot\text{-}dec}$ = *10-25%;* k = 0.245 – 0.548 yr^{-1} 8 yrs, field: $\varepsilon_{tot\text{-}dec}$ = *<1-7%;* k = 0.584 – 2.19 yr^{-1} 20 yrs, field: $\varepsilon_{tot\text{-}dec}$ = *1-3%;* k = 0.365 – 17.56 yr^{-1}
El-Fadel, Shazbak, Saliby and Leckie (1999)	logarithmic Field $C_{\alpha 1}$ = 0.015 – 0.035	logarithmic Field $C_{\alpha 2}$ = 0.132 – 0.25
Marques, Filz and Vilar (2003)	exponential 5 yrs, field b = 4×10^{-4} m^2/kN c = 1×10^{-3} day^{-1}	exponential 5 yrs, field E_{DG} = 0.15 – 0.21 d = 0.8×10^{-3} –2.5×10^{-3} day^{-1}
Hossain and Gabr[1] *(2005)*	logarithmic Field $C_{\alpha i}$ = 0.03 t_2 = 100 – 500 days	logarithmic Field C_β = 0.19

[1] third stage not active

3.4.9 Time-dependent settlement with depth

Even if the issue of waste description can be avoided, say by conducting compression tests on a particular waste from the site under investigation, the state of decomposition may still affect settlement prediction. Working cells may be filled over a period of time extending two years. The measured surface settlement will therefore be a function of decomposition processes that may be considerably more advanced at the base of a site than in the upper layers.

With few exceptions, the time-dependent settlement models described so far have been applied to and/or obtained from a sample of waste or the full depth of a landfill cell. In other words, compression parameters have been cell- or depth-averaged. Compression ratios of this kind must be deployed judiciously. Alternatively, the settlement model may be deployed on a lift basis. Models presented by Morris and Woods (1990), Bleiker et al. (1995) and Marques et al. (2003) in the preceding section, offer such a capability. Both of these models apply the exponential model to individual layers of waste, summing the layer settlement predictions to obtain surface settlement.

Another model that exploits the time-dependent nature of the filling process is the Incremental Settlement Prediction Model (Olivier et al. 2003). In this model, the logarithmic function is applied to discrete layers of waste, the times of placement of which are used to determined the settlement of each lift. From a number of field scale validation exercises, Olivier et al found the compression ratio to vary relatively little around an average value of (C'_α =) 0.11 when deployed in this way. Findings such as these indicate the benefit of implementing the settlement model on a spatial basis.

3.5 MORE FUNDAMENTAL SETTLEMENT MODELS

This section introduces a number of more fundamental landfill behaviour models that have emerged in recent years. The significance of biodegradation-related settlement has already been noted and the review of fundamental models begins with a review of the factors controlling biodegradation.

3.5.1 Biodegradation factors

The principal factors influencing the rate and extent of biodegradation in landfilled waste were outlined in Fig.4. It is not a definitive list but it does introduce a useful distinction between internal and external factors.

Internal factors

In Fig. 4, factors such as moisture content, temperature and pH are classified as internal. Internal factors define fundamental physical, chemical and (micro)biological phenomena that drive a predictable evolution of the landfill milieu. They give rise to process-based model parameters and may be derived from small scale or laboratory

tests. Their influence can be regarded as universal from site to site and region to region. Factors that may be regarded as internal, including those identified in Fig. 4 are:

- moisture content: it is generally acknowledged that moisture is the main factor controlling biodegradation (Rees 1980; Reinhart and Townsend 1997); certainly it is the most easily controlled via external operations such as leachate recirculation.
- temperature: that microbiological activity is temperature-dependent can be clearly shown in the laboratory but the impact of temperature on decomposition in the field is less clearly defined. Test cells in the UK (Landfill 2000) showed very high rates of gas production achieved at temperatures below 15°C. At another UK test site, Brogborough, there was no correlation between gas production and temperature (Knox 1999).
- waste composition: the amount of degradable matter and its degradability. There have been a number of investigations of waste composition. See Grisolia et al. (1993) for one of the earlier three part classifications into inert, highly deformable and readily biodegradable fractions.
- leachate quality (pH): acid accumulation can inhibit microbial activity and thereby stall the decomposition process (van Meerten et al. 1995).
- gas and liquid conductivity: the ease with which required reactants and inhibiting products to the digestion process can diffuse through the waste (Bleiker et al. 1995)
- microbiology: the anaerobic digestion process requires a consortium of hydrolytic, acetogenic and methanogenic bacteria to become established; the growth rate of methanogens is relatively slow so accelerated methanogenesis takes time to become established (Barlaz et al. 1989).

External factors

Referring again to Fig. 4, factors that can be regarded as external include:

- site geometry: defines the lateral extent and depth of waste, and hence constrains stress- or depth-related properties such as density, porosity, gas and hydraulic conductivities.
- filling sequence: the state of a layer of waste is defined by its placement, i.e.
  - its position in relation to site geometry and hence overburden stress/in situ density
  - timing which defines the commencement of decomposition, climatic influence (rainfall/evaporation) and internal moisture redistribution
- climate: influences boundary moisture transfers
- operational controls: includes waste compaction and placement procedures, daily cover soils, time of capping, leachate management (recirculation and/or sludge addition).

External factors are effectively initial conditions or features of a particular site that define the biodegradation process both initially (geometry, filling sequence, compaction) and during the life of the site (climate, leachate management). They convey the spatial aspects of the problem and influence the biodegradation model accordingly. Waste type and external factors such as climate and operational practices may be similar at sites that are geographically close, but they are unlikely to be the same from region to region. Geometry and filling sequence are most likely to differ from site to site irrespective of their geographical proximity. External factors are largely site-specific; they influence the decomposition process through their impact on the internal factors referred to in the previous section.

So, biodegradation factors can be associated with the fundamental biodegradation processes or they define the circumstances in which those processes occur. Such a classification is instructive as it emphasises both the formulation of the fundamental model and its implementation at field scale.

3.5.2 Biodegradation consequences - mass loss and settlement

If a biodegradation model is to be used to control long-term settlement then some means of interpreting the volumetric consequences of mass loss is required. Conventional soil mechanics volume descriptors, such as the void ratio, are not unique indicators of overall volume in waste because of the changing solid phase volume. For example, the degradation of solid mass may be accompanied by an equivalent (to the solid volume lost) increase in void volume. There is then no change in overall volume although the void ratio has increased and the waste has become more skeletal. Settlement of this form can be seen in Fig. 13, which shows layer strain calculated from field measurements at depth in an Australian landfill (McDougall et al, 2004), where episodes of settlement showing zero settlement strain giving way to renewed movement can be seen.

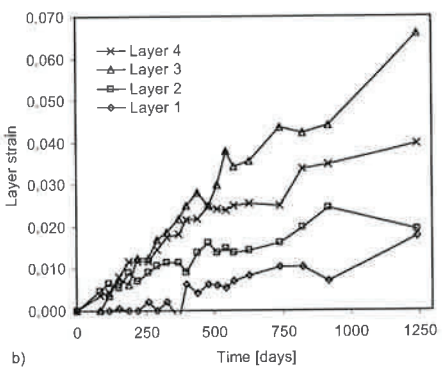


FIG. 13 Displacement of settlement monitoring stations at Lyndhurst Sanitary Landfill, stations in Control A shown as layer strain (adapted from Yuen, 1999).

Alternatively, decomposition may be accompanied by contemporaneous rearrangement of solids and overall settlement. In this case the associated change in void ratio is a function of changes in both void and solid phase volumes; void ratios may remain unchanged despite overall settlement. In fact, a constant void ratio condition is implicitly assumed by some of the fundamental landfill settlement models.

A general description of the relationship between decomposition of solid degradable matter, i.e. a change in solid phase volume V_S, and the induced change in void volume V_V, was presented by McDougall & Pyrah (2004), i.e.

$$dV_V = \Lambda \, dV_S \tag{16}$$

where Λ is the decomposition (or degradation)-induced void change parameter. Table 2 summarises changes in volumetric state variables and likely mechanical consequences associated with key values of Λ.

Coupling biodegradation with volume changes in this way offers three important benefits. Firstly, biodegradation settlement is not treated as a highly empirical time-dependent process. Time is communicated through solid organic matter depletion, which is controlled by the biodegradation model. There is a maximum rate of depletion but within that rate, under the influence of moisture deficit/addition or acid accumulation or changing crystallinity, for example, decomposition may slow down, accelerate, or stop completely. Secondly, there is no constraint on the form of biodegradation model selected; it can be as simple or as complex as necessary. Thirdly, this approach allows for a more fundamental treatment of changes in material properties such as stiffness, e.g. hardening with load and creep or (more likely) softening with decomposition.

Table 2: Decomposition induced void change parameter - reference values and associated phase composition changes where $dV_s < 0$.

Λ	Void ratio	Overall volume	Phase composition and its expected strength
-1	Maximum increase	No change	Much looser & possibly weaker
0	Increase	Reduction	Looser & possibly weaker
e (= void ratio)	No change	Large reduction	No change
>e	Decrease	Maximum reduction	More compact & possibly stronger

3.5.3 Model architecture – general ingredients

The classification of biodegradation factors presented in this chapter and the coupling of biodegradation with volumetric changes points to three main ingredients of a more fundamental approach to landfill settlement:

1. a model of the biodegradation process driven by parameters representing mainly internal factors
2. a means of implementation that communicates external factors as both initial and ongoing boundary conditions to the biodegradation model and,
3. an interpretation of the volumetric consequences of mass loss.

The models reviewed here are HBM (McDougall, 2007), LDAT (White et. al.2004), Moduelo (Lobo et al. 2008) and a model that has been developed at the University of Bahia, Brazil by Machado et al. (2008). Not all of these models have settlement analysis as their prime objective. The models also focus, to varying degrees, on hydrology or leachate quality and the strength of waste, so there is no common suite of factors upon which the models are founded. However, it is reasonable to say that they all recognise the importance of long-term volume change in the interpretation of landfill behaviour at field scale.

3.5.4 HBM, Edinburgh Napier University

The HBM model is a combination of three models each describing the hydraulic, biodegradation and mechanical behaviour of landfilled waste. The emphasis of this model is on settlement at field scale.

The hydraulic model is an unsaturated flow model. The biodegradation model is a two stage anaerobic digestion model and the mechanical model a visco-elasto-plastic deformation model. The three models are coupled as shown in Fig. 14, thereby enabling the integration and internal definition of system behaviour and variables that would otherwise be assumed constant or considered discretely. There is, for example, moisture control of biodegradation of solid degradable matter. The biodegradation model accounts for the enzymatic hydrolysis of solid cellulolytic matter. It is not a function of time but of the amount of moisture, volatile fatty acid (VFA) inhibition and the change in bioavailability. The hydrolysis function has the form:

$$r_g = \theta_E\, b\left[1-\left[\frac{S_O - S}{S_O}\right]^n\right]\exp\left(-k_{VFA}(c)\right) \qquad (17)$$

where

r_g = rate of VFA accumulation [$g_{VFA}/(m^3_{aqueous}.day)$]
θ_E = effective moisture content
b = maximum hydrolysis rate [$g_{VFA}/(m^3_{aqueous}.day)$]
S = solid degradable fraction [kg/m^3]
n = bioavailability transformation parameter
k_{VFA} = product inhibition coefficient [$m^3_{aqueous}/g_{VFA}$]

c = VFA concentration [$g_{VFA}/m^3_{aqueous}$]

Equation 17 allows any of the controlling factors to affect the rate of hydrolysis/VFA accumulation, for example it may be stalled due to lack of moisture, excessive VFA accumulation (low pH) or reducing bioavailability. Equally, restoration of say a moisture deficit will accelerate the hydrolysis.

Moreover, biodegradation adjusts solid and void phase volumes, in other words the porosity, through the decomposition induced void change parameter Λ referred to above. This parameter can be evaluated from large scale laboratory tests, e.g. those by Olivier and Gourc (2007). Figure 15 shows the Olivier and Gourc test data together with HBM simulation output at selected Λ values.

The HBM model is implemented using the finite element method and can therefore simulate the filling phase by timed disclosure of individual elements. In this way, porosity and density changes due to load application and biodegradation can be handled; the saturated hydraulic conductivity can then be internally defined and automatically adjusted for overburden stress or biodegradation. The similitude of the hydraulic model is thereby considerably enhanced.

The HBM model does not account for gas migration and considers only a very simple leachate chemistry – a lumped volatile fatty acid concentration and a methanogenic biomass concentration.

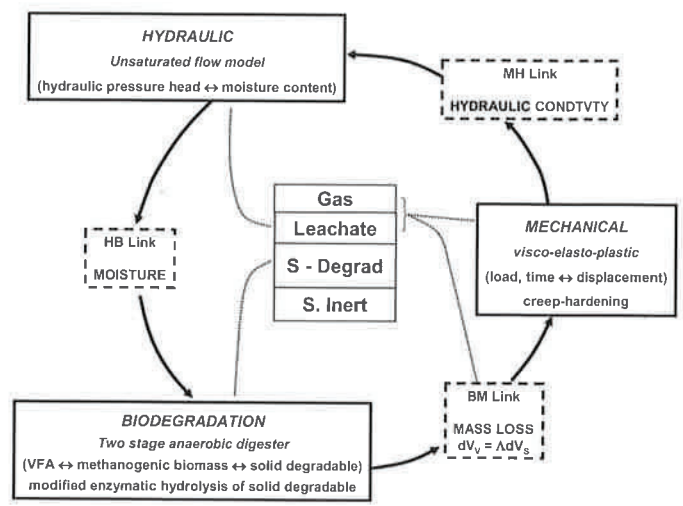


FIG. 14. Schematic diagram showing the constitutive formulation of the HBM model.

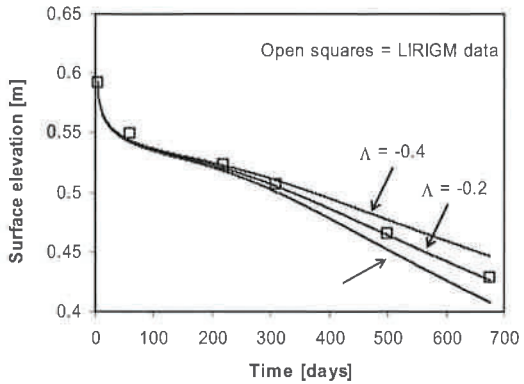


FIG. 15 Predicted (HBM) and measured secondary settlement behaviour during the experiment (LIRIGM, Olivier & Gourc, 2007) for selected values of decomposition-induced void change parameter, Λ.

3.5.5 LDAT, University of Southampton

LDAT has been developed at the University of Southampton (White et al. 2004), initially to interpret the long-term biodegradation of solid waste. It was designed to accommodate, in a spatially distributed context, a range of biochemical degradation pathways comprising the enzymatic hydrolysis, subsequent acetogenesis and methanogenesis. Biodegradation is treated as a three stage anaerobic digestion process, see Fig. 16. The degradation steps are handled using Monod kinetics, hence the depletion of the organic substrate by enzymatic hydrolysis is given by,

$$\frac{\partial C_S}{\partial t} = \left[\frac{\mu C_M}{K + C_M} C_S \right] \tag{18}$$

where

C_S = concentration of substrate [g/m^3]
C_M = concentration of hydrolytic enzymes [g/m^3]
μ = specific growth rate [g/m^3/day]
K = half saturation constant [g/m^3]

Physical properties such as density (and hydraulic conductivity) are determined from empirical relationships relating these properties to effective stress, i.e. to depth. In the case of dry density, a relationship of the form,

$$\rho'_S = A(\sigma - u)^a \tag{19}$$

where

ρ'_S = dry density
A, a = empirical coefficients
σ = total stress
u = pore water pressure

In this way a variation of density with depth is driven by empirical data and is not restricted to constant void ratio changes. With a similar expression controlling the hydraulic conductivity, LDAT offers an interpretation of degradation processes that allows for the kind of property variation with depth that will occur at field scale. A strength of the LDAT model is that the empirical relationships around which the model is built are obtained from the large-scale experimental facility at Pitsea.

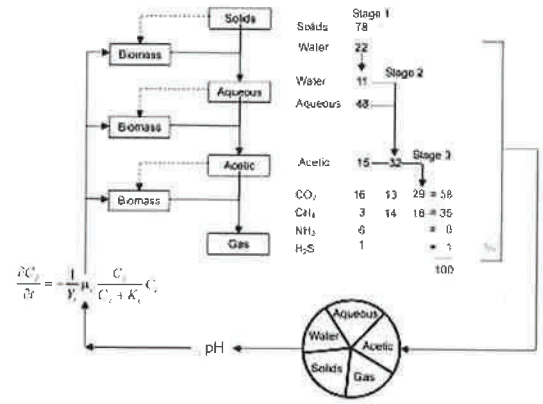


FIG. 16 Diagrammatic representation of the biodegradation process, from White et al (2004)

3.5.6 Moduelo, University of Cantabria

Moduelo is a landfill simulation tool that has been developed over a number of years at the University of Cantabria. It has available to it hydrological, biodegradation and settlement models. The biodegradation model uses a combination of first order kinetic functions to depict the conversion of readily and slowly hydrolysable solid matter into intermediate compounds and acetic acid, from which methane and carbon dioxide are produced. Lobo et al. (2008) indicate that biodegradation settlement is treated as a function of solid mass according to the 'Meruelo model'. In this case, the settlement to mass loss factor is taken to be 0.264 (no units given).

3.5.7 University of Bahia, Brazil

Machado et al. (2008) present an extension to the model they reported in 2002 (Machado et al. 2002). The earlier presentation deals with load and creep related

compression and shear behaviour, idealising waste as a combination of paste-like and fibrous fractions. The fibrous fraction is made up of plastic or plastic-like components and allows for strain hardening under deviatoric stress. The paste-like fraction contains all other materials including a degradable part.

In the 2008 extension, degradation is handled by a first order decay function based on the USEPA gas generation model,

$$\frac{\Delta m_s}{m_{so}} = \frac{L_o(1+w)\{1-\exp^{-kt}\}}{C_m} \tag{20}$$

where

m_s = mass of solids [subscript o refers to initial conditions]
L_o = methane generation potential [m^3 CH_4/Mg of refuse]
k = methane generation rate constant [1/yr]
w = MSW water content on dry weight basis
C_m = MSW organic matter methane yield [m^3 CH_4/Mg of dry refuse]

Biodegradation volume changes are handled by α, a decomposition-induced volume change parameter like the Λ parameter. Importantly, they indicate that values of α are not constant but a function of the biodegradation stage and probably other variables such as stress and waste composition. In the absence of more information, Machado et al (2008) propose that α is linearly related to the progress of decomposition, i.e.

$$\alpha(t) = \frac{-\alpha^* \Delta m_s}{m_{so}} \tag{21}$$

where

$\alpha(t)$ = mass loss generated volume change parameter
α^* = maximum value of α

From Eq. 21, the Authors compute volumetric strains over time using,

$$d\varepsilon_v = -\left(\frac{\gamma_{so}}{\gamma_{sp}}\right)\left(\frac{1}{1+e_o}\right)(1-\alpha(t))\frac{\partial m_s}{\partial t}\frac{1}{m_{so}}dt \tag{22}$$

where

γ_s = specific weight of MSW
γ_{sp} = specific weight of paste

The dependence of Λ on the degradation process, actually dissolution, has been reported in another paper in this volume (McDougall 2010, this volume). The data are obtained from tests on sand-salt mixtures, so quite different to waste, but they do show a common trend in the evolution of the parameter Λ over a range of stress states.

Comparison of this data with the form implied by Eq. 21 suggests that this is a topic that warrants further investigation.

3.5.8 Summary of more fundamental model features

Table 3 is provided not as a complete and definitive statement of model capabilities but as a synopsis of the different emphases and varying degrees of complexity embodied by the more fundamental settlement models.

Table 3 Summary of general features and modelling capabilities included in the four fundamental settlement models.

	HBM	Moduelo	LDAT	Brazil
	McDougall (2007)	Lobo et al (2008)	White et al (2004)	Machado et al (2002, 2008)
Settlement	Yes load, creep & biodegradation	Yes, biodegradation	Yes load, biodegradation	Yes, load, creep & biodegradation
Biodegradation	2 stage: hydrolysis, methanogenesis	3 stage: hydrolysis, acetogenesis, gasification	3 stage: lytic, acidogenesis, methanogenesis	based on USEPA gas model
Control	1) modified hydrolysis; 2) Monod	All first order kinetics	All Monod	First order kinetic
Pathways	1: bioavailability transformation	2: readily & slowly hydrolysable	3: fast, medium & slow	
Moisture control	Yes	Yes	Yes	Yes
Leachate species	VFA, MB	Intermediates, HAc, NH_3, H_2S	VFA, HAc,	N/A
pH inhibition	Yes			
Gas species	LFG	CH_4, CO_2	CH_4, CO_2	CH4
Biodegradation-related volume change	Λ	e fixed	density function	α (= Λ)
Implementation	Finite Element	Finite element	Finite difference, constant volume	

3.6 LANDFILL MODELLING CHALLENGE

Despite their state of development, indeed as a means of encouraging more coherent development, the landfill models described above were all invited to enter the landfill modelling challenge. Prediction of long-term settlement was one of the three main objectives of the challenge. The challenge was devised by the Waste Management Research group at the University of Southampton. It is comprehensively reported in two special issues of Waste and Resource Management (2008), see in particular Beaven et al. (2008) and Beaven (2008).

The Challenge

The landfill modelling challenge was a blind prediction exercise. Two consolidating anaerobic reactors were run for a period of 919 days during which time leachate quality, gas production and settlement were monitored. Each reactor is 480 mm diameter by 900 mm high, filled with 27 kg of fresh shredded MSW, and subjected to a vertical load (50 kPa & 150 kPa). Leachate quality data for the first 77 days was made available. The modellers were then asked to predict leachate quality, gas production and settlement for the remaining period of the test.

Lesson learned from the Challenge

Figure 17 shows the settlement predictions for CAR1 made by each of the four models together with the measured data. Whilst two of the models match the measured settlement behaviour reasonably well, perhaps the most significant observation to be made from Fig. 17 is the ability of the models to delineate an acceleration in settlement strain. The measured data show a relatively distinct acceleration at about 70 days. The HBM and Brazilian models show a general acceleration rather than a pronounced change of strain rates in the two phases; LDAT produces the greatest contrast between strain rates.

Importantly, the settlement behaviour modelled in Fig. 17 has been produced without resorting to *a priori* input of a transition time. No gas production data was released to the modellers. However, modellers were given the initial VFA data from which an acceleration in settlement could be deduced. Figure 18 shows these data. Very low VFA concentrations at 60 days indicate the consumption of excess VFA and the onset of accelerated methanogenesis together with increased settlement rate.

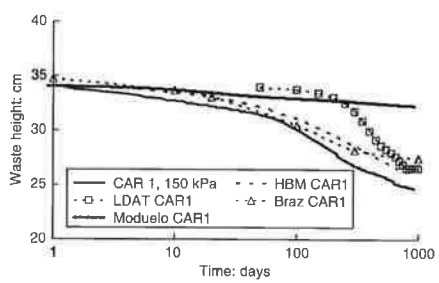


FIG. 17 Predicted waste settlements in CAR 1; from Beaven (2008)

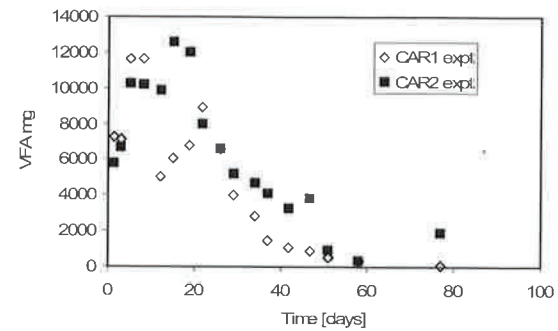


FIG. 18. Total VFA concentrations calculated from individual VFA concentrations measured in CARs 1 & 2 in the Landfill Modelling Challenge (Beaven et al. 2008)

Whilst the predicted settlement behaviour may be encouraging, if it is being modelled as a fundamental consequence of biodegradation-related mass loss, then it should be possible to match model and measured gas production curves. These are shown in Fig. 19, from which it is apparent that model predictions of gas production are mostly significantly lower than the actual gas production.

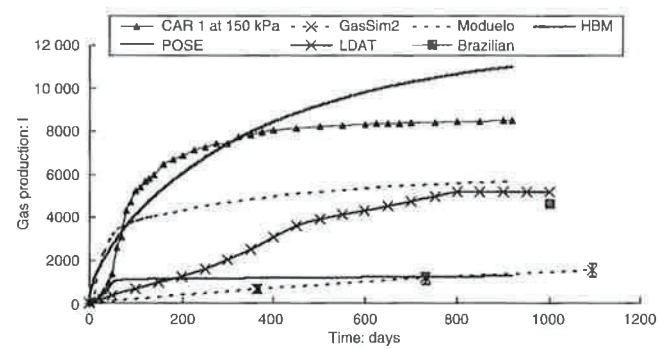


FIG. 19. Measured and predicted total [LFG] gas production for CAR1, from Beaven (2008)

The fit appears disappointing but is not necessarily indicative of a fundamental flaw in the biodegradation models. Rather, it emphasises the need to quantify the gas yield of the waste in question, i.e. the degradable content. Stoichiometric equations indicate precisely how much cellulolytic matter is required to produce a given quantity of landfill gas but the amount of gas produced by a given amount of organic matter depends on its degradability or bioavailability. Some organic matter is readily

degradable, some shielded by lignin; when shielded, degradation proceeds slowly, if at all. So, whilst gas production curves reflect the current rate and progress of biodegradation, knowledge of a parameter like the methane yield coefficients in Eq. 20 is necessary to define the process end point, i.e. the gas volume evolved and mass degraded as a proportion of the total 'organic' content present. Consider Fig. 20, which shows relationships between degradation, gas production and settlement. The stoichiometric relationship between gas production and mass loss is shown as a linear function with the total amount of cellulolytic matter denoted by M_O. M_C is the mass loss associated with current gas production, G_C. M_F is the amount of this waste that will eventually be degraded. The ratio of M_F to M_O is directly related to the yield coefficient C_m in Eq. 20. With this information, and a knowledge of the way in which a volume change parameter such as Λ evolves, it is possible to estimate ultimate long-term settlement magnitudes, S_F. It is through the forensic analysis of challenges of this kind that the role of biodegradation, its evolution in field-scale landfill cells and impact on settlement will be revealed.

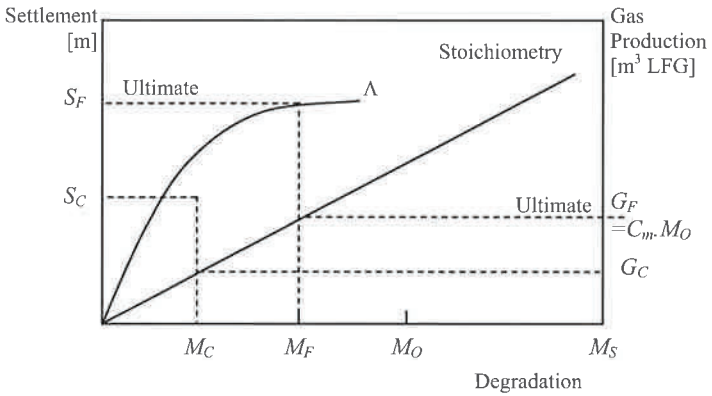


FIG. 20 Progress of settlement as a function of degradation, controlled by void volume change parameter Λ and gas production, via stoichiometric equation, showing limiting condition, i.e. ultimate settlement, defined by yield coefficient.

3.7 SUMMARY & CONCLUDING REMARKS

The analysis of landfill settlement is at a crossroads. Techniques for the analysis of short-term load-related primary compression and long-term settlement have been the subject of much research. For many years, one-dimensional compression and time-dependent analyses have been the main analytical tools. They have been shown to match well field observations over short periods of time and can be extended by the use of two settlement stages. However, the highly empirical nature of the analysis means that long-term settlement predictions will depend on the controlling conditions remaining constant for the life of the cell.

Recently there has been interest in more fundamental models. These models allow for the integration of mechanical, biodegradation and physico-chemical related phenomena. The latter phenomena are not part of the normal soil mechanics analytical toolkit. A number of models have emerged, four have been considered in this chapter, each with its own strength and emphasis. They do, however, all recognise the volumetric consequences of mass loss. Fundamental equations that link stress-related phenomena to microbial processes (and vice versa) are not known. Yet, we have seen here that mass loss is directly related to solid volume loss, which through a decomposition-induced volume change parameter, can be incorporated into settlement calculations. It therefore remains to understand and quantify the relationship between mass loss and the induced change in void volume. It is likely that this will be a function of (i) the stress state, (ii) particle stiffness, size distribution and shape, (iii) particle skeleton stiffness, and (iv) the rate and progress of degradation.

3.8 BIBLIOGRAPHY

Beaven, R. (1999) "The hydrogeological and geotechnical properties of household waste in relation to sustainable landfilling" PhD Thesis, University of London.

Coduto, D.P. and Huitric, R. (1990) "Monitoring landfill movements using precise instruments." Geotechnics of Waste Fills-Theory and Practice. in: A. Landva, G.D. Knowles (Eds.), ASTM STP 1070, Philadelphia, USA, 1990: 358–370.

Durmusoglu, E., Corapcioglu, M.Y. and Tuncay, K. (2005) "Landfill settlement with decomposition and gas generation" *J. Environmental Eng.*, ASCE, Vol 131, No 9: 1311-21.

Fassett, J.B., Leonards G.A. and Repetto, P.C. (1994) "Geotechnical properties of municipal solid waste and their use in landfill design" Waste Tech '94, Solid Waste Association of North America, Silver Springs, Maryland: 1-31.

Gabr, M.A. and Valero, S.N. (1995) "Geotechnical properties of municipal solid waste" *Geotechnical Testing Journal*, Vol 18, No 2: 241-51.

Hudson, A.P., White, J.K., Beaven, R.P. and Powrie, W. (2004) "Modelling the compression behaviour of landfilled domestic waste." Proc . Landfill Process Modelling Workshop, *Waste Man.*. Vol 24: 259-69.

Ivanova, L., Richards, D.J. and Smallman, D.J. (2008) "The long-term settlement of landfill waste" *Proc. I.C.E. Waste and Resource Man.*, Vol.161, WR3: 121-133.

Landva, A.O. and Clark, J.I. (1990) "Geotechnics of waste fill" Geotechnics of Waste Fills - Theory and practice, ASTM STP 1070, eds. Landva, A.O. & Knowles, G.D., ASTM, Philadelphia.

McDougall, J.R. (2008) "Landfill modelling challenge: HBM model predictions" *Proc. I.C.E. Waste and Resource Man.*, Vol 161, WR4: 147-154.

McDougall, J.R. and Pyrah, I.C. (2003) "Modelling load, creep and biodegradation settlement in landfill" Proc. Sardinia 2003, 9th Int'l Waste Man. & Landfill Symp., CISA, Cagliari, 2003.

Park, H., Lee, S.R. and Nam, Y.D. (2002) "Evaluation of decomposition effect on long-term settlement prediction for fresh municipal solid waste landfills" *J. Geotechnical and Geoenvironmental Engrg.*, Vol 128, No 2: 107-118.

Qian, X., Koerner, R. and Gray, D.H. (2002) "Geotechnical Aspects of landfill design and construction" Prentice Hall, New Jersey.

Spikula, D.R. (1998) "Subsidence performance of landfills" *Geotextiles & Geomembranes*, Vol 15: 395-402.

Richards, D.J., Powrie, W. and Beaven, R.P. (1997) "Factors relevant to the determination of final fill levels in landfills" Proc. Sardinia '97. 6th Int'l Landfill Symp., CISA, Cagliari, Italy.

Sharma, H.D. and De, A. (2007) "Municipal Solid Waste Landfill Settlement: Postclosure Perspectives" *J. Geotechnical and Geoenvironmental Engrg.* Vol 133, No 6: 619-629.

Yuen, S.T.S. and McDougall, J.R. (2003) "Effect of enhanced biodegradation on settlement of municipal solid waste landfills." *Australian Geomechanics*, Vol 38, No 2: 17–28.

Zhao, Y, Zhugen, C, Shi, Q. and Huang, R. (2001) "Monitoring and long term predictions of refuse compositions and settlement in large scale landfill" *Waste Man. & Res.*, Vol 19: 160-168.

3.9 REFERENCES

Barlaz, M.A., Ham, R.K. and Schaefer, D.M. (1989) "Mass balance analysis of anaerobically decomposed refuse" J. Environmental Engrg, Vol. 115, No. 6: 1088-1102.

Beaven, R. (2008) "Review of responses to a landfill modelling challenge" Proc. I.C.E. Waste and Resource Man., Vol 161, WR4: 155-166.

Beaven, R. and Powrie, W. (2005) "Hydrogeological and geotechnical properties of refuse using a large scale compression cell" Proc. Sardinia '95 5th Waste Management and Landfill Symposium, CISA, Cagliari, Italy. 1995; Vol. 2: 745-761.

Beaven, R. P., Ivanova, L. K. and Richards, D. J., (2008). "Setting a Challenge to landfill modellers." Proc. Institution of Civil Engineers. *Waste and Resource Management*, Vol. 161, No. 3: 91-98.

Benson, C.H., Barlaz, M.A., Lane, D.T. & Rawe, J.M. (2007) "Practice review of five bioreactor/recirculation landfills" *Waste Man.* Vol 27: 13-29.

Bjarngard, A. and Edgers, L. (1990) "Settlement of municipal solid waste landfills" Proc. 13th Madison Waste Conf., Univ. of Wisconsin-Madison.

Bleiker, D.E., Farquhar G. and McBean, E. (1995) "Landfill settlement and the impact on site capacity and refuse hydraulic conductivity" *Waste Man. & Res.* Vol 13, Number 6, December 1995: 533-554.

Edgers, L., Noble, J.J. and Williams, E. (1992) "A biologic model for long term settlement in landfills" Environmental Geotechnology, eds Usman & Acar, Balkema.

Edil, T.B. Ranguette, V.J. and Wuellner, W.W. (1990) "Settlement of municipal refuse" Geotechnics of Waste Fills - Theory and practice, ASTM STP 1070, eds. Landva, A.O. & Knowles, G.D., ASTM, Philadelphia.

Elagroudy, S.A., Warith, M.A. and Ghobrial, F.H. (2008) "Solid waste settlement in landfills/bioreactor landfills" Waste Man. Res. Trends, ed Golush, T.V., Nova Science Publishers: 165-220

El-Fadel, M. (1999) "Leachate recirculation effects on settlement and biodegradation rates in MSW landfills" *Environmental Technology*, Vol 20: 121-33.

El-Fadel, M. and Khoury, R. (2000) "Modelling settlement in MSW Landfills: a critical review" *Critical Reviews in Env. Sci & Techn*, Vol 30, No 3: 327-361.

El-Fadel, M., Shazbak, S., Saliby, E. and Leckie, J. (1999) "Comparative assessment of settlement models for municipal solid waste landfill applications" *Waste Man. & Res.*, Vol 17, No 5: 347-368.

Farquhar, G.J. and Rovers, F.A. (1973) "Gas production during refuse decomposition" *Water, Air, and Soil Pollution*, Vol. 2: 483-495.

Hossain, M.S. and Gabr, M.A. (2005) "Prediction of Municipal Solid Waste Landfill Settlement with Leachate Recirculation" Waste Containment and Remediation, Proc Geo-Frontiers 2005 Congress.

Gibson, R.E. and Lo, K.Y. (1961) "A theory of soils exhibiting secondary compression" *Acta Polytechna Scandinavica* C, Vol 10: 296, 1-15.

Grisolia, M. Gasparini, A. and Saetti, G.F. (1993) "Survey on waste compressibility" Proc. Sardinia '93. 4th Int'l Landfill Symp., CISA, Cagliari, Italy.

Halvadakis, C.R., Findikakis, A.N., Papelis, C. and Leckie, J.O. (1988) "The Mountain View controlled landfill project field experiment" *Waste Management and Research* Vol. 6, No. 2: 103-114.

Hossain, M.S., Gabr, M.A. and Barlaz, M.A. (2003) "Relationship of compressibility parameters to municipal solid waste decomposition" *J. Geotechnical & Geoenvironmental Engrg.* Vol 129, No 12: 1151-1158.

Jessberger, H.L. and Kockel, R. (1995) "Determination and assessment of the mechanical properties of waste materials." *Proc. Int'l. Symp. GREEN '93, Bolton, UK*, Balkema, Rotterdam.

Kavazanjian, E. Matasovic, N. and Bachus, R.C. (1999) "Large-diameter static and cyclic laboratory testing of municipal solid waste" Proc. Sardinia '99. 7th Int'l Landfill Symp., CISA, Cagliari, Italy.

Knox (1999) "Review of the Brogborough and Landfill 2000 test cells monitoring data" Environment Agency R&D Technical Report P231, WRc, Swindon, UK.

König, D., Kockel, R. and Jessberger, H.L. (1996) "Zur Beurteilung der Standsicherheit und zur Prognose der Setzungen von Mischabfalldeponien" Proc. 12. Nürnberger Deponieseminar (Prühs, H., Müllner, B. (eds), Nürnberg: pp 95 – 117.

Landva, A.O., Clark, J.I., Weisner, W.R. and Burwash, W.J. (1984) "Geotechnical engineering and refuse landfills" Proc. 6th Nat. Conf. on Waste man., Vancouver.

Leckie, J.O., Pacey, J.G. and Halvadakis, C.P. (1979) "Landfill management with moisture control" *J. Environmental Engrg. Div. ASCE* Vol. 105: 337–355.

Ling, H.I., Leshchinsky, D. Mohri, Y. and Kawabata, T. (1998) "Estimation of municipal solid waste landfill settlement" *J. Geotechnical & Geoenvironmental Engrg.* Vol 124, No 1: 21-28.

Lobo, A., Lopez, A., Cobo, N. and Tejero, I. (2008) "Simulation of municipal solid waste reactors using Moduelo" *Proc. of the Inst. Civ. Eng.. Waste and Resource Man.*, Vol.161, WR3: 99-104.

Machado, S.L., Carvalho, M.F. and Vilar, O.M. (2002) "Constitutive model for municipal solid waste" *J. Geotechnical and Geoenvironmental Engrg.* Vol 128, No 11: 940-952.

Machado, S.L., Vilar, O.M. and Carvalho, M.F. (2008) "Constitutive model for long term municipal solid waste mechanical behavior" *Computers & Geotechnics*, Vol 35: 775-790.

Marques, A.C.M., Filz, G.M. and Vilar, O.M. (2003) "Composite compressibility model for municipal solid waste" *J. Geotech. and Geoenvir. Engrg.* Vol. 129, No 4: 372-378.

McDougall J.R. (2007) "A hydro-bio-mechanical model for settlement and other behaviour in landfilled waste" *Computers & Geotechnics*, Vol. 34: 229-246.

McDougall, J.R. (2010) "Science and engineering of landfilled waste mechanics", Geotechnical Characterization, Properties, and Testing of Municipal Solid Waste, ASCE GSP (this volume).

McDougall J.R. and Pyrah I.C. (2004) "Phase relations for decomposable soils." *Geotechnique*, Vol. 54, No.7: 487-494.

Merz, R.C. and Stone, R. (1962) "Landfill settlement rates" Public works, Vol 93, (9): 103-106, 210-212

Morris, D.V and Woods, C.V. (1990) "Settlement and engineering design considerations in landfill and final cover design" Geotechnics of Waste Fills - Theory and practice, ASTM STP 1070, eds. Landva, A.O. & Knowles, G.D., ASTM, Philadelphia.

Olivier, F. and Gourc, J.P. (2007) "Hydromechanical behaviour of municipal solid waste subject to leachate recirculation in a large-scale compression reactor cell." Waste Man.

Olivier, F. Gourc, J.P., Munoz, M.L., Budka, A. and Denechau, P. (2003) "Validation of an incremental waste settlement prediction model with surface survey data" Proc. Sardinia 2003. 9th Int'l Waste Man. & Landfill Symp., CISA, Cagliari, Italy.

Oweis, I.S. and Khera, R.P. (1998) "Geotechnology of waste management" PWS, Boston.

Park, H and Lee, S.R. (1997) "Long-term settlement behaviour of landfills with refuse decomposition" *J. Resource Man. Technology*, Vol 24, No 4: 159-165.

Park, H. and Lee, S.R. (2002) "Long-term settlement behaviour of MSW landfills with various fill ages" *Waste Man. & Res.* Vol. 20: 259 – 268.

Rees, J. F. (1980). "Optimization of methane production and refuse decomposition in landfills by temperature control." *J. Chem. Technol. Biotechnol.*, Vol 30, No 8, 458-465.

Reinhart, D.R. and Townsend, T.G., (1998) "Landfill Bioreactor Design and Operation" Lewis Publishers, New York.

Sowers, G.F. (1973) "Settlement of waste disposal fills" Proc 8th Int. Conf. on Soil Mechs. & Foundation Eng., Moscow: 207-210.

van Meerten, J.J., Sellmeijer, J.B. and Pereboom, D. (1995) "Prediction of landfill settlements" Proc Sardinia '95. 5th Int'l Landfill Symp, CISA, Cagliari, Italy.

Wall, D.K. and Zeiss, C. (1995) "Municipal landfill biodegradation and settlement" *J. Environmental Eng.*, ASCE, Vol 121, No 3, (214-223).

Watts, K. and Charles, J.A. (1990) "Settlement of recently placed domestic refuse" Geotechnical Engineering, *Proc. of the Inst Civ. Eng*, Vol 88: 971-993.

Watts, K. and Charles, J.A. (1999) "Settlement characteristics of landfilled wastes" Proc. Inst. Civil Eng. Geotechnical Engineering. Vol 137. No 4: 225-234.

White, J., Robinson, J. and Ren, Q. (2004) "Modelling the biochemical degradation of solid waste in landfills" Waste Man. Vol 24: 227-240.

Yen, B.C. and Scanlon, B (1975) "Sanitary landfill settlement rates" *J. Geotechnical Engrg. Div.*, ASCE, Vol 101, GT5,: 475-487.

Yuen, S.T.S. (1999) Bioreactor landfills promoted by leachate recirculation: A full scale study. PhD Thesis, University of Melbourne, Australia.

Attachment A-2.3.2a

NTH Consultants, Ltd. (2008) *Settlement Monitoring Report: Master Cell VI-E – Phase I*.

Introduction