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Permit No.	Date	Document ID No.
28-03	March 08, 2016,	25737

March 8, 2016

Received by an e-mail
Date: March 8, 2016
Solid Waste Section
Raleigh Central Office

Mr. Ming-Tai Chao
North Carolina Department of Environment and
Natural Resources
Division of Waste Management
Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Subject: Dare County C&D Landfill
Dare County, North Carolina
Substantial Amendment and Phase V Permit to Construct Application
Revision Request

Dear Mr. Chao:

On behalf of Dare County, CDM Smith is requesting a revision to a requirement in the Substantial Amendment and Phase V Permit to Construct Application. As discussed in the Operations Plan (Section 5 – Compacted Fill (Base Pad)), the internal friction angle of compacted fill was specified to be at least 30 degrees. In order to evaluate the ability of available onsite soils to meet the requirements in the Permit to Construct application, CDM Smith collected two (2) geotechnical samples of stockpiled soils from the onsite borrow area to be used for the Phase V base pad construction and found one sample to be slightly off the required value for friction angle.

In addition to several other parameters, the geotechnical samples were analyzed for internal friction angle via triaxial tests (ASTM D4767). One sample demonstrated an internal friction angle of 35.60 degrees, but the other was measured at 29.46 degrees. Copies of the triaxial test results for the 2 samples are provided in **Attachment A**. Based on the test result, a CDM Smith geotechnical engineer reviewed the geotechnical evaluation and determined that a revised minimum internal friction angle of 28 degrees would still be sufficient to meet the factor of safety used for landfill design, without revision. Copies of the global stability analysis scenarios are provided in **Attachment B**.

In order to utilize the onsite soils and to limit the likelihood of having to remove and replace a failing test area during base pad construction, CDM Smith would like to revise the construction materials conformance requirements from an internal friction angle of 30 degrees to 28 degrees. As stated above, revision of the angle should alleviate the potential issue of deficient onsite materials and it will not have an impact on the geotechnical design of the landfill.





Mr. Ming-Tai Chao
March 8, 2016
Page 2

If you have any questions or comments, please do not hesitate to contact me by email at colonemf@cdmsmith.com or by phone at (919) 325-3569.

Very truly yours,

Mathew F. Colone, P.G.
CDM Smith Inc.

Attachments

cc: Edward Mann, Dare County
Kenton Yang, CDM Smith

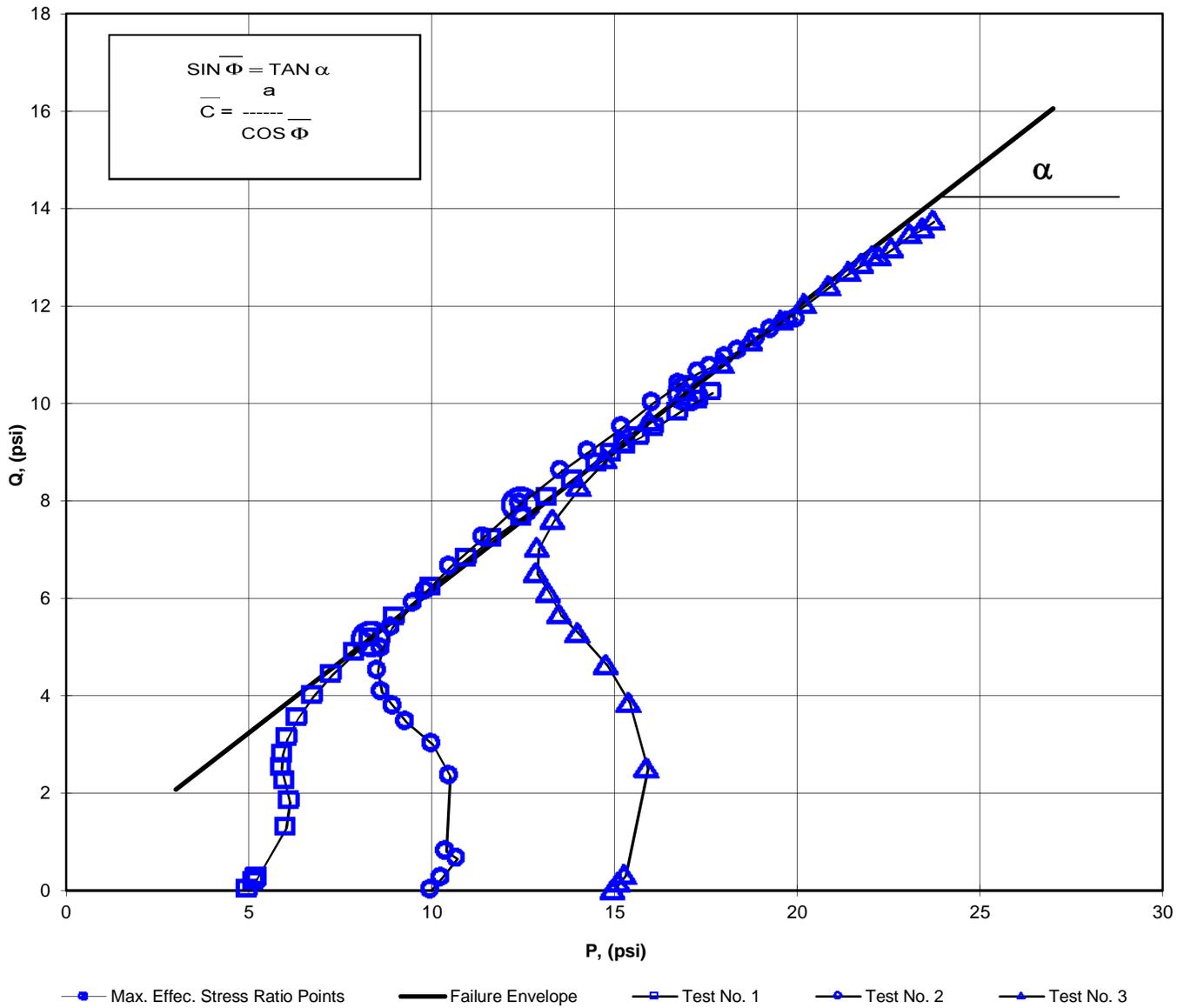


Attachment A
Stockpile Triaxial Test Results

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11**

Client:	CDM SMITH, INC.	Boring No.:	STOCKPILE
Client Reference:	DARE COUNTY C&D LF	Depth (ft):	N/A
Project No.:	2015-775-001	Sample No.:	N
Lab ID:	2015-775-001-001		

Consolidated Undrained Triaxial Test with Pore Pressure



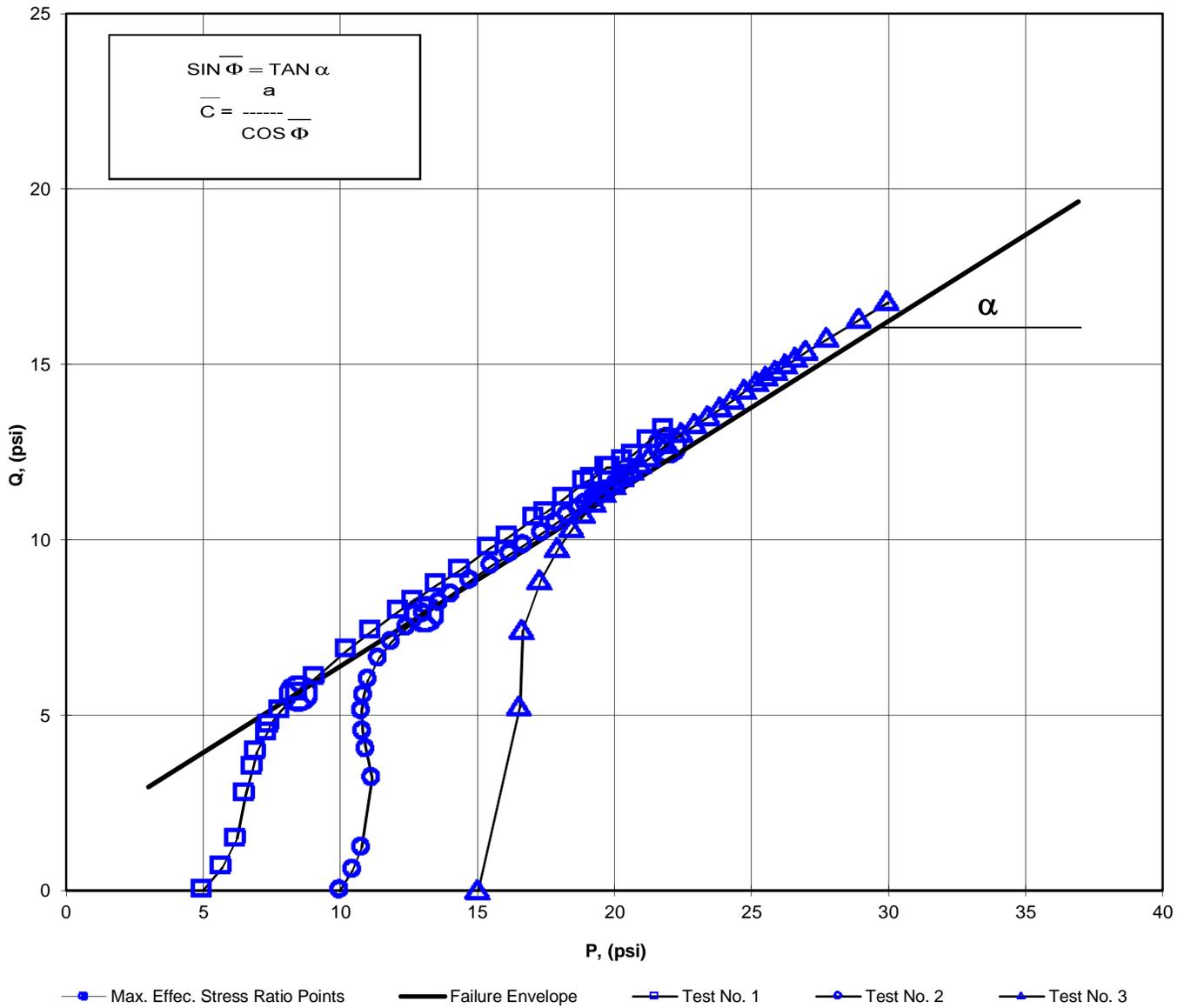
a	=	0.00	\overline{C}	=	0.00
α	=	30.2	$\overline{\Phi}$	=	35.60

Tested By: AF Date: 12/7/15 Approved By: MPS Date: 12/14/15

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11**

Client:	CDM SMITH, INC.	Boring No.:	STOCKPILE
Client Reference:	DARE COUNTY C&D LF	Depth (ft):	N/A
Project No.:	2015-775-001	Sample No.:	S
Lab ID:	2015-775-001-002		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	0.00	\overline{C}	=	0.00
α	=	26.2	$\overline{\Phi}$	=	29.46

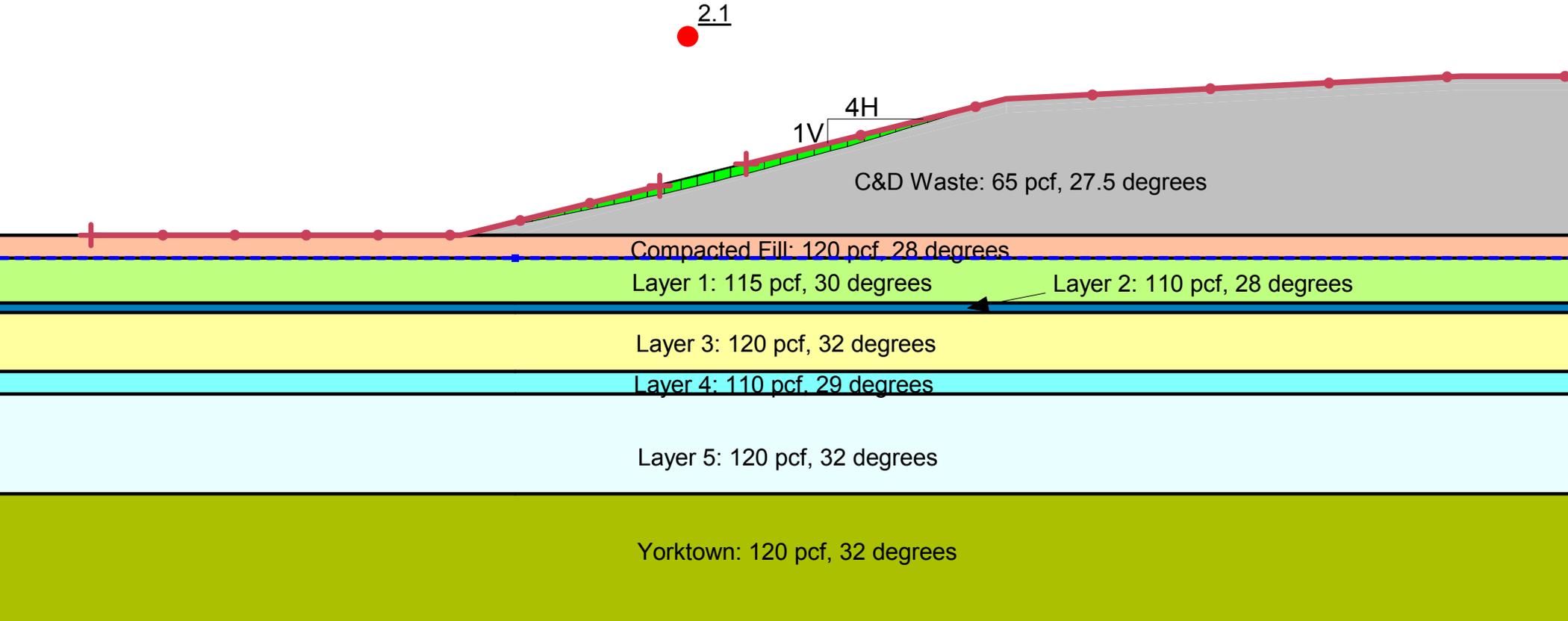
Tested By: SFS Date: 12/9/15 Approved By: MPS Date: 12/17/15

Attachment B

Global Stability Analysis Scenarios

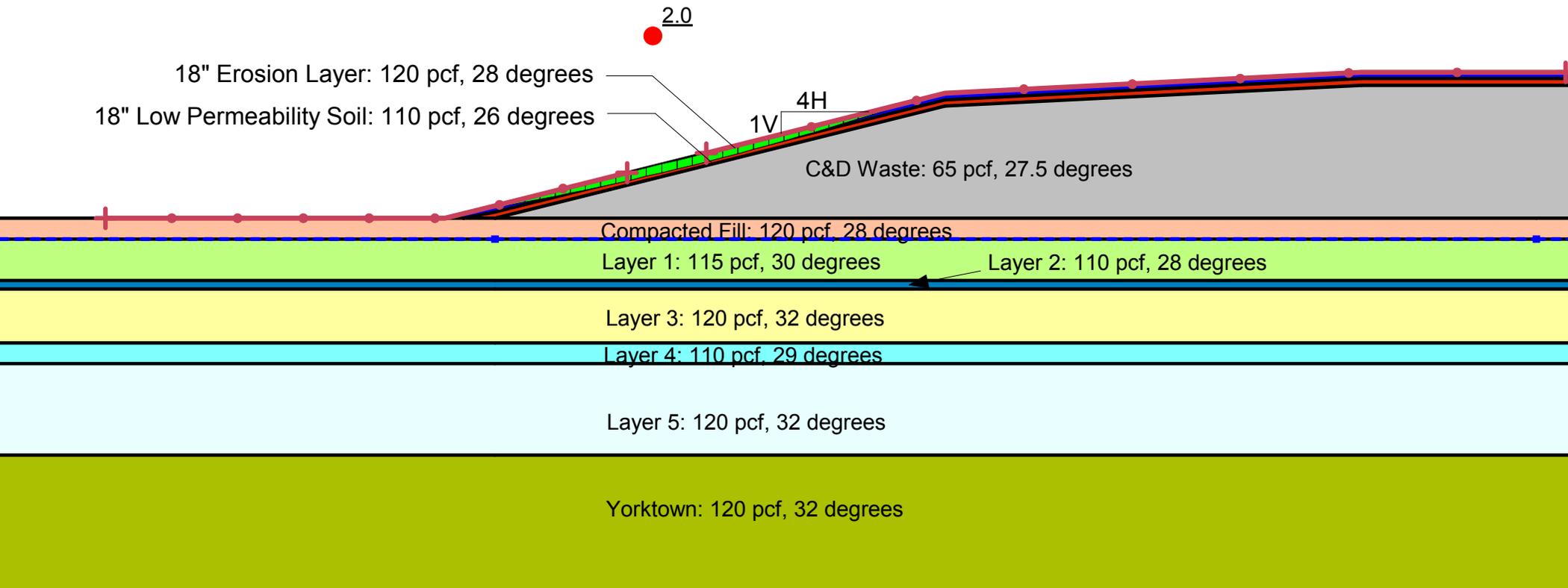
Dare County C&D Landfill Proposed Phase V Global Stability Analyses

End of Waste Placement



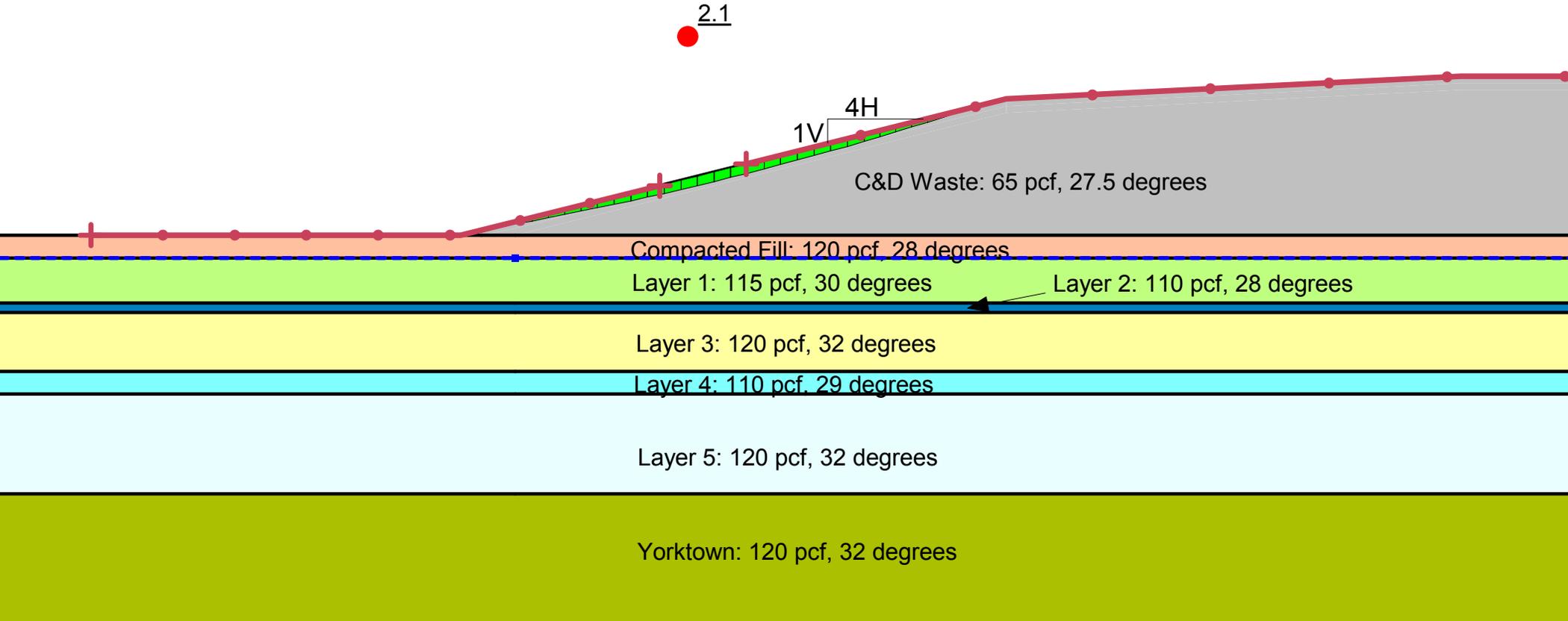
**Dare County C&D Landfill
Proposed Phase V
Global Stability Analyses**

Final Closure Grade



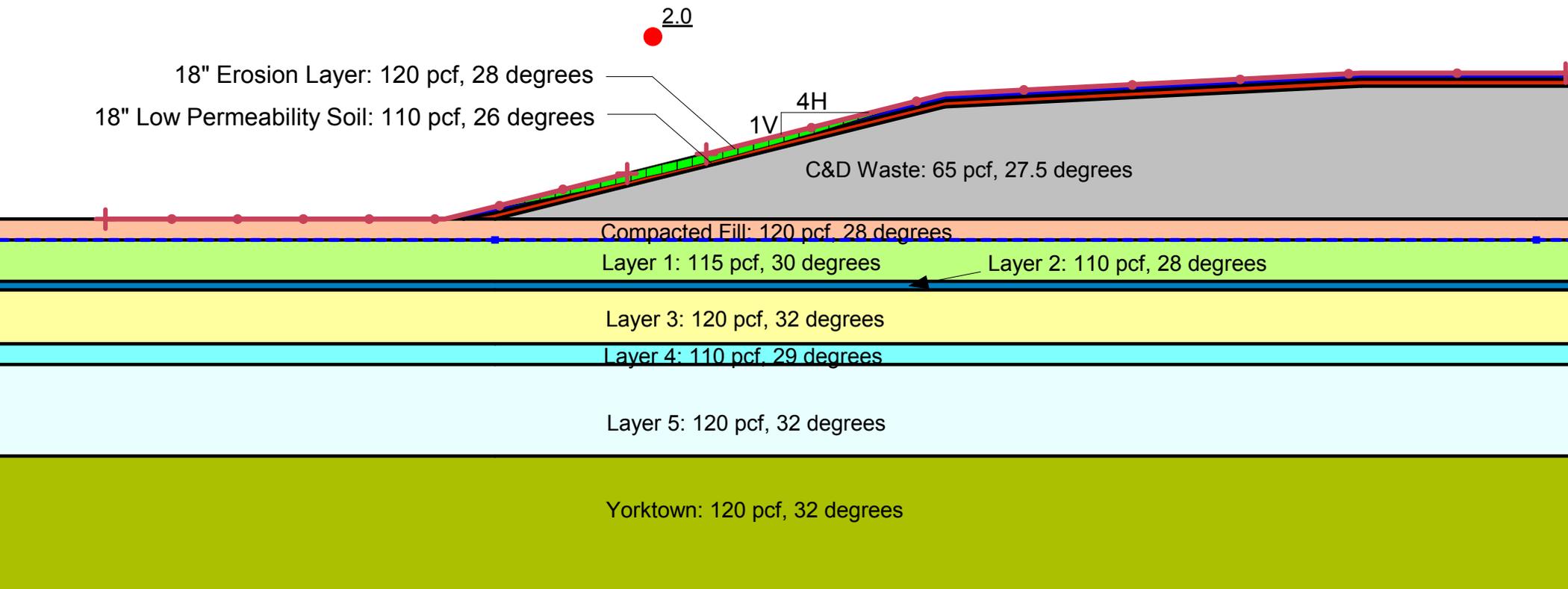
Dare County C&D Landfill
Proposed Phase V
Global Stability Analyses

End of Waste Placement



**Dare County C&D Landfill
Proposed Phase V
Global Stability Analyses**

Final Closure Grade



7.6 Slope Stability Analysis

7.6.1 General

Slope stability analyses were performed for the proposed Phase V expansion by using SLOPE/W version 2012 software program distributed by GEO-SLOPE International, Ltd. Stability analyses were performed for the following cases:

- End of waste placement condition and
- Final closure condition after final cap system installed.

7.6.2 Subsurface Design Properties

The assumed design properties for the subsurface soils are based upon SPT N-values and laboratory testing and are listed in Table 7-3.

7.6.3 Landfill Design Properties

The final landfill components will consist of the following in order of their occurrence below final closure grade;

- 18-inch-thick erosion layer,
- 18-inch-thick low permeability barrier layer,
- C&D waste, and
- Minimum 5-foot-thick compacted fill pad.

The assumed design properties of the components are listed in **Table 7-4**.

Table 7-4: Summary of Material Design Properties

Layer No.	Materials	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	Basis for Parameter Selection
1	Erosion Layer	120	28	0	From 2005 Permit Application Report and also CDM's Experiences on Similar Projects
2	Low Permeability Barrier Layer	110	26	0	
2	C&D (Waste)	65	27.5	0	
3	Compacted Fill Layer	120	28	0	

7.6.4 Global Stability Analyses

7.6.4.1 General

Analyses for overall (global) stability was performed using the SLOPE/W 2012 modeling software package from Geo-Slope International. This computer program uses the inputted slope geometry, soil and waste properties, and groundwater conditions and calculates a factor of safety failure of the overall landfill mass. The minimum acceptable factor of safety against overall slope failure before, during, and after waste placement is 1.5.

Section 5

Compacted Fill (Base Pad)

The materials, construction and certification requirements in this Section are intended to comply with Rule .0542 (2) and .0542 (5). This section applies to requirements for construction of the C&D landfills base pad.

5.1 Materials

A. Compacted fill materials shall conform to the following properties:

- | | | |
|---------------------------|-----------------------------|---|
| ▪ Soil Classification | ASTM D2487 | SC, ML, CL, MH, CH
(Upper two feet of base pad only) |
| ▪ As-Built Thickness | Topographic Survey | landfill base pad
minimum thickness will be 5 ft |
| ▪ Internal Friction Angle | ASTM D3083
or ASTM D4767 | 28 degrees |

* The Engineer may modify these conformance test properties based on the results of initial conformance testing, provided modification of these results does not compromise the hydraulic conductivity or internal friction angle test results.

- B. Compacted fill shall be a mineral soil free of organic material, loam, wood, trash, snow, ice, frozen soil, and other objectionable material.
- C. The Contractor shall use adequate construction quality control (CQC) to verify the conformance of materials according to this section. The Contractor shall submit to the Engineer, within 30 days of the effective date of the Agreement, representative samples from the soil source(s). In the case that the submitted samples fail to conform to the required criteria, the Contractor may locate another source, and upon approval of that source by the Engineer, submit samples from the new source for conformance testing at the cost of the Contractor.
- D. If the Contractor plans to use any blending of soils as compacted fill material, the Contractor shall submit the blended soil for the Engineer's approval in accordance with the requirements.

5.2 Conformance Testing

- A. Initial conformance testing shall be performed by the quality assurance laboratory (QAL) on samples from the soil source to assure compliance with the Specifications. The samples will be obtained from multiple test pits to be dug by the Contractor under the direction of the QAL. The following tests shall be performed on the samples.
1. Soil Classification (ASTM D2487)
 2. Sieve Analysis (ASTM D422)
 3. Atterberg Limits (ASTM 4318)

Chao, Ming-tai

From: Colone, Mathew <ColoneMF@cdmsmith.com>
Sent: Tuesday, March 08, 2016 1:45 PM
To: Chao, Ming-tai
Subject: RE: Dare County Phase V PTC - Materials Testing Revision
Attachments: Section 5_Engineering Plan_Appendix B_Geotechnical_Appendix D_Revised 03082016.pdf; Section 5_Engineering Plan_Appendix B_Geotechnical_Page 7-12_Revised 03082016.pdf; Section 6_CQA Plan_Section 5_Page 5-1_Revised 03082016.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Thanks Ming,
See attached. Revised pages for CQA Plan (Section 6, page 5-1), Engineering Plan (Section 5, Appendix B, page 7-12), and Engineering Plan (Section 5, Appendix B, Appendix D).
Please let me know if you need anything else.
Thanks again!
Mat

From: Chao, Ming-tai [mailto:ming.chao@ncdenr.gov]
Sent: Tuesday, March 08, 2016 12:37 PM
To: Colone, Mathew <ColoneMF@cdmsmith.com>
Subject: RE: Dare County Phase V PTC - Materials Testing Revision

Hi Mat:

E-mail me of the revised page(s) is just fine. I will combine the all submittal into a single document & DIN for filing & reviewing/approval purposes.

Ming Chao
Ming-Tai Chao, P.E.
Environmental Engineer
Permitting Branch, Solid Waste Section
NCDEQ, Division of Waste Management
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From: Colone, Mathew [<mailto:ColoneMF@cdmsmith.com>]
Sent: Tuesday, March 08, 2016 12:24 PM
To: Chao, Ming-tai <ming.chao@ncdenr.gov>
Subject: RE: Dare County Phase V PTC - Materials Testing Revision

Thanks Ming.

I'll check, but I think that the CQA section 5 is the only place that the 30 degree friction angle reference resides. That being said, can I email you the revised section(s)?

Thanks,
Mat

From: Chao, Ming-tai [<mailto:ming.chao@ncdenr.gov>]
Sent: Tuesday, March 08, 2016 10:46 AM
To: Colone, Mathew <ColoneMF@cdmsmith.com>
Subject: RE: Dare County Phase V PTC - Materials Testing Revision

Hi Mat:

A quick thought. In addition to the document that you sent to me yesterday, you may also have to update the Section 5 – Compact Fill (base Pad) of the CQA Plan and/or other area in the approved PTC Application for Phase V (DIN 24526) that may be subject to revision due to this change/modification.

Ming Chao

Ming-Tai Chao, P.E.
Environmental Engineer
Permitting Branch, Solid Waste Section
NCDEQ, Division of Waste Management
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ming.chao@ncdenr.gov
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From: Colone, Mathew [<mailto:ColoneMF@cdmsmith.com>]
Sent: Monday, March 07, 2016 5:35 PM
To: Chao, Ming-tai <ming.chao@ncdenr.gov>
Subject: RE: Dare County Phase V PTC - Materials Testing Revision

Ok. I'll get it signed in the morning and send it on.

Thanks,
Mat

----- Original message -----

From: "Chao, Ming-tai" <ming.chao@ncdenr.gov>
Date: 03/07/2016 4:54 PM (GMT-05:00)
To: "Colone, Mathew" <ColoneMF@cdmsmith.com>
Subject: RE: Dare County Phase V PTC - Materials Testing Revision

Mat: Any NC PE with CDM Smith can sign/approve it. Thanks.

Ming

From: Colone, Mathew [<mailto:ColoneMF@cdmsmith.com>]
Sent: Monday, March 07, 2016 4:49 PM
To: Chao, Ming-tai <ming.chao@ncdenr.gov>
Subject: RE: Dare County Phase V PTC - Materials Testing Revision

No problem. Kenton is out this week. Can the geotechnical engineer (Jintao Wen) seal that letter?

Thanks!

Mat

From: Chao, Ming-tai [<mailto:ming.chao@ncdenr.gov>]
Sent: Monday, March 07, 2016 4:47 PM
To: Colone, Mathew <ColoneMF@cdmsmith.com>
Cc: Wen, Jintao <WenJ@cdmsmith.com>; Yang, Kenton <YangKJ@cdmsmith.com>; Edward Lee Mann <edwardlee@darenc.com>; Shanna Fullmer <shanna@darenc.com>; Clyde Gard <clydeg@darenc.com>;
Mussler, Ed <ed.mussler@ncdenr.gov>
Subject: RE: Dare County Phase V PTC - Materials Testing Revision

Hi Mat:

This request involves the change of design and construction spec of the project; by law, we need a NC PE to sign/seal/approve the modification document. I am sorry to be picky on this matter, and Kenton can do it (co-sign the letter) easily.

Ming Chao

Ming-Tai Chao, P.E.
Environmental Engineer
Permitting Branch, Solid Waste Section
NCDEQ, Division of Waste Management
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From: Colone, Mathew [<mailto:ColoneMF@cdmsmith.com>]
Sent: Monday, March 07, 2016 3:54 PM
To: Chao, Ming-tai <ming.chao@ncdenr.gov>
Cc: Wen, Jintao <WenJ@cdmsmith.com>; Yang, Kenton <YangKJ@cdmsmith.com>; Edward Lee Mann <edwardlee@darenc.com>; Shanna Fullmer <shanna@darenc.com>; Clyde Gard <clydeg@darenc.com>
Subject: Dare County Phase V PTC - Materials Testing Revision

Hi Ming,

Attached is a letter request to revise the geotechnical testing requirements for the Dare County Phase V base pad. In particular, we are requesting a variance from the specified internal friction angle of the base pad material in the Permit To Construct. The minimum angle specified in the PTC is 30 degrees and we are requesting a variance to a minimum of 28 degrees.

We intend to put the project out to bid within the next two weeks, with construction to start in late May or June.

Please let me know if you have any questions.

Thanks,

Mat Colone

Mathew F. Colone, P.G. | Geologist | CDM Smith | 5400 Glenwood Avenue, Suite 400 Raleigh, NC 27612 |

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