MidAmerican ENERGY
OBSESSIVELY, RELENTLESSLY AT YOUR SERVICE.

4299 NW Urbandale Drive
Urbandale, Iowa 50322

August 23, 2011

Delivered via E-Mail to
hoffman.stephen@epa.gov

Mr. Stephen Hoffman
U.S. Environmental Protection Agency
Two Potomac Yard
2733 South Crystal Drive
5th Floor, N-5838
Arlington, Virginia 22202-2733

Re: Responses to Recommendations in Final Coal Combustion Waste Impoundment Round 7 - Dam Assessment Report for Riverside Generating Station

Dear Mr. Hoffman:

MidAmerican Energy Company ("MidAmerican") appreciates the opportunity to provide responses to the recommendations outlined in the Final Coal Combustion Waste Impoundment Round 7 - Dam Assessment Report for Riverside Generating Station. The specific recommendations were summarized in EPA's June 26, 2011 letter, Enclosure 2, submitted to MidAmerican's Ms. Cathy Woollums.

MidAmerican takes its environmental responsibilities very seriously, and as you will note in the responses, MidAmerican has undertaken a significant effort to increase the slope stability safety factor of Riverside's South Ash Pond to at least 1.5. As previously provided in correspondence with both Dewberry and EPA, the South Ash Pond (before modifications) exhibited factors of safety between 1.25 and 1.32. While it is recognized that these levels are below the recommended safety factor of 1.5, it does not indicate that the impoundment was near the point of failure, nor, in my opinion, does it justify a "poor" ranking.

Since spring 2011, construction activities have been progressing to increase the stability of the South Ash Pond levee structure, and that project is now nearing completion. The plans for this $2 million project were previously provided as Attachment G in the letter from MidAmerican to EPA dated March 4, 2011. Once this project is finished in September 2011, the final slope stability safety factors will range from 1.57 to 1.62, well above the minimum recommended levels.

For the above reasons, MidAmerican respectfully requests EPA to reevaluate the ranking for the South Ash Pond before publically releasing the report. Since the work is nearing completion, but not yet final, it should be reasonable to request that a ranking of "fair" currently be assigned to this pond. Once the work is complete next month, and documentation of such is provided to EPA, the ranking should be upgraded to "satisfactory".

All of the documentation to support this request is provided in the attachments. I hope you find the responses complete and consistent with your expectations. However, if you have any questions or require any additional information, please don't hesitate to contact me.

Sincerely,

Kevin D. Dodson
Director – Environmental Programs,
Compliance and Permitting
Phone: 515-281-2692
kddodson@midamerican.com

Attachments

cc: Doug Haiston
Dave Ulozas
Cathy Woollums
Dave Maystrick

Riverside Generating Station Recommendations

1.2.1 Recommendations Regarding the Structural Stability

EPA Comment: None appear warranted for the North Ash Pond.

MEC Response: MidAmerican agrees that no structural stability improvements are warranted for the North Ash Pond.

EPA Comment: Corrective measures should be implemented to improve the stability of the South Ash Pond in order to meet required safety standards for dams. MEC is aware of the deficiency and is preparing and intends to implement plans to address this concern. USEPA has requested that MEC document their plans for the improvement.

MEC Response: A project was initiated June 17, 2011, to improve the slope stability factor of the South Ash Pond such that it meets or exceeds the required factor of safety of 1.5. MidAmerican Energy Company ("MidAmerican") retained a qualified contractor to install dewatering wells and inclinometers, excavate the existing rip rap armor components, excavate the existing levee embankment material down to an elevation of 564 Mean Sea Level, and replace the embankment in compacted layers utilizing suitable materials and geogrid reinforcement. The majority of the project has already been completed and it is on schedule for final completion in September 2011.

During excavation of the levee embankment materials, a geotechnical contractor was retained to complete additional borings at the toe of the levee to obtain the necessary data to confirm assumptions previously made and allow completion of a more accurate slope stability analysis.

With this new information, the projected factor of safety after completion of this project will exceed the required factor of safety of 1.5. Please refer to Exhibit A for the Terracon reports detailing the newly calculated slope stability factors of safety.

The following photographs provide visual documentation of the status of the South Ash Pond levee improvement project.

Excavating embankment at about Station 11+50
Direction Looking: North Date: 07/11/2011

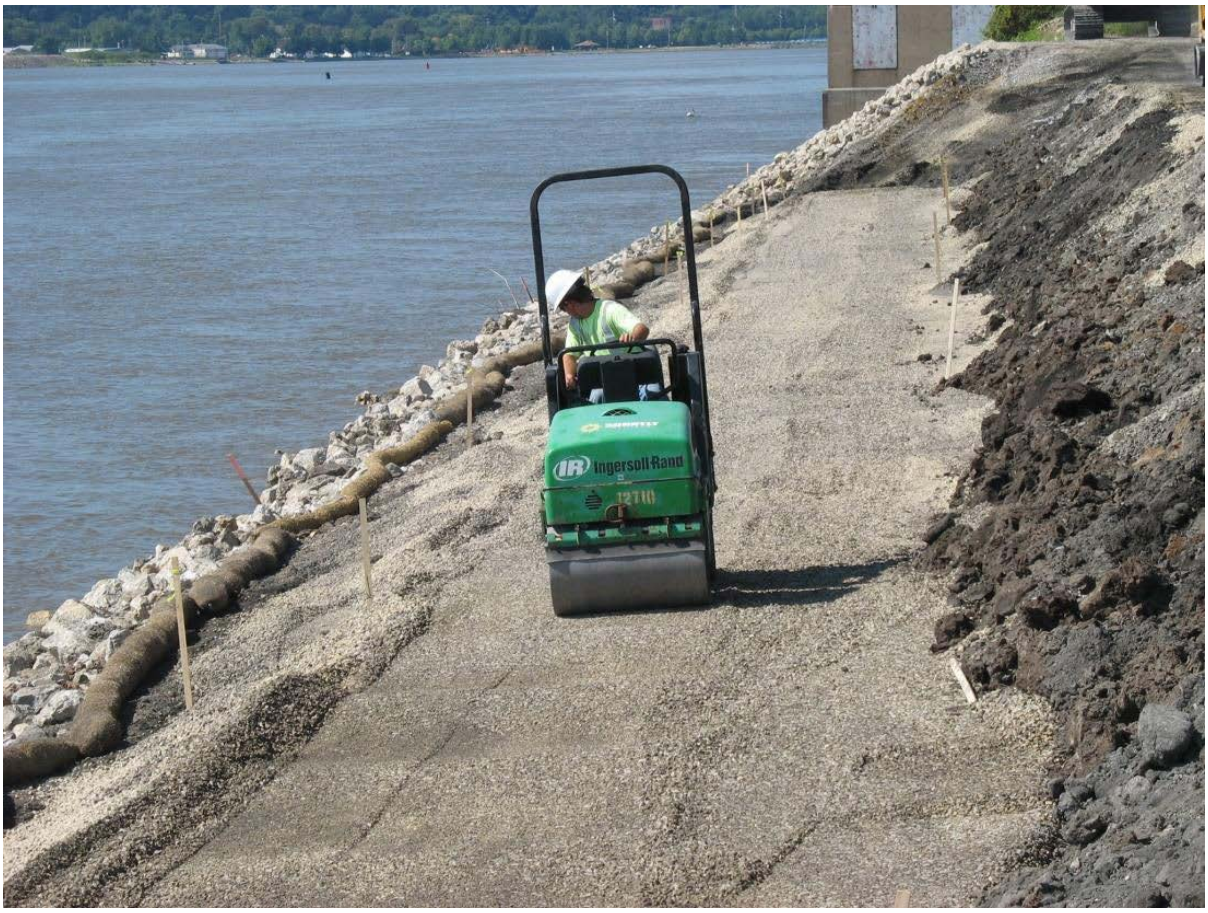
Proof rolling base of excavation at about Station 12+50
Direction Looking: South Date: 07/12/2011

Dressing up slope before placement of bedding material
Direction Looking: South Date: 07/21/2011

Bedding material on improved slope
Direction Looking: South Date: 07/15/2011

Additional borings being drilled at about Station 7+55 at toe of levee
Direction Looking: Northeast Date: 07/26/2011

Geogrid placed at elevation 566’ from about Station 6+00 to about Station 8+95
Direction Looking: South Date: 07/27/2011



Compacting clean stone backfill at about elevation 566’
Direction Looking: South Date: 08/03/2011

Improved slope at about Station 8+00
Direction Looking: South Date: 07/29/2011

1.2.2 Recommendations Regarding the Maintenance and Methods of Operation

EPA Comment: Maintenance should be performed on the North Ash Pond embankments consisting of the removal of thick woody-stemmed vegetation, dense brush and trees covering the upstream and downstream slope and establishing a grassed condition. Photo documentation has been provided by MidAmerican (see Appendix A, Doc 13), subsequent to the site visit, that indicate that this maintenance has been performed.

MEC Response: On May 25, 2011, a contractor was retained to remove all of the thick woody-stemmed vegetation, dense brush, and trees covering parts of the crest and the upstream and downstream slopes of the embankment at the North Ash Pond. The initial phase of work was completed May 28, 2011. Supporting photographs were submitted in MidAmerican's June 3, 2011, "Comments to the Draft Coal Combustion Waste Impoundment Round 7 Dam Assessment Report for Riverside Generating Station (Site #15)".

Since completion of that work, MidAmerican retained the contractor that is completing the South Ash Pond levee improvement project to remove all remaining tree stumps from the North Ash

Pond crest and embankment slopes, dress up the crest and upstream and downstream slopes, and seed the crest and slopes of the North Ash Pond levee embankment. That project was initiated August 10, 2011, and was completed August 16, 2011. Once the new vegetation is established, the slopes and crest of the levee will be mowed at least two or three times per growing season to maintain the structural integrity of the embankments.

The following photographs provide visual documentation of the status of the North Ash Pond levee improvement project.

North Pond Embankment after removal of stumps and dressing up
Direction: Looking North Date: 8/15/2011

North Pond Embankment after removal of stumps and dressing up
Direction: Looking Southeast Date: 8/15/2011

North Pond Embankment after seeding
Direction: Looking North Date: 8/17/2011

North Pond Embankment after seeding
Direction: Looking South Date: 8/17/2011

1.2.3 Recommendations Regarding the Field Observations

EPA Comment: A thorough visual observation should be made of the North Ash Pond embankments by the State of Iowa now that MidAmerican has removed thick woody-stemmed vegetation, dense brush and trees covering the upstream and downstream slopes.

MEC Response: MidAmerican will extend an offer to the Iowa Department of Natural Resources to visit Riverside Generating Station to observe the refurbished levee structures for the North Ash Pond and South Ash Pond.

1.2.4 Recommendations Regarding Continued Safe and Reliable Operation

EPA Comment: The North Ash Pond is recommended to be deactivated as it no longer receives coal combustion wastes.

MEC Response: As noted, the North Ash Pond no longer receives coal combustion wastes. However, MidAmerican does not plan to cap and close the North Ash Pond since it is currently

utilized to receive storm water runoff from the coal pile area. As such, MidAmerican will continue to inspect the North Ash Pond to ensure the integrity of the levees are well maintained.

EPA Comment: The South Ash Pond needs immediate remedial action to improve the factors of safety against slope instability.

MEC Response: Please refer to the response to Subsection 1.2.1 above. Work was initiated immediately after the Mississippi River level stabilized following the spring 2011 flooding.

Terracon

August 17, 2011

HGM Associates, Inc.
640 5th Avenue
Council Bluffs, Iowa 51502

Attention: Mr. Terry Smith, P.E.

Re: Interim Report - Results of Global Stability Analyses Revisions
South Ash Containment Pond Embankments
Riverside Generating Station
Bettendorf, Iowa
Terracon Project No. 07105081/02105081G

Dear Mr. Smith,

As requested, Terracon Consultants Inc. (Terracon) has revised our global stability analyses for the South Ash Containment Pond Embankments under Steady State Seepage conditions. To meet a minimum factor of safety of 1.5 under Steady State Seepage conditions as required by USACE embankment dam criteria, we recommended performing additional exploration during construction of the slope face remediation to better define the geometry and characteristics of the original 1968 embankment materials present beneath the toe of the embankments (reference out May 26, 2011 correspondence). To date, three (3) of the additional four (4) borings planned to augment the subsurface data have been completed. The fourth boring will be completed once the contractor has provided access to the final boring location. This letter presents our opinions based on the additional information from the three (3) supplemental borings performed to date. A complete revision of the geotechnical report for the project will be submitted upon completion of the final boring.

Our December 7, 2010 geotechnical report for the project indicated the global stability factor of safety of the embankments under conditions of Steady State Seepage ranged from 1.42 to 1.51 for the five sections analyzed. These results were particularly impacted by the limited information available regarding the geometry and material characteristics of the original 1968 construction. Therefore, our analyses included conservative estimates of the geometry and material characteristics for the original 1968 embankment construction located within and beneath the toe of the existing embankment (refer to Sections 3.2, 3.4 and 3.7 of our December 7, 2010 report). Borings performed for the project at that time did not penetrate these zones as they were performed from the crest of the embankments. In particular, the geometry of the original 1968 construction was estimated from limited historical drawings and MEC construction cost estimate data available. Characteristics of this zone and the alluvial river bed material presumed to be present beneath the original 1968 dike were estimated based on the limited available information.

The three (3) borings completed to date have shown that our original estimates of the geometry and material characteristics were conservative. The supplemental borings indicate the original 1968 embankment extended deeper than originally estimated with little to no native river bed alluvium present beneath the rip rap section.

Based on the information obtained from the supplemental borings, the subsurface stratigraphic models used in the global stability analysis were revised to reflect the conditions encountered at those locations and we have reanalyzed the embankment stability under Steady State Seepage conditions. The revised analyses for the referenced sections indicate the factor of safety under Steady State Seepage conditions ranges from 1.57 to 1.62 at the five design sections. These values exceed the minimum required factor of safety of 1.5 required for embankment dam safety criteria for the Steady State Seepage condition. Based on these results, no additional remediation of the embankment sections beyond that being currently performed to increase the stability of the riverside slopes appears necessary.

As previously discussed, one (1) planned boring has yet to be performed due to the contractor's staging schedule. Our final evaluation of Section E is contingent on completion of the remaining boring.

We appreciate the opportunity to be of further service to you on this project. If you have any questions regarding this letter, please contact us.

Sincerely,
Terracon Consultants, Inc.

Kathleen E. Jost

for: Steven M. Levorson, Ph.D., P.E.
Senior Consultant

Vaughn Rupnow, P.E.
Iowa No. 19259

LICENSED PROFESSIONAL ENGINEER
VAUGHN RUPNOW
19259
IOWA

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Vaughn Rupnow, P.E. — Date: 8/17/2011

My license renewal date is December 31, 2012.

Terracon

August 19, 2011

HGM Associates, Inc.
640 5th Avenue
Council Bluffs, Iowa 51502

Attention: Mr. Terry Smith, P.E.

Re: Interim Report - Results of Global Stability Analyses Revisions
South Ash Containment Pond Embankments
Riverside Generating Station
Bettendorf, Iowa
Terracon Project No. 07105081/02105081G

Dear Mr. Smith,

As requested, Terracon Consultants Inc. (Terracon) has performed a fourth boring in order to revise our global stability analyses for the South Ash Containment Pond Embankments under Steady State Seepage conditions. The boring was completed on August 19, 2011 and encountered one (1) foot of alluvial soils beneath the original 1968 embankment. Similar conditions were encountered at other supplemental boring locations, which resulted in factors of safety under Steady State Seepage conditions ranging from 1.57 to 1.62 at the five design sections. Although final analyses have not been completed for Section E, based solely upon the stratigraphy encountered at the boring location, we anticipate that factors of safety will exceed the minimum factor of safety of 1.5 under Steady State Seepage conditions as required by USACE embankment dam criteria. A complete revision of the geotechnical report for the project will be submitted upon completion of the analyses.

We appreciate the opportunity to be of further service to you on this project. If you have any questions regarding this letter, please contact us.

Sincerely,
Terracon Consultants, Inc.

Vaughn Rupnow, P.E.
Iowa No. 19259

Cale J. Wilson, P.E.
Iowa No. 19502

September 27, 2011

Terracon

HGM Associates, Inc.
640 5th Avenue
Council Bluffs, Iowa 51502

Attention: Mr. Terry Smith, P.E.

Re: Geotechnical Report Addendum No. 2
Revised Global Stability Analyses
South Ash Containment Pond Embankments
Riverside Generating Station
Bettendorf, Iowa
Terracon Project No. 07105081/02105081G

Dear Mr. Smith,

As requested, Terracon Consultants Inc. (Terracon) has conducted additional subsurface exploration and revised our global stability analyses of the South Ash Containment Pond Embankments to evaluate meeting a minimum factor of safety of 1.5 under Steady State Seepage conditions as required by USACE embankment dam criteria. This addendum letter summarizes the results of our additional exploration and analysis of the current embankment slopes. Logs of the supplemental borings and a revised location plan are included with this addendum letter.

Our December 7, 2010 geotechnical report for the project indicated the global stability factor of safety of the embankments under conditions of Steady State Seepage ranged from 1.42 to 1.51 for the five (5) sections analyzed. The borings performed for our original analysis did not extend into the 1968 embankment and access to perform borings to intercept the 1968 embankment was not available at that time. For this reason, the geometry and material properties of the original 1968 construction were estimated from limited historical drawings and MEC construction cost estimate data available. Based on the limited information, our analyses included conservative estimates of the geometry and material characteristics for the original 1968 embankment construction located within and beneath the toe of the existing embankments (refer to Sections 3.2, 3.4 and 3.7 of our December 7, 2010 report). Estimates of the original river alluvium properties and thicknesses beneath the 1968 embankment were also made for our analysis.

To help obtain a better understanding of the 1968 embankment and underlying alluvium, four (4) supplemental borings were performed during the remediation project for the South Ash Containment Pond Embankment project. The supplemental borings indicate the original 1968 embankment extended deeper than originally estimated with little to no native river bed alluvium present beneath the embankment section. The additional information obtained from the supplemental borings was used to update the slope stability cross-sections for our revised

analysis. The materials encountered in this zone consisted of a mixture of riprap, gravel, sand, silt, and ash. We assigned a friction angle of 36 degrees to this zone, labeled 1968 Levee Foundation, in our analysis.

Using the updated cross-sections, our revised analyses for the referenced sections indicate the factor of safety under Steady State Seepage conditions ranges from 1.50 to 1.57 at the five (5) design sections, shown in the following table. These values meet and/or exceed the minimum required factor of safety of 1.5 required for embankment dam safety criteria for the Steady State Seepage condition. Based on our revised analysis, it is our opinion that no additional remediation of the embankment sections beyond that which has been completed to date appears necessary.

	Estimated Factor of Safety Obtained from Steady State Seepage Analysis [1]	
Section	**Required Minimum Factor of Safety [2]**	**Downstream**
A	1.5	1.51
B	1.5	1.53
C	1.5	1.57
D	1.5	1.53
E	1.5	1.50

1. Reported factors of safety are for deep seated circular "failure" surfaces that emerge near the levee crest. Computed factors of safety for shallow circular "failure" surfaces near the toe of the levee may be smaller.
2. Reference: Table 6.1b from EM 1110-2-1913

The analysis and recommendations presented in this addendum are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This addendum is intended to supplement the original Geotechnical Engineering Report prepared for this project and is not intended to be used separately from the original report. This addendum and the recommendations contained herein are considered part of, and should be attached to, our geotechnical report for the project. The recommendations, opinions and limitations contained in the original geotechnical report and subsequent addenda that are not specifically addressed in this addendum remain valid.

This addendum has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. In the event changes in the nature, design, or location of the project as outlined in this addendum, are planned, the conclusions and recommendations contained in this addendum

shall not be considered valid unless Terracon reviews the changes, and either verifies or modifies the conclusions of this addendum in writing.

We appreciate the opportunity to be of further service to you on this project. If you have any questions regarding this letter, please contact us.

Sincerely,
Terracon Consultants, Inc.

FOR Steven M. Leyorson, Ph.D., P.E.
Senior Consultant

Vaughn Rupnow, P.E.
Iowa No. 19259

LICENSED PROFESSIONAL ENGINEER VAUGHN RUPNOW 19259 IOWA	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. Vaughn Rupnow, P.E. — Date: 9/27/2011 My license renewal date is December 31, 2012.

Attachments

LEGEND

⌖ APPROXIMATE BORING LOCATION

N

NOT TO SCALE

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr: WKB	Project No. 07105081	Terracon Consulting Engineers and Scientists	BORING LOCATION SKETCH	EXHIBIT
Drawn By: DWD	Scale: AS SHOWN		SOUTH ASH CONTAINMENT POND RIVERSIDE GENERATING STATION BETTENDORF, IOWA	A-1
Checked By: WKB/MRF	File No. GEO07105081-1			
Approved By: WKB	Date: NOV. 2010	370 40th Avenue (563) 355-0702 Bettendorf, Iowa 52722 (563) 355-4788		

LOG OF BORING NO. 12

CLIENT
HGM Associates, Inc.

SITE
Riverside Generating Station
Bettendorf, Iowa

PROJECT
Ash Containment Ponds - South Pond

Boring Location: Station 7+55

Approx. Surface Elev.: 564 ft

GRAPHIC LOG	DESCRIPTION	Elev.	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT-N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED COMPRESSION, psf
	FILL, MIXTURE OF RIPRAP, GRAVEL, SAND, SILT, AND ASH Dark brown					DHH					
	14	550	5, 10								
	SILTY SAND Dark Gray										
	16	548	15								
	WEATHERED SANDY SHALE* Gray										
	24	540	20								
	BOTTOM OF BORING										

***Classification of rock materials has been estimated estimated by the drill crew based on disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	2	WD	
WL			
WL			

Terracon

BORING STARTED	7-26-11		
BORING COMPLETED	7-26-11		
RIG	750	FOREMAN	JT
APPROVED	VER	JOB #	07105081

LOG OF BORING NO. 13

CLIENT
HGM Associates, Inc.

SITE
Riverside Generating Station
Bettendorf, Iowa

PROJECT
Ash Containment Ponds - South Pond

Boring Location: Station 1+25

Approx. Surface Elev.: 564 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT-N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED COMPRESSION, psf
	FILL, MIXTURE OF RIPRAP, GRAVEL, SAND, SILT, AND ASH Dark brown				DHH					
	13.5 / 550.5	5								
	WEATHERED LIMESTONE* ** Light Gray	10								
	18 / 546	15								
	BOTTOM OF BORING									

***Classification of rock materials has been estimated estimated by the drill crew based on disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	2	WD	
WL			
WL			

Terracon

BORING STARTED	8-8-11		
BORING COMPLETED	8-8-11		
RIG	750	FOREMAN	JG
APPROVED	VER	JOB #	07105081

LOG OF BORING NO. 14

CLIENT
HGM Associates, Inc.

SITE
Riverside Generating Station
Bettendorf, Iowa

PROJECT
Ash Containment Ponds - South Pond

Boring Location: Station 15+10

Approx. Surface Elev.: 564 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT-N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED COMPRESSION, psf
	FILL, MIXTURE OF RIPRAP, GRAVEL, SAND, SILT, AND ASH Dark brown				DHH					
		5								
		10								
	13 / 551									
	WEATHERED SANDY SHALE* ** Gray									
	15.5 / 548.5	15		1	SS	18	45	8		
	BOTTOM OF BORING									

***Classification of rock materials has been estimated estimated by the drill crew based on disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	2	WD	
WL			
WL			

Terracon

BORING STARTED	8-8-11		
BORING COMPLETED	8-8-11		
RIG	750	FOREMAN	JG
APPROVED	VER	JOB #	07105081

LOG OF BORING NO. 15

CLIENT
HGM Associates, Inc.

SITE
Riverside Generating Station
Bettendorf, Iowa

PROJECT
Ash Containment Ponds - South Pond

Boring Location: Station 17+60

Approx. Surface Elev.: 564 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	TESTS WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED COMPRESSION, psf
	FILL, MIXTURE OF RIPRAP, GRAVEL, SAND, SILT, AND ASH Dark brown				HS					
		5								
				1	SS	10	14	17		
		10		2	SS	12	8	14		
	12 552				HS					
	13 **MEDIUM TO COARSE SAND** Dark Gray 551			3	SS	10	8	15		
			SP	4	SS	18	80	13		
	WEATHERED SANDY SHALE* Gray	15			HS					
	16.5 547.5			5	SS	18	79	10		

BOTTOM OF BORING

***Classification of rock materials has been estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

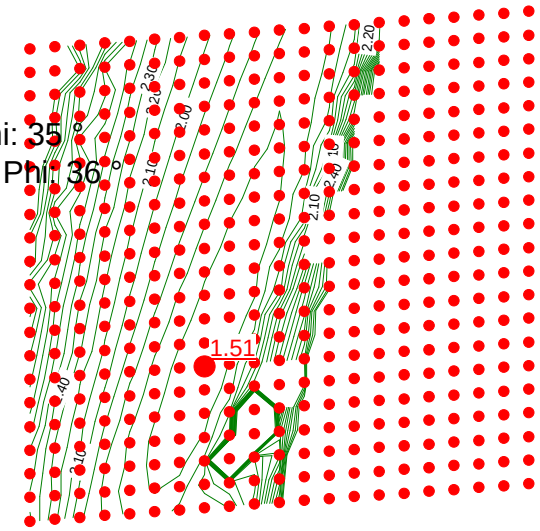
WATER LEVEL OBSERVATIONS, ft			
WL	▽ 2	WD	▼
WL	▼		▼
WL			

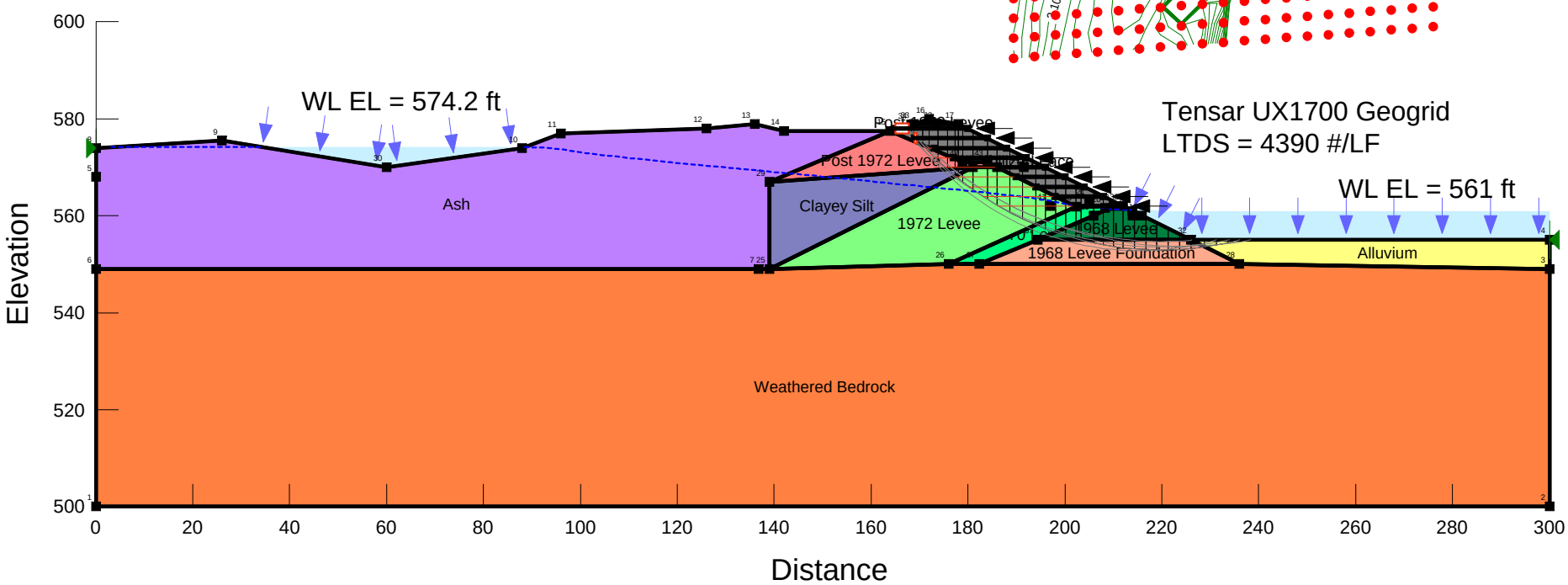
Terracon

BORING STARTED	8-19-11		
BORING COMPLETED	8-19-11		
RIG	35E	FOREMAN	RP
APPROVED	VER	JOB #	07105081

Title: 10-ft Stabilized Face - Steady State Seepage
File Name: SECT A 10ft Stabilized w 15 ft top(Steady State) REV MSE Sep 2011.gsz
Date: 9/23/2011 By: SML

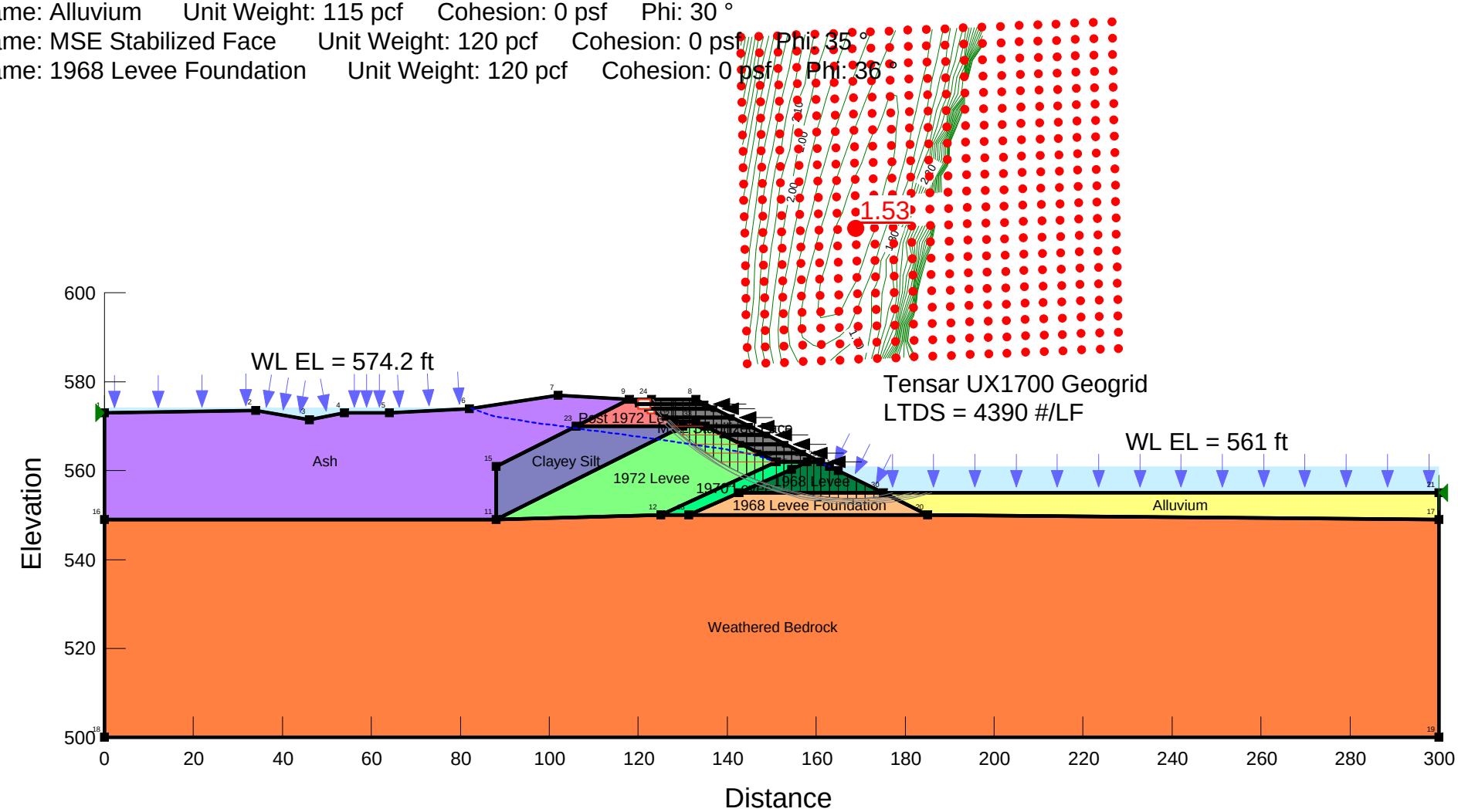
Name: 1968 Levee Unit Weight: 120 pcf Cohesion: 0 psf Phi: 38 °
Name: 1970 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Weathered Bedrock Unit Weight: 135 pcf Cohesion: 0 psf Phi: 40 °
Name: 1972 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 35 °
Name: Post 1972 Levee Unit Weight: 110 pcf Cohesion: 0 psf Phi: 35 °
Name: Clayey Silt Unit Weight: 105 pcf Cohesion: 0 psf Phi: 30 °
Name: Ash Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Alluvium Unit Weight: 115 pcf Cohesion: 0 psf Phi: 30 °
Name: MSE Stabilized Face Unit Weight: 120 pcf Cohesion: 0 psf Phi: 35 °
Name: 1968 Levee Foundation Unit Weight: 120 pcf Cohesion: 0 psf Phi: 36 °





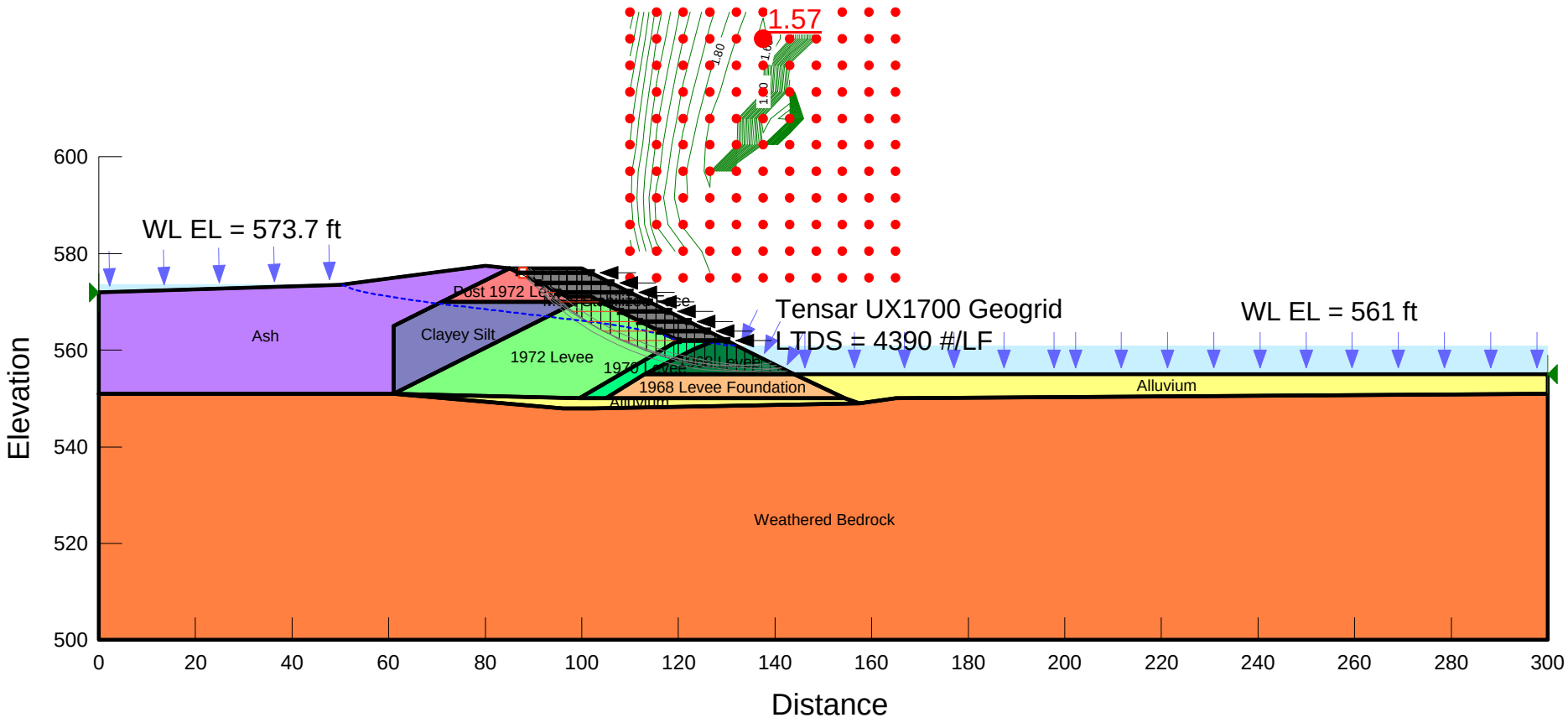
Title: 10-ft Stabilized Face - Steady State Seepage
File Name: SECT B 10-ft Stabilized w 15-ft top (Steady State) REV MSE Sep 2011.gsz
Date: 9/23/2011 By: SML

Name: 1968 Levee Unit Weight: 120 pcf Cohesion: 0 psf Phi: 38 °
Name: 1970 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Weathered Bedrock Unit Weight: 135 pcf Cohesion: 0 psf Phi: 40 °
Name: 1972 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 35 °
Name: Post 1972 Levee Unit Weight: 110 pcf Cohesion: 0 psf Phi: 35 °
Name: Clayey Silt Unit Weight: 105 pcf Cohesion: 0 psf Phi: 30 °
Name: Ash Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Alluvium Unit Weight: 115 pcf Cohesion: 0 psf Phi: 30 °
Name: MSE Stabilized Face Unit Weight: 120 pcf Cohesion: 0 psf Phi: 35 °
Name: 1968 Levee Foundation Unit Weight: 120 pcf Cohesion: 0 psf Phi: 36 °



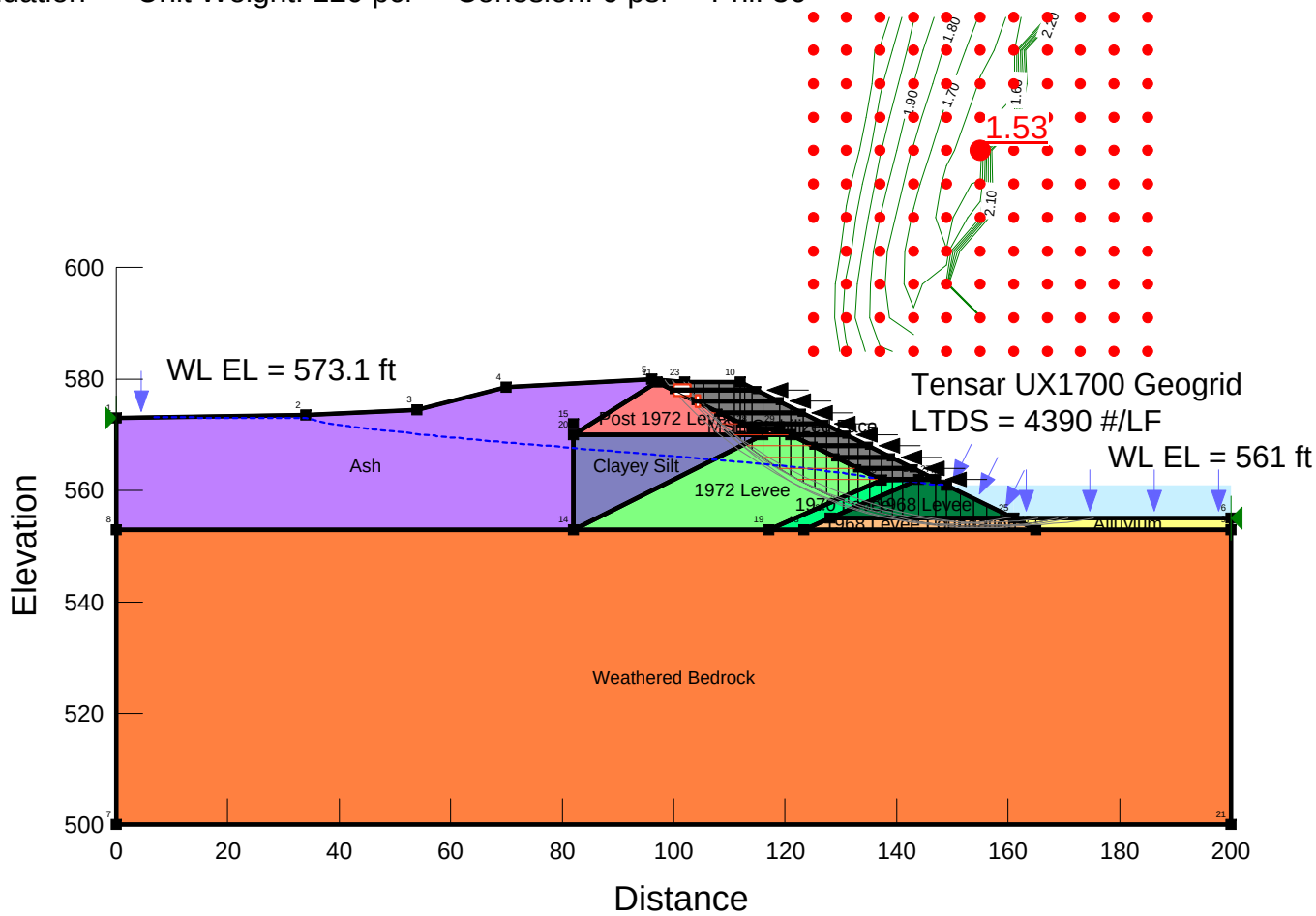
Title: 10-ft Stabilized Face - Steady State Seepage
File Name: SECT C 10-ft Stabilized w 15-ft top (Steady State) REV MSE Sep 2011.gsz
Date: 9/23/2011 By: SML

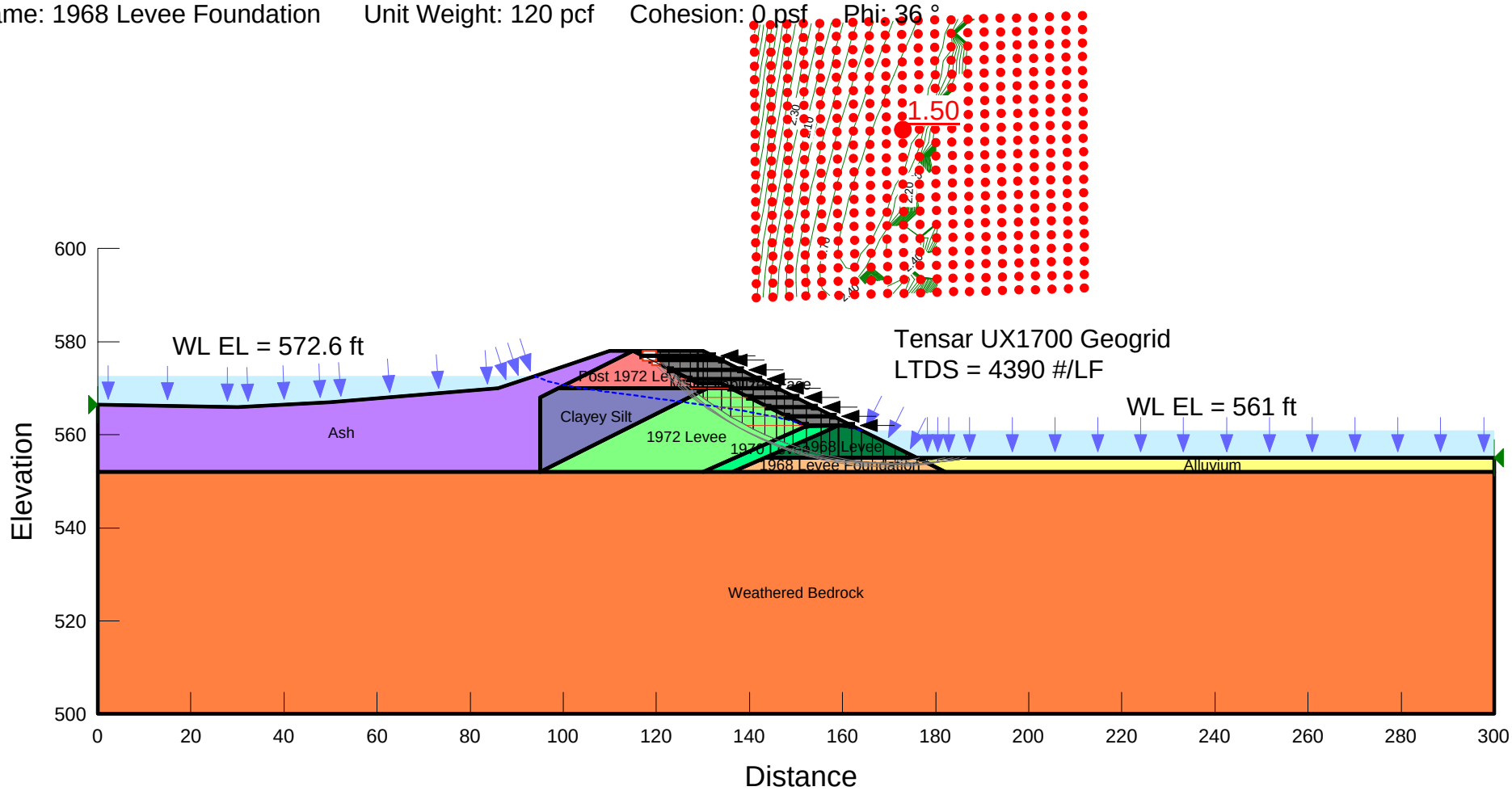
Name: 1968 Levee Unit Weight: 120 pcf Cohesion: 0 psf Phi: 38 °
Name: 1970 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Weathered Bedrock Unit Weight: 135 pcf Cohesion: 0 psf Phi: 40 °
Name: 1972 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 35 °
Name: Post 1972 Levee Unit Weight: 110 pcf Cohesion: 0 psf Phi: 35 °
Name: Clayey Silt Unit Weight: 105 pcf Cohesion: 0 psf Phi: 30 °
Name: Ash Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Alluvium Unit Weight: 115 pcf Cohesion: 0 psf Phi: 30 °
Name: MSE Stabilized Face Unit Weight: 120 pcf Cohesion: 0 psf Phi: 35 °
Name: 1968 Levee Foundation Unit Weight: 120 pcf Cohesion: 0 psf Phi: 36 °



Title: 10-ft Stabilized Face - Steady State Seepage
File Name: SECT D 10-ft Stabilized w 15ft top (Steady State) REV MSE Sep 2011.gsz
Date: 9/23/2011 By: SML

Name: 1968 Levee Unit Weight: 120 pcf Cohesion: 0 psf Phi: 38 °
Name: 1970 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Weathered Bedrock Unit Weight: 135 pcf Cohesion: 0 psf Phi: 40 °
Name: 1972 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 35 °
Name: Post 1972 Levee Unit Weight: 110 pcf Cohesion: 0 psf Phi: 35 °
Name: Clayey Silt Unit Weight: 105 pcf Cohesion: 0 psf Phi: 30 °
Name: Ash Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Alluvium Unit Weight: 115 pcf Cohesion: 0 psf Phi: 30 °
Name: MSE Stabilized Face Unit Weight: 120 pcf Cohesion: 0 psf Phi: 35 °
Name: 1968 Levee Foundation Unit Weight: 120 pcf Cohesion: 0 psf Phi: 36 °



Title: 10-ft Stabilized Face - Steady State Seepage
File Name: SECT E 10-ft Stabilized w15 ft top (Steady State) REV MSE Sep 2011.gsz
Date: 9/23/2011 By: SML

Name: 1968 Levee Unit Weight: 120 pcf Cohesion: 0 psf Phi: 38 °
Name: 1970 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 32 °
Name: Weathered Bedrock Unit Weight: 135 pcf Cohesion: 0 psf Phi: 40 °
Name: 1972 Levee Unit Weight: 100 pcf Cohesion: 0 psf Phi: 35 °
Name: Post 1972 Levee Unit Weight: 110 pcf Cohesion: 0 psf Phi: 35 °
Name: Clayey Silt Unit Weight: 105 pcf Cohesion: 0 psf Phi: 30 °
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Name: Alluvium Unit Weight: 115 pcf Cohesion: 0 psf Phi: 30 °
Name: MSE Stabilized Face Unit Weight: 120 pcf Cohesion: 0 psf Phi: 35 °
Name: 1968 Levee Foundation Unit Weight: 120 pcf Cohesion: 0 psf Phi: 36 °