VECTOR ENGINEERING, INC.

DATE: March 15, 2006

TO: Drew G. Kennedy
Sanders & Assoc. Inc.
4180 Douglas Blvd. Suite 100
Granite Bay, CA 95746

e-mail: dkennedy@sandersgeo.com

JOB NO: 051713.01
LAB LOG: 1764.0

RE: **Lab Report: Iron Canyon Fish Ladder SE05-071 Task 4**

Enclosed are results for: Samples Received - February 28, 2006

Code	Item	Quantity
22760	Sample Preparation, per hr.	5
22756	Uniaxial Strength (peak only), includes preparation (2.5" max)	
	Uniaxial Strength w Youngs Modulus, includes preparation (2.5	4
19534	Atterberg Limits, ASTM D-4318	1

Thank you for consulting Vector Engineering for your material testing requirements. We look forward to working with you again. If you have any questions or require any additional information, please call us at 1-530-272-2448.

Sincerely,

Prepared By: Lumin Ma, PhD
Laboratory Manager

Reviewed By: Kenneth R. Criley
Technical Director

This testing is based up on accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

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Vector Engineering Inc.

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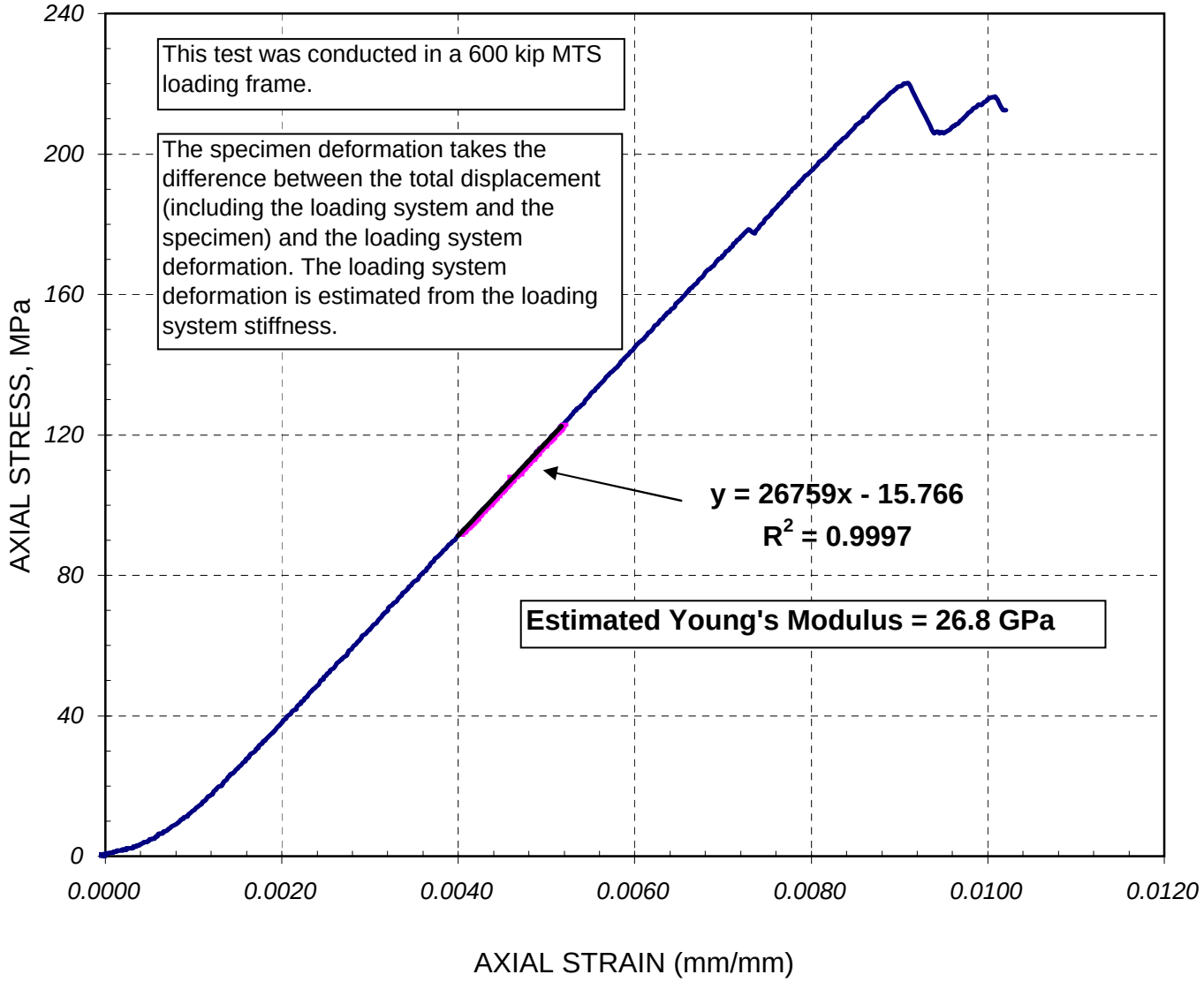
LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764A**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #1 (from hole #1)**	March 14, 2006



DENSITY	**2.84**	g/cm^3	**177.5**	pcf				
UNCONFINED COMPRESSIVE STRENGTH			**216.2**	MPa			**31360**	psi
YOUNG'S MODULUS		**26.8**	GPa		**3880**	ksi		
POISSON'S RATIO								
SPECIMEN DIAMETER		**25.29**	mm		**1.00**	inch		
SPECIMEN LENGTH		**50.06**	mm		**1.97**	inch		
LENGTH/DIAMETER RATIO			**1.98**					
LOADING RATE	**0.16**		mm/minute					
LOADING DIRECTION WITH RESPECT TO BEDDING PLANE								

NOTE: Specimen failed along pre-existing joints.

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #1 (from hole #1)-ucrp

Entered By: LM

Rev. By:

Lab Sample No. **1764A**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764A**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #1 (from hole #1)**	March 14, 2006

Parent rock block

Rock specimen - 0 degree view

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #1 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764A**

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UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764A**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #1 (from hole #1)**	March 14, 2006

Rock specimen - 90 degree view

Rock specimen - 180 degree view

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Entered By: LM

Rev. By:

Lab Sample No. **1764A**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764A**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #1 (from hole #1)**	March 14, 2006

Rock specimen - 270 degree view

Specimen failed along the joints

Rock specimen - Failed

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #1 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764A**

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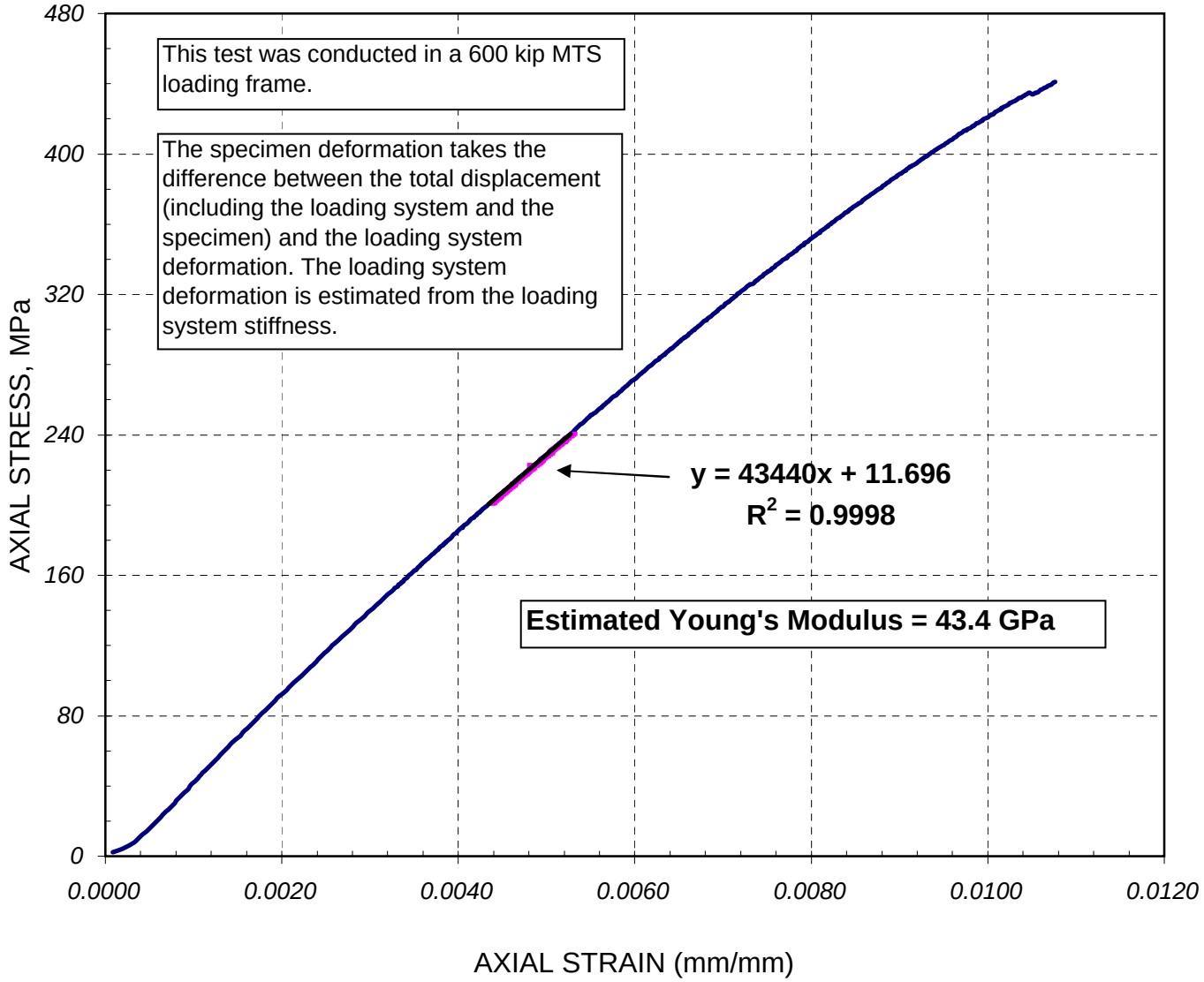
LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764B**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #2 (from hole #1)**	March 14, 2006



DENSITY	**2.85**	g/cm^3	**177.9**	pcf				
UNCONFINED COMPRESSIVE STRENGTH			**441.1**	MPa			**63970**	psi
YOUNG'S MODULUS	**43.4**	GPa	**6290**	ksi				
POISSON'S RATIO								
SPECIMEN DIAMETER	**25.28**	mm	**1.00**	inch				
SPECIMEN LENGTH	**61.88**	mm	**2.44**	inch				
LENGTH/DIAMETER RATIO	**2.45**							
LOADING RATE	**0.16**	mm/minute						
LOADING DIRECTION WITH RESPECT TO BEDDING PLANE								

NOTE: This specimen failed brittle and extremely violent.

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #2 (from hole #1)-ucrp

Entered By: LM

Rev. By:

Lab Sample No. **1764B**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764B**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #2 (from hole #1)**	March 14, 2006

Parent rock block

Rock specimen - 0 degree view

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #2 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764B**

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UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764B**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #2 (from hole #1)**	March 14, 2006

Rock specimen - 90 degree view

Rock specimen - 180 degree view

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	LM		**1764B**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764B**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #2 (from hole #1)**	March 14, 2006

Rock specimen - 270 degree view

Rock specimen - Failed

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #2 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764B**

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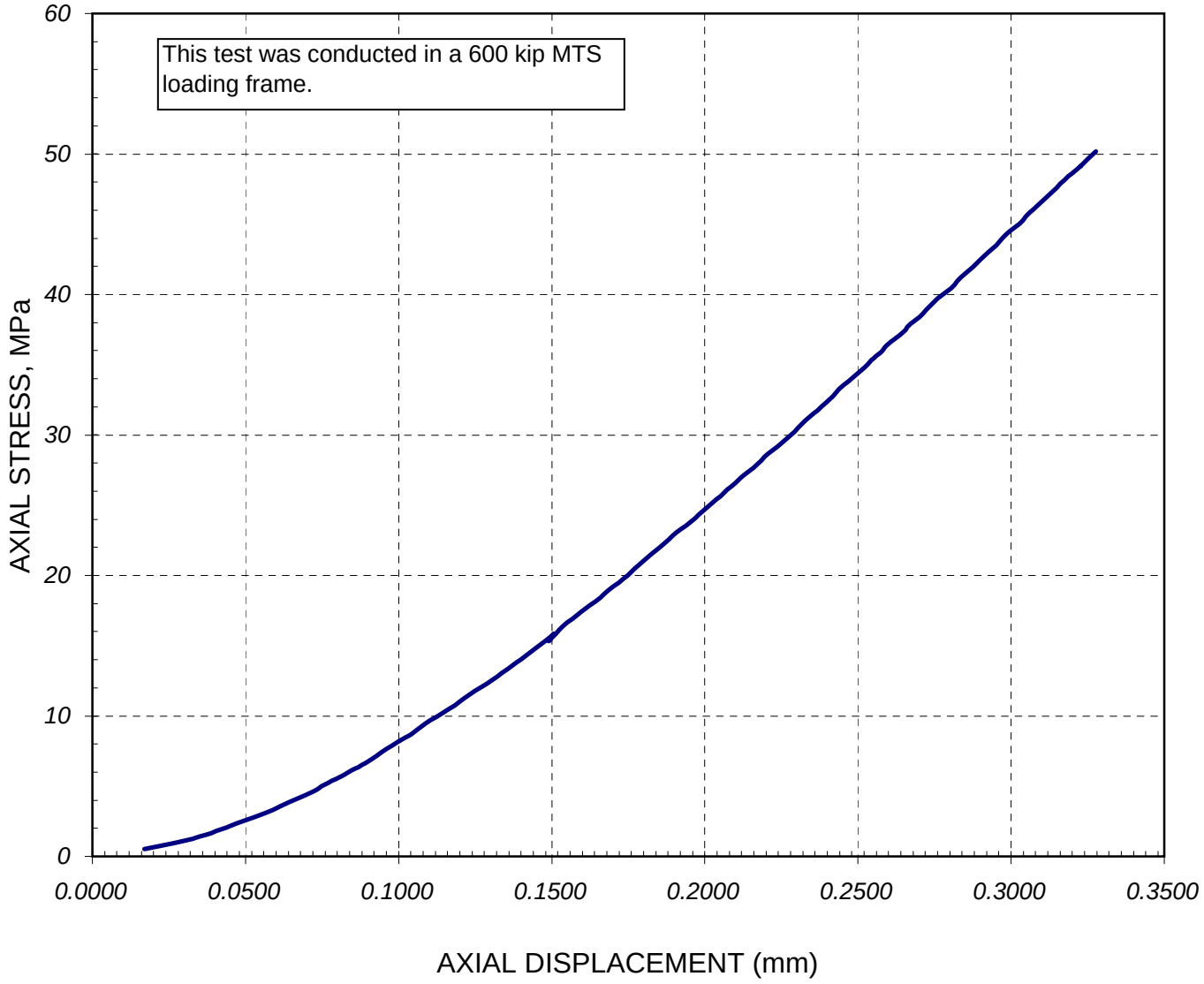
LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764C**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #3 (from hole #1)**	March 14, 2006



DENSITY	**2.84**	g/cm^3	**177.5**	pcf				
UNCONFINED COMPRESSIVE STRENGTH				**50.2**	MPa		**7280**	psi
YOUNG'S MODULUS	**N/A**	GPa				ksi		
POISSON'S RATIO								
SPECIMEN DIAMETER	**50.11**	mm		**1.97**	inch			
SPECIMEN LENGTH	**113.67**	mm		**4.48**	inch			
LENGTH/DIAMETER RATIO		**2.27**						
LOADING RATE	**0.16**	mm/minute						
LOADING DIRECTION WITH RESPECT TO BEDDING PLANE								

NOTE: Specimen failed along pre-existing joints.

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #3 (from hole #1)-ucrp

Entered By: LM

Rev. By:

Lab Sample No. **1764C**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764C**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #3 (from hole #1)**	March 14, 2006

Parent rock block

Rock specimen - 0 degree view

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #3 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764C**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764C**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #3 (from hole #1)**	March 14, 2006

Rock specimen - 90 degree view

Rock specimen - 180 degree view

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764C**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #3 (from hole #1)**	March 14, 2006

Rock specimen - 270 degree view

Specimen failed alon
joints

Rock specimen - Failed

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #3 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764C**

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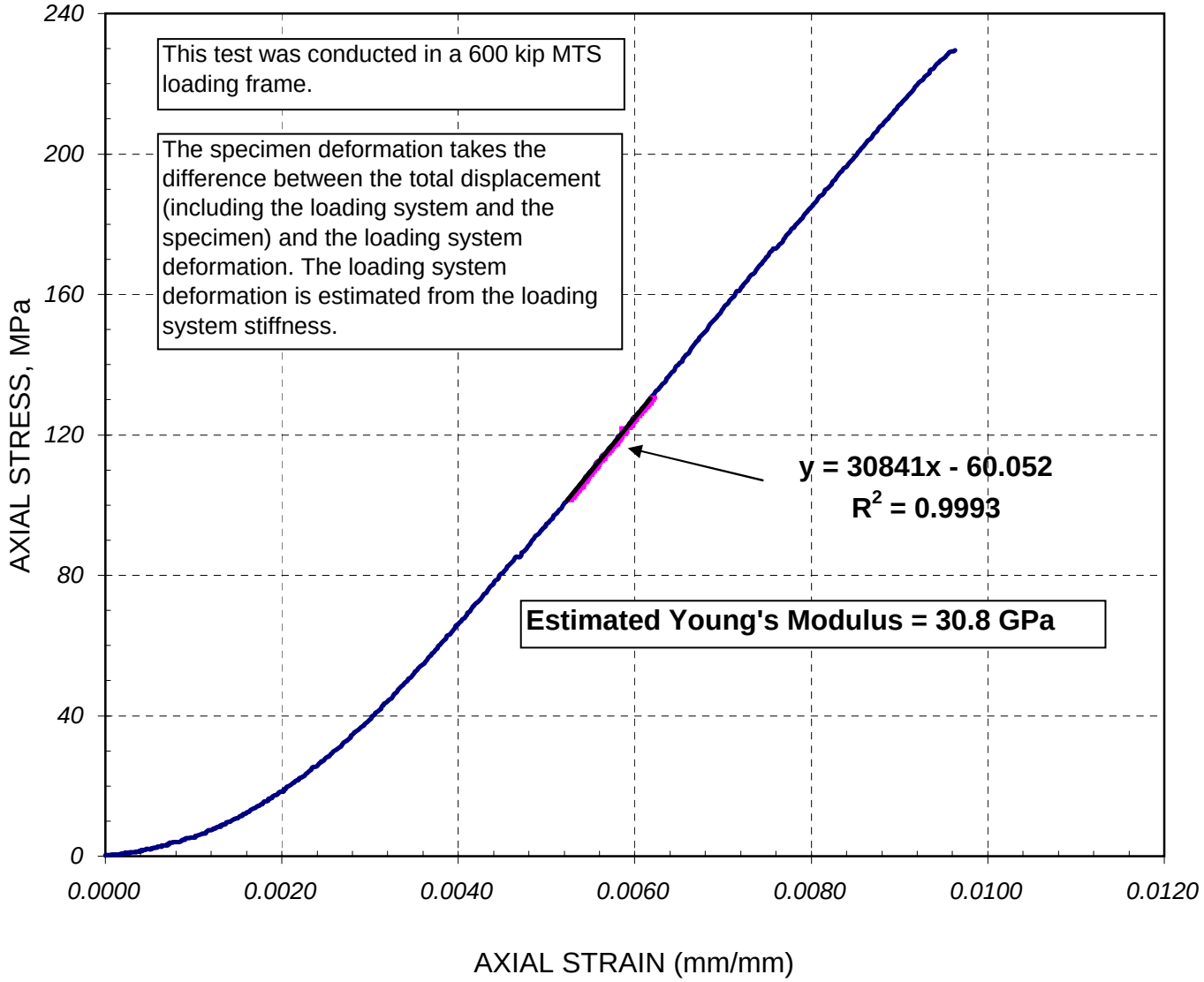
LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764D**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #4 (from hole #1)**	March 14, 2006



DENSITY	**2.83**	g/cm^3	**176.9**	pcf				
UNCONFINED COMPRESSIVE STRENGTH			**229.5**	MPa			**33280**	psi
YOUNG'S MODULUS		**30.8**	GPa		**4470**	ksi		
POISSON'S RATIO								
SPECIMEN DIAMETER		**25.28**	mm		**1.00**	inch		
SPECIMEN LENGTH		**42.18**	mm		**1.66**	inch		
LENGTH/DIAMETER RATIO			**1.67**					
LOADING RATE	**0.16**		mm/minute					
LOADING DIRECTION WITH RESPECT TO BEDDING PLANE								

NOTE: Specimen failed along pre-existing joints.

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #4 (from hole #1)-ucrp

Entered By: LM

Rev. By:

Lab Sample No. **1764D**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764D**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #4 (from hole #1)**	March 14, 2006

Parent rock block

Rock specimen - 0 degree view

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #4 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764D**

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764D**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #4 (from hole #1)**	March 14, 2006

Rock specimen - 90 degree view

Rock specimen - 180 degree view

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LABORATORY SERVICES

UNIAXIAL COMPRESSIVE STRENGTH

ASTM D-7012-04-Modified

Client / Project Name:	Project No:	Lab Log:
Sanders & Assoc., Inc.	051713.01	**1764D**

Project Name:	Specimen ID	Report Date:
Iron Canyon Fish Ladder SE05-071 Task 4	**Sample #4 (from hole #1)**	March 14, 2006

Rock specimen - 270 degree view

Specimen failed along the joints

Rock specimen - Failed

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L : Labexcel \ Projects \2005 \ 051713 \ Sample #4 (from hole #1)-ucrp	Entered By:	Rev. By:	Lab Sample No.
	LM		**1764D**

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LABORATORY SERVICES

ATTERBERG LIMITS

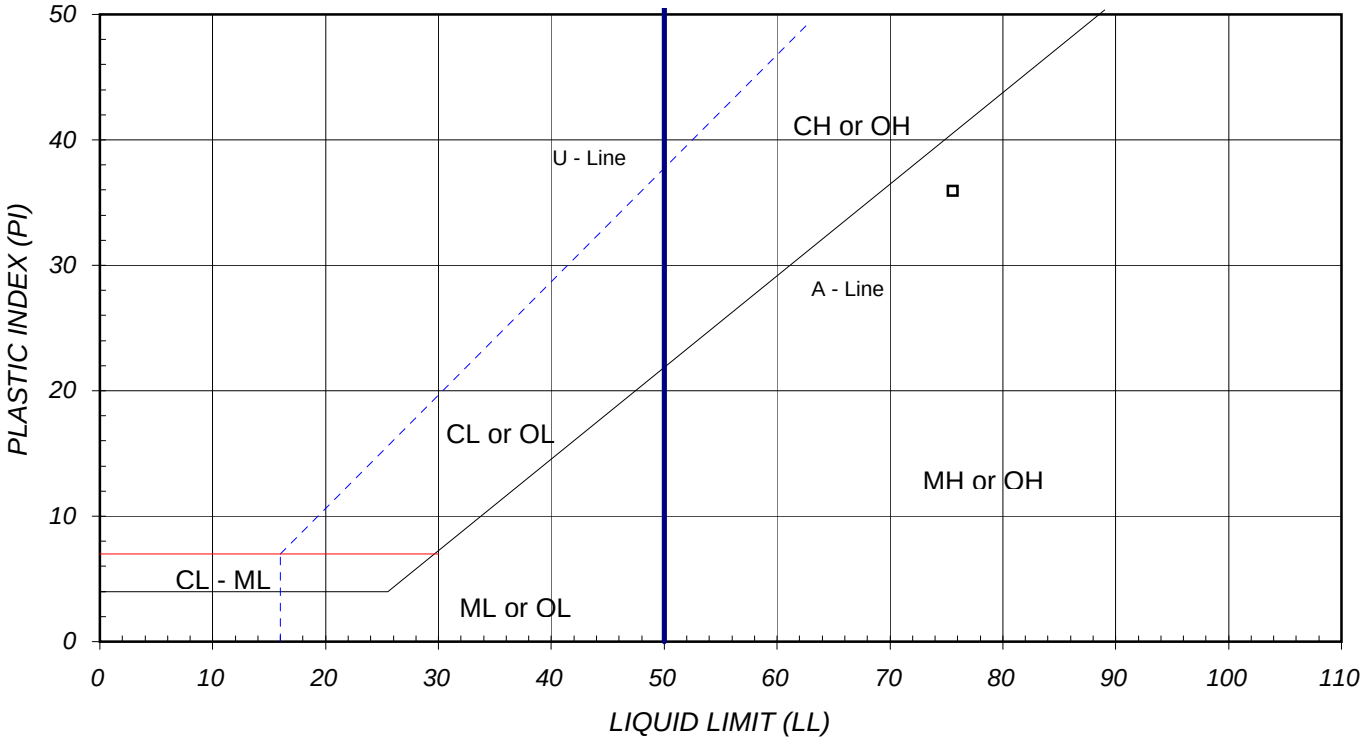
Summary Report

ASTM D-4318

Client: Sanders & Assoc. Inc.
Project No: 051713.01
Lab Log No.: **1764**
Project Name: Iron Canyon Fish Ladder SE05-071 Task 4
Report Date: March 13, 2006

LSN	SYMBOL	SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	UNIFIED SYMBOL	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX
1764E	□	Sample #5-lithic tuff	Brown elastic silt w/sand	MH	76	40	36

PLASTICITY CHART



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