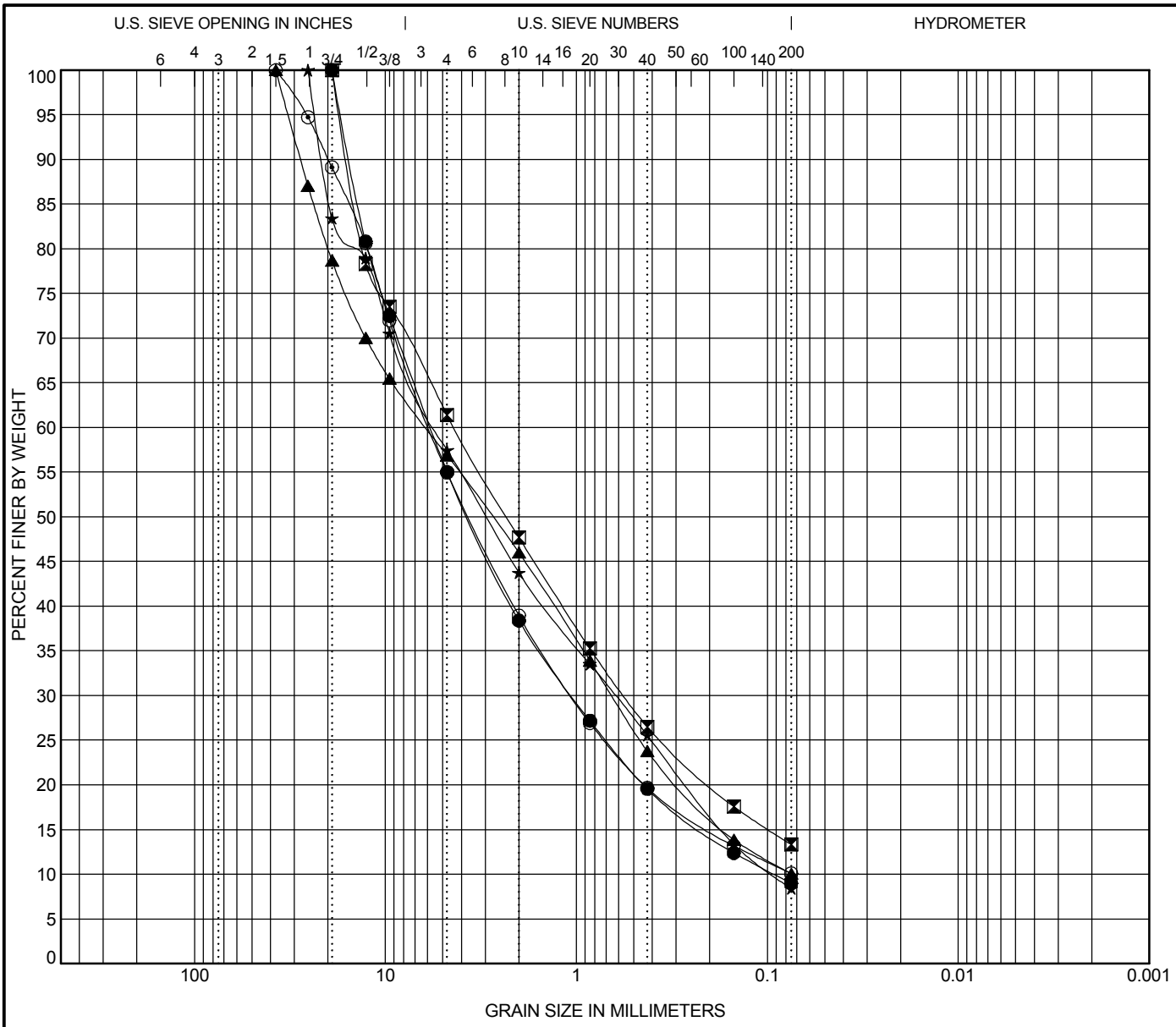
APPENDIX D
2008-2010 Field and Laboratory Testing Data

APPENDIX D.1
Index Test Results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**CUL-021-10 15.0 ft.**	**Well graded SAND with gravel**				**2.08**	**62.79**
⊠	**CUL-021-10 20.0 ft.**	**Silty SAND with gravel**					
▲	**CUL-021-10 25.0 ft.**	**Silty SAND with gravel**				**0.93**	**82.43**
★	**CUL-021-10 30.0 ft.**	**Poorly graded SAND with gravel**				**0.77**	**57.82**
⊙	**CUL-021-10 35.0 ft.**	**Silty GRAVELwith sand**				**2.61**	**79.40**

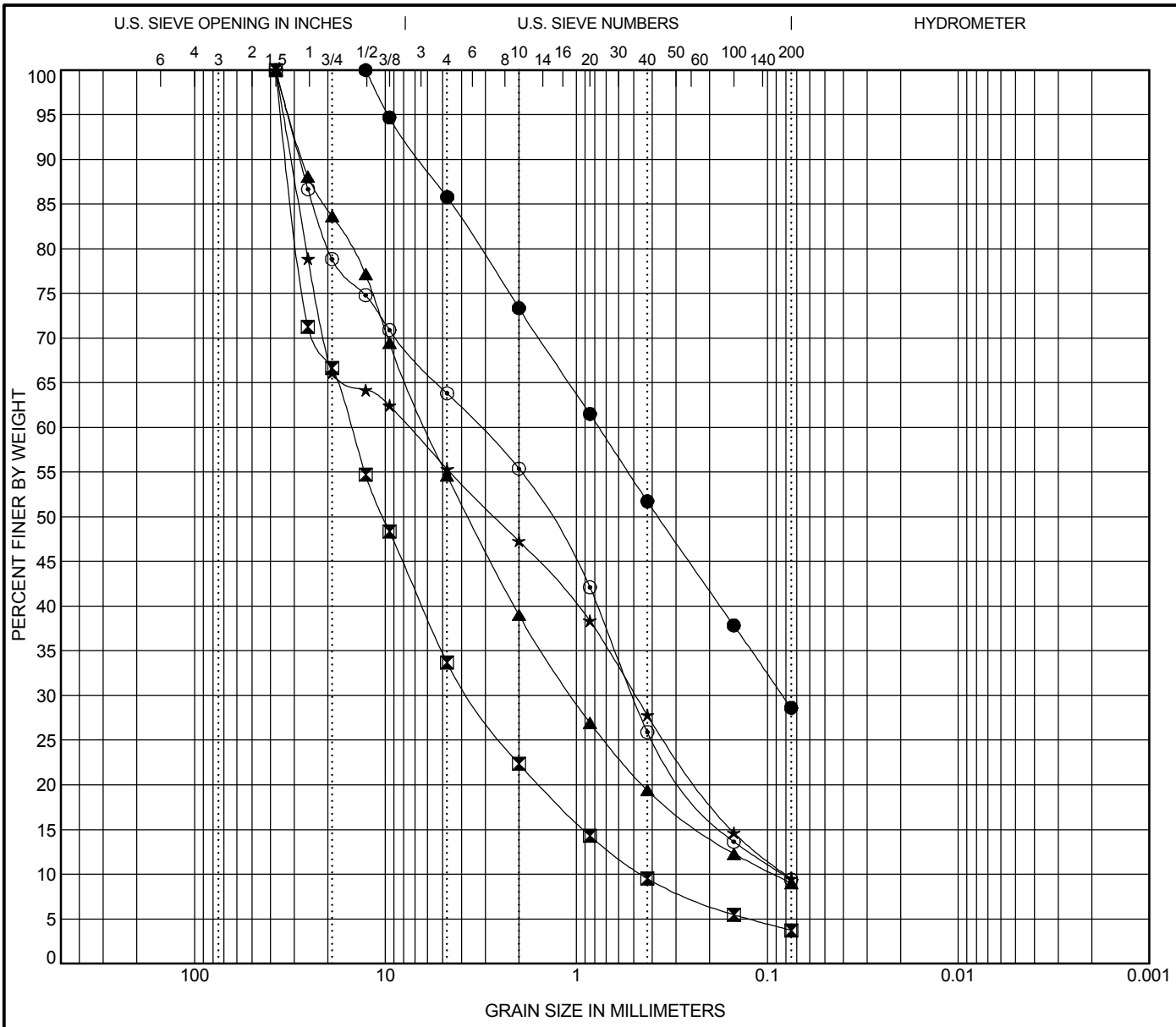
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**CUL-021-10 15.0 ft.**	**19.05**	**5.79**	**1.054**	**0.092**	**45.0**	**46.0**	**9.0**	
⊠	**CUL-021-10 20.0 ft.**	**19.05**	**4.353**	**0.56**		**38.6**	**48.1**	**13.3**	
▲	**CUL-021-10 25.0 ft.**	**37.5**	**6.112**	**0.651**		**43.1**	**46.8**	**10.1**	
★	**CUL-021-10 30.0 ft.**	**25.4**	**5.433**	**0.626**	**0.094**	**42.5**	**49.1**	**8.4**	
⊙	**CUL-021-10 35.0 ft.**	**37.5**	**5.837**	**1.059**		**45.0**	**44.9**	**10.1**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33761951.00008

URS

GRAIN SIZE: NO FIGURE T:\WSDOT I-90 SNOQUALMIE PASS\49000 DX 2010 GEOTECHNICAL EXPLORATION\TEST PIT AND BORING LOGS\BORINGS & TESTPITS 2010-LAB.GPJ URSSEA3B.GLB URSSEA3.GDT 11/15/10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**CUL-021-10 40.0 ft.**	**Silty SAND**					
⊠	**CUL-022-10 11.0 ft.**	**Well graded GRAVEL with sand**				**1.86**	**33.30**
▲	**CUL-022-10 16.0 ft.**	**Well graded SAND with gravel**				**1.97**	**66.05**
★	**CUL-022-10 21.0 ft.**	**Poorly graded SAND with gravel**				**0.40**	**93.30**
⊙	**CUL-022-10 26.0 ft.**	**Poorly graded SAND with gravel**				**0.97**	**38.78**

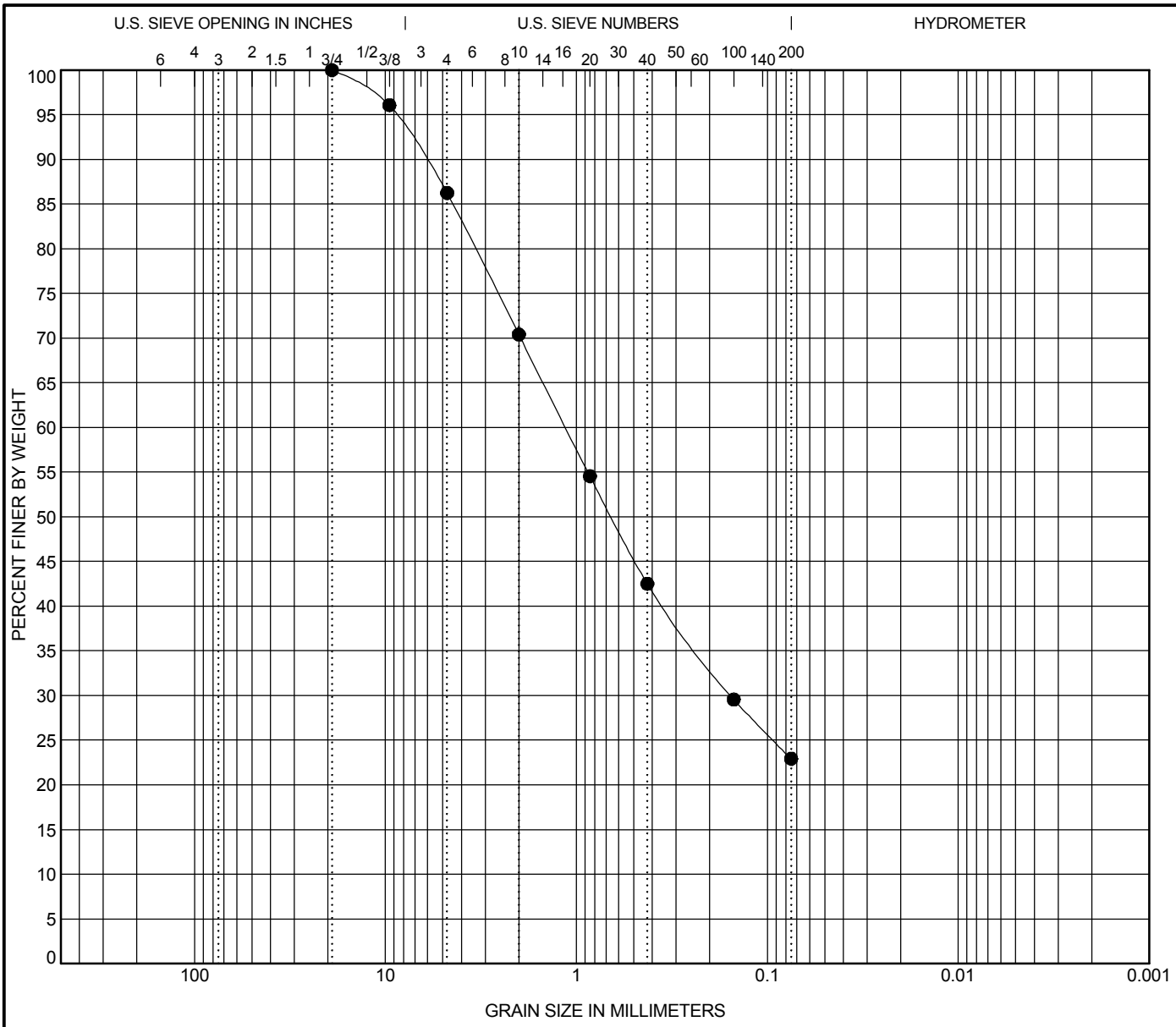
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**CUL-021-10 40.0 ft.**	**12.7**	**0.763**	**0.083**		**14.2**	**57.2**	**28.6**	
⊠	**CUL-022-10 11.0 ft.**	**37.5**	**15.197**	**3.587**	**0.456**	**66.3**	**30.0**	**3.7**	
▲	**CUL-022-10 16.0 ft.**	**37.5**	**6.112**	**1.055**	**0.093**	**45.4**	**45.6**	**9.0**	
★	**CUL-022-10 21.0 ft.**	**37.5**	**7.483**	**0.491**	**0.08**	**44.7**	**45.8**	**9.5**	
⊙	**CUL-022-10 26.0 ft.**	**37.5**	**3.207**	**0.506**	**0.083**	**36.2**	**54.4**	**9.4**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33761951.00008

URS

GRAIN SIZE: NO FIGURE T:\WSDOT I-90 SNOQUALMIE PASS\49000 DX 2010 GEOTECHNICAL EXPLORATION\TEST PIT AND BORING LOGS\BORINGS & TESTPITS 2010-LAB.GPJ URSSEA3B.GLB URSSEA3.GDT 11/15/10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**CUL-022-10 41.0 ft.**	**Silty SAND**					

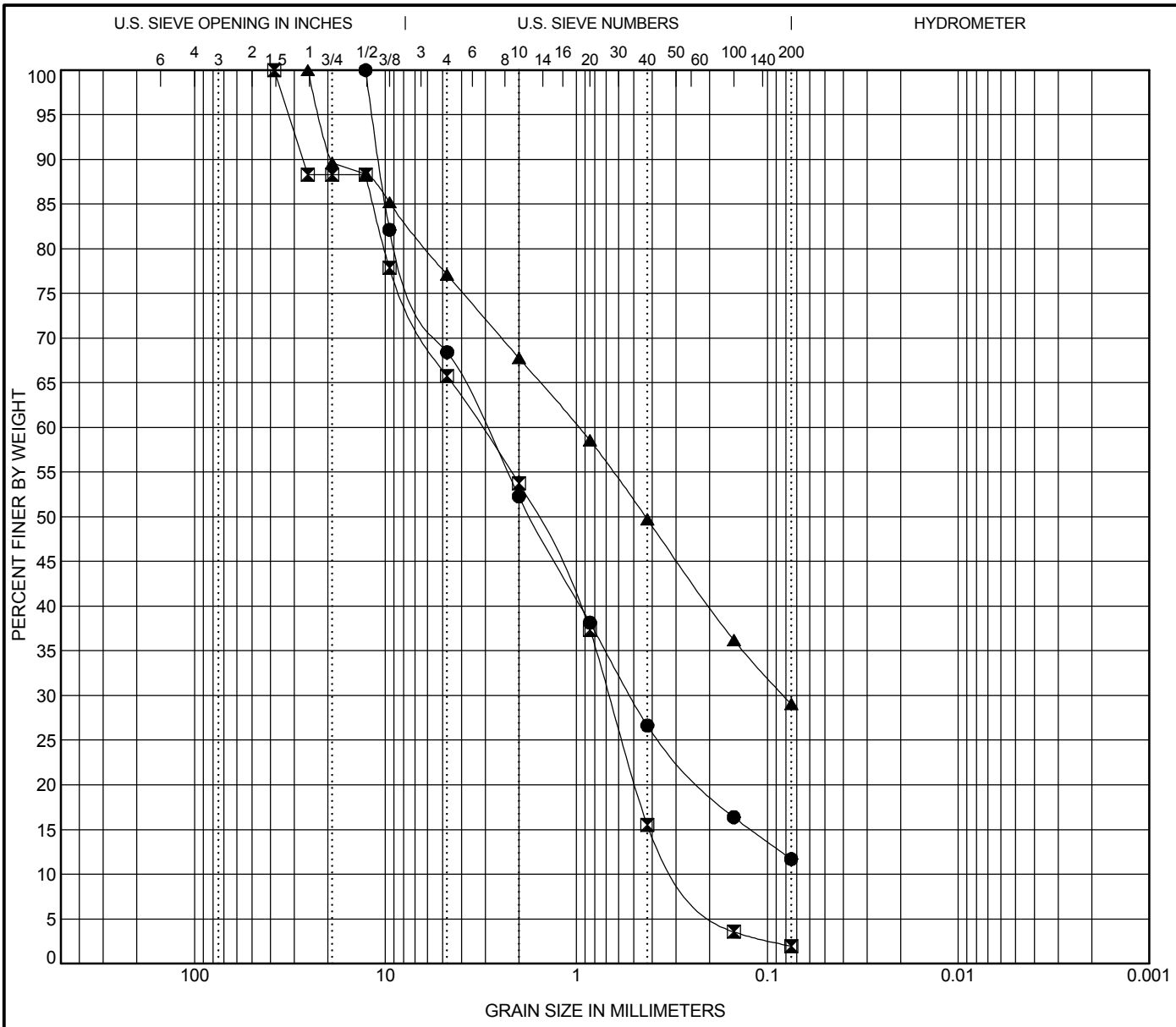
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**CUL-022-10 41.0 ft.**	**19.05**	**1.14**	**0.155**		**13.7**	**63.3**	**22.9**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33761951.00008

URS

GRAIN SIZE: NO FIGURE T:\WSDOT I-90 SNOQUALMIE PASS\49000 DX 2010 GEOTECHNICAL EXPLORATION\TEST PIT AND BORING LOGS\BORINGS & TESTPITS 2010-LAB.GPJ URSSEA3B.GLB URSSEA3.GDT 11/15/10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**EMB-027-09**	**5.0 ft.**	**Silty SAND with gravel**				**1.53**	**51.72**
⊠	**EMB-027-09**	**10.0 ft.**	**Poorly graded SAND with gravel**				**0.55**	**11.92**
▲	**EMB-027-09**	**15.0 ft.**	**Silty SAND with gravel**					

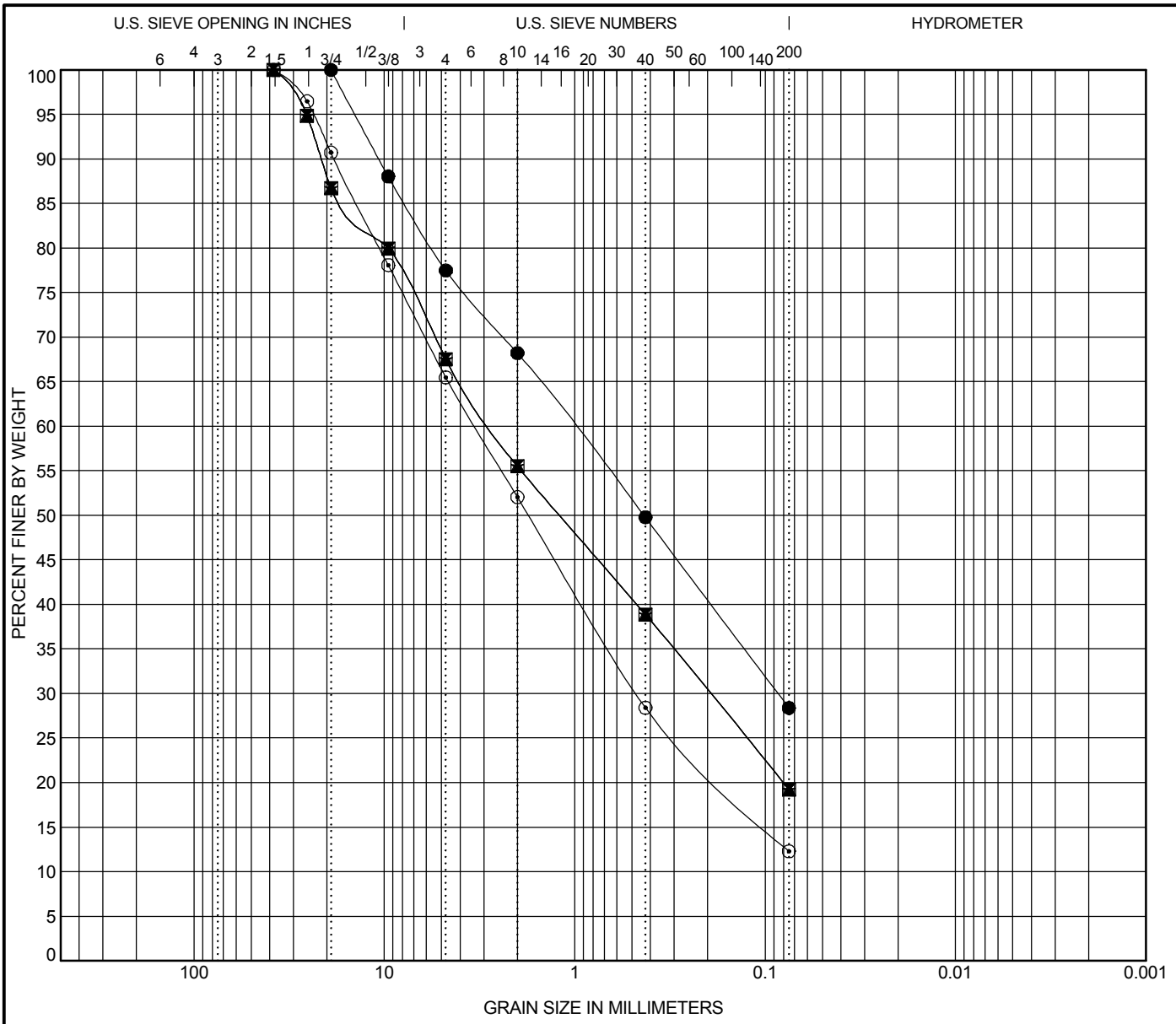
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EMB-027-09**	**5.0 ft.**	**12.7**	**3.023**	**0.52**		**31.6**	**56.7**	**11.7**	
⊠	**EMB-027-09**	**10.0 ft.**	**38.1**	**3.135**	**0.673**	**0.263**	**34.2**	**63.8**	**1.9**	
▲	**EMB-027-09**	**15.0 ft.**	**25.4**	**0.971**	**0.082**		**22.9**	**48.0**	**29.1**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758654.00009

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\35000 DG 2009 GEOTECHNICAL EXPLORATION PROGRAM\35090 TEST PIT AND BORING LOGS\35095 GINT\BORINGS & TESTPITS 2009.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GDT 7/20/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**RCB-001-08 28.6 ft.**	**Silty SAND with gravel**					
⊠	**RCB-001-08 33.6 ft.**	**Silty SAND with gravel**					
▲	**RCB-001-08 41.3 ft.**	**Silty SAND with gravel**					
★	**RCB-001-08 47.8 ft.**	**Silty SAND with gravel**					
⊙	**RCB-001-08 50.2 ft.**	**Silty SAND with gravel**				**1.14**	**56.90**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RCB-001-08 28.6 ft.**	**19.05**	**1.003**	**0.086**		**22.5**	**49.1**	**28.4**	
⊠	**RCB-001-08 33.6 ft.**	**38.1**	**2.761**	**0.194**		**32.5**	**48.3**	**19.2**	
▲	**RCB-001-08 41.3 ft.**	**38.1**	**2.761**	**0.194**		**32.5**	**48.3**	**19.2**	
★	**RCB-001-08 47.8 ft.**	**38.1**	**2.761**	**0.194**		**32.5**	**48.3**	**19.2**	
⊙	**RCB-001-08 50.2 ft.**	**38.1**	**3.338**	**0.472**		**34.5**	**53.2**	**12.3**	

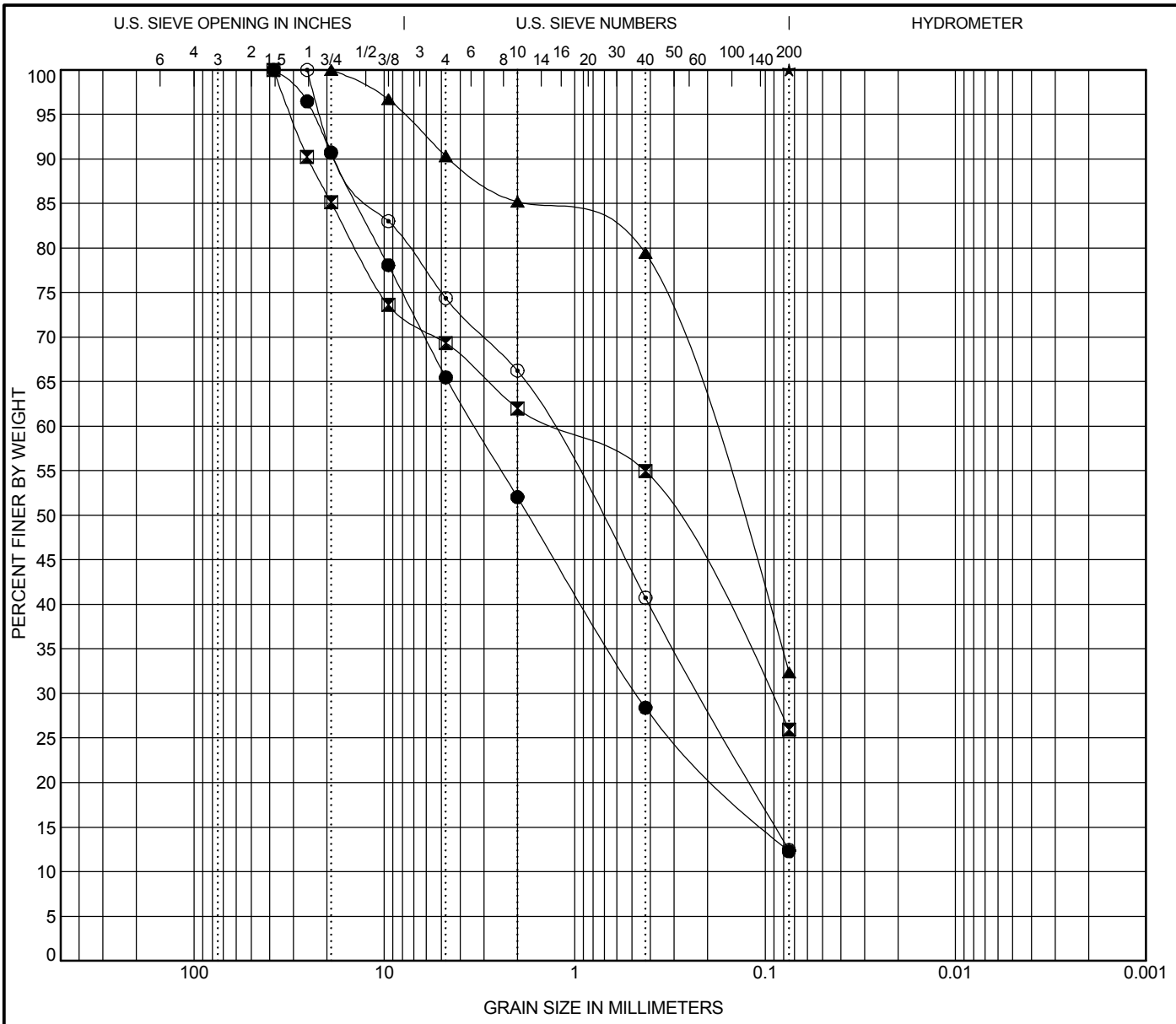
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**RCB-001-08 56.3 ft.**	**Silty SAND with gravel**				**1.14**	**56.90**
⊠	**RCB-001-08 62.8 ft.**	**Silty SAND with gravel**					
▲	**RCB-001-08 66.3 ft.**	**Silty SAND**					
★	**RCB-001-08 71.3 ft.**	**Silty CLAY**	**44**	**22**	**22**		
⊙	**RCB-001-08 76.3 ft.**	**Silty SAND with gravel**				**0.55**	**21.17**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RCB-001-08 56.3 ft.**	**38.1**	**3.338**	**0.472**		**34.5**	**53.2**	**12.3**	
⊠	**RCB-001-08 62.8 ft.**	**38.1**	**1.283**	**0.096**		**30.6**	**43.4**	**25.9**	
▲	**RCB-001-08 66.3 ft.**	**19.05**	**0.208**			**9.7**	**58.0**	**32.4**	
★	**RCB-001-08 71.3 ft.**	**0.075**				**0.0**	**0.0**	**100.0**	
⊙	**RCB-001-08 76.3 ft.**	**25.4**	**1.368**	**0.22**		**25.6**	**61.9**	**12.4**	

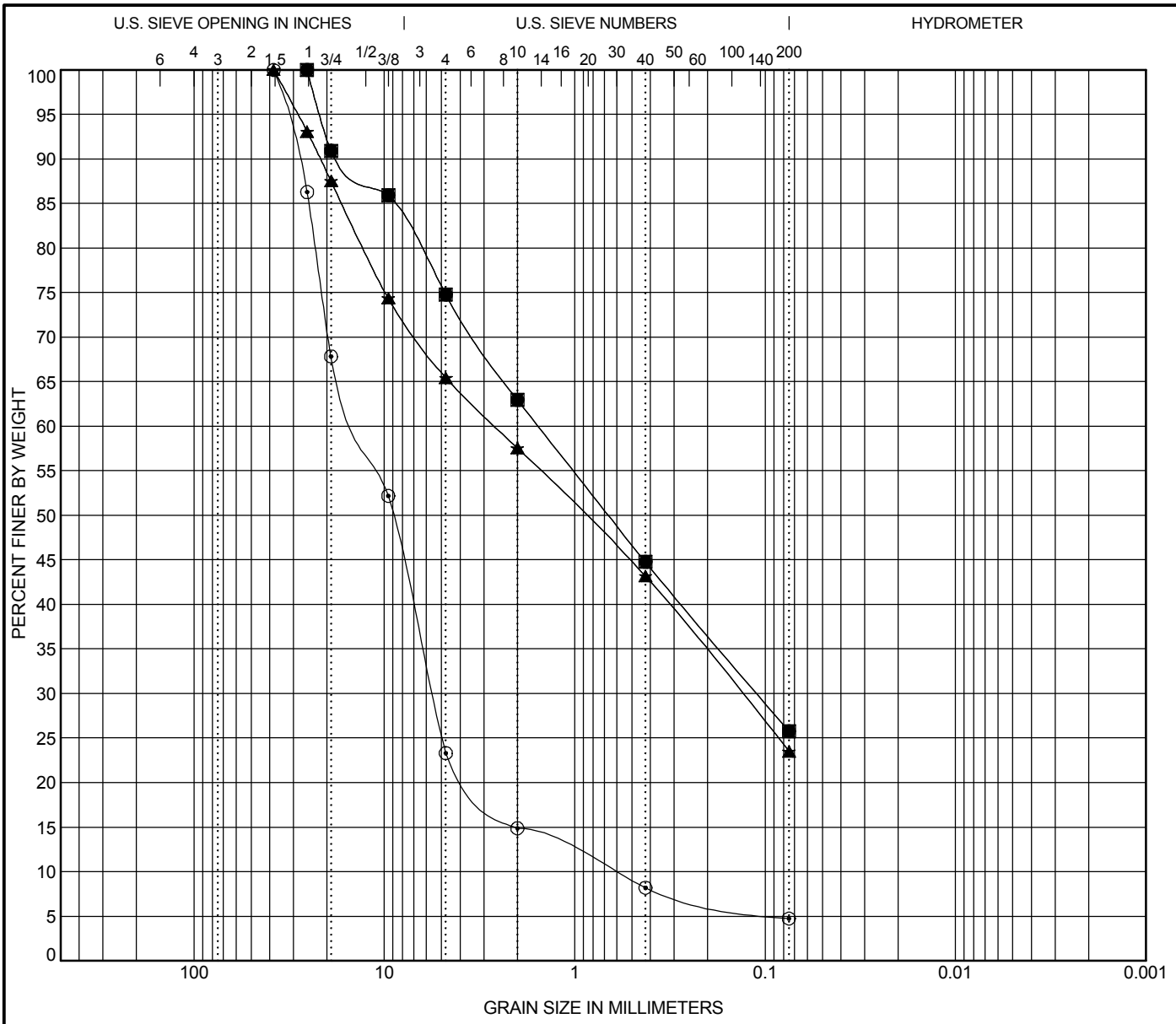
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**RCB-001-08 84.3 ft.**	**Silty SAND with gravel**					
⊠	**RCB-001-08 86.3 ft.**	**Silty SAND with gravel**					
▲	**RCB-001-08 91.7 ft.**	**Silty SAND with gravel**					
★	**RCB-001-08 96.3 ft.**	**Silty SAND with gravel**					
⊙	**RCB-002-08 4.0 ft.**	**Well-graded GRAVEL with sand**				**3.58**	**20.83**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RCB-001-08 84.3 ft.**	**25.4**	**1.556**	**0.11**		**25.2**	**49.0**	**25.8**	
⊠	**RCB-001-08 86.3 ft.**	**25.4**	**1.556**	**0.11**		**25.2**	**49.0**	**25.8**	
▲	**RCB-001-08 91.7 ft.**	**38.1**	**2.615**	**0.133**		**34.6**	**41.9**	**23.5**	
★	**RCB-001-08 96.3 ft.**	**38.1**	**2.615**	**0.133**		**34.6**	**41.9**	**23.5**	
⊙	**RCB-002-08 4.0 ft.**	**38.1**	**13.467**	**5.583**	**0.647**	**76.7**	**18.6**	**4.7**	

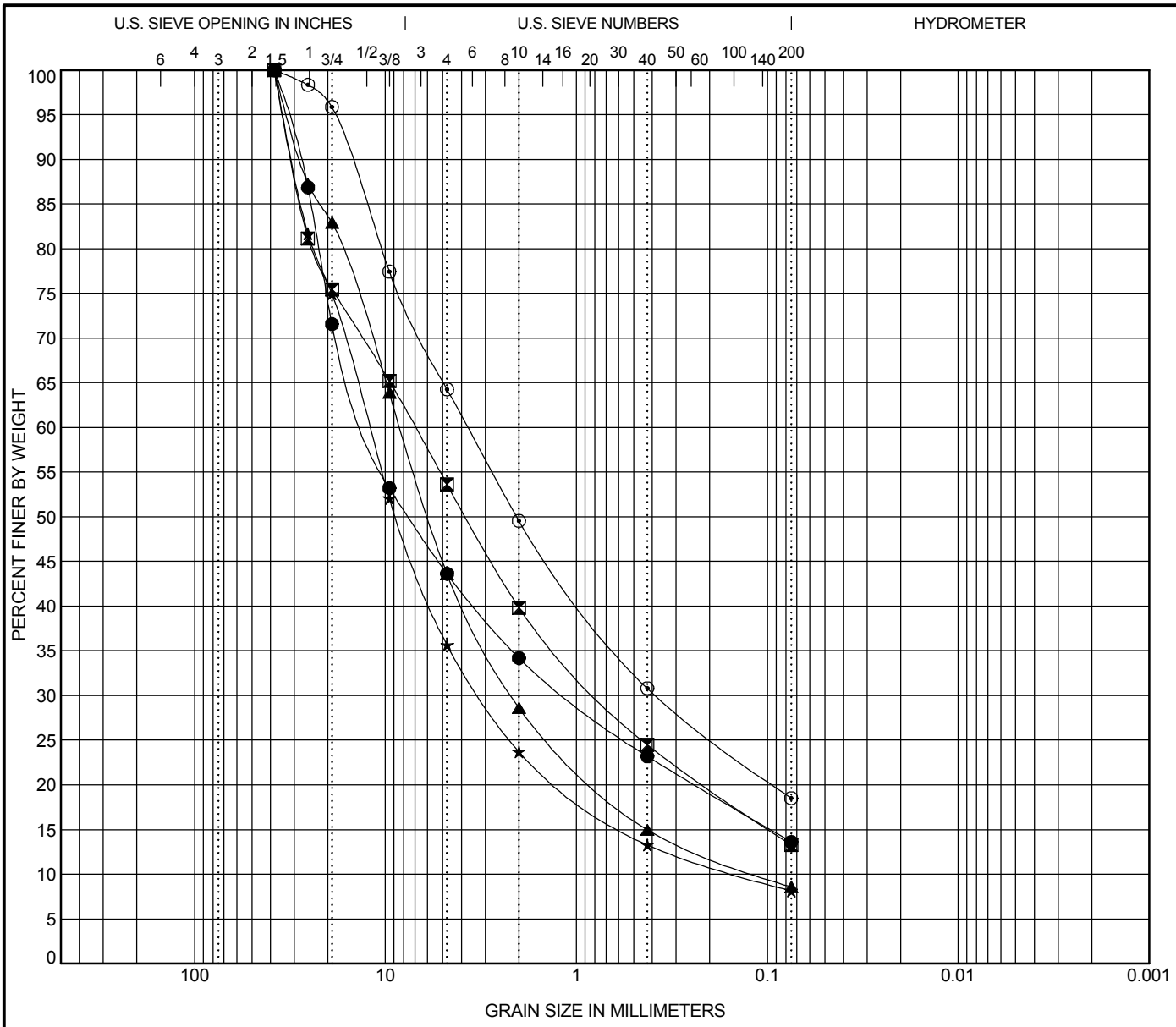
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**RCB-002-08 20.0 ft.**	**Silty GRAVEL with sand**					
⊠	**RCB-002-08 25.0 ft.**	**Silty GRAVEL with sand or SAND with gravel**					
▲	**RCB-002-08 30.0 ft.**	**Poorly-graded GRAVEL with sand**				**5.10**	**75.60**
★	**RCB-002-08 35.0 ft.**	**Poorly-graded GRAVEL with sand**				**5.83**	**85.88**
⊙	**RCB-002-08 40.0 ft.**	**Silty SAND with gravel**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RCB-002-08 20.0 ft.**	**38.1**	**12.31**	**1.108**		**56.4**	**30.0**	**13.6**	
⊠	**RCB-002-08 25.0 ft.**	**38.1**	**6.96**	**0.741**		**46.4**	**40.4**	**13.3**	
▲	**RCB-002-08 30.0 ft.**	**38.1**	**8.341**	**2.167**	**0.11**	**56.4**	**35.0**	**8.6**	
★	**RCB-002-08 35.0 ft.**	**38.1**	**12.117**	**3.156**	**0.141**	**64.4**	**27.5**	**8.1**	
⊙	**RCB-002-08 40.0 ft.**	**38.1**	**3.696**	**0.379**		**35.7**	**45.8**	**18.5**	

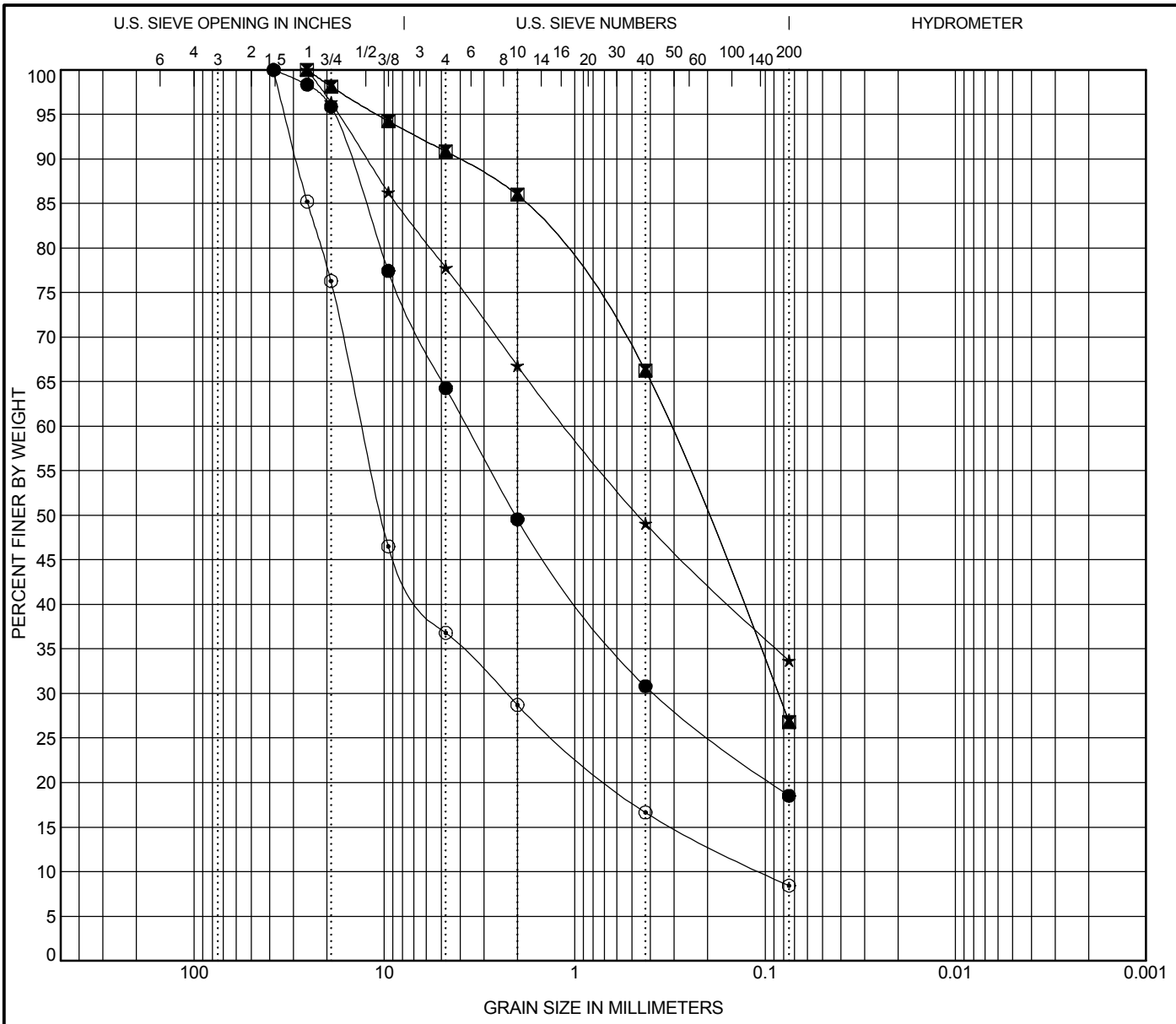
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**RCB-002-08 45.0 ft.**	**Silty SAND with gravel**					
⊠	**RCB-002-08 60.0 ft.**	**Silty SAND**					
▲	**RCB-002-08 65.0 ft.**	**Silty SAND**					
★	**RCB-002-08 75.0 ft.**	**Silty SAND with gravel**					
⊙	**RCB-003-08 29.0 ft.**	**Poorly-graded GRAVEL with sand**				**3.86**	**124.59**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RCB-002-08 45.0 ft.**	**38.1**	**3.696**	**0.379**		**35.7**	**45.8**	**18.5**	
⊠	**RCB-002-08 60.0 ft.**	**25.4**	**0.323**	**0.086**		**9.1**	**64.1**	**26.8**	
▲	**RCB-002-08 65.0 ft.**	**25.4**	**0.323**	**0.086**		**9.1**	**64.1**	**26.8**	
★	**RCB-002-08 75.0 ft.**	**25.4**	**1.104**			**22.2**	**44.1**	**33.7**	
⊙	**RCB-003-08 29.0 ft.**	**38.1**	**13.035**	**2.295**	**0.105**	**63.2**	**28.4**	**8.4**	

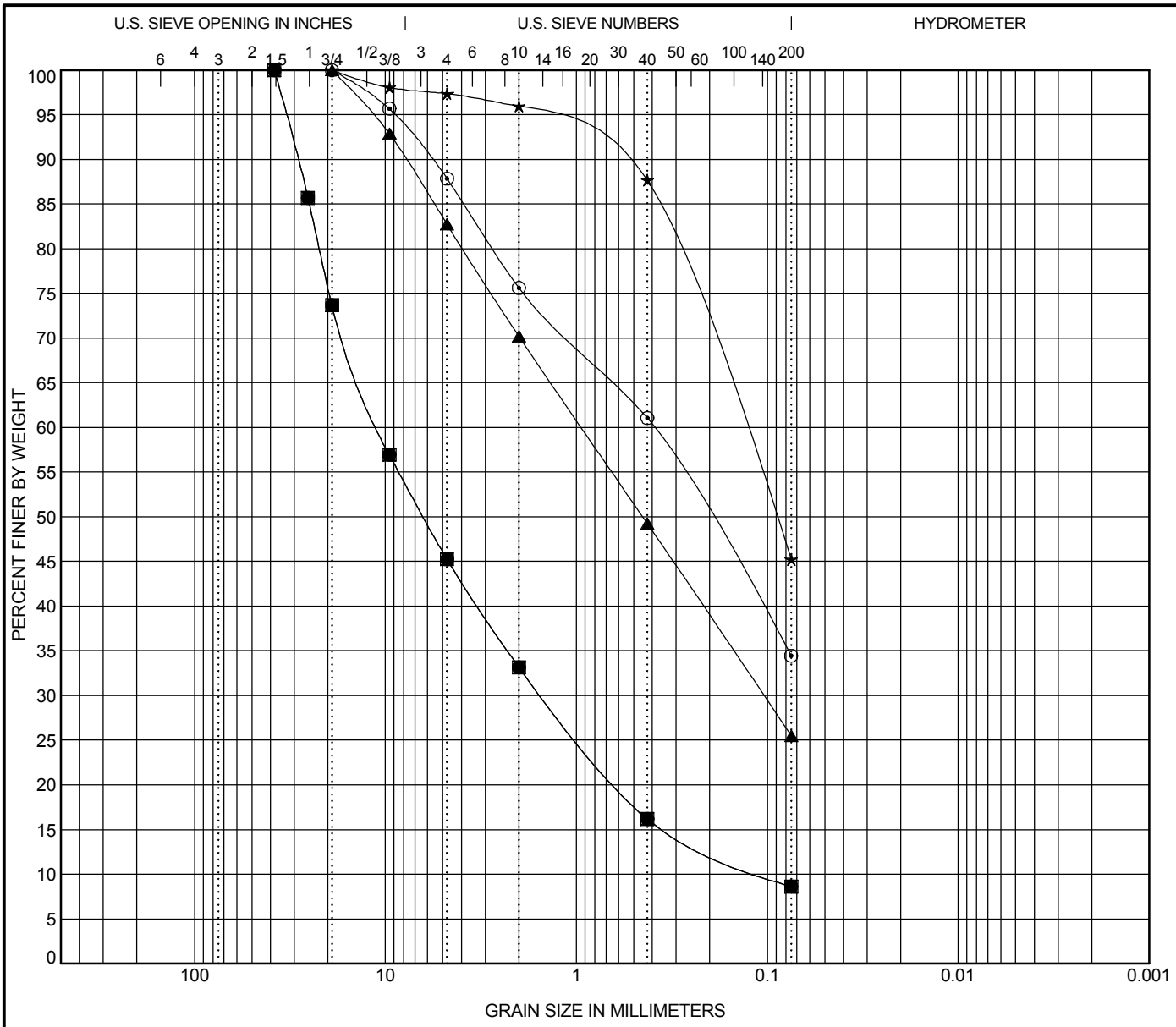
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**RCB-003-08 34.2 ft.**	**Well-graded GRAVEL with sand**				**2.02**	**105.19**
⊠	**RCB-003-08 41.5 ft.**	**Well-graded GRAVEL with sand**				**2.02**	**105.19**
▲	**RCB-003-08 45.6 ft.**	**Silty SAND with gravel**					
★	**RCB-003-08 51.5 ft.**	**Silty CLAY or Clayey SILT**	**28**	**21**	**7**		
⊙	**RCB-003-08 61.3 ft.**	**Silty SAND**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RCB-003-08 34.2 ft.**	**38.1**	**10.811**	**1.5**	**0.103**	**54.7**	**36.6**	**8.6**	
⊠	**RCB-003-08 41.5 ft.**	**38.1**	**10.811**	**1.5**	**0.103**	**54.7**	**36.6**	**8.6**	
▲	**RCB-003-08 45.6 ft.**	**19.05**	**0.941**	**0.104**		**17.3**	**57.2**	**25.5**	
★	**RCB-003-08 51.5 ft.**	**19.05**	**0.137**			**2.6**	**52.1**	**45.2**	
⊙	**RCB-003-08 61.3 ft.**	**19.05**	**0.396**			**12.1**	**53.4**	**34.5**	

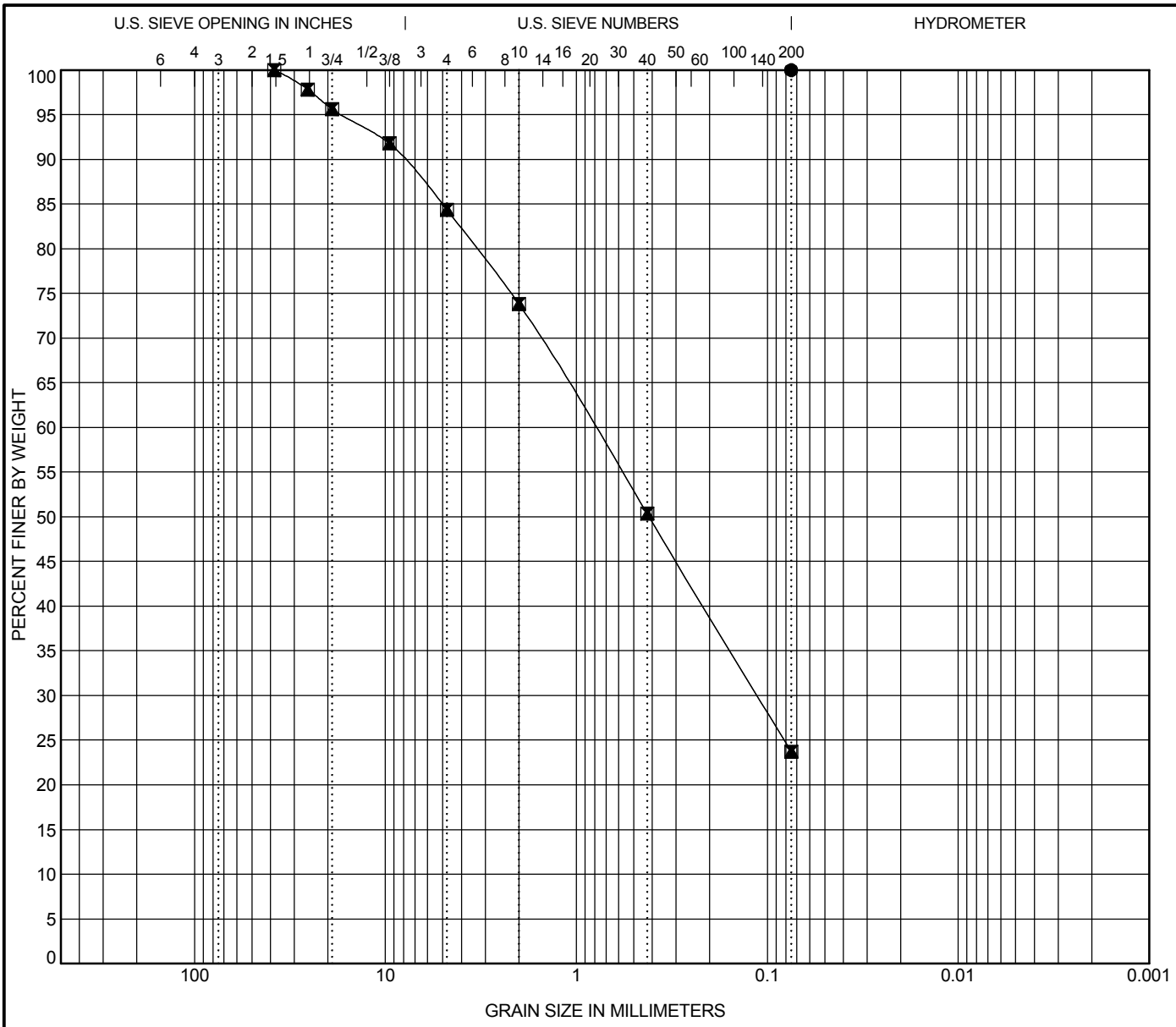
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**RCB-003-08 66.5 ft.**	**Silty CLAY**	**41**	**25**	**16**		
⊠	**RCB-003-08 71.5 ft.**	**Silty SAND with gravel**					
▲	**RCB-003-08 76.5 ft.**	**Silty SAND with gravel**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RCB-003-08 66.5 ft.**	**0.075**				**0.0**	**0.0**	**100.0**	
⊠	**RCB-003-08 71.5 ft.**	**38.1**	**0.804**	**0.113**		**15.6**	**60.7**	**23.7**	
▲	**RCB-003-08 76.5 ft.**	**38.1**	**0.804**	**0.113**		**15.6**	**60.7**	**23.7**	

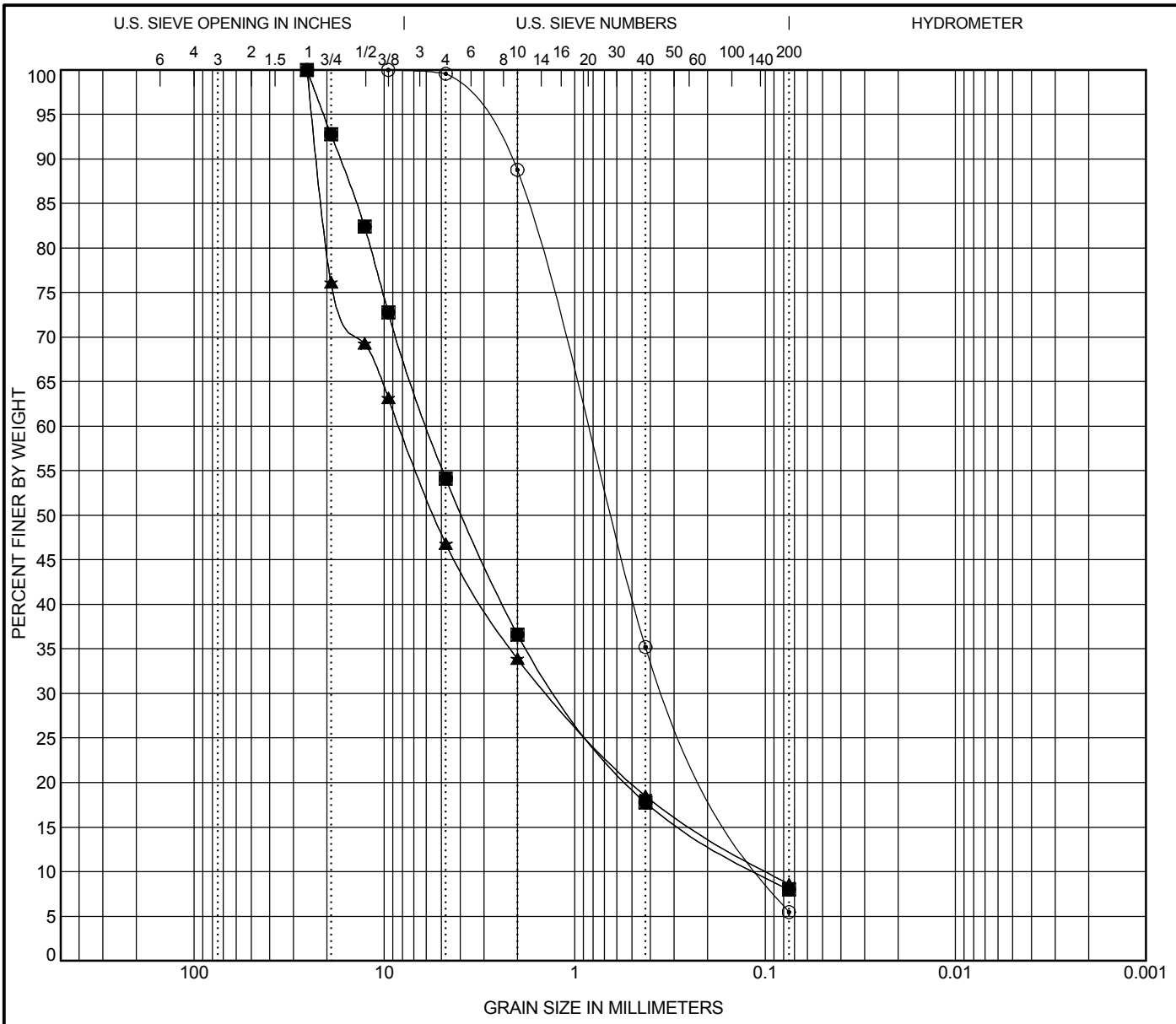
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SCB-002-08 5.0 ft.**	**Well graded SAND with gravel**				**2.12**	**55.11**
⊠	**SCB-002-08 11.5 ft.**	**Well graded SAND with gravel**				**2.12**	**55.11**
▲	**SCB-002-08 31.5 ft.**	**Well graded GRAVEL with sand**				**2.29**	**86.97**
★	**SCB-002-08 36.5 ft.**	**Well graded GRAVEL with sand**				**2.29**	**86.97**
⊙	**SCB-004-08 2.5 ft.**	**Well-graded SAND**				**1.16**	**8.90**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-002-08 5.0 ft.**	**25.4**	**5.914**	**1.161**	**0.107**	**45.9**	**46.1**	**8.0**	
⊠	**SCB-002-08 11.5 ft.**	**25.4**	**5.914**	**1.161**	**0.107**	**45.9**	**46.1**	**8.0**	
▲	**SCB-002-08 31.5 ft.**	**25.4**	**8.32**	**1.35**	**0.096**	**53.2**	**38.2**	**8.6**	
★	**SCB-002-08 36.5 ft.**	**25.4**	**8.32**	**1.35**	**0.096**	**53.2**	**38.2**	**8.6**	
⊙	**SCB-004-08 2.5 ft.**	**9.53**	**0.87**	**0.314**	**0.098**	**0.4**	**94.1**	**5.5**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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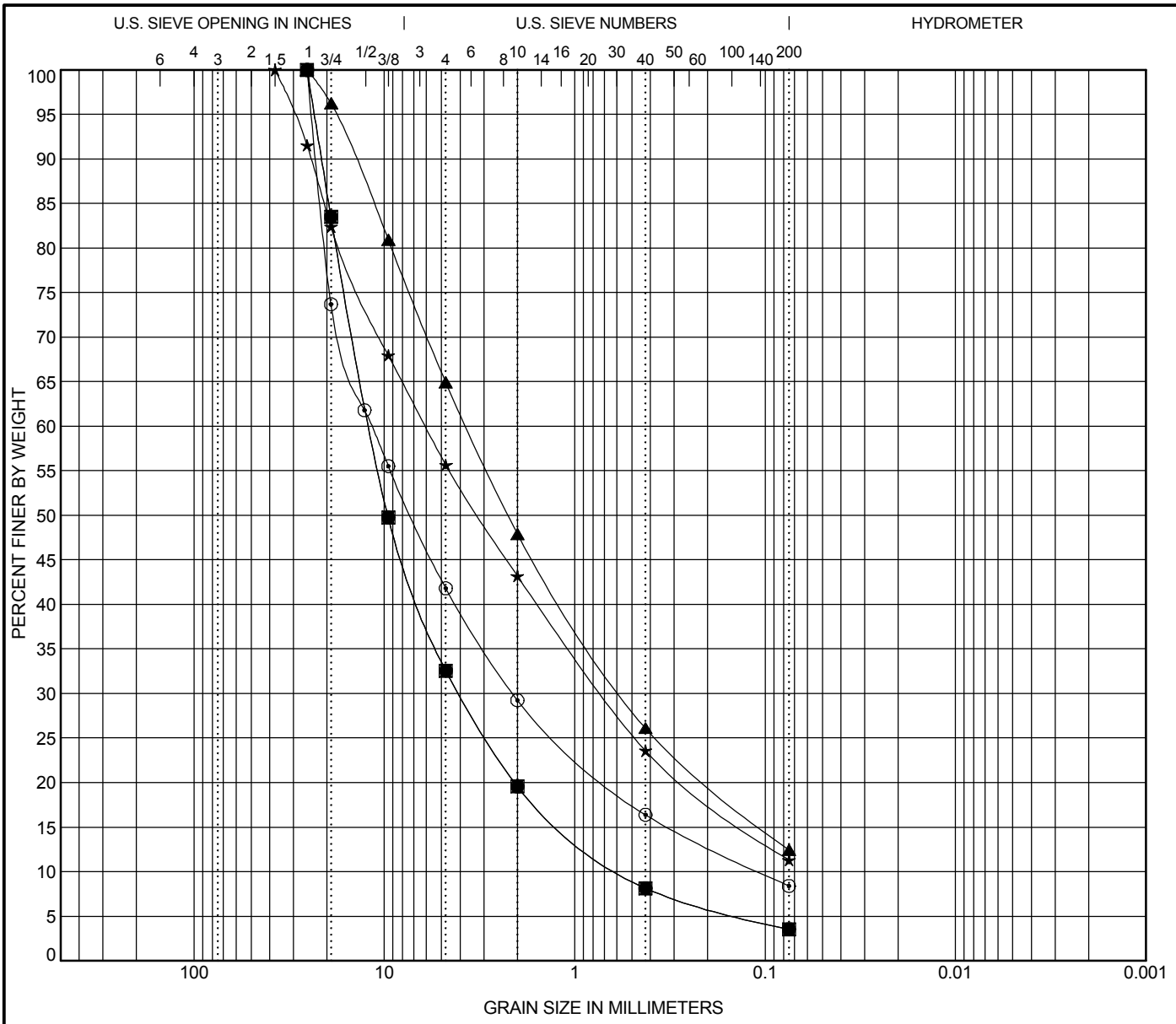
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SCB-004-08 17.5 ft.**	**Well-graded GRAVEL with sand**				**2.49**	**21.50**
⊠	**SCB-004-08 22.5 ft.**	**Well-graded GRAVEL with sand**				**2.49**	**21.50**
▲	**SCB-004-08 27.5 ft.**	**Silty SAND with gravel**				**1.54**	**67.16**
★	**SCB-004-08 32.5 ft.**	**Silty SAND with gravel or Silty GRAVEL with sand**				**1.32**	**97.54**
⊙	**SCB-005-08 5.0 ft.**	**Poorly graded GRAVEL with sand**				**3.57**	**109.89**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-004-08 17.5 ft.**	**25.4**	**11.761**	**4.005**	**0.547**	**67.4**	**29.0**	**3.5**	
⊠	**SCB-004-08 22.5 ft.**	**25.4**	**11.761**	**4.005**	**0.547**	**67.4**	**29.0**	**3.5**	
▲	**SCB-004-08 27.5 ft.**	**25.4**	**3.697**	**0.56**		**35.1**	**52.5**	**12.4**	
★	**SCB-004-08 32.5 ft.**	**37.5**	**6.072**	**0.705**		**44.3**	**44.3**	**11.3**	
⊙	**SCB-005-08 5.0 ft.**	**25.4**	**11.695**	**2.108**	**0.106**	**58.2**	**33.4**	**8.4**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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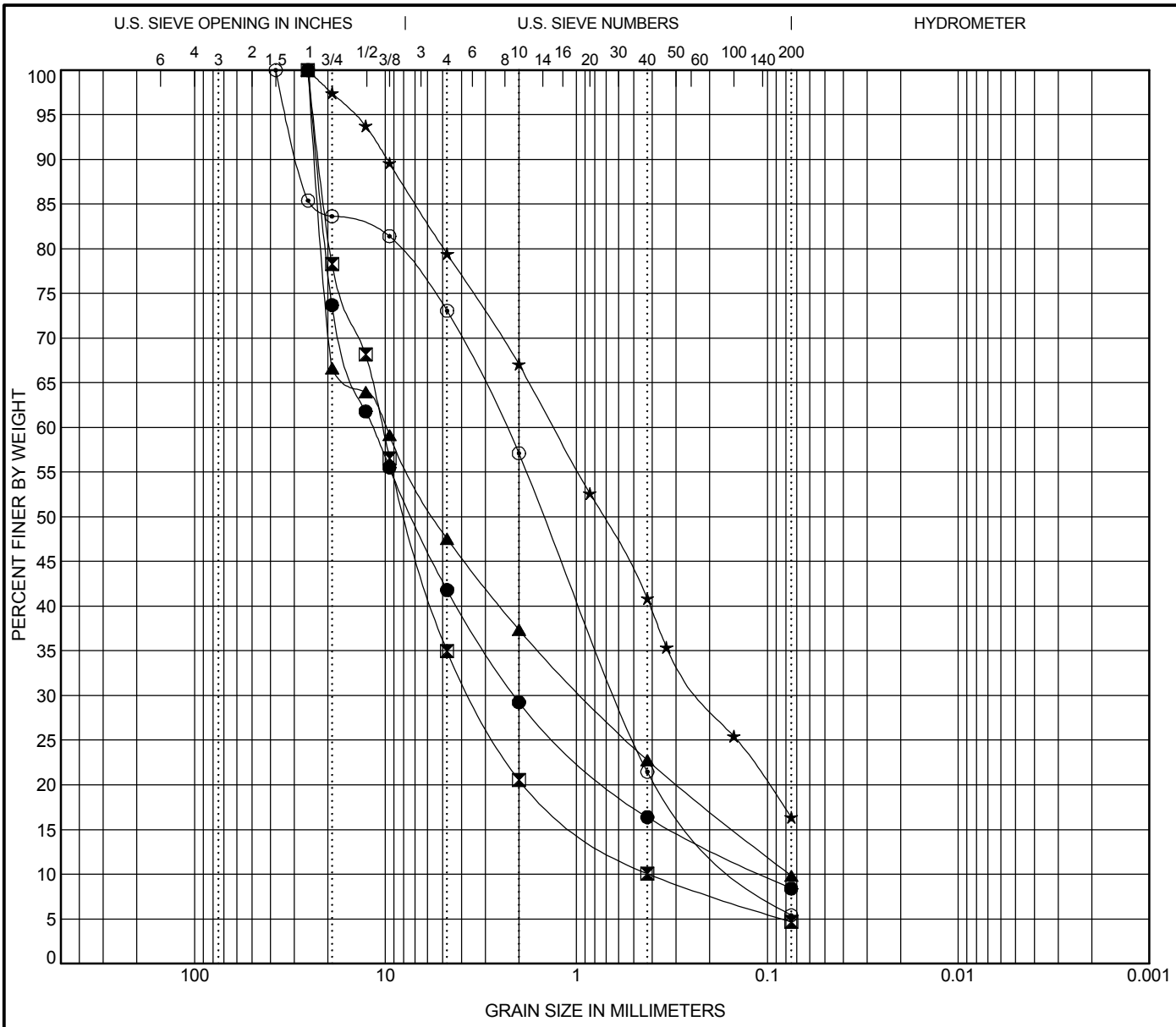
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SCB-005-08 10.0 ft.**	**Poorly graded GRAVEL with sand**				**3.57**	**109.89**
⊠	**SCB-005-08 16.5 ft.**	**Well graded GRAVEL with sand**				**2.87**	**24.86**
▲	**SCB-005-08 31.5 ft.**	**Well graded GRAVEL with sand**				**1.09**	**130.43**
★	**SCB-005-08 36.0 ft.**	**Silty SAND with gravel**					
⊙	**SCB-006-08 1.5 ft.**	**Well-graded SAND with gravel**				**1.32**	**18.97**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-005-08 10.0 ft.**	**25.4**	**11.695**	**2.108**	**0.106**	**58.2**	**33.4**	**8.4**	
⊠	**SCB-005-08 16.5 ft.**	**25.4**	**10.376**	**3.527**	**0.417**	**65.0**	**30.3**	**4.7**	
▲	**SCB-005-08 31.5 ft.**	**25.4**	**10.019**	**0.916**	**0.077**	**52.5**	**37.7**	**9.8**	
★	**SCB-005-08 36.0 ft.**	**25.4**	**1.315**	**0.217**		**20.6**	**63.1**	**16.4**	
⊙	**SCB-006-08 1.5 ft.**	**37.5**	**2.339**	**0.616**	**0.123**	**26.9**	**67.7**	**5.4**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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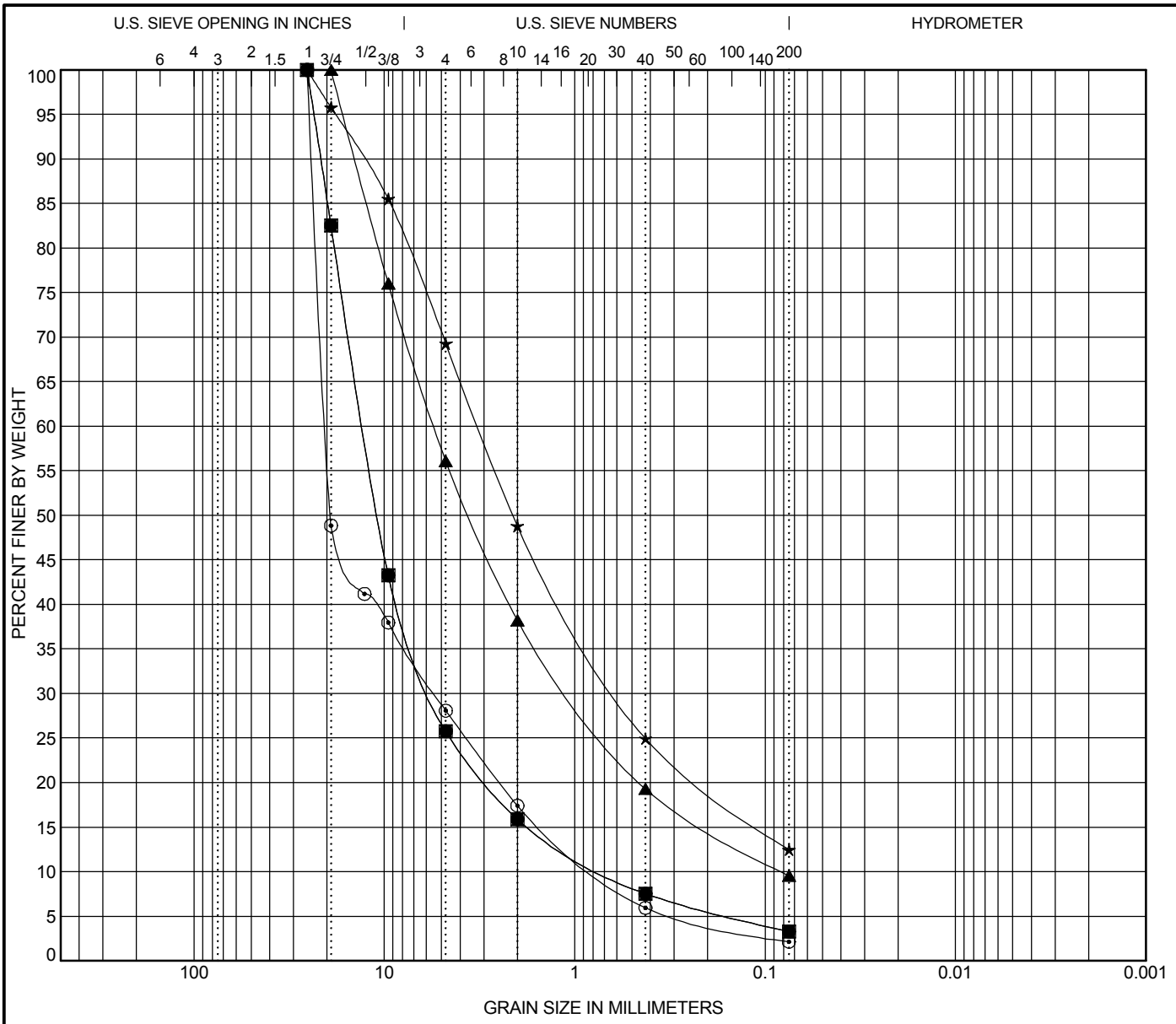
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SCB-006-08 6.0 ft.**	**Well-graded GRAVEL with sand**				**3.67**	**19.02**
⊠	**SCB-006-08 11.5 ft.**	**Well-graded GRAVEL with sand**				**3.67**	**19.02**
▲	**SCB-006-08 41.5 ft.**	**Well-graded SAND with gravel**				**2.35**	**67.01**
★	**SCB-006-08 51.5 ft.**	**Silty SAND with gravel**				**2.04**	**60.33**
⊙	**SCB-007-08 5.0 ft.**	**Well graded GRAVEL with sand**				**1.98**	**27.56**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-006-08 6.0 ft.**	**25.4**	**12.797**	**5.624**	**0.673**	**74.3**	**22.5**	**3.3**	
⊠	**SCB-006-08 11.5 ft.**	**25.4**	**12.797**	**5.624**	**0.673**	**74.3**	**22.5**	**3.3**	
▲	**SCB-006-08 41.5 ft.**	**19.05**	**5.445**	**1.021**	**0.081**	**43.9**	**46.5**	**9.5**	
★	**SCB-006-08 51.5 ft.**	**25.4**	**3.21**	**0.59**		**30.7**	**56.8**	**12.5**	
⊙	**SCB-007-08 5.0 ft.**	**25.4**	**20.282**	**5.441**	**0.736**	**71.9**	**25.9**	**2.1**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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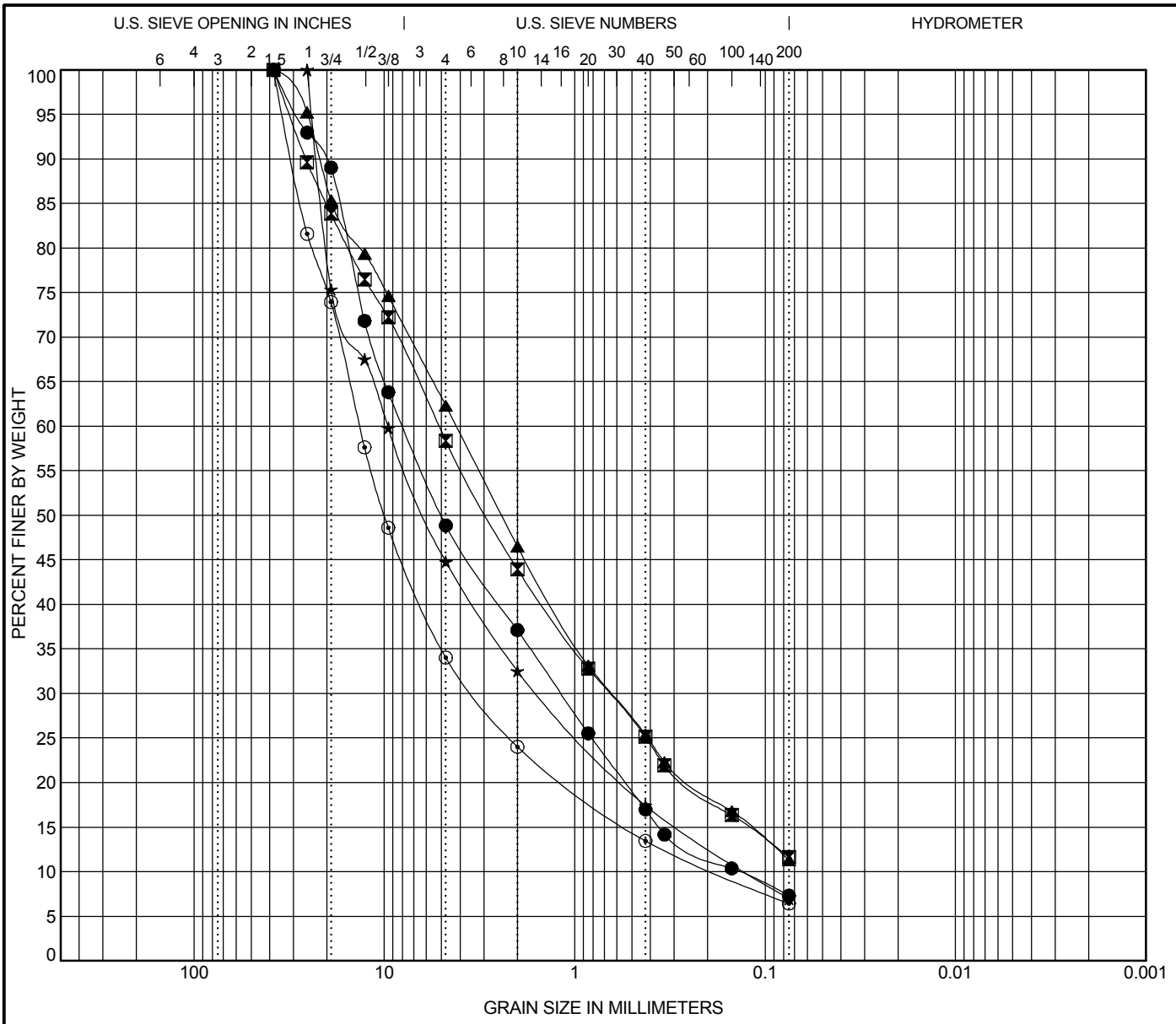
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SCB-007-08 26.5 ft.**	**Well graded GRAVEL with sand**				**1.27**	**57.70**
⊠	**SCB-007-08 56.5 ft.**	**Silty SAND with gravel**				**1.43**	**87.25**
▲	**SCB-007-08 61.5 ft.**	**Silty SAND with gravel**				**1.55**	**65.90**
★	**SCB-011-08 7.0 ft.**	**Well graded GRAVEL with sand**				**2.01**	**77.57**
⊙	**SCB-011-08 32.0 ft.**	**Poorly graded GRAVEL with sand**				**4.60**	**74.17**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-007-08 26.5 ft.**	**38.1**	**7.974**	**1.183**	**0.138**	**51.1**	**41.6**	**7.3**	
⊠	**SCB-007-08 56.5 ft.**	**38.1**	**5.159**	**0.66**		**41.6**	**46.7**	**11.6**	
▲	**SCB-007-08 61.5 ft.**	**38.1**	**4.186**	**0.643**		**37.7**	**51.0**	**11.3**	
★	**SCB-011-08 7.0 ft.**	**25.4**	**9.595**	**1.544**	**0.124**	**55.2**	**37.8**	**7.0**	
⊙	**SCB-011-08 32.0 ft.**	**38.1**	**13.471**	**3.356**	**0.182**	**66.0**	**27.6**	**6.4**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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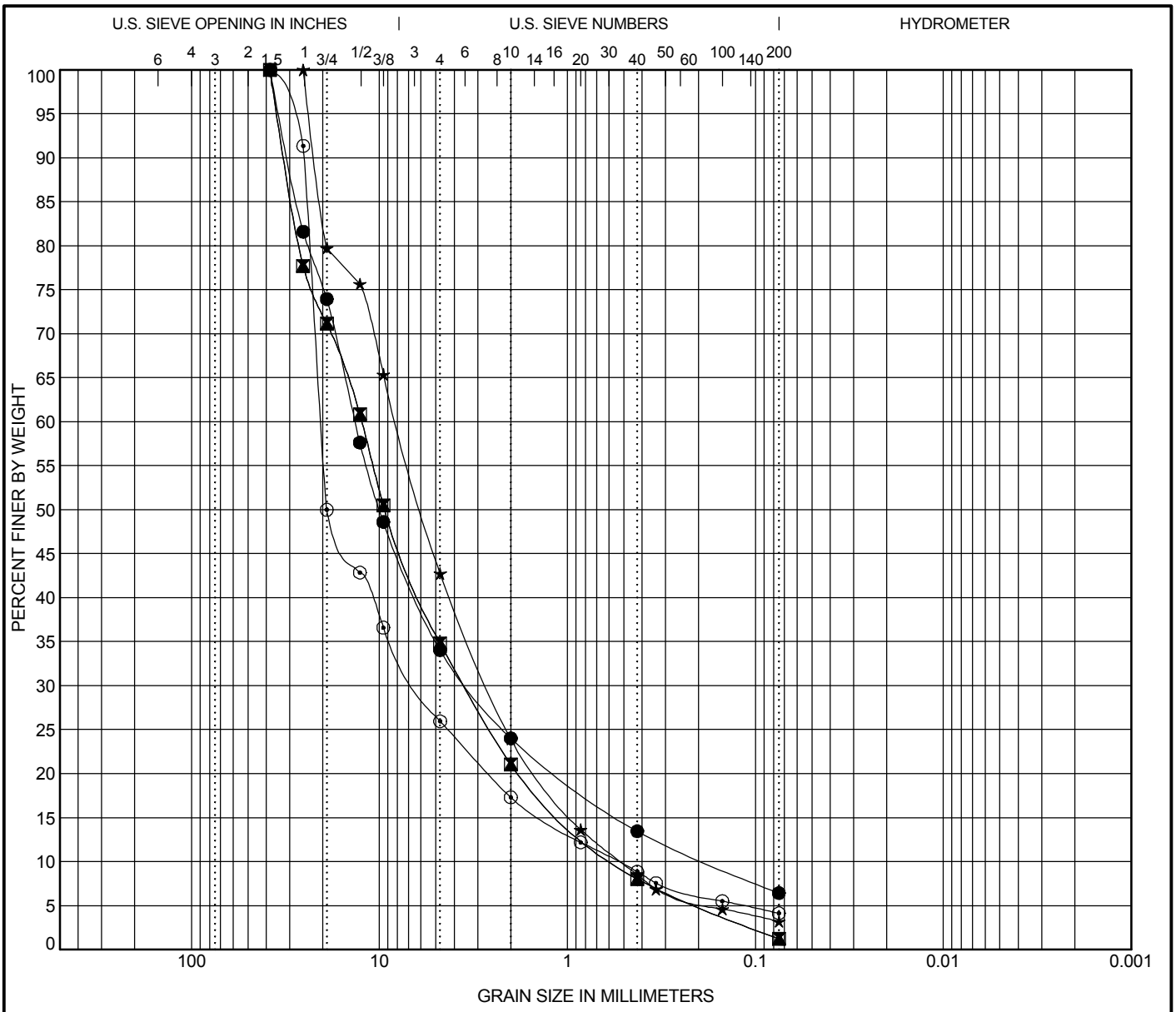
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SCB-011-08 37.0 ft.**	**Poorly graded GRAVEL with sand**				**4.60**	**74.17**
⊠	**SCB-014-08 9.5 ft.**	**Well graded GRAVEL with sand**				**1.85**	**23.05**
▲	**SCB-014-08 19.5 ft.**	**Well graded GRAVEL with sand**				**1.85**	**23.05**
★	**SCB-021-08 7.0 ft.**	**Well graded GRAVEL with sand**				**1.66**	**15.49**
⊙	**SCB-021-08 17.0 ft.**	**Poorly graded GRAVEL with sand**				**3.48**	**37.81**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-011-08 37.0 ft.**	**38.1**	**13.471**	**3.356**	**0.182**	**66.0**	**27.6**	**6.4**	
⊠	**SCB-014-08 9.5 ft.**	**38.1**	**12.405**	**3.512**	**0.538**	**65.2**	**33.6**	**1.2**	
▲	**SCB-014-08 19.5 ft.**	**38.1**	**12.405**	**3.512**	**0.538**	**65.2**	**33.6**	**1.2**	
★	**SCB-021-08 7.0 ft.**	**25.4**	**8.074**	**2.645**	**0.521**	**57.3**	**39.5**	**3.2**	
⊙	**SCB-021-08 17.0 ft.**	**38.1**	**20.424**	**6.192**	**0.54**	**74.1**	**21.8**	**4.1**	

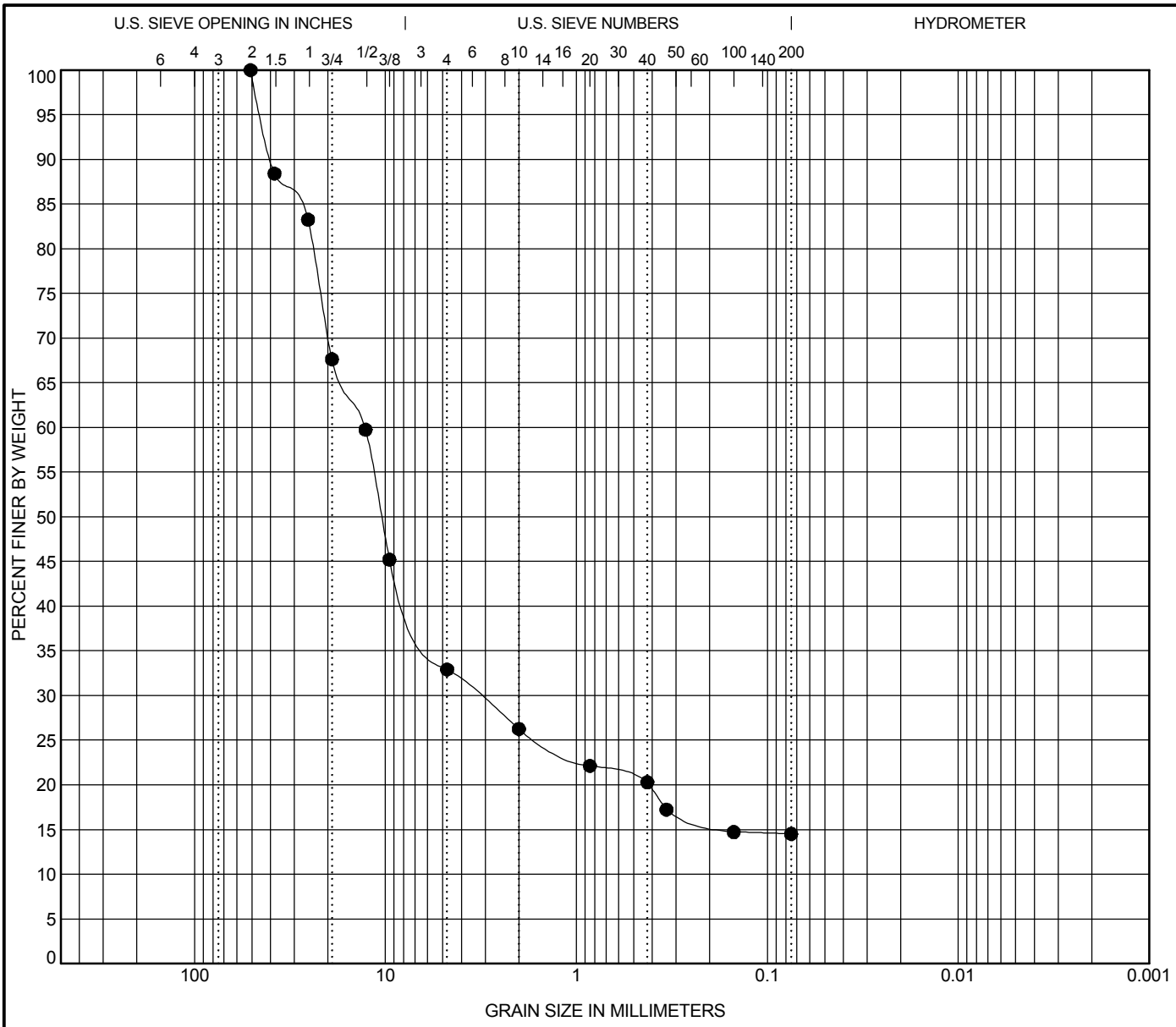
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SCB-021-08 22.0 ft.**	**Silty GRAVEL with sand**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-021-08 22.0 ft.**	**50.8**	**12.866**	**3.256**		**67.1**	**18.4**	**14.5**	

GRAIN SIZE DISTRIBUTION

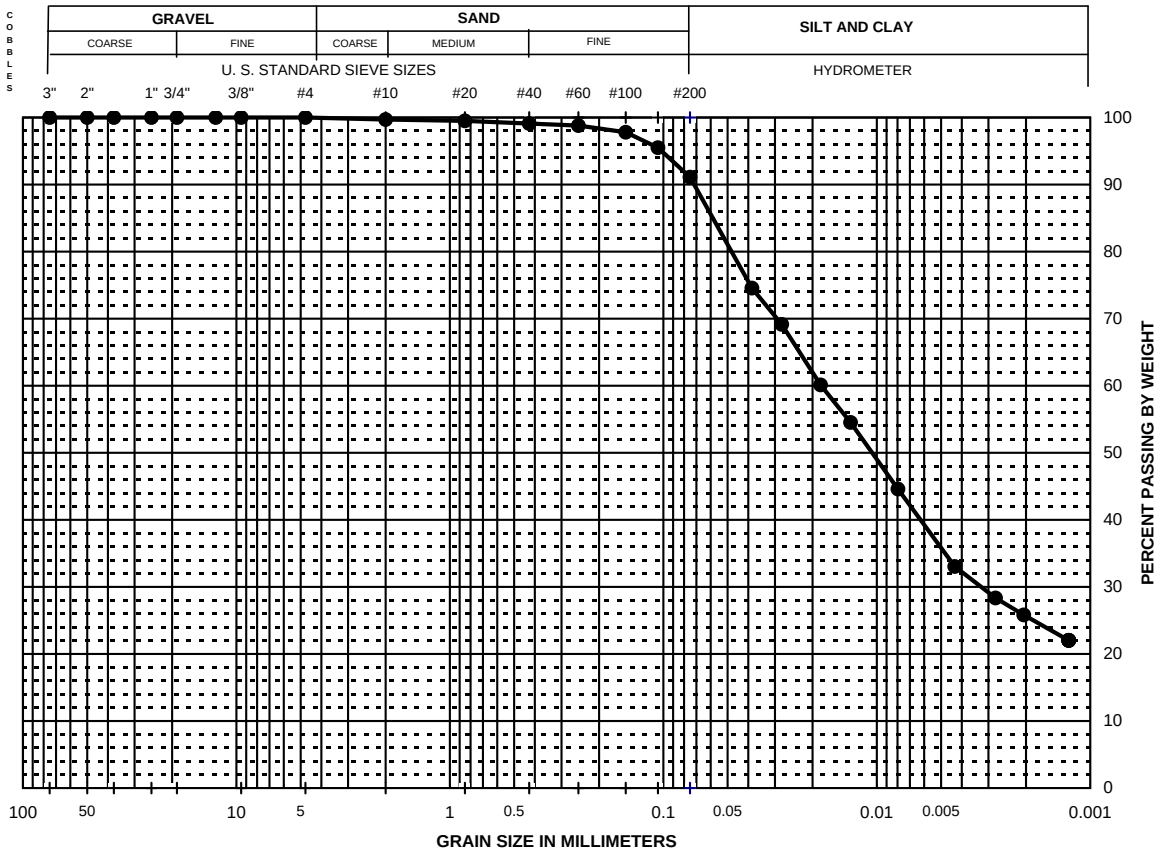
Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	100.0
#4	4.75	100.0
#10	2.00	99.7
#20	0.850	99.5
#40	0.425	99.1
#60	0.250	98.8
#100	0.150	97.8
#140	0.106	95.5
#200	0.075	91.1
Hydrometer Analysis	0.0385	74.6
	0.0279	69.1
	0.0183	60.1
	0.0133	54.5
	0.0080	44.6
	0.0043	33.0
	0.0028	28.3
	0.0020	25.8
	0.0013	22.0
	0.0013	22.0

% Cobbles	
% Gravel	
% Sand	8.9
% Fines	91.1
D_{60}	
D_{30}	
D_{10}	
C_u	
C_c	

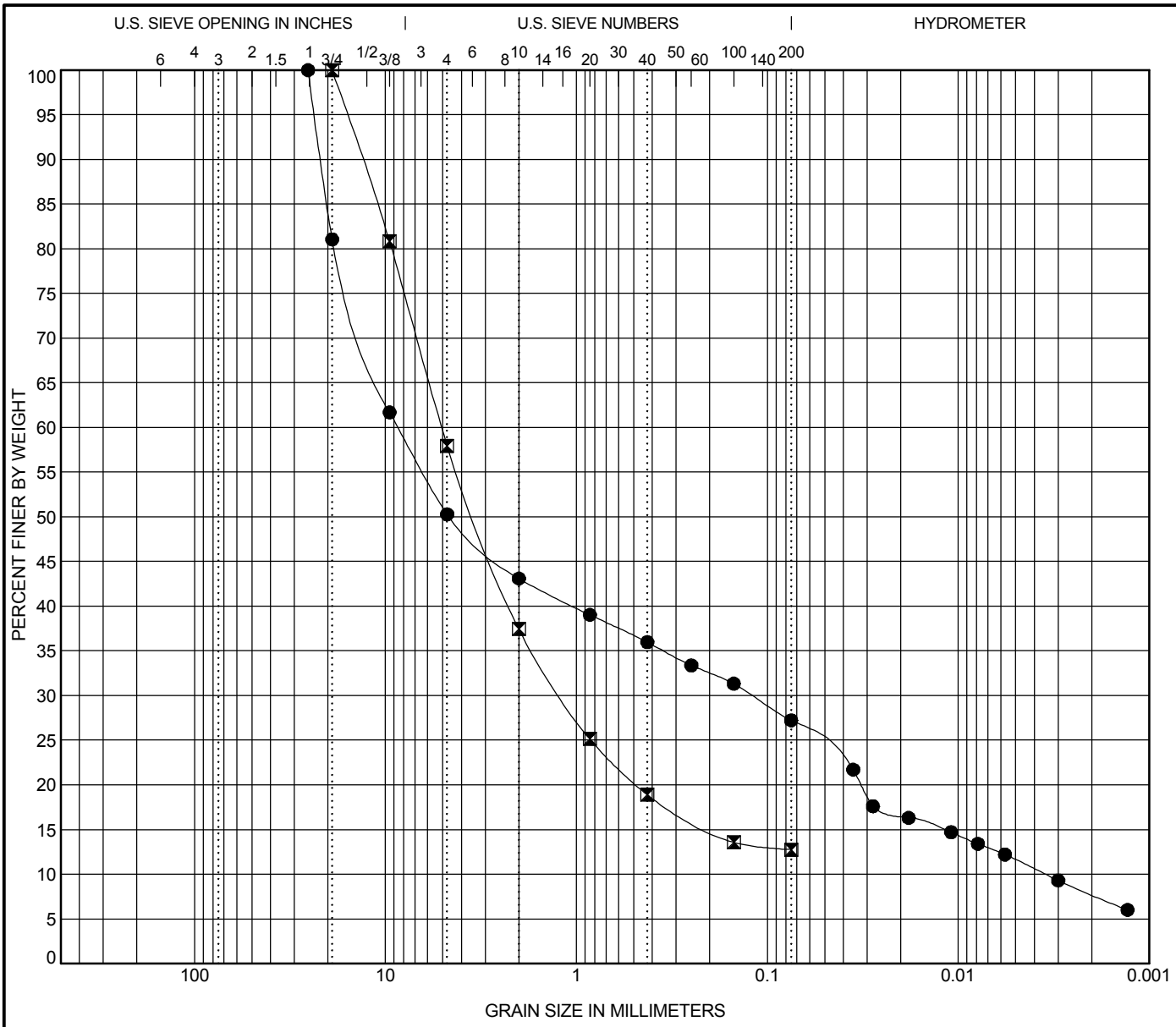
Exploration	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
SCB-022-09	C-20	61.3	●	21.6	28	9	26	**Light gray Clay (CL)**

PROJECT NAME: **I-90 Snoqualmie Pass East**

PROJECT NUMBER: **33758654**

PARTICLE-SIZE DISTRIBUTION CURVES

Figure:



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**SCB-028-09**	**50.1 ft.**	**Silty GRAVEL with Sand**				**0.48**	**2448.22**
⊠	**SCB-028-09**	**56.3 ft.**	**Silty SAND with Gravel**					

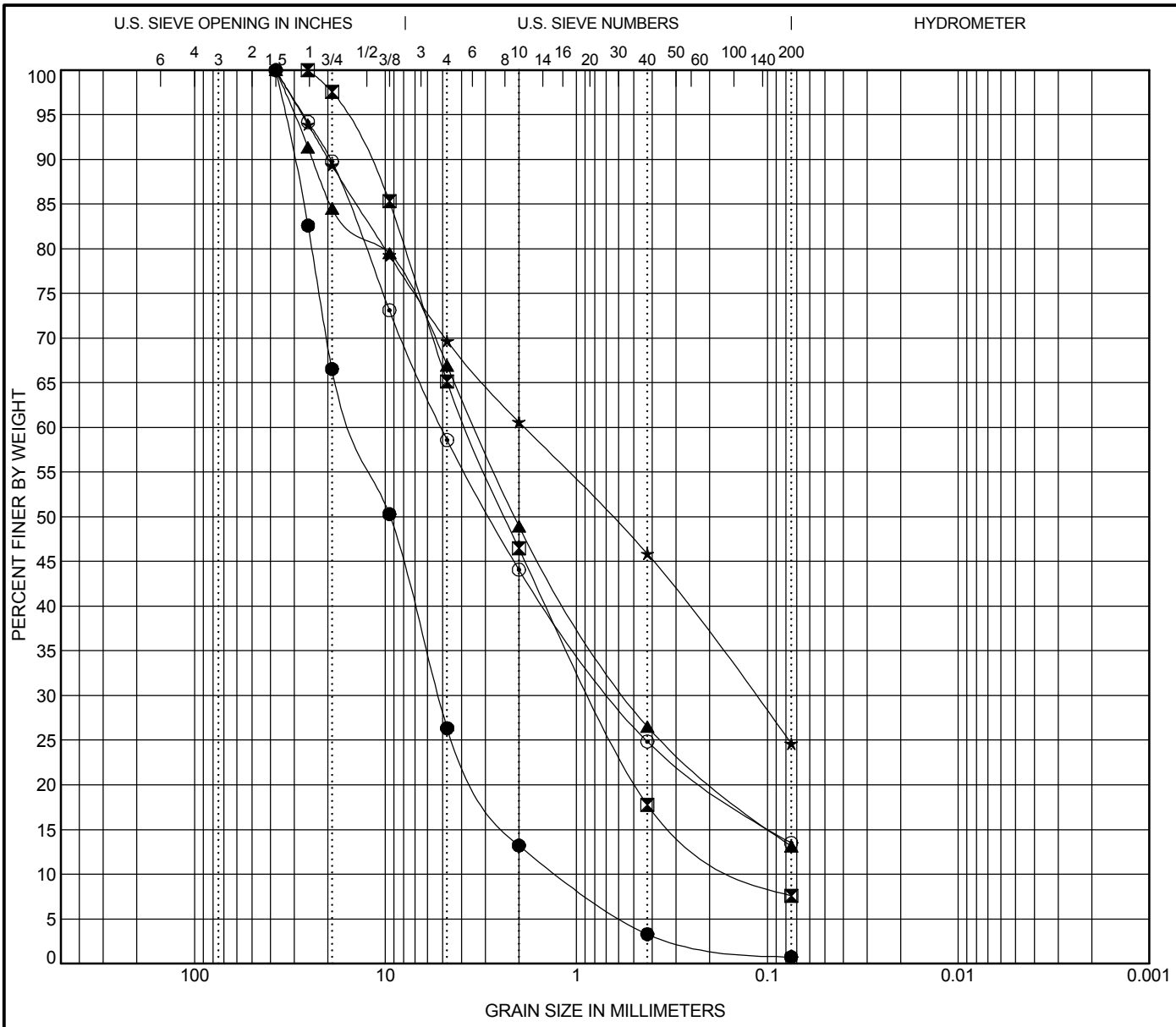
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SCB-028-09**	**50.1 ft.**	**25.4**	**8.575**	**0.12**	**0.004**	**49.7**	**23.0**	**15.6**	**11.6**
⊠	**SCB-028-09**	**56.3 ft.**	**19**	**5.055**	**1.193**		**42.1**	**45.2**	**12.8**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758654.00009

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\35000 DG 2009 GEOTECHNICAL EXPLORATION PROGRAM\35090 TEST PIT AND BORING LOGS\35095 GINT\BORINGS & TESTPITS 2009.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GDT 12/16/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**SSE-006-08**	**2.5 ft.**	**Well-graded GRAVEL with sand**				**1.60**	**11.88**
⊠	**SSE-008-08**	**2.5 ft.**	**Well-graded SAND with gravel**				**1.60**	**33.10**
▲	**SSE-009-08**	**2.0 ft.**	**Silty SAND with gravel**					
★	**SSE-009-08**	**4.5 ft.**	**Clayey SAND with gravel**					
⊙	**SSE-009-08**	**7.0 ft.**	**Silty SAND with gravel**					

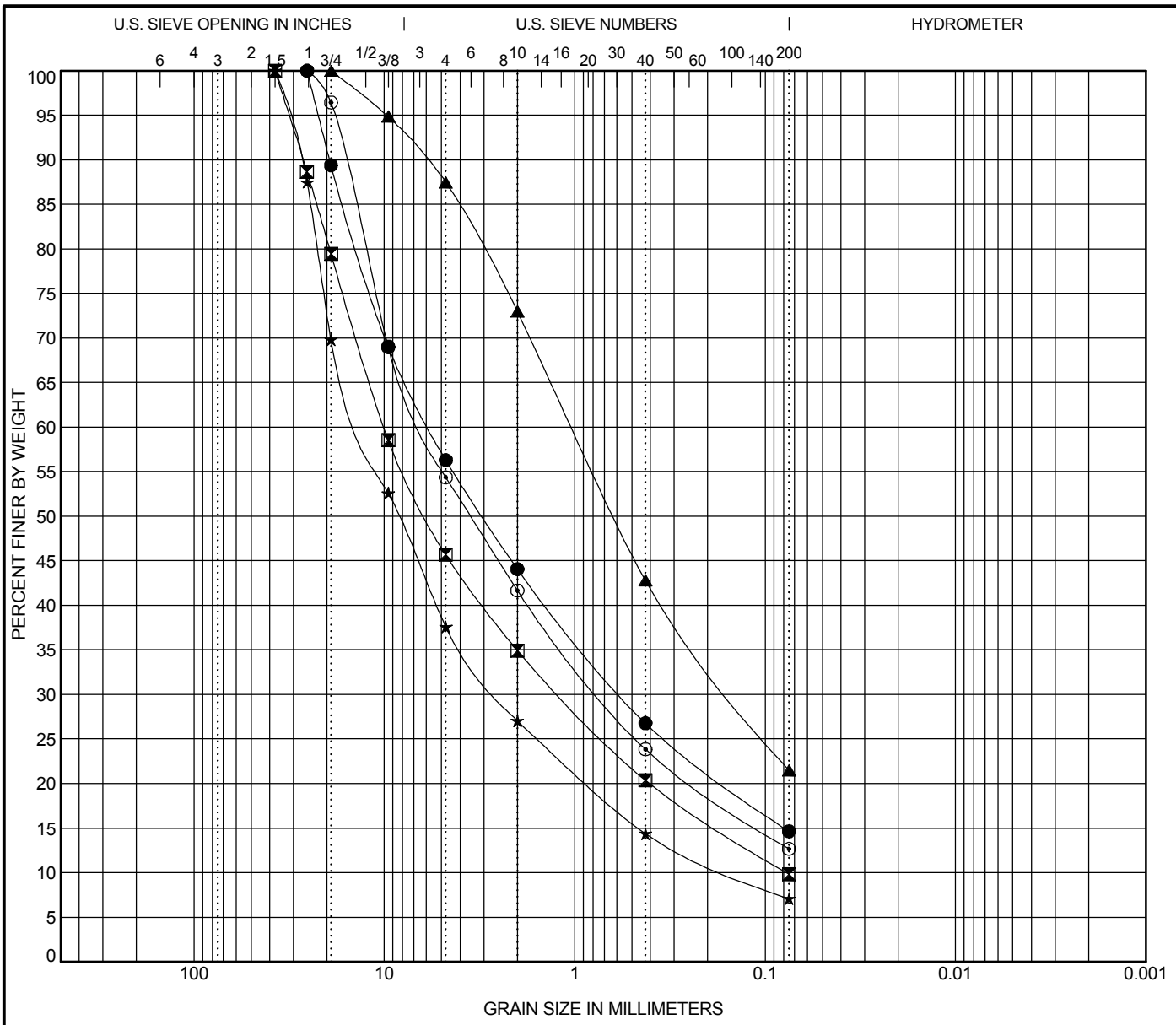
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SSE-006-08**	**2.5 ft.**	**37.5**	**14.41**	**5.283**	**1.213**	**73.7**	**25.6**	**0.7**	
⊠	**SSE-008-08**	**2.5 ft.**	**25.4**	**3.745**	**0.822**	**0.113**	**34.9**	**57.5**	**7.6**	
▲	**SSE-009-08**	**2.0 ft.**	**37.5**	**3.401**	**0.54**		**33.0**	**53.8**	**13.1**	
★	**SSE-009-08**	**4.5 ft.**	**37.5**	**1.875**	**0.116**		**30.3**	**45.1**	**24.6**	
⊙	**SSE-009-08**	**7.0 ft.**	**37.5**	**5.081**	**0.643**		**41.4**	**45.1**	**13.5**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 BORING AND TEST PIT LOGS\23114.8 TEMP\BORINGS I-90 2008.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	SSE-010-08	2.0 ft.	Silty GRAVEL with sand					
⊠	SSE-010-08	4.5 ft.	GRAVEL with sand				1.82	129.55
▲	SSE-010-08	7.0 ft.	Silty SAND with gravel					
★	SSE-011-08	2.5 ft.	Poorly-graded GRAVEL with sand				3.37	85.39
⊙	SSE-011-08	5.0 ft.	Silty GRAVEL with sand					

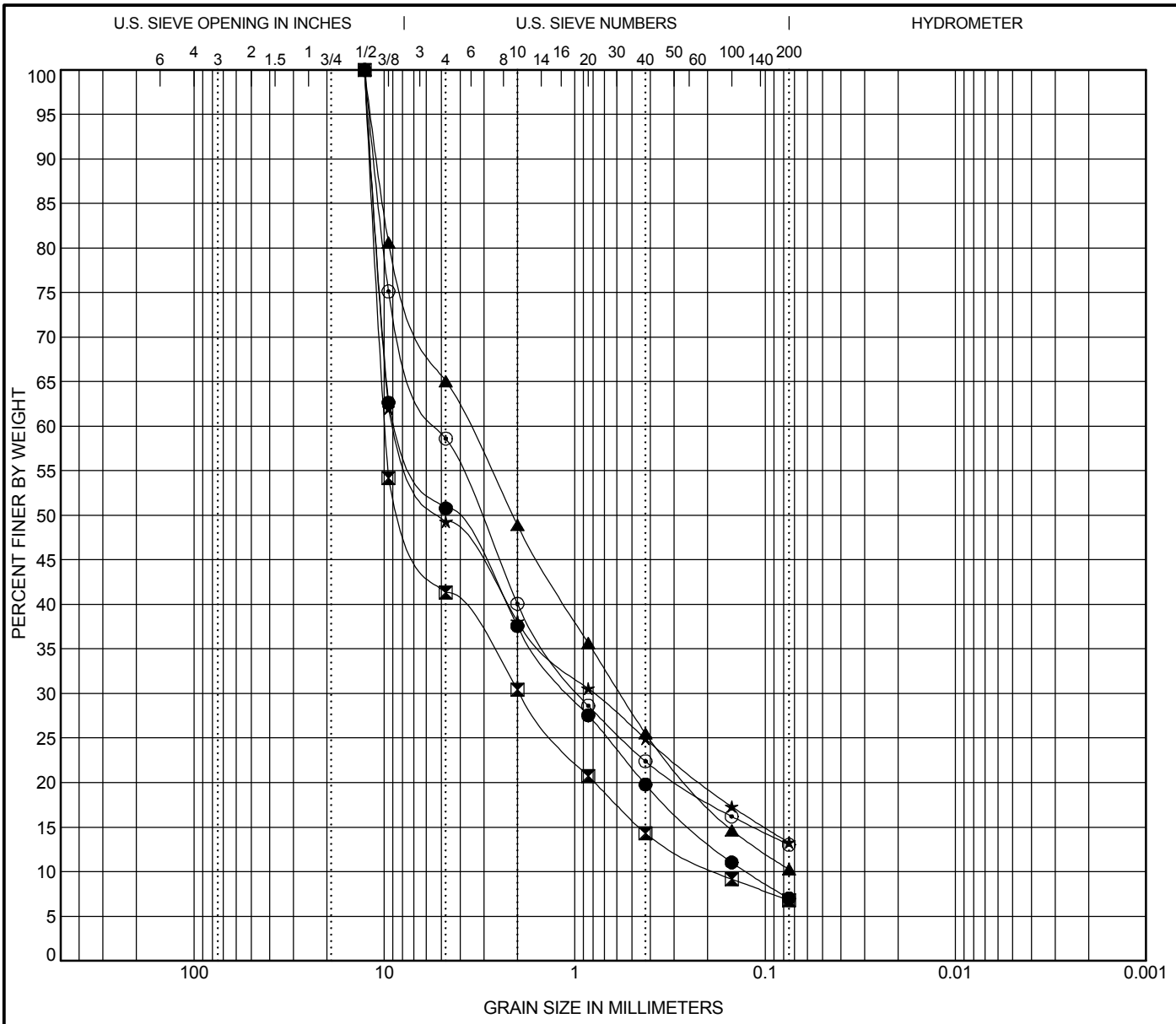
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SSE-010-08	2.0 ft.	25.4	5.814	0.567		43.7	41.7	14.6	
⊠	SSE-010-08	4.5 ft.	37.5	9.997	1.184	0.077	54.3	35.8	9.8	
▲	SSE-010-08	7.0 ft.	19.05	1.027	0.15		12.5	66.0	21.5	
★	SSE-011-08	2.5 ft.	37.5	12.833	2.55	0.15	62.4	30.5	7.1	
⊙	SSE-011-08	5.0 ft.	25.4	6.216	0.726		45.6	41.7	12.7	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 BORING AND TEST PIT LOGS\23114.8 TEMP\BORINGS I-90 2008.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	SSE-018-09	5.0 ft.	**Well graded GRAVEL with sand**				**1.07**	**64.75**
⊠	SSE-019-09	16.0 ft.	**Well graded GRAVEL with sand**				**2.13**	**55.52**
▲	SSE-021-09	0.0 ft.	**Silty SAND with gravel**				**1.28**	**50.31**
★	SSE-021-09	6.5 ft.	**Silty GRAVEL with sand**					
⊙	SSE-021-09	11.5 ft.	**Silty SAND with gravel**					

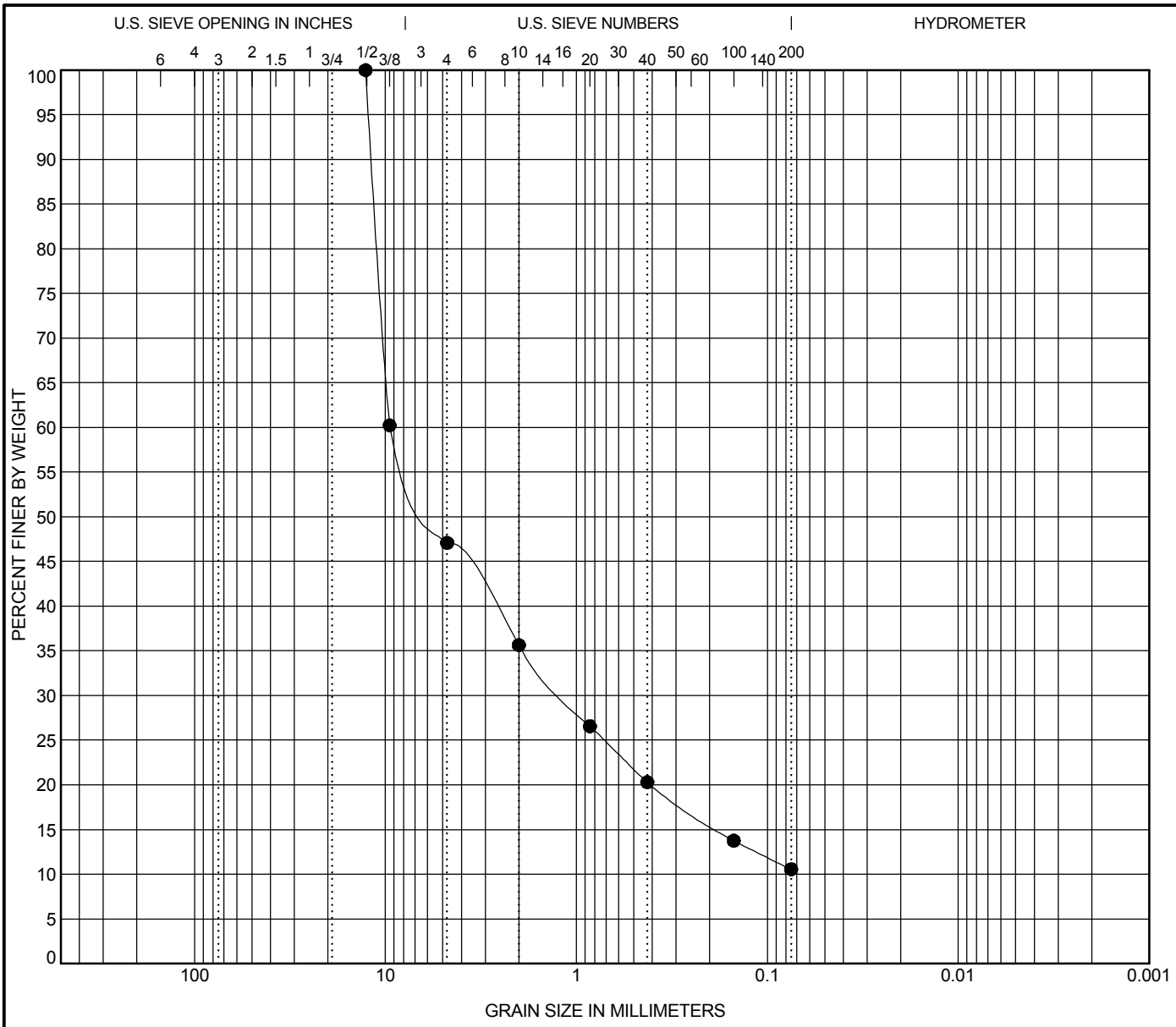
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SSE-018-09	5.0 ft.	**12.7**	**8.141**	**1.048**	**0.126**	**49.2**	**43.8**	**7.0**	
⊠	SSE-019-09	16.0 ft.	**12.7**	**9.857**	**1.93**	**0.178**	**58.7**	**34.6**	**6.8**	
▲	SSE-021-09	0.0 ft.	**12.7**	**3.621**	**0.577**		**34.9**	**54.8**	**10.3**	
★	SSE-021-09	6.5 ft.	**12.7**	**8.519**	**0.793**		**50.7**	**36.0**	**13.3**	
⊙	SSE-021-09	11.5 ft.	**12.7**	**5.035**	**0.942**		**41.4**	**45.6**	**13.0**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758654.00009

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\35000 DG 2009 GEOTECHNICAL EXPLORATION PROGRAM\35090 TEST PIT AND BORING LOGS\35095 GINT\BORINGS & TESTPITS 2009.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GDT 7/16/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SSE-022-09 4.0 ft.**	**Silty GRAVEL with sand**				**2.21**	**140.95**

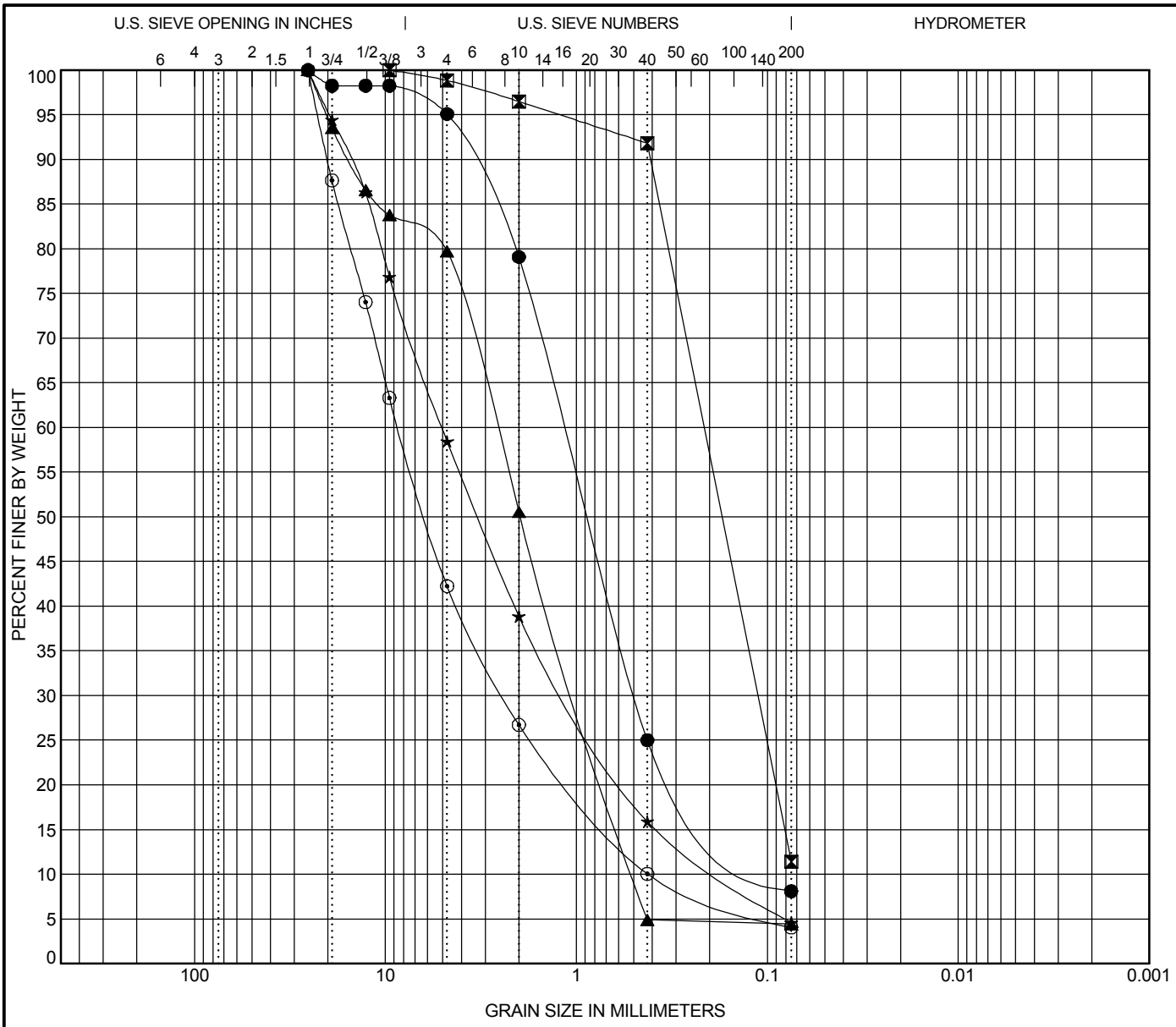
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SSE-022-09 4.0 ft.**	**12.7**	**9.376**	**1.175**		**52.9**	**36.5**	**10.6**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758654.00009

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\35000 DG 2009 GEOTECHNICAL EXPLORATION PROGRAM\35090 TEST PIT AND BORING LOGS\35095 GINT\BORINGS & TESTPITS 2009.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GDT 7/16/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SW2-008-08 9.0 ft.**	**Well graded GRAVEL**				**2.28**	**12.69**
⊠	**SW2-008-08 34.0 ft.**	**Silty SAND**				**0.81**	**2.94**
▲	**SW2-008-08 44.0 ft.**	**Poorly graded SAND with gravel**				**0.74**	**5.24**
★	**SW2-008-08 54.0 ft.**	**Well graded SAND with gravel**				**1.40**	**29.27**
⊙	**SW2-008-08 64.0 ft.**	**Well graded GRAVEL with sand**				**1.60**	**20.27**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SW2-008-08 9.0 ft.**	**25.4**	**1.158**	**0.49**	**0.091**	**4.9**	**87.0**	**8.1**	
⊠	**SW2-008-08 34.0 ft.**	**9.525**	**0.214**	**0.112**		**1.1**	**87.5**	**11.4**	
▲	**SW2-008-08 44.0 ft.**	**25.4**	**2.647**	**0.996**	**0.506**	**20.3**	**75.3**	**4.4**	
★	**SW2-008-08 54.0 ft.**	**25.4**	**5.035**	**1.1**	**0.172**	**41.5**	**53.9**	**4.6**	
⊙	**SW2-008-08 64.0 ft.**	**25.4**	**8.538**	**2.402**	**0.421**	**57.8**	**38.2**	**4.0**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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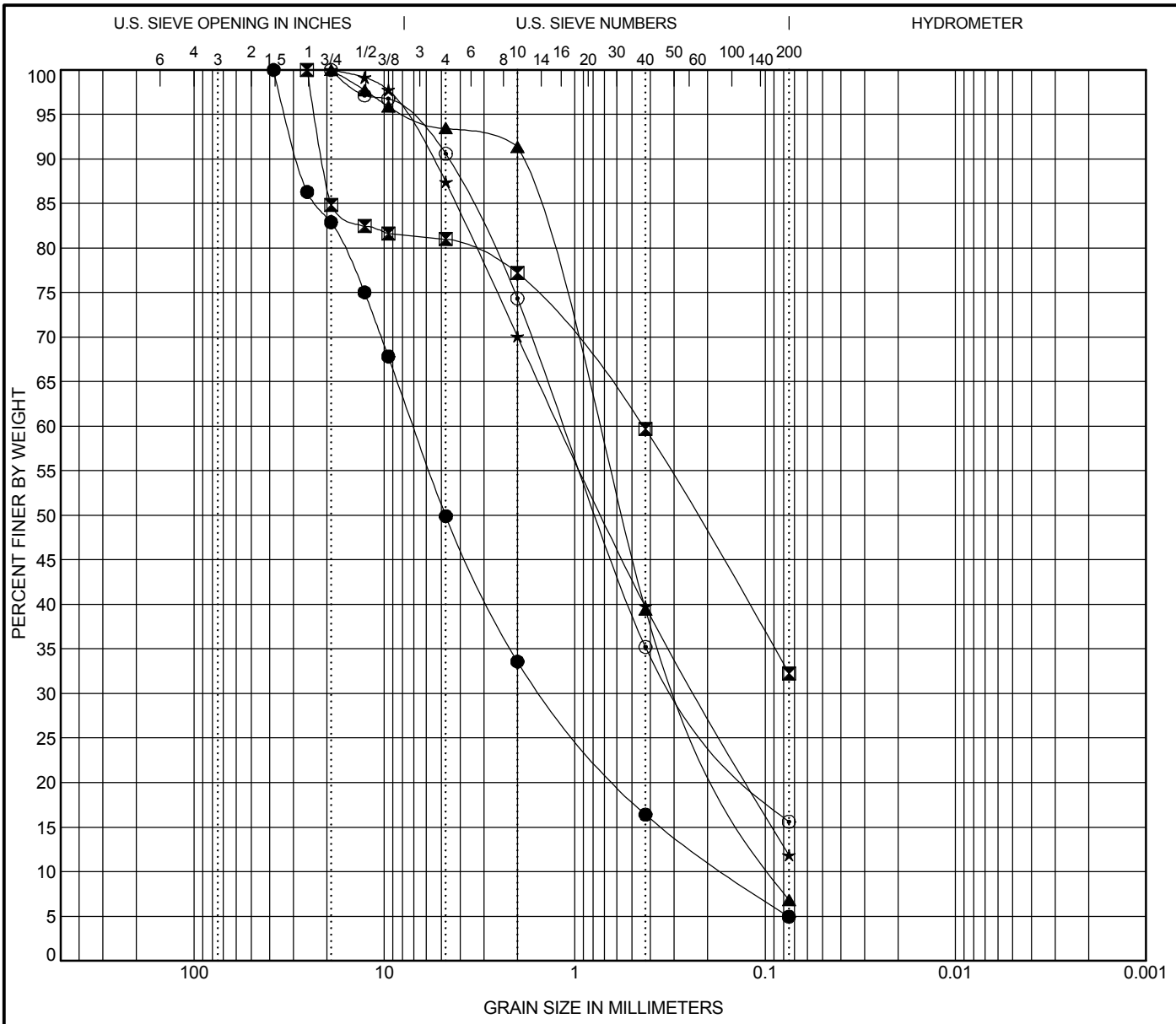
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SW2-008-08 74.0 ft.**	**Well graded GRAVEL with sand**				**1.85**	**43.54**
⊠	**SW2-008-08 94.0 ft.**	**Silty SAND with gravel**					
▲	**SW2-008-08 104.0 ft.**	**Poorly graded SAND**				**0.95**	**8.83**
★	**SW2-009-08 1.0 ft.**	**Silty SAND with gravel**				**0.67**	**17.85**
⊙	**SW2-009-08 20.0 ft.**	**Silty SAND**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SW2-008-08 74.0 ft.**	**38.1**	**7.028**	**1.448**	**0.161**	**50.1**	**45.0**	**4.9**	
⊠	**SW2-008-08 94.0 ft.**	**25.4**	**0.438**			**19.0**	**48.8**	**32.2**	
▲	**SW2-008-08 104.0 ft.**	**19.05**	**0.785**	**0.257**	**0.089**	**6.5**	**86.7**	**6.8**	
★	**SW2-009-08 1.0 ft.**	**19.05**	**1.194**	**0.232**		**12.6**	**75.6**	**11.8**	
⊙	**SW2-009-08 20.0 ft.**	**19.05**	**1.133**	**0.268**		**9.4**	**75.0**	**15.6**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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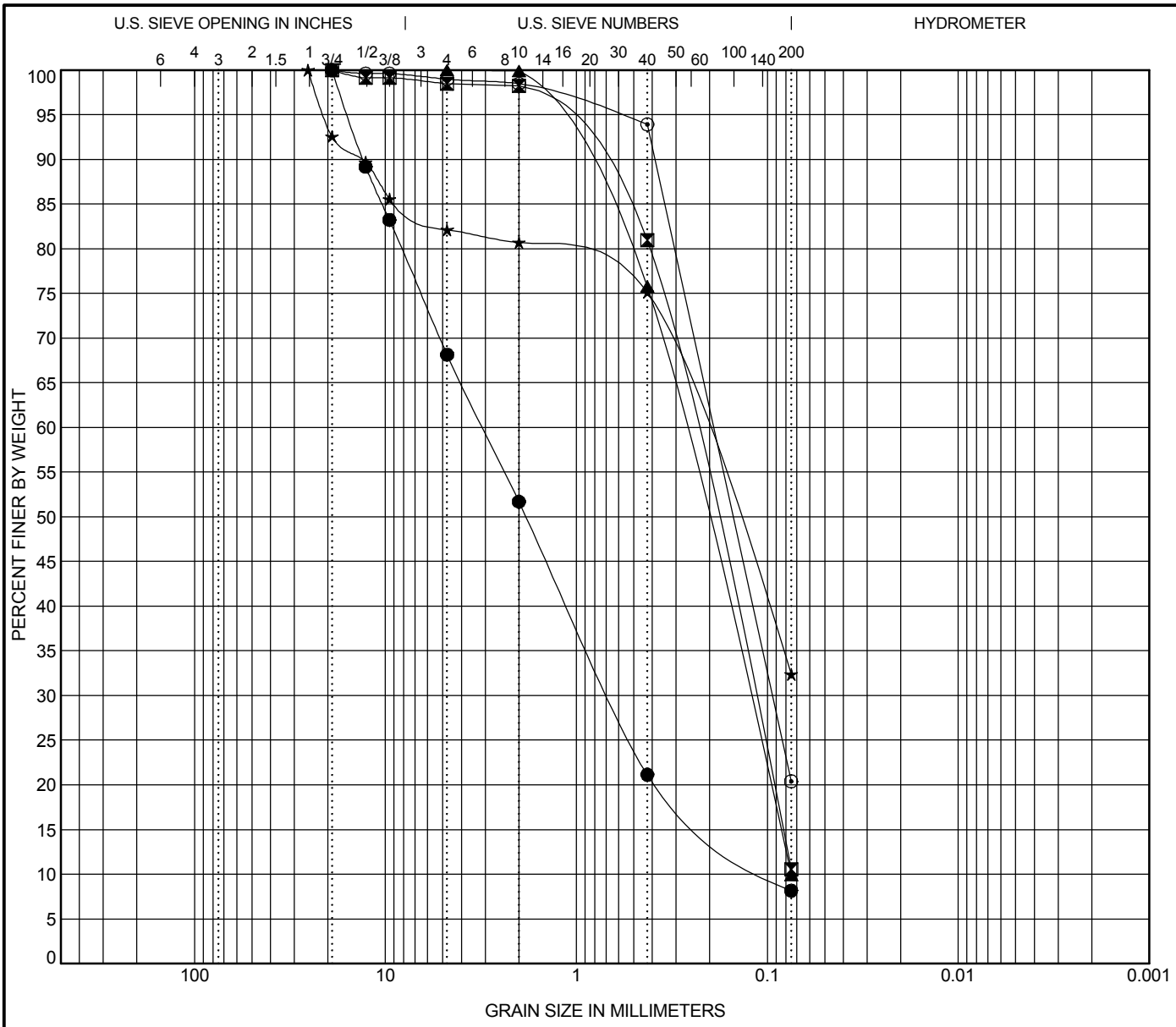
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SW2-009-08 29.0 ft.**	**Well graded SAND with gravel**				**1.49**	**32.26**
⊠	**SW2-009-08 54.0 ft.**	**Silty SAND**				**0.78**	**3.43**
▲	**SW2-009-08 64.0 ft.**	**Poorly graded SAND**				**0.77**	**3.73**
★	**SW2-009-08 76.0 ft.**	**Silty SAND with gravel**					
⊙	**SW2-009-08 86.0 ft.**	**Silty SAND**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SW2-009-08 29.0 ft.**	**19.05**	**3.095**	**0.666**	**0.096**	**31.9**	**60.0**	**8.2**	
⊠	**SW2-009-08 54.0 ft.**	**19.05**	**0.254**	**0.121**		**1.5**	**87.9**	**10.6**	
▲	**SW2-009-08 64.0 ft.**	**4.75**	**0.281**	**0.127**	**0.075**	**0.0**	**90.1**	**9.9**	
★	**SW2-009-08 76.0 ft.**	**25.4**	**0.23**			**17.9**	**49.7**	**32.4**	
⊙	**SW2-009-08 86.0 ft.**	**19.05**	**0.191**	**0.094**		**1.0**	**78.6**	**20.4**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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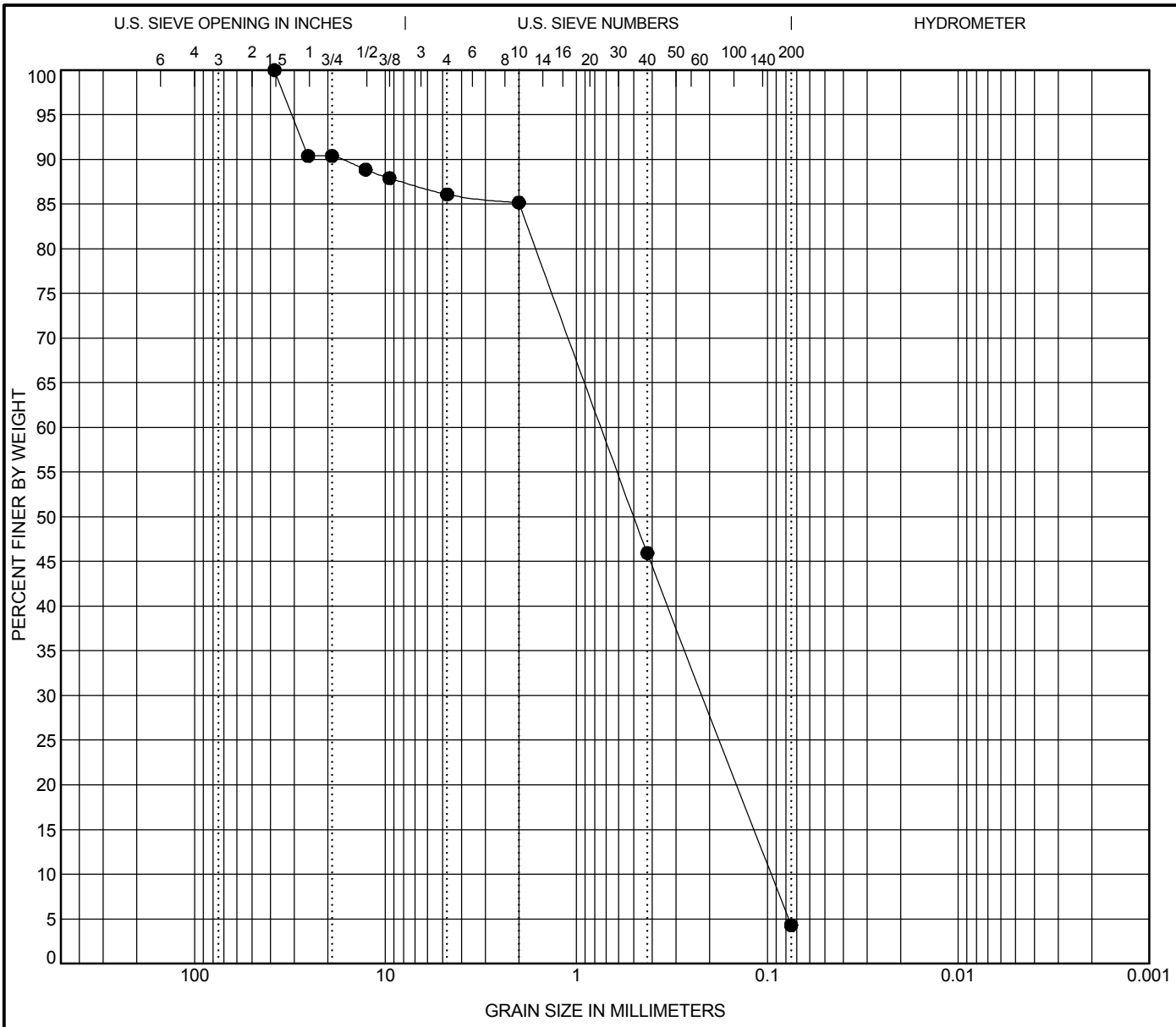
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**SW2-009-08 96.0 ft.**	**Poorly graded SAND with gravel**				**0.68**	**7.78**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SW2-009-08 96.0 ft.**	**38.1**	**0.74**	**0.219**	**0.095**	**13.9**	**81.8**	**4.3**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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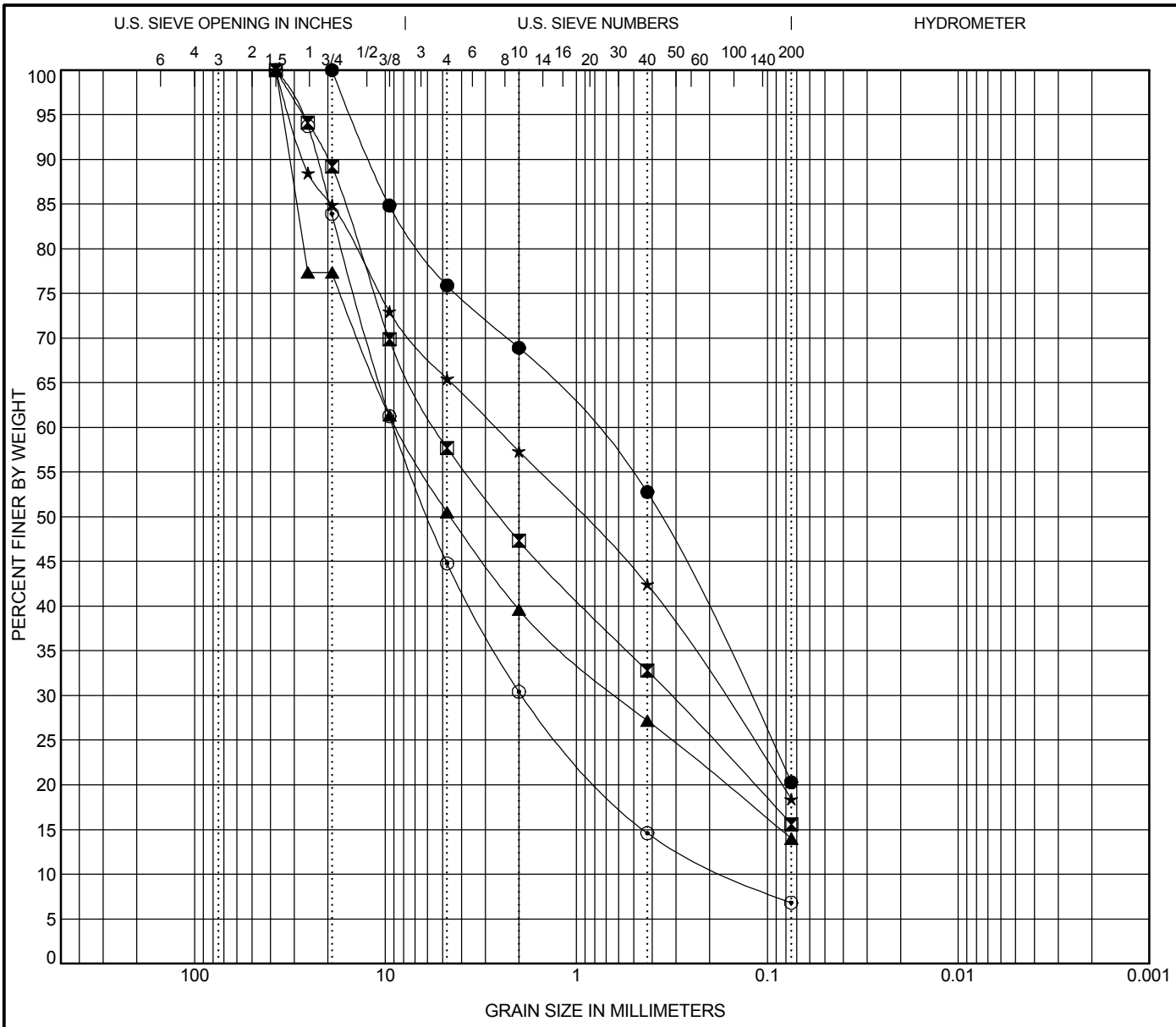
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HMF-001-08 5.0 ft.**	**Silty SAND with gravel**					
⊠	**HMF-001-08 10.0 ft.**	**SIlty SAND with gravel or GRAVEL with sand**					
▲	**HMF-002-08 5.0 ft.**	**Silty GRAVEL with snad**					
★	**HMF-002-08 10.0 ft.**	**Silty SAND with gravel**					
⊙	**HMF-003-08 2.5 ft.**	**Well-graded GRAVEL with sand**				**2.67**	**59.14**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**HMF-001-08 5.0 ft.**	**19.05**	**0.85**	**0.126**		**24.1**	**55.6**	**20.3**	
⊠	**HMF-001-08 10.0 ft.**	**37.5**	**5.415**	**0.321**		**42.3**	**42.1**	**15.6**	
▲	**HMF-002-08 5.0 ft.**	**37.5**	**8.75**	**0.603**		**49.5**	**36.5**	**14.0**	
★	**HMF-002-08 10.0 ft.**	**37.5**	**2.654**	**0.173**		**34.5**	**47.1**	**18.4**	
⊙	**HMF-003-08 2.5 ft.**	**37.5**	**9.036**	**1.921**	**0.153**	**55.2**	**38.0**	**6.8**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

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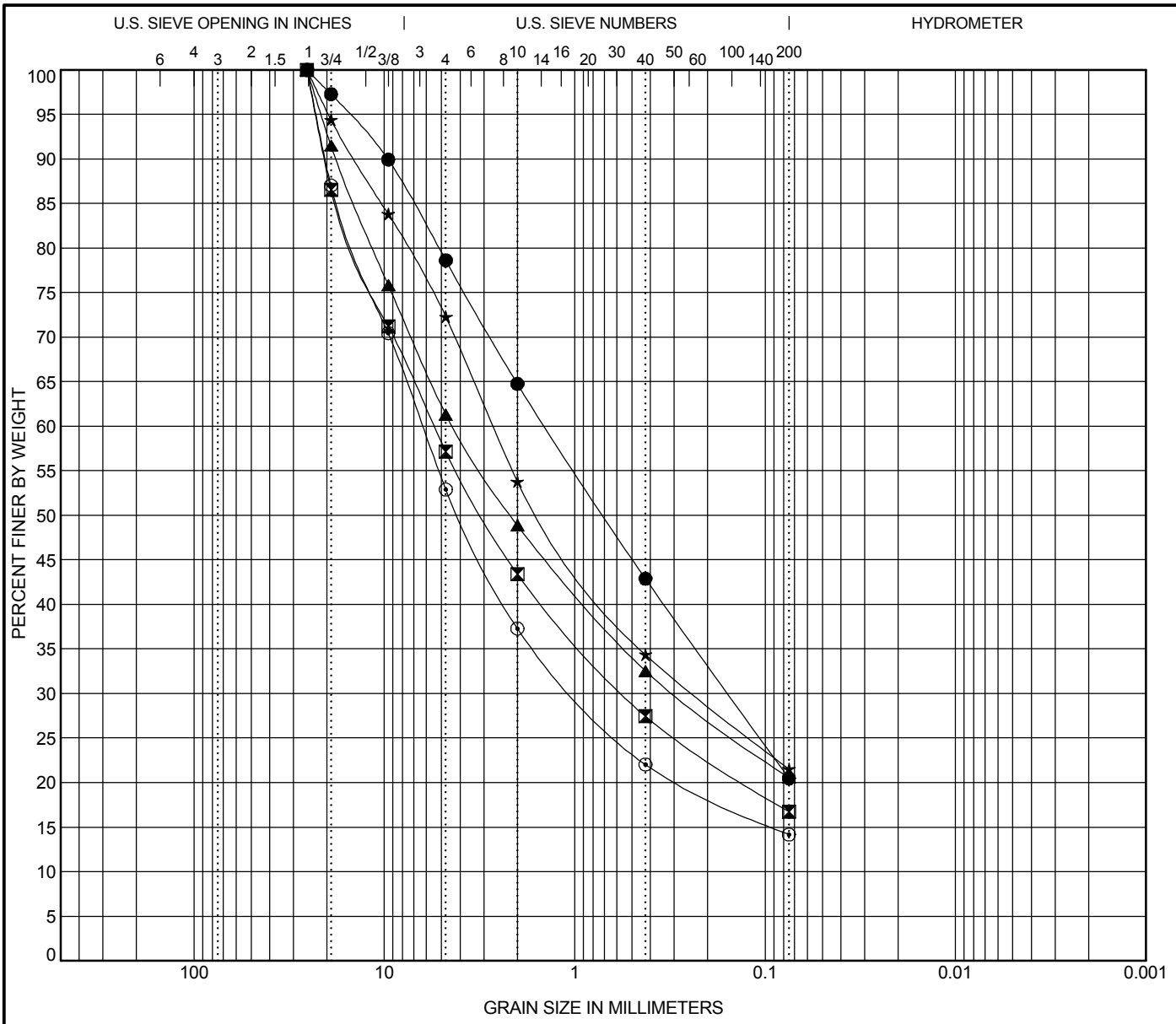
US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HMF-003-08 15.0 ft.**	**Silty SAND with gravel**					
⊠	**HMF-004-08 3.8 ft.**	**Silty GRAVEL with sand**					
▲	**HMF-004-08 7.5 ft.**	**Silty SAND with gravel**					
★	**HMF-004-08 8.8 ft.**	**Silty SAND with gravel**					
⊙	**HMF-005-08 4.0 ft.**	**Silty GRAVEL with sand**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**HMF-003-08 15.0 ft.**	**25.4**	**1.428**	**0.157**		**21.4**	**58.2**	**20.5**	
⊠	**HMF-004-08 3.8 ft.**	**25.4**	**5.471**	**0.544**		**42.9**	**40.4**	**16.7**	
▲	**HMF-004-08 7.5 ft.**	**25.4**	**4.333**	**0.294**		**38.7**	**40.8**	**20.6**	
★	**HMF-004-08 8.8 ft.**	**25.4**	**2.674**	**0.236**		**27.7**	**50.8**	**21.5**	
⊙	**HMF-005-08 4.0 ft.**	**25.4**	**6.297**	**0.955**		**47.1**	**38.7**	**14.2**	

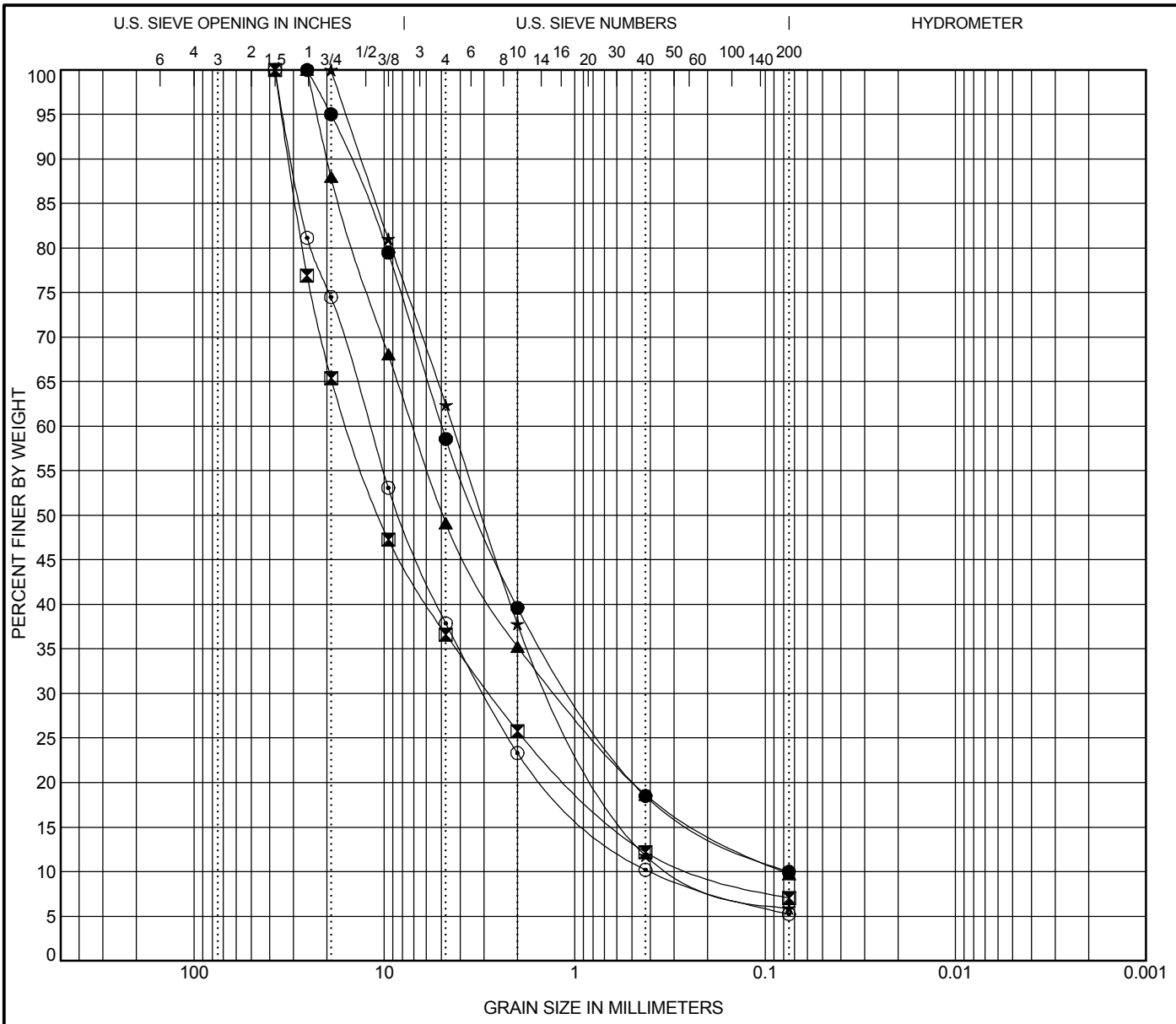
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HMF-005-08 11.5 ft.**	**Silty SAND with gravel**				**2.60**	**66.15**
⊠	**HMF-006-08 13.8 ft.**	**Well-graded GRAVEL with sand**				**2.50**	**76.39**
▲	**HMF-007-08 2.5 ft.**	**Well-graded GRAVEL with sand**				**2.67**	**89.40**
★	**HMF-007-08 12.5 ft.**	**Well-graded SAND with gravel**				**1.44**	**17.40**
⊙	**HMF-007-08 14.0 ft.**	**Well-graded GRAVEL with sand**				**1.87**	**30.04**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**HMF-005-08 11.5 ft.**	**25.4**	**4.981**	**0.988**	**0.075**	**41.4**	**48.6**	**10.0**	
⊠	**HMF-006-08 13.8 ft.**	**37.5**	**15.49**	**2.8**	**0.203**	**63.4**	**29.6**	**7.1**	
▲	**HMF-007-08 2.5 ft.**	**25.4**	**7.082**	**1.225**	**0.079**	**50.9**	**39.4**	**9.7**	
★	**HMF-007-08 12.5 ft.**	**19.05**	**4.365**	**1.256**	**0.251**	**37.6**	**56.5**	**5.9**	
⊙	**HMF-007-08 14.0 ft.**	**37.5**	**11.913**	**2.975**	**0.397**	**62.1**	**32.6**	**5.2**	

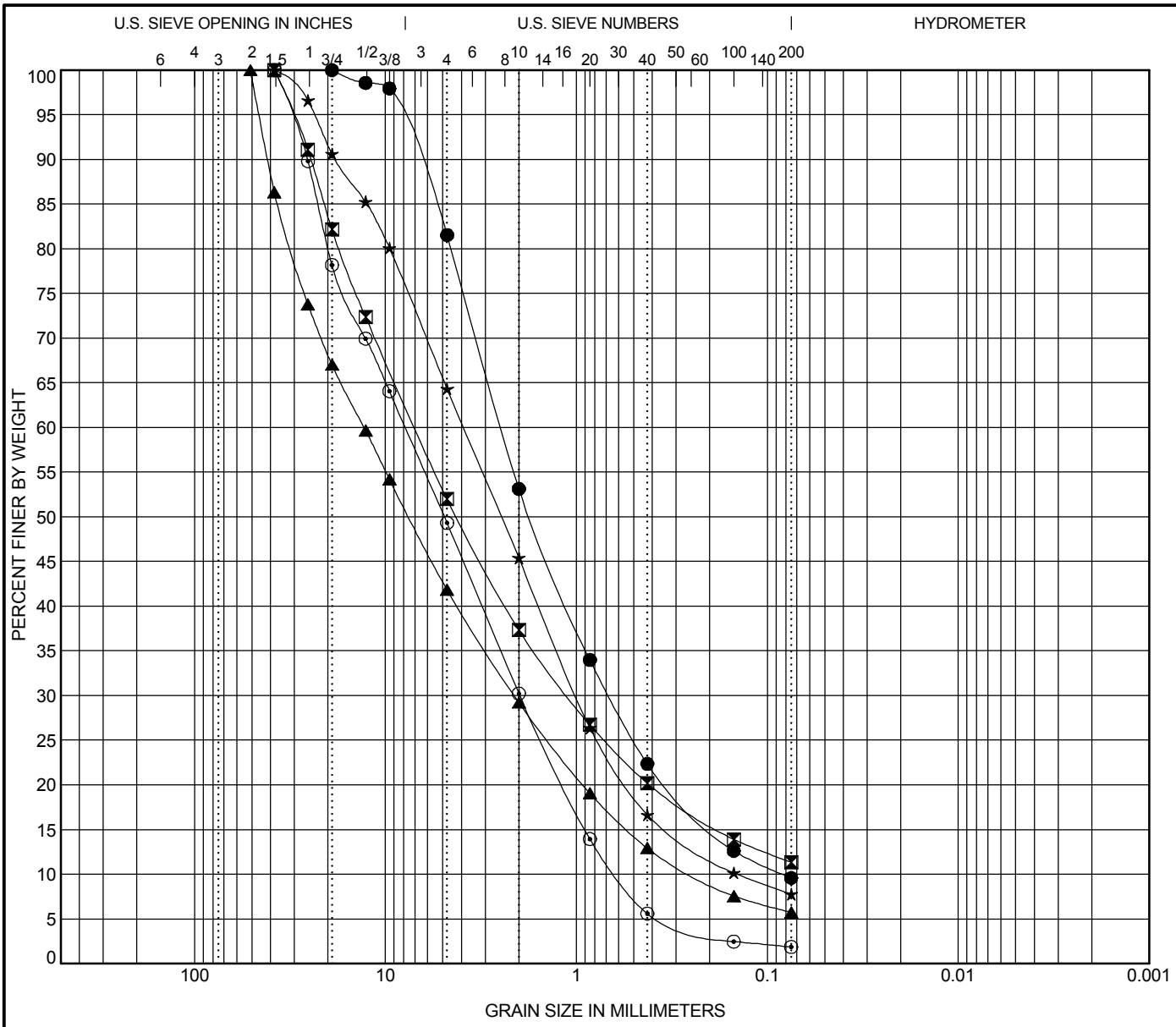
GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

URS

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	HMF-TP-001-09 2.5 ft.	Well graded SAND with gravel				2.21	29.86
⊠	HMF-TP-001-09 6.0 ft.	Silty GRAVEL with sand				3.35	133.69
▲	HMF-TP-001-09 11.0 ft.	Well graded GRAVEL with sand				1.43	53.71
★	HMF-TP-002-09 6.5 ft.	Silty SAND with gravel				1.79	27.16
⊙	HMF-TP-002-09 10.0 ft.	Poorly graded GRAVEL with sand				0.81	12.82

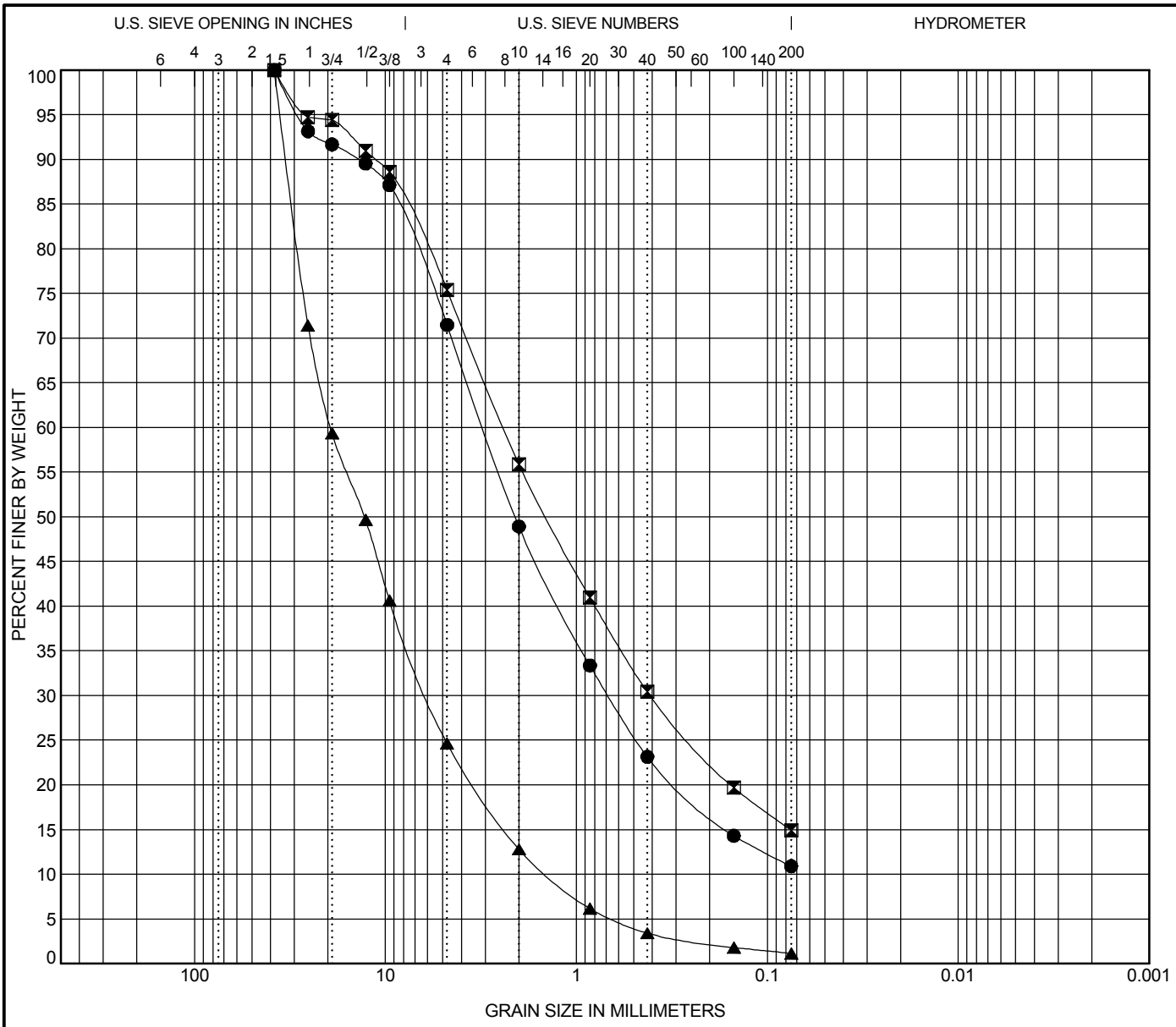
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	HMF-TP-001-09 2.5 ft.	19.05	2.466	0.671	0.083	18.5	72.0	9.6	
⊠	HMF-TP-001-09 6.0 ft.	38.1	6.992	1.106		48.0	40.6	11.3	
▲	HMF-TP-001-09 11.0 ft.	50.8	12.938	2.111	0.241	58.2	36.1	5.7	
★	HMF-TP-002-09 6.5 ft.	38.1	3.897	1.001	0.144	35.7	56.6	7.8	
⊙	HMF-TP-002-09 10.0 ft.	38.1	7.86	1.977	0.613	50.7	47.5	1.8	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758654.00009

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\35000 DG 2009 GEOTECHNICAL EXPLORATION PROGRAM\35090 TEST PIT AND BORING LOGS\35095 GINT\BORINGS & TESTPITS 2009.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GDT 7/16/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HMF-TP-003-09 2.5 ft.**	**Silty SAND with gravel**				**2.40**	**48.92**
⊠	**HMF-TP-003-09 7.0 ft.**	**Silty SAND with gravel**					
▲	**HMF-TP-003-09 11.0 ft.**	**Well graded GRAVEL with sand**				**1.33**	**13.85**

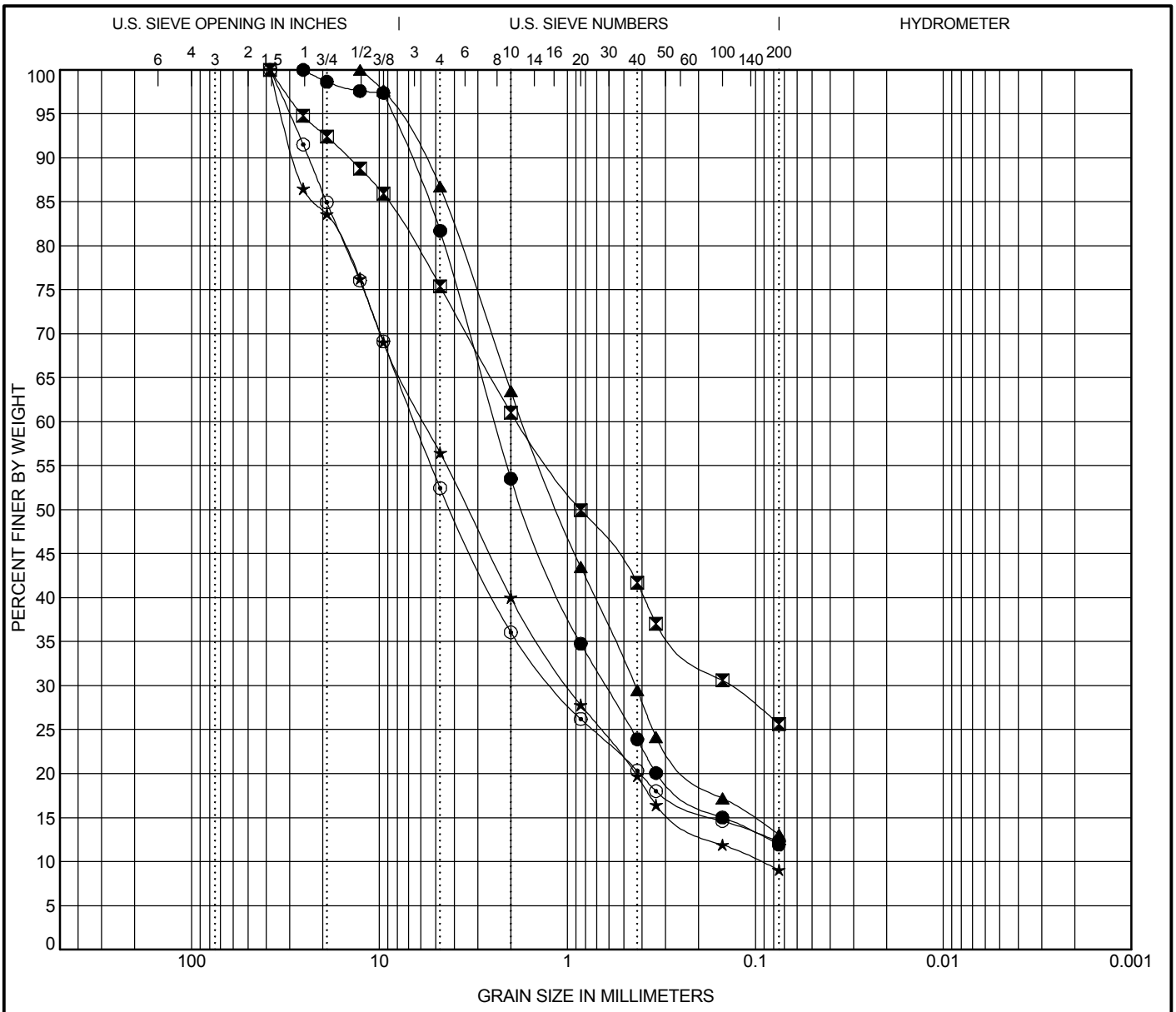
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**HMF-TP-003-09 2.5 ft.**	**38.1**	**3.058**	**0.677**		**28.5**	**60.6**	**10.9**	
⊠	**HMF-TP-003-09 7.0 ft.**	**38.1**	**2.399**	**0.408**		**24.6**	**60.4**	**14.9**	
▲	**HMF-TP-003-09 11.0 ft.**	**38.1**	**19.346**	**6**	**1.396**	**75.4**	**23.5**	**1.1**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758654.00009

Figure

US_GRAIN_SIZE G:\WSDOT I-90 SNOQUALMIE PASS\35000 DG 2009 GEOTECHNICAL EXPLORATION PROGRAM\35090 TEST PIT AND BORING LOGS\35095 GINT\BORINGS & TESTPITS 2009.GPJ URSSEA3B- NO URS LOGO.GLB URSSEA3.GDT 7/16/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HMF-TP-4-10 1.8 ft.**	**Silty SAND with gravel**				**3.31**	**50.01**
⊠	**HMF-TP-4-10 4.2 ft.**	**Silty SAND with gravel**					
▲	**HMF-TP-5-10 3.3 ft.**	**Silty SAND with gravel**					
★	**HMF-TP-5-10 7.5 ft.**	**Well graded SAND with gravel**				**1.80**	**61.11**
⊙	**HMF-TP-5-10 10.5 ft.**	**Silty GRAVEL with sand**				**5.62**	**170.31**

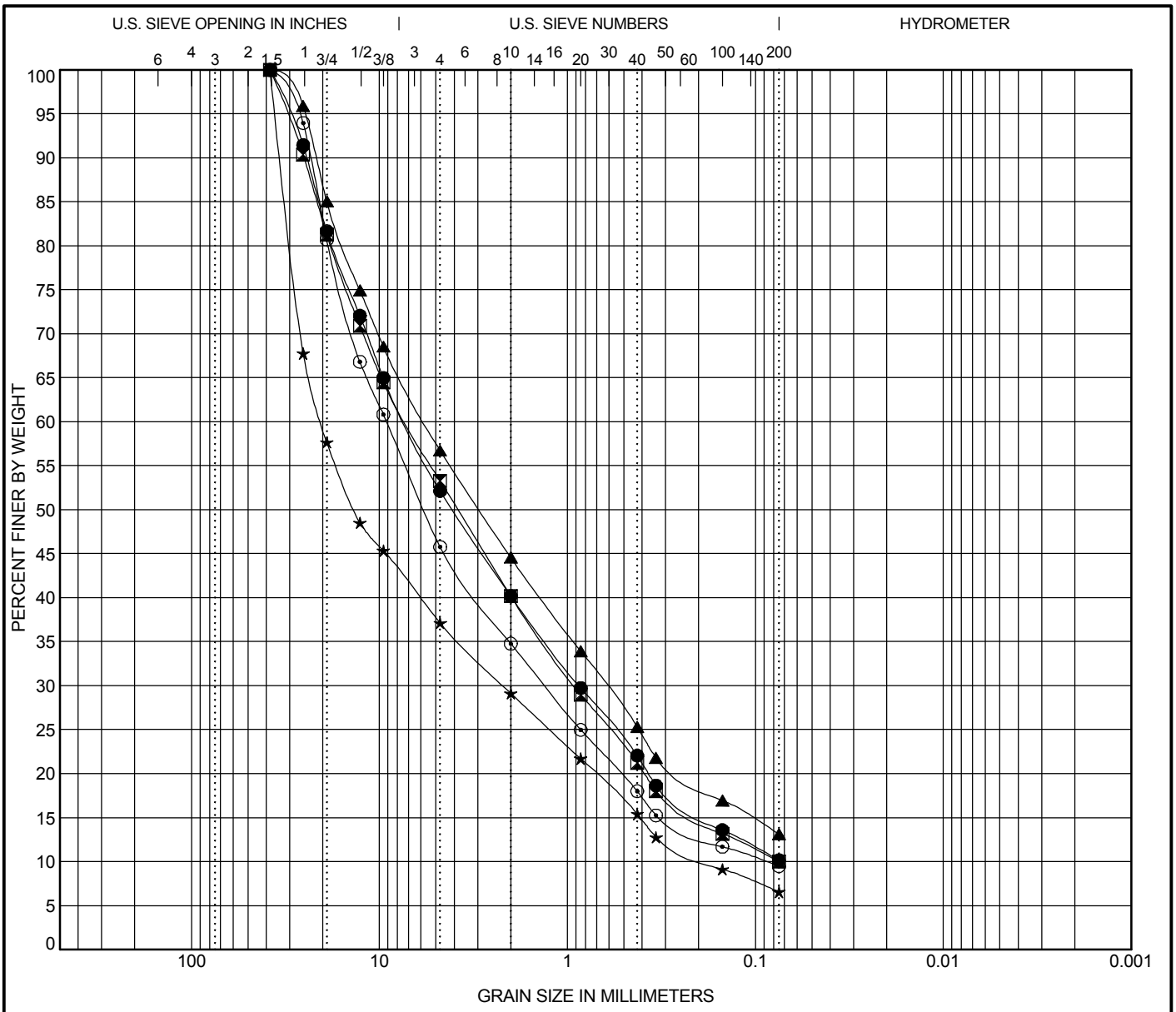
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**HMF-TP-4-10 1.8 ft.**	**25.4**	**2.44**	**0.627**		**18.3**	**69.8**	**11.9**	
⊠	**HMF-TP-4-10 4.2 ft.**	**38.1**	**1.844**	**0.138**		**24.6**	**49.8**	**25.6**	
▲	**HMF-TP-5-10 3.3 ft.**	**12.7**	**1.723**	**0.436**		**13.3**	**73.7**	**13.1**	
★	**HMF-TP-5-10 7.5 ft.**	**38.1**	**5.772**	**0.991**	**0.094**	**43.5**	**47.4**	**9.1**	
⊙	**HMF-TP-5-10 10.5 ft.**	**38.1**	**6.507**	**1.182**		**47.5**	**40.2**	**12.3**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33761951.00008

URS

GRAIN SIZE: NO FIGURE T:\WSDOT I-90 SNOQUALMIE PASS\49000 DX 2010 GEOTECHNICAL EXPLORATION\TEST PIT AND BORING LOGS\BORINGS & TESTPITS 2010-LAB.GPJ URSSEA3B.GLB URSSEA3.GDT 9/20/10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**INF-TP-007-10 4.0 ft.**	**Silty GRAVEL with sand**				**1.43**	**99.76**
⊠	**INF-TP-007-10 6.5 ft.**	**Silty GRAVEL with sand**				**1.57**	**96.13**
▲	**INF-TP-009-10 6.0 ft.**	**Silty SAND with gravel**					
★	**INF-TP-009-10 9.5 ft.**	**Well graded GRAVEL with sand**				**1.30**	**111.74**
⊙	**INF-TP-011-10 6.0 ft.**	**Well graded GRAVEL with sand**				**2.14**	**103.55**

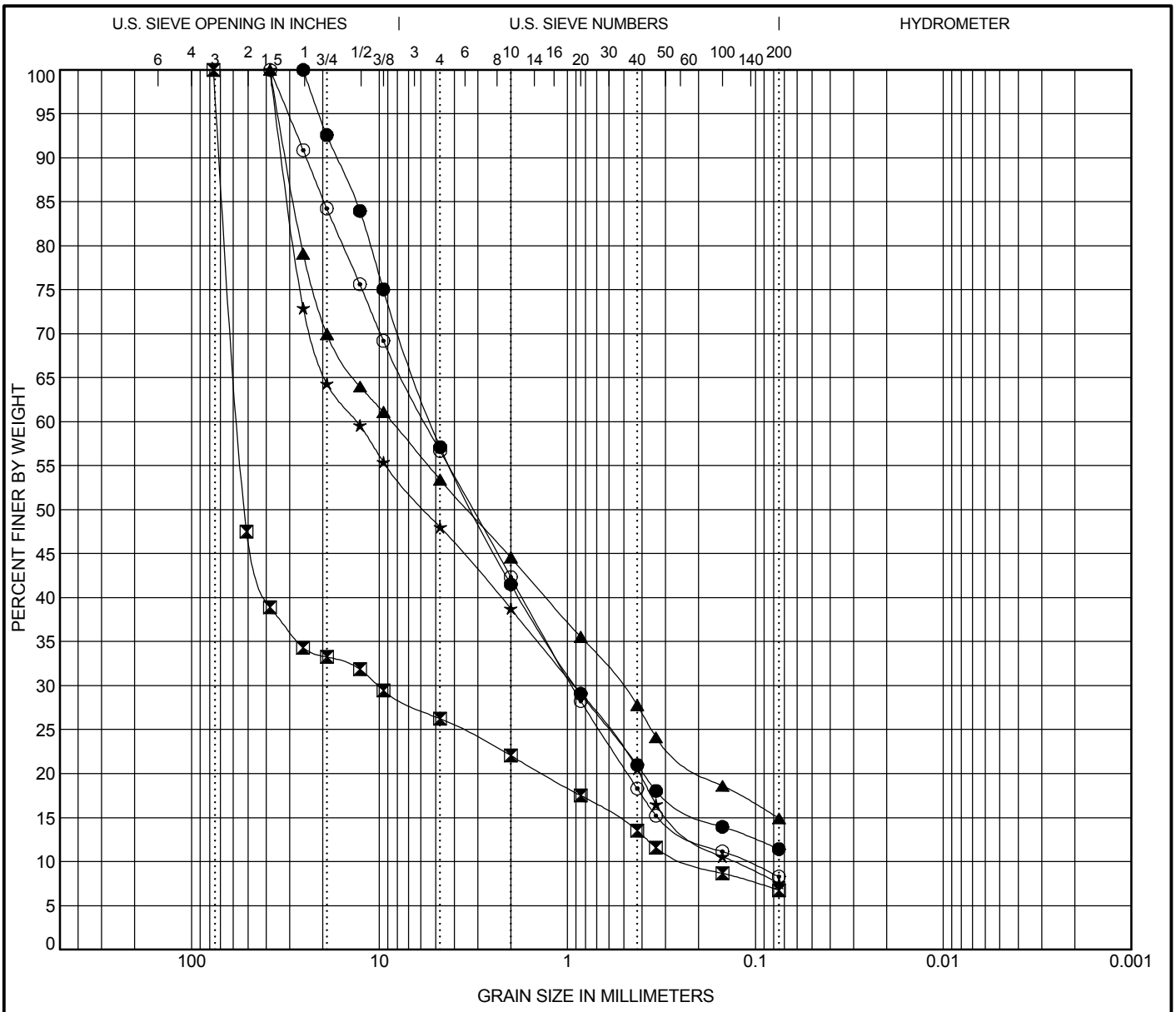
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**INF-TP-007-10 4.0 ft.**	**38.1**	**7.273**	**0.869**		**47.9**	**42.0**	**10.1**	
⊠	**INF-TP-007-10 6.5 ft.**	**38.1**	**7.209**	**0.921**		**46.7**	**43.3**	**10.0**	
▲	**INF-TP-009-10 6.0 ft.**	**38.1**	**5.758**	**0.62**		**43.3**	**43.6**	**13.1**	
★	**INF-TP-009-10 9.5 ft.**	**38.1**	**20.358**	**2.199**	**0.182**	**62.9**	**30.6**	**6.5**	
⊙	**INF-TP-011-10 6.0 ft.**	**38.1**	**9.171**	**1.319**	**0.089**	**54.2**	**36.3**	**9.5**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33761951.00008

URS

GRAIN SIZE: NO FIGURE T:\WSDOT I-90 SNOQUALMIE PASS\49000 DX 2010 GEOTECHNICAL EXPLORATION\TEST PIT AND BORING LOGS\BORINGS & TESTPITS 2010-LAB.GPJ URSSEA3B.GLB URSSEA3.GDT 9/20/10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**INF-TP-011-10 9.0 ft.**	**Silty SAND with gravel**				**3.03**	**104.25**
⊠	**INF-TP-013-10 3.0 ft.**	**Poorly graded GRAVEL with sand**				**8.47**	**256.81**
▲	**INF-TP-013-10 6.0 ft.**	**Silty GRAVEL with sand**					
★	**INF-TP-013-10 9.0 ft.**	**Poorly graded GRAVEL with sand**				**0.49**	**99.96**
⊙	**INF-TP10-10W10.0 ft.**	**Well graded SAND with gravel**				**1.38**	**50.22**

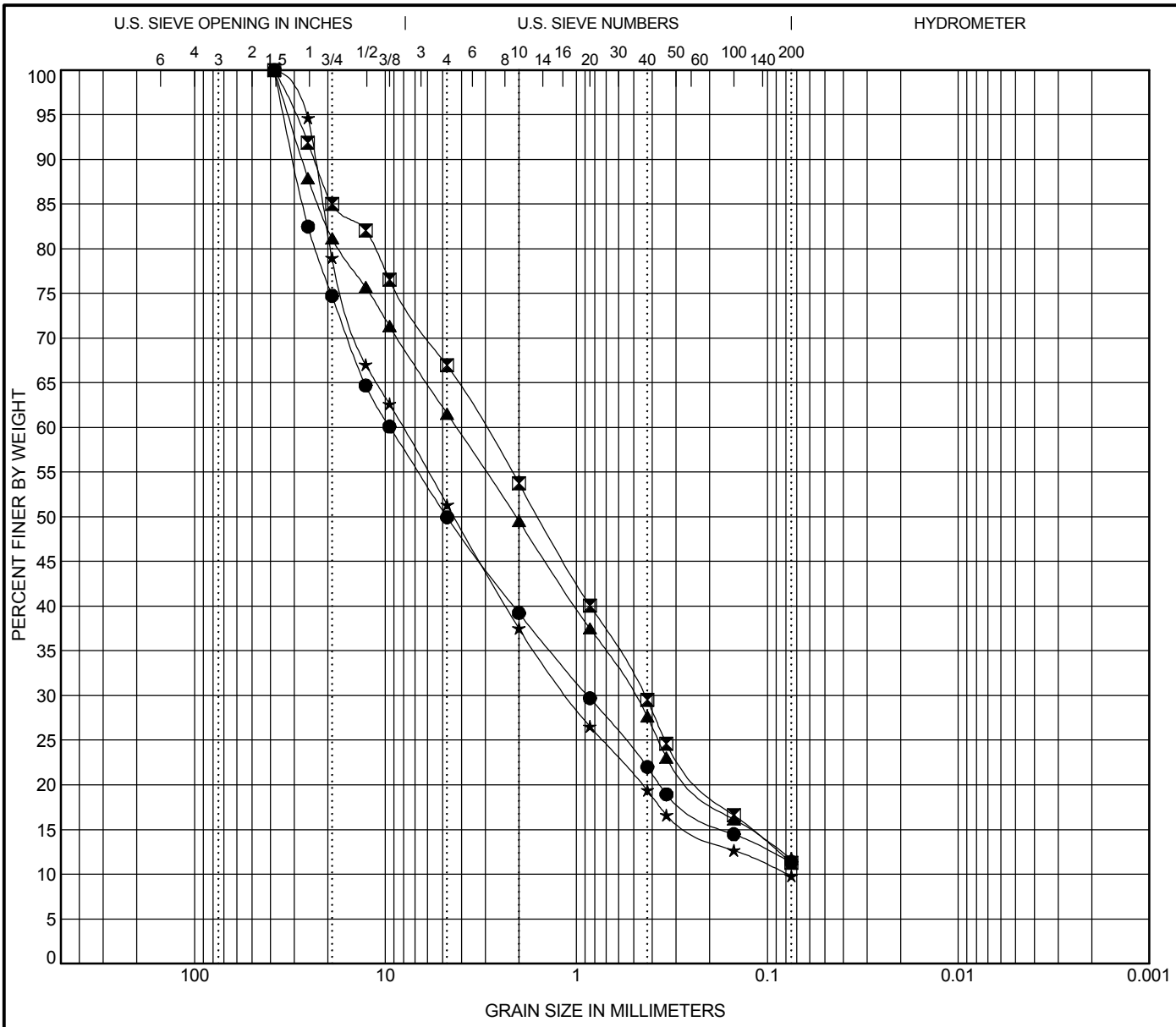
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**INF-TP-011-10 9.0 ft.**	**25.4**	**5.312**	**0.906**		**42.9**	**45.7**	**11.4**	
⊠	**INF-TP-013-10 3.0 ft.**	**76.2**	**55.951**	**10.162**	**0.218**	**71.7**	**19.5**	**6.7**	
▲	**INF-TP-013-10 6.0 ft.**	**38.1**	**8.613**	**0.517**		**46.6**	**38.5**	**14.9**	
★	**INF-TP-013-10 9.0 ft.**	**38.1**	**13.169**	**0.918**	**0.132**	**52.0**	**40.5**	**7.5**	
⊙	**INF-TP10-10W10.0 ft.**	**38.1**	**5.711**	**0.945**	**0.114**	**43.3**	**48.4**	**8.3**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33761951.00008

URS

GRAIN SIZE: NO FIGURE T:\WSDOT I-90 SNOQUALMIE PASS\49000 DX 2010 GEOTECHNICAL EXPLORATION\TEST PIT AND BORING LOGS\BORINGS & TESTPITS 2010-LAB.GPJ URSSEA3B.GLB URSSEA3.GDT 9/20/10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**INF-TP12-10W 10.0 ft.**	**Silty GRAVEL with sand**				**1.46**	**171.21**
⊠	**INF-TP-14-10 9.0 ft.**	**Silty SAND with gravel**				**1.00**	**47.36**
▲	**INF-TP-14-10 12.0 ft.**	**Silty SAND with gravel**				**1.03**	**74.14**
★	**INF-TP-15-10 25.0 ft.**	**Well graded GRAVEL with sand**				**1.95**	**102.90**

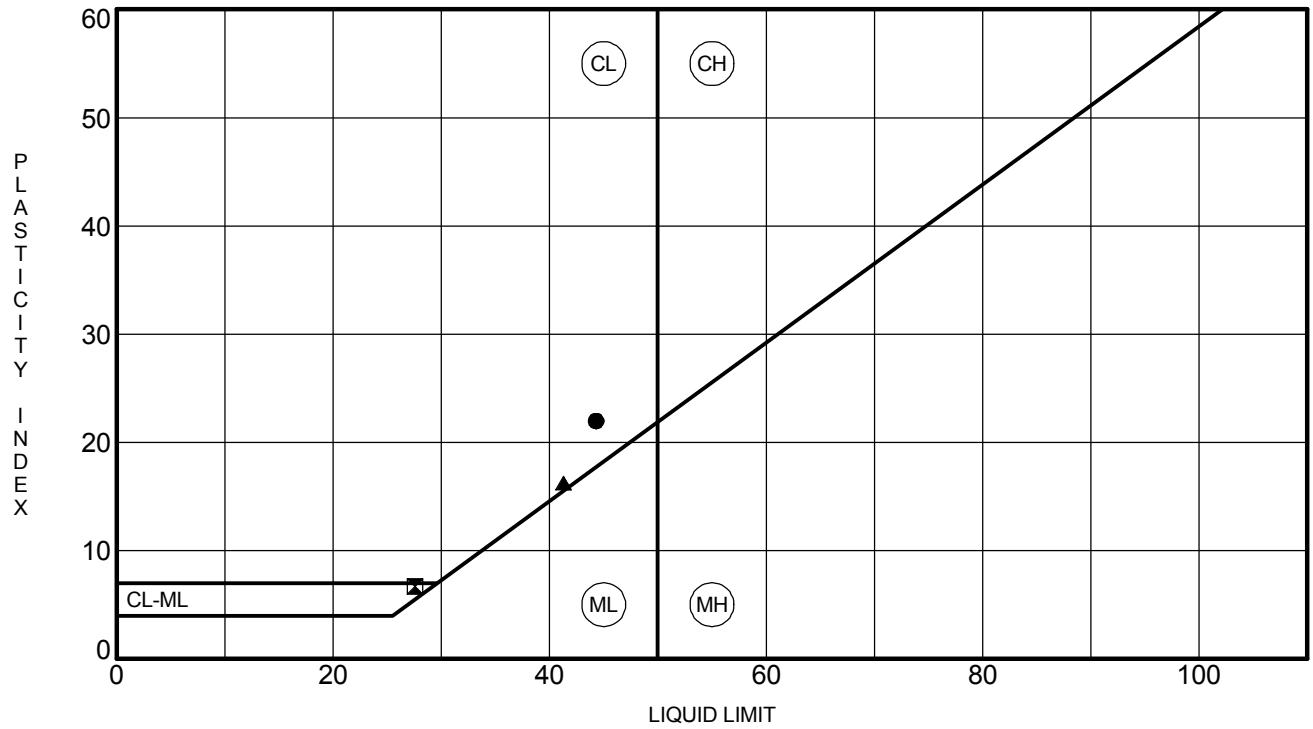
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**INF-TP12-10W 10.0 ft.**	**38.1**	**9.458**	**0.874**		**50.0**	**38.6**	**11.4**	
⊠	**INF-TP-14-10 9.0 ft.**	**38.1**	**3.012**	**0.439**		**33.1**	**55.7**	**11.3**	
▲	**INF-TP-14-10 12.0 ft.**	**38.1**	**4.245**	**0.501**		**38.4**	**49.8**	**11.7**	
★	**INF-TP-15-10 25.0 ft.**	**38.1**	**8.093**	**1.113**	**0.079**	**48.7**	**41.5**	**9.8**	

GRAIN SIZE DISTRIBUTION

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33761951.00008

URS

GRAIN SIZE: NO FIGURE T:\WSDOT I-90 SNOQUALMIE PASS\49000 DX 2010 GEOTECHNICAL EXPLORATION\TEST PIT AND BORING LOGS\BORINGS & TESTPITS 2010-LAB.GPJ URSSEA3B.GLB URSSEA3.GDT 9/20/10



	Specimen Identification		LL	PL	PI	Moisture	Classification
●	**RCB-001-08**	**71.3 ft**	**44**	**22**	**22**	**43.6**	**Silty CLAY**
⧗	**RCB-003-08**	**51.5 ft**	**28**	**21**	**7**	**26.0**	**Silty CLAY or Clayey SILT**
▲	**RCB-003-08**	**66.5 ft**	**41**	**25**	**16**	**32.5**	**Silty CLAY**

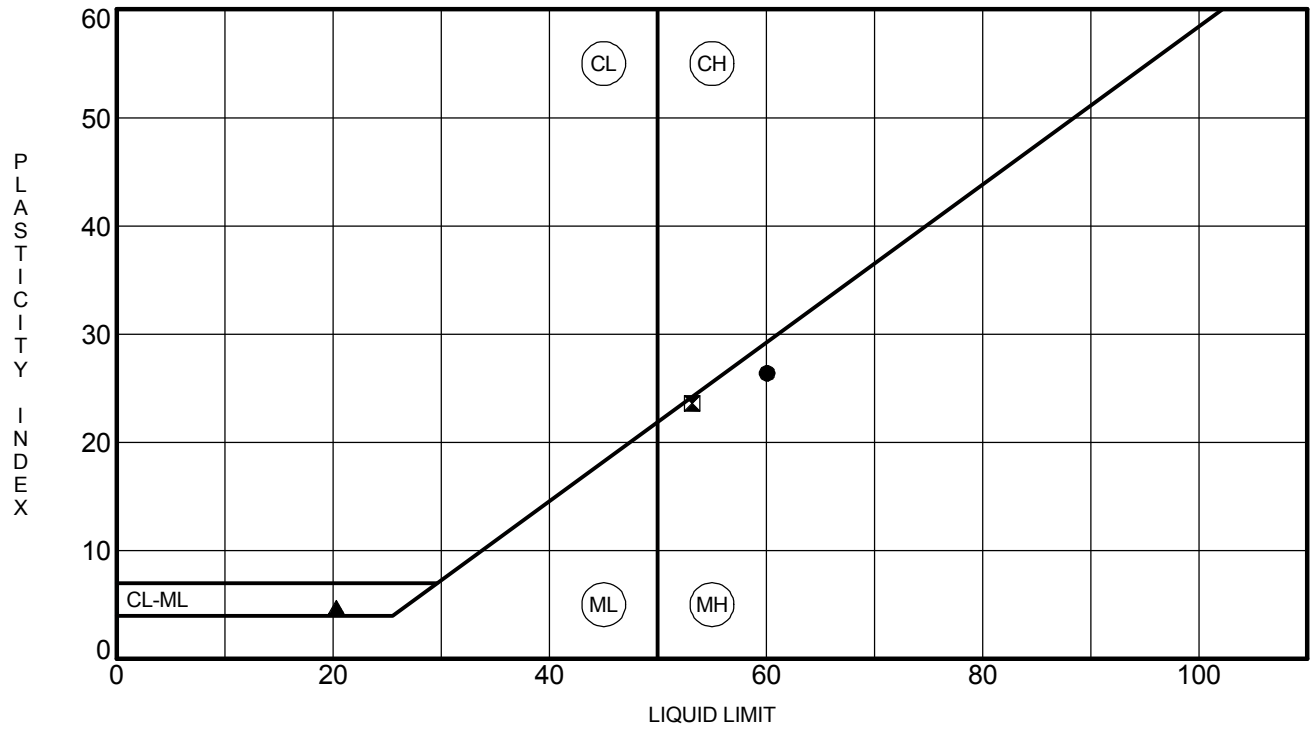
ATTERBERG LIMITS RESULTS

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

URS

Figure

US_ATTERBERG_LIMITS G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09



	Specimen Identification		LL	PL	PI	Moisture	Classification
●	**SCB-015-08**	**18.0 ft**	**60**	**34**	**26**	**36.2**	**Elastic SILT**
⊠	**SCB-015-08**	**28.0 ft**	**53**	**30**	**23**	**52.2**	**Elastic SILT**
▲	**SCB-021-08**	**68.2 ft**	**20**	**15**	**5**	**26.1**	**Silty CLAY-Clayey SILT**

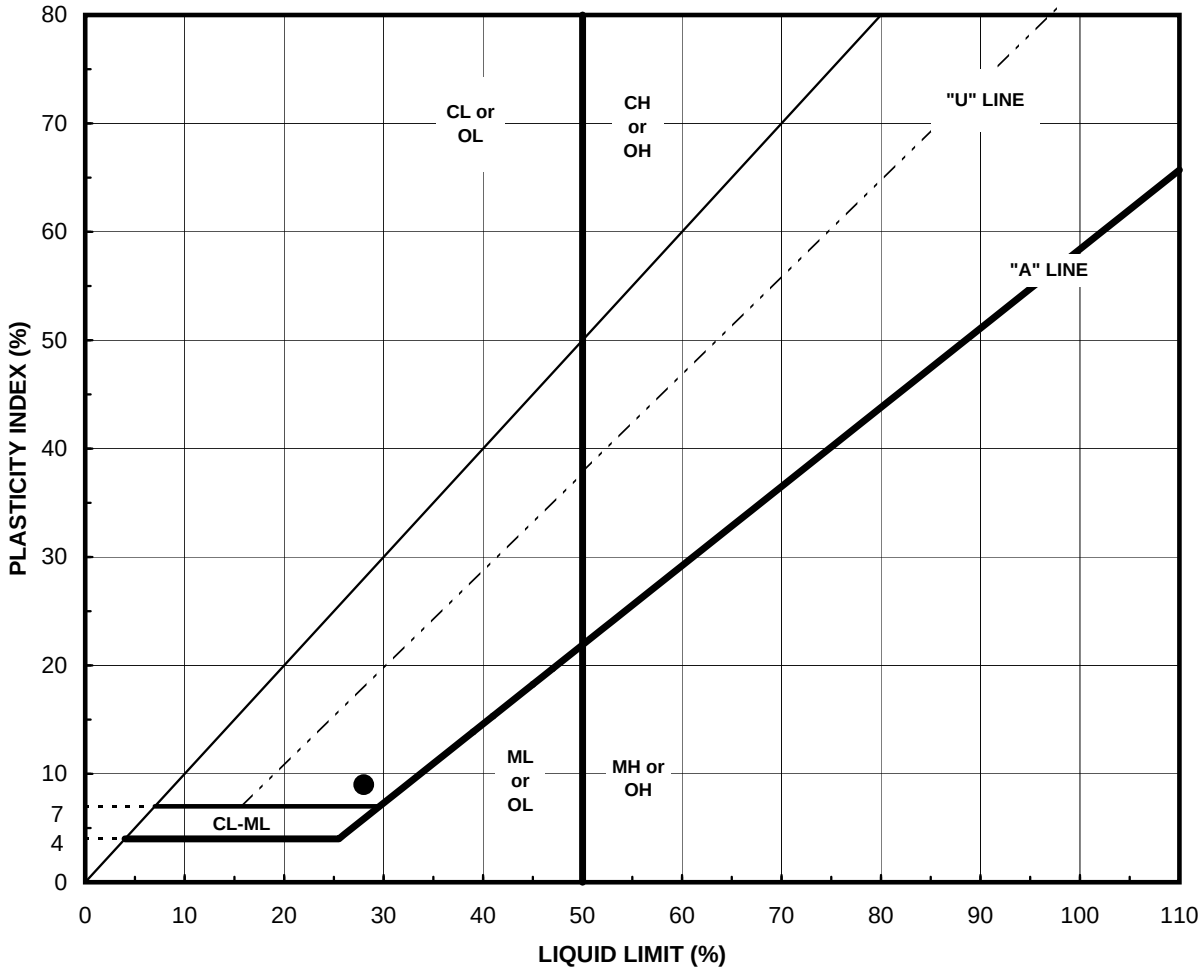
ATTERBERG LIMITS RESULTS

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

URS

Figure

US_ATTERBERG_LIMITS G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 - BORING & TEST PIT LOGS\BORINGS I-90 2008.GPJ URSSEA3B.GLB URSSEA3.GDT 2/23/09

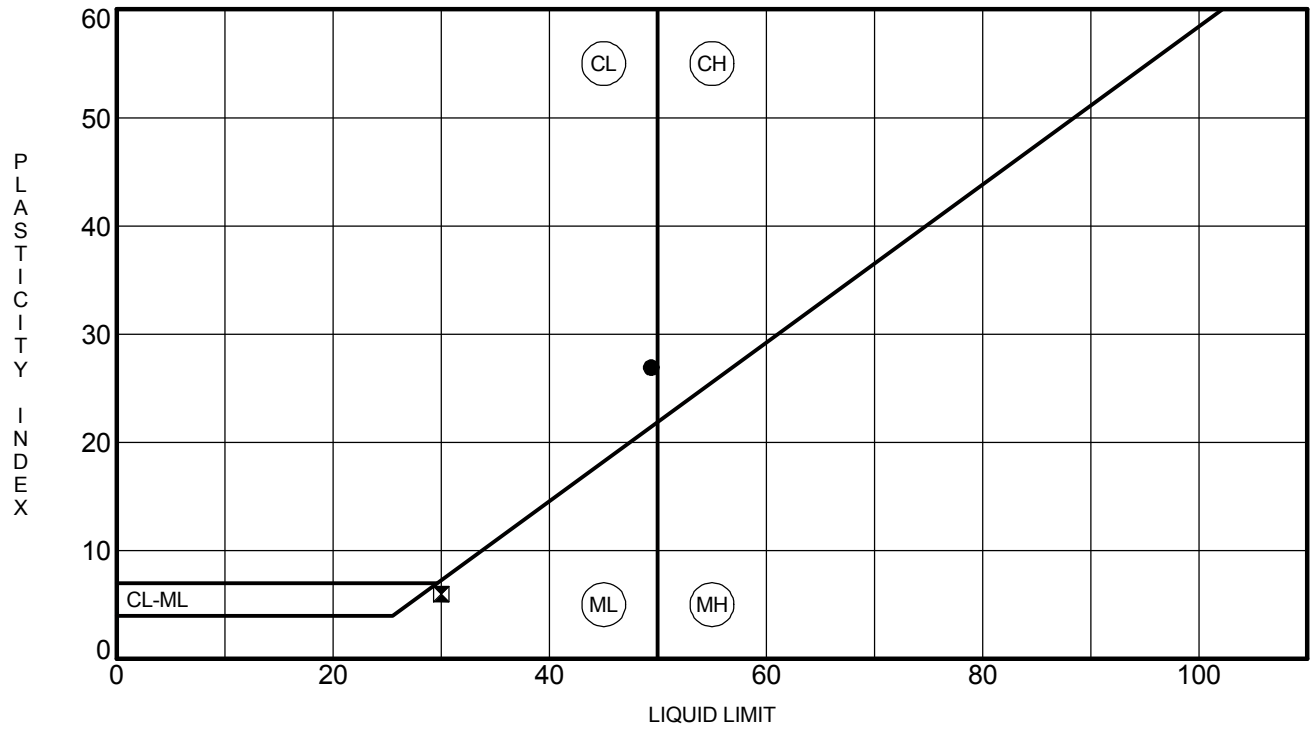


BORING / SAMPLE	DEPTH (ft.)	TEST SYMBOL	WATER CONTENT (%)	LL (%)	PI (%)	DESCRIPTION / CLASSIFICATION
SCB-022-09	61.3	●	21.6	28	9	Light gray Clay (CL)
		■				
		◆				
		○				
		□				
		◇				

Project Name: **I-90 Snoqualmie Pass East** **PLASTICITY CHART**

Project Number: **33758654** **Figure**

URS



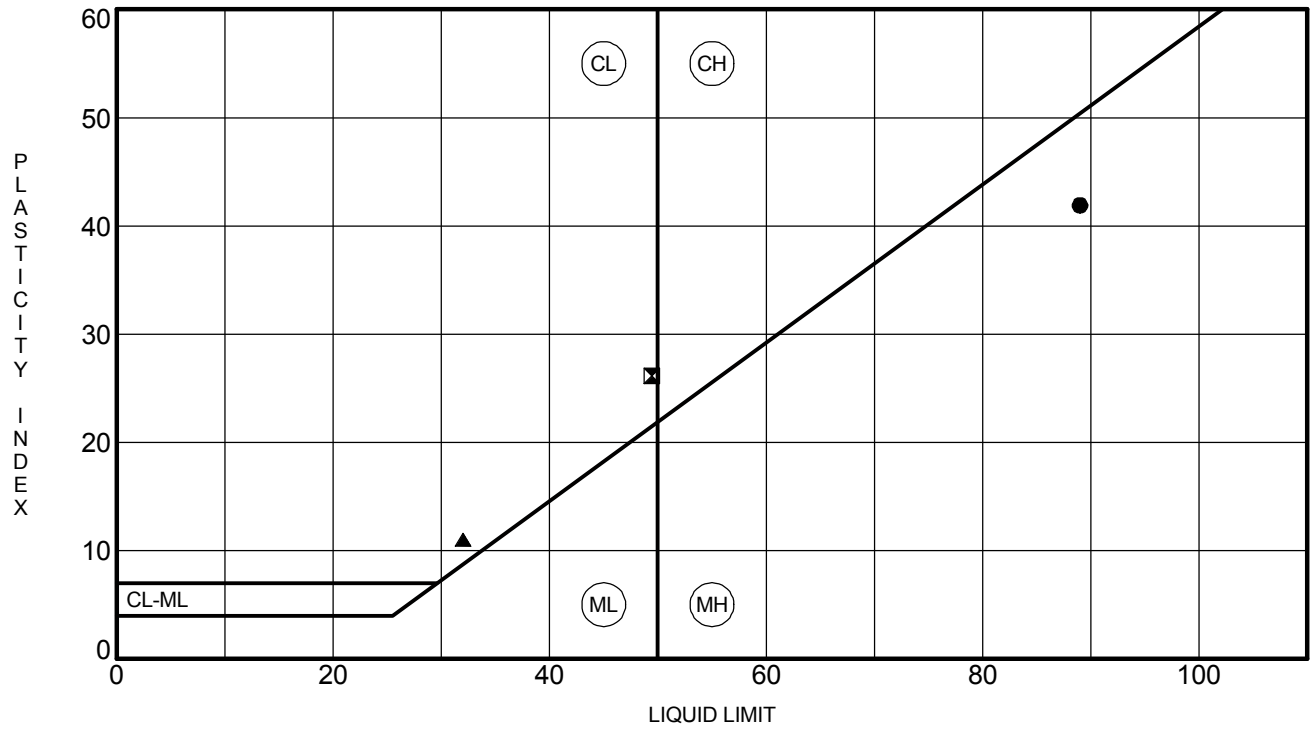
	Specimen Identification		LL	PL	PI	Moisture	Classification
●	**SW2-008-08**	**19.0 ft**	**49**	**22**	**27**	**54.2**	**CLAY**
⧗	**SW2-008-08**	**24.0 ft**	**30**	**24**	**6**		**Clayey SILT**

ATTERBERG LIMITS RESULTS

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

US_ATTERBERG_LIMITS G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 BORING AND TEST PIT LOGS\23114.8 TEMP\BORINGS I-90 2008.GPJ URSSEA3B- NO URS LOGO.GLB URS



	Specimen Identification		LL	PL	PI	Moisture	Classification
●	**SW2-009-08**	**19.0 ft**	**89**	**47**	**42**	**118.3**	**Organic CLAY**
⧗	**SW2-009-08**	**39.0 ft**	**49**	**23**	**26**	**47.5**	**CLAY**
▲	**SW2-009-08**	**44.0 ft**	**32**	**21**	**11**		**CLAY**

ATTERBERG LIMITS RESULTS

Project: I-90 Snoqualmie Pass East
Project Location: I-90 Hyak to Keechelus Dam, WA
Project Number: 33758632.13000

Figure

US_ATTERBERG_LIMITS G:\WSDOT I-90 SNOQUALMIE PASS\23000 CJ 2008 GEOTECHNICAL EXPLORATION PROGRAM\23100 FIELD EXPLORATION\23114 BORING AND TEST PIT LOGS\23114.8 TEMP\BORINGS I-90 2008.GPJ URSSEA3B- NO URS LOGO.GLB URS

NORTON CORROSION LIMITED

8820 222nd Street SE, Woodinville, WA 98072
Phone (425) 483-1616 • Fax (425) 485-1754
e-mail: sales@nortoncorrosion.com

July 10, 2008

RECEIVED
JUL 15 2008
URS CORPORATION
SEATTLE

Kranti Maturi
URS Corporation
1501 4th Avenue, Suite 1400
Seattle, WA 98011

Subject: **CATHODIC PROTECTION SOILS TESTING**
I-90 SNOQUALMIE PASS
URS JOB# 33758632.1600

Dear Kranti:

On June 24, 2008, Norton Corrosion Limited (NCL) received two soil samples to test for various corrosion characteristics. Below are the results of this testing.

NCL SAMPLE NO.	SAMPLE I.D.	pH	Chlorides (ppm)	Sulfates (ppm)	RESISTIVITY (OHM-CM) NATIVE	RESISTIVITY (OHM-CM) SATURATED
1	TCC-TP-002-08, D1	7.5	10.2	20.1	14,000	11,000
2	TCC-TP-002-08, D2	7.8	6.1	13.3	8,700	8,300
TESTING METHOD		ASTM 4972			ASTM G-57	ASTM G-57

Thank you for the opportunity to serve URS Corporation. If you have any additional questions, please feel free to give NCL a call.

Sincerely,

Randall Goodlund, P.E.
Principal Project Engineer

Z:\Documents\ENGINEERING\18829_URS_Soil Test_A.doc

APPENDIX D.2
Consolidation and Consolidated-Undrained Triaxial Compression Test Results

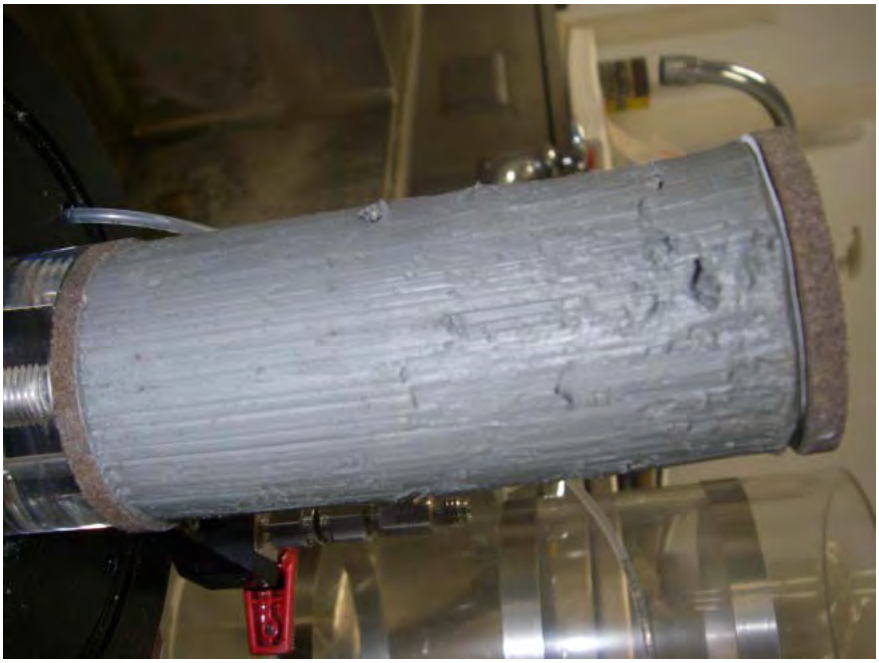
I-90, Boring SW2-008-08, Sample U-5, Specimen-a (depth=24.5 ft), Pre-CU Test View

I-90, Boring SW2-008-08, Sample U-5, Specimen-a (depth=24.5 ft), Post-CU Test View

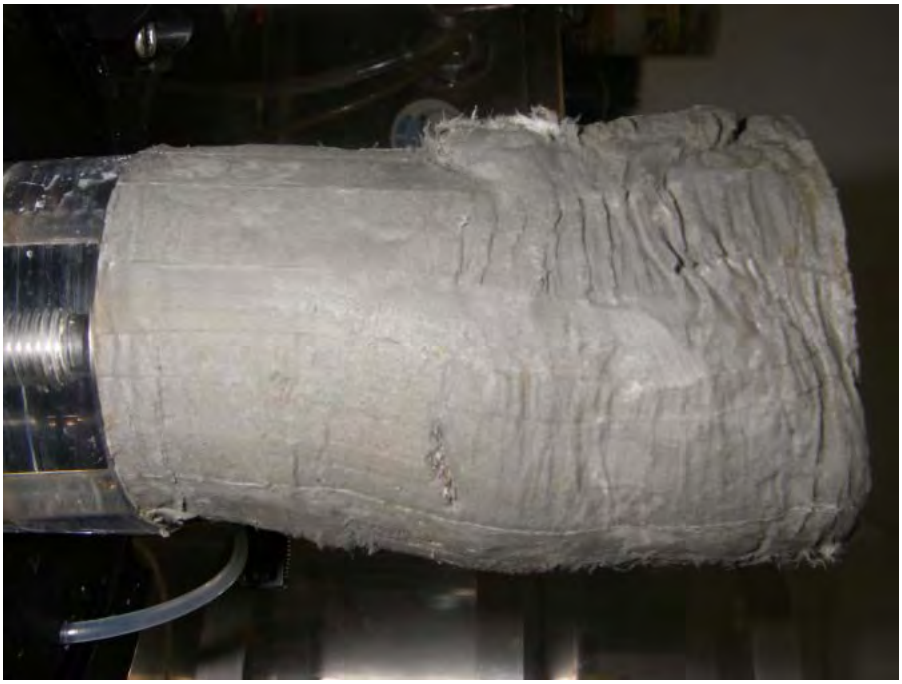
I-90, Boring SW2-008-08, Sample U-5, Specimen-b (depth=24.5 ft), Pre-CU Test View

I-90, Boring SW2-009-08, Sample S-7, Specimen-a (depth=44 -46 ft), Pre-CU Test View

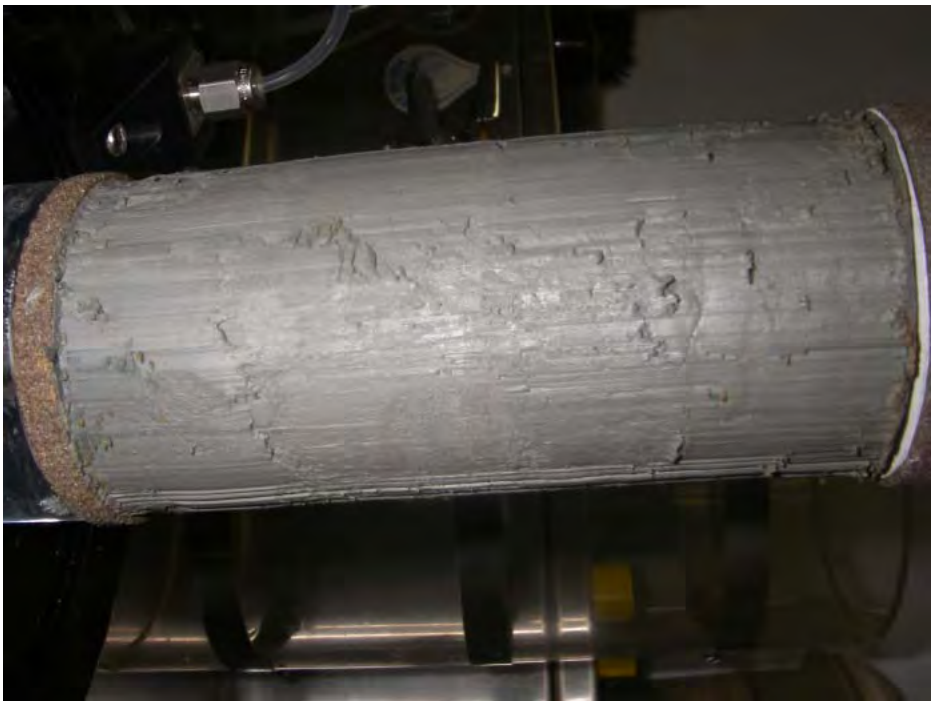
I-90, Boring SW2-009-08, Sample S-7, Specimen-a (depth=44 -46 ft), Post-CU Test View



I-90, Boring SW2-009-08, Sample S-7, Specimen-b (depth=44 -46 ft), Pre-CU Test View



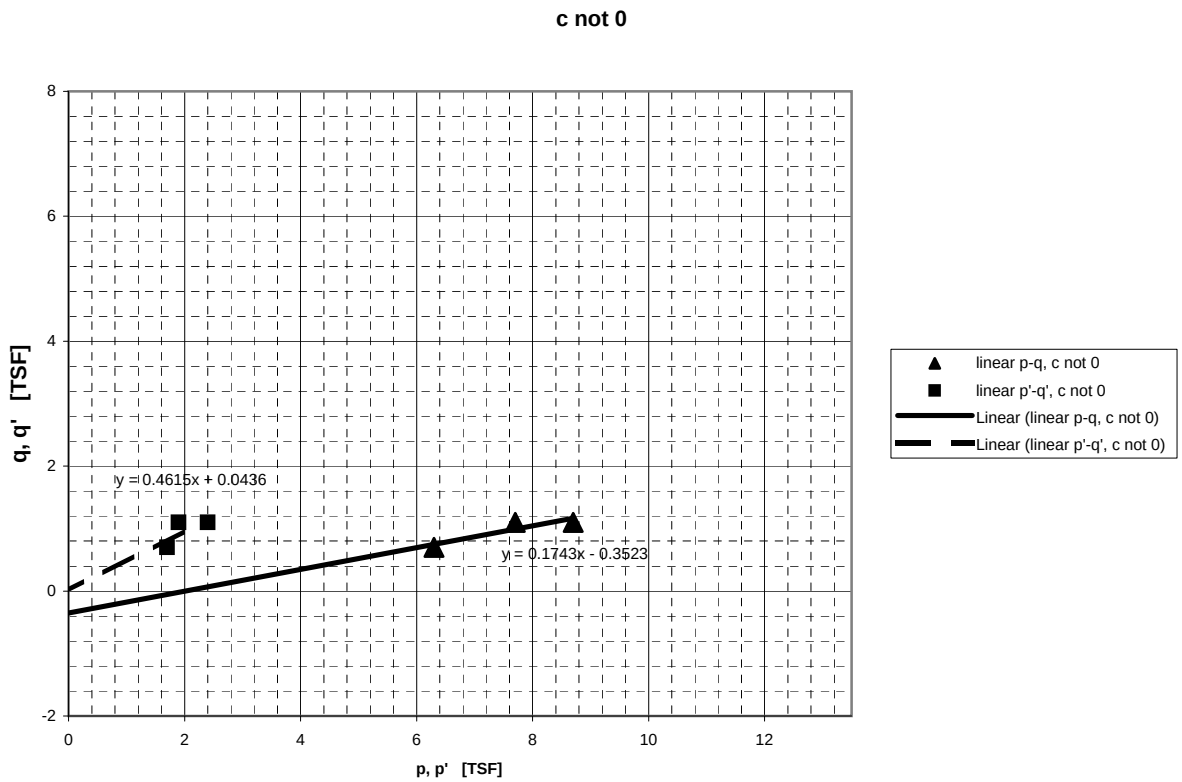
I-90, Boring SW2-009-08, Sample S-7, Specimen-b (depth=44 -46 ft), Post-CU Test View



I-90, Boring SW2-009-08, Sample S-7, Specimen-c (depth=44 -46 ft), Pre-CU Test View

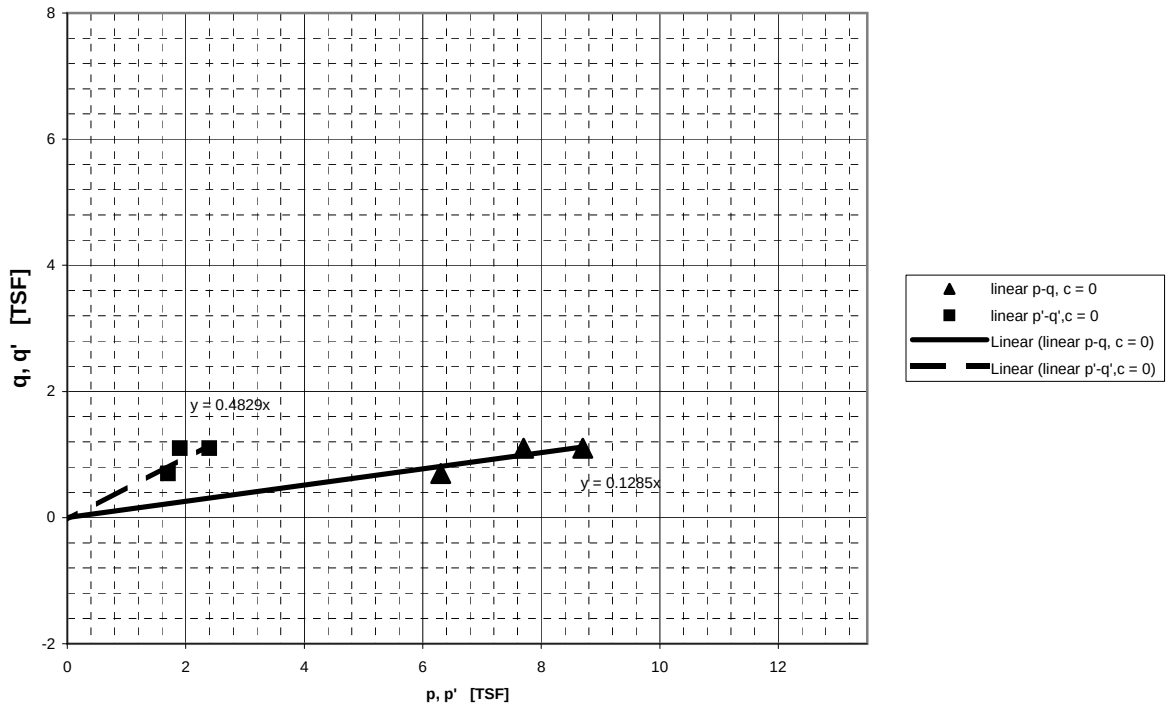
I-90, Boring SW2-009-08, Sample S-7, Specimen-c (depth=44 -46 ft), Post-CU Test View

	A	B	C	D	E	F	G	H	I
1									
2									
3			SW2-009-08						
4				p	q		p'	q'	
5				6.3	0.7		1.7	0.7	
6				7.7	1.1		2.4	1.1	
7				8.7	1.1		1.9	1.1	
8									
9									
10									



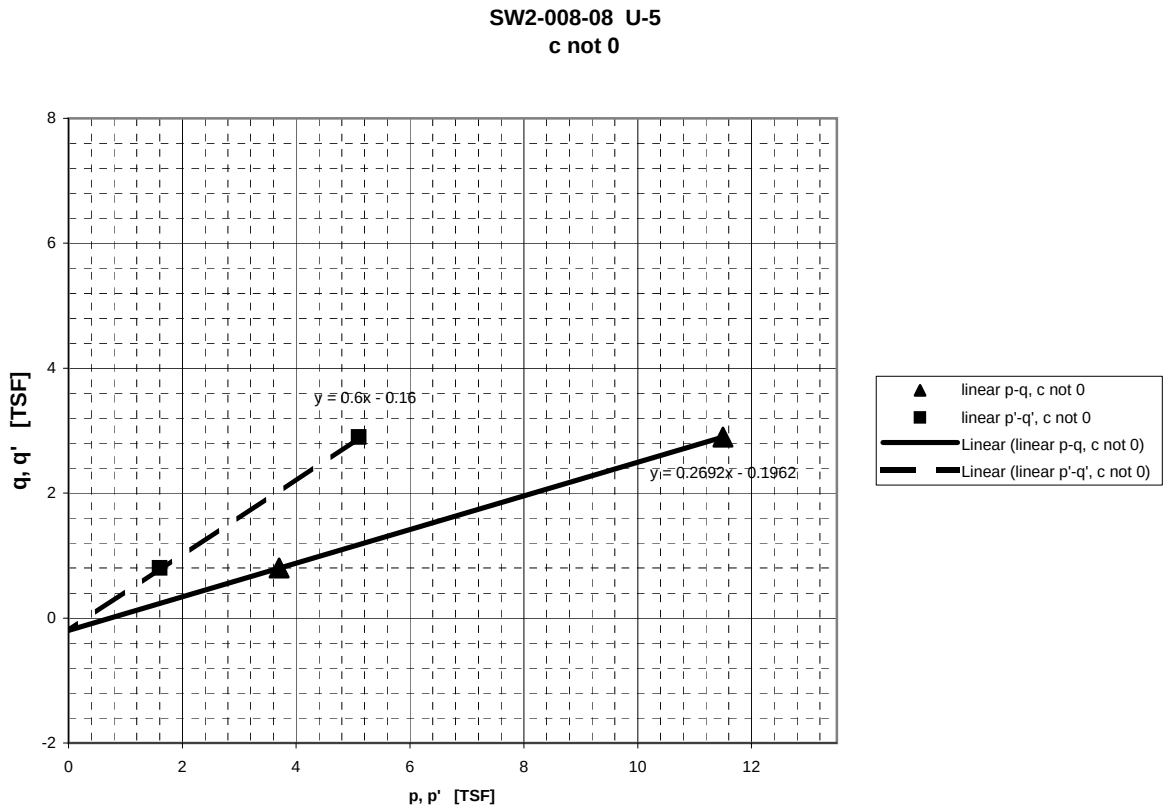
for p,					for p',			
tan α =	0.1743	a =	-0.3523		tan α =	0.4615	a =	0.0436
φ =	10.0	degrees			φ' =	27.5	degrees	
c =	-0.36	TSF			c' =	0.05	TSF	

SW2-009-08 S-7
c=0

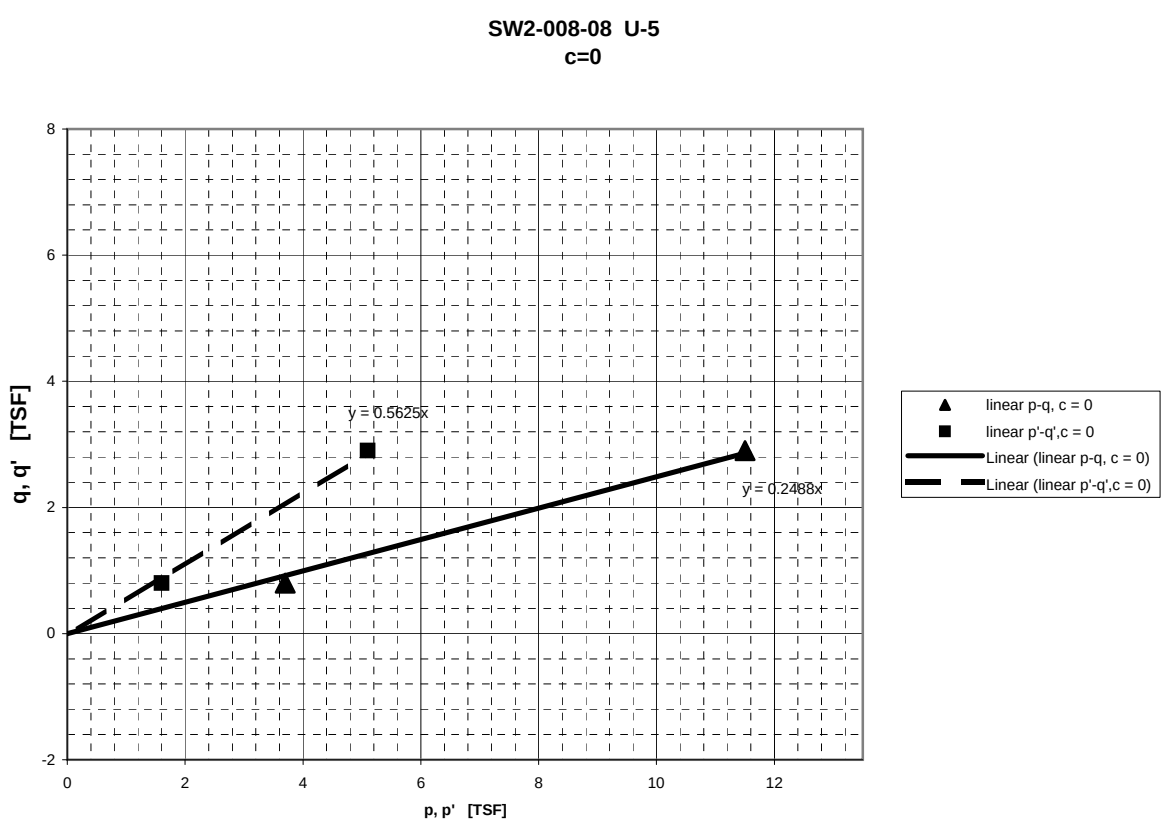


for p,					for p',			
tan α =	0.1285	a =	0		tan α =	0.4829	a =	0
φ =	7.4	degrees			φ' =	28.9	degrees	
c =	0.00	TSF			c' =	0.00	TSF	

	S	T	U	V	W	X	Y	Z	AA
1									
2									
3			SW2-008-08						
4				p	q		p'	q'	
5				3.7	0.8		1.6	0.8	
6				11.5	2.9		5.1	2.9	
7									
8									
9									
10									



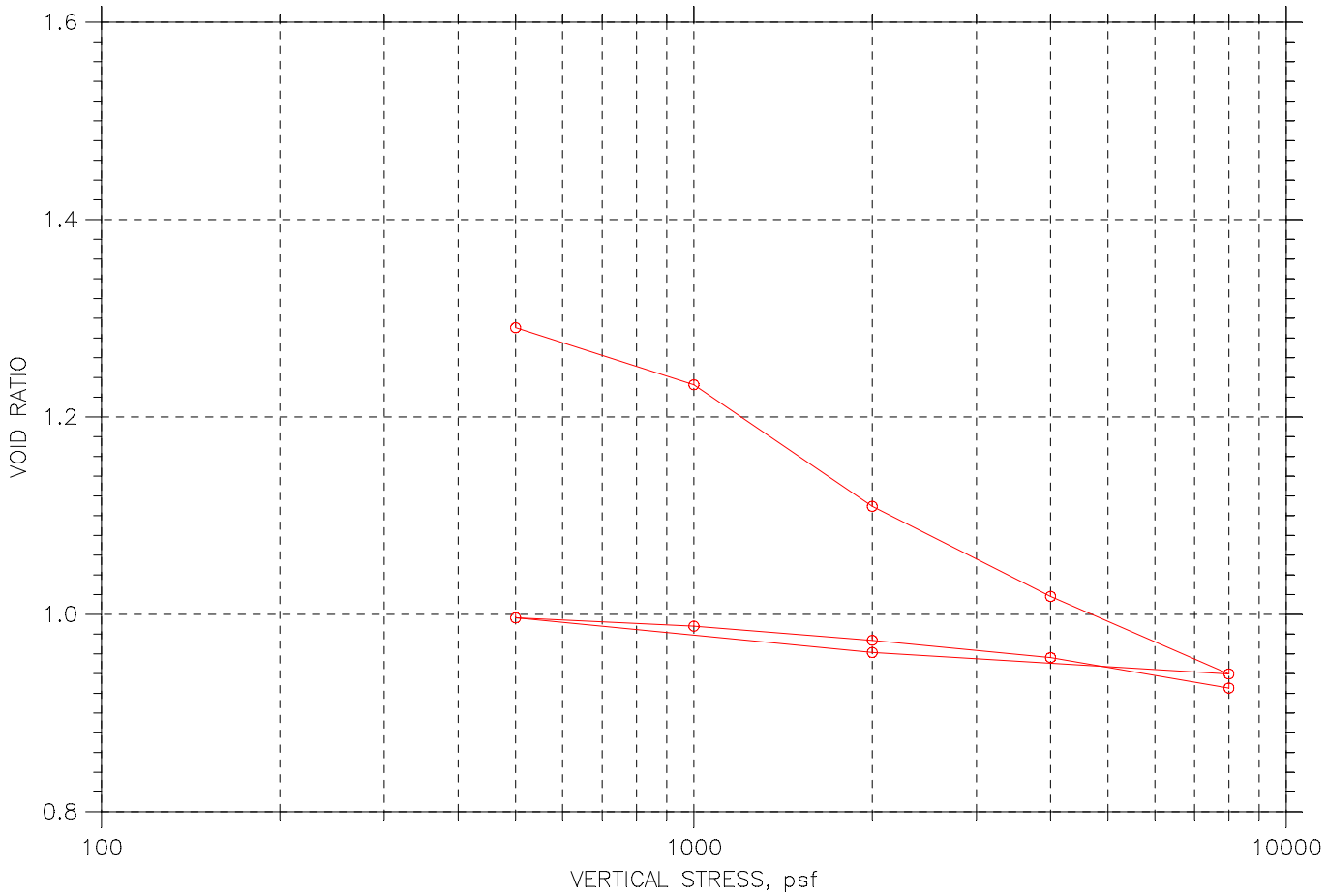
37									
38									
39	for p,					for p',			
40	tan α =	0.2692	a =	-0.1962		tan α =	0.6000	a =	-0.1600
41									
42									
43	φ =	15.6	degrees			φ' =	36.9	degrees	
44									
45	c =	-0.20	TSF			c' =	-0.20	TSF	
46									
47									
48									
49									
50									
51									

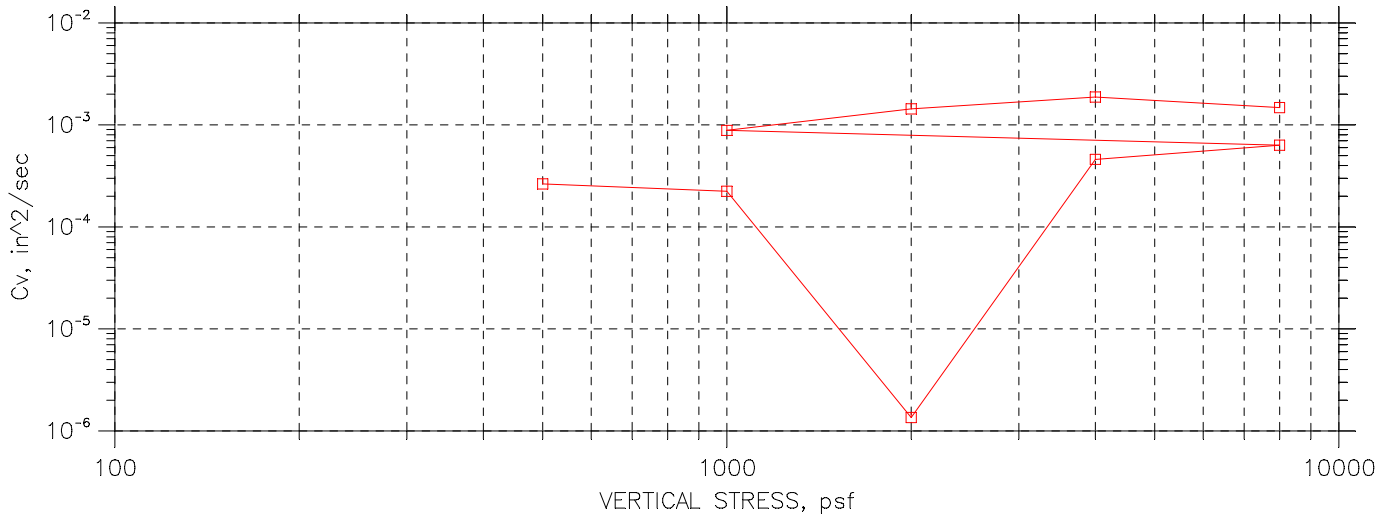


39	for p,					for p',			
40	tan α =	0.2488	a =	0		tan α =	0.5625	a =	0
43	φ =	14.4	degrees			φ' =	34.2	degrees	
45	c =	0.00	TSF			c' =	0.00	TSF	

CONSOLIDATION TEST DATA

SUMMARY REPORT



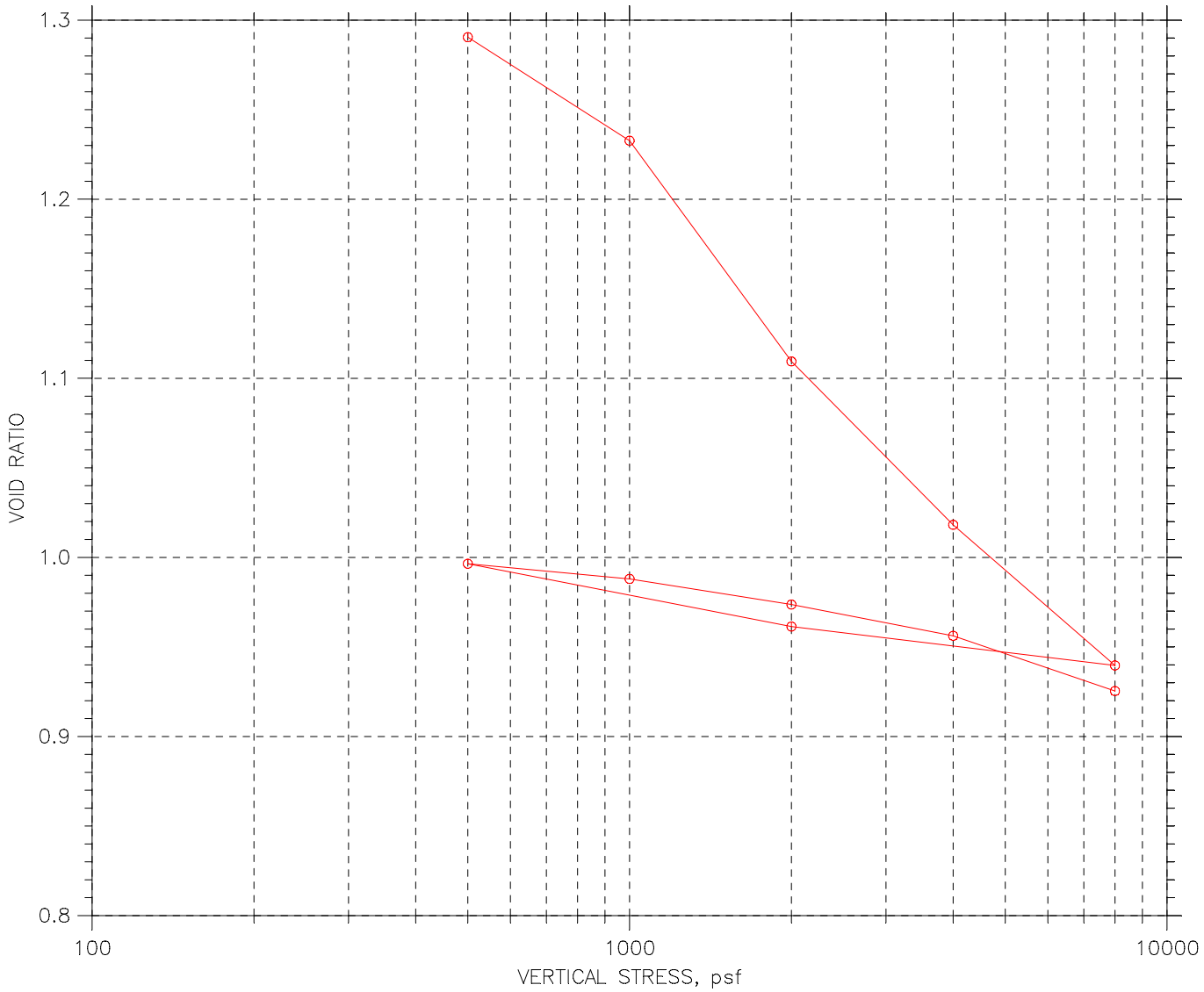


Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Tue, 16-DEC-2008 12:56:52

CONSOLIDATION TEST DATA

SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: 0 psf				Water Content, %	51.77	35.58
Preconsolidation Pressure: 0 psf				Dry Unit Weight, pcf	71.91	89.49
Compression Index: 3.81959e-313				Saturation, %	102.34	106.13
Diameter: 1.88 in		Height: 0.625 in		Void Ratio	1.40	0.93
LL: 30	PL: 24	PI: 6	GS: 2.76			

Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

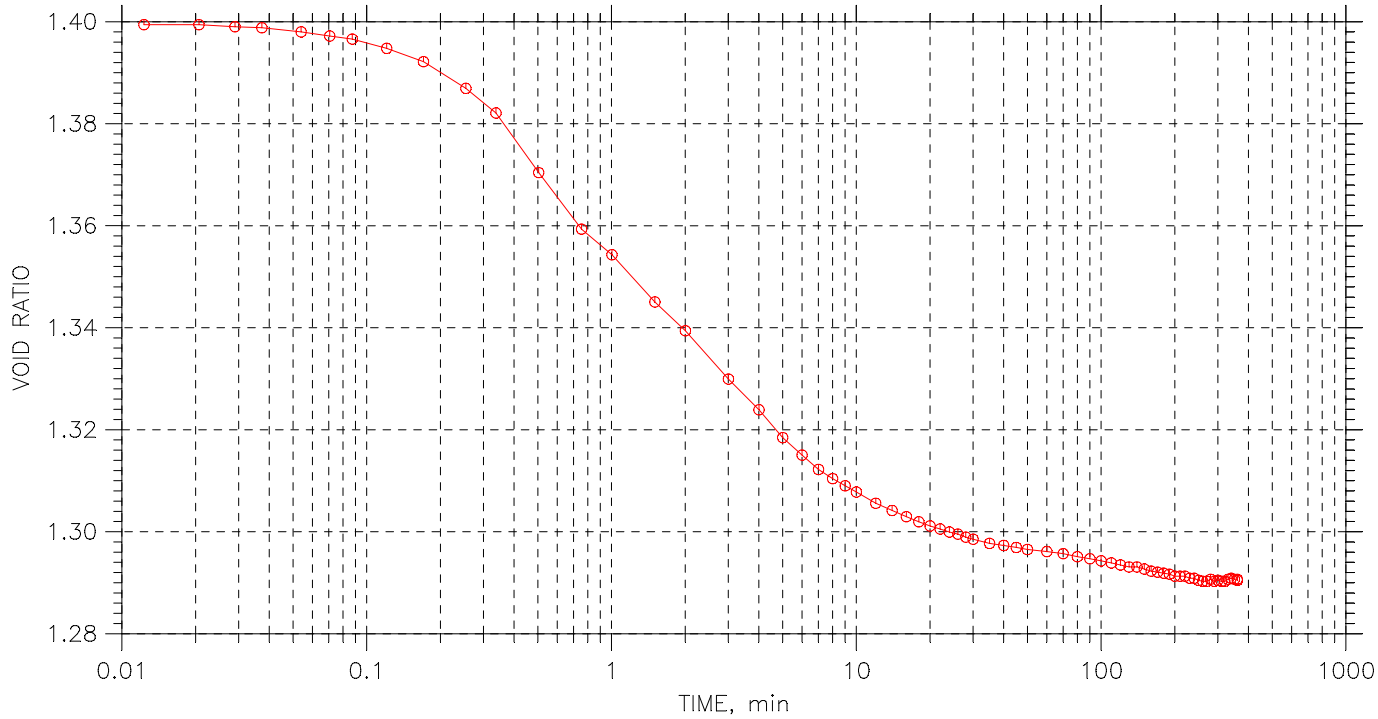
Tue, 16-DEC-2008 12:56:53

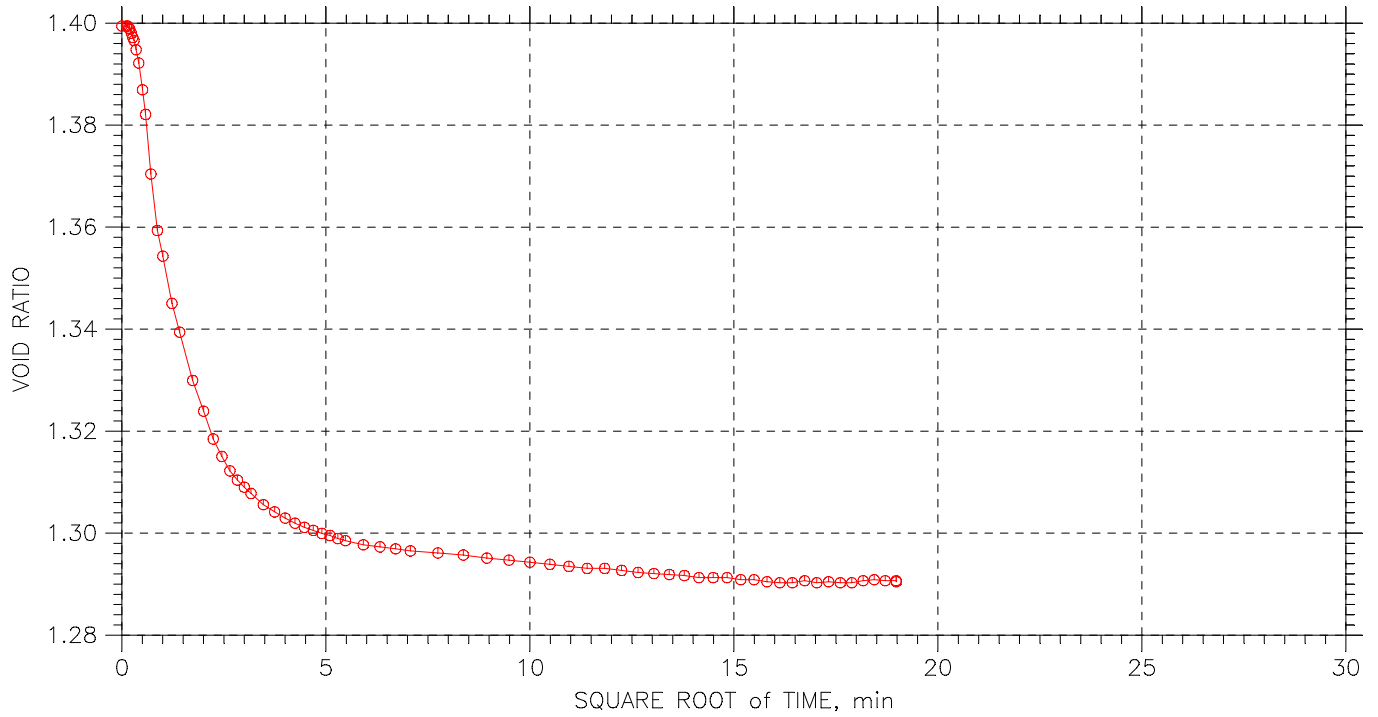
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 11

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

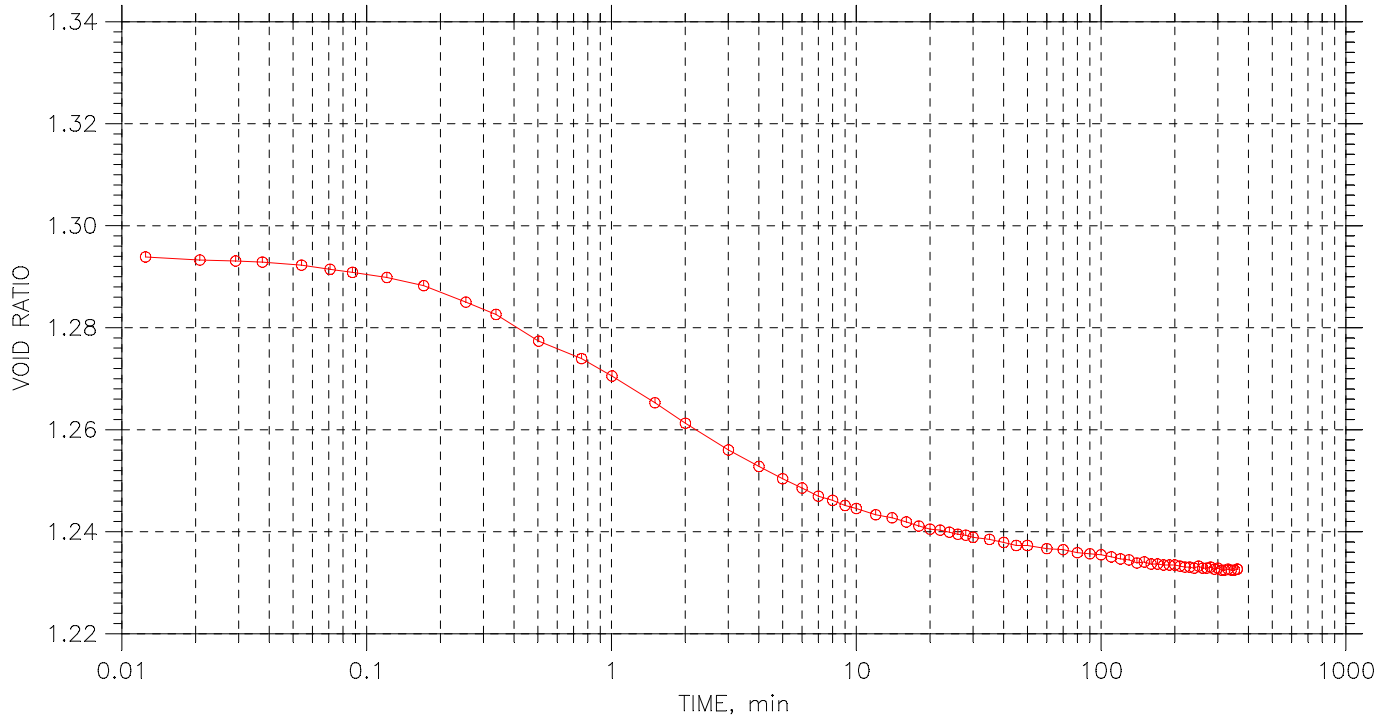
Tue, 16-DEC-2008 12:56:54

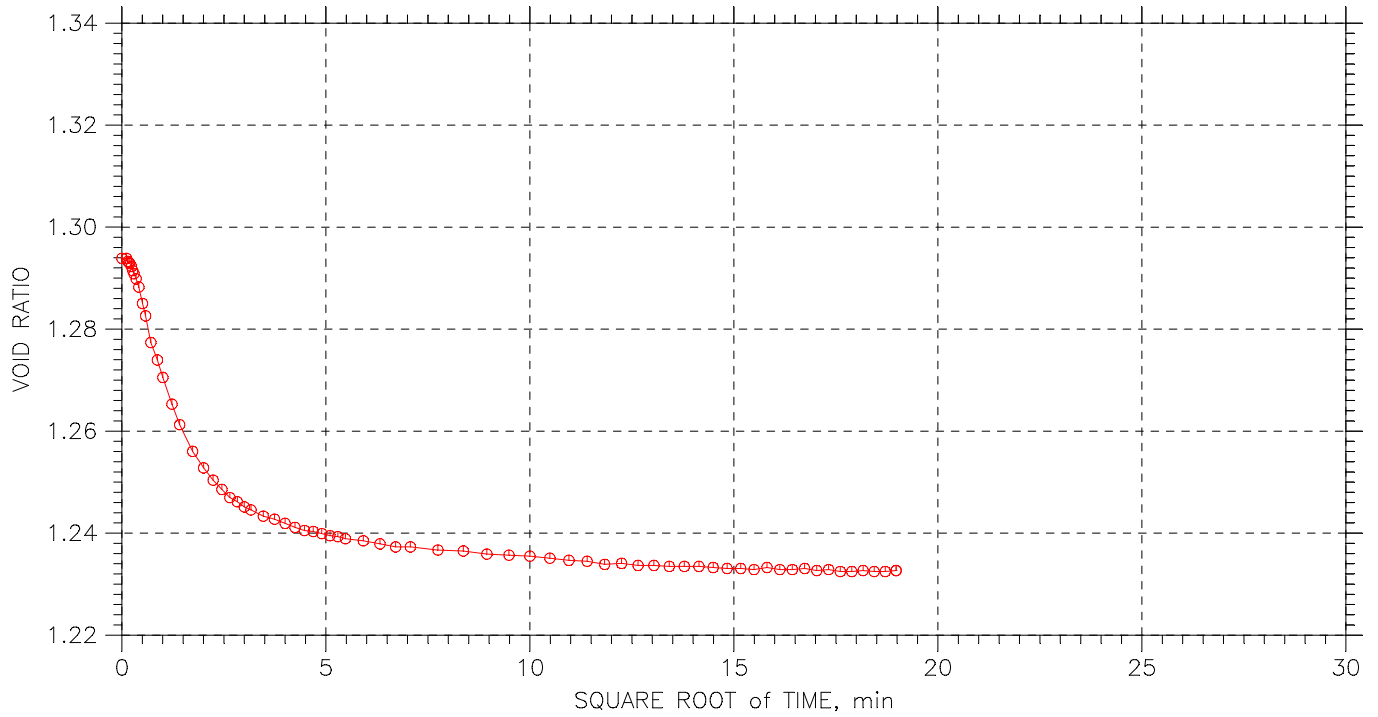
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 11

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

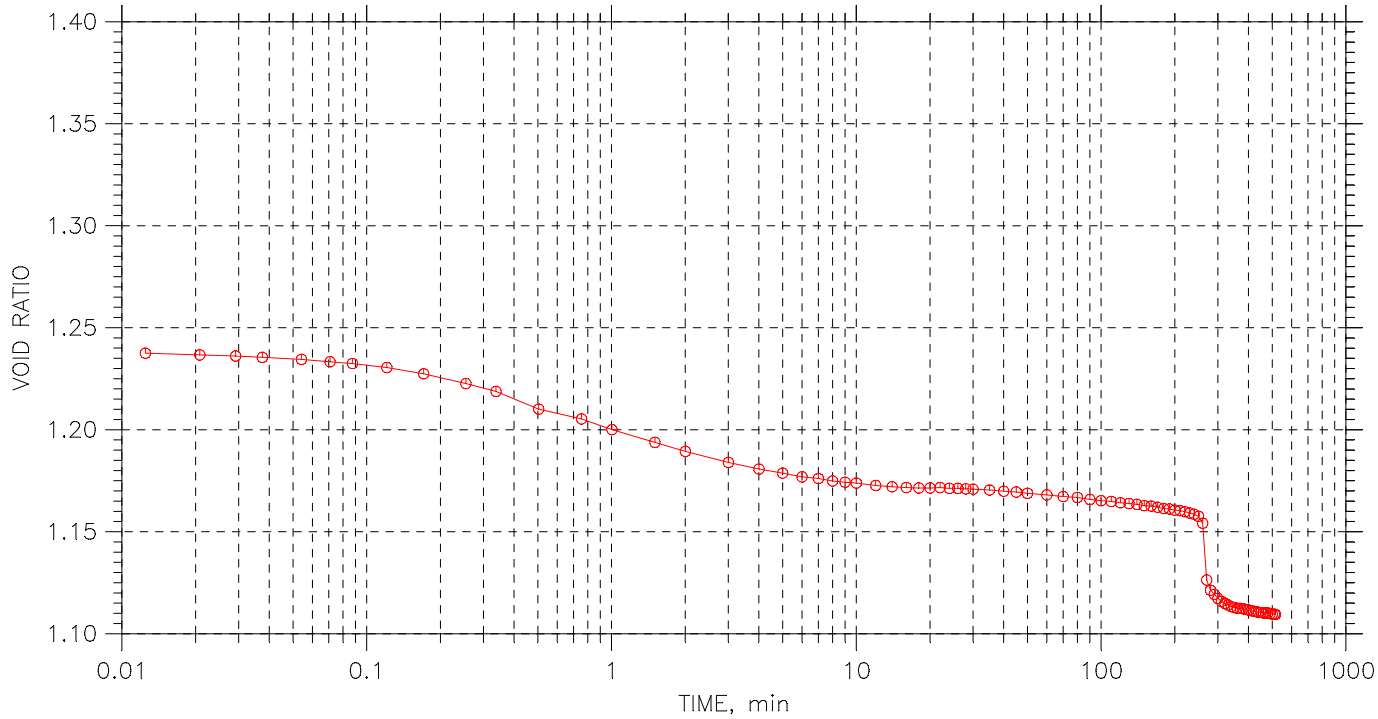
Tue, 16-DEC-2008 12:56:55

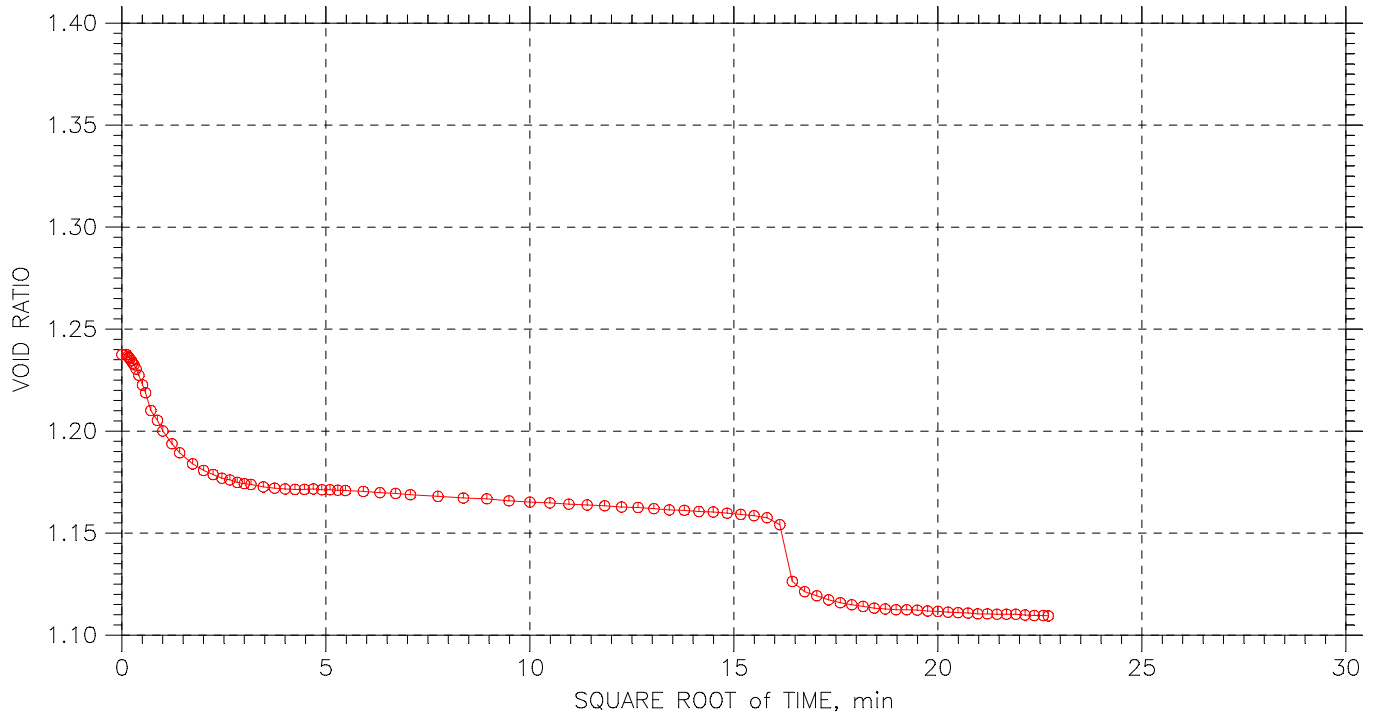
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 11

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

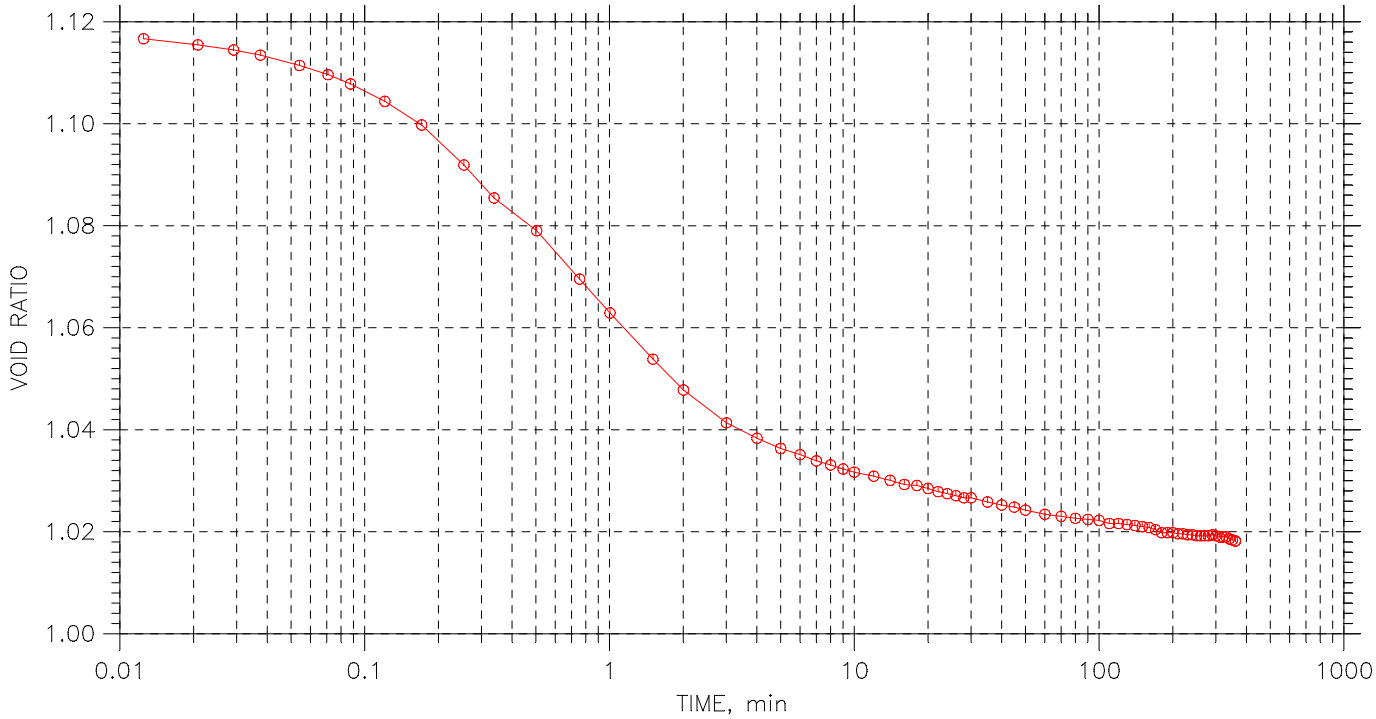
Tue, 16-DEC-2008 12:56:56

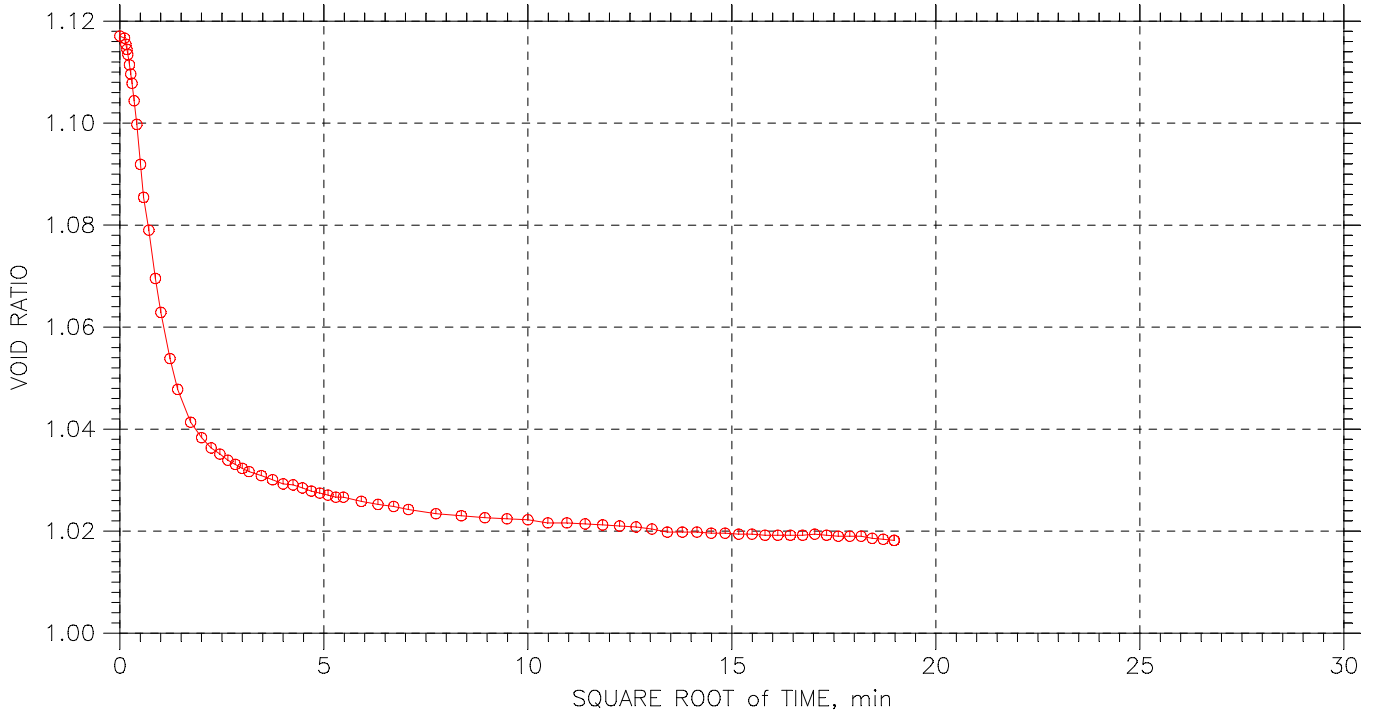
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 11

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

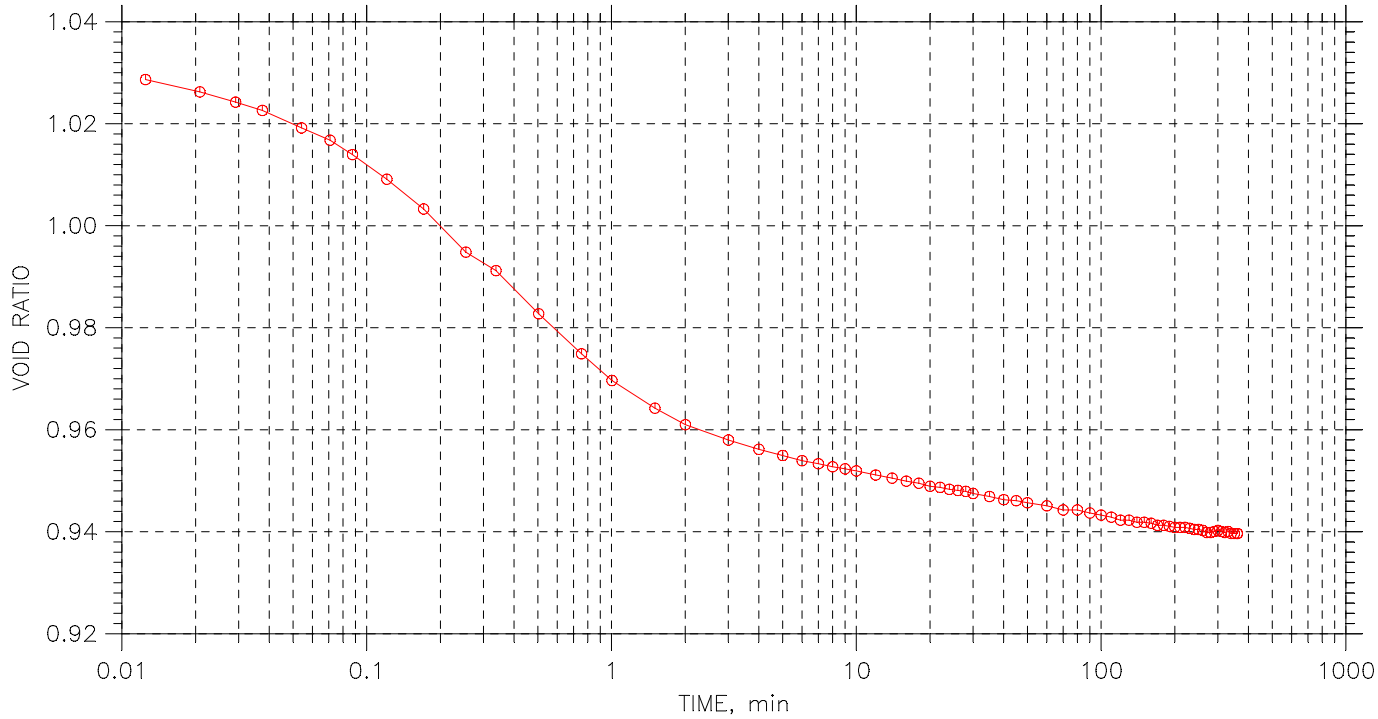
Tue, 16-DEC-2008 12:56:57

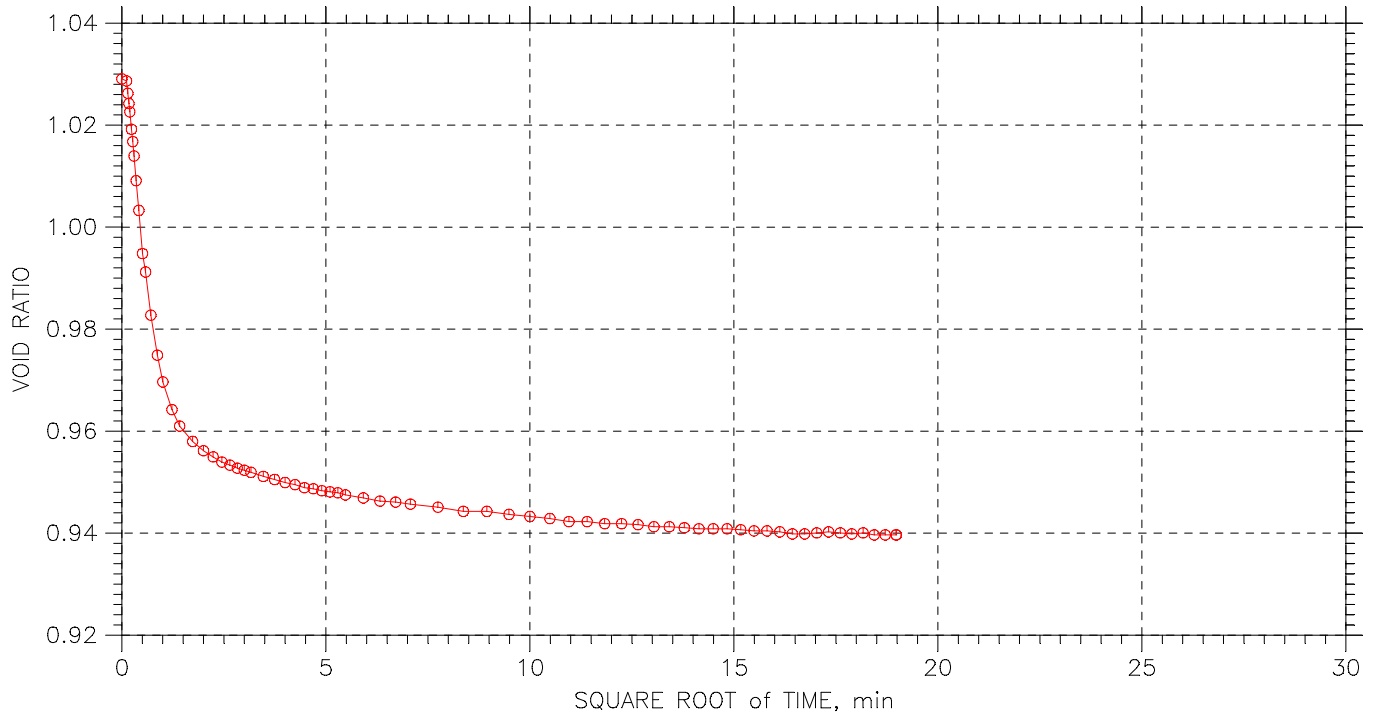
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 11

Stress: 8000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

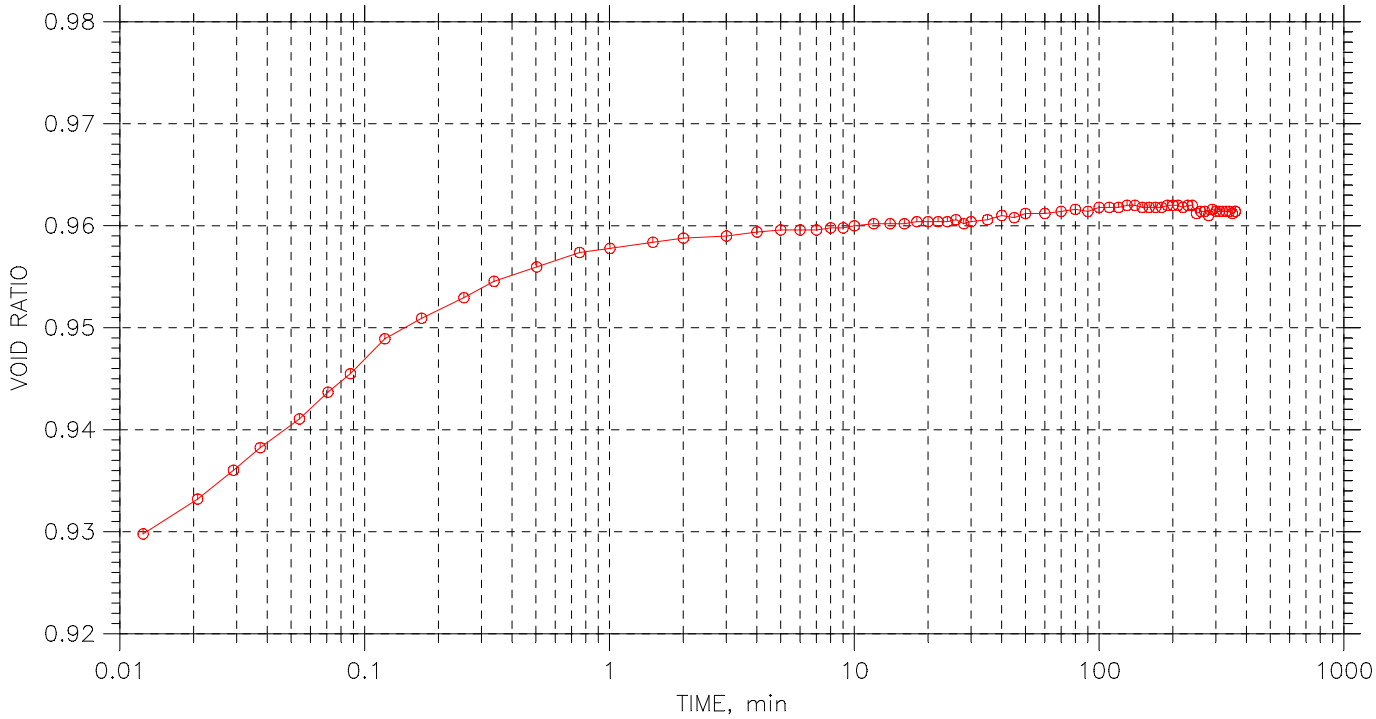
Tue, 16-DEC-2008 12:56:58

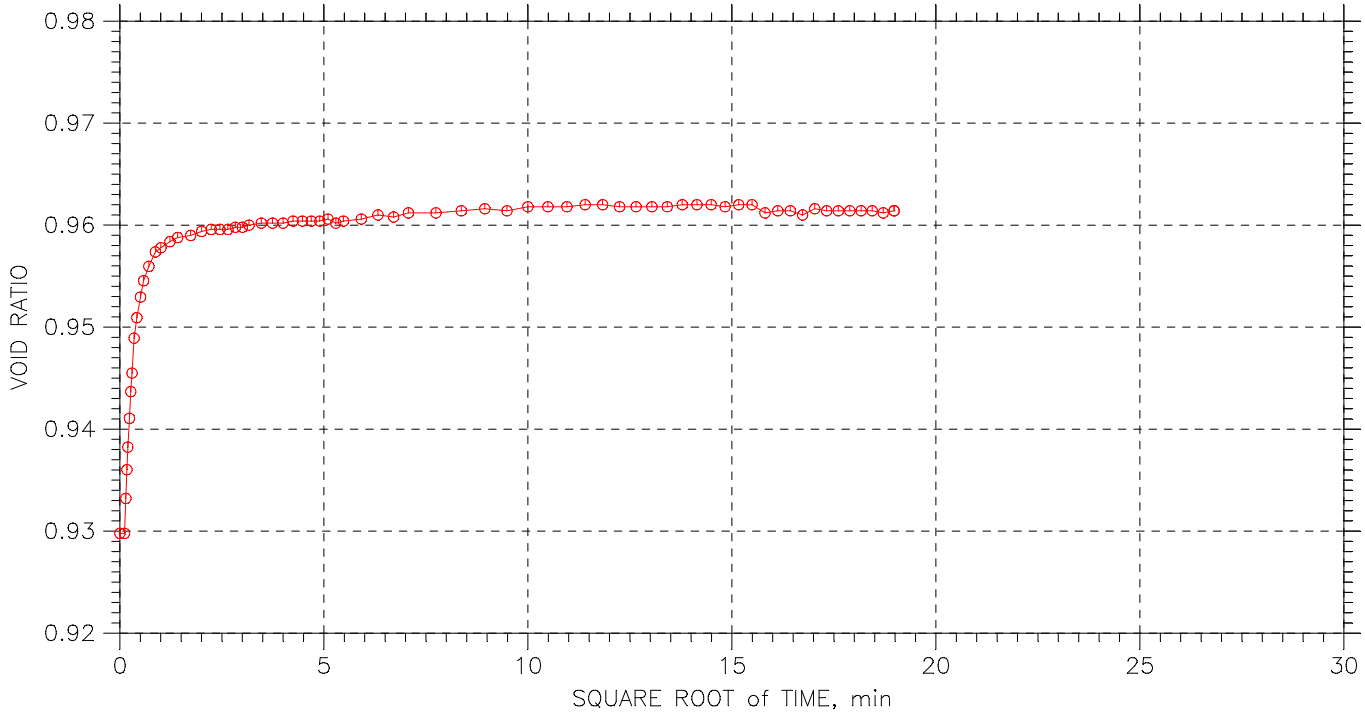
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 11

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

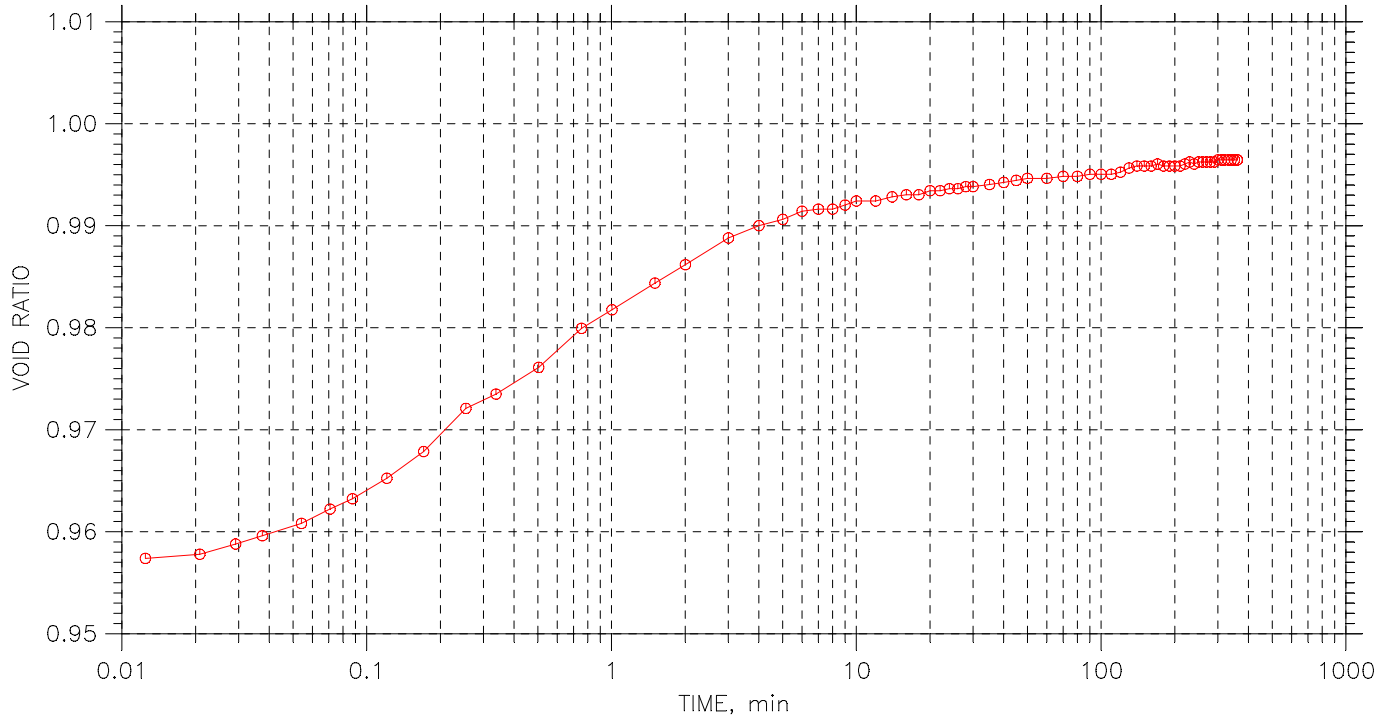
Tue, 16-DEC-2008 12:56:59

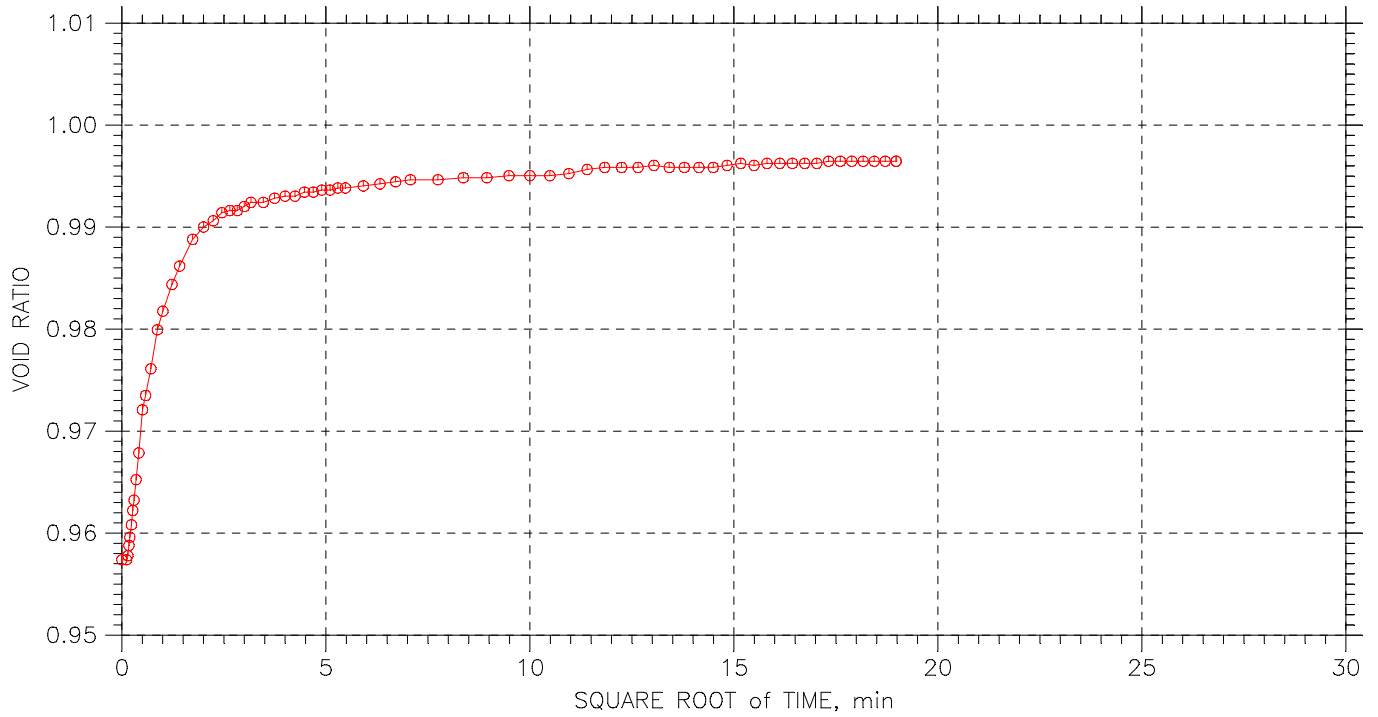
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 11

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

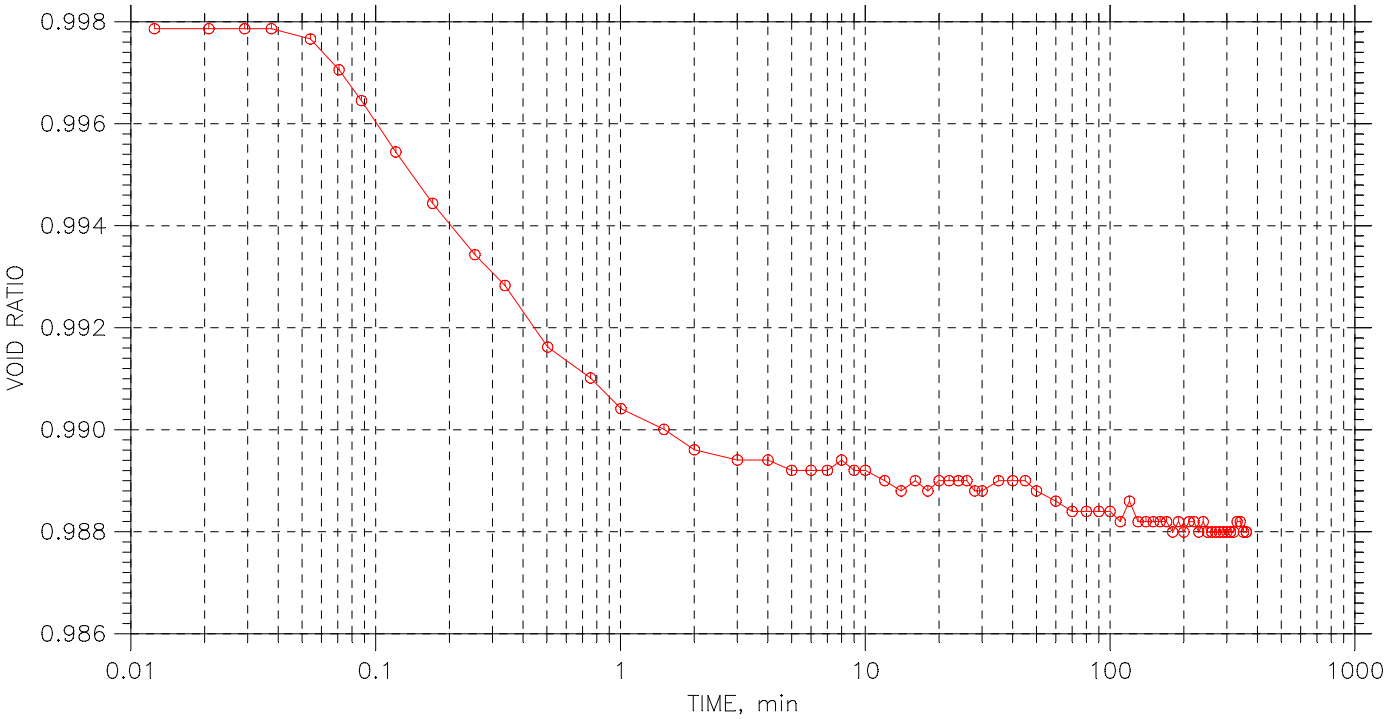
Tue, 16-DEC-2008 12:57:01

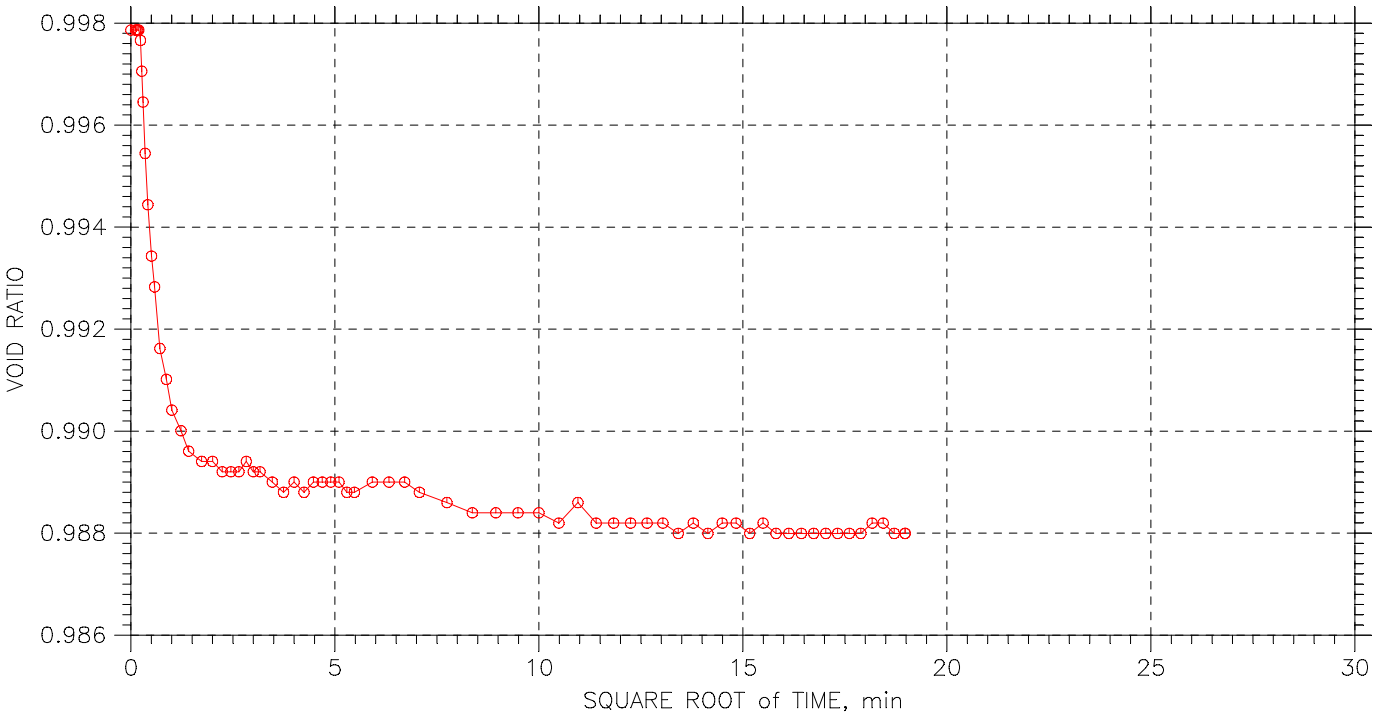
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 11

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

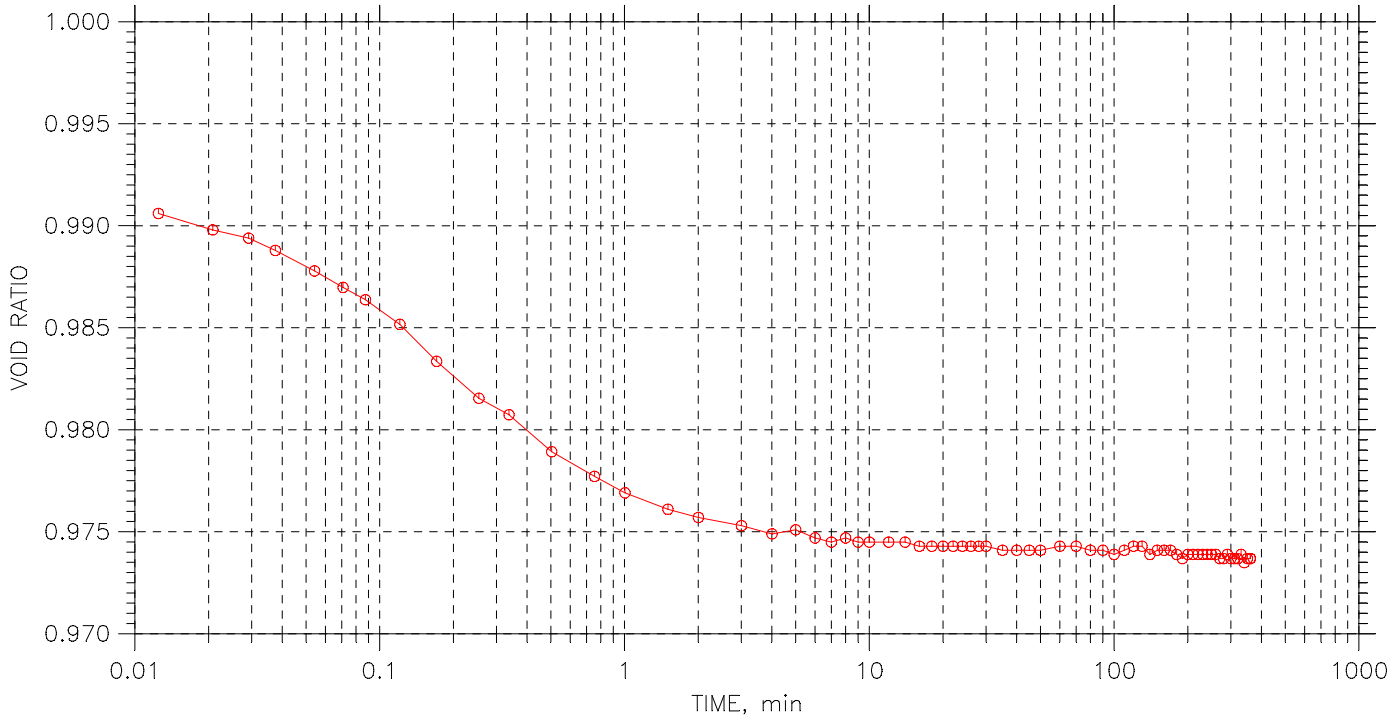
Tue, 16-DEC-2008 12:57:02

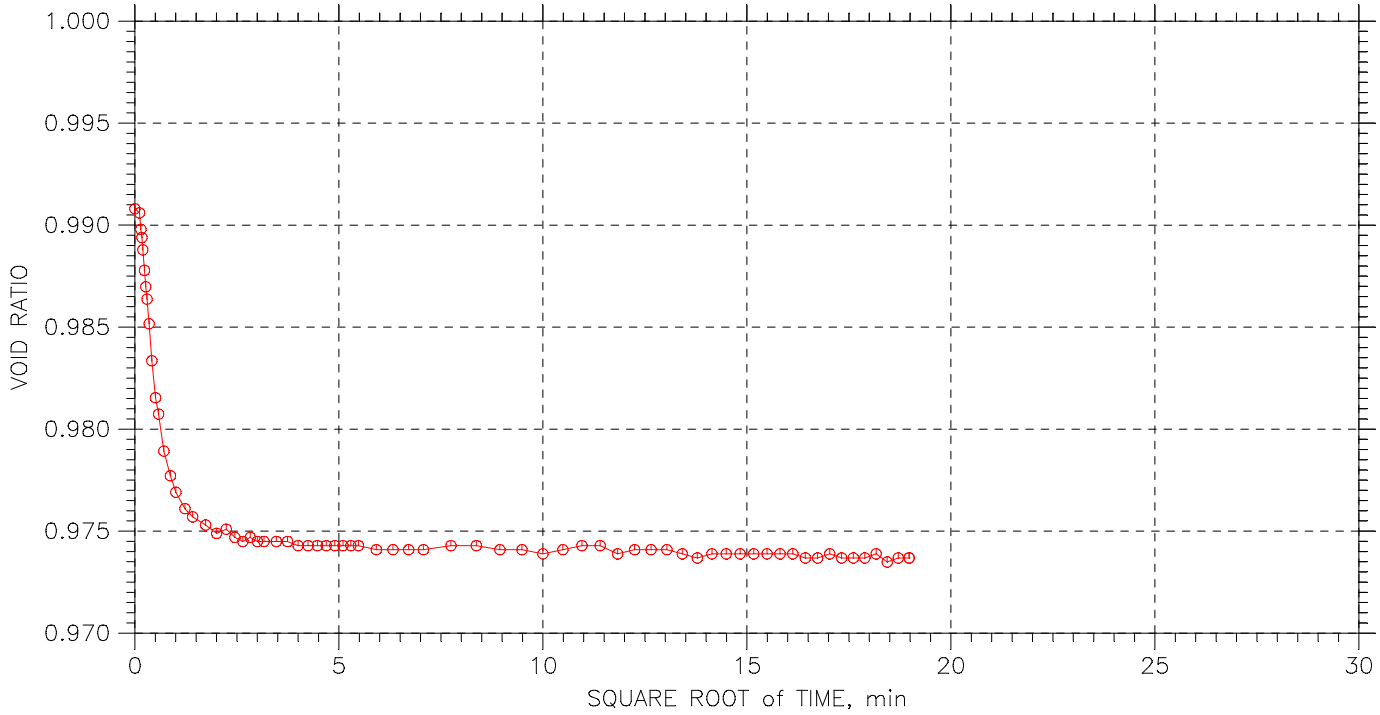
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 11

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

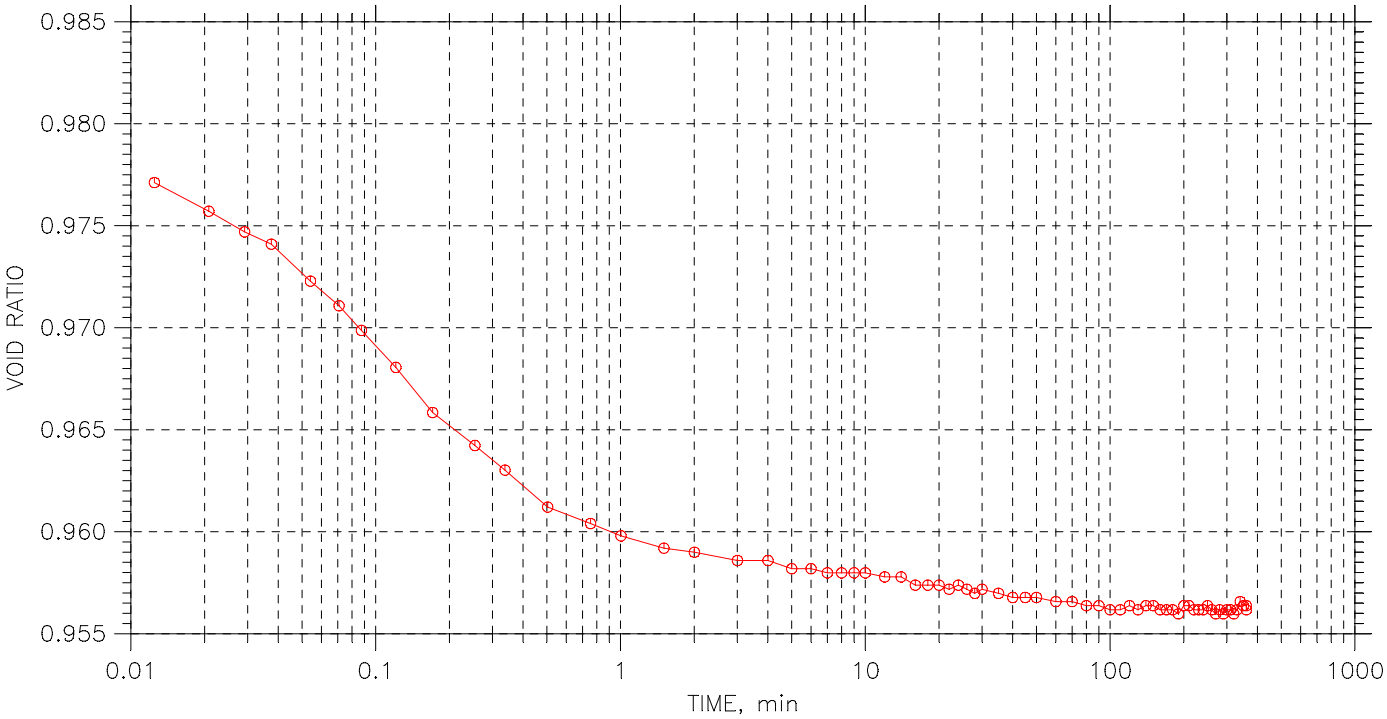
Tue, 16-DEC-2008 12:57:03

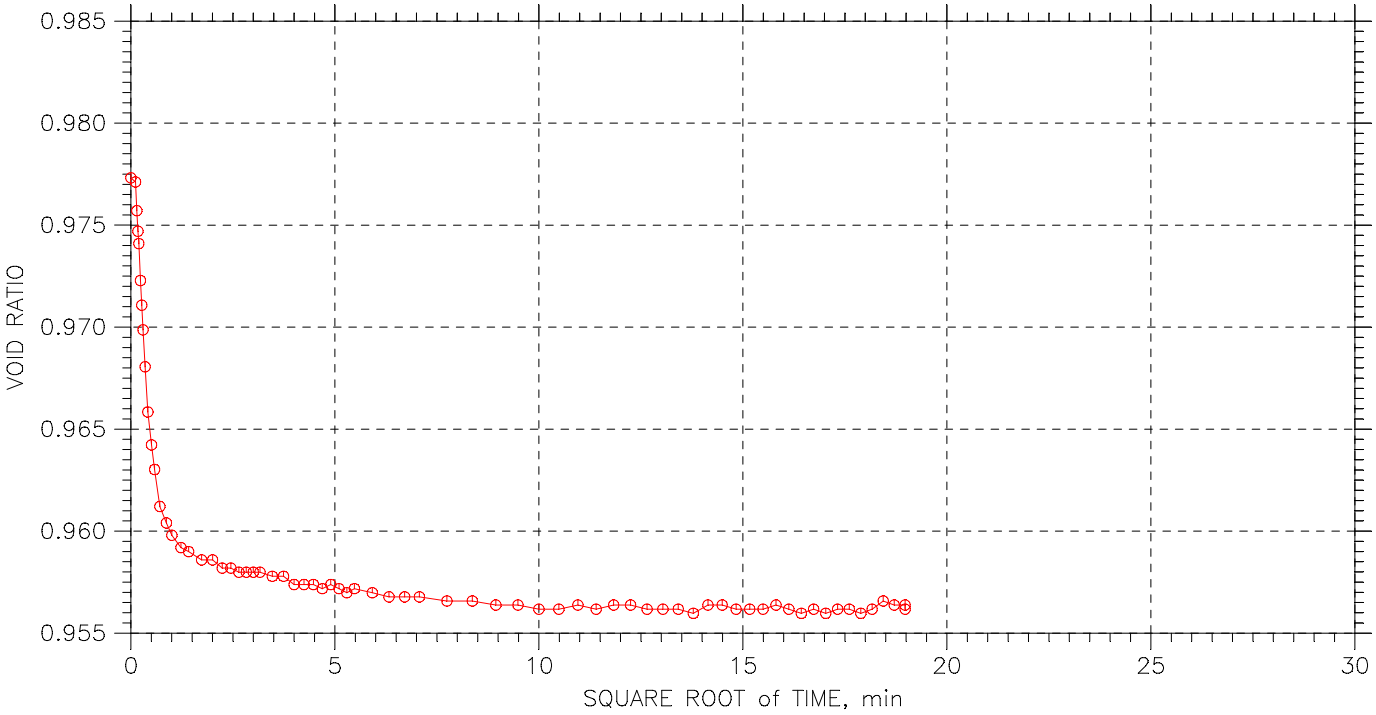
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 11

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

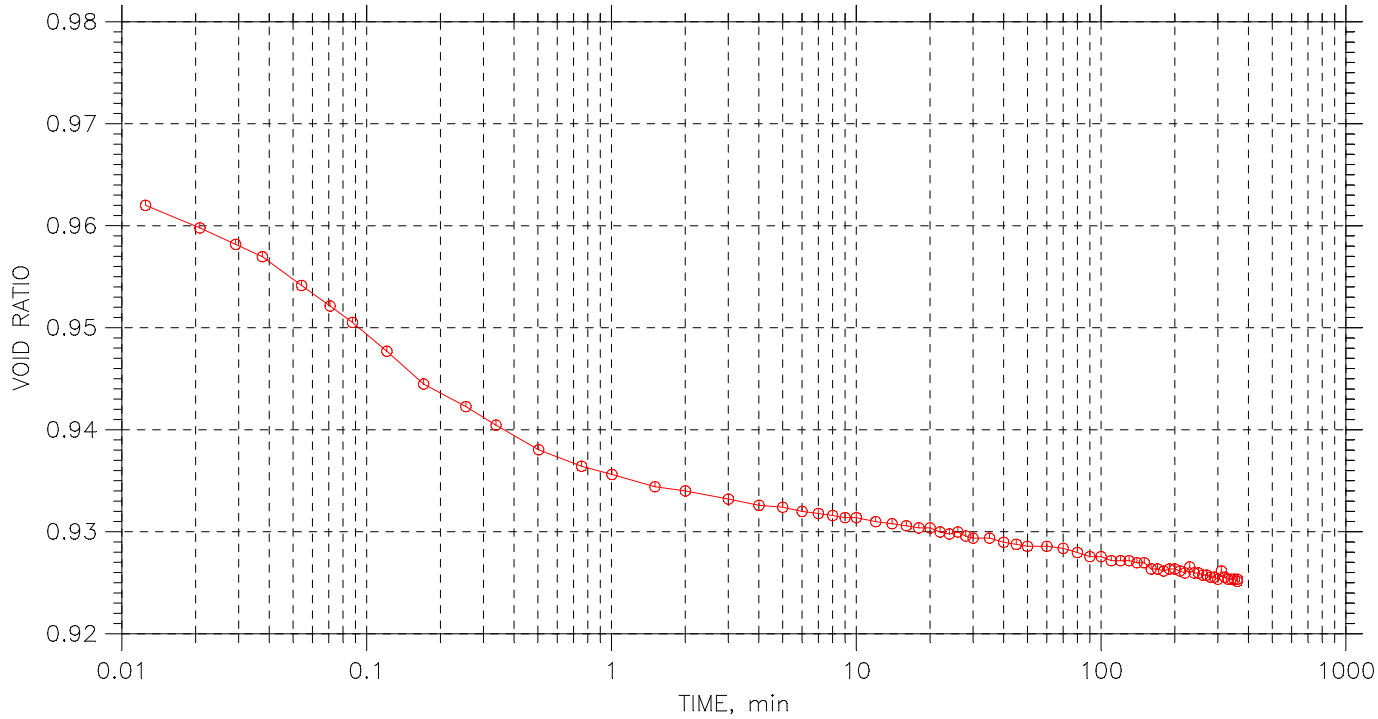
Tue, 16-DEC-2008 12:57:04

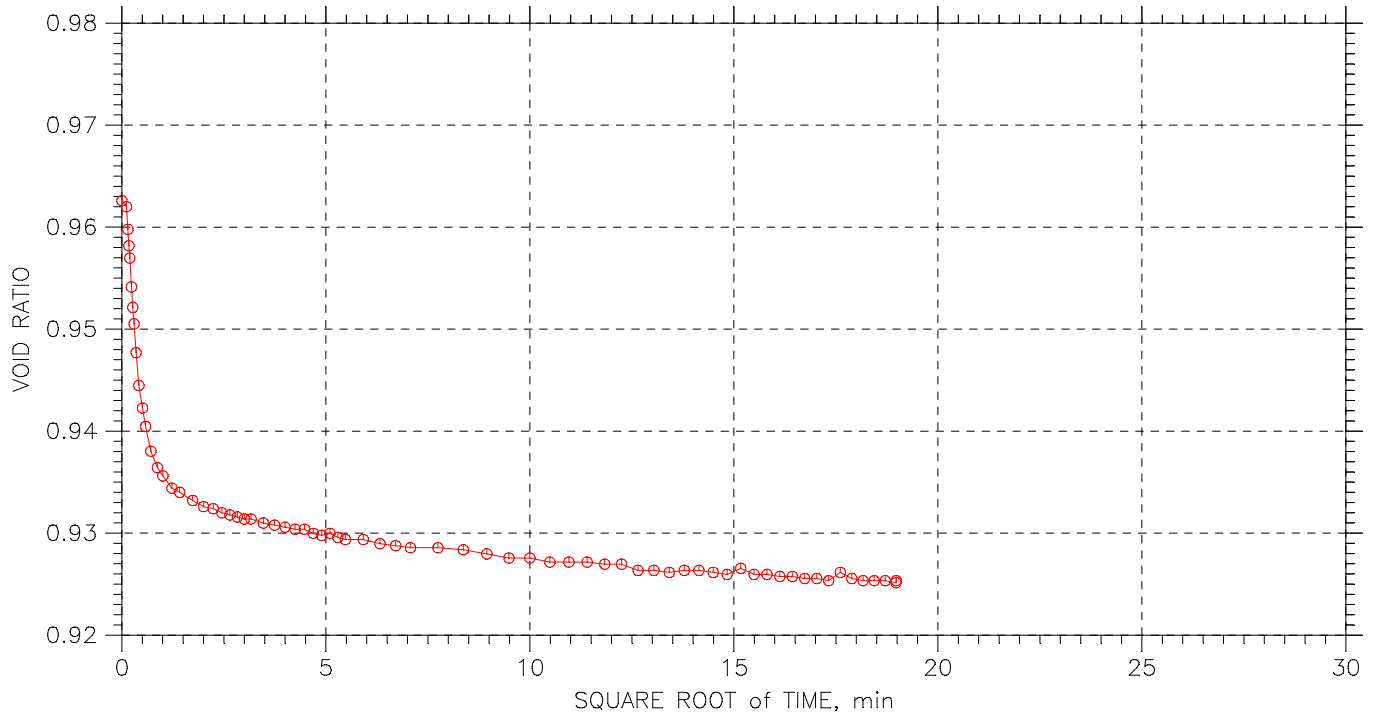
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 11

Stress: 8000. psf



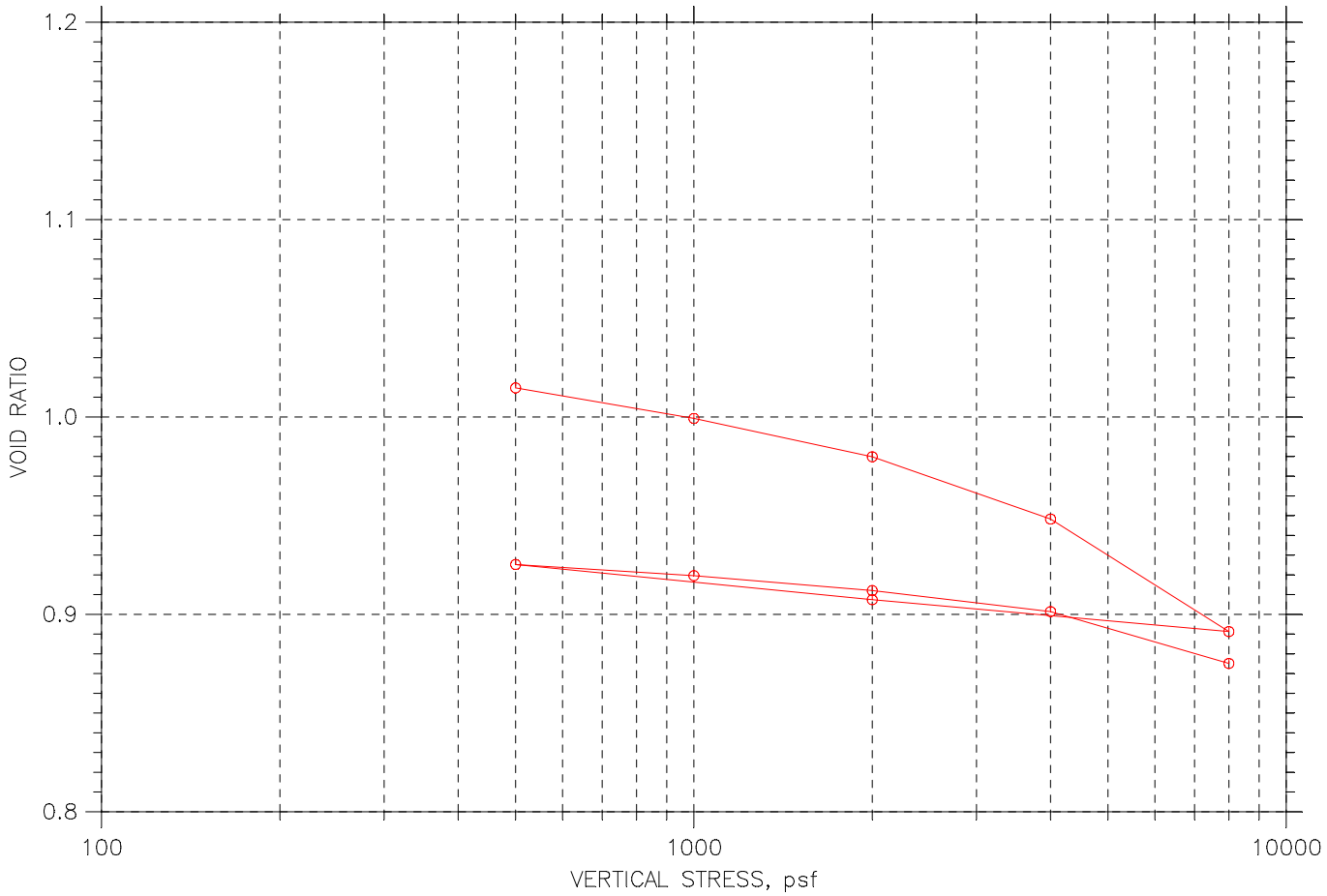


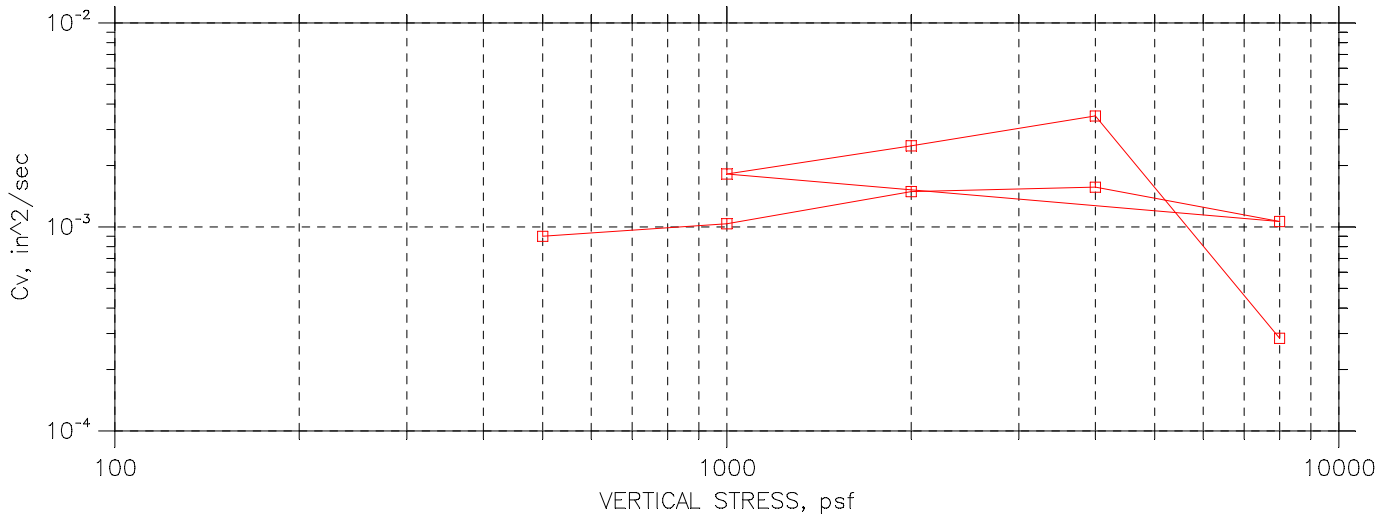
Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-008-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: U-5	Test Date: 11-12-08	Depth: 24.5 FT
	Test No.: 8087U5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Tue, 16-DEC-2008 12:57:05

CONSOLIDATION TEST DATA

SUMMARY REPORT



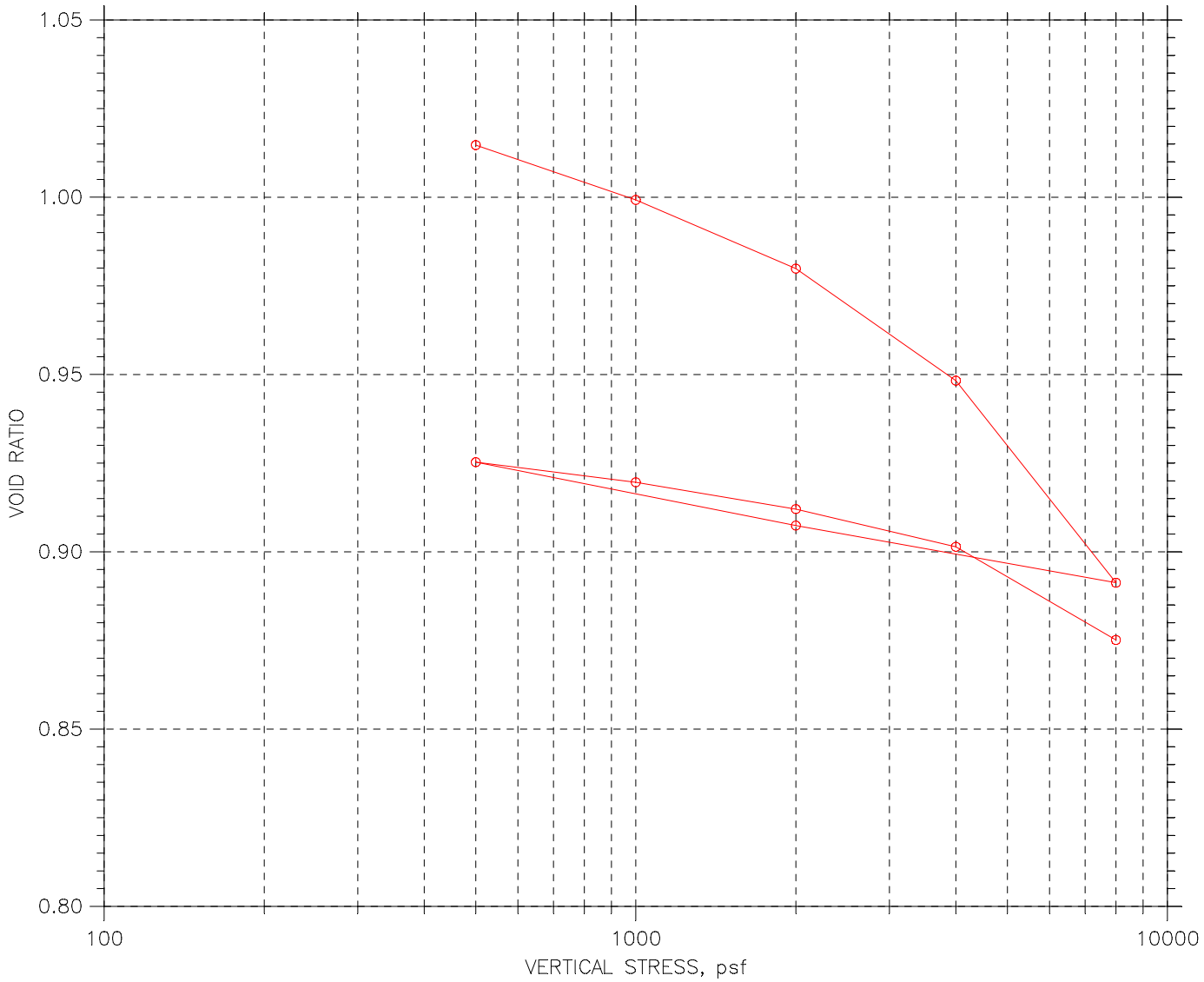


Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Tue, 16-DEC-2008 12:54:02

CONSOLIDATION TEST DATA

SUMMARY REPORT



					Before Test	After Test
Overburden Pressure: 0 psf				Water Content, %	38.47	32.20
Preconsolidation Pressure: 0 psf				Dry Unit Weight, pcf	84.05	91.56
Compression Index: 3.81959e-313				Saturation, %	101.46	101.18
Diameter: 1.88 in		Height: 0.625 in		Void Ratio	1.04	0.88
LL: 32	PL: 21	PI: 10	GS: 2.75			

Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

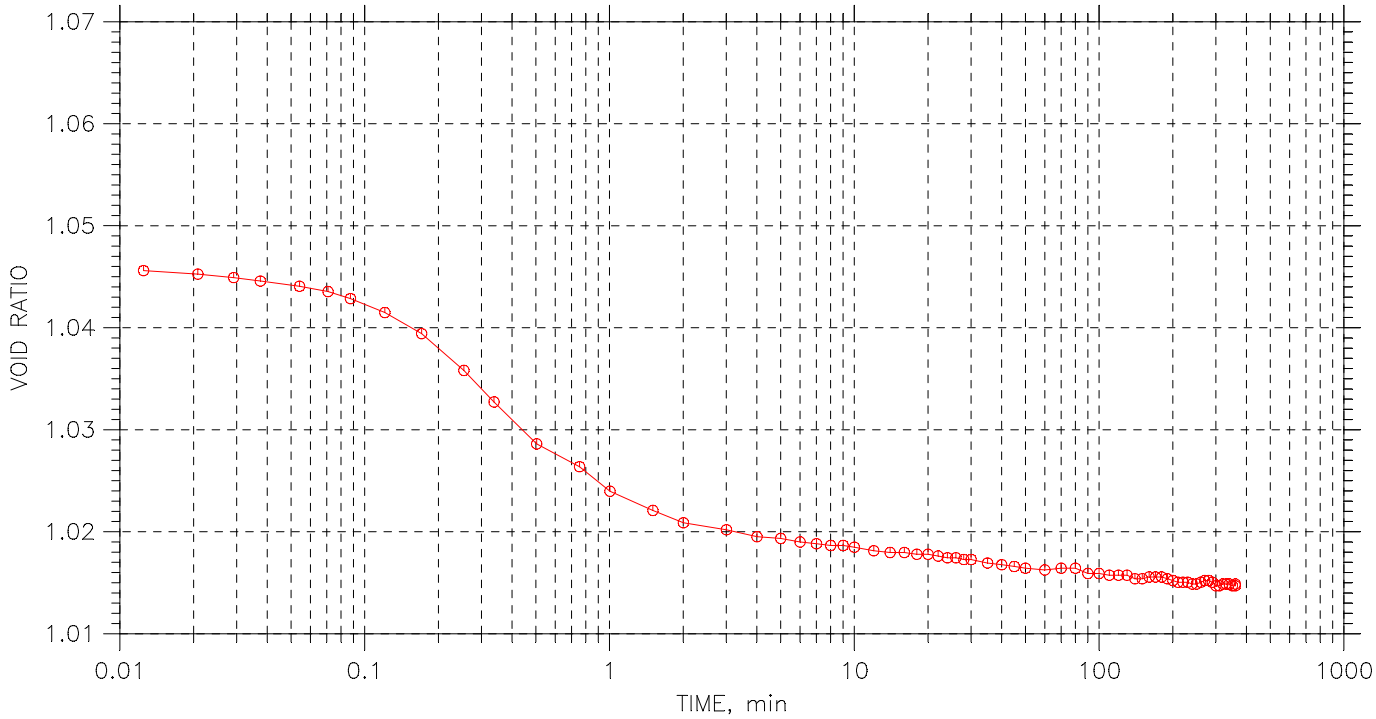
Tue, 16-DEC-2008 12:54:03

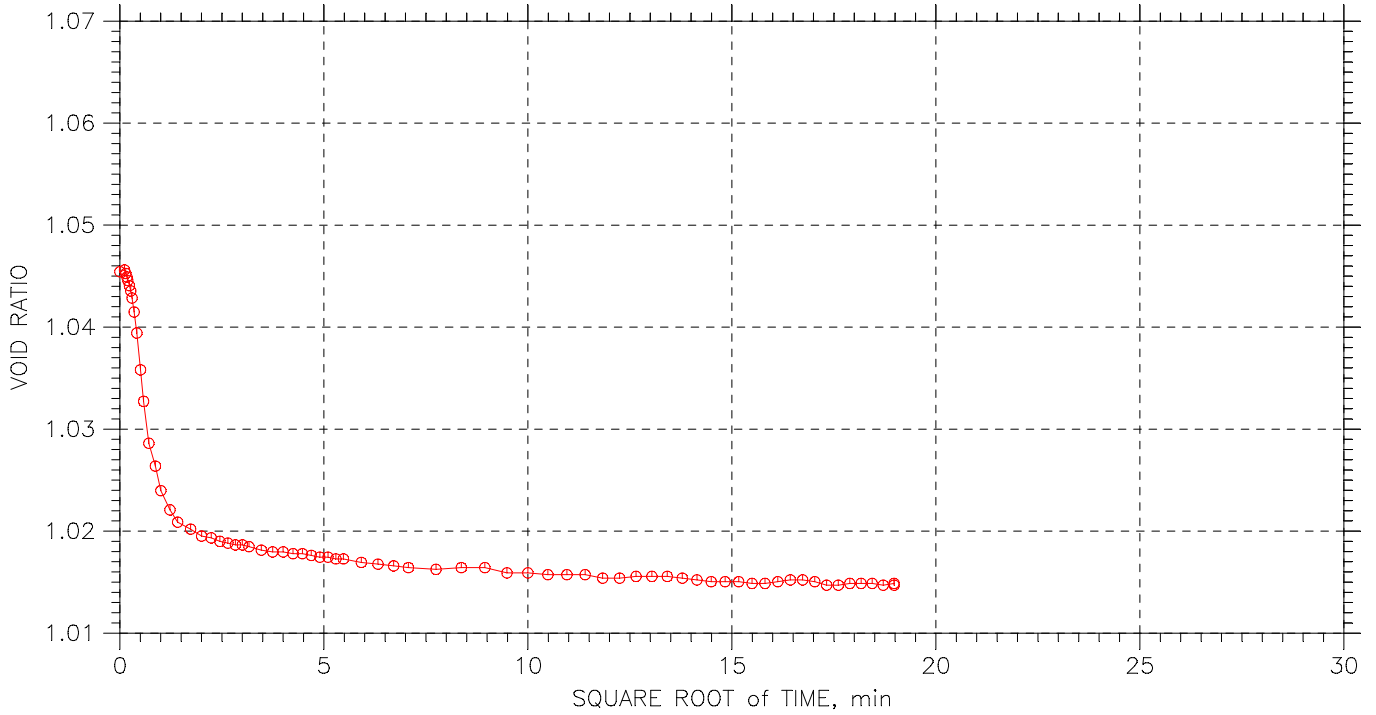
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 11

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

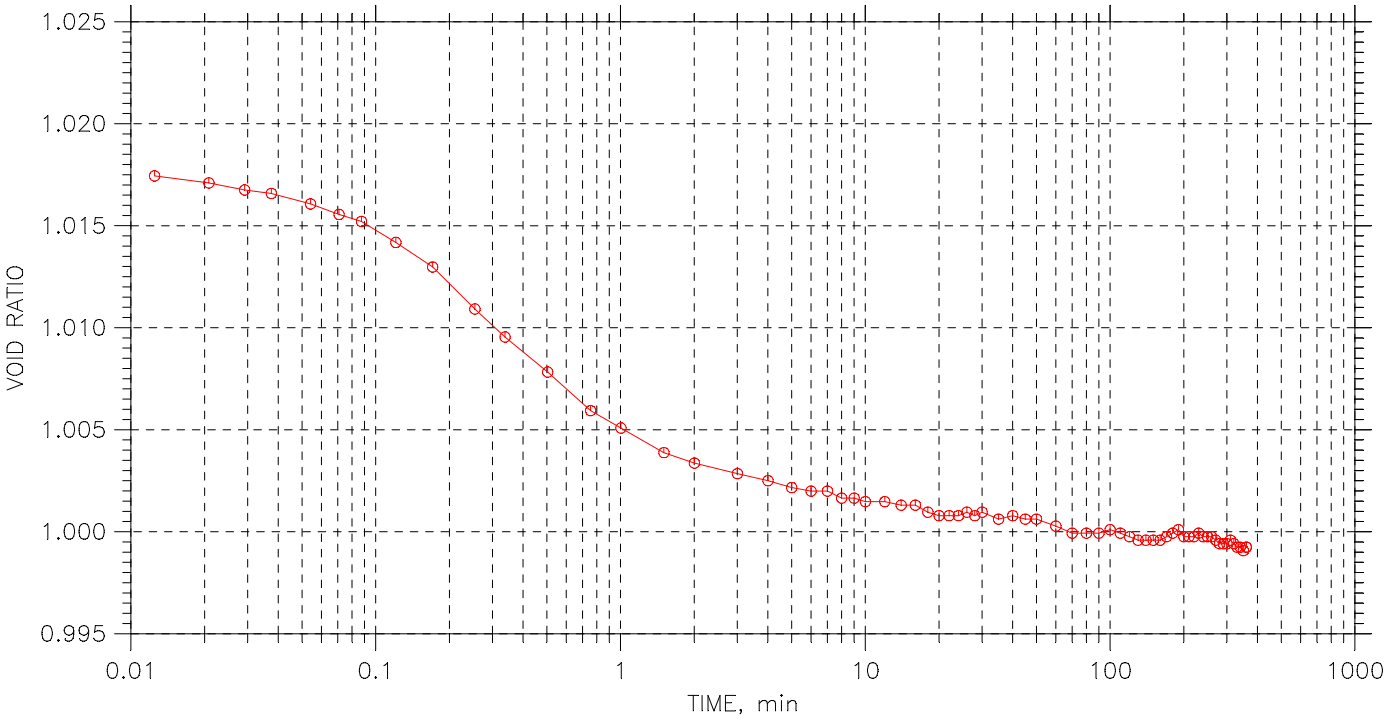
Tue, 16-DEC-2008 12:54:04

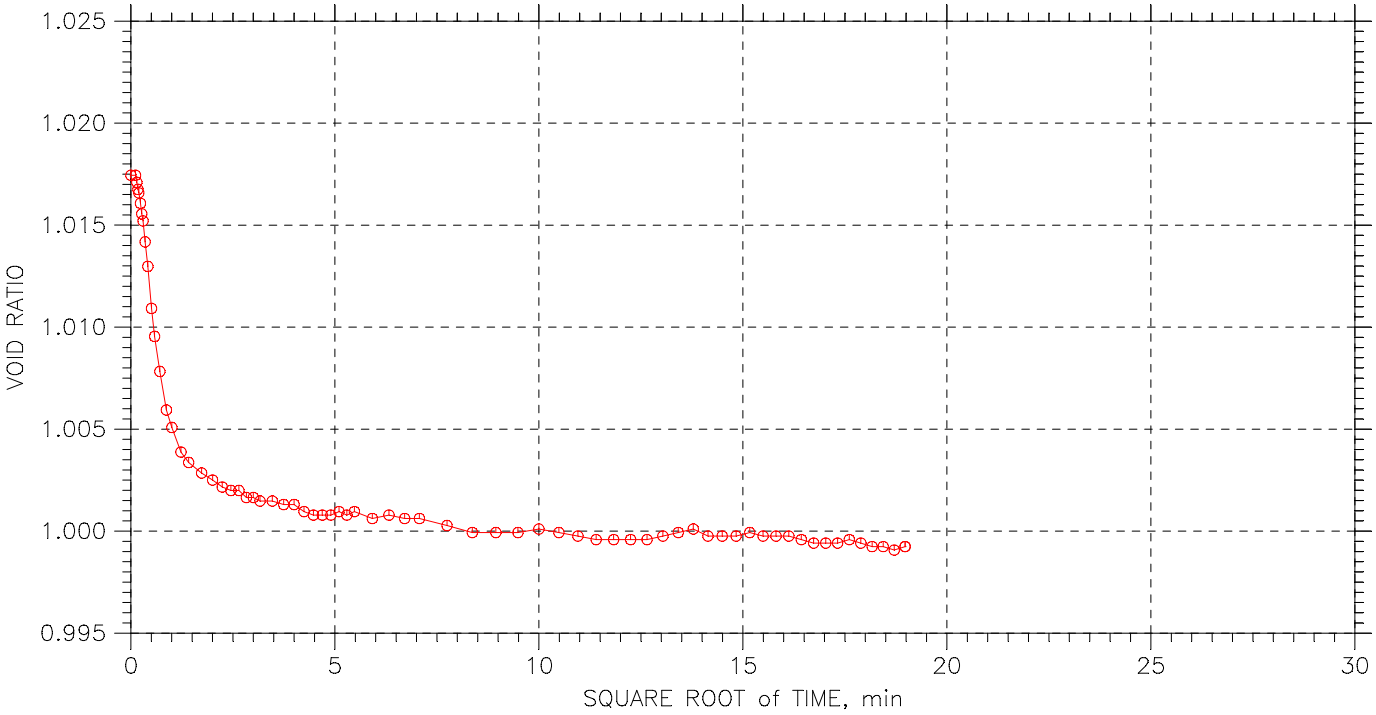
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 11

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

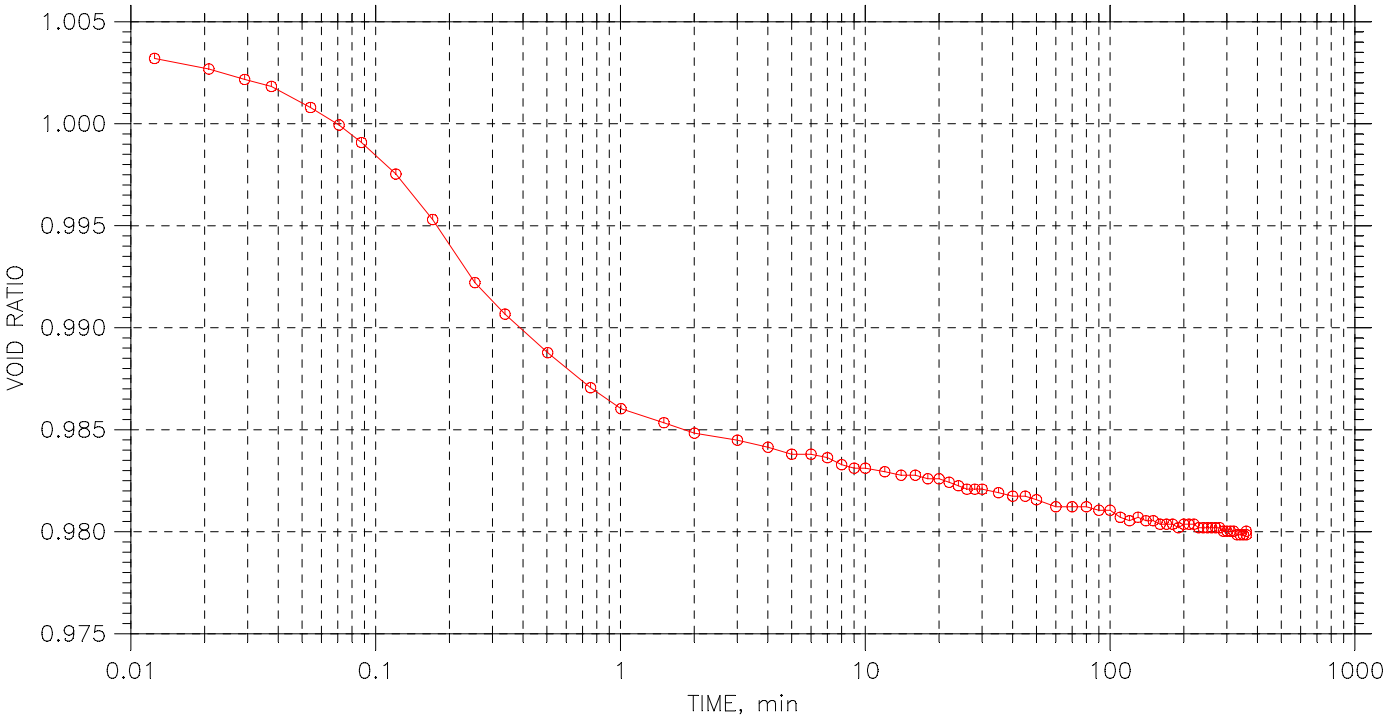
Tue, 16-DEC-2008 12:54:05

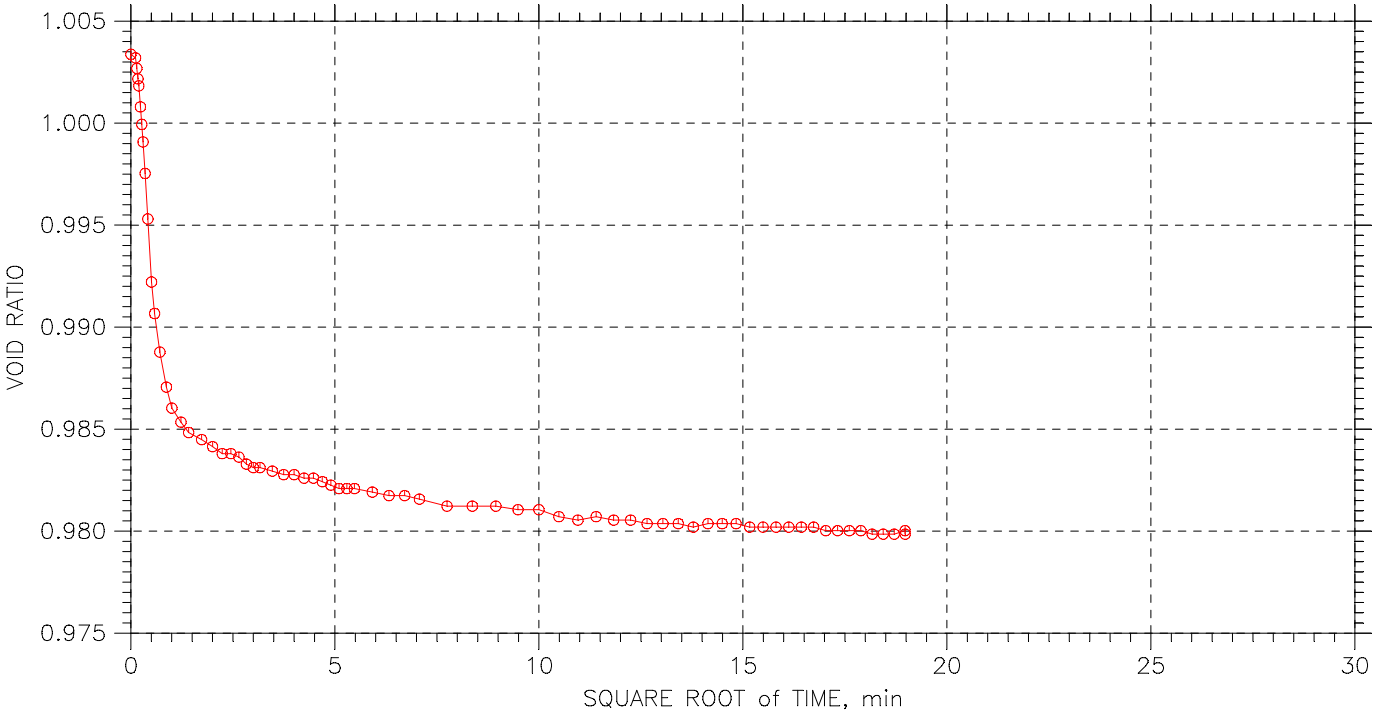
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 11

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

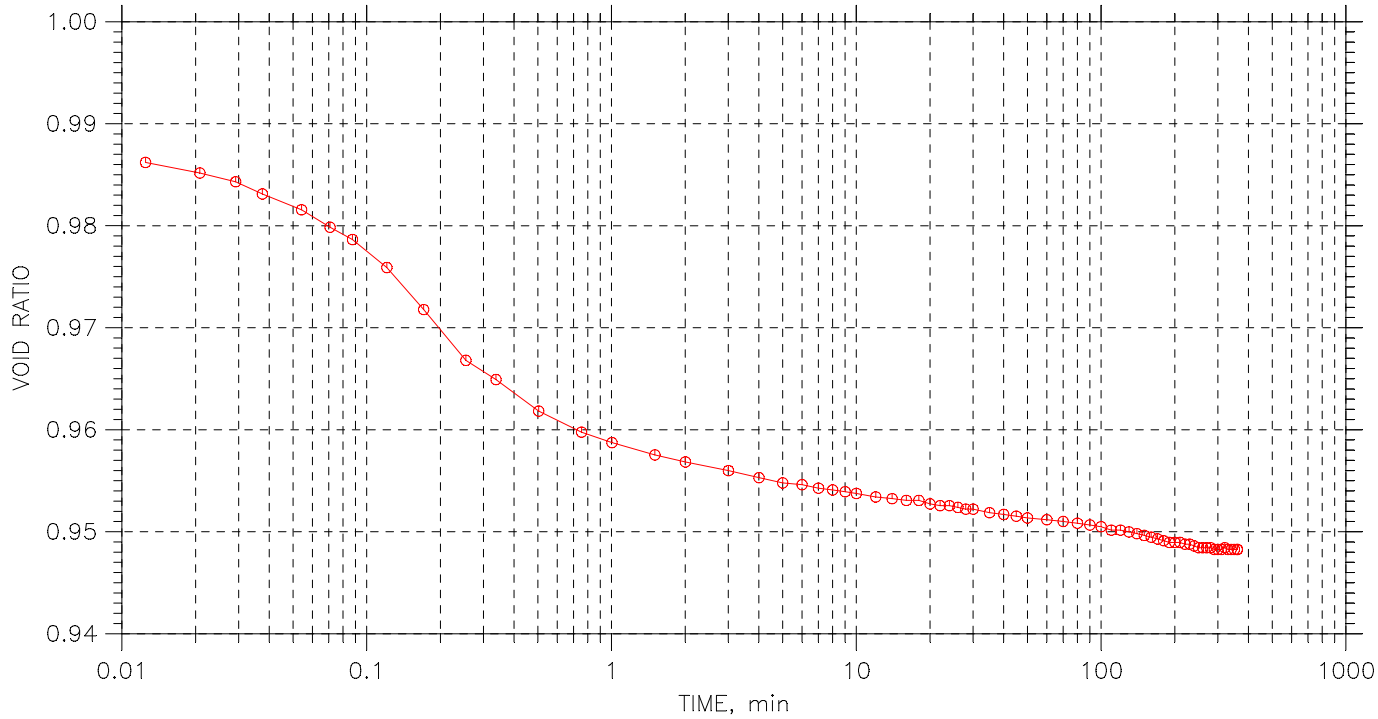
Tue, 16-DEC-2008 12:54:06

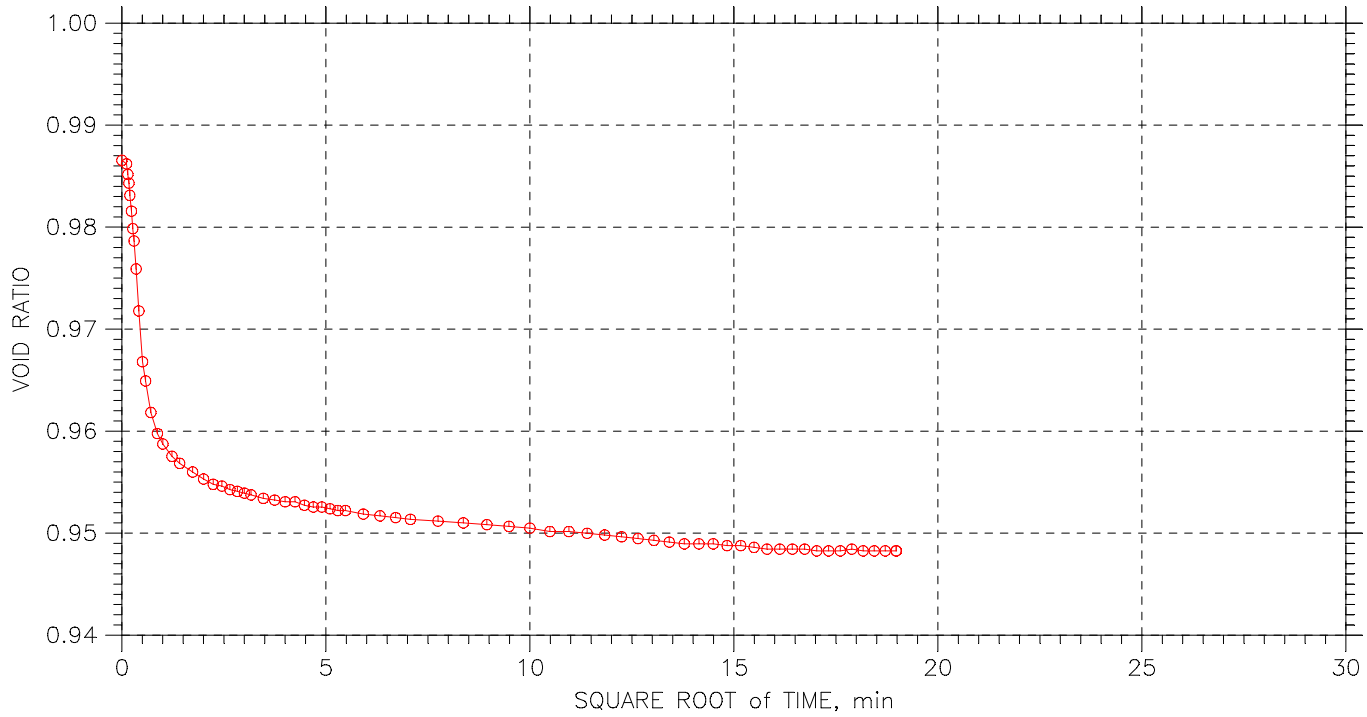
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 11

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

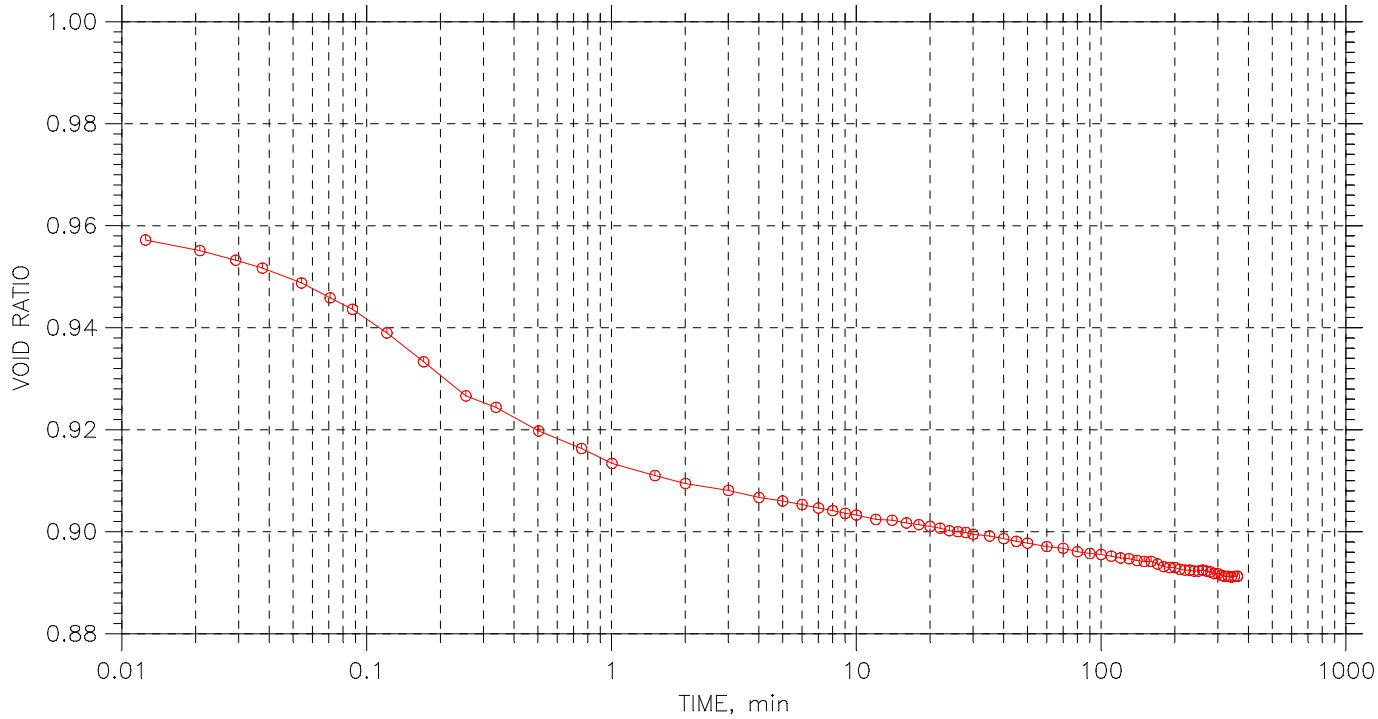
Tue, 16-DEC-2008 12:54:07

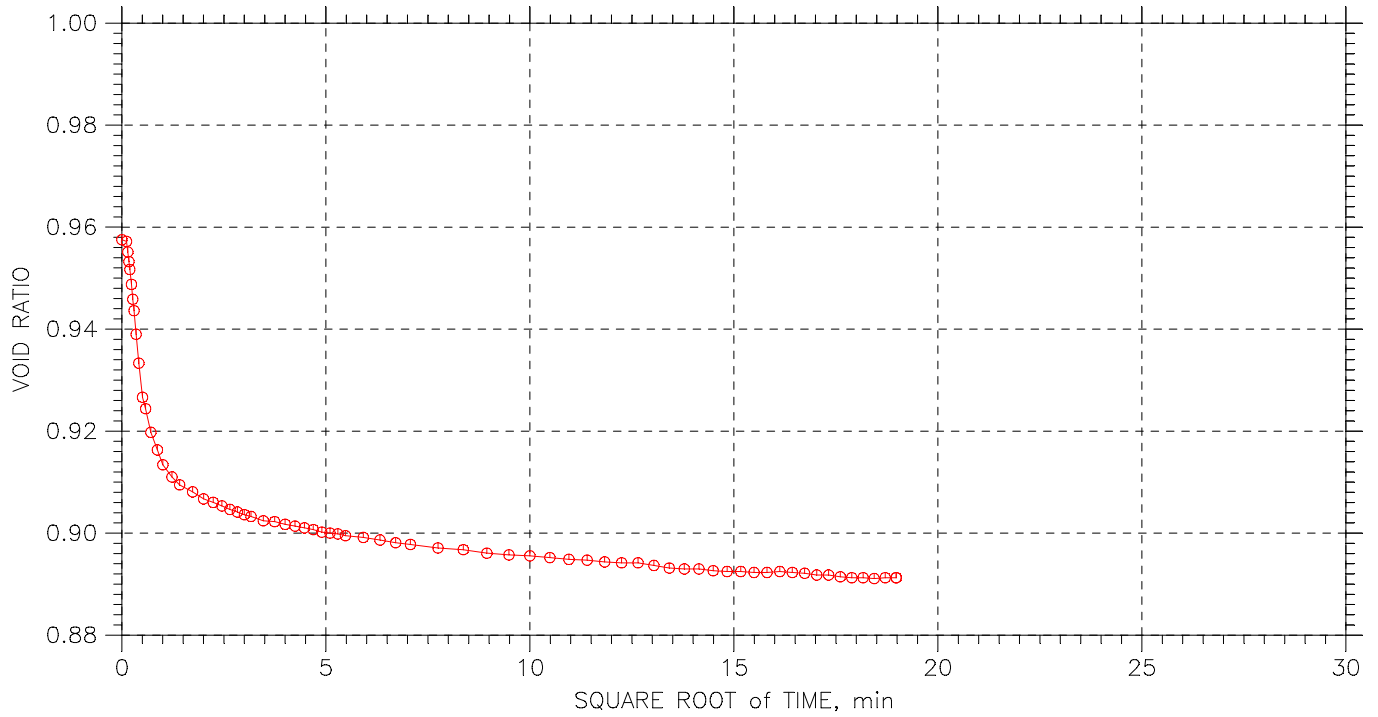
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 11

Stress: 8000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

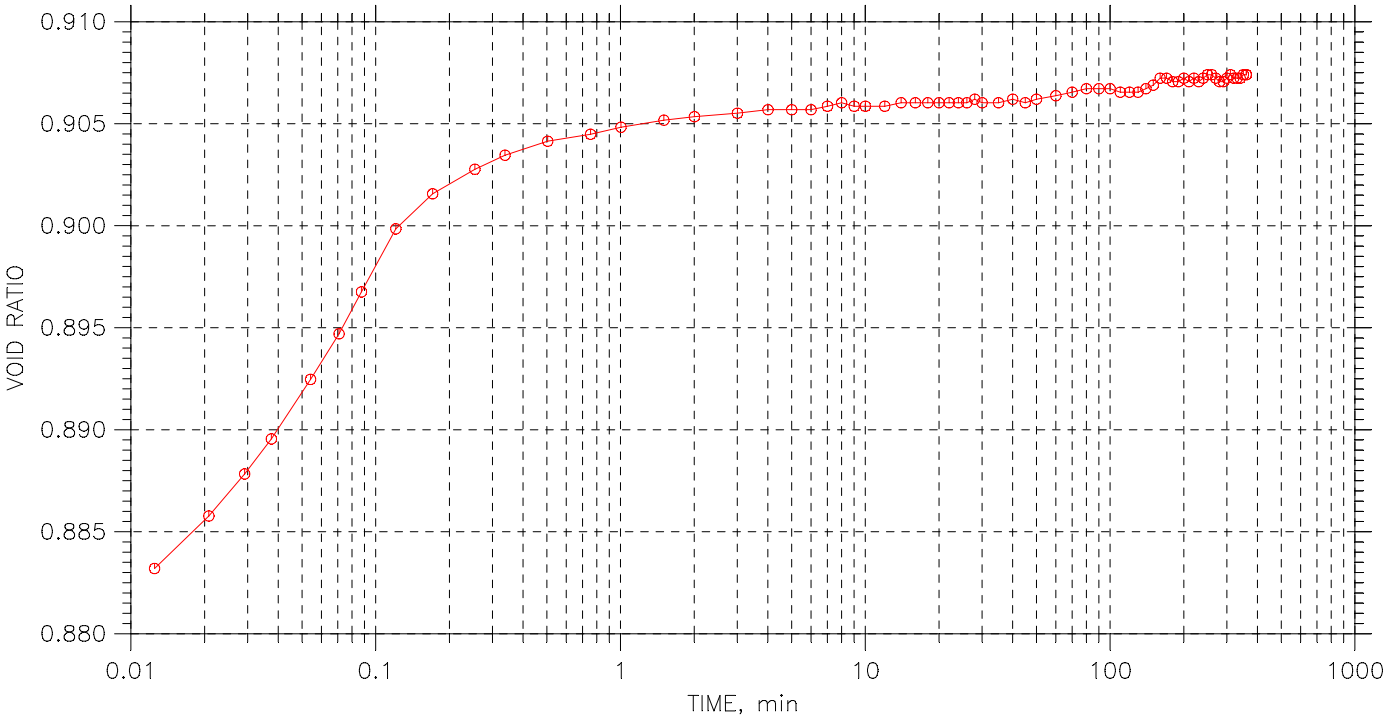
Tue, 16-DEC-2008 12:54:08

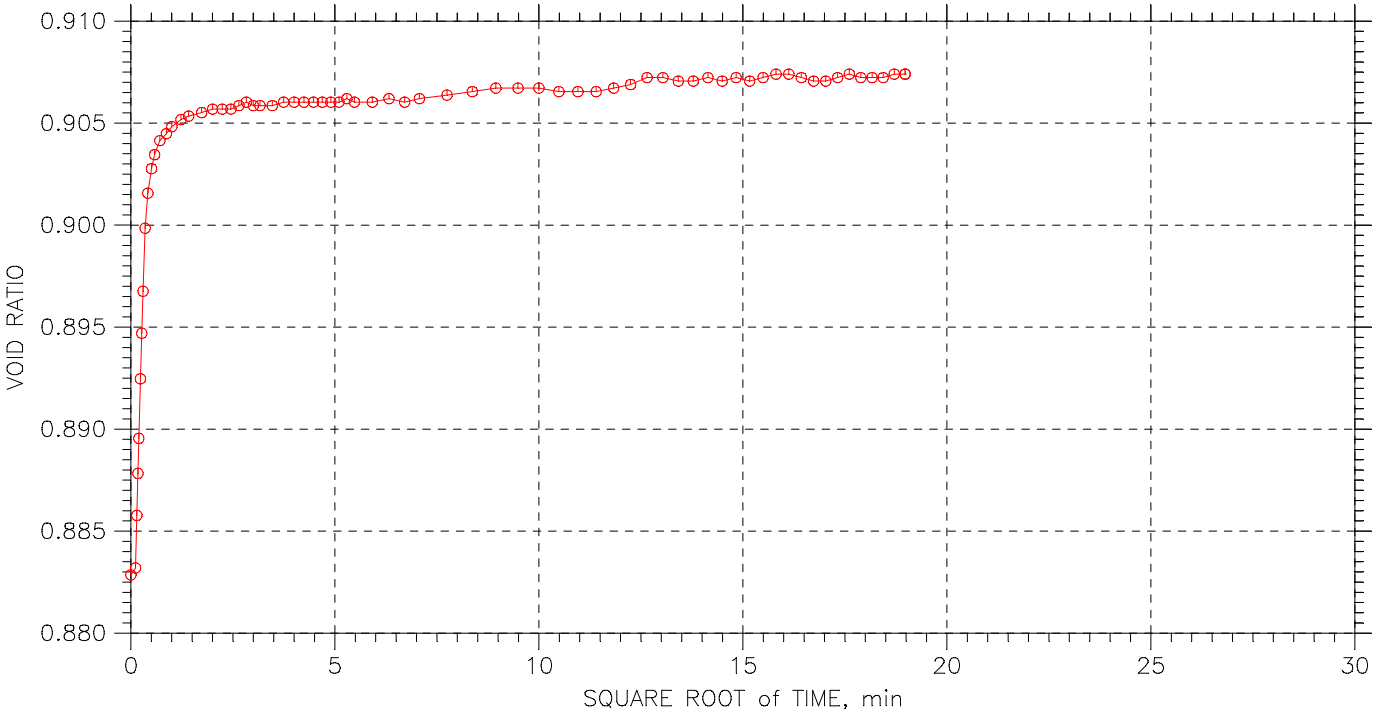
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 11

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

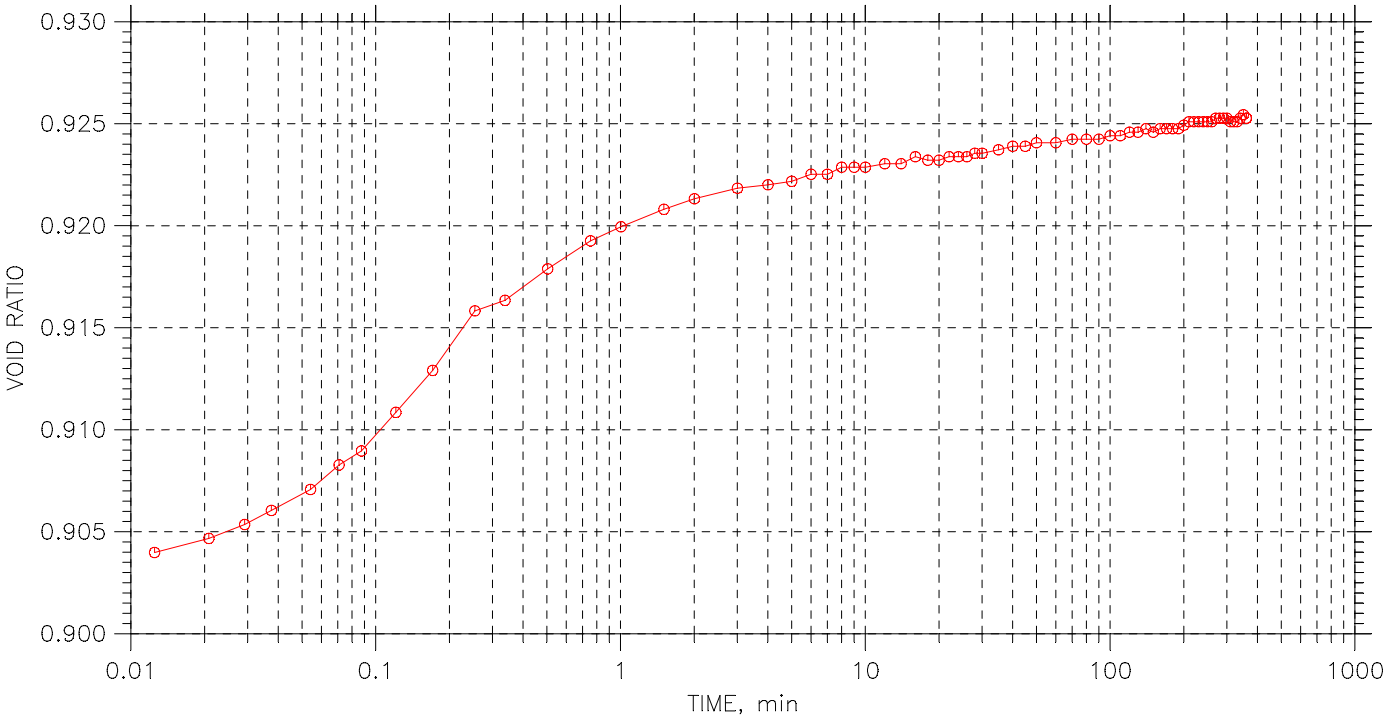
Tue, 16-DEC-2008 12:54:09

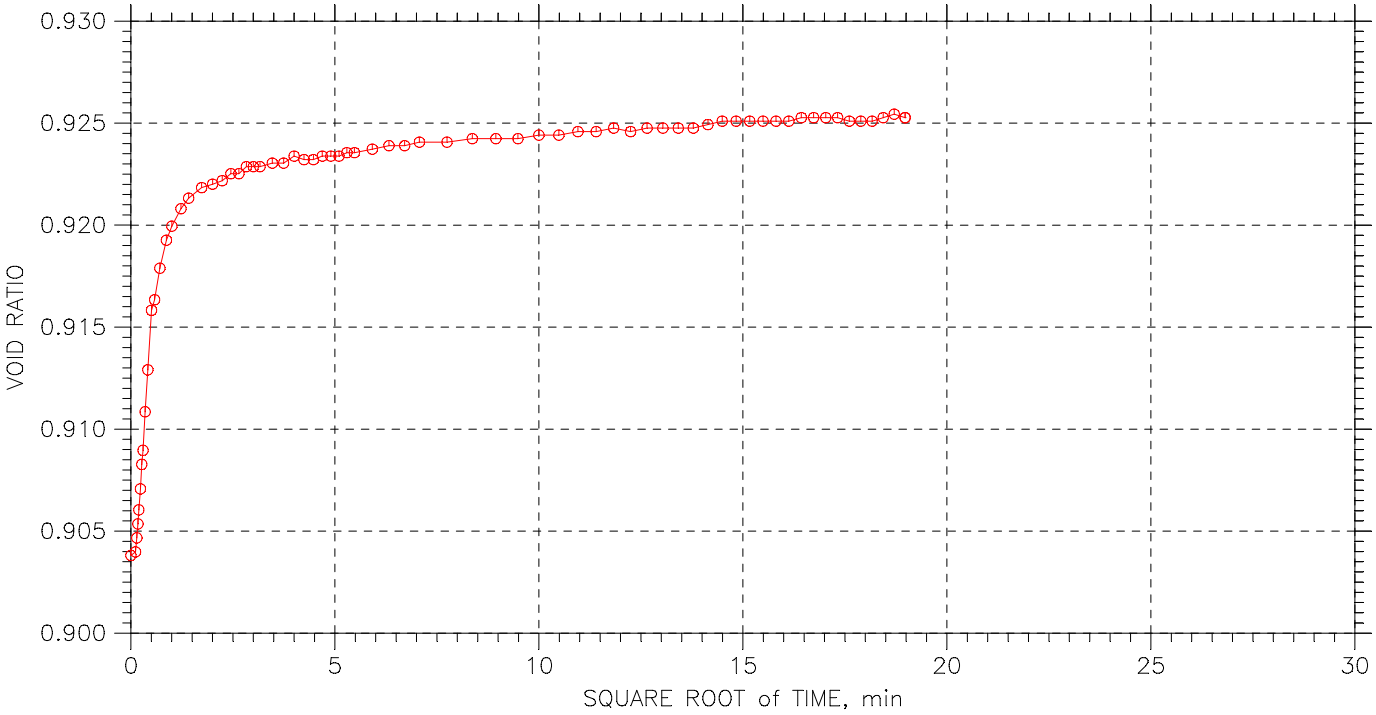
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 11

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

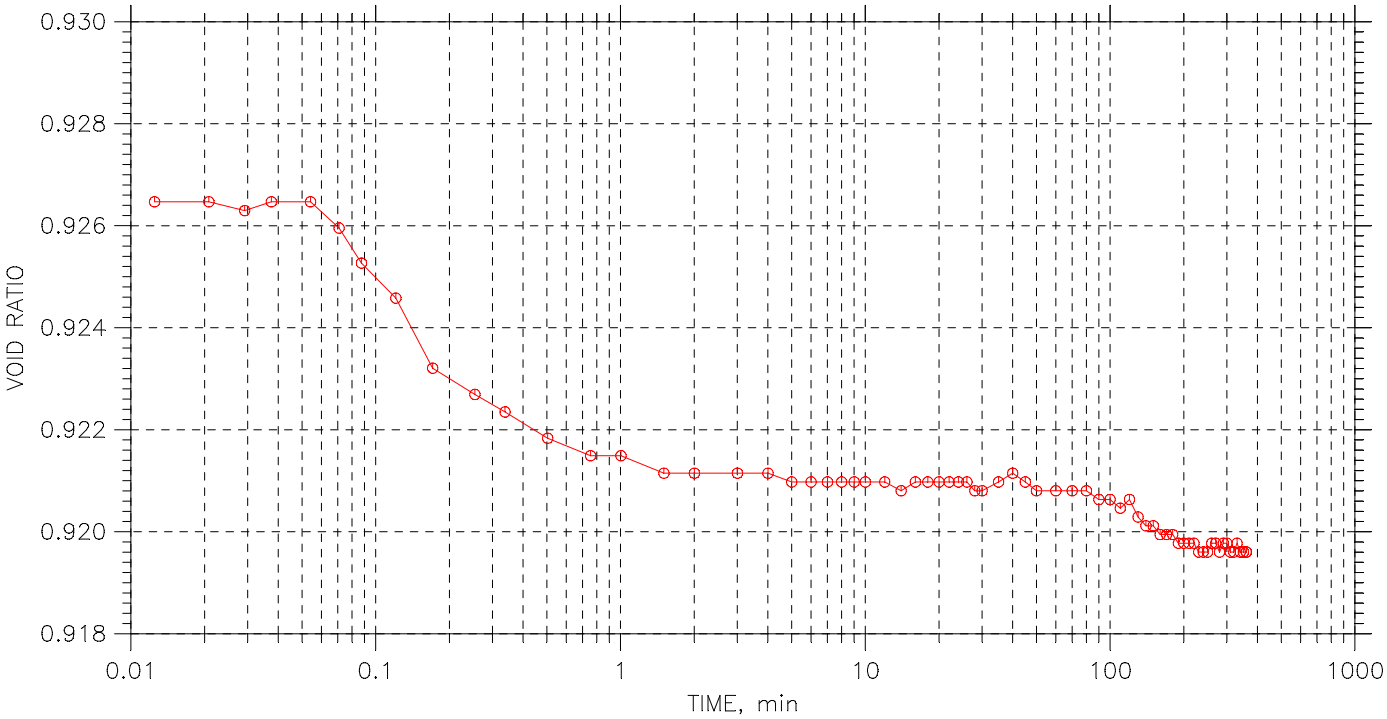
Tue, 16-DEC-2008 12:54:10

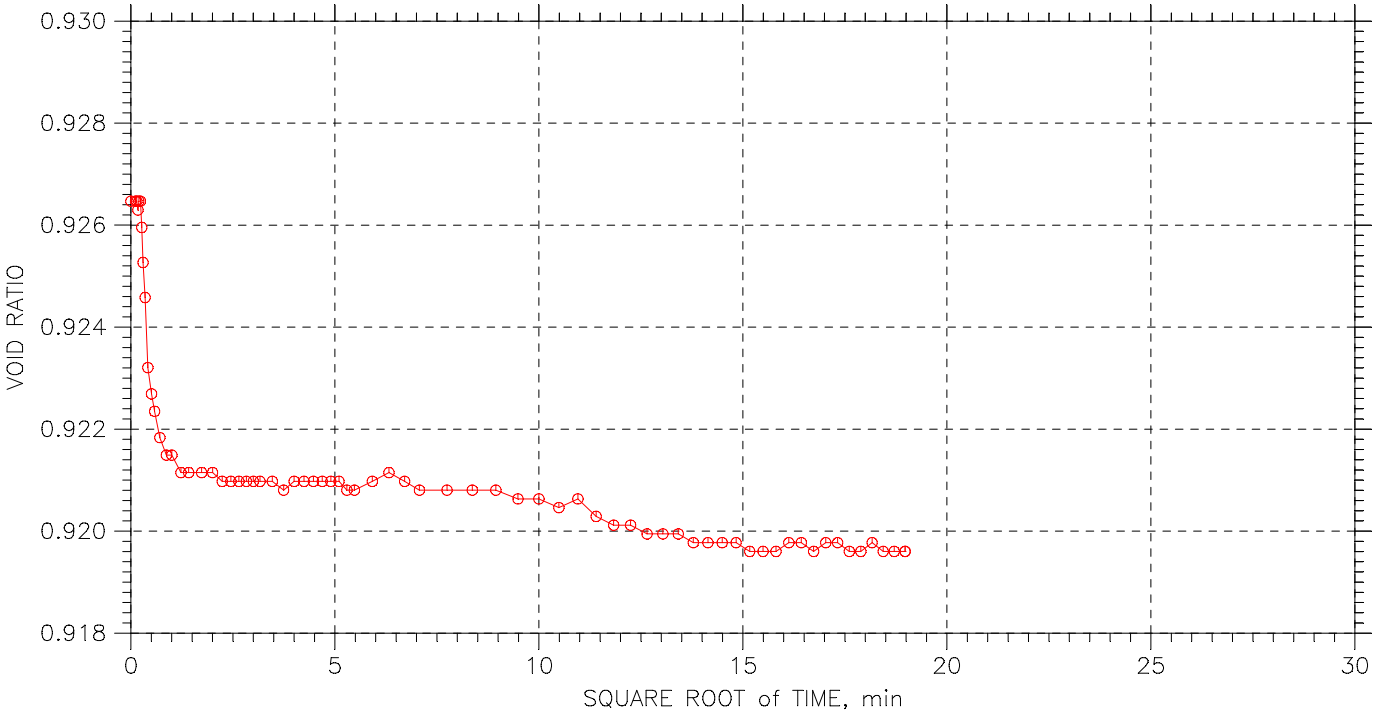
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 11

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

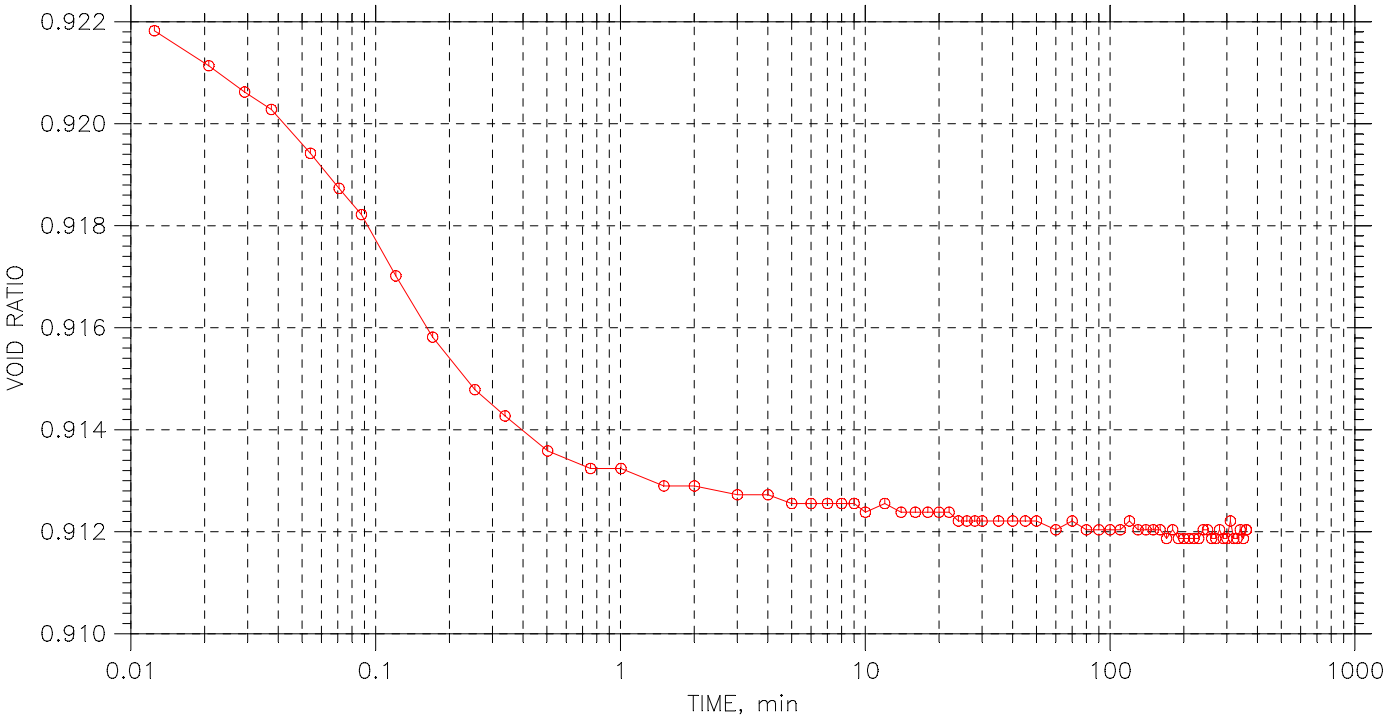
Tue, 16-DEC-2008 12:54:11

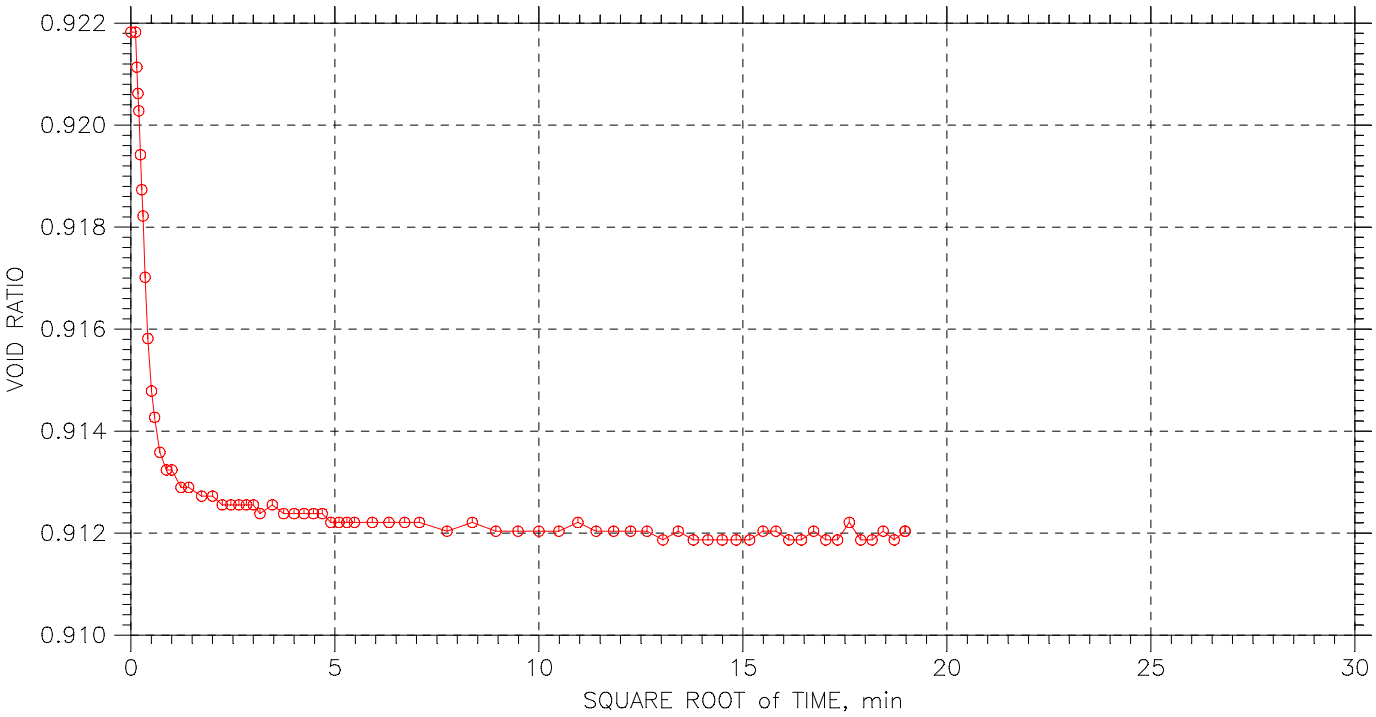
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 11

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

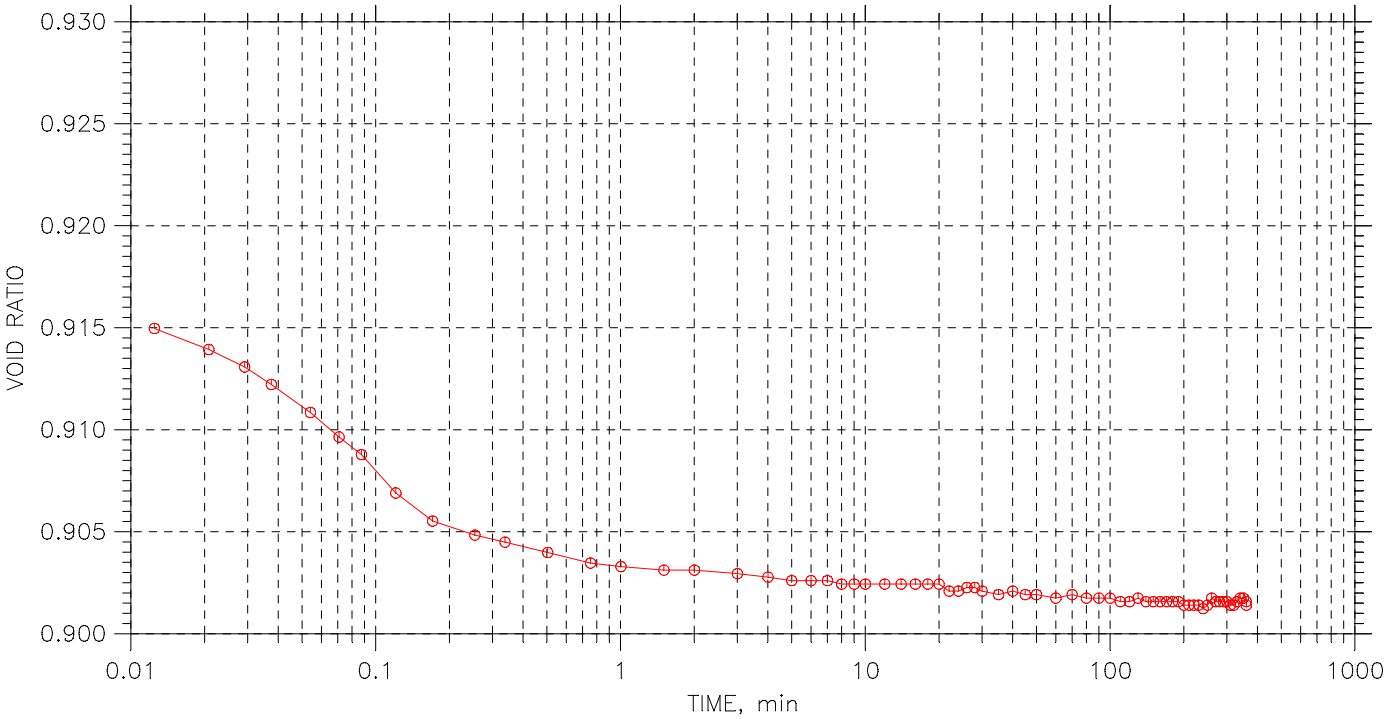
Tue, 16-DEC-2008 12:54:13

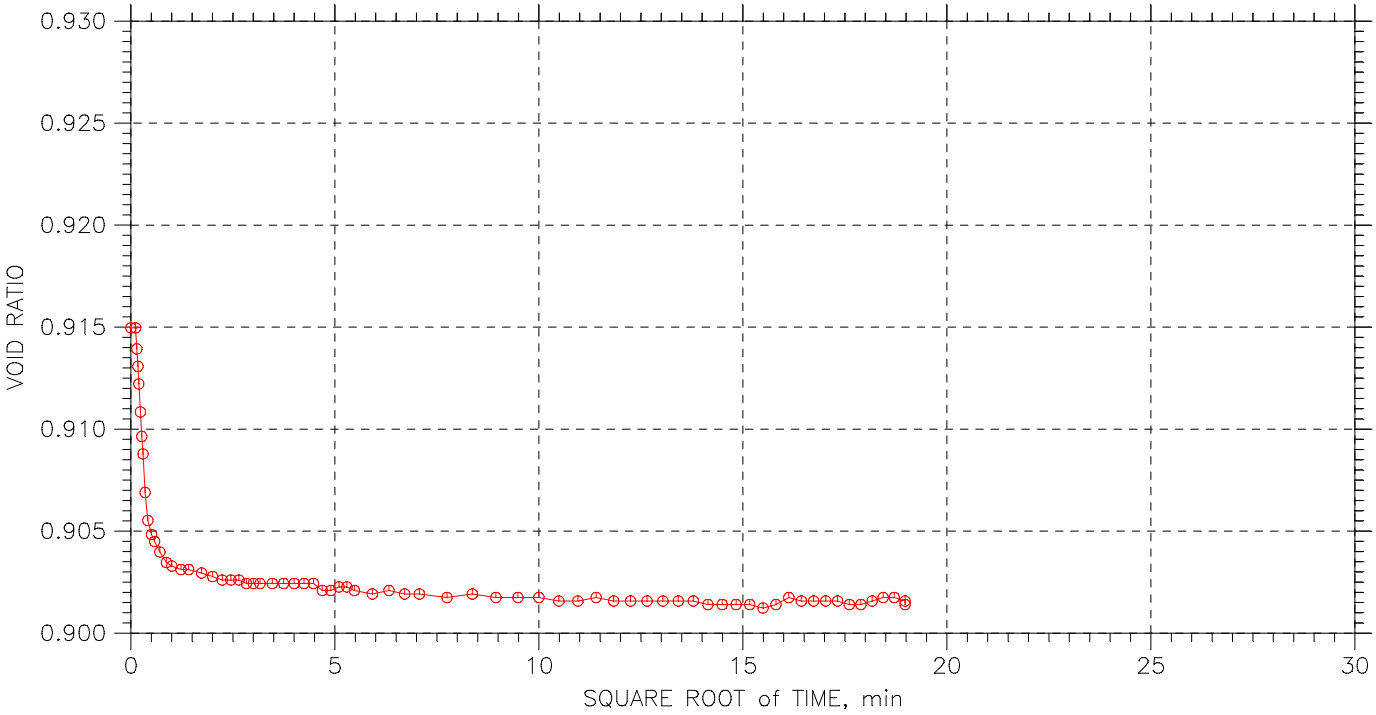
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 11

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

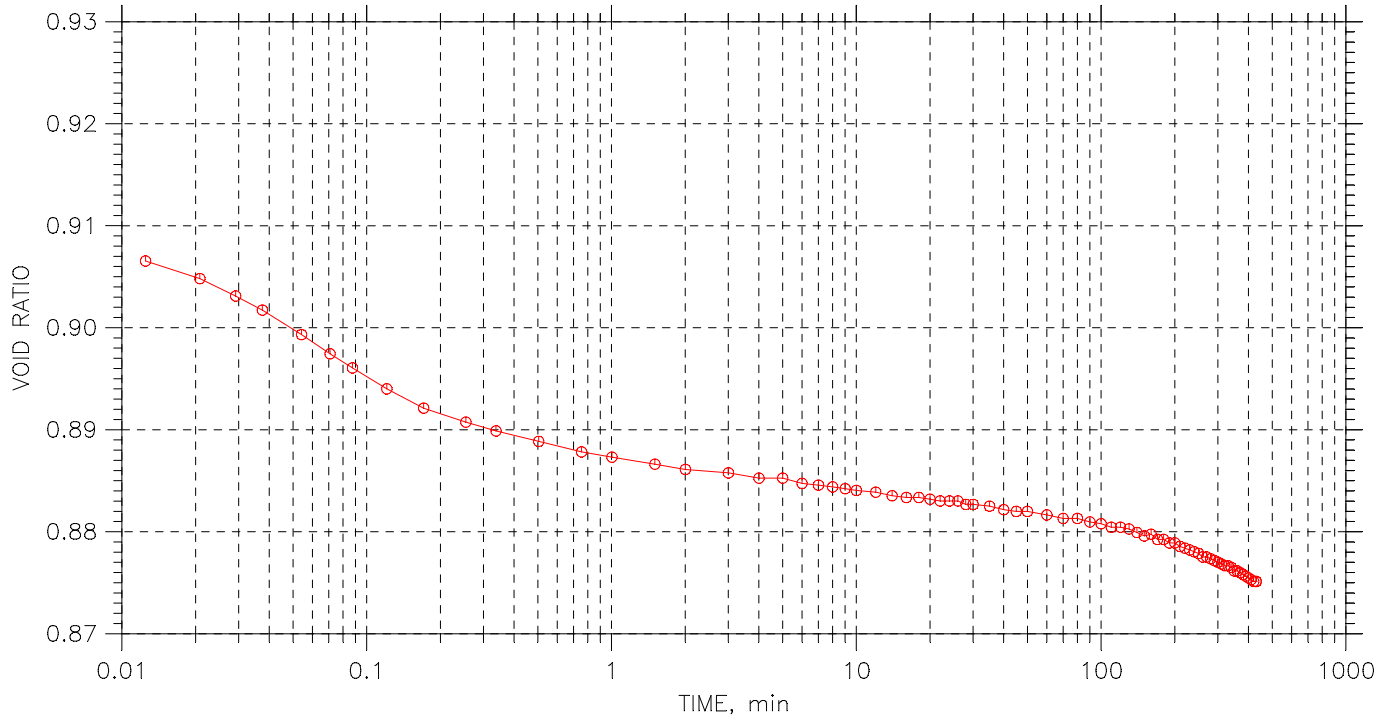
Tue, 16-DEC-2008 12:54:14

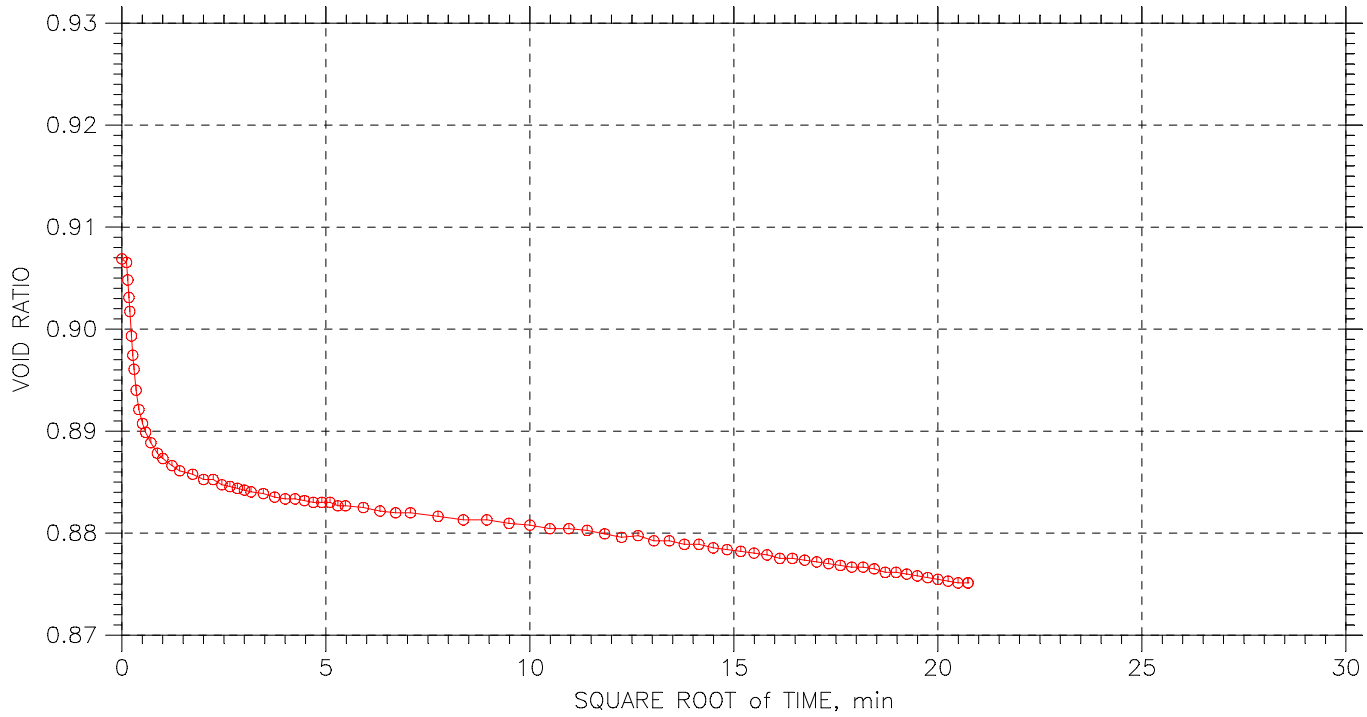
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 11

Stress: 8000. psf



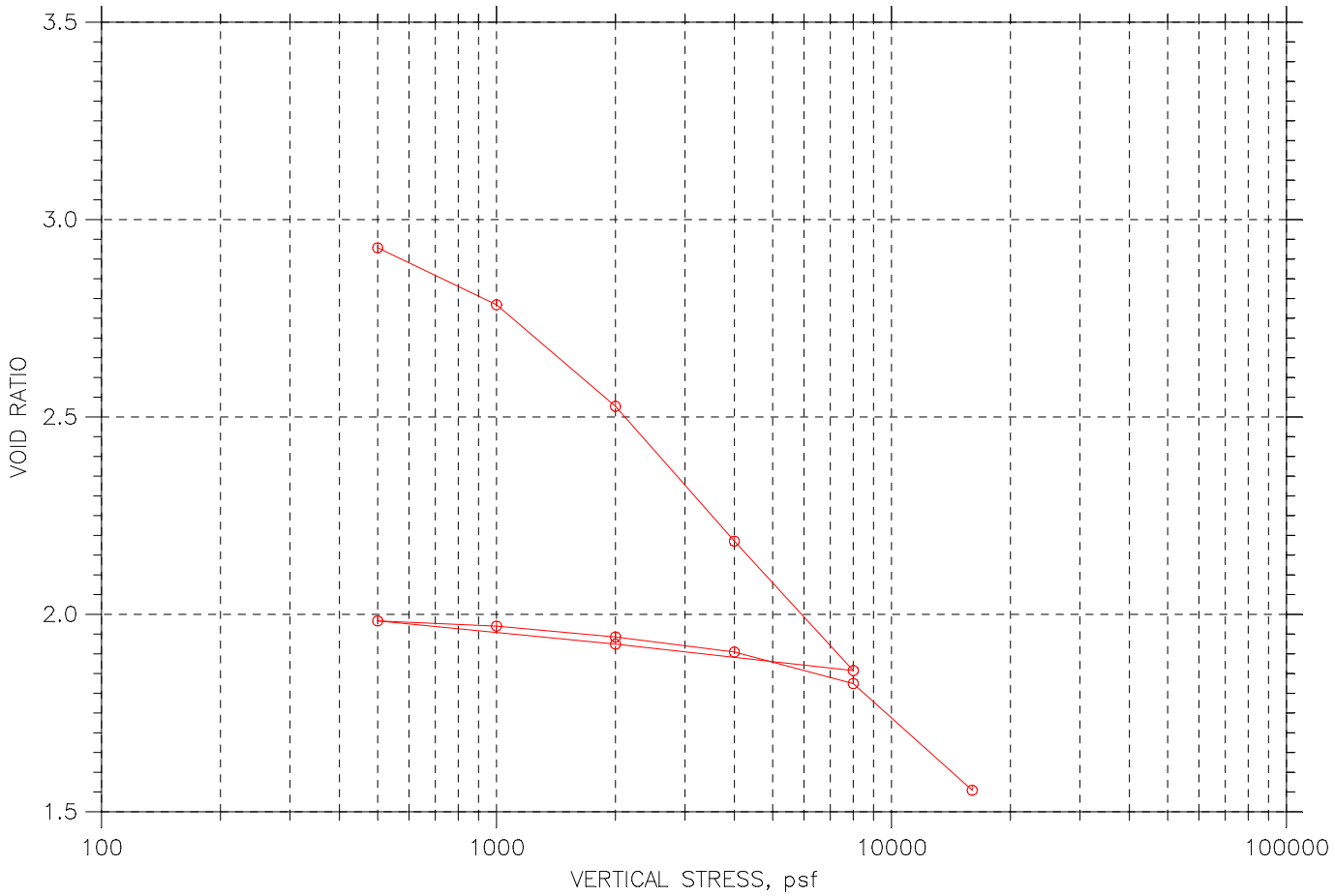


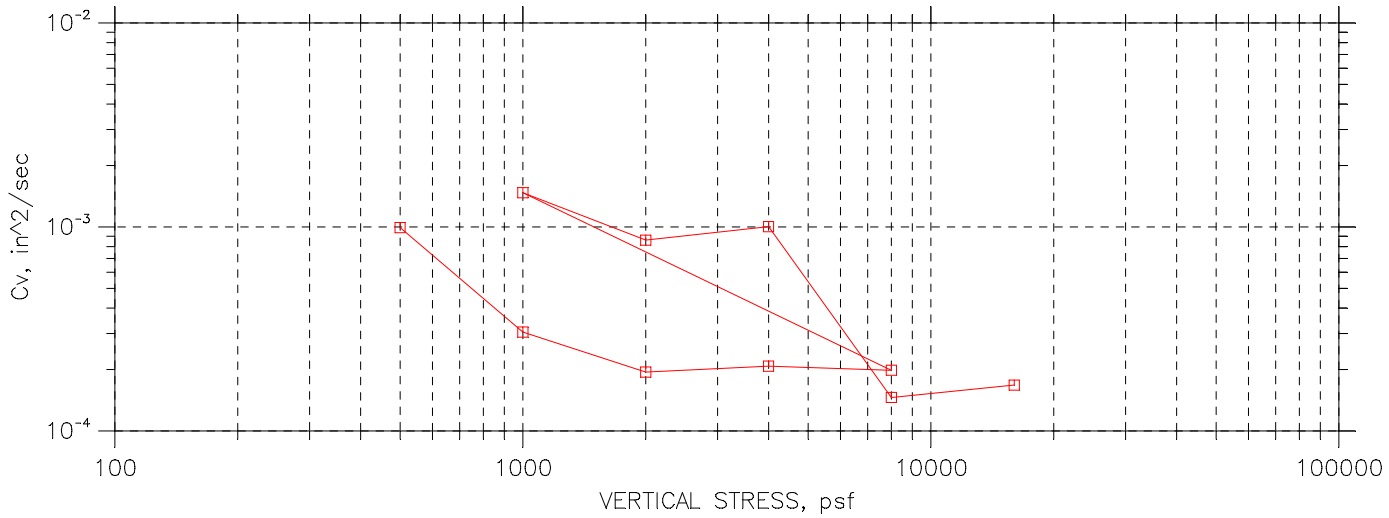
Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQUALMIE PASS EAST	Location: SR-90	Project No.: XL-2779
	Boring No.: SW2-009-08	Tested By: LHB	Checked By: XH/URS
	Sample No.: S-7	Test Date: 11-19-08	Depth: 45.3 FT
	Test No.: 8088S7C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Tue, 16-DEC-2008 12:54:15

CONSOLIDATION TEST DATA

SUMMARY REPORT



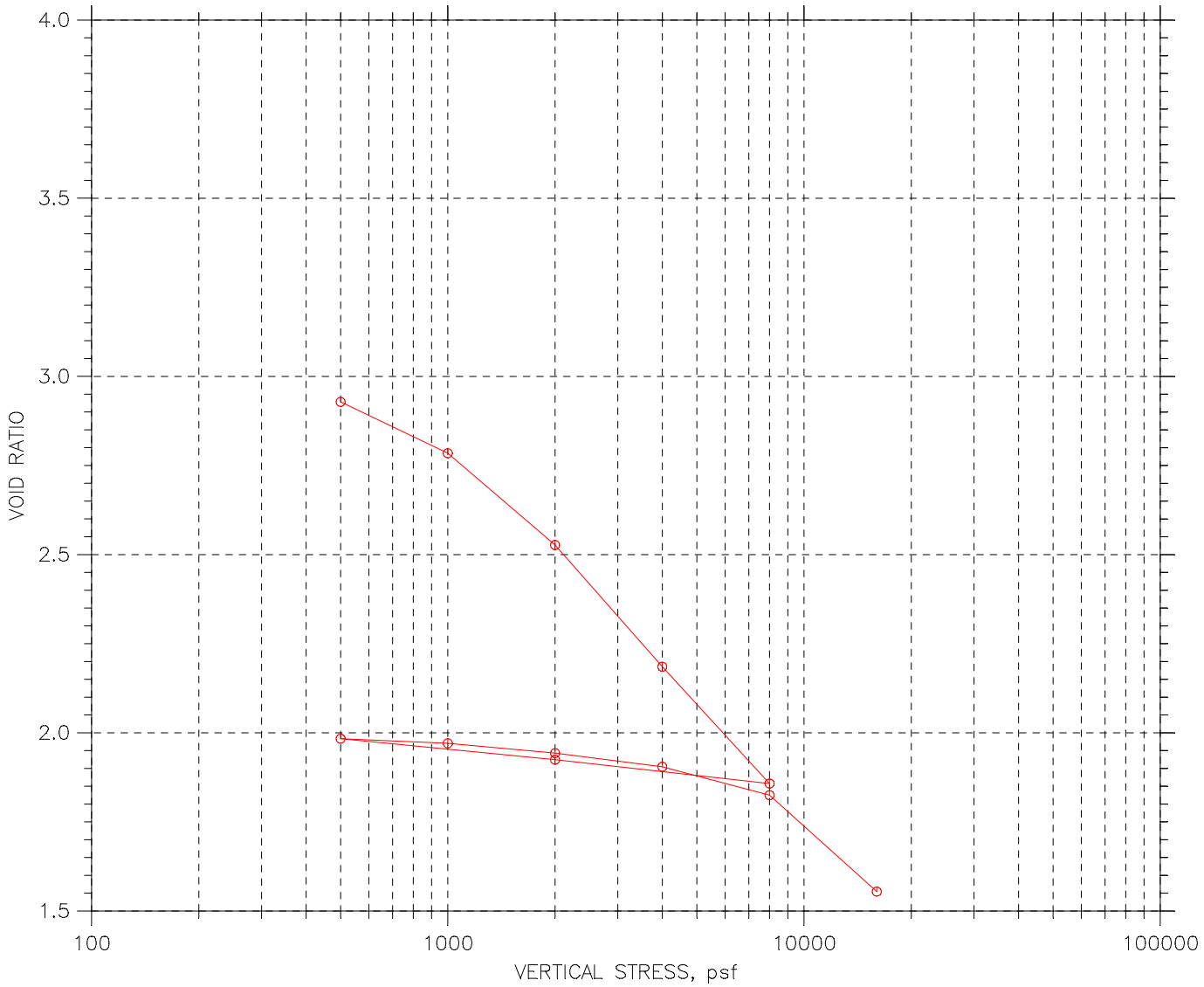


Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Thu, 05-FEB-2009 09:13:30

CONSOLIDATION TEST DATA

SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: 0 psf				Water Content, %	113.83	67.33
Preconsolidation Pressure: 0 psf				Dry Unit Weight, pcf	39.05	62.57
Compression Index: 3.81959e-313				Saturation, %	94.24	110.90
Diameter: 2.5 in		Height: 1 in		Void Ratio	3.09	1.55
LL: NP	PL: NP	PI: NP	GS: 2.56			

Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

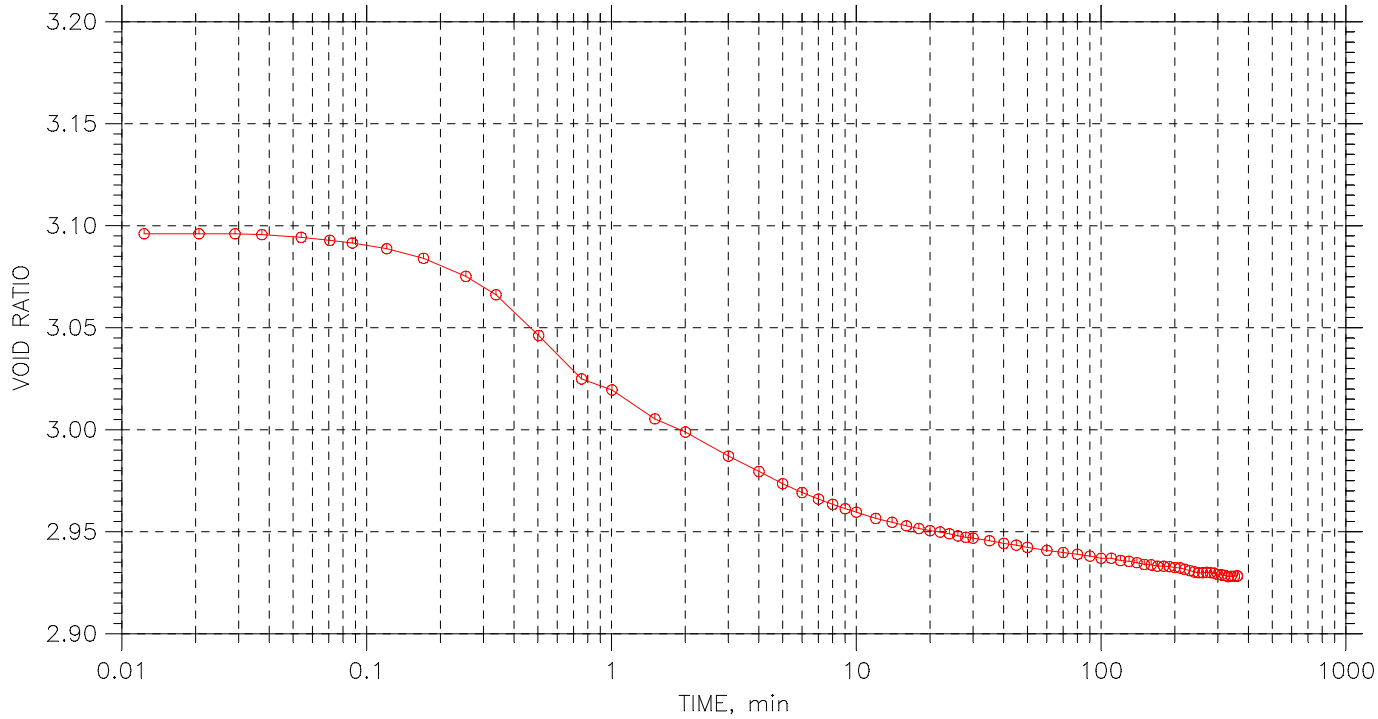
Thu, 05-FEB-2009 09:13:30

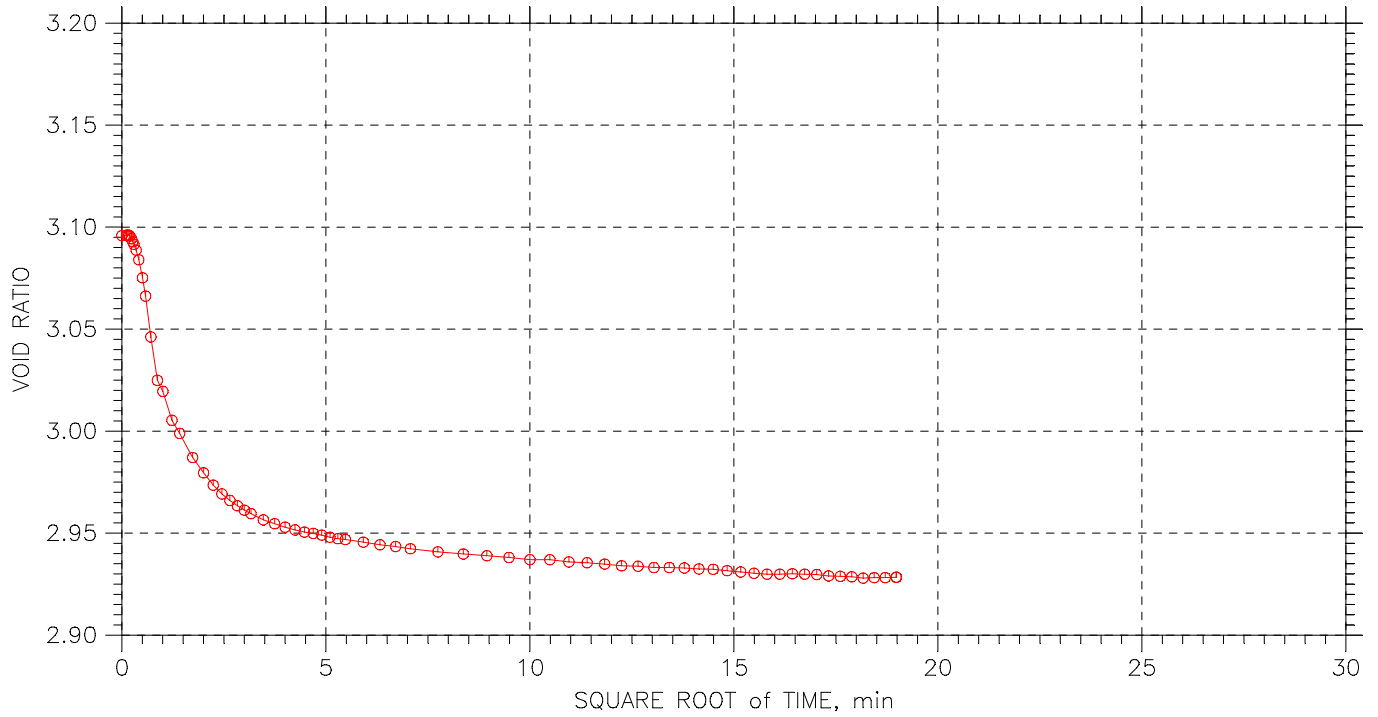
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 12

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

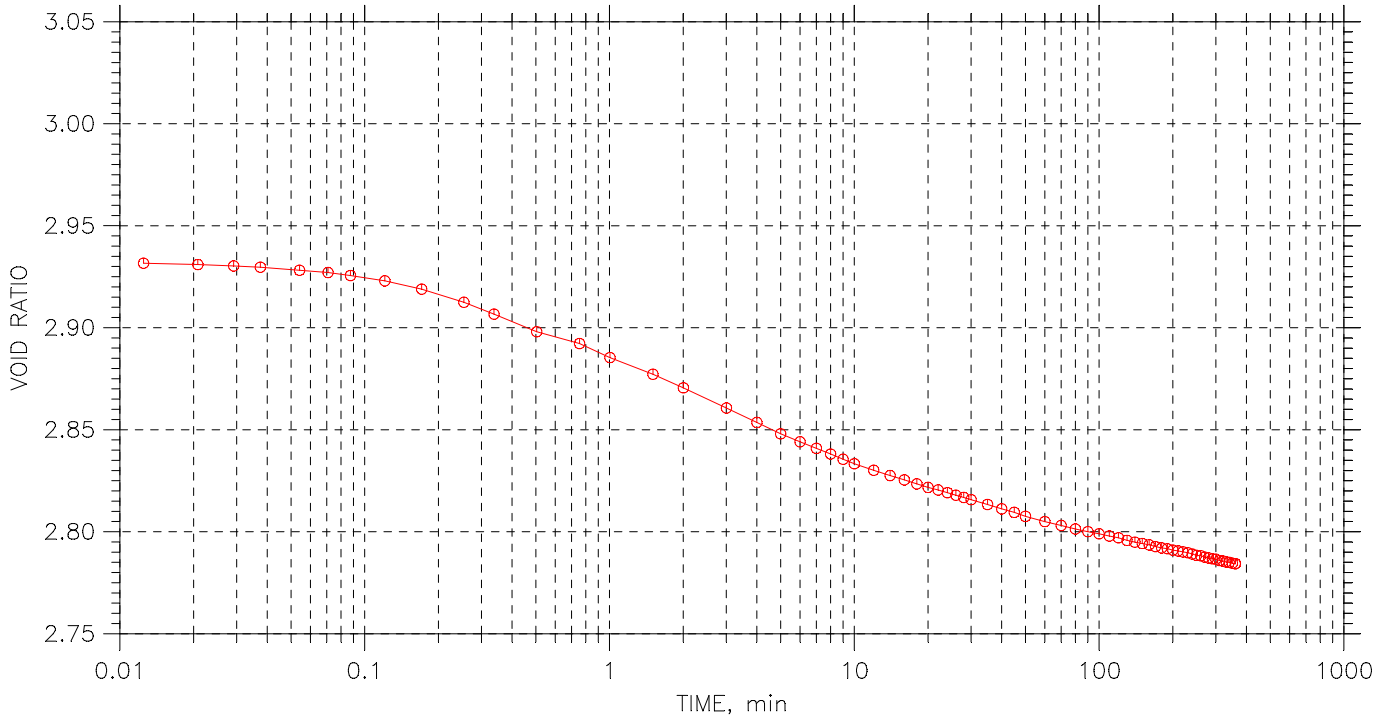
Thu, 05-FEB-2009 09:13:31

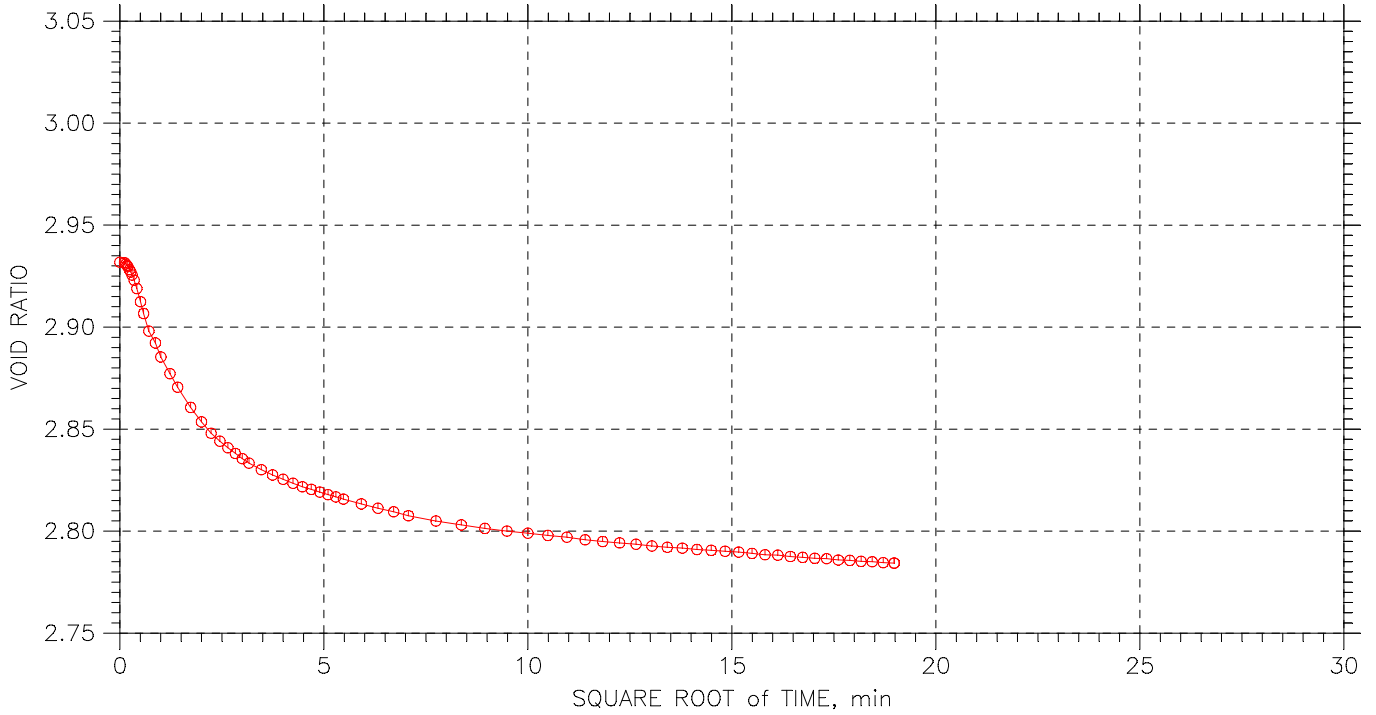
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 12

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

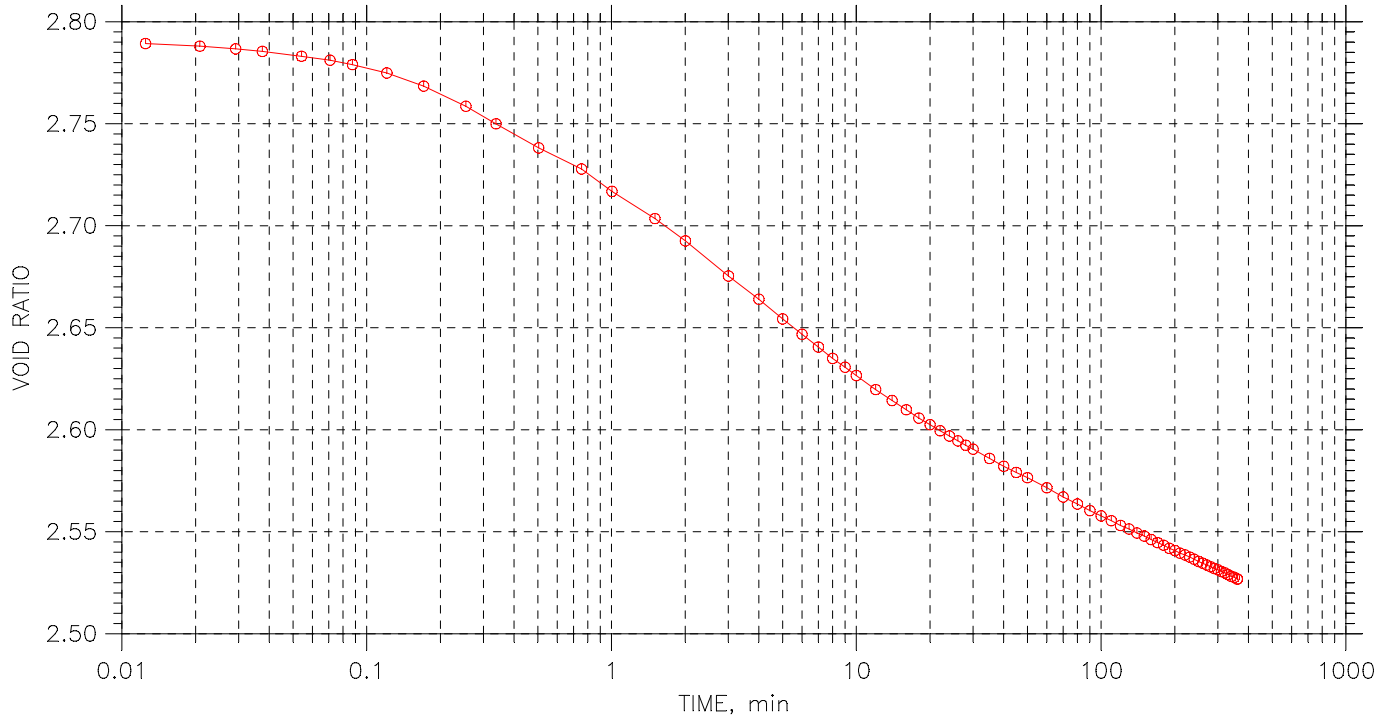
Thu, 05-FEB-2009 09:13:32

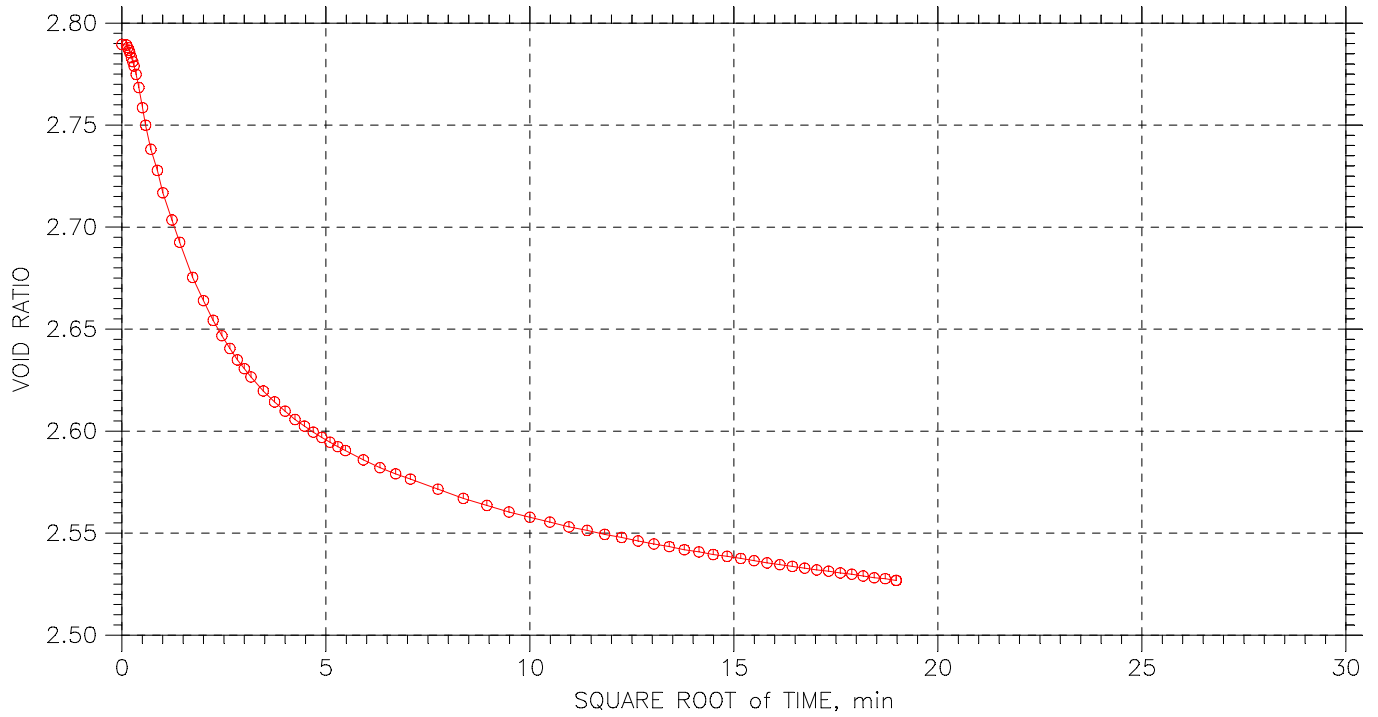
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 12

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

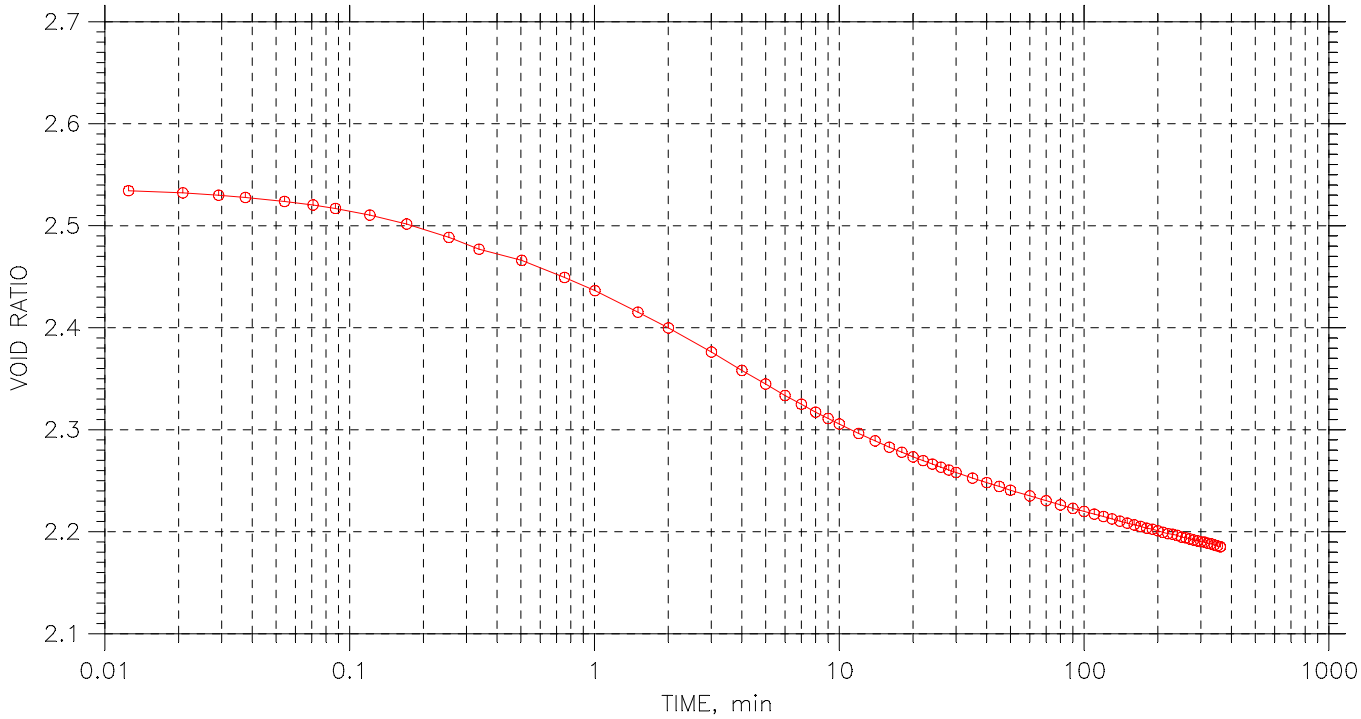
Thu, 05-FEB-2009 09:13:32

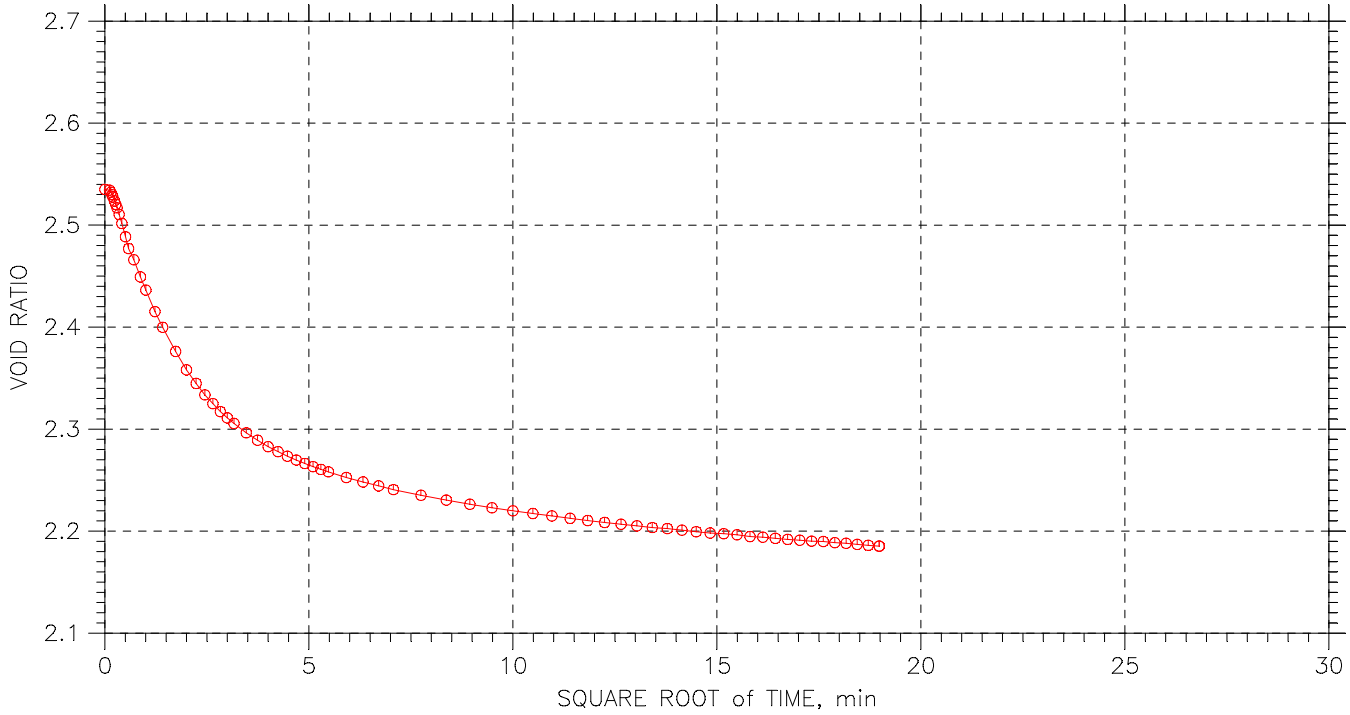
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 12

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

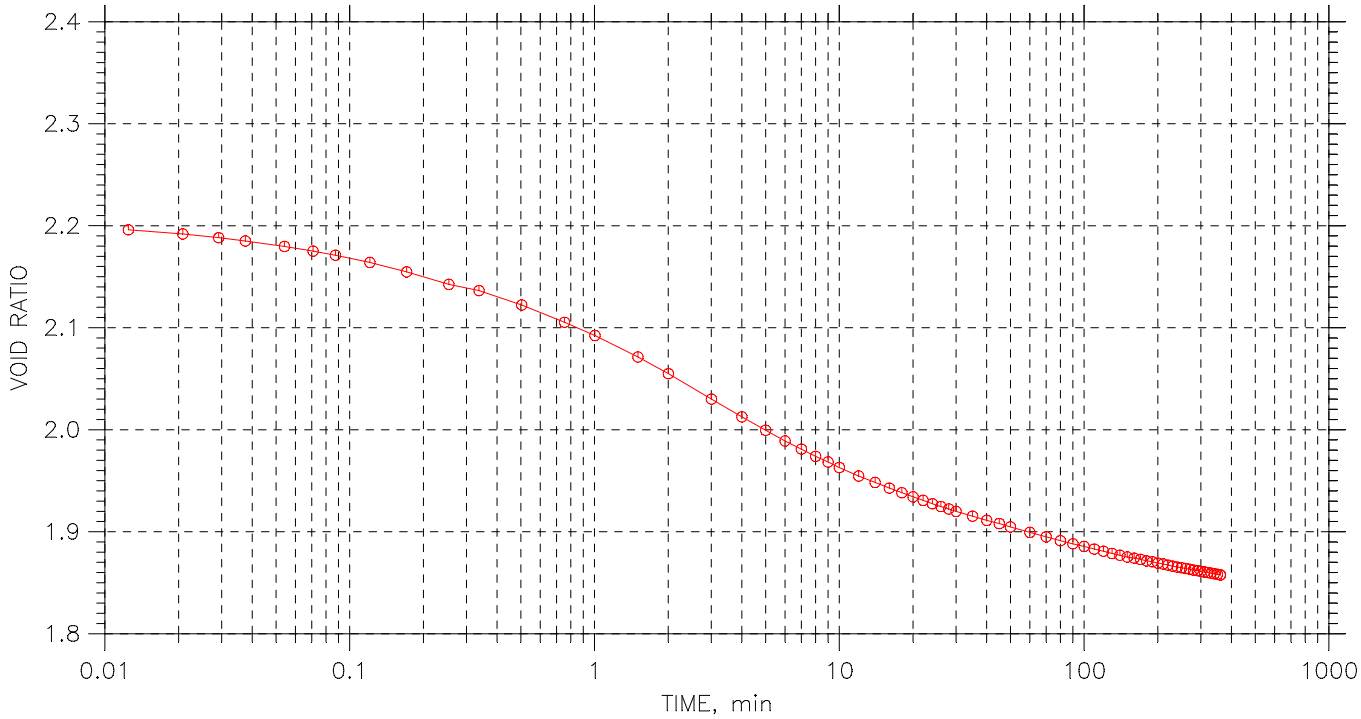
Thu, 05-FEB-2009 09:13:33

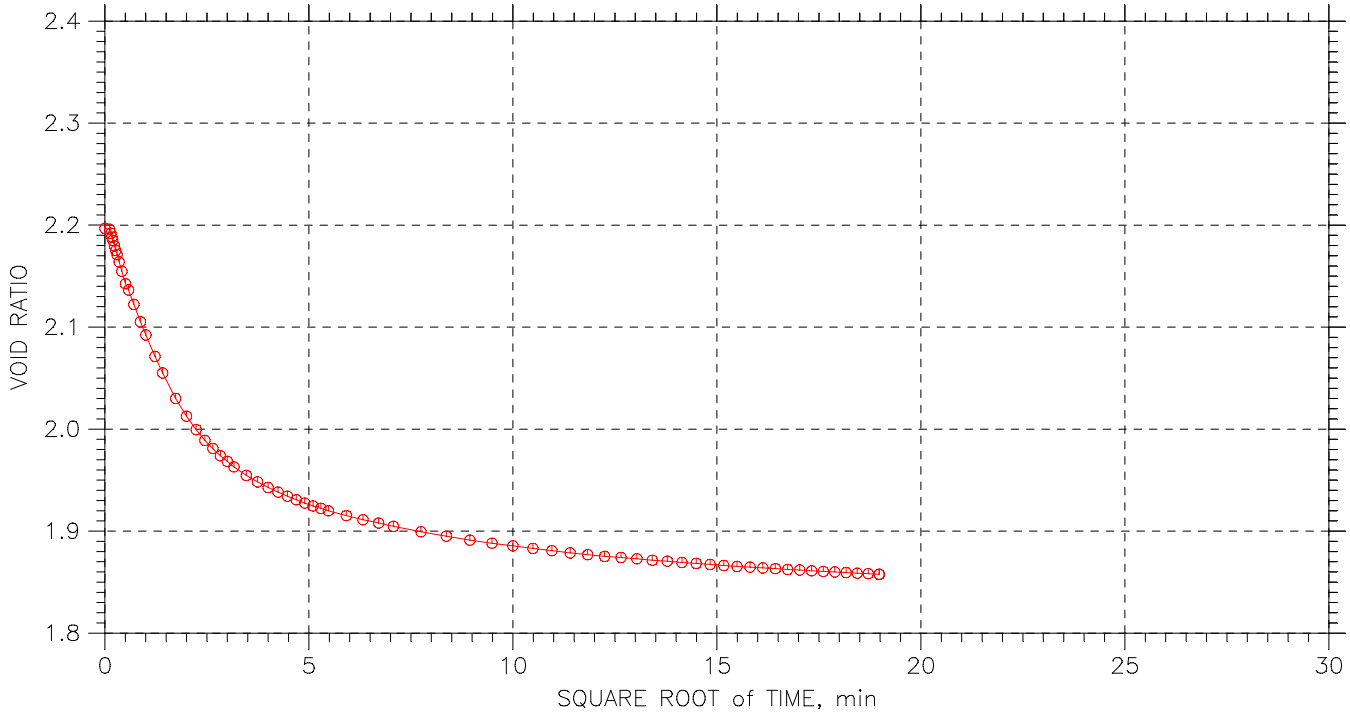
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 12

Stress: 8000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

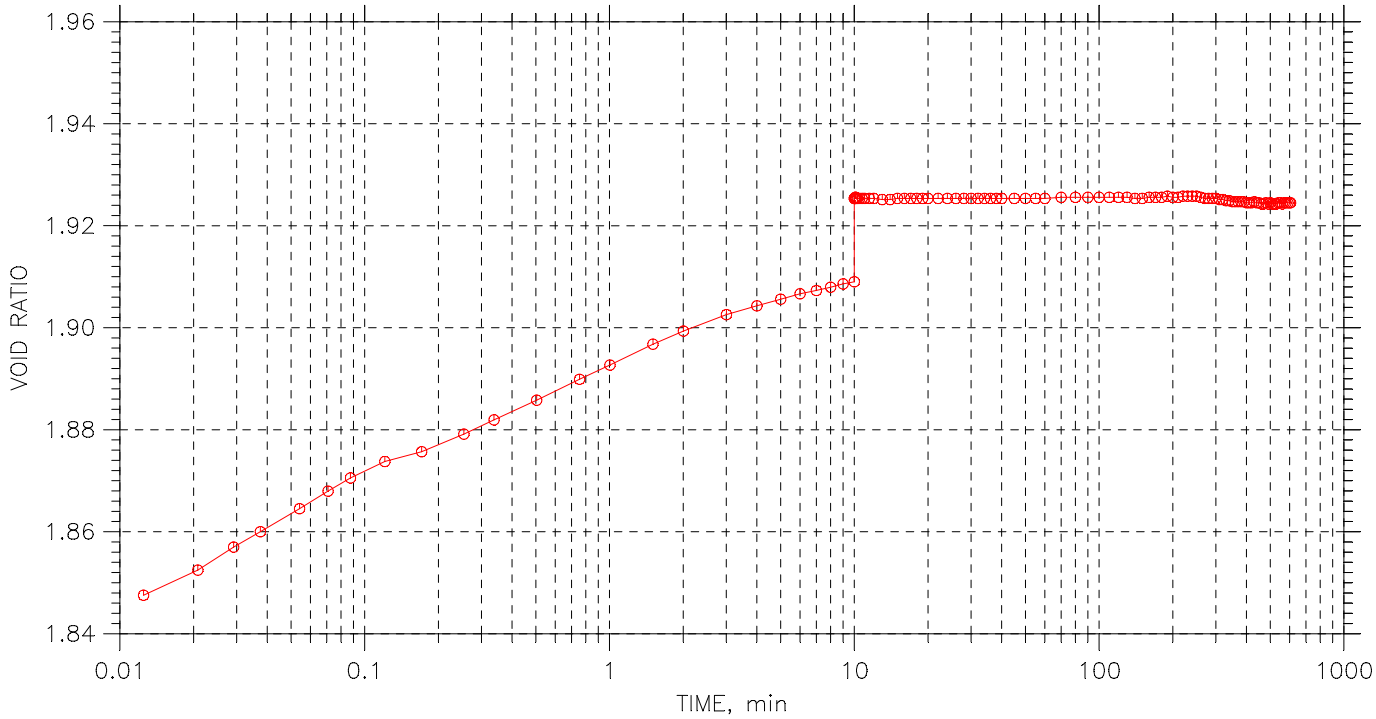
Thu, 05-FEB-2009 09:13:34

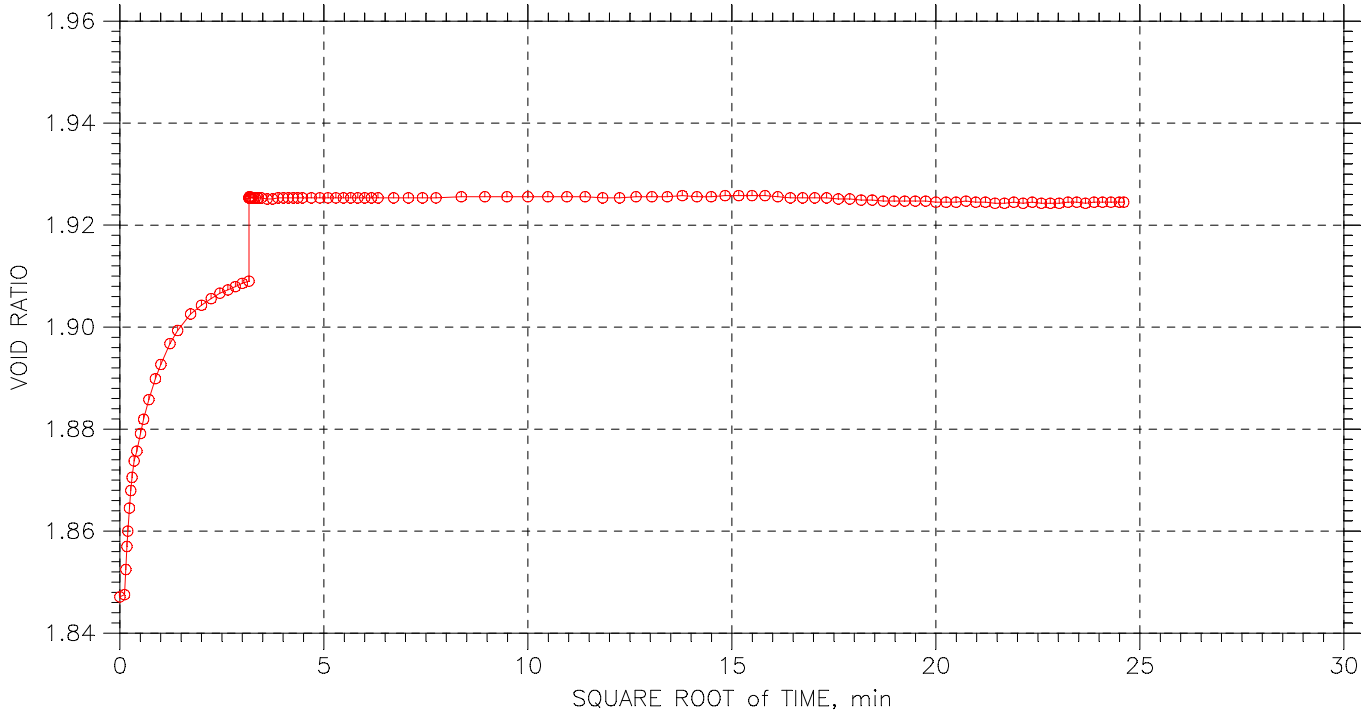
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 12

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

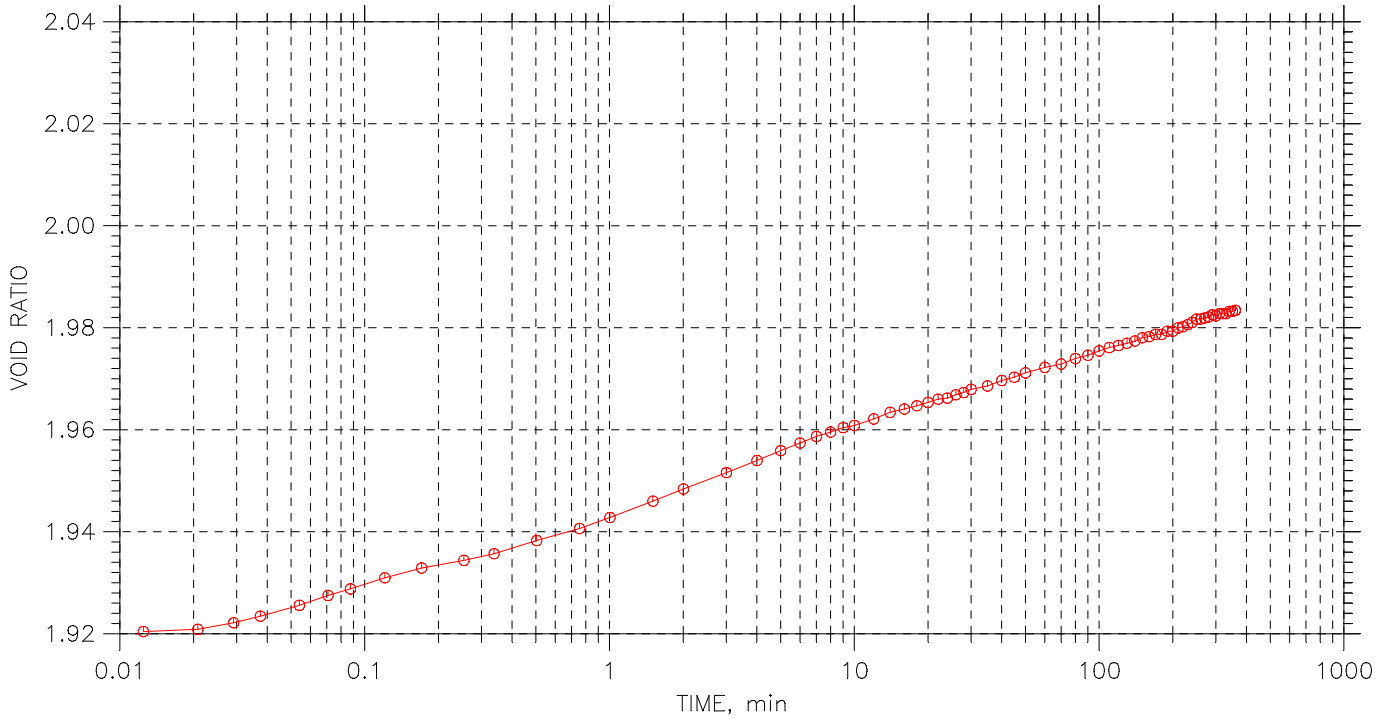
Thu, 05-FEB-2009 09:13:34

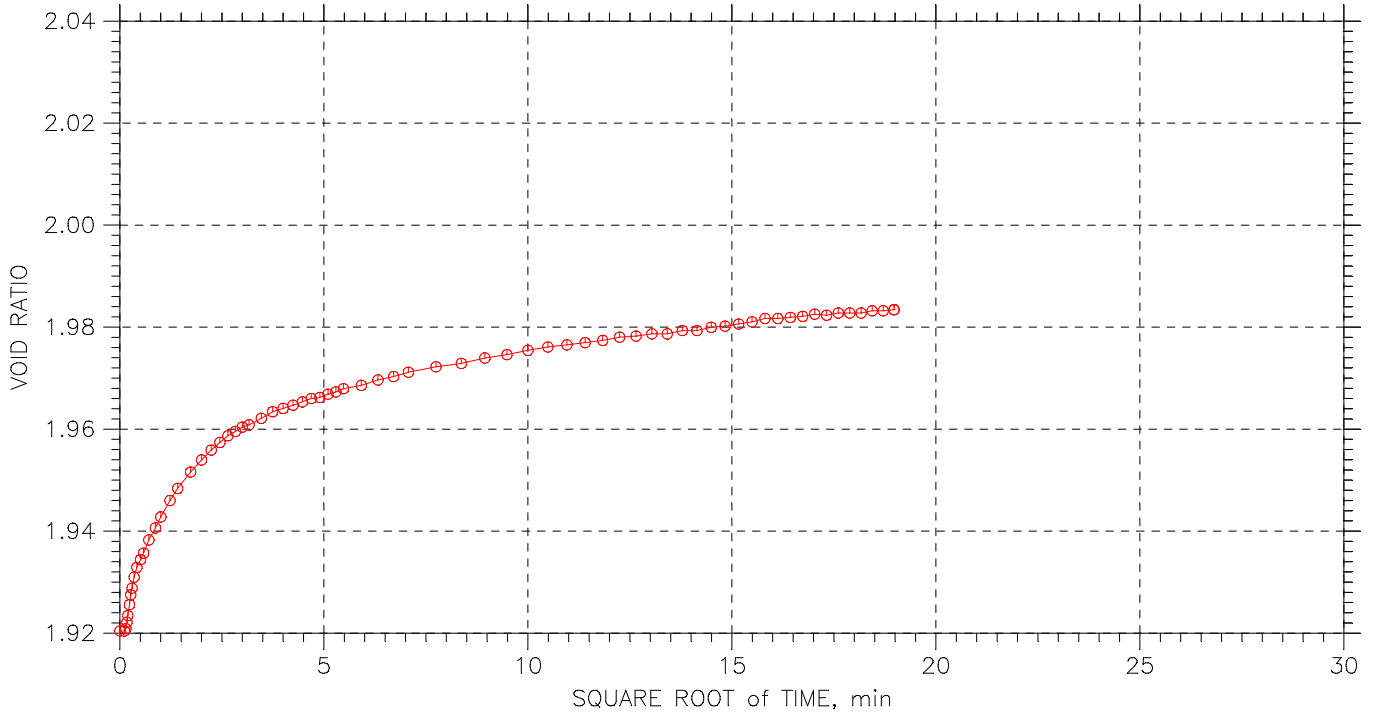
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 12

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

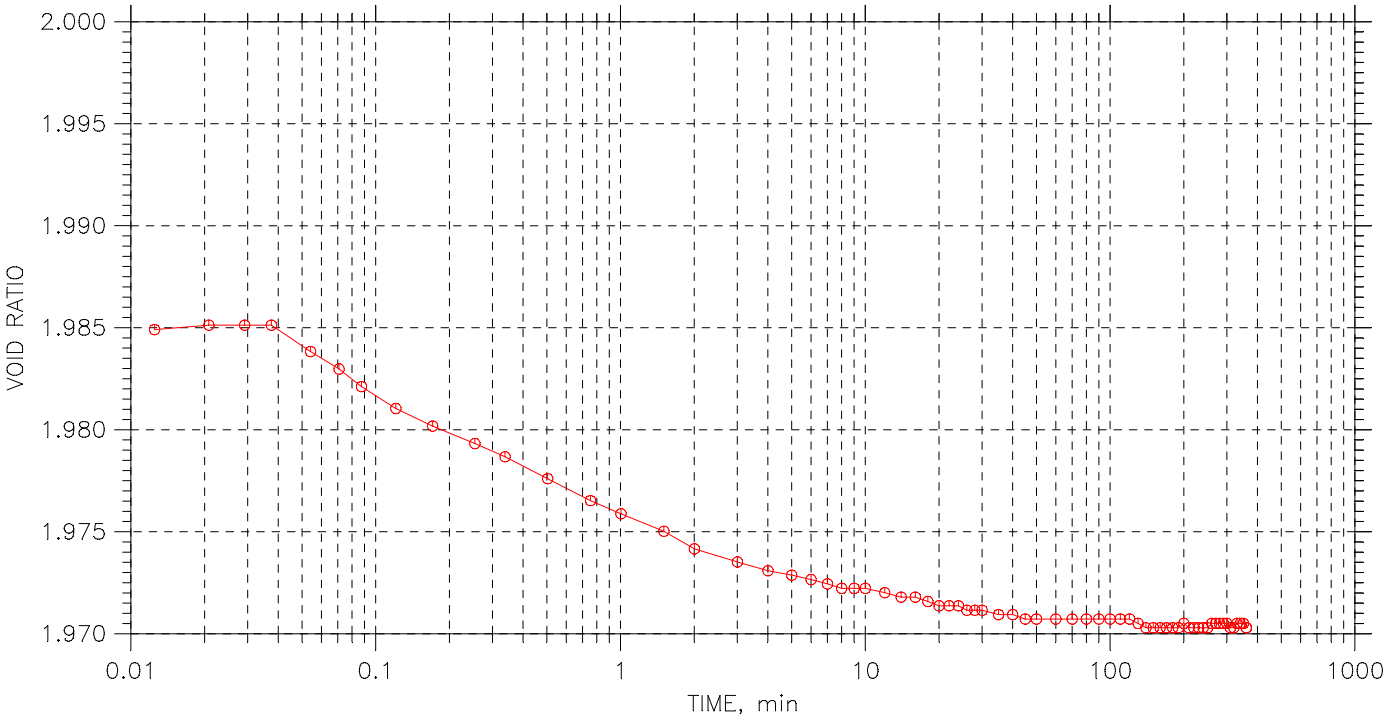
Thu, 05-FEB-2009 09:13:35

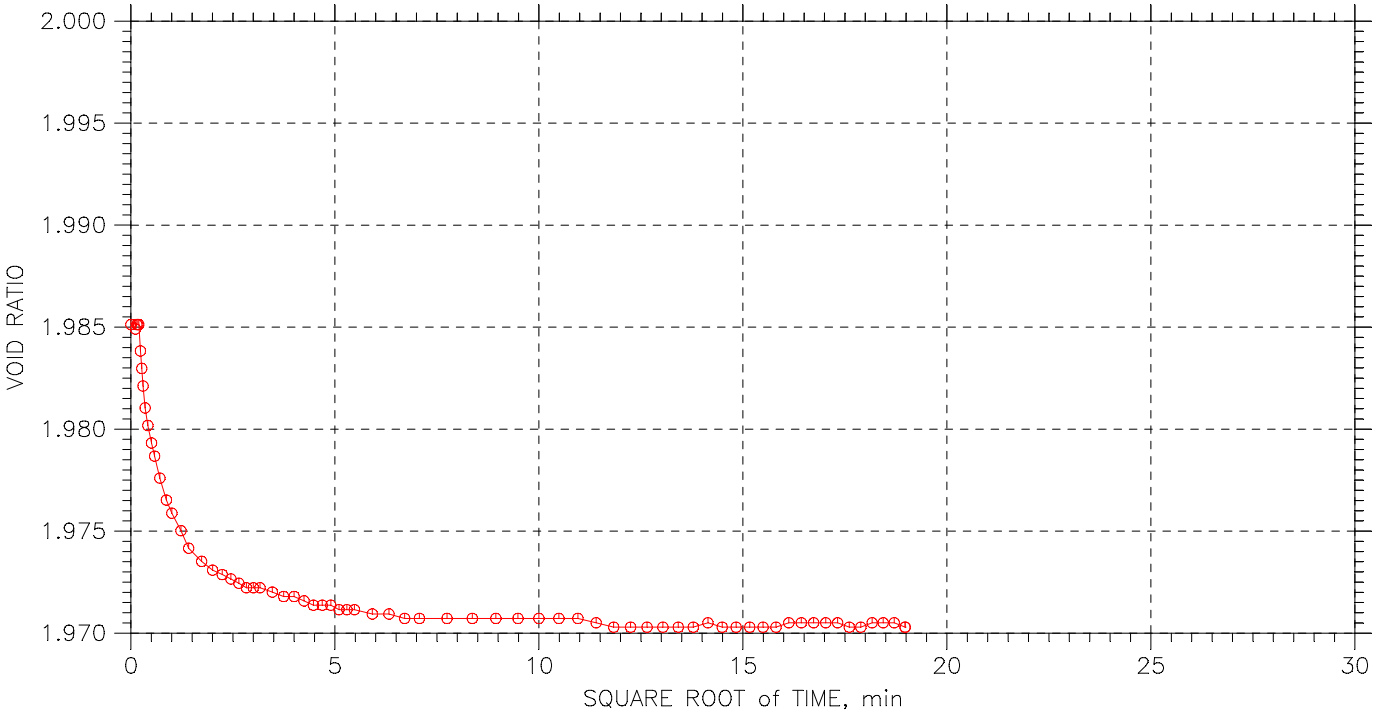
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 12

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

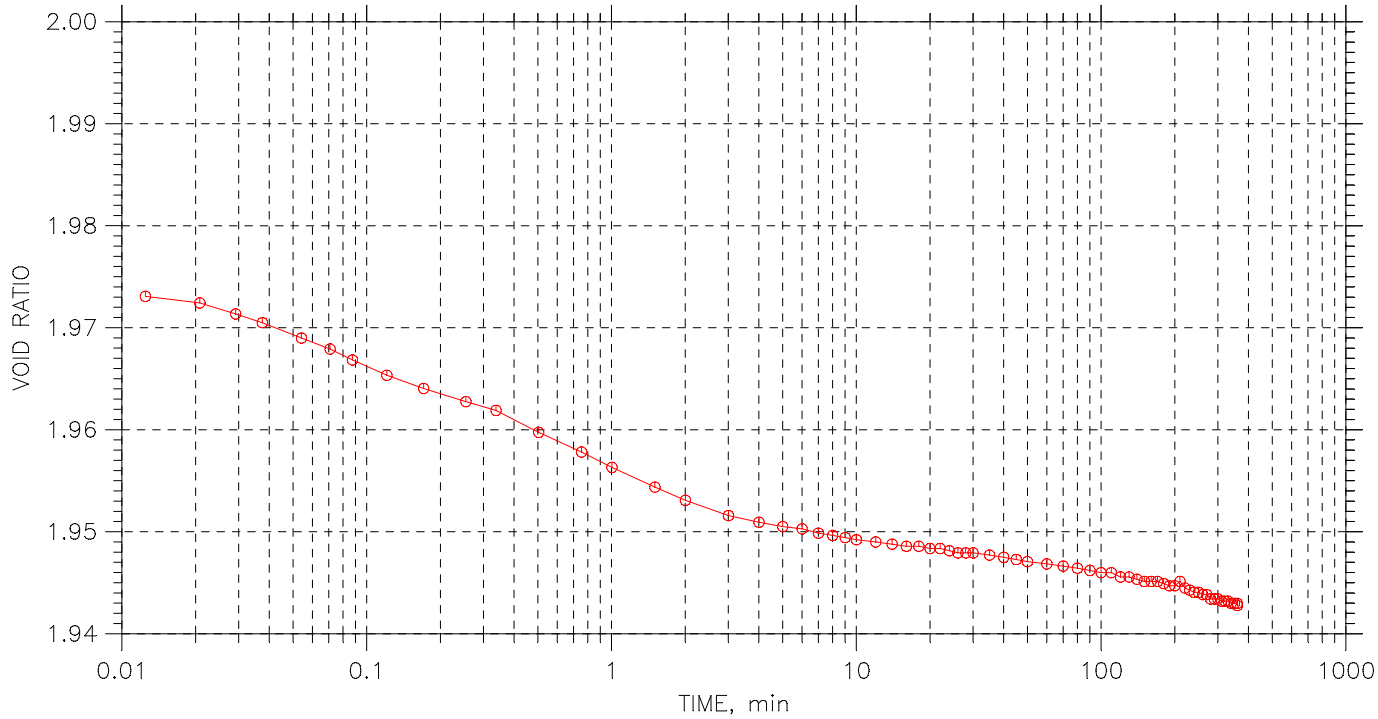
Thu, 05-FEB-2009 09:13:36

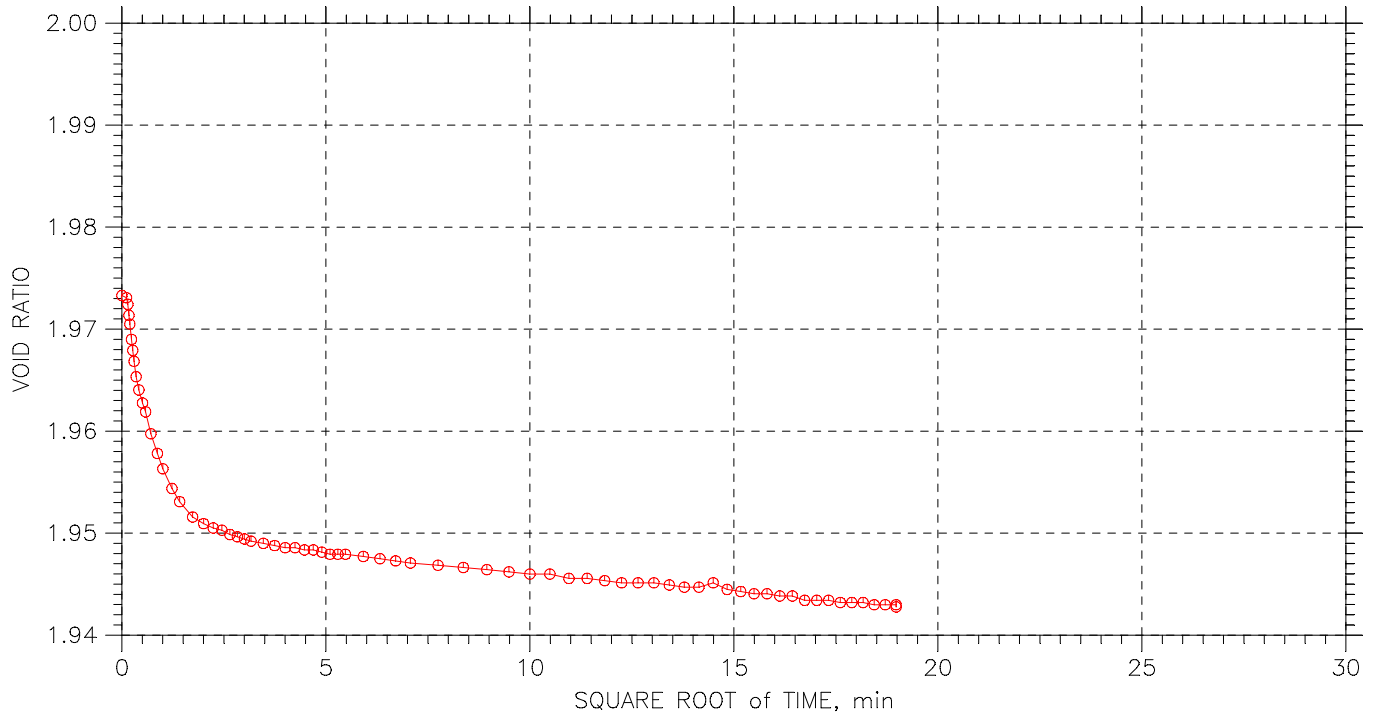
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 12

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

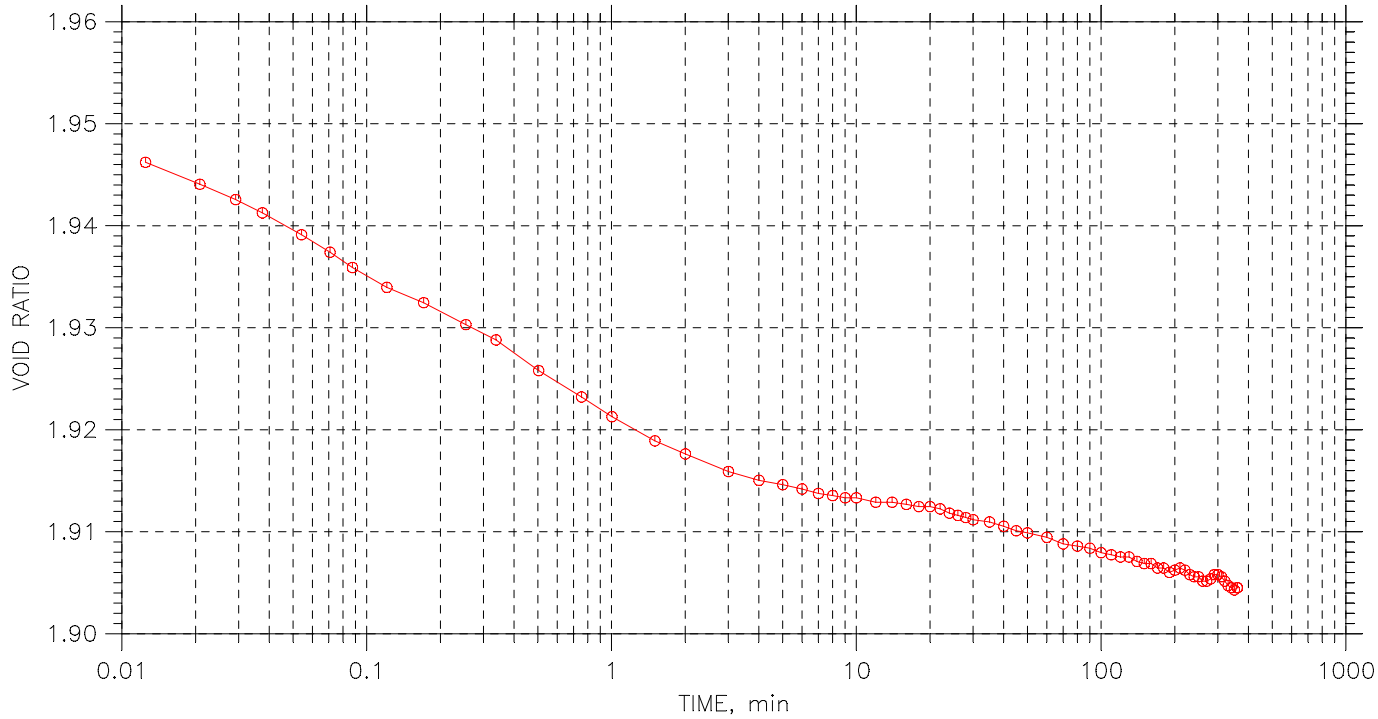
Thu, 05-FEB-2009 09:13:37

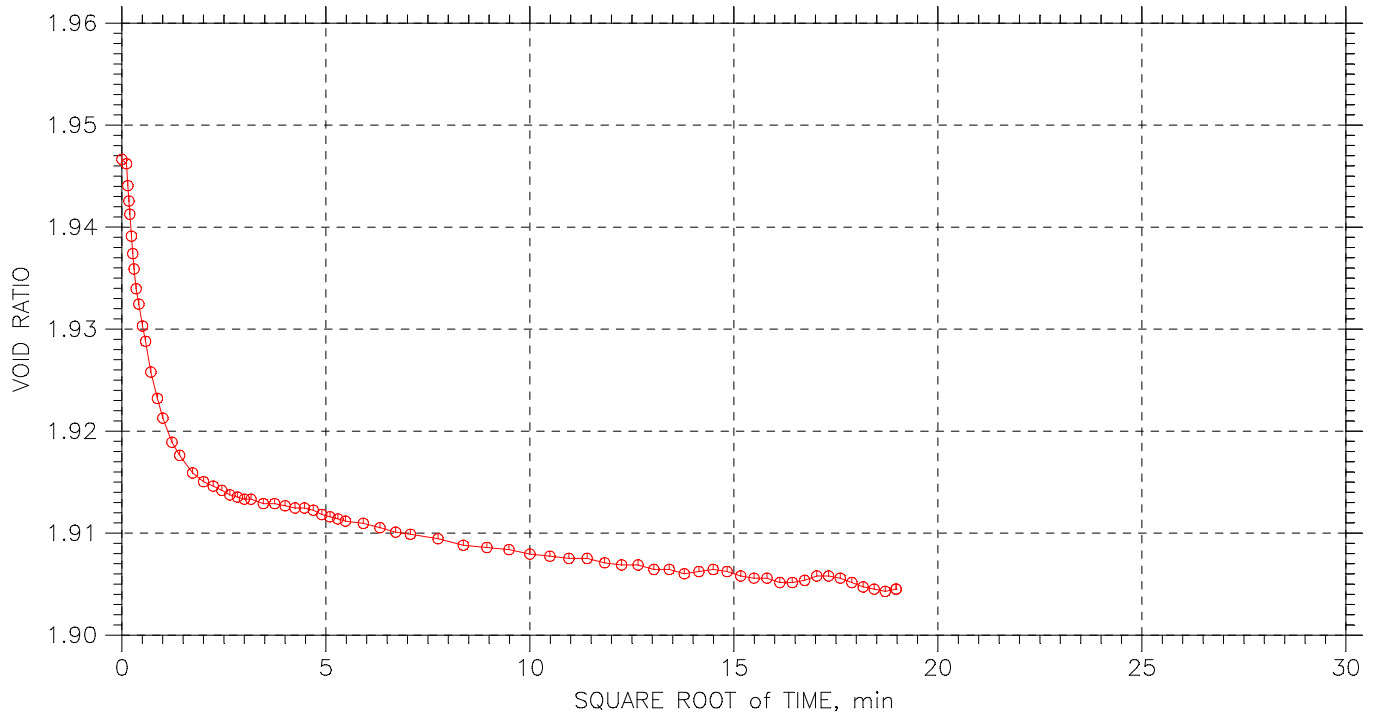
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 12

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

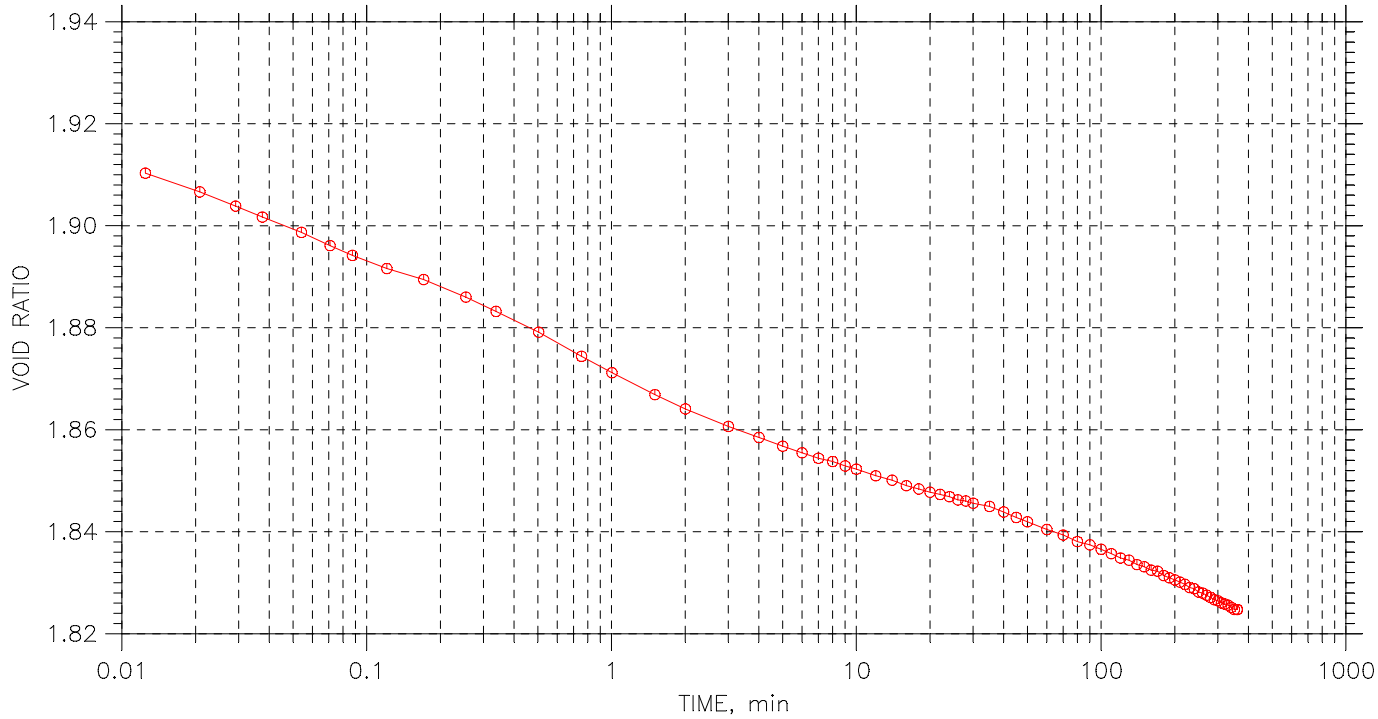
Thu, 05-FEB-2009 09:13:37

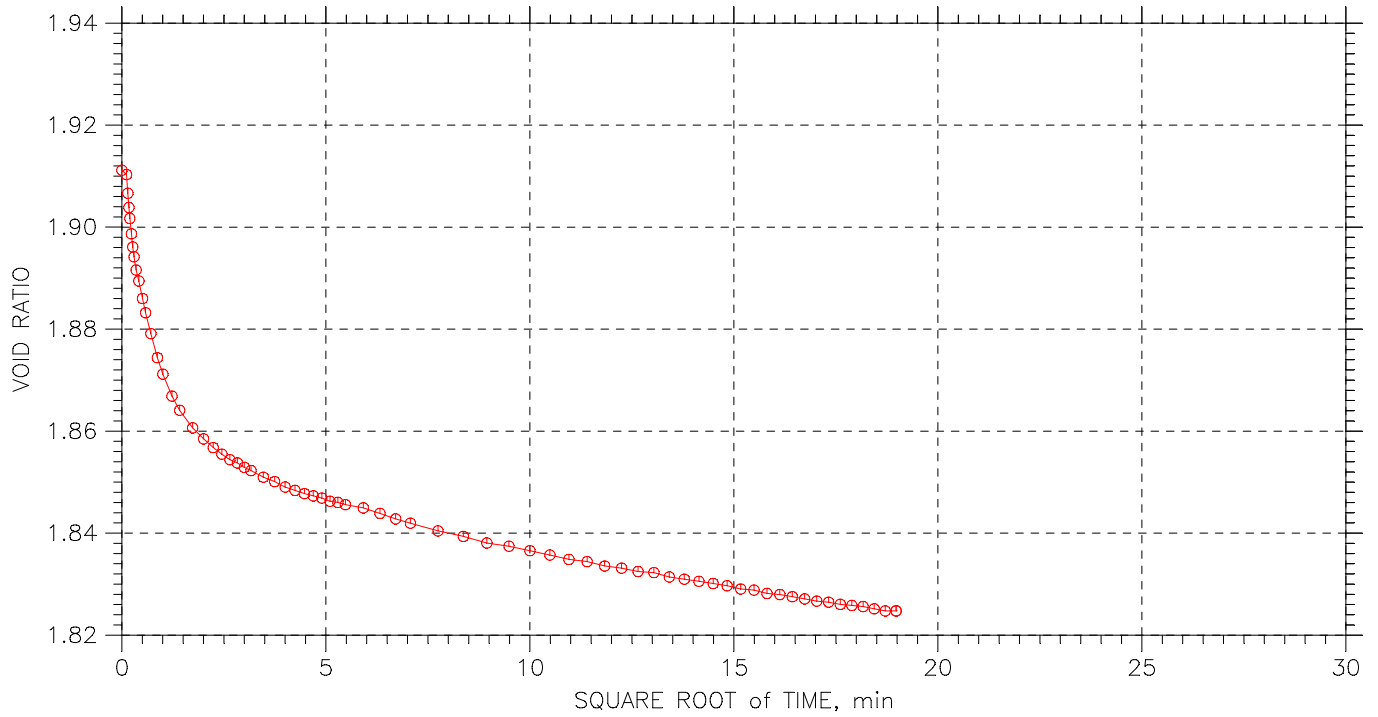
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 12

Stress: 8000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

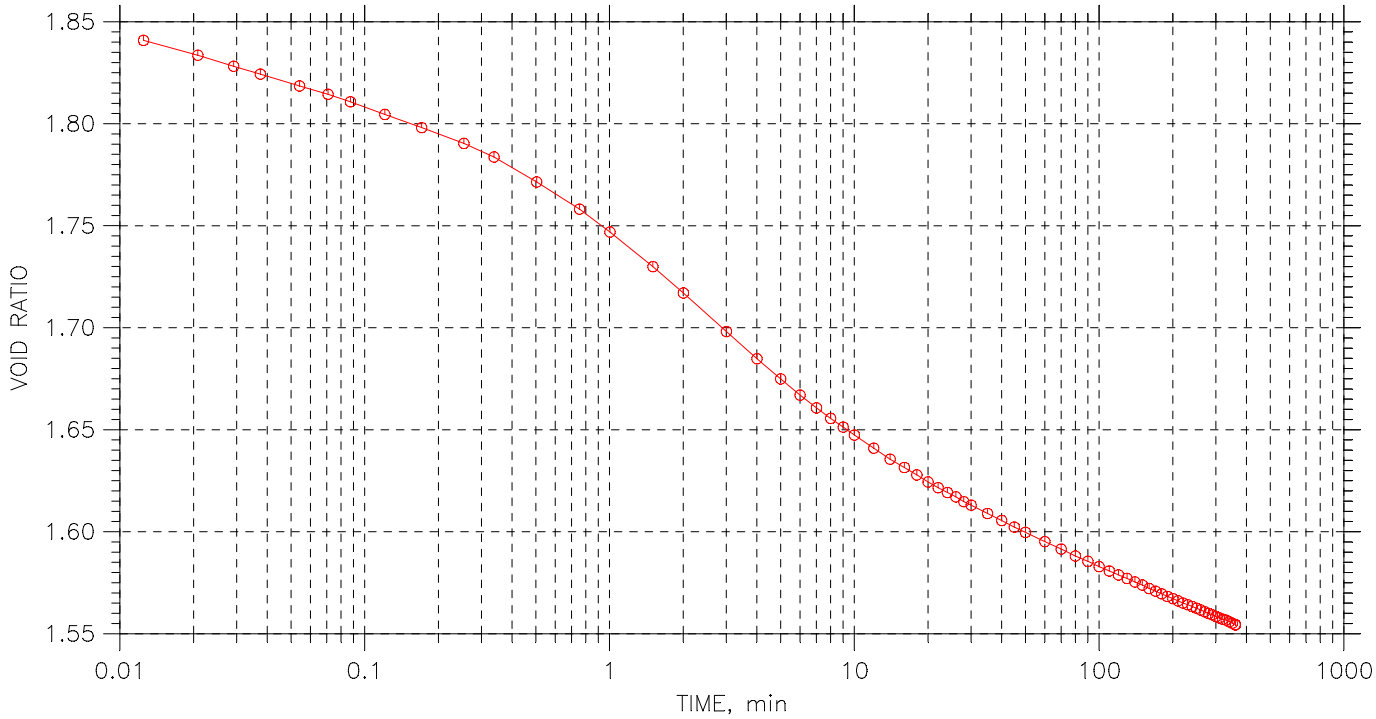
Thu, 05-FEB-2009 09:13:38

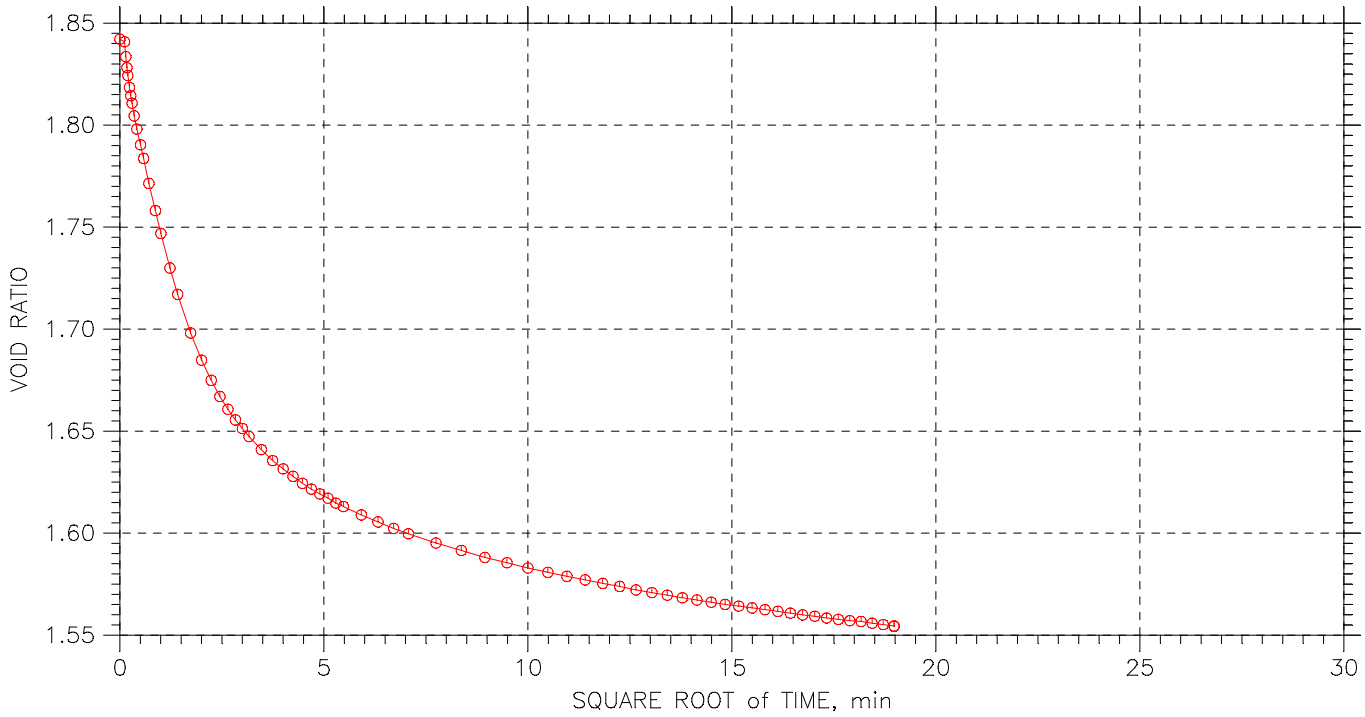
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 12

Stress: 16000 psf



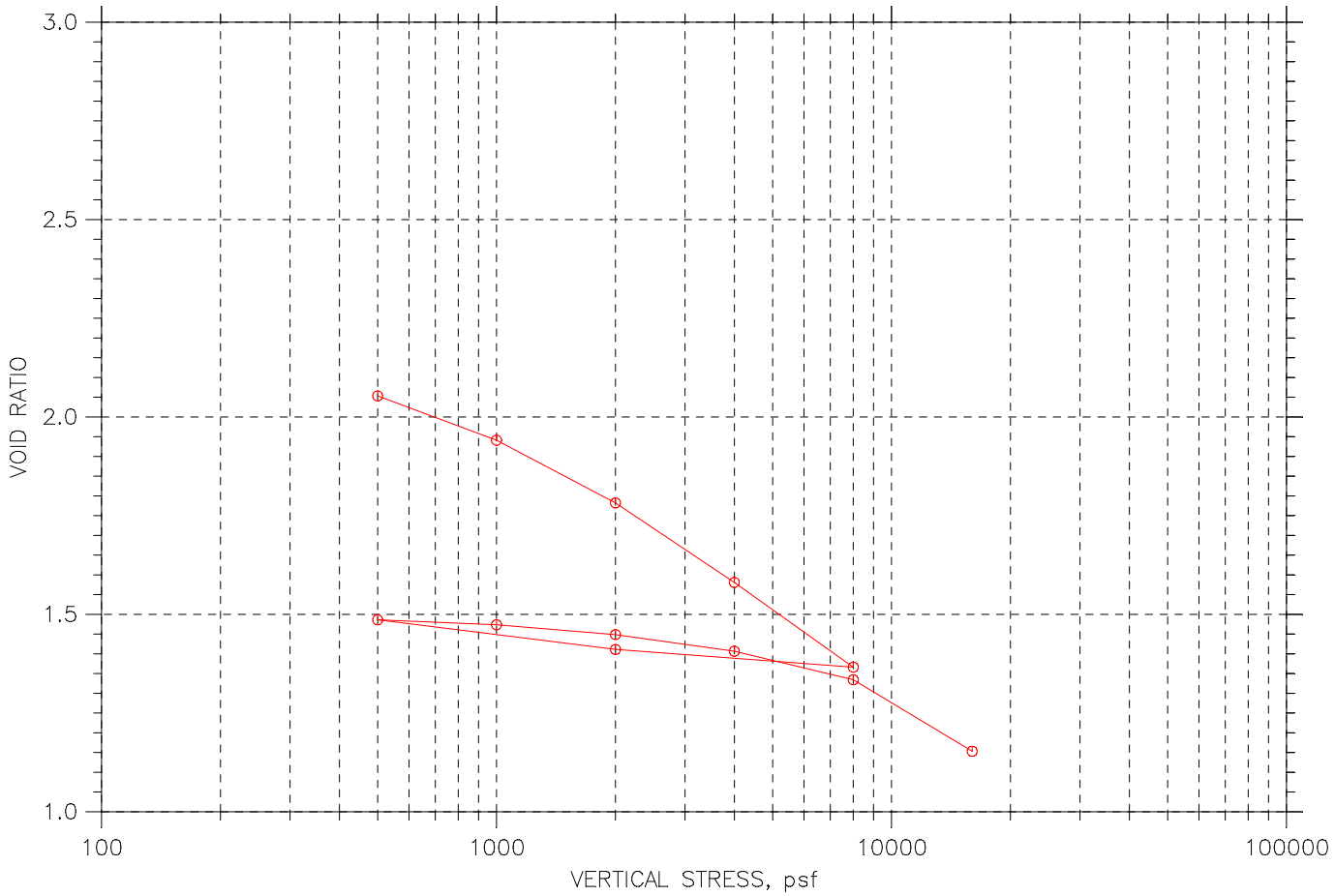


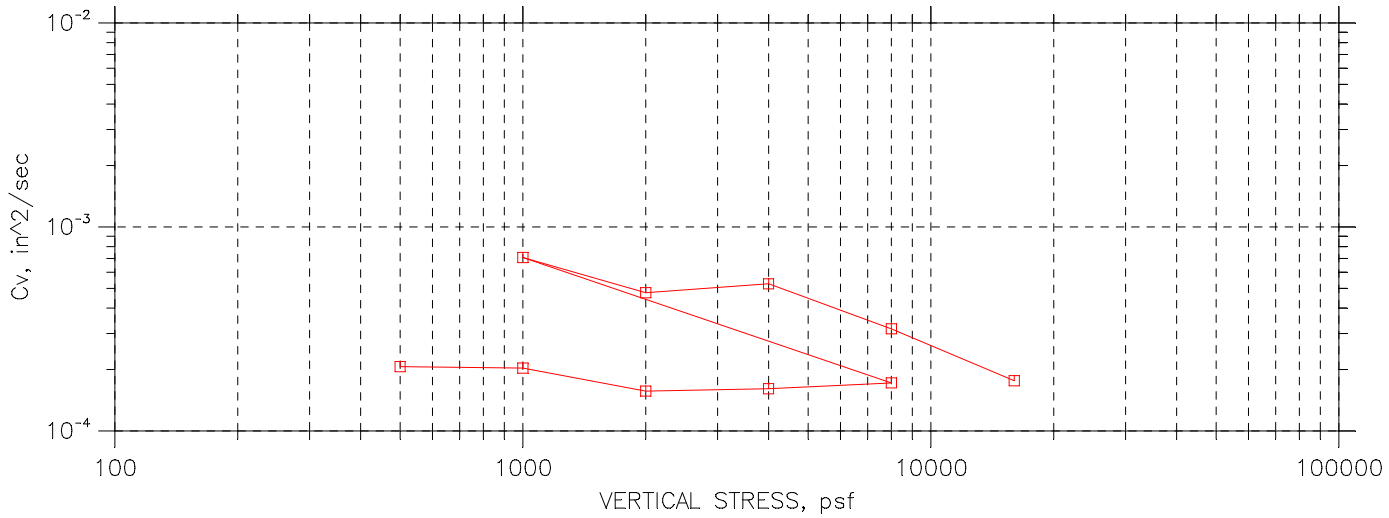
Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-3	Test Date: 12-23-08	Depth: 17.75FT
	Test No.: 8228S3C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Thu, 05-FEB-2009 09:13:39

CONSOLIDATION TEST DATA

SUMMARY REPORT



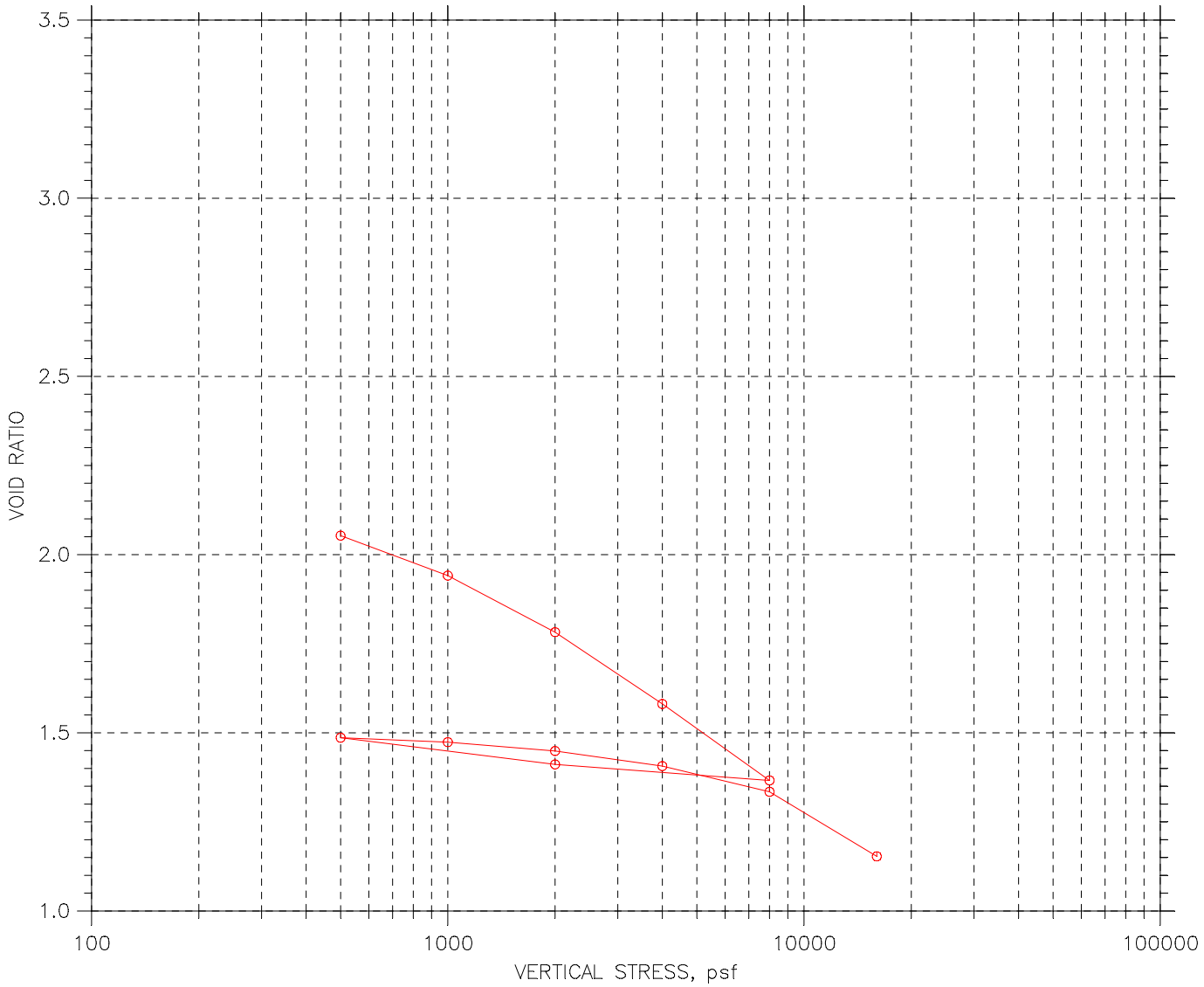


Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Thu, 05-FEB-2009 09:18:45

CONSOLIDATION TEST DATA

SUMMARY REPORT



					Before Test	After Test
Overburden Pressure: 0 psf				Water Content, %	83.54	50.12
Preconsolidation Pressure: 0 psf				Dry Unit Weight, pcf	50.4	74.23
Compression Index: 3.81959e-313				Saturation, %	98.52	111.28
Diameter: 2.5 in		Height: 1 in		Void Ratio	2.17	1.15
LL: NP	PL: NP	PI: NP	GS: 2.56			

Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

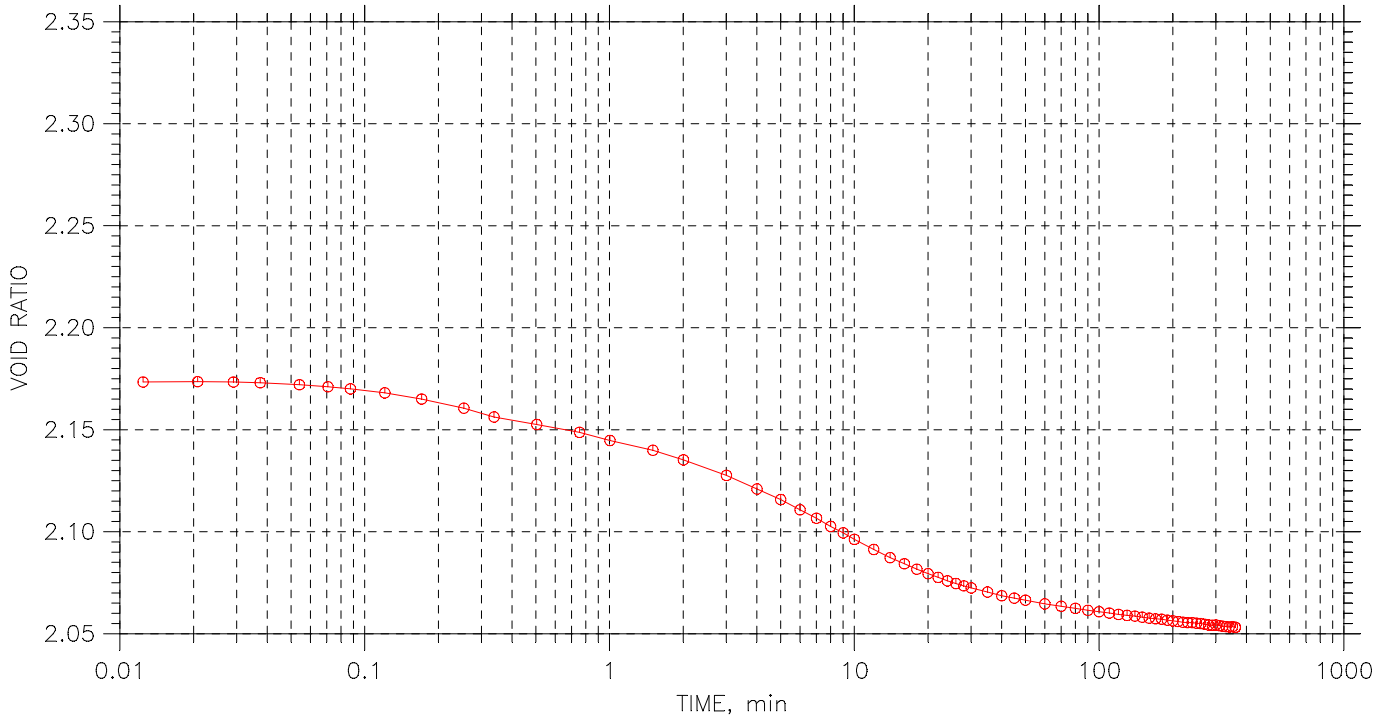
Thu, 05-FEB-2009 09:18:46

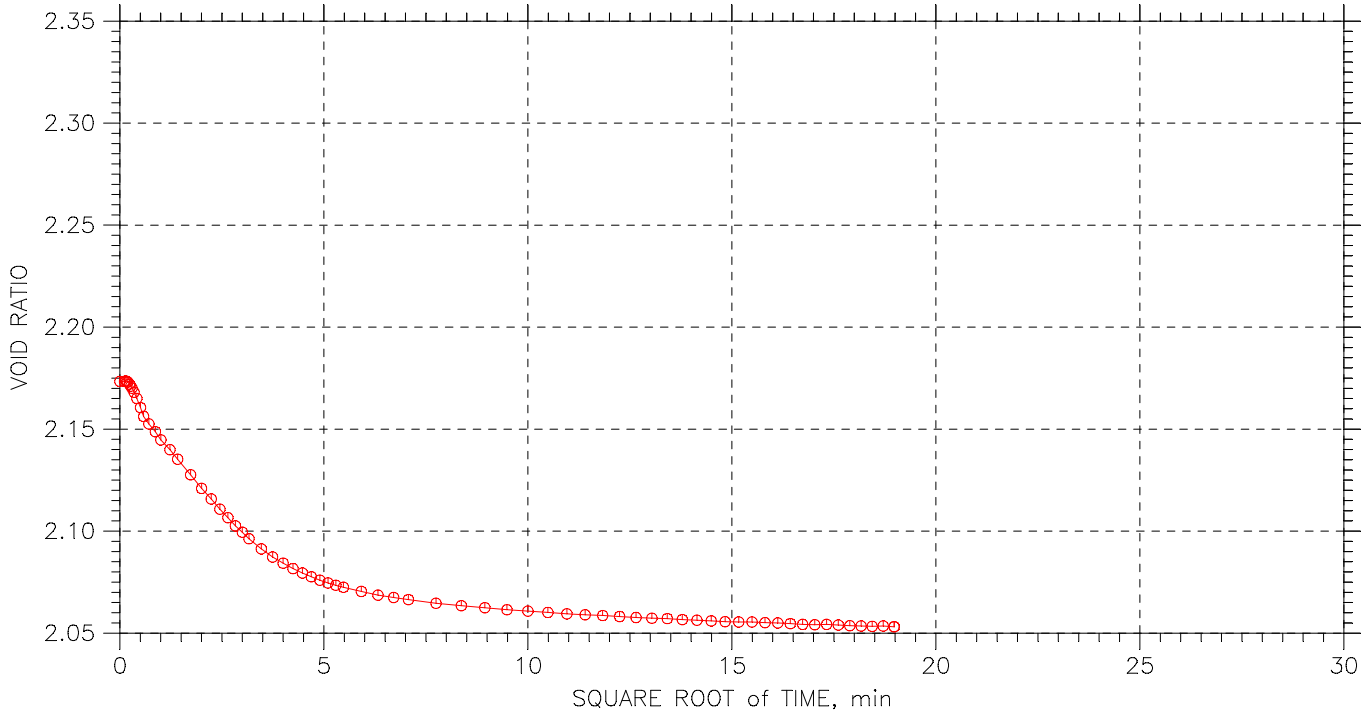
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 12

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

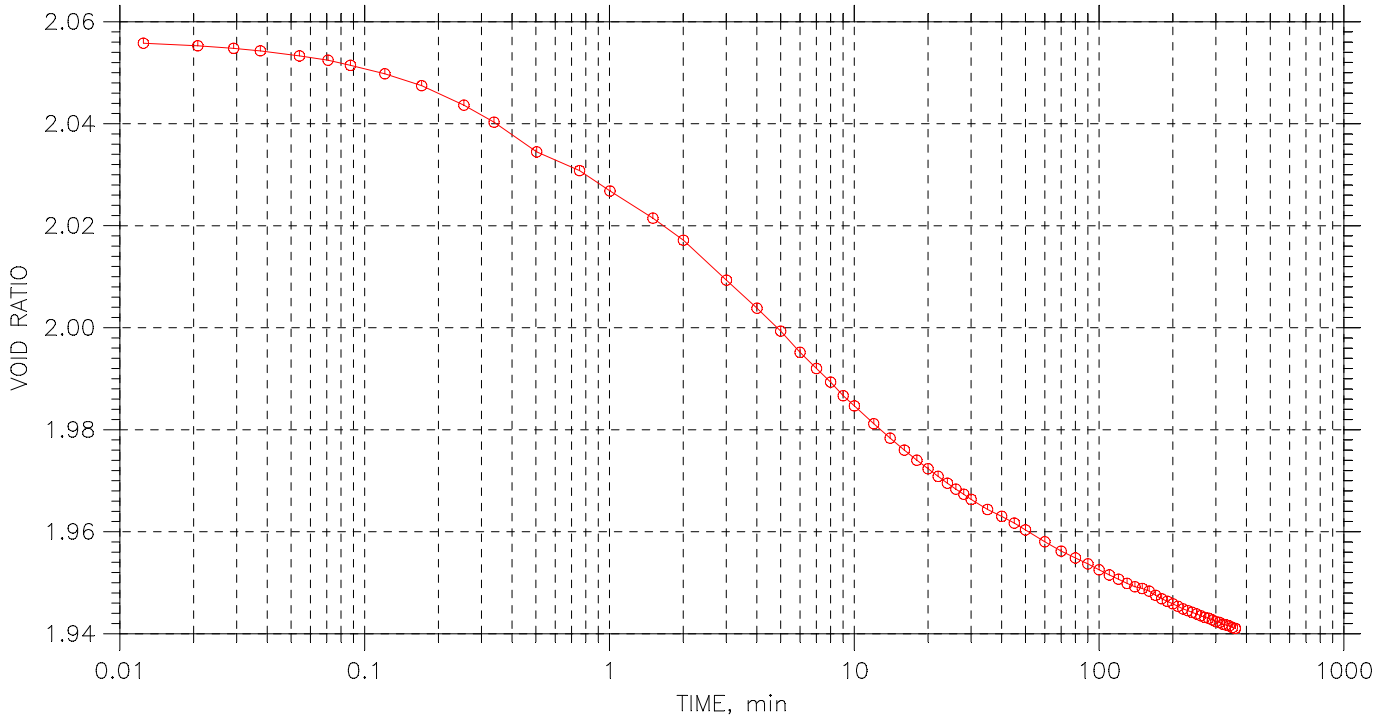
Thu, 05-FEB-2009 09:18:46

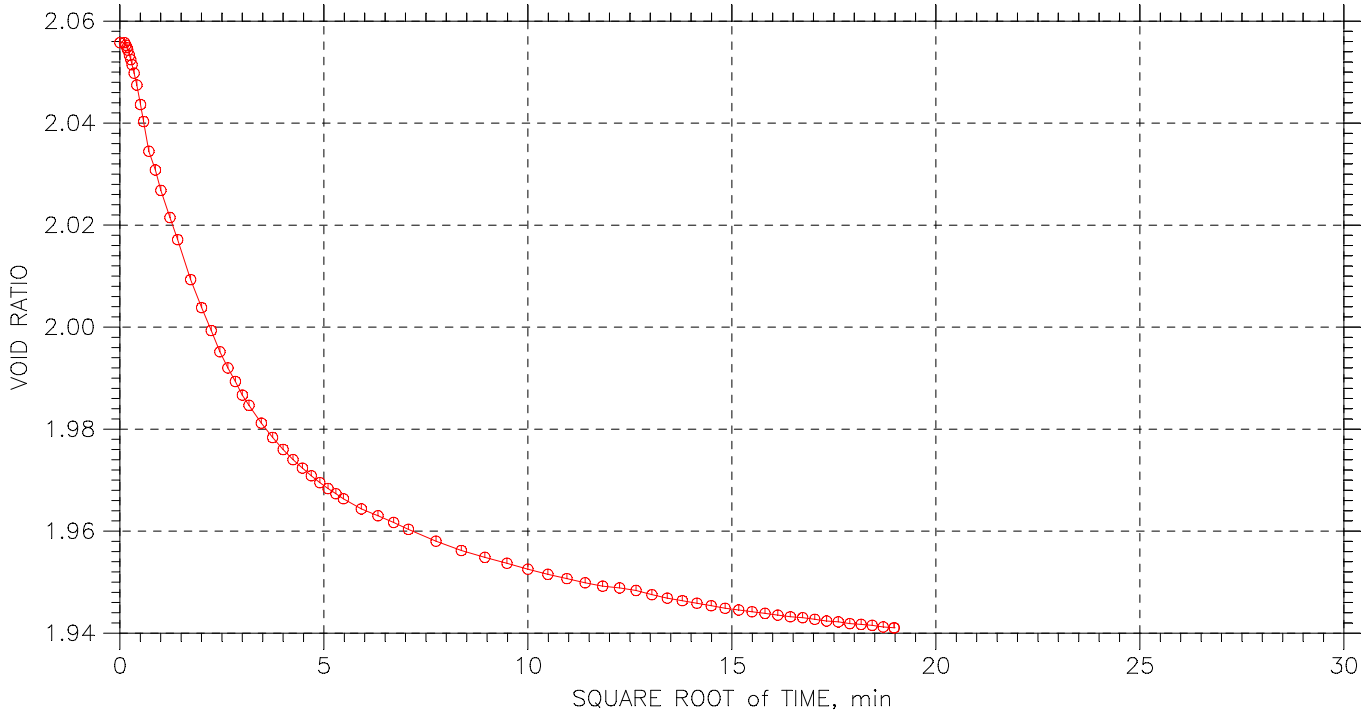
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 12

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

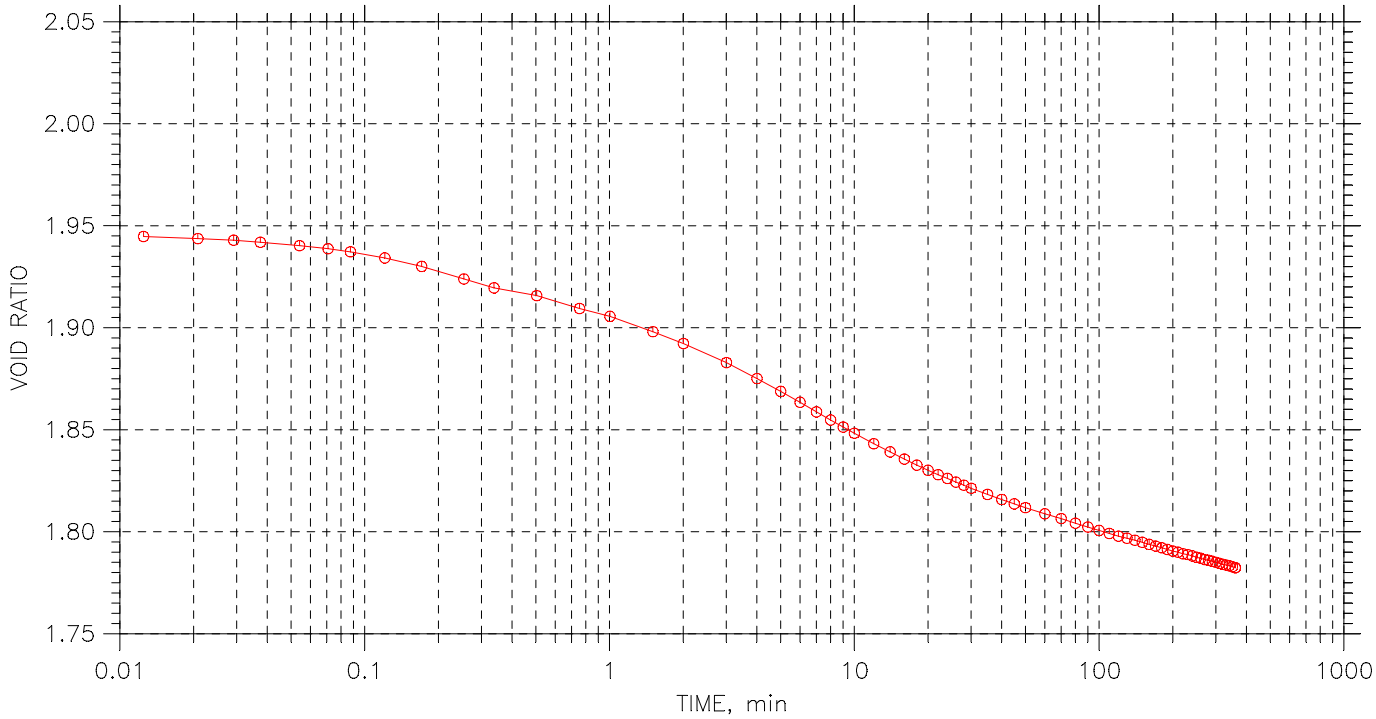
Thu, 05-FEB-2009 09:18:47

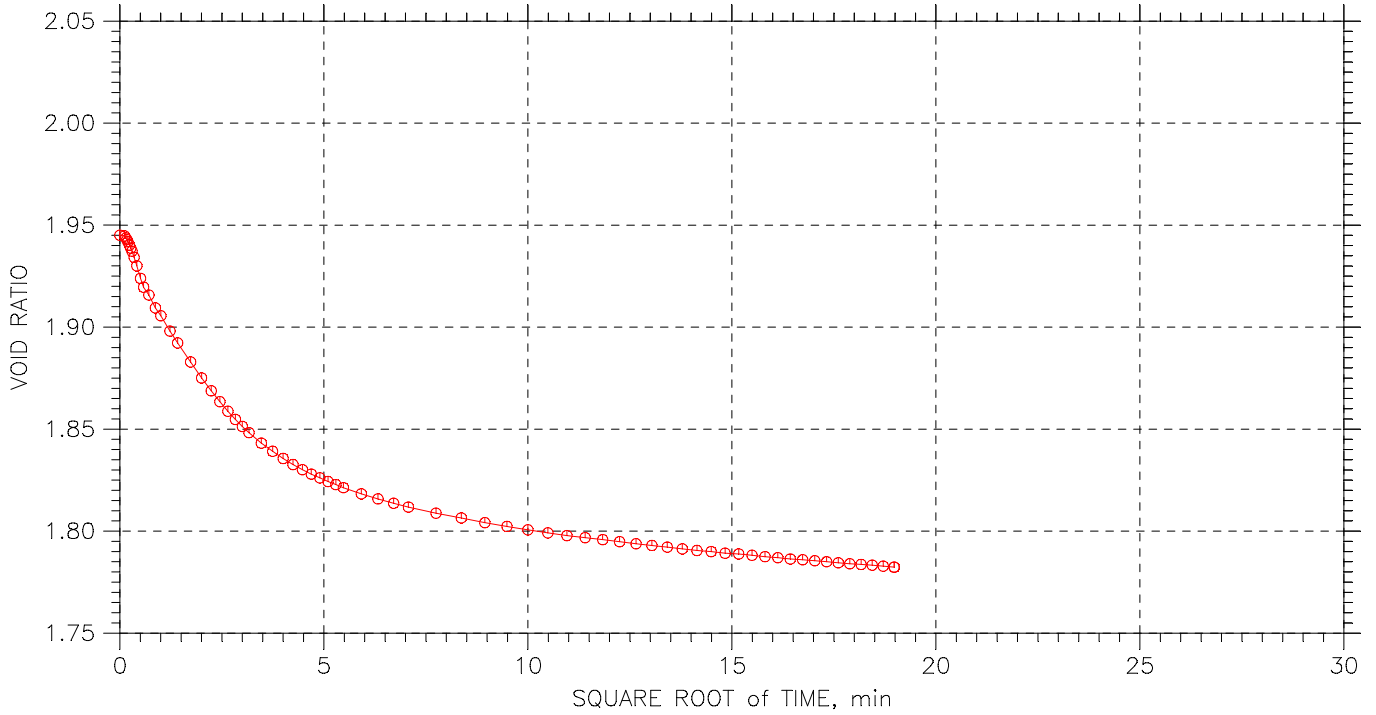
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 12

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

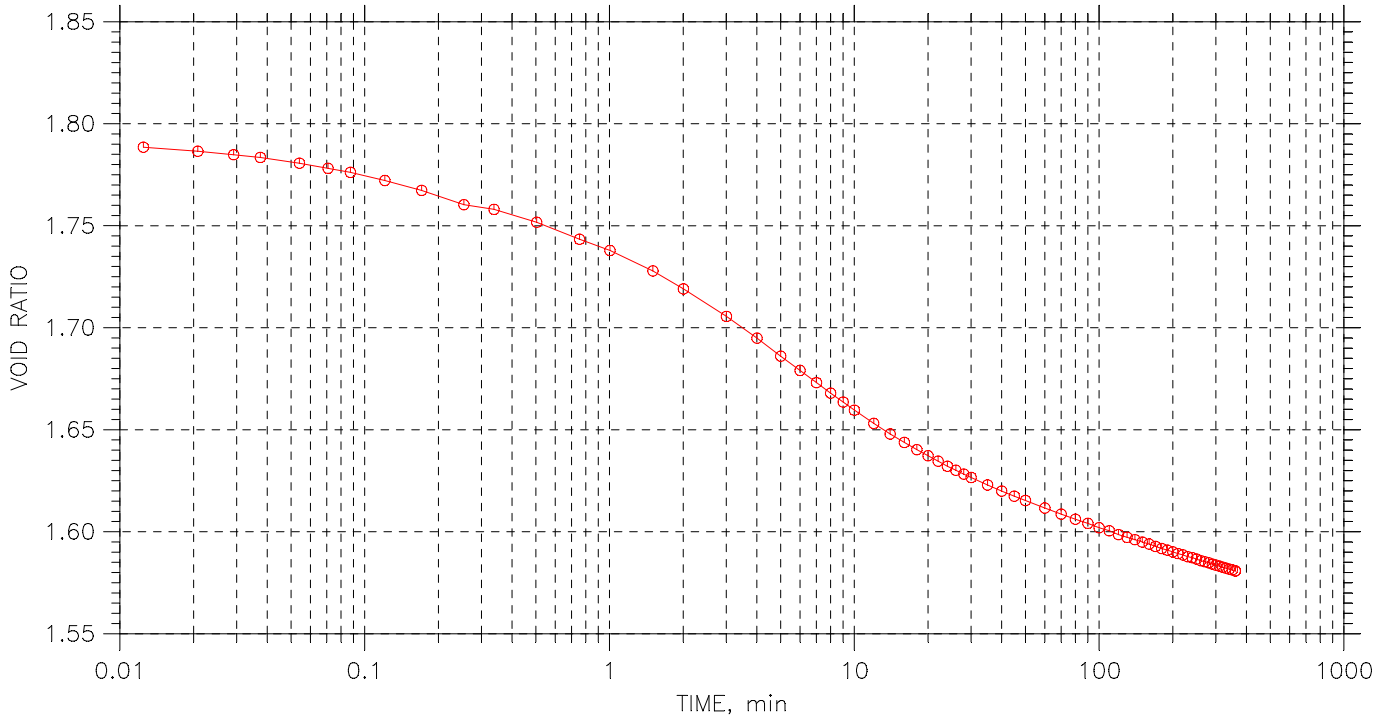
Thu, 05-FEB-2009 09:18:48

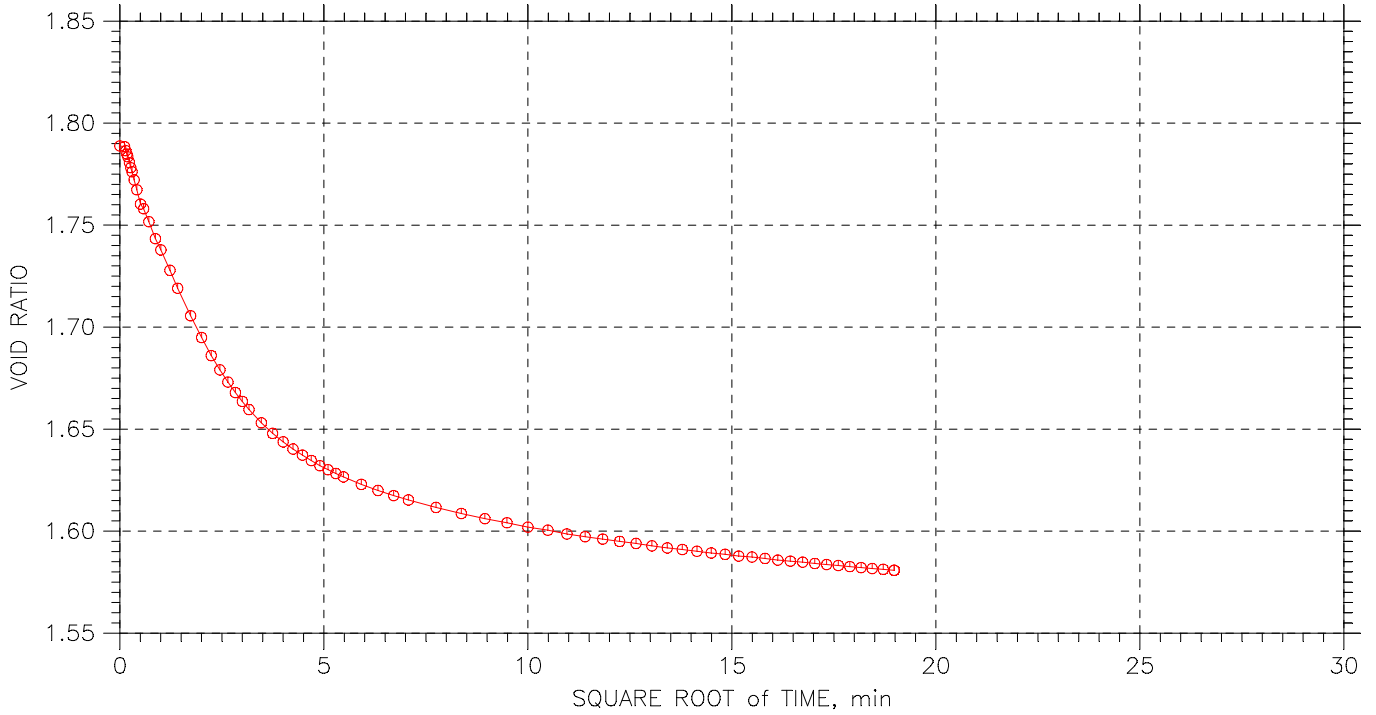
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 12

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

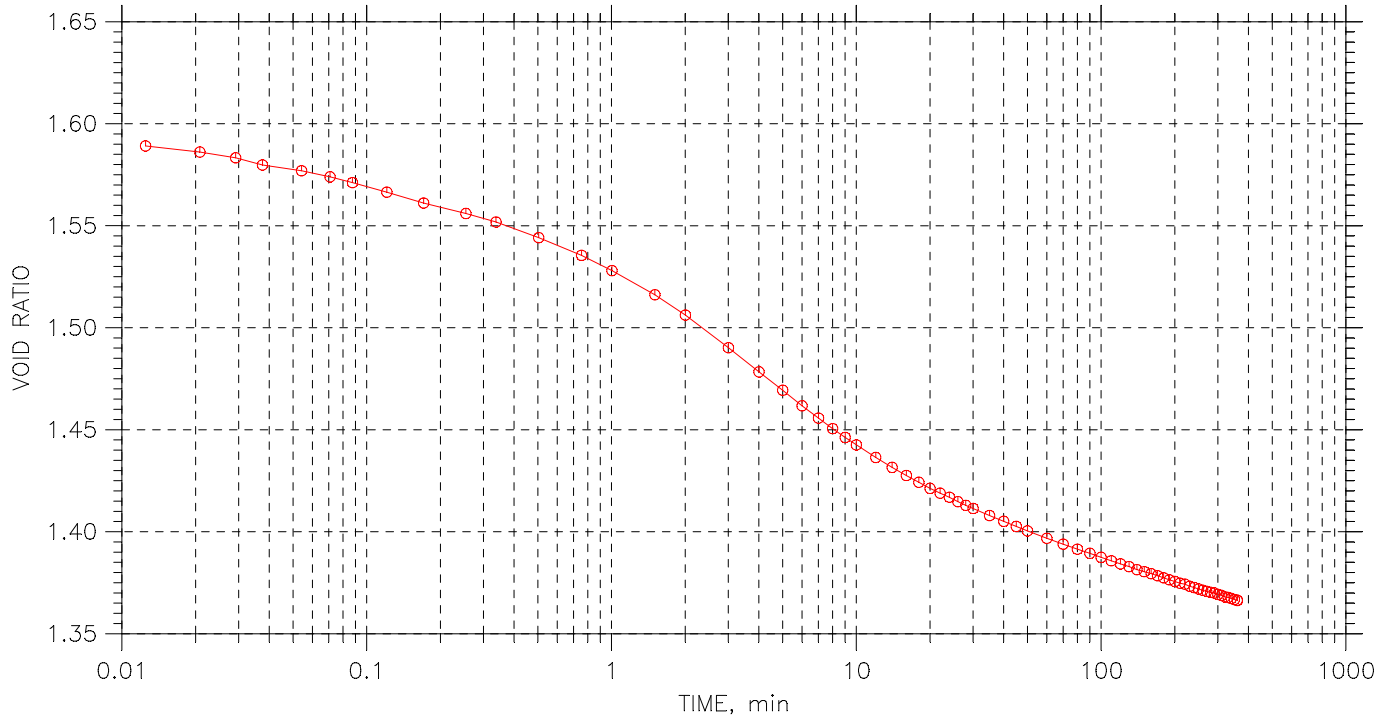
Thu, 05-FEB-2009 09:18:48

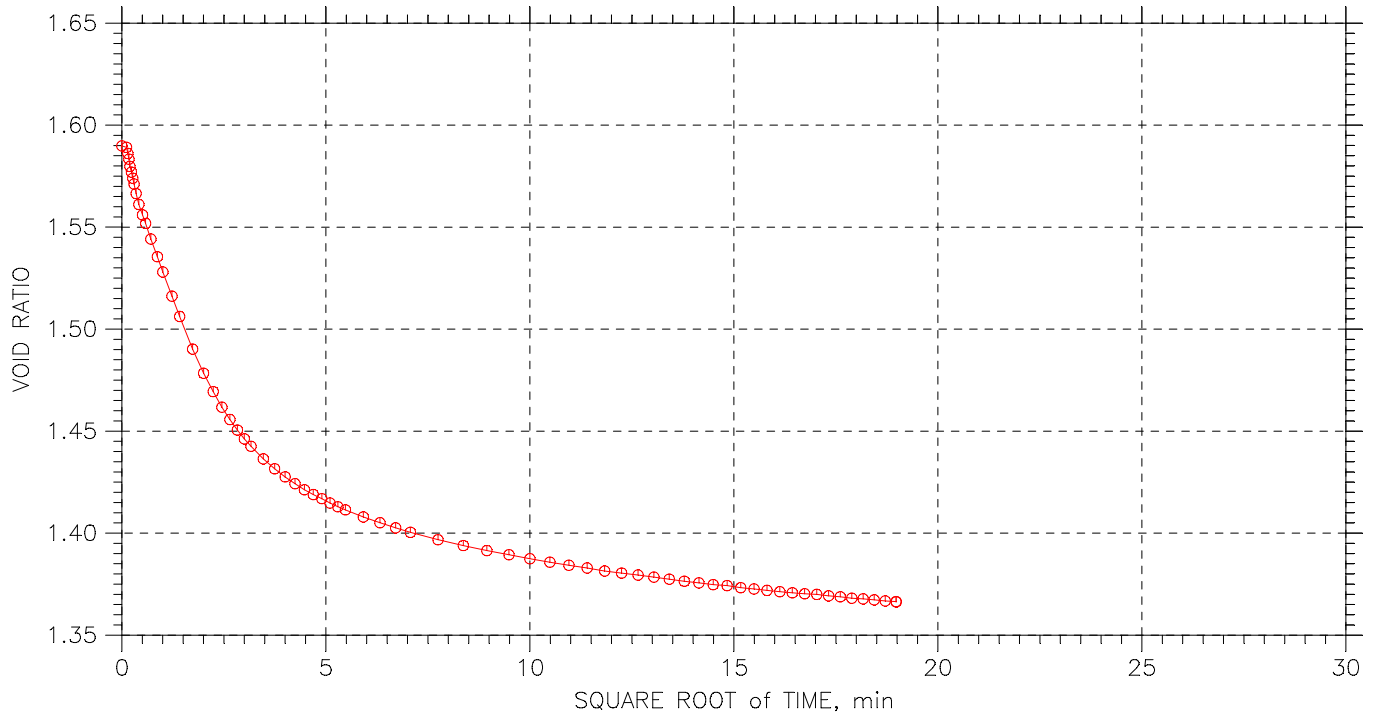
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 12

Stress: 8000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

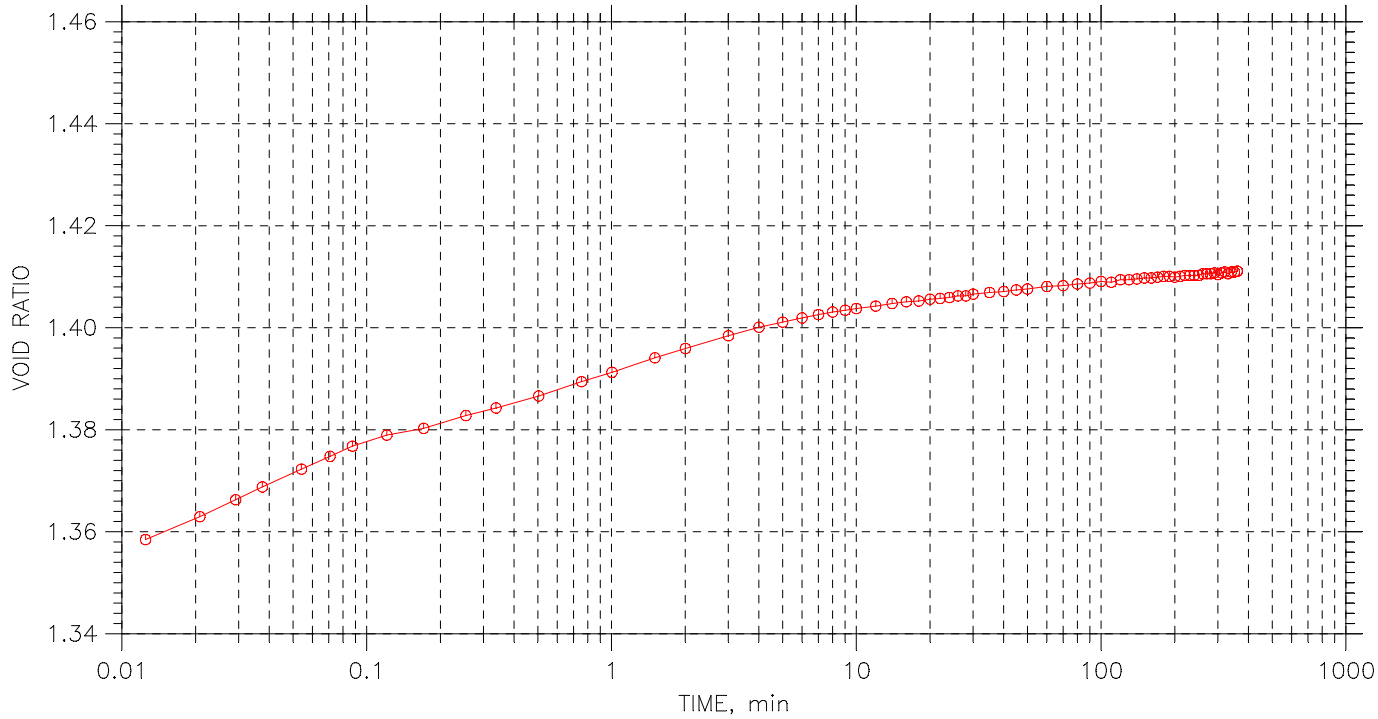
Thu, 05-FEB-2009 09:18:49

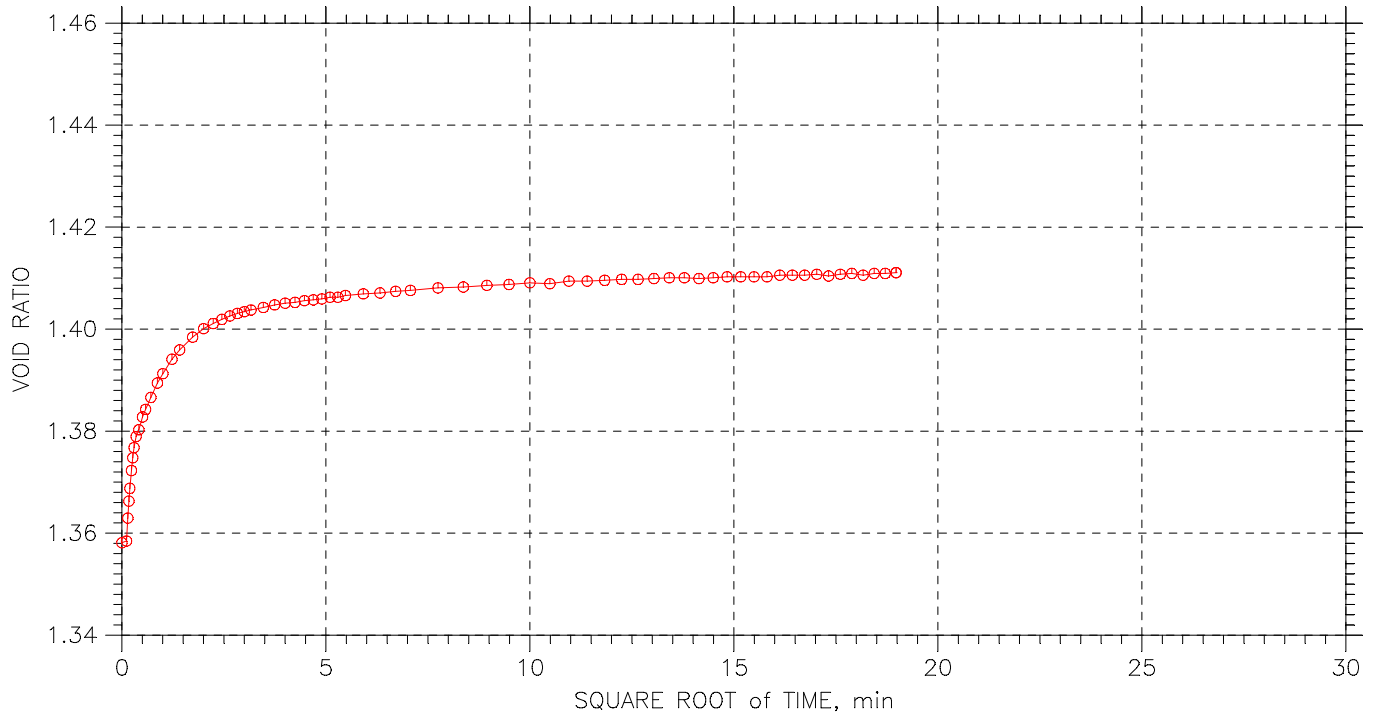
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 12

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

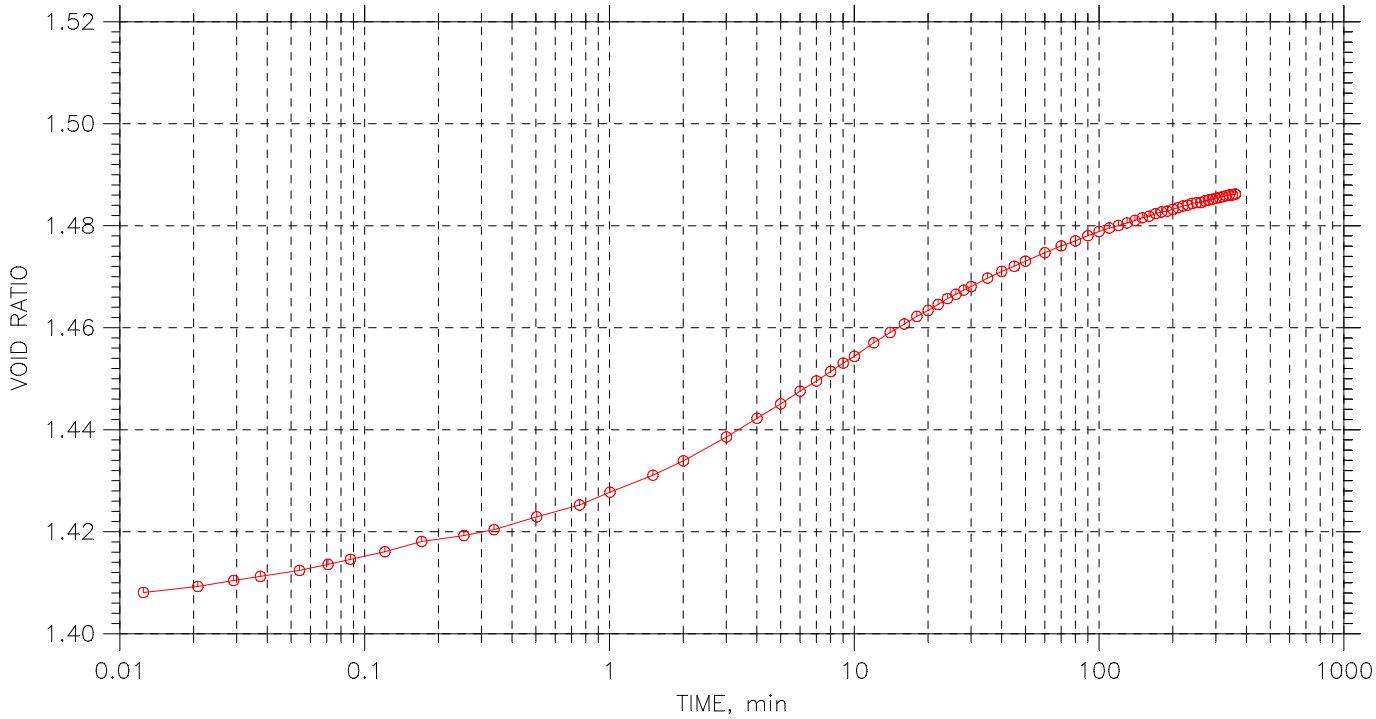
Thu, 05-FEB-2009 09:18:50

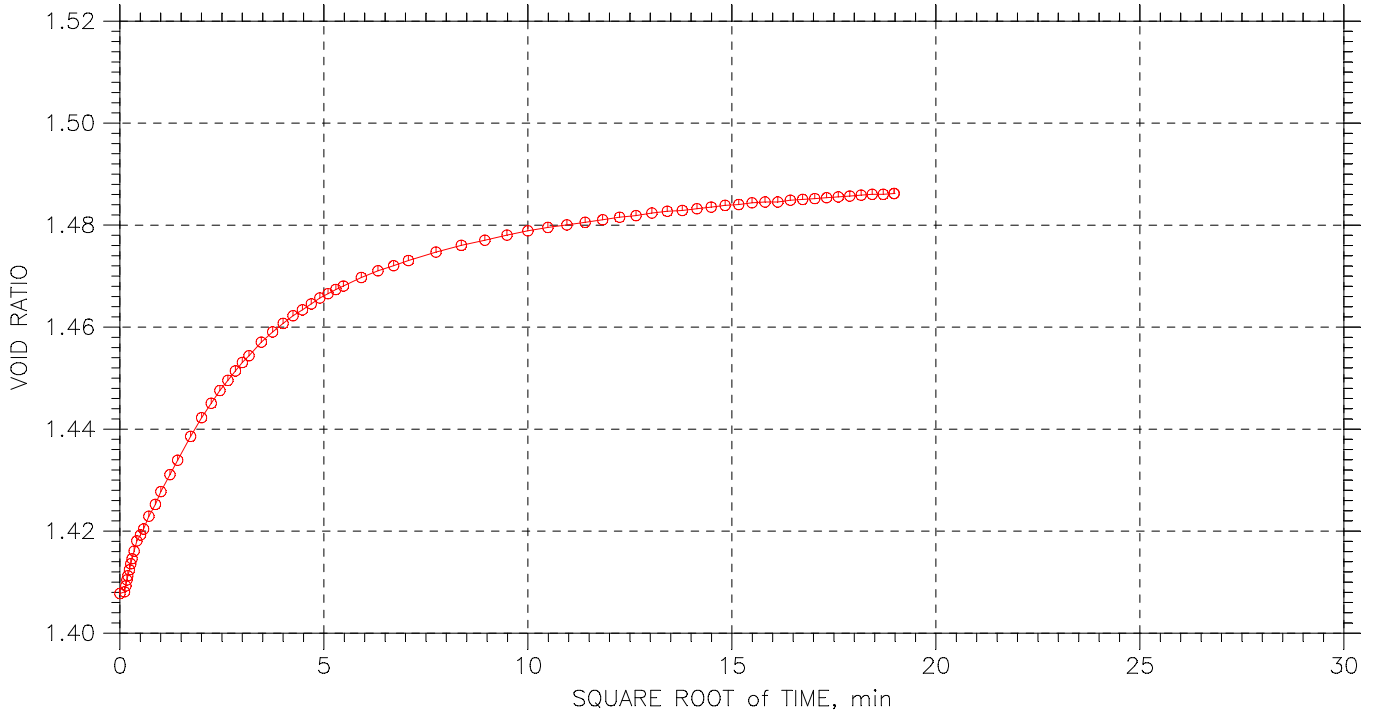
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 12

Stress: 500. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

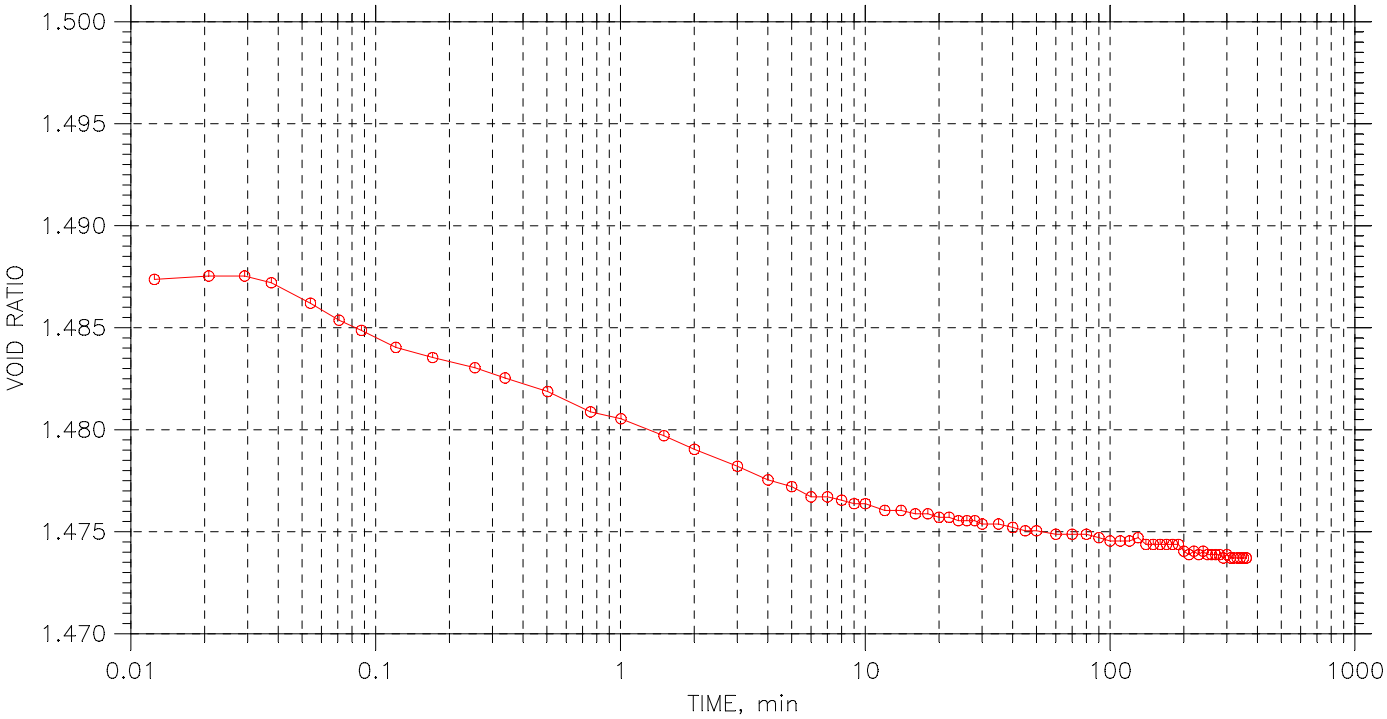
Thu, 05-FEB-2009 09:18:50

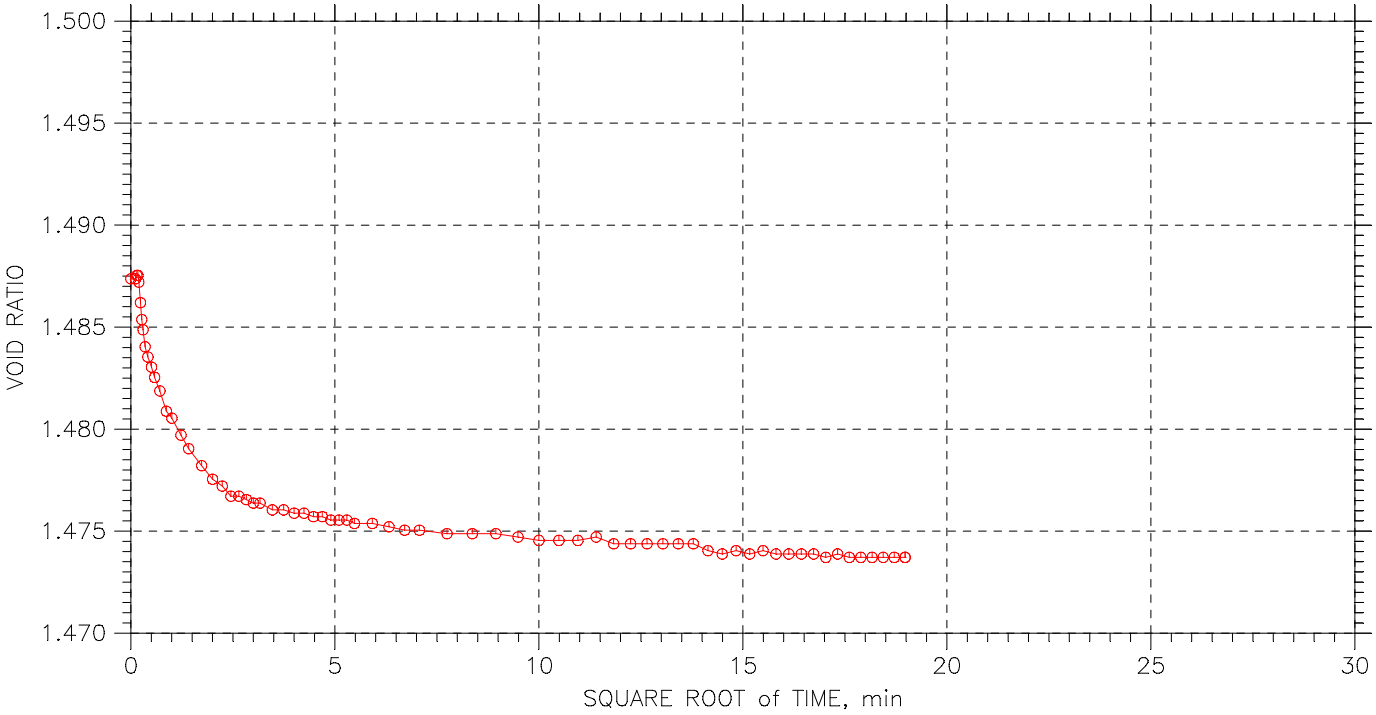
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 12

Stress: 1000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

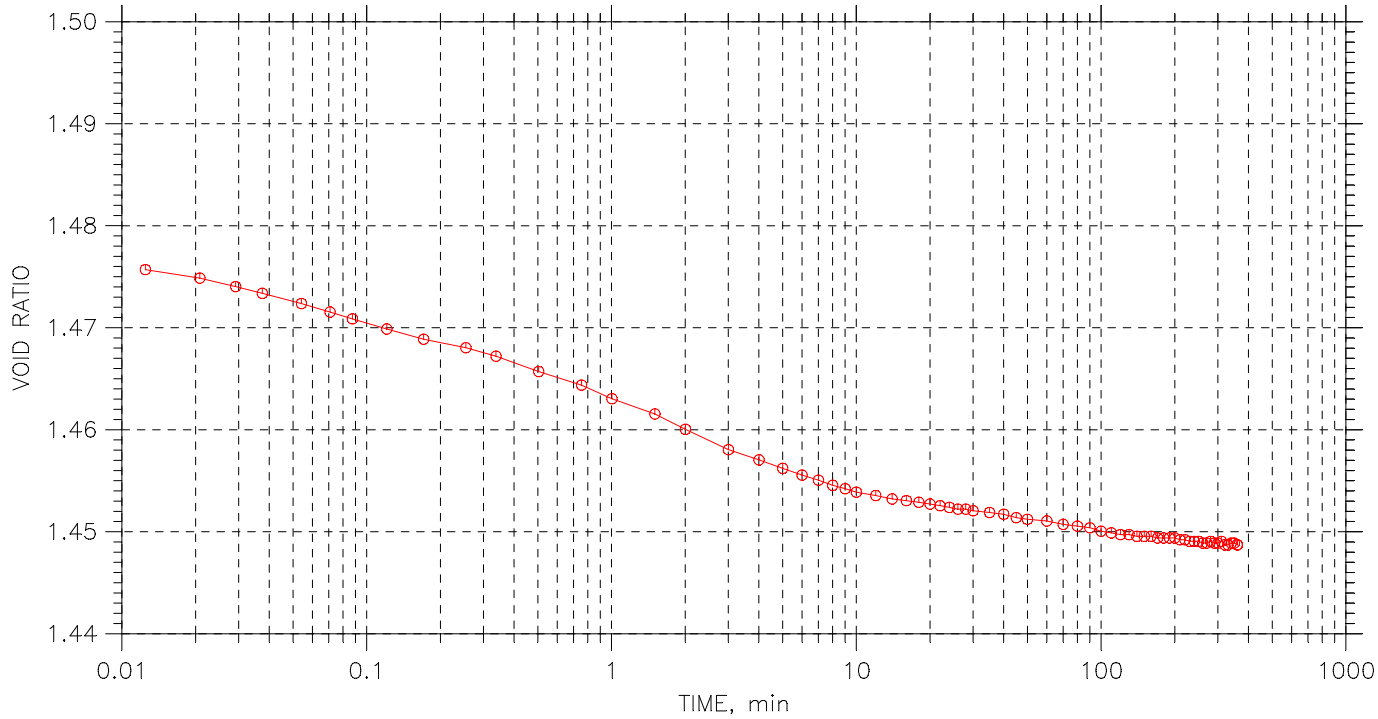
Thu, 05-FEB-2009 09:18:51

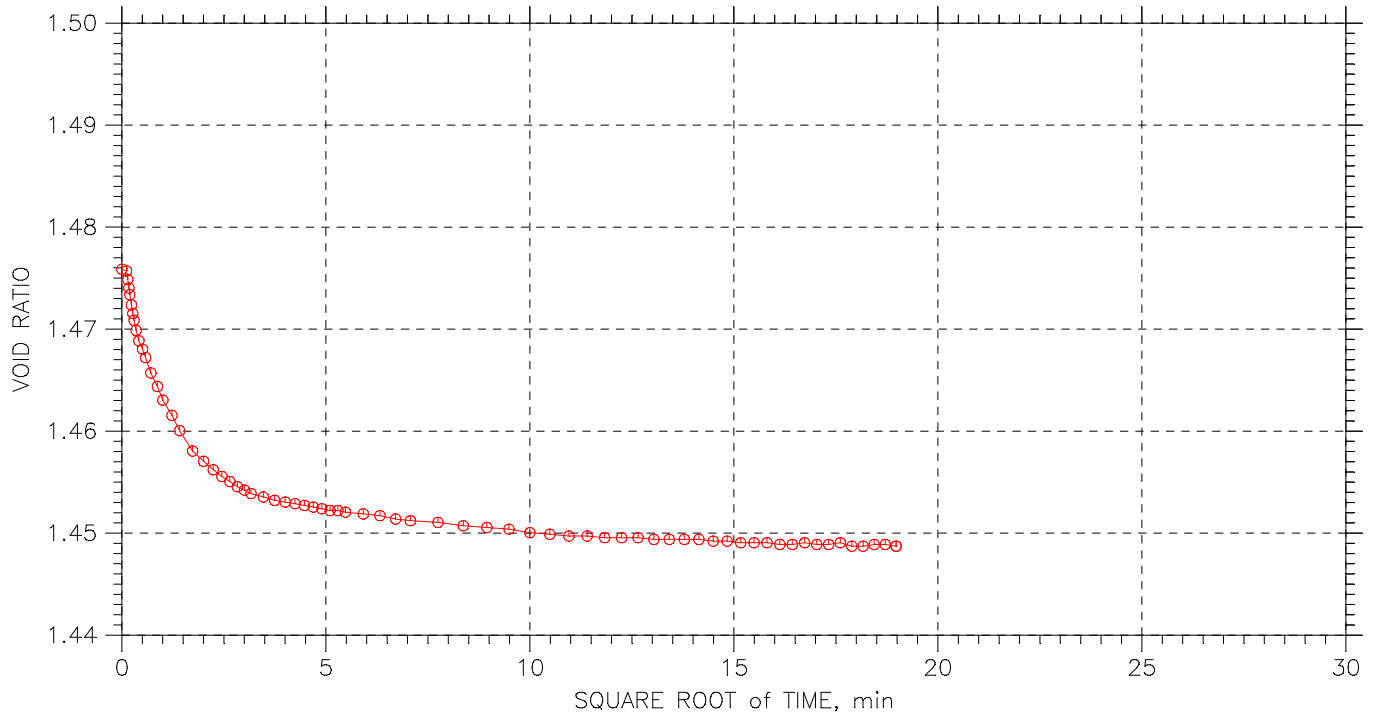
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 12

Stress: 2000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

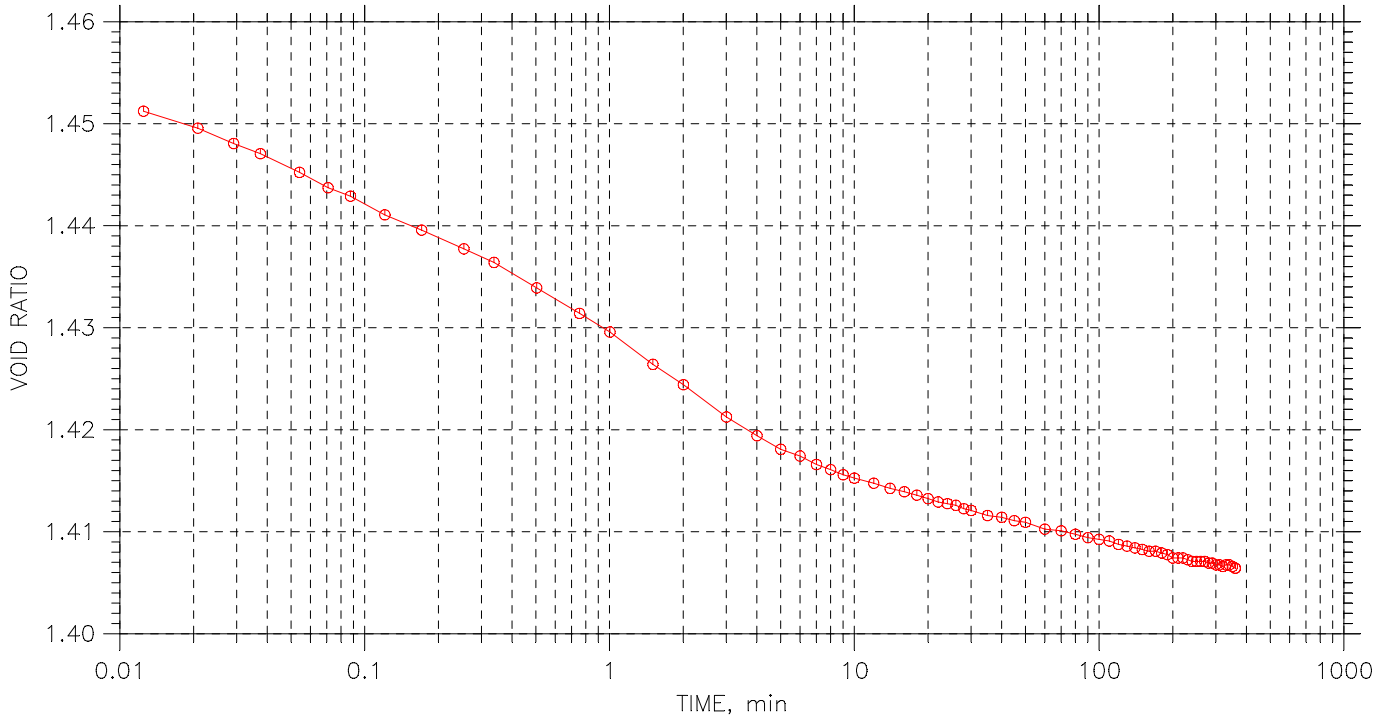
Thu, 05-FEB-2009 09:18:52

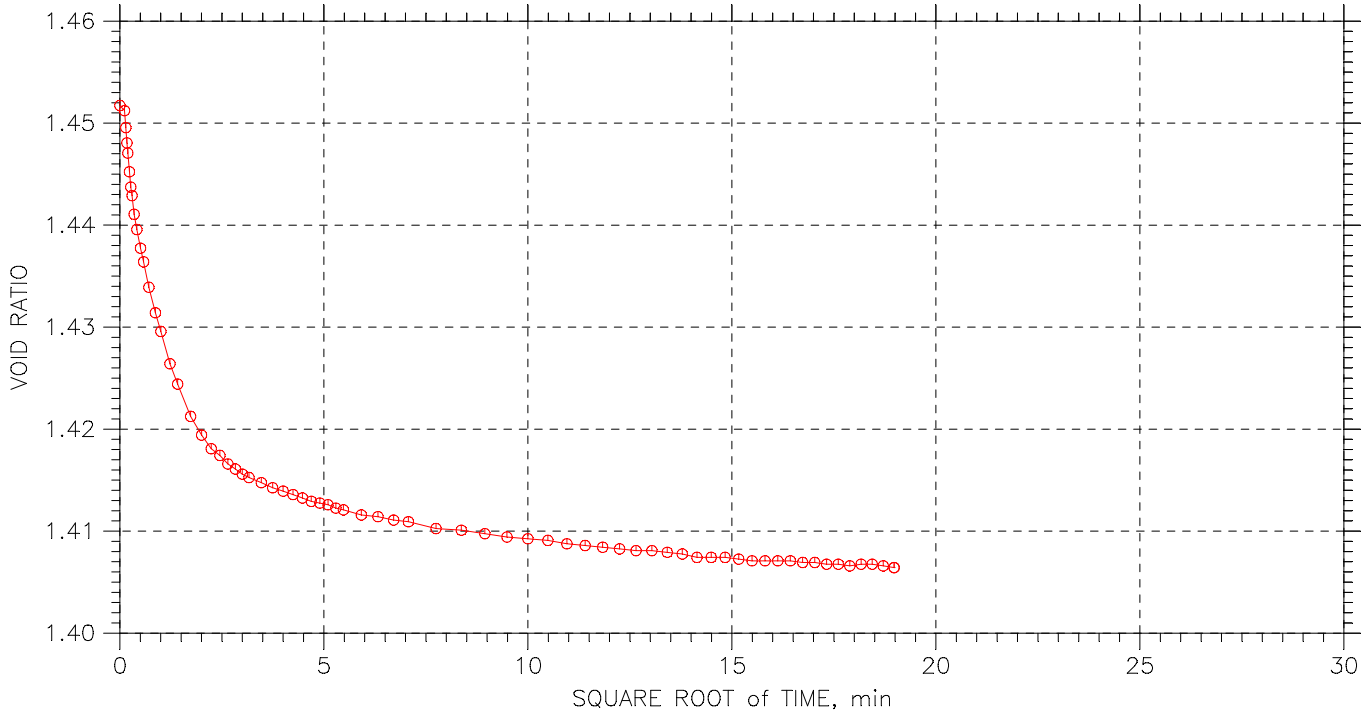
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 12

Stress: 4000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

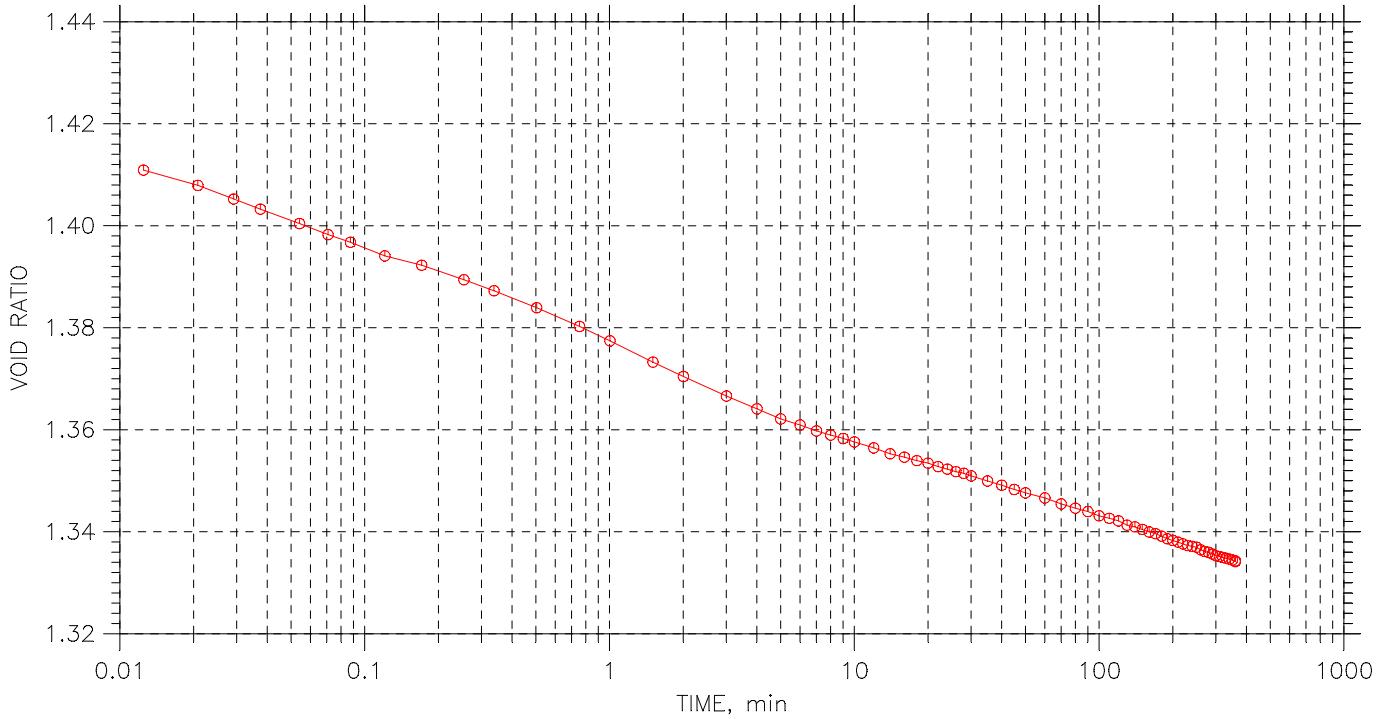
Thu, 05-FEB-2009 09:18:52

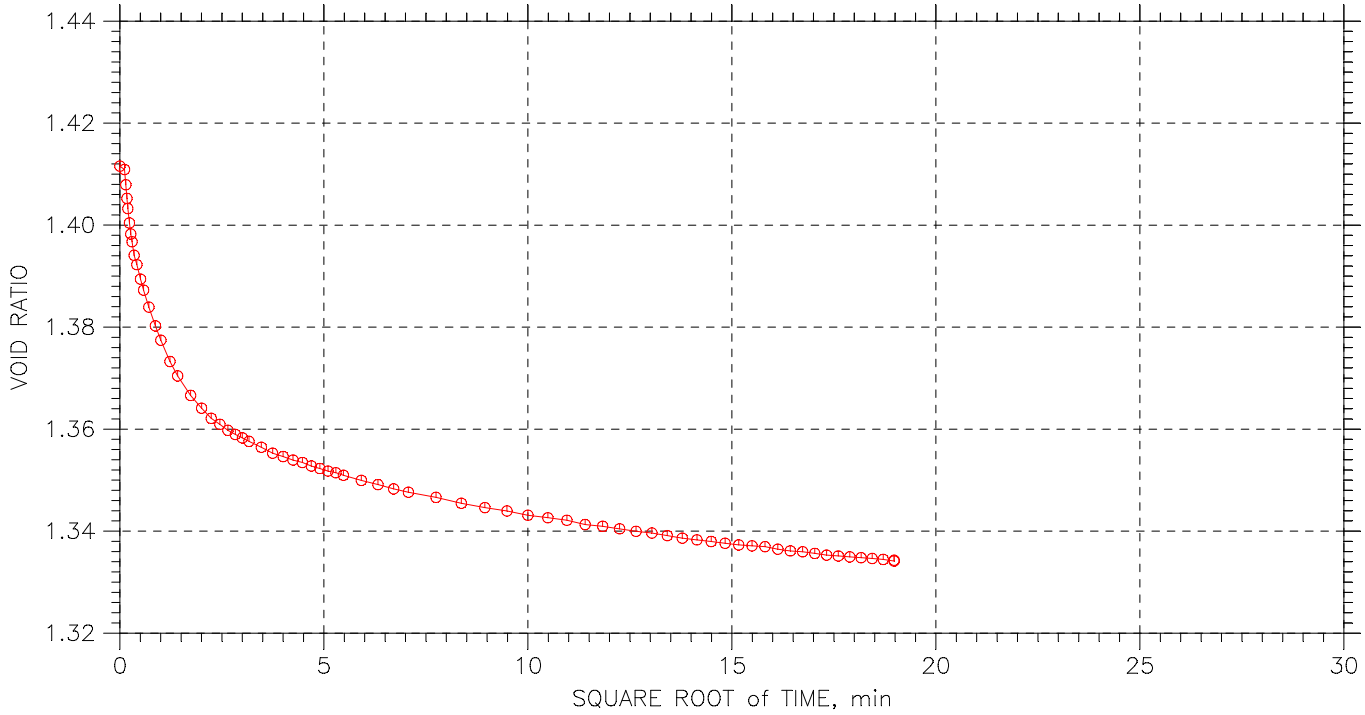
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 12

Stress: 8000. psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

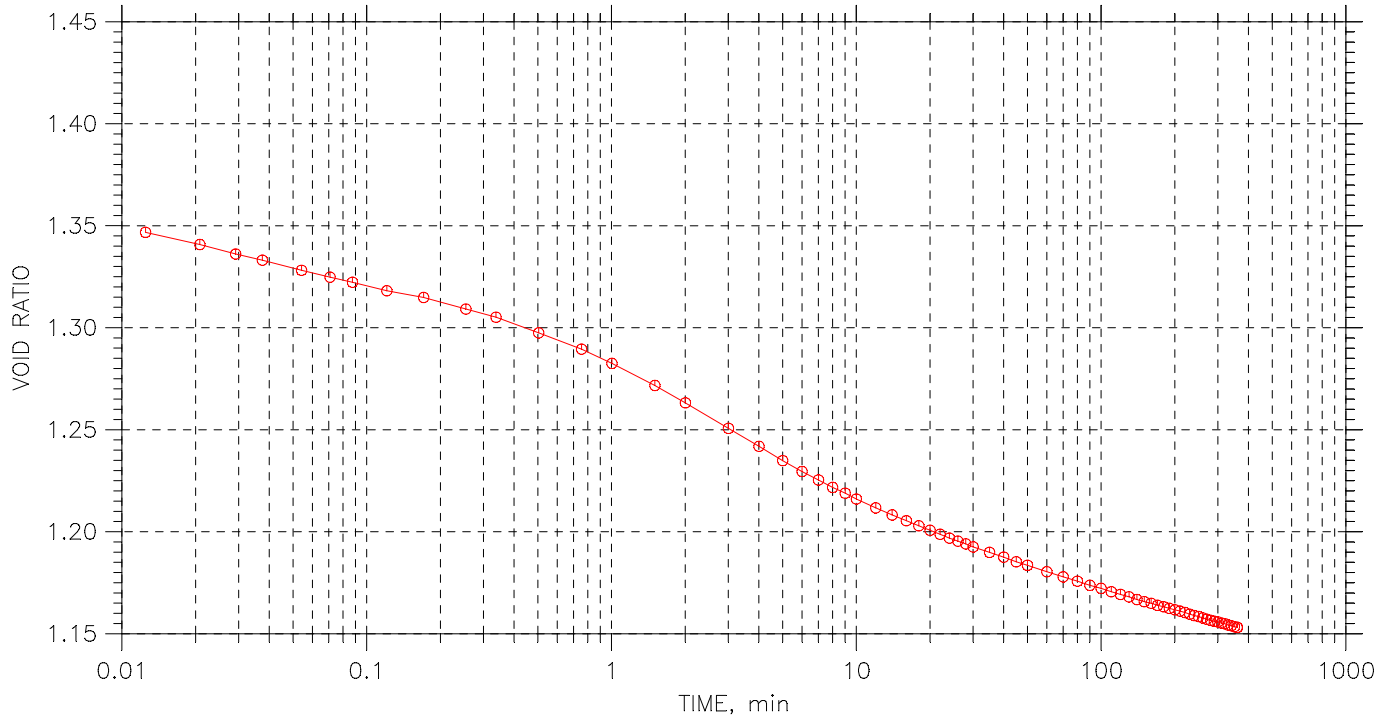
Thu, 05-FEB-2009 09:18:53

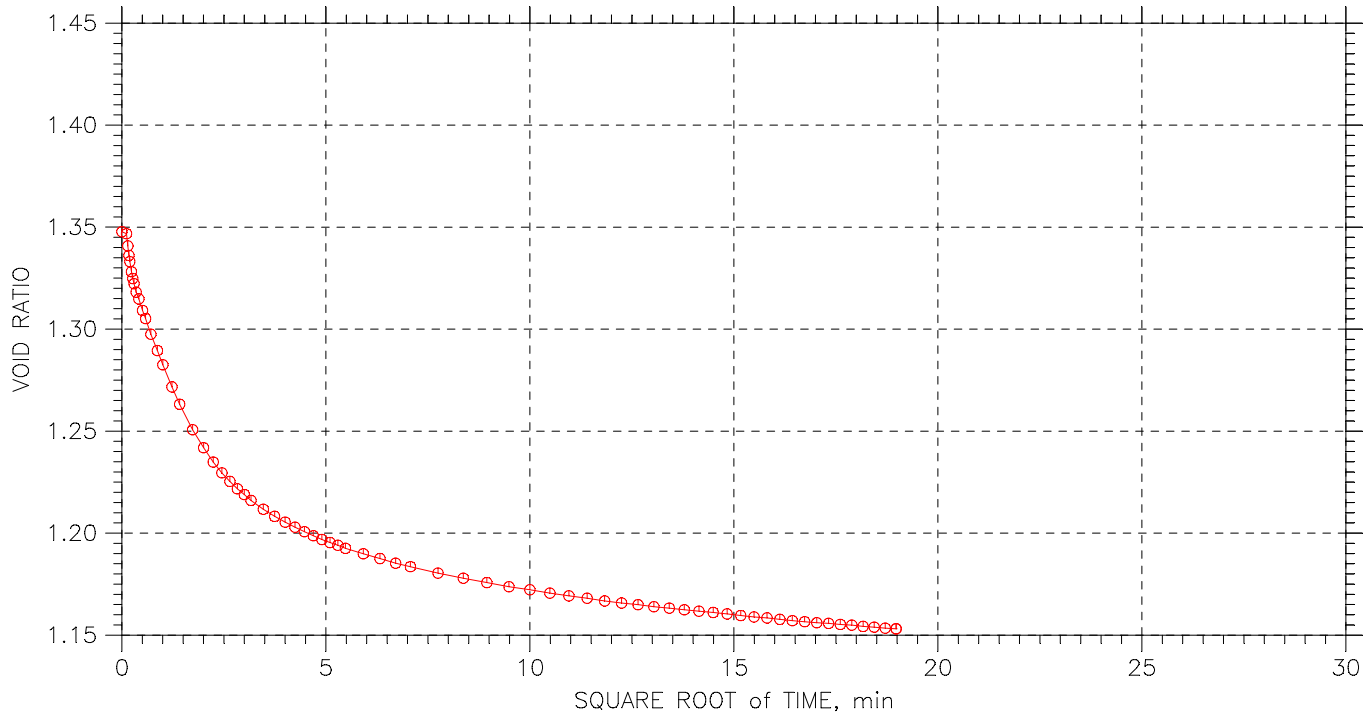
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 12

Stress: 16000 psf





Please insert your logo here and save the file under the same name logo.bmp	Project: SNOQ PASS E.HYAK TO LKLSE	Location: SR-90	Project No.: XL-2779
	Boring No.: SCB-015-08	Tested By: LHB	Checked By: DJ
	Sample No.: S-5	Test Date: 12-31-08	Depth: 27.75FT
	Test No.: 8228S5C	Sample Type: Shelby Tub	Elevation:
	Description:		
	Remarks:		

Thu, 05-FEB-2009 09:18:54

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Measured Specific Gravity: 2.76
Initial Void Ratio: 1.40
Final Void Ratio: 0.93

Liquid Limit: 30
Plastic Limit: 24
Plasticity Index: 6

Initial Height: 0.63 in
Specimen Diameter: 1.88 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID		RING		
Wt. Container + Wet Soil, gm	339	415.8	410.5	83
Wt. Container + Dry Soil, gm	259.8	398.85	398.85	71.4
Wt. Container, gm	80.4	366.1	366.1	38.8
Wt. Dry Soil, gm	179.4	32.748	32.748	32.6
Water Content, %	44.15	51.77	35.58	35.58
Void Ratio	---	1.40	0.93	---
Degree of Saturation, %	---	102.34	106.13	---
Dry Unit Weight, pcf	---	71.907	89.491	---

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	500	0.02757	1.290	4.41	1.1	1.2	2.79e-004	2.51e-004	2.64e-004
2	1e+003	0.04265	1.233	6.82	1.2	1.3	2.34e-004	2.14e-004	2.24e-004
3	2e+003	0.07479	1.109	11.97	195.0	0.0	1.35e-006	0.00e+000	1.35e-006
4	4e+003	0.09859	1.018	15.77	0.5	0.5	4.59e-004	4.60e-004	4.59e-004
5	8e+003	0.1191	0.940	19.05	0.3	0.4	6.43e-004	6.24e-004	6.33e-004
6	2e+003	0.1134	0.961	18.14	0.1	0.0	2.88e-003	0.00e+000	2.88e-003
7	500	0.1043	0.996	16.68	0.4	0.3	4.88e-004	6.49e-004	5.57e-004
8	1e+003	0.1065	0.988	17.03	0.3	0.0	8.84e-004	0.00e+000	8.84e-004
9	2e+003	0.1102	0.974	17.63	0.2	0.1	1.37e-003	1.51e-003	1.44e-003
10	4e+003	0.1148	0.956	18.36	0.1	0.0	1.87e-003	0.00e+000	1.87e-003
11	8e+003	0.1228	0.925	19.65	0.2	0.1	1.24e-003	1.82e-003	1.48e-003

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 1 of 11
Applied Stress: 500 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	59	-0.0008467	-0.14	1.399
2	0.01	0.11	59	-0.0008467	-0.14	1.399
3	0.02	0.14	64.4	-0.0008467	-0.14	1.399
4	0.03	0.17	69.7	-0.0007416	-0.12	1.399
5	0.04	0.19	75.1	-0.0006891	-0.11	1.399
6	0.05	0.23	85.8	-0.000479	-0.08	1.398
7	0.07	0.27	91.2	-0.0002689	-0.04	1.397
8	0.09	0.30	107	-0.0001113	-0.02	1.397
9	0.12	0.35	118	0.0003614	0.06	1.395
10	0.17	0.41	150	0.001044	0.17	1.392
11	0.25	0.50	204	0.00241	0.39	1.387
12	0.34	0.58	257	0.003671	0.59	1.382
13	0.50	0.71	375	0.006717	1.07	1.370
14	0.75	0.87	381	0.009606	1.54	1.359
15	1.00	1.00	418	0.01092	1.75	1.354
16	1.50	1.23	434	0.01334	2.13	1.345
17	2.00	1.42	477	0.01481	2.37	1.339
18	3.00	1.73	472	0.01728	2.76	1.330
19	4.00	2.00	472	0.01885	3.02	1.324
20	5.00	2.24	488	0.02027	3.24	1.318
21	6.00	2.45	483	0.02116	3.39	1.315
22	7.00	2.65	488	0.0219	3.50	1.312
23	8.00	2.83	488	0.02237	3.58	1.310
24	9.00	3.00	493	0.02274	3.64	1.309
25	10.00	3.16	493	0.02305	3.69	1.308
26	12.00	3.46	493	0.02363	3.78	1.306
27	14.00	3.74	493	0.024	3.84	1.304
28	16.00	4.00	493	0.02431	3.89	1.303
29	18.00	4.24	493	0.02458	3.93	1.302
30	20.00	4.47	493	0.02479	3.97	1.301
31	22.00	4.69	493	0.02494	3.99	1.301
32	24.00	4.90	499	0.0251	4.02	1.300
33	26.00	5.10	499	0.02521	4.03	1.300
34	28.00	5.29	493	0.02536	4.06	1.299
35	30.00	5.48	499	0.02547	4.08	1.299
36	35.00	5.92	499	0.02568	4.11	1.298
37	40.00	6.32	499	0.02579	4.13	1.297
38	45.00	6.71	499	0.02589	4.14	1.297
39	50.00	7.07	499	0.026	4.16	1.297
40	60.00	7.75	499	0.0261	4.18	1.296
41	70.00	8.37	499	0.02621	4.19	1.296
42	80.00	8.94	499	0.02636	4.22	1.295
43	90.00	9.49	499	0.02647	4.23	1.295
44	100.00	10.00	499	0.02657	4.25	1.294
45	110.00	10.49	499	0.02668	4.27	1.294
46	120.00	10.95	493	0.02678	4.29	1.293
47	130.00	11.40	493	0.02689	4.30	1.293
48	140.00	11.83	499	0.02689	4.30	1.293
49	150.00	12.25	499	0.02699	4.32	1.293
50	160.00	12.65	499	0.0271	4.34	1.292
51	170.00	13.04	499	0.02715	4.34	1.292
52	180.00	13.42	499	0.0272	4.35	1.292
53	190.00	13.78	499	0.02726	4.36	1.292
54	200.00	14.14	499	0.02736	4.38	1.291
55	210.00	14.49	499	0.02736	4.38	1.291
56	220.00	14.83	499	0.02736	4.38	1.291
57	230.00	15.17	499	0.02747	4.39	1.291
58	240.00	15.49	499	0.02747	4.39	1.291
59	250.00	15.81	499	0.02757	4.41	1.290
60	260.00	16.12	499	0.02762	4.42	1.290
61	270.00	16.43	499	0.02762	4.42	1.290
62	280.00	16.73	499	0.02752	4.40	1.291
63	290.00	17.03	499	0.02762	4.42	1.290
64	300.00	17.32	499	0.02757	4.41	1.290
65	310.00	17.61	499	0.02762	4.42	1.290
66	320.00	17.89	499	0.02762	4.42	1.290
67	330.00	18.17	499	0.02752	4.40	1.291
68	340.00	18.44	499	0.02747	4.39	1.291
69	350.00	18.71	499	0.02752	4.40	1.291
70	360.00	18.97	499	0.02752	4.40	1.291
71	360.19	18.98	493	0.02757	4.41	1.290

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 2 of 11
Applied Stress: 1e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	499	0.02668	4.27	1.294
2	0.01	0.11	542	0.02668	4.27	1.294
3	0.02	0.14	579	0.02684	4.29	1.293
4	0.03	0.17	606	0.02689	4.30	1.293
5	0.04	0.19	633	0.02694	4.31	1.293
6	0.05	0.23	676	0.0271	4.34	1.292
7	0.07	0.27	703	0.02731	4.37	1.291
8	0.09	0.30	729	0.02747	4.39	1.291
9	0.12	0.35	772	0.02773	4.44	1.290
10	0.17	0.41	821	0.02815	4.50	1.288
11	0.25	0.50	885	0.02899	4.64	1.285
12	0.34	0.58	928	0.02962	4.74	1.283
13	0.50	0.71	987	0.03099	4.96	1.277
14	0.75	0.87	923	0.03188	5.10	1.274
15	1.00	1.00	960	0.03277	5.24	1.271
16	1.50	1.23	955	0.03414	5.46	1.265
17	2.00	1.42	955	0.03519	5.63	1.261
18	3.00	1.73	987	0.03656	5.85	1.256
19	4.00	2.00	987	0.0374	5.98	1.253
20	5.00	2.24	982	0.03803	6.08	1.250
21	6.00	2.45	992	0.0385	6.16	1.249
22	7.00	2.65	992	0.03892	6.23	1.247
23	8.00	2.83	987	0.03913	6.26	1.246
24	9.00	3.00	992	0.03939	6.30	1.245
25	10.00	3.16	992	0.03955	6.33	1.245
26	12.00	3.46	992	0.03986	6.38	1.243
27	14.00	3.74	992	0.04002	6.40	1.243
28	16.00	4.00	992	0.04023	6.44	1.242
29	18.00	4.24	992	0.04044	6.47	1.241
30	20.00	4.47	992	0.0406	6.50	1.241
31	22.00	4.69	998	0.04065	6.50	1.240
32	24.00	4.90	992	0.04076	6.52	1.240
33	26.00	5.10	998	0.04086	6.54	1.240
34	28.00	5.29	992	0.04092	6.55	1.239
35	30.00	5.48	998	0.04102	6.56	1.239
36	35.00	5.92	998	0.04113	6.58	1.238
37	40.00	6.32	998	0.04128	6.61	1.238
38	45.00	6.71	998	0.04144	6.63	1.237
39	50.00	7.07	992	0.04144	6.63	1.237
40	60.00	7.75	998	0.0416	6.66	1.237
41	70.00	8.37	998	0.04165	6.66	1.236
42	80.00	8.94	998	0.04181	6.69	1.236
43	90.00	9.49	998	0.04186	6.70	1.236
44	100.00	10.00	992	0.04191	6.71	1.235
45	110.00	10.49	998	0.04202	6.72	1.235
46	120.00	10.95	998	0.04212	6.74	1.235
47	130.00	11.40	992	0.04218	6.75	1.234
48	140.00	11.83	998	0.04233	6.77	1.234
49	150.00	12.25	998	0.04228	6.76	1.234
50	160.00	12.65	998	0.04239	6.78	1.234
51	170.00	13.04	998	0.04239	6.78	1.234
52	180.00	13.42	998	0.04244	6.79	1.233
53	190.00	13.78	998	0.04244	6.79	1.233
54	200.00	14.14	998	0.04244	6.79	1.233
55	210.00	14.49	998	0.04249	6.80	1.233
56	220.00	14.83	998	0.04254	6.81	1.233
57	230.00	15.17	998	0.04254	6.81	1.233
58	240.00	15.49	1e+003	0.0426	6.82	1.233
59	250.00	15.81	998	0.04249	6.80	1.233
60	260.00	16.12	992	0.0426	6.82	1.233
61	270.00	16.43	998	0.0426	6.82	1.233
62	280.00	16.73	998	0.04254	6.81	1.233
63	290.00	17.03	998	0.04265	6.82	1.233
64	300.00	17.32	998	0.0426	6.82	1.233
65	310.00	17.61	998	0.0427	6.83	1.232
66	320.00	17.89	998	0.0427	6.83	1.232
67	330.00	18.17	998	0.04265	6.82	1.233
68	340.00	18.44	998	0.0427	6.83	1.232
69	350.00	18.71	998	0.0427	6.83	1.232
70	360.00	18.97	998	0.04265	6.82	1.233
71	360.05	18.98	998	0.04265	6.82	1.233

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 3 of 11
Applied Stress: 2e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	998	0.04139	6.62	1.238
2	0.01	0.11	1.12e+003	0.04139	6.62	1.238
3	0.02	0.14	1.22e+003	0.0416	6.66	1.237
4	0.03	0.17	1.3e+003	0.04175	6.68	1.236
5	0.04	0.19	1.35e+003	0.04191	6.71	1.235
6	0.05	0.23	1.43e+003	0.04217	6.75	1.234
7	0.07	0.27	1.49e+003	0.04249	6.80	1.233
8	0.09	0.30	1.54e+003	0.0427	6.83	1.232
9	0.12	0.35	1.63e+003	0.04322	6.92	1.230
10	0.17	0.41	1.73e+003	0.04401	7.04	1.227
11	0.25	0.50	1.86e+003	0.04527	7.24	1.223
12	0.34	0.58	1.89e+003	0.04627	7.40	1.219
13	0.50	0.71	1.9e+003	0.04853	7.76	1.210
14	0.75	0.87	1.9e+003	0.04979	7.97	1.205
15	1.00	1.00	1.98e+003	0.05116	8.18	1.200
16	1.50	1.23	1.97e+003	0.05278	8.45	1.194
17	2.00	1.42	1.97e+003	0.05394	8.63	1.189
18	3.00	1.73	1.97e+003	0.05536	8.86	1.184
19	4.00	2.00	1.98e+003	0.0562	8.99	1.181
20	5.00	2.24	1.98e+003	0.05672	9.08	1.179
21	6.00	2.45	1.99e+003	0.0572	9.15	1.177
22	7.00	2.65	1.99e+003	0.05741	9.19	1.176
23	8.00	2.83	1.98e+003	0.05772	9.24	1.175
24	9.00	3.00	1.99e+003	0.05788	9.26	1.174
25	10.00	3.16	1.99e+003	0.05798	9.28	1.174
26	12.00	3.46	1.99e+003	0.0583	9.33	1.173
27	14.00	3.74	1.99e+003	0.05846	9.35	1.172
28	16.00	4.00	1.99e+003	0.05856	9.37	1.172
29	18.00	4.24	1.99e+003	0.05862	9.38	1.171
30	20.00	4.47	2e+003	0.05862	9.38	1.171
31	22.00	4.69	2e+003	0.05856	9.37	1.172
32	24.00	4.90	2e+003	0.05867	9.39	1.171
33	26.00	5.10	2e+003	0.05867	9.39	1.171
34	28.00	5.29	2e+003	0.05872	9.40	1.171
35	30.00	5.48	2e+003	0.05877	9.40	1.171
36	35.00	5.92	1.99e+003	0.05888	9.42	1.170
37	40.00	6.32	2e+003	0.05904	9.45	1.170
38	45.00	6.71	2e+003	0.05914	9.46	1.169
39	50.00	7.07	1.99e+003	0.0593	9.49	1.169
40	60.00	7.75	2e+003	0.05951	9.52	1.168
41	70.00	8.37	2e+003	0.05972	9.55	1.167
42	80.00	8.94	2e+003	0.05982	9.57	1.167
43	90.00	9.49	2e+003	0.06009	9.61	1.166
44	100.00	10.00	2e+003	0.06024	9.64	1.165
45	110.00	10.49	2e+003	0.06035	9.66	1.165
46	120.00	10.95	2e+003	0.06051	9.68	1.164
47	130.00	11.40	2e+003	0.06061	9.70	1.164
48	140.00	11.83	2e+003	0.06072	9.71	1.163
49	150.00	12.25	2e+003	0.06087	9.74	1.163
50	160.00	12.65	2e+003	0.06093	9.75	1.163
51	170.00	13.04	2e+003	0.06108	9.77	1.162
52	180.00	13.42	2e+003	0.06124	9.80	1.161
53	190.00	13.78	2e+003	0.06129	9.81	1.161
54	200.00	14.14	2e+003	0.06145	9.83	1.161
55	210.00	14.49	2e+003	0.0615	9.84	1.160
56	220.00	14.83	2e+003	0.06166	9.87	1.160
57	230.00	15.17	2e+003	0.06182	9.89	1.159
58	240.00	15.49	2e+003	0.06198	9.92	1.159
59	250.00	15.81	2e+003	0.06224	9.96	1.158
60	260.00	16.12	1.99e+003	0.06313	10.10	1.154
61	270.00	16.43	1.99e+003	0.07038	11.26	1.126
62	280.00	16.73	2e+003	0.07169	11.47	1.121
63	290.00	17.03	2e+003	0.07222	11.56	1.119
64	300.00	17.32	2e+003	0.07275	11.64	1.117
65	310.00	17.61	2e+003	0.07311	11.70	1.116
66	320.00	17.89	2e+003	0.07338	11.74	1.115
67	330.00	18.17	2e+003	0.07359	11.77	1.114
68	340.00	18.44	2e+003	0.0738	11.81	1.113
69	350.00	18.71	2e+003	0.0739	11.82	1.113
70	360.00	18.97	2e+003	0.07401	11.84	1.112
71	370.00	19.24	2e+003	0.07401	11.84	1.112
72	380.00	19.49	2e+003	0.07406	11.85	1.112

73	390.00	19.75	2e+003	0.07416	11.87	1.112
74	400.00	20.00	2e+003	0.07422	11.87	1.112
75	410.00	20.25	2e+003	0.07432	11.89	1.111
76	420.00	20.49	2e+003	0.07437	11.90	1.111
77	430.00	20.74	2e+003	0.07443	11.91	1.111
78	440.00	20.98	2e+003	0.07453	11.92	1.110
79	450.00	21.21	2e+003	0.07453	11.92	1.110
80	460.00	21.45	2e+003	0.07458	11.93	1.110
81	470.00	21.68	2e+003	0.07458	11.93	1.110
82	480.00	21.91	2e+003	0.07458	11.93	1.110
83	490.00	22.14	2e+003	0.07469	11.95	1.110
84	500.00	22.36	2e+003	0.07474	11.96	1.110
85	510.00	22.58	2e+003	0.07474	11.96	1.110
86	515.43	22.70	1.99e+003	0.07479	11.97	1.109

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 4 of 11
Applied Stress: 4e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	2e+003	0.0728	11.65	1.117
2	0.01	0.11	2.34e+003	0.0729	11.66	1.117
3	0.02	0.14	2.56e+003	0.07322	11.71	1.115
4	0.03	0.17	2.7e+003	0.07348	11.76	1.114
5	0.04	0.19	2.82e+003	0.07374	11.80	1.113
6	0.05	0.23	2.99e+003	0.07427	11.88	1.111
7	0.07	0.27	3.11e+003	0.07474	11.96	1.110
8	0.09	0.30	3.21e+003	0.07521	12.03	1.108
9	0.12	0.35	3.37e+003	0.07611	12.18	1.104
10	0.17	0.41	3.55e+003	0.07732	12.37	1.100
11	0.25	0.50	3.8e+003	0.07936	12.70	1.092
12	0.34	0.58	3.95e+003	0.08105	12.97	1.085
13	0.50	0.71	3.74e+003	0.08273	13.24	1.079
14	0.75	0.87	3.92e+003	0.08519	13.63	1.070
15	1.00	1.00	3.83e+003	0.08693	13.91	1.063
16	1.50	1.23	3.88e+003	0.08929	14.29	1.054
17	2.00	1.42	3.92e+003	0.09087	14.54	1.048
18	3.00	1.73	3.96e+003	0.09255	14.81	1.041
19	4.00	2.00	3.98e+003	0.09334	14.93	1.038
20	5.00	2.24	3.99e+003	0.09386	15.02	1.036
21	6.00	2.45	3.99e+003	0.09418	15.07	1.035
22	7.00	2.65	3.99e+003	0.09449	15.12	1.034
23	8.00	2.83	3.99e+003	0.0947	15.15	1.033
24	9.00	3.00	3.99e+003	0.09491	15.19	1.032
25	10.00	3.16	3.99e+003	0.09507	15.21	1.032
26	12.00	3.46	3.99e+003	0.09528	15.24	1.031
27	14.00	3.74	3.99e+003	0.09549	15.28	1.030
28	16.00	4.00	3.99e+003	0.0957	15.31	1.029
29	18.00	4.24	3.99e+003	0.09575	15.32	1.029
30	20.00	4.47	4e+003	0.09591	15.35	1.028
31	22.00	4.69	3.99e+003	0.09607	15.37	1.028
32	24.00	4.90	4e+003	0.09617	15.39	1.027
33	26.00	5.10	3.99e+003	0.09628	15.40	1.027
34	28.00	5.29	4e+003	0.09638	15.42	1.027
35	30.00	5.48	4e+003	0.09638	15.42	1.027
36	35.00	5.92	3.99e+003	0.09659	15.45	1.026
37	40.00	6.32	3.99e+003	0.09675	15.48	1.025
38	45.00	6.71	4e+003	0.09686	15.50	1.025
39	50.00	7.07	4e+003	0.09701	15.52	1.024
40	60.00	7.75	4e+003	0.09722	15.56	1.023
41	70.00	8.37	4e+003	0.09733	15.57	1.023
42	80.00	8.94	4e+003	0.09743	15.59	1.023
43	90.00	9.49	4e+003	0.09749	15.60	1.022
44	100.00	10.00	4e+003	0.09754	15.61	1.022
45	110.00	10.49	4e+003	0.0977	15.63	1.022
46	120.00	10.95	4e+003	0.0977	15.63	1.022
47	130.00	11.40	4e+003	0.09775	15.64	1.021
48	140.00	11.83	3.99e+003	0.0978	15.65	1.021
49	150.00	12.25	4e+003	0.09785	15.66	1.021
50	160.00	12.65	4e+003	0.09791	15.67	1.021
51	170.00	13.04	4e+003	0.09801	15.68	1.020
52	180.00	13.42	4e+003	0.09817	15.71	1.020
53	190.00	13.78	4e+003	0.09817	15.71	1.020
54	200.00	14.14	4e+003	0.09817	15.71	1.020
55	210.00	14.49	4e+003	0.09822	15.72	1.020
56	220.00	14.83	4e+003	0.09822	15.72	1.020
57	230.00	15.17	4e+003	0.09827	15.72	1.019
58	240.00	15.49	4e+003	0.09827	15.72	1.019
59	250.00	15.81	4e+003	0.09833	15.73	1.019
60	260.00	16.12	4e+003	0.09833	15.73	1.019
61	270.00	16.43	4e+003	0.09833	15.73	1.019
62	280.00	16.73	4e+003	0.09833	15.73	1.019
63	290.00	17.03	4e+003	0.09827	15.72	1.019
64	300.00	17.32	4e+003	0.09833	15.73	1.019
65	310.00	17.61	4e+003	0.09838	15.74	1.019
66	320.00	17.89	4e+003	0.09838	15.74	1.019
67	330.00	18.17	4e+003	0.09838	15.74	1.019
68	340.00	18.44	4e+003	0.09848	15.76	1.019
69	350.00	18.71	4e+003	0.09854	15.77	1.018
70	360.00	18.97	4e+003	0.09859	15.77	1.018
71	360.21	18.98	4e+003	0.09859	15.77	1.018

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 5 of 11
Applied Stress: 8e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	4e+003	0.09575	15.32	1.029
2	0.01	0.11	4.9e+003	0.09586	15.34	1.029
3	0.02	0.14	5.53e+003	0.09649	15.44	1.026
4	0.03	0.17	5.88e+003	0.09702	15.52	1.024
5	0.04	0.19	6.15e+003	0.09744	15.59	1.023
6	0.05	0.23	6.5e+003	0.09833	15.73	1.019
7	0.07	0.27	6.77e+003	0.09896	15.83	1.017
8	0.09	0.30	6.99e+003	0.09969	15.95	1.014
9	0.12	0.35	7.34e+003	0.101	16.15	1.009
10	0.17	0.41	7.64e+003	0.1025	16.40	1.003
11	0.25	0.50	7.99e+003	0.1047	16.75	0.995
12	0.34	0.58	7.57e+003	0.1056	16.90	0.991
13	0.50	0.71	7.86e+003	0.1078	17.25	0.983
14	0.75	0.87	7.81e+003	0.1099	17.58	0.975
15	1.00	1.00	7.96e+003	0.1113	17.80	0.970
16	1.50	1.23	7.94e+003	0.1127	18.03	0.964
17	2.00	1.42	7.96e+003	0.1135	18.16	0.961
18	3.00	1.73	7.98e+003	0.1143	18.29	0.958
19	4.00	2.00	7.99e+003	0.1148	18.36	0.956
20	5.00	2.24	7.99e+003	0.1151	18.41	0.955
21	6.00	2.45	7.99e+003	0.1153	18.46	0.954
22	7.00	2.65	7.99e+003	0.1155	18.48	0.953
23	8.00	2.83	7.99e+003	0.1157	18.51	0.953
24	9.00	3.00	7.99e+003	0.1158	18.52	0.952
25	10.00	3.16	7.99e+003	0.1159	18.54	0.952
26	12.00	3.46	8e+003	0.1161	18.57	0.951
27	14.00	3.74	7.99e+003	0.1162	18.60	0.951
28	16.00	4.00	7.99e+003	0.1164	18.62	0.950
29	18.00	4.24	7.99e+003	0.1165	18.64	0.950
30	20.00	4.47	8e+003	0.1167	18.67	0.949
31	22.00	4.69	8e+003	0.1167	18.67	0.949
32	24.00	4.90	8e+003	0.1168	18.69	0.948
33	26.00	5.10	8e+003	0.1169	18.70	0.948
34	28.00	5.29	7.99e+003	0.1169	18.71	0.948
35	30.00	5.48	8e+003	0.117	18.72	0.947
36	35.00	5.92	8e+003	0.1172	18.75	0.947
37	40.00	6.32	8e+003	0.1173	18.78	0.946
38	45.00	6.71	8e+003	0.1174	18.78	0.946
39	50.00	7.07	8e+003	0.1175	18.80	0.946
40	60.00	7.75	8e+003	0.1177	18.83	0.945
41	70.00	8.37	8e+003	0.1179	18.86	0.944
42	80.00	8.94	8e+003	0.1179	18.86	0.944
43	90.00	9.49	7.99e+003	0.118	18.88	0.944
44	100.00	10.00	8e+003	0.1181	18.90	0.943
45	110.00	10.49	7.99e+003	0.1182	18.92	0.943
46	120.00	10.95	7.99e+003	0.1184	18.94	0.942
47	130.00	11.40	8e+003	0.1184	18.94	0.942
48	140.00	11.83	8e+003	0.1185	18.96	0.942
49	150.00	12.25	8e+003	0.1185	18.96	0.942
50	160.00	12.65	8e+003	0.1186	18.97	0.942
51	170.00	13.04	8e+003	0.1187	18.99	0.941
52	180.00	13.42	8e+003	0.1187	18.99	0.941
53	190.00	13.78	8e+003	0.1187	18.99	0.941
54	200.00	14.14	8e+003	0.1188	19.00	0.941
55	210.00	14.49	8e+003	0.1188	19.00	0.941
56	220.00	14.83	7.99e+003	0.1188	19.00	0.941
57	230.00	15.17	8e+003	0.1188	19.01	0.941
58	240.00	15.49	8e+003	0.1189	19.02	0.940
59	250.00	15.81	8e+003	0.1189	19.02	0.940
60	260.00	16.12	8e+003	0.1189	19.03	0.940
61	270.00	16.43	8e+003	0.119	19.04	0.940
62	280.00	16.73	8e+003	0.119	19.04	0.940
63	290.00	17.03	8e+003	0.119	19.04	0.940
64	300.00	17.32	7.99e+003	0.1189	19.03	0.940
65	310.00	17.61	8e+003	0.119	19.04	0.940
66	320.00	17.89	8e+003	0.119	19.04	0.940
67	330.00	18.17	8e+003	0.119	19.04	0.940
68	340.00	18.44	8e+003	0.1191	19.05	0.940
69	350.00	18.71	8e+003	0.1191	19.05	0.940
70	360.00	18.97	8e+003	0.1191	19.05	0.940
71	360.17	18.98	7.99e+003	0.1191	19.05	0.940

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 6 of 11
Applied Stress: 2e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	8e+003	0.1216	19.46	0.930
2	0.01	0.11	7.32e+003	0.1216	19.46	0.930
3	0.02	0.14	5.41e+003	0.1208	19.32	0.933
4	0.03	0.17	4.36e+003	0.12	19.20	0.936
5	0.04	0.19	3.76e+003	0.1194	19.11	0.938
6	0.05	0.23	3.08e+003	0.1187	18.99	0.941
7	0.07	0.27	2.69e+003	0.118	18.88	0.944
8	0.09	0.30	2.43e+003	0.1176	18.81	0.945
9	0.12	0.35	2.09e+003	0.1167	18.67	0.949
10	0.17	0.41	2.23e+003	0.1161	18.58	0.951
11	0.25	0.50	2.13e+003	0.1156	18.50	0.953
12	0.34	0.58	2.05e+003	0.1152	18.43	0.955
13	0.50	0.71	2.05e+003	0.1148	18.37	0.956
14	0.75	0.87	2.02e+003	0.1145	18.31	0.957
15	1.00	1.00	2e+003	0.1143	18.30	0.958
16	1.50	1.23	2e+003	0.1142	18.27	0.958
17	2.00	1.42	2e+003	0.1141	18.25	0.959
18	3.00	1.73	2e+003	0.114	18.25	0.959
19	4.00	2.00	2e+003	0.1139	18.23	0.959
20	5.00	2.24	2e+003	0.1139	18.22	0.960
21	6.00	2.45	2e+003	0.1139	18.22	0.960
22	7.00	2.65	2e+003	0.1139	18.22	0.960
23	8.00	2.83	2e+003	0.1138	18.21	0.960
24	9.00	3.00	2e+003	0.1138	18.21	0.960
25	10.00	3.16	2e+003	0.1138	18.20	0.960
26	12.00	3.46	2e+003	0.1137	18.19	0.960
27	14.00	3.74	2e+003	0.1137	18.19	0.960
28	16.00	4.00	2e+003	0.1137	18.19	0.960
29	18.00	4.24	2e+003	0.1137	18.19	0.960
30	20.00	4.47	2e+003	0.1137	18.19	0.960
31	22.00	4.69	2e+003	0.1137	18.19	0.960
32	24.00	4.90	2e+003	0.1137	18.19	0.960
33	26.00	5.10	2e+003	0.1136	18.18	0.961
34	28.00	5.29	2e+003	0.1137	18.19	0.960
35	30.00	5.48	2e+003	0.1137	18.19	0.960
36	35.00	5.92	2e+003	0.1136	18.18	0.961
37	40.00	6.32	2e+003	0.1135	18.16	0.961
38	45.00	6.71	2e+003	0.1136	18.17	0.961
39	50.00	7.07	2e+003	0.1135	18.15	0.961
40	60.00	7.75	2e+003	0.1135	18.15	0.961
41	70.00	8.37	2e+003	0.1134	18.14	0.961
42	80.00	8.94	2e+003	0.1133	18.14	0.962
43	90.00	9.49	2e+003	0.1134	18.14	0.961
44	100.00	10.00	2e+003	0.1133	18.13	0.962
45	110.00	10.49	2e+003	0.1133	18.13	0.962
46	120.00	10.95	2e+003	0.1133	18.13	0.962
47	130.00	11.40	2e+003	0.1132	18.12	0.962
48	140.00	11.83	2e+003	0.1132	18.12	0.962
49	150.00	12.25	2e+003	0.1133	18.13	0.962
50	160.00	12.65	2e+003	0.1133	18.13	0.962
51	170.00	13.04	2e+003	0.1133	18.13	0.962
52	180.00	13.42	2e+003	0.1133	18.13	0.962
53	190.00	13.78	2e+003	0.1132	18.12	0.962
54	200.00	14.14	2e+003	0.1132	18.12	0.962
55	210.00	14.49	2e+003	0.1132	18.12	0.962
56	220.00	14.83	2e+003	0.1133	18.13	0.962
57	230.00	15.17	2e+003	0.1132	18.12	0.962
58	240.00	15.49	2e+003	0.1132	18.12	0.962
59	250.00	15.81	2e+003	0.1135	18.15	0.961
60	260.00	16.12	2e+003	0.1134	18.14	0.961
61	270.00	16.43	1.99e+003	0.1134	18.14	0.961
62	280.00	16.73	2e+003	0.1135	18.16	0.961
63	290.00	17.03	2e+003	0.1133	18.14	0.962
64	300.00	17.32	2e+003	0.1134	18.14	0.961
65	310.00	17.61	2e+003	0.1134	18.14	0.961
66	320.00	17.89	2e+003	0.1134	18.14	0.961
67	330.00	18.17	2e+003	0.1134	18.14	0.961
68	340.00	18.44	2e+003	0.1134	18.14	0.961
69	350.00	18.71	2e+003	0.1135	18.15	0.961
70	360.00	18.97	2e+003	0.1134	18.14	0.961
71	360.10	18.98	2e+003	0.1134	18.14	0.961

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 7 of 11
Applied Stress: 500 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	2e+003	0.1144	18.31	0.957
2	0.01	0.11	2e+003	0.1144	18.31	0.957
3	0.02	0.14	1.75e+003	0.1143	18.30	0.958
4	0.03	0.17	1.49e+003	0.1141	18.25	0.959
5	0.04	0.19	1.32e+003	0.1139	18.22	0.960
6	0.05	0.23	1.12e+003	0.1136	18.17	0.961
7	0.07	0.27	992	0.1132	18.11	0.962
8	0.09	0.30	906	0.1129	18.07	0.963
9	0.12	0.35	778	0.1124	17.98	0.965
10	0.17	0.41	654	0.1117	17.87	0.968
11	0.25	0.50	526	0.1106	17.70	0.972
12	0.34	0.58	628	0.1102	17.64	0.973
13	0.50	0.71	579	0.1096	17.53	0.976
14	0.75	0.87	510	0.1086	17.37	0.980
15	1.00	1.00	542	0.1081	17.29	0.982
16	1.50	1.23	531	0.1074	17.19	0.984
17	2.00	1.42	515	0.1069	17.11	0.986
18	3.00	1.73	504	0.1063	17.00	0.989
19	4.00	2.00	510	0.1059	16.95	0.990
20	5.00	2.24	504	0.1058	16.93	0.991
21	6.00	2.45	504	0.1056	16.89	0.991
22	7.00	2.65	504	0.1055	16.88	0.992
23	8.00	2.83	504	0.1055	16.88	0.992
24	9.00	3.00	499	0.1054	16.87	0.992
25	10.00	3.16	504	0.1053	16.85	0.992
26	12.00	3.46	504	0.1053	16.85	0.992
27	14.00	3.74	499	0.1052	16.83	0.993
28	16.00	4.00	499	0.1052	16.82	0.993
29	18.00	4.24	499	0.1052	16.82	0.993
30	20.00	4.47	499	0.105	16.81	0.993
31	22.00	4.69	499	0.105	16.81	0.993
32	24.00	4.90	499	0.105	16.80	0.994
33	26.00	5.10	499	0.105	16.80	0.994
34	28.00	5.29	499	0.1049	16.79	0.994
35	30.00	5.48	499	0.1049	16.79	0.994
36	35.00	5.92	499	0.1049	16.78	0.994
37	40.00	6.32	499	0.1048	16.77	0.994
38	45.00	6.71	499	0.1048	16.77	0.994
39	50.00	7.07	504	0.1047	16.76	0.995
40	60.00	7.75	499	0.1047	16.76	0.995
41	70.00	8.37	499	0.1047	16.75	0.995
42	80.00	8.94	499	0.1047	16.75	0.995
43	90.00	9.49	499	0.1046	16.74	0.995
44	100.00	10.00	499	0.1046	16.74	0.995
45	110.00	10.49	499	0.1046	16.74	0.995
46	120.00	10.95	499	0.1046	16.73	0.995
47	130.00	11.40	499	0.1045	16.71	0.996
48	140.00	11.83	499	0.1044	16.71	0.996
49	150.00	12.25	499	0.1044	16.71	0.996
50	160.00	12.65	499	0.1044	16.71	0.996
51	170.00	13.04	499	0.1044	16.70	0.996
52	180.00	13.42	499	0.1044	16.71	0.996
53	190.00	13.78	499	0.1044	16.71	0.996
54	200.00	14.14	499	0.1044	16.71	0.996
55	210.00	14.49	499	0.1044	16.71	0.996
56	220.00	14.83	499	0.1044	16.70	0.996
57	230.00	15.17	499	0.1043	16.69	0.996
58	240.00	15.49	499	0.1044	16.70	0.996
59	250.00	15.81	499	0.1043	16.69	0.996
60	260.00	16.12	499	0.1043	16.69	0.996
61	270.00	16.43	499	0.1043	16.69	0.996
62	280.00	16.73	499	0.1043	16.69	0.996
63	290.00	17.03	499	0.1043	16.69	0.996
64	300.00	17.32	499	0.1043	16.68	0.996
65	310.00	17.61	499	0.1043	16.68	0.996
66	320.00	17.89	499	0.1043	16.68	0.996
67	330.00	18.17	499	0.1043	16.68	0.996
68	340.00	18.44	499	0.1043	16.68	0.996
69	350.00	18.71	499	0.1043	16.68	0.996
70	360.00	18.97	499	0.1043	16.68	0.996
71	360.11	18.98	499	0.1043	16.68	0.996

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 8 of 11
Applied Stress: 1e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	499	0.1039	16.62	0.998
2	0.01	0.11	499	0.1039	16.62	0.998
3	0.02	0.14	499	0.1039	16.62	0.998
4	0.03	0.17	499	0.1039	16.62	0.998
5	0.04	0.19	504	0.1039	16.62	0.998
6	0.05	0.23	579	0.1039	16.63	0.998
7	0.07	0.27	697	0.1041	16.66	0.997
8	0.09	0.30	783	0.1043	16.68	0.996
9	0.12	0.35	885	0.1045	16.72	0.995
10	0.17	0.41	965	0.1048	16.77	0.994
11	0.25	0.50	939	0.105	16.81	0.993
12	0.34	0.58	955	0.1052	16.83	0.993
13	0.50	0.71	987	0.1055	16.88	0.992
14	0.75	0.87	987	0.1057	16.91	0.991
15	1.00	1.00	987	0.1058	16.93	0.990
16	1.50	1.23	992	0.1059	16.95	0.990
17	2.00	1.42	998	0.106	16.97	0.990
18	3.00	1.73	998	0.1061	16.98	0.989
19	4.00	2.00	998	0.1061	16.98	0.989
20	5.00	2.24	992	0.1062	16.98	0.989
21	6.00	2.45	998	0.1062	16.98	0.989
22	7.00	2.65	998	0.1062	16.98	0.989
23	8.00	2.83	998	0.1061	16.98	0.989
24	9.00	3.00	998	0.1062	16.98	0.989
25	10.00	3.16	998	0.1062	16.98	0.989
26	12.00	3.46	998	0.1062	16.99	0.989
27	14.00	3.74	998	0.1063	17.00	0.989
28	16.00	4.00	998	0.1062	16.99	0.989
29	18.00	4.24	998	0.1063	17.00	0.989
30	20.00	4.47	998	0.1062	16.99	0.989
31	22.00	4.69	998	0.1062	16.99	0.989
32	24.00	4.90	998	0.1062	16.99	0.989
33	26.00	5.10	992	0.1062	16.99	0.989
34	28.00	5.29	998	0.1063	17.00	0.989
35	30.00	5.48	998	0.1063	17.00	0.989
36	35.00	5.92	998	0.1062	16.99	0.989
37	40.00	6.32	998	0.1062	16.99	0.989
38	45.00	6.71	998	0.1062	16.99	0.989
39	50.00	7.07	998	0.1063	17.00	0.989
40	60.00	7.75	998	0.1063	17.01	0.989
41	70.00	8.37	998	0.1064	17.02	0.988
42	80.00	8.94	998	0.1064	17.02	0.988
43	90.00	9.49	998	0.1064	17.02	0.988
44	100.00	10.00	998	0.1064	17.02	0.988
45	110.00	10.49	998	0.1064	17.03	0.988
46	120.00	10.95	1e+003	0.1063	17.01	0.989
47	130.00	11.40	998	0.1064	17.03	0.988
48	140.00	11.83	998	0.1064	17.03	0.988
49	150.00	12.25	998	0.1064	17.03	0.988
50	160.00	12.65	998	0.1064	17.03	0.988
51	170.00	13.04	998	0.1064	17.03	0.988
52	180.00	13.42	998	0.1065	17.03	0.988
53	190.00	13.78	998	0.1064	17.03	0.988
54	200.00	14.14	998	0.1065	17.03	0.988
55	210.00	14.49	998	0.1064	17.03	0.988
56	220.00	14.83	998	0.1064	17.03	0.988
57	230.00	15.17	998	0.1065	17.03	0.988
58	240.00	15.49	992	0.1064	17.03	0.988
59	250.00	15.81	998	0.1065	17.03	0.988
60	260.00	16.12	998	0.1065	17.03	0.988
61	270.00	16.43	998	0.1065	17.03	0.988
62	280.00	16.73	998	0.1065	17.03	0.988
63	290.00	17.03	998	0.1065	17.03	0.988
64	300.00	17.32	1e+003	0.1065	17.03	0.988
65	310.00	17.61	998	0.1065	17.03	0.988
66	320.00	17.89	998	0.1065	17.03	0.988
67	330.00	18.17	998	0.1064	17.03	0.988
68	340.00	18.44	998	0.1064	17.03	0.988
69	350.00	18.71	992	0.1065	17.03	0.988
70	360.00	18.97	1e+003	0.1065	17.03	0.988
71	360.07	18.98	998	0.1065	17.03	0.988

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 9 of 11
Applied Stress: 2e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	998	0.1057	16.92	0.991
2	0.01	0.11	1.15e+003	0.1058	16.93	0.991
3	0.02	0.14	1.29e+003	0.106	16.96	0.990
4	0.03	0.17	1.38e+003	0.1061	16.98	0.989
5	0.04	0.19	1.46e+003	0.1063	17.00	0.989
6	0.05	0.23	1.57e+003	0.1065	17.04	0.988
7	0.07	0.27	1.66e+003	0.1067	17.08	0.987
8	0.09	0.30	1.72e+003	0.1069	17.10	0.986
9	0.12	0.35	1.81e+003	0.1072	17.15	0.985
10	0.17	0.41	1.91e+003	0.1077	17.23	0.983
11	0.25	0.50	1.91e+003	0.1081	17.30	0.982
12	0.34	0.58	1.9e+003	0.1084	17.34	0.981
13	0.50	0.71	1.97e+003	0.1088	17.41	0.979
14	0.75	0.87	1.97e+003	0.1091	17.46	0.978
15	1.00	1.00	1.97e+003	0.1094	17.50	0.977
16	1.50	1.23	1.99e+003	0.1096	17.53	0.976
17	2.00	1.42	1.99e+003	0.1097	17.55	0.976
18	3.00	1.73	2e+003	0.1098	17.56	0.975
19	4.00	2.00	1.99e+003	0.1099	17.58	0.975
20	5.00	2.24	2e+003	0.1098	17.57	0.975
21	6.00	2.45	1.99e+003	0.1099	17.59	0.975
22	7.00	2.65	2e+003	0.11	17.60	0.974
23	8.00	2.83	2e+003	0.1099	17.59	0.975
24	9.00	3.00	2e+003	0.11	17.60	0.974
25	10.00	3.16	2e+003	0.11	17.60	0.974
26	12.00	3.46	2e+003	0.11	17.60	0.974
27	14.00	3.74	2e+003	0.11	17.60	0.974
28	16.00	4.00	1.99e+003	0.11	17.61	0.974
29	18.00	4.24	2e+003	0.11	17.61	0.974
30	20.00	4.47	2e+003	0.11	17.61	0.974
31	22.00	4.69	2e+003	0.11	17.61	0.974
32	24.00	4.90	2e+003	0.11	17.61	0.974
33	26.00	5.10	2e+003	0.11	17.61	0.974
34	28.00	5.29	2e+003	0.11	17.61	0.974
35	30.00	5.48	2e+003	0.11	17.61	0.974
36	35.00	5.92	2e+003	0.1101	17.61	0.974
37	40.00	6.32	2e+003	0.1101	17.61	0.974
38	45.00	6.71	2e+003	0.1101	17.61	0.974
39	50.00	7.07	2e+003	0.1101	17.61	0.974
40	60.00	7.75	2e+003	0.11	17.61	0.974
41	70.00	8.37	2e+003	0.11	17.61	0.974
42	80.00	8.94	2e+003	0.1101	17.61	0.974
43	90.00	9.49	2e+003	0.1101	17.61	0.974
44	100.00	10.00	2e+003	0.1101	17.62	0.974
45	110.00	10.49	2e+003	0.1101	17.61	0.974
46	120.00	10.95	1.99e+003	0.11	17.61	0.974
47	130.00	11.40	2e+003	0.11	17.61	0.974
48	140.00	11.83	1.99e+003	0.1101	17.62	0.974
49	150.00	12.25	2e+003	0.1101	17.61	0.974
50	160.00	12.65	2e+003	0.1101	17.61	0.974
51	170.00	13.04	2e+003	0.1101	17.61	0.974
52	180.00	13.42	2e+003	0.1101	17.62	0.974
53	190.00	13.78	2e+003	0.1102	17.63	0.974
54	200.00	14.14	2e+003	0.1101	17.62	0.974
55	210.00	14.49	2e+003	0.1101	17.62	0.974
56	220.00	14.83	2e+003	0.1101	17.62	0.974
57	230.00	15.17	2e+003	0.1101	17.62	0.974
58	240.00	15.49	2e+003	0.1101	17.62	0.974
59	250.00	15.81	2e+003	0.1101	17.62	0.974
60	260.00	16.12	2e+003	0.1101	17.62	0.974
61	270.00	16.43	2e+003	0.1102	17.63	0.974
62	280.00	16.73	2e+003	0.1102	17.63	0.974
63	290.00	17.03	2e+003	0.1101	17.62	0.974
64	300.00	17.32	2e+003	0.1102	17.63	0.974
65	310.00	17.61	2e+003	0.1102	17.63	0.974
66	320.00	17.89	2e+003	0.1102	17.63	0.974
67	330.00	18.17	2e+003	0.1101	17.62	0.974
68	340.00	18.44	2e+003	0.1103	17.64	0.973
69	350.00	18.71	2e+003	0.1102	17.63	0.974
70	360.00	18.97	2e+003	0.1102	17.63	0.974
71	360.07	18.98	2e+003	0.1102	17.63	0.974

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 10 of 11
Applied Stress: 4e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	2e+003	0.1093	17.48	0.977
2	0.01	0.11	2.33e+003	0.1093	17.49	0.977
3	0.02	0.14	2.69e+003	0.1097	17.55	0.976
4	0.03	0.17	2.91e+003	0.1099	17.59	0.975
5	0.04	0.19	3.08e+003	0.1101	17.61	0.974
6	0.05	0.23	3.33e+003	0.1106	17.69	0.972
7	0.07	0.27	3.5e+003	0.1109	17.74	0.971
8	0.09	0.30	3.61e+003	0.1112	17.79	0.970
9	0.12	0.35	3.79e+003	0.1117	17.87	0.968
10	0.17	0.41	3.95e+003	0.1122	17.96	0.966
11	0.25	0.50	3.85e+003	0.1127	18.03	0.964
12	0.34	0.58	3.92e+003	0.113	18.08	0.963
13	0.50	0.71	3.94e+003	0.1135	18.15	0.961
14	0.75	0.87	3.97e+003	0.1137	18.19	0.960
15	1.00	1.00	3.99e+003	0.1138	18.21	0.960
16	1.50	1.23	3.99e+003	0.114	18.24	0.959
17	2.00	1.42	3.99e+003	0.114	18.24	0.959
18	3.00	1.73	4e+003	0.1141	18.26	0.959
19	4.00	2.00	4e+003	0.1141	18.26	0.959
20	5.00	2.24	4e+003	0.1142	18.28	0.958
21	6.00	2.45	4e+003	0.1142	18.28	0.958
22	7.00	2.65	4e+003	0.1143	18.29	0.958
23	8.00	2.83	4e+003	0.1143	18.29	0.958
24	9.00	3.00	4e+003	0.1143	18.29	0.958
25	10.00	3.16	4e+003	0.1143	18.29	0.958
26	12.00	3.46	4e+003	0.1143	18.30	0.958
27	14.00	3.74	3.99e+003	0.1143	18.30	0.958
28	16.00	4.00	4e+003	0.1145	18.31	0.957
29	18.00	4.24	4e+003	0.1145	18.31	0.957
30	20.00	4.47	4e+003	0.1145	18.31	0.957
31	22.00	4.69	4e+003	0.1145	18.32	0.957
32	24.00	4.90	4e+003	0.1145	18.31	0.957
33	26.00	5.10	4e+003	0.1145	18.32	0.957
34	28.00	5.29	4e+003	0.1146	18.33	0.957
35	30.00	5.48	4e+003	0.1145	18.32	0.957
36	35.00	5.92	4e+003	0.1146	18.33	0.957
37	40.00	6.32	4e+003	0.1146	18.34	0.957
38	45.00	6.71	4e+003	0.1146	18.34	0.957
39	50.00	7.07	4e+003	0.1146	18.34	0.957
40	60.00	7.75	4e+003	0.1147	18.35	0.957
41	70.00	8.37	4e+003	0.1147	18.35	0.957
42	80.00	8.94	4e+003	0.1147	18.35	0.956
43	90.00	9.49	4e+003	0.1147	18.35	0.956
44	100.00	10.00	4e+003	0.1148	18.36	0.956
45	110.00	10.49	4e+003	0.1148	18.36	0.956
46	120.00	10.95	4e+003	0.1147	18.35	0.956
47	130.00	11.40	4e+003	0.1148	18.36	0.956
48	140.00	11.83	4e+003	0.1147	18.35	0.956
49	150.00	12.25	4e+003	0.1147	18.35	0.956
50	160.00	12.65	4e+003	0.1148	18.36	0.956
51	170.00	13.04	4e+003	0.1148	18.36	0.956
52	180.00	13.42	4e+003	0.1148	18.36	0.956
53	190.00	13.78	4e+003	0.1148	18.37	0.956
54	200.00	14.14	4e+003	0.1147	18.35	0.956
55	210.00	14.49	4e+003	0.1147	18.35	0.956
56	220.00	14.83	4e+003	0.1148	18.36	0.956
57	230.00	15.17	4e+003	0.1148	18.36	0.956
58	240.00	15.49	4e+003	0.1148	18.36	0.956
59	250.00	15.81	4e+003	0.1147	18.35	0.956
60	260.00	16.12	4e+003	0.1148	18.36	0.956
61	270.00	16.43	4e+003	0.1148	18.37	0.956
62	280.00	16.73	4e+003	0.1148	18.36	0.956
63	290.00	17.03	4e+003	0.1148	18.37	0.956
64	300.00	17.32	4e+003	0.1148	18.36	0.956
65	310.00	17.61	4e+003	0.1148	18.36	0.956
66	320.00	17.89	4e+003	0.1148	18.37	0.956
67	330.00	18.17	4e+003	0.1148	18.36	0.956
68	340.00	18.44	4e+003	0.1147	18.35	0.957
69	350.00	18.71	4e+003	0.1147	18.35	0.956
70	360.00	18.97	4e+003	0.1147	18.35	0.956
71	360.10	18.98	4e+003	0.1148	18.36	0.956

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: U-5
Test No.: 8087U5C

Location: SR-90
Tested By: LHB
Test Date: 11-12-08
Sample Type: Shelby Tub

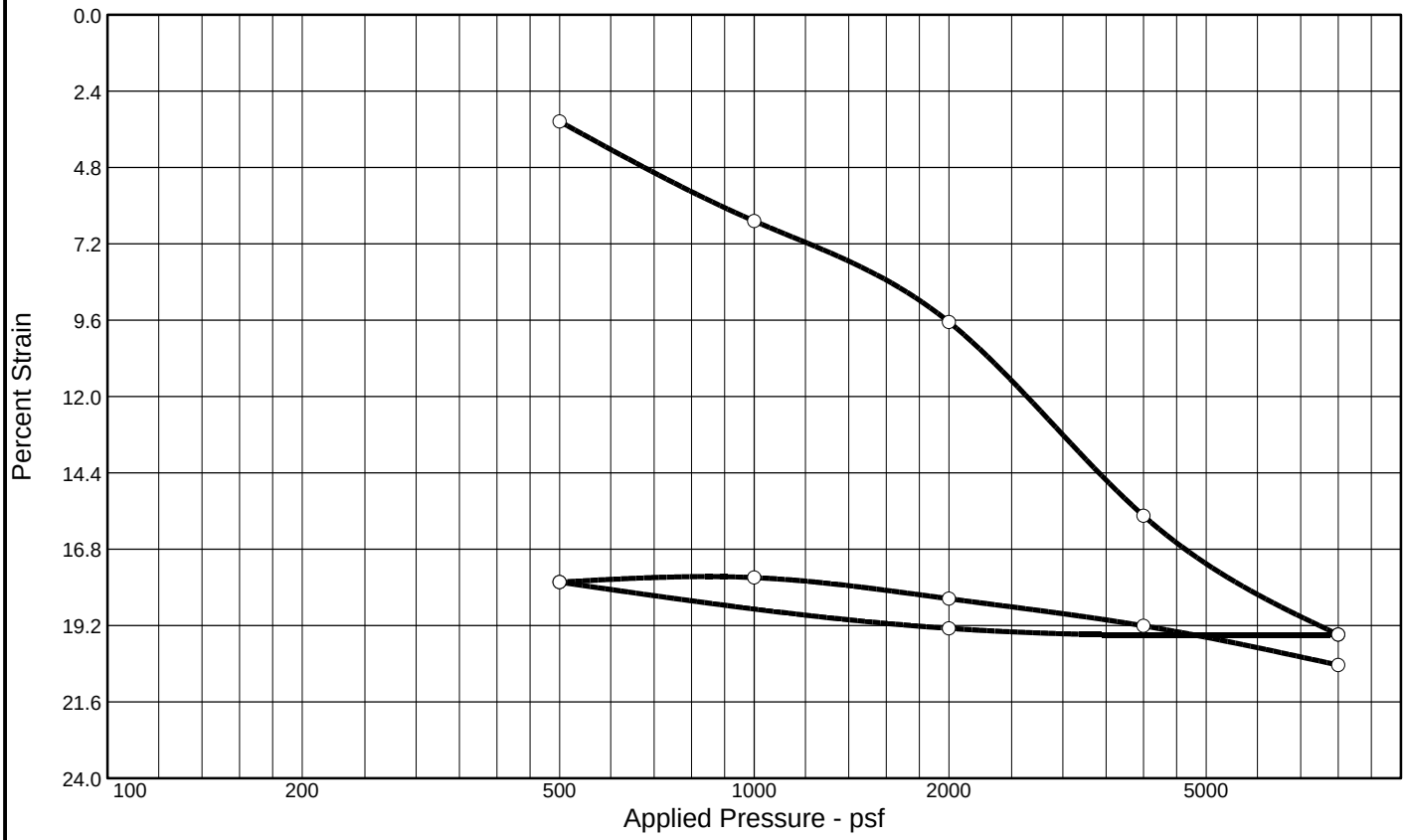
Project No.: XL-2779
Checked By: XH/URS
Depth: 24.5 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 11 of 11
Applied Stress: 8e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	4e+003	0.1131	18.09	0.963
2	0.01	0.11	4.99e+003	0.1132	18.12	0.962
3	0.02	0.14	5.74e+003	0.1138	18.21	0.960
4	0.03	0.17	6.19e+003	0.1142	18.28	0.958
5	0.04	0.19	6.52e+003	0.1146	18.33	0.957
6	0.05	0.23	6.97e+003	0.1153	18.45	0.954
7	0.07	0.27	7.29e+003	0.1158	18.53	0.952
8	0.09	0.30	7.5e+003	0.1162	18.60	0.951
9	0.12	0.35	7.79e+003	0.117	18.72	0.948
10	0.17	0.41	7.81e+003	0.1178	18.85	0.944
11	0.25	0.50	7.8e+003	0.1184	18.94	0.942
12	0.34	0.58	7.91e+003	0.1189	19.02	0.940
13	0.50	0.71	7.92e+003	0.1195	19.12	0.938
14	0.75	0.87	7.95e+003	0.1199	19.19	0.936
15	1.00	1.00	7.99e+003	0.1201	19.22	0.936
16	1.50	1.23	7.99e+003	0.1204	19.27	0.934
17	2.00	1.42	7.99e+003	0.1205	19.29	0.934
18	3.00	1.73	7.99e+003	0.1208	19.32	0.933
19	4.00	2.00	8e+003	0.1209	19.35	0.933
20	5.00	2.24	7.99e+003	0.121	19.35	0.932
21	6.00	2.45	8e+003	0.1211	19.37	0.932
22	7.00	2.65	7.99e+003	0.1211	19.38	0.932
23	8.00	2.83	7.99e+003	0.1212	19.39	0.932
24	9.00	3.00	7.99e+003	0.1212	19.40	0.931
25	10.00	3.16	8e+003	0.1212	19.40	0.931
26	12.00	3.46	8e+003	0.1213	19.41	0.931
27	14.00	3.74	8e+003	0.1214	19.42	0.931
28	16.00	4.00	8e+003	0.1214	19.43	0.931
29	18.00	4.24	8e+003	0.1215	19.44	0.930
30	20.00	4.47	8e+003	0.1215	19.44	0.930
31	22.00	4.69	8e+003	0.1216	19.46	0.930
32	24.00	4.90	8e+003	0.1217	19.46	0.930
33	26.00	5.10	8e+003	0.1216	19.46	0.930
34	28.00	5.29	7.99e+003	0.1217	19.47	0.930
35	30.00	5.48	8e+003	0.1218	19.48	0.929
36	35.00	5.92	7.99e+003	0.1218	19.48	0.929
37	40.00	6.32	8e+003	0.1219	19.50	0.929
38	45.00	6.71	8e+003	0.1219	19.51	0.929
39	50.00	7.07	8e+003	0.122	19.51	0.929
40	60.00	7.75	8e+003	0.122	19.51	0.929
41	70.00	8.37	8e+003	0.122	19.52	0.928
42	80.00	8.94	8e+003	0.1221	19.54	0.928
43	90.00	9.49	8e+003	0.1222	19.56	0.928
44	100.00	10.00	8e+003	0.1222	19.56	0.928
45	110.00	10.49	8e+003	0.1223	19.57	0.927
46	120.00	10.95	8e+003	0.1223	19.57	0.927
47	130.00	11.40	8e+003	0.1223	19.57	0.927
48	140.00	11.83	8e+003	0.1224	19.58	0.927
49	150.00	12.25	8e+003	0.1224	19.58	0.927
50	160.00	12.65	8e+003	0.1225	19.61	0.926
51	170.00	13.04	8e+003	0.1225	19.61	0.926
52	180.00	13.42	8e+003	0.1226	19.62	0.926
53	190.00	13.78	8e+003	0.1225	19.61	0.926
54	200.00	14.14	8e+003	0.1225	19.61	0.926
55	210.00	14.49	8e+003	0.1226	19.62	0.926
56	220.00	14.83	8e+003	0.1226	19.62	0.926
57	230.00	15.17	7.99e+003	0.1225	19.60	0.927
58	240.00	15.49	8e+003	0.1226	19.62	0.926
59	250.00	15.81	8e+003	0.1226	19.62	0.926
60	260.00	16.12	8e+003	0.1227	19.63	0.926
61	270.00	16.43	8e+003	0.1227	19.63	0.926
62	280.00	16.73	8e+003	0.1228	19.64	0.926
63	290.00	17.03	8e+003	0.1228	19.64	0.926
64	300.00	17.32	8e+003	0.1228	19.65	0.925
65	310.00	17.61	7.94e+003	0.1226	19.62	0.926
66	320.00	17.89	8e+003	0.1228	19.64	0.926
67	330.00	18.17	8e+003	0.1228	19.65	0.925
68	340.00	18.44	8e+003	0.1228	19.65	0.925
69	350.00	18.71	8e+003	0.1228	19.65	0.925
70	360.00	18.97	8e+003	0.1229	19.66	0.925
71	360.11	18.98	8e+003	0.1228	19.65	0.925

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation											
No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α
1	500	0.25		11	8000	1.29					
2	1000	0.18									
3	2000	0.21									
4	4000	0.28									
5	8000	0.45									
6	2000	3.05									
7	500	0.54									
8	1000	0.75									
9	2000	0.85									
10	4000	1.24									

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Swell Press. (psf)	Swell %	e_o
Sat.	Moist.											
95.8 %	44.1 %	75.7	30.1	6.4	2.75		717769	0.27	0.05			1.268

MATERIAL DESCRIPTION	USCS	AASHTO

Project No. XL-2779 **Client:** URS

Project: SR 90 Snoqualmie Pass East

Source: SW2-008-08 **Sample No.:** U-5 **Elev./Depth:** 24.5

Remarks:

Washington State Department of Transportation

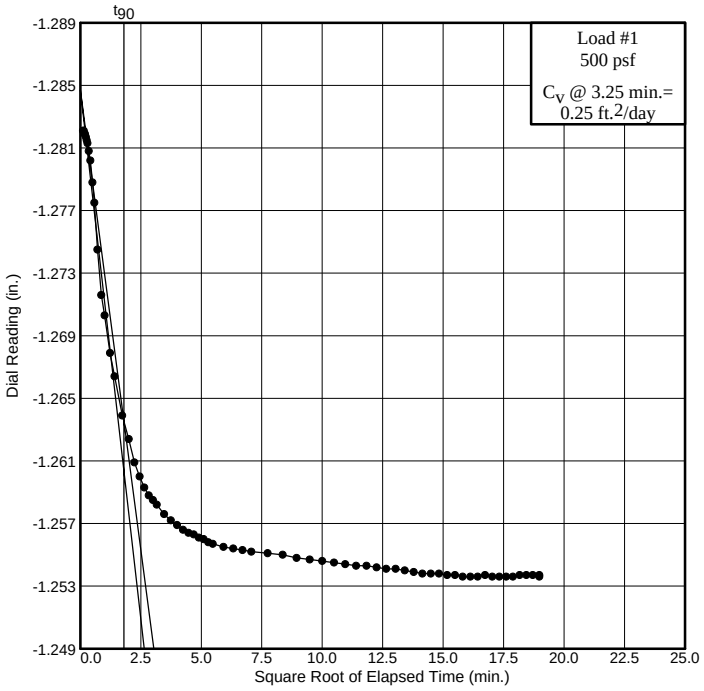
Olympia, WA

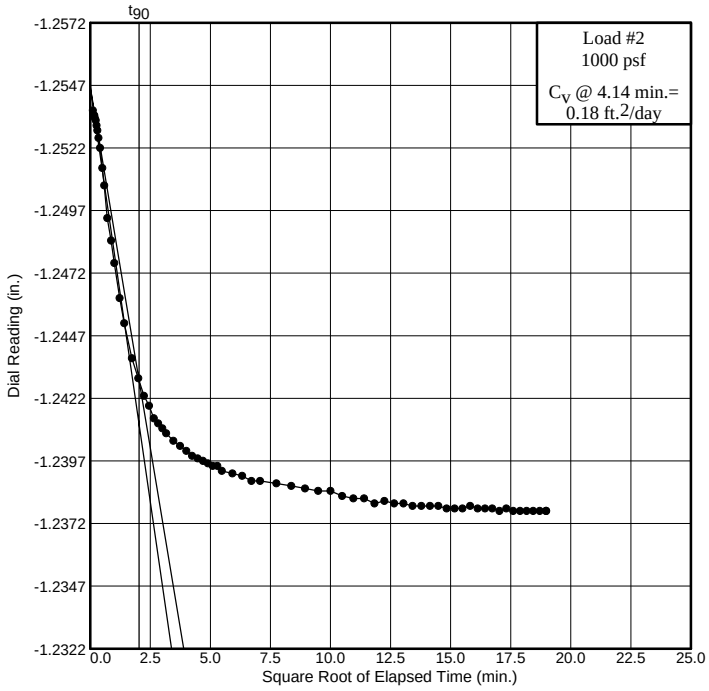
Figure

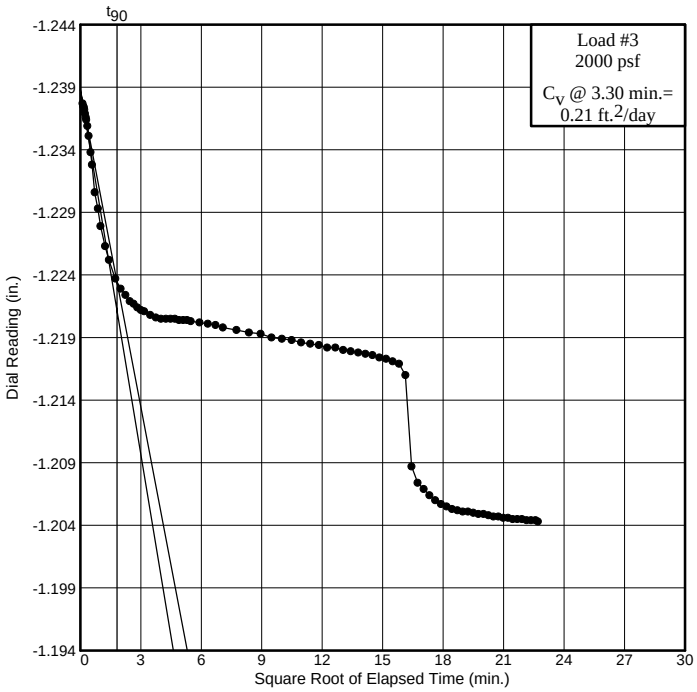
Dial Reading vs. Time

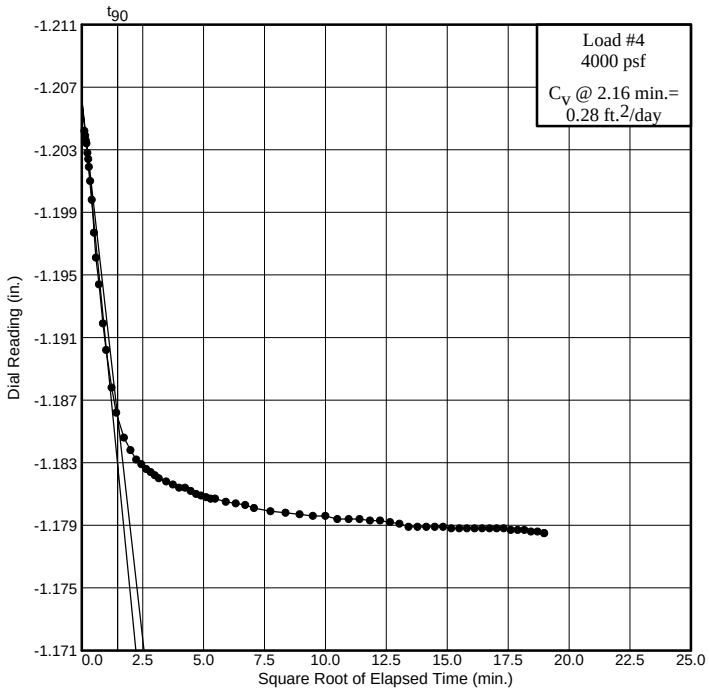
Project No.: XL-2779
Project: SR 90 Snoqualmie Pass East

Source: SW2-008-08 Sample No.: U-5 Elev./Depth: 24.5









Washington State Department of Transportation

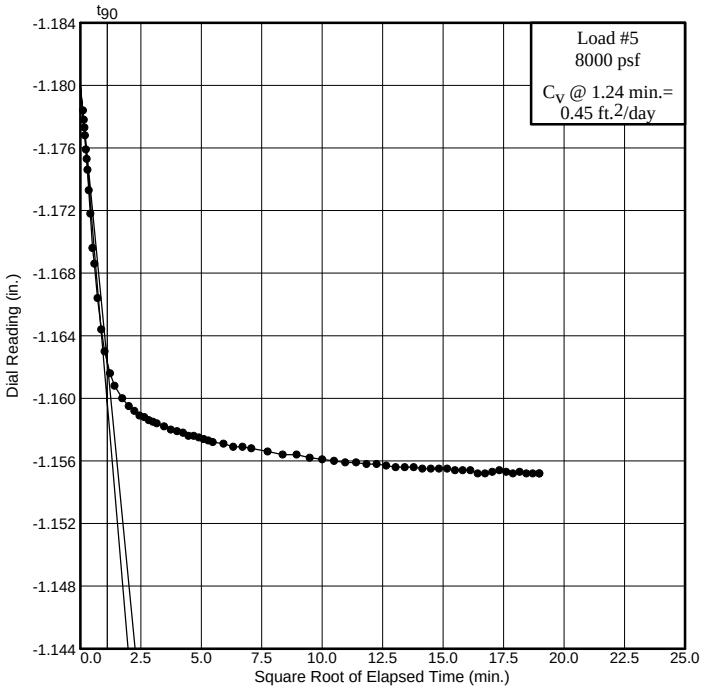
Olympia, WA

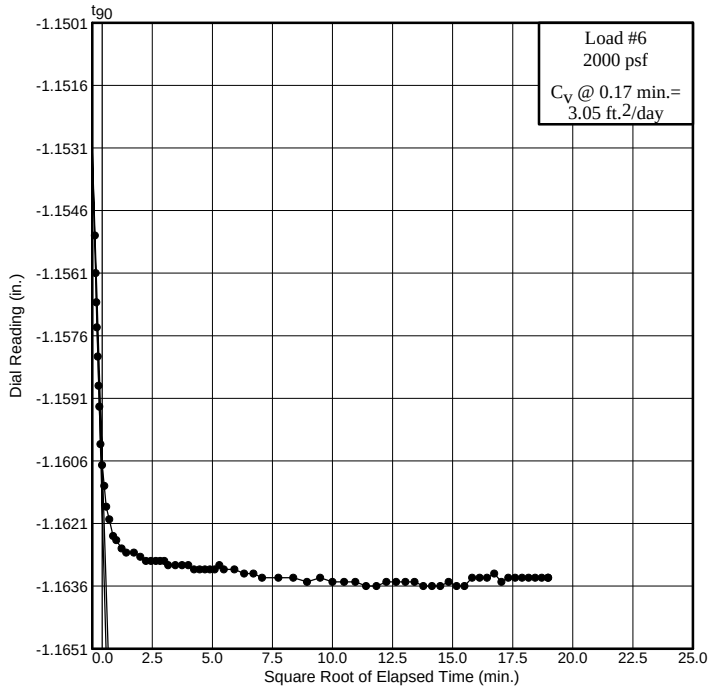
Figure

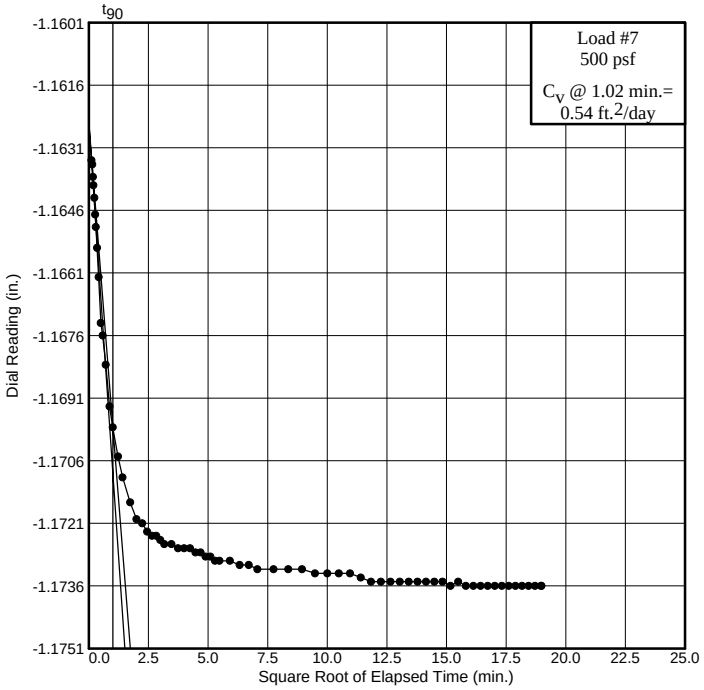
Dial Reading vs. Time

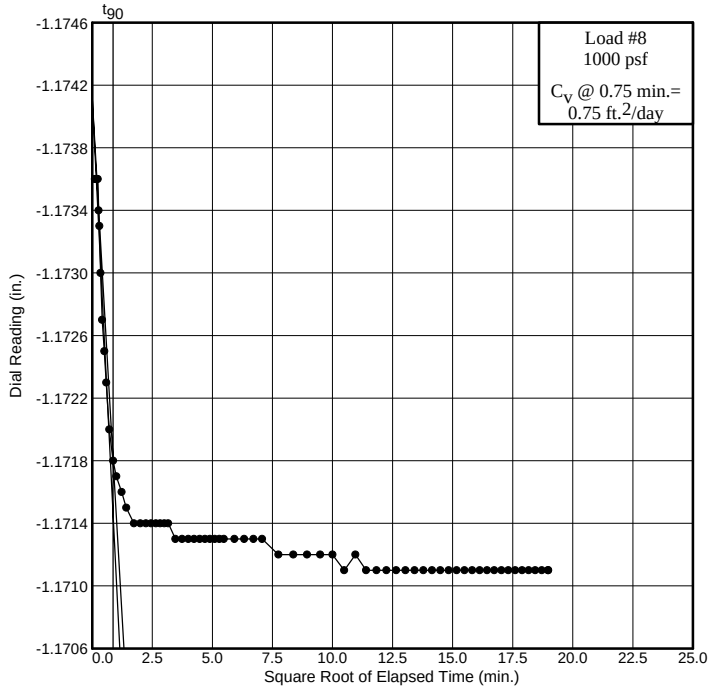
Project No.: XL-2779
Project: SR 90 Snoqualmie Pass East

Source: SW2-008-08 Sample No.: U-5 Elev./Depth: 24.5









Washington State Department of Transportation

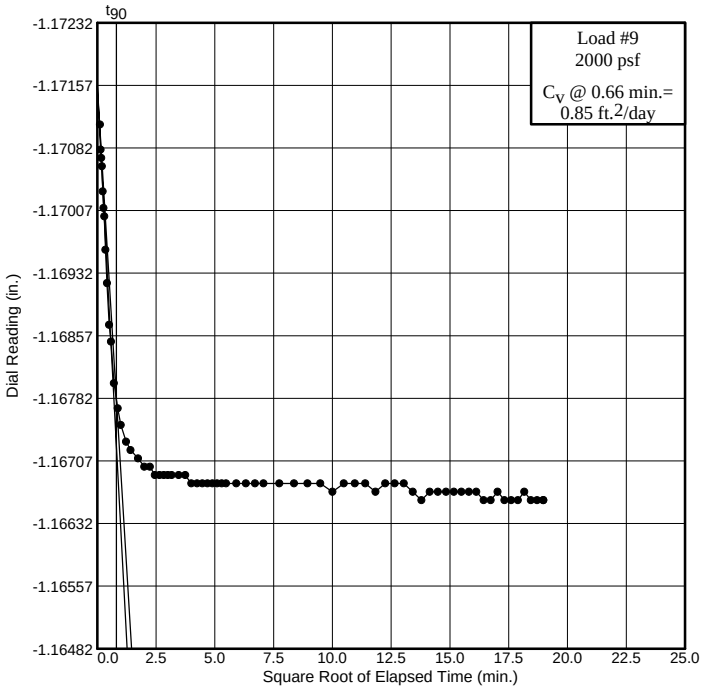
Olympia, WA

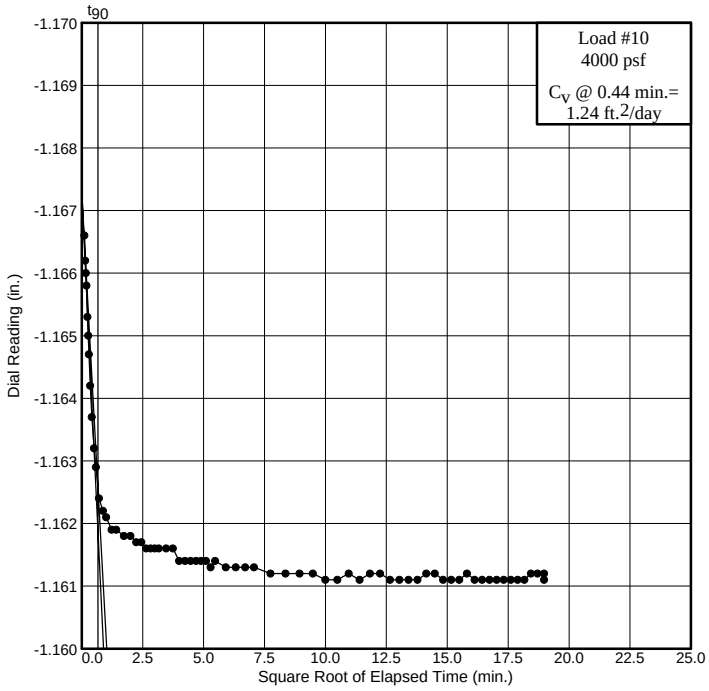
Figure

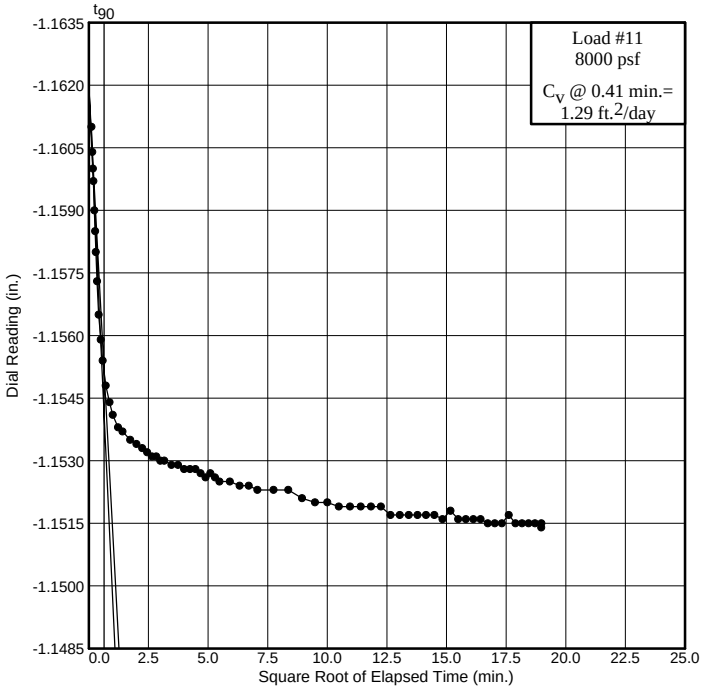
Dial Reading vs. Time

Project No.: XL-2779
Project: SR 90 Snoqualmie Pass East

Source: SW2-008-08 Sample No.: U-5 Elev./Depth: 24.5







Washington State Department of Transportation

Olympia, WA

Figure

Job No.	**XL-2779**	Date	**December 3, 2008**
Hole No.	**SW2-008-08**	Sheet	**1** of **1**
Project	**Snoqualmie Pass East - 2008 Barge, Truck, Skid**		

Laboratory Summary

Washington State Department of Transportation

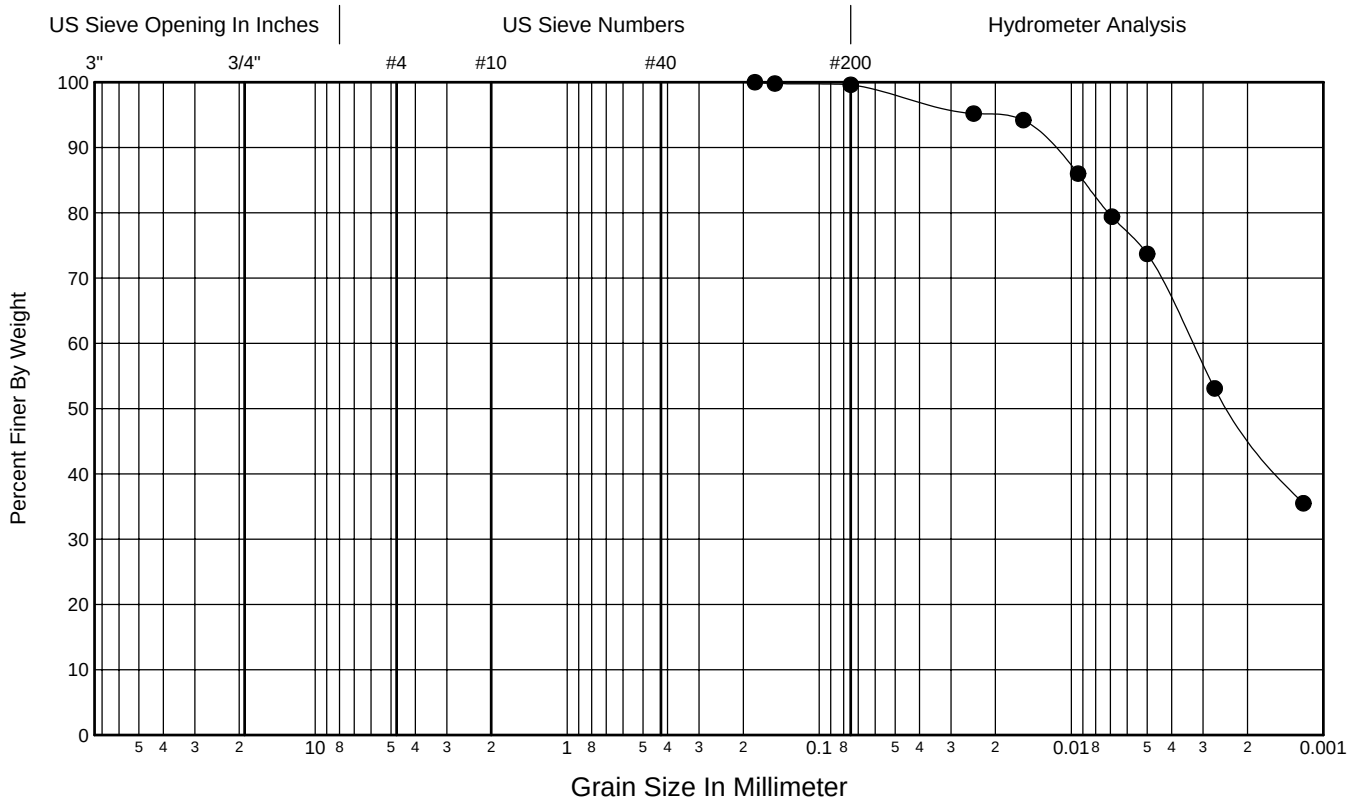
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	**24.2**	**7.38**	**U-5**	**ML**	**See Boring Log**	**SILT**	**35**	**30**	**24**	**6**

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	**0.0**	**0.4**	**99.6**		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	**0.003**	**0.00**			



Gravel	Sand			Silt and Clay
	Coarse	Medium	Fine	

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Measured Specific Gravity: 2.75
Initial Void Ratio: 1.04
Final Void Ratio: 0.88

Liquid Limit: 32
Plastic Limit: 21
Plasticity Index: 10

Initial Height: 0.63 in
Specimen Diameter: 1.88 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID		RING		
Wt. Container + Wet Soil, gm	349	419.1	416.7	88.8
Wt. Container + Dry Soil, gm	272.2	404.38	404.38	76.5
Wt. Container, gm	82.1	366.1	366.1	38.3
Wt. Dry Soil, gm	190.1	38.276	38.276	38.2
Water Content, %	40.40	38.47	32.20	32.20
Void Ratio	---	1.04	0.88	---
Degree of Saturation, %	---	101.46	101.18	---
Dry Unit Weight, pcf	---	84.046	91.555	---

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	500	0.008556	1.015	1.37	0.4	0.3	8.17e-004	1.00e-003	8.99e-004
2	1e+003	0.01329	0.999	2.13	0.3	0.0	1.04e-003	0.00e+000	1.04e-003
3	2e+003	0.01922	0.980	3.08	0.2	0.2	1.42e-003	1.57e-003	1.49e-003
4	4e+003	0.02888	0.948	4.62	0.2	0.2	1.49e-003	1.65e-003	1.57e-003
5	8e+003	0.04633	0.891	7.41	0.3	0.2	8.54e-004	1.41e-003	1.06e-003
6	2e+003	0.04139	0.907	6.62	0.1	0.1	3.85e-003	3.80e-003	3.82e-003
7	500	0.03592	0.925	5.75	0.2	0.2	1.47e-003	1.80e-003	1.62e-003
8	1e+003	0.03765	0.920	6.02	0.2	0.0	1.82e-003	0.00e+000	1.82e-003
9	2e+003	0.03997	0.912	6.39	0.1	0.0	2.50e-003	0.00e+000	2.50e-003
10	4e+003	0.04322	0.901	6.92	0.1	0.0	3.50e-003	0.00e+000	3.50e-003
11	8e+003	0.05126	0.875	8.20	1.0	0.0	2.84e-004	0.00e+000	2.84e-004

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 1 of 11
Applied Stress: 500 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	59	-0.0008467	-0.14	1.045
2	0.01	0.11	64.4	-0.0008992	-0.14	1.046
3	0.02	0.14	75.1	-0.0007942	-0.13	1.045
4	0.03	0.17	80.5	-0.0006891	-0.11	1.045
5	0.04	0.19	91.2	-0.0005841	-0.09	1.045
6	0.05	0.23	102	-0.0004265	-0.07	1.044
7	0.07	0.27	118	-0.0002689	-0.04	1.044
8	0.09	0.30	134	-5.878e-005	-0.01	1.043
9	0.12	0.35	166	0.0003614	0.06	1.041
10	0.17	0.41	220	0.0009918	0.16	1.039
11	0.25	0.50	316	0.002095	0.34	1.036
12	0.34	0.58	402	0.00304	0.49	1.033
13	0.50	0.71	424	0.004301	0.69	1.029
14	0.75	0.87	456	0.004984	0.80	1.026
15	1.00	1.00	477	0.005719	0.92	1.024
16	1.50	1.23	488	0.006297	1.01	1.022
17	2.00	1.42	488	0.006665	1.07	1.021
18	3.00	1.73	493	0.006875	1.10	1.020
19	4.00	2.00	493	0.007085	1.13	1.020
20	5.00	2.24	499	0.007138	1.14	1.019
21	6.00	2.45	499	0.007243	1.16	1.019
22	7.00	2.65	493	0.007295	1.17	1.019
23	8.00	2.83	499	0.007348	1.18	1.019
24	9.00	3.00	499	0.007348	1.18	1.019
25	10.00	3.16	499	0.0074	1.18	1.018
26	12.00	3.46	499	0.007505	1.20	1.018
27	14.00	3.74	499	0.007558	1.21	1.018
28	16.00	4.00	499	0.007558	1.21	1.018
29	18.00	4.24	499	0.00761	1.22	1.018
30	20.00	4.47	499	0.00761	1.22	1.018
31	22.00	4.69	499	0.007663	1.23	1.018
32	24.00	4.90	499	0.007715	1.23	1.017
33	26.00	5.10	499	0.007715	1.23	1.017
34	28.00	5.29	493	0.007768	1.24	1.017
35	30.00	5.48	499	0.007768	1.24	1.017
36	35.00	5.92	499	0.007873	1.26	1.017
37	40.00	6.32	499	0.007925	1.27	1.017
38	45.00	6.71	493	0.007978	1.28	1.017
39	50.00	7.07	499	0.008031	1.28	1.016
40	60.00	7.75	499	0.008083	1.29	1.016
41	70.00	8.37	499	0.008031	1.28	1.016
42	80.00	8.94	499	0.008031	1.28	1.016
43	90.00	9.49	499	0.008188	1.31	1.016
44	100.00	10.00	499	0.008188	1.31	1.016
45	110.00	10.49	499	0.008241	1.32	1.016
46	120.00	10.95	499	0.008241	1.32	1.016
47	130.00	11.40	499	0.008241	1.32	1.016
48	140.00	11.83	493	0.008346	1.34	1.015
49	150.00	12.25	499	0.008346	1.34	1.015
50	160.00	12.65	499	0.008293	1.33	1.016
51	170.00	13.04	499	0.008293	1.33	1.016
52	180.00	13.42	504	0.008293	1.33	1.016
53	190.00	13.78	499	0.008346	1.34	1.015
54	200.00	14.14	499	0.008398	1.34	1.015
55	210.00	14.49	499	0.008451	1.35	1.015
56	220.00	14.83	499	0.008451	1.35	1.015
57	230.00	15.17	499	0.008451	1.35	1.015
58	240.00	15.49	499	0.008503	1.36	1.015
59	250.00	15.81	499	0.008503	1.36	1.015
60	260.00	16.12	499	0.008451	1.35	1.015
61	270.00	16.43	499	0.008398	1.34	1.015
62	280.00	16.73	499	0.008398	1.34	1.015
63	290.00	17.03	499	0.008451	1.35	1.015
64	300.00	17.32	499	0.008556	1.37	1.015
65	310.00	17.61	499	0.008556	1.37	1.015
66	320.00	17.89	499	0.008503	1.36	1.015
67	330.00	18.17	499	0.008503	1.36	1.015
68	340.00	18.44	499	0.008503	1.36	1.015
69	350.00	18.71	499	0.008556	1.37	1.015
70	360.00	18.97	499	0.008503	1.36	1.015
71	360.12	18.98	499	0.008556	1.37	1.015

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 2 of 11
Applied Stress: 1e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	499	0.007718	1.23	1.017
2	0.01	0.11	552	0.007718	1.23	1.017
3	0.02	0.14	595	0.007823	1.25	1.017
4	0.03	0.17	633	0.007928	1.27	1.017
5	0.04	0.19	654	0.00798	1.28	1.017
6	0.05	0.23	703	0.008138	1.30	1.016
7	0.07	0.27	735	0.008296	1.33	1.016
8	0.09	0.30	762	0.008401	1.34	1.015
9	0.12	0.35	810	0.008716	1.39	1.014
10	0.17	0.41	864	0.009083	1.45	1.013
11	0.25	0.50	933	0.009714	1.55	1.011
12	0.34	0.58	976	0.01013	1.62	1.010
13	0.50	0.71	939	0.01066	1.71	1.008
14	0.75	0.87	982	0.01124	1.80	1.006
15	1.00	1.00	976	0.0115	1.84	1.005
16	1.50	1.23	987	0.01187	1.90	1.004
17	2.00	1.42	987	0.01203	1.92	1.003
18	3.00	1.73	992	0.01218	1.95	1.003
19	4.00	2.00	992	0.01229	1.97	1.003
20	5.00	2.24	998	0.01239	1.98	1.002
21	6.00	2.45	998	0.01245	1.99	1.002
22	7.00	2.65	998	0.01245	1.99	1.002
23	8.00	2.83	992	0.01255	2.01	1.002
24	9.00	3.00	998	0.01255	2.01	1.002
25	10.00	3.16	992	0.0126	2.02	1.001
26	12.00	3.46	998	0.0126	2.02	1.001
27	14.00	3.74	998	0.01266	2.02	1.001
28	16.00	4.00	998	0.01266	2.02	1.001
29	18.00	4.24	998	0.01276	2.04	1.001
30	20.00	4.47	998	0.01281	2.05	1.001
31	22.00	4.69	998	0.01281	2.05	1.001
32	24.00	4.90	998	0.01281	2.05	1.001
33	26.00	5.10	998	0.01276	2.04	1.001
34	28.00	5.29	998	0.01281	2.05	1.001
35	30.00	5.48	998	0.01276	2.04	1.001
36	35.00	5.92	998	0.01287	2.06	1.001
37	40.00	6.32	998	0.01281	2.05	1.001
38	45.00	6.71	998	0.01287	2.06	1.001
39	50.00	7.07	998	0.01287	2.06	1.001
40	60.00	7.75	998	0.01297	2.08	1.000
41	70.00	8.37	998	0.01308	2.09	1.000
42	80.00	8.94	998	0.01308	2.09	1.000
43	90.00	9.49	998	0.01308	2.09	1.000
44	100.00	10.00	1e+003	0.01302	2.08	1.000
45	110.00	10.49	998	0.01308	2.09	1.000
46	120.00	10.95	998	0.01313	2.10	1.000
47	130.00	11.40	998	0.01318	2.11	1.000
48	140.00	11.83	998	0.01318	2.11	1.000
49	150.00	12.25	998	0.01318	2.11	1.000
50	160.00	12.65	998	0.01318	2.11	1.000
51	170.00	13.04	998	0.01313	2.10	1.000
52	180.00	13.42	998	0.01308	2.09	1.000
53	190.00	13.78	998	0.01302	2.08	1.000
54	200.00	14.14	998	0.01313	2.10	1.000
55	210.00	14.49	998	0.01313	2.10	1.000
56	220.00	14.83	998	0.01313	2.10	1.000
57	230.00	15.17	998	0.01308	2.09	1.000
58	240.00	15.49	998	0.01313	2.10	1.000
59	250.00	15.81	998	0.01313	2.10	1.000
60	260.00	16.12	998	0.01313	2.10	1.000
61	270.00	16.43	998	0.01318	2.11	1.000
62	280.00	16.73	998	0.01323	2.12	0.999
63	290.00	17.03	998	0.01323	2.12	0.999
64	300.00	17.32	998	0.01323	2.12	0.999
65	310.00	17.61	998	0.01318	2.11	1.000
66	320.00	17.89	998	0.01323	2.12	0.999
67	330.00	18.17	998	0.01329	2.13	0.999
68	340.00	18.44	998	0.01329	2.13	0.999
69	350.00	18.71	998	0.01334	2.13	0.999
70	360.00	18.97	998	0.01329	2.13	0.999
71	360.04	18.97	998	0.01329	2.13	0.999

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 3 of 11
Applied Stress: 2e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	998	0.01202	1.92	1.003
2	0.01	0.11	1.13e+003	0.01208	1.93	1.003
3	0.02	0.14	1.23e+003	0.01223	1.96	1.003
4	0.03	0.17	1.31e+003	0.01239	1.98	1.002
5	0.04	0.19	1.36e+003	0.0125	2.00	1.002
6	0.05	0.23	1.45e+003	0.01281	2.05	1.001
7	0.07	0.27	1.51e+003	0.01307	2.09	1.000
8	0.09	0.30	1.58e+003	0.01334	2.13	0.999
9	0.12	0.35	1.67e+003	0.01381	2.21	0.998
10	0.17	0.41	1.8e+003	0.01449	2.32	0.995
11	0.25	0.50	1.95e+003	0.01544	2.47	0.992
12	0.34	0.58	1.88e+003	0.01591	2.55	0.991
13	0.50	0.71	1.94e+003	0.01649	2.64	0.989
14	0.75	0.87	1.96e+003	0.01701	2.72	0.987
15	1.00	1.00	1.99e+003	0.01733	2.77	0.986
16	1.50	1.23	1.98e+003	0.01754	2.81	0.985
17	2.00	1.42	1.99e+003	0.0177	2.83	0.985
18	3.00	1.73	1.99e+003	0.0178	2.85	0.984
19	4.00	2.00	1.99e+003	0.01791	2.86	0.984
20	5.00	2.24	2e+003	0.01801	2.88	0.984
21	6.00	2.45	1.99e+003	0.01801	2.88	0.984
22	7.00	2.65	2e+003	0.01806	2.89	0.984
23	8.00	2.83	2e+003	0.01817	2.91	0.983
24	9.00	3.00	2e+003	0.01822	2.92	0.983
25	10.00	3.16	2e+003	0.01822	2.92	0.983
26	12.00	3.46	2e+003	0.01827	2.92	0.983
27	14.00	3.74	2e+003	0.01833	2.93	0.983
28	16.00	4.00	2e+003	0.01833	2.93	0.983
29	18.00	4.24	1.99e+003	0.01838	2.94	0.983
30	20.00	4.47	2e+003	0.01838	2.94	0.983
31	22.00	4.69	2e+003	0.01843	2.95	0.982
32	24.00	4.90	2e+003	0.01848	2.96	0.982
33	26.00	5.10	2e+003	0.01854	2.97	0.982
34	28.00	5.29	2e+003	0.01854	2.97	0.982
35	30.00	5.48	2e+003	0.01854	2.97	0.982
36	35.00	5.92	2e+003	0.01859	2.97	0.982
37	40.00	6.32	2e+003	0.01864	2.98	0.982
38	45.00	6.71	2e+003	0.01864	2.98	0.982
39	50.00	7.07	2e+003	0.01869	2.99	0.982
40	60.00	7.75	2e+003	0.0188	3.01	0.981
41	70.00	8.37	2e+003	0.0188	3.01	0.981
42	80.00	8.94	2e+003	0.0188	3.01	0.981
43	90.00	9.49	2e+003	0.01885	3.02	0.981
44	100.00	10.00	2e+003	0.01885	3.02	0.981
45	110.00	10.49	1.99e+003	0.01896	3.03	0.981
46	120.00	10.95	2e+003	0.01901	3.04	0.981
47	130.00	11.40	2e+003	0.01896	3.03	0.981
48	140.00	11.83	2e+003	0.01901	3.04	0.981
49	150.00	12.25	2e+003	0.01901	3.04	0.981
50	160.00	12.65	2e+003	0.01906	3.05	0.980
51	170.00	13.04	2e+003	0.01906	3.05	0.980
52	180.00	13.42	2e+003	0.01906	3.05	0.980
53	190.00	13.78	2e+003	0.01911	3.06	0.980
54	200.00	14.14	2e+003	0.01906	3.05	0.980
55	210.00	14.49	2e+003	0.01906	3.05	0.980
56	220.00	14.83	2e+003	0.01906	3.05	0.980
57	230.00	15.17	2e+003	0.01911	3.06	0.980
58	240.00	15.49	2e+003	0.01911	3.06	0.980
59	250.00	15.81	2e+003	0.01911	3.06	0.980
60	260.00	16.12	2e+003	0.01911	3.06	0.980
61	270.00	16.43	2e+003	0.01911	3.06	0.980
62	280.00	16.73	2e+003	0.01911	3.06	0.980
63	290.00	17.03	2e+003	0.01917	3.07	0.980
64	300.00	17.32	2e+003	0.01917	3.07	0.980
65	310.00	17.61	2e+003	0.01917	3.07	0.980
66	320.00	17.89	2e+003	0.01917	3.07	0.980
67	330.00	18.17	2e+003	0.01922	3.08	0.980
68	340.00	18.44	2e+003	0.01922	3.08	0.980
69	350.00	18.71	2e+003	0.01922	3.08	0.980
70	360.00	18.97	2e+003	0.01917	3.07	0.980
71	360.12	18.98	2e+003	0.01922	3.08	0.980

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 4 of 11
Applied Stress: 4e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	2e+003	0.01717	2.75	0.987
2	0.01	0.11	2.34e+003	0.01728	2.76	0.986
3	0.02	0.14	2.59e+003	0.01759	2.81	0.985
4	0.03	0.17	2.74e+003	0.01785	2.86	0.984
5	0.04	0.19	2.85e+003	0.01822	2.92	0.983
6	0.05	0.23	3.01e+003	0.01869	2.99	0.982
7	0.07	0.27	3.15e+003	0.01922	3.08	0.980
8	0.09	0.30	3.27e+003	0.01959	3.13	0.979
9	0.12	0.35	3.47e+003	0.02043	3.27	0.976
10	0.17	0.41	3.7e+003	0.02169	3.47	0.972
11	0.25	0.50	3.96e+003	0.02321	3.71	0.967
12	0.34	0.58	3.81e+003	0.02379	3.81	0.965
13	0.50	0.71	3.95e+003	0.02474	3.96	0.962
14	0.75	0.87	3.96e+003	0.02537	4.06	0.960
15	1.00	1.00	3.96e+003	0.02568	4.11	0.959
16	1.50	1.23	3.99e+003	0.02605	4.17	0.958
17	2.00	1.42	3.99e+003	0.02626	4.20	0.957
18	3.00	1.73	3.99e+003	0.02652	4.24	0.956
19	4.00	2.00	3.99e+003	0.02673	4.28	0.955
20	5.00	2.24	3.99e+003	0.02689	4.30	0.955
21	6.00	2.45	3.99e+003	0.02694	4.31	0.955
22	7.00	2.65	4e+003	0.02705	4.33	0.954
23	8.00	2.83	3.99e+003	0.0271	4.34	0.954
24	9.00	3.00	4e+003	0.02715	4.34	0.954
25	10.00	3.16	3.99e+003	0.0272	4.35	0.954
26	12.00	3.46	4e+003	0.02731	4.37	0.953
27	14.00	3.74	4e+003	0.02736	4.38	0.953
28	16.00	4.00	3.99e+003	0.02741	4.39	0.953
29	18.00	4.24	3.99e+003	0.02741	4.39	0.953
30	20.00	4.47	4e+003	0.02752	4.40	0.953
31	22.00	4.69	4e+003	0.02757	4.41	0.953
32	24.00	4.90	4e+003	0.02757	4.41	0.953
33	26.00	5.10	4e+003	0.02762	4.42	0.952
34	28.00	5.29	4e+003	0.02768	4.43	0.952
35	30.00	5.48	3.99e+003	0.02768	4.43	0.952
36	35.00	5.92	4e+003	0.02778	4.45	0.952
37	40.00	6.32	4e+003	0.02783	4.45	0.952
38	45.00	6.71	4e+003	0.02789	4.46	0.952
39	50.00	7.07	4e+003	0.02794	4.47	0.951
40	60.00	7.75	4e+003	0.02799	4.48	0.951
41	70.00	8.37	4e+003	0.02804	4.49	0.951
42	80.00	8.94	4e+003	0.0281	4.50	0.951
43	90.00	9.49	4e+003	0.02815	4.50	0.951
44	100.00	10.00	4e+003	0.0282	4.51	0.950
45	110.00	10.49	4e+003	0.02831	4.53	0.950
46	120.00	10.95	4e+003	0.02831	4.53	0.950
47	130.00	11.40	4e+003	0.02836	4.54	0.950
48	140.00	11.83	4e+003	0.02841	4.55	0.950
49	150.00	12.25	4e+003	0.02846	4.55	0.950
50	160.00	12.65	4e+003	0.02852	4.56	0.949
51	170.00	13.04	4e+003	0.02857	4.57	0.949
52	180.00	13.42	4e+003	0.02862	4.58	0.949
53	190.00	13.78	4e+003	0.02867	4.59	0.949
54	200.00	14.14	4e+003	0.02867	4.59	0.949
55	210.00	14.49	4e+003	0.02867	4.59	0.949
56	220.00	14.83	4e+003	0.02873	4.60	0.949
57	230.00	15.17	4e+003	0.02873	4.60	0.949
58	240.00	15.49	4e+003	0.02878	4.60	0.949
59	250.00	15.81	4e+003	0.02883	4.61	0.948
60	260.00	16.12	4e+003	0.02883	4.61	0.948
61	270.00	16.43	4e+003	0.02883	4.61	0.948
62	280.00	16.73	4e+003	0.02883	4.61	0.948
63	290.00	17.03	4e+003	0.02888	4.62	0.948
64	300.00	17.32	4e+003	0.02888	4.62	0.948
65	310.00	17.61	4e+003	0.02888	4.62	0.948
66	320.00	17.89	4e+003	0.02883	4.61	0.948
67	330.00	18.17	4e+003	0.02888	4.62	0.948
68	340.00	18.44	4e+003	0.02888	4.62	0.948
69	350.00	18.71	4e+003	0.02888	4.62	0.948
70	360.00	18.97	4e+003	0.02888	4.62	0.948
71	360.17	18.98	4e+003	0.02888	4.62	0.948

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 5 of 11
Applied Stress: 8e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	4e+003	0.02605	4.17	0.958
2	0.01	0.11	4.89e+003	0.02616	4.18	0.957
3	0.02	0.14	5.43e+003	0.02679	4.29	0.955
4	0.03	0.17	5.75e+003	0.02736	4.38	0.953
5	0.04	0.19	5.98e+003	0.02784	4.45	0.952
6	0.05	0.23	6.33e+003	0.02873	4.60	0.949
7	0.07	0.27	6.63e+003	0.02962	4.74	0.946
8	0.09	0.30	6.88e+003	0.0303	4.85	0.944
9	0.12	0.35	7.21e+003	0.03172	5.08	0.939
10	0.17	0.41	7.62e+003	0.03346	5.35	0.933
11	0.25	0.50	7.64e+003	0.03551	5.68	0.927
12	0.34	0.58	7.72e+003	0.03619	5.79	0.924
13	0.50	0.71	7.94e+003	0.03761	6.02	0.920
14	0.75	0.87	7.92e+003	0.03866	6.19	0.916
15	1.00	1.00	7.99e+003	0.03955	6.33	0.913
16	1.50	1.23	7.97e+003	0.04029	6.45	0.911
17	2.00	1.42	7.99e+003	0.04076	6.52	0.909
18	3.00	1.73	7.98e+003	0.04118	6.59	0.908
19	4.00	2.00	7.99e+003	0.0416	6.66	0.907
20	5.00	2.24	7.99e+003	0.04181	6.69	0.906
21	6.00	2.45	7.99e+003	0.04202	6.72	0.905
22	7.00	2.65	8e+003	0.04223	6.76	0.905
23	8.00	2.83	7.99e+003	0.04239	6.78	0.904
24	9.00	3.00	8e+003	0.04254	6.81	0.904
25	10.00	3.16	7.99e+003	0.04265	6.82	0.903
26	12.00	3.46	7.99e+003	0.04291	6.87	0.902
27	14.00	3.74	7.99e+003	0.04296	6.87	0.902
28	16.00	4.00	7.99e+003	0.04312	6.90	0.902
29	18.00	4.24	8e+003	0.04323	6.92	0.901
30	20.00	4.47	7.99e+003	0.04333	6.93	0.901
31	22.00	4.69	8e+003	0.04344	6.95	0.901
32	24.00	4.90	8e+003	0.04359	6.98	0.900
33	26.00	5.10	8e+003	0.04365	6.98	0.900
34	28.00	5.29	7.99e+003	0.0437	6.99	0.900
35	30.00	5.48	7.99e+003	0.0438	7.01	0.899
36	35.00	5.92	8e+003	0.04391	7.03	0.899
37	40.00	6.32	8e+003	0.04407	7.05	0.899
38	45.00	6.71	8e+003	0.04422	7.08	0.898
39	50.00	7.07	8e+003	0.04433	7.09	0.898
40	60.00	7.75	8e+003	0.04454	7.13	0.897
41	70.00	8.37	8e+003	0.04465	7.14	0.897
42	80.00	8.94	8e+003	0.04486	7.18	0.896
43	90.00	9.49	8e+003	0.04496	7.19	0.896
44	100.00	10.00	7.99e+003	0.04501	7.20	0.896
45	110.00	10.49	7.99e+003	0.04512	7.22	0.895
46	120.00	10.95	8e+003	0.04522	7.24	0.895
47	130.00	11.40	8e+003	0.04528	7.24	0.895
48	140.00	11.83	8e+003	0.04538	7.26	0.894
49	150.00	12.25	8e+003	0.04543	7.27	0.894
50	160.00	12.65	8e+003	0.04543	7.27	0.894
51	170.00	13.04	7.99e+003	0.04559	7.29	0.894
52	180.00	13.42	7.99e+003	0.04575	7.32	0.893
53	190.00	13.78	8e+003	0.0458	7.33	0.893
54	200.00	14.14	8e+003	0.0458	7.33	0.893
55	210.00	14.49	8e+003	0.04591	7.34	0.893
56	220.00	14.83	8e+003	0.04596	7.35	0.892
57	230.00	15.17	8e+003	0.04596	7.35	0.892
58	240.00	15.49	8e+003	0.04601	7.36	0.892
59	250.00	15.81	8e+003	0.04601	7.36	0.892
60	260.00	16.12	8e+003	0.04596	7.35	0.892
61	270.00	16.43	8e+003	0.04601	7.36	0.892
62	280.00	16.73	8e+003	0.04606	7.37	0.892
63	290.00	17.03	8e+003	0.04617	7.39	0.892
64	300.00	17.32	8e+003	0.04617	7.39	0.892
65	310.00	17.61	8e+003	0.04627	7.40	0.891
66	320.00	17.89	8e+003	0.04633	7.41	0.891
67	330.00	18.17	8e+003	0.04633	7.41	0.891
68	340.00	18.44	8e+003	0.04638	7.42	0.891
69	350.00	18.71	8e+003	0.04633	7.41	0.891
70	360.00	18.97	8e+003	0.04633	7.41	0.891
71	360.18	18.98	8e+003	0.04633	7.41	0.891

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 6 of 11
Applied Stress: 2e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	8e+003	0.0489	7.82	0.883
2	0.01	0.11	6.4e+003	0.04879	7.81	0.883
3	0.02	0.14	5.06e+003	0.048	7.68	0.886
4	0.03	0.17	4.32e+003	0.04737	7.58	0.888
5	0.04	0.19	3.85e+003	0.04685	7.50	0.890
6	0.05	0.23	3.26e+003	0.04596	7.35	0.892
7	0.07	0.27	2.88e+003	0.04527	7.24	0.895
8	0.09	0.30	2.6e+003	0.04464	7.14	0.897
9	0.12	0.35	2.12e+003	0.0437	6.99	0.900
10	0.17	0.41	2.15e+003	0.04317	6.91	0.902
11	0.25	0.50	2.08e+003	0.0428	6.85	0.903
12	0.34	0.58	2.01e+003	0.04259	6.82	0.903
13	0.50	0.71	2.02e+003	0.04238	6.78	0.904
14	0.75	0.87	2.01e+003	0.04228	6.76	0.904
15	1.00	1.00	2.01e+003	0.04217	6.75	0.905
16	1.50	1.23	2e+003	0.04207	6.73	0.905
17	2.00	1.42	2e+003	0.04202	6.72	0.905
18	3.00	1.73	2e+003	0.04196	6.71	0.906
19	4.00	2.00	2e+003	0.04191	6.71	0.906
20	5.00	2.24	2e+003	0.04191	6.71	0.906
21	6.00	2.45	2e+003	0.04191	6.71	0.906
22	7.00	2.65	2e+003	0.04186	6.70	0.906
23	8.00	2.83	2e+003	0.04181	6.69	0.906
24	9.00	3.00	2e+003	0.04186	6.70	0.906
25	10.00	3.16	2e+003	0.04186	6.70	0.906
26	12.00	3.46	2e+003	0.04186	6.70	0.906
27	14.00	3.74	2e+003	0.04181	6.69	0.906
28	16.00	4.00	2e+003	0.04181	6.69	0.906
29	18.00	4.24	2e+003	0.04181	6.69	0.906
30	20.00	4.47	2e+003	0.04181	6.69	0.906
31	22.00	4.69	2e+003	0.04181	6.69	0.906
32	24.00	4.90	2e+003	0.04181	6.69	0.906
33	26.00	5.10	2e+003	0.04181	6.69	0.906
34	28.00	5.29	2e+003	0.04175	6.68	0.906
35	30.00	5.48	2e+003	0.04181	6.69	0.906
36	35.00	5.92	2e+003	0.04181	6.69	0.906
37	40.00	6.32	2e+003	0.04175	6.68	0.906
38	45.00	6.71	2e+003	0.04181	6.69	0.906
39	50.00	7.07	1.99e+003	0.04175	6.68	0.906
40	60.00	7.75	2e+003	0.0417	6.67	0.906
41	70.00	8.37	2e+003	0.04165	6.66	0.907
42	80.00	8.94	2e+003	0.0416	6.66	0.907
43	90.00	9.49	2e+003	0.0416	6.66	0.907
44	100.00	10.00	2e+003	0.0416	6.66	0.907
45	110.00	10.49	2e+003	0.04165	6.66	0.907
46	120.00	10.95	2e+003	0.04165	6.66	0.907
47	130.00	11.40	2e+003	0.04165	6.66	0.907
48	140.00	11.83	2e+003	0.0416	6.66	0.907
49	150.00	12.25	2e+003	0.04154	6.65	0.907
50	160.00	12.65	2e+003	0.04144	6.63	0.907
51	170.00	13.04	2e+003	0.04144	6.63	0.907
52	180.00	13.42	2e+003	0.04149	6.64	0.907
53	190.00	13.78	2e+003	0.04149	6.64	0.907
54	200.00	14.14	2e+003	0.04144	6.63	0.907
55	210.00	14.49	2e+003	0.04149	6.64	0.907
56	220.00	14.83	2e+003	0.04144	6.63	0.907
57	230.00	15.17	2e+003	0.04149	6.64	0.907
58	240.00	15.49	2e+003	0.04144	6.63	0.907
59	250.00	15.81	2e+003	0.04139	6.62	0.907
60	260.00	16.12	2e+003	0.04139	6.62	0.907
61	270.00	16.43	2e+003	0.04144	6.63	0.907
62	280.00	16.73	2e+003	0.04149	6.64	0.907
63	290.00	17.03	2e+003	0.04149	6.64	0.907
64	300.00	17.32	2e+003	0.04144	6.63	0.907
65	310.00	17.61	2e+003	0.04139	6.62	0.907
66	320.00	17.89	2e+003	0.04144	6.63	0.907
67	330.00	18.17	2e+003	0.04144	6.63	0.907
68	340.00	18.44	2e+003	0.04144	6.63	0.907
69	350.00	18.71	2e+003	0.04139	6.62	0.907
70	360.00	18.97	2e+003	0.04139	6.62	0.907
71	360.11	18.98	2e+003	0.04139	6.62	0.907

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 7 of 11
Applied Stress: 500 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	2e+003	0.04249	6.80	0.904
2	0.01	0.11	1.74e+003	0.04243	6.79	0.904
3	0.02	0.14	1.53e+003	0.04222	6.76	0.905
4	0.03	0.17	1.39e+003	0.04201	6.72	0.905
5	0.04	0.19	1.29e+003	0.0418	6.69	0.906
6	0.05	0.23	1.1e+003	0.04149	6.64	0.907
7	0.07	0.27	987	0.04112	6.58	0.908
8	0.09	0.30	896	0.04091	6.55	0.909
9	0.12	0.35	762	0.04033	6.45	0.911
10	0.17	0.41	622	0.0397	6.35	0.913
11	0.25	0.50	536	0.03881	6.21	0.916
12	0.34	0.58	585	0.03865	6.18	0.916
13	0.50	0.71	536	0.03818	6.11	0.918
14	0.75	0.87	526	0.03776	6.04	0.919
15	1.00	1.00	504	0.03755	6.01	0.920
16	1.50	1.23	510	0.03729	5.97	0.921
17	2.00	1.42	504	0.03713	5.94	0.921
18	3.00	1.73	504	0.03697	5.92	0.922
19	4.00	2.00	504	0.03692	5.91	0.922
20	5.00	2.24	504	0.03687	5.90	0.922
21	6.00	2.45	499	0.03676	5.88	0.923
22	7.00	2.65	504	0.03676	5.88	0.923
23	8.00	2.83	499	0.03666	5.86	0.923
24	9.00	3.00	499	0.03666	5.86	0.923
25	10.00	3.16	499	0.03666	5.86	0.923
26	12.00	3.46	504	0.0366	5.86	0.923
27	14.00	3.74	499	0.0366	5.86	0.923
28	16.00	4.00	499	0.0365	5.84	0.923
29	18.00	4.24	499	0.03655	5.85	0.923
30	20.00	4.47	504	0.03655	5.85	0.923
31	22.00	4.69	504	0.0365	5.84	0.923
32	24.00	4.90	499	0.0365	5.84	0.923
33	26.00	5.10	499	0.0365	5.84	0.923
34	28.00	5.29	499	0.03644	5.83	0.924
35	30.00	5.48	499	0.03644	5.83	0.924
36	35.00	5.92	499	0.03639	5.82	0.924
37	40.00	6.32	499	0.03634	5.81	0.924
38	45.00	6.71	499	0.03634	5.81	0.924
39	50.00	7.07	499	0.03629	5.81	0.924
40	60.00	7.75	499	0.03629	5.81	0.924
41	70.00	8.37	499	0.03623	5.80	0.924
42	80.00	8.94	499	0.03623	5.80	0.924
43	90.00	9.49	499	0.03623	5.80	0.924
44	100.00	10.00	499	0.03618	5.79	0.924
45	110.00	10.49	499	0.03618	5.79	0.924
46	120.00	10.95	499	0.03613	5.78	0.925
47	130.00	11.40	499	0.03613	5.78	0.925
48	140.00	11.83	504	0.03608	5.77	0.925
49	150.00	12.25	499	0.03613	5.78	0.925
50	160.00	12.65	499	0.03608	5.77	0.925
51	170.00	13.04	499	0.03608	5.77	0.925
52	180.00	13.42	499	0.03608	5.77	0.925
53	190.00	13.78	499	0.03608	5.77	0.925
54	200.00	14.14	499	0.03602	5.76	0.925
55	210.00	14.49	499	0.03597	5.76	0.925
56	220.00	14.83	504	0.03597	5.76	0.925
57	230.00	15.17	499	0.03597	5.76	0.925
58	240.00	15.49	499	0.03597	5.76	0.925
59	250.00	15.81	499	0.03597	5.76	0.925
60	260.00	16.12	499	0.03597	5.76	0.925
61	270.00	16.43	499	0.03592	5.75	0.925
62	280.00	16.73	499	0.03592	5.75	0.925
63	290.00	17.03	499	0.03592	5.75	0.925
64	300.00	17.32	499	0.03592	5.75	0.925
65	310.00	17.61	499	0.03597	5.76	0.925
66	320.00	17.89	499	0.03597	5.76	0.925
67	330.00	18.17	499	0.03597	5.76	0.925
68	340.00	18.44	499	0.03592	5.75	0.925
69	350.00	18.71	499	0.03587	5.74	0.925
70	360.00	18.97	504	0.03592	5.75	0.925
71	360.10	18.98	499	0.03592	5.75	0.925

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 8 of 11
Applied Stress: 1e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	499	0.03555	5.69	0.926
2	0.01	0.11	499	0.03555	5.69	0.926
3	0.02	0.14	499	0.03555	5.69	0.926
4	0.03	0.17	499	0.03561	5.70	0.926
5	0.04	0.19	493	0.03555	5.69	0.926
6	0.05	0.23	547	0.03555	5.69	0.926
7	0.07	0.27	665	0.03571	5.71	0.926
8	0.09	0.30	746	0.03592	5.75	0.925
9	0.12	0.35	853	0.03613	5.78	0.925
10	0.17	0.41	965	0.03655	5.85	0.923
11	0.25	0.50	949	0.03671	5.87	0.923
12	0.34	0.58	971	0.03681	5.89	0.922
13	0.50	0.71	987	0.03697	5.92	0.922
14	0.75	0.87	987	0.03708	5.93	0.921
15	1.00	1.00	992	0.03708	5.93	0.921
16	1.50	1.23	998	0.03718	5.95	0.921
17	2.00	1.42	998	0.03718	5.95	0.921
18	3.00	1.73	998	0.03718	5.95	0.921
19	4.00	2.00	998	0.03718	5.95	0.921
20	5.00	2.24	998	0.03723	5.96	0.921
21	6.00	2.45	998	0.03723	5.96	0.921
22	7.00	2.65	998	0.03723	5.96	0.921
23	8.00	2.83	998	0.03723	5.96	0.921
24	9.00	3.00	998	0.03723	5.96	0.921
25	10.00	3.16	998	0.03723	5.96	0.921
26	12.00	3.46	998	0.03723	5.96	0.921
27	14.00	3.74	998	0.03729	5.97	0.921
28	16.00	4.00	998	0.03723	5.96	0.921
29	18.00	4.24	992	0.03723	5.96	0.921
30	20.00	4.47	998	0.03723	5.96	0.921
31	22.00	4.69	998	0.03723	5.96	0.921
32	24.00	4.90	998	0.03723	5.96	0.921
33	26.00	5.10	998	0.03723	5.96	0.921
34	28.00	5.29	998	0.03729	5.97	0.921
35	30.00	5.48	998	0.03729	5.97	0.921
36	35.00	5.92	998	0.03723	5.96	0.921
37	40.00	6.32	998	0.03718	5.95	0.921
38	45.00	6.71	998	0.03723	5.96	0.921
39	50.00	7.07	998	0.03729	5.97	0.921
40	60.00	7.75	998	0.03729	5.97	0.921
41	70.00	8.37	998	0.03729	5.97	0.921
42	80.00	8.94	998	0.03729	5.97	0.921
43	90.00	9.49	998	0.03734	5.97	0.921
44	100.00	10.00	998	0.03734	5.97	0.921
45	110.00	10.49	998	0.03739	5.98	0.920
46	120.00	10.95	998	0.03734	5.97	0.921
47	130.00	11.40	998	0.03744	5.99	0.920
48	140.00	11.83	998	0.0375	6.00	0.920
49	150.00	12.25	998	0.0375	6.00	0.920
50	160.00	12.65	998	0.03755	6.01	0.920
51	170.00	13.04	998	0.03755	6.01	0.920
52	180.00	13.42	998	0.03755	6.01	0.920
53	190.00	13.78	998	0.0376	6.02	0.920
54	200.00	14.14	998	0.0376	6.02	0.920
55	210.00	14.49	998	0.0376	6.02	0.920
56	220.00	14.83	998	0.0376	6.02	0.920
57	230.00	15.17	992	0.03765	6.02	0.920
58	240.00	15.49	998	0.03765	6.02	0.920
59	250.00	15.81	998	0.03765	6.02	0.920
60	260.00	16.12	998	0.0376	6.02	0.920
61	270.00	16.43	998	0.0376	6.02	0.920
62	280.00	16.73	998	0.03765	6.02	0.920
63	290.00	17.03	998	0.0376	6.02	0.920
64	300.00	17.32	998	0.0376	6.02	0.920
65	310.00	17.61	998	0.03765	6.02	0.920
66	320.00	17.89	998	0.03765	6.02	0.920
67	330.00	18.17	998	0.0376	6.02	0.920
68	340.00	18.44	998	0.03765	6.02	0.920
69	350.00	18.71	998	0.03765	6.02	0.920
70	360.00	18.97	998	0.03765	6.02	0.920
71	360.07	18.98	998	0.03765	6.02	0.920

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 9 of 11
Applied Stress: 2e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	998	0.03697	5.92	0.922
2	0.01	0.11	1.14e+003	0.03697	5.92	0.922
3	0.02	0.14	1.28e+003	0.03718	5.95	0.921
4	0.03	0.17	1.37e+003	0.03734	5.97	0.921
5	0.04	0.19	1.45e+003	0.03745	5.99	0.920
6	0.05	0.23	1.56e+003	0.03771	6.03	0.919
7	0.07	0.27	1.65e+003	0.03792	6.07	0.919
8	0.09	0.30	1.73e+003	0.03808	6.09	0.918
9	0.12	0.35	1.83e+003	0.03844	6.15	0.917
10	0.17	0.41	1.95e+003	0.03881	6.21	0.916
11	0.25	0.50	1.92e+003	0.03913	6.26	0.915
12	0.34	0.58	1.95e+003	0.03929	6.29	0.914
13	0.50	0.71	1.97e+003	0.0395	6.32	0.914
14	0.75	0.87	1.98e+003	0.0396	6.34	0.913
15	1.00	1.00	1.99e+003	0.0396	6.34	0.913
16	1.50	1.23	2e+003	0.03971	6.35	0.913
17	2.00	1.42	2e+003	0.03971	6.35	0.913
18	3.00	1.73	2e+003	0.03976	6.36	0.913
19	4.00	2.00	2e+003	0.03976	6.36	0.913
20	5.00	2.24	2e+003	0.03981	6.37	0.913
21	6.00	2.45	2e+003	0.03981	6.37	0.913
22	7.00	2.65	2e+003	0.03981	6.37	0.913
23	8.00	2.83	2e+003	0.03981	6.37	0.913
24	9.00	3.00	2e+003	0.03981	6.37	0.913
25	10.00	3.16	2e+003	0.03986	6.38	0.912
26	12.00	3.46	2e+003	0.03981	6.37	0.913
27	14.00	3.74	2e+003	0.03986	6.38	0.912
28	16.00	4.00	2e+003	0.03986	6.38	0.912
29	18.00	4.24	2e+003	0.03986	6.38	0.912
30	20.00	4.47	2e+003	0.03986	6.38	0.912
31	22.00	4.69	2e+003	0.03986	6.38	0.912
32	24.00	4.90	2e+003	0.03992	6.39	0.912
33	26.00	5.10	2e+003	0.03992	6.39	0.912
34	28.00	5.29	2e+003	0.03992	6.39	0.912
35	30.00	5.48	2e+003	0.03992	6.39	0.912
36	35.00	5.92	2e+003	0.03992	6.39	0.912
37	40.00	6.32	2e+003	0.03992	6.39	0.912
38	45.00	6.71	2e+003	0.03992	6.39	0.912
39	50.00	7.07	2e+003	0.03992	6.39	0.912
40	60.00	7.75	2e+003	0.03997	6.39	0.912
41	70.00	8.37	2e+003	0.03992	6.39	0.912
42	80.00	8.94	2e+003	0.03997	6.39	0.912
43	90.00	9.49	2e+003	0.03997	6.39	0.912
44	100.00	10.00	2e+003	0.03997	6.39	0.912
45	110.00	10.49	2e+003	0.03997	6.39	0.912
46	120.00	10.95	2e+003	0.03992	6.39	0.912
47	130.00	11.40	2e+003	0.03997	6.39	0.912
48	140.00	11.83	2e+003	0.03997	6.39	0.912
49	150.00	12.25	2e+003	0.03997	6.39	0.912
50	160.00	12.65	2e+003	0.03997	6.39	0.912
51	170.00	13.04	2e+003	0.04002	6.40	0.912
52	180.00	13.42	2e+003	0.03997	6.39	0.912
53	190.00	13.78	2e+003	0.04002	6.40	0.912
54	200.00	14.14	2e+003	0.04002	6.40	0.912
55	210.00	14.49	2e+003	0.04002	6.40	0.912
56	220.00	14.83	2e+003	0.04002	6.40	0.912
57	230.00	15.17	2e+003	0.04002	6.40	0.912
58	240.00	15.49	2e+003	0.03997	6.39	0.912
59	250.00	15.81	2e+003	0.03997	6.39	0.912
60	260.00	16.12	2e+003	0.04002	6.40	0.912
61	270.00	16.43	2e+003	0.04002	6.40	0.912
62	280.00	16.73	2e+003	0.03997	6.39	0.912
63	290.00	17.03	2e+003	0.04002	6.40	0.912
64	300.00	17.32	2e+003	0.04002	6.40	0.912
65	310.00	17.61	2e+003	0.03992	6.39	0.912
66	320.00	17.89	2e+003	0.04002	6.40	0.912
67	330.00	18.17	1.99e+003	0.04002	6.40	0.912
68	340.00	18.44	2e+003	0.03997	6.39	0.912
69	350.00	18.71	2e+003	0.04002	6.40	0.912
70	360.00	18.97	2e+003	0.03997	6.39	0.912
71	360.08	18.98	2e+003	0.03997	6.39	0.912

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

Soil Description:
Remarks:

Constant Load Step: 10 of 11
Applied Stress: 4e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	2e+003	0.03907	6.25	0.915
2	0.01	0.11	2.26e+003	0.03907	6.25	0.915
3	0.02	0.14	2.62e+003	0.03939	6.30	0.914
4	0.03	0.17	2.85e+003	0.03965	6.34	0.913
5	0.04	0.19	3.03e+003	0.03991	6.39	0.912
6	0.05	0.23	3.29e+003	0.04033	6.45	0.911
7	0.07	0.27	3.48e+003	0.0407	6.51	0.910
8	0.09	0.30	3.63e+003	0.04096	6.55	0.909
9	0.12	0.35	3.85e+003	0.04154	6.65	0.907
10	0.17	0.41	3.9e+003	0.04196	6.71	0.906
11	0.25	0.50	3.93e+003	0.04217	6.75	0.905
12	0.34	0.58	3.99e+003	0.04228	6.76	0.904
13	0.50	0.71	3.99e+003	0.04243	6.79	0.904
14	0.75	0.87	3.99e+003	0.04259	6.81	0.903
15	1.00	1.00	3.99e+003	0.04264	6.82	0.903
16	1.50	1.23	3.99e+003	0.0427	6.83	0.903
17	2.00	1.42	3.99e+003	0.0427	6.83	0.903
18	3.00	1.73	4e+003	0.04275	6.84	0.903
19	4.00	2.00	4e+003	0.0428	6.85	0.903
20	5.00	2.24	4e+003	0.04285	6.86	0.903
21	6.00	2.45	4e+003	0.04285	6.86	0.903
22	7.00	2.65	4e+003	0.04285	6.86	0.903
23	8.00	2.83	4e+003	0.04291	6.87	0.902
24	9.00	3.00	4e+003	0.04291	6.87	0.902
25	10.00	3.16	4e+003	0.04291	6.87	0.902
26	12.00	3.46	4e+003	0.04291	6.87	0.902
27	14.00	3.74	3.99e+003	0.04291	6.87	0.902
28	16.00	4.00	4e+003	0.04291	6.87	0.902
29	18.00	4.24	4e+003	0.04291	6.87	0.902
30	20.00	4.47	4e+003	0.04291	6.87	0.902
31	22.00	4.69	4e+003	0.04301	6.88	0.902
32	24.00	4.90	4e+003	0.04301	6.88	0.902
33	26.00	5.10	4e+003	0.04296	6.87	0.902
34	28.00	5.29	4e+003	0.04296	6.87	0.902
35	30.00	5.48	4e+003	0.04301	6.88	0.902
36	35.00	5.92	4e+003	0.04306	6.89	0.902
37	40.00	6.32	4e+003	0.04301	6.88	0.902
38	45.00	6.71	4e+003	0.04306	6.89	0.902
39	50.00	7.07	4e+003	0.04306	6.89	0.902
40	60.00	7.75	4e+003	0.04312	6.90	0.902
41	70.00	8.37	3.99e+003	0.04306	6.89	0.902
42	80.00	8.94	4e+003	0.04312	6.90	0.902
43	90.00	9.49	4e+003	0.04312	6.90	0.902
44	100.00	10.00	4e+003	0.04312	6.90	0.902
45	110.00	10.49	4e+003	0.04317	6.91	0.902
46	120.00	10.95	4e+003	0.04317	6.91	0.902
47	130.00	11.40	4e+003	0.04312	6.90	0.902
48	140.00	11.83	4e+003	0.04317	6.91	0.902
49	150.00	12.25	4e+003	0.04317	6.91	0.902
50	160.00	12.65	4e+003	0.04317	6.91	0.902
51	170.00	13.04	3.99e+003	0.04317	6.91	0.902
52	180.00	13.42	4e+003	0.04317	6.91	0.902
53	190.00	13.78	4e+003	0.04317	6.91	0.902
54	200.00	14.14	4e+003	0.04322	6.92	0.901
55	210.00	14.49	4e+003	0.04322	6.92	0.901
56	220.00	14.83	4e+003	0.04322	6.92	0.901
57	230.00	15.17	4e+003	0.04322	6.92	0.901
58	240.00	15.49	4e+003	0.04327	6.92	0.901
59	250.00	15.81	4e+003	0.04322	6.92	0.901
60	260.00	16.12	4e+003	0.04312	6.90	0.902
61	270.00	16.43	4e+003	0.04317	6.91	0.902
62	280.00	16.73	4e+003	0.04317	6.91	0.902
63	290.00	17.03	4e+003	0.04317	6.91	0.902
64	300.00	17.32	4e+003	0.04317	6.91	0.902
65	310.00	17.61	4e+003	0.04322	6.92	0.901
66	320.00	17.89	4e+003	0.04322	6.92	0.901
67	330.00	18.17	4e+003	0.04317	6.91	0.902
68	340.00	18.44	4e+003	0.04312	6.90	0.902
69	350.00	18.71	4e+003	0.04312	6.90	0.902
70	360.00	18.97	4e+003	0.04317	6.91	0.902
71	360.10	18.98	4e+003	0.04322	6.92	0.901

CONSOLIDATION TEST DATA

Project: SNOQUALMIE PASS EAST
Boring No.: SW2-008-09
Sample No.: S-7
Test No.: 8088S7C

Location: SR-90
Tested By: LHB
Test Date: 11-19-08
Sample Type: Shelby Tub

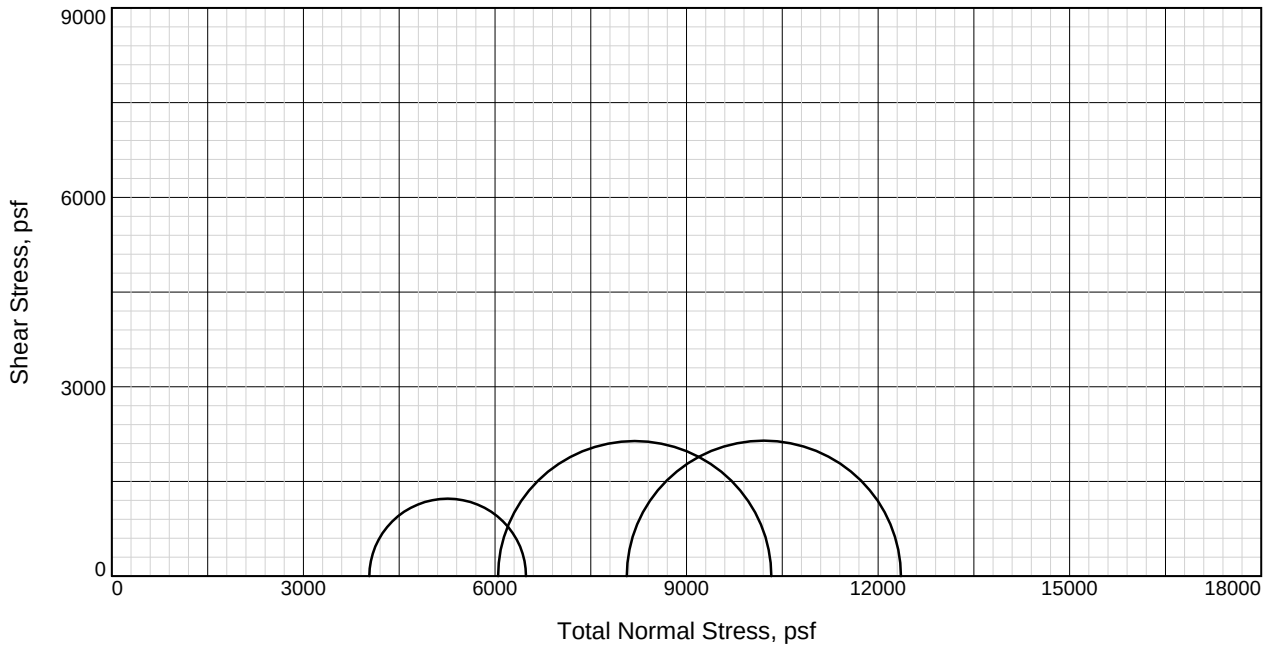
Project No.: XL-2779
Checked By: XH/URS
Depth: 45.3 FT
Elevation:

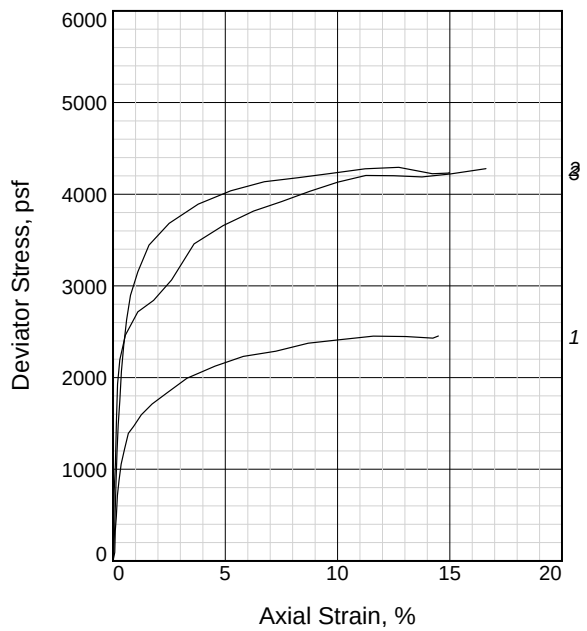
Soil Description:
Remarks:

Constant Load Step: 11 of 11
Applied Stress: 8e+003 psf

	Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement in	Strain %	Void Ratio
1	0.00	0.00	4e+003	0.04155	6.65	0.907
2	0.01	0.11	4.88e+003	0.04165	6.66	0.907
3	0.02	0.14	5.63e+003	0.04218	6.75	0.905
4	0.03	0.17	6.13e+003	0.0427	6.83	0.903
5	0.04	0.19	6.48e+003	0.04312	6.90	0.902
6	0.05	0.23	6.98e+003	0.04386	7.02	0.899
7	0.07	0.27	7.3e+003	0.04443	7.11	0.897
8	0.09	0.30	7.53e+003	0.04486	7.18	0.896
9	0.12	0.35	7.85e+003	0.04549	7.28	0.894
10	0.17	0.41	7.78e+003	0.04606	7.37	0.892
11	0.25	0.50	7.89e+003	0.04648	7.44	0.891
12	0.34	0.58	7.96e+003	0.04675	7.48	0.890
13	0.50	0.71	7.96e+003	0.04706	7.53	0.889
14	0.75	0.87	7.97e+003	0.04738	7.58	0.888
15	1.00	1.00	7.98e+003	0.04753	7.61	0.887
16	1.50	1.23	7.99e+003	0.04774	7.64	0.887
17	2.00	1.42	7.99e+003	0.0479	7.66	0.886
18	3.00	1.73	7.99e+003	0.04801	7.68	0.886
19	4.00	2.00	7.99e+003	0.04816	7.71	0.885
20	5.00	2.24	7.99e+003	0.04816	7.71	0.885
21	6.00	2.45	7.99e+003	0.04832	7.73	0.885
22	7.00	2.65	7.99e+003	0.04837	7.74	0.885
23	8.00	2.83	8e+003	0.04843	7.75	0.884
24	9.00	3.00	8e+003	0.04848	7.76	0.884
25	10.00	3.16	8e+003	0.04853	7.77	0.884
26	12.00	3.46	7.99e+003	0.04858	7.77	0.884
27	14.00	3.74	8e+003	0.04869	7.79	0.884
28	16.00	4.00	8e+003	0.04874	7.80	0.883
29	18.00	4.24	7.99e+003	0.04874	7.80	0.883
30	20.00	4.47	8e+003	0.04879	7.81	0.883
31	22.00	4.69	8e+003	0.04885	7.82	0.883
32	24.00	4.90	8e+003	0.04885	7.82	0.883
33	26.00	5.10	8e+003	0.04885	7.82	0.883
34	28.00	5.29	8e+003	0.04895	7.83	0.883
35	30.00	5.48	8e+003	0.04895	7.83	0.883
36	35.00	5.92	7.99e+003	0.049	7.84	0.883
37	40.00	6.32	8e+003	0.04911	7.86	0.882
38	45.00	6.71	8e+003	0.04916	7.87	0.882
39	50.00	7.07	8e+003	0.04916	7.87	0.882
40	60.00	7.75	8e+003	0.04927	7.88	0.882
41	70.00	8.37	8e+003	0.04937	7.90	0.881
42	80.00	8.94	8e+003	0.04937	7.90	0.881
43	90.00	9.49	8e+003	0.04948	7.92	0.881
44	100.00	10.00	8e+003	0.04953	7.92	0.881
45	110.00	10.49	7.99e+003	0.04964	7.94	0.880
46	120.00	10.95	8e+003	0.04964	7.94	0.880
47	130.00	11.40	8e+003	0.04969	7.95	0.880
48	140.00	11.83	8e+003	0.04979	7.97	0.880
49	150.00	12.25	8e+003	0.0499	7.98	0.880
50	160.00	12.65	8e+003	0.04985	7.98	0.880
51	170.00	13.04	8e+003	0.05	8.00	0.879
52	180.00	13.42	8e+003	0.05	8.00	0.879
53	190.00	13.78	8e+003	0.05011	8.02	0.879
54	200.00	14.14	8e+003	0.05011	8.02	0.879
55	210.00	14.49	7.99e+003	0.05021	8.03	0.879
56	220.00	14.83	8e+003	0.05027	8.04	0.878
57	230.00	15.17	8e+003	0.05032	8.05	0.878
58	240.00	15.49	8e+003	0.05037	8.06	0.878
59	250.00	15.81	8e+003	0.05042	8.07	0.878
60	260.00	16.12	7.99e+003	0.05053	8.08	0.878
61	270.00	16.43	8e+003	0.05053	8.08	0.878
62	280.00	16.73	8e+003	0.05058	8.09	0.877
63	290.00	17.03	8e+003	0.05063	8.10	0.877
64	300.00	17.32	7.99e+003	0.05069	8.11	0.877
65	310.00	17.61	8e+003	0.05074	8.12	0.877
66	320.00	17.89	8e+003	0.05079	8.13	0.877
67	330.00	18.17	8e+003	0.05079	8.13	0.877
68	340.00	18.44	7.99e+003	0.05084	8.13	0.876
69	350.00	18.71	8e+003	0.05095	8.15	0.876
70	360.00	18.97	8e+003	0.05095	8.15	0.876
71	370.00	19.24	8e+003	0.051	8.16	0.876
72	380.00	19.49	8e+003	0.05105	8.17	0.876

73	390.00	19.75	8e+003	0.05111	8.18	0.876
74	400.00	20.00	8e+003	0.05116	8.19	0.875
75	410.00	20.25	8e+003	0.05121	8.19	0.875
76	420.00	20.49	8e+003	0.05126	8.20	0.875
77	430.00	20.74	8e+003	0.05126	8.20	0.875
78	430.01	20.74	8e+003	0.05126	8.20	0.875





Sample No.		1	2	3
Initial	Water Content, %	56.6	37.7	50.0
	Dry Density, pcf	67.7	82.6	72.3
	Saturation, %	101.1	95.8	100.0
	Void Ratio	1.5437	1.0865	1.3817
	Diameter, in.	1.88	1.88	1.88
	Height, in.	4.04	4.04	3.98
At Test	Water Content, %	38.0	28.1	33.6
	Dry Density, pcf	67.7	82.6	72.3
	Saturation, %	67.9	71.3	67.0
	Void Ratio	1.5437	1.0865	1.3817
	Diameter, in.	1.88	1.88	1.88
	Height, in.	4.04	4.04	3.98
Strain rate, %/min.		0.05	0.05	0.05
Eff. Cell Pressure, psi		28.00	42.00	56.00
Fail. Stress, psf		2454	4280	4293
Excess Pore Pr., psf		1970	3393	6349
Strain, %		14.5	16.6	12.7
Ult. Stress, psf				
Excess Pore Pr., psf				
Strain, %				
$\bar{\sigma}_1$ Failure, psf		4516	6934	6008
$\bar{\sigma}_3$ Failure, psf		2062	2655	1715

Type of Test:
CU with Pore Pressures

Sample Type: Shelby Tube

Description:

LL= 31.6 **PL=** 21.3 **PI=** 10.3

Specific Gravity= 2.76

Remarks:

Figure _____

Client: URS

Project: SR 90 Snoqualmie Pass East

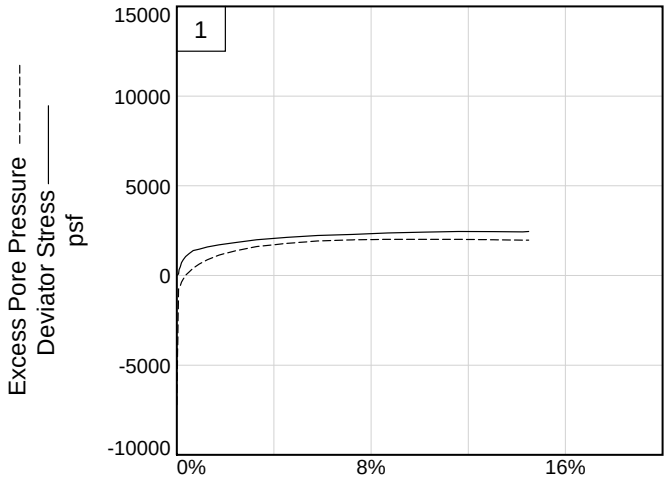
Source of Sample: SW2-009-08 **Depth:** 44-46

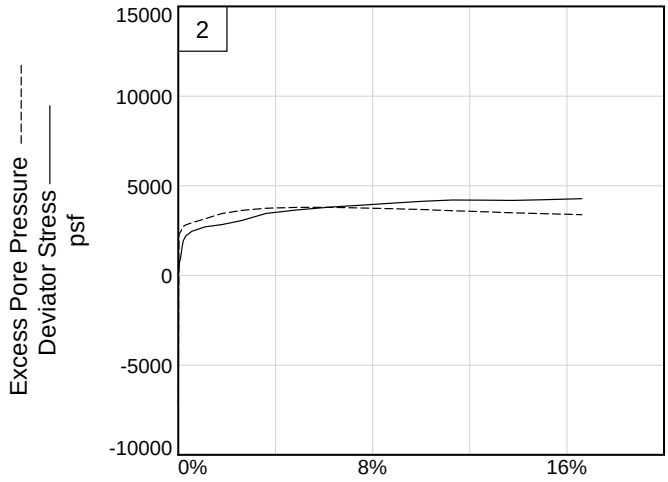
Sample Number: S-7

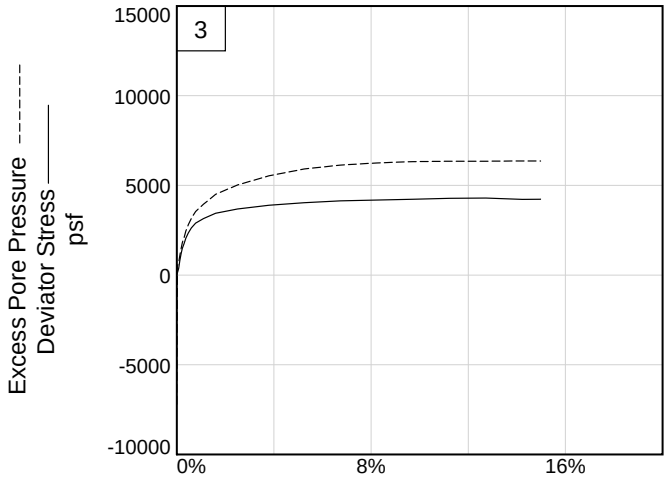
Proj. No.: XL-2779 **Date Sampled:**

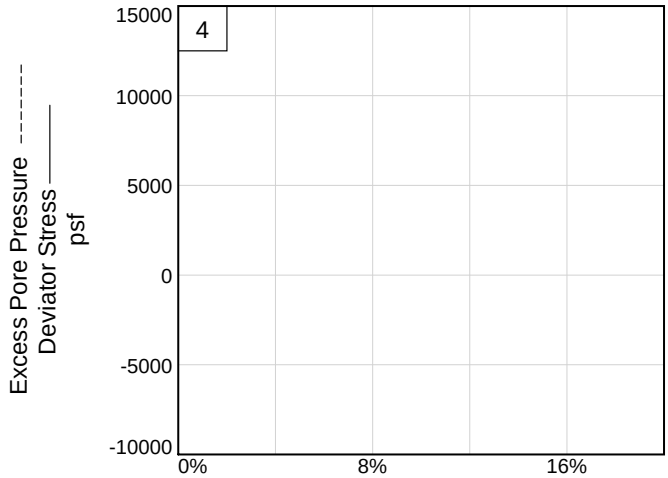
TRIAXIAL SHEAR TEST REPORT

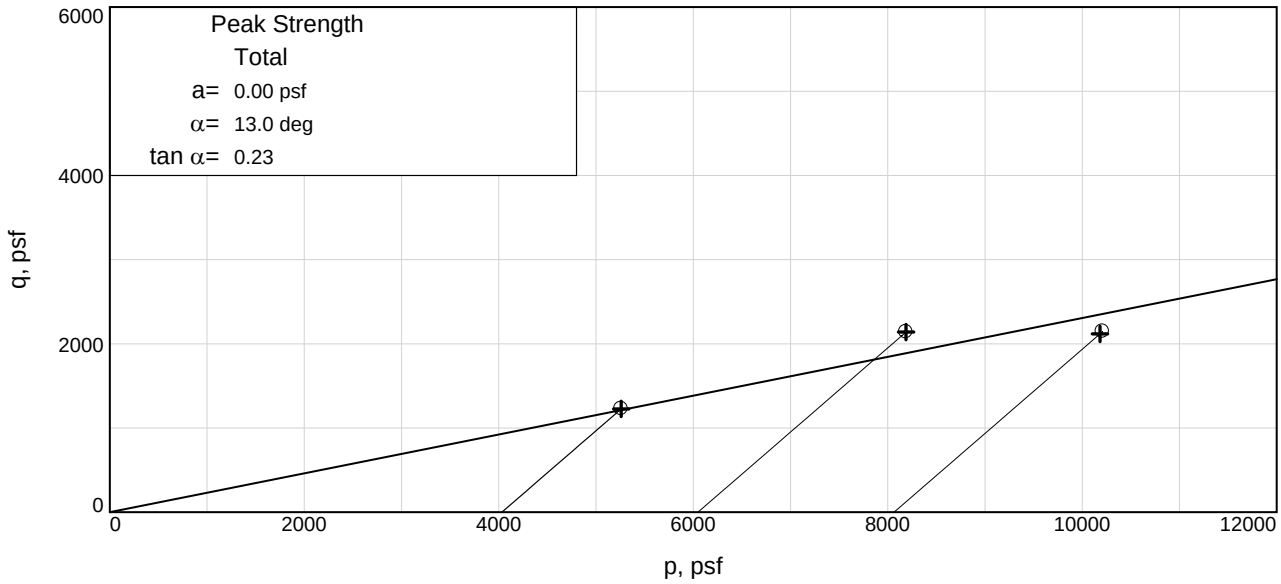
Washington State Department of Transportation











Stress Paths: o indicates peak + indicates end

Client: URS

Project: SR 90 Snoqualmie Pass East

Source of Sample: SW2-009-08 **Depth:** 44-46 **Sample Number:** S-7

Project No.: XL-2779 **Figure** _____

Washington State Department of Transportation

Job No.	**XL-2779**	Date	**December 3, 2008**
Hole No.	**SW2-009-08**	Sheet	**1** of **1**
Project	**Snoqualmie Pass East - 2008 Barge, Truck, Skid**		

Laboratory Summary

Washington State Department of Transportation

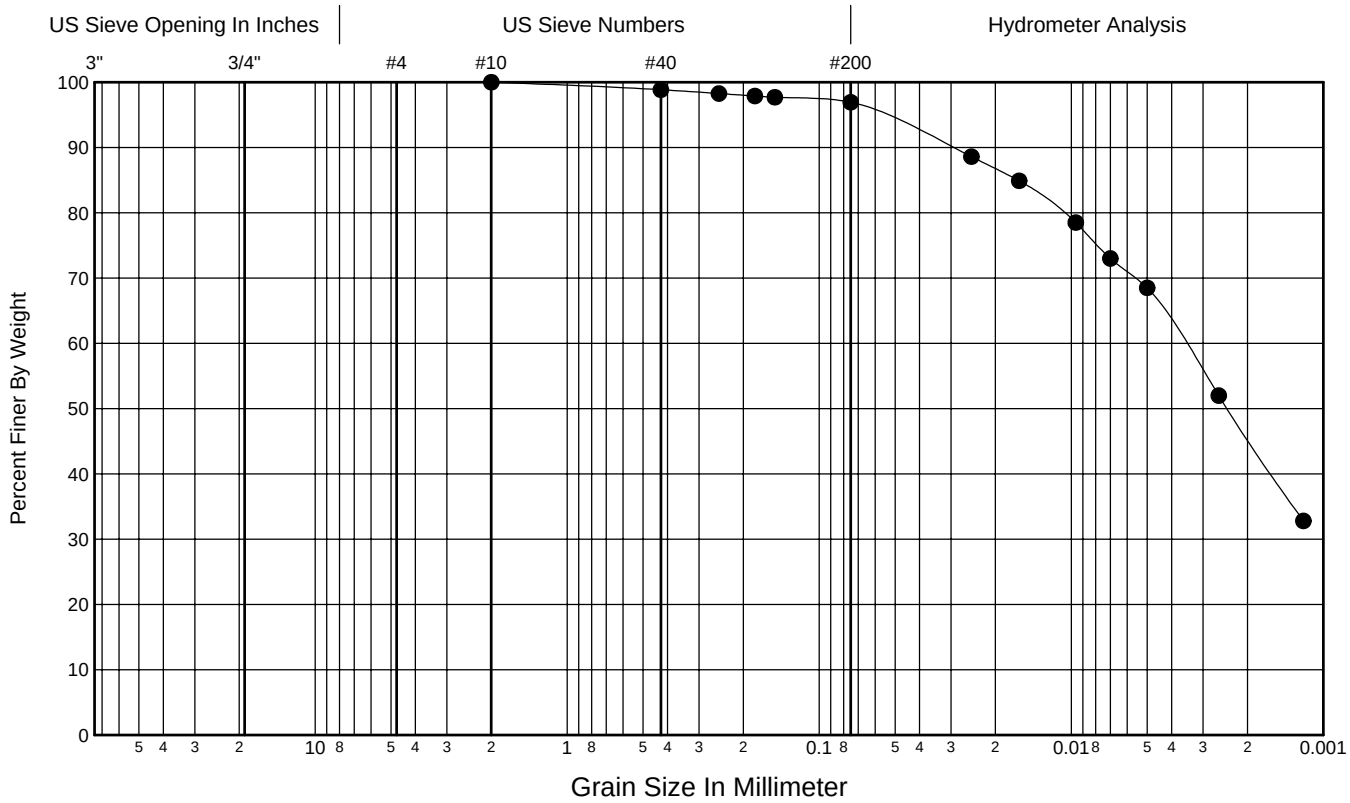
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	**44.3**	**13.50**	**S-7**	**CL**	**See Boring Log**	**LEAN CLAY**	**38**	**37**	**21**	**16**

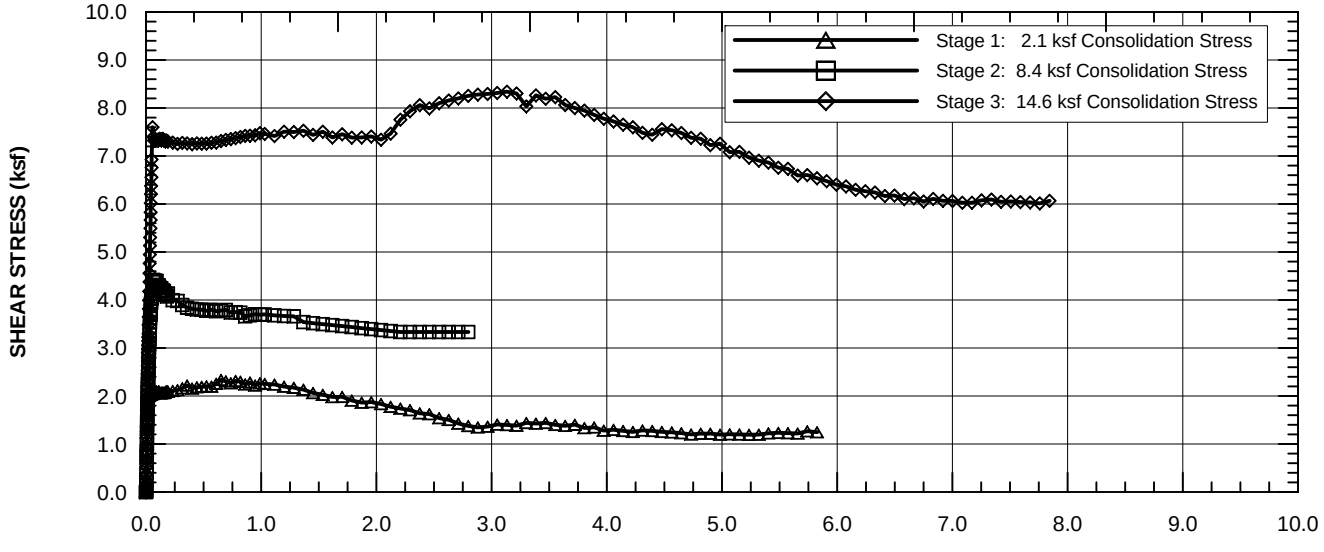
GRADATION FRACTIONS

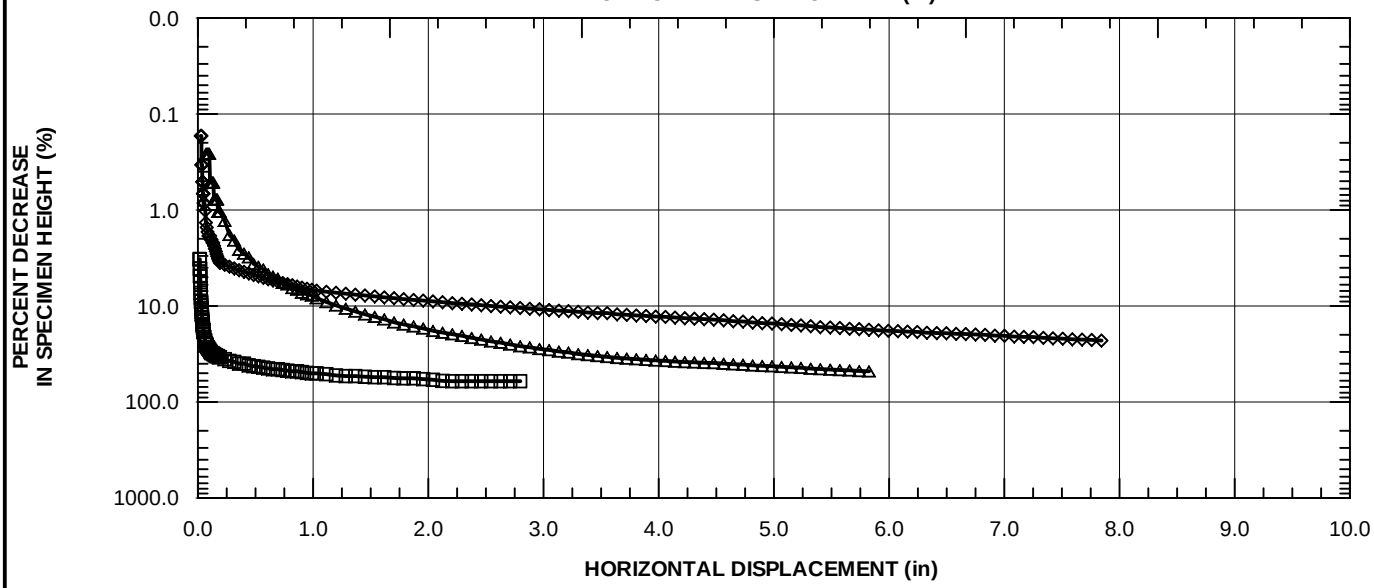
	%Gravel	%Sand	%Fines	Cc	Cu
●	**0.0**	**3.1**	**96.9**		

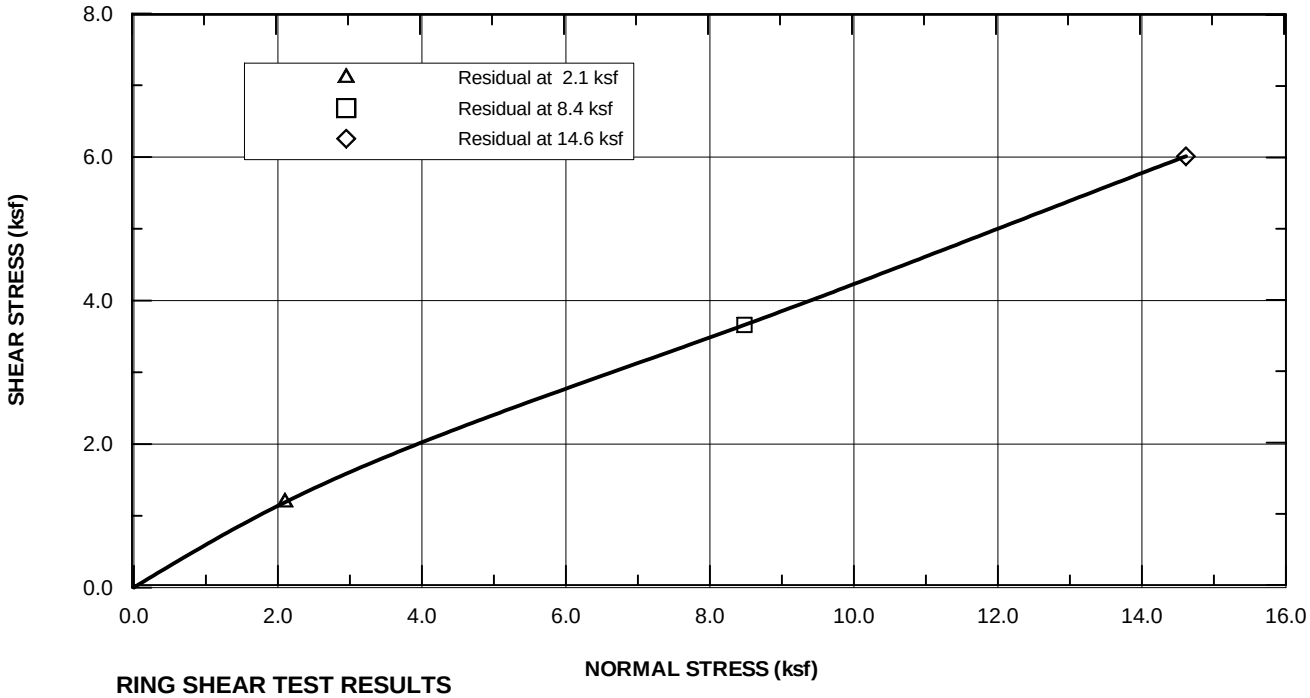
GRADATION VALUES

	D60	D50	D30	D20	D10
●	**0.004**	**0.00**			



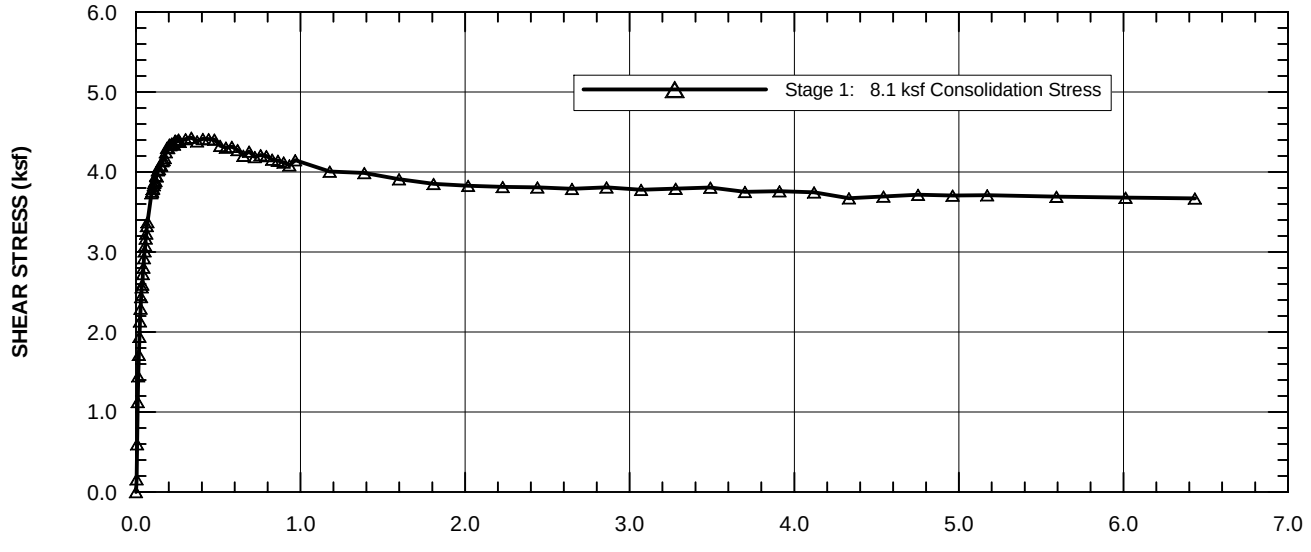


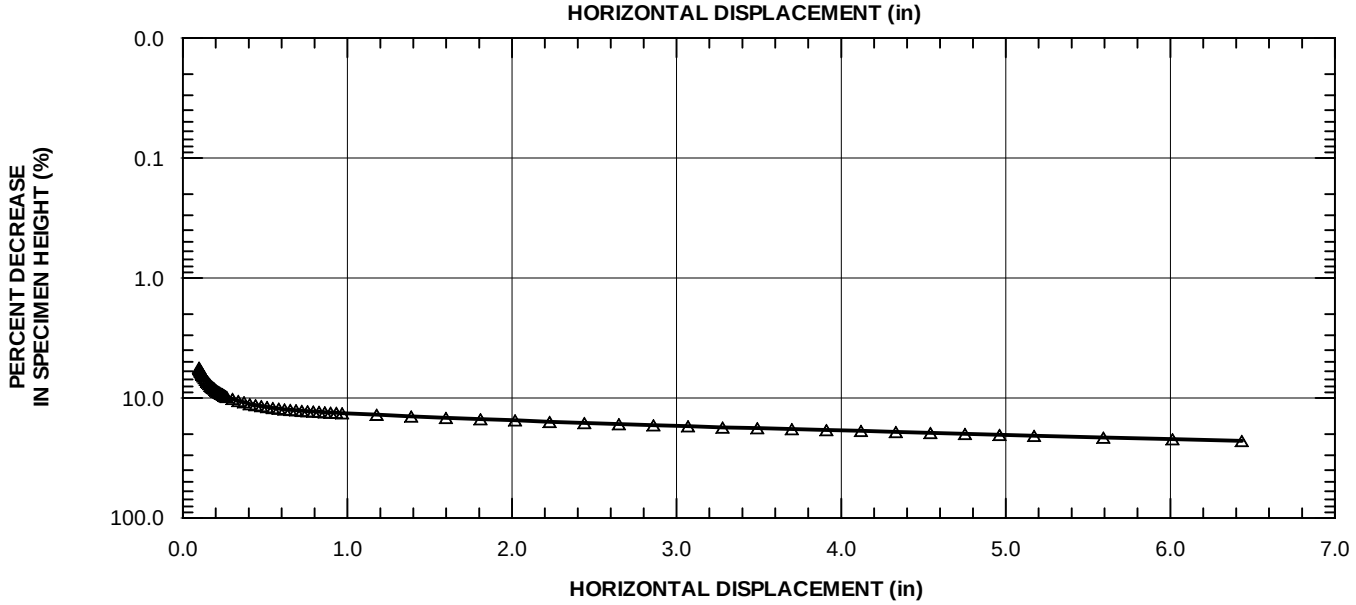


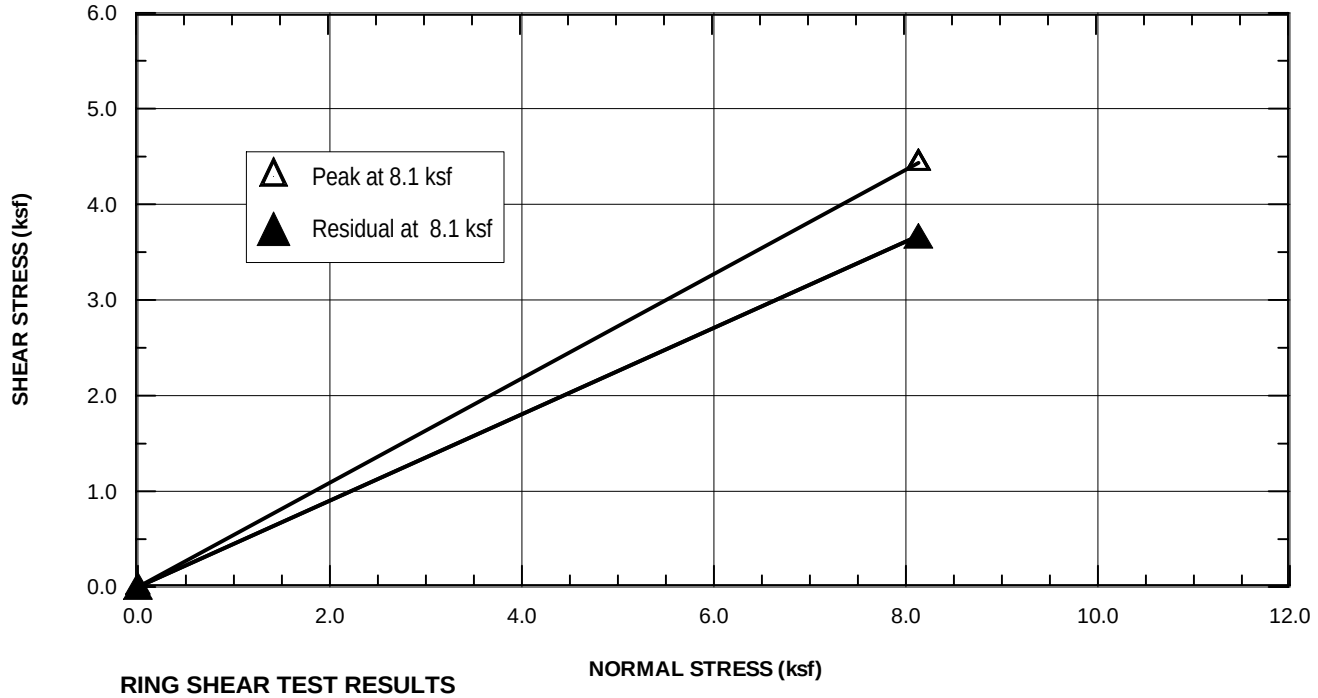


RING SHEAR TEST RESULTS
Project Name.: I-90 Snoqualmie Pass East
Project Number: 33758654
Exploration No.: SCB-022-09
Sample C-20 at 61.25 ft

Liquid Limit (%): 28
Clay Fraction (%): 26



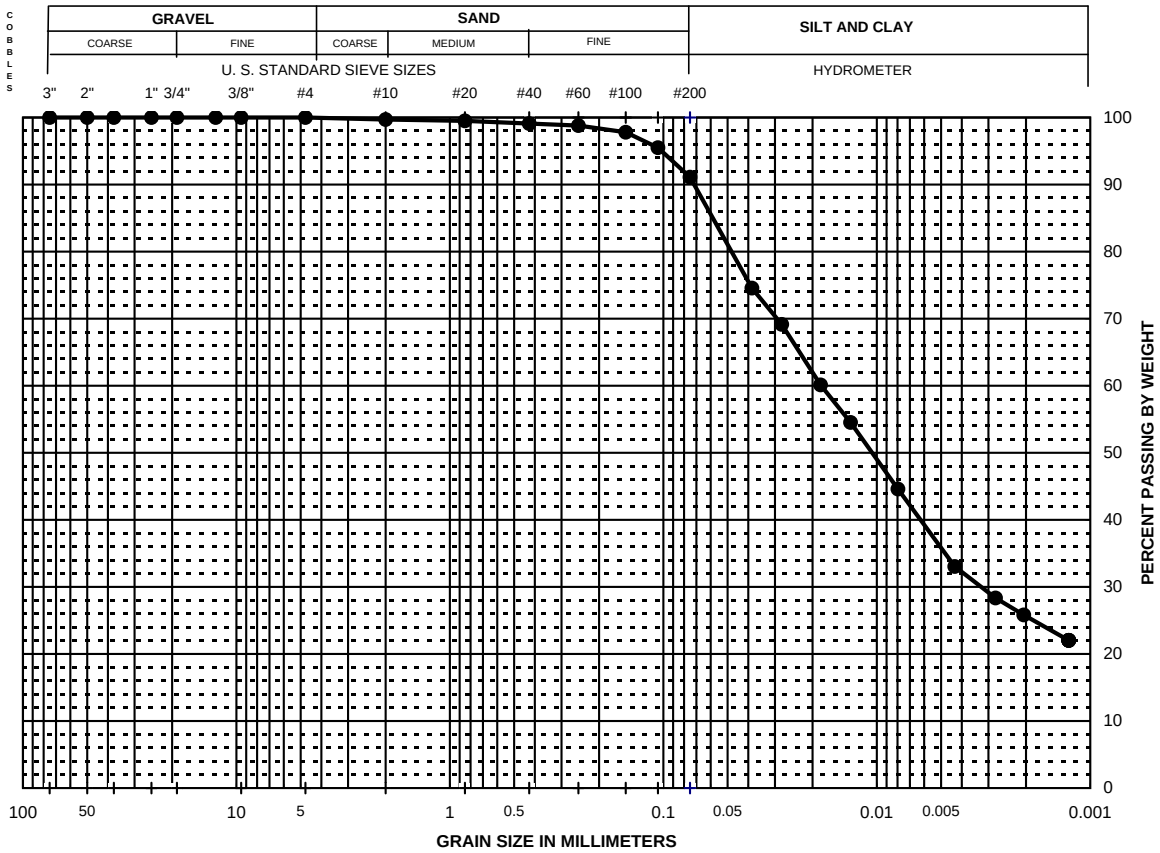




RING SHEAR TEST RESULTS
Project Name.: I-90 Snoqualmie Pass East
Project Number: 33758654
Exploration No.: SCB-022-09
Sample C-20 at 61.25 ft

Liquid Limit (%): 28
Clay Fraction (%): 26

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	100.0
#4	4.75	100.0
#10	2.00	99.7
#20	0.850	99.5
#40	0.425	99.1
#60	0.250	98.8
#100	0.150	97.8
#140	0.106	95.5
#200	0.075	91.1
Hydrometer Analysis	0.0385	74.6
	0.0279	69.1
	0.0183	60.1
	0.0133	54.5
	0.0080	44.6
	0.0043	33.0
	0.0028	28.3
	0.0020	25.8
	0.0013	22.0
	0.0013	22.0

% Cobbles	
% Gravel	
% Sand	8.9
% Fines	91.1
D_{60}	
D_{30}	
D_{10}	
C_u	
C_c	

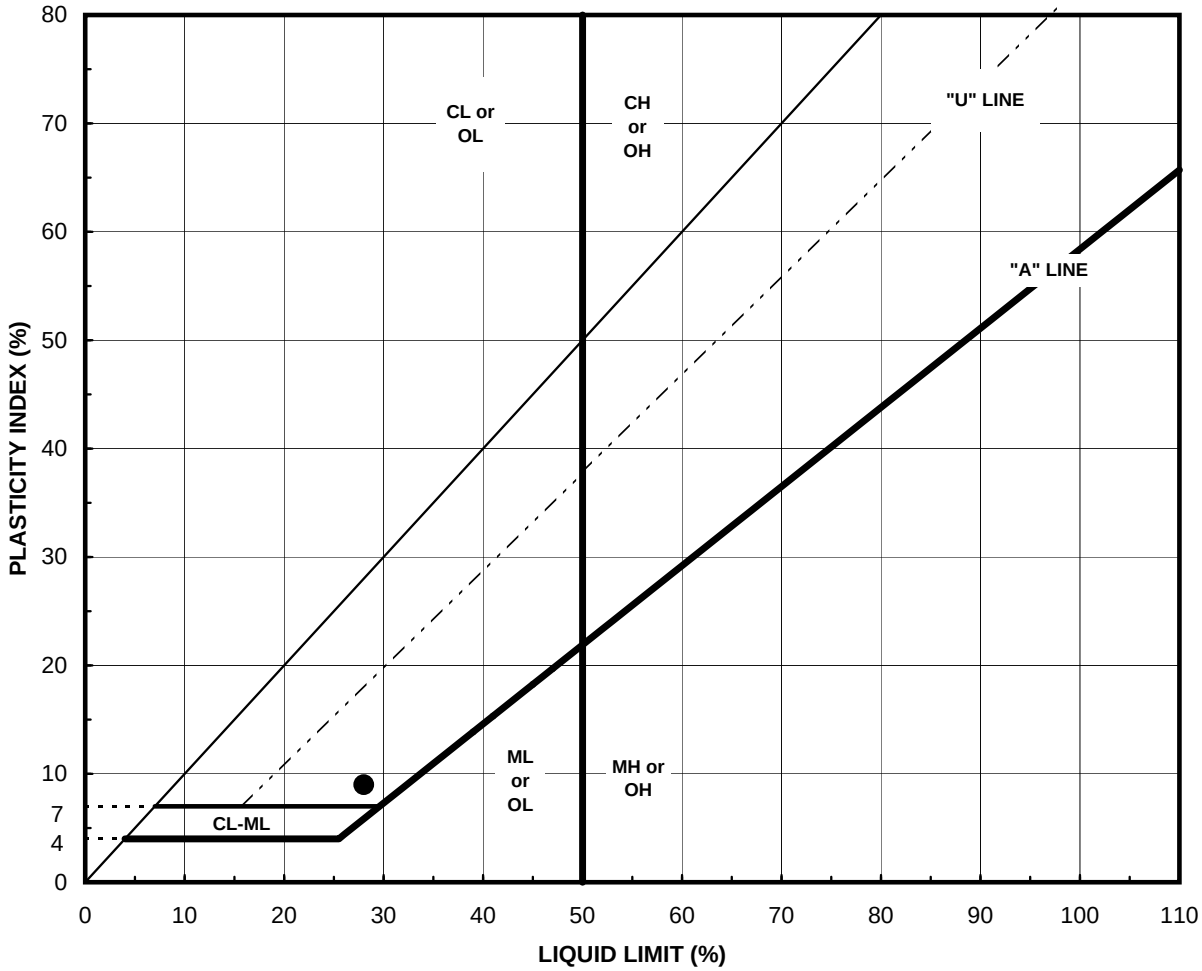
Exploration	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
SCB-022-09	C-20	61.3	●	21.6	28	9	26	**Light gray Clay (CL)**

PROJECT NAME: **I-90 Snoqualmie Pass East**

PROJECT NUMBER: **33758654**

PARTICLE-SIZE DISTRIBUTION CURVES

Figure:



BORING / SAMPLE	DEPTH (ft.)	TEST SYMBOL	WATER CONTENT (%)	LL (%)	PI (%)	DESCRIPTION / CLASSIFICATION
SCB-022-09	61.3	●	21.6	28	9	Light gray Clay (CL)
		■				
		◆				
		○				
		□				
		◇				

Project Name: **I-90 Snoqualmie Pass East** **PLASTICITY CHART**

Project Number: **33758654** **Figure**

URS

APPENDIX D.3
In-Situ Engineering Report – Pressuremeter Testing

Report of In Situ Pressuremeter Testing

Conducted for:

2009 Geotechnical Exploration Program
I-90 Snoqualmie Pass East Snowshed

Lake Keechelus, WA

Submitted to:

URS Corporation
1501 4th Ave, Ste 1400
Seattle, WA 98101-1616

In Situ Engineering Project Number: 843
URS Project Number: 33758654.00010

June 2009

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TABLE OF CONTENTS

1.0 INTRODUCTION 2
2.0 PURPOSE 2
3.0 PRESSUREMETER 2
4.0 HOLE FORMATION 4
5.0 TEST PROCEDURE 5
6.0 RANGE OF DATA 7
7.0 STANDARD METHOD OF ANALYSIS OF THE SHEAR MODULUS 8
9.0 DETERMINATION OF STRENGTH PROPERTIES BY MODEL ANALYSIS 13
10.0 CONCLUSIONS 16
11.0 REFERENCES 16

FIGURES

Fig.1. Schematic details of the pressuremeter 3
Fig.2. Pre-bored Pressuremeter test I-90-04 at 85ft in SSD-007-09 6
Fig.3. Comparison of Tests I-90-04, I-90-09 and I-90-19 7
Fig.4. Modulus Determination for I-90-20 at 57ft, hole 008 9
Fig.5. Parallel Modulus Loops for I-90-06 at 82ft, borehole 007 10
Fig.6. Increasing Modulus Loops for I-90-11 at 69ft, borehole 007 10
Fig.7. Cohesive Model for test I-90-04, hole 007, Shear Modulus = 90,000 psi 14
Fig.8. Frictional Model for test I-90-04, hole 007, Shear Modulus = 420,000 psi 14

TABLES

Table 1a Pressuremeter Test Depth and Material Description: SSD-007-09 5
Table 1b Pressuremeter Test Depth and Material Description: SSD-006-09 5
Table 1c Pressuremeter Test Depth and Material Description: SSD-006-09 5
Table 2a Limit Pressure, Shear Modulus and Shear Strength (log method): SSD-007-09 12
Table 2b Limit Pressure, Shear Modulus and Shear Strength (log method): SSD-006-09 12
Table 2c Limit Pressure, Shear Modulus and Shear Strength (log method): SSD-008-09 12
Table 3a Material Properties from Model Analysis: SSD-007-09 15
Table 3b Material Properties from Model Analysis: SSD-006-09 15
Table 3c Material Properties from Model Analysis: SSD-006-09 16

APPENDIX

I Field Data and Data Interpretation.

1.0 INTRODUCTION

This report presents the results of a pressuremeter study, conducted on from May 31st through June 10th, 2009 in three test borings: SSD-006-09, SSD-007-09 and SSD-008-09. Testing was performed on Lake Keechelus, along the I-90 corridor, in Washington. The pressuremeter testing (PMT) was conducted by In Situ Engineering, Snohomish, WA under contract to URS Corporation, Seattle, WA. The drilling and deployment of the pressuremeter was accomplished by the Washington Department of Transportation. The boreholes were drilled using a barge mounted CME 45 skid rig The barge was located over holes SSD-006-09, SSD-007-09, and SSD-008-09 by WSDOT crews where the water depths was 17, 18 and 17 feet respectively. In all 22 pressuremeter tests were attempted, of which all were successful tests. The borehole name, test depths and preliminary material descriptions are presented in Table 1a, 1b and 1c. Test depths are referenced to the mudline.

2.0 PURPOSE

The purpose of this study was to determine the *in-situ* strength properties of Meta Welded Lapilli Tuff bedrock for the construction of a new showshed which will cover all lanes of traffic. The new snowshed will be constructed over the impounded waters of Lake Kecheelus. Particularly of interest was the correlated unconfined compressive strength determined by pressuremeter methods.

3.0 PRESSUREMETER

The pressuremeter used for this study was a prebored monocell pressuremeter. The pressuremeter has three electronic displacement sensors spaced 120 degrees apart that are located at the center of the pressuremeter. A flexible membrane is placed over the sensors and clamped at each end. The membrane is covered by a protective sheet of stainless steel strips. The unit is pressurized using oil fed into the system by a manual pump in order to deform the adjacent material. The electronic signals from the displacement sensors and the pressure sensor were transmitted by cable to the surface. During the test, the average expansion versus pressure was displayed on a computer screen. The pressuremeter was expanded by regulating the flow of oil to the PMT unit.

The prebored pressuremeter was placed down the test pocket hole before expansion was commenced.

Fig. 1 presents the essential details of the pressuremeter.

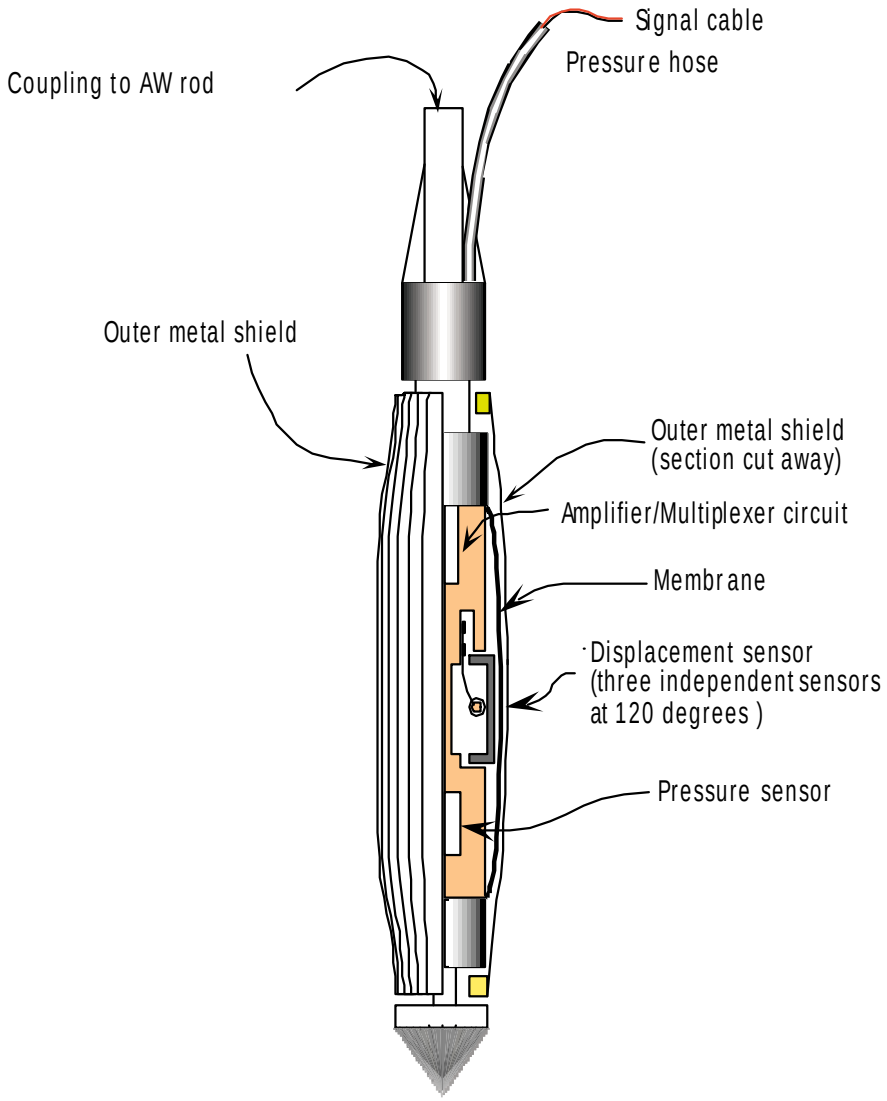


Fig.1. Schematic details of the pressuremeter

4.0 HOLE FORMATION

Mud rotary drilling techniques were used to drill the three boreholes. In each boring the goal was to attempt 8 tests within the first 20-25 feet of bedrock encountered. At each location, the drillers advanced HW casing through the water and as far into the overburden as possible. The hole was cored using an HQ core barrel until solid rock was encountered. In order to determine that bedrock had been reached, the drillers often drilled 5 to 10 feet into the rock as to ensure they were not drilling through a large boulder. Rock was encountered in 006, 007, and 008 at 54ft, 61ft and 42ft respectively below mudline. Once HQ was advanced to an appropriate depth into the bedrock (determined by the drillers and URS personnel) an NQ core barrel was used to create a test pocket for the pressuremeter. Tests pockets were drilled anywhere from 5 to 8 feet in length. Three tests were performed in each 7 or 8 foot pocket, whereas only two tests could be performed in a 5 foot test pocket. The instrument was advanced to the bottom of each test pocket, or as far as possible, and then raised from 1.5' to 2.5' to perform each adjoining test. Raising the instrument 1.5' is standard practice, but in longer test pockets, it was requested to increase the spacing between the tests for borehole SSD-008-09. Upon completing pressuremeter tests in a given test pocket, the pressuremeter was brought to the surface. The HQ core barrel was then advanced, when possible, through the tested zone, stopping just above the next zone to be tested. The NQ core barrel would again be advanced to create the next text pocket.

In both SSD-006-09 and SSD-008-09, two longer tests pockets were drilled, accompanied by one shorter 5 foot test pocket in order to complete the 8 tests. In SSD-007-09 two longer test pockets were drilled, allowing for 6 tests to be completed. The HQ core barrel could not be advanced through the second test pocket and thus the hole was abandoned before the last two tests could be attempted. This decision was made due to the heavily fractured nature of the rock and the concern for the ability to retrieve or advance the instrument down a longer NQ core hole (approximately 13 feet). A similar problem occurred in borehole SSD-006-09, but due to the competent nature of the rock encountered, it was deemed safe to advance the instrument down a longer NQ core hole (approximately 11 feet).

The details of the test depth and the initial sample description are given in Table 1a, 1b and 1c. Depths are referenced to the bottom of the instrument during the test. The zone tested spans 18" and begins 2 feet above the bottom of the instrument, spanning downward.

Table 1a Pressuremeter Test Depth and Material Description: SSD-006-09

Hole	Test	Date	Test Depth (ft)	Soil Description	Recovery	RQD
SSD-006-09	1-90-07	6/3/2009	66	Meta Welded Lapilli Tuff	98	98
SSD-006-09	1-90-08	6/3/2009	64.5	Meta Welded Lapilli Tuff	98	98
SSD-006-09	1-90-09	6/3/2009	63	Meta Welded Lapilli Tuff	98	98
SSD-006-09	1-90-10	6/4/2009	70.5	Meta Welded Lapilli Tuff	86	86
SSD-006-09	1-90-11	6/4/2009	69	Meta Welded Lapilli Tuff	86	86
SSD-006-09	1-90-12	6/4/2009	79	Meta Welded Lapilli Tuff	100	100
SSD-006-09	1-90-13	6/4/2009	77.5	Meta Welded Lapilli Tuff	100	100
SSD-006-09	1-90-14	6/4/2009	76	Meta Welded Lapilli Tuff	84	78

Table 1b Pressuremeter Test Depth and Material Description: SSD-007-09

Hole	Test	Date	Test Depth (ft)	Soil Description	Recovery	RQD
SSD-007-09	I-90-01	5/31/2009	77	Meta Welded Lapilli Tuff	85	12
SSD-007-09	I-90-02	5/31/2009	75.5	Meta Welded Lapilli Tuff	85	12
SSD-007-09	I-90-03	5/31/2009	74	Meta Welded Lapilli Tuff	85	12
SSD-007-09	I-90-04	5/31/2009	85	Meta Welded Lapilli Tuff	90	13
SSD-007-09	I-90-05	5/31/2009	83.5	Meta Welded Lapilli Tuff	90	13
SSD-007-09	I-90-06	5/31/2009	82	Meta Welded Lapilli Tuff	90	30

Table 1c Pressuremeter Test Depth and Material Description: SSD-008-09

Hole	Test	Date	Test Depth (ft)	Soil Description	Recovery	RQD
SSD-008-09	1-90-15	6/10/2009	54	Meta Welded Lapilli Tuff	86	59
SSD-008-09	1-90-16	6/10/2009	52	Meta Welded Lapilli Tuff	94	81
SSD-008-09	1-90-17	6/10/2009	50	Meta Welded Lapilli Tuff	94	81
SSD-008-09	1-90-18	6/10/2009	62	Meta Welded Lapilli Tuff	92	60
SSD-008-09	1-90-19	6/10/2009	59.5	Meta Welded Lapilli Tuff	92	60
SSD-008-09	1-90-20	6/10/2009	57	Meta Welded Lapilli Tuff	83	40
SSD-008-09	1-90-21	6/10/2009	66.8	Meta Welded Lapilli Tuff	96	56
SSD-008-09	1-90-22	6/10/2009	65	Meta Welded Lapilli Tuff	96	56

5.0 TEST PROCEDURE

A typical test procedure used on this project is as follows: The membrane was expanded by controlling the flow of oil into the pressuremeter, increasing the pressure in small steps until the membrane starts to expand against the borehole wall. Once the pressure reached a significant value, between 600 and 700 psi, the pressure was reduced to no more than 40% of the maximum past pressure, then increased again.

The resulting unload-reload loop can be used to evaluate the elastic behavior of the material. In materials which behave in a plastic manner, the loops will exhibit a hysteretic behavior. That is, the unloading path will follow the "mirror" image of the reloading path. In linear materials such as sands the loops will be very tight exhibiting little hysteretic behavior.

The pressure was then advanced in steps until a pressure between 1,200 and 1,300 psi was reached before completing a second unload-reload cycle. A third unload-reload loop was then completed once a pressure above 1,800 psi was reached before finally draining the instrument completely reaching 2,000 psi. If the disturbance is small, the slope of the loops will tend to be parallel. Often in rock, and especially in fractured rock, some deviation will take place. It is believed that some opening of the joint spacing occurs after drilling the rock. As the rock is loaded with pressure, the rock joint openings will close back up and the fragments will lock together creating stiffer and stronger mass, which will lead to an increased slope for the unload-reload loops and thus an increased modulus value.

In Figure 2, Test I-90-04 is a typical example of a test performed at this site in borehole SSD-007-09. The membrane begins to expand, pushing against the borehole wall. The steps above are then carried out in accordance with the operator's judgment. Due to concern for the safety of the instrument, the pressure was reduced after reaching values around 2,000 psi. This value was determined prior to testing.

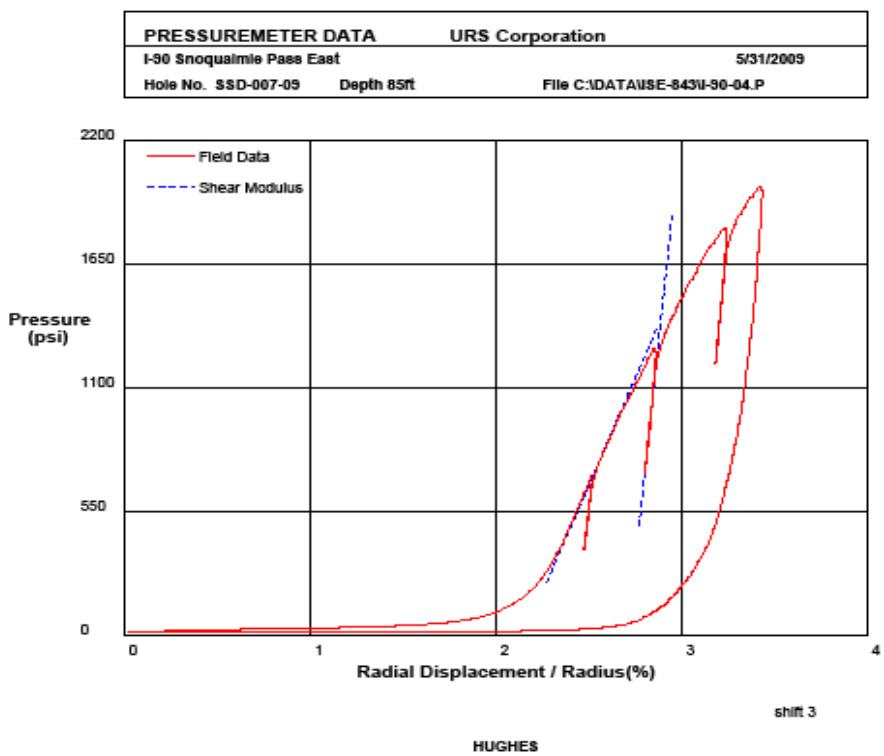


Fig.2. Pre-bored Pressuremeter test I-90-04 at 85ft in SSD-007-09

6.0 RANGE OF DATA

The material tested consisted of Lapilli Tuff with different amounts of fracture exhibited in the three boreholes tested. Below, in Figure 3 are three representative tests I-90-04, I-90-09, I-90-19 in holes SSD-007-09, SSD-006-09, and SSD-008-09 respectively. The tests in Hole 006 are essentially un-fractured intact rock with a compressive strength in excess of 4,000 psi, having a shear modulus in excess of 5,000,000 psi in most tests. The tests in the other two holes are in progressively more fractured rock. These tests tend to behave in a cohesive - frictional manner. The RQD for the zones tested are as follows: test 4 had an RQD of 13%, test 9 with an RQD of 98% and test 19 with an RQD of 60%. It should be noted that test 19 was performed in a particularly fractured zone. The RQD for the entire core in that area, between 57 and 62ft was 60%, but the in intact portion of the core was not the location where test 19 was conducted, which was towards the upper portion of the core at 59.5ft. It should be noted that the RQD for the core above in borehole 008, from 54 to 57ft, had an RQD of 40%. The RQD for the zone tested in test 19 would have been close to 0% had only that section of the core been considered.

Tests performed in SSD-007-09 exhibited compressive strengths ranging from 2,300 psi to 3,100 psi, with a shear modulus ranging from approximately 1,000,000 psi to over 2,500,000 psi. The tests in SSD-008-09 had compressive strengths of 2,800 psi ranging to over 4,000 psi, with shear modulus values ranging from 800,000 psi to almost 3,000,000 psi.

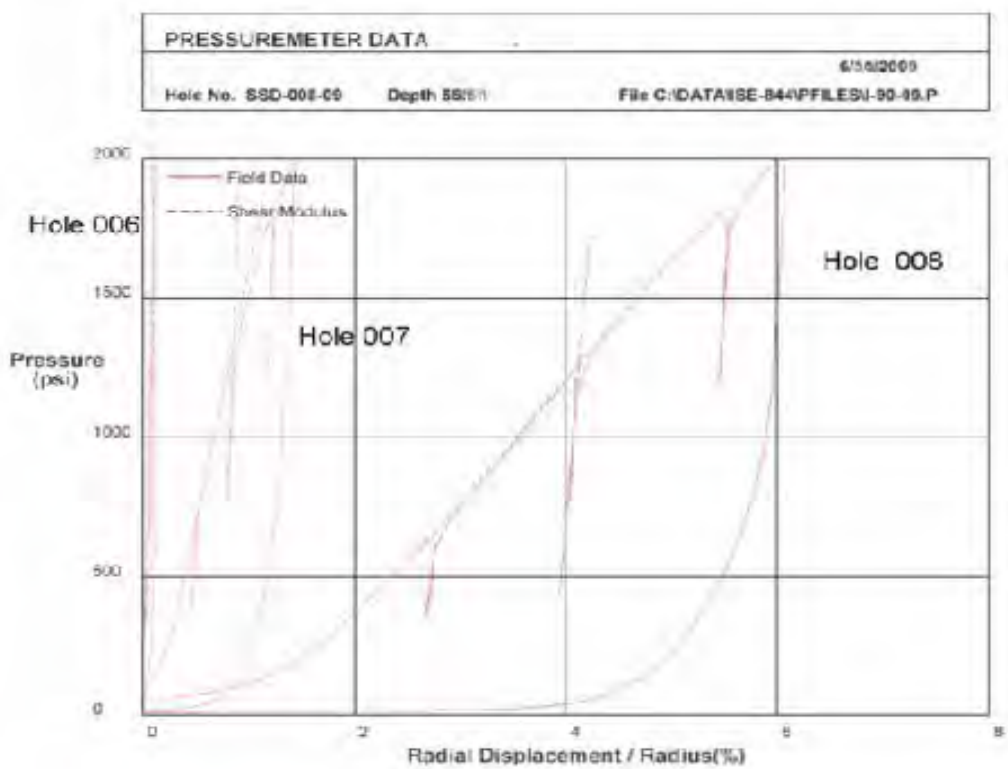


Fig.3. Comparison of Tests I-90-04, I-90-09 and I-90-19

7.0 STANDARD METHOD OF ANALYSIS OF THE SHEAR MODULUS

If the material surrounding the pressuremeter is assumed to extend to infinity, and assumed to behave as an idealized linear elastic, homogeneous material, which does not fail under shear or tension, then the displacement on the boundary of the pressuremeter, u_a, for a given pressure, P, is given by:

$$u_a = P(a)\,(1+\mu) / E \qquad 1)$$

where "E" is the Young's Modulus, "a" the radius of the pressuremeter cavity, and "μ" the Poisson's ratio. As the shear modulus, "G", and the Young's modulus, "E", are related by the following relationship:

$$E=2(G)(1+\mu) \qquad 2)$$

Equation 1 reduces to:

$$u_a = 0.5P(a) / G \qquad 3)$$

Hence, the shear modulus G is given by:

$$G = 0.5 * \Delta \text{ Pressure} / \Delta(\text{radial displacement/radius}) \qquad 4)$$

This modulus for the average slope of the initial part of the pressuremeter curve (A-B in Fig.4) is a shear modulus and is different than the "pressuremeter modulus" as defined in the American Society for Testing and Materials (ASTM) D4719, Section 9.5. The ASTM "pressuremeter modulus" is really a Young's modulus with ASTM recommending a Poisson's ratio of 0.33 unless other values are known. The modulus values reported in the tables below are shear modulus values not an ASTM "pressuremeter modulus".

In many tests a straight section of the initial part of the curve is not as well defined to enable the modulus to be determined. However, the modulus determined from the unload-reload loops (C-D in Fig.4), which is often higher than the initial loading modulus, is more accurately defined and is probably more representative of the modulus for the *in-situ* material. In Figure 4, the test has been shifted 4% strain in order to frame the test more appropriately. Beyond the shift, the first 1.7% of the test pictured below represents the pressuremeter expanding against slough before hitting the borehole wall, making a total of 5.7% strain exhibited before contact with the borehole wall is made. The initial slope formed upon contacting the borehole wall is used to determine the Menard modulus.

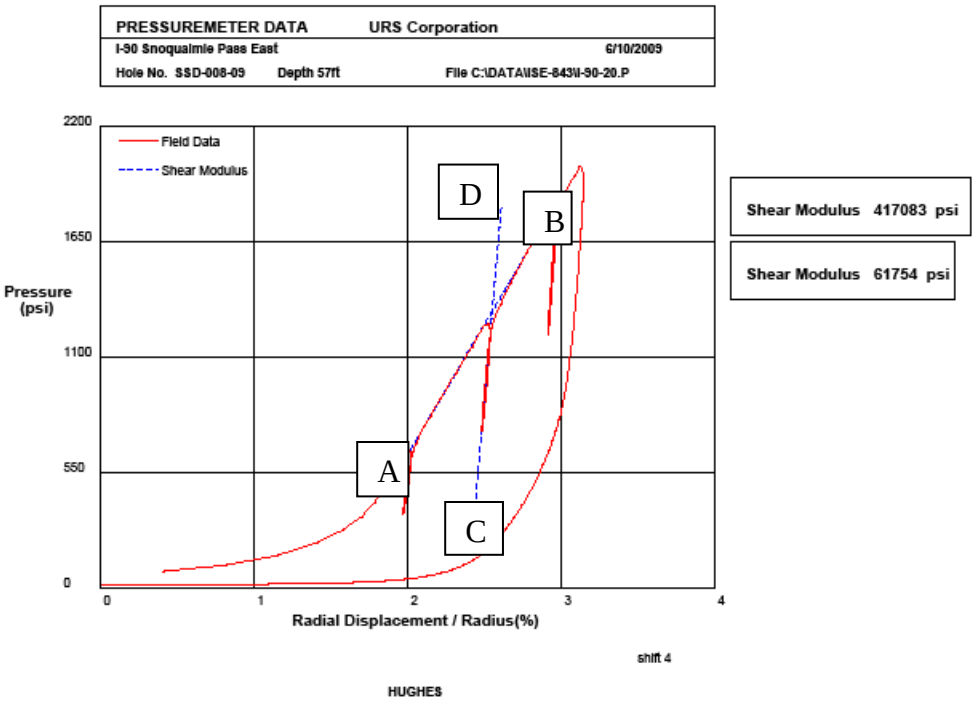


Fig.4. Modulus Determination for I-90-20 at 57ft, hole 008

Some indication of the quality of data can be determined by the ability to obtain parallel unload-reload loops. If there is significant borehole disturbance or in rock, especially fractured rock, the unload-reload curves will not be parallel, they will get steeper with each successive loop. Under compression the gaps or small cracks in the rock are filled, increasing the stiffness of the rock and thereby increasing the shear modulus. Shear modulus values are displayed in Table 2. The values reflected in Table 2 are based on the modulus determined by both the initial slope as well as the unload-reload loops. The values for the unload-reload loops reflect an average value determined by the unload-reload loops in cases where they were close to parallel as shown in Figure 5, test I-90-06. When the rock continued to stiffen, as shown in Figure 6, test I-90-11, the value recorded reflects the highest modulus value determined by the unload-reload loops.

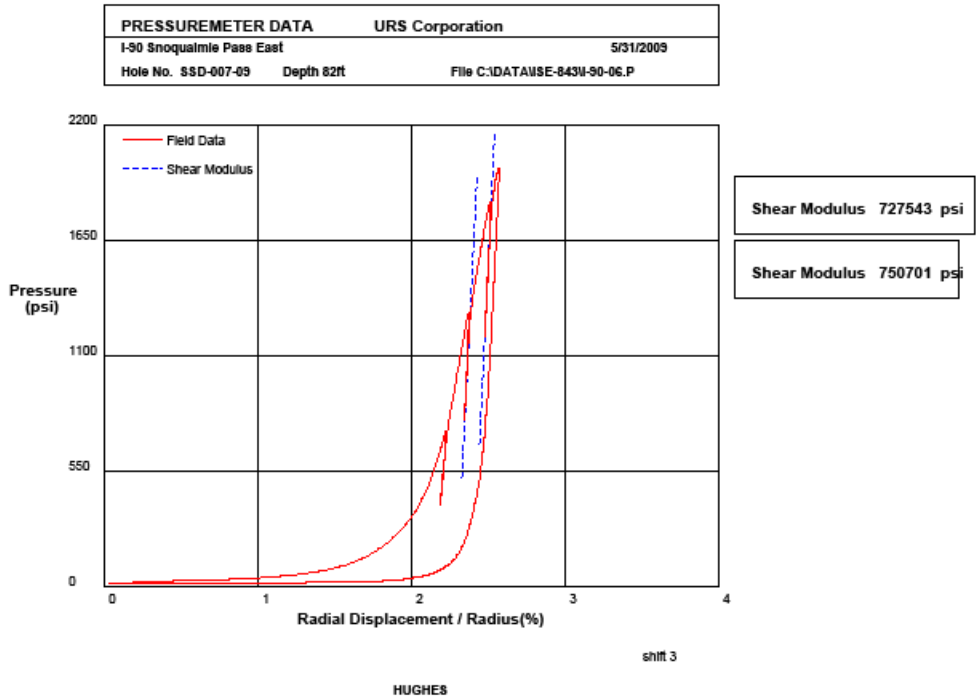


Fig.5. Parallel Modulus Loops for I-90-06 at 82ft, borehole 007

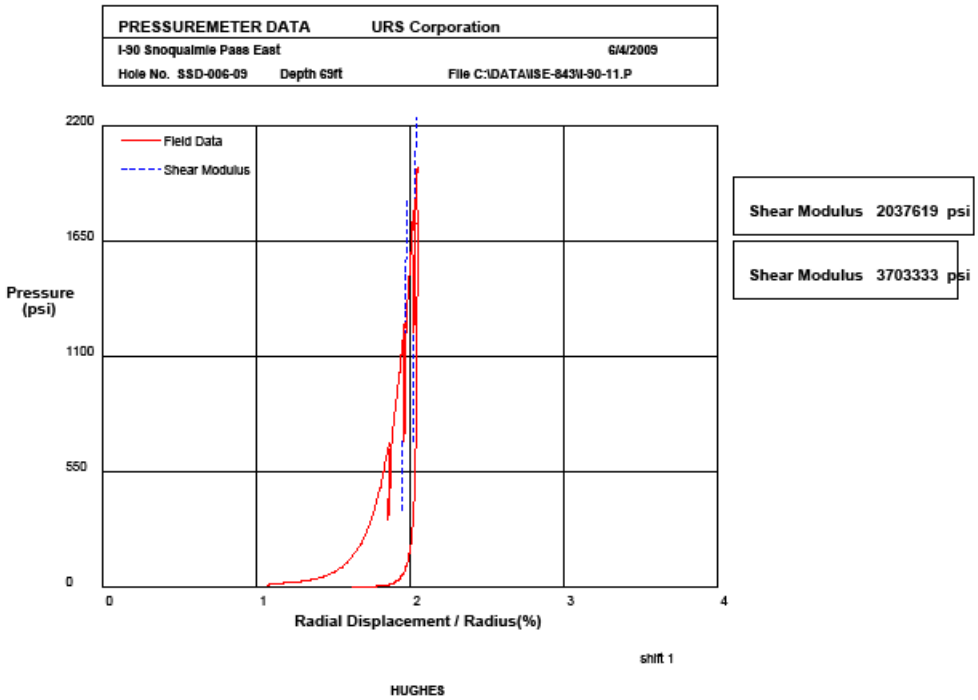


Fig.6. Increasing Modulus Loops for I-90-11 at 69ft, borehole 007

8.0 DETERMINATION OF THE LIMIT PRESSURE

From a visual inspection of the typical pressuremeter curve in a cohesive material, it can be noted that the pressure tends to a limit. However, to make this limit pressure a quantitative measurement, the limit pressure is defined as that pressure which occurs when the volume of the pressuremeter has doubled. However, few pressuremeter tests ever actually expand this far before reaching the limit of the strain sensing system. The pressuremeters used in this investigation will only expand to about 20% before the displacement limit is reached.

If the material being tested is assumed to behave as an elastic cohesive material, then the equation governing the pressure-displacement curve is given by:

$$P = P_L + (c)\log_e (u_a/_a) \qquad 5)$$

$$P_L = P_o + c + (c)\log_e [G/c] \qquad 6)$$

Where:

P_L" is the theoretical limit pressure at infinite expansion

"c" is the undrained cohesive strength,

"P_O" is the total *in-situ* lateral stress, and "G" is the shear modulus.

From Equation 5, a plot of pressure P against the log of u_a/a will be a straight line, provided the shear strength remains constant with strain. The slope of this line will provide a measure of the undrained shear strength, c. The Limit Pressure, as defined by the ASTM code D4719, Section 10.6, is the pressure at which the cavity has doubled in size. This doubling in size occurs when u_a/a is equal to 41%. (The origin of the strain used in the log/normal plots is the assumed origin at the *in-situ* stress state). If any disturbance is present, the above method of determining the cohesive strength usually provides an overly optimistic value. The above method applies to cohesive materials. However it can be used in granular materials to give an indication of the maximum or limit pressure that can be applied to the ground for the design of foundations. The shear strength determined by this method is not appropriate in granular materials. In this study, some of the fractured rock behaved in a frictional - cohesive manner. Because the limit of the rock was never reached, plotting the data on a log scale provides inappropriate results. However, the tests all reached values of 2,000 psi; therefore it can be determined that the limit pressure values are at least and projected to be all well above 2,000 psi.

The values determined for limit pressure and shear modulus are summarized below in Table 2.

Table 2a Limit Pressure, Shear Modulus and Shear Strength (log method): SSD-007-09

Hole	Test	Depth (ft)	Initial Shear Modulus (psi)	Unload-Reload Shear Modulus (psi)	Limit Pressure (psi)
SSD-007-09	I-90-01	77	110,000	600,000	>2000
SSD-007-09	I-90-02	75.5	120,000	650,000	>2000
SSD-007-09	I-90-03	74	200,000	650,000	>2000
SSD-007-09	I-90-04	85	90,000	400,000	>2000
SSD-007-09	I-90-05	83.5	220,000	>1,000,000	>2000
SSD-007-09	I-90-06	82	200,000	750,000	>2000

Table 2b Limit Pressure, Shear Modulus and Shear Strength (log method): SSD-006-09

Hole	Test	Depth (ft)	Initial Shear Modulus (psi)	Unload-Reload Shear Modulus (psi)	Limit Pressure (psi)
SSD-006-09	1-90-07	66	600,000	>1,500,000	>2000
SSD-006-09	1-90-08	64.5	720,000	>4,500,000	>2000
SSD-006-09	1-90-09	63	1,200,000	>6,000,000	>2000
SSD-006-09	1-90-10	70.5	280,000	>1,500,000	>2000
SSD-006-09	1-90-11	69	360,000	>4,000,000	>2000
SSD-006-09	1-90-12	79	520,000	>2,000,000	>2000
SSD-006-09	1-90-13	77.5	1,000,000	>3,000,000	>2000
SSD-006-09	1-90-14	76	1,000,000	>4,500,000	>2000

Table 2c Limit Pressure, Shear Modulus and Shear Strength (log method): SSD-008-09

Hole	Test	Depth (ft)	Initial Shear Modulus (psi)	Unload-Reload Shear Modulus (psi)	Limit Pressure (psi)
SSD-008-09	1-90-15	54	100,000	450,000	>2000
SSD-008-09	1-90-16	52	200,000	900,000	>2000
SSD-008-09	1-90-17	50	200,000	1,000,000	>2000
SSD-008-09	1-90-18	62	130,000	1,000,000	>2000
SSD-008-09	1-90-19	59.5	20,000	300,000	>2000
SSD-008-09	1-90-20	57	60,000	500,000	>2000
SSD-008-09	1-90-21	66.8	110,000	700,000	>2000
SSD-008-09	1-90-22	65	220,000	1,100,000	>2000

9.0 DETERMINATION OF STRENGTH PROPERTIES BY MODEL ANALYSIS

The PMT data can sometimes be used directly to determine the *in-situ* material properties such as the cohesive strength and the friction angle. To do so, a material model and failure mechanism must be assumed. If it is assumed that the material behaves in an ideal manner, in that the material deforms at constant volume throughout the test (i.e. it does not consolidate or dilate) and the shear strength remains constant, the pressuremeter curve can be interpreted by simple analytical means. The slope of the plot of pressure against the log of the strain can be used to give a direct measure of the shear strength, as discussed in Section 8. Unfortunately, real materials do not quite behave in this manner, and the shear strength determined by this method may not be accurate, particularly in disturbed material, in materials which degrade or partial tests in an enlarged hole. The shear strength determined by plotting on a log scale is not appropriate in frictional materials. However, this method of analysis often forms a basis for rating all materials.

A more realistic method for determining the shear strength in cohesive material is to compare the field PMT data with an ideal model pressuremeter curve based on an assumed set of material parameters. If, for instance, the material is assumed to be cohesive and fails at constant shear strength and constant volume, then the material parameters required for this model are the shear strength, lateral stress, and shear modulus. Adjustments can be made to those three parameters until a mathematical curve can be fitted to the field data. Judgment is required to adjust these three parameters to determine the best fit to the data, particularly if there is disturbance present. The strain origin also has to be adjusted to be somewhere in the range of the *in-situ* lateral stress.

In frictional materials, if it is assumed that the material has a constant friction angle and no cohesion then a simple model can be used to compare the data.

Because most of the rock tested in this study behaved in a frictional – cohesive manner, both models can be used to fit the pressuremeter curves. In order to fit the models appropriately, different shear modulus values had to be used, a reflection of the material tested. For the cohesive models, the initial shear modulus values were used, while values determined by the unload-reload loops were used in the frictional models. Figures 7 and 8 are an example of test 1-90-04 plotted using a cohesive model and frictional model respectively.

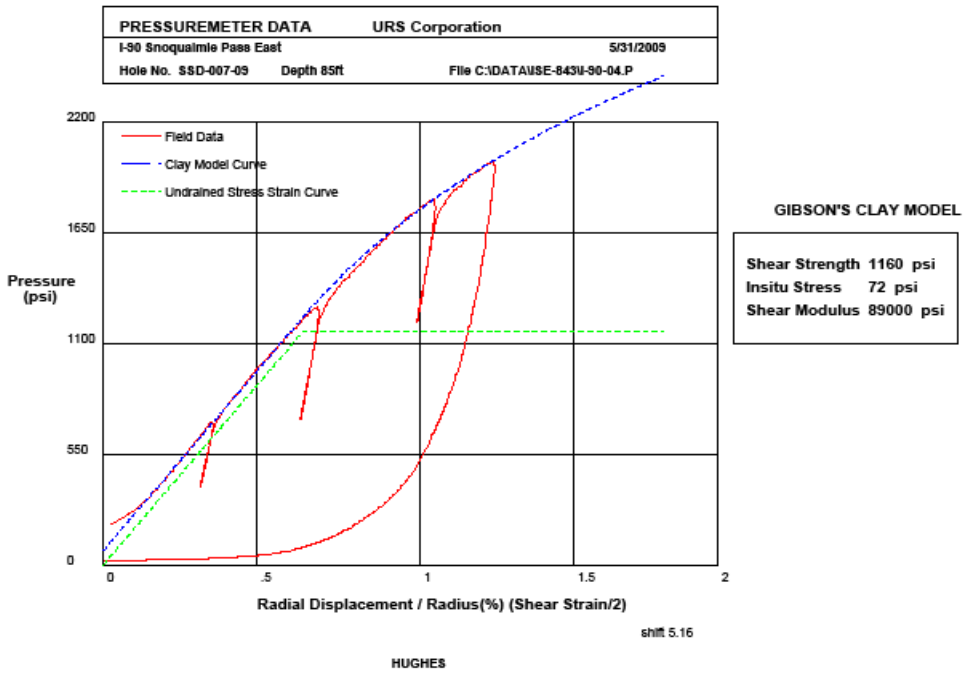


Fig.7. Cohesive Model for test I-90-04, hole 007, Shear Modulus = 90,000 psi

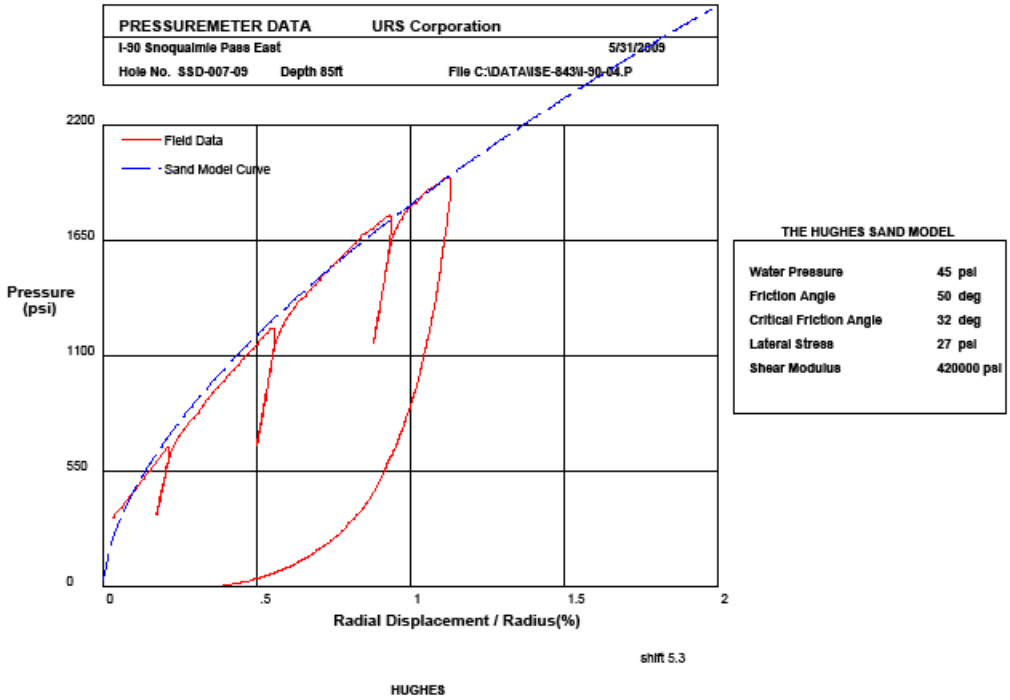


Fig.8. Frictional Model for test I-90-04, hole 007, Shear Modulus = 420,000 psi

In Figure 7, it can be seen that the rock has started to yield to the pressure applied. In this model, a lower shear strength value is exhibited than many of the other tests. All the tests were pressurized to a predetermined 2,000 psi. In materials where this yield has not yet occurred, such as those tested in SSD-006-09, the best curve fit assumes a value of at least 2,000 psi for the shear strength. It should be noted that it is possible and likely that this is a conservative value in such cases. Material properties determined by the pressuremeter models, along with modulus values used in that determination are displayed in Table 3. Friction angles over 50 degrees were recorded as “>50” in Table 3 due to the exponential increase in strength with any value higher than 50.

Table 3a Material Properties from Model Analysis: SSD-006-09

Hole	Test	Depth (ft)	Shear Strength (psi) cohesive model	Shear Modulus (psi) cohesive model	Friction Angle (degrees) friction model	Shear Modulus (psi) friction model
SSD-006-09	1-90-07	66	>2000	615,000	>50	1,500,000
SSD-006-09	1-90-08	64.5	>2000	650,000	>50	1,900,000
SSD-006-09	1-90-09	63	>2000	1,050,000	>50	2,500,000
SSD-006-09	1-90-10	70.5	>2000	255,000	>50	1,100,000
SSD-006-09	1-90-11	69	>2000	380,000	>50	1,500,000
SSD-006-09	1-90-12	79	>2000	510,000	>50	1,500,000
SSD-006-09	1-90-13	77.5	>2000	1,100,000	>50	2,200,000
SSD-006-09	1-90-14	76	>2000	970,000	>50	2,500,000

Table 3b Material Properties from Model Analysis: SSD-007-09

Hole	Test	Depth (ft)	Shear Strength (psi) cohesive model	Shear Modulus (psi) cohesive model	Friction Angle (degrees) friction model	Shear Modulus (psi) friction model
SSD-007-09	I-90-01	77	1550	108,000	>50	545,000
SSD-007-09	I-90-02	75.5	1500	115,000	>50	620,000
SSD-007-09	I-90-03	74	1550	180,000	>50	630,000
SSD-007-09	I-90-04	85	1150	89,000	>50	420,000
SSD-007-09	I-90-05	83.5	1500	220,000	>50	840,000
SSD-007-09	I-90-06	82	1500	200,000	>50	770,000

Table 3c Material Properties from Model Analysis: SSD-008-09

Hole	Test	Depth (ft)	Shear Strength (psi) cohesive model	Shear Modulus (psi) cohesive model	Friction Angle (degrees) friction model	Shear Modulus (psi) friction model
SSD-008-09	1-90-15	54	1600	98,000	>50	430,000
SSD-008-09	1-90-16	52	1600	195,000	>50	870,000
SSD-008-09	1-90-17	50	>2000	200,000	>50	870,000
SSD-008-09	1-90-18	62	>2000	125,000	>50	700,000
SSD-008-09	1-90-19	59.5	1400	23,000	49	245,000
SSD-008-09	1-90-20	57	1850	60,000	>50	355,000
SSD-008-09	1-90-21	66.8	>2000	120,000	>50	610,000
SSD-008-09	1-90-22	65	>2000	210,000	>50	1,100,000

10.0 CONCLUSIONS

The materials at the site are composed of meta-welded lapilli tuff with different degrees of fracturing. The strongest and most in tact rock was found in SSD-006-09. In general, the strength exhibited by the tuff was a reflection of how fractured the material was in any given zone tested. Unconfined compressive strengths (twice the shear strength) were all higher than the discussed limit of 2,000 psi that was hoped to be obtained. The lowest shear strength values were determined to be in SSD-007-09, which also recorded the lowest RQD percentage.

11.0 REFERENCES

Mair, R.J. and Wood, D.M. 1987. Pressuremeter testing: methods and interpretation. CIRIA Ground Engineering Report. Butterworths, London.

ASTM D4719. 2007. Standard tests method for pressuremeter testing in soils.

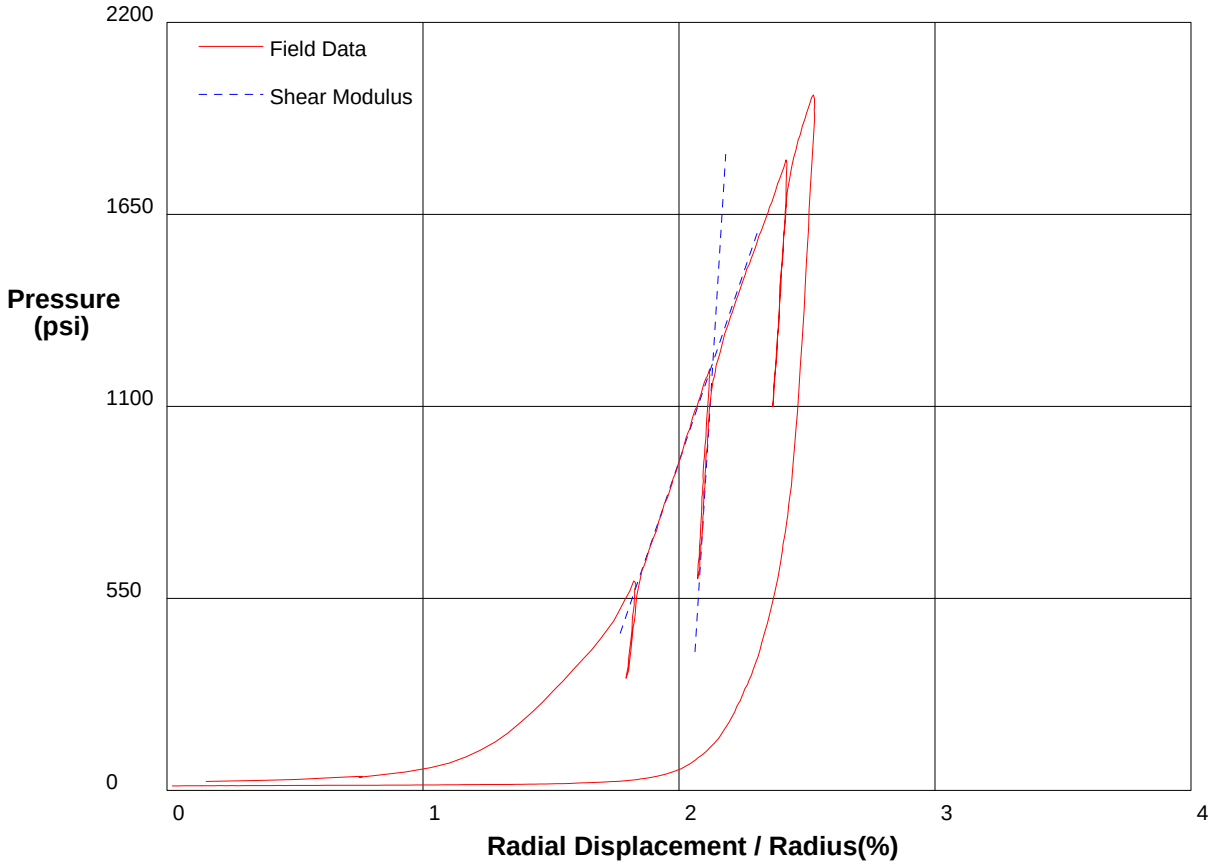
Appendix I – Field Data and Data Interpretation

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 77ft** **File C:\DATA\ISE-843\I-90-01.P**



Shear Modulus 594637 psi

Shear Modulus 107179 psi

shift 3

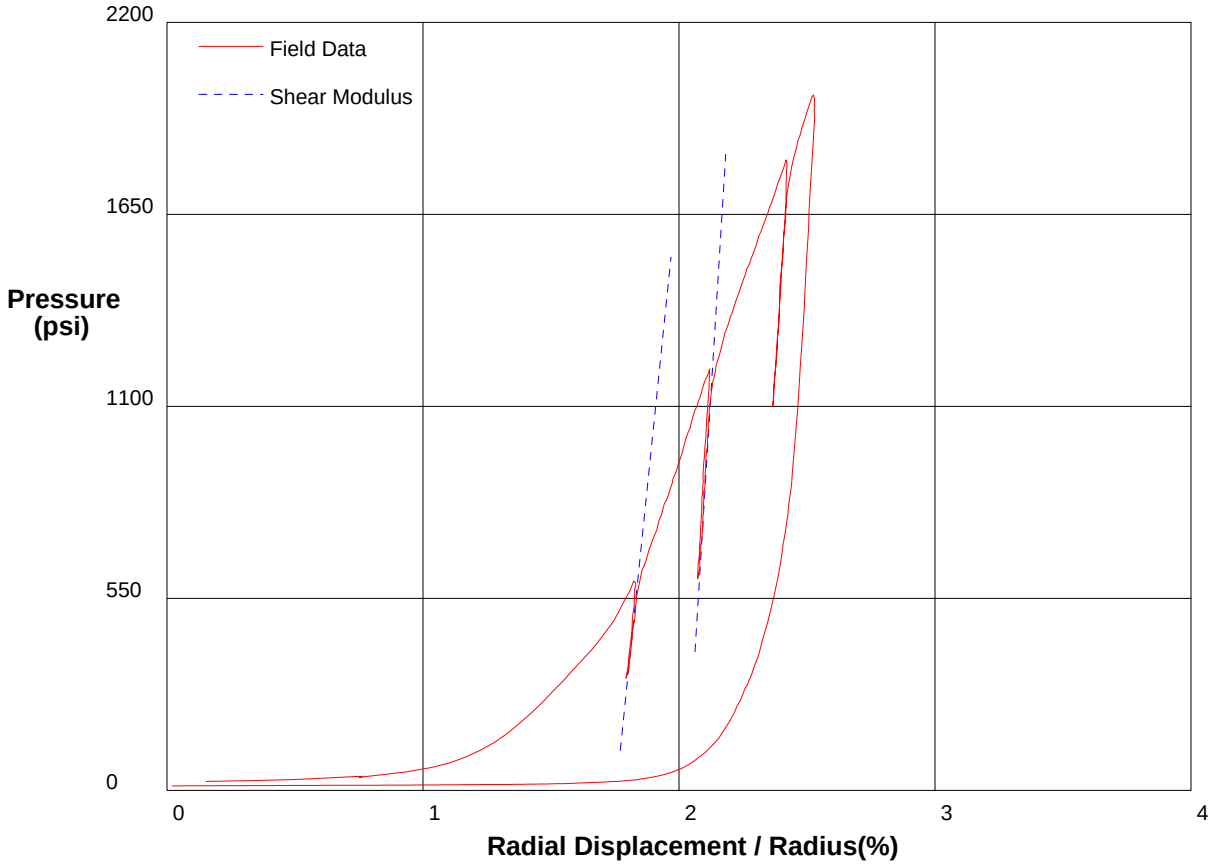
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 77ft** **File C:\DATA\ISE-843\I-90-01.P**



Shear Modulus 594637 psi

Shear Modulus 357017 psi

shift 3

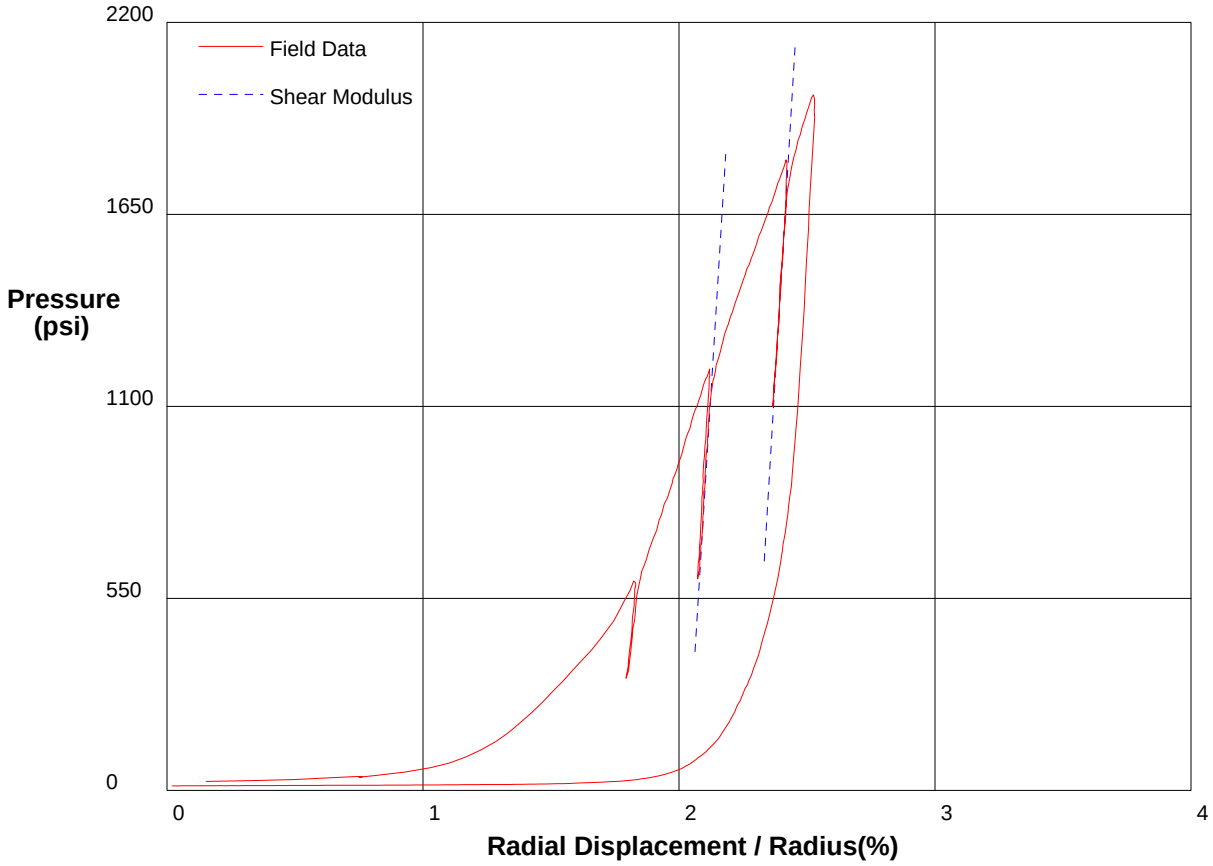
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 77ft** **File C:\DATA\ISE-843\I-90-01.P**



Shear Modulus 594637 psi

Shear Modulus 613768 psi

shift 3

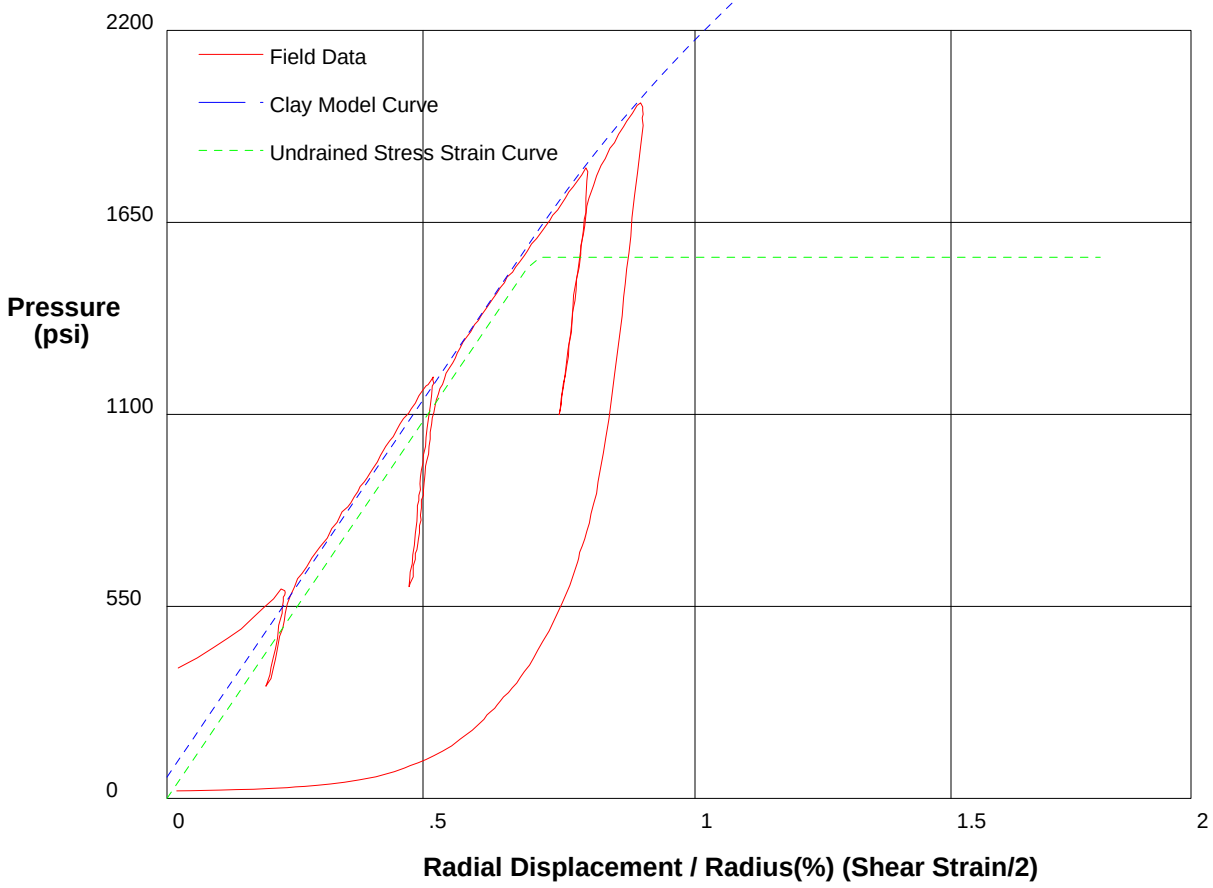
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 77ft** **File C:\DATA\ISE-843\I-90-01.P**



shift 4.6

GIBSON'S CLAY MODEL

Shear Strength	**1550**	**psi**
Insitu Stress	**61**	**psi**
Shear Modulus	**108000**	**psi**

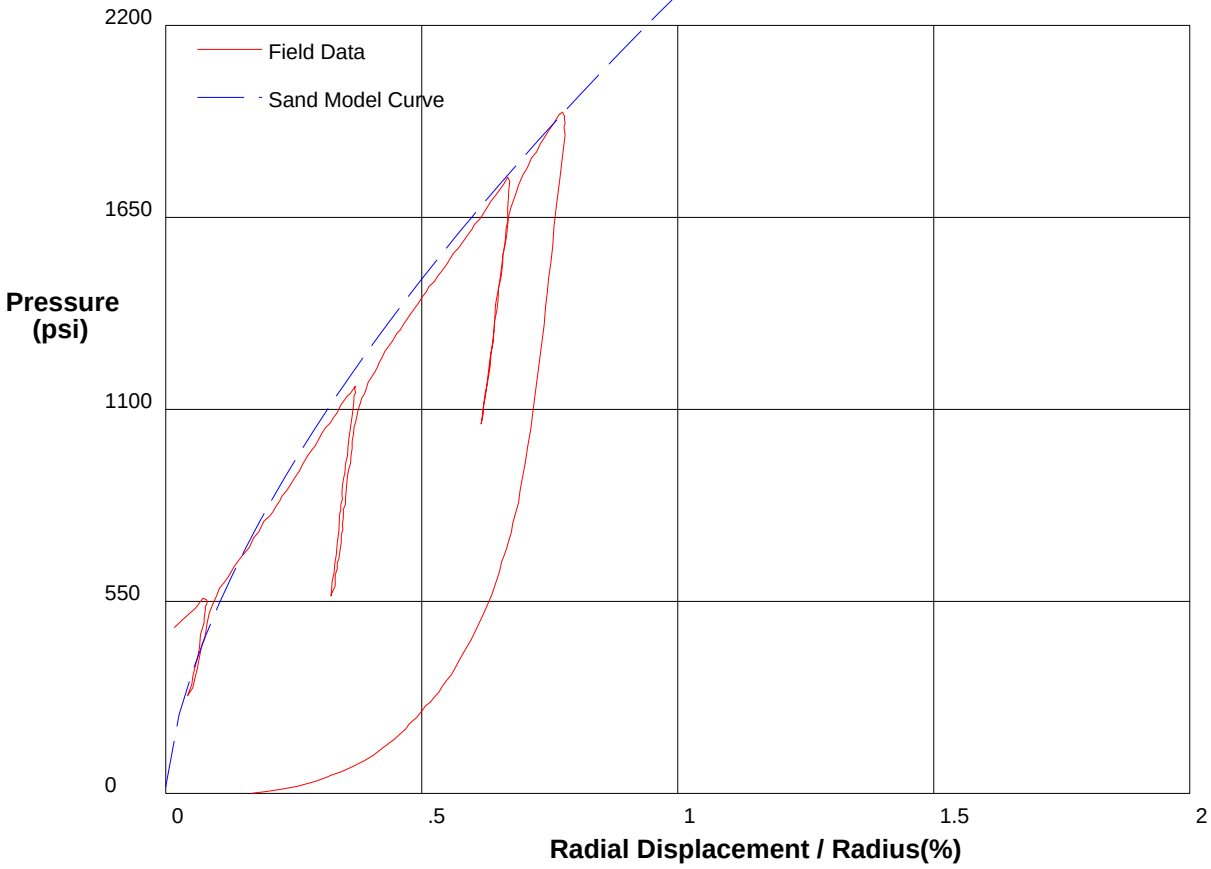
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 77ft** **File C:\DATA\ISE-843\I-90-01.P**



THE HUGHES SAND MODEL

Water Pressure	**41 psi**
Friction Angle	**52 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**20 psi**
Shear Modulus	**545000 psi**

shift 4.75

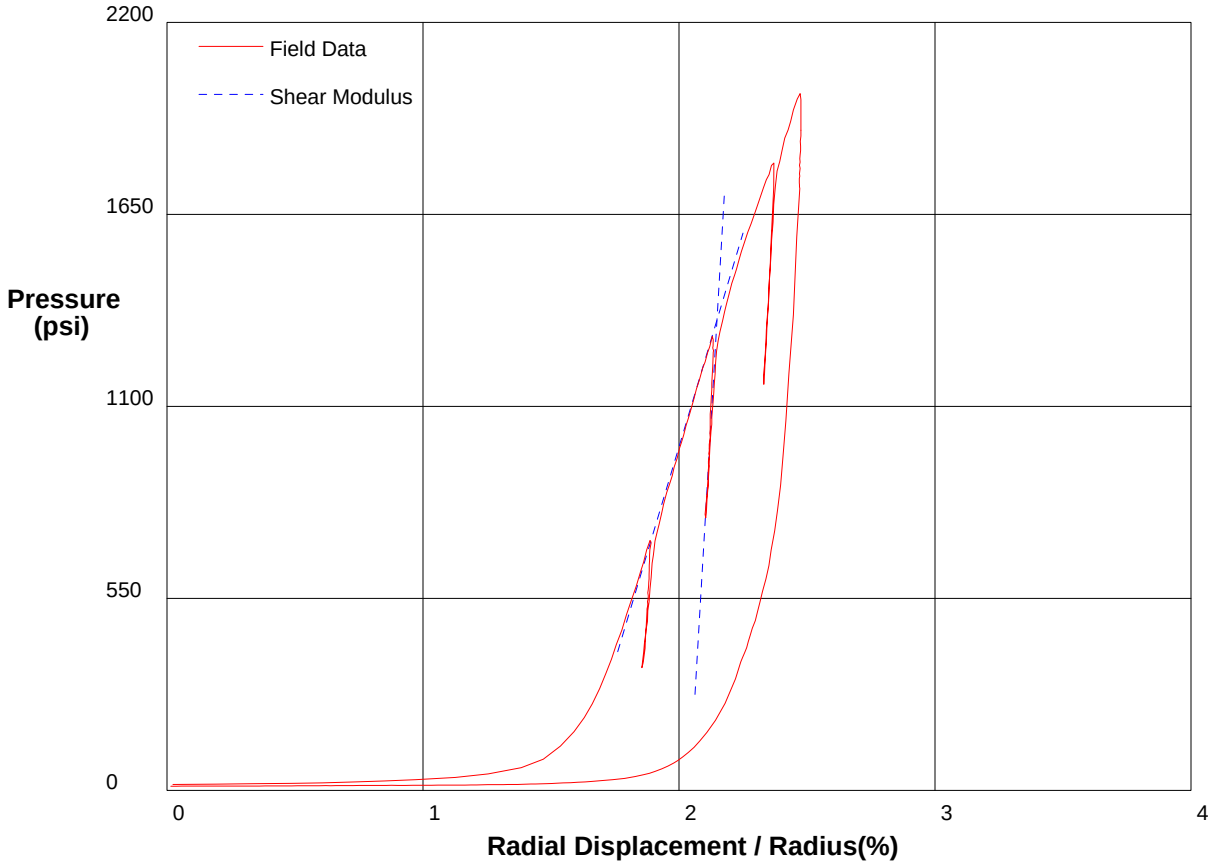
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 75.5ft** **File C:\DATA\ISE-843\I-90-02.P**



Shear Modulus 623333 psi

Shear Modulus 122482 psi

shift 3

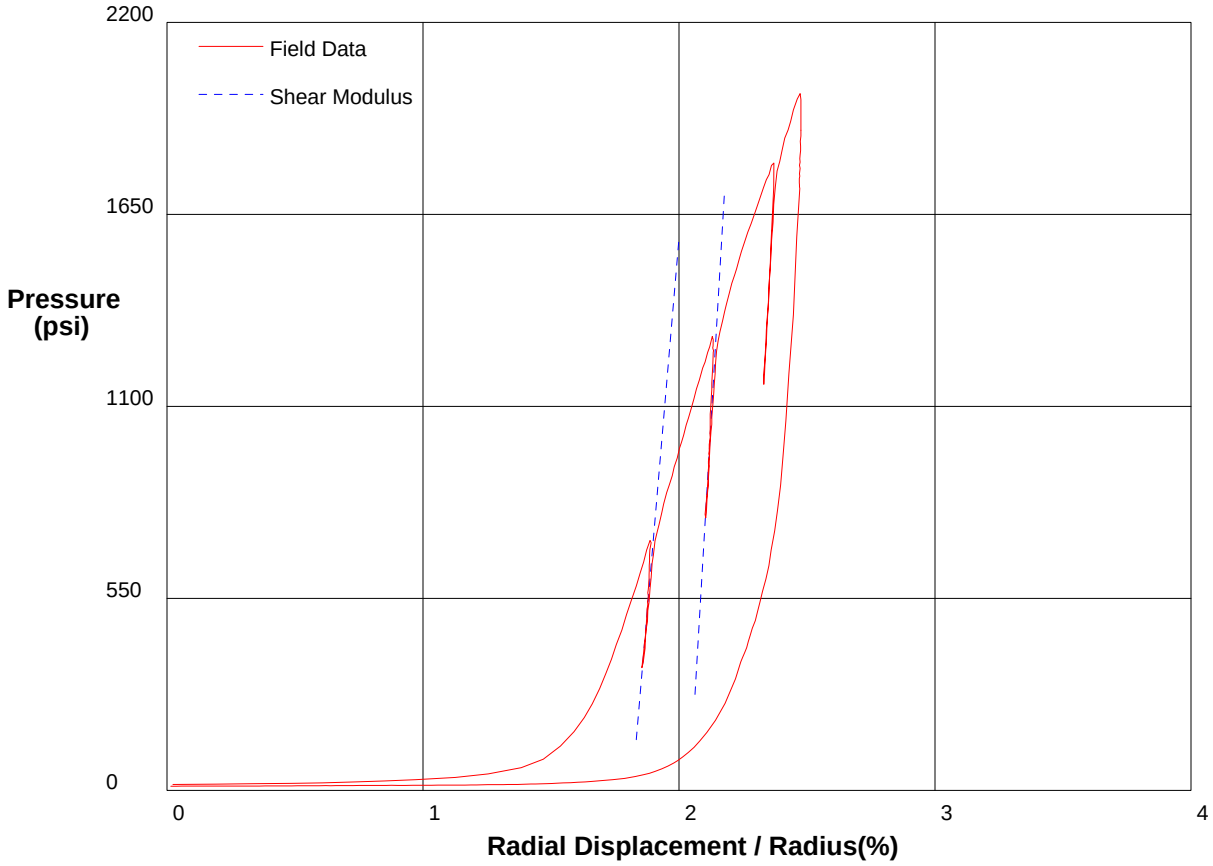
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 75.5ft** **File C:\DATA\ISE-843\I-90-02.P**



Shear Modulus 623333 psi

Shear Modulus 430833 psi

shift 3

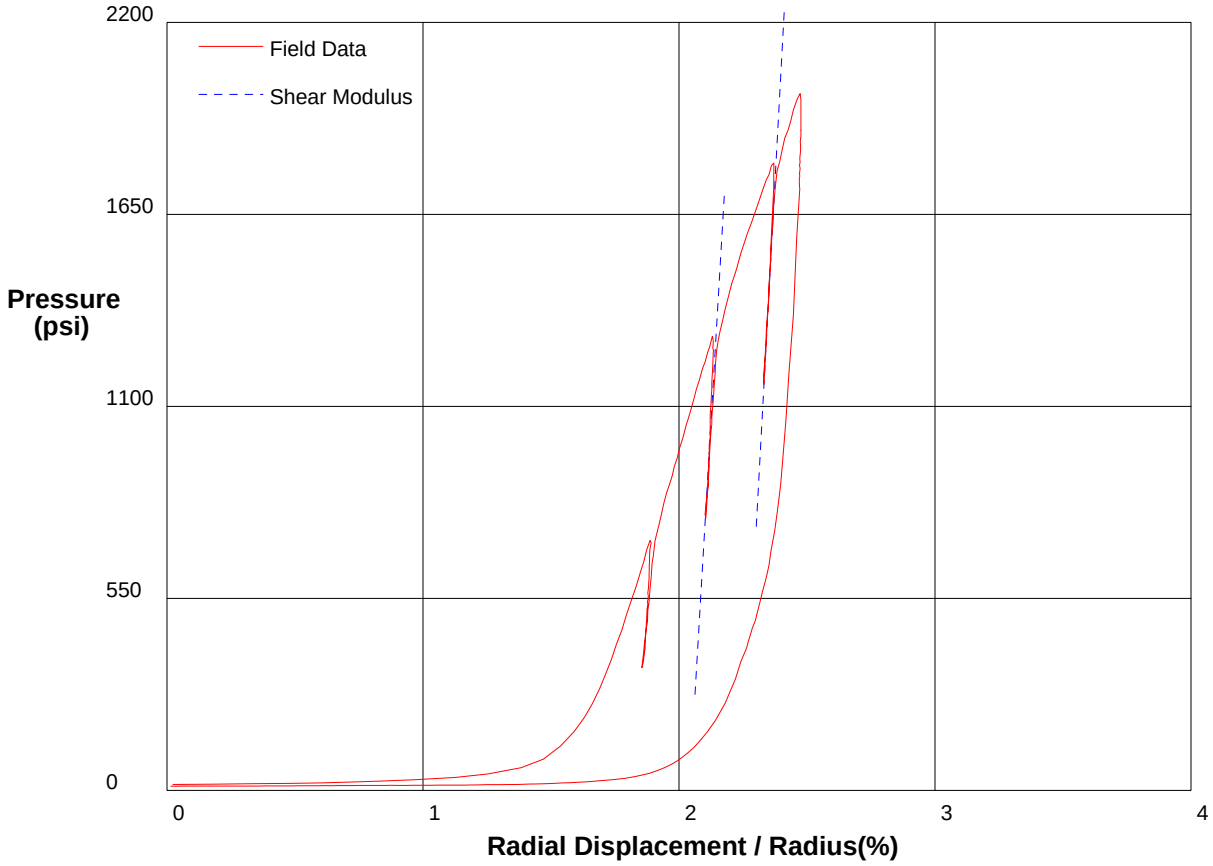
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 75.5ft** **File C:\DATA\ISE-843\I-90-02.P**



Shear Modulus 623333 psi

Shear Modulus 675714 psi

shift 3

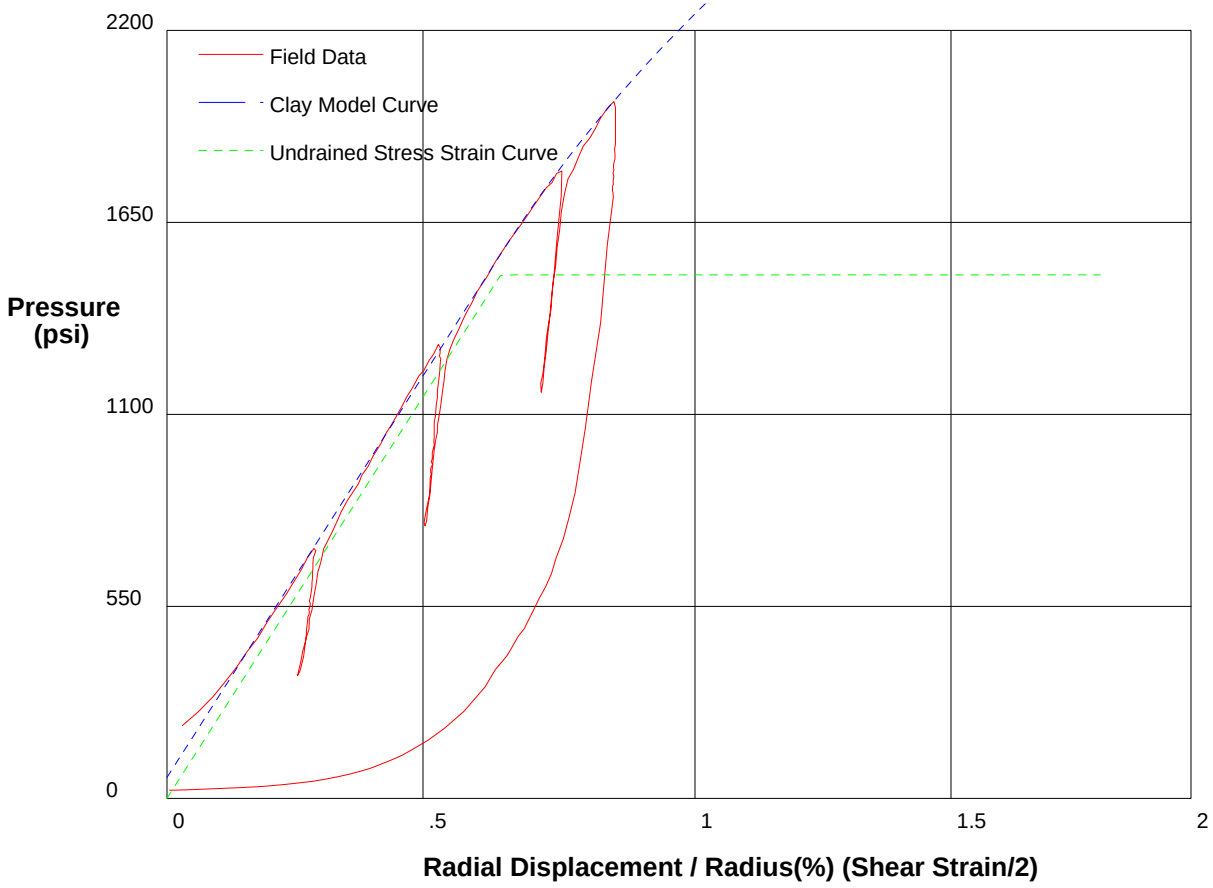
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 75.5ft** **File C:\DATA\ISE-843\I-90-02.P**



GIBSON'S CLAY MODEL

Shear Strength	**1500 psi**
Insitu Stress	**60 psi**
Shear Modulus	**115000 psi**

shift 4.6

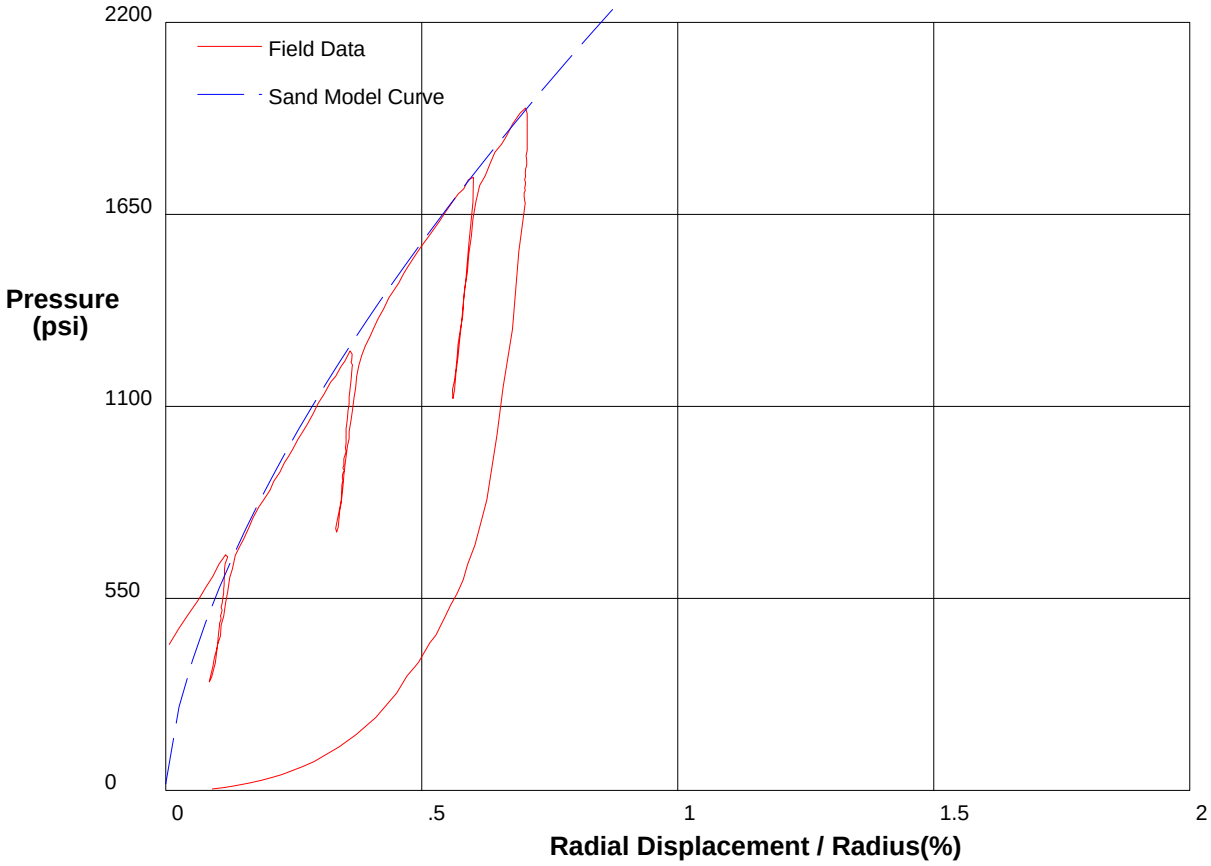
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 75.5ft** **File C:\DATA\ISE-843\I-90-02.P**



THE HUGHES SAND MODEL

Water Pressure	**41 psi**
Friction Angle	**52 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**19 psi**
Shear Modulus	**620000 psi**

shift 4.77

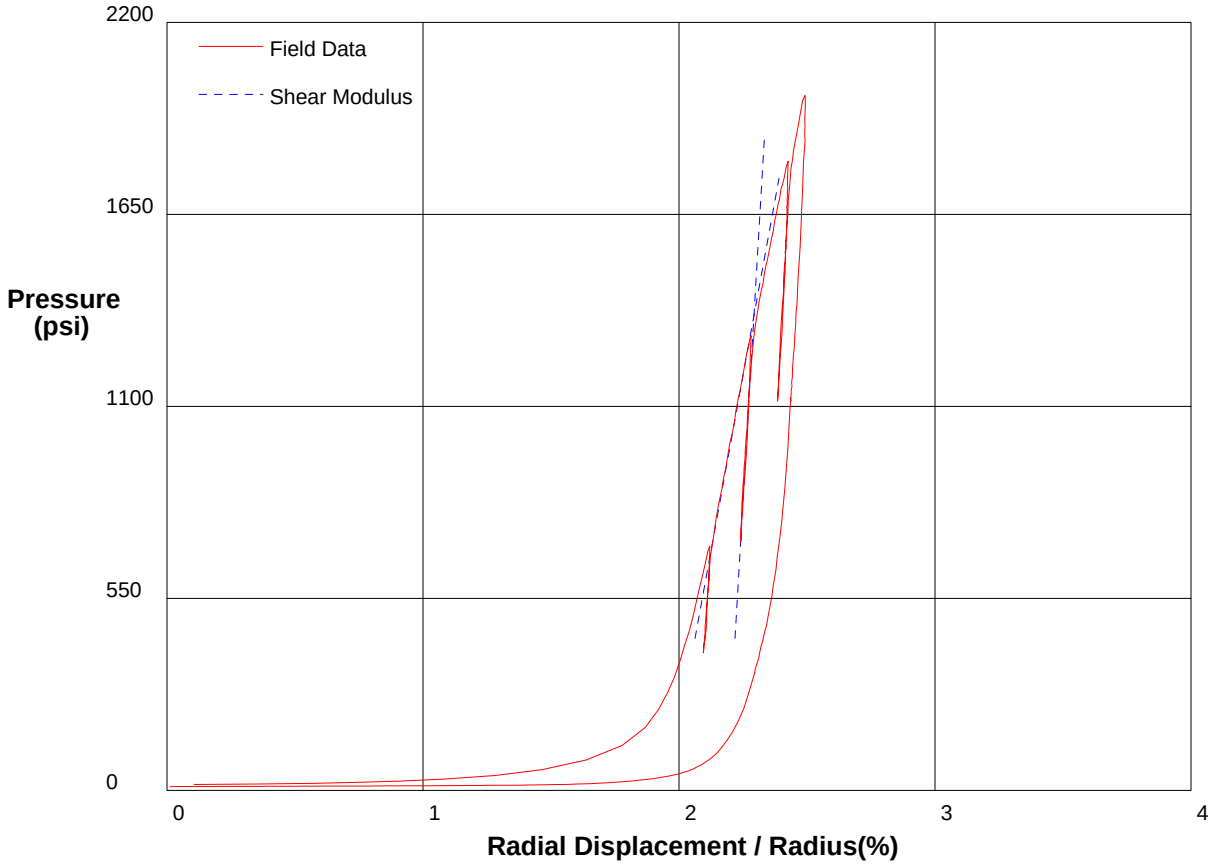
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 74ft** **File C:\DATA\ISE-843\I-90-03.P**



Shear Modulus 623333 psi

Shear Modulus 200793 psi

shift 3

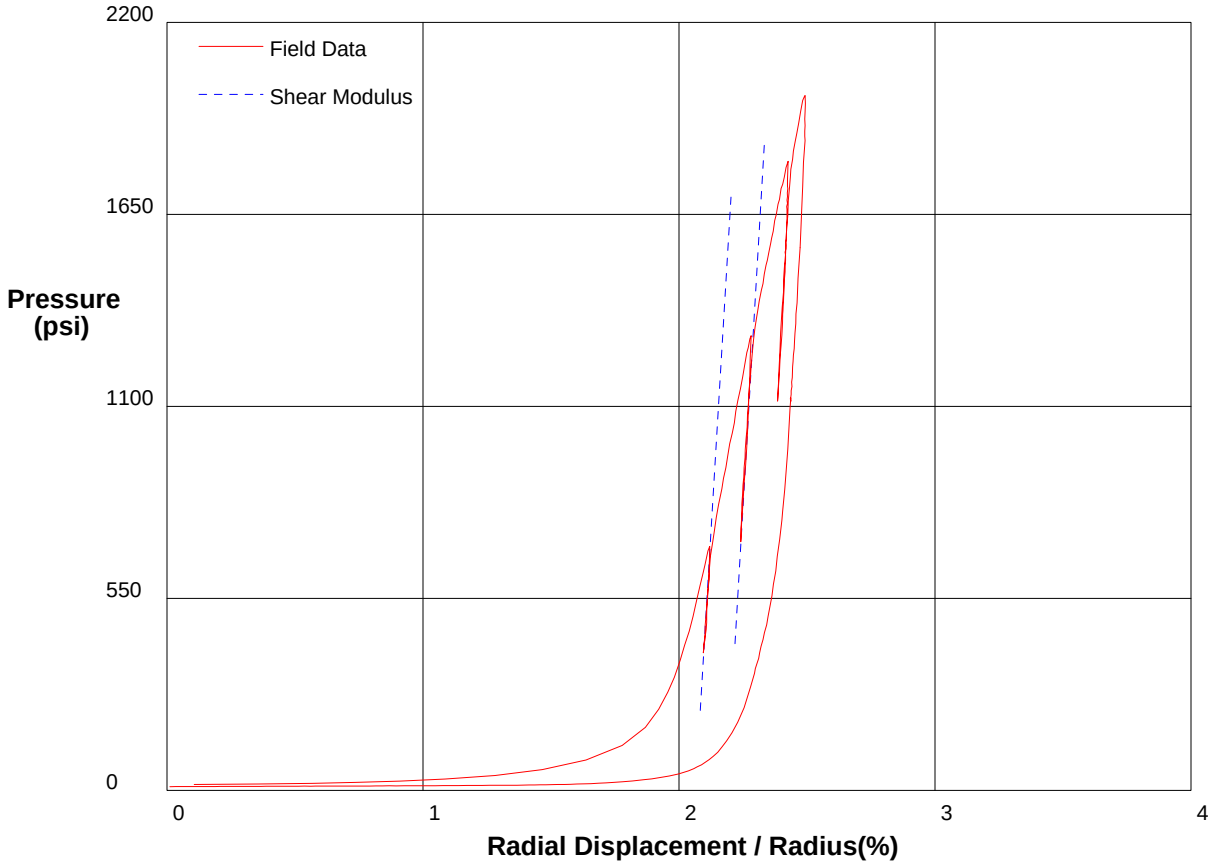
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 74ft** **File C:\DATA\ISE-843\I-90-03.P**



Shear Modulus 623333 psi

Shear Modulus 613768 psi

shift 3

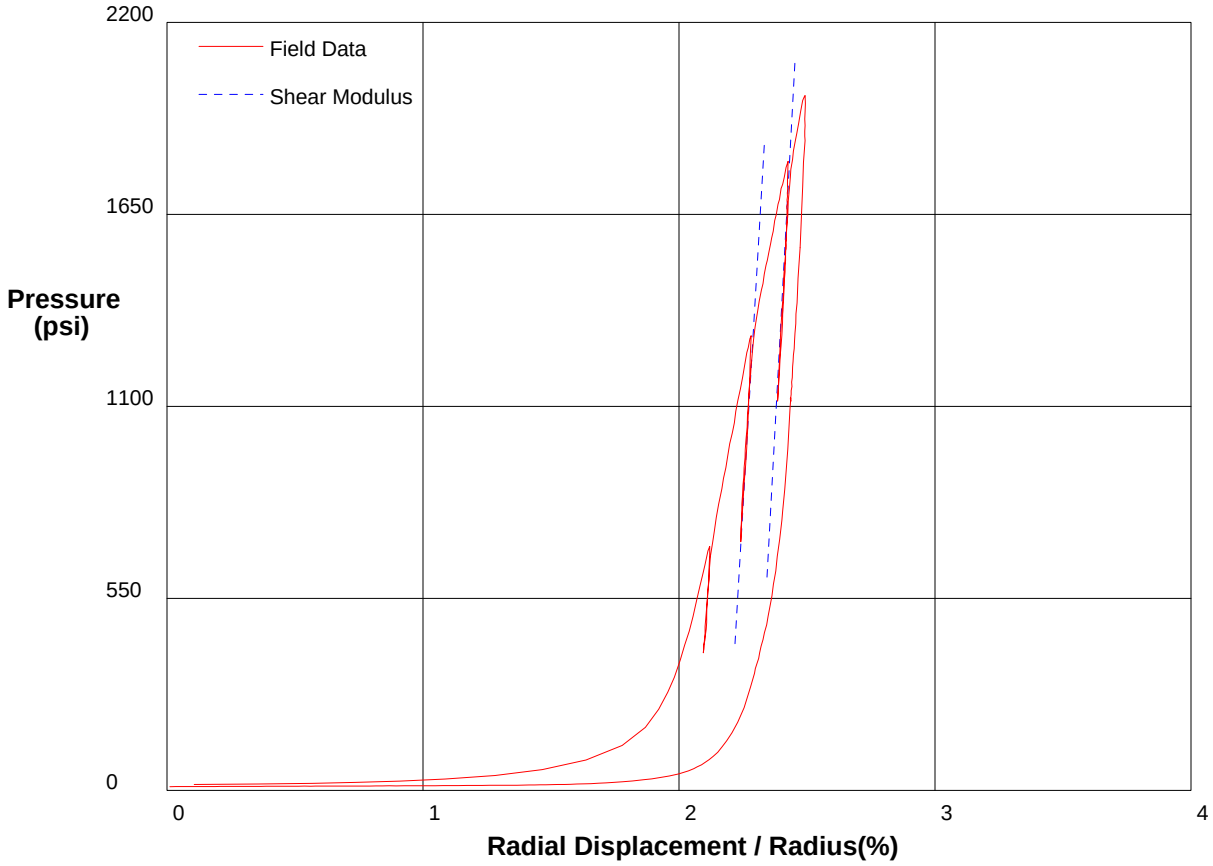
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 74ft** **File C:\DATA\ISE-843\I-90-03.P**



Shear Modulus 623333 psi

Shear Modulus 675714 psi

shift 3

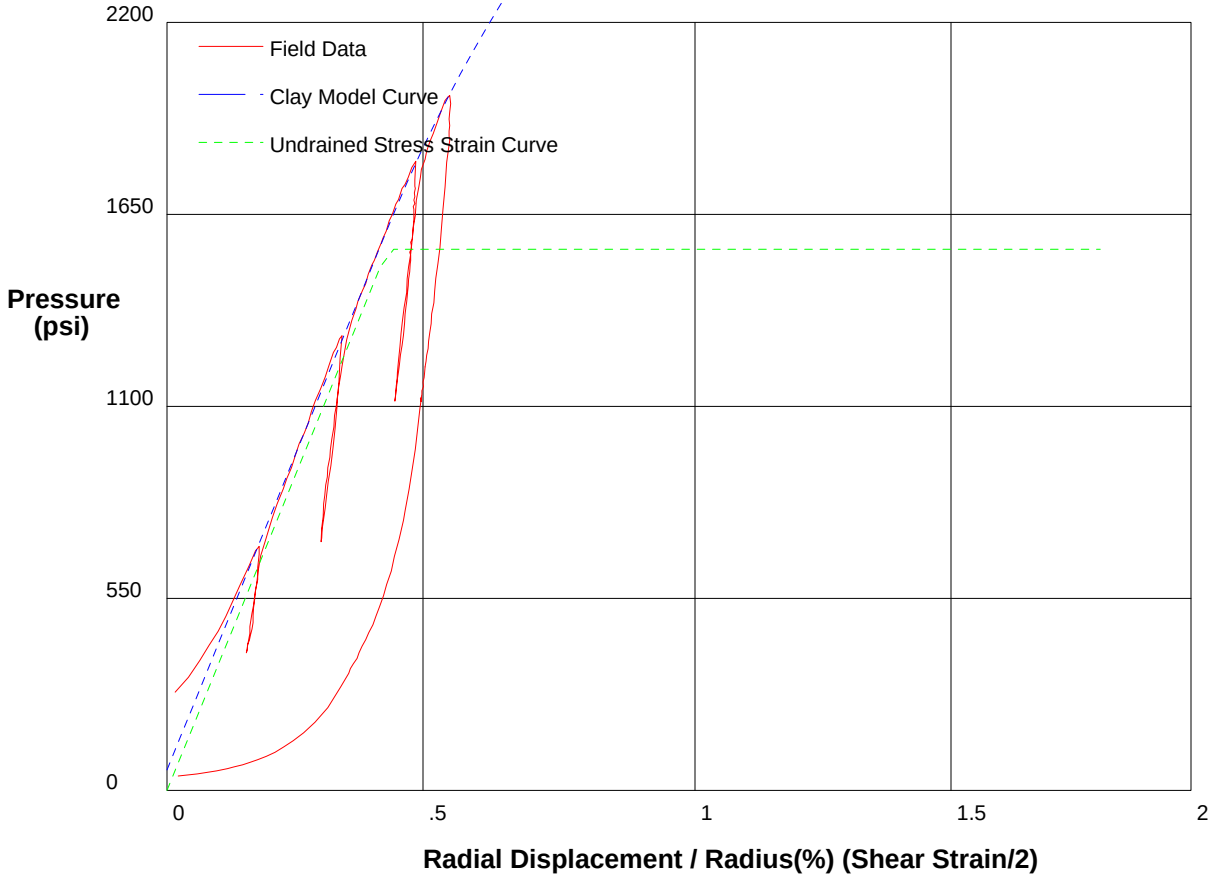
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 74ft** **File C:\DATA\ISE-843\I-90-03.P**



shift 4.94

GIBSON'S CLAY MODEL

Shear Strength	**1550**	**psi**
Insitu Stress	**59**	**psi**
Shear Modulus	**180000**	**psi**

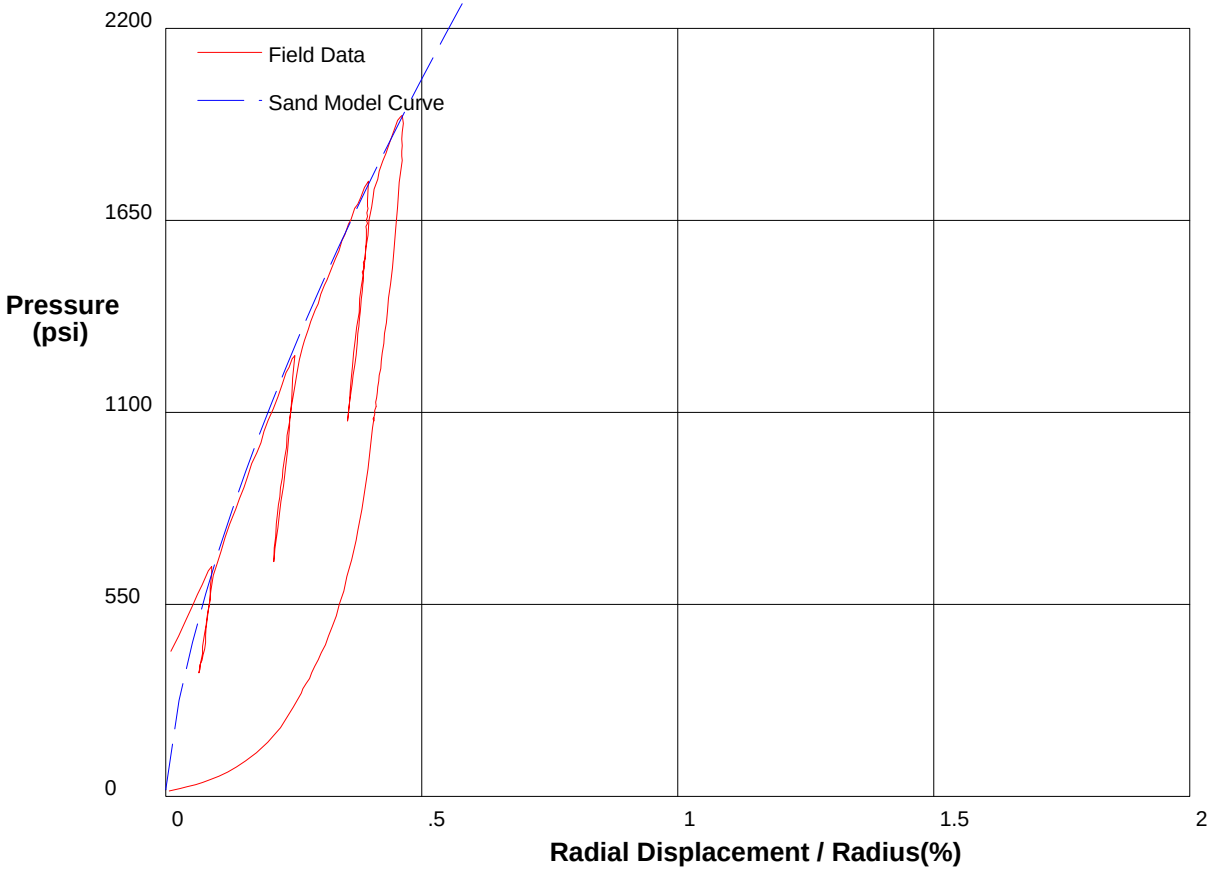
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 74ft** **File C:\DATA\ISE-843\I-90-03.P**



THE HUGHES SAND MODEL

Water Pressure	**40 psi**
Friction Angle	**55 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**19 psi**
Shear Modulus	**630000 psi**

shift 5.03

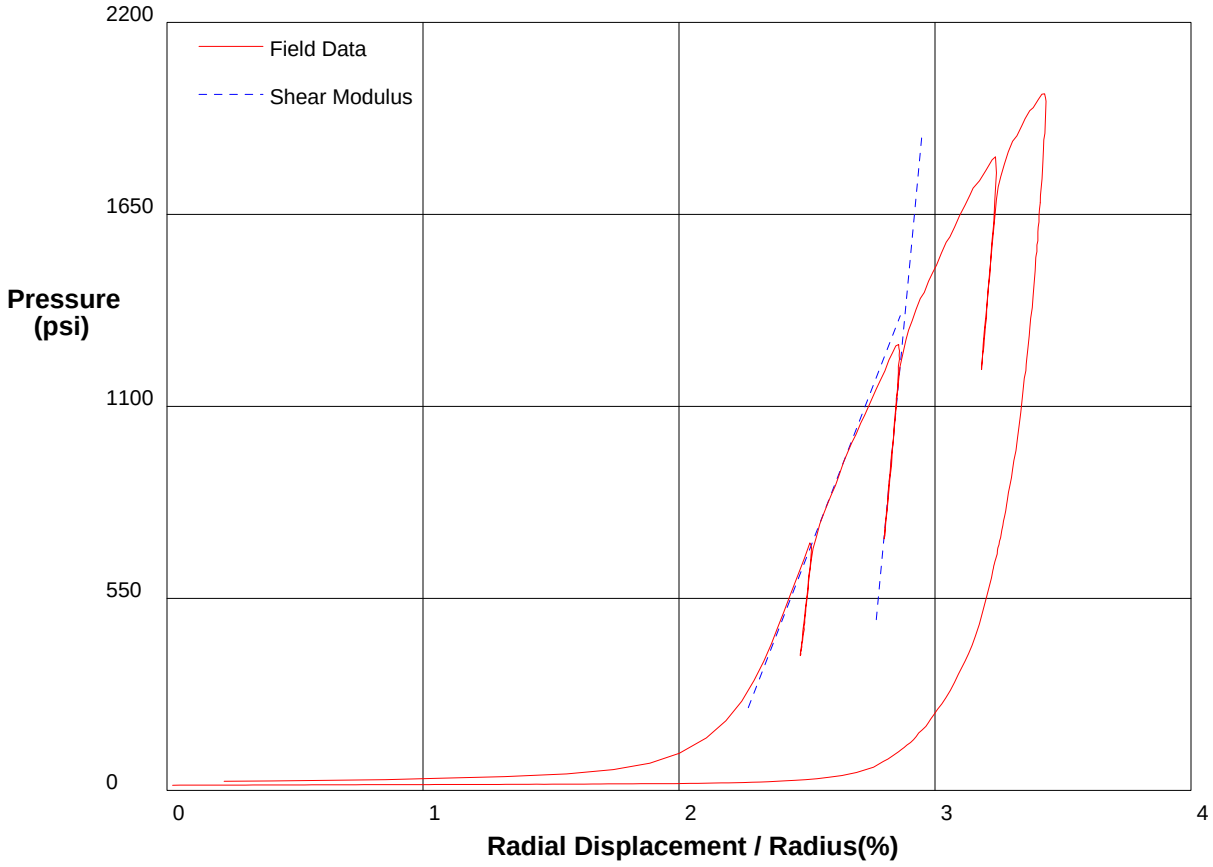
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 85ft** **File C:\DATA\ISE-843\I-90-04.P**



Shear Modulus 390392 psi

Shear Modulus 94561 psi

shift 3

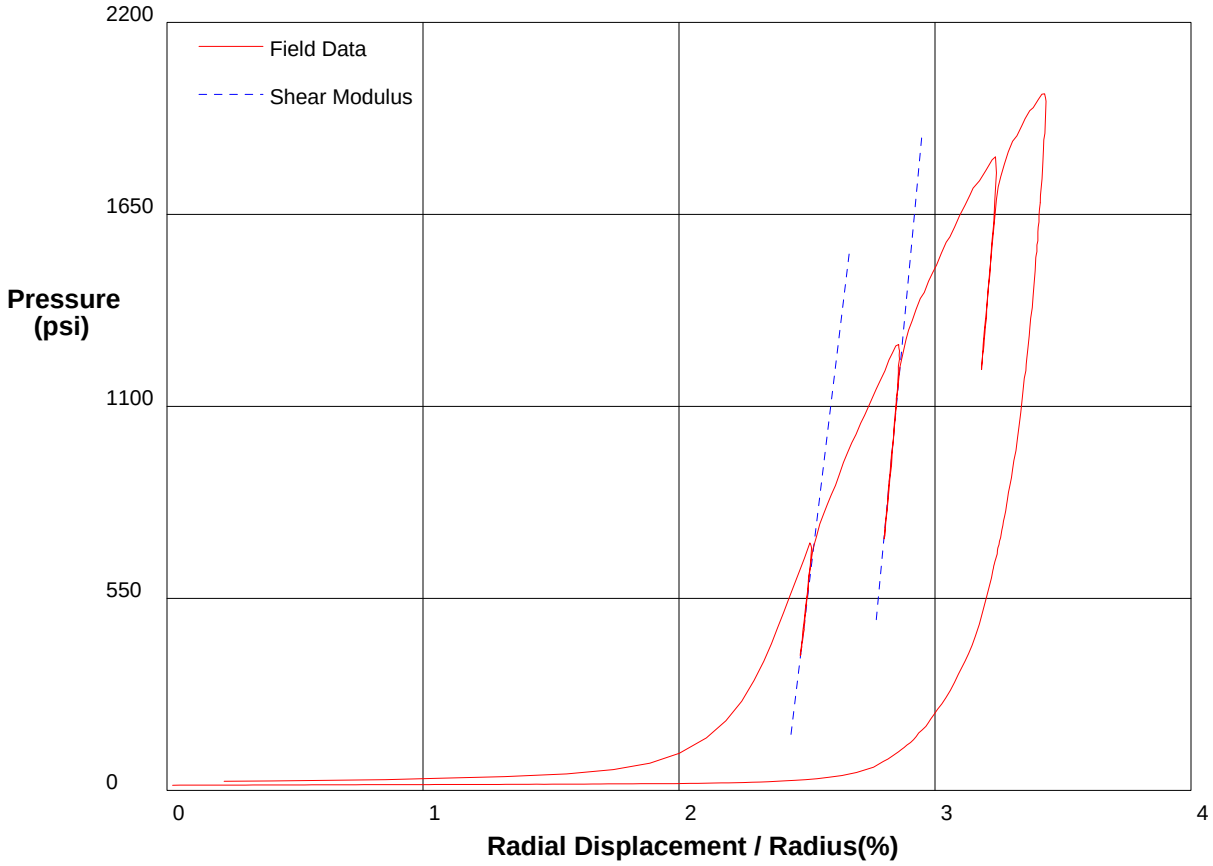
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 85ft** **File C:\DATA\ISE-843\I-90-04.P**



Shear Modulus 390392 psi

Shear Modulus 303333 psi

shift 3

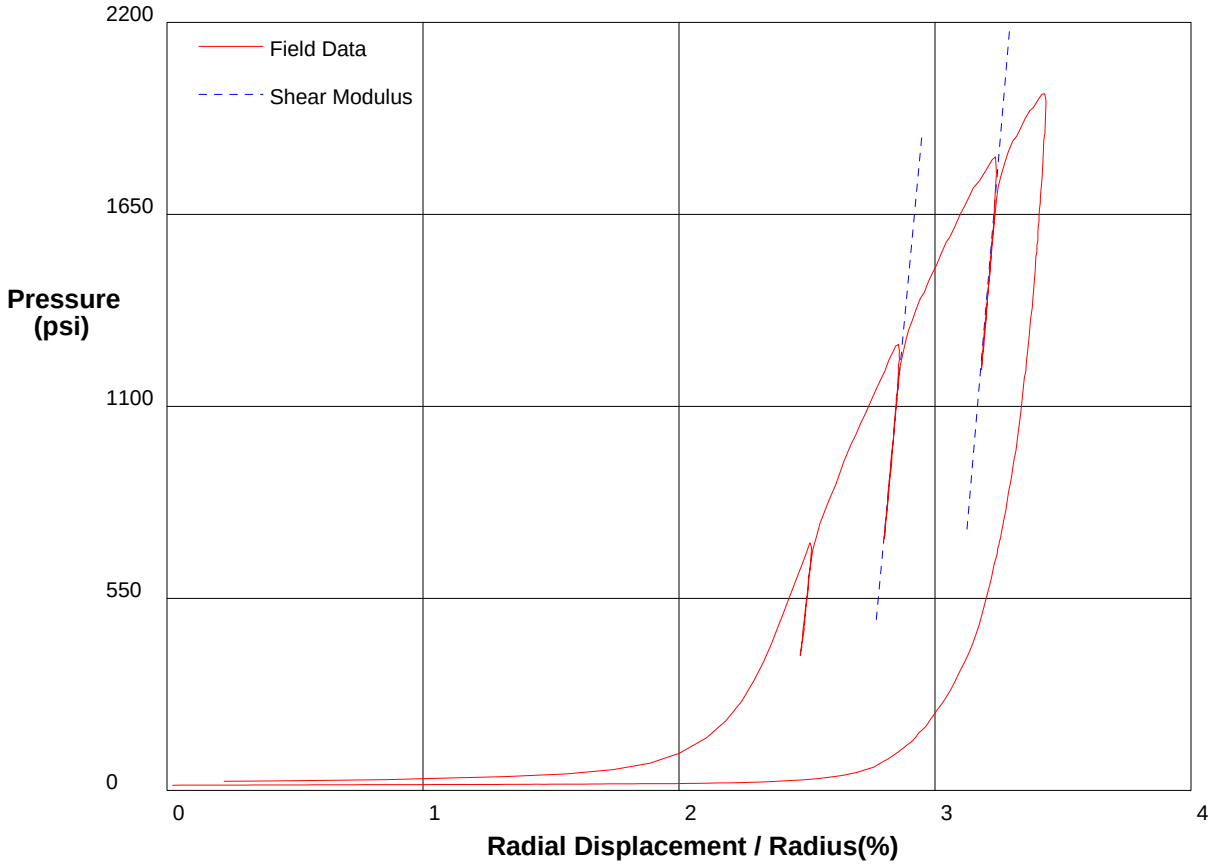
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 85ft** **File C:\DATA\ISE-843\I-90-04.P**



Shear Modulus 390392 psi

Shear Modulus 430833 psi

shift 3

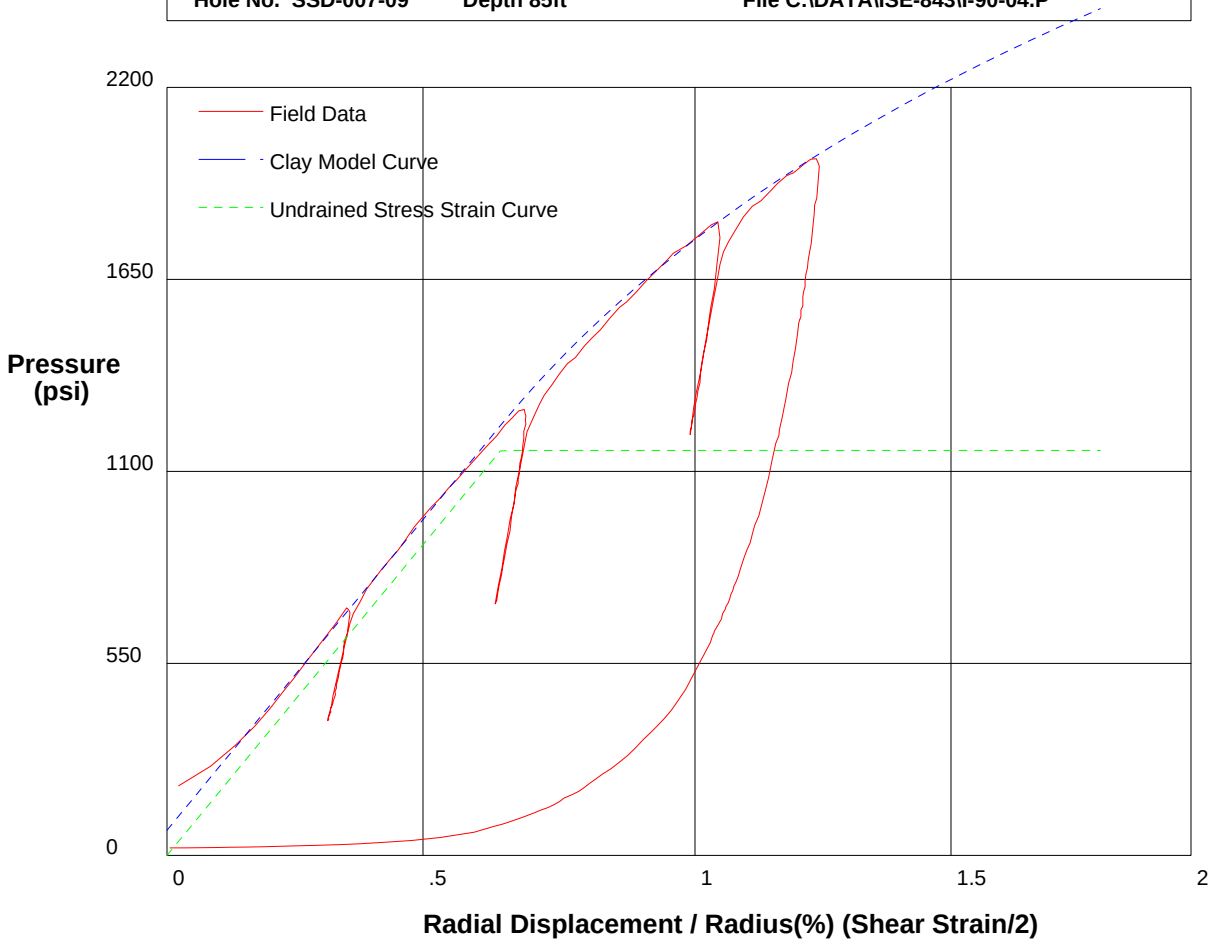
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 85ft** **File C:\DATA\ISE-843\I-90-04.P**



GIBSON'S CLAY MODEL

Shear Strength	**1160 psi**
Insitu Stress	**72 psi**
Shear Modulus	**89000 psi**

shift 5.16

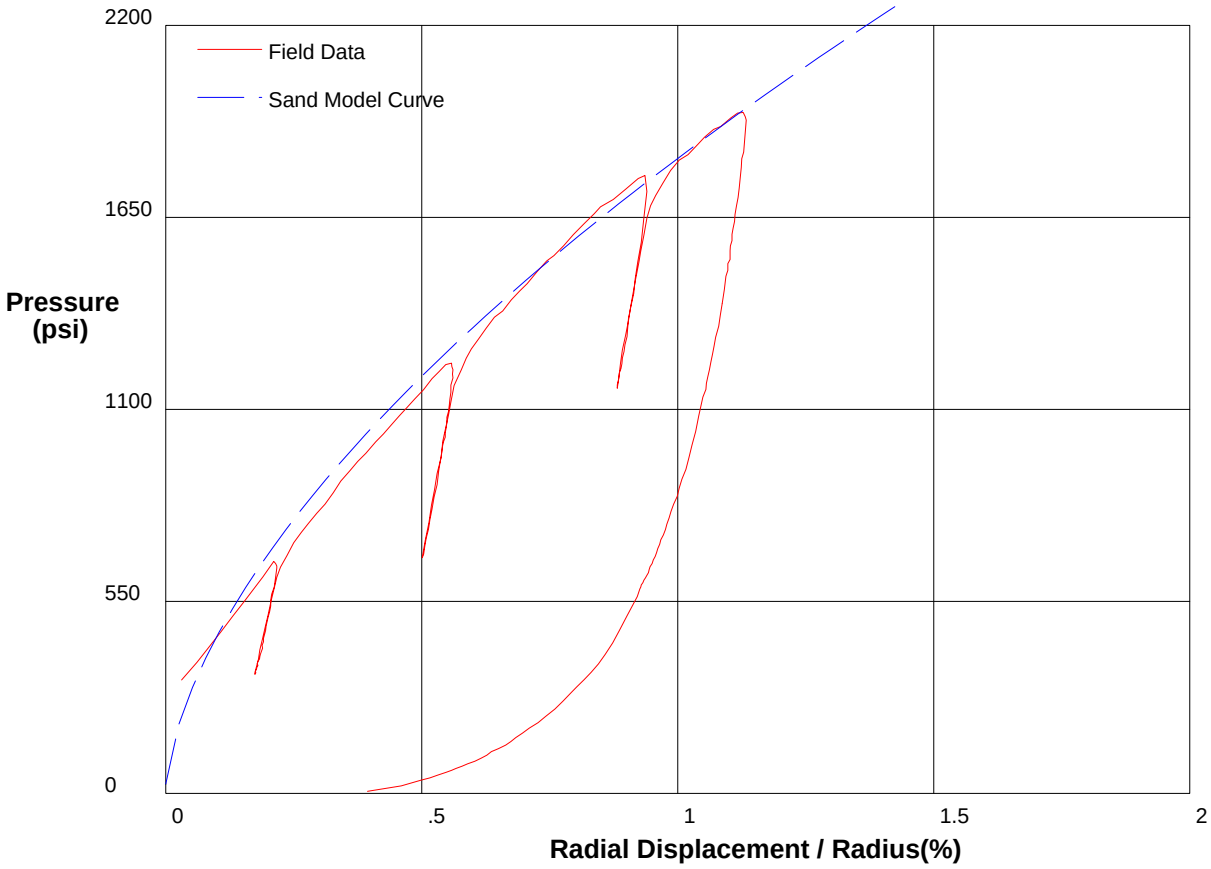
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 85ft** **File C:\DATA\ISE-843\I-90-04.P**



THE HUGHES SAND MODEL

Water Pressure	**45 psi**
Friction Angle	**50 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**27 psi**
Shear Modulus	**420000 psi**

shift 5.3

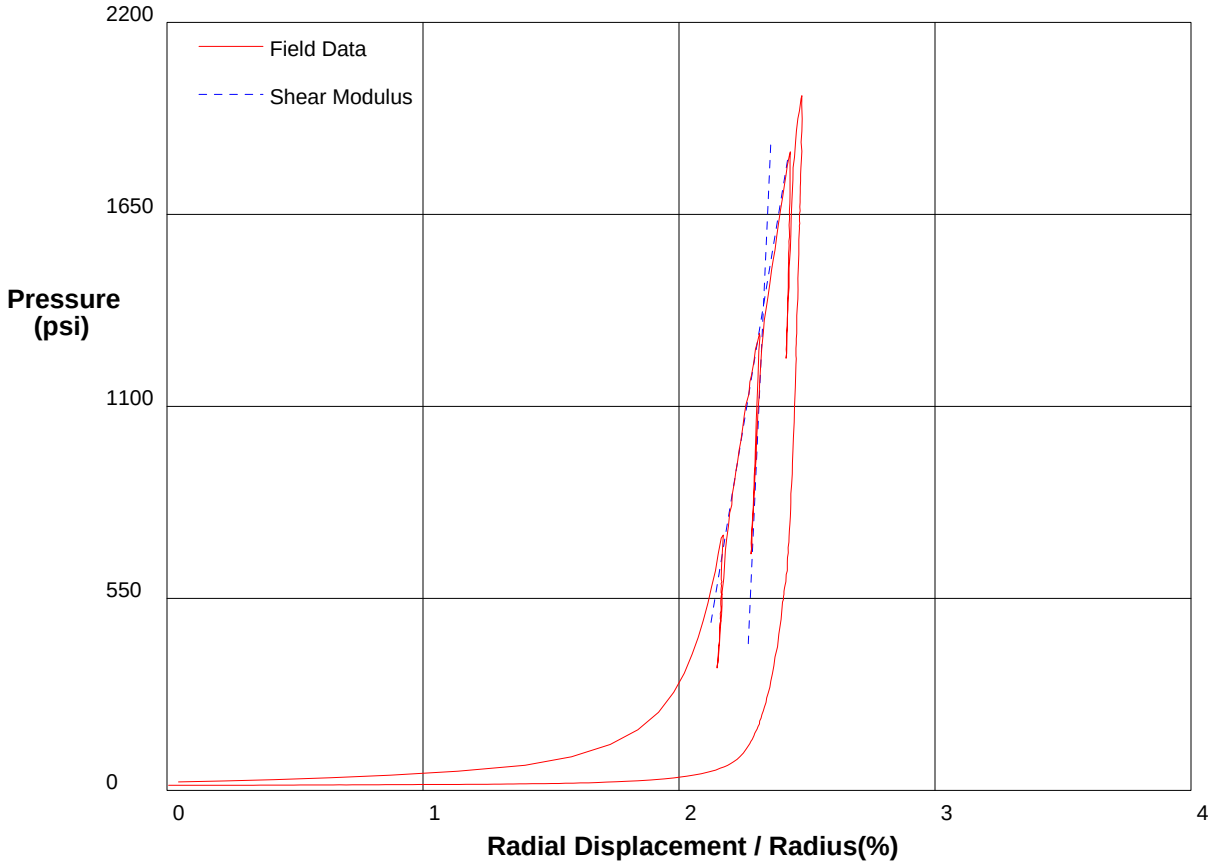
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 83.5ft** **File C:\DATA\ISE-843\I-90-05.P**



Shear Modulus 817451 psi

Shear Modulus 221264 psi

shift 3

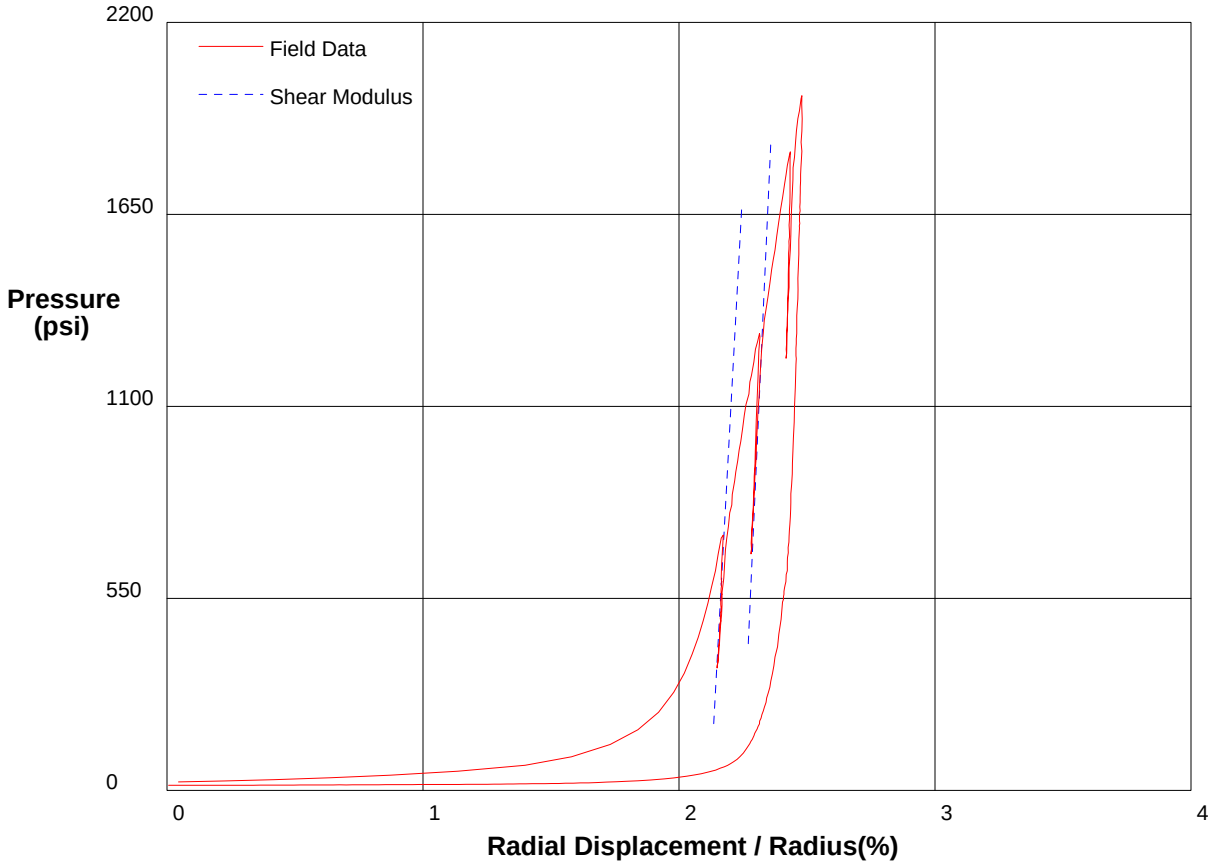
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 83.5ft** **File C:\DATA\ISE-843\I-90-05.P**



Shear Modulus 817451 psi

Shear Modulus 675714 psi

shift 3

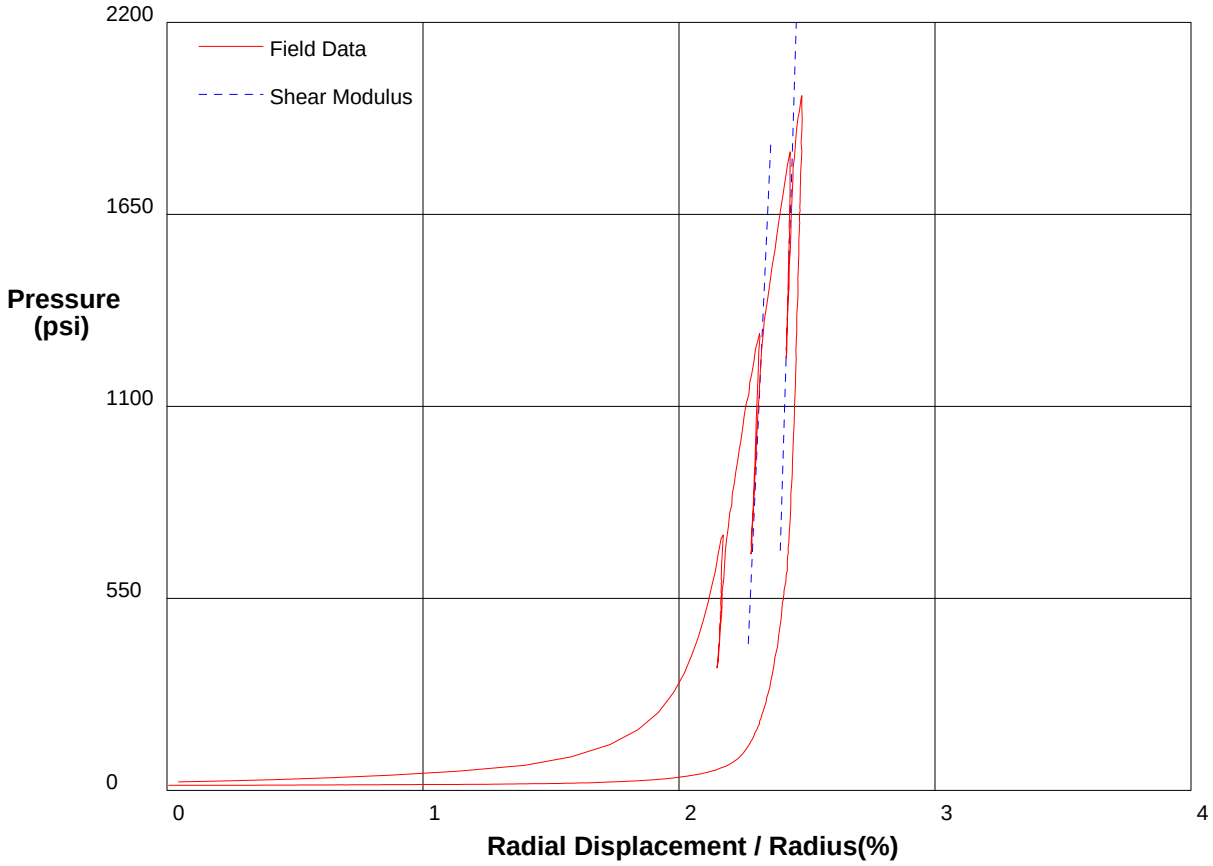
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 83.5ft** **File C:\DATA\ISE-843\I-90-05.P**



Shear Modulus 817451 psi

Shear Modulus 1210000 psi

shift 3

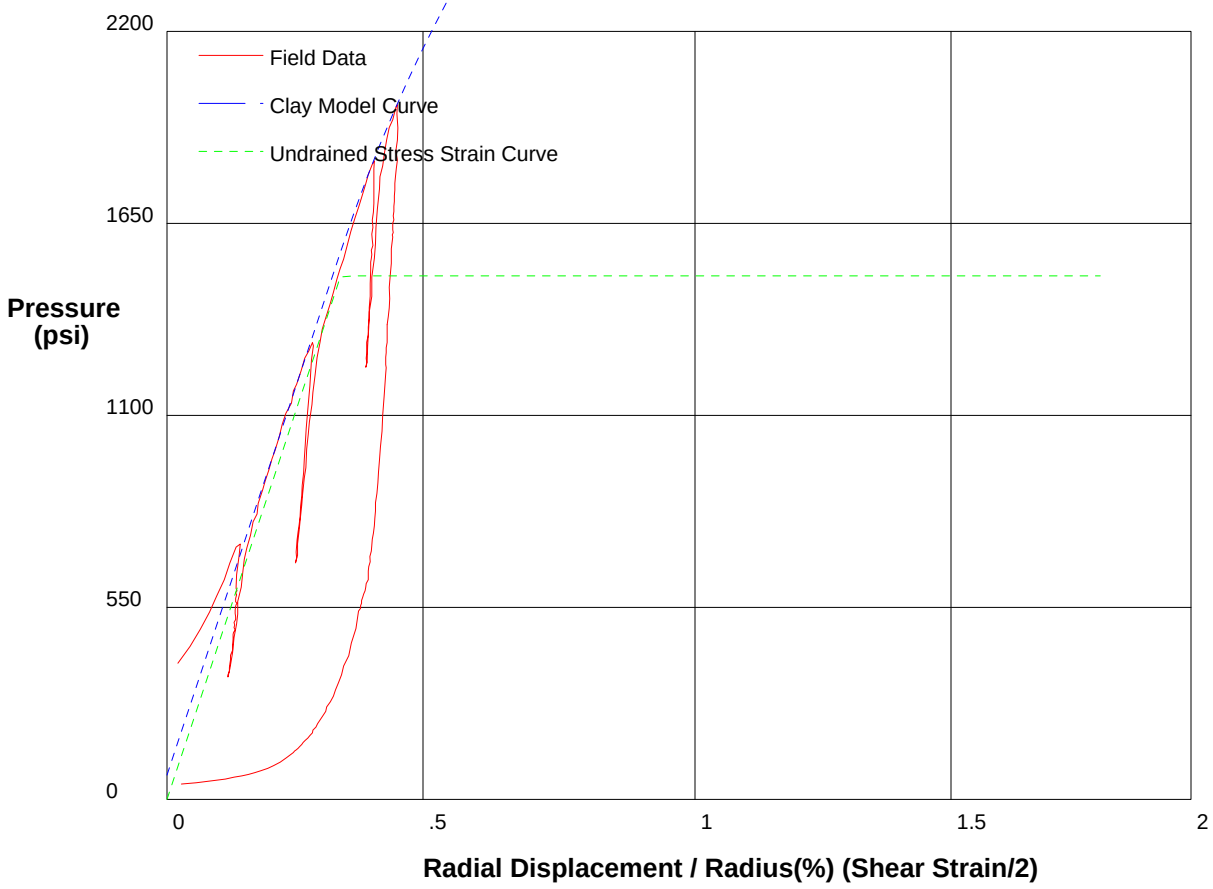
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 83.5ft** **File C:\DATA\ISE-843\I-90-05.P**



GIBSON'S CLAY MODEL

Shear Strength	**1500**	**psi**
Insitu Stress	**70**	**psi**
Shear Modulus	**221000**	**psi**

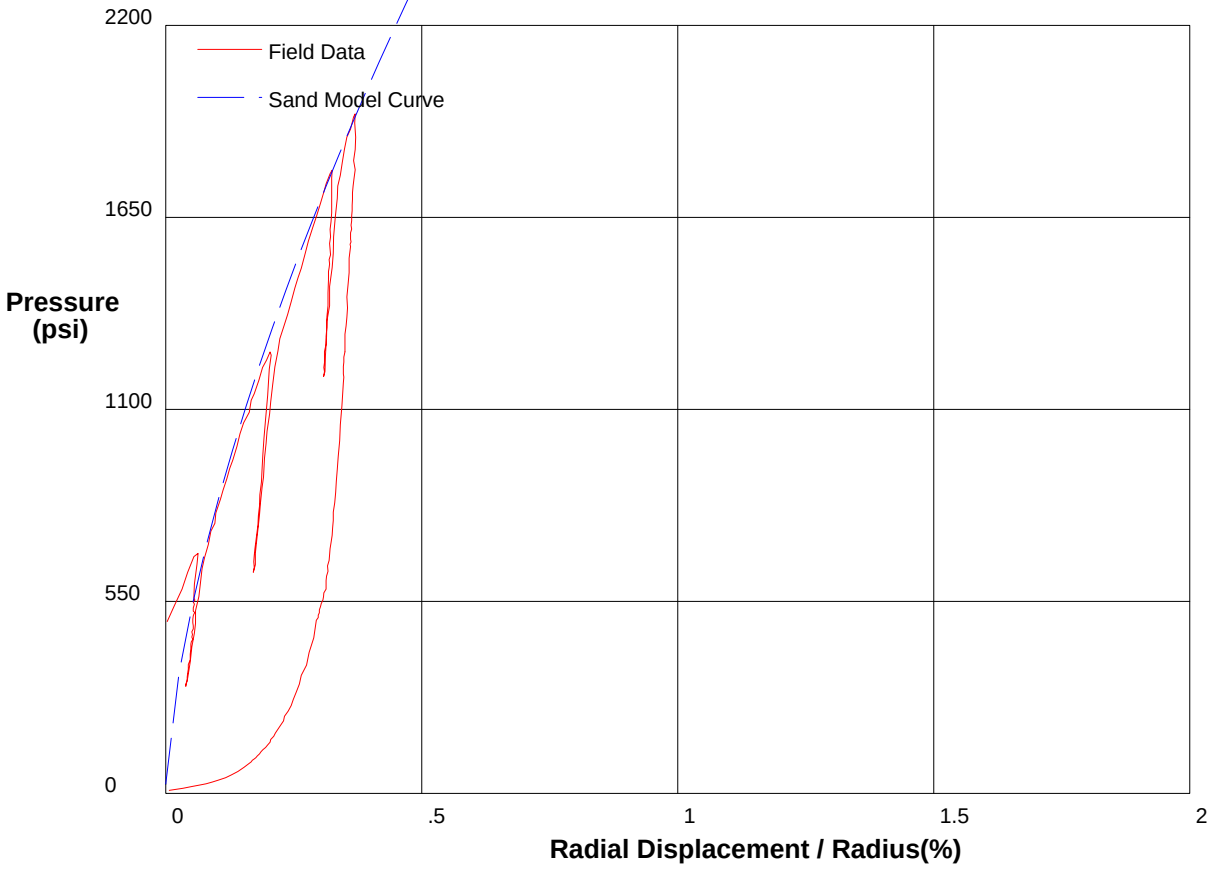
shift 5.03

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 83.5ft** **File C:\DATA\ISE-843\I-90-05.P**



THE HUGHES SAND MODEL

Water Pressure	**44 psi**
Friction Angle	**53 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**27 psi**
Shear Modulus	**840000 psi**

shift 5.11

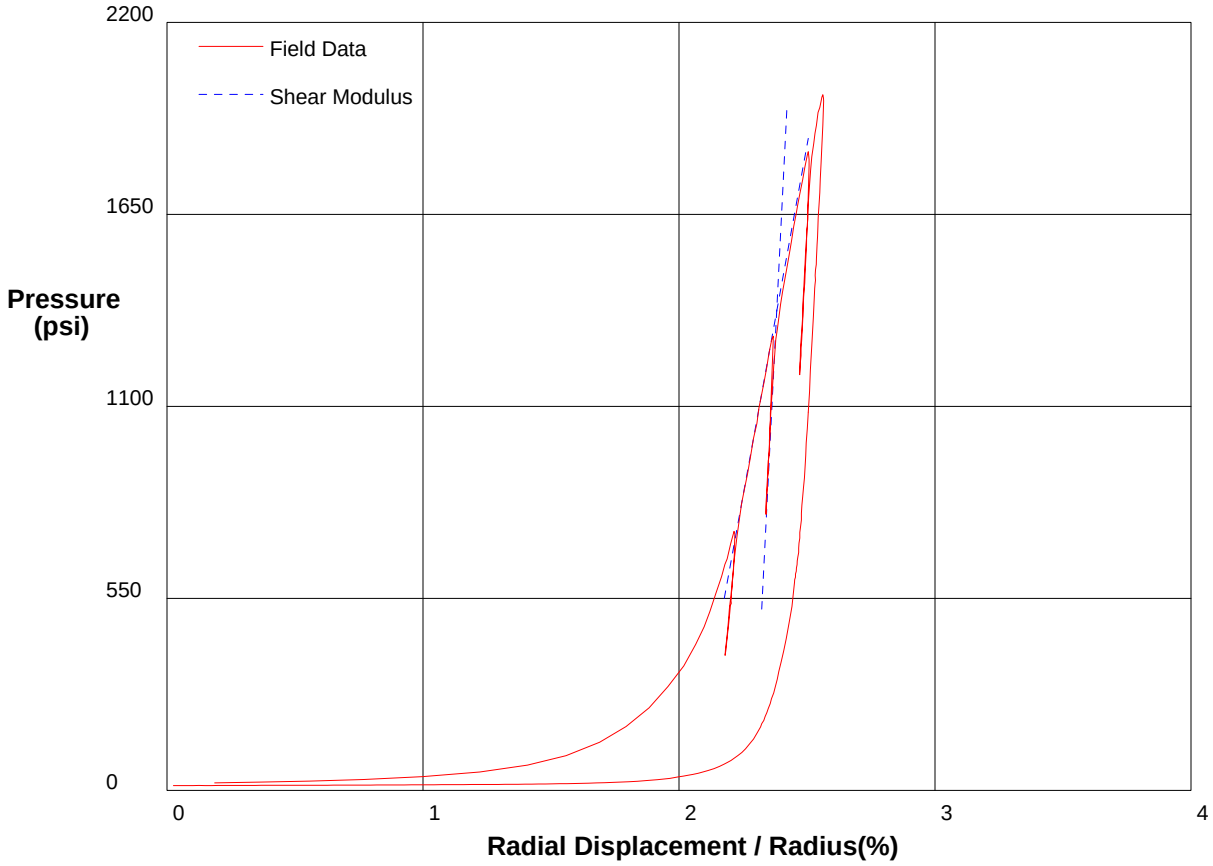
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 82ft** **File C:\DATA\ISE-843\I-90-06.P**



Shear Modulus 727543 psi

Shear Modulus 200793 psi

shift 3

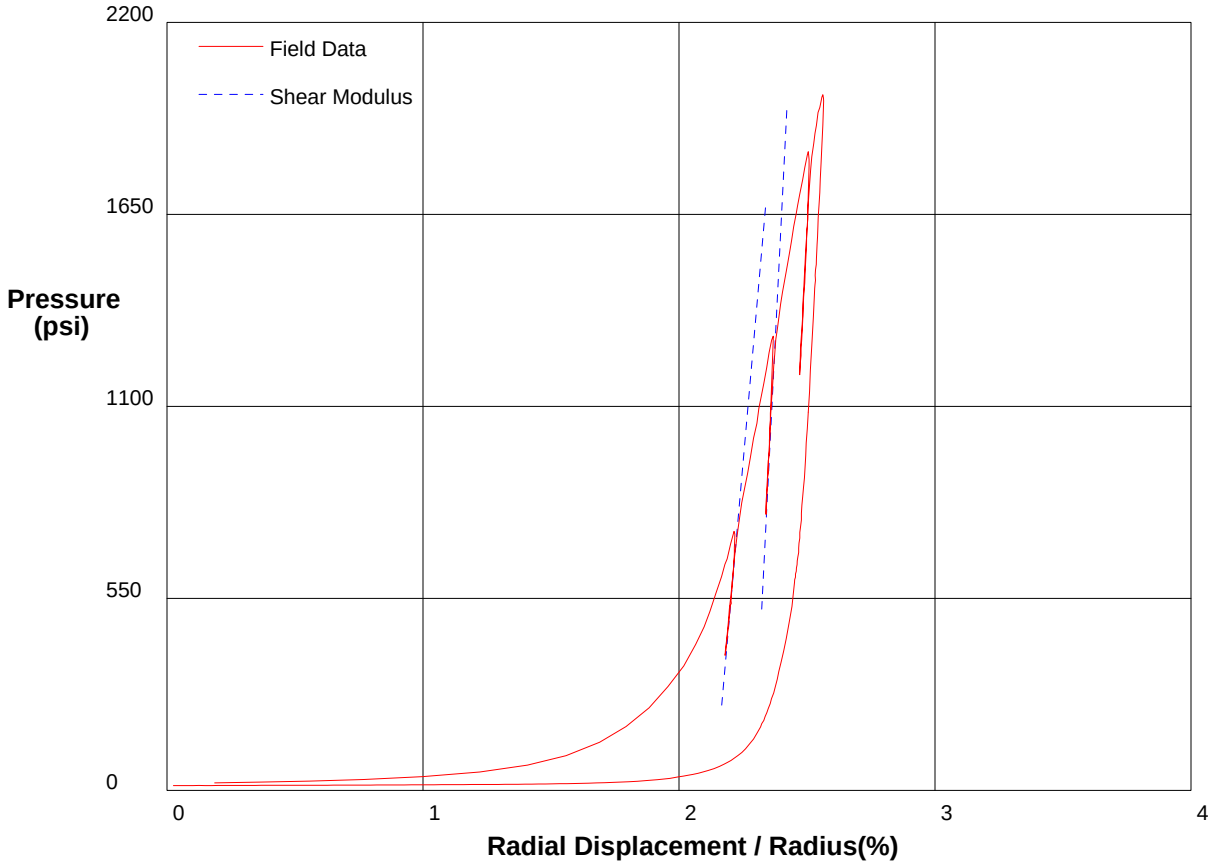
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 82ft** **File C:\DATA\ISE-843\I-90-06.P**



Shear Modulus 727543 psi

Shear Modulus 416666 psi

shift 3

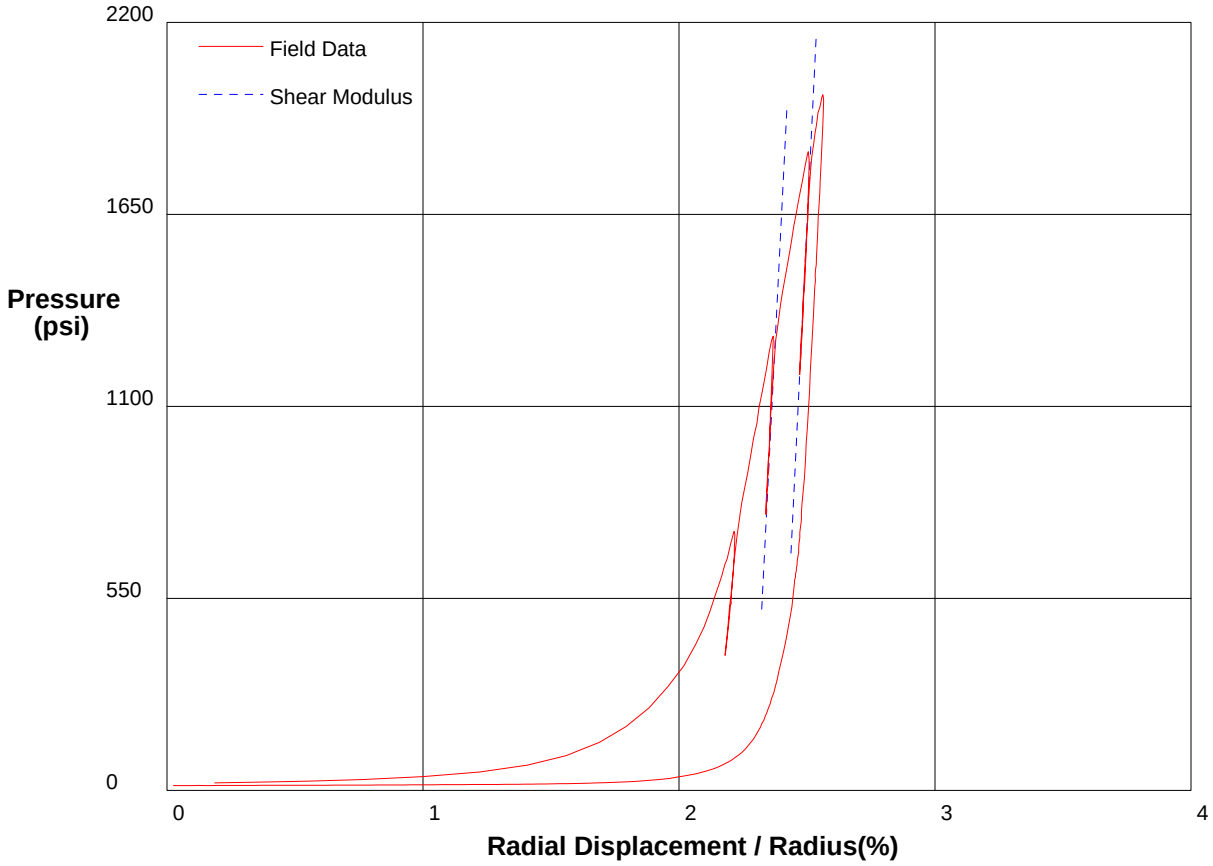
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 82ft** **File C:\DATA\ISE-843\I-90-06.P**



Shear Modulus 727543 psi

Shear Modulus 750701 psi

shift 3

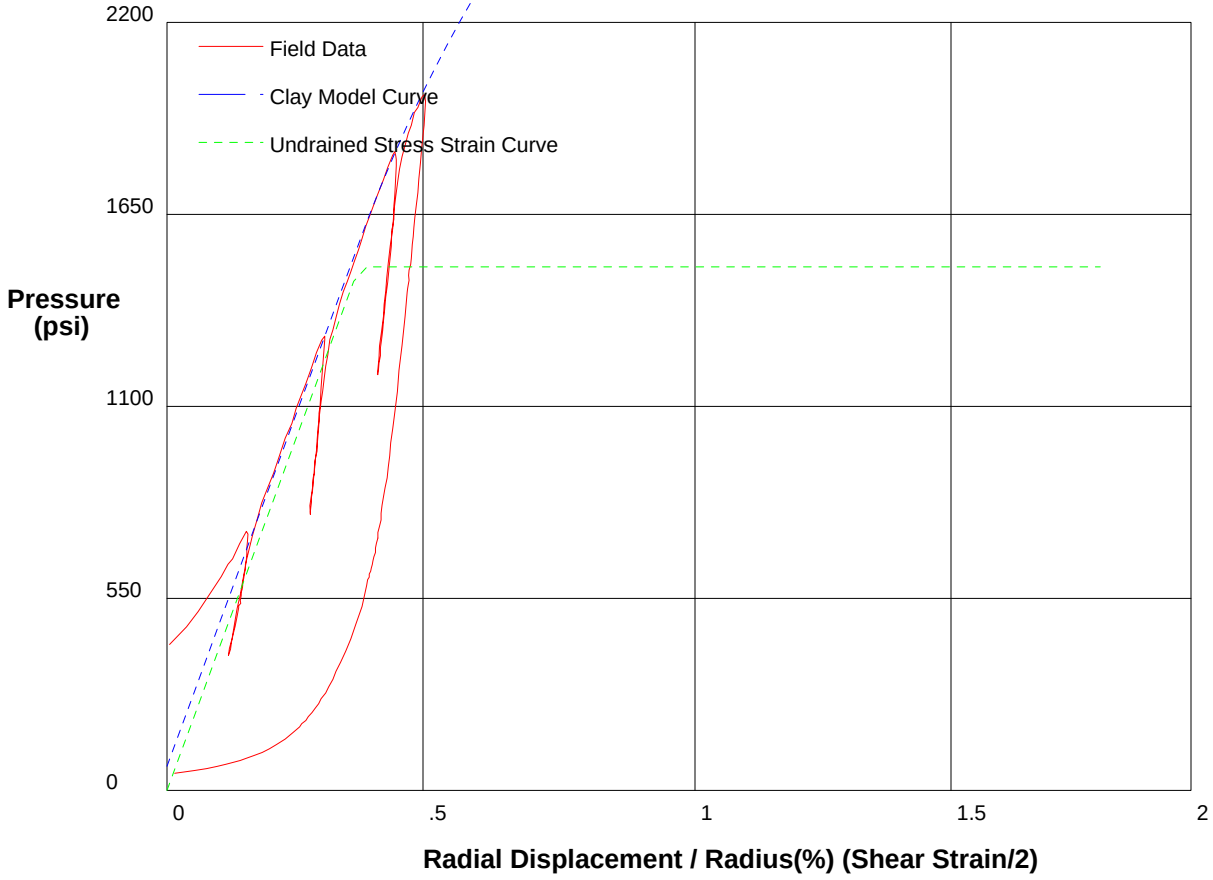
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 82ft** **File C:\DATA\ISE-843\I-90-06.P**



GIBSON'S CLAY MODEL

Shear Strength	**1500**	**psi**
Insitu Stress	**69**	**psi**
Shear Modulus	**200000**	**psi**

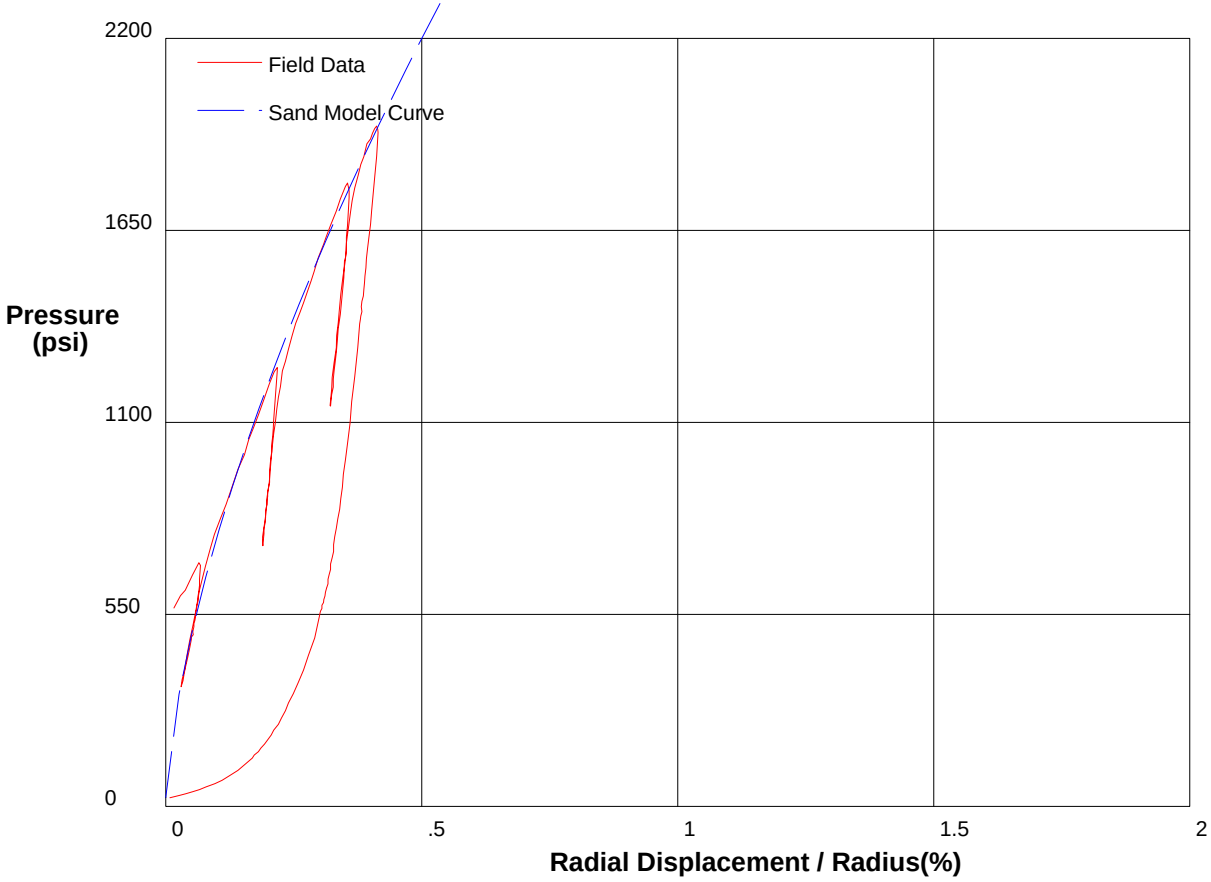
shift 5.06

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **5/31/2009**

Hole No. SSD-007-09 **Depth 82ft** **File C:\DATA\ISE-843\I-90-06.P**



THE HUGHES SAND MODEL

Water Pressure	**44 psi**
Friction Angle	**53 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**26 psi**
Shear Modulus	**770000 psi**

shift 5.15

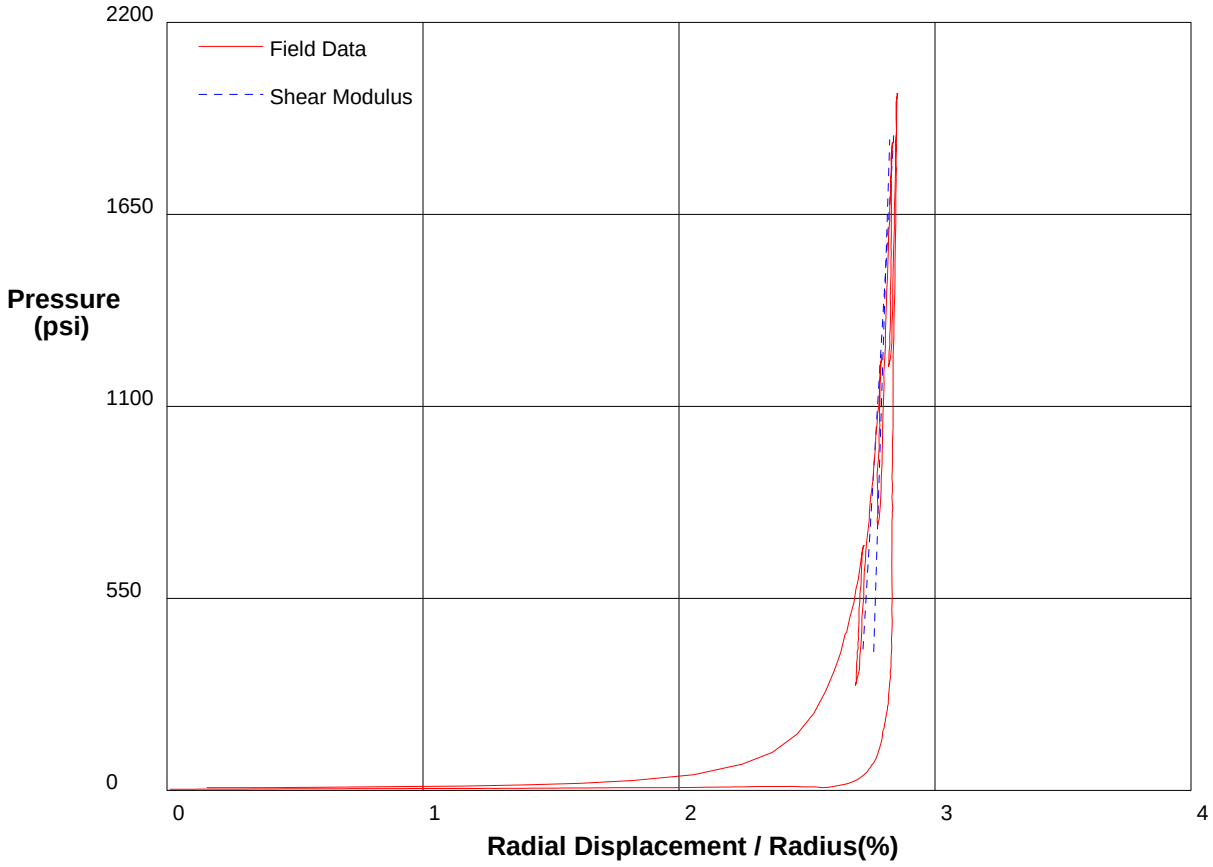
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 66ft** **File C:\DATA\ISE-843\I-90-07.P**



Shear Modulus 1173333 psi

Shear Modulus 613768 psi

shift 1

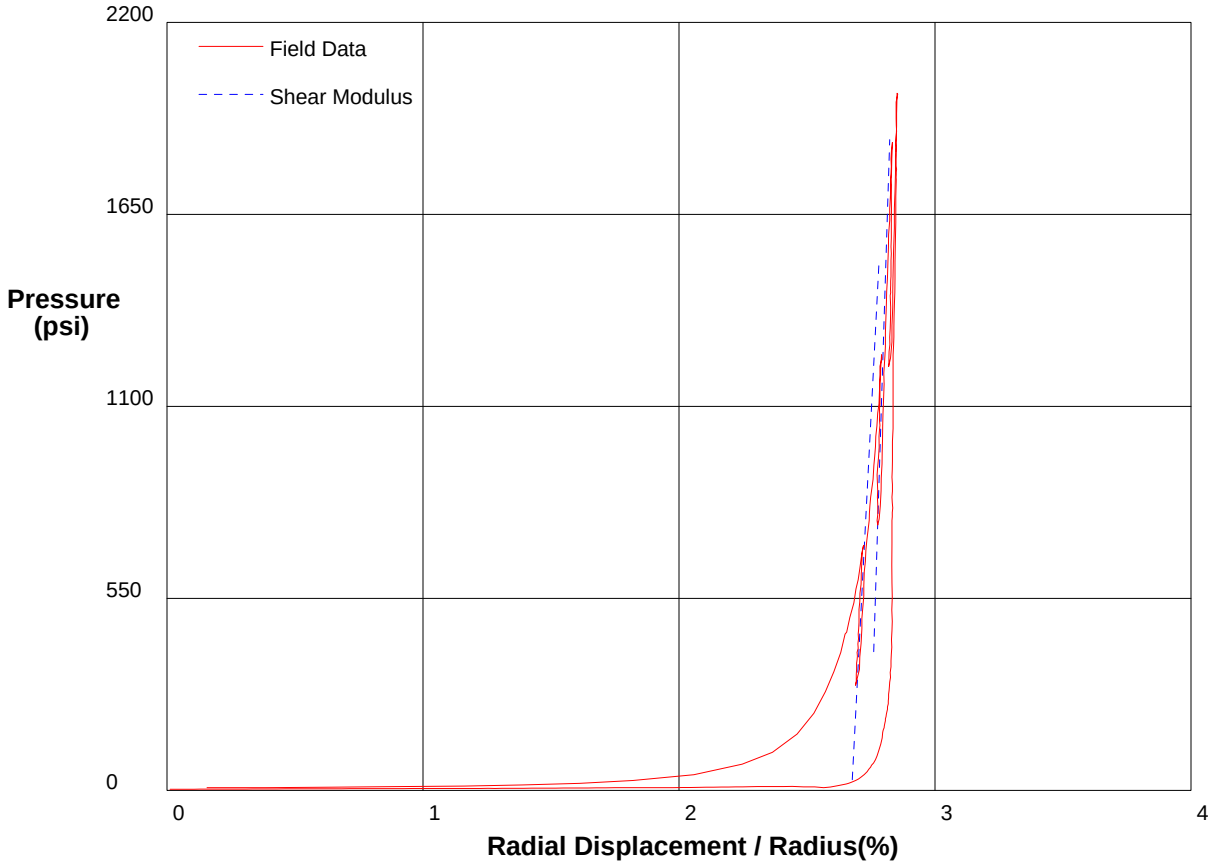
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 66ft** **File C:\DATA\ISE-843\I-90-07.P**



Shear Modulus 1173333 psi

Shear Modulus 711333 psi

shift 1

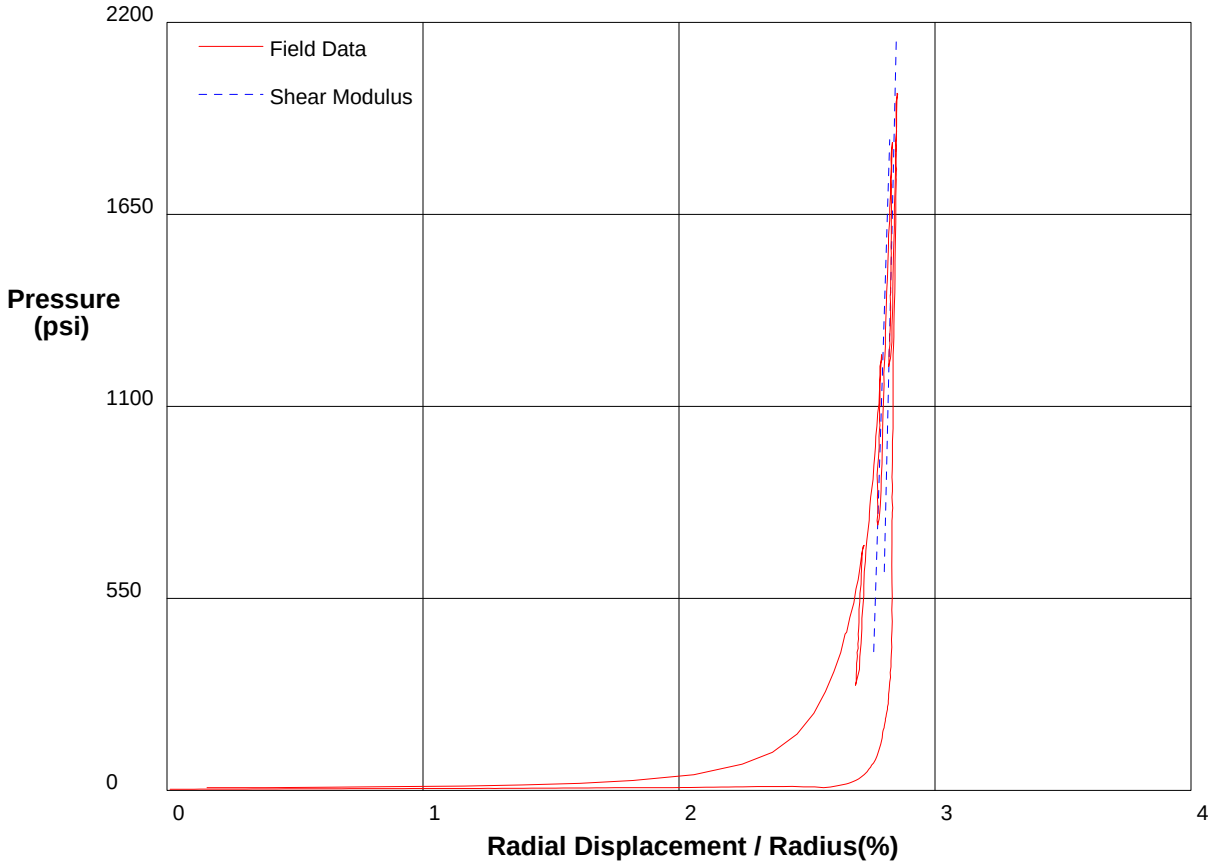
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 66ft** **File C:\DATA\ISE-843\I-90-07.P**



Shear Modulus 1173333 psi

Shear Modulus 1625555 psi

shift 1

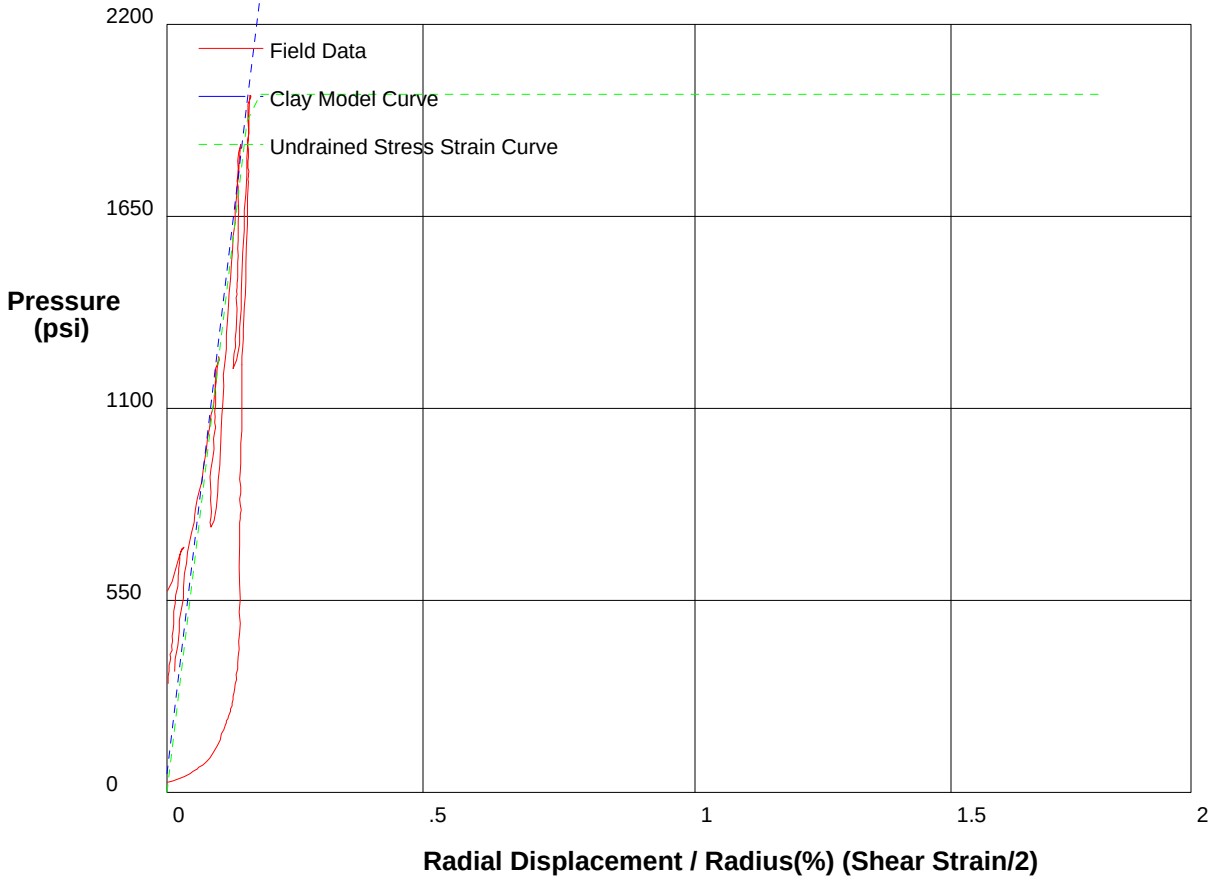
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 66ft** **File C:\DATA\ISE-843\I-90-07.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**54**	**psi**
Shear Modulus	**615000**	**psi**

shift 3.69

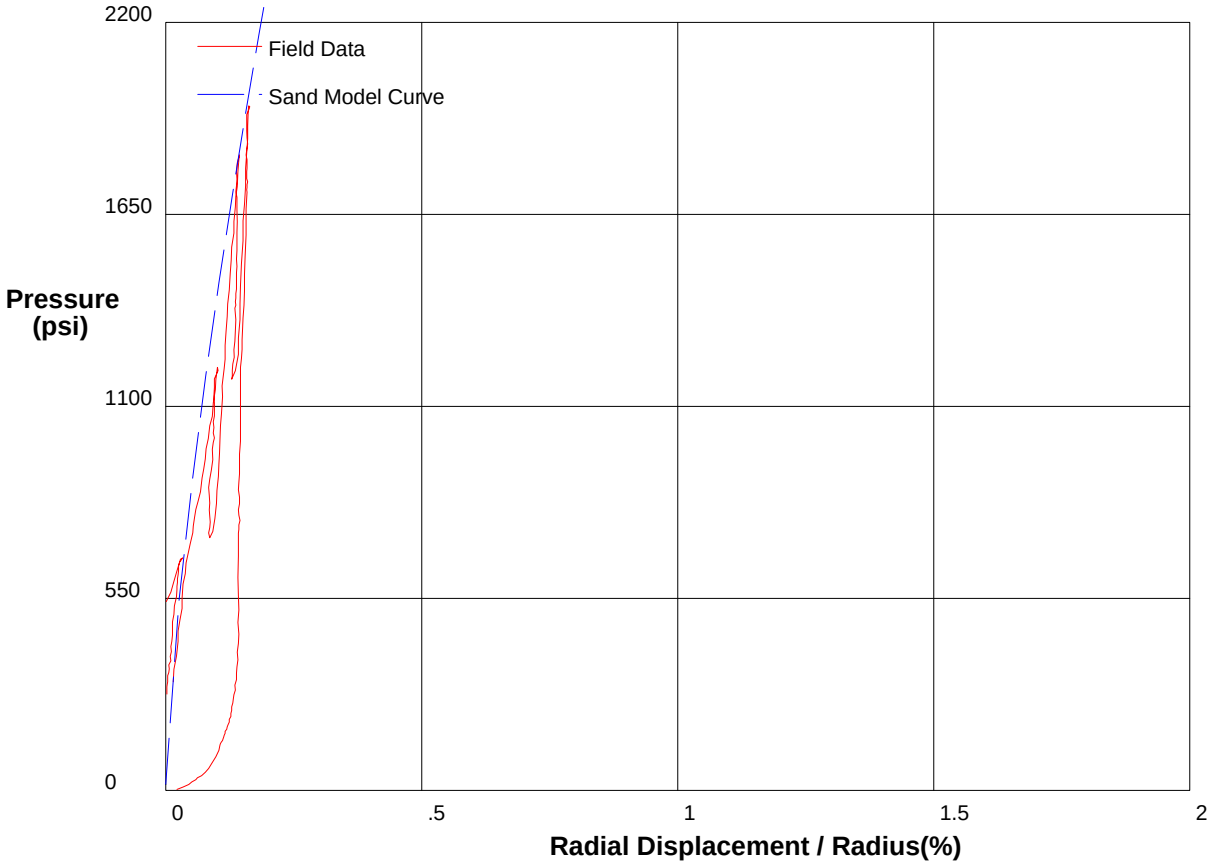
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 66ft** **File C:\DATA\ISE-843\I-90-07.P**



THE HUGHES SAND MODEL

Water Pressure	**36 psi**
Friction Angle	**57 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**18 psi**
Shear Modulus	**1500000 psi**

shift 3.69

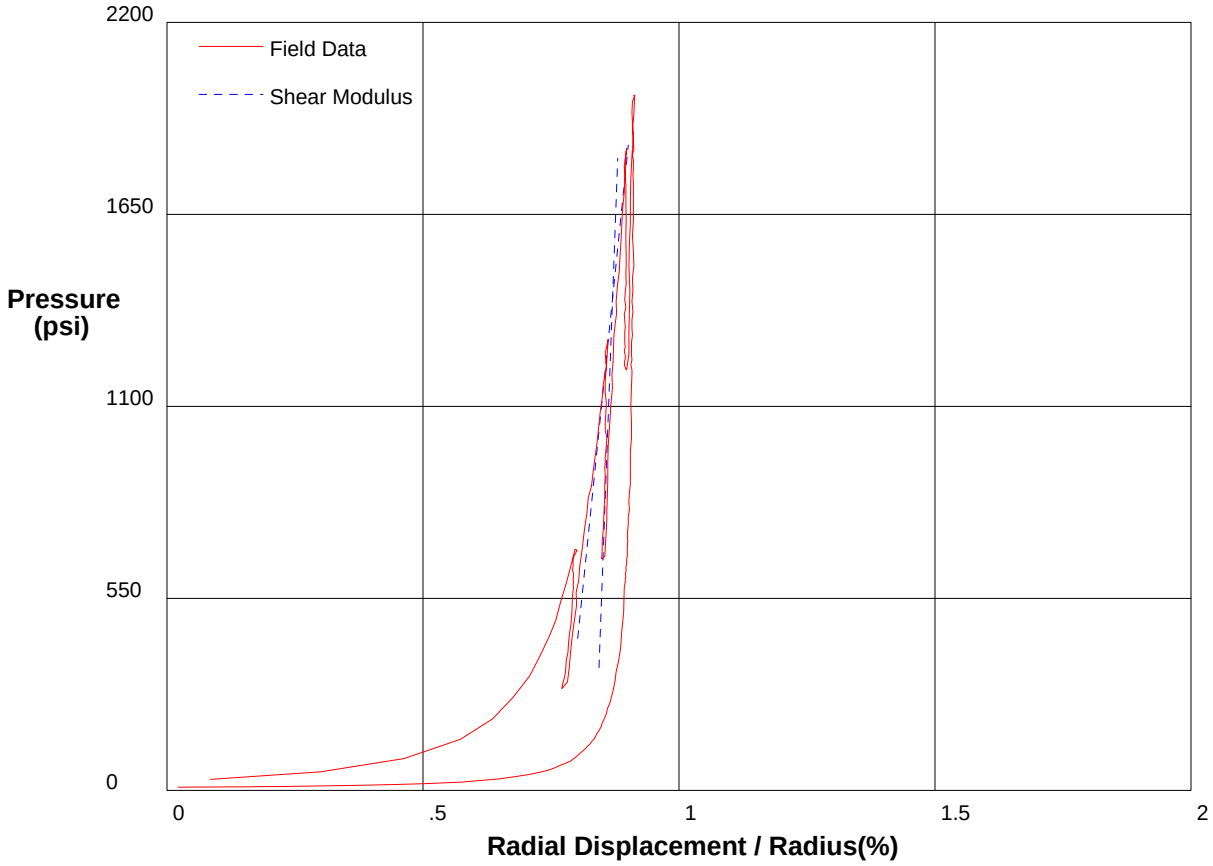
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 64.5ft** **File C:\DATA\ISE-843\I-90-08.P**



Shear Modulus 2000952 psi

Shear Modulus 714035 psi

shift 3

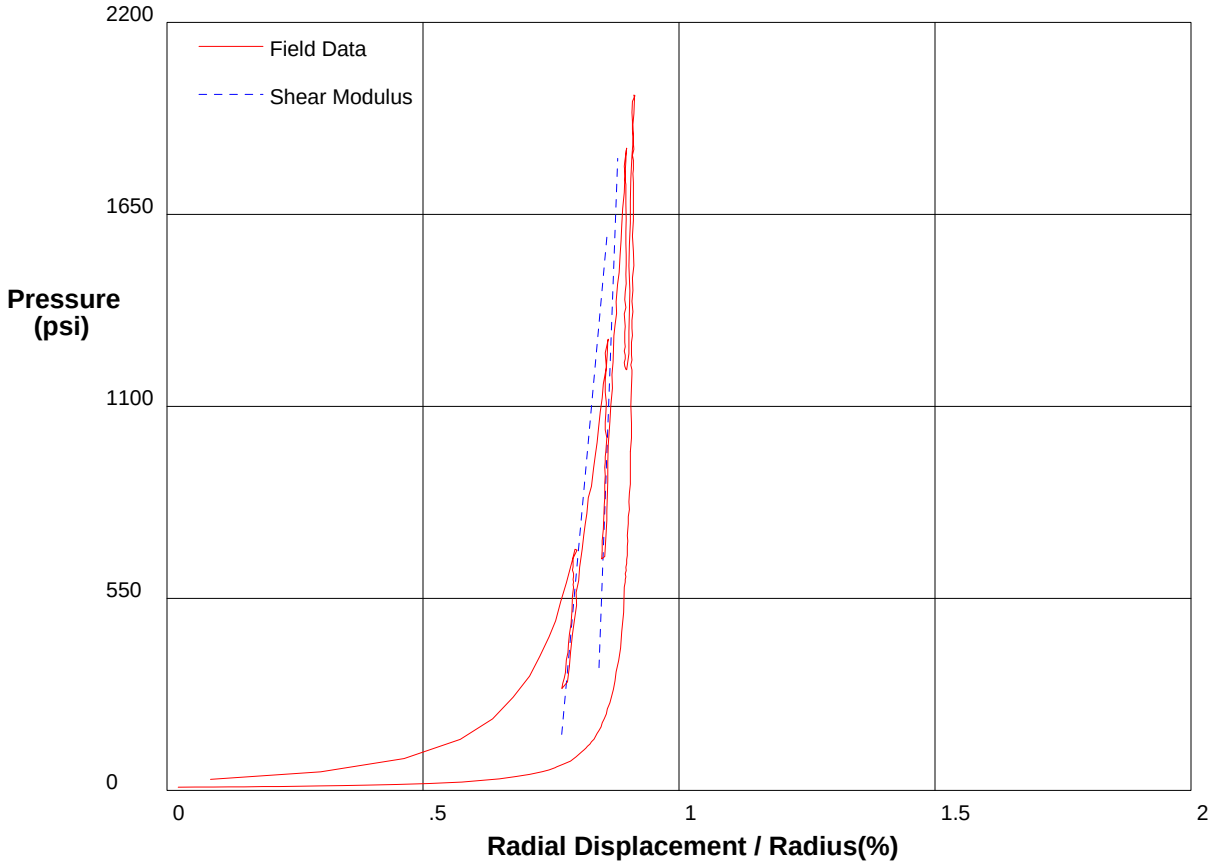
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 64.5ft** **File C:\DATA\ISE-843\I-90-08.P**



Shear Modulus 2000952 psi

Shear Modulus 806666 psi

shift 3

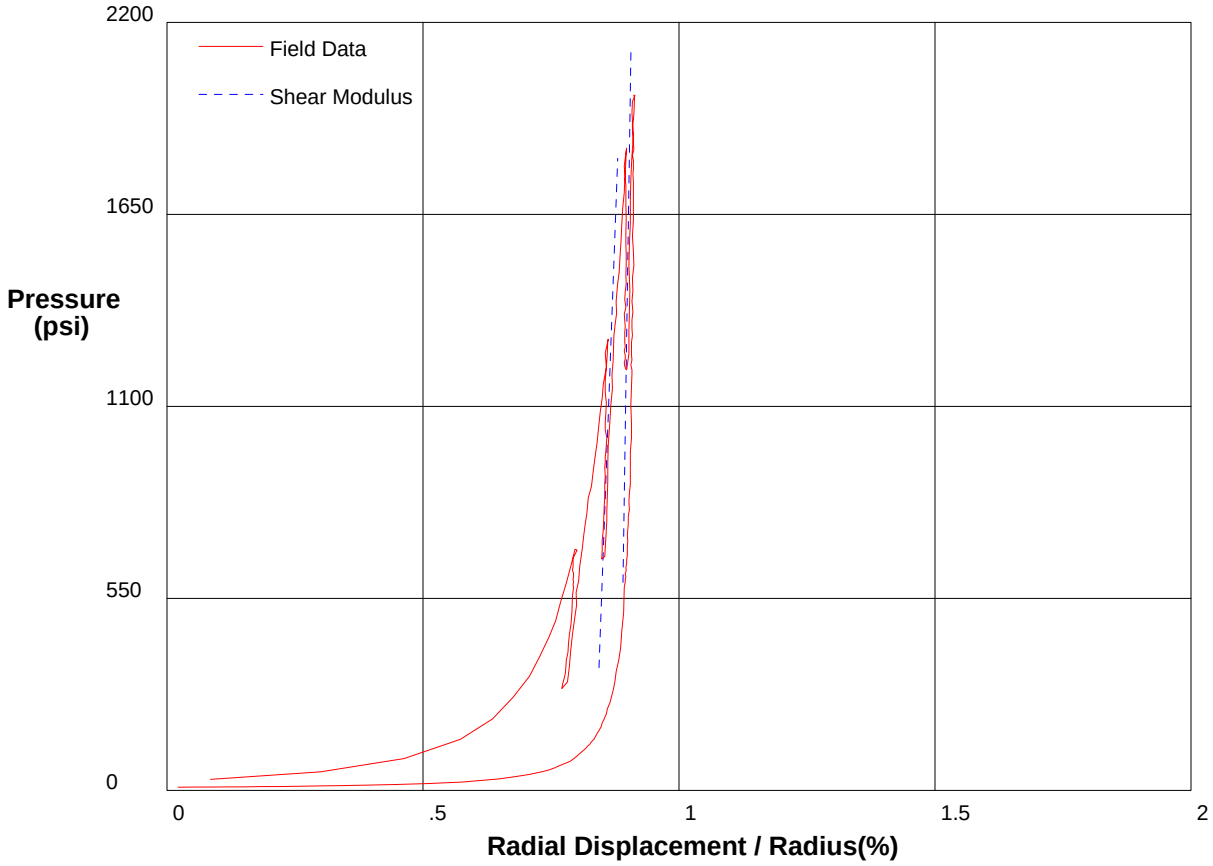
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 64.5ft** **File C:\DATA\ISE-843\I-90-08.P**



Shear Modulus 2000952 psi

Shear Modulus 4913333 psi

shift 3

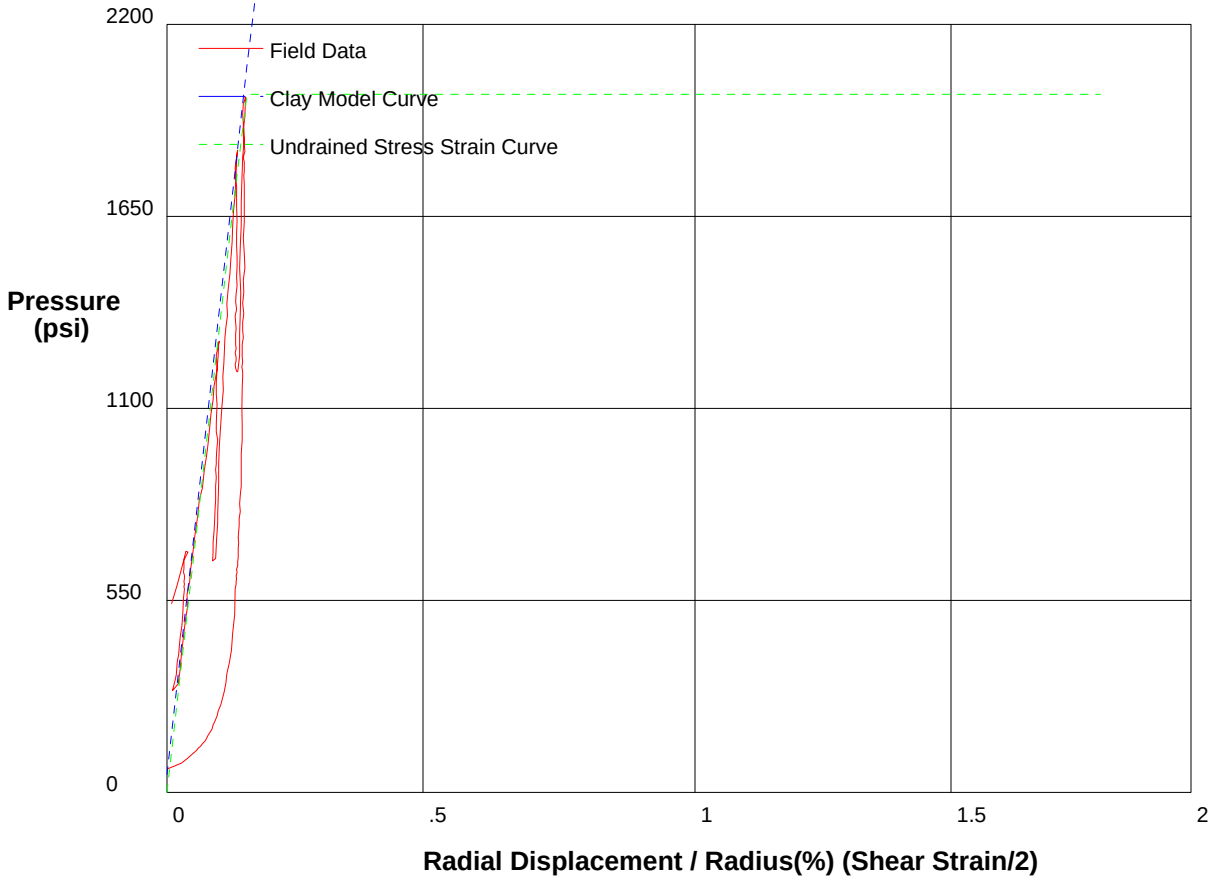
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 64.5ft** **File C:\DATA\ISE-843\I-90-08.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**52**	**psi**
Shear Modulus	**650000**	**psi**

shift 3.76

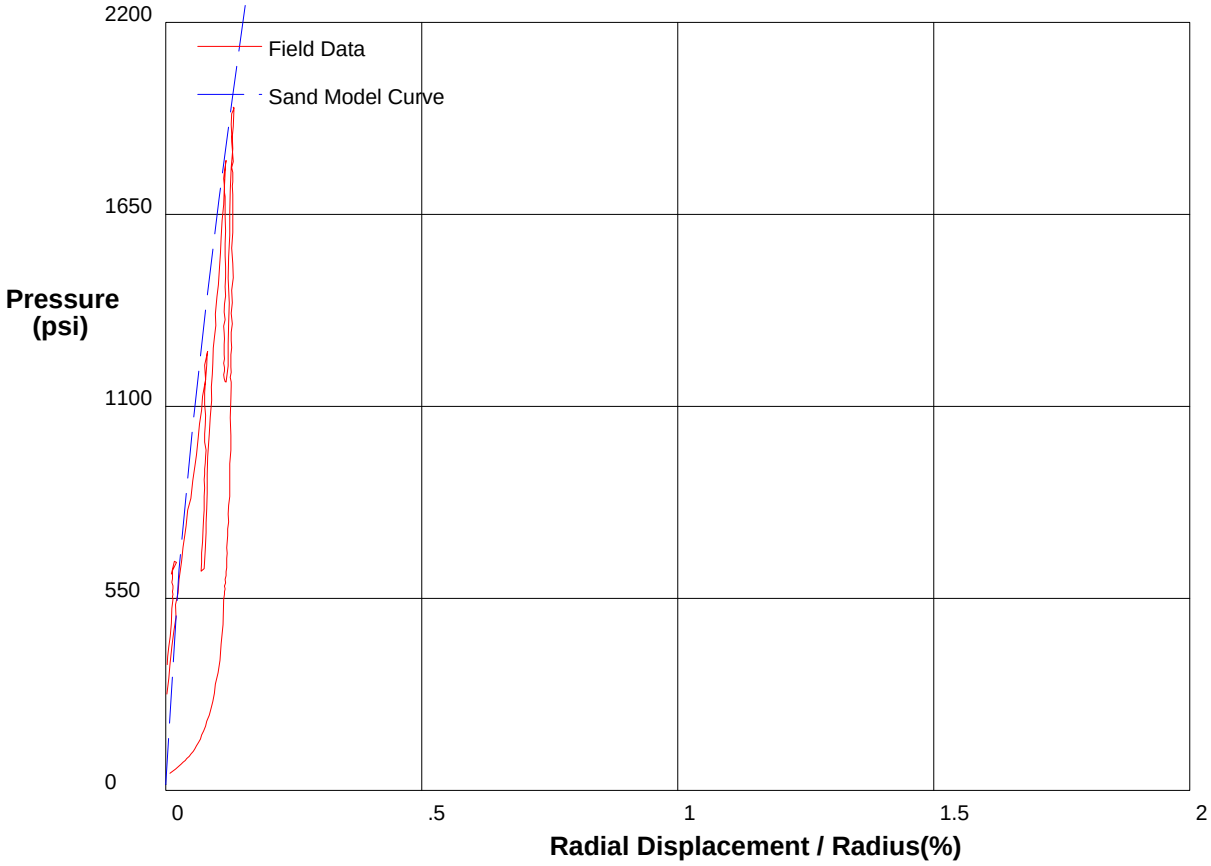
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 64.5ft** **File C:\DATA\ISE-843\I-90-08.P**



THE HUGHES SAND MODEL

Water Pressure	**35 psi**
Friction Angle	**57 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**17 psi**
Shear Modulus	**1900000 psi**

shift 3.78

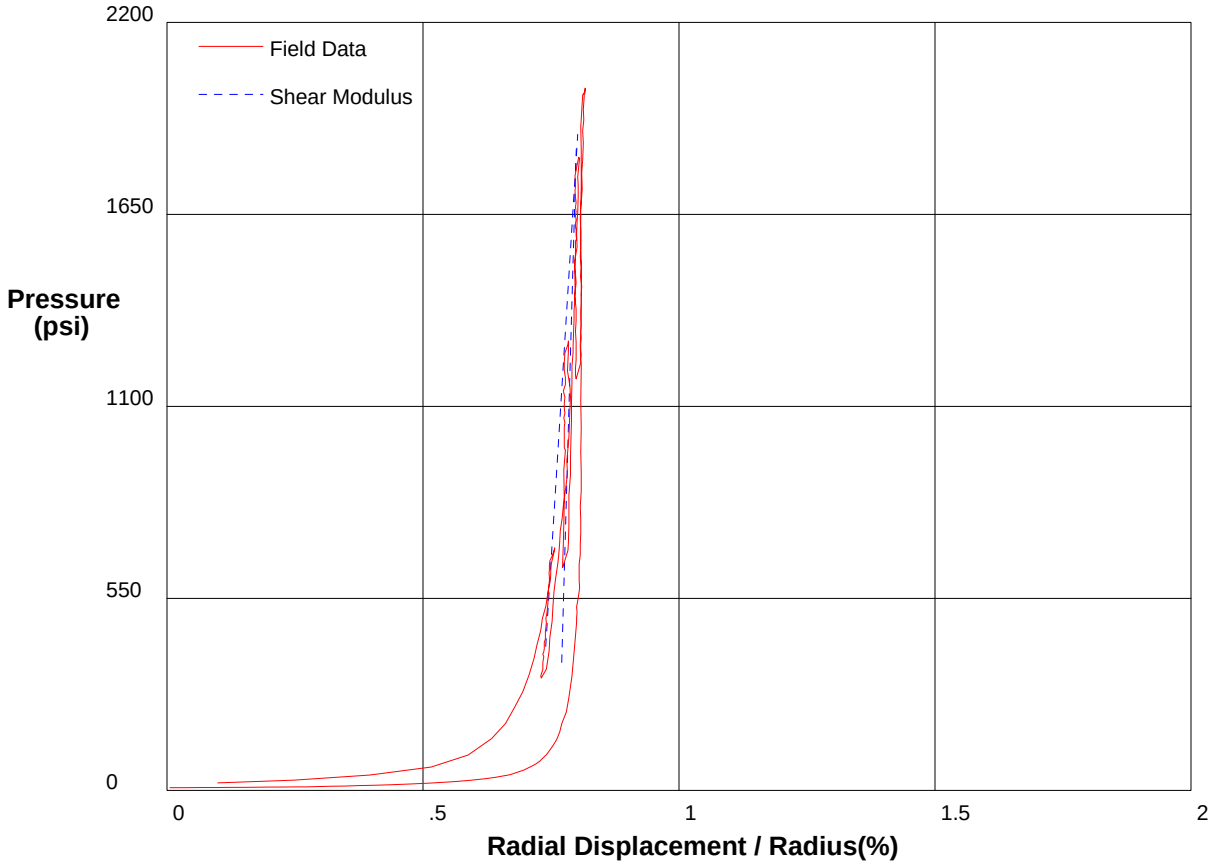
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 63ft** **File C:\DATA\ISE-843\I-90-09.P**



Shear Modulus 2566666 psi

Shear Modulus 1173333 psi

shift 3

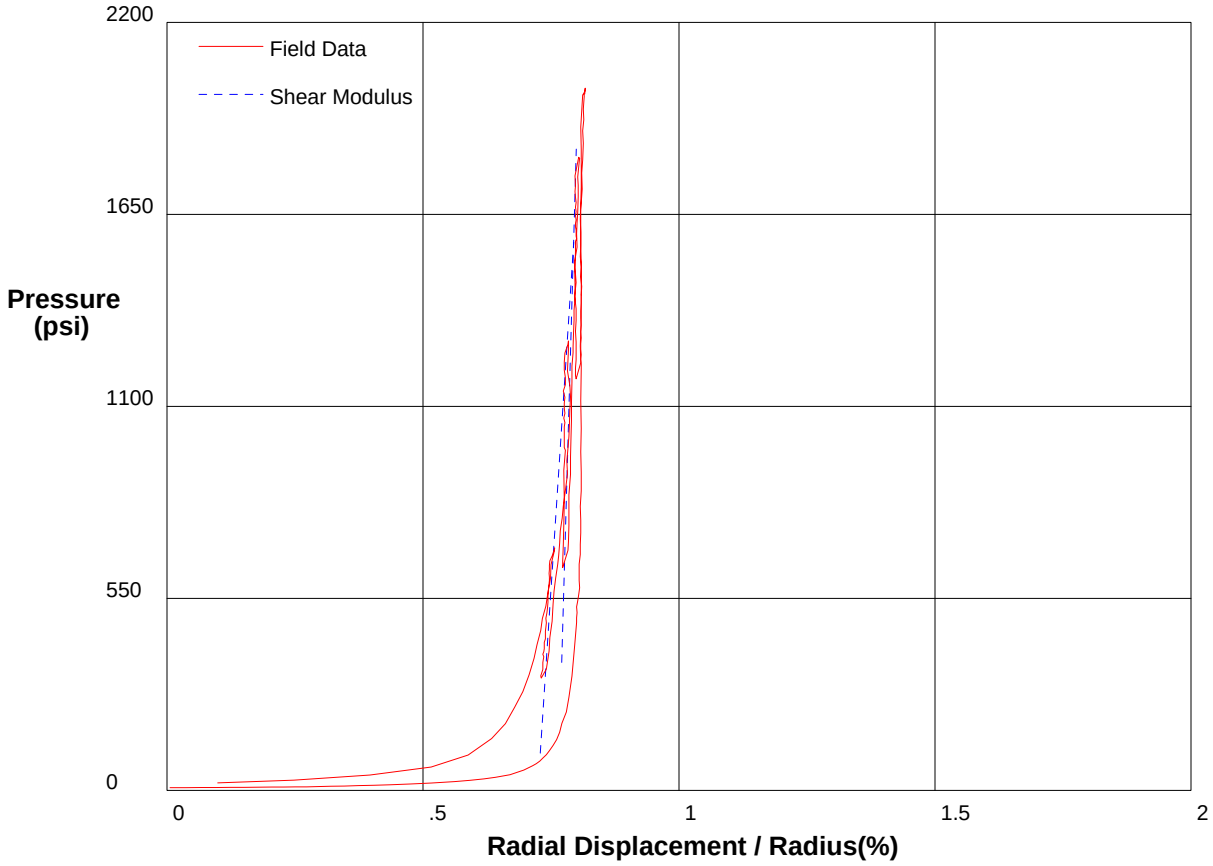
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 63ft** **File C:\DATA\ISE-843\I-90-09.P**



Shear Modulus 2566666 psi

Shear Modulus 1123466 psi

shift 3

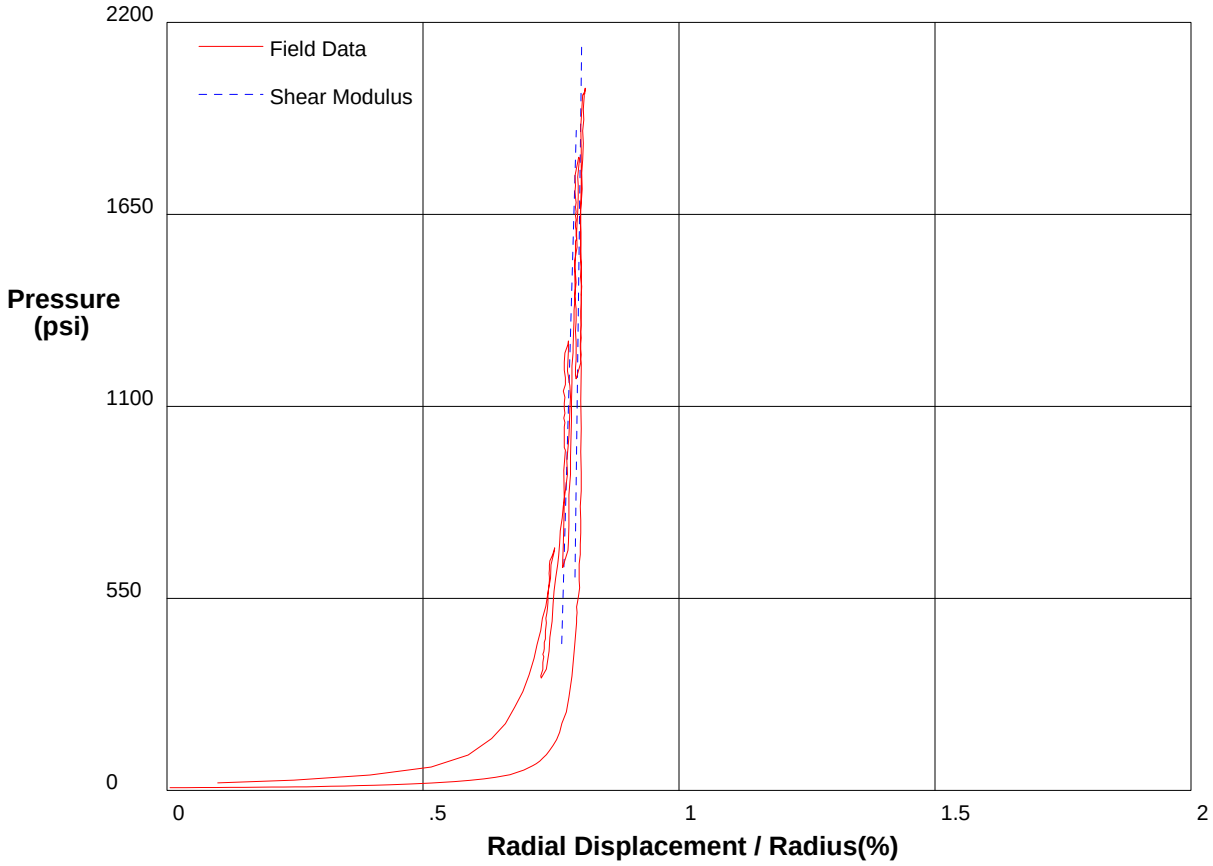
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 63ft** **File C:\DATA\ISE-843\I-90-09.P**



Shear Modulus 2566666 psi

Shear Modulus 5910667 psi

shift 3

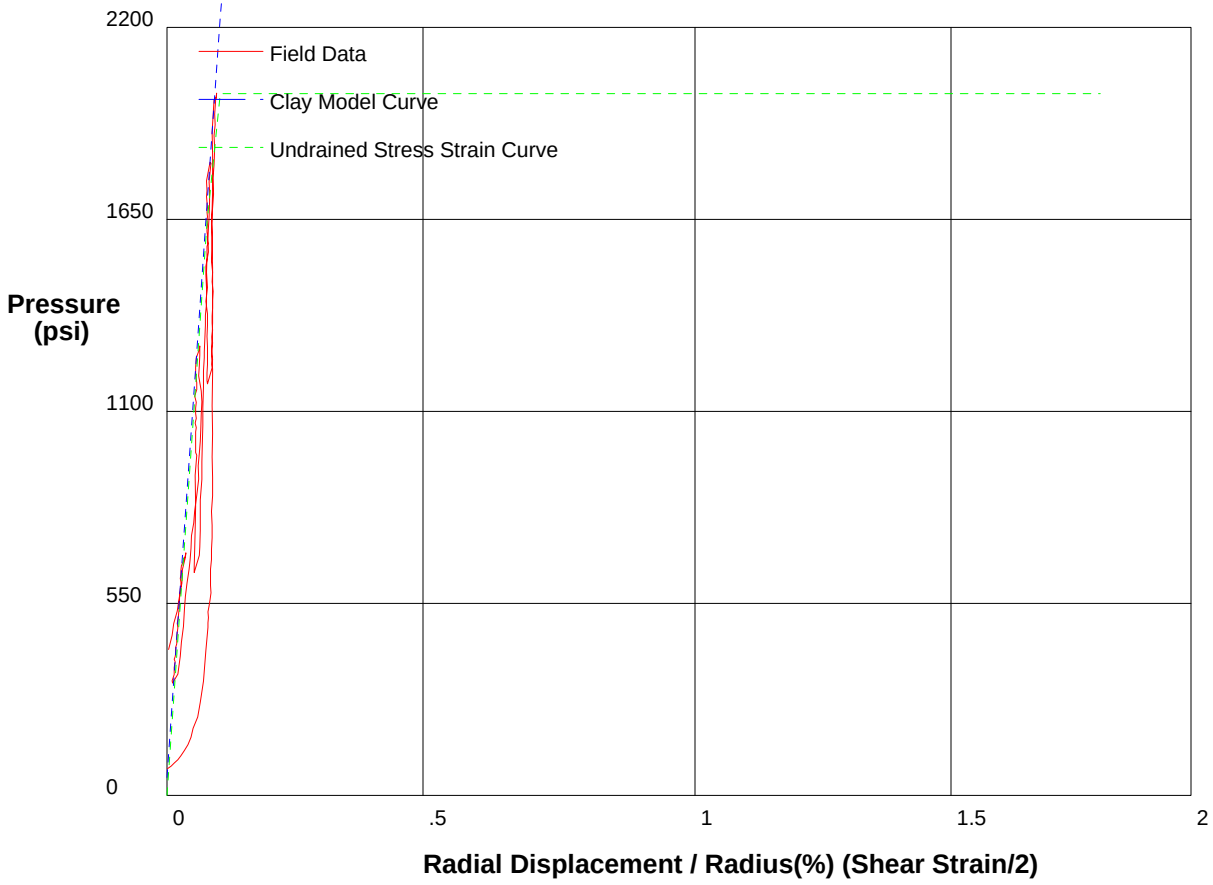
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 63ft** **File C:\DATA\ISE-843\I-90-09.P**



GIBSON'S CLAY MODEL

Shear Strength	**2010**	**psi**
Insitu Stress	**51**	**psi**
Shear Modulus	**1050000**	**psi**

shift 3.72

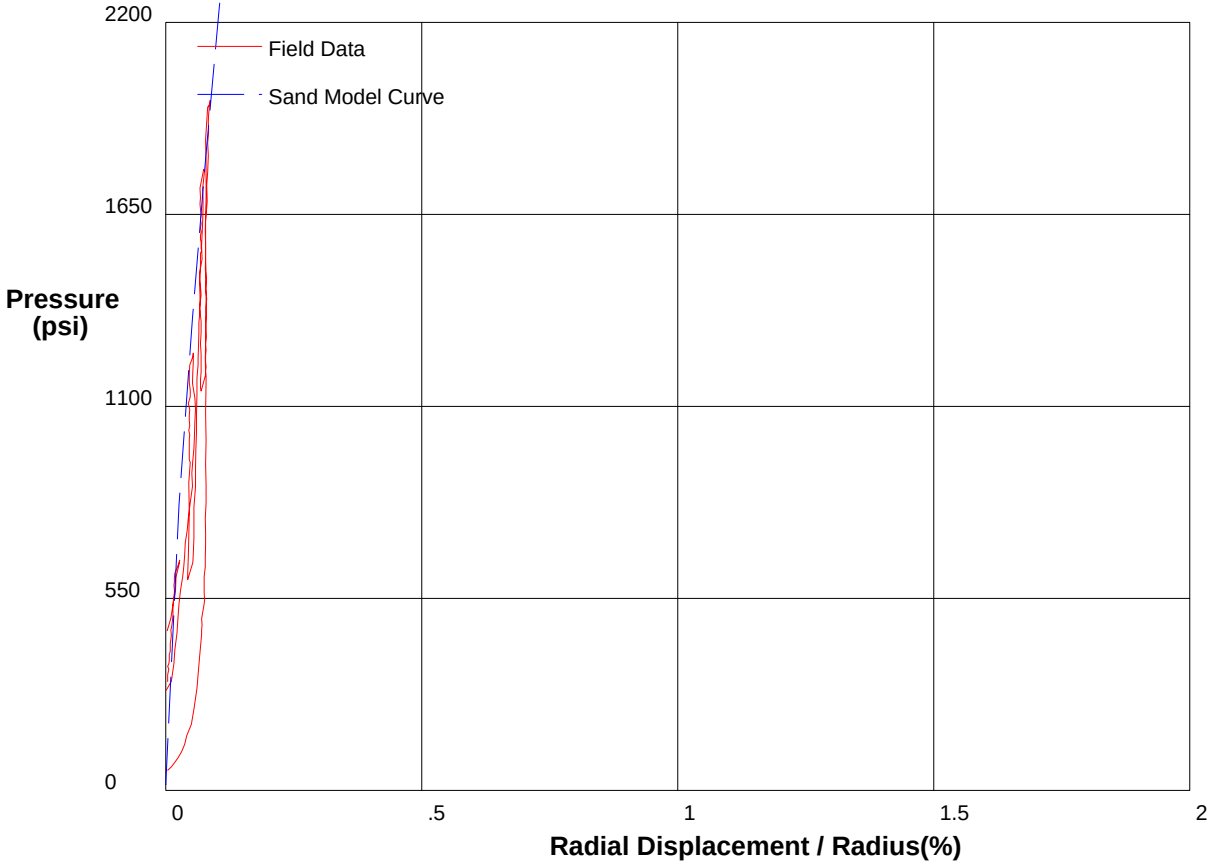
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/3/2009**

Hole No. SSD-006-09 **Depth 63ft** **File C:\DATA\ISE-843\I-90-09.P**



THE HUGHES SAND MODEL

Water Pressure	**35 psi**
Friction Angle	**58 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**17 psi**
Shear Modulus	**2500000 psi**

shift 3.73

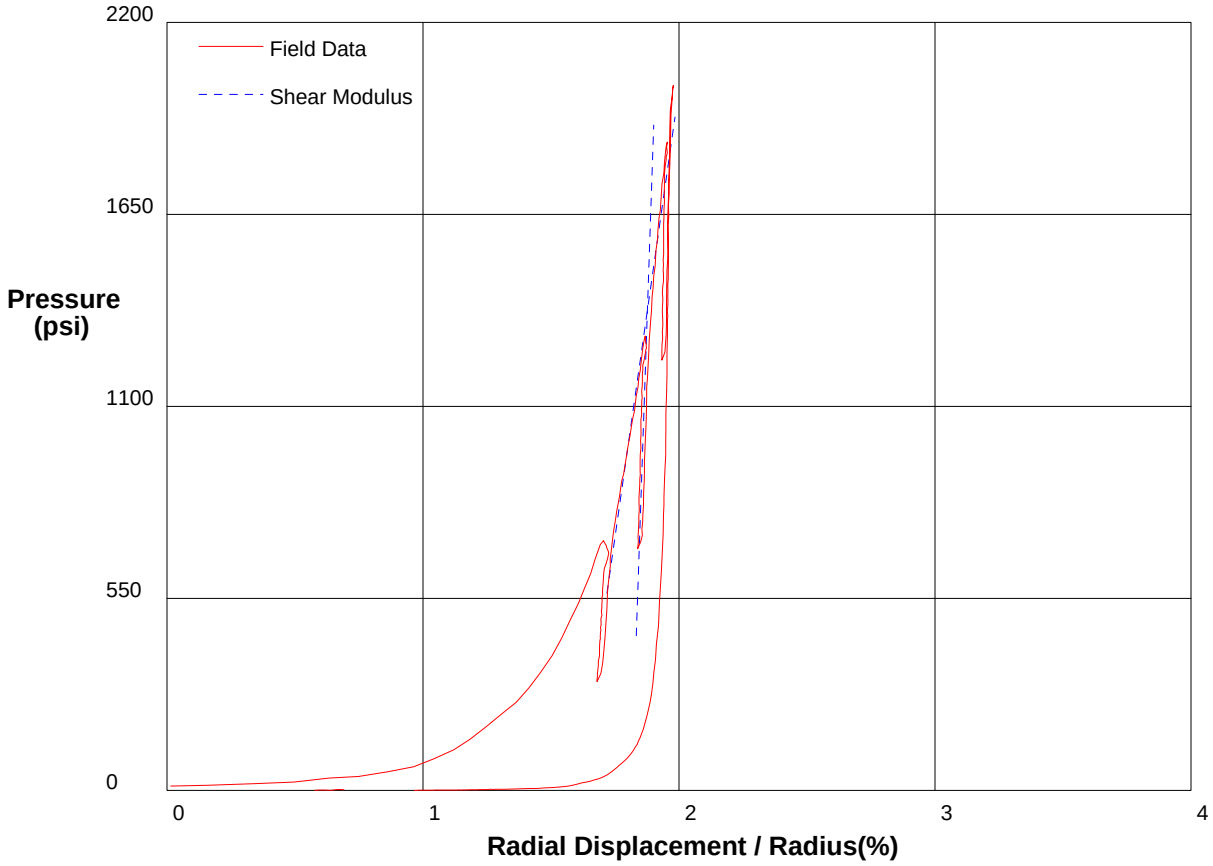
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 70.5ft** **File C:\DATA\ISE-843\I-90-10.P**



Shear Modulus 1080256 psi

Shear Modulus 256666 psi

shift 1

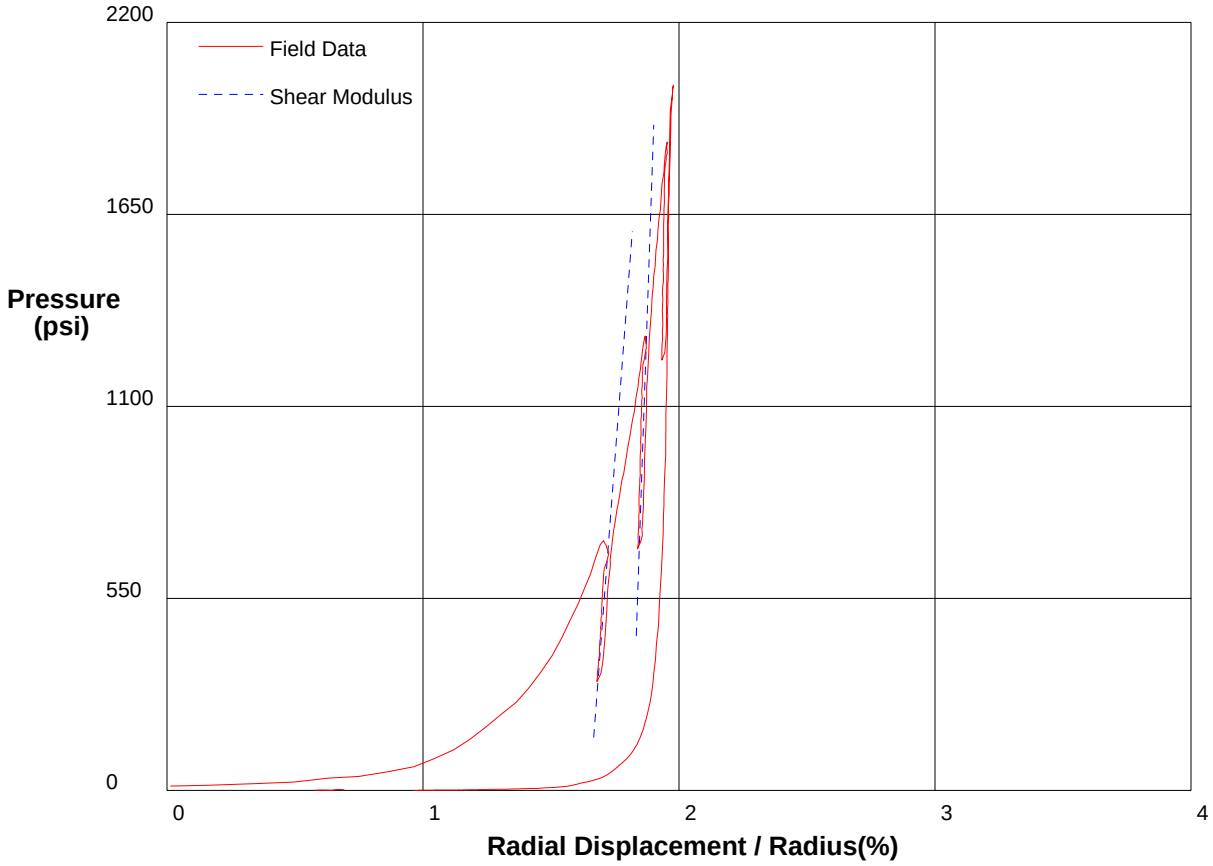
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 70.5ft** **File C:\DATA\ISE-843\I-90-10.P**



Shear Modulus 1080256 psi

Shear Modulus 479195 psi

shift 1

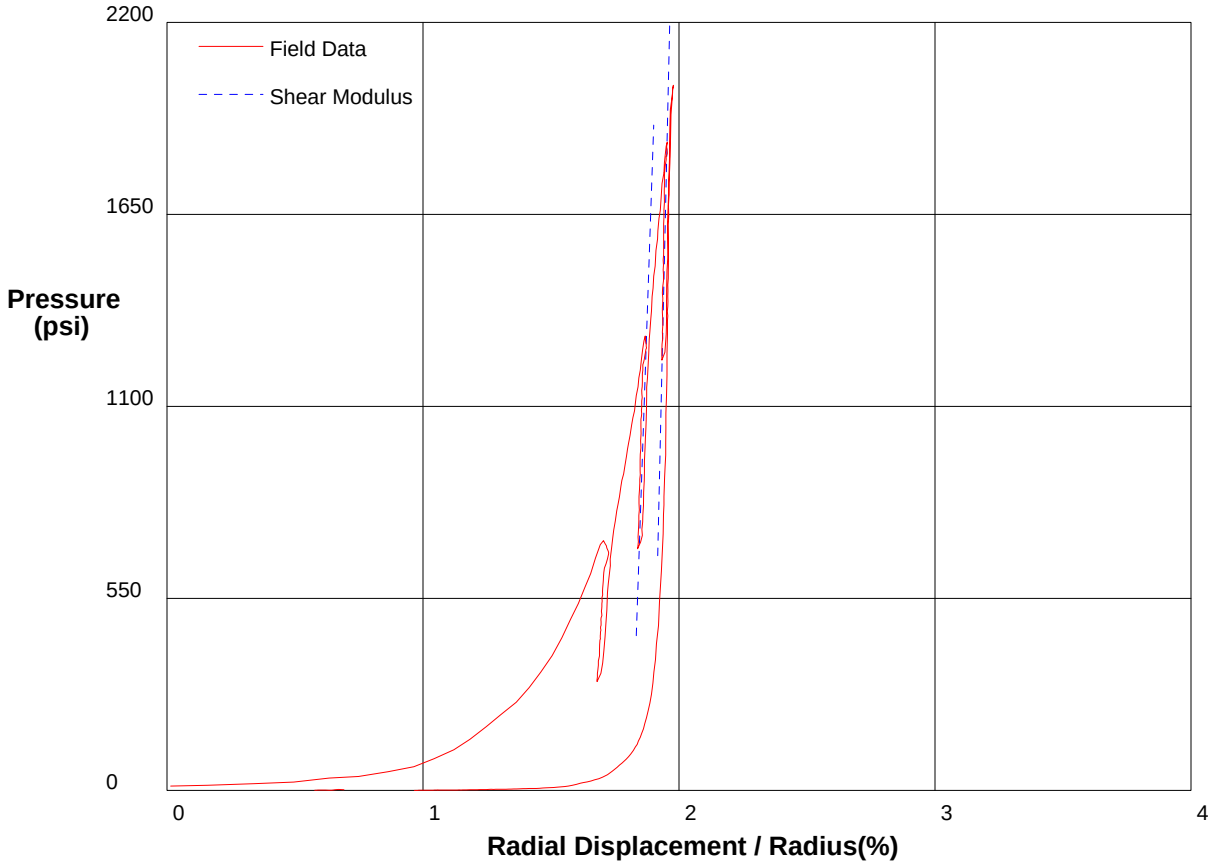
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 70.5ft** **File C:\DATA\ISE-843\I-90-10.P**



Shear Modulus 1080256 psi

Shear Modulus 1625555 psi

shift 1

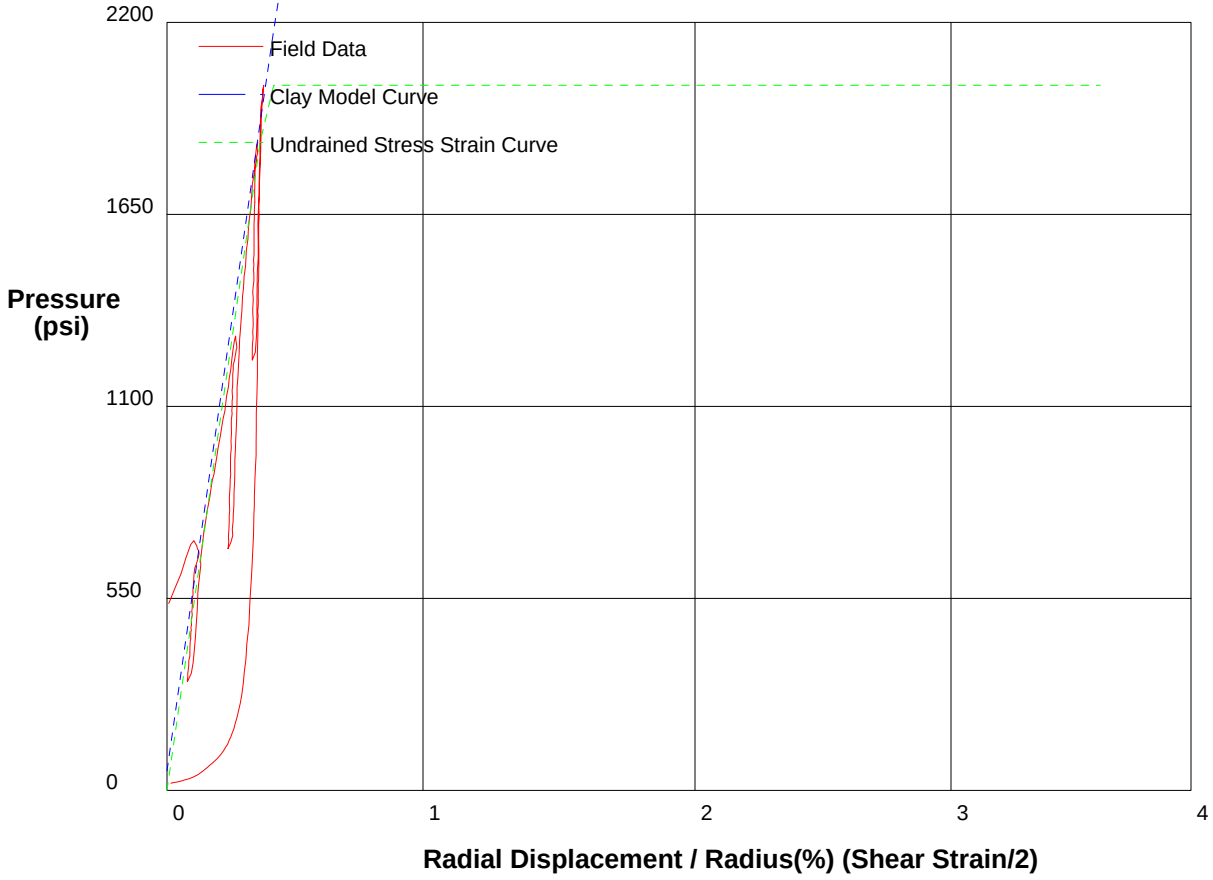
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 70.5ft** **File C:\DATA\ISE-843\I-90-10.P**



GIBSON'S CLAY MODEL

Shear Strength	**2020**	**psi**
Insitu Stress	**56**	**psi**
Shear Modulus	**255000**	**psi**

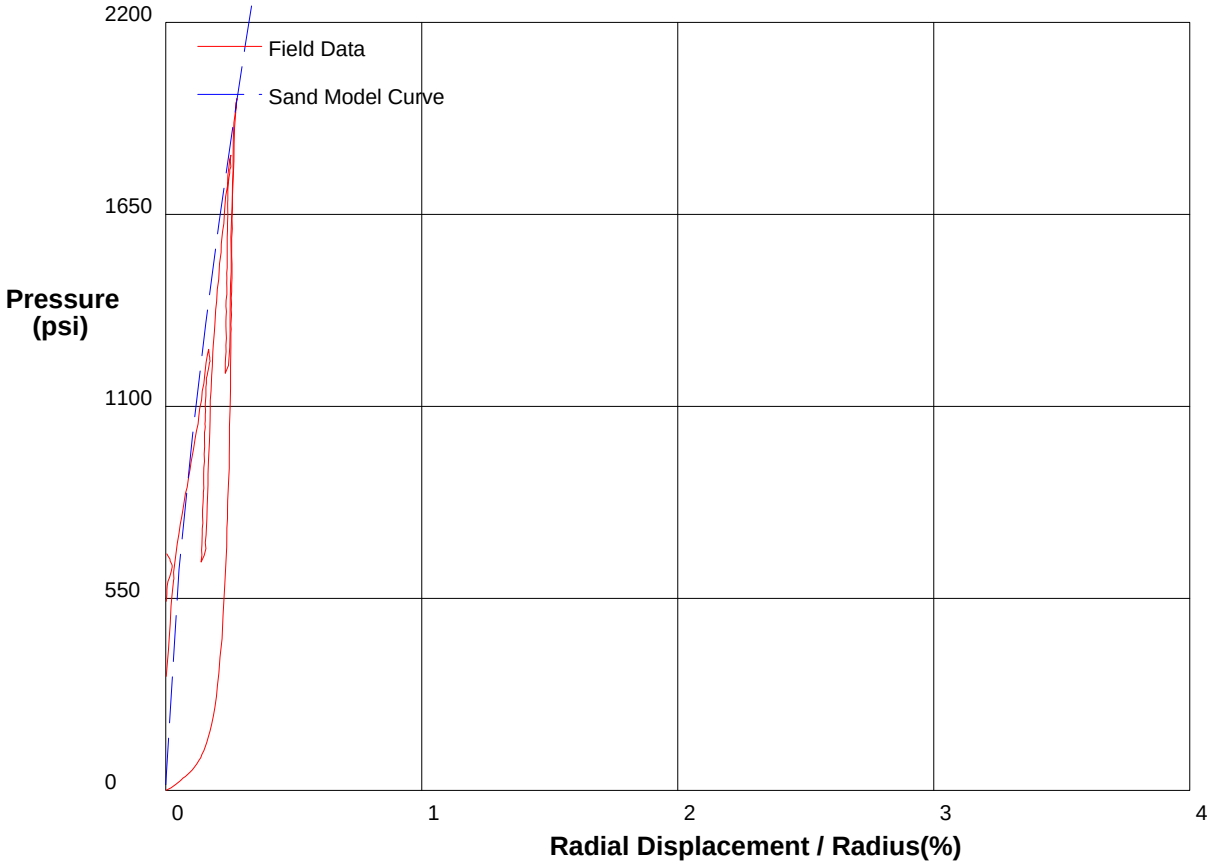
shift 2.6

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 70.5ft** **File C:\DATA\ISE-843\I-90-10.P**



THE HUGHES SAND MODEL

Water Pressure	**38 psi**
Friction Angle	**55 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**18 psi**
Shear Modulus	**1100000 psi**

shift 2.7

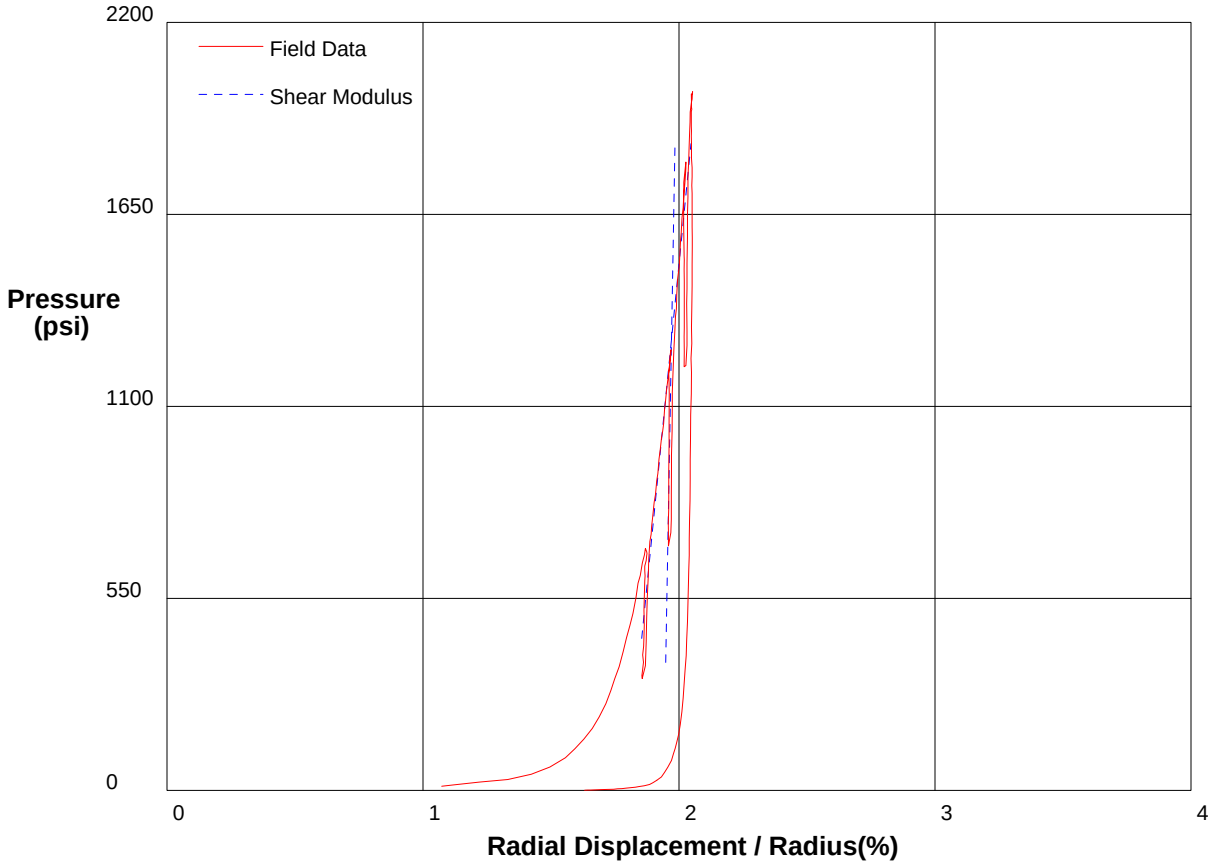
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 69ft** **File C:\DATA\ISE-843\I-90-11.P**



Shear Modulus 2037619 psi

Shear Modulus 367657 psi

shift 1

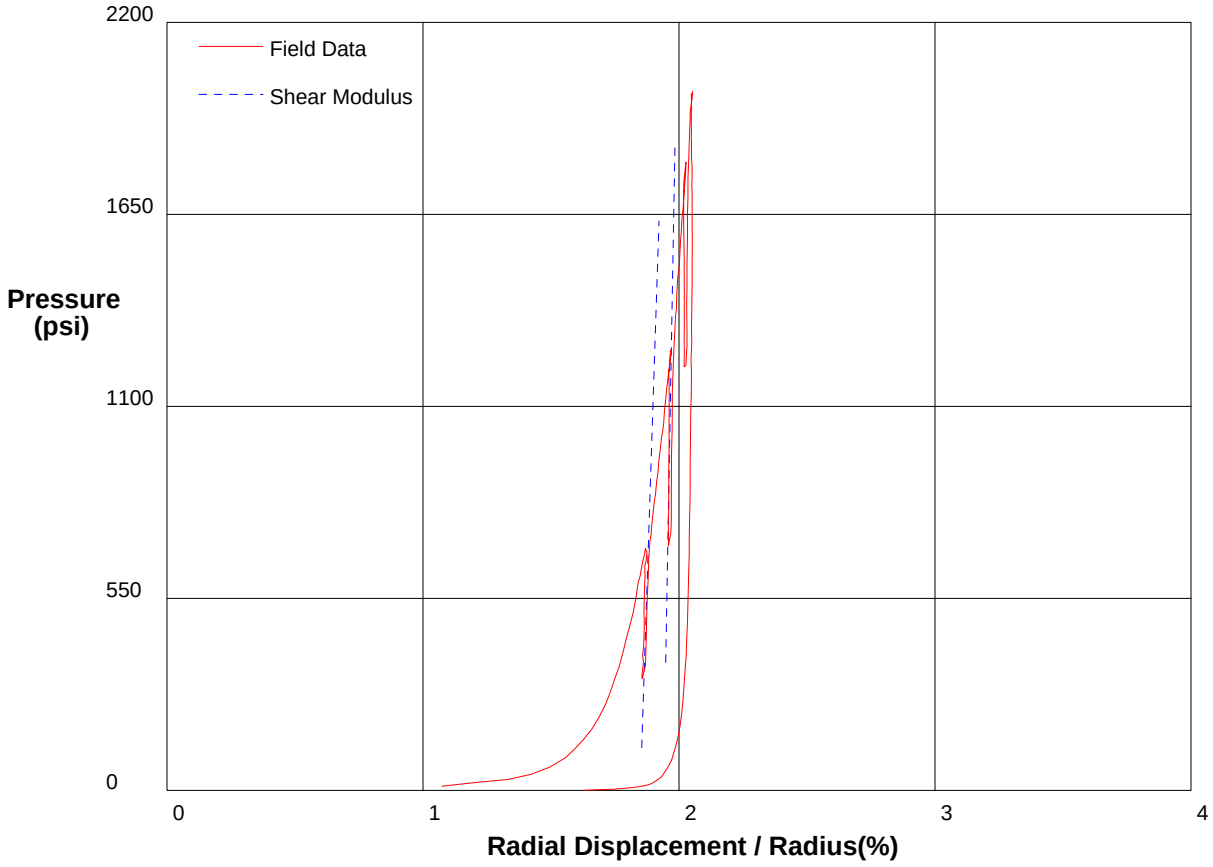
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 69ft** **File C:\DATA\ISE-843\I-90-11.P**



Shear Modulus 2037619 psi

Shear Modulus 1114102 psi

shift 1

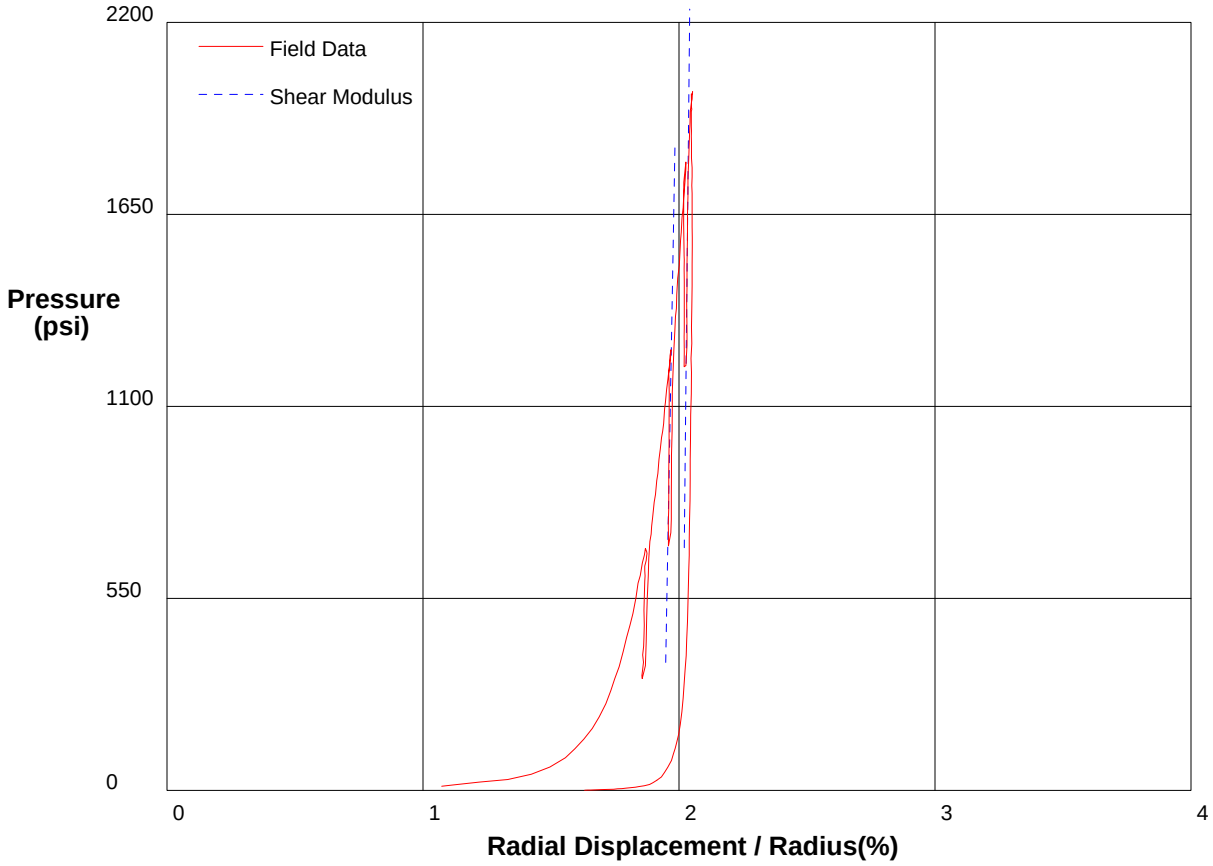
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 69ft** **File C:\DATA\ISE-843\I-90-11.P**



Shear Modulus 2037619 psi

Shear Modulus 3703333 psi

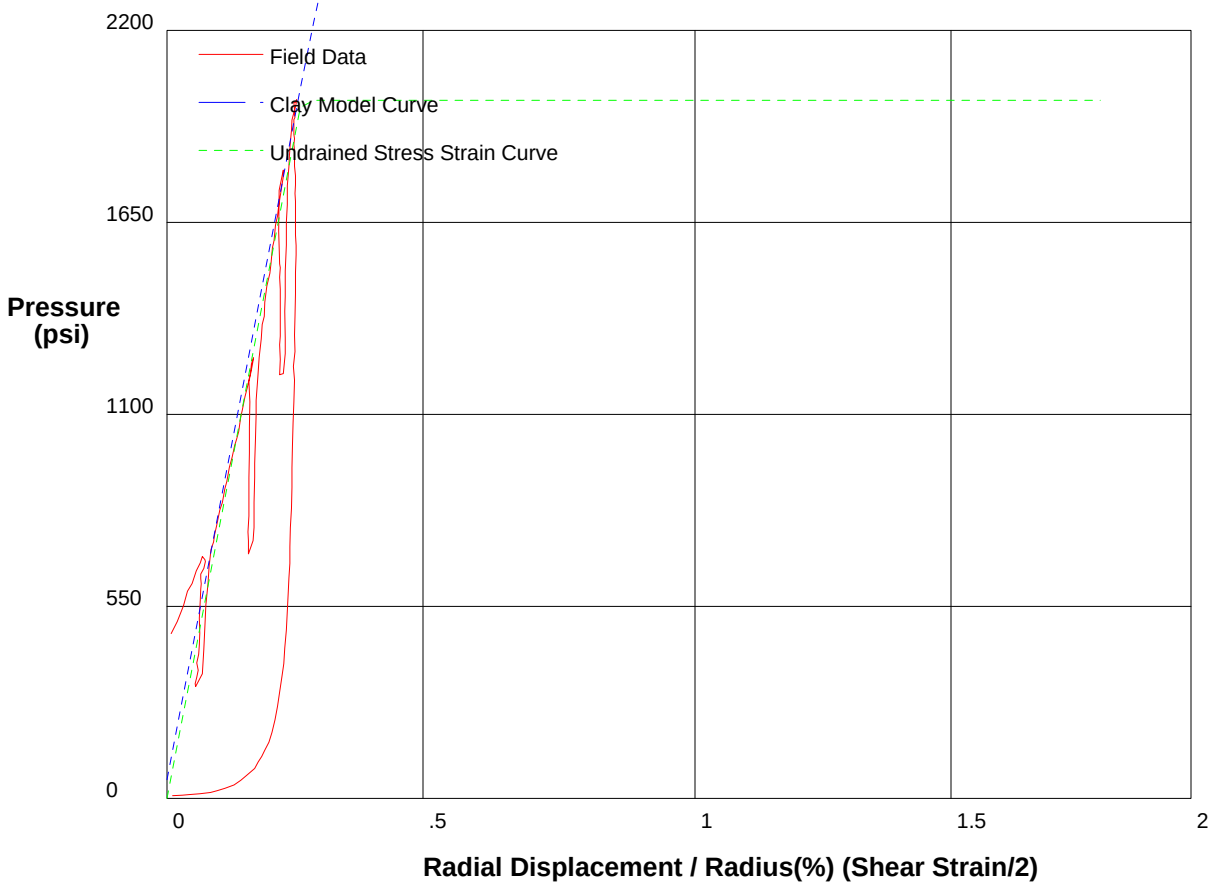
shift 1

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 69ft** **File C:\DATA\ISE-843\I-90-11.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**54**	**psi**
Shear Modulus	**380000**	**psi**

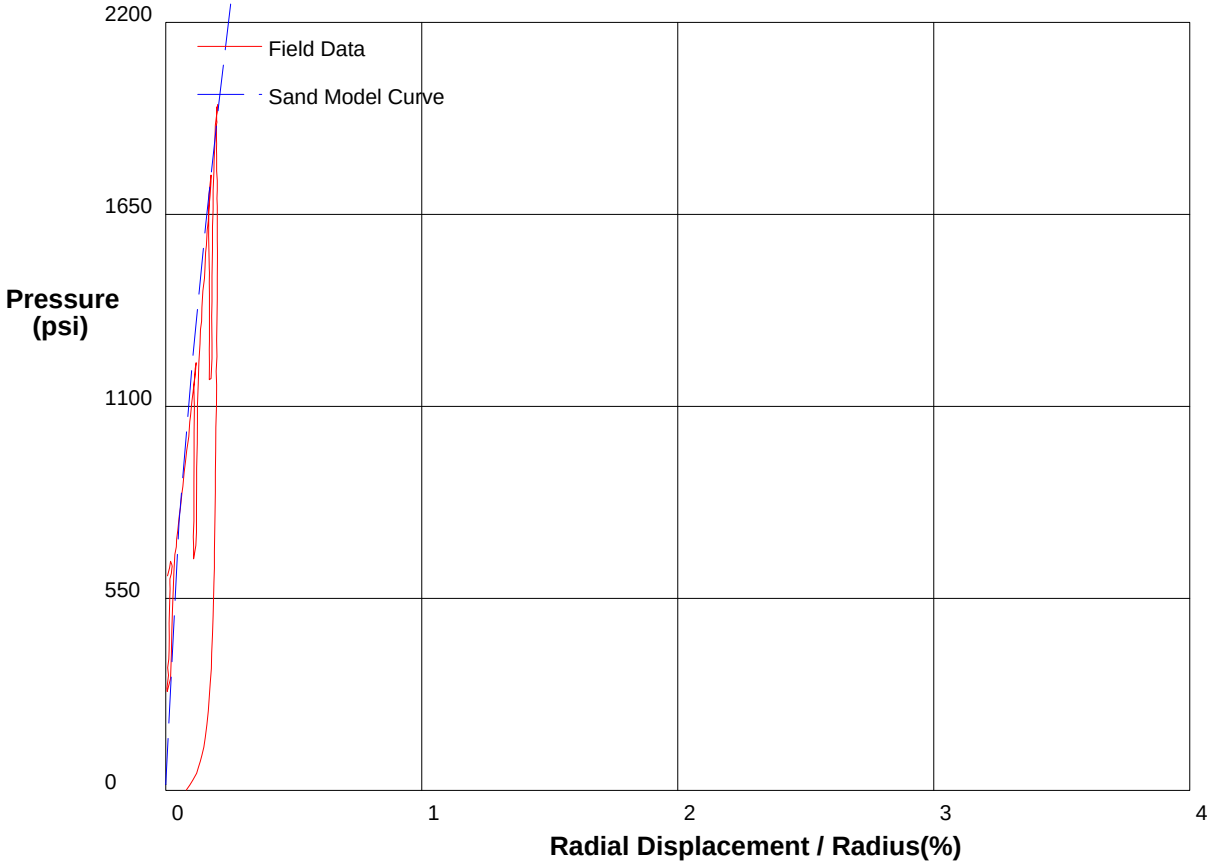
shift 2.8

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 69ft** **File C:\DATA\ISE-843\I-90-11.P**



THE HUGHES SAND MODEL

Water Pressure	**37 psi**
Friction Angle	**55 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**17 psi**
Shear Modulus	**1500000 psi**

shift 2.85

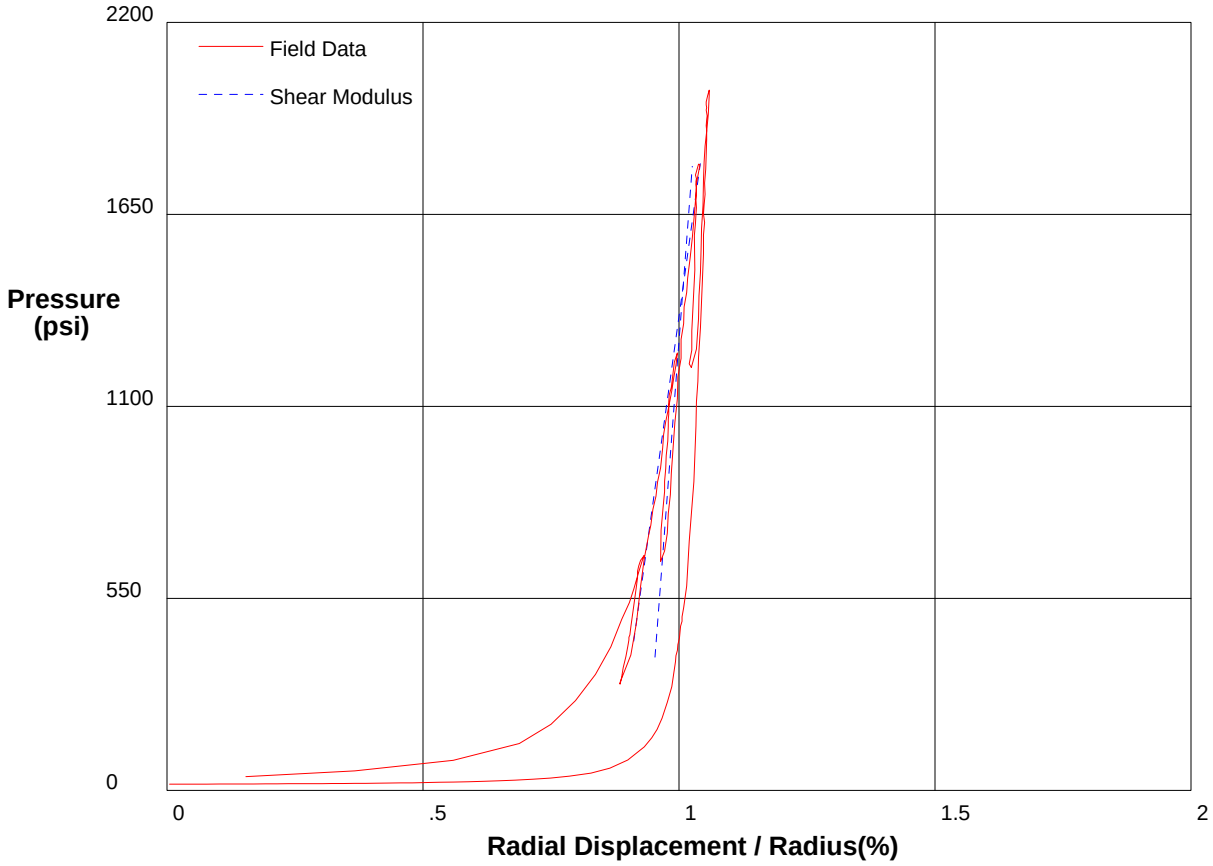
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 79ft** **File C:\DATA\ISE-843\I-90-12.P**



Shear Modulus 963809 psi

Shear Modulus 525066 psi

shift 3

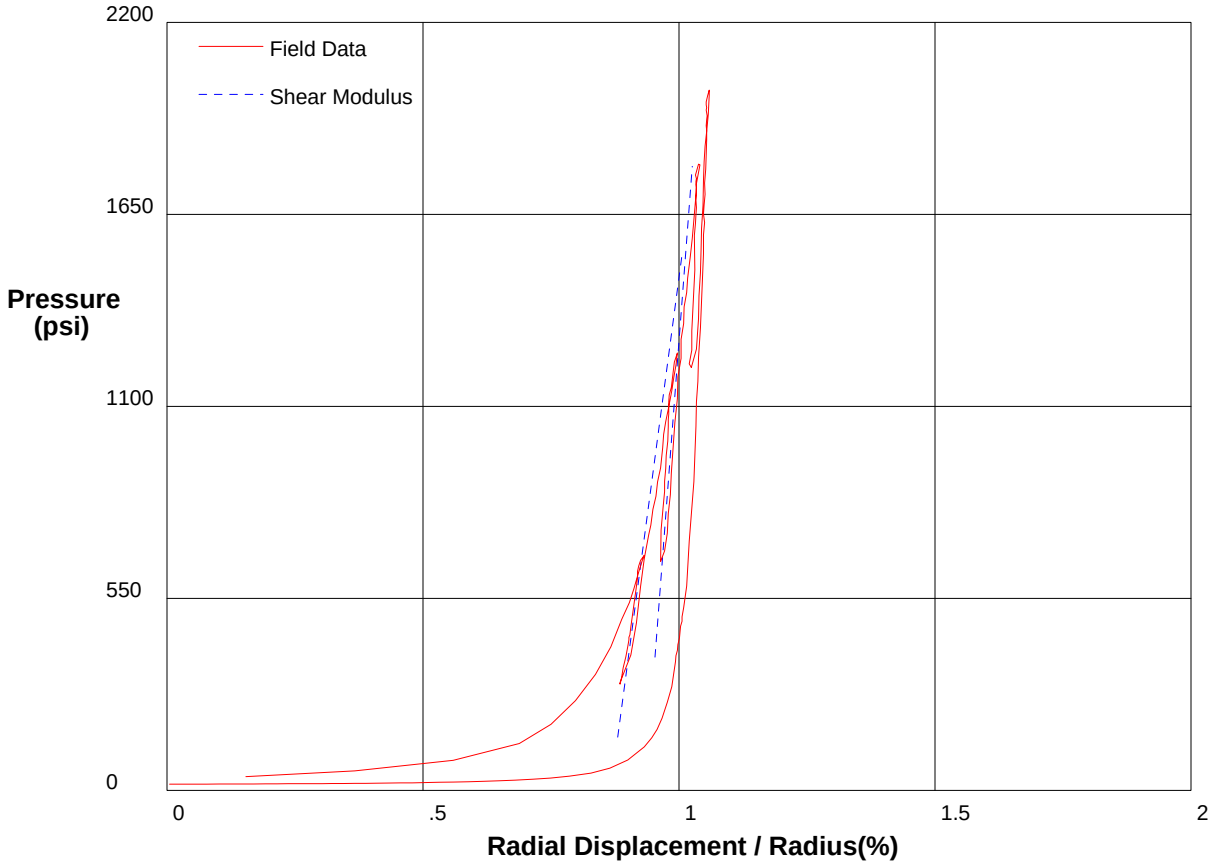
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 79ft** **File C:\DATA\ISE-843\I-90-12.P**



Shear Modulus 963809 psi

Shear Modulus 550000 psi

shift 3

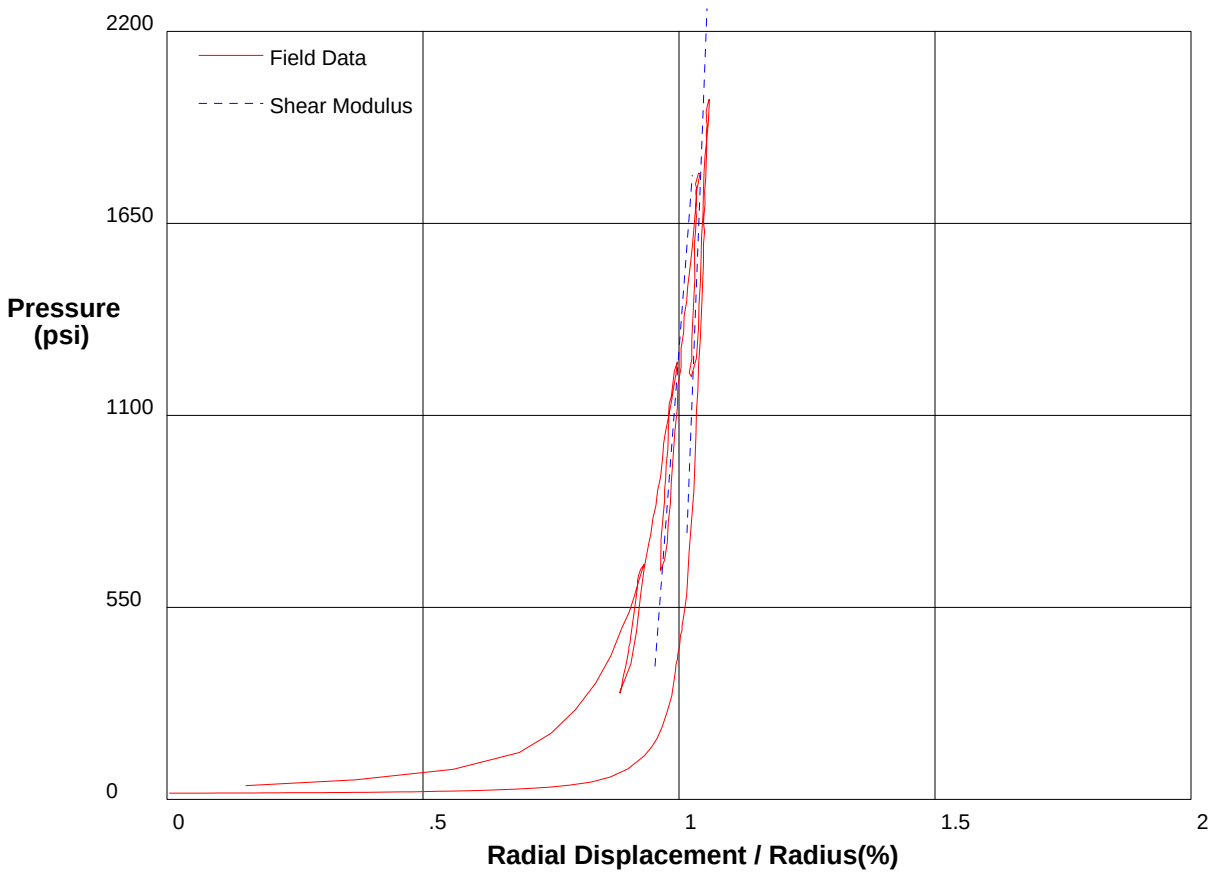
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 79ft** **File C:\DATA\ISE-843\I-90-12.P**



Shear Modulus 963809 psi

Shear Modulus 1921333 psi

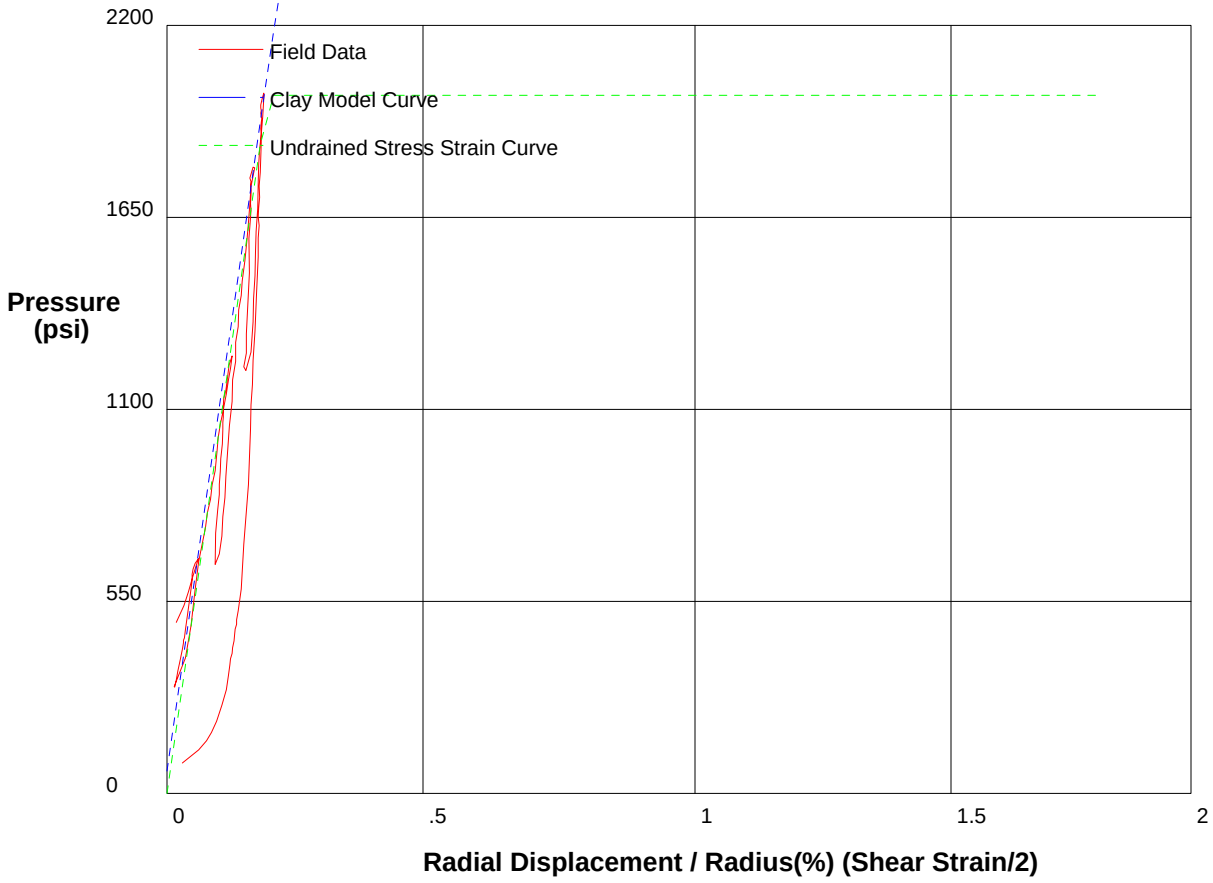
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 79ft** **File C:\DATA\ISE-843\I-90-12.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**64**	**psi**
Shear Modulus	**510000**	**psi**

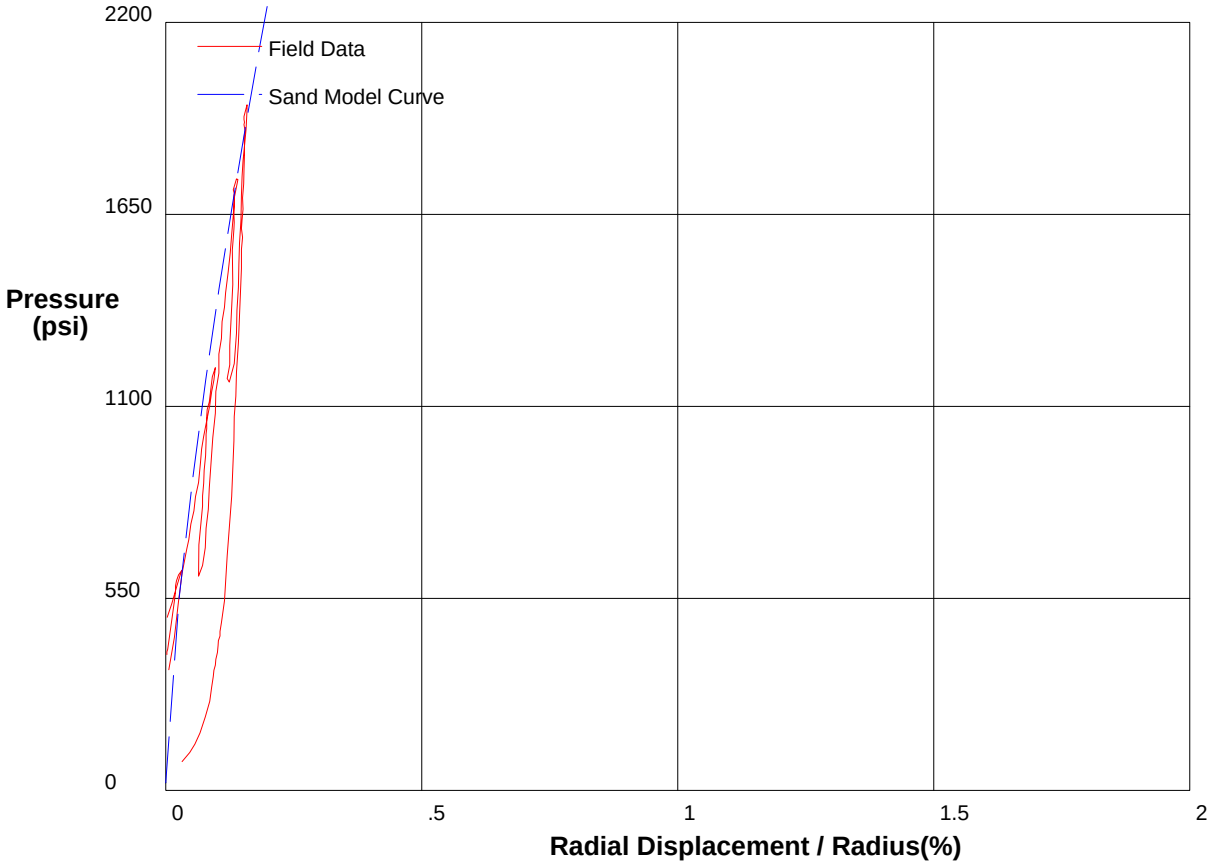
shift 3.87

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 79ft** **File C:\DATA\ISE-843\I-90-12.P**



THE HUGHES SAND MODEL

Water Pressure	**42 psi**
Friction Angle	**56 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**22 psi**
Shear Modulus	**1500000 psi**

shift 3.9

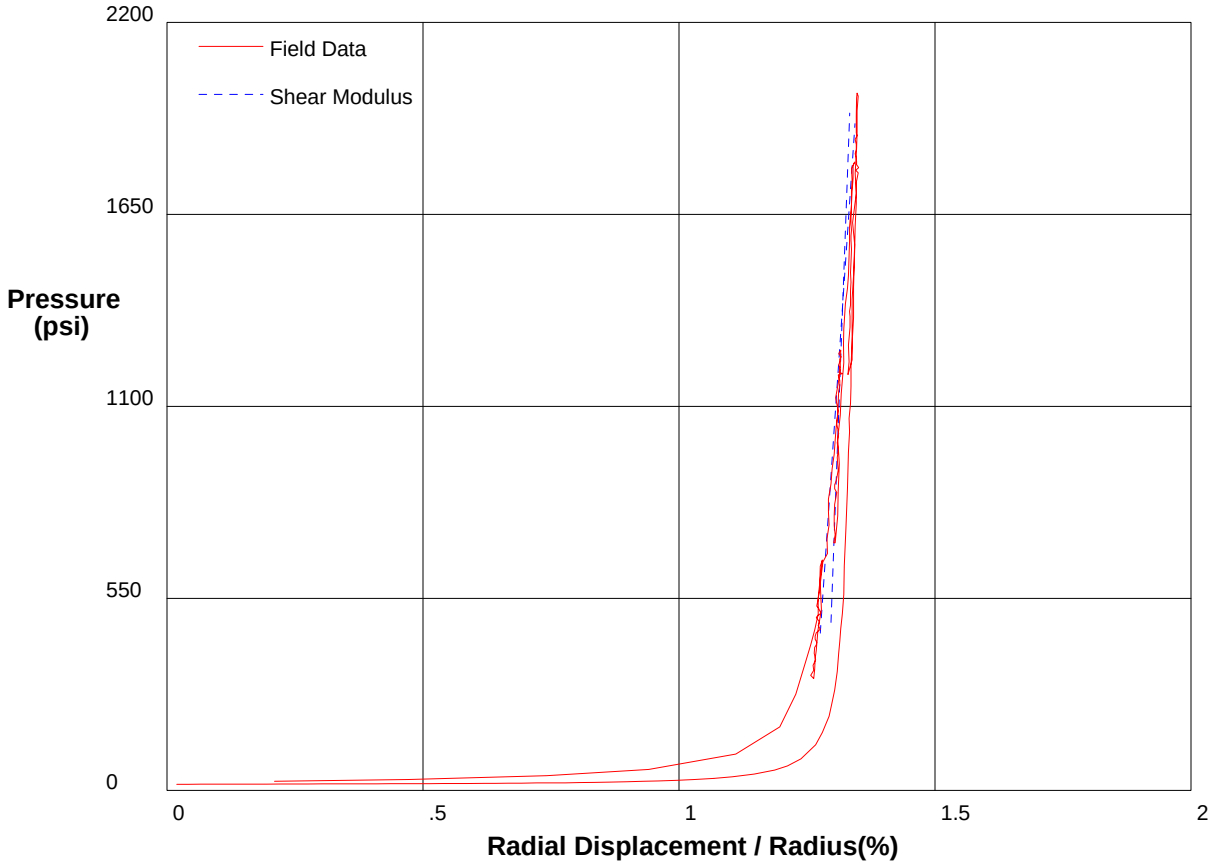
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 77.5ft** **File C:\DATA\ISE-843\I-90-13.P**



Shear Modulus 2000952 psi

Shear Modulus 1077436 psi

shift 3

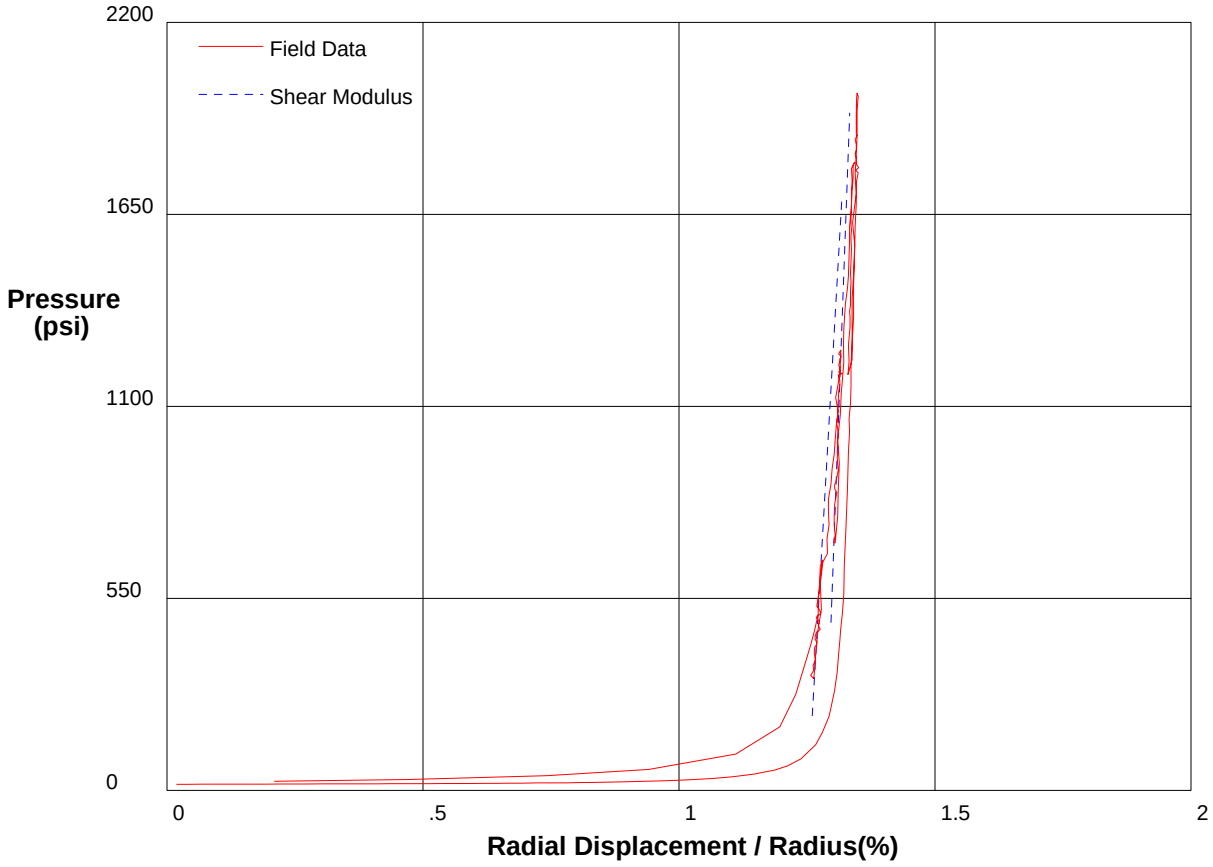
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 77.5ft** **File C:\DATA\ISE-843\I-90-13.P**



Shear Modulus 2000952 psi

Shear Modulus 1286666 psi

shift 3

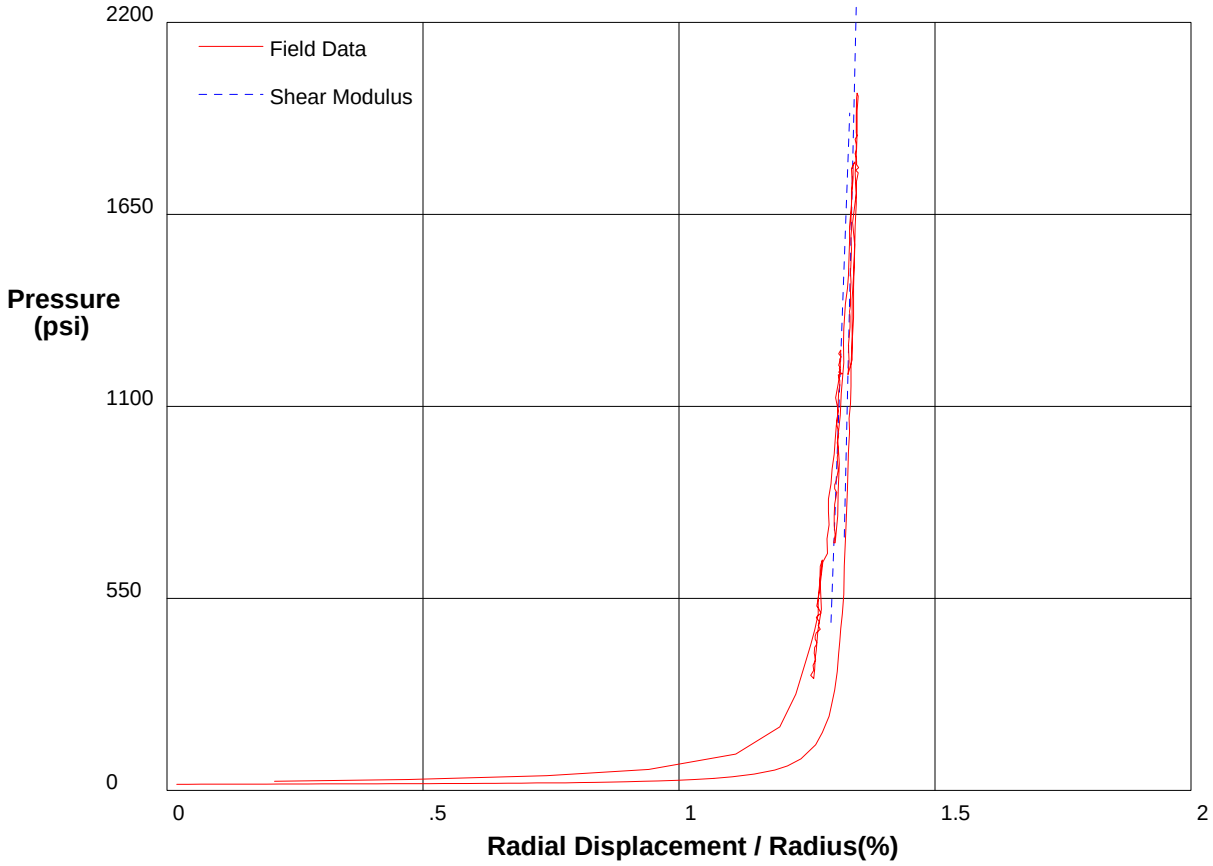
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 77.5ft** **File C:\DATA\ISE-843\I-90-13.P**



Shear Modulus 2000952 psi

Shear Modulus 3251111 psi

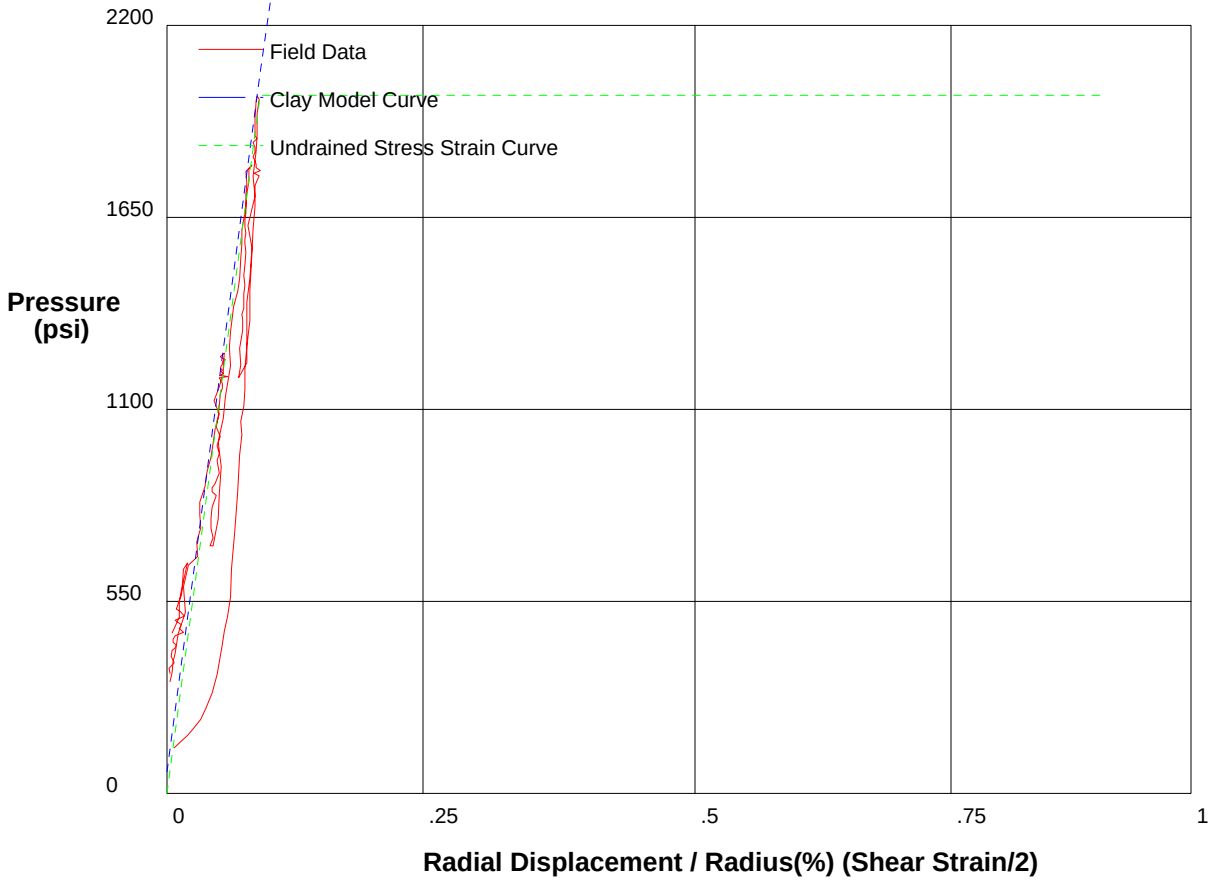
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 77.5ft** **File C:\DATA\ISE-843\I-90-13.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**62**	**psi**
Shear Modulus	**1100000**	**psi**

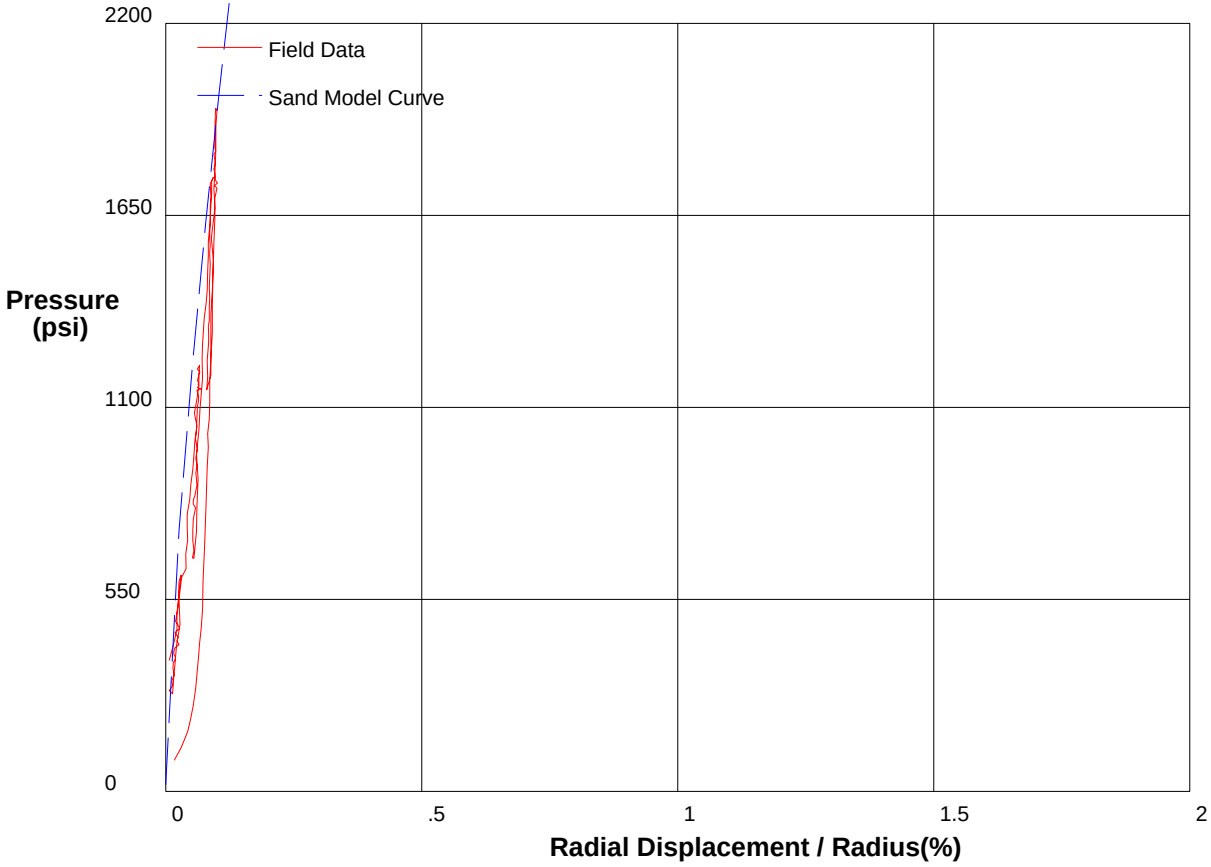
shift 4.26

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 77.5ft** **File C:\DATA\ISE-843\I-90-13.P**



THE HUGHES SAND MODEL

Water Pressure	**41 psi**
Friction Angle	**57 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**21 psi**
Shear Modulus	**2200000 psi**

shift 4.25

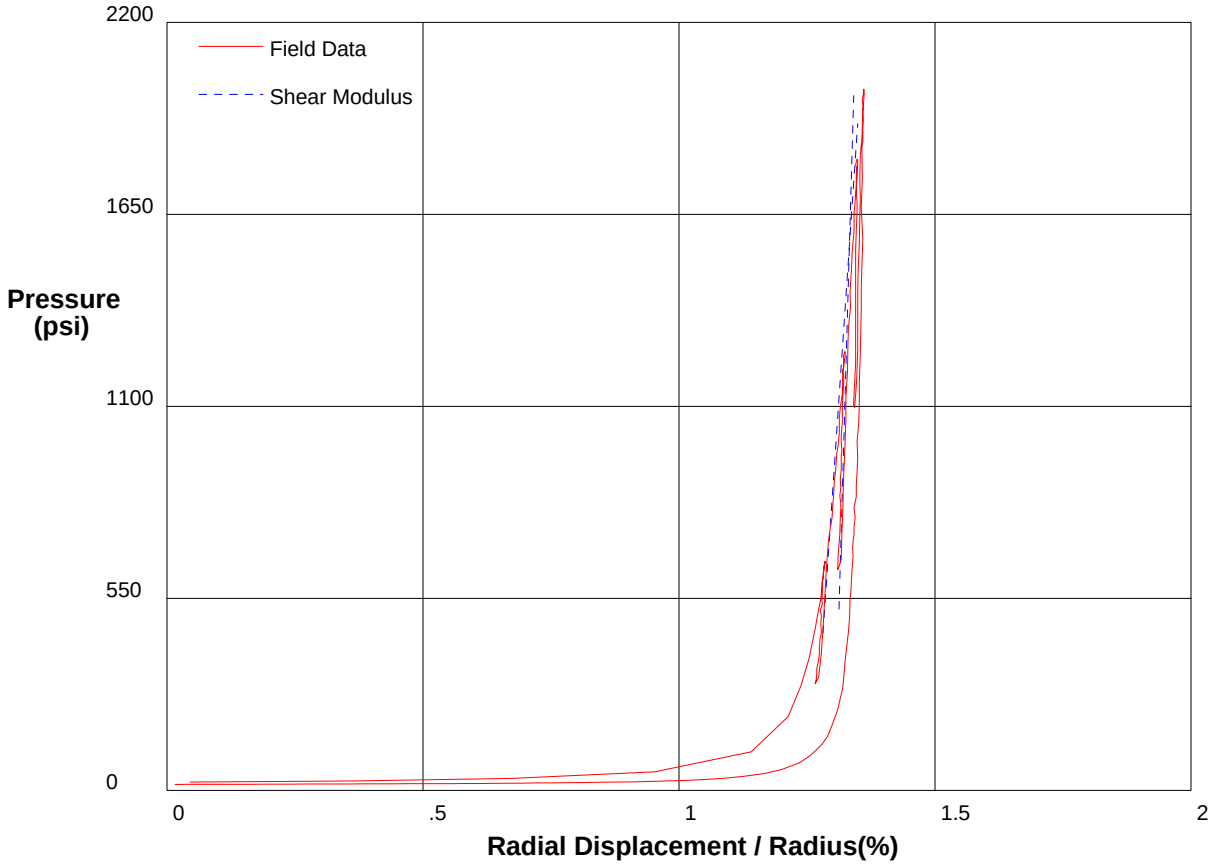
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 76ft** **File C:\DATA\ISE-843\I-90-14.P**



Shear Modulus 2566666 psi

Shear Modulus 1077436 psi

shift 3

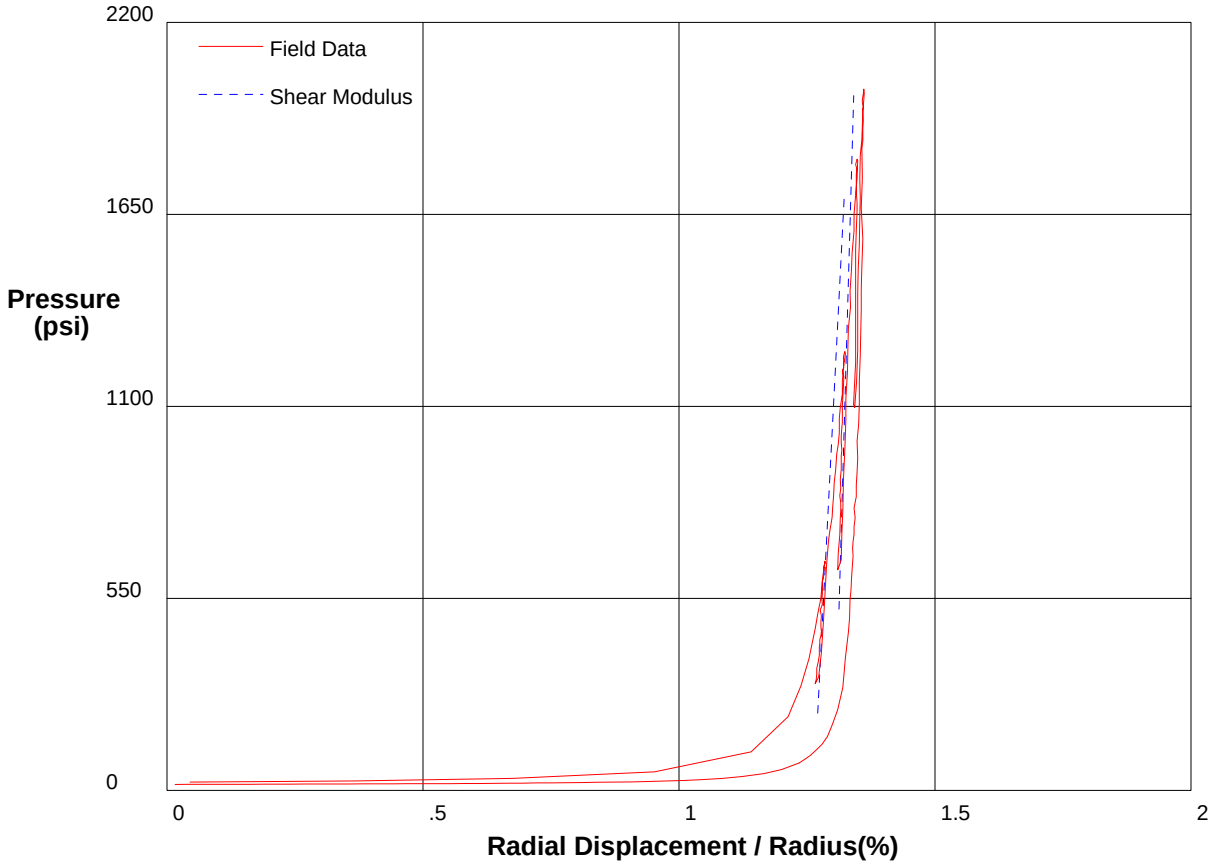
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 76ft** **File C:\DATA\ISE-843\I-90-14.P**



Shear Modulus 2566666 psi

Shear Modulus 1422666 psi

shift 3

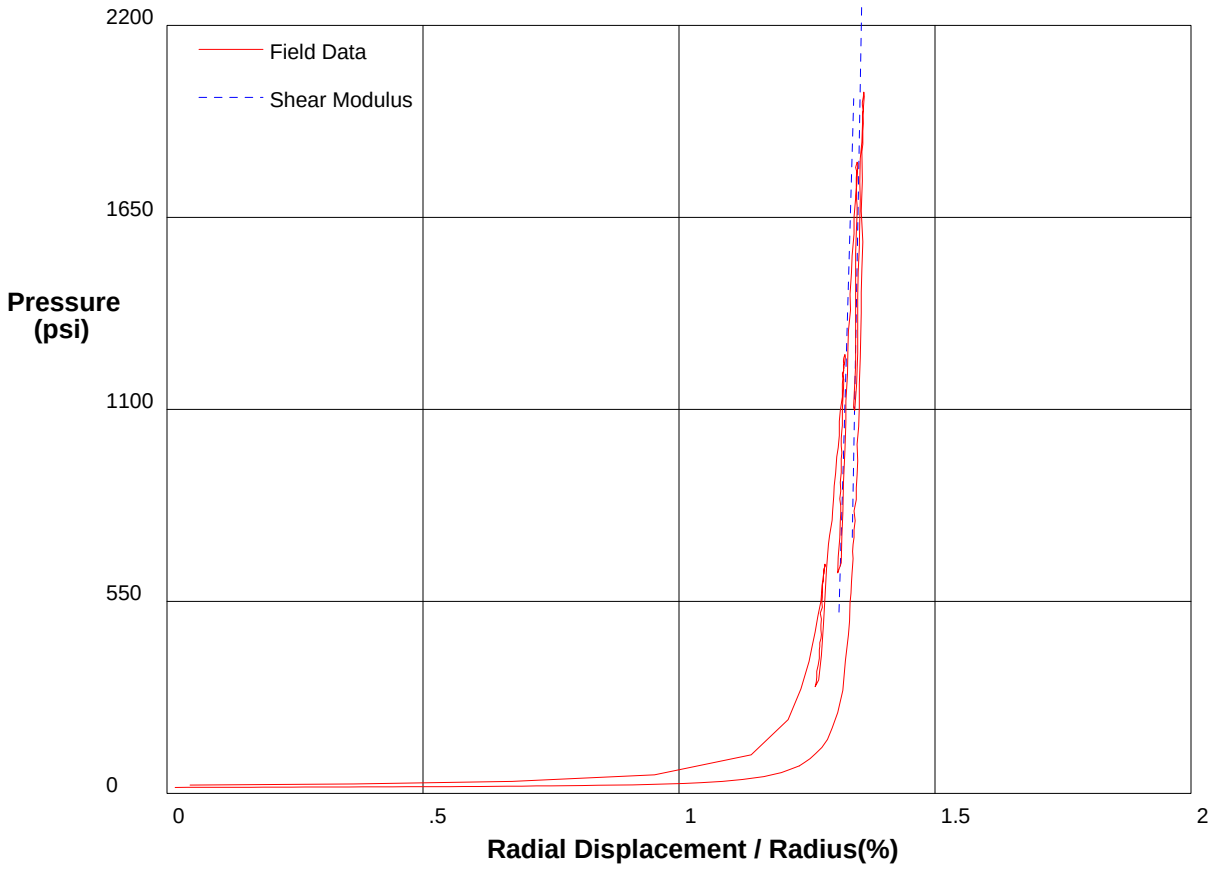
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 76ft** **File C:\DATA\ISE-843\I-90-14.P**



Shear Modulus 2566666 psi

Shear Modulus 4200952 psi

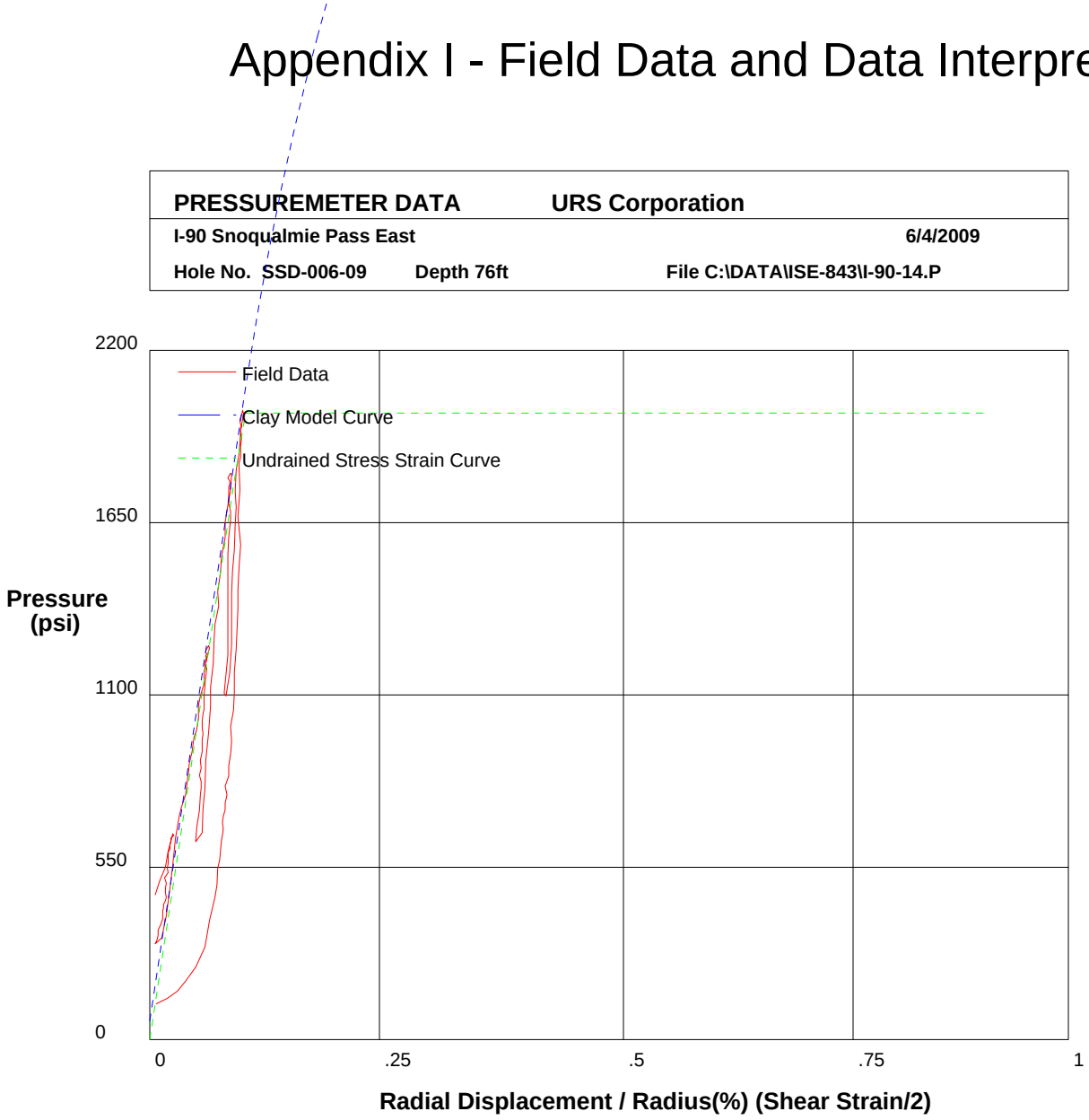
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 76ft** **File C:\DATA\ISE-843\I-90-14.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**60**	**psi**
Shear Modulus	**970000**	**psi**

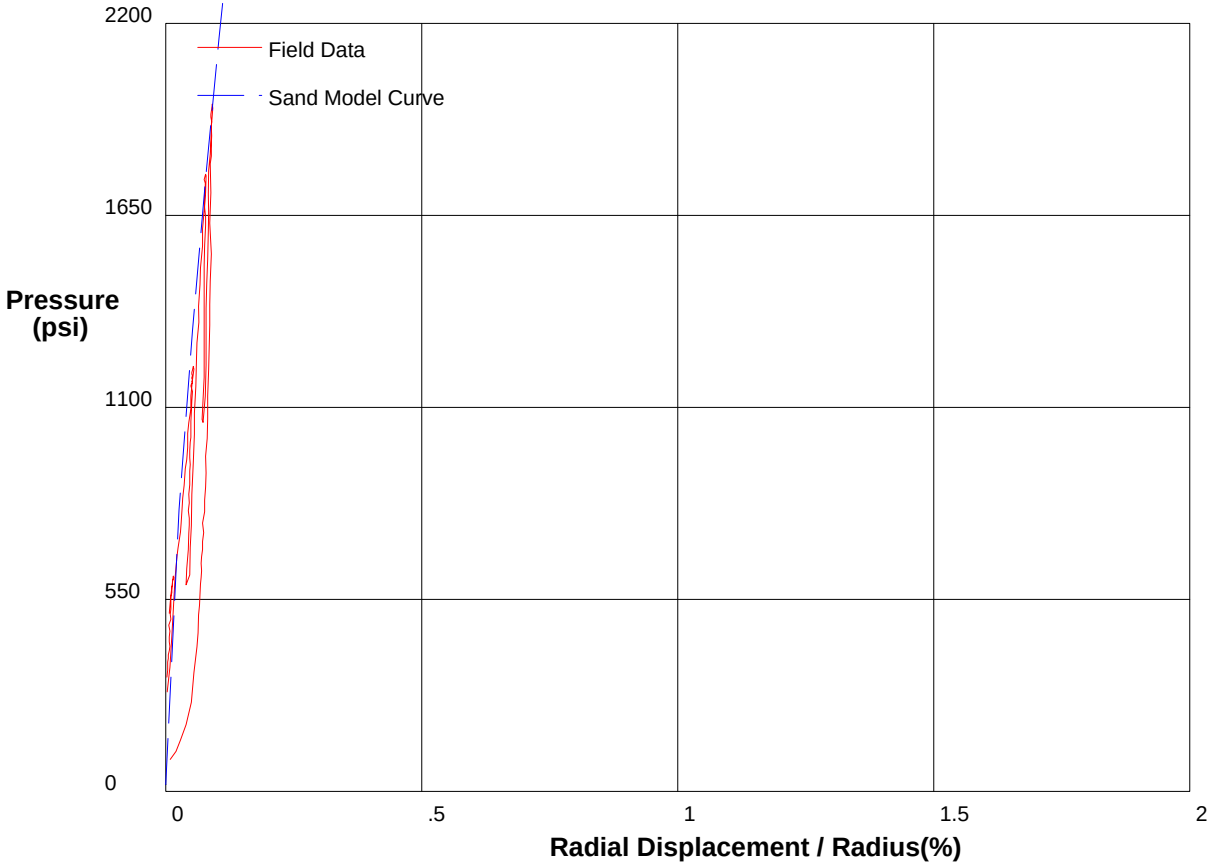
shift 4.26

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/4/2009**

Hole No. SSD-006-09 **Depth 76ft** **File C:\DATA\ISE-843\I-90-14.P**



THE HUGHES SAND MODEL

Water Pressure	**40 psi**
Friction Angle	**57 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**20 psi**
Shear Modulus	**2500000 psi**

shift 4.27

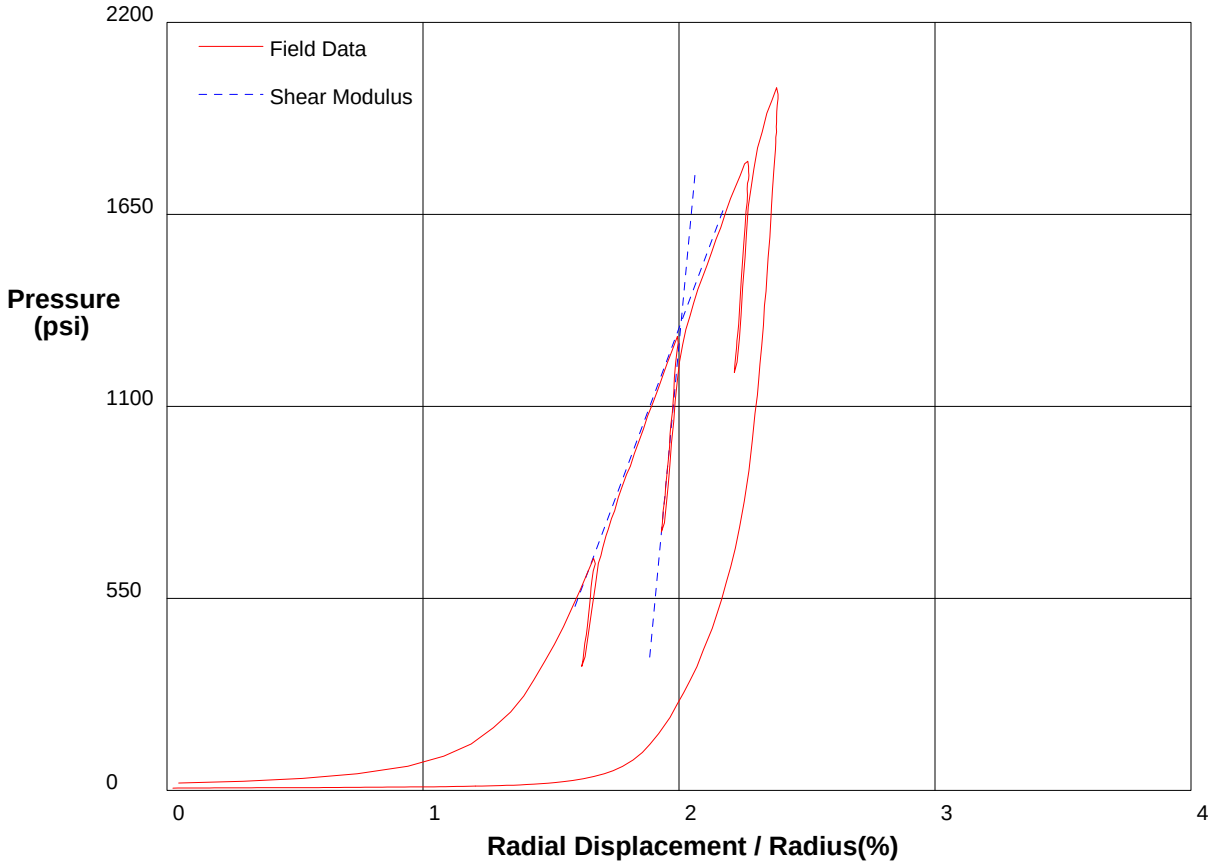
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 54ft** **File C:\DATA\ISE-843\I-90-15.P**



Shear Modulus 390392 psi

Shear Modulus 98108 psi

shift 2

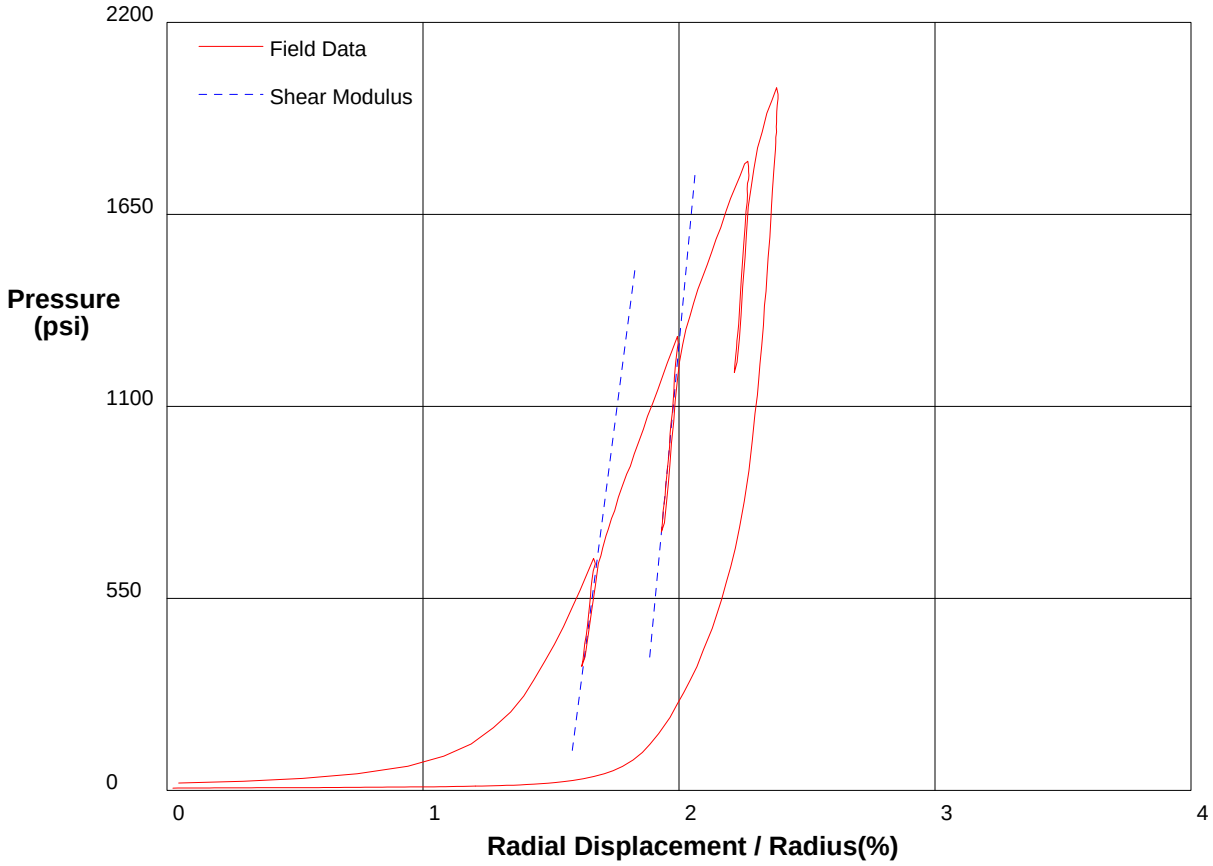
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 54ft** **File C:\DATA\ISE-843\I-90-15.P**



Shear Modulus 390392 psi

Shear Modulus 281631 psi

shift 2

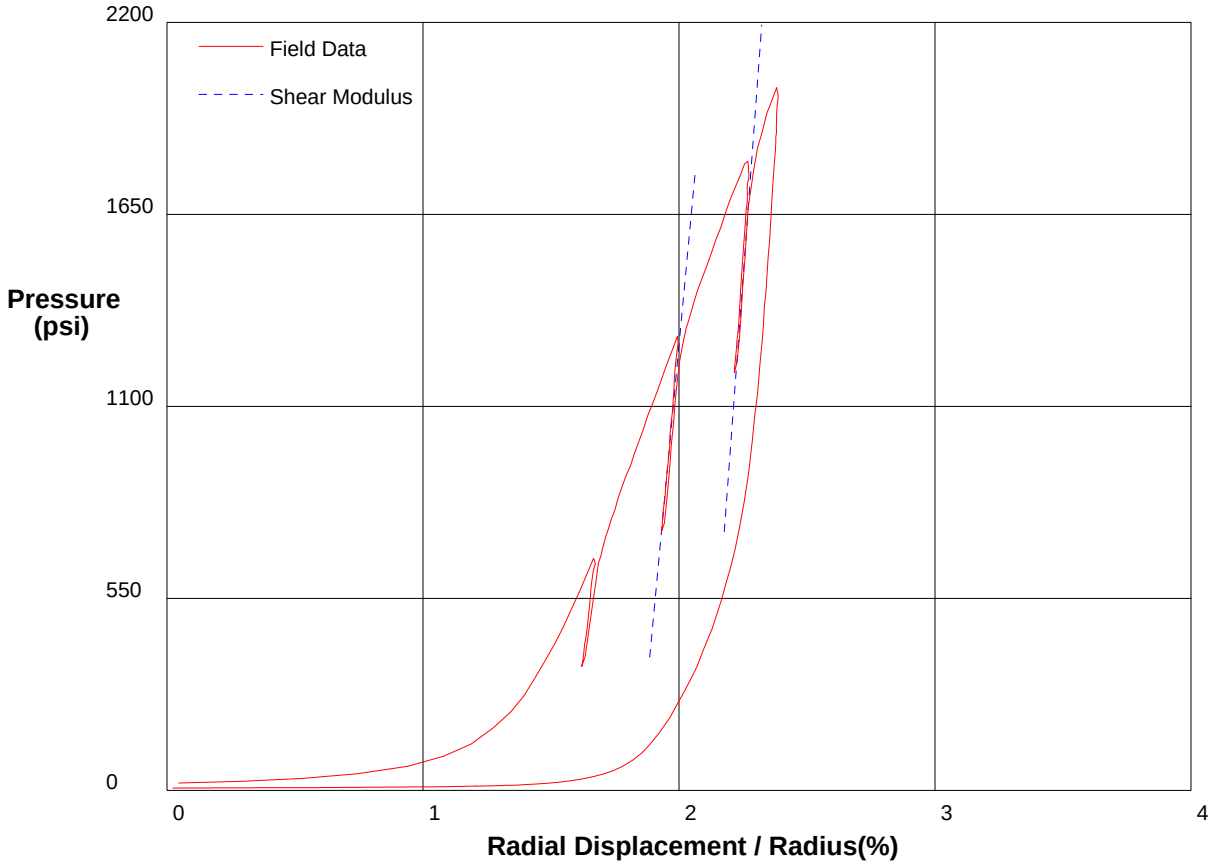
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 54ft** **File C:\DATA\ISE-843\I-90-15.P**



Shear Modulus 390392 psi

Shear Modulus 497619 psi

shift 2

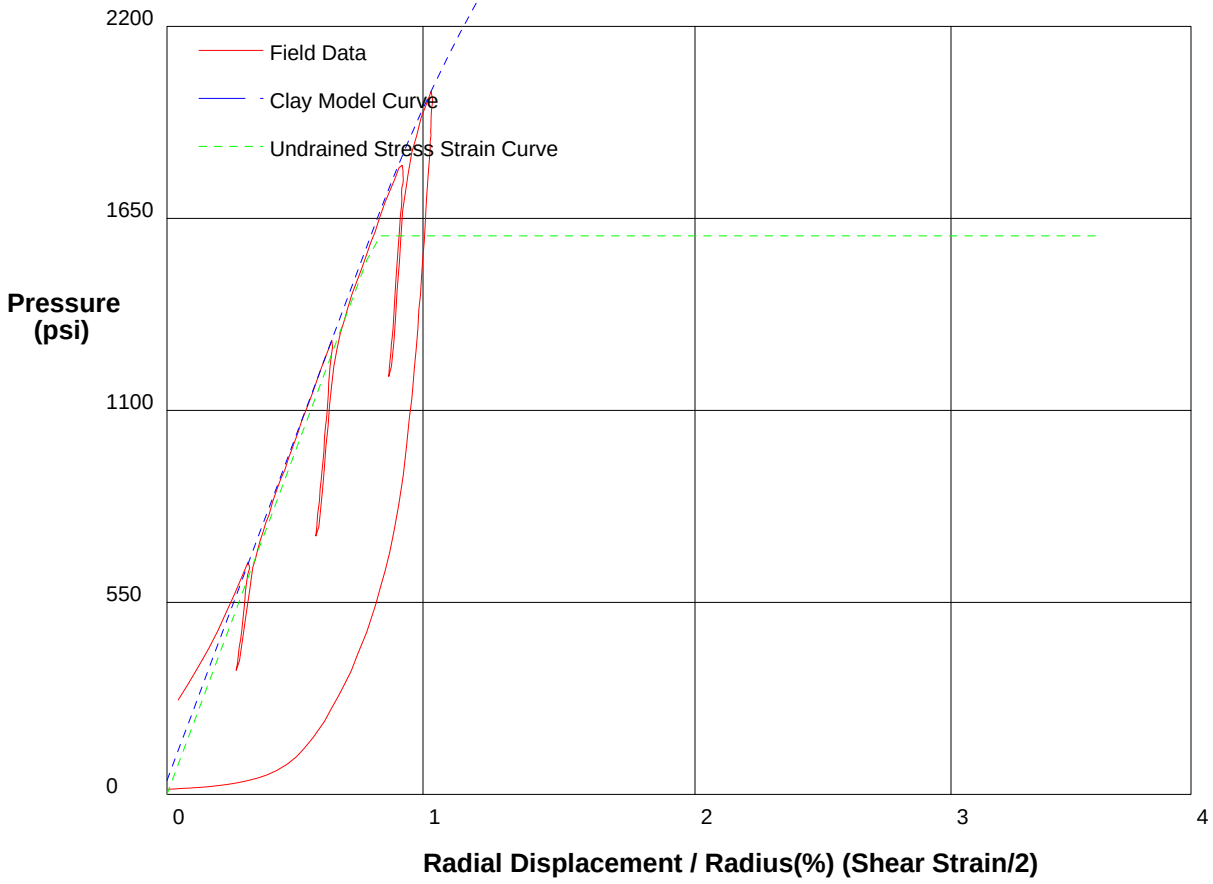
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 54ft** **File C:\DATA\ISE-843\I-90-15.P**



GIBSON'S CLAY MODEL

Shear Strength	**1600**	**psi**
Insitu Stress	**40**	**psi**
Shear Modulus	**98000**	**psi**

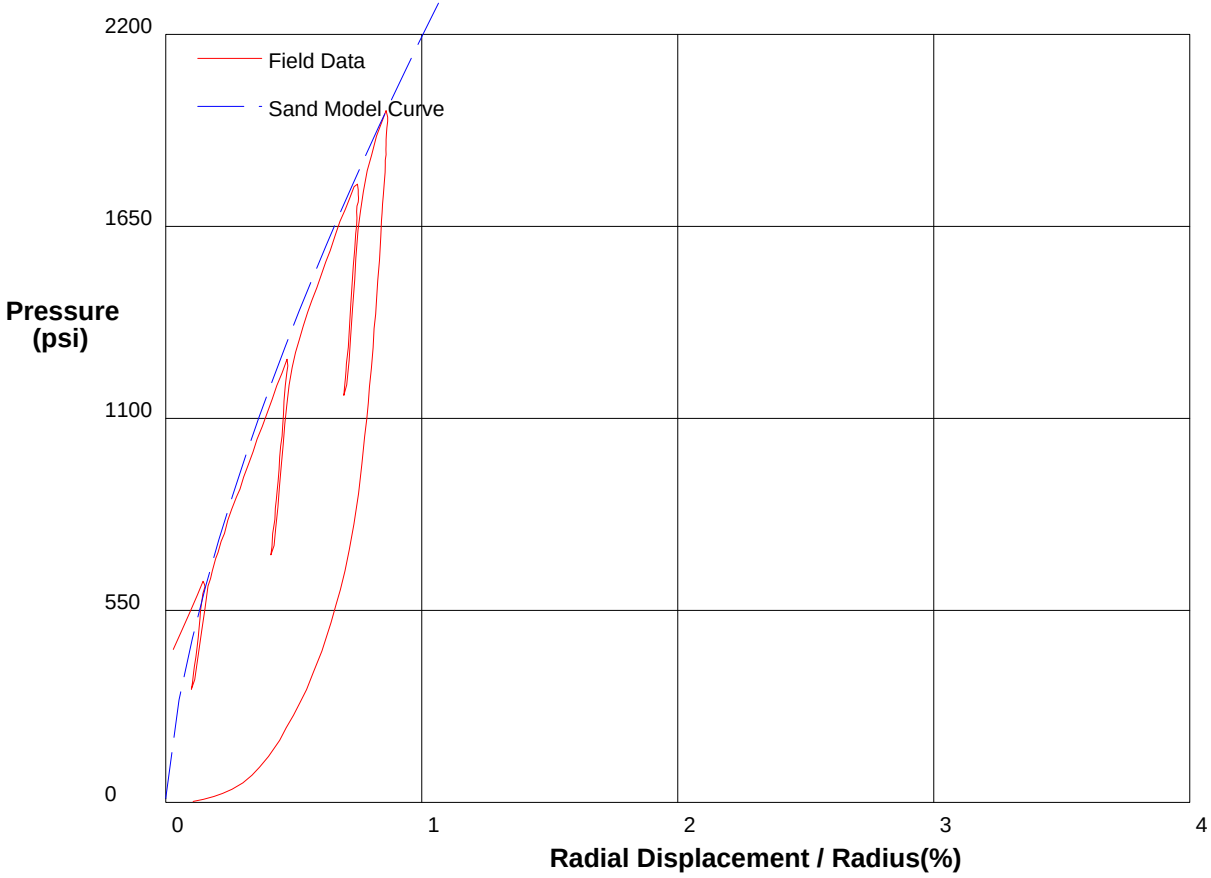
shift 3.35

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 54ft** **File C:\DATA\ISE-843\I-90-15.P**



THE HUGHES SAND MODEL

Water Pressure	**31 psi**
Friction Angle	**55 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**12 psi**
Shear Modulus	**430000 psi**

shift 3.52

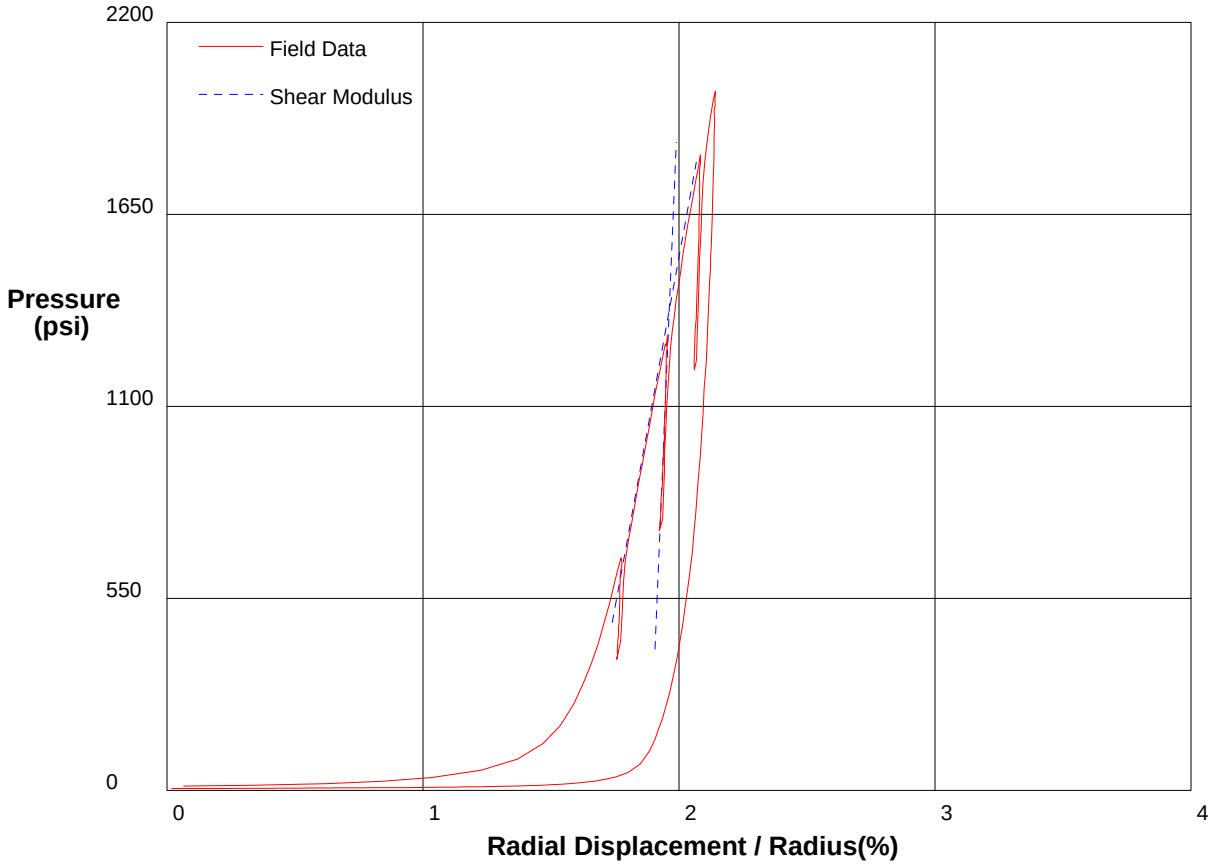
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 52ft** **File C:\DATA\ISE-843\I-90-16.P**



Shear Modulus 870833 psi

Shear Modulus 200793 psi

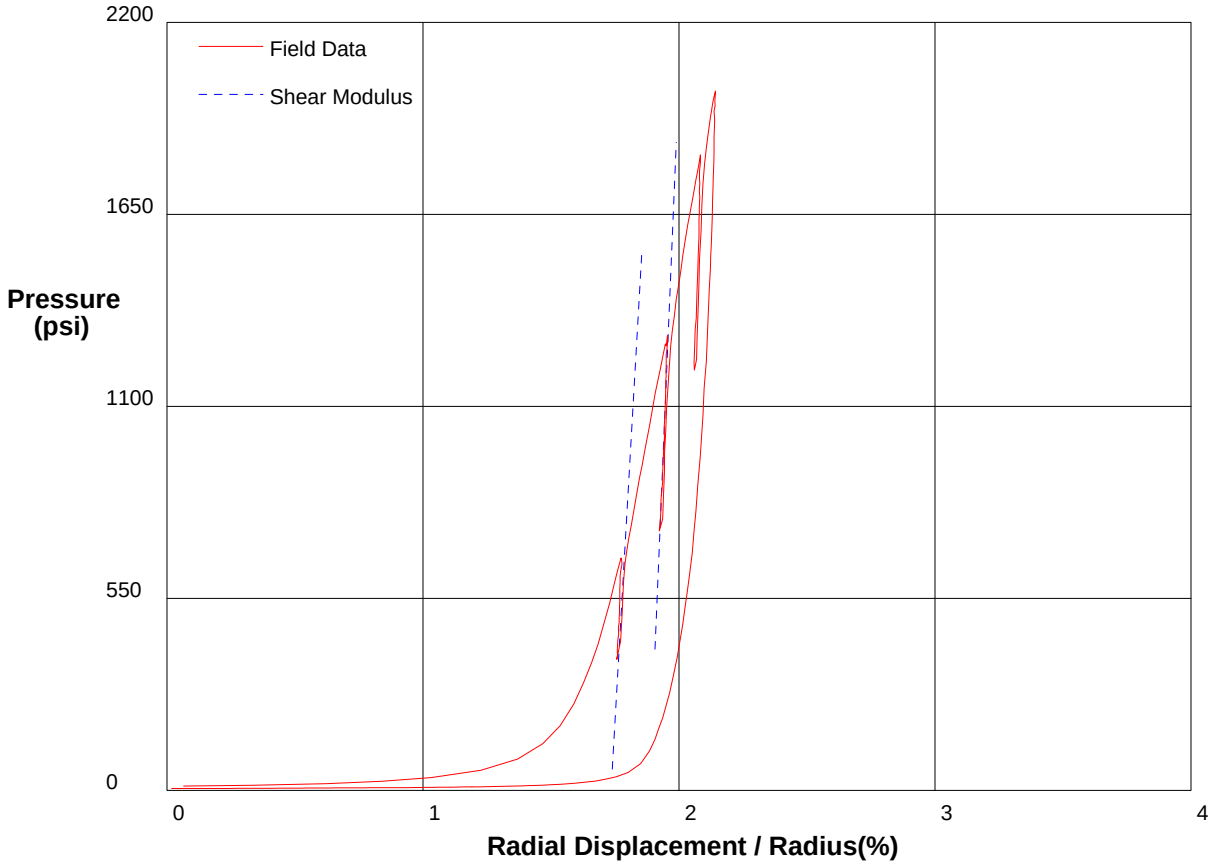
shift 2

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 52ft** **File C:\DATA\ISE-843\I-90-16.P**



Shear Modulus 870833 psi

Shear Modulus 643333 psi

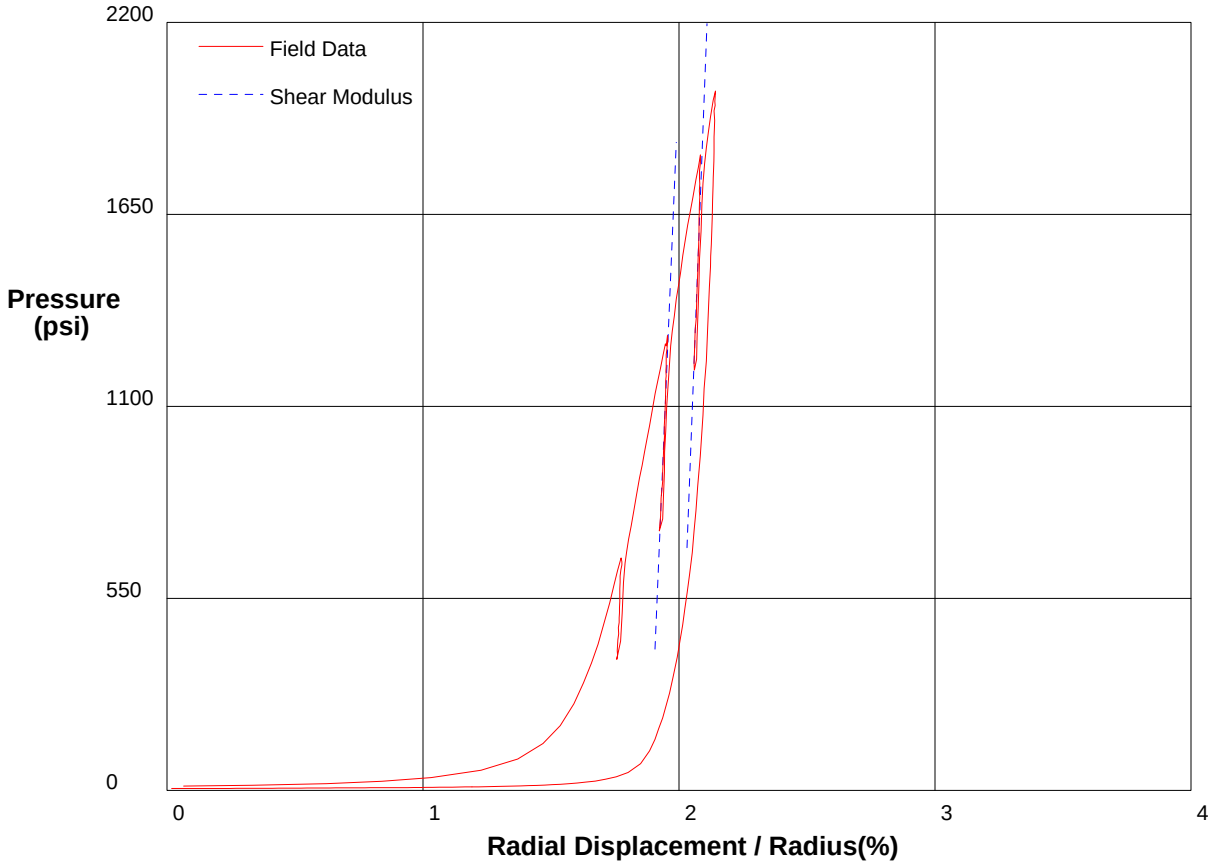
shift 2

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 52ft** **File C:\DATA\ISE-843\I-90-16.P**



Shear Modulus 870833 psi

Shear Modulus 960666 psi

shift 2

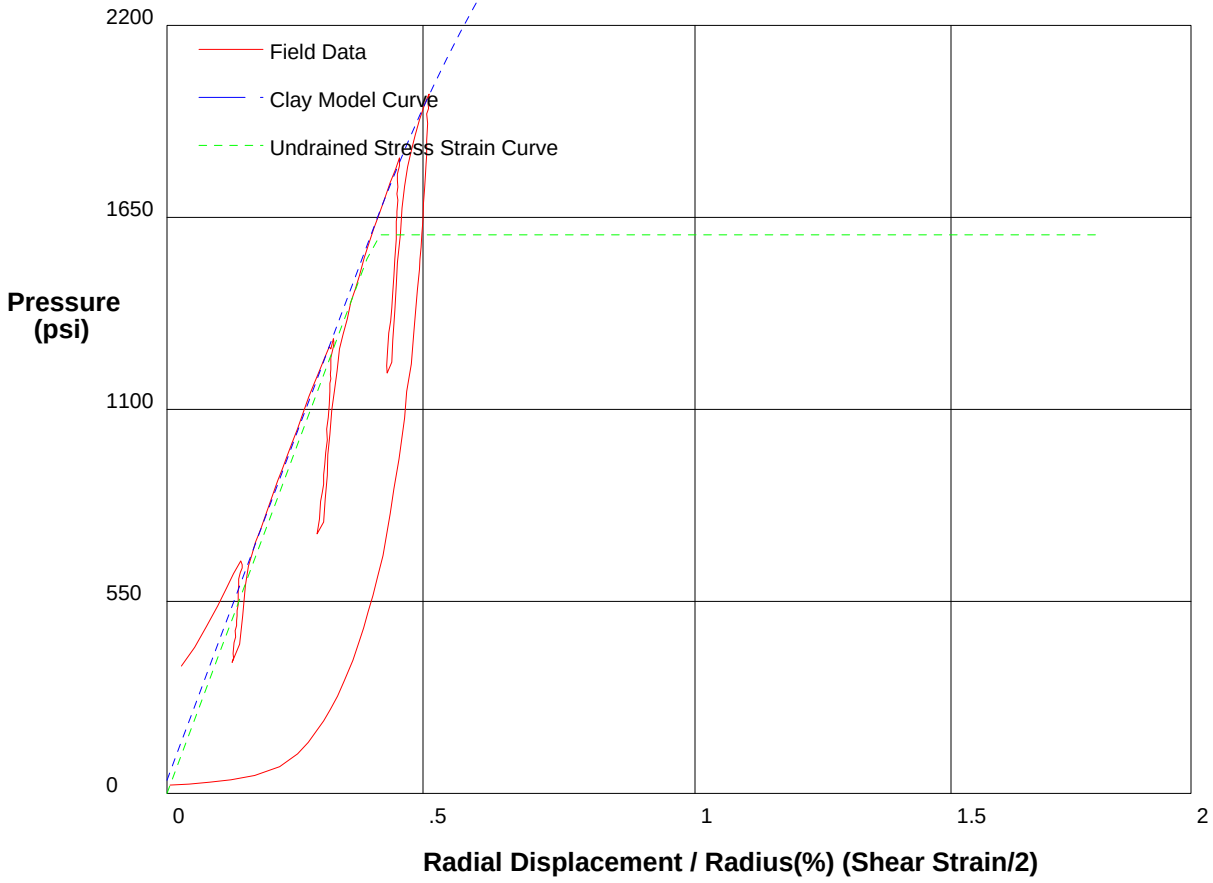
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 52ft** **File C:\DATA\ISE-843\I-90-16.P**



GIBSON'S CLAY MODEL

Shear Strength	**1600**	**psi**
Insitu Stress	**38**	**psi**
Shear Modulus	**196000**	**psi**

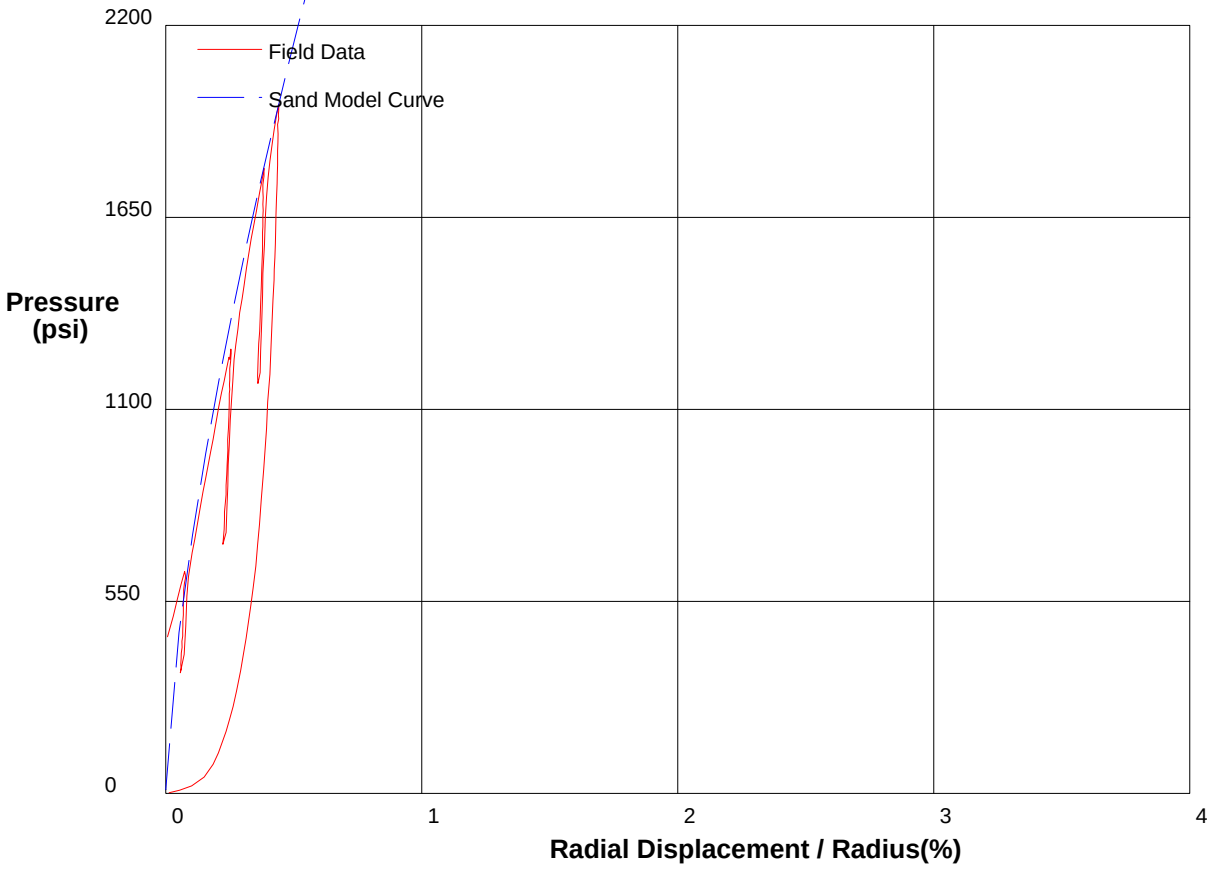
shift 3.63

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 52ft** **File C:\DATA\ISE-843\I-90-16.P**



THE HUGHES SAND MODEL

Water Pressure	**30 psi**
Friction Angle	**55 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**11 psi**
Shear Modulus	**870000 psi**

shift 3.7

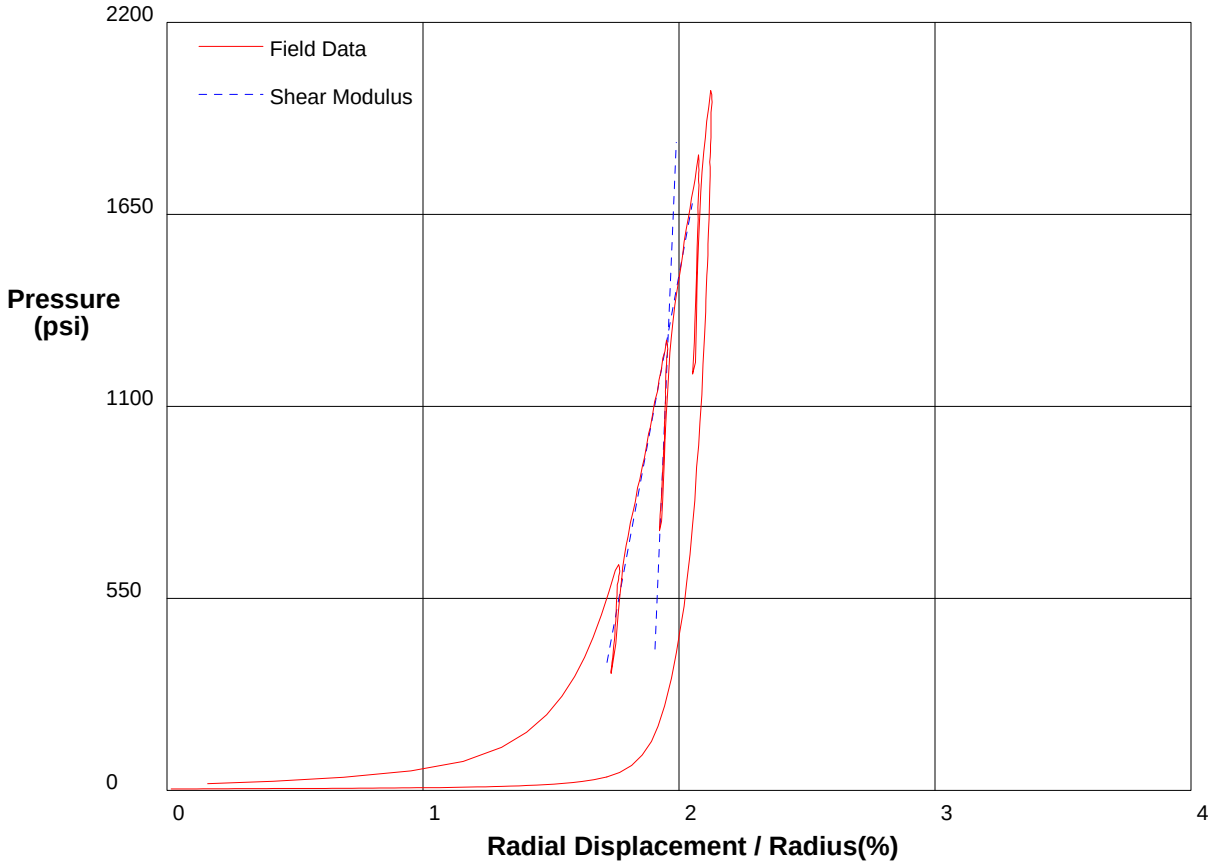
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 50ft** **File C:\DATA\ISE-843\I-90-17.P**



Shear Modulus 870833 psi

Shear Modulus 197083 psi

shift 2

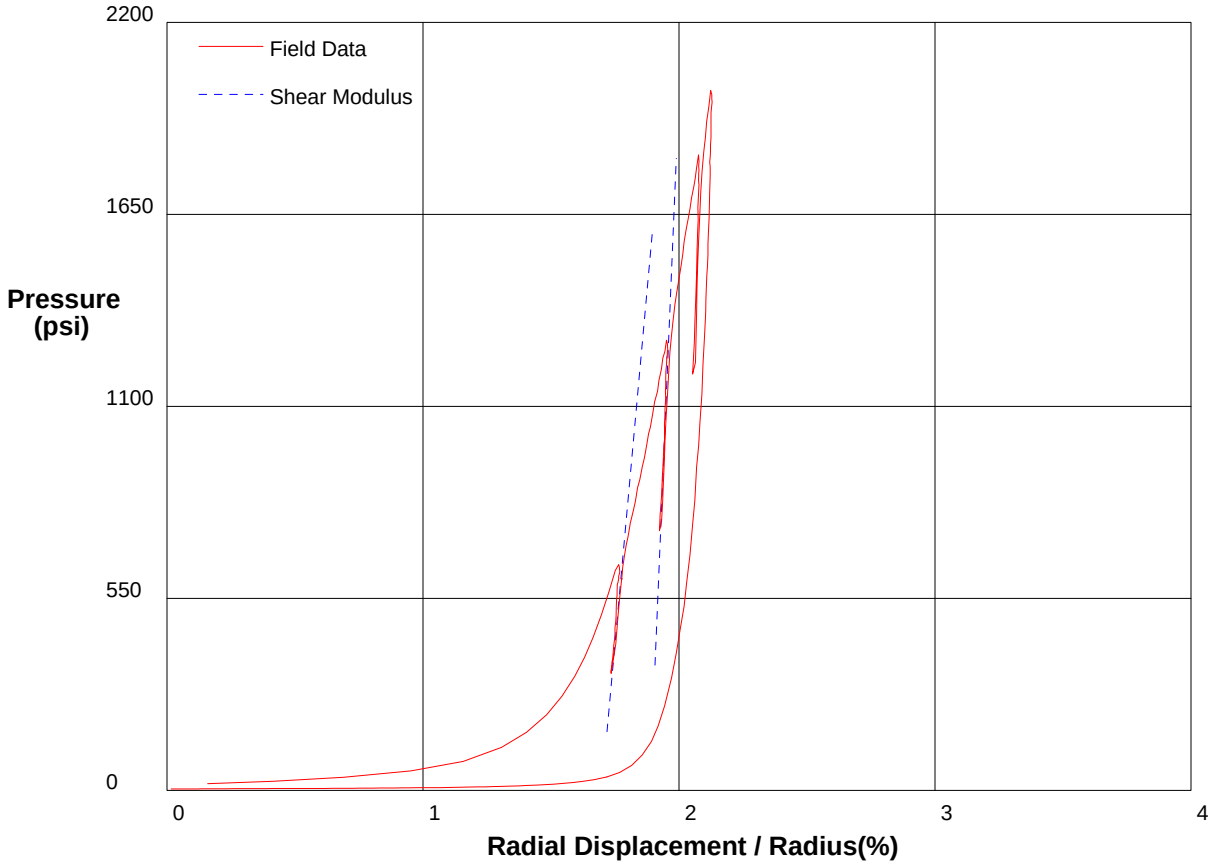
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 50ft** **File C:\DATA\ISE-843\I-90-17.P**



Shear Modulus 870833 psi

Shear Modulus 403333 psi

shift 2

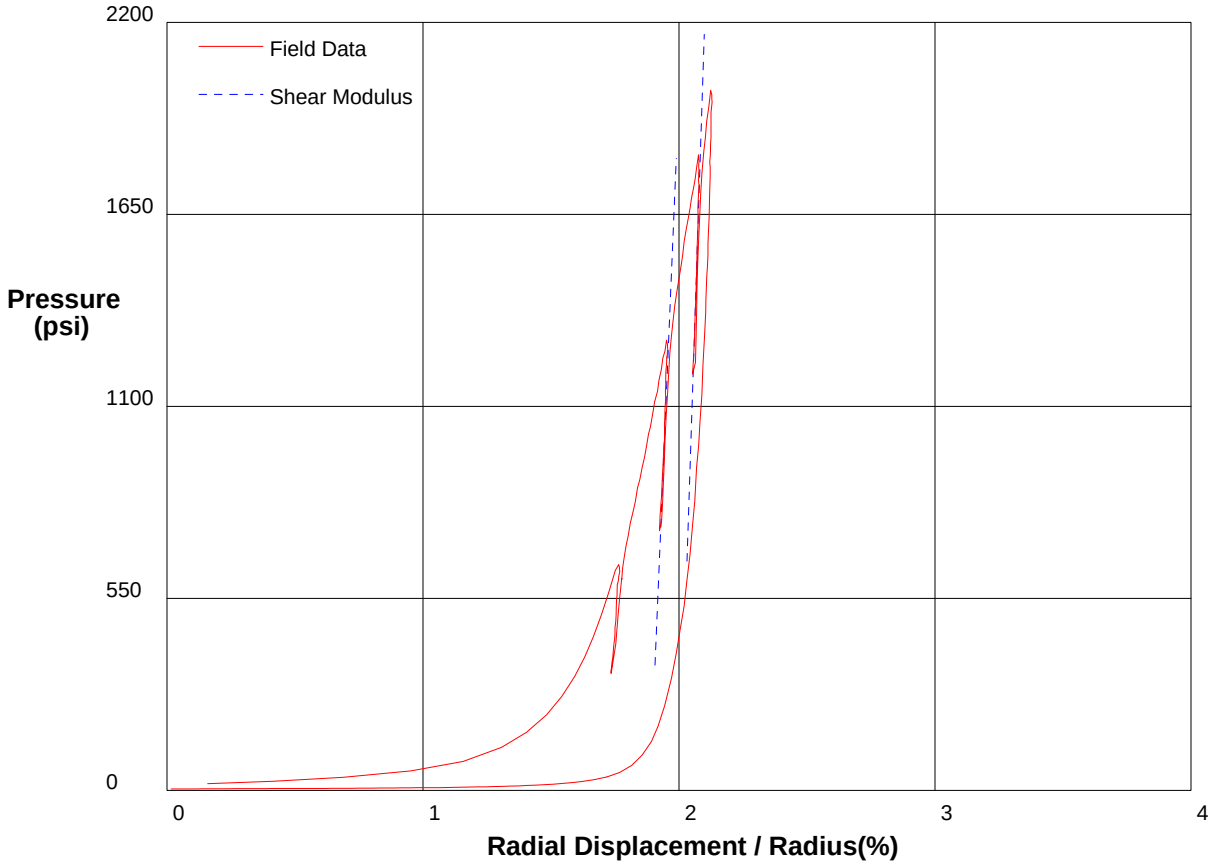
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 50ft** **File C:\DATA\ISE-843\I-90-17.P**



Shear Modulus 870833 psi

Shear Modulus 1114102 psi

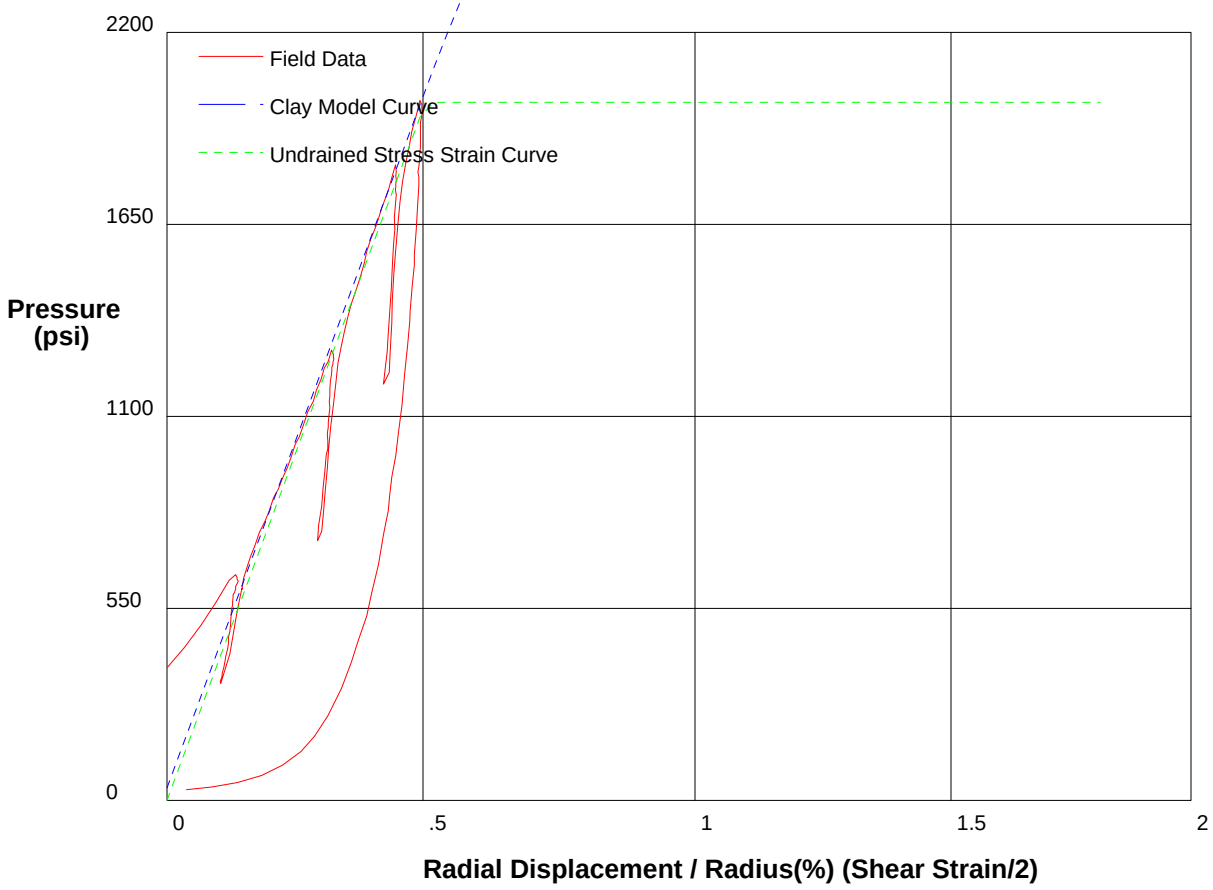
shift 2

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 50ft** **File C:\DATA\ISE-843\I-90-17.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**36**	**psi**
Shear Modulus	**198000**	**psi**

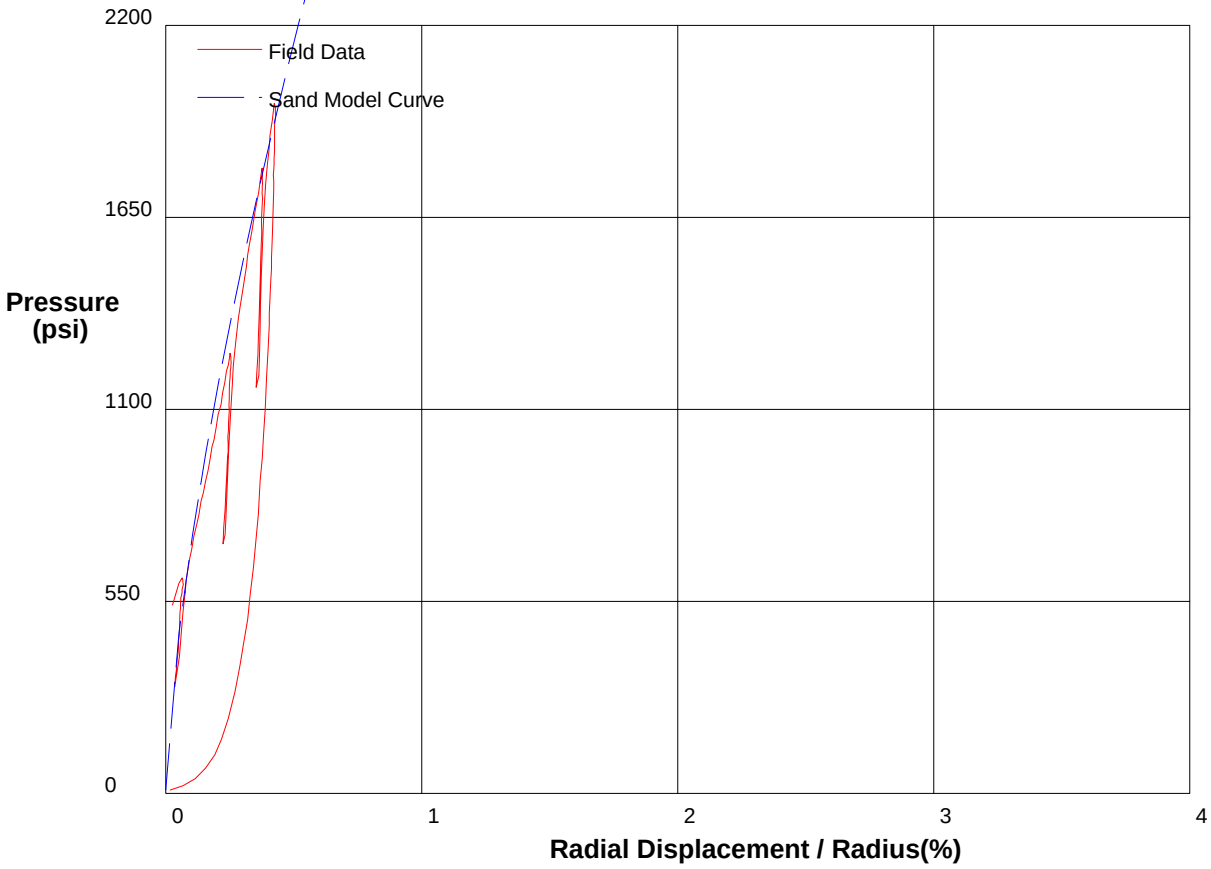
shift 3.63

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 50ft** **File C:\DATA\ISE-843\I-90-17.P**



THE HUGHES SAND MODEL

Water Pressure	**29 psi**
Friction Angle	**55 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**11 psi**
Shear Modulus	**870000 psi**

shift 3.7

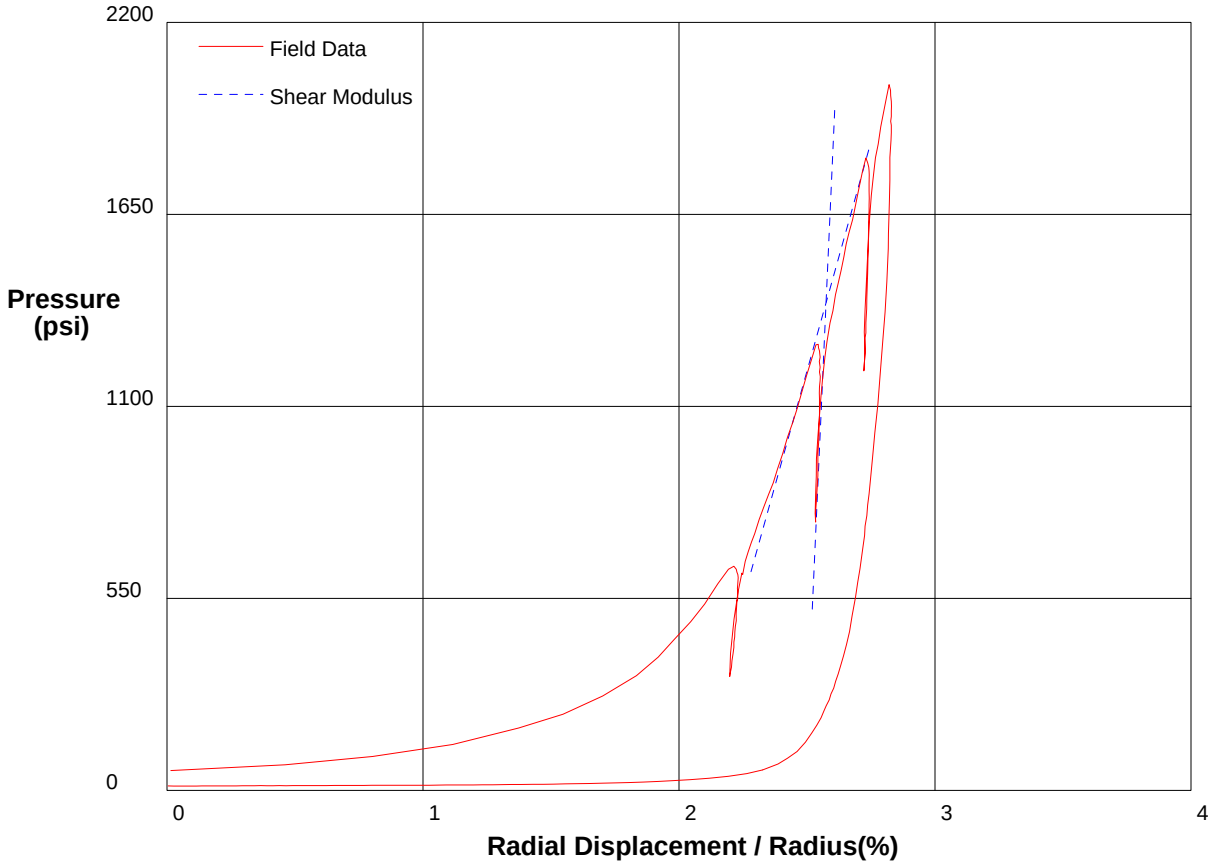
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 62ft** **File C:\DATA\ISE-843\I-90-18.P**



Shear Modulus 817451 psi

Shear Modulus 131423 psi

shift 3

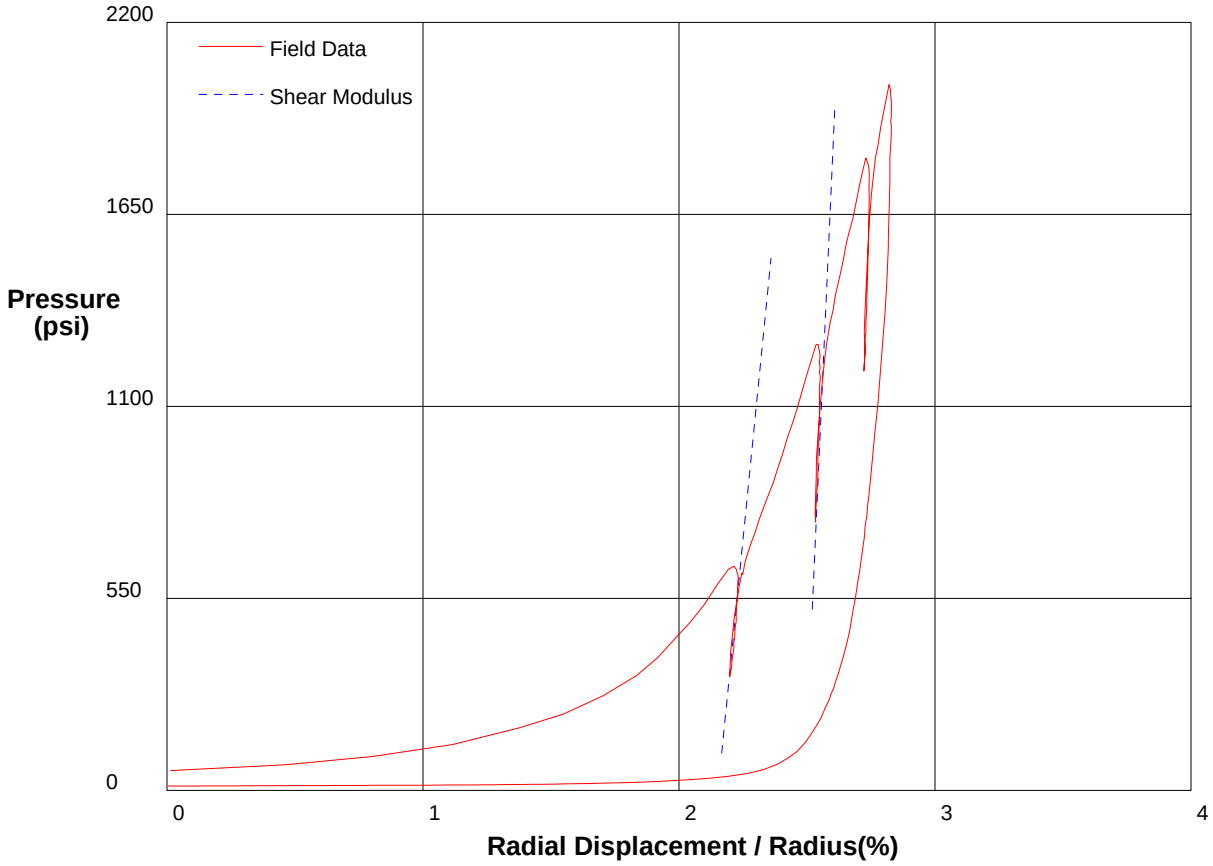
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 62ft** **File C:\DATA\ISE-843\I-90-18.P**



Shear Modulus 817451 psi

Shear Modulus 367657 psi

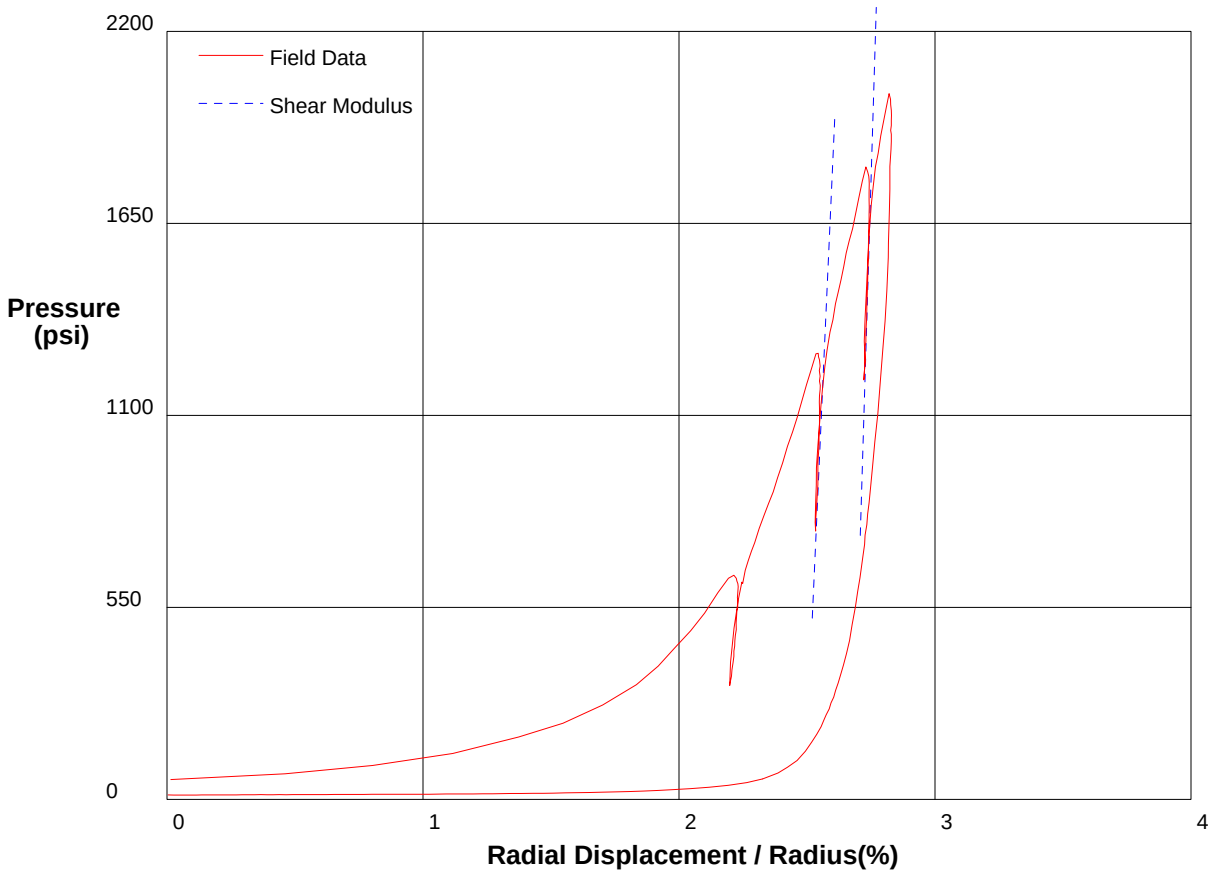
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 62ft** **File C:\DATA\ISE-843\I-90-18.P**



Shear Modulus 817451 psi

Shear Modulus 1210000 psi

shift 3

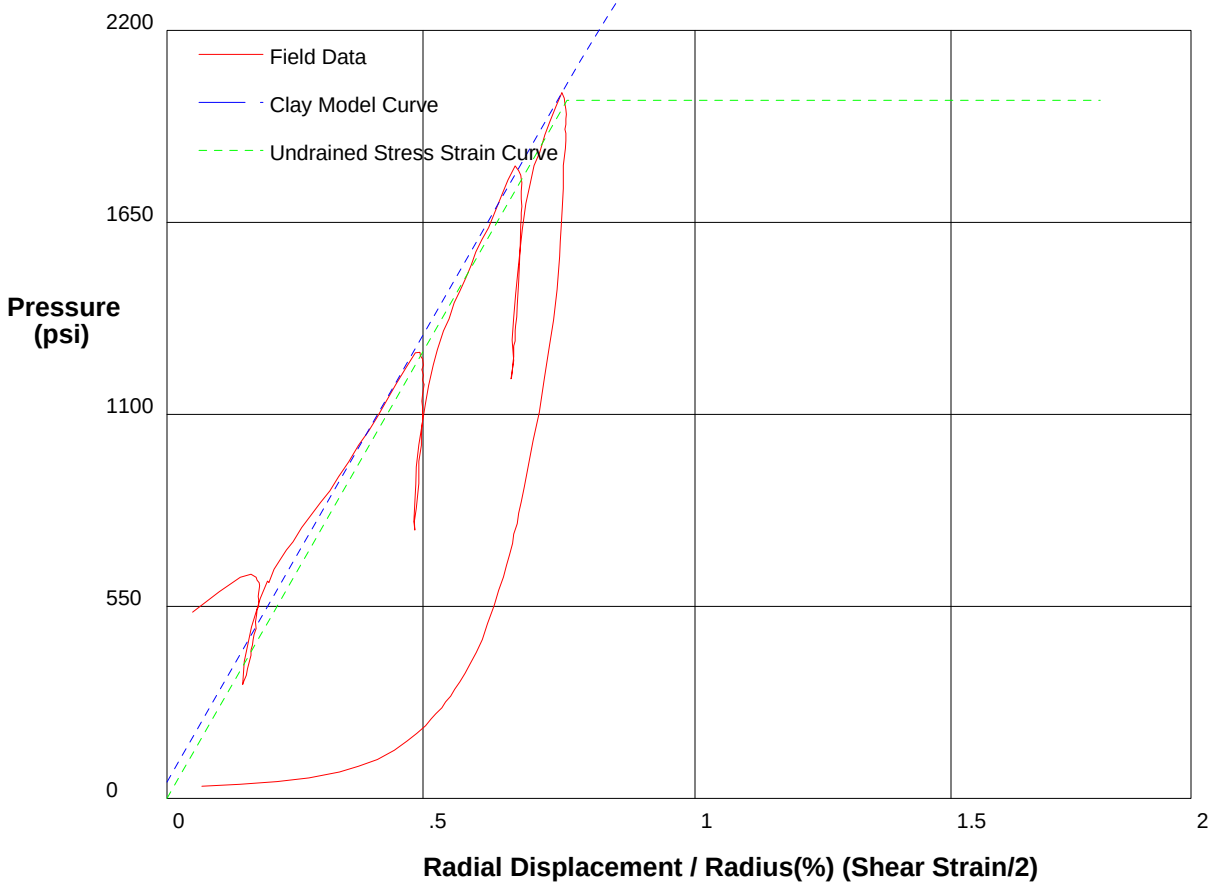
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 62ft** **File C:\DATA\ISE-843\I-90-18.P**



GIBSON'S CLAY MODEL

Shear Strength	**2000**	**psi**
Insitu Stress	**47**	**psi**
Shear Modulus	**128000**	**psi**

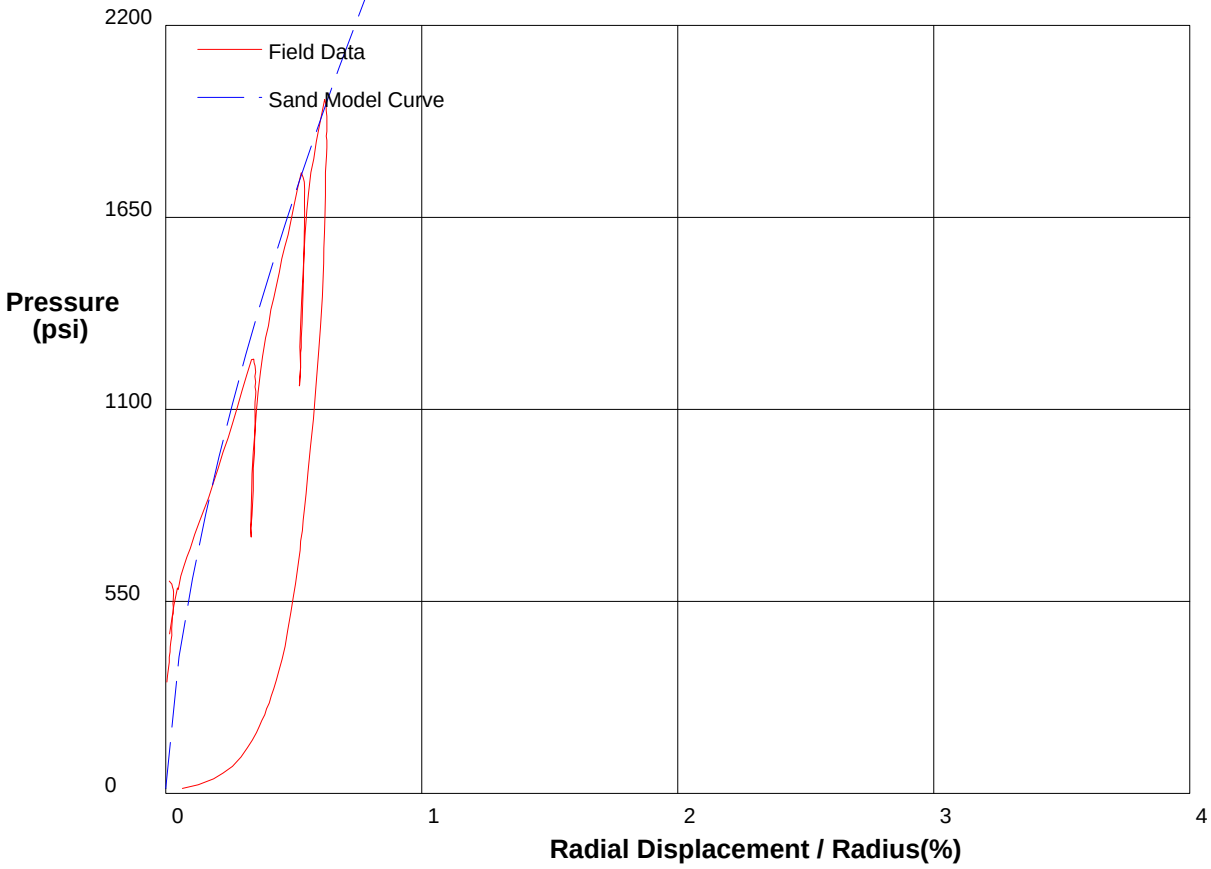
shift 5.05

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 62ft** **File C:\DATA\ISE-843\I-90-18.P**



THE HUGHES SAND MODEL

Water Pressure	**34 psi**
Friction Angle	**53 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**15 psi**
Shear Modulus	**700000 psi**

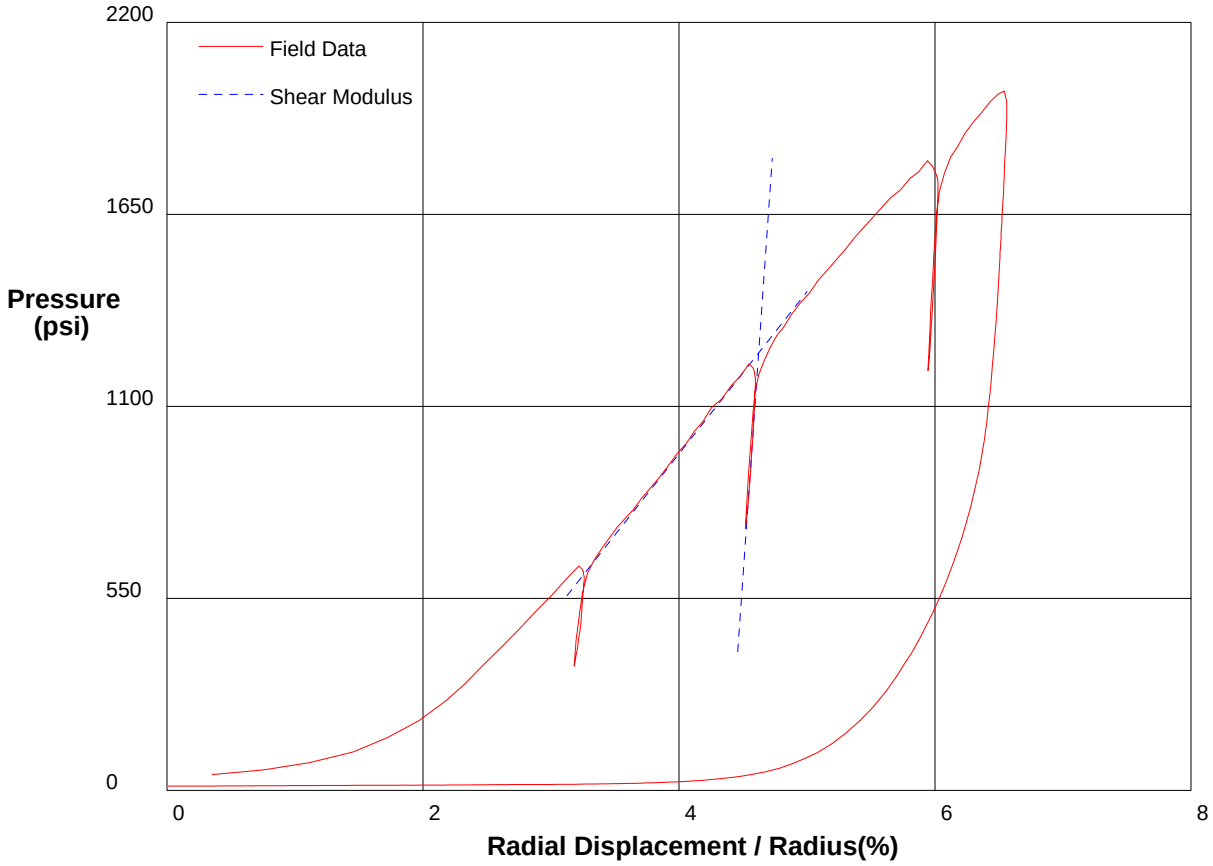
shift 5.2

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 59.5ft** **File C:\DATA\ISE-843\I-90-19.P**



Shear Modulus 260897 psi

Shear Modulus 23222 psi

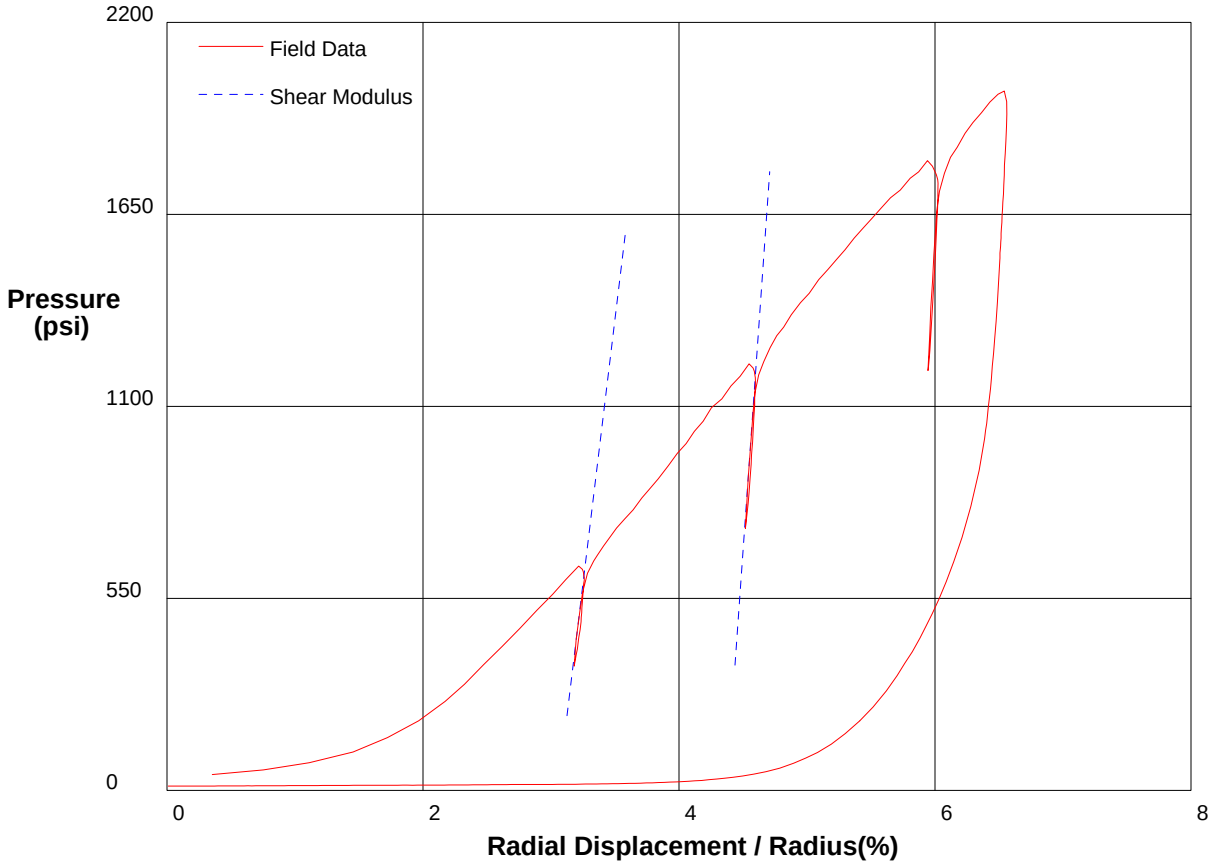
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 59.5ft** **File C:\DATA\ISE-843\I-90-19.P**



Shear Modulus 260897 psi

Shear Modulus 151666 psi

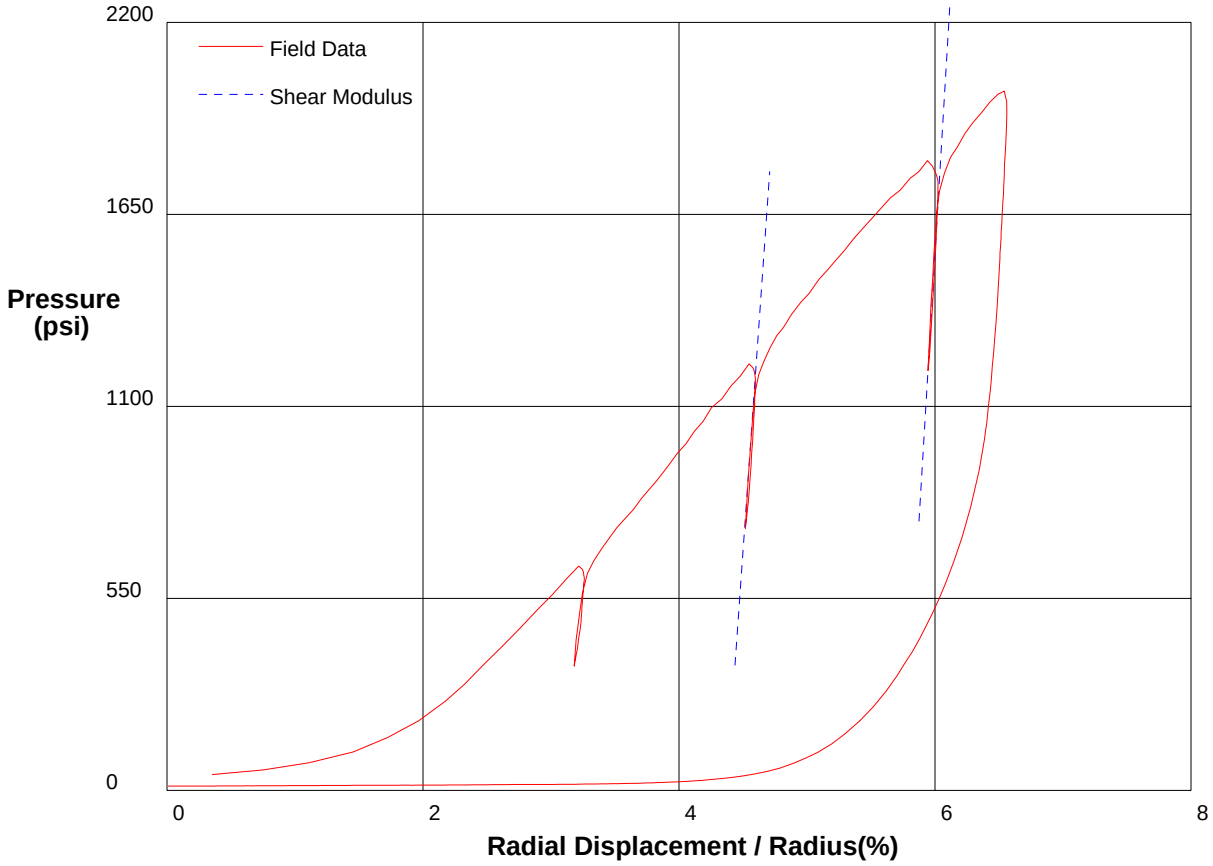
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 59.5ft** **File C:\DATA\ISE-843\I-90-19.P**



Shear Modulus 260897 psi

Shear Modulus 306884 psi

shift 3

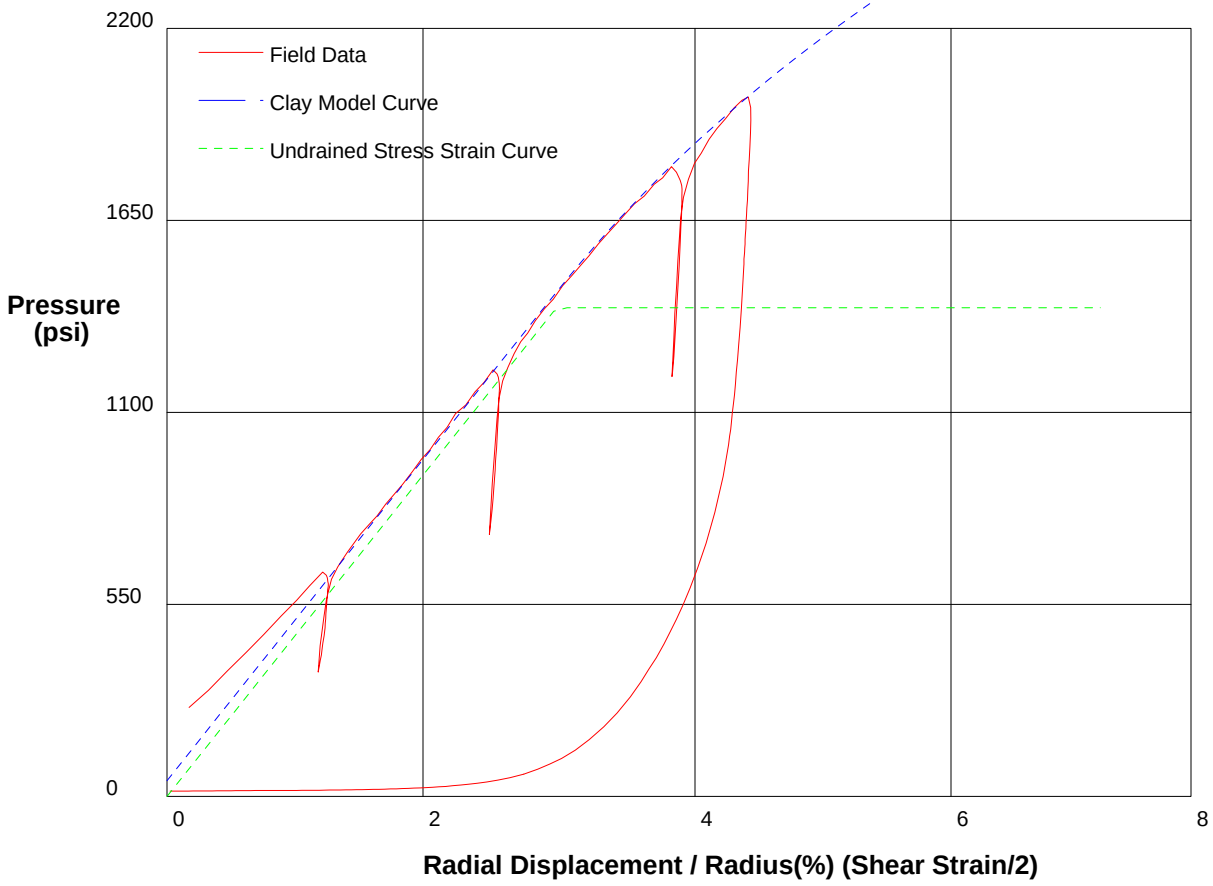
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 59.5ft** **File C:\DATA\ISE-843\I-90-19.P**



GIBSON'S CLAY MODEL

Shear Strength	**1400 psi**
Insitu Stress	**45 psi**
Shear Modulus	**23000 psi**

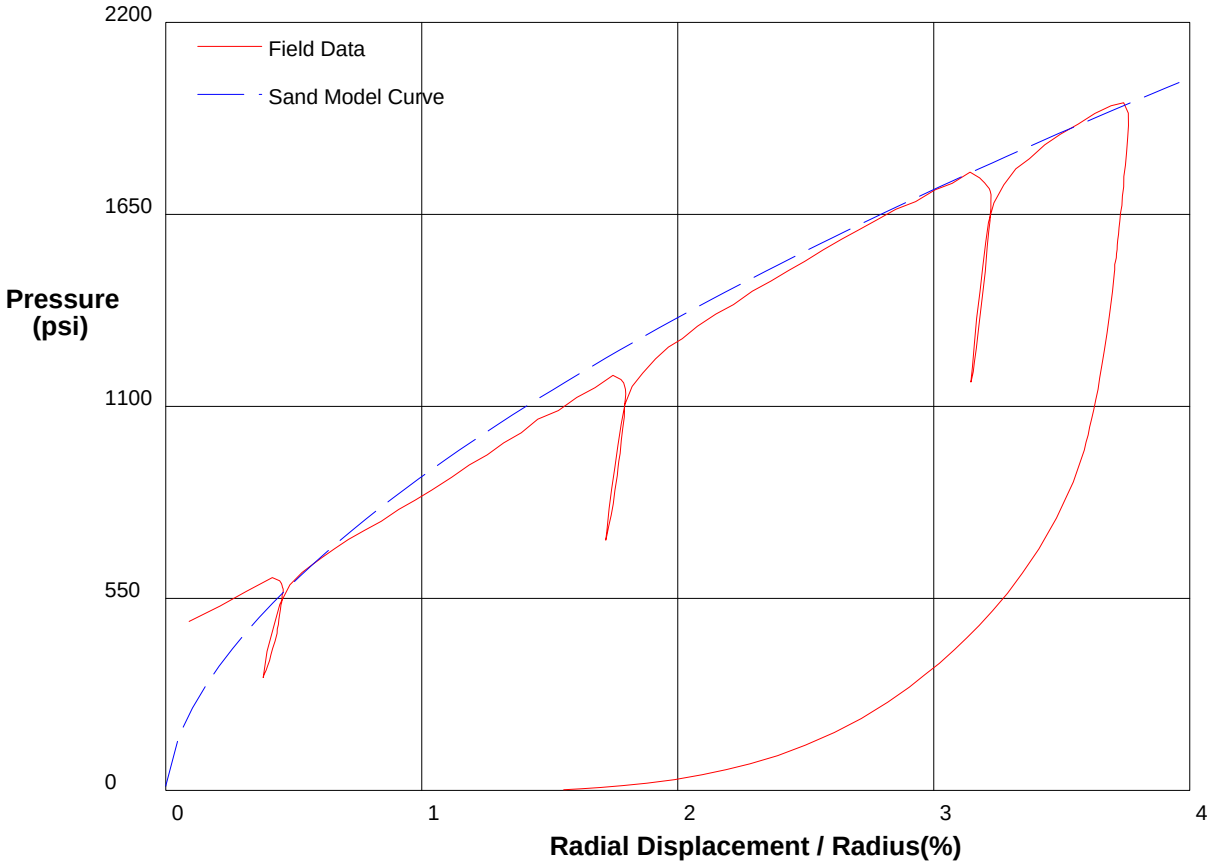
shift 5

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 59.5ft** **File C:\DATA\ISE-843\I-90-19.P**



THE HUGHES SAND MODEL

Water Pressure	**33 psi**
Friction Angle	**49 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**13 psi**
Shear Modulus	**245000 psi**

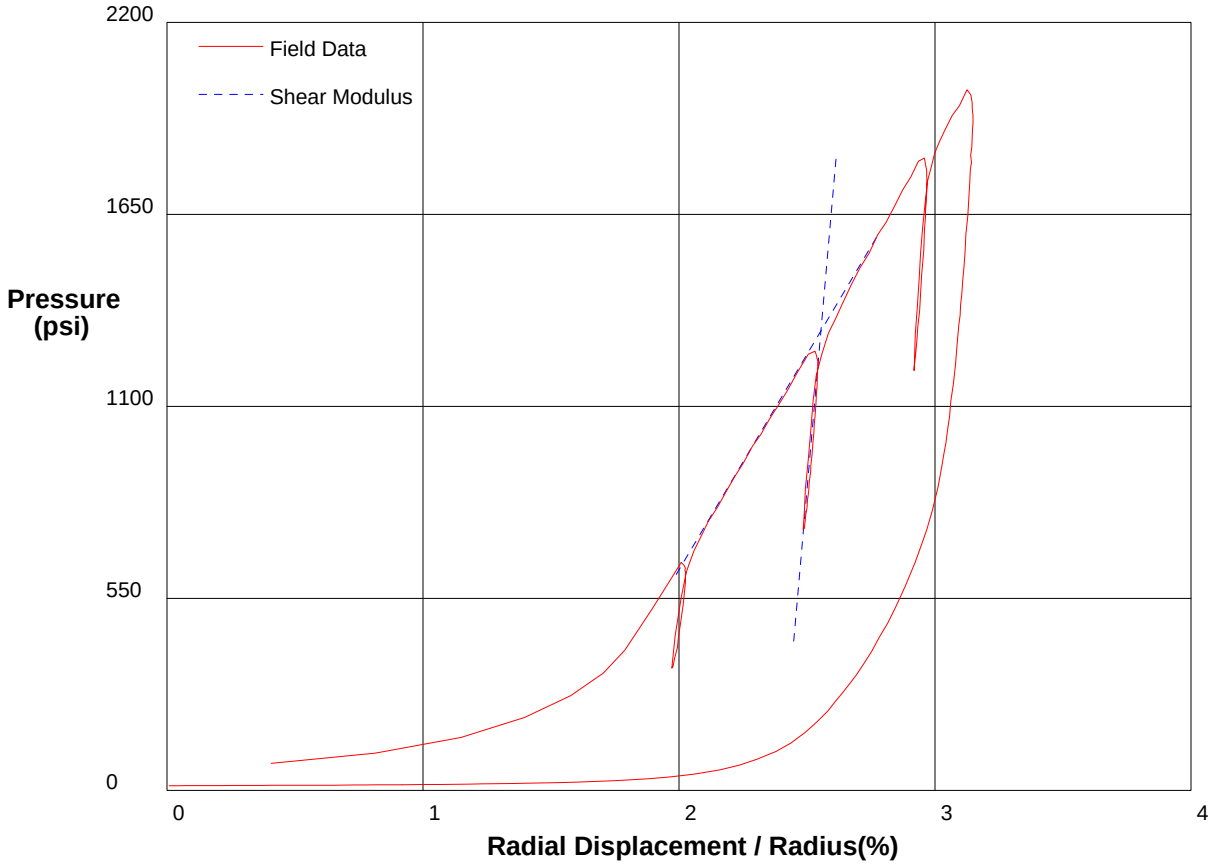
shift 5.8

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 57ft** **File C:\DATA\ISE-843\I-90-20.P**



Shear Modulus 417083 psi

Shear Modulus 61754 psi

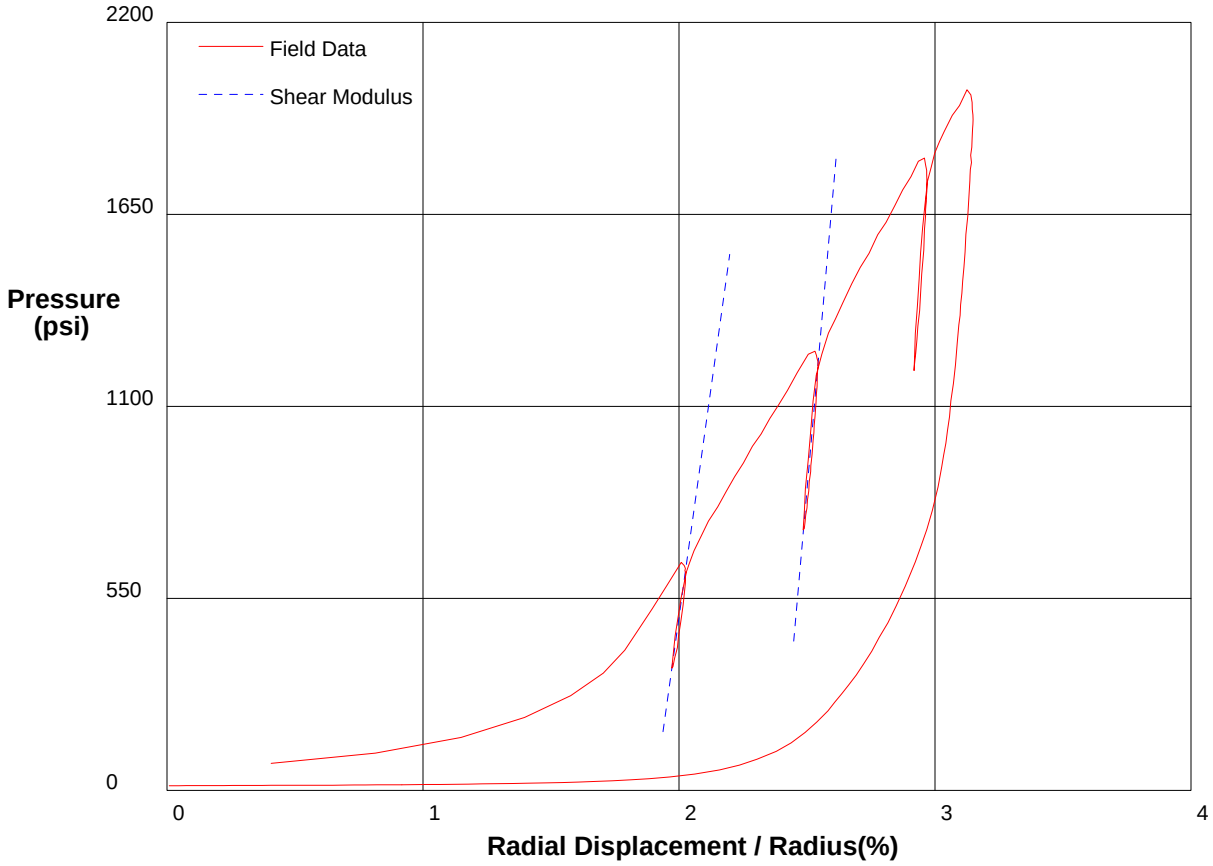
shift 4

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 57ft** **File C:\DATA\ISE-843\I-90-20.P**



Shear Modulus 417083 psi

Shear Modulus 262533 psi

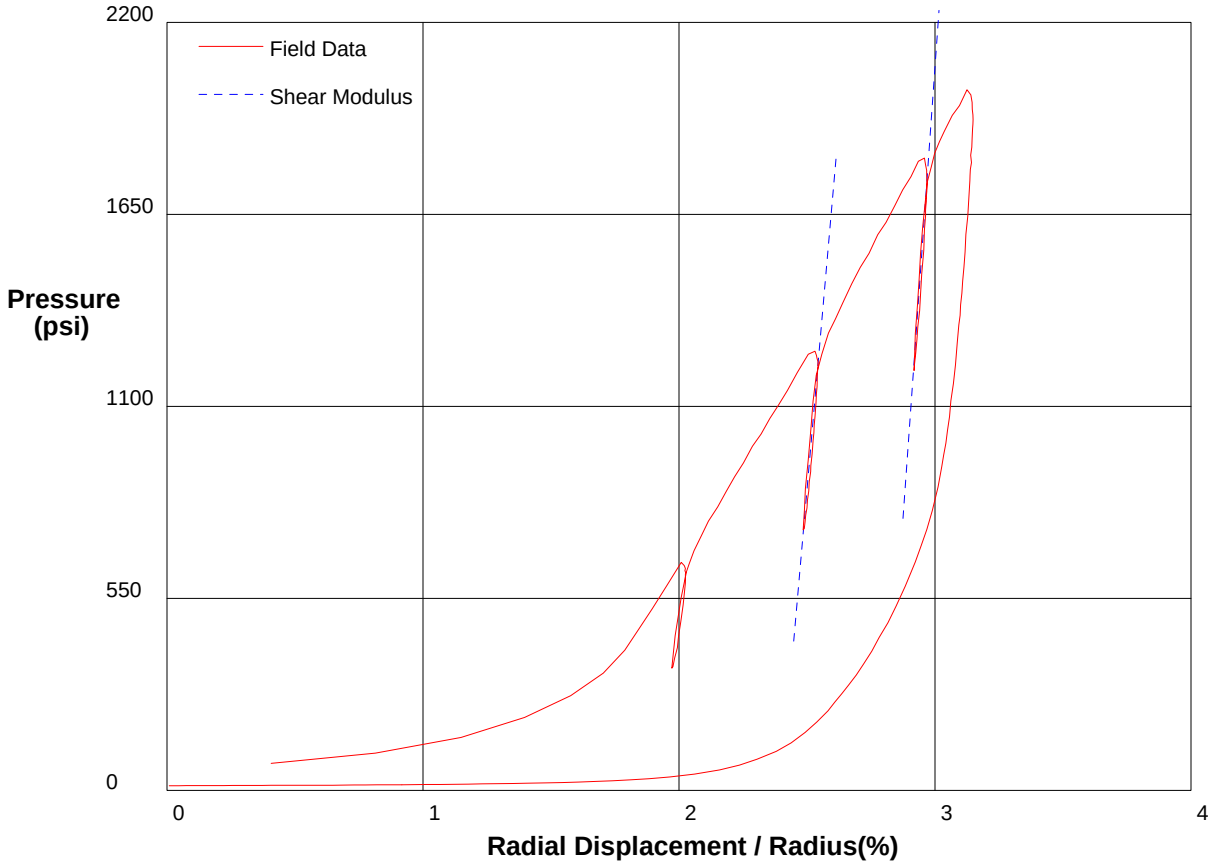
shift 4

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 57ft** **File C:\DATA\ISE-843\I-90-20.P**



Shear Modulus 417083 psi

Shear Modulus 517407 psi

shift 4

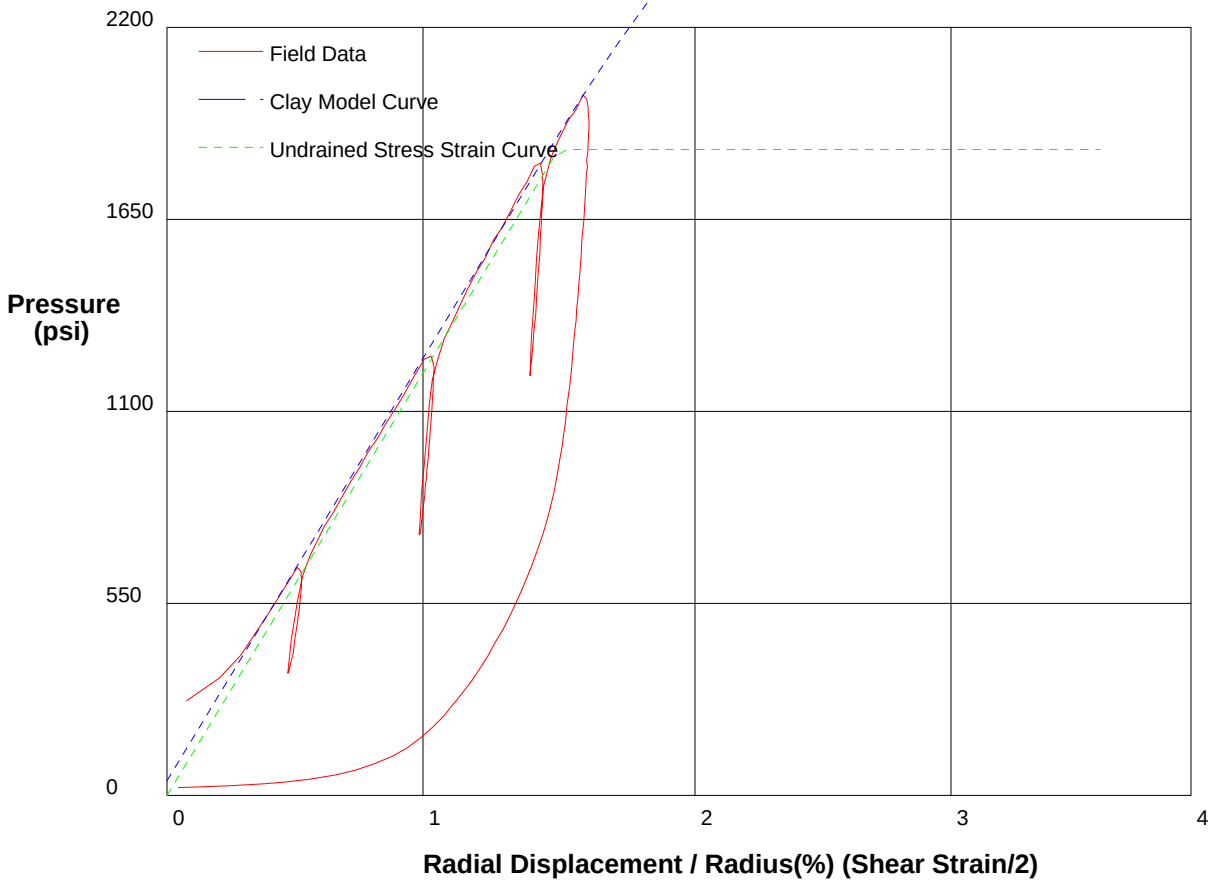
HUGHES

Appendix I - Field Data and Data Interpretation

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 57ft** **File C:\DATA\ISE-843\I-90-20.P**



GIBSON'S CLAY MODEL

Shear Strength	**1850**	**psi**
Insitu Stress	**42**	**psi**
Shear Modulus	**60500**	**psi**

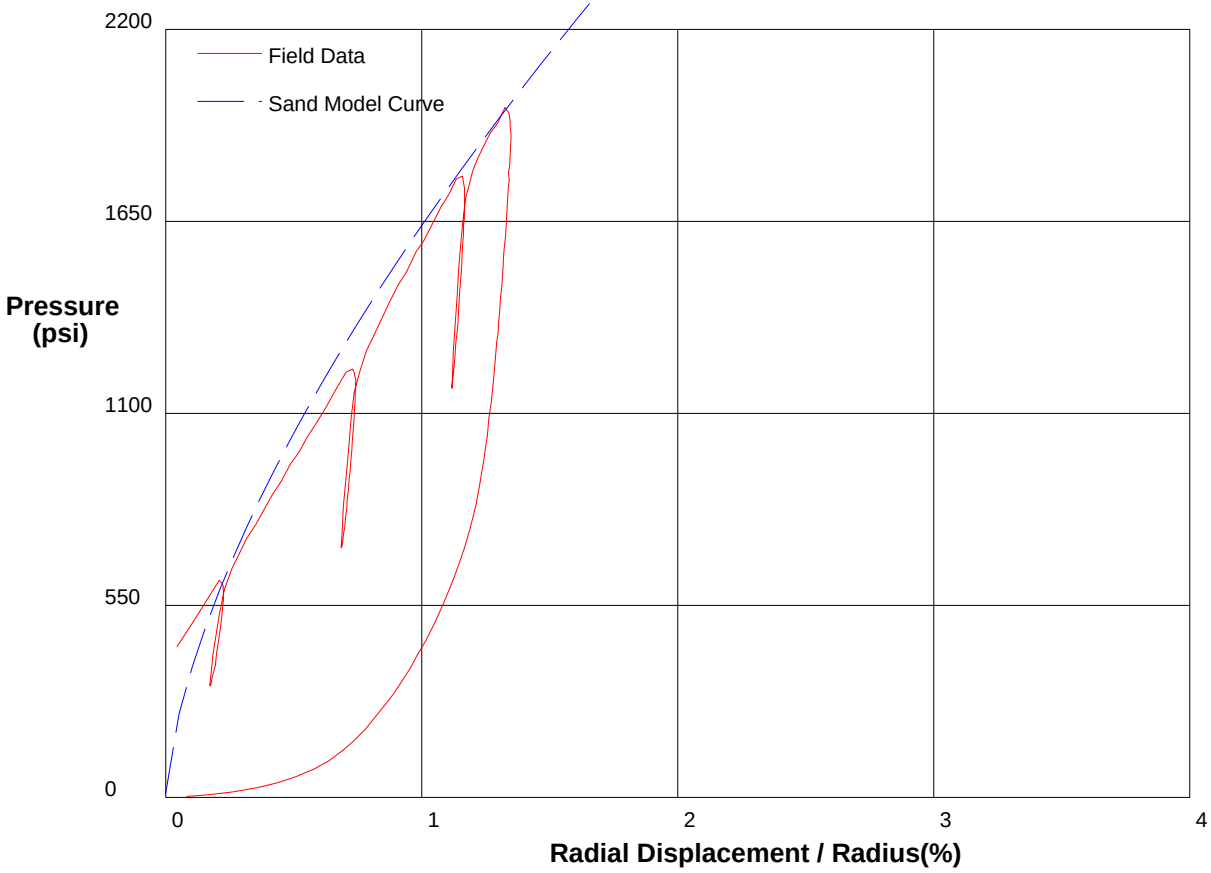
shift 5.5

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 57ft** **File C:\DATA\ISE-843\I-90-20.P**



THE HUGHES SAND MODEL

Water Pressure	**31 psi**
Friction Angle	**53 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**13 psi**
Shear Modulus	**355000 psi**

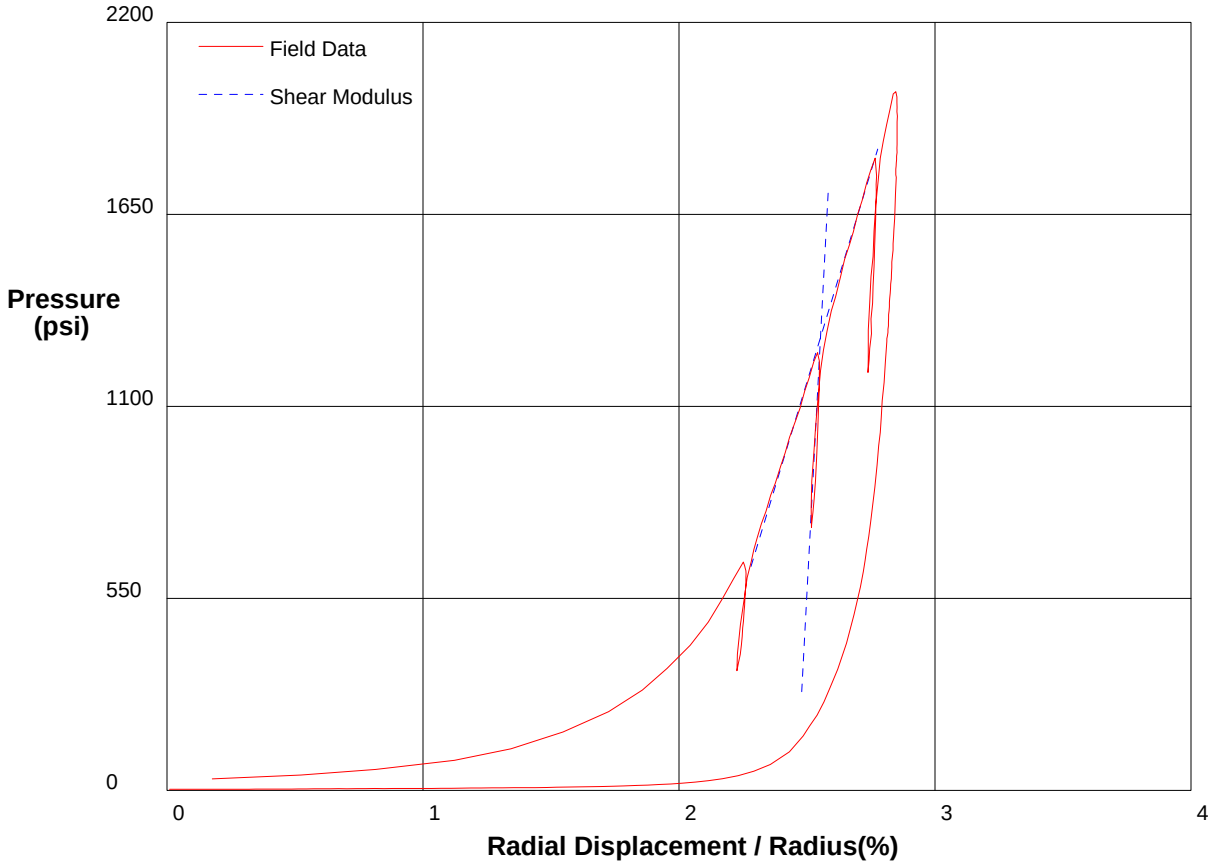
shift 5.8

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 66.8ft** **File C:\DATA\ISE-843\I-90-21.P**



Shear Modulus 689333 psi

Shear Modulus 120807 psi

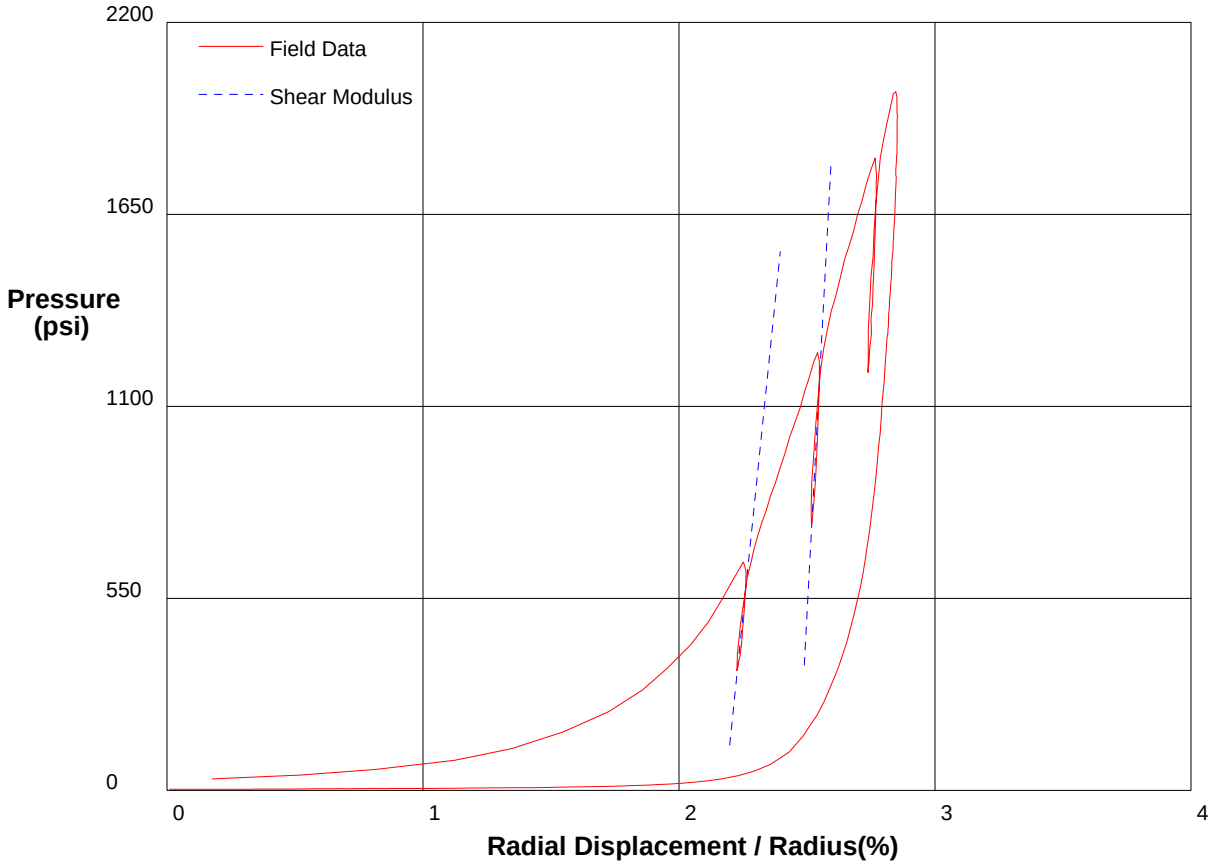
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 66.8ft** **File C:\DATA\ISE-843\I-90-21.P**



Shear Modulus 689333 psi

Shear Modulus 357017 psi

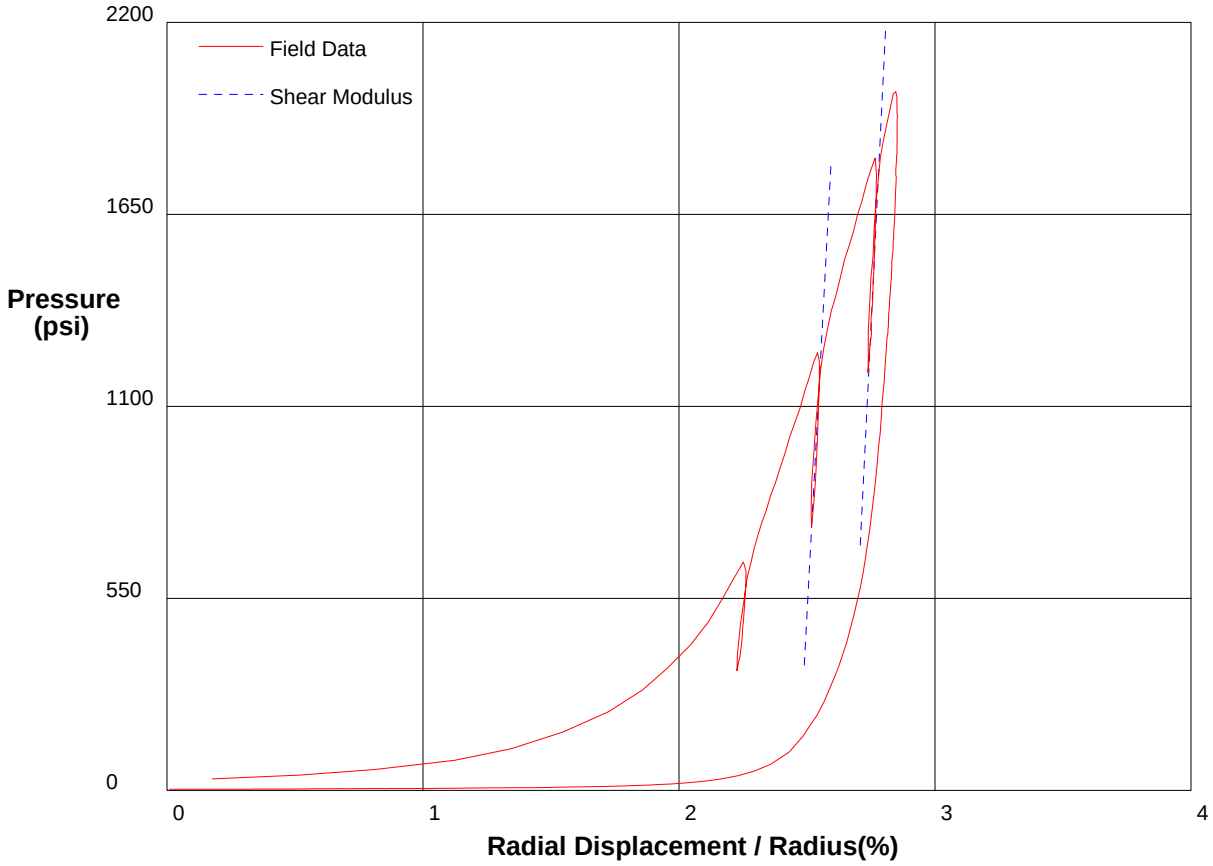
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 66.8ft** **File C:\DATA\ISE-843\I-90-21.P**



Shear Modulus 689333 psi

Shear Modulus 750701 psi

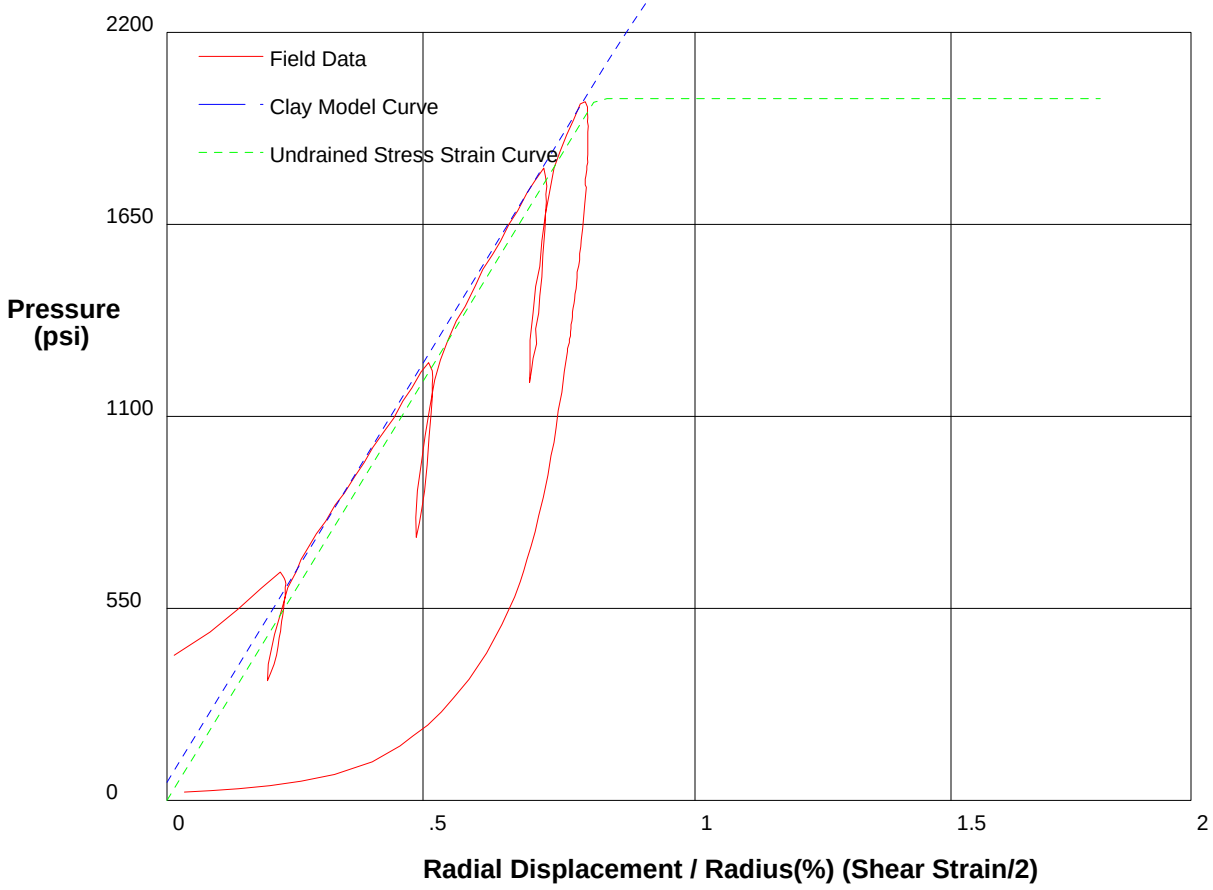
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 66.8ft** **File C:\DATA\ISE-843\I-90-21.P**



GIBSON'S CLAY MODEL

Shear Strength	**2010**	**psi**
Insitu Stress	**52**	**psi**
Shear Modulus	**120000**	**psi**

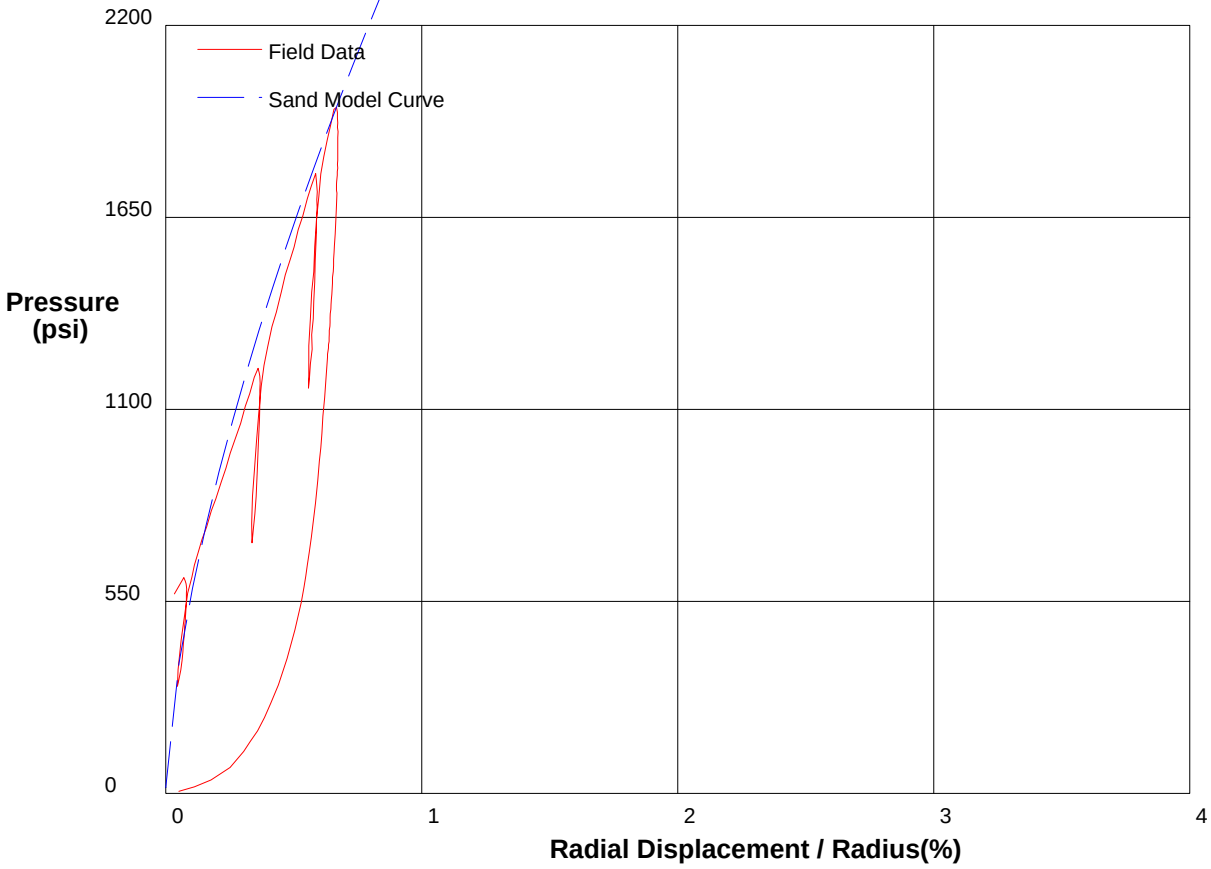
shift 5.03

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 66.8ft** **File C:\DATA\ISE-843\I-90-21.P**



THE HUGHES SAND MODEL

Water Pressure	**36 psi**
Friction Angle	**53 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**17 psi**
Shear Modulus	**610000 psi**

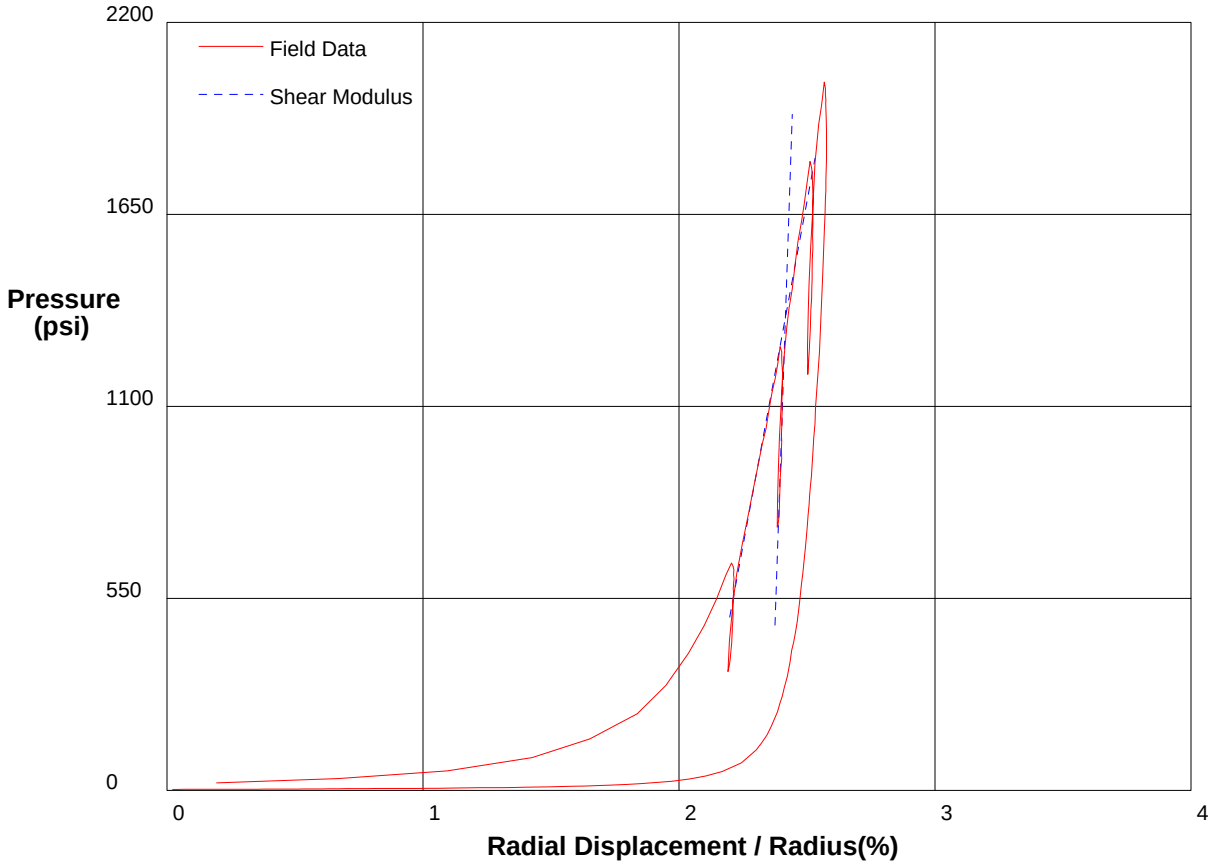
shift 5.18

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 65ft** **File C:\DATA\ISE-843\I-90-22.P**



Shear Modulus 1080256 psi

Shear Modulus 197083 psi

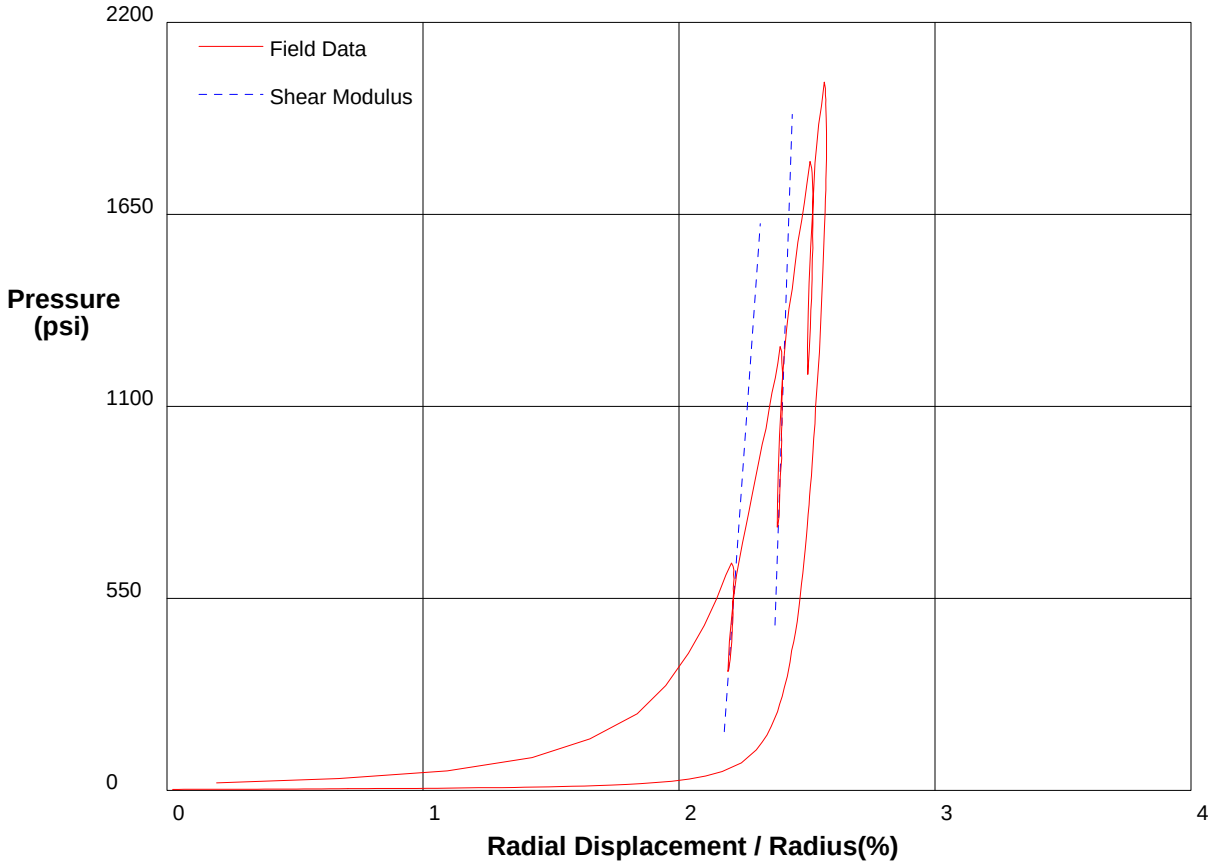
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 65ft** **File C:\DATA\ISE-843\I-90-22.P**



Shear Modulus 1080256 psi

Shear Modulus 517407 psi

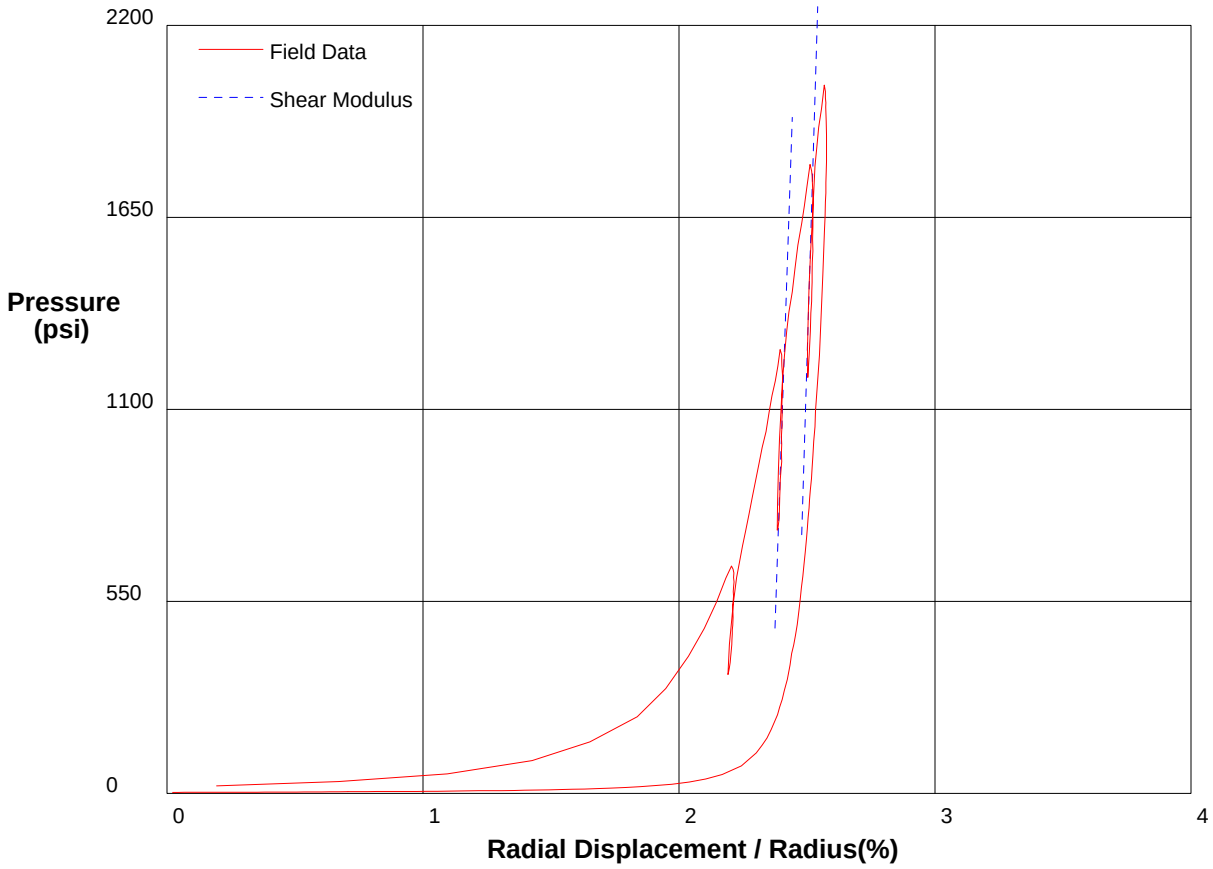
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 65ft** **File C:\DATA\ISE-843\I-90-22.P**



Shear Modulus 1080256 psi

Shear Modulus 1210000 psi

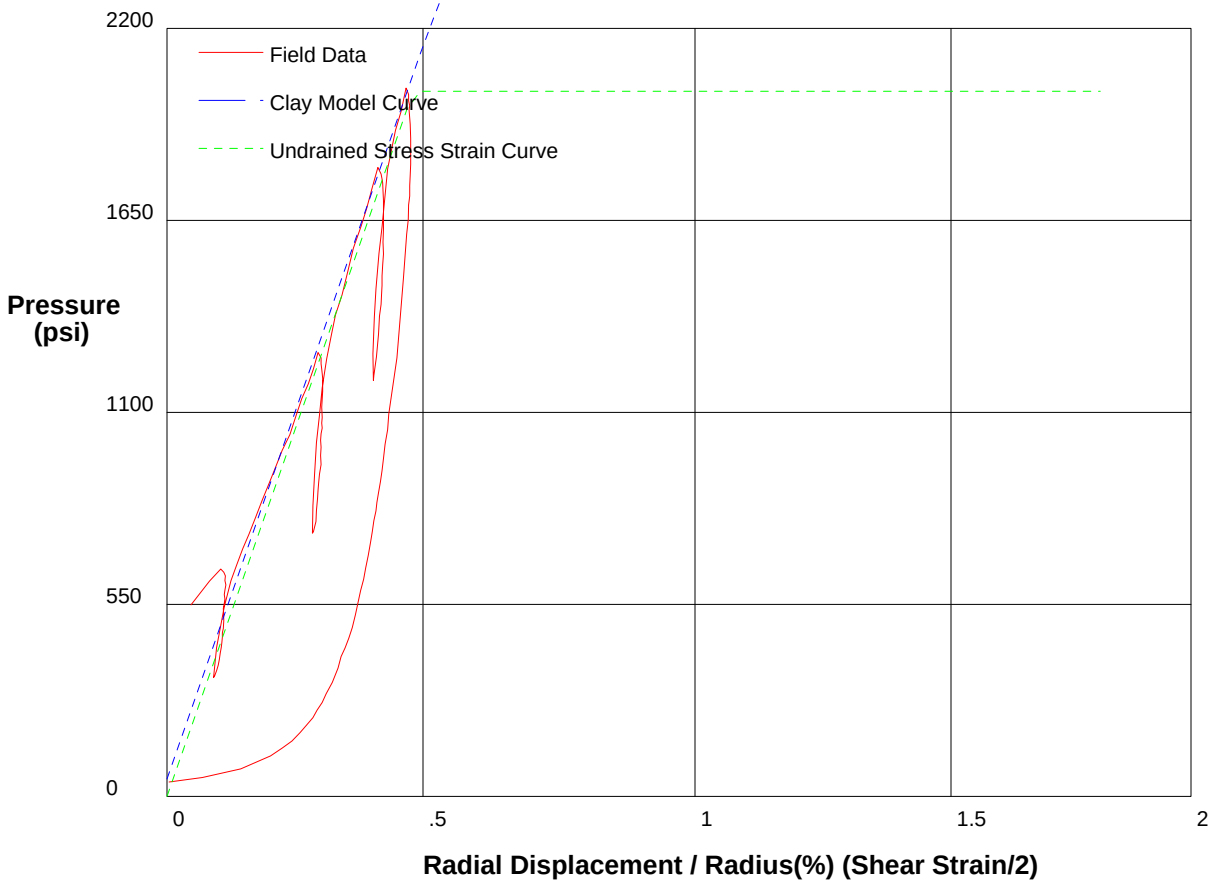
shift 3

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 65ft** **File C:\DATA\ISE-843\I-90-22.P**



GIBSON'S CLAY MODEL

Shear Strength	**2020**	**psi**
Insitu Stress	**50**	**psi**
Shear Modulus	**210000**	**psi**

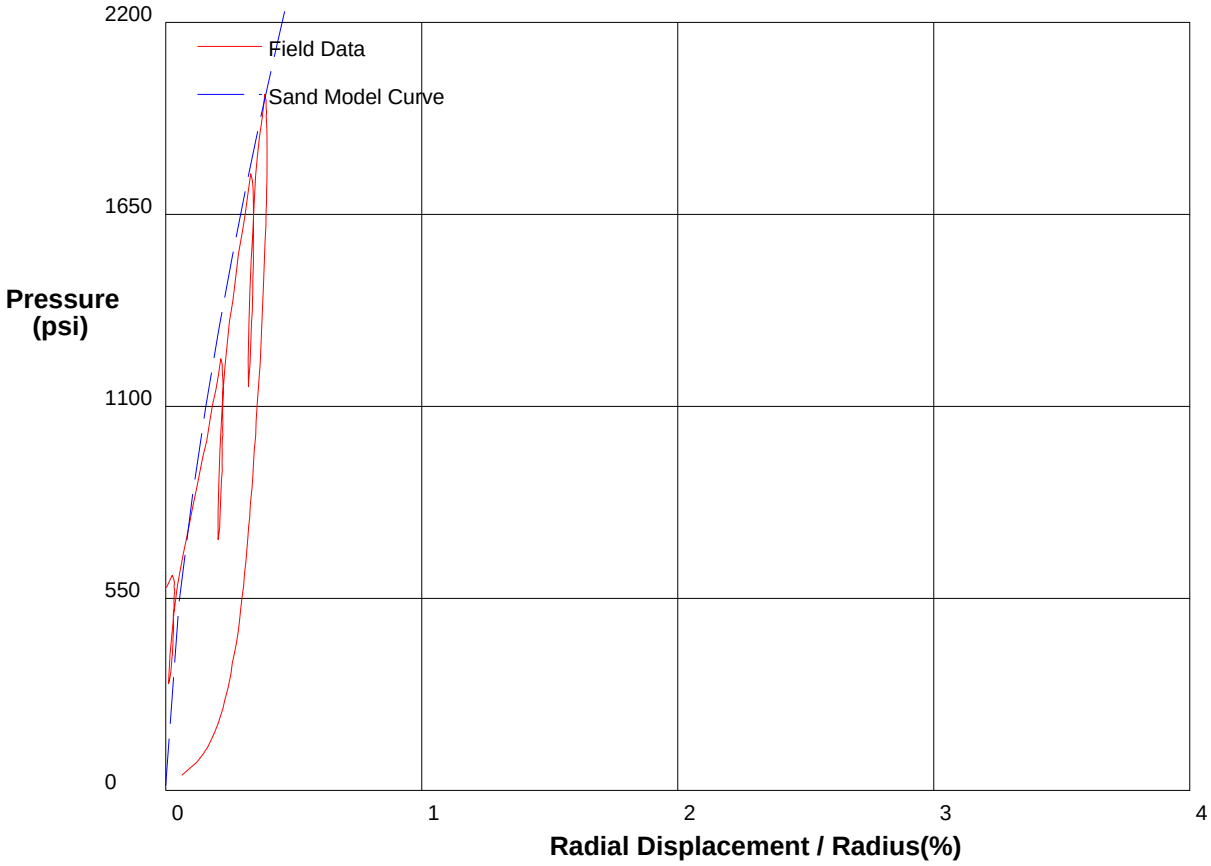
shift 5.1

HUGHES

PRESSUREMETER DATA **URS Corporation**

I-90 Snoqualmie Pass East **6/10/2009**

Hole No. SSD-008-09 **Depth 65ft** **File C:\DATA\ISE-843\I-90-22.P**



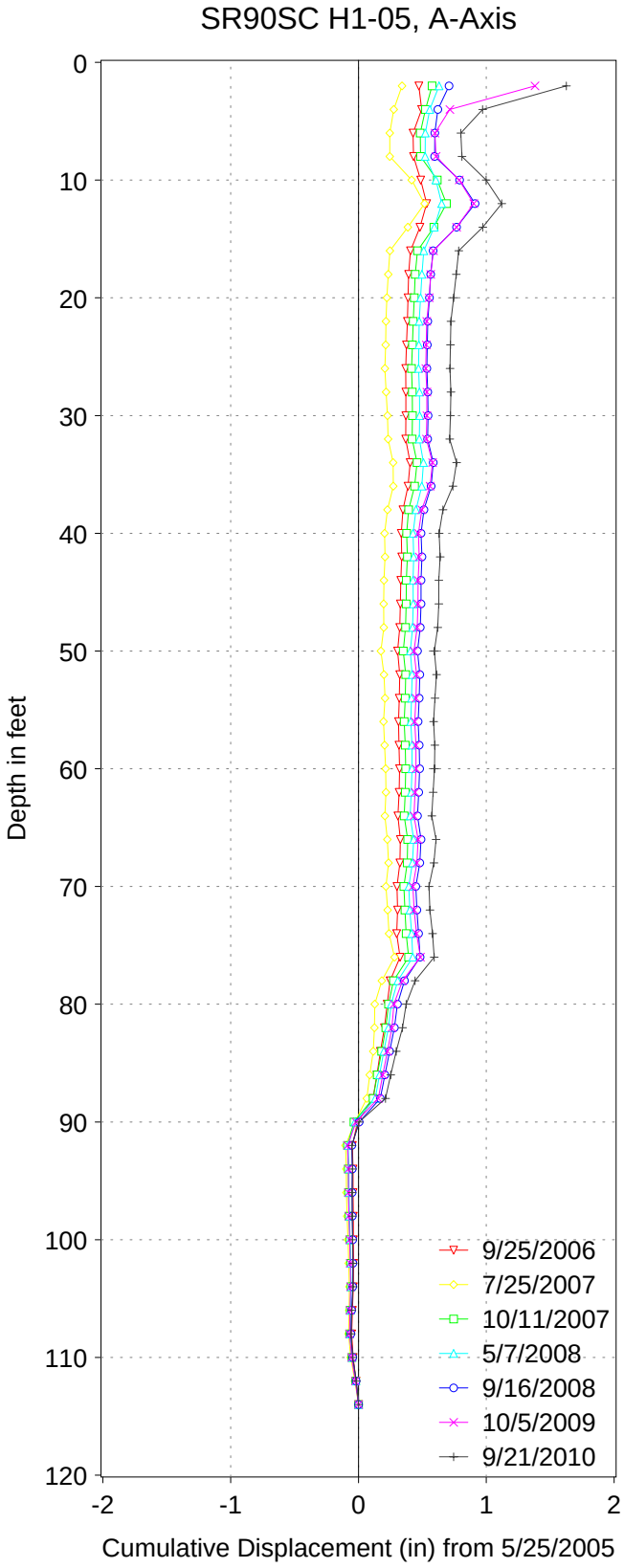
THE HUGHES SAND MODEL

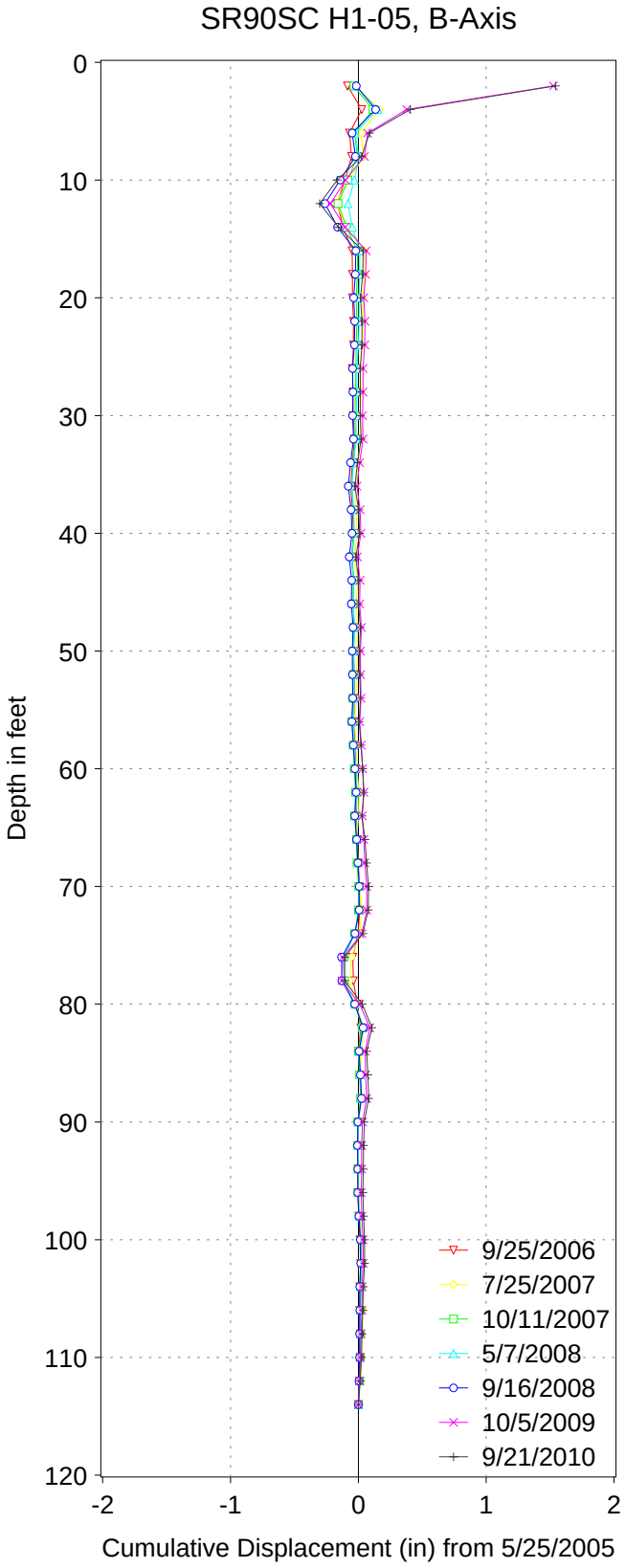
Water Pressure	**35 psi**
Friction Angle	**53 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**16 psi**
Shear Modulus	**1100000 psi**

shift 5.18

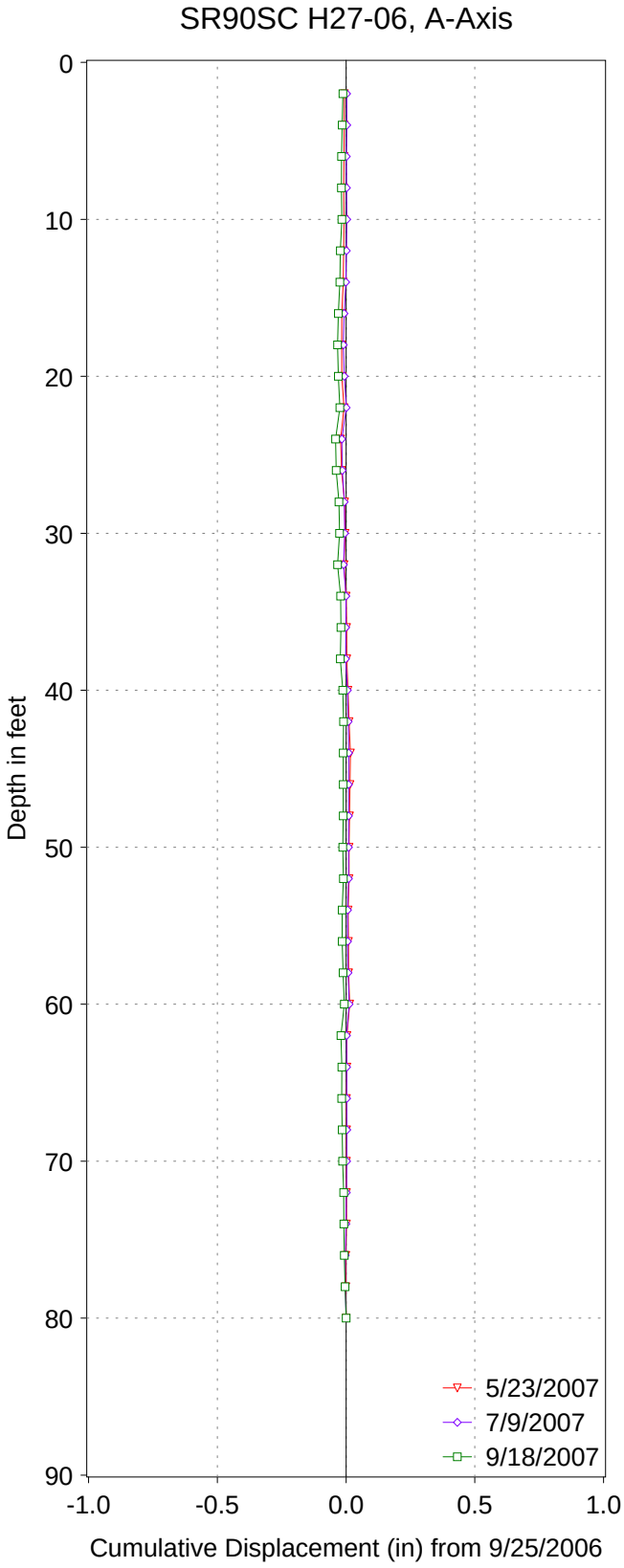
HUGHES

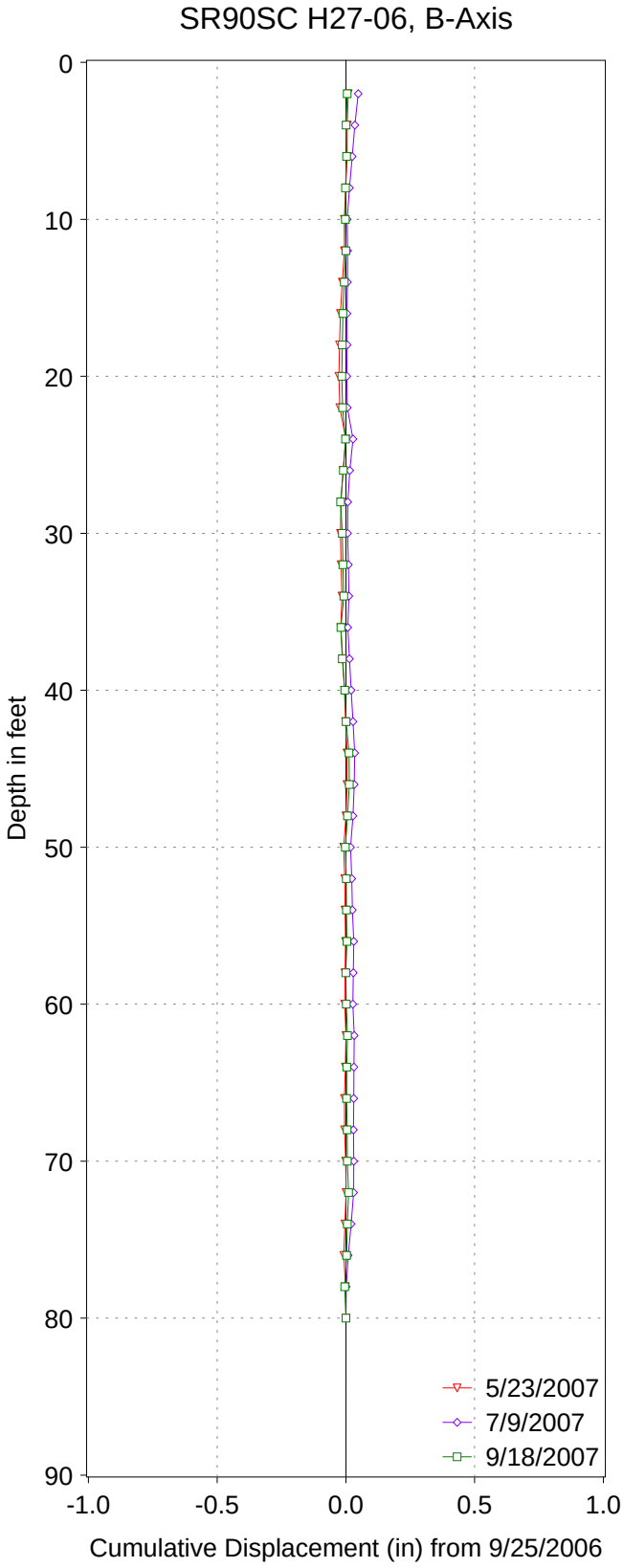
APPENDIX D.4
Inclinometer Data



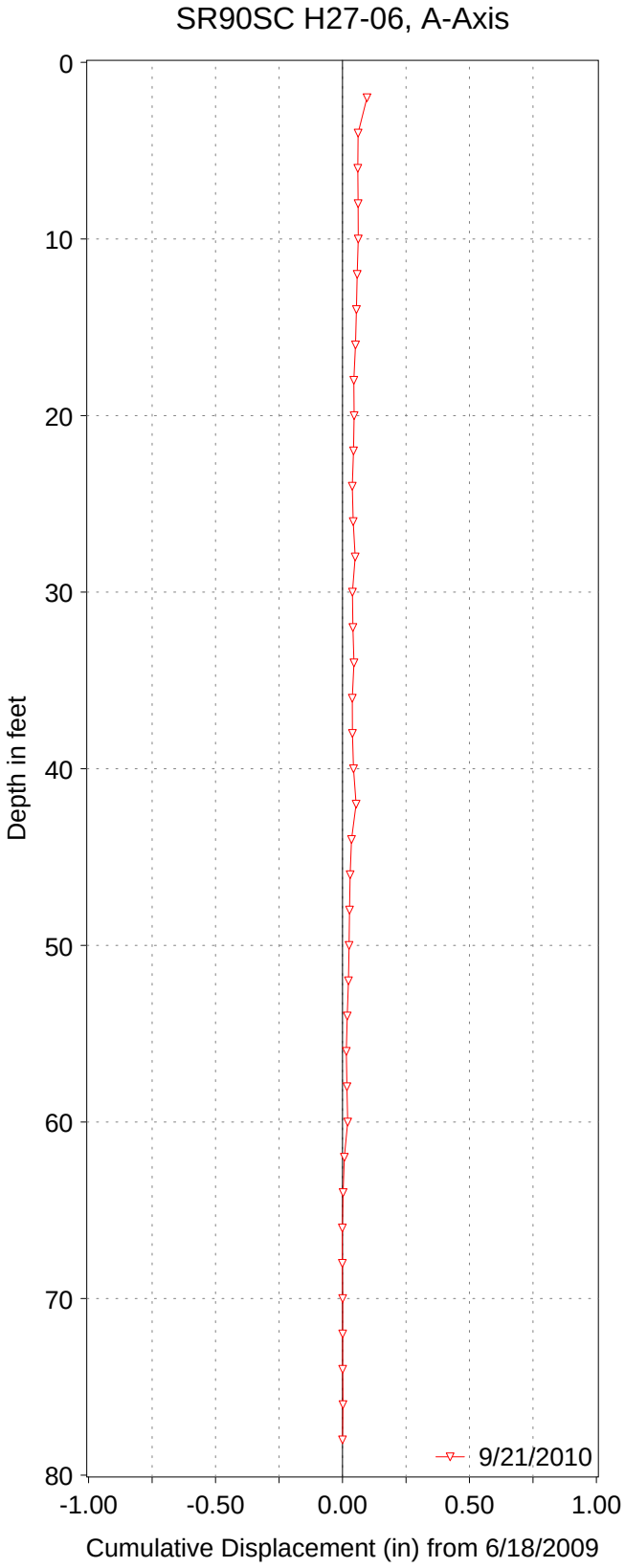


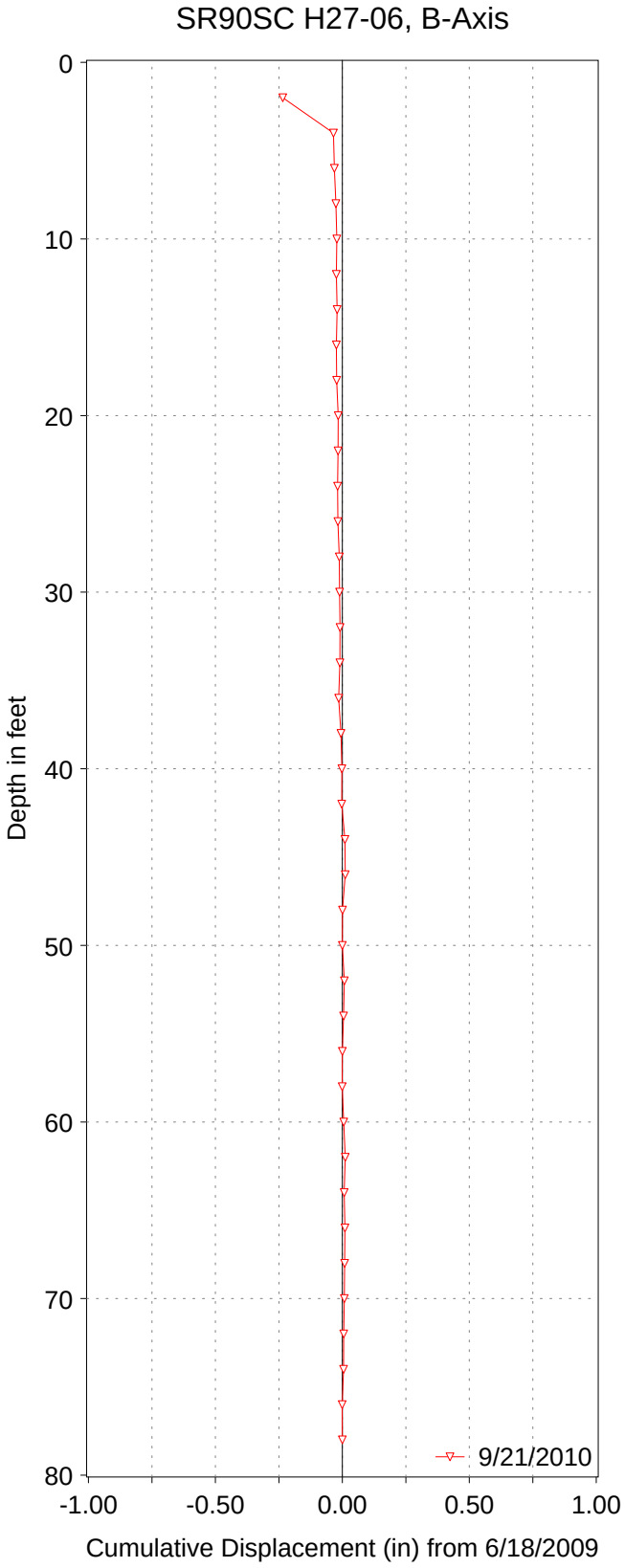
WSDOT	XL-2779 SR 90
Geotechnical Division	Slide Curve Vic.
Instrumentation Section	H-1-05
Olympia, WA	A+ = N232 deg.



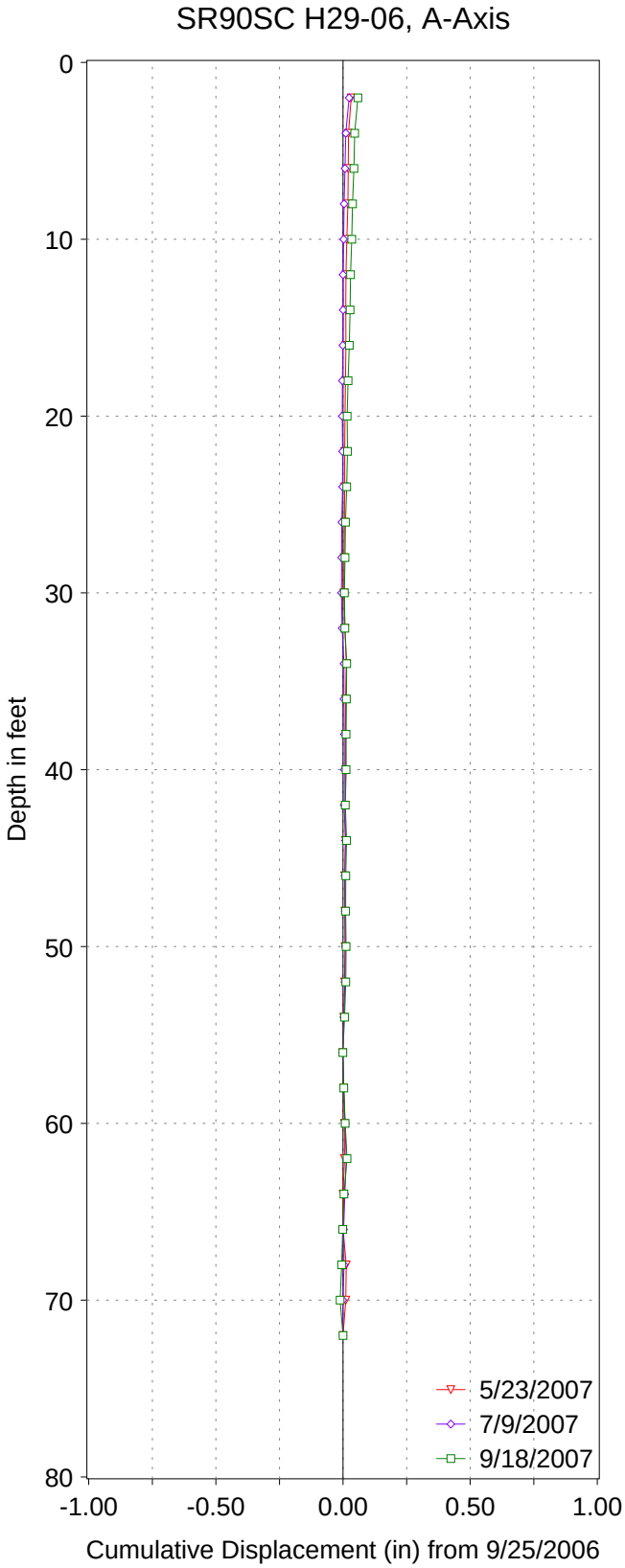


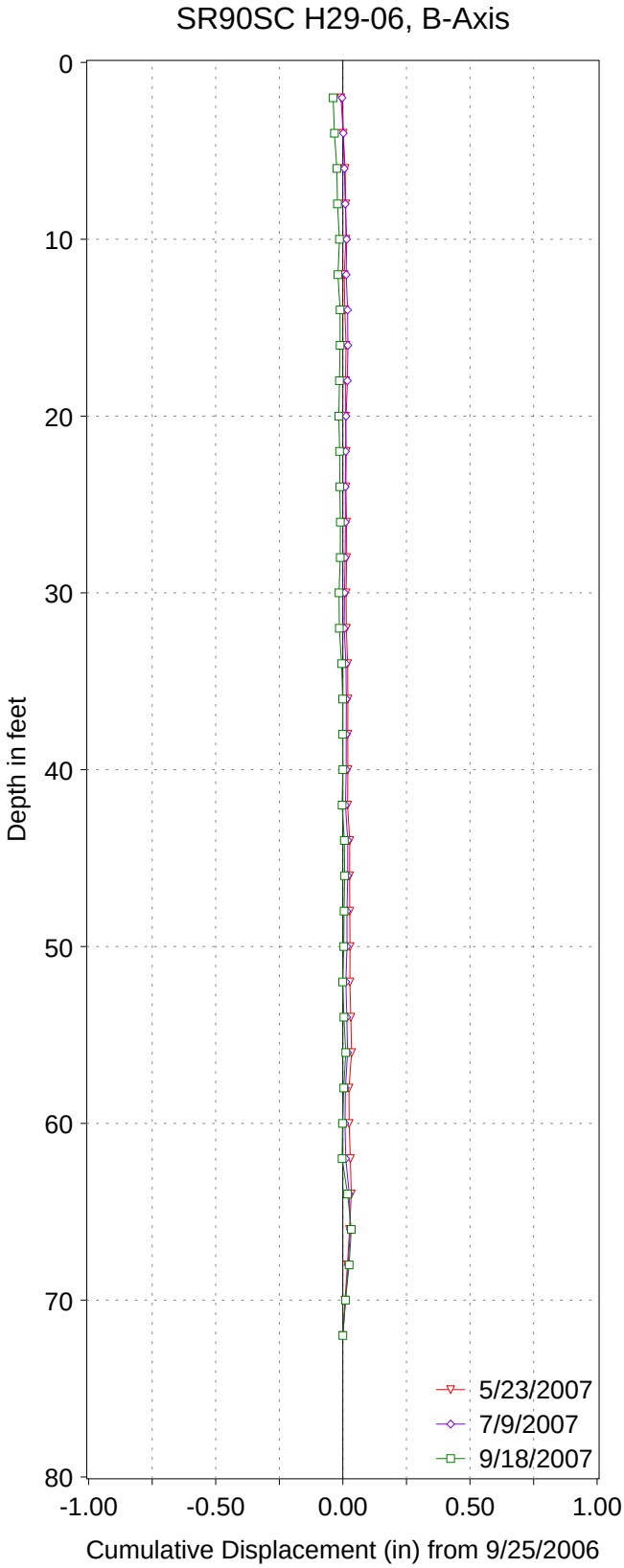
WSDOT	XL-2779 SR 90
Geotechnical Division	Slide Curve Vic.
Instrumentation Section	H-27-06
Olympia, WA	A+ = N280 deg.



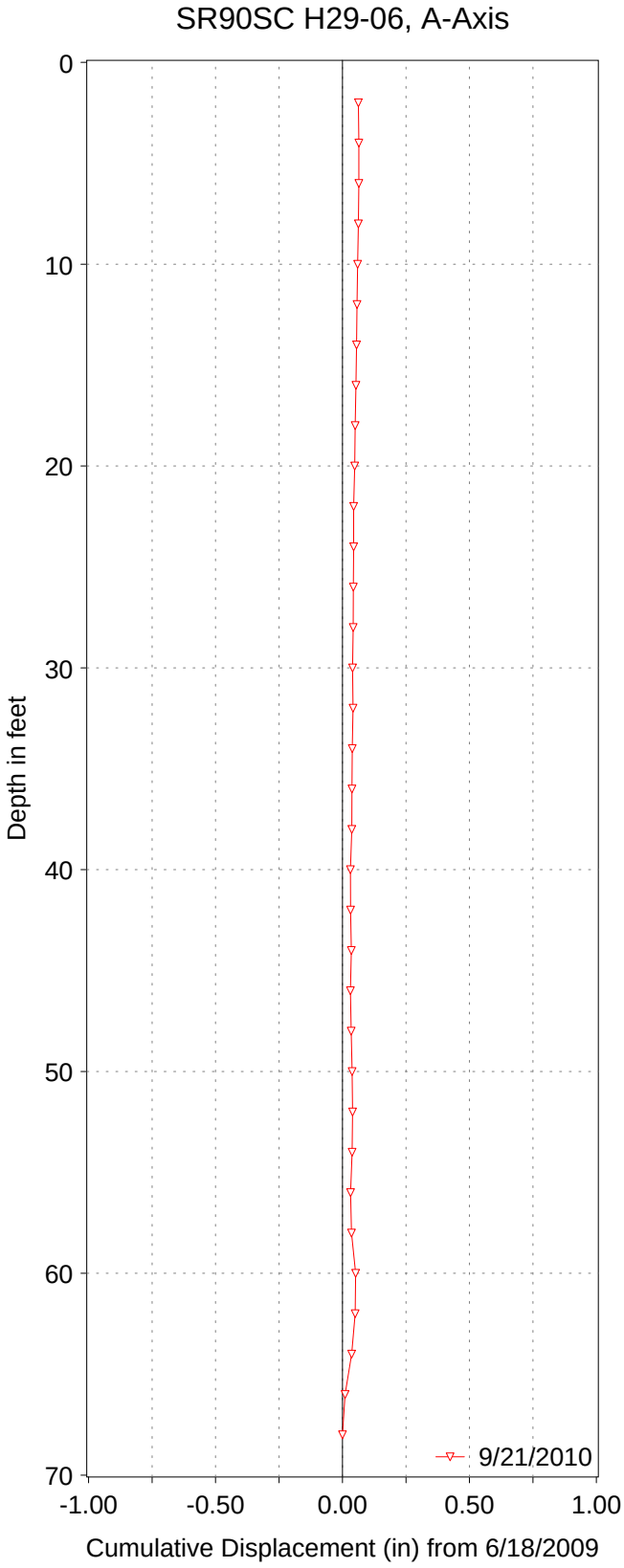


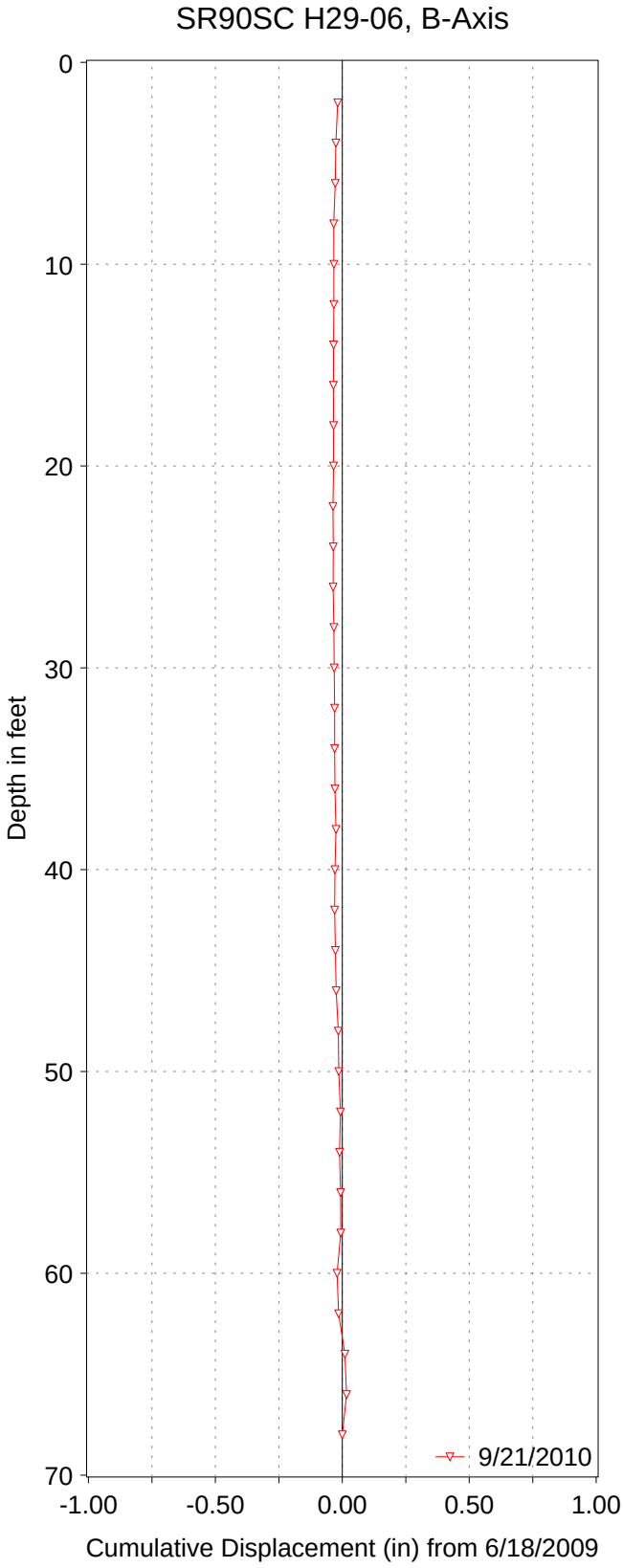
WSDOT	XL-2779 SR 90
Geotechnical Division	Slide Curve Vic.
Instrumentation Section	H-27-06 (New)
Olympia, WA	A+ = N280 deg.



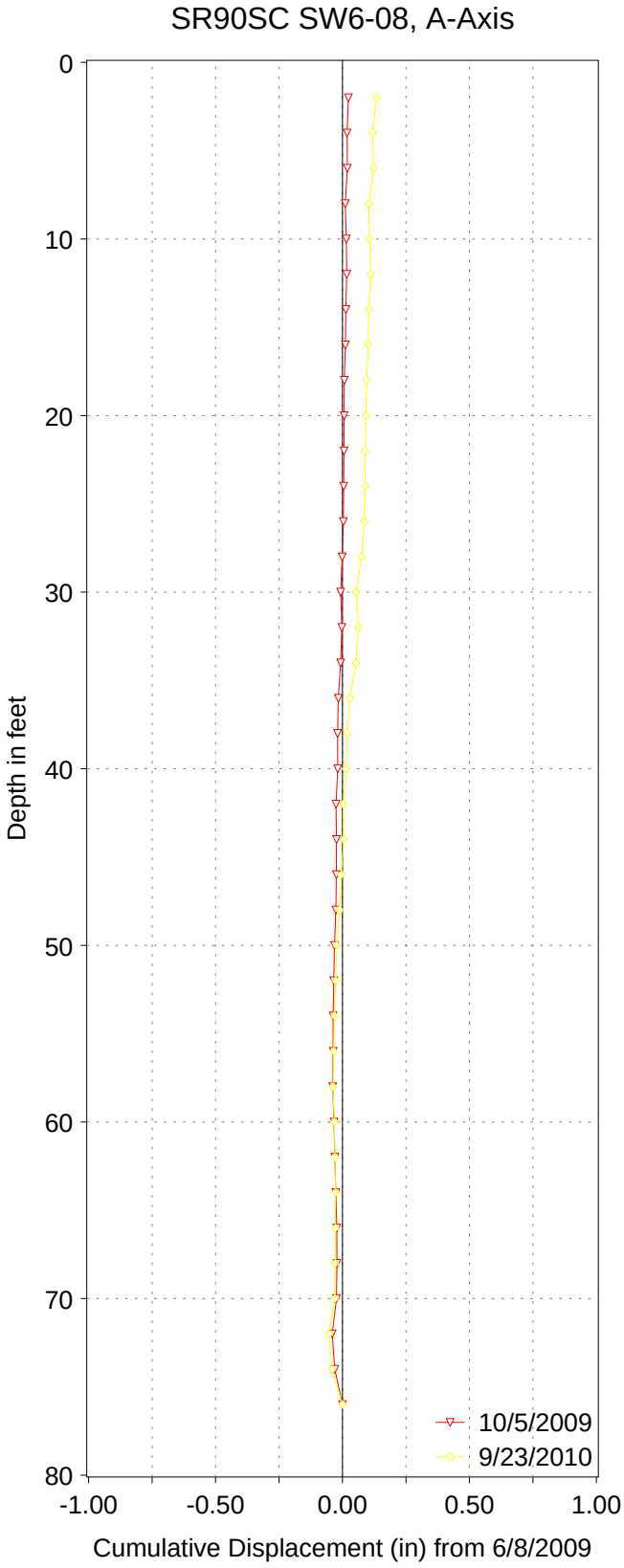


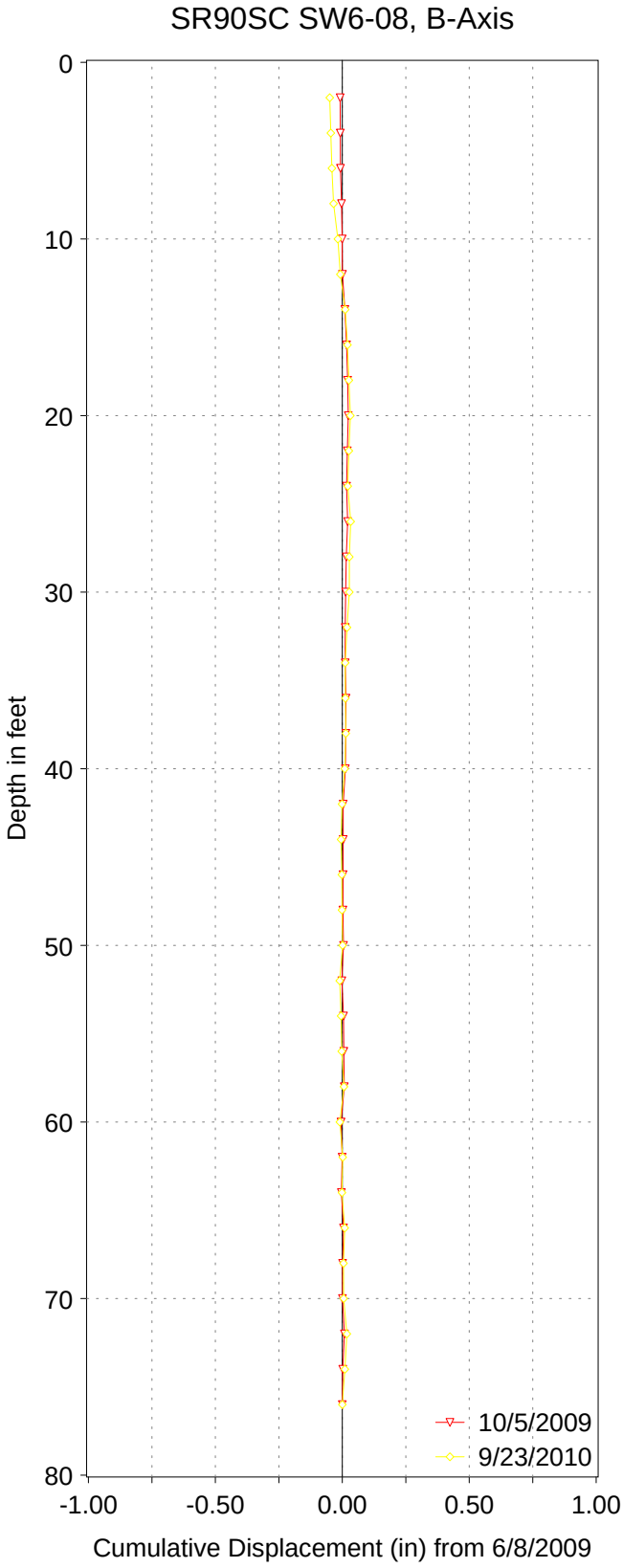
WSDOT	XL-2779 SR 90
Geotechnical Division	Slide Curve Vic.
Instrumentation Section	H-29-06
Olympia, WA	A+ = N259 deg.





WSDOT	XL-2779 SR 90
Geotechnical Division	Slide Curve Vic.
Instrumentation Section	H-29-06 (New)
Olympia, WA	A+ = N259 deg.





WSDOT	**I-90 Slide Curve**
Geotechnical Division	**XL-2779**
Instrumentation Section	**SW2-006-08**
Olympia, WA	**A+ Dir. = N220 Deg.**