

Appendix A

M_R Test Reports for Subgrade Soils

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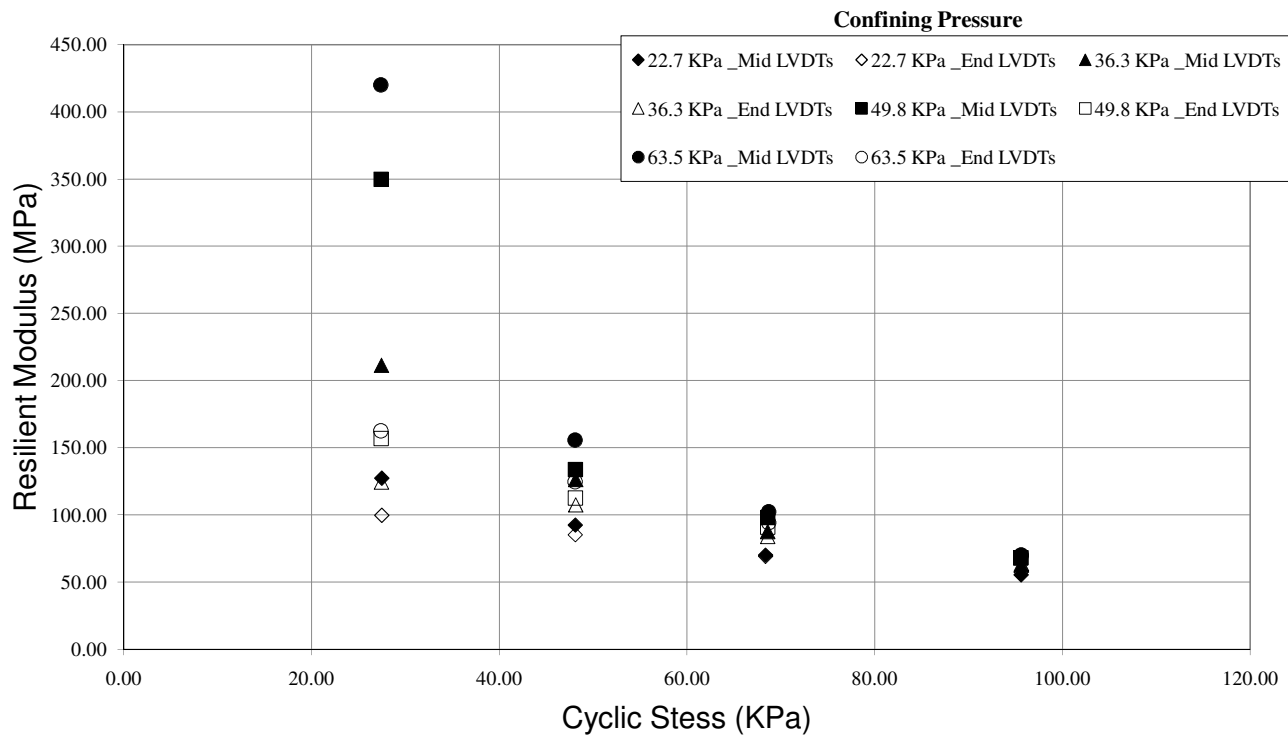
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0101	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1407.97	Soil Type:	High plastic Clay
Sample Moisture (%):	26.90%	Max. Dry Density (kg/m³):	1473
Replicate #:	1	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.38	27.41	27.44	27.47	48.08	48.12	48.13	48.09
Confining Pressure (KPa)	64.29	49.32	36.77	23.76	63.47	50.11	36.50	22.48
Mr - mid LVDTs (MPa)	420.00	349.89	211.31	127.42	155.61	133.79	126.22	92.52
Mr - end LVDTs (MPa)	162.48	156.92	124.54	99.68	124.62	112.52	107.47	85.21

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.71	68.60	68.59	68.36	95.58	95.57	95.63	95.61
Confining Pressure (KPa)	63.01	49.73	36.51	22.28	63.13	49.94	35.48	22.10
Mr - mid LVDTs (MPa)	102.32	98.01	87.63	70.16	70.21	67.93	62.77	55.50
Mr - end LVDTs (MPa)	94.25	90.82	84.00	69.14	69.78	68.06	63.66	57.51

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

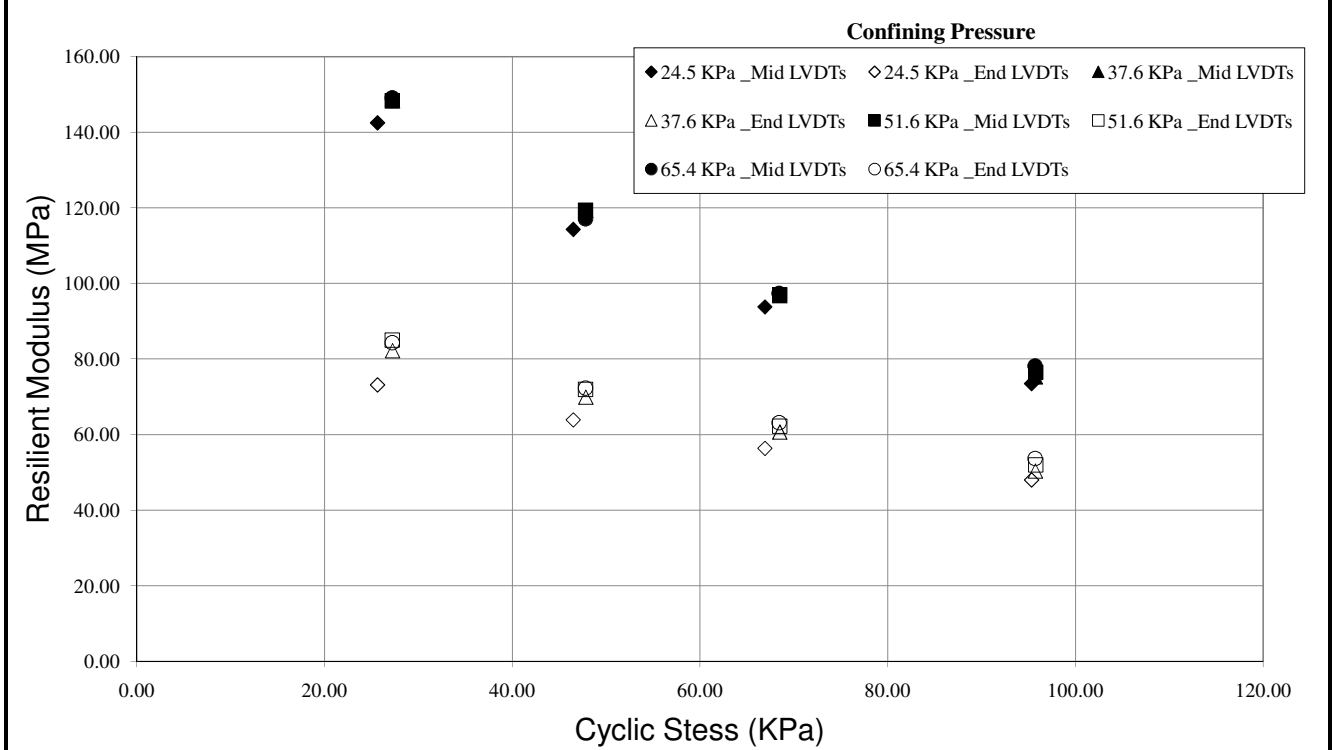
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0102	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1400.38	Soil Type:	High plastic Clay
Sample Moisture (%):	27.52%	Max. Dry Density (kg/m³):	1473
Replicate #:	2	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.20	27.22	27.24	25.65	47.79	47.81	47.83	46.50
Confining Pressure (KPa)	65.94	51.24	38.21	24.46	65.28	51.70	37.43	24.95
Mr - mid LVDTs (MPa)	149.10	148.29	148.36	142.45	117.09	119.39	119.30	114.27
Mr - end LVDTs (MPa)	84.29	84.95	82.19	73.17	72.30	71.92	69.87	63.90

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.45	68.50	68.50	66.92	95.69	95.79	95.74	95.33
Confining Pressure (KPa)	64.86	51.51	37.34	24.39	65.45	51.99	37.56	24.25
Mr - mid LVDTs (MPa)	97.38	97.03	96.72	93.77	78.12	76.41	75.23	73.49
Mr - end LVDTs (MPa)	63.15	62.22	60.62	56.37	53.64	51.92	50.32	48.00

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

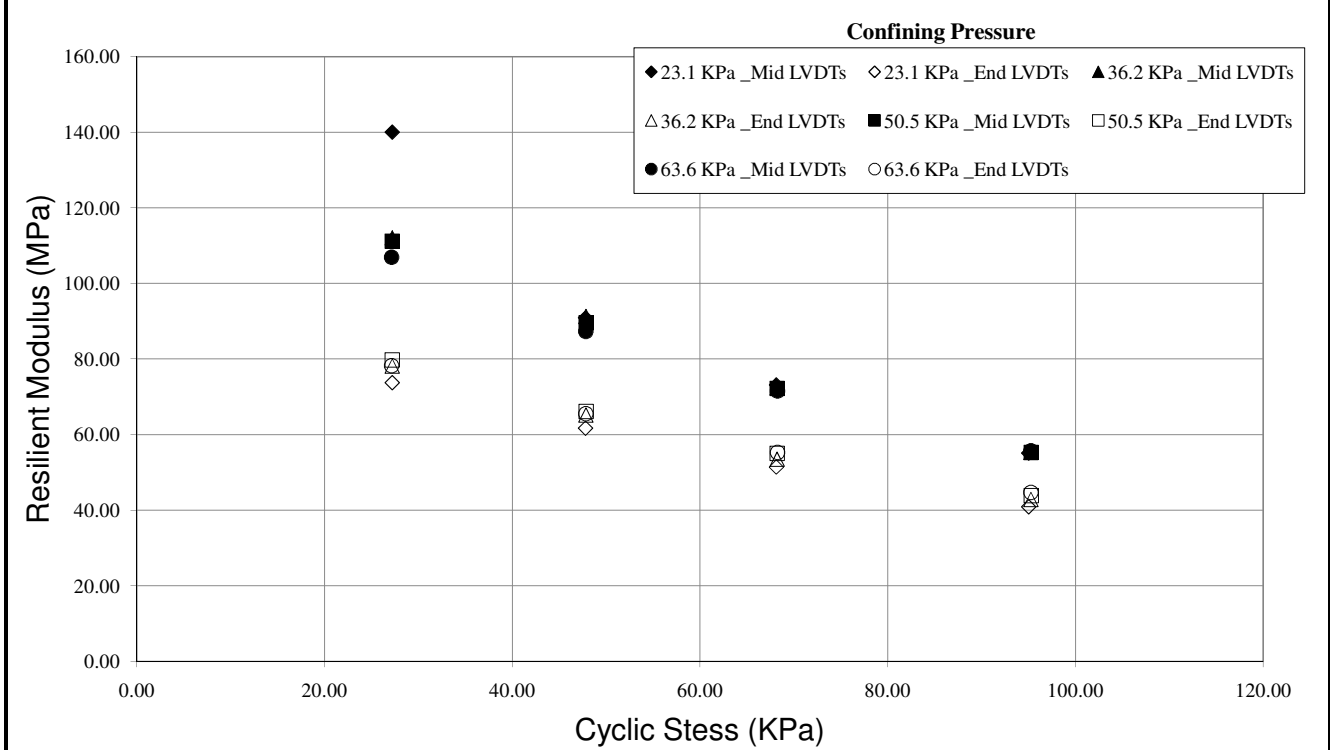
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0103	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1393.52	Soil Type:	High plastic Clay
Sample Moisture (%):	28.40%	Max. Dry Density (kg/m³):	1473
Replicate #:	3	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.15	27.21	27.23	27.22	47.85	47.86	47.86	47.80
Confining Pressure (KPa)	64.99	50.73	37.50	23.34	62.80	50.59	35.83	23.21
Mr - mid LVDTs (MPa)	106.92	111.13	112.12	140.03	87.31	89.59	91.27	90.90
Mr - end LVDTs (MPa)	78.24	79.70	78.16	73.70	65.54	66.13	65.19	61.66

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.26	68.23	68.23	68.12	95.25	95.31	95.27	95.01
Confining Pressure (KPa)	63.66	50.89	35.61	23.02	62.84	49.80	35.83	22.95
Mr - mid LVDTs (MPa)	71.52	72.24	72.43	73.13	55.73	55.27	55.30	55.10
Mr - end LVDTs (MPa)	55.23	55.04	53.45	51.38	44.69	43.84	42.79	40.88

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

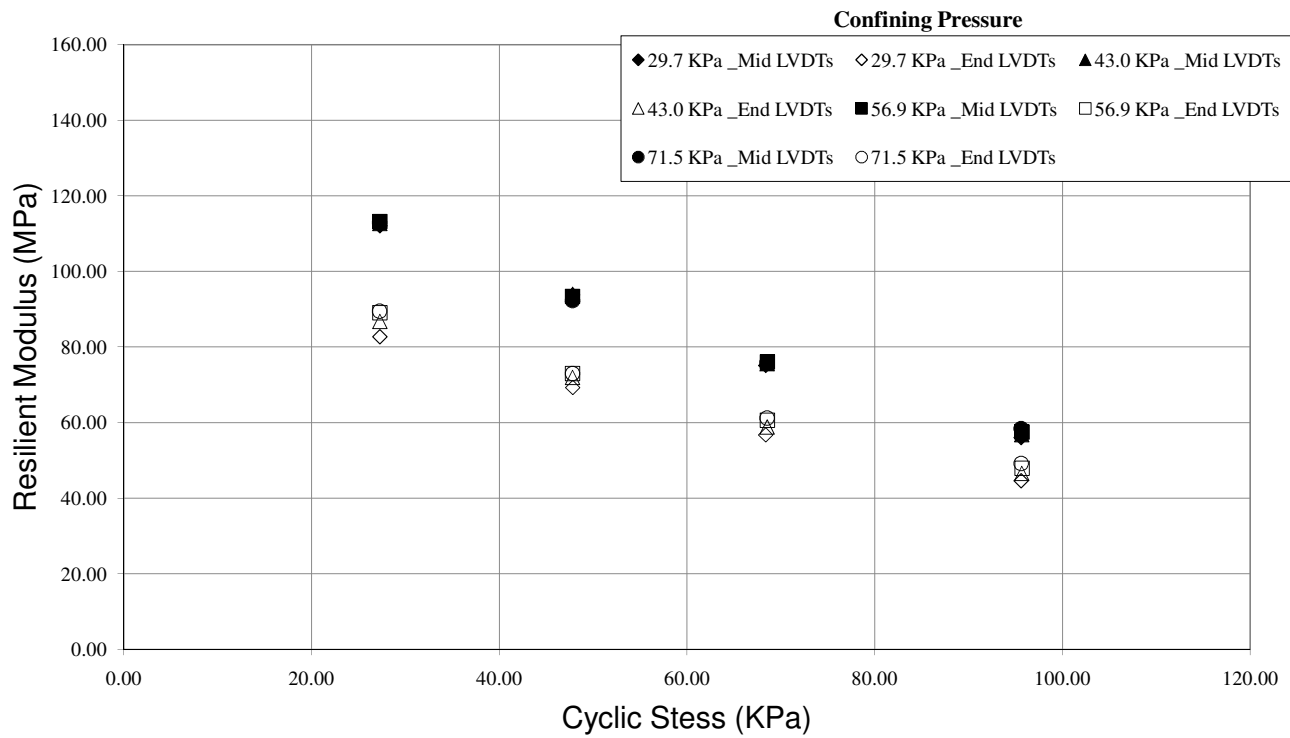
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0104	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1471.16	Soil Type:	High plastic Clay
Sample Moisture (%):	28.52%	Max. Dry Density (kg/m³):	1473
Replicate #:	1	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.26	27.27	27.28	27.28	47.80	47.79	47.80	47.83
Confining Pressure (KPa)	70.82	56.05	42.09	30.31	71.69	56.62	43.65	29.57
Mr - mid LVDTs (MPa)	112.95	113.22	112.72	112.05	92.31	93.35	94.01	93.74
Mr - end LVDTs (MPa)	89.47	89.04	86.78	82.71	72.96	73.00	71.95	69.26

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.54	68.57	68.53	68.39	95.59	95.68	95.66	95.61
Confining Pressure (KPa)	71.59	57.02	42.64	29.33	71.95	57.73	43.75	29.75
Mr - mid LVDTs (MPa)	75.92	76.03	75.60	75.11	58.44	57.49	56.83	56.05
Mr - end LVDTs (MPa)	61.19	60.60	58.84	56.73	49.16	47.89	46.54	44.61

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

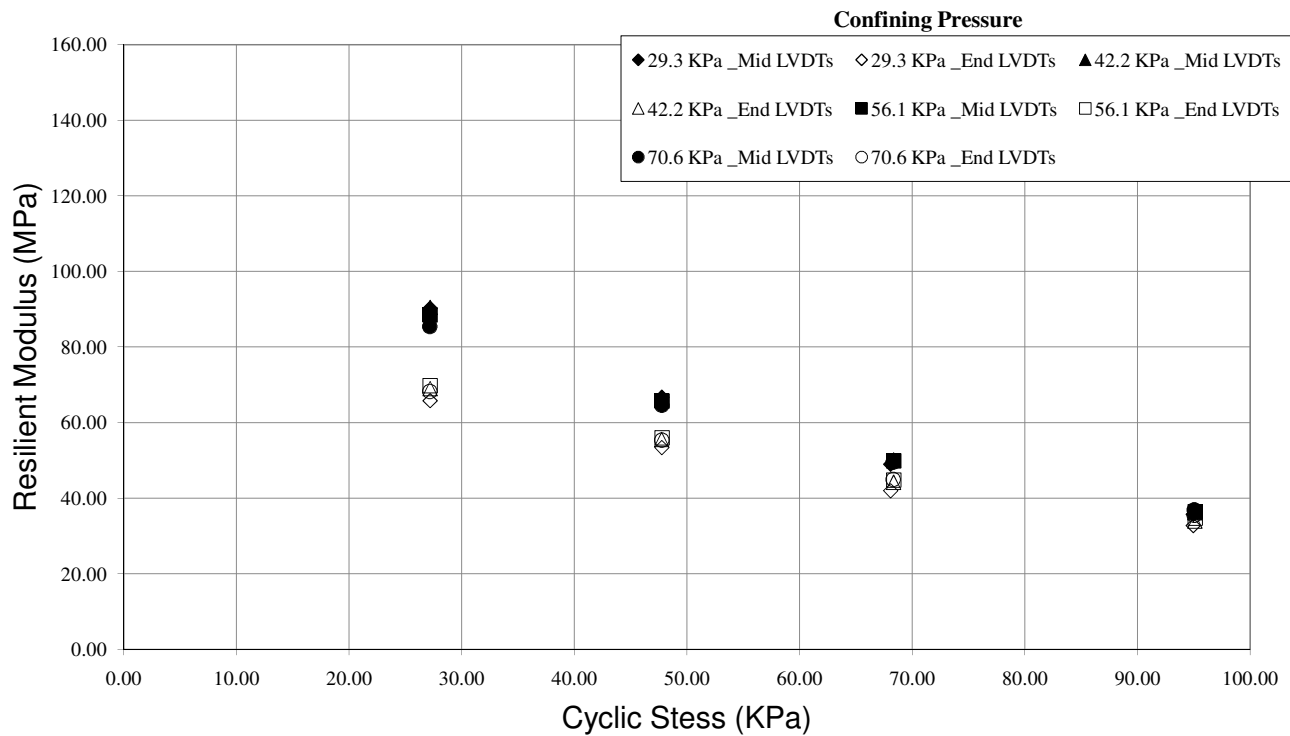
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0105	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1433.16	Soil Type:	High plastic Clay
Sample Moisture (%):	28.20%	Max. Dry Density (kg/m³):	1473
Replicate #:	2	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.17	27.20	27.21	27.20	47.75	47.78	47.75	47.77
Confining Pressure (KPa)	70.08	55.68	42.36	29.55	70.84	56.24	41.77	29.48
Mr - mid LVDTs (MPa)	85.41	88.44	90.48	90.24	64.61	65.66	66.56	66.72
Mr - end LVDTs (MPa)	68.19	69.78	69.02	65.80	55.37	55.98	55.53	53.39

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.31	68.35	68.34	68.08	95.04	95.13	95.09	94.95
Confining Pressure (KPa)	70.73	56.05	42.80	29.24	70.67	56.39	41.98	28.81
Mr - mid LVDTs (MPa)	49.50	49.83	50.09	48.99	36.86	36.42	36.13	35.75
Mr - end LVDTs (MPa)	44.90	44.81	44.20	41.94	35.45	34.73	33.90	32.70

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

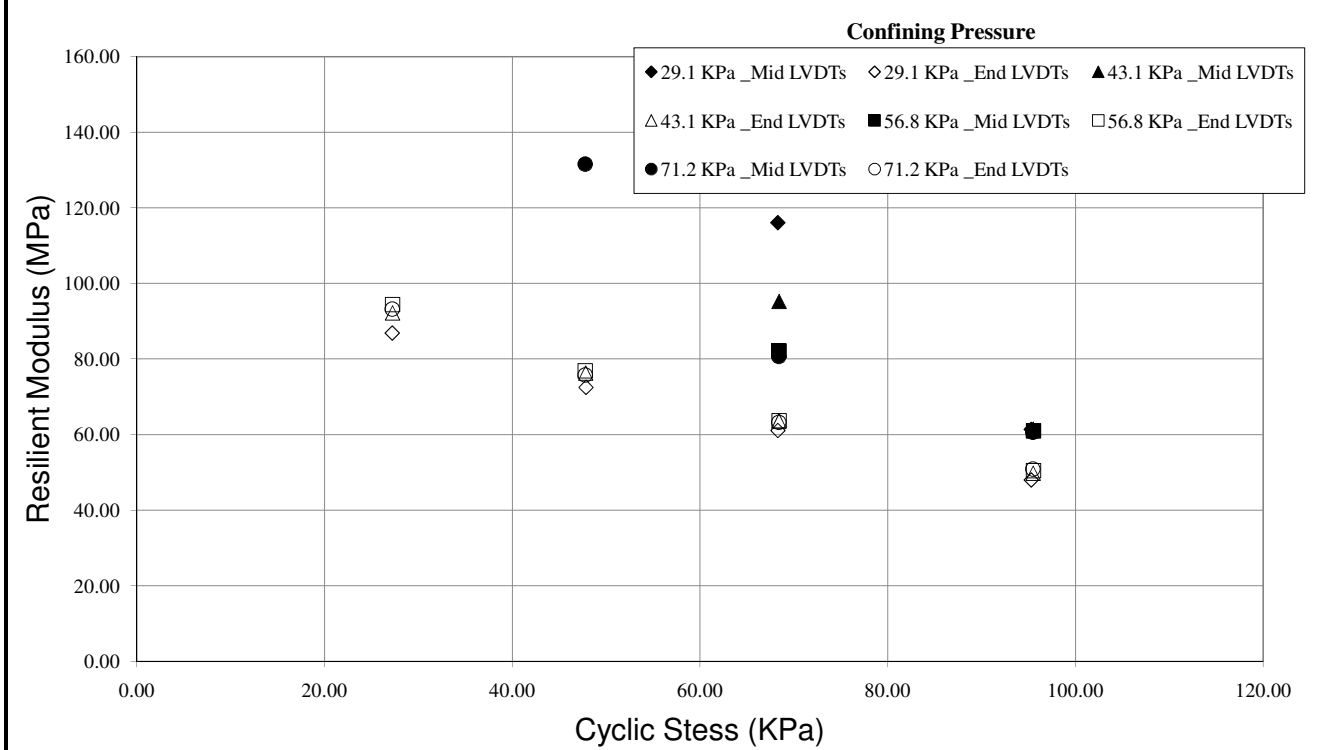
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0106	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1478.99	Soil Type:	High plastic Clay
Sample Moisture (%):	27.76%	Max. Dry Density (kg/m³):	1473
Replicate #:	3	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.20	27.25	27.24	27.22	47.79	47.78	47.82	47.85
Confining Pressure (KPa)	71.71	56.12	42.81	28.57	71.07	57.48	43.57	29.44
Mr - mid LVDTs (MPa)	2926.15	3994.83	4068.09	3691.84	131.59	184.91	310.84	375.71
Mr - end LVDTs (MPa)	93.23	94.39	92.21	86.84	75.77	76.86	76.28	72.47

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.41	68.42	68.42	68.29	95.46	95.54	95.51	95.28
Confining Pressure (KPa)	71.45	56.29	43.32	29.26	70.43	57.38	42.62	29.00
Mr - mid LVDTs (MPa)	80.65	82.13	95.27	116.08	60.61	60.94	61.44	61.36
Mr - end LVDTs (MPa)	63.26	63.64	63.54	61.08	50.87	50.43	49.75	48.01

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

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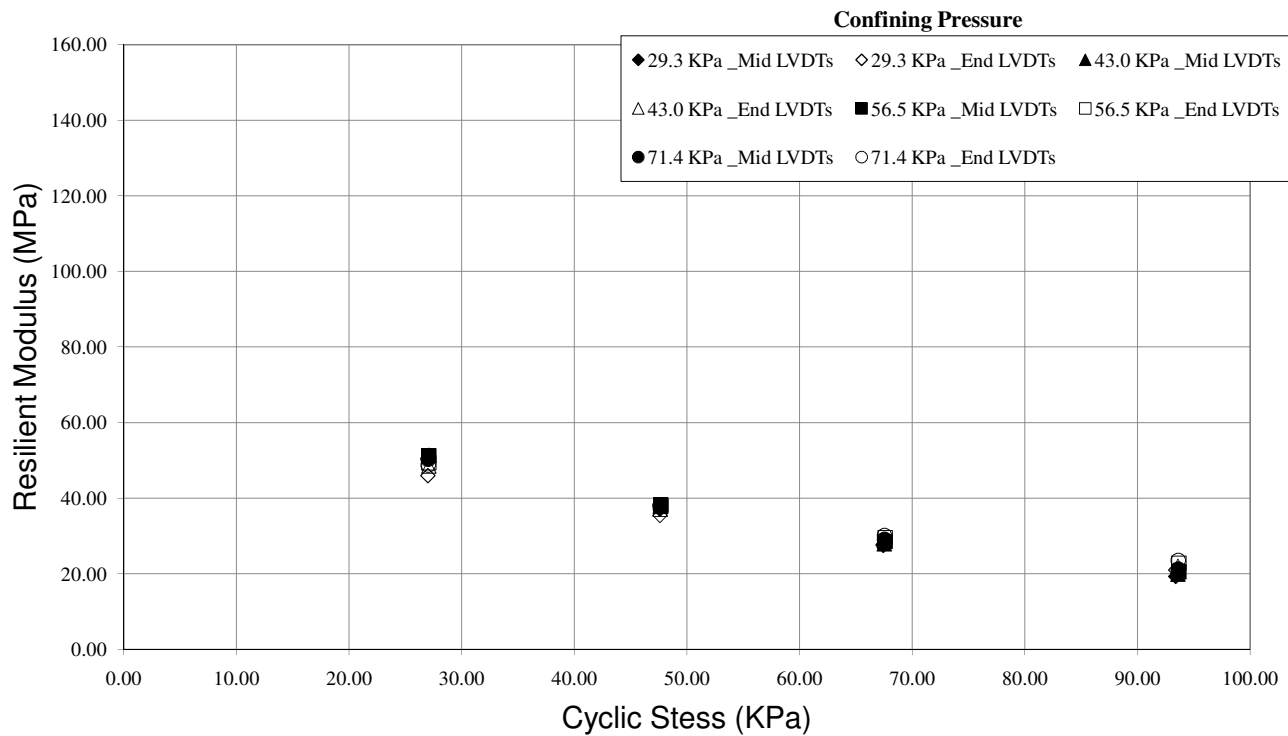
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0107	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1426.00	Soil Type:	High plastic Clay
Sample Moisture (%):	31.50%	Max. Dry Density (kg/m³):	1473
Replicate #:	1	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.03	27.07	27.08	27.01	47.62	47.68	47.62	47.61
Confining Pressure (KPa)	71.53	56.78	43.35	29.36	71.61	56.98	42.74	30.01
Mr - mid LVDTs (MPa)	50.30	51.22	51.33	50.40	38.05	38.13	37.85	37.02
Mr - end LVDTs (MPa)	48.76	49.31	48.45	45.97	37.87	37.81	37.07	35.45

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.54	67.59	67.52	67.42	93.61	93.68	93.60	93.38
Confining Pressure (KPa)	70.99	56.19	43.58	29.06	71.32	56.09	42.24	28.70
Mr - mid LVDTs (MPa)	29.09	28.49	27.93	27.49	21.25	20.49	19.91	19.30
Mr - end LVDTs (MPa)	30.15	29.53	28.73	27.78	23.49	22.74	21.98	20.96

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

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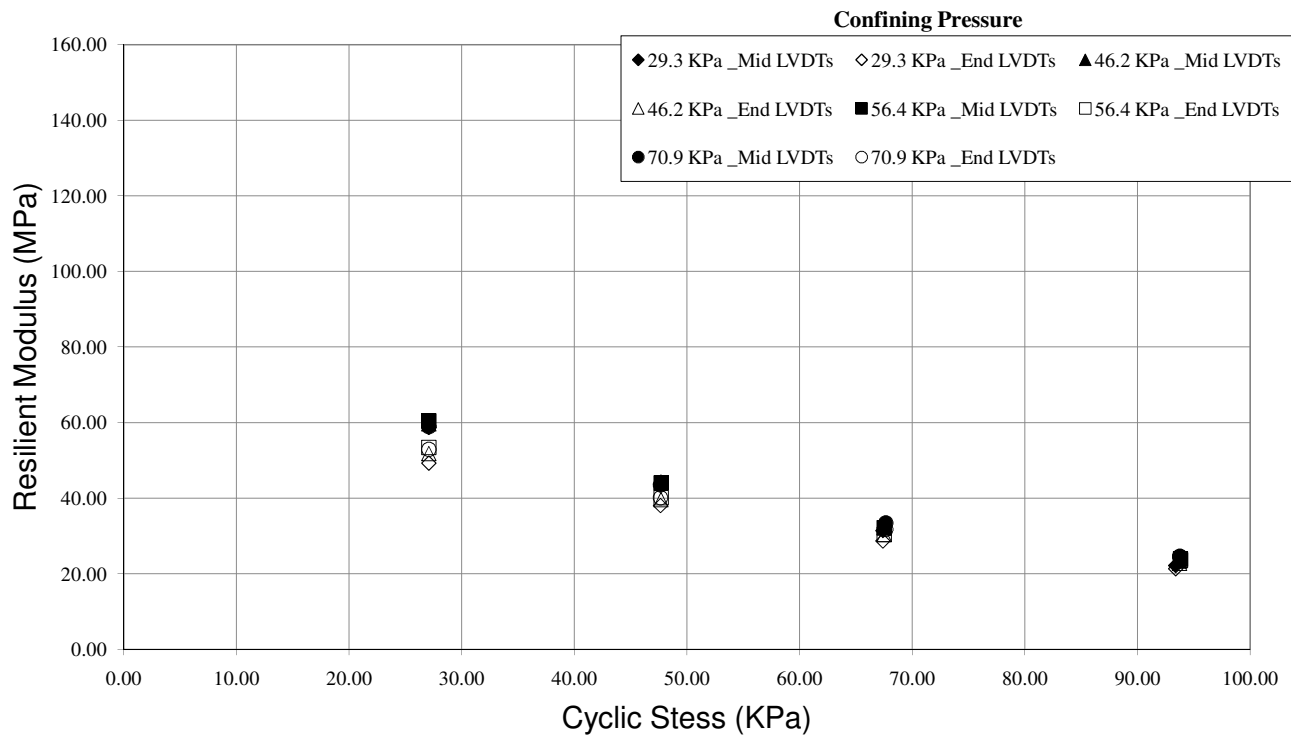
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0108	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1432.31	Soil Type:	High plastic Clay
Sample Moisture (%):	31.39%	Max. Dry Density (kg/m³):	1473
Replicate #:	2	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.09	27.09	27.08	27.07	47.65	47.72	47.68	47.65
Confining Pressure (KPa)	70.03	55.74	42.35	29.49	70.81	56.82	42.63	29.54
Mr - mid LVDTs (MPa)	58.92	60.44	59.71	58.70	43.47	44.02	44.29	43.64
Mr - end LVDTs (MPa)	52.91	53.38	51.83	49.23	40.11	40.12	39.63	38.00

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.65	67.51	67.51	67.40	93.76	93.80	93.73	93.40
Confining Pressure (KPa)	71.00	56.49	56.49	29.22	71.62	56.41	43.38	29.00
Mr - mid LVDTs (MPa)	33.45	32.12	32.12	31.44	24.65	23.86	23.31	22.19
Mr - end LVDTs (MPa)	31.72	30.35	30.35	28.64	24.43	23.53	22.71	21.30

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

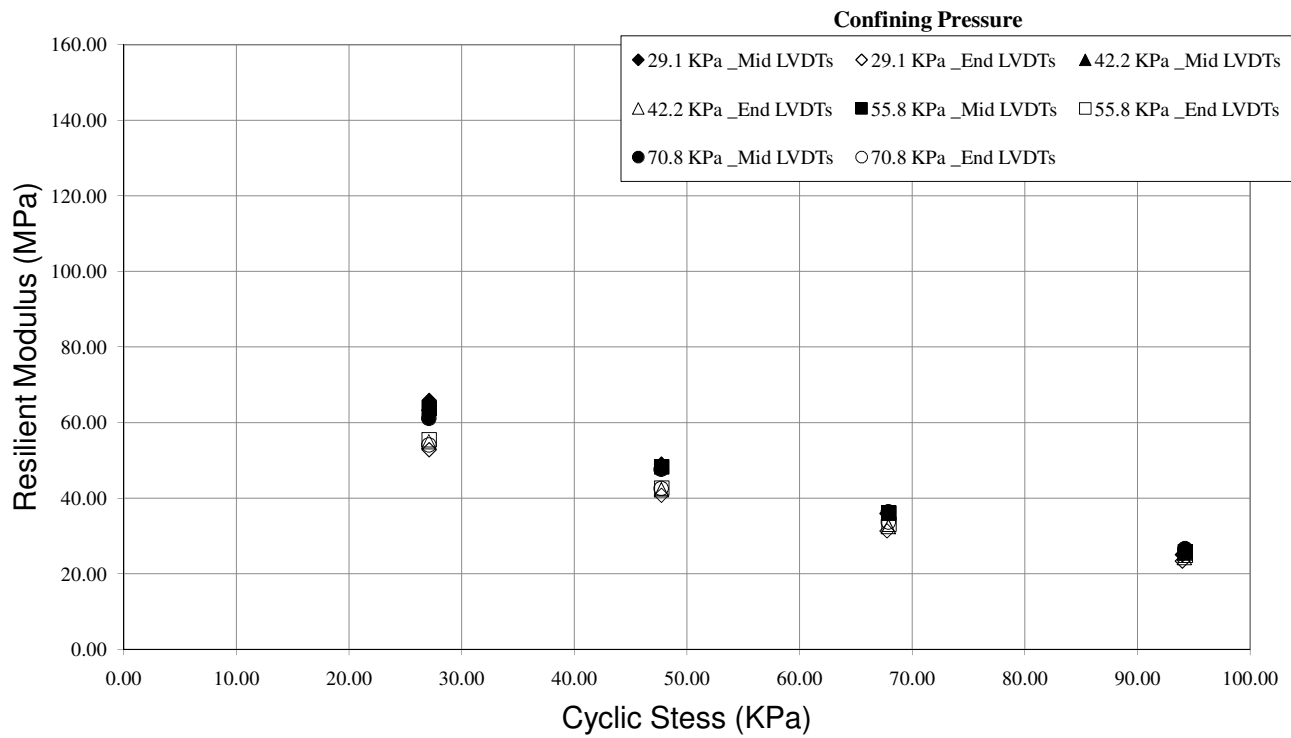
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0109	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1445.00	Soil Type:	High plastic Clay
Sample Moisture (%):	30.57%	Max. Dry Density (kg/m³):	1473
Replicate #:	3	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.08	27.11	27.09	27.10	47.71	47.75	47.73	47.72
Confining Pressure (KPa)	70.51	55.19	41.93	29.72	70.65	55.92	42.05	29.09
Mr - mid LVDTs (MPa)	61.14	63.65	65.07	65.82	47.64	48.23	48.84	49.03
Mr - end LVDTs (MPa)	54.07	55.43	54.93	52.80	42.55	42.64	42.23	40.75

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.89	67.94	67.89	67.76	94.20	94.25	94.16	93.99
Confining Pressure (KPa)	70.91	56.03	42.83	28.80	71.12	56.23	41.94	28.69
Mr - mid LVDTs (MPa)	36.38	36.08	36.05	35.93	26.66	25.80	25.42	25.07
Mr - end LVDTs (MPa)	33.64	33.07	32.43	31.33	25.82	24.91	24.24	23.36

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

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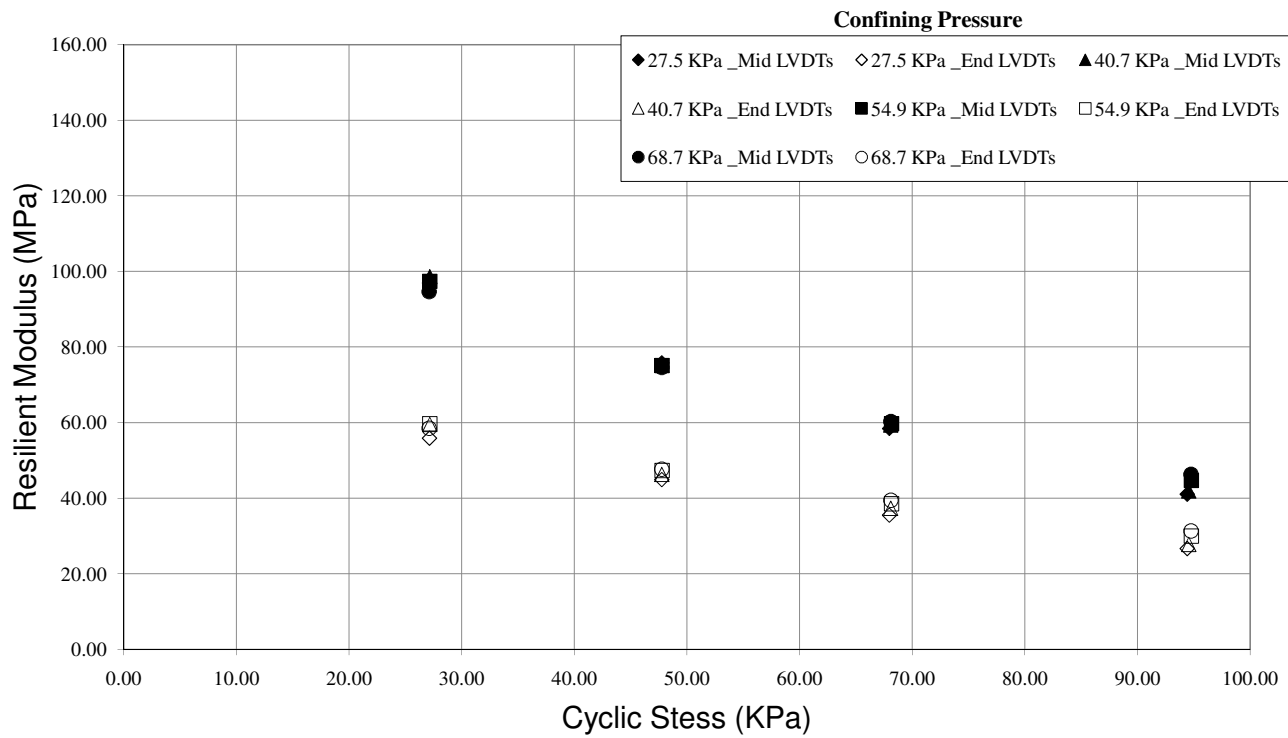
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0110	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1434.38	Soil Type:	High plastic Clay
Sample Moisture (%):	30.47%	Max. Dry Density (kg/m³):	1473
Replicate #:	1	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.12	27.16	27.16	27.13	47.76	47.78	47.77	47.76
Confining Pressure (KPa)	67.67	53.92	40.22	27.42	68.81	55.34	40.93	27.89
Mr - mid LVDTs (MPa)	94.61	97.32	98.60	96.89	74.61	75.11	75.15	75.77
Mr - end LVDTs (MPa)	58.45	59.66	59.52	55.84	47.66	47.32	46.29	44.89

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.11	68.15	68.10	67.97	94.75	94.78	94.56	94.41
Confining Pressure (KPa)	69.00	55.25	41.39	27.23	69.24	55.06	40.37	27.41
Mr - mid LVDTs (MPa)	60.30	59.70	59.38	58.40	46.32	44.66	41.92	41.04
Mr - end LVDTs (MPa)	39.46	38.49	37.37	35.48	31.33	29.91	27.78	26.63

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

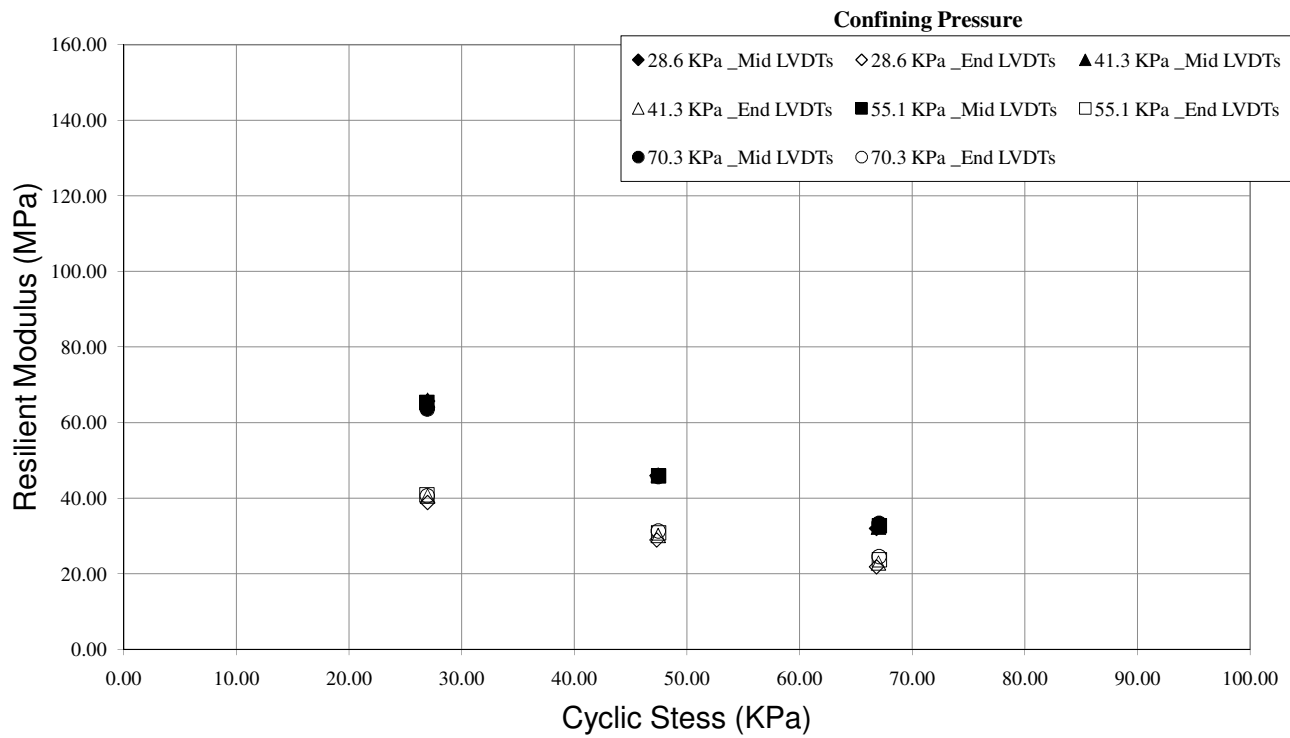
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0111	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1403.30	Soil Type:	High plastic Clay
Sample Moisture (%):	33.35%	Max. Dry Density (kg/m³):	1473
Replicate #:	2	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	26.93	26.92	26.96	26.97	47.45	47.48	47.44	47.32
Confining Pressure (KPa)	70.00	54.42	40.90	28.47	70.35	55.20	41.30	28.27
Mr - mid LVDTs (MPa)	63.55	65.33	65.95	65.65	45.67	45.91	46.13	45.95
Mr - end LVDTs (MPa)	40.62	40.90	40.50	38.81	31.27	30.75	30.10	28.90

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.05	67.09	67.00	66.83	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	70.43	55.76	41.66	29.14	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	33.29	32.67	32.31	32.00	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	24.52	23.65	22.80	21.79	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

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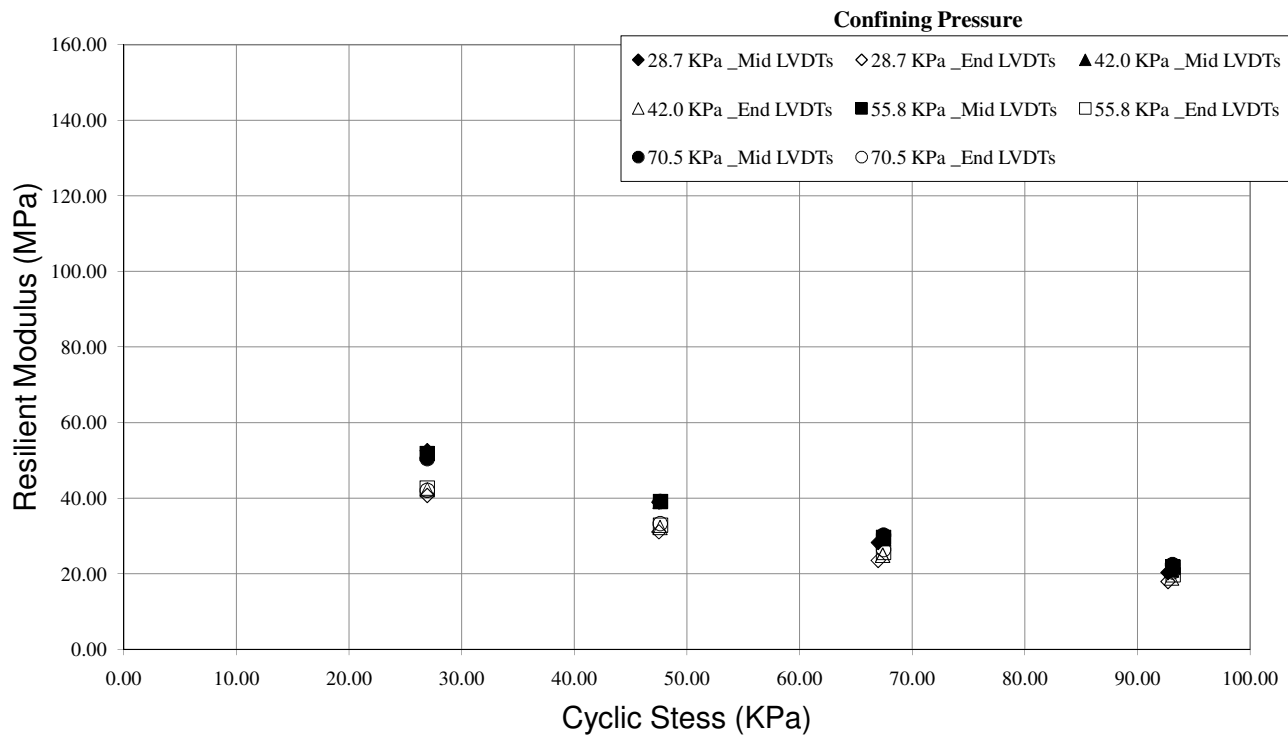
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0112	Client Lab #:	WSS071779
Date Tested:		Location:	PTH 59
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1415.38	Soil Type:	High plastic Clay
Sample Moisture (%):	31.88%	Max. Dry Density (kg/m³):	1473
Replicate #:	3	Optimum Moisture (%):	28.20%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	26.95	26.95	26.94	26.95	47.61	47.65	47.61	47.51
Confining Pressure (KPa)	70.12	54.87	41.46	28.96	70.45	55.76	42.39	28.27
Mr - mid LVDTs (MPa)	50.40	51.82	52.51	52.56	39.08	39.11	39.18	38.96
Mr - end LVDTs (MPa)	42.07	42.61	42.23	40.71	33.23	32.83	32.27	31.07

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.44	67.46	67.37	66.98	93.12	93.16	93.02	92.70
Confining Pressure (KPa)	70.72	56.14	41.62	28.48	70.50	56.24	42.51	29.01
Mr - mid LVDTs (MPa)	30.22	29.64	29.28	28.23	22.41	21.72	20.99	20.30
Mr - end LVDTs (MPa)	26.42	25.66	24.92	23.50	20.45	19.74	18.88	17.91

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

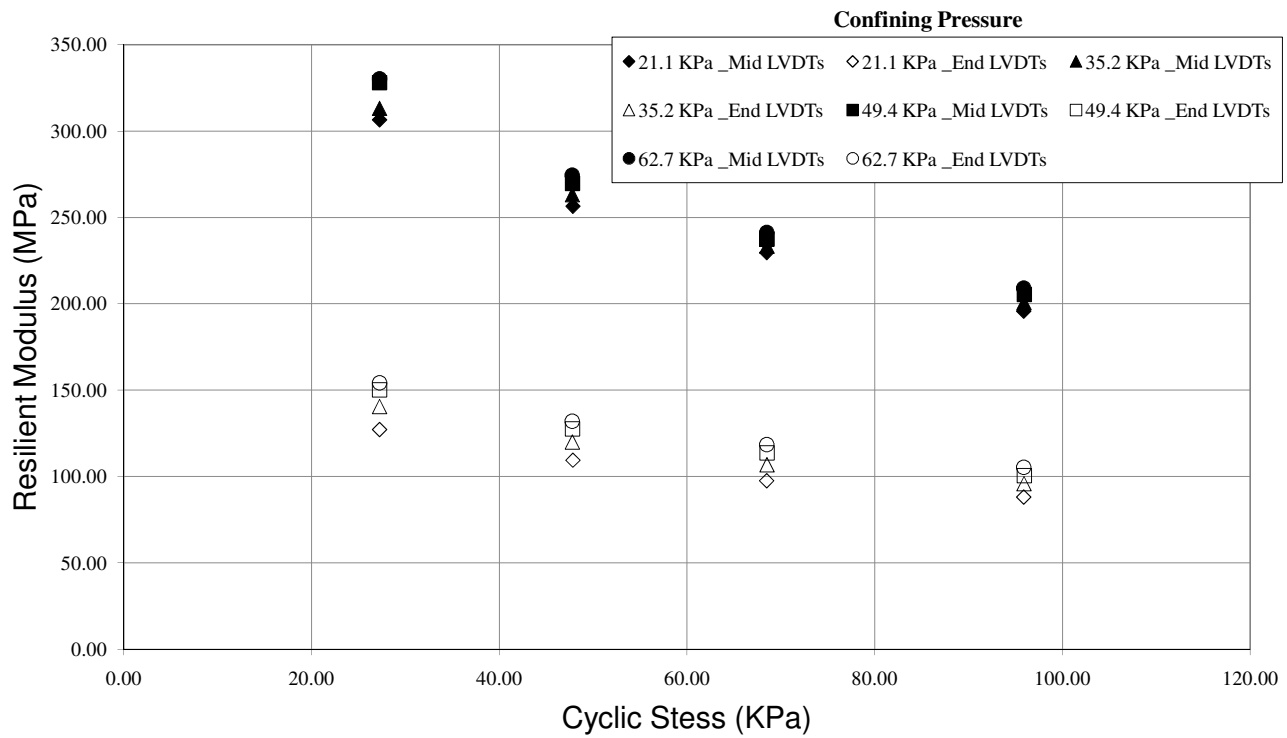
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0101	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1592.50	Soil Type:	High Plastic Clay
Sample Moisture (%):	18.75%	Max. Dry Density (kg/m³):	1631
Replicate #:	1	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.26	27.26	27.25	27.24	47.76	47.80	47.79	47.84
Confining Pressure (KPa)	62.91	49.46	35.80	22.55	63.83	49.50	36.19	21.01
Mr - mid LVDTs (MPa)	330.14	328.02	313.17	306.44	274.42	269.59	263.22	256.48
Mr - end LVDTs (MPa)	154.28	150.20	140.54	127.20	132.01	127.54	119.99	109.40

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.48	68.54	68.53	68.48	95.89	95.94	95.90	95.86
Confining Pressure (KPa)	63.05	49.43	34.39	20.78	60.94	49.14	34.56	20.25
Mr - mid LVDTs (MPa)	241.21	237.42	233.34	229.60	209.04	205.38	200.76	195.80
Mr - end LVDTs (MPa)	118.52	113.62	106.75	97.53	105.25	100.45	95.81	88.07

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

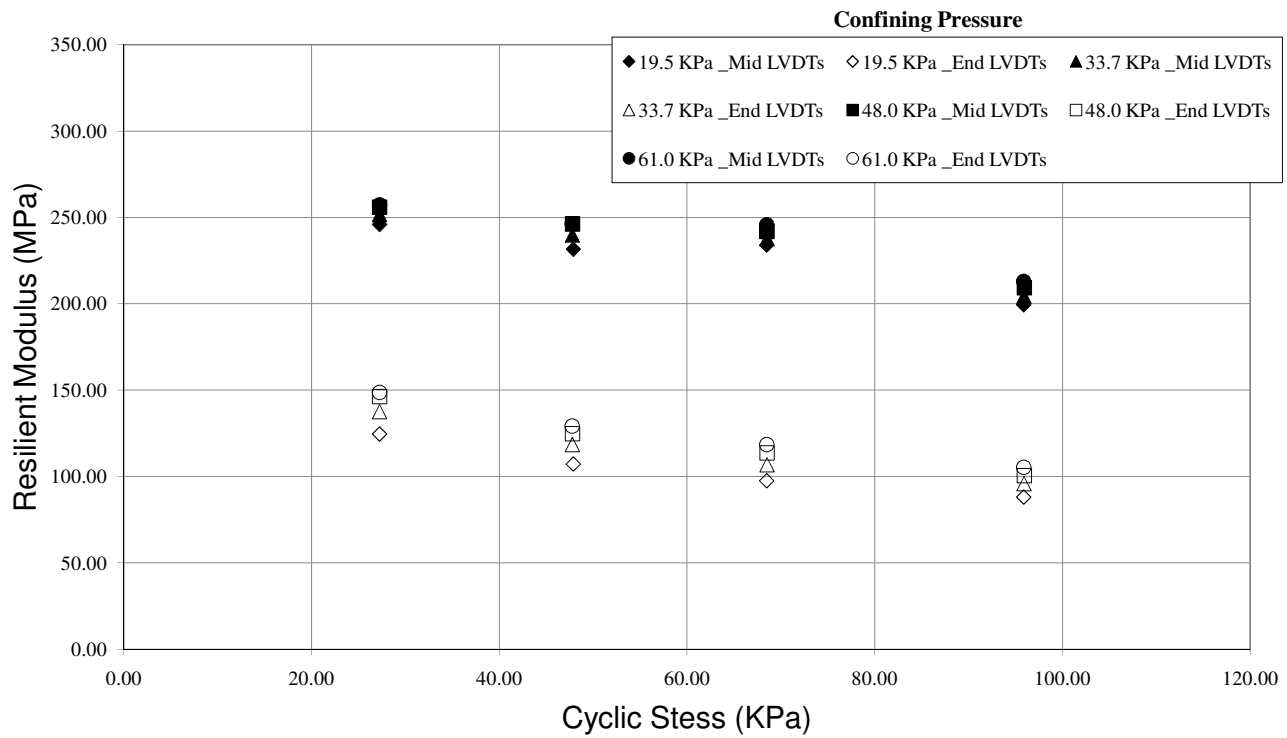
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0102	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1592.50	Soil Type:	High Plastic Clay
Sample Moisture (%):	18.77%	Max. Dry Density (kg/m³):	1631
Replicate #:	2	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.24	27.27	27.25	27.25	47.77	47.80	47.79	47.88
Confining Pressure (KPa)	60.91	46.73	33.52	18.61	58.97	46.81	32.15	18.47
Mr - mid LVDTs (MPa)	257.14	255.95	251.68	245.86	246.34	246.12	239.86	231.57
Mr - end LVDTs (MPa)	148.59	146.21	137.57	124.60	129.30	124.86	118.52	107.22

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.48	68.54	68.53	68.48	95.89	95.94	95.90	95.86
Confining Pressure (KPa)	63.05	49.43	34.39	20.78	60.94	49.14	34.56	20.25
Mr - mid LVDTs (MPa)	245.74	241.88	237.72	233.93	212.95	209.22	204.51	199.47
Mr - end LVDTs (MPa)	118.52	113.62	106.75	97.53	105.25	100.45	95.81	88.07

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

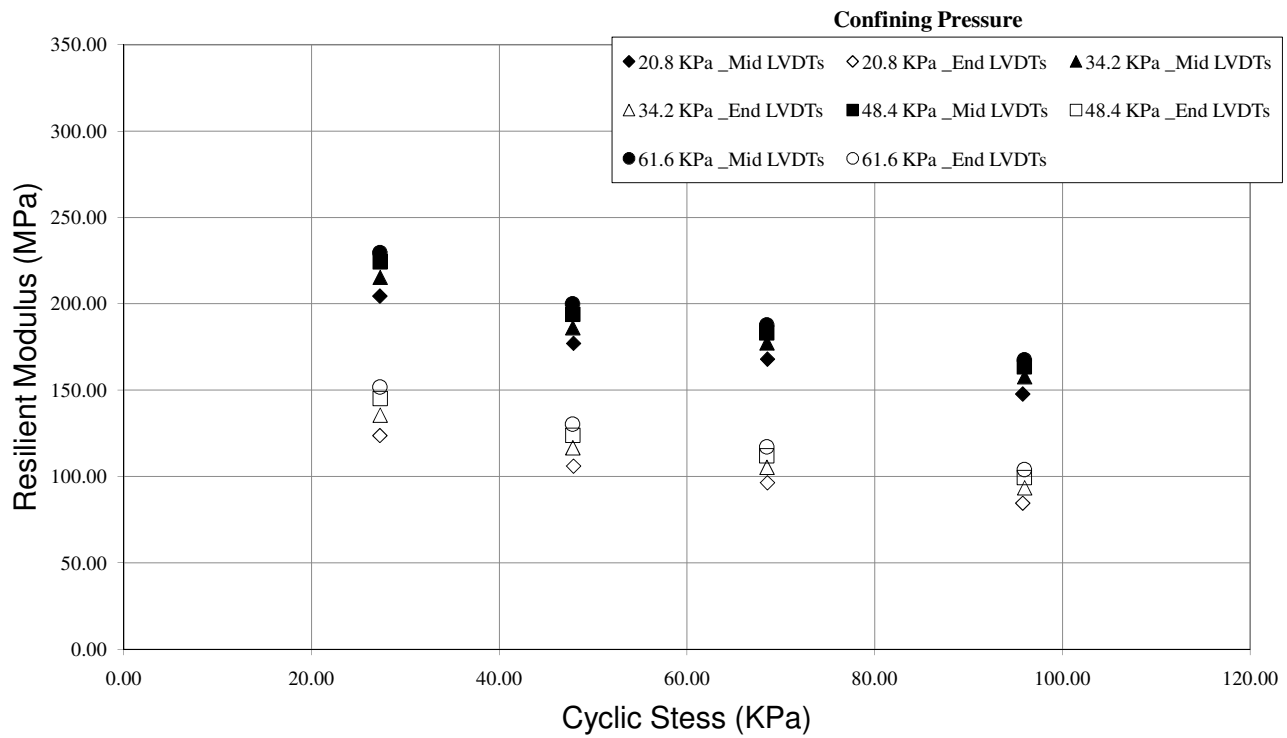
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0103	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1592.81	Soil Type:	High Plastic Clay
Sample Moisture (%):	18.81%	Max. Dry Density (kg/m³):	1631
Replicate #:	3	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.29	27.32	27.30	27.27	47.81	47.84	47.83	47.91
Confining Pressure (KPa)	61.96	48.44	34.80	21.08	62.25	48.38	33.92	20.62
Mr - mid LVDTs (MPa)	229.71	224.18	215.38	204.37	199.96	193.81	186.23	176.99
Mr - end LVDTs (MPa)	151.83	145.12	135.58	123.73	130.39	123.79	116.76	106.04

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.49	68.50	68.52	68.58	95.93	95.95	95.98	95.78
Confining Pressure (KPa)	60.36	48.23	34.03	20.99	61.75	48.35	34.23	20.37
Mr - mid LVDTs (MPa)	187.82	183.04	177.37	167.86	167.55	163.44	157.84	147.67
Mr - end LVDTs (MPa)	117.12	112.00	105.32	96.39	103.97	99.46	93.52	84.55

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

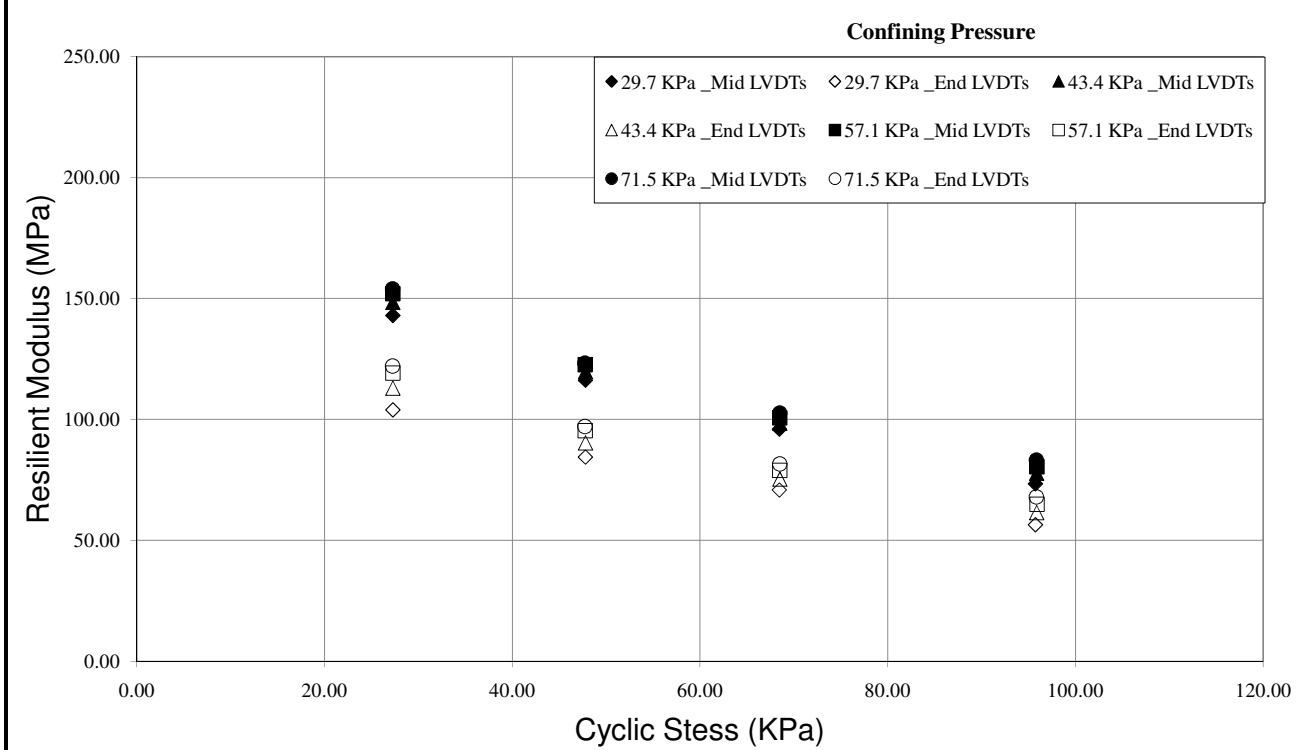
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0104	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1618.36	Soil Type:	High Plastic Clay
Sample Moisture (%):	20.43%	Max. Dry Density (kg/m³):	1631
Replicate #:	1	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.25	27.27	27.27	27.27	47.75	47.76	47.79	47.78
Confining Pressure (KPa)	71.13	57.62	42.84	29.97	71.73	56.41	43.98	28.93
Mr - mid LVDTs (MPa)	153.91	152.01	148.39	143.00	123.33	122.59	119.67	116.16
Mr - end LVDTs (MPa)	122.07	119.22	112.94	104.01	97.01	95.30	90.31	84.48

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.49	68.50	68.50	68.45	95.85	95.89	95.86	95.73
Confining Pressure (KPa)	71.14	57.03	43.73	29.74	71.86	57.14	42.89	30.08
Mr - mid LVDTs (MPa)	102.65	100.68	98.35	95.95	83.15	80.38	77.73	73.38
Mr - end LVDTs (MPa)	81.58	78.97	75.33	70.87	67.97	64.94	61.49	56.47

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

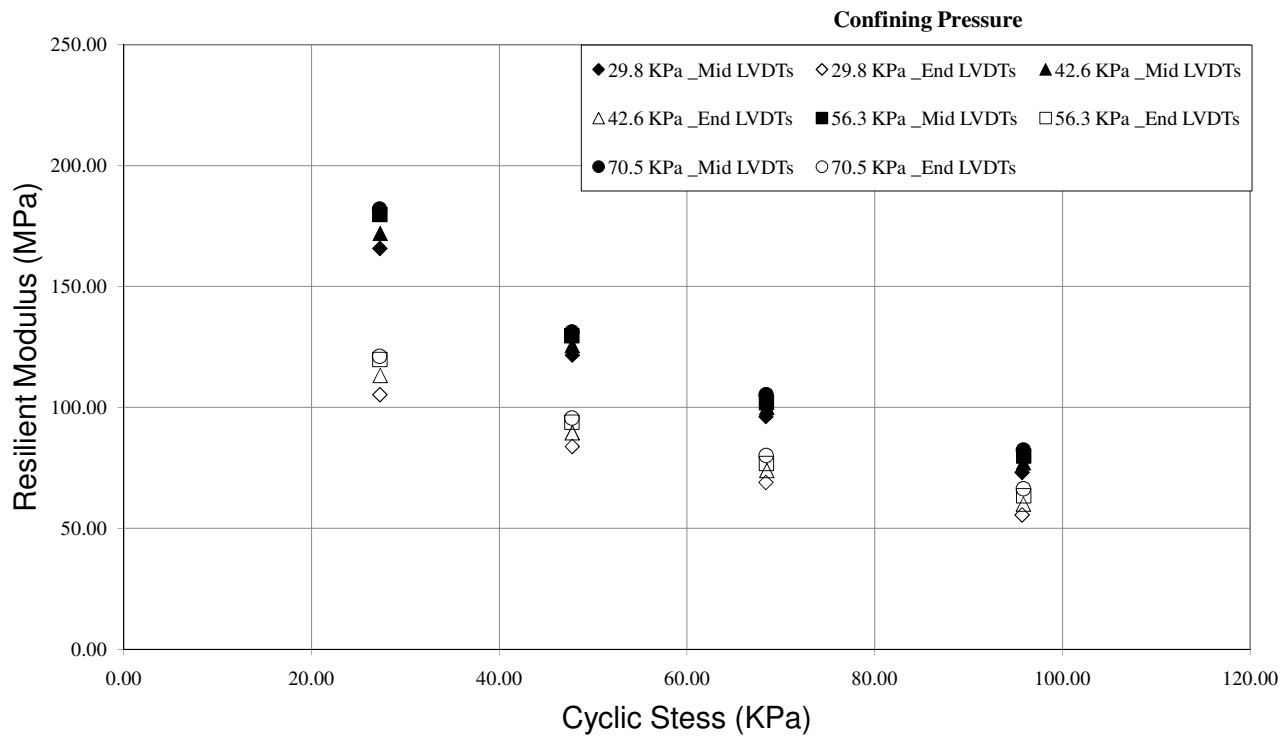
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0105	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1620.18	Soil Type:	High Plastic Clay
Sample Moisture (%):	20.33%	Max. Dry Density (kg/m³):	1631
Replicate #:	2	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.26	27.27	27.30	27.28	47.73	47.73	47.76	47.77
Confining Pressure (KPa)	69.75	56.61	42.03	29.80	70.70	56.48	42.65	29.85
Mr - mid LVDTs (MPa)	181.97	179.79	171.97	165.74	131.21	129.55	125.56	121.55
Mr - end LVDTs (MPa)	121.19	119.78	113.19	105.24	95.65	93.93	89.46	83.84

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.43	68.47	68.49	68.42	95.84	95.88	95.82	95.72
Confining Pressure (KPa)	70.71	55.48	42.52	29.67	70.81	56.81	43.12	29.71
Mr - mid LVDTs (MPa)	105.22	101.98	99.98	96.16	82.38	79.87	77.14	73.08
Mr - end LVDTs (MPa)	80.16	76.82	73.90	69.00	66.34	63.47	60.02	55.57

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

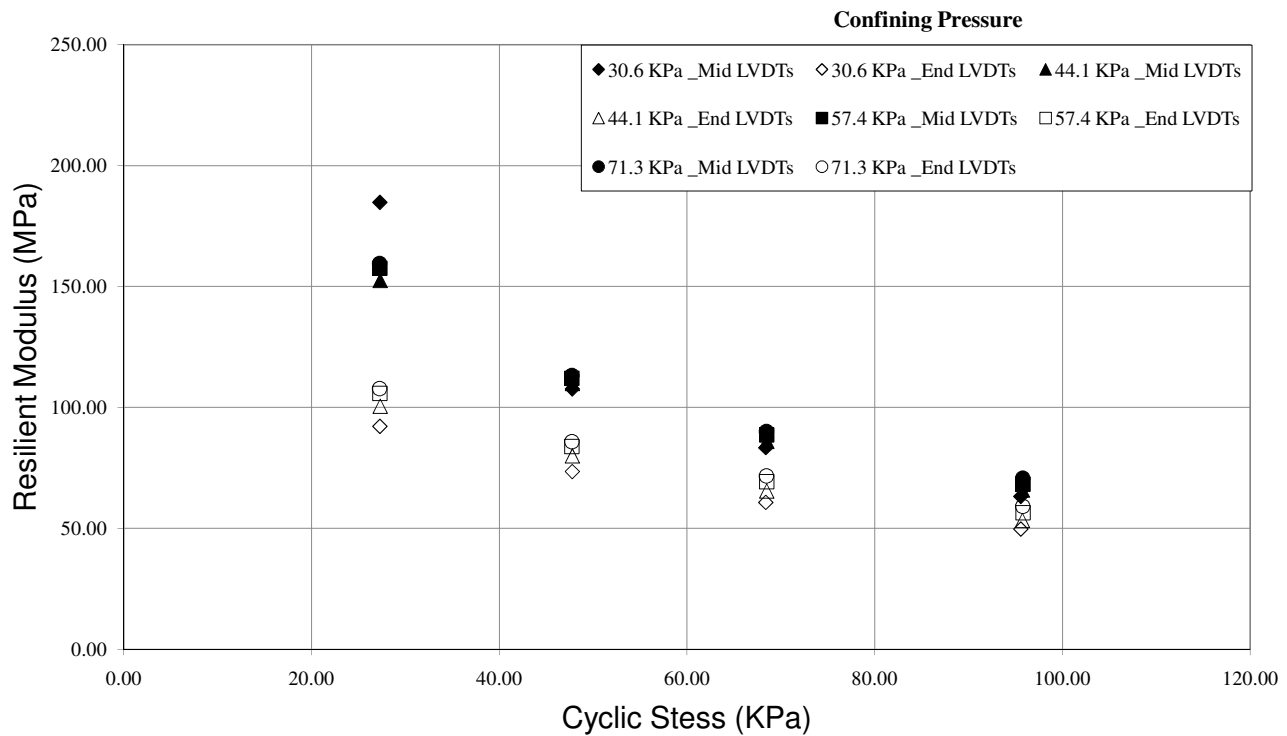
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0106	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1616.12	Soil Type:	High Plastic Clay
Sample Moisture (%):	20.44%	Max. Dry Density (kg/m³):	1631
Replicate #:	3	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.25	27.27	27.30	27.29	47.72	47.74	47.77	47.79
Confining Pressure (KPa)	71.58	57.62	44.53	30.66	71.43	57.54	44.00	30.75
Mr - mid LVDTs (MPa)	159.57	157.54	152.54	184.82	113.18	112.01	109.95	107.57
Mr - end LVDTs (MPa)	107.73	105.82	100.46	92.18	85.76	83.81	79.93	73.50

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.46	68.51	68.49	68.40	95.76	95.80	95.74	95.57
Confining Pressure (KPa)	71.04	57.10	44.06	30.53	71.20	57.52	43.88	30.29
Mr - mid LVDTs (MPa)	90.03	88.56	86.05	83.30	70.80	68.26	65.90	63.14
Mr - end LVDTs (MPa)	71.65	69.33	65.47	60.73	59.15	56.48	53.32	49.72

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

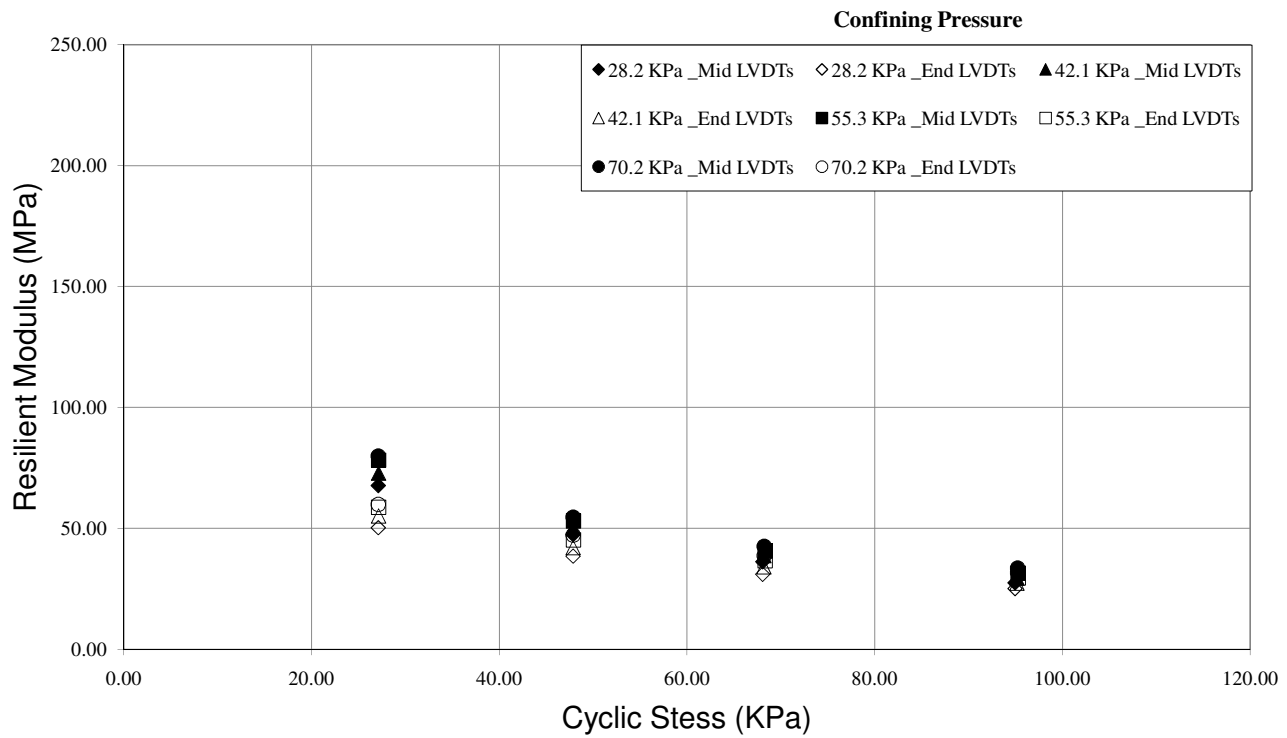
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0107	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1579.09	Soil Type:	High Plastic Clay
Sample Moisture (%):	23.48%	Max. Dry Density (kg/m³):	1631
Replicate #:	1	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.12	27.16	27.16	27.11	47.86	47.92	47.88	47.86
Confining Pressure (KPa)	69.87	56.02	42.83	27.71	70.22	54.79	40.85	28.64
Mr - mid LVDTs (MPa)	79.84	78.15	72.81	67.68	54.54	53.07	50.25	47.32
Mr - end LVDTs (MPa)	59.84	58.69	55.12	50.25	47.23	45.16	42.04	38.50

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.22	68.33	68.21	68.06	95.21	95.28	95.17	94.93
Confining Pressure (KPa)	70.11	55.65	42.40	27.87	70.41	54.71	42.25	28.47
Mr - mid LVDTs (MPa)	42.56	40.59	38.73	36.15	33.61	31.41	29.51	27.46
Mr - end LVDTs (MPa)	38.68	36.59	34.15	31.00	31.68	29.51	27.40	25.05

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

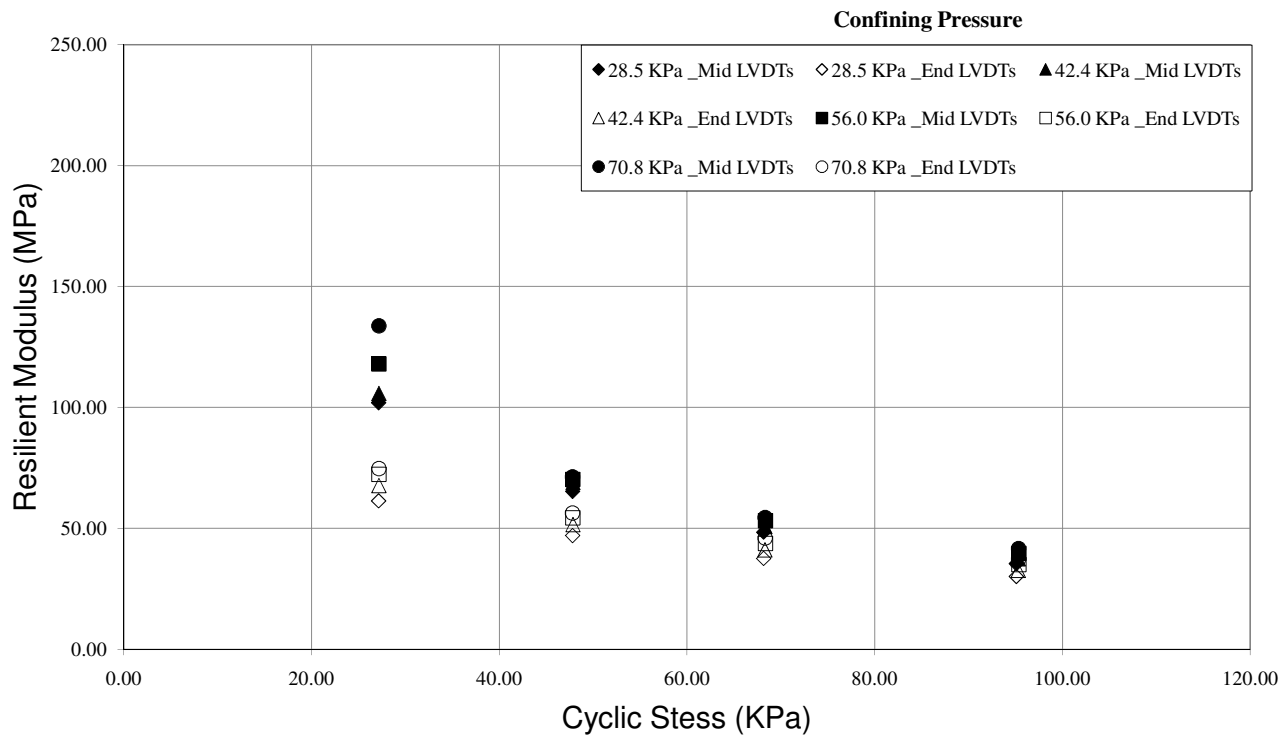
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0108	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1585.52	Soil Type:	High Plastic Clay
Sample Moisture (%):	22.57%	Max. Dry Density (kg/m³):	1631
Replicate #:	2	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.19	27.18	27.19	27.16	47.82	47.85	47.86	47.83
Confining Pressure (KPa)	70.65	56.24	43.36	28.76	70.61	55.30	42.77	28.19
Mr - mid LVDTs (MPa)	133.66	117.94	105.76	101.93	71.21	70.23	69.06	65.24
Mr - end LVDTs (MPa)	74.65	72.32	67.69	61.38	56.27	54.33	51.55	47.03

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.33	68.36	68.31	68.17	95.32	95.37	95.30	95.09
Confining Pressure (KPa)	71.05	56.40	41.68	28.52	70.70	55.94	41.65	28.55
Mr - mid LVDTs (MPa)	54.50	53.14	50.77	48.37	41.63	39.69	37.42	35.39
Mr - end LVDTs (MPa)	46.02	43.78	41.08	37.52	37.22	35.02	32.61	30.07

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

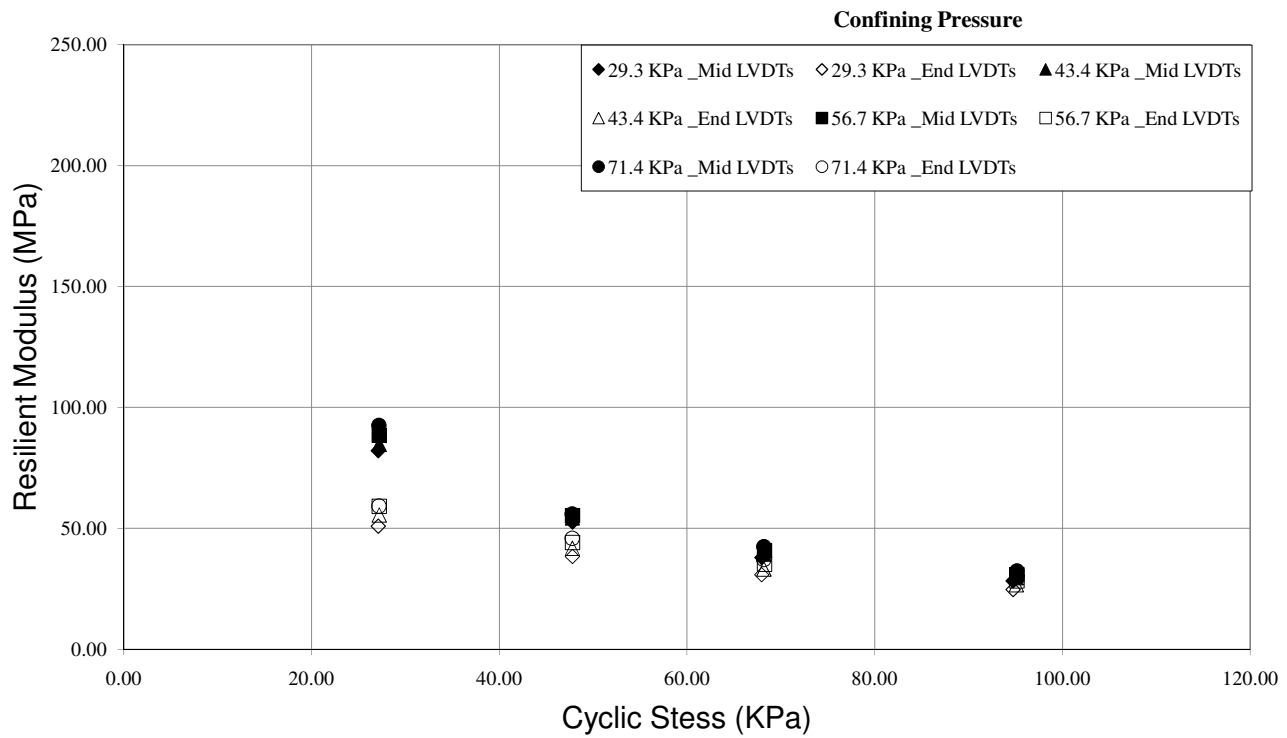
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0109	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1587.59	Soil Type:	High Plastic Clay
Sample Moisture (%):	23.07%	Max. Dry Density (kg/m³):	1631
Replicate #:	3	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.17	27.20	27.20	27.12	47.78	47.82	47.78	47.79
Confining Pressure (KPa)	71.08	56.61	44.02	29.54	71.63	56.54	43.30	28.76
Mr - mid LVDTs (MPa)	92.62	88.41	84.73	82.07	55.96	55.20	54.29	52.52
Mr - end LVDTs (MPa)	59.28	59.11	55.54	50.85	45.92	44.11	41.76	38.33

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.21	68.25	68.19	67.96	95.16	95.16	95.09	94.75
Confining Pressure (KPa)	71.22	57.26	42.72	29.59	71.72	56.57	43.48	29.49
Mr - mid LVDTs (MPa)	42.41	40.66	39.29	37.90	32.35	30.78	29.56	28.28
Mr - end LVDTs (MPa)	37.18	35.21	33.18	30.78	30.11	28.28	26.62	24.64

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

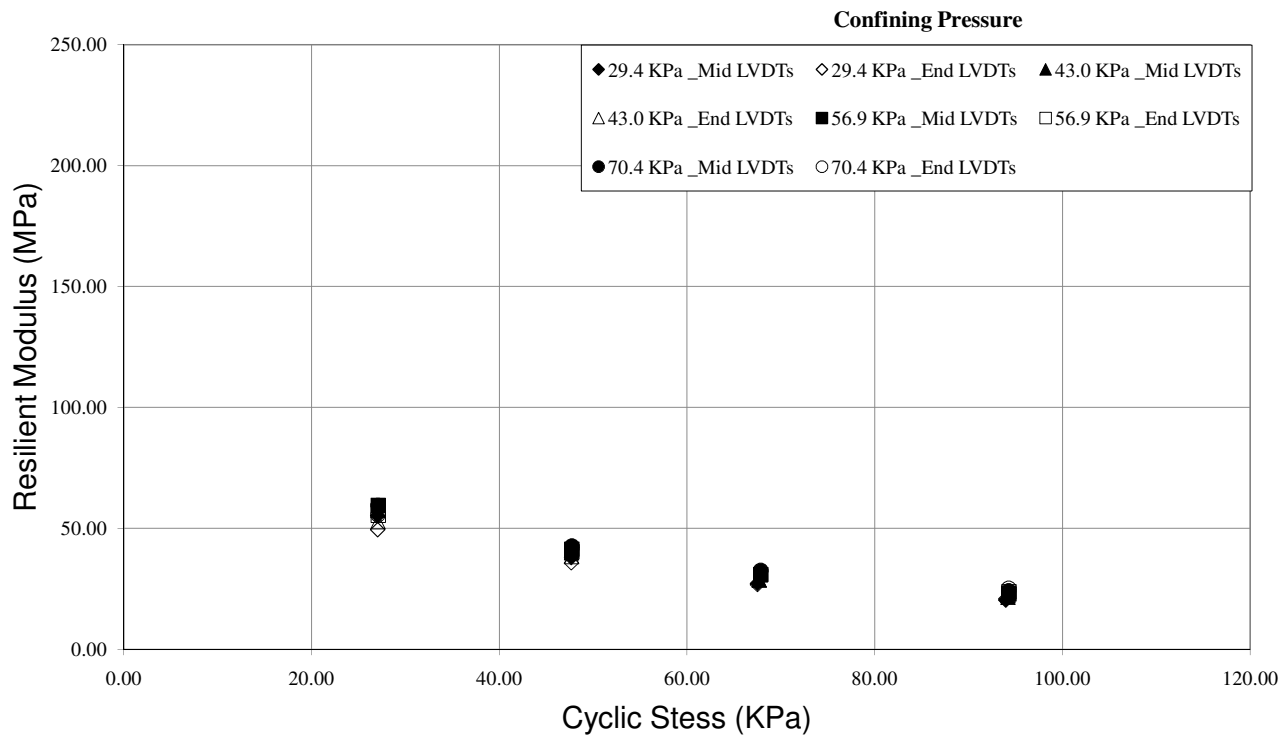
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0110	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1588.56	Soil Type:	High Plastic Clay
Sample Moisture (%):	24.00%	Max. Dry Density (kg/m³):	1631
Replicate #:	1	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.07	27.11	27.09	27.06	47.73	47.74	47.72	47.69
Confining Pressure (KPa)	70.93	56.95	42.44	29.24	70.48	57.04	43.70	29.71
Mr - mid LVDTs (MPa)	59.54	59.52	57.33	55.24	42.68	41.42	39.85	37.89
Mr - end LVDTs (MPa)	55.67	55.35	52.78	49.45	41.69	40.32	38.37	35.71

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.84	67.84	67.70	67.51	94.26	94.30	94.20	93.96
Confining Pressure (KPa)	70.12	57.34	42.70	29.66	70.20	56.39	42.96	29.18
Mr - mid LVDTs (MPa)	32.41	30.83	28.64	27.26	24.23	22.81	21.47	20.34
Mr - end LVDTs (MPa)	32.60	30.95	28.57	26.73	25.23	23.80	22.27	20.85

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

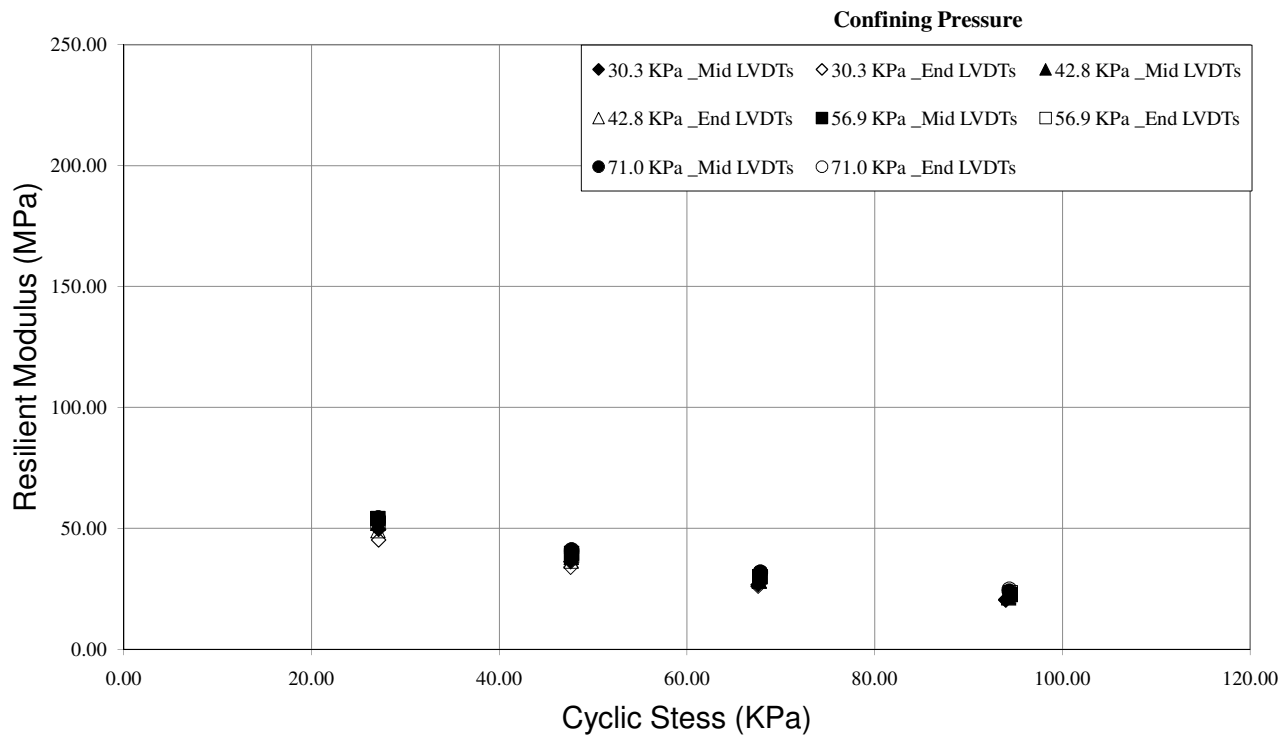
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0111	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1592.02	Soil Type:	High Plastic Clay
Sample Moisture (%):	23.52%	Max. Dry Density (kg/m³):	1631
Replicate #:	2	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.10	27.09	27.08	27.14	47.70	47.72	47.67	47.61
Confining Pressure (KPa)	70.11	57.36	42.87	30.42	71.65	57.36	42.53	30.44
Mr - mid LVDTs (MPa)	54.35	54.13	52.11	49.57	41.13	39.70	38.00	36.19
Mr - end LVDTs (MPa)	52.75	52.05	48.99	45.17	40.23	38.64	36.45	33.92

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.80	67.77	67.70	67.58	94.34	94.43	94.28	93.97
Confining Pressure (KPa)	71.21	56.07	43.21	30.03	70.96	56.96	42.60	30.28
Mr - mid LVDTs (MPa)	31.86	30.03	28.35	26.71	24.04	22.56	21.20	20.30
Mr - end LVDTs (MPa)	31.82	29.99	28.09	26.05	24.88	23.35	21.79	20.59

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

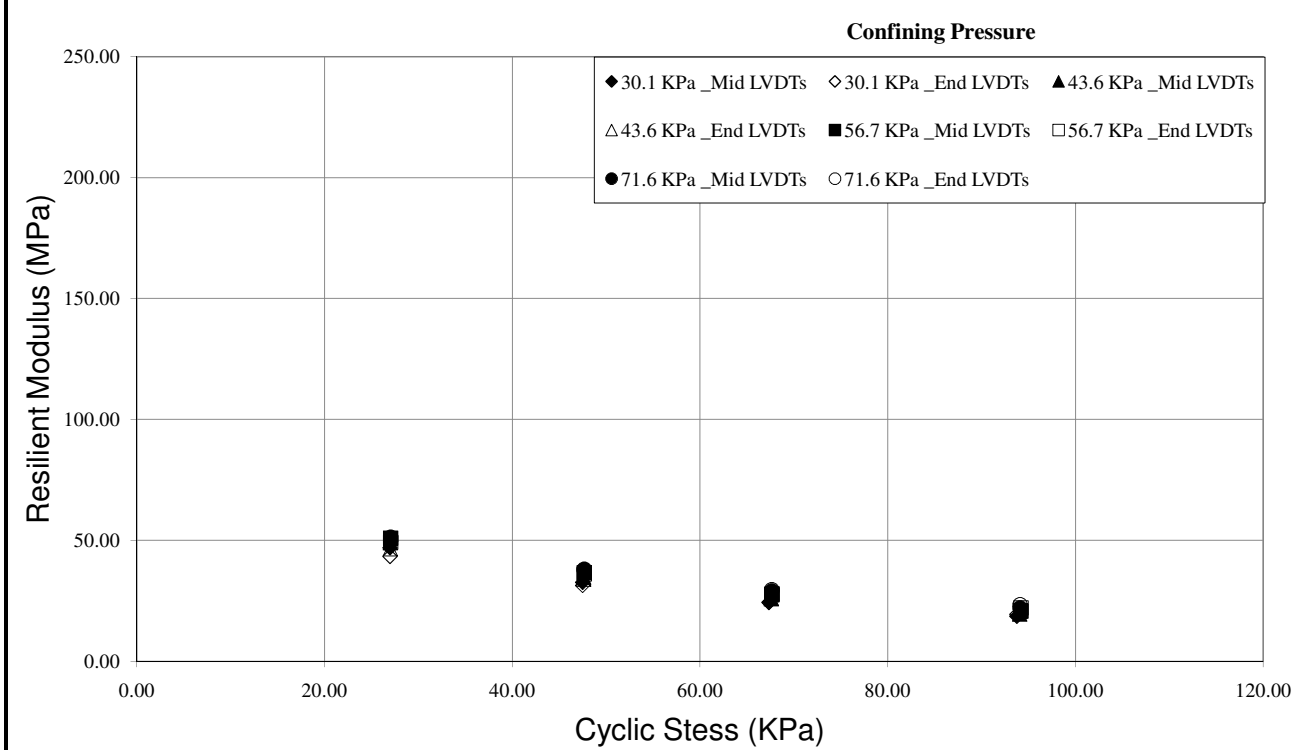
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0112	Client Lab #:	WSS071574
Date Tested:		Location:	PTH 75
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1581.70	Soil Type:	High Plastic Clay
Sample Moisture (%):	23.91%	Max. Dry Density (kg/m³):	1631
Replicate #:	3	Optimum Moisture (%):	20.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.03	27.06	27.02	26.99	47.66	47.65	47.61	47.50
Confining Pressure (KPa)	71.05	56.46	42.46	30.03	71.51	56.84	43.98	29.57
Mr - mid LVDTs (MPa)	51.23	50.90	49.08	46.91	38.01	36.56	34.82	32.58
Mr - end LVDTs (MPa)	49.99	49.18	46.58	43.34	37.63	36.08	34.05	31.32

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.66	67.68	67.59	67.36	94.10	94.19	94.05	93.77
Confining Pressure (KPa)	71.84	56.71	43.99	29.81	72.07	56.62	44.11	30.83
Mr - mid LVDTs (MPa)	29.11	27.43	25.85	24.34	22.06	20.75	19.55	18.57
Mr - end LVDTs (MPa)	29.60	27.92	26.12	24.25	23.36	21.99	20.63	19.38

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

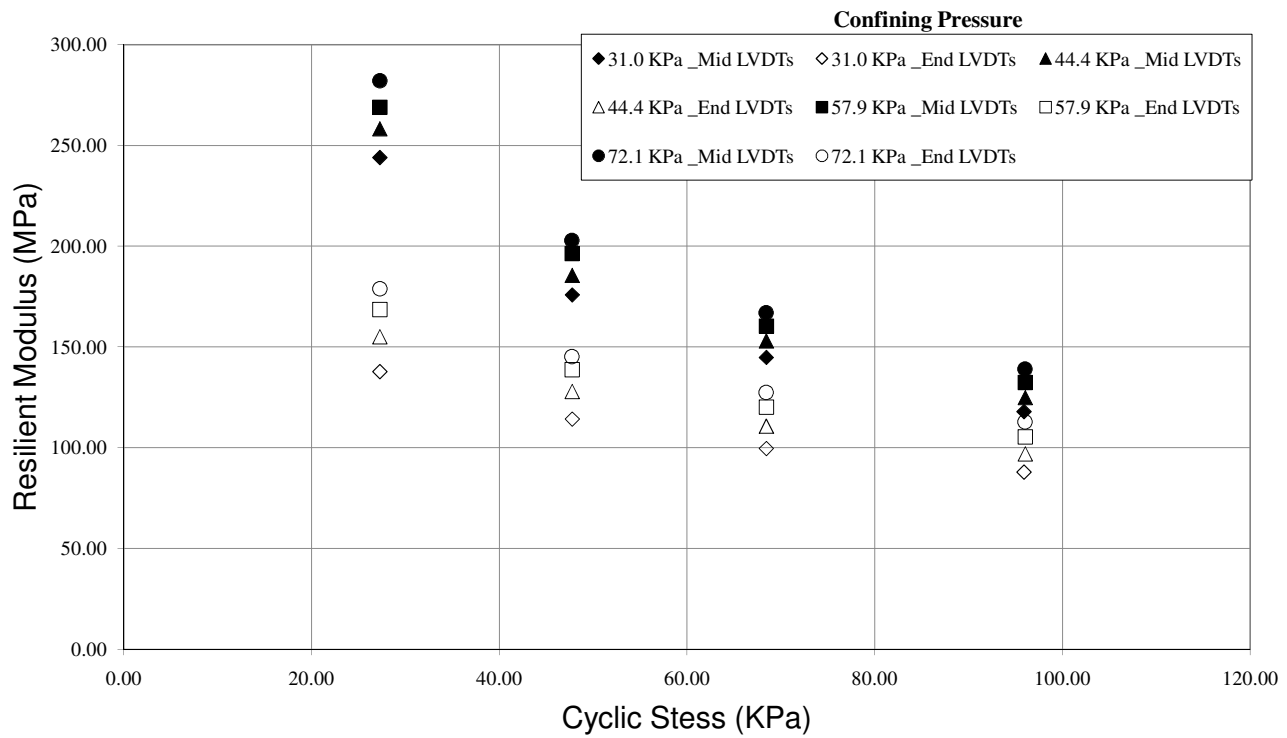
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0301	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1789.48	Soil Type:	Sandy Clay
Sample Moisture (%):	12.44%	Max. Dry Density (kg/m³):	1856
Replicate #:	1	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.29	27.30	27.28	27.29	47.75	47.77	47.78	47.78
Confining Pressure (KPa)	71.83	57.80	44.93	30.85	71.97	58.05	44.19	30.91
Mr - mid LVDTs (MPa)	282.15	268.88	258.33	244.05	202.91	196.27	185.65	175.83
Mr - end LVDTs (MPa)	178.93	168.57	155.12	137.77	145.19	138.70	127.96	114.20

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.43	68.45	68.47	68.47	96.00	96.05	96.06	95.92
Confining Pressure (KPa)	72.41	58.05	43.94	31.01	72.38	57.77	44.66	31.07
Mr - mid LVDTs (MPa)	167.03	160.38	153.07	144.78	138.98	132.42	124.95	117.87
Mr - end LVDTs (MPa)	127.44	120.12	110.67	99.62	112.81	105.44	96.91	87.90

Tested By: Haithem Soliman

Date:

Reviewed By: Dr. Ahmed Shalaby

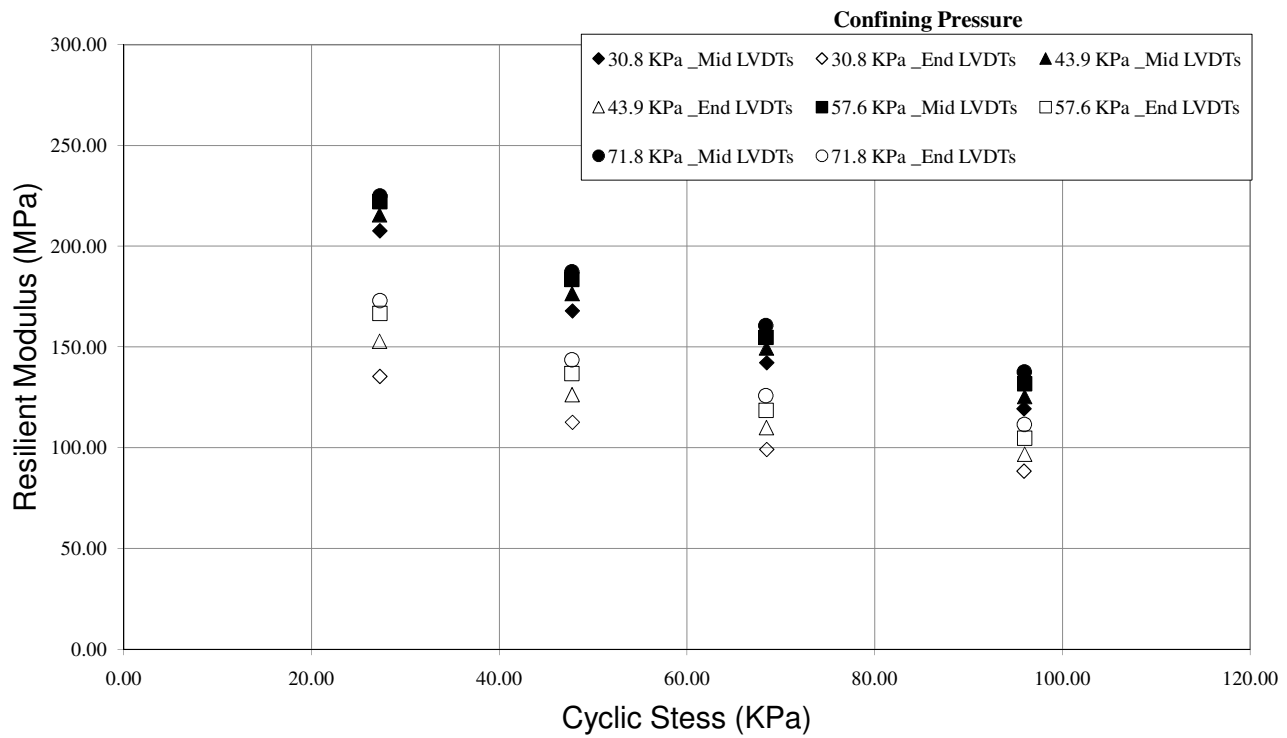
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0302	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1789.72	Soil Type:	Sandy Clay
Sample Moisture (%):	12.31%	Max. Dry Density (kg/m³):	1856
Replicate #:	2	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.27	27.28	27.26	27.27	47.75	47.74	47.77	47.79
Confining Pressure (KPa)	71.38	57.62	43.83	30.77	71.47	57.70	43.96	30.74
Mr - mid LVDTs (MPa)	224.93	222.11	215.53	207.63	187.25	183.42	176.39	167.94
Mr - end LVDTs (MPa)	172.98	166.61	152.77	135.42	143.58	136.88	126.34	112.66

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.39	68.43	68.48	68.49	95.94	95.98	95.98	95.89
Confining Pressure (KPa)	72.06	57.68	44.07	30.76	72.33	57.52	43.91	30.82
Mr - mid LVDTs (MPa)	160.66	154.72	149.46	142.21	137.58	131.72	125.34	119.41
Mr - end LVDTs (MPa)	125.79	118.55	110.05	99.16	111.49	104.77	96.87	88.42

Tested By: Haithem Soliman

Date:

Reviewed By: Dr. Ahmed Shalaby

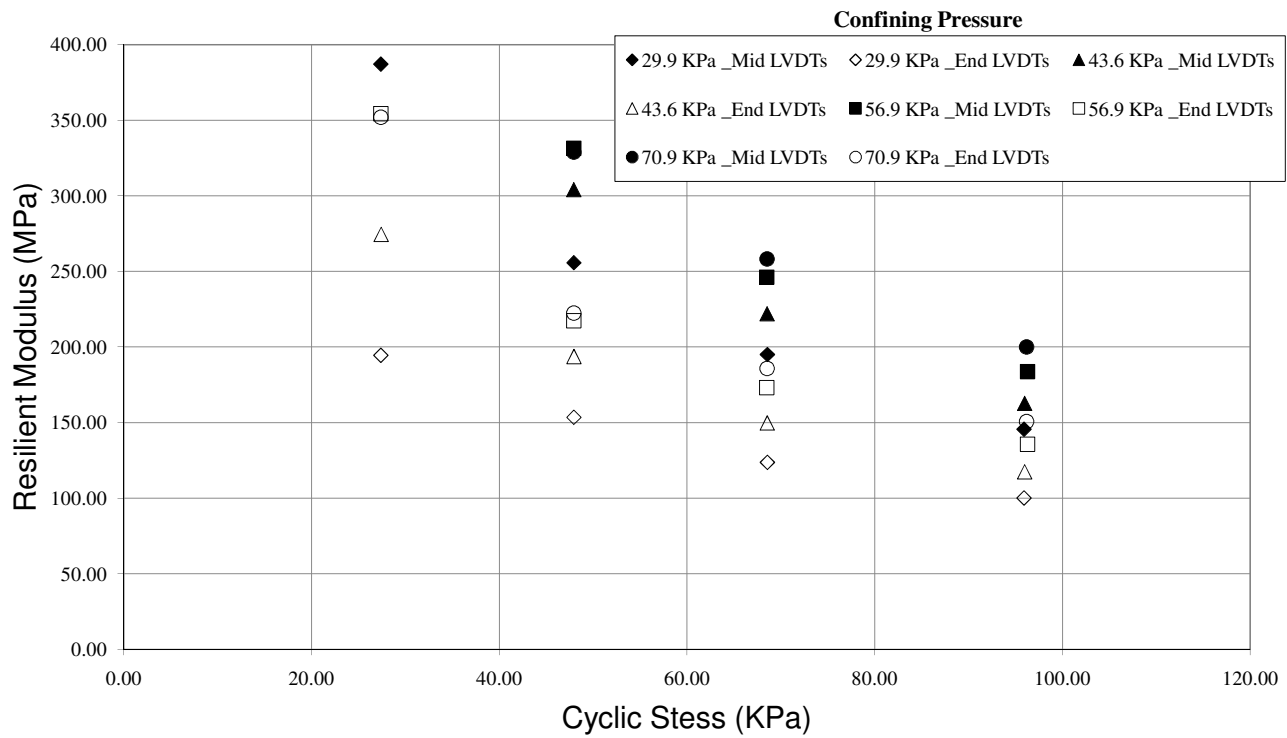
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0303	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1790.21	Soil Type:	Sandy Clay
Sample Moisture (%):	12.41%	Max. Dry Density (kg/m³):	1856
Replicate #:	3	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.39	27.38	27.42	27.38	47.95	47.95	47.95	47.95
Confining Pressure (KPa)	70.42	56.97	43.67	29.78	70.95	57.49	43.52	29.72
Mr - mid LVDTs (MPa)	677.00	742.03	550.89	387.20	328.97	331.50	304.13	255.81
Mr - end LVDTs (MPa)	352.05	354.24	274.53	194.39	222.45	217.30	193.73	153.40

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.51	68.50	68.54	68.56	96.18	96.27	95.97	95.89
Confining Pressure (KPa)	71.20	56.54	43.60	29.58	71.08	56.74	43.52	30.35
Mr - mid LVDTs (MPa)	258.29	246.15	222.07	195.08	199.89	183.60	162.79	145.65
Mr - end LVDTs (MPa)	185.81	173.10	149.70	123.67	150.74	135.59	117.40	100.11

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

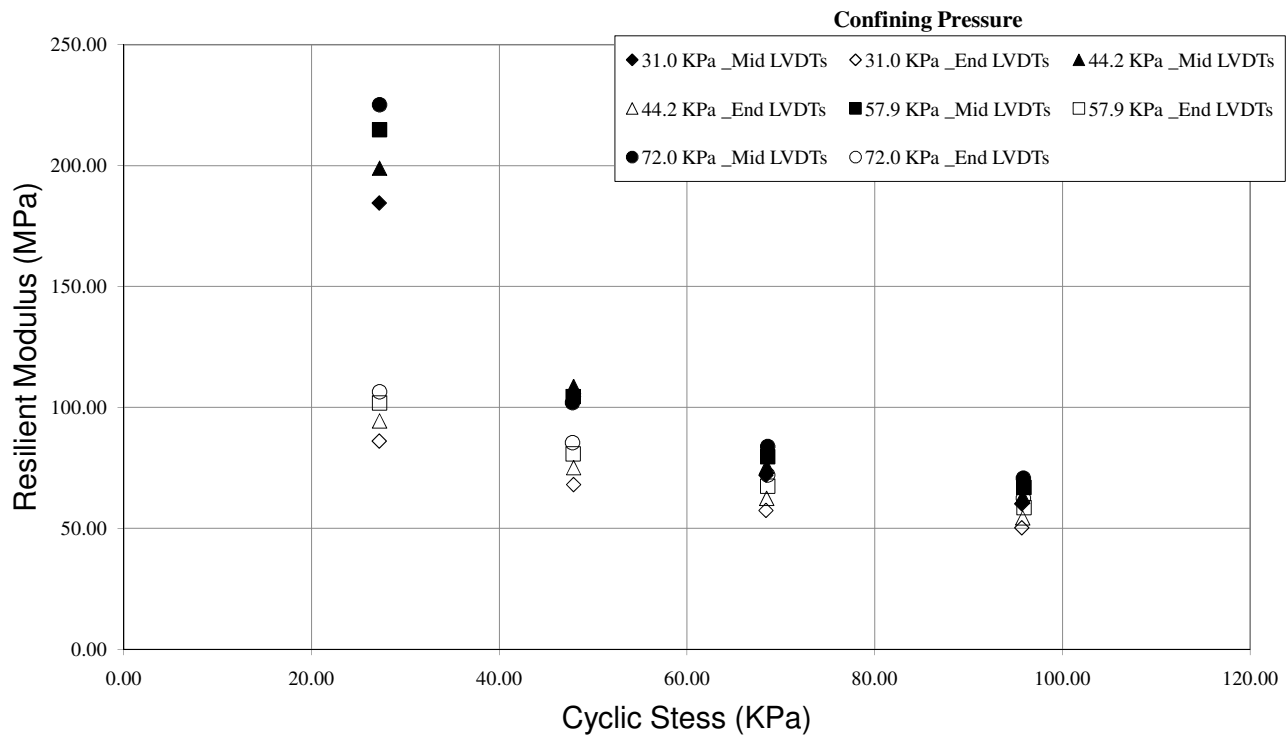
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0304	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1846.17	Soil Type:	Sandy Clay
Sample Moisture (%):	13.52%	Max. Dry Density (kg/m³):	1856
Replicate #:	1	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.23	27.23	27.26	27.22	47.82	47.88	47.92	47.92
Confining Pressure (KPa)	71.75	57.61	44.05	30.66	72.02	57.84	44.01	31.02
Mr - mid LVDTs (MPa)	225.09	214.88	198.93	184.59	102.01	104.50	108.66	104.48
Mr - end LVDTs (MPa)	106.53	101.81	94.46	86.11	85.41	80.79	75.17	68.12

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.60	68.61	68.48	68.41	95.83	95.89	95.76	95.66
Confining Pressure (KPa)	72.36	57.83	44.26	31.16	71.94	58.23	44.51	31.28
Mr - mid LVDTs (MPa)	83.82	79.59	75.62	72.05	70.72	66.86	63.24	60.21
Mr - end LVDTs (MPa)	72.10	67.38	62.47	57.42	62.51	58.60	54.40	50.25

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

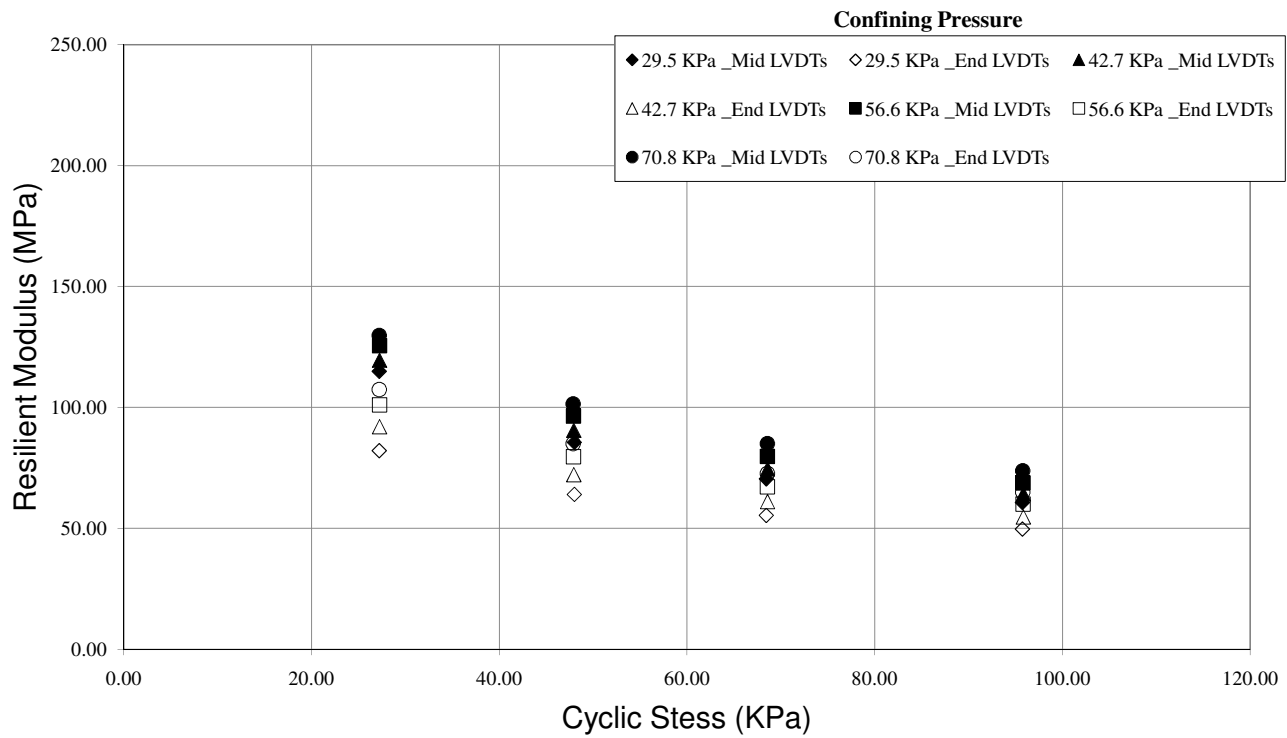
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0305	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1844.23	Soil Type:	Sandy Clay
Sample Moisture (%):	13.65%	Max. Dry Density (kg/m³):	1856
Replicate #:	2	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.23	27.24	27.25	27.23	47.86	47.90	47.93	48.02
Confining Pressure (KPa)	70.89	56.66	42.24	28.97	70.20	56.45	43.18	29.61
Mr - mid LVDTs (MPa)	129.75	125.46	119.58	114.96	101.48	96.46	90.55	85.55
Mr - end LVDTs (MPa)	107.35	101.09	92.07	82.15	85.06	79.60	72.25	64.05

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.56	68.57	68.58	68.46	95.77	95.81	95.82	95.75
Confining Pressure (KPa)	71.04	56.45	43.04	29.75	70.93	57.02	42.42	29.75
Mr - mid LVDTs (MPa)	84.97	79.75	74.61	70.47	73.84	68.82	64.25	60.72
Mr - end LVDTs (MPa)	72.73	67.17	61.10	55.42	64.92	60.02	54.72	49.75

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

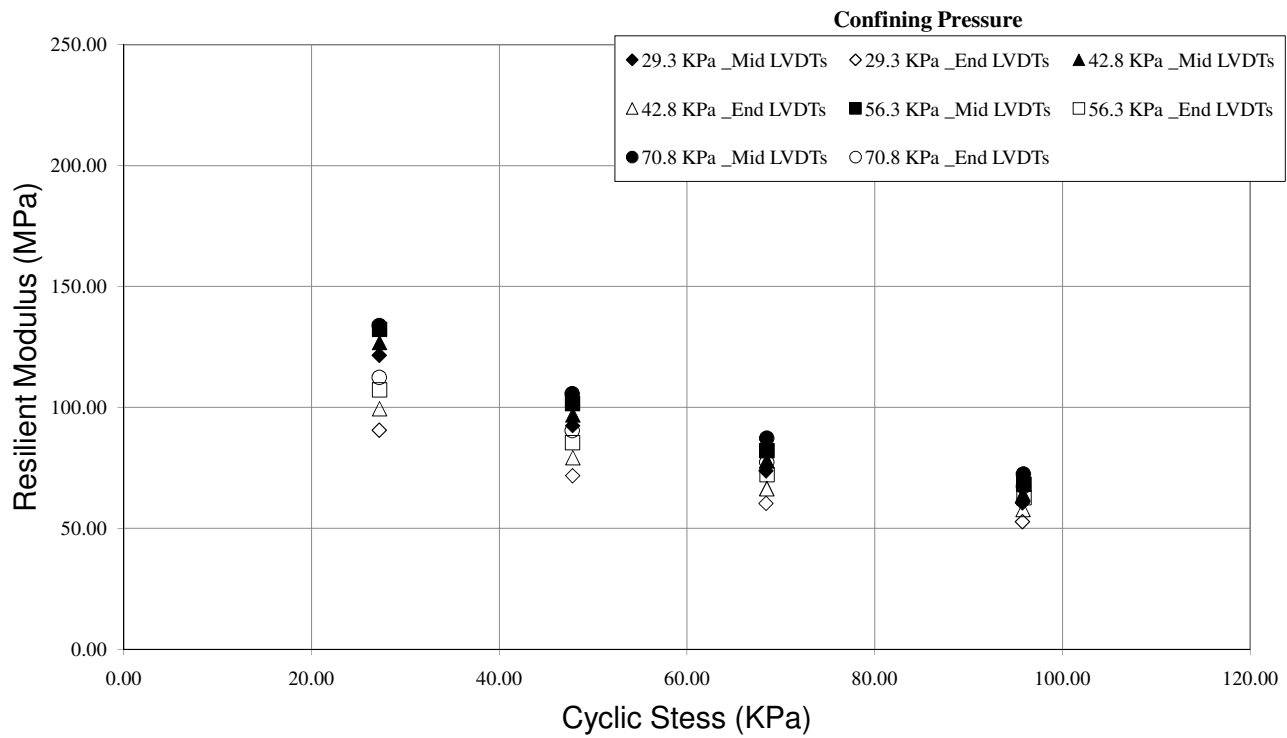
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0306	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1845.26	Soil Type:	Sandy Clay
Sample Moisture (%):	13.56%	Max. Dry Density (kg/m³):	1856
Replicate #:	3	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.22	27.24	27.24	27.20	47.78	47.82	47.85	47.80
Confining Pressure (KPa)	70.68	56.41	43.22	29.42	70.50	55.72	42.49	29.67
Mr - mid LVDTs (MPa)	133.87	132.27	126.81	121.55	105.61	101.52	96.91	92.47
Mr - end LVDTs (MPa)	112.35	107.30	99.44	90.57	90.49	85.49	79.22	71.75

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.49	68.53	68.51	68.40	95.83	95.90	95.82	95.72
Confining Pressure (KPa)	71.09	56.66	42.75	29.01	71.01	56.58	42.77	29.22
Mr - mid LVDTs (MPa)	87.22	82.13	77.97	73.81	72.52	68.23	64.17	60.60
Mr - end LVDTs (MPa)	77.40	72.19	66.44	60.33	67.26	62.63	57.78	52.78

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

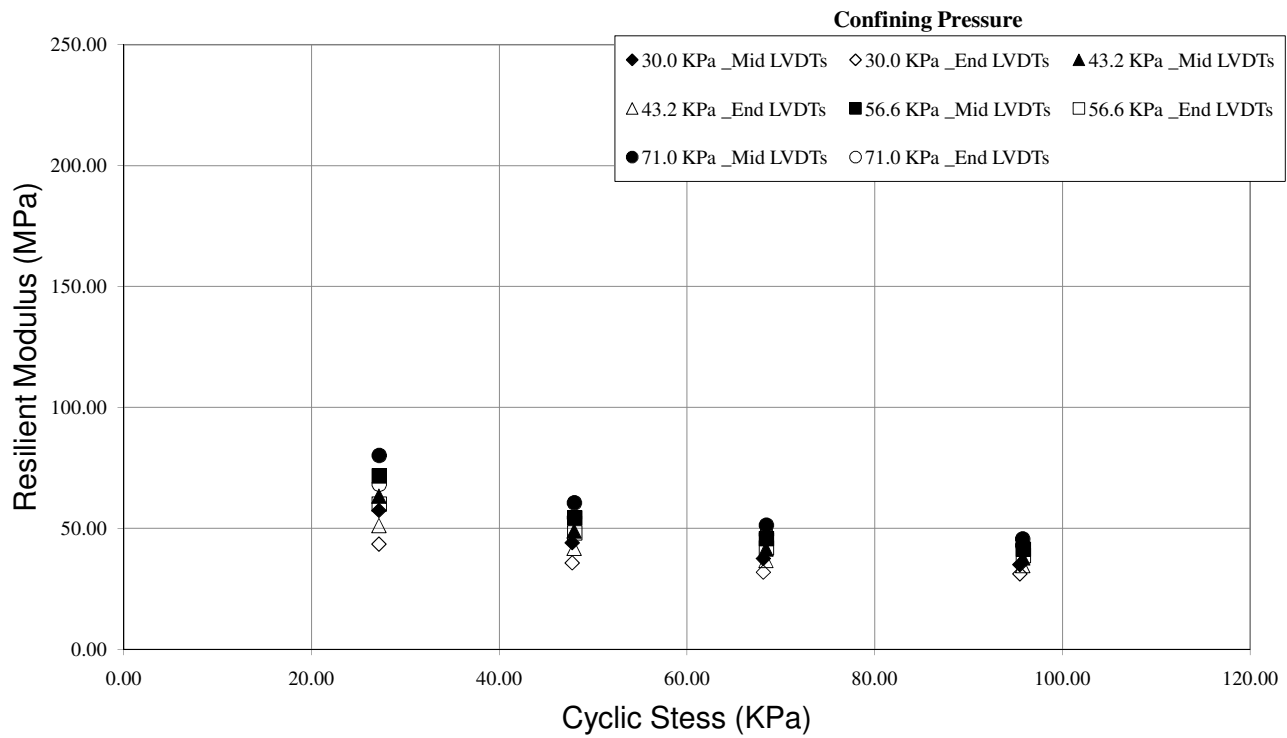
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0307	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1815.52	Soil Type:	Sandy Clay
Sample Moisture (%):	15.46%	Max. Dry Density (kg/m³):	1856
Replicate #:	1	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.22	27.21	27.20	27.20	48.01	48.04	47.99	47.78
Confining Pressure (KPa)	71.20	56.89	43.62	30.13	70.67	56.45	43.75	30.21
Mr - mid LVDTs (MPa)	80.15	71.64	63.35	57.43	60.59	54.30	48.95	44.03
Mr - end LVDTs (MPa)	68.27	59.97	51.17	43.46	54.44	48.06	41.80	35.71

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.46	68.47	68.43	68.13	95.75	95.85	95.78	95.46
Confining Pressure (KPa)	71.28	56.20	42.67	30.07	70.79	56.82	42.83	29.70
Mr - mid LVDTs (MPa)	51.28	45.78	41.47	37.45	45.54	41.38	37.82	34.97
Mr - end LVDTs (MPa)	47.48	41.86	36.81	31.85	43.01	38.74	34.68	31.17

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

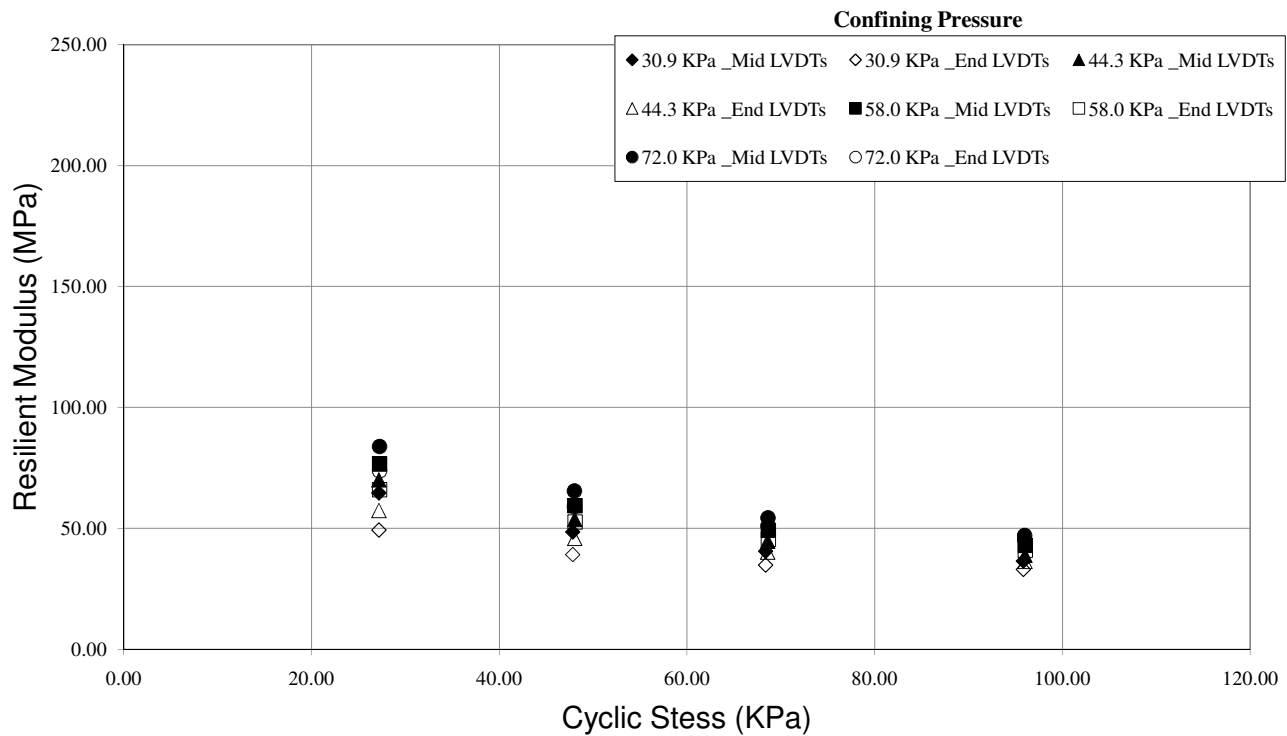
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0308	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1817.77	Soil Type:	Sandy Clay
Sample Moisture (%):	15.39%	Max. Dry Density (kg/m³):	1856
Replicate #:	2	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.26	27.25	27.19	27.17	48.00	48.07	48.04	47.82
Confining Pressure (KPa)	72.06	57.16	45.17	30.77	72.55	58.54	44.14	30.96
Mr - mid LVDTs (MPa)	83.79	76.62	70.04	64.61	65.50	59.31	53.67	48.48
Mr - end LVDTs (MPa)	73.80	65.96	57.36	49.37	58.96	52.58	45.83	39.22

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.64	68.66	68.60	68.38	95.96	96.03	96.00	95.85
Confining Pressure (KPa)	71.95	58.15	44.49	30.67	71.29	57.96	43.53	31.20
Mr - mid LVDTs (MPa)	54.30	49.19	44.64	40.50	47.08	43.01	38.86	36.46
Mr - end LVDTs (MPa)	50.84	45.48	40.12	34.87	45.19	40.97	36.30	33.08

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

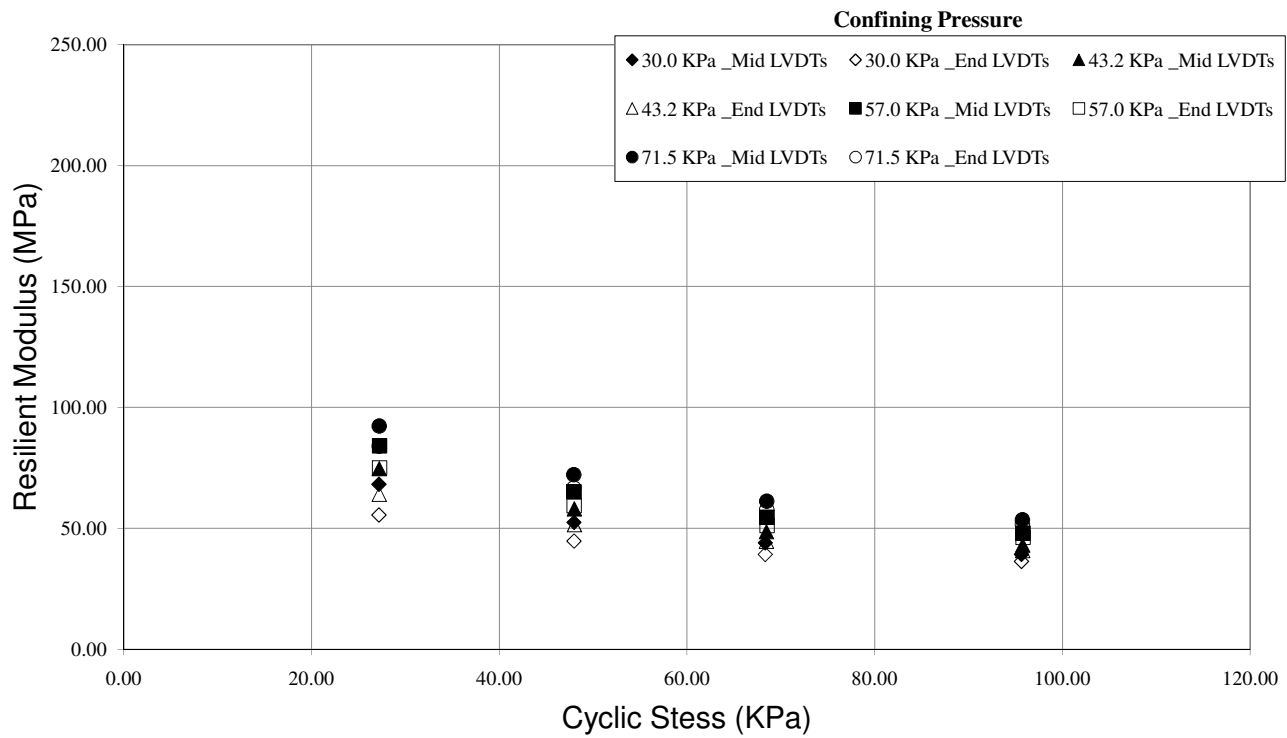
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0309	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1823.41	Soil Type:	Sandy Clay
Sample Moisture (%):	15.22%	Max. Dry Density (kg/m³):	1856
Replicate #:	3	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.21	27.24	27.21	27.17	47.93	47.98	47.99	47.96
Confining Pressure (KPa)	71.29	57.39	43.54	30.10	71.46	57.25	43.51	30.14
Mr - mid LVDTs (MPa)	92.33	84.16	74.78	68.28	72.22	65.03	58.11	52.48
Mr - end LVDTs (MPa)	83.95	75.04	64.17	55.48	66.66	59.30	51.53	44.70

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.51	68.52	68.45	68.33	95.74	95.79	95.75	95.64
Confining Pressure (KPa)	71.65	56.74	43.03	30.00	71.55	56.69	42.74	29.73
Mr - mid LVDTs (MPa)	61.27	54.64	48.68	44.00	53.54	48.01	43.10	39.28
Mr - end LVDTs (MPa)	57.80	51.18	44.65	39.16	51.73	46.20	40.84	36.29

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

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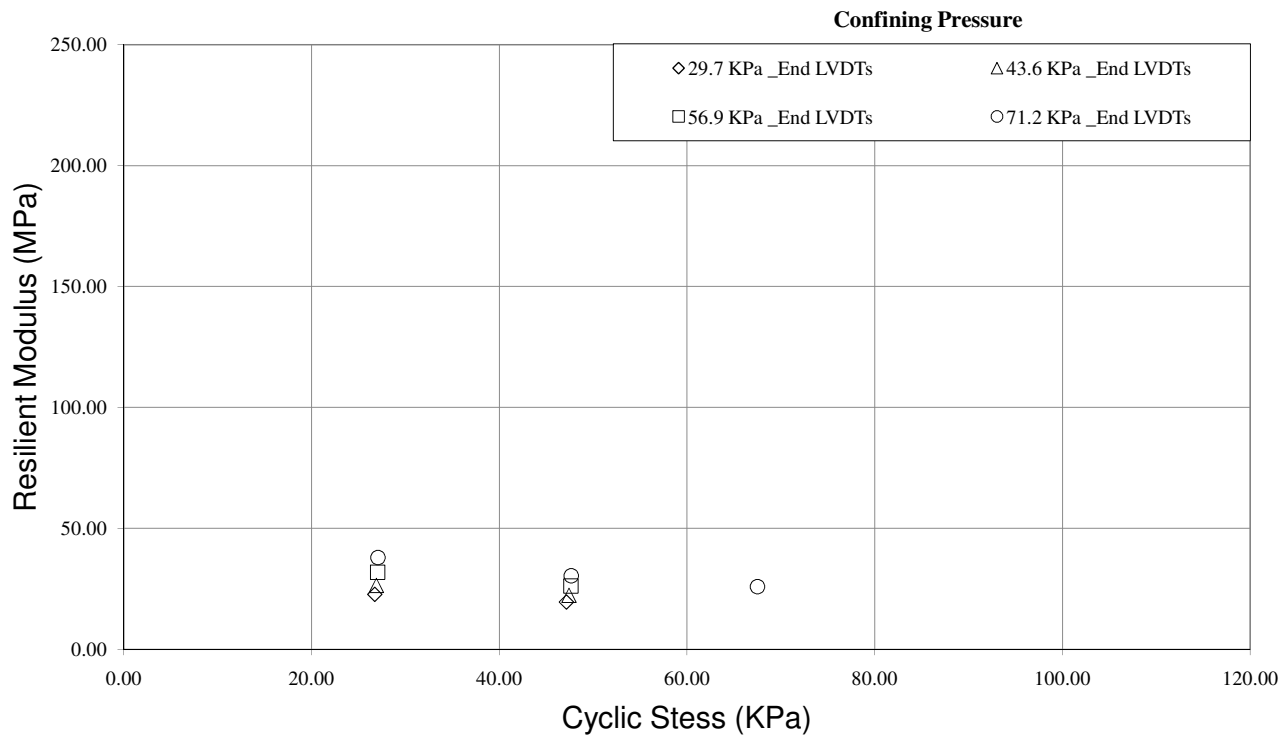
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0310	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1789.05	Soil Type:	Sandy Clay
Sample Moisture (%):	17.03%	Max. Dry Density (kg/m³):	1856
Replicate #:	1	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.09	27.05	26.91	26.75	47.68	47.65	47.44	47.14
Confining Pressure (KPa)	71.36	56.97	43.84	29.67	71.58	56.88	43.37	29.71
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	37.90	31.83	26.45	22.71	30.37	26.12	22.35	19.54

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.51	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	70.77	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	25.92	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Tested By: Haithem Soliman

Date:

Reviewed By: Dr. Ahmed Shalaby

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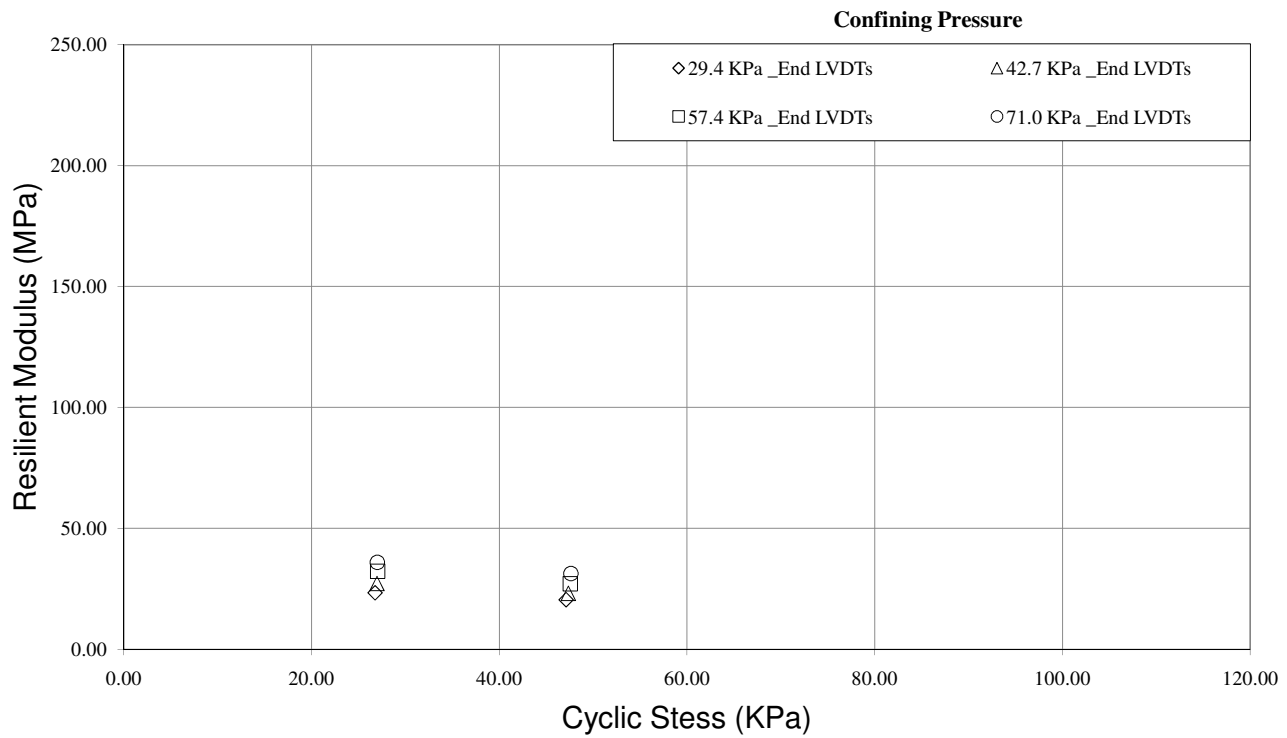
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0311	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1792.57	Soil Type:	Sandy Clay
Sample Moisture (%):	16.90%	Max. Dry Density (kg/m³):	1856
Replicate #:	2	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.02	27.06	26.97	26.77	47.65	47.56	47.36	47.14
Confining Pressure (KPa)	71.04	57.36	42.93	29.46	70.91	57.50	42.55	29.30
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	35.99	32.18	27.15	23.32	31.29	27.11	23.13	20.45

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

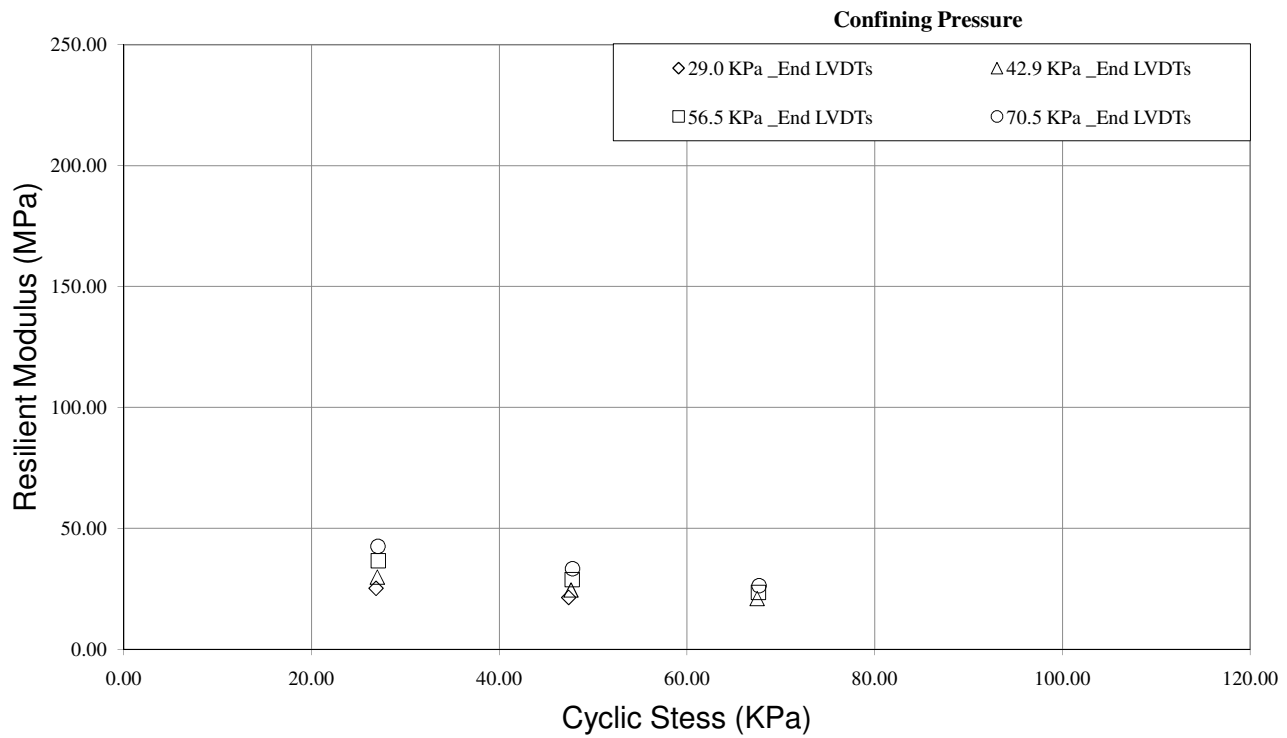
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0312	Client Lab #:	WSS071613-14
Date Tested:		Location:	PTH 16
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1793.85	Soil Type:	Sandy Clay
Sample Moisture (%):	16.85%	Max. Dry Density (kg/m³):	1856
Replicate #:	3	Optimum Moisture (%):	14.10%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.08	27.10	27.00	26.88	47.81	47.78	47.63	47.41
Confining Pressure (KPa)	69.79	56.72	42.79	28.98	70.93	57.10	43.15	29.00
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	42.49	36.55	29.90	25.17	33.27	28.78	24.51	21.44

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.67	67.62	67.46	N/A	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	70.85	55.73	42.68	N/A	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	26.25	23.55	20.99	N/A	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

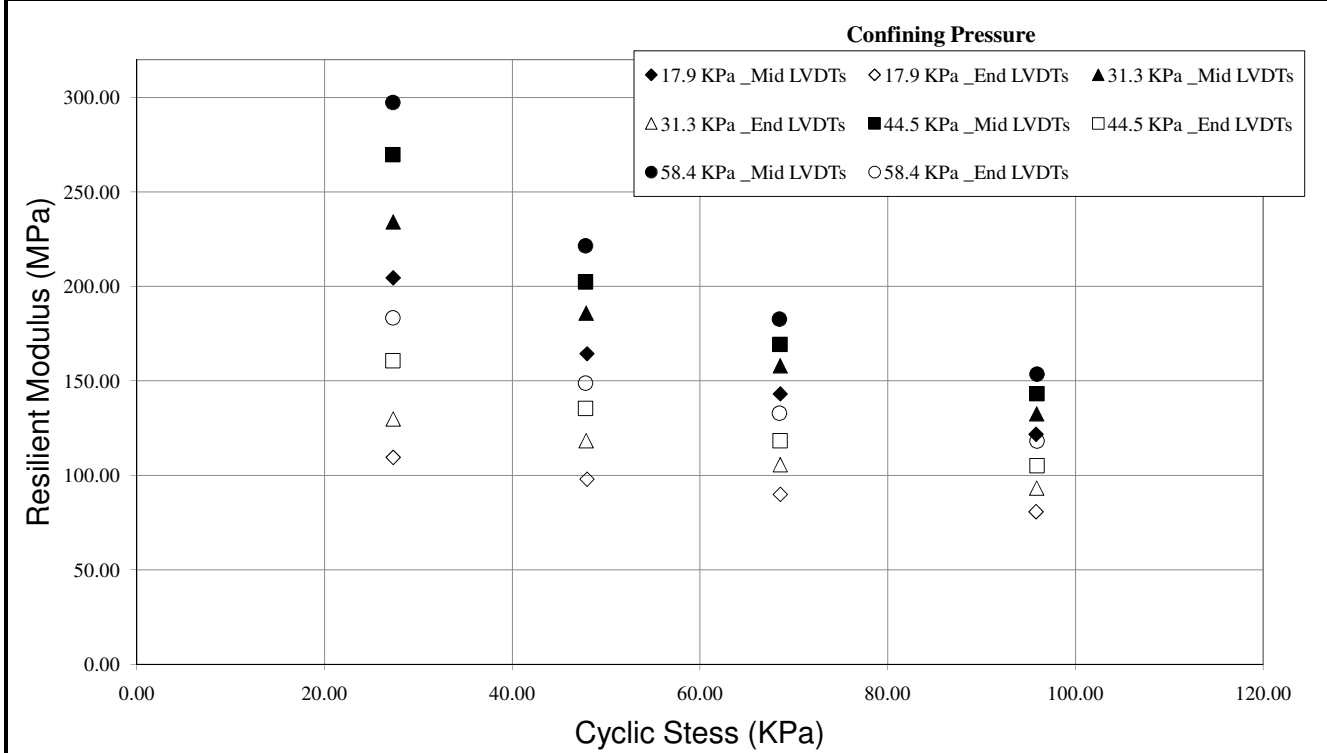
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0401	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1788.57	Soil Type:	Sandy Clay
Sample Moisture (%):	10.98%	Max. Dry Density (kg/m³):	1877
Replicate #:	1	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.30	27.30	27.30	27.31	47.81	47.82	47.87	47.95
Confining Pressure (KPa)	58.92	44.90	31.33	18.40	58.16	44.48	31.68	17.31
Mr - mid LVDTs (MPa)	297.27	269.72	234.16	204.45	221.47	202.30	185.87	164.30
Mr - end LVDTs (MPa)	183.30	160.71	129.82	109.45	148.82	135.46	118.38	97.94

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.45	68.53	68.55	68.55	95.90	95.91	95.89	95.79
Confining Pressure (KPa)	58.32	44.20	31.38	18.92	58.27	44.28	30.99	16.83
Mr - mid LVDTs (MPa)	182.60	169.36	158.02	143.03	153.56	143.18	132.63	121.64
Mr - end LVDTs (MPa)	132.84	118.32	105.64	89.95	118.10	105.05	93.33	80.79

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

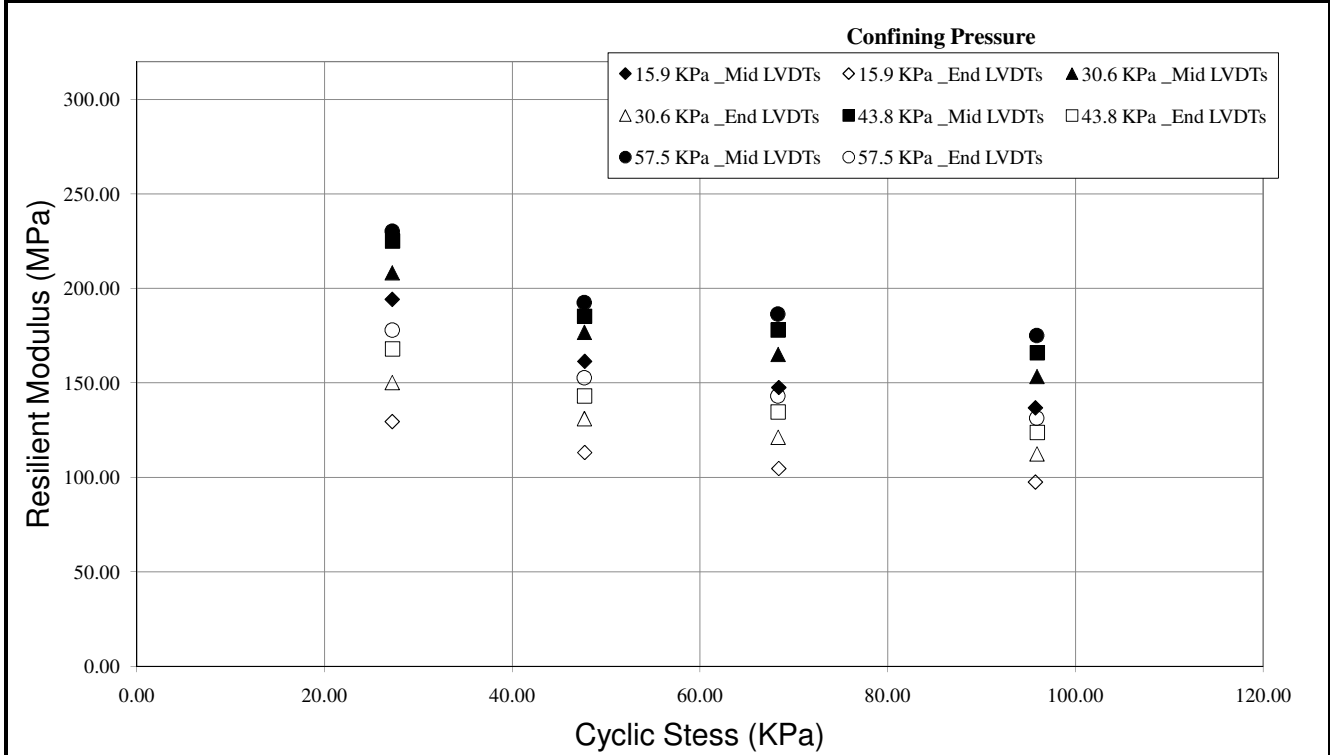
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0402	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1787.96	Soil Type:	Sandy Clay
Sample Moisture (%):	10.61%	Max. Dry Density (kg/m³):	1877
Replicate #:	2	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.23	27.24	27.23	27.21	47.68	47.69	47.70	47.72
Confining Pressure (KPa)	57.64	43.78	30.76	16.18	57.44	43.86	30.56	15.73
Mr - mid LVDTs (MPa)	230.23	224.97	208.33	194.19	192.43	185.25	176.74	161.36
Mr - end LVDTs (MPa)	177.97	167.94	150.13	129.44	152.67	143.07	131.04	113.04

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.29	68.32	68.32	68.39	95.86	95.93	95.90	95.73
Confining Pressure (KPa)	57.57	43.70	30.60	15.98	57.48	43.81	30.36	15.67
Mr - mid LVDTs (MPa)	186.48	177.85	165.14	147.54	174.99	165.88	153.40	136.80
Mr - end LVDTs (MPa)	143.12	134.57	121.13	104.59	131.35	123.81	112.33	97.47

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

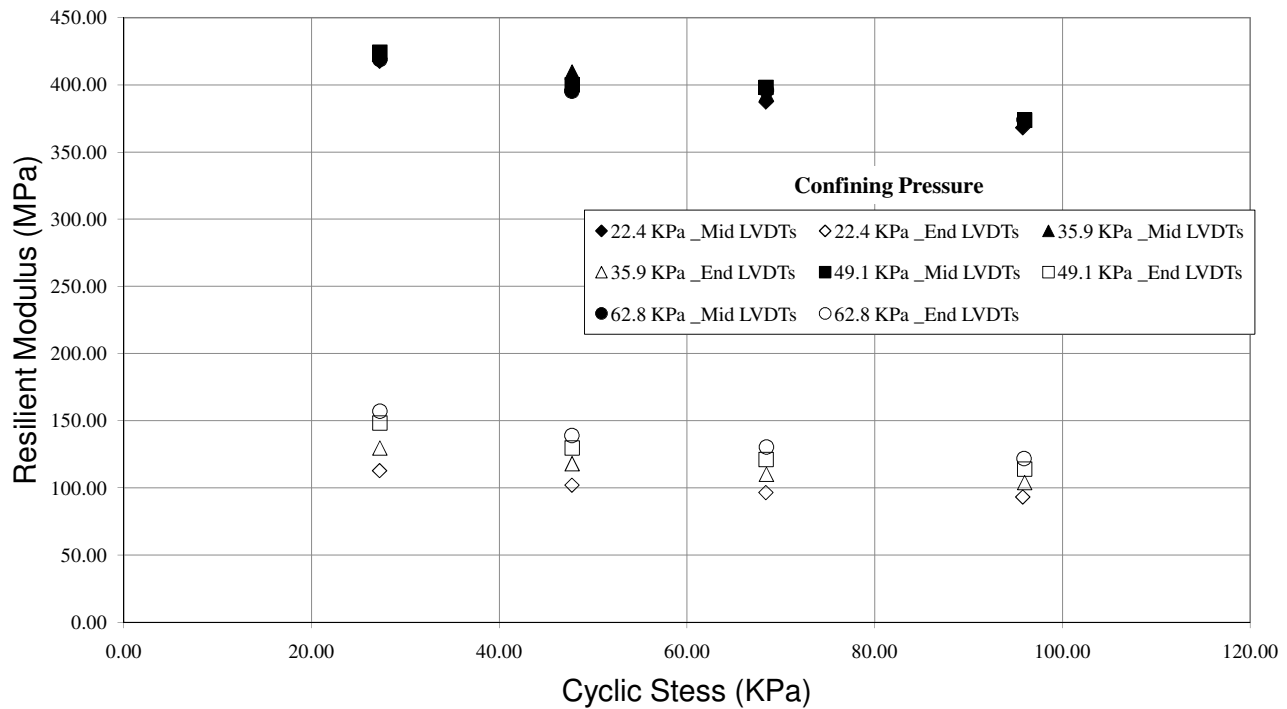
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0403	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1785.84	Soil Type:	Sandy Clay
Sample Moisture (%):	10.54%	Max. Dry Density (kg/m³):	1877
Replicate #:	3	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.27	27.29	27.27	27.24	47.74	47.77	47.76	47.74
Confining Pressure (KPa)	62.68	49.16	35.74	22.96	62.83	48.98	35.86	22.83
Mr - mid LVDTs (MPa)	418.84	424.31	423.50	417.63	395.14	399.99	409.54	396.69
Mr - end LVDTs (MPa)	157.21	148.23	129.71	112.87	138.89	129.65	118.00	102.05

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.45	68.42	68.46	68.39	95.92	95.99	95.99	95.76
Confining Pressure (KPa)	62.71	49.00	35.84	23.08	62.80	49.34	36.07	20.91
Mr - mid LVDTs (MPa)	396.01	398.09	393.02	387.24	374.16	373.73	373.62	368.17
Mr - end LVDTs (MPa)	130.49	121.20	110.20	96.50	121.92	114.00	104.10	93.21

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

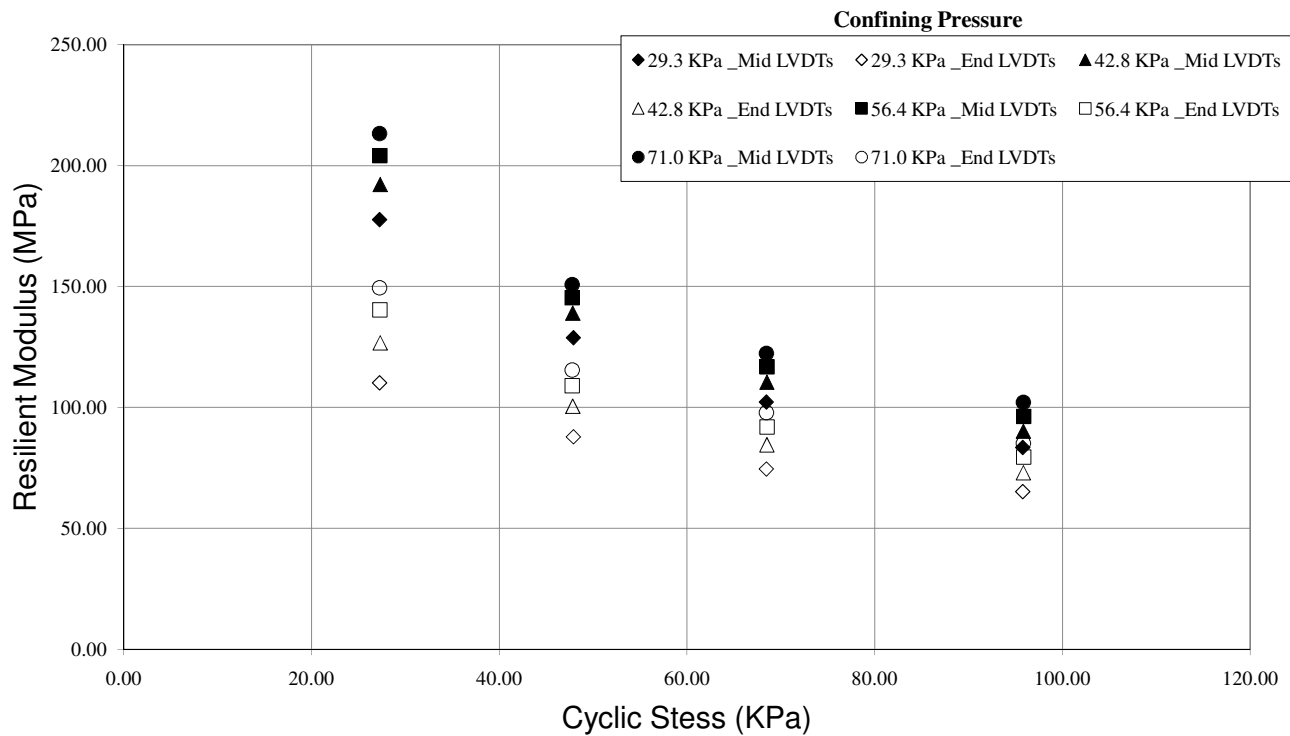
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0404	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1867.54	Soil Type:	Sandy Clay
Sample Moisture (%):	11.82%	Max. Dry Density (kg/m³):	1877
Replicate #:	1	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.26	27.29	27.33	27.26	47.76	47.78	47.84	47.90
Confining Pressure (KPa)	70.40	56.45	42.48	29.65	71.33	56.61	42.91	29.15
Mr - mid LVDTs (MPa)	213.21	204.12	192.15	177.70	150.84	145.33	138.98	128.85
Mr - end LVDTs (MPa)	149.53	140.30	126.66	110.16	115.41	108.95	100.45	87.82

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.48	68.52	68.52	68.45	95.83	95.87	95.83	95.77
Confining Pressure (KPa)	71.17	56.54	42.91	29.04	70.92	56.00	42.92	29.48
Mr - mid LVDTs (MPa)	122.39	116.85	110.48	102.24	102.15	96.33	90.24	83.44
Mr - end LVDTs (MPa)	97.90	91.97	84.58	74.49	85.11	79.50	73.02	65.12

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

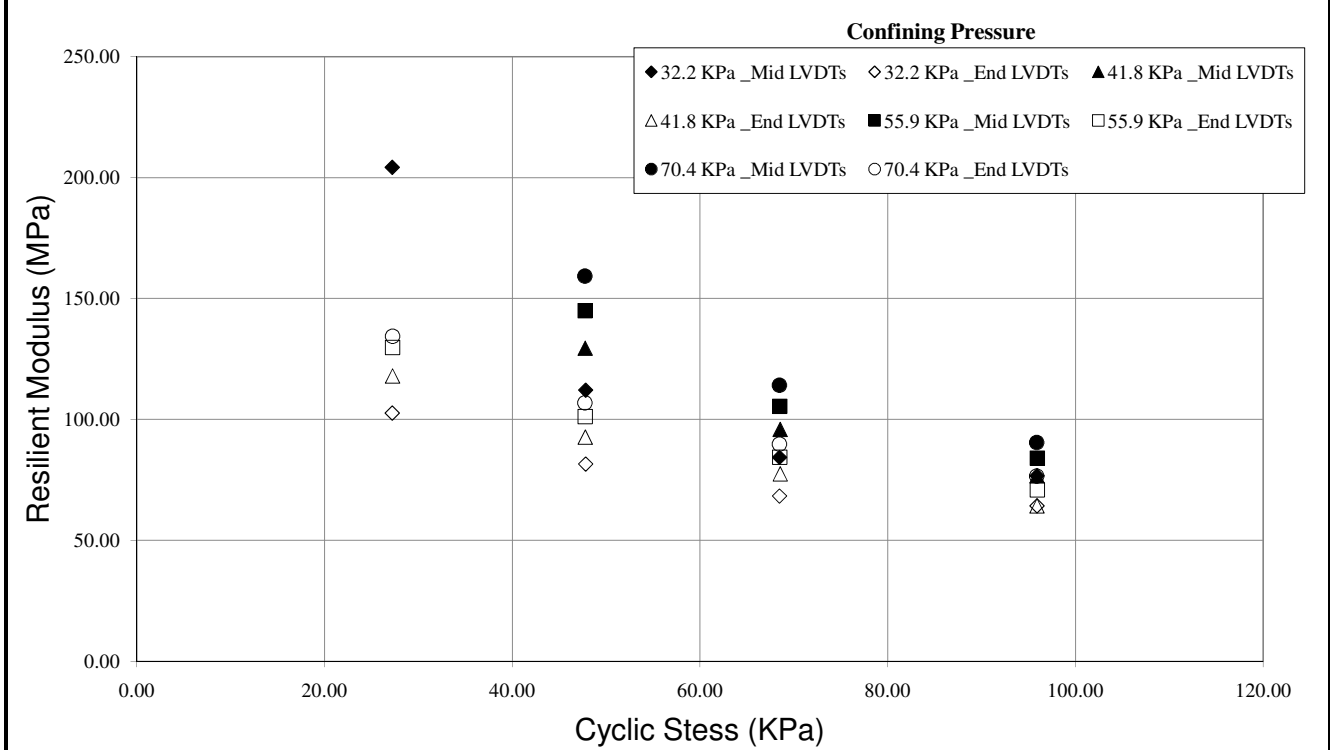
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0405	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1856.13	Soil Type:	Sandy Clay
Sample Moisture (%):	12.82%	Max. Dry Density (kg/m³):	1877
Replicate #:	2	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.25	27.26	27.25	27.22	47.75	47.76	47.78	47.83
Confining Pressure (KPa)	69.84	55.47	40.96	29.39	70.29	56.16	42.16	29.41
Mr - mid LVDTs (MPa)	442.33	335.33	265.43	204.24	159.25	145.01	129.47	112.14
Mr - end LVDTs (MPa)	134.36	129.73	118.00	102.59	106.85	101.12	92.68	81.56

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.47	68.51	68.55	68.48	95.88	95.94	95.91	95.91
Confining Pressure (KPa)	70.84	55.61	42.04	28.00	70.68	56.17	42.10	42.10
Mr - mid LVDTs (MPa)	114.15	105.39	95.90	84.36	90.41	83.96	76.75	76.75
Mr - end LVDTs (MPa)	89.79	84.34	77.50	68.32	76.59	70.84	64.27	64.27

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

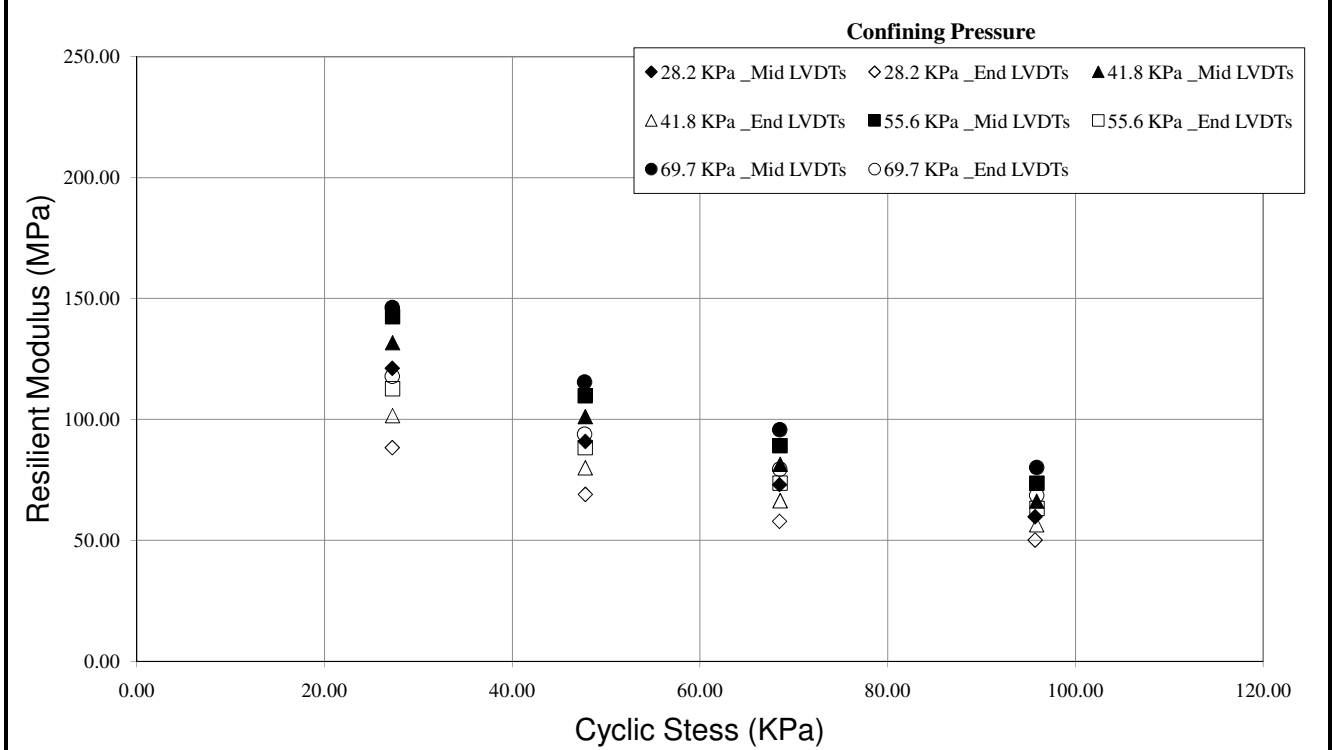
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0406	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1854.79	Soil Type:	Sandy Clay
Sample Moisture (%):	12.89%	Max. Dry Density (kg/m³):	1877
Replicate #:	3	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.23	27.24	27.25	27.21	47.71	47.76	47.79	47.79
Confining Pressure (KPa)	69.02	55.41	42.25	27.91	69.78	55.74	41.77	28.45
Mr - mid LVDTs (MPa)	146.27	142.46	131.75	121.19	115.46	109.81	101.14	90.93
Mr - end LVDTs (MPa)	117.79	112.71	101.52	88.29	93.84	88.33	80.00	69.02

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.49	68.52	68.55	68.48	95.86	95.92	95.89	95.71
Confining Pressure (KPa)	70.02	55.65	41.43	28.46	70.12	55.59	41.63	28.15
Mr - mid LVDTs (MPa)	95.76	89.07	81.44	73.04	80.16	73.62	66.28	59.80
Mr - end LVDTs (MPa)	79.49	73.69	66.43	57.90	68.66	63.21	56.48	50.16

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

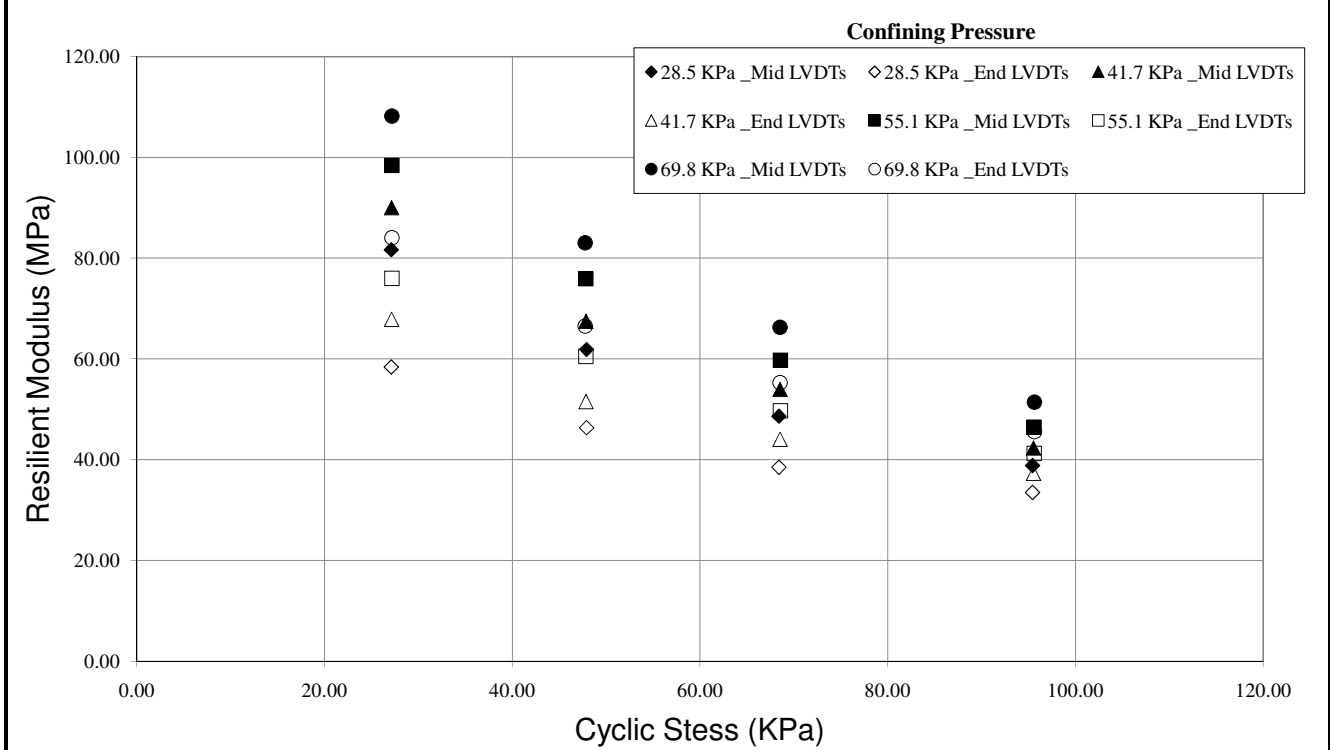
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0407	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1832.88	Soil Type:	Sandy Clay
Sample Moisture (%):	14.27%	Max. Dry Density (kg/m³):	1877
Replicate #:	1	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.19	27.17	27.14	27.11	47.77	47.83	47.85	47.91
Confining Pressure (KPa)	69.90	55.24	42.47	28.69	69.62	55.36	41.10	28.79
Mr - mid LVDTs (MPa)	108.17	98.43	90.03	81.68	83.05	75.94	67.50	61.89
Mr - end LVDTs (MPa)	84.07	76.01	67.89	58.43	66.54	60.51	51.57	46.36

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.53	68.56	68.52	68.40	95.63	95.58	95.52	95.42
Confining Pressure (KPa)	69.89	55.00	41.77	28.70	69.93	55.00	41.45	27.98
Mr - mid LVDTs (MPa)	66.25	59.75	54.00	48.63	51.41	46.48	42.36	38.82
Mr - end LVDTs (MPa)	55.28	49.71	44.08	38.51	45.56	41.27	37.33	33.51

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

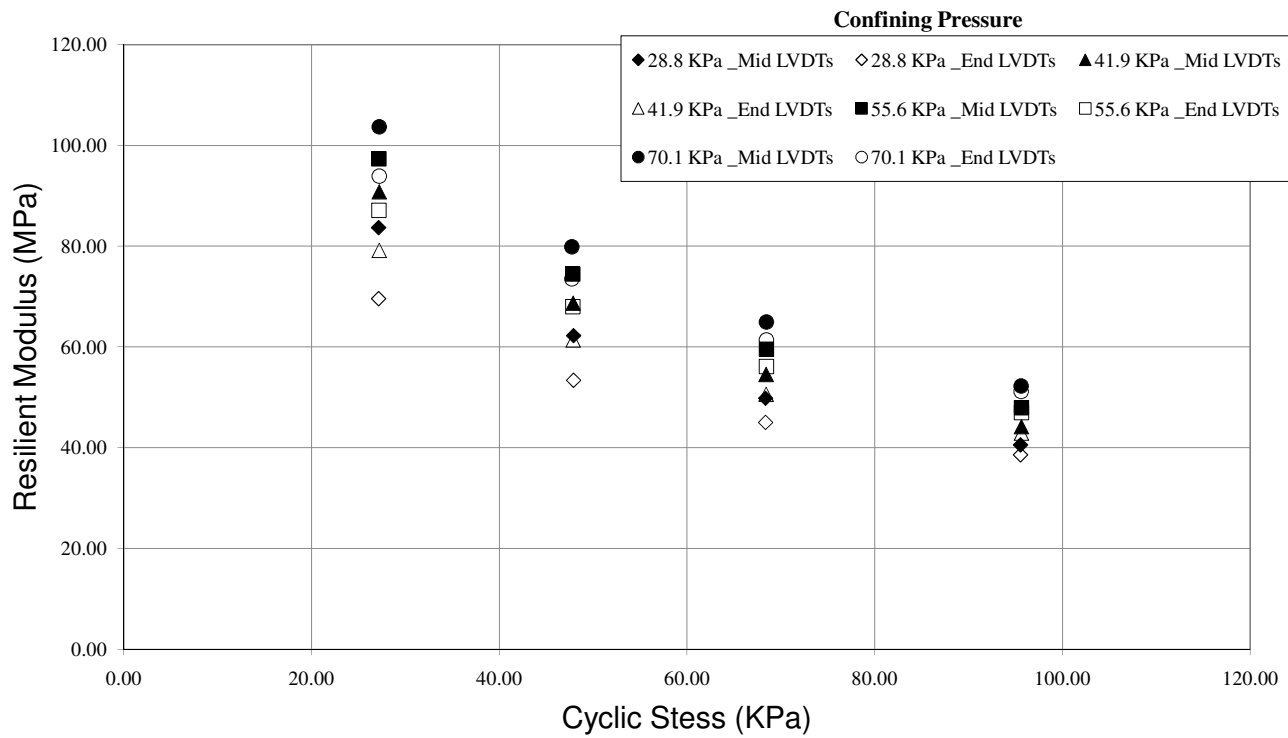
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0408	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1835.61	Soil Type:	Sandy Clay
Sample Moisture (%):	13.84%	Max. Dry Density (kg/m³):	1877
Replicate #:	2	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.20	27.20	27.21	27.15	47.74	47.83	47.86	47.91
Confining Pressure (KPa)	70.06	55.61	41.75	29.00	70.08	56.10	42.23	28.84
Mr - mid LVDTs (MPa)	103.68	97.37	90.81	83.68	79.88	74.49	68.72	62.24
Mr - end LVDTs (MPa)	93.89	87.14	79.17	69.60	73.51	68.01	61.37	53.39

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.45	68.48	68.42	68.36	95.59	95.63	95.62	95.52
Confining Pressure (KPa)	70.51	55.58	41.49	28.66	69.88	55.11	42.15	28.87
Mr - mid LVDTs (MPa)	64.92	59.54	54.56	49.82	52.22	47.95	44.18	40.56
Mr - end LVDTs (MPa)	61.38	56.11	50.61	45.01	51.18	46.98	42.91	38.58

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

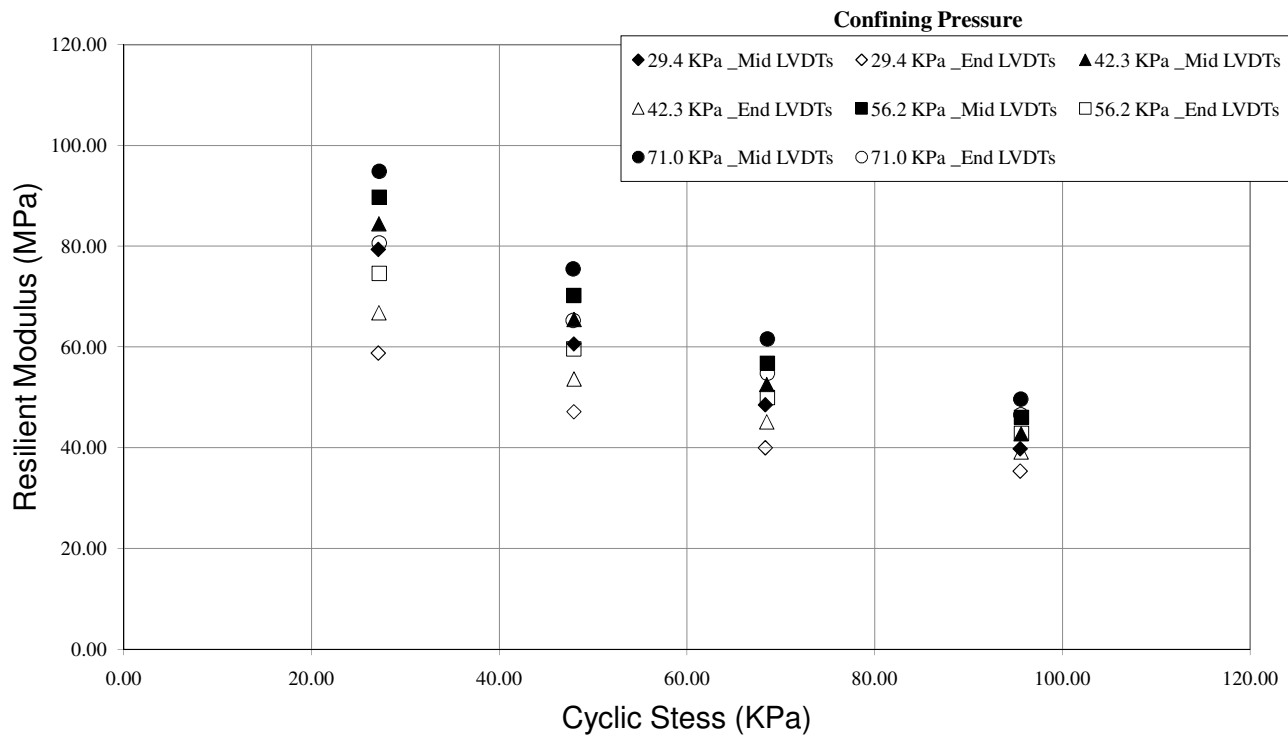
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0409	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1838.53	Soil Type:	Sandy Clay
Sample Moisture (%):	13.93%	Max. Dry Density (kg/m³):	1877
Replicate #:	3	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.20	27.20	27.18	27.11	47.88	47.94	47.97	47.95
Confining Pressure (KPa)	70.57	56.10	41.70	29.50	71.10	56.15	42.40	29.30
Mr - mid LVDTs (MPa)	94.83	89.70	84.44	79.39	75.50	70.23	65.46	60.62
Mr - end LVDTs (MPa)	80.66	74.59	66.78	58.77	65.24	59.63	53.64	47.15

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.57	68.56	68.50	68.34	95.58	95.63	95.59	95.48
Confining Pressure (KPa)	71.12	56.26	42.66	29.55	71.03	56.40	42.59	29.26
Mr - mid LVDTs (MPa)	61.59	56.74	52.57	48.51	49.62	46.02	42.80	39.80
Mr - end LVDTs (MPa)	54.81	49.95	45.14	40.00	46.51	42.86	39.15	35.37

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

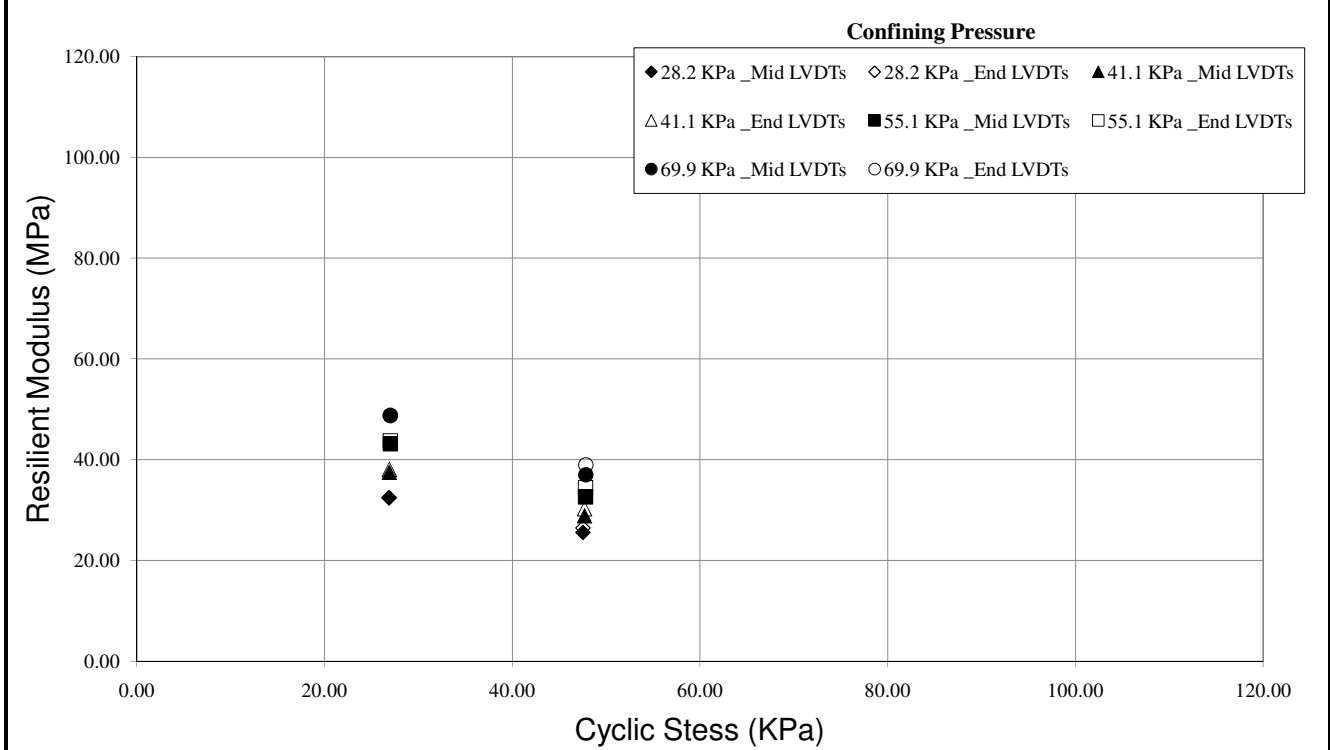
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0410	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1849.45	Soil Type:	Sandy Clay
Sample Moisture (%):	15.08%	Max. Dry Density (kg/m³):	1877
Replicate #:	1	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.00	27.02	26.92	26.87	47.84	47.81	47.72	47.53
Confining Pressure (KPa)	69.22	54.85	40.90	27.64	70.49	55.35	41.20	28.68
Mr - mid LVDTs (MPa)	48.83	43.15	37.52	32.41	36.98	32.63	28.85	25.56
Mr - end LVDTs (MPa)	48.75	43.71	38.10	32.48	38.96	34.44	30.26	26.45

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

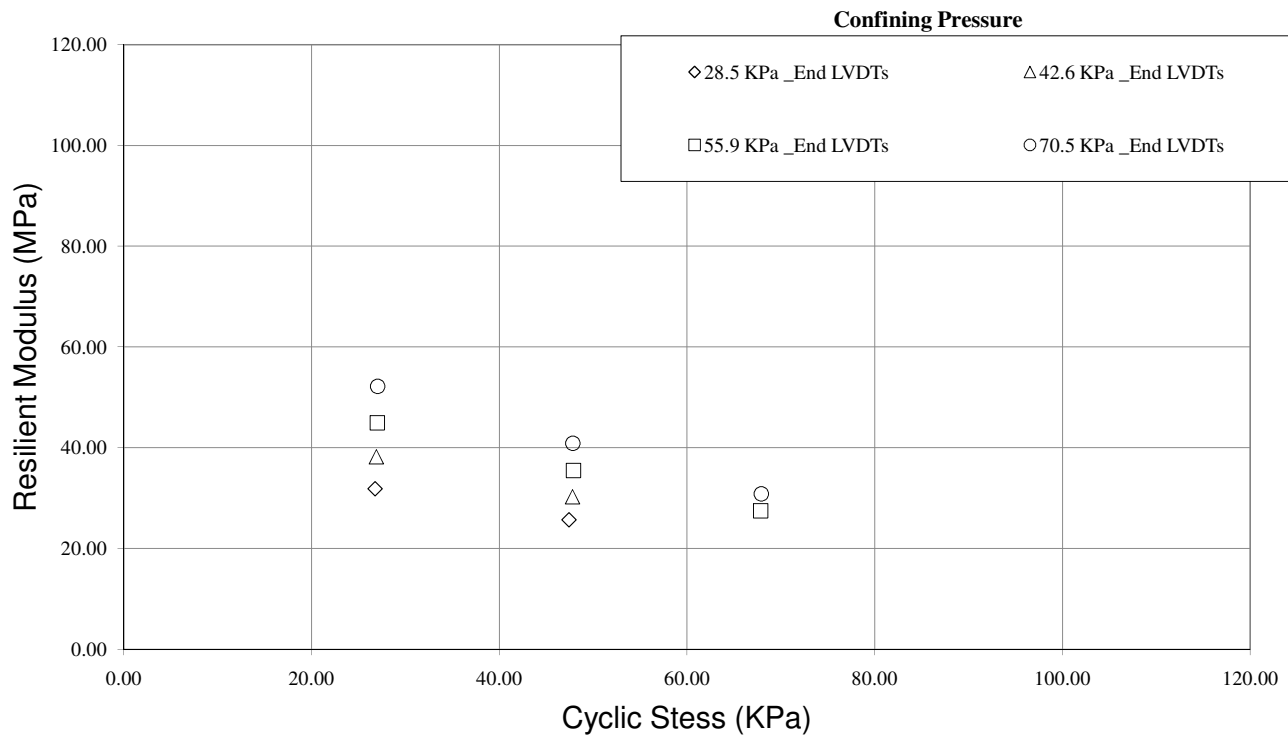
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0411	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1849.57	Soil Type:	Sandy Clay
Sample Moisture (%):	15.27%	Max. Dry Density (kg/m³):	1877
Replicate #:	2	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.04	27.01	26.91	26.78	47.83	47.91	47.81	47.43
Confining Pressure (KPa)	70.57	55.49	42.97	28.76	70.85	56.45	42.16	28.15
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	52.18	44.97	38.20	31.87	40.86	35.50	30.29	25.70

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.91	67.86	N/A	N/A	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	70.09	55.87	N/A	N/A	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	30.85	27.50	N/A	N/A	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

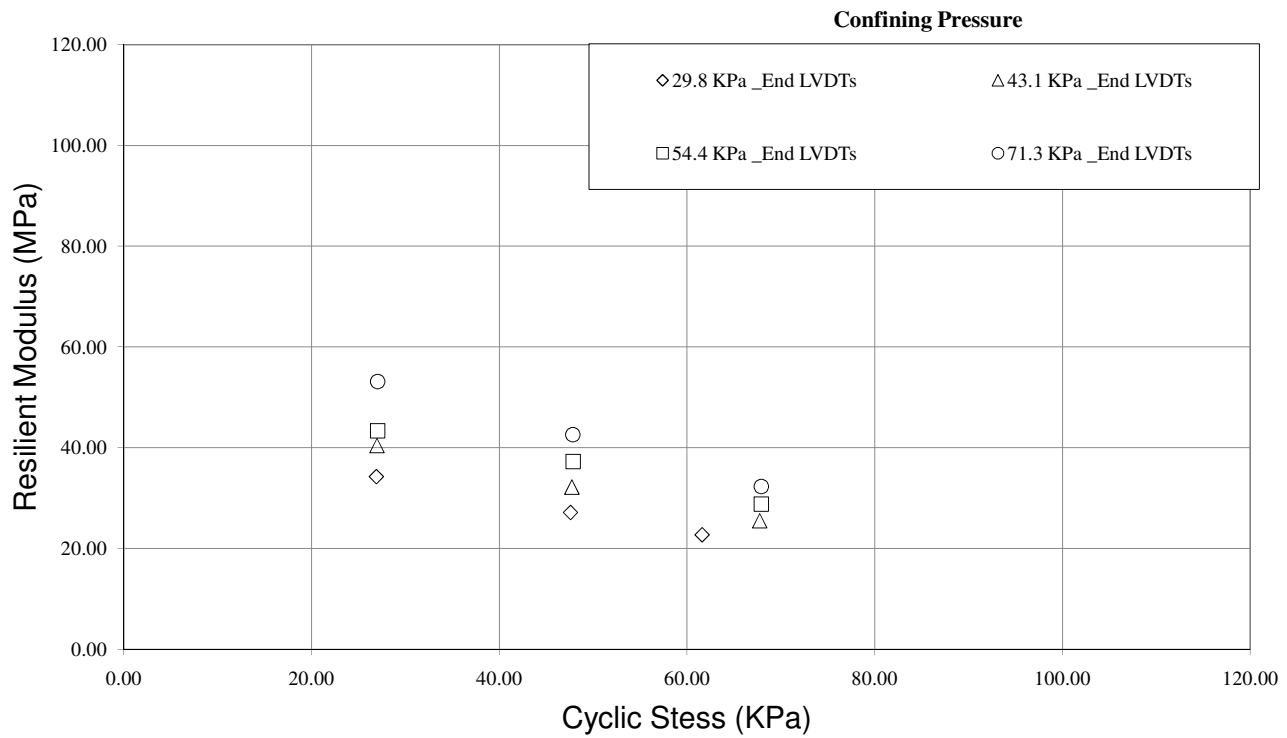
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0412	Client Lab #:	WSS071615
Date Tested:		Location:	PTH 1 West
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1847.87	Soil Type:	Sandy Clay
Sample Moisture (%):	15.22%	Max. Dry Density (kg/m³):	1877
Replicate #:	3	Optimum Moisture (%):	13.40%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.05	27.05	26.99	26.91	47.85	47.86	47.75	47.60
Confining Pressure (KPa)	71.30	49.18	43.31	30.43	71.72	57.01	42.90	29.04
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	53.16	43.38	40.44	34.24	42.56	37.23	32.23	27.15

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	67.91	67.91	67.76	61.62	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	70.94	57.02	43.20	29.82	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	32.28	28.80	25.54	22.73	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

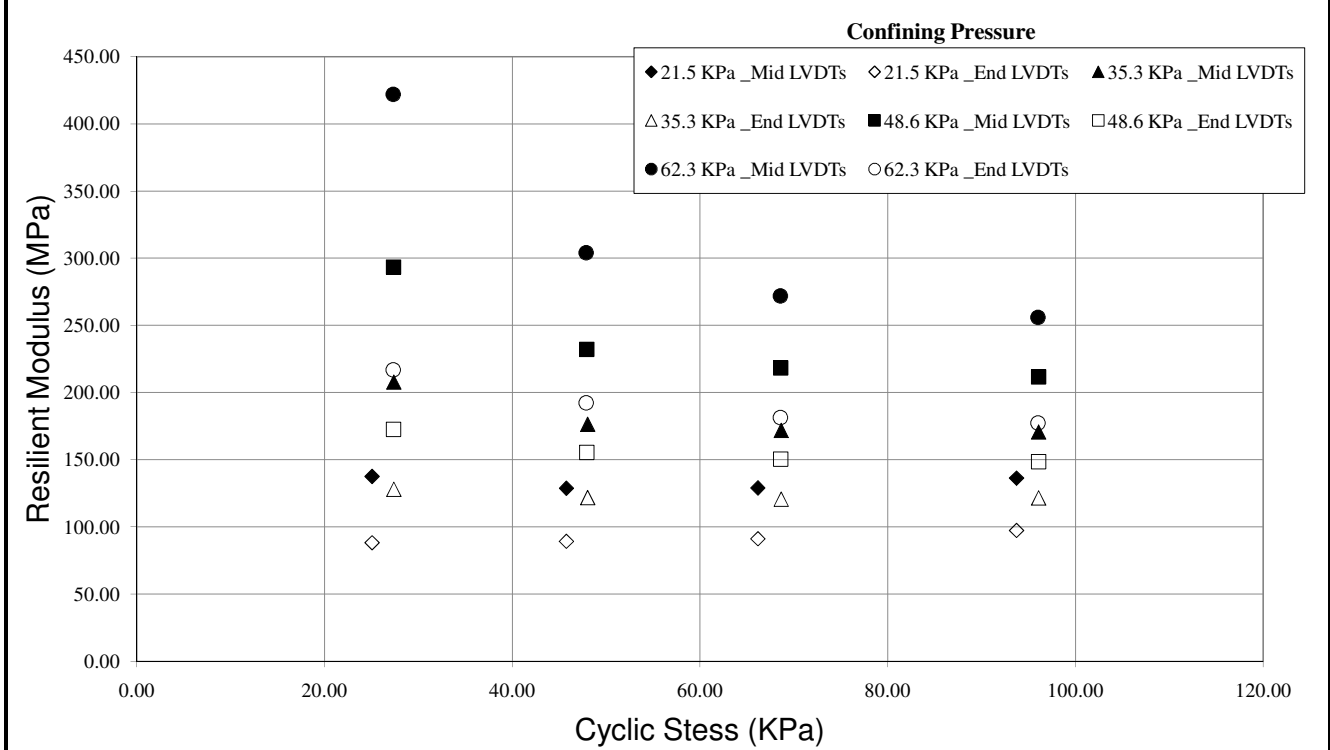
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0501	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1756.27	Soil Type:	Silt
Sample Moisture (%):	8.59%	Max. Dry Density (kg/m³):	1865
Replicate #:	1	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.32	27.35	27.38	25.08	47.86	47.93	48.03	45.78
Confining Pressure (KPa)	62.82	48.43	35.00	22.61	62.70	48.40	35.34	21.79
Mr - mid LVDTs (MPa)	421.95	293.24	207.74	137.48	304.09	232.16	176.26	128.87
Mr - end LVDTs (MPa)	216.94	172.68	128.05	88.23	192.43	155.36	121.87	89.27

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.55	68.60	68.66	66.18	95.99	96.08	96.09	93.73
Confining Pressure (KPa)	62.57	49.04	35.22	21.09	60.98	48.51	35.45	20.33
Mr - mid LVDTs (MPa)	271.98	218.33	171.69	129.02	256.05	211.57	170.59	136.28
Mr - end LVDTs (MPa)	181.42	150.34	120.76	91.17	177.24	148.48	121.61	97.41

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

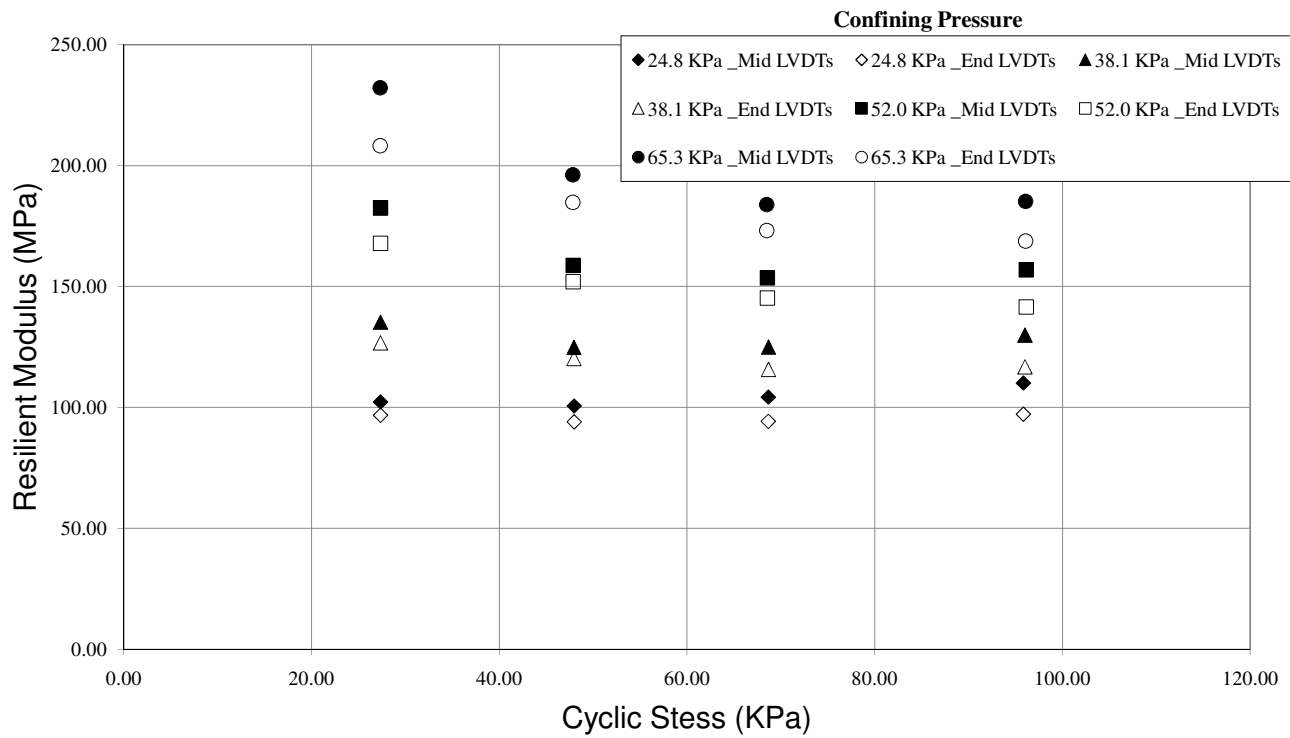
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0502	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1757.31	Soil Type:	Silt
Sample Moisture (%):	8.69%	Max. Dry Density (kg/m³):	1865
Replicate #:	2	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.32	27.36	27.34	27.36	47.84	47.87	47.95	47.99
Confining Pressure (KPa)	65.81	52.09	38.27	25.72	65.63	51.75	38.83	25.21
Mr - mid LVDTs (MPa)	232.16	182.43	135.28	102.29	196.13	158.78	124.86	100.67
Mr - end LVDTs (MPa)	208.24	167.83	126.66	96.71	184.78	151.99	120.20	93.98

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.49	68.56	68.68	68.67	96.09	96.13	96.00	95.83
Confining Pressure (KPa)	65.27	52.19	37.64	24.19	64.45	51.82	37.83	24.00
Mr - mid LVDTs (MPa)	183.84	153.63	124.98	104.26	185.19	156.90	129.94	110.09
Mr - end LVDTs (MPa)	173.20	145.22	115.73	94.20	168.84	141.50	116.80	97.16

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

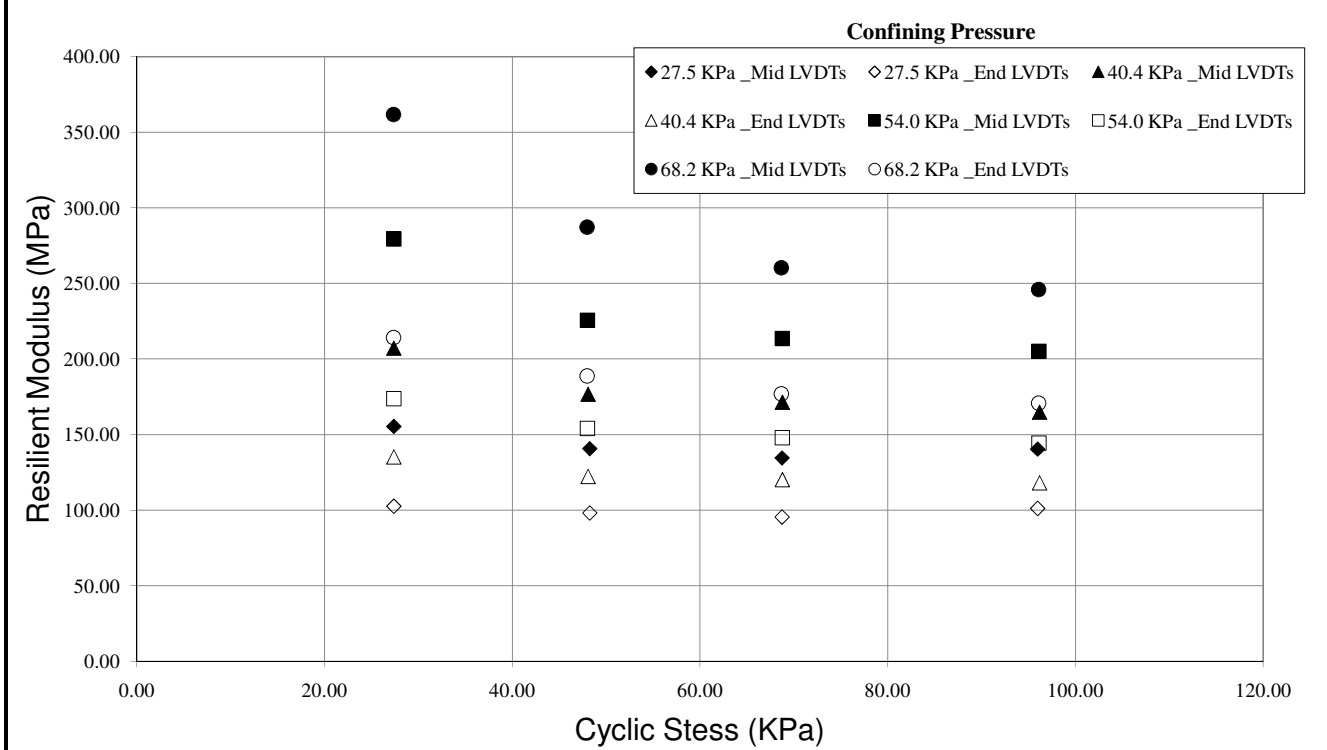
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0503	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1756.40	Soil Type:	Silt
Sample Moisture (%):	8.67%	Max. Dry Density (kg/m³):	1865
Replicate #:	3	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.34	27.37	27.39	27.40	47.96	48.01	48.09	48.27
Confining Pressure (KPa)	68.53	54.01	41.71	27.81	68.17	53.13	39.95	27.71
Mr - mid LVDTs (MPa)	361.77	279.32	207.12	155.28	287.20	225.65	176.68	140.59
Mr - end LVDTs (MPa)	214.27	173.78	135.17	102.54	188.83	154.13	122.31	98.08

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.66	68.76	68.78	68.76	96.07	96.12	96.18	95.99
Confining Pressure (KPa)	67.98	54.46	40.84	26.75	68.15	54.41	39.15	27.54
Mr - mid LVDTs (MPa)	260.21	213.47	171.27	134.48	245.94	205.04	164.75	140.25
Mr - end LVDTs (MPa)	176.83	147.92	120.24	95.42	170.86	144.30	118.09	101.07

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

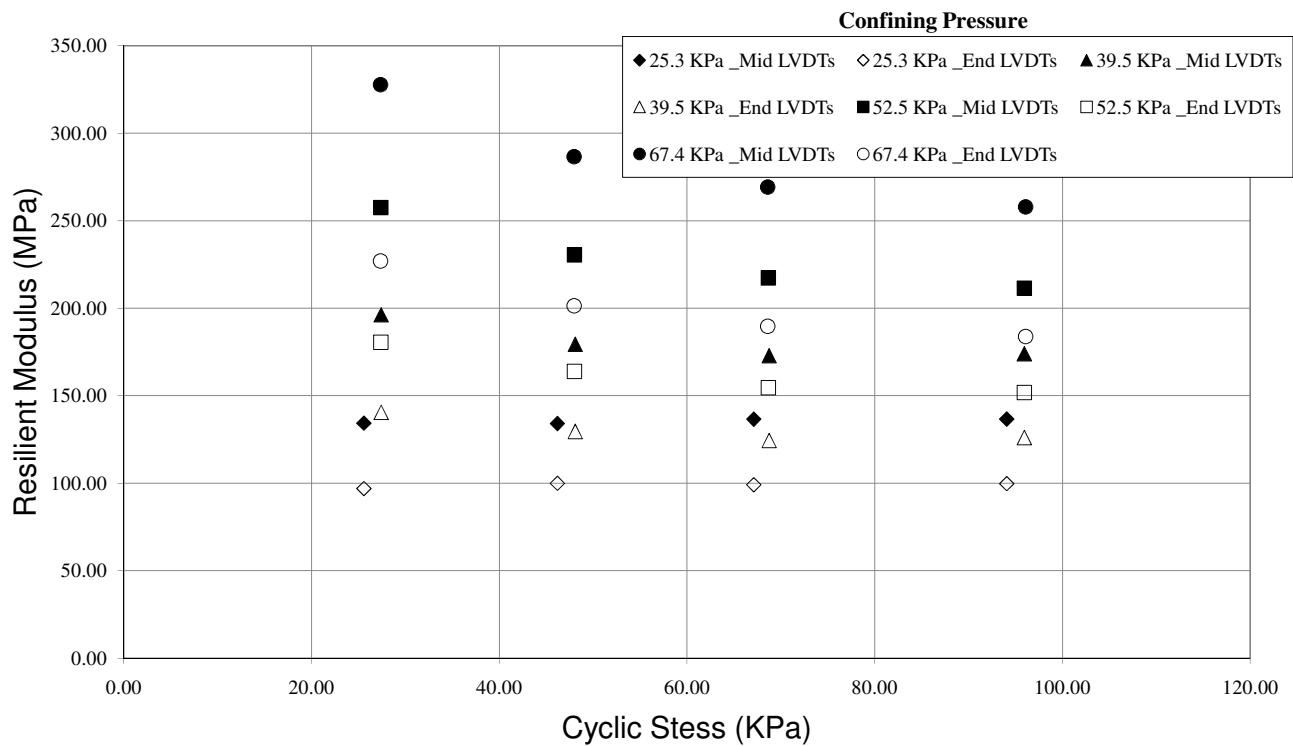
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0504	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1825.66	Soil Type:	Silt
Sample Moisture (%):	11.18%	Max. Dry Density (kg/m³):	1865
Replicate #:	1	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.36	27.39	27.41	25.58	47.99	48.01	48.09	46.19
Confining Pressure (KPa)	68.35	52.86	40.59	25.85	67.24	52.68	39.32	25.10
Mr - mid LVDTs (MPa)	327.81	257.53	196.27	134.27	286.53	230.36	179.42	134.07
Mr - end LVDTs (MPa)	226.88	180.57	140.39	96.91	201.34	163.87	129.58	99.95

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.61	68.66	68.74	67.11	96.07	95.95	95.93	94.05
Confining Pressure (KPa)	67.34	52.59	39.07	25.49	66.80	51.94	38.98	24.58
Mr - mid LVDTs (MPa)	269.23	217.19	172.89	136.51	257.79	211.49	174.04	136.57
Mr - end LVDTs (MPa)	189.74	154.63	124.45	99.10	183.80	151.78	126.14	99.77

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

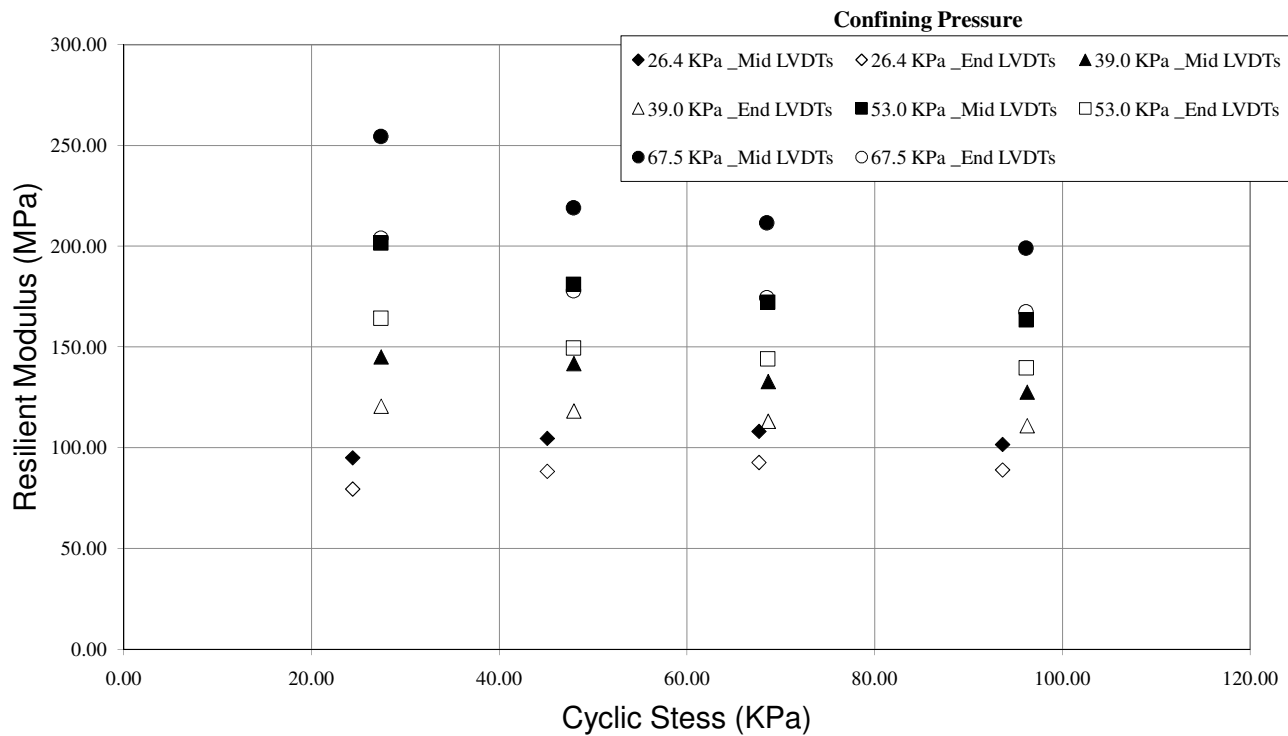
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0505	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1823.17	Soil Type:	Silt
Sample Moisture (%):	10.67%	Max. Dry Density (kg/m³):	1865
Replicate #:	2	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.38	27.39	27.41	24.39	47.91	47.92	47.95	45.13
Confining Pressure (KPa)	68.00	53.92	38.69	25.97	67.48	52.24	38.93	26.81
Mr - mid LVDTs (MPa)	254.44	201.63	145.08	95.03	219.06	181.09	141.72	104.61
Mr - end LVDTs (MPa)	203.95	164.33	120.57	79.41	177.86	149.45	118.21	88.20

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.50	68.60	68.67	67.68	96.09	96.16	96.26	93.62
Confining Pressure (KPa)	67.50	53.60	38.63	26.75	67.13	52.34	39.90	26.23
Mr - mid LVDTs (MPa)	211.52	172.17	132.77	108.10	199.06	163.55	127.56	101.60
Mr - end LVDTs (MPa)	174.47	144.18	113.07	92.61	167.42	139.60	110.91	88.91

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

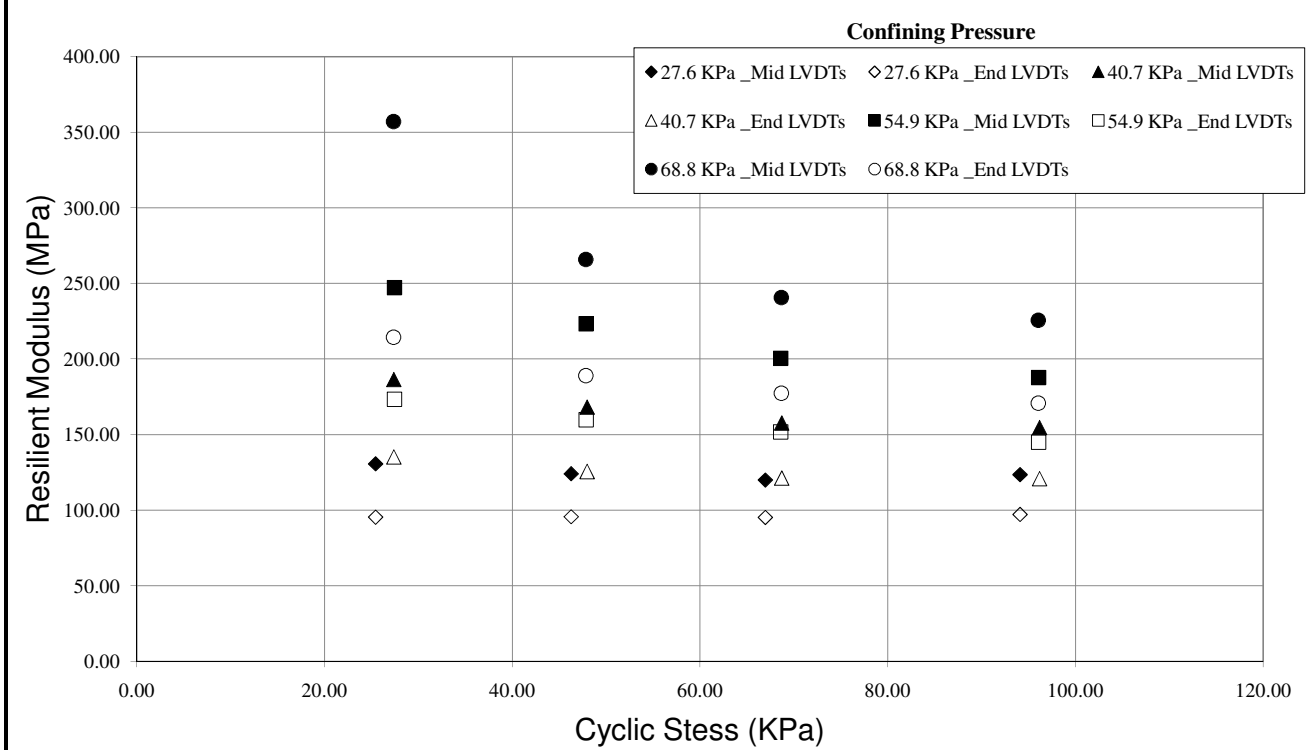
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0506	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1825.11	Soil Type:	Silt
Sample Moisture (%):	10.94%	Max. Dry Density (kg/m³):	1865
Replicate #:	3	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.36	27.46	27.39	25.45	47.84	47.89	47.98	46.28
Confining Pressure (KPa)	68.77	54.48	41.57	27.62	69.40	55.73	40.47	28.08
Mr - mid LVDTs (MPa)	357.15	247.11	186.50	130.58	265.81	223.17	168.19	124.01
Mr - end LVDTs (MPa)	214.29	173.32	135.17	95.34	188.98	159.85	125.62	95.65

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.66	68.60	68.71	66.96	96.03	96.08	96.17	94.09
Confining Pressure (KPa)	68.42	55.15	40.68	27.13	68.78	54.15	40.25	27.72
Mr - mid LVDTs (MPa)	240.52	200.42	157.64	119.92	225.57	187.66	154.70	123.44
Mr - end LVDTs (MPa)	177.28	151.61	121.28	95.15	170.82	144.99	120.90	97.19

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

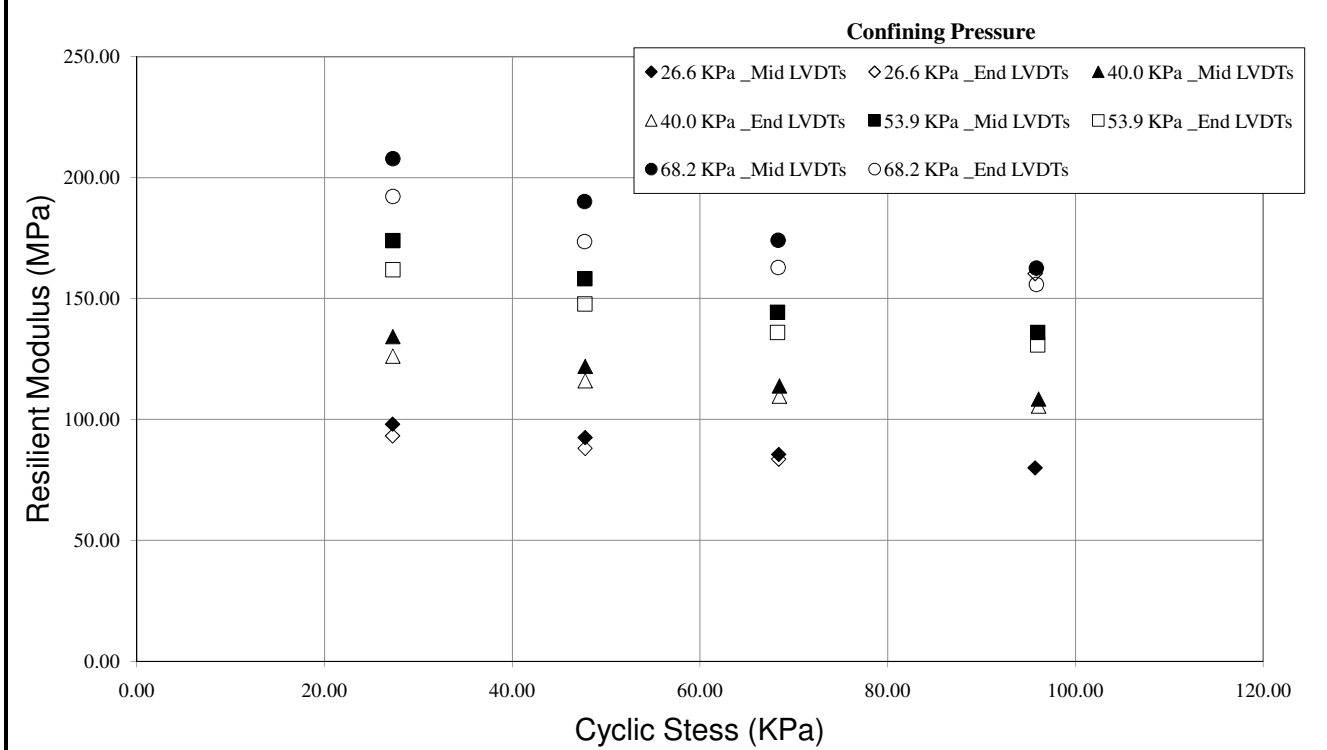
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0507	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1847.99	Soil Type:	Silt
Sample Moisture (%):	12.19%	Max. Dry Density (kg/m³):	1865
Replicate #:	1	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.29	27.27	27.27	27.24	47.69	47.73	47.76	47.76
Confining Pressure (KPa)	68.38	53.79	41.18	26.92	67.99	54.60	39.45	26.34
Mr - mid LVDTs (MPa)	207.85	173.94	134.28	98.01	190.02	158.20	122.00	92.49
Mr - end LVDTs (MPa)	192.14	161.84	126.24	93.21	173.55	147.74	116.01	88.04

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.33	68.27	68.45	68.39	95.84	95.98	96.06	95.70
Confining Pressure (KPa)	68.31	54.00	40.07	27.02	67.94	53.08	39.29	26.15
Mr - mid LVDTs (MPa)	174.03	144.34	113.85	85.51	162.59	136.01	108.44	79.95
Mr - end LVDTs (MPa)	162.89	135.97	109.58	83.56	155.80	130.81	105.47	160.37

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

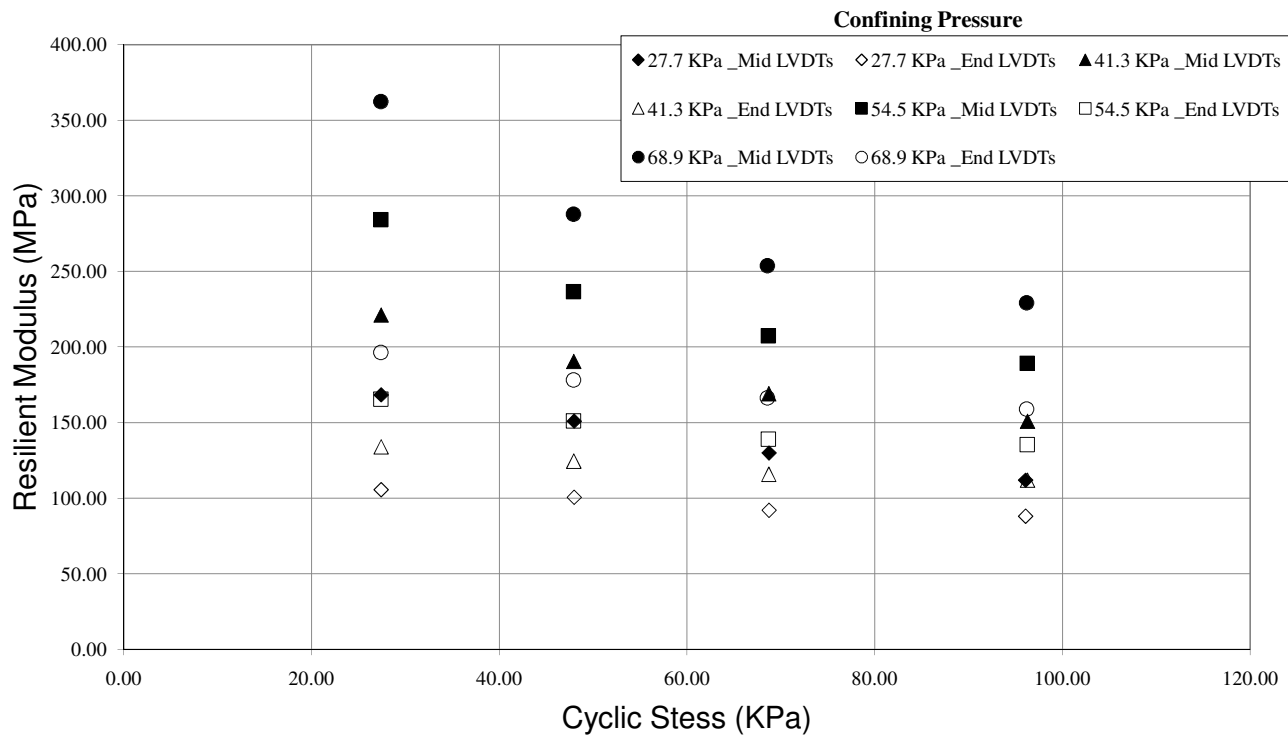
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0508	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1852.18	Soil Type:	Silt
Sample Moisture (%):	13.05%	Max. Dry Density (kg/m³):	1865
Replicate #:	2	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.37	27.40	27.41	27.42	47.92	47.91	47.93	47.99
Confining Pressure (KPa)	68.30	54.10	41.80	28.56	69.13	55.23	41.38	28.30
Mr - mid LVDTs (MPa)	362.37	284.23	221.11	168.28	287.92	236.60	190.49	150.95
Mr - end LVDTs (MPa)	196.31	165.49	133.91	105.47	178.10	151.00	124.53	100.50

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.55	68.68	68.72	68.75	96.18	96.24	96.29	96.08
Confining Pressure (KPa)	69.30	53.83	40.96	26.85	69.00	54.98	41.07	27.13
Mr - mid LVDTs (MPa)	253.77	207.34	168.99	129.78	229.19	189.17	150.87	111.82
Mr - end LVDTs (MPa)	166.34	138.95	115.85	91.92	158.97	135.48	112.00	87.94

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

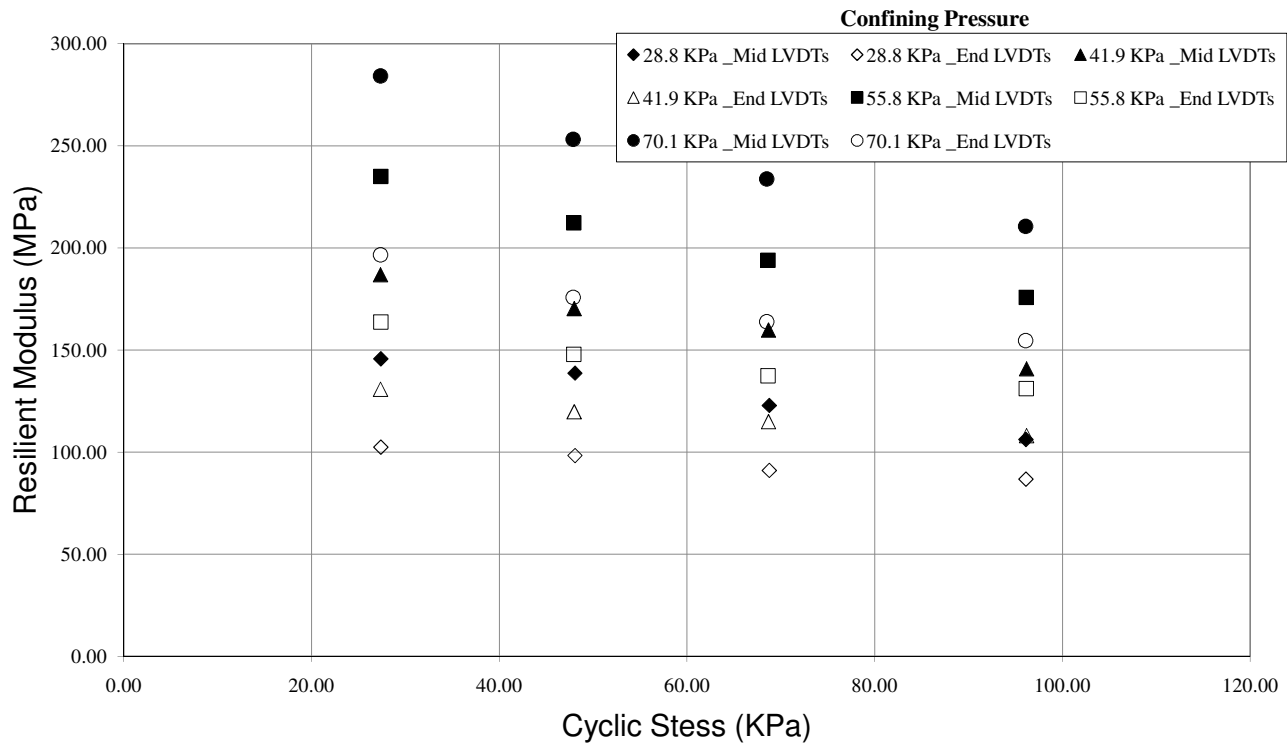
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0509	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1851.94	Soil Type:	Silt
Sample Moisture (%):	12.63%	Max. Dry Density (kg/m³):	1865
Replicate #:	3	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.35	27.39	27.35	27.38	47.88	47.93	47.98	48.07
Confining Pressure (KPa)	69.69	55.11	41.88	29.23	70.39	56.19	41.69	29.58
Mr - mid LVDTs (MPa)	284.20	234.99	186.91	145.63	253.12	212.30	170.24	138.58
Mr - end LVDTs (MPa)	196.55	163.63	130.82	102.45	175.67	147.80	119.72	98.33

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.50	68.62	68.69	68.78	96.06	96.15	96.19	96.13
Confining Pressure (KPa)	70.49	55.94	42.77	28.20	69.95	55.83	41.27	28.36
Mr - mid LVDTs (MPa)	233.75	193.84	159.76	122.75	210.56	175.69	140.76	106.09
Mr - end LVDTs (MPa)	163.88	137.33	114.86	91.03	154.61	131.05	108.01	86.77

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

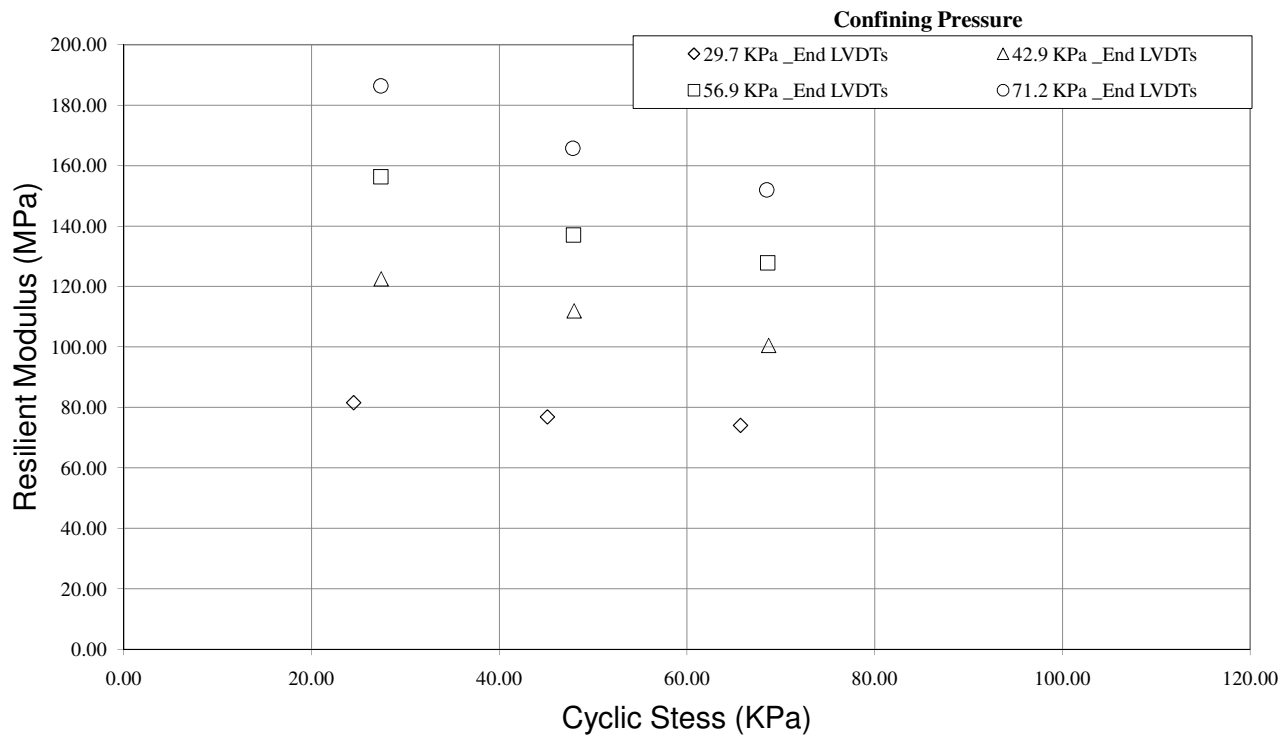
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0510	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1819.53	Soil Type:	Silt
Sample Moisture (%):	14.80%	Max. Dry Density (kg/m³):	1865
Replicate #:	1	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.38	27.38	27.43	24.49	47.85	47.91	47.98	45.13
Confining Pressure (KPa)	71.28	57.15	42.40	29.58	71.34	55.92	43.91	28.93
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	186.32	156.35	122.52	81.60	165.70	137.08	111.92	76.90

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.51	68.59	68.69	65.71	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	71.11	57.60	42.27	30.73	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	151.96	127.80	100.50	74.10	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

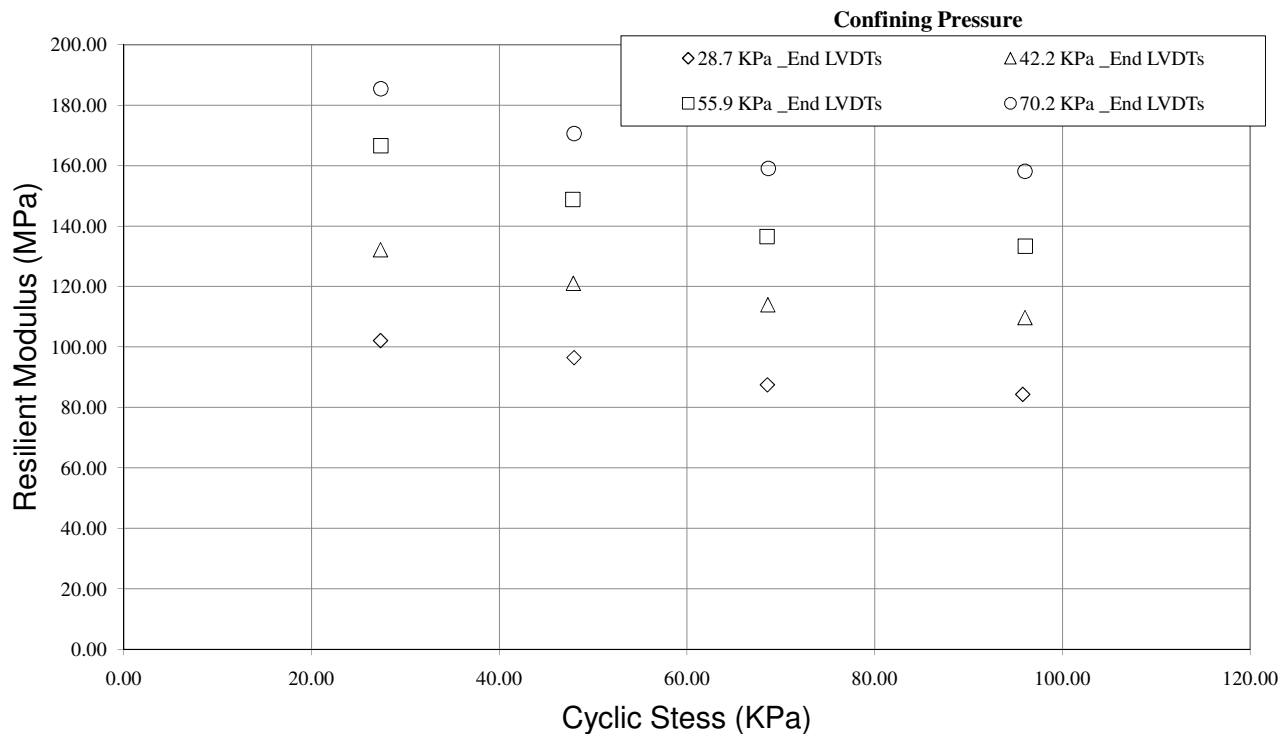
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0511	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1814.12	Soil Type:	Silt
Sample Moisture (%):	14.99%	Max. Dry Density (kg/m³):	1865
Replicate #:	2	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.40	27.37	27.35	27.37	47.99	47.82	47.89	47.99
Confining Pressure (KPa)	69.20	56.05	41.56	28.66	70.78	56.53	42.17	29.60
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	185.43	166.59	132.18	102.06	170.63	148.74	121.08	96.43

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.65	68.55	68.62	68.58	96.02	96.04	96.02	95.78
Confining Pressure (KPa)	70.36	55.61	42.78	28.22	70.42	55.40	42.37	28.43
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	159.01	136.52	113.97	87.44	158.06	133.31	109.70	84.31

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

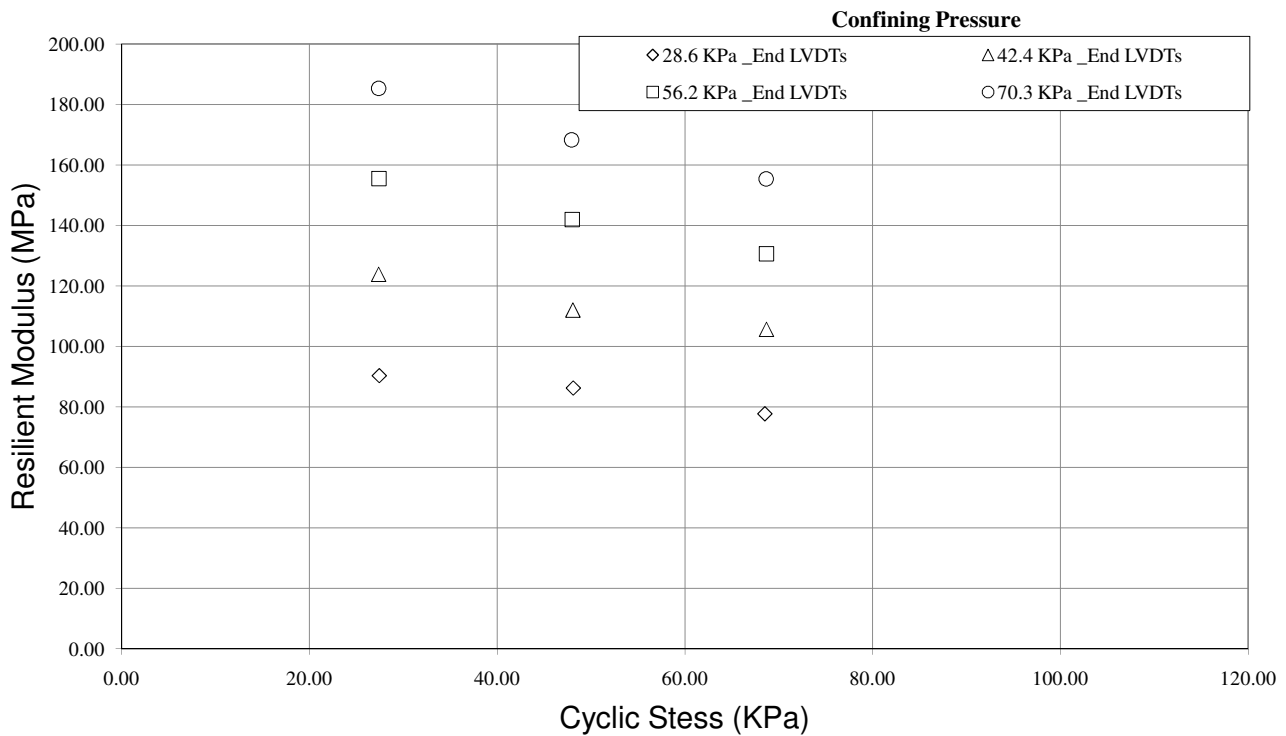
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0512	Client Lab #:	
Date Tested:		Location:	PTH 34
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1821.04	Soil Type:	Silt
Sample Moisture (%):	14.95%	Max. Dry Density (kg/m³):	1865
Replicate #:	3	Optimum Moisture (%):	13%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.37	27.40	27.38	27.44	47.94	47.99	48.07	48.11
Confining Pressure (KPa)	70.31	55.38	42.63	28.36	70.03	56.58	41.67	29.02
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	185.28	155.47	123.87	90.33	168.26	141.93	112.07	86.25

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.65	68.68	68.70	68.53	N/A	N/A	N/A	N/A
Confining Pressure (KPa)	70.66	56.64	42.98	28.39	N/A	N/A	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	155.43	130.62	105.68	77.72	N/A	N/A	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

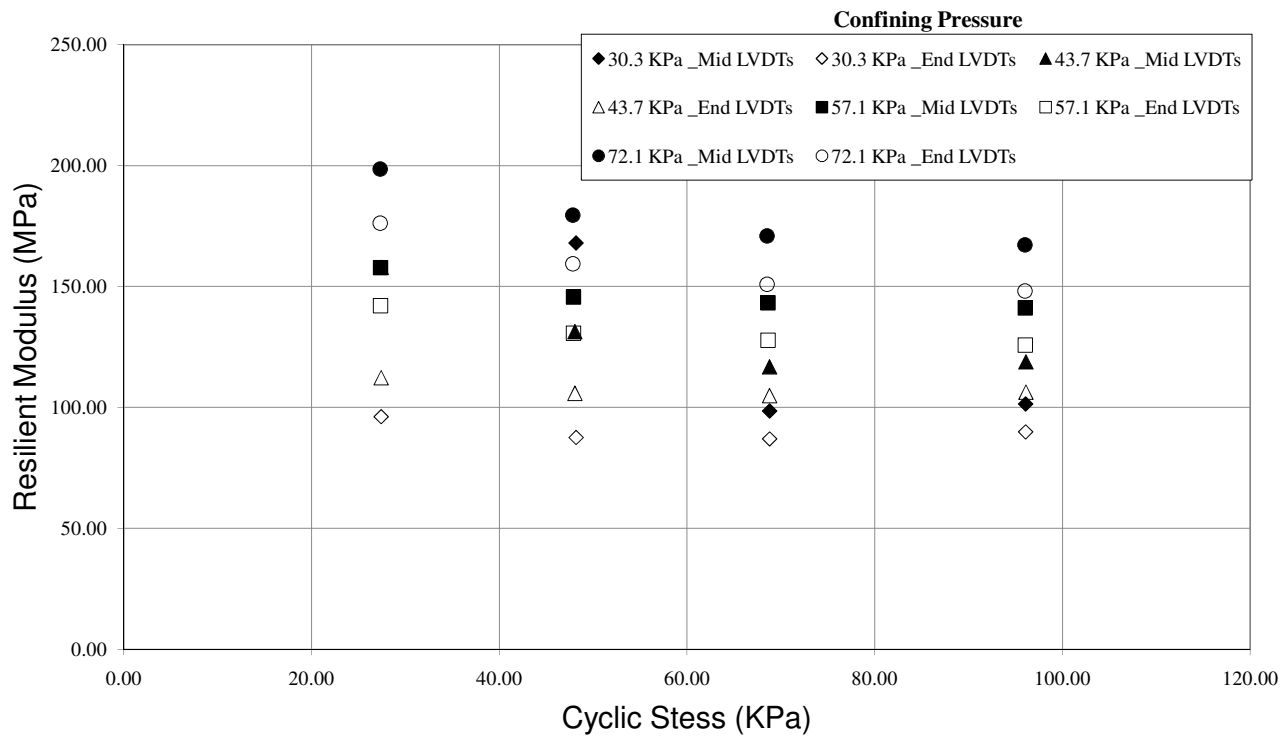
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0601	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1771.94	Soil Type:	Silty Sand
Sample Moisture (%):	7.64%	Max. Dry Density (kg/m³):	1859
Replicate #:	1	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.31	27.35	27.40	27.42	47.85	47.90	48.05	48.19
Confining Pressure (KPa)	71.94	56.80	44.20	30.76	72.00	56.72	43.20	30.03
Mr - mid LVDTs (MPa)	198.56	157.77	157.96	6405.37	179.49	145.61	131.37	167.98
Mr - end LVDTs (MPa)	176.24	142.05	112.26	96.14	159.34	130.71	105.88	87.52

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.53	68.64	68.79	68.80	96.02	96.05	96.11	96.07
Confining Pressure (KPa)	72.03	57.85	43.25	29.93	72.36	57.03	44.12	30.54
Mr - mid LVDTs (MPa)	170.92	143.21	116.84	98.52	167.23	141.09	118.90	101.43
Mr - end LVDTs (MPa)	150.89	127.73	104.90	86.98	148.08	125.76	106.31	89.85

Tested By: Haithem Soliman

Date:

Reviewed By: Dr. Ahmed Shalaby

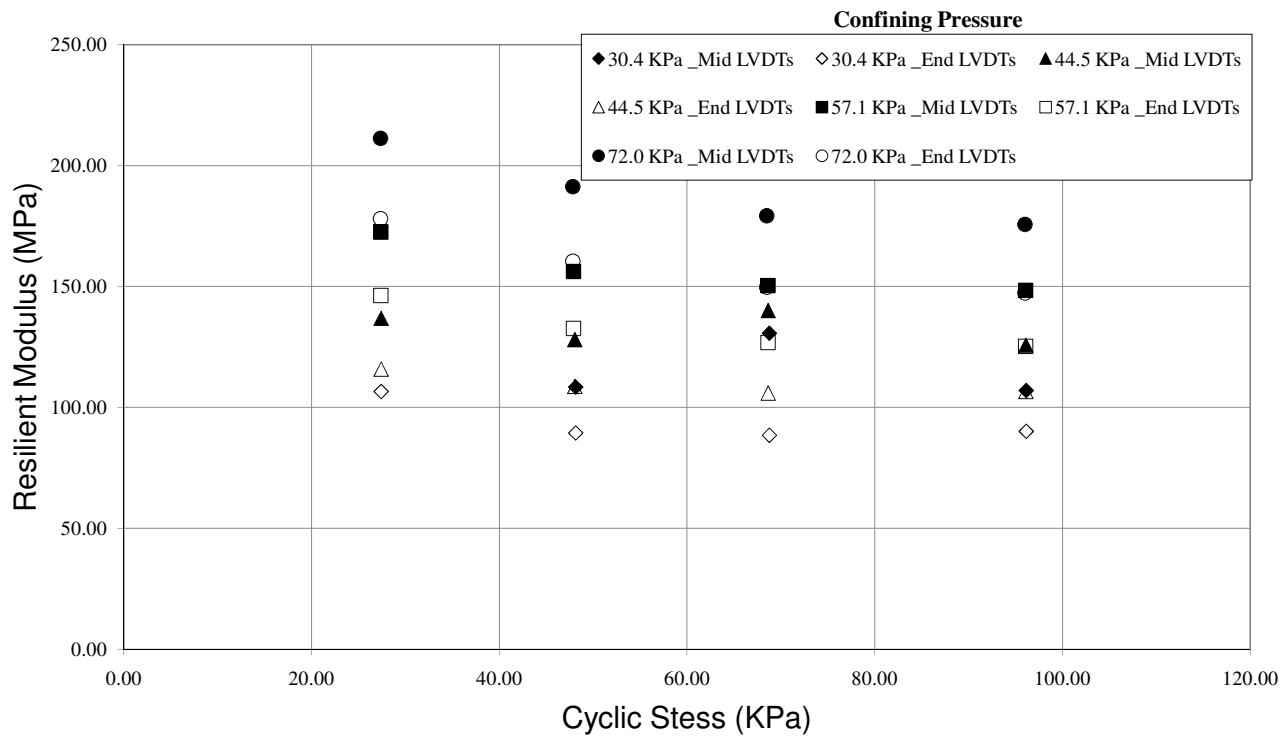
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0602	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1774.49	Soil Type:	Silty Sand
Sample Moisture (%):	7.63%	Max. Dry Density (kg/m³):	1859
Replicate #:	2	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.36	27.37	27.43	27.41	47.85	47.91	48.06	48.14
Confining Pressure (KPa)	72.17	57.73	44.80	30.21	72.35	57.03	44.31	30.38
Mr - mid LVDTs (MPa)	211.27	172.45	136.82	334.60	191.34	156.17	128.00	108.42
Mr - end LVDTs (MPa)	178.07	146.34	115.91	106.54	160.51	132.66	108.69	89.42

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.51	68.65	68.66	68.78	96.00	96.07	96.12	96.15
Confining Pressure (KPa)	71.51	56.79	44.27	30.56	72.07	56.97	44.60	30.64
Mr - mid LVDTs (MPa)	179.27	150.37	140.01	130.68	175.71	148.38	125.78	106.99
Mr - end LVDTs (MPa)	149.77	126.90	105.94	88.47	147.31	125.31	106.62	90.11

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

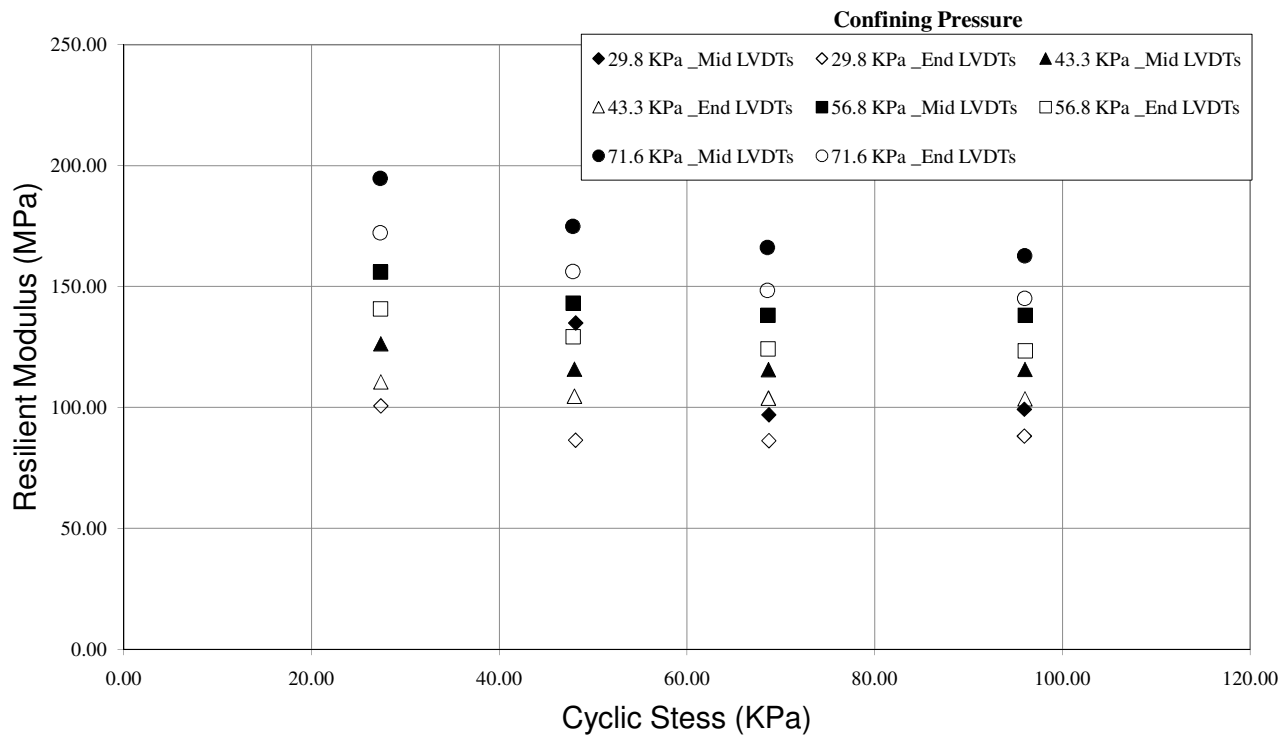
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0603	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1772.54	Soil Type:	Silty Sand
Sample Moisture (%):	7.71%	Max. Dry Density (kg/m³):	1859
Replicate #:	3	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.31	27.35	27.38	27.39	47.84	47.89	48.01	48.14
Confining Pressure (KPa)	71.92	57.57	43.58	29.96	71.51	56.47	43.04	29.68
Mr - mid LVDTs (MPa)	194.75	155.96	126.35	1699.91	174.90	143.05	115.84	134.94
Mr - end LVDTs (MPa)	172.26	140.73	110.63	100.61	156.22	129.23	104.73	86.45

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.58	68.62	68.68	68.73	95.99	96.03	96.03	95.95
Confining Pressure (KPa)	71.50	56.21	43.50	30.01	71.52	56.81	42.92	29.49
Mr - mid LVDTs (MPa)	166.17	138.07	115.64	96.99	162.69	138.02	115.79	99.28
Mr - end LVDTs (MPa)	148.39	124.16	103.93	86.25	145.08	123.34	103.61	88.15

Tested By: Haithem Soliman

Date:

Reviewed By: Dr. Ahmed Shalaby

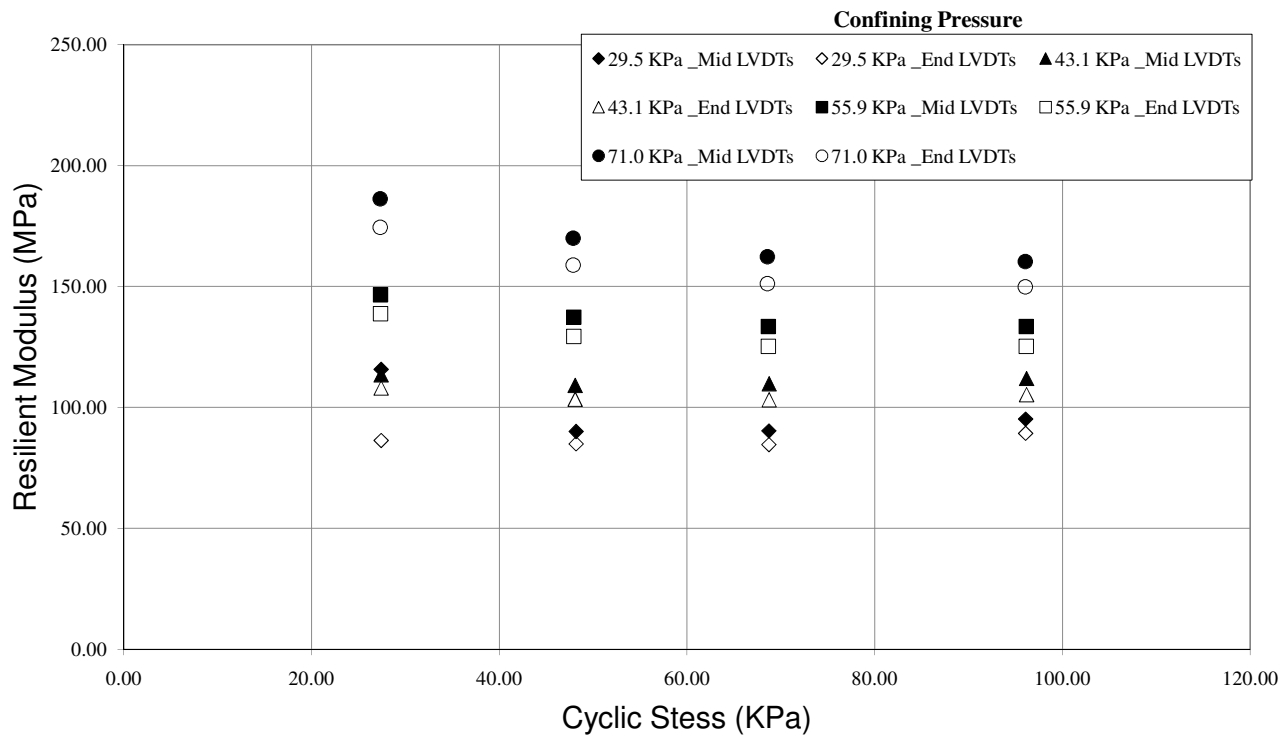
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0604	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1833.30	Soil Type:	Silty Sand
Sample Moisture (%):	9.48%	Max. Dry Density (kg/m³):	1859
Replicate #:	1	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.33	27.36	27.40	27.42	47.88	47.95	48.07	48.19
Confining Pressure (KPa)	71.00	55.75	43.61	29.43	70.92	56.18	42.61	29.47
Mr - mid LVDTs (MPa)	186.21	146.53	113.49	115.77	169.93	137.29	109.09	90.07
Mr - end LVDTs (MPa)	174.42	138.72	108.10	86.31	158.83	129.38	103.39	84.91

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.57	68.67	68.74	68.74	96.03	96.14	96.17	96.09
Confining Pressure (KPa)	70.83	55.90	43.24	29.01	71.07	55.68	43.08	30.00
Mr - mid LVDTs (MPa)	162.30	133.42	109.79	90.31	160.32	133.50	111.95	95.22
Mr - end LVDTs (MPa)	151.23	125.22	103.17	84.59	149.90	125.30	105.35	89.29

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

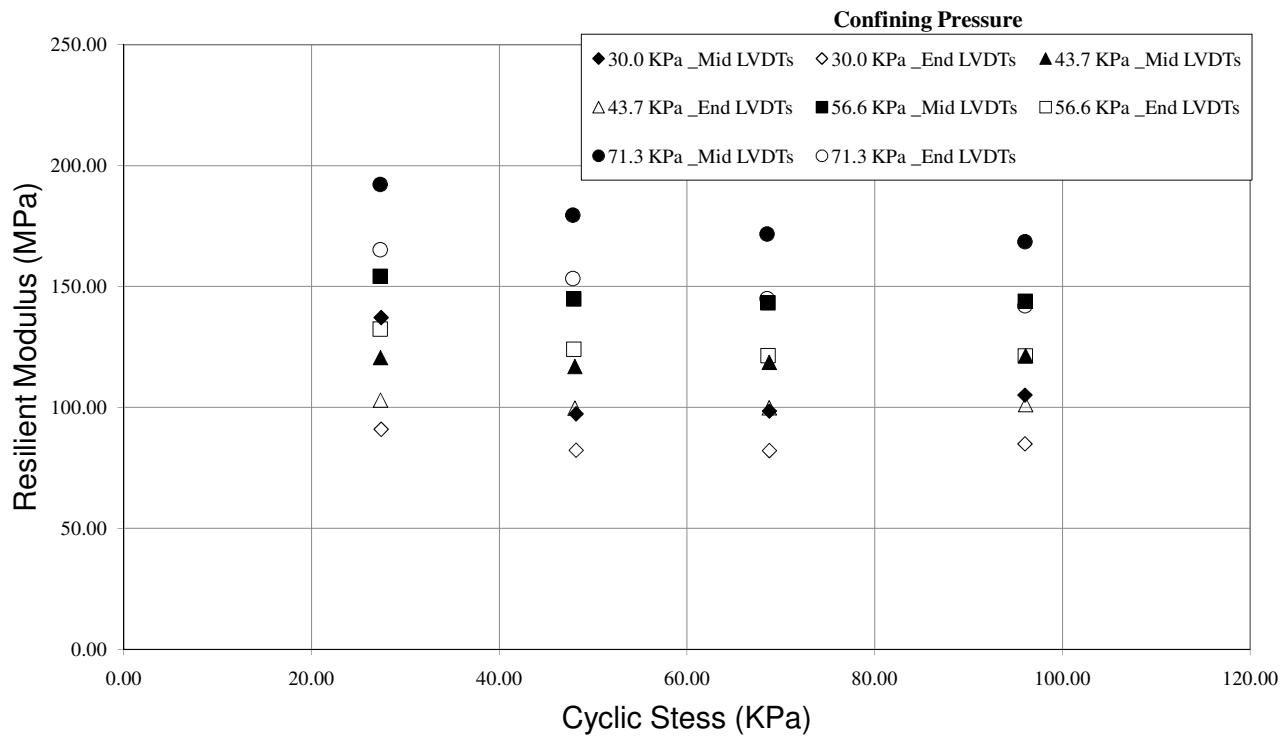
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0605	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1834.70	Soil Type:	Silty Sand
Sample Moisture (%):	9.42%	Max. Dry Density (kg/m³):	1859
Replicate #:	2	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.31	27.33	27.35	27.41	47.84	47.93	48.06	48.18
Confining Pressure (KPa)	70.38	56.31	43.75	29.53	71.79	56.29	43.55	30.69
Mr - mid LVDTs (MPa)	192.14	154.18	120.55	137.12	179.46	144.82	116.89	97.28
Mr - end LVDTs (MPa)	165.18	132.43	103.01	90.96	153.33	124.04	99.75	82.29

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.52	68.65	68.77	68.78	95.99	96.04	96.09	96.01
Confining Pressure (KPa)	71.51	56.88	43.94	30.01	71.33	56.75	43.44	29.75
Mr - mid LVDTs (MPa)	171.65	143.21	118.55	98.42	168.48	143.87	121.36	105.03
Mr - end LVDTs (MPa)	144.98	121.36	99.85	82.14	142.10	121.28	101.16	84.93

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

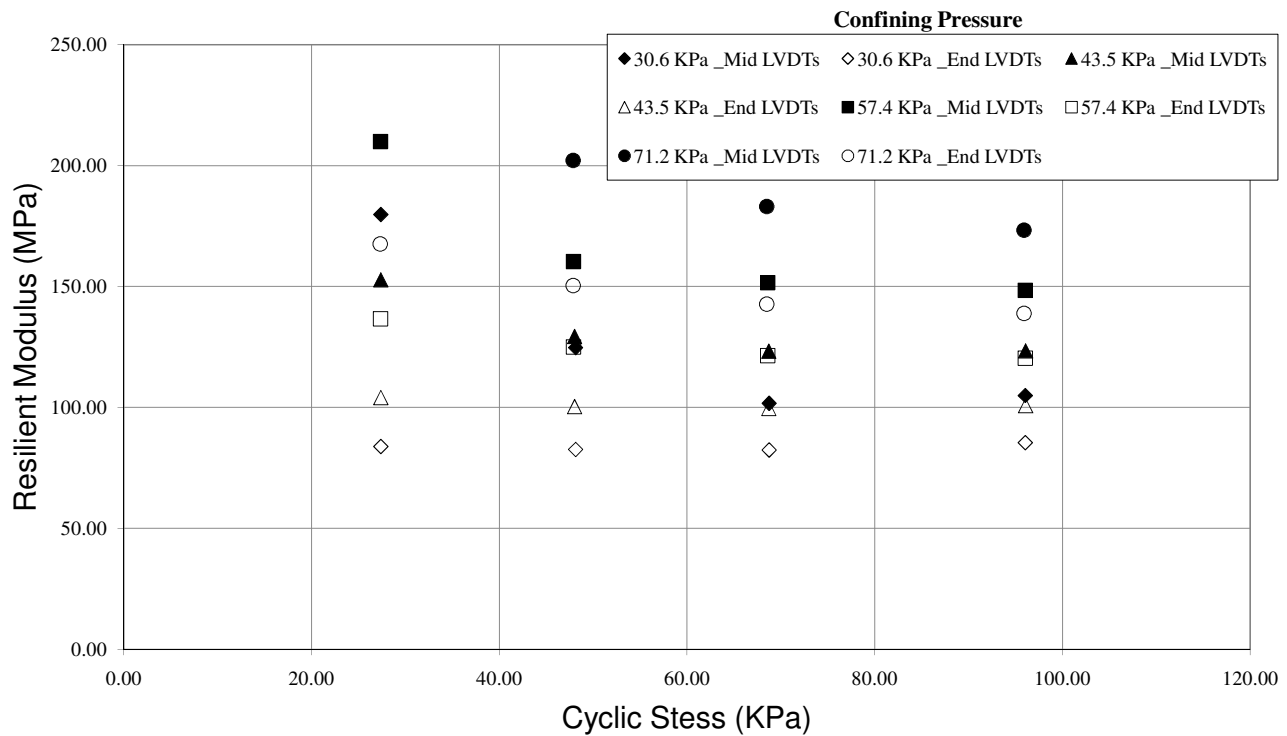
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0606	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1834.82	Soil Type:	Silty Sand
Sample Moisture (%):	9.50%	Max. Dry Density (kg/m³):	1859
Replicate #:	3	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.31	27.35	27.38	27.38	47.88	47.91	48.02	48.14
Confining Pressure (KPa)	71.36	58.13	43.39	30.17	70.89	57.06	43.74	30.89
Mr - mid LVDTs (MPa)	288.65	209.87	152.71	179.77	202.18	160.33	129.23	124.74
Mr - end LVDTs (MPa)	167.53	136.59	104.12	83.84	150.38	124.97	100.38	82.59

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.48	68.61	68.71	68.75	95.91	96.03	96.08	96.04
Confining Pressure (KPa)	72.10	57.46	43.73	30.59	70.49	56.81	43.31	30.70
Mr - mid LVDTs (MPa)	183.09	151.59	123.20	101.74	173.25	148.46	123.37	104.93
Mr - end LVDTs (MPa)	142.71	121.46	99.65	82.39	138.88	120.31	100.80	85.42

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

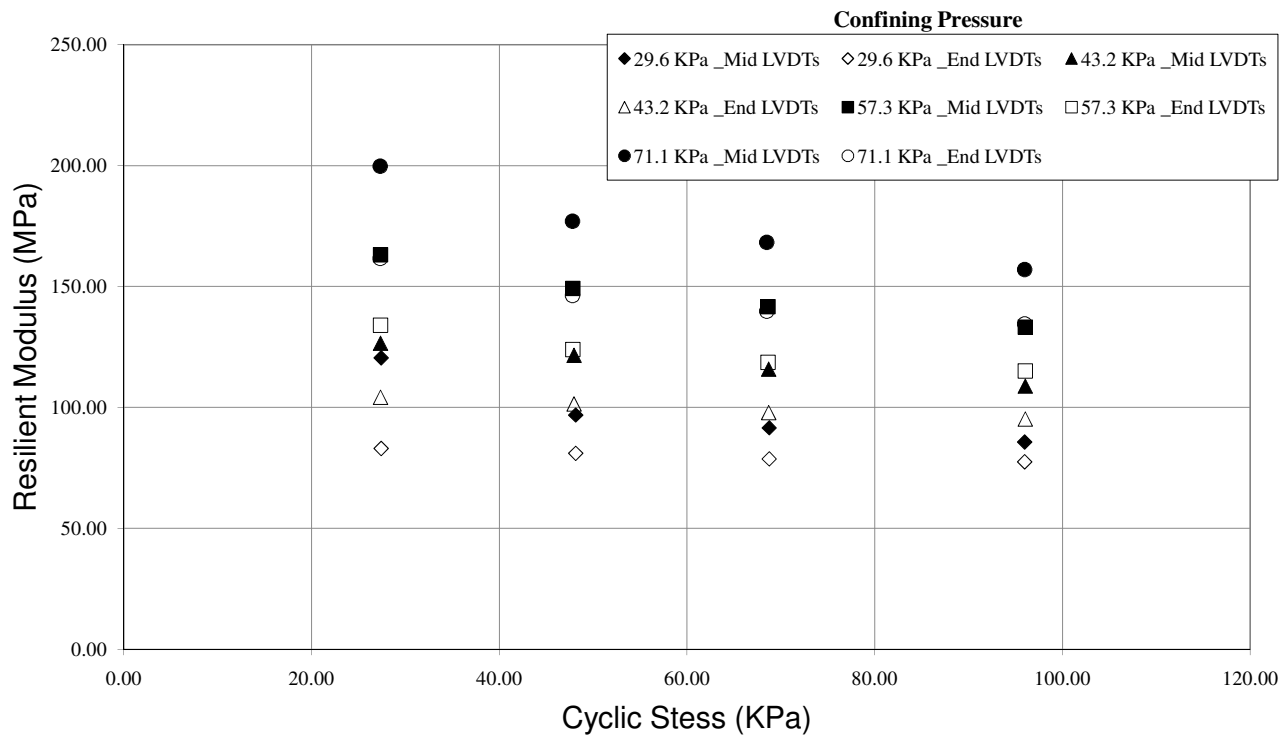
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0607	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1834.40	Soil Type:	Silty Sand
Sample Moisture (%):	12.41%	Max. Dry Density (kg/m³):	1859
Replicate #:	1	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.32	27.35	27.36	27.41	47.81	47.85	47.97	48.14
Confining Pressure (KPa)	71.53	57.29	42.55	30.00	70.29	57.27	43.83	29.34
Mr - mid LVDTs (MPa)	199.74	163.11	126.54	120.52	177.00	149.18	121.55	96.89
Mr - end LVDTs (MPa)	161.61	134.00	104.23	83.04	146.23	123.89	101.44	81.05

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.49	68.62	68.71	68.75	95.96	96.03	96.05	95.96
Confining Pressure (KPa)	71.26	57.31	43.50	29.55	71.15	57.43	42.86	29.41
Mr - mid LVDTs (MPa)	168.19	141.65	115.88	91.59	157.00	133.13	108.91	85.72
Mr - end LVDTs (MPa)	139.80	118.68	97.92	78.75	134.50	115.06	95.22	77.53

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

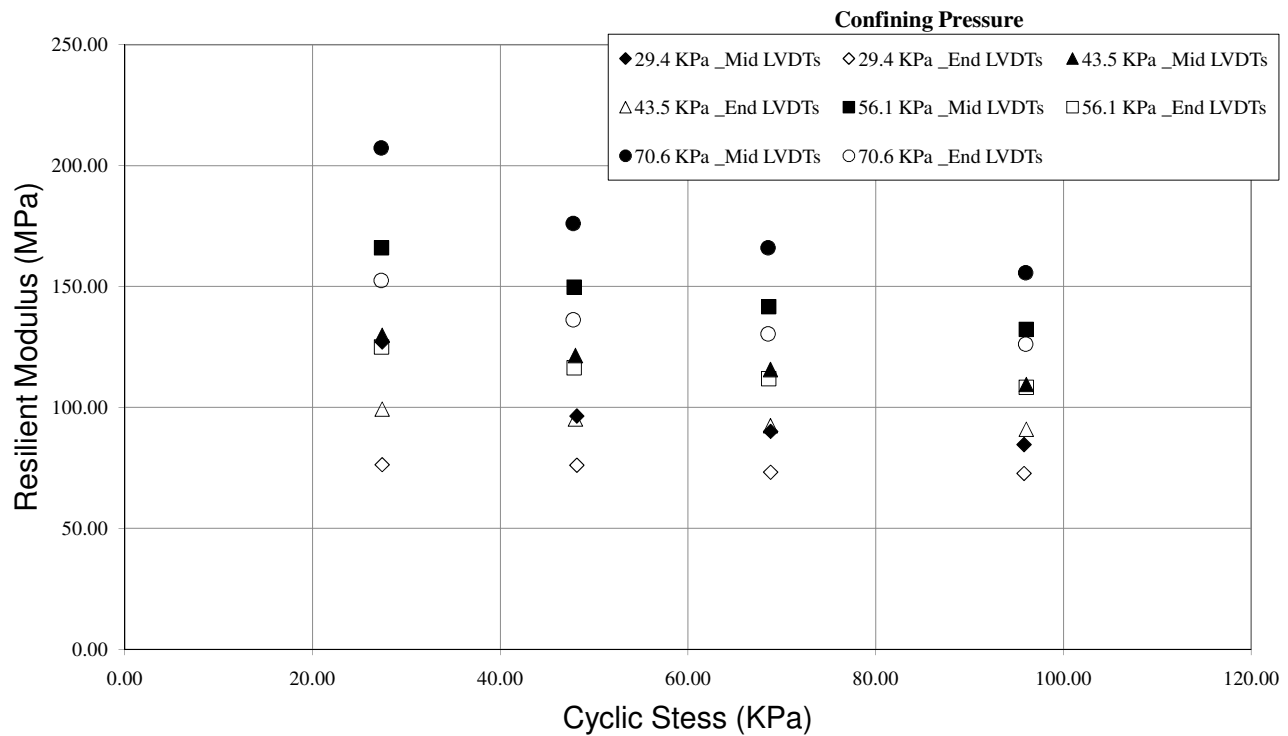
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0608	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1838.71	Soil Type:	Silty Sand
Sample Moisture (%):	12.32%	Max. Dry Density (kg/m³):	1859
Replicate #:	2	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.33	27.35	27.41	27.43	47.77	47.88	48.00	48.17
Confining Pressure (KPa)	70.36	55.90	43.69	29.53	70.65	56.10	43.71	29.80
Mr - mid LVDTs (MPa)	207.29	166.00	129.82	127.05	176.08	149.71	121.46	96.47
Mr - end LVDTs (MPa)	152.52	125.01	99.28	76.34	136.29	116.38	95.18	76.13

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.54	68.60	68.77	68.81	95.98	96.03	96.03	95.81
Confining Pressure (KPa)	70.84	56.44	43.30	29.25	70.62	56.00	43.39	29.10
Mr - mid LVDTs (MPa)	166.06	141.68	115.67	90.10	155.69	132.28	109.56	84.68
Mr - end LVDTs (MPa)	130.39	111.93	92.37	73.23	126.15	108.29	90.92	72.73

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

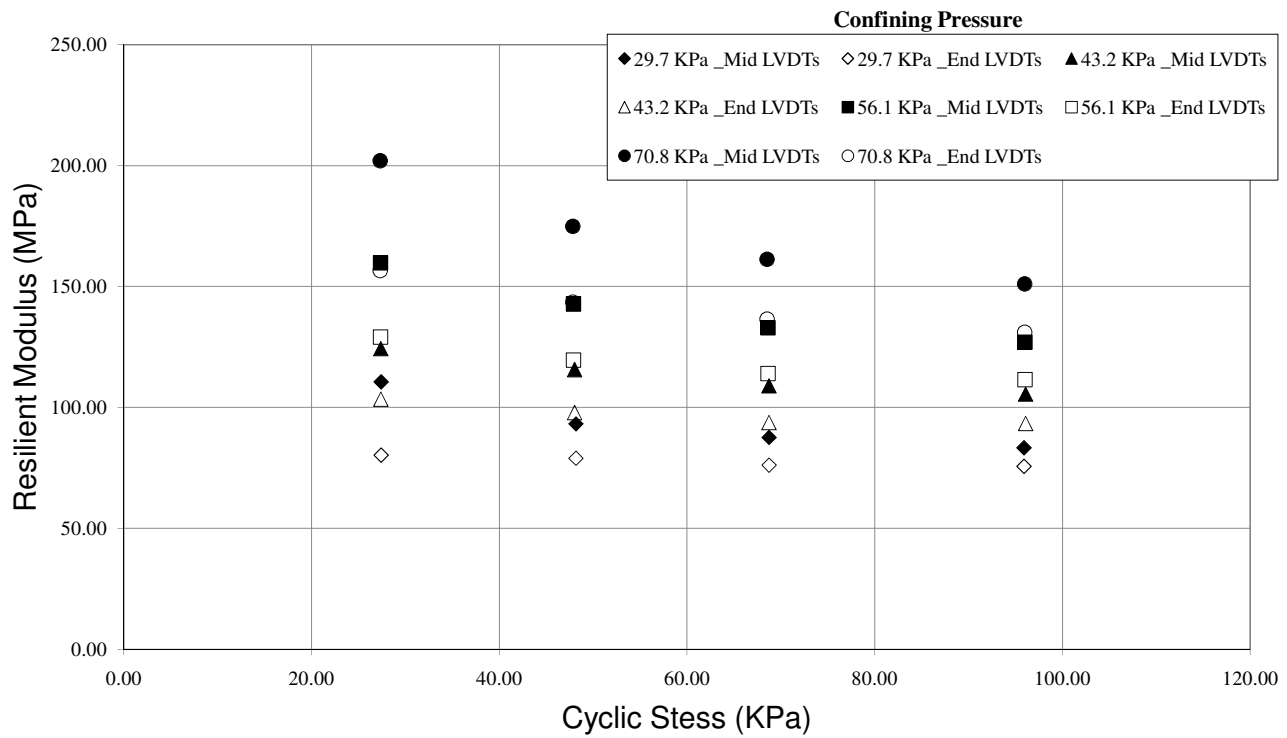
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0609	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1837.25	Soil Type:	Silty Sand
Sample Moisture (%):	12.53%	Max. Dry Density (kg/m³):	1859
Replicate #:	3	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.32	27.34	27.39	27.42	47.84	47.92	48.02	48.17
Confining Pressure (KPa)	70.30	56.24	43.77	29.74	70.99	56.07	43.30	29.91
Mr - mid LVDTs (MPa)	201.98	159.82	124.29	110.63	174.88	142.76	115.62	93.24
Mr - end LVDTs (MPa)	156.57	129.12	103.36	80.26	143.56	119.60	97.85	78.97

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.52	68.63	68.73	68.73	95.96	96.00	96.06	95.89
Confining Pressure (KPa)	70.98	55.88	42.22	29.51	70.87	56.30	43.42	29.52
Mr - mid LVDTs (MPa)	161.19	132.95	108.89	87.61	151.02	126.91	105.51	83.34
Mr - end LVDTs (MPa)	136.49	113.97	93.72	76.11	131.10	111.43	93.36	75.64

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

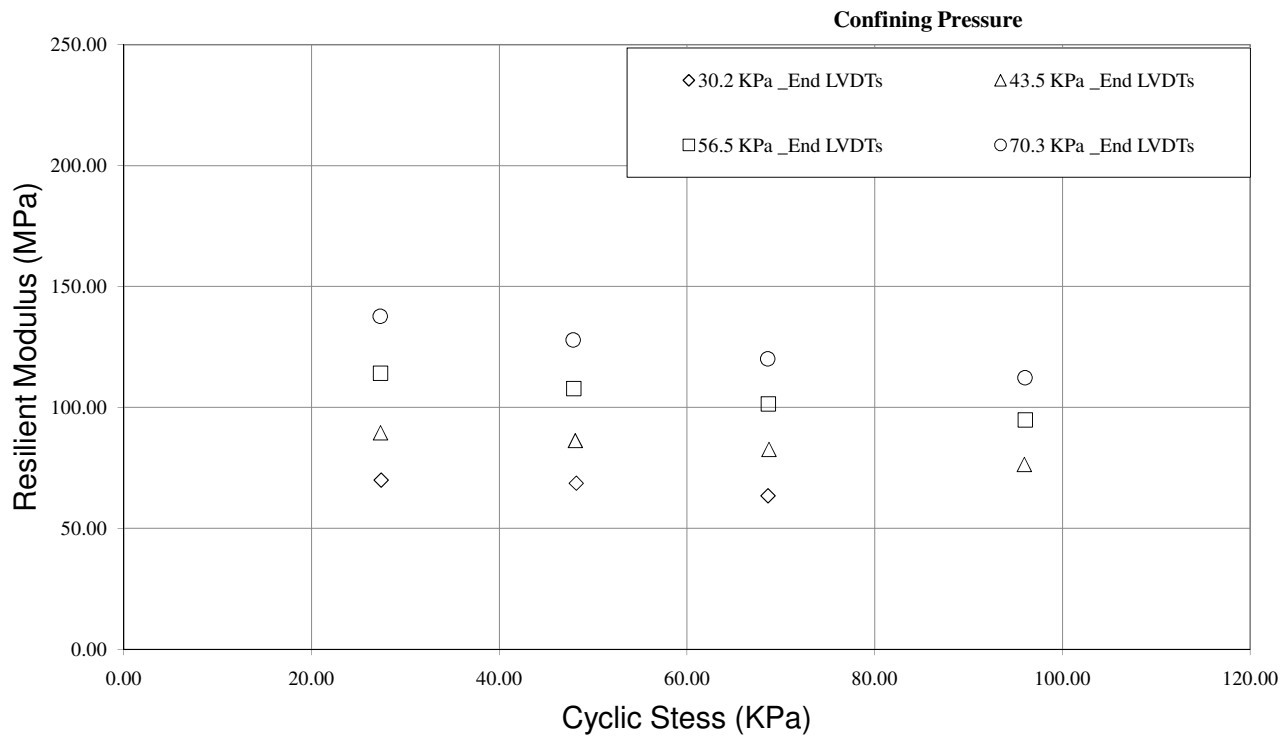
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0610	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1801.13	Soil Type:	Silty Sand
Sample Moisture (%):	14.58%	Max. Dry Density (kg/m³):	1859
Replicate #:	1	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.32	27.36	27.35	27.42	47.86	47.93	48.10	48.20
Confining Pressure (KPa)	70.38	56.43	44.05	30.51	70.57	57.12	43.36	29.77
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	137.65	114.14	89.59	69.97	127.91	107.72	86.31	68.68

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.59	68.67	68.74	68.62	96.01	96.06	95.95	N/A
Confining Pressure (KPa)	70.00	56.55	43.28	30.47	70.18	55.78	43.27	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	120.08	101.45	82.64	63.49	112.25	94.79	76.41	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

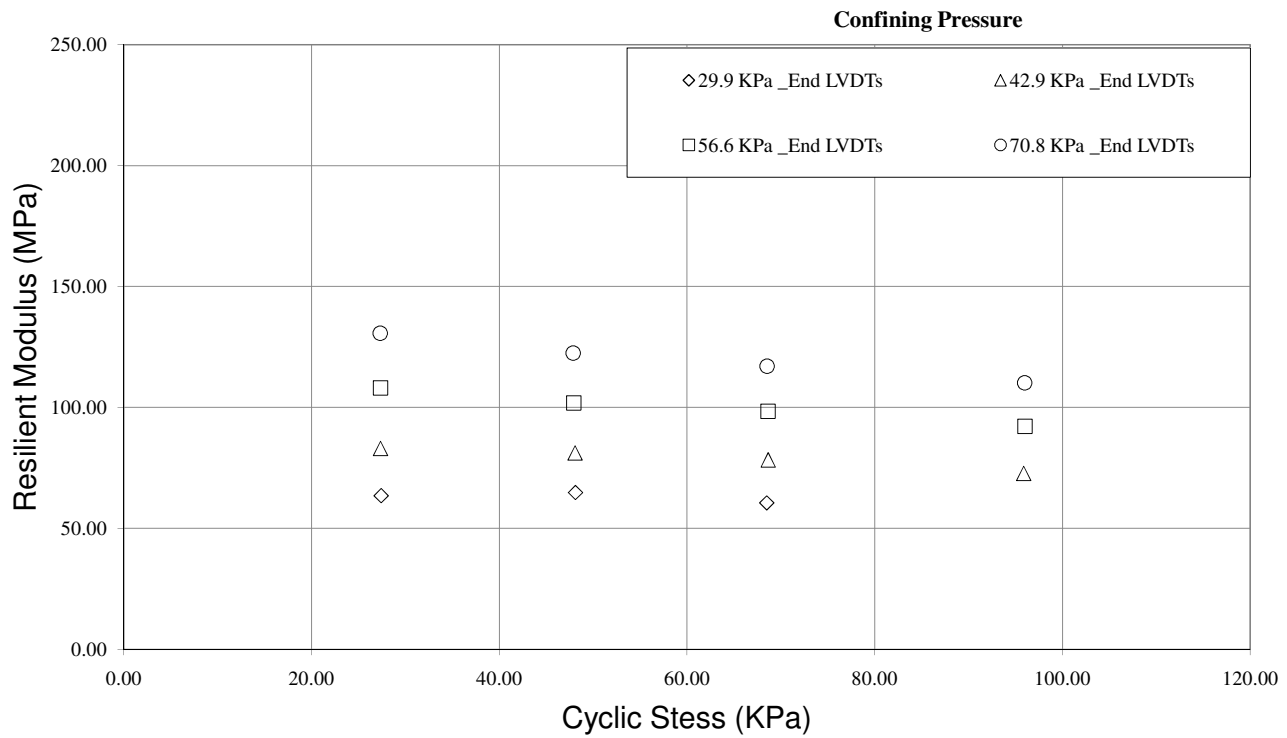
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0611	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1796.64	Soil Type:	Silty Sand
Sample Moisture (%):	13.62%	Max. Dry Density (kg/m³):	1859
Replicate #:	2	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.30	27.34	27.36	27.43	47.87	47.96	48.08	48.13
Confining Pressure (KPa)	70.92	57.26	42.84	29.38	71.05	56.54	42.68	30.32
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	130.66	108.02	83.02	63.55	122.46	101.85	81.20	64.85

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.52	68.63	68.66	68.51	95.98	96.00	95.88	N/A
Confining Pressure (KPa)	70.85	56.97	42.30	30.06	70.41	55.80	43.71	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	117.03	98.39	78.32	60.55	110.15	92.19	72.76	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		

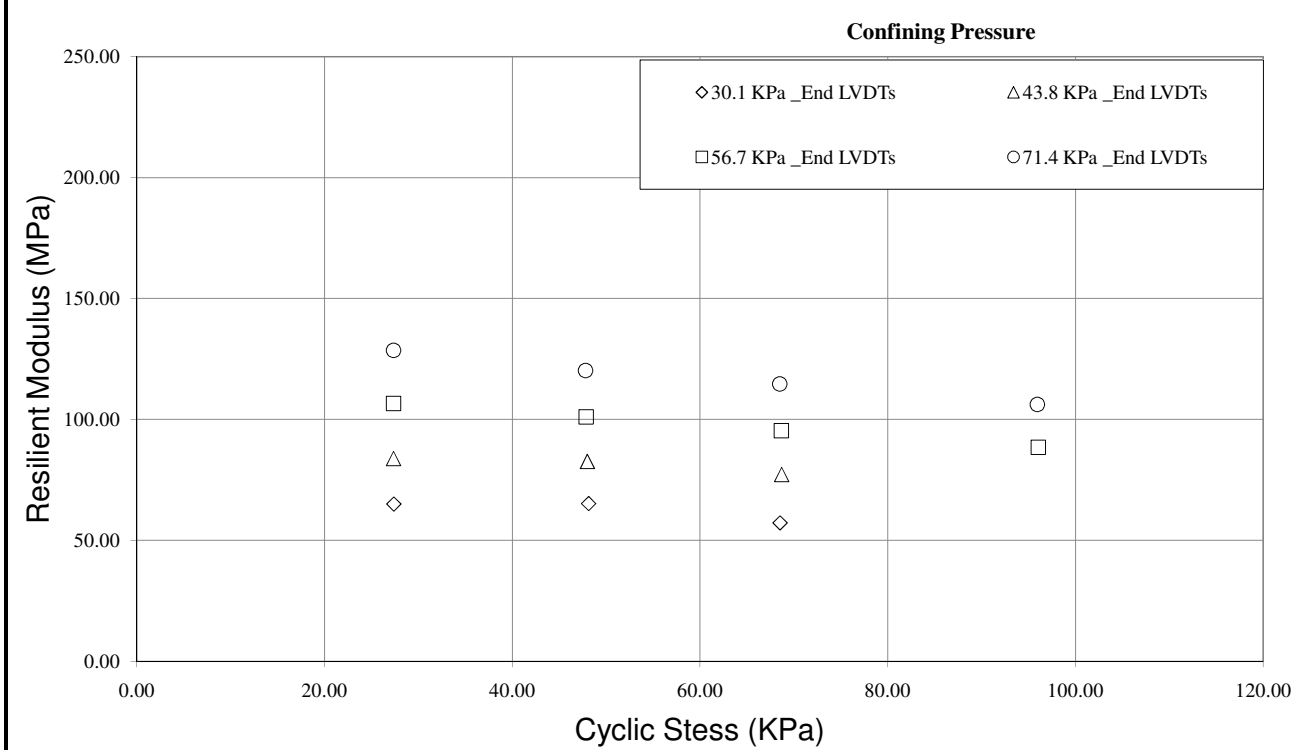
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Soil Resilient Modulus - Test Summary

Client:	Manitoba Infrastructure and Transportaion	Report To:	
Project:	Soil Resilient Modulus for Typical Manitoba Soils	Contract #:	
PRL Lab #:	S09A0612	Client Lab #:	WSS071611
Date Tested:		Location:	PTH 1 Portage Bypass
Tested By:	H.S.	Date Sampled:	
Sample Prepared By:	H.S.	Sampled By:	MIT
Sample Dry Density (kg/m³):	1798.34	Soil Type:	Silty Sand
Sample Moisture (%):	13.84%	Max. Dry Density (kg/m³):	1859
Replicate #:	3	Optimum Moisture (%):	10.80%



Sequence No.	1	2	3	4	5	6	7	8
Cyclic Stress (KPa)	27.34	27.35	27.35	27.40	47.81	47.88	48.00	48.15
Confining Pressure (KPa)	71.06	56.82	44.17	30.28	71.41	57.01	44.15	30.47
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	128.62	106.53	83.83	65.05	120.25	101.01	82.62	65.24

Sequence No.	9	10	11	12	13	14	15	16
Cyclic Stress (KPa)	68.50	68.66	68.70	68.54	95.95	96.04	N/A	N/A
Confining Pressure (KPa)	71.67	56.27	42.95	29.53	71.41	56.63	N/A	N/A
Mr - mid LVDTs (MPa)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mr - end LVDTs (MPa)	114.66	95.42	77.27	57.26	106.20	88.41	N/A	N/A

Tested By:	Haithem Soliman	Date:	
Reviewed By:	Dr. Ahmed Shalaby		