

Appendix A

Geotechnical Summary Tables

Massachusetts Water Resources Authority
Rehabilitation of Weston Aqueduct Supply Main 3
Weston, Waltham, Belmont, Arlington, Somerville, and Medford, Massachusetts

Table 2-1
Summary of Geotechnical Laboratory Test Results

Exploration Number	Sample Number	Sample Depth (ft)	Stratum	USCS Classification ¹	Grain Size Analysis ²						Atterberg Limits ³			Moisture Content (%) ⁽⁴⁾	Organic Content (%) ⁽⁵⁾	
					Gravel (%)		Sand (%)			Fines (%)		LL (%)	PL (%)			PI (%)
					Coarse	Fine	Coarse	Medium	Fine	Silt	Clay					
Construction Package 2																
B-18	S-5	9-10.5	Silty Sand	SM	3.2	11.1	10.9	24.2	23.9	26.7	--	--	--	11.6	--	
B-19	S-3	4-6	Fill	SM	0.0	39.8	15.1	18.5	12.8	13.8	--	--	--	9.7	--	
B-20 (MW)	S-2	2-4	Silty Sand	ML	0.0	0.2	3.2	18.2	26.1	52.3	--	--	--	22.6	3.2	
B-21	S-5	8-10	Fill	SM	30.0	6.4	6.8	17.6	23.9	15.3	--	--	--	13.8	--	
B-22	S-3	4-6	Sand and Gravel	SM	9.5	18.6	16.6	21.9	16.3	17.1	--	--	--	11.0	--	
B-24	V-1	2-2.5	Fill	SM	0.0	11.5	9.1	21.7	28.2	29.5	--	--	--	13.8	--	
B-24	V-2	4.5-5	Fill	SM	0.0	19.3	13.3	22.1	25.0	20.3	--	--	--	8.3	--	
B-25 (MW)	V-1	2-2.5	Fill	GM	18.4	26.8	10.3	18.1	13.1	13.3	--	--	--	7.2	--	
B-25 (MW)	S-1	6-8	Sand and Gravel	GP-GM	14.5	33.6	11.8	18.0	13.6	8.5	--	--	--	11.4	--	
B-26	V-1	2-2.5	Fill	SM	0.0	36.1	14.5	22.5	12.8	14.1	--	--	--	8.6	--	
B-26	S-2	9-9.7	Sand and Gravel	SM	1.8	37.3	13.3	22.2	12.6	12.8	--	--	--	7.9	--	
B-27	S-1	0.5-2	Sand and Gravel	SM	0.0	24.8	13.5	25.3	21.1	15.3	--	--	--	6.5	--	
B-28	S-4	9-9.8	Sand and Gravel	SP-SM	21.8	18.9	13.3	23.2	11.7	11.1	--	--	--	7.2	--	
B-29	S-5	8-10	Sand and Gravel	GW-GM	22.1	29.4	12.7	18.7	9.1	8.0	--	--	--	10.8	--	
B-30	V-2	5-5.5	Sand and Gravel	ML	0.0	6.3	4.5	15.4	19.0	45.1	9.7	20	17	3	20.2	--
B-31	V-1	2-2.5	Sand and Gravel	SM	18.1	1.2	3.2	19.0	15.0	43.5	--	--	--	20.3	--	
B-31	S-3	14-14.7	Sand and Gravel	ML	0.0	6.2	4.1	14.7	24.9	32.5	17.6	--	--	--	11.0	--
B-32	S-2	8-10	Sand and Gravel	SW-SM	13.8	28.5	14.9	22.8	10.8	9.2	--	--	--	9.0	--	
B-33	S-2	2-4	Sand and Gravel	GP-GM	9.5	41.1	10.6	21.0	11.0	6.8	--	--	--	5.6	--	
B-34	V-1	2-2.5	Sand and Gravel	SM	12.2	21.3	9.0	19.1	14.5	23.9	--	--	--	13.1	--	
B-35	S-2	2-3.5	Sand and Gravel	SP-SM	18.7	27.5	13.8	21.9	11.3	6.8	--	--	--	6.3	--	
B-36	S-3	4-6	Sand	SP	0.0	3.5	13.5	55.5	26.0	1.5	--	--	--	4.5	--	
B-37	V-1	2-2.5	Sand	SP	3.2	7.5	3.2	52.2	32.0	1.9	--	--	--	5.1	--	

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Exploration Number	Sample Number	Sample Depth (ft)	Stratum	USCS Classification ¹	Grain Size Analysis ²						Atterberg Limits ³			Moisture Content (%) ⁽⁴⁾	Organic Content (%) ⁽⁵⁾	
					Gravel (%)		Sand (%)			Fines (%)		LL (%)	PL (%)			PI (%)
					Coarse	Fine	Coarse	Medium	Fine	Silt	Clay					
B-38	V-1	3-3.5	Sand	SP	5.3	4.9	4.8	51.3	31.7	2.0	--	--	--	6.3	--	
B-38	S-3	14-16	Sandy Silt	ML	0.0	0.0	0.0	0.3	2.6	87.1	10.0	NV	NP	NP	28.6	--
B-39	S-5	8-10	Sand	SW-SM	0.0	10.5	8.5	53.6	18.8	8.6	--	--	--	6.4	--	
B-40	S-6	14-16	Sandy Silt	ML	0.0	0.0	0.0	0.6	1.6	80.7	17.1	--	--	--	27.4	--
B-41	V-2	5.5-6	Sand and Gravel	SP-SM	0.0	4.0	3.9	52.0	29.0	11.1	--	--	--	28.8	--	
B-41	S-2	8-10	Silty Sand	SM	0.0	0.0	0.0	0.6	79.9	19.5	--	--	--	28.5	--	
B-42	S-2	8-10	Silty Sand	SM	0.0	12.4	4.2	7.8	37.7	25.3	12.6	--	--	--	80.6	9.4
B-42	S-3	14-16	Silty Sand	ML	0.0	0.0	0.1	0.6	7.2	92.1	--	--	--	25.1	--	
B-43	S-5	8-10	Clay	CL	0.0	0.0	0.1	0.6	2.1	44.8	52.4	42	21	21	25.7	--
B-44	S-1	6-8	Sand and Gravel	SM	5.6	29.2	12.0	18.4	22.0	12.8	--	--	--	14.4	--	
B-45	S-3	10-12	Sandy Silt	ML	0.0	0.7	0.3	1.1	3.6	87.9	6.4	--	--	--	24.1	--
B-45	S-4	14-16	Clay	CL	0.0	0.0	0.0	0.1	0.4	59.3	40.2	30	18	12	24.8	--
B-46	S-2	8-10	Sandy Silt	ML	0.0	0.0	0.0	0.1	29.3	66.7	3.9	--	--	--	26.0	--
B-47	V-1	2-2.5	Sand and Gravel	GP-GM	13.8	32.9	12.4	21.0	12.1	7.8	--	--	--	5.4	--	
B-48	S-4	6-8	Silty Sand	SM	0.0	0.0	0.1	1.7	76.8	21.4	--	--	--	9.2	--	
B-50	S-2	2-4	Sand and Gravel	SM	20.4	17.5	11.0	14.1	14.0	23.0	--	--	--	11.7	--	
B-51	S-4	6-8	Sand and Gravel	GW-GM	21.5	33.5	11.1	15.2	10.5	8.2	--	--	--	6.3	--	
B-52	S-3	4-5	Sand and Gravel	SM	0.0	17.0	14.3	26.5	28.6	13.6	--	--	--	13.4	--	
B-53 (MW)	S-2	2-3.3	Sand and Gravel	SM	9.6	24.7	10.8	13.5	14.5	26.9	--	--	--	10.3	--	
B-54	S-3	4-6	Sand and Gravel	GM	10.6	33.2	12.5	15.7	10.9	17.1	--	--	--	10.3	--	
B-55	S-1	2-3.8	Sand and Gravel	GW-GM	18.6	30.5	14.4	19.0	10.7	6.8	--	--	--	9.4	--	

Notes:

1. USCS classifications were performed in accordance with ASTM D2487.
2. Grain size analysis tests performed in accordance with ASTM D7928 & D6913 and ASTM D1140.
3. Atterberg limit tests performed in accordance with ASTM D4318.
4. Moisture content analysis performed in accordance with ASTM D2216.
5. Organic content analysis performed in accordance with ASTM D2974.

Abbreviations:

- | | |
|--|------------------|
| SP-SM: Poorly Graded Sand and Silty Sand | ML: Silt |
| GP-GM: Poorly Graded Gravel and Silty Gravel | GM: Silty Gravel |
| SW-SM: Well Graded Sand and Silty Sand | CL: Lean Clay |
| SM: Silty Sand | CH: Fat Clay |
| SP: Poorly Graded Sand | OH: Organic Silt |
| GW-GM: Well Graded Gravel | ft: feet |
| -- Not conducted | % percent |

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Table 2-2 Continued
Summary of Subsurface Conditions

Exploration Number	Approximate Coordinates		Stationing	Existing/ Proposed Pipe Invert Depth (ft)	Approximate Offset from Alignment (ft)	Offset from Alignment Direction	Existing Pipe Surface Cover	Approximate Ground Surface Elevation (ft) ⁽¹⁾	Approximate Exploration Depth (ft)	Stratum Thickness (ft)										Approximate Depth to Top of Bedrock (ft)	Approximate Depth to Groundwater (ft) ⁽²⁾
	Northing	Easting								Pavement or Topsoil	Fill	Sand and Gravel	Silty Sand	Sand	Organic Soils	Sandy Silt	Silty Clay	Weathered Rock	Bedrock		
Construction Package 2																					
B-18	2958168.831	722741.199	87+80	11.9	37.5	West	Asphalt	87.9	14.0	0.3	1.7	5.5	4.5	NE	NE	NE	NE	>2.0	NE	NE	1.5
B-19	2958306.224	723000.451	90+60	9.0	35.8	East	Asphalt	82.0	14.0	0.3	6.2	NE	NE	NE	NE	NE	NE	2.5	>5.0	9.0	9.3
B-20 (MW)	2958679.142	723407.2716	96+10	8.0	32.7	North	Sand	77.0	14.0	0.5	NE	6.0	5.5	NE	NE	NE	NE	>2.0	NE	NE	4.1
B-21	2958896.476	723754.5903	100+20	11.0	8.8	West	Topsoil	82.5	15.0	4.0	7.5	>3.5	NE	NE	NE	NE	NE	NE	NE	NE	12.0
B-22	2959021.322	724037.4743	103+30	9.6	53.2	South	Topsoil	96.1	16.5	0.3	2.7	6.2	NE	NE	NE	NE	NE	2.3	>5.0	11.5	7.8
B-23														Not Performed							
B-24	2959921.083	724730.7697	114+55	8.0	41.3	West	Asphalt	55.0	21.0	1.0	3.8	>16.2	NE	NE	NE	NE	NE	NE	NE	NE	14.5
B-25 (MW)	2960373.897	725100.683	120+40	5.6	17.4	West	Asphalt	49.6	15.0	0.3	3.2	>11.5	NE	NE	NE	NE	NE	NE	NE	NE	8.5
B-26	2960688.666	725293.7979	124+65	8.0	21.2	West	Asphalt	53.0	15.0	0.3	5.2	>9.5	NE	NE	NE	NE	NE	NE	NE	NE	8.0
B-27	2961016.628	725613.5234	130+20	6.6	21.7	East	Asphalt	50.1	16.0	0.3	NE	>15.7	NE	NE	NE	NE	NE	NE	NE	NE	6.5
B-28	2961222.699	726042.7302	135+00	8.8	20.1	South	Asphalt	54.8	16.0	0.3	NE	>15.7	NE	NE	NE	NE	NE	NE	NE	NE	14.5
B-29	2961354.692	726508.8779	139+85	6.3	24.0	South	Asphalt	47.8	16.0	0.3	1.7	>14.0	NE	NE	NE	NE	NE	NE	NE	NE	6.6
B-30	2961499.898	726877.4759	143+80	6.4	17.4	South	Asphalt	44.9	16.0	0.4	4.1	>11.5	NE	NE	NE	NE	NE	NE	NE	NE	5.2
B-31	2961592.099	727250.3929	147+65	7.2	16.4	South	Asphalt	51.7	19.8	1.2	NE	>18.6	NE	NE	NE	NE	NE	NE	NE	NE	6.0
B-32	2961885.947	728253.0253	158+20	7.8	24.5	North	Topsoil	67.3	16.0	3.0	3.0	>10.0	NE	NE	NE	NE	NE	NE	NE	NE	NE
B-33	2961982.249	728675.3252	162+50	7.3	51.3	North	Asphalt	65.8	16.0	0.3	1.7	>14.0	NE	NE	NE	NE	NE	NE	NE	NE	NE
B-34	2962009.928	728929.5735	165+05	7.7	36.9	North	Asphalt	65.7	16.0	0.7	NE	>15.3	NE	NE	NE	NE	NE	NE	NE	NE	NE
B-35	2962067.658	729417.6995	169+90	7.5	13.9	North	Asphalt	66.5	16.0	0.5	NE	>15.5	NE	NE	NE	NE	NE	NE	NE	NE	NE
B-36	2962336.151	729714.3343	175+20	8.1	44.0	North	Asphalt	66.1	15.3	0.3	1.7	>6.8	NE	6.5	NE	NE	NE	NE	NE	NE	NE
B-37	2962447.356	730136.9483	179+65	7.8	16.3	East	Asphalt	65.3	16.0	0.3	0.7	>4.0	NE	11.0	NE	NE	NE	NE	NE	NE	NE
B-38	2962860.489	730274.4037	185+00	9.2	59.7	West	Asphalt	57.7	16.0	0.7	2.3	4.0	NE	5.0	NE	>4.0	NE	NE	NE	NE	8.5
B-39	2963203.172	730823.592	191+55	8.0	29.2	West	Asphalt	51.0	17.0	0.4	NE	3.6	NE	11.1	NE	>1.9	NE	NE	NE	NE	11.8
B-40	2963369.111	731109.016	194+85	11.2	14.8	West	Asphalt	43.2	21.0	0.2	3.8	4.0	NE	NE	NE	>13.0	NE	NE	NE	NE	5.2
B-41	2963681.245	731597.5608	200+70	6.8	11.2	West	Topsoil	41.3	16.0	0.2	3.3	4.5	>8.0	NE	NE	NE	NE	NE	NE	NE	4.1

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Table 2-2 Continued
Summary of Subsurface Conditions

Exploration Number	Approximate Coordinates		Stationing	Existing/ Proposed Pipe Invert Depth (ft)	Approximate Offset from Alignment (ft)	Offset from Alignment Direction	Existing Pipe Surface Cover	Approximate Ground Surface Elevation (ft) ⁽¹⁾	Approximate Exploration Depth (ft)	Stratum Thickness (ft)										Approximate Depth to Top of Bedrock (ft)	Approximate Depth to Groundwater (ft) ⁽²⁾
	Northing	Easting								Pavement or Topsoil	Fill	Sand and Gravel	Silty Sand	Sand	Organic Soils	Sandy Silt	Silty Clay	Weathered Rock	Bedrock		
B-42	2963916.376	731917.682	204+70	7.6	24.9	West	Asphalt	42.1	21.0	0.2	NE	5.8	>15.0	NE	NE	NE	NE	NE	NE	NE	3.2
B-43	2964059.368	732508.0332	211+10	7.0	41.8	North	Topsoil	43.5	16.0	0.5	1.5	NE	6.0/>4.0	NE	NE	NE	4.0	NE	NE	NE	5.3
B-44	2964126.803	732954.263	215+70	8.7	14.7	South	Topsoil	45.7	16.0	1.0	NE	6.5	NE	>4.0	NE	4.5	>4.0	NE	NE	NE	7.0
B-45	2964321.559	733550.3289	222+00	7.5	10.3	East	Topsoil	48.5	16.0	0.3	NE	NE	NE	NE	NE	12.7	>3.0	NE	NE	NE	5.4
B-46	2964423.883	733848.2348	225+15	10.4	16.2	East	Topsoil	56.9	16.0	1.0	NE	7.0	NE	NE	NE	4.0	>4.0	NE	NE	NE	6.4
B-47	2964858.916	734327.5545	231+55	9.2	50.9	West	Topsoil	68.7	16.0	1.0	NE	>15.0	NE	NE	NE	NE	NE	NE	NE	NE	12.8
B-48	2965111.753	734637.5415	235+55	6.7	56.4	West	Topsoil	62.2	16.0	0.5	NE	5.5	>10.0	NE	NE	NE	NE	NE	NE	NE	11.3
B-49	2965275.154	735017.5246	239+55	9.2	51.9	East	Topsoil	59.2	16.0	0.8	5.2	>10.0	NE	NE	NE	NE	NE	NE	NE	NE	7.2
B-50	2965897.095	735637.6863	248+30	7.3	35.9	West	Asphalt	71.3	15.0	1.0	NE	>14.0	NE	NE	NE	NE	NE	NE	NE	NE	NE
B-51	2965991.68	735756.981	249+80	9.5	22.4	West	Topsoil	77.0	14.4	0.3	NE	>14.1	NE	NE	NE	NE	NE	NE	NE	NE	7.7
B-52	2966243.213	736227.419	255+15	9.4	38.2	West	Asphalt	87.9	14.5	0.3	NE	8.7	NE	NE	NE	NE	NE	>5.5	NE	NE	5.2
B-53 (MW)	2966643.912	736978.095	263+60	8.9	38.2	West	Asphalt	105.9	11.0	0.3	NE	2.6	NE	NE	NE	NE	NE	3.1	>5.0	6.0	6.0
B-54	2966867.492	737411.643	268+45	4.7	50.7	East	Asphalt	96.2	14.1	0.4	1.6	11.0	NE	NE	NE	NE	NE	>1.1	NE	NE	11.0
B-55	2967033.905	737747.5134	272+55	9.7	20.7	North	Asphalt	99.2	13.0	1.5	NE	6.5	NE	NE	NE	NE	NE	>5.0	NE	NE	5.8

Notes:

1. Ground surface elevations referenced to Boston City Base (BCB) Vertical Datum.
2. Indicated depths are depths below ground surface at the time of drilling.
3. Groundwater levels were measured at the completion of drilling and may not represent static groundwater conditions.

Abbreviations:

NE - Not Encountered
 NR - Not Recorded
 > - Layer not fully penetrated
 / - Layer encountered twice in test boring
 ft - feet

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**Table 2-3
Summary of Groundwater Monitoring Well Readings**

Monitoring Well Number	Ground Surface Elevation ⁽¹⁾	Depth to Groundwater (ft) ⁽²⁾
		2/27/2018
B-20 (MW)	76.95	3.40
B-25 (MW)	49.64	8.12
B-53 (MW)	105.91	6.90

Notes:

1. Ground surface elevations referenced to Boston City Base (BCB) Vertical Datum.
2. Indicated depths are depths below ground surface as measured on the date identified.

Abbreviations:

ft - feet
NE - Not Encountered
