

October 6, 2017

Portland Public Schools
Attn: Mr. Steve Effros
Project Manager, Facilities and Asset Management
501 North Dixon Street
Portland, Oregon 97227

Re: Instrumentation Installation and Monitoring Report
Retaining Wall Settlement and Lateral Movement Monitoring
Harriet Tubman Middle School Site for Portland Public Schools
2231 North Flint Avenue, Portland, Oregon
Rhino One Project Number: PPS-2017-010

Dear Mr. Effros:

RhinoOne Geotechnical Engineering is pleased to submit this letter regarding the geotechnical exploration and slope movement monitoring system installed at the Tubman School site. We had previously completed a preliminary review of the site in 2014¹. This study was recommended as a follow up to our previous review to quantify the magnitude, direction and depth of movements at this site. A series of three inclinometers, two piezometers and 24 survey monitoring points were established during this phase of work.

Field Exploration and Subsurface Conditions:

The inclinometers and piezometers were installed on June 20 and 21 by Western States Soil Conservation, Inc. of Hubbard, Oregon. The instruments are located along the western edge of the School's parking lot as shown on Figure 1 attached. Borings B-1 and B-2 were each drilled to a depth of 50 feet, while boring B-3 was drilled to a depth of 40 feet.

The subsurface soils in the area consist of fill material underlain by sandy silt, silty sand, and poorly to well graded sands. The fill material was encountered to a depth of 18 to 20 feet below ground surface (BGS) in borings B-1 and B-2, respectively. In boring B-3, the fill extended to a depth of 7.5 feet BGS. The fill material consisted of very soft (or very loose) to stiff (or loose) layers of silts, sands, and gravels. Brick debris was observed among the gravel to a depth of 18 feet BGS in boring B-1. The drill rig lost circulation frequently in the fill which indicates that there are large voids within the fill.

Below the fill, very soft or soft silt with sand to very loose or loose sand with silt was observed to a depth of approximately 20 to 35 feet below ground surface (BGS). Medium dense silty fine sand was encountered below the silt in borings B-2 and B-3 at depths of approximately 38 feet BGS. Dense to very dense coarse sand with gravel was encountered in each of the borings at a depth of approximately 40 feet BGS, which corresponds to an approximate elevation of 100 feet, and extending to the maximum depth explored of 50 feet BGS. Interpreted boring logs are attached.

¹ RhinoOne Geotechnical, Report of Geotechnical Engineering Services, Vertical Settlement and Lateral Movement, Tubman School Site for Portland Public Schools, Portland Oregon, ROG Project Number PPS-2013-003 dated July 08, 2014.

Groundwater depth could not be measured during installation due to the use of mud-rotary drilling techniques. Information provided by the US Geological Survey (USGS) *Estimated Depth to Groundwater Study of the Portland Metro Area*², suggests groundwater in the project area is approximately 65 feet BGS. Vibrating wire piezometers with automatic data recorders were installed at a depth of 30 and 35 feet below ground surface in borings B-1 and B-2.

Slope inclinometer pipes were installed at the termination depth for each of the borings. A survey monitoring system was also established by HHPR on 24 points along the building, parking lot and on top of ODOT retaining wall. The initial readings on these points are attached at the end of this report. The initial inclinometer readings were collected on July 6, 2017 with an additional reading collected on September 29, 2017.

Conclusions:

Based on our exploration for this study and a review of earlier study, the depth of fill varies from 7.5 feet the north / east side the site to as much as 30 feet or more near the south west portions of the site. The fill material consists of very soft (or very loose) to stiff (or loose) layers of silts, sands, and gravels. Brick debris was observed among the gravel to a depth of 18 feet BGS in boring B-1. The drill rig lost circulation frequently in the fill which indicates that there are large voids within the fill. This fill is not suitable for the placement of any improvements. We understand that the existing building was placed on timber piles installed over the fill. It is very likely that some of the piles have terminated in the fill due to obstructions.

The inclinometers have not shown any movement in the three months since their installation. This is expected as there has not been any large rain event in the last few months. We have not conducted a second set of survey monitoring. Our recommendation is to complete a second monitoring event in Feb/March of 2018 during the wet winter months.

RhinoOne appreciates this opportunity to work on this project. If you have any questions, please contact me at 360.852.6367.

Sincerely,

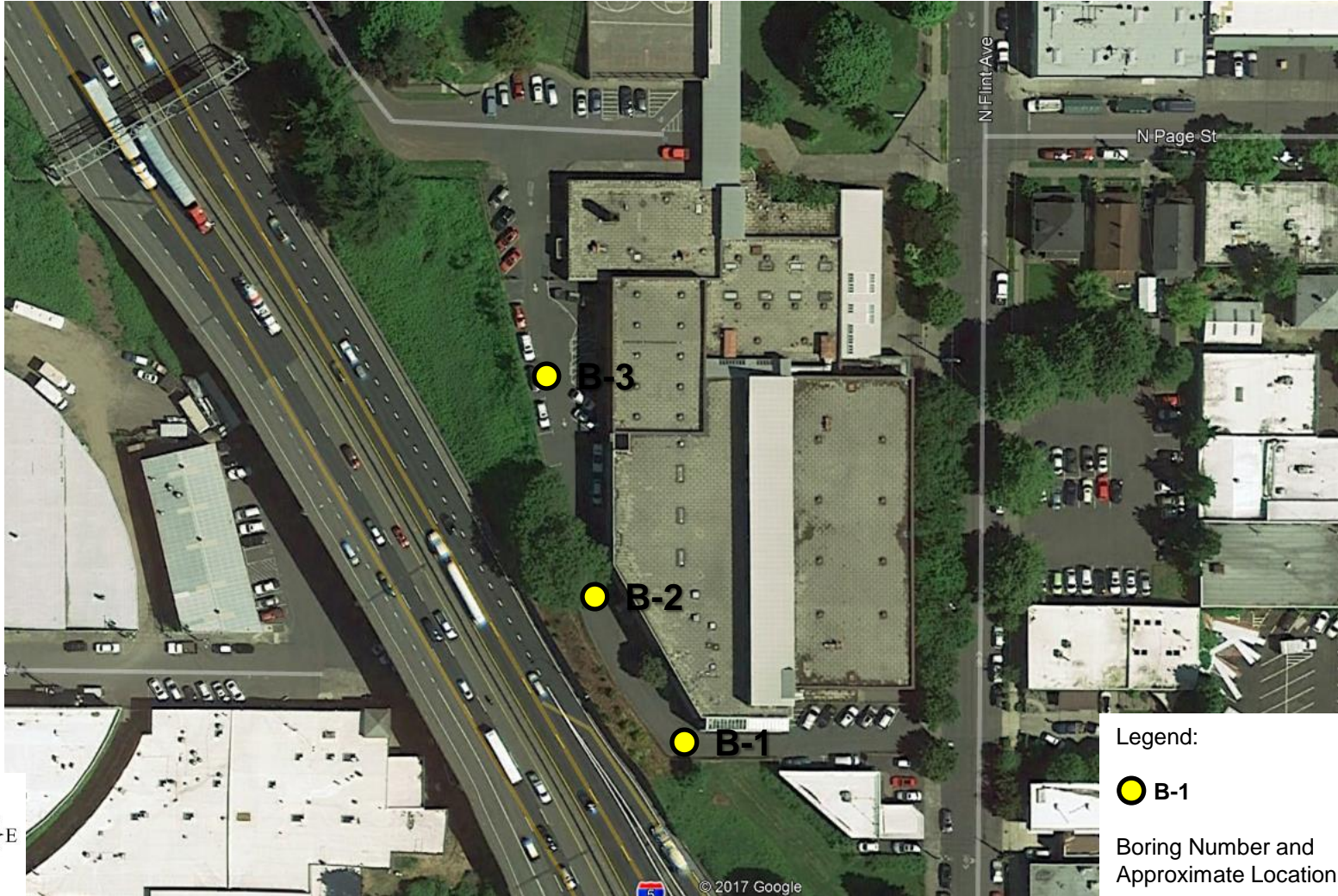


Rajiv Ali, PE, GE, PhD
Managing Principal
RhinoOne Geotechnical
rajiv@rhinooneeng.com

Attachments:

Figure 1 – Site Exploration Plan
Boring Logs
HHPR Survey Baseline Data and Map

² US Geological Survey (USGS). *Estimated Depth to Ground Water in the Portland, Oregon Area*. Accessed from website http://or.water.usgs.gov/projs_dir/puz/ on July 6, 2017.



4610 NE 77th Avenue, Suite 126
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 360-258-1738

Harriet Tubman Middle School

2231 North Flint Avenue
 Portland, Oregon

Project Number:
 PPS-2017-010

Figure 1 – Site Exploration Plan

Date:
 October 2017



Harriet Tubman Middle School
 2231 North Flint Avenue
 Portland, Oregon

Boring Number:
B-1

Project: Harriet Tubman Middle School

Driller: Western States Soil Conservation

Project Number: PPS-2017-010

Date: June 20, 2017

Drilling Method: Mud Rotary

Elevation: 136 feet AMSL

Diameter: 3-7/8"

Water Level: NA

Logged by: Peter Hughes

Sample No.	Sample Type	Recovery (%)	PID (ppmV)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
							0		Asphalt Cement Concrete (6-inch)		
								SM	Dense, sandy GRAVEL, base rock		
									Loose, brown, silty SAND [FILL]		
SS1		67		1-2-1	3			ML	Soft, brown, sandy SILT with trace organics; moist, low plasticity	28.6	
SS2		100		0-0-0	0		5		Becomes very soft [FILL]	29.8	
								SM	Very loose, brown, silty SAND [FILL]		
SS3		60		0-1-3	4			ML SM	Soft to medium stiff, brown, sandy SILT [FILL]	29.0	Some mud circulation lost
							10		Very loose to loose, brown, silty SAND, occasional gravel (brick) [FILL]		
SS4		0		4-2-2	4				Becomes gray-brown, fine SAND with some silt; moist [FILL]		
SS5		17		1-2-2	4					25.2	Slowly losing mud circulation
SS6		17		2-2-7	9		15	GP	Loose, red-grey, GRAVEL with sandy silt; moist, gravel mostly consists of brick [FILL]	13.3	
								ML	Very soft, brown, sandy SILT; moist, no plasticity		
SS7		100		0-0-0	0		20			32.5	
								SM	Very loose, grey, silty fine SAND; moist		
SS8		84		0-3-3	6		25		Becomes loose and brown	28.7	
SS9		84		4-3-4	7		30		Becomes grey, fine SAND with some silt; damp to moist	26.7	

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\PPS-2017-010 Tubman School.log Date: 10/6/2017

Project: Harriet Tubman Middle School

Driller: Western States Soil Conservation

Project Number: PPS-2017-010

Date: June 20, 2017









Drilling Method: Mud Rotary

Elevation: 136 feet AMSL

Diameter: 3-7/8"

Water Level: NA

Logged by: Peter Hughes

Sample No.	Sample Type	Recovery (%)	PID (ppmV)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
SS10		60		4-4-3	7		35		SP Loose, grey, fine SAND with some silt	33.5	
SS11		78		14-25-35	60		40		SW Very dense, grey, medium to coarse SAND with trace fine gravel; moist, subrounded to subangular	14.1	
SS12		84		28-31-30	61		45		Becomes gravelly medium to coarse SAND	11.4	
SS13		63		25-44-48	92		50		Boring terminated at 51.5 feet BGS: Slope Inclinometer pipe installed to 50 feet BGS, VW piezometer (S/N 1503026) installed at 30 feet BGS. Boring backfilled with bentonite/grout mix, installed monument set in concrete	11.5	
							55				
							60				
							65				



Harriet Tubman Middle School
2231 North Flint Avenue
Portland, Oregon

Boring Number:
B-2

Project: Harriet Tubman Middle School

Driller: Western States Soil Conservation

Project Number: PPS-2017-010

Date: June 21, 2017

Drilling Method: Mud Rotary

Elevation: 139 feet AMSL

Diameter: 3-7/8"

Water Level: NA

Logged by: Peter Hughes

Sample No.	Sample Type	Recovery (%)	PID (ppmV)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
							0		Asphalt Cement Concrete (5-inch)		
									Dense, sandy GRAVEL, base rock		
SS1		78		5-8-8	16			ML	Very stiff, brown-grey, SILT with some sand; damp, low to medium plasticity [FILL]	23.9	
SS2		78		3-4-4	8		5	ML	Medium stiff to stiff, fine sandy SILT; damp [FILL]	24.0	
SS3		46		2-3-3	6				Becomes medium stiff, grey, sandy SILT with some gravel; moist [FILL]	25.3	
SS4		17		1-0-2	2		10		Becomes very soft to soft	17.2	Below 10 to 20 feet slowly losing mud. Eventually lost all circulation and could not regain. Moved boring approximately 10 feet north in order to complete
SS5		0		7-7-8	15		15		Becomes stiff to very stiff	24.2	
SS6		67		4-4-5	9		20	ML	Stiff, brown-grey, sandy SILT; moist	22.7	
SS7		67		4-3-6	9		25			23.7	
SS8		62		4-4-4	8		30	ML	Medium stiff to stiff, brown, SILT with some fine sand; moist, low plasticity	27.8	

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Harriet Tubman Middle School
 2231 North Flint Avenue
 Portland, Oregon

Boring Number:
B-2

Project: Harriet Tubman Middle School

Driller: Western States Soil Conservation

Project Number: PPS-2017-010

Date: June 21, 2017

Drilling Method: Mud Rotary

Elevation: 139 feet AMSL

Diameter: 3-7/8"

Water Level: NA

Logged by: Peter Hughes

Sample No.	Sample Type	Recovery (%)	PID (ppmV)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
SS9		67		4-5-6	11		35		SM Medium dense, grey-brown, silty fine SAND; damp	24.8	
SS10		78		14-15-24	39		40		SP Dense, grey, medium to coarse SAND; damp, subrounded to subangular	13.5	
SS11		78		19-28-27	55		45		Becomes very dense, medium to coarse SAND with some fine gravel	9.7	
SS12		67		27-34-32	66		50			11.5	
									Boring terminated at 51.5 feet BGS: Slope Inclinator pipe installed to 50 feet BGS, VW piezometer (S/N 38242) installed at 35 feet BGS. Boring backfilled with bentonite/grout mix, installed monument set in concrete		
							55				
							60				
							65				

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Harriet Tubman Middle School
 2231 North Flint Avenue
 Portland, Oregon

Boring Number:
B-3

Project: Harriet Tubman Middle School

Driller: Western States Soil Conservation

Project Number: PPS-2017-010

Date: June 20, 2017

Drilling Method: Mud Rotary

Elevation: 140 feet AMSL

Diameter: 3-7/8"

Water Level: NA

Logged by: Peter Hughes

Sample No.	Sample Type	Recovery (%)	PID (ppmV)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
							0		Asphalt Cement Concrete (7-inch)		
									Dense, sandy GRAVEL, base rock		
SS1		50		1-1-2	3				Soft, brown, fine sandy SILT; moist, low to no plasticity [FILL]	26.0	No mud lost
SS2		62		2-1-1	2		5		Very loose, brown-grey, silty fine SAND; damp [FILL]	30.7	
SS3		50		1-0-1	1				Very soft, brown, SILT with some fine sand; moist, medium plasticity	31.4	
SS4		18		1-3-2	5		10		Loose, grey-brown, silty fine SAND with trace gravel; moist	37.1	
							15		Becomes very loose to loose, fine SAND with some silt; damp	29.2	
SS5		67		2-2-2	4				Becomes medium dense	31.6	
SS6		67		3-6-5	11		20		Becomes medium dense	31.6	
SS7		67		6-7-7	14		25		Becomes silty fine SAND	23.2	
SS8		72		8-7-8	15		30		Becomes silty fine SAND	27.4	

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Project: Harriet Tubman Middle School

Driller: Western States Soil Conservation

Project Number: PPS-2017-010

Date: June 20, 2017




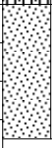
Drilling Method: Mud Rotary

Elevation: 140 feet AMSL

Diameter: 3-7/8"

Water Level: NA

Logged by: Peter Hughes

Sample No.	Sample Type	Recovery (%)	PID (ppmV)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
SS9		78		5-6-6	12		35		SM Medium dense, silty fine SAND; moist to wet	30.4	
SS10		78		14-16-20	36		40		SP Dense, grey, medium to coarse SAND; moist, subrounded to subangular	15.2	
Boring terminated at 41.5 feet BGS: Slope Inclinometer pipe installed to 40 feet BGS. Boring backfilled with bentonite/grout mix, installed monument set in concrete											

JOB #: ROG-01

DATE: 20170626

CREW: CLG/MF



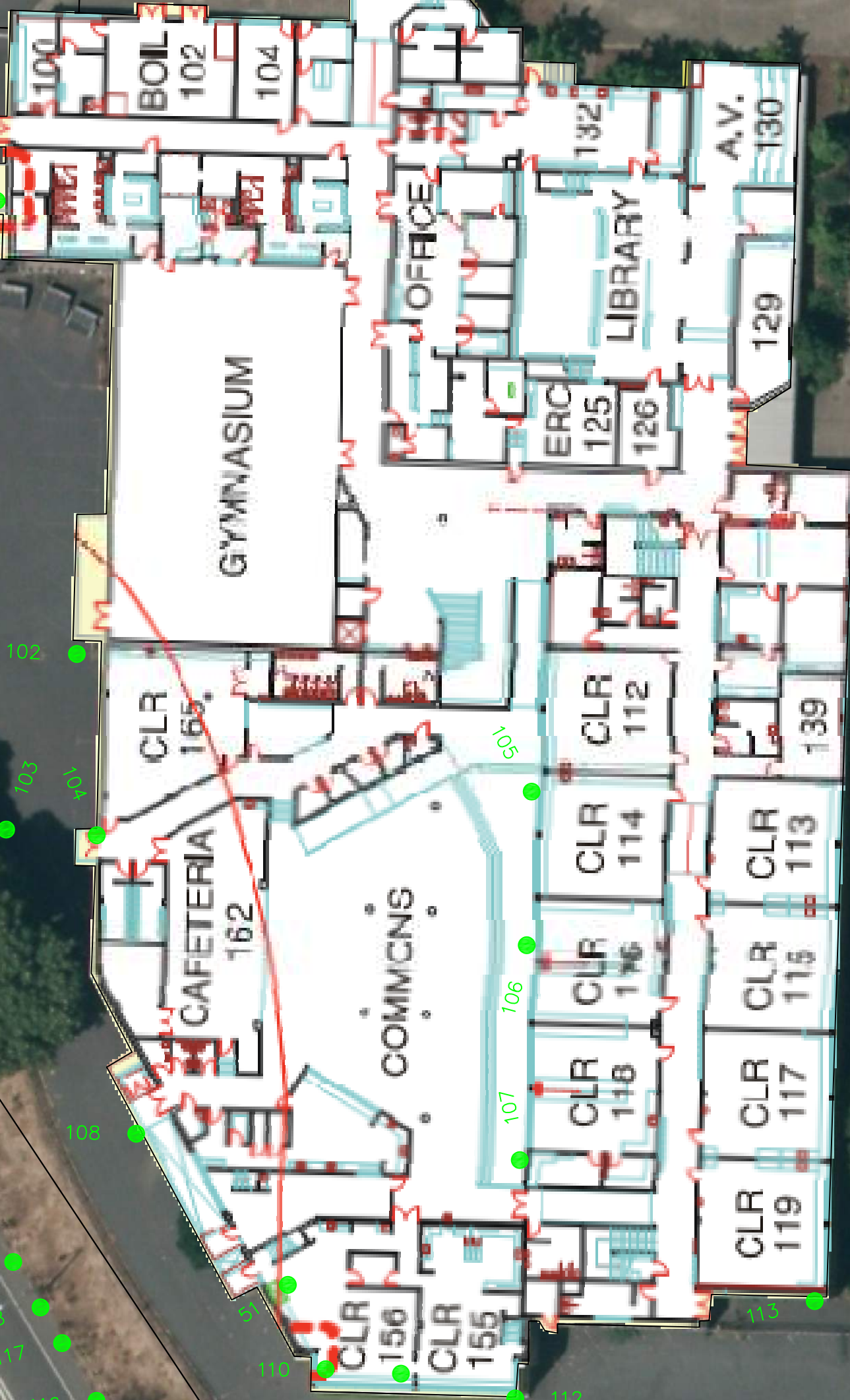
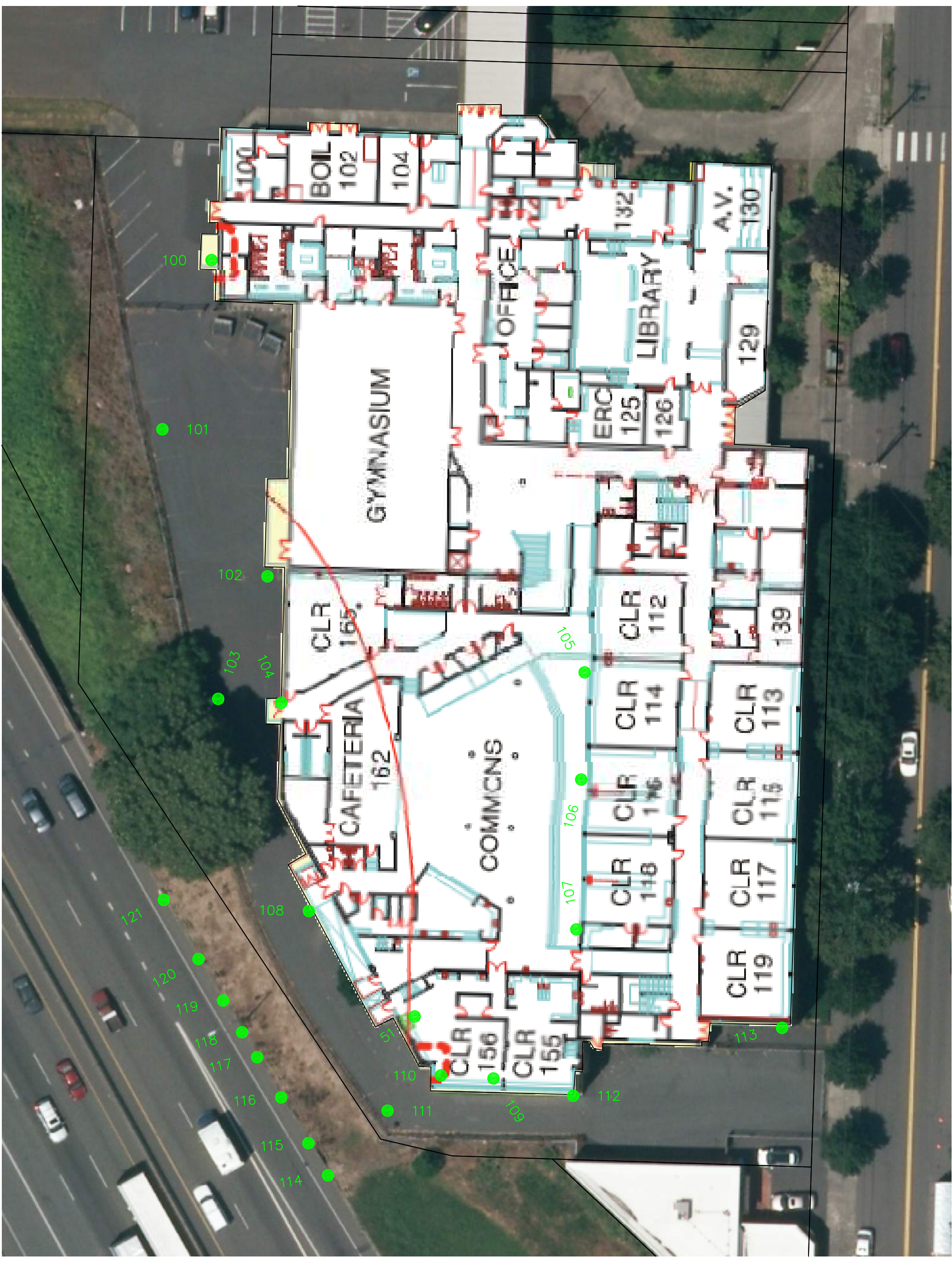
ENGINEERS ♦ PLANNERS ♦ SURVEYORS

Harper Houf Peterson Righellis Inc.

Prepared By: JTC

Checked By: JTC

POINT #	NORTHING	EASTING	ELEV.	DESCRIPTION
HARRIET TUBMAN SCHOOL				
BASELINE MONITORING - JUNE 26, 2017				
MP = MONITORING POINT				
MW = MONITORING WELL				
51	689953.37	7646312.19	135.44	MP SCRIBE
100	690215.90	7646241.67	140.05	MP SCRIBE
101	690157.18	7646224.62	138.22	MP PUNCH EAST RIM MW
102	690106.14	7646261.10	137.41	MP MAG
103	690063.61	7646243.99	136.75	MP PUNCH EAST RIM MW
104	690062.24	7646265.92	145.41	MP STICKER
105	690072.81	7646371.21	137.47	MP SCRIBE
106	690035.61	7646370.02	137.47	MP SCRIBE
107	689983.59	7646368.34	137.46	MP SCRIBE
108	689989.97	7646275.48	134.89	MP MAG
109	689931.87	7646339.58	135.42	MP SCRIBE
110	689932.94	7646321.33	135.43	MP SCRIBE
111	689920.68	7646302.79	133.54	MP PUNCH EAST RIM MW
112	689925.86	7646367.24	135.03	MP MAG
113	689949.44	7646439.75	137.19	MP MAG
114	689898.27	7646282.11	125.21	MP SCRIBE
115	689909.42	7646275.31	125.91	MP SCRIBE
116	689925.29	7646265.85	126.25	MP SCRIBE
117	689939.27	7646257.52	126.49	MP SCRIBE
118	689947.91	7646252.29	126.73	MP SCRIBE
119	689958.91	7646245.69	126.95	MP SCRIBE
120	689973.34	7646237.14	127.01	MP SCRIBE
121	689993.84	7646225.11	126.05	MP SCRIBE



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