



Weston & Sampson<sup>SM</sup>

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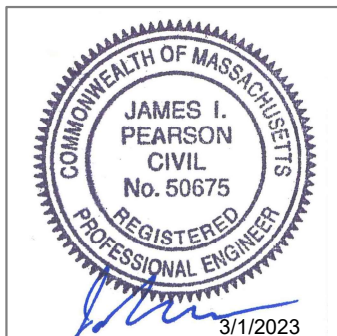
CONTRACT  
DOCUMENTS

March 1, 2023

CITY OF  
**PORTSMOUTH**  
NEW HAMPSHIRE

Portsmouth New Hampshire Skate Park

**Bid #39-23**



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## SECTION 00 31 32

### SUBSURFACE DATA

#### PART 1 - GENERAL:

##### 1.01 SCOPE:

- A. A subsurface exploration program consisting of soil borings has been performed, with reasonable care. The following data is appended hereto and is part of the Contract Documents.

- Boring logs B-1 through B-16

If Contractors deem the subsurface information insufficient, they may, after obtaining Owner's permission, carry out additional subsurface explorations, at no expense to the Owner.

- B. Subsurface information provided in the Contract Documents is limited by the methods used for obtaining and expressing such data, and is subject to various interpretations. The terms used to describe soils, rock, groundwater and such other conditions are subject to local usage and individual interpretation.
- C. Borings have been completed substantially at the locations indicated on the drawings and advanced to the depths shown on the logs. Soil information presented in the logs, as to classification, gradation, properties, density and consistency, is based on visual observation of recovered samples. Reported groundwater levels are those measured in the field at the particular location and at the time measurements were made, and do not necessarily represent permanent groundwater elevations. Groundwater elevations may be affected by temperature, rainfall, and other factors that may not have been present at the time the measurements were made. The Contractors should be aware that groundwater level fluctuations may affect methods of construction.
- D. Subsurface exploration, soil data are for the general information of the Contractor. The Contractors bidding on the project are obligated to examine the site, review boring logs, all available information and records of explorations, investigations and other pertinent data for the site, and then based upon their own interpretations and investigations decide the character of material to be encountered and excavated, the suitability of the materials to be used for backfilling and such other purposes, the groundwater conditions, difficulties or obstacles likely to be encountered, and other conditions affecting the work. The subsurface data is accurate only at the particular locations and times the subsurface explorations were made. No other warranty either expressed or implied by the Owner, Engineer or their agents is made as to the accuracy of the subsurface information and data shown on the drawings or presented in the Contract Documents.

END OF SECTION





**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-1  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 55 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/27/16 **DATE END** 9/27/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	18/24	0-2	5-21-30-35	0.2	Very dense, brown, gravelly, fine to coarse SAND FILL, some silt, trace debris (brick, asphalt); moist. Bottom 12" grades to little silt.	1,2	<b>SAND FILL WITH DEBRIS</b>
5		S-2	8/24	5-7	5-6-9-6	0.1	Medium dense, dark brown, fine to medium SAND FILL, some silt, litte gravel; moist.		
10		S-3	14/24	10-12	17-27-21-22	0.1	Dense, brown, fine to medium SAND, little gravel, trace to little silt; moist.		
15		S-4	15/24	15-17	13-27-36-59	0.1	Very dense, brown, fine to medium SAND, little gravel, trace silt; moist.		
20		S-5	10/10	20-20.8	88-100/4"		Very dense, brown, fine to medium SAND, some gravel, trace silt; moist.		
25		S-6	13/24	25-27	38-15-18-19		Dense, brown, fine to medium SAND, trace silt; moist.		
30							Boring terminated at 27 ft.		<b>SAND</b>

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Grab sample submitted for environmental analysis. 2. Periodic auger grinding from about 0 to 25 ft. (possible cobbles, boulders, and/or debris).
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-1



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-2  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors  
**FOREMAN** Sam Shaw  
**WSE ENGINEER:** Julie A. Eaton, EIT

**BORING LOCATION** See attached plan  
**GROUND SURFACE ELEV.** 55 ft. +/- **DATUM** NAVD88  
**DATE START** 9/28/16 **DATE END** 9/28/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	15/24	0-2	10-19-10-9	0.2	Medium dense, dark brown, fine to medium SILTY SAND FILL, little gravel, little debris (wood, brick); moist.	1	<b>SAND FILL WITH DEBRIS</b>
5		S-2	9/19	5-6.6	4-3-7-50/1"	2.4	Medium dense, dark brown, fine to medium SILTY SAND FILL, little gravel, trace debris (wood); moist.	2 3 4	
10		S-3	0/24	10-12	7-8-9-8	N/A	No recovery.		
15		S-4	8/24	12-14	56-17-19-14	3.3	Dense, dark brown, fine to medium SAND FILL, some debris (wood, concrete, brick, paper), little silt, little gravel; moist.		
20		S-6	18/24	20-22	12-17-19-16	2.6	Dense, brown, fine to coarse SAND, trace gravel, trace silt; moist.		
25		S-7	18/24	25-27	17-18-11-14	0.1	Medium dense, brown, fine to coarse SAND, some gravel, trace to little silt; moist.		
30		S-8	18/24	30-32	16-19-19-20		Dense, dark gray, fine to coarse SAND, some silt, some gravel; moist.		
							Boring terminated at 32 ft.		

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 5 ft. 2. Grab sample submitted for environmental analysis. 3. Auger refusal at 6.5 ft. Moved east 5 ft. Auger refusal at 5 ft. Moved south 8 ft. Auger grinding 0 to 3 ft. and 4.5 to 6.5 ft. with concrete fragments observed in cuttings. 4. Periodic auger grinding from about 7 to 12.5 ft. with wood fragments observed in cuttings. (possible cobbles, boulders, and/or debris)
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-2



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-3  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors  
**FOREMAN** Sam Shaw  
**WSE ENGINEER:** Julie A. Eaton, EIT

**BORING LOCATION** See attached plan  
**GROUND SURFACE ELEV.** 55 ft. +/- **DATUM** NAVD88  
**DATE START** 9/27/16 **DATE END** 9/27/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION	
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"					
0		S-1	15/24	0-2	5-5-4-4	0.0	Stiff, brown, CLAYEY SILT FILL, little fine sand, little gravel, trace debris (asphalt, brick); very moist.		<b>SAND/CLAYEY SILT FILL WITH DEBRIS</b>	
5		S-2	9/24	5-7	5-8-5-5	0.1	Medium dense, brown, fine to medium SILTY SAND FILL, some gravel; very moist. Bottom 3": pulverized asphalt debris.			
10		S-3	5/24	10-12	4-6-8-11	0.2	Stiff, brown, CLAYEY SILT FILL, little fine sand, little gravel; wet.	1		
15		S-4	13/24	15-17	55-25-29-30	0.4	Very dense, gray-brown fine to coarse SAND FILL, some debris (concrete), some gravel, little silt; moist. Bottom 4": brown, fine to medium SAND, trace gravel, trace silt; moist.	2		<b>SAND</b>
20		S-5	13/24	20-22	28-31-28-25	0.2	Very dense, brown, fine to coarse SAND, little gravel, little silt; moist.			
25		S-6	13/24	25-27	27-32-26-31		Very dense, brown, gravelly, fine to coarse SAND, trace silt; moist.			
30		S-7	14/24	30-32	35-29-18-10		Dense, brown, fine to coarse SAND, little gravel, trace silt; moist.			
							Boring terminated at 32 ft.			

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY
0-4	V. LOOSE	0-2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
> 50	V. DENSE	15-30	V. STIFF
		> 30	HARD

**NOTES:**  
1. Auger grinding from about 13.5 to 15.5 ft. (possible cobbles, boulders, and/or debris)  
2. Grab sample submitted for environmental analysis.  
3. Periodic auger grinding from about 18 to 30 ft. (possible cobbles)

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-3



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-4  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/27/16 **DATE END** 9/27/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	15/24	0-2	17-24-20-11	0.1	Dense, brown, fine to coarse SAND FILL, some gravel, some silt, trace debris (brick, asphalt); moist.	1	<b>SAND FILL WITH DEBRIS</b>
5		S-2	12/24	5-7	6-8-9-10	0.5	Medium dense, dark brown, SILTY SAND FILL, little gravel; very moist.		
10		S-3	13/24	10-12	5-6-4-7	0.8	Medium dense, dark brown, fine to medium SAND FILL, some silt, little debris (asphalt), trace gravel, trace organics (roots); moist.	2	
15		S-4	17/24	15-17	25-31-78-71	2.4	Very dense, dark brown, fine to medium SAND FILL, some silt, little debris (wood, asphalt), trace gravel; moist. Bottom 6": brown, fine to coarse SAND, some gravel, trace silt; moist.		
20		S-5	3/9	20-20.8	68-100/3"	1.5	Very dense, brown, gravelly, fine to coarse SAND, trace to little silt; moist.		
25		S-6	12/24	25-27	73-43-27-37		Very dense, brown, gravelly, fine to coarse SAND, trace silt; moist.		
30							Boring terminated at 27 ft.		<b>SAND</b>

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 1 to 25 ft. (possible cobbles, boulders, and/or debris). Wood fragments observed in cuttings to about 18 ft. 2. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-4



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-5  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 57 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/28/16 **DATE END** 9/28/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	12/23	0-1.9	7-8-40-100/5"	0.0	Dense, brown, gravelly, fine to coarse SAND FILL, little silt, trace debris (wood); moist.	1	<b>SAND FILL WITH DEBRIS</b>
5		S-2	18/24	5-7	10-79-60-38	0.2	Very dense, dark brown, fine to coarse SAND FILL, some gravel, little silt; moist.		
10		S-3	5/24	10-12	6-7-6-8	0.1	Medium dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist.		
15		S-4	14/24	15-17	10-28-33-13	0.6	Very dense, brown, gravelly, fine to coarse SAND FILL, some silt, trace debris (asphalt); moist.	2	
20							Boring terminated at 17 ft.		
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 13 ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-5



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-6  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/28/16 **DATE END** 9/28/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	15/24	0-2	10-19-26-20	0.0	Dense, brown, fine to coarse SAND FILL, little to some gravel, little silt, trace debris (brick, asphalt); moist.	1	<b>SAND FILL WITH DEBRIS</b>
5		S-2	4/8	5-5.6	14-100/2"	0.5	Very dense, dark brown, gravelly fine to coarse SAND FILL, little to some silt, little debris (wood fragments); moist.		
10		S-3	13/24	10-12	18-15-12-12	0.0	Medium dense, dark brown, fine to coarse SAND FILL, some silt, little debris (brick, ash, asphalt), trace gravel; moist. Bottom 4": grades to brown, silty.	2	
15		S-4	6/24	15-17	17-15-13-14	0.3	Medium dense, dark brown, fine to medium SAND FILL, some silt, little debris (wood fragments, asphalt), little gravel; moist.		
20							Boring terminated at 17 ft.		
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 3 to 6 ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-6



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-7  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors  
**FOREMAN** Sam Shaw  
**WSE ENGINEER:** Julie A. Eaton, EIT

**BORING LOCATION** See attached plan  
**GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**DATE START** 9/28/16 **DATE END** 9/28/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	19/24	0-2	9-14-29-23	0.0	Dense, dark brown, fine to coarse SAND FILL, some gravel, little debris (concrete, asphalt), little silt; moist.		<b>SAND FILL WITH DEBRIS</b>
5		S-2	8/24	5-7	25-61-16-13	0.3	Very dense, dark brown, fine to coarse SAND FILL, some gravel, some silt, little debris (brick, wood); moist.		
10		S-3	3/24	10-12	10-1/12"-1	1.0	Very loose, dark brown, fine to medium SAND FILL, some silt, some debris (wood, ash), trace gravel; moist.		
15		S-4	12/24	15-17	11-14-13-26	4.1	Medium dense, dark brown, fine to medium SAND FILL with debris (wood, fabric, ash), some silt, little gravel; moist.		
20							Boring terminated at 17 ft.	1	
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-7



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-8  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors  
**FOREMAN** Sam Shaw  
**WSE ENGINEER:** Julie A. Eaton, EIT

**BORING LOCATION** See attached plan  
**GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**DATE START** 9/28/16 **DATE END** 9/28/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	12/24	0-2	5-8-18-42	0.2	Medium dense, brown, sandy GRAVEL FILL, little silt; moist.	1	<b>SAND FILL WITH DEBRIS</b>
5		S-2	6/24	5-7	13-14-12-10	9.5	Medium dense, dark brown, fine to coarse SAND FILL, trace gravel, trace to little silt, trace debris (wood fragments, brick, asphalt); moist.	2	
10		S-3	6/24	10-12	6-7-4-29	1.6	Medium dense, dark brown, fine to medium SILTY SAND FILL with debris (wood fragments, ash, asphalt), trace gravel; moist.		
15		S-4	5/24	15-17	14-25-15-12	2.6	Dense, dark brown, fine to medium SILTY SAND FILL with wood fragments; very moist.		
20							Boring terminated at 17 ft.		
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 14 ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-8





**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-9  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 57 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/27/16 **DATE END** 9/27/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION	
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"					
0		S-1	13/24	0-2	12-22-27-14	0.0	Very dense, dark brown, gravelly, fine to coarse SAND FILL, little to some silt; moist.	1	SAND/CLAYEY SILT FILL WITH DEBRIS	
5		S-2	15/24	5-7	3-32-27-6	0.0	Hard, gray, CLAYEY SILT FILL, little gravel, little fine sand; moist.			
10		S-3	7/24	10-12	3-2-3-6	0.7	Medium stiff, gray-brown, ORGANIC CLAYEY SILT FILL, little to some fine sand, trace gravel, trace debris (asphalt); moist.	2		
15		S-4	4/5	15-15.4	100/5"	3.2	Brown WOOD DEBRIS, little fine to medium sand, trace silt, trace gravel; moist.			
20		S-5	12/24	20-22	27-36-30-29	9.6	Very dense, brown, gravelly, fine to coarse SAND, little silt; moist.	3		SAND
25		S-6	11/24	25-27	14-21-28-41	1.2	Very dense, brown, gravelly, fine to coarse SAND, little silt; moist. Bottom 4": grades to fine to medium SAND, trace silt; moist.			
30		S-7	9/24	30-32	37-41-45-40	2.7	Very dense, brown, gravelly, fine to coarse SAND, trace silt; moist. Boring terminated at 32 ft.			

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 30 ft. with heavy auger grinding from about 15 to 16.5 ft. (over 10 minutes to advance). Wood fragments observed in auger cuttings. 2. Grab sample submitted for environmental analysis. 3. Slow auger advancement from about 20 to 30 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-9



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-10  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/29/16 **DATE END** 9/29/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	16/24	0-2	8-12-12-12	0.1	Medium dense, brown, fine to medium SAND FILL, little gravel, little silt, trace debris (fabric); moist.	1	<b>SAND/CLAYEY SILT FILL WITH DEBRIS</b>
5		S-2	12/24	5-7	4-4-3-4	0.2	Medium stiff, dark brown, CLAYEY SILT FILL, some fine sand, little gravel, trace debris (wood, ash); very moist.		
10		S-3	12/24	10-12	4-3-8-8	0.5	Stiff, brown, CLAYEY SILT FILL, little fine sand, little gravel, trace debris (brick, wood); very moist.	2	
15		S-4	10/24	15-17	15-8-4-3	0.1	Medium dense, brown, fine to medium SAND FILL, little to some silt, little gravel, trace debris (asphalt, ash, wood); moist.		
20							Boring terminated at 17 ft.		
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic Auger grinding from about 2 to 13ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-10



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-11  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/29/16 **DATE END** 9/29/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	14/24	0-2	17-46-33-24	0.0	Very dense, brown, gravelly, fine to coarse SAND FILL, some silt; moist.	1	SAND/CLAYEY SILT FILL WITH DEBRIS
5		S-2	11/24	5-7	8-8-6-7	0.0	Stiff, brown, CLAYEY SILT FILL, some fine sand, some debris (concrete, brick, asphalt), little gravel; moist.	2	
10		S-3	12/24	10-12	22-8-9-9	0.5	Stiff, brown, sandy SILT FILL, little gravel, little clay, trace debris (asphalt); moist. Bottom 6": grades to little organics (fine roots).	3	
15		S-4	13/24	15-17	8-15-17-19		Dense, light brown, fine to medium SAND, trace gravel, trace silt; moist. Boring terminated at 17 ft.		SAND
20									
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 10 ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis. 3. Possible buried topsoil layer.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-11



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-12  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 57 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/29/16 **DATE END** 9/29/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	11/24	0-2	14-35-32-69	0.1	Very dense, brown, gravelly, fine to coarse SAND FILL, trace silt; moist.	1, 2	SAND FILL WITH DEBRIS
5		S-2	11/24	5-7	8-9-8-2	0.0	Medium dense, dark brown, SILTY SAND FILL, little gravel, trace debris (wood, asphalt); moist.		
10		S-3	7/24	10-12	5-14-15-33	0.2	Very dense, brown, gravelly, fine to coarse SAND FILL, trace silt; moist. Bottom 3": Very dense, brown, gravelly, fine to coarse SAND, trace silt; moist.		SAND
15		S-4	13/24	15-17	18-22-35-24		Very dense, brown, gravelly, fine to coarse SAND, little silt; moist. Boring terminated at 17 ft.		
20									
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 15 ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-12



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-13  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors  
**FOREMAN** Sam Shaw  
**WSE ENGINEER:** Julie A. Eaton, EIT  
**BORING LOCATION** See attached plan  
**GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**DATE START** 9/28/16 **DATE END** 9/28/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	14/24	0-2	12-21-22-17	0.1	Dense, brown, gravelly, fine to coarse SAND FILL, little silt, trace debris (asphalt, brick); moist.	1	SAND FILL WITH DEBRIS
5		S-2	9/24	5-7	8-11-7-6	0.7	Medium dense, dark brown, fine to coarse SAND FILL, some silt, trace debris (asphalt), trace gravel; moist.		
10		S-3	11/24	10-12	7-15-9-12	2.2	Medium dense, dark brown, fine to coarse SAND FILL, some gravel, little silt, trace debris (brick, asphalt); moist.	2	
15		S-4	14/24	15-17	14-23-43-49		Very dense, brown, fine to coarse SAND, some gravel, trace silt; moist. Boring terminated at 17 ft.		
20									
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 10 ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-13



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-14  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/29/16 **DATE END** 9/29/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	11/12	0-1	23-100/6"	0.0	Very dense, brown, fine to coarse SAND FILL, little gravel, little silt; moist. Bottom 3": grades to gravelly.	1	<b>SAND FILL WITH DEBRIS</b>
5		S-2	13/24	5-7	30-31-23-18	0.5	Very dense, dark brown, fine to coarse SAND FILL, some debris (asphalt, brick), little gravel, little silt; moist.		
10		S-3	4/14	10-11.1	3-7-100/2"	1.8	Very dense, dark brown, fine to medium SAND FILL with debris (brick, wood), some silt, trace gravel; very moist.	2	
15		S-4	6/24	15-17	11-10-12-10	32.8	Medium dense, dark brown, fine to medium SANDY DEBRIS FILL (wood, asphalt), some silt, little gravel; very moist.	3	
20							Boring terminated at 17 ft.		
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 1 to 9 ft. (possible cobbles, boulders, and/or debris). 2. Heavy auger grinding from about 9 to 9.5 ft. and 11.5 to 15 ft. (possible cobbles, boulders, and/or debris) 3. Grab sample submitted for environmental analysis.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-14



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-15  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/29/16 **DATE END** 9/29/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	16/24	0-2	6-14-20-21	0.1	Dense, brown, fine to coarse SAND FILL, little gravel, little silt; moist. Bottom 4": grades to some debris (asphalt).	1	SAND/CLAYEY SILT FILL WITH DEBRIS
5		S-2	17/24	5-7	15-15-6-8	0.4	Top 7": Medium dense, brown fine to medium SAND FILL, some silt, little gravel, trace debris (brick, asphalt); moist. Very stiff, dark gray, CLAYEY SILT FILL, some fine sand, trace debris (asphalt, brick); moist.		
10		S-3	17/24	10-12	8-7-5-4	14.0	Medium dense, dark brown, SILTY SAND FILL with debris (brick, ash, wood, leaves), trace gravel; very moist.	2	
15		S-4	2/24	15-17	5-5-2/12"	0.5	Dark brown, WOOD DEBRIS, some fine sand, some silt; very moist. Boring terminated at 17 ft.	3	
20									
25									
30									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Periodic auger grinding from about 0 to 5 ft. (possible cobbles, boulders, and/or debris). 2. Grab sample submitted for environmental analysis. 3. Organic odor emitting from borehole.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.  
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-15



**PROJECT**  
Rt. 33 Recreation Field  
Portsmouth, NH

**REPORT OF BORING No.** B-16  
**SHEET** 1 OF 1  
**Project No.** 2160648.A  
**CHKD BY** Thomas J. Strike, PE

**BORING Co.** New England Boring Contractors **BORING LOCATION** See attached plan  
**FOREMAN** Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88  
**WSE ENGINEER:** Julie A. Eaton, EIT **DATE START** 9/29/16 **DATE END** 9/29/16

**SAMPLER:** 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES  
USING A 140 lb. CATHEAD OPERATED HAMMER.  
**CASING:** HOLLOW STEM AUGER DRILLING METHODS  
TRUCK RIG  
**CASING SIZE:** 2 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
9/29/2016		25 ft. +/-		based on wet sample.

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	7/12	0-1	12-32-50/0"	0.0	Dense, dark brown, fine to medium SAND FILL, little to some silt, trace gravel, trace debris (asphalt); moist.	1	SAND FILL WITH DEBRIS
5		S-2	8/24	5-7	11-29-20-10	0.2	Dense, dark brown, fine to coarse SAND FILL, little to some silt, trace gravel, trace debris (asphalt, ash, concrete); moist.	2	
10		S-3	12/24	10-12	17-49-13-17	2.2	Dark brown, WOOD FRAGMENTS, trace fine sand; moist. Bottom 6": grades to yellow foam debris.	3	
15		S-4	11/24	15-17	11-7-5-6	0.2	Medium dense, dark brown, SILTY SAND FILL, some wood fragments, little gravel; moist.		
20		S-5	9/24	20-22	29-10-9-7	1.2	Same as above.	4	
25		S-6	11/24	25-27	16-51-4-2	0.8	Dark brown, SILTY SAND FILL with WOOD FRAGMENTS; wet.		
30		S-7	18/24	30-32	8-7-7-6	0.6	Medium dense, brown, fine to coarse SAND, trace gravel, trace silt; wet.		
		S-8	5/24	32-34	10-15-47-48		Very dense, brown, fine to coarse SAND, some gravel, trace silt; wet.		SAND
							Boring terminated at 34 ft.		

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1. Spoon was bouncing and tilting. Auger refusal at 1 ft. Moved ~5 ft. south, auger refusal at 1 ft., moved ~8 ft. south, auger grinding from about 0 to 4 ft. and heavy auger grinding from about 4 to 5 ft. (possible boulders and/or debris) 2. Grab sample submitted for environmental analysis. 3. Heavy auger grinding 7 to 7.5 ft. (possible cobbles and/or debris). 4. Periodic auger grinding from about 20 to 27.5 ft. (possible cobbles, boulders, and/or debris).
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

**GENERAL NOTES:** i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.  
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

**BORING No.** B-16



SECTION 00 31 43

PERMITS

PART 1 – GENERAL

1.01 DESCRIPTION:

This Section provides specific information and defines specific requirements of the Contractor regarding the preparation and acquisition of permits required to perform the work of this project.

1.02 RELATED WORK:

- A. Section 01 11 00, CONTROL OF WORK AND MATERIALS
- B. Section 01 14 19.16, DUST CONTROL
- D. Section 01 57 19, ENVIRONMENTAL PROTECTION
- I. Section 31 00 00, EARTHWORK

1.03 GENERAL REQUIREMENTS:

- A. The Owner has obtained or will obtain and pay for the permits listed below, which are required for this project. The Contractor shall assist in obtaining certain permits, as indicated. The Contractor shall obtain and pay for all other permits required, as defined under the Permits subsection of Section 00 72 00, GENERAL CONDITIONS.

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<u>Permits by Owner</u>	<u>Status</u>
*NHDES Alteration of Terrain Permit	In Progress
City of Portsmouth Site Plan Review (TAC)	Completed

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## PART 2 - PRODUCTS

Not Used.

## PART 3 – EXECUTION

### 3.01 PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS:

- A. The Contractor shall perform the work in accordance with the Contract Documents, including the attached permits/order of conditions, and any applicable municipal requirements.
- B. Prior to commencing any construction activities, the Contractor shall demonstrate to the Owner and the Engineer, through on-site inspection or approvals, that it is in full compliance with the terms and conditions of all permits specified herein. The Contractor shall maintain full compliance with all permits throughout the performance of the work, and upon request, grant access to permitting authorities to inspect the site for the purpose of verifying such compliance.

END OF SECTION

SECTION 01 11 00

CONTROL OF WORK AND MATERIALS

PART 1 – GENERAL

Not Used.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 HAULING, HANDLING AND STORAGE OF MATERIALS:

- A. The Contractor shall, at its own expense, handle and haul all materials furnished by it and shall remove any of its surplus materials at the completion of the work.
- B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by it that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.
- C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be always had to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.
- D. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

3.03 OPEN EXCAVATIONS:

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at its own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.

- B. Bridges provided for access to private property during construction shall be removed when no longer required.
- C. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.
- D. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.
- E. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

#### 3.04 MAINTENANCE OF TRAFFIC:

- A. Unless permission to close the street is received in writing from the proper authority, all excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be safely maintained at all times.
- B. Should the Chief of Police deem it necessary, uniformed officers will be assigned to direct traffic. The Contractor shall make all arrangements in obtaining uniformed officers required.
- C. The Contractor shall at its own expense, as directed by the Police Traffic Control/Safety Officer, provide and erect acceptable barricades, barrier fences, traffic signs, and all other traffic devices not specifically covered in a bid item, to protect the work from traffic, pedestrians, and animals. The Contractor shall provide sufficient temporary lighting such as lanterns/flashers (electric battery operated) or other approved illuminated traffic signs and devices to afford adequate protection to the traveling public, at no additional cost to the Owner.
- D. The Contractor shall furnish all construction signs that are deemed necessary by and in accordance with Part VI of the Manual on Uniform Traffic Control Devices as published by the U.S. Department of Transportation. In addition, the Contractor may be required to furnish up to 128 square feet of additional special construction warning signs. Size and exact wording of signs shall be determined by the Engineer during construction.
- E. The intent of policing is to ensure public safety by direction of traffic. Police officers are not to serve as watchmen to protect the Contractor's equipment and materials.
- F. Nothing contained herein shall be construed as relieving the Contractor of any of its

responsibilities for protection of persons and property under the terms of the Contract.

3.05 CARE AND PROTECTION OF PROPERTY:

The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at its expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Engineer.

3.06 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

- A. All existing buildings, utilities, pipes, poles, wires fences, curbing, property line markers and other structures which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported, and protected from damage by the contractor. Should such property be damaged, it shall be restored by the Contractor, at no additional cost to the Owner.
- B. The Contractor shall determine the location of all underground structures and utilities (including existing water services, drain lines, electrical lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by Contractor.
- C. When fences interfere with the Contractor's operations, it shall remove and (unless otherwise specified) promptly restore them in accordance with Section 01 14 19.19 EXISTING FENCES.
- D. On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels which are shaped so as to cut or otherwise damage such surfaces.
- E. All property damaged by the Contractor's operations shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.
- F. Restoration of existing property and structures shall be carried out as promptly as practicable and shall not be left until the end of the construction period.

3.07 MAINTENANCE OF FLOW:

- A. The Contractor shall at its own cost, provide for the flow of sewers and drains interrupted during the progress of the work, and shall immediately cart away and dispose of all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.
- B. All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs any of the aforesaid drainage facilities, it shall repair the same within the same day.
- C. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by its operations as described in Section 01 74 13, CLEANING UP.

### 3.08 REJECTED MATERIALS AND DEFECTIVE WORK:

- A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor and shall not be made use of elsewhere in the work.
- B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.
- C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

### 3.09 SANITARY REGULATIONS:

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

### 3.10 SAFETY AND HEALTH REGULATIONS:

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, " The Contractor shall be familiar with the requirements of these regulations.

#### SITE INVESTIGATION:

- 3.11 The Contractor acknowledges that it has satisfied itself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint itself with available information will not relieve it from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

#### HANGERS, PADS, AND SUPPORTS:

### 3.12

- A. Unless otherwise indicated, hangers and supports shall be by the trade providing the supported item.
- B. Except where detailed or specified, design of hangers and supports shall be the responsibility of the Contractor. All parts of such hangers or supports shall be designed in accordance with accepted engineering practice, using a factor of safety of at least 2½.
- C. When proprietary hangers, etc., are supplied, satisfactory evidence of the strength of such items shall be furnished.
- D. Hangers for items hung from steel and concrete shall be centered on the vertical center of gravity of the beam.
- E. Locations and sizes of openings, sleeves, concrete pads, steel frames, and other equipment supports are indicated on the drawings for bidding purposes only. Final sizes and locations of such items shall be obtained from the shop drawings.

### 3.13 SLEEVES, HOLES, HANGERS, INSERTS, ETC.:

- A. Except where holes and openings are dimensioned, and hangers, inserts, and supports are

fully called for on the architectural and structural drawings (or reference is made thereon to drawings containing such information) to accommodate mechanical or electrical items, they shall be by the mechanical or electrical trade concerned.

- B. Sleeves, inserts, anchors, etc., supplied under the mechanical and electrical contracts in sufficient time to so permit, shall be set in concrete, masonry, etc., or fastened to steel deck, etc., by the respective architectural or structural trade. Where not supplied in sufficient time, installation of such items shall be the responsibility of the mechanical or electrical trade involved.
- C. Nothing shall be suspended from the steel roof deck and no fastenings made to it, except with the prior permission of the Engineer. Request for permission shall be accompanied by full details of the hanger or fastener, including the weight of the item to be suspended.
- D. Nailers and other wood members attached to steel or masonry, for which fasteners are not indicated on the design drawings or in the specification, shall be fastened with the equivalent of ½-inch diameter bolts at 3 feet o.c.
- E. Openings for mechanical and electrical items in finished areas of the building shall be closed off with near escutcheon plates or similar closures. These closures shall be by the mechanical or electrical trade involved.

3.14 ROOF PROTECTION:

Where work must be performed over completed roofing, the roofing shall be protected by 2 layers of ½-inch thick plywood, laid with joints in the second layer offset 1/2 sheet width and length from joints in the first layer. No material shall be stored or work performed on areas of roof which are not so protected.

3.15 WEATHER PROTECTION:

In conformance with Sections 44F and 44G of Chapter 149 of the General Laws of The General Contractor shall install weather protection and shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the Director of Building Construction in the Executive Office for Administration and Finance.

3.16 ELECTRIC SERVICE:

- A. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide and



pay for all temporary wiring, switches, connections, and meters.

- B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

3.17 HAZARDOUS WASTE:

Should the Contractor, while performing work under this contract, uncover hazardous materials, he shall immediately notify the Engineer. The Contractor is not, and has no authority to act as, a handler, generator, operator or disposer of hazardous or toxic substances found or identified at the site, and the Owner shall undertake all such functions.

3.18 POLLUTION LIABILITY:

The Owner shall hold harmless, indemnify and defend the Contractor from and against any and all liability, claims, damages, and cost of defense resulting from the handling, generating, operating, treating, storing, transporting or disposing of hazardous or toxic substances at or on the site by parties other than the Contractor or its agents or subcontractors and for the discharge, disposal or emission of leachate, groundwater pollution, or any other pollution whatsoever from or on the site, unless such liability, claims, damages, or cost of defense arises as a result of the Contractor's negligence or failure to comply with any part of the Contract or any applicable law, rule or regulations.

END OF SECTION

## SECTION 01 12 16

### SCOPE AND SEQUENCE OF WORK

#### PART 1 – GENERAL

##### 1.01 WORK INCLUDED:

- A. The construction of a new skate park including but not limited to demolition, earthwork, earthwork stabilization, stormwater infrastructure, parking lot, sidewalks, and improvements to support the new skate park.

##### 1.02 RELATED WORK:

- A. SECTION 01 11 00 – CONTROL OF WORK AND MATERIALS

#### PART 2 - PRODUCTS (NOT APPLICABLE)

#### PART 3 - EXECUTION

##### 3.01 GENERAL:

- A. The Contractor shall be responsible for scheduling its activities and the activities of any subcontractors involved, to meet the completion date, or milestones, established for the contract. Scheduling of the work shall be coordinated with the Owner and Engineer.
- B. The Construction Sequence Requirements shall be used by the Contractor to form a complete schedule for the project, which shall be coordinated with the Owner and Engineer. Prior to performing any work at the site, the Contractor shall submit a detailed plan to the Engineer for review. The plan shall describe the proposed sequence, methods, and timing of the work.

##### 3.02 CONSTRUCTION SEQUENCING REQUIREMENTS:

- A. The City of Portsmouth under a separate contractor will provide to the winning skatepark contractor the project area (the Site) as defined by the limit of work, where the Site has been excavated, cut, and filled accordingly to meet the proposed site subgrade elevations to be set via clearing and grubbing, cutting, filling, and placement of existing earth/soils throughout the site area to the established subgrade elevations as indicated within the contracts plans. All ground vegetation within the limit of work will be cleared, grubbed, and stockpiled by the City's contractor for offsite disposal by the Contractor. The Contractor shall be responsible for the balance of tree and brush removal including disposal outside the limits of the

subgrade earthwork but within the limits of the project area, such as but not necessarily limited to the vegetation within the rip rap area along Greenland Road. The Contractor will be responsible for coordinating with the City's contractor to ensure subgrade elevations have been set correctly per the contract plans prior to inheriting complete ownership of the project area. The Contractor will be responsible for maintaining the subgrade compaction throughout the project area and ensuring the subgrade elevations remain true and accurate throughout the duration of construction. The Contractor shall be aware that no existing excess soil materials shall be removed from the site without approval from the City and the Engineer. The expectation that any soils within the existing project area that are not required to construction as represented in the contract documents shall be stockpiled in an area that identified by the City on site. This may include stockpiling outside the limit of work.

The Contractor shall engage Artisan Skateparks (Artisan) under this scope of work for the specific skatepark construction included within this scope of work and as indicated within the plans and specifications. The Contractor shall note that the City of Portsmouth has engaged Artisan Skateparks to perform the installation and construction, including all labor, materials, and equipment. The City of Portsmouth and Artisan Skateparks have established a set cost and scope for the construction of the skatepark. Artisan Skateparks shall be contacted at:

Artisan Skateparks  
4600 Tamarack Dr.  
Kitty Hawk, NC 27949

Contact: Andy Duck  
Email: [andy@artisanskateparks.com](mailto:andy@artisanskateparks.com)  
Phone: (252) 202-1333

The Contractor will be responsible for complete installation of the stormwater infrastructure system, including but not limited to excavation, installation of pipes and inlet structures, the subsurface drainage system below the skatepark, etc., backfilling and compaction accordingly throughout the project area. Within the skatepark limits, the Contractor shall stub the stormwater inlet pipes at the locations indicated on the skatepark plans for the final drain inlets and grates to be installed by Artisan. The Contractor shall also install and stub the empty electrical conduit to the designated locations within the skatepark area for future installation of the electrical system as depicted on the plans. The Contractor shall also prepare the structural pad below the skatepark to the set elevations per the plans and details to be received by Artisan. The structural pad must meet the requirements of Artisan prior to acceptance. Artisan shall be responsible for all work within the skatepark area, excluding the brick pavers areas (two total areas) and the shade pavilion Add Alternate No. 1 as indicated within the plans and specification documents. The Contractor shall be responsible for coordination with Artisan throughout the full

construction of the skatepark to ensure that all scope items within this contract are considered and coordinated prior completing the construction of the Skatepark, including but not limited to, installation of shade pavilion footings, subsurface stormwater system, brick pavers.

The Contractor shall be responsible for all work, labor, materials, equipment outside the skatepark limit but within the full project scope limit of work as indicated within the plans and specifications including by not limited to parking lot and entrance drive, hot mix asphalt pathways, empty electrical conduits and hand holes, guardrail, loaming and seeding.

END OF SECTION

## SECTION 01 14 19.16

### DUST CONTROL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

This section of the specification covers the control of dust via calcium chloride and water, complete.

#### PART 2 - PRODUCTS

##### 2.01 CALCIUM CHLORIDE:

- A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.
- B. Calcium chloride failing to meet the requirements of the aforementioned specifications or that which has become caked or sticky in shipment, may be rejected by the Engineer.

##### 2.02 WATER:

- A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

#### PART 3 - EXECUTION

##### 3.01 APPLICATION:

- A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01 57 19, ENVIRONMENTAL PROTECTION.
- B. Calcium chloride shall be uniformly applied at the rate of 1-1/2 pounds per square yard or at any other rate as required by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be determined by the Engineer.
- C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

- D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

END OF SECTION

## SECTION 01 31 19.23

### CONSTRUCTION MEETINGS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

- A. This Section specifies requirements for project meetings including but not limited to Pre-Construction Conference and Progress Meetings.
- B. It shall be the responsibility of the Contractor to coordinate work between all subcontractors, sections, and trades required for the proper completion of the Work.

##### 1.02 PRE-CONSTRUCTION CONFERENCE:

- A. After the bids have been opened but prior to the start of the construction there will be a pre-construction conference to discuss the phasing and scheduling of the Project. The specific time and place of the conference shall be arranged by the Engineer after the Contract has been awarded.
- B. This pre-construction conference is intended to establish lines of communication between the parties involved, review responsibilities and personnel assignments, establish project schedules, discuss proposed performance methods, and coordinate Work to be performed by subcontractors.
- C. Authorized representatives of the Owner, Engineer and their consultants, the Contractor, its Superintendent and Site Foreman, and all others invited by the Contractor, shall attend the pre-construction conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- D. Discuss items of significance at the pre-construction conference that could affect progress including at least the following:
  - 1. Tentative construction schedule
  - 2. Critical Work sequencing
  - 3. Designation of responsible personnel
  - 4. Procedures for processing field decisions and Change Orders
  - 5. Procedures for processing Applications for Payment
  - 6. Review of Davis Bacon and other federal requirements
  - 7. Distribution of Contract Documents
  - 8. Submittal of Shop Drawings, Product Data and Samples
  - 9. Preparation of record documents

10. Use of the premises
11. Office, work and storage, and laydown areas
12. Equipment deliveries
13. Construction safety procedures
14. Environmental health and safety procedures
15. First aid
16. Security
17. Housekeeping
18. Working hours
19. Traffic Control
20. Emergency Vehicle Access to and around work site
21. Environmental protection measures for construction site

### 1.03 PROGRESS MEETINGS:

A. During the course of the Project, the Contractor shall attend weekly progress meetings as scheduled by the Owner. The Owner, based on work progress and activities, may adjust the progress meetings to biweekly or other. The attendance of subcontractors may be required during the progress of the Work. The Contractor's delegate to the meeting shall be prepared and authorized to discuss the following items:

1. Progress of Work/Critical Work Sequencing in relation to Contract Schedule.
2. Proposed Work activities for forthcoming period.
3. Resources committed to Contract.
4. Coordination of Work with others.
5. Status of procurement of equipment and materials.
6. Status of Submittals.
7. Outstanding actions, decisions, or approvals that affect Work activities.
8. Site access and/or security issues
9. Hazards and risks
10. Housekeeping
11. Quality issues
12. Potential Claims
13. Change Orders
14. Costs, budget, and payment requests

B. The Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized and the revised schedule shall be submitted to the Engineer and Owner.

### PART 2 - PRODUCTS

Not used.



PART 3 – EXECUTION

Not used.

END OF SECTION

## SECTION 01 32 16

### CONSTRUCTION SCHEDULING

#### PART 1- GENERAL

##### 1.01 PROGRAM DESCRIPTION:

- A. A Critical Path Method (CPM) construction schedule shall be used to control the work of this Contract and to provide a definitive basis for determining job progress. The Contractor shall prepare the construction schedule. All work shall be done in accordance with the established CPM schedule and the Contractor and his subcontractors shall be responsible for cooperating fully with the Engineer and the Owner in effectively utilizing the CPM schedule.
- B. The CPM schedule to be prepared and submitted by the Contractor shall consist of a CPM network (diagram of activities) and a computer-generated schedule (print-out) as specified herein. The format shall be the activity-on-node precedence network.
- C. The Contractor shall develop his own outline of the work and prepare his proposed CPM schedule. The computer-based schedule shall be the product of a recognized commercial computer software producer and shall meet all of the requirements defined herein.

##### 1.02 QUALIFICATIONS:

- A. The Contractor shall have the capability of preparing and utilizing the specified CPM scheduling technique. A statement of CPM capability shall be submitted by the Contractor in writing to the Engineer within 10 days after the issuance of the Notice to Proceed to verify that either the Contractor's organization has in-house capability qualified to use the technique or that the Contractor employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the Contractor or his consultant has successfully applied the CPM scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of a computer-based CPM schedule. The submittal shall include the name of the individual on the Contractor's staff who will be responsible for the CPM schedule and for providing the required updating information.

##### 1.03 SUBMITTALS:

- A. Submit under provisions of Section 01 33 00.
- B. Within 10 days following the issuance of the Notice to Proceed, the Contractor shall submit the CPM Schedule to the Engineer for review and acceptance. The Contractor shall submit to the Engineer a preliminary network defining the planned operations during the first 60 calendar days after the issuance of the Notice to Proceed. The Contractor's general approach for the balance of the project shall be indicated. Cost of

activities expected to be completed or partially completed before submission and approval of the complete network shall be included.

#### 1.04 APPROVED CPM SCHEDULE:

- A. Following review by the Engineer, the Contractor shall incorporate the Engineer's comments into the network and submit the revised network and computer-generated schedule. This final submittal shall be delivered to the Engineer within 60 days after the issuance of the Notice to Proceed.
- B. CPM schedules, which contain activities showing negative, float or which extend beyond the contract completion date in the computer-generated schedule will not be approved.
- C. The approved network shall then be the approved CPM schedule to be used by the Contractor for planning, organizing and directing the work, and reporting progress.
- D. Approval of the CPM activity network by the Engineer is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work within the contract completion date. Omissions and errors in the approved CPM schedule shall not excuse performance less than that required by the Contract. Approval by the Engineer in no way makes the Engineer an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Engineer, of the CPM schedule.
- E. The CPM activity network shall be submitted on sheets 24-in by 36-in and may be divided into as many separate sheets as required. An electronic file in PDF format shall be submitted concurrent with the hard copy schedule.

### PART 2 – PRODUCTS

NOT USED

### PART 3 – EXECUTION

#### 3.01 NETWORK REQUIREMENTS:

- A. The network shall show the order and inter-dependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The **basic concept of a network analysis diagram** shall be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.
- B. Detailed network activities shall include: construction activities, the submittal and approval of shop drawings, the procurement of materials and equipment, fabrication of

materials and equipment and their delivery, installation and testing, start-up and training. The Contractor shall break the work into activities with durations no longer than twenty working days each, except as to non-construction activities (such as procurement of materials and delivery of equipment) and any other activities for which the Engineer may approve the showing of longer duration. To the extent feasible, **activities related** to a specific physical area of the work should be grouped on the network for ease of understanding and simplification.

- C. Separate activities shall be provided for each significant identifiable function in each trade area in each facility. Activities shall be so identified that there will be no reasonable doubt as to how much work remains on each. Specific activities which shall be included are: all subcontract work, all interface work between subcontractors and between the Contractor and subcontractors, leakage tests of pipelines, electrical connections to each item of equipment, supplier and manufacturer technical assistance, mechanical connections to each item of equipment, all tests, concrete finishing, each item of site work, (including restraints on other activities) and all utilities, fuels and chemicals.
- D. Each activity on the network shall have the following indicated on the NODE representing it.
  - 1. A single duration (i.e., the single best estimate of elapsed time considering the scope of the work involved in the activity and the resources planned for accomplishing the activity) expressed in working days.
  - 2. A five character (or less) code indicative of the party responsible for accomplishing the activity.
  - 3. A cost estimate for each activity which, when accumulated with the cost of all activities, equals the total contract cost. Estimated overhead and profit shall be prorated throughout all activities. Materials costs shall be assigned to delivery activities.
  - 4. A brief description of the activity.
- E. The selection and number of activities shall be subject to the Engineer's approval. The detailed network need not be time scaled but shall be drafted to show a continuous flow from left to right with no flow from right to left. In addition to the brief description, the Contractor shall submit a separate list of all activities containing a detailed narrative of the scope of each activity, including the trades, subcontractors involved, and number of man-hours estimated.
- F. To the extent that the network or any revision thereof shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been approved by the Engineer. Failure to include on a network any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, notwithstanding the review of the network by the Engineer.

- G. Except where earlier completions are specified, CPM schedules, which show completion of all work prior to the contract completion date, may be approved by the Engineer but in no event shall they be acceptable as a basis for claim for delay against the Owner by the Contractor.

3.02 COMPUTER-GENERATED SCHEDULE REQUIREMENTS:

- A. Each computer-generated schedule submittal from the CPM activity network shall include the following tabulations: a list of activities in numerical order, a list of activity precedence's, a schedule sequenced by Early Start Date and a schedule sequenced by Total Float. Each schedule shall include the following minimum items:

1. Activity numbers
2. Estimated duration
3. Activity description
4. Early start date (calendar dated)
5. Early finish date (calendar dated)
6. Latest allowable start date (calendar dated)
7. Latest allowable finish date (calendar dated)
8. Status (whether critical)
9. Estimated cost of the activity
10. Total float and free float

- B. In addition, each schedule shall be prefaced with the following summary data:

1. Contract name and number
2. Contractor's Name
3. Contract duration
4. Contract schedule
5. The effective or starting date of the schedule.

- C. The workday to calendar date correlation shall be based on an 8-hour day and 40-hour week with adequate allowance for holidays, adverse weather and all other special requirements of the work.

3.03 PROGRESS REPORTING:

- A. Progress under the approved CPM schedule shall be evaluated monthly by the Contractor. Not less than seven days prior to each monthly progress meeting, The Contractor shall evaluate the status of each activity on which work has started or is due to start, based on the preceding CPM schedule; to show actual progress, to identify those activities started and those completed during the previous period, to show the estimated time required to complete or the percent complete of each activity started but not yet completed and to reflect any changes indicated for the network. Activities shall not be considered complete until they are, in fact, 100 percent complete.
- B. At each progress meeting the Contractor shall submit a narrative report based on the CPM schedule evaluation described above, in a format agreed upon by the Contractor and the Engineer. The report shall include a description of the progress during the previous period in terms of completed activities, an explanation of each activity which is showing a delay, a description of problem areas, current and anticipated delaying factors and their estimated impact on performance of other activities and completion dates and an explanation of corrective action taken or proposed. This report, as well as the CPM Status Report, will be discussed at each progress meeting.

3.04 RESPONSIBILITY FOR SCHEDULE COMPLIANCE:

- A. Whenever it becomes apparent from the current CPM schedule and narrative report that delays to the critical path have resulted and the contract completion date will not be met, the Contractor shall take some or all of the following actions at no additional cost to the Owner. He shall submit to the Engineer for approval, a written statement of the steps he intends to take to remove or arrest the delay to the critical path in the approved schedule.

3.05 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME:

- A. If the Contractor desires to make changes in his method of operating which affect the approved CPM schedule, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer approves these changes, the Contractor shall revise and submit for approval, without additional cost to the Owner, all of the affected portions of the CPM network. The Contractor shall adjust the CPM schedule only after prior approval of his proposed changes by the Engineer.
- B. If the completion of any activity, whether or not critical, falls more than 100 percent behind its approved duration, the Contractor shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.

- C. Shop drawings which are not approved on the first submittal or within the schedule time and equipment which do not pass the specified tests shall be immediately rescheduled.
- D. The contract time will be adjusted only for causes specified in this Contract. In the event the Contractor requests an extension of any contract completion date, he shall furnish such justification and supporting evidence as the Engineer may deem necessary to determine whether the Contractor is entitled to an extension of time under the provisions of this Contract. The Engineer will, after receipt of such justification and supporting evidence, make findings of fact and will advise the Contractor in writing thereof. If the Engineer finds that the Contractor is entitled to any extension of any contract completion date, the Engineer's determination as to the total number of day's extension shall be based upon the currently approved CPM schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule. Actual delays in activities, which, according to the CPM schedule, do not affect any contract completion date shown by the critical path in the network, will not be the basis for a change therein.
- E. Each request for change in any contract completion date shall be submitted by the Contractor to the Engineer within 30 days after the beginning of the delay for which a time extension is requested but before the date of final payment under this Contract. No time extension will be granted for requests, which are not submitted within the foregoing time limit.

### 3.06 COORDINATING SCHEDULES WITH OTHER CONTRACT SCHEDULES:

- A. Where work is to be performed under this Contract concurrently with or contingent upon work performed on the same facilities or area under other contracts, the Contractor's CPM Schedule shall be coordinated with the schedules of the other contracts. The Contractor shall obtain the schedules of the other appropriate contracts from the Owner for the preparation and updating of his CPM schedule and shall make the required changes in his schedule when indicated by changes in corresponding schedules.
- B. In case of interference between the operations of different contractors, the Owner will determine the work priority of each Contractor and the sequence of work necessary to expedite the completion of the entire project. In all such cases, the decision of the Owner shall be accepted as final. The temporary delay of the Contractor's work due to such circumstances shall not be considered as justification for claims for additional compensation.

END OF SECTION

## SECTION 01 32 33

### CONSTRUCTION PHOTOGRAPHS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This section covers construction progress photographs to be furnished by the Contractor on the project.
- B. Construction photographs shall be provided by a commercial photographer acceptable to the Engineer.

#### PART 2 - PRODUCTS

##### 2.01 PHOTOGRAPHS AND PRINTS:

- A. Digital photographs shall be in .gif, .jpeg, .bmp or .tif format.
- B. Prints, if requested, shall be 8 x 10 full color on single weight, white base, and glossy paper, mounted with binder tabs.
- C. Photographs shall be taken using a digital camera before groundbreaking, monthly throughout the Work, and on final acceptance of the project.
- D. Multiple views shall taken **once per week**. The Engineer shall approve selection of views.

#### PART 3 - EXECUTION

##### 3.01 COMPUTER FILES:

- A. Photos to be turned over to the Engineer and shall be retained by the Engineer for future reference during the project.





## SECTION 01 33 23

### SUBMITTALS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

##### 1.02 RELATED WORK:

- A. Divisions 1 – 48 of these specifications that require submittals.

#### PART 2 - PRODUCTS

NOT USED

#### PART 3 - EXECUTION

##### 3.01 GENERAL:

- A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.
- B. The Contractor shall submit the shop and working drawing submittals either electronically or hard copy.

##### 3.02 ELECTRONIC SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email to [kunkelb@wseinc.com@wseinc.com](mailto:kunkelb@wseinc.com@wseinc.com), one electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.
- C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.

### 3.03 HARD COPY SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer, by mail (to Weston & Sampson Engineers, attention: CSD), six (6) copies each of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

### 3.04 SHOP AND WORKING DRAWINGS:

- A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.
- B. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from its subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.
- C. Only drawings that have been prepared, checked and corrected by the fabricator should be submitted to the Contractor by its subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on

the shop drawings must be identified on the drawings and in a separate submittal to the Engineer, as required in this section of the specifications and General Conditions.

- D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.
- E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating its work with that of all other trades; and performing its work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.
- F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.
- G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.
- H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when it needs more than two copies or when so requested.

### 3.05 SAMPLES:

- A. Samples specified in individual Sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products,

color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

- B. The number of samples submitted shall be as specified. Submittal and processing of samples shall follow the procedures outlined for shop and working drawings unless the specifications call for a field submittal or mock-up.
- C. Acceptance of samples will be acknowledged via a copy of the transmittal noting status. When samples are not acceptable, prompt resubmittal will be required.

### 3.06 OPERATING AND MAINTENANCE MANUALS AND SPARE PARTS LISTS:

- A. Where reference is made in technical specification sections to operating and maintenance manuals and/or spare parts lists, the Contractor shall submit four copies to the Engineer for review in accordance with the instructions furnished under "Shop and Working Drawings." If the submittal is complete and does not require any changes, an acknowledgement (copy of transmittal) will be returned noting status. If the submittal is incomplete or does require changes, corrections, additions, etc., two copies of the submittal will be returned with a copy of transmittal noting status. Four copies of the final operating and maintenance manuals and/or spare parts list shall be delivered to the Engineer prior to or with the equipment when it is delivered to the job site. For systems requiring field adjustment and balancing, such as heating and ventilating, the Contractor shall submit separate test results and adjustment data on completion of the work, to be incorporated into the system manual.
- B. The information included in the manual shall be as described in the specification sections, but as a minimum shall contain clear and concise instructions for operating, adjusting, lubricating and maintaining the equipment, an exploded assembly drawing identifying each part by number and a listing of all parts of the equipment, with part numbers and descriptions required for ordering spare parts. Spare parts lists shall include recommended quantity and price.
- C. Operating and maintenance manuals shall be in durable loose-leaf binders, on 8½-inch by 11-inch paper, with diagrams and illustrations either on 8½-inch by 11 inch or multiple foldouts. The instructions shall be annotated to indicate only the specific equipment furnished. Reference to other sizes or models of similar requirement shall be deleted or neatly lined out.

END OF SECTION

## SECTION 01 35 29

### HEALTH AND SAFETY PLAN

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. Prior to the start of work on the site, Contractor shall prepare and submit a site-specific health and safety plan that includes consideration of all known and potential hazards at the site. Work may not proceed at the project site until the Contractor's health and safety plan has been received and reviewed by the Engineer.

##### 1.02 REFERENCES:

- A. OSHA 29 CFR 1910.120

##### 1.03 RELATED WORK:

- A. Section 02 61 00, HANDLING AND DISPOSAL OF EXCAVATED MATERIALS

#### PART 2 – PRODUCTS

##### 2.01 HEALTH AND SAFETY PLAN:

- A. The health and safety plan shall include, but not necessarily be limited to the following:

1. Identification of Contractor's Site Safety Officer.
2. Identification of Hazards and Risks Associated with Project.
3. Contractor's Standard Operating Procedures, Including Personnel Training and Field Orientation.
4. Respiratory Protection Training Requirements.
5. Levels of Protection and Selection of Equipment Procedures.
6. Type of Medical Surveillance Program.
7. Personal Hygiene Requirements and Guidelines.
8. Zone Delineation of the Project Site.
9. Site Security and Entry Control Procedures.

10. Field Monitoring of Site Contaminants.
11. Contingency and Emergency Procedures.
12. Listing of Emergency Contacts.

### PART 3 - EXECUTION

#### 3.01 PERSONAL PROTECTIVE EQUIPMENT:

- A. The personal protective equipment shall be provided based on the chemical and physical hazards to be encountered during the work. The Contractor shall determine the level of protection based on applicable state and federal standards and requirements set forth in the Contractor's health and safety plan. Modified Level D protection shall be the minimum requirement for all on-site personnel.

END OF SECTION

SECTION 01 45 16.13

CONTRACTOR QUALITY CONTROL

PART 1 - GENERAL

1.01 GENERAL PROVISIONS:

Attention is directed to the General Conditions of the Contract, all Divisions of the Specifications and the Drawings, all of which apply to this section.

1.02. WORK INCLUDED:

- A. The scope of the work under this Specification section, without limiting the generality thereof, includes the furnishing of all labor, materials, equipment, services, and incidentals necessary to complete all of the work in accordance with the Contract Documents, which are intended to describe and provide for a finished piece of work.
- B. The work includes the following, without limiting the generality thereof:
  - 1. The making available to the Owner's testing laboratory any samples or specimens which the laboratory may require to perform quality control testing on concrete, fill materials, or other material as the Owner may elect.
  - 2. The coordinating and scheduling of work and the giving of timely notice to afford the Owner's testing laboratory the opportunity to take samples and make observations or tests.
  - 3. Provide safe access to the site or area for the **Landscape Architect/Engineer** to collect data, samples, and the like.

1.03. TESTING LABORATORY:

- A. The Owner will select, engage, and pay for the services of an independent testing laboratory to perform structural tests on concrete, soil testing, compaction testing and such other materials as the **Landscape Architect/Engineer** may deem appropriate.
- B. Retesting of materials which fail the original test shall be paid for by the Contractor.



PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

## SECTION 01 45 23

### STRUCTURAL TESTS AND INSPECTIONS

#### PART 1 -GENERAL

##### 1.01 WORK INCLUDED:

- A. Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Obtaining, coordinating, and providing notifications to the Owner and Engineer.
  - 2. Provide safe access to the work of this Contract to accommodate the indicated tests and inspections.
  - 3. Implementing corrective action and providing additional tests and/or inspections for work identified as non-conforming by the Independent Testing Agency.

##### 1.02 GENERAL REQUIREMENTS:

- A. The New Hampshire State Code, Latest Edition, requires the Structural Engineer of Record (SER) to provide a program of structural tests and inspections for this project.
- B. Attachment A, Program of Structural Tests and Inspections, shall not relieve the Contractor or its subcontractors of their responsibilities and obligations for quality control of the Work; their other obligations for supervising the Work; for any design work which is included in their scope of services; for full compliance with the requirements of the Contract Documents; the detection of, or failure to detect, deficiencies or defects, whether detected or undetected, in all parts of the Work, and to otherwise comply with all requirements of the Contract Documents.
- C. The Program of Structural Tests and Inspection does not apply to the Contractor's equipment, temporary structures used by the Contractor to construct the project, the Contractor's means, methods, procedures, and job site safety.

##### 1.03 CONTRACTOR RESPONSIBILITIES:

- A. The Contractor shall provide free and safe access to the Work for the SER and all other individuals who are observing the Work or performing structural tests or inspections. The Contractor shall provide all ladders, scaffolding, staging, and

up-to-date safety equipment, all in good and safe working order, and qualified personnel to handle and erect them, as may be required for safe access.

- B. The Contractor shall give reasonable notice to the Owner and the Engineer of when the various parts of the Work will be ready for testing and/or inspection. The Contractor shall notify the Owner and the Engineer a minimum of 48 hours before such tests and/or inspections are to take place.

## PART 2 - PRODUCTS

NOT USED.

## PART 3 - EXECUTION

NOT USED.

## ATTACHMENT A

### PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS

The following is a summary of Work subject to Tests and Inspections under the Program.

1. In-situ Bearing Strata for Footings
2. Controlled Structural Fill
3. Cast-In-Place Concrete

Agent

Abbreviation

SER                      Structural Engineer of Record  
ITA                        Contractor – Independent Testing Agency

#### **In-Situ Bearing Strata for Footings**

Item	Agent	Scope
1. Bearing Strata QC Review	ITA	Review Contractor's field quality control procedures.
2. General Excavation	ITA	Inspect strata for conformance to the structural drawings, specifications, and/or geotechnical report.
3. General Excavation	ITA	Ensure that excavation is to proper depth or material.
4. General Excavation	ITA	Ensure that excavation is controlled and contains no unsuitable materials.
5. Bearing surfaces for footings	ITA	Inspect bearing surfaces for conformance to the requirements of the structural drawings, specifications, and/or geotechnical report.

## Controlled Structural Fill

Item	Agent	Scope
1. Controlled Structural Fill QC Review	SER	Review Contractor's field quality control procedures
2. Fill Material	ITA	Test material for conformance to specifications or geotechnical report. Perform laboratory compaction tests in accordance with the specifications to determine optimum water content and maximum dry density.
3. Installation of controlled structural fill	ITA	Provide full-time inspection of the installation, in accordance with the specifications.
4. Density of Fill	ITA	Perform field density tests of the in-place fill in accordance with the specifications.

## Cast-In-Place Concrete Construction

Item	Agent	Scope
1. Cast-In-Place Concrete Construction QC Review	SER	Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections.
2. Mix Design	SER	Review Mix Designs
3. Materials	SER	Review material certifications for conformance to Specifications
4. Batching Plant	ITA	Review Plant quality control procedures and batching and mixing methods
5. Reinforcement Installation	ITA	Inspect reinforcing for size, quantity, condition and placement
6. Anchor Rods	ITA	Inspect anchor rods prior to and during placement of concrete.
6. Formwork	ITA	Inspect form sizes for proper sizes of concrete members.
7. Concrete Placement and Sampling fresh Concrete	ITA	Observe concrete placement operations. Verify conformance to specifications including cold-weather and hot-weather placement procedures. Perform slump, density and air content tests at point of discharge.
8. Evaluation of Concrete	ITA	Test and evaluate in accordance with the specifications.
9. Curing and Protection	ITA	Observe procedures for conformance to the specifications.

END OF SECTION

## SECTION 01 56 39

### TREE PROTECTION AND TRIMMING

#### PART 1 – GENERAL

##### 1.01 WORK INCLUDED:

- A. This section includes the protection and trimming of trees that are to remain but interfere with, or are affected by, execution of the Work, whether temporary or new construction.

##### 1.02 RELATED WORK:

- A. SECTION 31 00 00 EARTHWORK
- B. SECTION 31 11 00 CLEARING AND GRUBBING
- C. SECTION 31 23 00 EXCAVATION, BORROW AND BACKFILL
- D. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL
- E. SECTION 32 91 13 SOIL PREPARATION AND SOIL MIXES
- F. SECTION 32 91 19 LOAMING AND SEEDING

##### 1.03 QUALITY ASSURANCE:

- A. Tree Pruning Standards: Comply with the National Arborist Association's "Pruning Standards for Shade Trees" except where more stringent requirements are indicated.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS:

- A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D448, size 24, with 90 to 100 percent passing a 2-½-inch (63-mm) sieve and not more than 10 percent passing a ¾-inch (19-mm) sieve.
- B. Topsoil: As per Specification Section 32 91 13: Soil Preparation and Soil Mixes.
- C. Filter Fabric: Manufacturer's standard, non-woven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

## PART 3 - EXECUTION

### 3.01 PREPARATION:

- A. Temporary Protection: Provide temporary fencing, barricades, or other suitable guards located outside the drip line (outer perimeter of branches) to protect remaining trees and other plants from damage.
- B. Protect tree root systems from damage due to noxious materials caused by run-off or spillage while mixing, placing, or storing construction materials. Protect root systems from flooding, eroding, or excessive wetting caused by dewatering operations.
- C. Do not store construction materials, debris, or excavated material within the drip line of remaining trees. Do not permit vehicles or foot traffic within the drip line and prevent soil compaction over root systems.
- D. Do not allow fires.

### 3.02 EXCAVATION:

- A. Install shoring or other protecting support systems to minimize sloping or benching of excavations.
- B. Do not excavate within tree drip line, unless otherwise indicated.
- C. Where excavation for new construction is required within tree drip lines, hand excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
  - 1. Relocate roots in backfill areas wherever possible. If encountering large, main lateral roots, expose beyond excavation limits as required to bend and relocate without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3-inches (75 mm) back from new construction.
  - 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition and temporarily support and protect roots from damage until they are permanently relocated and covered with earth.
- D. Where utilities trenches are required within tree drip lines, tunnel under or around the roots by drilling, auger boring, pipe jacking, or digging by hand.

- 1. Root Pruning: Do not cut main lateral roots to tap roots; cut only smaller roots that interfere with installation of new work. Cut roots with sharp



pruning instruments; do not break or chop.

### 3.03 REGRADING:

- A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade beyond tree drip line. Maintain existing grades within tree drip lines.
  - 1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots to tap roots; cut only smaller roots. Cut roots cleanly with sharp pruning instruments; do not break or chop.
- B. Minor Fill: Where existing grade is 6-inches (150 mm) or less below elevation of finish grade shown, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- C. Moderate Fill: Where existing grade is more than 6-inches (150 mm) but less than 12-inches (300 mm) below finish grade elevation, place a layer of drainage fill, filter fabric, and a final layer of topsoil on existing grade.
  - 1. Carefully place drainage fill against tree trunk approximately 2-inches (50 mm) above finish grade elevation and extend not less than 18-inches (450 mm) from tree trunk on all sides. For balance of area within drip line perimeter, place drainage fill to an elevation 6-inches (150 mm) below grade.
  - 2. Place filter fabric with overlapping edges of 6-inches (150 mm) minimum.
  - 3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

### 3.04 TREE PRUNING:

- A. If required, prune remaining trees to compensate for root loss caused by damaging or cutting root system as required by the **Landscape Architect/Engineer** in accordance with accepted horticultural practices.
- B. Cut branches with sharp pruning instruments; do not break or chop.

### 3.05 TREE REPAIR AND REPLACEMENT:

- A. Promptly repair trees damaged by construction operations to prevent progressive deterioration.
  - 1. Provide new trees of size and species selected by the **Landscape Architect/Engineer** when trees over 6-inches (150 mm) in caliper, measured 12-inches (300 mm) above grade, are required to be replaced, due to abuse/damage/neglect of contractor.

3.06 DISPOSAL OF WASTE MATERIALS:

- A. Burning on Owner's Property: Burning is not permitted on Owner's property.
- B. Disposal: Remove excess excavated material, displaced trees, and excess chips from Owner's property.

END OF SECTION

## SECTION 01 57 13

### SILT CURTAIN

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This Section specifies furnishing, placement and removal of a silt curtain.

##### 1.02 QUALITY ASSURANCE:

- A. Sampling, testing and approval of materials shall be by the Engineer. Allow a minimum of two weeks for notification and approval of materials source.

##### 1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

Shop drawings showing complete details of manufacture and materials; include installation instructions.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS:

###### A. SILT CURTAIN:

1. The silt curtain shall be Stillwaterscreen by American Marine, Inc., Cocoa, FL, or approved equal.
2. The silt curtain shall be fabricated from 18-ounce nylon reinforced vinyl having a tensile strength of 300 lbs/foot.
3. Floatation shall be of marine quality expanded polystyrene having a net buoyancy of at least 13 lb/foot.
4. Floatation shall be enclosed by the fabric. The fabric shall not be suspended from or fastened to the floatation.
5. Bottom ballast shall be, at a minimum, 1/4-inch galvanized steel chain having a weight of 0.7 lb/foot.
6. The fabric shall enclose the chain.

7. Fabric sections shall be connected by laced grommets. The lacing and grommets shall have a strength such that the fabric will tear before the grommets pull out or the lacing breaks.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

##### A. SILT CURTAIN:

1. A silt curtain shall be constructed at the limit of work and as indicated on the plans to limit the spread of the silt off site
2. The silt curtain shall be installed to the manufacturer's recommendations at the locations shown on the drawings.
3. The silt curtain shall be left in place until such time as the Engineer deems it prudent to remove it.

END OF SECTION

## SECTION 01 57 16

### RODENT CONTROL

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This section specifies requirements for rodent control activities by the Contractor at all work and laydown (or staging) areas in connection with this Contract.
- B. The Contractor shall retain the services of a licensed rodent exterminator to conduct an inspection of the work and laydown areas and report on the presence of rodents and take any necessary measures to eliminate existing rodent populations prior to start of work.

##### 1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Within ten days after Notice to Proceed, submit to the Engineer a written description of rodent control measures to be used and the areas to be included in the program.
- B. Provide the name and background of the licensed rodent exterminator retained to provide any necessary rodent eradication measures prior to start of work.

#### PART 2 - PRODUCTS

##### 2.01 CONTAINERS:

Use metal or heavy-duty plastic refuse containers with tight-fitting lids for disposal of all garbage, or trash associated with food. These containers shall not have openings that allow access by rodents.

#### PART 3 - EXECUTION

##### 3.01 WORK AND LAYDOWN AREAS WITHIN THE CONTRACT AREA:

- A. Before mobilization begins, obtain written verification from the rodent exterminator that rodent populations have been effectively controlled in areas to be occupied.
- B. Following site clearing and before demolition, excavation, or construction, inspect work and laydown areas and remove all remaining trash, debris, and weeds.

- C. Maintain work and laydown areas free of trash, garbage, weeds, and debris. Provide and enforce proper use of refuse containers to ensure that rodents and other pests are not harbored or attracted.
- D. Designate specific locations as lunch and coffee break areas to prevent random disposal of garbage and trash. Keep those areas free of litter and garbage, and provide refuse containers as described in 2.01 of this section. Keep refuse containers upright with their lids shut tight.
- E. Have all refuse containers emptied daily to maintain site sanitation.
- F. Notify the Engineer within 24 hours whenever rodents (rats or mice) or signs of rodent activity (burrows or droppings) are observed in work or laydown areas. Take appropriate action to locate and control the rodents.

### 3.02 LAYDOWN AREAS OUTSIDE THE CONTRACT AREA:

- A. Implement pest control at all laydown areas that are not areas of this Contract, but that are used by the Contractor in connection with this Contract. Undertake rodent control at least two weeks prior to use of the area and with time to ensure that the site is free of rodent populations (rats and mice) prior to site occupancy. Maintain the site free of rodents throughout the duration of its use.
- B. Clear laydown areas of trash, debris, and weeds prior to occupancy. Initiate those actions only after rodent populations have been effectively controlled.
- C. Maintain laydown areas free of trash, garbage, weeds, and debris. Provide and enforce proper use of refuse containers to ensure that rodents and other pests are not harbored or attracted.
- D. Dispose of all garbage or trash associated with food in refuse containers with tight-fitting lids as described in 2.01 of this Section. Have refuse containers emptied daily to maintain site sanitation.

END OF SECTION

## SECTION 01 57 19

### ENVIRONMENTAL PROTECTION

#### PART 1 – GENERAL

##### 1.01 DESCRIPTION:

- A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.
- B. The requirements set forth in this section of the specifications apply to cross-country areas, river and stream crossings, and construction in and adjacent to wetlands, unless otherwise specifically stated.
- C. All work under this Contract shall be in accordance with the Conservation Commissions' Orders of Conditions as well as any conditional requirements applied, all of which are attached to Section 00 31 43, PERMITS.
- D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

##### 1.02 RELATED WORK:

- A. Section 00 31 43, PERMITS
- B. Section 01 14 19.16, DUST CONTROL
- C. Section 01 33 23, SUBMITTALS
- D. Section 31 00 00, EARTHWORK
- E. Section 31 05 13.33, BENTONITE DAMS
- F. Section 31 11 00, CLEARING AND GRUBBING
- G. Section 31 23 19, DEWATERING
- H. Section 31 50 00, SUPPORT OF EXCAVATION
- I. Section 32 92 00, SURFACE RESTORATION OF CROSS COUNTRY AREAS

##### 1.03 SUBMITTALS:

Portsmouth New Hampshire Skatepark

Environmental Protection  
Section No. 01 57 19-1

- A. The Contractor shall submit details and literature fully describing environmental protection methods to be employed in carrying out construction activities within 100 feet of wetlands or across areas designated as wetlands.

**PART 2 - PRODUCTS**

**2.01 SILT FENCE:**

- A. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to a mesh backing, and stapled to preweathered oak posts installed as shown on the drawings. The oak posts shall be 1-1/4-inches by 1-1/4-inches (Minimum Dimension) by 48-inches and shall be tapered. The bottom edge of the silt fence shall be buried as shown on the drawings.
- B. The silt fence shall be DOT Silt Fence PPDM3611, as manufactured by U.S. Silt & Site Supply/Getsco, Concord, NH, or approved equal.
- C. Silt fence properties:

<b><u>Physical Properties</u></b>	<b><u>Test Method</u></b>	<b><u>Minimum Value</u></b>
Grab Strength, lbs.	ASTM-D-4632	124
Grab Elongation, %	ASTM-D-4632	15
Mullen burst, psi	ASTM-D-3786	300
Puncture, lbs.	ASTM-D-4833	65
Trapezoidal Tear, lbs.	ASTM-D-4533	65
UV Resistance <sup>2</sup> , % <sup>3</sup>	ASTM-D-4355	80@500 hrs.
AOS, US Sieve No.	ASTM-D-4751	30
Flow Rate, gal/min/sq ft	ASTM-D-4491	10
Permittivity,(1/sec)gal/min/sq ft	ASTM-D-4491	0.05 sec <sup>-1</sup>

**2.02 STRAW BALES:**

- A. Straw bales shall consist of certified seed free stems of agricultural grain and cereal crops and shall be free of grasses and legumes. Standard bales shall be 14-inches high, 18- inches wide and 36- to 40-inches long tied with polypropylene twine and weigh within 5 percent of 7 lbs. per cubic ft.

**2.03 STRAW WATTLES:**

- A. Straw Wattles shall consist of a 100% biodegradable exterior jute or coir netting with 100% wheat straw interior filling as manufactured by GEI Works, Sebastian, Florida (Phone: 772-646-0597; website: [www.erosionpollution.com](http://www.erosionpollution.com)), or approved equal.



#### 2.04 SILT CURTAIN:

- A. The silt curtain shall be a Type-1-Silt-Barrier consisting of 18-ounce vinyl fabric skirt with a 6-inch marine quality floatation device. The skirt shall be ballasted to hang vertical in the water column by a minimum 3/16-inch galvanized chain. The silt curtain shall extend into the water as shown on the drawings. If necessary, join adjacent ends of the silt curtain by connecting the reinforcing grommets and shackling ballast lines.

#### 2.05 CATCH BASIN PROTECTION:

- A. To trap sediment and to prevent sediment from clogging drainage systems, catch basin protection in the form of a siltation sack (Siltsack as manufactured by ACF Environmental, Inc. or approved equal) shall be provided as approved by the Engineer.

### PART 3- EXECUTION

#### 3.01 NOTIFICATION AND STOPPAGE OF WORK:

- A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of the Order of Conditions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was in compliance.

#### 3.02 AREA OF CONSTRUCTION ACTIVITY:

- A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

#### 3.03 PROTECTION OF WATER RESOURCES:

- A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's

responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.

- B. Special measures should be taken to insure against spillage of any pollutants into public waters.

#### 3.04 CONSTRUCTION IN AREAS DESIGNATED AS WETLANDS ON THE DRAWINGS:

- A. Insofar as possible, the Contractor shall make every effort to minimize disturbance within areas designated as wetlands or within 100-feet of wetland resource areas. Total easement widths shall be limited to the widths shown.
- B. The Contractor shall perform his work in such a way that these areas are left in the condition existing prior to construction.
- C. The elevations of areas designated as wetlands shall not be unduly disturbed by the Contractor's operations outside of the trench limits. If such disturbance does occur, the Contractor shall take all measures necessary to return these areas to the elevations which existed prior to construction.
- D. In areas designated as wetlands, the Contractor shall carefully remove and stockpile the top 24 inches of soil. This topsoil material shall be used as backfill for the trench excavation top layer. The elevation of the trench shall be restored to the preconstruction elevations wherever disturbed by the Contractor's operation.
- E. The Contractor shall use a trench box, sheeting or bracing to support the excavation in areas designated as wetlands.
- F. Excavated materials shall not be permanently placed or temporarily stored in areas designated as wetlands. Temporary storage areas for excavated material shall be as required by the Engineer.
- G. The use of a temporary gravel roadway to construct the pipeline in the wetlands area is not acceptable. The Contractor will be required to utilize timber or rubber matting to support his equipment in these areas. The timber or rubber matting shall be constructed in such a way that it is capable of supporting all equipment necessary to install the pipeline. The timber or rubber matting shall be constructed of materials and placed in such a way that when removed the material below the matting will not be unduly disturbed, mixed or compacted so as to adversely affect recovery of the existing plant life.
- H. Bentonite dams shall be placed in wetlands to prevent drainage. Locations for dams are as indicated on the drawings or as required by the Engineer.

#### 3.05 PROTECTING AND MINIMIZING EXPOSED AREAS:

- A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, temporary vegetation, mulching or other protective measures shall be provided as specified.
- B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to insure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Engineer.

### 3.06 LOCATION OF STORAGE AREAS:

- A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project, and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.
- B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of baled **hay or straw** around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.
- C. There shall be no storage of equipment or materials in areas designated as wetlands.
- D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.
- E. Storage areas in cross-country locations shall be restored to pre-construction conditions with the planting of native species of trees and shrubs.

### 3.07 PROTECTION OF LANDSCAPE:

- A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.
- B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.

- C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of under the provisions of Section 31 11 00, CLEARING AND GRUBBING.
- D. Cultivated hedges, shrubs, and plants which could be injured by the Contractor's operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

### 3.08 CLEARING AND GRUBBING:

- A. The Contractor shall clear and grub only on the Owner's land or the Owner's easements, and only the area required for construction operations, as approved by the Engineer. Removal of mature trees (4-inches or greater DBH) will not be allowed on temporary easements.
- B. The Contractor shall not remove trees in the Owner's temporary easements without permission of the Engineer.

### 3.09 DISCHARGE OF DEWATERING OPERATIONS:

- A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.
- B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands. When constructing in a wetlands area, the Contractor shall discharge water from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.
- C. The pumped water shall be filtered through filter fabric and baled hay, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

### 3.10 DUST CONTROL:

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed. Calcium chloride shall be as specified under Section 01 14 19.16, DUST CONTROL.
- B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

### 3.11 SEPARATION AND REPLACEMENT OF TOPSOIL:

- A. Topsoil shall be carefully removed from cross-country areas where excavations are to be made, and separately stored to be used again as required. The topsoil shall be stored in an area acceptable to the Engineer and adequate measures shall be employed to prevent erosion of said material.

### 3.12 BALED HAY OR STRAW:

- A. To trap sediment and to prevent sediment from clogging drainage systems, baled **hay or straw** shall be used where shown on the drawings. Care shall be taken to keep the bales from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically. **Hay** bales shall not be placed within a waterway during construction of the pipeline crossing.

### 3.13 ERECTION AND MAINTENANCE OF SILT FENCE:

- A. Where indicated on the drawings or where required by the Engineer, the Contractor shall erect and maintain a temporary silt fence. In areas designated as wetlands, the Contractor shall line the limits of the construction easement with a silt fence. The silt fence shall be used specifically to contain sediment from runoff water and to minimize environmental damage caused by construction.

### 3.14 SURFACE RESTORATION OF CROSS COUNTRY AREAS:

- A. Plantings detailed in Section 32 92 00 shall be conducted when construction of the pipeline has been completed within the areas designated. A one-year guarantee of maintenance will be required on these plantings to ensure that they establish in the area.

### 3.15 CATCH BASIN PROTECTION:

- A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation sack shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation sack from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The Contractor shall properly dispose of all debris at no additional cost to the Owner.
- B. All catch basin protection shall be removed by the Contractor after construction is complete.

### 3.16 STRAW WATTLES:

- A. The wattles will be placed in a shallow trench (2-3 inches deep) and staked in the ground using wooden stakes driven at 4-foot intervals. The wooden stakes will be placed at a minimum depth of 24-inches into the ground.
- B. The wattles shall be regularly inspected and before and after every forecasted major weather event. All deposited sediment shall be removed and not allowed to accumulate to the top of the wattles. Wattles damaged during construction shall be repaired or replaced as required by the Engineer at no additional cost to the Owner.
- C. The Contractor shall remove all wattles after construction is completed.

END OF SECTION

## SECTION 01 74 13

### CLEANING UP

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of its work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

##### 1.02 RELATED WORK:

- A. Section 00 72 00 GENERAL CONDITIONS
- B. Section 01 11 00 CONTROL OF WORK AND MATERIALS
- C. Section 01 14 00 SPECIAL PROVISIONS
- D. Section 01 57 19 ENVIRONMENTAL PROTECTION

#### PART 2 - PRODUCTS

Not applicable

#### PART 3 - EXECUTION

##### 3.01 DAILY CLEANUP:

- A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.
- B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.
- C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

##### 3.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

- A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

3.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

- A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures it built; shall remove all temporary works, tools and machinery or other construction equipment it furnished; shall remove all rubbish from any grounds which it has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by its operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

- A. The Contractor shall restore or replace, when and as required, any property damaged by its work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

3.05 FINAL CLEANUP:

- A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION



SECTION 01 78 00

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers administrative and procedural requirements for closing out the project, including, but not limited to:
  - 1. Project as-built documents
  - 4. Final Cleaning
  - 3. Substantial Completion
  - 4. Closeout Procedures
  - 5. Final Completion
  - 6. Correction/Warranty Period
- B. Closeout checklist to be completed by the Engineer.

1.02 RELATED WORK:

- A. General Requirements in their entirety.
- B. Section 01 74 13, CLEANING UP
- C. Section 01 78 39, PROJECT AS-BUILT RECORD DRAWINGS
- D. Division 2 through Division 16.

1.03 AS-BUILT DOCUMENTS:

- A. Contractor shall maintain on site, separate from the documents used for construction, one set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.
  - 1. Contract Drawings.
  - 2. Specifications.

3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Written interpretations and clarifications.
7. Field Orders.
8. Field test reports properly verified.

B. The completed set of as-built documents shall be submitted to the Engineer with the final Application for Payment.

C. The draft and completed set of as-built documents shall be submitted to the Engineer and Owner in conformance with the requirements of Section 01 78 39.

#### 1.06 FINAL CLEANING:

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Clean the site, including landscape development areas of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to smooth, even textured surfaces.
2. Remove waste and surplus materials, rubbish, fencing equipment, temporary utilities and construction facilities from the site, unless otherwise required by the Engineer.
3. Comply with requirements of Section 01 74 13 CLEANING UP.

#### 1.07 SUBSTANTIAL COMPLETION:

A. Substantial Completion is officially defined in the General and Supplementary Conditions. The date of substantial completion will be certified by the Engineer. This date will not be certified until the following requirements have been satisfied by the Contractor:

1. All Contract requirements are coordinated into a fully operational system. All individual units of equipment and treatment are fully operative and performing at specified efficiencies. Where efficiencies are not specified, performance shall meet acceptable standards for the particular unit.

2. All field tests have been satisfactorily completed and reports forwarded to the Engineer.
3. All final training has been completed by the manufacturers' representatives.
4. All spare parts and lubricants have been satisfactorily delivered to the Owner. Spare parts are for the exclusive use of the Owner when the facility has been turned over. Contractor is responsible for all maintenance and repair materials required until the facility is accepted by the Owner.

#### 1.08 CLOSEOUT PROCEDURES:

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's and Owner's inspection.
- B. Accompany Engineer and Owner on inspection to verify conformance with the Contract Documents. Prepare a punch list of work items that have been determined by inspection to not conform to Contract Documents. Punch list items shall include work items that are missing, incomplete, damaged, incorrect items, or improperly installed or constructed. The Contractor shall correct the punch list deficiencies by re-work, modifications, or replacement, as appropriate, until the items conform to the Contract Documents. The initial punch list shall be produced by the Contractor, with copies to the Engineer and Owner. When the Contractor has reduced the number of deficient items to a reasonable level, the Engineer will develop a definitive punch list for the use of the Contractor.
- C. Provide submittals to Engineer that are required by governing or other authorities.
- D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. The Contractor shall submit the following documents with or prior to Final Application for Payment: Set of as-built documents, Contract Completion and Acceptance Certificate, Consent of Surety to Final Payment, Release and Waiver of Liens and Claims (SECTION 01 78 00 – ATT. A), Affidavit of Payment of Debts and Claims, and remaining releases, waivers, warranties/guarantees, and all other data required by the Contract Documents.

#### 1.09 FINAL COMPLETION:

- A. Prior to final completion, the following tasks shall be completed:
  1. All items in the punch list shall be completed.

2. All Contract closeout documentation shall be submitted to and accepted by the Engineer.

1.10 CORRECTION/WARRANTY PERIOD:

- A. During the correction period, the Contractor shall correct all deficiencies in equipment and materials.
- B. During the warranty period, the Contractor shall perform all corrective work on warranty deficiencies.
- C. Corrective work will be identified by the Engineer or Owner, as appropriate. The Contractor will be notified of the item(s) requiring corrective work.
- D. The Contractor shall begin work on all corrective work within ten days of being notified of the deficiency by the Engineer and shall then work continuously until the deficiency is corrected. Upon completion of the corrective work, the Contractor shall submit a letter report to the Engineer describing the deficiency and the corrective action that was taken.
- E. The Contractor shall coordinate all corrective work with the Engineer and/or the Owner.

1.11 COMPLETION CHECKLIST:

- A. The Project Completion Checklist, which follows, and shall be completed as the project nears completion. When the project has been fully completed, Final Payment can be approved.

# PROJECT COMPLETION CHECKLIST

Owner \_\_\_\_\_ Job No.

Project \_\_\_\_\_

As part of the project closeout, all items listed below must be checked off as being complete or otherwise accounted for. The person verifying completion of the item shall list the completion date and his/her initials.

<b>Project Closeout Checklist</b>		
	Date Completion Verified	Verified by
<b>AS-BUILT DOCUMENTS HANDED OVER</b>		
1. Contract Drawings		
2. Specifications		
3. Addenda		
4. Change Orders/Contract Modifications		
5. Reviewed Shop Drawings, Product Data and Samples		
6. Written Interpretations/Clarifications		
7. Field Orders		
8. Field Test Reports		
<b>EQUIPMENT CHECKOUT AND CERTIFICATIONS</b>		
1. Construction Complete per Drawings/Specifications		
2. Equipment Installed and Adjusted		
3. All Shop Drawings have Final Approval		
4. All Shop Tests Complete and Results Submitted		

<b>Project Closeout Checklist</b>		
	Date Completion Verified	Verified By
<b>FINAL CLEANING</b>		
1. All Construction Facilities Removed		
2. All Construction Debris Removed		
3. All Areas Swept/Cleared		
<b>SUBSTANTIAL COMPLETION</b>		
1. All Items Coordinated Into a Fully Operational System		
2. All Equipment Units Operational at Specified Efficiencies		
3. All Field Tests Completed and Reports Submitted		
4. All Final Training by Manufacturer's Rep. Completed		
5. All Spare Parts and Lubricants Provided		
<b>CLOSEOUT PROCEDURES</b>		
1. Written Certification Submitted that Work is Ready for Owner & Engineer Inspector		
2. Inspection by Owner, Engineer, Contractor completed		
3. Punch List of Nonconforming Items Prepared		
4. Documents Required by Governing or Other Authorities Submitted (List Them)		
5. Final Application for Payment Received		
6. Contract Completion and Acceptance Certificate Submittal		
7. Consent of Surety to Final Payment Submittal		
8. Release and Waiver of Liens and Claims Submitted		
9. Affidavit of Payment of Debts and Claims Submitted		
10. Warranties/Guarantees Submitted		
11. Other Required Releases and Waivers Submitted (List Them)		
12. Permits Submitted (List Them)		

**Project Closeout Checklist**

	Date Completion Verified	Verified By
13. Weekly Payrolls Submitted as Required by Law		
<b>FINAL COMPLETION</b>		
1. All Items in Punch List Completed		
2. All Other Required Documentation Submitted (List It)		
<b>CORRECTION/WARRANTY PERIOD</b>		
1. Correction Period Start Date: _____  End Date: _____		
2. Specific Warranties Provided  <u>Item</u> <u>Warranty Duration</u>		

Full name of persons signing their initials on this checklist:

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END OF SECTION



## SECTION 01 78 39

### PROJECT AS-BUILT RECORD DRAWINGS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

This Section covers the Contractors As-Built Record drawings for the project. The As-Built Record drawings for the project shall include, but are not limited to:

A. The Contractors construction coordination drawings for all the project disciplines. The Contractors construction coordination drawings for the project disciplines shall be submitted to the Engineer prior to Construction of the said discipline. The Contractors construction coordination drawings for the project disciplines shall include but are not limited to the following:

1. Site Civil Landscape
2. Site Civil Utilities
3. Electrical
4. Skate Park

B. Draft Record Documents Review

Upon completion of the project construction the Contractor shall submit a complete copy of 24- by 36-inch Record Drawings to the Owner and the Engineer for review. The Owner and the Engineer shall jointly review the Record Drawings and provide comments to the Contractor. The Contractor shall modify the Record Drawings as necessary based on the comments provided by the Owner and the Engineer.

C. Final Record Documents

Upon incorporation and acceptance of the Draft Record Drawings comments from the Owner and the Engineer, the Contractor shall submit the Final Record Drawings and documentation. The Contractor shall submit two sets of 24- by 36-inch Record Drawings to the Owner and an additional two sets of 24- by 36-inch Record Drawings to the Engineer for their records. The Contractor shall also submit to the Engineer a minimum 20 gigabyte flash drive with the electronic Record Drawing files. The electronic Record Drawing files shall be obtained from the Owner (the Engineer shall provide on behalf of the Owner if the Engineer was the project designer) and developed in AutoCAD 2010/Revit 2017 (or later) and the submittal shall include the Final AutoCAD DWG/Revit RVT file documents, drawing line types, blocks, etc. The actual version of AutoCAD/Revit shall be coordinated with the Engineer.

D. Pre- and Post-Construction Survey

The Contractor shall perform a pre- and post-construction survey of the entire project area. The topographic survey shall be performed by or under the supervision of and certified by a Registered Land Surveyor in the State of New Hampshire. The Contractor shall also submit to the Engineer a minimum 20 gigabyte flash drive with the electronic pre- and post-construction survey files. The Contractor shall send the electronic pre- and post-construction survey files to the Engineer which shall be developed in AutoCAD 2010/ Revit 2017 (or later) and the submittal shall include the Final AutoCAD DWG / Revit RVT file documents, drawing line types, blocks, etc. The actual version of AutoCAD / Revit shall be coordinated with the Engineer. The Contractor shall notify the Owner and Engineer at least 48-hours in advance of each survey.

1.02 RELATED WORK:

- A. General Requirements in their entirety.
- B. Division 02 through Division 48.

1.03 AS-BUILT DOCUMENTS:

- A. Contractor shall maintain on site, separate from the documents used for construction, one complete set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other Modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Written interpretations and clarifications.
  - 7. Field Orders.
  - 8. Field test reports properly verified.
- B. The completed set of documents shall include but are not limited to:
  - 1. Significant deviations of any nature made during construction.
- C. The completed set of as-built documents shall be submitted to the Engineer with the final Application for Payment.

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

## SECTION 01 92 13

### OPERATION AND MAINTENANCE MANUALS

#### PART 1 - GENERAL

##### 1.01 SCOPE OF WORK:

- A. This section includes procedural requirements for compiling and submitting operation and maintenance data required to complete the project.

##### 1.02 RELATED WORK:

- A. General Requirements in their entirety.
- B. Individual Technical Specification Sections Specific for Operation and Maintenance Data.
- C. Section 01 33 23, SUBMITTALS

##### 1.03 FORMAT:

- A. Prepare data in form of an instructional manual.
- B. Binders: Commercial quality, 8 ½- x 11-inch three-ring binders with hardback, washable, plastic covers; two inch maximum ring size. When multiple binders are used, correlate data into related, consistent groupings. Provide a table of contents in each binder.
- C. Cover: Identify each binder cover and spine with typed or printed title OPERATION AND MAINTENANCE INSTRUCTION; list title of Project facility; identify subject matter of contents.
- D. Arrange contents by systems under section numbers and sequence of Table of Contents.
- E. Provide tabbed flyleaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data - on 20-pound paper.
- G. Drawings: Provide with reinforced punched, binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Submit certification that the data and drawings provided pertain exactly to the model, size, and series product and equipment installed in the work.
- I. All documents will be electronically scannable.

J. All products, systems, and drawings must be cross-referenced with tag ID numbers.

K. The manual for each piece of equipment shall be a separate document with the following specific requirement:

1. Contents:

Table of Contents and Index

Brief description of each system and components

Starting and stopping procedures

Special operating instructions

Routine maintenance procedures

Manufacturer's printed operating and maintenance instructions, parts list, illustrations, and diagrams

One copy of each wiring diagram

One copy of each approved shop drawing and each Contractor's coordination and layout drawing

List of spare parts, manufacturer's price, and recommended quantity

Name, address and telephone number of local service representatives.

2. Material

Loose leaf on 60 pound, punched paper

Holes reinforced with plastic cloth or metal

Page size, 8 ½- x 11-inches

Diagrams, illustrations and attached foldouts as required, of original quality, reproduced by dry copy method

Covers: oil, moisture and wear resistant 9 x 12 size

#### 1.04 QUALITY ASSURANCE:

- A. Prepare instructions and data by personnel experienced in maintenance and operations of described products.

#### 1.05 CONTENTS, EACH VOLUME (BINDER):

- A. Table of Contents: Provide title of Contract, schedule of products and systems, indexed to content of the volume. A listing of all relevant tag ID numbers for each volume shall be placed immediately after the Table of Contents.
- B. For each product or systems: List names, addresses, and telephone numbers of subcontractors and suppliers, including local source of suppliers and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- E. Text: As required to supplement product data, provide logical sequence of instructions for each procedure incorporating manufacturer's instructions.
- F. Warranties, Guarantees, and Bonds: Bind copy of each
- G. See O&M Manual Review Checklist at end of this specification section.

#### 1.06 MANUAL FOR MATERIALS AND FINISHES:

- A. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- B. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- C. Additional Requirements: As specified in individual product specification sections.

#### 1.07 SUBMITTALS:

- A. Submit draft and final copies of operation and maintenance manuals as described in Section 01 33 23.13 SUBMITTAL OF OPERATION AND MAINTENANCE MANUALS.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

Note to Specifier: Review the attached Checklist and add items that are required or delete items not relative to this project.

**OPERATION AND MAINTENANCE MANUAL  
REVIEW CHECKLIST**

1. Name, address, telephone/fax number of the manufacturer
2. Name, address, contact name, telephone/fax of local representative
3. Name, address, telephone/fax number of the contractor
4. Exploded view/general arrangement of materials of construction
5. Description of operation/operating principal
6. Project specific Operating parameters
7. Wiring Diagrams (If Applicable)
8. Troubleshooting checklist
9. Recommended spare parts list with prices, and ordering instructions
10. Model number and the serial number of the model provided
11. Performance curves or tabulated data
12. Routine Maintenance instructions/service instructions with recommended Intervals
13. Assembly and disassembly instructions
14. Recommended lubricates and lubrication schedule.
15. Approved copies of Shop Drawings are to be included in the manual
16. Startup/break-in and adjustment instructions
17. Warranty information

Reviewed By: \_\_\_\_\_  
Weston & Sampson Engineers

Date: \_\_\_\_\_

Document1

END OF SECTION



## SECTION 02 41 13

### SELECTIVE SITE DEMOLITION

#### PART 1 - GENERAL

##### 1.01 SCOPE OF WORK:

- A. Work under this Section shall consist of the careful removal, storage for reuse, transportation off-site, or demolition, of all structures and site features encountered or noted to be removed or abandoned to a minimum of three feet below finished grade, and the removal and disposal of all materials not called for to be reused or salvaged, in accordance with the contract drawings, these specifications, and Engineer's requirements. Provide all labor, equipment, materials and transportation necessary to complete the work.
- B. Items plan referenced to be removed and stored shall be carefully removed and stored on site in a manner and location designated by the Engineer for reinstallation later as shown on the plans or as indicated by the Engineer.
- C. Items plan referenced, or as indicated by the Engineer to be removed and disposed of shall be removed from the site and properly and legally disposed of by the Contractor.
- D. Items indicated on the contract drawings or in the specifications to be removed and salvaged, or other items required to be removed by the Engineer, shall be transported to a municipal storage facility, located within the City confines, and unloaded and stacked as required by the Engineer.
- E. Items indicated on the contract drawings or in the specification to be removed and reset shall be carefully removed and reset in the same location as existing according to the specification and details.
- F. The following scope describes the general work/demolition requirements of this Section.
  - 1. Cement concrete and bituminous concrete pavements.
  - 2. Curbing
  - 3. Vehicular Swing gate and footings complete.
  - 4. Other features as indicated on the drawings.

##### 1.02 PROTECTION:

- A. The Contractor shall assume complete responsibility and liability for the safety and structural integrity of all work and utilities to remain during demolition.
- B. Provide safeguards including, but not limited to, warning signs, barricades, temporary fences, warning lights and other items required for protection of personnel and the general public during performance of all work.
- C. All features related to protection shall be maintained until that work has been completed to the point when such safeguards are no longer required.

1.03 SPECIAL REQUIREMENTS:

- A. The Contractor shall salvage items label to be salvaged and transport these to the Owner's City Yard unless these are called for to be reused or required by the Engineer to be disposed of.
- B. Install erosion controls to protect adjacent areas from eroded materials likely to enter wetlands, resource areas, or drainage ways/systems, downstream of areas disturbed by work activities.
- C. Where items to be demolished are located within or adjacent to pavements to remain, the Contractor shall make provisions to protect that pavement to remain. Cut concrete pavement back to score line and cut bituminous concrete pavement back far enough so as not to allow disturbance to base course materials. Pavements damaged as a result of Contractor activities shall be replaced to the extent determined by the Engineer at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 BACKFILL:

- A. The Contractor shall provide suitable backfill as specified under Section 31 23 00 of these Specifications, to fill voids left by removal or abandonment of site features, and shall provide all pipe cap ends, mortar, brick and other material needed to cap off or plug pipes of various sizes and kinds.
- B. Suitable materials shall be used as base course fill and topsoil to the depth as specified herein. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

2.02 TEMPORARY FENCE:

- A. The work under these Items shall conform to the Section 01 56 26, TEMPORARY CHAIN LINK FENCE.
- B. The work shall include temporary installation of chain link fence around the

perimeter of the work limits where shown on the plans, and as required by the Engineer, and as Contractor sees fit to protect work.

- C. Temporary fence shall consist of 6-foot-high chain link fence anchored into a base that is both stable and movable to allow access and adjustment as needed. Reclaimed existing fence fabric and materials may be used with the approval of the Engineer. The Contractor shall submit a shop drawing to the Engineer for approval prior to installation.

### PART 3 - EXECUTION

#### 3.01 SALVAGEABLE MATERIAL:

- A. Frames, grates and other salvageable material shall be carefully removed to minimize damage and stored for later reuse, transport, or removal from site.

#### 3.02 ABANDONED STRUCTURES:

- A. All inlets and outlets shall be plugged with at least eight (8) inches of brick and mortar masonry. Upper portions of masonry structures shall be removed to a depth of three feet. The bottoms of all structures shall be broken to allow drainage, and the structure shall be filled with suitable backfill material placed in six (6) inch layers and thoroughly compacted at each level.
- B. The Engineer shall review work related to abandoned structures before backfilling. Those items not reviewed before backfilling shall be uncovered and backfill procedures observed, at no expense to the Owner.

#### 3.03 ABANDONED PIPES OR CONDUITS:

- A. Plug previously abandoned drainpipes encountered with masonry brick at least eight (8) inches in thickness.
- B. Abandon discontinued water supplies that are encountered during the execution of this contract in accordance with Owner requirements.
- C. Electrical conduits encountered and previously abandoned shall be capped or plugged.

END OF SECTION

## SECTION 02 61 00

### HANDLING AND DISPOSAL OF EXCAVATED MATERIALS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This Section specifies requirements for the excavation, handling, stockpiling, transportation and disposal of excavated materials, and the handling, treatment, and disposal of groundwater (if required).
- B. The work shall include excavation, stockpiling, sampling and performing laboratory analysis, and the loading, hauling, and disposal of excavated materials off-site. The work also includes the pumping of water (if encountered) and the on-site treatment and discharge or temporary storage, transport, and disposal of pumped water as specified herein.

##### 1.02 RELATED SECTIONS:

- A. SECTION 01 35 29, HEALTH AND SAFETY PLAN
- B. SECTION 31 00 00, EARTHWORK

##### 1.03 REFERENCES:

- A. 40 CFR 1910.120, Occupational Safety and Health Administration (OSHA) guideline for work within contaminated areas
- B. Chapter Env-Or 600, Contaminated Site Management
- C. Chapter Env-Sw 900, Management of Certain Wastes
- C. All other applicable local, state, and federal laws and regulations.

##### 1.04 SUBMITTALS:

- A. Submit to the Engineer an Excavated Materials Management Plan (EMMP) which includes the following information, no more than 14 days after issuance of the Notice to Proceed:
  - 1. The construction procedures and sequence of performing the work under this section and related sections. The tasks shall, at a minimum, include the proposed sequence of excavation and reuse of excavated materials, plans identifying

temporary stockpile locations, surplus soil testing procedures and analytical methods, and the procedures for handling groundwater.

2. The name and address of a primary and secondary disposal or recycling facility that will accept surplus soil and, if necessary, any other subsurface debris requiring off-site disposal.
  3. Written confirmation shall be submitted to the Engineer from each of the disposal or recycling facilities indicating that they will accept contaminated soils or groundwater, and any other materials to be removed as part of this Work.
  4. The name and address of the laboratory that will perform analytical testing of soil and groundwater samples.
- B. Submit to the Engineer all pertinent information relating to the transport of material specified herein, within 14 days after issuance of the Notice to Proceed. The information submitted shall include as a minimum:
1. Name and address of all transporters; and
  2. Name and address of any hazardous waste transporters, plus:
    - a. United States Environmental Protection Agency (EPA) Identification Number and expiration date.
    - b. Proof of permit, license or authorization to transport hazardous waste in all affected states.
    - c. Proof of Insurance
- C. Laboratory results for all samples collected and/or analyzed by the Contractor shall be submitted to the Engineer within 2 days of receipt in tabulated spreadsheet form summarizing detections and exceedances of the Soil Remediation Standards (SRS) along with the raw laboratory data package. The results shall include all Chain-of-Custody forms and all documentation provided by the laboratory. Analytical data shall be kept confidential, distributed only to the Engineer.
- D. Provide a copy of all permits, completed bills of lading, and recycling, incineration certificates to the Owner, Property Owner, and Engineer.
- F. Contractor shall provide to the Engineer copies of all weight slips, both tare and gross, for every load weighed and disposed of at the disposal or recycling facilities. The Owner will only allow progress payments after receipt of these weight slips.
- G. If required, the Contractor shall prepare and submit a Notice of Intent for coverage under the Environmental Protection Agency's (EPA's) Dewatering and Remediation General

Permit (DRGP) for discharge of groundwater dewatering effluent to surface water. A copy of the draft NOI, including the results of any source and receiving water sampling and analysis to support the NOI, shall be provided to the Engineer a minimum 10 days prior to submittal to EPA. Contractor shall submit the NOI as an “Operator” according to the DRGP requirements.

#### 1.05 PERMITS:

- A. The work of this Section shall be performed in accordance with all applicable federal, state, and local regulations, laws, codes, and ordinances governing the handling, transportation, and disposal of soil and groundwater.
- B. Contractor shall obtain all local, State, and Federal permits required for the transport and disposal of all liquid and solid waste resulting from the performance of this Work. Contractor shall document that the disposal/recycling/reuse facilities proposed have all current certifications and permits as required by Federal, State, and local regulatory agencies to receive and dispose/recycle/reuse of the excavated material.

#### 1.07 EXISTING CONDITIONS

- A. The Contractor shall note that the work of this Section includes handling soil that contains metals, petroleum hydrocarbons, and semi-volatile organic compounds (SVOCs). Soil boring/sampling locations are shown on the Contract Drawings. Tables and laboratory data reports with the sampling results are provided as an Attachment to these specifications.
- B. A geotechnical subsurface investigation was performed in 2016. The investigation included collecting soil samples within the limits of work from select intervals between 0-2 and 15-17 feet below ground surface. The results identified arsenic and select SVOCs in soil, which at some locations exceeded their Soil Remediation Standards (SRS). Where detected, the concentrations were consistent with background concentrations for naturally occurring soil (arsenic) or historic fill containing traces of ash and asphalt debris. The investigation also identified large amounts of wood debris in some locations. The large amount of wood debris may indicate the presence of stumps in the area.
- C. Historically, the Project area was associated with the Former Portsmouth Gun Club (FPGC), which was assigned the NHDES Site ID #200812028. The FPGC site was associated with the historic detection of lead in soil from a former shooting range. The site was closed in 2009 with a Certificate of No Further Action from NHDES.

### PART 2 - PRODUCTS

#### 2.01 GENERAL:

- A. Contractor shall furnish all drums, storage containers, packing materials and any other products and materials required for collecting, storing and transporting contaminated soils

and groundwater in compliance with all NHDES, EPA, United States Department of Transportation (DOT) and local requirements. All drums shall meet the requirements of DOT 49 CFR (Code of Federal Regulations) 173.

- B. The Contractor shall have available and all personnel shall wear personal protective equipment and protective clothing consistent with the levels of protection for this work as indicated in the site-specific Health and Safety Plan.

#### 2.02 STOCKPILE SHEETING:

- A. 10-mil (minimum) nylon-reinforced polyethylene (NRPE) or 20-mil (minimum) polyethylene sheeting shall be used for all stockpile sheeting.
- B. Stockpile sheeting shall be manufactured of new, first quality materials and manufactured specifically for the intended use. The material shall be ultra-violet resistant and cold crack resistant to -40 degrees Fahrenheit.

#### 2.03 CONTAINERS:

- A. Containers used for storing surplus excavated soil (i.e. roll-off containers) and hauling contaminated material shall be constructed of steel, in good condition and designed for the intended purpose of safe, secure storage of contaminated material during loading and transport to an approved facility. The containers shall have a secure cover, which will prevent a release of material from truck during transportation. The containers must be approved by and labeled in accordance with the U.S Department of Transportation (DOT). The containers shall be sift proof and water resistant in accordance with the DOT regulations.

### PART 3 - EXECUTION

#### 3.01 GENERAL REQUIREMENTS:

- A. The Contractor shall maximize the reuse of all excavated materials on-site as backfill unless otherwise indicated by the Engineer. No off-site material shall be brought to the site without prior approval of the Engineer.
- B. No surplus excavated materials shall be removed without prior approval by the Engineer and Owner. Surplus excavated materials shall be transported off-site for reuse, recycling or disposed of based the requirements of this Section.
- C. The Owner will be the generator of any surplus excavated materials removed from the site and will sign all waste profile applications, material shipping records, manifests, and bills of lading used to transport the material off-Site. The Contractor will be the generator of material contaminated as a result of a release of oil or hazardous materials caused by Contractor or their Sub-Contractor's operations.

- D. The Owner will have final approval over all reuse/disposal/recycling options based on the analytical data.
- E. The Contractor shall immediately notify the Engineer of suspected contaminated materials with visible stains or unnatural odor, or if other potentially contaminated and/or hazardous material is encountered. The Contractor shall excavate and stockpile areas of suspected contaminated and/or hazardous material as required by the Engineer.

#### 3.04 DISPOSAL CHARACTERIZATION TESTING:

- A. The Contractor is responsible for collecting samples and performing laboratory analysis to characterize any surplus excavated materials that are proposed to be transported off-site. A minimum 2-days notice shall be provided to the Engineer prior to sample collection. No samples shall be collected unless the Contractor's EMMP has been approved and the Engineer is present to witness the sample collection.
- B. The Contractor shall collect and perform additional disposal characterization sampling and analytical testing of the excavated material as required by its permitted reuse/disposal/recycling facility at no additional cost to the Owner.
- C. Samples shall be taken in such a manner as not to cause any cross-contamination. All sampling equipment shall be decontaminated between usages.
- D. The Owner may conduct additional sampling upon excavation of the site. The Engineer may stop the Contractor's work in a particular location at any time to have samples taken and analyzed. If necessary, the Contractor shall assist the Engineer in collecting samples. The work shall not resume in that area until directed by the Engineer. Stoppage of work for this reason, or until laboratory results are delivered to the Engineer, shall not be a cause for the Contractor to request additional compensation or an extension of time to the Contract or to other intermediate Contract deadlines.

#### 3.05 TEMPORARY STOCKPILING REQUIREMENTS

- A. The Contractor shall temporarily stockpile excavated material on-Site after notifying the Engineer of the stockpile location. Temporary stockpile locations shall be confined to within the limits of work. Stockpiles shall not be located within or adjacent to any known environmental resource area, wetland, or active drainage structures.
- B. The Contractor shall manage temporary stockpiles to prevent the cross-contamination of excavated materials between different excavated materials categories.
- C. Temporary stockpiles shall not exceed **250 cubic yards**.
- D. All excavated material shall be stored in a secure manner to prevent exposure to humans and the environment. The stockpiles shall be clearly and securely barricaded from contact by workers and the public.



- E. Stockpiles shall be placed entirely on polyethylene sheeting, as indicated in Paragraph 2.02 of this Section, and be covered at the end of each day's work with the same material to minimize the infiltration of precipitation and erosion of the stockpile. Any cover material used shall be properly secured and possess the necessary physical strength to resist tearing by the wind and other elements. Stockpile covers shall be repaired or replaced as necessary throughout the Project.
- F. Disposal of material that is contaminated because of careless handling or use of unauthorized procedures shall be disposed of off-site at the Contractor's expense. Delays of Work resulting from temporary storage of excavated material, regardless of the classification, shall be at no additional cost to the Owner.

### 3.06 EXCAVATED MATERIAL CATEGORIES

- A. Excavated materials shall only be removed from the Site after approval by the Owner and Engineer.
- B. Surplus excavated materials shall be transported off-site for disposal at a non-hazardous Subtitle D landfill, asphalt batching, or thermal recycling facility based on the results of the disposal characterization testing.
- C. Excavated materials shipped to a disposal/recycling facility must meet the selected facility's chemical and physical acceptance criteria. Selected facilities must be established, fully operational, appropriately insured, and be operating in compliance with all applicable local, State, and Federal regulations.
- D. The Contractor will not be allowed to dispose of excavated material at disposal facilities listed in the EPA Superfund Program.

### 3.05 CONTAMINATED SOIL DISPOSAL

- A. Surplus soil shall be disposed of at a legally permitted recycling facility approved by the Owner not less than 7 days prior to disposal of soil. Trucks utilized for hauling contaminated soil off-site shall provide suitable mechanism to cover the soil, have a clean exterior, and no liquids shall be leaking from the trucks.
- B. Transport shall ensure the protection of health, safety, public welfare and the environment, and be consistent with the receiving facility's permit requirements and with any other law in the receiving state(s) which may govern the transport of contaminated soil.
- C. Surplus excavated materials shall be transported off-site using a uniform non-hazardous waste manifest, material shipping record, or bill of lading. Copies of all required documentation for handling, transport, and disposal, including certified weight slips for each load of soil received off-site, shall be provided to the Owner.

### 3.06 GROUNDWATER MANAGEMENT:

- A. The Contractor shall, at all times during construction, provide and maintain proper and satisfactory means and devices for removal of all water entering the excavations, and shall remove all such water promptly.
- B. Where required, dewatering effluent shall be treated and discharged in accordance with applicable state and federal permits and regulations, including the Environmental Protection Agency's (EPA) Dewatering and Remediation General Permit (DRGP). Treatment of effluent shall be adequate for discharge based on the permit limits.
- C. The Contractor shall be responsible for the sampling and analysis of groundwater and surface water, as necessary, to support the preparation of any NOI or other permit applications. Laboratory testing results shall be submitted to the Engineer for review.
- D. Water pumped or drained from excavations or water courses encountered in the work shall be disposed of in strict compliance with pertinent federal, state, and local environmental regulations. Any damage caused by or resulting from dewatering operations shall be the sole responsibility of the Contractor. The Contractor shall be responsible for maintaining the effluent quality (i.e., turbidity, suspended solids, etc.) of water discharged from dewatering operations in accordance with pertinent regulations and permits.
- E. As an alternative to treating and discharge, the Contractor may elect to temporarily store, characterize, and transport off-site for treatment/disposal of pumped water from dewatering operations. Prior to removal, the Contractor shall provide the name and address of the proposed receiving facility along with a copy of their current operating permit.

END OF SECTION

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ATTACHMENT

Soil Testing Results

Table 1  
Soil Sampling Results  
RT 33 Skate Park Project  
Portsmouth, New Hampshire

Parameter	Units	Soil Remediation Standards (Table-600-2)	SAMPLE LOCATIONS - LIMITS OF WORK									
			B-1 S-1 9/27/2016 0-2 ft bus	B-3 S-4 9/27/2016 15-15 ft bus	B-4 S-3 9/27/2016 10-12 ft bus	B-5 S-4 9/27/2016 15-17 ft bus	B-6 S-3 9/28/2016 10-12 ft bus	B-10 S-3 9/29/2016 10-12 ft bus	B-11 S-2 9/29/2016 5-7 ft bus	B-12 S-1 9/29/2016 0-2 ft bus		
<b>VOCs</b>												
1,2,4-Trimethylbenzene	mg/kg	130	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
1,3,5-Trimethylbenzene	mg/kg	96	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
4-Isopropyltoluene	mg/kg	330	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
Acetone	mg/kg	75	<0.0031	<b>0.0826</b>	<0.0031	<0.0038	<b>0.102</b>	<0.0036	<0.0034	<b>0.0525</b>	<b>0.0525</b>	
Ethylbenzene	mg/kg	120	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
Isopropylbenzene	mg/kg	350	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
n-Butylbenzene	mg/kg	110	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
n-Propylbenzene	mg/kg	85	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
sec-Butylbenzene	mg/kg	130	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
Toluene	mg/kg	100	<0.0031	<0.0038	<0.004	<0.0038	<0.0031	<0.0036	<0.0034	<0.0037	<0.0037	
Xylenes (Total)	mg/kg	500	<0.0056	<0.0069	<0.0068	<0.0068	<0.0063	<0.0062	<0.006	<0.0068	<0.0068	
Total VOCs	mg/kg	NS	<0.0313	<b>0.0862</b>	<b>0.303</b>	<0.0379	<b>0.102</b>	<0.0364	<0.0339	<0.0339	0.0525	
<b>SVOCs</b>												
Acenaphthene	mg/kg	340	<0.359	<0.358	<0.416	<0.361	<0.42	<0.395	<1.58	<1.58	<0.35	
Anthracene	mg/kg	1,000	<0.359	<0.358	<0.416	<0.361	<0.42	<0.395	<1.58	<1.58	<0.35	
Benzo(a)anthracene	mg/kg	1	<b>0.348</b>	<0.358	<b>0.993</b>	<0.361	<0.42	<b>0.982</b>	<1.58	<1.58	<0.35	
Benzo(b)fluoranthene	mg/kg	0.7	<b>0.788</b>	<0.358	<b>1.54</b>	<0.361	<0.42	<b>1.57</b>	<1.58	<1.58	<0.35	
Benzo(k)fluoranthene	mg/kg	NS	<0.359	<0.358	<b>0.602</b>	<0.361	<0.42	<b>0.49</b>	<1.58	<1.58	<0.35	
Carbazole	mg/kg	12	<0.359	<0.358	<b>0.653</b>	<0.361	<0.42	<b>0.523</b>	<1.58	<1.58	<0.35	
Chrysene	mg/kg	120	<0.359	<0.358	<0.416	<0.361	<0.42	<0.395	<1.58	<1.58	<0.35	
Dibenz(a,h)Anthracene	mg/kg	0.7	<0.18	<0.18	<b>1.03</b>	<0.181	<0.211	<b>0.953</b>	<b>0.853</b>	<b>0.853</b>	<0.176	
Dibenzofuran	mg/kg	NS	<0.359	<0.358	<b>0.235</b>	<0.361	<0.42	<b>0.205</b>	<0.793	<0.793	<0.35	
Fluoranthene	mg/kg	960	<0.359	<0.358	<b>2.53</b>	<0.361	<0.42	<b>2.26</b>	<1.58	<1.58	<0.35	
Indeno(1,2,3-cd)Pyrene	mg/kg	1	<b>1.34</b>	<0.358	<b>0.495</b>	<0.361	<0.42	<b>0.428</b>	<1.58	<1.58	<0.35	
Phenanthrene	mg/kg	NS	<0.359	<0.358	<b>0.847</b>	<0.361	<0.42	<b>1.26</b>	<1.58	<1.58	<0.35	
Phenol	mg/kg	95	<0.359	<0.358	<0.416	<0.361	<0.42	<0.395	<1.58	<1.58	<0.35	
Pyrene	mg/kg	720	<0.359	<0.358	<0.416	<0.361	<0.42	<0.395	<1.58	<1.58	<0.35	
Pyrene	mg/kg	114	<0.359	<0.358	<0.416	<0.361	<0.42	<0.395	<1.58	<1.58	<0.35	
Total SVOCs	mg/kg	NS	<b>5.738</b>	<0.358	<b>12.285</b>	<b>1.993</b>	<b>0.424</b>	<b>11.691</b>	<b>0.853</b>	<b>0.853</b>	<b>0.199</b>	
<b>TPH/ETPH</b>												
Total Petroleum Hydrocarbons	mg/kg	10,000	<b>158</b>	<b>65.8</b>	<b>186</b>	<b>79.3</b>	<42.2	<b>64.2</b>	<b>209</b>	<b>48.3</b>	<b>48.3</b>	
<b>Total Metals</b>												
Arsenic	mg/kg	11	<b>8.83</b>	<b>10.4</b>	<b>4.9</b>	<b>10.6</b>	<b>11.5</b>	<b>12.4</b>	<b>6.57</b>	<b>13.9</b>	<b>13.9</b>	
Barium	mg/kg	1,000	<b>41.5</b>	<b>23.8</b>	<b>24.8</b>	<b>28.7</b>	<b>91.4</b>	<b>50.4</b>	<b>45</b>	<b>50.5</b>	<b>50.5</b>	
Cadmium	mg/kg	33	<0.44	<0.53	<0.45	<0.48	<0.58	<0.47	<0.48	<0.38	<0.38	
Chromium	mg/kg	130	<b>39.3</b>	<b>18.7</b>	<b>17.6</b>	<b>51</b>	<b>35.8</b>	<b>34.3</b>	<b>24.8</b>	<b>53</b>	<b>53</b>	
Lead	mg/kg	400	<b>24.5</b>	<b>14.6</b>	<b>80</b>	<b>19.2</b>	<b>21.6</b>	<b>34.1</b>	<b>35.3</b>	<b>12.5</b>	<b>12.5</b>	
Mercury	mg/kg	0.095	<b>0.095</b>	<b>0.095</b>	<b>0.095</b>	<b>0.095</b>	<b>0.095</b>	<b>0.095</b>	<b>0.095</b>	<b>0.095</b>	<b>0.095</b>	
Selenium	mg/kg	180	<0.44	<0.53	<0.45	<0.48	<0.58	<0.47	<0.48	<0.38	<0.38	
Silver	mg/kg	89	<0.44	<0.53	<0.45	<0.48	<0.58	<0.47	<0.48	<0.38	<0.38	
<b>PCBs</b>												
Total PCBs	mg/kg	1	<0.0545	<0.0572	<0.0606	<0.0535	<0.0571	<0.0586	<0.055	<0.056	<0.056	

**Abbreviations:**  
TPH = Total Petroleum Hydrocarbons  
PCBs = Polychlorinated Biphenyls  
VOC = Volatile Organic Compound  
SVOCs = Semivolatile Organic Compounds  
ETPH = Extractable Total Petroleum Hydrocarbons

NS = No Standard  
ND = Not Detected  
mg/kg = milligrams per kilogram  
NT = Not Tested

**Notes:**  
< = parameter not detected above laboratory method reporting limit  
Total Concentrations represent the sum of detected analytes  
**BOLD:** Parameter detected above laboratory detection limit  
Represents an exceedance of the Soil Standards

Table 1  
Soil Sampling Results  
RT 33 Skate Park Project  
Portsmouth, New Hampshire

Parameter	Units	Soil Remediation Standards (Table 600-2)	SAMPLE LOCATIONS - OUTSIDE LIMITS OF WORK							
			B-2 S-2 9/28/2016 5-6.5 ft. bas	B-7 S-4 9/28/2016 15-17 ft. bas	B-8 S-2 9/28/2016 5-7 ft. bas	B-9 S-3 9/28/2016 10-12 ft. bas	B-13 S-3 9/28/2016 10-12 ft. bas	B-14 S-4 9/28/2016 15-17 ft. bas	B-16 S-3 9/29/2016 10-12 ft. bas	B-16 S-2 9/29/2016 5-7 ft. bas
<b>VOCs</b>										
1,2,4-Trimethylbenzene	mg/kg	130	<0.0038	<0.0038	<0.0035	<0.0045	<0.0034	<0.0045	<0.0045	<0.0047
1,3,5-Trimethylbenzene	mg/kg	96	<0.0036	<0.0036	<0.0035	<0.0045	<0.0034	<0.0045	<0.0045	<0.0047
4-Isopropyltoluene	mg/kg	330	0.0312	0.0312	0.04	0.04	<0.0034	0.138	0.138	0.0554
Acetone	mg/kg	120	<0.0038	<0.0038	0.237	0.0045	<0.0036	<0.0045	<0.0045	0.208
Ethylbenzene	mg/kg	330	<0.0036	<0.0036	<0.0035	0.0045	<0.0034	<0.0045	<0.0045	0.0196
n-Propylbenzene	mg/kg	96	<0.0036	<0.0036	<0.0035	<0.0045	<0.0034	<0.0045	<0.0045	0.0095
n-Butylbenzene	mg/kg	110	<0.0038	<0.0038	<0.0035	<0.0045	<0.0034	<0.0045	<0.0045	0.0097
n-Propylbenzene	mg/kg	85	<0.0038	<0.0038	<0.0035	<0.0045	<0.0034	<0.0045	<0.0045	<0.0047
sec-Butylbenzene	mg/kg	130	<0.0036	<0.0036	<0.0035	<0.0045	<0.0034	<0.0045	<0.0045	<0.0047
Toluene	mg/kg	100	<0.0038	<0.0038	<0.0035	0.0105	<0.0034	<0.0045	<0.0045	<0.0047
Xylenes (Total)	mg/kg	500	<0.0065	<0.0065	<0.0063	0.0075	<0.0062	<0.0075	<0.0075	<0.0083
Total VOCs	mg/kg	NS	0.2327	0.2327	0.1017	0.294	<0.0036	0.138	0.138	0.0867
<b>SVOCs</b>										
Acenaphthene	mg/kg	340	<0.385	1.14	<0.703	<0.389	<0.388	1.44	<0.421	<0.376
Anthracene	mg/kg	1,000	0.415	1.71	<0.703	0.526	<0.388	<0.421	<0.421	<0.376
Benzofluoranthene	mg/kg	1	1.44	2.8	0.802	1.09	0.723	<0.421	<0.421	<0.376
Benzofluoranthene	mg/kg	17	2.4	3.88	1.62	1.19	0.56	<0.421	<0.421	0.483
Benzofluoranthene	mg/kg	NS	0.608	0.819	0.62	0.389	0.552	<0.421	<0.421	<0.376
Benzofluoranthene	mg/kg	12	0.921	1.15	<0.703	0.395	0.531	<0.421	<0.421	<0.376
Carbazole	mg/kg	NS	0.445	1.29	<0.703	<0.389	<0.388	<0.421	<0.421	<0.376
Chrysene	mg/kg	120	1.62	2.81	0.951	0.89	0.922	<0.211	<0.211	0.34
Dibenzofluoranthene	mg/kg	0.7	0.286	<0.397	<0.352	<0.195	<0.195	<0.211	<0.211	<0.189
Dibenzofluoranthene	mg/kg	NS	<0.385	1.76	<0.703	<0.389	<0.388	1.1	<0.423	<0.376
Fluoranthene	mg/kg	960	4.58	8.26	2.15	2.88	2.2	0.429	0.49	0.737
Indeno(1,2,3-cd)Pyrene	mg/kg	1	0.567	<0.792	<0.703	<0.389	0.422	<0.421	<0.421	<0.376
Phenanthrene	mg/kg	NS	1.73	9.88	0.953	2.26	0.871	1.4	<0.421	0.466
Phenanthrene	mg/kg	56	<0.385	<0.792	<0.703	<0.389	<0.388	<0.421	<0.421	<0.376
Pyrene	mg/kg	720	3.8	5.2	1.46	3.17	2.4	<0.421	<0.421	0.72
Pyrene	mg/kg	NS	<0.385	4.45	<0.703	<0.389	<0.388	7.15	<0.421	<0.376
Total SVOCs	mg/kg	NS	19.452	46.916	8.766	13.204	10.647	7.781	0.966	3.049
<b>TPH/EI/TPH</b>										
Total Petroleum Hydrocarbons	mg/kg	10,000	73.5	354	168	136	222	163	319	136
<b>Total Metals</b>										
Arsenic	mg/kg	11	8.66	7.43	6.42	13.7	15.8	11.8	9.64	10.5
Barium	mg/kg	1,000	56.3	43.2	22.6	58.4	30.1	71.4	95.7	110
Cadmium	mg/kg	33	<0.38	<0.55	0.58	<0.55	<0.51	<0.46	<0.55	0.49
Chromium	mg/kg	130	26.9	29	28.4	32.7	27.3	57.2	31	34.4
Lead	mg/kg	400	1.32	307	72	30.9	277	318	221	416
Mercury	mg/kg	1.4	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04
Selenium	mg/kg	180	<0.38	<0.55	0.52	<0.55	<0.51	<0.46	<0.55	<0.49
Silver	mg/kg	89	<0.38	<0.55	<0.52	<0.55	<0.51	<0.46	<0.55	<0.42
<b>PCBs</b>										
Total PCBs	mg/kg	1	<0.0616	<0.0569	<0.0575	<0.0583	<0.0536	<0.0601	<0.0654	<0.0651

**Abbreviations:**  
TPH = Total Petroleum Hydrocarbons  
PCBs = Polychlorinated Biphenyls  
VOC = Volatile Organic Compound  
SVOCs = Semivolatile Organic Compounds  
EI/TPH = Extractable Total Petroleum Hydrocarbons

**NS** = No Standard  
**ND** = Not Detected  
**mg/kg** = milligrams per kilogram  
**NT** = Not Tested

**Notes:**  
<= parameter not detected above laboratory method reporting limit  
Total Concentrations represent the sum of detected analytes  
**BOLD:** Parameter detected above laboratory detection limit  
**BOLD:** Represents an exceedance of the Soil Standards



*CERTIFICATE OF ANALYSIS*

Ken Gendron  
Weston & Sampson Engineers, Inc.  
427 Main St  
Worcester, MA 01608

**RE: RTE 33 Portsmouth (N/A)**  
**ESS Laboratory Work Order Number: 1610112**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
Laboratory Director

**REVIEWED**

**By ESS Laboratory at 4:02 pm, Oct 14, 2016**

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with NELAC Standards, A2LA and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**SAMPLE RECEIPT**

The following samples were received on October 06, 2016 for the analyses specified on the enclosed Chain of Custody Record.

**Low Level VOA vials were frozen by Weston and Sampson on day of sampling.**

<u>Lab Number</u>	<u>Sample Name</u>	<u>Matrix</u>	<u>Analysis</u>
1610112-01	B-1 S-1	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-02	B-2 S-2	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-03	B-3 S-4	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-04	B-4 S-3	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-05	B-5 S-4	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-06	B-6 S-3	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-07	B-7 S-4	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-08	B-8 S-2	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B, 8260B Low, 8270D
1610112-09	B-9 S-3	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-10	B-10 S-3	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-11	B-11 S-2	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-12	B-12 S-1	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-13	B-13 S-3	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-14	B-14 S-4	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-15	B-15 S-3	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D
1610112-16	B-16 S-2	Soil	6010C, 6020A, 7471B, 8082A, 8100M, 8260B Low, 8270D



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**PROJECT NARRATIVE**

**5035/8260B Volatile Organic Compounds / Low Level**

1610112-08 Reported above the quantitation limit; Estimated value (E).

4-Isopropyltoluene

CJ61137-BS1 Blank Spike recovery is above upper control limit (B+).

Methylene Chloride (131% @ 70-130%)

**8270D Semi-Volatile Organic Compounds**

1610112-01 Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).

Perylene-d12 (29% @ 50-200%)

1610112-02 Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).

Perylene-d12 (45% @ 50-200%)

1610112-03 Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).

Perylene-d12 (48% @ 50-200%)

1610112-03 Surrogate recovery(ies) outside of criteria due to matrix (UCM/coelution/matrix is present) (SM).

2,4,6-Tribromophenol (5% @ 30-130%), 2-Fluorophenol (19% @ 30-130%)

1610112-04 Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).

Perylene-d12 (31% @ 50-200%)

1610112-09 Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).

Perylene-d12 (40% @ 50-200%)

1610112-13 Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).

Perylene-d12 (49% @ 50-200%)

1610112-15 Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).

Perylene-d12 (49% @ 50-200%)

CJ61112-BS1 Blank Spike recovery is below lower control limit (B-).

Aniline (39% @ 40-140%), Benzidine (% @ 40-140%), Hexachlorocyclopentadiene (11% @ 40-140%)

CJ61112-BSD1 Blank Spike recovery is below lower control limit (B-).

Benzidine (% @ 40-140%), Hexachlorocyclopentadiene (11% @ 40-140%)

CJ61112-BSD1 Relative percent difference for duplicate is outside of criteria (D+).

Benzoic Acid (36% @ 30%)

CZJ0067-CCV1 Calibration required quadratic regression (Q).

2,4-Dinitrophenol (106% @ 80-120%)

CZJ0067-CCV1 Continuing Calibration %Diff/Drift is above control limit (CD+).

Benzidine (21% @ %)

CZJ0094-CCV1 Calibration required quadratic regression (Q).

2,4-Dinitrophenol (95% @ 80-120%)

CZJ0113-CCV1 Calibration required quadratic regression (Q).

2,4-Dinitrophenol (84% @ 80-120%)

CZJ0113-CCV1 Continuing Calibration %Diff/Drift is below control limit (CD-).

4-Nitrophenol (36% @ 20%), Benzo(g,h,i)perylene (21% @ 20%), Pentachlorophenol (21% @ 20%)

CZJ0125-CCV1 Calibration required quadratic regression (Q).

2,4-Dinitrophenol (84% @ 80-120%), Benzoic Acid (77% @ 80-120%), Pentachlorophenol (86% @ 80-120%)





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.

Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

CZJ0125-CCV1 [Continuing Calibration %Diff/Drift is below control limit \(CD-\).](#)

Benzoic Acid (23% @ 20%)

CZJ0132-CCV1 [Calibration required quadratic regression \(Q\).](#)

2,4-Dinitrophenol (74% @ 80-120%)

CZJ0132-CCV1 [Continuing Calibration %Diff/Drift is below control limit \(CD-\).](#)

2,4-Dinitrophenol (26% @ 20%), 4,6-Dinitro-2-Methylphenol (22% @ 20%), 4-Nitroaniline (24% @ 20%), 4-Nitrophenol (45% @ 20%), Benzoic Acid (31% @ 20%), Pentachlorophenol (24% @ 20%)

CZJ0162-CCV1 [Calibration required quadratic regression \(Q\).](#)

2,4-Dinitrophenol (84% @ 80-120%), Pentachlorophenol (88% @ 80-120%)

**No other observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015C - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH / VPH

**Prep Methods**

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	8.83 (2.21)		6010C		1	KJK	10/12/16 20:00	2.52	100	CJ61103
Barium	41.5 (2.21)		6010C		1	KJK	10/12/16 20:00	2.52	100	CJ61103
Cadmium	ND (0.44)		6020A		20	NAR	10/13/16 14:57	2.52	100	CJ61103
Chromium	39.3 (0.88)		6010C		1	KJK	10/12/16 20:00	2.52	100	CJ61103
Lead	24.5 (4.42)		6010C		1	KJK	10/12/16 20:00	2.52	100	CJ61103
Mercury	0.058 (0.036)		7471B		1	BJV	10/11/16 12:55	0.62	40	CJ61104
Selenium	ND (0.44)		6020A		20	NAR	10/13/16 14:57	2.52	100	CJ61103
Silver	ND (0.44)		6010C		1	KJK	10/12/16 20:00	2.52	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 8.9  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0028)		8260B Low		0	10/07/16 17:24		[CALC]
1,4-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0625)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
2-Butanone	ND (0.0313)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
2-Hexanone	ND (0.0313)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
4-Isopropyltoluene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0313)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Acetone	ND (0.0313)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Acrylonitrile	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Allyl Chloride	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 8.9  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Bromobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Bromochloromethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Bromoform	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Bromomethane	ND (0.0063)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Chlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Chloroethane	ND (0.0063)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Chloroform	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Chloromethane	ND (0.0063)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Dibromomethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0063)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Diethyl Ether	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Ethylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Methylene Chloride	ND (0.0156)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Naphthalene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Styrene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0313)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 8.9  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Toluene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Trichloroethene	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0031)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0063)		8260B Low		1	10/07/16 17:24	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0056)		8260B Low		1	10/07/16 17:24		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>118 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>102 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>107 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>105 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 20.4  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1221	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1232	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1242	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1248	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1254	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1260	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1262	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604
Aroclor 1268	ND (0.0545)		8082A		1	10/11/16 15:01		CJ60604

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	64 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	74 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	72 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	77 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 20.7  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	158 (40.3)		8100M		1	10/07/16 15:39	CZJ0081	CJ60608
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		73 %		40-140				





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
1,2,4-Trichlorobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
1,2-Dichlorobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
1,3-Dichlorobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
1,4-Dichlorobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,4,5-Trichlorophenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,4,6-Trichlorophenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,4-Dichlorophenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,4-Dimethylphenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,4-Dinitrophenol	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,4-Dinitrotoluene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2,6-Dinitrotoluene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2-Chloronaphthalene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2-Chlorophenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2-Methylnaphthalene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2-Methylphenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2-Nitroaniline	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
2-Nitrophenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
3,3'-Dichlorobenzidene	ND (0.718)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
3+4-Methylphenol	ND (0.718)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
3-Nitroaniline	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
4-Bromophenyl-phenylether	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
4-Chloro-3-Methylphenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
4-Chloroaniline	ND (0.718)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
4-Nitroaniline	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
4-Nitrophenol	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Acenaphthene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Acenaphthylene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.718)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Aniline	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Anthracene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Azobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Benzidine	ND (0.718)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
<b>Benzo(a)anthracene</b>	<b>0.548</b> (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
<b>Benzo(a)pyrene</b>	<b>0.616</b> (0.180)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>0.768</b> (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Benzo(g,h,i)perylene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Benzo(k)fluoranthene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Benzoic Acid	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Benzyl Alcohol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
bis(2-Chloroethoxy)methane	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
bis(2-Chloroethyl)ether	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Butylbenzylphthalate	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Carbazole	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
<b>Chrysene</b>	<b>0.519</b> (0.180)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Dibenzo(a,h)Anthracene	ND (0.180)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Dibenzofuran	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Diethylphthalate	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Dimethylphthalate	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Di-n-butylphthalate	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Di-n-octylphthalate	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
<b>Fluoranthene</b>	<b>1.34</b> (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Fluorene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Hexachlorobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Hexachlorobutadiene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Hexachlorocyclopentadiene	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Hexachloroethane	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-1 S-1  
Date Sampled: 09/27/16 12:00  
Percent Solids: 90  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-01  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Naphthalene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Nitrobenzene	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
N-Nitrosodimethylamine	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
N-nitrosodiphenylamine	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Pentachlorophenol	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
<b>Phenanthrene</b>	<b>0.807</b> (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Phenol	ND (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
<b>Pyrene</b>	<b>1.14</b> (0.359)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609
Pyridine	ND (1.80)		8270D		1	10/08/16 3:30	CZJ0094	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	51 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	75 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	55 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	57 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	52 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	52 %		30-130
<i>Surrogate: Phenol-d6</i>	56 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	87 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	8.66 (1.88)		6010C		1	KJK	10/12/16 20:03	3.18	100	CJ61103
Barium	58.3 (1.88)		6010C		1	KJK	10/12/16 20:03	3.18	100	CJ61103
Cadmium	ND (0.38)		6020A		20	NAR	10/13/16 15:15	3.18	100	CJ61103
Chromium	26.9 (0.75)		6010C		1	KJK	10/12/16 20:03	3.18	100	CJ61103
Lead	132 (3.76)		6010C		1	KJK	10/12/16 20:03	3.18	100	CJ61103
Mercury	2.12 (0.394)		7471B		10	BJV	10/11/16 15:39	0.6	40	CJ61104
Selenium	ND (0.38)		6020A		20	NAR	10/13/16 15:15	3.18	100	CJ61103
Silver	ND (0.38)		6010C		1	KJK	10/12/16 20:03	3.18	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 8.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0030)		8260B Low		0	10/07/16 17:50		[CALC]
1,4-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0711)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
2-Butanone	ND (0.0355)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
2-Hexanone	ND (0.0355)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
4-Isopropyltoluene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0355)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
<b>Acetone</b>	<b>0.166 (0.0355)</b>		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Acrylonitrile	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Allyl Chloride	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 8.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Bromobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Bromochloromethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Bromoform	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Bromomethane	ND (0.0071)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Chlorobenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Chloroethane	ND (0.0071)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Chloroform	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Chloromethane	ND (0.0071)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Dibromomethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0071)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Diethyl Ether	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Ethylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Methylene Chloride	ND (0.0178)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Naphthalene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Styrene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0355)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 8.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Toluene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Trichloroethene	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0036)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0071)		8260B Low		1	10/07/16 17:50	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0060)		8260B Low		1	10/07/16 17:50		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>118 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>99 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>108 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>108 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 19.4  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1221	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1232	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1242	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1248	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1254	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1260	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1262	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604
Aroclor 1268	ND (0.0616)		8082A		1	10/11/16 16:23		CJ60604

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	61 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	67 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	61 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	64 %		30-150





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 20.5  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	73.5 (43.7)		8100M		1	10/07/16 16:19	CZJ0081	CJ60608

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: O-Terphenyl</i>	75 %		40-140



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
1,2,4-Trichlorobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
1,2-Dichlorobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
1,3-Dichlorobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
1,4-Dichlorobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,4,5-Trichlorophenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,4,6-Trichlorophenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,4-Dichlorophenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,4-Dimethylphenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,4-Dinitrophenol	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,4-Dinitrotoluene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2,6-Dinitrotoluene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2-Chloronaphthalene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2-Chlorophenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2-Methylnaphthalene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2-Methylphenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2-Nitroaniline	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
2-Nitrophenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
3,3'-Dichlorobenzidene	ND (0.771)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
3+4-Methylphenol	ND (0.771)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
3-Nitroaniline	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
4-Bromophenyl-phenylether	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
4-Chloro-3-Methylphenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
4-Chloroaniline	ND (0.771)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
4-Nitroaniline	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
4-Nitrophenol	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Acenaphthene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Acenaphthylene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.771)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Aniline	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Anthracene</b>	<b>0.415</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Azobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Benzidine	ND (0.771)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Benzo(a)anthracene</b>	<b>1.44</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Benzo(a)pyrene</b>	<b>1.24</b> (0.193)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>2.24</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Benzo(g,h,i)perylene</b>	<b>0.608</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Benzo(k)fluoranthene</b>	<b>0.921</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Benzoic Acid	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Benzyl Alcohol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
bis(2-Chloroethoxy)methane	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
bis(2-Chloroethyl)ether	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Butylbenzylphthalate	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Carbazole</b>	<b>0.445</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Chrysene</b>	<b>1.62</b> (0.193)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Dibenzo(a,h)Anthracene</b>	<b>0.286</b> (0.193)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Dibenzofuran	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Diethylphthalate	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Dimethylphthalate	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Di-n-butylphthalate	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Di-n-octylphthalate	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Fluoranthene</b>	<b>4.58</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Fluorene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Hexachlorobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Hexachlorobutadiene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Hexachlorocyclopentadiene	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Hexachloroethane	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Indeno(1,2,3-cd)Pyrene</b>	<b>0.567</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-2 S-2  
Date Sampled: 09/28/16 08:10  
Percent Solids: 84  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-02  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Naphthalene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Nitrobenzene	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
N-Nitrosodimethylamine	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
N-nitrosodiphenylamine	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Pentachlorophenol	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Phenanthrene</b>	<b>1.73</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Phenol	ND (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
<b>Pyrene</b>	<b>3.36</b> (0.385)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609
Pyridine	ND (1.93)		8270D		1	10/08/16 4:07	CZJ0094	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	75 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	89 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	81 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	75 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	76 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	74 %		30-130
<i>Surrogate: Phenol-d6</i>	82 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	110 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	10.4 (2.64)		6010C		1	KJK	10/12/16 20:20	2.08	100	CJ61103
Barium	23.8 (2.64)		6010C		1	KJK	10/12/16 20:20	2.08	100	CJ61103
Cadmium	ND (0.53)		6020A		20	NAR	10/13/16 15:20	2.08	100	CJ61103
Chromium	18.7 (1.06)		6010C		1	KJK	10/12/16 20:20	2.08	100	CJ61103
Lead	14.6 (5.28)		6010C		1	KJK	10/12/16 20:20	2.08	100	CJ61103
Mercury	0.048 (0.034)		7471B		1	BJV	10/11/16 12:59	0.64	40	CJ61104
Selenium	ND (0.53)		6020A		20	NAR	10/13/16 15:20	2.08	100	CJ61103
Silver	ND (0.53)		6010C		1	KJK	10/12/16 20:20	2.08	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 7.2  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0035)		8260B Low		0	10/07/16 18:16		[CALC]
1,4-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0762)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
2-Butanone	ND (0.0381)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
2-Hexanone	ND (0.0381)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
4-Isopropyltoluene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0381)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
<b>Acetone</b>	<b>0.0826</b> (0.0381)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Acrylonitrile	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Allyl Chloride	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 7.2  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Bromobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Bromochloromethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Bromoform	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Bromomethane	ND (0.0076)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Chlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Chloroethane	ND (0.0076)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Chloroform	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Chloromethane	ND (0.0076)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Dibromomethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0076)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Diethyl Ether	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Ethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Methylene Chloride	ND (0.0191)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Naphthalene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Styrene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0381)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 7.2  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Toluene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Trichloroethene	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0038)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0076)		8260B Low		1	10/07/16 18:16	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0069)		8260B Low		1	10/07/16 18:16		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>118 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>103 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>76 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>106 %</i>		<i>70-130</i>





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 19.2  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1221	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1232	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1242	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1248	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1254	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1260	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1262	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604
Aroclor 1268	ND (0.0572)		8082A		1	10/11/16 16:41		CJ60604

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	70 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	78 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	77 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	79 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 19.8  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	65.8 (41.6)		8100M		1	10/07/16 16:58	CZJ0081	CJ60608
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		79 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 15.3  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
1,2,4-Trichlorobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
1,2-Dichlorobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
1,3-Dichlorobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
1,4-Dichlorobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,4,5-Trichlorophenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,4,6-Trichlorophenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,4-Dichlorophenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,4-Dimethylphenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,4-Dinitrophenol	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,4-Dinitrotoluene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2,6-Dinitrotoluene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2-Chloronaphthalene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2-Chlorophenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2-Methylnaphthalene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2-Methylphenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2-Nitroaniline	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
2-Nitrophenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
3,3'-Dichlorobenzidene	ND (0.718)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
3+4-Methylphenol	ND (0.718)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
3-Nitroaniline	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
4-Bromophenyl-phenylether	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
4-Chloro-3-Methylphenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
4-Chloroaniline	ND (0.718)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
4-Nitroaniline	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
4-Nitrophenol	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Acenaphthene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Acenaphthylene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 15.3  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.718)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Aniline	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Anthracene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Azobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzidine	ND (0.718)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzo(a)anthracene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzo(a)pyrene	ND (0.180)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzo(b)fluoranthene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzo(g,h,i)perylene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzo(k)fluoranthene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzoic Acid	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Benzyl Alcohol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
bis(2-Chloroethoxy)methane	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
bis(2-Chloroethyl)ether	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Butylbenzylphthalate	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Carbazole	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Chrysene	ND (0.180)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Dibenzo(a,h)Anthracene	ND (0.180)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Dibenzofuran	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Diethylphthalate	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Dimethylphthalate	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Di-n-butylphthalate	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Di-n-octylphthalate	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Fluoranthene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Fluorene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Hexachlorobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Hexachlorobutadiene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Hexachlorocyclopentadiene	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Hexachloroethane	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-3 S-4  
Date Sampled: 09/27/16 13:25  
Percent Solids: 91  
Initial Volume: 15.3  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-03  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Naphthalene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Nitrobenzene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
N-Nitrosodimethylamine	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
N-nitrosodiphenylamine	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Pentachlorophenol	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Phenanthrene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Phenol	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Pyrene	ND (0.358)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609
Pyridine	ND (1.80)		8270D		1	10/08/16 4:45	CZJ0094	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	68 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	5 %	SM	30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	34 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	70 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	19 %	SM	30-130
<i>Surrogate: Nitrobenzene-d5</i>	68 %		30-130
<i>Surrogate: Phenol-d6</i>	49 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	117 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	4.90 (2.27)		6010C		1	KJK	10/12/16 20:26	2.6	100	CJ61103
Barium	24.8 (2.27)		6010C		1	KJK	10/12/16 20:26	2.6	100	CJ61103
Cadmium	ND (0.45)		6020A		20	NAR	10/13/16 15:26	2.6	100	CJ61103
Chromium	17.6 (0.91)		6010C		1	KJK	10/12/16 20:26	2.6	100	CJ61103
Lead	50.0 (4.54)		6010C		1	KJK	10/12/16 20:26	2.6	100	CJ61103
Mercury	0.085 (0.033)		7471B		1	BJV	10/11/16 13:01	0.71	40	CJ61104
Selenium	ND (0.45)		6020A		20	NAR	10/13/16 15:26	2.6	100	CJ61103
Silver	ND (0.45)		6010C		1	KJK	10/12/16 20:26	2.6	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85  
Initial Volume: 7.3  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0034)		8260B Low		0	10/07/16 18:42		[CALC]
1,4-Dichlorobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0809)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
2-Butanone	ND (0.0405)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
2-Hexanone	ND (0.0405)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
4-Isopropyltoluene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0405)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
<b>Acetone</b>	<b>0.303 (0.0405)</b>		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Acrylonitrile	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Allyl Chloride	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85  
Initial Volume: 7.3  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Bromobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Bromochloromethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Bromoform	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Bromomethane	ND (0.0081)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Chlorobenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Chloroethane	ND (0.0081)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Chloroform	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Chloromethane	ND (0.0081)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Dibromomethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0081)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Diethyl Ether	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Ethylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Methylene Chloride	ND (0.0202)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Naphthalene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Styrene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0405)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85  
Initial Volume: 7.3  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Toluene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Trichloroethene	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0040)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0081)		8260B Low		1	10/07/16 18:42	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0068)		8260B Low		1	10/07/16 18:42		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>120 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>99 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>108 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>110 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85  
Initial Volume: 19.5  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1221	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1232	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1242	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1248	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1254	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1260	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1262	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327
Aroclor 1268	ND (0.0606)		8082A		1	10/12/16 19:12		CJ61327

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	67 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	74 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	74 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	75 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85  
Initial Volume: 20.2  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	186 (43.9)		8100M		1	10/07/16 17:38	CZJ0081	CJ60608

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: O-Terphenyl</i>	85 %		40-140



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
 Client Project ID: RTE 33 Portsmouth  
 Client Sample ID: B-4 S-3  
 Date Sampled: 09/27/16 15:25  
 Percent Solids: 85  
 Initial Volume: 14.2  
 Final Volume: 0.5  
 Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
 ESS Laboratory Sample ID: 1610112-04  
 Sample Matrix: Soil  
 Units: mg/kg dry  
 Analyst: TJ  
 Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
1,2,4-Trichlorobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
1,2-Dichlorobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
1,3-Dichlorobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
1,4-Dichlorobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,3,4,6-Tetrachlorophenol	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,4,5-Trichlorophenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,4,6-Trichlorophenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,4-Dichlorophenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,4-Dimethylphenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,4-Dinitrophenol	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,4-Dinitrotoluene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2,6-Dinitrotoluene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2-Chloronaphthalene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2-Chlorophenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2-Methylnaphthalene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2-Methylphenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2-Nitroaniline	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
2-Nitrophenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
3,3'-Dichlorobenzidene	ND (0.832)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
3+4-Methylphenol	ND (0.832)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
3-Nitroaniline	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
4,6-Dinitro-2-Methylphenol	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
4-Bromophenyl-phenylether	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
4-Chloro-3-Methylphenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
4-Chloroaniline	ND (0.832)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
4-Nitroaniline	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
4-Nitrophenol	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Acenaphthene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Acenaphthylene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85  
Initial Volume: 14.2  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.832)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Aniline	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Anthracene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Azobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Benzidine	ND (0.832)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Benzo(a)anthracene</b>	<b>0.993</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Benzo(a)pyrene</b>	<b>1.01</b> (0.208)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>1.54</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Benzo(g,h,i)perylene</b>	<b>0.602</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Benzo(k)fluoranthene</b>	<b>0.653</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Benzoic Acid	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Benzyl Alcohol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
bis(2-Chloroethoxy)methane	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
bis(2-Chloroethyl)ether	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Butylbenzylphthalate	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Carbazole	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Chrysene</b>	<b>1.03</b> (0.208)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Dibenzo(a,h)Anthracene</b>	<b>0.235</b> (0.208)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Dibenzofuran	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Diethylphthalate	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Dimethylphthalate	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Di-n-butylphthalate	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Di-n-octylphthalate	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Fluoranthene</b>	<b>2.53</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Fluorene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Hexachlorobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Hexachlorobutadiene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Hexachlorocyclopentadiene	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Hexachloroethane	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Indeno(1,2,3-cd)Pyrene</b>	<b>0.495</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-4 S-3  
Date Sampled: 09/27/16 15:25  
Percent Solids: 85  
Initial Volume: 14.2  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-04  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Naphthalene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Nitrobenzene	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
N-Nitrosodimethylamine	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
N-nitrosodiphenylamine	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Pentachlorophenol	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Phenanthrene</b>	<b>0.847</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Phenol	ND (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
<b>Pyrene</b>	<b>2.35</b> (0.416)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609
Pyridine	ND (2.08)		8270D		1	10/08/16 5:22	CZJ0094	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	67 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	83 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	69 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	73 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	66 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	67 %		30-130
<i>Surrogate: Phenol-d6</i>	69 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	118 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	10.6 (2.38)		6010C		1	KJK	10/12/16 20:30	2.26	100	CJ61103
Barium	28.7 (2.38)		6010C		1	KJK	10/12/16 20:30	2.26	100	CJ61103
Cadmium	ND (0.48)		6020A		20	NAR	10/13/16 15:32	2.26	100	CJ61103
Chromium	51.0 (0.95)		6010C		1	KJK	10/12/16 20:30	2.26	100	CJ61103
Lead	19.2 (4.76)		6010C		1	KJK	10/12/16 20:30	2.26	100	CJ61103
Mercury	0.035 (0.032)		7471B		1	BJV	10/11/16 13:03	0.67	40	CJ61104
Selenium	ND (0.48)		6020A		20	NAR	10/13/16 15:32	2.26	100	CJ61103
Silver	ND (0.48)		6010C		1	KJK	10/12/16 20:30	2.26	100	CJ61103





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 7.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0035)		8260B Low		0	10/07/16 19:08		[CALC]
1,4-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0758)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
2-Butanone	ND (0.0379)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
2-Hexanone	ND (0.0379)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
4-Isopropyltoluene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0379)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Acetone	ND (0.0379)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Acrylonitrile	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Allyl Chloride	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 7.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Bromobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Bromochloromethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Bromoform	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Bromomethane	ND (0.0076)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Chlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Chloroethane	ND (0.0076)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Chloroform	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Chloromethane	ND (0.0076)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Dibromomethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0076)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Diethyl Ether	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Ethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Methylene Chloride	ND (0.0189)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Naphthalene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Styrene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0379)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 7.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Toluene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Trichloroethene	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0038)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0076)		8260B Low		1	10/07/16 19:08	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0070)		8260B Low		1	10/07/16 19:08		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>116 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>99 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>107 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>107 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 20.1  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1221	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1232	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1242	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1248	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1254	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1260	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1262	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604
Aroclor 1268	ND (0.0535)		8082A		1	10/11/16 19:12		CJ60604

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	69 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	74 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	74 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	75 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 20.9  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	79.3 (38.6)		8100M		1	10/07/16 18:18	CZJ0081	CJ60608
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		72 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 14.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2-Chlorophenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2-Methylnaphthalene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2-Methylphenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2-Nitroaniline	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
2-Nitrophenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
3,3'-Dichlorobenzidene	ND (0.723)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
3+4-Methylphenol	ND (0.723)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
3-Nitroaniline	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
4-Chloroaniline	ND (0.723)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
4-Nitroaniline	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
4-Nitrophenol	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Acenaphthene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Acenaphthylene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 14.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.723)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Aniline	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Anthracene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Azobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Benzidine	ND (0.723)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Benzo(a)anthracene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
<b>Benzo(a)pyrene</b>	<b>0.295</b> (0.181)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>0.466</b> (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Benzo(g,h,i)perylene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Benzo(k)fluoranthene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Benzoic Acid	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Carbazole	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
<b>Chrysene</b>	<b>0.289</b> (0.181)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Dibenzo(a,h)Anthracene	ND (0.181)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Dibenzofuran	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Diethylphthalate	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Dimethylphthalate	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
<b>Fluoranthene</b>	<b>0.549</b> (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Fluorene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Hexachloroethane	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-5 S-4  
Date Sampled: 09/28/16 14:15  
Percent Solids: 93  
Initial Volume: 14.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-05  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Naphthalene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Nitrobenzene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Pentachlorophenol	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Phenanthrene	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Phenol	ND (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
<b>Pyrene</b>	<b>0.394</b> (0.361)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609
Pyridine	ND (1.81)		8270D		1	10/11/16 15:14	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	80 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	92 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	87 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	80 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	84 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	81 %		30-130
<i>Surrogate: Phenol-d6</i>	92 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	82 %		30-130





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	11.5 (2.90)		6010C		1	KJK	10/12/16 20:34	2.03	100	CJ61103
Barium	91.4 (2.90)		6010C		1	KJK	10/12/16 20:34	2.03	100	CJ61103
Cadmium	ND (0.58)		6020A		20	NAR	10/13/16 15:38	2.03	100	CJ61103
Chromium	35.8 (1.16)		6010C		1	KJK	10/12/16 20:34	2.03	100	CJ61103
Lead	216 (5.80)		6010C		1	KJK	10/12/16 20:34	2.03	100	CJ61103
Mercury	0.523 (0.033)		7471B		1	BJV	10/11/16 13:05	0.7	40	CJ61104
Selenium	1.91 (0.58)		6020A		20	NAR	10/13/16 15:38	2.03	100	CJ61103
Silver	ND (0.58)		6010C		1	KJK	10/12/16 20:34	2.03	100	CJ61103





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85  
Initial Volume: 9.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0027)		8260B Low		0	10/07/16 19:34		[CALC]
1,4-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0626)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
2-Butanone	ND (0.0313)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
2-Hexanone	ND (0.0313)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
4-Isopropyltoluene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0313)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
<b>Acetone</b>	<b>0.102 (0.0313)</b>		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Acrylonitrile	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Allyl Chloride	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85  
Initial Volume: 9.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Bromobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Bromochloromethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Bromoform	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Bromomethane	ND (0.0063)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Chlorobenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Chloroethane	ND (0.0063)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Chloroform	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Chloromethane	ND (0.0063)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Dibromomethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0063)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Diethyl Ether	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Ethylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Methylene Chloride	ND (0.0156)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Naphthalene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Styrene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0313)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85  
Initial Volume: 9.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Toluene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Trichloroethene	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0031)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0063)		8260B Low		1	10/07/16 19:34	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0053)		8260B Low		1	10/07/16 19:34		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>125 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>94 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>110 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>112 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85  
Initial Volume: 20.6  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1221	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1232	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1242	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1248	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1254	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1260	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1262	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604
Aroclor 1268	ND (0.0571)		8082A		1	10/11/16 19:31		CJ60604

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	<i>86 %</i>		<i>30-150</i>
<i>Surrogate: Decachlorobiphenyl [2C]</i>	<i>95 %</i>		<i>30-150</i>
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>84 %</i>		<i>30-150</i>
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	<i>90 %</i>		<i>30-150</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85  
Initial Volume: 20.9  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	ND (42.2)		8100M		1	10/07/16 18:58	CZJ0081	CJ60608

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	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: O-Terphenyl</i>	66 %		40-140



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85  
Initial Volume: 14  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
1,2,4-Trichlorobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
1,2-Dichlorobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
1,3-Dichlorobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
1,4-Dichlorobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,3,4,6-Tetrachlorophenol	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,4,5-Trichlorophenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,4,6-Trichlorophenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,4-Dichlorophenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,4-Dimethylphenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,4-Dinitrophenol	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,4-Dinitrotoluene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2,6-Dinitrotoluene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2-Chloronaphthalene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2-Chlorophenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2-Methylnaphthalene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2-Methylphenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2-Nitroaniline	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
2-Nitrophenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
3,3'-Dichlorobenzidene	ND (0.841)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
3+4-Methylphenol	ND (0.841)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
3-Nitroaniline	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
4,6-Dinitro-2-Methylphenol	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
4-Bromophenyl-phenylether	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
4-Chloro-3-Methylphenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
4-Chloroaniline	ND (0.841)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
4-Nitroaniline	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
4-Nitrophenol	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Acenaphthene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Acenaphthylene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-6 S-3  
Date Sampled: 09/28/16 12:20  
Percent Solids: 85  
Initial Volume: 14  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-06  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.841)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Aniline	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Anthracene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Azobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzidine	ND (0.841)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzo(a)anthracene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzo(a)pyrene	ND (0.211)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzo(b)fluoranthene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzo(g,h,i)perylene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzo(k)fluoranthene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzoic Acid	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Benzyl Alcohol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
bis(2-Chloroethoxy)methane	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
bis(2-Chloroethyl)ether	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Butylbenzylphthalate	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Carbazole	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Chrysene	ND (0.211)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Dibenzo(a,h)Anthracene	ND (0.211)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Dibenzofuran	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Diethylphthalate	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Dimethylphthalate	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Di-n-butylphthalate	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Di-n-octylphthalate	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
<b>Fluoranthene</b>	<b>0.424</b> (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Fluorene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Hexachlorobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Hexachlorobutadiene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Hexachlorocyclopentadiene	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Hexachloroethane	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
 Client Project ID: RTE 33 Portsmouth  
 Client Sample ID: B-6 S-3  
 Date Sampled: 09/28/16 12:20  
 Percent Solids: 85  
 Initial Volume: 14  
 Final Volume: 0.5  
 Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
 ESS Laboratory Sample ID: 1610112-06  
 Sample Matrix: Soil  
 Units: mg/kg dry  
 Analyst: TJ  
 Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Naphthalene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Nitrobenzene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
N-Nitrosodimethylamine	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
N-nitrosodiphenylamine	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Pentachlorophenol	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Phenanthrene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Phenol	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Pyrene	ND (0.420)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609
Pyridine	ND (2.11)		8270D		1	10/08/16 6:37	CZJ0094	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	73 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	83 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	76 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	74 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	75 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	74 %		30-130
<i>Surrogate: Phenol-d6</i>	77 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	105 %		30-130





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	7.43 (2.77)		6010C		1	KJK	10/12/16 20:38	2.12	100	CJ61103
Barium	43.2 (2.77)		6010C		1	KJK	10/12/16 20:38	2.12	100	CJ61103
Cadmium	ND (0.55)		6020A		20	NAR	10/13/16 15:44	2.12	100	CJ61103
Chromium	29.0 (1.11)		6010C		1	KJK	10/12/16 20:38	2.12	100	CJ61103
Lead	307 (5.53)		6010C		1	KJK	10/12/16 20:38	2.12	100	CJ61103
Mercury	0.105 (0.037)		7471B		1	BJV	10/11/16 13:07	0.62	40	CJ61104
Selenium	ND (0.55)		6020A		20	NAR	10/13/16 15:44	2.12	100	CJ61103
Silver	ND (0.55)		6010C		1	KJK	10/12/16 20:38	2.12	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 7.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0032)		8260B Low		0	10/07/16 20:00		[CALC]
1,4-Dichlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0762)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
2-Butanone	ND (0.0381)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
2-Hexanone	ND (0.0381)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
<b>4-Isopropyltoluene</b>	<b>0.0312</b> (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0381)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
<b>Acetone</b>	<b>0.176</b> (0.0381)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Acrylonitrile	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Allyl Chloride	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 7.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Bromobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Bromochloromethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Bromoform	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Bromomethane	ND (0.0076)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Chlorobenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Chloroethane	ND (0.0076)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Chloroform	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Chloromethane	ND (0.0076)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Dibromomethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0076)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Diethyl Ether	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Ethylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Methylene Chloride	ND (0.0190)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
<b>Naphthalene</b>	<b>0.0255 (0.0038)</b>		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Styrene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0381)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 7.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Toluene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Trichloroethene	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0038)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0076)		8260B Low		1	10/07/16 20:00	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0065)		8260B Low		1	10/07/16 20:00		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>124 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>102 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>110 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>106 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 20.6  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1221	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1232	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1242	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1248	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1254	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1260	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1262	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327
Aroclor 1268	ND (0.0569)		8082A		1	10/12/16 19:31		CJ61327

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	<i>93 %</i>		<i>30-150</i>
<i>Surrogate: Decachlorobiphenyl [2C]</i>	<i>105 %</i>		<i>30-150</i>
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>63 %</i>		<i>30-150</i>
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	<i>57 %</i>		<i>30-150</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 19.2  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	354 (45.8)		8100M		1	10/07/16 19:39	CZJ0081	CJ60608
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		72 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 14.8  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2-Chlorophenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2-Methylnaphthalene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2-Methylphenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2-Nitroaniline	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
2-Nitrophenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
3,3'-Dichlorobenzidene	ND (1.59)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
3+4-Methylphenol	ND (1.59)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
3-Nitroaniline	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
4-Chloroaniline	ND (1.59)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
4-Nitroaniline	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
4-Nitrophenol	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Acenaphthene</b>	<b>1.14</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Acenaphthylene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 14.8  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (1.59)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Aniline	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Anthracene</b>	<b>1.71</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Azobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Benzidine	ND (1.59)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Benzo(a)anthracene</b>	<b>2.80</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Benzo(a)pyrene</b>	<b>2.38</b> (0.397)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>3.98</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Benzo(g,h,i)perylene</b>	<b>0.819</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Benzo(k)fluoranthene</b>	<b>1.15</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Benzoic Acid	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Carbazole</b>	<b>1.29</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Chrysene</b>	<b>2.81</b> (0.397)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Dibenzo(a,h)Anthracene	ND (0.397)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Dibenzofuran</b>	<b>1.76</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Diethylphthalate	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Dimethylphthalate	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Fluoranthene</b>	<b>8.26</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Fluorene</b>	<b>2.72</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Hexachloroethane	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-7 S-4  
Date Sampled: 09/28/16 12:00  
Percent Solids: 85  
Initial Volume: 14.8  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-07  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Naphthalene</b>	<b>0.897</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Nitrobenzene	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Pentachlorophenol	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Phenanthrene</b>	<b>9.88</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Phenol	ND (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
<b>Pyrene</b>	<b>5.32</b> (0.792)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609
Pyridine	ND (3.97)		8270D		2	10/11/16 15:52	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	67 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	88 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	72 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	70 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	68 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	65 %		30-130
<i>Surrogate: Phenol-d6</i>	75 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	84 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	6.42 (2.60)		6010C		1	KJK	10/12/16 20:42	2.11	100	CJ61103
Barium	22.6 (2.60)		6010C		1	KJK	10/12/16 20:42	2.11	100	CJ61103
Cadmium	0.58 (0.52)		6020A		20	NAR	10/13/16 15:50	2.11	100	CJ61103
Chromium	28.4 (1.04)		6010C		1	KJK	10/12/16 20:42	2.11	100	CJ61103
Lead	72.0 (5.20)		6010C		1	KJK	10/12/16 20:42	2.11	100	CJ61103
Mercury	0.038 (0.031)		7471B		1	BJV	10/11/16 13:13	0.7	40	CJ61104
Selenium	ND (0.52)		6020A		20	NAR	10/13/16 15:50	2.11	100	CJ61103
Silver	ND (0.52)		6010C		1	KJK	10/12/16 20:42	2.11	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 7.9  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0032)		8260B Low		0	10/07/16 20:26		[CALC]
1,4-Dichlorobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0695)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
2-Butanone	ND (0.0347)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
2-Hexanone	ND (0.0347)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
<b>4-Isopropyltoluene</b>	<b>E 0.337</b> (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0347)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
<b>Acetone</b>	<b>0.237</b> (0.0347)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Acrylonitrile	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Allyl Chloride	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 7.9  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Bromobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Bromochloromethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Bromoform	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Bromomethane	ND (0.0069)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Chlorobenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Chloroethane	ND (0.0069)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Chloroform	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Chloromethane	ND (0.0069)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Dibromomethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0069)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Diethyl Ether	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Ethylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Methylene Chloride	ND (0.0174)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
<b>Naphthalene</b>	<b>0.0047 (0.0035)</b>		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Styrene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0347)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 7.9  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Toluene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Trichloroethene	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0035)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0069)		8260B Low		1	10/07/16 20:26	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0063)		8260B Low		1	10/07/16 20:26		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>119 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>103 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>106 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>108 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 26.3  
Final Volume: 15  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Methanol**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,1,1-Trichloroethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,1,2,2-Tetrachloroethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,1,2-Trichloroethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,1-Dichloroethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,1-Dichloroethene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,1-Dichloropropene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2,3-Trichlorobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2,3-Trichloropropane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2,4-Trichlorobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2,4-Trimethylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2-Dibromo-3-Chloropropane	ND (0.723)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2-Dibromoethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2-Dichlorobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2-Dichloroethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,2-Dichloropropane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,3 Dichloropropene (Total)	ND (0.145)		8260B		1	10/11/16 15:59		[CALC]
1,3,5-Trichlorobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,3,5-Trimethylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,3-Dichlorobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,4-Dichlorobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
1,4-Dioxane - Screen	ND (28.9)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
2,2-Dichloropropane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
2-Butanone	ND (0.723)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
2-Chlorotoluene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
2-Hexanone	ND (0.723)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
4-Chlorotoluene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
<b>4-Isopropyltoluene</b>	<b>8.86 (0.145)</b>		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
4-Methyl-2-Pentanone	ND (0.723)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Acetone	ND (0.723)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Acrylonitrile	ND (0.723)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Allyl Chloride	ND (0.289)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 26.3  
Final Volume: 15  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Methanol**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Bromobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Bromochloromethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Bromodichloromethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Bromoform	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Bromomethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Carbon Disulfide	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Carbon Tetrachloride	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Chlorobenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Chloroethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Chloroform	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Chloromethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
cis-1,2-Dichloroethene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Dibromochloromethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Dibromomethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Dichlorodifluoromethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Diethyl Ether	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Di-isopropyl ether	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Ethyl tertiary-butyl ether	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Ethylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Hexachlorobutadiene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Isopropylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Methyl tert-Butyl Ether	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Methylene Chloride	ND (0.289)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Naphthalene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
n-Butylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
n-Propylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
sec-Butylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Styrene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
tert-Butylbenzene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Tertiary-amyl methyl ether	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Tetrachloroethene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 26.3  
Final Volume: 15  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Methanol**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrahydrofuran	ND (0.723)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Toluene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
trans-1,2-Dichloroethene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Trichloroethene	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Trichlorofluoromethane	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Vinyl Chloride	ND (0.145)		8260B		1	10/11/16 15:59	CZJ0121	CJ61136
Xylenes (Total)	ND (0.289)		8260B		1	10/11/16 15:59		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	94 %		70-130
<i>Surrogate: 4-Bromofluorobenzene</i>	90 %		70-130
<i>Surrogate: Dibromofluoromethane</i>	101 %		70-130
<i>Surrogate: Toluene-d8</i>	93 %		70-130





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 19.1  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1221	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1232	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1242	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1248	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1254	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1260	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1262	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327
Aroclor 1268	ND (0.0575)		8082A		1	10/12/16 19:50		CJ61327

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	65 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	73 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	71 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	73 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 19.4  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	168 (42.4)		8100M		1	10/07/16 20:19	CZJ0081	CJ60608
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		68 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 15.6  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2-Chlorophenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2-Methylnaphthalene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2-Methylphenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2-Nitroaniline	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
2-Nitrophenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
3,3'-Dichlorobenzidine	ND (1.41)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
3+4-Methylphenol	ND (1.41)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
3-Nitroaniline	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
4-Chloroaniline	ND (1.41)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
4-Nitroaniline	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
4-Nitrophenol	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Acenaphthene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Acenaphthylene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 15.6  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (1.41)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Aniline	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Anthracene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Azobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Benzidine	ND (1.41)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
<b>Benzo(a)anthracene</b>	<b>0.802</b> (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
<b>Benzo(a)pyrene</b>	<b>0.830</b> (0.352)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>1.62</b> (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Benzo(g,h,i)perylene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Benzo(k)fluoranthene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Benzoic Acid	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Carbazole	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
<b>Chrysene</b>	<b>0.951</b> (0.352)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Dibenzo(a,h)Anthracene	ND (0.352)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Dibenzofuran	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Diethylphthalate	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Dimethylphthalate	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
<b>Fluoranthene</b>	<b>2.15</b> (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Fluorene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Hexachloroethane	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-8 S-2  
Date Sampled: 09/28/16 14:40  
Percent Solids: 91  
Initial Volume: 15.6  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-08  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Naphthalene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Nitrobenzene	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Pentachlorophenol	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
<b>Phenanthrene</b>	<b>0.953</b> (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Phenol	ND (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
<b>Pyrene</b>	<b>1.46</b> (0.703)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609
Pyridine	ND (3.52)		8270D		2	10/11/16 16:29	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	68 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	93 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	76 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	74 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	71 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	68 %		30-130
<i>Surrogate: Phenol-d6</i>	81 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	96 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	13.7 (2.75)		6010C		1	KJK	10/12/16 20:46	2.21	100	CJ61103
Barium	58.4 (2.75)		6010C		1	KJK	10/12/16 20:46	2.21	100	CJ61103
Cadmium	ND (0.55)		6020A		20	NAR	10/13/16 15:56	2.21	100	CJ61103
Chromium	32.7 (1.10)		6010C		1	KJK	10/12/16 20:46	2.21	100	CJ61103
Lead	30.9 (5.50)		6010C		1	KJK	10/12/16 20:46	2.21	100	CJ61103
Mercury	0.046 (0.033)		7471B		1	BJV	10/11/16 13:15	0.73	40	CJ61104
Selenium	ND (0.55)		6020A		20	NAR	10/13/16 15:56	2.21	100	CJ61103
Silver	ND (0.55)		6010C		1	KJK	10/12/16 20:46	2.21	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 6.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,1,1-Trichloroethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,1,2,2-Tetrachloroethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,1,2-Trichloroethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,1-Dichloroethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,1-Dichloroethene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,1-Dichloropropene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2,3-Trichlorobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2,3-Trichloropropane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2,4-Trichlorobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2,4-Trimethylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2-Dibromo-3-Chloropropane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2-Dibromoethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2-Dichlorobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2-Dichloroethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,2-Dichloropropane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,3,5-Trichlorobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,3,5-Trimethylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,3-Dichlorobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,3-Dichloropropene (Total)	ND (0.0037)		8260B Low		0	10/07/16 20:52		[CALC]
1,4-Dichlorobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
1,4-Dioxane	ND (0.0907)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
2,2-Dichloropropane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
2-Butanone	ND (0.0453)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
2-Chlorotoluene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
2-Hexanone	ND (0.0453)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
4-Chlorotoluene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
<b>4-Isopropyltoluene</b>	<b>0.0440</b> (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
4-Methyl-2-Pentanone	ND (0.0453)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
<b>Acetone</b>	<b>0.235</b> (0.0453)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Acrylonitrile	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Allyl Chloride	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 6.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Bromobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Bromochloromethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Bromodichloromethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Bromoform	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Bromomethane	ND (0.0091)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Carbon Disulfide	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Carbon Tetrachloride	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Chlorobenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Chloroethane	ND (0.0091)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Chloroform	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Chloromethane	ND (0.0091)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
cis-1,2-Dichloroethene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Dibromochloromethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Dibromomethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Dichlorodifluoromethane	ND (0.0091)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Diethyl Ether	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Di-isopropyl ether	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Ethyl tertiary-butyl ether	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Ethylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Hexachlorobutadiene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Isopropylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Methyl tert-Butyl Ether	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Methylene Chloride	ND (0.0227)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Naphthalene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
n-Butylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
n-Propylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
sec-Butylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Styrene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
tert-Butylbenzene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Tertiary-amyl methyl ether	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Tertiary-butyl Alcohol	ND (0.0453)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 6.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MEK

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Tetrahydrofuran	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
<b>Toluene</b>	<b>0.0105</b> (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
trans-1,2-Dichloroethene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Trichloroethene	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Trichlorofluoromethane	ND (0.0045)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Vinyl Chloride	ND (0.0091)		8260B Low		1	10/07/16 20:52	CZJ0093	CJ60724
Xylenes (Total)	ND (0.0075)		8260B Low		1	10/07/16 20:52		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>112 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>103 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>104 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>106 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 20.5  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 11:45

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1221	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1232	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1242	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1248	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1254	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1260	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1262	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604
Aroclor 1268	ND (0.0593)		8082A		1	10/11/16 20:27		CJ60604

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	72 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	77 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	82 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	87 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 19  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	136 (48.0)		8100M		1	10/07/16 21:01	CZJ0081	CJ60608
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		67 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 15.6  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
1,2,4-Trichlorobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
1,2-Dichlorobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
1,3-Dichlorobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
1,4-Dichlorobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,4,5-Trichlorophenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,4,6-Trichlorophenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,4-Dichlorophenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,4-Dimethylphenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,4-Dinitrophenol	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,4-Dinitrotoluene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2,6-Dinitrotoluene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2-Chloronaphthalene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2-Chlorophenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2-Methylnaphthalene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2-Methylphenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2-Nitroaniline	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
2-Nitrophenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
3,3'-Dichlorobenzidene	ND (0.779)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
3+4-Methylphenol	ND (0.779)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
3-Nitroaniline	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
4-Bromophenyl-phenylether	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
4-Chloro-3-Methylphenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
4-Chloroaniline	ND (0.779)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
4-Nitroaniline	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
4-Nitrophenol	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Acenaphthene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Acenaphthylene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 15.6  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.779)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Aniline	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Anthracene</b>	<b>0.526</b> (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Azobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Benzidine	ND (0.779)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Benzo(a)anthracene</b>	<b>1.09</b> (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Benzo(a)pyrene</b>	<b>0.803</b> (0.195)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>1.19</b> (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Benzo(g,h,i)perylene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Benzo(k)fluoranthene</b>	<b>0.395</b> (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Benzoic Acid	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Benzyl Alcohol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
bis(2-Chloroethoxy)methane	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
bis(2-Chloroethyl)ether	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Butylbenzylphthalate	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Carbazole	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Chrysene</b>	<b>0.890</b> (0.195)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Dibenzo(a,h)Anthracene	ND (0.195)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Dibenzofuran	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Diethylphthalate	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Dimethylphthalate	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Di-n-butylphthalate	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Di-n-octylphthalate	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Fluoranthene</b>	<b>2.88</b> (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Fluorene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Hexachlorobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Hexachlorobutadiene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Hexachlorocyclopentadiene	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Hexachloroethane	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-9 S-3  
Date Sampled: 09/27/16 11:20  
Percent Solids: 82  
Initial Volume: 15.6  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-09  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Naphthalene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Nitrobenzene	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
N-Nitrosodimethylamine	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
N-nitrosodiphenylamine	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Pentachlorophenol	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Phenanthrene</b>	<b>2.26</b> (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Phenol	ND (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
<b>Pyrene</b>	<b>3.17</b> (0.389)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609
Pyridine	ND (1.95)		8270D		1	10/08/16 8:29	CZJ0094	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	65 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	75 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	72 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	60 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	71 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	59 %		30-130
<i>Surrogate: Phenol-d6</i>	75 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	129 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	12.4 (2.37)		6010C		1	KJK	10/12/16 20:50	2.49	100	CJ61103
Barium	50.4 (2.37)		6010C		1	KJK	10/12/16 20:50	2.49	100	CJ61103
Cadmium	ND (0.47)		6020A		20	NAR	10/13/16 16:01	2.49	100	CJ61103
Chromium	34.3 (0.95)		6010C		1	KJK	10/12/16 20:50	2.49	100	CJ61103
Lead	34.1 (4.73)		6010C		1	KJK	10/12/16 20:50	2.49	100	CJ61103
Mercury	0.053 (0.034)		7471B		1	BJV	10/11/16 13:17	0.69	40	CJ61104
Selenium	ND (0.47)		6020A		20	NAR	10/13/16 16:01	2.49	100	CJ61103
Silver	ND (0.47)		6010C		1	KJK	10/12/16 20:50	2.49	100	CJ61103





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 8.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,1,1-Trichloroethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,1,2,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,1,2-Trichloroethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,1-Dichloroethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,1-Dichloroethene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,1-Dichloropropene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2,3-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2,3-Trichloropropane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2,4-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2,4-Trimethylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2-Dibromo-3-Chloropropane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2-Dibromoethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2-Dichloroethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,3,5-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,3,5-Trimethylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,3-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,3-Dichloropropene (Total)	ND (0.0031)		8260B Low		0	10/11/16 17:12		[CALC]
1,4-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
1,4-Dioxane	ND (0.0727)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
2,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
2-Butanone	ND (0.0364)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
2-Chlorotoluene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
2-Hexanone	ND (0.0364)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
4-Chlorotoluene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
4-Isopropyltoluene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
4-Methyl-2-Pentanone	ND (0.0364)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Acetone	ND (0.0364)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Acrylonitrile	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Allyl Chloride	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 8.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Bromobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Bromochloromethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Bromodichloromethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Bromoform	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Bromomethane	ND (0.0073)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Carbon Disulfide	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Carbon Tetrachloride	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Chlorobenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Chloroethane	ND (0.0073)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Chloroform	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Chloromethane	ND (0.0073)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
cis-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Dibromochloromethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Dibromomethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Dichlorodifluoromethane	ND (0.0073)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Diethyl Ether	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Di-isopropyl ether	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Ethyl tertiary-butyl ether	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Ethylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Hexachlorobutadiene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Isopropylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Methyl tert-Butyl Ether	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Methylene Chloride	ND (0.0182)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Naphthalene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
n-Butylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
n-Propylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
sec-Butylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Styrene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
tert-Butylbenzene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Tertiary-amyl methyl ether	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Tertiary-butyl Alcohol	ND (0.0364)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 8.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Tetrahydrofuran	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Toluene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
trans-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Trichloroethene	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Trichlorofluoromethane	ND (0.0036)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Vinyl Chloride	ND (0.0073)		8260B Low		1	10/11/16 17:12	CZJ0122	CJ61137
Xylenes (Total)	ND (0.0062)		8260B Low		1	10/11/16 17:12		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>122 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>103 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>115 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>108 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 20.1  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 16:53

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1221	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1232	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1242	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1248	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1254	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1260	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1262	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709
Aroclor 1268	ND (0.0586)		8082A		1	10/11/16 20:46		CJ60709

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	65 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	71 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	74 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	72 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 19.7  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: DPS  
Prepared: 10/7/16 9:45

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	64.2 (44.9)		8100M		1	10/07/16 21:39	CZJ0081	CJ60608
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		74 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 14.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2-Chlorophenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2-Methylnaphthalene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2-Methylphenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2-Nitroaniline	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
2-Nitrophenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
3,3'-Dichlorobenzidene	ND (0.791)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
3+4-Methylphenol	ND (0.791)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
3-Nitroaniline	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
4-Chloroaniline	ND (0.791)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
4-Nitroaniline	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
4-Nitrophenol	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Acenaphthene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Acenaphthylene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 14.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.791)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Aniline	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Anthracene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Azobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Benzidine	ND (0.791)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Benzo(a)anthracene</b>	<b>0.982</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Benzo(a)pyrene</b>	<b>1.06</b> (0.198)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>1.67</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Benzo(g,h,i)perylene</b>	<b>0.490</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Benzo(k)fluoranthene</b>	<b>0.523</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Benzoic Acid	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Carbazole	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Chrysene</b>	<b>0.953</b> (0.198)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Dibenzo(a,h)Anthracene</b>	<b>0.205</b> (0.198)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Dibenzofuran	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Diethylphthalate	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Dimethylphthalate	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Fluoranthene</b>	<b>2.26</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Fluorene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Hexachloroethane	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Indeno(1,2,3-cd)Pyrene</b>	<b>0.428</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-10 S-3  
Date Sampled: 09/29/16 14:10  
Percent Solids: 85  
Initial Volume: 14.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-10  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Naphthalene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Nitrobenzene	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Pentachlorophenol	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Phenanthrene</b>	<b>1.26</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Phenol	ND (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
<b>Pyrene</b>	<b>1.86</b> (0.395)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609
Pyridine	ND (1.98)		8270D		1	10/11/16 17:06	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	54 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	90 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	63 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	59 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	59 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	55 %		30-130
<i>Surrogate: Phenol-d6</i>	66 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	109 %		30-130





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	6.57 (2.39)		6010C		1	KJK	10/12/16 20:54	2.38	100	CJ61103
Barium	45.0 (2.39)		6010C		1	KJK	10/12/16 20:54	2.38	100	CJ61103
Cadmium	ND (0.48)		6020A		20	NAR	10/13/16 16:07	2.38	100	CJ61103
Chromium	24.8 (0.96)		6010C		1	KJK	10/12/16 20:54	2.38	100	CJ61103
Lead	35.3 (4.79)		6010C		1	KJK	10/12/16 20:54	2.38	100	CJ61103
Mercury	0.098 (0.033)		7471B		1	BJV	10/11/16 13:19	0.69	40	CJ61104
Selenium	ND (0.48)		6020A		20	NAR	10/13/16 16:07	2.38	100	CJ61103
Silver	0.78 (0.48)		6010C		1	KJK	10/12/16 20:54	2.38	100	CJ61103





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 8.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,1,1-Trichloroethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,1,2,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,1,2-Trichloroethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,1-Dichloroethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,1-Dichloroethene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,1-Dichloropropene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2,3-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2,3-Trichloropropane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2,4-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2,4-Trimethylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2-Dibromo-3-Chloropropane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2-Dibromoethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2-Dichloroethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,3,5-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,3,5-Trimethylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,3-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,3-Dichloropropene (Total)	ND (0.0030)		8260B Low		0	10/11/16 17:38		[CALC]
1,4-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
1,4-Dioxane	ND (0.0678)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
2,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
2-Butanone	ND (0.0339)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
2-Chlorotoluene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
2-Hexanone	ND (0.0339)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
4-Chlorotoluene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
4-Isopropyltoluene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
4-Methyl-2-Pentanone	ND (0.0339)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Acetone	ND (0.0339)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Acrylonitrile	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Allyl Chloride	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 8.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Bromobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Bromochloromethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Bromodichloromethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Bromoform	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Bromomethane	ND (0.0068)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Carbon Disulfide	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Carbon Tetrachloride	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Chlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Chloroethane	ND (0.0068)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Chloroform	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Chloromethane	ND (0.0068)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
cis-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Dibromochloromethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Dibromomethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Dichlorodifluoromethane	ND (0.0068)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Diethyl Ether	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Di-isopropyl ether	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Ethyl tertiary-butyl ether	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Ethylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Hexachlorobutadiene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Isopropylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Methyl tert-Butyl Ether	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Methylene Chloride	ND (0.0170)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Naphthalene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
n-Butylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
n-Propylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
sec-Butylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Styrene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
tert-Butylbenzene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Tertiary-amyl methyl ether	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Tertiary-butyl Alcohol	ND (0.0339)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 8.4  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Tetrahydrofuran	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Toluene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
trans-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Trichloroethene	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Trichlorofluoromethane	ND (0.0034)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Vinyl Chloride	ND (0.0068)		8260B Low		1	10/11/16 17:38	CZJ0122	CJ61137
Xylenes (Total)	ND (0.0060)		8260B Low		1	10/11/16 17:38		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>125 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>105 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>116 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>105 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 20.7  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 16:53

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1221	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1232	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1242	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1248	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1254	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1260	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1262	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709
Aroclor 1268	ND (0.0550)		8082A		1	10/11/16 21:04		CJ60709

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	61 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	68 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	72 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	72 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 19.8  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: ZLC  
Prepared: 10/7/16 10:00

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	209 (43.2)		8100M		1	10/07/16 15:39	CZJ0090	CJ60712
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		62 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 14.4  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
1,2,4-Trichlorobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
1,2-Dichlorobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
1,3-Dichlorobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
1,4-Dichlorobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,3,4,6-Tetrachlorophenol	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,4,5-Trichlorophenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,4,6-Trichlorophenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,4-Dichlorophenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,4-Dimethylphenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,4-Dinitrophenol	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,4-Dinitrotoluene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2,6-Dinitrotoluene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2-Chloronaphthalene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2-Chlorophenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2-Methylnaphthalene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2-Methylphenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2-Nitroaniline	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
2-Nitrophenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
3,3'-Dichlorobenzidene	ND (3.17)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
3+4-Methylphenol	ND (3.17)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
3-Nitroaniline	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
4,6-Dinitro-2-Methylphenol	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
4-Bromophenyl-phenylether	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
4-Chloro-3-Methylphenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
4-Chloroaniline	ND (3.17)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
4-Chloro-phenyl-phenyl ether	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
4-Nitroaniline	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
4-Nitrophenol	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Acenaphthene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Acenaphthylene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 14.4  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (3.17)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Aniline	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Anthracene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Azobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzidine	ND (3.17)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzo(a)anthracene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzo(a)pyrene	ND (0.793)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzo(b)fluoranthene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzo(g,h,i)perylene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzo(k)fluoranthene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzoic Acid	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Benzyl Alcohol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
bis(2-Chloroethoxy)methane	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
bis(2-Chloroethyl)ether	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
bis(2-chloroisopropyl)Ether	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
bis(2-Ethylhexyl)phthalate	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Butylbenzylphthalate	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Carbazole	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
<b>Chrysene</b>	<b>0.853</b> (0.793)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Dibenzo(a,h)Anthracene	ND (0.793)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Dibenzofuran	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Diethylphthalate	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Dimethylphthalate	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Di-n-butylphthalate	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Di-n-octylphthalate	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Fluoranthene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Fluorene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Hexachlorobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Hexachlorobutadiene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Hexachlorocyclopentadiene	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Hexachloroethane	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-11 S-2  
Date Sampled: 09/29/16 14:45  
Percent Solids: 88  
Initial Volume: 14.4  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-11  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Naphthalene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Nitrobenzene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
N-Nitrosodimethylamine	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
N-Nitroso-Di-n-Propylamine	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
N-nitrosodiphenylamine	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Pentachlorophenol	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Phenanthrene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Phenol	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Pyrene	ND (1.58)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609
Pyridine	ND (7.93)		8270D		4	10/13/16 19:03	CZJ0162	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	56 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	73 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	64 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	72 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	64 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	59 %		30-130
<i>Surrogate: Phenol-d6</i>	65 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	84 %		30-130





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	13.9 (1.92)		6010C		1	KJK	10/12/16 20:59	2.83	100	CJ61103
Barium	50.5 (1.92)		6010C		1	KJK	10/12/16 20:59	2.83	100	CJ61103
Cadmium	ND (0.38)		6020A		20	NAR	10/13/16 16:25	2.83	100	CJ61103
Chromium	53.0 (0.77)		6010C		1	KJK	10/12/16 20:59	2.83	100	CJ61103
Lead	12.5 (3.84)		6010C		1	KJK	10/12/16 20:59	2.83	100	CJ61103
Mercury	ND (0.032)		7471B		1	BJV	10/11/16 13:21	0.67	40	CJ61104
Selenium	ND (0.38)		6020A		20	NAR	10/13/16 16:25	2.83	100	CJ61103
Silver	ND (0.38)		6010C		1	KJK	10/12/16 20:59	2.83	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 7.3  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,1,1-Trichloroethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,1,2,2-Tetrachloroethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,1,2-Trichloroethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,1-Dichloroethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,1-Dichloroethene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,1-Dichloropropene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2,3-Trichlorobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2,3-Trichloropropane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2,4-Trichlorobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2,4-Trimethylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2-Dibromo-3-Chloropropane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2-Dibromoethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2-Dichlorobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2-Dichloroethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,2-Dichloropropane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,3,5-Trichlorobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,3,5-Trimethylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,3-Dichlorobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,3-Dichloropropene (Total)	ND (0.0034)		8260B Low		0	10/11/16 18:04		[CALC]
1,4-Dichlorobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
1,4-Dioxane	ND (0.0744)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
2,2-Dichloropropane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
2-Butanone	ND (0.0372)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
2-Chlorotoluene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
2-Hexanone	ND (0.0372)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
4-Chlorotoluene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
4-Isopropyltoluene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
4-Methyl-2-Pentanone	ND (0.0372)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
<b>Acetone</b>	<b>0.0525 (0.0372)</b>		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Acrylonitrile	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Allyl Chloride	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 7.3  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Bromobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Bromochloromethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Bromodichloromethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Bromoform	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Bromomethane	ND (0.0074)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Carbon Disulfide	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Carbon Tetrachloride	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Chlorobenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Chloroethane	ND (0.0074)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Chloroform	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Chloromethane	ND (0.0074)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
cis-1,2-Dichloroethene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Dibromochloromethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Dibromomethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Dichlorodifluoromethane	ND (0.0074)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Diethyl Ether	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Di-isopropyl ether	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Ethyl tertiary-butyl ether	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Ethylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Hexachlorobutadiene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Isopropylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Methyl tert-Butyl Ether	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Methylene Chloride	ND (0.0186)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Naphthalene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
n-Butylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
n-Propylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
sec-Butylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Styrene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
tert-Butylbenzene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Tertiary-amyl methyl ether	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Tertiary-butyl Alcohol	ND (0.0372)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 7.3  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Tetrahydrofuran	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Toluene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
trans-1,2-Dichloroethene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Trichloroethene	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Trichlorofluoromethane	ND (0.0037)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Vinyl Chloride	ND (0.0074)		8260B Low		1	10/11/16 18:04	CZJ0122	CJ61137
Xylenes (Total)	ND (0.0068)		8260B Low		1	10/11/16 18:04		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>124 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>104 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>117 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>106 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 19.4  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 16:53

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1221	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1232	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1242	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1248	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1254	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1260	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1262	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709
Aroclor 1268	ND (0.0560)		8082A		1	10/11/16 21:23		CJ60709

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	71 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	78 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	77 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	78 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 19.4  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: ZLC  
Prepared: 10/7/16 10:00

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	48.3 (42.0)		8100M		1	10/07/16 16:18	CZJ0090	CJ60712
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		60 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2-Chlorophenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2-Methylnaphthalene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2-Methylphenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2-Nitroaniline	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
2-Nitrophenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
3,3'-Dichlorobenzidene	ND (0.701)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
3+4-Methylphenol	ND (0.701)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
3-Nitroaniline	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
4-Chloroaniline	ND (0.701)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
4-Nitroaniline	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
4-Nitrophenol	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Acenaphthene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Acenaphthylene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.701)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Aniline	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Anthracene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Azobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Benzidine	ND (0.701)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Benzo(a)anthracene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
<b>Benzo(a)pyrene</b>	<b>0.199</b> (0.176)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Benzo(b)fluoranthene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Benzo(g,h,i)perylene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Benzo(k)fluoranthene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Benzoic Acid	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Carbazole	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Chrysene	ND (0.176)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Dibenzo(a,h)Anthracene	ND (0.176)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Dibenzofuran	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Diethylphthalate	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Dimethylphthalate	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Fluoranthene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Fluorene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Hexachloroethane	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-12 S-1  
Date Sampled: 09/29/16 15:05  
Percent Solids: 92  
Initial Volume: 15.5  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-12  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Naphthalene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Nitrobenzene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Pentachlorophenol	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Phenanthrene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Phenol	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Pyrene	ND (0.350)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609
Pyridine	ND (1.76)		8270D		1	10/11/16 18:21	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	79 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	89 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	85 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	78 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	80 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	80 %		30-130
<i>Surrogate: Phenol-d6</i>	87 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	102 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	15.8 (2.55)		6010C		1	KJK	10/12/16 21:18	2.13	100	CJ61103
Barium	30.1 (2.55)		6010C		1	KJK	10/12/16 21:18	2.13	100	CJ61103
Cadmium	ND (0.51)		6020A		20	NAR	10/13/16 16:31	2.13	100	CJ61103
Chromium	27.3 (1.02)		6010C		1	KJK	10/12/16 21:18	2.13	100	CJ61103
Lead	277 (5.11)		6010C		1	KJK	10/12/16 21:18	2.13	100	CJ61103
Mercury	0.094 (0.030)		7471B		1	BJV	10/11/16 13:23	0.71	40	CJ61104
Selenium	ND (0.51)		6020A		20	NAR	10/13/16 16:31	2.13	100	CJ61103
Silver	ND (0.51)		6010C		1	KJK	10/12/16 21:18	2.13	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
 Client Project ID: RTE 33 Portsmouth  
 Client Sample ID: B-13 S-3  
 Date Sampled: 09/28/16 14:50  
 Percent Solids: 92  
 Initial Volume: 8.1  
 Final Volume: 10  
 Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
 ESS Laboratory Sample ID: 1610112-13  
 Sample Matrix: Soil  
 Units: mg/kg dry  
 Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,1,1-Trichloroethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,1,2,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,1,2-Trichloroethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,1-Dichloroethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,1-Dichloroethene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,1-Dichloropropene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2,3-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2,3-Trichloropropane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2,4-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2,4-Trimethylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2-Dibromo-3-Chloropropane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2-Dibromoethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2-Dichloroethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,3,5-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,3,5-Trimethylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,3-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,3-Dichloropropene (Total)	ND (0.0031)		8260B Low		0	10/11/16 18:30		[CALC]
1,4-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
1,4-Dioxane	ND (0.0671)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
2,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
2-Butanone	ND (0.0336)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
2-Chlorotoluene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
2-Hexanone	ND (0.0336)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
4-Chlorotoluene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
4-Isopropyltoluene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
4-Methyl-2-Pentanone	ND (0.0336)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Acetone	ND (0.0336)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Acrylonitrile	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Allyl Chloride	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92  
Initial Volume: 8.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Bromobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Bromochloromethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Bromodichloromethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Bromoform	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Bromomethane	ND (0.0067)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Carbon Disulfide	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Carbon Tetrachloride	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Chlorobenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Chloroethane	ND (0.0067)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Chloroform	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Chloromethane	ND (0.0067)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
cis-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Dibromochloromethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Dibromomethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Dichlorodifluoromethane	ND (0.0067)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Diethyl Ether	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Di-isopropyl ether	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Ethyl tertiary-butyl ether	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Ethylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Hexachlorobutadiene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Isopropylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Methyl tert-Butyl Ether	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Methylene Chloride	ND (0.0168)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Naphthalene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
n-Butylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
n-Propylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
sec-Butylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Styrene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
tert-Butylbenzene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Tertiary-amyl methyl ether	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Tertiary-butyl Alcohol	ND (0.0336)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92  
Initial Volume: 8.1  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Tetrahydrofuran	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Toluene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
trans-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Trichloroethene	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Trichlorofluoromethane	ND (0.0034)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Vinyl Chloride	ND (0.0067)		8260B Low		1	10/11/16 18:30	CZJ0122	CJ61137
Xylenes (Total)	ND (0.0062)		8260B Low		1	10/11/16 18:30		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>123 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>100 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>115 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>109 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92  
Initial Volume: 20.3  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 16:53

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1221	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1232	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1242	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1248	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1254	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1260	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1262	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709
Aroclor 1268	ND (0.0536)		8082A		1	10/11/16 22:20		CJ60709

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	79 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	91 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	77 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	96 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92  
Initial Volume: 19.9  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: ZLC  
Prepared: 10/7/16 10:00

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	222 (41.0)		8100M		1	10/07/16 18:14	CZJ0090	CJ60712
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		76 %		40-140				





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92  
Initial Volume: 14  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2-Chlorophenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2-Methylnaphthalene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2-Methylphenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2-Nitroaniline	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
2-Nitrophenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
3,3'-Dichlorobenzidene	ND (0.777)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
3+4-Methylphenol	ND (0.777)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
3-Nitroaniline	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
4-Chloroaniline	ND (0.777)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
4-Nitroaniline	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
4-Nitrophenol	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Acenaphthene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Acenaphthylene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92  
Initial Volume: 14  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.777)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Aniline	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Anthracene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Azobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Benzidine	ND (0.777)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Benzo(a)anthracene</b>	<b>0.723</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Benzo(a)pyrene</b>	<b>0.856</b> (0.195)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Benzo(b)fluoranthene</b>	<b>1.36</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Benzo(g,h,i)perylene</b>	<b>0.552</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Benzo(k)fluoranthene</b>	<b>0.531</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Benzoic Acid	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Carbazole	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Chrysene</b>	<b>0.922</b> (0.195)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Dibenzo(a,h)Anthracene	ND (0.195)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Dibenzofuran	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Diethylphthalate	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Dimethylphthalate	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Fluoranthene</b>	<b>2.20</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Fluorene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Hexachloroethane	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Indeno(1,2,3-cd)Pyrene</b>	<b>0.422</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-13 S-3  
Date Sampled: 09/28/16 14:50  
Percent Solids: 92  
Initial Volume: 14  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-13  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Naphthalene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Nitrobenzene	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Pentachlorophenol	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Phenanthrene</b>	<b>0.871</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Phenol	ND (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
<b>Pyrene</b>	<b>2.21</b> (0.388)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609
Pyridine	ND (1.95)		8270D		1	10/11/16 18:59	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	61 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	87 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	73 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	70 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	68 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	65 %		30-130
<i>Surrogate: Phenol-d6</i>	76 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	120 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	11.8 (2.28)		6010C		1	KJK	10/12/16 21:22	2.62	100	CJ61103
Barium	71.4 (2.28)		6010C		1	KJK	10/12/16 21:22	2.62	100	CJ61103
Cadmium	ND (0.46)		6020A		20	NAR	10/13/16 16:37	2.62	100	CJ61103
Chromium	57.2 (0.91)		6010C		1	KJK	10/12/16 21:22	2.62	100	CJ61103
Lead	318 (4.56)		6010C		1	KJK	10/12/16 21:22	2.62	100	CJ61103
Mercury	0.043 (0.039)		7471B		1	BJV	10/11/16 13:25	0.6	40	CJ61104
Selenium	ND (0.46)		6020A		20	NAR	10/13/16 16:37	2.62	100	CJ61103
Silver	ND (0.46)		6010C		1	KJK	10/12/16 21:22	2.62	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 6.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,1,1-Trichloroethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,1,2,2-Tetrachloroethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,1,2-Trichloroethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,1-Dichloroethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,1-Dichloroethene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,1-Dichloropropene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2,3-Trichlorobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2,3-Trichloropropane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2,4-Trichlorobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2,4-Trimethylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2-Dibromo-3-Chloropropane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2-Dibromoethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2-Dichlorobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2-Dichloroethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,2-Dichloropropane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,3,5-Trichlorobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,3,5-Trimethylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,3-Dichlorobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,3-Dichloropropene (Total)	ND (0.0037)		8260B Low		0	10/11/16 18:56		[CALC]
1,4-Dichlorobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
1,4-Dioxane	ND (0.0892)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
2,2-Dichloropropane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
2-Butanone	ND (0.0446)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
2-Chlorotoluene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
2-Hexanone	ND (0.0446)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
4-Chlorotoluene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
<b>4-Isopropyltoluene</b>	<b>0.138</b> (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
4-Methyl-2-Pentanone	ND (0.0446)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Acetone	ND (0.0446)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Acrylonitrile	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Allyl Chloride	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 6.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Bromobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Bromochloromethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Bromodichloromethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Bromoform	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Bromomethane	ND (0.0089)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Carbon Disulfide	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Carbon Tetrachloride	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Chlorobenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Chloroethane	ND (0.0089)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Chloroform	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Chloromethane	ND (0.0089)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
cis-1,2-Dichloroethene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Dibromochloromethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Dibromomethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Dichlorodifluoromethane	ND (0.0089)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Diethyl Ether	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Di-isopropyl ether	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Ethyl tertiary-butyl ether	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Ethylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Hexachlorobutadiene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Isopropylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Methyl tert-Butyl Ether	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Methylene Chloride	ND (0.0223)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Naphthalene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
n-Butylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
n-Propylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
sec-Butylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Styrene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
tert-Butylbenzene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Tertiary-amyl methyl ether	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Tertiary-butyl Alcohol	ND (0.0446)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 6.7  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Tetrahydrofuran	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Toluene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
trans-1,2-Dichloroethene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Trichloroethene	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Trichlorofluoromethane	ND (0.0045)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Vinyl Chloride	ND (0.0089)		8260B Low		1	10/11/16 18:56	CZJ0122	CJ61137
Xylenes (Total)	ND (0.0075)		8260B Low		1	10/11/16 18:56		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>117 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>107 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>111 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>109 %</i>		<i>70-130</i>



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 19.9  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 16:53

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1221	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1232	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1242	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1248	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1254	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1260	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1262	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709
Aroclor 1268	ND (0.0601)		8082A		1	10/11/16 22:39		CJ60709

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	70 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	83 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	78 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	74 %		30-150





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 19.4  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: ZLC  
Prepared: 10/7/16 10:00

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	163 (46.2)		8100M		1	10/07/16 18:53	CZJ0090	CJ60712
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		69 %		40-140				





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 14.2  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2-Chlorophenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
<b>2-Methylnaphthalene</b>	<b>1.67</b> (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2-Methylphenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2-Nitroaniline	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
2-Nitrophenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
3,3'-Dichlorobenzidine	ND (0.843)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
3+4-Methylphenol	ND (0.843)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
3-Nitroaniline	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
4-Chloroaniline	ND (0.843)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
4-Nitroaniline	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
4-Nitrophenol	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
<b>Acenaphthene</b>	<b>1.44</b> (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Acenaphthylene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 14.2  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.843)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Aniline	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Anthracene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Azobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzidine	ND (0.843)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzo(a)anthracene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzo(a)pyrene	ND (0.211)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzo(b)fluoranthene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzo(g,h,i)perylene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzo(k)fluoranthene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzoic Acid	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Carbazole	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Chrysene	ND (0.211)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Dibenzo(a,h)Anthracene	ND (0.211)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
<b>Dibenzofuran</b>	<b>1.10</b> (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Diethylphthalate	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Dimethylphthalate	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
<b>Fluoranthene</b>	<b>0.429</b> (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
<b>Fluorene</b>	<b>0.992</b> (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Hexachloroethane	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-14 S-4  
Date Sampled: 09/29/16 12:25  
Percent Solids: 84  
Initial Volume: 14.2  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-14  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
<b>Naphthalene</b>	<b>2.42</b> (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Nitrobenzene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Pentachlorophenol	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
<b>Phenanthrene</b>	<b>1.40</b> (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Phenol	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Pyrene	ND (0.421)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609
Pyridine	ND (2.11)		8270D		1	10/11/16 19:36	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	77 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	90 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	82 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	77 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	78 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	77 %		30-130
<i>Surrogate: Phenol-d6</i>	83 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	116 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	9.64 (2.77)		6010C		1	KJK	10/12/16 21:31	2.43	100	CJ61103
Barium	95.7 (2.77)		6010C		1	KJK	10/12/16 21:31	2.43	100	CJ61103
Cadmium	ND (0.55)		6020A		20	NAR	10/13/16 16:42	2.43	100	CJ61103
Chromium	31.0 (1.11)		6010C		1	KJK	10/12/16 21:31	2.43	100	CJ61103
Lead	221 (5.54)		6010C		1	KJK	10/12/16 21:31	2.43	100	CJ61103
Mercury	0.441 (0.044)		7471B		1	BJV	10/11/16 13:27	0.61	40	CJ61104
Selenium	ND (0.55)		6020A		20	NAR	10/13/16 16:42	2.43	100	CJ61103
Silver	ND (0.55)		6010C		1	KJK	10/12/16 21:31	2.43	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 8  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,1,1-Trichloroethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,1,2,2-Tetrachloroethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,1,2-Trichloroethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,1-Dichloroethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,1-Dichloroethene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,1-Dichloropropene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2,3-Trichlorobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2,3-Trichloropropane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2,4-Trichlorobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>1,2,4-Trimethylbenzene</b>	<b>0.146</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2-Dibromo-3-Chloropropane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2-Dibromoethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2-Dichlorobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2-Dichloroethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,2-Dichloropropane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,3,5-Trichlorobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>1,3,5-Trimethylbenzene</b>	<b>0.0534</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,3-Dichlorobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,3-Dichloropropene (Total)	ND (0.0031)		8260B Low		0	10/11/16 19:48		[CALC]
1,4-Dichlorobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
1,4-Dioxane	ND (0.0842)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
2,2-Dichloropropane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
2-Butanone	ND (0.0421)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
2-Chlorotoluene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
2-Hexanone	ND (0.0421)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
4-Chlorotoluene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>4-Isopropyltoluene</b>	<b>0.0074</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
4-Methyl-2-Pentanone	ND (0.0421)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>Acetone</b>	<b>0.208</b> (0.0421)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Acrylonitrile	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Allyl Chloride	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 8  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Bromobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Bromochloromethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Bromodichloromethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Bromoform	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Bromomethane	ND (0.0084)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Carbon Disulfide	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Carbon Tetrachloride	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Chlorobenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Chloroethane	ND (0.0084)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Chloroform	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Chloromethane	ND (0.0084)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
cis-1,2-Dichloroethene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Dibromochloromethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Dibromomethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Dichlorodifluoromethane	ND (0.0084)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Diethyl Ether	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Di-isopropyl ether	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Ethyl tertiary-butyl ether	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>Ethylbenzene</b>	<b>0.0156</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Hexachlorobutadiene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>Isopropylbenzene</b>	<b>0.0065</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Methyl tert-Butyl Ether	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Methylene Chloride	ND (0.0211)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>Naphthalene</b>	<b>0.0097</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>n-Butylbenzene</b>	<b>0.0097</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>n-Propylbenzene</b>	<b>0.0090</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>sec-Butylbenzene</b>	<b>0.0050</b> (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Styrene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
tert-Butylbenzene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Tertiary-amyl methyl ether	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Tertiary-butyl Alcohol	ND (0.0421)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 8  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Tetrahydrofuran	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Toluene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
trans-1,2-Dichloroethene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Trichloroethene	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Trichlorofluoromethane	ND (0.0042)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
Vinyl Chloride	ND (0.0084)		8260B Low		1	10/11/16 19:48	CZJ0122	CJ61137
<b>Xylenes (Total)</b>	<b>0.0441</b> (0.0062)		8260B Low		1	10/11/16 19:48		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>122 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>99 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>113 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>107 %</i>		<i>70-130</i>





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 20.6  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 16:53

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1221	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1232	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1242	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1248	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1254	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1260	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1262	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328
Aroclor 1268	ND (0.0654)		8082A		1	10/12/16 19:11		CJ61328

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	83 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	82 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	66 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	74 %		30-150





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 20.9  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: ZLC  
Prepared: 10/7/16 10:00

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	319 (48.3)		8100M		1	10/07/16 19:31	CZJ0090	CJ60712
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: O-Terphenyl</i>		63 %		40-140				



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 15.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
1,2,4-Trichlorobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
1,2-Dichlorobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
1,2-Diphenylhydrazine as Azobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
1,3-Dichlorobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
1,4-Dichlorobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,3,4,6-Tetrachlorophenol	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,4,5-Trichlorophenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,4,6-Trichlorophenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,4-Dichlorophenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,4-Dimethylphenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,4-Dinitrophenol	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,4-Dinitrotoluene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2,6-Dinitrotoluene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2-Chloronaphthalene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2-Chlorophenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2-Methylnaphthalene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2-Methylphenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2-Nitroaniline	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
2-Nitrophenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
3,3'-Dichlorobenzidine	ND (0.848)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
3+4-Methylphenol	ND (0.848)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
3-Nitroaniline	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
4,6-Dinitro-2-Methylphenol	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
4-Bromophenyl-phenylether	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
4-Chloro-3-Methylphenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
4-Chloroaniline	ND (0.848)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
4-Chloro-phenyl-phenyl ether	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
4-Nitroaniline	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
4-Nitrophenol	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Acenaphthene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Acenaphthylene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 15.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.848)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Aniline	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Anthracene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Azobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzidine	ND (0.848)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzo(a)anthracene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzo(a)pyrene	ND (0.212)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzo(b)fluoranthene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzo(g,h,i)perylene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzo(k)fluoranthene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzoic Acid	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Benzyl Alcohol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
bis(2-Chloroethoxy)methane	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
bis(2-Chloroethyl)ether	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
bis(2-chloroisopropyl)Ether	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
bis(2-Ethylhexyl)phthalate	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Butylbenzylphthalate	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Carbazole	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Chrysene	ND (0.212)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Dibenzo(a,h)Anthracene	ND (0.212)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Dibenzofuran	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Diethylphthalate	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Dimethylphthalate	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Di-n-butylphthalate	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Di-n-octylphthalate	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
<b>Fluoranthene</b>	<b>0.490</b> (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Fluorene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Hexachlorobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Hexachlorobutadiene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Hexachlorocyclopentadiene	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Hexachloroethane	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Indeno(1,2,3-cd)Pyrene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-15 S-3  
Date Sampled: 09/29/16 10:05  
Percent Solids: 74  
Initial Volume: 15.9  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-15  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/7/16 10:05

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Naphthalene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Nitrobenzene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
N-Nitrosodimethylamine	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
N-Nitroso-Di-n-Propylamine	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
N-nitrosodiphenylamine	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Pentachlorophenol	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Phenanthrene	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Phenol	ND (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
<b>Pyrene</b>	<b>0.478</b> (0.423)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609
Pyridine	ND (2.12)		8270D		1	10/11/16 20:13	CZJ0113	CJ60609

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	56 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	84 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	67 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	62 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	63 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	57 %		30-130
<i>Surrogate: Phenol-d6</i>	71 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	122 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry

Extraction Method: 3050B

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	10.5 (2.10)		6010C		1	KJK	10/12/16 21:35	2.69	100	CJ61103
Barium	110 (2.10)		6010C		1	KJK	10/12/16 21:35	2.69	100	CJ61103
Cadmium	0.49 (0.42)		6020A		20	NAR	10/13/16 16:48	2.69	100	CJ61103
Chromium	34.4 (0.84)		6010C		1	KJK	10/12/16 21:35	2.69	100	CJ61103
Lead	416 (4.20)		6010C		1	KJK	10/12/16 21:35	2.69	100	CJ61103
Mercury	0.971 (0.170)		7471B		5	BJV	10/11/16 15:41	0.66	40	CJ61104
Selenium	0.49 (0.42)		6020A		20	NAR	10/13/16 16:48	2.69	100	CJ61103
Silver	ND (0.42)		6010C		1	KJK	10/12/16 21:35	2.69	100	CJ61103



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88  
Initial Volume: 6  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,1,1-Trichloroethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,1,2,2-Tetrachloroethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,1,2-Trichloroethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,1-Dichloroethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,1-Dichloroethene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,1-Dichloropropene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2,3-Trichlorobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2,3-Trichloropropane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2,4-Trichlorobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2,4-Trimethylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2-Dibromo-3-Chloropropane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2-Dibromoethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2-Dichlorobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2-Dichloroethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,2-Dichloropropane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,3,5-Trichlorobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,3,5-Trimethylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,3-Dichlorobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,3-Dichloropropene (Total)	ND (0.0042)		8260B Low		0	10/11/16 19:22		[CALC]
1,4-Dichlorobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
1,4-Dioxane	ND (0.0942)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
2,2-Dichloropropane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
2-Butanone	ND (0.0471)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
2-Chlorotoluene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
2-Hexanone	ND (0.0471)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
4-Chlorotoluene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
4-Isopropyltoluene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
4-Methyl-2-Pentanone	ND (0.0471)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
<b>Acetone</b>	<b>0.0867</b> (0.0471)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Acrylonitrile	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Allyl Chloride	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88  
Initial Volume: 6  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Benzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Bromobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Bromochloromethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Bromodichloromethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Bromoform	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Bromomethane	ND (0.0094)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Carbon Disulfide	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Carbon Tetrachloride	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Chlorobenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Chloroethane	ND (0.0094)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Chloroform	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Chloromethane	ND (0.0094)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
cis-1,2-Dichloroethene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Dibromochloromethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Dibromomethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Dichlorodifluoromethane	ND (0.0094)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Diethyl Ether	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Di-isopropyl ether	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Ethyl tertiary-butyl ether	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Ethylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Hexachlorobutadiene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Isopropylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Methyl tert-Butyl Ether	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Methylene Chloride	ND (0.0236)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Naphthalene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
n-Butylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
n-Propylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
sec-Butylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Styrene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
tert-Butylbenzene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Tertiary-amyl methyl ether	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Tertiary-butyl Alcohol	ND (0.0471)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88  
Initial Volume: 6  
Final Volume: 10  
Extraction Method: 5035

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: MD

**5035/8260B Volatile Organic Compounds / Low Level**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Tetrachloroethene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Tetrahydrofuran	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Toluene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
trans-1,2-Dichloroethene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Trichloroethene	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Trichlorofluoromethane	ND (0.0047)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Vinyl Chloride	ND (0.0094)		8260B Low		1	10/11/16 19:22	CZJ0122	CJ61137
Xylenes (Total)	ND (0.0083)		8260B Low		1	10/11/16 19:22		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>117 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>103 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>112 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>109 %</i>		<i>70-130</i>





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88  
Initial Volume: 20.5  
Final Volume: 10  
Extraction Method: 3540C

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: SMR  
Prepared: 10/7/16 16:53

**8082A Polychlorinated Biphenyls (PCB)**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1221	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1232	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1242	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1248	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1254	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1260	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1262	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328
Aroclor 1268	ND (0.0551)		8082A		1	10/12/16 19:29		CJ61328

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	86 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	91 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	71 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	79 %		30-150



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88  
Initial Volume: 19.6  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: ZLC  
Prepared: 10/7/16 10:00

**8100M Total Petroleum Hydrocarbons**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	136 (43.3)		8100M		1	10/07/16 20:10	CZJ0090	CJ60712

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: O-Terphenyl</i>	78 %		40-140



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88  
Initial Volume: 15  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/11/16 17:24

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1-Biphenyl	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
1,2,4-Trichlorobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
1,2-Dichlorobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
1,2-Diphenylhydrazine as Azobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
1,3-Dichlorobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
1,4-Dichlorobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,3,4,6-Tetrachlorophenol	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,4,5-Trichlorophenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,4,6-Trichlorophenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,4-Dichlorophenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,4-Dimethylphenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,4-Dinitrophenol	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,4-Dinitrotoluene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2,6-Dinitrotoluene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2-Chloronaphthalene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2-Chlorophenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2-Methylnaphthalene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2-Methylphenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2-Nitroaniline	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
2-Nitrophenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
3,3'-Dichlorobenzidene	ND (0.754)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
3+4-Methylphenol	ND (0.754)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
3-Nitroaniline	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
4,6-Dinitro-2-Methylphenol	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
4-Bromophenyl-phenylether	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
4-Chloro-3-Methylphenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
4-Chloroaniline	ND (0.754)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
4-Chloro-phenyl-phenyl ether	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
4-Nitroaniline	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
4-Nitrophenol	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Acenaphthene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Acenaphthylene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth  
Client Sample ID: B-16 S-2  
Date Sampled: 09/29/16 09:20  
Percent Solids: 88  
Initial Volume: 15  
Final Volume: 0.5  
Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
ESS Laboratory Sample ID: 1610112-16  
Sample Matrix: Soil  
Units: mg/kg dry  
Analyst: TJ  
Prepared: 10/11/16 17:24

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acetophenone	ND (0.754)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Aniline	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Anthracene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Azobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Benzidine	ND (0.754)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Benzo(a)anthracene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
<b>Benzo(a)pyrene</b>	<b>0.313</b> (0.189)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
<b>Benzo(b)fluoranthene</b>	<b>0.483</b> (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Benzo(g,h,i)perylene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Benzo(k)fluoranthene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Benzoic Acid	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Benzyl Alcohol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
bis(2-Chloroethoxy)methane	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
bis(2-Chloroethyl)ether	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
bis(2-chloroisopropyl)Ether	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
bis(2-Ethylhexyl)phthalate	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Butylbenzylphthalate	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Carbazole	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
<b>Chrysene</b>	<b>0.340</b> (0.189)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Dibenzo(a,h)Anthracene	ND (0.189)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Dibenzofuran	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Diethylphthalate	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Dimethylphthalate	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Di-n-butylphthalate	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Di-n-octylphthalate	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
<b>Fluoranthene</b>	<b>0.737</b> (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Fluorene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Hexachlorobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Hexachlorobutadiene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Hexachlorocyclopentadiene	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Hexachloroethane	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Indeno(1,2,3-cd)Pyrene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
 Client Project ID: RTE 33 Portsmouth  
 Client Sample ID: B-16 S-2  
 Date Sampled: 09/29/16 09:20  
 Percent Solids: 88  
 Initial Volume: 15  
 Final Volume: 0.5  
 Extraction Method: 3546

ESS Laboratory Work Order: 1610112  
 ESS Laboratory Sample ID: 1610112-16  
 Sample Matrix: Soil  
 Units: mg/kg dry  
 Analyst: TJ  
 Prepared: 10/11/16 17:24

**8270D Semi-Volatile Organic Compounds**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Isophorone	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Naphthalene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Nitrobenzene	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
N-Nitrosodimethylamine	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
N-Nitroso-Di-n-Propylamine	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
N-nitrosodiphenylamine	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Pentachlorophenol	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
<b>Phenanthrene</b>	<b>0.456</b> (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Phenol	ND (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
<b>Pyrene</b>	<b>0.720</b> (0.376)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112
Pyridine	ND (1.89)		8270D		1	10/13/16 3:49	CZJ0132	CJ61112

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	41 %		30-130
<i>Surrogate: 2,4,6-Tribromophenol</i>	51 %		30-130
<i>Surrogate: 2-Chlorophenol-d4</i>	42 %		30-130
<i>Surrogate: 2-Fluorobiphenyl</i>	42 %		30-130
<i>Surrogate: 2-Fluorophenol</i>	41 %		30-130
<i>Surrogate: Nitrobenzene-d5</i>	41 %		30-130
<i>Surrogate: Phenol-d6</i>	43 %		30-130
<i>Surrogate: p-Terphenyl-d14</i>	65 %		30-130



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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**Total Metals**

**Batch CJ61103 - 3050B**

**Blank**

Arsenic	ND	2.50	mg/kg wet
Barium	ND	2.50	mg/kg wet
Cadmium	ND	0.50	mg/kg wet
Chromium	ND	1.00	mg/kg wet
Lead	ND	5.00	mg/kg wet
Selenium	ND	0.50	mg/kg wet
Silver	ND	0.50	mg/kg wet

**LCS**

Arsenic	151	9.26	mg/kg wet	161.0	94	80-120
Barium	333	9.26	mg/kg wet	351.0	95	80-120
Cadmium	190	23.1	mg/kg wet	190.0	100	80-120
Chromium	85.1	3.70	mg/kg wet	87.90	97	80-120
Lead	134	18.5	mg/kg wet	138.0	97	80-120
Selenium	310	23.1	mg/kg wet	305.0	101	80-120
Silver	56.7	1.85	mg/kg wet	58.00	98	80-120

**LCS Dup**

Arsenic	145	9.62	mg/kg wet	161.0	90	80-120	4	20
Barium	323	9.62	mg/kg wet	351.0	92	80-120	3	20
Cadmium	190	24.0	mg/kg wet	190.0	100	80-120	0.01	30
Chromium	82.5	3.85	mg/kg wet	87.90	94	80-120	3	20
Lead	131	19.2	mg/kg wet	138.0	95	80-120	3	20
Selenium	306	24.0	mg/kg wet	305.0	100	80-120	1	30
Silver	55.0	1.92	mg/kg wet	58.00	95	80-120	3	20

**Batch CJ61104 - 7471B**

**Blank**

Mercury	ND	0.033	mg/kg wet
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**LCS**

Mercury	16.2	1.65	mg/kg wet	15.90	102	80-120
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**LCS Dup**

Mercury	16.1	1.83	mg/kg wet	15.90	101	80-120	1	20
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**5035/8260B Volatile Organic Compounds / Low Level**

**Batch CJ60724 - 5035**

**Blank**

1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet
1,1,2,2-Tetrachloroethane	ND	0.0050	mg/kg wet
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet
1,1-Dichloroethane	ND	0.0050	mg/kg wet
1,1-Dichloroethene	ND	0.0050	mg/kg wet
1,1-Dichloropropene	ND	0.0050	mg/kg wet
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ60724 - 5035**

1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromoethane	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,3,5-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichloropropene (Total)	ND	0.0050	mg/kg							
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dioxane	ND	0.100	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2-Butanone	ND	0.0500	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Hexanone	ND	0.0500	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Isopropyltoluene	ND	0.0050	mg/kg wet							
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet							
Acetone	ND	0.0500	mg/kg wet							
Acrylonitrile	ND	0.0050	mg/kg wet							
Allyl Chloride	ND	0.0050	mg/kg wet							
Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0050	mg/kg wet							
Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							





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**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ60724 - 5035**

Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tertiary-butyl Alcohol	ND	0.0500	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	ND	0.0050	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylenes (Total)	ND	0.0100	mg/kg							
Surrogate: 1,2-Dichloroethane-d4	0.0544		mg/kg wet	0.05000		109	70-130			
Surrogate: 4-Bromofluorobenzene	0.0507		mg/kg wet	0.05000		101	70-130			
Surrogate: Dibromofluoromethane	0.0522		mg/kg wet	0.05000		104	70-130			
Surrogate: Toluene-d8	0.0534		mg/kg wet	0.05000		107	70-130			

**LCS**

1,1,1,2-Tetrachloroethane	0.0549	0.0050	mg/kg wet	0.05000		110	70-130			
1,1,1-Trichloroethane	0.0530	0.0050	mg/kg wet	0.05000		106	70-130			
1,1,2,2-Tetrachloroethane	0.0472	0.0050	mg/kg wet	0.05000		94	70-130			
1,1,2-Trichloroethane	0.0461	0.0050	mg/kg wet	0.05000		92	70-130			
1,1-Dichloroethane	0.0478	0.0050	mg/kg wet	0.05000		96	70-130			
1,1-Dichloroethene	0.0487	0.0050	mg/kg wet	0.05000		97	70-130			
1,1-Dichloropropene	0.0496	0.0050	mg/kg wet	0.05000		99	70-130			
1,2,3-Trichlorobenzene	0.0489	0.0050	mg/kg wet	0.05000		98	70-130			
1,2,3-Trichloropropane	0.0459	0.0050	mg/kg wet	0.05000		92	70-130			
1,2,4-Trichlorobenzene	0.0478	0.0050	mg/kg wet	0.05000		96	70-130			
1,2,4-Trimethylbenzene	0.0496	0.0050	mg/kg wet	0.05000		99	70-130			
1,2-Dibromo-3-Chloropropane	0.0431	0.0050	mg/kg wet	0.05000		86	70-130			
1,2-Dibromoethane	0.0499	0.0050	mg/kg wet	0.05000		100	70-130			
1,2-Dichlorobenzene	0.0460	0.0050	mg/kg wet	0.05000		92	70-130			
1,2-Dichloroethane	0.0523	0.0050	mg/kg wet	0.05000		105	70-130			
1,2-Dichloropropane	0.0459	0.0050	mg/kg wet	0.05000		92	70-130			
1,3,5-Trichlorobenzene	0.0496	0.0050	mg/kg wet	0.05000		99	70-130			
1,3,5-Trimethylbenzene	0.0505	0.0050	mg/kg wet	0.05000		101	70-130			
1,3-Dichlorobenzene	0.0463	0.0050	mg/kg wet	0.05000		93	70-130			
1,3-Dichloropropene (Total)	0.0881	0.0050	mg/kg							
1,4-Dichlorobenzene	0.0467	0.0050	mg/kg wet	0.05000		93	70-130			





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ60724 - 5035**

1,4-Dioxane	1.01	0.100	mg/kg wet	1.000		101	70-130			
2,2-Dichloropropane	0.0504	0.0050	mg/kg wet	0.05000		101	70-130			
2-Butanone	0.238	0.0500	mg/kg wet	0.2500		95	70-130			
2-Chlorotoluene	0.0484	0.0050	mg/kg wet	0.05000		97	70-130			
2-Hexanone	0.233	0.0500	mg/kg wet	0.2500		93	70-130			
4-Chlorotoluene	0.0488	0.0050	mg/kg wet	0.05000		98	70-130			
4-Isopropyltoluene	0.0498	0.0050	mg/kg wet	0.05000		100	70-130			
4-Methyl-2-Pentanone	0.214	0.0500	mg/kg wet	0.2500		86	70-130			
Acetone	0.238	0.0500	mg/kg wet	0.2500		95	70-130			
Acrylonitrile	0.0477	0.0050	mg/kg wet	0.05000		95	70-130			
Allyl Chloride	0.0500	0.0050	mg/kg wet	0.05000		100	70-130			
Benzene	0.0461	0.0050	mg/kg wet	0.05000		92	70-130			
Bromobenzene	0.0466	0.0050	mg/kg wet	0.05000		93	70-130			
Bromochloromethane	0.0472	0.0050	mg/kg wet	0.05000		94	70-130			
Bromodichloromethane	0.0547	0.0050	mg/kg wet	0.05000		109	70-130			
Bromoform	0.0464	0.0050	mg/kg wet	0.05000		93	70-130			
Bromomethane	0.0496	0.0100	mg/kg wet	0.05000		99	70-130			
Carbon Disulfide	0.0485	0.0050	mg/kg wet	0.05000		97	70-130			
Carbon Tetrachloride	0.0551	0.0050	mg/kg wet	0.05000		110	70-130			
Chlorobenzene	0.0484	0.0050	mg/kg wet	0.05000		97	70-130			
Chloroethane	0.0435	0.0100	mg/kg wet	0.05000		87	70-130			
Chloroform	0.0490	0.0050	mg/kg wet	0.05000		98	70-130			
Chloromethane	0.0545	0.0100	mg/kg wet	0.05000		109	70-130			
cis-1,2-Dichloroethene	0.0476	0.0050	mg/kg wet	0.05000		95	70-130			
Dibromochloromethane	0.0501	0.0050	mg/kg wet	0.05000		100	70-130			
Dibromomethane	0.0483	0.0050	mg/kg wet	0.05000		97	70-130			
Dichlorodifluoromethane	0.0468	0.0100	mg/kg wet	0.05000		94	70-130			
Diethyl Ether	0.0474	0.0050	mg/kg wet	0.05000		95	70-130			
Di-isopropyl ether	0.0463	0.0050	mg/kg wet	0.05000		93	70-130			
Ethyl tertiary-butyl ether	0.0440	0.0050	mg/kg wet	0.05000		88	70-130			
Ethylbenzene	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
Hexachlorobutadiene	0.0490	0.0050	mg/kg wet	0.05000		98	70-130			
Isopropylbenzene	0.0413	0.0050	mg/kg wet	0.05000		83	70-130			
Methyl tert-Butyl Ether	0.0468	0.0050	mg/kg wet	0.05000		94	70-130			
Methylene Chloride	0.0434	0.0250	mg/kg wet	0.05000		87	70-130			
Naphthalene	0.0420	0.0050	mg/kg wet	0.05000		84	70-130			
n-Butylbenzene	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
n-Propylbenzene	0.0487	0.0050	mg/kg wet	0.05000		97	70-130			
sec-Butylbenzene	0.0485	0.0050	mg/kg wet	0.05000		97	70-130			
Styrene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
tert-Butylbenzene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130			
Tertiary-amyl methyl ether	0.0415	0.0050	mg/kg wet	0.05000		83	70-130			
Tertiary-butyl Alcohol	0.212	0.0500	mg/kg wet	0.2500		85	70-130			
Tetrachloroethene	0.0500	0.0050	mg/kg wet	0.05000		100	70-130			
Tetrahydrofuran	0.0382	0.0050	mg/kg wet	0.05000		76	70-130			



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ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ60724 - 5035**

Toluene	0.0474	0.0050	mg/kg wet	0.05000		95	70-130			
trans-1,2-Dichloroethene	0.0467	0.0050	mg/kg wet	0.05000		93	70-130			
Trichloroethene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130			
Trichlorofluoromethane	0.0463	0.0050	mg/kg wet	0.05000		93	70-130			
Vinyl Chloride	0.0552	0.0100	mg/kg wet	0.05000		110	70-130			
Xylenes (Total)	0.152	0.0100	mg/kg							
Surrogate: 1,2-Dichloroethane-d4	0.0578		mg/kg wet	0.05000		116	70-130			
Surrogate: 4-Bromofluorobenzene	0.0562		mg/kg wet	0.05000		112	70-130			
Surrogate: Dibromofluoromethane	0.0549		mg/kg wet	0.05000		110	70-130			
Surrogate: Toluene-d8	0.0547		mg/kg wet	0.05000		109	70-130			

**LCS Dup**

1,1,1,2-Tetrachloroethane	0.0537	0.0050	mg/kg wet	0.05000		107	70-130	2	25	
1,1,1-Trichloroethane	0.0551	0.0050	mg/kg wet	0.05000		110	70-130	4	25	
1,1,2,2-Tetrachloroethane	0.0511	0.0050	mg/kg wet	0.05000		102	70-130	8	25	
1,1,2-Trichloroethane	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	6	25	
1,1-Dichloroethane	0.0502	0.0050	mg/kg wet	0.05000		100	70-130	5	25	
1,1-Dichloroethene	0.0517	0.0050	mg/kg wet	0.05000		103	70-130	6	25	
1,1-Dichloropropene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130	4	25	
1,2,3-Trichlorobenzene	0.0526	0.0050	mg/kg wet	0.05000		105	70-130	7	25	
1,2,3-Trichloropropane	0.0492	0.0050	mg/kg wet	0.05000		98	70-130	7	25	
1,2,4-Trichlorobenzene	0.0507	0.0050	mg/kg wet	0.05000		101	70-130	6	25	
1,2,4-Trimethylbenzene	0.0513	0.0050	mg/kg wet	0.05000		103	70-130	3	25	
1,2-Dibromo-3-Chloropropane	0.0462	0.0050	mg/kg wet	0.05000		92	70-130	7	25	
1,2-Dibromoethane	0.0502	0.0050	mg/kg wet	0.05000		100	70-130	0.5	25	
1,2-Dichlorobenzene	0.0486	0.0050	mg/kg wet	0.05000		97	70-130	5	25	
1,2-Dichloroethane	0.0543	0.0050	mg/kg wet	0.05000		109	70-130	4	25	
1,2-Dichloropropane	0.0485	0.0050	mg/kg wet	0.05000		97	70-130	5	25	
1,3,5-Trichlorobenzene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130	4	25	
1,3,5-Trimethylbenzene	0.0521	0.0050	mg/kg wet	0.05000		104	70-130	3	25	
1,3-Dichlorobenzene	0.0478	0.0050	mg/kg wet	0.05000		96	70-130	3	25	
1,3-Dichloropropene (Total)	0.0934	0.0050	mg/kg							
1,4-Dichlorobenzene	0.0485	0.0050	mg/kg wet	0.05000		97	70-130	4	25	
1,4-Dioxane	1.05	0.100	mg/kg wet	1.000		105	70-130	4	20	
2,2-Dichloropropane	0.0525	0.0050	mg/kg wet	0.05000		105	70-130	4	25	
2-Butanone	0.253	0.0500	mg/kg wet	0.2500		101	70-130	6	25	
2-Chlorotoluene	0.0504	0.0050	mg/kg wet	0.05000		101	70-130	4	25	
2-Hexanone	0.239	0.0500	mg/kg wet	0.2500		96	70-130	2	25	
4-Chlorotoluene	0.0503	0.0050	mg/kg wet	0.05000		101	70-130	3	25	
4-Isopropyltoluene	0.0513	0.0050	mg/kg wet	0.05000		103	70-130	3	25	
4-Methyl-2-Pentanone	0.233	0.0500	mg/kg wet	0.2500		93	70-130	9	25	
Acetone	0.255	0.0500	mg/kg wet	0.2500		102	70-130	7	25	
Acrylonitrile	0.0513	0.0050	mg/kg wet	0.05000		103	70-130	7	25	
Allyl Chloride	0.0534	0.0050	mg/kg wet	0.05000		107	70-130	7	25	
Benzene	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	5	25	
Bromobenzene	0.0492	0.0050	mg/kg wet	0.05000		98	70-130	5	25	



*CERTIFICATE OF ANALYSIS*

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**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ60724 - 5035**

Bromochloromethane	0.0507	0.0050	mg/kg wet	0.05000		101	70-130	7	25	
Bromodichloromethane	0.0575	0.0050	mg/kg wet	0.05000		115	70-130	5	25	
Bromoform	0.0460	0.0050	mg/kg wet	0.05000		92	70-130	1	25	
Bromomethane	0.0512	0.0100	mg/kg wet	0.05000		102	70-130	3	25	
Carbon Disulfide	0.0512	0.0050	mg/kg wet	0.05000		102	70-130	5	25	
Carbon Tetrachloride	0.0566	0.0050	mg/kg wet	0.05000		113	70-130	3	25	
Chlorobenzene	0.0476	0.0050	mg/kg wet	0.05000		95	70-130	2	25	
Chloroethane	0.0448	0.0100	mg/kg wet	0.05000		90	70-130	3	25	
Chloroform	0.0513	0.0050	mg/kg wet	0.05000		103	70-130	4	25	
Chloromethane	0.0576	0.0100	mg/kg wet	0.05000		115	70-130	6	25	
cis-1,2-Dichloroethene	0.0506	0.0050	mg/kg wet	0.05000		101	70-130	6	25	
Dibromochloromethane	0.0492	0.0050	mg/kg wet	0.05000		98	70-130	2	25	
Dibromomethane	0.0513	0.0050	mg/kg wet	0.05000		103	70-130	6	25	
Dichlorodifluoromethane	0.0483	0.0100	mg/kg wet	0.05000		97	70-130	3	25	
Diethyl Ether	0.0509	0.0050	mg/kg wet	0.05000		102	70-130	7	25	
Di-isopropyl ether	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	6	25	
Ethyl tertiary-butyl ether	0.0470	0.0050	mg/kg wet	0.05000		94	70-130	7	25	
Ethylbenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130	2	25	
Hexachlorobutadiene	0.0510	0.0050	mg/kg wet	0.05000		102	70-130	4	25	
Isopropylbenzene	0.0426	0.0050	mg/kg wet	0.05000		85	70-130	3	25	
Methyl tert-Butyl Ether	0.0500	0.0050	mg/kg wet	0.05000		100	70-130	7	25	
Methylene Chloride	0.0456	0.0250	mg/kg wet	0.05000		91	70-130	5	25	
Naphthalene	0.0464	0.0050	mg/kg wet	0.05000		93	70-130	10	25	
n-Butylbenzene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130	4	25	
n-Propylbenzene	0.0505	0.0050	mg/kg wet	0.05000		101	70-130	4	25	
sec-Butylbenzene	0.0506	0.0050	mg/kg wet	0.05000		101	70-130	4	25	
Styrene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130	3	25	
tert-Butylbenzene	0.0516	0.0050	mg/kg wet	0.05000		103	70-130	4	25	
Tertiary-amyl methyl ether	0.0443	0.0050	mg/kg wet	0.05000		89	70-130	7	25	
Tertiary-butyl Alcohol	0.233	0.0500	mg/kg wet	0.2500		93	70-130	9	20	
Tetrachloroethene	0.0487	0.0050	mg/kg wet	0.05000		97	70-130	3	25	
Tetrahydrofuran	0.0407	0.0050	mg/kg wet	0.05000		81	70-130	6	25	
Toluene	0.0497	0.0050	mg/kg wet	0.05000		99	70-130	5	25	
trans-1,2-Dichloroethene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130	6	25	
Trichloroethene	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	3	25	
Trichlorofluoromethane	0.0477	0.0050	mg/kg wet	0.05000		95	70-130	3	25	
Vinyl Chloride	0.0576	0.0100	mg/kg wet	0.05000		115	70-130	4	25	
Xylenes (Total)	0.149	0.0100	mg/kg							
Surrogate: 1,2-Dichloroethane-d4	0.0574		mg/kg wet	0.05000		115	70-130			
Surrogate: 4-Bromofluorobenzene	0.0527		mg/kg wet	0.05000		105	70-130			
Surrogate: Dibromofluoromethane	0.0546		mg/kg wet	0.05000		109	70-130			
Surrogate: Toluene-d8	0.0517		mg/kg wet	0.05000		103	70-130			

**Batch CJ61137 - 5035**

<b>Blank</b>										
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ61137 - 5035**

1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromoethane	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,3,5-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichloropropene (Total)	ND	0.0050	mg/kg							
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dioxane	ND	0.100	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2-Butanone	ND	0.0500	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Hexanone	ND	0.0500	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Isopropyltoluene	ND	0.0050	mg/kg wet							
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet							
Acetone	ND	0.0500	mg/kg wet							
Acrylonitrile	ND	0.0050	mg/kg wet							
Allyl Chloride	ND	0.0050	mg/kg wet							
Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0050	mg/kg wet							



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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ61137 - 5035**

Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tertiary-butyl Alcohol	ND	0.0500	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	ND	0.0050	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylenes (Total)	ND	0.0100	mg/kg							
Surrogate: 1,2-Dichloroethane-d4	0.0539		mg/kg wet	0.05000		108	70-130			
Surrogate: 4-Bromofluorobenzene	0.0517		mg/kg wet	0.05000		103	70-130			
Surrogate: Dibromofluoromethane	0.0545		mg/kg wet	0.05000		109	70-130			
Surrogate: Toluene-d8	0.0542		mg/kg wet	0.05000		108	70-130			

**LCS**

1,1,1,2-Tetrachloroethane	0.0543	0.0050	mg/kg wet	0.05000		109	70-130			
1,1,1-Trichloroethane	0.0585	0.0050	mg/kg wet	0.05000		117	70-130			
1,1,2,2-Tetrachloroethane	0.0570	0.0050	mg/kg wet	0.05000		114	70-130			
1,1,2-Trichloroethane	0.0534	0.0050	mg/kg wet	0.05000		107	70-130			
1,1-Dichloroethane	0.0559	0.0050	mg/kg wet	0.05000		112	70-130			
1,1-Dichloroethene	0.0550	0.0050	mg/kg wet	0.05000		110	70-130			
1,1-Dichloropropene	0.0558	0.0050	mg/kg wet	0.05000		112	70-130			
1,2,3-Trichlorobenzene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
1,2,3-Trichloropropane	0.0566	0.0050	mg/kg wet	0.05000		113	70-130			
1,2,4-Trichlorobenzene	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
1,2,4-Trimethylbenzene	0.0559	0.0050	mg/kg wet	0.05000		112	70-130			
1,2-Dibromo-3-Chloropropane	0.0526	0.0050	mg/kg wet	0.05000		105	70-130			
1,2-Dibromoethane	0.0518	0.0050	mg/kg wet	0.05000		104	70-130			
1,2-Dichlorobenzene	0.0514	0.0050	mg/kg wet	0.05000		103	70-130			



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ61137 - 5035**

1,2-Dichloroethane	0.0577	0.0050	mg/kg wet	0.05000		115	70-130			
1,2-Dichloropropane	0.0556	0.0050	mg/kg wet	0.05000		111	70-130			
1,3,5-Trichlorobenzene	0.0545	0.0050	mg/kg wet	0.05000		109	70-130			
1,3,5-Trimethylbenzene	0.0565	0.0050	mg/kg wet	0.05000		113	70-130			
1,3-Dichlorobenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
1,3-Dichloropropene (Total)	0.107	0.0050	mg/kg							
1,4-Dichlorobenzene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130			
1,4-Dioxane	1.08	0.100	mg/kg wet	1.000		108	70-130			
2,2-Dichloropropane	0.0589	0.0050	mg/kg wet	0.05000		118	70-130			
2-Butanone	0.275	0.0500	mg/kg wet	0.2500		110	70-130			
2-Chlorotoluene	0.0553	0.0050	mg/kg wet	0.05000		111	70-130			
2-Hexanone	0.242	0.0500	mg/kg wet	0.2500		97	70-130			
4-Chlorotoluene	0.0556	0.0050	mg/kg wet	0.05000		111	70-130			
4-Isopropyltoluene	0.0551	0.0050	mg/kg wet	0.05000		110	70-130			
4-Methyl-2-Pentanone	0.254	0.0500	mg/kg wet	0.2500		101	70-130			
Acetone	0.279	0.0500	mg/kg wet	0.2500		112	70-130			
Acrylonitrile	0.0564	0.0050	mg/kg wet	0.05000		113	70-130			
Allyl Chloride	0.0584	0.0050	mg/kg wet	0.05000		117	70-130			
Benzene	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Bromobenzene	0.0530	0.0050	mg/kg wet	0.05000		106	70-130			
Bromochloromethane	0.0529	0.0050	mg/kg wet	0.05000		106	70-130			
Bromodichloromethane	0.0633	0.0050	mg/kg wet	0.05000		127	70-130			
Bromoform	0.0479	0.0050	mg/kg wet	0.05000		96	70-130			
Bromomethane	0.0576	0.0100	mg/kg wet	0.05000		115	70-130			
Carbon Disulfide	0.0568	0.0050	mg/kg wet	0.05000		114	70-130			
Carbon Tetrachloride	0.0584	0.0050	mg/kg wet	0.05000		117	70-130			
Chlorobenzene	0.0474	0.0050	mg/kg wet	0.05000		95	70-130			
Chloroethane	0.0520	0.0100	mg/kg wet	0.05000		104	70-130			
Chloroform	0.0550	0.0050	mg/kg wet	0.05000		110	70-130			
Chloromethane	0.0613	0.0100	mg/kg wet	0.05000		123	70-130			
cis-1,2-Dichloroethene	0.0545	0.0050	mg/kg wet	0.05000		109	70-130			
Dibromochloromethane	0.0497	0.0050	mg/kg wet	0.05000		99	70-130			
Dibromomethane	0.0558	0.0050	mg/kg wet	0.05000		112	70-130			
Dichlorodifluoromethane	0.0488	0.0100	mg/kg wet	0.05000		98	70-130			
Diethyl Ether	0.0570	0.0050	mg/kg wet	0.05000		114	70-130			
Di-isopropyl ether	0.0550	0.0050	mg/kg wet	0.05000		110	70-130			
Ethyl tertiary-butyl ether	0.0527	0.0050	mg/kg wet	0.05000		105	70-130			
Ethylbenzene	0.0510	0.0050	mg/kg wet	0.05000		102	70-130			
Hexachlorobutadiene	0.0514	0.0050	mg/kg wet	0.05000		103	70-130			
Isopropylbenzene	0.0468	0.0050	mg/kg wet	0.05000		94	70-130			
Methyl tert-Butyl Ether	0.0552	0.0050	mg/kg wet	0.05000		110	70-130			
Methylene Chloride	0.0655	0.0250	mg/kg wet	0.05000		131	70-130			B+
Naphthalene	0.0492	0.0050	mg/kg wet	0.05000		98	70-130			
n-Butylbenzene	0.0594	0.0050	mg/kg wet	0.05000		119	70-130			
n-Propylbenzene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130			



*CERTIFICATE OF ANALYSIS*

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ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ61137 - 5035**

sec-Butylbenzene	0.0546	0.0050	mg/kg wet	0.05000		109	70-130			
Styrene	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
tert-Butylbenzene	0.0550	0.0050	mg/kg wet	0.05000		110	70-130			
Tertiary-amyl methyl ether	0.0491	0.0050	mg/kg wet	0.05000		98	70-130			
Tertiary-butyl Alcohol	0.256	0.0500	mg/kg wet	0.2500		102	70-130			
Tetrachloroethene	0.0457	0.0050	mg/kg wet	0.05000		91	70-130			
Tetrahydrofuran	0.0458	0.0050	mg/kg wet	0.05000		92	70-130			
Toluene	0.0536	0.0050	mg/kg wet	0.05000		107	70-130			
trans-1,2-Dichloroethene	0.0542	0.0050	mg/kg wet	0.05000		108	70-130			
Trichloroethene	0.0534	0.0050	mg/kg wet	0.05000		107	70-130			
Trichlorofluoromethane	0.0494	0.0050	mg/kg wet	0.05000		99	70-130			
Vinyl Chloride	0.0616	0.0100	mg/kg wet	0.05000		123	70-130			
Xylenes (Total)	0.145	0.0100	mg/kg							
Surrogate: 1,2-Dichloroethane-d4	0.0583		mg/kg wet	0.05000		117	70-130			
Surrogate: 4-Bromofluorobenzene	0.0518		mg/kg wet	0.05000		104	70-130			
Surrogate: Dibromofluoromethane	0.0574		mg/kg wet	0.05000		115	70-130			
Surrogate: Toluene-d8	0.0511		mg/kg wet	0.05000		102	70-130			

**LCS Dup**

1,1,1,2-Tetrachloroethane	0.0519	0.0050	mg/kg wet	0.05000		104	70-130	5	25	
1,1,1-Trichloroethane	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	6	25	
1,1,2,2-Tetrachloroethane	0.0548	0.0050	mg/kg wet	0.05000		110	70-130	4	25	
1,1,2-Trichloroethane	0.0516	0.0050	mg/kg wet	0.05000		103	70-130	3	25	
1,1-Dichloroethane	0.0533	0.0050	mg/kg wet	0.05000		107	70-130	5	25	
1,1-Dichloroethene	0.0525	0.0050	mg/kg wet	0.05000		105	70-130	5	25	
1,1-Dichloropropene	0.0529	0.0050	mg/kg wet	0.05000		106	70-130	5	25	
1,2,3-Trichlorobenzene	0.0504	0.0050	mg/kg wet	0.05000		101	70-130	7	25	
1,2,3-Trichloropropane	0.0540	0.0050	mg/kg wet	0.05000		108	70-130	5	25	
1,2,4-Trichlorobenzene	0.0498	0.0050	mg/kg wet	0.05000		100	70-130	6	25	
1,2,4-Trimethylbenzene	0.0535	0.0050	mg/kg wet	0.05000		107	70-130	4	25	
1,2-Dibromo-3-Chloropropane	0.0488	0.0050	mg/kg wet	0.05000		98	70-130	7	25	
1,2-Dibromoethane	0.0481	0.0050	mg/kg wet	0.05000		96	70-130	7	25	
1,2-Dichlorobenzene	0.0491	0.0050	mg/kg wet	0.05000		98	70-130	5	25	
1,2-Dichloroethane	0.0551	0.0050	mg/kg wet	0.05000		110	70-130	5	25	
1,2-Dichloropropane	0.0534	0.0050	mg/kg wet	0.05000		107	70-130	4	25	
1,3,5-Trichlorobenzene	0.0512	0.0050	mg/kg wet	0.05000		102	70-130	6	25	
1,3,5-Trimethylbenzene	0.0541	0.0050	mg/kg wet	0.05000		108	70-130	4	25	
1,3-Dichlorobenzene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130	3	25	
1,3-Dichloropropene (Total)	0.102	0.0050	mg/kg							
1,4-Dichlorobenzene	0.0481	0.0050	mg/kg wet	0.05000		96	70-130	7	25	
1,4-Dioxane	1.09	0.100	mg/kg wet	1.000		109	70-130	0.7	20	
2,2-Dichloropropane	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	7	25	
2-Butanone	0.262	0.0500	mg/kg wet	0.2500		105	70-130	5	25	
2-Chlorotoluene	0.0526	0.0050	mg/kg wet	0.05000		105	70-130	5	25	
2-Hexanone	0.225	0.0500	mg/kg wet	0.2500		90	70-130	7	25	
4-Chlorotoluene	0.0531	0.0050	mg/kg wet	0.05000		106	70-130	5	25	





*CERTIFICATE OF ANALYSIS*

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**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ61137 - 5035**

4-Isopropyltoluene	0.0522	0.0050	mg/kg wet	0.05000		104	70-130	5	25	
4-Methyl-2-Pentanone	0.242	0.0500	mg/kg wet	0.2500		97	70-130	5	25	
Acetone	0.264	0.0500	mg/kg wet	0.2500		106	70-130	5	25	
Acrylonitrile	0.0548	0.0050	mg/kg wet	0.05000		110	70-130	3	25	
Allyl Chloride	0.0565	0.0050	mg/kg wet	0.05000		113	70-130	3	25	
Benzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130	4	25	
Bromobenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130	4	25	
Bromochloromethane	0.0502	0.0050	mg/kg wet	0.05000		100	70-130	5	25	
Bromodichloromethane	0.0597	0.0050	mg/kg wet	0.05000		119	70-130	6	25	
Bromoform	0.0450	0.0050	mg/kg wet	0.05000		90	70-130	6	25	
Bromomethane	0.0548	0.0100	mg/kg wet	0.05000		110	70-130	5	25	
Carbon Disulfide	0.0540	0.0050	mg/kg wet	0.05000		108	70-130	5	25	
Carbon Tetrachloride	0.0552	0.0050	mg/kg wet	0.05000		110	70-130	6	25	
Chlorobenzene	0.0451	0.0050	mg/kg wet	0.05000		90	70-130	5	25	
Chloroethane	0.0481	0.0100	mg/kg wet	0.05000		96	70-130	8	25	
Chloroform	0.0528	0.0050	mg/kg wet	0.05000		106	70-130	4	25	
Chloromethane	0.0593	0.0100	mg/kg wet	0.05000		119	70-130	3	25	
cis-1,2-Dichloroethene	0.0522	0.0050	mg/kg wet	0.05000		104	70-130	4	25	
Dibromochloromethane	0.0472	0.0050	mg/kg wet	0.05000		94	70-130	5	25	
Dibromomethane	0.0532	0.0050	mg/kg wet	0.05000		106	70-130	5	25	
Dichlorodifluoromethane	0.0449	0.0100	mg/kg wet	0.05000		90	70-130	8	25	
Diethyl Ether	0.0542	0.0050	mg/kg wet	0.05000		108	70-130	5	25	
Di-isopropyl ether	0.0528	0.0050	mg/kg wet	0.05000		106	70-130	4	25	
Ethyl tertiary-butyl ether	0.0506	0.0050	mg/kg wet	0.05000		101	70-130	4	25	
Ethylbenzene	0.0481	0.0050	mg/kg wet	0.05000		96	70-130	6	25	
Hexachlorobutadiene	0.0480	0.0050	mg/kg wet	0.05000		96	70-130	7	25	
Isopropylbenzene	0.0446	0.0050	mg/kg wet	0.05000		89	70-130	5	25	
Methyl tert-Butyl Ether	0.0525	0.0050	mg/kg wet	0.05000		105	70-130	5	25	
Methylene Chloride	0.0626	0.0250	mg/kg wet	0.05000		125	70-130	4	25	
Naphthalene	0.0470	0.0050	mg/kg wet	0.05000		94	70-130	5	25	
n-Butylbenzene	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	7	25	
n-Propylbenzene	0.0531	0.0050	mg/kg wet	0.05000		106	70-130	5	25	
sec-Butylbenzene	0.0519	0.0050	mg/kg wet	0.05000		104	70-130	5	25	
Styrene	0.0477	0.0050	mg/kg wet	0.05000		95	70-130	5	25	
tert-Butylbenzene	0.0524	0.0050	mg/kg wet	0.05000		105	70-130	5	25	
Tertiary-amyl methyl ether	0.0482	0.0050	mg/kg wet	0.05000		96	70-130	2	25	
Tertiary-butyl Alcohol	0.248	0.0500	mg/kg wet	0.2500		99	70-130	3	20	
Tetrachloroethene	0.0426	0.0050	mg/kg wet	0.05000		85	70-130	7	25	
Tetrahydrofuran	0.0444	0.0050	mg/kg wet	0.05000		89	70-130	3	25	
Toluene	0.0507	0.0050	mg/kg wet	0.05000		101	70-130	6	25	
trans-1,2-Dichloroethene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130	6	25	
Trichloroethene	0.0508	0.0050	mg/kg wet	0.05000		102	70-130	5	25	
Trichlorofluoromethane	0.0460	0.0050	mg/kg wet	0.05000		92	70-130	7	25	
Vinyl Chloride	0.0583	0.0100	mg/kg wet	0.05000		117	70-130	6	25	
Xylenes (Total)	0.137	0.0100	mg/kg							





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Low Level

**Batch CJ61137 - 5035**

Surrogate: 1,2-Dichloroethane-d4	0.0585		mg/kg wet	0.05000		117	70-130			
Surrogate: 4-Bromofluorobenzene	0.0511		mg/kg wet	0.05000		102	70-130			
Surrogate: Dibromofluoromethane	0.0573		mg/kg wet	0.05000		115	70-130			
Surrogate: Toluene-d8	0.0514		mg/kg wet	0.05000		103	70-130			

5035/8260B Volatile Organic Compounds / Methanol

**Batch CJ61136 - 5035**

**Blank**

1,1,1,2-Tetrachloroethane	ND	0.200	mg/kg wet							
1,1,1-Trichloroethane	ND	0.200	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.200	mg/kg wet							
1,1,2-Trichloroethane	ND	0.200	mg/kg wet							
1,1-Dichloroethane	ND	0.200	mg/kg wet							
1,1-Dichloroethene	ND	0.200	mg/kg wet							
1,1-Dichloropropene	ND	0.200	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.200	mg/kg wet							
1,2,3-Trichloropropane	ND	0.200	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.200	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.200	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	1.00	mg/kg wet							
1,2-Dibromoethane	ND	0.200	mg/kg wet							
1,2-Dichlorobenzene	ND	0.200	mg/kg wet							
1,2-Dichloroethane	ND	0.200	mg/kg wet							
1,2-Dichloropropane	ND	0.200	mg/kg wet							
1,3 Dichloropropene (Total)	ND	0.200	mg/kg wet							
1,3,5-Trichlorobenzene	ND	0.200	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.200	mg/kg wet							
1,3-Dichlorobenzene	ND	0.200	mg/kg wet							
1,4-Dichlorobenzene	ND	0.200	mg/kg wet							
1,4-Dioxane - Screen	ND	40.0	mg/kg wet							
2,2-Dichloropropane	ND	0.200	mg/kg wet							
2-Butanone	ND	1.00	mg/kg wet							
2-Chlorotoluene	ND	0.200	mg/kg wet							
2-Hexanone	ND	1.00	mg/kg wet							
4-Chlorotoluene	ND	0.200	mg/kg wet							
4-Isopropyltoluene	ND	0.200	mg/kg wet							
4-Methyl-2-Pentanone	ND	1.00	mg/kg wet							
Acetone	ND	1.00	mg/kg wet							
Acrylonitrile	ND	1.00	mg/kg wet							
Allyl Chloride	ND	0.400	mg/kg wet							
Benzene	ND	0.200	mg/kg wet							
Bromobenzene	ND	0.200	mg/kg wet							
Bromochloromethane	ND	0.200	mg/kg wet							
Bromodichloromethane	ND	0.200	mg/kg wet							



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**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Methanol

**Batch CJ61136 - 5035**

Bromoform	ND	0.200	mg/kg wet							
Bromomethane	ND	0.200	mg/kg wet							
Carbon Disulfide	ND	0.200	mg/kg wet							
Carbon Tetrachloride	ND	0.200	mg/kg wet							
Chlorobenzene	ND	0.200	mg/kg wet							
Chloroethane	ND	0.200	mg/kg wet							
Chloroform	ND	0.200	mg/kg wet							
Chloromethane	ND	0.200	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.200	mg/kg wet							
Dibromochloromethane	ND	0.200	mg/kg wet							
Dibromomethane	ND	0.200	mg/kg wet							
Dichlorodifluoromethane	ND	0.200	mg/kg wet							
Diethyl Ether	ND	0.200	mg/kg wet							
Di-isopropyl ether	ND	0.200	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.200	mg/kg wet							
Ethylbenzene	ND	0.200	mg/kg wet							
Hexachlorobutadiene	ND	0.200	mg/kg wet							
Isopropylbenzene	ND	0.200	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.200	mg/kg wet							
Methylene Chloride	ND	0.400	mg/kg wet							
Naphthalene	ND	0.200	mg/kg wet							
n-Butylbenzene	ND	0.200	mg/kg wet							
n-Propylbenzene	ND	0.200	mg/kg wet							
sec-Butylbenzene	ND	0.200	mg/kg wet							
Styrene	ND	0.200	mg/kg wet							
tert-Butylbenzene	ND	0.200	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.200	mg/kg wet							
Tetrachloroethene	ND	0.200	mg/kg wet							
Tetrahydrofuran	ND	1.00	mg/kg wet							
Toluene	ND	0.200	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.200	mg/kg wet							
Trichloroethene	ND	0.200	mg/kg wet							
Trichlorofluoromethane	ND	0.200	mg/kg wet							
Vinyl Chloride	ND	0.200	mg/kg wet							
Xylenes (Total)	ND	0.400	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	4.70		mg/kg wet	5.000		94	70-130			
Surrogate: 4-Bromofluorobenzene	5.04		mg/kg wet	5.000		101	70-130			
Surrogate: Dibromofluoromethane	5.12		mg/kg wet	5.000		102	70-130			
Surrogate: Toluene-d8	4.90		mg/kg wet	5.000		98	70-130			

**LCS**

1,1,1,2-Tetrachloroethane	2.08	0.200	mg/kg wet	2.000		104	70-130			
1,1,1-Trichloroethane	1.97	0.200	mg/kg wet	2.000		99	70-130			
1,1,2,2-Tetrachloroethane	1.88	0.200	mg/kg wet	2.000		94	70-130			
1,1,2-Trichloroethane	1.89	0.200	mg/kg wet	2.000		95	70-130			
1,1-Dichloroethane	1.90	0.200	mg/kg wet	2.000		95	70-130			



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**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Methanol

**Batch CJ61136 - 5035**

1,1-Dichloroethene	1.99	0.200	mg/kg wet	2.000		100	70-130			
1,1-Dichloropropene	2.00	0.200	mg/kg wet	2.000		100	70-130			
1,2,3-Trichlorobenzene	2.01	0.200	mg/kg wet	2.000		100	70-130			
1,2,3-Trichloropropane	2.00	0.200	mg/kg wet	2.000		100	70-130			
1,2,4-Trichlorobenzene	1.94	0.200	mg/kg wet	2.000		97	70-130			
1,2,4-Trimethylbenzene	1.90	0.200	mg/kg wet	2.000		95	70-130			
1,2-Dibromo-3-Chloropropane	1.92	1.00	mg/kg wet	2.000		96	70-130			
1,2-Dibromoethane	1.93	0.200	mg/kg wet	2.000		96	70-130			
1,2-Dichlorobenzene	1.98	0.200	mg/kg wet	2.000		99	70-130			
1,2-Dichloroethane	1.87	0.200	mg/kg wet	2.000		94	70-130			
1,2-Dichloropropane	1.93	0.200	mg/kg wet	2.000		97	70-130			
1,3 Dichloropropene (Total)	3.88	0.200	mg/kg wet							
1,3,5-Trichlorobenzene	2.14	0.200	mg/kg wet	2.000		107	70-130			
1,3,5-Trimethylbenzene	1.96	0.200	mg/kg wet	2.000		98	70-130			
1,3-Dichlorobenzene	1.93	0.200	mg/kg wet	2.000		96	70-130			
1,4-Dichlorobenzene	1.89	0.200	mg/kg wet	2.000		95	70-130			
1,4-Dioxane - Screen	50.0	40.0	mg/kg wet	40.00		125	44-241			
2,2-Dichloropropane	1.97	0.200	mg/kg wet	2.000		99	70-130			
2-Butanone	9.55	1.00	mg/kg wet	10.00		95	70-130			
2-Chlorotoluene	1.96	0.200	mg/kg wet	2.000		98	70-130			
2-Hexanone	9.95	1.00	mg/kg wet	10.00		99	70-130			
4-Chlorotoluene	1.94	0.200	mg/kg wet	2.000		97	70-130			
4-Isopropyltoluene	2.01	0.200	mg/kg wet	2.000		100	70-130			
4-Methyl-2-Pentanone	10.1	1.00	mg/kg wet	10.00		101	70-130			
Acetone	9.92	1.00	mg/kg wet	10.00		99	70-130			
Acrylonitrile	1.66	1.00	mg/kg wet	2.000		83	70-130			
Allyl Chloride	1.94	0.400	mg/kg wet	2.000		97	70-130			
Benzene	2.03	0.200	mg/kg wet	2.000		101	70-130			
Bromobenzene	1.98	0.200	mg/kg wet	2.000		99	70-130			
Bromochloromethane	1.92	0.200	mg/kg wet	2.000		96	70-130			
Bromodichloromethane	2.05	0.200	mg/kg wet	2.000		102	70-130			
Bromoform	2.15	0.200	mg/kg wet	2.000		108	70-130			
Bromomethane	1.97	0.200	mg/kg wet	2.000		98	70-130			
Carbon Disulfide	1.94	0.200	mg/kg wet	2.000		97	70-130			
Carbon Tetrachloride	2.04	0.200	mg/kg wet	2.000		102	70-130			
Chlorobenzene	1.93	0.200	mg/kg wet	2.000		97	70-130			
Chloroethane	1.80	0.200	mg/kg wet	2.000		90	70-130			
Chloroform	1.95	0.200	mg/kg wet	2.000		97	70-130			
Chloromethane	1.98	0.200	mg/kg wet	2.000		99	70-130			
cis-1,2-Dichloroethene	1.94	0.200	mg/kg wet	2.000		97	70-130			
Dibromochloromethane	2.20	0.200	mg/kg wet	2.000		110	70-130			
Dibromomethane	1.82	0.200	mg/kg wet	2.000		91	70-130			
Dichlorodifluoromethane	1.83	0.200	mg/kg wet	2.000		92	70-130			
Diethyl Ether	1.96	0.200	mg/kg wet	2.000		98	70-130			
Di-isopropyl ether	1.94	0.200	mg/kg wet	2.000		97	70-130			



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Methanol

**Batch CJ61136 - 5035**

Ethyl tertiary-butyl ether	2.03	0.200	mg/kg wet	2.000		102	70-130			
Ethylbenzene	1.97	0.200	mg/kg wet	2.000		99	70-130			
Hexachlorobutadiene	1.99	0.200	mg/kg wet	2.000		100	70-130			
Isopropylbenzene	1.64	0.200	mg/kg wet	2.000		82	70-130			
Methyl tert-Butyl Ether	1.89	0.200	mg/kg wet	2.000		95	70-130			
Methylene Chloride	1.87	0.400	mg/kg wet	2.000		93	70-130			
Naphthalene	2.04	0.200	mg/kg wet	2.000		102	70-130			
n-Butylbenzene	1.99	0.200	mg/kg wet	2.000		100	70-130			
n-Propylbenzene	1.92	0.200	mg/kg wet	2.000		96	70-130			
sec-Butylbenzene	1.91	0.200	mg/kg wet	2.000		95	70-130			
Styrene	2.06	0.200	mg/kg wet	2.000		103	70-130			
tert-Butylbenzene	2.00	0.200	mg/kg wet	2.000		100	70-130			
Tertiary-amyl methyl ether	1.95	0.200	mg/kg wet	2.000		98	70-130			
Tetrachloroethene	1.98	0.200	mg/kg wet	2.000		99	70-130			
Tetrahydrofuran	1.73	1.00	mg/kg wet	2.000		87	70-130			
Toluene	1.91	0.200	mg/kg wet	2.000		96	70-130			
trans-1,2-Dichloroethene	1.94	0.200	mg/kg wet	2.000		97	70-130			
Trichloroethene	1.95	0.200	mg/kg wet	2.000		98	70-130			
Trichlorofluoromethane	1.67	0.200	mg/kg wet	2.000		83	70-130			
Vinyl Chloride	1.91	0.200	mg/kg wet	2.000		95	70-130			
Xylenes (Total)	5.88	0.400	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	4.81		mg/kg wet	5.000		96	70-130			
Surrogate: 4-Bromofluorobenzene	5.07		mg/kg wet	5.000		101	70-130			
Surrogate: Dibromofluoromethane	5.27		mg/kg wet	5.000		105	70-130			
Surrogate: Toluene-d8	4.99		mg/kg wet	5.000		100	70-130			

**LCS Dup**

1,1,1,2-Tetrachloroethane	2.06	0.200	mg/kg wet	2.000		103	70-130	1	25	
1,1,1-Trichloroethane	1.92	0.200	mg/kg wet	2.000		96	70-130	3	25	
1,1,2,2-Tetrachloroethane	1.87	0.200	mg/kg wet	2.000		93	70-130	0.9	25	
1,1,2-Trichloroethane	1.92	0.200	mg/kg wet	2.000		96	70-130	1	25	
1,1-Dichloroethane	1.81	0.200	mg/kg wet	2.000		91	70-130	5	25	
1,1-Dichloroethene	1.83	0.200	mg/kg wet	2.000		92	70-130	8	25	
1,1-Dichloropropene	2.04	0.200	mg/kg wet	2.000		102	70-130	2	25	
1,2,3-Trichlorobenzene	1.99	0.200	mg/kg wet	2.000		99	70-130	1	25	
1,2,3-Trichloropropane	1.98	0.200	mg/kg wet	2.000		99	70-130	0.8	25	
1,2,4-Trichlorobenzene	1.95	0.200	mg/kg wet	2.000		97	70-130	0.2	25	
1,2,4-Trimethylbenzene	1.95	0.200	mg/kg wet	2.000		98	70-130	3	25	
1,2-Dibromo-3-Chloropropane	2.03	1.00	mg/kg wet	2.000		102	70-130	5	25	
1,2-Dibromoethane	1.90	0.200	mg/kg wet	2.000		95	70-130	2	25	
1,2-Dichlorobenzene	1.95	0.200	mg/kg wet	2.000		98	70-130	1	25	
1,2-Dichloroethane	1.78	0.200	mg/kg wet	2.000		89	70-130	5	25	
1,2-Dichloropropane	2.03	0.200	mg/kg wet	2.000		102	70-130	5	25	
1,3 Dichloropropene (Total)	3.59	0.200	mg/kg wet							
1,3,5-Trichlorobenzene	2.07	0.200	mg/kg wet	2.000		104	70-130	3	25	
1,3,5-Trimethylbenzene	2.00	0.200	mg/kg wet	2.000		100	70-130	2	25	



*CERTIFICATE OF ANALYSIS*

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**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Methanol

**Batch CJ61136 - 5035**

1,3-Dichlorobenzene	1.95	0.200	mg/kg wet	2.000		97	70-130	1	25	
1,4-Dichlorobenzene	1.93	0.200	mg/kg wet	2.000		96	70-130	2	25	
1,4-Dioxane - Screen	48.7	40.0	mg/kg wet	40.00		122	44-241	3	200	
2,2-Dichloropropane	1.88	0.200	mg/kg wet	2.000		94	70-130	5	25	
2-Butanone	8.90	1.00	mg/kg wet	10.00		89	70-130	7	25	
2-Chlorotoluene	1.97	0.200	mg/kg wet	2.000		98	70-130	0.3	25	
2-Hexanone	10.1	1.00	mg/kg wet	10.00		101	70-130	1	25	
4-Chlorotoluene	1.92	0.200	mg/kg wet	2.000		96	70-130	0.9	25	
4-Isopropyltoluene	2.05	0.200	mg/kg wet	2.000		103	70-130	2	25	
4-Methyl-2-Pentanone	9.17	1.00	mg/kg wet	10.00		92	70-130	10	25	
Acetone	8.98	1.00	mg/kg wet	10.00		90	70-130	10	25	
Acrylonitrile	1.86	1.00	mg/kg wet	2.000		93	70-130	12	25	
Allyl Chloride	1.90	0.400	mg/kg wet	2.000		95	70-130	2	25	
Benzene	2.03	0.200	mg/kg wet	2.000		102	70-130	0.4	25	
Bromobenzene	1.97	0.200	mg/kg wet	2.000		98	70-130	0.5	25	
Bromochloromethane	1.86	0.200	mg/kg wet	2.000		93	70-130	3	25	
Bromodichloromethane	1.98	0.200	mg/kg wet	2.000		99	70-130	3	25	
Bromoform	2.11	0.200	mg/kg wet	2.000		106	70-130	2	25	
Bromomethane	1.97	0.200	mg/kg wet	2.000		99	70-130	0.2	25	
Carbon Disulfide	1.96	0.200	mg/kg wet	2.000		98	70-130	0.8	25	
Carbon Tetrachloride	2.00	0.200	mg/kg wet	2.000		100	70-130	2	25	
Chlorobenzene	1.93	0.200	mg/kg wet	2.000		97	70-130	0.1	25	
Chloroethane	1.77	0.200	mg/kg wet	2.000		88	70-130	2	25	
Chloroform	1.80	0.200	mg/kg wet	2.000		90	70-130	8	25	
Chloromethane	1.96	0.200	mg/kg wet	2.000		98	70-130	1	25	
cis-1,2-Dichloroethene	1.79	0.200	mg/kg wet	2.000		89	70-130	8	25	
Dibromochloromethane	2.07	0.200	mg/kg wet	2.000		103	70-130	6	25	
Dibromomethane	1.79	0.200	mg/kg wet	2.000		90	70-130	1	25	
Dichlorodifluoromethane	1.76	0.200	mg/kg wet	2.000		88	70-130	4	25	
Diethyl Ether	1.79	0.200	mg/kg wet	2.000		90	70-130	9	25	
Di-isopropyl ether	1.93	0.200	mg/kg wet	2.000		96	70-130	0.6	25	
Ethyl tertiary-butyl ether	1.93	0.200	mg/kg wet	2.000		97	70-130	5	25	
Ethylbenzene	2.00	0.200	mg/kg wet	2.000		100	70-130	1	25	
Hexachlorobutadiene	1.93	0.200	mg/kg wet	2.000		96	70-130	3	25	
Isopropylbenzene	1.68	0.200	mg/kg wet	2.000		84	70-130	2	25	
Methyl tert-Butyl Ether	1.75	0.200	mg/kg wet	2.000		87	70-130	8	25	
Methylene Chloride	1.91	0.400	mg/kg wet	2.000		96	70-130	2	25	
Naphthalene	2.02	0.200	mg/kg wet	2.000		101	70-130	1	25	
n-Butylbenzene	1.97	0.200	mg/kg wet	2.000		99	70-130	0.8	25	
n-Propylbenzene	2.00	0.200	mg/kg wet	2.000		100	70-130	4	25	
sec-Butylbenzene	1.89	0.200	mg/kg wet	2.000		95	70-130	0.6	25	
Styrene	2.03	0.200	mg/kg wet	2.000		102	70-130	1	25	
tert-Butylbenzene	2.04	0.200	mg/kg wet	2.000		102	70-130	2	25	
Tertiary-amyl methyl ether	1.92	0.200	mg/kg wet	2.000		96	70-130	2	25	
Tetrachloroethene	2.02	0.200	mg/kg wet	2.000		101	70-130	2	25	



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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5035/8260B Volatile Organic Compounds / Methanol

**Batch CJ61136 - 5035**

Tetrahydrofuran	1.69	1.00	mg/kg wet	2.000		84	70-130	3	25	
Toluene	1.92	0.200	mg/kg wet	2.000		96	70-130	0.3	25	
trans-1,2-Dichloroethene	1.81	0.200	mg/kg wet	2.000		90	70-130	7	25	
Trichloroethene	1.92	0.200	mg/kg wet	2.000		96	70-130	2	25	
Trichlorofluoromethane	1.54	0.200	mg/kg wet	2.000		77	70-130	8	25	
Vinyl Chloride	1.97	0.200	mg/kg wet	2.000		98	70-130	3	25	
Xylenes (Total)	5.89	0.400	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	4.49		mg/kg wet	5.000		90	70-130			
Surrogate: 4-Bromofluorobenzene	5.05		mg/kg wet	5.000		101	70-130			
Surrogate: Dibromofluoromethane	4.90		mg/kg wet	5.000		98	70-130			
Surrogate: Toluene-d8	5.04		mg/kg wet	5.000		101	70-130			

8082A Polychlorinated Biphenyls (PCB)

**Batch CJ60604 - 3540C**

<b>Blank</b>										
Aroclor 1016	ND	0.0500	mg/kg wet							
Aroclor 1221	ND	0.0500	mg/kg wet							
Aroclor 1232	ND	0.0500	mg/kg wet							
Aroclor 1242	ND	0.0500	mg/kg wet							
Aroclor 1248	ND	0.0500	mg/kg wet							
Aroclor 1254	ND	0.0500	mg/kg wet							
Aroclor 1260	ND	0.0500	mg/kg wet							
Aroclor 1262	ND	0.0500	mg/kg wet							
Aroclor 1268	ND	0.0500	mg/kg wet							

Surrogate: Decachlorobiphenyl	0.0222		mg/kg wet	0.02500		89	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0229		mg/kg wet	0.02500		92	30-150			
Surrogate: Tetrachloro-m-xylene	0.0188		mg/kg wet	0.02500		75	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0185		mg/kg wet	0.02500		74	30-150			

<b>LCS</b>										
Aroclor 1016	0.444	0.0500	mg/kg wet	0.5000		89	40-140			
Aroclor 1260	0.455	0.0500	mg/kg wet	0.5000		91	40-140			

Surrogate: Decachlorobiphenyl	0.0233		mg/kg wet	0.02500		93	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0249		mg/kg wet	0.02500		100	30-150			
Surrogate: Tetrachloro-m-xylene	0.0211		mg/kg wet	0.02500		84	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0192		mg/kg wet	0.02500		77	30-150			

<b>LCS Dup</b>										
Aroclor 1016	0.449	0.0500	mg/kg wet	0.5000		90	40-140	1	30	
Aroclor 1260	0.461	0.0500	mg/kg wet	0.5000		92	40-140	1	30	

Surrogate: Decachlorobiphenyl	0.0231		mg/kg wet	0.02500		92	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0246		mg/kg wet	0.02500		98	30-150			
Surrogate: Tetrachloro-m-xylene	0.0210		mg/kg wet	0.02500		84	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0193		mg/kg wet	0.02500		77	30-150			



*CERTIFICATE OF ANALYSIS*

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Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8082A Polychlorinated Biphenyls (PCB)

**Batch CJ60709 - 3540C**

**Blank**

Aroclor 1016	ND	0.0500	mg/kg wet							
Aroclor 1221	ND	0.0500	mg/kg wet							
Aroclor 1232	ND	0.0500	mg/kg wet							
Aroclor 1242	ND	0.0500	mg/kg wet							
Aroclor 1248	ND	0.0500	mg/kg wet							
Aroclor 1254	ND	0.0500	mg/kg wet							
Aroclor 1260	ND	0.0500	mg/kg wet							
Aroclor 1262	ND	0.0500	mg/kg wet							
Aroclor 1268	ND	0.0500	mg/kg wet							

Surrogate: Decachlorobiphenyl	0.0200		mg/kg wet	0.02500		80	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0207		mg/kg wet	0.02500		83	30-150			
Surrogate: Tetrachloro-m-xylene	0.0183		mg/kg wet	0.02500		73	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0183		mg/kg wet	0.02500		73	30-150			

**LCS**

Aroclor 1016	0.447	0.0500	mg/kg wet	0.5000		89	40-140			
Aroclor 1260	0.452	0.0500	mg/kg wet	0.5000		90	40-140			
Surrogate: Decachlorobiphenyl	0.0216		mg/kg wet	0.02500		87	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0225		mg/kg wet	0.02500		90	30-150			
Surrogate: Tetrachloro-m-xylene	0.0207		mg/kg wet	0.02500		83	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0193		mg/kg wet	0.02500		77	30-150			

**LCS Dup**

Aroclor 1016	0.430	0.0500	mg/kg wet	0.5000		86	40-140	4	30	
Aroclor 1260	0.441	0.0500	mg/kg wet	0.5000		88	40-140	3	30	
Surrogate: Decachlorobiphenyl	0.0214		mg/kg wet	0.02500		85	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0223		mg/kg wet	0.02500		89	30-150			
Surrogate: Tetrachloro-m-xylene	0.0200		mg/kg wet	0.02500		80	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0184		mg/kg wet	0.02500		74	30-150			

**Batch CJ61327 - 3540C**

**Blank**

Aroclor 1016	ND	0.0500	mg/kg wet							
Aroclor 1221	ND	0.0500	mg/kg wet							
Aroclor 1232	ND	0.0500	mg/kg wet							
Aroclor 1242	ND	0.0500	mg/kg wet							
Aroclor 1248	ND	0.0500	mg/kg wet							
Aroclor 1254	ND	0.0500	mg/kg wet							
Aroclor 1260	ND	0.0500	mg/kg wet							
Aroclor 1262	ND	0.0500	mg/kg wet							
Aroclor 1268	ND	0.0500	mg/kg wet							

Surrogate: Decachlorobiphenyl	0.0212		mg/kg wet	0.02500		85	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0226		mg/kg wet	0.02500		90	30-150			





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ESS Laboratory Work Order: 1610112

**Quality Control Data**

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8082A Polychlorinated Biphenyls (PCB)

**Batch CJ61327 - 3540C**

Surrogate: Tetrachloro-m-xylene	0.0195		mg/kg wet	0.02500		78	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0193		mg/kg wet	0.02500		77	30-150			

**LCS**

Aroclor 1016	0.462	0.0500	mg/kg wet	0.5000		92	40-140			
Aroclor 1260	0.460	0.0500	mg/kg wet	0.5000		92	40-140			

Surrogate: Decachlorobiphenyl	0.0226		mg/kg wet	0.02500		90	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0245		mg/kg wet	0.02500		98	30-150			
Surrogate: Tetrachloro-m-xylene	0.0221		mg/kg wet	0.02500		89	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0204		mg/kg wet	0.02500		82	30-150			

**LCS Dup**

Aroclor 1016	0.450	0.0500	mg/kg wet	0.5000		90	40-140	3	30	
Aroclor 1260	0.446	0.0500	mg/kg wet	0.5000		89	40-140	3	30	

Surrogate: Decachlorobiphenyl	0.0214		mg/kg wet	0.02500		86	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0231		mg/kg wet	0.02500		92	30-150			
Surrogate: Tetrachloro-m-xylene	0.0211		mg/kg wet	0.02500		84	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0196		mg/kg wet	0.02500		78	30-150			

**Batch CJ61328 - 3540C**

**Blank**

Aroclor 1016	ND	0.0500	mg/kg wet							
Aroclor 1221	ND	0.0500	mg/kg wet							
Aroclor 1232	ND	0.0500	mg/kg wet							
Aroclor 1242	ND	0.0500	mg/kg wet							
Aroclor 1248	ND	0.0500	mg/kg wet							
Aroclor 1254	ND	0.0500	mg/kg wet							
Aroclor 1260	ND	0.0500	mg/kg wet							
Aroclor 1262	ND	0.0500	mg/kg wet							
Aroclor 1268	ND	0.0500	mg/kg wet							

Surrogate: Decachlorobiphenyl	0.0193		mg/kg wet	0.02500		77	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0201		mg/kg wet	0.02500		81	30-150			
Surrogate: Tetrachloro-m-xylene	0.0168		mg/kg wet	0.02500		67	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0189		mg/kg wet	0.02500		76	30-150			

**LCS**

Aroclor 1016	0.486	0.0500	mg/kg wet	0.5000		97	40-140			
Aroclor 1260	0.444	0.0500	mg/kg wet	0.5000		89	40-140			

Surrogate: Decachlorobiphenyl	0.0233		mg/kg wet	0.02500		93	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0248		mg/kg wet	0.02500		99	30-150			
Surrogate: Tetrachloro-m-xylene	0.0196		mg/kg wet	0.02500		78	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0206		mg/kg wet	0.02500		83	30-150			

**LCS Dup**

Aroclor 1016	0.489	0.0500	mg/kg wet	0.5000		98	40-140	0.7	30	
Aroclor 1260	0.466	0.0500	mg/kg wet	0.5000		93	40-140	5	30	





*CERTIFICATE OF ANALYSIS*

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**Quality Control Data**

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**8082A Polychlorinated Biphenyls (PCB)**

**Batch CJ61328 - 3540C**

Surrogate: Decachlorobiphenyl	0.0245		mg/kg wet	0.02500		98	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0258		mg/kg wet	0.02500		103	30-150			
Surrogate: Tetrachloro-m-xylene	0.0198		mg/kg wet	0.02500		79	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0208		mg/kg wet	0.02500		83	30-150			

**8100M Total Petroleum Hydrocarbons**

**Batch CJ60608 - 3546**

**Blank**

Decane (C10)	ND	0.2	mg/kg wet							
Docosane (C22)	ND	0.2	mg/kg wet							
Dodecane (C12)	ND	0.2	mg/kg wet							
Eicosane (C20)	ND	0.2	mg/kg wet							
Hexacosane (C26)	ND	0.2	mg/kg wet							
Hexadecane (C16)	ND	0.2	mg/kg wet							
Nonadecane (C19)	ND	0.2	mg/kg wet							
Nonane (C9)	ND	0.2	mg/kg wet							
Octacosane (C28)	ND	0.2	mg/kg wet							
Octadecane (C18)	ND	0.2	mg/kg wet							
Tetracosane (C24)	ND	0.2	mg/kg wet							
Tetradecane (C14)	ND	0.2	mg/kg wet							
Total Petroleum Hydrocarbons	ND	37.5	mg/kg wet							
Triacontane (C30)	ND	0.2	mg/kg wet							

Surrogate: O-Terphenyl	4.68		mg/kg wet	5.000		94	40-140			
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**LCS**

Decane (C10)	1.9	0.2	mg/kg wet	2.500		78	40-140			
Docosane (C22)	2.4	0.2	mg/kg wet	2.500		97	40-140			
Dodecane (C12)	2.1	0.2	mg/kg wet	2.500		84	40-140			
Eicosane (C20)	2.5	0.2	mg/kg wet	2.500		99	40-140			
Hexacosane (C26)	2.4	0.2	mg/kg wet	2.500		97	40-140			
Hexadecane (C16)	2.4	0.2	mg/kg wet	2.500		95	40-140			
Nonadecane (C19)	2.2	0.2	mg/kg wet	2.500		88	40-140			
Nonane (C9)	1.7	0.2	mg/kg wet	2.500		69	30-140			
Octacosane (C28)	2.4	0.2	mg/kg wet	2.500		97	40-140			
Octadecane (C18)	2.4	0.2	mg/kg wet	2.500		95	40-140			
Tetracosane (C24)	2.4	0.2	mg/kg wet	2.500		97	40-140			
Tetradecane (C14)	2.2	0.2	mg/kg wet	2.500		86	40-140			
Total Petroleum Hydrocarbons	32.8	37.5	mg/kg wet	35.00		94	40-140			
Triacontane (C30)	2.4	0.2	mg/kg wet	2.500		97	40-140			

Surrogate: O-Terphenyl	4.89		mg/kg wet	5.000		98	40-140			
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**LCS Dup**

Decane (C10)	2.2	0.2	mg/kg wet	2.500		87	40-140	11	50	
Docosane (C22)	2.5	0.2	mg/kg wet	2.500		101	40-140	4	50	



*CERTIFICATE OF ANALYSIS*

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ESS Laboratory Work Order: 1610112

**Quality Control Data**

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**8100M Total Petroleum Hydrocarbons**

**Batch CJ60608 - 3546**

Dodecane (C12)	2.2	0.2	mg/kg wet	2.500		89	40-140	5	50	
Eicosane (C20)	2.6	0.2	mg/kg wet	2.500		103	40-140	4	50	
Hexacosane (C26)	2.5	0.2	mg/kg wet	2.500		101	40-140	4	50	
Hexadecane (C16)	2.5	0.2	mg/kg wet	2.500		102	40-140	7	50	
Nonadecane (C19)	2.3	0.2	mg/kg wet	2.500		92	40-140	5	50	
Nonane (C9)	1.9	0.2	mg/kg wet	2.500		77	30-140	11	50	
Octacosane (C28)	2.5	0.2	mg/kg wet	2.500		101	40-140	5	50	
Octadecane (C18)	2.5	0.2	mg/kg wet	2.500		99	40-140	5	50	
Tetracosane (C24)	2.5	0.2	mg/kg wet	2.500		101	40-140	4	50	
Tetradecane (C14)	2.3	0.2	mg/kg wet	2.500		92	40-140	7	50	
Total Petroleum Hydrocarbons	34.1	37.5	mg/kg wet	35.00		97	40-140	4	50	
Triacontane (C30)	2.5	0.2	mg/kg wet	2.500		101	40-140	4	50	

<i>Surrogate: O-Terphenyl</i>	<i>5.02</i>		mg/kg wet	<i>5.000</i>		<i>100</i>	<i>40-140</i>			
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**Batch CJ60712 - 3546**

**Blank**

Decane (C10)	ND	0.2	mg/kg wet							
Docosane (C22)	ND	0.2	mg/kg wet							
Dodecane (C12)	ND	0.2	mg/kg wet							
Eicosane (C20)	ND	0.2	mg/kg wet							
Hexacosane (C26)	ND	0.2	mg/kg wet							
Hexadecane (C16)	ND	0.2	mg/kg wet							
Nonadecane (C19)	ND	0.2	mg/kg wet							
Nonane (C9)	ND	0.2	mg/kg wet							
Octacosane (C28)	ND	0.2	mg/kg wet							
Octadecane (C18)	ND	0.2	mg/kg wet							
Tetracosane (C24)	ND	0.2	mg/kg wet							
Tetradecane (C14)	ND	0.2	mg/kg wet							
Total Petroleum Hydrocarbons	ND	37.5	mg/kg wet							
Triacontane (C30)	ND	0.2	mg/kg wet							

<i>Surrogate: O-Terphenyl</i>	<i>4.60</i>		mg/kg wet	<i>5.000</i>		<i>92</i>	<i>40-140</i>			
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**LCS**

Decane (C10)	2.2	0.2	mg/kg wet	2.500		88	40-140			
Docosane (C22)	2.5	0.2	mg/kg wet	2.500		100	40-140			
Dodecane (C12)	2.3	0.2	mg/kg wet	2.500		92	40-140			
Eicosane (C20)	2.5	0.2	mg/kg wet	2.500		100	40-140			
Hexacosane (C26)	2.4	0.2	mg/kg wet	2.500		97	40-140			
Hexadecane (C16)	2.5	0.2	mg/kg wet	2.500		101	40-140			
Nonadecane (C19)	2.5	0.2	mg/kg wet	2.500		101	40-140			
Nonane (C9)	1.9	0.2	mg/kg wet	2.500		76	30-140			
Octacosane (C28)	2.4	0.2	mg/kg wet	2.500		96	40-140			
Octadecane (C18)	2.5	0.2	mg/kg wet	2.500		99	40-140			
Tetracosane (C24)	2.5	0.2	mg/kg wet	2.500		99	40-140			
Tetradecane (C14)	2.4	0.2	mg/kg wet	2.500		94	40-140			



*CERTIFICATE OF ANALYSIS*

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ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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**8100M Total Petroleum Hydrocarbons**

**Batch CJ60712 - 3546**

Total Petroleum Hydrocarbons	33.4	37.5	mg/kg wet	35.00		95	40-140			
Triacotane (C30)	2.4	0.2	mg/kg wet	2.500		95	40-140			

<i>Surrogate: O-Terphenyl</i>	4.52		mg/kg wet	5.000		90	40-140			
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**LCS Dup**

Decane (C10)	2.1	0.2	mg/kg wet	2.500		84	40-140	4	50	
Docosane (C22)	2.4	0.2	mg/kg wet	2.500		96	40-140	4	50	
Dodecane (C12)	2.2	0.2	mg/kg wet	2.500		88	40-140	4	50	
Eicosane (C20)	2.4	0.2	mg/kg wet	2.500		97	40-140	4	50	
Hexacosane (C26)	2.3	0.2	mg/kg wet	2.500		94	40-140	3	50	
Hexadecane (C16)	2.5	0.2	mg/kg wet	2.500		99	40-140	2	50	
Nonadecane (C19)	2.4	0.2	mg/kg wet	2.500		97	40-140	4	50	
Nonane (C9)	1.8	0.2	mg/kg wet	2.500		73	30-140	5	50	
Octacosane (C28)	2.3	0.2	mg/kg wet	2.500		92	40-140	4	50	
Octadecane (C18)	2.4	0.2	mg/kg wet	2.500		95	40-140	4	50	
Tetracosane (C24)	2.4	0.2	mg/kg wet	2.500		95	40-140	4	50	
Tetradecane (C14)	2.4	0.2	mg/kg wet	2.500		95	40-140	0.3	50	
Total Petroleum Hydrocarbons	32.3	37.5	mg/kg wet	35.00		92	40-140	3	50	
Triacotane (C30)	2.3	0.2	mg/kg wet	2.500		92	40-140	3	50	

<i>Surrogate: O-Terphenyl</i>	4.30		mg/kg wet	5.000		86	40-140			
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**8270D Semi-Volatile Organic Compounds**

**Batch CJ60609 - 3546**

**Blank**

1,1-Biphenyl	ND	0.333	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.333	mg/kg wet							
1,2-Dichlorobenzene	ND	0.333	mg/kg wet							
1,2-Diphenylhydrazine as Azobenzene	ND	0.333	mg/kg wet							
1,3-Dichlorobenzene	ND	0.333	mg/kg wet							
1,4-Dichlorobenzene	ND	0.333	mg/kg wet							
2,3,4,6-Tetrachlorophenol	ND	1.67	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.333	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.333	mg/kg wet							
2,4-Dichlorophenol	ND	0.333	mg/kg wet							
2,4-Dimethylphenol	ND	0.333	mg/kg wet							
2,4-Dinitrophenol	ND	1.67	mg/kg wet							
2,4-Dinitrotoluene	ND	0.333	mg/kg wet							
2,6-Dinitrotoluene	ND	0.333	mg/kg wet							
2-Chloronaphthalene	ND	0.333	mg/kg wet							
2-Chlorophenol	ND	0.333	mg/kg wet							
2-Methylnaphthalene	ND	0.333	mg/kg wet							
2-Methylphenol	ND	0.333	mg/kg wet							
2-Nitroaniline	ND	0.333	mg/kg wet							
2-Nitrophenol	ND	0.333	mg/kg wet							



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ60609 - 3546**

3,3'-Dichlorobenzidine	ND	0.667	mg/kg wet							
3+4-Methylphenol	ND	0.667	mg/kg wet							
3-Nitroaniline	ND	0.333	mg/kg wet							
4,6-Dinitro-2-Methylphenol	ND	1.67	mg/kg wet							
4-Bromophenyl-phenylether	ND	0.333	mg/kg wet							
4-Chloro-3-Methylphenol	ND	0.333	mg/kg wet							
4-Chloroaniline	ND	0.667	mg/kg wet							
4-Chloro-phenyl-phenyl ether	ND	0.333	mg/kg wet							
4-Nitroaniline	ND	0.333	mg/kg wet							
4-Nitrophenol	ND	1.67	mg/kg wet							
Acenaphthene	ND	0.333	mg/kg wet							
Acenaphthylene	ND	0.333	mg/kg wet							
Acetophenone	ND	0.667	mg/kg wet							
Aniline	ND	1.67	mg/kg wet							
Anthracene	ND	0.333	mg/kg wet							
Azobenzene	ND	0.333	mg/kg wet							
Benzidine	ND	0.667	mg/kg wet							
Benzo(a)anthracene	ND	0.333	mg/kg wet							
Benzo(a)pyrene	ND	0.167	mg/kg wet							
Benzo(b)fluoranthene	ND	0.333	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.333	mg/kg wet							
Benzo(k)fluoranthene	ND	0.333	mg/kg wet							
Benzoic Acid	ND	1.67	mg/kg wet							
Benzyl Alcohol	ND	0.333	mg/kg wet							
bis(2-Chloroethoxy)methane	ND	0.333	mg/kg wet							
bis(2-Chloroethyl)ether	ND	0.333	mg/kg wet							
bis(2-chloroisopropyl)Ether	ND	0.333	mg/kg wet							
bis(2-Ethylhexyl)phthalate	ND	0.333	mg/kg wet							
Butylbenzylphthalate	ND	0.333	mg/kg wet							
Carbazole	ND	0.333	mg/kg wet							
Chrysene	ND	0.167	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.167	mg/kg wet							
Dibenzofuran	ND	0.333	mg/kg wet							
Diethylphthalate	ND	0.333	mg/kg wet							
Dimethylphthalate	ND	0.333	mg/kg wet							
Di-n-butylphthalate	ND	0.333	mg/kg wet							
Di-n-octylphthalate	ND	0.333	mg/kg wet							
Fluoranthene	ND	0.333	mg/kg wet							
Fluorene	ND	0.333	mg/kg wet							
Hexachlorobenzene	ND	0.333	mg/kg wet							
Hexachlorobutadiene	ND	0.333	mg/kg wet							
Hexachlorocyclopentadiene	ND	1.67	mg/kg wet							
Hexachloroethane	ND	0.333	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.333	mg/kg wet							
Isophorone	ND	0.333	mg/kg wet							



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ60609 - 3546**

Naphthalene	ND	0.333	mg/kg wet							
Nitrobenzene	ND	0.333	mg/kg wet							
N-Nitrosodimethylamine	ND	0.333	mg/kg wet							
N-Nitroso-Di-n-Propylamine	ND	0.333	mg/kg wet							
N-nitrosodiphenylamine	ND	0.333	mg/kg wet							
Pentachlorophenol	ND	1.67	mg/kg wet							
Phenanthrene	ND	0.333	mg/kg wet							
Phenol	ND	0.333	mg/kg wet							
Pyrene	ND	0.333	mg/kg wet							
Pyridine	ND	1.67	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	2.63		mg/kg wet	3.333		79	30-130			
Surrogate: 2,4,6-Tribromophenol	4.46		mg/kg wet	5.000		89	30-130			
Surrogate: 2-Chlorophenol-d4	3.99		mg/kg wet	5.000		80	30-130			
Surrogate: 2-Fluorobiphenyl	2.75		mg/kg wet	3.333		82	30-130			
Surrogate: 2-Fluorophenol	3.92		mg/kg wet	5.000		78	30-130			
Surrogate: Nitrobenzene-d5	2.68		mg/kg wet	3.333		80	30-130			
Surrogate: Phenol-d6	4.01		mg/kg wet	5.000		80	30-130			
Surrogate: p-Terphenyl-d14	3.07		mg/kg wet	3.333		92	30-130			

**LCS**

1,1-Biphenyl	2.46	0.333	mg/kg wet	3.333		74	40-140			
1,2,4-Trichlorobenzene	2.29	0.333	mg/kg wet	3.333		69	40-140			
1,2-Dichlorobenzene	2.19	0.333	mg/kg wet	3.333		66	40-140			
1,2-Diphenylhydrazine as Azobenzene	2.59	0.333	mg/kg wet	3.333		78	40-140			
1,3-Dichlorobenzene	2.20	0.333	mg/kg wet	3.333		66	40-140			
1,4-Dichlorobenzene	2.15	0.333	mg/kg wet	3.333		65	40-140			
2,3,4,6-Tetrachlorophenol	2.77	1.67	mg/kg wet	3.333		83	30-130			
2,4,5-Trichlorophenol	2.99	0.333	mg/kg wet	3.333		90	30-130			
2,4,6-Trichlorophenol	2.81	0.333	mg/kg wet	3.333		84	30-130			
2,4-Dichlorophenol	2.57	0.333	mg/kg wet	3.333		77	30-130			
2,4-Dimethylphenol	2.59	0.333	mg/kg wet	3.333		78	30-130			
2,4-Dinitrophenol	2.74	1.67	mg/kg wet	3.333		82	30-130			
2,4-Dinitrotoluene	3.11	0.333	mg/kg wet	3.333		93	40-140			
2,6-Dinitrotoluene	2.77	0.333	mg/kg wet	3.333		83	40-140			
2-Chloronaphthalene	2.20	0.333	mg/kg wet	3.333		66	40-140			
2-Chlorophenol	2.29	0.333	mg/kg wet	3.333		69	30-130			
2-Methylnaphthalene	2.40	0.333	mg/kg wet	3.333		72	40-140			
2-Methylphenol	2.39	0.333	mg/kg wet	3.333		72	30-130			
2-Nitroaniline	2.58	0.333	mg/kg wet	3.333		77	40-140			
2-Nitrophenol	2.48	0.333	mg/kg wet	3.333		74	30-130			
3,3'-Dichlorobenzidine	2.73	0.667	mg/kg wet	3.333		82	40-140			
3+4-Methylphenol	4.74	0.667	mg/kg wet	6.667		71	30-130			
3-Nitroaniline	2.72	0.333	mg/kg wet	3.333		82	40-140			
4,6-Dinitro-2-Methylphenol	2.96	1.67	mg/kg wet	3.333		89	30-130			
4-Bromophenyl-phenylether	2.70	0.333	mg/kg wet	3.333		81	40-140			
4-Chloro-3-Methylphenol	2.80	0.333	mg/kg wet	3.333		84	30-130			



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ60609 - 3546**

4-Chloroaniline	2.28	0.667	mg/kg wet	3.333		68	40-140			
4-Chloro-phenyl-phenyl ether	2.65	0.333	mg/kg wet	3.333		79	40-140			
4-Nitroaniline	2.77	0.333	mg/kg wet	3.333		83	40-140			
4-Nitrophenol	2.80	1.67	mg/kg wet	3.333		84	30-130			
Acenaphthene	2.61	0.333	mg/kg wet	3.333		78	40-140			
Acenaphthylene	2.72	0.333	mg/kg wet	3.333		82	40-140			
Acetophenone	2.32	0.667	mg/kg wet	3.333		70	40-140			
Aniline	1.76	1.67	mg/kg wet	3.333		53	40-140			
Anthracene	2.86	0.333	mg/kg wet	3.333		86	40-140			
Azobenzene	2.59	0.333	mg/kg wet	3.333		78	40-140			
Benzidine	1.58	0.667	mg/kg wet	3.333		47	40-140			
Benzo(a)anthracene	2.99	0.333	mg/kg wet	3.333		90	40-140			
Benzo(a)pyrene	3.10	0.167	mg/kg wet	3.333		93	40-140			
Benzo(b)fluoranthene	3.00	0.333	mg/kg wet	3.333		90	40-140			
Benzo(g,h,i)perylene	3.06	0.333	mg/kg wet	3.333		92	40-140			
Benzo(k)fluoranthene	2.86	0.333	mg/kg wet	3.333		86	40-140			
Benzoic Acid	2.82	1.67	mg/kg wet	3.333		84	40-140			
Benzyl Alcohol	2.36	0.333	mg/kg wet	3.333		71	40-140			
bis(2-Chloroethoxy)methane	2.37	0.333	mg/kg wet	3.333		71	40-140			
bis(2-Chloroethyl)ether	2.12	0.333	mg/kg wet	3.333		64	40-140			
bis(2-chloroisopropyl)Ether	2.24	0.333	mg/kg wet	3.333		67	40-140			
bis(2-Ethylhexyl)phthalate	3.04	0.333	mg/kg wet	3.333		91	40-140			
Butylbenzylphthalate	2.97	0.333	mg/kg wet	3.333		89	40-140			
Carbazole	2.97	0.333	mg/kg wet	3.333		89	40-140			
Chrysene	2.90	0.167	mg/kg wet	3.333		87	40-140			
Dibenzo(a,h)Anthracene	3.11	0.167	mg/kg wet	3.333		93	40-140			
Dibenzofuran	2.61	0.333	mg/kg wet	3.333		78	40-140			
Diethylphthalate	2.89	0.333	mg/kg wet	3.333		87	40-140			
Dimethylphthalate	2.77	0.333	mg/kg wet	3.333		83	40-140			
Di-n-butylphthalate	3.17	0.333	mg/kg wet	3.333		95	40-140			
Di-n-octylphthalate	2.90	0.333	mg/kg wet	3.333		87	40-140			
Fluoranthene	3.04	0.333	mg/kg wet	3.333		91	40-140			
Fluorene	2.76	0.333	mg/kg wet	3.333		83	40-140			
Hexachlorobenzene	2.77	0.333	mg/kg wet	3.333		83	40-140			
Hexachlorobutadiene	2.32	0.333	mg/kg wet	3.333		70	40-140			
Hexachlorocyclopentadiene	2.22	1.67	mg/kg wet	3.333		67	40-140			
Hexachloroethane	2.12	0.333	mg/kg wet	3.333		64	40-140			
Indeno(1,2,3-cd)Pyrene	3.11	0.333	mg/kg wet	3.333		93	40-140			
Isophorone	2.57	0.333	mg/kg wet	3.333		77	40-140			
Naphthalene	2.26	0.333	mg/kg wet	3.333		68	40-140			
Nitrobenzene	2.32	0.333	mg/kg wet	3.333		70	40-140			
N-Nitrosodimethylamine	2.30	0.333	mg/kg wet	3.333		69	40-140			
N-Nitroso-Di-n-Propylamine	2.46	0.333	mg/kg wet	3.333		74	40-140			
N-nitrosodiphenylamine	2.94	0.333	mg/kg wet	3.333		88	40-140			
Pentachlorophenol	3.16	1.67	mg/kg wet	3.333		95	30-130			



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ60609 - 3546**

Phenanthrene	2.76	0.333	mg/kg wet	3.333		83	40-140			
Phenol	2.36	0.333	mg/kg wet	3.333		71	30-130			
Pyrene	2.99	0.333	mg/kg wet	3.333		90	40-140			
Pyridine	1.85	1.67	mg/kg wet	3.333		55	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	2.40		mg/kg wet	3.333		72	30-130			
Surrogate: 2,4,6-Tribromophenol	4.78		mg/kg wet	5.000		96	30-130			
Surrogate: 2-Chlorophenol-d4	3.81		mg/kg wet	5.000		76	30-130			
Surrogate: 2-Fluorobiphenyl	2.71		mg/kg wet	3.333		81	30-130			
Surrogate: 2-Fluorophenol	3.70		mg/kg wet	5.000		74	30-130			
Surrogate: Nitrobenzene-d5	2.59		mg/kg wet	3.333		78	30-130			
Surrogate: Phenol-d6	3.98		mg/kg wet	5.000		80	30-130			
Surrogate: p-Terphenyl-d14	3.42		mg/kg wet	3.333		102	30-130			

**LCS Dup**

1,1-Biphenyl	2.21	0.333	mg/kg wet	3.333		66	40-140	11	30	
1,2,4-Trichlorobenzene	2.04	0.333	mg/kg wet	3.333		61	40-140	11	30	
1,2-Dichlorobenzene	1.99	0.333	mg/kg wet	3.333		60	40-140	10	30	
1,2-Diphenylhydrazine as Azobenzene	2.42	0.333	mg/kg wet	3.333		72	40-140	7	30	
1,3-Dichlorobenzene	1.99	0.333	mg/kg wet	3.333		60	40-140	10	30	
1,4-Dichlorobenzene	1.95	0.333	mg/kg wet	3.333		59	40-140	10	30	
2,3,4,6-Tetrachlorophenol	2.61	1.67	mg/kg wet	3.333		78	30-130	6	30	
2,4,5-Trichlorophenol	2.76	0.333	mg/kg wet	3.333		83	30-130	8	30	
2,4,6-Trichlorophenol	2.59	0.333	mg/kg wet	3.333		78	30-130	8	30	
2,4-Dichlorophenol	2.30	0.333	mg/kg wet	3.333		69	30-130	11	30	
2,4-Dimethylphenol	2.30	0.333	mg/kg wet	3.333		69	30-130	12	30	
2,4-Dinitrophenol	2.66	1.67	mg/kg wet	3.333		80	30-130	3	30	
2,4-Dinitrotoluene	2.92	0.333	mg/kg wet	3.333		88	40-140	6	30	
2,6-Dinitrotoluene	2.60	0.333	mg/kg wet	3.333		78	40-140	7	30	
2-Chloronaphthalene	1.95	0.333	mg/kg wet	3.333		59	40-140	12	30	
2-Chlorophenol	2.08	0.333	mg/kg wet	3.333		62	30-130	10	30	
2-Methylnaphthalene	2.12	0.333	mg/kg wet	3.333		64	40-140	12	30	
2-Methylphenol	2.19	0.333	mg/kg wet	3.333		66	30-130	9	30	
2-Nitroaniline	2.41	0.333	mg/kg wet	3.333		72	40-140	7	30	
2-Nitrophenol	2.19	0.333	mg/kg wet	3.333		66	30-130	13	30	
3,3'-Dichlorobenzidine	2.64	0.667	mg/kg wet	3.333		79	40-140	3	30	
3+4-Methylphenol	4.41	0.667	mg/kg wet	6.667		66	30-130	7	30	
3-Nitroaniline	2.57	0.333	mg/kg wet	3.333		77	40-140	6	30	
4,6-Dinitro-2-Methylphenol	2.85	1.67	mg/kg wet	3.333		85	30-130	4	30	
4-Bromophenyl-phenylether	2.57	0.333	mg/kg wet	3.333		77	40-140	5	30	
4-Chloro-3-Methylphenol	2.53	0.333	mg/kg wet	3.333		76	30-130	10	30	
4-Chloroaniline	2.05	0.667	mg/kg wet	3.333		61	40-140	11	30	
4-Chloro-phenyl-phenyl ether	2.43	0.333	mg/kg wet	3.333		73	40-140	9	30	
4-Nitroaniline	2.70	0.333	mg/kg wet	3.333		81	40-140	3	30	
4-Nitrophenol	2.64	1.67	mg/kg wet	3.333		79	30-130	6	30	
Acenaphthene	2.37	0.333	mg/kg wet	3.333		71	40-140	10	30	
Acenaphthylene	2.45	0.333	mg/kg wet	3.333		74	40-140	10	30	





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ60609 - 3546**

Acetophenone	2.12	0.667	mg/kg wet	3.333		64	40-140	9	30	
Aniline	1.58	1.67	mg/kg wet	3.333		47	40-140	11	30	
Anthracene	2.73	0.333	mg/kg wet	3.333		82	40-140	5	30	
Azobenzene	2.42	0.333	mg/kg wet	3.333		72	40-140	7	30	
Benzidine	1.72	0.667	mg/kg wet	3.333		52	40-140	8	30	
Benzo(a)anthracene	2.81	0.333	mg/kg wet	3.333		84	40-140	6	30	
Benzo(a)pyrene	2.98	0.167	mg/kg wet	3.333		89	40-140	4	30	
Benzo(b)fluoranthene	2.78	0.333	mg/kg wet	3.333		83	40-140	8	30	
Benzo(g,h,i)perylene	2.96	0.333	mg/kg wet	3.333		89	40-140	3	30	
Benzo(k)fluoranthene	2.88	0.333	mg/kg wet	3.333		86	40-140	0.8	30	
Benzoic Acid	2.74	1.67	mg/kg wet	3.333		82	40-140	3	30	
Benzyl Alcohol	2.12	0.333	mg/kg wet	3.333		64	40-140	10	30	
bis(2-Chloroethoxy)methane	2.07	0.333	mg/kg wet	3.333		62	40-140	13	30	
bis(2-Chloroethyl)ether	1.96	0.333	mg/kg wet	3.333		59	40-140	8	30	
bis(2-chloroisopropyl)Ether	2.02	0.333	mg/kg wet	3.333		60	40-140	10	30	
bis(2-Ethylhexyl)phthalate	2.86	0.333	mg/kg wet	3.333		86	40-140	6	30	
Butylbenzylphthalate	2.81	0.333	mg/kg wet	3.333		84	40-140	6	30	
Carbazole	2.84	0.333	mg/kg wet	3.333		85	40-140	4	30	
Chrysene	2.78	0.167	mg/kg wet	3.333		83	40-140	4	30	
Dibenzo(a,h)Anthracene	3.00	0.167	mg/kg wet	3.333		90	40-140	3	30	
Dibenzofuran	2.37	0.333	mg/kg wet	3.333		71	40-140	10	30	
Diethylphthalate	2.72	0.333	mg/kg wet	3.333		82	40-140	6	30	
Dimethylphthalate	2.59	0.333	mg/kg wet	3.333		78	40-140	7	30	
Di-n-butylphthalate	3.03	0.333	mg/kg wet	3.333		91	40-140	5	30	
Di-n-octylphthalate	2.74	0.333	mg/kg wet	3.333		82	40-140	5	30	
Fluoranthene	2.93	0.333	mg/kg wet	3.333		88	40-140	4	30	
Fluorene	2.54	0.333	mg/kg wet	3.333		76	40-140	8	30	
Hexachlorobenzene	2.64	0.333	mg/kg wet	3.333		79	40-140	5	30	
Hexachlorobutadiene	1.98	0.333	mg/kg wet	3.333		60	40-140	16	30	
Hexachlorocyclopentadiene	1.66	1.67	mg/kg wet	3.333		50	40-140	29	30	
Hexachloroethane	1.96	0.333	mg/kg wet	3.333		59	40-140	8	30	
Indeno(1,2,3-cd)Pyrene	2.99	0.333	mg/kg wet	3.333		90	40-140	4	30	
Isophorone	2.26	0.333	mg/kg wet	3.333		68	40-140	13	30	
Naphthalene	2.00	0.333	mg/kg wet	3.333		60	40-140	12	30	
Nitrobenzene	2.07	0.333	mg/kg wet	3.333		62	40-140	12	30	
N-Nitrosodimethylamine	2.04	0.333	mg/kg wet	3.333		61	40-140	12	30	
N-Nitroso-Di-n-Propylamine	2.21	0.333	mg/kg wet	3.333		66	40-140	11	30	
N-nitrosodiphenylamine	2.80	0.333	mg/kg wet	3.333		84	40-140	5	30	
Pentachlorophenol	3.01	1.67	mg/kg wet	3.333		90	30-130	5	30	
Phenanthrene	2.67	0.333	mg/kg wet	3.333		80	40-140	3	30	
Phenol	2.13	0.333	mg/kg wet	3.333		64	30-130	10	30	
Pyrene	2.82	0.333	mg/kg wet	3.333		84	40-140	6	30	
Pyridine	1.66	1.67	mg/kg wet	3.333		50	40-140	11	30	
Surrogate: 1,2-Dichlorobenzene-d4	2.12		mg/kg wet	3.333		64	30-130			
Surrogate: 2,4,6-Tribromophenol	4.50		mg/kg wet	5.000		90	30-130			





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ60609 - 3546**

Surrogate: 2-Chlorophenol-d4	3.33		mg/kg wet	5.000		67	30-130			
Surrogate: 2-Fluorobiphenyl	2.30		mg/kg wet	3.333		69	30-130			
Surrogate: 2-Fluorophenol	3.21		mg/kg wet	5.000		64	30-130			
Surrogate: Nitrobenzene-d5	2.22		mg/kg wet	3.333		67	30-130			
Surrogate: Phenol-d6	3.44		mg/kg wet	5.000		69	30-130			
Surrogate: p-Terphenyl-d14	3.09		mg/kg wet	3.333		93	30-130			

**Batch CJ61112 - 3546**

<b>Blank</b>										
1,1-Biphenyl	ND	0.333	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.333	mg/kg wet							
1,2-Dichlorobenzene	ND	0.333	mg/kg wet							
1,2-Diphenylhydrazine as Azobenzene	ND	0.333	mg/kg wet							
1,3-Dichlorobenzene	ND	0.333	mg/kg wet							
1,4-Dichlorobenzene	ND	0.333	mg/kg wet							
2,3,4,6-Tetrachlorophenol	ND	1.67	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.333	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.333	mg/kg wet							
2,4-Dichlorophenol	ND	0.333	mg/kg wet							
2,4-Dimethylphenol	ND	0.333	mg/kg wet							
2,4-Dinitrophenol	ND	1.67	mg/kg wet							
2,4-Dinitrotoluene	ND	0.333	mg/kg wet							
2,6-Dinitrotoluene	ND	0.333	mg/kg wet							
2-Chloronaphthalene	ND	0.333	mg/kg wet							
2-Chlorophenol	ND	0.333	mg/kg wet							
2-Methylnaphthalene	ND	0.333	mg/kg wet							
2-Methylphenol	ND	0.333	mg/kg wet							
2-Nitroaniline	ND	0.333	mg/kg wet							
2-Nitrophenol	ND	0.333	mg/kg wet							
3,3'-Dichlorobenzidine	ND	0.667	mg/kg wet							
3+4-Methylphenol	ND	0.667	mg/kg wet							
3-Nitroaniline	ND	0.333	mg/kg wet							
4,6-Dinitro-2-Methylphenol	ND	1.67	mg/kg wet							
4-Bromophenyl-phenylether	ND	0.333	mg/kg wet							
4-Chloro-3-Methylphenol	ND	0.333	mg/kg wet							
4-Chloroaniline	ND	0.667	mg/kg wet							
4-Chloro-phenyl-phenyl ether	ND	0.333	mg/kg wet							
4-Nitroaniline	ND	0.333	mg/kg wet							
4-Nitrophenol	ND	1.67	mg/kg wet							
Acenaphthene	ND	0.333	mg/kg wet							
Acenaphthylene	ND	0.333	mg/kg wet							
Acetophenone	ND	0.667	mg/kg wet							
Aniline	ND	1.67	mg/kg wet							
Anthracene	ND	0.333	mg/kg wet							
Azobenzene	ND	0.333	mg/kg wet							



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ61112 - 3546**

Benzidine	ND	0.667	mg/kg wet							
Benzo(a)anthracene	ND	0.333	mg/kg wet							
Benzo(a)pyrene	ND	0.167	mg/kg wet							
Benzo(b)fluoranthene	ND	0.333	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.333	mg/kg wet							
Benzo(k)fluoranthene	ND	0.333	mg/kg wet							
Benzoic Acid	ND	1.67	mg/kg wet							
Benzyl Alcohol	ND	0.333	mg/kg wet							
bis(2-Chloroethoxy)methane	ND	0.333	mg/kg wet							
bis(2-Chloroethyl)ether	ND	0.333	mg/kg wet							
bis(2-chloroisopropyl)Ether	ND	0.333	mg/kg wet							
bis(2-Ethylhexyl)phthalate	ND	0.333	mg/kg wet							
Butylbenzylphthalate	ND	0.333	mg/kg wet							
Carbazole	ND	0.333	mg/kg wet							
Chrysene	ND	0.167	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.167	mg/kg wet							
Dibenzofuran	ND	0.333	mg/kg wet							
Diethylphthalate	ND	0.333	mg/kg wet							
Dimethylphthalate	ND	0.333	mg/kg wet							
Di-n-butylphthalate	ND	0.333	mg/kg wet							
Di-n-octylphthalate	ND	0.333	mg/kg wet							
Fluoranthene	ND	0.333	mg/kg wet							
Fluorene	ND	0.333	mg/kg wet							
Hexachlorobenzene	ND	0.333	mg/kg wet							
Hexachlorobutadiene	ND	0.333	mg/kg wet							
Hexachlorocyclopentadiene	ND	1.67	mg/kg wet							
Hexachloroethane	ND	0.333	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.333	mg/kg wet							
Isophorone	ND	0.333	mg/kg wet							
Naphthalene	ND	0.333	mg/kg wet							
Nitrobenzene	ND	0.333	mg/kg wet							
N-Nitrosodimethylamine	ND	0.333	mg/kg wet							
N-Nitroso-Di-n-Propylamine	ND	0.333	mg/kg wet							
N-nitrosodiphenylamine	ND	0.333	mg/kg wet							
Pentachlorophenol	ND	1.67	mg/kg wet							
Phenanthrene	ND	0.333	mg/kg wet							
Phenol	ND	0.333	mg/kg wet							
Pyrene	ND	0.333	mg/kg wet							
Pyridine	ND	1.67	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	2.34		mg/kg wet	3.333		70	30-130			
Surrogate: 2,4,6-Tribromophenol	3.02		mg/kg wet	5.000		60	30-130			
Surrogate: 2-Chlorophenol-d4	3.60		mg/kg wet	5.000		72	30-130			
Surrogate: 2-Fluorobiphenyl	2.37		mg/kg wet	3.333		71	30-130			
Surrogate: 2-Fluorophenol	3.61		mg/kg wet	5.000		72	30-130			
Surrogate: Nitrobenzene-d5	2.34		mg/kg wet	3.333		70	30-130			
Surrogate: Phenol-d6	3.72		mg/kg wet	5.000		74	30-130			



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ61112 - 3546**

<i>Surrogate: p-Terphenyl-d14</i>	3.53		mg/kg wet	3.333		106	30-130			
<b>LCS</b>										
1,1-Biphenyl	2.35	0.333	mg/kg wet	3.333		70	40-140			
1,2,4-Trichlorobenzene	2.18	0.333	mg/kg wet	3.333		65	40-140			
1,2-Dichlorobenzene	2.10	0.333	mg/kg wet	3.333		63	40-140			
1,2-Diphenylhydrazine as Azobenzene	2.41	0.333	mg/kg wet	3.333		72	40-140			
1,3-Dichlorobenzene	2.14	0.333	mg/kg wet	3.333		64	40-140			
1,4-Dichlorobenzene	2.12	0.333	mg/kg wet	3.333		64	40-140			
2,3,4,6-Tetrachlorophenol	2.23	1.67	mg/kg wet	3.333		67	30-130			
2,4,5-Trichlorophenol	2.72	0.333	mg/kg wet	3.333		81	30-130			
2,4,6-Trichlorophenol	2.50	0.333	mg/kg wet	3.333		75	30-130			
2,4-Dichlorophenol	2.41	0.333	mg/kg wet	3.333		72	30-130			
2,4-Dimethylphenol	2.28	0.333	mg/kg wet	3.333		69	30-130			
2,4-Dinitrophenol	2.23	1.67	mg/kg wet	3.333		67	30-130			
2,4-Dinitrotoluene	2.91	0.333	mg/kg wet	3.333		87	40-140			
2,6-Dinitrotoluene	2.54	0.333	mg/kg wet	3.333		76	40-140			
2-Chloronaphthalene	2.14	0.333	mg/kg wet	3.333		64	40-140			
2-Chlorophenol	2.25	0.333	mg/kg wet	3.333		68	30-130			
2-Methylnaphthalene	2.22	0.333	mg/kg wet	3.333		67	40-140			
2-Methylphenol	2.27	0.333	mg/kg wet	3.333		68	30-130			
2-Nitroaniline	2.37	0.333	mg/kg wet	3.333		71	40-140			
2-Nitrophenol	2.31	0.333	mg/kg wet	3.333		69	30-130			
3,3'-Dichlorobenzidine	1.67	0.667	mg/kg wet	3.333		50	40-140			
3+4-Methylphenol	4.65	0.667	mg/kg wet	6.667		70	30-130			
3-Nitroaniline	2.40	0.333	mg/kg wet	3.333		72	40-140			
4,6-Dinitro-2-Methylphenol	2.46	1.67	mg/kg wet	3.333		74	30-130			
4-Bromophenyl-phenylether	2.39	0.333	mg/kg wet	3.333		72	40-140			
4-Chloro-3-Methylphenol	2.41	0.333	mg/kg wet	3.333		72	30-130			
4-Chloroaniline	1.93	0.667	mg/kg wet	3.333		58	40-140			
4-Chloro-phenyl-phenyl ether	2.43	0.333	mg/kg wet	3.333		73	40-140			
4-Nitroaniline	2.91	0.333	mg/kg wet	3.333		87	40-140			
4-Nitrophenol	2.66	1.67	mg/kg wet	3.333		80	30-130			
Acenaphthene	2.41	0.333	mg/kg wet	3.333		72	40-140			
Acenaphthylene	2.39	0.333	mg/kg wet	3.333		72	40-140			
Acetophenone	2.24	0.667	mg/kg wet	3.333		67	40-140			
Aniline	1.30	1.67	mg/kg wet	3.333		39	40-140			B-
Anthracene	2.65	0.333	mg/kg wet	3.333		79	40-140			
Azobenzene	2.41	0.333	mg/kg wet	3.333		72	40-140			
Benzidine	ND	0.667	mg/kg wet	3.333			40-140			B-
Benzo(a)anthracene	2.68	0.333	mg/kg wet	3.333		80	40-140			
Benzo(a)pyrene	2.92	0.167	mg/kg wet	3.333		88	40-140			
Benzo(b)fluoranthene	2.96	0.333	mg/kg wet	3.333		89	40-140			
Benzo(g,h,i)perylene	2.90	0.333	mg/kg wet	3.333		87	40-140			
Benzo(k)fluoranthene	2.95	0.333	mg/kg wet	3.333		88	40-140			



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ61112 - 3546**

Benzoic Acid	2.18	1.67	mg/kg wet	3.333		66	40-140			
Benzyl Alcohol	2.24	0.333	mg/kg wet	3.333		67	40-140			
bis(2-Chloroethoxy)methane	2.23	0.333	mg/kg wet	3.333		67	40-140			
bis(2-Chloroethyl)ether	2.53	0.333	mg/kg wet	3.333		76	40-140			
bis(2-chloroisopropyl)Ether	2.21	0.333	mg/kg wet	3.333		66	40-140			
bis(2-Ethylhexyl)phthalate	3.05	0.333	mg/kg wet	3.333		91	40-140			
Butylbenzylphthalate	2.90	0.333	mg/kg wet	3.333		87	40-140			
Carbazole	2.79	0.333	mg/kg wet	3.333		84	40-140			
Chrysene	2.73	0.167	mg/kg wet	3.333		82	40-140			
Dibenzo(a,h)Anthracene	2.91	0.167	mg/kg wet	3.333		87	40-140			
Dibenzofuran	2.38	0.333	mg/kg wet	3.333		72	40-140			
Diethylphthalate	2.62	0.333	mg/kg wet	3.333		79	40-140			
Dimethylphthalate	2.48	0.333	mg/kg wet	3.333		74	40-140			
Di-n-butylphthalate	2.97	0.333	mg/kg wet	3.333		89	40-140			
Di-n-octylphthalate	2.72	0.333	mg/kg wet	3.333		82	40-140			
Fluoranthene	2.79	0.333	mg/kg wet	3.333		84	40-140			
Fluorene	2.51	0.333	mg/kg wet	3.333		75	40-140			
Hexachlorobenzene	2.50	0.333	mg/kg wet	3.333		75	40-140			
Hexachlorobutadiene	2.18	0.333	mg/kg wet	3.333		65	40-140			
Hexachlorocyclopentadiene	0.361	1.67	mg/kg wet	3.333		11	40-140			B-
Hexachloroethane	2.13	0.333	mg/kg wet	3.333		64	40-140			
Indeno(1,2,3-cd)Pyrene	2.90	0.333	mg/kg wet	3.333		87	40-140			
Isophorone	2.34	0.333	mg/kg wet	3.333		70	40-140			
Naphthalene	2.21	0.333	mg/kg wet	3.333		66	40-140			
Nitrobenzene	2.26	0.333	mg/kg wet	3.333		68	40-140			
N-Nitrosodimethylamine	2.13	0.333	mg/kg wet	3.333		64	40-140			
N-Nitroso-Di-n-Propylamine	2.34	0.333	mg/kg wet	3.333		70	40-140			
N-nitrosodiphenylamine	2.66	0.333	mg/kg wet	3.333		80	40-140			
Pentachlorophenol	2.77	1.67	mg/kg wet	3.333		83	30-130			
Phenanthrene	2.60	0.333	mg/kg wet	3.333		78	40-140			
Phenol	2.23	0.333	mg/kg wet	3.333		67	30-130			
Pyrene	2.79	0.333	mg/kg wet	3.333		84	40-140			
Pyridine	1.81	1.67	mg/kg wet	3.333		54	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	2.47		mg/kg wet	3.333		74	30-130			
Surrogate: 2,4,6-Tribromophenol	4.00		mg/kg wet	5.000		80	30-130			
Surrogate: 2-Chlorophenol-d4	3.87		mg/kg wet	5.000		77	30-130			
Surrogate: 2-Fluorobiphenyl	2.64		mg/kg wet	3.333		79	30-130			
Surrogate: 2-Fluorophenol	3.88		mg/kg wet	5.000		78	30-130			
Surrogate: Nitrobenzene-d5	2.60		mg/kg wet	3.333		78	30-130			
Surrogate: Phenol-d6	4.04		mg/kg wet	5.000		81	30-130			
Surrogate: p-Terphenyl-d14	3.34		mg/kg wet	3.333		100	30-130			

**LCS Dup**

1,1-Biphenyl	2.52	0.333	mg/kg wet	3.333		76	40-140	7	30	
1,2,4-Trichlorobenzene	2.32	0.333	mg/kg wet	3.333		70	40-140	6	30	
1,2-Dichlorobenzene	2.24	0.333	mg/kg wet	3.333		67	40-140	6	30	



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D Semi-Volatile Organic Compounds

**Batch CJ61112 - 3546**

1,2-Diphenylhydrazine as Azobenzene	2.60	0.333	mg/kg wet	3.333		78	40-140	7	30	
1,3-Dichlorobenzene	2.31	0.333	mg/kg wet	3.333		69	40-140	7	30	
1,4-Dichlorobenzene	2.22	0.333	mg/kg wet	3.333		67	40-140	5	30	
2,3,4,6-Tetrachlorophenol	2.45	1.67	mg/kg wet	3.333		73	30-130	9	30	
2,4,5-Trichlorophenol	2.92	0.333	mg/kg wet	3.333		88	30-130	7	30	
2,4,6-Trichlorophenol	2.72	0.333	mg/kg wet	3.333		81	30-130	8	30	
2,4-Dichlorophenol	2.59	0.333	mg/kg wet	3.333		78	30-130	7	30	
2,4-Dimethylphenol	2.48	0.333	mg/kg wet	3.333		75	30-130	8	30	
2,4-Dinitrophenol	2.55	1.67	mg/kg wet	3.333		76	30-130	13	30	
2,4-Dinitrotoluene	3.04	0.333	mg/kg wet	3.333		91	40-140	4	30	
2,6-Dinitrotoluene	2.66	0.333	mg/kg wet	3.333		80	40-140	5	30	
2-Chloronaphthalene	2.30	0.333	mg/kg wet	3.333		69	40-140	7	30	
2-Chlorophenol	2.45	0.333	mg/kg wet	3.333		74	30-130	9	30	
2-Methylnaphthalene	2.37	0.333	mg/kg wet	3.333		71	40-140	6	30	
2-Methylphenol	2.50	0.333	mg/kg wet	3.333		75	30-130	10	30	
2-Nitroaniline	2.49	0.333	mg/kg wet	3.333		75	40-140	5	30	
2-Nitrophenol	2.55	0.333	mg/kg wet	3.333		76	30-130	10	30	
3,3'-Dichlorobenzidine	1.42	0.667	mg/kg wet	3.333		43	40-140	16	30	
3+4-Methylphenol	5.08	0.667	mg/kg wet	6.667		76	30-130	9	30	
3-Nitroaniline	2.44	0.333	mg/kg wet	3.333		73	40-140	2	30	
4,6-Dinitro-2-Methylphenol	2.78	1.67	mg/kg wet	3.333		83	30-130	12	30	
4-Bromophenyl-phenylether	2.59	0.333	mg/kg wet	3.333		78	40-140	8	30	
4-Chloro-3-Methylphenol	2.56	0.333	mg/kg wet	3.333		77	30-130	6	30	
4-Chloroaniline	2.11	0.667	mg/kg wet	3.333		63	40-140	9	30	
4-Chloro-phenyl-phenyl ether	2.56	0.333	mg/kg wet	3.333		77	40-140	5	30	
4-Nitroaniline	3.12	0.333	mg/kg wet	3.333		94	40-140	7	30	
4-Nitrophenol	2.82	1.67	mg/kg wet	3.333		84	30-130	6	30	
Acenaphthene	2.56	0.333	mg/kg wet	3.333		77	40-140	6	30	
Acenaphthylene	2.55	0.333	mg/kg wet	3.333		77	40-140	7	30	
Acetophenone	2.43	0.667	mg/kg wet	3.333		73	40-140	8	30	
Aniline	1.53	1.67	mg/kg wet	3.333		46	40-140	17	30	
Anthracene	2.82	0.333	mg/kg wet	3.333		85	40-140	6	30	
Azobenzene	2.60	0.333	mg/kg wet	3.333		78	40-140	7	30	
Benzidine	ND	0.667	mg/kg wet	3.333			40-140		30	B-
Benzo(a)anthracene	2.90	0.333	mg/kg wet	3.333		87	40-140	8	30	
Benzo(a)pyrene	3.13	0.167	mg/kg wet	3.333		94	40-140	7	30	
Benzo(b)fluoranthene	3.09	0.333	mg/kg wet	3.333		93	40-140	4	30	
Benzo(g,h,i)perylene	3.08	0.333	mg/kg wet	3.333		92	40-140	6	30	
Benzo(k)fluoranthene	3.17	0.333	mg/kg wet	3.333		95	40-140	7	30	
Benzoic Acid	3.14	1.67	mg/kg wet	3.333		94	40-140	36	30	D+
Benzyl Alcohol	2.47	0.333	mg/kg wet	3.333		74	40-140	10	30	
bis(2-Chloroethoxy)methane	2.39	0.333	mg/kg wet	3.333		72	40-140	7	30	
bis(2-Chloroethyl)ether	2.71	0.333	mg/kg wet	3.333		81	40-140	7	30	
bis(2-chloroisopropyl)Ether	2.36	0.333	mg/kg wet	3.333		71	40-140	7	30	
bis(2-Ethylhexyl)phthalate	3.24	0.333	mg/kg wet	3.333		97	40-140	6	30	



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
---------	--------	-----	-------	-------------	---------------	------	-------------	-----	-----------	-----------

8270D Semi-Volatile Organic Compounds

**Batch CJ61112 - 3546**

Butylbenzylphthalate	3.09	0.333	mg/kg wet	3.333		93	40-140	6	30	
Carbazole	2.96	0.333	mg/kg wet	3.333		89	40-140	6	30	
Chrysene	2.85	0.167	mg/kg wet	3.333		85	40-140	4	30	
Dibenzo(a,h)Anthracene	3.14	0.167	mg/kg wet	3.333		94	40-140	7	30	
Dibenzofuran	2.51	0.333	mg/kg wet	3.333		75	40-140	5	30	
Diethylphthalate	2.72	0.333	mg/kg wet	3.333		82	40-140	4	30	
Dimethylphthalate	2.57	0.333	mg/kg wet	3.333		77	40-140	4	30	
Di-n-butylphthalate	3.17	0.333	mg/kg wet	3.333		95	40-140	6	30	
Di-n-octylphthalate	2.88	0.333	mg/kg wet	3.333		86	40-140	6	30	
Fluoranthene	3.05	0.333	mg/kg wet	3.333		92	40-140	9	30	
Fluorene	2.62	0.333	mg/kg wet	3.333		79	40-140	4	30	
Hexachlorobenzene	2.71	0.333	mg/kg wet	3.333		81	40-140	8	30	
Hexachlorobutadiene	2.31	0.333	mg/kg wet	3.333		69	40-140	6	30	
Hexachlorocyclopentadiene	0.359	1.67	mg/kg wet	3.333		11	40-140	0.6	30	B-
Hexachloroethane	2.25	0.333	mg/kg wet	3.333		67	40-140	5	30	
Indeno(1,2,3-cd)Pyrene	3.12	0.333	mg/kg wet	3.333		94	40-140	7	30	
Isophorone	2.48	0.333	mg/kg wet	3.333		74	40-140	6	30	
Naphthalene	2.34	0.333	mg/kg wet	3.333		70	40-140	5	30	
Nitrobenzene	2.40	0.333	mg/kg wet	3.333		72	40-140	6	30	
N-Nitrosodimethylamine	2.33	0.333	mg/kg wet	3.333		70	40-140	9	30	
N-Nitroso-Di-n-Propylamine	2.53	0.333	mg/kg wet	3.333		76	40-140	8	30	
N-nitrosodiphenylamine	2.82	0.333	mg/kg wet	3.333		84	40-140	6	30	
Pentachlorophenol	3.14	1.67	mg/kg wet	3.333		94	30-130	13	30	
Phenanthrene	2.77	0.333	mg/kg wet	3.333		83	40-140	6	30	
Phenol	2.39	0.333	mg/kg wet	3.333		72	30-130	7	30	
Pyrene	2.94	0.333	mg/kg wet	3.333		88	40-140	5	30	
Pyridine	1.93	1.67	mg/kg wet	3.333		58	40-140	6	30	
Surrogate: 1,2-Dichlorobenzene-d4	2.51		mg/kg wet	3.333		75	30-130			
Surrogate: 2,4,6-Tribromophenol	4.26		mg/kg wet	5.000		85	30-130			
Surrogate: 2-Chlorophenol-d4	4.02		mg/kg wet	5.000		80	30-130			
Surrogate: 2-Fluorobiphenyl	2.73		mg/kg wet	3.333		82	30-130			
Surrogate: 2-Fluorophenol	4.00		mg/kg wet	5.000		80	30-130			
Surrogate: Nitrobenzene-d5	2.65		mg/kg wet	3.333		80	30-130			
Surrogate: Phenol-d6	4.25		mg/kg wet	5.000		85	30-130			
Surrogate: p-Terphenyl-d14	3.38		mg/kg wet	3.333		102	30-130			



*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**Notes and Definitions**

- U Analyte included in the analysis, but not detected
- SM Surrogate recovery(ies) outside of criteria due to matrix (UCM/coelution/matrix is present) (SM).
- Q Calibration required quadratic regression (Q).
- IM Internal Standard(s) outside of criteria due to matrix (UCM/coelution is present) (IM).
- E Reported above the quantitation limit; Estimated value (E).
- D+ Relative percent difference for duplicate is outside of criteria (D+).
- D Diluted.
- CD+ Continuing Calibration %Diff/Drift is above control limit (CD+).
- CD- Continuing Calibration %Diff/Drift is below control limit (CD-).
- B+ Blank Spike recovery is above upper control limit (B+).
- B- Blank Spike recovery is below lower control limit (B-).
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection Limit
- I/V Initial Volume
- F/V Final Volume
- § Subcontracted analysis; see attached report
- 1 Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
- 2 Range result excludes concentrations of target analytes eluting in that range.
- 3 Range result excludes the concentration of the C9-C10 aromatic range.
- Avg Results reported as a mathematical average.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report





*CERTIFICATE OF ANALYSIS*

Client Name: Weston & Sampson Engineers, Inc.  
Client Project ID: RTE 33 Portsmouth

ESS Laboratory Work Order: 1610112

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/documents/AllLabs.xls>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_OPRA/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

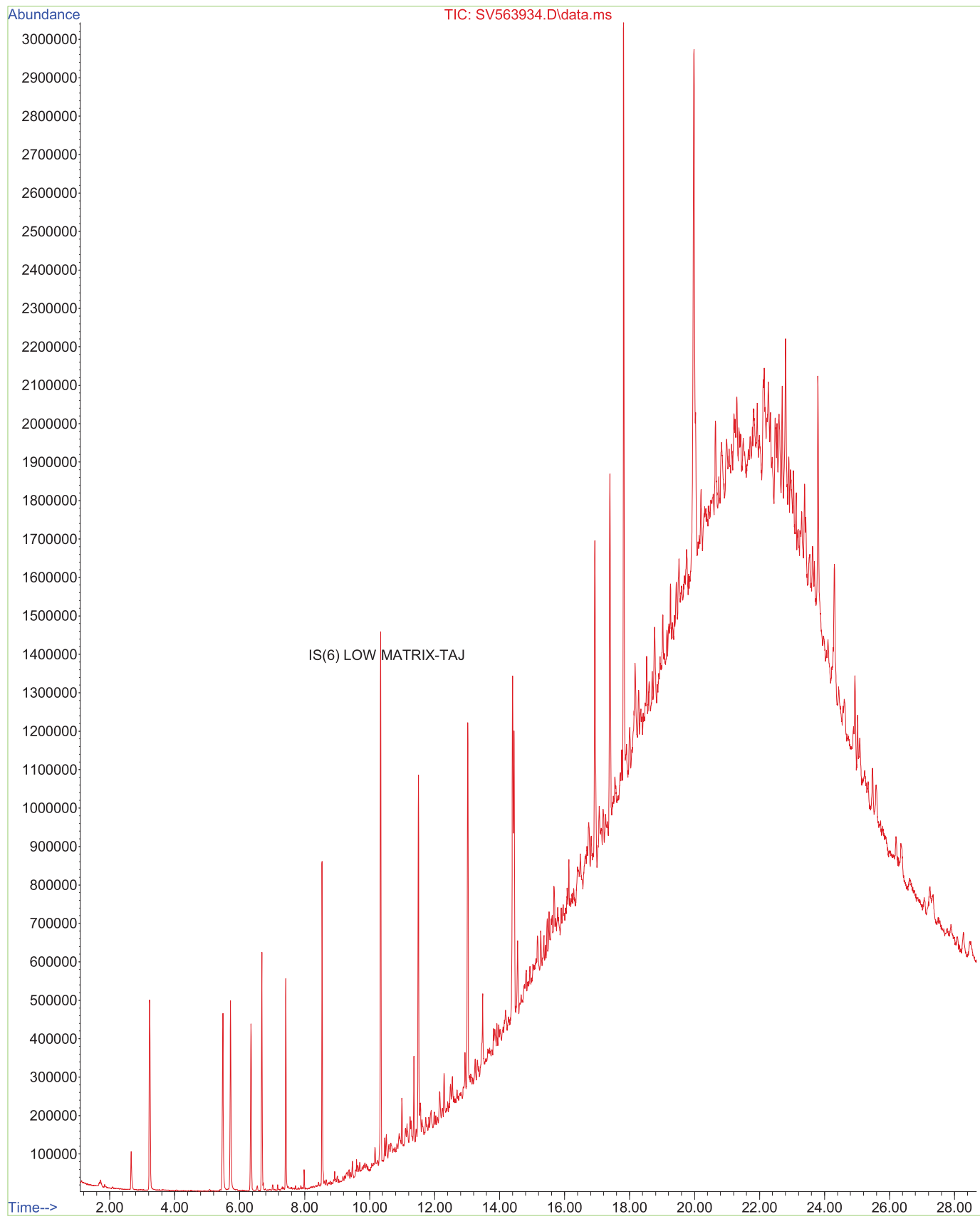
United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

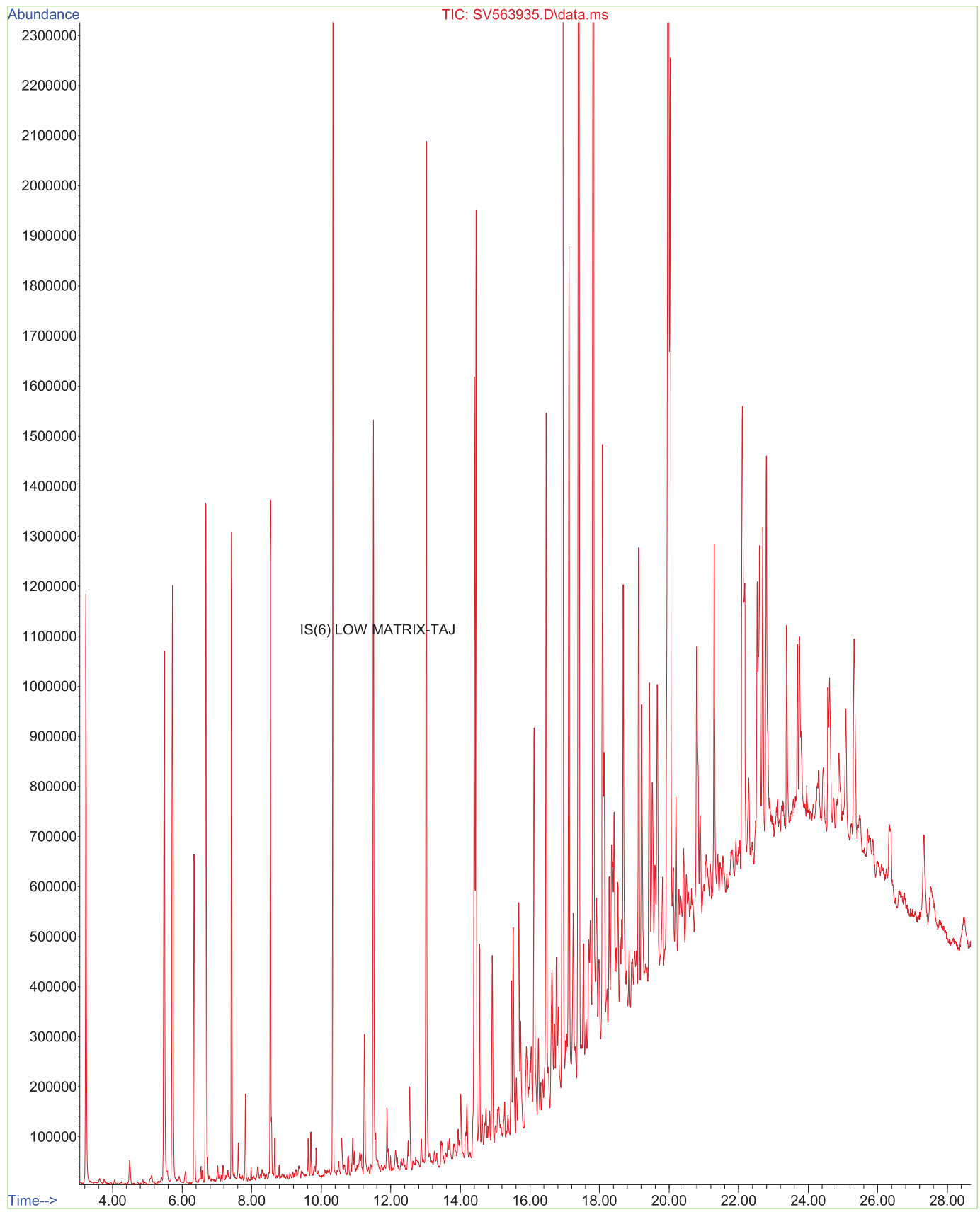
[http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory\\_accreditation\\_program/590095](http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory_accreditation_program/590095)



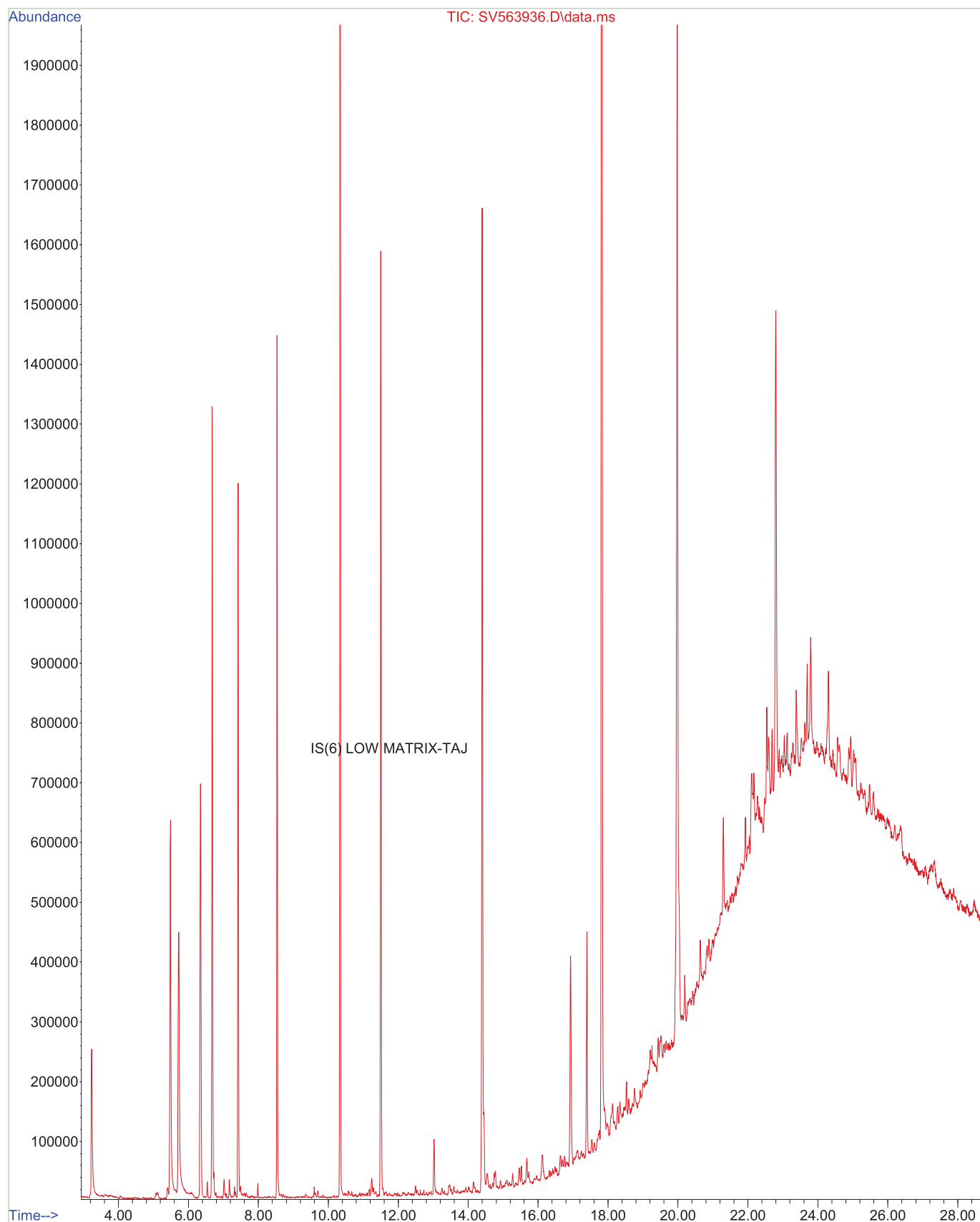
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Operator : TJ  
Acquired : 8 Oct 2016 3:30 am using AcqMethod SV5A.M  
Instrument : SVOAMS5  
Sample Name: 1610112-01  
Misc Info :  
Vial Number: 12



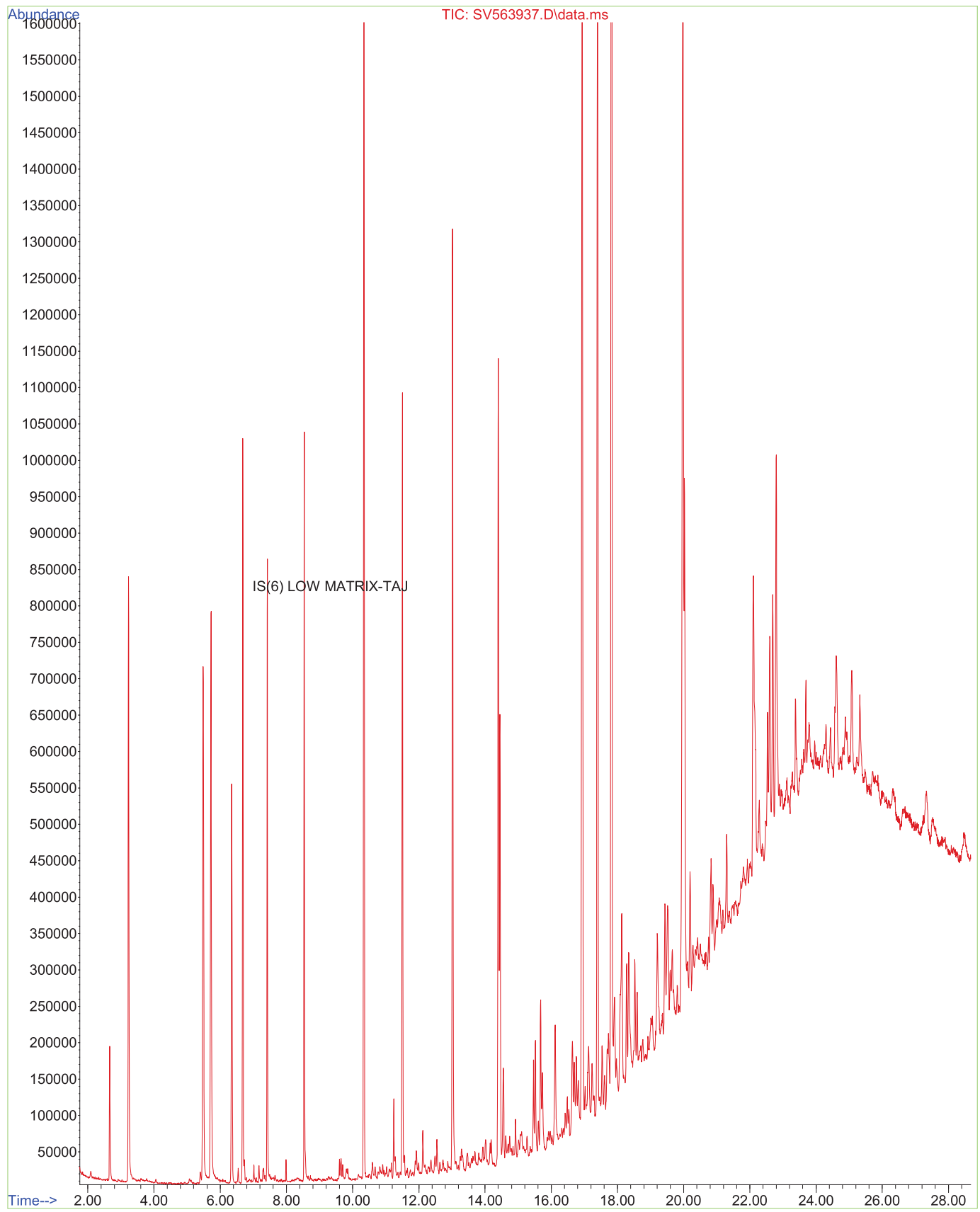
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Instrument : SVOAMS5  
Sample Name: 1610112-02  
Misc Info :  
Vial Number: 13



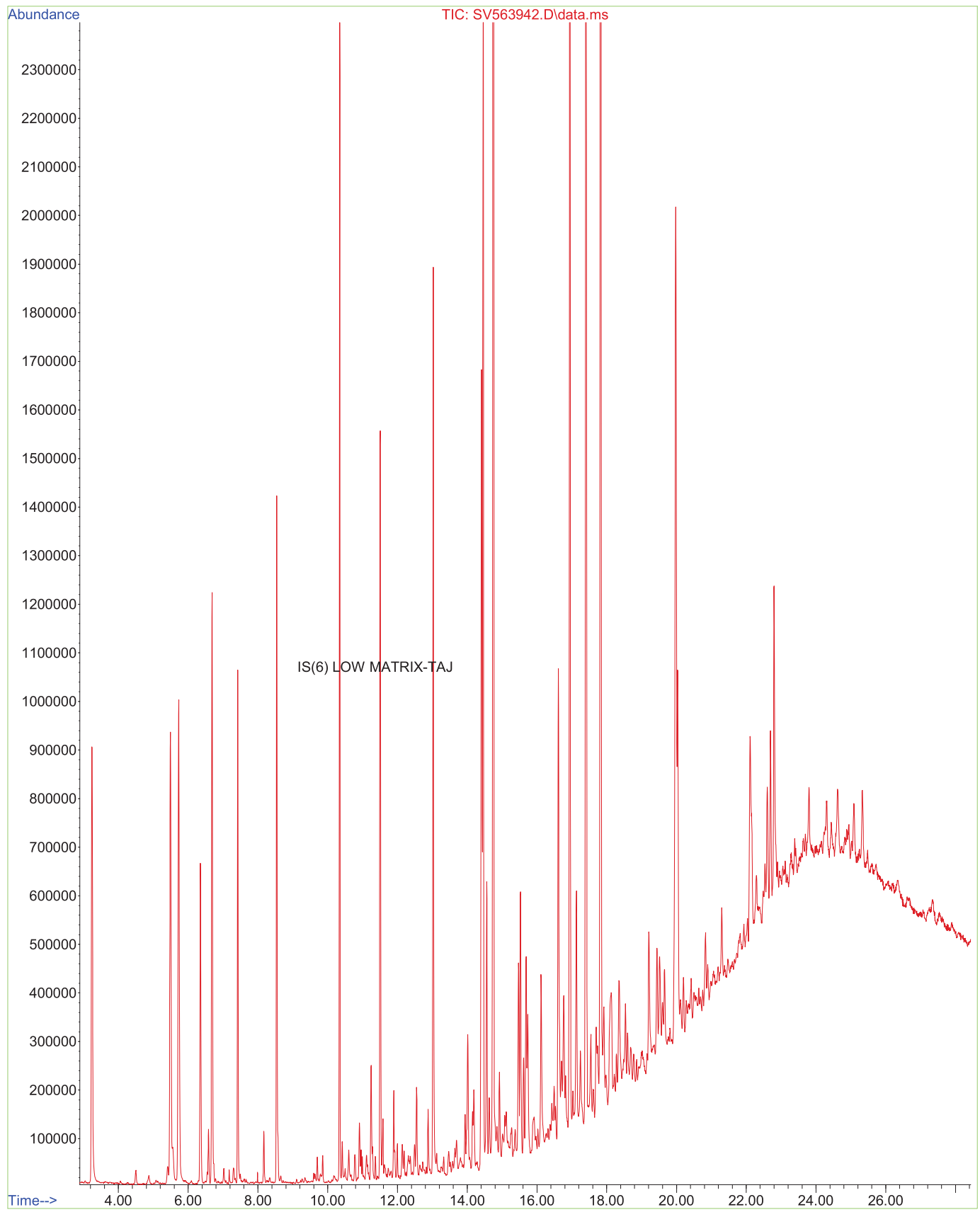
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Instrument : SVOAMS5  
Sample Name: 1610112-03  
Misc Info :  
Vial Number: 14



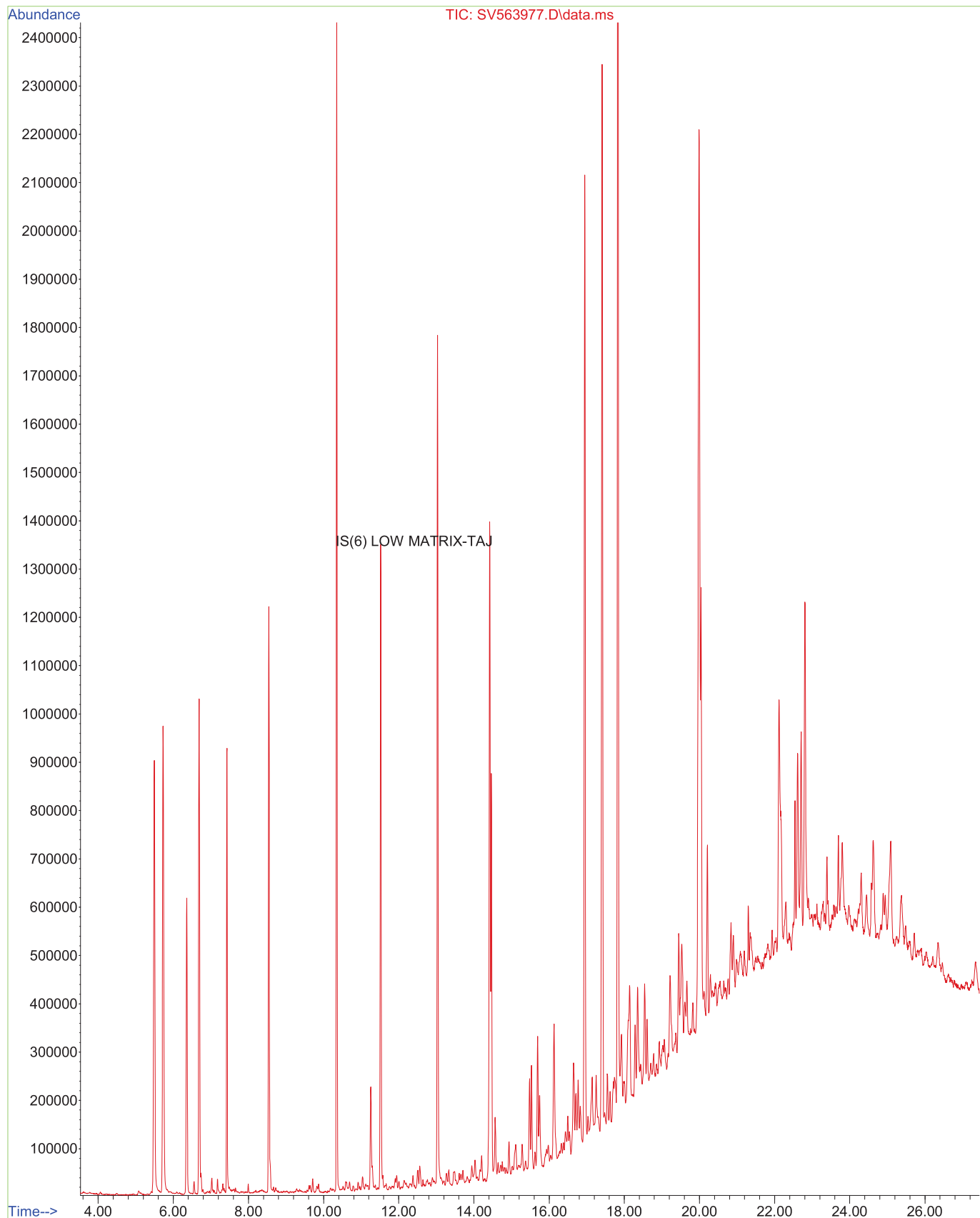
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Operator : TJ  
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Instrument : SVOAMS5  
Sample Name: 1610112-04  
Misc Info :  
Vial Number: 15



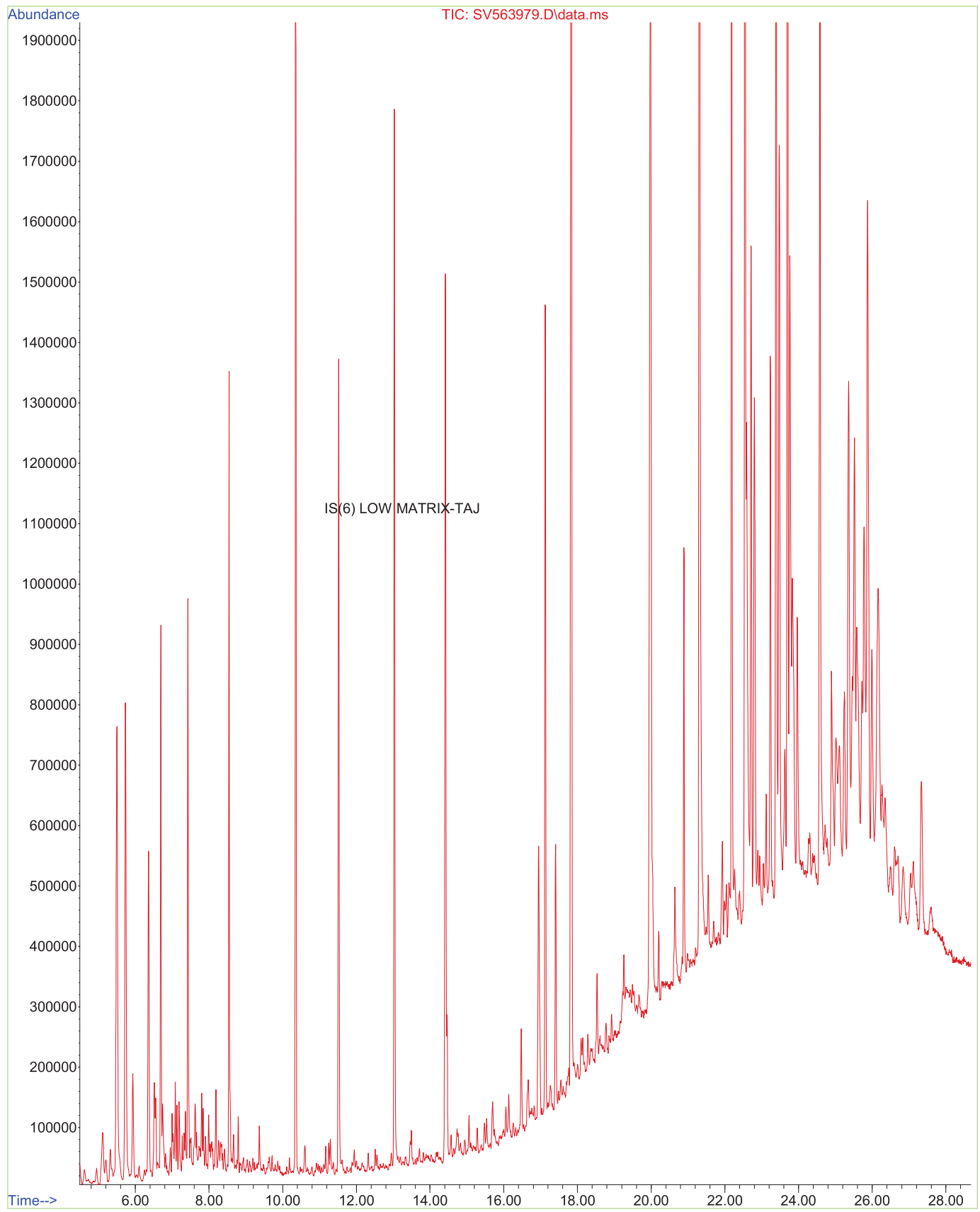
File :Q:\SVOA\MS5\MS5-1016\100716\SV563942.D  
Operator : TJ  
Acquired : 8 Oct 2016 8:29 am using AcqMethod SV5A.M  
Instrument : SVOAMS5  
Sample Name: 1610112-09  
Misc Info :  
Vial Number: 20



File : Q:\SVOA\MS5\MS5-1016\101116\SV563977.D  
Operator : TJ  
Acquired : 11 Oct 2016 6:59 pm using AcqMethod SV5A.M  
Instrument : SVOAMS5  
Sample Name: 1610112-13  
Misc Info :  
Vial Number: 12



File :Q:\SVOA\MS5\MS5-1016\101116\SV563979.D  
Operator : TJ  
Acquired : 11 Oct 2016 8:13 pm using AcqMethod SV5A.M  
Instrument : SVOAMS5  
Sample Name: 1610112-15  
Misc Info :  
Vial Number: 14



## ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston & Sampson Engineers, Inc - TB/CMT

ESS Project ID: 1610112

Date Received: 10/6/2016

Shipped/Delivered Via: ESS Courler

Project Due Date: 10/14/2016

Days for Project: 5 Day

1. Air bill manifest present?  No  
Air No.: NA
2. Were custody seals present?  No
3. Is radiation count <100 CPM?  Yes
4. Is a Cooler Present?  Yes  
Temp: 1.2 Iced with: Ice
5. Was COC signed and dated by client?  Yes

6. Does COC match bottles?  Yes
7. Is COC complete and correct?  Yes
8. Were samples received intact?  Yes
9. Were labs informed about short holds & rushes? Yes / No  NA
10. Were any analyses received outside of hold time? Yes /  No

11. Any Subcontracting needed? Yes /  No  
ESS Sample IDs: \_\_\_\_\_  
Analysis: \_\_\_\_\_  
TAT: \_\_\_\_\_

12. Were VOAs received?  Yes / No  
a. Air bubbles in aqueous VOAs?  Yes / No  
b. Does methanol cover soil completely?  Yes / No / NA

13. Are the samples properly preserved?  Yes / No  
a. If metals preserved upon receipt: Date: \_\_\_\_\_  
b. Low Level VOA vials frozen: Date: 10/6/16

Time: \_\_\_\_\_ By: \_\_\_\_\_  
Time: 1945 By: JC SC 10/7/16

**Sample Receiving Notes:**

- ① rec'd one DI water vial for B-9, S-3; B-13, S-3; B-14 S-4
- ② B-12 S-1 preserved with NaHSO<sub>4</sub> not DI water W 10/6/16

14. Was there a need to contact Project Manager?  Yes / No  
a. Was there a need to contact the client?  Yes / No  
Who was contacted? \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ By: \_\_\_\_\_

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	72115	Yes	NA	Yes	8 oz. Jar - Unpres	NP	
01	72131	Yes	NA	Yes	VOA Vial - Methanol	MeOH	
01	72182	Yes	NA	Yes	VOA Vial - Other	Other	
01	72163	Yes	NA	Yes	VOA Vial - Other	Other	
02	72114	Yes	NA	Yes	8 oz. Jar - Unpres	NP	
02	72130	Yes	NA	Yes	VOA Vial - Methanol	MeOH	
02	72160	Yes	NA	Yes	VOA Vial - Other	Other	
02	72161	Yes	NA	Yes	VOA Vial - Other	Other	
03	72113	Yes	NA	Yes	8 oz. Jar - Unpres	NP	
03	72129	Yes	NA	Yes	VOA Vial - Methanol	MeOH	
03	72158	Yes	NA	Yes	VOA Vial - Other	Other	
03	72159	Yes	NA	Yes	VOA Vial - Other	Other	
04	72112	Yes	NA	Yes	8 oz. Jar - Unpres	NP	
04	72128	Yes	NA	Yes	VOA Vial - Methanol	MeOH	
04	72156	Yes	NA	Yes	VOA Vial - Other	Other	
04	72157	Yes	NA	Yes	VOA Vial - Other	Other	
05	72111	Yes	NA	Yes	8 oz. Jar - Unpres	NP	
05	72127	Yes	NA	Yes	VOA Vial - Methanol	MeOH	
05	72154	Yes	NA	Yes	VOA Vial - Other	Other	
05	72155	Yes	NA	Yes	VOA Vial - Other	Other	
06	72110	Yes	NA	Yes	8 oz. Jar - Unpres	NP	
06	72126	Yes	NA	Yes	VOA Vial - Methanol	MeOH	
06	72152	Yes	NA	Yes	VOA Vial - Other	Other	
06	72153	Yes	NA	Yes	VOA Vial - Other	Other	



## ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston & Sampson Engineers, Inc - TB/CMT

ESS Project ID: 1610112  
Date Received: 10/6/2016

07	72109	Yes	NA	Yes	8 oz. Jar - Unpres	NP
07	72125	Yes	NA	Yes	VOA Vial - Methanol	MeOH
07	72150	Yes	NA	Yes	VOA Vial - Other	Other
07	72151	Yes	NA	Yes	VOA Vial - Other	Other
08	72108	Yes	NA	Yes	8 oz. Jar - Unpres	NP
08	72124	Yes	NA	Yes	VOA Vial - Methanol	MeOH
08	72148	Yes	NA	Yes	VOA Vial - Other	Other
08	72149	Yes	NA	Yes	VOA Vial - Other	Other
09	72107	Yes	NA	Yes	8 oz. Jar - Unpres	NP
09	72123	Yes	NA	Yes	VOA Vial - Methanol	MeOH
09	72147	Yes	NA	Yes	VOA Vial - Other	Other
10	72106	Yes	NA	Yes	8 oz. Jar - Unpres	NP
10	72122	Yes	NA	Yes	VOA Vial - Methanol	MeOH
10	72144	Yes	NA	Yes	VOA Vial - Other	Other
10	72145	Yes	NA	Yes	VOA Vial - Other	Other
11	72105	Yes	NA	Yes	8 oz. Jar - Unpres	NP
11	72121	Yes	NA	Yes	VOA Vial - Methanol	MeOH
11	72142	Yes	NA	Yes	VOA Vial - Other	Other
11	72143	Yes	NA	Yes	VOA Vial - Other	Other
12	72104	Yes	NA	Yes	8 oz. Jar - Unpres	NP
12	72120	Yes	NA	Yes	VOA Vial - Methanol	MeOH
12	72140	Yes	NA	Yes	VOA Vial - NaHSO4	NaHSO4
12	72141	Yes	NA	Yes	VOA Vial - NaHSO4	NaHSO4
13	72103	Yes	NA	Yes	8 oz. Jar - Unpres	NP
13	72119	Yes	NA	Yes	VOA Vial - Methanol	MeOH
13	72138	Yes	NA	Yes	VOA Vial - Other	Other
14	72102	Yes	NA	Yes	8 oz. Jar - Unpres	NP
14	72118	Yes	NA	Yes	VOA Vial - Methanol	MeOH
14	72136	Yes	NA	Yes	VOA Vial - Other	Other
15	72101	Yes	NA	Yes	8 oz. Jar - Unpres	NP
15	72117	Yes	NA	Yes	VOA Vial - Methanol	MeOH
15	72134	Yes	NA	Yes	VOA Vial - Other	Other
15	72135	Yes	NA	Yes	VOA Vial - Other	Other
16	72100	Yes	NA	Yes	8 oz. Jar - Unpres	NP
16	72116	Yes	NA	Yes	VOA Vial - Methanol	MeOH
16	72132	Yes	NA	Yes	VOA Vial - Other	Other
16	72133	Yes	NA	Yes	VOA Vial - Other	Other

**2nd Review**

Are barcode labels on correct containers?

Yes  No

Completed

By: [Signature]

Date & Time: 10/6/16 1930

Reviewed

By: [Signature]

Date & Time: 10/6/16 1945

Delivered

By: [Signature]

Date & Time: 10/6/16 1945

# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston, RI 02910-2211  
 Tel. (401) 461-7181 Fax (401) 461-4486  
 www.esslaboratory.com

Co. Name  
**WESTON + SAMPSON ENG.**

Contact Person  
**KEVIN GENDRON**

City  
**ROXBURY** State  
**MA**

Tel. **978 532 1900** Fax

# CHAIN OF CUSTODY

Turn Time  Standard  Other

Regulatory State: MA RI CT NH NJ NY ME Other

Is this project for any of the following: (please circle)  
 MA-MCP Navy USACE CT DEP Other

Project Name  
**RTE 33 PORTS MOUTH**

Address  
**8 CENTENNIAL DRIVE**

City  
**ROXBURY** Zip  
**01960**

Project #  
**01960**

Email: **gendronk@wseinc.com**

ESS Lab # **1610112**

Reporting Limits

Electronic Deliverables Excel Access PDF

Analysis

TPH X  
 8270 X  
 PCB X  
 PCB 48 X

ESS Lab ID	Date	Collection Time	Grab - G Composite - C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol/ Container
1	9/27/16	12:00	G	S	B-1 S-1	9/27	1	1/12A	V
2	9/28/16	8:10			B-2 S-2		1	1/12	
3	9/27/16	13:25			B-3 S-4		1	1/12	
4	9/27/16	15:25			B-4 S-3		1	1/12	
5	9/28/16	14:15			B-5 S-4		1	1/12	
6	9/28/16	12:20			B-6 S-3		1	1/12	
7	9/28/16	12:00			B-7 S-4		1	1/12	
8	9/28/16	14:40			B-8 S-2		1	1/12	
9	9/27/16	11:20			B-9 S-3		1	1/12	
10	9/29/16	14:10			B-10 S-3		1	1/12	V

Container Type: P-Poly G-Glass AG-A Amber Glass S-Sterile V-VOA Matrix S-Soft SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present  Yes  No Internal Use Only   Technician

Seals Intact  Yes  No NA:  Pickup   Technician

Cooler Temperature: **1.2 Ice**

Relinquished by: (Signature, Date & Time) **10/5/16 14:00**

Relinquished by: (Signature, Date & Time) **10/16/16**

Relinquished by: (Signature, Date & Time) **10/16/16 18:34**

Received by: (Signature, Date & Time) **10/16/16 18:39**

Received by: (Signature, Date & Time)

Received by: (Signature, Date & Time)

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Ascorbic Acid, 8-ZnAc2, 9-ICE

Sampled by: **Julie A. Eaton**

Comments:

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy

2 (Yellow) Client Receipt

# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston, RI 02910-2211  
 Tel. (401) 461-7181 Fax (401) 461-4486  
 www.esslaboratory.com

# CHAIN OF CUSTODY

Turn Time  Standard  Other \_\_\_\_\_

Regulatory State: MA RI CT (NH) NJ NY ME Other \_\_\_\_\_

is this project for any of the following: (please circle)  
 MA-MCP Navy USACE CT DEP Other \_\_\_\_\_

Project # \_\_\_\_\_ Project Name \_\_\_\_\_

Address: CENTEN N IAU DRIVE

City: PEABODY State: MA

Zip: 01960

PO # \_\_\_\_\_

email: gendron@esslab.com

ESS Lab # 1610112

Reporting Limits - \_\_\_\_\_

Electronic Deliverables Excel Access PDF

Analysis

Vol of Container

Pres Code

Sample ID

Matrix

Grab-G Composite-C

Collection Time

Date

ESS Lab ID

ESS Lab ID	Date	Collection Time	Grab-G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis
11	9/29/16	1445	G	S	B-11 S-2	A	1	11+29/16+5	X	TPH X 8870 X 8860 X PCB X PCPAX
12	9/29/16	1505			B-12 S-1		1	11+2		
13	9/29/16	1450			B-13 S-3		1	11+1		
14	9/29/16	1225			B-14 S-4		1	11+1		
15	9/29/16	1005			B-15 S-3		1	11+2		
16	9/29/16	9:20			B-16 S-2		1	11+2		

Container Type: P-Glass AG-Nber Glass S-Sterile V-VOA Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filler

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Ascorbic Acid, 8-ZnAct, 9-ICE

Sampled by: Julie A Eaton

Comments:

Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Received by: (Signature, Date & Time) \_\_\_\_\_

Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Received by: (Signature, Date & Time) \_\_\_\_\_

Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Received by: (Signature, Date & Time) \_\_\_\_\_

Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Received by: (Signature, Date & Time) \_\_\_\_\_

Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Received by: (Signature, Date & Time) \_\_\_\_\_

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy

2 (Yellow) Client Receipt

## SECTION 02 61 13

### EXCAVATION AND STOCKPILING OF CONTAMINATED MATERIAL

#### PART 1 – GENERAL

##### 1.01 DESCRIPTION:

- A. Furnish all labor, materials, equipment, and incidentals necessary to properly excavate, remove, and/or segregate contaminated soils including debris piles and other material for off-site disposal. The CONTRACTOR shall be responsible for analytical testing of soils for disposal and confirmatory purposes, as required by the disposal/recycling facility and ENGINEER.
- B. The Contractor shall excavate lead-impacted soils within the limit of work, as required by the Engineer. All excavated soil shall be stockpiled on and securely covered with 20 mil polyethylene while awaiting disposal characterization results.
- C. The contractor shall assist the engineer with collection of 20 post-excavation confirmatory XRF and disposal characterization samples as required by the disposal facility. All disposal characterization samples shall be submitted to a State of New Hampshire certified laboratory with a standard 5-7 day turn around time. The CONTRACTOR will be responsible for the cost of analytical testing of all disposal characterization samples.
- D. Contaminated materials may include soil, sediment, vegetation, sand, or debris removed from below grade for disconnection/abandonment of utilities, removed from below grade for demolition of below grade structures and foundations, segregated from stockpiles of soil and debris, and any other demolition activity associated with this contract.

##### 1.02 RELATED WORK:

- A. Section 00 31 43 – PERMITS
- B. Section 01 14 19.16 – DUST CONTROL
- C. Section 01 35 29 – HEALTH AND SAFETY PLAN
- D. Section 01 57 19 – ENVIRONMENTAL PROTECTION
- E. Section 02 41 13 - SELECTIVE SITE DEMOLITION
- F. Section 31 00 00 – EARTHWORK

##### 1.03 SUBMITTALS:

- A. Laboratory results for all samples collected and/or analyzed by the CONTRACTOR shall be submitted to the ENGINEER within 2 days of receipt. The results shall include all Chain-of-Custody forms and all documentation provided by the laboratory.
- B. Hazardous Materials Management Plan (HMMP) for Construction in Contaminated Areas.

The CONTRACTOR shall submit a HMMP to the ENGINEER for review ten business days prior to starting work. The HMMP shall include the following:

- 2. The CONTRACTOR shall develop the procedures for excavating, laboratory testing, or other monitoring of contaminated soil generated during construction and/or site preparation, as required by regulations.
- 3. A schedule detailing the proposed sequence of contaminated soil excavation, stockpiling, and sampling.
- 4. Prepare health and safety information and requirements for the work associated with this Section. The information and requirements shall be incorporated into the site-specific Health and Safety Plan submitted under Section 01 35 29 - HEALTH AND SAFETY PLAN.

#### 1.04 REFERENCES:

- A. New Hampshire S Department of Environmental Services (DES) Policy Number:
  - 1. WSC-94-400, Interim Remediation Waste Management Policy for Petroleum Contaminated Soils.
  - 2. WSC-94-320, Construction Activities in Contaminated Areas.

#### 1.05 DEFINITIONS:

- A. Contaminated Material: Soil, sediment, sand, vegetation, or debris indicated by analytical results to contain any contaminant concentrations equal to or greater than reportable concentrations established by any reportable or cleanup concentration.

#### 1.06 QUALITY CONTROL:

- A. The work shall conform to applicable local, state and federal regulatory agencies governing the handling of contaminated soils and hazardous materials.
- B. Best Management Practices shall take place while performing the work described in this Section.

### PART 2 – PRODUCTS

## 2.01 GENERAL:

- A. At the expense of the CONTRACTOR, all personnel shall wear personal protective equipment and protective clothing consistent with the levels of protection required for this work as indicated in the site-specific Health and Safety Plan and in accordance with Section 01 35 29 – HEALTH AND SAFETY PLAN.
- B. Containers used for hauling the contaminated soil shall be constructed of steel, in good condition and designed for the intended purpose of safe, secure storage of hazardous material during loading and transport to an approved disposal facility. The containers must be containers approved by and labeled in accordance with the U.S. Department of Transportation (DOT).
- C. The containers shall be sift proof and water resistant in accordance with the U.S. DOT regulations.

## 2.02 FILL MATERIALS:

- A. The backfill material shall meet the requirements specified in Section 31 00 00 - EARTHWORK.
- B. Notify the ENGINEER as to the source of the backfill material. Provide samples as requested by the ENGINEER.

## PART 3 – EXECUTION

### 3.01 GENERAL:

- A. The CONTRACTOR shall excavate and convey materials to perform site work described in this Contract.
- B. The CONTRACTOR shall segregate materials excavated during the course of the Work that are suspected to be contaminated based on existing analytical data and/or visual and olfactory appearance or other physical indications of contamination as required by the ENGINEER.

### 3.02 FIELD SCREENING

- A. The Engineer shall perform field screen on-site soils for the presence of lead using an x-ray fluorescence (XRF) meter to be provided by the Contractor for the duration of excavation and confirmatory sampling activities. Field screening shall be used to determine the extent/limits of lead-impacted (lead levels greater than 300 mg/kg or as determined by the Engineer) soil.

### 3.03 EXCAVATION AND RELOCATION OF CONTAMINATED MATERIAL:

- A. Where soils are identified on the drawings and based on confirmatory testing to be lead

impacted, the Contractor shall excavate additional soil in these areas to meet the 300 mg/kg cleanup level. The contractor shall excavate and relocate these soil materials to the soil stockpile location on site.

- B. Contractor shall backfill excavated areas to match existing grades with Class B backfill and loam, as applicable, in accordance with Section 31 00 00 – Earthwork.

#### 3.04 CHARACTERIZATION:

- A. The CONTRACTOR shall be responsible for characterizing the material for the purpose of obtaining approvals from the disposal facility(ies).
  - 1. The CONTRACTOR shall perform all requested lab analyses of contaminated material as required by the receiving facility.
  - 2. The CONTRACTOR will be permitted to collect additional samples to perform additional testing of the contaminated material as required by the facility at no additional cost to the OWNER.

### 3.05 STORAGE OF EXCAVATED MATERIAL:

- A. The CONTRACTOR shall be allowed to stockpile potentially contaminated excavated material on-site pending approval/manifests for transport and disposal or reuse if the following conditions are met:
  - 1. The stockpiled contaminated material must be removed off-site as soon as possible and in all cases within 90 days from the day of its initial excavation for hazardous waste and 120 days for non-hazardous waste (hazardous waste as defined in 310 CMR 30.0000 and RCRA).
  - 2. The stockpiled contaminated material shall be placed on 20-mil (minimum) polyethylene sheeting and covered with 20-mil (minimum) polyethylene sheeting or 10-mil nylon sheeting.
  - 3. The polyethylene sheeting shall be bermed around the edges to prevent any infiltration of stormwater or exfiltration of leachate.
  - 4. The base of the temporary stockpile shall be sloped to create leachate collection points. Collect and dispose of all leachate generated from the stockpiles.
- B. If any one of these conditions cannot be met, then the CONTRACTOR shall store contaminated material soil in water-tight containers at no additional cost to the OWNER pending transportation and disposal. The containers must be removed off site within 90 days from the first day of excavation/generation for hazardous waste and 120 days for non-hazardous waste.

### 3.06 POST-EXCAVATION CONFIRMATORY SAMPLING AND EXCAVATION OF ADDITIONAL CONTAMINATED MATERIAL:

- A. The ENGINEER shall perform post-excavation confirmatory sampling and analysis at representation locations to determine compliance with the 300 mg/kg cleanup level.
- B. Excavation may include additional material as required by the ENGINEER based on post excavation confirmatory sampling analytical data and/or physical indications of contamination, such as soil discoloration or unusual odors. Perform this work at the lump sum/unit bid prices established for removal and disposal of contaminated material.
- C. All analyses shall be provided by the CONTRACTOR at no additional cost to the OWNER with standard 5-7 day turn around time.
- D. Submit a copy of all chemical analyses to the ENGINEER within 2 days of receipt of the laboratory report.
- E. All analyses shall be performed by a laboratory certified for such analyses by the State of New Hampshire.



- F. The ENGINEER may stop the CONTRACTOR's work in a particular location at any time in order to have samples taken and analyzed. If necessary, the CONTRACTOR shall assist the ENGINEER in collecting samples. The work shall not resume in that area until approved by the ENGINEER. Stoppage of work for this reason, or until laboratory results are delivered to the ENGINEER, shall not be a cause for the CONTRACTOR to request additional compensation or an extension of time to the Contract or to other intermediate Contract deadlines.
  
- G. The CONTRACTOR shall not backfill the excavation until the ENGINEER has given approval to do so. The CONTRACTOR shall expect at least a three (3) day period for time to confirm that the appropriate limits of excavation has been determined.

END OF SECTION

SECTION 03 05 00

FIELD CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers concrete and all related items necessary to place and finish the concrete work.
- B. Concrete thrust, and anchor blocks, to be provided at all water main bends, tees, plugs and wyes and at other locations required by the Engineer shall be installed in accordance with the details shown on the drawings and as specified in this section.
- C. Concrete encasement for piping with shallow cover and for encasement of telephone, and electrical duct bank when specified shall be installed in accordance with the details shown on the drawings and as specified in this section.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Concrete Institute (ACI)

- ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
- ACI 305 Recommended Practice for Hot Weather Concreting
- ACI 306 Recommended Practice for Cold Weather Concreting
- ACI SP-66 ACI Detailing Manual
- ACI 318 Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

- ASTM A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM C33	Concrete Aggregates
ASTM C94	Ready-Mixed Concrete
ASTM C143	Test for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C260	Air Entraining Admixtures for Concrete
ASTM C494	Chemical Admixtures for Concrete

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

Statement of materials constituting the design of mixes for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the Contract.

PART 2 - PRODUCTS

2.01 CONCRETE:

- A. All concrete, reinforced or non-reinforced shall have a 28 day compressive strength of 3000 psi unless otherwise noted on the design drawings. A minimum of 5.5 sacks of cement per cubic yard and a maximum water cement ratio of 6.9 gallons per sack shall be used.
- B. Concrete shall conform to ASTM C94. The Contractor shall be responsible for the design of the concrete mixtures. Slump shall be a maximum of 4-inches and a minimum of 2-inches, determined in accordance with ASTM C143.
- C. Admixtures shall be as specified in subsection 2.05. No additional admixtures shall be used unless approved by the Engineer.
- D. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.03 CEMENT:

The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to the applicable requirements of ASTM C150.

2.04 AGGREGATES

- A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.

- B. Maximum size aggregate shall be 3/4-inch.

#### 2.05 ADMIXTURES:

- A. All concrete (unless otherwise directed) shall contain an air entraining agent. Air entrained concrete shall have air content by volume of 4 to 8 percent for 3/4-inch aggregate.
- B. Air entraining agent shall be in accordance with ASTM C260 and shall be Darex AEA, as manufactured by W.R. Grace & Company; Placewel (air entraining Type), as manufactured by Johns Manville; Sika AER as manufactured by Sika Chemical Company; or an approved equal product.
- C. Water reducing agent shall be WRDA, as manufactured by W.R. Grace & Company; Placewel (non-air entraining Type), as manufactured by Johns Manville; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.
- D. Water reducing agent-retarder shall be "Daratard," as manufactured by W.R. Grace & Company; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.

#### 2.06 WATER:

- A. Water for concrete shall be potable, free of deleterious amounts of oil, acid, alkali, organic matter and other deleterious substances.

### PART 3 - EXECUTION

#### 3.01 PREPARATION:

- A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or the material which would tend to reduce the bond.
- B. Earth, concrete, masonry, or other water permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed.
- C. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

#### 3.02 THRUST AND ANCHOR BLOCKS:

- A. Minimum bearing areas for thrust blocks and dimensions of anchor blocks shall be as shown on the drawings.

- B. Concrete for thrust and anchor blocks shall be placed against undisturbed earth, and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints.

### 3.03 FILL CONCRETE:

- A. Fill concrete shall be placed in those locations as indicated on the design drawings. Fill concrete shall consist of materials as previously specified, with a minimum 28-day compressive strength of 3000 psi.
- B. Before fill concrete is placed, the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set.
- C. Fill concrete shall be brought to lines and grades as shown on the design drawings.

### 3.04 CONCRETE PLACING DURING COLD WEATHER:

- A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40°F, or is expected to fall to below 40°F, within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.
- B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

### 3.05 CONCRETE PLACING DURING HOT WEATHER:

- A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.
- B. During periods of excessively hot weather (90°F or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement, will not be acceptable, and will be rejected.

### 3.06 FIELD QUALITY CONTROL:

- A. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Owner. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.
  
- B. At least 4 standard compression test cylinders shall be made and tested and 1 slump test from each day's placement of concrete. A minimum of four compression test cylinders shall be made and tested for each 100 cubic yards of each type and design strength of concrete placed. One cylinder shall be tested at 7 days, and two at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. If the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.
  
- C. The Engineer shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected shall be final.

END OF SECTION

SECTION 03 11 00  
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section of the specifications covers the furnishing and installation of forms for cast-in-place concrete.

1.02 RELATED WORK:

- A. Section 01 45 23, STRUCTURAL TESTS AND INSPECTIONS
- C. Section 03 21 00, CONCRETE REINFORCEMENT
- D. Section 03 30 00, CAST-IN-PLACE CONCRETE

1.03 REFERENCES:

The following standards form a part of this specification:

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301 Standard Specifications for Structural Concrete

ACI 347 Recommended Practices for Concrete Formwork

U.S. ARMY CORPS OF ENGINEERS (CE)

CE 03300 Cast-in-Place Concrete

PART 2 - PRODUCTS

2.01 MATERIALS:

- C. Form release agent shall be a non-staining, non-yellowing, non-toxic liquid free from kerosene and resins of the type recommended by the manufacturer of the forming system being used such as EZ strip by L&M Construction Chemicals, Omaha, NB and "Magic Kote" by Symons Corp., Des Plaines, IL or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION:

Surfaces of forms to be in contact with concrete shall be greased with nonstaining form release compound. Wetting will not be accepted as a substitute. Approval of the Engineer shall be obtained before use of coated materials or liners in lieu of form release compound, except as modified herein.

3.02 CONSTRUCTION:

- A. For concrete surfaces which will be visible after completion of the structure, painted or unpainted, the type and the precise location of form ties, nails joints between form members, and any other features which will leave a visible trace in the finished concrete, will be subject to the approval of the Engineer.
- B. Formwork shall be so constructed, braced, or tied that the formed surfaces of the concrete will be perfectly true, smooth, and to the dimensions shown on the drawings. All forms used for circular sections shall be true arcs as indicated on the drawings. Short chords will not be acceptable. Form line shall present an uninterrupted surface conforming to radii indicated on the drawings.
- C. Forms shall be sufficiently tight to prevent leakage of mortar, and when necessary shall have temporary openings as required for thorough cleaning, and as required for introduction of concrete to avoid excessive free fall. Panels damaged in stripping or otherwise shall not be reused.

3.03 REMOVAL OF FORMS

- A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 30 percent of the ultimate strength prescribed by the design and not before reaching the following number of day-degrees [whichever is the longer]:

<u>Forms for</u>	<u>Day-Degree*</u>
Slabs	500

\* Day-Degree: Total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily weighted average temperature of 60 deg F equals 300 day-degrees. Temperatures below 50 deg F are not to be considered in determining Day-Degree.

- C. Shoring shall not be removed until the concrete has attained at least 70 percent of the specified strength and sufficient strength to support safely its own weight and the construction live loads upon it.



- D. Forms shall be removed in such a manner as not to impair safety and serviceability of the structure. Concrete exposed by form removal shall have sufficient strength not to be damaged by the removal operation.

END OF SECTION

Document1

SECTION 03 21 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section of the specification covers the furnishing and installation of reinforcement for cast-in-place concrete.

1.02 RELATED WORK:

- A. Section 01 45 23, STRUCTURAL TESTS AND INSPECTIONS
- B. Section 03 11 00, CONCRETE FORMWORK
- C. Section 03 30 00, CAST-IN-PLACE CONCRETE

1.03 SYSTEM DESCRIPTION:

Materials and construction shall conform to ACI 318 and ACI 350 unless otherwise noted on the design drawings or modified herein.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. The Contractor shall furnish the Engineer with complete checked, reinforcing steel shop drawings and bar lists. Shop drawing shall include grade of steel used as well as splice lengths.
- B. Mill test reports shall accompany drawings. Fabrication shall not commence until the drawings and mill test reports have been released by the Engineer.
- C. When fiber reinforcement is used, contractor shall submit manufacturer's data confirming that material meets the specification.

1.05 REFERENCES:

- A. The following standards form a part of these specifications:

American Concrete Institute (ACI)

ACI 318 Building Code Requirements for Concrete

ACI 347 Recommended Practice for Concrete Formwork

ACI 350 Environmental Engineering Concrete Structures

ACI SP-66 ACI Detailing Manual

American Society for Testing and Materials (ASTM)

ASTM A185 Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement

ASTM A497 Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement

ASTM A615 Deformed Billet-Steel Bars for Concrete Reinforcement

ASTM A775 Epoxy-coated Reinforcing Steel Bars

ASTM A884 Epoxy-coated Welded Wire Fabric

American Welding Society (AWS)

AWS 12.1 Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Welded steel wire fabric shall conform to ASTM A185 or ASTM A497 and ASTM A884 if epoxy-coated fabric is specified. Gauge and spacing of wires shall be as indicated on the drawings.
- B. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Bars shall be shipped to the site with bars of the same size and shape, fastened in bundles with securely wired-on metal identification tags listing both size and mark.
- C. Steel failing to meet the requirements of this specification or the drawings will be rejected and shall be removed from the site immediately.

PART 3 - EXECUTION

3.01 STEEL INSTALLATION:

- A. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings (including ice), that reduce or destroy bond. When there is a delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned as necessary.
- B. After forms have been oiled, but before concrete is placed, all steel shall be securely wired in the exact position called for, and shall be maintained in that position until all concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Engineer.
- C. Concrete blocks having a minimum bearing area of 2-inches by 2-inches and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Wood blocks, stones, brick chips, etc., shall not be used to support reinforcement.
- D. Metal supports shall be of types that will not penetrate the surface of formwork or slab and which will not show through or stain surfaces that are to be exposed to view, painted or unpainted.
- F. Reinforcement, which is to be exposed for a considerable length of time after having been placed, shall be painted with a heavy coat of cement grout, if required by the Engineer.

END OF SECTION

SECTION 03 30 00  
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all concrete and all related items necessary to place and finish the concrete work.

1.02 RELATED WORK:

- A. Section 01 45 23, STRUCTURAL TESTS AND INSPECTIONS
- B. Section 03 11 00, CONCRETE FORMWORK
- B. Section 03 15 13, WATERSTOPS
- C. Section 03 21 00, CONCRETE REINFORCEMENT
- D. Section 07 92 00, JOINT PROTECTION
- E. Section 09 90 00, PAINTING
- F. Section 22 00 00, PLUMBING
- G. Section 31 00 00, EARTHWORK
- H. Items furnished under other Sections and installed under this Section include, but are not limited to:

Items embedded in concrete, including anchors, sleeves, floor drains, castings, frames for hatches, angles, nosings, and other miscellaneous metals.

1.03 REFERENCES:

- A. The following standards form a part of these specifications:

American Concrete Institute (ACI)

ACI 301 Structural Concrete for Buildings

ACI 302 Recommended Practice for Concrete Floor and Slab Construction

- ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Replacing Concrete
- ACI 305 Recommended Practice for Hot Weather Concreting
- ACI 306 Recommended Practice for Cold Weather Concreting
- ACI 318 Building Code Requirements for Reinforced Concrete
- ACI 347 Recommended Practice for Concrete Formwork
- ACI 350 Code Requirements for Environmental Engineering Concrete Structures

American Society for Testing and Materials (ASTM)

- ASTM C33 Concrete Aggregates
- ASTM C39 Compressive Strength of Cylindrical Concrete Specimens
- ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- ASTM C87 Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
- ASTM C94 Ready-Mixed Concrete
- ASTM C143 Standard Method for Slumps of Portland Cement Concrete
- ASTM C150 Portland Cement
- ASTM C171 Sheet Materials for Curing Concrete
- ASTM C231 Air Content of Freshly Mixed Concrete by the Pressure Method
- ASTM C260 Air-Entraining Admixtures for Concrete
- ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete
- ASTM C494 Chemical Admixtures for Concrete
- ASTM D1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- ASTM D1752 Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Shop drawings of the materials specified herein.
- B. Statement of materials constituting the design of mixes which satisfy the specified strength for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the contract.
- C. Provide one copy of the "Certificate of Delivery" for each load of concrete as it arrives on the site, under the provisions of ASTM C94.

PART 2 - PRODUCTS

2.01 CONCRETE:

- A. Concrete conforming to the requirements listed below shall be used where indicated on the drawings. Unless otherwise indicated, concrete used as fill under foundations, and elsewhere approved by the Engineer, shall be the 3,000 psi mix.

TABLE

Minimum Comp. Strength at 28 days (psi)	Maximum Water/Cement ratio (gallons per bag of cement)*	Cement Factor: 94 lb. Bags per cubic yard minimum**
3000	0.59 (6.9)	5.5
4000	0.48 (5.6)	6.5
5000	0.40 (4.7)	7.4

\* Based on air-entrained concrete. If non-air-entrained concrete is called for, the listed maximum water/cement ratios may be increased slightly, as approved by the Engineer. The water is the total water in the mix, including free water on the aggregate.

\*\* These are minimum amounts; increase as necessary to meet mix requirements.

- B. Concrete shall conform to ASTM C94. One copy of the Certificate of Delivery required by ASTM C94 shall be delivered to the Engineer immediately upon arrival of each load of concrete at the site. The Contractor shall be responsible for the design of the concrete mixtures.
- C. Standard compression tests of all proposed mixes shall be made by the testing laboratory or other satisfactory evidence shall be presented that the design mixes will attain the minimum strengths listed on the design drawings or called for herein, within the

limitations of the ACI Code. No concrete shall be delivered to the job site until the Engineer has approved the design mixes.

- D. All concrete (unless otherwise directed) shall contain an air-entraining agent. Air entrained concrete shall have an air content by volume of 3 to 6 percent for 1-1/2-inch aggregate and 4 to 8 percent for 3/4-inch aggregate. The air content shall be the responsibility of the testing laboratory and in accordance with ASTM C231.
- E. All concrete shall contain a mid-range water reducer to minimize cement and water content of the mix, at the specified slump, in accordance with ASTM C494.
- F. Slump for all concrete shall be from 3-inch to 4-inch, except for concrete using a superplasticizer, when the maximum slump shall be 8-inches. Any concrete having a slump greater than 4-inches (8-inches with superplasticizer) shall be promptly removed from the site.
- G. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixture other than those specified shall be used in concrete without the specific written permission of the Engineer in each case.
- H. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

#### 2.02 CEMENT:

- A. The cement shall be an approved brand of American manufactured Portland Cement, Type IIA conforming to ASTM C150. The brand name and type of cement proposed for use shall be submitted to the Engineer for approval immediately following award of contract. Only one color of cement, all of the same manufacture, shall be used for the work.
- B. When the use of high-early-strength Portland cement (Type IIIA) is permitted by the Engineer the same strength requirements shall apply, but the indicated strengths shall be attained in 7 days instead of 28 days.

#### 2.03 ADMIXTURES:

- A. Air entraining agent shall be in accordance with ASTM C260.
- B. Water reducing agent shall be a mid-range water reducer meeting ASTM C494, Type A.
- C. Water reducing agent-retarder shall be in accordance with ASTM C494, Type D.
- D. Superplasticizer agent shall be in accordance with ASTM C494, Type F or Type G and contain no more than 0.1% chloride ions. Product may be plant added or field added based on the best application considering distance, temperature and time.



2.04 AGGREGATES:

- A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.
- B. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM C33.
- C. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33.
- D. The following designated sizes of aggregate shall be the maximum employed in concrete.

2-inch for mass concrete

1½-inch for reinforced sections 18-inch and over in thickness

¾-inch for reinforced and unreinforced sections less than 18-inch thickness.

2.05 WATER:

Water for concrete shall be potable, free from injurious amounts of oil, acid, alkali, organic matter and other deleterious substances.

2.06 GROUT:

Grout shall be mixed in the proportions of one part Portland Cement to 2 parts sand, by volume. Only sufficient water shall be used to enable grout to barely hold its shape when squeezed into a ball in the hand. Aggregate for grout shall conform to the requirements of the reference specification for concrete. Prior approval of the Engineer shall be obtained for the use of proprietary grouts, and the instructions of the Engineer shall be followed in their use.

2.07 CURING MATERIALS:

- A. Curing compound shall be a curing/hardener compound such as Acurion by AntiHydro, Sikaguard Cure/Hard by Sika, Super Diamond Clear by Euclid or approved equal.
- B. Curing paper shall be a fiber-reinforced laminated Kraft bituminous product conforming to the requirements of ASTM C171.

2.08 JOINT FILLER:

- 1. Preformed joint filler strip shall conform to ASTM D1751 or D1752, having a thickness as indicated on the drawings.
- 2. Fillers shall be provided in pieces of the full thickness required. Use of multiple layers of thin pieces to make-up the full thickness will not be permitted.

## 2.09 JOINT SEALANT:

Joint sealant for construction and control joints shall be a two-part polysulfide base sealant conforming to Thiokol's Building Trade Performance Specification, Class A (self-leveling), Type II (hardness: 35-45 Shore A).

## PART 3 - EXECUTION

### 3.01 GENERAL:

Under no circumstances shall concrete that has set or partially set before placing be used; and no retempering of concrete or grout will be permitted.

### 3.02 PREPARATION:

- A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or other material which would tend to reduce the bond.
- B. Unless otherwise indicated, a moisture barrier shall be used under all slabs placed on the ground in accordance with ACI 302.1R. The moisture barrier shall be fungi-resistant and shall have a vapor permeance rating not exceeding 0.01 perms (Perms [grains/ft<sup>2</sup>\*hr\*in. Hg]) per ASTM F1249 or ASTM E96) and 10 mils thickness (49 lbs/MSF). The moisture barrier shall be a high-performance underslab vapor retarder made from polyethylene resins that exceed ASTM E1745, Class A. Sheets shall be lapped 6-inches at joints and sealed with 2-inch wide tape or as recommended by the manufacturer. The vapor barrier should have all laps, seams, penetrations and terminations sealed and should carry across footings.
- C. When no moisture barrier is used, the earth, concrete, masonry, or other water-permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.
- D. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned by chipping and washing off all dirt and scum and laitance. It then shall be moistened prior to placing new concrete.
- E. Concrete surfaces that act as a seat for structural members (other than those resting on grout) shall be troweled to an extremely flat and level surface. If necessary, such surfaces shall be ground off to achieve the required flatness and level.
- F. Fill concrete on top of concrete shall be placed in the locations indicated on the drawings or designated by the Engineer. Before fill concrete is placed, the following procedures

shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set. Fill concrete shall be brought to the lines and grades shown on the drawings or approved by the Engineer.

- G. Concrete for thrust and anchor blocks shall be placed against undisturbed earth and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints. Minimum bearing areas and dimensions shall be as shown on the drawings.

### 3.03 MIXING:

- A. Concrete shall be ready-mixed, or transit-mixed, as produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Adding water in controlled amounts during the mixing cycle shall be done only with the express approval of, and in the presence of the Engineer.
- B. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the nameplate. Discharge at the site shall be within 1-1/2 hours after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.
- C. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI 304 and ASTM C94.
- D. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

### 3.04 INSTALLATION/APPLICATION/ERECTION:

- A. Placing
  - 1. No concrete shall be placed by pumping methods without the prior written approval of the Engineer. Should the Contractor be allowed to place concrete by pumping methods, procedures, mix design of concrete, and all other precautions shall be in

accordance with ACI 304.2R and as approved by the Engineer.

2. Concrete shall be placed in alternate areas, as defined by the construction and control joints indicated on the design drawings. A minimum of 3 days shall elapse between placement of adjacent sections.
3. Segregation of the concrete shall be prevented during handling; should any segregation occur, the concrete shall be remixed before it is placed. Concrete shall be placed in the forms in horizontal layers not over 1 to 2 feet thick. Concrete shall not be allowed to drop freely more than 4 feet. If the free drop to the point of placement must exceed 4 feet, the Contractor shall obtain the approval of the Engineer for the proposed method of depositing the concrete. The concrete shall not be required to flow over distances greater than 3 feet in any direction in the forms or on the ground, unless otherwise permitted by the Engineer.
4. Unless otherwise noted, the work begun on any day shall be completed in daylight of the same day.
5. "Cold Joints" are to be avoided, but if they occur, they are to be treated as bonded construction joints.
6. Chutes for conveying concrete shall be of U-shaped design and sized to insure a continuous flow of concrete. Flat (coal) chutes shall not be employed. Chutes shall be metal or metal-lined, and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45 degrees and shall be such as to prevent segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than 5 feet above the surface of the concrete in the forms, a spout shall be used and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally more than 5 feet.
7. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cubic yards of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.

8. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be wet, tamped, and rolled until thoroughly compacted prior to placing concrete.
9. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings or approved by the Engineer.
10. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each run, and the water and debris shall not be discharged inside the form.

B. Concrete Placing During Cold Weather

1. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40°F, or is expected to fall to below 40°F, within 72 hours, and the concrete after placing shall be protected by covering, heat, or both. No accelerant shall be used to prevent freezing.
2. The temperature of concrete surfaces shall not be permitted to drop below 50°F. for at least 7 days after placement of the concrete.
3. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

C. Concrete Placing During Hot Weather

1. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays that will result in excessive mixing of the concrete after arrival on the job.
2. During periods of excessively hot weather (90°F, or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement will not be acceptable, and will be rejected.
3. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. The record shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress

of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

#### D. Pipes And Embedded Metals

1. Special care shall be taken to bring the concrete into solid contact with pipes and iron work embedded in the walls and floors, particularly underneath and around all pipes where a head of water exists, making watertight joints.
2. In general, such embedded items are not shown on the structural design drawings. Design drawings of the other trades shall be consulted for their location and details.
3. Anchor bolt location, size and details shall be verified with the equipment manufacturer's certified drawings before installation.
4. Anchor bolts, reglets, sleeves, edge angles and similar embedded items will be provided, delivered to the site under other Sections of the specification, for installation under this Section.
5. Where edge angles, etc., have nuts welded on to receive machine screws, the threads of the nuts shall be protected from concrete, and the concrete shall be excluded from the space to be occupied by the screw, by the use of wood plugs or other effective means.
6. Inserts required for hanging mechanical and electrical items shall be provided and installed in the forms under the mechanical and electrical sections of the specification.
7. Should the Contractor be allowed to leave openings in the concrete for pipes or ironwork, to await the arrival of items that would delay the prosecution of the work, the openings shall be subject to the approval of the Engineer. Appropriate construction joints shall be provided. In filling any such openings with concrete, a mixture of 1: 1-1/2 : 3 shall be used and a watertight bond shall be secured between the old and new concrete.
8. In bolting miscellaneous items to concrete after the concrete has set, expansion bolts of an approved pattern and type shall be used. The Contractor shall submit to the Engineer, for approval, the types of expansion bolts. Expansion bolts shall not be used until they are approved.

#### E. Curing

1. Concrete curing shall be performed as specified in ACI 301 and as stated herein. All curing procedures shall have prior approval of the Engineer.
2. Concrete Floors

Concrete floors which are to receive paint, concrete fill, mortar setting beds, grout fill, or any other subsequent finish shall be cured by one of the following procedures immediately after completion of placement and finishing:

- a. Ponding or continuous sprinkling.
  - b. Application of absorptive mats or fabric kept continuously wet.
  - c. Application of sand kept continuously wet.
  - d. Application of waterproof sheet materials conforming to ASTM C171.
  - e. Application of curing compounds conforming to ASTM C309, if it can be demonstrated to the Engineer's satisfaction that the compound is applicable and that it will not prevent bonding of the subsequent finish to be received. Compound shall be placed at a rate of 200 square feet per gallon, in two applications perpendicular to each other.
3. Curing procedure shall be continued for at least 7 days.
- a. Moisture loss from surface placed against metal or wood forms shall be minimized by keeping forms wet until removal.
  - b. Curing shall be continued for at least 7 days. When forms are removed during the curing period, surfaces shall be cured by spraying or by the use of a curing compound as previously specified.
  - c. Surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect the exposed surface.

#### F. Bracing And Supports

1. All concrete members shall be adequately and safely supported and braced until the permanent supports and braces are installed.
2. Backfilling against exterior walls shall not be done until supporting slabs are in place and have attained 70 percent of design strength, otherwise walls shall be braced against earth lateral pressure, using a system approved by the Engineer.
3. Backfilling against retaining walls shall not commence until the wall concrete has reached its 28-day strength.

#### G. Removing Forms And Supports

1. Removal of forms shall take place in accordance with ACI 347, Section 3.6. Except as otherwise specifically authorized by the Engineer, forms shall not be removed until the concrete has aged for the following number of day-degrees or attained 50 percent strength. (Day-degrees equals the total of number of days times the average daily air temperature at the surface of concrete. For example, 5 days at a daily average temperature of 60°F. equals 300 day-degrees.)

<u>Location</u>	<u>Day-Degrees</u>
Slabs	500

2. Shores under beams and slabs shall not be removed until the concrete has attained at least 70 percent of the specified cylinder strength and also sufficient strength to support safely its own weight and the construction loads upon it.

#### H. Patching

1. Defective concrete and honeycombed areas as determined by the Engineer shall be chipped down reasonably square and at least one-inch deep to sound concrete by means of hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly imbedded in the parent concrete, subject to Engineer's final inspection. If honeycomb exists around reinforcement, chip to provide a clear space at least 1-inch wide all around the steel. For areas less than 1-1/2 inches deep, the patch may be made following the procedure for filling form tie holes, described in the subsection below, using adequately dry (non-trowelable) mixtures to avoid sagging. Thicker repairs will require build-up in 1-inch layers on successive days. Unless otherwise indicated, thicker repairs shall be made with Vertipatch mortar mixture blended with Acryl-Set, both by Master Builders, Inc., Cleveland, Ohio, or approved equal.
2. For concrete areas exposed to serious abrasion and/or impact forces, the Engineer may order the use of grout with a non-shrink metallic aggregate (Embeco by Master Builders, Inc.; Ironite by Fox Industries, Madison, IL; or approved equal) as an additive in the proportions listed below:

Material	Small Patches		Large Formed Patches	
	Volumes	Weights	Volumes	Weights
Cement	1.0	1.0	1.0	1.0
Metal Aggregate	0.15	0.25	0.2	0.33
Sand	1.5	1.5	1.5	1.0
Pea Gravel	--	--	1.5	1.5

#### I. Finishing Of Formed Surfaces

1. All concrete that is to be left exposed to view shall be scraped to remove projecting



imperfections left by voids in the forms.

2. In addition to scraping, exterior exposed concrete shall be covered with a cement-base plaster mix. The mix shall consist of Thoroseal Plastic Mix and Acryl 60, as manufactured by Standard Drywall Products, Miami, FL, or approved equal. It shall be mixed and applied in accordance with the manufacturer's recommendations.
3. In addition to scraping, interior concrete surfaces which will be exposed to view and concrete surfaces which are to be prepared and painted as specified in Section 09 90 00, PAINTING, shall receive a smooth rubbed finish, in accordance with ACI 301 and as described below.
4. To permit satisfactory finishing, forms shall be removed from the vertical faces of the concrete as early as is possible without damaging the surface. Immediately after stripping forms, any fins or projections left by the forms shall be chipped off, and the surfaces rubbed smooth.
5. Form tie holes and other voids and faults shall be patched. Voids shall be cleaned out, roughened, thoroughly wetted, coated with neat cement paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.
6. Rubbing shall be performed while the surface is wet using a carborundum or cement sand brick, to achieve a smooth uniform, even textured finish. Patched and chipped areas shall be blended to match as closely as possible the appearance of the rest of the surface. No cement wash or plastering will be permitted, and no mortar shall be used except as required above.
7. Where finishing is performed before the end of the curing period, concrete shall under no circumstances be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

\*L. Testing

1. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the contractor. The laboratory shall supply testing equipment, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.

- a. The Testing Laboratory shall conform to the requirements of ASTM E-329 as modified in NH State Building Code. The State Board of Building Regulations and Standards shall license them.
2. At least one slump test shall be performed from each truckload of concrete. The sample for slump shall be taken from the middle third of a truckload. Air content tests shall be made at the discretion of the Engineer. If the measured slump or air content falls outside the specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the concrete shall be considered to have failed the requirements of the specification and shall be immediately removed from the jobsite to be discarded.
3. The Contractor shall advise the Engineer of his readiness to proceed with concrete placement at least one working day prior to each placement. The Engineer will inspect the preparations for concrete, including the preparation of previously placed concrete, the reinforcing, and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.
4. A minimum of four standard compression test cylinders shall be made and tested for each 100 cubic yards or fraction thereof for each type and design strength of concrete from each day's placement of concrete. One cylinder shall be tested at 7 days and two cylinders at 28 days. The fourth cylinder from each set shall be kept until the 28-day test report on the second and third cylinders in the same set has been received. The Engineer reserves the right to require test cylinders to be made for each truckload of concrete if the nature of the project or project experience indicates such additional tests are required for proper control of concrete quality; such tests will be at the Contractor's expense.
5. The strength level shall be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength  $f'_c$ , and no individual strength test (average of two cylinders) result falls below the specified strength  $f'_c$  by more than 500 psi.
6. In the event the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days.

M. Failure To Meet Requirements

1. The Engineer shall have the right to reject concrete represented by low strength tests or to agree to further testing of the concrete. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected or additional tests shall be conducted shall be final. All direct and indirect costs associated with further curing and testing of the concrete shall be at the Contractor's expense. All costs associated with removing rejected concrete, placing

new concrete, and conducting tests on new concrete shall be at the Contractor's expense.

2. If the Engineer agrees to consider further curing and/or testing of the concrete before making a final decision, the Contractor shall submit a detailed plan to the Engineer, including proposed criteria for acceptance of the concrete. The plan may include additional curing of the concrete, drilling and testing of cores, load testing of the structure, or a combination.
3. If additional curing is permitted before further inspection and testing, the Contractor shall provide any necessary materials and labor to further cure the suspect concrete.
4. If drilling and testing of cores is permitted, the Contractor shall be responsible for obtaining the cores, including provision of ladders, scaffolding, and such incidental equipment as may be required. If additional curing is permitted, cores shall be drilled after the curing period, and shall be in accordance with ASTM Methods C39 and C42. The Contractor shall repair all core holes to the satisfaction of the Engineer.
5. The burden of proof, including, but not limited to the work of cutting and testing the cores, inspection, evaluation, engineering, repair of the holes, or removal and replacement of the concrete in question, and all associated costs therefor, shall be at the expense of the Contractor.
6. If load testing of the concrete is permitted, and if not otherwise indicated, slabs or beams under load test shall be loaded with their own weights plus a superimposed load of 2 times the design live load. The load shall be applied uniformly over the portion being tested in the approved manner and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period, does not exceed the following value:

$$D \text{ equals } 0.001 (L \times L)/t$$

in which "L" is span in feet, "t" is depth of slab, or beam in inches. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, the slab, or beam under test recovers at least 75 percent of the observed deflection.

7. If the suspect concrete still fails to meet specification requirements, the Engineer shall have the right to reject the concrete, have it removed and replaced, in accordance with paragraph 5 above, or to require mechanical strengthening of the concrete to satisfy project requirements. The Contractor shall submit a removal and replacement plan for review by the Engineer.

END OF SECTION

## SECTION 06 20 00

### FINISH CARPENTRY

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This section of the specification covers furnishing tools, equipment, labor and materials necessary to perform finish carpentry work complete, and miscellaneous carpentry items not specified elsewhere including fasteners and supports.
- B. Metal fasteners, plates, brackets, and accessories connected directly into woodwork shall be a part of this section of the specification. Nails, screws, bolts, anchors, brackets, and other similar hardware for fastening and securing woodwork and other items provided under this section of the specification shall be furnished under this section.

##### 1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. manufacturer's literature of the materials of this section.
- C. Certificate of wood treatment upon delivery of treated wood product. Treated wood product shall bear appropriate American Wood Preservers Bureau (AWPB) quality mark.

##### 1.04 DELIVERY AND STORAGE:

Finish carpentry material shall be delivered to the job dry, and shall be protected from injury, dirt, dampness and extreme changes of temperature and humidity at all times. Doors, trim, and other prefinished material shall be completely wrapped as required to prevent injury during shipment and storage. Finish materials shall not be delivered until the building is heated and all masonry and other "wet" work has been completed and allowed to become thoroughly dry.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS:

- A. The grades of all materials under this section shall be defined by the rules of the recognized associations of lumber manufacturers producing the material specified, but the maximum defects and blemishes permissible in any specified grades shall not exceed the limitations of the American Lumber Standards. Materials not specifically listed shall be of an accepted grade dictated by good practice.

- B. Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Finished woodwork shall be of sound stock, thoroughly seasoned, kiln dried to a moisture content not exceeding 12 percent.
- C. Finish carpentry and millwork, in general, shall comply with the following sections, as applicable, of the Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program as published by the Architectural Woodwork Institutes for Material and Work of "Custom Grade":

Section 100                  Lumber

- E. White pine shall include northern white pine, western white pine, and sugar pine.
- G. WOOD FIRE RETARDANT TREATMENT:
  - 1. Exposed wood trim and sheathing shall receive fire-retardant treatment conforming to American Wood Preservers Association, AWWA Standard C20 for lumber and AWWA C27 for plywood.
  - 2. Fire retardant treated lumber shall bear UL label and shall have UL Fire-Hazard Classification "FR-S", when tested in accordance with ASTM E84.
  - 3. Material to receive interior grade fire-retardant treatment shall be pressure impregnated with "Dricon" fire-retardant chemicals manufactured by Hickson Corporation, Atlanta, Georgia, in accordance with manufacturer's instructions.
    - a. Material to receive interior grade fire retardant treatment.

PART 3 - EXECUTION

3.01 CONSTRUCTION:

- A. Work shall be erected plumb, true and square. Finish work shall be accurately mitered or butted to meet in straight hairline joints, in accordance with the best commercial practice.
- B. All exterior wood trim shall be fully back primed prior to installation. Prime cut edges after installation and prior to application of additional wood members.
- C. Finish nails shall be used on all exposed trim. Galvanized nails shall be used on all exterior finish work.

- D. Shingles shall have a minimum of two (2) nails per shingle (pre-drill holes). Shingles shall be finished with a bleaching oil. (See Section 09 90 00, PAINTING).
- E. Minimum length of nails shall be twice the thickness of wood being fastened. Nail heads in finished work shall be sunk neatly with a nail set and the resulting hole filled with putty. Fasteners in items such as moldings shall be concealed.
- F. Exposed surfaces of woodwork shall be machine sanded to an even, smooth surface, free of defects, blemishes, machine or tool marks, abrasions, dirt, smudges, or raised grain. Adequate protection shall be provided as necessary to prevent damage or staining of carpentry items.
- G. Woodwork abutting masonry or other finish materials shall be scribed and fitted as tightly to abutting material as is possible without damaging it.

END OF SECTION

## SECTION 12 93 00

### SITE FURNISHINGS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. Furnish and install site furnishings in the locations shown or as described herein, complete with anchorages and associated site work.

##### 1.02 RELATED SECTIONS:

- A. Section 03 30 00, CAST-IN-PLACE CONCRETE
- B. Section 31 00 00, EARTHWORK

##### 1.03 SUBMITTALS: IN ACCORDANCE WITH SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Catalog information on site furnishings.

#### PART 2 - PRODUCTS

##### 2.01 SITE FURNISHINGS:

###### A. Bench

- 1. Model # 195 as manufactured by DUMOR, P.O. Box 142, Mifflintown, PA 17059, (800) 598-4018, [www.dumor.com](http://www.dumor.com)

###### B. Bicycle Rack

- 1. The bike racks shall be "Cycle Sentry" series by Secure Site Design, LLC ([www.securesitedesign.com](http://www.securesitedesign.com)) Model No. BRWS-101, or approved equal to be installed in concrete footings embedded/direct bury. Surface mounting will not be accepted. Receptacles shall be powder coated in standard color to be selected by Owner.

###### C. Port a John Shade Shelter

- 1. Shade Structure shall be Model # PLE-HC2 as manufactured by The Poligon Park Architecture, 420 N. 136<sup>th</sup> Avenue, Holland, MI 49424, 800-354-7721, [www.poligon.com](http://www.poligon.com), represented locally by Site Specific, P.O. Box 325, Rochester, MA. Cindy Maak, 1-508-763-0207 Note that new structure installations (as indicated on the drawings) shall be constructed on a cement concrete pad, eleven (11') feet wide x nineteen (19') feet in length and six (6") inches in depth and



reinforced with welded wire fabric as directed.

2. Shade structure shall be furnished with the anchor attachment and concrete footings, such that each column is connected to each concrete footing in conformance with manufacturer's recommendations. Contractor shall include footing and anchor information as part of the submittal application.
3. Shade structure shall be furnished with a structural panel understanding seam roof (SPSS) and galvanized frame structure and associated components.
4. Colors shall be determined through the shop drawing submittal application and approved by the owner and or owner's representative prior to fabrication and installation.
5. Include stamped engineered drawing for supports and foundations.

### PART 3 - EXECUTION

- 3.01 Equipment shall be permanently installed in concrete anchorages unless otherwise indicated by manufacturer specifications. See Section 03 30 00, Cast in Place Concrete.
- 3.02 Site furnishings shall be installed in accordance manufacturer's installation instructions, and as shown on the plans.
- 3.03 Any site improvement materials which are constructed of steel and not galvanized, or factory coated with a finish system shall be painted in the field in accordance with Division 9 Specification "Painting and Finishes". Colors by Engineer.
- 3.04 All site furnishings shall be installed ready for use. All nets, cables, uprights, etc., shall be in place.

END OF SECTION

SECTION 13 34 23.26

SHADE STRUCTURE – ADD ALTERNATE NO. 1

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing and installing a pre-engineered shade structure at center of the skatepark

1.02 RELATED WORK:

A. SECTION 03 30 00, CAST-IN-PLACE CONCRETE

B. SECTION 05 50 00, MISCELLANEOUS METALS

C. Division 26, ELECTRICAL

1.03 SYSTEM DESCRIPTION:

A. Barrel Vault Structure 20x40 ft. (Skatepark Shelter) with MG over STG.

B. ROOF SLOPE: 1.

C. Minimum Clearance Height (MCH): 10-ft 0-in. Minimum clearance height under the

structure indicates the lowest height of a member from finish grade for clearance under the structure. This is generally the clearance under roof eave or frame, whichever is lower.

1.01 REFERENCES

A. REFERENCE STANDARDS:

1. AISC - American Institute of Steel Construction Manual of Steel Construction.
2. ASTM - American Society for Testing and Materials.
3. AWS - American Welding Society.
4. LEED - Leadership in Energy and Environmental Design.
5. OSHA - Occupational Safety and Health Administration Steel Erection Standard 29 CFR 1926 Subpart R-Steel Erection.
6. PCI - Powder Coating Institute.
7. SSPC The Society for Protective Coatings.
8. Architecturally Exposed Structural Steel (AESS) - as defined by AISC

1.02 SUBMITTALS

- A. GENERAL SUBMITTAL:  
Submit engineered drawings and engineered calculations.
- B. PRODUCT DESIGN REQUIREMENTS:  
The building shall meet the following design requirements as shown on the drawings:
1. Building Code: See drawings.
  2. Ground Snow Load (Pg): See drawings.
  3. Basic Wind Speed (V): See drawings.
  4. Seismic Design: See drawings.
- D. FOUNDATION DESIGN:
1. The shelter shall be set on prepared foundations designed by an engineer retained by owner using the column reactions provided by manufacturer.
- E. ANCHOR BOLTS:
1. Anchor bolts shall be provided by manufacturer.
  2. Hooked anchors are not permitted per AISC requirements.

### 1.03 QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS:
1. Minimum of (10) years in the shelter construction industry.
  2. Full time on-staff Licensed Engineer.
  3. Full time on-staff Quality Assurance Manager.
  4. Full time on-staff LEED AP.
  5. All welders AWS Certified.
  6. Manufacturer owned and controlled finishing system to include shot blast, pretreatment, primer, and top coat.
  7. Published Quality Management System.
  8. Annual audit of Quality System and Plant Processes by Third Party Agency.
  9. Annual audit of powder coat finish system by Third Party Agency (PCI).
- B. MANUFACTURER'S CERTIFICATIONS:
1. AISC Certified Building Fabricator, (American Institute of Steel Construction) Certified Building Fabricator is an AISC Quality Management Systems (QMS) Certification which sets the quality standard for the structural steel industry.

2. PCI 4000 S Certified, Certification thru Powder Coating Institute for original equipment manufacturers (OEMs) to evaluate process on entire finish system to add powdercoat over steel.
3. City of Los Angeles, CA Approved Fabricator Type I Steel.
4. Clark County, NV Approved Fabricator steel.
5. City of Houston, TX Approved Fabricator for Structural Steel.
6. Miami Dade County Certificate of Competency for Structural Steel.
7. State of Utah Approved Fabricator for Medium and High Strength Steel.
8. City of Riverside, CA Approved Fabricator Type I Steel.
9. City of Phoenix, AZ Approved Steel Fabricator.

#### 1.04 FIELD OR SITE CONDITIONS

- A. Foundations shall be at the same elevation unless specifically noted otherwise on the drawings.

#### 1.05 MANUFACTURER WARRANTY

- A. Shelter must have a (10) year limited warranty on steel frame members.
- B. Shelter must have a (10) year limited warranty on paint system.

#### 1.06 QUALITY ASSURANCE

- A. All work and materials shall be in full accordance with local and/or state ordinances, and with any other prevailing rules and regulations regarding potentially hazardous equipment or locations.

#### 1.07 SUBMITTAL: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Submit manufacturer's product information and specifications for the proposed structure, including specific exterior and interior finish to be used.
- B. Submit detail and assembly drawings, including connections to the base slab, and operating and maintenance information.

### PART 2 - PRODUCTS

#### 2.01 SHELTER SYSTEM AND MATERIALS

- A. MANUFACTURERS:
  1. Manufacturer shall be Poligon, a product of PorterCorp, 4240 N 136th Ave., Holland, MI 49424; 616.399.1963;

E-mail: info@poligon.com; www.poligon.com.

**B. PRODUCT REQUIREMENTS AND MATERIALS:**

**1. GENERAL:**

The pre-engineered package shall be pre-cut unless otherwise noted and prefabricated which will include all parts necessary to field construct the shelter. The shelter shall be shipped knocked down to minimize shipping expenses. Field labor will be kept to a minimum by pre-manufactured parts. Onsite welding is not necessary.

**2. REINFORCED CONCRETE:**

- a. Concrete shall have minimum 28-day compressive strength of 3,000 psi and slump of 4 (+/- 1 ), unless otherwise noted on the drawings.
- b. Reinforcing shall be ASTM A615, grade 60.

**3. STEEL COLUMNS:**

- a. Hollow structural steel tube minimum ASTM A500 grade B with a minimum wall thickness of 3/16 .
- b. Unless columns are direct buried, columns shall be anchored directly to concrete foundation with a minimum of four anchor rods to meet OSHA requirement 1926.755(a)(1).

**4. STRUCTURAL FRAMING:**

- a. Hollow Structural Steel tube minimum ASTM500 grade B. I beams, tapered columns, or open channels shall not be accepted for primary beams.
- b. Frame will have a STANDARD POLI-5000 finish.
- c. Color chosen from manufacturer's standard color chart; textured colors not available:

**5. COMPRESSION MEMBERS:**

- a. Compression rings of structural channel or welded plate minimum ASTM A36 or compression tubes or structural steel tube minimum ASTM A500 grade B shall only be used.

**6. CONNECTION REQUIREMENTS:**

- a. Anchor bolts shall be ASTM F1554 (Grade 36) unless otherwise noted.
- b. Structural fasteners shall be zinc plated ASTM A325 high strength bolts and A563 high strength nuts.
- c. Structural fasteners shall be hidden within framing members wherever possible.
- d. Structural fasteners shall be manufactured in the U.S
- e. No field welding shall be required to construct the shelter.
- f. All welds shall be free of burrs and inconsistencies.
- g. Exposed fasteners shall be powder coated by manufacturer prior to shipment

- to match frame or roof colors as applicable.
- h. Manufacturer shall provide extra structural and roofing fasteners.

7. ROOFING MATERIALS:

a. PRIMARY ROOF DECK: FACTORY PRE-STAINED TONGUE AND GROOVE (TG):

1. T&G shall be of 2x6 tongue and groove, Hem Fir, Select Structural KD 15. Factory stained .
2. Manufacturer shall supply 30 pound felt and drip edge if both primary and secondary roofs are being supplied by the manufacturer.
3. Contractor shall cut T&G down to required lengths.

b. SECONDARY ROOF DECK: MEGA RIB METAL ROOFING (MG):

1. Roofing shall be 24 gauge ribbed galvalume steel sheets, with ribs 1 1/2 high and 7.2 on center.
2. Roof surface shall be painted with Kynar 500 to the manufacturers standard color: .
3. Roof panels shall be factory pre-cut to size and angled to provide ease of one-step installation.
4. Metal roofing trim shall match the color of the roof and shall be factory made of 26 gauge Kynar 500 painted steel.
5. Trim shall include panel ridge caps, hip caps, eave trim, splice channels, rake trim, roof peak cap, and corner trim as applicable for model selected. Trim may need to be cut to length and notched. Installation drawings shall have detailed information on how to cut and affix roof trim. Note: rake trim is optional on curved MG roofs.
6. Ridge, hip, and valley caps shall be pre-formed with a single central bend to match the roof pitch and shall be hemmed on the sides.
7. Roof peak cap shall be pre-manufactured.
8. Manufacturer shall supply painted screws and butyl tape.

8. FINISHES:

a. STANDARD POLI-5000 FINISH:

1. Steel shall be cleaned, pretreated, and finished at a facility owned and directly supervised by the manufacturer.
2. Steel shall be shot blasted to SSPC-SP10 near-white blast cleaning. SSPC-SP2 hand tool cleaning will not be an acceptable alternative.
3. Parts shall be pretreated in a (3) stage iron phosphate or equal washer.
4. Epoxy primer powder coat shall be applied to parts for superior corrosion protection.
5. Top coat of Super Durable TGIC powder coat shall be applied over the epoxy primer.
6. Finish shall not have any VOC emissions.

7. Sample production parts shall have been tested and meet the following criteria:
  - a. Salt spray resistance per ASTM B 117/ ASTM D 1654 to 10,000 hours with no creep from scribe line and rating of 10.
  - b. Humidity resistance per ASTM D2247-02 to 5,000 hours with no loss of adhesion or blistering.
  - c. Color/UV resistance per ASTM G154-04 to 2,000 hours exposure, alternate cycles with results of no chalking, 75% color retention, color variation maximum 3.0 E variation CIE formula (before and after 2,000 hours exposure).
8. The manufacturer shall be PCI 4000 S Certified
9. Exposed fasteners for frame and ornamentation shall be powder coated to match structure.

9. ACCESSORIES

a. ELECTRICAL ACCESS & CUTOUPS:

1. Electrical access to be provided through a 1 1/8 diameter hole in the column base plate and diameter holes are provided through connection plates for wire access through columns, trusses, and into the compression ring/tube. Electrical cutouts shall be provided in 4 places for fixtures or wires.

PART 3 – EXECUTION

3.01 INSTALLERS STORAGE AND HANDLING

- A. Protect building products after arrival at destination from weather, sunlight, and damage.
- B. Installer shall store product elevated to allow air circulation and to not introduce mold, fungi decay or insects to the product.
- C. Product must be handled with protective straps or padded forks if lifting with mechanical equipment. Use of chain or cable to lift product into place will not be accepted and may void manufacturer's warranty.
- E. The secondary roof shall be installed immediately after the primary roof to prevent moisture damage to wood.

3.02 ERECTION

A. INSTALLATION:

Install all components according to manufacturer's installation instructions and these specifications.

B. GENERAL CONTRACTOR:

Interface with other work is to be coordinated by the customer or the customer's agent. Certain designs have electrical or other plumbing requirements that are not supplied by Poligon.

C. TOLERANCES:

Tolerances on steel structural members are set according to AISC construction practices, abided in the factory, and cannot be increased. No field slotting or opening of holes will be allowed. It is therefore essential that contractors conform to the tolerances specified on the installation drawings for anchor bolt or column layout details.

D. OSHA COMPLIANCE:

OSHA Compliance to Steel Erection Standard 29CRF 1926 Subpart R-Steel Erection.

3.03 REPAIR

- A. Do not attempt any field changes without first contacting Poligon.

3.04 FIELD OR SITE QUALITY CONTROL

- A. Field or Site Tests and Inspections are not required by Poligon but may be required by the customer or by the local building inspector.
- B. Installation of the building shall be strictly in accordance with manufacturer's instructions to assure that the completed structure is stable and watertight. Care shall be exercised to avoid damaging or marring finished surfaces. Any such damage or marred areas shall be repaired to the Engineer's satisfaction or replaced at no additional cost to the Owner.

END OF SECTION



# poligon<sup>®</sup>

PROJECT: PORTSMOUTH NH SKATEPARK

LOCATION: PORTSMOUTH, NH

BUILDING TYPE: WAVE 40x20

ROOF TYPE: MEGA-RIB OVER T&G

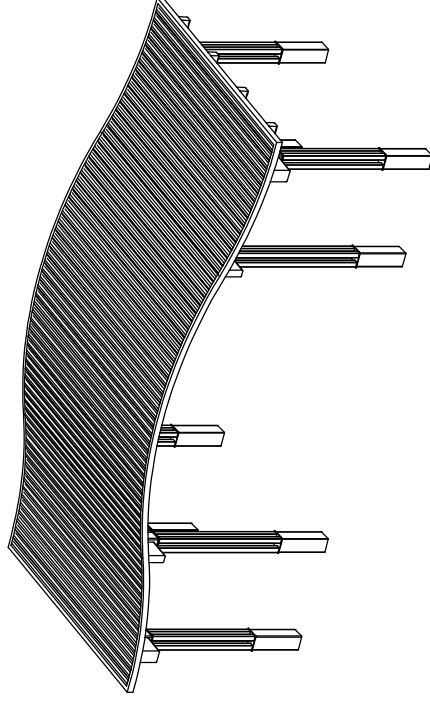
BUILDING NUMBER: P16144

ORDER NUMBER: 74962

QUOTE NUMBER: 2768

**DRAWING LIST:**

SHEET NUMBER	DRAWING DESCRIPTION
CS	COVER SHEET
1	ARCHITECTURAL ELEVATIONS
2	STRUCTURAL FRAMING PLAN
3	COLUMN LAYOUT



**CERTIFICATES:** AUSTIN CERTIFICATE OF COMPETENCY NO. 21-0819.13  
**VERIFICATION:** FPO (POWDER COATING INSTITUTE) 4000 CERTIFIED

**FABRICATOR APPROVALS:**  
 CITY OF PHOENIX, AZ APPROVED FABRICATOR #C08-2010  
 CITY OF LOS ANGELES, CA APPROVED FABRICATOR #FB01596  
 CITY OF RIVERSIDE, CA APPROVED FABRICATOR #SF-000042  
 COUNTY OF LOS ANGELES, CA APPROVED FABRICATOR #470  
 CLARK COUNTY, NV APPROVED FABRICATOR #262  
 STATE OF UTAH APPROVED FABRICATOR 02008-14  
 AISC APPROVED FABRICATOR C-00018751

**MATERIALS:**

DESCRIPTION	ASTM DESIGNATION
TUBE STEEL	A500 (GRADE B)
SCHEDULE PIPE	A53 (GRADE B)
RWT PIPE	A519
LIGHT GAGE COLD FORMED	A1003 (GRADE 50)
STRUCTURAL STEEL PLATE	A572
ROOF PANELS (STEEL)	A663



**STOP!!**

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**USE FOR PRELIMINARY  
 PLANNING AND ESTIMATING  
 ONLY**

**GENERAL NOTES:** UNLESS OTHERWISE STATED, THIS STRUCTURE WAS DESIGNED TO ONLY SUPPORT WHAT IS SHOWN ON THESE DRAWINGS. THE MANUFACTURER MUST BE CONTACTED IF ANYTHING ELSE IS TO BE ATTACHED TO THIS STRUCTURE (WALLS, COLUMN WRAPS, RAILINGS, ETC.) SO THE DESIGN OF THIS STRUCTURE CAN BE REVIEWED AND POSSIBLY REVISED.

UNLESS NOTED OTHERWISE, THIS STRUCTURE WAS DESIGNED ASSUMING NO SEPARATION HAS SEEN ANY MOVEMENT OF STRUCTURE WITH AN LEAVE HEIGHT EQUAL TO OR GREATER THAN THE LEAVE HEIGHT OF THIS STRUCTURE. IF THAT SEPARATION DOES NOT EXIST, THE MANUFACTURER MUST BE CONTACTED SO THE DESIGN OF THIS STRUCTURE CAN BE REVIEWED AND POSSIBLY REVISED.

STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERRECTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) SPECIFICATION MANUAL.

ALL WELDING IS PERFORMED BY AMERICAN WELDING SOCIETY (AWS) CERTIFIED WELDERS AND CONFORMS TO THE LATEST EDITION OF AWS D1.1 OR D1.3 AS REQUIRED.

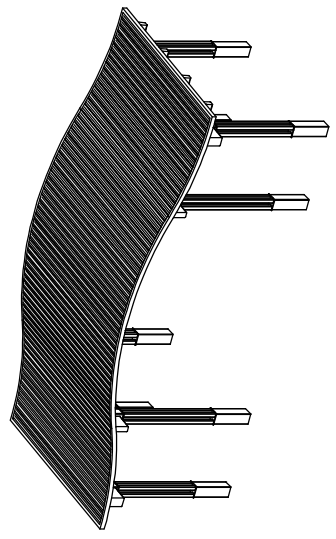
PARTS SHOWN MAY BE UPGRADED DUE TO STANDARDIZED FABRICATION. REFER TO THE SHIPPING BILL OF MATERIALS FOR POSSIBLE SUBSTITUTIONS.

FOR PROPER FIELD INSTALLATION OF THE BUILDING IT IS RECOMMENDED THAT THE PRIMARY FRAME INSTALLER AND THE ROOF INSTALLER HAVE A MINIMUM FIVE (5) YEARS DOCUMENTED EXPERIENCE INSTALLING THIS TYPE OF PRODUCT.

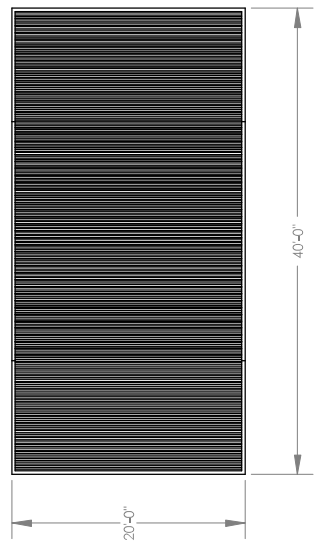
FOR PROPER FIELD INSTALLATION OF THE BUILDING IT IS RECOMMENDED THAT ALL ELECTRIC WIRING BE DONE BEFORE THROUGH THE STRUCTURAL MEMBERS BEFORE THE BUILDING IS ERRECTED.

**GENERAL ROOF NOTES:**

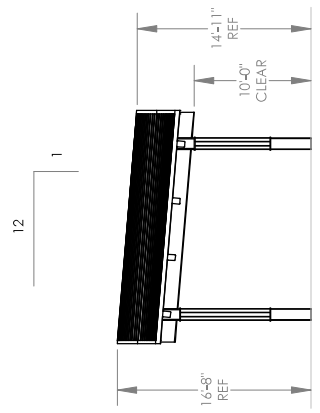
1. METAL ROOFING:
  - 24 GAUGE GALVALUME COATED
  - 1/2" x 1/4" PANELS
  - TRIM COLOR MATCHES TO SEE POLYGON.COM FOR COLOR OPTIONS
- 2.
- 3.



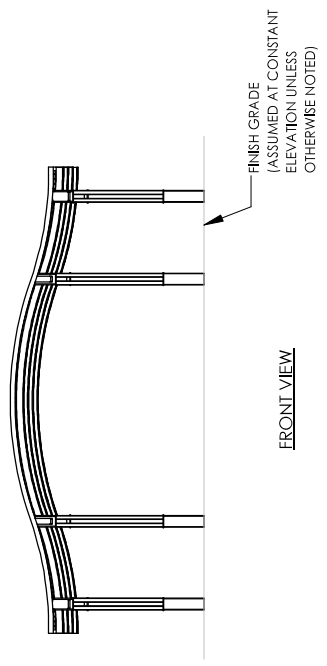
ISOMETRIC VIEW



TOP VIEW



SIDE VIEW



FRONT VIEW

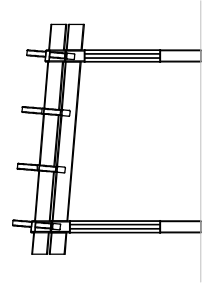
**STOP!!**  
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 PLANNING AND ESTIMATING  
 ONLY

PROJECT: PORTSMOUTH NH SKATEPARK  
 PROJECT LOCATION: PORTSMOUTH, NH  
 DRAWING: STRUCTURAL FRAMING PLAN

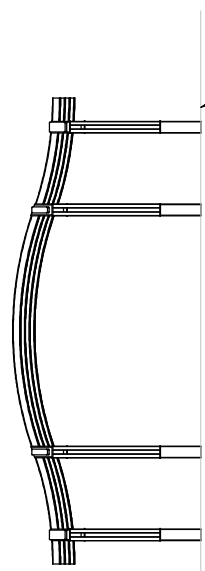
PRINT DATE: 1/21/2023  
 DRAWN BY: brian.sterken  
 JOB NO: P16144  
 CAD MODEL: ~P16144-74962-E1

REV LEVEL: A  
 SCALE: 1:128

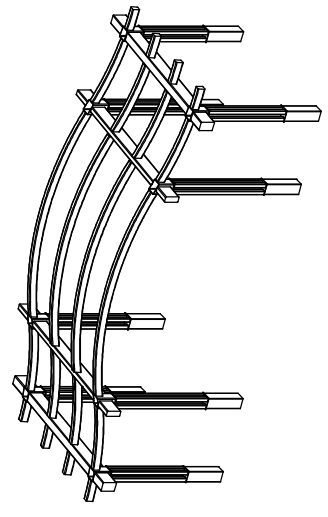
WWW.POLYGON.COM  
 MAIN: (616) 888-3500  
 FIELD SUPPORT: (616) 888-3504  
 by PORTER CORP  
**poligon**



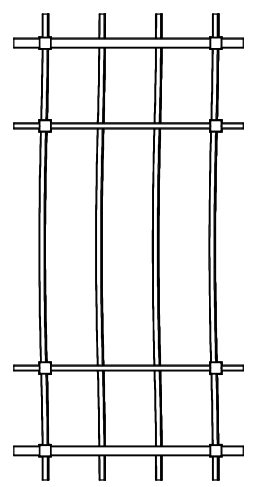
SIDE VIEW



FRONT VIEW



ISOMETRIC VIEW

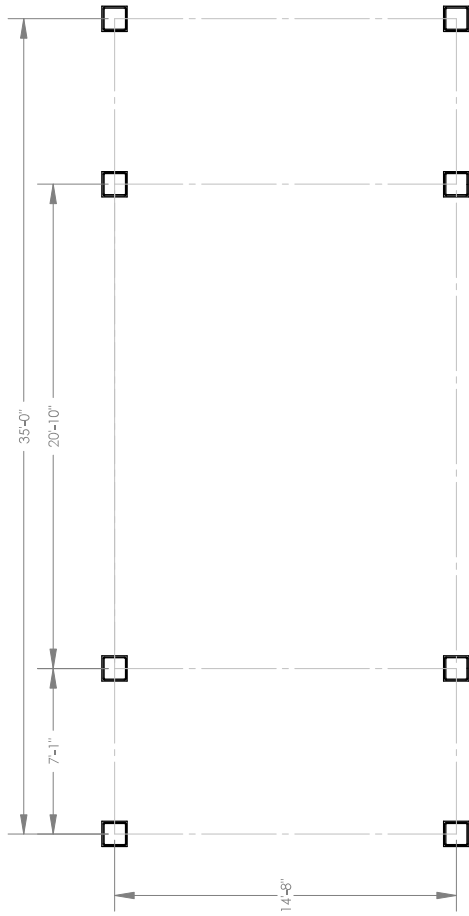


TOP VIEW

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 PLANNING AND ESTIMATING  
 ONLY

**ANCHOR BOLT LAYOUT NOTES:**

1. ENGINEERING WILL DETERMINE REQUIRED ANCHOR BOLT LAYOUT AFTER ENGINEERING PACKAGE IS ORDERED.
2. CUSTOMER MAY SUGGEST PREFERRED ANCHOR BOLT LAYOUT.



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FRAME COLOR: **BUMPER BLACK**  
ROOF COLOR: **EVERGREEN**  
COLORS MAY VARY SLIGHTLY FROM RENDERED IMAGE

PORTSMOUTH NH SKATEPARK  
PORTSMOUTH, NH  
WAVE 40X20

## SECTION 26 00 50

### ELECTRICAL WORK - GENERAL PROVISIONS

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDED:

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to make ready for use the complete electrical systems as shown on the Drawings and as specified hereinafter.
- B. In conjunction with other sections of Division 26, the work shall include but not be limited to furnishing and installing the following:
  - 1. Electrical services
  - 2. Electrical raceway systems
  - 3. Wires and cables
  - 4. Panelboards
  - 5. Miscellaneous equipment
  - 6. Grounding systems
  - 7. Circuit breakers
- C. Make all necessary connections at "packaged" equipment furnished under other sections and Divisions of these specifications.
- D. Make all connections to equipment and devices furnished under Division 26 and other sections of these specifications except as otherwise specified.
- E. Connect process and instrumentation cables furnished with field-mounted equipment under other sections and Divisions of these specifications.
- F. Mount all motor control equipment enclosures not factory mounted, unless otherwise indicated.
- G. It is the intent of these specifications that the electrical system shall be suitable in every way for the service required. All material and all work which may be reasonably implied as being incidental to the work of this section shall be furnished at no extra cost to the Owner.

##### 1.2 RELATED WORK:

- A. The Contractor's attention is directed to the General Conditions, Supplementary Conditions.
- B. Excavation and backfilling required for underground electrical work is included under Division 2.
- C. Concrete work and reinforcing for electrical equipment pads is included under Division 3.

1.3 CODES, INSPECTIONS, PERMITS AND FEES:

- A. All material and installations shall be in accordance with the latest edition of the National Electric Code and all applicable local codes and ordinances.
- B. Obtain all necessary permits and pay all fees for permits and inspections.

INTERPRETATION OF DRAWINGS:

1.4

- A. The Drawings are not intended to show exact locations of conduit runs.
- B. Each three-phase circuit shall be run in a separate conduit unless otherwise shown on the Drawings.
- C. Unless otherwise noted and/or approved by the Engineer all conduits shall be installed concealed.
- D. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.
- E. Any work installed contrary to or without review by the Engineer shall be subject to change as required by the Engineer, and no extra compensation will be allowed for making these changes.
- F. The locations of equipment, shown on the drawings are approximate only. Exact locations shall be as determined by the Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as required by the Engineer and furnish all labor and materials necessary to complete the work in an acceptable manner.
- G. Circuit layouts are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.

Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment.

- H. All connections to equipment shall be made as required and in accordance with the approved shop and setting drawings.

#### 1.5 SUBMITTALS:

In accordance with requirements of general specifications, submit the following:

- A. Complete shop drawings shall be submitted for but not limited to the following equipment: panelboards, fire alarm, service cabinets, load centers, conduit and wire.
- B. The manufacturer's name, product designation or catalog number, descriptive literature and data shall be submitted for the following material and equipment:
  - 1. Conduit
  - 2. Boxes and fittings
  - 3. Wires, cables and appurtenances
  - 4. Service cabinets
  - 5. Wiring devices and appurtenances
  - 6. Circuit breakers
  - 7. Panelboards
  - 8. Grounding Equipment
- C. Prior to submittal, all shop drawings shall be checked for accuracy and conformance to contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to the specifications and drawings. This statement shall also list all discrepancies with the specifications and drawings. Shop drawings not so checked and noted shall be returned.
- D. The Engineer's review shall be only for conformance with the design concept of the project and compliance with the specifications and drawings. The responsibility of, and the necessity of, furnishing materials and workmanship required by the specifications and drawings which may not be indicated on the shop drawings is included under the work of this section.
- E. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this section.



1.6 MANUFACTURER'S SERVICES:

Furnish manufacturer's services for testing and start-up when required.

1.7 ELECTRIC SERVICES:

- A. The electric utility serving this project is Eversource.
- B. Service to Cabinet will be as shown on the drawings.
- C. The electric utility will furnish and install the primary cables, transformer, and meter.
- D. Make all arrangements with the electric utility for obtaining services and pay all fees and charges by the electric utility for the service installation.
- E. All work and material for the service shall be in accordance with the requirements of the electric utility.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. The materials used in all systems shall be new, unused and as hereinafter specified. All materials, where not specified, shall be of the very best of their respective kinds. Samples of materials or manufacturer's specifications shall be submitted for review as required by the Engineer.
- B. Materials and equipment used shall be Underwriters' Laboratories, Inc. listed.
- C. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out-of- doors. Electrical equipment shall be stored in dry permanent shelters. If any apparatus has been damaged, such damage shall be repaired at no additional cost. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as required by the Engineer, or shall be replaced at no additional cost to the Owner.
- D. The Contractor's attention is directed to the requirements of the various sections of division 26 for additional product specifications.

2.2 MANUFACTURER'S NAMEPLATES:

- A. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation. The required information may be die-stamped into the surface of the equipment or may be marked on durable nameplates permanently fastened to the equipment.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION:

- A. Provide and place all sleeves for conduit penetrations through floors, walls, partitions, etc. Locate all necessary slots and inserts for electrical work and place in form before concrete is poured.
- B. Equipment shall be kept upright at all times. When equipment has to be tilted for ease of passage through restricted areas during transportation, the manufacturer shall be required to brace the equipment suitably, to insure that the tilting does not impair the functional integrity of the equipment.

#### 3.2 RECORD DRAWINGS:

As the work progresses, legibly record (red line) all field changes on a set of project contract drawings. Prior to Substantial Completion of the project, submit the red lined prints to the Engineer for use in preparation of the record drawings.

#### 3.3 TESTS AND ADJUSTMENTS:

- A. Test all systems furnished under Division 26 and repair or replace all defective work. Make all necessary adjustments to the systems and equipment and instruct the Owner's personnel in the proper operation of the systems and equipment.

END OF SECTION

## SECTION 26 05 33

### RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

###### A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

###### B. Related Requirements:

1. Section 27 15 13 "Communications copper horizontal cabling" for conduits, surface pathways, inner duct, boxes, and faceplate adapters serving electronic safety and security.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

#### PART 2 - PRODUCTS

##### 2.1 METAL CONDUITS AND FITTINGS

###### A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. AFC Cable Systems; a part of Atkore International.
  - b. Allied Tube & Conduit; a part of Atkore International.
  - c. Anamet Electrical, Inc.
  - d. Opti-Com Manufacturing Network, Inc (OMNI).
  - e. O-Z/Gedney; a brand of Emerson Industrial Automation.
2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. ARC: Comply with ANSI C80.5 and UL 6A.
5. IMC: Comply with ANSI C80.6 and UL 1242.
6. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
  - a. Comply with NEMA RN 1.
  - b. Coating Thickness: 0.040-inch, minimum.
7. EMT: Comply with ANSI C80.3 and UL 797.
8. FMC: Comply with UL 1; zinc-coated steel or aluminum.
9. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. AFC Cable Systems; a part of Atkore International.
  - b. Allied Tube & Conduit; a part of Atkore International.
  - c. Anamet Electrical, Inc.
  - d. FSR Inc.
  - e. O-Z/Gedney; a brand of Emerson Industrial Automation.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings for EMT:
  - a. Material: Steel.
  - b. Type: Setscrew.

6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
  7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040-inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 NONMETALLIC CONDUITS AND FITTINGS

### A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. AFC Cable Systems; a part of Atkore International.
  - b. Anamet Electrical, Inc.
  - c. FRE Composites.
  - d. RACO; Hubbell.
  - e. Thomas & Betts Corporation; A Member of the ABB Group.

### B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. ENT: Comply with NEMA TC 13 and UL 1653.
2. RNC: Type EPC-40-PVC, or type EPC-80-PVC as noted complying with NEMA TC 2 and UL 651 unless otherwise indicated.
3. LFNC: Comply with UL 1660.

### C. Nonmetallic Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. AFC Cable Systems; a part of Atkore International.
  - b. Anamet Electrical, Inc.
  - c. Arnco Corporation.
  - d. FRE Composites.
  - e. RACO; Hubbell.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.

3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
4. Fittings for LFNC: Comply with UL 514B.
5. Solvents and Adhesives: As recommended by conduit manufacturer.

## 2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  1. B-line, an Eaton business.
  2. Hoffman; a brand of Pentair Equipment Protection.
  3. MonoSystems, Inc.
  4. Square D.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
  1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

## 2.4 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  1. Crouse-Hinds, an Eaton business.
  2. Erickson Electrical Equipment Company.
  3. Hoffman; a brand of Pentair Equipment Protection.
  4. Hubbell Incorporated.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- D. Cabinets:

1. NEMA 250, Type 1 or Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

### A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Armorcast Products Company.
  - b. NewBasis.
  - c. Oldcastle Enclosure Solutions.
  - d. Oldcastle Precast, Inc.
  - e. Quazite: Hubbell Power Systems, Inc.
2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC." or per appropriate system.
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

### C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of hot-dip galvanized-steel diamond plate.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Armorcast Products Company.
  - b. NewBasis.
  - c. Nordic Fiberglass, Inc.
  - d. Oldcastle Precast, Inc.
  - e. Quazite: Hubbell Power Systems, Inc.
2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC." or per appropriate system.
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

### PART 3 - EXECUTION

#### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  1. Exposed Conduit: GRC.
  2. Concealed Conduit, Aboveground: GRC.
  3. Underground Concrete Encased Conduit: RNC, Type EPC-40-PVC.
  4. Underground Direct Buried Conduit: RNC, Type EPC-80-PVC.
  5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Minimum Raceway Size: 1/2-inch trade size.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
  1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  3. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
  4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.



- D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- E. Install surface raceways only where indicated on Drawings.
- F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

### 3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- C. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12-inches of changes in direction.
- D. Support conduit within 12-inches of enclosures to which attached.
- E. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- F. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- G. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- H. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12-inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- J. Surface Raceways:
  - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
- K. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a

flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

- L. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service raceway enters a building or structure.
  - 3. Where otherwise required by NFPA 70.

### 3.3 INSTALLATION OF UNDERGROUND CONDUIT

#### A. Direct-Buried Conduit:

- 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 20 00 "Earth Moving" for pipe less than 6-inches in nominal diameter.
- 2. Install backfill as specified in Section 31 20 00 "Earth Moving."
- 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12-inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 20 00 "Earth Moving."
- 4. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
- 5. Install manufactured rigid steel conduit elbows for stub-ups at poles.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3-inches of concrete for a minimum of 12-inches on each side of the coupling.
  - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60-inches from edge of equipment base. Install insulated grounding bushings on terminations at equipment.
- 6. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

### 3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1-inch above finished grade.
- D. Install handholes with bottom below frost line.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

### 3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

## SECTION 31 00 00

### EARTHWORK

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. The Contractor shall make excavations of depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.
- B. This section covers the work of furnishing and placing geosynthetic for use in geosynthetic-reinforced soil pad as specified and shown in the Contract Drawings. The geosynthetic-reinforced soil pad shall include a mechanically stabilized layer with a final (compacted) thickness of 12 inches underlain by the geosynthetic specified herein. The work shall also include the furnishing of materials, labor, and other incidentals necessary to maintain the geosynthetic in the required position until the completion of any other associated work item. Prior to placing geosynthetic material, the subgrade shall be observed and evaluated by the Engineer.

##### 1.02 RELATED WORK:

- A. Section 00 31 32, SUBSURFACE DATA
- B. Section 00 31 43, PERMITS
- C. Section 01 11 00, CONTROL OF WORK AND MATERIALS
- D. Section 01 57 19, ENVIRONMENTAL PROTECTION
- E. Section 31 05 13.13, LOAM BORROW (TOPSOIL)
- F. Section 31 11 00, CLEARING AND GRUBBING
- G. Section 31 23 19, DEWATERING
- H. Section 31 23 23, EXPANDED POLYSTYRENE FILL (GEOFOAM)
- I. Section 31 50 00, SUPPORT OF EXCAVATION
- J. Section 32 11 23, PROCESSED GRAVEL ROADWAY
- K. Section 32 91 19, SEEDING

### 1.03 REFERENCE STANDARDS:

#### American Society for Testing and Materials (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C136	Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM	D1557	Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 Lb.) Hammer and Eighteen-inch (18") Drop.
ASTM	D2922	Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM	D6913	Test Methods for Particle-Size Distribution of Soils Using Sieve Analysis

State of New Hampshire Department of Transportation (NHDOT) Standard Specifications for Road and Bridge Construction

### 1.04 SUBMITTALS AND TESTING

- A. Submit physical samples for each backfill and fill material from each proposed source including on-site materials to the geotechnical testing laboratory.
- B. Contractor shall submit a grain size distribution curve performed in accordance with ASTM D6913 and results of a moisture-density relationship determination in accordance with ASTM D1557 for each proposed backfill and fill material and for those delivered to the site for review by the Engineer. Additional samples and analysis shall be submitted if a change in material occurs at the borrow source.
- C. Submit additional geotechnical and analytical test data and certifications for every 1,000 cubic yards (every 500 cubic yards for moisture density curves) of material imported or reused on-site or anytime consistency of material changes in the opinion of the Engineer. Submit associated chemical laboratory data on the imported materials throughout the course of the Work, if requested by the Engineer, to evaluate the consistency of the source or process, at no additional cost to the Owner.

### 1.05 PROTECTION OF EXISTING PROPERTY:

- A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, bench marks, observation

wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.

- B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at its own cost, existing benchmarks, observation wells, monuments, and other reference points which are disturbed or destroyed.
- C. Buried drainage structures and pipes, including those which project less than eighteen inches (18") above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment and shall be maintained at all times until completion of project.

#### 1.06 DRAINAGE:

- A. The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff will not adversely affect construction procedures nor cause excessive disturbance of underlying natural ground or abutting properties.

#### 1.07 FROST PROTECTION AND SNOW REMOVAL:

- A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.
- B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.

### PART 2 - PRODUCTS

#### 2.01 MATERIAL:

- A. GRAVEL BORROW (STRUCTURAL FILL):

Gravel Borrow shall satisfy the requirements listed in NHDOT Specification Section 304.2.4, Table 304-1, Item No. 304.2.

B. CRUSHED STONE:

Crushed stone shall satisfy the requirements listed in NHDOT Specification Section 304.2.10, Table 304-1, Item No. 304.4.

C. SAND BORROW:

Sand Borrow shall satisfy the requirements listed in NHDOT Specification Section 304.2.3, Table 304-1, Item No. 304.1.

D. PEASTONE:

Peastone shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8-inch square sieve opening	-	100%
Passing No. 8 sieve opening	-	0%

E. COMMON BORROW:

Common Borrow shall be well-graded, natural inorganic soil containing no stone greater than 6-inches maximum dimension and possess no more than 20 percent of material by weight passing the No. 200 sieve. The materials shall be free of trash, ice, snow, tree stumps, roots and other organic and deleterious materials. It shall be free of plastic clays, of all materials subject to decay or other materials that will corrode piping, concrete, or metals. Topsoil shall not be considered for reuse as Common Borrow.

F. NON-WOVEN FILTER FABRIC

1. Non-woven filter fabric shall be Tencate Mirafi 140N as manufactured by Tencate Geosynthetics Americas, Pendergrass, GA; Foss-65, as manufactured by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH; or approved equal.

G. GEOSYNTHETIC FOR REINFORCED SOIL PAD

1. The geosynthetic to be used for reinforced soil pad shall be Tencate Mirafi RS380i as manufactured by Tencate Geosynthetics Americas, Pendergrass, GA, or approved equal.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The Contract Drawings indicate the proposed finish alignments, elevations, and grades of the work. Establish the line and grade in close conformity with the Contract Drawings.

The Engineer, however, may make minor adjustments in the field as necessary due to conditions encountered.

- B. The Contractor is responsible for establishing construction phasing, means, and methods and interim grading and temporary conditions required to attain the finished product required by the Contract Documents. The Contractor is responsible for all construction, protection, movement, and maintenance of stockpiles. Establish and maintain suitable benchmarks and grade control to accurately perform the work.
- C. Perform all excavations and of whatever materials encountered, in a manner as required to allow for placing of temporary earth support, forms, installation of pipes and other work, and to permit access for the purpose of observing the work. Excavations shall be to such widths as will give suitable space for the required work.
- D. No excavation is permitted within the zone of influence below the underside of the closest edge of any in-place footing, slab, or utility at a higher elevation without providing adequate sheeting and bracing (designed by a Professional Engineer registered in the State of New Hampshire and retained by the Contractor) to prevent movement of the in-place footing, slab, or utility.
- E. When excavations have reached subgrade elevations, the subgrade shall be observed and evaluated by the Engineer prior to placement of overlying materials including geosynthetic, fill, crushed stone, concrete forms, rebar, and pavements. Evaluation may consist of probing and/or visual observation of a proof roll using the rear wheels of a fully loaded 10-wheel dump truck or construction equipment of similar size, weight, and configuration. The Contractor shall provide all necessary equipment and personnel for proof rolling. After observation and evaluation, the Contractor will receive approval to proceed if conditions meet project requirements.
- F. Subgrades and bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work. Work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.
- G. The Contractor shall segregate and stockpile separately materials that are considered suitable for on-site re-use by the Engineer from unsuitable materials.
- H. The Contractor shall protect all stockpiled material intended for use on-site, imported or suitable excavated, from precipitation. Stockpiled materials that become too saturated to be placed and compacted as required in this Section shall be disposed off-site and replaced with suitable material at no expense to the Owner.

### 3.02 SITE EXCAVATION FOR REINFORCED SOIL PAD:

- A. The reinforced soil pad areas shall be properly prepared as detailed on the plans, as specified, or as required by the Engineer.



- B. Subgrade surface shall be flat, free from deleterious materials, and loose or otherwise unsuitable soils.
- C. Prior to placement of geosynthetic, subgrade shall be compacted to provide a firm surface and proof rolled as specified herein. Any soft areas, as determined by the Engineer, shall be mitigated in accordance with this specification.

### 3.03 GEOSYNTHETIC PLACEMENT FOR REINFORCED SOIL PAD:

- A. Geosynthetic shall be installed in accordance with the manufacturer's recommendations.
- B. Geosynthetic shall be placed to the lines, grades, and limits indicated in the Contract Drawings. The geosynthetic shall be placed in direct contact with the compacted soil subgrade.
- C. Geosynthetic shall be placed in continuous longitudinal strips in a manner that minimizes joints.
- D. Only that amount of geosynthetic required for immediately pending work shall be placed, to prevent undue damage to the geosynthetic. After a layer of geosynthetic has been placed flat and pulled tight, soil shall be placed and compacted to the thicknesses indicated in the Contract Drawings.
- E. After a layer of geosynthetic has been placed, suitable means, such as pins or small piles of soil, shall be used to hold the geosynthetic in position until overlying soil layer can be placed. Under no circumstances shall a track-type vehicle be allowed on the geosynthetic before at least six inches of soil has been placed on the geosynthetic. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and the geosynthetic.

### 3.04 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

- A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.
- B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.
- C. The Contractor shall place a minimum of 12-inch layer of crushed stone wrapped in filter fabric over the underlying soil to stabilize areas which may become disturbed as a result

of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

### 3.05 EXCAVATION:

#### A. GENERAL:

1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.
2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.
3. All excavated materials shall be stockpiled separately from each other within the limits of work.
4. The Contractor shall follow a construction procedure, which permits visual identification of stable ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.
5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as directed by the Engineer. Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice, and trash. Unless specified elsewhere or otherwise required by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted gravel borrow or crushed stone wrapped all around in non-woven filter fabric.

#### B. TRENCHES:

1. The Contractor shall satisfy all dewatering requirements specified in Section 31 23 19 DEWATERING, before performing trench excavations.
2. Trenches shall be excavated to such depths as will permit the pipe to be laid at the elevations, slopes, and depths of cover indicated on the Drawings. Trench widths shall be as shown on the Drawings or as specified.

3. Where pipe is to be laid in bedding material, the trench may be excavated by machinery to, or just below, the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.
4. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 12-inches above the top of the pipe before excavation.
5. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed.
6. If, in the opinion of the Engineer, the subgrade, during trench excavation, has been disturbed as a result of rain, surface water runoff or groundwater seepage pressures, the Contractor shall remove such disturbed subgrade to a minimum of 12-inches and replace with crushed stone wrapped in filter fabric. Cost of removal and replacement shall be borne by the Contractor.

C. FOUNDATION EXCAVATION:

1. Excavations shall not be wider than required to set, brace, and remove forms for concrete, or perform other necessary work.
2. After the excavation has been made, and before forms are set for footings, mats, slabs, or other structures, and before reinforcing is placed, all loose or disturbed material shall be removed from the subgrade. The bearing surface shall then be compacted to meet the requirements of this specification.
3. If, in the opinion of the Engineer, the existing material at subgrade elevation is unsuitable for structural support, the Contractor shall excavate and dispose of the unsuitable material to the required width and depth as required by the Engineer. If, in the opinion of the Engineer, filter fabric is required; the Contractor shall place filter fabric, approved by the Engineer, as per manufacturer's recommendations. Crushed stone shall then be placed in lifts and compacted to required densities. Backfill shall be placed to the bottom of the proposed excavation.

D. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.
2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal

excavation, shall be included in the work to be done under items involving normal excavation.

3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.06 BACKFILL PLACEMENT AND COMPACTION:

A. GENERAL:

1. Prior to backfilling, the Contractor shall compact the exposed subgrade to the densities as specified herein.
2. After approval of subgrade by the Engineer, the Contractor shall backfill areas to required contours and elevations with specified materials.
3. The Contractor shall place and compact materials to the specified density in continuous horizontal layers, not to exceed nine (9) inches in uncompacted lifts. The degree of compaction shall be based on maximum dry density as determined by ASTM Test D1557. The minimum degree of compaction for fill placed shall be as follows:

Area	ASTM Density Degree of Compaction
Geosynthetic Reinforced Soil Pad	95%
Skate Park Area	95%
Parking Areas	95%
Trench Backfill	95%
All Other Areas	92%

4. In-place density tests shall be made in accordance with ASTM D 6938 as the work progresses, to evaluate the degree of compaction being attained by the Contractor. Compaction testing shall be performed by a materials testing and inspection laboratory engaged and paid for by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. Additional in-place density testing shall be made at the Contractor's expense by the geotechnical testing laboratory. Testing locations shall be selected by the Engineer unless otherwise noted.
5. Where horizontal layers meet a rising slope, the Contractor shall key each layer by benching into the slope.

6. If the material removed from the excavation is suitable for backfill with the exception that it contains stones larger than permitted, the Contractor has the option to remove the oversized stones and use the material for backfill or to provide replacement backfill at no additional cost to the Owner.
7. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.
8. Where called for on the Drawings, Geofoam shall be placed as recommended by the manufacturer.

**B. TRENCHES:**

1. Bedding as detailed and specified shall be furnished and installed beneath the pipeline prior to placement of the pipeline. A minimum bedding thickness shall be maintained between the pipe and undisturbed material, as shown on the Drawings.
2. As soon as practicable after pipes have been laid, backfilling shall be started.
3. Unless otherwise indicated on the Drawings, backfill shall be placed by hand shovel in 6-inch thick lifts up to a minimum level of 12-inches above the top of pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled. Compaction of each lift in the zone around the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken that material close to the bank, as well as in all other portions of the trench, is thoroughly compacted to densities required.
4. If the materials above the trench bottom are unsuitable for backfill, the Contractor shall furnish and place backfill materials meeting the requirements specified herein.
5. Should the Engineer order crushed stone for utility supports or for other purposes, the Contractor shall furnish and install the crushed stone as directed.

**C. BACKFILLING UNDER FOUNDATIONS:**

1. Material under structures shall be Gravel, as shown on the Drawings or as required by the Engineer. Where Gravel is required to support proposed footings, walls, slabs, and other structures, the material shall be placed in a manner accepted by the Engineer. Compaction of each lift shall meet the density requirements of this specification.

D. BACKFILLING ADJACENT TO STRUCTURES:

1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads to which they will be subjected. Excavated material approved by the Engineer may be used in backfilling around structures. Backfill material shall be thoroughly compacted to meet the requirements of this specification.
2. Contractor shall use extra care when compacting adjacent to pipes and drainage structures. Backfill and compaction shall proceed along sides of drainage structures so that the difference in top of fill level on any side of the structure shall not exceed two feet (2') at any stage of construction.
3. Where backfill is to be placed on only one side of a structural wall, only hand-operated roller or plate compactors shall be used within a lateral distance of five feet (5') of the wall for walls less than fifteen feet (15') high and within ten feet (10') of the wall for walls more than fifteen feet (15') high.

3.07 DISPOSAL OF SURPLUS MATERIALS:

- A. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Engineer.
- B. Surplus excavated materials, which are acceptable to the Engineer, shall be used to backfill normal excavations or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.

END OF SECTION

## SECTION 31 05 13.13

### LOAM BORROW (TOPSOIL)

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This Section covers all labor, materials, and equipment necessary to furnish and place Loam Borrow and all related work as indicated on the drawings and as herein specified.
- B. Existing on-site topsoil shall not be re-used.

##### 1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK
- B. Section 32 92 19, SEEDING

##### 1.03 QUALITY ASSURANCE:

- A. For each particular source of loam, the Contractor shall send representative samples totaling approximately 10 pounds of Loam Borrow to an approved State-certified testing laboratory.
- B. Loam shall be subject to tests for Soluble Salts (1:2 soil-water ratio), Nitrogen (including nitrate and ammonium Nitrogen), Phosphorous, Potassium, Sulfate, Calcium, Magnesium, Aluminum, and Ferric Iron concentrations.
- C. Loam shall also be tested for heavy metals concentration, which shall include Boron, Cadmium, Zinc, Chromium, Copper, Lead, Manganese, and Nickel.
- D. Mechanical gradation (textural analysis) as per USDA Soil Classification System and determine Organic matter content and the pH (1:1 soil-water ratio).
- E. All tests shall be at the Contractor's expense. Laboratory test results shall state whether the Loam Borrow is acceptable as a planting medium, whether it needs to be amended, or if it fails to meet accepted requirements. Test results shall also include soil amendment and fertilizing recommendations and shall be forwarded to the Engineer at least 1 month before any loaming is to be undertaken.
- F. Samples and tests shall continue to be made at the Contractor's expense until Loam Borrow to be provided is found to be acceptable to the Engineer.

##### 1.04 SUBMITTALS:

In accordance with requirements of Section 01 33 23 SUBMITTALS, the Contractor shall submit the following:

- A. Information detailing the soil amendments including limestone, fertilizers, organic material amendments, and the name and address of the supplier and origin of Loam Borrow shall be submitted to the Engineer for approval.
- B. Soils test results shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM BORROW:

- 1. Loam Borrow shall consist of, fertile, friable natural topsoil, typical of productive soils in the vicinity, obtained from naturally well-drained areas that have never been stripped. Loam Borrow shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.
- 2. Loam Borrow shall be classified as a sandy loam by the USDA textural classification system as determined by sieve and pipette or hydrometer analysis. Loam Borrow shall have the following mechanical analysis:

<u>Textural Class</u>	<u>Percent of Total Weight</u>	<u>Avg. Percentage</u>
Sand (0.05 – 2.0mm range)	45 – 75	60
Silt (0.002 – 0.05mm range)	15 – 35	25
Clay (less than 0.002mm)	5 – 20	15

- 3. Loam Borrow shall contain not less than 4 percent or more than 7 percent organic matter as determined by the loss of weight by ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F.
- 4. Loam Borrow shall not be excessively acid or alkaline, and shall not contain any phytotoxic materials or unacceptable concentration levels of any substance harmful to plant growth as determined by the soils testing laboratory. Loam Borrow shall have a pH value range between 5.0 and 6.5. Maximum soluble salt index shall be 100. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be less than or equal to 1.0 millimhos/cm. Aluminum concentration levels shall be less than 200ppm.
- 5. Loam Borrow shall not be worked, excavated, or delivered in a frozen or muddy condition. Soil structure shall not be destroyed through excessive and unnecessary handling or compaction.



6. Existing on-site topsoil may be re-used as Loam Borrow provided it meets these specifications.
7. All amendments to Loam Borrow shall be approved by the Engineer and shall be made in accordance with recommendations from the soils testing laboratory for use of Loam Borrow as a plant-growing medium and these specifications.

B. LIMESTONE:

Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

C. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogeneous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.
2. For Fertilizers containing Nitrogen, at least 50 percent of the nitrogenous elements shall be Urea-form or derived from organic sources and contain no less than 3 percent water-soluble Nitrogen.
3. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, containing not less than 18 percent available phosphoric acid.

D. ORGANIC MATERIAL AMENDMENTS:

1. Organic compost shall be a standard commercial product comprised of fully decomposed, 100 percent plant-derived, natural organic matter. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Compost shall be free of sticks, stones, weed seeds, roots, mineral or other foreign matter and delivered air dry. It shall be free from excessive soluble salts, heavy metals, phytotoxic compounds, and/or substances harmful to plant growth and viability. Organic compost shall have an acidity range of 4.5 to 7.0 pH.
2. Sphagnum Peat Moss shall be a standard commercial product. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention

of plant nutrients. Peat moss shall be free of sticks, stones, weeds or weed seeds, roots, mineral or other foreign matter. It shall be free from toxic substances and/or compounds harmful to plant growth and viability. It shall be delivered air dry in standard bales and shall have an acidity range of 3.5 to 5.5 pH.

3. Humus shall be natural humus, reed peat, or sedge peat. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Humus shall be free of sticks, stones, weeds, roots, mineral or other foreign matter and/or toxic substances harmful to plant growth and viability. It shall be low in wood content, free from hard lumps and excessive amounts of zinc and delivered air dry in a shredded or granular form. The acidity range for humus shall be 5.5 to 7.5 pH, and the organic matter content shall be not less than 85 percent, as determined by loss on ignition. The minimum water holding capacity shall be 200 percent by weight on an oven-dry basis.
4. Manure shall be well-rotted, leached, cow manure not less than 8 months or more than 2 years old. It shall be free of sawdust, shavings, or refuse of any kind and shall not contain more than 25 percent straw. It shall contain no substances harmful to plant growth. The Contractor shall furnish information regarding chemical disinfectants, if any, that may have been used in storage of the manure.

### PART 3 - EXECUTION

- 3.01 After approval of rough grading, the sub-base shall be raked to a depth of 3 inches to remove stones, rock or other foreign materials 3-inches or larger in dimension. The Engineer shall inspect the work for approval, prior to placing of Loam Borrow.
- 3.02 Loam Borrow shall be placed and spread to the required depths over the locations approved by the Engineer.
- 3.03 Lime shall be uniformly applied in accordance with the soil testing laboratory recommendations, or as required by the Engineer, at a maximum rate of 100 pounds per 1000 square feet per application, in necessary quantities to achieve the pH range requirements for Loam Borrow.
- 3.04 Fertilizer shall be uniformly applied in accordance with the soil testing laboratory recommendations, or as required by the Engineer. At slopes exceeding 25 percent gradient, fertilizer shall be applied manually in a manner approved by the Engineer. Fertilizer shall not be applied between June 15 and August 31.
- 3.05 Loam Borrow shall be worked by tilling or power raking to a minimum depth of 6-inches, thoroughly incorporating the lime and fertilizer into the soil. The Loam Borrow shall then be raked until the surface is finely pulverized and smooth and compacted with rollers, weighing between 75 and 100 pounds per linear foot of tread, to an even surface conforming to the prescribed lines, grades and depths indicated on the plans.

END OF SECTION

## SECTION 31 10 00

### CLEARING AND GRUBBING

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. The Contractor shall do all required clearing and grubbing as indicated on the drawings or herein specified in the area required for construction operations.
- B. Unless otherwise noted, all areas to be cleared shall also be grubbed.
- C. The Contractor shall not clear and grub outside of the area required for construction operations.

##### 1.02 RELATED WORK:

Any trees and shrubs specifically designated by the Owner not to be cut, removed, destroyed, or trimmed shall be saved from harm and injury in accordance with Section 01 57 19, ENVIRONMENTAL PROTECTION.

#### PART 2 - PRODUCTS: NOT APPLICABLE

#### PART 3 - EXECUTION

##### 3.01 CLEARING:

- A. Unless otherwise indicated, the Contractor shall cut or otherwise remove all trees, saplings, brush and vines, windfalls, logs and trees lying on the ground, dead trees and stubs more than 1-foot high above the ground surface (but not their stumps), trees which have been partially uprooted by natural or other causes (including their stumps), and other vegetated matter such as shags, sawdust, bark, refuse, and similar materials.
- B. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operations, trees, stumps, and stubs to be cleared shall be cut as close to the ground as practicable but not more than 6-inches above the ground surface in the case of small trees, and 12-inches in the case of large trees. Saplings, brush and vines shall be manually pulled from the ground along with as much of the root mass as possible to prevent resprouting.

##### 3.02 GRUBBING:

- A. Unless otherwise indicated, the Contractor shall completely remove all stumps and roots.

- B. Any depression remaining from the removal of a stump and not filled in by backfilling shall be filled with gravel borrow and/or loam, whichever is appropriate to the proposed ground surface.

3.03 DISPOSAL:

All material collected in the course of the clearing and grubbing, shall be disposed of in a satisfactory manner away from the site or as otherwise approved. Such disposal shall be carried on as promptly as possible and shall not be left until the final clean-up period.

END OF SECTION

SECTION 31 20 00

PRELIMINARY EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section specifies preliminary earthwork including placement of fill, construction of embankments, and compaction.

1.02 QUALITY ASSURANCE:

- A. Testing and inspections: The Engineer will make such tests, in accordance with the methods specified in 1.03 below, as are deemed necessary to determine compliance with these specifications. The suitability of earth materials, for use in fills and embankments, will be determined by the Engineer, at no expense to the Owner.
- B. Sampling, testing and approval of materials shall be by the Engineer. Allow a minimum of two weeks for notification and approval of materials source.

1.03 REFERENCES:

The following standards form a part of these specifications as referenced:

ASTM International (ASTM)

ASTM	D422	Sieve Analysis
ASTM	D423	Liquid Limit
ASTM	D424	Plastic Limit and Plasticity Index
ASTM	D1140	Percent Passing No. 200 Sieve
ASTM	D1557	Moisture - Density Relationship (Method C)
ASTM	D2049	Relative Density
ASTM	D2922	In-Place Density

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23  
SUBMITTALS, SUBMIT THE FOLLOWING:

Shop drawings showing complete details of manufacture and materials; include installation instructions.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Permanent fill shall be free from organic matter and plastic fines and shall conform to the following:

<u>Opening of Sieve</u>	<u>Percent Passing</u>
3 in.	100
1/2 in.	50-100
No. 4	50-100
No. 50	0-45
No. 200	0-7

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Fill material shall not be placed, spread, rolled or compacted when it is frozen or thawing or during unfavorable weather conditions.
- B. Slopes and embankments shall be maintained until final completion and acceptance of this portion of the work and until the end of the warranty period. Slides, slipouts, washouts and settlements which occur for any reason shall be promptly repaired, and slopes or embankments shall be regraded to the proper lines and grades.

3.02 REMOVAL OF SUBSURFACE OBSTRUCTIONS:

Subsurface structures and related obstructions shall be removed to the greatest extent possible and as shown on the drawings. The Engineer shall determine the extent of obstruction removal and at no additional cost to the Owner.

3.03 CONSTRUCTION:

A. PLACEMENT OF FILL:

1. Placement of all permanent fill at levels more than 6-inches shall be as follows:
  - a. Permanent fill shall be placed in loose lifts, no more than nine inches thick and shall be mechanically compacted to at least 95 percent of the maximum dry density in accordance with ASTM D1597.
  - b. The Contractor shall be prepared to add water to the fill as it is being compacted to achieve the specified degree of compaction.

F. TOLERANCES:

1. Complete embankment slopes to plus or minus six inches of the slope line indicated.

END OF SECTION



## SECTION 31 13 16

### TREE PRUNING, TREE AND STUMP REMOVALS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. The work of this Section includes the following:
  - 1. Pruning – all trees to remain shall have crown cleaning performed including the removal of dead and crossing limbs as well as all limbs necessary to execute the scope of work required under this contract.
  - 2. Removal of trees and stumps.
- B. Refer to the Contract Drawings for general location of trees to be removed. Trees are to remain and be pruned in conformance with this Specification. Tree removals shall be limited to the locations denoted on the plans and shall include the removal of individual trees that would impede the construction of proposed facilities AS APPROVED BY OWNER’S REPRESENTATIVE.

##### 1.02 QUALIFICATIONS OF CONTRACTOR:

- A. This work shall be limited to individuals, partnerships and corporations who are actively engaged in the field of Arboriculture, and who demonstrate competence, experience and financial capability to carry out the terms of this project. The Owner may require proof of these qualifications.
- B. All work shall be conducted by qualified and trained personnel under the direct supervision of a New Hampshire Arborist Association in the Contractor’s employ.

##### 1.03 PERSONNEL:

- A. The Contractor shall submit each employee’s name and title prior to the commencement of work. The Contractor shall advise the Owner of any changes in personnel assigned to this Contract.
- B. The crew foreman shall have a minimum of five (5) years climbing/pruning experience. At least one (1) crew person shall be an MCA and shall be certified in CPR.
- C. Each trimmer shall be experienced and highly qualified with the necessary tree worker skills to successfully complete the work of this Section, including the ability and training to perform aerial rescue. Said skill shall also include worker

safety and ability in compliance with current OSHA and ANSI Z-133.1 Standards.

1.04 SPECIAL REQUIREMENTS:

- A. All wood shall be removed from the site and be properly disposed of in accordance with state and local regulations.
- B. No burning shall be permitted on the project site.
- C. Prior to commencing work, the Contractor shall submit a plan to the Owner for legal disposal of removed materials, in conformance with State and Federal regulations.

1.05 STANDARDS AND DEFINITIONS:

- A. All pruning work shall be performed in accordance with the following:
  - 1. The ANSI A300 'Standard Practices for Trees, Shrubs, and Other Wood Plant Materials' of the Secretariat: National Arborist Association, Post Office Box 1094, Amherst, New Hampshire 03031.
  - 2. American National Standards Institute (ANSI) Standard Z-133.1.
  - 3. The standards and practices of the International Society of Arborists.
  - 4. The standards and practices of the New Hampshire Arborist Association.
  - 5. The standards and practices of the American Association of Nurserymen.
- B. The term 'Owner' shall mean the Owner's designated representative charged with carrying out the requirements of this Project, Architect, Engineer, Planner, or Tree Warden as referenced herein, rendering approvals for the Owner.

1.06 EXAMINATION OF SITE AND DOCUMENTS:

- A. The Contractor shall be responsible for having a clear understanding of the existing site conditions and shall be responsible for fully carrying out the work of this Section, regardless of actual site conditions encountered.

1.07 ORDER OF WORK:

- A. Based on the site conference, the Contractor shall submit a schedule of work for the Owner's review and approval prior to beginning work. Unless otherwise authorized by the Owner, failure of the Contractor to comply with the approved removal schedule shall be sufficient cause to give notice that the Contractor is in

default of the contract.

#### 1.08 PROTECTION OF TREES TO BE PRESERVED:

- A. The Contractor shall protect all existing trees and other site features designated to remain. The placement of protection devices, such as snow fence enclosures, shall, however, be at the Contractor's discretion.
- B. Damage no trees to remain by burning, pumping water, cutting of live roots or branches, or any other means. Neither vehicles nor equipment shall be parked within the dripline of trees to remain, or where ever damage may result to trees to be saved. Construction material shall not be stored beneath trees to be saved.
- C. The Contractor shall be liable for any damage to any trees or other site features to remain, and shall immediately report to the Owner. Damaged trees and other site features shall be restored or replaced to match existing to remain to the satisfaction of the Owner.
- D. The Contractor shall compensate the Owner for damages by installing replacement tree(s) of the size and species approved by the Owner and of sufficient quantity such that the sum of the Diameter at Breast Height (DBH) inches for replacement trees equals the total DBH inches of the damaged tree(s). Damaged shrubs shall be replaced with shrubs(s) of the same size, species, and quantity, unless determined otherwise by the Owner.

#### 1.09 USE AND CARE OF THE SITE:

- A. The Contractor shall leave the work site at the end of each working period in a condition satisfactory to the Owner.
- B. Pavements shall be swept and lawns or other surfaces raked and/or otherwise cleaned of all material related to the work operation. Degree of clean-up required will be described by the Owner and will be based upon the character of the work area.
- C. All trimmings or any other form of debris shall be collected and chipped. The Contractor shall remove all materials and shall dispose of such materials off site in a legal manner.
- D. The Contractor shall be fully and solely responsible for any damage to equipment or vehicles left at the site of the work. All necessary permits shall be obtained by the Contractor.

## PART 2 - PRODUCTS

#### 2.01 EQUIPMENT:

Portsmouth New Hampshire Skatepark

Tree Pruning, Tree and Stump Removals  
Section No. 31 13 16-3

- A. Equipment necessary for this Contract shall be properly maintained and in good operating condition to the City's satisfaction. The Contractor shall promptly remove and replace any equipment which the Owner deems to be in unsatisfactory condition or otherwise unsuitable.
- B. Cutting tools shall be kept well sharpened to provide clean smooth cuts. Any tools utilized on any tree suspected to have cankers or other fungal, bacterial or viral diseases shall be sterilized or not used on any other specimen.
- C. A disc chipper shall be used which will process material up to twelve (12) inches in diameter.

### PART 3 - EXECUTION

#### 3.01 PRUNING:

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to complete all aspects of the work in accordance with all local, state and federal regulations in force at the same time of this Contract and in accordance with tree pruning as specified herein.
- B. The work of this Section consists of all pruning work and related items as specified herein and includes, but is not limited to:
  - 1. Pruning – Crown cleaning on all trees to remain as well as limb removal required to allow for the proper installation of scope of work, as approved by Owner's Representative prior to any pruning operations.

Crown cleaning is defined as medium pruning and shall consist of the removal of dead, dying, diseased, crossing, interfering, objectionable and weak branches on the main trunks as well as those within the leaf area. An occasional branch one (1) inch or less in diameter may remain within the main leaf area where it is not practical to remove it.

#### 3.02 DESCRIPTION OF PRUNING WORK:

- A. Pruning and trimming are generally described as the removal and disposal of limbs, branches and stubs which are either dead, potentially detrimental to the health of the tree or dangerous to pedestrians, visually deficient, interfering or otherwise objectionable as determined by the Owner.
- B. The limits of all trees to be pruned have been identified on the plans or referenced elsewhere in this specification section.

- C. Vehicle access shall be controlled and approved by the Owner.
- D. If the Contractor discovers tree(s) which have not been marked for pruning, but whose condition is such that removal is warranted, whether due to death, disease, decay, or structural weakness, such tree(s) shall not be pruned and the Contractor shall immediately report these findings in writing to the Owner and await the Owner's direction before proceeding with work on the particular tree(s) in question.
- E. All pruning shall be performed in a manner that maintains the natural aesthetic characteristics of the species and variety of trees. No topping or dehorning of trees or stubbing back of branches shall be permitted. All cuts shall be made to a lateral branch that is a minimum of one third (1/3) the size of the branch being removed, unless otherwise instructed by the Owner.
- F. The use of climbing spurs or spiked shoes shall not be permitted and their use will result in the immediate cancellation of the contract.
- G. All cuts shall be made sufficiently close to the parent stem so that wound closure can be readily started under normal conditions. Cuts shall, however, never be made through the branch collar. Slab cuts and rip cuts will result in cancellation of the contract.
- H. All limbs over two (2) inches in diameter to be removed shall be precut to prevent splitting. Any branches that by falling would injure existing trees to remain or other objects shall be lowered to the ground by proper ropes.
- I. On trees known to be diseased and where there is known to be danger of transmitting the disease on tools, tools shall be disinfected with alcohol or bleach after each cut between trees.
- J. Lateral branches as well as occasional branch suckers ("water sprouts") may be retained. Complete removal of secondary laterals and branch suckers resulting in the stripping of major limbs, ("lion tailing") will not be permitted.
- K. Tree paint to seal pruning cuts shall not be used.
- L. All branches and limbs shall be manually lowered to the ground via rope and pulley. This practice must be consistent with the National Arborist Association Standards for Pruning. All grade-level artifacts and landscaping must be protected from damage.

### 3.03 REMOVALS:

- A. The Contractor shall furnish all labor, materials, equipment and transportation

required to complete all aspects of the removals work in accordance with all local, state, and federal regulations in force at the time of this contract and in accordance with tree and stump removals as specified herein and with approval by owner's representative.

#### 3.04 DESCRIPTION OF REMOVAL WORK:

- A. Removal is generally described as the removal of groups and individual trees which interfere with the growth of more desirable types of trees; the clearing away of lesser growth that may obscure outstanding trees; and thinning out to provide space for healthy growth by the elimination of thinner, weaker trees.
- B. The Contractor shall adhere to the specifications and provide suitable facilities for inspecting the work. Failure of the Owner to immediately reject unsatisfactory work or to notify the Contractor of deviations from the specification shall not relieve the Contractor of responsibility to correct or remedy unsatisfactory work.
- C. The Contractor shall only work on trees designated by the Owner. No compensation will be made for work performed on any other tree or trees.
- D. Trees designated to be removed shall be taken down and all leaves, branches and trunks of trees properly disposed of by chipping and removal from the premises.
- E. Fell trees in a manner that allows all site features and those trees to be saved undamaged.
- F. Removal of all the parts of each tree shall be completed on the same day that the tree is cut.
- G. Excavation or grading within the branch spread of trees to be saved shall be performed only under the direction of the Owner unless otherwise directed. Removal of pavement such as bituminous concrete in these zones shall be by hand tools and/or air spade to ensure root health for trees to remain.
- H. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including but not limited to those regulations concerning noise levels, protective devices and operator safety.
- I. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the work site and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall provide, erect, and maintain protective devices acceptable to the Owner, including but not limited to barricades, lights and warning signs.
- J. Any practice employed by the Contractor that is obviously hazardous as

determined by the Owner shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Owner to discontinue such practice.

END OF SECTION 31 13 16

## SECTION 31 23 16.26

### ROCK EXCAVATION AND DISPOSAL

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

The Contractor shall excavate rock, if encountered, to the lines and grades indicated on the drawings or as required, shall dispose of the excavated material, and shall furnish the required material as specified in Section 31 00 00 EARTHWORK for backfill in place of the excavated rock.

##### 1.02 RELATED WORK:

- A. Section 31 50 00, SUPPORT OF EXCAVATION
- B. Section 31 00 00, EARTHWORK
- C. Section 03 05 00, FIELD CONCRETE

##### 1.03 DEFINITIONS:

- A. The word "rock," wherever used as the name of the excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding three (3) cubic yards (CY) in volume, or solid ledge rock which, in the opinion of the Engineer, requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed by normal earth excavation methods, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."
- B. The word "earth," wherever used as the name of an excavated material, or material to be excavated shall mean all kinds of material other than rock as above defined.

##### 1.04 QUALITY ASSURANCE:

- A. The Contractor shall conform to all municipal ordinances and state and federal laws relating to the transportation, storage, handling, and use of explosives. In the event that any of the above mentioned laws, ordinances, or regulations require a licensed blaster to perform or supervise the work of blasting, said licensed blaster shall, at all times, have his license on the work site and shall permit examination thereof by the Engineer or other officials having jurisdiction.



- B. The Contractor shall procure all permits required for blasting.

1.05 SUBMITTALS:

- A. At least two weeks before beginning blasting operations, the Contractor shall submit to the Engineer for record the following data:
  - 1. Name of Contractor or Subcontractor responsible for blasting and monitoring operations and license number.
  - 2. Name, affiliation, and license number of the person or persons who will be directly responsible for designing each blast, supervising the loading of the shot, and firing it.
- B. Copies of all permits required for blasting.
- C. Results of pre-blast survey.
- D. When blasting is in progress, daily reports on blasting operations and blast monitoring results.

1.06 DELIVERY/STORAGE AND HANDLING:

Delivery, storage and handling of explosives shall conform to all federal, state and local regulations and permits.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 PREPARATION/PRE-BLAST SURVEY

If required, the pre-blast survey shall be conducted in accordance with state regulations and/or local permit requirements.

3.02 EXCAVATION:

- A. The Contractor shall excavate rock to the lines and grades indicated on the drawings or as required by the Engineer. The excavated rock shall be removed and disposed of by the Contractor as specified for surplus excavated materials under Section 31 00 00, EARTHWORK.
- B. Work damaged by blasting shall be repaired or replaced at the Contractor's expense.

- C. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below:
1. In pipe trenches, excess excavation shall be filled with the required material and compacted in the same manner as specified for the material in the zone around the pipe under Section 31 00 00 EARTHWORK.
  2. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with concrete which shall have a minimum 28-day compressive strength of 3000 psi. Other excess excavation shall be filled with Class B backfill compacted to a minimum of 92 percent density (ASTM D1557 Method C) as specified under Section 31 00 00, EARTHWORK.
  3. If the rock below normal depth is shattered due to drilling or blasting operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches crushed stone may be used for backfill, if approved. All such removal and backfilling shall be done by and at the expense of the Contractor.
- D. When required by the Engineer, the Contractor shall remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly to determine whether seams or other defects exist.
- E. When concrete is to be placed on rock, the rock shall be free of all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, water, ice, snow, and other objectionable substances.

### 3.03 VIBRATION AND AIR BLAST MONITORING:

- A. The Contractor shall measure air blast and vibration levels of blasting operations to assure compliance with all applicable regulations and local permits.
- B. Records of each day's air blast and vibration measurements shall be submitted to the Engineer in writing no later than the start of the next day's work. Records shall include, as a minimum:
- Identification of instrument
  - Name of observer
  - Name of interpreter

- Distance and direction of recording station from the area of detonation
- Date and exact time of reading
- Type of ground at recording station
- Peak particle velocity for all components as well as resultant for all frequencies of vibrations
- Duration of motion with a velocity in excess of one thousandth of an inch per second
- A copy of the photographic record of seismograph readings
- Peak air blast level.

3.05 POST BLASTING INSPECTIONS:

The Contractor shall examine any properties, structures, and conditions where complaints of damage have been received or damage claims have been filed. Advance notice shall be given to all interested parties so that the parties may be present during the final examination. Records of the final examination shall be signed and distributed to the owner of the property, the head of the local fire department, and the Engineer.

END OF SECTION

## SECTION 31 23 19

### DEWATERING

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.

##### 1.02 RELATED WORK:

- A. Section 31 25 15, ENVIRONMENTAL PROTECTION
- B. Section 31 00 00, EARTHWORK
- C. Section 31 50 00, SUPPORT OF EXCAVATION

##### 1.03 SYSTEM DESCRIPTION:

- A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.
- B. Normal dewatering is defined as using conventional pumps installed in open excavations, ditches, or sumps. Special dewatering is defined as using single or two stage well points, deep wells, or educator and ejector systems installed in drilled holes or jetted in place.

##### 1.04 QUALITY ASSURANCE:

- A. The Contractor is responsible for the adequacy of the dewatering systems. He shall retain the services of a Professional Engineer registered in the state where the project is located, experienced in dewatering systems, to independently evaluate the boring and test pit logs and any other soils information available to determine those areas that will require special dewatering techniques and to design the required system. The Contractor's Professional Engineer shall provide sufficient on-site inspection and supervision to assure that the dewatering is carried out in accordance with his design.

- B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.
- C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.
- D. The dewatering system and excavation support (see Section 31 50 00) shall be designed so that lowering of the groundwater level within the work area does not adversely affect structures, utilities or wells outside of the work area.
- E. Where special dewatering is used, the Contractor shall obtain at his expense the services of a registered professional engineer to investigate, design and monitor the dewatering system. The Contractor shall also furnish materials and install at least two observation wells at each excavation area. The location of the wells shall be determined in the field by the Contractor's engineer.

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. At least two weeks prior to installing his dewatering system, Contractor shall submit the attached Certificate of Design completed and signed by Contractor, identifying the engineer responsible for design of the dewatering system. He shall also submit a schedule showing the timing of installation and operation of the dewatering system.
- B. The Contractor shall submit to the Engineer for record purposes only, the following items bearing the Contractor's Engineer's stamp and signature, and identifying the codes and specifications followed in the design.
  - 1. Plans and description of the dewatering system, including the number, location and depth of wells, well points or sumps; designs of filters to prevent pumping of fine soil; method and location for filtering and disposal of pumped water; and flow capacity of proposed system.
  - 2. Locations of observation wells.
- C. The Contractor shall submit records of pump operation and groundwater elevations as required by the Owner's Engineer.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

### 3.01 DEWATERING OPERATIONS:

- A. All water pumped or drained from the work shall be disposed of in a manner which will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work.
- B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.
- C. Dewatering procedures to be used shall be as described below:
  - 1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.
  - 2. For dewatering operations with relatively minor flows, pump discharges shall be directed into haybale sedimentation traps lined with filter fabric. Water is to be filtered through the haybales and filter fabric prior to being allowed to seep out into its natural water course.
  - 3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall be used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.
  - 4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags are to be utilized in catch basins.
- D. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

### 3.02 SPECIAL DEWATERING:

- A. If conventional dewatering methods are inadequate to ensure dry and stable conditions for structural foundations, the Contractor shall be required to use special dewatering as necessary.
- B. Special dewatering techniques may consist of one or two stage wellpoint systems, deep wells, or eductor and ejector type systems. The Contractor shall utilize a system which provides proper construction conditions and prevents settlement at time of installation and upon backfilling.
- C. In areas requiring special dewatering, the Contractor shall lower the groundwater level to a minimum of 2 feet below the bottom of the final excavation grade prior to any installation and maintain that groundwater level until the excavation has been backfilled.

The groundwater levels shall be monitored by the Contractor's engineer to ensure conformance with the requirements of these specifications. Construction will not be allowed until the Owner's Engineer is satisfied that the above provisions are met.

3.03 NOISE LEVEL REQUIREMENTS:

- A. All primary dewatering equipment shall be electrically operated and shall run on commercial power. Standby equipment shall be independent of commercial power and shall provide dewatering upon primary pump or power failure.
- B. All equipment utilized by the Contractor shall conform to the Department of Environmental Protection Division of Air Quality Control regulations governed by the following policy:

"A source of sound will be considered to be violating the Department's noise regulation (310 CMR 7.10) if the source:

- 1. Increases the broadband sound level by more than 10 dB(A) above ambient, or
- 2. Produces a "pure tone" condition - when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.

These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours. The ambient may also be established by other means with the consent of the Department."

The Contractor shall construct sound enclosures or utilize other noise reduction techniques if the equipment does not meet the noise level requirements.

END OF SECTION - 31 23 19

(Certificate of Design follows this page)

CERTIFICATE OF DESIGN

Re: Contract Between:

OWNER: \_\_\_\_\_  
(Name)

and

CONTRACTOR: \_\_\_\_\_  
(Name)

on

CONTRACT: \_\_\_\_\_  
(Number)

Date: \_\_\_\_\_

Title: \_\_\_\_\_

Contractor hereby certifies that \_\_\_\_\_:  
(Engineer)

1. Is licensed or registered to perform professional engineering work in the state of \_\_\_\_\_;  
(Location of Project)
2. Is qualified to design the \_\_\_\_\_  
(Item)  
specified in Section \_\_\_\_\_ of subject contract;
3. Has designed \_\_\_\_\_ before;  
(Item)
4. Has prepared the design in full compliance with the applications and requirements of Section \_\_\_\_\_ of subject contract including all applicable laws, regulations, rules, and codes; and
5. The work has been signed and sealed pursuant to applicable state law.

FOR: \_\_\_\_\_  
(Contractor)

BY: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name and Title)

Dated: \_\_\_\_\_

Document1



SECTION 31 23 23

EXPANDED POLYSTYRENE FILL (GEOFOAM)

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Work under this item shall include designing Expanded Polystyrene (EPS) block sizes, geometries and layout to meet the configurations indicate on the drawings, as well as furnishing, on-site storage and protection prior to placement, and placing the EPS block fill to the lines and grades indicated on the Contract Drawings and as specified herein.
- B. This specification only applies to the EPS blocks outside of the limits of the skatepark as indicated on the Contract Drawings.

1.02 RELATED WORK:

- A. Section 31 23 19 – DEWATERING
- B. Section 31 50 00 – TEMPORARY SUPPORT OF EXCAVATION
- C. Section 31 00 00 – EARTHWORK

1.03 REFERENCES:

The following reference standards shall apply in whole or in part to material supplied under this specification:

ASTM C 203	Test Methods for Breaking Load and Flexural Properties of Block Type Thermal Insulation
ASTM C 578	Standard Specification for Rigid Cellular Polystyrene Insulation
ASTM C 390	Criteria for Sampling and Acceptance of Preformed Thermal Insulation Lots
ASTM D 1621	Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D 1622	Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D 2863	Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-like Combustion of Plastics (Oxygen Index)
ASTM D 6817	Standard Specification for Rigid Cellular Polystyrene Geofoam
Portsmouth New Hampshire Skatepark	Expanded Polystyrene Fill (Geofoam) Section No. 31 23 23-1

1.04 SUBMITTALS:

- C. A minimum of 20 business days prior to beginning work, submit two copies of certified third-party test reports to the Owner's Engineer for review, showing that at least two separately molded EPS blocks of each type (density), representative of those which will be supplied, conform to the physical properties and standards listed above. Test specimen selection and preparation shall be done in accordance with ASTM D1621 and D1622.
- D. Submit detailed manufacturing records for the tested blocks which clearly state, in part, the percentage, type (in-plant or post-consumer), and original density of any recycled EPS material (regrind) used in the molding process.
- E. Submit block storage plan indicating locations on the site for storing each type of EPS block to be supplied for the project. Indicate measures to secure blocks during storage for protection against displacement due to wind and flood stresses.
- F. Submit installation drawings showing the EPS block layout plan with sufficient detail and section views to illustrate all aspects of block installation to the satisfaction of the Owner's Engineer.

1.05 QUALITY ASSURANCE/ QUALITY CONTROL:

- A. The EPS blocks shall be produced by a manufacturer with an in-place quality control program which is monitored and certified by an accredited, independent third-party testing organization.
- B. Each EPS block shall be labeled with the manufacturer's name, product type, lot number, date of manufacture, weight and density (as measured after seasoning and trimming), and percent regrind content. Unlabeled blocks will be rejected. The Contractor shall supply detailed manufacturing records of individual blocks if requested by the Owner's Engineer. Unless approved by the Owner's Engineer, the date of delivery of EPS blocks must be after a minimum of one week and within one month of manufacture.
- C. Each specified grade of EPS blocks shall be received, inspected, and stockpiled separately from other grades of block in designated areas on the site in accordance

with a material stockpile plan proposed by the Contractor and accepted by the Engineer and the State.

- D. The Contractor shall perform on-site density tests by weighing and measuring three blocks randomly chosen from each truckload or from each batch no larger than 2,500± cubic feet of EPS delivered to the project site. The Contractor shall provide a calibrated scale accurate to within 0.1 lbs and with sufficient capacity for this purpose. The Contractor shall submit a recent (within 30 days) calibration certificate from a certified third-part testing laboratory for the scale and any appurtenant equipment to the Owner's Engineer for approval. Blocks shall be kept clean and dry prior to weighing.
- E. If any selected blocks do not meet the flatness or dimensional tolerances, the entire sampled truckload or batch will be rejected by the Owner's Engineer. The entire sampled truckload or batch will also be rejected if two or more of the selected blocks are below the specified minimum whole block density, any selected block is below the specified minimum test specimen dry density, or the average dry unit weight of all three blocks is below the specified minimum whole block dry density. When two of five consecutive truckloads or batches have been rejected, further deliveries will be accepted under a tightened inspection procedure.
- F. Tightened inspection shall consist of weighing and measuring five blocks randomly chosen from each truckload or from each batch no larger than 2,500± cubic feet of EPS delivered to the project site. If any of the selected blocks do not meet the flatness or dimensional tolerances, the entire sampled truckload or batch will be rejected by the Owner's Engineer. Under tightened inspection, the entire sampled truckload or batch will also be rejected if two or more of the selected blocks are below the specified minimum whole block density or any one selected block is below the specified minimum test specimen dry density. Normal inspection shall resume after acceptance of five consecutive batches under tightened inspection procedures.
- G. The supplier may sort and resubmit selected blocks from rejected lots under the tightened inspection procedure.
- H. Any EPS blocks that do not meet flatness or dimensional tolerances or have side area surface damage of 20% or more or volume damage of 1% or more will be rejected.
- I. The Owner reserves the right to take additional random samples from the project site (in general 1 block per 10,000 cubic feet) for additional quality assurance testing.

If testing yields unsatisfactory results the Contractor may be directed to remove and replace potentially defective EPS blocks at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 EXPANDED POLYSTYRENE FILL:

- A. EPS is typically supplied as rectangular blocks with nominal dimensions of 3 ft. x 4 ft. x 8 ft. Other block shapes and dimensions are used to form horizontal and vertical curves in the fill. Blocks shall be smooth and flat on all surfaces and have a flatness and dimensional tolerance of  $\pm 0.5\%$ . Blocks shall be manufactured using a modified resin that contains a fire-retardant additive. Blocks shall be seasoned by storing them at the manufacturer's facility in normal ambient room temperature for a minimum of 72 hours after being released from the mold. Blocks shall meet the following physical requirements after seasoning:

	EPS15
Min. Whole Block Dry Density, (lbs/ft <sup>3</sup> )	0.9
Min. Compressive Strength @1% deformation, (psi)	3.6
Flexural Strength (psi)	25.0
Flammability (Oxygen Index, %)	24.0

- B. Unless authorized in writing by the Engineer, regrind content in geofoam blocks shall not exceed 10% and shall consist of clean scrap from manufacturing plant cuttings, only.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Exercise care to prevent damage to the EPS during delivery, storage and construction. Protect the EPS blocks from (1) Organic solvents such as acetone,

benzene, and paint thinner; (2) Petroleum based solvents such as gasoline and diesel fuel; (3) Open flames and (4) Prolonged exposure to sunlight (more than 30 days).

- B. Provide a system of temporary weights or tie downs, approved by the Owner's Engineer, to anchor the EPS blocks against wind gust or flooding potential.
- C. Do not drive or operate heavy machinery or place concentrated loads directly on the EPS blocks. EPS blocks damaged due to the Contractor's operations shall be removed and replaced at no additional cost to the State.
- D. Trim the EPS blocks in the field where necessary with a portable hot wire device supplied by the manufacturer, or a handsaw, or an alternative cutting method approved by the Owner's Engineer.
- E. Chairs or standees for support of the reinforcing steel mat within the concrete distribution slab shall have broad plastic "feet" or other means of preventing the feet from puncturing and penetrating the EPS blocks, as approved by the Owner's Engineer.

### 3.02 SITE PREPARATION

- A. Where required by the Contract Drawings, the soil subgrade shall be excavated to the elevations given on the contract drawings and in accordance with Specification 31 00 00.
- B. Prior to placement of EPS blocks, the soil subgrade shall be cleared of vegetation, any large or sharp-edged rock particles, any kind of debris and shall be leveled within a tolerance of 2 inches in 10 feet. Subgrades shall be observed by the Owner's Engineer prior to placement of overlying materials.
- C. There shall be no standing water or accumulated snow or ice on the subgrade layer within the area where EPS blocks are placed at the time of block placement.
- D. EPS blocks shall not be placed on frozen subgrade. De-icing salts shall not be used except as directed by the Owner's Engineer.
- E. If required, dewater the area using pumps or other suitable methods approved by the Owner's Engineer and in accordance with Section 31 23 19 – DEWATERING. Dewatering must continue until there is sufficient fill on top of the EPS blocks to prevent

them from shifting or floating. Water shall be discharged in accordance with the requirements of Section 31 23 19 - DEWATERING.

### 3.03 BLOCK PLACEMENT

- A. Notify the Owner's Engineer prior to placement of EPS blocks. The Contractor shall allow for part-time observation of block placement as requested by the Engineer.
- B. Place the EPS blocks as indicated in the contract documents and according to approved installation drawings.
- C. There shall be no debris of any kind between adjacent surfaces of EPS blocks at the time adjacent EPS blocks are placed.
- D. There shall be no standing water or accumulated snow or ice on the previously placed EPS block layer within the area where subsequent EPS blocks are to be placed at the time of block placement.
- E. EPS blocks shall be placed so that all vertical and horizontal joints between blocks are tight. Avoid continuous vertical joints by laying blocks in a running bond pattern and orienting the long axis of the blocks in each successive layer perpendicular to the long axis of the blocks in the underlying layer.
- F. While placing successive layers of EPS blocks, the Contractor shall exercise care to assure that all placed blocks are supported over their entire bearing area. In the event the top constructed surface of an assembly of blocks becomes uneven or where rocking of the blocks is observed, Contractor shall notify the Owner's Engineer and propose a remedial procedure for corrective action. Such procedure shall be submitted for review and approval by the Owner's Engineer prior to resuming construction.
- G. Blocks shall be placed such that the resulting exterior vertical surfaces on the sides of the EPS Block Fill structures are vertical and planar within a tolerance of 1/8-inch between blocks. Block faces not satisfying this criterion shall be field trimmed using hot wire cutting apparatus to achieve the desired evenness within the above tolerance.
- H. Inter-block mechanical connectors shall not be used unless approved by the Owner's Engineer.
- I. The final surface of the EPS blocks shall be covered as indicated on the Contract Drawings. Care shall be exercised during placement of the cover material so as not to cause any damage to the EPS blocks.

## SECTION 31 50 00

### SUPPORT OF EXCAVATION

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This section of the specification covers wood sheeting and bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to other methods of excavation support and underpinning which the Contractor elects to use to complete the work.
- B. The Contractor shall furnish and place timber sheeting of the kinds and dimensions required, complying with these specifications, where indicated on the drawings or required by the Engineer.

##### 1.02 RELATED WORK:

- A. Section 31 23 19, DEWATERING.
- B. Section 31 00 00, EARTHWORK.

##### 1.03 QUALITY ASSURANCE:

- A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, Contractors shall be familiar with the requirements of these regulations.
- B. The excavation support system shall be of sufficient strength and be provided with adequate bracing to support all loads to which it will be subjected. The excavation support system shall be designed to prevent any movement of earth that would diminish the width of the excavation or damage or endanger adjacent structures.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS:

- A. Timber sheeting shall be sound spruce, pine, or hemlock, planed on one side and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.

- B. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design. Timber or steel used for bracing shall be new or undamaged used material which does not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

- A. Work shall not be started until all materials and equipment necessary for their construction are either on the site of the work or satisfactorily available for immediate use as required.
- B. The sheeting shall be securely and satisfactorily braced to withstand all pressures to which it may be subjected and be sufficiently tight to minimize lowering of the groundwater level outside the excavation, as required in Section 31 23 19, DEWATERING.
- C. The sheeting shall be driven by approved means to the design elevation. No sheeting may be left so as to create a possible hazard to safety of the public or a hindrance to traffic of any kind.
- D. If boulders or very dense soils are encountered, making it impractical to drive a section to the desired depth, the section shall, as required, be cut off.
- E. The sheeting shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting may be left in place or salvaged at the option of the Contractor. Steel or wood sheeting permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.
- F. All cut-off will become the property of the Contractor and shall be removed by him from the site.
- G. Responsibility for the satisfactory construction and maintenance of the excavation support system, complete in place, shall rest with the Contractor. Any work done, including incidental construction, which is not acceptable for the intended purpose shall be either repaired or removed and reconstructed by the Contractor at his expense.
- H. The Contractor shall be solely responsible for repairing all damage associated with installation, performance, and removal of the excavation support system.

END OF SECTION



## SECTION 32 11 23

### RECYCLED ASPHALT PAVEMENT (RAP)

#### PART 1 – GENERAL

##### 1.01 WORK INCLUDED:

Recycled Asphalt Pavement (RAP) Placement of processed gravel upon a sub-grade as required in accordance with these specifications and in the locations indicated on the contract drawings.

##### 1.02 RELATED WORK:

Section 31 00 00 EARTHWORK

##### 1.03 REFERENCES:

The following standard forms part of these specifications:

New Hampshire of Transportation (NHDOT)

##### 1.04 DESCRIPTION OF WORK:

The processed gravel shall be furnished and placed to the depth as indicated in the standard detail in the contract drawings.

#### PART 2 – PRODUCTS

##### 2.01 RECYCLED ASPHALT PAVEMENT (RAP):

Recycled Asphalt Pavement shall be provided by the City of Portsmouth Department of Public Works and placed by the contractor and satisfy the requirements as listed below.

#### PART 3 – EXECUTION

##### 3.01 PLACEMENT AND COMPACTION:

- A. The Recycled Asphalt Pavement shall be spread in layers upon the prepared sub-grade from self-spreading vehicles or with power graders of approved types or by hand methods.
- B. The Recycled Asphalt Pavement shall be spread in layers not more than 4-inches thick, compacted measure. The Recycled Asphalt Pavement shall be compacted in accordance with the requirements of Section 31 00 00.

END OF SECTION

SECTION 32 14 00

BRICK PAVERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions, Division 0 and Division 1, General Requirements, apply to the work of this Section.

1.02 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all necessary labor, materials, equipment, transportation and services necessary to complete the work of this Section as specified herein, as shown on the drawings, or both.
- B. The work of this Section includes, but is not limited to the following:
  - 1. Subbase and base course construction
  - 2. Brick Unit Pavers

1.03 RELATED WORK

- A. Carefully examine all the Contract Documents for requirements that affect the work of this Section. Other specification sections that directly relate to the work of this Section include, but are not limited to the following:
  - 1. Section 31 20 00- Earthwork
  - 2. Section 03 35 00- Cement Concrete Pavement
  - 3. Section 12 93 00- Site Furnishings

1.04 REFERENCES

- A. American Society of Testing and Materials (ASTM):
  - 1. C 33 - Specification for Concrete Aggregates.
  - 2. C 136 - Method for Sieve Analysis for Fine and Coarse Aggregate.
  - 3. C 936 - Specification for Solid Interlocking Paving Units.
  - 4. D 448 – Standard Sizes of Processed Aggregates.

5. D 698 and D 1557 -Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures.
8. D 2940 - Graded Aggregate Material for Bases or Sub bases for Highways or Airports.

#### 1.05 SUBMITTALS

- A. Design Mix Submittals: Submit design mix submittals including description of materials, proportions, and mechanical sieve sizes of aggregates for the following:
  1. Certified sieve analysis for grading of bedding and joint/void sand.
  2. Bituminous concrete setting bed mix.
  3. Asphalt tack coat.
- B. Samples: the following samples shall be reviewed in the field for the following items:
  1. Furnish not less than four individual concrete pavers of each type, size, color and finish required to the Owner's Representative for approval. Samples shall exhibit the full color range of pavers to be provided.
- C. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following items:
  1. Neoprene-modified asphalt adhesive
  2. Brick Paver
- D. Test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 and CSA A231.2-95 for resistance to freeze-thaw and or other applicable requirements.
- E. Sieve analysis for grading of bedding/aperture/joint sand.

#### 1.06 MOCK-UPS

- A. Construct sample panels of brick pavers on the specified base and as per Contract Documents. Sample panel shall exhibit proposed color range, texture, band, jointing, pattern, finish, paver size, and workmanship. Unless otherwise indicated, size of panel shall be 4 feet x 4 feet minimum.
  1. One sample panel representing brick pavers shall be constructed on a concrete base, with bituminous concrete setting bed, pavers and jointing as required for the finished work.

2. The quality of workmanship, paver jointing and cleanliness of pavers after installation must be approved by the Owner's Representative before permanent paving is started.
3. If the original sample is not approved, the Contractor shall provide additional samples, as required, at no cost to the Owner until an approved sample is obtained.
4. The approved sample shall become the minimum standard for unit paving for this project.

#### 1.07 PROJECT CONDITIONS

- A. Weather: Perform work only when existing and forecasted weather conditions are within the limits established by referenced standards. Perform work only when ambient temperature is forecasted to be at least 50-degrees Fahrenheit and when temperatures have not been below 35-degrees Fahrenheit for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess amount of moisture or is in a frozen state.
- B. Construction methods, transportation and delivery of mixtures, spreading, finishing, compaction joints, etc. shall conform with NHDOT Standard Specifications for Highways and Bridges unless otherwise specified herein.
- C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required and for other construction activities.
- D. Grade Control: Establish and maintain required lines and elevations.

#### 1.08 REGULATORY REQUIREMENTS

- A. Strictly comply with applicable codes, regulations and requirements of authorities having jurisdiction.

#### 1.09 QUALITY ASSURANCE

- A. Installer must review installation procedures of all brick paving and sequence of work with General Contractor to ensure proper coordination with other subcontractors and suppliers whose work is affected by the delivery schedule and installation of paving work.
- B. Paver manufacturer shall be an ICPI Certified Producer.
- C. Installation shall be by a contractor and crew with at least five years experience in placing concrete pavers on projects of similar size and scope.

- D. Contractor shall conform to all local, state licensing and bonding requirements and shall have received a Record of Completion of the ICPI Commercial Paver Technician Course or be an ICPI Certified Contractor.
- E. Do not install subbase or base materials, or pavers, during heavy rain or snowfall. Do not install subbase or base or pavers over frozen materials.

#### 1.10 TESTING

- A. During the placing and rolling operation, repeated checks shall be made to ascertain the correct rate of application to provide the required compacted thickness
- B. If the average thickness is deficient from the specified thickness by one quarter (1/4) inch or more, the extent of the deficient area shall be corrected at the Contractor's expense.
- C. Upon completion of testing, the Contractor shall properly fill all test holes by compacting a fine aggregate bituminous concrete for the full depth of the core. The finished surface shall be smooth.

#### 1.11 COORDINATION

- A. This Contractor shall coordinate with all other trades especially grading, curb installation, electrical and plumbing contractors, through the General Contractor in order to prevent covering up unfinished or uninspected work and loss of time or labor by mis-scheduling and to assure the steady progress of all work of the Contract. Any rework shall be done at no cost to the Owner.

#### 1.12 LAYOUT AND GRADES

- A. A Registered Land Surveyor or Registered Professional Engineer employed by the Contractor shall lay out all lines and grade work in accordance with the Contract Documents.

#### 1.13 DISTURBING EXISTING PAVEMENT DURING CONSTRUCTION

- A. Existing paved areas shall be protected from damage by construction activities to the extent possible. Where sections of the finished paved areas have to be removed, the edges shall be saw cut in all cases and patched.

### PART 2 - PRODUCTS

#### 2.01 GRADING AND COMPACTION OF SUB-BASE

- A. Do all necessary grading in addition to that specified under EARTHWORK to bring subgrade or foundation after final compaction to required grades and

sections to obtain a foundation of uniform bearing surface. In absence of specific requirements, compact foundation by such means as will provide firm base and insurance against settlement of superimposed work.

- B. Sub-base preparation, including material, shall be of properly approved quality as specified under EARTHWORK. Start of work under this Section shall constitute acceptance of the foundation conditions to which this work is to be applied. Any defects in work resulting from such conditions shall be corrected under this Section, Site Improvements, at no additional cost to the Owner.

## 2.02 BRICK PAVERS

- A. The standard of quality, design and function required is based on brick pavers manufactured by Pine Hall Brick Company, Inc. 2701 Shorefair Drive, Winston-Salem, NC 27116. (800) 334-8689. Or approved equal. Brick pavers shall meet ASTM C 936.
  - 1. Paver size shall be 4-inches x 8-inches, StormPave Full Range, 2 1/4-inch thickness. Wire cut. or custom equivalents. Refer to drawings for pattern and location.
  - 2. All pavers shall have a minimum compressive strength of 8,000 pounds per square inch.
  - 3. Water absorption shall be 5 percent or less when tested in accordance with ASTM C 140 with no individual stone testing more than 7 percent.
  - 4. Contractor to provide Owner's Representative with samples of material and color for approval.
- B. Additional acceptable manufacturers include:
  - 1. The Belden Brick Co., Tel: (330) 451-2031
  - 2. Endicott Brick, Tel: (402) 729-3315
  - 3. Or approved equal

## 2.04 CONCRETE BASE

- A. The concrete base shall be provided, installed and paid for under Division 2 Section 03 35 00, and shall have a thickness and weep holes as shown on the Drawings.

## 2.05 BITUMINOUS SETTING BED

- A. Asphalt cement to be used in the bituminous setting bed shall conform to ASTM D 3381. Viscosity grade shall be A.C. 10 or A.C. 20.
- B. Fine aggregate to be used in the bituminous setting bed shall be clean, hard sand with durable particles and free from adherent coating, lumps of clay,

alkali salts, and organic matter. Aggregate shall be uniformly graded from "coarse" to "fine" with 100 percent by weight passing the No. 4 sieve and shall meet the gradation requirements when tested in accordance with ASTM C 136.

- C. Fine aggregate shall be dried and shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300 degrees Fahrenheit at an asphalt plant. The approximate proportion of materials shall be 7 percent cement asphalt and 93 percent fine aggregate. Each ton of material shall be apportioned by weight in the approximate ratio of 145 pounds asphalt to 1,855 pounds sand. The Contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet specified requirements.

#### 2.06 ASPHALTIC PRIMER

- A. Primer for base beneath bituminous setting bed shall be an emulsified asphalt rapid setting type conforming to AASHTO M 140, Grade RS-1, or AASHTO M 208, Grade CRS-1.

#### 2.07 NEOPRENE-MODIFIED ASPHALT ADHESIVE

- A. Neoprene modified asphalt adhesive shall meet the following requirements:
  - 1. Mastic (asphalt adhesive):
    - a. Solids (base) content by volume = 75+ 1 percent.
    - b. Weight = 8.0 to 8.5 pounds/gallon
    - c. Solvent vehicle = Varsol [over 100oF flash].
  - 2. Base (2 percent neoprene, 10 percent fibers, 88 percent asphalt):
    - a. Melting point (ASTM D 36) = 200oF minimum.
    - b. Penetration at 77oF 100 gram load 5 second (0.1 mm) = 23 to 27.
    - c. Ductility (ASTM D 113 at 77oF, 5 cm/minute) = 125 cm, minimum.

#### 2.08 SAND FOR JOINT FILLER

- A. Joint filler between paver joints shall be a polymeric sand meeting ASTM C144. Sand mixture shall contain coloring additive to match joint filler mixture with color of brick pavers.
  - 1. Color of joint filler shall match the color range of the brick paver and shall be approved by the Owner's Representative.
  - 2. Sand shall be HP2 Polymeric Sand manufactured by Techniseal, 300 Liberte Avenue Quebec, Canada or approved equal.

#### 2.08 MORTAR FOR JOINT FILLER



- A. Joints between paver that are to be placed in kind as indicated on plans shall have mortar joints shall meeting ASTM C144. uniformly graded from coarse to fine with not more than 5% passing the No. 100 sieve; 100% may pass the No. 30 sieve, but if the work requires a coarser sand, the coarse sieve size limit may be increased to the No. 16 size.
  - 1. Mortar joint filler shall match the color range of the existing mortar joints and shall be approved by the Owner's Representative.
  - 2. Latex Additive for Thick Set Mortar and Grout: Laticrete International, Inc. "3701 Latex Additive", or approved equal and is recommended for use in thick set mortars and grout for exterior applications.

## 2.09 WATER

- A. Water shall be potable and shall be free of injurious contaminants.

## PART 3 – EXECUTION

### 3.01 ACCEPTABILITY OF CONCRETE BASE

- A. Contractor shall examine the concrete base provided, installed and paid for under the work of the Section 32 1313 to determine its adequacy to receive concrete pavers and setting bed. Concrete shall have fully cured prior to the work of installing concrete pavers. Evidence of inadequate base shall be brought to the immediate attention of the Landscape Architect and shall be corrected by the Contractor as directed by the Owner's Representative at no additional cost to the Owner.
- B. Start of work of this Section, shall constitute acceptance of concrete base.

### 3.02 BITUMINOUS SETTING BED

- A. The surface of the concrete base shall receive an asphalt prime coat before laying bituminous setting bed at all vehicular locations as indicated on the Contract Documents. Prime coat shall be applied at rate that will leave bituminous residue of 5 to 7 gallons per 100 square yards after evaporation of vehicle. Base surface shall be dry and clean when prime coat is applied. Bituminous setting bed shall not be placed until vehicle has completely evaporated from prime coat.
- B. Bituminous setting bed shall be installed over the concrete base. Control bars 3/4 inch deep shall be placed directly over the base. If grades must be adjusted, wood chocks under depth control bars shall be set to proper grade. Set two bars parallel to each other to serve as guides for the striking board. The depth control bars must be set carefully to bring the pavers, when laid, to proper grade.

- C. While still hot (not less than 250 degrees Fahrenheit (121 degrees Centigrade) some of the bituminous bed material shall be placed between the parallel depth control bars. This bed shall be pulled with the striking board over the control bars several times. After each passage, low porous spots shall be showered with fresh bituminous material to produce a smooth, firm, and even setting bed. As soon as this initial panel is completed, advance the first bar to the next position in readiness for striking the next panel. After the depth control bars and wood chocks have been removed, carefully fill any depressions that remain.
- D. The setting bed shall be rolled with a power roller to a nominal depth of 3/4 inch (19.05 mm) while still hot. The setting bed thickness shall be adjusted so that when the concrete pavers are placed and rolled, the top surface of the pavers will be at the required finished grade.
- E. A coating of neoprene-modified asphalt adhesive shall be applied by mopping, squeegeeing, or troweling over the top surface of the bituminous setting bed so as to provide continuous bond under the pavers.
  - 1. If adhesive is trowel-applied, trowel shall be serrated type with serrations not to exceed 1/16 inch (1.59 mm).

### 3.03 SETTING BRICK PAVERS

- A. Brick pavers shall be set on a bituminous setting bed over a prepared concrete base. Setting bed shall be protected from damage prior to setting pavers.
- B. Brick pavers with chips, cracks, stains, or other structural or aesthetic defects shall not be used.
- C. Only competent workmen under adequate supervision shall perform the work of setting concrete pavers. Set pavers in accordance with manufacturer's recommendations. Concrete pavers shall be set true to the required lines and grades in the pattern detailed on the Contract Documents.
- D. After the modified asphalt adhesive is applied, pavers shall be carefully placed by hand, set true to the required lines and grades in the pattern shown on the Contract Documents. Accurate alignment shall be maintained. The Owner's Representative will approve the start of paving layouts.
- E. Pavers shall be neatly cut and fitted at all perimeters and closures to fit neatly and closely. Pavers shall be tightly butted. Joints between pavers shall be uniform and shall not exceed 1/8 inch in width. Joints greater than 1/8 inch in width will not be accepted. Surface edge of one paver shall be level with the next adjacent pavers so that no voids, rocking motions, or tripping hazards are encountered. There shall be no deviation from a true grade greater than 1/4 inch in 10 feet. All finish paved areas shall slope to drain at a minimum of 1/8 inch in 1 foot.

- F All cutting and patching required to complete the work shall be done (including the filling and closing of all openings) with water-cooled radial cut-off type masonry saws with diamond-tipped blade for a sharp, straight edge. Cut edges shall be plumb and straight. Scoring and breaking will not be acceptable.
  - 1. After cutting of pavers, grind all cut edges of top surfaces of pavers to create a beveled, 45 degree angle equal to the manufacturer's bevel. Ground bevels shall be straight and true and shall be accomplished using a sufficiently fine grinding wheel or blade to prevent apparent grind marks on the bevels.
- G. After a sufficient area of pavers has been installed, joints of pavers shall be filled by sweeping sand into the joints, as specified, performed and paid for under this Section.
- H. Completed surface shall be compacted by running a medium plate vibrator across the top of the pavers. Additional joint filler material shall be swept in the joints during vibration to completely fill joint space.
- I. Newly laid pavers shall be protected at all times by panels of plywood. These panels may be advanced as work progresses; however, the plywood protection shall be kept in areas which will be subjected to continued movement of materials and equipment. All necessary precautions shall be taken in order to avoid depressions and protect paver alignment.

#### 3.04 JOINT TREATMENT

- A. Joint filler shall be swept dry into the joints between pavers until the joints are completely filled. Surface shall be swept clean. Swept surface shall than be thoroughly dampened with a low-volume fine spray of water.
  - 1. Sweep sand into paver joints until joints are filled solid. Fog lightly with water and repeat a minimum of three times or until joints are compacted and full.
  - 2. Prior to acceptance, the paved area shall be flooded with water to assure that there are no depressions. Pavers with top surfaces greater than 1/16 inch above or below adjacent pavers shall be removed and reset. Remove and reset pavers as required until surface is true to line and grade. Refill sand joints as necessary until all joints are filled to finish grade.
- B. Concrete paving shall be kept damp by intermittent spraying for three days, minimum, to effectively cure the joints.
- C. Mortar Joints
  - 1. Spread and screed to uniform thickness, except for minor variations required to produce a true surface, level in plane or uniformly sloped for

drainage as shown. Cut back, bevel edge, remove and discard setting bed material which has reached initial set prior to placing of paver units.

2. Wet brick units several hours before laying, unless their gain in weight resulting from partial immersion flatware in 1/8" of water for 1 minute is less than 3/4 oz. per 30 sq. in. of immersed area. Do not lay bricks with free moisture on the surface.
3. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, taking care not to smear grout on adjoining paver units and other surfaces. After initial set of grout, finish joints by tooling to produce a very slightly concave polished joint, free from drying cracks.
4. Cure grout by maintaining in a damp condition for 7 days.

D. Repair and Pointing:

1. Remove and replace brick pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining pavers. Provide new pavers to match adjoining pavers and install in fresh mortar, pointed to eliminate evidence of replacement.
2. Pointing: During the tooling of joints, enlarge voids of holes and completely fill with mortar.

3.05 CLEANING OF BRICK PAVER SURFACES

- A. After completion of concrete paving, surfaces shall be carefully cleaned, removing all dirt, excess filler, and stains.
- B. Clean pavers using an approved masonry cleaner and soft bristle brush.

3.06 GUARANTEE

- A. The Contractor shall guarantee all pavement installations, including materials and workmanship, for a period of one year from the date of acceptance. The Contractor shall make interim repairs as necessary to maintain all paved areas in good, usable condition.

END OF SECTION

## SECTION 32 14 13.19

### HOT MIX ASPHALT PAVEMENT

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. Under this Section, the Contractor shall furnish all necessary labor, materials, equipment, and transportation necessary to construct the following:
  - 1. The hot mix asphalt (HMA) pavement for the parking areas and pedestrian walks, etc. shall be composed of materials as specified herein and shall be constructed on a prepared base course to the depth, grade and cross-section shown on the plans, as specified herein and as required by the Engineer
  - 2. Unless otherwise specified pavement thickness shall be two and one half (2.5) inch HMA binder course and a one and one half (1.5) inch dense mix (top) course or one and a half (1.5) inch HMA binder course, and a one and a half (1.5) inch HMA dense mix (top) course as indicated on the plans.

##### 1.02 REFERENCES:

- A. Reference to the standards, specifications and tests of technical societies, organizations and governmental bodies are made in the Contract Documents.
  - 1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).
  - 2. ASTM - ASTM International.
  - 3. Latest edition of the standards for the New Hampshire Department of Transportation (NHDOT), hereinafter referred to as the "NHDOT Standard Specifications."

##### 1.03 SUBMITTALS – IN ACCORDANCE WITH SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Asphalt emulsion Type SS-1 product and application specification.
- B. Catalog cuts and manufacturer's specifications for Airport Grade Asphalt Emulsion Mix and Aggregate.
- C. Compaction tests are required on all HMA base surfaces on a 50' grid interval or per Owner's direction. At the Contractor's expense, an independent testing agency

must perform the work and submit the results directly to the Landscape Architect.

1.04 WARRANTY

The pavement and coatings shall be guaranteed against defects in workmanship or quality for a period of one (1) year after final acceptance. The Contractor shall replace, repair, recoat or otherwise make satisfactory to the Owner any unacceptable pavement and or coating at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 HMA PAVEMENT:

- A. HMA Pavement shall consist of binder mix and top courses constructed to the thicknesses shown on the plans and shall conform to the relevant provisions of NHDOT Standard Specifications unless specified otherwise hereinafter.
- B. The joint sealant shall be a hot poured rubberized emulsified asphalt sealant meeting the requirements of Federal Specifications SS-S-1401 or SS-S-164.
- C. The tack coat shall be an asphalt emulsion, RS-1 if required, conforming to sections of the NHDOT Standard Specifications.
- D. Porous asphalt pavement material shall be accordance with the following:
  - Asphalt Materials
  - Performance Graded Binder, PG 70-22, or PG 76-22..... 902.01(a)
  - Coarse Aggregates shall be Class B or higher ..... 904.03
  - Fibers.....AASHTO M 325
  - Fine Aggregates .....904.02

A Design Mix Formula (DMF) shall be prepared in accordance with sections of the NHDOT Standard Specifications except that the DMF will be based on OG19.0 mm open graded mixture designation in accordance with specifications. The DMF shall be submitted in the current NHDOT format as a submittal. The DMF shall list the minimum plant discharge temperature for HMA and WMA as applicable to the mixture.

The DMF shall be determined for the porous asphalt mixture from a volumetric mix design for OG19.0 mm open graded mixture in accordance with Section 401.05 of the NHDOT Standard Specifications. The DMF shall meet the following criteria:

- Course aggregates will be steel slag, limestone or crushed gravel with a crushed content of  $\geq 90\%$  two face and one face.
- Binder selection will be PG 76-22 or PG 70-22 with fibers.
- Air void will be  $\geq 16\%$  using ASTM D 6752, Vacuum Sealing method
- VMA should be  $\geq 26\%$  using ASTM D 6752, Vacuum sealing method

- Draindown test will be  $\leq 3\%$  (open graded mixtures may incorporate fibers).
- Gyrotory compaction shall be 20 gyrations at 260 $\pm$  9 degrees F.

The single percentage of aggregate passing each required sieve shall be within the following limits:

Sieve Requirement Tolerances 19.0mm	100%	-
12.5mm	70 – 90%	+/- 5%
9.5mm	40 – 65%	+/- 5%
4.75mm	15 – 30%	+/- 5%
2.36mm	8 – 15%	+/- 5%
0.60mm	5 – 9%	+/- 2%
0.075mm	1 – 8%	+/- 2%
Binder %	5.5% min	+/- 0.7%

## 2.02 ASPHALT EMULSION:

- A. Asphalt emulsion tack coat shall be Type SS-1 or SS-1H as specified by the Asphalt Institute.

## 2.03 TROWELABLE ASPHALT FILLER/PATCH:

- A. Airport grade asphalt emulsion mix and aggregate shall be used to repair gouges or cracks which can then be brought to grade to receive an overlay or color sealcoat.

## PART 3 - EXECUTION

### 3.01 HMA PAVEMENT:

- A. HMA pavements shall be constructed on a prepared foundation of gravel in accordance with the NHDOT Standard Specifications, except where overlayment is over existing pavement.
- B. The HMA mixtures shall be placed on the approved base only when, in the opinion of the Landscape Architect, the course is sufficiently dry and weather conditions are suitable.
- C. Where walls, curbing, or other suitable permanent supports are not present, the Contractor shall secure proper alignment and adequate compaction of the binder and surface courses as shown on the Contract Drawings and finish all edges with a neat, tamped edge.
- D. The mixture shall be placed in two (2) courses as shown on the Contract Drawings. Each course shall be spread and finished as required in the NHDOT Standard Specifications.

- E. Prior to completion of HMA overlay, the Contractor shall have the existing patched surfaces tack coated and leveled to eliminate all “birdbaths” or extreme lows which may create ponding or drainage problems. Leveling course (surface treatment) HMA applied as necessary, shall be raked and feathered and be properly rolled and compacted. The Contractor shall apply “level” lines, screeds, or use other measures to achieve the proper leveling surface suitable for overlay.

All adhesive fabric shall be in place and approved prior to completing this work.

- F. After completion, the HMA courses shall conform to the thickness shown on the Contract Drawings, smooth and even and of a dense and uniform structure. When tested with a sixteen (16) foot straight edge placed parallel to the centerline of the pavement, there shall be no deviation from a true surface in excess of one-quarter (1/4) inch.

### 3.02 ASPHALT EMULSION TACK COAT:

- A. To all existing surfaces to be pave against or overlaid, apply a single very thin (0.05 to 0.15 gallons per square yard) application of diluted asphalt emulsion (Type SS-1) to cover the entire surface of existing pavement.
- B. Essential qualities of coverage are (1) it must be very thin and (2) uniformly cover the entire surface of existing pavement.
- C. Place only that amount of tack coat which can be overlaid with new pavement by the end of each day, and **IF RAIN IS ANTICIPATED DO NOT APPLY TACK COAT.**

END OF SECTION



## SECTION 32 16 00

### CURBING

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This section covers furnishing and installation of granite curb, hot mix asphalt curb and precast parking curb, where required, as shown on the Drawings and herein specified.
- B. This section also covers replacement of curbing removed during construction.

##### 1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK.
- B. Section 32 14 13.19, HOT MIX ASPHALT PAVEMENT.

##### 1.03 REFERENCES:

The following standards form a part of these specifications, as referenced:

New Hampshire Department of Transportation (NHDOT) Standard Specifications

##### 1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

Shop drawings, showing dimensions of typical curb sections.

#### PART 2 - PRODUCTS

##### 2.01 GRANITE CURBING:

- A. Granite curbing shall be Type VAI conforming to the latest edition of the NHDOT Standard Specifications
- B. Special shapes and corners shall be supplied as required.

#### PART 3 - EXECUTION

##### 3.01 GRANITE CURBING:

- A. Removal and resetting and/or removal and replacing of granite curbing shall be in accordance with Subsection 580 of the latest edition of the NHDOT Standard

Specifications. The curbing shall have a 6-inch reveal unless otherwise required by the Engineer.

- B. Except as modified herein or on the drawings, installation of curbing shall conform to the NHDOT Standard Specifications.
- C. Excavation shall be made to the bottom of the 6-inch gravel base below the curbing, the trench being sufficiently wide to permit thorough tamping. The base shall be compacted to a firm, even surface and shall be approved by the Engineer.
- D. The curbing shall be set on edge and settled into place with a heavy wooden hand-rammer, to the line and grade required, straight and true for the full depth. The joints of the stone curbing shall be pointed with mortar for the full depth of the curbing. At approximately 50-foot intervals, a 1/2-inch joint shall not be filled with mortar but left free for expansion. The ends of the stone curbing at driveways and intersections shall be cut at a bevel or rounded as required by the Engineer.
- E. The trench for the stone curbing shall be backfilled with approved concrete until the trench is filled per construction detail .

END OF SECTION

## SECTION 32 92 19

### SEEDING

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This Section includes furnishing all labor, materials, equipment, seed and incidental materials necessary to accomplish all grass seeding and related work, complete in place, maintained, and accepted, in accordance with the Contact Drawings and Specifications. All grassed areas disturbed by the Contractor's operations shall be repaired as herein specified.
- B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of grass seeded areas, as part of the work of this contract.

##### 1.02 RELATED WORK:

- A. Section 31 05 13.13, LOAM BORROW

##### 1.03 SUBMITTALS:

In accordance with requirements of Section 01 33 23 SUBMITTALS, the Contractor shall submit the following to the Engineer for review and approval:

- A. Information for seed mixes including the following:
  - 1. Name and address of the seed supplier.
  - 2. Source of origin and dates of harvest for each of the various types of seed
  - 3. Certification of seed mix composition and proportion, indicating named seed varieties by percent, percent germination, purity, and percent crop seed, percent inert matter, and percent weed seed content.
  - 4. Estimated number of seeds per pound of each type of seed in the mix
- B. Information detailing proposed limestone, fertilizers, insecticides, herbicides, fungicides, mulch materials, hydroseeding materials (as required), and slope protection material (as required) to be applied to seeded areas.
- C. Watering, fertilizing and maintenance schedule.

- D. Marked up prints indicating the square footage of all proposed seeded areas with quantities of various soil additives and amendments, and quantities of seed for each area prior to beginning work.

## PART 2 - PRODUCTS

### 2.01 MATERIALS:

#### A. LOAM BORROW:

- 1. Loam Borrow shall be as specified in Section 31 05 13.13, LOAM BORROW.

#### B. LIMESTONE:

- 1. Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

#### C. FERTILIZER:

- 1. Fertilizer shall be a complete, standard commercial fertilizer, homogenous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.
- 2. The analysis for supplemental maintenance fertilizer shall have a ratio of Nitrogen (N) – Phosphorous (P) – Potassium (K) of approximately 4 – 1 – 2 and shall be applied to deliver 1 pound of Nitrogen per 1000 square feet, or as approved by the Engineer. At least 50 percent of nitrogenous elements shall be Urea-form or derived from organic sources and contain no less than 3 percent water soluble Nitrogen.

#### D. SEED:

- 1. Seed shall be of an approved perennial variety mixture, the previous year's crop, clean, and high in germinating value. Weed seed content shall be less than 0.5 percent and include no noxious weeds. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates of compliance relative to mixture purity and germinating value. Seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with applicable State and Federal laws. Seed that has become wet, moldy or otherwise damaged shall not be accepted.

2. Grass seed for lawn areas shall conform to the following requirements:

Botanical and Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Chewing's Fescue (Festuca rubra commutata)	30%	70%	97%
'Kentucky 31' Tall Fescue (Festuca arundinacea 'Kentucky 31')	30%	90%	98%
Kentucky Bluegrass (Poa pratensis)	20%	80%	85%
Perennial Ryegrass (Lolium perenne)	20%	90%	98%

G. HYDROSEED MULCH, TACKIFIERS AND WATER RETENTION AGENTS:

1. Wood fiber mulch for Hydroseed application shall be a manufactured product of natural wood cellulose fibers with a non-toxic green marking dye incorporated to ensure uniform distribution. Mulch shall be packed in sealed original containers, clearly labeled with brand name and manufacturer. It shall have delivered moisture content less than 12 percent.
2. Hydroseed tackifier shall be a powdered starch-based product approved by the Engineer. Hydroseed tackifier shall be applied in conjunction with the hydroseed slurry in accordance with the manufacturer's recommendations.
3. Moisture retention agent shall be a powdered starch-based product, approved by the Engineer, and shall be capable of retaining up to 400 times their weight in water. Moisture retaining agents shall be added to the hydroseed slurry in accordance with the manufacturer's recommendations. Moisture retention agent shall be 'Hydro-Gel', as manufactured by Finn Corporation, Fairfield, OH.

H. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100 percent biodegradable mesh with 100 percent biodegradable straw or straw/coconut fill. Fill shall be held together by biodegradable fastening. Weight shall be 0.50 pounds per square yard. Erosion control blankets shall be applied parallel to direction of water flow. The erosion control blankets shall be by North American Green, Evansville, IN or approved equal. For slopes 2:1 or greater, erosion control blanket shall be composed of 70

percent straw 30 percent coconut fiber, Model SC150. For slopes less than 2:1, erosion control blanket shall be a high velocity straw matting, Model S150.

2. Six-inch wire staples shall be placed in accordance with the manufacturer's recommendations to anchor the mesh material. Staples shall be biodegradable.

I. WATER:

1. Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be the furnished by the Contractor, at no additional cost to the Owner.

J. INSECTICIDES:

1. No insecticides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.
2. Insecticides shall be EPA registered and approved for use in public open spaces. All insecticides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
3. Insecticide use shall be limited and selective, only to control specific insect infestations, as identified by the Contractor or the Owner's Representative, that may result in the disfigurement, decline, or death of plant materials.
4. Grub control insecticide shall be Proturf Insecticide III, as manufactured by A.M. Scotts & Sons, Inc.; Dursban Granules, as manufactured by Old Fox Chemical Corp., or APMC; or approved equal.

K. HERBICIDES:

1. No herbicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.
2. All herbicides shall be EPA registered and approved for use in public open spaces. All herbicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
3. Herbicide for post-emergent application shall be glyphosate contact, 'Roundup', as manufactured by Monsanto, Inc., or approved equal.

4. Herbicide use shall be limited and selective, only to control specific weed infestations that have been identified by the Contractor or the Owner's Representative.

L. FUNGICIDES:

1. No fungicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.
2. Fungicides shall be EPA registered and approved for use in public open spaces. All fungicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
3. Fungicide use shall be limited and selective, only to control specific fungal pathogenic disease infestations, as identified by the Contractor or the Owner's Representative that may result in the disfigurement, decline, or death of plant materials.

PART 3 - EXECUTION

3.01 GENERAL:

- A. All work shall be performed by skilled workers with a minimum of 2 years of seeded lawn construction and establishment experience and under the full-time supervision of a qualified foreman.
- B. Seeding operations shall not begin less than 4 days after the application of lime and fertilizer and the seedbed areas are reviewed and approved by the Engineer.
- C. Seeding shall be done when soil and weather conditions permit in early spring, until June 15, or from September 10 to October 15, unless otherwise approved. If it becomes necessary for seed to be sown after June 15, provisions shall be made for supplementary water and using a mulch cover over lawn areas.
- D. If there is a delay in seeding, during which weeds grow, or soil is washed out, the Contractor shall eliminate the weeds by chemical or physical means, or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.
- E. Seed shall be sown at the approved rate, on a non-windy day by machine, or as approved by the Engineer.
- F. The surface shall be kept moist by a fine spray until the seed shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 square feet, the Contractor shall reseed, roll, and water as necessary to obtain proper germination.

- G. If there is insufficient time in the planting season to complete soil preparations, fertilizing, and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor, or as required by the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.
- H. Protection of all newly loamed and graded areas is required and shall be accomplished by whatever means necessary such as mulch applied with a tackifier, or by other means approved by the Engineer. The Contractor shall be responsible for the prevention of siltation in areas beyond the limit of work and for all means of protection throughout the maintenance period at no additional cost to the Owner.

### 3.02 SURFACE PREPARATION:

- A. If approved by the Engineer, the entire site area to be seeded shall be treated with an approved herbicide, in accordance with the manufacturer's instructions, not less than 7 days before the start of seeding operations.
- B. If approved by the Engineer, grub control insecticide shall be spread on the surface of the seedbed, in accordance with the manufacturer's instructions, after the seedbed has been properly graded, not less than 24 hours before the start of seeding operations.

### 3.03 BROADCAST SEEDING, PLACING MULCH AND SLOPE EROSION PROTECTION:

- A. The seed mix shall be broadcast at 6 pounds per 1000 square feet, as recommended by the seed supplier, or as required by the Engineer. Seed shall be divided into 2 equal amounts and uniformly distributed in 2 applications at right angles to each other. Seed shall then be raked lightly into the soil to a depth of 1/4-inch.
- B. If mulch is not necessary the seed shall be directly firmed into the soil with a roller that will apply pressure between 75 and 100 pounds per linear foot of width.
- C. Straw Mulch shall be used based on time of seeding as previously specified over all seeded areas, as designated on the plans, or as otherwise required. If mulch is to be used, it shall be loosely spread to a uniform depth at a rate of 4-1/2 tons per acre to provide 1/4-inch of cover, or as otherwise required. The seed and mulch shall then be firmed into the soil with a roller that will apply a pressure between 75 and 100 pounds per foot of width.
- D. Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer, the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.



- E. Slope erosion control blankets shall be placed as indicated on the plans or as required by the Engineer.

#### 3.04 HYDROSEEDING:

- A. The application of lime, fertilizer, grass seed and mulch may be accomplished in a single operation with the use of approved hydroseeding equipment. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The slurry shall be of such consistency that it can be sprayed from a hydroseed gun or through at least 200 feet of 1½- inch diameter hose. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed, and mulch shall be equal to the specified quantities.
- B. Prior to the start of hydroseeding, the Contractor shall furnish to the Engineer, in writing, the weights of limestone, fertilizer, grass seed, mulch, tackifier (as required) and moisture retention agent (as required) per 100 gallons of water to be used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of hydroseeding operations are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other means.
- C. Seed shall be incorporated with the mulching material to obtain a minimum hydroseeded sown coverage of 200 pounds of the specified seed mix per acre, as recommended by the seed suppliers, or as required by the Engineer.
- D. Wood fiber mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise directed. Mulch shall be placed by spraying from an approved spraying machine with pressure sufficient to cover the entire area in a single operation.
- E. The Contractor shall immediately cleanup hydroseed oversprays from plant materials, pavements, furnishings, etc., to the satisfaction of the Engineer.

#### 3.05 MAINTENANCE:

- A. The Contractor shall maintain and protect the entire seeded area, as necessary to ensure dense healthy growth, until completion of the guarantee period and final acceptance of the project, or for 60 days, whichever is longer. If lawns are planted in late summer or during the fall, maintenance shall continue through the following spring for at least 30 days. Maintenance shall include watering as specified, liming, fertilizing, removal of stones, control of weeds, insect pests and fungal pathogens, and regular mowing. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

- B. The first cutting of lawn areas shall be done when the grass is between 2½ - to 3-inches in height. The lawn shall be cut no shorter than 2-inches in height and shall be regularly mowed as necessary to maintain the above-prescribed conditions. All cuttings shall be removed from the lawn during the maintenance period and disposed of off-site.
- C. The Contractor shall be responsible to regularly water seeded areas with the equivalent of 1-inch minimum of rainfall per week, or as necessary to develop and sustain dense, green growth.
- D. Six weeks after turf has established, and only during the months of April, May, or September, the Contractor shall apply fertilizer as specified above, at one half the rate recommended by the initial soils laboratory tests, or as required by the Engineer.
- E. The Contractor shall be responsible for securing all seeded areas from physical damage as necessary, including warning signs, barriers, temporary fencing, or other means of protection, through the guarantee period until final acceptance. All damaged areas shall be repaired to reestablish healthy vigorous growth of turf to the satisfaction of the Engineer, at no additional cost to the Owner. All temporary barriers shall remain the property of the Contractor and shall be removed by the Contractor upon final acceptance by the Engineer.
- F. Pavement shall be kept clean and clear of cuttings and debris at all times during the maintenance period to the satisfaction of the Engineer.

### 3.06 INSPECTION AND PRELIMINARY ACCEPTANCE:

- A. At the beginning of the planting season following that in which the permanent grass crop is sown, seeded areas will be inspected. Any section not showing dense, vigorous growth shall be promptly reseeded by the Contractor at no additional cost to the Owner. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor, as many times as necessary, in accordance with these specifications, until they are accepted.
- B. The Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals, or replacements.
- C. Inspection and acceptance of seeded areas may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

### 3.07 GUARANTEE:

- A. Seeded areas shall be guaranteed until final acceptance of the project, or, in the case of late summer or fall planting, the guarantee period shall extend through the following spring.

- B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.
- C. Guarantee shall not apply to the replacement of seeded lawns resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.
- D. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.08 FINAL INSPECTION AND FINAL ACCEPTANCE:

- A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.
- B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

## SECTION 33 05 13.13

### RAISING AND/OR RESETTING OF MANHOLE FRAME AND COVER

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. This Section covers raising and/or resetting of sewer manhole frame and cover. The work includes raising, resetting, and/or adjusting of structures to line and grade.

##### 1.02 RELATED WORK

- A. Section 01 12 16, SCOPE AND SEQUENCE OF WORK
- B. Section 01 14 19.22, HANDLING EXISTING FLOWS
- C. Section 01 33 19, DOCUMENTATION
- D. Section 01 33 23, SUBMITTALS
- E. Section 33 39 13, PRECAST MANHOLES AND CATCH BASINS

#### PART 2 - PRODUCT

##### 2.01 SEWER COVER:

- A. Contractor to reuse Owner's existing frames and covers, unless they are damaged and need to be replaced. If replacement is needed the items should be specified, cover shall be the standard of the Owner.

#### PART 3 - EXECUTION

##### 3.01 RAISING AND/OR RESETTING OF MANHOLE FRAME AND COVER:

- A. In areas where bituminous pavement exists, existing sewer manhole castings shall be raised to the proper grade where indicated on the contract drawings or as required by the Engineer.
- B. Cut around manhole castings a minimum of 8-inches from casting. Excavate and remove old masonry to such a depth as required by the Engineer and rebuild masonry below the bottom of the casting. Backfill with mortar or bituminous concrete. Place high, early strength concrete or bituminous concrete collar, as required, to approximately 1-1/2-inches

below the raised casting grade.

- D. The Contractor shall provide a top course approximately 1-1/2-inches thick and shall match existing surrounding grades and pavement materials. The Contractor shall provide a watertight seal between the masonry work and the casting.

3.02 INSTALLATION OF MANHOLE FRAME AND COVER:

- A. Where necessary, replacement covers and frames shall be furnished and installed in-place by the Contractor. The cover and frame shall provide a watertight seal.

END OF SECTION

SECTION 33 05 26.13

TRACER TAPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing, handling, and installation of tracer tape at utility conduit and pipe locations where utilities are indicated on plans.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer's literature on the materials, colors and printing specified herein, shall be submitted to the Engineer for review.
- B. Tape samples shall also be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Tracer tape shall be by Reef Industries, Houston, TX; Empire Level, Mukwonago, WI; Pro-Line Safety Products Co., W. Chicago, IL; or approved equal.

2.02 TRACER TAPE:

- A. Tracer tape shall be at least 3-inches wide.
- B. Tracer tape for non-ferrous pipe or conduit shall be constructed of a metallic core bonded to plastic layers. The metallic tracer tape shall be a minimum 5-mil thick and must be locatable at a depth of 18-inches with ordinary pipe locaters.
- C. Tracer tape for ferrous pipe or conduit shall consist of multiple bonded plastic layers. The non-metallic tracer tape shall elongate at least 500% before breaking.
- D. The tape shall bear the wording: "BURIED DRAIN LINE BELOW" (with "DRAIN" replaced by "WATER", "SEWER", "ELECTRICAL", "GAS", "TELEPHONE", or "CHEMICAL" as appropriate), continuously repeated every 30-inches to identify the pipe.
- E. Tape colors shall be as follows, as recommended by the American Public Works Association (APWA):

Electric	Red
Gas & Oil	Yellow

Communications	Orange
Water	Blue
Sewer & Drain	Green
Chemical	Red (not APWA)

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

- A. Tracer tape shall be installed directly above the pipe or conduit it is to identify, approximately 12-inches below the proposed ground surface.
- B. The Contractor shall follow the manufacturer's recommendations for installation of the tape, as approved by the Engineer.

END OF SECTION

SECTION 33 11 13.28

HIGH DENSITY POLYETHYLENE PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers furnishing, handling, laying, joining and installation of HDPE piping, fittings and appurtenances.
- B. The Contractor shall furnish and install the various pipelines and appurtenant work as indicated on the Contract Drawings and as specified herein, or as reasonably required to produce a complete, proper, and functional installation in accordance with the intent of these Contract Documents.

1.02 RELATED WORK:

- A. Section 02 66 00.16, FLEXIBLE MEMBRANE LINER
- B. Section 31 00 00, EARTHWORK
- C. Section 33 39 13, PRECAST MANHOLES AND CATCH BASINS
- D. Section 33 31 13.16, POLYVINYL CHLORIDE GRAVITY PIPE & FITTINGS

1.03 REFERENCES:

- A. The following standards form a part of this specification as referenced:

American Water Works Association (AWWA)

AWWA C906 Polyethylene PE Pressure Pipe and fittings, 4 in. through 63 in.,  
for Water Distribution

ASTM International

ASTM D1248 Specifications for Polyethylene Plastics Molding and Extrusion  
Materials.

ASTM D2837 Method for Obtaining Hydrostatic Design Basis for Thermoplastic  
Pipe Materials.

ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings  
Materials



ASTM F714 Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

Plastic Pipe Institute (PPI)

PPI TR-3 Policies and Procedures for Developing Hydrostatic Design Stresses for Thermoplastic Pipe Materials.

#### 1.04 QUALITY ASSURANCE:

- A. All pipe and fittings shall be inspected and tested at the factory as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates providing evidence of such tests.
- B. The Owner reserves the right to have any or all pipe, fittings, and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.
- C. Deflections in horizontal alignment will not be permitted at joints without written consent of the Engineer. If approved, deflections shall not exceed one-half the manufacturer's recommendation.
- D. When requested by the Engineer, the Contractor shall ensure that a qualified representative of the manufacturer shall be present at the jobsite for the first day of pipe laying, to assure that proper procedures are followed.
- E. The Engineer shall be notified in advance when the location of an existing pipeline conflicts with the proposed location of the Work.
- F. Pipe and fittings of the same type shall be products of a single manufacturer.
- G. All piping shall be of the type and size shown on the drawings and described in this section of the Specifications.

#### 1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Pipes and fittings shall be carefully handled when loading and unloading. Pipes shall be lifted by hoists or lowered on skidways in such a manner as to avoid shock.
- B. HDPE pipe shall be protected from exposure to sunlight (unless restrained in racks) to prevent bowing of the pipe due to expansion and contraction. Such protection shall consist of canvas covering, or other material, as recommended by the manufacturer. Plastic sheets, which may allow excessive temperatures to develop where the pipe is stored, shall not be used.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Shop drawings shall consist of manufacturer's scale drawings or catalog cuts including descriptive literature and complete characteristics, specifications, and code requirements. Shop drawings shall be submitted for the HDPE pressure pipe, type of joints, fittings, and couplings, in accordance with the specifications.

PART 2 - PRODUCTS

2.01 HIGH-DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS:

- A. All HDPE pipe and fittings shall be manufactured from virgin polyethylene resin, PE 4710, and shall conform to ASTM F714.
- B. All polyethylene fittings shall have a pressure rating equal to or higher than the pressure rating of the pipe.
- C. All HDPE fittings at the manholes shall have ANSI Class 150 316 stainless steel backing rings.
- D. Unless noted otherwise, all pipe and fittings shall be SDR 21 rated at 80 psi.
- D. All piping and valves shall be supported by the size and style supports shown in the drawings, or an approved equal.
- F. Pipe shall be homogeneous throughout; free from voids, cracks, and other defects; as uniform as commercially practicable in color, density, and other physical properties.
- G. Pipe surfaces shall be free from nicks, scratches, and other blemishes. The joining surfaces of pipe shall be free from gouges and other imperfections that could cause leakage at joints.
- H. Fittings for transition from the HDPE main to the PVC building service shall be one of the following, or an approved equal, as recommended by the pipe manufacturer:
  - 1. Electrofusion saddles as manufactured by Central Plastics.
  - 2. Conventional fusion saddles as manufactured by Central Plastics, Philips Driscopipe, or Plexco.
  - 3. INSERTA TEE as manufactured by Fowler Manufacturing Co.

For fused saddles, transition couplings for HDPE to PVC shall be submitted for approval.

2.02 PERFORATED HIGH-DENSITY POLYETHYLENE (HDPE) PIPE:

- A. All perforated HDPE pipe shall be manufactured and have the characteristics of the solid HDPE pipe specified above and meet perforation requirements of ASTM F810.

- B. Pipe perforations shall consist of two 3/4-inch diameter holes, 5-inches o.c throughout the length of the pipe. The holes shall be drilled on the bottom side of the pipe, at 60 degrees on each side of the vertical centerline.

### PART 3 - EXECUTION

#### 3.01 INSPECTION BEFORE INSTALLATION:

- A. Each length of pipe and each fitting shall be carefully inspected prior to being lowered into the trench. All materials not meeting the requirements of these specifications, or otherwise found defective or unsatisfactory by the Engineer, shall be rejected and immediately marked and removed from the jobsite by the Contractor.
- B. Bedding, sub-bedding, and other trench conditions shall be carefully inspected prior to laying pipe. All conditions shall be made available to the Engineer for inspection.

#### 3.02 PIPE INSTALLATION:

- A. Pipe interiors, fitting interiors, and joint surfaces shall be thoroughly cleaned prior to installation. Pipes and fittings shall be maintained clean. For HDPE pipe, a clean cotton cloth shall be employed for cleaning; polyester-type materials shall not be used as they may melt during fusion procedures.
- B. Pipes shall be installed in the locations and to the required lines and grades shown on the drawings and provided in these Specifications, using an approved method of control.
- C. Excavations shall be maintained free of water during the progress of the Work. No pipes shall be laid in water, nor shall there be any joints made up in water.
- D. If any defective pipe is discovered after being placed, removal and replacement with sound pipe will be required at no additional cost to the Owner.

#### 3.03 HDPE PIPE JOINING:

- A. HDPE pipe should be joined by butt-fusion methods, having a completely uniform and monolithic pipe interior according to the fusion joining procedures as instructed by the manufacturer.
- B. Each individual performing fusion joining shall have had at least one year of experience in the use of the fusion procedure.
- C. Inspection of joints shall be performed by a person qualified by training or experience to evaluate the acceptability of HDPE joints made under the applicable joining procedures.
- D. The pipe sections shall be joined at ground level to a length recommended by the manufacturer, such that when pulling the pipe into position alongside the trench, maximum allowable stress is not exceeded. Use appropriate materials and equipment, as

recommended by the HDPE pipe manufacturer, when pulling butt-fused pipe sections alongside the trench, to prevent pipe damage.

- E. HDPE pipe boots shall be provided on all entrance piping in manholes.

END OF SECTION

## SECTION 33 44 19.13

### STORMWATER TREATMENT SYSTEM

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED:

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install all precast concrete storm-water treatment systems and appurtenances in accordance with the Drawings and these specifications.

##### 1.02 RELATED WORK:

- A. Section 03 05 00, FIELD CONCRETE
- B. Section 31 00 00, EARTHWORK

##### 1.03 QUALITY CONTROL INSPECTION:

- A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.
- B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.
- C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi when tested in accordance with ASTM C-109. Epoxy mortar may be utilized for repairs.

##### 1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Shop Drawings

Structural design calculations and shop drawings, which shall be certified by a Professional Engineer retained by the system manufacturer or Contractor and licensed in the state where the system is to be installed.

B. Affidavit on patent infringement

The Contractor shall submit to the Engineer, prior to installation of the stormwater treatment system, an affidavit regarding patent infringement rights stating that any suit or claim against the Owner due to alleged infringement rights shall be defended by the Contractor who will bear all the costs, expenses and attorney's fees incurred thereof.

C. Performance Documentation

The following documentation must be submitted by the Contractor and approved by the Engineer prior to the manufacture and delivery of any materials.

1. Laboratory Data

The stormwater treatment system supplier shall provide documentation of Total Suspended Solids (TSS) removal efficiency from laboratory testing conducted on the supplier's full-scale system. The documentation shall include:

- a. TSS removal efficiency versus operating rate for the full operating range of the stormwater treatment system for a uniform 50-micron particle size.
- b. TSS removal calculations for each system specified herein. The calculations must demonstrate that the system(s) is capable of achieving a net annual TSS removal efficiency as required by local regulations and as based upon a uniform 50-micron particle size and the best available rainfall data for the project site location.

2. Field Test Data

The stormwater treatment system supplier shall provide documentation of TSS removal efficiency from field testing conducted on an installed system. The documentation shall be in accordance with the following:

- a. The testing and documentation shall have been conducted by an independent third party.
- b. The testing and documentation shall include at least 10 storms.
- c. The testing and documentation must show TSS removal results that meet or exceed the performance requirements for the system(s) specified herein.

3. Manufacturing Experience

The stormwater treatment supplier shall provide evidence of at least 5 years of successful product design and use. The supplier shall provide an installation list of projects, model sizes installed and installation dates where the same type systems as specified herein have been designed and produced by the supplier.

D. Operation and Maintenance Manuals

Furnish four copies of the operation and maintenance manuals for the stormwater treatment systems.

PART 2 - PRODUCTS

2.01 MATERIALS AND DESIGN:

- A. Concrete for precast storm-water treatment systems shall conform to ASTM C 857 and C 858 and meet the following additional requirements:
1. The wall thickness shall not be less than 6-inches (152 mm) or as shown on the dimensional drawings. In all cases the top slab and wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 loading requirements as determined by a Licensed Professional Engineer.
  2. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.
  3. Cement shall be Type II Portland cement conforming to ASTM C 150.
  4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or until 5 days after fabrication and/or repair, whichever is the longer.
  5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a rubber seal system meeting the requirements of ASTM C923.
- B. Internal aluminum plate components shall be ¼-inch (6 mm) thick aluminum alloy 5052-H32 in accordance with ASTM B 209.
- C. Internal aluminum angle components shall be ¼-inch (6 mm) thick aluminum alloy 6063 in accordance with ASTM B 308.
- D. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.
- E. Casting for manhole frames and covers shall be in accordance with ASTM A48, CLASS 30B and AASHTO M105.
- F. A bitumen sealant in conformance with ASTM C 990 shall be utilized in affixing the aluminum swirl chamber to the concrete vault.

2.02 PERFORMANCE:

- A. Unless otherwise indicated, all equipment used shall provide the results listed in the schedule below. Proposed equipment shall be submitted in writing to the Engineer, along with sufficient data supported by certified tests that the system can meet the end results shown in the table and this specification section:

**Table 2.02**

<b>Location</b>	<b>Vortechs Model (1)</b>	<b>Design Treatment Capacity (cfs) (2)</b>	<b>Sediment Storage (yd<sup>3</sup>) (2)</b>

(1) Systems shall be Vortechs Models as noted or approved equal.

(2) The systems shall be capable of providing above flow capacities and sediment storage volumes.

- B. Each stormwater treatment system shall include a circular aluminum “swirl chamber” (or “grit chamber”) with a tangential inlet to induce a swirling flow pattern that will accumulate and store settle-able solids in a manner and a location that will prevent re-suspension of previously captured particulates.
- C. Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.
- D. Each stormwater treatment system shall be capable of removing 80% of the net annual Total Suspended Solids (TSS) load based on a uniform 50-micron particle size. Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests. Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location. Individual stormwater treatment systems shall have the Design Treatment Capacity listed in Table 2.02, and shall not resuspend trapped sediments or reentrain floating contaminants at flow rates up to and including the specified Design Treatment Capacity.
- E. Individual stormwater treatment systems shall have usable sediment storage capacity of not less than the corresponding volume listed in Table 2.02. The systems shall be designed such that the pump-out volume is less than ½ of the total system volume. The systems shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.
- F. A feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable



contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.

- G. The stormwater treatment system manufacturer shall furnish documentation which supports all product performance claims and features, storage capacities and maintenance requirements.
- H. Stormwater treatment systems shall be completely housed within one structure.

#### 2.03 MANUFACTURER:

- A. Each stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff during the aforementioned period.
- B. Each stormwater treatment system shall be a Vortechs<sup>TM</sup> System as manufactured by Vortechtechnics, Inc., 41 Evergreen Drive, Portland, Maine 04103, or approved equal.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

- A. Each stormwater treatment system shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise required by the Engineer.
- B. Place the precast base unit on a granular subbase of minimum thickness of six inches after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.
- C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C 990-91 along the construction joint in the section that is already in place.
- D. After setting the base and wall or riser sections, install the circular swirl chamber wall by bolting the swirl chamber to the side walls at the three (3) tangent points and at the 3-inch wide inlet tab using HILTI brand concrete anchors or equivalent 1/2-inch diameter by 2-3/4-inch minimum length at heights of approximately 3-inches off the floor and at the mid-height of the completed trap (at locations of pre-drilled holes in aluminum components). Seal the bottom edge of the swirl chamber to the trap floor with the supplied aluminum angle flange. Adhere 1/4-inch thick by 1-inch wide neoprene sponge material to the flange with half of its width on the horizontal leg of the flange and half of its width on the vertical leg. The aluminum angle flange shall be affixed to the floor with a minimum 3/8-inch diameter by 2-3/4-inch drop in wedge anchor at the location of the predrilled holes. Affix the swirl chamber to the flange with hex head 1/4-inch x 1-1/2-inch

zinc coated self- tapping screws at the location of the predrilled holes. Seal the vault sidewalls to the outside of the swirl chamber from the floor to the same height as the inlet pipe invert using butyl mastic or approved equal.

- E. Prior to setting the precast roof section, bitumen sealant equal to ASTM C 990 shall be placed along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least 1-inch greater than the nominal gap between the top of the baffle and the roof section. The nominal gap shall be determined either by field measurement or the shop drawings. After placement of the roof section has compressed the butyl mastic sealant in the gap, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. Also apply non-shrink grout to the joints at the side edges of the baffle wall.
- F. After setting the precast roof section of the storm-water treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a ¼-inch maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Storm-water Treatment Systems shall conform to ASTM specification C 891 “Standard Practice for Installation of Underground Precast Utility Structures”.
- G. Holes made in the concrete sections for handling or other purposes shall be plugged with a nonshrink grout or by using grout in combination with concrete plugs.
- H. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

END OF SECTION