

June 2, 2016

DIN 26162

Mr. Perry Sugg, P.G.  
Permitting Hydrogeologist  
NC DEQ Division of Waste Management  
1646 Mail Service Center  
Raleigh, North Carolina 27699-1646

**RE: Davidson County MSW Landfill  
Phase 2 Area 2 Cell 2 - Rock Blasting Documentation**

Dear Mr. Sugg:

On behalf of Davidson County and based on our earlier correspondence, Smith Gardner, Inc. (S+G) presents this letter to document rock blasting performed recently during construction of Phase 2 Area 2 Cell 2 of the County's municipal solid waste (MSW) landfill. A rock blasting plan was submitted April 8, 2016 and was approved by North Carolina Department of Environmental Quality (NCDEQ) Division of Waste Management (DWM) on April 11, 2016. This report documents the blasting events and provides vibration water level monitoring results as requested by the DWM.

### **Blasting Events**

The blasting was performed National Quarry Services, Inc. (NQS), under subcontract to Shamrock Environmental Corp. who is the general contractor for the project. Personnel from S+G were also present during blasting procedures. Blasting was conducted during daylight hours on April 27 and May 4, 2016. The drill hole pattern, charge weights, and delays were selected to minimize the amount of energy which may impact the underlying rock. The planned peak particle velocities at blast monitoring locations were designed to be <1 inch/sec. The **attached** figure presents the approximate blast locations.

Blasting procedures were executed in general accordance with the approved blasting plan from NQS.

### **Blast Monitoring**

During blasting, seismographs were used to monitor three locations (one adjacent to Area 2 - Cell 1; one north of Cell 2 and between Monitoring Well 2 to the west and Monitoring Wells 10S and 10D (aka PZ-37S and PZ-37D) to the east; and one adjacent to the leachate storage tank facility) for each blast. Locations were selected based on closest proximity to the area that may be affected by the blasting. Measurements were collected for peak particle velocity, frequency, and sound level. **Table 1** presents the data retrieved from each seismograph during each blast event. The peak velocities recorded were well below the generally accepted criterion of 1 in/sec. Blasting records are included in **Attachment 1**.

Mr. Perry Sugg, P.G.

June 2, 2016

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In addition to the use of seismographs, S+G personnel measured water levels in Monitoring Wells 2, 10S, and 10D both before each blast and immediately after the all-clear signal was given. No changes in water levels were noted.

### Rock Removal Quantities

As you know, initial estimates projected removal of up to approximately 20,000 CY of rock to install Area 2 Cell 2. Calculations after blasting indicate approximately 840 CY of rock were removed during the 2 blasting events and which included several large boulders. This was due to the successful ripping of overlying material which turned out to be mostly weathered rock. Rock quantities removed from individual blast areas are summarized below. Rock was removed to 4 feet below subgrade elevations at both locations.

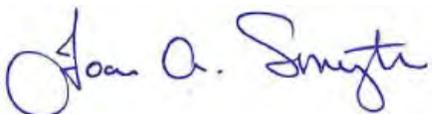
- 4/27/16: 736 CY removed; and
- 5/4/16: 104 CY removed.

### Conclusion

The blasting that was performed in Area 2 Cell 2 appears to have met the rules and requirements of the DWM. Based on the generally low velocities generated and the lack of changes in water levels pre- and post-blast, no changes to the groundwater flow regime are expected and no modifications to the water quality monitoring plan are proposed at this time.

A copy of this blasting summary letter will also be included in the construction quality assurance (CQA) report for the project. Please contact us with any questions or concerns at (919) 828- 0577 or by email below.

Sincerely,  
**SMITH GARDNER, INC.**



Joan A. Smyth, P.G.  
Vice President, Senior Hydrogeologist  
[joan@smithgardnerinc.com](mailto:joan@smithgardnerinc.com)



Pieter K. Scheer, P.E.  
Vice President, Senior Engineer  
[pieter@smithgardnerinc.com](mailto:pieter@smithgardnerinc.com)



Attachments: Figure1- Site Map with Blast Locations  
Table 1 - Seismograph Data  
Attachment 1- Blast Reports

cc: Steven Sink, Davidson County

**GENERAL EROSION AND SEDIMENTATION CONTROL NOTES**

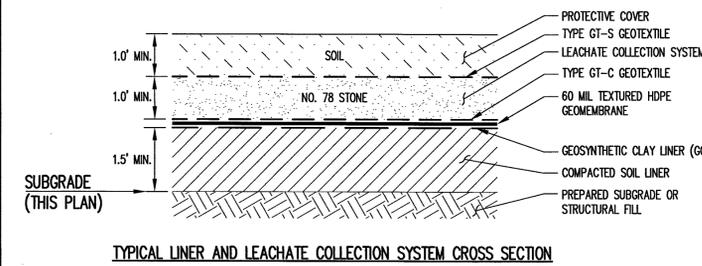
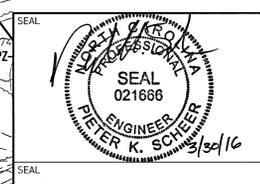
- ALL EROSION AND SEDIMENTATION CONTROL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL AS WELL AS APPLICABLE REGULATIONS.
- EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE ESTABLISHED PRIOR TO, OR AS SOON AS PRACTICAL THEREAFTER, ANY LAND CLEARING OR CONSTRUCTION ACTIVITIES MAY BEGIN. THE CONTRACTOR SHALL FOLLOW THE FOLLOWING SCHEDULE FOR EXPANSION OF BORROW AREA E:
  - CONTACT THE NCDENR DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES, LAND QUALITY SECTION, (WINSTON-SALEM REGIONAL OFFICE: (336) 771-5000).
  - FLAG THE CLEARING LIMITS.
  - INSTALL TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT.
  - CLEAR THE VEGETATED PORTION OF THE SITE AND INSTALL SILT AND STONE FILTER FENCING (WHERE REQUIRED) PRIOR TO STRIPPING/GRUBBING.
  - REMOVE/STOCKPILE SOIL AS REQUIRED FOR CONSTRUCTION.
  - PERFORM FINE GRADING AND ESTABLISH PERMANENT VEGETATION ON COMPLETED AREAS.
  - AFTER STABILIZATION, REMOVE SILT FENCING AND OTHER TEMPORARY MEASURES AS DIRECTED BY THE OWNER AND INSTALL PERMANENT VEGETATION ON THE DISTURBED AREAS.
- ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CONSTRUCTED ACCORDING TO THE CONTRACT DRAWINGS AND SPECIFICATIONS.
- ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT OF GREATER THAN 0.5 INCHES OF RAIN PER 24 HOUR PERIOD AND APPROPRIATE MAINTENANCE CONDUCTED. MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO:
  - THE REMOVAL AND SATISFACTORY DISPOSAL OF TRAPPED OR DEPOSITED SEDIMENTS FROM BASINS, TRAPS, BARRIERS, FILTERS, AND/OR DRAINAGE FEATURES/DEVICES;
  - REPLACEMENT OF FILTER FABRICS USED FOR SILT FENCES UPON LOSS OF EFFICIENCY; AND
  - REPLACEMENT OF ANY OTHER COMPONENTS WHICH ARE DAMAGED OR CANNOT SERVE THE INTENDED USE.
- SOIL STABILIZATION SHALL BE ACHIEVED ON ANY AREA OF THE SITE WHERE LAND-DISTURBING ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED ACCORDING TO THE FOLLOWING SCHEDULE:
  - ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES STEEPER THAN 3 HORIZONTAL TO 1 VERTICAL (3H:1V) SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 7 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY.
  - ALL OTHER DISTURBED AREAS SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 14 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY.
  - BASINS, TRAPS, CHANNELS, AND DIVERSIONS SHALL BE LINED WITH ANCHORED ROLLED EROSION PRODUCTS OR RIP RAP AND/OR VEGETATED UPON CONSTRUCTION.
  - PERMANENT GROUND COVER FOR ALL DISTURBED AREAS SHALL BE ESTABLISHED WITHIN 15 WORKING DAYS OR 90 CALENDAR DAYS (WHICHEVER IS SHORTER) FOLLOWING COMPLETION OF CONSTRUCTION OR DEVELOPMENT.

CULVERT SCHEDULE							
NO.	NO. OF PIPES	SIZE/TYPE	LENGTH (FEET)	SLOPE (%)	INV. IN (FEET)	INV. OUT (FEET)	REMARKS
C-11	1	36" RCP (CLASS III) W/ FES	90	2.8	694.0	691.5	INLET IN DI-11
C-1	1	30" RCP (CLASS III) W/ FES	64	0.8	695.0	694.5	OUTLET IN DI-11
C-J	1	18" RCP (CLASS III) W/ FES (2)	80	1.3	698.0	697.0	-

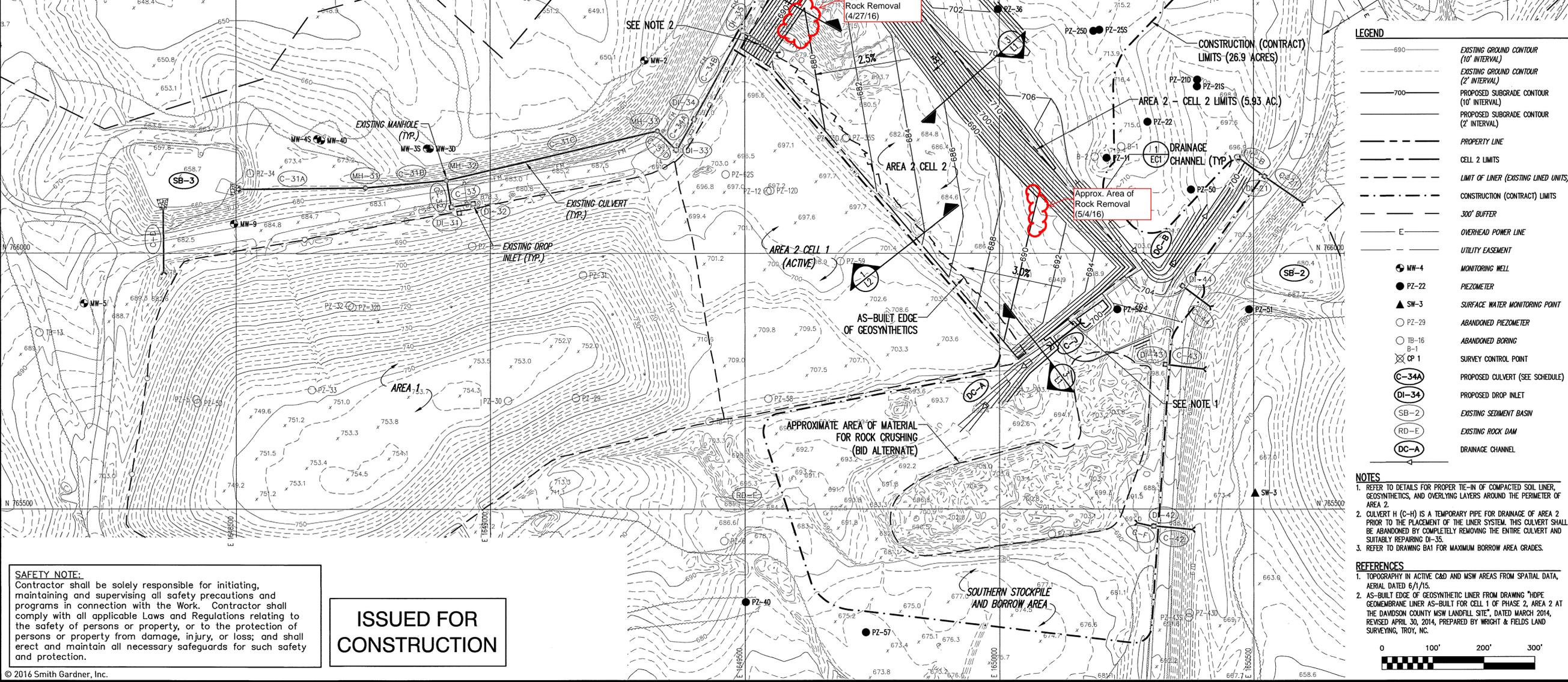
NOTE: PROVIDE 1 FOOT MIN. COVER OVER ALL CULVERTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.

PREPARED FOR:  
**DAVIDSON COUNTY INTEGRATED SOLID WASTE MANAGEMENT LEXINGTON, NORTH CAROLINA**

PREPARED BY:  
NC LIC. NO. C-0828 (ENGINEERING)  
**SMITH+GARDNER ENGINEERS**  
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577



TYPICAL LINER AND LEACHATE COLLECTION SYSTEM CROSS SECTION  
NOT TO SCALE



**LEGEND**

---	EXISTING GROUND CONTOUR (10' INTERVAL)
---	EXISTING GROUND CONTOUR (2' INTERVAL)
---	PROPOSED SUBGRADE CONTOUR (10' INTERVAL)
---	PROPOSED SUBGRADE CONTOUR (2' INTERVAL)
---	PROPERTY LINE
---	CELL 2 LIMITS
---	LIMIT OF LINER (EXISTING LINED UNITS)
---	CONSTRUCTION (CONTRACT) LIMITS
---	300' BUFFER
---	OVERHEAD POWER LINE
---	UTILITY EASEMENT
● MW-4	MONITORING WELL
● PZ-22	PIEZOMETER
▲ SW-3	SURFACE WATER MONITORING POINT
○ PZ-29	ABANDONED PIEZOMETER
○ TB-16	ABANDONED BORING
⊗ CP 1	SURVEY CONTROL POINT
○ C-34A	PROPOSED CULVERT (SEE SCHEDULE)
○ DI-34	PROPOSED DROP INLET
○ SB-2	EXISTING SEDIMENT BASIN
○ RD-E	EXISTING ROCK DAM
○ DC-A	DRAINAGE CHANNEL

REV.	DATE	DESCRIPTION
1	3/16	ISSUED FOR CONSTRUCTION

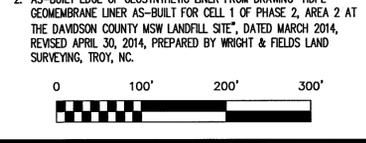
PROJECT TITLE:  
**DAVIDSON COUNTY MSW LANDFILL PHASE 2 - AREA 2 - CELL 2 CONSTRUCTION DRAWINGS**

DRAWING TITLE:  
**AREA 2 - CELL 2 SUBGRADE GRADING AND DRAINAGE PLAN**

DESIGNED: P.K.S.	PROJECT NO: DAVIDCO 15-11
DRAWN: C.T.J.	SCALE: AS SHOWN
APPROVED: PKS	DATE: FEB. 2016
FILENAME: DAVIDCO-D0811	SHEET NUMBER: 3
	DRAWING NUMBER: S2

- NOTES**
- REFER TO DETAILS FOR PROPER TIE-IN OF COMPACTED SOIL LINER, GEOSYNTHETICS, AND OVERLYING LAYERS AROUND THE PERIMETER OF AREA 2.
  - CULVERT H (C-H) IS A TEMPORARY PIPE FOR DRAINAGE OF AREA 2 PRIOR TO THE PLACEMENT OF THE LINER SYSTEM. THIS CULVERT SHALL BE ABANDONED BY COMPLETELY REMOVING THE ENTIRE CULVERT AND SUITABLY REPAIRING DI-35.
  - REFER TO DRAWING BAI FOR MAXIMUM BORROW AREA GRADES.

- REFERENCES**
- TOPOGRAPHY IN ACTIVE C&D AND MSW AREAS FROM SPATIAL DATA, AERIAL DATED 6/1/15.
  - AS-BUILT EDGE OF GEOSYNTHETIC LINER FROM DRAWING "HDPE GEOMEMBRANE LINER AS-BUILT FOR CELL 1 OF PHASE 2, AREA 2 AT THE DAVIDSON COUNTY MSW LANDFILL SITE", DATED MARCH 2014, REVISED APRIL 30, 2014, PREPARED BY WRIGHT & FIELDS LAND SURVEYING, TROY, NC.



**SAFETY NOTE:**  
Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

**ISSUED FOR CONSTRUCTION**

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**Table 1**  
Seismograph Data  
Davidson County MSWLF  
Phase 2 Area 2 Cell 2

Event	Blast Monitoring Location	Peak Particle Velocity (PPV)			Acoustic (dB)
		Transverse	Vertical	Longitudinal	
Blast 1 4/27/16	BML1	0.048 in/s @ 30 Hz	0.073 in/s @ 20 Hz	0.065 in/s @ 12 Hz	134
	BML2	0.123 in/s @ 10 Hz	0.105 in/s @ 12 Hz	0.083 in/s @ 10 Hz	NM
	BML3	NT	NT	NT	NT
Blast 2 5/4/16	BML1	0.035 in/s @ 13 Hz	0.023 in/s @ 18 Hz	0.030 in/s @ 20 Hz	120
	BML2	0.063 in/s @ 12 Hz	0.030 in/s @ 17 Hz	0.065 in/s @ 16 Hz	133
	BML3	NT	NT	NT	NT

**Note:**

- BML: Blast Monitoring Location
  - BML1: Between MW-2 and MW-10S/10D (PZ-37S/37D)
  - BML2: Cell 1 - Cell 2 Tie-In
  - BML3: Leachate Storage Tank Facility

- NT: Seismograph did not Trigger (0.03 in/sec)
- NM: Not Measured

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**Attachment 1**

**Blasting Reports**

**Rock Blasting Documentation  
Davidson County MSWLF - Phase 2 Area 2 Cell 2  
Davidson County, North Carolina**

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# BLASTING REPORT

Inv. 6425  
 Shot Number C16-438  
 Date 4/27/2016  
 Time 6:29 PM

Consumer Shamrock Env.  
 Address BROWN Summit, NC  
 Delivery ticket # 11163 NQS

Operation Davidson Co. Landfill  
 Job Address Old Hwy 29 Thomasville, NC  
 Blast Location @ west slope cell #2

No. Holes 28 Diameter 3 in. Depth 3'-22' ft.  
 Burden 4 ft., Spacing 4 ft., Sub-drilling 0 ft., Total stemming depth 2.5'-5' ft.

Material used to stem Crushed Stone Type of shot Boulders

Material being blasted Granite Boulders

Blasters name Jim Schultz Signature [Signature]

Blasters license No. \_\_\_\_\_ State \_\_\_\_\_

### Explosives used:

Type	Date Code	Diameter/Length	Brand Name	# Cartridge	Weight Per Cartridge	Total Weight per Type
<u>1.1D</u>	<u>06AP16JI</u>	<u>2x16"</u>	<u>Unimax</u>	<u>39 1/2 stk</u>	<u>2.5 lb</u>	<u>98.75 lbs</u>
<u>1.1D</u>	<u>09DE15JI</u>	<u>1 1/2" x 16"</u>	<u>Unimax</u>	<u>3 stk</u>	<u>1.5 lb</u>	<u>4.5 lbs</u>

Total Weight Explosives 103.25 lbs

### Initiators used:

Brand	Type	Quantity	Date code of initiators
<u>EZ-Det</u>	<u>25/350ms x 16'</u>	<u>23 ea.</u>	<u>12OC15W1</u>
<u>EZ-Det</u>	<u>25/350ms x 30'</u>	<u>6 ea.</u>	<u>08FE16W1</u>
<u>EZTL</u>	<u>17ms x 20'</u>	<u>7 ea.</u>	<u>02NO15W1</u>
<u>Nonal LIL</u>	<u>0ms x 500'</u>	<u>2 ea.</u>	<u>15FE16X1</u>

Estimated yds<sup>3</sup> 800 Powder factor .13 lbs/yds<sup>3</sup> Non-electric firing device Shotshell primer

Maximum weight of explosives detonated within any 8 millisecond period 10

Maximum number of holes or decks detonated within any 8 millisecond period 1

Weather Partly Cloudy Temp. 84° Wind direction South Velocity 0-5 mph

Actual Scaled distance 31.6 @ 10' Cell 1-2 Tie in Were mats or other protection used yes  no

Seismograph used : Yes  No  PPV See Attached db \_\_\_\_\_

Special conditions \_\_\_\_\_

Seismograph Locations:

Unit No: 4187 E  
Location: Leachate Tank  
Coordinates: N/A  
Elevation: N/A  
Distance to Blast: 1043'  
Trigger level: 0.03 in/sec  
Seismic reading: NT or SA

Unit No: 3351  
Location: Cell 1-2 Tie in  
Coordinates: N/A  
Elevation: N/A  
Distance to Blast: 100'  
Trigger level: 0.03 in/sec  
Seismic reading: NT or SA

Unit No: 4184  
Location: PZ-37s / PZ-37d  
Coordinates: N/A  
Elevation: N/A  
Distance to Blast: 345'  
Trigger level: 0.03 in/sec  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Personnel on Shot Crew:

Mike Baker - Shot crew / Powder Driver

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NT = Seismograph did not trigger  
SA = See Attached Seismograph Report

**Date/Time** Long at 6:28:28 PM April 27, 2016  
**Trigger Source** Geo: 0.0300 in/s  
**Range** Geo :5.00 in/s  
**Record Time** 5.0 sec at 1024 sps

**Serial Number** 4184 V 2.6 MultiSeis V  
**Battery Level** 6.1 Volts  
**Calibration** September 21, 2015 by Vibra-Tech Inc.  
**File Name** F184GCIL.ZG1

**Notes**

Location: Davidson Co Landfill  
 Client: Shamrock Enviro.  
 User Name: Jim Schultz  
 Converted: April 28, 2016 8:12:50 AM (V7.04)

**Extended Notes**

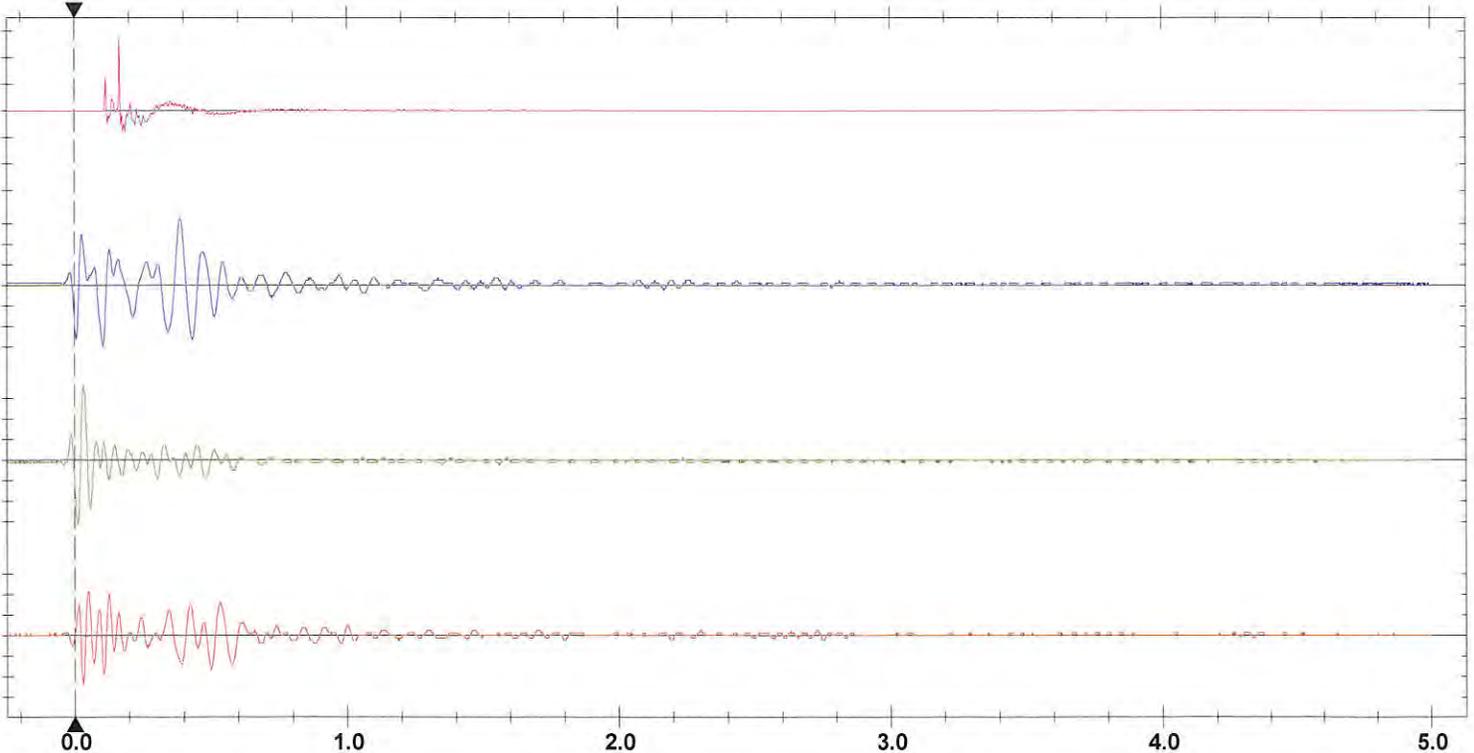
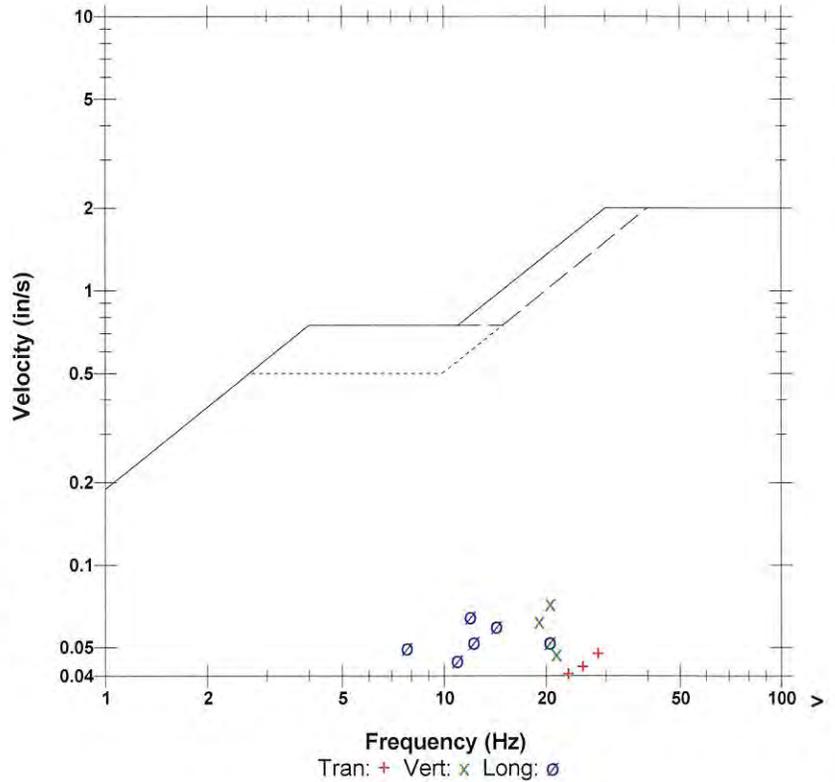
Post Event Notes  
Monitoring Wells

**Microphone** Linear Weighting  
**PSPL** 133.6 dB(L) at 0.166 sec  
**ZC Freq** 39 Hz  
**Channel Test** Passed (Freq = 20.0 Hz Amp = 449 mv)

	Tran	Vert	Long	
PPV	0.0475	0.0725	0.0650	in/s
PPV	24.5	28.2	27.3	dB
ZC Freq	30	20	12	Hz
Time (Rel. to Trig)	0.030	0.032	0.385	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00042	0.00058	0.00084	in
Dynamic Geo Cal.	Passed	Passed	Passed	

Peak Vector Sum 0.0956 in/s at 0.032 sec

**USBM RI8507 And OSMRE**



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 0.0200 in/s/div Mic: 0.00500 psi(L)/div  
 Trigger =

**Date/Time** Vert at 6:29:45 PM April 27, 2016  
**Trigger Source** Geo: 0.0300 in/s  
**Range** Geo :5.00 in/s  
**Record Time** 5.0 sec at 1024 sps

**Serial Number** 3351 V 2.6 MultiSeis V  
**Battery Level** 6.2 Volts  
**Calibration** October 6, 2015 by Vibra-Tech Inc.  
**File Name** E351GCIM.1L1

**Notes**  
 Location: Davidson Co. Landfill  
 Client: Shamrock Env.  
 User Name: Jim Schultz  
 Converted: April 28, 2016 8:07:05 AM (V7.04)

**Extended Notes**  
 Cell 1-2 Tie in  
**Post Event Notes**

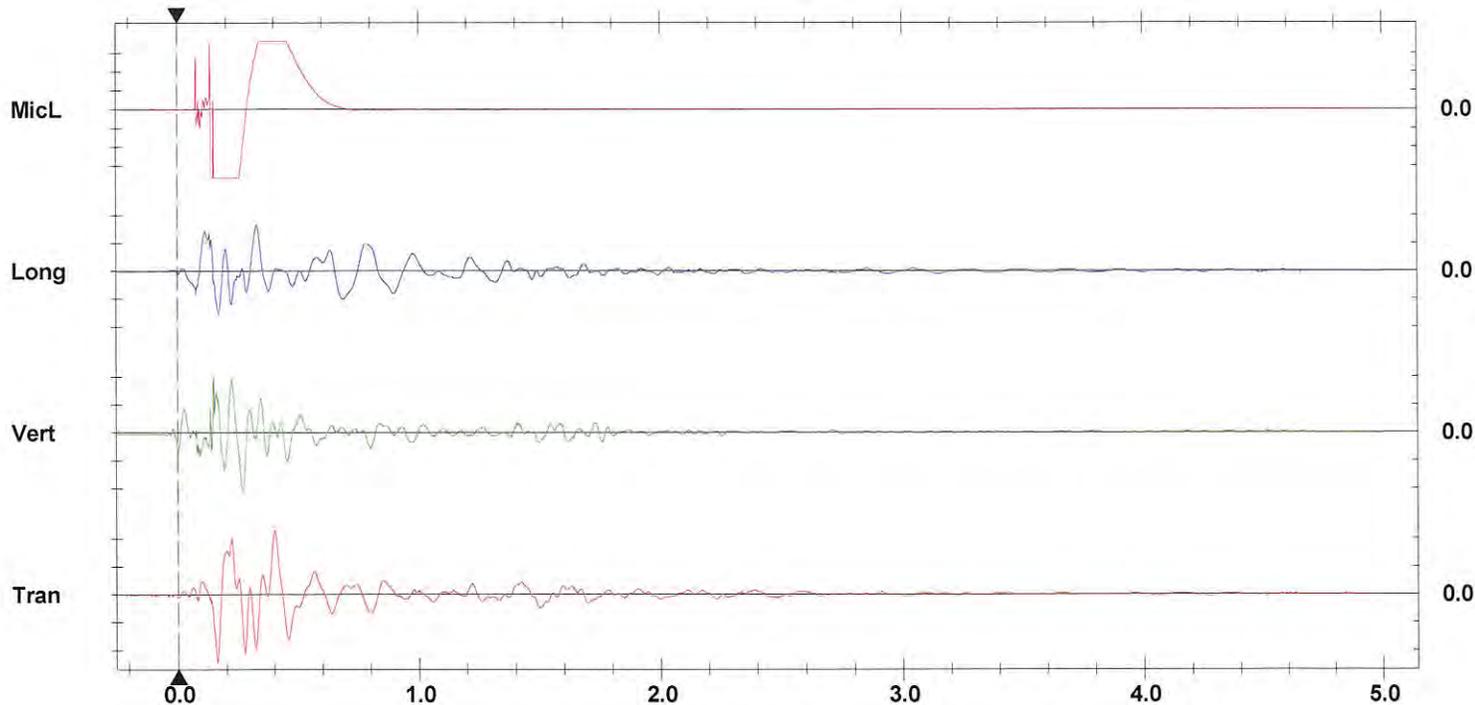
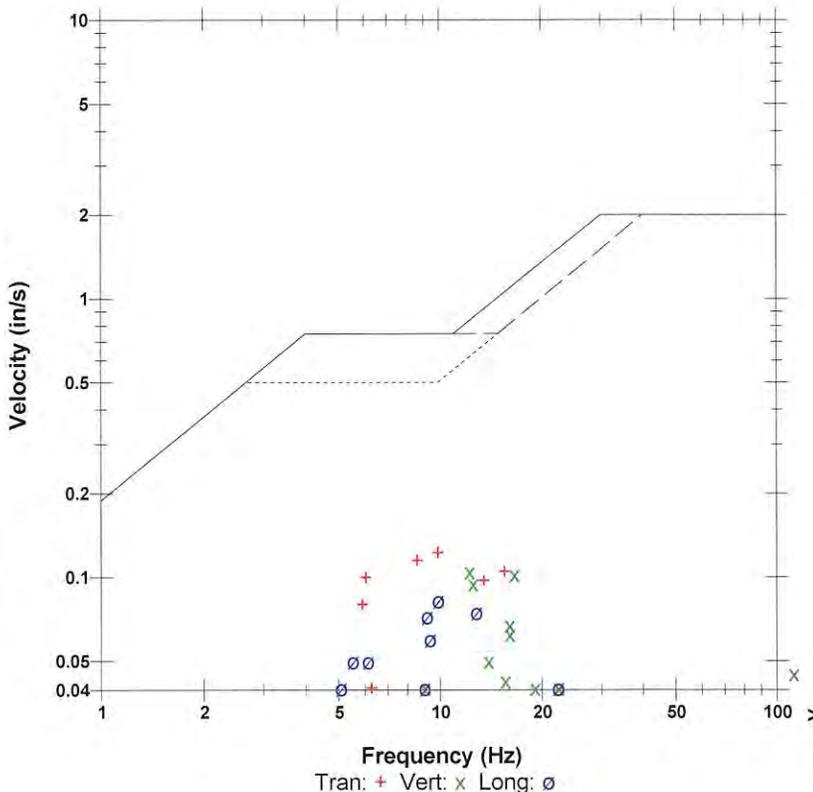
**Microphone** Linear Weighting  
**PSPL** \*\*\* dB(L) at 0.136 sec  
**ZC Freq** 15 Hz  
**Channel Test** Passed (Freq = 20.0 Hz Amp = 536 mv)

	Tran	Vert	Long	
PPV	0.123	0.105	0.0825	in/s
PPV	32.8	31.4	29.3	dB
ZC Freq	10	12	10	Hz
Time (Rel. to Trig)	0.160	0.270	0.328	sec
Peak Acceleration	0.0265	0.0862	0.0597	g
Peak Displacement	0.00230	0.00126	0.00151	in
Dynamic Geo Cal.	Passed	Passed	Passed	

**Peak Vector Sum** 0.151 in/s at 0.160 sec

\*\*\* : Out of Range

**USBM RI8507 And OSMRE**



**Time Scale:** 0.20 sec/div **Amplitude Scale:** Geo: 0.0500 in/s/div Mic: 0.01000 psi(L)/div  
**Trigger =** [Symbol]



# BLASTING REPORT

Shot Number 216-438(3)

Date 5/4/2016

Time 6:09

Consumer Shamrock Environmental  
Address Browns Summit, NC  
Delivery ticket # 11132

Operation Davidson Co Landfill  
Job Address Old US 29 Thomasville, NC  
Blast Location West end cell 2

No. Holes 12 Diameter 3 in. Depth 5 ft.

Burden 4 ft., Spacing 4 ft., Sub-drilling 0 ft., Total stemming depth 4 ft.

Material used to stem Crushed stone Type of shot Boulders / outcrop

Material being blasted Granite

Blasters name Jim Schultz Signature [Signature]

Blasters license No. \_\_\_\_\_ State \_\_\_\_\_

### Explosives used:

Type	Date Code	Diameter/Length	Brand Name	# Cartridge	Weight Per Cartridge	Total Weight per Type
<u>L11)</u>	<u>06API16JI</u>	<u>2"x16"</u>	<u>Unimax</u>	<u>12 ea</u>	<u>2.5 lb</u>	<u>30 lbs</u>

Total Weight Explosives 30 lbs

### Initiators used:

Brand	Type	Quantity	Date code of initiators
<u>EZ-Det</u>	<u>25/350 ms x 16'</u>	<u>12 ea</u>	<u>12 OC15W1</u>
<u>Nonel LIL</u>	<u>0ms x 500'</u>	<u>2 ea</u>	<u>15 FE16X1</u>

Estimated yds<sup>3</sup> 32 Powder factor 0.94 lbs/yds<sup>3</sup> Non-electric firing device Shotshell

Maximum weight of explosives detonated within any 8 millisecond period 2.5 lb

Maximum number of holes or decks detonated within any 8 millisecond period 1

Weather Partly cloudy Temp. 74° Wind direction Calm Velocity - mph

Actual Scaled distance 79 @ 125' Cell 1-2 Tie in Were mats or other protection used yes  no

Seismograph used:  Yes  No PPV See Attached db SA.

Special conditions \_\_\_\_\_

**Date/Time** Long at 6:09:56 PM May 4, 2016  
**Trigger Source** Geo: 0.0300 in/s  
**Range** Geo :5.00 in/s  
**Record Time** 5.0 sec at 1024 sps

**Serial Number** 4184 V 2.6 MultiSeis V  
**Battery Level** 5.7 Volts  
**Calibration** September 21, 2015 by Vibra-Tech Inc.  
**File Name** F184GCVJ.SK1

**Notes**

Location: Davidson Co. Landfill  
 Client: Shamrock Enviro.  
 User Name: Brandon Lambert  
 Converted: May 6, 2016 7:20:34 AM (V7.04)

**Extended Notes**

Cell #1 - #2 Tie in

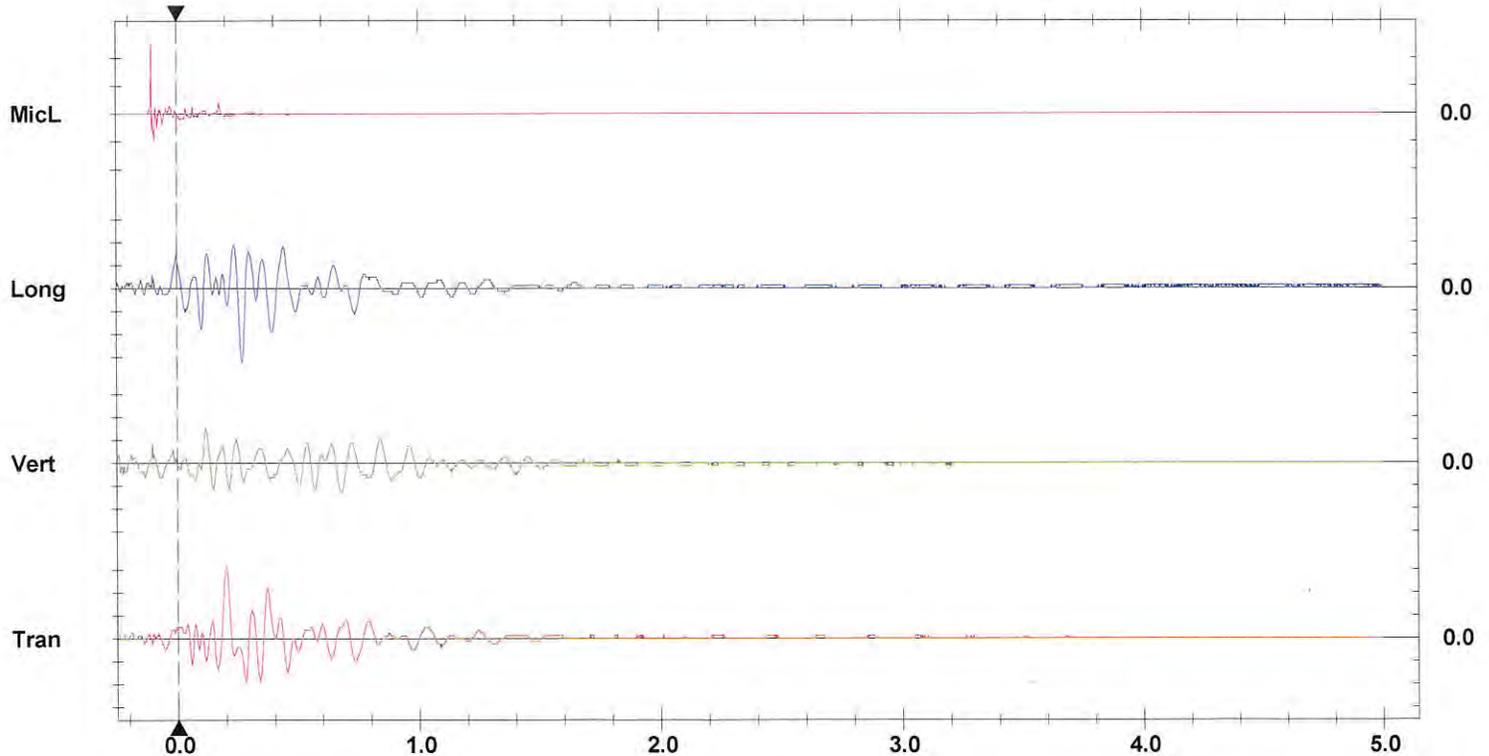
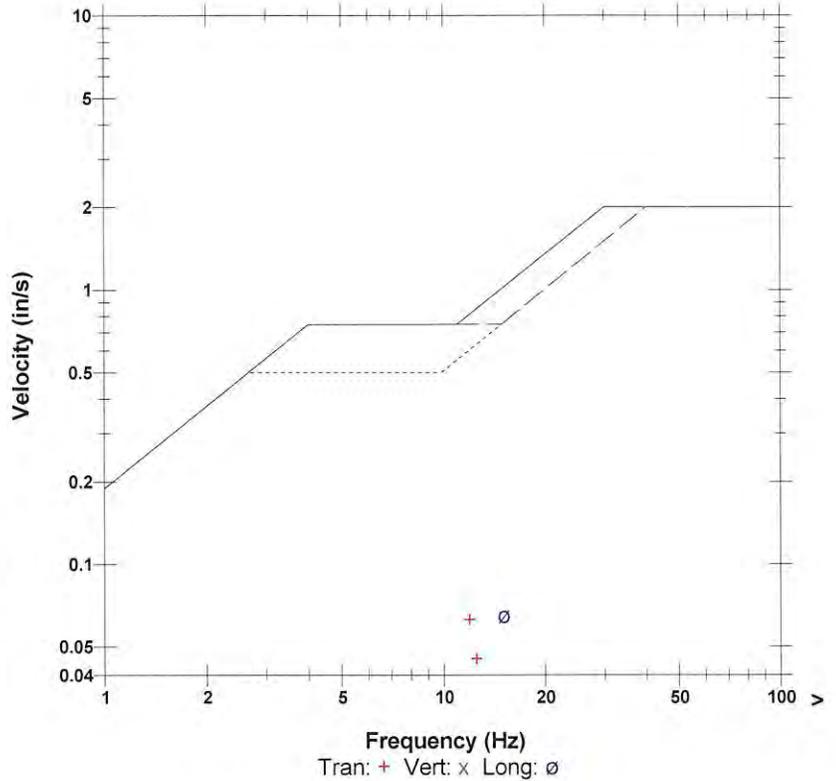
**Post Event Notes**

**Microphone** Linear Weighting  
**PSPL** 133.3 dB(L) at -0.101 sec  
**ZC Freq** 34 Hz  
**Channel Test** Passed (Freq = 20.0 Hz Amp = 448 mv)

	Tran	Vert	Long	
PPV	0.0625	0.0300	0.0650	in/s
PPV	26.9	20.5	27.3	dB
ZC Freq	12	17	16	Hz
Time (Rel. to Trig)	0.199	0.116	0.271	sec
Peak Acceleration	0.0133	0.0199	0.0199	g
Peak Displacement	0.00082	0.00035	0.00065	in
Dynamic Geo Cal.	Passed	Passed	Passed	

Peak Vector Sum 0.0694 in/s at 0.271 sec

**USBM R18507 And OSMRE**



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 0.0200 in/s/div Mic: 0.00500 psi(L)/div  
 Trigger =

Date/Time Long at 6:11:13 PM May 4, 2016  
 Trigger Source Geo: 0.0300 in/s  
 Range Geo :5.00 in/s  
 Record Time 5.0 sec at 1024 sps

Serial Number 3351 V 2.6 MultiSeis V  
 Battery Level 6.1 Volts  
 Calibration October 6, 2015 by Vibra-Tech Inc.  
 File Name E351GCVJ.UP1

Notes  
 Location: *Davidson Co. Landfill*  
 Client: *Shamrock Enviro.*  
 User Name: *Jim Schultz*  
 Converted: May 6, 2016 7:27:14 AM (V7.04)

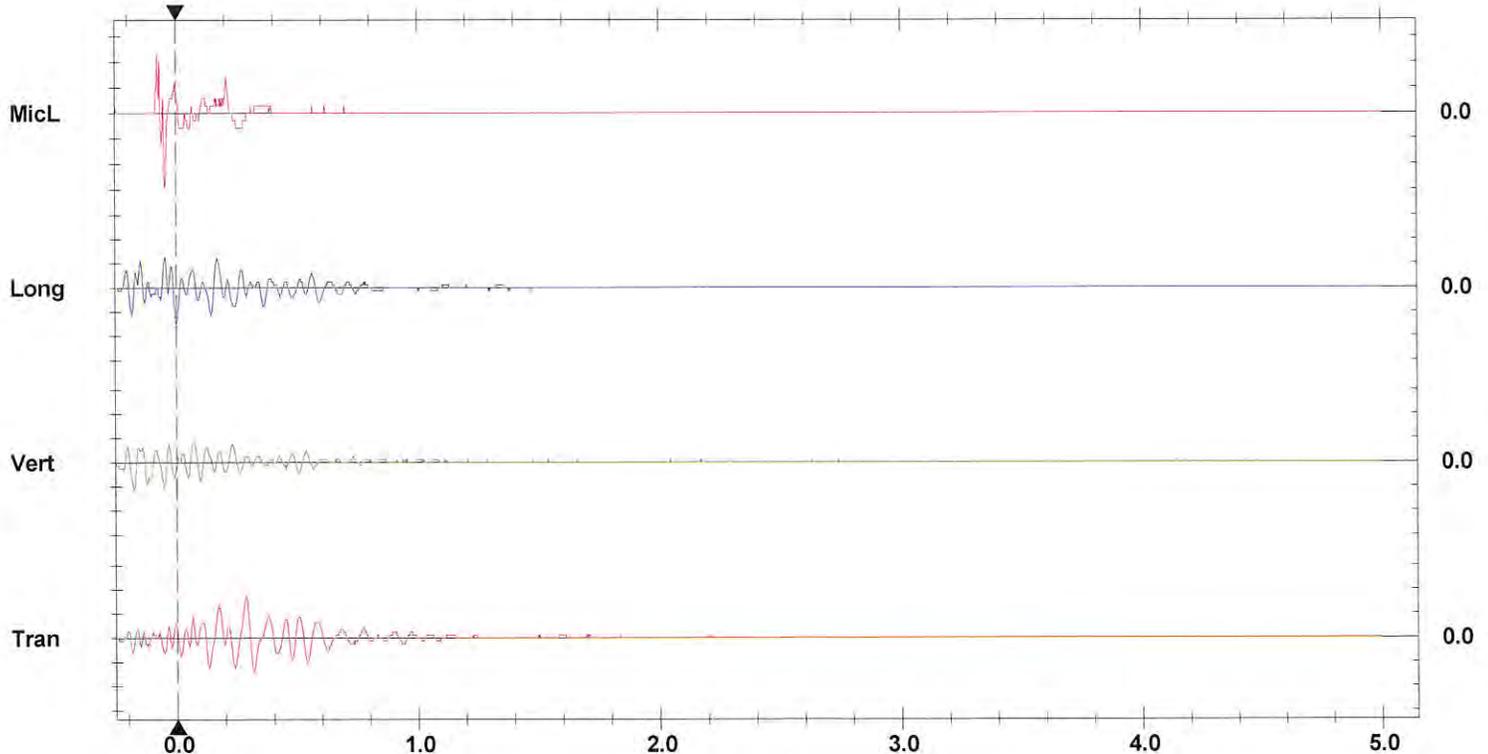
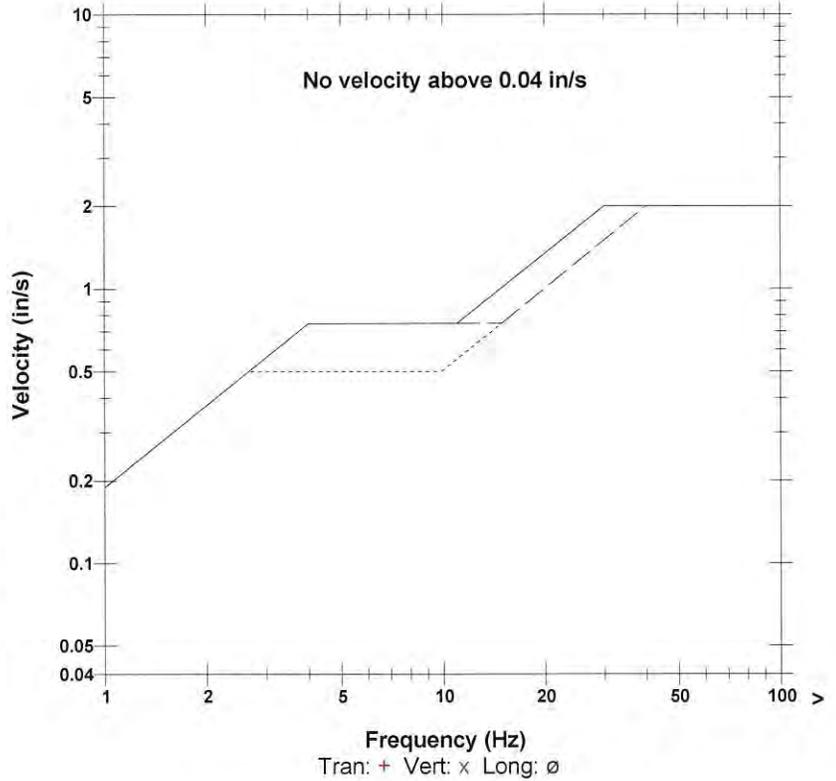
Extended Notes *Monitoring walls*  
 Post Event Notes

Microphone Linear Weighting  
 PSPL 120.0 dB(L) at -0.042 sec  
 ZC Freq 28 Hz  
 Channel Test Passed (Freq = 20.0 Hz Amp = 536 mv)

	Tran	Vert	Long	
PPV	0.0350	0.0225	0.0300	in/s
PPV	21.9	18.0	20.5	dB
ZC Freq	13	18	20	Hz
Time (Rel. to Trig)	0.284	-0.171	0.002	sec
Peak Acceleration	0.0133	0.0133	0.0133	g
Peak Displacement	0.00040	0.00019	0.00023	in
Dynamic Geo Cal.	Passed	Passed	Passed	

Peak Vector Sum 0.0381 in/s at 0.170 sec

### USBM R18507 And OSMRE



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 0.0200 in/s/div Mic: 0.00100 psi(L)/div  
 Trigger =

Seismograph Locations:

Unit No: 4187E  
Location: Leachata Tank  
Coordinates: N/A  
Elevation: N/A  
Distance to Blast: 1043'  
Trigger level: 0.03 in/sec  
Seismic reading: NT or SA

Unit No: 3351  
Location: Monitoring Wells  
Coordinates: N/A  
Elevation: N/A  
Distance to Blast: 345'  
Trigger level: 0.03 in/sec  
Seismic reading: NT or SA 0.038 in/sec

Unit No: 4184  
Location: Cell 1-2 Tie in  
Coordinates: N/A  
Elevation: N/A  
Distance to Blast: 125'  
Trigger level: 0.03  
Seismic reading: NT or SA 0.069 in/sec

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Unit No: \_\_\_\_\_  
Location: \_\_\_\_\_  
Coordinates: \_\_\_\_\_  
Elevation: \_\_\_\_\_  
Distance to Blast: \_\_\_\_\_  
Trigger level: \_\_\_\_\_  
Seismic reading: NT or SA

Personnel on Shot Crew:

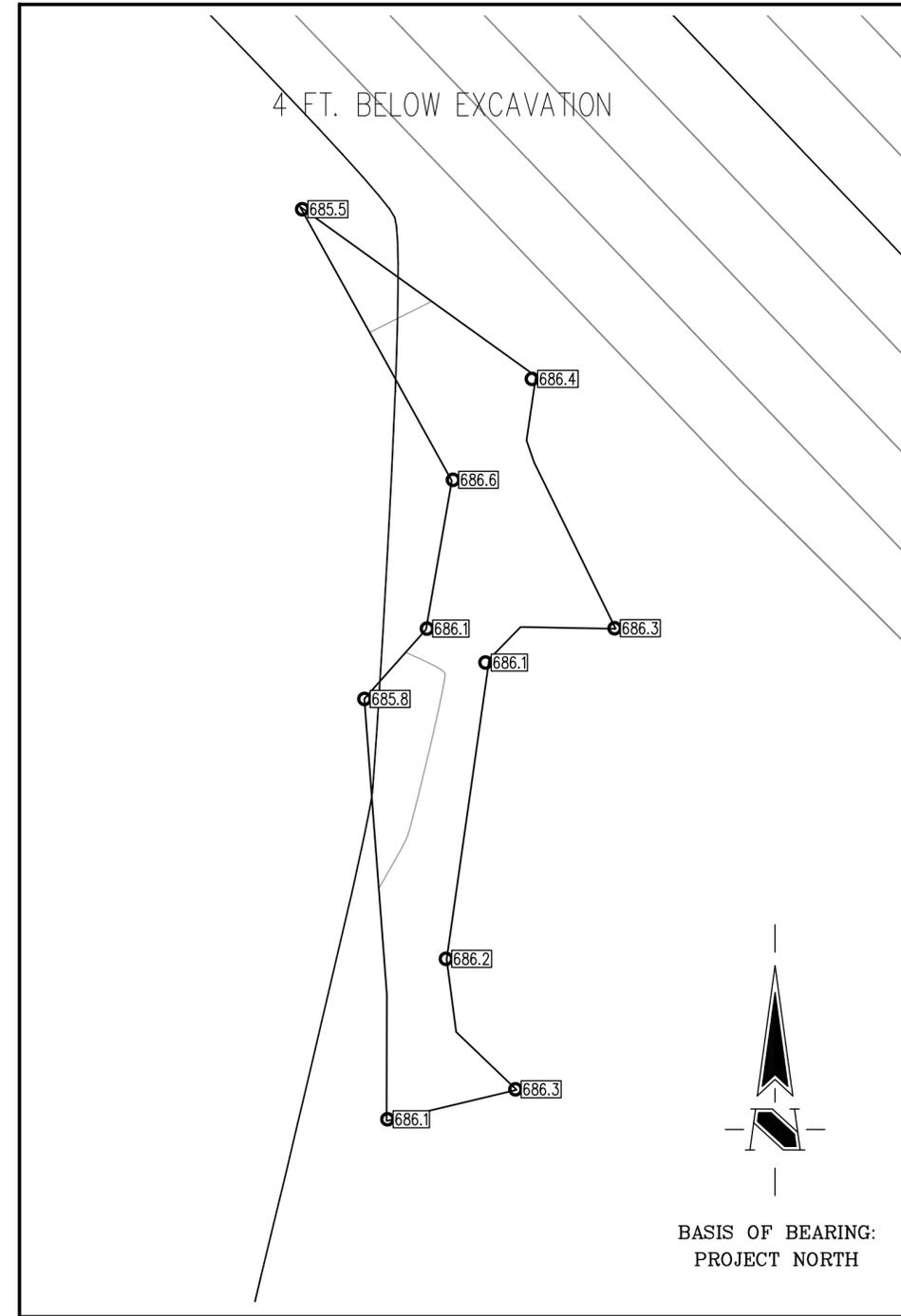
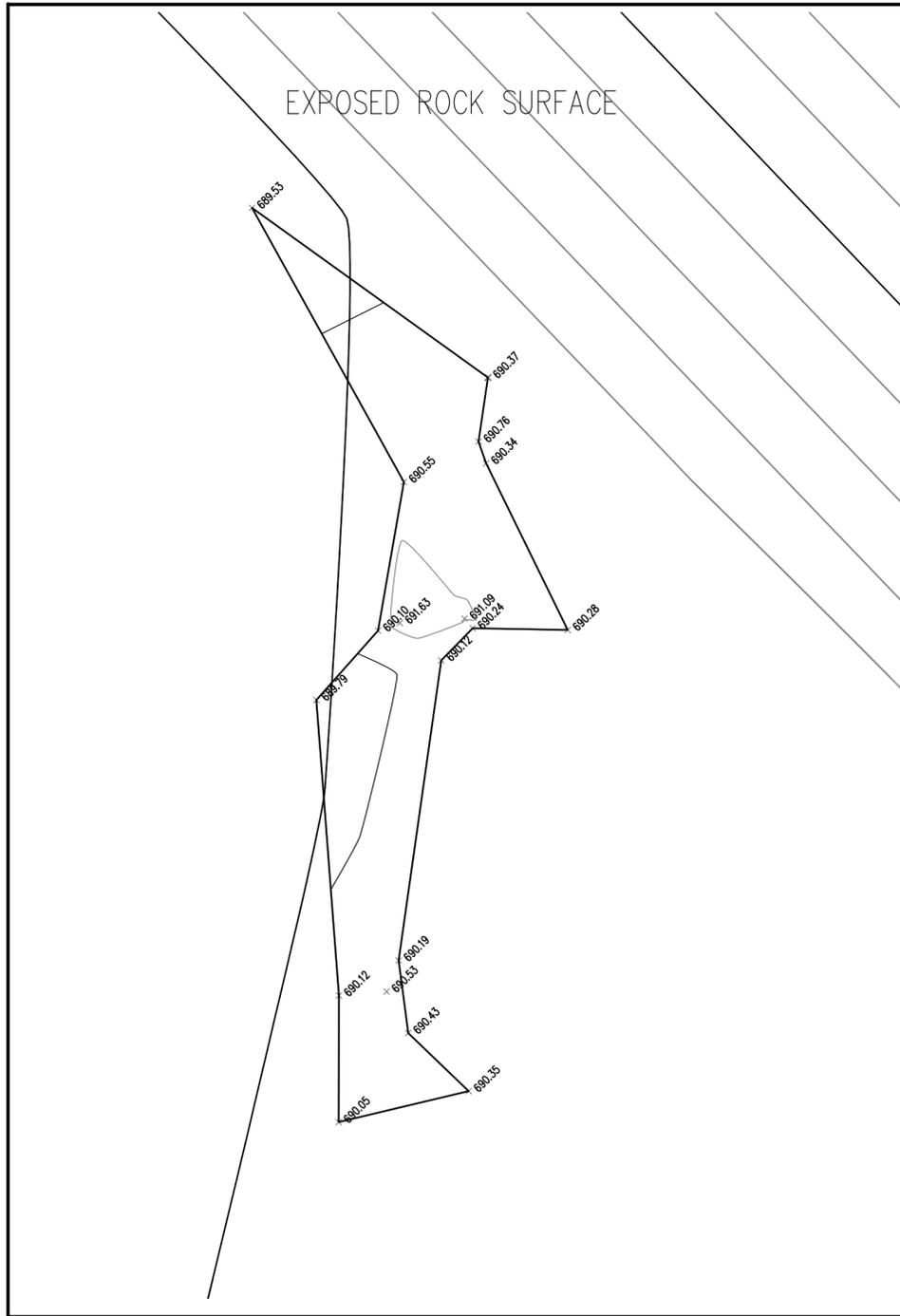
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NT = Seismograph did not trigger  
SA = See Attached Seismograph Report



REVISIONS:

DATE: 5-17-16  
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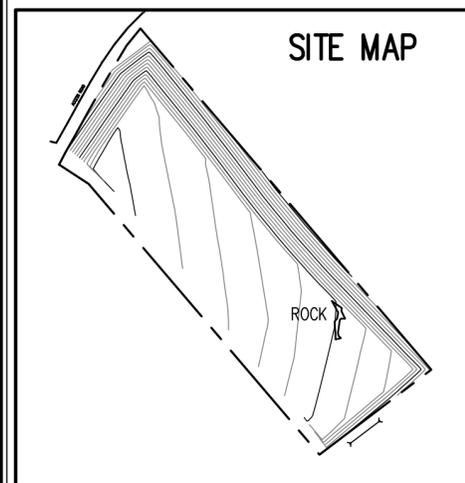



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Civil Engineering  
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Land Surveying  
Landscape Architecture  
Transportation Engineering

**DAVIDSON COUNTY LANDFILL  
PH 2 CELL 2 ROCK REMOVAL EXHIBIT**  
OLD HIGHWAY 29, THOMASVILLE, DAVIDSON COUNTY, NORTH CAROLINA

**SHAMROCK ENVIRONMENTAL**



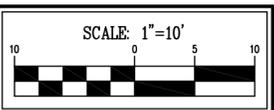
Base Surface: Top of Exposed Rock  
Comparison Surface: 4 ft. Below Excavation Perimeter

Net volume = 104.24 Cu. Yd.<Cut>

**NOTES:**

1. SITE CALIBRATED TO PANEL POINTS FROM DESIGN TOPOGRAPHIC SURVEY, USING N.C. GEODETIC SURVEY GNSS REAL TIME NETWORK.
2. SITE DATUM 0.48' BELOW NAVD '88 AT CALIBRATION ORIGIN.

FIELD SURVEY DATE: 05-04-16	PROJECT NO.: 10220.001
DRAWN BY: MSM	CHECKED BY:
OWNER:	
DRAWING FILES: B:\10K\10220\001\DWG\10220-Staking.dwg	



SHEET NO.:  
**1**  
of 1