March 1, 2018

Howard County Public School System
10910 Clarksville Pike
Ellicott City. Maryland 21042

Attention: Mr. Scott Washington
Director of School Construction

Re: ***High School #13***
Mission Road Site
Jessup, Maryland
MC Job No. 17352

Dear Mr. Washington,

Morabito Consultants, Inc. is pleased to submit this report for professional structural engineering services related to the site evaluation for High School #13. We understand the Howard County Public School System (HCPSS) is currently evaluating the feasibility of the Mission Road Site in Jessup for a new High School. The site is near an active quarry that has a mining permit for another 13 to 14 years. The Howard County School Board has stated that they want "an analysis by a structural engineer to determine how regular blasting from the quarry would effect the integrity of the building".

To assist us in our evaluation we have employed the services of Mr. David Miller, P.G. of Seismic Surveys Inc., a vibration consultant, and Mr. Eric Rehwoldt of Terracon Consultants, Inc. , a geotechnical engineer. Mr. Miller is very familiar with the site and surrounding conditions. We have also received the following enclosed information to complete our analysis:

1. Preliminary site plan prepared by Fisher, Collins, & Carter for High School #13, and Elementary School # 43 on Mission Road Site.
2. Vibration Monitoring Field Report #1 dated February 2, 2018 completed by AECOM as requested by Howard County Government.
3. Vibration Monitoring Field Report #2 dated February 6, 2018 completed by AECOM as requested by Howard County Government.
4. Savage Quarry Monitoring Report dated February 13, 2018 completed by Hillis Carnes Engineering Associates as requested by Howard County Public Schools (HCPSS).
5. Savage Quarry Monitoring Report dated February 19, 2018 completed by Hillis Carnes Engineering Associates as requested by Howard County Public School (HCPSS).

All new buildings as per the International Building Code 2015 as adopted by Howard County must be

designed for the appropriate wind and seismic loads. These lateral loads imposed on the building are based on various parameters including the following:

1. Location
2. Soil Parameters
3. Size and Geometric Shape
4. Construction Type
5. Building Classification

As such we have been informed that High School #13 will be based on the design of the Marriotts Ridge High School in Howard County. We have received the existing drawings dated July 2003 which we understand was used for the basis of design of this school. In addition, we have been informed that a full geotechnical evaluation of the site that would include borings and a corresponding report by a licensed geotechnical engineer will NOT be completed until the clearing and mass grading of the site is complete. As such per IBC Code 2015 as adopted by Howard County, specifically section 11.4.2 of ASCE 7-10 it states the following "Where the soil properties are not known in sufficient detail to determine the site class, Site Class D shall be used…." Given these various parameters as noted above we can determine the magnitude of the lateral loads on the building.

With the assistance of both David Miller and Mr. Eric Rehwoldt an evaluation was completed to compare the loads from the ground vibrations events to the code required applicable lateral design seismic loads that will be imposed on the building. A Blast Response Spectra Analysis was completed to compare ground vibration events from relatively low energy quarry blasting sources to IBC values for earthquake design for structures. Blast vibrations are primarily high frequency, low displacement surface waves that diminish in intensity rapidly with increased distance from the source. Earthquakes generally result in low frequency and high displacement surface waves of long duration. As such in an effort to provide comparable numbers peak particle velocity (PPV) and frequency have been shown to be the best indicator of damage potential from blasting.

Seismological research has led to the establishment of criteria relating the occurrence of damage to structures to vibration intensities and frequencies. The intensity is typically measured as peak particle velocity (PPV). The U.S. Bureau of Mines (USBM) allows a PPV limit for transient vibrations of 0.75 in/sec. for drywall and plaster on lath for vibration frequencies below 11Hz and a limit of 2.0 in/sec for vibrations at frequencies below 30 HZ. to protect residences from threshold damage.

Maryland has adopted the USBM curve through COMAR 26.21.02.22. These criteria are for prevention of "threshold damage" to residential structures, based upon PPV and vibration frequency. Threshold damage is defined as "loosening of paint, small plaster cracks at joints between construction elements, and lengthening of old cracks". Damage to engineered structures, and heavy commercial buildings would require higher levels than the criteria stated above. The USBM has published that minor and major damage to drywall and plaster or cracking of masonry or concrete would require a PPV of 3.0 to 10.0 in/sec. We have reviewed the enclosed data submitted by AECOM and Hillis Carnes Engineering Associates and have found all these results to be well within the acceptable range as per the USBM curve as adopted by the State of Maryland thru Comar 26.21.02.22. As such based on these results no

damage to the structure and /or its finishes is anticipated as a result of the blasting.

In addition, Mr. Eric Rehwoldt of Terracon Consultants has completed a Blast Response Spectra Analysis and has compared it to the IBC Response Spectra Curve. Enclosed is the comparison of response spectra for the proposed school site near Savage Quarry in Howard County, MD. The plot presents the Seismic Site Class D design response spectrum (developed per ASCE-7) and response spectra developed based on seismograph recordings at the site due to blast loading in near proximity to the site. As expected, the response spectra developed from blast loading lies above the ASCE-7 Site Class design response spectrum for periods below 0.09 sec, the peak spectral acceleration occurring at 0.05 sec with an amplitude of 0.19g. This is due to the fact that blasting operations generally have a higher frequency content than the design earthquake motions and will generate high spectral acceleration at low period. However, considering that the proposed school building will be a one- to three-story structure, the fundamental period of the proposed structure will be roughly in the 0.1s to 0.3s range. As presented in the appended plot, within the fundamental period of the proposed structure – the ASCE-7 Site Class D design response spectrum lies above the response spectra developed from the data generated by the blasting operation. As such, the Seismic Site Class D design response spectrum should be used for seismic design of the proposed school building.

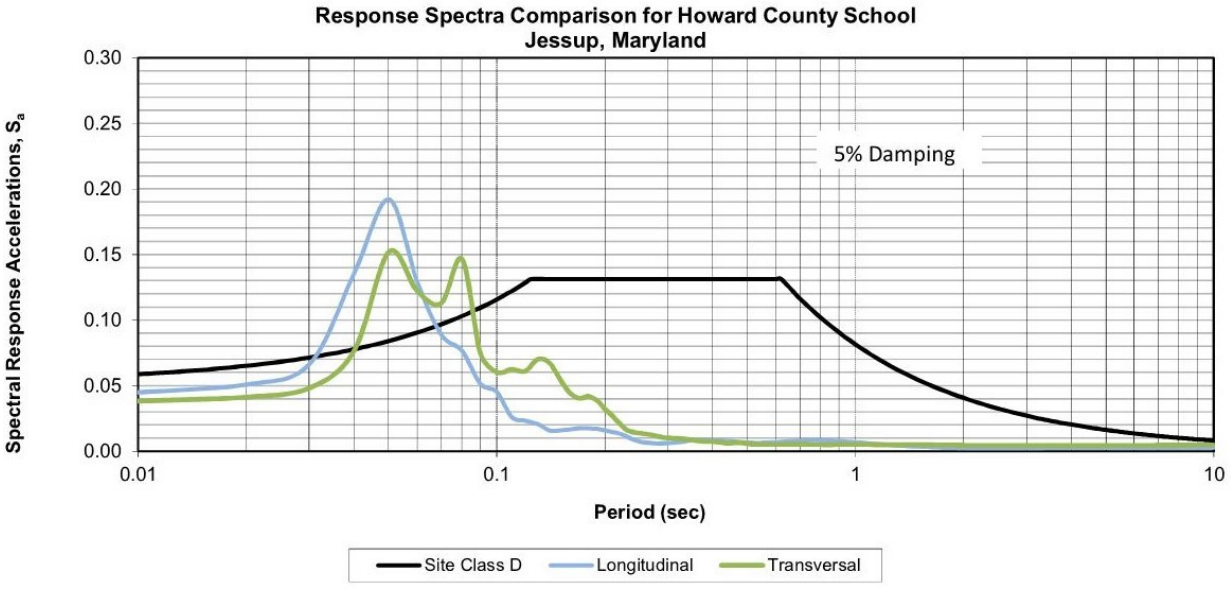


Figure 1 – Response Spectra

Please be aware however that occupants of buildings are much more sensitive to vibrations than the buildings they occupy. People can feel vibrations that are only 1/100 of the levels shown capable of causing cracks in drywall or plaster. Levels at 1/5 of the established safe limits will often cause complaints. Marked air blast effects may enhance this perceptibility. The typical response of a building occupant to noticeable vibration effects is to be concerned about the effect of the vibrations on the building they occupy. This concern usually causes the occupant to inspect the building more closely than usual and in doing so notice pre-existing defects for the first time.

The USBM also studied the effects of air blast in Report of Investigation RI 8485,1980, "Structure Response and Damage Produced by Air Blast from Surface Mining." In this publication the USBM recommends a maximum safe air blast level of 133dB. The state of Maryland currently has an air blast limit of 130dB for controlling air blast from blasting (COMAR 26.21.01.21). This recommendation recognizes the potential for enhanced human response to blasting from air blast and is well below levels capable of causing window breakage or other types of structural damage.

The maximum air blast measured in this study was 119.8 dB which equates to pressure of 0.0029 PSI or a wind speed of 19 MPH. An air blast at the regulatory limit of 130 dB equates to a pressure of .009 PSI or a wind speed of 23 MPH. The proposed High School #13 located at the Mission Road site must be designed for a wind speed of 115 MPH which is greater than the wind pressures caused by the air blast form the quarry. As such the structural integrity of the building will not be affected by the air blast.

As discussed by Wesley L. Bender in his presentation *Understanding Blast Vibrations and Airblast, their Causes, and their Damage Potential*, when comparing airblast with conventional noise sources, one must bear in mind that airblast is an impulse of very short duration and is not repeated continuously. For this reason, airblast limits are usually established that are well above the limits set for continuous noise sources and also above those limits usually imposed on firing ranges and the like that are sources of repeated impulses. Because of its very short duration, airblast makes a negligible contribution to recorded average daily noise levels.

That part of the air overpressure wave that is in the audible range (above 16 Hz or so) can be startling in an otherwise quiet surrounding. The energy level, however, is usually very small and will not normally contribute to actual damage. The lower frequency portion of the pressure wave, rather than being heard, is felt as concussion. This concussion tends to excite structures and cause windows and doors to rattle. Damage from this concussion at elevated levels is possible, but the major adverse contribution is to human response. If a nearby blast causes windows to rattle, the average person cannot tell whether it was airblast or vibration that caused it, although they will generally assume the latter.

The relationship of decibels to pressure and the probable result of various airblast intensities are presented in the Figure 2. The equivalent wind gust velocities are also given for several intensities.

Airblast Intensity dB	psi	Probable Result	Average Human Response
180	2.900	Structural damage	Ear drum rupture possible
175	1.631		
170	0.917	Many windows break	Intolerable
165	0.516		
160	0.290		
155	0.163	(equal to a 96 mph wind gust)	
150	0.092	Poorly mounted windows can break	
145	0.052		
140	0.029	(equal to a 40 mph wind gust)	Distinctly unpleasant
134	0.0145	OSMRE and USBM limit	
130	0.0092	(equal to a 23 mph wind gust)	
125	0.0052		
120	0.0029		Mildly unpleasant
115	0.0016		
110	0.00092	(equal to a 7.2 mph wind gust)	
105	0.00052		
100	0.00029		
95	0.00016		
90	0.000092		Strongly perceptible
85	0.000052		
80	0.000029		
75	0.000016		
70	0.0000092		Distinctly perceptible
65	0.0000052		
60	0.0000029		Perceptible

Figure 2 – Relationship of Airblast to Noise Levels

In the foregoing figure it should be noted that Average Human Response is just that. One can find individuals who would tolerate considerably higher intensities of airblast without complaint, while others may appear to be distressed at much lower intensities. As you can see from the Figure 2 above, human perception from an air blast of only 60dB is perceptible. An air blast of 90dB is considered strongly perceptible and an air blast of 120 dB is considered mildly unpleasant. All these values are considerable less than the allow value of 130dB which is the regulatory limit as adopted by Maryland.

Studies have shown environmental stresses, such as temperature, humidity, and wind fluctuations, impart more stresses on a structure than vibrations that satisfy regulatory limits. Thermal expansion, contraction, and dimension changes from humidity changes also generate considerable stress on structures, and can result in separations or shifts in building materials. Different building materials have different coefficients of thermal expansion and contraction. The different rates of dimension change between different building materials often result in separations, warping, or misalignments along originally square construction members. A comparison of typical environmental stresses and equivalent particle velocity levels is shown in Figure 5.

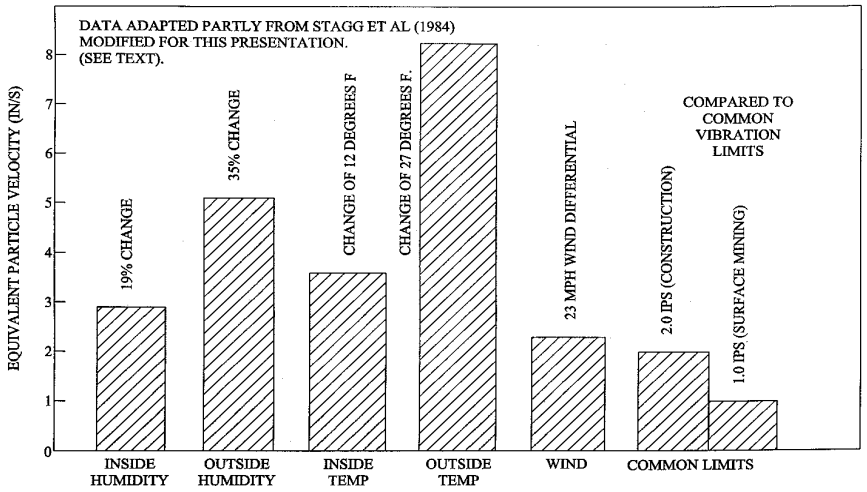


Figure 3 – Typical Environmental Stresses
And Equivalent Ground Vibrations

As you can see from figure 3 minor changes in environmental, temperature and humidity will impart significantly more stresses on a structure than vibrations that satisfy the regulatory limits.

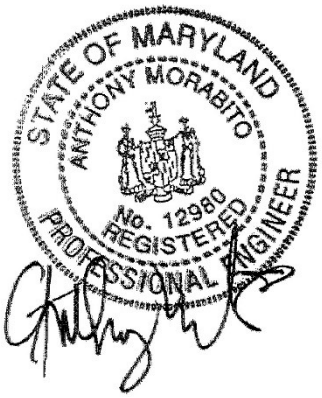
In summary based on field reports by AECOM and Hillis Carnes Engineering Associates along with engineer's analysis completed by our firm in conjunction with Seismic Surveys, Inc. and Terracon Consultants, Inc., it is our professional opinion that regular blasting from the quarry would have no detrimental effect to the structural integrity of the building. Minor changes in environmental, temperature, and humidity will impact significant more stresses on a structure than vibrations that satisfy the regulatory limits.

Thank you for the opportunity of preparing this report. We hope and trust we have addressed your concerns on this new high school site as it relates to its proximity to the existing quarry. Please feel free to call if you have any additional questions.

Very truly yours,

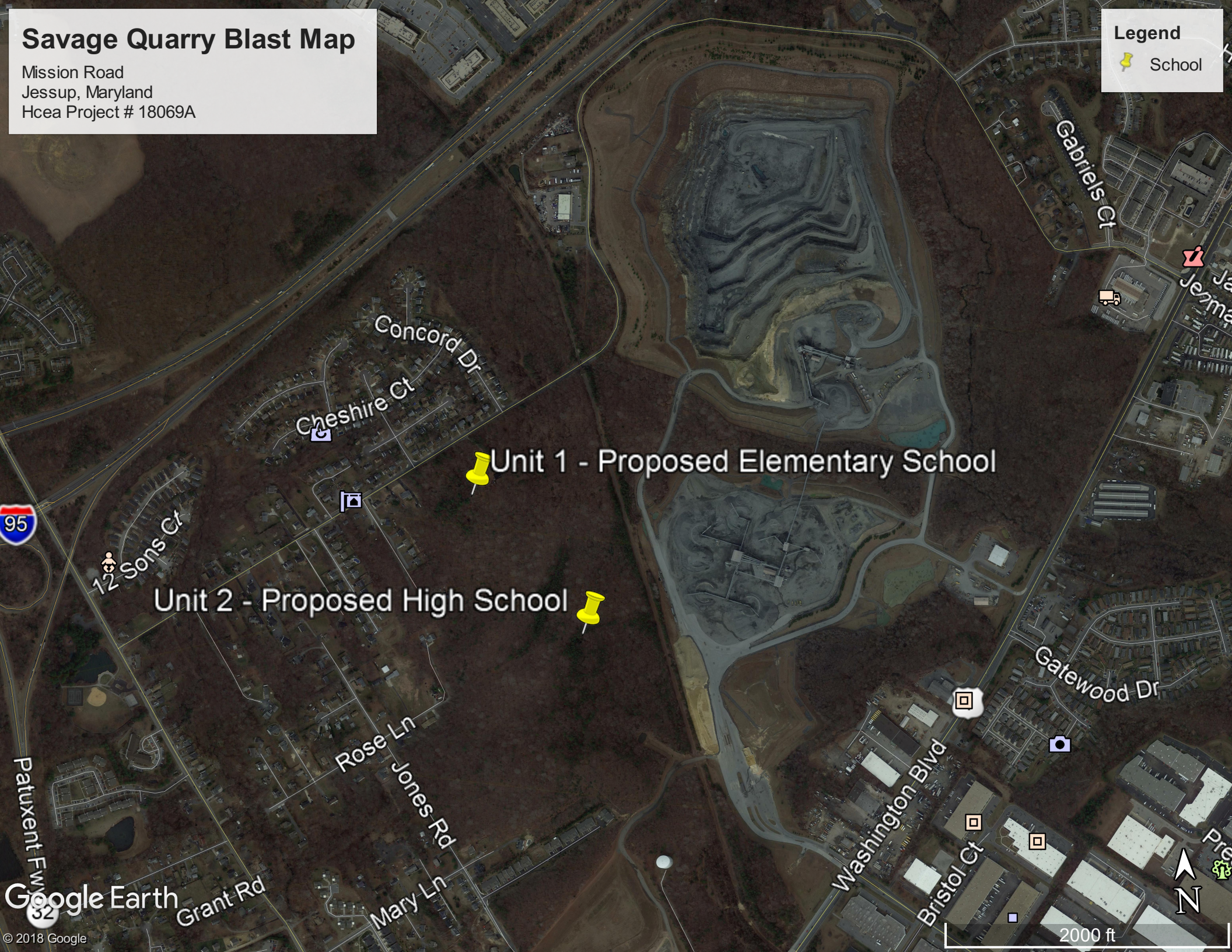
MORABITO CONSULTANTS, INC.

Anthony Morabito, PE
Vice President



Savage Quarry Blast Map

Mission Road
Jessup, Maryland
Hcea Project # 18069A



HILLIS-CARNES
ENGINEERING ASSOCIATES

Hillis-Carnes Engineering
Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 1 - Proposed Elementary School

File Name: 718420180213105849000 2.hst
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Samples: 187
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Seismic Gain: 10.2 in/s
Voltage Range: 6.11 - 6.21

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Vertical: 0.0634 in/sec @ 18.3 Hz (2/13/2018 2:01:49 PM)	Acoustic Scale: 126.0 dBL
Transverse: 0.0372 in/sec @ 24.4 Hz (2/13/2018 2:01:49 PM)	Seismic Scale: 0.100 in/sec (0.0250 in/sec/div)
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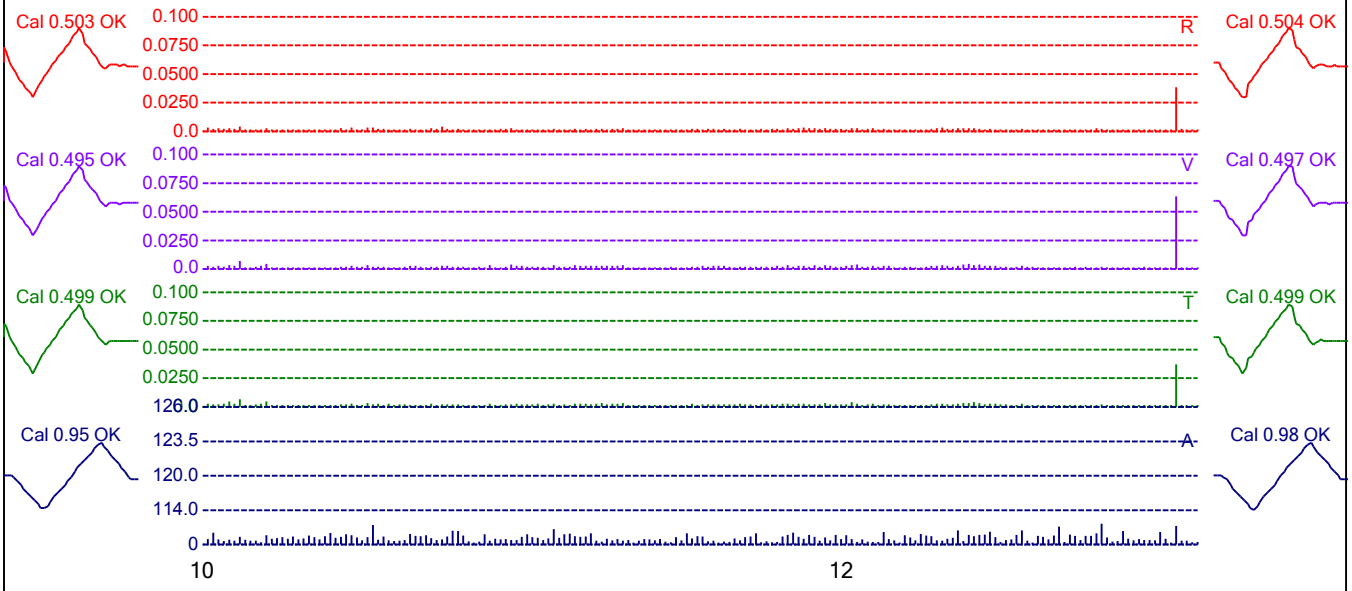
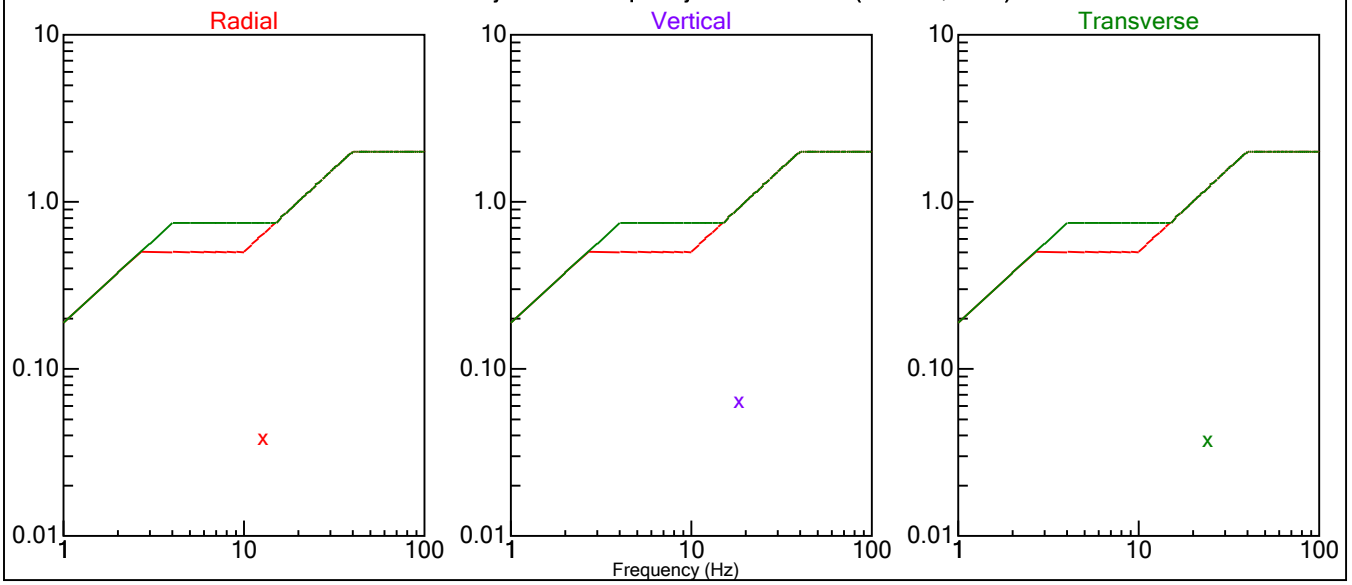


Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



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ENGINEERING ASSOCIATES

Hillis-Carnes Engineering
Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 1 - Proposed Elementry School

File: 718420180213140111000 1.evt
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Pre-Trigger: 1.0 Second
Seismic Gain: 10.2in/sec
Acoustic Gain: 148.2 dBL
Voltage: 6.18

Peaks and Frequencies	Graph Information
PPV Maximum: 0.0634 in/sec (-1.0000 sec)	Duration: -1.000 s To: 15.000 s
Radial: 0.0384 in/sec @ 12.8 Hz (-1.0000 sec)	Acoustic Scale: 126.0 dBL
Vertical: 0.0634 in/sec @ 18.3 Hz (-1.0000 sec)	Seismic Scale: 0.100 in/sec (0.0250 in/sec/div)
Transverse: 0.0372 in/sec @ 24.4 Hz (-1.0000 sec)	Time Intervals: 1.00 sec
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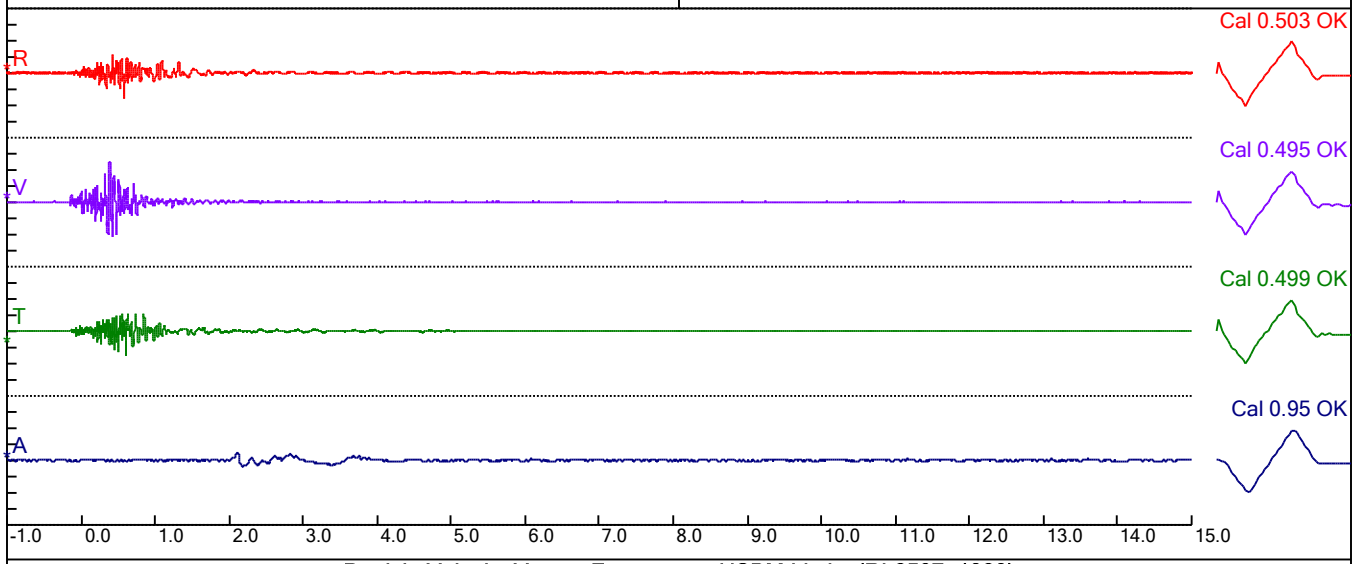
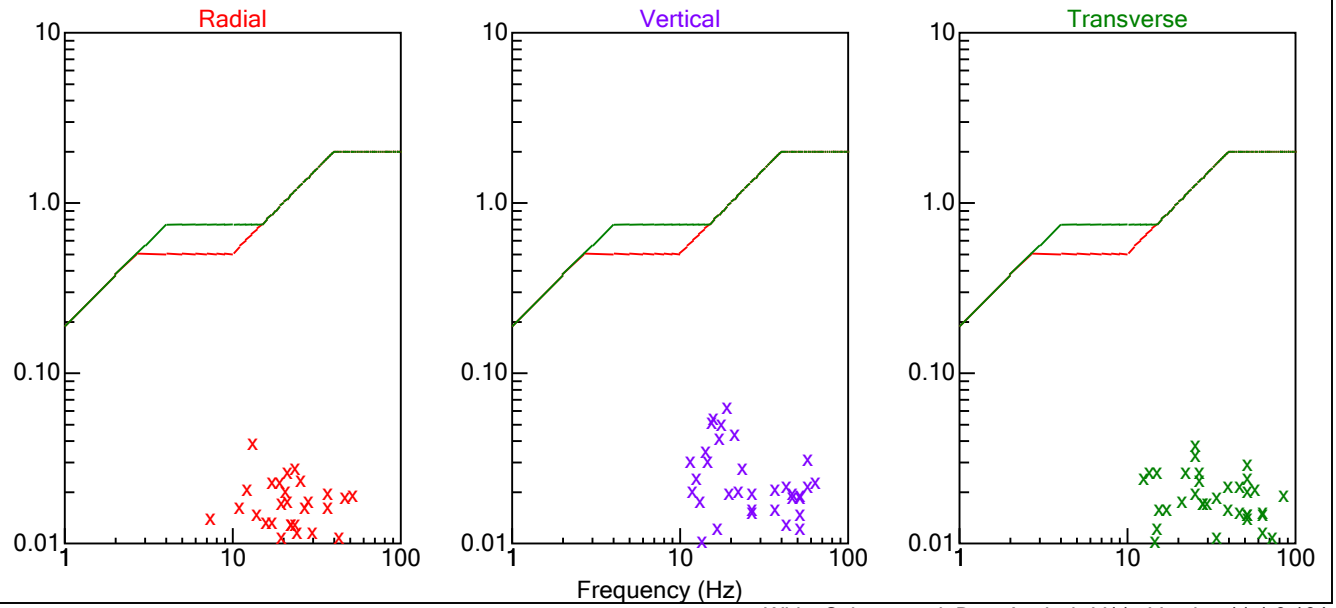


Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



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Hillis-Carnes Engineering
Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 2 - Proposed High School

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Seismic Gain: 10.2 in/s
Voltage Range: 6.32 - 6.27

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Transverse: 0.0216 in/sec @ 25.6 Hz (2/13/2018 1:00:44 PM)	Seismic Scale: 0.100 in/sec (0.0250 in/sec/div)
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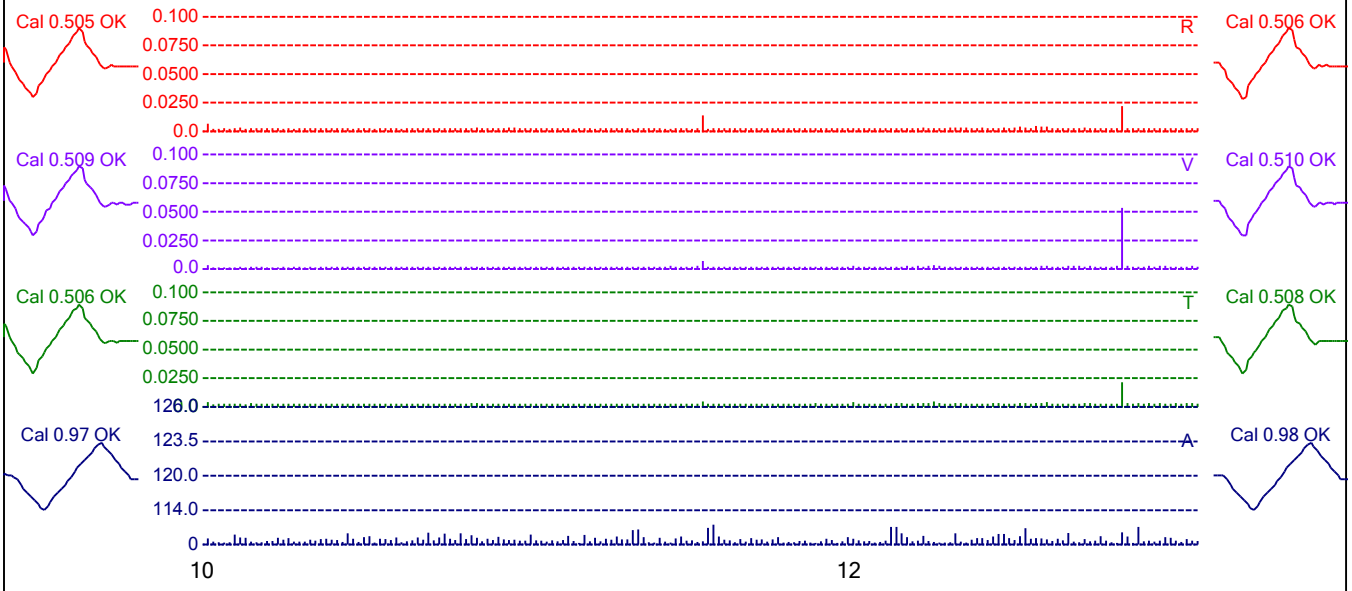
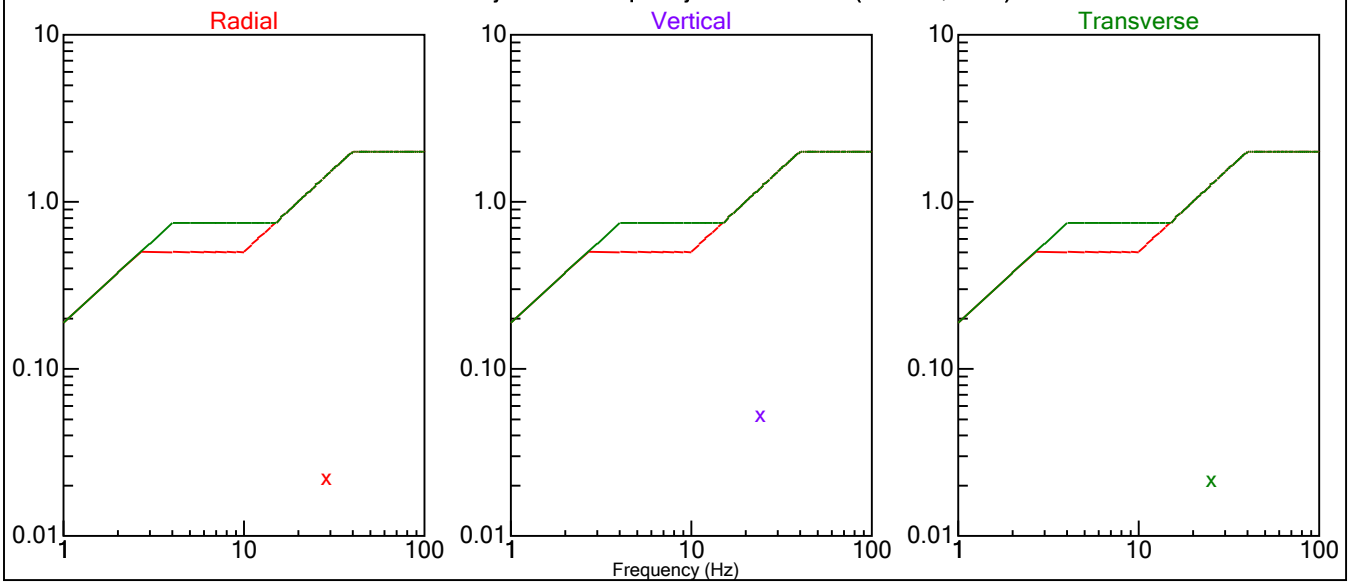


Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



White Seismograph Data Analysis V11 - Version 11.1.0.104

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ENGINEERING ASSOCIATES

Hillis-Carnes Engineering
Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 1 - Proposed Elementary School

File: 718420180213140111000 1.evt
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Air Trigger: 125.0 dBL
Sample Rate: 1024
Duration: 15 Seconds
Pre-Trigger: 1.0 Second
Seismic Gain: 10.2in/sec
Acoustic Gain: 148.2 dBL
Voltage: 6.18

Peaks and Frequencies	Graph Information
PPV Maximum: 0.0634 in/sec (-1.0000 sec)	Duration: -1.000 s To: 15.000 s
Radial: 0.0384 in/sec @ 12.8 Hz (-1.0000 sec)	Acoustic Scale: 126.0 dBL
Vertical: 0.0634 in/sec @ 18.3 Hz (-1.0000 sec)	Seismic Scale: 0.100 in/sec (0.0250 in/sec/div)
Transverse: 0.0372 in/sec @ 24.4 Hz (-1.0000 sec)	Time Intervals: 1.00 sec
Acoustic: 108.7 dBL @ 3.5 Hz (-1.0000 sec)	
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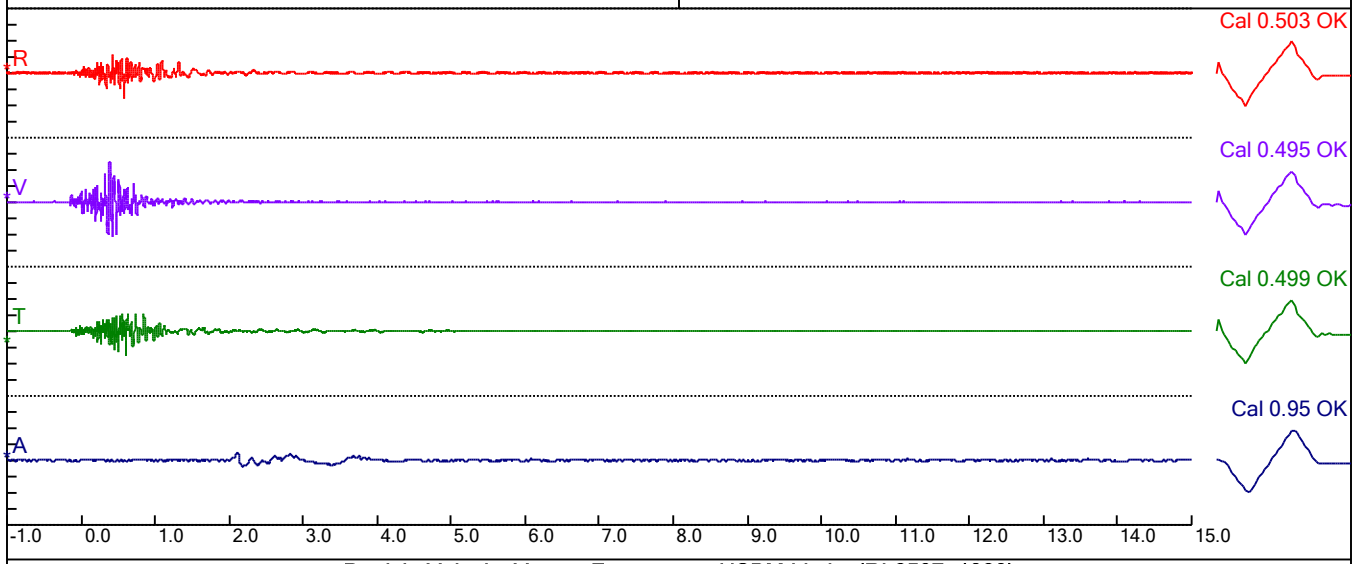
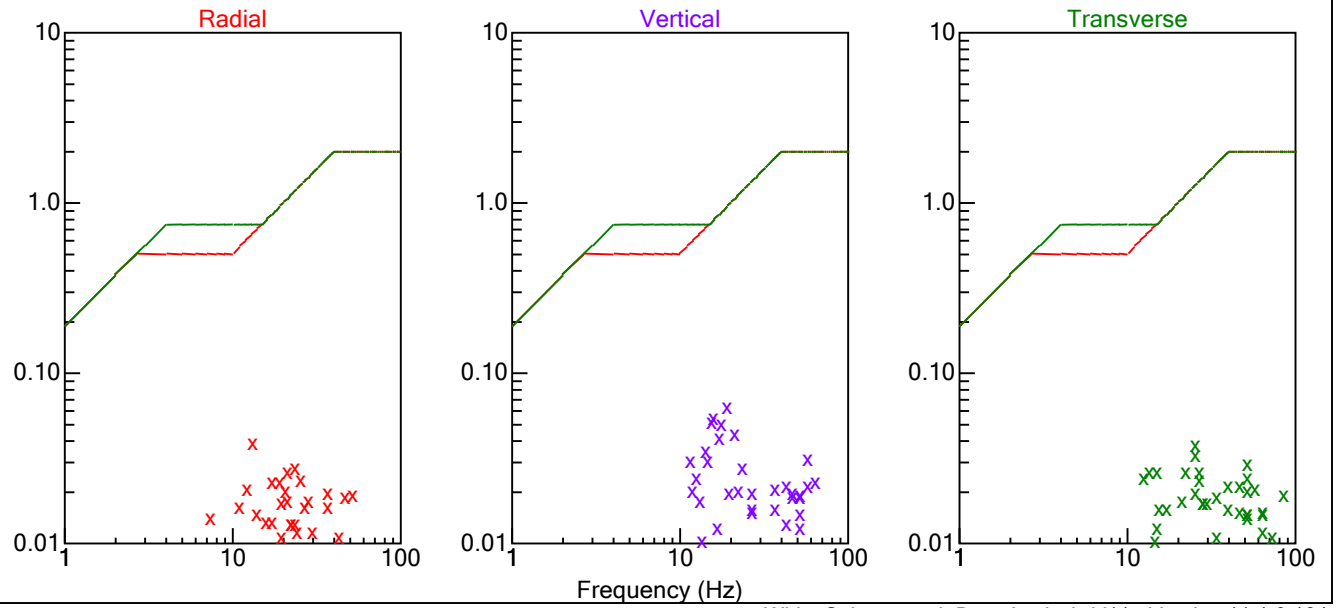


Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



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Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 1 - Proposed Elementary School

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Peaks and Frequencies	Graph Information
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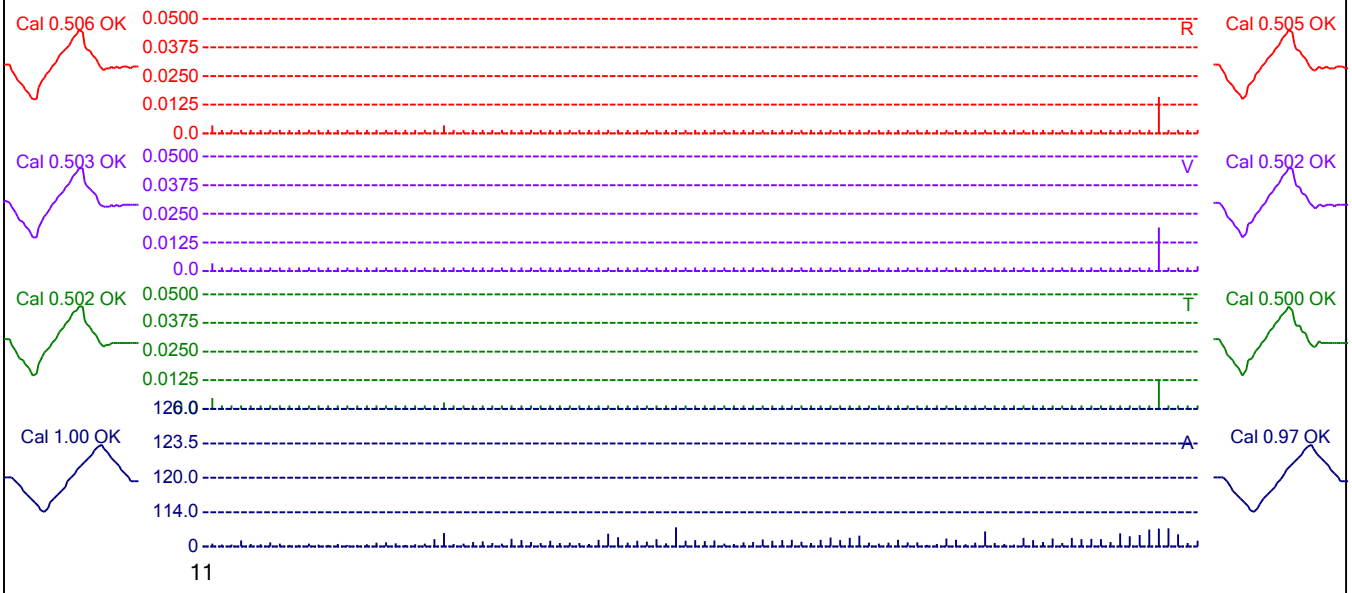
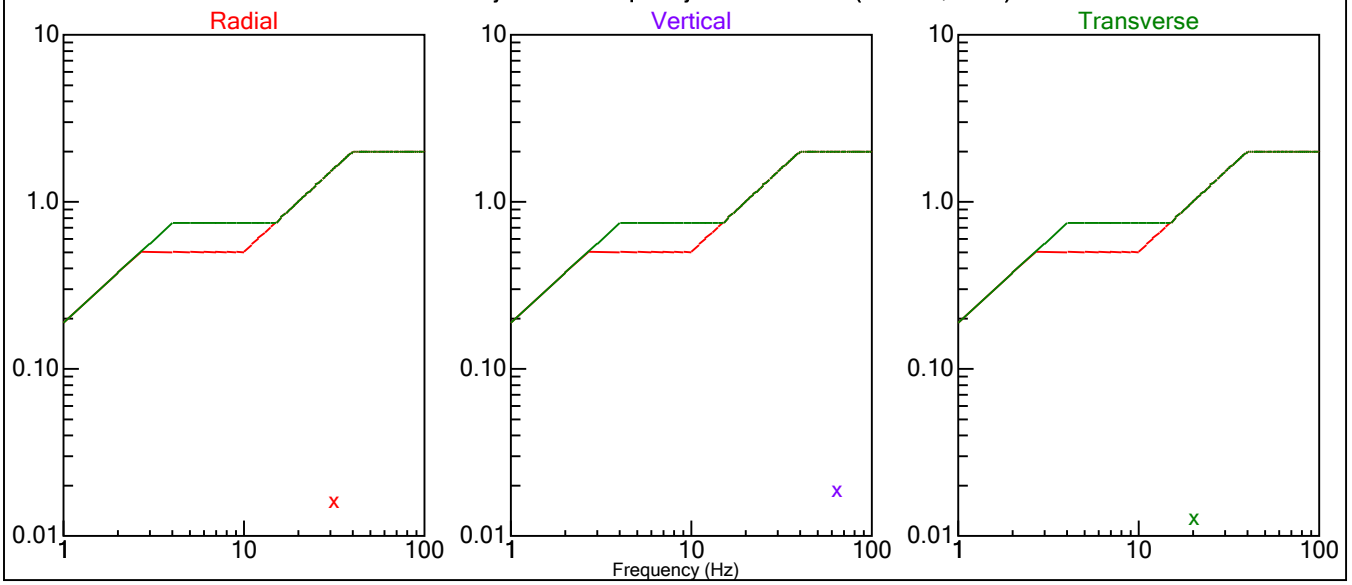


Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



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HILLIS-CARNES
ENGINEERING ASSOCIATES

Hillis-Carnes Engineering
Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 1 - Proposed Elementary School

File: 718420180219124828003.evt
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Pre-Trigger: 1.0 Second
Seismic Gain: 10.2in/sec
Acoustic Gain: 148.2 dBL
Voltage: 6.25

Peaks and Frequencies	Graph Information
PPV Maximum: 0.0191 in/sec (-1.0000 sec)	Duration: -1.000 s To: 8.000 s
Radial: 0.0159 in/sec @ 32.0 Hz (-1.0000 sec)	Acoustic Scale: 126.0 dBL
Vertical: 0.0191 in/sec @ 64.0 Hz (-1.0000 sec)	Seismic Scale: 0.0500 in/sec (0.0125 in/sec/div)
Transverse: 0.0128 in/sec @ 20.5 Hz (-1.0000 sec)	Time Intervals: 1.00 sec
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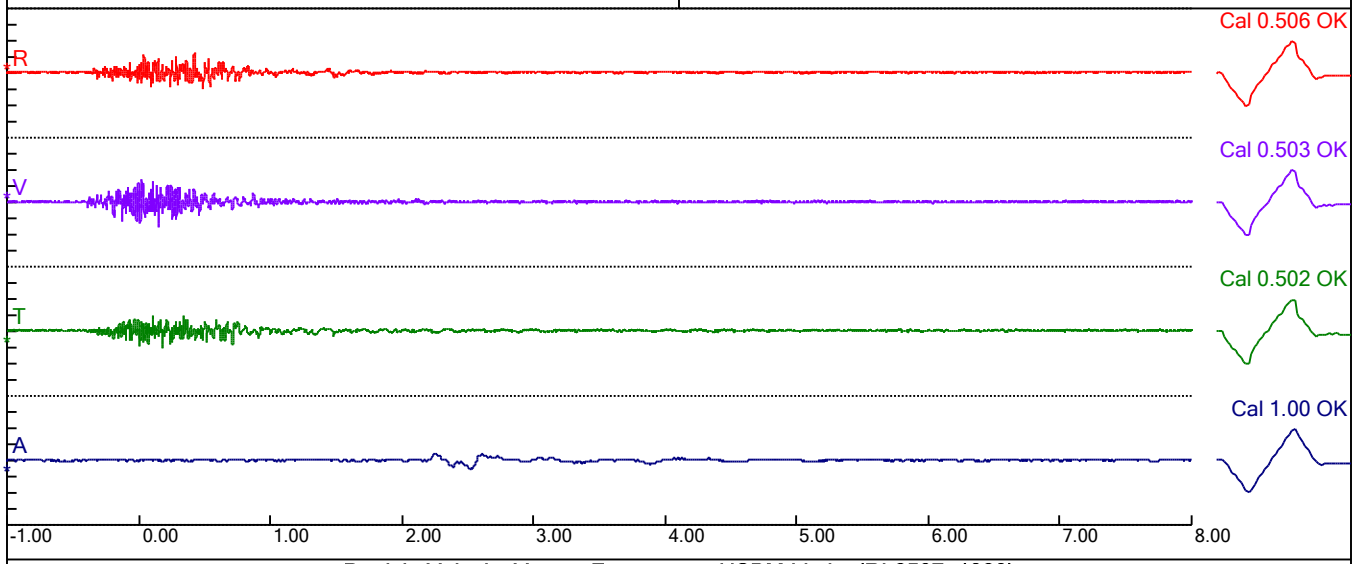
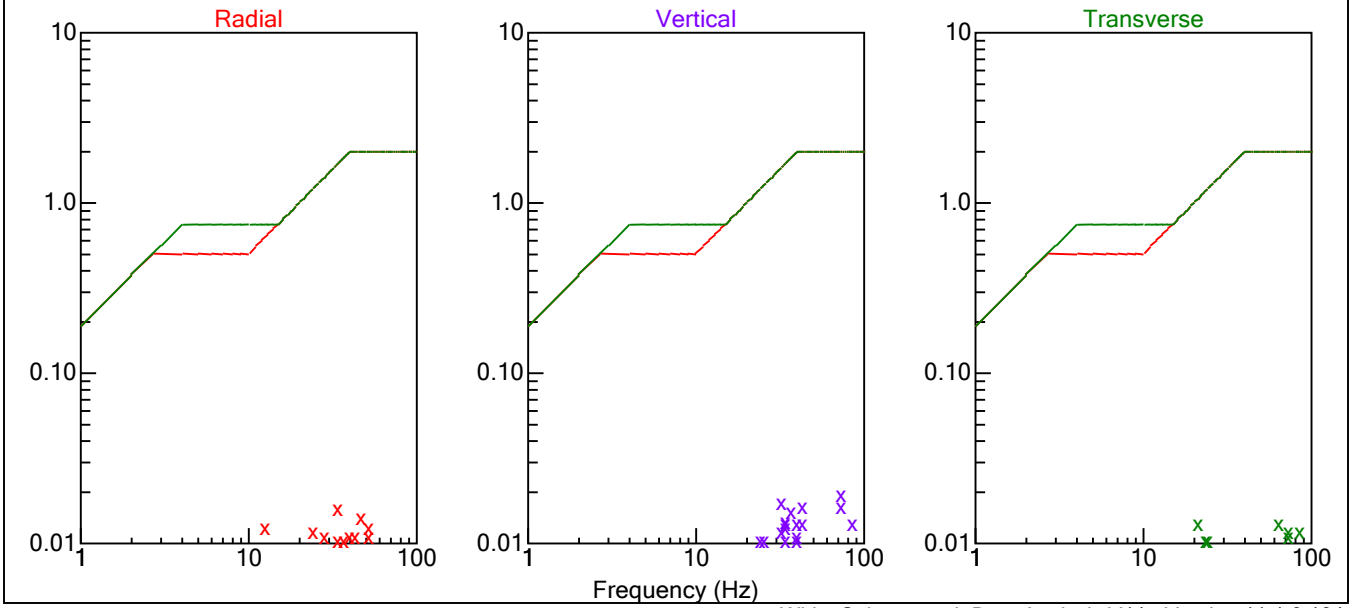


Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



White Seismograph Data Analysis V11 - Version 11.1.0.104

HILLIS-CARNES
ENGINEERING ASSOCIATES

Hillis-Carnes Engineering
Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 2 - Proposed High School

File Name: 7178201802191125450007.hst
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Samples: 96
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Seismic Gain: 10.2 in/s
Voltage Range: 6.24 - 6.22

Peaks and Frequencies	Graph Information
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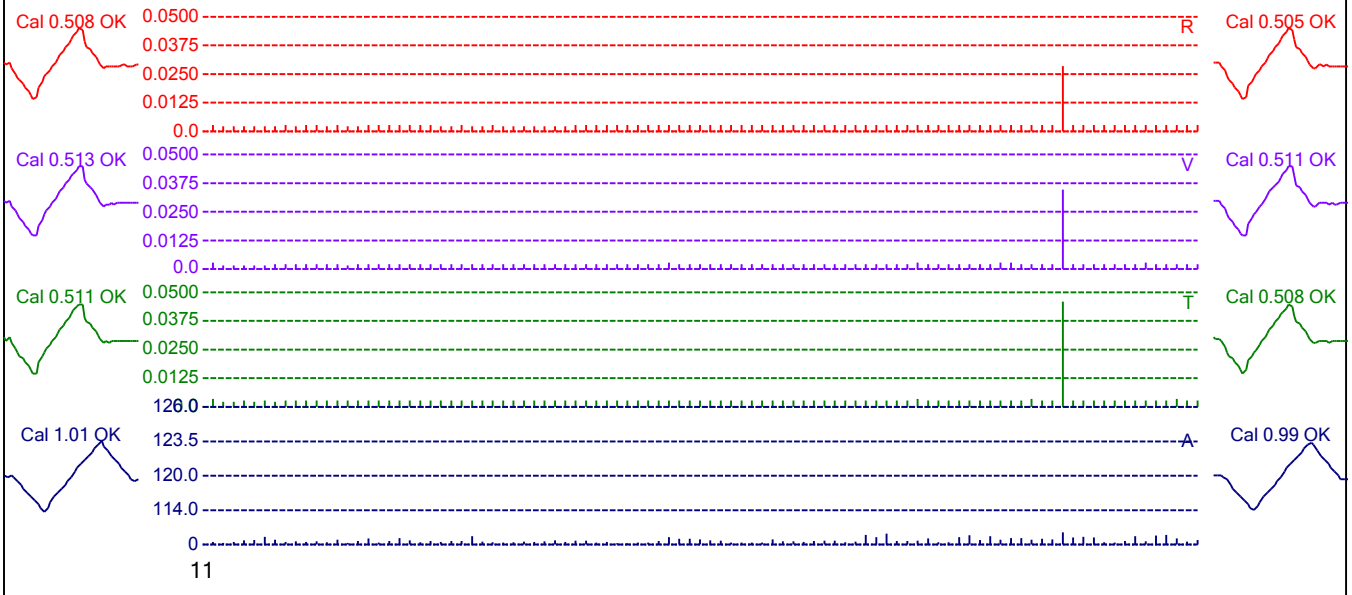
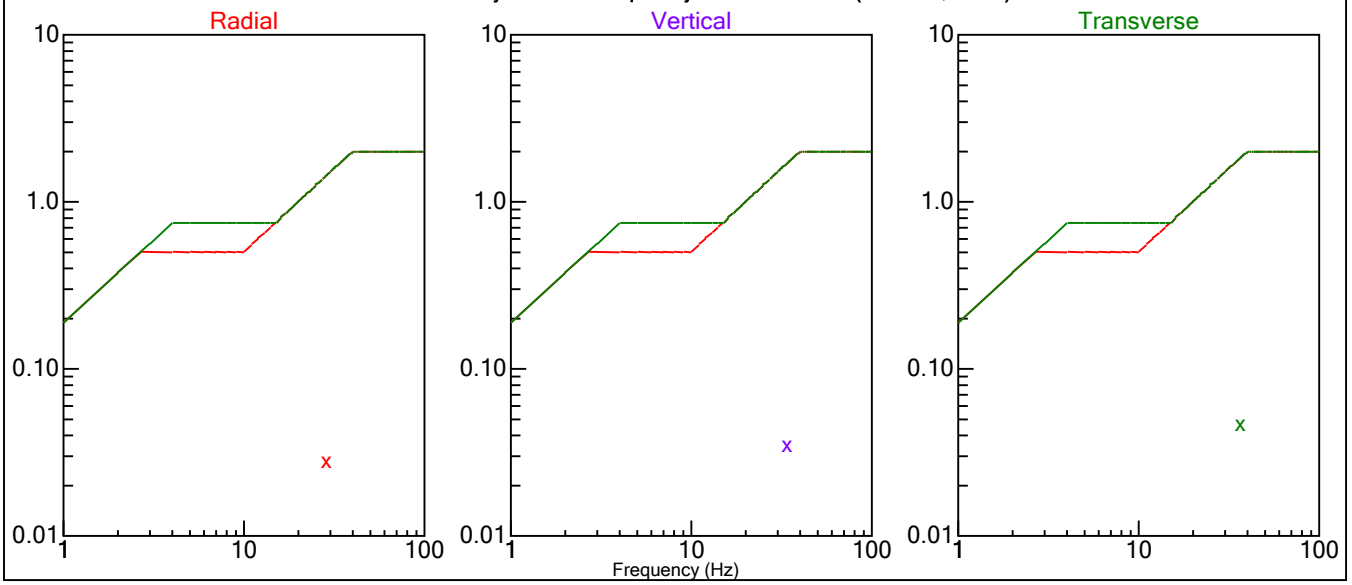
Radial: 0.0284 in/sec @ 28.4 Hz (2/19/2018 12:48:45 PM)	Samples: 96
Vertical: 0.0347 in/sec @ 34.1 Hz (2/19/2018 12:48:45 PM)	Acoustic Scale: 126.0 dBL
Transverse: 0.0459 in/sec @ 36.6 Hz (2/19/2018 12:48:45 PM)	Seismic Scale: 0.0500 in/sec (0.0125 in/sec/div)
Acoustic: 105.1 dBL @ 4.0 Hz (2/19/2018 12:48:45 PM)	Time Intervals: 2 Hours
Seis Calibration Date (SN): 7/10/2017 (7178)	
Air Calibration Date (SN): 7/10/2017 (7178)	



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



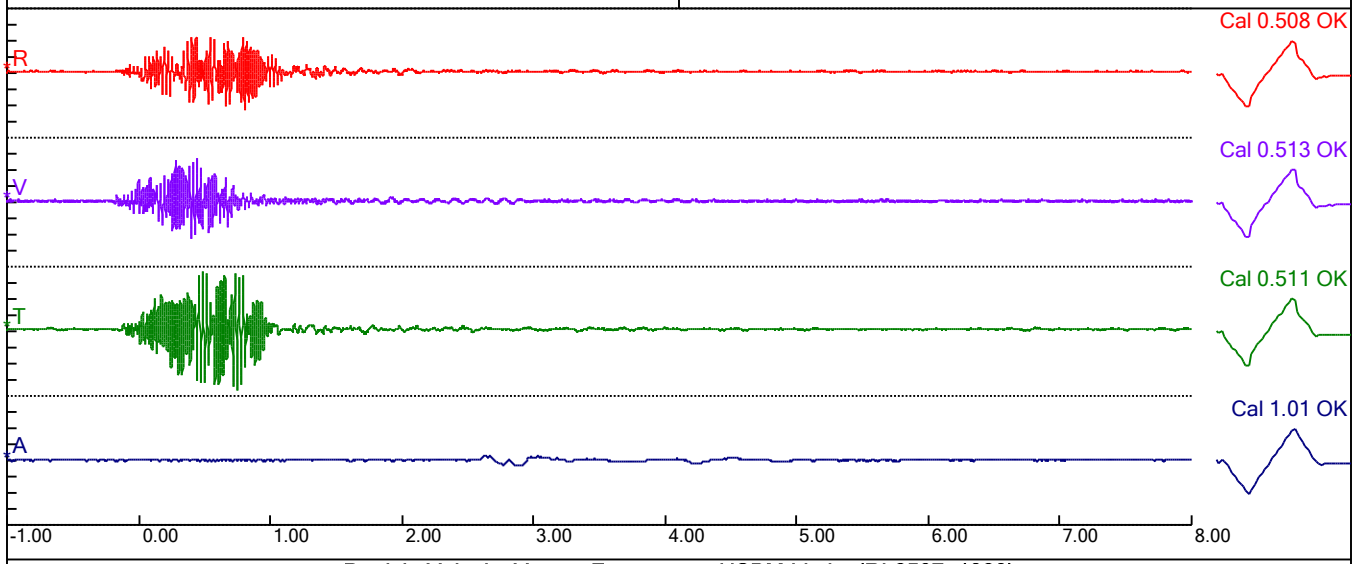
White Seismograph Data Analysis V11 - Version 11.1.0.104

HILLIS-CARNES
ENGINEERING ASSOCIATES

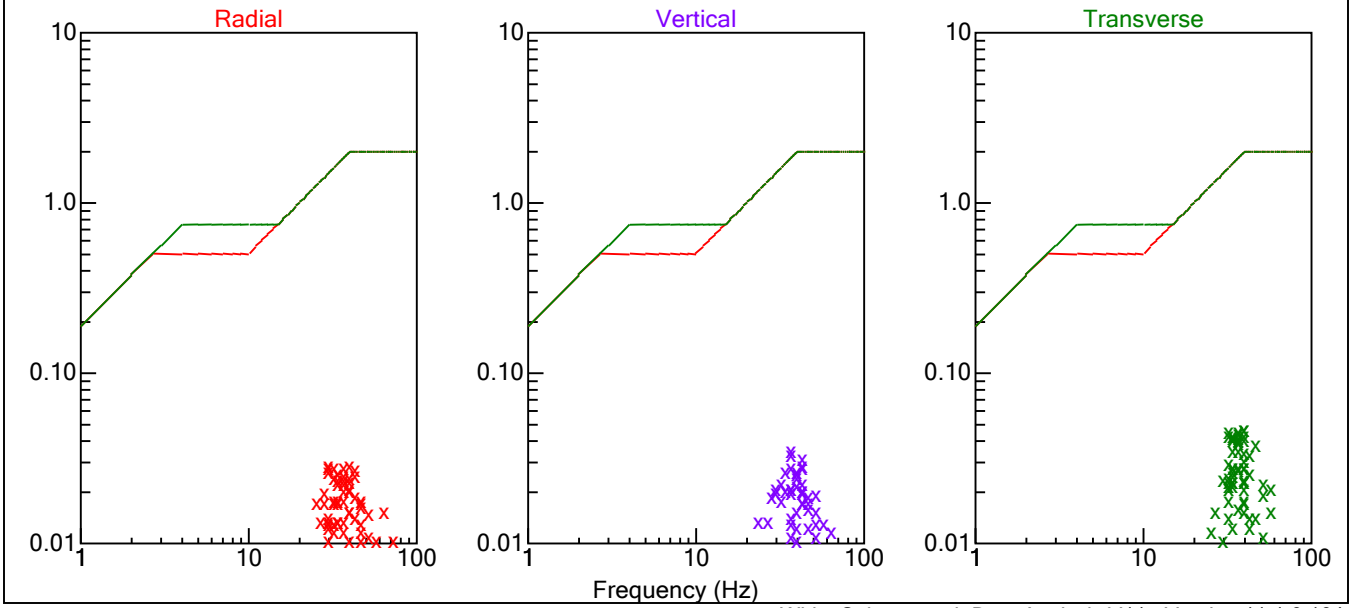
Hillis-Carnes Engineering
Savage Quarry Monitoring
Mission Road, Jessup, MD
Client - HCPS
HCEA Project # - 18069A
Unit 2 - Proposed High School

File: 717820180219124811006.evt
Number: 0006
Date and Time: 2/19/2018 12:48:11 PM
SN: 7178
Seismic Trigger: 0.0150 in/sec
Air Trigger: 135.0 dBL
Sample Rate: 1024
Duration: 8 Seconds
Pre-Trigger: 1.0 Second
Seismic Gain: 10.2in/sec
Acoustic Gain: 148.2 dBL
Voltage: 6.27

Peaks and Frequencies	Graph Information
PPV Maximum: 0.0459 in/sec (-1.0000 sec)	Duration: -1.000 s To: 8.000 s
Radial: 0.0284 in/sec @ 28.4 Hz (-1.0000 sec)	Acoustic Scale: 126.0 dBL
Vertical: 0.0347 in/sec @ 34.1 Hz (-1.0000 sec)	Seismic Scale: 0.0500 in/sec (0.0125 in/sec/div)
Transverse: 0.0459 in/sec @ 36.6 Hz (-1.0000 sec)	Time Intervals: 1.00 sec
Acoustic: 105.1 dBL @ 4.0 Hz (-1.0000 sec)	
Seis Calibration Date (SN): 7/10/2017 (7178)	
Air Calibration Date (SN): 7/10/2017 (7178)	



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



White Seismograph Data Analysis V11 - Version 11.1.0.104

AECOM
4 North Park Drive, Suite 300
Hunt Valley, Maryland 21030
www.aecom.com

410 785 7220 tel
410 785 6818 fax

February 6, 2018

Reference: Field Report #1 – February 2, 2018
Vibration Monitoring
Mission Road Property – Savage Quarry
Jessup, Maryland

This field report documents the results of the vibration monitoring conducted on the subject property on February 2, 2018 related to a blast event at the Savage Quarry. The vibration monitoring was conducted using three Instatel Micromate Vibration and Overpressure monitors. The vibration monitors were placed at the locations shown on Figure 1. The geophones were planted firmly into the ground at each location. The instruments were set to record continuous vibration information at five minute histogram intervals. The instrument is also set to record more detailed full waveform information for events that exceed a selected vibration trigger level. The Federal Transportation Administration (FTA, 2006) has established guideline vibration damage criteria for various structural categories. The applicable guideline for reinforced-concrete, steel or timber structures without plaster is a Peak Particle Velocity (PPV) of 0.50 in/second. For this monitoring program the vibration trigger level for recording of full waveform records has been set to a PPV of 0.05 in/second, which coincides with 10% of the applicable vibration damage criteria.

The blast occurred at approximately 12:45 PM. The vibration monitoring results are summarized in Table 1. The results indicate a maximum vibration of 0.046 in/sec recorded at Monitoring Location 1 which was located approximately 1,800 feet from the blast. The maximum air blast (noise) level was 124.5 dB at Monitoring Location 3.

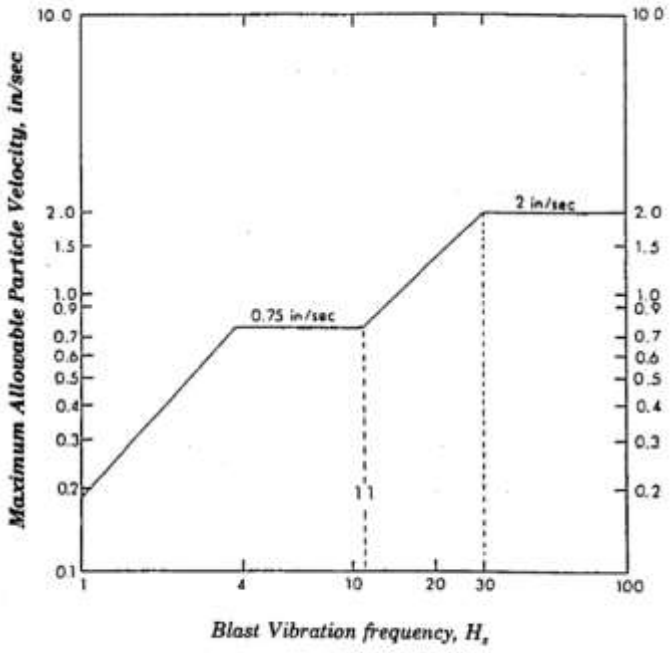
Table 1

Vibration Monitor Location	Location Description	Approximate Distance From Blast (feet)	Ground Vibration (inches/sec)	Frequency (Hz)	Air Blast (dB)
1	Northeast Property Corner	1,800	0.046	28	< 116
2	Planned Elementary School	2,800	0.024	30	< 120
3	Planned High School	3,000	0.03	32	124.5

The applicable regulations relative to surface mining in Maryland is the Code of Maryland Regulations (COMAR) Title 26. Department of Environment, Part 4. Subtitle 21 Mining, Chapter 26.21.01.22. The regulation states that the maximum vibration at a structure located 1,000 feet or greater from the blast may not exceed a peak particle velocity of 0.75 in/second. The regulation also provides a graph of maximum allowable peak particle velocity versus the frequency of the vibration (Graph 1). The relevant regulation for the air blast (sound level) is in section 26.21.01.21 which sets the compliance limit at 130.0 dB.

The results indicate that the vibration and air blast levels recorded at the three monitoring locations are well below the applicable maximum regulatory levels.

Graph I



We appreciate the opportunity to support Howard County on this project. Should you have any questions or comments on the above, please contact me at (301) 820-3125 or by email at timothy.king@aecom.com.

Sincerely,

AECOM

Timothy King, PG
Principal Geologist

Attachment: Figure 1

Figure 1 - Site Plan

AECOM
4 North Park Drive, Suite 300
Hunt Valley, Maryland 21030
www.aecom.com

410 785 7220 tel
410 785 6818 fax

February 7, 2018

Reference: Field Report #2 – February 6, 2018
Vibration Monitoring
Mission Road Property – Savage Quarry
Jessup, Maryland

This field report documents the results of the vibration monitoring conducted on the subject property on February 6, 2018 related to a blast event at the Savage Quarry. The vibration monitoring was conducted using three Instatel Micromate Vibration and Overpressure monitors. The vibration monitors were placed at the locations shown on Figure 1. The geophones were planted firmly into the ground at each location. The instruments were set to record continuous vibration information at one minute histogram intervals. The instrument is also set to record more detailed full waveform information for events that exceed a selected vibration trigger level. The Federal Transportation Administration (FTA, 2006) has established guideline vibration damage criteria for various structural categories. The applicable guideline for reinforced-concrete, steel or timber structures without plaster is a Peak Particle Velocity (PPV) of 0.50 in/second. For this monitoring event the vibration trigger level for recording of full waveform records has been set to a PPV of 0.015 in/second, which coincides with 3% of the applicable vibration damage criteria.

The blast occurred at 1:58 PM. The vibration monitoring results are summarized in Table 1. The results indicate a maximum vibration of 0.031 in/sec recorded at Monitoring Location 1 which was located approximately 2,580 feet from the blast. The maximum air blast (noise) level was 119.8 dB at Monitoring Location 2.

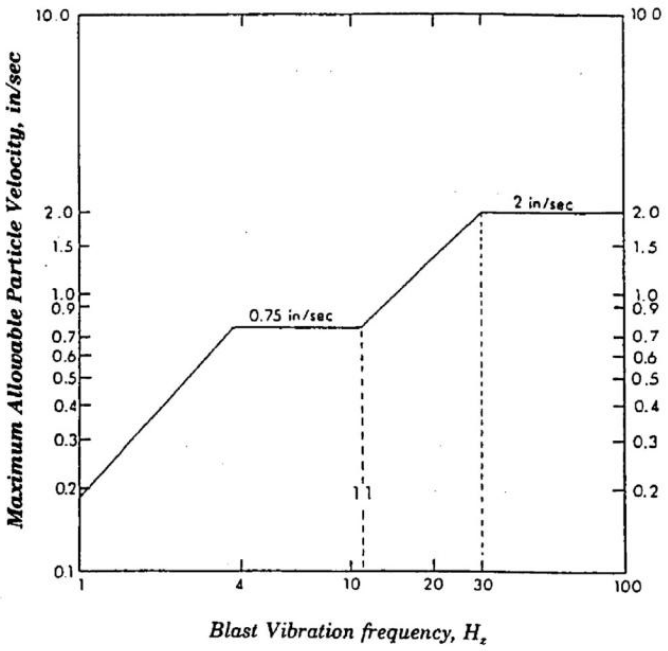
Table 1

Vibration Monitor Location	Location Description	Approximate Distance From Blast (feet)	Ground Vibration (inches/sec)	Frequency (Hz)	Air Blast (dB)
1	Northeast Property Corner	2,580	0.031	12	110.4
2	Planned Elementary School	3,710	0.023	13	119.8
3	Planned High School	3,850	0.026	20	104.2

The applicable regulations relative to surface mining in Maryland is the Code of Maryland Regulations (COMAR) Title 26. Department of Environment , Part 4. Subtitle 21 Mining, Chapter 26.21.01.22. The regulation states that the maximum vibration at a structure located 1,000 feet or greater from the blast may not exceed a peak particle velocity of 0.75 in/second. The regulation also provides a graph of maximum allowable peak particle velocity versus the frequency of the vibration (Graph 1). The relevant regulation for the air blast (sound level) is in section 26.21.01.21 which sets the compliance limit at 130.0 dB.

The results indicate that the vibration and air blast levels recorded at the three monitoring locations are well below the applicable maximum regulatory levels.

Graph I



We appreciate the opportunity to support Howard County on this project. Should you have any questions or comments on the above, please contact me at (301) 820-3125 or by email at timothy.king@aecom.com.

Sincerely,

AECOM

Timothy King, PG
Principal Geologist

Attachment: Figure 1

Figure 1 - Site Plan

MISSION ROAD CAMPUS

HIGH SCHOOL #13 and ELEMENTARY SCHOOL #43

SCALE: 1"=60' DATE: NOVEMBER 6, 2017