Agenda

Thursday September 28th, 2023 - 7:00 P.M

	Estimated Start Time
Call to Order	7:00 P.M.
Site Preparation & Blasting Presentation	7:05 P.M.
Questions and Answers	7:35 P.M.
Adjourn	8:05 P.M.

Site Work Update: Permits / Approvals/ Consultation

- Executive Office of Energy and Environmental Affairs (EEA)
  - Massachusetts Environmental Policy Act Office (MEPA)
    - MEPA Advisory Process (3 months) – May 2022
    - MEPA Fail Safe Process (3 months) – March 2023
- Wakefield Zoning Board of Appeals (ZBA) – May 2023
- National Pollutant Discharge Elimination System (NPDES) – July 2023
- Stormwater Pollution Prevention Plan (SWPPP) – July 2023
- Middlesex Superior Court – August 2023
  - Request for Restraining Order – Denied
  - Request for Immediate Injunction – Denied
- Wakefield Fire Department / MA Department of Public Safety
  - Blasting Permit - September 2023

Site Work Update: Permits / Approvals/ Consultation

- United States Fisheries and Wildlife (USFWS)
- Stormwater Protection
  - Wakefield Engineering Department Approval
  - Weekly inspection of environmental controls
- US Enviornmental Protection Agency (EPA)
- Mass Department of Environmental Protection (DEP)
  - Pre tree removal environmental controls inspection
  - Post tree removal environmental controls inspection

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MD Drilling & Blasting

Northeast Metropolitan Regional Vocational High School

Wakefield, MA

September 28th, 2023

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Presentation Topics

- **Project Overview**
- **Comparable Projects**
- **Blasting Safety and Pre-Blast Planning**
- **Measuring Ground and Air Response, Human Perception, What Research Has Revealed**

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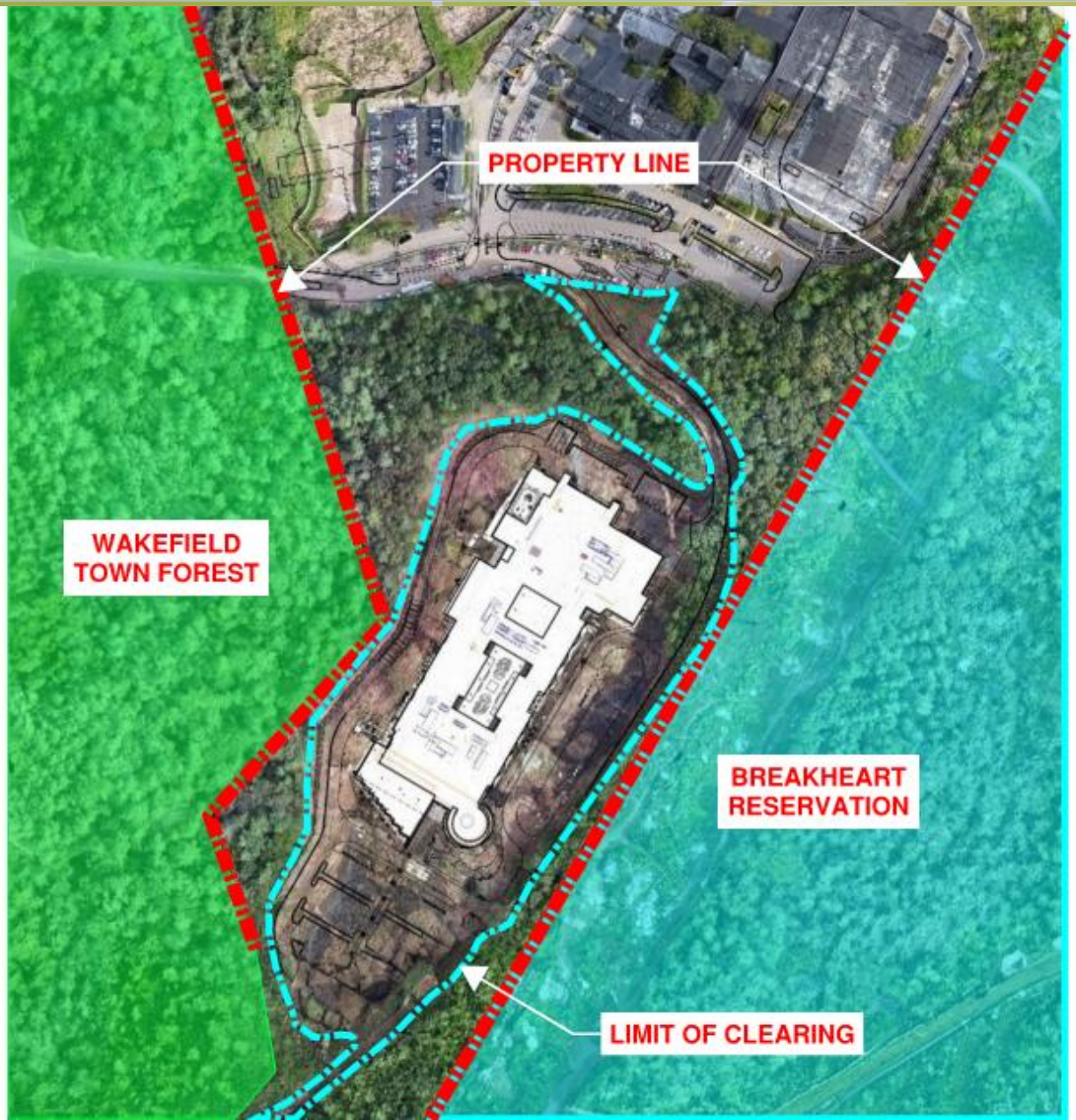
Project Overview

Drilling & Blasting



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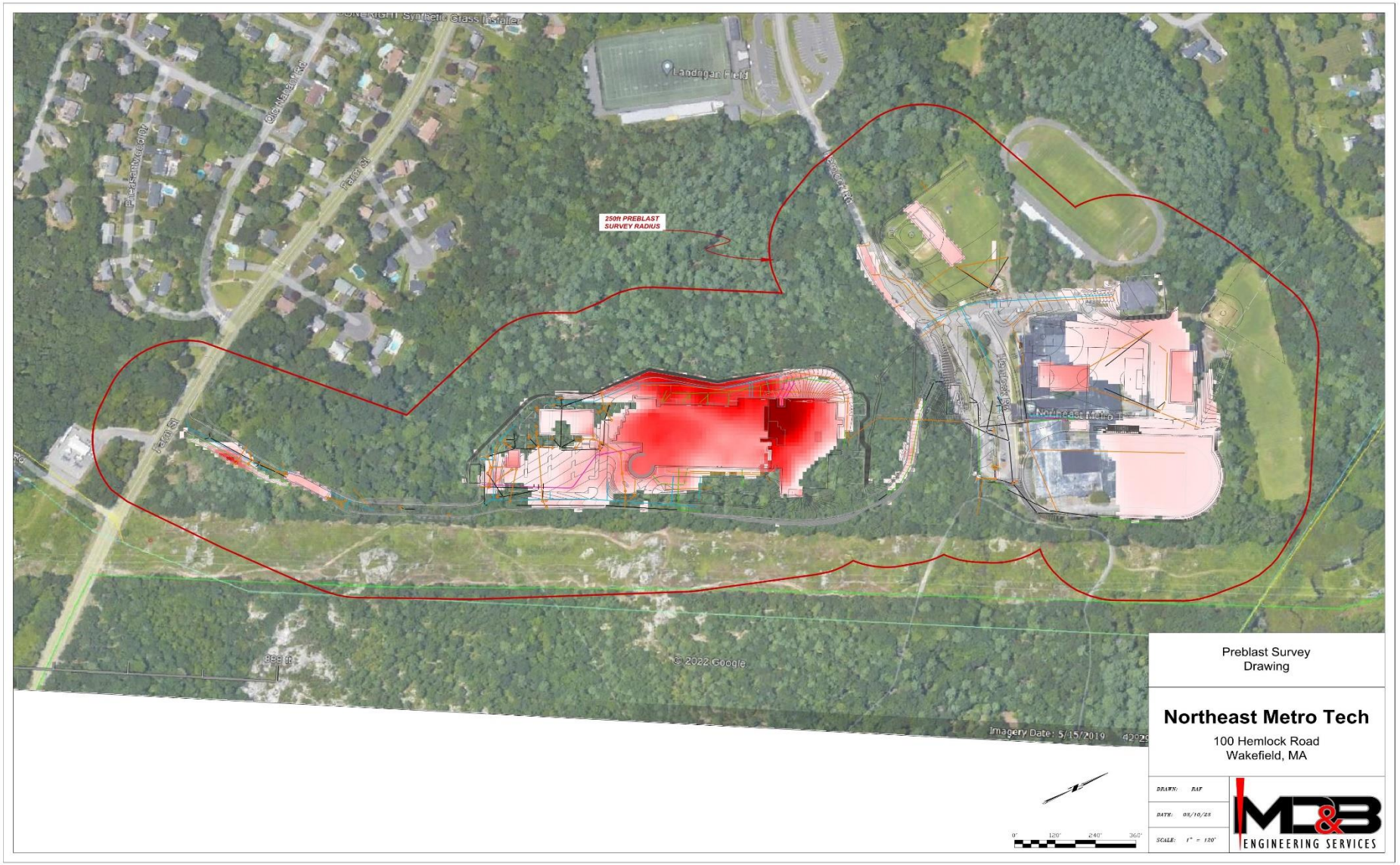
Project Overview

Drilling & Blasting



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Project Overview

- **Project Schedule**
  - **Test Blast October 12th**
  - **Production Blasting (Ongoing daily after test blast)**
  - **Estimated Blasting Completion (1/31/24)**

- **Typical day**
  - **1 to 2 blasts per day, M-F**
  - **MD D&B will aim for blasts to occur at a consistent, regular time daily between 11 AM – 2 PM**

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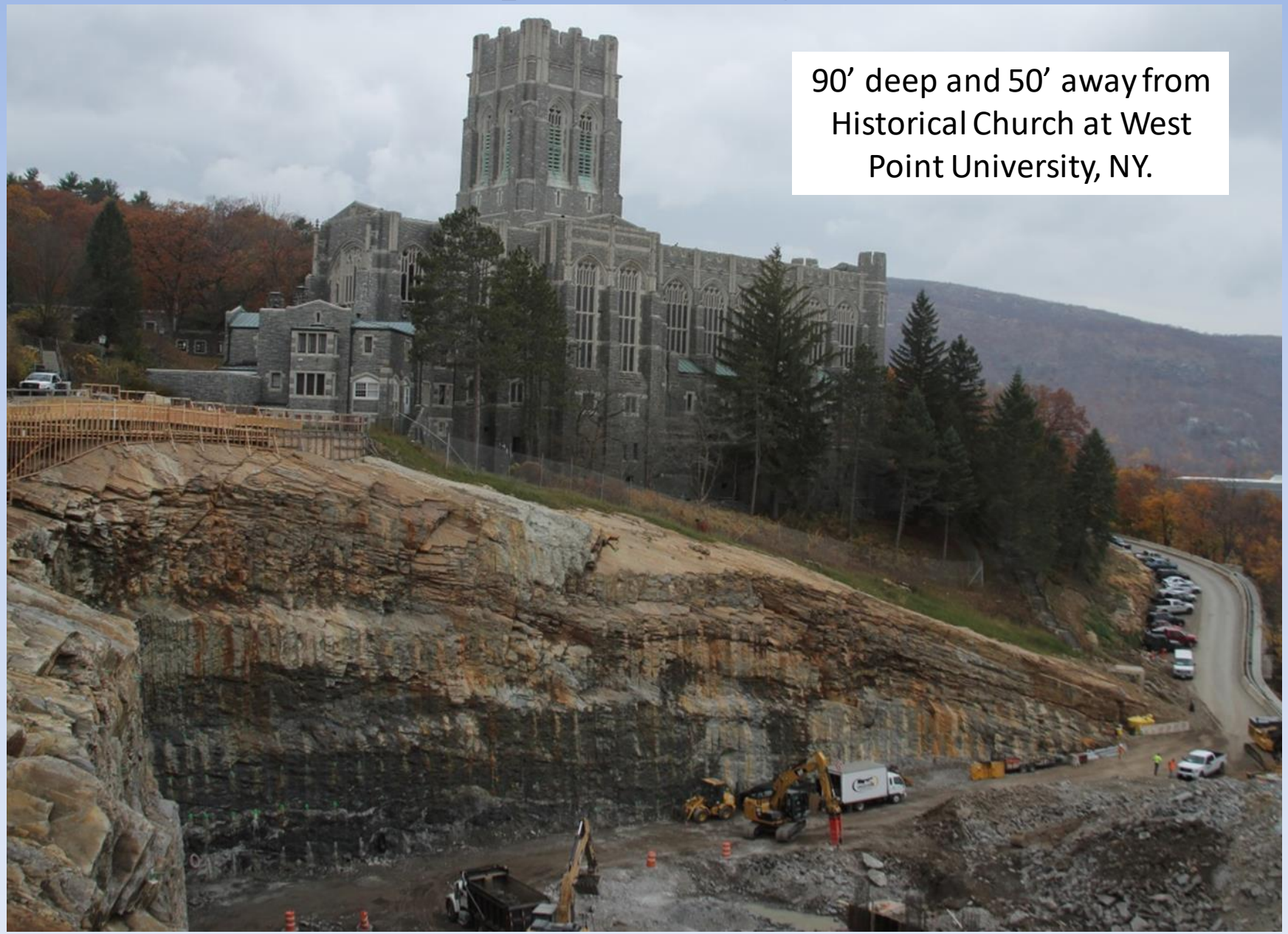
Comparable Projects

MD Drilling & Blasting



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Comparable Projects

MD Drilling & Blasting

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Blasting Safety

Pre-Blast Planning

Hazard Assessment

Our most important responsibility in working on any jobsite is to identify potential hazards before the project starts.

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Pre-Blast Planning

Pre-Blast Condition Survey

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Pre-Blast Planning

Pre-blast Condition Survey

- **Vibration can be perceived at levels as low as 1/100th of the safe level for a residential structure.**
- **When vibration generated from a new blasting operation is initially felt, the natural response of a home owner will often be a focused inspection of their home that will reveal pre-existing but unnoticed cracks (generated by natural environmental forces).**
- **These pre-existing defects will not be attributed to the project if they are pre-identified in a survey.**
- **The inspection also identifies surrounding activity, operation or process that the proposed work may need coordination with.**

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Pre-Blast Planning

- **13 Pre-Blast Condition Surveys have been performed by a third party company for this project. These locations are all more than 250 ft from the blasting limits.**
- **30 minutes until blast - All abutters and other, if desired, can be notified with text or call notification prior to blast. If you would like to be added to this notification list, please call Esta Falvey, in our office, at 508-478-0273.**
- **5 minutes until blast – 3 Long Audible Horn Signal**
- **1 minute to blast – 2 Short Audible Horn Signal**
- **Blast Occurs**
- **Blast All Clear – 1 Long Audible Horn Signal**

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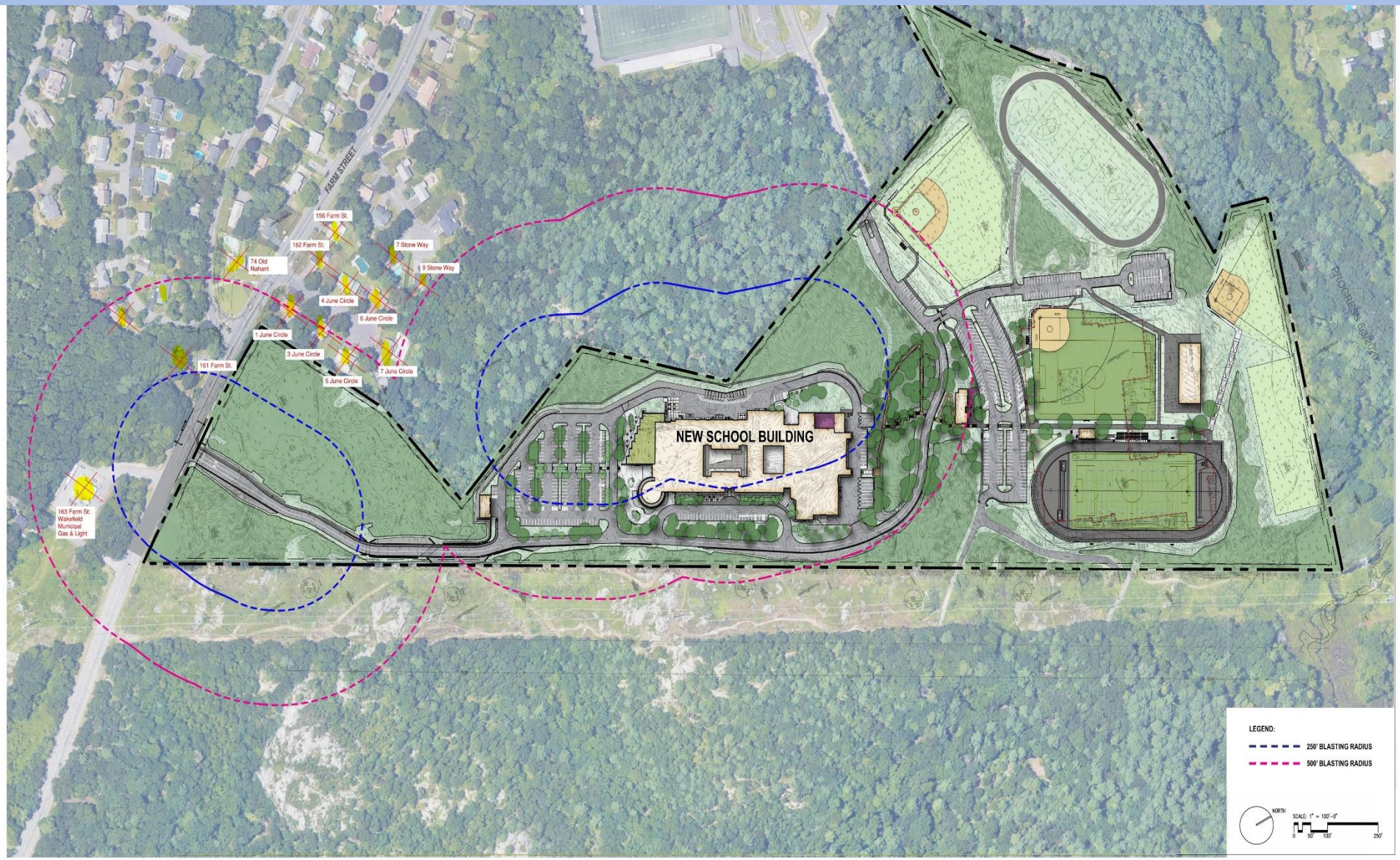
Pre-Blast Planning

Drilling & Blasting



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Pre-Blast Planning

MD Drilling & Blasting

Section 65.9.18 Blasting Regulatory Review

If a property owner thinks that damage occurred as a result of blasting, they should file a regulatory review form with the fire department within 30 days of the blasting.

A Few Things To Remember

If a blasting project is planned near your property, take a close look at your home or business. You may be surprised at how many cracks in walls, floors, and ceilings already exist just from seasonal changes in humidity, age, and normal wear and tear. Most property owners don't notice these cracks until after blasting has started and mistake them for blasting damage.

Per MA DFS Facts About Blasting
Please contact Wakefield Fire Department for Regulatory Review.

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Pre-Blast Planning

Mathematical Blast Design:

Blast Location

Distance to Structures

Geology

Vibration Estimate Calculations

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Pre-Blast Planning

Loaded Hole-Blast Design for:

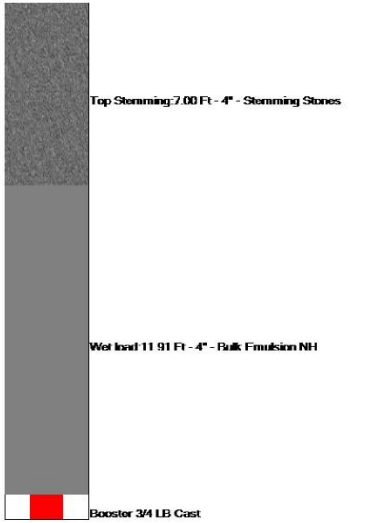
Job Northeast Metro Tech
Owner/Site
Location: Wakefield, MA **Division:** North
Customer
Author rforsyth On:3/27/2023 Updated By mshaughnessy On: 9/7/2023
Blast Plan Description: Greater than 6'

9/7/2023 12:06 PM

APPENDIX A. - Blast Design Plan:

Est. Number Of Holes:	*65*
Hole Depth:	*18.91 Ft*
Hole Diameter:	*4 in*
Burden:	*8.00 Ft*
Spacing:	*11.00 Ft*
Holes per Delay:	*1*
Pounds Per Delay:	*82.30 Lbs*
Pounds Per Hole:	*82.30 Lbs*
Total est. Pounds:	*5,349.50 Lbs*
Powder Factor:	*1.34 Lbs/Cy*
Decks:	*0*

Loaded Hole **Depth - Diameter - Product**



Blast Plan Notes:

Vibration Prediction (formula based on Dupont Handbook)

Site Factor (k) :	*200*	*Ground Constant based on Site/Rock Conidtions*
Distance Ft (d)	*600*	*Distance to Structure*
Lbs per Delay (w)	*82.30*	*Lbs explosives per 8 milisecond delay*
Scaled Distance (sd)	*66.14*	*(sd = d/ square root of w)*
Estimated PPV	*0.24*	*(ppv = k * sd ^ -1.6)*

Typical for Production work consistent with holes 18.91 Ft deep at 600 from a structure utilizing 4' In diameter at a 8 Ft by 11 Ft pattern.

Plan View/Timing Design (please see attached timing diagram)

Pre-Blast Design Analysis is used to scale the blast geometry and charge, based on proximity to structure and safe vibration limits

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Pre-Blast Planning

After the Blast Plan is finalized a pattern of holes is drilled into the ledge. Explosive charges are loaded into the drilled holes. The final step in preparing the blast involves the setting of mats to prevent debris from leaving the immediate blast area.

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Pre-Blast Planning

Through out the entire project safety is the first and foremost priority.

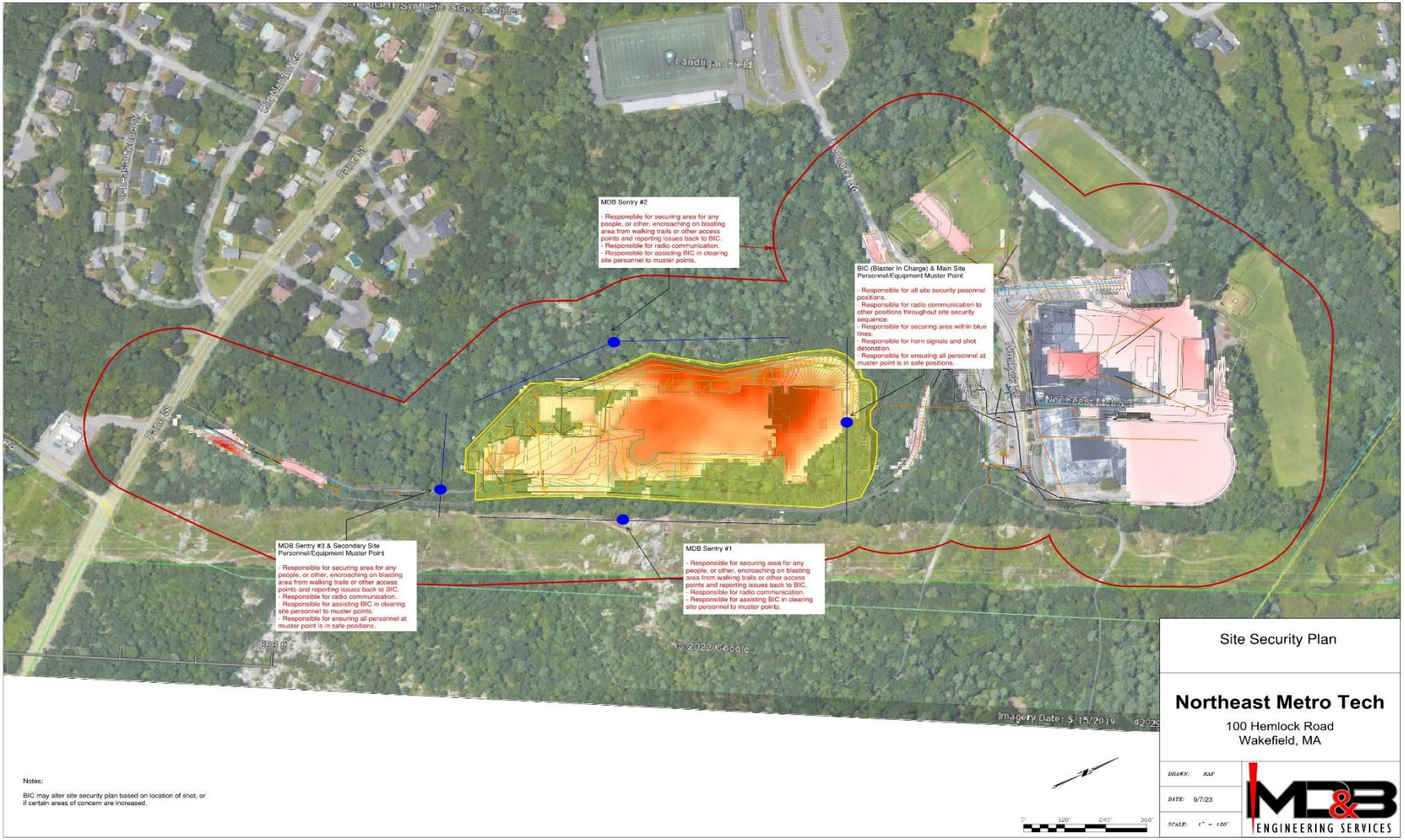
Each blast is closely coordinated with local officials and job site management personnel.

This project will also require coordination with both adjacent schools to ensure blasts occur at appropriate times to minimize any impact on the students daily activities.

People, equipment and traffic on adjacent roadways are monitored and controlled at the time of the blast if necessary, to insure the absolute safety of all.

Site Security

Pre-Blast Planning



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Site Security

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Comparable Blast

Measuring Ground and Air Response

Ground Response

When an explosive is detonated in rock, energy is released. Some of that energy is absorbed by the rock and transmitted through the ground in the form of a seismic wave.

As the seismic wave travels outward from its source, ground particles respond. These particles move back and forth ever so slightly, quickly returning back to their original rest position after the seismic wave passes. We sense this oscillation as vibration.

Air Response (AIR OVERPRESSURE)

An airborne pressure pulse resulting from the detonation of explosives. Air blast may be caused by the displacement of the material being blasted or the release of expanding gas into the air.

Can best be described as distant thunder.

Measuring Ground and Air Response

65.9.14.4 Seismograph Placement. The seismograph shall be placed at the nearest inhabited building adjacent to the blast area that is not owned, leased, or controlled by the blasting operation.

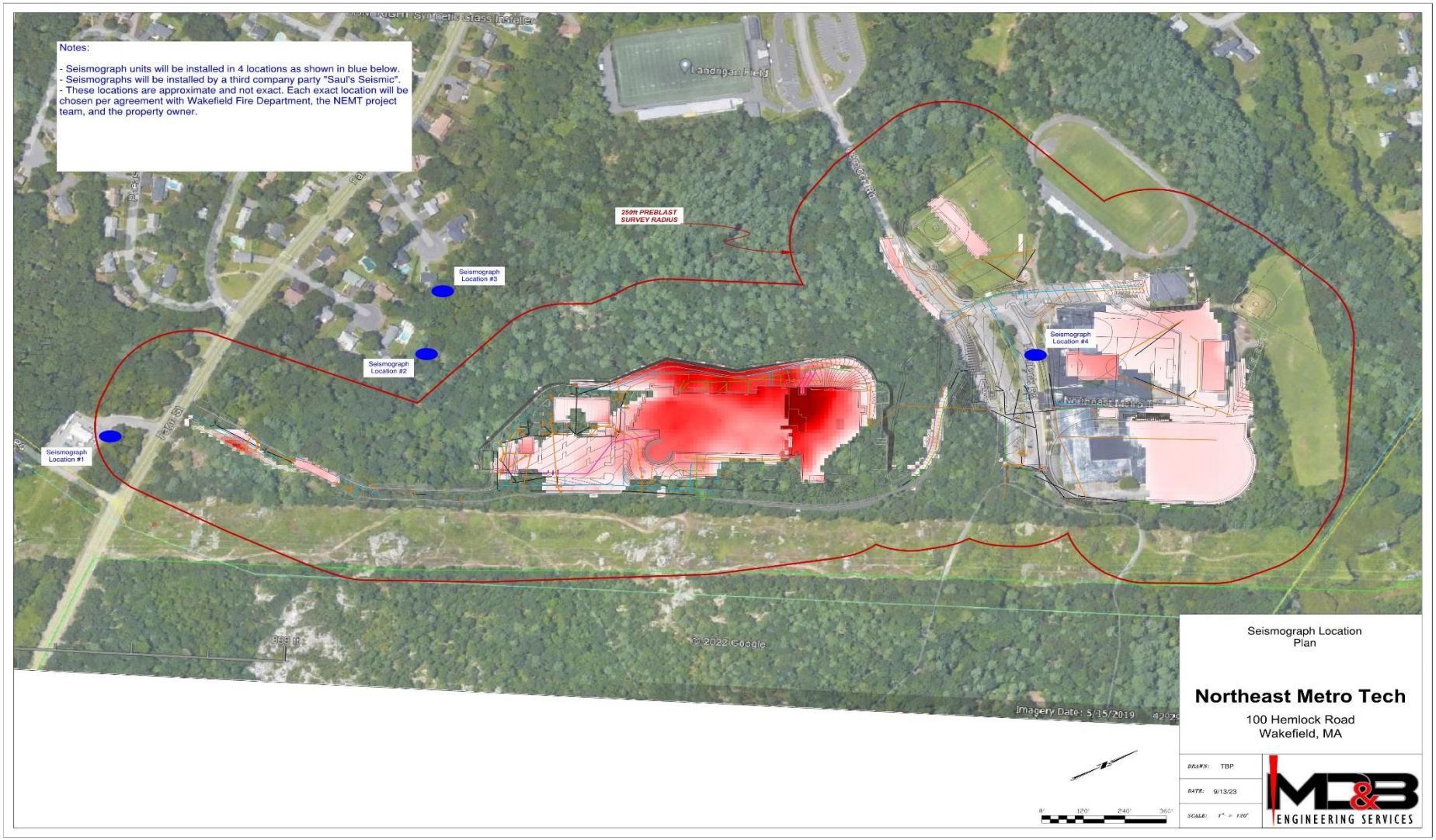
65.9.14.4.2 If there is no suitable location for seismograph placement within ten feet of the structure that is mutually agreed upon by the blaster and the Head of the Fire Department or his designee, the condition which made it unsuitable to place to seismograph within ten feet of the structure and the alternative location agreed upon by the Head of the Fire Department or his designee shall be noted, in writing, in the blastplan.

65.9.14.4.3 If the person in control of said nearest structure refuses to grant permission for seismograph placement as required by this *Code* the Head of the Fire Department shall be immediately notified.

65.9.14.4.3.1 Such refusal shall be further documented in writing by the blaster and be placed in the blasting record.

65.9.14.4.3.2 Placement of the seismograph shall then be at a location mutually agreed upon by the blaster and the Head of the Fire Department or his or her designee.

Measuring Ground and Air Response



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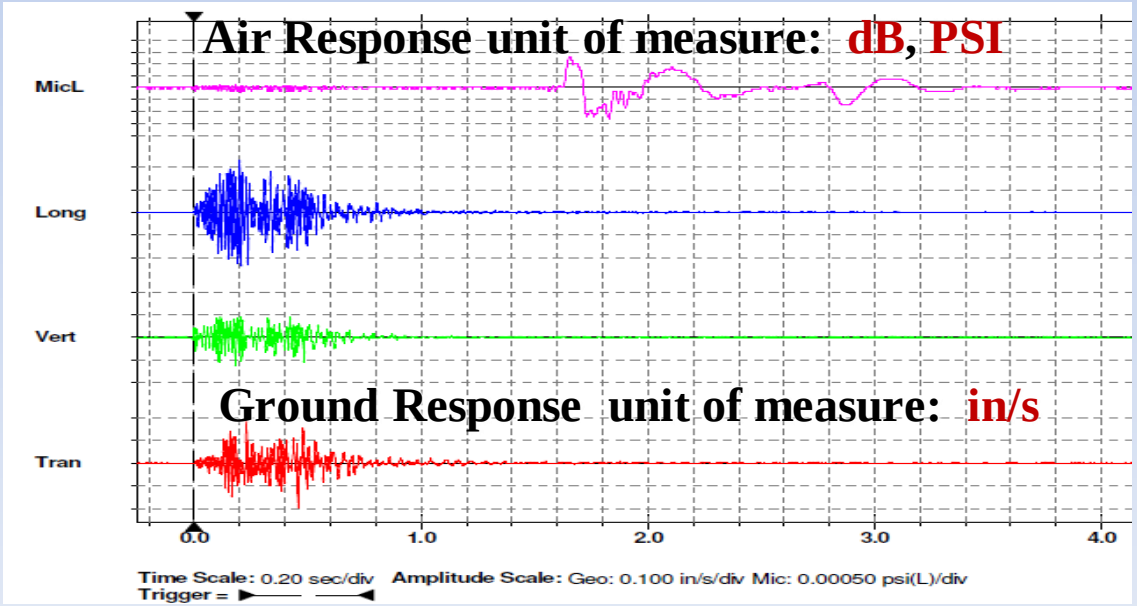
Measuring Ground and Air Response

Seismograph Monitoring

Provides a permanent record documenting air and ground response



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Measuring Ground and Air Response

Waves radiate from the energy source and decay in intensity with distance

The geology and blast design can influence the rate of deterioration, but as a rule, vibration decreases to one-third of its former value every time the distance doubles.

Measuring Ground and Air Response

USBM research established safe ground response limits that involve three components of vibration:

Particle Velocity:

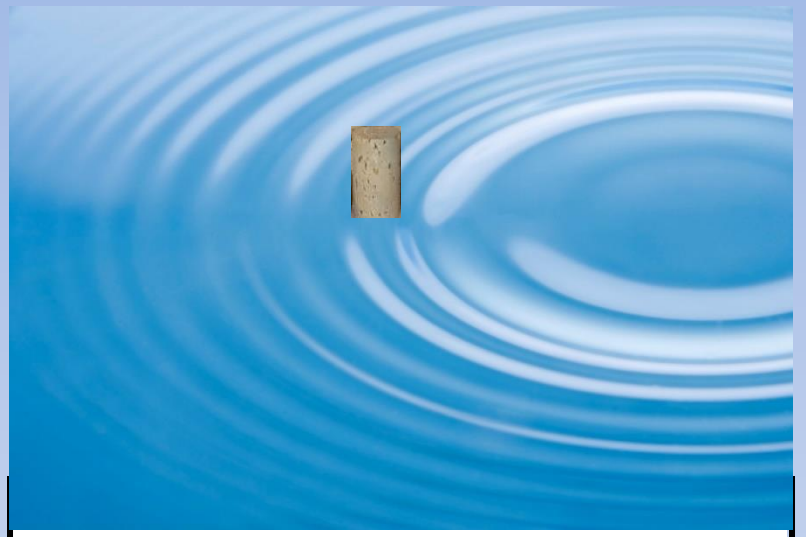
The speed in inches per second the ground is displaced.

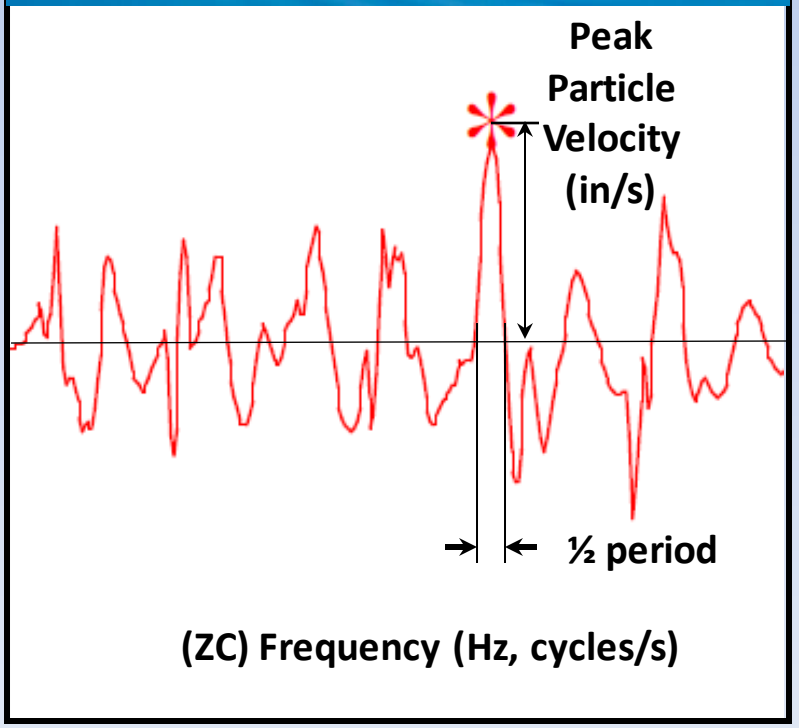
Frequency:

The number of times the ground moves back and forth in one second.

Displacement:

The elastic distance in inches the ground moves from its rest position.





What Research Has Revealed

About Air Response

- Unlike the "Safe Limit" for ground response the USBM research recommended a 133 dB Air Response limit based on annoyance level
- 133 dB = to a 27-28 mph wind (Sutherland 1968)
- Actual safe limit 140 dB (40mph wind)

What Research Has Revealed

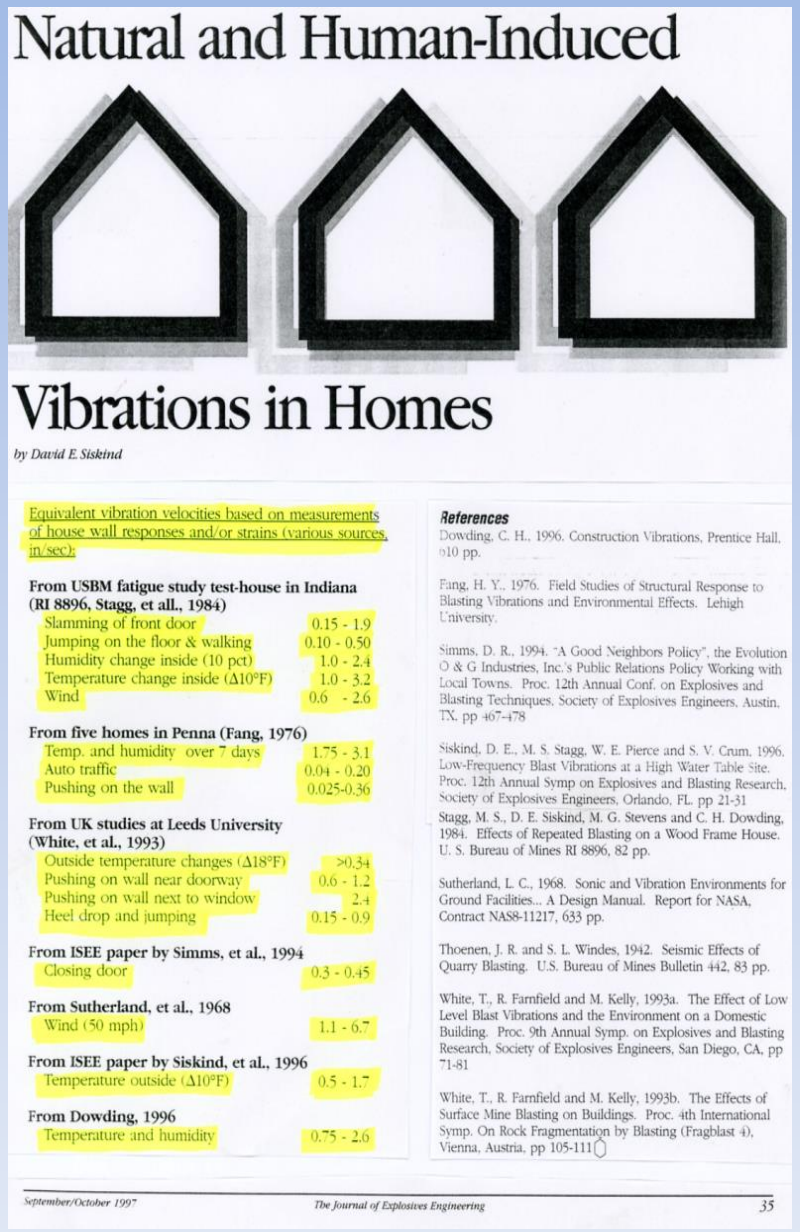
About Ground Response

- "Safe Limit" 2 IPS (above 40HZ)
- Damage does not occur at 2.1 IPS
- Most homes can tolerate level of 5.0 IPS or more at high frequency

What Research Has Revealed

About Natural and Human Induced Forces on Structure:

- Temperature change can exert forces greater than 3 IPS on a home
- Humidity change can exert forces greater than 2 IPS on a home
- Wind can exert forces greater than 6 IPS on a home



Natural and Human-Induced

Vibrations in Homes

by David E Siskind

Equivalent vibration velocities based on measurements of house wall responses and/or strains (various sources, in/sec):

From USBM fatigue study test-house in Indiana (RI 8896, Stagg, et all., 1984)	
Slamming of front door	0.15 - 1.9
Jumping on the floor & walking	0.10 - 0.50
Humidity change inside (10 pct)	1.0 - 2.4
Temperature change inside (Δ10°F)	1.0 - 3.2
Wind	0.6 - 2.6
From five homes in Penna (Fang, 1976)	
Temp. and humidity over 7 days	1.75 - 3.1
Auto traffic	0.04 - 0.20
Pushing on the wall	0.025-0.36
From UK studies at Leeds University (White, et al., 1993)	
Outside temperature changes (Δ18°F)	>0.34
Pushing on wall near doorway	0.6 - 1.2
Pushing on wall next to window	2.4
Heel drop and jumping	0.15 - 0.9
From ISEE paper by Simms, et al., 1994	
Closing door	0.3 - 0.45
From Sutherland, et al., 1968	
Wind (50 mph)	1.1 - 6.7
From ISEE paper by Siskind, et al., 1996	
Temperature outside (Δ10°F)	0.5 - 1.7
From Dowding, 1996	
Temperature and humidity	0.75 - 2.6

References

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White, T., R. Farnfield and M. Kelly, 1993b. The Effects of Surface Mine Blasting on Buildings. Proc. 4th International Symp. On Rock Fragmentation by Blasting (Fragblast 4), Vienna, Austria, pp 105-111

Questions?

Blast Notifications

- **30 minutes until blast - All abutters and other, if desired, can be notified with text or call notification prior to blast. If you would like to be added to this notification list, please call Esta Falvey, in our office, at 508-478-0273.**