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MD Drilling & Blasting

Saugus Ridge
Blasting Presentation

March 28, 2019

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Presentation Topics

- **Comparable Project**
- **Blasting Safety and Pre-Blast Planning**
- **Measuring Ground and Air Response**

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Comparable Project

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Comparable Project

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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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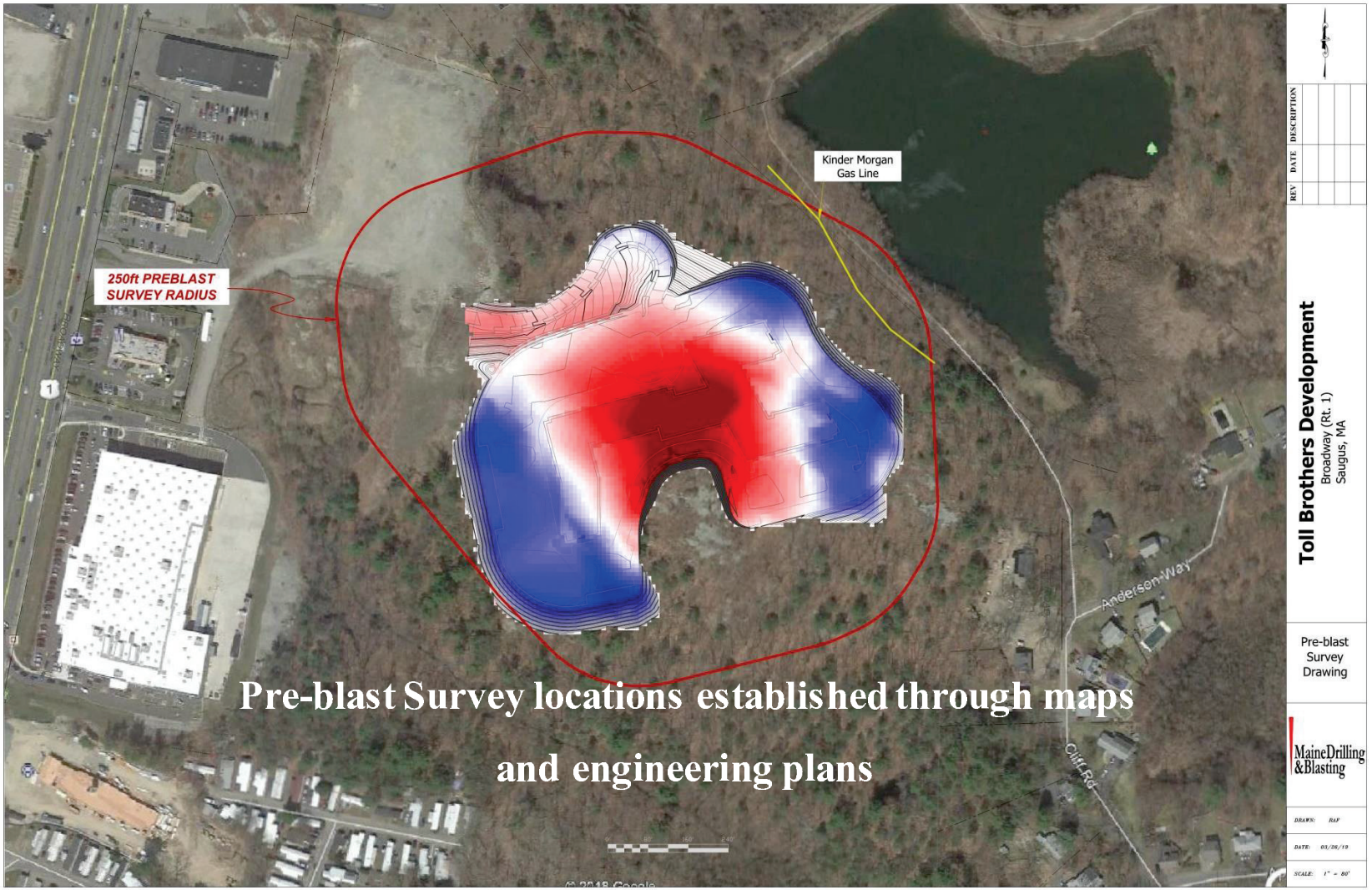
Pre-Blast Planning

Pre-blast Condition Survey



Pre-blast Survey locations established through maps and engineering plans

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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 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 his or her 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

Blast Design:

Blast Location

Distance to Structures

Geology

Vibration Estimate Calculations

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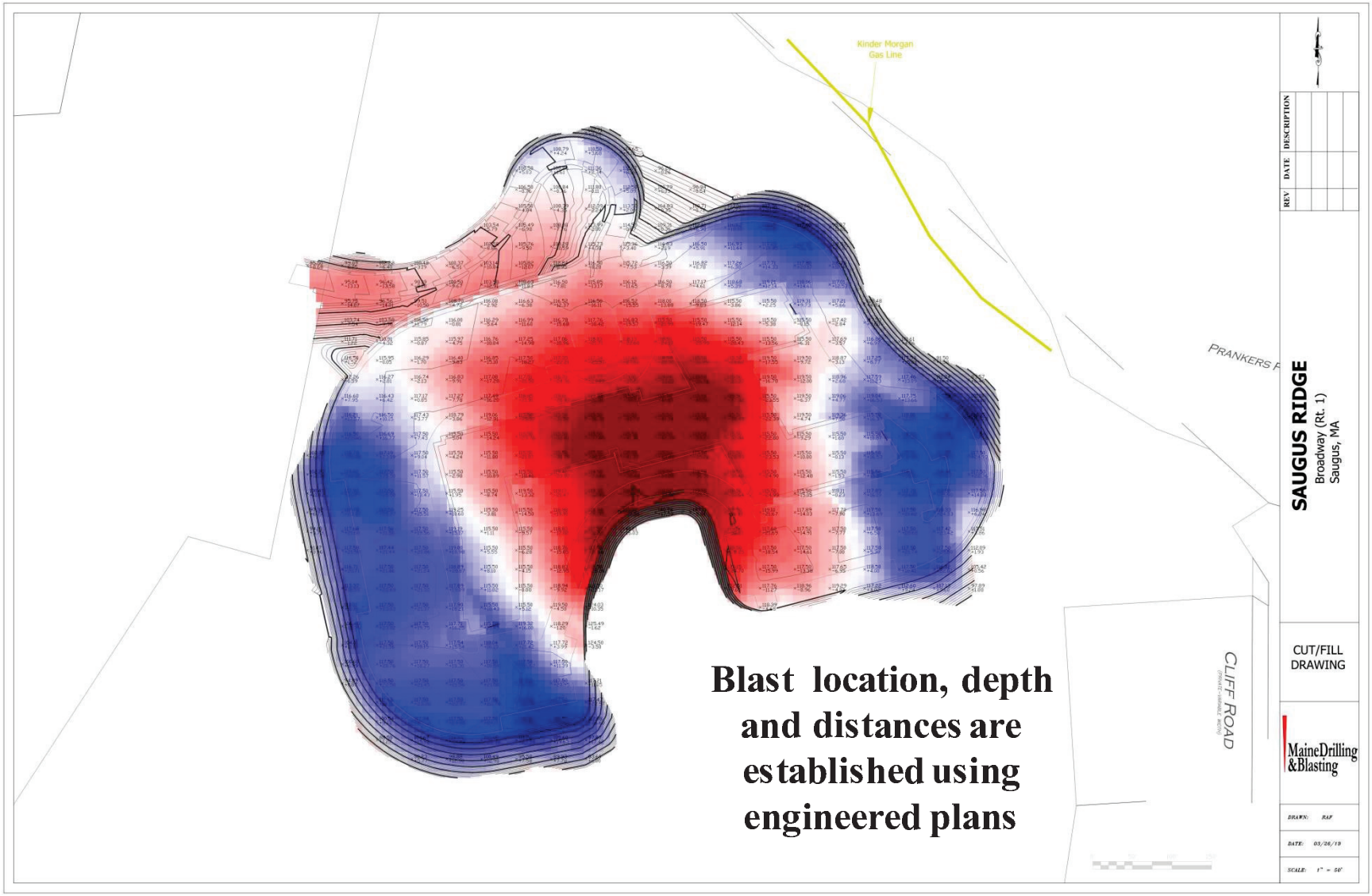
Pre-Blast Planning



Blast location, depth and distances are established using engineered plans

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Pre-Blast Planning

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PRE-BLAST DESIGN and VIBRATION ANALYSIS
Saugus Ridge
28-Mar-19

Blast Data		
Represents the maximum lbs allowed vs. the closest structure		
Scale Distance	20	
Actual Distance	150	ft
Max Charge Weight/Delay	56.25	lbs
Actual vs Allowed Calculations		
Maximum Hole Depth	11	**ft**
Stemming Between Decks	0	ft
Stemming at top	6	ft
Diameter of hole/product	3.5	in
Density	1.26	g/cc
Lbs/ft	5.26	lbs/ft
Max Allowed Feet of Powder/Delay	5.00	ft
Decks Required?	No	
Actual # of Stemming Decks	0.0	
Actual Total ft. of Product	5.00	ft
Actual Total lb's of Product/Hole	26.28	lbs
Actual Feet of Product/Deck	5.00	ft
Actual Lbs/Deck	26.28	lbs
Powder Factor	1.35	
Yardage per hole	19.47	cu. yd's
Sq. ft per hole	47.78	sq. ft
Square Pattern	6.91	ft
Burden	6.0	ft
Spacing	8.0	ft

Production Blast Vibration Analysis Estimated PPV's (inches/sec) at closest structures using different "K" factors								
Holes or Decks/Delay Factor	1.00							
Max lbs/delay	26.28	K Value	130.00		K Value	160.00	K Value	242.00
Max ft/delay	5.00							
Gas Line	150.00							
Scale Distance	29.26	Est. PPV	0.59		Est. PPV	0.72	Est. PPV	1.09
Residence	425.00							
Scale Distance	82.91	Est. PPV	0.11		Est. PPV	0.14	Est. PPV	0.21

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

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Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Blasting Plan Approval Form/Field Checklist
TENNESSEE GAS PIPELINE

General Information

Blasting Contractor:	Maine Drilling and Blasting	*Blaster's Name*	Andy Dufore
Address:	296 West Street	*Address:*	8 Seavey Drive
City, State, Zip:	Milford, MA	*City, State, Zip:*	Auburn, NH
Phone:	508-478-0273	*Phone:*	(603) 396-5011
		License Number	BL - 007215

Project Summary: (Why are you blasting in this area?)
Ironwood Apartments

Exact Location of Blasting:
25' from gas line

Blasting Information

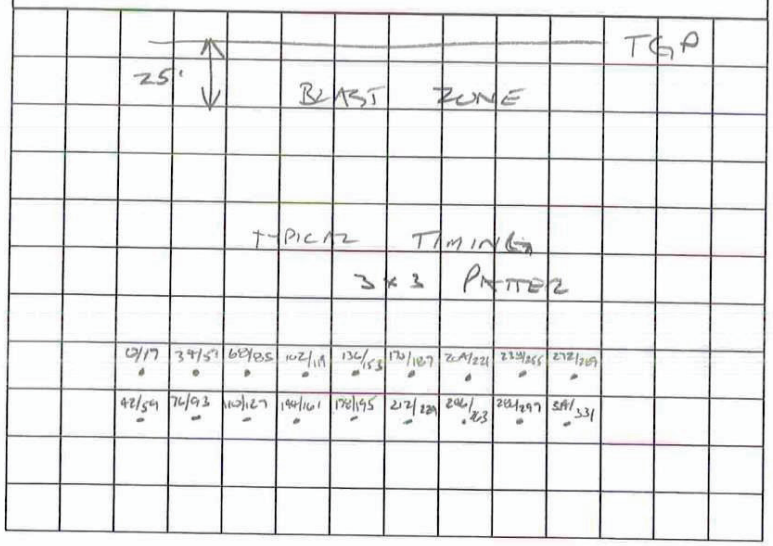
• *Explosive Type*	1 1/2 Unimax
Total amount of explosives used.	
• *Maximum charge per hole.*	3.47 LBS
• *Maximum charge per delay.*	1.74 LBS
• *Delay Interval*	8 MS
Delay Type (include manufacturer)	non-el EZ Det 1.4B
Initiating Method: (electric or non-electric)	non-electric
Type of circuit	N/A
• *Distance to nearest above ground structure*	150 Feet
Distance to nearest below ground structure	
• *Distance to nearest pipeline (TGP)*	25 feet
* *TGP Line Number*	
* *TGP Station Plus (nearest to blast)*	
• *Type of material blasted (soil, rock)*	Rock
Shot Padding to be used: (if applicable)	Rubber Tire Blast Mat
• *Number of seismographs proposed*	2
• *Will seismograph be placed near TGP pipeline?*	yes
• *Proposed date of blast*	TBD - Near Future

• This is information that must be provided.
* Provided by Pipeline

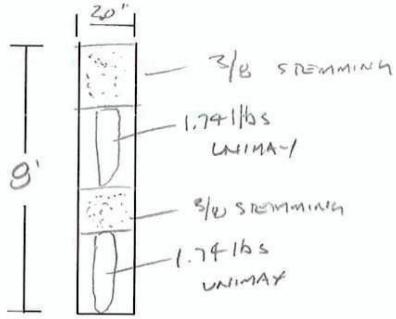
Blaster's Signature _____ *Date* 12/16/16

Sketch proposed blast pattern including number of holes, burden and spacing distance, delay pattern, and if decking is used. Also, include distance and direction between TGP pipeline and nearest blast hole. Also, sketch a hole profile including dimensions, stemming, and charges.

Remarks:



Blast Hole Profile:



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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

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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.

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

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Measuring Ground and Air Response

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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.

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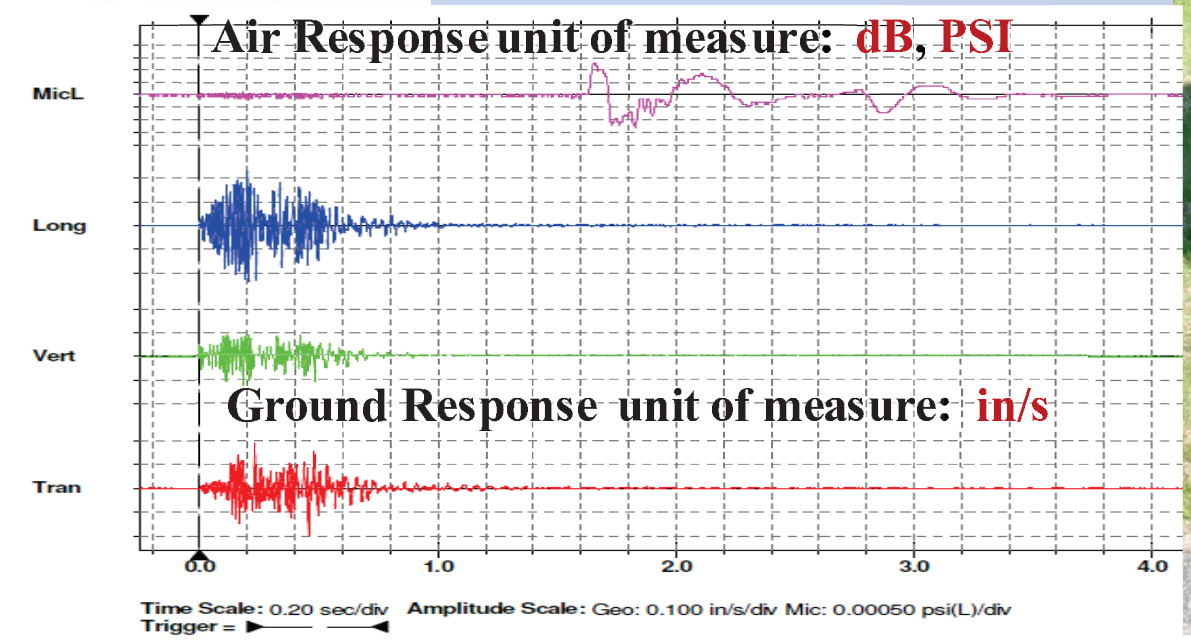
Measuring Ground and Air Response

Seismograph Monitoring

Provides a permanent record documenting air and ground response



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What Research Has Revealed

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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 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)