

**Blasting Control Plan  
For  
Montgomery Bell Academy  
Soccer Field and Parking Garage Structure**

Preparation of this blasting plan includes performing an exposure analysis to determine necessary control measures, pre-blast inspection zone, communication plan, seismic and air concussion monitoring program, blasting concerns and damage claims reporting process required to conduct blasting in a safe and responsible manner while making every effort to control the impact and minimize the inconvenience to the neighborhood and project owner. The blasting plan is intended to identify and address any potential project specific owner or neighborhood concerns associated with the blasting portion of the project. Exposure analysis will consider the four potential damage components of a blasting operation, other pertinent conditions and evaluate them given the specific project requirements and the exposures associated with the local area around the site. The four potential damage components of any blasting operation are fly rock, crater zone damage, air concussion and ground vibration. Other pertinent conditions includes identify special structures of concerns or other site specific conditions that have bearing on the blasting project or its potential impact on the community.

### **Exposure Analysis**

Fly rock or flying debris potential was evaluated based on geologic testing data from the site and the site geometry. These were taken into consideration to prepare blasting specifications for the project which will be designed to control blasted material through the use of natural overburden, blasting mats and precise drilling protocol governing the drill pattern, hole diameter, lift depth, stemming depth and type in order to protect against the potential for fly rock or other flying debris.

Crater zone permanent displacement was evaluated based on the site specific exposure distances, type of exposed structures, the geological testing data evaluation and project specific requirements. Based on these considerations line drilling will be utilized to limit crater zone influence and contain it within the perimeters of the site.

Air Concussion potential was evaluated based on line of sight type consideration stemming from the local topography and building landscape footprint analysis for the local areas around the project. Based on this analysis a 750 to 1000 feet pre-blast perimeter was identified for use in developing the pre-blast perimeter zone for the project with a minimum perimeter line of 1000 feet used from the northern end of the project and with 750 feet perimeter used from the southern end of the project unless structures are significantly blocked or shadowed by larger multi-story buildings. Additionally a multi directional air concussion monitoring program is recommended for the project with air concussion monitoring locations around the projects perimeter in order to measure and document air overpressure associated with blasting activities.

Ground vibration potential from the project was evaluated based on the depth of blasting, transmission rates of the type of material blasted and the distance exposures associated with the project. Based on this analysis a 600 to 750 feet pre-blast perimeter was identified for use in developing the pre-blast perimeter zone for the project with a minimum perimeter line with 600 feet used from the northern end of the project and with 750 feet perimeter used from the southern end of the project. Additionally a multi directional seismic monitoring program is recommended for the project with seismic locations around the projects perimeter in order to measure and document ground vibrations amplitude, frequency and attenuations associated with blasting activities.

An analysis of other pertinent conditions for the project has been conducted to identify special structures of concerns or other site specific conditions that have bearing on the blasting project or its potential impact on the community. As a part of this review several historically significant structures have been identified and added to those structures to receive a pre-blast survey. Some project specifications for the site were identified that require care to be taken to prevent over blasting the rock strata during the excavation of the site. This special condition will be addressed by the blasting specifications and their control on the drilling and blasting geometry and explosive loading for the project. The blasting specifications will also be designed to control blasted material through the use of natural overburden, blasting mats and precise drilling protocol governing the drill pattern, hole diameter, lift depth, stemming depth and type in order to reduce potential for back breakage into the sub strata of the rock under the excavation.

## **Control Measures**

Control measures identified for the project include the development of detailed blasting specifications designed to: address advanced site preparations to include site perimeter protection (fencing / barricades), quality assurance measures needed in the selection of a grading and blasting subcontractor, submittals required to demonstrate grading and blasting subcontractor's competence and experience, outline of specific blasting plan requirements for blasting plan proposed by selected blasting subcontractor, to allow owners blasting consultant representative an opportunity to review and verify compliance with project specifications, define process for adjustment to the blasting subcontractor's blasting plan, outline ongoing blasting records submittal requirements, define line drilling requirements, define operational limitations to include product type limitations for explosives and firing devices in addition to the delivery and handling requirements for all explosive products used on the project, define drilling constraints, and establish ground vibration and air concussion limits for the project.

## **Pre-blast Inspection Zone**

The Tennessee Blasting Standards Act governs blasting activities in the State of Tennessee and mandates pre-blast inspections be performed on all projects at distances extending 300 feet from the outer perimeter of a given blasting site unless the site is a permanent blasting operation i.e. a mine or quarry or unless the standard table of distance is not exceeded by any blast at the given site. The pre-blast inspection zone for this site is based on exposure analysis discussed previously in this document. The pre-blast perimeter established for this project exceeds the State of Tennessee minimum requirements by an additional safety factor of no less than two and sometimes three plus.

For this project, pre-blast inspections of all 107 structures, within the outer thick orange perimeter boundary area on the attached map will be conducted by VCE, Inc prior to the blasting operation. These pre-blast inspections include documenting buildings, houses, and other structures within a minimum radius of 600 feet of any blasting and in some cases extend beyond 1000 feet. This pre-blast inspection will include photographing and diagramming existing structural conditions. In addition to completing the pre-blast inspection, the visit associated with the pre-blast survey will be used to further inform property owners of the project and promote good public relations to neighbors in the area who did not attend the proposed community information meetings for the project.

## Communication Plan

This plan will include a pre-construction public meeting that will be held by the general contractor, owners blasting consultant and the excavation and blasting subcontractor for the purpose of presenting information about the projects scope, general time table and other project specific information in an effort to promote good neighbor relations and provide a forum to address project questions or concerns. This plan will included the blasting subcontractor providing a principle contact who will serve as the blasting foreman for the project. Additionally the blasting subcontractor will provide a blaster in charge for each blast who will secure the blast site and will make audible warning notifications with a suitable air-horn prior to each blast and an audible notification of "all clear" following each blast as required by federal, state, and local ordinance specifically addressed in OSHA 29 CFR 1926.909 subpart U, Table U-1. This is the convention that is used on all blast sites in the local community. This is usual and customary within the blasting industry and is employed as a safety practice for the neighboring homeowners and residents as well as the construction personnel.

### TABLE U-1

**WARNING SIGNAL** - A 1-minute series of (3) long blasts 5 minutes prior to blast signal.

**BLAST SIGNAL** - A series of short blasts 1 minute prior to the shot.

**ALL CLEAR SIGNAL** - A prolonged blast following the inspection of blast area.

Blasting warning signs will be provided as part of the communication plan and placed around the site perimeter, specifically at the site entrance and at points of vehicular and pedestrian access or exposure in compliance with US DOT FHWA Manual on Uniform Traffic Control Devices with the latest revisions incorporated.

Blasting activities will be performed during a daily blast window from 9 am to 3:30 pm which has been established to minimize exposure and inconvenience to the neighboring public by avoiding blasting during peak traffic periods.

## **Seismic and Air Concussion Monitoring Program**

Based on the results from the exposure analysis and the ground vibration and air over pressure requirements of the Tennessee Blasting Standards Act a nine point multi directional seismic and air concussion monitoring program will be employed for the project with eight fixed mounted and portable seismographs designed to monitor and document ground vibrations amplitude in peak particle velocity, frequency in Hz and air concussion (air blast) in decibels. The seismic and air concussion monitoring will be conducted with Physical Measurement Technology EXAD-8 seismographs. This is state-of-the-art equipment used by state and local regulators. This equipment will be used at select structures or locations around the perimeter of the site, on the site, and in the adjacent neighborhood as required in evaluating compliance with the Tennessee Blasting Standards Act and job specifications. The specific seismic and air concussion monitoring locations are identified by blue markers on the attached map. Portable monitoring on the site will be moved as the blasting progresses to give the blaster needed feedback so he can fine tune his blasting as he approaches the closer exposure distances associated with the structures surrounding the site.

Seismic data will be evaluated after each blast and feedback will be given to the blaster and on site general contractor's representative in an ongoing fashion to allow minor adjustment to the blasting activities as they progress through the course of the day. This data will be provided in a weekly blast analysis report to the owner's representative.

## **Blasting Concerns and Damage Claims Reporting Process**

If blasting damage concerns arise during the project please contact VCE Inc. The owners blasting consultant project representative is Jon Parker (615-804-4735). Mr. Parker will schedule portable seismic and air concussion monitoring testing at the structure of concern and provide feedback to the property owner of the ground vibration and air concussion levels relative to the blasting specification and known material specific damage thresholds. In the unlikely event blasting damage claims arise they can also be reported to Jon Parker at 615-804-4735. He will notify the general contractor, the blasting contractor, and he will schedule an engineering investigation of the claim with VCE Inc. engineering personnel. The results of that investigation will be presented to the Blasting Sub-Contractor and their insurance company for processing. The general contractor and owner's representative will be copied with the report of investigation.

If blasting damage is confirmed by the engineers report the blasting contractor's insurance will be tasked with the responsibility of processing the claim. Their job will be to follow up with the homeowner to arrange suitable repair performed by a qualified contractor. Insurance companies are well aware that if blasting damage occurs they have a distinct legal liability to repair the damages. If the insurance company does not fix the damage to your satisfaction we will assist you in drafting a letter of complaint to the Department of Commerce and Insurance. Our past experience indicates that step will not be required.