

20.0 BLASTING

20.1 Introduction

During construction of transmission lines and substations associated with the NECEC Project, it is likely that occasional shallow-to-bedrock soil depths and subsurface boulders will be encountered. Blasting may be required in order to install transmission line support structures, or for substation construction in these areas. For transmission line construction, blasting activity will be limited to the small volume of material needed to be removed to fit and plumb pole structures. Due to the small charge required for setting transmission line structures, the blasting plan will only address structures and wells within 500 feet of the blast site. Blasting that may be required for construction of substations will be achieved through blast detonation in delayed series that will result in no greater impact or vibration than those charges required for setting transmission line structures.

Where blasting is required, the blasting contractor will precede the construction crews, probing the pole and guy anchor locations using a tracked drilling machine. Should a limiting body of rock be encountered, six to ten 4-inch diameter “pilot” holes will be drilled. The explosives will then be packed and stemmed in the holes. Once the small charges have detonated, the fragmented material will be removed. Finally, backfilling is performed to achieve required grading and/or to plumb transmission line structures. At some pole guy anchor locations, a 2 or 3-inch diameter hole will be drilled and a mechanical expansion bolt anchor will be installed. Blasting will be utilized at guy wire and pole anchor locations where appropriate.

In rare circumstances, blasting may be required for breaking or moving large boulders that restrict construction equipment from accessing structure locations. The charges required to complete this task are also anticipated to be relatively small.

No adverse effects on either sensitive natural resources or adjacent property owners are anticipated from blasting activity due to the small charges required. Section 20.2 includes a proposed Blasting Plan for the Project that describes the proposed pre-blast procedure, the monitoring of surrounding properties and infrastructure, and all proposed safety measures, including those pertaining to transportation and use.

20.2 Blasting Plan

Blasting will be performed by licensed companies/employees in accordance with this Blasting Plan and in compliance with MDEP, and other federal, state, and local requirements so that blasting does not impact wetlands, protected areas, wells, or structures on abutting properties.

20.2.1 Pre-Blasting Survey

The construction contractor/blasting subcontractor will conduct pre-blast inspections on all properties within and abutting all blast sites prior to undertaking the work. A minimum distance of 500 feet will be evaluated in identifying relevant properties and structures to be surveyed. Inspections shall include interior and exterior conditions (cosmetic as well as structural findings). These inspections are for the benefit of property owners and the construction contractor/blasting subcontractor. Affected property owners may also request and receive pre-blast survey results

At a minimum, the pre-blast survey must include the following information:

1. Explosive type;
2. Type of detonation;
3. Delay type and interval;
4. Initiating methods;
5. Delay pattern;
6. Maximum shot hole depth and diameter;
7. Maximum charge per hole;
8. Maximum charge per delay;
9. Distance to nearest below-ground structures including existing buried pipelines, cables, etc., if any;
10. Distance to nearest above ground structures including existing buildings, utility poles, etc., if any;
11. Peak particle velocity monitoring and control;
12. Proposed fly-rock control method;
13. Matting (type-construction);
14. Safety (reference will be made to all federal, state, county, and local requirements)
15. Environmental (reference will be made to all federal, state, county, and local requirements);
16. Mitigation methods; and
17. Contingency planning.

Review of the pre-blast survey by CMP shall not relieve the general contractor and/or blasting contractor of responsibility for damages because of blasting operations.

20.2.2 Blasting Procedures Plan

The construction contractor/blasting subcontractor shall prepare a blasting procedures plan. The blasting procedures plan must include, at a minimum, the following information:

- Test Blast Program: A test blast program will be performed in accordance with the typical blasting plan and typical loaded hole for determination of shot design performance relative to required job specifications. Plans may be adjusted to achieve desired performance.
- Blasting Procedures Plan: A blasting procedures plan shall be prepared and submitted to CMP for review. As a minimum, the procedures plan must contain detailed information on the following:
 - A. Name and qualifications of the person responsible for designing and directing the blasting. This designated individual must be present and responsible for all blasts.
 - B. A copy of any necessary blasting permit(s) obtained to conduct blasting on the site.
 - C. A plan showing the locations of blasts, drill patterns, delay periods, decking, and blast monitoring instruments.
 - D. A general schedule of blasting activities.

20.3 Transportation, Storage, Use and Vibration Control

The construction contractor/blasting subcontractor shall ensure that transportation, storage and use of explosives is in accordance with federal and state regulations and the stipulations contained in applicable permits. The construction contractor/blasting subcontractor shall provide CMP with all copies of permits obtained by the construction contractor/subcontractors prior to commencement of blasting operations.

20.3.1 Transportation

1. Vehicles used for the transportation of explosives shall not be loaded beyond rated capacity for the vehicle;
2. Explosives shall be transported in vehicle(s) with covered body(s) to prevent dislodgment from the vehicle;
3. Explosives vehicles shall be marked with reflective signs on both sides and on the front and rear, bearing the word “EXPLOSIVES” in red letters on a white background in addition to the diamond-shaped signs listing the class of explosives;
4. When blasting caps are transported on the same vehicle as explosives, the blasting caps shall be contained in a cap magazine designed for that purpose as defined in 49 C.F.R. 177.835(g);

5. No spark-producing materials will be transported in the truck bed with explosives;
6. Vehicles used to transport explosives shall be inspected prior to each use. A record of inspections will be kept with the vehicle;
7. Explosives vehicles shall be operated in a safe and prudent manner;
8. No person shall smoke within 50 feet of explosives; and
9. All vehicles transporting explosives shall have two ABC fire extinguishers of 10-pound size located in the cab of the vehicle.

20.3.2 Storage

1. Magazines shall comply with Bureau of Alcohol, Tobacco, Firearms, and Explosives (“ATF”) regulations and placed no closer than 100 feet of each other; and
2. The area around each magazine shall be kept free of combustible materials for at least 25 feet.

20.3.3 Use

1. Drilling and loading operations shall not occur within 50 feet of one other;
2. Drilling equipment will be equipped with a suitable dust control apparatus and will be kept in repair and in use during all drilling operations;
3. Tamping of explosives shall be done using a wooden tamping pole;
4. Blast mats will be utilized when deemed necessary. The number of mats and the position of the mats used on any one shot will be at the discretion of the blaster; however, whenever a question occurs of whether or not to use mats, the blaster will always use the safest procedure. If necessary, depending upon encountered conditions, every shot could be matted;
5. Prior to each blast, the person responsible for shooting is aware of the conditions and procedures and shall determine that the area is clear of personnel and equipment;
6. CMP shall be advised of the time of each planned shot as far in advance as possible;
7. The following blast signals shall be used: 3 blasts = 5 minutes to shot; 2 blasts = shot imminent; 1 long blast = all clear;
8. Signs shall be posted warning of the blast signals;
9. The blaster shall determine after each blast that no misfire has occurred;
10. In the event of misfire, the area shall be cleared for not less than 30 minutes, after which the blaster shall take appropriate steps to determine the cause of the misfire. All misfires shall be reported to the safety engineer;
11. Detonation of each shot will be by means of a non-electric system. Each series of holes will be delayed for a minimal fly rock and ground concussion using millisecond interval delays;
12. Blasting operations will be restricted to daylight hours;

13. The blasting operation will be under the direction of a blasting foreman. The blaster and driller will be experienced in both drilling and blasting;
14. Drilling patterns will depend upon the depth of the rock and its condition; and
15. The Test Blast Program will be performed in accordance with the typical blasting plan and typical loaded hole for determination of shot design performance relative to required job specifications. Plans will be adjusted relative to meeting desired performance.

20.3.4 Vibration Control

When a blast is being planned, the following information will be documented in a blasting log to be kept by the person responsible for blasting operations:

1. Location;
2. Depth and patterns of holes;
3. Number of holes;
4. Amount and type of explosives per hole per delay;
5. Type of detonation;
6. Scaled distance as defined in EM385-1-1 25.COB as a scaled factor (ft./lb. units) of the potential damage to a structure, based on the distance from the nearest structure to the blast site and the weight of explosives per delay. When scaled distance is less than 70, seismograph(s) will be used to monitor and record vibration;
7. Time and date of shot; and
8. Location of closest structure (building and/or utility pole).

Any peak particle velocity should be limited to 2 inches per second at any structure or at 250 feet, whichever is nearer, and a peak air-over-pressure of 129 dB. Ground vibration will be controlled by use of delays and loading patterns.

20.3.5 Record Keeping

When a blast is being planned, the following information will be documented in a blasting log to be kept by the person responsible for blasting operations:

1. Location;
2. Depth and patterns of holes;
3. Number of holes;
4. Amount and type of explosives per hole per delay;
5. Type of detonation;
6. Time and date of shot;

7. Location of closest structure (building and/or utility pole);

In addition, the blasting log shall include the following information as outlined in 38 M.R.S. § 490-Z(14)(L):

A record of each blast, including seismographic data, must be kept for at least one year from the date of the last blast, and must be available for inspection at the blasting contractor's office:

1. Name of blasting company or blasting contractor;
2. Location, date and time of blast;
3. Name, signature and social security number of blaster;
4. Type of material blasted;
5. Number and spacing of holes and depth of burden or stemming;
6. Diameter and depth of holes;
7. Type of explosives used;
8. Total amount of explosives used;
9. Maximum amount of explosives used per delay period of 8 milliseconds or greater;
10. Maximum number of holes per delay period of 8 milliseconds or greater;
11. Method of firing and type of circuit;
12. Direction and distance in feet to the nearest dwelling, public building, school, church, or commercial or institutional building neither owned nor controlled by the owner;
13. Weather conditions, including factors such as wind direction and cloud cover;
14. Height or length of stemming;
15. Amount of mats or other protection used;
16. Type of detonators used and delay periods used;
17. The exact location of each seismograph and the distance of each seismograph from the blast;
18. Seismographic readings;
19. Name and signature of the person operating each seismograph; and
20. Names of the person and the firm analyzing the seismographic data.

Documentation of seismograph and other instrumentation calibration must be maintained prior to blasting. Copies of all blasting logs and seismic records shall be submitted to CMP on a weekly basis.

20.4 Monitoring

All shots that could affect structures will be monitored by seismographs. The units will be set and operated by the blaster and will be set near the closest structure. These units not only record the results of

each blast for the logs, but they also serve as indicators to help guide in determining the type, size, and patterns of the shots.