



CARVEL PROPERTY DEVELOPMENT

**Pine Plains and Milan,
Dutchess County, New York**

**APPENDIX 10.3 – SEQR ROCK
EXCAVATION CONCEPT**

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SEQR Rock Excavation Concept
Carvel Property Development
Towns of Pine Plains and Milan
Dutchess County, New York

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1.0 INTRODUCTION

The Carvel Property Development is a 2,200 (+/-) acre proposed golf, second home and pre-retirement community development located partially within the Towns of Pine Plains and Milan, Dutchess County, New York, just south of the Columbia County boundary.

The Carvel Property Development is a master planned community complex incorporating recreational amenities, community facilities and a range of residential housing types, which will be designed, developed, and operated with sensitivity to environmental resources and in keeping with the character of the area and local community. The existing Carvel Golf Course will be redesigned and expanded into 27 holes and accompanied by new golf clubhouse facilities. Other amenities will include a Homeowner's Clubhouse with Spa facilities, swimming, tennis, field sports, a health and fitness center; a lakefront activity area complete with picnic areas, fishing and non-motorized boating opportunities; and extensive nature trails. A variety of housing configurations will be oriented to the various lifestyles with architectural themes compatible with the natural setting of the site and consistent with the character of the local communities. Included with the development will be all necessary infrastructure including an on-site central water and sewer system, drainage facilities and extensive natural resource conservation, protection and enhancement programs.

2.0 EARTHWORK OPERATIONS

In order for the development to be economically feasible, earthwork will be necessary to manage cut grade areas with fill grade areas. Based on limited knowledge of the site, rock excavation is anticipated in some areas of the site to establish proposed grades for roadways, utilities, structures and other infrastructure components. As part of the design development, a subsurface investigation including test boring and test pit explorations will be conducted to define the in-place soil and rock characteristics, which will allow the designers to tailor the development to the site conditions. By limiting rock excavation operations and reusing soils across the site, costs to construct the development will be reduced.

It is anticipated that soil excavation and filling at the site will be performed using common construction equipment employed throughout the industry and that mitigation measures such as dust control, noise control, vehicle washes, etc. will minimize disturbance to the local community.

Various methods of rock excavation will be utilized during site construction depending on the type and condition of the bedrock at a particular area. In soft

weathered rock, standard construction equipment is typically sufficient to excavate or “rip” the bedrock. If the rock is less weathered and stronger, additional mechanical devices may be required to break the rock down into removable size pieces for excavation. As a last resort, to break apart massive, strong and fresh (non-weathered) bedrock, drill and blast operations will be utilized to fragment the rock so that it can be excavated. By utilizing combinations of these techniques, rock excavation can be performed in a responsible and economical manner.

3.0 ROCK EXCAVATION OPERATIONS

It is anticipated that rock excavation at the site will require some use of drill and blast operations, hereinafter referred to as blasting, to fragment rock into workable size pieces. At this time, it is not possible to accurately gauge where blasting will be required, but areas where grade reductions are necessary and where the probability that rock excavation and possibly blasting is also necessary, can be anticipated.

Since rock excavation is expensive, especially when blasting is required, the amount of rock excavation will be minimized as much as possible by developing engineering alternatives to avoid rock wherever possible. Rock excavation and blasting is not anticipated for the following development components:

- Single family residential structures,
- Golf course areas, and
- Open areas.

Therefore, potential rock excavation will be limited to areas where roadways, utilities, multiple family structures and other infrastructure components are proposed. Based on the current state of the design, areas where grades will be reduced to achieve finished grade are as follows:

Depth of Cut Below Grade	Probability of Encountering Rock	Probability of Blasting Rock	Approximate Area	
<i>0 to 2 feet</i>	<i>Very Low</i>	<i>Extremely Low</i>	<i>830,500 Sq Ft</i>	<i>19 Acres</i>
<i>2 to 5 feet</i>	<i>Low</i>	<i>Very Low</i>	<i>1,757,000 Sq Ft</i>	<i>40 Acres</i>
<i>5 to 10 feet</i>	<i>Moderate</i>	<i>Low</i>	<i>1,151,000 Sq Ft</i>	<i>26 Acres</i>
<i>10 feet or more</i>	<i>High</i>	<i>Moderate</i>	<i>459,125 Sq Ft</i>	<i>11 Acres</i>

Additional rock excavation may be necessary to accommodate subbase and utility installation. As indicated in the previous chart, although rock may be encountered, the likelihood that it will require blasting is somewhat lower. Typically, rock can be

mechanically excavated through the weathered zones until fresh rock is encountered. If excavation to such a depth is insufficient, then other methods may be required for excavation. Depending on factors such as the size of an area, design flexibility, rock characteristics and others, the decision to excavate the rock or not will be made at the earliest possible time during the design and construction phases.

4.0 POTENTIAL USES OF EXCAVATED ROCK

The primary purpose of blasting operations at the site is to facilitate excavation of rock to proposed site grades and not to develop stockpiles of usable aggregate. However, excavated rock, whether a result of blasting operations or mechanical excavation methods, could potentially be used on site for a variety of purposes including, but not limited to:

- Coarse aggregate for concrete,
- Rip-Rap,
- Roadway subbase,
- Structural fill,
- Slope reinforcement,
- Erosion control and more.

The rock can typically be left in its excavated state (i.e., size and shape) for many of the functions listed, but may require modification to be used as a concrete aggregate, roadway subbase or structural fill. Rock used for these purposes will most likely need to be processed using a rock crusher to develop gravel size particles for use. Excavated rock would be loaded onto trucks at the excavation location and delivered to the on-site rock crusher area for processing. A stockpile of crushed rock would be created for future use.

Economically it is favorable to co-locate the rock crushing and concrete fabrication processes so the cost to truck material across the site is minimized. Rock crushing and concrete fabrication operations would most likely be performed near the existing sand and gravel mine site where both fine and coarse aggregate are readily available and close to a major roadway for cement and additive deliveries.

5.0 BLASTING OPERATIONS

When blasting is required for the Carvel Property Development, a comprehensive plan will be developed based on site specific information and will be submitted for approval to the regulatory agencies/authorities. Modern blasting operations are

conducted routinely without damage or inconvenience to those people or properties located nearby. A controlled blast is performed by:

- Drilling holes into the bedrock to design depth, diameter and spacing,
- Placement of a charge, carefully designed for optimal breakage, into the drilled hole, and
- Timed detonation of the charges in an optimal sequence to fragment the rock while minimizing vibration and noise.

Rock blasting creates three effects of concern:

- Flyrock – Rock pieces propelled into the air
- Ground Motion – Ground vibrations from the blast, and
- Airblast – Air pressure created by the blast.

These effects can be controlled and quantified by proper application of preventative measures, monitoring and proper design of the blast by a qualified explosive engineer. Prior to any blasting operations, it is essential to monitor and record the existing conditions of structures and areas adjacent to the site. This is typically performed through a combination of background vibration monitoring and pre-blast site surveys. During the blast, ground vibration and air blast pressure are monitored and recorded at various intervals from the blast and at nearby structures. Flyrock is minimized by using blast mats over the surface. Included at the end of this document is Figure 1, a chart that compares limits of human perception to ground vibrations.

6.0 CONCLUSION

The Carvel Property Development will require extensive earthwork operations that will most likely require rock excavation and some blasting operations. However, as part of the overall development rock excavation will be minimized to the extent possible and blasting operations will only be resorted to if necessary.

When a subsurface investigation is completed, engineers will be able to tailor the proposed design to the site conditions and limit the impacts and costs associated with rock excavation and the earthwork in general. Concrete fabrication and rock crushing operations located on-site will make use of the products on-site and will help to make the development a little more self-sustaining.