

**APPENDIX 16.6**  
**Rock Removal, Blasting and Trucking Program**

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**JARDIM ESTATES EAST**

**ROCK REMOVAL, BLASTING AND TRUCKING PROGRAM**

**VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY**

**October 10, 2011**

This blasting mitigation plan identifies the procedures involved for the proper removal of rock, potential blasting protocols and trucking routes to ensure all work is performed in an environmentally sensitive and safe way for the Jardim Estates East subdivision.

The rock removal and blasting program presented herein is a guide for the removal of ledge rock and bedrock from those areas of the proposed development where rock is believed to interfere with the proposed construction. The intent of this program is to enable the applicant to safely, systematically, and environmentally accomplish the removal of the rock to prepare the site for the construction of the road and infrastructure as well as the individual home sites. The rock removal for this project is required only to complete the proposed development and is not a vehicle for the production of material items for sale or use elsewhere.

Rock removal may be required for the construction of a portion of the private road, infrastructure, utility lines and some home sites as well as portions of some of the individual driveways. This is based primarily on site inspections of the property by this office and exploratory deep test hole borings conducted in the areas of the home sites, the water quality basins for each lot and for the placement of a separate sewage treatment system, and several suspect areas for the proposed driveways and road. Based on these, a map has been prepared indicating the potential blast zones and is presented as Figure 1. The blast zone locations for the road, house and driveway construction is shown. Areas of cut not included in the potential blast zones are believed to contain deep soil profiles based on the deep test hole borings, visual observations and topography.

Rock removal does not necessarily mean blasting. It is not the intent of the developer to blast rock to achieve the desired grade. Blasting is costly with potential liability. In addition, the lots are large enough such that the developer may shift the location of the house slightly to avoid rock, if encountered, to avoid removing rock and increasing costs. The developer will also attempt other, less intrusive methods to remove the rock including the use of a large excavator to rip or pull the rock or the use of a hydraulic ram hoe (hammer). These two methods will be primarily used to extricate the rock from the ground and if these methods prove ineffective, then blasting will be utilized as the last option. The developer will utilize the most efficient and cost effective method to remove the rock, with blasting being the last resort.

## Potential Blast Zones

The areas identified as potential blast sites generally consist of glacial till soils derived dominantly from granite, gneiss and schist bedrock. The bedrock located on this site is typically fractured granite bedrock and bedrock outcrops are common. The blast sites typically have an overburden of the glacial till mixed with large boulders overlying the bedrock and some areas the bedrock crops out at the surface.

The potential blast sites are generally located around the private road into the surrounding subdivision lots. The potential blast zones have been labeled as follows:

**Table 1 – distances from blast zone to on-site structures**

blast zone	description	distance to nearest on-site structure (ft)	structure description
1	Lot 7 residence	250	Existing residence lot 11*
2	Lot 8 residence	450	Existing residence lot 11*
3	Lot 10 residence	100	Existing residence lot 11*
4	Lot 3/4 driveway	550	Existing residence lot 11*
5	Private road station +/- 7+50	70	Existing residence lot 11*

\* Existing residence on lot 11 is owned by the subdivision applicant

**Table 2 – distances from blast zones to off-site structures (See Figure 1)**

blast zone	description	distance to nearest on-site structure (ft)	structure description
1	Lot 7 residence	170	North residence out parcel c
2	Lot 8 residence	230	Woodlawn Street residence
3	Lot 10 residence	160	Woodlawn Street residence
4	Lot 3/4 driveway	140	Out parcel c pool
5	Private road station +/- 7+50	170	North residence out parcel c

Most of the above distances are less than the minimum recommended distance from the blast site of 500 feet. Therefore, if blasting is required in the identified areas, then a pre-blast survey of all of the structures within the limiting distance will be required. While blasting may occur in the identified areas (only if other methods prove unworthy), it is believed that with the necessary precautions in place and proper preparations and safety measures by the NYS licensed blaster, there will not likely be impacts to on-site or off-site structures.

Based on the identified blast zones, field reconnaissance was performed and exploratory test holes were dug to assess the areas. The amount of rock removal has been estimated and is shown in table 3 below.

**Table 3 – estimated rock removal**

blast zone	description	rock amt (cy)	30% exp (cy)	total rock (cy)
1	Lot 7 residence *	270	350	350
2	Lot 8 residence *	270	350	350
3	Lot 10 residence *	270	350	350
4	Lot 3/4 driveway	90	115	115
5	Private road station +/- 7+50	222	288	288
	<b>Totals</b>			<b>+1450</b>

\*rock amounts for the houses are based on an estimated 40% of the average cut of 670 cubic yards per house, see the Cut/Fill Analysis prepared by Cronin Engineering, P.E., P.C., dated October 10, 2011.

**Pre-Construction Schedule**

Prior to any construction of the development, the developer shall comply with the following schedule:

1. Satisfy all applicable conditions of Subdivision and Site Plan Approval by the Planning Board and identify what other applicable permits for site development are required.
2. File pertinent documents with the County Department of Health, affected utility companies, the Village of Tarrytown, NYSDEC, and any other involved agency, for necessary reviews and approvals.
3. Obtain the services of a Site Engineer, licensed in the State of New York and as approved by the Village of Tarrytown for the construction of the road and infrastructure and Stormwater SWPPP inspections.
4. Post all necessary Performance Bonds for the proposed site work and pay all required fees.
5. Submit any required insurance riders to the appropriate authorities.
6. Stake the property lines as necessary, flag the work limits, identify trees to be protected, if any, and establish elevation reference points (bench marks) on site as necessary.
7. Meet with representatives from the appropriate Village Departments to establish the construction protocol.
8. Contact the Underground Line Location Service (Code 53) at 800-962-7962.
9. Secure the site with required fencing and gates, as necessary.
10. Confirm utility mark outs with the Site Engineer and Contractor.

With the completion of the Pre-Construction Schedule, the on-site construction of the development may proceed pursuant to the construction sequencing program prepared for the project. In the event, during the course of construction, blasting is required the following protocol shall be followed by the developer:

**Explosives And Blasting**

In the event blasting is required to achieve the necessary final grades, blasting operations shall strictly adhere to the following requirements:

1. Prior to any drilling or blasting, a pre-blast survey must be prepared and shall include all structures (houses, garages, sheds, individual water wells, or other structures) within 500 feet of any proposed blast site. The pre-blast survey shall include photos, video, sketches, detailed notes and a written report to completely document the affected properties and shall be conducted by qualified personnel. Every structure shall be carefully examined for cracks, deformation from any cause, and other damage that could be claimed.
2. It shall be the responsibility of the blaster to ensure that the particle velocity of the blasts shall be kept to a minimum (2 in/sec) with a 'scaled distance' of 8 or larger. A seismograph shall be provided for each blast and placed in an appropriate location for best measurements. All seismograph readings shall be recorded and maintained as part of the record.
3. All blasting and blasting operations shall be in conformity with the Code of Federal Regulations, Title 29-Labor, Part 1926, Section 1926.900
4. The provisions of Article 16 of the labor Law of the State of New York, as well as Industrial Code Rules contained in Title 12, Part 39 of the New York Code of Rules and Regulations are recognized as applicable to the possession, handling, storage and transportation of explosives and shall be complied with by all blasters.
5. No person, firm or corporation shall detonate explosives unless it is licensed pursuant to Section 458 of the Labor Law of the State of New York, and in addition to such licensing, has obtained a permit for such blasting from the Building Inspector of the Village of Tarrytown.
6. No person shall blast or cause to be blasted any rock or other substance with any explosive or store explosives in the Village of Tarrytown without having first obtained a permit therefor from the Building Inspector upon written application on an approved form.

7. Before a permit is issued, the persons shall submit evidence in the form of a certificate of insurance issued by an insurance company authorized to do business in the state of New York and in a form acceptable to the Village of Tarrytown Village Attorney, guaranteeing that the applicant has in full force and effect a policy of public liability insurance.
8. No person shall use in a blasting operation a quantity of explosives greater than necessary to properly start the rock or other substances or use such an amount as will endanger persons or property.
9. All blasts scheduled to take place within 600 feet of any roadway or structure, including residential structures and individual water wells, before firing, shall be covered with metal matting or other suitable screens of sufficient size, weight and strength to prevent the escape of broken rock or other material in a manner liable to cause injury or damage to persons or property. No person shall fire or explode or direct or cause to be fired or exploded any blast in or near any highway or public place in the Village of Tarrytown unless competent men, carrying a red flag, shall have been placed at a reasonable distance on all sides of the blast to give proper warning thereof at least three minutes in advance of the firing.
10. No person shall conduct blasting operations within the Village of Tarrytown after the hour of 4:00 pm and before 8:00 am, or at any time on Saturday, Sunday or any holiday recognized by the Village of Tarrytown.
11. Whenever blasting is to occur within 500 feet of any structure, including residential dwellings and individual water wells, the inhabitants of such structure or residential dwelling shall be personally notified of the date and approximate time that blasting will occur. Said notice shall be received no less than 24 hours prior to blasting.
12. All blasting operations shall be in accordance with the Village of Tarrytown requirements.
13. No person shall conduct blasting operations without a seismograph located at the property lines and all blast locations shall be provided with steel mats or similar material, as approved by the Village of Tarrytown.
14. Blasting operations in the proximity of overhead power lines, communication lines, utility services, or other services shall not be carried on until the operators and/or owners have been notified and measures for safe controls have been taken.
15. When blasting is done within 500 feet of any structure (house, shed, water well, etc.), the blaster shall take special precautions in the loading, delaying, initiation and confinement of each blast with steel mats or similar approved method.
16. All blast holes shall be stemmed to the collar or to a point that will confine the charge.
17. No loaded holes shall be left unattended or unprotected.
18. The blaster shall keep an accurate, up-to-date record of explosives, blasting agents and blasting supplies used in a blast and shall keep an accurate running inventory of all explosives and blasting agents stored on the site, if any.
19. Any storage of blasting material (explosives, blasting caps, etc.) shall comply with the American Table of Distances for Storage of Explosives and shall be stored in a suitable container and properly barricaded with an earthen berm or other similar method. In no event shall explosives be stored within 300 of any residence or structure.

### **Quantities, Trucking and Hours of Operation**

The areas delineated as a potential blast zone for the road, infrastructure, houses and driveways have been quantified. For the potential blast zones, it is estimated that approximately 1,450 cubic yards of rock will be generated, including the applied expansion factor.

It is the intent of the developer that all of the rock removed will be utilized on site for the construction of the roadway (fill sections) and/or for fill sections required on individual lots, landscaping, landscaping walls and any infrastructure construction. It is believed that the developer will remove minimal material offsite. Removing material offsite is an additional cost and will be done only if necessary. Additionally, rock may be crushed on site with the use of a mobile crusher. The crushed rock will be used for road base and or driveway bases. Due to the small amount of rock expected, it is unlikely that crushing will be performed and that the material will be used for the road construction near the cul-de-sac where fill is required.

In the event material (rock or soil) is removed from the site, it will take place during the established hours of operation. All trucks used for the transport of material from the site shall meet all the necessary requirements of the New York State Department of Transportation and shall have the necessary permits to do such work. All trucks shall have covers (for the material for transportation) and the truck exteriors shall be clean and free of all loose material (rocks, dirt, mud, etc.) prior to leaving the site. The trucks shall be cleaned or hosed down as necessary to comply with this requirement. The contractor, at the end of each day is required to inspect Sheldon Avenue and the private roads in the neighborhood for any material that may have fallen off the trucks (rocks, dirt, mud clods, etc.) and shall clean the road accordingly.

It is anticipated that some combination of 10-wheel dump trucks, with a capacity of 20 cubic yards and 18-wheel tractor trailers with a capacity of 35 cubic yards may be used to remove material from the site, if removed at all. There may be any combination of truck types used on a daily basis.

Trucking routes to and from the site will be limited to mitigate any potential impacts of truck loads of material leaving the site. To that end, the trucking routes are identified below:

- |   |                   |
|---|-------------------|
| • from Site via private road westerly to Route 9 north *    | Permitted always* |
| • from Site to via private road westerly to Route 9 south * | Permitted always* |
| • from Site to Browning Lane to Sheldon Avenue west         | Limited use**     |

\*Trucks will not be permitted to exit the site onto Route 9 before 9:00 am and after 3:00 p.m. to minimize the project's construction impact on this location during the busy morning and evening rush hours.

\*\*Limited use indicates that these roads are not to be used unless a specific destination on or via these roads is required. Trucks are not to utilize these roads as short cuts or a matter of convenience. The primary route for trucks shall be to Route 9 north or south.

Rock removal either by blasting or hammering shall only take place between the hours of 8:00 am and 4:00 pm, Mondays through Fridays. There shall not be any blasting on Saturdays or Sundays or any holiday recognized by the Village of Tarrytown.

## **Project Equipment**

Below is an estimated equipment list for the construction of the development. The exact type and number may vary depending on the rate of construction and time of year. However, the list is provided to indicate the anticipated equipment required to facilitate the construction of the project.

1. Two bulldozers
2. Two to three excavators (315 or larger)
3. One hydraulic ram hoe (hammer)
4. One front end loader (track or rubber tire)
5. Two to three tri-axle dump trucks (20+ yards) for on site use to move material
6. One rubber tire backhoe
7. One mobile crusher (possible and only temporary for rock crushing)

## **Air and Noise**

All operations of the project, blasting, rock ripping, rock crushing and trucking (if applicable) shall be in accordance with the Village of Tarrytown Code. No work shall be performed on Saturdays or Sundays or any holiday recognized by the Village of Tarrytown. All work on site shall take place between the hours of 8:00 am and 4:00 pm, Monday through Friday, except for the above days.

## **Reclamation**

Following the rock removal in those areas of the proposed road right of way, common driveway or at driveway entrances where there are exposed rock faces, the rock faces, if any, shall be cleaned of all loose material and made stable. In areas where the rock is not stable, the loose rock shall be ripped out or re-blasted to achieve a stable side slope.

All areas of exposed rock with a slope less than 1 foot vertical to 3 foot horizontal (1:3) shall be provided with a minimum 4" layer of loamy soil, covered by a minimum of 4" of top soil prior to seeding and mulching. Areas of exposed rock greater than a 1:3 slope may be left exposed. The rock however shall be clean of dirt and loose rocks shall be removed such that the rock is stable and attractive. All other areas of rock removal (i.e., trench rock, foundation rock) will be covered as required to complete the applicable construction.

The topsoil used shall be free of stones >2", trash, debris, and have less than 10% gravel by volume. The soil shall have > 6% by weight fine textured stable organic material, muck soil will not be considered top soil. The topsoil shall not be placed in a frozen or muddy condition. Topsoil shall be uniformly distributed over the target areas and evenly spread to a depth of 4". After the topsoil installation is complete, ground limestone (calcium carbonate) shall be spread uniformly and thoroughly over the top soil at a rate of approximately 100 lbs per 1000 square feet or to achieve a soil ph of 6.0. Upon completion of the lime, the site soil shall be fertilized with 600 lbs of 5-10-10 or equivalent per acre. Immediately after the soil has been prepared, permanent seeding shall be applied. The seed mix shall contain the following ratios:

Kentucky Blue Grass	65%
Perennial Rye Grass	20%
Fine Fescue	15%

This seed mixture shall be applied at a rate of 175-200 lbs per acre within a day of the completion of the soil placement. Upon placement of the seed mixtures, the entire seeded area shall be mulched. The mulch shall consist of hay or straw and shall be applied at a rate of 2 tons per acre or 100-200 bales per acre.

The erosion controls in place for the construction of the development shall remain until a stable vegetative (grass) cover is established. The removal of the erosion control barriers shall be at the direction of the site engineer only. The above described critical area seeding as well as the establishment of trees and shrubs shall be in conformance with the approved subdivision plans and the standards presented in current edition of "New York Guidelines for Urban Erosion and Sediment Control".

Complete reclamation of the site will occur upon completion of all construction and landscaping as per the approved subdivision plans.

### **Cluster Subdivision Potential Blast Zones**

The potential blast sites have been identified for the cluster subdivision are similar to the conventional subdivision plan and generally located around the private road into the surrounding subdivision lots. The potential blast zones have been labeled as follows:

**Table 1 – distances from blast zone to on-site structures, cluster subdivision**

blast zone	description	distance to nearest on-site structure (ft)	structure description
1	Lot 5 residence	250	Existing residence lot 11*
2	Lot 6 residence	540	Existing residence lot 11*
3	Lot 7 residence	450	Existing residence lot 11*
4	Lot 9 residence	200	Existing residence lot 11*
5	Lot 10 residence	70	Existing residence lot 11*
6	Lot 3/4 driveway	550	Existing residence lot 11*
7	Private road station +/- 7+50	70	Existing residence lot 11*

\* Existing residence on lot 11 is owned by the subdivision applicant

**Table 2 – distances from blast zones to off-site structures, cluster subdivision (See Figure 1)**

blast zone	description	distance to nearest on-site structure (ft)	structure description
1	Lot 5 residence	180	North residence out parcel c
2	Lot 6 residence	350	North residence out parcel c
3	Lot 7 residence	240	Woodlawn Street residence
4	Lot 9 residence	130	Woodlawn Street residence
5	Lot 10 residence	180	Woodlawn Street residence
6	Lot 3/4 driveway	140	Out parcel c pool
7	Private road station +/- 7+50	170	North residence out parcel c

Most of the above distances are less than the minimum recommended distance from the blast site of 500 feet. Therefore, if blasting is required in the identified areas, then a pre-blast survey of all of the structures within the limiting distance will be required. While blasting may occur in the identified areas (only if other methods prove unworthy), it is believed that with the necessary precautions in place and proper preparations and safety measures by the NYS licensed blaster, there will not likely be impacts to on-site or off-site structures.

Based on the identified blast zones, field reconnaissance was performed and exploratory test holes were dug to assess the areas. The amount of rock removal has been estimated and is shown in table 3 below.

**Table 3 – estimated rock removal-cluster subdivision**

blast zone	description	rock amt (cy)	30% exp (cy)	total rock (cy)
1	Lot 5 residence *	270	350	350
2	Lot 6 residence *	270	350	350
3	Lot 7 residence *	270	350	350
4	Lot 9 residence *	270	350	350
5	Lot 10 residence *	270	350	350
6	Lot 3/4 driveway	90	115	115
7	Private road station +/- 7+50	222	288	288
	<b>Totals</b>			<b>+2150</b>

\*rock amounts for the houses are based on an estimated 40% of the average cut of 670 cubic yards per house, see the Cut/Fill Analysis prepared by Cronin Engineering, P.E., P.C., dated October 10, 2011.



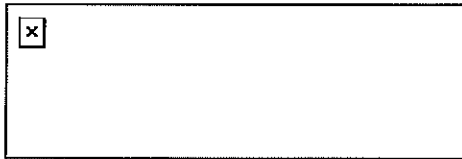
The cluster subdivision is anticipated to require more blasting than the conventional plan as the houses are clustered around the proposed private road in an area where ledge rock is more prevalent. This report identifies two additional proposed house locations for potential blasting and as such there is expected to be a modest increase in the rock amounts removed for the cluster subdivision development.

**Prepared by:****Cronin Engineering, P.E., P.C.**

39 Arlo Lane, Cortlandt Manor, NY 10567

P: (914)736-3664

F: (914)736-3693



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