GEOLOGY

Chapter Eight

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A. Introduction

Subsurface conditions at the site were extensively investigated beginning in October 2008 and ending in August 2009. The purpose of these investigations was to establish the soil and bedrock characteristics of the site, as well as groundwater conditions. Particular attention was paid to areas of proposed cuts and fills, including rock cuts, retaining walls, soil/rock embankments, slopes near proposed buildings, detention basins, and areas where grade changes and/or loading is proposed.

The results of the geotechnical and hydrogeologic studies are provided in Appendix L. The reader is referred to this appendix for further details.

In summary, 18 test borings were drilled and 51 test pits were excavated at the site to provide detailed subsurface data in the areas of the proposed development. Map #8.1 depicts the locations of the explorations that were made during the geotechnical investigations, see also Appendix O.

Site geology consists of a thin layer of topsoil; over dense Till comprised of a well graded mixture of sands, clay, silt-clay, and cobbles/boulders; over metamorphic bedrock comprised of a blend of amphibolite, gneiss, pyroxenic amphibolite.

Depths to groundwater at the site are generally below the maximum depths explored (i.e., deeper than about 20 feet). In localized areas, such as near the smaller wetland to the southeast and in some of the proposed detention basin areas, groundwater is as shallow as about four feet.

The results of subsurface testing were used to perform geotechnical engineering analyses to confirm stability of the proposed development Based on the results of these analyses, the applicant determined that proposed cuts and fill, and site retaining walls will be stable. In addition, it was determined that the natural site soils and bedrock (below the surficial topsoil) are suitable for support of normal shallow foundations and slab-on-grade construction.

B. Existing Conditions

The site is presently undeveloped except for one single family residence, an unpaved roadway, and a relatively level staging area used to operate a firewood business. The site has a generally triangular shape with two nearly perpendicular legs parallel to Route 312

(to the north) and I-84 (to the west), and the third longer leg running along the existing Metro North Railroad tracks to the southeast of the site.

Site topography generally drops off from the high point near the northwest corner (Elevation 660) down to the wetlands (Elevation 440). Existing grades range from fairly steep (1.2 horizontal to 1.0 vertical [1.2H:1V] at the higher elevations) to moderately steep(6H:1V lower on the site), except at the small wetland area where grades are flat. Much of the site is wooded.

Depth to bedrock varies from exposed at the surface, to below the maximum explored depth (about 20 feet), with more typical depths ranging from about 3 to 8 feet.

The steepest slopes on the property, to the east of the wood processing area, are man-made fill slopes created to provide area for the existing commercial operation.

The site slopes are stable.

A 0.2 acre isolated area of wetland is present along the site's southeastern boundary. Many years ago, this small area of wetland was split off from the large wetland to the south and southeast as a result of railroad track construction.

C. Potential Impacts of the Proposed Project

1. Approximately 41 acres of the site will be disturbed.

2. Although the existing site soils and bedrock are eminently competent to support proposed loads from site construction and new structures, proposed site construction will create unbalanced embankment fill and soil/rock cut loads .

3. The existing site grades (topography) will be changed. The re-grading will modify the pattern of water infiltration and run-off as it generally flows down diverted into the stormwater system), while exposing bedrock and constructing rockfill or rock revetted slopes will tend to increase infiltration. Lastly, removal of trees and vegetation will reduce the evapotranspiration, which, in turn, creates more net infiltration.

4. The Hotel building will require the creation of a pad which will have an average elevation of 620+/-. Grades in the area range from 620 to 650 presently. The retail area will have two pad elevations, 545+/- and 580+/-.

5. Maximum bedrock cut slope heights will occur along the west side of the entrance road (to the north of the hotel) and will have a maximum height of about 55 feet.

6. A bedrock cut of approximately 35 feet will be created to allow the lower retail unit to be built into the hillside. This rock cut will serve as the building wall for the lower retail unit.

7. Excavated materials will consist of relatively small volumes of granular soil and large proportions of bedrock. Bedrock excavation will require drilling and blasting to provide a blend suitable for rock fill, and a mix of boulders used to construct site retaining walls with a more natural appearance than other man-made alternatives (such as modular walls or cast-in-place concrete walls).

8. The applicant is assuming that due to the history of site disturbance, the site will yield only about three inches of useable topsoil after screening; this will all be reused on-site. It therefore anticipated that some topsoil will need to be imported for plant beds and lawns.

9. Retaining walls will be constructed to support some fill areas along Route 312 and above the wetland areas. The larger walls will be constructed using large boulders (derived from blasted rock), and smaller walls of reinforced concrete or other man made products. Maximum height of retaining walls will be limited to 20 feet constructed in two tiers with a 12-wide separation bench that is slightly pitched to shed water.

10. The grades opposite the existing westbound I-84 interchange will be excavated to create the main entryway. The hillside will be excavated to construct the loop driveway system.

11. The Hotel driveway will be created to the southeast by cutting the inside curve and filling along the outside. The Hotel will be located primarily in an area of excavation.

12. The upper and lower level retail pad is situated in a cut/fill zone. The site will be excavated to allow the lower level building to be constructed into the hillside. The excavated materials will be processed and moved downhill to create fill areas to support portions of the building, parking areas and the internal loop driveway.

13. Stormwater basins will generally be located to the west at lower elevations compared to the developed portions of the site. They will be created in both cut and fill areas. The side slopes of the proposed basins will be constructed at 3H:1V (horizontal to vertical).

D. Proposed Mitigation Measures

1. The site surface will be disturbed in limited increments during construction as shown schematically on the Stormwater Pollution Prevention Plans, C-6A to C-6G. Sequential disturbance will allow the contractor to minimize soil erosion. Moreover, due to the shallow depth to bedrock, much of the exposed surface in cut areas will consist of non-erodible bedrock. Since on-site borrow materials used for fill areas will largely consist of excavated rock fill, incrementally filled areas will also be largely non-erodible (as compared to many sites requiring soil filled areas).

2. The impacts of the new loads created by the cut and fill slopes have been carefully evaluated using detailed geotechnical analyses to confirm that adverse on- or off-site effects (such as unstable slope conditions, or lack of adequate support for proposed buildings or ponds) would not occur. Specifically, results of stability analyses indicate that the proposed cut and fill slopes have adequate factors of safety against sliding based on the proposed construction materials (i.e., rock fill slopes) and methods (i.e., placement and compaction requirements).

3. The altered topography and groundwater flows will not be meaningfully impacted. Increased impervious areas will tend to reduce water infiltration (as the flows are diverted into the stormwater collection system), while exposing bedrock and constructing rock fill or rock revetted slopes will tend to increase infiltration. Removal of trees and vegetation will reduce transpiration, which in turn, generally creates more net infiltration. Regarding the smaller wetland area located on the western side of the railroad tracks, potential impacts will be negligible as this wetland is hydraulically connected to the significantly larger wetland to the southeast of the tracks. As previously mentioned, one large wetland existed prior to construction of the railroad.

4. The bedrock cut along the main access road, to the east of the hotel, has been designed at 1H:2V with a 15 foot minimum width lower rock catchment ditch at the base of the rock cut to provide adequate rock fall protection to address long term weathering of the rock face. The rock catchment ditch was designed to provide necessary protection from rock fall per accepted geotechnical engineering practices. The bedrock slope height and geometry are similar to the upper-half of the rock face along Interstate I-84 to the south of the site (which has a maximum height of 56 feet and a 1H:2V face). Where bedrock is exposed in cut areas, the permanent (final) rock faces will be drilled and blasted in such a manner as to protect the final rock face and to provide a stable, intact slope.

5. Controlled blasting will be used to provide protection of off-site improvements and site features to remain – such as permanent rock faces in cut areas, and to provide desired rock fragmentation. Such procedures will require vibration and overpressure control, tight blasting patterns, and high powder factors to maximize rock fragmentation. This will maximize re-usability of the blast rock for fill material and facilitate on-site rock crushing to provide a blend suitable for rock fill.

6. The proposed site earthwork will be balanced. The proposed excavation in the hotel area will provide borrow materials to balance the site and visually lower the profile of the hotel. All material excavated on-site will be reused and will remain on-site.

   200,000 cubic yards of soil will be cut and reused in fill areas. 250,000 cubic yards of bedrock will be excavated, crushed, and used in fill slopes and retaining walls. The processed rock fill is anticipated to generate 20% more volume, compared to the volume of excavated bedrock. See attached 2' grading plan which depicts the cut and fill line as well as the location of retaining walls, Map #3.1.

7. The applicant is assuming that due to past site disturbance, the site will yield only about three inches of topsoil after screening. All existing topsoil will be reused on-site. Due to its limited on-site volume, however, it is anticipated that some topsoil will need to be imported for planting beds and lawns.

8. Some of the bedrock will be crushed and screened on-site to create processed stone and gravel for use below roadways, parking, and buildings. Some processed bedrock will also be segregated to provide rip-rap for use as slope cover (i.e., revetment) and long-term protection. Lastly, some of the blasted bedrock will be mixed with limited volumes of on-site soils to generate a rock fill. No rock or soil is planned for export or import (except topsoil).

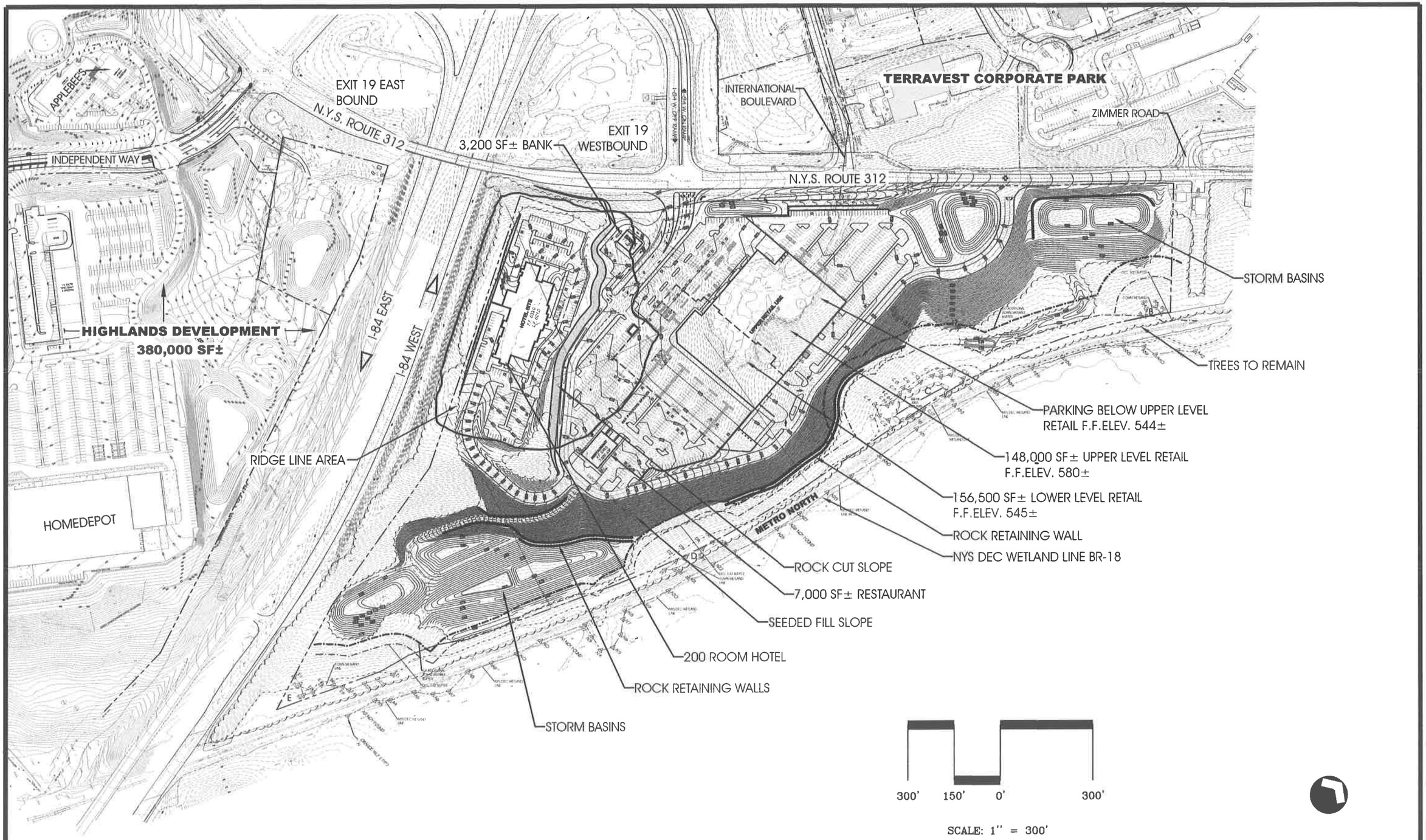
9. The larger walls will be constructed using boulders (derived from blasted rock), with intentions of creating a more natural appearance compared to other man-made alternatives (such as modular walls or cast-in-place concrete walls). Maximum retaining wall heights will be limited to twenty feet and constructed in two tiers with a twelve foot (minimum width) separation bench that is slightly pitched to shed water. Site retaining walls will be constructed under the direction of the geotechnical engineer and/or structural engineer to provide required design and quality control/quality assurance.

10. Cut areas in soil (as opposed to bedrock) will be stabilized using 2H:1V or flatter slopes.

11. Fill slopes along the access road (behind the main retail area and the main parking areas) will be constructed with rock fill that is placed and compacted in a systematic manner to allow finished slopes at 1.5H:1V. Other fill slopes which may be constructed with either rock fill or soil (such as the embankment slope to the southeast of the easterly end of the access road) will be constructed at 2H:1V.

12. Stormwater Pollution Prevention Plans, also called Erosion Control Plans, describe the phasing of construction operations. The phasing of site construction and the limited, sequential disturbance areas will protect the site from erosion. All stormwater is to be contained within each disturbed area until stabilized stormwater detention/sediment basins are in place and functional. Sedimentation basins will also be established to handle design storm events. Water will be held on-site and, if necessary, treated with flocculants to remove sediment prior to discharge. The Stormwater Pollution Prevention Plan will be prepared under the latest guidelines for erosion and sediment control for New York State. As shown on the Drawings, exposed areas of disturbance will be minimized; water will be contained within areas of disturbance and sent to sediment basins after the basins have been stabilized. Following the Stormwater Pollution Prevention Plan guidelines and the direction of the geotechnical engineer and structural engineer, environmental impacts will be minimized during construction of the soil cut slopes, rock cut slopes, soil fill slopes and retaining walls.

13. Proposed rock excavation areas will be used as staging areas for site and building construction since they are less prone to erosion. On-site rock fill and crushed rock will be used to create erosion control check dams and rock filters.



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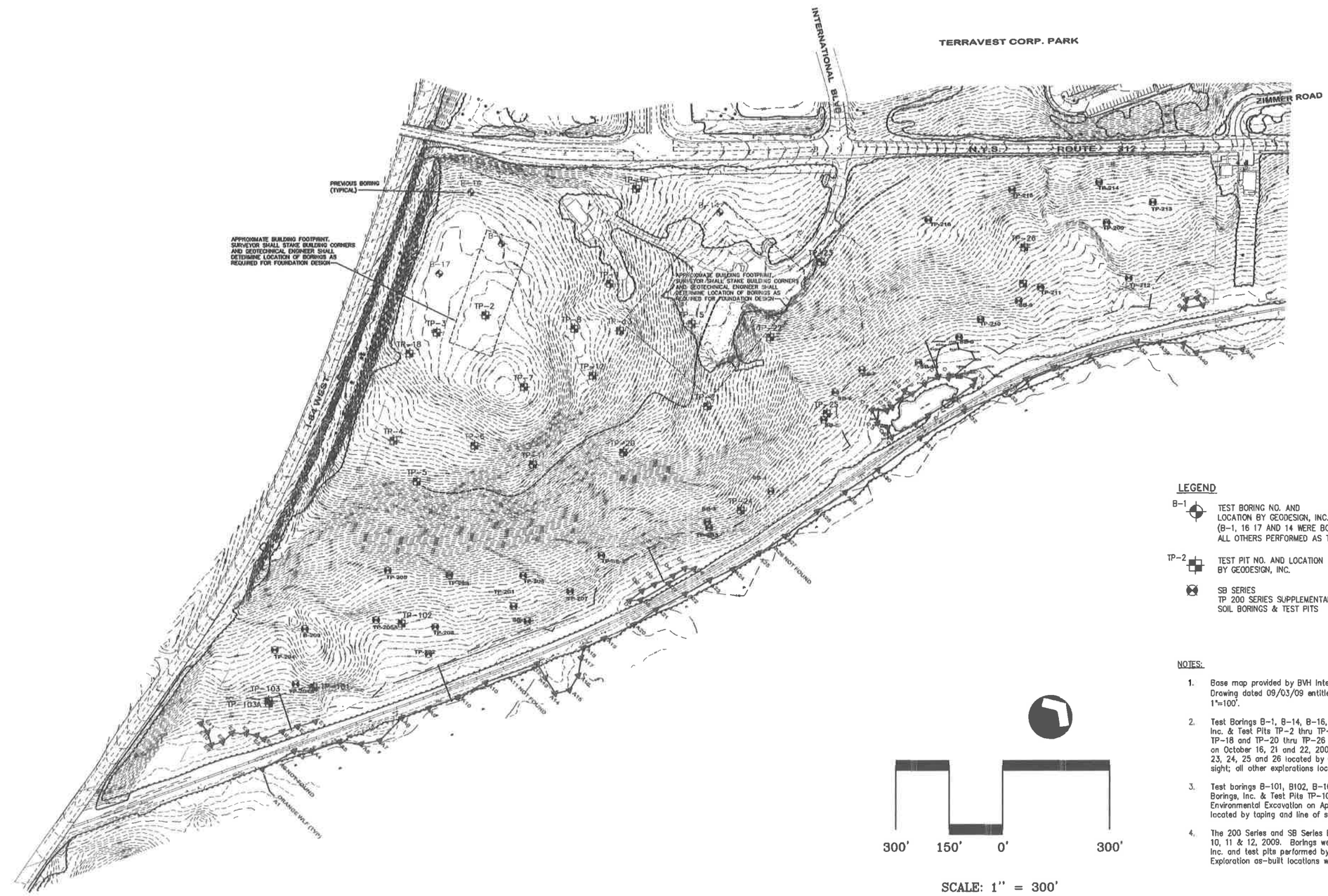
Preliminary Site Plan
CROSSROADS 312, LLC
ROUTE 312 TOWN OF SOUTHEAST, PUTNAM COUNTY, NEW YORK

Developer/Applicant:
Crossroads 312, LLC
c/o Covington Management
ClockTower Commons
Brewster NY 10509

Project:	1480
Scale:	1"=300'
Date:	12/13/12

Map 3.1



SCALE: 1" = 300'

LEGEND

B-1 — TEST BORING NO. AND LOCATION BY GEODESIGN, INC. (B-1, 16 17 AND 14 WERE BORINGS; ALL OTHERS PERFORMED AS TEST PITS)

TP-2 — TEST PIT NO. AND LOCATION BY GEODESIGN, INC.

SB SERIES TP 200 SERIES SUPPLEMENTAL SOIL BORINGS & TEST PITS

NOTES:

1. Base map provided by BVH Integrated Services, Inc. via, e-mail. Drawing dated 09/03/09 entitled: Boring Location Plan, original scale 1"=100'.
2. Test Borings B-1, B-14, B-16, B-17 performed by General Borings, Inc. & Test Pits TP-2 thru TP-9, TP-11, TP-12, TP-14, TP-15, TP-18 and TP-20 thru TP-26 performed by Environmental Excavation, on October 16, 21 and 22, 2008. Explorations 13A,16, 17, 18, 21, 22, 23, 24, 25 and 26 located by GeoDesign, Inc. by taping and line of sight; all other explorations located by surveyor.
3. Test borings B-101, B102, B-102A, and B-103 performed by General Borings, Inc. & Test Pits TP-101 thru TP-104 performed by Environmental Excavation on April 14 & 16, 2009. Explorations located by taping and line of sight.
4. The 200 Series and SB Series Explorations were performed on August 10, 11 & 12, 2009. Borings were performed by New England Borings, Inc. and test pits performed by ECO Site Development, Inc. The Exploration as-built locations were located by Project Surveyor.

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Exploration Location Plan
CROSSROADS 312, LLC
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Map 8.1