



Dynamic Earth, LLC
245 Main Street, Suite 110
Chester, NJ 07930
T. 908-879-7095

Date: December 12, 2022
Via email: will@shibuilders.com

SHI BUILDERS
c/o WILLIAM CUMMINGS
74 Bellevue Avenue
Summit, New Jersey 07901

Attn: Mr. William Cummings

RE: Exposed Rock Face Review
Proposed Residential Subdivision
2-10 Ridge Road
Block 80.03, Lots 10 & 21
Township of West Orange
Essex County, New Jersey
Dynamic Earth Project No.: 4266-99-001EC

Dear Mr. Cummings;

Dynamic Earth, LLC (Dynamic Earth) has completed a rock slope review for the above referenced site. The results of our review are detailed herein.

PROJECT DETAILS

The subject site is currently undeveloped and heavily wooded. Based on a May 11, 2022 *ALTA/NSPS Land Title Survey* prepared by Dynamic Survey, LLC, the proposed site development will include subdividing the parcel into four single-family residential properties. While details of the proposed homes have not been developed, each residence is expected to occupy a building square footprint area of approximately $\pm 3,000$ square feet. Site grading plans have not been developed at the time of this report. Existing site elevations generally grade from an approximate elevation of 633 feet within the western portion of the site along Ridge Road downward to the northern and eastern portions of the site along Mount Pleasant Avenue approximately ranging between 509 feet and 592 feet respectively.

Dynamic Earth previously performed a subsurface investigation at the site and the results were issued in a June 8, 2022 *Report of Preliminary Geotechnical Stormwater Basin Area Investigation*. Subsequent to our initial investigation, we were requested to provide additional services related to a May 22, 2022 *An Ordinance Amending and Supplementing Chapter 25, Section 28 of the Revised General Ordinances of the Township of West Orange, entitled "Steep Slopes and Natural Features Ordinance."* Based on *Section 25-28.7 Information Required – Subsection b 12 through 16* of the amended ordinances a geotechnical analysis for slope stability is required for any slopes equal to or greater than ten percent measured over a run of ten feet. Based on the aforementioned *ALTA/NSPS Land Title Survey* existing slopes of greater than 10 percent, and the site is therefore subject to special investigation an analysis per requirements of the local Ordinance.

SCOPE OF SERVICES

Dynamic Earth's scope of services included initial site visit to review the exposed rock faces, measure discontinuities, lithology, orientation, spacing, persistence, number of discontinuities and seepage if visible, review available geology data, rock mass in terms of block shape, size, weathering, and number of discontinuities and available rockfall data. Dynamic Earth prepared preliminary evaluation of the proposed rock slopes, preliminary considerations and recommendations.

www.dynamic-earth.com

Lake Como, NJ • Chester, NJ • Toms River, NJ • Newark, NJ • Newtown, PA • Philadelphia, PA
Bethlehem, PA • Allen, TX • Houston, TX • Austin, TX • Delray Beach, FL • Annapolis, MD

SITE GEOLOGY

The subject site is located in a region of the Piedmont Physiographic Province of New Jersey known as the Newark Basin. The Newark Basin contains rocks of the Newark Super Group and Brunswick Group which is a stratigraphic series of Triassic to Jurassic age igneous and sedimentary rocks containing intrusive sills and dikes as well as extrusive volcanic. The primary formation beneath the site is known as the Orange Mountain Basalt which includes basalts, greenish-gray to greenish-black, massive, pillow, and columnar jointed structures separated by thick beds of red siltstone or volcanoclastic rocks. The formation beneath the eastern portion of the site is known as the Passaic Formation of the Brunswick Group which includes thin to thick bedded siltstone and sandstone. Mud cracks, ripple marks, crossbeds and burrows are common. The overburden materials include residual soils derived from the underlying bedrock.

Surficial geology at the site consists of the Rahway Till (Qwtr). The reported lithology consists of exposed clayey silt and sandy silt deposits and include pebbles and cobbles and few boulders directly desisted from glacial ice. Overburden material also include reworked on-site soils.

PREVIOUS SUBSURFACE INVESTIGATION

Based on our previous investigation, existing fill material underlain by glacial deposits, residual soils and weathered rock/rock was encountered. Relatively shallow weathered rock/rock was generally encountered at depths ranging between 3.3 feet and 12 feet below the ground surface. One soil boring performed within the northwestern portion of the site encountered weathered rock/rock as deep as approximately 20.7 feet below the ground surface. Indicators of seasonal high groundwater (i.e., based on soil mottling) were encountered within the soil profile pit excavations at depths ranging between approximately 1.4 feet and five feet below the ground surface; corresponding to elevations ranging between approximately 621.3 feet and 612.4 feet. Groundwater was encountered at depths ranging between approximately two feet and 9.6 feet below the ground surface; corresponding to elevations ranging between 621.3 feet and 562.1 feet. Groundwater levels are expected to fluctuate seasonally and following significant periods of precipitation.

Conventional shallow foundations and ground supported floor slabs bearing on structural fill material (where site grades are raised), natural soils and/or underlying weathered rock are expected to be feasible for the proposed site development, based on the results our previous investigation. Portions of the on-site soils included existing fill material. As such, partial overexcavation and replacement of the existing fill material will be required.

FIELD SITE VISIT OBSERVATIONS SUMMARY:

Dynamic Earth performed a site visit to rock outcrops (where accessible) located along northeastern, eastern and southeastern portions of the site. Please see the attached for the *Outcrop Location Plan*.

Outcrop 1: During our site visit, a rock outcrop approximately 262 feet in length located along on the northeastern portion along Mount Pleasant Avenue was observed. Based on visual observation, the exposed rock was subangular, moderately fractured and weathered grey siltstone. Icicles and wetness observed at the surface of the rock slope along the bedding planes.

Fracture planes observed with the persistent fracture plane ranged in thickness between approximately one foot and three feet, and included an angle of strike approximately 56 degrees in northeast and a bedding dip direction of 82 degrees to a strike direction of 24 degrees and dip direction of 85 degrees. Less persistent fracture planes were observed with thicknesses ranging between three to five feet included an angle of strike approximately 220 degrees northwest a bedding dip direction of 24 degrees to an angle of strike approximately 226 degrees in the northwest a bedding dip direction of 23 degrees. Both fracture planes consisted of fracture width varying approximately between 0.25 inch to one inch.

Outcrop 2: A second rock outcrop approximately 82 feet length was observed along the eastern portion of the site. Based on visual observation the rock surface consisted of dark grey basalt, slightly fractured and slightly weathered with massive columnar joints with joint heights larger than 10 feet. No surface wetness or seepage observed on the rock face.

Fracture planes observed the persistent plane indicated angle of strike approximately 150 degrees in southwest and a bedding dip direction of 83 degrees with joint spacing between three to five feet. Less persistent fracture planes indicated angle of strike approximately 216 degrees in the northwest and a bedding dip direction of 14 degrees and bedding thickness was spaced larger than approximately 10 feet. Both fracture planes consisted of fracture width varying approximately between 0.25 inch to one inch.

Outcrop 3: Approximately 582 feet length of the rock surface located along the property line between Crest Ridge Reality and the proposed site was observed and evaluated. Due to the limited access to the area, visual observations were made and rock strike and dip angles were not obtained. The rock surface consisted of dark grey basalt, slightly fractured and slightly weathered with columnar joints with joint heights larger than 10 feet underlying massive basalt beddings. No surface wetness or seepage observed on the rock face.

PRELIMINARY DEVELOPMENTAL CONSIDERATIONS

Based on our initial review of the accessible exposed rock faces and our previous subsurface investigation, Dynamic Earth's preliminary developmental considerations and recommendations are summarized below.

Rock outcrops located along the northeast portion of the site (outcrop 1) indicated seepage and wetness. The presence of seepage and icicles could be a potential indicator of instability. Water filled discontinuities can potentially reduce the effective shear strength along the discontinuity plane by means of hydrostatic forces. In addition, the formation of ice can destabilize the block form of the rock face causing breakage of joint bonds. Outcrops 2 and outcrops 3 did not show signs of seepage or formation of ice at the time of our site visit. However, these areas should be monitored particular following precipitation and/or during the wet seasons of the year.

Based on our observations and review, preliminary project planning should include keeping building developments at least 100 feet from existing and observed rock outcrops. An approximate area is shown on the attached *Rock Outcrop Buffer* plan. The slopes observed during the field investigation indicated soil cover over bedrock. If the development limited to the area outside of the proposed buffer area, the rock slopes are anticipated to have minimum impact from the development.

SUPPLEMENTAL RECOMMENDATIONS:

At the time of our review, site plans had not been finalized. Once site plans are finalized, Dynamic Earth should review the final site plans to evaluate if the initial recommendations included herein are consistent and/or if additional recommendations or investigation is warranted.

Please feel free to contact us with any questions regarding these matters.

Sincerely,

DYNAMIC EARTH, LLC



Patrick J. Granitzki, P.E.
Principal
NJ PE License No. 24GE05355900



Janitha Batagoda, Ph.D.
Geotechnical Engineer

Enclosures:
Outcrop Location Plan
Field Visit Photo Log
Rock Surface Details
Rock Outcrop Buffer Plan

CC: Robert P. Freud (Dynamic Engineering Consultants, PC); Ryan Ward (Dynamic Engineering Consultants, PC)

GENERAL LIMITATIONS

Supplemental recommendations will be required upon finalization of conceptual site plans or if significant changes are made in the characteristics or location of the proposed site development. Dynamic Earth should be included as a consultant to the design team and should be provided final plans for review to confirm these criteria apply or to modify recommendations as necessary.

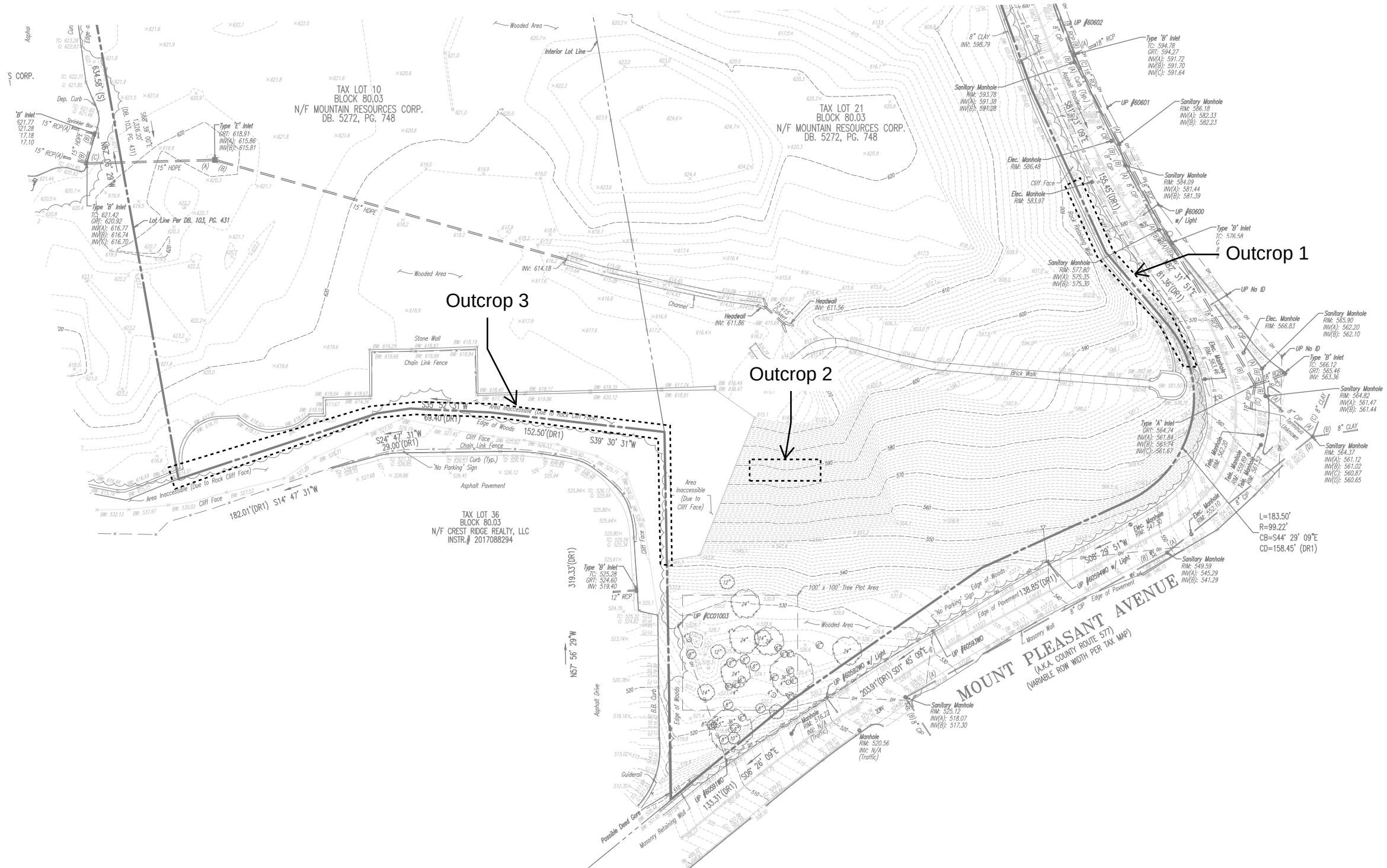
The results presented herein should be utilized by a qualified engineer in preparing preliminary design concepts and site grading. The engineer should consider these results as minimum physical standards that may be superseded by local and regional building codes and structural considerations. These results are prepared for the use of the client for the specific project detailed and should not be used by any third party. These recommendations are relevant to the preliminary design phase and should not be substituted for construction specifications.

The possibility exists that conditions observed during our site visit may differ from those at specific development locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil/rock conditions. Therefore, Dynamic Earth Geotechnical Engineers or their representatives should observe and document the final construction procedures used and the conditions encountered, as well as conduct testing and inspection to ensure the design criteria are met or recommendations to address deviations are implemented. Any exposed rock outcrops during construction should be brought to the immediate attention of Dynamic Earth to review.

Dynamic Earth assumes that a qualified contractor will be employed to perform the construction work, and that the contractor will be required to exercise care to ensure all excavations are performed in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties and maintaining slope stability. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

Outcrop Location Plan



SCALE: N.T.S.

JOB No:
4266-99-001E

SHEET No:

1

OF 1

DRAWN BY:
DR
DESIGNED BY:
-
CHECKED BY:
PG

DATE:
12/05/2022

TITLE:

OUTCROP LOCATION PLAN

PROJECT: **SHI BUILDERS
PROPOSED DEVELOPMENT**
2 & 10 RIDGE ROAD
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY,
NEW JERSEY

Rev. # 0

DEC Client Code: 4266

LEGEND:

NOTES:

- THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE OBSERVED ROCK OUTCROP LOCATIONS.
- THIS PLAN HAS BEEN PREPARED BASED ON AN ALTA/NSPS LAND TITLE SURVEY DATED MAY 11, 2022 BY DYNAMIC SURVEY LLC.



245 Main Street - Suite 110
Chester, NJ 07930
T: 908.879.7095 - F: 908.879.0222
www.dynamic-earth.com

Field Visit Photo Log



Photo 1 – Outcrop 1 (Seepage at the Surface)



Photo 2 – Outcrop 1 (Seepage at the Surface)



Photo 3 – Outcrop 1



Photo 4 – Outcrop 1



Photo 5 – Outcrop 2



Photo 6 – Outcrop 2



Photo 7 – Outcrop 2



Photo 8 – Outcrop 2



Photo 9 – Outcrop 3

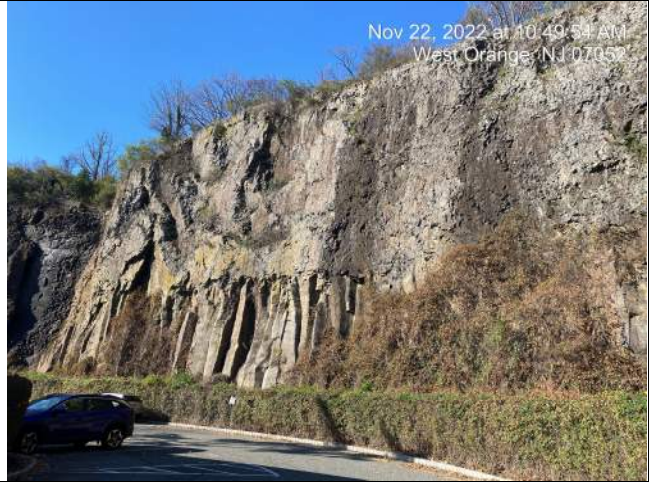


Photo 10 – Outcrop 3



Photo 11 – Outcrop 3

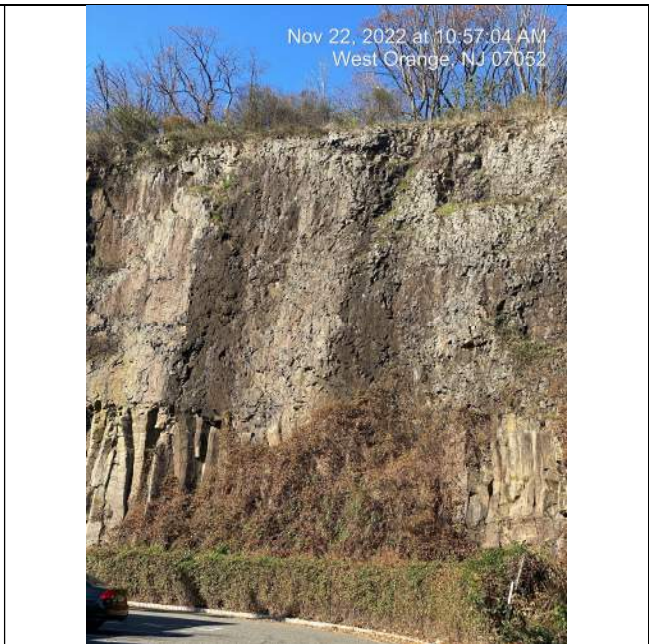
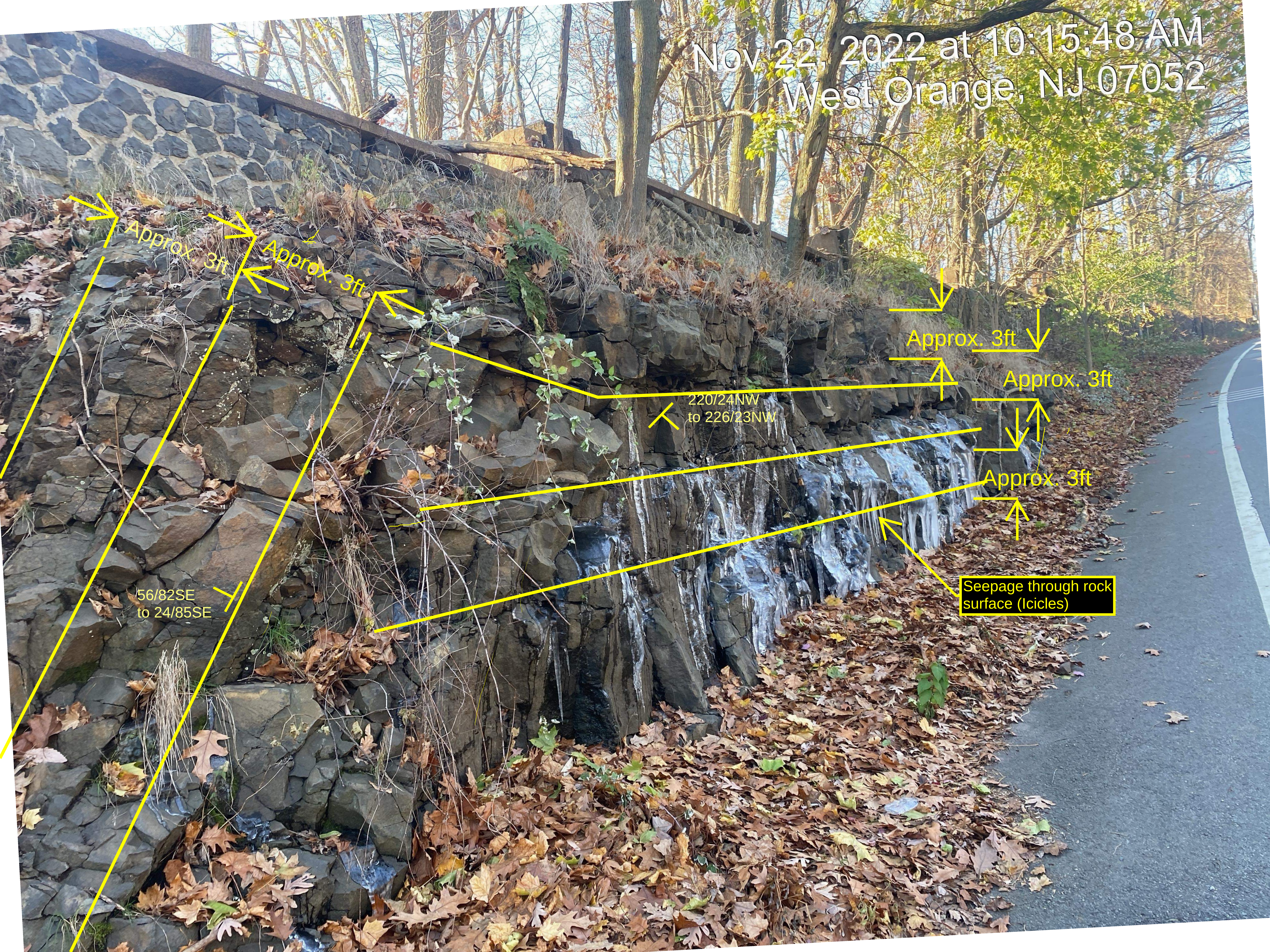


Photo 12 – Outcrop 3

Rock Surface Details

Nov 22, 2022 at 10:15:48 AM
West Orange, NJ 07052



Approx. 3ft

Approx. 3ft

220/24NW
to 226/23NW

56/82SE
to 24/85SE

Approx. 3ft

Approx. 3ft

Approx. 3ft

Seepage through rock
surface (Icicles)

Nov 22, 2022 at 10:46:10 AM
West Orange, NJ 07052

216/14NW

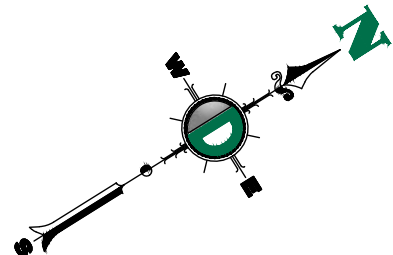
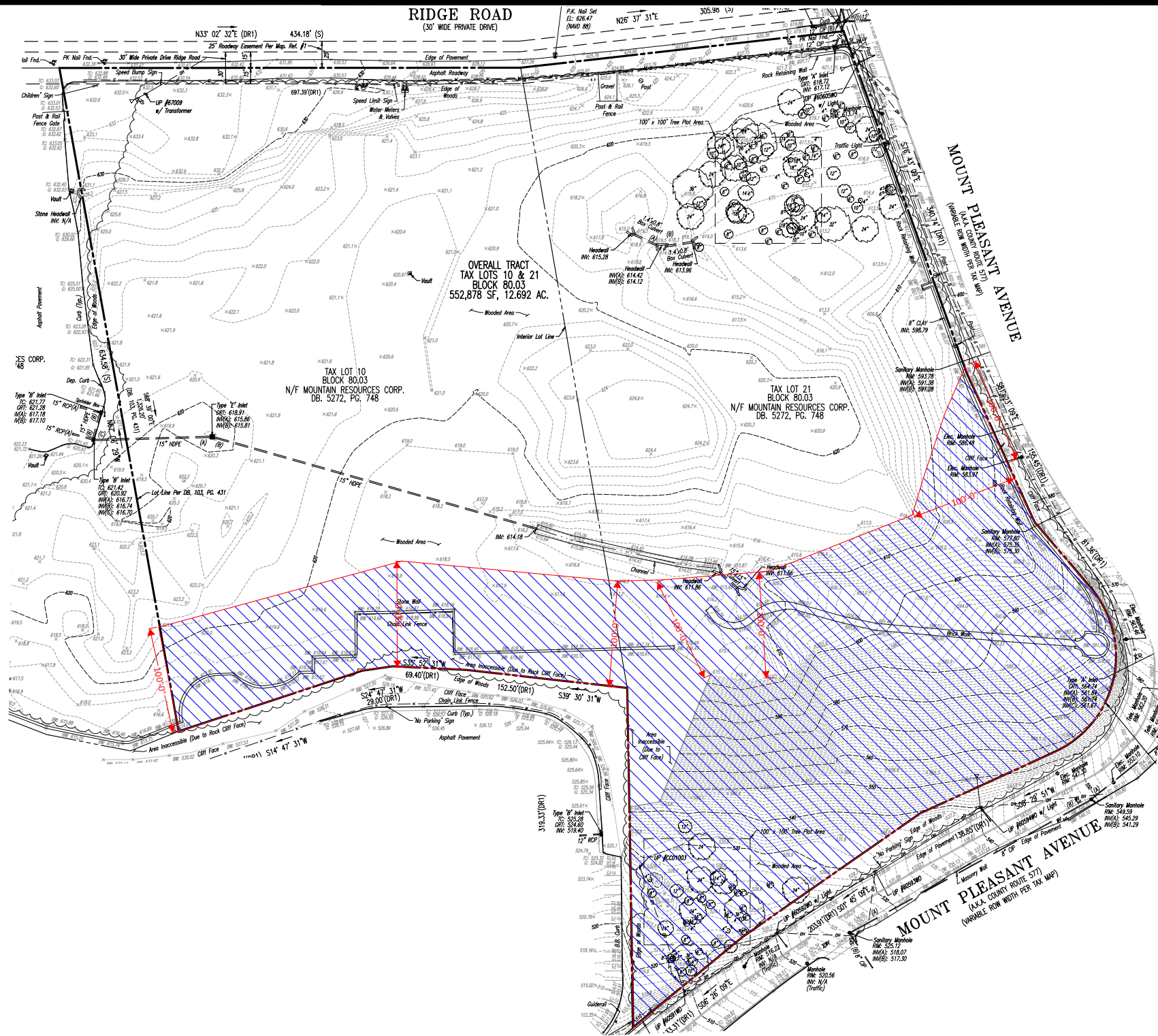
52/76SE



Nov 22, 2022 at 10:49:51 AM
West Orange, NJ 07052



Rock Outcrop Buffer Plan



SCALE: N.T.S.

JOB No:
4266-99-001E

SHEET No:

1

OF 1

DRAWN BY:
JB
DESIGNED BY:
-
CHECKED BY:
PG

DATE:
12/12/2022

TITLE:

ROCK OUTCROP BUFFER PLAN

PROJECT: **SHI BUILDERS
PROPOSED DEVELOPMENT**
2 & 10 RIDGE ROAD
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY,
NEW JERSEY

Rev. # 0

DEC Client Code: 4266

LEGEND:

 ROCK OUTCROP BUFFER AREA

NOTES:

1. THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE OBSERVED ROCK OUTCROP LOCATIONS.
2. THIS PLAN HAS BEEN PREPARED BASED ON AN ALTA/NSPS LAND TITLE SURVEY DATED MAY 11, 2022 BY DYNAMIC SURVEY LLC.



245 Main Street - Suite 110
Chester, NJ 07930
T: 908.879.7095 - F: 908.879.0222
www.dynamic-earth.com