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GEOTECHNICAL EXPLORATION REPORT

FOR THE

3 WEST SUMMIT CHAGRIN FALLS SITE DEVELOPMENT PROJECT

WGE #20191070

PREPARED FOR

SILVERLEAF DEVELOPMENT
7414 SILVERLEAF COURT
SAGAMORE HILLS, OHIO 44067

BY

WERTZ GEOTECHNICAL ENGINEERING, INC.
400 COLLIER DRIVE
DOYLESTOWN, OHIO 44230

DRILLING | MATERIAL TESTING | ENGINEERING

August 5th, 2019

Silverleaf Development
7414 Silverleaf Court
Sagamore Hills, Ohio 44067

ATTN: **Robert Vitt**

RE: **Geotechnical Exploration Report for the 3 West Summit Chagrin Site Development Project located in Chagrin Falls, OH; WGE #20191070**

Mr. Vitt:

Wertz Geotechnical Engineering has completed the requested subsurface investigation for the 3 West Summit Chagrin Falls site development project located in Chagrin Falls, Cuyahoga County, Ohio. The purpose of this investigation was to define the general subsurface conditions; and to make recommendations relative to site preparation and earthwork, foundation design, construction, and other pertinent geotechnical aspects of the project. This report was prepared by an experienced engineering and geological staff. These professional services have been performed, the findings obtained, and the recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. If you have any questions or concerns regarding the information presented in this submittal, or have need of additional services, please contact our office at (330) 454-1113.

Sincerely,

Andrew Hillier

Andrew Hillier
Project Geologist

Leroy Wertz

Leroy Wertz, P.E.
Project Engineer

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PROJECT DESCRIPTION

SITE DESCRIPTION

The project site is located at 3 West Summit Street, Chagrin Falls, Ohio. The site is located along a hillside west of North Main Street between West Summit Street and West Cottage Street. A home and garage structures are located onsite along West Summit Street. The home is located at the top of the hillside, with gradually sloping grades to the north and south near the structure. The property slopes moderately downward to the south from an elevation of 1018 to 970 feet with an overall grade of 3.5:1 (Horizontal:Vertical). The hillside is forested with mature, well-established trees and brush. The ground surface of the slope was generally wet at the time of our site visits.

The project plans include the construction of three (3) buildings and the installation of a retaining wall, by open cut excavation, into the existing slopes. The buildings will be three stories with the lowest floor elevations ranging from 975.25 to 973.25 feet. A retaining wall will be constructed north, east and west of the proposed buildings. The top elevation of the retaining wall will range from 980 feet in the southeast corner to 999 feet in the northwest. The maximum unbalanced soil height will be approximately 24 feet in the northwest corner prior to construction of the buildings. After construction of the buildings, the site grades will be structurally backfilled to 1 foot below second floor elevation. The finish grades, along the base of the wall, will range from 980.25 feet to 984.25 feet.

The building structures will consist of concrete below finish subgrade with wood framing built above. It is assumed that the structural loadings for the buildings will be less than 5 kips per foot for bearing walls and 25 kips for columns. Drive lanes, to the garages, are located south of the buildings.

Smaller retaining walls will be located south of the buildings, along the proposed parking lots and driveways.

DESCRIPTION OF REGIONAL GEOLOGICAL SETTING

The site area in downtown Chagrin Falls, Cuyahoga County is situated in the Killbuck-Glaciated Pittsburgh Plateau Physiographic Region of Ohio, which is defined by ridges and flat uplands, generally covered with thin drift and dissected by steep valleys; valley segments alternate between broad drift-filled and narrow rock-walled reaches (Ohio Department of Natural Resources Division of Geological Survey, 1998).

According to the USDA Web Soil Survey, the site area is mapped by the local soil and water conservation district as Dekalb-Loudonville Complex, a material derived from residuum weathered from sandstone on hillsides on uplands; and Loudonville-Urban Land Complex, a material derived from sandstone and/or till on ridges (USDA, 2019). A USDA Web Soil Survey map is presented in Figure 3.

According to publicly available mine data from ODNR, no active or inactive surface or underground sand and gravel, limestone, or coal mining activities are present within or in close proximity to the site footprint.

According to 24k Ohio Division of Geological Survey (ODNR-DGS) Bedrock Geology Maps, bedrock in the area consists of the Cuyahoga Formation, of which the major lithologies consist of shale, siltstone, and sandstone; and minor lithologies consist of limestone and conglomerate (Ohio Department of Natural Resources Division of Geological Survey, 1991). Bedrock is reported by ODNR-DGS to be around 950 feet above mean sea level, which is around 10-20 feet below existing grades onsit e. Actual bedrock depths, according to our exploration data, exists over 76 feet below the existing grades onsite. Bedrock was not encountered during our exploration. A geologic map is presented in Figure 4.

FIELD INVESTIGATION & LABORATORY TESTING

Four (4) soil borings were advanced at the project site on June 12, June 13, June 17, and June 18, 2019 utilizing a CME-45 all-terrain rotary drilling rig with 2.25" hollow stem augers operated by WGE drilling staff. The boring locations were selected by WGE personnel, approved by a geotechnical engineer, and staked in the field utilizing a handheld GPS unit, as is shown on the attached Location Plan.

Standard penetration testing and sampling were performed at the depth intervals shown on the attached Soil Boring Logs utilizing a 140-lb automatic hammer, falling 30 inches, to drive a 2 inch outer-diameter split spoon sampler over three six-inch intervals. Several Shelby tube (undisturbed thin-wall tube samples) were collected at varying depths, at locations slightly offset from the original boring locations, where cohesive soils of interest were encountered. Collected samples were examined and visually classified by our personnel in the field based on the visual-manual procedure (ASTM D-2488). Representative samples were retained and transported to our office, for further examination and the assignment of laboratory testing, by one of our geotechnical engineers.

Moisture content testing (ASTM D-2216), Atterberg limit testing (ASTM D-4318), and unconfined compression testing (ASTM D-2166) was performed on select retained samples. Fifty-two (52) moisture content tests, twelve (12) Atterberg limits, and two (2) unconfined compression tests were conducted on the retained samples. A description of the results is included on the attached Boring Logs.

Static groundwater level observations and hole depth soundings were made upon completion of each boring and were followed by backfilling the holes. Groundwater level observations made at each boring are indicated on the attached Soil Boring Logs. It should be noted that groundwater levels and zones of saturation should be expected to fluctuate seasonally based on variation in amounts of rainfall, evapotranspiration, runoff from impervious areas, and several other factors.

SUBSURFACE CONDITIONS

Soil boring data collected at the site indicated the presence of clays in a soft to hard condition, silts in a loose to medium dense condition, and sands in a very dense condition. These can be described for engineering purposes as the following:

- Topsoil was encountered up to 7 inches below the existing grades onsite.
- Soft to hard clays, with silt and very fine sand seams and medium dense silt layers of varying moisture content and plasticity, were encountered to depths ranging from approximately 67 to 72 feet below the existing grades in borings B-1 and B-2 and from approximately 37 to 42 feet below the existing grades in borings B-3 and B-4. This clay and these silt seams were underlain by sands in a very dense, wet condition in all borings. See the attached Boring Logs (Attachment A) and Subsurface Profile (Figure 2) for specific information on the varying types and probable extents of these soils.
- Groundwater was generally observed at the interface between the clays, with silt and fine sand seams; and the lower silt seams/very dense sands, although isolated groundwater is likely present, within the silt and fine seams encountered above these layers.

GEOTECHNICAL RECOMMENDATIONS

We offer the following for your consideration based on our analysis of the soil conditions encountered at the locations indicated, and the assumption that conditions between and away from the soil borings are similar to those known:

EXCAVATIONS

Excavations should either be sloped back or shored in accordance with Occupational Safety & Health Administration (OSHA) regulations and any other applicable local codes. Parameters for design of temporary shoring are included in those regulations. With respect to excavation, side slopes feet should be classified as Type "C" per OSHA. Type "C" excavations should be cut back to a slope no steeper than a 1.5:1 (Horizontal:Vertical). Steeper cut slopes may be acceptable, as determined by an on-site qualified person.

Slight groundwater seepage should be anticipated during excavation of the wall. Areas along the wall, exhibiting seepage, should be evaluated daily. Proper drainage should be maintained for excavation safety.

The subsurface test data indicated that the excavation will likely encounter medium stiff to hard clay or loose to medium dense silt. These soils can be excavated with large hydraulic excavators.

EARTHWORK GENERAL GUIDELINES

- Efforts should be made, during installation of the proposed retaining wall, to maintain vegetation along existing and adjacent slopes to provide support until the retaining wall can be fully installed.
- All surfaces, cut to subgrade elevation or subgrades to receive fill, should be evaluated under the direction of an on-site geotechnical engineer or his direct assigns. Any areas of soft soils, or obviously contaminated zones, should be undercut or stabilized as directed by the engineer.
- The engineered fill should be clean, inert soil which should be approved by the geotechnical engineer. The engineered fill should have a dry density greater than 100 pcf, liquid limit less than 50%, and an organic content less than 1%. The onsite subsoils appeared to be suitable engineered fill material. Some drying of the onsite material may be required prior to compaction.
- The fill material should be placed on the approved subgrade in controlled lifts. Each lift should be compacted to a stable condition at a minimum of 98% maximum dry density per ASTM D-698, with a moisture content between 2.0% below, to 1.5% over optimum moisture. All filling operations should be observed by a qualified soils technician under the supervision of a geotechnical engineer. Field density tests should be made to assure compaction to specification.
- All surfaces should be sealed and sloped, after each day or prior to inclement weather, to promote positive drainage of water offsite.
- Construction traffic should be kept off any wet subgrades.

OPEN CUT EXCAVATION

We do not recommend that the main retaining wall be constructed by excavating an open cut prior to installation due to the inadequate Factor of Safety. Loose silt and or medium stiff layers were encountered in the profile. We recommend that cut slope be continuously reinforced during construction. The Factor of Safety for an open cut of 1:1 slope is 1.0. Please see the attached slope stability analyses for the proposed cut slopes. These analyses provide results that indicate that the wall should either consist of a soil nail wall, a sheet pile and lag retaining wall with tiebacks, a soldier pile and lag retaining wall with tiebacks, and/or a secant wall consisting of drilled piers, all of which could provide continuous reinforcement to the slope during installation.

RETAINING WALL DESIGN

It should be dully noted that the general area (Chagrin Falls, OH) has a long history of containing areas of mass slope movement and of substantial landslides. Caution must be applied during construction in this area, especially during the retention of soil on slopes, as reflected in the city requirement, regarding the engineering statement of site stability. An overgrown scarp from a failure over 100 years ago can be observed near the crest of the slope, approximately 80 feet from the existing residential domicile. The onsite soils should provide adequate shear strength, if not overly disturbed by the construction activities. Deep soils underlying the site have substantial material strength, as is reflected in the SPT testing results and unconfined compression results. Therefore, deep failures are not as likely to be a limiting factor to constructability.

There are many seams of silty fine wet sand present throughout the clay. The wall should be designed to freely drain groundwater seepage, to prevent excess pore pressure, in the subsoils behind the wall.

The concept of soil nail walls for retention and reinforcement of the slope seem to be suitable for this site. Since the excavation is to be sequenced from the top down, frequent vertical drains should be placed at the soil to shotcrete interface in areas that require draining (fine silt and sand seams or areas of seepage or groundwater flow), and at regular intervals, just before the shotcrete is applied. Exposed areas of seepage, or free-draining seams, should be addressed immediately, on the same day they are encountered. This will help prevent the back-up of water and the buildup of excess pore-water pressure, within the overlying soil matrix.

Soil nail sizes and lengths should be designed based on the slope stability and ability of the system, under each stage during construction, to reinforce and retain the soils. Slope stability calculations must be performed for each stage of construction. It should be noted that soil nail lengths in the uppermost formations may need to be extended, during later stages of construction, should the global stability analyses indicate that it is needed for the proper reinforcement of the slopes. If localized poor soil conditions are encountered, adjustments may be made to the length or spacing of the nails (i.e., more closely spaced or longer nails) at the discretion of the engineer. Soil nail size should allow for the predicted corrosion loss of metal.

With respect to sheet pile and/or soldier pile walls with tiebacks, as with the soil nail wall approach, careful attention to details, with respect to drainage concurrent to retaining wall installation, will be an important factor in maintaining adequate global stability. Tiebacks can be either helical anchors, with pre-tensioning recommended to remove slack from couplers, or drilled and pretensioned deep soil anchors. Sheet piles will likely encounter driving refusal, within a few feet, into the present dense sand layer.

SLOPE AND GLOBAL STABILITY

The stability of the existing and proposed slopes onsite was evaluated using the ReSSA 3.0 slope evaluation program by Adam's Engineering. Two scenarios were evaluated – one consisting of the existing grades onsite and one consisting of the proposed cut slopes, with a 1:1 open cut along the hillside, during retaining wall installation. The interpolated profile between B-1 and B-3 was chosen as the critical section, along which to analyze the slopes. Slope stability was calculated using the Bishop method of slices (1955) at the specified boundaries (defined arc entry and exit points along the slope surface, between the toe of the slope, and the top of the slope), which provides an adequate Factor of Safety result for rotational slip surfaces. The soil shear strength parameters were estimated from field and lab data, as well as our experience with soils in this area. The analyses performed indicated that the existing slope has a Factor of Safety of rotational slope failure of 1.7 under drained (long-term) conditions and 1.2 under undrained (short-term) conditions. The analyses further indicated that the proposed cut area and 1:1 cut slopes have an inadequate Factor of Safety of 1.0 for both drained and undrained conditions. A summary of the estimated shear strength parameters of the onsite soils are provided below in Table 1:

Table 1. Estimated Shear Strength Parameters

Soil Type	Internal Friction ϕ Undrained	Cohesion C_u Undrained (psf)	Internal Friction ϕ' Drained	Cohesion C' Drained (psf)	Unit Weight γ (pcf)
Stiff to Very Stiff Clay	0	1500	27	300	130
Medium Stiff Clay	0	500	24	100	130
Soft Clay	0	300	20	50	130
Medium Dense Silt	31	0	31	0	130
Very Dense Sand	36	0	26	0	140

The results for the proposed cut, and the relative instability of the existing slopes onsite, signal that a 1:1 cut slope along the hillside, during installation of the retaining wall, will likely not be stable during either short-term or long-term conditions. Due to the relative instability of the site, it is recommended that the wall be installed concurrent to soil excavation, without an open cut, in order to continually reinforce and retain the soil during construction and installation and prevent rotational failure and excess disturbance of soils above the retaining wall. These analyses indicated that the retaining wall should either consist of a soil nail wall, a sheet pile and lag retaining wall with tiebacks, a soldier pile and lag retaining wall with tiebacks, and/or a secant wall consisting of drilled piers, all of which could provide continuous reinforcement to the slope during installation.

It should be noted that the accuracy of these analyses were limited to the amount of field testing performed, and extent to which observations could be made, during the field investigation, with both feasibility and economic considerations given to the extents of the exploration. Due to the inherent uncertainty given with the complex subsoil geometry, a suitably conservative design was chosen in order to represent the probable site conditions based on our subsurface data. Should conditions vary greatly from those encountered between, under, and away from the borings performed onsite, subsoil geometries could exist that result in a Factor of Safety different, and potentially lower, from that shown. Therefore, the calculated Factors of Safety shown should be used with due care, while noting the limitations and inherent error and uncertainty present in performing such calculations in this area. Should further data be obtained in the future, such as data obtained during excavation and installation of the retaining wall systems, the subsurface profile and parameters may be altered in future analyses, in order to more accurately represent the actual conditions onsite, and provide a more reliable interpretation of the subsurface stability.

A global stability analysis should be performed, after the wall design concept is finalized. Additional analyses should be performed during construction of the wall to ensure proper and safe reinforcing and retention of the onsite soils. Project drawings should be provided to us for our analyses. Due to the dense sand layer below the wall, it is our opinion that a properly designed wall should have a minimum global stability Factor of Safety of 1.5.

BUILDING STRUCTURE FOUNDATIONS

Typical shallow spread footings are recommended for transmitting structural loads to the subsoil with maximum and differential settlement potential of less than 1 and 0.5 inches, respectively.

The undisturbed medium stiff clays, medium dense silts, loose sands, and engineered fill are capable of supporting a net bearing pressure of 2,000 psf. The following provisions for foundation design and construction should apply:

- The foundation subgrades, for an allowable design bearing pressure of 2,000 psf, should consist of medium stiff clay, medium dense silts, loose sands, engineered fill, or better soils. The foundation subgrade should be approved by a geotechnical engineer, or their representative, prior to concrete placement. Any deleterious foundation subgrade soils be undercut and backfilled with lean concrete or an approved engineered coarse aggregate.
- Foundation subgrades should be concreted in a dry and frost-free condition as soon after exposure as possible.
- The ground surface, surrounding the building, should be graded to direct surface drainage of water away from all exterior foundation walls and members.
- All exterior footings should be located below the depth of potential frost penetration (3.5 feet).
- Site class definition "D" should be used for design of the structure according to the Ohio Building Code and Related Codes, section 1613.5.2 "Site Class Definitions."

BASEMENT DESIGN CONSIDERATIONS

The basement walls for the building structures require special design consideration, due to the location of the proposed retaining wall. The proposed retaining wall could inadvertently apply an additional loading to the walls, depending on the wall designs, and backfill materials utilized between the basement walls, and the proposed retaining wall. The foundation walls for the building should be carefully reviewed by an experienced structural engineer.

The foundation walls, away from the retaining wall, should be designed based on an equivalent at-rest fluid pressure of 45 psf per foot of depth (ϕ=30°; γ=130 pcf). These pressures assume the wall and foundations are backfilled with properly compacted, granular, engineered fill, compacted as outlined above, within the influence zone of the wall. Granular soils are defined as sand and gravel soils, with less than 20 percent passing the 200 sieve.

Sliding resistance for the foundation should be provided, due to friction at the base of the foundation, using a coefficient of friction of 0.36. All backfill supporting floor slabs should be properly compacted. Foundations should not be supported by the backfill of the retaining wall.

Damp proofing of the basement should follow the standard local building code.

SLAB AND PAVEMENT SUPPORT

Asphalt pavement and concrete slabs should be adequately supported on approved site soils prepared according to *Earthwork General Guidelines*, or on engineered fill placed and compacted to the provided specifications.

Floor slab subgrades should be evaluated, prior to stone placement by our personnel. All interior floor slabs should be provided with an adequate thickness of free-draining granular subbase (ODOT #57 limestone) with a suitable vapor barrier. All exterior concrete slabs should have a minimum of 4 inches of #304 crushed limestone base.

The parking lot should consist of a minimum of 6 inches of #304 crushed limestone, 2.5 inches of #441 Type II intermediate course, and 1.5 inches of #441 Type I finish course. This pavement section assumes that the parking lot will only be used for light weight traffic. The pavement section for the main drive lane, and areas to be accessed by heavier-weight traffic, should consist of 6 inches of #304 crushed limestone, 4 inches of #441 Type II intermediate course, and 1.5 inches of #441 Type I finish course.

The refuse dumpster pad should be supported on a minimum of 6 inches of #304 crushed limestone, overlain by an 8-inch ODOT Item 451 reinforced concrete pavement. The maximum control joint spacing should be 15 feet.

If construction traffic is to use the pavement, we recommended that the "construction work area" consist of a minimum of 5 inches of #441 Type II intermediate course, over 6 inches of #304 stone base. Construction traffic, with studded tires, should be kept off the asphalt pavement.

Catch basins should be provided with finger drains to allow drainage of the stone base. The pavement subgrades should be proof-rolled after they are graded, immediately prior to stone placement. Any yielding areas should be stabilized prior to stone placement.

STANDARD OF CARE AND LIMITATIONS

Our recommendations for this project were developed utilizing the soil and rock information obtained from the test borings that were made at the proposed site. The test borings only depict the soil conditions at the specified locations and time at which they were made. The soil conditions at other locations on the site may differ from those occurring at the boring locations. Additionally, the conclusions and recommendations have been based upon the available soil information and the design details furnished to us. We should be immediately notified, if during construction, any conditions different from those found in this investigation are evident, or our project assumptions are incorrect. We will advise you of any modifications to our conclusions and recommendations deemed necessary, after observing the exposed conditions and/or changes to the project scope. The scope of our services does not include any environmental assessment, or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water, within or beyond the site studied.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Wertz Geotechnical Engineering, Inc. is not responsible for the conclusions, opinions, or recommendation made by others based upon the data included herein. We hope you will find this report satisfactory. Please contact our office if we can be of further service or you have questions regarding this submittal.

Respectfully submitted,

Andrew Hillier
Project Geologist

Leroy Wertz, P.E.
Project Engineer

STATE OF OHIO
LEROY D. WERTZ
E-69643
REGISTERED
PROFESSIONAL ENGINEER

FIGURE 1

Geotechnical Boring Location Map

WERTZ GEOTECHNICAL ENGINEERING

Doylestown, Ohio 44230

330-454-1113

LEROY@WERTZGEO.COM

GEOTECHNICAL BORING LOCATION MAP

CLIENT

SILVERLEAF DEVELOPMENT

7514 Silverleaf Ct.,
Sagamore Hills, OH 44067

SITE

SOUTHWEST CORNER OF WEST SUMMIT STREET AND NORTH MAIN STREET, CHAGRIN FALLS, OH

PROJECT NAME

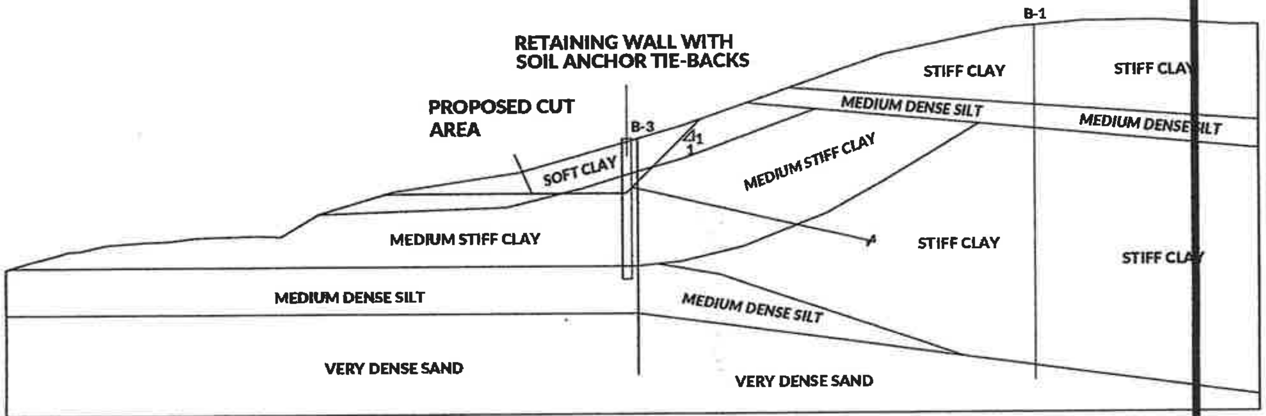
3 WEST SUMMIT PROJECT

LAYOUT BY CD	DATE: 6/5/2019
DRAWN BY CD	FIGURE NO. 1
CHECKED BY LW	

Wertz Geotechnical Engineering (WGE) shall not be held liable for improper or incorrect use of the data presented and/or contained herein. These data and related graphics are not legal documents and are not intended to be used as such. WGE does not guarantee the positional or thematic accuracy of the GIS data presented in this figure. WGE gives no warranty, expressed or implied, as to the accuracy, reliability, or completeness of these data.

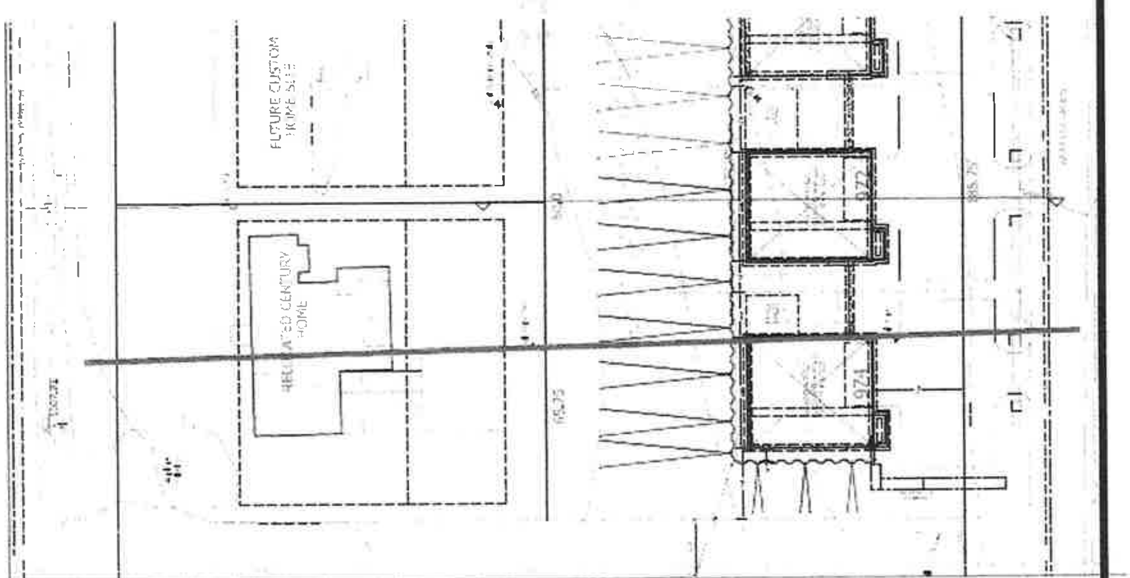
FIGURE 2

Site Profile with Proposed Retaining Wall



INTERPOLATED SUBSURFACE AREA AND PROPOSED RETAINING WALL CUT AREA

SCALE = N.T.S.



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SITE SUBSURFACE PROFILE WITH PROPOSED RETAINING WALL

CLIENT: SILVERLEAF DEVELOPMENT, 7414 SILVERLEAF COURT, SAGAMORE HILLS, OHIO 44067

PROJECT: 3 WEST SUMMIT STREET PROJECT

LOCATION: 3 WEST SUMMIT STREET, CHAGRIN FALLS, OH

DATE: 8/1/2019

LAYOUT BY: A.HILLIER

DRAWING BY: A. HILLIER

FIGURE 2

FIGURE 3

USDA Web Soil Survey Map

Map Scale: 1:1,050 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

FIGURE 4

ODNR Bedrock Geology Map

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DkF	Dekalb-Loudonville complex, 25 to 70 percent slopes	1.0	37.6%
LuC	Loudonville-Urban land complex, rolling	1.7	62.4%
Totals for Area of Interest		**2.8**	**100.0%**

ATTACHMENT A

Geotechnical Boring Logs

3 WEST SUMMIT STREET PROJECT GEOLOGIC MAP

Bedrock Topography of Ohio 24K (ODNR-DGS) -Bedrock Topography 24K - Data Points

• Water well, data from Ohio Division of Water

Bedrock Topography of Ohio 24K (ODNR-DGS) -Bedrock Topography 24K - Contours

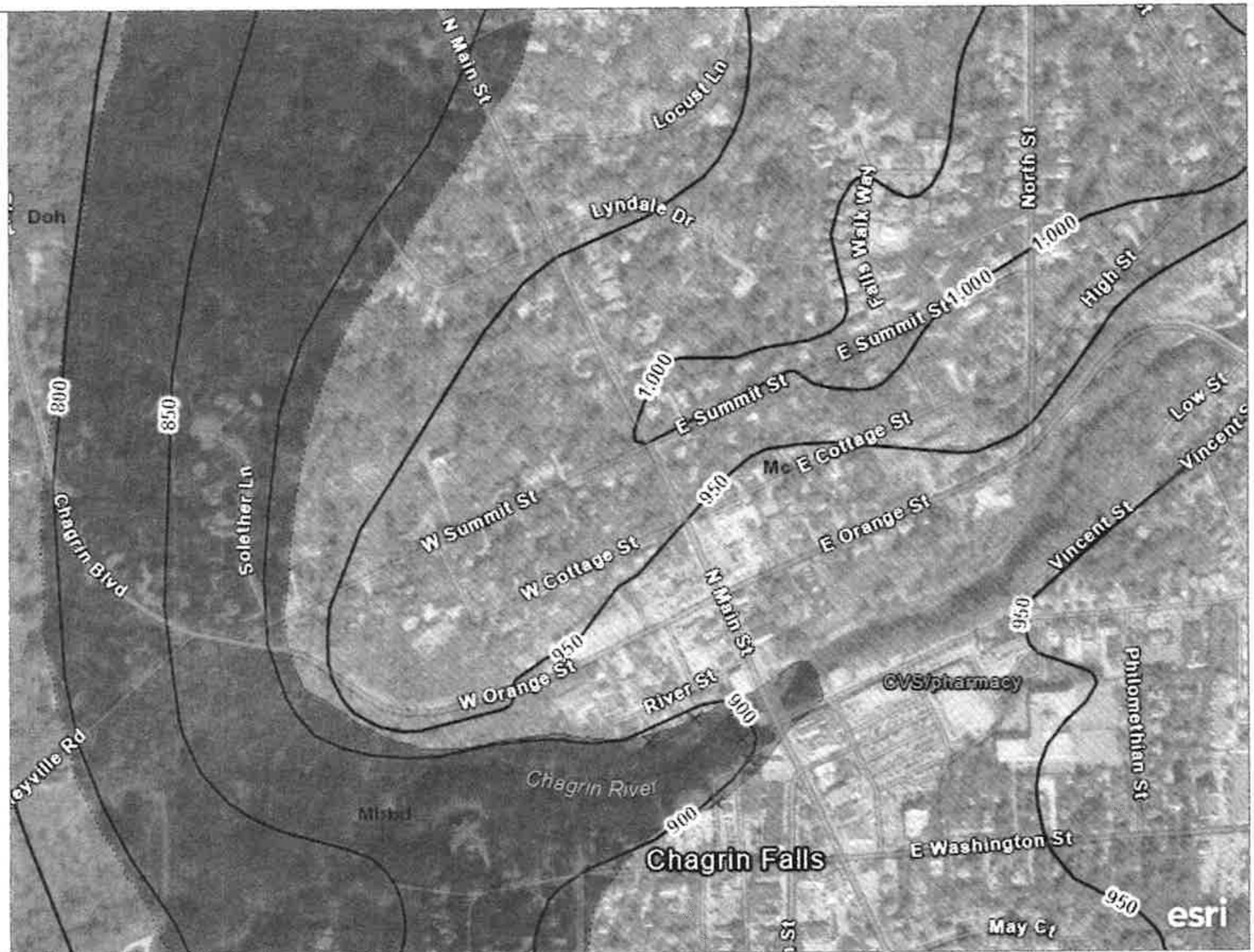
— Bedrock Topography Contour (50-ft Interval), data from ODNR-DGS)

-Bedrock Geology 24K
-Data Bedrock Geology of Ohio 24K (ODNR-DGS)

Doh - Ohio Shale Major: Shale, Black Shale

Mbbd - Berea Sandstone and Bedford Shale, Undivided Major: Sandstone, Shale Minor: Siltstone

Mc - Cuyahoga Formation Major: Shale, Siltstone, Sandstone Minor: Conglomerate, Limestone



Bedrock likely exists over 76 feet below the existing grades onsite. Bedrock onsite may differ from that which is shown, due to the discrepancy between the topography contours and actual depths encountered.

Ohio Department of Natural Resources-Division of Geological Survey | USDA FSA | Cuyahoga County, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

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PROJECT:	3 West Summit Street Project	**PROJECT NO.:** 20191070	**DRILL RIG:** CME 45	**BORING ID:**	B-1
LOCATION:	West Summit Street, Chagrin Falls, Ohio		**METHOD:** Hollow Stem	**DATE STARTED:**	6/13/2019
LOGGED BY:	A.C.		**AUGER SIZE:** 2.25 inches	**DATE COMPLETED:**	6/13/2019
DRILL CREW:	J.$. & A.B.		**HAMMER:** Automatic SPT	**ELEVATION:**	feet MSL
GROUNDWATER ENCOUNTER DEPTH:	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:** 75' bgs	**CAVE DEPTH:**	13' bgs

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
		AS	--	--		7" TOPSOIL
2	1	1.0-2.5	3-4-5	18		Damp, stiff, brown, lean CLAY. Wn%: 22.9
4	2	3.5-5.0	2-7-8	15		Damp, stiff, brown, lean CLAY. Wn%: 18.3
9	3	8.5-10.0	5-12-22	11		Damp, hard, lean CLAY, some silt, sand, and gravel. Wn%: 15.9 LL=27 | PL=16 | PI=11 (CL)
14	4	13.5-15.0	5-8-13	18		Damp, very stiff, brown, lean CLAY. Wn%: 16.3
19	5	18.5-20.0	4-8-9	18		Damp, very stiff, gray, lean CLAY, trace of very fine sand and silt. Wn%: 22.4 LL=27 | PL=19 | PI=8 (CL) SH-1 (20.0'-22.0'): UCS=6970psf | Wn%: 17.5 | LL=27 | PL=17 | PI=10 (CL)
24	6	23.5-25.0	2-3-6	18		Damp, stiff, gray, lean CLAY. Wn%: 18
29	7	28.5-30.0	1-4-7	18		Damp, stiff, gray, lean CLAY. Wn%: 17.6 SH-2 (30.0'-32.0'): UCS=6280psf | Wn%: 17.5 | LL=27 | PL=16 | PI=11 (CL)
34	8	33.5-35.0	3-5-8	18		Damp, stiff, gray, lean CLAY. Wn%: 18.9

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PROJECT: 3 West Summit Street Project
PROJECT NO.: 20191070
DRILL RIG: CME 45
BORING ID: B-1

LOCATION: West Summit Street, Chagrin Falls, Ohio
METHOD: Hollow Stem
DATE STARTED: 6/13/2019

LOGGED BY: A.C.
AUGER SIZE: 2.25 inches
DATE COMPLETED: 6/13/2019

DRILL CREW: J.$. & A.B.
HAMMER: Automatic SPT
ELEVATION: feet MSL

GROUNDWATER ENCOUNTER DEPTH: None
GROUNDWATER AT COMPLETION: None
TOTAL DEPTH: 75' bgs
CAVE DEPTH: 13' bgs

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
36						
37						
38						
39	9	38.5-40.0	2-6-11	18		Damp, very stiff, gray, lean CLAY. Wn%: 16.5
40						
41						
42						
43						
44	10	43.5-45.0	3-7-9	16		Damp, stiff, gray, lean CLAY. Wn%: 16.5 LL=29 | PL=17 | PI=12 (CL)
45						
46						
47						
48						
49	11	48.5-50.0	4-8-12	18		Moist, very stiff, gray, lean CLAY. Wn%: 26.2
50						
51						
52						
53						
54	12	53.5-55.0	2-4-5	18		Moist, stiff, gray, lean CLAY. Wn%: 31.3
55						
56						
57						
58						
59	13	58.5-60.0	2-3-6	0		No Recovery; Probable lean to silty CLAY.
60						
61						
62						
63						
64	14	63.5-65.0	4-5-5	18		Damp, stiff, gray, silty CLAY, trace of very fine sand. Wn%: 13.9 LL=18 | PL=14 | PI=4 (CL-ML)
65						
66						
67						
68						
69	15	68.5-70.0	15-10-20	18		Damp, very stiff, gray, silty CLAY, trace of very fine sand. Wn%: 15
70						

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PROJECT: 3 West Summit Street Project
PROJECT NO.: 20191070
DRILL RIG: CME 45
BORING ID: B-1

LOCATION: West Summit Street, Chagrin Falls, Ohio
METHOD: Hollow Stem
DATE STARTED: 6/13/2019

LOGGED BY: A.C.
AUGER SIZE: 2.25 inches
DATE COMPLETED: 6/13/2019

DRILL CREW: J.$. & A.B.
HAMMER: Automatic SPT
ELEVATION: feet MSL

GROUNDWATER ENCOUNTER DEPTH: None
GROUNDWATER AT COMPLETION: None
TOTAL DEPTH: 75' bgs
CAVE DEPTH: 13' bgs

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
71						
72						
73						
74	16	73.5-75.0	40-34-48	18		Damp, very dense, brown, very fine to coarse SAND and GRAVEL. Wn%: 16.2
75						
76						
77						
78						
79						
80						
81						
82						
84						
85						
86						
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103						
104						

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PROJECT:	3 West Summit Street Project	**PROJECT NO.:** 20191070	**DRILL RIG:** CME 45	**BORING ID:** B-2	
LOCATION:	West Summit Street, Chagrin Falls, Ohio		**METHOD:** Hollow Stem	**DATE STARTED:** 6/12/2019	
LOGGED BY:	A.C.		**AUGER SIZE:** 2.25 inches	**DATE COMPLETED:** 6/12/2019	
DRILL CREW:	J.$. & A.B.		**HAMMER:** Automatic SPT	**ELEVATION:** feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:** 76.5' bgs	**CAVE DEPTH:** 70' bgs	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
0–1		AS	--	--		6" TOPSOIL.
2	1	1.0-2.5	5-7-8	19		Damp, stiff, brown, lean CLAY, trace of sand. Wn%: 16.1
4	2	3.5-5.0	5-11-13	17		Damp, very stiff, brown, lean CLAY, trace of sand. Wn%: 15.9
9	3	8.5-10.0	6-9-11	19		Damp, very stiff, brown, lean CLAY, trace of sand. Wn%: 16.6
14	4	13.5-15.0	4-7-10	18		Damp, very stiff, brown, lean CLAY, trace of sand. Wn%: 17 LL=27 | PL=18 | PI=9 (CL)
19	5	18.5-20.0	3-4-6	18		Damp, stiff, gray, lean CLAY, minor sand. Wn%: 16
24	6	23.5-25.0	3-4-6	18		Damp, stiff, gray, lean CLAY, minor sand. Wn%: 18.4
29	7	28.5-30.0	3-4-7	18		Damp, stiff, gray, lean CLAY, trace of sand. Wn%: 16.8
34	8	33.5-35.0	10-11-12	18		Moist, medium dense, gray SILT, trace of very fine sand. Wn%: 22.6 LL=N/A | PL=N/A | PI=N/A (NP)

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PROJECT:	3 West Summit Street Project	**PROJECT NO.:** 20191070	**DRILL RIG:** CME 45	**BORING ID:** B-2	
LOCATION:	West Summit Street, Chagrin Falls, Ohio		**METHOD:** Hollow Stem	**DATE STARTED:** 6/12/2019	
LOGGED BY:	A.C.		**AUGER SIZE:** 2.25 inches	**DATE COMPLETED:** 6/12/2019	
DRILL CREW:	J.$. & A.B.		**HAMMER:** Automatic SPT	**ELEVATION:** feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:** 76.5' bgs	**CAVE DEPTH:** 70' bgs	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
36–38						
39	9	38.5-40.0	7-9-10	18		Damp, medium dense, gray SILT, trace of very fine sand. Wn%: 21.2
40–43						
44	10	43.5-45.0	9-12-14	18		Damp, medium dense, grary SILT, trace of very fine sand. Wn%: 22.6 LL=N/A | PL=N/A | PI=N/A (NP)
45–47						
49	11	48.5-50.0	5-6-7	18		Damp, stiff, gray, lean CLAY. Wn%: 21.8
50–53						
54	12	53.5-55.0	6-7-8	18		Damp, stiff, gray, lean CLAY. Wn%: 28.8 LL=49 | PL=26 | PI=23 (CL)
55–58						
59	13	58.5-60.0	2-4-5	18		Damp, stiff, gray, lean CLAY. Wn%: 25.1
60–63						
64	14	63.5-65.0	4-5-8	18		Damp, stiff, gray, sandy lean CLAY, trace of silt. Wn%: 13.3
65–68						
69	15	68.5-70.0	50/5"	5		Damp, very dense, brown, fine to coarse SAND and GRAVEL. Wn%: 5.9

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PROJECT: 3 West Summit Street Project	**PROJECT NO.:** 20191070	**DRILL RIG:** CME 45	**BORING ID:** B-2	
LOCATION: West Summit Street, Chagrin Falls, Ohio		**METHOD:** Hollow Stem	**DATE STARTED:** 6/12/2019	
LOGGED BY: A.C.		**AUGER SIZE:** 2.25 inches	**DATE COMPLETED:** 6/12/2019	
DRILL CREW: J.$. & A.B.		**HAMMER:** Automatic SPT	**ELEVATION:** feet MSL	
GROUNDWATER ENCOUNTER DEPTH: None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:** 76.5' bgs	**CAVE DEPTH:** 70' bgs	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
71						
72						
73						
74						
75						
76	16	75.5-76.5	50/5"	5		Damp, very dense, brown, fine to coarse SAND and GRAVEL. Wn%: 8.5
77						
78						
79						
80						
81						
82						
83						
84						
85						
86						
87						
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102						
103						
104						
105						

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PROJECT: 3 West Summit Street Project
PROJECT NO.: 20191070
DRILL RIG: CME 45
BORING ID: B-3

LOCATION: West Summit Street, Chagrin Falls, Ohio
METHOD: Hollow Stem
DATE STARTED: 6/17/2019

LOGGED BY: D.K.
AUGER SIZE: 2.25 inches
DATE COMPLETED: 6/18/2019

DRILL CREW: J.$. & A.C.
HAMMER: Automatic SPT
ELEVATION: feet MSL

GROUNDWATER ENCOUNTER DEPTH: 28.5' bgs
GROUNDWATER AT COMPLETION: None
TOTAL DEPTH: 41.5' bgs
CAVE DEPTH: 21' bgs

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
0–1		AS	--	--		4" TOPSOIL.
2	1	1.0-2.5	2-2-4	8		Damp, medium stiff, brown, lean CLAY. Wn%: 22.1
4	2	3.5-5.0	0-2-2	16		Moist, soft, brown, lean CLAY. Wn%: 27.3
9	3	8.5-10.0	2-3-5	14		Moist, medium stiff, brown, lean CLAY. Wn%: 26.9
14	4	13.5-15.0	4-4-6	13		Damp, stiff, brown, lean CLAY. Wn%: 20.8
19	5	18.5-20.0	4-6-7	15		Moist, stiff, gray, lean CLAY. Wn%: 26.5
24	6	23.5-25.0	2-2-3	16		Moist, medium stiff, gray, lean CLAY. Wn%: 25.7 LL=34 | PL=13 | PI=13 (CL)
29	7	28.5-30.0	4-6-5	16		Wet, medium dense, gray, very fine sandy SILT, trace of clay. Wn%: 24
34	8	33.5-35.0	12-18-19	18		Damp, hard, gray, clayey SILT, trace sand and gravel. Wn%: 14 LL=22 | PL=16 | PI=6 (CL-ML)

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PROJECT:	3 West Summit Street Project	**PROJECT NO.:** 20191070	**DRILL RIG:** CME 45	**BORING ID:**	B-3
LOCATION:	West Summit Street, Chagrin Falls, Ohio		**METHOD:** Hollow Stem	**DATE STARTED:**	6/17/2019
LOGGED BY:	D.K.		**AUGER SIZE:** 2.25 inches	**DATE COMPLETED:**	6/18/2019
DRILL CREW:	J.$. & A.C.		**HAMMER:** Automatic SPT	**ELEVATION:**	feet MSL
GROUNDWATER ENCOUNTER DEPTH:	28.5' bgs	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:** 41.5' bgs	**CAVE DEPTH:**	21' bgs

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
36						
37						
38						
39	9	38.5-40.0	15-50-50/1.5	13		Damp, very dense, gray and brown, clayey, fine to coarse SAND and GRAVEL. Wn%: 14.1
40						
41	10	40.0-41.5	50/5.5"	2		Wet, very dense, gray and brown, fine to coarse SAND and GRAVEL, minor silt and clay. Wn%: 12.2
42						
43						
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PROJECT:	3 West Summit Street Project	**PROJECT NO.:** 20191070	**DRILL RIG:** CME 45	**BORING ID:** B-4	**Page 1 of 2**
LOCATION:	West Summit Street, Chagrin Falls, Ohio		**METHOD:** Hollow Stem	**DATE STARTED:** 6/17/2019	
LOGGED BY:	A.C.		**AUGER SIZE:** 2.25 inches	**DATE COMPLETED:** 6/17/2019	
DRILL CREW:	J.$. & A.C.		**HAMMER:** Automatic SPT	**ELEVATION:** feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:** 50' bgs	**CAVE DEPTH:** 9' bgs	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
0-1		AS	--	--		6" TOPSOIL.
2	1	1.0-2.5	3-4-5	15		Moist, stiff, brown, lean CLAY. Wn%: 20
4-5	2	3.5-5.0	2-3-5	12		Damp, medium stiff, brown, lean CLAY. Wn%: 18.6
9-10	3	8.5-10.0	2-4-5	12		Moist, loose, brown SILT, trace of clay. Wn%: 27.7
14-15	4	13.5-15.0	4-6-6	11		Moist, medium dense, brown SILT. Wn%: 25.9 LL=N/A | PL=N/A | PI=N/A (NP)
19-20	5	18.5-20.0	2-4-6	12		Damp, stiff, brown, high plasticity CLAY. Wn%: 22.6
24-25	6	23.5-25.0	3-4-5	16		Moist, stiff, gray, high-plasticity CLAY. Wn%: 29.5 LL=52 | PL=29 | PI=23 (CH)
29-30	7	28.5-30.0	3-5-6	18		Moist, stiff, gray, lean CLAY, trace of fine sand. Wn%: 18.1
34-35	8	33.5-35.0	2-2-4	18		Damp, loose, gray, fine sandy SILT. Wn%: 19.2

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PROJECT:	3 West Summit Street Project	**PROJECT NO.:** 20191070		**DRILL RIG:**	CME 45
LOCATION:	West Summit Street, Chagrin Falls, Ohio			**METHOD:**	Hollow Stem
LOGGED BY:	A.C.			**AUGER SIZE:**	2.25 inches
DRILL CREW:	J.$. & A.C.			**HAMMER:**	Automatic SPT
GROUNDWATER ENCOUNTER DEPTH:	None	**GROUNDWATER AT COMPLETION:**	None	**TOTAL DEPTH:**	50' bgs

BORING ID:	B-4
DATE STARTED:	6/17/2019
DATE COMPLETED:	6/17/2019
ELEVATION:	feet MSL
CAVE DEPTH:	9' bgs

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	GRAPHIC LOG	LITHOLOGY
36						
37						
38						
39	9	38.5-40.0	39-50/3.5"	8		Damp, very dense, brown, fine sandy SILT, minor gravel. Wn%: 9.4
40						
41						
42						
43						
44	10	43.5-45.0	27-28-41	10		Damp, very dense, brown, fine SAND. Wn%: 3.3
45						
46						
47						
48						
49	11	48.5-50.0	17-31-30	16		Damp, very dense, brown, fine SAND. Wn%: 5.5
50						
51						
52						
53						
54						
55						
56						
57						
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60						
61						
62						
63						
64						
65						
66						
67						
68						
69						
70						

ATTACHMENT B

Slope Stability Analyses

Existing Conditions Undrained B1 - B3

PROJECT IDENTIFICATION

Title:	3 West Summit
Project Number:	WGE - 20191070
Client:	Silverleaf Development
Designer:	A. Hillier
Station Number:	B1-B3

Description:

Slope Stability Analysis of Existing Slopes Onsite

Company's information:

Name:	Wertz Geotechnical Engineering, Inc.
Street:	400 Collier Drive Doylestown, OH 44230
Telephone #:	
Fax #:	
E-Mail:	office@wertzgeo.com

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Original date and time of creating this file: Wed Jul 31 08:20:42 2019

PROGRAM MODE: Analysis of a General Slope using NO reinforcement material.

INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ³]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ²]
1......Stiff to Very Stiff Clay.........................	130.0	0.0	1500.0
2......Medium Dense Silt..............................	130.0	31.0	0.0
3......Soft Clay..	130.0	0.0	300.0
4......Medium Stiff Clay................................	130.0	0.0	500.0
5......Stiff to Very Stiff Clay.........................	130.0	0.0	1500.0
6......Medium Dense Silt..............................	130.0	31.0	0.0
7......Very Dense Sand.................................	140.0	36.0	0.0

REINFORCEMENT

Analysis of slope WITHOUT reinforcement.

WATER

Unit weight of water = 62.45 [lb/ft ³]
Water pressure is defined by phreatic surface in Effective Stress Analysis.

SEISMICITY

Not Applicable

DRAWING OF SPECIFIED GEOMETRY - GENERAL

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.
-- Xw,Yw represents the coordinates of phreatic surface.

GEOMETRY

Soil profile contains 7 layers (see details in next page)

WATER GEOMETRY

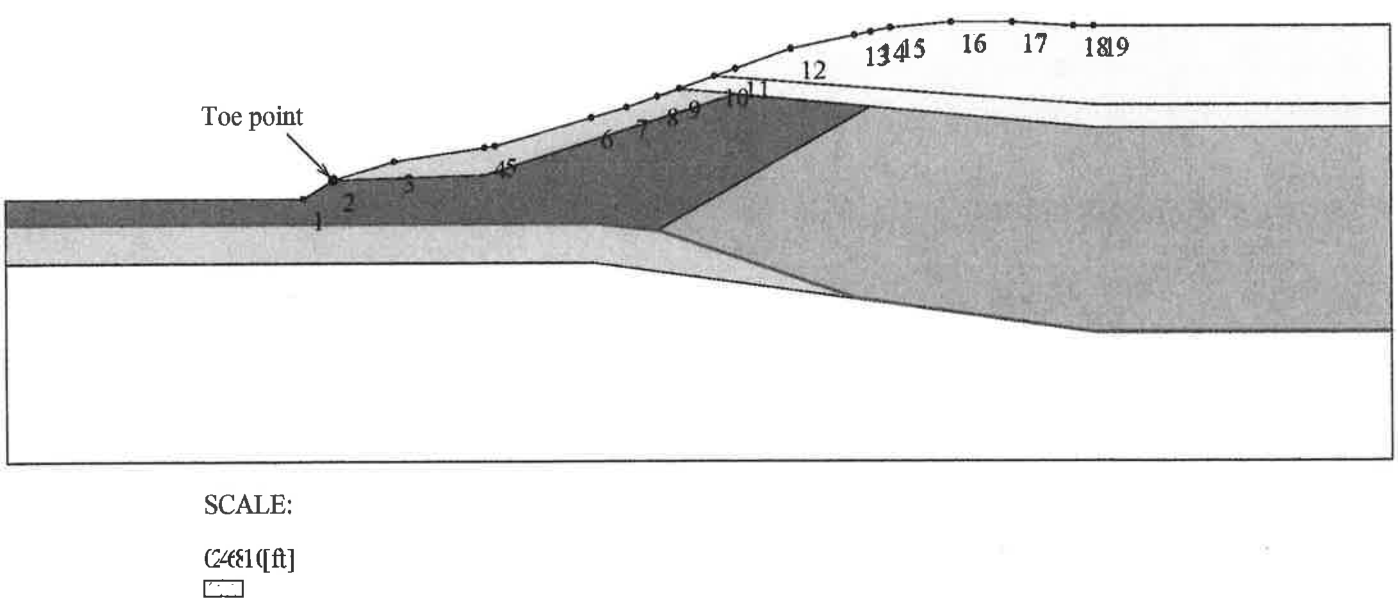
Phreatic line was specified.

UNIFORM SURCHARGE

Surcharge load, Q1 ....None
Surcharge load, Q2 ....None
Surcharge load, Q3 ....None

STRIP LOAD

............................None..................................



TABULATED DETAILS OF GENERAL SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
ater was described by phreatic line.

	#	Xi	Yi
Top of Layer 1	1	57.80	973.10
	2	65.70	977.90
	3	81.50	982.60
	4	107.80	986.50
	5	141.90	996.30
	6	184.60	1011.20
	7	210.30	1016.60
	8	226.00	1018.00
	9	241.80	1018.00
	10	257.60	1017.00
	11	262.90	1017.00
Top of Layer 2	12	57.80	973.10
	13	65.70	977.90
	14	81.50	982.60
	15	107.80	986.50
	16	141.90	996.30
	17	164.60	1004.20
	18	262.90	996.80
Top of Layer 3	19	57.80	973.10
	20	65.70	977.90
	21	81.50	982.60
	22	107.80	986.50
	23	141.90	996.30
	24	155.55	1001.01
	25	262.90	991.00
Top of Layer 4	26	57.80	973.10
	27	65.70	977.90
	28	105.10	979.10
	29	170.07	999.60
	30	205.29	996.38
	31	262.90	991.00
Top of Layer 5	32	132.80	966.70
	33	149.90	964.90
	34	205.29	996.38
	35	262.90	991.00
Top of Layer 6	36	132.80	966.70
	37	149.90	964.90
	38	201.10	947.40
	39	262.90	938.90
Top of Layer 7	40	132.80	956.70
	41	262.90	938.90
Top of Phreatic Line	43	132.80	966.70
	44	149.90	964.90
	45	201.10	947.60
	46	262.90	938.90

TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
Water was described by phreatic line. Y values are tabulated in the right most column.

#	X	Y1	Y2	Y3	Y4	Y5	Y6	Y7	(phreatic) Yw
1	57.80	973.10	973.10	973.10	973.10	966.70	966.70	956.70	966.70
2	65.70	977.90	977.90	977.90	977.90	966.70	966.70	956.70	966.70
3	81.50	982.60	982.60	982.60	978.38	966.70	966.70	956.70	966.70
4	105.10	986.10	986.10	986.10	979.10	966.70	966.70	956.70	966.70
5	107.80	986.50	986.50	986.50	979.95	966.70	966.70	956.70	966.70
6	132.80	993.68	993.68	993.68	987.84	966.70	966.70	956.70	966.70
7	141.90	996.30	996.30	996.30	990.71	965.74	965.74	955.45	965.74
8	149.90	999.09	999.08	999.06	993.24	964.90	964.90	954.36	964.90
9	155.55	1001.06	1001.05	1001.01	995.02	968.11	962.97	953.59	962.99
10	164.60	1004.22	1004.20	1000.17	997.87	973.25	959.88	952.35	959.93
11	170.07	1006.13	1003.79	999.66	999.60	976.36	958.01	951.60	958.08
12	184.60	1011.20	1002.69	998.30	998.27	984.62	953.04	949.61	953.18
13	201.10	1014.67	1001.45	996.76	996.76	994.00	947.40	947.36	947.60
14	205.29	1015.55	1001.14	996.38	996.38	996.38	946.82	946.78	947.01
15	210.30	1016.60	1000.76	995.91	995.91	995.91	946.13	946.10	946.30
16	226.00	1018.00	999.58	994.45	994.45	994.45	943.98	943.95	944.09
17	241.80	1018.00	998.39	992.97	992.97	992.97	941.80	941.79	941.87
18	257.60	1017.00	997.20	991.49	991.49	991.49	939.63	939.63	939.65
19	262.90	1017.00	996.80	991.00	991.00	991.00	938.90	938.90	938.90

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	100.33	985.39	57.49	973.35	74.62	994.63	27.32	2.34	
2	120.30	990.09	57.78	973.11	80.62	1012.62	45.63	2.08	
3	140.27	995.83	57.33	973.32	85.68	1032.90	65.98	1.74	
4	160.23	1002.70	57.11	973.38	90.15	1053.18	86.37	1.45	
5	180.20	1009.66	86.51	984.34	126.73	1021.51	54.76	1.34	
. 6	200.17	1014.47	86.42	984.25	133.04	1037.93	71.10	1.20 .	OK
7	220.13	1017.48	65.06	978.59	118.29	1094.97	127.97	1.20	
8	240.10	1018.00	57.67	973.12	95.64	1212.00	241.88	1.42	
9	260.07	1017.00	73.78	980.96	140.49	1135.60	168.42	1.85	
10	280.03	1017.00	65.15	978.42	137.01	1195.87	229.02	1.96	
11	300.00	1017.00	56.33	973.39	122.52	1306.08	339.21	2.06	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	57.28	973.25	220.13	1017.48	102.46	1128.84	162.02	1.24	
2	61.82	975.74	220.13	1017.48	111.01	1110.26	143.24	1.22	
3	65.06	978.59	220.13	1017.48	118.29	1094.97	127.97	1.20	
4	69.14	979.94	220.13	1017.48	121.99	1089.82	121.92	1.21	
5	73.72	981.04	220.13	1017.48	125.60	1084.97	116.16	1.22	
6	78.79	981.90	200.17	1014.47	125.87	1048.91	81.89	1.22	
7	82.44	983.38	200.17	1014.47	129.78	1042.56	75.79	1.21	
. 8	86.42	984.25	200.17	1014.47	133.04	1037.93	71.10	1.20 .	OK
9	91.35	984.28	200.17	1014.47	135.86	1035.05	67.52	1.21	
10	95.22	985.23	200.17	1014.47	138.64	1032.32	64.06	1.22	
11	99.41	985.88	200.17	1014.47	141.06	1030.94	61.36	1.25	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.20
Critical Circle: Xc = 133.04[ft], Yc = 1037.93[ft], R = 71.10[ft]. (Number of slices used = 59)

Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

NOT CONDUCTED

Three-Part Wedge Stability Analysis

NOT CONDUCTED

Existing Conditions Drained B1 - B3

PROJECT IDENTIFICATION

Title:	3 West Summit
Project Number:	WGE - 20191070
Client:	Silverleaf Development
Designer:	A. Hillier
Station Number:	B1-B3

Description:
Slope Stability Analysis of Existing Slopes Onsite

Company's information:

Name:	Wertz Geotechnical Engineering, Inc.
Street:	400 Collier Drive Doylestown, OH 44230
Telephone #:	
Fax #:	
E-Mail:	office@wertzgeo.com

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Original date and time of creating this file: Wed Jul 31 08:20:42 2019

PROGRAM MODE: Analysis of a General Slope using NO reinforcement material.

INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ³]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ²]
1.......Stiff to Very Stiff Clay..........................	130.0	27.0	300.0
2.......Medium Dense Silt...............................	130.0	31.0	0.0
3.......Soft Clay..	130.0	20.0	50.0
4.......Medium Stiff Clay................................	130.0	24.0	100.0
5.......Stiff to Very Stiff Clay..........................	130.0	27.0	300.0
6.......Medium Dense Silt...............................	130.0	31.0	0.0
7.......Very Dense Sand.................................	140.0	36.0	0.0

REINFORCEMENT

Analysis of slope WITHOUT reinforcement.

WATER

Unit weight of water = 62.45 [lb/ft ³]
Water pressure is defined by phreatic surface in Effective Stress Analysis.

SEISMICITY

Not Applicable

DRAWING OF SPECIFIED GEOMETRY - GENERAL

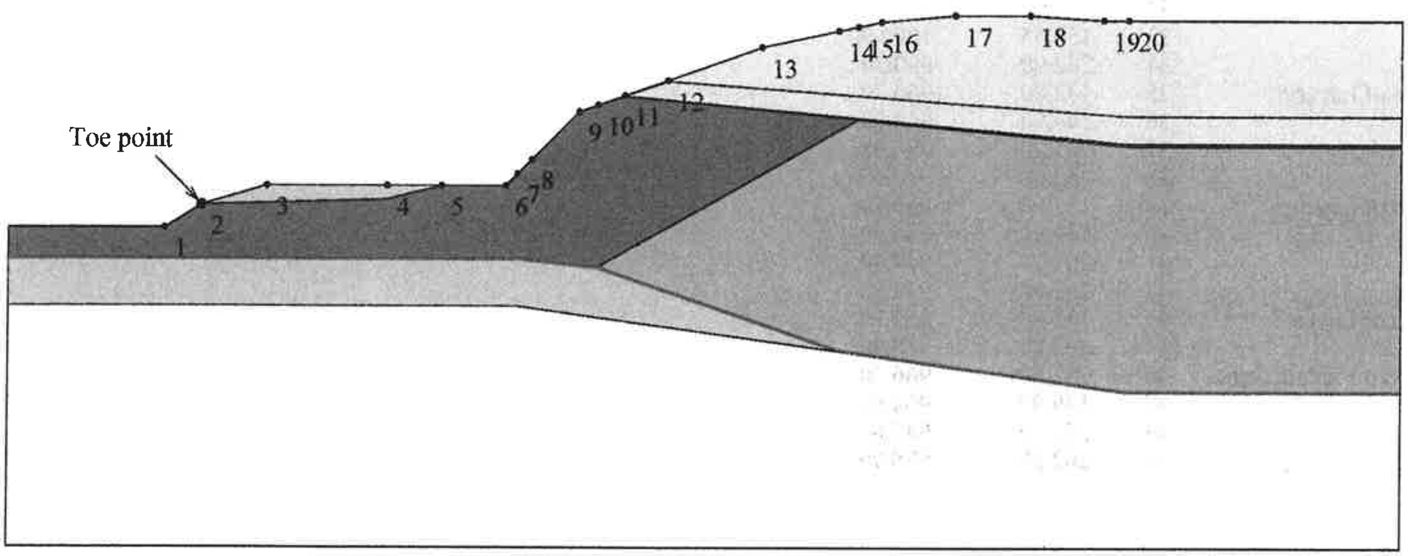
-- Problem geometry is defined along sections selected by user at x,y coordinates.
X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.
-- Xw,Yw represents the coordinates of phreatic surface.

GEOMETRY
Soil profile contains 7 layers (see details in next page)

WATER GEOMETRY
Phreatic line was specified.

UNIFORM SURCHARGE
Surcharge load, Q1 ....None
Surcharge load, Q2 ....None
Surcharge load, Q3 ....None

STRIP LOAD
...........................None.................................



SCALE:

C24681([ft]

TABULATED DETAILS OF GENERAL SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
Water was described by phreatic line.

	#	Xi	Yi
Top of Layer 1	1	57.80	973.10
	2	65.70	977.90
	3	79.60	982.00
	4	130.30	982.00
	5	145.90	997.60
	6	184.60	1011.20
	7	210.30	1016.60
	8	226.00	1018.00
	9	241.80	1018.00
	10	257.60	1017.00
	11	262.90	1017.00
Top of Layer 2	12	57.80	973.10
	13	65.70	977.90
	14	79.60	982.00
	15	130.30	982.00
	16	145.90	997.60
	17	164.60	1004.00
	18	262.90	996.80
Top of Layer 3	19	57.80	973.10
	20	65.70	977.90
	21	79.60	982.00
	22	130.30	982.00
	23	145.90	997.60
	24	155.55	1000.90
	25	262.90	991.00
Top of Layer 4	26	57.80	973.10
	27	65.70	977.90
	28	105.10	979.10
	29	116.60	982.00
	30	130.30	982.00
	31	135.80	987.50
	32	145.90	997.60
	33	155.55	1000.90
	34	262.90	990.50
Top of Layer 5	35	132.80	966.70
	36	149.90	964.90
	37	205.29	995.98
	38	262.90	990.50
Top of Layer 6	39	132.80	966.70
	40	149.90	964.90
	41	201.10	947.40
	42	262.90	938.90
Top of Layer 7	43	132.80	956.70
	44	262.90	938.90
Top of Phreatic Line	46	132.80	966.70
	47	149.90	964.90
	48	201.10	947.60
	49	262.90	938.90

TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
ater was described by phreatic line. Y values are tabulated in the right most column.

#	X	Y1	Y2	Y3	Y4	Y5	Y6	Y7	(phreatic) Yw
1	57.80	973.10	973.10	973.10	973.10	966.70	966.70	956.70	966.70
2	65.70	977.90	977.90	977.90	977.90	966.70	966.70	956.70	966.70
3	79.60	982.00	982.00	982.00	978.32	966.70	966.70	956.70	966.70
4	105.10	982.00	982.00	982.00	979.10	966.70	966.70	956.70	966.70
5	116.60	982.00	982.00	982.00	982.00	966.70	966.70	956.70	966.70
6	130.30	982.00	982.00	982.00	982.00	966.70	966.70	956.70	966.70
7	132.80	984.50	984.50	984.50	984.50	966.70	966.70	956.70	966.70
8	135.80	987.50	987.50	987.50	987.50	966.38	966.38	956.29	966.38
9	145.90	997.60	997.60	997.60	997.60	965.32	965.32	954.91	965.32
10	149.90	999.01	998.97	998.97	998.97	964.90	964.90	954.36	964.90
11	155.55	1000.99	1000.90	1000.90	1000.90	968.07	962.97	953.59	962.99
12	164.60	1004.17	1004.00	1000.07	1000.02	973.15	959.88	952.35	959.93
13	184.60	1011.20	1002.54	998.22	998.09	984.37	953.04	949.61	953.18
14	201.10	1014.67	1001.33	996.70	996.49	993.63	947.40	947.36	947.60
15	205.29	1015.55	1001.02	996.31	996.08	995.98	946.82	946.78	947.01
16	210.30	1016.60	1000.65	995.85	995.60	995.50	946.13	946.10	946.30
17	226.00	1018.00	999.50	994.40	994.07	994.01	943.98	943.95	944.09
18	241.80	1018.00	998.35	992.95	992.54	992.51	941.80	941.79	941.87
19	257.60	1017.00	997.19	991.49	991.01	991.00	939.63	939.63	939.65
20	262.90	1017.00	996.80	991.00	990.50	990.50	938.90	938.90	938.90

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	150.60	999.25	130.21	982.02	127.96	1005.36	23.45	1.01	
2	142.30	994.00	130.17	982.00	130.00	994.30	12.30	1.21	
3	154.27	1000.54	130.07	982.01	124.24	1014.69	33.20	1.01	. OK
4	166.23	1004.74	130.01	982.00	117.07	1042.83	62.18	1.08	
5	178.20	1008.95	130.23	982.03	119.38	1057.57	76.31	1.23	
6	190.17	1012.37	129.78	981.98	120.07	1076.45	94.97	1.34	
7	202.13	1014.88	129.89	981.99	122.11	1094.87	113.14	1.45	
8	214.10	1016.94	130.00	982.00	122.88	1117.82	136.00	1.57	
9	226.07	1018.00	130.11	982.00	124.37	1143.20	161.30	1.69	
10	238.03	1018.00	107.19	982.21	135.47	1135.87	156.24	1.84	
11	250.00	1017.48	129.07	981.97	121.26	1232.22	250.37	2.04	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	57.40	973.19	226.07	1018.00	97.76	1161.09	192.19	1.98	
2	64.68	977.58	214.10	1016.94	105.15	1127.25	155.04	1.94	
3	72.08	979.87	214.10	1016.94	110.59	1122.94	148.16	1.85	
4	79.39	981.97	202.13	1014.88	108.52	1118.68	139.77	1.71	
5	86.46	982.05	190.17	1012.37	112.49	1085.54	106.71	1.62	
6	93.52	982.10	190.17	1012.37	118.21	1072.71	93.91	1.53	
7	100.82	982.08	178.20	1008.95	119.12	1054.21	74.42	1.44	
8	107.91	982.10	166.23	1004.74	120.71	1035.57	54.98	1.31	
9	115.04	982.09	166.23	1004.74	124.15	1030.69	49.44	1.22	
10	122.51	982.04	154.27	1000.54	127.27	1010.37	28.73	1.12	
11	130.07	982.01	154.27	1000.54	124.24	1014.69	33.20	1.01	. On extreme X-exit

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

inimum Factor of Safety = 1.01
Critical Circle: Xc = 124.24[ft], Yc = 1014.69[ft], R = 33.20[ft]. (Number of slices used = 54)

Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

NOT CONDUCTED

Three-Part Wedge Stability Analysis

NOT CONDUCTED

Cut Slope Conditions Drained B1 - B3

PROJECT IDENTIFICATION

Title:	3 West Summit
Project Number:	WGE - 20191070
Client:	Silverleaf Development
Designer:	A. Hillier
Station Number:	B1-B3

Description:
Slope Stability Analysis of Existing Slopes Onsite

Company's information:

Name:	Wertz Geotechnical Engineering, Inc.
Street:	400 Collier Drive Doylestown, OH 44230
Telephone #:	
Fax #:	
E-Mail:	office@wertzgeo.com

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Original date and time of creating this file: Wed Jul 31 08:20:42 2019

PROGRAM MODE: Analysis of a General Slope using NO reinforcement material.

INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ³]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ²]
1.......Stiff to Very Stiff Clay..........................	130.0	27.0	300.0
2......Medium Dense Silt................................	130.0	31.0	0.0
3......Soft Clay..	130.0	20.0	50.0
4......Medium Stiff Clay.................................	130.0	24.0	100.0
5......Stiff to Very Stiff Clay..........................	130.0	27.0	300.0
6......Medium Dense Silt................................	130.0	31.0	0.0
7.......Very Dense Sand..................................	140.0	36.0	0.0

REINFORCEMENT

Analysis of slope WITHOUT reinforcement.

WATER

Unit weight of water = 62.45 [lb/ft ³]
Water pressure is defined by phreatic surface in Effective Stress Analysis.

SEISMICITY

Not Applicable

DRAWING OF SPECIFIED GEOMETRY - GENERAL

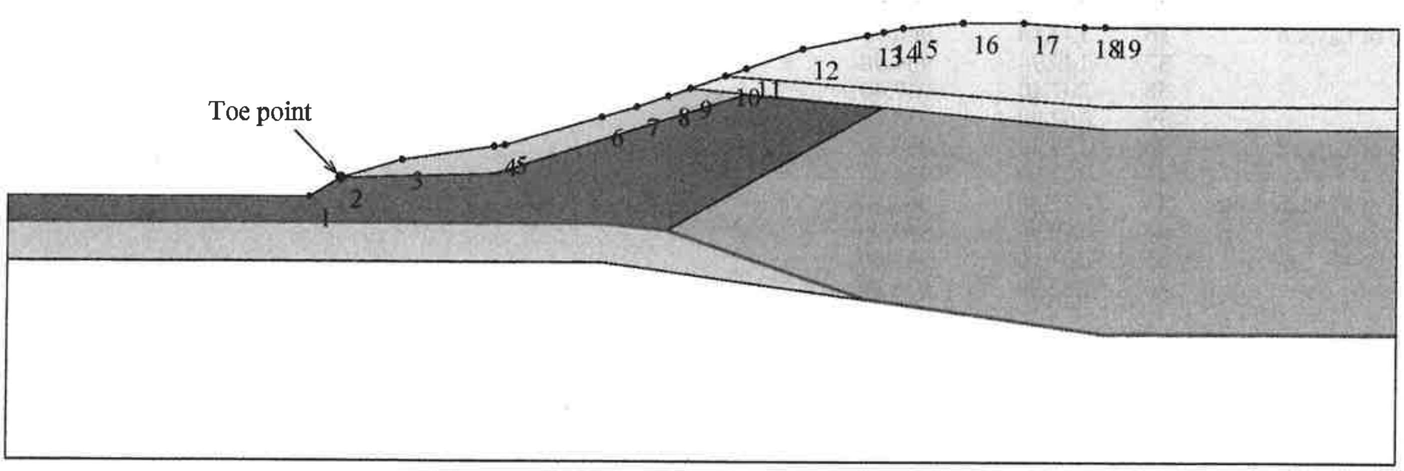
-- Problem geometry is defined along sections selected by user at x,y coordinates.
X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.
-- Xw,Yw represents the coordinates of phreatic surface.

GEOMETRY
Soil profile contains 7 layers (see details in next page)

WATER GEOMETRY
Phreatic line was specified.

UNIFORM SURCHARGE
Surcharge load, Q1 ....None
Surcharge load, Q2 ....None
Surcharge load, Q3 ....None

STRIP LOAD
...........................None..................................



SCALE:

(2481([ft]

TABULATED DETAILS OF GENERAL SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
Water was described by phreatic line.

	#	Xi	Yi
Top of Layer 1	1	57.80	973.10
	2	65.70	977.90
	3	81.50	982.60
	4	107.80	986.50
	5	141.90	996.30
	6	184.60	1011.20
	7	210.30	1016.60
	8	226.00	1018.00
	9	241.80	1018.00
	10	257.60	1017.00
	11	262.90	1017.00
Top of Layer 2	12	57.80	973.10
	13	65.70	977.90
	14	81.50	982.60
	15	107.80	986.50
	16	141.90	996.30
	17	164.60	1004.20
	18	262.90	996.80
Top of Layer 3	19	57.80	973.10
	20	65.70	977.90
	21	81.50	982.60
	22	107.80	986.50
	23	141.90	996.30
	24	155.55	1001.01
	25	262.90	991.00
Top of Layer 4	26	57.80	973.10
	27	65.70	977.90
	28	105.10	979.10
	29	170.07	999.60
	30	205.29	996.38
	31	262.90	991.00
Top of Layer 5	32	132.80	966.70
	33	149.90	964.90
	34	205.29	996.38
	35	262.90	991.00
Top of Layer 6	36	132.80	966.70
	37	149.90	964.90
	38	201.10	947.40
	39	262.90	938.90
Top of Layer 7	40	132.80	956.70
	41	262.90	938.90
Top of Phreatic Line	43	132.80	966.70
	44	149.90	964.90
	45	201.10	947.60
	46	262.90	938.90

TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
ater was described by phreatic line. Y values are tabulated in the right most column.

#	X	Y1	Y2	Y3	Y4	Y5	Y6	Y7	(phreatic) Yw
1	57.80	973.10	973.10	973.10	973.10	966.70	966.70	956.70	966.70
2	65.70	977.90	977.90	977.90	977.90	966.70	966.70	956.70	966.70
3	81.50	982.60	982.60	982.60	978.38	966.70	966.70	956.70	966.70
4	105.10	986.10	986.10	986.10	979.10	966.70	966.70	956.70	966.70
5	107.80	986.50	986.50	986.50	979.95	966.70	966.70	956.70	966.70
6	132.80	993.68	993.68	993.68	987.84	966.70	966.70	956.70	966.70
7	141.90	996.30	996.30	996.30	990.71	965.74	965.74	955.45	965.74
8	149.90	999.09	999.08	999.06	993.24	964.90	964.90	954.36	964.90
9	155.55	1001.06	1001.05	1001.01	995.02	968.11	962.97	953.59	962.99
10	164.60	1004.22	1004.20	1000.17	997.87	973.25	959.88	952.35	959.93
11	170.07	1006.13	1003.79	999.66	999.60	976.36	958.01	951.60	958.08
12	184.60	1011.20	1002.69	998.30	998.27	984.62	953.04	949.61	953.18
13	201.10	1014.67	1001.45	996.76	996.76	994.00	947.40	947.36	947.60
14	205.29	1015.55	1001.14	996.38	996.38	996.38	946.82	946.78	947.01
15	210.30	1016.60	1000.76	995.91	995.91	995.91	946.13	946.10	946.30
16	226.00	1018.00	999.58	994.45	994.45	994.45	943.98	943.95	944.09
17	241.80	1018.00	998.39	992.97	992.97	992.97	941.80	941.79	941.87
18	257.60	1017.00	997.20	991.49	991.49	991.49	939.63	939.63	939.65
19	262.90	1017.00	996.80	991.00	991.00	991.00	938.90	938.90	938.90

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	100.33	985.39	57.80	973.10	57.80	1052.82	79.72	2.28	
2	120.30	990.09	57.80	973.10	57.80	1096.53	123.43	2.45	
3	140.27	995.83	99.59	985.48	111.93	1022.07	38.62	1.96	
4	160.23	1002.70	99.38	985.42	109.75	1064.72	79.97	1.71	OK
5	180.20	1009.66	99.45	985.36	104.52	1114.82	129.56	1.83	
6	200.17	1014.47	99.59	985.44	124.04	1089.47	106.86	1.98	
7	220.13	1017.48	95.06	984.89	126.84	1119.23	138.05	2.05	
8	240.10	1018.00	57.67	973.12	95.64	1212.00	241.88	2.15	
9	260.07	1017.00	57.80	973.10	57.80	1461.01	487.91	2.44	
10	280.03	1017.00	57.80	973.10	57.80	1557.55	584.45	2.78	
11	300.00	1017.00	56.33	973.18	85.85	1508.39	536.03	3.09	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	57.29	973.18	220.13	1017.48	89.80	1175.14	204.56	2.07	
2	61.84	975.70	220.13	1017.48	97.85	1160.01	187.80	2.10	
3	65.79	978.06	180.20	1009.66	66.24	1199.32	221.26	2.02	
4	69.67	979.39	160.23	1002.70	82.51	1117.07	138.28	1.95	
5	73.97	980.65	160.23	1002.70	87.87	1106.04	126.16	1.94	
6	78.45	981.88	160.23	1002.70	92.93	1096.07	115.10	1.91	
7	82.38	982.95	160.23	1002.70	97.64	1086.13	104.30	1.86	
8	86.74	983.55	160.23	1002.70	100.89	1079.87	97.35	1.82	
9	91.10	984.16	160.23	1002.70	104.15	1073.66	90.45	1.78	
10	95.24	984.80	160.23	1002.70	107.42	1067.52	83.61	1.74	
11	99.38	985.42	160.23	1002.70	109.75	1064.72	79.97	1.71	On extreme X-exit

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

.inimum Factor of Safety = 1.71

Critical Circle: Xc = 109.75[ft], Yc = 1064.72[ft], R = 79.97[ft]. (Number of slices used = 56)

Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

NOT CONDUCTED

Three-Part Wedge Stability Analysis

NOT CONDUCTED

Cut Slope Conditions Undrained B1 - B3

PROJECT IDENTIFICATION

Title:	3 West Summit
Project Number:	WGE - 20191070
Client:	Silverleaf Development
Designer:	A. Hillier
Station Number:	B1-B3

Description:
Slope Stability Analysis of Existing Slopes Onsite

Company's information:

Name:	Wertz Geotechnical Engineering, Inc.
Street:	400 Collier Drive Doylestown, OH 44230
Telephone #:	
Fax #:	
E-Mail:	office@wertzgeo.com

Original file path and name:
Original date and time of creating this file: Wed Jul 31 08:20:42 2019

PROGRAM MODE: Analysis of a General Slope using NO reinforcement material.

INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ³]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ²]
1.......Stiff to Very Stiff Clay..........................	130.0	0.0	1500.0
2.......Medium Dense Silt..............................	130.0	31.0	0.0
3.......Soft Clay..	130.0	0.0	300.0
4.......Medium Stiff Clay................................	130.0	0.0	500.0
5.......Stiff to Very Stiff Clay..........................	130.0	0.0	1500.0
6.......Medium Dense Silt..............................	130.0	31.0	0.0
7.......Very Dense Sand..................................	140.0	36.0	0.0

REINFORCEMENT

Analysis of slope WITHOUT reinforcement.

WATER

Unit weight of water = 62.45 [lb/ft ³]
Water pressure is defined by phreatic surface in Effective Stress Analysis.

SEISMICITY

Not Applicable

DRAWING OF SPECIFIED GEOMETRY - GENERAL

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.
-- Xw,Yw represents the coordinates of phreatic surface.

GEOMETRY

Soil profile contains 7 layers (see details in next page)

WATER GEOMETRY

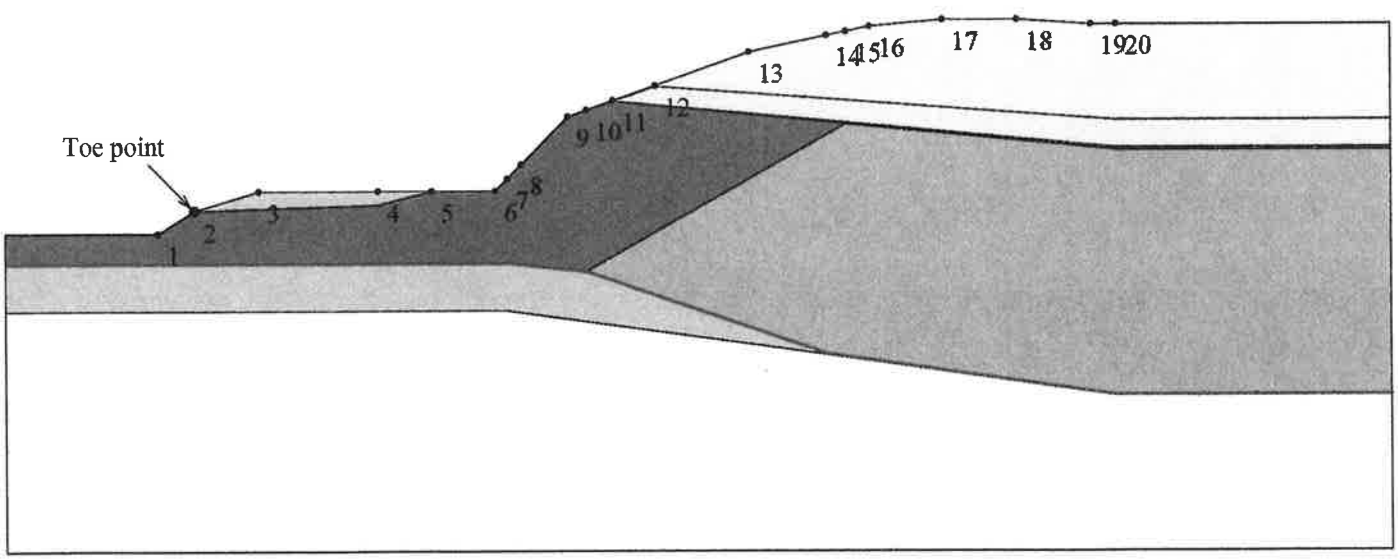
Phreatic line was specified.

UNIFORM SURCHARGE

Surcharge load, Q1 ....None
Surcharge load, Q2 ....None
Surcharge load, Q3 ....None

STRIP LOAD

...........................None..................................



SCALE:

C24681([ft]

TABULATED DETAILS OF GENERAL SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
ater was described by phreatic line.

	#	Xi	Yi
Top of Layer 1	1	57.80	973.10
	2	65.70	977.90
	3	79.60	982.00
	4	130.30	982.00
	5	145.90	997.60
	6	184.60	1011.20
	7	210.30	1016.60
	8	226.00	1018.00
	9	241.80	1018.00
	10	257.60	1017.00
	11	262.90	1017.00
Top of Layer 2	12	57.80	973.10
	13	65.70	977.90
	14	79.60	982.00
	15	130.30	982.00
	16	145.90	997.60
	17	164.60	1004.00
	18	262.90	996.80
Top of Layer 3	19	57.80	973.10
	20	65.70	977.90
	21	79.60	982.00
	22	130.30	982.00
	23	145.90	997.60
	24	155.55	1000.90
	25	262.90	991.00
Top of Layer 4	26	57.80	973.10
	27	65.70	977.90
	28	105.10	979.10
	29	116.60	982.00
	30	130.30	982.00
	31	135.80	987.50
	32	145.90	997.60
	33	155.55	1000.90
	34	262.90	990.50
Top of Layer 5	35	132.80	966.70
	36	149.90	964.90
	37	205.29	995.98
	38	262.90	990.50
Top of Layer 6	39	132.80	966.70
	40	149.90	964.90
	41	201.10	947.40
	42	262.90	938.90
Top of Layer 7	43	132.80	956.70
	44	262.90	938.90
Top of Phreatic Line	46	132.80	966.70
	47	149.90	964.90
	48	201.10	947.60
	49	262.90	938.90

TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 7 layers. Coordinates in [ft.]
Water was described by phreatic line. Y values are tabulated in the right most column.

#	X	Y1	Y2	Y3	Y4	Y5	Y6	Y7	(phreatic) Yw
1	57.80	973.10	973.10	973.10	973.10	966.70	966.70	956.70	966.70
2	65.70	977.90	977.90	977.90	977.90	966.70	966.70	956.70	966.70
3	79.60	982.00	982.00	982.00	978.32	966.70	966.70	956.70	966.70
4	105.10	982.00	982.00	982.00	979.10	966.70	966.70	956.70	966.70
5	116.60	982.00	982.00	982.00	982.00	966.70	966.70	956.70	966.70
6	130.30	982.00	982.00	982.00	982.00	966.70	966.70	956.70	966.70
7	132.80	984.50	984.50	984.50	984.50	966.70	966.70	956.70	966.70
8	135.80	987.50	987.50	987.50	987.50	966.38	966.38	956.29	966.38
9	145.90	997.60	997.60	997.60	997.60	965.32	965.32	954.91	965.32
10	149.90	999.01	998.97	998.97	998.97	964.90	964.90	954.36	964.90
11	155.55	1000.99	1000.90	1000.90	1000.90	968.07	962.97	953.59	962.99
12	164.60	1004.17	1004.00	1000.07	1000.02	973.15	959.88	952.35	959.93
13	184.60	1011.20	1002.54	998.22	998.09	984.37	953.04	949.61	953.18
14	201.10	1014.67	1001.33	996.70	996.49	993.63	947.40	947.36	947.60
15	205.29	1015.55	1001.02	996.31	996.08	995.98	946.82	946.78	947.01
16	210.30	1016.60	1000.65	995.85	995.60	995.50	946.13	946.10	946.30
17	226.00	1018.00	999.50	994.40	994.07	994.01	943.98	943.95	944.09
18	241.80	1018.00	998.35	992.95	992.54	992.51	941.80	941.79	941.87
19	257.60	1017.00	997.19	991.49	991.01	991.00	939.63	939.63	939.65
20	262.90	1017.00	996.80	991.00	990.50	990.50	938.90	938.90	938.90

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	150.60	999.25	130.21	982.02	127.96	1005.36	23.45	1.89	
2	142.30	994.00	129.89	982.00	130.21	994.09	12.09	3.07	
3	154.27	1000.54	129.85	982.04	134.99	1000.62	19.28	1.46	
4	166.23	1004.75	129.85	982.07	140.76	1005.08	25.47	1.14	
5	178.20	1008.95	108.19	982.16	137.85	1009.52	40.35	1.10	
6	190.17	1012.37	108.27	982.07	142.29	1015.95	48.01	1.04	
. 7	202.13	1014.88	100.16	982.73	140.13	1033.76	64.82	1.04 .	OK
8	214.10	1016.94	100.31	982.43	140.25	1055.60	83.35	1.11	
9	226.07	1018.00	107.79	982.19	142.43	1081.01	104.71	1.23	
10	238.03	1018.00	57.63	973.13	99.75	1188.90	219.84	1.40	
11	250.00	1017.48	92.73	982.71	153.45	1081.11	115.63	1.66	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	57.39	973.21	226.07	1018.00	102.96	1141.62	174.47	1.31	
2	64.68	977.62	226.07	1018.00	116.74	1112.23	144.33	1.25	
3	72.08	979.92	214.10	1016.94	123.03	1075.36	108.19	1.18	
4	79.39	982.00	214.10	1016.94	129.63	1065.46	97.41	1.14	
5	86.58	982.08	202.13	1014.88	131.97	1042.10	75.26	1.09	
6	93.83	982.05	202.13	1014.88	136.03	1037.90	70.00	1.06	
. 7	100.16	982.73	202.13	1014.88	140.13	1033.76	64.82	1.04 .	OK
8	108.20	982.10	202.13	1014.88	143.86	1030.89	60.43	1.04	
9	115.04	982.37	202.13	1014.88	147.67	1027.86	55.99	1.06	
10	122.58	982.13	202.13	1014.88	151.16	1025.70	52.11	1.09	
11	129.85	982.09	202.13	1014.88	154.77	1023.22	48.09	1.14	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.04
Critical Circle: Xc = 140.13[ft], Yc = 1033.76[ft], R = 64.82[ft]. (Number of slices used = 60)

Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

NOT CONDUCTED

Three-Part Wedge Stability Analysis

NOT CONDUCTED

WEST SUMMIT ST PROJECT

EXISTING PROJECT VICINITY DENSITY MAP

Prepared By:
SILVERLEAF VENTURES LLC
7514 Sheffield Court
Sagamore Hills, Ohio 44067
Phone: (216) 538-3380

SCALE	NTS
DATE	7/23/19
JOB No.	3300
DRAWING No.	1
ISSUE	A

WEST SUMMIT ST PROJECT

PROPOSED PROJECT VICINITY DENSITY MAP

Prepared By:
SILVERLEAF VENTURES LLC
7514 Silverleaf Court
Sagamore Hills, Ohio 44067
Phone: (216) 536-3380

SCALE:	NTS
DATED:	7/23/19
JOB No.	3300
DRAWING No.	2
ISSUE	A

STREET VIEW

WEST SUMMIT ST PROJECT

PROPOSED ELEVATIONS

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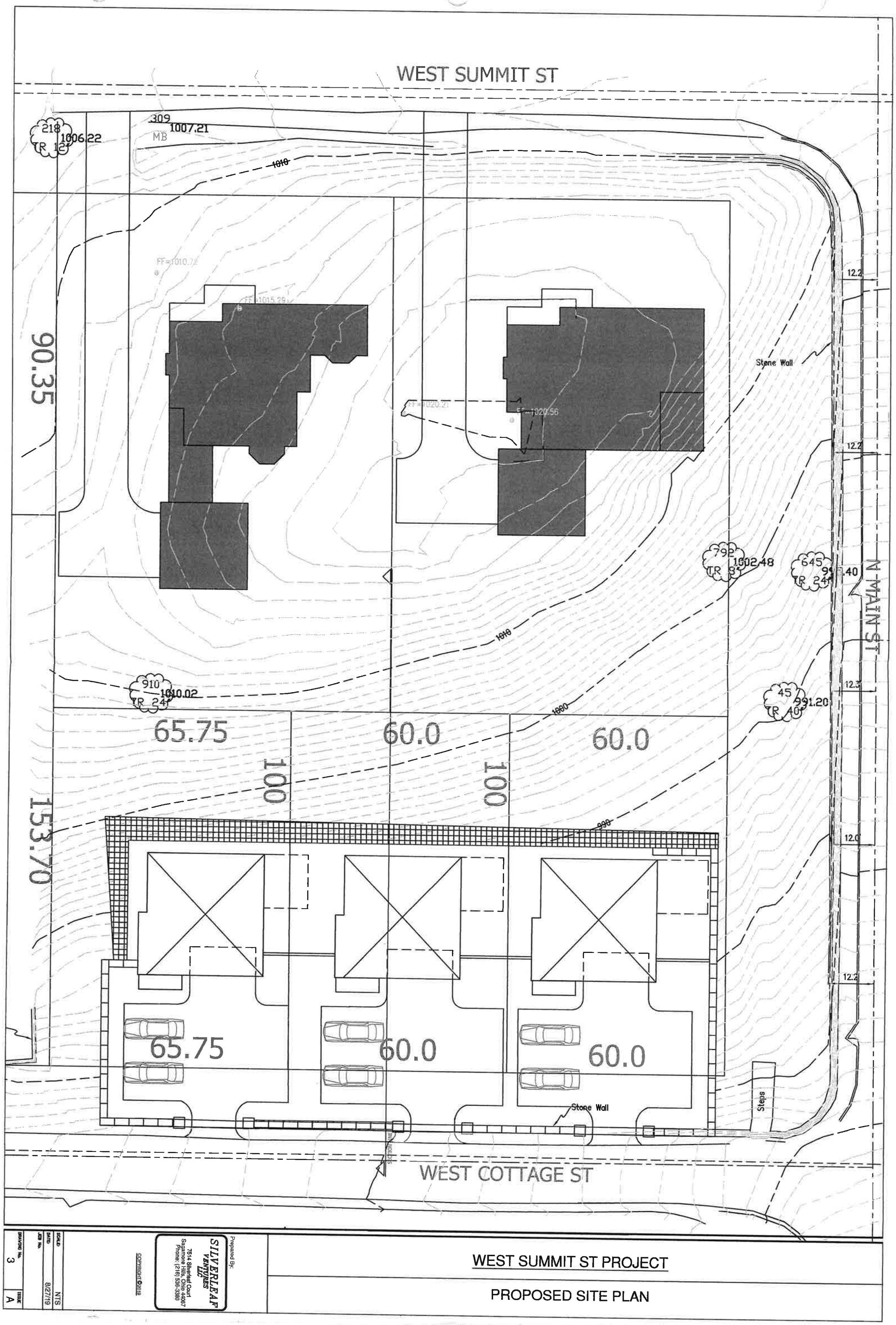
SCALE	NTS
DATE	7/23/19
JOB No.	3300
DRAWING No.	5
ISSUE	A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N MAIN ST
WEST COTTAGE ST
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Stone Wall
Stone Wall
Steps
WEST SUMMIT ST PROJECT
PROPOSED SITE PLAN
NTS
8/27/19
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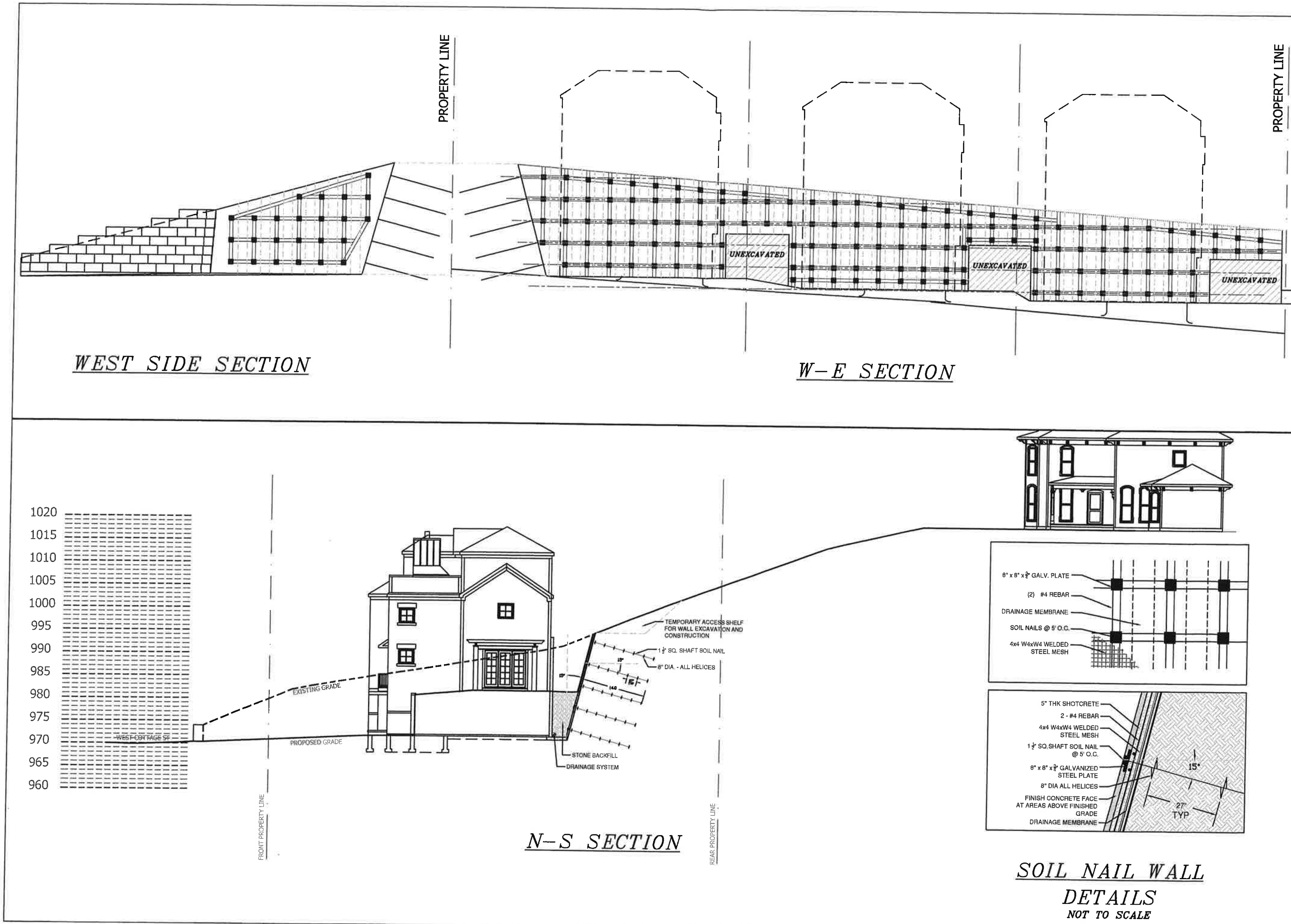

WEST SUMMIT ST PROJECT

SOIL NAIL LAYOUT/DETAILS

Prepared By:
SILVERLEAF VENTURES LLC
7514 Silverleaf Court
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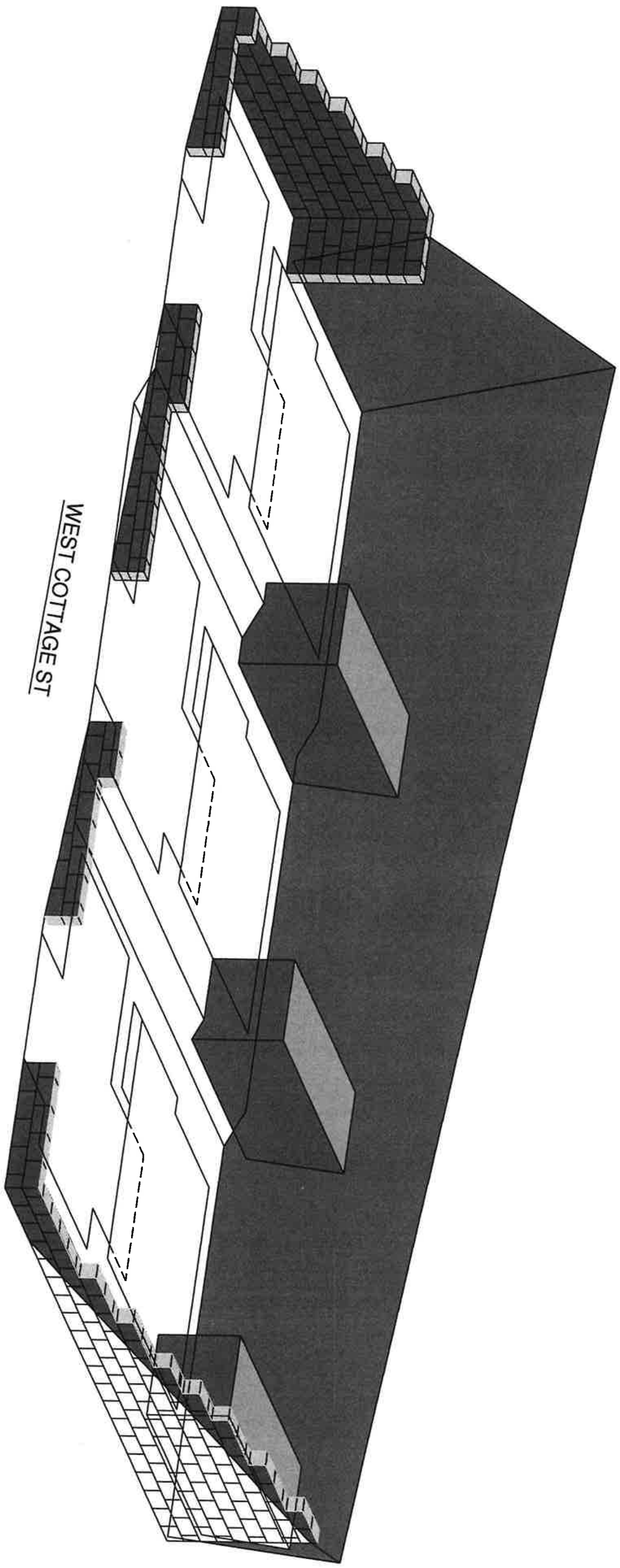
SCALE	1" = 20'-0"
DATE	7/23/19
JOB No.	3300
DRAWING No.	4
ISSUE	A



Prepared By:
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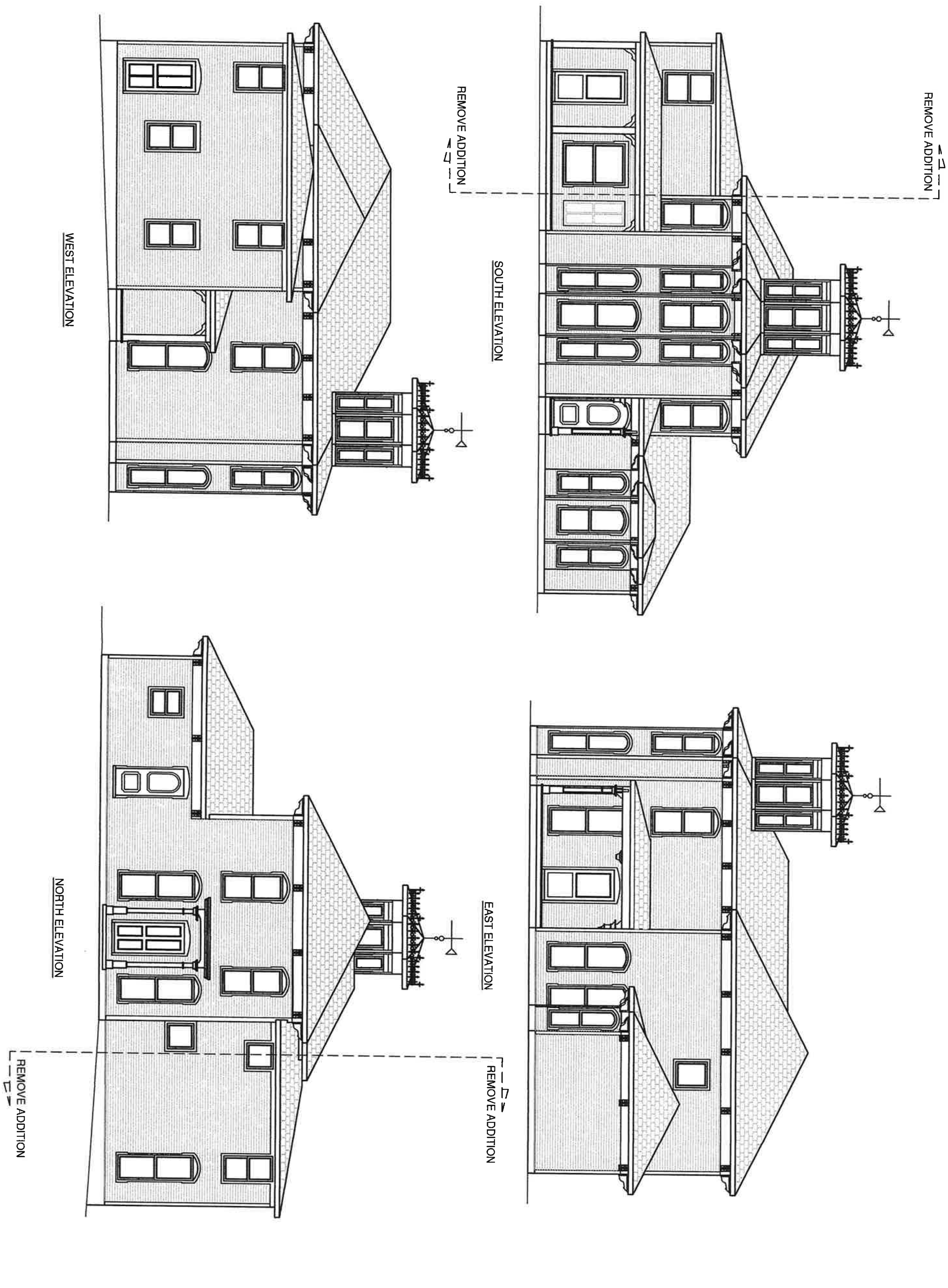
SCALE	NTS
DATE	7/23/19
JOB No.	3300
DRAWING No.	6
ISSUE	A

WEST SUMMIT ST PROJECT

PROPERTY ISOMETRIC



3 WEST SUMMIT ST

EXISTING ELEVATIONS

Prepared By:
SILVERLEAF VENTURES LLC
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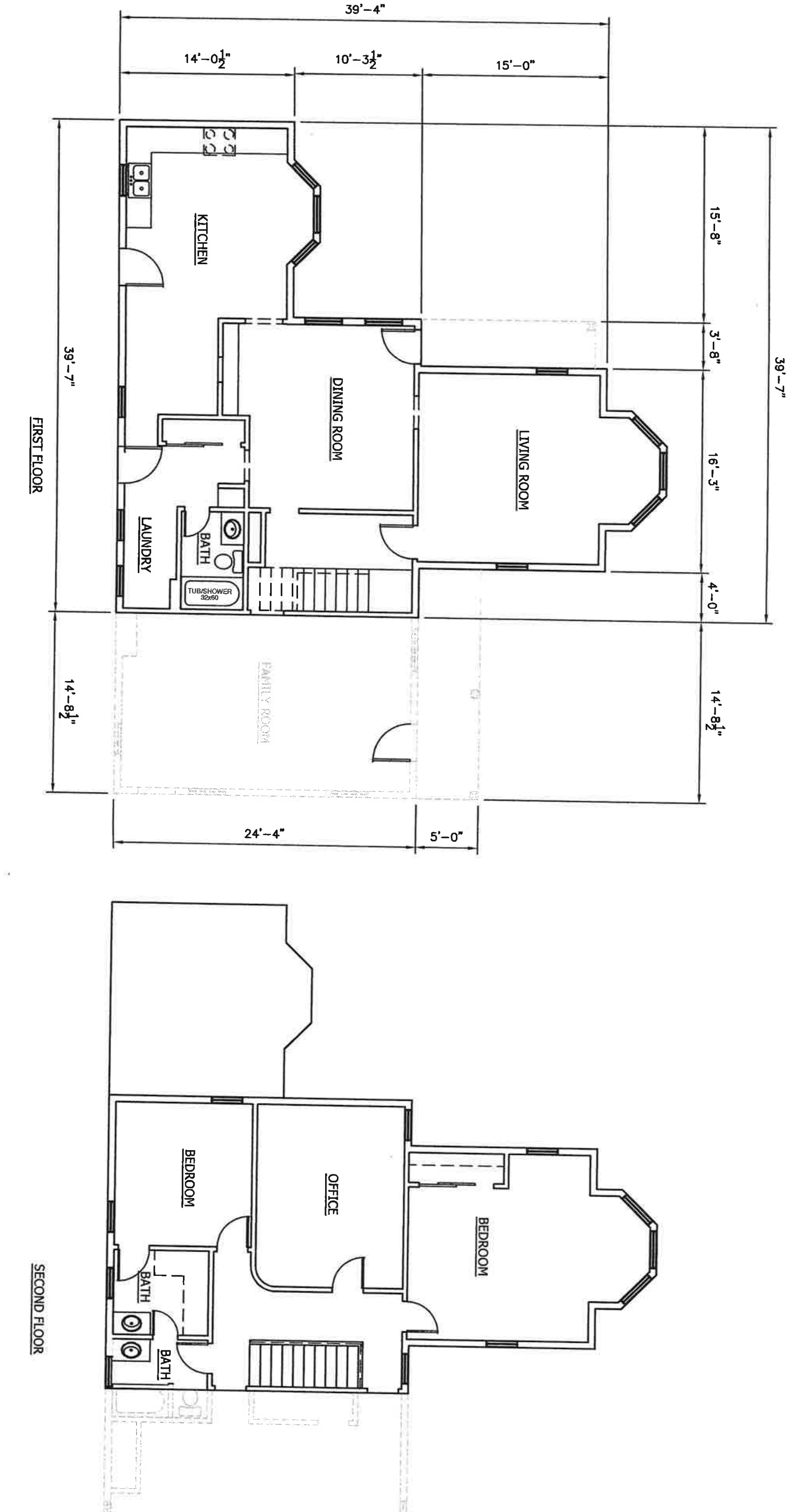
Sagamore Hills, Ohio 44067
Phone: (216) 536-3380

SCALE	NTS
DATE	7/23/19
JOB No.	3300
DRAWING No.	7
ISSUE	A



SCALE	NTS
DATED	7/23/19
JOB No.	3300
DRAWING No.	7
ISSUE	A

Prepared By:
SILVERLEAF VENTURES LLC

3 WEST SUMMIT ST

EXISTING FLOOR PLAN