DMY ENGINEERING CONSULTANTS INC.

Dulles, VA
Washington, DC
Gaithersburg, MD

June 10, 2016

Mr. Mark Gunn, P.E.
Rinker Design Associates, P.C.
9385 Discovery Boulevard, Suite 200
Manassas, Virginia 20109

Reference: Addendum Letter - Minor Structure Report for Retaining Wall RW #1
Sycolin Road Widening Phase IV
VDOT Project No. U000-253-312, P101, R201, C501
Leesburg, Virginia
DMY Project No. 01.02095.01

Dear Mr. Gunn:

DMY Engineering Consultants Inc. (DMY) is pleased to submit this addendum letter to our Geotechnical Engineering Report dated August 21, 2015 (latest revision May 25, 2016) for the above-referenced project. This letter presents a minor structure report for Retaining Wall RW #1.

1.0 PROJECT INFORMATION

Retaining Wall RW #1 is proposed on the east side of Sycolin Road from Station 116+50 to Station 118+80. The height of the retaining wall varies from 7 to 16 feet (from bottom of footing to top of wall) with an exposed height varying from 0 to 11 feet. The proposed retaining wall is located on an existing 2H:1V slope with height varying from 12 to 17 feet. The type of retaining wall was not determined at the time of report preparation. It appears that either a segmental block MSE wall or a cantilever concrete wall is suitable. The retaining wall and associated soil boring information is summarized in the following table:

Table 1-1: Summary of Retaining Wall

Wall ID	Location	Retaining Wall Type	Max. Exposed Wall Height (feet)	Reference Borings
RW #1	Sycolin Road Sta. 116+50 to 118+80, Right	MSE/Cantilever	11	RW-1 through RW-5

The description of the proposed project given above is based on the information provided to us by the project team and information gathered during our site reconnaissance. If any of the assumptions or project information is incorrect or changed, DMY should be informed so that we may revise our geotechnical recommendations, if necessary.

2.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

2.1. Site Geology

Based on a review of the Virginia Geologic Map Data available through USGS's online resources (http://mrdata.usgs.gov/geology/state/state.php?state=VA), the project site is located within the Culpeper Basin of Northern Virginia and is underlain by Newark Supergroup including Sandstone, Siltstone and Shale of the Upper Triassic Age.

In the Culpeper Basin, residual soils have developed from the in-place chemical and physical weathering of the underlying parent bedrock. The soils associated with this geology typically consist of sandy clays, silts, and silty sand materials along with varying amounts of weathered rock fragments. With increasing depth, soil increases in granularity and strength, gradually transitions into highly weathered or Intermediate Geomaterials, and eventually transitions into competent bedrock.

The subsurface profile may be altered by man, by excavating or filling, or by effects of water through the process of erosion or alluvial deposition.

2.2. Subsurface Conditions

A total of five (5) Standard Penetration Test (SPT) borings (RW-1 through RW-5) were drilled at the proposed retaining wall. The borings were drilled by a track-mounted CME-55 drill rig using the hollow stem auger method with automatic hammer. The approximate locations of the borings are shown on the attached Boring Location Plan. The subsurface conditions encountered at the boring locations are shown in the attached boring logs.

Surficial Materials
About 4 inches of topsoil was encountered in all borings.

Residual Soils
Immediately beneath the surficial soils, residual soils were encountered in all borings. The encountered residual soils in the borings consisted of soft to stiff sandy SILT (ML) and medium dense to very dense silty SAND (SM) and clayey SAND (SC) with SPT N-values ranging from 4 to 67 blows per foot (bpf). Varying amounts of rock fragments were present in the soil samples.

Intermediate Geomaterials (IGM)
IGM is defined as natural residual soils having a minimum SPT N-value of 50 blows per 6 inches of penetration. IGM was encountered in all borings and consisted of very dense silty SAND (SM) with varying amounts of rock fragments.

Auger Refusal Materials

Auger refusal was encountered in Borings RW-1 through RW-4 at depths ranging 7.5 to 16 feet below site grade corresponding to EL 358.1 to EL 378.0 feet. Auger refusal materials could be parent bedrock, boulder, or lens of rock.

Groundwater

Groundwater was not encountered either during drilling or at 24 hours after drilling completion. It should be noted that groundwater levels fluctuate with seasonal and climatic variations and may be different at other times and locations than those stated in this letter.

3.0 RETAINING WALL RECOMMENDATIONS

The soil parameters used for the evaluation are summarized in the following table. These parameters were selected based on our current subsurface exploration, *VDOT's Soil Design Parameters for Sound Barrier Walls, Retaining Walls, and Non-Critical Slopes,* our prior experience in similar soils and geologies, and laboratory testing results. The laboratory testing results are included in the attachment.

Table 3-1: Summary Soil Parameters

Soil Stratum	Soil Classification	Range of SPT N_{60} (bpf)	Cohesion, c (psf)	Friction Angle, ϕ (degree)	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)
New Fill	ML, SC, or SM	-	50	30	115	122
Residual-I	ML & SC	4 to 15	250	20	110	117
Residual-II	SM & SC	25 to 67	100	34	130	137
IGM	SM	50/6" to 50/1"	250	36	132	139

We have evaluated the wall foundation bearing capacity and settlement at the maximum wall height location. In our evaluation, we assumed a minimum footing width (for cantilever wall) or a minimum reinforcement length (for MSE wall) of 9.6 feet at the location of maximum wall height. The nominal and factored foundation bearing capacity was determined to be 10,920 PSF and 4,914 PSF, respectively. A resistance factor of 0.45 was used. The detailed calculations are attached to the end of this letter.

A detailed global stability analysis was not performed; however, considering the dense to very dense nature of the onsite soils, the presence of shallow auger refusal materials, and our engineering experience of nearby sites with similar geology, global stability is not considered an issue at this site.

Based on our subsurface exploration data and our analyses, no undercut and replacement are required. IGM was encountered at or above the proposed foundation elevations. Difficult excavation involving a large trackhoe equipped with a hoe ram is likely needed to achieve the proposed grades.

All new footings should be placed at a minimum depth of 30 inches below finished grade to provide adequate frost cover protection acceptable for this region. Heavy earthwork equipment should maintain a minimum horizontal distance away from the walls of one foot per foot of vertical wall height. Lighter compaction equipment should be used close to the walls.

During construction, the bearing capacity at the final footing excavation should be documented in the field by an authorized representative of the Geotechnical Engineer of Record to check that the in situ bearing capacity at the bottom of each footing excavation is adequate for the design loads.

4.0 LIMITATIONS

The recommendations provided are based in part on project information provided to us and are only applied to the specific project and site discussed in this letter. If the project information section in this letter contains incorrect information or if additional information is available, DMY should be contacted to review our recommendations. We can then modify our recommendations for the proposed project.

Regardless of the thoroughness of a subsurface investigation, there is always a possibility that subsurface conditions may vary from those documented during a subsurface exploration at specific locations. In addition, the construction process itself may alter subsurface conditions. Therefore, experienced geotechnical personnel should be engaged to observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations. We recommend that DMY be retained to provide this service based upon our familiarity with the project, the subsurface conditions, and the intent of the recommendations.

We have prepared this letter for use by the design professionals for design purposes in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made as to the professional advice included in this letter.

We appreciate the opportunity to be of service to you on this project and please do not hesitate to contact the undersigned if you have any questions regarding the information in this letter. We look forward to serving as your geotechnical engineer on the remainder of this project and on future projects.

Respectfully,

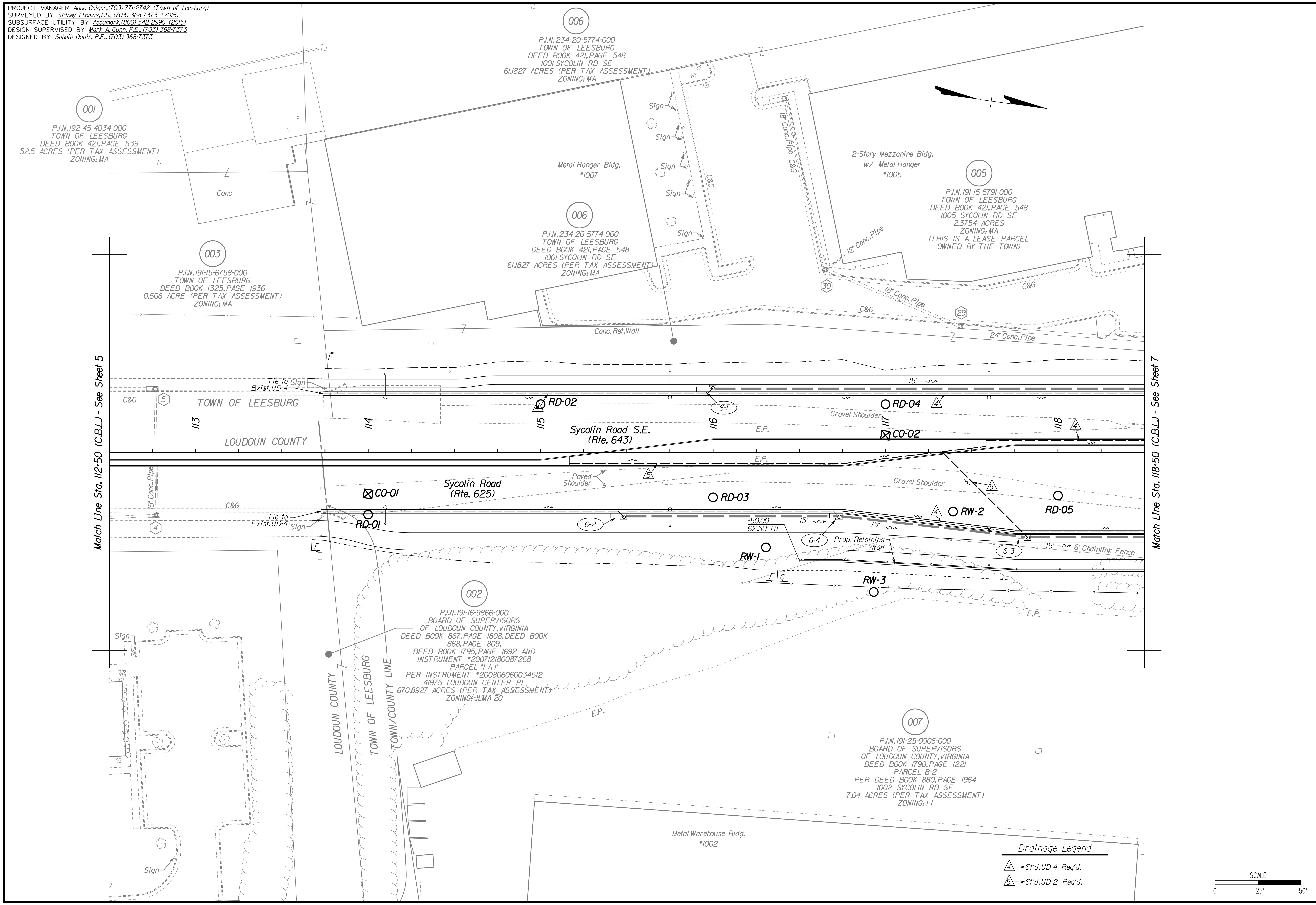
DMY ENGINEERING CONSULTANTS INC.

Paul Li, PhD, PE
Project Engineer

Peng "Paul" Zhang, PE
Vice President

Attachments:
Boring Location Plan
Boring Logs
Laboratory Test Results
Retaining Wall Calculations

PROJECT MANAGER Anne Geiger,(703) 771-2742 (Town of Leesburg)
SURVEYED BY Sidney Thomas,L.S.,(703) 368-7373 (2015)
SUBSURFACE UTILITY BY Accumark,(800) 542-2990 (2015)
DESIGN SUPERVISED BY Mark A. Gunn, P.E.,(703) 368-7373
DESIGNED BY Sohaib Qadir, P.E.,(703) 368-7373



006
P.I.N. 234-20-5774-000
TOWN OF LEESBURG
DEED BOOK 421,PAGE 548
1001 SYCOLIN RD SE
61.1827 ACRES (PER TAX ASSESSMENT)
ZONING: MA
001
P.I.N. 192-45-4034-000
TOWN OF LEESBURG
DEED BOOK 421,PAGE 539
52.5 ACRES (PER TAX ASSESSMENT)
ZONING: MA
Conc
Metal Hanger Bldg.
#1007
2-Story Mezzanine Bldg.
w/ Metal Hanger
#1005
005
P.I.N. 191-15-5791-000
TOWN OF LEESBURG
DEED BOOK 421,PAGE 548
1005 SYCOLIN RD SE
2.3754 ACRES
ZONING: MA
(THIS IS A LEASE PARCEL
OWNED BY THE TOWN)
003
P.I.N. 191-15-6758-000
TOWN OF LEESBURG
DEED BOOK 1325,PAGE 1936
0.506 ACRE (PER TAX ASSESSMENT)
ZONING: MA
18" Conc. Pipe
12" Conc. Pipe
24" Conc. Pipe
Conc. Ret. Wall
Sign
C&G
Match Line Sta. 112+50 (C.B.L.) - See Sheet 5
Match Line Sta. 118+50 (C.B.L.) - See Sheet 7
Tie to Exist. UD-4
TOWN OF LEESBURG
LOUDOUN COUNTY
Sycolin Road S.E.
(Rte. 643)
Sycolin Road
(Rte. 625)
RD-01
RD-02
RD-03
RD-04
RD-05
CO-01
CO-02
RW-1
RW-2
RW-3
Gravel Shoulder
Paved Shoulder
E.P.
15" Conc. Pipe
Prop. Retaining Wall
6' Chainlink Fence
+50.00
62.50' RT
6-1
6-2
6-3
6-4
002
P.I.N. 191-16-9866-000
BOARD OF SUPERVISORS
OF LOUDOUN COUNTY,VIRGINIA
DEED BOOK 867,PAGE 1808,DEED BOOK
868,PAGE 809,
DEED BOOK 1795,PAGE 1692 AND
INSTRUMENT #200712180087268
PARCEL "1-A-1"
PER INSTRUMENT #200806060034512
41975 LOUDOUN CENTER PL
670.8927 ACRES (PER TAX ASSESSMENT)
ZONING: JLMA-20
LOUDOUN COUNTY
TOWN OF LEESBURG
TOWN/COUNTY LINE
007
P.I.N. 191-25-9906-000
BOARD OF SUPERVISORS
OF LOUDOUN COUNTY,VIRGINIA
DEED BOOK 1790,PAGE 1221
PARCEL B-2
PER DEED BOOK 880,PAGE 1964
1002 SYCOLIN RD SE
7.04 ACRES (PER TAX ASSESSMENT)
ZONING: I-1
Metal Warehouse Bldg.
#1002
Drainage Legend
Std. UD-4 Req'd.
Std. UD-2 Req'd.
SCALE
0 25' 50'

Rinker Design Associates, P.C.
Civil Engineering · Surveying · Land Planning · Transportation · Environmental · Right of Way Services

ENGINEER:
Rinker Design Associates, P.C.
Engineering * Surveying * Land Planning * Transportation * Environmental Services
"We Welcome the Opportunity to Make Your Vision Reality"

PROJECT MANAGER: MARK A. GUNN, P.E.

PROJECT NAME: SYCOLIN ROAD WIDENING PHASE IV
FROM CLAUDIA DRIVE TO TOLBERT LANE S.E.
PLAN SHEET SYCOLIN ROAD
STATION 112+50 TO 118+50
Town of Leesburg Loudoun County, Virginia
SUBMISSION DATE: 02/12/2016

ASSOCIATED PLAN
C.I.P. NUMBER: TLCI-2016-0002
VDOT PROJ. NO. U000-253-312
TOWN NUMBER: TBD

Sheet 6 of 20

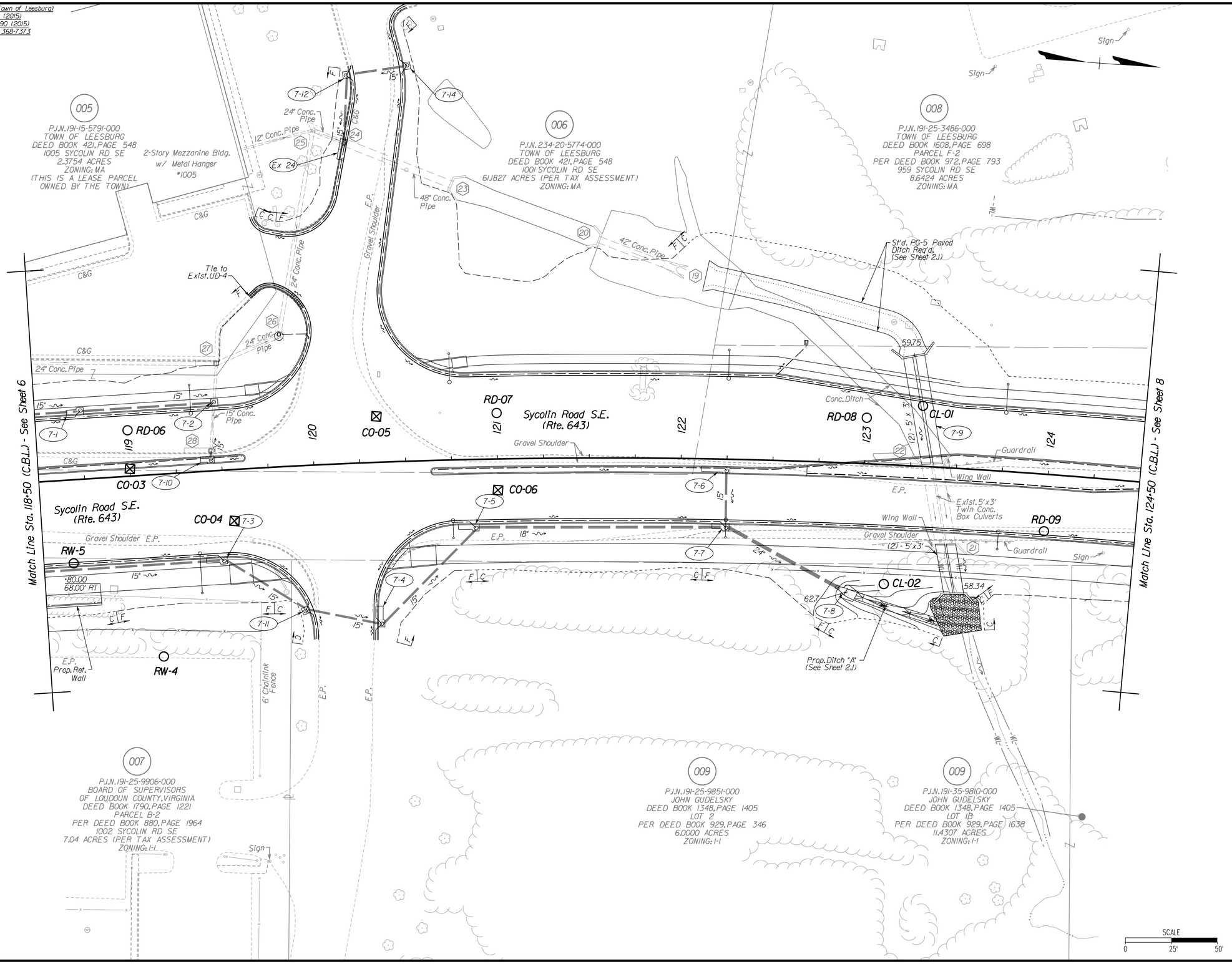
REVISED 10/11/2013

R.O.W. PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR CONSTRUCTION.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT-OF-WAY SHOWN ON THESE PLANS.

PROJECT MANAGER Anne Geiger,(703) 771-2742 (Town of Leesburg)
SURVEYED BY Sidney Thomas, L.S., (703) 368-7373 (2015)
SUBSURFACE UTILITY BY Accumark,(800) 542-2990 (2015)
DESIGN SUPERVISED BY Mark A. Gunn, P.E., (703) 368-7373
DESIGNED BY Sohaib Qadir, P.E., (703) 368-7373



R.O.W. PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR CONSTRUCTION.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT-OF-WAY SHOWN ON THESE PLANS.

REVISED 10/11/2013

Office Locations
Rinker Design Associates, P.C.
Civil Engineering – Surveying – Land Planning
Environmental Services – Transportation – Right-of-Way Services

ENGINEER:
Rinker Design Associates, P.C.
Engineering • Surveying • Land Planning • Transportation • Environmental Services
3020 Gateway Drive, Suite 200, Pittsburgh, PA 15220 • e-mail: info@rinkerdesign.com
Telephone: (703) 368-7373 Fax: (703) 257-5443
"We Welcome the Opportunity to Make Your Vision Reality"

PROJECT MANAGER: MARK A. GUNN, P.E.

PROJECT NAME: SYCOLIN ROAD WIDENING PHASE IV
FROM CLAUDIA DRIVE TO TOLBERT LANE S.E.
PLAN SHEET SYCOLIN ROAD
STATION 118+50 TO 124+50
Loudoun County, Virginia
Town of Leesburg
SUBMISSION DATE: 02/12/2016

ASSOCIATED PLAN
C.I.P. NUMBER: TLCI-2016-0002
VDOT PROJ. NO. U000-253-312
TOWN NUMBER: TBD

Sheet 7 of 20

VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: RETAINING WALL

RW-1
PAGE 1 OF 1

STATION: 116+28 OFFSET: R 55
LATITUDE: 39.076966° N LONGITUDE: 77.552958° W
SURFACE ELEVATION: 385.46 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 2-29-2016
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: O. Gomez
Logger: P. Li

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		3									0.0 / 385.46 Topsoil=4 inches **Tops**				
1.0		5	100								0.3 / 385.16 *Residual*, Brown, SILT, stiff, moist **ML**			20.6	
1.5	384	6													
2.0		7			2										
2.5		5													
3.0		5	100									36	8	24.3	97.7
3.5	382	7													
4.0		10			4										
4.5		8									4.0 / 381.46 *Residual*, Brown, fine to medium, SILTY SAND, very dense, moist **SM**				
5.0		16	109											13.7	
5.5	380	39													
6.0		50/4			5.83						5.5 / 379.96 *IGM*, Brown, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist **SM**			11.4	
6.5		50/4	100		6 6.33										
7.0															
7.5	378										7.5 / 377.96 Auger Refusal at 7.5 feet.				

REMARKS: Rig Type: CME 55.
Temporary piezometer was installed to 7.5 ft and screened for bottom 5 ft for 24-hr ground water readings.

PAGE 1 OF 1
RW-1

SPT_LOGB:LOGS.GPJ:8.30.003:012512:5/25/16

VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: RETAINING WALL

RW-2

STATION: 117+39 OFFSET: R 34
LATITUDE: 39.077254° N LONGITUDE: 77.553079° W
SURFACE ELEVATION: 385.68 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 3-1-2016
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: O. Gomez
Logger: P. Li

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
	385	3 4 7 8	75		2						0.0 / 385.68 Topsoil=4 inches **Tops** 0.3 / 385.38 *Residual*, Brown and gray, fine to medium CLAYEY SAND, medium dense to dense, moist **SC**			21.7	
2		7 14 27 37	100									32	11	14.1	44.0
4		50/6	84		4 4.5						4.0 / 381.68 *IGM*, Gray, fine to coarse, SILTY SAND WITH GRAVEL, contains rock fragments, very dense, moist **SM**			9.9	
	380														
6		50/5	100		6 6.42									6.6	
8		50/4	100		8 8.33									4.5	
10															
	375														
12															
		50/4	100		13.5 13.83									9.0	
14															

REMARKS: Rig Type: CME 55.
Temporary piezometer was installed to 16 ft and screened for bottom 5 ft for 24-hr ground water readings.

SPT_LOGB:LOGS.GPJ:8.30.003:012512:5/25/16

Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: RETAINING WALL

RW-2

STATION: 117+39 OFFSET: R 34
LATITUDE: 39.077254° N LONGITUDE: 77.553079° W
SURFACE ELEVATION: 385.68 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 3-1-2016
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: O. Gomez
Logger: P. Li

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
16	370										16.0 / 369.68 Auger Refusal at 16 feet.				

REMARKS: Rig Type: CME 55.
Temporary piezometer was installed to 16 ft and screened for bottom 5 ft for 24-hr ground water readings.

SPT_LOGB:LOGS.GPJ:8.30.003:012512:5/25/16

VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: RETAINING WALL

RW-3
PAGE 1 OF 1

STATION: 116+95 OFFSET: R 80
LATITUDE: 39.077145° N LONGITUDE: 77.552896° W
SURFACE ELEVATION: 368.79 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 2-29-2016
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: O. Gomez
Logger: P. Li

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		1									0.0 / 368.79 Topsoil=4 inches **Tops**				
1.0	368	2	75								0.3 / 368.49 *Residual*, Brown, SANDY SILT, soft, moist **ML**			23.1	
1.5		2													
2.0		12			2						1.5 / 367.29 *Residual*, Gray, fine to coarse, SILTY SAND WITH GRAVEL, loose to very dense, moist **SM**				
2.5		17 50/5	109											8.9	
3.0	366				2.92						2.5 / 366.29 *IGM*, Brown, fine to coarse, SILTY SAND WITH GRAVEL, contains rock fragments, very dense, moist **SM**				
3.5															
4.0					4										
4.5		25													
5.0	364	36	100											7.0	
5.5		50/6			5.5										
6.0					6										
6.5		12									6.0 / 362.79 *Residual*, Brown, fine to coarse, SILTY SAND WITH GRAVEL, dense, moist **SM**				
7.0	362	15	75									NP	NP	17.4	15.1
7.5		15													
8.0		20 50/1	0		8 8.08						8.0 / 360.79 *IGM*, Brown, fine to coarse, SILTY SAND WITH GRAVEL, contains rock fragments, very dense, moist **SM**				
8.5											8.5 / 360.29 Auger Refusal at 8.5 feet.				

REMARKS: Rig Type: CME 55.
Temporary piezometer was installed to 8.5 ft and screened for bottom 5 ft for 24-hr ground water readings.

PAGE 1 OF 1
RW-3

SPT_LOGB:LOGS.GPJ:8.30.003:012512:5/25/16

VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: RETAINING WALL

RW-4
PAGE 1 OF 1

STATION: 119+12 OFFSET: R 100
LATITUDE: 39.077747° N LONGITUDE: 77.552930° W
SURFACE ELEVATION: 368.62 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 2-29-2016
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: O. Gomez
Logger: P. Li

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0		4									0.0 / 368.62 Topsoil=4 inches **Tops**				
		9									0.3 / 368.32 *Residual*, Light brown and gray, fine to coarse, SILTY SAND WITH GRAVEL, medium dense to very dense, moist **SM**			6.6	
		16	84												
		20			2										
2		18													
		26										NP	NP	8.2	35.0
		29	84												
	365	17													
4		20			4										
		28													
		38	84											9.0	
		46													
6		11			6										
		16													
		12	100											25.3	
		34													
8		50/5			8										
			100		8.42									11.4	
	360										8.0 / 360.62 *IGM*, Light brown, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist **SM**				
10															
											10.5 / 358.12 Auger Refusal at 10.5 feet.				

REMARKS: Rig Type: CME 55.
Temporary piezometer was installed to 10.5 ft and screened for bottom 5 ft for 24-hr ground water readings.

PAGE 1 OF 1
RW-4

SPT_LOGB:LOGS.GPJ:8.30.003:012512:5/25/16

VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: RETAINING WALL

RW-5
PAGE 1 OF 1

STATION: 118+65 OFFSET: R 45
LATITUDE: 39.077604° N LONGITUDE: 77.553097° W
SURFACE ELEVATION: 383.51 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 3-1-2016
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: O. Gomez
Logger: P. Li

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0.0		3									0.0 / 383.51 Topsoil=4 inches **Tops**			
0.5		7									0.3 / 383.21 *Residual*, Brown and gray, SANDY SILT, stiff, moist **ML**			
1.0		8	75											18.4
1.5	382	10												
2.0		34			2						2.0 / 381.51 *Residual*, Gray, fine to coarse, SILTY SAND WITH GRAVEL, contains rock fragments, very dense, moist **SM**			
2.5		46	67											16.1
3.0		50/6									SAME, contains rock fragments,			
3.5	380				3.5									
4.0		16			4									
4.5		31												
5.0		36	100											19.4
5.5	378	41												
6.0		16			6									
6.5		20	85											23.3
7.0		50/2			7.17						7.0 / 376.51 *IGM*, Gray, fine to coarse, SILTY SAND WITH GRAVEL, contains rock fragments, very dense, moist **SM**			
7.5	376													
8.0		50/2	100		8 8.17									6.1
8.5														
9.0														
9.5	374													
10.0											10.0 / 373.51 Boring Terminated at 10 feet.			

REMARKS: Rig Type: CME 55.
Temporary piezometer was installed to 10 ft and screened for bottom 5 ft for 24-hr ground water readings.

PAGE 1 OF 1
RW-5

SPT_LOG:LOGS.GPJ:8.30.003:012512:5/25/16

DMY ENGINEERING CONSULTANTS INC.
45662 Terminal Drive, Suite 110
Dulles, Virginia 20166
tel: (703) 665-0586 fax: (202) 688-1918

SUMMARY OF LABORATORY RESULTS

CLIENT Rinker Design Associates, P.C.

PROJECT NAME Sycolin Road Retaining WALL

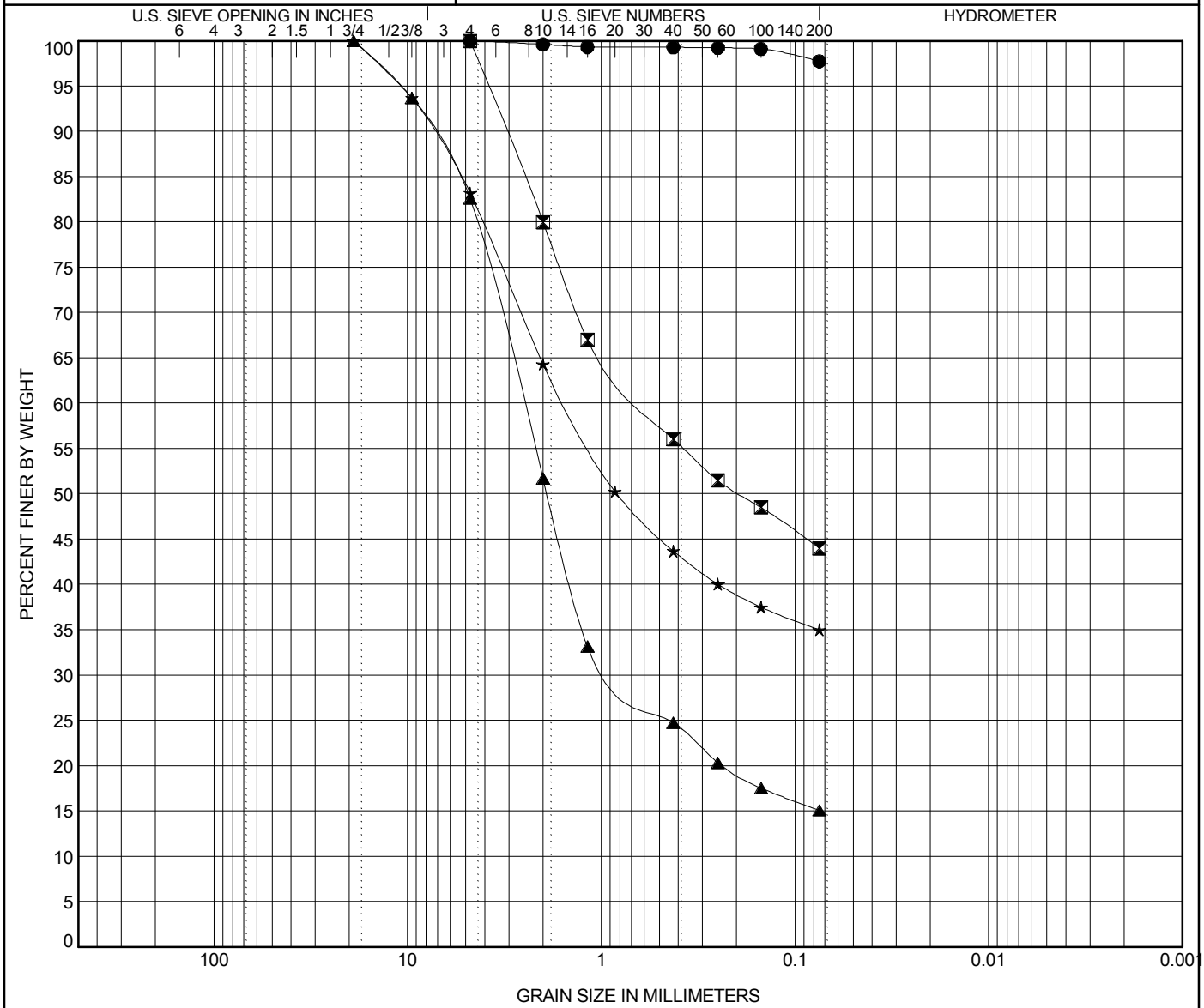
PROJECT NUMBER 01.02095.01

PROJECT LOCATION Town of Leesburg, Virginia

Sample ID	Depth (FT)	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Water Content (%)	Proctor Method	Max Dry Density (pcf)	Optimum Moisture (%)	Oversize Fraction (%)	Sample Description/Classification
RW-1-1	0.0 - 2.0					20.6					
RW-1-2	2.0 - 4.0	36	28	8	97.7	24.3					Brown, Silt (**ML**)
RW-1-3	4.0 - 6.0					13.7					
RW-1-4	6.0 - 8.0					11.4					
RW-2-1	0.0 - 2.0					21.7					
RW-2-2	2.0 - 4.0	32	21	11	44.0	14.1					Brown, Clayey Sand (**SC**)
RW-2-3	4.0 - 6.0					9.9					
RW-2-4	6.0 - 8.0					6.6					
RW-2-5	8.0 - 10.0					4.5					
RW-2-6	13.5 - 15.0					9.0					
RW-3-1	0.0 - 2.0					23.1					
RW-3-2	2.0 - 4.0					8.9					
RW-3-3	4.0 - 6.0					7.0					
RW-3-4	6.0 - 8.0	NP	NP	NP	15.1	17.4					Brown, Silty Sand With Gravel (**SM**)
RW-4-1	0.0 - 2.0					6.6					
RW-4-2	2.0 - 4.0	NP	NP	NP	35.0	8.2					Brown, Silty Sand With Gravel (**SM**)
RW-4-3	4.0 - 6.0					9.0					
RW-4-4	6.0 - 8.0					25.3					
RW-4-5	8.0 - 10.0					11.4					
RW-5-1	0.0 - 2.0					18.4					
RW-5-2	2.0 - 4.0					16.1					
RW-5-3	4.0 - 6.0					19.4					
RW-5-4	6.0 - 8.0					23.3					
RW-5-5	8.0 - 10.0					6.1					

PROJECT NAME: Sycolin Road Retaining WALL
PROJECT NO.: 01.02095.01
LOCATION: Town of Leesburg, Virginia CLIENT:
Rinker Design Associates, P.C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

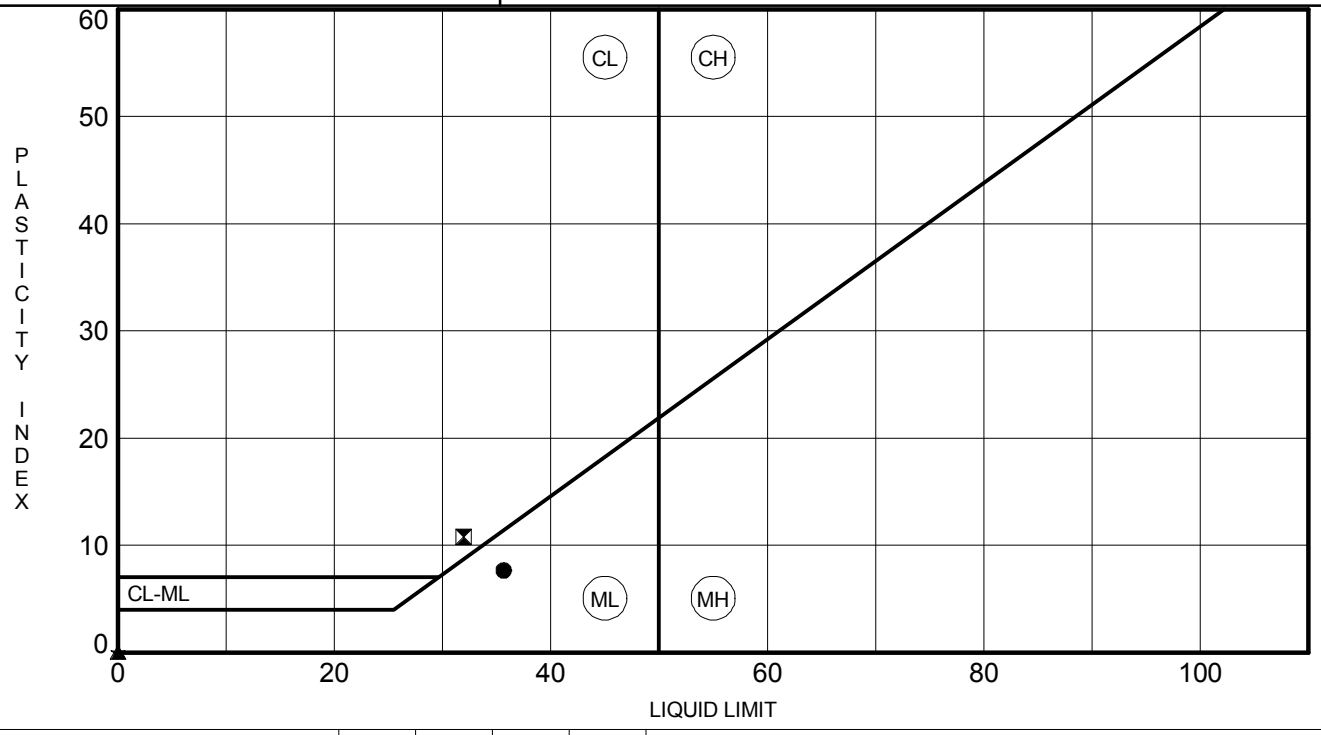
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**RW-1-2**	**2.0-4.0**	Brown, Silt (**ML**)	**36**	**28**	**8**
⧓	**RW-2-2**	**2.0-4.0**	Brown, Clayey Sand (**SC**)	**32**	**21**	**11**
▲	**RW-3-4**	**6.0-8.0**	Brown, Silty Sand With Gravel (**SM**)	**NP**	**NP**	**NP**
★	**RW-4-2**	**2.0-4.0**	Brown, Silty Sand With Gravel (**SM**)	**NP**	**NP**	**NP**

		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RW-1-2**	**4.75**				**0.0**	**2.3**	**97.7**	
⧓	**RW-2-2**	**4.75**	**0.614**			**0.0**	**56.0**	**44.0**	
▲	**RW-3-4**	**19**	**2.524**	**0.804**		**17.4**	**67.5**	**15.1**	
★	**RW-4-2**	**19**	**1.54**			**16.8**	**48.2**	**35.0**	

GRAIN SIZE 4/15/16

PROJECT NAME: Sycolin Road Retaining WALL
PROJECT NO.: 01.02095.01
LOCATION: Town of Leesburg, Virginia CLIENT:
Rinker Design Associates, P.C.

ATTERBERG LIMITS RESULTS ASTM D4318



	SAMPLE	DEPTH (FT)	LL	PL	PI	Fines	SAMPLE DESCRIPTION
●	**RW-1-2**	**2.0-4.0**	**36**	**28**	**8**	**97.7**	Brown, Silt (**ML**)
⊠	**RW-2-2**	**2.0-4.0**	**32**	**21**	**11**	**44.0**	Brown, Clayey Sand (**SC**)
▲	**RW-3-4**	**6.0-8.0**	**NP**	**NP**	**NP**	**15.1**	Brown, Silty Sand With Gravel (**SM**)
★	**RW-4-2**	**2.0-4.0**	**NP**	**NP**	**NP**	**35.0**	Brown, Silty Sand With Gravel (**SM**)

ATTERBERG LIMITS 4/15/16

Shallow Foundation Bearing Capacity Calculations

Project Number:	VDOT No. U000-253-312, P101, R201, C501; DMY No. 01.02095.01
Project Name:	Sycolin Road Widening
Project Location:	Leesburg, Virginia
Foundation Location:	Retaining Wall RW #1; Station 117+25
Reference Borings:	RW-2

Eccentricity=	1.6	ft	
B =	9.6	ft	Soil Type: SM
Y =	130	pcf	
Y_{sat} =	137	pcf	Reference: Soil Design Parameter for Sound Barrier
ϕ =	34	degrees	walls, Retaining Walls and Non-critical Slopes,
c =	100	psf	VDOT April 2011
D_f =	3.0	ft	
N=	25 to 67	blows/ft	

Bearing Capacity for Continuous or Strip Foundation

$$q_u = c' N_c + q N_q + \frac{1}{2} \gamma B N_\gamma$$

where, $q = \gamma * D_f$

Reference: Principle of Foundation Engineering 6th Edition, Chapter 3, Braja M. Das

Nc =	5.2	LRFD Manual Table 10.6.3.1.2a-1;
Nq =	0.0	Bearing capacity factors reduced for footing on
Ny =	25.0	slope. Fig. 10.6.3.1.2c-1 and 10.6.3.2c-2

Resistance Factor =	0.45		LRFD Manual Table 11.5.7-1
Nominal Bearing q_u=	**10920**	psf	
Factored Bearing q_a=	**4914**	psf	

Calculated by:	PL	6/7/2016
Checked by:	PZ	6/10/2016

Settlement Estimate -Burland & Burbidge

Wall Footing (Strip)
(Station 117+25)

		EN
Footing Width (ft)	B	9.6
Footing Length (ft)	L	100
Depth of Influence (ft)	Z_I	7.3
N average within Z_I	N60	25
Preconsolidation Pressure (psf)	σ_p'	0
Structrual Load (plf)	P	47040
Bearing Pressure (psf)	q	4900

Footing Shape Factor	Fs	1.5
Settlement (inch)	**S**	**0.6**