

Capital Trail – Varina Phase

Henrico County

Virginia

Geotechnical Engineering Data Report

Project No. 0005-043-714

PPMS No. 86280

Virginia Department of Transportation

October 3, 2012

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1.0 INTRODUCTION

The purpose of this data report is to present the results of the preliminary subsurface exploration performed by the Virginia Department of Transportation (VDOT) to prospective design-builders for the Virginia Capital Trail project (Varina Phase) Design-Build project, in order for them to have a uniform basis for preparation of proposals. The scope of work includes but is not limited to, construction of embankments, paved asphalt multiuse path consisting of asphalt, and bridges in the vicinity of Route 5. Limitations on use of this report and the geotechnical data provided herein are discussed in **Section 9.0**.

2.0 PROJECT DESCRIPTION

The Project is located in Henrico County, Virginia, and includes the design and construction of the Virginia Capital Trail between Rocketts Landing and Longbridge Road in Charles City County. The Trail will be located parallel to Route 5. The Trail will be a 10 feet wide full depth asphalt pavement structure throughout the project limits unless otherwise noted in the preliminary design plans included in the RFP Information Package. The total length for the Varina Phase of the Virginia Capital Trail is approximately 10.8 miles. Right of way acquisition and utility relocation activities will be the responsibility of the Design-Builder.

3.0 SITE DESCRIPTION

The area of the proposed project is rural in nature. The path will traverse moderately wooded areas with intermittent residential and commercial driveway/entrances. Additionally, bridges are scoped to traverse the following: Almond Creek {04BH-001 and 04BH-002}, Four Mile Creek {12BH-003}, and Cornelius Creek {12BH-004}. Plans imply proposed drainage work as follows: 36.0 inch pipe {12BH-006}, box culvert extension {12BH-007}, and 60.0 inch pipe {12BH-008}. There are numerous underground and overhead utilities on both sides of Route 5.

4.0 GEOLOGIC MAPPING

This section of Route 5 is located within the western boundary of the Coastal Plain, a Quaternary aged accumulation of sediments which extends from Maryland to North Carolina. The Coastal Plain was created during transgression and regression of the Atlantic Ocean associated with changes of sea levels during Ice Age events and consists, within the area of the proposed project, primarily of soils (Shirley Formation) that are interbedded gravel, sand, silt, clay, and peat; at altitudes to 35-45 ft. deposited on soils (Charles City Formation) that are interbedded sand, silt, clay and minor gravel; at

altitudes to 70-80 ft. As a result of these processes, two main types of soil, and their weathered constituents, can be anticipated within the project limits:

Chuckatuck Formation – “Coastal Plain From expanded explanation (ref. VA002): Chuckatuck Formation (middle(?) Pleistocene, Johnson and Berquist, 1989). Light- to medium-gray, yellowish-orange, and red dish-brown sand, silt, and clay and minor amounts of dark-brown and brownish-black peat. Comprises surficial deposits of mid-level coast-parallel plains (altitude 50-60 feet) and equivalent riverine terraces. Eastward, unit is truncated by the Suffolk scarp; westward, along major stream drainages, unit is separated from the younger topographically lower Shirley Formation by the Kingsmill scarp and equivalent estuarine scarps. Fluvial-estuarine facies includes, from bottom to top, (1) channel-fill deposits of poorly sorted, cross-bedded, pebbly and cobbly sand interbedded, locally, with peat and sandy silt rich in organic matter, (2) moderately well-sorted, cross-bedded to planar bedded, fine- to medium-grained sand grading up ward into (3) clayey silt and sandy and silty clay. Bay facies of coastwise plain includes a basal gravelly sand filling shallow paleochannels, a thin but extensive pebbly sand containing heavy mineral laminae and Ophiomorpha burrows, and an upper, relatively thick, medium- to fine-grained silty sand and sandy silt. Thickness is 0 to 26 feet.” (U.S. Department of the Interior, 2007)¹

5.0 FIELD EXPLORATION

The field exploration for this project was performed on February, 2012. Subsurface conditions were explored by drilling a total of 5 standard penetration test (SPT) borings in accordance with ASTM D 1586. The boring logs are included in the **Appendix Section**. The boring numbering was not in sequential fashion. The proposed borings were staked by referencing landmarks on plan sheets and the GPS coordinates were verified via hand-held GPS. The borings are not numbered sequentially due to elimination of proposed borings due to limited access.

Additional borings used in project 0895-043-F01 are included in the **Appendix Section**.

Additionally, a boring location plan of the SPT locations is included in **Appendix Section**.

Soil descriptions on the boring records are visual and are generally in accordance with the Unified Soil Classification System (USCS) as described in ASTM D 2487 and ASTM D 2488.

¹

U.S. Department of the Interior. (2007, April 4). Retrieved December 9, 2011, from U.S. Geological Survey: <http://tin.er.usgs.gov/geology/state/sgmc-unit.php?unit=VAQc;0>

All SPT soil samples are available for inspection at the office of the Richmond District Materials Engineer, 2430 Pine Forest Drive, Richmond, Virginia 23834. Please call Mr. Harold Dyson, P.E. at (804) 524-6211 to obtain access to the samples.

6.0 SUBSURFACE CONDITIONS

6.1 Generalized Subsurface Conditions

We have characterized the following generalized subsurface soil stratigraphy based on the boring data presented in **Appendix Section**.

Topsoil. Topsoil was observed to be 2.0 ft thick at boring 04BH-001. Recommend the thickness of topsoil at 12” (300 mm) for estimating purposes for stripping depths. The estimate is based on information from **VDOT Project 0005-018-114**.

Coastal Plain Sediments (Chuckatuck Formation). This stratum generally consist of very loose to dense cohesionless soils and very soft to stiff cohesion soils. The soils encountered within the upper 5 ft (1.5m) of the ground surface in borings 04BH-001 12BH-004, 12BH-006, 12BH-007, and 12BH-008, consisted of very soft to soft consistency fine-grained soils and/or very loose to loose density coarse-grained soils. Weight of hammer (WOH) material was encountered in the upper 10.0 ft (3.0 m) zone within borings 12BH-003. Very dense material was encountered at depths ranging from 53.0 ft (16.2 m) – 108.8 ft (33.2 m).

6.2 Ground Water

For SPT borings, groundwater was first encountered at EL ranging from 17.4 – 128.9 ft. Long term ground water measurements were not recorded. Fluctuations of the ground water levels shown on the boring logs should be expected with changes in precipitation, stream levels, surface run-off and evaporation.

7.0 PAVEMENTS

7.1 Minimum Pavement Sections

If the Design-Builder confirms that the minimum pavement sections are inadequate for actual design/construction conditions, it shall notify VDOT during the Scope Validation Period of the necessary changes and proposed price adjustments, if any. Acceptable changes are limited to increasing the thickness of the base or subbase layers specified below. Any changes to the minimum pavement sections noted above must be approved by VDOT prior to implementation. The Design-Builder shall be responsible for the final

design and construction of the pavements for this Project as approved by VDOT and in accordance with the Contract Documents.

The Design-Builder shall prepare and incorporate the validated pavement sections into the plans, typical sections, profiles and cross-sections in accordance with the applicable manuals noted in Section 2.1.1 of this document. This includes drainage and subdrainage requirements to ensure positive drainage both within the pavement structure and on the pavement surface.

The minimum pavement sections for the project are as follows:

Virginia Capital Trail

2.0 inches of Asphalt Concrete SM-12.5A (estimated 220 lb/sy)
8.0 inches of Coarse Aggregate, Size No. 8, Aggregate Base Material, Type I, Size No. 21B, or RAP (RAP of comparable gradation is acceptable when consistent with **Special Provision for Crushed Hydraulic Cement Concrete**, with respect to Acceptance criteria.)

Geosynthetics and free-draining material shall be used for stabilization and drainage at the discretion of the Design Manager. Approximate locations requiring geosynthetics may be interpolated from the data included in the preliminary geotechnical study that is provided in the RFP Information Package. These locations shall be verified in the final geotechnical report provided by the Design-Builder and any discrepancies must be reported to VDOT prior to the expiration of the Scope Validation Period.

Entrances

PE-1 TYPE I/III

2.0 inches of Asphalt Concrete SM-12.5A (estimated 220 lb/sy)
6.0 inches of Aggregate Base Material, Type I, Size No. 21B or RAP of comparable gradation

PE-1 TYPE IV

~~4.0 inches of Asphalt Concrete SM-12.5A (estimated 220 lb/sy X 2 lifts)~~
~~4.0 inches of Asphalt Concrete BM-25.0A (estimated 440 lb/sy)~~

8.0 GEOTECHNICAL ENGINEERING CONSIDERATIONS DURING DESIGN AND CONSTRUCTION

In addition to the presentation of subsurface exploration and soil laboratory testing data, an objective of this report is also to discuss in general terms pertinent geotechnical issues that should be considered during the design and construction of this project.

8.1 Earthwork

Preliminary grading plans indicate that moderate to extensive cut and fill will be required on this project. Earthwork issues that should be considered during design include, but are not limited to, subgrade preparation, subdrainage, compacted fill placement, slope benching, allowable cut and fill slope angles, evaluation of stability and settlement in both design and construction for non-retained fills, both existing and proposed, throughout the project.

It will be the design-builder's responsibility to synthesize a reasonable analysis of the stability and settlements of the embankments that have been designed to the minimum tolerances specified in the RFP for this project. The impact of settlement on the overall construction of the embankments must be determined during design and an appropriate monitoring system is required as stipulated in Section 2.5.

For subgrades, it will be important to address topsoil stripping, appropriate methods for evaluation of subgrade suitability, and procedures for mitigating unsuitable subgrade materials. With respect to subdrainage, the design-builder should identify areas where subdrainage is needed beyond that required by the standard VDOT specifications/special provisions and design the appropriate types of subdrainage. The design-builder should evaluate the suitability of on-site soils for use as fill or backfill with respect to soil types and moisture contents as discussed in Section 10.3, below.

Accordingly, moisture conditioning of the on-site soils should be anticipated and considered in design and construction of this project. Therefore, it will be important that the design-builder address the potential impact that these soils could have on earthwork operations and how they should be treated during construction. As an alternative to aeration and/or mechanical drying, the design-builder may elect to use pelletized quick lime to dry soils that are excessively wet provided dust is adequately controlled.

8.2 Slope Design

Cut and fill slopes shall be no steeper than 2H:1V unless supported by engineering analyses based on site specific field investigation and site specific laboratory strength testing. Slopes steeper than 2H:1V must be approved by the Department.

The following factors of safety are to be used with limit equilibrium methods of analysis to determine factors of safety for representative sections of all soil cut and soil embankment fill slope areas greater than 10 ft (3.0 m) in height and/or where slopes are supporting, or are supported by, retaining structures. The factors of safety listed in Table 1 below are valid for subsurface investigations performed in accordance with Chapter III of the Materials Division's Manual of Instructions or for site specific investigation plans approved by the District Materials Engineer. Approval of site specific investigation plans with reduced boring frequency may require higher factors of safety.

Table 1: Minimum Factors of Safety for Soil Cut/Fill Slopes

Slope analysis parameters based on:	Factor of Safety	
	Involves Structure or Critical Slope ^{1,4}	Non-Critical Slope
In-situ or lab. tests and measurements ^{2,3}	1.5	1.3
No site specific tests	N/A ³	1.5

Notes:

1. A critical slope is defined as any slope that is greater than 25' in height, affects or supports a structure, impounds water or whose failure would result in significant cost for repair, or damage to private property
2. Site specific in-situ tests include both ground water measurements and SPT testing but may also include CPT or DMT
3. Parameters for critical slopes involving structures must be based on specific laboratory testing
4. Problem soils (very soft and very loose soils, fissured or heavily over-consolidated soils), must be analyzed using shear strength parameters determined from appropriate laboratory strength tests in accordance with accepted local engineering practice
5. Construction plans shall specify use of soil types consistent with the parameters used in slope analyses

8.3 Unsuitable Materials

Unsuitable materials are defined under Section 101.02 of Part 5 of the RFP document as:

Any material for use as embankment fill, and in cut areas to a depth of at least 3 ft below subgrade directly beneath pavements and at least 2 ft beneath the bedding of minor structures and laterally at least 2 ft beyond the outside edge of the pavement shoulders and bedding limits of the minor structures that classify as CH, MH, OH and OL in accordance with the Unified Soil Classification System (USCS), that contains more than 5 percent by weight organic matter, that exhibits a swell greater than 5 percent as determined from the California Bearing Ratio (CBR) test using VTM-8, and that exhibits strength, consolidation, durability of rock or any other characteristics that are deemed unsuitable by the Design-Builders' geotechnical engineer or as denoted in the Contract Documents for use in the Work. Saturated or very dry and/or loose or very soft coarse- and fine-grained soils that exhibit excessive pumping, weaving or rutting under the weight of construction equipment are also considered unsuitable unless they can be moisture conditioned through either mechanical or chemical means to an acceptable moisture content that allows adequate compaction to meet project specifications, and classification testing indicates they are not otherwise unsuitable. Topsoil, peat, coal and carbonaceous shale shall also be considered unsuitable material. All unsuitable material shall be disposed of and/or treated as discussed in Section 106.04 at no cost to the Department.

Acceptable methods of handling these unsuitable materials are outlined in Section 106.04 of Part 5 of the RFP document as follows:

The Design-Builders’ geotechnical engineer shall confirm that slopes, earthwork, pavement, and foundation subgrades satisfy the design and Contract Document requirements. The Design-Builders’ geotechnical engineer shall perform an inspection of all embankment and pavement subgrades and minor structure excavations immediately prior to placement of embankment fill, aggregate base, subbase or bedding materials to identify excessively soft, loose, dried or saturated soils that exhibit excessive pumping, weaving or rutting under the weight of the construction equipment. Such materials are considered unsuitable and must be removed or modified in place to provide adequate support for embankment, pavement subgrade or minor structures. Materials unsuitable for use in the Work shall be disposed of at an approved Disposal Area or landfill licensed to receive such Material unless the materials can be adequately treated in place through pre-approved methods of chemical and/or mechanically stabilization to satisfy the design and Contract Document requirements. All Unsuitable Materials shall be disposed of off-site and/or treated in place at no cost to the Department. Unsuitable Materials and methods of treatment shall be identified on the plans and cross sections.

The design-builder’s qualified geotechnical engineer shall perform an inspection of all pavement subgrades and minor structure excavations immediately prior to placement of aggregate base, subbase or bedding materials to identify excessively soft or saturated soils that exhibit excessive pumping, weaving or rutting under the weight of the construction equipment in accordance with the requirements outlined in Part 5 of the RFP document. Such soils are also considered unsuitable and must be removed or modified in place to provide adequate support for embankment, pavement subgrade or minor structures.

The following table demonstrates potential areas of unsuitable material based on borings presented in Section 6.1 Generalized Subsurface Conditions:

Table 1. Potential Areas of Unsuitable Materials

Boring	Latitude	Longitude	Depth Range (ft)
			Soft or loose soil
04BH-001	37.50641836	77.41183547	5.5 – 15.5
04BH-002	37.50662637	77.41210416	5.5 – 15.5
12BH-003	37.432655	77.325071	0.0 – 3.0; 7.0 – 15.0; 20.0 – 25.0
12BH-004	37.465382	77.382426	0.0 – 5.5
12BH-006	37.430305	77.314204	0.0 – 6.0
12BH-007	37.459615	77.377074	0.0 – 15.0
12BH-008	37.474961	77.390188	5.0 – 15.0

The table above presents potential areas of unsuitable materials with respect to criteria defined in the RFP. The loose (N <11) or soft (N<5) characterization is based on N-value of SPT counts.

8.4 Drainage Structures

The design-builder should consider subsurface conditions in order to design adequate and uniform support for the proposed pipe culverts in order to limit total and differential settlements to meet the criteria specified in the RFP. The design-builder should also consider the chemical testing (pH and resistivity) when selecting allowable pipe materials.

9.0 LIMITATIONS

This report has been prepared to facilitate preparation of proposals for this project and should not be solely relied upon for the final design and construction of this project. A design level geotechnical investigation must be performed by the design-builder to verify and augment the information included in this report including those investigations specified by the Request for Proposals (RFP) during the Scope Validation Period. Reference should be made to the other Contract Documents, including the RFP and General Conditions provided with the RFP, for further information regarding required investigations and the identification, resolution and responsibility for differing site conditions.

The boring logs included in this report depict the subsurface soil, ground water, and existing pavement conditions at the specific locations where the borings were performed. These conditions may vary at other locations beyond, or between, these specific locations. Accordingly, the Department does not warrant or guarantee that the information provided on the logs, or in this report, can be projected as indicative of conditions beyond the limits of the borings, and any such projection is purely interpretive. In addition, the ground water levels recorded on the boring logs indicate the ground water conditions that existed at the time of the investigation. Ground water levels may vary considerably, with time, according to prevailing climate, rainfall, surface runoff, evaporation, construction and other factors.

The boring logs are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Department, and are not intended as a substitute for personal investigation, interpretation and judgment by others. Also, the information contained herein represents borings that were performed by the Department and may not represent all of the borings performed on the project, particularly if consultant designers performed work under self contained geotechnical/design contracts.

The minimum pavement sections and discussion of geotechnical considerations as presented in this report are based on the information revealed by our exploration. We

have attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during subsequent site explorations and construction. The design-builder must perform additional test borings and laboratory testing to develop the design for this project and to meet the minimum requirements outlined in Chapter 3 of the current VDOT Material Division's Manual of Instructions and the current AASHTO LRFD Bridge Design Specifications, 2007; 2008 Interim Specifications; and VDOT Modifications.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project.

Appendix

PROJECT MANAGER: Keith Helcher, P.E. (804) 524-5153 (Richmond District)
 SURVEYED BY: David Burch, L.S. (804) 524-5157 (Richmond District)
 DESIGN SUPERVISED BY: Vernon Helstman, P.E. (804) 225-4310 (Central Office)
 DESIGNED BY: Larissa Tachmetov (804) 786-8387 (Central Office)

Note: Temporary Filter Barrier to be placed minimum 1ft within Right of Way or Temporary Construction Easement.

REFERENCES
 (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

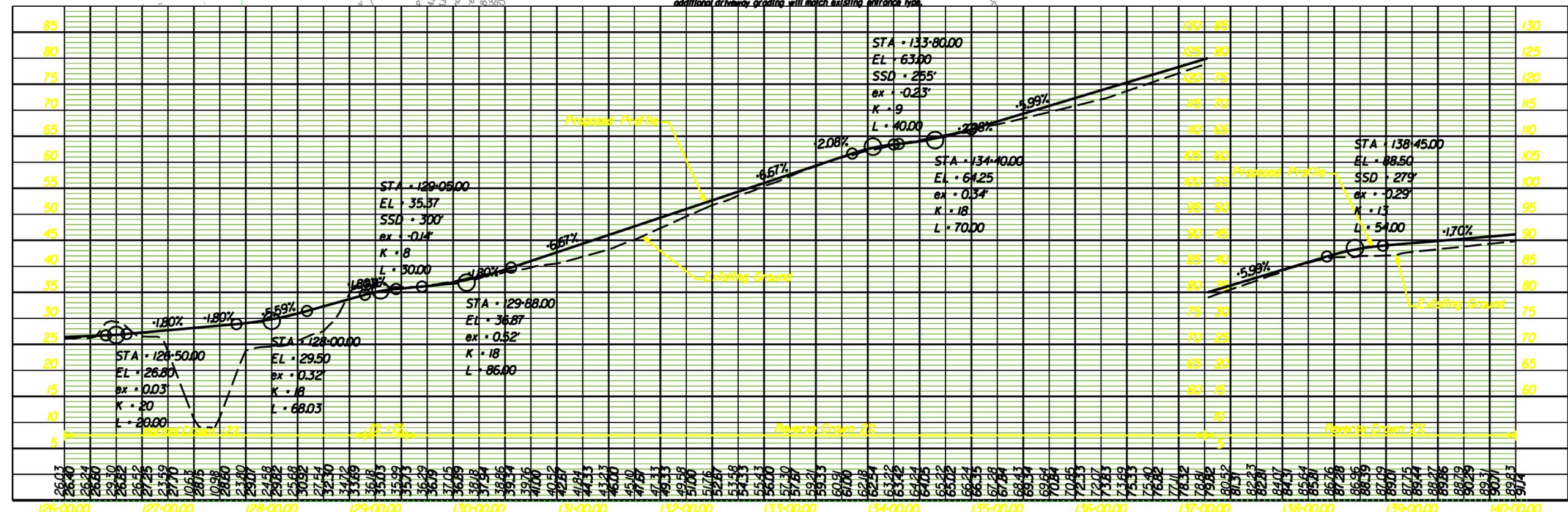
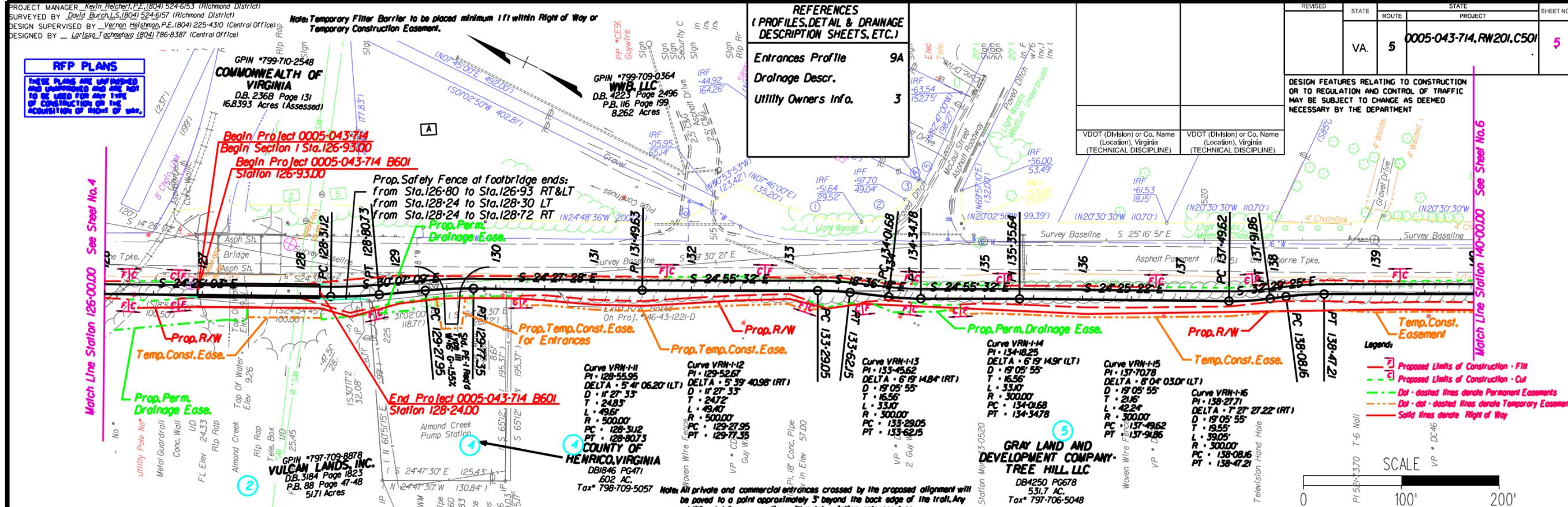
Entrances Profile 9A
 Drainage Descr. 3
 Utility Owners Info. 3

RFP PLANS
 THESE PLANS ARE OFFERED AND UNOFFERED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

REVISION	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	5	0005-043-714, RW201, C501	5

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)	VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)



PROJECT MANAGER: Kevin Belcher, P.E. (804) 524-6153 (Richmond District)
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 DESIGNED BY: Larissa Tachmetova (804) 786-8387 (Central Office)

RFP PLANS
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- Legend:**
- Proposed Limits of Construction - Fill
 - Proposed Limits of Construction - Cut
 - - - Dot - dashed lines denote Permanent Easements
 - . - . Dot - dot - dashed lines denote Temporary Easements
 - Solid lines denote Right of Way

Note: Temporary Filter Barrier to be placed minimum 1ft within Right of Way or Temporary Construction Easement.

GPIN *805-698-7655
REYNOLDS REAL ESTATE VENTURES, LLC
 D.B. 2771 Page 870
 D.B. 462 Page 214 Plat
 Plat Book 61 Page 73
 Plat Book 63 Page 8
 139739 Acres (Assessed)

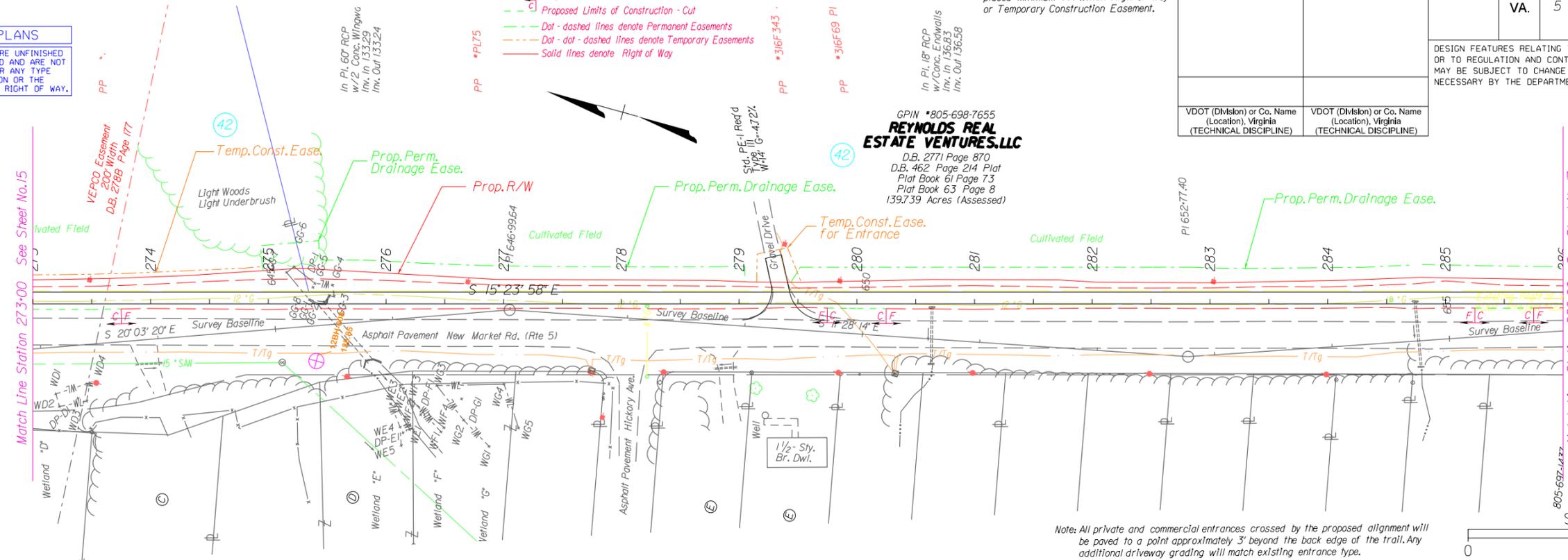
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		ROUTE	PROJECT	
	VA.	5	0005-043-714, RW201, C501	16

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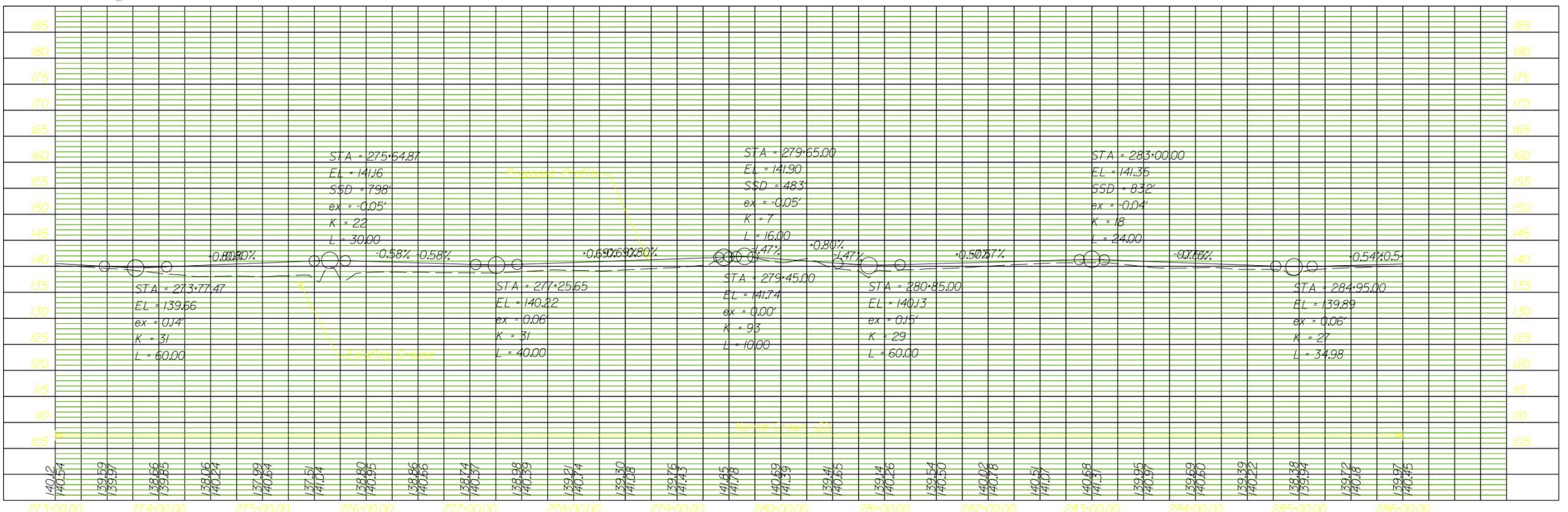
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REFERENCES
 (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Entrances Profile	17C
Drainage Descr.	
Utility Owners Info.	3



Note: All private and commercial entrances crossed by the proposed alignment will be paved to a point approximately 3' beyond the back edge of the trail. Any additional driveway grading will match existing entrance type.



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RFP PLANS
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Note: The Trail should be designed to avoid existing traffic design equipment at Laburnum Ave and may require a retaining wall.

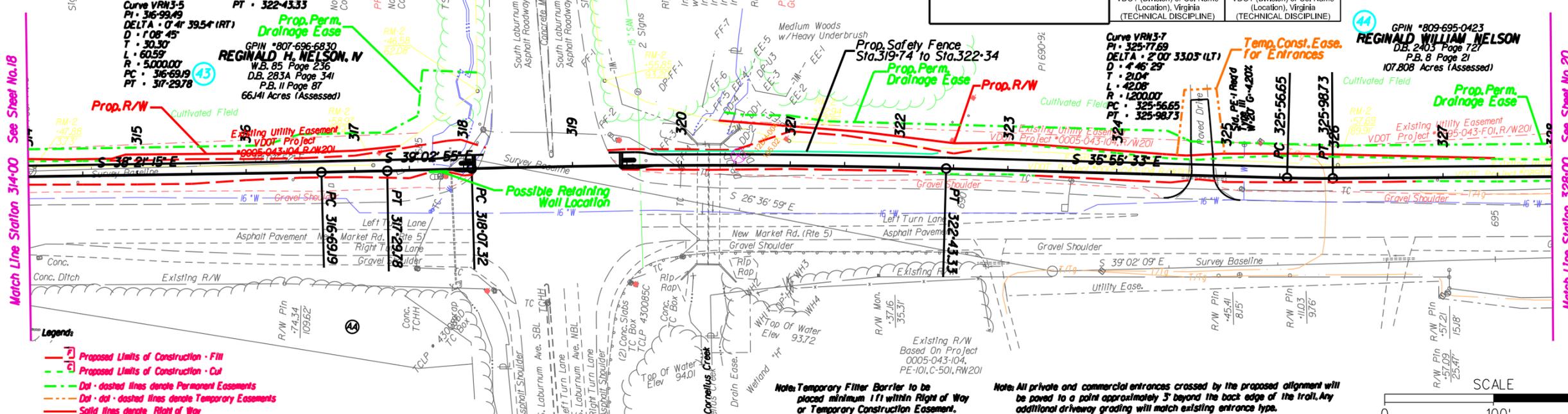
**REFERENCES
 (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)**

Entrances Profile 24A
 Drainage Descr. 3
 Utility Owners Info. 3

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	5		0005-043-714, RW201, C501	19

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

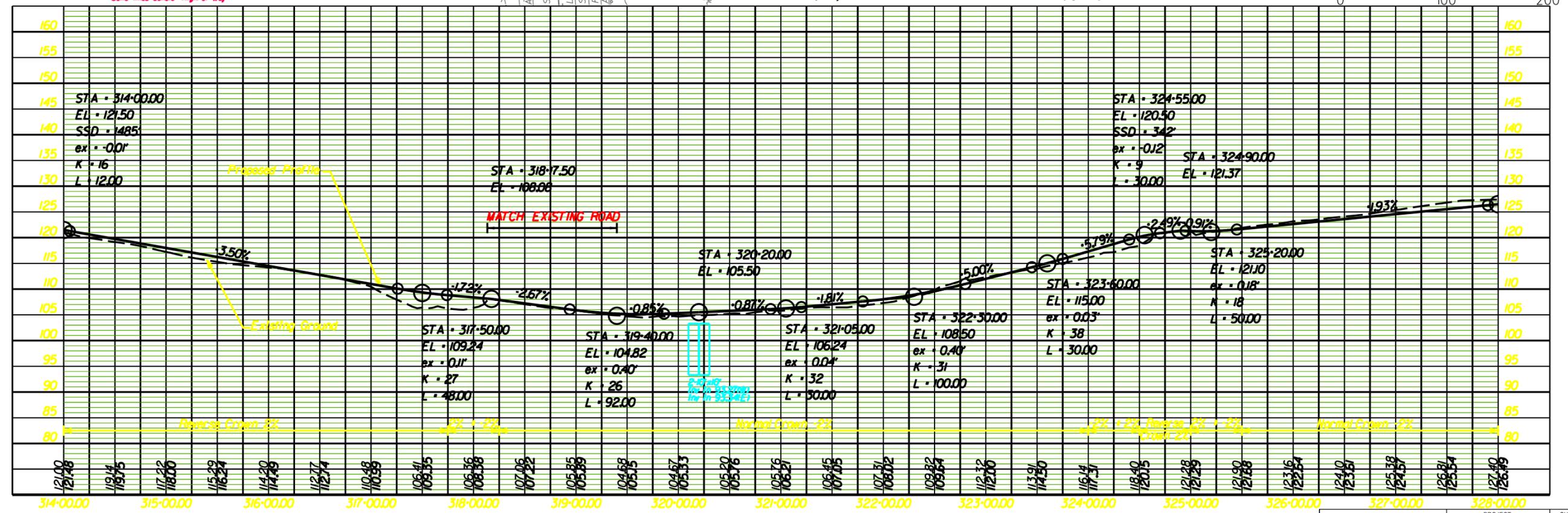
GPIN #809-695-0423
REGINALD WILLIAM NELSON
 D.B. 2403 Page 727
 P.B. 8 Page 21
 107.808 Acres (Assessed)



- Legends**
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 - Solid lines denote Right of Way

Note: Temporary Filter Barrier to be placed minimum 1ft within Right of Way or Temporary Construction Easement.

Note: All private and commercial entrances crossed by the proposed alignment will be paved to a point approximately 3' beyond the back edge of the trail. Any additional driveway grading will match existing entrance type.



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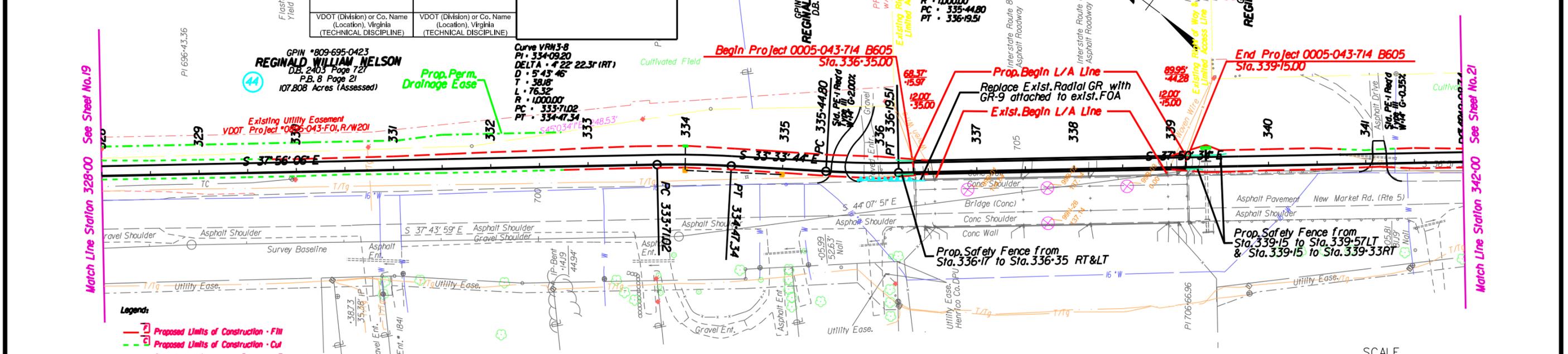
REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Entrances Profile	24A
Drainage Descr.	
Utility Owners Info.	3

VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)	VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	5	0005-043-714, RW20I, C50I	20

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

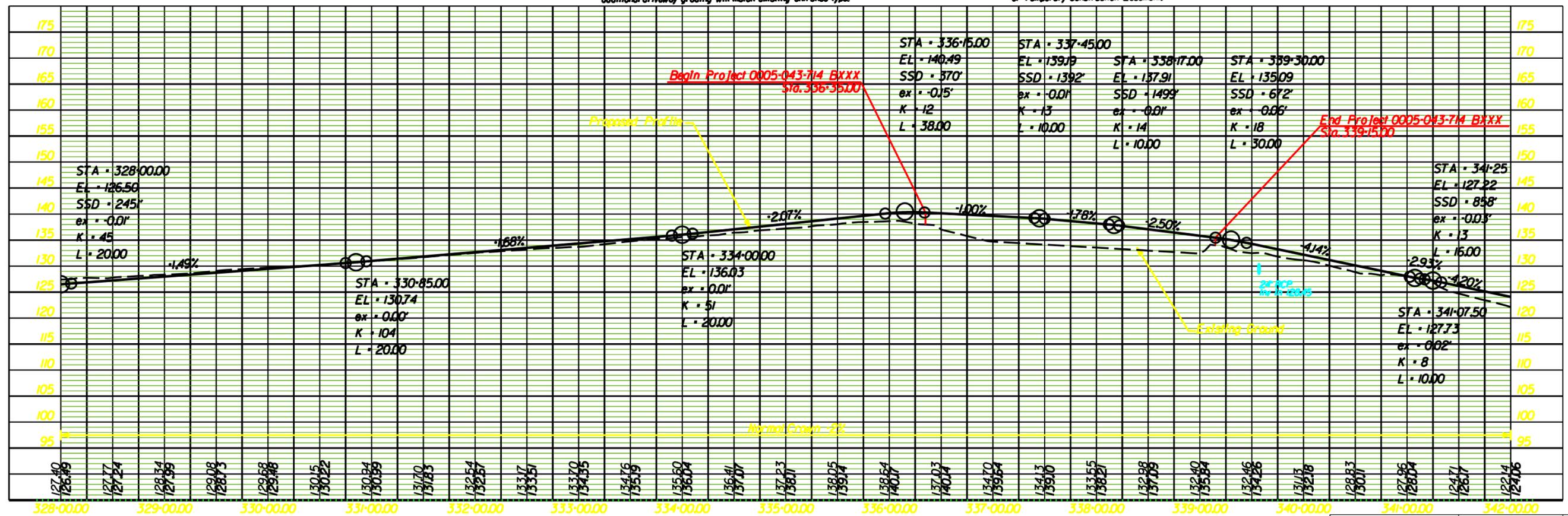
RFP PLANS
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Note: All private and commercial entrances crossed by the proposed alignment will be paved to a point approximately 3' beyond the back edge of the front. Any additional driveway grading will match existing entrance type.

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GPIN #808-693-9954
REGINALD M. NELSON, IV
 D.B. 2135 Page 269
 25.6 Acres
 Curve VRN3-11
 PI: 345-5174
 DELTA = 121° 59' 51" (RT)
 D = 22' 55" 06"
 T = 26.68'
 L = 53.36'
 R = 250.00'
 PC = 345-2506
 PT = 345-7822

GPIN #809-692-4528
W. F. HUNT, LLC
 D.B. 3935 Page 471
 3.864 Acres

GPIN #809-692-2359
A. LOREN ATKINS
 D.B. 2618 Page 1357
 D.B. 1747 Page 2048 Plat
 1.47 Acres

GPIN #809-692-4528
W. F. HUNT, LLC
 D.B. 3935 Page 471
 3.864 Acres

REVISION	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	5	0005-043-714, RW201, C501	21

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)

VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

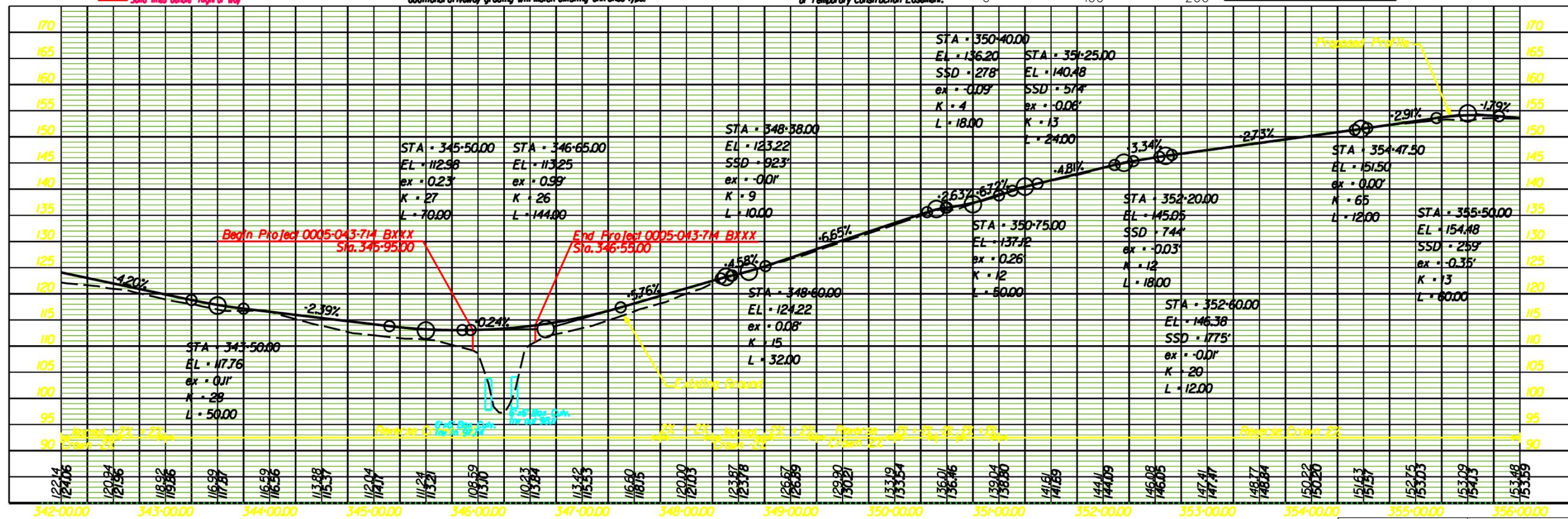
Entrances Profile	24A
Drainage Descr.	
Utility Owners Info.	3

RFP PLANS
 THESE PLANS ARE UNAPPROVED AND UNFORWARDED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

- Legends:**
- Proposed Limits of Construction - Fill
 - Proposed Limits of Construction - Cut
 - Dat - dashed lines denote Permanent Easements
 - Dat - dot - dashed lines denote Temporary Easements
 - Solid lines denote Right of Way

Note: All private and commercial entrances crossed by the proposed alignment will be paved to a point approximately 3' beyond the back edge of the front. Any additional driveway grading will match existing entrance type.

Note: Temporary Filter Barrier to be placed minimum 11' within Right of Way or Temporary Construction Easement.



PROJECT MANAGER: Kevin Helcher, P.E. (804) 524-6153 (Richmond District)
 SURVEYED BY: David Burch, L.S. (804) 524-6157 (Richmond District)
 DESIGN SUPERVISED BY: Vernon Helshman, P.E. (804) 225-4310 (Central Office)
 DESIGNED BY: Larissa Tachmetova (804) 786-8387 (Central Office)

Note: All private and commercial entrances crossed by the proposed alignment will be paved to a point approximately 3' beyond the back edge of the trail. Any additional driveway grading will match existing entrance type.

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Entrances Profile 45A
 Drainage Descr. 3
 Utility Owners Info. 3

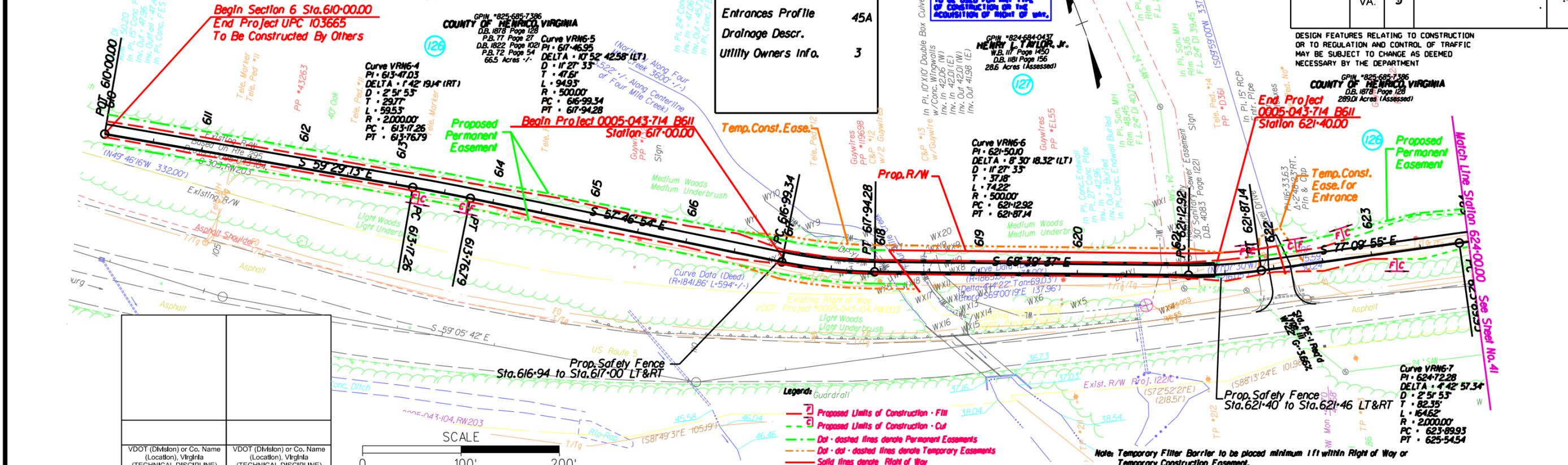
RFP PLANS

THESE PLANS ARE UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

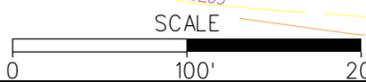
REVISION	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	5	0005-043-714, RW201, C501	40

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

COUNTY OF HENRICO, VIRGINIA
 G.P.N. #825-685-7386
 D.B. 1878 Page 128
 285.01 Acres (Assessed)

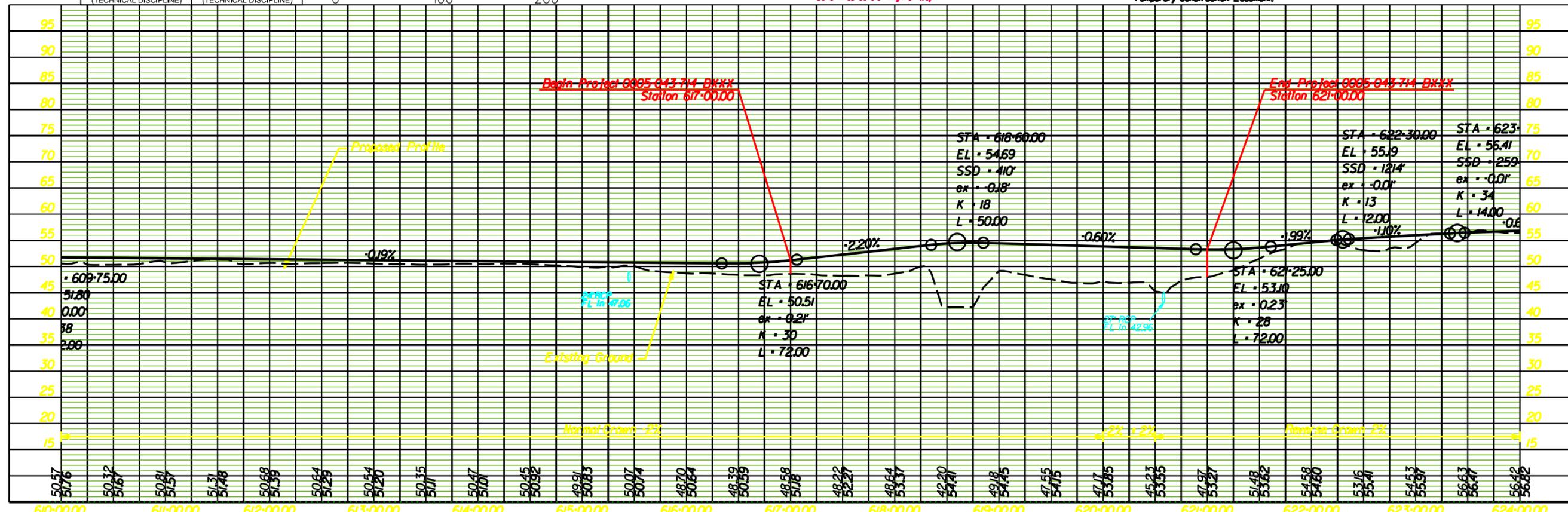


VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)	VDOT (Division) or Co. Name (Location), Virginia (TECHNICAL DISCIPLINE)



- Legends
- Proposed Limits of Construction - Fill
 - Proposed Limits of Construction - Cut
 - Dot - dashed lines denote Permanent Easements
 - Dot - dot - dashed lines denote Temporary Easements
 - Solid lines denote Right of Way

Note: Temporary Filter Barrier to be placed minimum 1ft within Right of Way or Temporary Construction Easement.



PROJECT MANAGER: Kevin Belcher, P.E. (804) 524-6153 (Richmond District)
 SURVEYED BY: David Burch, L.S. (804) 524-6157 (Richmond District)
 DESIGN SUPERVISED BY: Vernon Halstrom, P.E. (804) 225-4310 (Central Office)
 DESIGNED BY: Larissa Tachmetag, (804) 286-8387 (Central Office)

GPIN #827-682-4251
DAVID R. DAGENHART & SHELLEY G. DAGENHART
 D.B. 2368 Page 221
 Plat Book 70 Page 51-52
 3.34 +/- Acres
 Lot 15 Block C
 New Market Heights Section 1

Possible Septic Field
 No Visible Evidence
 Unable to Contact Owner

GPIN #833-682-5297
KCA/CAMP HILL INVESTMENTS, L.C.
 D.B. 3935 Page 271
 460.657 Acres (Assessed)

Declaration of Restrictive Covenants
 KCA/CAMP HILL INVESTMENTS, L.C.
 D.B. 4666 Page 711
 Preserved RPA & Non-RPA
 Upland Buffer
 Approximate Location

REVISION	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	5	0005-043-714, RW201, C501	43

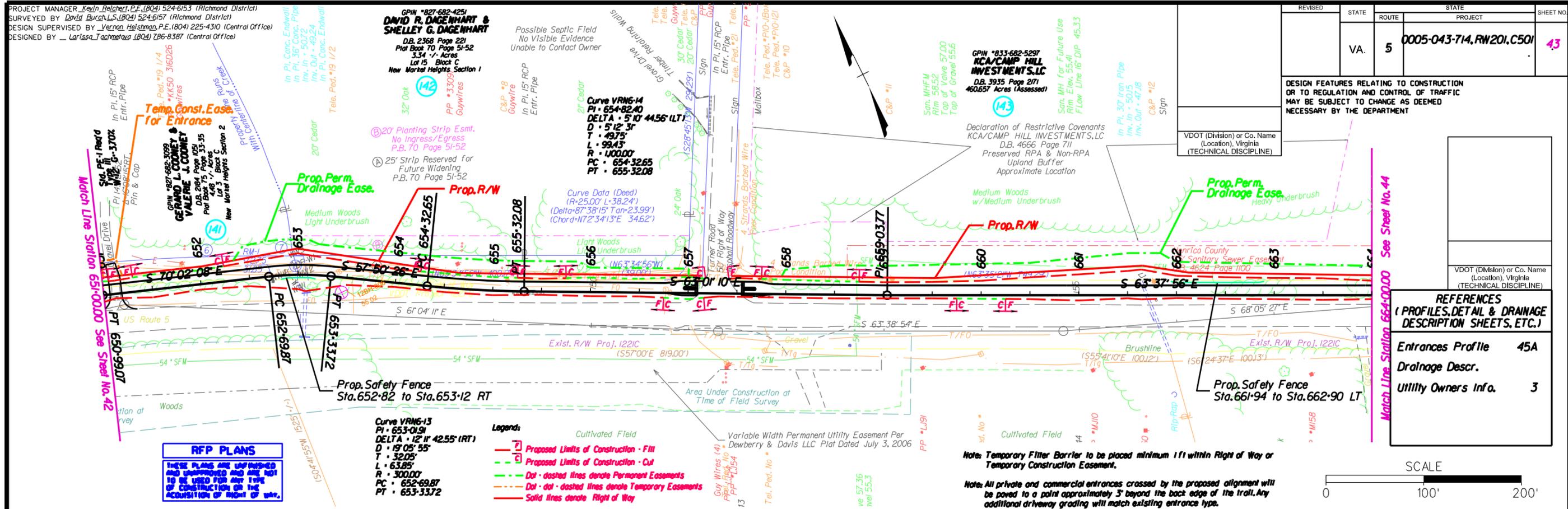
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

VDOT (Division) or Co. Name
 (Location), Virginia
 (TECHNICAL DISCIPLINE)

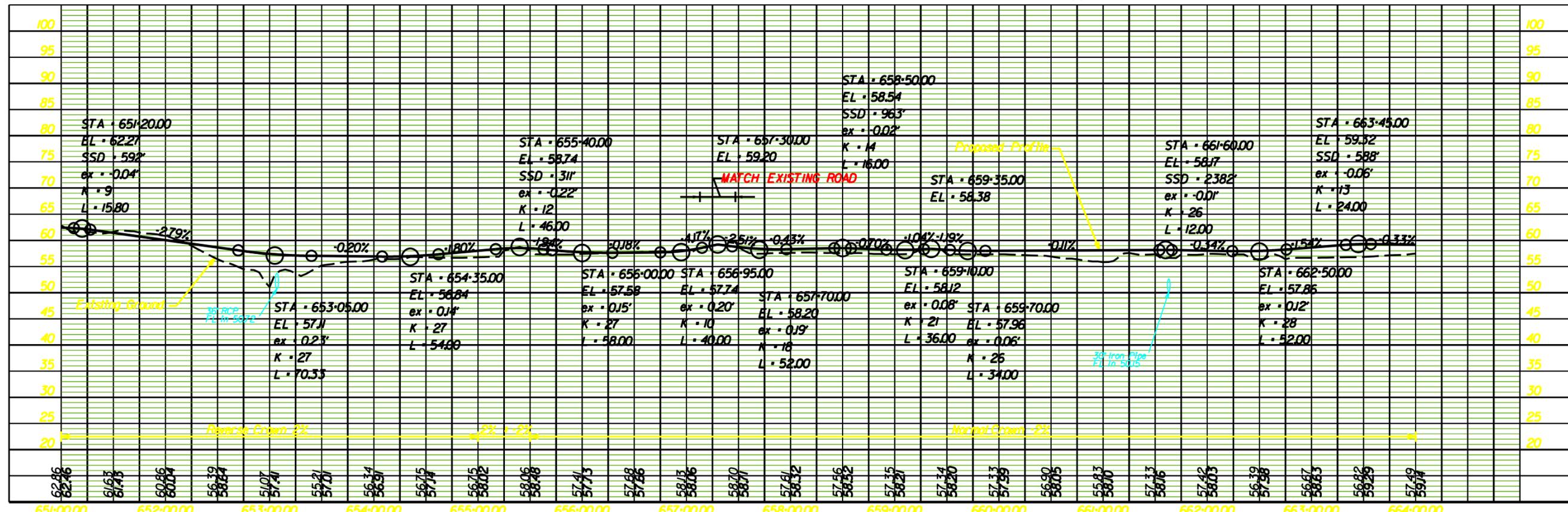
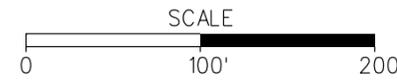
VDOT (Division) or Co. Name
 (Location), Virginia
 (TECHNICAL DISCIPLINE)

**REFERENCES
 (PROFILES, DETAIL & DRAINAGE
 DESCRIPTION SHEETS, ETC.)**

Entrances Profile	45A
Drainage Descr.	
Utility Owners Info.	3



RFP PLANS
 THESE PLANS ARE UNAPPROVED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



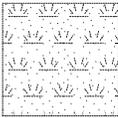
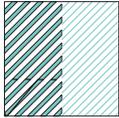
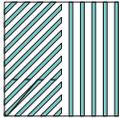
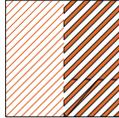
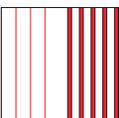
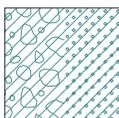
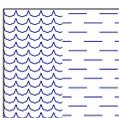
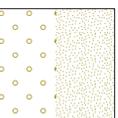
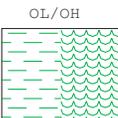
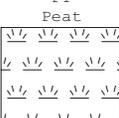
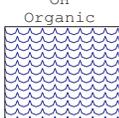
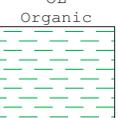
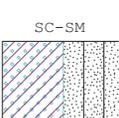
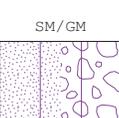
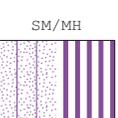
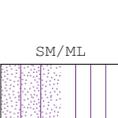
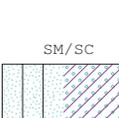
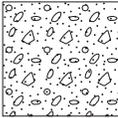
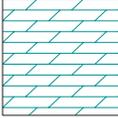
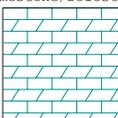
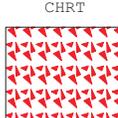
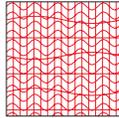
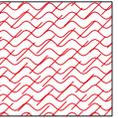
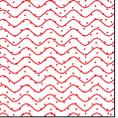


MATERIAL AND SAMPLE SYMBOLS LIST

Pavement/Soils				Sedimentary Rocks		Igneous Rocks	Metamorphic Rocks	Sampling
<p>ASPH - ASPHALT PVT</p>	<p>GP - Poorly-graded Gravel</p>	<p>MH - Elastic Silt</p>	<p>SC - Clayey Sand</p>	<p>CGL - Conglomerate</p>	<p>SE - Shell Bed</p>	<p>AND - Andesite</p>	<p>GGE - Gouge</p>	<p>SPT</p>
<p>CH - Fat Clay</p>	<p>GP-GC</p>	<p>MH/CH</p>	<p>SM - Silty Sand</p>	<p>CLST - Cherty Limestone</p>	<p>SHL - Shale</p>	<p>BST - Basalt</p>	<p>GNS - Gneiss</p>	<p>Core</p>
<p>CL - Lean Clay</p>	<p>GP-GM</p>	<p>MH/ML</p>	<p>SP - Poorly-Graded Sand</p>	<p>COL - Coal</p>	<p>SLS - Siltstone</p>	<p>DBS - Diabase</p>	<p>MYL - Mylonite</p>	<p>Auger</p>
<p>CL-ML</p>	<p>GW - Well-Graded Gravel</p>	<p>MH/SM</p>	<p>SP-SC</p>	<p>MST - Mudstone</p>	<p>SST - Sandstone</p>	<p>DRT - Diorite</p>	<p>PHY - Phyllite</p>	<p>Vane</p>
<p>CONC- CONCRETE PVT</p>	<p>GW-GC</p>	<p>ML - Silt</p>	<p>SP-SM</p>	<p>GWK - Graywacke</p>	<p>SST-SHL - Interbedded Sandstone/Shale</p>	<p>GBR - Gabbro</p>	<p>SCH - Schist</p>	<p>Undisturbed</p>
<p>FL - Fill</p>	<p>GW-GM</p>	<p>ML/CL</p>	<p>SW - Well-Graded Sand</p>	<p>LST - Limestone</p>	<p>SST-SLS - Interbedded Sandstone/Siltstone</p>	<p>GRD - Granodiorite</p>	<p>SLT - Slate</p>	<p>Grab</p>
<p>GC - Clayey Gravel</p>	<p>GM/GP</p>	<p>ML/GM</p>	<p>SW-SC</p>	<p>UCY - Underclay</p>	<p>SHLS-Shaly Limestone</p>	<p>GRN Granite</p>	<p>Misc.</p>	<p>No Recovery</p>
<p>GC-GM</p>	<p>GM/ML</p>	<p>ML/SM</p>	<p>SHDS Shaly Dolostone</p>	<p>MSH Silty Shale</p>	<p>POR - Porphyry</p>	<p>CAV - Cavity</p>	<p>HWR Highly Weathered Rock</p>	<p>Other</p>
<p>GM - Silty Gravel</p>	<p>GM/SM</p>	<p>SW-SM</p>	<p>CHK Chalk</p>	<p>SSHL Sandy Shale</p>	<p>RHY - Rhyolite</p>	<p>BRC - Breccia</p>		



MATERIAL AND SAMPLE SYMBOLS LIST

Pavement/Soils	Sedimentary Rocks	Igneous Rocks	Metamorphic Rocks	Sampling
<p>TOPS-TOPSOIL</p>  <p>SC/CH</p>  <p>CH/CL</p>  <p>CH/MH</p>  <p>CH/SC</p>  <p>CL/ML</p>  <p>CL/SC</p>  <p>CL/CH</p>  <p>GP/GW</p>  <p>CRA Crushed Aggregate</p>  <p>GW/GP</p>  <p>ML/MH</p>  <p>GC/SC</p>  <p>OH/OL</p>  <p>GP/SP</p>  <p>OL/OH</p>  <p>PT Peat</p>  <p>OH Organic</p>  <p>SC/CL</p>  <p>OL Organic</p>  <p>SC/GC</p>  <p>SC-SM</p>  <p>SP/SW</p>  <p>SM/GM</p>  <p>SM/MH</p>  <p>SM/ML</p>  <p>SM/SC</p>  <p>SP/GP</p>  <p>SW/SP</p> 	<p>BLD-Boulder Bed</p>  <p>DLS Dolostone</p>  <p>LST-DLS-Interbedded Limestone/Dolostone</p>  <p>CHRT</p> 	<p>CHT Charnockite</p>  <p>DLS Dolostone</p>  <p>LST-DLS-Interbedded Limestone/Dolostone</p>  <p>CHRT</p> 	<p>MSLS Metasiltstone</p>  <p>MSST Metasandstone</p>  <p>QZT - Quartzite</p>  <p>SPS Soapstone</p>  <p>MBST Metabasalt</p>  <p>MBL Marble</p> 	



UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)		
Clean Gravels (Less than 5% fines)		
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
Gravels with fines (More than 12% fines)		
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
Clean Sands (Less than 5% fines)		
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
Sands with fines (More than 12% fines)		
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

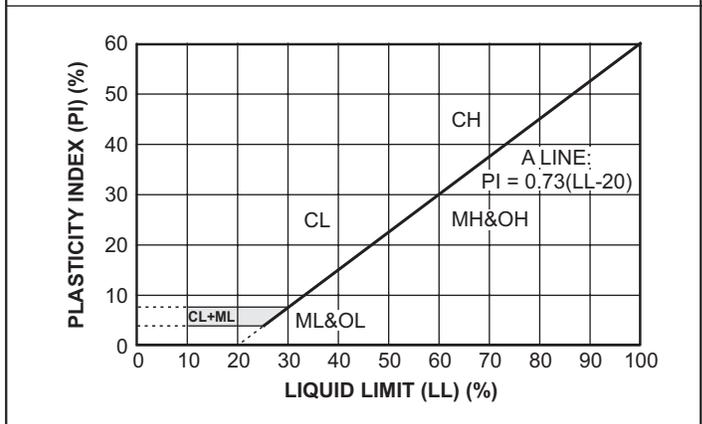
LABORATORY CLASSIFICATION CRITERIA

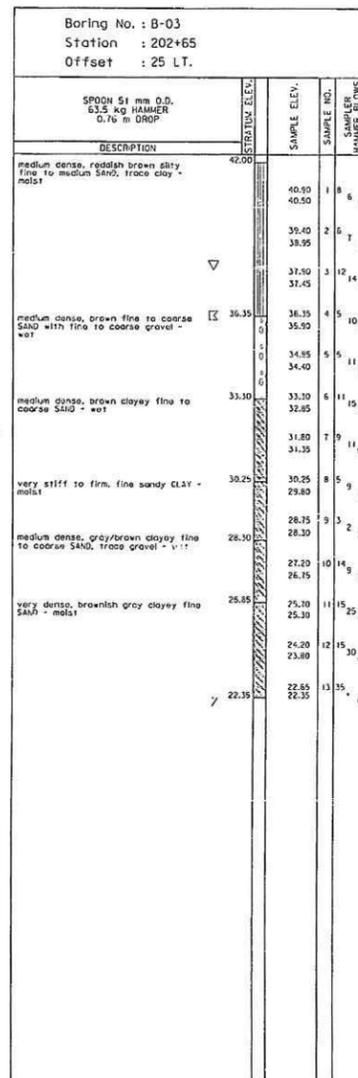
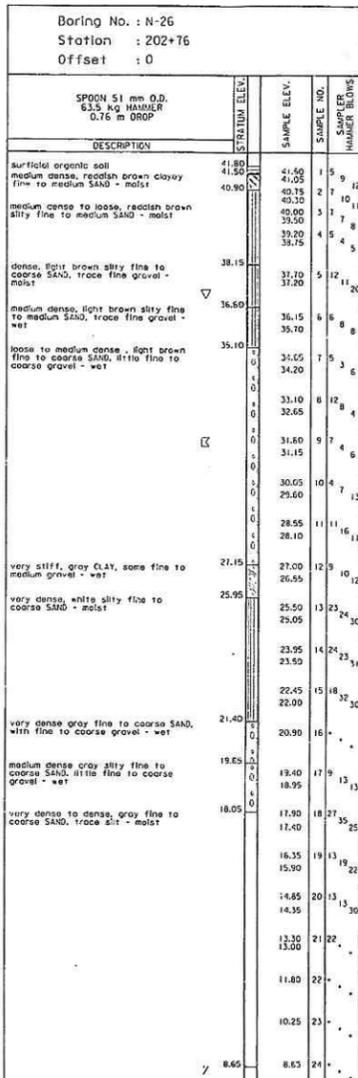
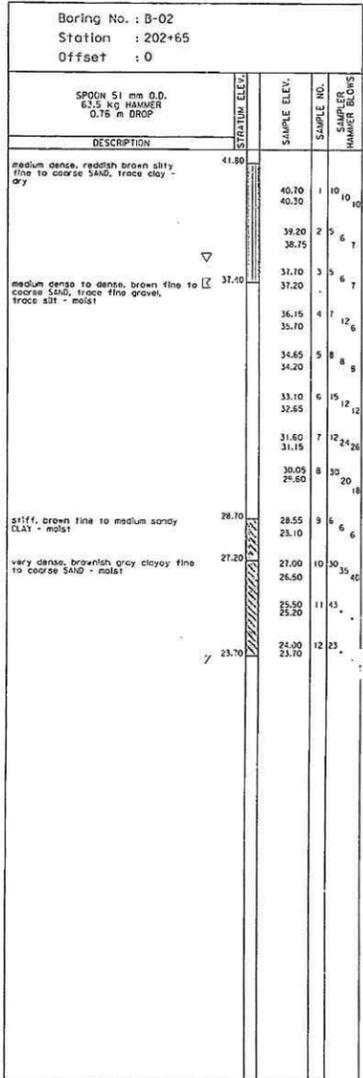
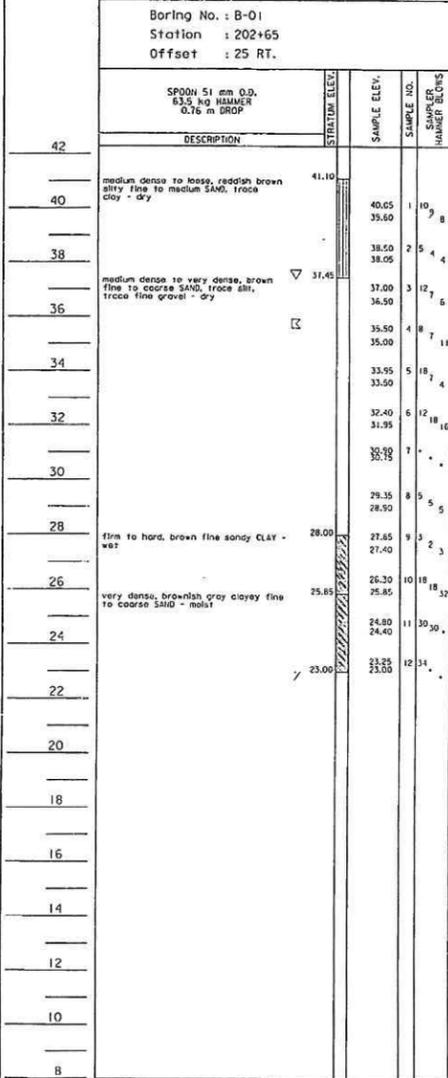
GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent GW, GP, SW, SP
 More than 12 percent GM, GC, SM, SC
 5 to 12 percent Borderline cases requiring dual symbols

PLASTICITY CHART





GEOLOGIC SECTION
Scale: 1 : 100

▽ ELEVATION OF GROUNDWATER
□ ELEVATION OF CAVE-IN
▽ ELEVATION AT BOTTOM OF DRILL HOLE
EQUIPMENT -
CB - CORE BARREL

SUBSURFACE INFORMATION - Boring Logs

This subsurface information shown on the boring logs in these plans was obtained with reasonable care and recorded in good faith solely for use by the Department in establishing design controls for the project. The Department has no reason to suspect that such information is not reasonably accurate as an approximate indication of the subsurface conditions of the sites where the borings were taken. The Department does not in any way warrant or guarantee that such data can be projected as indicative of conditions beyond the limits of the borings shown and any such projections by bidders are purely interpretive and altogether speculative. Further, the Department does not in any way guarantee, either expressly or by implication, the sufficiency of the information for bid purposes.

The boring logs are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Department, and are not intended as a substitute for personal investigation, interpretation and judgment by the bidders.



COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION			
STRUCTURE AND BRIDGE DIVISION			
ENGINEERING GEOLOGY			
NEW MARKET ROAD OVER RTE 895			
Approved for Construction	10/4/99	Designed: RSB	Date: July 2, 1999
Drawn: JSC		Checked: RSB	
Revisions		Plan No. 277-02	Sheet No. 28 of 28



PROJECT #: 005-043
 LOCATION: Over Almonds Creek
 STRUCTURE: East Abutment

04BH-001

PAGE 1 OF 3

STATION:
 LATITUDE: 37.506418 °N
 SURFACE ELEVATION: 29.0 ft

OFFSET:
 LONGITUDE: -77.411835 °W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 9-13-04
 Drilling Method(s): Hollow Stem Auger
 SPT Method: Manual Hammer
 Other Test(s):
 Driller: Puryear
 Logger: Conner

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND		
		STANDARD PENETRATION TEST HAMMER BLOWS	% SOIL RECOVERY	SAMPLE LEGEND	SAMPLE INTERVAL	% CORE RECOVERY	ROCK QUALITY DESIGNATION	DIP		STRATA	JOINTS
0	29.0										
2	27.0	2	100		4.5						
4	25	2	100		6						
6		1									
8	20										
10		1	100		9.5						
12		2			11						
14	15										
16		3	53		14.5						
18		7			16						
20	10										
22		50	0		19.5						
24		19	67		20.5						
26	5	18			22						
28		22									
30	0	6	100		24.5						
32		10			26						
34	-5	14									
36											
38		9	100		29.5						
40	-10	15			31						
		23									
		4	100		34.5						
		7			36						
		13									
		7			39.5						

0.0 / 29.0	TOPSOIL with gravel TOPS
2.0 / 27.0	Brownish-red SAND with a trace of clay SC
7.0 / 22.0	Brown clayey SAND SC
14.0 / 15.0	Brown SAND and GRAVEL with trace of organics SP
19.5 / 9.5	Greenish-gray SAND and GRAVEL with trace of clay SP-SC
28.0 / 1.0	Gray silty SAND with trace of clay SC-SM

REMARKS: RIG TYPE: CME-45.
 Concrete is under asphalt in road.

PAGE 1 OF 3

04BH-001

SPT_LOG:005-043.GPJ:8.30.002:081505:6/15/12



PROJECT #: 005-043
 LOCATION: Over Almonds Creek
 STRUCTURE: East Abutment

04BH-001
 PAGE 2 OF 3

STATION: OFFSET:
 LATITUDE: 37.506418 °N LONGITUDE: -77.411835 °W
 SURFACE ELEVATION: 29.0 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	GROUND WATER	DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	% SOIL RECOVERY	SAMPLE LEGEND	SAMPLE INTERVAL	% CORE RECOVERY	ROCK QUALITY DESIGNATION	STRATA						
		12 16	100											
42					41									
44	-15	2 5 14	100		44.5									
46					46									
48														
50	-20	11 50	100		49.5 50.5									
52										50.0 / -21.0 Greenish gray clayey SAND with gravel SC				
54	-25	3 12 16	100		54.5					53.0 / -24.0 Greenish gray clayey SILT with gravel MH				
56					56									
58														
60	-30	9 10 20	100		59.5					58.0 / -29.0 Greenish gray silty CLAY with trace of sand and mica CL-ML				
62					61									
64	-35	7 14 20	100		64.5					63.0 / -34.0 Gray micaceous sandy SILT ML				
66					66									
68														
70	-40	40 40 10	91		69.5 70.6					69.0 / -40.0 Greenish gray clayey SAND and GRAVEL with trace of fine mica and rock fragments GP-GC				
72														
74	-45	16 20 30	100		74.5					74.0 / -45.0 Varigated micaceous sandy SILT with trace of clay ML				
76					76									
78														
80	-50	21			79.5					77.0 / -48.0 Greenish gray silty SAND with trace of mica SM				

REMARKS: RIG TYPE: CME-45.
 Concrete is under asphalt in road.

PAGE 2 OF 3

04BH-001

SPT_LOG:005-043.GPJ:8.30.002:081505:6/15/12



STATION:
 LATITUDE: 37.506418 °N
 SURFACE ELEVATION: 29.0 ft

OFFSET:
 LONGITUDE: -77.411835 °W
 COORD. DATUM: NAD 83

FIELD DATA

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 9-13-04 Drilling Method(s): Hollow Stem Auger SPT Method: Manual Hammer Other Test(s): Driller: Puryear Logger: Conner	GROUND WATER	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	% SOIL RECOVERY	SAMPLE LEGEND	SAMPLE INTERVAL	% CORE RECOVERY	ROCK QUALITY DESIGNATION	STRATA						
		50	56	X	80.4									
											80.4 / -51.4 Borehole Terminated			

REMARKS: RIG TYPE: CME-45.
 Concrete is under asphalt in road.



PROJECT #: 005-043
 LOCATION: Over Almonds Creek
 STRUCTURE: West Abutment

04BH-002
 PAGE 1 OF 2

STATION: OFFSET:
 LATITUDE: 37.506626 °N LONGITUDE: -77.412104 °W
 SURFACE ELEVATION: 26.6 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA							
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	GROUND WATER							
		STANDARD PENETRATION TEST HAMMER BLOWS	% SOIL RECOVERY	SAMPLE LEGEND	SAMPLE INTERVAL	% CORE RECOVERY	ROCK QUALITY DESIGNATION	STRATA		DIP	DATE(S) DRILLED	DRILLING METHOD(S)	SPT METHOD	OTHER TEST(S)	DRILLER	LOGGER	LIQUID LIMIT
										Date(s) Drilled: 9-27-04 Drilling Method(s): Hollow Stem Auger SPT Method: Manual Hammer Other Test(s): Driller: Puryear Logger: Conner							
										GROUND WATER ∇ FIRST ENCOUNTERED AT: 9.2 ft DEPTH							
										DESCRIPTION OF STRATA			LL	PI			
2	25										0.0 / 26.6	Sand and gravel with coal-like material (possible abandoned RR bed - Fill). FL					
4		3			4.5												
6		1			6												
8		2															
10	20	1			9.5												
12		2			11												
14																	
16	15	1			14.5												
18		2			16												
20	10				100												
22		50			19.5												
24		7			20.5												
26		15			22												
28		22			22						19.0 / 7.6	Large GRAVEL layer GP					
30		7			24.5						19.5 / 7.1	Brown coarse SAND and GRAVEL with a trace of clay SP-SC					
32		15			26						23.0 / 3.6	Gray coarse SAND and GRAVEL SP					
34		9			24.5												
36		21			26												
38		20			29.5												
40		6			31												
		8			36												
		15			36												
		3			34.5												
		7			36												
		11			39.5												
		3															
		7															

REMARKS: RIG TYPE: CME-45.
 Terminated hole because of rain. Drilling pressure was 500 to 900 lbs. last 12 ft. (Hard Drilling).

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04BH-002

SPT_LOG:005-043.GPJ:8.30.002:081505:6/15/12



PROJECT #: 0005-043-714
 LOCATION: Henrico County
 STRUCTURE: BOX CULVERT

12BH-003

PAGE 1 OF 1

STATION:
 LATITUDE: 37.432852° N
 SURFACE ELEVATION: 50.06 ft

OFFSET:
 LONGITUDE: -77.325852° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 2-9-12 - 2-9-12
 Drilling Method(s): Hollow Stem Auger
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: Puryear
 Logger: Lewis

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 5.3 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	50.06	wh	100					
2.0	48.06	wh	100					
4.0	46.06	wh	100					
5.3	45.00	wh	100					
6.0		wh	100					
8.0		wh	100					
10.0	40.00	wh	100					
14.0		wh	100					
15.5		wh	100					
19.0		wh	100					
20.5		wh	100					
24.0		wh	100					
25.5		wh	100					

0.0 / 50.06	Brown silty CLAY CH		
2.0 / 48.06	Brown silty SAND SM		
4.0 / 46.06	Brown SAND with gravel SP		
8.0 / 42.06	Grey clayey SAND SC		
10.0 / 40.06	Grey sandy SILT ML		
25.5 / 24.56	Borehole Terminated		

REMARKS: Rig Type: Mudbug.

PAGE 1 OF 1

12BH-003

SPT_LOG:0005-043-714.GPJ.8.30.002:092710:6/14/12



PROJECT #: 0005-043-714
 LOCATION: Henrico County
 STRUCTURE: BOX CULVERT/BRIDGE

12BH-007

PAGE 1 OF 1

STATION:
 LATITUDE: 37.459694° N
 SURFACE ELEVATION: 109.43 ft

OFFSET:
 LONGITUDE: -77.377191° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 2-6-12 - 2-6-12
 Drilling Method(s): Hollow Stem Auger
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: Drew
 Logger: Lewis

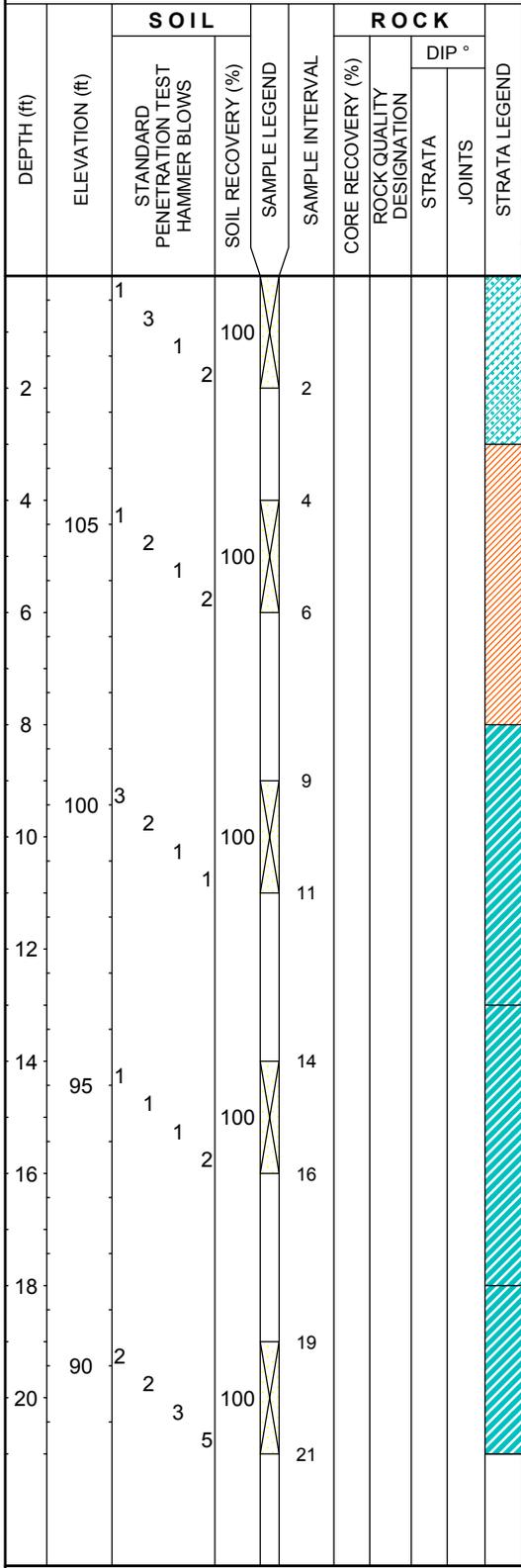
LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: ATV-550. Cave In 5.3 feet.

PAGE 1 OF 1

12BH-007

SPT_LOG:0005-043-714.GPJ.8.30.002:092710:6/14/12



PROJECT #: 0005-043-714
 LOCATION: Henrico County
 STRUCTURE: PIPE

12BH-008

PAGE 1 OF 1

STATION:
 LATITUDE: 37.474961° N
 SURFACE ELEVATION: 138.9 ft

OFFSET:
 LONGITUDE: -77.390188° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 2-6-12 - 2-6-12
 Drilling Method(s): Hollow Stem Auger
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: Drew
 Logger: Lewis

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 10.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
3		6	0					
4		4	4					
2								
4	135	wh	100					
6		1	2					
8								
10	130	1	100					
12		1	2					
14	125	wh	100					
16		wh	1					

0.0 / 138.9 Brown silty SAND SM		
3.0 / 135.9 Grey sandy CLAY CL		
8.0 / 130.9 Grey silty SAND SM		
16.0 / 122.9 Borehole Terminated		

REMARKS: Rig Type: ATV-550. Cave In 3.7 feet.

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12BH-008

SPT_LOG:0005-043-714.GPJ.8.30.002:092710:6/14/12