PLANNING COMMISSION WORK SESSION MEETING



Tuesday, October 25, 2022 at 7:00 PM

AGENDA

CALL TO ORDER.

WORK SESSION ITEMS.

1. SUP 2022-03 Amazon Data Center - The Applicant is requesting a Special Use Permit for a 220,000 square foot data center on Industrial zoned property designated in the New Town Character District on the Future Land Use Map located off Blackwell Road and Lee Highway. This will be the second work session held by the Planning Commission. GPIN 6984-69-2419-000.

COMMENTS FROM THE COMMISSION.

COMMENTS FROM THE STAFF.

ADJOURNMENT.



Walsh Colucci Lubeley & Walsh Pc RECEIVED
TOWN OF WARRENTON

SEP 0.9 2022

Community Development

John H. Foote (703) 680-4664 Ext. 5114 jfoote@thelandlawyers.com Fax: (703) 680-2161

September 9, 2022

Via Hand Delivery and E-Mail

Denise M. Harris Planning Manager Community Development Department 21 Main Street Warrenton, VA 20186

Re: Special Use Permit #SUP2022-00003, AWS Warrenton Data Center /

Post Work Session Submission

Dear Ms. Harris:

In your email to me of August 11, 2022, you asked if our client intended to provide additional information to the Town in preparation for the second work session on this application scheduled for September 27, 2022. We provide the following for the Town's consideration.

1) Schedule a balloon test and let the PC know before it occurs.

This firm has contracted with Wetlands Studies and Solutions to conduct balloon tests. As you know, consultation has already occurred between and among the Town Staff, Bohler, WSSI, and AWS as to the timing of these tests, and their locations and the tests are now scheduled for September 15th. At present the forecast is promising, but September 19 and 20 can be used as rain dates if needed.

2) Provide the Landscape Plan and Tree Survey.

A Landscape Plan is already an exhibit at page 4 of the SUP Plan, and so we would inquire as to what more is required. The Tree Study is included with this letter as Exhibit 1.

ATTORNEYS AT LAW

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3) Elaborate and document the water usage.

a) The Applicant has previously reported that the principal ongoing use of water at the site is for "domestic" uses in the sense that it needs water for toilets, sinks, water fountains, humidification, and limited irrigation largely for the purpose of establishing the landscaping. The architects at Corgan have provided the following data. No other comparably valuable use would require so little water.

Office Uses

The average daily water demand for domestic uses is 190.5 gallons per day. The annual such demand is calculated to be 69,532 gallons per year

Humidifiers

The average daily water demand for humidification purposes is calculated to be 190.1 gallons per day and the annual water demand is 69,380 gallons per year. Because there is a requirement that humidifiers be drained and maintained, there is a daily sewer requirement of 18.9 gallons per day and an annual sewer requirement of 6,900 gallons per year associated with this function.

Total

Based on the foregoing, the combined average daily water demand is 380.6 gallons, the annual water demand for domestic purposes and humidification is 138,912 gallons per year.

The average daily demand for sanitary sewer purposes is 209.4 gallons per day, resulting in an annual requirement of 76,432 gallons per year (domestic uses and humidification).

b) As you know, water is also used *in* the cooling system, but as is the Applicant has often stated, it is not used *for* cooling directly. Rather, the facility is air cooled. To accomplish this, the cooling system is initially charged with approximately 19,000 gallons of water over several weeks' time. This is mixed with propylene glycol at the time of that initial charge. Once it is full it is not thereafter replenished, although the glycol may be recycled into and out of the system.

The facility is served by multiple mechanical system types based on space use. For the purpose of understanding how cooling is managed, the building will consist of two "Data Halls" with a central office/support area separating the two Halls.

For those Data Halls there is a dedicated, redundant, chilled water plant consisting of 500-ton air-cooled chillers and associated pumps, and redundant dual path distribution piping that provides chilled water to Data Hall Air Handling Units (DAHU). Each chiller has an associated Thermal Energy Storage Tank (TES) to allow cooling for "ride-through time" in the event of a loss of normal power, and until normal power is restored. All of the chillers, pumps, tanks and accessories are located on the roof. Freeze protection is accomplished by adding 30% propylene glycol, as noted above.

Each Data Hall is served by these DAHU's, by connecting into the ceiling above the servers through overhead ductwork, with drops into each "cold aisle" in the Data Halls. The Data Hall racks are built with what is known as Hot Aisle Containment, which extends a barrier from the floor to an opening in the ceiling and allows for the warm air from a bank of servers to rise and recirculate to the DAHU's where is it recooled. Humidification to the Data Hall is provided by wall mounted steam generation humidifiers located with the DAHUs.

4) Invite PC members to visit site.

This is only a matter of advising us when members of the Planning Commission would like to visit. If there are FOIA concerns, then they can visit in pairs. We would like to arrange this so that someone from our team is present and if it could be arranged for one or two days that would be quite nice.

5) Questions about elevations and height.

¹ A "cold aisle/hot-aisle containment system" is one in which cold air is distributed by the means described above into a data hall, to maintain a safe and effective temperature. Of course, the servers generate hot air. They are installed back-to-back, creating an "aisle" between them where this hot air concentrates, and so the "hot aisle containment" system consists of a physical barrier that collects the hot air expelled from the rack-mounted equipment and channels it to the ceiling, where it is collected. It is then returned to the DAHUs, cooled, and the process repeats. This moves hot air to where it can be released safely and efficiently before it has the chance to mix with the cold air, which needs to remain cold in order to be effective, and efficiently re-chills and reuses it.

Bohler has prepared revised graphics that depict the height of the structure with the roof-mounted equipment and they are attached to this letter as **Exhibit 2**.

The architects at Corgan are presently working on revised graphics for the building itself but they are not completed. They will be available for the Work Session and will include photorealistic renderings. The standard parapet height is 41'-0" and the highest parapet height is 45'-0". The equipment screening height is 56'-4", and the top of tallest point on rooftop equipment is 56'-9".

Bohler has also prepared a Preliminary Grading Plan as promised at the Work Session, and it is included with this letter as **Exhibit 3**.

6) Noise generation.

A summary of the very extensive noise study that was performed is attached to this letter together with the entire study, which contains the technical background, are attached to this letter as **Exhibits 4** and **5**. To amend previous responses to the effect that noise limits can be fully achieved, this demonstrates that the noise ordinance requirements for the site can be achieved in every location where there is anyone to hear. The only place frequency levels are exceeded is over Route 17 and at the very edge of Parcel 9985-60-5718-500, which is itself zoned Industrial, and is currently vacant.

7) Lighting impacts.

The Town requires a Lighting Plan to be provided as a part of the Site Development Plan. This requires the preparation and submission of a photometric plan that shows the intensity of light throughout the site and at the boundary of the property. The Applicant has written that all building mounted lighting will have a maximum height of 25', and controls be installed on the site fixtures such that they dim to 50% output between 11 PM and dawn, and that fixtures be LED cut off, downward facing, lights that reduce or eliminate spillover at the property boundary. The Applicant has no need to illuminate anything but its secure perimeter and internal areas.

8) Relationship with Dominion, power needs, and phasing.

While AWS does not have a role in planning transmission line routing, it understands that Dominion Energy is working collaboratively with the County, the Town, and the public to understand priorities and refine routes prior to its SCC

submission. The Applicant has said that it will commence operation on existing power and await a decision on additional power by others.

9) Explanation of emergency plans and how potential leaks are contained.

AWS Data Centers (DC) adhere to the Federal Spill Prevention and Control Countermeasure Plan (SPCC) Regulations, as well as State and County rules for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. See 40 CFR Part 112. AWS DC's SPCC Plans are certified by a professional engineer, who assures that all passive and active control measures for oil containment, storage, and discharge comply with Local, State and Federal regulations.

AWS DC's SPCC Plans list a combination of active and passive containment measures needed to meet the requirements of 40 CFR 112.7(c). All affected AWS employees are trained annually on the SPCC mitigation measures. AWS DC's double-walled storage tanks have inner and outer tank walls that meet the definition of secondary containment under the DEQ LPR-SRR-2019-03 - Storage Tank Program Compliance Manual, Volume V - AST Guidance, and under 40 CFR Part 112, Section 8.1.2.2; therefore, tertiary containment² is not required. AWS's fuel oil loading and unloading operations fall under the general secondary containment requirements of 40 CFR Part 112.7(c). Oil water separators are not required under 40 CFR 112.7(c) of the SPCC Rule, and at the State and County level are only mentioned as a recommendation, not a mandate.

Diesel fuel oil is delivered by a licensed tanker truck fuel delivery company. Truck unloading facilities and procedures meet the locally accepted standards and the U.S. Department of Transportation (DOT) requirements.

10) Geotechnical Report

A copy of the Geotechnical Study for the site is provided as Exhibit 6.

11) Planned Community Outreach, if any.

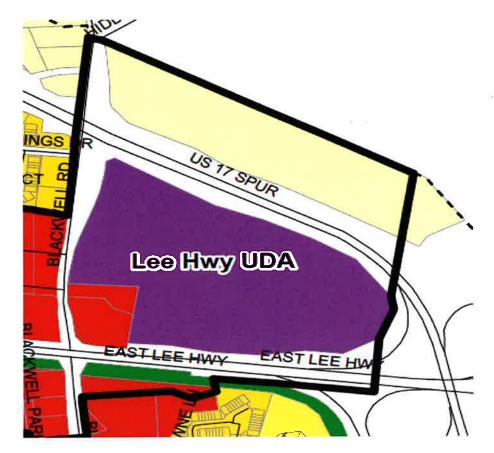
It is still a matter under internal discussion as to whether this can be done effectively. As a general matter, the Applicant has found that the public hearing

² Tertiary containment may consist of such things as a remote or diked impoundment comprised of various combinations such as site drainage, sumps, diversion tanks, pits, ponding areas, lagoons, and/or impervious liners.

process remains the most valuable venue for the exchange of information between itself and the community, and the relevant decision-makers. It is in such a forum that information can be shared in an orderly manner, and questions asked that are directly related to the land use issues presented in any case. Based on the specific circumstances pertaining to this case, and the first work session before the Planning Commission, it must be asked whether either an in-person or virtual session could be productive, or whether it would continue to be focused on issues over which the Applicant has no control.

12) Relationship to the Comprehensive Plan.

The Applicant has responded extensively to questions regarding the Comprehensive Plan. The property is shown on the Future Land Use Map as Light Industrial and is zoned Industrial. The property is also located within the Lee Highway Urban Development Area (UDA). One of the Goals and Policies of the Lee Highway UDA is to evaluate development incentives that stimulate private investment and new development. This data center will be a new development on vacant industrial land and will finally put the land to a productive use that has escaped every other potential purchaser that has evaluated it over the last three plus decades.



The proposed data center is a light industrial use, and thus aligns directly with the land use plan. There is little likelihood that another user, were the Applicant not seeking this approval, would rezone the land to a less intense classification. Despite contentions that there are alternative sites in the Town, there is a limited supply of industrially zoned land in Warrenton, some of that land is already in industrial use, or topographically challenged, and this site is suitable for the proposed facility.

A Comprehensive Plan cannot, however, be evaluated solely by looking at its colored land use maps. It is a compilation of policies. The site is located in the New Town Warrenton Character District, which is, among other things, intended to create a mix of uses, green space and public amenities, as well as provide a location for a major employer. No individual site can be expected to meet all objectives in the Plan. The District is also a place in which the Town seeks a signature job center. The Applicant in this case is indeed a major employer, and while the data center will not employ hundreds of workers, those that it does employ make above average incomes. Traffic burden post-construction is very low. The physical design of the data center is intended to have the least possible impact on those residential areas in the vicinity,

with substantial screening and buffering areas as depicted on the Landscape Plan, and where the facility itself is situated on the Property. Although a degree of that design must follow the requirements of form following function, the enhanced architecture that Corgan has now produced is intended to avoid previous designs of other data centers that were less architecturally appealing, and to satisfy the purpose and intent of § 9-26.1(F) of the Town Zoning Ordinance with respect to Building Façades at data center developments.

The 2040 Plan has significant economic and fiscal goals that seek to achieve a strong, diversified, and resilient economy that supports both residents and businesses and increases the employment base. The Town proposes that it be *proactive* in its own economic development, and this unique development advances each of these goals

The local tax revenues generated by a data center will assist in promoting a diverse, equitable, and stable tax base to maintain a healthy economy, with exceptionally little impact on Town services.

While there were comments presented at the Work Session to the effect that the new Plan envisioned the development of the site with a greater mix of uses than that which is sought in this Application, the history and circumstances of the property suggest that this will not be the future of the land. As was mentioned at the Work Session, two major retailers have evaluated the site and concluded that it could not be made to suffice for their purposes. This has been largely because Blackwell Road cannot handle a significant, sustained, traffic burden. There is presently insufficient right-of-way and it would be exceptionally difficult and costly to improve it. An estimate for the reconstruction of the intersection of Blackwell and Lee Highway alone is set at a high end of \$3.5M. Importantly, Blackwell Road at the site is identified as a Signature Street in the Complete Streets Recommendations, a classification that does not include significant reconstruction.

It is also a fact that the land had been on the market for many years without success. Its size and developable acreage argues against a smaller mixed-use project.

13) Taxation.

It has been suggested that recent changes in Virginia law have adversely affected the taxation of data centers.³

³ It has also been suggested that some data centers may be exempt from local taxation of real estate and tangible personal property. This is not so. Virginia Code § 58.1-3502 makes

Virginia segregates personal property for taxation by localities, and has authorized localities to tax tangible personal property, defined as all personal property that is physical personalty, not intangible, not merchants' capital, or short-term rental property.

There are two statutes that relate to the classification of data centers for purposes of taxation. First, § 58.1-3503 (A)(17) with regard to the general classification of tangible personal property, classifies "computer equipment and peripherals used in a data center" as a potentially separate classification for tangible personal property taxation. A data center is defined (by incorporation from the next statute below) as

a facility whose primary services are the storage, management, and processing of digital data and is used to house (i) computer and network systems, including associated components such as servers, network equipment and appliances, telecommunications, and data storage systems; (ii) systems for monitoring and managing infrastructure performance; (iii) equipment used for the transformation, transmission, distribution, or management of at least one megawatt of capacity of electrical power and cooling, including substations, uninterruptible power supply systems, all electrical plant equipment, and associated air handlers; (iv) Internet-related equipment and services: (v) data communications connections; (vi) environmental controls; (vii) fire protection systems; and (viii) security systems and services[.]

Second, by Va. Code § 58.1-3506 (A)(43) the General Assembly has created yet another optional classifications of tangible personal property for taxation, and permits data centers to be segregated from other forms of personal property under that section, again at the locality's option.

The distinction between the two statutes is that they permit the application of different tax rates to classifications of kinds of personal property depending on which statute is used for the purpose of classification.

any firm, company, or corporation engaged in business for profit who or which leases, borrows or otherwise has made available to it any tangible personal property to be used in such business from any agency or political subdivision of the federal, state or local governments liable to local taxation.

Regardless of which classification is employed, data centers are to be valued by means of a percentage or percentages of original cost, or by such other method as may reasonably be expected to determine the actual fair market value. This is determined by the local assessor, and was not changed by the new statute.

That new statute, Code § 58.1-3295.3, found in the Article in the Tax Code dealing with Reassessment/Assessment (Valuation) Procedure and Practice, addresses in part the assessment of data centers. It references "computer equipment and peripherals" as subject to classification under either of the two foregoing statutes, § 58.1-3503 (A)(17) or § 58.1-3506 (A)(43). They remain *valued* for taxation purposes as they have previously been assessed.

However, now if "fixtures" are installed at a data center and taxed under the provisions of Title 58.1 dealing with Tangible Personal Property, Machinery and Tools and Merchants Capital Taxation, those fixtures must now be assessed using the cost approach. "Cost approach" means assessing value by determining the cost to construct a reproduction or suitable replacement of fixtures, and deducting physical, functional, and economic depreciation sustained by such fixtures. "Fixtures" means all fixtures and equipment used in a data center except computer equipment and peripherals, equipment used for external surveillance and security, and fire and burglar alarm systems. The term includes generators, radiators, exhaust fans, and fuel storage tanks; electrical substations, power distribution equipment, cogeneration equipment, and batteries; chillers, computer room air conditioners, and cool towers; heating, ventilating, and air conditioning systems; water storage tanks, water pumps, and piping; monitoring systems; and transmission and distribution equipment.

In short, HB 791 passed by the legislature in 2022 does not affect the valuation of computer equipment and peripherals, or the local taxation thereof.

14) Proposed Conditions of a Special Use Permit.

As is customary in the Town, the Applicant is attaching a proposed set of conditions for the special use permit for review and edit by the Town as **Exhibit 7**.

15) Conclusion.

The Applicant respectfully submits that valid planning aspirations must also take into consideration existing zoning and land use history, and the actual, instead of the imagined, impact of a use. This proposal advances a number of policies that are set out in the 2040 Plan, and is matched well both to the actual zoning of the land, and to a realistic future.

Very truly yours,

WALSH, COLUCCI, LUBELEY & WALSH, P.C.

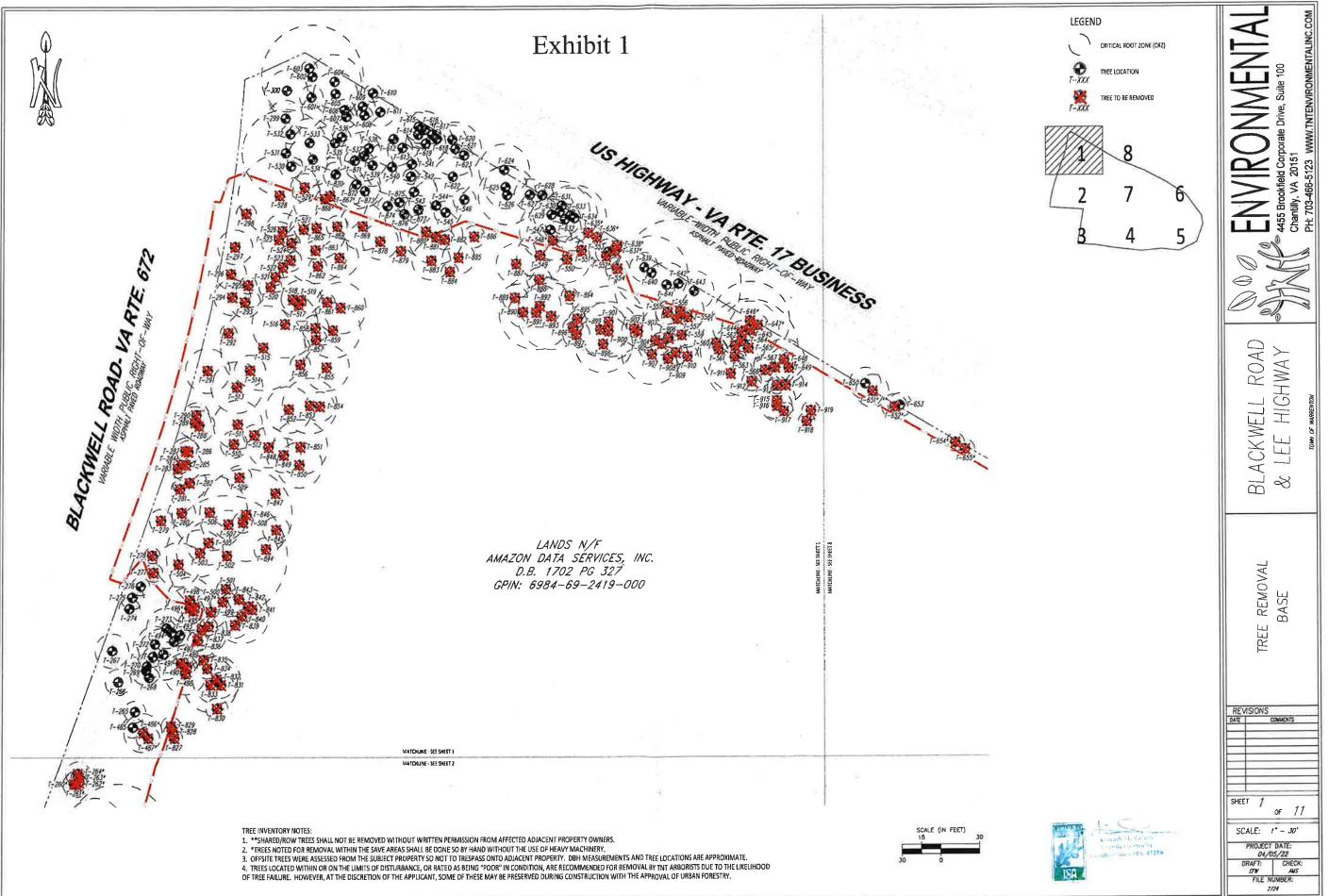
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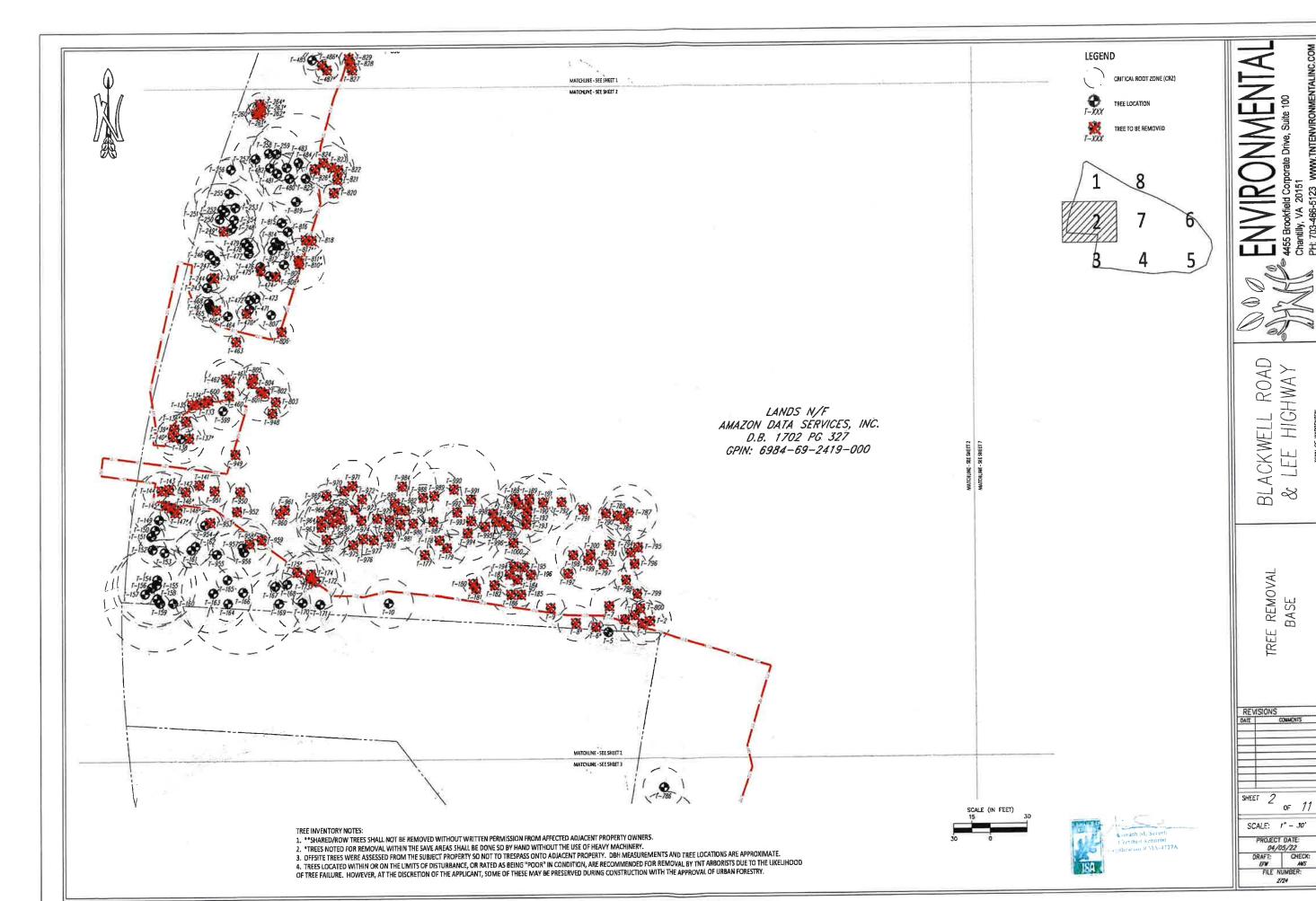
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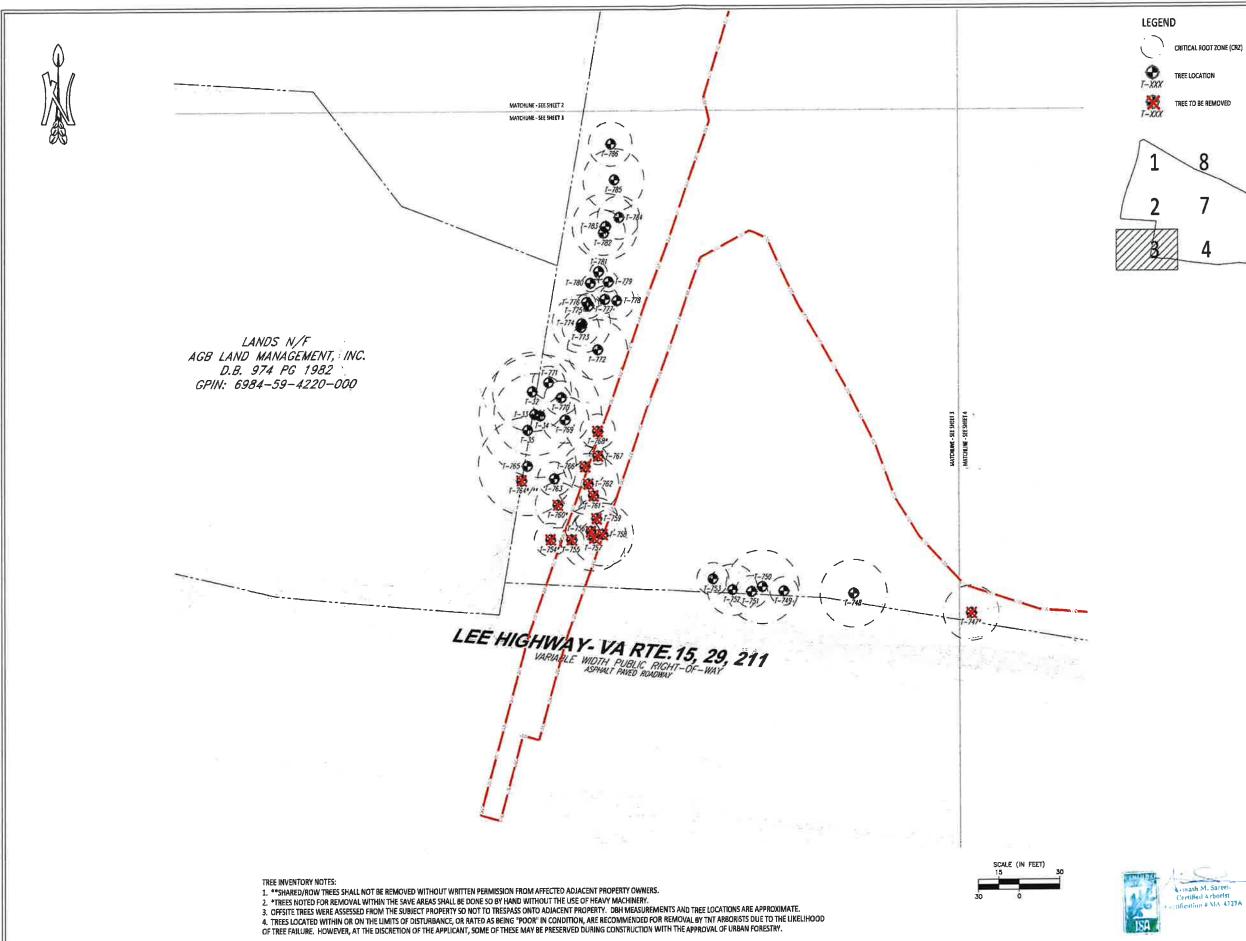
cc: Jay Reinke Umar Shahid Rebecca Ford Taylor Hicks, Esq. Jessica Pfeiffer

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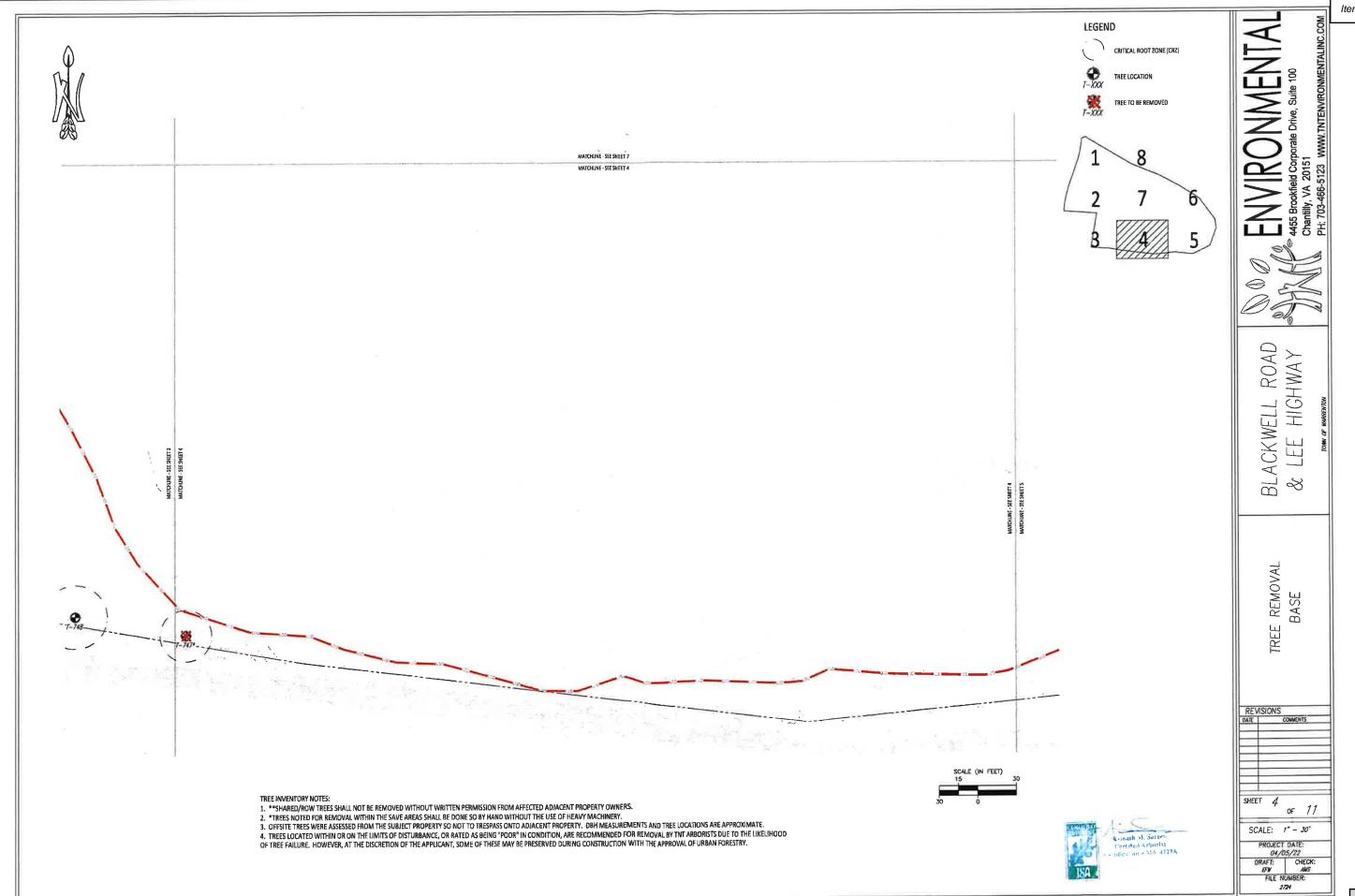






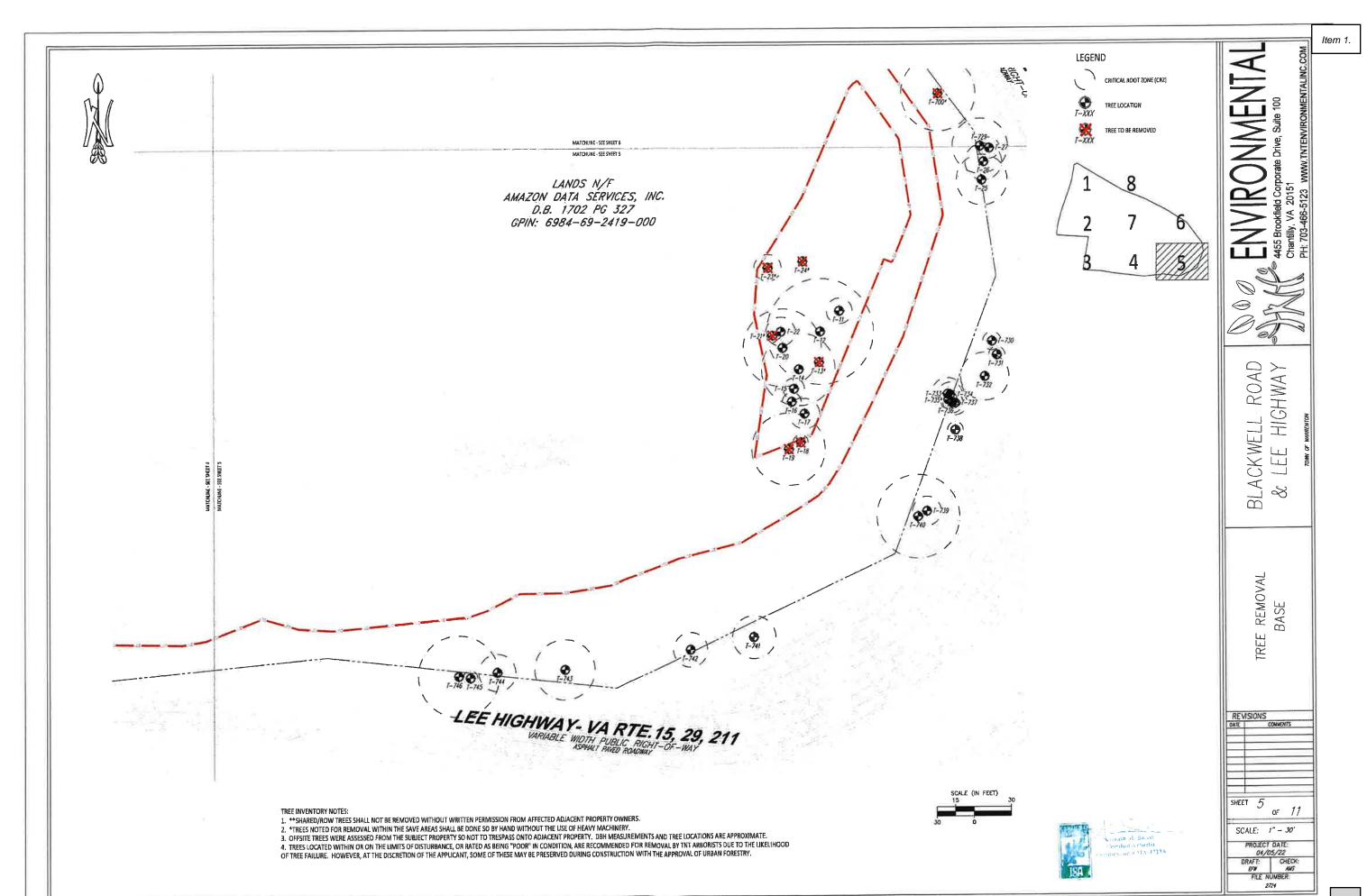


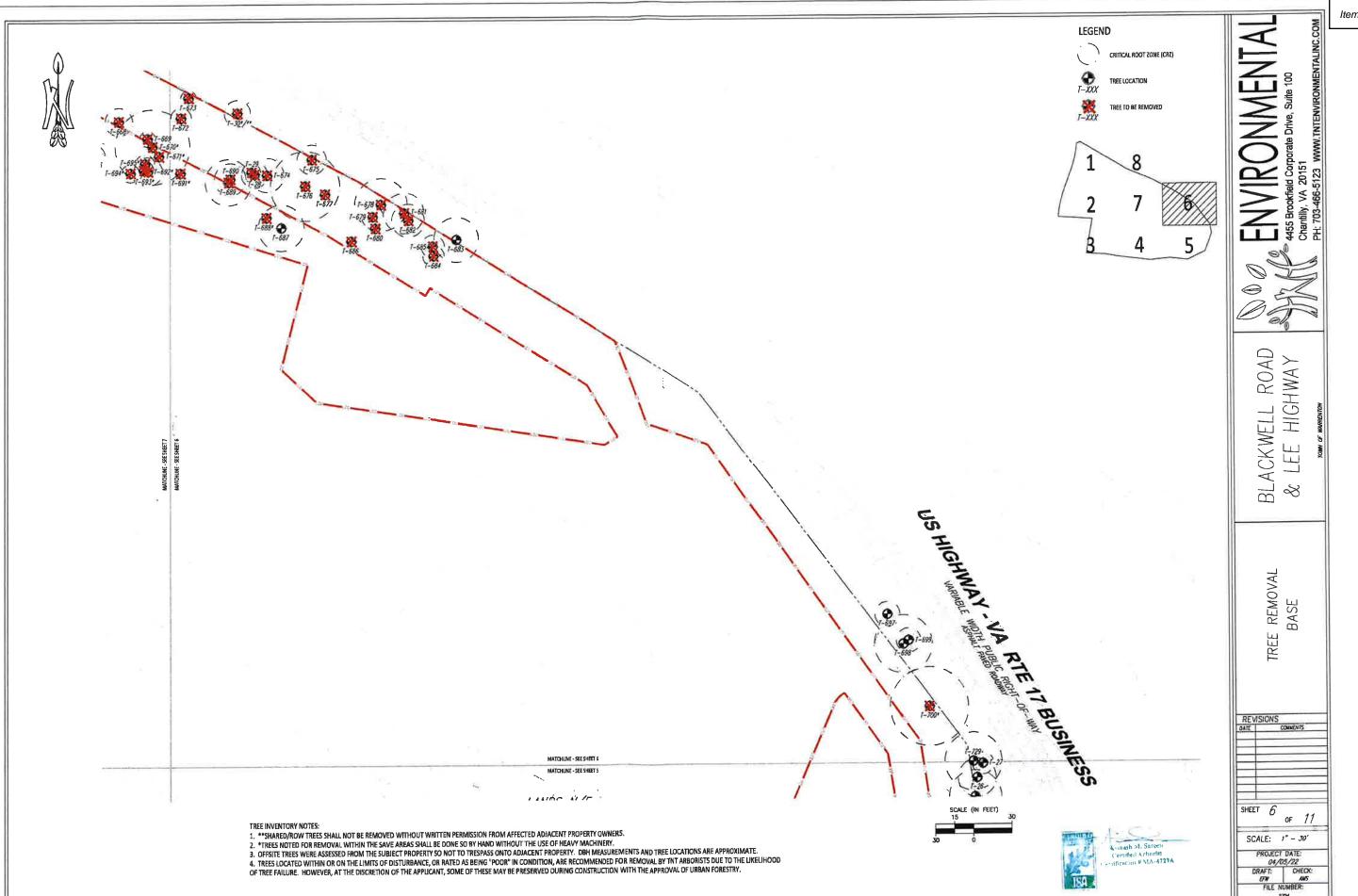
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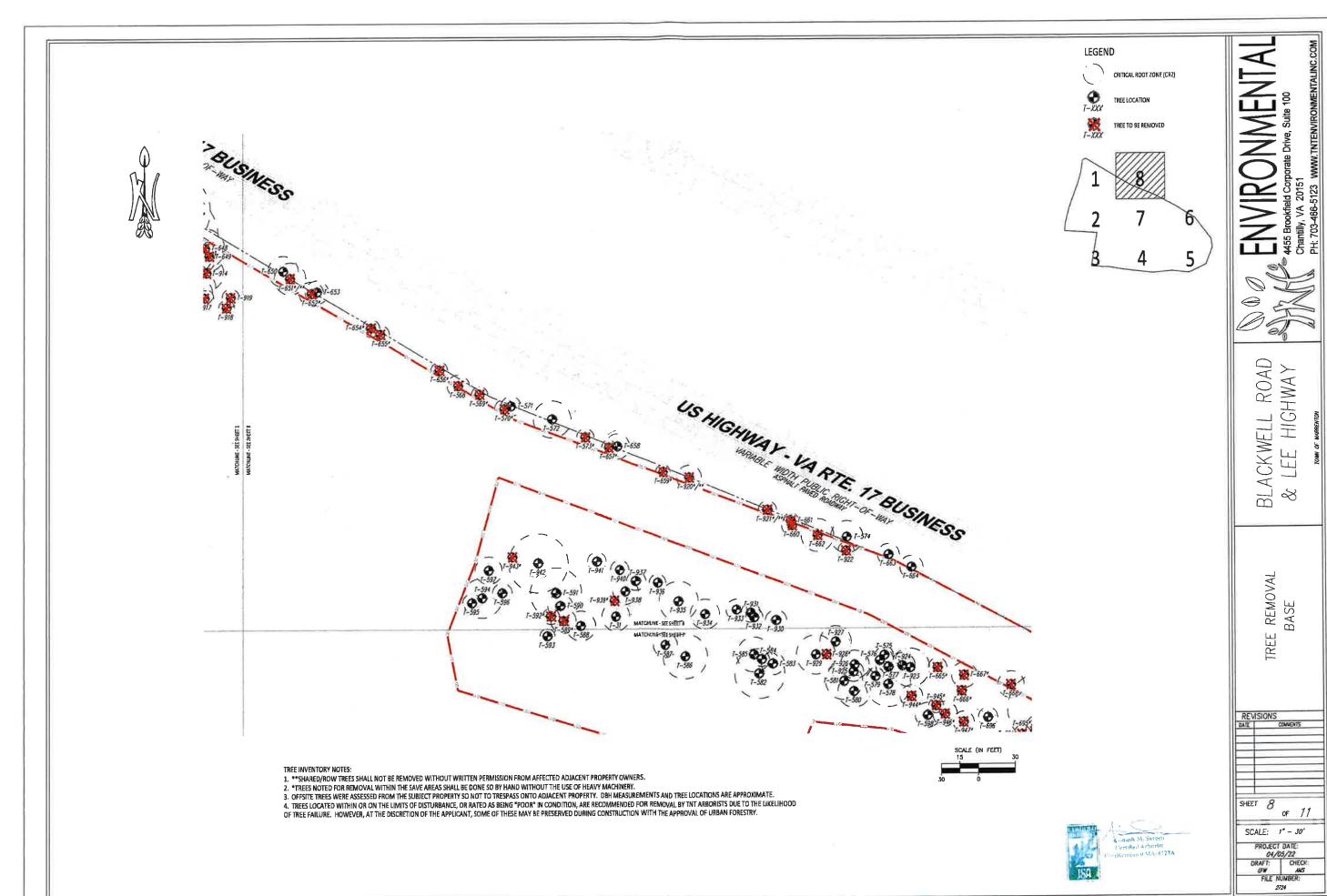
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Tree		Size	Critical Roct			Offsite or	Albert & Albert & Consumpted State	Tru s	Common Name	Site	Critical Root	Condition	Ramove	Offsite or	Notes & Arborist Recommendations
Number	Common Name	(Inches DBH)	Zena (feet)	Condition	Ramove	Shared	Notes & Arberist Recommendations	 mber	sassannis salens.	DBH)	Zone (foet)			Shared	Some dead limbs
1	Black Walnut	14.0	14.0	Fair. Fair	X		Dead and broken limbs CODIT, lower wound, and dead limbs	255 256	Fulip Poplar Black Locust	10.2	10.2	Good Poor			Mostly one-sided, several dead limbs, and vines in rangey
3	Black Walnut	17.1	17.3	Fair	X		Vines, and dead limbs Watersprauts, dead limbs, and lean in growth	257 258	Tulip Poplar Black Cherry	18.5	10.2	Fair			Deadwood at base, and vines in canopy Dense vines up trunk, and irregular growth
5	Pignut Hickory	7.0	7.0	Poor		Offsite	Double trunk, dead limbs, topped, and vittes	259	Tulip Poplar	22.0	22.0	Good	X*		Some dead limbs Several dead limbs, vines up trunk and in canopy. Recommended for removal due to invasive nature.
5	Black Walnut Hackberry	15.7	6.0 15.7	Foat	x.		Mechanical damage to fower stem, and root flare Vines	261	Tree of Heaven	10.1	10.1	Poor	X.		Several dead limbs, vines up trunk and in canopy, Recommended for removal due to invasive nature.
e e	Black Walnut	14.6	14.5	fair	X*		Vines, dead timbs, and small cavities	263	Tree of Heaven	63	63	Poor	X*	-	Several dead limbs, vines up trunk and in canopy. Recommended for removal due to invasive nature. Several dead limbs, vines up trunk and in canopy. Recommended for removal due to invasive nature.
10	Pignut Hickory Black Walnut	11.5 20.2	11.5 20.2	Fair.	×		Vines, and dead limbs Dead limbs, vines, and watersprouts	261	free of Heaven	9.4	9.4	Poer	χ•		Several dead limbs, vines up trunk and in canopy. Recommended for removal due to invasive nature.
- 11	Black Locust	10.4	10.4	fair fair			Vines Multi-trunk, vines, watersprouts, and some deadwood	265 266	Green Ash	10.3	10.3	Poor		-	Several dead limbs, and vines up trunk Several dead limbs, and vines up trunk
13	Red Maple Dead	410	43.0	Fair	X*			267	Tulio Poplar	11.1	13.1	Fair			Vines up trunk Some de ad limbs
15	Red Magle Back Cherry	29.7 8.7	29.7 8.7	Fair Fair		-	Vines, and dead limbs Sean in growth	268 269	Black Locust Black Locust	8.3 11.3	83	Fair Poor			Several dead limbs, and vines up trunk
16	Stack (ocurt	7.6	7.5	Fair			Vines, and dead limbs	270	Black tocust	10.3	10.3 7.5	Poor			Several dead limbs, and vines up trunk Several dead limbs, and vines up trunk
17	Black Locust Black Locust	12.4 6.1	6.1	Fair	×		Double trunk, and vines Vines, and lean in growth	271	Black Locust Black Locust	14.2	14.2	Fair			Double trunk, vines up trunk, and leaning
19	Black Locust	29.5	29.5	Fait	×		Multi-trunk, and vines Multi-trunk	273	Tulio Poolar Black Locust	15.6 5.1	21	Fair Poor			Triple trunk, one dead leader, and some dead limbs Several dead limbs, and vines up trunk
20	Red Maple Dead	31.5	31.5	Falt	X*		Matt. Dane	275	American Sycamore	9.1	9.1	Falt			Vines up trunk Vines up trunk
22	Black Locust White Ash	11.7	11.7	Fair	X*		Multi-Irunk, and vines	277	Tulip Poolar Tulip Poolar	7,1	7.1	Fair Fair	×		Vines up trunk
24	Dead		140		×.			278 279	Tulip Poplar Tulip Poplar	9.0	6.2 9.0	Good	x		Vines at base
25	Black Walnut	20.6 14.9	20.5 14.9	Fair		ROW	Dead limbs, and watersprouts	280	Tulip Poplar	10 #	10.8	Good	×		
27	Tree of Heaven	8.5	8.5	Eair	-	NOW	Sind and death and	281	Red Maple American Sycamore	13.2	13.2	Falt Good	x		Mostly one-sided, and vines up trunk
28	Black Walnut Black Walnut	7.2	7.2	Poor	X		Vines, and dead limbs Vines, dead limbs, and hollow	263	Cattonwood	7.3	7.1	Good	x		
30 31	Black Walnut	10.2	10.2	Poor fair	X+/++	AOW	Dead limbs, and vines Vines, and dead limbs	28A 28S	Tulip Poplar Tulip Poplar	12.3	6,2 12,3	Good	x		
32	Tulip Poplar	29.0	29.0	Fair		Offsite	Multi-trunk, watersprouts, and broken leader	286	Tulip Poplar	9.0	90	Good	x		
33	Sovelder Sovelder	300 450	30.0 45.0	fair fair			Multi-trunk, and ley Multi-trunk, and ley	287 288	Tulio Poplar Tulio Poplar	12.2	12.2	Good	X		
15	Dead	+	193			Offsite		789 250	Tulio Poplar	12.6	9.6	Good	X		
133	Black Locust Black Locust	100	10.0	Fair Fair	×		Dead limbs, dieback, wines, and watersprouts Dead limbs, dieback, vines, and watersprouts	291	Tulip Poplar Tulip Poplar	17.4	17.4	Good	×		Vines up trunk Vines in canopy
135	Black Locust	6.0	60	Fair	X.		Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	292	Bradford Pear Tulio Poplar	6.5	11.8	Fair Good	×		Vines in Gropy
136	Black Locust	3.5 10.0	8.5 10.0	Poor	×.		Dead limbs, dieback, vines, and watersprouts	294	American Sycamore	14.0	14.0	Falt	x		Vines up trunk
138	Pignut Hickory	20.0	70.0 14.5	Fair	X*		Dead limbs, dieback, wines, and watersprouts Dead limbs, dieback, wines, and watersprouts	295 296	Tulio Poplar Tulio Poplar	11.9	6.6 11.9	Good	×		Vines at base
140	Pigaut Hickory	14.1	14.3	Tair	Х*		Dead limbs, dieback, vines, and watersprouts	297 298	Tulio Poplar	13.4 2.6	7,6	Fair	×		Some dead limbs, and vines up trunk Dense vines in canopy
142	Black Locust Huckberry	16.0	16 0 6.3	Post Fair	x		Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	292	Pignut Hickory	14.2	14.2	Fair			Vines in canopy
143	Tutip Poplar	5.5	5.5	Fair	X		Doad limbs, double trunk, dioback, vinos, and watersprouts bead limbs, double trunk, dieback, vines, and watersprouts	460	Pignut Hickory Black Gurn	9.2	9.2	Fait	×		Double trunk, same dead limbs, and vines up trunk Vines, and dead limbs
144	Pignut Hickory Tulip Poplar	15.0 28.0	15.0 28.0	Fair Fair	X.		Dead limbs, dieback, vines, and watersprouts	461	Red Maple	17.7	17.7	Fair	×		Vines, and slight lean in growth Multi-trunk, and vines
146	Tulip Poplar Black Locust	8.0	11.0 #.0	Fair Poor	X*	_	Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	463	Red Maple American Sycamore	17.0 6.4	17.0 6.4	Fair Good	×		Vines
148	Black Lecust	14.0	14.0	Poor	X.		Qead limbs, dieback, vines, and watersprouts	U/A	Ewanton Cherry	16.2	16.2	Good			Vines Vines, and dead limbs
169	Pignut Hickory Pignut Hickory	8.0	8.0	Fair Fair	-	_	Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	465 466	Ewanzan Cherry Dead				X.		
151	Pignut Hickory	10.3	10.3	fair			Dead limbs, dieback, vines, and watersprouts	468	Kwanzan Chorry Kwanzan Cherry	12.4 11.2	12.4	Fair			Vines, and dead limbs Vines, and dead limbs
152	Pignut Hickory	11.2	11.1	Fair Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	470	Tree of Heaven	7.6	7.6	Fair	X*		Lean. Recommended for removal due to invasive nature.
154	Tully Poplar	11.3	11.3 32.0	Fair Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	471	Black Locust Black Cherry	2.4	10.6	Fair			
155 156	Tulip Poplar Tulip Poplar	32.0	32.0	Poor			Dead limbs, dieback, vines, and watersprouts	473	Green Ath	7.0 A.7	7.0	Poor			Emerald Ash Borer
157 158	Black Locust Red Maple	43.0	7.5 43.0	Fair Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, multi-trunk, dieback, vines, and watersprouts	474	Black Locust Orad	- 1.	8.7	Fair	X*		
159	Red Maple	7.5	7,5	Poor			Dead limbs, diebsck, vines, and watersprouts	476	Green Ash American Sycamore	7,2 12.8	7.2	Fair			Dead limbs Many small cavities, and vines
160	Pignut Hickory Pignut Hickory	14.0	14.0	Fair Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	47%	Tolip Poplar	7.0	7.0	Fair			Vines
162	Pignut Hickory	14.0	14.0	fair Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	480	American Sycamore Tulip Poolar	13.5 21.1	21.1	Fair Good	_		Vines Double trunk
163 164	White Oak Red Maple	14.0	32.0 14.0	Poor			Dead limbs, dieback, vines, and watersprouts	491	Tulto Poptar	16.2	152	Good			Watersprouts, and vines
165	Pignut Hickory Northern Red Oak	9.2 50.0	53.0	Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	483	Tulip Poplar Tulip Poplar	11.1	11.3	Good			Watersprouts
167	Pignut Hickory	60	6.0	fair			Dead limbs, dieback, vines, and watersprouts	484 485	Tuha Poplar Black Walnut	40.0 a.o	80	Fair	-		Double trunk, dead limbs, and vines Vines, and dead limbs
168	Tulip Poplar Tulip Poplar	25.5	25.5	Fair			Dead limbs, double trunk, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts	486	Black Locust	15.0	15.0	Poor	×*		Motiti-trunk , and vines Topoed Recommended for romoval due to invasive nature.
170	Tulip Poplar Tulip Poplar	22.5	22.5	Fair Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, watersprouts, and vines	488	Tree of Heaven Silver Maple	16.2	16.2	Poor Fair	x.		Dead limbs, and watersprouts
172	Tulip Poplar	24.0	24.0	Fair	×		Dead limbs, watersprouts, and vines	490	Red Maple	6.0	60	Fair Fair	X		Gead limbs, and water prouts
173	Tulip Poplar Tulip Poplar	11.0	11.0	Fair	X		Dead limbs, watersprouts, and vines Dead limbs, watersprouts, and vines	491	Tulip Poplar	20.0	20.0	Fair			Vines
175	Tulip Poplar	17,0	17.0	Fair	x.		Dead limbs, watersprouts, and vines	492	Tulip Poplar Red Maple	17.0	17.0	Good			
177	Black Walnut Black Walnut	8.0 A.5	#.5	Fair Fair	×		Dead limbs, watersprouts, and vines Dead limbs, watersprosits, and vines	494	Eastern Redcedar	8.0	8.0	Fair	- U-		Double trunk
179	Tulip Poplar Pignut Hickory	16.0	16.0 8.5	Fair Poor	×		Dead limbs, watersprouts, and vines bead limbs, watersprouts, and vines	495	Tulip Poplar Tulip Poplar	17.0	17.0	Good	x.		
181	Dead	-	- 7		×		Dead limbs, watersprouts, and vines	497 498	Red Maple	6.5	65 18.2	Good Good	X.	-	
183	Stack Walnut Tulip Poplar	16.0 5.5	160 8.5	Poor Fair	×		Dead limbs, watersprouts, and vines Dead limbs, watersprouts, and vines	499	Tulip Poptar Tulip Poplar	12.5	12.5	Good	×		
184	Black Walnut	16.0	160	Fair Fair	×		Dead limbs, watersprouts, and vines Dead limbs, watersprouts, and vines	500 501	Tulip Poplar Pin Oak	7.1	7.1	Poor Falt	×		Large cavity at base Vines
185	Pignut Hickory Pignut Hickory	9.5 16.0	9.5 16.0	Fair Fair	×		Dead fimbs, watersprouts, and vines	502	Cottonwood	47.1	47.1	Fair	x		Multi-trunk, and dead limbs Multi-trunk, dead limbs, and deadwood
187 188	Tulip Poplar Tulip Poplar	13.9	13.2	Fair Fair	×		Crooked trunk, and co-dominant stems Covered in dense vines	503	Red Maple Red Maple	18.3	18.3	Fair Fair	×		Multi-trunk
189	Tulip Poplar	18.4	15.4	Good	×		1.000-22-200-20110711	505	Red Maple	17.0	17.0 29.5	Good	×	-	Vines Couble trunk, and dead timbs
190	Tulip Poplar	23.7	23.7	Fair	×		A few small broken limbs Poor branch formation, and covered in dense vines	506 507	Red Muple Green Ash	29.5	11.2	Foor	×		Emerald Ash Sorer
192	Tulip Poplar	22.0	22.0	Fair	X		Co-dominant stems	509	Green Ash Green Ash	9.5	9.5	Poor Fair	×	-	Emerald Ash Borer Lean in growth
193	Tulip Poplar Tulip Poplar	18.3	10.5	fair Fair	X		Groken leader, and covered in vines Covered in vines, and several dead and broken limbs	510	Mackemut Hickory	10.5	10.5	Good	X		
195	Flowering Dogwood Black Walnut		11.0 7.3	Poor Fair	×		Double trunk, and mostly dead Co-dominant stems, and covered in vines	511	White Oak Mockernut Hickory	19.0	19,0 8.5	Fair Good	X		Dead limbs, and deadwood Dead limbs
196 197	Pignot Hickory	6.3	6.3	Fale	×		Covered to vines	513	White Oak	20.0	20.0	fair	×		Dead limbs, and deadwood
198 199	Pignut Hickory Pignut Hickory	6.4	6.4	Good	×		Covered in vines One-sided	514	Red Maple White Dak	12.0 31.0	12.0 33.0	Good Fair	×		Doad limbs, and deadwood
200	Tulip Poplar	29.0	29.0	Fair	Ŷ		Several dead and broken limbs	516	White Ook Tulip Poplar	26 0 6.2	25 Q 6 2	Fair Fair	X	-	Dead limbs, and deadwood Vines, and dead limbs
243	Black Oak Black Qak	9.8	9.8	Fair			Some dead limbs, and vines up trunk Some dead limbs, and mostly one-tided	517 518	Tulip Poplar	9.0	9.0	Fair	×		Vines, and dead limbs
245	Dead	*.	397	Tair	X*		Several dead limbs, and vines up trunk	519 520	Tulip Poplar White Oak	9.0	16.1	Good Fair	×		Dead limbs, and deadwood
246 247	Black Locust	8.2	11.0 8.2	Fair			Several dead limbs, and vines up trunk	521	White Oak	6.2	6.2	Fair	×	-	Dead limbs, and deadwood Dead limbs, and deadwood
248 249	Northern Red Dak Dead	19,1	19.1	Poor	X*		Mostly dead	522	White Oak Mockernut Hickory	8.5	8.5	Fair Fair	×		Dead limbs, and deadwood
250	Yulip Poplar	29.2	29.2	Fair			Some dead limbs, and vines up trunk	524 525	Tulip Poptar Tulip Poptar	7.0	7.0	Fair Fair	×	1	Dead limbs, and deadwood Dead limbs, and deadwood
251 252	Cottonwood Fulip Paplar	21.4	17.3 21.4	Good			Same dead limbs	576	Tulip Poplar	14.0	14.0	Fair	×		Dead limbs, and deadwood
253 254	Tulip Poplar	11.4	11.4	Fair			Cavity up trunk Some dead limbs	527	Mockemut Hickory Northern Red Oak	11.0	32.0	Fair Fair	X		Dead timbs, and deadwood Dead timbs, and deadwood
125	Tulip Poplar	d-MA			_	_					1000				The state of the s

December Company Com	-				,				
Section Column			Common Name	Site		Condition	Ramove		Notes & Arbertst Recommendations
December	Nu	mber	Locumbal Comme		Zone (fost)			Shared	
		255	Tulip Poplar		28.2	Good			
Part					10.2	Poor			
		257	Tulip Poplar						
No.									
The comment of the control of the									
Description									Several dead timbs, vines up trunk and in canday, Recommended for removal due to invalve nature.
Section of the company of the comp								_	Serveral dead limbs, when up trunk and in carego, herometrical for removal due to invalve nature
Description Company								-	Several dead limbs, wines up trans and in carpory. Recommended for removal due to invative nature
Post March									Several dead limbs, times up truck and in cancer. Recommended for removal due to invaline octure.
								_	Several dead timbs, and vices up truck
Best Section Column Co									
Section 1									
Page									
Page									
Page Billion page 1				7.8		Poor			Several dead limbs, and vines up trunk
				14.2	14.2	Fair			Double trunk, vines up trunk, and leaning
			Tulio Poolar	15.6	15.6	Fair			
		274	Black Locust						
Total Property 12 12 13 15 16 16 17 18 18 18 18 18 18 18		275	American Sycamore						
Total Professor 1.5									
									Vines up trunk
									Waterstone
									Vints at oase
								_	Martin and Alded and Martin on trink
1932								_	POLYTIE POLY, JULY HELD WAR
								-	
Fig. Teph regist 12.1									
1982 Triphyspider 10 10 10 10 10 10 10 1									
1812 Typis Person 1912 1913 1904									
1912 Tujis Pester 132 132 132 105									
190									
1911 The Property 12 15 50ed X William 1911 11 11 11 11 11 11									
							X		
1932 Tuber Personal 1.5							×		
Part Perglan 1.18				6.5	6.5	Fair	X		Vines in canopy
200 Total Pedat		293	Tulio Poplar	11.7	11.5				
Mail program 13-0 11-0 Cool X									Vines up trusk
1972 Table Popler 11-6									TOPICO DE ESC.
Page Continuement 7.6 7.6 7.0 7.5 7.0 7.5 7.0 7.5 7.0 7.5									
Page of Michael 12									
December 15.1 16.							-		
Section							_		
Heart Mode							v		
Administration 19									
April Comp.									
Word									
60									Vines
650									Vines, and dead limbs
Sea							X.		The state of the s
271 Bast Leonart 76 76 Fair V Lean, Recommended for namous Que to invasible nature.		467	Kwanzan Chorry	12.4	12.4	Fale			
Birt Learnst 10.6 10.6 Fair		468	Kwantan Cherry	11.2	11.2	Fair			
272 Elect Cherny 7.4 7.4 Fair		470	Tree of Heaven	7.6		Fair	X*		Lean. Recommended for removal due to invasive nature.
273 Green Ann. 70 70 Prop.									
# # # # # # # # # # # # # # # # # # #			Black Cherry				_	_	
275 CAS								_	Emerald Ash Boror
15 Green Abb 2,2 7,2 Fair Mountain State 1,24 1,2				A.7	8.7	Fair			
277 American Spriamore 12.6 12.6 Poor							Α-	-	Destinate
18							_		
15									
Add							_		
493									
Main									- Aligna mc
149 1 Tulip Poplar 11.1 11.3 Good									Watersprouts, and vines
Math									
MSS Black Nathout BO BO Fait Wines , and decad limbs									Double trunk, dead limbs, and vines
Black Locust 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.1 15.2				ao.		Fair			Vines, and dead limbs
### Tepe of Reywarn 9.2 9.2 9.0 9.2 9.2 9.0 ### Solver Maple 15.2 15				15.0	15.0	Poor	×*		
BP		457		9.2	9.2	Poor	x.		
Begin Red Maple 80 80 Fair X Dead limbs, and watersprouts				16.2					
Page Tulip Popular 20.0 20.0 Fair Vines			Red Maple				-		Goad limbs, and watersprouts
Tylio Poplar 170 170 Good							X	_	pencs
Part							-	-	Vines
Eastern Redecedar 8.0 8.0 Fair Double trunk							-	-	
295 Tulip Poplar 9.0 9.0 Seed X*							-	_	Double trusk
Page Tulip Poplar 17:0 17:0 Good X*							U-	_	productions.
1977 Red Maple 6.5 6.5 Good X 1988 Tulip Poplar 18.7 18.2 Good X 1999 Tulip Poplar 19.2 19.2 Good X 1900 Tulip Poplar 19.3 19.2 Poper X 1901 Tulip Poplar 19.3 19.2 Poper X 1902 Tulip Poplar 19.3 19.3 Falt X 1902 Cottonwood 47.1 47.1 Falt X 1902 Cottonwood 47.1 47.1 Falt X 1903 San Maylar 18.3 18.3 18.3 Falt X 1904 Red Maple 17.2 17.2 Falt X 1905 Red Maple 17.2 17.2 Falt X 1905 Red Maple 17.0 17.0 Good X 1905 Red Maple 17.0 17.0 Good X 1906 Red Maple 29.3 29.5 Falt X 1907 Green Ash 11.2 11.2 Fopor X 1908 Green Ash 10.3 8.0 8.0 Popor X 1909 Green Ash 8.0 8.0 Popor X 1909 Green Ash 8.5 9.5 Falt X 1909 Green Ash 8.0 8.0 Popor X 1909 Green Ash 8.5 9.5 Falt X 1909 Green Ash 8.0 8.0 Popor X 1909 Green Ash 8.0 Red Maple								1	
1						_			
100								_	
102 102 102 102 102 103 103 104 105									
									Large cavity at base
Sol									
1933 Red Maple 18.3 18.3 Fair X Multi-trunk, dead limbs, and deadwood									Multi-trunk, and dead limbs
See Med Maple 17.2 17.3 Fair X Multi-trumh									Multi-trunk, dead limbs, and deadwood
See No. See					17.2	Fair	×		
Soc						Good	×		
Sof Green Ash 112 112 Foor X Emertal Ash Borer		506		29.5					
Section Sect		507	Green Ash						
Si0 Merckernut Fickery 10.5 10.5 Good X								-	
State		509	Green Ash					_	Lean in growth
State		510	Mackemut Hickory						
State Stat								-	
Side Red Maple 12.0 12.0 Good X Dead limbs, and deadwood Side								-	
S15								-	Dead Ilmos, and deadwood
Side								_	Post links and deathered
S17 Tulip Poplar 6.2 6.2 Fair X Vices, and dead limbs								_	
Sile Tulip Poplar 3-0 9-0 Sale X Vines, and dead limbs								_	
Signature Sign								1	
520 White Oak 9.0 9.0 Fair X Dead limbs, and deadwood									LUBA ELEMENTARIO E
121 White Oak 6.2 6.2 Fair X Dead limbs, and deadwood	\vdash								Dead limbs, and deadwood
S22	-								Dead limbs, and deadwood
533 Mockemus Hickory 8.5 E.5 Fair X Dead limbs, and deadwood 534 Tulip Poplar 7.0 7.0 Fair X Dead limbs, and deadwood 535 Tulip Poplar 14.0 14.0 Fair X Dead limbs, and deadwood 536 Tulip Poplar 14.0 14.0 Fair X Dead limbs, and deadwood 537 Mockemut Neckory 11.0 11.0 Fair X Dead limbs, and deadwood									Dead limbs, and deadwood
524 Tolio Poplar 2.0 7.0 Fair X Dead limbs, and deadwood 535 Tulio Poplar 14.0 14.9 Fair X Dead limbs, and deadwood 336 Tulio Poplar 14.0 14.0 Fair X Dead limbs, and deadwood 337 Mockemut Nekory 11.0 11.0 Fair X Dead limbs, and deadwood					8.5		×		
535 Tulip Peplar 14.0 14.0 Fair X Dead limbs, and deadwood 536 Tulip Peplar 14.0 14.0 Fair X Dead limbs, and deadwood 337 Mookemat Nekory 11.0 11.0 Fair X Dead limbs, and deadwood	-				7.0		×		
526 Tulip Poplar 16.0 14.0 Falr X Dead limbs, and deadwood 527 Mockernut Hickory 11.0 11.0 Fair X Dead limbs, and deadwood				14.0				_	
						I fale	l X	1	Dead limbs, and deadwood
S28 Northern Red Oak 320 320 Fair X Dead timbs, and deadwood	E	576	Tulip Poplar					+	20.14010.0010.001
The state of the s		526 527	Tulip Poplar Mockernut Hickory	11.0	11.0	Fair	×		

BLACKWELL ROAD & LEE HIGHWAY

SHEET 9 OF 11 SCALE: NTS PROJECT DATE
04/05/22

DRAFT: CHECK:
DW AMS
FILE NUMBER:
2724

Contact of Smeath Contact Charles (Carling Contact of C

REVISIONS COMMENTS

Tree Number	Common Name	Size (Inches DBH)	Critical Root Zone (feet)	Condition	Remove	Offsite or Shared	Noiss & Arbortal Recommendations
529 530	White Oak Mockernut Hickory	9.0	90	Fair	X*		Watersprouts
511	White Dak	340	ио	Fale			Double trunk, dead limbs, and deadwood
532	White Oak	7.5	7.5	Fair	-	_	Dead limbs, and deadwood Dead limbs, and deadwood
533	Meckernut Hickory White Oak	20.0	20.0	Fair			Dead limbs, and deadwood
535	Northern Red Oak	21.0	21.0	Fair			Dead limbs, and deadwood
516	Pignut Hickory	7.0	7.0	Fair	_		Dead limbs, and deadwood Dead limbs, and deadwood
537	Tulip Poplar Pignut Hickory	19.0	19.0 # 5	Fair			Dead limbs, and deadwood
539	Pignut Hickory	16.2	16.2	Fair			Dead limbs, and deadwood
540	Pignut Hickory	210	21.0	Fair			Dead limbs, and deadwood
541	Pignut Hickory	15.2	13.7	Fair	_	_	Dead limbs, and deadwood Dead limbs, and deadwood
543	Tulia Poplar Tulia Poplar	19.0	18.0	Fair	_		Dead limbs, vines, and deadwood
544	Tulip Poplar	21.0	21.0	Good			
545	Tulip Poplar	9,0	9.0	Fair			Vines, and dead limbs
546	Pignet Hickory	9.0	24.0	Good	_	_	Dead limbs, and vines
548	Tulip Poplar Tulip Poplar	15.0	150	Fair	x.		Dead limbs, and small cavity at base
549	Tulip Poplar	18.2	18.7	Falr	×		Couble trunk, and dead limbs
\$50	Northern Red Oak	18.0	18.0	Poor	×		Vines, dead limbs, and deadwood Dead limbs
551	Northern Red Oak	10.0	10,0	Fair	X.		Dead limbs, and deadwood
553	Black Cherry Black Cherry	10.0	100	Fair			Dead limbs, and deadwood
554	Black Cherry	9.0	90	Fair	×		Dead limbs, and deadwood
555	Tree of Heaven	9.0	90	Fair	X		Dead limbs, deadwood, and watersprouts Dead limbs, and deadwood
558	Tulip Poplar	19.0	19.0	Fair Fair	×		Dead limbs, and deadwood Dead limbs, and deadwood
557 558	Northern Red Oak	7.2	7,2	Fair	x		Dead limbs, and deadwood
550	Dead				×		
560	Dead	4		- 4	×		Dead limbs
561	Black Gum Black Walnut	7.2	105	Fair	×		Dead limbs, and deadwood
563	White Oak	9.0	2.0	Fair	×		Dead limbs, and deadwood
564	White Oak	8.0	8.0	Fait	X		Dead limbs, and watersprouts
565 566	Tulip Poplar	38.0 9.0	380	Fair	×		Dead limbs, and deadwood Dead limbs
567	Tulip Poplar Tulip Poplar	16.0	16.0	Fair	×		Dead fimbs, and watersprouts
168	Tulip Poplar	9.0	9.0	Good	×		Vines
569	Mack Walnut	6.5	65	Fair	х.		Vines, and dead limbs Vines
571	Black Walnut	8.0	80	Fair Fair	x.		Dead limbs, and watersprouts
572	Black Cherry	15.0	150	Fale		ROW	Lean in growth, vines, and dead limbs
573	Black Walnut	7.0	7.0	Fair	X.		aW.C.
574	Black Cherry	130	110	Poor	_	ROW	Dead limbs, vinet, and deadwood
575 576	Black Walnut Black Walnut	11.0	11.0	Four			Dead limbs
577	Black Cherry	10.0	10.0	Poor			Dradwood, drad limbs, and conks
578	Black Cherry	28.0	18.0	Poor	_		Dead limbs, deadwood, and dead leader Vinos
580	Black Walnut Black Walnut	13.0	13.0	Good			Vines, and dead limbs
581	Black Walnut	150	15.0	Fair			Vines, and dead limbs
582	Black Walnut	20.0	30.0	Fair			Vines, and dead limbs
\$83	Huchberry	9.0	90	Fall	_		Vines, and dead limbs
584	Black Walnut Black Walnut	140	14.0	Poor			Topped
586	Black Walnut	18.0	18.0	Fair			Dead limbs, deadwood, and vines
587	Black Walnut	10.0	100	Fair			Dead limbs, deadwood, and vines Dead limbs, deadwood, and vines
583	Black Walnut free of Heaven	10.0	12.0	Fall Poor	¥.		Dead limbs, deadwood, small cavity, and vines. Recommended for removal due to invasive nature.
590	Black Walnut	9.1	9.8	Fair			Dead limbs, deadwood, and vines
591	Black Walnut	20.5	20.5	Fair			Dead limbs, deadwood, and vines
592	Black Walnut	6.5	60	Fair	х.		Dead limbs, deadwood, and vines. Recommended for removal due to invasive nature. Dead limbs, dieback, vines, and watersprauts.
594	Black Walnut	160	16.0	Fair			Dead limbs, dieback, vines, and watersprouts
595	Black Walnut	7.5	7.5	Falt			Dead limbs, dieback, vines, and waterspropts
596	Black Walnut	8.0	8.0	Fair			Dead limbs, dieback, vines, and watersprouts
597	Black Walnut	10.0	10.0	Fair			Dead limbs, dieback, vines, and watersprouts Dead limbs, dieback, vines, and watersprouts
599	Tulio Poplar	15.1	15.1	Fale			Dead limbs, dieback, vines, and watersprouts
600	Tulip Yoplar	7.6	7.6	Fair	x		Dead filmbs, dieback, vines, and watersprouts
501	Pignut Hickory	9.3	9.1	Good	-		Covity at base, several dead limbs, and hollow sound
503	White Oak Tulip Poplar	63	63	Good			AMERICA DE SOMPHE SE PERME SER ME PORTES SE MA PROPERTIE.
504	P'enut Hickory	21.0	21.0	Good			
605	Fignut Hickory	17.4	17.4	Poor	-		Deadwood up trunk, funçal growth up trunk, and several dead limbs
607	Tulip Poplar	86	8.6	Good	1		Sweeping growth
608	Pignut Hickory	6.7	67	Good			- Control Annual
609	Fignut Hickory	5.8	98	Good			200000000000000000000000000000000000000
610	Tulto Popiar	7.0	7.0	Good		Shared	Some vines up trunk One-sided with some vines
611	Tulip Poplar Fignut Hickory	21.1	21.1	Good			Some dead firmbs
613	Tulip Foplar	7.8	7.8	Good			
614	Tulip Poplar	6.7	5.7	Good			Sweezing growth Large cavity near base
615	Tulip Poplar Tulip Poplar	11.7	14.4	Good			Mostly one-sided
617	Tulip Poplar	6.0	68	Good			Mostly one-sided
618	Tutio Poplar	12.2	12.2	Good			Vines up trunk, and mostly one-sided
619	Tulip Poplar	15.6	11.3	Good		ROW	Decay at base
621	Tulip Poplar Tulip Poplar	20.8	20.8	Falr			Vines in canopy, and some dead limbs
622	Tulip Poplar	15.2	15.2	Good			Yines up trunk
623	White Oak	6.7	6.7	Fair	-	Post	Vines up trunk, and some dead limbs Vines on trunk
624 525	Tulip Poplar White Duk	16.6	20.0	Good Fair		ROW	Vines up trunk Vines up trunk, swelling at base, and some dead limbs
626	Northern Red Oak	22.9	22.9	Fair			Vines up trunk, and several dead limbs
627	Pignut Hickory	12.3	17.3	Fair			Vines up trunk, and several dead limbs
628	Fignut Hickory	M	88	Good		Shared	
610	Tulip Poplar Tulip Poplar	23.4	23.4	Good			Several dead limbs
631	Northern Red Oak	9.1	9.1	Fair		Shared	Masthy one-sided, and vines in canagy
632	Tulio Poplar	12.1	12.1	Good			Vines up trunk
633	Tutip Poplar	21.1	21.1	Poor	-	_	Missing too Some dead limbs
634	Tulip Poplar Dead	25.4	25.4	Good	X*		Some State Inner
635	Dead				X.		
637	Dead		- :	74	x.		
638	Dead		1		X*	_	Was in the Control of
639	Fignut Hickory Tulip Poplar	28.4	28.4	Good	_	-	Vines up trunk Some dead limbs
	re-rain magnet						Some dead limbs
641	Tulip Poplar	17.4	17.4	Good	_		Double trunk, and some dead limbs

Tree	Common Name	Size (inches	Critical Root Zone (leat)	Condition	Ramove	Official or Shared	Notes & Arborist Recommendations
643	Black Walnut	15.6	15.6	fair			Some dead timbs
644	White Oak Black Walnut	22.3	22.3	Cood	x		Some dead limbs
616	White Oak	80.3	301	fair fair	x.		Several dead limbs, and mostly one-sided Some dead limbs
647	Black Cherry Tulip Poplar	16.0	150	Fair	×		Vines in canagy
650	Green Ash Tulip Poplar	12.3	11.6	Fair	×	RDW	Vines in canepy Dense vines up trunk and in canepy
651	Tulip Poplar	12.6	12.0	Fair	X-/	Shared	Dense vines up trunk and in canopy
652	Tulip Poplar Mulberry	9.8	98	Fair Poor	×.	NOR	Dense vines up trusk and in canopy Dense vines up trusk and in canopy
654	Green Ash	7.0 7.4	7.0	Poor	x.		Dense vines up trunk and in canogy Dense vines up trunk and in canogy
655	Green Ash Black Walnut	6.7	6.7	Fair	χ*		Vines in canopy
657 658	Black Walnut Boxelder	10.2	101	Poer	x.	NDW	Dease vines in canapy Dease vines in canapy
650	Black Walnut	6.0	6.0	Fair	х•		Dense vines in canopy
661	Black Walnut Black Walnut	62	<u>84</u> 62	Fair	×		Dense vines in canopy Dense vines in canopy
667	Black Walnut	13.7	13.2	Fair	x	2011	Dense vinos in canopy Dense vines in canopy
661	Black Cherry Black Cherry	93	93	Poor		ROW	Dense vines in canopy
665	Black Walnut	7.6	7.6	Pour	X.		Dense vings in canopy
665 667	Dead Hatkberry	10.2	10.2	Poor	X*		Failed top, and dense vines
668 669	Tulip Poplar Stack Walnut	10.8 G.1	10.8	Fair	×		Dense vines up trunk Failing trunk, 3ed dense vines up trunk
670	Tulip Poplar	29.0	29.0	Fair	X*		Derse vines up trunk
671	Black Walnut	81	81	Fair	X.		Vines in canopy
673	Black Walnut	60	50	Fair	×		Vines up trunk Vines up trunk
674	Black Walnut Black Cherry	13.2 11.4	13.2	Fair Fair	×		Vines up trunk
676 677	Tulip Poplar Dead	27.0	27.0	Fale	×		Vines up trunk
678	Tulip Poptar	20.3	20.1	fair	×		Dense vines up trunk
679 880	Black Cherry Dead	AS	A.S	Fair	×		Dense vines up trunk
681	Black Wafnut	15.7	15.7	Fair	х		Dense vines up trunk Dense vines up trunk
682	Black Walnut Buxelder	17.4	12.6	Fair	×	now	Double trunk, and dense wines up trunk
684	Black Walnut	84	8.4 9.0	Fair Fair	×		Dense vines up trunk Dense vines up trunk
686 686	Black Walnut Dead	90			×		
687 688	Black Walnut Dead	17.5	17.9	Fair	x.		Dense vines up trunk
689	Black Walnut	18.0	18.0	Fair	×		Dense vines up trunk
690 691	Black Walnut Dead	12.4	12.4	Tait	X.		Densy vines up trunk
4/12	Tree of Heseen	11.1	11.1	Fair	X.		Dense vines up trunk. Recommended for removal due to invasive nature. Dense vines up trunk. Recommended for removal due to invasive nature.
694	Tree of Heaven	7.8	7.8	Fale	X.		Dense vines up trunk. Recommended for removal due to invasive nature
Q95 C96	Tree of Heaven Black Cherry	7.4	7.4	Fair	X*		Dense vines up trunk. Recommended for removal due to invasive nature. Mostly dead
696 697	Eastern Redcedar	9.7	9.7	Fair		ROW	Double trunk, and dense vines up trunk
629	Slippery tim	22.5	9.4	Fair	-	ROW	Vines up trunk Vines up trunk
700	Bradford Pear	30.5	30.5	Fair	x.	NOW	Double trunk, and poerly gruned for powerlines. Recommended for recreval due to invasive nature. Vines up trunk
729	Black Walnut Eastern Redcedar	7.4	7.4	Fair		AOW	Several small dead limbs
731	Eastern Redcedar Tulip Poptar	5.5 19.5	195	Good	-	ROW	Several small dead limbs
711	Black Cherry	13.2	13.2	Poor			Mostly dead, and vines up trunk
734 735	Eastern Redcedar Tree of Heaven	7.1	7.1	Fair	X*		Mostly doad, and many doad limbs Foorly pruned for powerlines. Resummended for removal due to invasive nature.
735	Penimmon	8.7	9.3	Fait Poor		ROW	Vines up trunk Poor form, and watersproots
737	Penimmon	98 64	6.4	Fair		ROW	Vines up trunk
739	Tulip Poplar	11.8	118	Fair Good	-	ROW	Vines up trunk Double trunk, and vines up trunk
741	Bradford Pear	17.4	17.4	Fair		ROW	Double trunk, and vines up trunk
742	Red Muple Utack Cherry	24.4	140	Fair			Vines up truck, and in canopy Foorly pruned for powerlines, and vines in canopy
744	Black Cherry	15.1	15.1	Fair		ROW	Poorly pruned for powerlines, and vines in casopy Vines up trunk, and some dead limbs
745	Red Maple Red Maple	13.0	330	Fair		ROW	Multi-trunk, poorly pruned for powerlors, and several dead limbs
747	Black Cherry Red Muple	20.2	202	Foot	x.		Dradwood at base, dente vines, and many dead flimbs Multi-trunk, several dead limbs, and vines up trunk
729	Red Maple	10.4	104	File			Vines in canapy Double trunk, some dead fimbs, and vines up trunk
750 751	Black Cherry Eastern Redcedar	27.0	11.8	Fair Fair			Vines up trunk, and some dead limbs
752	Tulip Poplar	18.8	16.3	Fair Poor		-	Pruned for powerlines, one-sided, and English by up trunk Deme xines up trunk, and many dead limbs
751 754	Stack Cherry Soxelder	12.1	12.1	Poor	X*		Mostly dead
755 756	Stippery Dm	8.8 6.4	88	Fair Tale	×		Dense vines ua trank Vines in canapy
757	American Sycamore	24.0	240	Fale	×		Dense vines up trunk Dense vines up trunk
75A 759	American Sycamore Tulis Poplar	23.0	154	Fair Poor	X		Failed crown, vines up trunk, and poor form
760	Bovelder	16.7	16.7	Poor	x.	\vdash	Mostly steed Vines up trunk
761	Perummon Tulio Peolar	22.3	30 223	fair fair	X		Several dead limbs
763 764	Boxelder	12.4	124	Fair	x-/	Shared	Deme vines in caregy
765	Dead Stack Cherry	36.0	36 O	Poor		1	Mostly dead
767	Tulip Poptar Bovelder	15.4	64	Fair	X*		Dense vines in conopy Vines up trunk
768	Black Walnut	12.8	12.8	fair	X*	-	Vines up trunk Corrected growth some dead limbs, and vines in canopy
770	Boxelder Boxelder	17.0	17.0	Fair			Dense vines up trunk
771	Hackberry	12.1	12.1	Fair		+	Dente vines up trunk Dente vines up trunk
773	Soveider Saxeider	13,4	13.4	Poor			Mostly dead
774	Hackberry Boxelder	2L2	92	Fair		-	Dense vines up trunk Oense vines up trunk
776	Hackberry	6.6	6.6	Fair			Vines up trunk
777	Hackberry Black Walnut	100	134	Fair			Vines up trunk Vines up trunk, and pruned for powerlines
779	Soxelder Hickberry	7.3	7.3	Poor			Poorly pruned for powerlines, and many dead limbs Dense vines up trunk
750	/Sickberry	62	6.2	Fair	1	1	Dense vines up trunk
781	Hackberry	6.2	62		-		
781 782	Hackberry Hackberry	16.1	16.3	Fair	\vdash		Vines up trunk Deadwood up trunk, and vines in canopy
781	Hackberry						

Tree	Common Name	(Inches Size	Critical Root Zone (leat)	Condition	Remove	Official or Shared	Notes & Arborist Recommendations
643	Břack Walnut	15.6	15.6	fair			Some dead limbs
615	White Oak Black Walnut	22.3	22.3	Good	x	-	Some dead limbs
646	White Oak	30.1	30 1	fair	X*		Several dead limbs, and mostly one-sided Some dead limbs
647	Black Cherry Tulip Poplar	160	150	Fair Fair	X*		Vines in canapy
649	Green Ash	11.6	11.6	Falt	×	ROW	Vines in canopy Dense vines up trunk and in canopy
650	Totio Poplar Totio Poplar	12.8	123 124	Fair	X-/	Shared	Dense vines up trunk and in canopy
652	Tulip Poplar	98	98	Fair	×*		Dense vines up trusk and in canopy
651	Green Ash	7.0	7.0	Poor	X*	MOE	Bense vines up trusk and in canogy Dense vines up trusk and in canogy
655	Green Ash	7,4	7.4	Poor	X*		Dense wines up trunk and in canopy
656	Black Walnut Black Walnut	6.7 60	6.7	Fair Poer	x.	_	Vines in canopy Deose vines in canopy
888	Boxelder	10.2	10.2	Poor		ADW	Dense vines in canopy
650	Black Walnut Black Walnut	84	84	Fair	X.		Dense vines in canopy Dense vines in canopy
661	Black Walnut	62	6.2	Folt	X		Dense vines in canopy
667	Black Walnut	13.7 86	13.2 8.8	Fair Poor	x	ROW	Dense vines in canopy Dense vines in canopy
661	Stack Cherry Black Cherry	93	9.3	Pour		ROW	Dense vines in canopy
645	Black Walnut	7.6	7.6	Pour	X.		Dense vings in canopy
665	Dead Hackberry	10.2	10.2	Poor	x.		Failed top, and dense vines
668	Tulio Poplar	10.8	10.8	Fale	x		Dense vines up trunk Failing trunk, 3ed dense vines up trunk
669	Stack Walnut Telip Poplar	29.0	29.0	Poor Fair	x.		Dense vines up trunk
671	Dead	_ ,			X*		
672	Black Walnut Black Walnut	81	81	Fair Fair	×		Vines un canopy. Vines up trunk
674	Black Walnut	13.2	13.2	Fait	Х		Vines up trunk
675	Mack Cherry Tulip Poolar	11.4 27.0	11.4 27.0	Fair	×		Vines up trunk Vines up trunk
676	Dead Dead	41.0			X		
678	Tulip Poptar	20.3	20.1	fair	×		Dente vines up trunk Dense vines up trunk
679 680	Black Cherry Dead	AS	A.S	Fair	×		
681	Black Walnut	15.7	15.7	Fair	х		Dense vines up trunk Dense vines up trunk
682	Black Walnut Boxelder	17.4	12.6	Fair Fair	X	now	Double trunk, and dense where up trunk
684	Black Walnut	84	2.4	Tair	×		Dense vines up trunk
686 686	Black Walnut Dead	90	9.0	Fair	×		Dense vines up trunk
687	Black Walnut	17.5	17.9	Fair			Dense vines up trunk
68A	Dead Black Walnut	18.0	18.0	Fair	X.		Dense vines up trunk
670	Black Walnut	12.4	12.4	Tüt	×		Dense vines up trunk
691 4/32	Dead Tree of Heseen	11.1	11.1	Fair	X.		Dense vines up trunk. Recommended for removal due to invasive nature.
693	Tree of Heaven	7.8	7.8	Fair	Х*		Donie vines up trunk. Recommended for removal due to invasive nature.
694 695	Tree of Heaven	7.0	7.4	Fair	X.		Deese vines up trunk. Recommended for removal due to invative nature. Dente vines up trunk. Recommended for removal due to invasive nature.
696	Black Cherry	7.9	7.9	Poor			Mostly dead
697	Eastern Redcedar	9.7	22.5	Fair Fair	-	ROW	Double trunk, and dense vines up trunk Vines up trunk
679	Mack Cherry Slippery Elm	22.5	9.4	Fair		agw	Vines up trunk
700	Bradford Pear	30.5	30.5	Fair Fair	x.	#OW	Double trunk, and postily pruned for powerlines. Recommended for removal due to invasive nature. Vines up trunk
729	Black Walnut Eastern Redcedar	7.A	7.4	Tair		AOW	Several small dead limbs
731	Eastern Redcedar	6.5	6.5	Good		ROW	Several small dead limbs
732	Tulip Poptar Black Cherry	13.2	125	Poor		HUV	Mostly dead, and vines up trunk
734	Eastern Redcedar	10.1	10 1	Poor	х.		Mostly dood, and many dood limbs Foorly pruned for powerlines. Resummended for removal due to invasive nature.
735	Tree of Heaven Persimmon	87	8.7	Fair Fair	X-	ROW	Vines up trunk
737	Slack Cherry	9.8	9.8	Poor		ROW	Poor form, and waterspharts Vines up trunk
738	Persimmon Tulio Poolar	11.8	6.4 11.8	Fair		ROW	Vines up trunk
740	Tulip Poplar	140	34.0	Good		ROW	Double trunk, and vines up trunk. Double trunk, and vines up trunk
741	Bradford Pear Red Muple	12.4	17.4	Fair		ROW	Vines up trunk, and in canopy
743	Utack Cherry	24.4	26.4	Tair			Foorly pruned for powerlines, and vines in caregy
744	Black Cherry Red Maple	6.1	61	Fair	-	ROW	Poorly pruned for powerlines, and vines in canopy Vines up trunk, and some dead limbs
746	Red Maple	13.0	33.0	fair		ROW	Multi-trunk, poorly pruned for powerfores, and several dead limbs
747	Black Cherry Red Muple	20.2	20.2	Foot	x.		Deadwood at base, dense vanes, and many dead limbs Multi-trunk, several dead limbs, and vines up trunk
749	Red Maple	10.4	104	Fale			Vines in canady
750 751	Black Cherry Eastern Reddedar	27.0	11.8	Fair			Double trunk, some dead limbs, and vines up trunk Vines up trunk, and some dead limbs
752	Tulip Poplar	15.8	16.5	fair			Pruned for powerlines, one-sided, and English ky up trunk
751 754	Stack Cherry Soxelder	11.9	11.9	Poor	X-		Deme vines up trusi, and many dead limbs Mostly dead
755	Boselder	8.8	8.8	Fair	X		Dense vines up trunk
756	Slippery Dm	24.0	64	Tale Fale	x		Vines in canopy Dense vines up trunk
757. 758	American Sycamore American Sycamore	23.0	210	Fair	x		Denta vines up trunk
759	Tulip Poplar	15.4	154	Poor	X.		Failed crown, vinns up trunk, and poor form Nosily dead
760	Boxelder Persimmon	90	16.7	Fair	×		Vines up trunk
762	Tulio Peolar	72.3	22.3	fair	x		Several dead limbs Dense vines in caropy
764	Boxelder Dead	12.4	12.4	Fair	X-/	Shared	
765	Stack Cherry	36.0	36 O	Poor			Mostly dead
766	Tulip Poptar Boxelder	15.4	64	Fair	X*		Dense vines in conopy Vines up trunk
768	Black Walnut	12.8	12.8	fair	X*		Vines up trunk
769 770	Bourider Bowelder	17.0	17.0	Fair			Corrected growth some dead limbs, and vines in canopy Dense vines up trunk
771	Hackberry	12.1	12.1	Fair			Dente vines up trunk
772	Sourider	22.0	22.0	Fair	-	-	Dense vines up trunk Mostly dead
773	Baselder Hackberry	13,4 2L2	21.2	Poor Fair			Dense vines up trunk
775	Boxelder	92	9.2	Fair		\vdash	Oense vines up trunk Vines up trunk
776	Hackberry	100	100	Fair			Vines up trunk
778	Black Walnut	13.4	134	Fair			Vines up trunk, and pruned for powerlines
779 780	Baselder Hickberry	62	62	Fair		+	Poorly pruned for powerlines, and many dead limbs Dense vines up trunk.
781	Hackberry	6.2	6.2	Fair		-	Dense vines up trunk
782 783	Hackberry Tulip Poplar	24.2	163	Fair Poor	-		Vines up trunk Deadwood up trunk, and vines in canapy
		-		1.00.			

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	BLACKWELL ROAD	& IFF HIGHWAY	TO ALL TO STATE OF THE PARTY OF

EXISTING VEGETATION INVENTORY

REVISIONS
DATE COMMENTS

SHEET 10 OF 11 SCALE: NTS

PROJECT DATE:
04/05/22

DRAFT: CHECK:
BY AMS
FILE NUMBER:
2774

Tree Number	Common Name	(Inches DBH)	Critical Root Zone (feet)	Condition	Asmore	Official or Shared	Notes & Arbonst Recommendations
756	Black Walnut	16.2	16 2	Fair	×		Some dead limbs by, and dead limbs
787 783	American Sycamore	19.5	19.5	far	×		Vices and dead limbs
789	Tulip Poplar	12.0	12.0	Far	×		Vinet
750	Eastern Redcedar	6.0	60	Fair	×		Topped, broken leader, and vines
791	Eastern Redcedar	6.5	6.5	Poor	×		Topped, and vines
792	Castern Redeedar	11.1	11.1	Poor	×		Vines, and dead limbs
793	fulip Poplar	17.4	17.4	fair	×		Vines
794	Black Walnut Black Walnut	2.5	9.5	Far	×	_	Vines, and dead limbs Vines, and dead limbs
796	Eastern Redcedar	2.3	93	Fair	x		Dead and broken limbs
797	Pigsut Hickory	6.7	6.7	fair	×		Lean in growth, and vines
798	Mack Walnut	9.7	9.7	far	×		Dead limbs
799	Eastern Redendar	6.4	6.4	Good	×		
500	Huckberry	9.8	93	Tarr	×		Watersprouts, and dead limbs
801	Tulip Poplar	23.7	23.7	Fair	X		Dense vines up trunk
802	Red Muple	6.0	6.0	fair	×		Growing into trunk of T-801
803	Tulip Poplar	12.5	12,5	Fair	X		Bense vines up trunk
804 805	Red Maple Red Maple	10.0	10 H	Fair Tair	X		Dense vines up trunk Poor form, and lean in growth
106	Red Maple	2.5	95	Fair	×		Poor form, covered in dense vines, and lean in growth
807	Red Maple	12.5	12.5	Fair	_		Double trunk, co-dominant stems, and covered in dense vines
608	Tulip Poplar	12.1	12.1	Poor	I.		Pour form, broken co-stem, and covered in deme vines
509	American Sycamore	12.5	12.5	Good			II. CHROMANAMAMANA MASSASSASSASSASSASSASSASSASSASSASSASSASS
810	American Sycamore	21.0	21.0	Good	X.		Vines in canopy
811	Fignut Hickory	6.5	6.5	Tair	X*		Broken top, and vines up trunk
612	American Sycamore	7.0	7.0	Good			
81.3	Yulip Poplar	11.1	11.1	Good			
814	American Sycamore	7.1	7.1	fair			Lean in growth, and vines on trunk Vines on think, and a few broken limbs
815 816	Pignot Mickory American Sysamore	0.8	9.8	Good			Vines on trunk
817	Tulip Poptar	15.3	15.1	Fair	х.		Colidominant stems, and vines on trunk
818	Yulip Poplar	68	6.8	Fair	×		Vines on trunk, and several dead and broken limbs
819	American Sycamore	19.1	19.1	fair			Dense vines on trunk and in cancey
#20	American Sycamore	2.3	4.3	Good	x		
821	Tukp Poplar	7.6	7,6	Poor	×		Broken top, and dense vines up trunk
822	Tulip Poplar	11.0	11.0	Fait	×		Vines up trunk
623	Tulip Poplar	18.0	18.0	fair	×		Vines up trunk
824	Tulip Poplar	18.3	12.3	Fair	×		Vines up trunk
825 826	American Sycamore Pignut Hickory	7.0	95	Good	x+		Lean in growth
826 827	Tree of Heaven	6.5	6.5	Fair	×		Poer form, and covered in vines
828	Tree of Heaven	7.0	7.0	Fair	×		Poor form, and covered in vines
829	Tree of Heaven	7.6	7.6	Fair	×		Poor form, and covered in vines
830	Red Mople	8.5	R.S.	Pace	×		Cavity, dead and broken limbs, and poor form
833	Dead		7		_ X		
532	Cottonwood	18.5	18.5	Fair	_ X		Poor form, and covered in dense vines
834	American Sycamore	21.0	21.0	Good	×		Poor form, and vines in canopy
	Red Muple Red Muple	7.9	8.7	Fair	×		Co-dominant items, and several dead and broken limbs
835 A36	Dead	87		Fair	- x		CO-Comman terms and terrial occuration and terminos
837	Cottonwood	12.8	19 8	Fair	×		Several large dead and broken limbs
535	Red Maple	6.5	63	Fair	1		Vines up trunk
#29	White Cak	10.0	10.0	Fair/Poor	×		Double trunk, dead co-stems, some broken limbs, and vines in canopy
840	Cottonwood	21.0	21.0	Fair	Х.		A few dead and broken limbs
841	Mockemut Hickory	6.9	6.9	Poor	×		Double trunk, dead co-stem, poor form, and vines up canopy
542	Northern Red Dak	14.0	14.0	Poor	×		High dieback, hypoxylon canker on limbs
844	Northern Red Oak	9.1	9.3	Fair	×		Vides in candpy Dense vines up trunk
845	Pignus Hickory Tulip Poplar	10.5	10.5	Good	- x		Vines up trunk and in canopy
346	White Oak	36.0	160	Poor	- î		Large cavity, and large dead and broken limbs
547	Dead			-	×		
848	Mocketnut Hickory	15.8	15.8	Good	×		
849	Mockemut Hickory	13.5	13.5	Good	X		
850	Mockemut Hickory	17.8	17.8	Good	×		Vines to care by
#51	Mockemut Hickory	21.4	21.4	Good	×		a activistics respectively.
852	White Oak Northern Red Oak	21.6	21.5	Fair	×		A few dead and broken limbs, high amount of dieback, large dead and broken limbs, and not throughout
854	Mockemut Hickory	11.5	11.5	Good	×		right amount of distance, sage bead and process install, and for the decorporati
855	Tulip Poplar	18.0	18.0	Fair	×		Co-dominant stems, included bark, and several small dead and broken limbs
856	Tulip Poplar	80	8.0	Fair	×		Dead to-stem, and several small broken limbs
857	Tulip Poplar	90	9.0	Good	×		
858	White Oak	t0.5	10.5	fair	×		Leaningrowth
859	Mockernut Inchory	21.5	21.5	Good	×		
860	Mackemut Hickory	20.0	70.0	Good	×		
861	Mockemut Hickory	6.3	6.3	Good	×		David tree handed note 7 441
863	Mockemus Hickory White Oak	7.0 25.5	7.0	Good	× 1	_	Dead tree hooked onto T-\$62. Several dead and broken limbs
364	Mockemut Hickory	15.0	15.0	Fair	×		Many broken limbs in lower canapy
B65	Northern Red Oak	23.0	23.9	Fair	×		Several dead and broken limbs
864	Tulip Poplar	7.5	7.5	Good	X*		
967	Northern Red Oak	30.0	10.0	Fale	X*		Several dead and broken limbs
8.8	Mackernut Hickory	8.5	8.5	Good	×		
81/9	Tulip Poplar	18.5	18.5	Good	×		
870	Mockernut Hickory Mockernut Hickory	9.7	9.7	Good			
871 872	Northern Red Oak	18.9	18.9	Good Fair			Several large dead and broken limbs
873	White Oak	12.4	12.4	Fair			Co-dominant stems, and a few small dead limbs
874	Tulip Poplar	7.5	7.5	Good			
875	Tulip Poplar	7.0	7.0	Fair			Co-dominant stems, and one large dead limb
876	White Oak	12.5	12.8	Fair			Mony watersprouts
A77	Tulip Poplar	11.0	11.0	Fair			Co-dominant stems
878	White Oak	14.0	14.0	Fair	×		Several dead and broken limbs
879	Dead	100	- 10.0	Part .	×		for deministrative and deministrative and a
880	WNtz Oak	20.0	200	Fair	X*		Co-dominant steres, and a few dead and broken limbs
SA1 SA2	Mockernut Hickory Mockernut Hickory	7.9	7.9	Fair Good	×		Lean in growth, and several dead and broken limbs
883	Mackemus Hickory Mackemus Hickory	15.0	15.0	Fair	×		Several dead and broken limbs, and vines in canopy
884	American Elm	6.8	68	Fair	×		A few dead and broken limbs
885	Tulip Poplar	12.8	12.8	Fair	×		Crooked trunk, and a few dead and broken limbs
	White Oak	8.5	8.5	Fair	×		Several dead and broken limbs, and dense vines in canopy
866	Mockemus Hickory	15.8	15.8	Fair	×		Co-dominant stems, and several small broken limbs
		95	9.5	Good	×		Vines on trunk
866 587 898	Mockernut Hickory	10.0	10.0	Fair	×		Vines up trunk
865 887 898 889	Tulip Poplar			Maria .	x		
866 887 898 889 890	Tulip Poplar Tulip Poplar	12.0	12.0	Good			
855 587 818 849 890 891	Tulip Poplar Tulip Poplar Tulip Poplar	13.0 29.0	29.0	Poor	X		Several large dead and broken limbs
855 587 898 889 890 891 892	Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar	12.0 29.0 16.5	29.0 16.5	Poor Tair	X		Creoked trunk
855 587 858 869 890 891 892 891	Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar	12.0 29.0 16.5 26.0	29 0 16 5 26 0	Poor Fair Fair	X X X		
865 587 898 889 890 891 892 891 893	Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar American Sim	13.0 29.0 16.5 26.0 6.3	29 0 16 5 26 0 6 3	Poor Fair Fair Good	X X X		Creoked trunk
865 587 848 869 890 891 891 892 891 894 895	Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar American Clm Mackemut Hickory	12.0 29.0 16.5 26.0 6.3 6.4	29 0 16 5 26 0 6 1 6 4	Poor Fair Fair Good Good	X X X X		Crooked trunk A few stead and broken limbs
866 587 848 849 890 891 892 891 894 894 896	Sulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar American Elm Mackemus Hickory Mockernut Hickory	13.0 29.0 16.5 26.0 6.3	29 0 16 5 26 0 6 3	Poor Fair Fair Good	X X X		Creoked trunk
866 587 898 869 890 891 892 893 894 894	Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar American Clm Mackemut Hickory	12.0 29.0 16.5 26.0 6.3 6.4 7.8	29 0 16 5 26 0 6.1 6.4 7.8	Poor Fair Fair Good Good Fair/Poor	X X X X X		Crooked trunk A few dead and forsien fimbs Covity in trunk

Tree Number	Comman Name	(inches DBH)	Critical Root Zone (feet)	Condition	Ramove	Offsite or Shared	Notes & Arborist Recommendations
901	Tulip Poglar	27.5	27.5	Good	×		
902	Tulio Poplar	6.5	6.5	Good	×	_	Vines on trunk
903	Cottonwood	11.9	11.9	Fair	×		Crooked trunk, and poor form
504	Modremut Hickory	12.4	12.4	Poor	×		Cavity in trunk, and oppr form
905	Premut Hickory	3.5	8.8	Good	×		
906	Tulip Poplar	25 3	25.3	Fair	×		Co-dominant stems
907	Tulip Poplar	23.4	23.4	Poor	X		Cavity with weep wounds
908	Dead	1.14		1	X		TADAMAN AND AND AND AND AND AND AND AND AND A
909	Black Walnut	95	9.5	Fair	×		Poor form, and several dead and broken limbs
910	Fignut Hickory	3.5	8.8	Good	×		
911		17,4	17.4	Fair	x		Crocked trunk, and several dead and broken limbs
	White Oak					-	
912	Hackberry	75	7.5	Fair	X		Several small dead and broken limbs
913	Black Gum	7.0	7.0	Poor	×		Poor form, many dead and broken limbs, and leaning
914	Black Gum	140	140	Poor	X		Couble trunk, weak crotch, many watersprouts, dead and broken limbs, and dead co-ster
915	Tulip Popler	14.4	14.4	Fair	×		Poor form, crooked trunk, and several broken limbs
215	Tulip Poplar	12,0	12.0	Poor	- X		Cavities throughout, and co-dominant stems
917	Modernut Hickory	7.5	7.5	Poor	×		Covered in dense vines, and many dead and broken limbs
918	Mackernut Hickory	54	64	Fair	×		Covered in vines
919		7.0	7.0	Fair			Twisted trunk
	Modernut Hickory	10.0			X./	Shared	Topped, and covered in deme vines
920	Mockernut Hickory		100	Poor			
921	American Etm	7.0	7.0	Poor	X./	Shared	Partially toped, and covered in dente vinet
922	Modernut Hickory	6.5	6.5	Fair	X		Double trunk, and covered in dense vines
923	Black Cherry	15.5	15.5	Poor			Bouble trunk, covered in dense vines, and many dead and broken limbs
924	Mack Walnut	10.2	102	Fair			Covered in vines
925	Black Walnut	80	80	Fair		š .	Covered in vines
916	Black Walnut	11.5	11.5	Falc			Covered in vines
927	Black Walnut	12.5	12.8	Poor			Large dead and broken limbs, and covered in dense vines
928			14.9	1001	х•		
	Dead	100				-	1000 614124111111111111111111111111111111111
929	Stack Walnut	15.6	15.8	Poor		_	Large dead and broken limbs, and covered in dense vines
930	Stack Walnut	A.2	8.2	Poor			Covered in dense vines, and topped
931	Black Walnut	7.8	7.8	Poor			Covered in dense vines, and topped
932	Black Walnut	7.0	7.0	Poor			Covered in dense vines, and topped
933	Slack Walnut	85	8.5	Poor			Covered in dense vines, and topped
934	Black Walnut	12.0	12.0	Poor			Poor form, and covered in dense vines
935		16.0	16.0	Poor			Covered in dense vines, and several cavities throughout
	Black Walnut				_		
936	Black Walnut	6.8	6.8	Poor			Covered in dense vines, and poor form
937	Black Walnut	7.5	7.5	Poor	_		Covered in dense vines, and open form
938	Black Walnut	10.5	105	Poor			Covered in dense vines, and poor form
939	Dead				x.		
940	Stack Walnut	7.8	7.8	Poor			Covered in dense vines, and poor form
941	Black Walnut	7.5	7.5	Poor			Covered in dense vines, and poor form
942	Mack Walnut	23 8	23.5	Poor			Covered in dense vines, large broken limbs, and some dead limbs
943	Dead			-	X.		Double trunk, covered in dense vines, large broken limbs, and some dead limbs
944	Black Walnut	90	9.0	Page	X*		Topped, and covered in dense vines
			50		X*		
945	Black Walnut	60		Poor			Topped, and covered in dente vines
946	Kwanzan Cherry	10.0	100	Poor	χ.		Poor form, covered in dense vines, and uprooting
347	Mack Walnut	8.5	3.5	Poor	X.		Co-dominant stems, covered in dense vines, and partially topped
949	Red Maple	6.5	6.5	Fair	X		Crooked trunk, and vines on trunk
949	Red Maple	11.5	11.5	Fair	X		Covered in dense vines, and several dead and broken limbs
950	Black Cherry	83	8.5	Falr	X		Crooked trunk, and covered in dense vines
951	Red Maple	13.1	13.1	Fair	X		Double trunk, dead and broken limbs, and vines in canopy
952	Red Maple	11.7	11.7	fair	¥		Double trunk, included back, and vines in zanopy
953	Black Locust	10.2	10.2	Poor	X.		Topped, and covered in vines
954	Black Locust	12.0	12.0	Fair			Covered in dense vinus
						_	
955	Fignut Hickory	60	6.0	Good			Co-dominant stems
556	American Sycamore	90	9.0	Good	_		Lean in growth
957	Tulio Poplar	24.5	24.5	Fair			Vines on trunk, and a few dead and broken limbs
958	American Sycamore	15.0	15.0	Good	X.		
959	Pignut Hickory	75	2.5	Good	×		Vines on trunk
960	Tulip Poplar	65	6.5	P001	x		Cavity in base, and dense vines up truck
961	Tulip Poplar	10.8	10.8	Fair	×		Vines on trust
962	Tulip Poplar	16.5	16.5	Good	×		
963	Tulip Popler	20.0	700	Good	×		
						-	
964	Tulip Papter	30.5	20.5	Good	X		
965	American Sycamore	23.0	23.0	Good	×		
966	Tulip Poplar	20.0	20.0	Fair	X		Co-dominant stems
567	Tulip Poptar	14.0	14.0	Good	X		
968	Tulip Poplar	10.0	10.0	Fair	X		Covered in dense vines
969	Tulip Poplar	100	10.0	Falr	X		Pageform
970	Tulio Poptar	7.0	7.0	Fair	×		Poor form
971	Tulip Poplar	21.0	21.0	Exie	y v		A few dead and broken limbs
		7.5	7.5	Fair	x		Poor form, and vines up trunk
	Sud Litaria			E-415			
972	Red Maple			Good			Food forth, and most up from
972 973	Tulip Poplar	17.0	17.0	Good	X		
972 973 974	Tulip Poplar Tulip Poplar	17.0 27.8	17.0 27.8	Fair	X		Co-dominant stems
972 973 974 975	Tulip Poplar Tulip Poplar Red Maple	17.0	17.0		X		
972 973 974 975 976	Tulip Poplar Tulip Poplar Rad Maple Dead	17.0 27.8 7.0	17.0 27.8 7.0	Fair Good	X X		Co-dominant stams
972 973 974 975	Tulip Poplar Tulip Poplar Red Maple	17.0 27.8	17.0 27.8	Fair	X		
972 973 974 975 976	Tulip Poplar Tulip Poplar Rad Maple Dead	17.0 27.8 7.0	17.0 27.8 7.0	Fair Good	X X		Co-dominant stoms
972 973 974 975 976 977 978	Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pigout Hickory	17.0 27.8 7.0 8.0 7.1	17.0 27.8 7.0	Fair Good - Fair	X X X		Co-dominant stams
972 973 974 975 976 977 978 979	Tulio Poplar Tulio Poolar Red Maple Dead Tulio Poolar Pignut Hickory Pignut Hickory	17.0 27.8 7.0 8.0 7.1 7.2	17.0 27.8 7.0 8.0 7.1 7.2	Fair Good - Fair Good Good	X X X		Co-dominant stams
972 973 974 975 976 977 978 979 980	Tulio Poplar Tulio Poplar Red Maple Dead Tulio Poplar Pignut Hickory Tulio Poplar	17.0 27.8 7.0	17.0 27.8 7.0 - 80 7.1 7.2 17.0	Fair Good Fair Good	X X X		Co-dominant stams
972 973 974 975 976 977 978 979 980 981	Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pignut Hickory Pignut Hickory Tulip Poplar Tulip Poplar	17.0 27.8 70 80 7.1 7.2 17.0	17.0 27.8 7.0 - 8.0 7.1 7.1 17.0 20.0	Fair Good Fair Good Good Good Fair	X X X X X		Co-dominant stams Covered in dense vines
972 973 974 975 976 977 978 979 980 981 982	Tulip Poplar Tulip Poplar Tulip Poplar And Maple Dead Tulip Poplar Pignut Hickory Pignut Hickory Tulip Poplar Tulip Poplar Tulip Poplar American Sycamore	17.0 27.8 7.0	17.0 27.8 7.0 -	Fair Good Good Good Good Fair Good Good Good Fair Good	X X X X X X		Co-dominant stams Covered in dense vines
972 973 974 975 976 977 978 979 980 981 982	Tulip Poplar Tulip Poplar Tulip Poplar Rad Maole Dead Tulip Poplar Pignut Hickory Pignut Hickory Tulip Poplar Tulip Poplar American Sycamore American Sycamore	17.0 27.8 7.0	17.0 27.8 7.0 80 7.1 7.2 17.0 20.0 7.9	Fair Good Fair Good Good Good Fair Good Good	x x x x x		Co-dominant stams Covered in dense vines Co-dominant stams
972 973 974 975 976 977 978 979 980 981 981 984	Tulio Poplar Tulio Poplar Red Maple Dead Tulio Poplar Pignut Hickory Pignut Hickory Tulio Poplar Tulio Poplar American Sycamore Tulio Poplar	17.0 27.8 7.0	17.0 27.8 7.0 -	Fair Good Fair Good Good Good Fair Good Good Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines
972 973 974 975 976 977 978 979 980 981 982	Tulip Poplar Tulip Poplar Tulip Poplar Rad Maole Dead Tulip Poplar Pignut Hickory Pignut Hickory Tulip Poplar Tulip Poplar American Sycamore American Sycamore	17.0 27.8 7.0	17.0 27.8 7.0 80 7.1 7.2 17.0 20.0 7.9	Fair Good Fair Good Good Good Fair Good Good	x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Dense vines in canopy
972 973 974 975 976 977 978 979 980 981 981 984	Tulio Poplar Tulio Poplar Red Maple Dead Tulio Poplar Pignut Hickory Pignut Hickory Tulio Poplar Tulio Poplar American Sycamore Tulio Poplar	17.0 27.8 7.0	17.0 27.8 7.0 80 7.1 7.2 17.0 20.0 7.9	Fair Good Fair Good Good Good Fair Good Good Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems
972 973 974 975 976 977 977 978 979 980 981 981 983 984 985	Tulip Poolar Tulip Poolar Tulip Poolar Rad Maple Dead Tulip Poolar Pignut Mickory Pignut Mickory Tulip Poolar	17.0 27.8 7.0 8.0 7.1 7.2 17.0 20.0 7.0 18.5 28.0	17.0 27.8 7.0 	Fair Good Fair Good Good Fair Good Fair Good Fair Fair Fair	x x x x x x x x x x		Co-dominant stams Covered in dense vines Co-dominant stems Dense vines in canopy A few deed and broken limbs
972 973 974 975 976 977 978 979 980 981 981 983 984 985 986	Tulip Poplar Tulip Poplar Rad Maple Dead Tulip Poplar Pignut Hickory Tulip Poplar De ad Tulip Poplar American Sycamore	17.0 27.8 7.0 8.0 7.1 7.2 17.0 20.9 7.0 18.5 28.0	17.0 22.8 7.0 	Fair Good - Fair Good Good Good Good Fair Good Fair Fair Fair Fair	x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Dense vines in canopy A few deed and broken limbs Covered in dense vines, and shallow roots
972 973 974 975 976 977 977 978 979 981 981 983 984 985 986 987	Tulip Poplar Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pignut Mckory Pignut Mckory Tulip Poplar Tulip Poplar Tulip Poplar American Sycamore Tulip Poplar	27.0 27.8 7.0	17.0 27.8 7.0 -	Fair Good Fair Good Good Good Good Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stams Covered in dense vines Co-dominant stams Co-dominant stams Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few boken limbs, and shallow roots Vines us trank
972 973 974 975 976 977 977 978 979 981 981 983 983 983 986 989	Tulip Poplar Tulip Poplar Tulip Poplar Ard Maple Dead Tulip Poplar Pignut Hickory Tulip Poplar Tulip Poplar Tulip Poplar American Sycamore American Sycamore Tulip Poplar Dead Tulip Poplar American Sycamore Tulip Poplar American Sycamore Tulip Poplar Tulip Poplar	17.0 27.8 70	17.0 27.8 7.0 -	Fair Good Fair Good Good Good Good Fair Good Good Fair Good Good Fair Fair Fair Fair Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Dense vines in canopy A few deed and broken limbt Covered in dense vines, a few broken limbt, and shallow roots Vines up their Co-dominant stems
972 973 974 975 976 977 978 979 981 981 981 983 984 985 986 987 988 989 980	Tulip Poplar Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pignut Mickory Pignut Mickory Tulip Poplar	27.0 27.8 7.0	17.0 27.8 7.0 -	Fair Good Fair Good Good Good Good Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stams Covered in dense vines Co-dominant stams Co-dominant stams Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few boken limbs, and shallow roots Vines us trank
972 973 974 975 976 977 977 978 979 981 981 983 983 983 986 989	Tulip Poplar Tulip Poplar Tulip Poplar Ard Maple Dead Tulip Poplar Pignut Hickory Tulip Poplar Tulip Poplar Tulip Poplar American Sycamore American Sycamore Tulip Poplar Dead Tulip Poplar American Sycamore Tulip Poplar American Sycamore Tulip Poplar Tulip Poplar	17.0 27.8 70	17.0 27.8 7.0 -	Fair Good Fair Good Good Good Good Fair Good Good Fair Good Good Fair Fair Fair Fair Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Dense vines in canopy A few deed and broken limbt Covered in dense vines, a few broken limbt, and shallow roots Vines up their Co-dominant stems
972 973 974 975 976 977 978 979 981 981 981 983 984 985 986 987 988 989 980	Tulip Poplar Tulip Poplar Tulip Poplar Rad Maple Dead Tulip Poplar Pignut Hickory Pignut Hickory Tulip Poplar	17.0 27.8 70	17.0 27.8 7.0 -	Fair Good Fair Good Good Good Good Fair Good Good Fair Good Good Fair Fair Fair Fair Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Dense vines in canopy A few deed and broken limbt Covered in dense vines, a few broken limbt, and shallow roots Vines up their Co-dominant stems
972 973 974 975 976 977 978 977 978 978 981 981 981 982 983 983 985 986 987 988 989 990 991	Tulip Poplar Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pignut Hickory Tulip Poplar Dead Tulip Poplar	17.0 27.8 70 80 7.1 17.0 10.0 7.0 18.5 28.0 90 30.0 11.0 22.5 36.8	17.0 27.8 7.0 - 30 7.1 7.2 17.0 20.0 7.0 18.5 28.0 20.0 11.0 20.0 11.0 20.0 20.0 20.0 20	Fair Good Fair Good Good Good Fair Soud Good Fair Fair Fair Fair Fair Fair Fair Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stoms Covered in dense vines Co-dominant stoms Co-dominant stoms Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few broken limbs, and shallow roots Vines up trank Co-dominant stoms Double trunk, covered in dense vines, and some broken limbs Covered in dense vines, and some broken limbs Covered in dense vines
972 973 974 975 976 977 978 979 981 981 983 983 983 989 989 990 991 992 993	Tulip Poplar Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pignut Mckory Pignut Mckory Pignut Mckory Tulip Poplar	17.0 27.8 70 80 7.1 72 17.0 100 70 18.5 28.0 90 100 110 12.5 16.8	17.0 27.8 7.0 -	Fair Good Fair Good Good Good Fair Good Good Fair Fair Fair Fair Fair Fair Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stams Covered in dense vines Co-dominant stams Co-dominant stams Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few booken limbs, and shallow roots Vines us trunk Co-deminant stams Oouble trunk, covered in dense vines Covered in dense vines Co-dominant stams Co-dominant stams Co-dominant stams Co-dominant stams Co-dominant stams
972 973 974 975 975 976 977 978 979 981 982 983 983 985 986 997 988 989 990 991 991 991 994	Tulip Poplar Tulip Poplar Tulip Poplar Tulip Poplar And Maple Dead Tulip Poplar Pignut Hickory Tulip Poplar American Sycamore American Sycamore American Sycamore Tulip Poplar Dead Tulip Poplar	17.0 27.8 7.0	17.9 27.8 7.0 	Fair Good Fair Good Good Good Fair Fair Fair Fair Fair Fair Fair Fair	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Co-dominant stems Co-dominant stems Co-dominant stems Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few broken limbs. Co-dominant stems Double trunk, covered in dense vines, and scame broken limbs Co-dominant stems, and vines up trunk
972 973 974 975 975 976 977 978 979 980 981 982 983 983 985 986 987 988 989 990 991 992 993 993 994 995	Tulip Poplar Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pignut Hickory Pignut Hickory Tulip Poplar	17.0 27.8 70	17.9 27.8 7.0 8.0 7.1 7.1 7.2 17.0 20.0 7.0 18.5 28.0 - 9.0 20.0 11.0 22.5 35.8 - 20.7 21.2 22.5 11.5	Fair Good	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Co-dominant stems Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few broken limbs, and shallow roots Vines us trunk Co-dominant stems Couble trunk covered in dense vines Covered in dense vines Covered in dense vines Co-dominant stems, and vines us trunk Co-dominant stems, and vines us trunk Co-dominant stems, and vines us trunk Vines on trunk Vines on trunk
972 973 974 975 976 977 978 979 981 982 983 984 989 990 991 992 993 993 994	Tulip Poplar Tulip Poplar Tulip Poplar Rad Maple Dead Tulip Poplar Pignut Mickory Pignut Mickory Tulip Poplar	17.0 27.8 70 80 7.1 72 17.0 70 18.5 28.0 90 30.0 11.0 12.5 56.8 	17.0 27.8 7.0 - 8.0 7.1 7.2 17.0 20.0 7.9 18.5 28.0 - 9.0 30.0 11.0 22.5 53.3 - 22.5 11.0 22.5 11.0 22.5 11.0 22.5 11.0 22.5 12.0 22.5 13.0 22.5 23.0 24.0 24.0 25.0 26.	Fair Good Fair Good Good Fair Good Good Fair Good Fair Good Fair Fair Fair Good Food Food Good Food Good Food Good Food Good Food Good Food Good Food F	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few broken limbs. Covered in dense vines, and scan shallow roots Vines vo trank Co-dominant stems Double trunk, covered in dense vines Vines on trunk Vines on trunk Vines on trunk
972 973 974 975 976 977 977 978 979 980 981 982 983 985 985 986 987 988 989 990 991 992 993	Tulip Poplar Tulip Poplar Tulip Poplar Red Maple Dead Tulip Poplar Pignut Hickory Pignut Hickory Tulip Poplar	17.0 27.8 70	17.0 27.8 7.0 	Fair Good	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Co-dominant stems Dense vines in canopy A few deed and broken limbs Covered in dense vines, and shallow roots Vines up trunk Co-dominant stems Double trunk, covered in dense vines, and seme broken limbs Co-dominant stems, and vines up trunk Co-dominant stems, and vines up trunk Vines on trunk Vines on trunk Vines on trunk Vines on trunk
972 973 974 975 976 977 978 979 981 982 983 984 989 990 991 992 993 993 994	Tulip Poplar Tulip Poplar Tulip Poplar Rad Maple Dead Tulip Poplar Pignut Mickory Pignut Mickory Tulip Poplar	17.0 27.8 70 80 7.1 72 17.0 70 18.5 28.0 90 30.0 11.0 12.5 56.8 	17.0 27.8 7.0 	Fair Good Fair Good Good Fair Good Good Fair Good Fair Good Fair Fair Fair Good Food Food Good Food Good Food Good Food Good Food Good Food Good Food F	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Dense vines in canopy A few deed and broken limbs Covered in dense vines, a few broken limbs. Covered in dense vines, and scan shallow roots Vines vo trank Co-dominant stems Double trunk, covered in dense vines Vines on trunk Vines on trunk Vines on trunk
972 973 974 975 976 977 977 981 981 981 982 983 984 997 990 991 991 993 993 993 994 995 995 997	Tulip Poplar Tulip Poolar Tulip Poolar Rad Maple Dead Tulip Poplar Pignut Hickory Tulip Poplar De ad Tulip Poplar	17.0 27.8 7.0	17.0 27.8 7.0 	Fair Good Fair Good Good Good Fair Soud Good Fair Fair Fair Good Fair Fair Good Good Food Fair Fair Good Good Good Good Good Good Good Goo	x x x x x x x x x x x x x x x x x x x		Co-dominant stems Covered in dense vines Co-dominant stems Co-dominant stems Dense vines in canopy A few deed and broken limbs Covered in dense vines, and shallow roots Vines up trunk Co-dominant stems Double trunk, covered in dense vines, and seme broken limbs Co-dominant stems, and vines up trunk Co-dominant stems, and vines up trunk Vines on trunk Vines on trunk Vines on trunk Vines on trunk





EXISTING VEGETATION INVENTORY

BLACKWELL ROAD & LEE HIGHWAY

REVISIONS COMMENTS

SHEET 11
OF 11

SCALE: N/IS
PROJECT DATE:
04/05/22

DRAFT: CHECK:
OFW AMS
FILE NUMBER:
2724

Exhibit 2

NOTE: FOR ILLUSTRATIVE PURPOSES ONLY.



NOTES

- LOCATIONS OF INTERIOR SIDEWALKS AND PARKING ARE SUBJECT TO CHANGE WITH FIRMLOTTE DESIGN.
- 2. SIZE AND LOCATION OF PROPOSED BMP (SWALPOND ID SUBJECT TO CHANGE WITH PAND LOCATION OF PROPOSED BMP (SWALPOND ID SUBJECT TO CHANGE WITH)



REVISIONS									
REA	REV BATE COMVENT								
Ţ.	7/10/22	TOWNCOMMENTS	JCW						
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NOT APPROVED FOR CONSTRUCTION

SPECIAL USE PERMIT

AMAZON DATA SERVICES, INC.

BLACKWELL ROAD & LTH HIGHWAY TOWN OF WARRENTON FRUQUER COUNTY, VIRGINIA 20155

BOHLER /



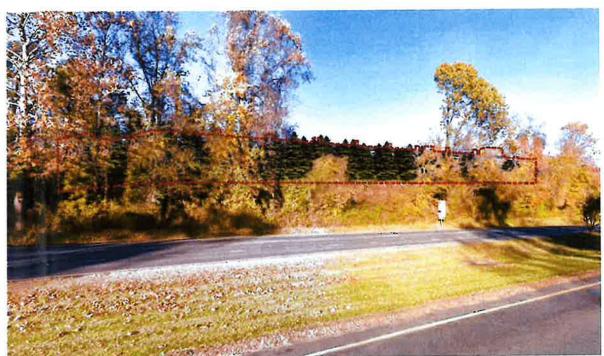
ILLUSTRATIVE PLAN

C-5

REVISION 1 - 7/10/22

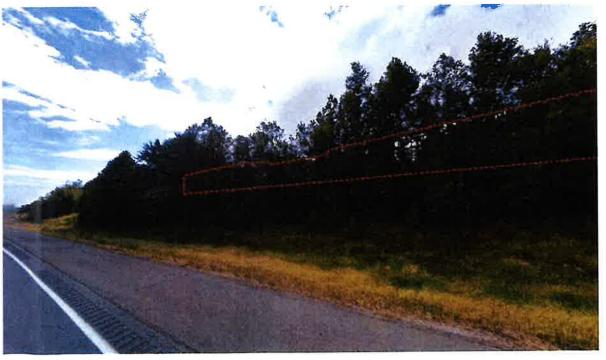


VIEW 1



VIEW 2





VIEW 3

LEGEND

BUILDING OUTLINE

NOTE TREES SHOWN AT
5 YEARS OF GROWTH

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NOT APPROVED FOR CONSTRUCTION

PROJECT No. V21
DRAWN BY:

PROJECT:

SPECIAL USE PERMIT

- FOR -

AMAZON DATA SERVICES, INC.

DEVELOPMENT

BLACKWELL ROAD & LEE HIGHWAY

TOWN OF WARRENTON
FAUQUIER COUNTY, VIRGINIA 20186

BOHLER /

28 BLACKWELL PARK LANE, SUITE 2 WARRENTON, VIRGINIA 20186 Phose (\$40) 349-4500 Fax: (\$40) 349-4521 VA@BohlerEng.com



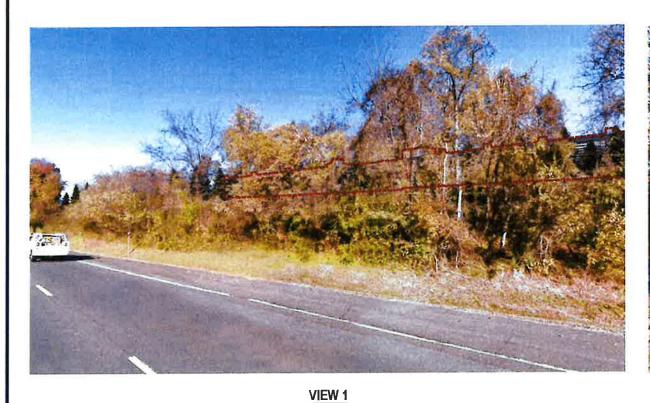
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STREET VIEW RENDERINGS

SHEET NUMBER

C-6

REVISION 1 - 7/10/22





VIEW 2



VIEW 3



VIEW 4

LEGEND
BUILDING OUTLINE
NOTE: TREES SHOWN AT
5 YEARS OF GROWTH

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PROJECT

SPECIAL USE PERMIT

AMAZON DATA SERVICES, INC.

DEVELOPME

ELACKWELL ROAD & LEE HIGHWAY TOWN OF WARRENTON FAUQUIER COUNTY VIRGINIA 20186

BOHLER /

28 BLACKWELL PARK LANE, SUITE 201 WARRENTON, VIRCINIA 20166 Phone: (540) 349-4500 Fax: (540) 349-0321 VA@BohlorEng.com



SHEET TITLE

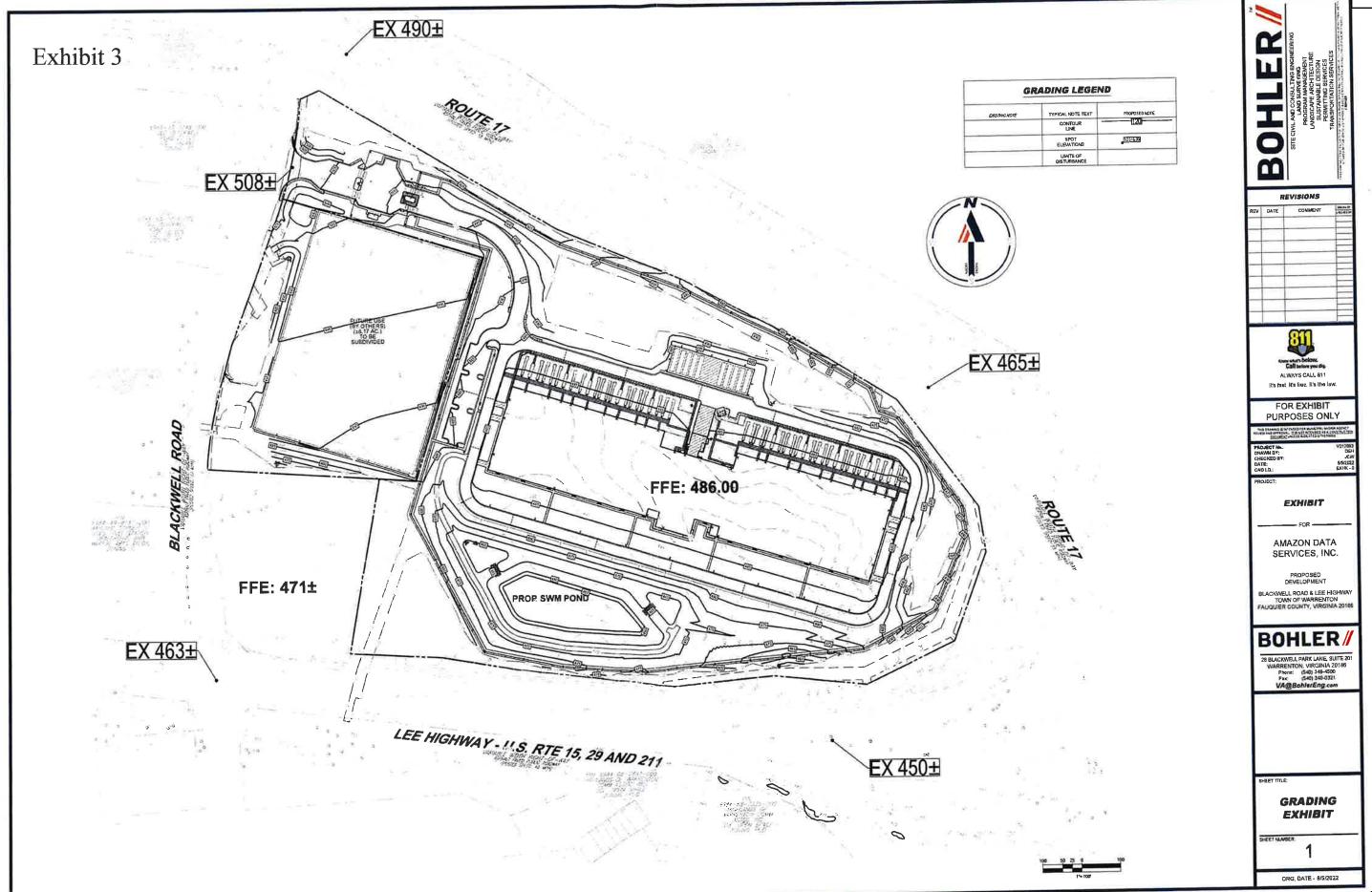
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Item 1

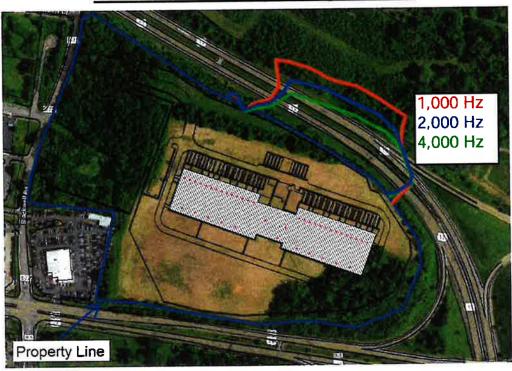


Exhibits 4 and 5

Town Limits

Limit	Correction	63	125	250	500	1000	2000	4000	8000
Base Limits	n/a	72	70	65	59	55	51	47	44
Daytime	-5 R-District	67	65	60	54	50	46	42	39
Nighttime	-5 R-District -5 10pm-7am	62	60	55	49	45	41	37	34
Daytime Industrial	n/a	72	70	65	59	55	51	47	44
Nighttime Industrial	-5 10pm-7am	67	65	60	54	50	46	42	39
Generator	-5 R-District +5 20% of 1 hr	72	70	65	59	55	51	47	44

Locations Exceeding at Property Line



Noise Levels

- Noise from chillers will exceed town limit @ 1,000 4,000 Hz at northeast property line for nighttime limits.
- o All other frequencies will be contained within the property line.
- O Daytime limits at all frequencies will be contained within the property line.

Impact

- o Impact is not possible on Route 17, as there is no one to hear noise.
- o For Industrial land impacted, noise will be equal to traffic noise (per measurements at site).

Mitigation

o Either involves a roof barrier taller than equipment (~16-20' tall) or baffles incorporated into sheaths, which would impact airflow.

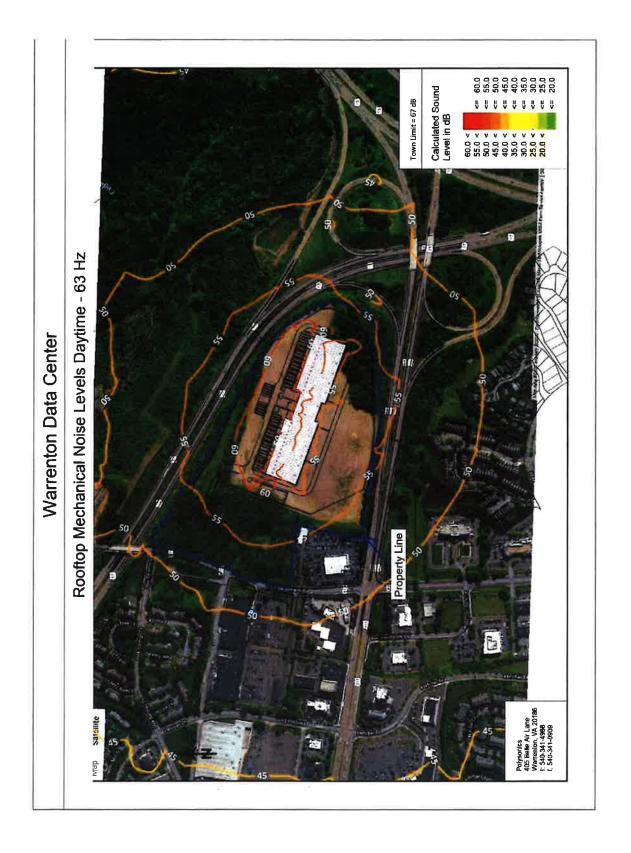
Summary

- Daytime Model
 - o Will exceed town limit @ 1,000 4,000 Hz northeast of Route 17, but there is not residential present.
 - o Town limit shown to be met.
- Nighttime Model
 - o Will exceed town limit @ 500 4,000 Hz northeast of Route 17, but there is not residential present.
 - o Town limit shown to be met.
- Generator
 - o Town limit shown to be met.
- Measurements
 - o All measurements in residential areas shown to meet Town Limit. M3 (north of site) is the loudest, but is not impacting residences.
 - o M1
- Data center quieter than background noise except during evening hours.
- Quieter than town limit except for 2,000 Hz by 1 dB.
- o M2
 - Data center quieter than background noise except during evening hours.
 - Quieter than town limit except for 1,000 2,000 Hz, by 1 dB.
- o M3
 - For low frequencies, quieter except during evening hours. For mid to high frequencies, equal to or higher background noise.
 - Quieter than town limit except for 1,000 4,000 Hz, by 9 dB.
- o M4
 - Data center quieter than background noise.
 - Quieter than town limit.
- o M5
 - For low frequencies, quieter except during evening hours.
 - Quieter than town limit.

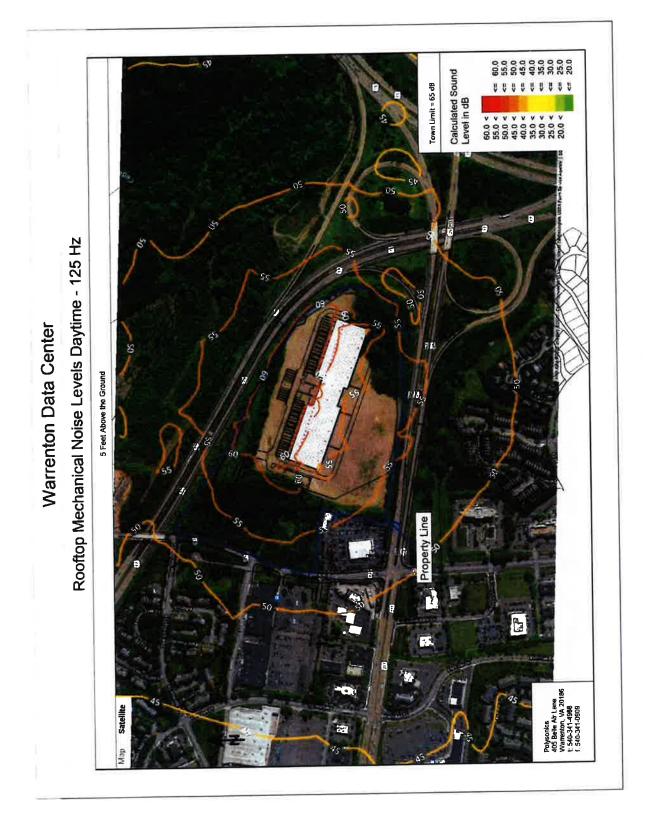
Town Limits

Limit	Correction	63	125	250	500	1000	2000	4000	8000
Base Limits	n/a	72	70	65	59	55	51	47	44
Daytime	-5 R-District	67	65	60	54	50	46	42	39
Nighttime	-5 R-District -5 10pm-7am	62	60	55	49	45	41	37	34
Generator	-5 R-District +5 20% of 1 hr	72	70	65	59	55	51	47	44

Daytime Model



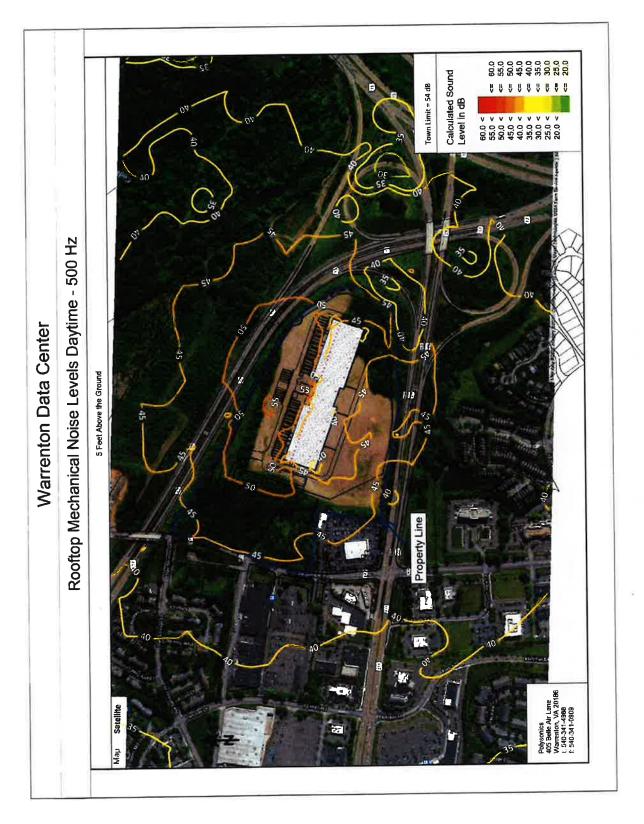
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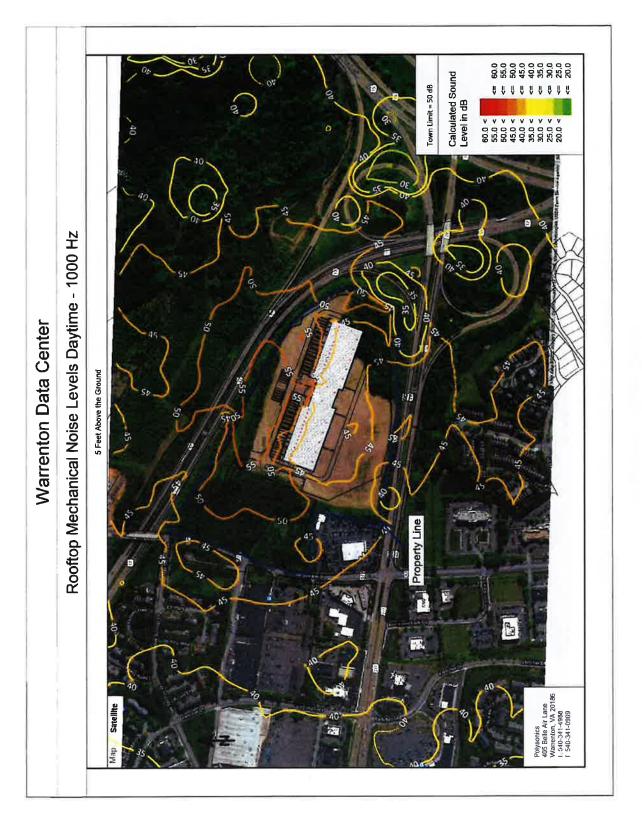
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Calculated Sound Level in dB TownLimit = 60 dB 0.000 000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0. Rooftop Mechanical Noise Levels Daytime - 250 Hz Warrenton Data Center 5 Feet Above the Ground Property Line 1

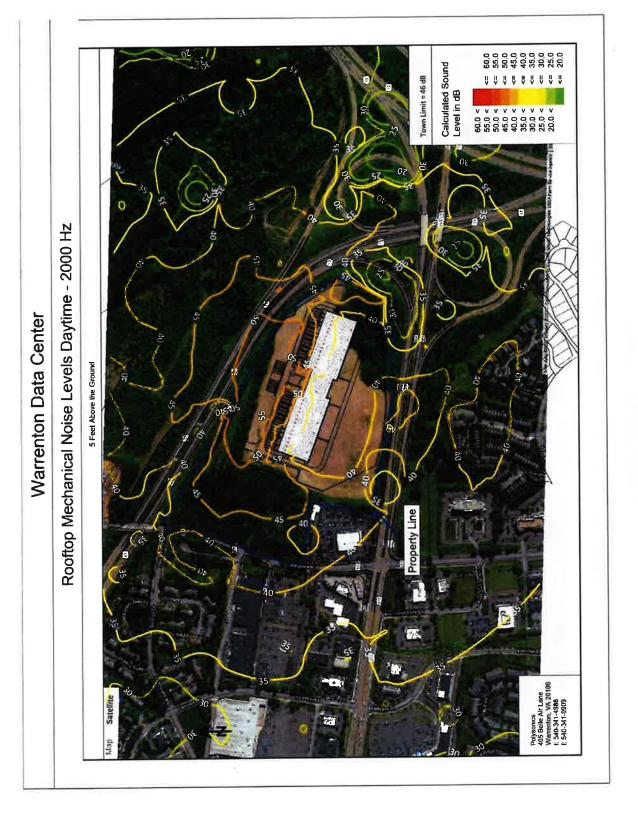
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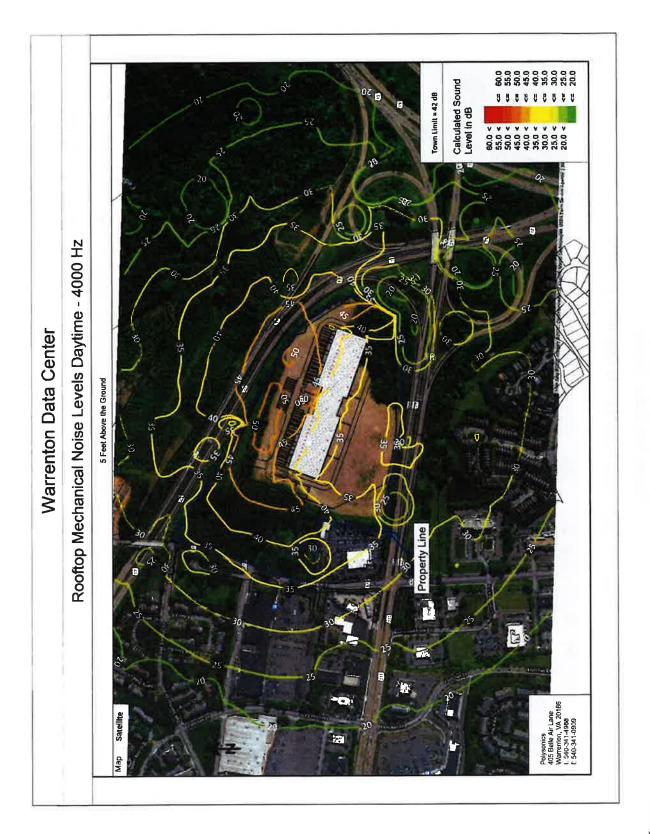
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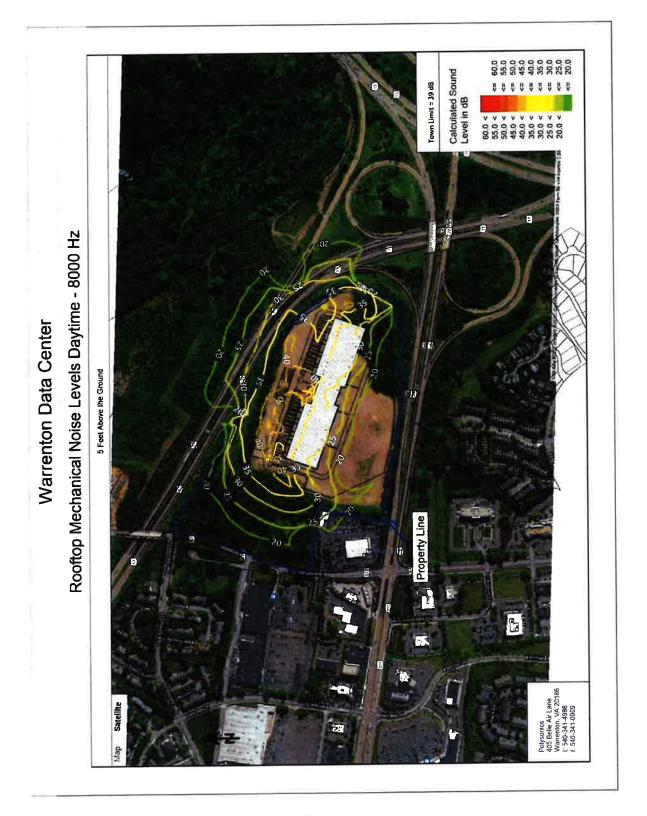


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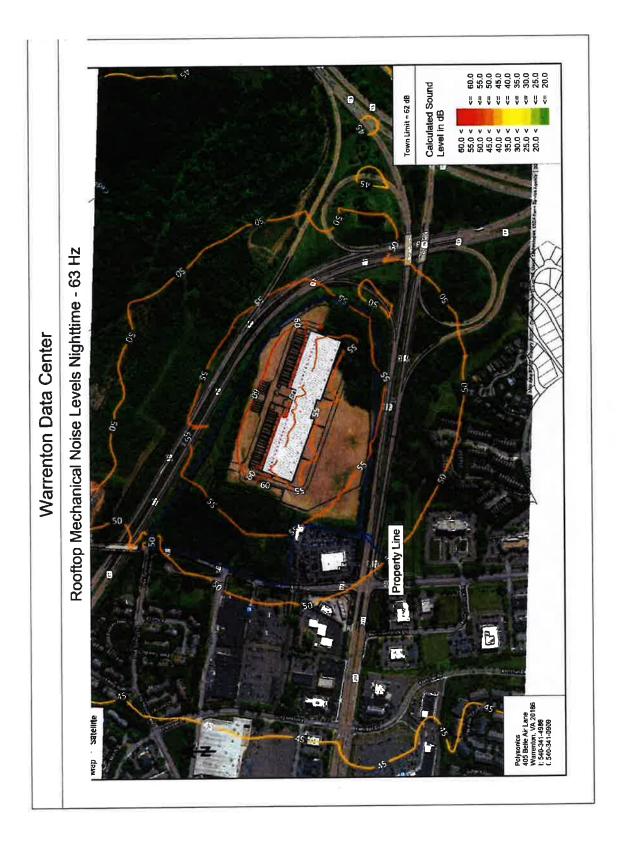
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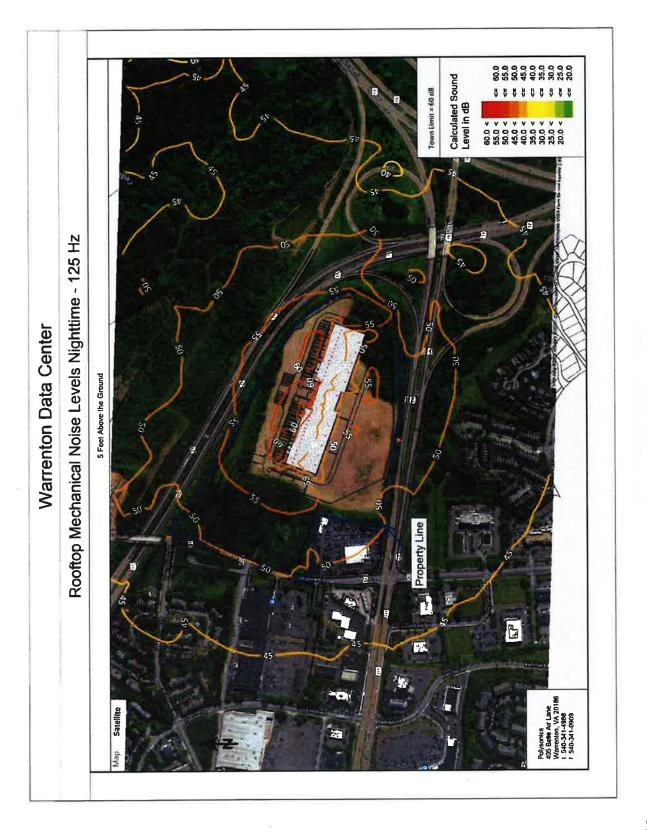




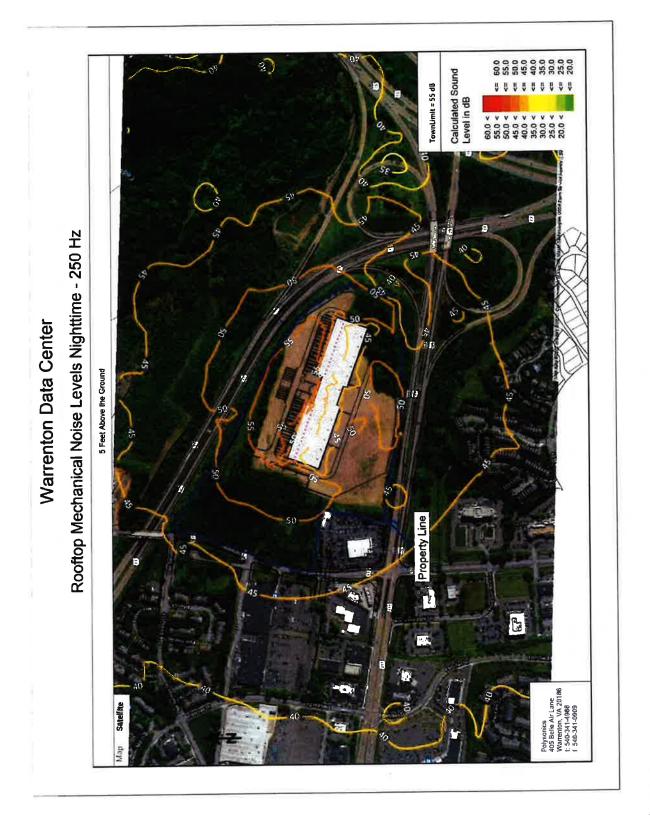
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Nighttime Model





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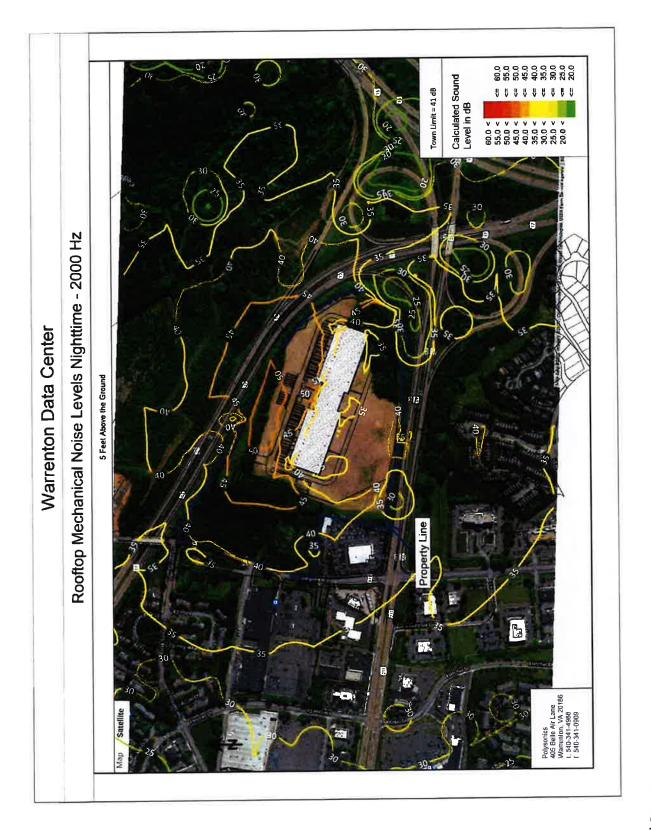
Adjacent Property Owners List Generated and Reviewed with PWC Real Estate Assessments Website on August 26, 2022

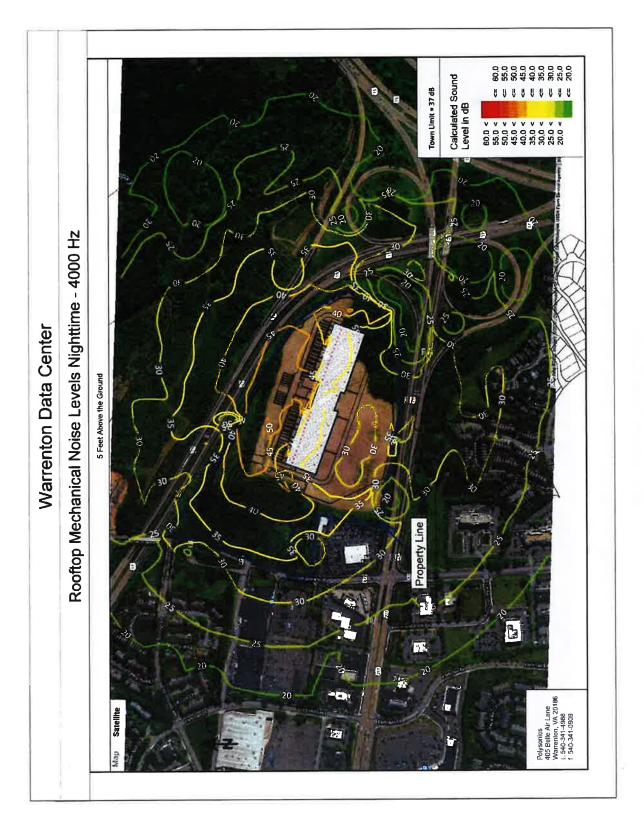
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	1 7397-84-4736	13000 GATEWAY CEN	T GAINESVILLE, V	13000 GATEWAY CENT GAINESVILLE, VA LOWES HOME CENTERS INC ATTN: SR VICE PRES C			1000 LOW! MOORESV Prince William County
	2 7397-93-1744	7450 LIMESTONE DR GAINESVILLE, VA VGCC LC	GAINESVILLE, V	VA VGCC LC			12500 FAIF FAIRFAX, V Prince William County
	3 7497-03-0650.00	7475 LIMESTONE DR	GAINESVILLE, V	475 LIMESTONE DR GAINESVILLE, VA UNIT OWNERS GATEWAY CROSSING RETAIL COND			12500 FAIF FAIRFAX, V Prince William County
	4 7397-93-8571.00	7481 LIMESTONE DR	GAINESVILLE, V	7481 LIMESTONE DR GAINESVILLE, VA GATEWAY CENTER LC			12500 FAIF FAIRFAX, V. Prince William County
	5 7497-03-0758.00	7485 LIMESTONE DR	GAINESVILLE, V	7485 LIMESTONE DR GAINESVILLE, VA FAUQUIER BANK			10 COURT! WARRENT! Prince William County
	6 7397-93-8854.00	7489 LIMESTONE DR	GAINESVILLE, V	7489 LIMESTONE DR GAINESVILLE, VA H3L1 INVESTMENT LLC ATTN KYUNG SIN LEE & LE			14256-A W CENTREVIL Prince William County
	7 7397-94-3859	5291 WELLINGTON BI	R GAINESVILLE, V	5291 WELLINGTON BR GAINESVILLE, VA GATEWAY BRANCH OUTDOORS LC			12500 FAIF FAIRFAX, V Prince William County
	8 7397-93-0796	5300 WELLINGTON B	R GAINESVILLE, V	3300 WELLINGTON BR GAINESVILLE, VA DTE WSSI FACILITY LLC C/O THE DAVEY TREE EXPE			1500 N MA KENT, OH & Prince William County
	9 7397-94-5516	5351 WELLINGTON BI	R GAINESVILLE, V	5351 WELLINGTON BR GAINESVILLE, VA GATEWAY BRANCH LC			12500 FAIR FAIRFAX, V Prince William County
	10 7497-04-1151	5399 WELLINGTON BI	R GAINESVILLE, V	5399 WELLINGTON BR GAINESVILLE, VA NORTHERN VIRGINIA ELECTRIC COOP PLANT ACC			PO BOX 27 MANASSA: Prince William County
	1 Gateway Crossing Ret	tail 012500 Fair Lake Circle	Fairfax, VA 220	1. Gateway Crossing Retail C12500 Fair Lake Circle Fairfax, VA 22033 Gateway Crossing Retail CUO			12500 Fair Fairfax, VA Planned Development District
Ť	,			Walsh, Colucci, Lubelev & Walsh, P.C. (c/o Jessica Pfeiffer)	Pfeiffer)		4310 Princ Prince William, VA 22192

Calculated Sound Level in dB Town Limit = 49 dB Rooftop Mechanical Noise Levels Nighttime - 500 Hz Warrenton Data Center 5 Feet Above the Ground Property Line Polysonics 405 Belle Air Lane Warrenton, VA 20186 1: 540-341-4988 I. 540-341-0909

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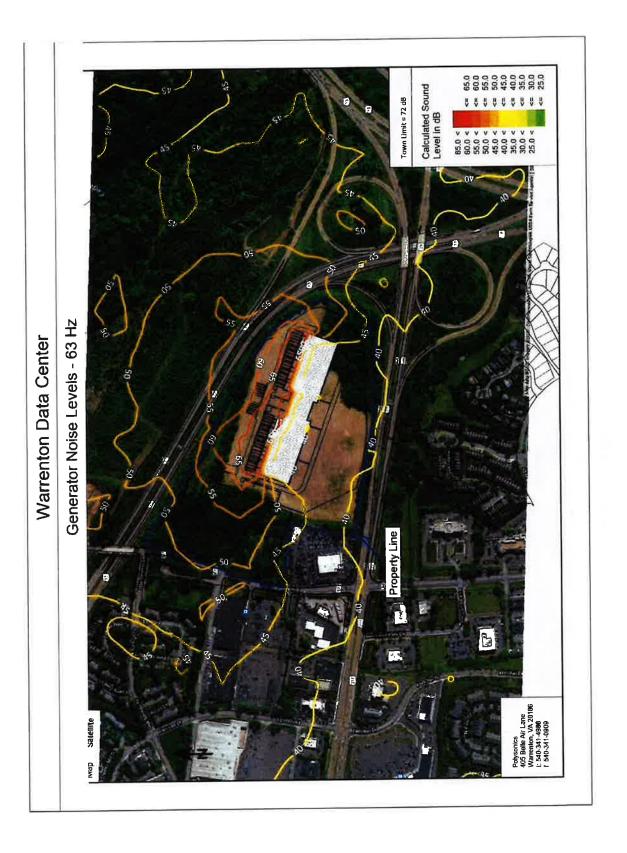


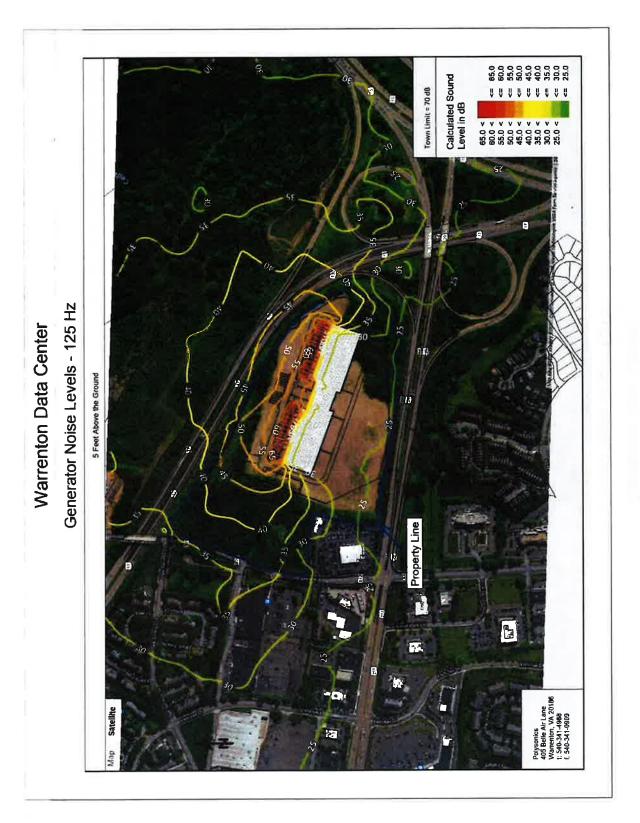


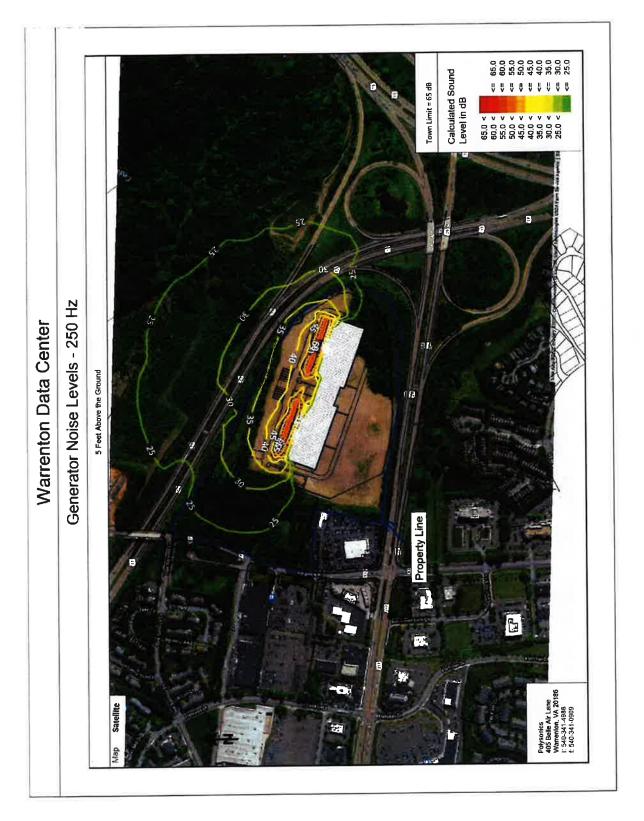
60.0 55.0 50.0 45.0 40.0 35.0 25.0 Calculated Sound Level in dB Town Limit = 34 dB Rooftop Mechanical Noise Levels Nighttime - 8000 Hz Warrenton Data Center FI K 5 Feet Above the Ground Property Line Polysonics 405 Belle Air Lane Warrenton, VA 20186 I: 540-341-4986 I: 540-341-0909 Satellite

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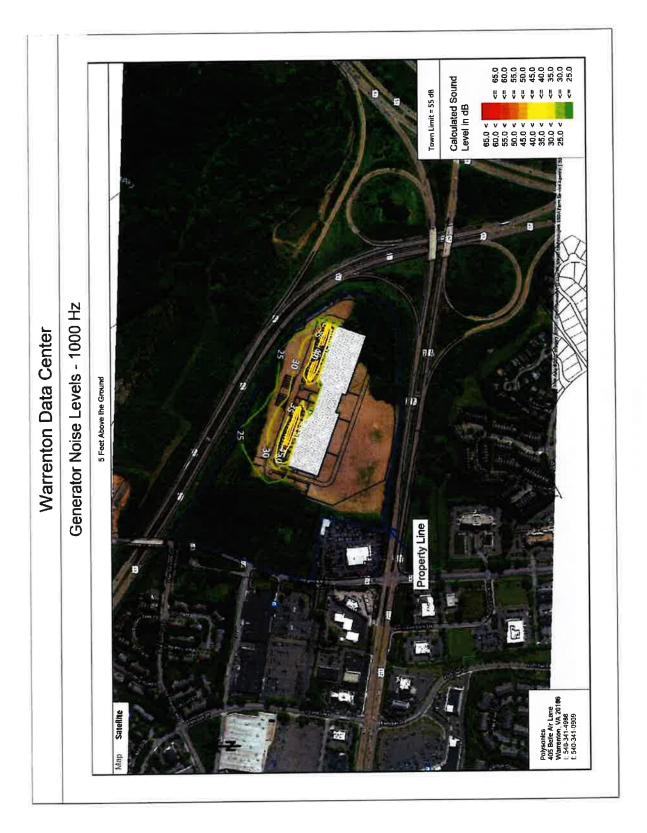
Generator Model



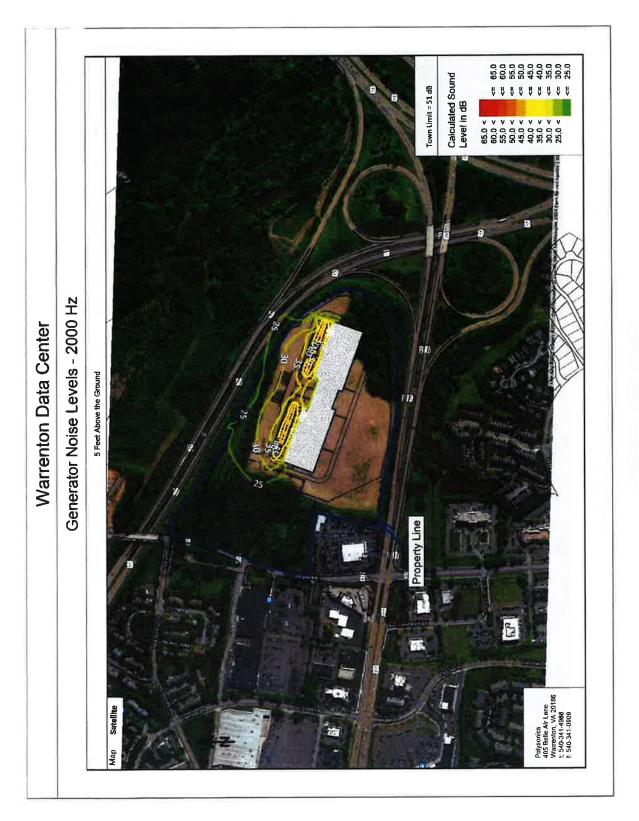




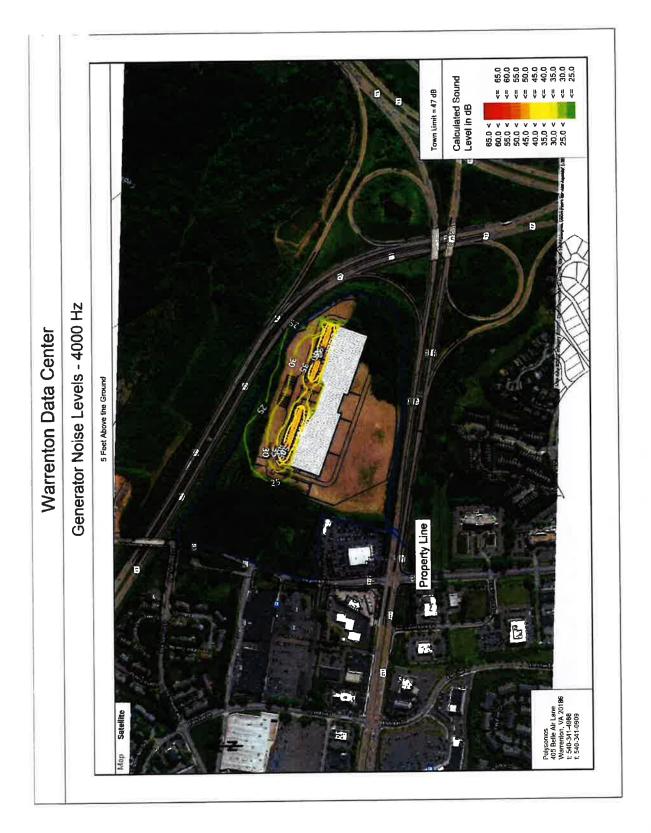
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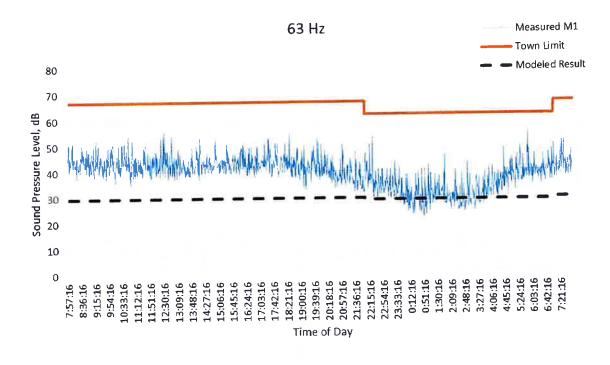
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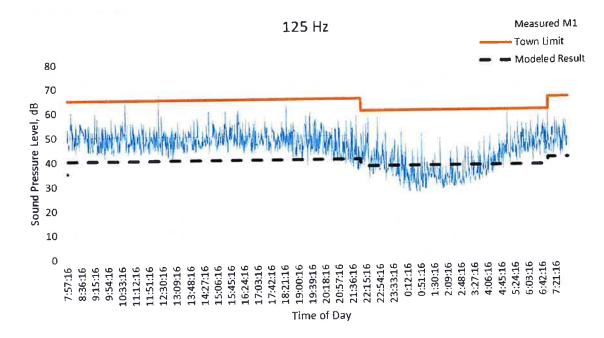
Measurement Map

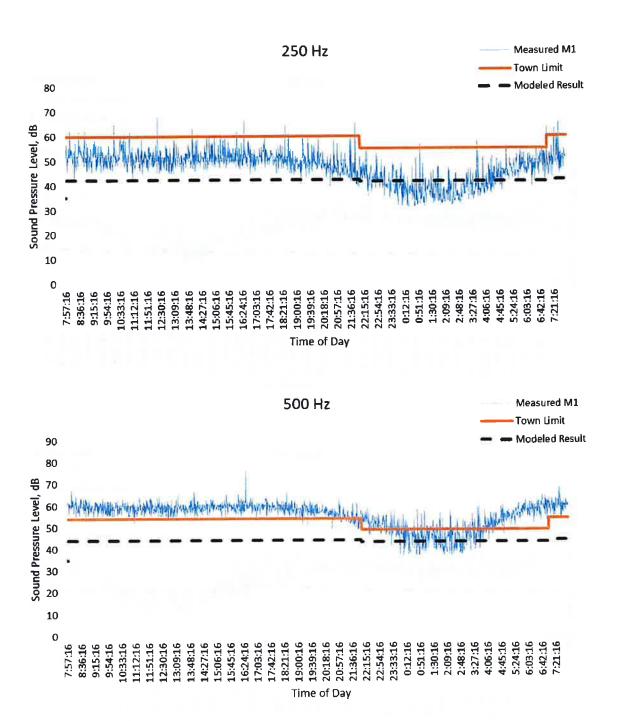
Measurement Summary

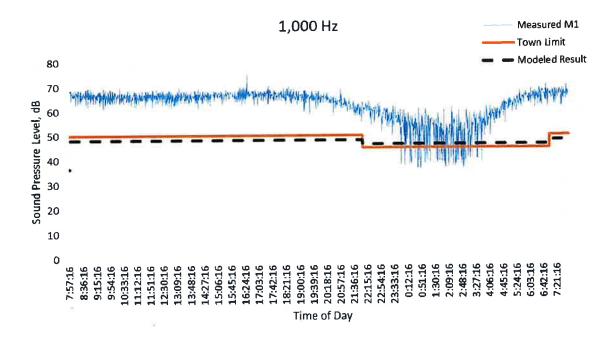
Loc.	Day/ Night	Data	63	125	250	500	1000	2000	4000	8000
MI	Day	Lowest Measured	32	35	40	48	58	52	38	25
		Town Limit	67	65	60	54	50	46	42	39
		SoundPlan	30	40	42	44	48	44	39	17
		Lowest Measured	22	26	31	36	36	28	24	19
	Night	Town Limit	62	60	55	49	45	41	37	34
		SoundPlan	29	37	42	43	46	42	36	17
M2		Lowest Measured	32	36	34	40	49	46	37	24
	Day	Town Limit	67	65	60	54	50	46	42	39
		SoundPlan	27	38	40	42	47	44	39	16
		Lowest Measured	23	27	27	32	32	23	25	19
	Night	Town Limit	62	60	55	49	45	41	37	34
	Nigit	SoundPlan	26	35	39	41	46	42	36	16
				TOTAL ST					22	20
		Lowest Measured	28	35	34	38	42	37	32	20
	Day	Town Limit	67	65	60	54	50	46	42	39
М3		SoundPlan	32	45	46	49	55	52	48	32
CIVI		Lowest Measured	22	30	31	33	34	32	31	19
	Night	Town Limit	62	60	55	49	45	41	37	34
		SoundPlan	31	42	45	48	53	50	45	32
M4	Day	Lowest Measured	30	37	41	45	53	50	42	26
		Town Limit	67	65	60	54	50	46	42	39
		SoundPlan	25	37	38	41	47	43	35	3
	Night	Lowest Measured	22	30	33	34	35	26	37	19
		Town Limit	62	60	55	49	45	41	37	34
		SoundPlan	24	34	38	41	45	41	32	3
						1000				
M5	Day	Lowest Measured	27	28	31	37	42	37	30	20
		Town Limit	67	65	60	54	50	46	42	39
		SoundPlan	23	34	37	39	44	42	32	0
	Night	Lowest Measured	22	25	28	29	29	27	23	19
		Town Limit	62	60	55	49	45	41	37	34
		SoundPlan	23	31	36	38	43	40	30	0

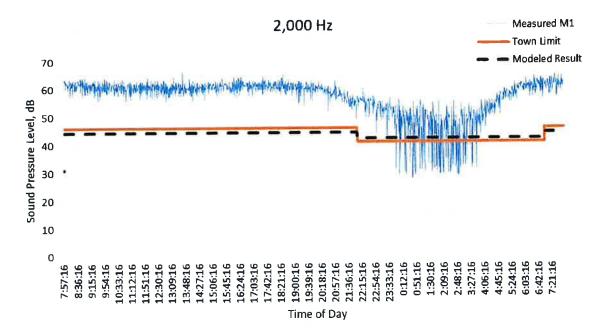
M1 Results

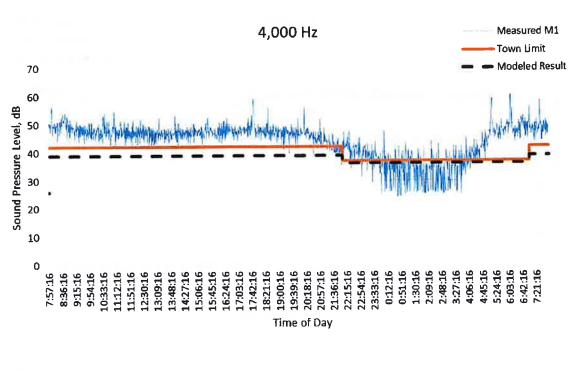


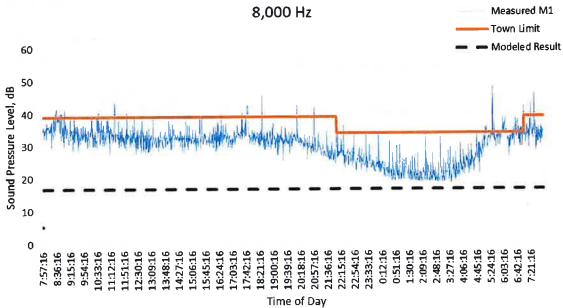




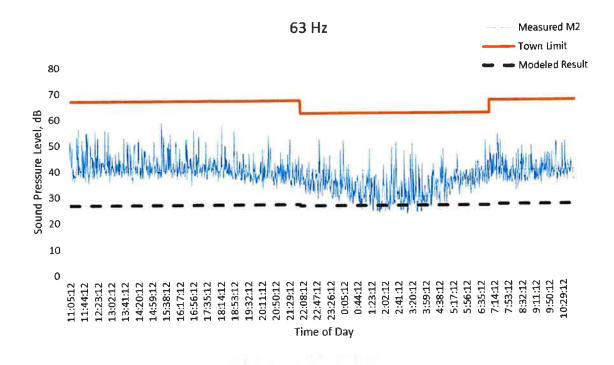


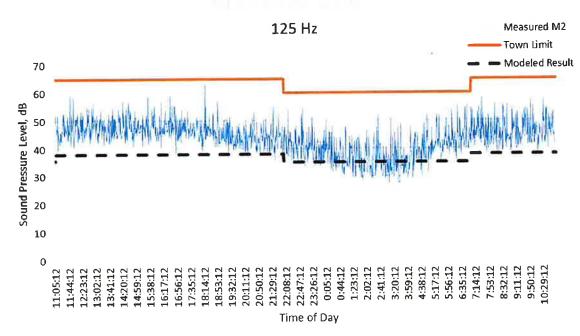


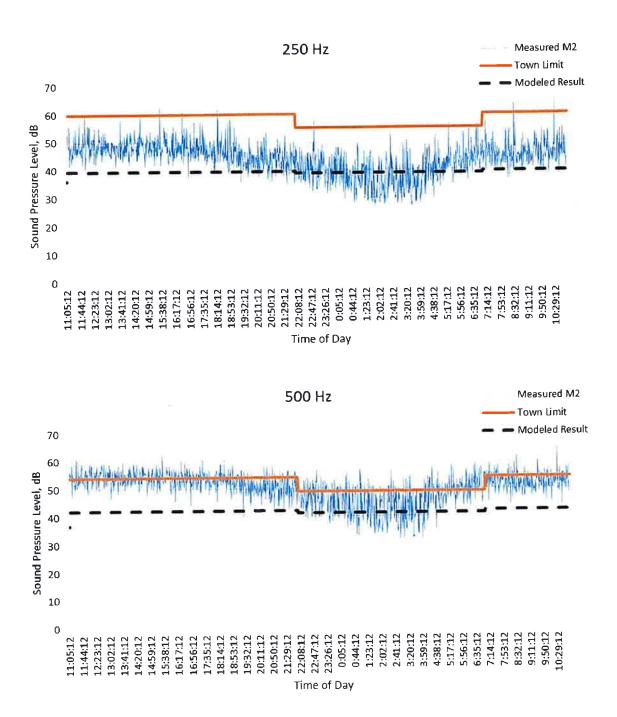


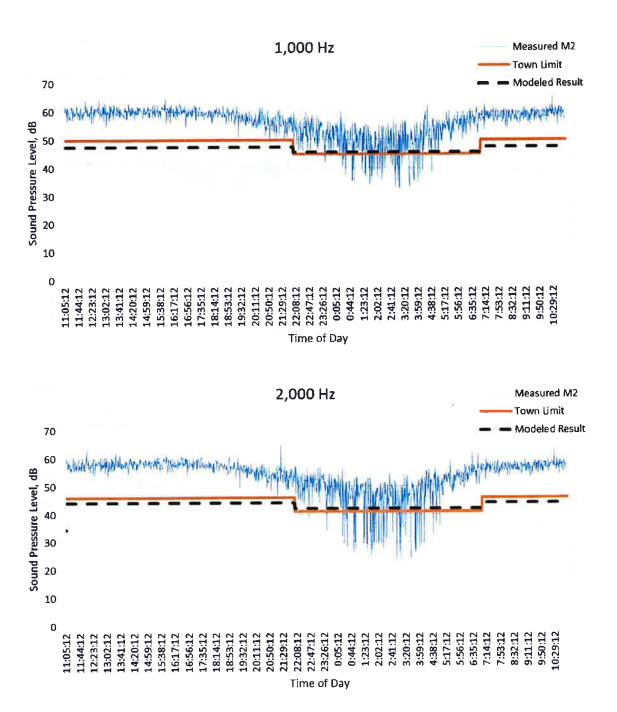


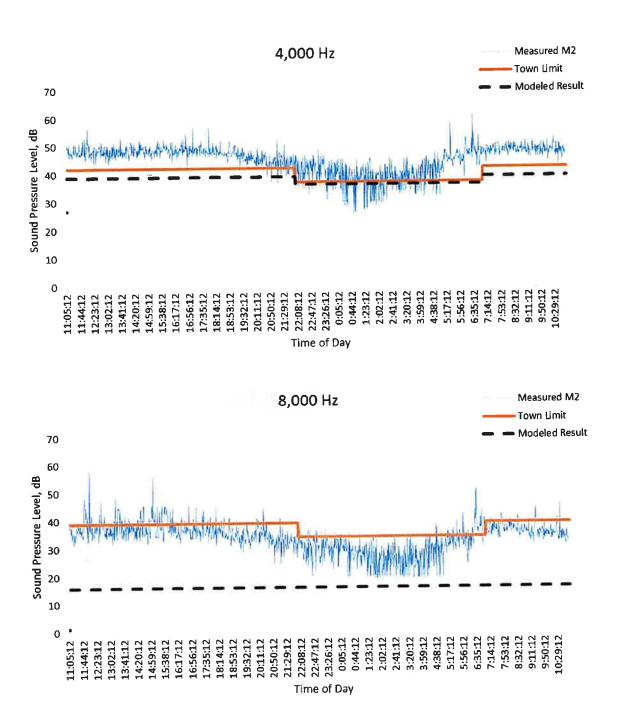
M2 Results



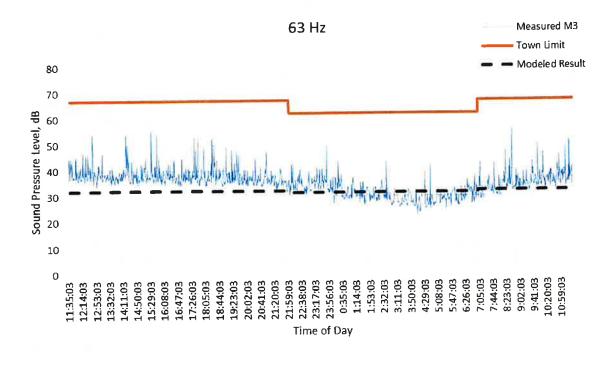


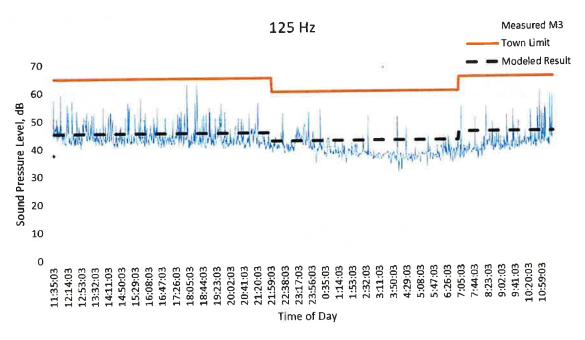


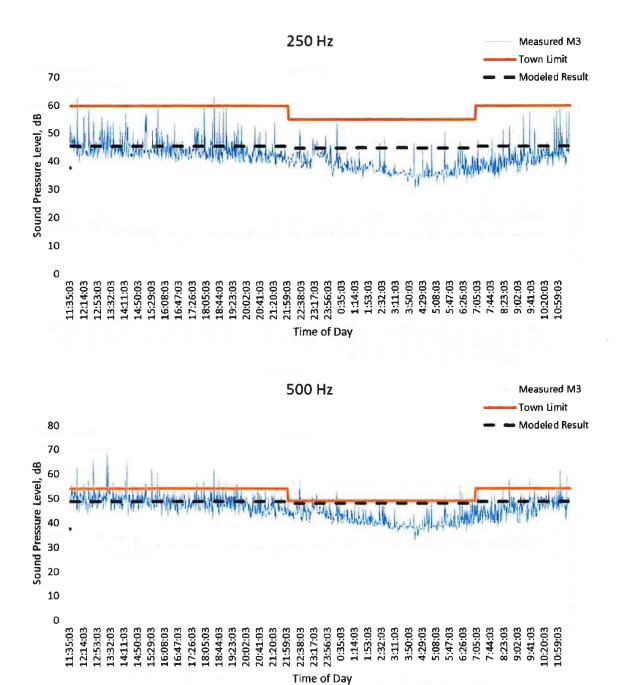


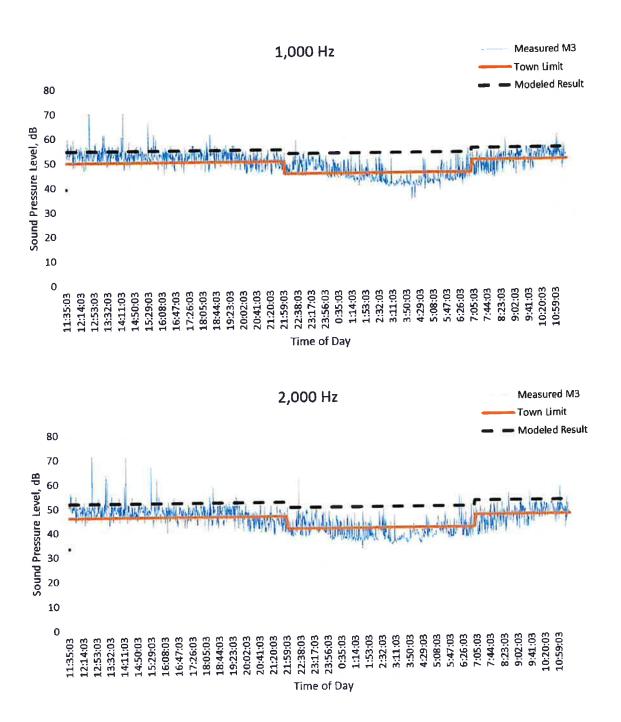


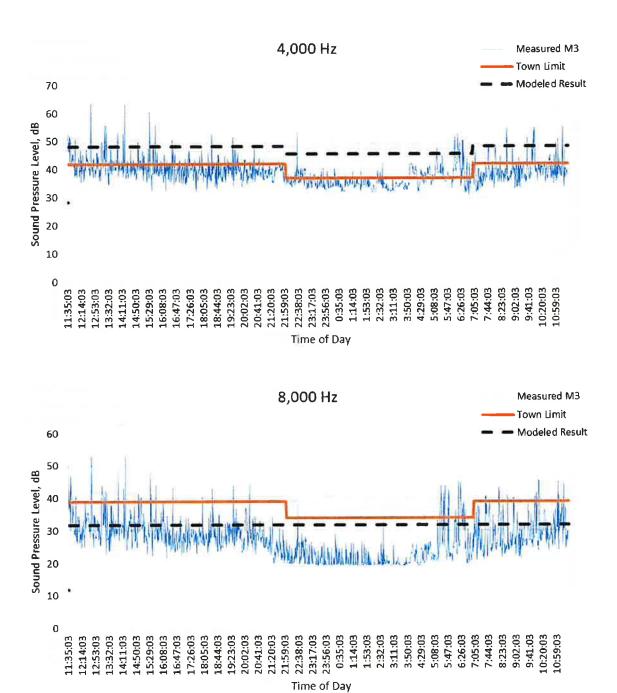
M3 Results



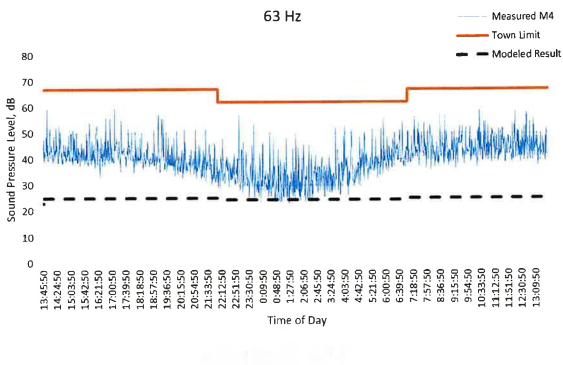


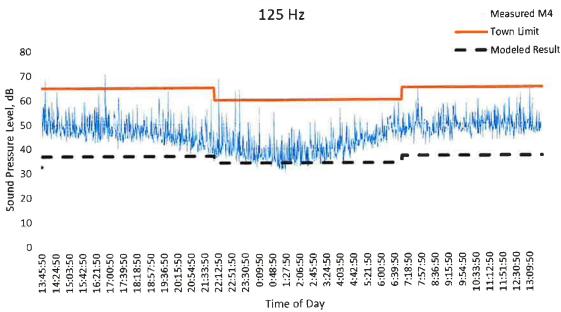


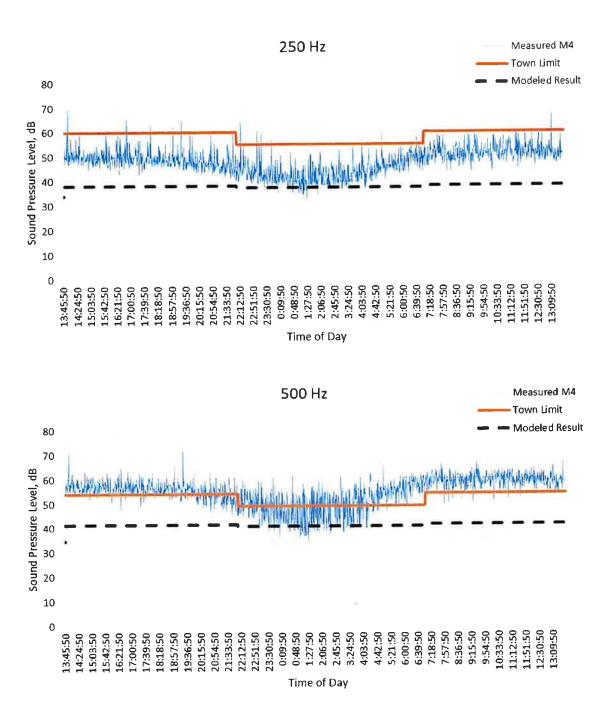


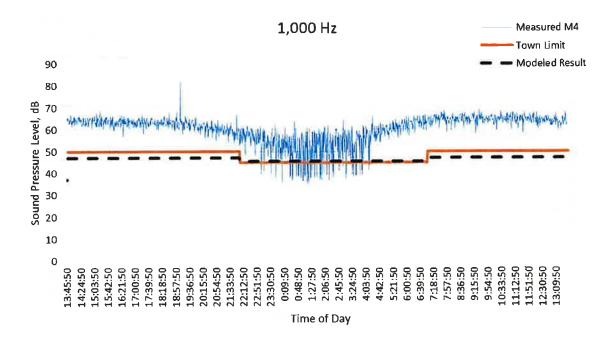


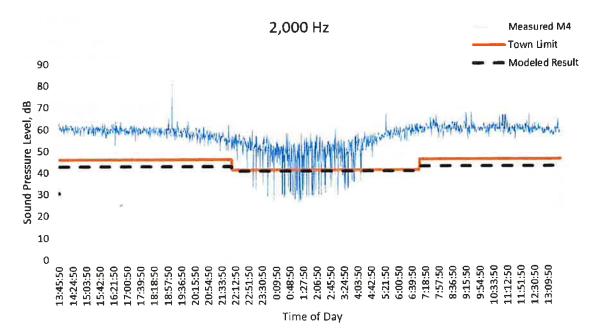
M4 Results

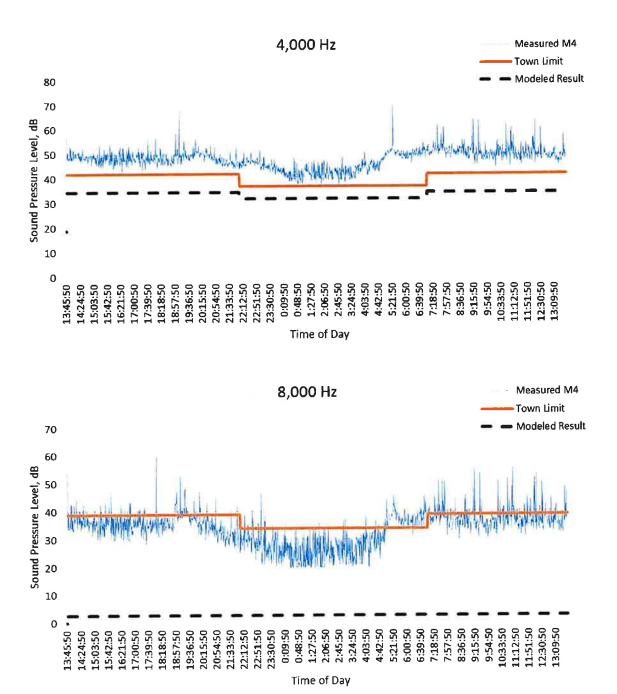




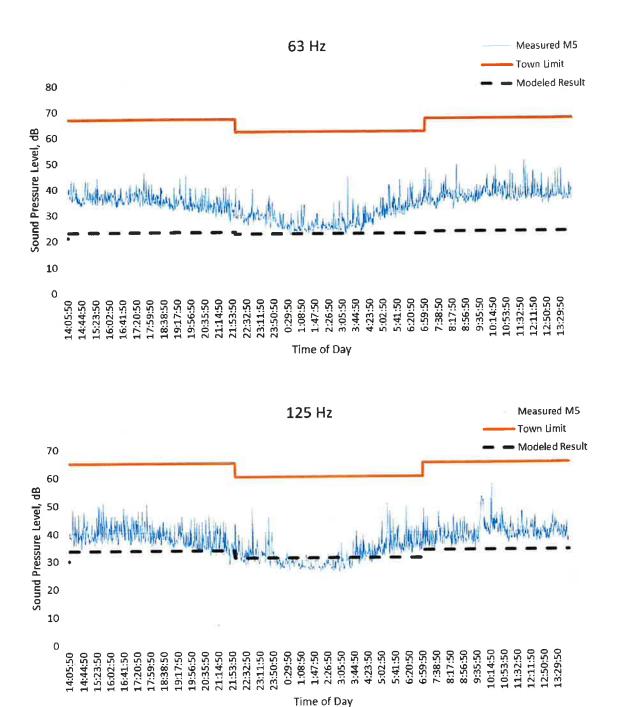


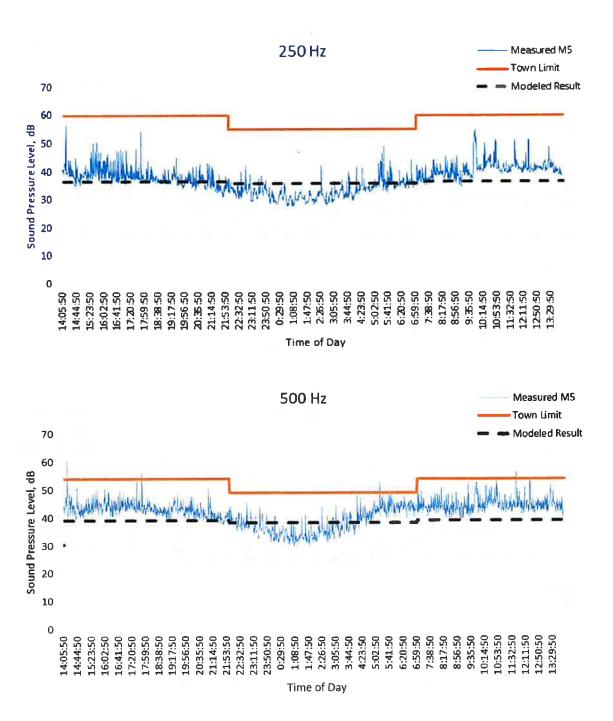


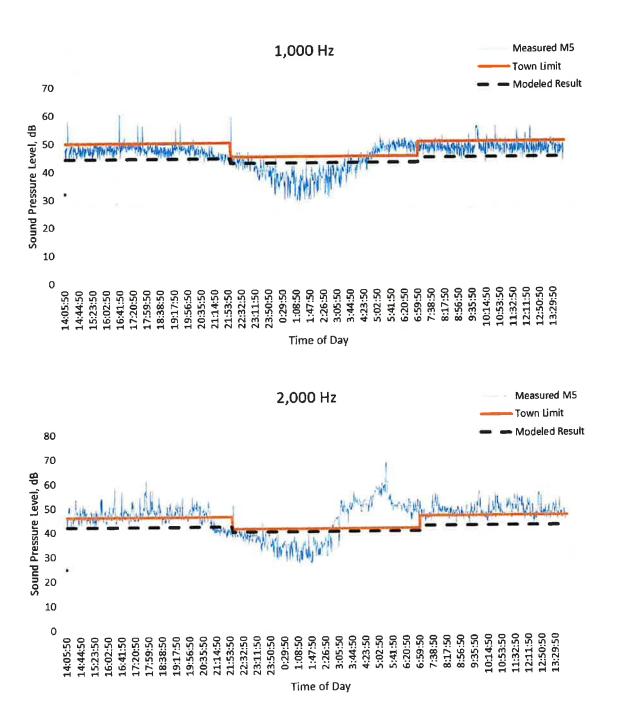




M5 Results







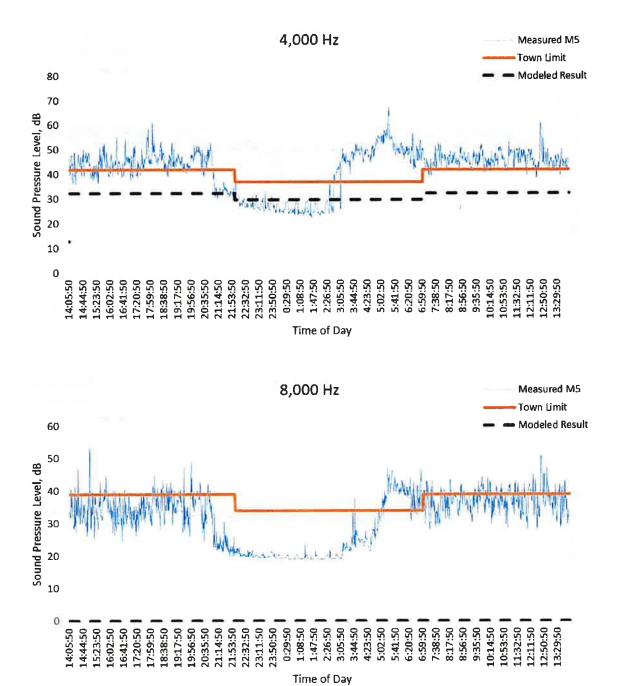
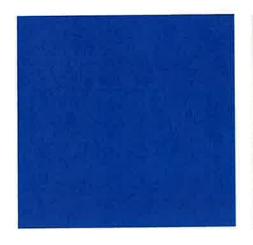


Exhibit 6







ECS MID-ATLANTIC, LLC

Geotechnical Engineering Report

Warrenton Data Center

Lee Highway and Blackwell Road Warrenton, Virginia 20186

ECS Project No. 01:31153

Revised August 15, 2022





"Setting the Standard for Service"

Geotechnical • Construction Materials • Environmental • Facilities

Revised August 15, 2022

Ms. Patricia Krinke **Bohler Engineering** 28 Blackwell Park Lane, Suite 201 Warrenton, Virginia 20186

ECS Project No. 01:31153

Reference:

Geotechnical Engineering Report

Warrenton Data Center

Lee Highway and Blackwell Road Warrenton, Virginia 20186

Dear Ms. Krinke:

ECS Mid-Atlantic, LLC (ECS) has completed the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our Proposal No. 01:63686-GP1, dated May 4, 2021. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration conducted and our design and construction recommendations.

It has been our pleasure to be of service to Bohler Engineering during the design phase of this project. We would welcome the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS MID-ATLANTIC, LLC

John A. Short, EIT **Project Manager**

JAShort@ecslimited.com

Dominic O. Apy

Dominic O. Agyepong, PE

Principal Engineer

DAgyepong@ecslimited.com

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EXECUTIVE SUMMARY

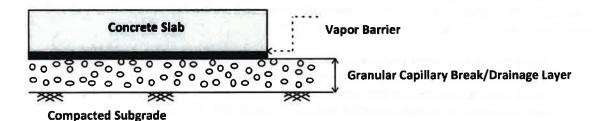
This Executive Summary is intended as a brief overview of the primary geotechnical conditions that are expected to affect design and construction. Information gleaned from this Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

- Based on the subsurface exploration completed we anticipate the site will be suitable for the
 proposed development. We do not anticipate conditions on the project site to adversely affect
 future development beyond the typical difficulties encountered in this geographic region (i.e.,
 rock excavation, potentially expansive soils, and moisture sensitive soils).
- For shallow foundation design we recommend the following design parameters:

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure (Stratum I Soil/Structural Fill)	3,000 psf	3,000 psf
Net Allowable Bearing Pressure (Stratum II- Weathered Rock Areas)	8,000 psf	8,000 psf
Minimum Width	24 inches	24 inches
Minimum Footing Embedment Depth (below slab or finished grade)	24 inches	24 inches

Deep foundation systems such as Drilled Shaft foundations or Auger Cast-In-Place (ACIP) Pile foundations can be utilized for heavily loaded structures. Deep foundations may be designed for an allowable bearing pressure on the order of 50 tons to 100 tons, if extended at least 3 drilled shaft diameters into the relatively unweathered rock. Actual designs will be provided in the final geotechnical report.

 Provided subgrades and structural fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-on-Grade). The following graphic depicts our soil-supported slab recommendations:



- 1. Drainage Layer Thickness: 6 inches minimum.
- 2. Drainage Layer Material: 6 Inches of VDOT #57 stone, VDOT 21-A/21-B

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Structural Fill in accordance with the recommendations included in this report. Floor slabs placed in areas where expansive soils (CH/MH) are encountered should be underlain by at least 2 feet of compacted suitable fill.

Subgrade Modulus: Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, k_1 of 150 pci (lbs./cu. inch).

Based on report, the anticipated geotechnical issues be considered during design included issues related to shallow bedrock, perched groundwater, potentially expansive and moisture sensitive soils, and deep foundations (drilled shafts) for the buildings.

• Satisfactory Structural Fill Materials: Materials satisfactory for use as Structural Fill should consist of inorganic soils with the following engineering properties and compaction requirements.

STRUCTURAL FILL INDEX PROPERTIES					
Subject	Property				
Building and Structural Areas	LL < 40, PI<15				
Pavement Areas	LL < 45, PI<20				
Max. Particle Size	4 inches				
Fines Content (% passing #200 sieve)	Max. 25 %				
Max. organic content	5% by dry weight				

• Compaction Methodologies:

STRUCTURAL FILL COMPACTION REQUIREMENTS					
Subject Requirement					
Compaction Standard	Standard Proctor, ASTM D698/ Virginia Test Method (VTM-1)				
	95% of Max. Dry Density for fill less than 10 feet				
Required Compaction	98% of Max. Dry Density for fill greater than 10 feet				
Moisture Content	-2 to +3 % points of the soil's optimum value				
oose Thickness 8 inches prior to compaction					

 Building and site retaining walls and foundations (soil bearing, lateral earth pressures, subgrade modulus, coefficients of friction, etc.)

Site Soil Design Parameters

Material	Unit Weight (pcf)	Angle of Internal Friction (phi)	At-Rest Pressure (psf per vertical foot of wall)	Active Pressure (psf per vertical foot of wall)	Passive Pressure (psf per vertical foot of wall)
СН	115	12	90	75	175
ML	120	25	70	50	300
SM	125	30	65	45	375
Weathered Rock	135	45	40	25	400

Material	Compacted or In-Situ Soil Moist Unit Weight (δ)	Angle of Internal Friction (ø)	Cohesion (C)	Coefficient of Earth Pressure at Rest (K _o)	Coefficient of Active Earth Pressure (Ka)	Coefficient of Passive Earth Pressure (K _p)
СН	115	12	0	0.79	0.66	1.52
ML	120	25	0	0.58	0.41	2.46
SM	125	30	0	0.50	0.33	3.0
Weathered Rock	135	45	0	0.29	0.17	5.82

For sliding coefficient:

Sliding Friction Coefficient [Concrete on Soil] (µ)	0.30
Skin Friction [Concrete cast against Soil] (F _s) ¹	250 psf

- Potentially expansive soils (CH/MH) are common in the local geology characterized at this site. Expansive soils should not be reused as engineered fill in the building pad, nor as fill for roadway, curb, gutter, and sidewalk subgrade, within utility trenches, or within embankment slopes. Expansive soils (CH/MH) should be undercut to 4 feet below finished exterior grade or to 2 feet below the bottom of footing, whichever is deeper, and backfilled with controlled, compacted fill where encountered. In proposed pavement areas, we recommend undercutting and replacement of the expansive soils (CH/MH) to provide at least 2 feet of non-expansive soil fill below the pavement subgrade.
- Based on the soil conditions encountered (shallow rock and low permeability soils), stormwater management facilities that require infiltration are not feasible for this site.
- Considering the shallow weathered rock surface encountered at this site and our experience with other projects in the area, we recommend that the design for the building be based on a seismic site classification of Site Class C.
- Preliminary pavement section designs based on laboratory data and assumed design parameters are included within the report. We recommend pavement designs be developed in accordance with applicable VDOT requirements. Finalized designs should be based on anticipated traffic loading conditions and actual soil subgrade conditions. For design purposes, we recommend using a design California Bearing Ratio (CBR) value of 4 for the on-site clayey, silty, and sandy soil materials. Additionally, we recommend a Resiliency Factor (RF) of 1.5 be utilized for design of the proposed pavements.
- Groundwater on this site can be characterized as being broadly perched above less permeable
 materials and shallow rock. The depth at which perched water is present on the site varies with
 surface elevation. In low-lying areas, the presence of perched water is more pronounced. In higher
 areas and on ridge lines, perched water may be present, including above design cut elevations,
 but is less concentrated. Soils at contact with perched water levels were very moist to wet. In
 most cases, moisture then decreased with depth. The permanent groundwater able is significantly
 below the anticipated extents of excavation for this project.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design and construction of an industrial site which includes one data center building, a guard house facility, a stormwater management pond, a substation area, associated pavement infrastructure, and mass grading for the overall site. The recommendations developed for this report are based on project information supplied by Bohler Engineering.

Our services were provided in accordance with our Proposal No. No. 01:63686-GP1, dated May 4, 2021. This report contains the procedures and results of our subsurface exploration program, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items.

- A brief review and description of our field and laboratory test procedures.
- A review of surface topographical features and site conditions.
- A review of area and site geologic conditions.
- A review of subsurface soil stratigraphy with pertinent available physical properties.
- Copies of our soil test boring logs.
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills.
- Recommended foundation types.
- General recommendations for pavement design including a recommended design CBR value.
- Evaluation and recommendations relative to groundwater control.
- Recommendations for design and construction of drainage structures and stormwater management facilities.
- An evaluation of potential soil and rock excavation issues.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION & CURRENT SITE CONDITIONS

The proposed project site is located to the northeast of the intersection of Lee Highway and Blackwell Road in Warrenton, Fauquier County, Virginia. The subject property spans a single parcel (GPIN: 6984-69-2419) which, at the time of this exploration, is primarily occupied by active farmland with some wooded areas in the northwest and southeast portions, and site elevations range from approximate EL. 510± feet along the north edge of the site to approximate EL. 465± feet in the northeast corner. The southwest corner of the site is bordered by an existing car dealership. An aerial view of the site is pictured below.

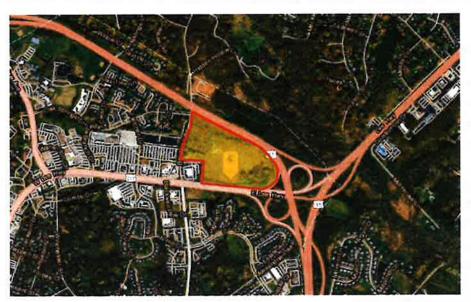


Figure 2.1.1 Site Location

2.2 PROPOSED CONSTRUCTION

It is our understanding that the development will include the construction of one 214,388 sq. ft., 1-story data center building (FFE = EL. 486.0 feet), a guard house facility, a stormwater management pond, a 6-acre substation area, a retaining wall with a maximum exposed height of 6 feet, and associated pavement infrastructure. Based on current proposed grading information, it is our understanding that soils fill on the order of 21± feet and cuts on the order of 40± feet will be required in order to establish final site grades.

The description of the proposed project is based on the information provided to us by your office or other design team members at this time. If any of the information is inaccurate, either due to misunderstanding or due to design changes that may occur later, we recommend that we be contacted to provide additional or alternate recommendations that may be required.

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2.2.1 Structural Information/Loads

A maximum structural column loading of 450 kips has been provided by the structural engineer at this time and it is our understanding that shallow foundations are considered feasible in design for support of the main building. If additional/revised maximum structural loading becomes available, ECS should be informed so that we may confirm or re-evaluate our recommendations.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our exploration procedures are explained in greater detail in Appendix B including the insert titled Subsurface Exploration Procedures. Our overall scope of work included drilling a total of 20 soil borings. Thirteen borings were performed in the vicinity of the data center building and guard house structural footprints, two borings were performed within the proposed stormwater pond, and five borings were performed within proposed pavement areas.

A track-mounted drill rig was utilized to drill the soil test borings. Borings were advanced to depths on the order of up to 80± feet below the existing ground surface. The subsurface exploration was completed under the general supervision of an ECS geotechnical engineer.

Boring locations were identified in the field by ECS personnel using GPS techniques prior to mobilization of our drilling equipment. The approximate as-drilled boring locations are shown on the Boring Location Diagram in Appendix A. Ground surface elevations noted on our boring logs were interpolated from the provided existing contour mapping.

Standard penetration tests (SPTs) were conducted in the borings at regular intervals in general accordance with ASTM D 1586. Representative samples were obtained during these tests and were used to classify the soils encountered. The standard penetration resistances obtained provide a general indication of soil shear strength and compressibility.

Rock sampling was performed at Borings B-3 and B-10 in accordance with ASTM D-2113 using a diamond-studded bit fastened to the end of a hollow double-tube core barrel. The core barrel was drilled into the rock up to five feet at a time, and the samples were removed for measurement of sample recovery. The recovery is determined as the ratio of sample length recovered to the distance drilled.

The core samples were stored in boxes and returned to our laboratory for identification and determination of the Rock Quality Designation (RQD). The RQD is determined as the ratio of intact rock in NX or NQ core sections 4 inches or longer to the distance drilled. Percentages of recovery and RQD are given on the boring logs included in the Appendix of this report and summarized within the table below.

Boring No.	Depth of Core Run (feet) REC (%)		RQD (%)
D 2	39.0-44.0	32	13
B-3	44.0-49.0	53	7
D 10	23.5-28.5	87	17
B-10	28.5-33.5	100	22

3.1 SUBSURFACE CHARACTERIZATION

The project site is located within the Central Blue Ridge Anticlinorium. Based on the USGS Geological Map of Virginia (1993), the site is mapped within the Catoctin Formation – Metabasalt soils. This formation typically consists of grayish green to dark yellowish green, fine-grained, schistose chlorite and actinolite

bearing metabasalt. The materials will initially weather into Silty and Clayey SAND and then into SILT and CLAY with extensive weathering.

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil and rock strata. Please refer to the boring logs in Appendix B.

Table 3.1.1 - Subsurface Soil Summary

Approximate Depth (ft)	Stratum	Description	Ranges of SPT ⁽¹⁾ N-values (bpf)
0-0.5 (Surface cover)	n/a	Topsoil, Roots, and Organics	N/A
0.3-32.0	1	- Very Loose to Very Dense SAND (SM) and SILT (ML) with varying amounts of parent rock fragments - Firm to Very Stiff CLAY (CL, CH, MH)	4 to 50/4
3.0-80.0	11	- Very Dense Weathered Rock with varying amounts of parent rock fragments	60 to 50/0

Notes: (1) Standard Penetration Test

3.2 GROUNDWATER OBSERVATIONS

Groundwater was encountered in 4 of the 20 borings (B-1, B-2, B-3, and B-5) drilled as part of this geotechnical study ranging from depths of 23± to 53± feet below the existing ground surface. Perched water occurs as precipitation that enters the site, either directly or from overland flow from adjacent properties, begins to percolate through the near surface soils. Once the water percolation reaches the bedrock, which is virtually impermeable, it begins to flow at the intersection of the rock and the soil. This groundwater flow continues down gradient with the water table occasionally surfacing to form as springs and intermittent streams. Only in the lowest lying areas and adjacent to existing creeks is a shallow groundwater table in a continuous condition. Otherwise, it is related to precipitation, although springs may exist in the lower lying areas for extended periods of time without recharge from rainfall. Therefore, the groundwater conditions at this site are expected to be significantly influenced by surface water runoff and precipitation.

Because of the perched nature of the groundwater at this site, long term groundwater conditions can be deceptive. Although the true groundwater table can exist several hundred feet below the existing ground surface, groundwater located in streams and creeks, because of perched overland flow, creates the presence of an effective near surface groundwater table. Because the water is perched and flows at the interface between the soil and bedrock, water exiting fracture channels and cracks is common. Therefore, although all building excavations may appear dry at the time of completion, it is very common for fracture patterns in the rock, because of natural conditions or blasting to become natural pathways for ground water flow.

The highest groundwater observations are normally encountered in the late winter and early spring. Variations in the location of the long-term water table may occur because of changes in precipitation, evapo-transpiration, surface water runoff, and other factors not immediately apparent at the time of this

exploration. The site may also be subject to severe desiccation during extended dry periods. Therefore, earthwork operations, especially in the winter and spring months are more likely to encounter difficulties with perched conditions than those operations undertaken in the summer or fall.

3.3 LABORATORY TESTING

Representative soil samples were selected tested in our laboratory to check field classification and to evaluate pertinent engineering properties. The laboratory testing program included visual classifications (ASTM D4318), moisture content tests (ASTM D2216), Atterberg Limits tests (ASTM D4318), washed sieve grain size analyses (ASTM D412), thermal resistivity testing (ASTM D5334), and California Bearing Ratio testing.

Each soil sample was visually classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. A brief explanation of the Unified Soil Classification System is included in Appendix B of this report. The various soil types were grouped into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ, the transitions may be gradual, rather than distinct.

4.0 DESIGN RECOMMENDATIONS

The design recommendations outlined in this report are based on the 20 soil test borings performed within the proposed development limits. The following sections provide recommendations for foundation design, soil supported floor slabs, seismic design parameters, pavements, and stormwater management facilities.

4.1 BUILDING FOUNDATIONS

4.1.1 Shallow Foundations (Option)

Provided subgrades and structural fills are prepared as recommended in this report, the buildings, structures, and lightly-loaded substation features may be supported by shallow foundations including column footings and continuous wall footings. We recommend the foundation design use the following parameters:

Table 4.1.1.1 Shallow Foundation Design

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure (Stratum I Soil/Structural Fill) (1)	3,000 psf	3,000 psf
Net Allowable Bearing Pressure (Stratum II) ¹	8,000 psf	8,000 psf
Minimum Width	24 inches	24 inches
Minimum Footing Embedment Depth (below slab or finished grade) (2)	24 inches	24 inches
Estimated Total Settlement (3)	Less than 1 inch	Less than 1 inch
Estimated Differential Settlement (4)	Less than 0.5 inches between columns	Less than 0.5 inches

Notes:

- (1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
- (2) For frost penetration requirements.
- (3) Based on assumed structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
- (4) Based on maximum column/wall loads and variability in borings. Differential settlement should be re-evaluated once the foundation plans are more complete.

Potential Undercuts: Most of the natural soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structures. If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled with lean concrete ($f'_c \ge 1,000$ psi at 28 days) up to the original design bottom of footing elevation; the original footing shall be constructed on top of the hardened lean concrete. Additional undercutting of foundations may be required if highly plastic soils or undocumented fill soils are present below the foundation. Please see the <u>High Plasticity Soils</u> section of this report.

For building and site retaining walls and foundations (soil bearing, lateral earth pressures, subgrade modulus, coefficients of friction, etc.).

Site Soil Design Parameters

Material	Unit Weight (pcf)	Angle of Internal Friction (phi)	At-Rest Pressure (psf per vertical foot of wall)	Active Pressure (psf per vertical foot of wall)	Passive Pressure (psf per vertical foot of wall)
СН	115	12	90	75	175
ML	120	25	70	50	300
SM	125	30	65	45	375
Weathered Rock	135	45	40	25	400

Material	Compacted or In-Situ Soil Moist Unit Weight (δ)	Angle of Internal Friction (ø)	Cohesion (C)	Coefficient of Earth Pressure at Rest (K _o)	Coefficient of Active Earth Pressure (Ka)	Coefficient of Passive Earth Pressure (K _p)
СН	115	12	0	0.79	0.66	1.52
ML	120	25	0	0.58	0.41	2.46
SM	125	30	0	0.50	0.33	3.0
Weathered Rock	135	45	0	0.29	0.17	5.82

• For sliding coefficient:

Sliding Friction Coefficient [Concrete on Soil] (μ)	0.30
Skin Friction [Concrete cast against Soil] (F _s) ¹	250 psf

4.1.2 Drilled Shafts (Option)

In the event maximum structural loads for the building are considered to be excessive for shallow foundation system design, the building as well as typical more heavily-loaded substation structures (e.g. transmission line towers, etc.) can be designed to bear on drilled shaft foundations. For preliminary design purposes only, we estimated that drilled shafts may be designed to bear in rock sockets having a depth of at least 1 shaft diameter with a design capacity of 60 ksf. An average rock unconfined strength of 4,000 psi may be utilized for preliminary design purposes. Rock suitable for end bearing can generally be identified in the field during drilling by observing drill cuttings which appear generally dry and to consist of rock fragments, a pronounced grinding of the auger teeth and visible dust noted during drilling. Based on the rock depths encountered, we estimate the shaft lengths will vary across the site between 15 feet to over 40 feet in some areas. Additional borings and rock coring data will be required to determine final tip elevations for each drilled shaft location. Project planning and estimates should account for potential variability of drilled shaft length throughout the project.

The actual structural designs of the drilled shaft foundation system (including final pler locations, pier lengths, pier dimensions, and spacing) shall be designed and submitted, separately, for review approval and appropriate permit to Prince William County Building Division prior to construction.

We recommend all drilled shaft excavations be observed and approved by the GER prior to concrete placement. We recommend a pre-production meeting be held prior to drilling operations to review the shaft termination criteria with the GER and drilling contractor. Termination criteria shall be determined by the GER based on the final structural design and type of rig.

4.1.3 Auger Cast-In-Place (ACIP) Pile Foundations (Option)

Auger Cast-In-Place (ACIP) piles are installed by drilling a hollow stem auger with a closed tip. Upon reaching the bearing stratum, the plug is removed, and a sand-cement grout is placed under pressure through the hollow stem as the augers are withdrawn (tremie placement). The upper portion of the pile is terminated approximately 6 inches above the bottom of the proposed pile cap. ACIP foundations may be preliminarily designed for an allowable bearing pressure on the order of 50 tons to 100 tons. We estimate the shaft lengths will vary across the site between 25 feet to over 60 feet in some areas. Additional borings and rock coring data will be required to determine final tip elevations for each ACIP location. Project planning and estimates should account for potential variability of drilled shaft length throughout the project.

Auger cast-in-place piles greater than 18 inches in diameter will require special equipment to be installed and generally cannot be drilled more than 60 feet in the ground. Please note top of pile elevations were used in calculations and were estimated to be two feet below the finished floor elevations.

The actual structural designs of the ACIP foundation system (including final pier locations, pier lengths, pler dimensions, and spacing) shall be designed and submitted, separately, for review approval and appropriate permit to Prince William County Building Division prior to construction.

We recommend a series of three widely spaced auger probe/test piles be installed under the observation of the geotechnical engineer. Based on these observations, at least one pile should be selected for load testing, by the geotechnical engineer. The purpose of the test piles is to confirm our assumption of pile capacity (which is related to our design safety factor) and to allow observation of the subsurface conditions encountered by the augers.

The single test pile should be load tested in axial compression. The primary objective of the load test program is to observe the load-settlement response of an individual pile in order to verify that the contractor's construction procedures and installation equipment can produce an acceptable pile foundation. The geotechnical engineer should be retained to select the location of the test, observe and document the installation of the test pile and reaction piles, perform the load test and interpret the results, and develop recommendations concerning installation procedure and design tip elevations of production piles. Significant differences from accepted procedures or expected results should be brought to the attention of the Structural Consultant.

The axial compressive pile load test should be performed in general accordance with procedures outlined in ASTM D1143, Paragraphs 5.1 and 5.3. The test pile should eventually be loaded to plunging failure, which can be described as a total pile butt displacement on the order of 15% of the pile diameter, or about

2 inches. Accurate systems referenced to a stationary reference beam supported well away from the zone of influence of the test pile and reaction piles (if applicable). We recommend the load test be performed no sooner than five days after the installation of the test pile, unless the contractor can establish sufficient grout strength only after three days.

Auger cast piles may also be utilized to anchor the reaction frame system for the pile load test. However, these anchor piles may be pulled upward during loading. Upward movement of the piles beyond that of elastic elongation would reduce the downward axial capacity of these piles. Therefore, these anchor piles should not be used as production piles.

4.2 SLABS ON GRADE

Provided subgrades and structural fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-on-Grade). The following graphic depicts our soil-supported slab recommendations:

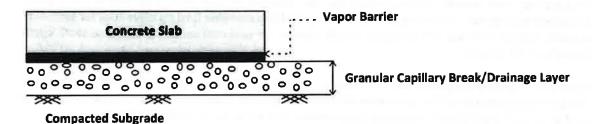


Figure 4.2.1

- 1. Drainage Layer Thickness: 6 inches minimum.
- 2. Drainage Layer Material: 6 inches of VDOT #57 stone, VDOT 21-A/21-B

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted structural fill in accordance with the recommendations included in this report. Floor slabs placed in areas where expansive soils (CH/MH) are encountered should be underlain by at least 2 feet of compacted suitable fill.

Subgrade Modulus: Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, k_1 of 150 pci (lbs./cu. inch).

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

Slab Isolation: Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the

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use of a free-floating slab such as in a drop down footing/monolithic slab configuration, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

4.3 BELOW GRADE WALLS

Any below grade walls that will be backfilled with soil or aggregate should be designed to withstand lateral earth pressures and surcharge loads. For below grade walls that are properly drained, the walls may be designed for an equivalent fluid pressure of 60 pounds per square foot (psf) per foot of wall height. The 60 psf horizontal pressure reflects the moderate strength low plasticity silty and clayey soils present with the wall influence zones. A Lateral Earth Pressure Diagram illustrating our general recommendations regarding the application of lateral earth pressure are included in the Appendix D of this report and in Figure 4.3.1.

The following Figure depicts the suggested lateral earth pressure condition for a "drained condition" with restrained wall top:

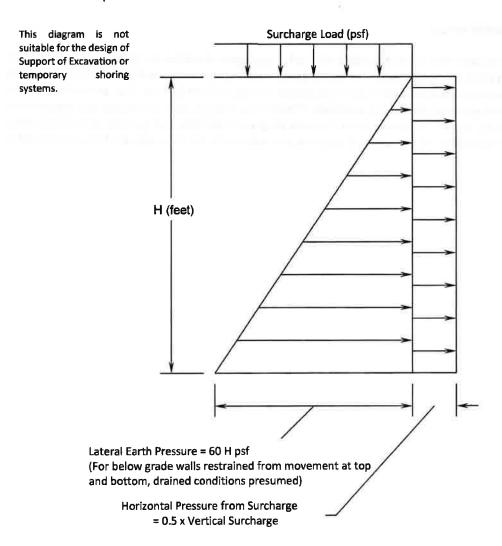


Figure 4.3.1

Any surcharge loads imposed within a 45 degree slope of the base of the wall should be considered in the below grade wall design. The influence of these surcharge loads on the below grade walls should be based on an at-rest pressure coefficient, k_0 , of 0.5 in the case of restrained walls.

Backfill materials should consist of inorganic materials, free of debris and be free draining. The fill placed adjacent to the below grade walls should not be over-compacted. Heavy earthwork equipment should maintain a minimum horizontal distance away from the below grade walls of 1 foot per foot of vertical wall height. Lighter compaction equipment should be used close to the below grade walls and the thickness of the lifts should be no more than 6 inches where light weight compaction equipment is used.

To reduce excessive pressures against the below grade walls, and to reduce the settlement of the wall backfill, it is recommended that the wall backfill be compacted to between 92% and 95% of the maximum dry density determined in accordance with ASTM D 698 or VTM-1. Where the fill will be supporting pavement or other structures, the fill should be compacted to near 95% of this specification. Backfill materials which are placed behind below-grade walls should be free of organic materials and debris, free-draining, non-frost susceptible, and should not include any high plasticity Elastic SILT (MH) or Fat CLAY (CH) materials.

Depending upon the excavation methods employed at the time of installation, it may be advantageous to discontinue use of soil as structural backfill and substitute using open graded stone such as VDOT No. 57 stone. The use of No. 57 stone should help with any problems that should be encountered when attempting to backfill and compact soils. The top 2 feet of backfill should be suitable soils placed and compacted in accordance with the section titled <u>Fill Placement</u>. We recommend filter fabric be placed between the VDOT No. 57 stone and the compacted soil to reduce the risk of the soil fines migrating into the voids in the VDOT No. 57 stone. The GER should be contacted prior to employing the use of open graded stone to backfill around these structures.

Suitable manmade drainage materials may be used in lieu of the free draining granular backfill, adjacent to the below grade walls. These materials should be covered with a filter fabric having an Apparent Opening Size (AOS) consistent with the size of the soils to be retained. The material should be placed in accordance with the manufacturer's recommendations and connected to either the perimeter drainage system or the underslab granular mat, which in turn should be properly drained. The ground surface adjacent to the below grade walls should be kept properly graded to prevent ponding of water adjacent to below grade walls.

4.4 SEISMIC DESIGN CONSIDERATIONS

The International Building Code (IBC) 2012 and Chapter 20 of ASCE 7 require site classification for seismic design based on the upper 100 feet of a soil profile. Three methods are utilized in classifying sites, namely the shear wave velocity (v_s) method; the undrained shear strength (s_u) method; and the Standard Penetration Test Resistance (N-value) method. Where site specific data are not available to a depth of 100 feet, appropriate soil properties are permitted to be estimated by the registered design professional preparing the soils report based on known geologic conditions. The seismic site class definitions for the weighted average of either the SPT N-values or the shear wave velocities in the upper 100 feet of the soil profile are presented in Chapter 20 of ASCE 7 and in the table below.

Table 4.4.1: Seismic Site Classification

Site Class	Soil Profile Name	Shear Wave Velocity, Vs, (ft./s)	N value (bpf)
A	Hard Rock	Vs > 5,000 fps	N/A
В	Rock	2,500 < Vs ≤ 5,000 fps	N/A
c	Very dense soil and soft rock	1,200 < Vs ≤ 2,500 fps	>50
D	Stiff Soil Profile	600 ≤ Vs ≤ 1,200 fps	15 to 60
F	Soft Soil Profile	Vs < 600 fps	<15

In the absence of actual shear wave (V_s) data, we utilized the Standard Penetration Test (SPT) N-values recorded from the borings. Considering the shallow rock surface encountered at this site and our experience with other projects in the area, we recommend that the design for the building be based on a seismic site classification of **Site Class C**.

Considering that the foundation will bear in or close to bedrock, a Site Class B may be possible; however, site specific seismic testing to determine the shear wave velocity of the rock would be required to evaluate this site classification. If it is determined by the structural engineer that an increase in the site class for the project site will result in significant economic savings in the final design, we would be pleased to provide additional site-specific seismic testing services.

4.5 PAVEMENTS

The pavement design recommendations shall conform to the latest VDOT Road and Bridge Standards and Specifications. For the design and construction of exterior pavements, we recommend that all the procedures outlined in the <u>Subgrade Preparation and Earthwork Operations</u> and <u>Fill Placement and Compaction</u> sections be followed through the establishment of roadway section subgrade elevations.

We recommend that topsoil, existing fill material, construction debris, and any other soft or unsuitable materials be removed from the pavement area. The stripped surface should be proofrolled and carefully observed at the time of construction in order to aid in identifying the localized soft or unsuitable materials which should be removed. If high plasticity soils are exposed during the final grading of the paved areas, we recommend that these areas be over-excavated of the high plasticity soil to a depth of 2 feet and replaced with engineered fill.

An important consideration with the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should reduce the possibility of the subgrade materials becoming saturated over a long period of time. We would be pleased to be of further assistance to you in the design of the project pavements by providing additional recommendations during construction of the project.

It is common practice to install only the base aggregate and the base course asphalt during initial construction, and then the final topping surface asphalt much later in the construction process. Often, depending upon the sequence and timing of construction, the final pavement surface may not be placed until several months to even years after the initial base asphalt is placed. Studies have shown that the most critical load conditions for most development occur during the construction phase. In particular, the pavement system is subjected to loading that includes construction equipment, low-boys, concrete trucks, pre-fabricated joist and dry wall deliveries, and other heavy, high concentrated truck loading which does not occur once the development is finished. Not only does this represent the highest traffic loading condition, but it occurs at a time when the pavement section is not at its full strength, simply because the surface asphalt has not been placed.

Although it is usually not economically feasible to increase the pavement section to satisfy this potential design issue, it should be recognized that prudent steps can be taken to help reduce failures of the pavement system during the construction. For example, we recommend using intermediate type asphalt for the base layer of asphalt to reduce the amount of surface water infiltration into the pavement subbase.

Furthermore, any areas that are low and will have a tendency to pond water should be drained to the extent feasible. This should normally be undertaken in areas that are relatively low and wet, or in areas where there is known to be a concentration of construction traffic. These concentrations should be considered to be the initial entryways to the site, the travelways and any other high-construction traffic areas.

Depending upon the time in which the temporary construction is used as a service road, some failures should be expected. If the construction pavement system fails, it will be necessary to remove this failed section and replace it with the initial design section or an equivalent repaired section.

If pavements will be constructed early during site development to accommodate construction traffic, consideration must be given to the construction of heavier pavement sections, capable of accommodating the much heavier loads normally associated with these activities. The design of actual pavement sections is beyond the scope of this report. We recommend final pavement designs be developed in accordance with applicable VDOT and Prince William County requirements, as appropriate. Such a design should be developed considering anticipated traffic loading conditions, soil subgrade conditions, and CBR value.

Rutting of pavement and ultimately pavement failure are typically experienced due to front loading garbage trucks imposing concentrated wheel loads on pavements. Therefore, we recommend that the pavement in any trash pick-up areas consist of a reinforced concrete pavement underlain by VDOT 21A subbase. Design of concrete pavements is beyond the scope of this report. We recommend concrete pavement designs be developed in accordance with applicable VDOT and Prince William County requirements. Such a design should be based on anticipated traffic loading conditions and soil subgrade conditions.

A design CBR value of 4 is recommended based on laboratory testing performed on samples obtained from Borings B-14 and B-15 during our subsurface exploration. Additionally, we recommend that a Resiliency Factor (RF) of 1.5 be utilized for design purposes of the pavements. If the results of the CBR tests taken during construction differ from that mentioned above, the pavement design should be modified as necessary.

New Asphalt Pavement Section: We have assumed that asphalt (light-duty and heavy-duty) and concrete (heavy-duty) pavement section designs for the parking lot and access roadway pavement areas will be based upon 20-year and 30-year design lives with assumed ESALs of 19,300/610,000 for light/heavy-duty Flexible Pavements and 1,400,000 for Rigid Pavement. If these assumptions are found to be inaccurate for the finalized project average daily traffic values, ECS shall be informed in order to revise pavement section design accordingly.

We have also assumed other design parameters in table below.

Table 4.5.1 Pavement Design Parameters

Reliability	90%
Overall Standard Deviation	0.49
Effective Subgrade Resilient Modulus	6,000 psi
Initial Serviceability	4.2
Terminal Serviceability	2.8

The following sections are expected to provide adequate support for standard-duty pavement and heavyduty pavements for the newly constructed pavement areas that will be part of the development of the project site.

Table 4.5.2 Design Pavement Sections

and of the basel and t	Pavement Thickness (inches)			
Pavement Material	Standard-Duty - Asphalt	Heavy-Duty - Asphalt	Heavy-Duty - Concrete	
Surface Course	1.5	1.5		
Intermediate Course		2.0		
Base Course	3.0	3.0	***	
Portland Cement Concrete	***	100 V	8.0	
Aggregate Base Material	6.0	8.0	8.0	
Total Pavement Section Thickness	10.5	14.5	16.0	

It should be recognized that construction loading conditions may be more severe than in-service conditions and the Geotechnical Engineer should be advised of any traffic loading conditions that become available in order to confirm and/or modify the pavement section recommendations.

New Concrete Pavement Section: The heavy-duty concrete pavement section should consist of a minimum of 8 inches of air-entrained Portland cement concrete having a minimum 28-day compressive strength of 4,000 pounds per square inch (psi). The concrete pavement shall be underlain by a minimum of 8 inches of compacted dense-graded aggregate base course stone (VDOT 21-A). The rigid concrete pavement section should be provided with construction joints at appropriate intervals per typical concrete pavement construction requirements.

Exterior Concrete Slabs on Grade (Sidewalks, Curbs, Gutters, and Dumpster Pads): The exterior concrete slabs recommendations should conform to the latest VDOT Road and Bridge Standards and Specifications. For the construction of exterior concrete, we recommend that topsoil and any other soft or unsuitable materials be removed from the paved area. The stripped surface should be proofrolled and carefully

observed at the time of construction in order to aid in identifying the localized soft or unsuitable materials which should be removed.

We recommend that exterior concrete slabs such as sidewalks, curbs and gutter be underlain by a minimum of 4 inches of granular material having a maximum aggregate size of 1.5 inches and no more than 2% passing the #200 sieve. This granular layer will reduce the potential for frost heaving of the exterior slabs. Exterior concrete exposed to the weather should be air-entrained.

4.6 SITE RETAINING WALL

One retaining wall with a maximum exposed wall height of 6 feet is proposed along the northeast edge of the site. While design details for the wall are not available at this time, general recommendations have been provided below.

Since retaining walls are free to rotate at the top, they effectively mobilize more of the shear strength of the retained soil than conventional basement or loading dock walls. For the design of permanent site retaining walls with level backfill, we recommend an equivalent fluid pressure of 45 psf per vertical foot of wall. At the areas of the walls such as corners where rotation will be limited, we recommend an equivalent fluid pressure of 60 psf per vertical foot of wall since rotation is restricted in these areas. This lateral earth pressure assumes that low-plasticity materials with a LL equal to or less than 40 and a PI less than 15, unless the material can be shown to have a very low expansion potential, are used for the wall backfill and that drainage of the backfill is provided as discussed below. A Lateral Earth Pressure Diagram has been included in the Appendix to further detail the anticipated earth pressure distribution behind the wall. The design should also account for any surcharge loads that are within a 45° slope from the base of the wall, and any slope of the backfill. The retaining wall should be designed so that the resultant of the overturning forces remains in the central one-third of the footing.

The foundations for proposed retaining wall should be designed for a maximum allowable soil bearing pressure of 3,000 psf, provided that the footings are founded within firm natural soils or engineered fill placed over firm natural soils. Special care should be taken to confirm soft existing soils are removed prior to the placement of structural fill on the established foundation subgrades.

Sliding resistance of the retaining wall can be achieved either through the use of a shear key (for concrete retaining walls only) or through the frictional forces developed at the base of the retaining wall. A shear key, if installed, can be designed for a passive pressure of 300 psf per foot of depth. This assumes that the soils at the base of the retaining wall are approved, firm natural soils or compacted structural fill. A frictional resistance coefficient of 0.3 can be utilized for sliding resistance design for the retaining wall. The structural design of proposed retaining walls should be approved prior to site implementation.

The recommendations presented herein assume that the backfill behind the retaining wall is properly drained. Suitable man-made drainage materials may be used in lieu of the free draining granular backfill, adjacent to the wall. These materials should be covered with a filter fabric having an Apparent Opening Size (AOS) consistent with the size of the soils to be retained and should be placed in accordance with the manufacturer's requirements. Drainage of the backfill may be accomplished through the use of 4-inch diameter weep holes at 8 feet spacing, through the wall, immediately above proposed grade at the front of the wall. Alternatively, a longitudinal drain line could be used behind the retaining wall. The drain should consist of a 6-inch perforated pipe surrounded by a minimum of 6 inches of VDOT No. 57 stone.

The No. 57 stone should be completely wrapped in a filtration geotextile such as Mirafi 140N. The geotextile used should be reviewed and approved by the geotechnical engineer. The ground surface adjacent to the retaining wall should be kept properly graded to prevent ponding of water adjacent to the wall or drainage of water over the front of the wall.

The land above the recommended geogrid reinforcement layers must be designated as a "soil reinforcement zone easement" and any future landscaping or planting should be coordinated such that it does not disturb the soil reinforcement system and/or will not affect the retaining wall stability. The geogrid layers will be installed in conjunction with the wall construction and thus will precede the excavations for plant material and landscaping. Trees and other plant material that might impact the geogrid reinforcing shall be kept outside the soil reinforcement zone easement.

The construction sequence will be important in areas where construction of the wall will either be in conflict or be too close to any existing storm pipes and structures. We recommend that in such cases, the storm pipes and the structures be installed first or simultaneously with the construction of the wall, since excavation for the storm pipes and structures after construction of the wall may jeopardize the stability of the wall. The wall designer should consider the presence of the storm structures in his or her design and should include standard or specific details for placement of wall backfill around these structures in design. In cases where storm sewer pipes penetrate and/or are located underneath the proposed wall, we recommend the provision of an encasement/liner or a grade beam in order to allow the pipes to be removed for maintenance without affecting the wall stability. If the storm line extends through the face of the wall, then block units should be saw cut within 1/2-inch of the pipe. Details for the pipe outlet and casing as well as wall sections with the pipe in the reinforcing zone should be included in the retaining wall design.

4.7 STORM WATER MANAGEMENT PONDS

One storm water management pond is currently proposed for the site. At the time of this report, specific details regarding water surface elevations and locations and elevations of pond structures were not available. As such, it is the intent of this section to provide general recommendations for design and construction of the pond. Once detailed pond designs and grading is available, ECS should be contacted to provide updated recommendations and, if necessary, global stability analyses for the pond.

4.7.1 Earthwork Operations

Subgrade preparation operations should consist of stripping all vegetation, rootmat, and topsoil and any other soft or unsuitable material from the dam embankment. Where possible, stripping limits for the proposed grading of the dam should be extended at least 10 feet beyond the toe.

After stripping to the desired grade and prior to new fill placement, the exposed soils should be carefully examined to identify any localized loose, yielding or otherwise unsuitable materials by an experienced geotechnical engineer or his authorized representative. After examining the exposed soils, loose and yielding areas can be identified by proofrolling with an approved piece of equipment, such as a loaded dump truck having an axle weight of at least 10 tons. Any soft or unsultable materials encountered during this proofrolling should be removed and replaced with an approved backfill.

4.7.2 Embankment Fill Placement

The on-site materials may be reused as engineered fill if they do not contain organics or foreign debris, are not highly plastic, are not environmentally impacted, and conform to the criteria outlined below for acceptable soil types for construction. Based on observations made during the subsurface exploration program and following visual observation of the recovered soil samples, some of the natural soils may be suitable for reuse as engineered fill materials; however additional laboratory testing will be required for confirmation of soils to be used as engineered fill. Under no circumstances should CH soils be used as fill material in proposed structural areas.

The preparation of fill subgrades should be observed on a full-time basis. These observations should be performed by the Geotechnical Engineer of Record, or their representative, to ensure all unsuitable materials have been removed, and the subgrade is suitable for support of the proposed construction and/or fills. In some areas, excessively soft and/or wet soils may be encountered for fill subgrades, especially in the winter or early spring months. All soft areas should be excavated and removed.

Upon achieving competent subgrade materials, the excavated area should be filled, where appropriate, to planned grades with an approved controlled, compacted fill. All fill and backfill placed within the embankments and around the structures should be placed in lifts not exceeding 8-inches in loose thickness and moisture conditioned to within 2 percentage points on the wet side of the optimum moisture content. We recommend that the lifts be compacted to at least 95 % of their maximum dry density, as determined by ASTM D-698, Standard Proctor, for the full depth of the fill. Acceptable soil types for construction of the embankment on the upstream and downstream side (excluding the clay liner) include soils having a USCS designation of ML and CL; and SM and SC having a minimum of 25% passing No. 200 sieve. The on-site SM and SC soils tested do generally meet these requirements and should be suitable for use as fill.

The timing for placement of backfill for the embankment should be planned to minimize the risk of piping of soil based on laboratory tests performed on the material proposed for use prior to construction (additional observations and analyses may be required for the clay liner placement).

It is recommended that new fill soils be <u>benched</u> into the existing soils to verify adequate soil bonding of these materials. If the top of an exposed layer is too smooth, it should be rerolled with a sheepsfoot roller, or scarified prior to the placement of the next lift of fill. Although it is desirable to seal off fill surfaces on a daily basis using a steel drum or rubber tired roller, these surfaces should be scarified the following day prior to fill activities to minimize the creation of planes of seepage within the embankment structure.

Fill materials should not be placed on frozen soils or frost-heaved soils and/or soils which have been recently subjected to precipitation. All frozen soils should be removed prior to continuation of fill operations. Borrow fill materials, if required, should not contain frozen materials at the time of placement. All frost-heaved soils should be removed prior to placement of controlled, compacted fill, granular subbase materials, foundation or slab concrete, and asphalt pavement materials. Soil bridging lifts within the proposed embankment should not be used since excessive settlement of the structure can occur. Also, trees should not be planted on the existing dam embankment.

4.7.3 Facility Outlets

The principal outlet pipes penetrating the embankment dams should be provided with seepage control measures consisting of a concrete cradle and downstream collection drain. Primary outlet conduits, which penetrate the facility embankments, should be constructed on a concrete cradle along the upstream two-thirds of the conduit length. The downstream one-third of the principal spillway pipe should be surrounded with a 12-inch thick layer of open graded coarse aggregate (VDOT No. 78) wrapped with a suitable nonwoven geotextile with an Apparent Opening Size (AOS) of 70. (The coarse aggregate should conform to the current VDOT Road and Bridge Specifications Section 203 and the geotextile with Section 245.) The gravel layer below and around the conduit at the downstream end will serve to collect any seepage along the conduit. This drainage blanket should be daylighted at the slope face or tied into the stormwater discharge structure.

4.7.4 Foundations for Drainage Control Structures

Based on the results of our subsurface exploration and our engineering analysis, we recommend that any proposed stormwater discharge control structures be supported on spread footing foundations bearing either on suitable firm natural soils or on new engineered fill constructed over suitable natural soils. Assuming subgrades are prepared according to the recommendations above, the foundations may be designed for a net allowable soil bearing pressure of 2,000 pounds per square foot (psf).

If unsuitable soil types or bearing conditions are found to exist at the foundation level, then the base of the excavation should be lowered to suitable materials. As an alternative, the original bottom-of-footing level can be restored by the placement of "lean" (1,000 psi) concrete after removal of the unsuitable soils.

Fill materials should be placed in accordance with the <u>Compaction</u> section of this report. The soil will be moisture and disturbance sensitive; therefore, excavation for the outlet structures should proceed in an expeditious manner in order to reduce exposure of the bedding soils. The foundation excavation should be observed and the bearing pressure of the footing subgrade tested by an authorized representative of the GER.

Granular bedding should not be used to support foundations or pipes penetrating the facility embankments. Granular soils should only be used where specifically designed for drainage. Conduits penetrating the embankments should be supported by properly placed soil or natural soils trimmed to fit the pipe diameter, or concrete fill, such as lean concrete or "flowable" fill, to control seepage along such conduits which could otherwise result in a soil piping failure. The upstream two thirds of the primary discharge pipe should be placed over a concrete cradle as described in the previous section.

4.7.5 Pond Liner (Wet Ponds Only)

In order to maintain the permanent pool elevations, we recommend the use of a clay or synthetic liner to minimize the potential for seepage through the silty and clayey sand materials and weathered rock.

The liner should be present along the entire pond bottom, including embankment slopes up to the 10-yr storm elevation on the impounded side only. The liner should consist of an 18-inch thick layer of material meeting the specification of the most recent edition of the BMP Clearinghouse (Table 14.4). The liner should consist of soil with a minimum of 30% clay particles, by weight. The material should also have a

minimum Plasticity Index of 15 and a minimum Liquid Limit of 30. We recommend the liner have a maximum permeability of 1×10^{-7} ft/sec and should be compacted to 90% to 95% of the maximum dry density as determined by the Standard Proctor Method (ASTM D698). Generally, a soil material classified as Lean CLAY (CL) and having less than 10% retained on the #4 sieve should meet this requirement. Fat CLAY (CH) is not recommended for use as a liner due to concerns over shrinkage cracks. We also recommend the soils for the liner be installed at 2 to 3 percentage points wet of the optimum moisture content. Clay liner materials should be kept moist during and after installation to reduce the potential for desiccation and cracking. It is recommended that new clay liner soils be benched into the existing soils to verify adequate soil bonding of these materials.

4.8 SOIL THERMAL RESISTIVITY

Soil thermal resistivity testing was performed on remolded samples obtained from depths ranging from 1± feet to 6± feet below site grades. The samples were compacted to approximately 95% of the maximum dry density as determined by the Standard Proctor Method (ASTM D698). Tests were performed in general accordance with ASTM D5334. Tests were performed at various moisture contents to develop a dry-out curve. Based on the test results, we recommend the following maximum resistivity values at each location be used for design:

Sample No.	Recommended Max. Rho (°C*cm/W)
B-2	220
B-7	190
B-11	205

Based on the test results, we recommend a **single maximum resistivity value of 220** be used for design of general site duct banks. Laboratory test results for each sample are included in the Appendix of this report.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping all vegetation, rootmat, topsoil, existing fill, and any soft or unsuitable materials from the 10-foot expanded building and 5-foot expanded pavement limits, and 5 feet beyond the toe of structural fills. Deeper topsoil or organic laden soils may be present in wet, low-lying, and poorly drained areas. Root balls may extend as deep as about 2 feet and will require additional localized stripping depth to completely remove the organics. ECS should be retained to verify that topsoil and unsuitable surficial materials have been removed prior to the placement of structural fill or construction of structures.

5.1.2 Proofrolling

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be thoroughly proofrolled with construction equipment having a minimum axle load of 10 tons [e.g. fully loaded tandem-axle dump truck]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying any localized yielding materials.

Where proofrolling identifies areas that are unstable or "pumping" subgrade those areas should be repaired prior to the placement of any subsequent Structural Fill or other construction materials. Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. The situation should be discussed with ECS to determine the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed unstable materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade.

5.1.3 Site Temporary Dewatering

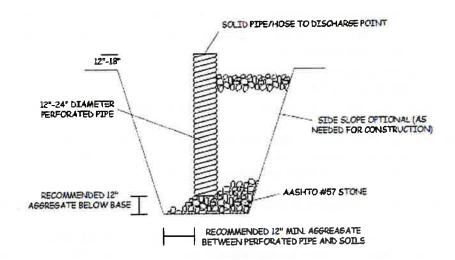
Groundwater on this site can be characterized as being broadly perched above less permeable materials and shallow rock. The depth at which perched water is present on the site varies with surface elevation. In low-lying areas the presence of perched water is more pronounced. In higher areas and on ridge lines, perched water may be present, including above design cut elevations, but is less concentrated. Soils at contact with perched water levels were very moist to wet. In most cases, moisture then decreased with depth.

The contractor shall make their own assessment of temporary dewatering needs based upon the limited subsurface groundwater information presented in this report. Soil sampling is not continuous, and thus soil and groundwater conditions may vary between sampling intervals (typically 5 feet). If the contractor believes additional subsurface information is needed to assess dewatering needs, they should obtain such information at their own expense. ECS makes no warranties or guarantees regarding the adequacy of the provided information to determine dewatering requirements; such recommendations are beyond our scope of services.

Dewatering systems are a critical component of many construction projects. Dewatering systems must be selected, designed, and maintained by a qualified and experienced (specialty or other) contractor familiar with the succinct geotechnical and other aspects of the project. The failure to properly design and maintain a dewatering system for a given project can result in delayed construction, unnecessary foundation subgrade undercuts, detrimental phenomena such as 'running sand' conditions, internal erosion (i.e., 'piping'), the migration of 'fines' down-gradient towards the dewatering system, localized settlement of nearby infrastructure, foundations, slabs-on-grade and pavements, etc. Water discharged from any site dewatering system shall be discharged in accordance with all local, state and federal requirements.

Strategies for Addressing Perched Groundwater:

The typical primary strategy for addressing perched groundwater seeping into excavations is pumping from trench (or French) and sump pits with sump pumps. A typical sump pump drain (found in a sump pit or along a French drain) is depicted below. The inlet of the sump pump is placed at the bottom of the corrugated pipe and the discharge end of the sump is directed to an appropriate stormwater drain.



Sump Pit/Pump Diagram

Details of a typical French drainage installation are included in Appendix D. A typical French drain consists of an 18 to 24-inch wide by 18 to 24-inch deep bed of AASHTO #57 (or similar open graded aggregate) aggregate wrapped in a medium duty, non-woven geotextile and (sometimes) containing a 6-inch diameter, Schedule 40 PVC perforated or slotted pipe. Actual dimensions should be as determined necessary by ECS during construction. After the installation has been completed, the geotextile should be wrapped over the top of the aggregate and pipe followed by placement of backfill. The top of the drain should be positioned at least 18 inches below the design subgrade elevations. Drains should not be routed within the expanded building limits.

Pumping wells or a vacuum system could also be used to address perched groundwater. These techniques often are only effective during the initial depletion of the perched water quantity and may quickly be ineffective at addressing accumulation of water from rain, snow, etc.

5.2 EARTHWORK OPERATIONS

5.2.1 High Plasticity Solls

Within the proposed project limits, potentially expansive soils (CH/MH) were encountered during this exploration; these types of soils are common in this area, and, based on the regional geology as well as results from past ECS subsurface explorations performed on nearby sites, these and other high plasticity soils are believed to present at the site at locations which may not have been evaluated during this subsurface exploration. Care should be taken to limit moisture variations in order to reduce potential volume changes. If the field work is conducted during the winter or early spring months, it is expected that even the low-plasticity clay/silt soils at the surface may need to be removed or dried prior to fill placement. If expansive clays and clay-silt mixtures are encountered, they should not be used as fill for roadway, curb, gutter, and sidewalk subgrade, within utility trenches, or within embankment slopes. For suitability of natural soils to be used in structural areas (i.e. foundations and floor slabs), soils meeting all four of the following provisions shall be considered expansive per IBC 2012, except that tests to show compliance with items 1, 2, and 3 shall not be required if the test prescribed in Item 4 is conducted:

- Plasticity Index (PI) of 15 or greater, determined in accordance with ASTM D 4318.
- 2. More than 10 percent of the soil particles pass a No. 200 sieve (0.75 μm), determined in accordance with ASTM D 422.
- 3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422.
- 4. Expansion Index greater than 20, determined in accordance with ASTM D4829.

If the Plasticity Index (PI) of the soil is 20 or less and the Liquid Limit (LL) is 45 or less, the Plasticity Index Corrected (PI cor) or the Expansion Index Corrected (E1 cor) may be substituted in the definition of Expansive Soil. Where PI cor and E1 cor are determined as follows:

Pl cor = Pl x (% Passing No.40 sieve)/100 and El cor = El x (% Passing No. 4 Sieve)/100

These soils should not be reused as engineered fill. When these soils are encountered in cut areas, they should be undercut to 4 feet below finished exterior grade or to 2 feet below the bottom of footing, whichever is deeper, and backfilled with controlled, compacted fill. If the bottom of the plastic soils extends to depths less than 4 feet below the finished exterior grade, the undercutting and replacement may be limited to the depth of the high plasticity soils.

Alternatively, the footings can be "stepped down" to bear either at 4 feet below exterior grade or at 2 feet below normal footing subgrade, whichever is deeper, bearing on the plastic soils. If the plastic soils are found to be less than 4 feet in thickness, the footing needs bear only below the plastic soils and the frost line.

Floor slabs placed in areas where highly plastic soils are encountered should be underlain by at least 2 feet of compacted suitable fill. In proposed pavement areas, we recommend undercutting and replacement of the expansive soils in order to provide at least 2 feet of non-expansive soil fill below the pavement subgrade.

5.2.2 Existing Man-Placed Fill

Existing man-placed fill was not encountered below the existing ground surface within any of the borings evaluated for this exploration. However, it should be noted that the general site is bordered by some developed areas and fill may be present in areas of the site not explored during our current study or adjacent to utilities or structures at the site. Existing fill material should be considered undocumented fill and will have to be removed and reworked or replaced within structural areas. Any encountered trash or unsuitable fill materials should be completely removed within structural areas and should not be used in structural fill areas.

If areas of existing fill are encountered at a subsequent time during site development, it may be feasible to remove and re-compact the existing fill materials; however, further laboratory testing should be performed at that time to confirm if the fill materials satisfy the requirements for an engineered fill. Some moisture conditioning of the soils may be necessary prior to placement in order to achieve proper compaction. Additionally, the amount of debris present in existing fill materials can frequently be difficult to evaluate with soil borings. Therefore, test pits may be warranted to confirm the fill does not contain unacceptable debris prior to reuse in engineered fill. Some screening may be required to remove any debris prior to placement of these soils, so the planning of earthwork operations should recognize and account for these efforts and increased costs.

5.2.3 Weathered Rock and Rock Excavation Operations

Weathered rock was encountered as shallow as 3.0± feet below the existing ground surface. Rock excavation will be required for mass grading and installation of any deep utilities. Typically, for excavations in relatively unweathered rock material, ripping is practical for excavations extending down to about 2 feet below the depth of auger refusal. However, blasting or hoe-ramming for removal of weathered rock or intact rock will likely be required below auger refusal depths.

For the construction planning and final pay quantities, we recommend that the following definition be utilized in the project specification to define rock:

"For footings, trenches and pits, rock shall be defined as those materials that cannot be excavated with a Caterpillar Model No. 320L track-type hydraulic excavator, equipped with a 42-inch wide short-tip radius rock bucket, rated at not less than 120 hp flywheel power with a maximum drawbar pull force of not less than 39,700 lbs. Boulders or masses of rock exceeding one-half cubic yard in volume shall also be considered rock excavation. This classification does not include materials such as loose rock, concrete, or other materials that can be removed by means other than drilling and blasting, hoe-ramming, or rock trenching, but which for reasons of economy in excavating, the contractor chooses to remove by drilling and blasting, hoe-ramming, or rock trenching techniques."

Refusal materials (intact rock) normally require blasting in deep excavations. Blasting in utility trenches should be done carefully to avoid damage to the surrounding materials. When the material to be excavated requires blasting, the contractor should comply with the requirements of the county.

5.2.4 Structural Fill

Product Submittals: Prior to placement of structural fill, representative bulk samples (about 50 pounds) of on-site and off-site borrow should be submitted to ECS for laboratory testing, which will include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications.

Satisfactory Structural Fill Materials: Fill material underneath the proposed structures and pavements should consist of an approved material (CL, ML, SC, SM or more granular), free of debris, organics, and cobbles greater than 4 inches. The structural fill in the "active zone" under the building pad should have Liquid Limit (LL) no greater than 40 and Plasticity Index (PI) less than 15, and shall be non-expansive in addition to meeting all the other requirements for a suitable structural fill material. The "active zone" is defined by PWC as a buffer of at least four feet below the final exterior grades or two feet below the bottom of the foundation, whichever is greater. Fill below the "active zone" for structures, and below subgrade for slopes and pavement (curb and gutter, sidewalk, etc.) should have LL and PI no greater than 45 and 20, respectively, unless it can be shown to have very low expansion potential. If no structural fill is required, the upper two feet of existing soil shall meet these criteria. Under no circumstances should high plasticity (CH, MH) soil be used as fill material in proposed structural areas.

The low plasticity natural soils at this site are expected to be suitable for use as controlled fill; however, they may require moisture content adjustments, via discing or other drying techniques or spraying of water to the soil prior to their use as controlled fill material. Additionally, any debris or other unsuitable materials must be removed, as necessary, from the on-site materials prior to their reuse as engineered fill. The planning of earthwork operations should recognize and account for these efforts and increased costs. Suitable structural fill soils should have the index properties shown in the tables below.

STRUCTURAL FILL INDEX I	PROPERTIES
Subject	Property
Building and Structural Areas	LL < 40, PI<15
Pavement Areas	LL < 45, PI<20
Max. Particle Size	4 inches
Fines Content (% passing #200 sieve)	Max. 25 %
Max. organic content	5% by dry weight

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Requirement	
Standard Proctor, ASTM D698/ Virginia Test Method (VTM-1)	
95% of Max. Dry Density for fill less than 10 feet	
98% of Max. Dry Density for fill greater than 10 feet	
-2 to +3 % points of the soil's optimum value	
8 inches prior to compaction	

Flowable Fill/Lean Concrete Fill Recommendations: Low strength flowable fill/lean concrete materials are also considered suitable for use as fill to restore site grades to final slab-on-grade elevations for conduit installation. Prior to the placement of these materials, subgrades shall be observed and approved in accordance with the requirements presented in this report. Fill areas shall be limited to locations where compaction of approved structural fill soils will not result in adequate parameters/values, and fill depths shall be limited to depths to which consolidation will not be permissible. The flowable fill shall be approved by the design team to ensure placement, curing, and resistivity values are achieved. Other approved structural fill materials shall not be layered between multiple lifts of flowable fill.

On-Site Borrow Suitability: Significant natural deposits of soils classified in our boring logs as Silty SAND/Sandy SILT (SM/ML) have been identified as being present on the site. These occur mostly at relatively shallow depth below the surface where residual soils are mostly weathered.

Non-Durable Rock: Nondurable rock materials removed in ripping excavations may be used as fill if suitably broken down by mechanical compaction effort. Durability is the term used to describe the ability of a rock or rock-like material to withstand long term chemical or mechanical weathering without size degradation. Any weathered rock excavated from the site and used as engineered fill should have a well-graded grain size distribution with rock and soil particles ranging from clay or silt size particles to a maximum size of 4 inches in diameter. Particles larger than this should be broken by mechanical compaction equipment to achieve the desired grain size distribution, and the samples should have a minimum of 20% passing the #200 sieve and 50% passing the #40 sieve. Variations from these recommendations should be approved by the GER, at the time the samples are prepared.

Fill Placement: Fill materials should not be placed on frozen soils, on frost-heaved soils, and/or on excessively wet soils. Borrow fill materials should not contain frozen materials at the time of placement, and all frozen or frost-heaved soils should be removed prior to placement of Structural Fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

Fill Equilibrium Monitoring: Up to approximately 21± feet of new fill will be required to reach planned grades in some areas. With this extensive fill and predominately fine-grained soils anticipated for its construction, settlement monitoring prior to commencing foundation construction is recommended in order to confirm the fill has reached equilibrium. Likewise, it would be prudent to place the extensive new fill for the building as early as possible in the site development phase so that any residual, fill-induced settlement can occur without major impacts to the building construction schedule.

We believe that the majority of the fill-induced settlement will occur within the fill itself, rather than over a deep soft soil layer. Therefore, a monitoring program utilizing near-surface settlement plates or

monuments should be implemented near or immediately upon the conclusion of the fill placement. The frequency of monitoring should be on a weekly basis, but this should be adjusted as necessary by the GER based upon settlement rates. The GER will also determine the duration of the settlement monitoring based on settlement rates and trends. Typically, the fill-induced settlement rates are highest during the fill placement and begin to taper off shortly after ceasing any fill placement. Fill-induced settlements will practically stop within two or so months after the completion of any fill placement. Construction can begin when subsequent readings indicate settlement of the fill under its own weight has virtually ceased.

5.2.5 Temporary and Permanent Slopes

Because of the erodibility of the natural soil at the site, special care should be taken to prevent erosion. We recommend that temporary slopes established during construction be constructed no steeper than 1H:1V and maintained for no more than 30 days.

Landscape berms can be constructed as steep as 2H:1V; however, it should be noted that the site soil is highly erodible and that adequate measures must be taken to prevent erosion of slopes steeper than 3H:1V. All slopes must be protected from erosion by a ground cover of adequate vegetation and erosion control measures. All excavations should be performed in accordance with the current OSHA and VOSHA regulations.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

Slab Subgrade Verification: Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in **Section 5.1.2 Proofrolling**.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Any loose or unsuitable materials encountered should be removed and replaced with suitable compacted structural fill or pipe stone bedding material.

Utility Backfilling: The granular bedding material (often VDOT #57 stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend

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that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Structural Fill and Fill Placement.

Excavation Safety: All excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by Bohler. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

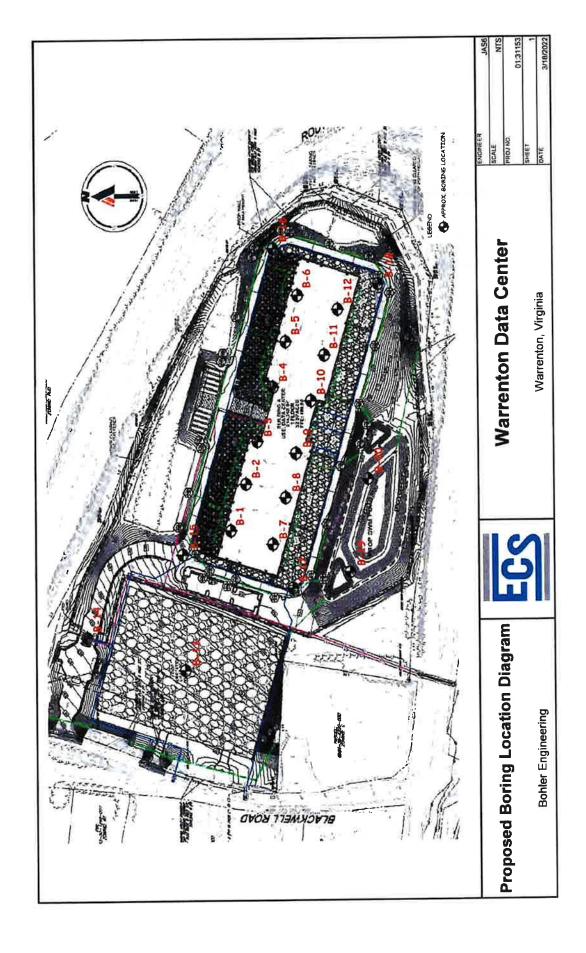
We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise. ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Diagrams & Reports

Site Location Diagram
Boring Location Diagram





APPENDIX B – Field Operations

Reference Notes for Boring Logs Subsurface Exploration Procedure Notes Boring Logs B-1 through B-20



REFERENCE NOTES FOR BORING LOGS

MATERIAL	1,2	
	ASPH	ALT
	CONC	RETE
80000	GRAV	EL
	TOPS	OIL
	VOID	
	BRICK	•
8000	AGGF	REGATE BASE COURSE
	FILL ³	MAN-PLACED SOILS
	GW	WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GP	POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GM	SILTY GRAVEL gravel-sand-silt mixtures
7/2	GC	CLAYEY GRAVEL
7.7.2	sw	gravel-sand-clay mixtures WELL-GRADED SAND
1333333	SP	gravelly sand, little or no fines POORLY-GRADED SAND
	3r	gravelly sand, little or no fines
	SM	SM SILTY SAND sand-silt mixtures
////	sc	CLAYEY SAND sand-clay mixtures
	ML	SILT non-plastic to medium plasticity
IIIII	MH	ELASTIC SILT high plasticity
	CL	LEAN CLAY low to medium plasticity
	СН	FAT CLAY
	OL	high plasticity ORGANIC SILT or CLAY
المركرا		non-plastic to low plasticity
	ОН	ORGANIC SILT or CLAY high plasticity
	PT	PEAT

	DRILLING SAMPLING SYMBOLS & ABBREVIATIONS		
SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
ws	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION			
DESIGNATION		PARTICLE SIZES	
Boulders		12 inches (300 mm) or larger	
Cobbles		3 inches to 12 inches (75 mm to 300 mm)	
Gravel:	Coarse	% inch to 3 inches (19 mm to 75 mm)	
	Fine	4.75 mm to 19 mm (No. 4 sieve to 3/2 inch)	
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)	
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)	
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)	
Silt & Clay	("Fines")	<0.074 mm (smaller than a No. 200 sieve)	

COHESIVE SILTS & CLAYS		
UNCONFINED COMPRESSIVE STRENGTH, QP	SPT ⁵	CONSISTENCY ⁷ (COHESIVE)
<0.25	<3	Very Soft
0.25 - < 0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT ⁷	COARSE GRAINED (%)8	FINE GRAINED (%) ⁸
Trace	<5	<5
Dual Symbol (ex: SW-SM)	10	10
With	15 - 25	15 - 25
Adjective (ex: "Silty")	>30	>30

GRAVELS, SANDS	& NON-COHESIVE SILTS
SPT ⁶	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

	WATER LEVELS
Ā	WL (First Encountered)
Ţ	WL (Completion)
Ā	WL (Seasonal High Water)
<u></u>	WL (Stabilized)

highly organic soils

¹Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

²To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

³Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

⁴Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

⁶The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In day and cohesive sits, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

⁷Minor deviation from ASTM D 2488-17 Note 16.

⁸Percentages are estimated to the nearest 5% per ASTM D 2488-17.



SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 12 inches (in 3 or 4 Increments of 6 inches each)
- Auger is advanced* and an additional SPT is performed
- One SPT test is typically performed for every two to five feet
- Obtain two-inch diameter soil sample

*Drilling Methods May Vary— The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.





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					Topsoil Thickness [4"]				=					
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								ЩЦ		1				
5	S-2	55	18	16	(CH) SANDY FAT CLAY, moist, firm	brown an	d gray,			487	4-4-5 (9)	⊗ 15.1	ı	
5 -					(SM) SILTY SAND, brow	wn, moist	, medium			40/				
3	S-3	SS	18	10	dense):- :- :-	5-5-7 (12)	Ø12	_	
2					WEATHERED ROCK, li	ght brown	, moist,			1	32-50/3"			Ø50/3·
-	S-4	SS	9	0	very dense					482	(50/3")			Faula
15-	S-5	SS	16	3					፟፟፟፟፟	477	29-38-50/4" (88/10") 50/3" (50/3")			⊗ ₂₀₁₂ . ⊗ ₂₀₁₂ .
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V	WL (Sta	abilize	d)			AT	v				DKILLIN	IG METHO	. э. сэ п эА	
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35									-	457	(50/5")		
S J. 2008										1	24 42 50 tall		
40-	S-10	SS	15	15						452	24-43-50/3" (93/9")	16.5	(Figure)
45 -	S-11	55	10	10						447	32-50/4 " (50/4")		⊗ ₅₀₄ .
50-	3-12	SS	4	4						442	50/4" (50/4")		⊗ _{50м} -
55 -	S-13.	_55	4	4						437	50/4" (50/4")		Ф _{50/4} .
60-	S-14	SS	3	3	END OF BOR	ING AT 58.	8 FT			432	50/3" (50/3")		⊗ _{50/3} .
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					INES REPRESENT THE APPROX	KIMATE BOUI	NDARY LINES BE						KADUAL
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-					Topsoil Thickness [3"] (SM) SILTY SAND, brov	yn, mois	t, loose			1	2-3-7			1
-	S-1	SS	18	12	(0, 0,,	•					(10)	84	24.7	2
5-	D35- 191 S-2	BG1 SS	60 18	18	WEATHERED ROCK, lig gray, and black, moist,					475	17-24-38 (62)	11.7 11.7	× Be	g [85.6%]
	5-3	SS	17	17						17.15.00	19-34-50/5" (84/11")			⊗ _{84/11} .
10-	5-4	SS	17	17						470	20-37-50/5" (8 7/11")			Ø _{87//11} -
2 2 3 2 2											17-24-32		/	/
15-	S-5	SS	18	18						465	(56)	12.6	866	
20	S-6	SS	9	9						460-	24-50/3" (50/3")			850/J·
20 -										1				
25-	S-7	SS	17	15						455-	30-41-50/5" (91/11")			⊗ _{91/11} -
4	S-8	SS	9	9						E	45-50/3"			⊗ _{50/3} -
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ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	DF MATERIAL			WAIER LEVELS ELEVATION (FT)	81OW5/6*	X—— RI		ON BLOWS/FT N & RECOVERY
-					WEATHERED ROCK, lig					1			
-					gray, and black, moist	., very dens	-			4			
_	S-9	SS	11	10						38-50/5" (50/5")			Ø50/5-
35-	S-10	-55	a	4					44	50/4"			Ø504-
1										(50/4")			
40-									44	7			
45 -	S-11	SS	5	5					☑ 43	50/5" (50/5") 5			⊗ _{50/5} .
50-	S-12	_ss	3	3					43	50/3" (50/3")			⊗ _{sors} .
55 -	S-13.	SS	4	-4					42	50/4" (50/4")			⊗ _{50/4} -
60-	S-14	SS	3	3	END OF BORI	NG AT 58.8	FT		42	50/3" (50/3")			⊗ ₅₀₀ .
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												Plastic Limit	Water Conten	t Liquid Limit
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	-									.2	4-5-7		28 ×	44 [71.0%]
-	S-2	SS	18	18				Ш		470-	(12)	Ø12 2f	76 ^	□ [71.0%]
5-	-									1				
	5-3	SS	18	12						1	6-7-9 (16)	Ø ₁₆		
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10														
	-													
	-									-			A,	
	S-5	SS	11	11						2	39-50/5" (50/5")			Ø _{50/5} .
15	- 33	- 55	11							460-	(50/5)			
13	3									3				
	3													
	-													
	S-6	SS	5	5						1	50/5" (50/5")			Ø _{50/5} -
20	-									455	(3-7-7			
20	3		1					掘		2				
	3									-				
	_									(*				
	5-7	SS	5	5.	1						50/5" (50/5")			⊗ _{50/5} -
25	_								1	450-	,==,2,			
25														
	}													
	-													
	S-8	SS	2	2	1				∇	1	50/2" (50/2")			®50/2°
30	_									445-	1			
30	1													
		UE exa	ATIFIC	ATION!	CONTINUED O	IN NEXT PA	DARY LINES	BETWEE	N SOI	L TYPES. I	N-SITU THE T	RANSITION MA	Y BE GRADI	JAL
	WL (Fir				INES REPRESENT THE APPROA		ING START			4 2021			6.0	
_	WL (Co	_			35.0	BOR	30000		-		2000 TV 2 7 10			
	WL (Se	_		\\/ater			ING IPLETED:		Oct 0	4 2021	НАММ	ER TYPE: A	uto	
				.valci			IPMENT:		LOGG	ED BY:	DRILLIN	G METHOD: 3	.25 HSA	
₩	WL (St	zeווועפ	u)		GF	OTECHNI	CAL BOI	REHO	LE L	.OG				

CLIENT	:						PROJECT	NO.:	- 1	BORING N	10.:	SHEET:		
Bohler I							01:31153		_	-03		2 of 2		FL'C
PROJEC							DRILLER/G							
Warren			ter				All Americ	an Geo	tech,	Inc.		1		
SITE LO			kwell i	Road. V	Varrenton, Virginia 20186							LOS	SS OF CIRCULATION	<u>}1807</u>
NORTH					ASTING:	STATION:			SL 47		LEVATION:	ВС	OTTOM OF CASING	-
	BER	w w	<u>S</u>	Ê					SIS	E		Plastic I X-	imit Water Conter	nt Liquid Limit
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)					WATER LEVELS	ELEVATION (FT)	BLOWS/6"	_	ANDARD PENETRATIO	
EP T	, je	MPL	Ä	S S	DESCRIPTION O	F MATERIAL	-		TER	NAT	NO		QUALIT DESIGNATIO	N & RECOVER!
□	AM	S. S.	AM	띭					- ₹		ш		REC	
	r.		0,										ALIBRATED PENETROR CONTENTI %	HETEN TON/SF
					WEATHERED ROCK, lig	ht brown	to gray,	Her.		1				
-	1				moist, very dense					-				
1	5.9	SS_	3	3						1	50/3"			⊗ _{50/3} .
			-	*						-	(50/3")			
35 -									¥	440-				
-										-				
-										-				
-		200	648	2						-	co inii			
	\$-10	-ss	2	2	COLUCT IDEC 339/ DOI	130/1	101-1-1-1	45.		1 -1	50/2" (50/2")			⊗ _{50/2} -
40-					SCHIST, [REC=32%,RQI Weathered, Very Hard					435		1		
	1				weathered, very mark	a, Light C	ii ay			1 4		!		
- 2	5-11	RC	60	19						1		13 🖟 🤇	32	
	-									1 -		;		
					′					1		l l		
7	-				SCHIST, [REC=53%,RQI	D= 7 %], H	lighly	H.		F				
45-	1				Weathered, Very Hard	d, Brown	ish Gray			430-				
-	S-12	RC	60	32						1		7	∳ 53	
] 12	"	00	3-								1		
	}									<u> </u>		1		
-	1	-	-	-	AUGER REFUSA	AL AT 49.0	FT		-	-			!	
50-	1				1.002					425-				
	1									1				
	1									1				
	3									1				
,	-		1							1				
	4									400				
55-	1									420-				
-	1		1											
	1									1				
9	-													
=	-													
60-	-									415				
-	1									4				
	1		_	-				-	-		-	-		
	I -	HE STR	ATIFICA	TION	INES REPRESENT THE APPROXII	MATE BOUN	NDARY LINES F	SETWEF	N SOII	L TYPES. IN	N-SITU THE T	RANSITION I	MAY BE GRADI	JAL
\(\sigma\)	WL (Fir				29.0		RING STARTI			2021	CAVE IN		36.0	
X	WL (Co	mplet	ion)		35.0	7.00	RING		Oct 04	\$ 2021	HAMME	R TYPF	Auto	
T	WL (Se	asona	High '	Water)		-	MPLETED:			ED BY:				
V	WL (Sta	abilize	d)			ATV	UIPMENT: /			DY:	DRILLING	G METHOD	; 3.25 HSA	
					GEC		ICAL BOR	REHO	LE L	OG				

CLIENT:		Selection of					PROJECT NO 01:31153).;		ORING N	NO.:	SHEET: 1 of 2	-00
PROJEC	_						DRILLER/CC						<u>-68</u>
Warren			er				All American	Geot	ech, i	nc.			
SITE LO					Vissiale 20186							LOSS OF CIRCULATIO	N 21003
NORTH		ig Blac	KWEII H		arrenton, Virginia 20186 STING:	STATION:			SU 48:		LEVATION:	BOTTOM OF CASING	. 5
	3ER	ш	Î.	2					SIS	E		Plastic Limit Water Conti	Δ
БЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	OF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOW5/6"	S STANDARD PENETRAL ROCK QUALITY DESIGNATI RQD	
	SAM	A.S.	SAM	RĒ		,			3	<u> </u>		CALIBRATED PENETRO	METER TON/SF
1/2					Topsoil Thickness [6"]	- L. L	malet.	mii		1			
1	S-1	SS	18	18	(ML) SILT, brown to lig medium dense to ver		moist,			-	5-5-16 (21)	25.2	
5	D35-	8G1 SS	60 18	18]	11-13-19 (32)	2.2	[85.1%]
5-	S 2									478-	5-7-8		
-	S-3	SS	18	18						1	(15)	Ø ₁₅ 16.9	
	5-4	SS	18	18						1	7-10-10 (20)	⊗ ₂₀	
10-										473-			
15-	S-5	SS	18	18			t.			468	11-11-13 (24)	22.6	
20-	S-6	SS	18	18						463	21-23-31 (54)	84	
					WEATHERED ROCK, b	rownish gr	ray, moist,						
	S-7	SS	8	8	very dense			關		1	47-50/2" (50/2")		S50/2"
25-										458	(30/2 /		
	S-8	SS	11	11						0000	36-50/5"		⊗ _{sors} .
30	3-8	33	11	11						453	(50/5")		
					CONTINUED O	N NEXT P	AGE					TRANSITION MANY DE CRA	DUAL
					INES REPRESENT THE APPROX	KIMATE BOUN	IDARY LINES BE						JUAL
又	WL (Fir	st Enc	ountei	red)	Dry	BO	RING STARTE	D: !	Sep 2	8 2021	CAVE IN	N DEPTH: 17.0	
-	WL (Co	_	_	Water)	Dry	cor	RING MPLETED:			8 2021	намм	ER TYPE: Auto	
-	WL (St	_		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		ATV	JIPMENT:			GED BY:	DRILLIN	NG METHOD: 3.25 HSA	
\vdash	,				GE	OTECHN	ICAL BOR	EHO	LE L	.OG			

CLIEN	T: r Engine	ering					PROJECT NO.: 01:31153		BORING I B-04	NO.:	SHEET: 2 of 2		FCo
	CT NAM						DRILLER/CON						-63
	nton Da		er				All American G	ieotech	, Inc.				
0.00			:kwell f	Road, V	Varrenton, Virginia 20186						LOS!	OF CIRCULATION	<u>>1003</u> >
	HING:				STING:	STATION:		- 1	URFACE E	LEVATION:	ВО	ITOM OF CASING	
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION (WATER LEVELS	ELEVATION (FT)	"9/S/WS/8"	X— ROCK C	undard Penetration Quality Designation QD	N BLOWS/FT
3	-				WEATHERED ROCK, b very dense				-	50/1"			&
	-5-9-	-55	-1-	1	AUGER REFUS	AL AT 33.6 F	Т		1 -1	(50/1")			⊗ _{50/1} -
35	-								448				
	-								1 4				
	-								-				
40	-								443-				
	-								1 4				
1	-								-				
3	4								1 4				
	4								1				
45	-								438-				
	1								1 4				
									1 4				
	_							1	1				
	1								1				
50	3								433-				
50	-								1				
	3								-				
	7								1				
									1				
	7								7				
55	-							- 1	428				
	-												
	-								-				
	-								-				
	4								-				
60	-								423-				
1	4								1 4				
	1_							_	1				
	Т	HE STR	ATIFICA	TION II	NES REPRESENT THE APPROX	(IMATE BOUND	ARY LINES BETW	EEN SO	IL TYPES. IN	N-SITU THE T	I RANSITION IV	IAY BE GRADU	AL
	WL (Fir	st Enc	ounter		Dry		NG STARTED:		28 2021	CAVE IN		17.0	
_	WL (Cc		_		Dry	BORI		Sep 2	28 2021	НАММЕ	R TYPE:	Auto	
A	WL (Se	asonal	High \	Water)			PLETED: PMENT:	LOG	GED BY:				
V	WL (St	abilized	1)			ATV				DRILLIN	3 METHOD:	3.25 HSA	
					GF	OTECHNIC	CAL BOREH	OLE	OG				

CLIENT:		rina					PROJECT NO 01:31153	D.:	- 1	BORING N	NO.:	SHEET:	00
PROJEC							DRILLER/CO						-63
Warrent			er				All America	n Geote	ch, l	inc.		100	
SITE LO			kwell R	oad. W	arrenton, Virginia 20186							LOSS OF CIRCULATION	>1003
NORTH					STING:	STATION:			SU 48		LEVATION:	BOTTOM OF CASING	-
DЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	DF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOW5/6"	Plastic Limit Water Content Lic X———— STANDARD PENETRATION BL ROCK QUALITY DESIGNATION B. R RQD ——————————————————————————————————	-∆ DWS/FT ECOVERY
-					Topsoil Thickness [6"]		/	mil		=			
	S-1	SS	18	10	(ML) SANDY SILT, redo loose	lish brown	, moist,			-	3-3-5 (8)	⊗ ₆	
5-	S-2	5S	18	18						477-	4-5-4 (9)	⊗,	
-	S-3	SS	18	18	(ML) SILT, brown and medium dense to ver		st,			1	3-5-7 (12)	№ 12 28.8	ļ
-	S-4	SS	18	18							6-9-9 (18)	Q ₁	
10-										472-			
15-	S-5	SS	18	18						467	21-27-35 (62)	Be2	
20-	_S-6	SS	5	5	(ML) SANDY SILT WIT quartz fragments, ligi moist, very dense					462-	50/5" (50/5")		Ø _{50/5} .
9					(ML) SILT, light brown dense to dense	ı , moist, m	edium				9-10-13		
25-	S-7	SS	18	18						457-	(23)	\$23	
30-	5-8	SS	18	18						452	16-19-22 (41)	de.	
					CONTINUED O	N NEXT P	AGE			D'OFF :	AL CITAL THE	DANCITION MAY BE CRADUAL	
												RANSITION MAY BE GRADUAL	
-	WL (Fir	_		ed)	53.0		RING STARTE	D: S	ep 2	8 2021	CAVE IN	DEPTH: 49.0	
_	NL (Co NL (Se		_	Mater			RING MPLETED:			8 2021	НАММ	ER TYPE: Auto	
_	WL (Se WL (Sta		_	vvaler			JIPMENT:	L	.OGC	GED BY:	DRILLIN	G METHOD: 3.25 HSA	
-	-,-,-		_		GE		ICAL BOR	EHOI	LE L	OG			

CLIENT		74.00000						ROJECT N	0.:		ORING	NO.:	SHEET: 2 of 3		A -
Bohler I				_				1:31153 RILLER/CI	ONTRA	_	-05 R ·		2 01 3		6
PROJEC Warren			a r				100	il America							
SITE LO													LDCC OF G	IRCULATION)ioux)
1			kwell R	load, V	Varrenton, Virginia 20186								LUSS OF C	IRCULATION	Name of the last
NORTH	ING:			EA	ASTING:	STATIO	ON:			SU 482		LEVATION:	воттом	OF CASING	
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION	I OF MATER	RIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	X—————————————————————————————————————	PENETRATION BLOV PESIGNATION & REC	AS/FT COVERV
35-	S-9	SS	18	18	(ML) SILT, light brow dense to dense WEATHERED ROCK, very dense						447-	21-38-43 (81)	19.9	30× 8	\$ _{[87.5%}
30 -											5 E S				
40 -	S-10	SS	11	11							442	46-50/5" (50/5")			Ø _{50/5} -
45-	S-11	SS	- 5	5							437	50/5" (50/5")			⊗ _{50/5} .
50-	S-12	SS	-3	-3-						y	432-	50/3" (50/3")			⊗ _{50/3} -
55-	S-13	-ss-	-2	-2						¥	427 -	50/2" (50/2")			⊗ _{soz} -
60-	S-14	-\$\$	-2-	-2-							422	50/2" (50/2")			⊗ _{sorz} .
					CONTINUED	ON NEX	T PAG	E							
	T	HE STR	ATIFICA	TION L	INES REPRESENT THE APPRO	OXIMATE BO	OUNDAF	RY LINES BE	TWEEN	SOIL	TYPES. I	N-SITU THE T	RANSITION MAY E	BE GRADUAL	
\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	NL (Fir	st Enco	ounter	ed)	53.0		BORING	STARTE	D: 5	ep 28	3 2021	CAVE IN	DEPTH: 49.0	D	
_	NL (Co			A / _ + \	48.0		BORING		s	ep 28	3 2021	НАММЕ	R TYPE: Aut	20	
	NL (Sea			<i>r</i> vater)	J		EQUIPN		L	ogg	ED BY:	решли	G METHOD: 3.2 !	E HSA	
<u> </u>	NL (Sta	bilized	1)		G		ATV		EHOI	Ele	OG	DKILLIN	G WETHOD; 3.2	J 113/5	

CLIENT Bohler I		ring					PROJECT NO.: 01:31153		BORING B-05	NO,;	SHEET: 3 of 3	ECC
PROJEC	T NAM	iE:					DRILLER/CON					
Warren SITE LO			er				All American e	eoteci	1, 1116.		LOSS OF CIRCULATION	ON SIDER
			kwell F		Varrenton, Virginia 20186						2033 DF CIRCULATIO	
NORTH	ING:			EA	STING:	STATION:		- 1	SURFACE 182	ELEVATION:	BOTTOM OF CASIN	G 💌
E	SAMPLE NUMBER	γE	(NE) :	(NI)				219	E	ŧ,	Plastic Limit Water Conl X S STANDARD PENETRA	Δ
ОЕРТН (FT)	N N	SAMPLE TYPE	SAMPLE DIST. (1N)	RECOVERY (IN)	DESCRIPTION O	OF MATERIAL		MATER EVELS	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY DESIGNAT	
DEP	MPLI	SAMI	MPL					TAW.	LEV.	<u> </u>	RQD REC	
	🛭	"	SA	"					"		CALIBRATED PENETR [FINES CONTENT] %	DMETER TON/SF
					WEATHERED ROCK, b	rownish gra	ay, moist, 🎽		8			
	S-15	SS	-5	5	very dense					50/5"		⊗ _{50/5} -
65		-555					7		417-	(50/5")		
65 -									1			
-									1	1		
9										1		
	5 16	-55- -	-1-	-1-			7			50/1" (50/1")		® _{50/1} -
70-							Ē		412-	,.,		
'0							151					
-									3-2	1		
2										1		
3	5-17	SS	=3-	3-					-	50/3" (50/3")		⊗ _{50/3} -
75-							F		407 -			
-										1		
							掘			1		
1	5-18	SS	-1-	1-1-	END OF BORI	NG AT 78.6	FT		-	50/1" (50/1")		⊗ _{50/1} -
80-									402-	-		
	1											
	1											
									8	1		
-	1								- 02	1		
85-									397-	-		
-	1								3			
-	1									}		
	1									-		
-	1								73			
90-									392-	-		
	1											
-	1								- 25	}		
	1											
-	TI	HE STRA	ATIFICA	TION L	INES REPRESENT THE APPROX	IMATE BOUND	DARY LINES BETV	VEEN S	OIL TYPES.	IN-SITU THE T	RANSITION MAY BE GRA	DUAL
\(\sigma\)	VL (Firs				53.0	- Constant	ING STARTED:		28 2021		I DEPTH: 49.0	
-	VL (Co	_			48.0	BOR			20 2024	LIABABAT	ER TYPÉ: Auto	
A /	NL (Sea	sonal	High \	Water)		COM	IPLETED:		28 2021	PAIVIIVI	ENTIFE: AULO	
_	NL (Sta	_				EQU ATV	IPMENT:	LOC	GGED BY:	DRILLIN	G METHOD: 3.25 HSA	
	, - (J.Ca		-1		GE		CAL BOREH	OLE	LOG			

CLIEN	T:						PROJECT NO	D.:	В	ORING I	NO.:	SHEET:		
	Enginee						01:31153			-06		1 of 2		272
	CT NAN						DRILLER/CC							-03
	nton Dat		er				Ali America	Geot	ecn, I	nc.			1.0	
	CATION		kwell R	load, W	arrenton, Virginia 20186							LOSS OF	CIRCULATION	<u>>1002</u> >
NORT	HING:			EA	STING: ST	TATION:			SU 482		LEVATION:	BOTTOR	of Casing	-
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF N	∕/ATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	X STANDA ROCK QUALI RQD REC	RD PENETRATION BL ITY DESIGNATION & R ATED PENETROMETER	OWS/FT
	+				Topsoil Thickness [6"]									
	S-1	SS	18	12	(ML) SANDY SILT, reddish loose	a brown, r	noist,			-	4-5-5 (10)	⊗ ₁₀	25.2	
5-	S-2	SS	18	10	(ML) SILT, light brown, m medium dense	oist, loos	e to			477	3-5-6 (11)	⊗.,		
	S-3	SS .	18	18							3-4-4 (8)	⊗8	41	.a.
10	5-4	SS	18	18						472-	7-7-7 (14)	Q 14		
					WEATHERED ROCK, light moist, very dense	brown a	nd gray,			1000	20.27.22			
15	S-5	SS	18	18						467-	22-27-33 (60)	18.3	860	
20	5-6	SS	11	11						462-	33-50/5" (50/5")			Ø\$0:5·
2	S-7	SS	16	16						6.3%; Y. E.	27-39-50/4"			⊗ 89/10·
25	357	3.3	10	10						457	(89/10")			
30	S-8	SS	9	9						452	20-50/3" (50/3")			⊗ _{50/3} -
					CONTINUED ON N									
					NES REPRESENT THE APPROXIMA	ATE BOUNDA	ARY LINES BE	TWEEN	SOIL	TYPES. II			BE GRADUAL	
_	WL (Fir			ed)	Dry		NG STARTED	: S	ep 28	2021	CAVE IN	DEPTH: 20	0.0	
_	WL (Co			Mater\	Dry	BORIN	NG PLETED:	s	ep 26	2021	НАММЕ	R TYPE: AL	ıto	
_	WL (Sta			, vale()		-	MENT:	L	OGG	ED BY:	DRILLING	5 METHOD: 3.	25 HSA	
H	,				GEOT		AL BORE	HOL	ELI	OG				

CLIENT:							PROJECT NO.: BORING NO.:		10.:	SHEET: 2 of 2		00		
Bohler E		_					01:31153	01:31153 B-06 DRILLER/CONTRACTOR:				2 01 2		66
PROJEC							All American Geotech, Inc.						=	
Warrent SITE LOC	_	_	er				All Alliance		,			LOSS OF	CIRCULATION	2100>
			well R	oad, W	arrenton, Virginia 20186							2037 6		
NORTH					STING:	TATION:	SURFACE ELEVATION 482				LEVATION:	BOTTON	M OF CASING	
	BER	SAMPLE TYPE	(SE)	2						(FI)	¥	х	Water Content Liq	-Δ
ОЕРТН (FT)	SAMPLE NUMBER		SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF	MATERIAL		WATER LEVELS	ELEVATION (FT)	BLOWS/6"		RD PENETRATION BLC ITY DESIGNATION & RE		
5	SAME	SA	SAME	REC					*	33		CAUBRA	ATED PENETROMETER	ron/sf
-					WEATHERED ROCK, ligh	t brown	and gray,			-				
3		- 1			moist, very dense					-				
4	s-9	SS	-1-	1	AUGER REFUSA	FT	SULT	_	-	50/1"			⊗ _{son} .	
-			172.41		AUGER REFUSA	LAI 33.0				447-	(50/1")			
35										447				
										-				
8										7				
=										1				
40 -										442-				
-														
- 5										1 7				
<u> </u>										-				- 1
-										-				
45 -										437 -				
-										_				
-														
										-				
										-				
50 -										432-				
50														
										:				
-	1													
										427 -	-			
55 -										427				
	1									[]	}			
8														
	1									1	1			
	1										1			
60-	1									422-				
51	-									1 2	1			
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL														
		st Enco		ed)	Dry		RING START	ED:	Sep 2	8 2021	CAVE IN	DEPTH: 2	0.0	
_		mpleti asonal		Mater1	Dry		RING MPLETED:			B 2021	НАММ	ER TYPE: A	iuto	
	_	asonar abilized		vvate:)		EQ	UIPMENT:		LOGG	SED BY:	DRILLIN	IG METHOD: 3	.25 HSA	
- X	v∧	DIIIZE(-/		GEO	ATI OTECHN	ICAL BO	REHO	LE L	.OG				
1									_					

CLIENT	T:						PROJECT NO.: BORING NO.			NO.:	SHEET:			
Bohler	Enginee	ring					01:31153 B-07				1 of 1	LCC		
PROJE	CT NAN	ΛE:					DRILLER/CONTRACTOR:						_03	
Warrer	iton Dai	ta Cent	er				All Ame	rican Geot	tech, I	Inc.				
SITE LC			kwell f	load, W	Varrenton, Virginia 20186							LOSS OF CIRCULATION	ON NO	
NORT					STING:	STATION	N: SURFACE ELEVATION: 492					BOTTOM OF CASIN	4G	
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	DF MATERIA	L	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X			
8	-				Topsoil Thickness [6"]	Topsoil Thickness [6"]								
	S-1	SS	18	9	(ML) SANDY SILT, redd	lish brow	n, moist,		=	3-3-4 (7) 3-4-5	8,			
919	D35-	BG1	60						=		2e 19×	37 [86,5%]		
5	193 5-2	SS	18	12	(CH) FAT CLAY, light br	own and	arav			487	(9)	18,4		
9	S-3	SS	18	18	moist, very stiff	own and	gi ay,				7-7-9 (16)	⊗ ₁₆ 28 ×31.6	60 (86.0%)	
9850	-				(ML) SANDY SILT, brov	vn and g	ay, moist	- Killi		1 3	4-7-9			
10-	5-4	55	18	16	medium dense					482	(16)	&u.		
15 20 25	- S-6	SS	4	4	WEATHERED ROCK, lig moist, very dense					477-472-467-462-	50/5" (50/5") 50/4" (50/4")		85015°	
						10.4.4	NIP A PALL	e personal	N.CC.	L TYPES	1 CITILTUE T	DANGITION MAY BE COST	DUAL	
∇					INES REPRESENT THE APPROX		INDARY LINE DRING STAF			L TYPES. II 9 2021	CAVE IN		DUAL	
							ORING STAF							
▼ WL (Seasonal High Water)							MPLETED:			9 2021 SED BY:	HAMME			
V	WL (Sta	abilized	d)			AT	v				DRILLIN	G METHOD: 3.25 HSA		
					GE	DIECHI	IICAL BO	JKEHO	LE L	UG				

CLIENT Bohler I	Enginee						PROJECT NO.: BORING NO.: 01:31153 B-08 DRILLER/CONTRACTOR:			10.:	SHEET: 1 of 3		EC ₂	
PROJECT NAME: DRILLER/CONTRACTOR: Warrenton Data Center All American Geotech, Inc.														
SITE LO	CATION	ř:		oad, W	arrenton, Virginia 20186							LOSS	of circulation) Sieus
NORTH					STING:	STATION:		SURFACE ELEVATION 487			LEVATION:	BOTTOM OF CASING		
	8	SAMPLE TYPE	ĝ					WATER LEVELS	E		Plastic Limit Water Content Liquid Limit X		L Liquid Limit ——∆	
DEPTH (FT)	SAMPLE NUMBER		SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION O	IF MATERIAL			ELEVATION (FT)	BLOWS/6"				
DEPTI	MPLE	AMPL	MPLE	ECOV	DESCRIPTION OF									
	SAR	٠	SAI	œ	Kudu					ш			LIBRATED PENETROM	ETER TON/SF
					Topsoil Thickness [6"] (ML) SANDY SILT, redd	lich brown	moist		1	3-3-3				
-	5-1	SS	18	18	loose	11311 010 1111	, 1110136,			(6)		8,	29.0	
2			40	10			, moist,]	2-3-3	&.			
5-	S-2	SS	18	18	(ML) SILT, light brown	and grav		##		482-	(6)	1		
2	-	C.E.	18	18	loose to medium dens					3-4-5 (9)	8.			
	S-3	SS	10	10	3									
	S-4	55	18	18					-	4-5-6 (11)	Ø,,		45.1	
10-										477				
	1									1				
9														
1	S-5	SS	18	18						470	6-7-9 (16)	∞16		
15-	+									472-				
2	1									-				
											7.9.10			
	S-6	SS	18	18					7-8-10 (18)	⊗ ₁₈	25.3	,		
20	-							Ш				1 1		
8	4													
	1_		_							2	8-11-12			
25	_ S-7	SS	18	18						462-	(23)	\$23		
8	1									1				
8	-									-				
70	1		18	18	-					-	9-10-13 (23)	⊗ .,		
30	S-8	SS	18	18						457	(23)		\	
					CONTINUED O	N NEXT P	AGE	Tun					AAV DE CDAD	IAI
					INES REPRESENT THE APPROX									UAL
							RING STARTE	D: (Oct 0	2 2021		I DEPTH:	53.0	
▼ WL (Completion) Dry ▼ WL (Seasonal High Water)							RING MPLETED:	Oct 02 2021 HAMMER TYPE: Auto						
-	WL (St					EQ.	UIPMENT:		LOG	GED BY:	DRILLIN	IG METHOD	: 3.25 HSA	
F			<u> </u>		GE		ICAL BO	REHO	LE I	.OG				

CLIENT		501					PROJECT NO.:		ORING	NO.:	SHEET:		LA
	Enginee						01:31153 DRILLER/CONTR		-08 R-		2 of 3		EC.6
	CT NAN		er				All American Geo						
SITE LO											1055	OF CIRCULATION	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
=		nd Blac	kwell F		Varrenton, Virginia 20186			1.5.		-15145101			
NORTH	IING:			EA	ASTING:	STATION:		48:		ELEVATION:	BOT	TOM OF CASING	
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION (of Material		WATER LEVELS	ELEVATION (FT)	BLOW5/6"	X—— R		
35-	S-9	SS	18	18	(ML) SILT, light brown loose to medium den WEATHERED ROCK, b very dense	se	/ FIRE		452-	11-24-37 (61)		8 6:1	
40 -	S-10	SS	17	17					447	14-23-50/5" (73/11")			₩111/E
45-	S-11	SS	-5	5					442-	50/5" (50/5")			8 _{50/5} -
50 -	S-12	SS	_3	3					437-	50/3" (50/3")			⊗ _{50/3} -
55	3-13	SS	4	4					432-	50/4" (50/4")			Ø _{50М} -
60-	S-14.	5 \$	3	-3-	-				427 -	50/3" (50/3")			Ø _{soa} .
					CONTINUED O	N NEXT PA	AGE		7/055	IN CITE THE	DANICITION	IAV DE CDADI	IAI
_					INES REPRESENT THE APPROX								JAL
_	WL (Fir			red)	Dry	BOR	ING STARTED:	Oct 02	2 2021	CAVE IN	DEPTH:	53.0	
-	WL (Co WL (Se	_	_	Water	Dry	BOR	ING IPLETED:		2 2021	намм	ER TYPE:	Auto	
_	WL (Sta		_			ATV	IPMENT:		ED BY:	DRILLIN	g method:	3.25 HSA	
					GE	OTECHNI	CAL BOREHO	LE L	OG				

CLIENT:							PROJECT N 01:31153	10.:		ORING N	O.:	SHEET: 3 of 3		-00
Bohler E PROJEC							DRILLER/C	ONTRA						-67
Warrent			er .				All Americ							
SITE LOC	ATION	l:		nad W	arrenton, Virginia 20186							LOSS OF C	IRCULATION	<u>>100</u> 2>
NORTH		III DIOCI	NOCH II		STING:	STATION	l:		SU 487		EVATION:	воттом	OF CASING	
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	OF MATERIA	AL		WATER LEVELS	ELEVATION (FT)	BLOW5/6"	X—————————————————————————————————————	D PENETRATION BL	-∆ ows/ft
	SA	S	SA	œ						Ш			TED PENETROMETER NT) %	t TON/SF
65 –	S-15	SS	_5_	5	WEATHERED ROCK, be very dense	rownish	gray, moist,			422-	50/5" (50/5")			⊗ ₅₀₅ -
70-	S-16	-\$\$	-2-	-2 -						417-	50/2" (50/2")			8 ₅₀₂ -
75	5-1Z	_55_	-4-	-4-						412-	50/4" (50/4")			⊗ 50/4-
80-	S-18	SS	_5	5.	END OF BORI	NG AT 80).0 FT			407-	50/5" (50/5")	ě		⊗ ₅₀₅ -
85 -										402-				
90 -										397				
-	1									-				
	1			 										
					INES REPRESENT THE APPROX									
	NL (Fir	_	_	ed)	Dry		ORING START	ED: (Oct 02	2021	CAVE IN	DEPTH: 53	.0	
_	NL (Co		_		Dry		ORING COMPLETED:		Oct 02	2021	НАММ	ER TYPE: Au	ito	
	NL (Se	_		water)		E	QUIPMENT:		LOGG	ED BY:	DRILLIN	IG METHOD: 3.2	25 HSA	
× '	AL (OL	יטיוועפנ	-)		GE		NICAL BOR	REHO	LE L	OG				

CLIENT:	2002	24.000					PROJECT NO.: 01:31153	- 11	BORING N	10.:	SHEET: 1 of 2	-00
PROJECT							ORILLER/CONTR				10/2	FUC
Warrento			er				All American Ge					
SITE LOCA			kwell R	load, W	/arrenton, Virglnia 20186						LOSS OF CIRCULAT	ON NO.
NORTHIN				_		ATION:		5t		LEVATION:	BOTTOM OF CASI	NG 💌
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF M	1 A TERIAL		WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Con X STANDARD PENETR ROCK QUALITY DESIGNA ROC ROC CAUBRATED PENET FINES CONTENT! %	ATION & RECOVERY
					Topsoil Thickness [6"]	. b	- alat	1	1			
1:	S-1	SS	18	9	(ML) SANDY SILT, reddish loose	i brown, n	noist,		1 =	2-2-3 (5)	€,	
= :	935- 189 S-2	BG1 SS	60 18	13	(CL) LEAN CLAY, reddish b		1//		473	3-4-5 (9)	28 ×—	49 (76.4%) 4.8
	S-3	SS	18	14	(ML) SANDY SILT, reddish loose	i brown, n	noist,		-	4-4-4 (B)	Se .	
10	S-4	SS	18	18	(ML) SILT, light brown, mo very dense	oist, dens	se to		468	13-19-26 (45)	Ø45 30.€	[72.7%]
15	S-5	SS	18	17					463-	11-15-27 (42)	842	
20-	S-6	_55_	_4_	4					458-	50/4" (50/4")	,	8504°
25	S-7	SS	18	18					453	14-15-17 (32)	& 2	
30-	S-8	SS	5	5	WEATHERED ROCK, light and black, moist, very de	ense			448	50/5" (50/5")		Øsers:
					CONTINUED ON N			FNISS	I Desc	Leimin	DANGITION MAY BE CO	DUAL
V 1411					NES REPRESENT THE APPROXIMAT							DUAL
▼ WI		_		eul	Dry	BORIN	G STARTED:		9 2021	CAVE IN		
3Z WI				Water)		СОМР	LETED		9 2021	HAMME	R TYPE: Auto	
▼ WI	L (Sta	bilized)		0507	ATV	MENT: AL BOREHO	1000000	SED BY:	DRILLING	G METHOD: 3.25 HSA	

CLIENT:							PROJECT N 01:31153	NO.:		ORING!	NO.:	SHEET: 2 of 2	FCO
PROJEC							DRILLER/C	ONTRA	CTOR	₹:			-65
Warreni	ton Dat	a Cent	er				All Americ	an Geot	ech, li	nc.			
SITE LO	CATION	i: id Blac	kwell R	oad. W	Varrenton, Virginia 20186							LOSS OF CIRCULA	TION NO.
NORTH					STING:	STATION:			SU 478		LEVATION:	BOTTOM OF CAS	SING
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	of Material			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Cr X STANDARD PENET ROCK QUALITY DESIGN RQD REC CALIBRATED PENET ITINIS CONTENTS S.	TRATION BLOWS/FT NATION & RECOVERY
					WEATHERED ROCK, lig and black, moist, very	ght gray, b / dense	rown,						
-	S-9	SS	14	14						-	17-26-50/2" (76/8")		⊗ _{76/8} -
35-					AUGER REFUS	AL AT 34.8	FT	777		443	, -, - ,		
	S-10-	SS	-0-	-0-						438-	50/0" (50/0")		⊗ _{sore} .
40 -										-			
45 -										433-			
50 -										428 -			
55 -										423			
60-										418			
												TRANSITION MAY BE CO	PADIJAI
					LINES REPRESENT THE APPRO Dry					L TYPES. 9 2021		TRANSITION MAY BE G	NADUAL
-	WL (Fi	_		ea)	Dry		ORING START						
-	WL (Se	_	_	Water	·)	cc	OMPLETED: QUIPMENT:			9 2021 ED BY:			
¥	WL (St	abilize	d)			AT	v				DRILLIN	NG METHOD: 3.25 HS)A
					GI	COLECHI	NICAL BO	KEHU	LE L	.00			

CLIENT:		40.00					PROJECT 01:31153		- 1	ORING N	10.:	SHEET: 1 of 2		100
Bohler E							DRILLER/					1012		LC
PROJEC							All Ameri							
Warrent			er				All Amen	can Geot	eun, i	116.				
SITE LOC			kwell R	oad, W	arrenton, Virginia 20186							LOSS OF CIR	CULATION)1802)
NORTH	ING:			EA	STING:	STATION:			SU 469		LEVATION:	воттам с	F CASING	
DEРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	of Materia	L	1078.77	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY	PENETRATION BLC DESIGNATION & RU PENETROMETER	-∆ TWS/FT ECOVERY
					Topsoil Thickness [6"]			4111						1
	5-1	SS	18	12	(SM) SILTY SAND, redo very loose to loose	lish brow	n, moist,			-	1-2-2 (4)	⊗ ₄ 21.5		
-	S-2	SS	18	18						-	2-2-3 (5)	⊗₅	20.0	
5-					(ML) SANDY SILT WITH	H GRAVEL	, contains			464	,-,			
	S-3	SS	18	18	quartz fragments, ligh loose	it brown,	moist,			=	5-4-5 (9)	18.2		
-	S-4	SS	5	5	WEATHERED ROCK, lig	-				3	50/5"			⊗ 50/5*
10					grayish brown, moist,	very den	se			459	(50/5")			5-0-1
15-	S-S	SS	5	_5						454-	50/5" (50/5")			⊗ _{sos} .
20 -	-S-6-	SS	3	_3	<u></u>					449-	50/3" (50/3")			⊗ _{50/3} -
-	5-7	5 5	0	-0-							50/0"			- Ø _{50/0} -
25	S-8	RC	60	52	SCHIST, [REC=87%,RQ Weathered, Very Har					444-	(50/0")	17 🌎		\$87
-					SCHIET INC. 4000/ P	OD_339/1	L Lizki.			1				<u>.i</u>
30-					SCHIST, [REC=100%,R Weathered, Very Har			E.5		439		1		:
	5-9	RC	-60	60	CONTINUED O	N NEXT I	PAGE					↑		•
	TI	HE STR	ATIFICA	TION LI	NES REPRESENT THE APPROX			BETWEEN	SOIL	TYPES. II	N-SITU THE T	RANSITION MAY BE	GRADUAL	
Z V	VL (Firs				Dry		RING START			2021	CAVE IN			
Y \	VL (Co	mpleti	on)		Dry	ВС	RING		Oct 05	2021	HAMME	R TYPE: Auto)	
X /	VL (Sea	sonal	High \	Vater)		-	MPLETED: UIPMENT:			ED BY:				
▼ \	VL (Sta	bilized	1)		CF	AT					DRILLING	G METHOD: 3.25	HSA	_

CLIENT: Bohler E		ring					PROJECT N 01:31153	0.:	- 1	ORING NO	0.:	SHEET: 2 of 2	Fo	
PROJEC'							DRILLER/CO							7
Warrent			er				All America	n Geote	ech, Ir	ıc.				
SITE LOC	ATION	i: nd Blaci	well R	oad, W	arrenton, Virginia 20186				-10-			LOSS OF CIRCUL	ATION	21002
NORTH					STING:	STATION:			SUI 469		EVATION:	BOTTOM OF CA	ASING	-
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	DF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY DESK	Content Liquid Lim Content Liquid Lim A ETRATION BLOWS/FT SNATION B RECOVER	\neg
DEPT	SAMPLE	SAMP	SAMPLE	RECOV					WATE	ELEVA	BIC		FETADMETÉR TON/SF	-
-					SCHIST, [REC=100%,RG Weathered, Very Har	QD=22%], d, Grayish	Highly Brown			-		FINES CONTENT) %		100
35 -					AUGER REFUS	AL AT 33.5	FT			434			***************************************	
-										1				
40										429				
î dile î														
45 -										424				
50										419				
55										414-				
60 -										409-				
		L	1	TICH	INES REPRESENT THE APPRO)	(INANTE POLIT	NDARVIINES B	FTMFF	N SOII	TYPES IN	I-SITU THE T	RANSITION MAY BF G	RADUAL	
\sqrt{\sq}\ext{\sqrt{\sq}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}		HE STR			INES REPRESENT THE APPROX		RING STARTE			2021		DEPTH: 19.0		
Y V	VL (Co	mplet	ion)		Dry	во	RING		-	2021	100011.72	ER TYPE: Auto		
_	_	asona abilize		Water		-	MPLETED: UIPMENT:		LOGG	ED BY:	DRILLIN	G METHOD: 3.25 H	SA	
	. v L (3L	COMIZE	-1		GE	OTECHN	ICAL BOR	EHO	LE L	OG				

CLIEN		-1					PROJI 01:31	ECT NO.:		BOI B-11	RING N	0.:	SHEET: 1 of 1	500	
	Enginee CT NAN			_				ER/CON	TRAC		_		2012	FFC	
1	nton Da		er					merican G							Ц
	CATIOI		loveli F	Road, V	Varrenton, Virginia 20186								LOSS OF CIRCULATION	>100×	1
NORT					STING:	STATIO	N:			SURF 468	ACE EI	EVATION:	BOTTOM OF CASING	-	
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	of Mater	IAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Conter X STANDARD PENETRATIC ROCK QUALITY DESIGNATIO RQD REC CAUBRATED PENETRON JENES CONTENT! N	M BLOWS/FT N & RECOVERY	
					Topsoil Thickness [6"]		- I <i>I</i>				4				
	S-1	SS	18	8	(ML) SILT, brownish gr dense	ray, moi:	st, loose i	10				3-3-4 (7)	87 24.7×	45 [81.49	%]
5-	D35- 194 S-2	BG1 SS	60 18	12						4	463	5-6-9 (15)	2 1 ₩15	<u>41</u> [82.5	%]
	S-3	SS	18	16							1	7- 10 -12 (22)	•		
10	5-4	SS	18	18							458-	11-12-16 (28)	⊗ ₂₈		
15	S-5	SS	18	18							453	10-15-19 (34)	84		
20	S-6	SS	_5_	5	WEATHERED ROCK, g dense	ray, moi	st, very				448	50/5" {50/5"}		Secs	MELEO
25	S:7	SS	3	-3-	END OF BORI	NG AT 2	5.0 FT				443	50/3" (50/3")		⊗ _{50/3}	e:
30											438				
															I
					INES REPRESENT THE APPROX	IMATE BO	UNDARY LI	NES BETV	VEEN S	OILT	YPES. IN			JAL	
_	WL (Fir	_		ed)	Dry		BORING ST	ARTED:	\$e	29 20	021	CAVE IN	DEPTH: 12.7		
_	WL (Co WL (Se			Matas	Dry		ORING COMPLETE	D:	Se	p 29 2	021	HAMME	R TYPE: Auto		
	WL (St			vvaler,	1		QUIPMEN		LO	GGED	D BY:	DRILLING	G METHOD: 3.25 HSA		
_	(=				GE		NICAL I	BOREH	OLE	LO	G				

CLIENT:		ring					PROJECT NO.: 01:31153		B -12	NG NO.:	SHEET: 1 of 1	ECc
PROJEC	TNAN	E:					DRILLER/CON All American (
Warren			er				All American	Jeoler	11, 1116.		LOSS OF CIRCULATION	N >1003
			kwell R	load, W	Jarrenton, Virginia 20186						Edds of circulation	
NORTH					STING:	STATION:		- 1	SURFAC	CE ELEVATION:	BOTTOM OF CASIN	g 🕦
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C			r in the state of	WAIER LEVELS	BLOWS/6"	Plastic Limit Water Cont X STANDARD PENETRA ROCK QUALITY DESKINAT RQQ REC CALIBRATED PENETRI [FINES CONTENTI S.	TION BLOWS/FT
					Topsoil Thickness [6"]			111	\dashv			
3.	5-1	SS	18	18	(SM) SILTY SAND, red	dish brown,	, moist,			3-4-5 - (9)	⊗ 26.1	
					loose			Ш		1		
-	S-2	SS	18	18	(ML) SANDY SILT, redo medium dense				46	6-7-11 (18)	⊗₁8 7	
5 -					(ML) SILT, light brown	, moist, me	dium			3	\	
3	S-3	SS	18	18	dense					10-13-12 (25)	⊗ ₂₅	
	1									10-11-15	1	
10 -	S-4	SS	18	18					46	(26)	⊗ 26 25.1	
15-		SS		18	WEATHERED ROCK, li moist, very dense				45	50/5" (50/5")	8.2	Sport.
25					END OF BOR	ING AT 23.9	FI			49-		
											TRANSITION A ANY DE COA	DUAL
					INES REPRESENT THE APPRO							JUUAL
∇	WL (Fi	st Enc	ounte	red)	Dry		RING STARTED:	. 00	t 02 202	CAVE II	N DEPTH: 14.0	
_	WL (Co	_	_	\\/ato=	Dry	BOI	RING MPLETED:		ct 02 202		ER TYPE: Auto	
-	WL (Se		_	water	1	100000	JIPMENT:	LC	OGGED	BY: DRILLIN	NG METHOD: 3.25 HSA	
<u>*</u>	WL (St	abilize	۵۱	-	GE	OTECHN	ICAL BORE	HOL	E LOG			

CLIENT	:						PROJECT NO	D.:	- 1	BORING	NO.:	SHEET:
Bohler							01:31153		_	3-13		1 of 1
PROJEC							ORILLER/CC					=53
Warren SITE LO			er				All America	Geot	ecn,	inc.		
1.7			kwell I	Road, V	Varrenton, Virginia 20186							LOSS OF CIRCULATION
NORTH	IING:			EA	ASTING: STATIC	ON:			SL 49		LEVATION:	BOTTOM OF CASING
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATER	RIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY ROD REG ○ CAUBRATED PENETROMETER TON/SF
1.5					Topsoil Thickness [4"]		/			-		
-	S-1	ss	18	10	(ML) SILT WITH SAND, reddis moist, loose to medium dens		wn,			-	3-3-5 (8)	⊗ _b ad [*] e
5-	S-2	SS	18	12						485-	2-3-6 (9)	18.4 ²⁸ × 46 [77.6%]
-	S-3	SS	18	18						-	7-8-11 (19)	Ø ₁₈
-	- A	SS	4	4	(SM) SILTY SAND WITH GRAV	VEL, gr	ay and			1	50/4"	Store.
10-		-33			dark brown, moist, medium very dense		to			480-	(50/4")	
15-	S-5	SS	18	18						475-	12-13-15 (28)	⊗ _{2a}
20-	S-6	SS	18	18						470-	10-12-17 (29)	825
-					WEATHERED ROCK, dark bro moist, very dense	wnish				-	50/2"	
25	S-7	-33								465-	(50/2")	Stor.
	5-8	SS	0	0-	AUGER REFUSAL AT 2	27.0 FT					50/0" (50/0")	⊗ _{son} .
30-	1									460		
					NES REPRESENT THE APPROXIMATE BO							
	NL (Fir			ea)			G STARTED	: S	ep 30	2021	CAVE IN	DEPTH: 18.5
_	NL (Co			A/ator1		BORING COMPL		S	ep 30	2021	HAMME	R TYPE: Auto
	VL (Sea			water)		EQUIPN		L	OGG	ED BY:	DRILLING	METHOD: 3.25 HSA
w \	VL (Sta	pilized	1)		GEOTECH	ATV	N BORE	HOI	FI	ne	S.,,,EE,,	

CLIENT:							PROJECT N	0.:		ORING N	0.:	SHEET:		
Bohler E	nginee	ring					01:31153			-14		1 of 1		ECC
PROJEC							All America							
Warrent			Er				All America	n Geot	ecn, i	IIL.)1003)
SITE LO			kwell R	load, W	arrenton, Virginia 20186							Loss	S OF CIRCULATION	7,007
NORTH					STING:	STATION:			500		LEVATION:	ВО	TTOM OF CASING	1
	E E	ш	<u> 2</u>	9					57	E		Plastic Li X—	mit Water Content	Liquid Limit —∆
БЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	OF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"		andard Penetration Quality Designation	
DE	SAMPL	SAM	SAMPI	RECC					WAI	ELEV	80	— F	LIBRATED PENETROME	TER TON/SF
-					Topsoil Thickness [3"] (MH) ELASTIC SILT, lig		moist	m		1	3-4-4			
	S-1	SS	18	18	firm to stiff	iit biowii,	illoist,			=	(8)	⊗ ₈		
2-	D35-	BG1	-60-	40]	2-4-5	5.6 ⊗ _a	²⁷ × 30	49 5 (85.7%)
5-	186 5-2	SS	18	18	(SM) SILTY SAND, bro	wn, moist,	, medium			495	(9)	\	30.5	
23	S-3	SS	18	18	dense to dense]	5-9-11 (20)	\$20	31,6	
-										1	10-12-19			
10-	5-4	SS	18	18						490	(31)		30.4	
-										1			/	
- 0					WEATHERED ROCK, roblack, moist, very der		wn and			1	50/5"			⊗ 50/5•
	S-5	SS	_5_	5_						485	(50/5")			-50.5
15 -										100				
	S-6	-ss	2	2	END OF BORI	NG AT 18.7	FT	dres		400	50/2" (50/2")			® _{\$02} .
20 -										480				
3														
										-				
25 -]									475				
	-									1				
25	1									-				
30 -	1									470-				
									1			DANIELTICA:	MAN DE CRADI	IAI
∇	T WL (Fir				INES REPRESENT THE APPROX		NDARY LINES B			L TYPES. II		RANSITION I	11.5	mL
_	WL (Co			,	Dry	во	RING			0 2021		ER TYPE:	Auto	
_	WL (Se			Water		EQ	MPLETED: UIPMENT:			GED BY:		IG METHOD); 3.25 HSA	
<u> </u>	WL (St	apilize	a)		GE	OTECHN	IICAL BOR	EHO	LE L	.OG				

CLIENT		erico e					ROJECT NO.: 21:31153		BORING B-15	NO.:	SHEET: 1 of 1	5	
PROJE(_				RILLER/CON	TRACT			1011		25
Warren			er			100	All American G						
SITE LO									-		LOSS OF CIRCULAT	ION	\$100? \$
			kwell i	Road, V	Warrenton, Virginia 20186								
NORTH	IING:			EA	ASTING: STATIO	ON:			SURFACE 197	ELEVATION:	BOTTOM OF CAS	NG	-
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATER	RIAL		WATER LEVELS	ELEVATION (FT)	BLOWS/6*	Plastic Limit Water Co X STANDARD PENET ROCK QUALITY DESIGN ROD REC CALIBRATED PENET PINES CONTENT) 36	ATION BLOWS/	FT
9					Topsoil Thickness [4"]		///	77					
1	5-1	SS	18	12	(CL) LEAN CLAY WITH SAND, brown, moist, stiff	grayis	h //		-	3-4-6 (10)	⊗ ₁₀ 26 25,5	44	[76.5%]
-	D35-	BG1	-60				V	$\langle l \rangle$	1	1	21 X	45	[81.6%]
5-	187 5-2	5S	18	17			//		492-	4-4-7 (11)	\$6 ×		[01,074]
3					(ML) SANDY SILT WITH GRAV								
2	S-3	SS	18	18	brown and gray, moist, very	aense				23-24-29 (53)	10.8	\	
- H					WEATHERED ROCK, grayish b	orown	to		1	15-34-50/3"			8 15
1	S-4	SS	15	14	gray, moist, very dense		H		3	(84/9")			®8479-
10 -	\Box								487				
	-						15			1			
-	1									1			
-	-	1		-					- 5	50/3"			
	_S-S	-55-	_3_	3-						(50/3")			\$50/3"
15-	1								482-	-			
	5-6-	-55-	-1-	1	AUGER REFUSAL AT 1	6 1 FT				50/1"			Sgn-
8	-				7,000.				-	(50/1")			
-	}			1						1			
1 8	1								9	1			
20-									477-	1			
8	1									1			
-	1												
1 2	1								3	1			
1 2	1								2	1			
25-	-								472-	1			
25	}								11.2	-			
									1 :	1			
"	7									-			
	1									-			
-	1									7			
30-	1								467				
	Т	HE STR	ATIFICA	ATION L	INES REPRESENT THE APPROXIMATE BO	OUNDA	RY LINES BETW	/EEN SO	OIL TYPES.	IN-SITU THE T	RANSITION MAY BE GRA	ADUAL	
	WL (Fir			red)		BORIN	G STARTED:	Sep	30 2021	CAVE IN	DEPTH: 10.3		
	WL (Co					BORIN COMPI		Sep	30 2021	намм	ER TYPE: Auto		
A	WL (Se	asonal	High \	Water)	,	EQUIP		LOG	GED BY:	D201131	C METHOD: 9 95 VC		
ZV '	WL (Sta	bilized	1)			ATV				DKILLIN	G METHOD: 3.25 HSA		
					GEOTECH	INIC/	AL BOREH	OLE	LOG				

CLIENT							PROJECT NO 01:31153	O.;	- 11	ORING N	NO.:	SHEET: 1 of 1		-00
PROJEC							DRILLER/CO	NTRA						LU '.
Warren	ton Dat	a Cent	er				All America	n Geote	ch, I	nc.				
SITE LO			bwell 9	oad W	arrenton, Virginia 20186							LOSS OF	CIRCULATION	21003
NORTH		IQ DIBC	KWEII II		STING:	STATION:			SU 47		LEVATION:	воттон	M OF CASING	-
	MER.	ш	(NE)	î					SIS	FI		Plastic Llmit X———	Water Content L	iquld Limit —∆
БЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	OF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6		RD PENETRATION I	
	AZ.	ιζ	SAN	E					>	ш			ATED PENETROMETI FENT] %	R TON/SF
3					Topsoil Thickness [6"] (SM) SILTY SAND, brow	wn, moist,	loose				3-5-5			
-	S-1	SS	18	18						3	(10)	Ø₁0	24.5	
5-	5-2	SS	18	18	(ML) SANDY SILT, light moist, medium dense		d gray,			470-	5-4-7 (11)	8.,		
200	S-3	SS	18	18						-	6-6-8 (14)	⊗ 14	3 5. 1	[54.6%]
1	S-4	SS	18	18						105	5-7-11 (18)	Ø ₁₅		
10-										465	40.67.47			
15-	S-5	SS	18	14						460	10-13-17 (30)	840	25.8	
18	S-6	SS	4	4	WEATHERED ROCK, lig very dense	ght brown,	moist,			-	50/4" (50/4")			Ø50/4*
20-										455-				
1	S-7	SS	5	5_	END OF BORI	NG AT 24 0	ET			-	50/5" (50/5")			⊗ _{50/5} .
25-							-			450-				
30-										445-				
			L	TION	INES REPRESENT THE APPROX	INAATE DOLLN	DARVIINES DE	TMEEN	LSOII	TYPES	N-SITU THE T	RANSITION MAY	BE GRADUA	L
\sqrt{\sq}\}}}\sqrt{\sq}}}}}\sqrt{\sq}}}}}}\sqrt{\sq}}}}}}\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sq}}}}}}}\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sq}}}}}}\sqrt{\sqrt{\sqrt{\sq}}}}}}}\sqrt{\sqrt{\sqrt{\sq}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}	T WL (Fir				Dry		UNG STARTE			2 2021			1.7	
▼ '	WL (Co	mplet	ion)		Dry	BOR		•	Oct 02	2 2021	намм	ER TYPE: A	uto	
	WL (Se			Water)		EQL	IPMENT:			ED BY:	100,000	G METHOD: 3	.25 HSA	
<u> </u>	WL (Sta	bilized	d)		GE	OTECHNI	CAL BOR	EHOI	E L	OG	1-1,14411			

CLIEN	T: Engine	rina					PROJECT NO. 01:31153	:	BC	ORING N	NO.:	SHEET: 1 of 1		
	CT NAN		_				DRILLER/CON	TRAC	_			2012		CC
	nton Da		er				Ali American						-	
SITE L	OCATIO	N:		and M	Varrenton, Virginia 20186							LOSS OF CIR	CULATION	71007
	HING:	no mac	.kweii i			ATION:			SUF 492		LEVATION;	воттом о	F CASING	-
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MA	IATERIAL			WATER LEVELS	ELEVATION (FT)	BLOW5/6"	ROCK QUALITY I	PENETRATION BLOODESIGNATION & REG	ANS/FT COVERY
	S-1	SS	18	20	Topsoil Thickness [3"] (SM) SILTY SAND, reddish loose	brown, i	moist,			1	4-4-4 (8)	⊗ ₁3 .7 7		
	S-2	SS	18	18						407	3-4-4 (8)	⊗.		
5	S-3	SS	18	18	(ML) SANDY SILT, brown a very loose	and gray,	moist,			487	1-2-2 (4)	⊗ ∗	36.0	
	S-4	SS	5	5	WEATHERED ROCK, dark g	gray, moi	ist, very			-	50/5" (50/5")		_	⊗ 50/5·
10	1	SS	-3-	-3						482-	50/3"			⊗ _{50/3} .
15					END OF BORING	AT 13.8 F				477	(50/3")			
20										472				
25										467				
30	-									702				
								\Box	\Box					
∇	WL (Fir				INES REPRESENT THE APPROXIMAT Dry		ARY LINES BETY IG STARTED:			TYPES. IN 2021	CAVE IN		GRADUAL	
	WL (Co				Dry	BORIN	IG		_	2021	HAMME			
	WL (Se			Water)		-	LETED: MENT:			D BY:		6 METHOD: 3.25		
<u> </u>	WL (Sta	bilized	d)		GEOTE	ATV ECHNIC	AL BORE	HOLE	: LC	G	DVITCHA	5 WIETHOU: 5.25	* 14979	

CLIENT:							PROJECT	NO.:		ORING N	VO.:	SHEET:	
Bohler E	nginee	ring					01:31153			-18		1 of 1	EC.C
PROJEC							DRILLER/C						
Warrent			er				All Americ	an Geot	ecn, i	nc.			
SITE LOC	CATION	l: d Blaci	oveli R	oad. W	arrenton, Virginia 20186							LOSS OF CIRCULATION)1003)
NORTH					STING:	STATION:			SU 482		LEVATION:	BOTTOM OF CASING	
	BER	ш	(N)	2					SIS	Ē		Plastic Limit Water Content L	△
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	OF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOW5/6"	S STANDARD PENETRATION & ROCK QUALITY DESIGNATION & ROD REC	
	SAN	<i>S</i> 3	SAN	RE				IS 200	>			CALIBRATED PENETROMET	ER TON/SF
			40	40	Topsoil Thickness [6"] (SM) SILTY SAND, red		n, moist,			1	3-3-4		
-	S-1	SS	18	18	loose to medium den	se					(7)		
5-	S-2	SS	18	18						477-	4-5-7 (12)	25.2	
-	5-3	SS	18	18						-	7-9-13 (22)	©22 22.4	
					(ML) SILT, light brown	, moist, d	ense			-	15-15-22		
10-	S-4	SS	18	18						472	(37)	14.7 0007	
-					WEATHERED ROCK, II	ght brown	1 to	1222	1				
	S-5	SS	_5_	5_	grayish brown, moist						50/5" (50/5")		Ø\$0.5·
15-										467	(==1=)		
-										-			
-	S-6	SS	4	4	END OF BORI	NG AT 18.	9 FT	444	2	-	50/4" (50/4")		⊗ _{50/4} .
20 -										462 -			
25 -										457-			
										1 2			
											3		
30 -	1									452-			
											1	TO A MELTICAL A ANY DE COADUL	NI .
					INES REPRESENT THE APPROX								AL
_	WL (Fir	_		red)	Dry		RING START	ED:	Oct 0	1 2021	CAVE IN	N DEPTH: 14.5	
-	WL (Co WL (Se		_	Water'		cc	DRING DMPLETED:			1 2021	НАММ	ER TYPE: Auto	
-	WL (Sta					AT				GED BY:	DRILLIN	IG METHOD: 3.25 HSA	
					GE	OTECHN	VICAL BO	REHO	LE L	.OG			

CLIENT: Bohler E		ring					U 100 1	JECT NO.:	- 1	ORING N	NO.:	SHEET: 1 of 1	-Co
PROJEC	T NAN	ΛE:					DRI	LLER/CONTR					<u>-67.</u>
Warrent SITE LO			er				All	American Geo	itech,	Inc.			(cool)
			kwell F		Varrenton, Virginia 20186							LOSS OF CIRCULATION	21003
NORTH	ING:			EA	STING:	STATIO	N:		SL 49		LEVATION:	BOTTOM OF CASING	-
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION (IAL		WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Conte X STANDARD PENETRATI ROCK QUALITY DESIGNATIO RQD REC CALIBRATED PENETROI LIFINES CONTENT! %	ON BLOWS/FT
24 -					Topsoil Thickness [4"] (CL) SANDY LEAN CLA	Y. reddis	sh brow	n. 177	1	=	4-4-3		
	S-1	SS	18	18	moist, firm	,		" <i>\</i> ///]	(7)	Ø7 21€2	
5-	D35- 190 S 2	BG1 SS	60 18	18	(GM) SILTY GRAVEL W brown and brown, m medium dense			dish e	NO CONTROL OF THE PROPERTY OF	485	3-4-6 (10)	2 ⁴ × 33.6	55 [72.0%]
-	5-3	SS	18	18				000000	Nachadona		3-3-4 (7)	36	3×[45.3949.2
10-	5-4	SS	18	18				000000	CAROCARO	480-	9-7-8 (15)	Sec.	
15-	_S-5	SS	5	5	WEATHERED ROCK, li gray, moist, very den		wn and	dark		475-	50/5" (50/5")		Øsors.
20-	-S-6-	SS	-1-	1	END OF BOR	ING AT 18	8.6 FT		000000	470-	50/1" (50/1")		⊗ _{Sori} -
20													
25-										465			
30-										460			
		115 675	ATIFIC	ATION	INES REPRESENT THE APPROX	(INANTE DO		LINES RETME	EN SO!	I TYPES II	N-SITU THE T	RANSITION MAY BE GRAD	UAL
\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\			ounte		INES REPRESENT THE APPROX		0.00	STARTED:		1 2021		DEPTH: 14.5	
_	<u> </u>	mplet	_	/	Dry		BORING	JOHNED.	_		5.7525		
_	_	_	_	Water)			COMPLE		_	1 2021	MMAH	ER TYPE: Auto	
_	_	abilize					equipme atv	ENT:	LOGO	ED BY:	DRILLIN	IG METHOD: 3.25 HSA	
	,,,,,,				GE			BOREHO	LE L	.OG			

CLIENT							PROJECT	NO.:	E	ORING N	10.:	SHEET:		
Bohler E		ring					01:31153		В	-20		1 of 1		ECC
PROJEC		_					DRILLER/	ONTRA	CTO	R:				_0
Warren			er				All Americ	an Geo	ech, l	nc.				
SITE LO			kwell R	toad. W	arrenton, Virginia 20186							LOSS	OF CIRCULATION	<u>>100%</u>
NORTH				EA	STING:	STATION:			SU 49		LEVATION:	вот	OM OF CASING	
	ER.	ш	(N	9					รา	E		Plastic Lin X—	nit Water Content	Liquid Limit
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF	F MATERIAI			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	47.000		Particular and Property Co.
	SAN	Ŋ	SAN	<u>«</u>				F0880	>	ш		O cau	BRATED PENETROME	TER TON/SF
-					Topsoil Thickness [4"] (SM) SILTY SAND, brow	vn, moist	, loose			1	4-4-4			
	S-1	SS	18	10						3	(8)	18	.9	
-	S-2	SS	18	18	(ML) SILT, reddish brow brown, moist, medium					1	5-7-7 (14)	⊗ 14	34.5	
5-					dense					485	7-9-10			
2	S-3	SS	18	18]	(19)	⊗ 19		
1	S-4	SS	18	18	(MH) ELASTIC SILT WIT brown, moist, hard to					1	14-15-16 (31)	B 3	38	× [76.2%]
10-										480				
15-	S-5	SS	18	18						475	8-15-26 (41)		\$2.	
20 -	S-6	SS	18	18						470	17-23-35 (58)		800	
25 -	S-7	SS	5_	5.	WEATHERED ROCK, lig moist, very dense	ght brow	n and gray,			465	50/5" (50/5")			850.5-
30	S-8	SS	4	4	END OF BORIF	NG AT 28.	9 FT			460	50/4" (50/4")			⊗ ₅₀₁₄ -
_	-		-	-				+	+					
					INES REPRESENT THE APPROXI									AL
_	WL (Fir WL (Co	_		red)	Dry		RING START	ED:		1 2021		I DEPTH:	23.0	
_	WL (Se			Water		cc	MPLETED:			1 2021		ER TYPE:	Auto	
	WL (Sta	_				AT				GED BY:	DRILLIN	IG METHOD:	3.25 HSA	
					GEO	OTECHN	VICAL BO	<u>REHO</u>	LE L	.OG				

APPENDIX C – Laboratory Testing

Laboratory Test Results Summary Plasticity Charts Grain Size Analysis Standard Proctor Test Results California Bearing Ratio Test Results Thermal Resistivity Test Results

		Lab	orato	Laboratory Testing Summary	stin	nS 6	mm	Ž					
					Atter	Atterberg Limits	nits	**Percent	Moisture	Moisture - Density	CBR (%)	(%)	!
Sample Location	Sample	Depth (feet)	√MC (%)	Soil	==	귐	ឨ	Passing No. 200 Sieve	<maximum Density (pcf)</maximum 	<optimum Moisture (%)</optimum 	0.1 in. 0.2 in.		#Organi Content (
B-01	S-10	38.5-39.75	16.5	ML	Δ	ď	£	75.6					
B-01	S-2	3.5-5	15.1										
B-02	S-1	1-2.5	24.7										
B-02	S-2	3.5-5	11.2										
B-02	S-5	13,5-15	12.6										
B-03	۲ .	1-2.5	25.3										
B-03	S-2	3.5-5	21.6	ML	44	28	16	71.0					
B-04	S-1	1-2.5	26.2										
B-04	S-3	6-7.5	16.9										
B-04	S-5	13.5-15	22.6										
Notes	See test rep	orts for lest n	nethod, ^A	STM D221	6-19, •A	3TM D248	18, ••AST	M D1140-17, #	ASTM D2974-;	Notes: See test reports for test method, "ASTM D2216-19, "ASTM D2488, ""ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values	report for	- D4718 c	orrected
Definitions	: MC: Moistur Bearing Rat	MC: Moisture Content, Soil Type: US Bearing Ratio, OC: Organic Content	oil Type: U	SCS (Uniffi t	ed Soil C	lassificati	on Systei	n), LL: Liquid I	imit, PL: Plasti	Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content	ticity Inde	x, CBR: (alifornia

#Organic Content (%)

Project No.: 01:31153 Date Reported: Address

Office Number / Fax

(703)471-8400

(703)834-5527

14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232

ECS Mid-Atlantic LLC - Chantilly

Office / Lab

Project: Warrenton Data Center Client:



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ivong	Htran	Dtran

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					Atte	Atterberg Limits	mits	**Percent	Moisture	Moisture - Density	CBR (%)		
Sample Location	Sample Number	Depth (feet)	√MC (%)	Soil	3	4	<u>=</u>	Passing No. 200 Sieve	<maximum Density (pcf)</maximum 	<optimum Moisture (%)</optimum 	0.1 in.	#Organic 0.2 in. Content (%)	#Organic Content (%
B-05	S-3	6-7.5	28.8										
B-05	6-8	33.5-35	19.9	M	45	30	15	87.5					
B-06	P-S	1-2.5	25.2										
B-06	S-3	6-7.5	41.6										
B-06	S-5	13.5-15	18.3										
B-07	S-2	3.5-5	18.4										
B-07	S-3	6-7.5	31.6	ᆼ	09	28	32	86.0					
B-08	S-1	1-2.5	29.0										
B-08	S-4	8.5-10	46.1										
B-08	8-e	18.5-20	25.3										
Notes:	: See test repo	ords for test r	nethod, ^A	STM D22	16-19, 'AS	STM D248	38, AST	M D1140-17,#	Notes; See test reports for test method, "ASTM D2216-19, "ASTM D2488, ""ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values	Oe1 < See test	report for D4	718 corr	I ≝
Definitions:	: MC: Moisture Content, Soil Type: US Bearing Ratio, OC: Organic Content	Content, So.	oil Type: U	ISCS (Unif.	ied Soil C	lassificati	on Syster	n), LL: Liquid L	Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Rearing Rearing Resign OC: Organic Content	: Limit, PI: Plasí	licity Index, C	SBR: Call	至

Project No.: 01:31153 Date Reported:

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Approved by	Otran	
Checked by	Htran	
Tested by	guovi	

					Atte	Atterberg Limits	mits	**Percent	Moisture	Moisture - Density	CBR (%)	
Sample Location	Sample Number	Depth (feet)	√MC (%)	Soil	=	됩	₫	Passing No. 200 Sieve	<maximum Density (pcf)</maximum 	<optimum Molsture (%)</optimum 	0.1 in.	#Organic 0.2 in. Content (%)
60-B	S-2	3.5-5	34.8									
B-09	\$	8.5-10	30.8	ML	ď	ΝP	ď	72.7				
B-10	S-1	1-2.5	21.5									
B-10	S-2	3.5-5	28.0									
B-10	S-3	6-7.5	18.2									
B-11	S-1	1-2.5	24.7	MI	45	28	17	81.4				
B-11	S-3	6-7.5	13.9									
B-12	S-1	1-2.5	26.1									
B-12	S-2	3.5-5	13.7									
B-12	8. 4.	8.5-10	25.1									
Notes:	See test repo	orts for test	method, ^/	ASTM D22	16-19, 'A	STM D24	88. "AS	IM D1140-17, i	#ASTM D2974-;	Notes: See test reports for test method, ^ASTM D2216-19, ^ASTM D2488, ^ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values	report for D4	18 corrected
Definitions:	: MC: Moisture Content, Soil Type: US Bearing Ratio, OC: Organic Content	e Content, So, OC: Orga	soil Type: L inic Conter	USCS (Unit	fled Soil C	Sassificat	ion Syste	m), LL: Liquid	imit, PL: Plasti	Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: Califomia Bearing Ratio, OC: Organic Content	ticity Index, C	BR: California
Project: Warrenton Data Center Client:	nter					Pro Date R	Project No.: Date Reported:	Project No.: 01;31153 e Reported:				
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Checked by	Approved by
Htran	Dtran

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					Atte	Atterberg Limits	mits	**Percent	Moisture	Moisture - Density	CBR (%)	(%)	
Sample Location	Sample	Depth (feet)	√MC (%)	Soil Type	=	4	=	Passing No. 200 Sieve	<maximum Density (pcf)</maximum 	<optimum Moisture (%)</optimum 	0.1 in.	0.2 in.	#Organic Content (%)
B-13	S-1	1-2.5	30.6										
B-13	S-2	3.5-5	18.4	ML	46	28	18	9'22					
B-14	S-2	3.5-5	30.7	Ā	51	93	21	86.3					
. B- 14	8-3	6-7.5	31.6										
B-14	84	8.5-10	30.4										
B-15	۴3	1-2.5	25.5	ರ	44	26	18	76.5					
B-15	S-3	6-7.5	10.8										
B-16	S-1	1-2.5	24.5										
B-16	S-3	6-7.5	35.1	¥	ď	ΔN	ďN	54.6					ī
B-16	8-5	13,5-15	25.8										
Notes	Notes: See test reports for values	nds for test n	nethod, ^A	STM D221	6-19, AS	TM D248	38, "AST	M D1140-17, #	ASTM D2974-2	test method, ^ASTM D2216-19, "ASTM D2488, ""ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected	report for	D4718 c	отестве
Definitions	s: MC: Moisture Conte	Content, Se	nt, Soil Type: US	SCS (Unifi	ed Soil C	lassificati	on Syster	n), LL: Liquid L	imit, PL: Plastic	Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California	icity Inde)	x, CBR: 0	California

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ory Tes
Laborato

					Atter	Atterberg Limits	Tits	**Percent	Moisture	Moisture - Density	CBR (%)	(%)	!
Sample Location	Sample Number	Depth (feet)	√MC (%)	Soil	3	4	₫	Passing No. 200 Sieve	<maximum Density (pcf)</maximum 	<optimum Moisture (%)</optimum 	0.1 in. 0.2 in.		#Organic Content (%)
B-17	?	1-2.5	13.7										
B-17	S-3	6-7.5	36.0										
B-18	S-2	3.5-5	25.2										
B-18	S-3	6-7.5	22.4										
B-18	S-4	8.5-10	14.7										
B-19	S-1	1-2.5	21.2										
B-19	S-3	6-7.5	49.2	GM	61	38	23	45.3					
B-20	S-1	1-2.5	18.9										
B-20	S-2	3.5-5	34.5										
B-20	S.4	8.5-10	31.5	MH	63	38	25	76.2					
Notes:	See test repr values	orts for lest	nethod, ^A	STM D22	16-19, *A	STM D24	88, ••AST	IM D1140-17, #	#ASTM D2974-	Notes: See test reports for lest method, "ASTM D2216-19, "ASTM D2488, ""ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values	report for	D4718 c	corrected
Definitions:	: MC: Moisture Content, Soil Type: Us Bearing Ratio, OC: Organic Content	Content, So, OC: Orga	oil Type: U	SCS (Unif	ied Soil C	lassificati	ion Syste	m), LL: Liquid I	imit, PL: Plasti	Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearino Ratio, OC: Organic Content	ticity Inde	x, CBR: C	California

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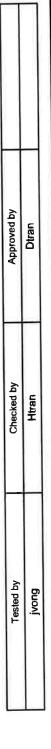
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					Atte	Atterberg Limits	mits	**Percent	Moisture	Moisture - Density	CB	CBR (%)	
Sample Location	Sample	Depth (feet)	√M C (%)	Soil Type	=	P	ā	Passing No. 200 Sieve	<maximum Density (pcf)</maximum 	<optimum Moisture (%)</optimum 	0.1 in.	0.2 in.	#Organic Content (%)
B-02	D3S-191	1-6	11.7	占	39	18	21	85.6	122.1	15.2			
B-04	D3S-188	1-6	2.2	ML	dN dN	Ā	Q.	85.1	112.3	15.8			
B-07	D3S-193	1-6	2.6	ರ	37	19	18	86.5	112.2	17.7			
B-09	D3S-189	1-6	5.2	ML	49	28	21	76.4	9 '66	21.6			
B-11	D3S-194	1-6	2.1	ME	41	27	14	82.5	119.2	13.8			
≥ B-14	D3S-186	1-6	5.6	J U	49	27	22	2'38	102.3	22.4	2	4.7	
B-15	D3S-187	1-6	5.6	ರ	45	21	24	81.6	111.0	17.7	7.6	9'9	
B-19	D3S-190	1-6	33.6	용	55	24	31	72.0	101.9	24.2			
Notes	Notes: See test reports for values	rts for test r	nethod, ^A	STM D221	6-19, *AS	3TM D248	38, **AST	M D1140-17, #	ASTM D2974-2	test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected	report for	D4718 c	orrected
Definitions	Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Rearino Ratio, OC: Organic Content	Content, S.	ent, Soil Type: Us	SCS (Unifi	ed Soil C	lassificati	on Syste	n), LL: Liquid L	imit, PL: Plastic	: Limit, PI: Plast	icity Inde	x, CBR: (Salifornia

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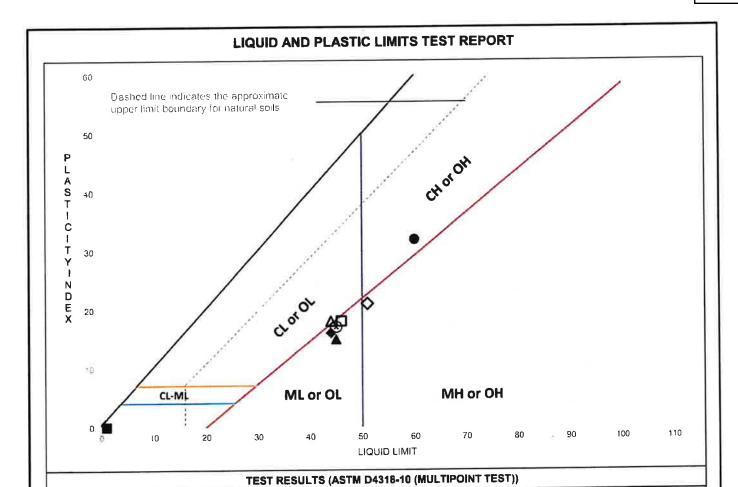
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proved by	Dtran
Checked by Ap	Htran
Tested by	gnovi



Sample Sample Sample uscs **Material Description** %<#200 AASHTO PL PI %<#40 Number Depth (ft) Location Sill with Sand Trace Mica Yellow Light

	B-01	S-10	38,5-39.75	NP	NP	NP	95.3	75.6	A-4	ML	Brown
•	B-03	S-2	3.5-5	44	28	16	91.7	71.0	A-7-6	ML	Silt with Sand Trace Mica Yellow Light Brown
lack	B-05	S-9	33.5-35	45	30	15	99.5	87.5	A-7-5	ML	Silt Trace Mica Yellow Light Brown
•	B-07	S-3	6-7.5	60	28	32	93.9	86.0	A-7-6	СН	Fat Clay Light Brown
*	B-09	S-4	8.5-10	NP	NP	NP	95.9	72.7	A-4	ML	Silt with Sand Trace Mica Yellow Light Brown
8	B-11	S-1	1-2.5	45	28	17	95.3	81.4	A-7-6	ML	Silt with Sand Trace Mica Brown
	B-13	S-2	3.5-5	46	28	18	89.9	77.6	A-7-6	ML	Silt with Sand Trace Mica Yellowish Light Brown
\Diamond	B-14	S-2	3.5-5	51	30	21	94.7	86.3	A-7-5	МН	Elastic Silt Trace Mica Light Brown
Δ	B-15	S-1	1-2.5	44	26	18	85.8	76.5	A-7-6	CL	Lean Clay with Sand Light Brown
×	B-16	S-3	6-7.5	NP	NP	NP	85.3	54.6	A-4	ML	Sandy Silt Trace Mica Yellowish Light Brown

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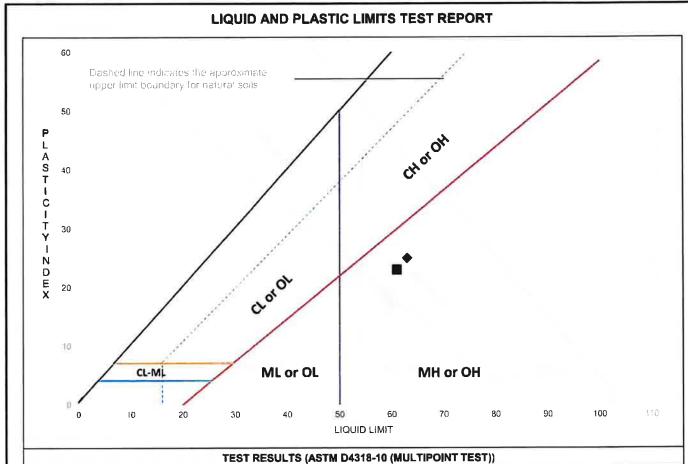
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ivong	Htran	Dtran	



Sample Sample Sample USCS PL %<#40 %<#200 **AASHTO** Material Description LL Location Number Depth (ft) Silty Gravel with Sand Trace Mica A-7-5 45.3 GM **B-19** 6-7.5 23 53.5 S-3 61 38 Yellowish Brown Elastic Silt with Sand Trace Mica мн S-4 8.5-10 76.2 A-7-5 B-20 63 38 25 88.6 Yellowish Light Brown

Project: Warrenton Data Center Project No.: 01:31153



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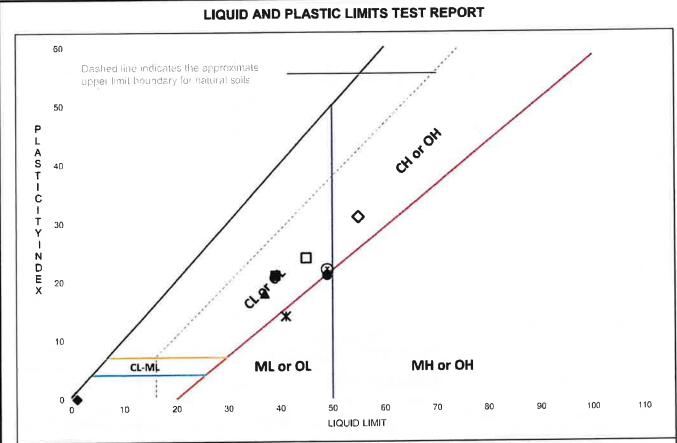
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įvong	Htran	Diren	



TEST RESULTS (ASTM D4318-10 (MULTIPOINT TEST)) Sample Sample Sample **Material Description** USCS %<#200 **AASHTO** PL %<#40 LL Depth (ft) Location Number CL Lean Clay Yellowish Brown 85.6 A-6 98.8 B-02 D3S-191 1-6 18 Silt Trace Mica Yellowish Brown ML 85.1 A-4 NP 97.9 B-04 D3S-188 1-6 NP NP Lean Clay Trace Mica Brown CL 86.5 A-6 37 96.0 B-07 D3S-193 1-6 19 18 \blacksquare ML Silt with Sand Brwon 76.4 A-7-6 21 91.1 B-09 D3S-189 1-6 49 28 Silt with Sand Trace Mica Yellowish 82.5 A-7-6 ML 41 27 14 97.9 B-11 D3S-194 1-6 * Brown Lean Clay with Sand Yellowisht Brown CL 95.3 85.7 A-7-6 27 22 8 B-14 D3S-186 1-6 49 Lean Clay with Sand Yellowish Brown CL 81,6 A-7-6 B-15 D3S-187 1-6 45 21 92.4 CH Fat Clay with Sand Brown 72.0 A-7-6 \Diamond B-19 D3S-190 1-6 55 31 80.6

Project: Warrenton Data Center Client: Project No.: 01:31153 Date Reported:



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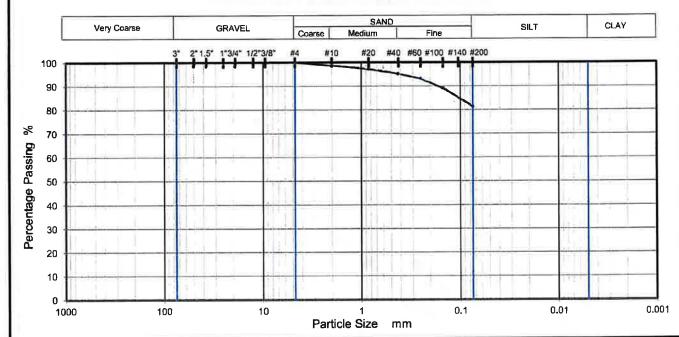
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Sle	eving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	98.6		
#20	97.2		
#40	95.3		
#60	93.3		
#100	89.1		
#200	81.4		

Dry Mass of sample, g 40.6	Dry Mass of sample, g	40.6
----------------------------	-----------------------	------

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	1.4
Medium Sand, #10 to #40	3.3
Fine Sand, #40 to #200	13.9
Fines <#200	81.4

USCS	ML	Liquid Limit	45	D90	0.167	D50	D10
AASHTO	A-7-6	Plastic Limit	28	D85	0.104	D30	Cu
USCS Group Name	Silt with sand	Plasticity Index	17	D60		D15	Cc

Project: Warrenton Data Center

Client:

Sample Description: Silt with Sand Trace Mica Brown

Sample Source: B-11

Project No.: 01:31153 Depth (ft): 1 - 2.5

Sample No.: S-1
Date Reported:



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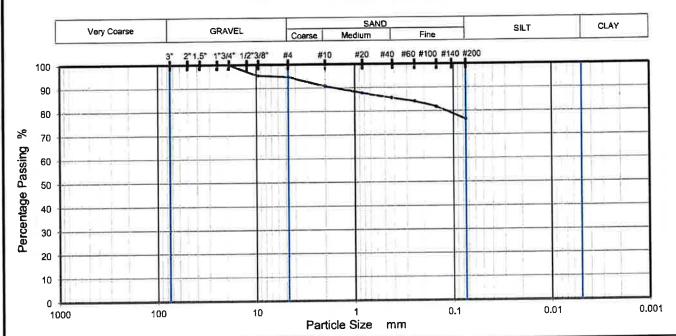
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jvong	Htran	Dtran	



TEST RESULTS (ASTM D422-63(2007))

Sie	eving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
3/4"	100.0		
3/8"	95.4		
#4	94.8		
#10	90.8		
#20	87.8		
#40	85.8		
#60	84.3		
#100	82.0		
#200	76.5		
9			

Sample Proportions	% dry mass
/ery coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	5.2
Coarse Sand, #4 to #10 sieve	4.0
fedium Sand, #10 to #40	5.0
ine Sand, #40 to #200	9.3
ines <#200	76.5

42.3

		Million and I have I	44	Moon I	1.592	ID50	D10
USCS	CL	Liquid Limit		D90		-0	010
AASHTO	A-7-6	Plastic Limit	26	D85	0.320	D30	Cu
USCS Group Name	Lean clay with sand	Plasticity Index	18	D60		JD15	JCc J

Project: Warrenton Data Center

Client:

Sample Description: Lean Clay with Sand Light Brown

Sample Source: B-15

Project No.: 01:31153 Depth (ft): 1 - 2.5 Sample No.: S-1

Dry Mass of sample, g

Date Reported:

-Cc

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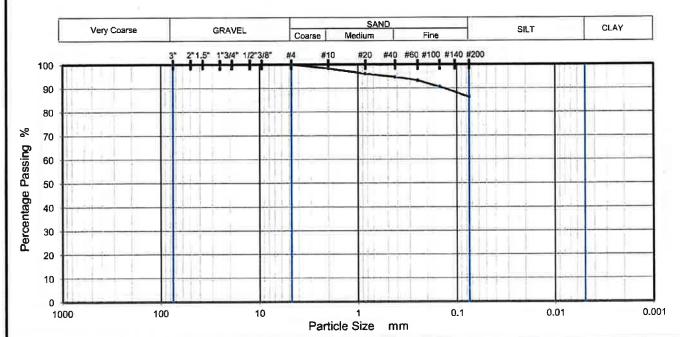
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Sie	ving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	98.3		
#20	96.1		
#40	94.7		
#60	93.4		
#100	90.7		
#200	86.3		

Dry Mass of sample, g	43.6
-----------------------	------

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	1.7
Medium Sand, #10 to #40	3.6
Fine Sand, #40 to #200	8,4
Fines <#200	86.3

USCS	MH	Liquid Limit	51	D90	0.134	D50	j D10
AASHTO	A-7-5	Plastic Limit	30	D85		D30	Cu
USCS Group Name	Elastic silt	Plasticity Index	21	D60		D15	ICc I

Project: Warrenton Data Center

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Sample Description: Elastic Silt Trace Mica Light Brown

Sample Source: B-14

Project No.: 01:31153 Depth (ft): 3.5 - 5

Sample No.: S-2

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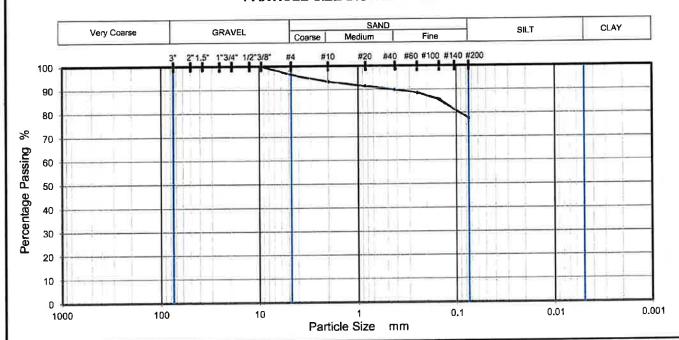
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jvong	Htran	Dtran	



TEST RESULTS (ASTM D422-63(2007))

g	Particle Size mm	% Passing
	1	
	4	
֡		

Dry Mass of sample, g	41.7

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	3.5
Coarse Sand, #4 to #10 sieve	3.0
Medium Sand, #10 to #40	3.6
Fine Sand, #40 to #200	12,3
Fines <#200	77.6

		Tree of the second	10	15	0.445	Nora I	1D10
USCS	ML	Liquid Limit	46	D90	0.445	D50	010
AASHTO	A-7-6	Plastic Limit	28	D85	0.141	D30	Cu
USCS Group Name	Silt with sand	Plasticity Index	18	D60		D15	ICc I

Project: Warrenton Data Center

Client:

Sample Description: Silt with Sand Trace Mica Yellowish Light Brown

Sample Source: B-13

Project No.: 01:31153 Depth (ft): 3.5 - 5 Sample No.: S-2

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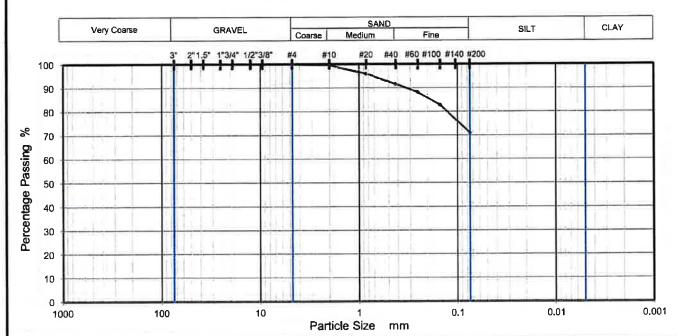
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Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	





Sie	ving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	99.6		
#20	96.1		
#40	91,7		_
#60	88.2		
#100	82.9		
#200	71.0		
		_	

Dry Mass of sample, g 40.9	Dry Mass of sample, g	40.9
----------------------------	-----------------------	------

% dry mass
0.0
0.0
0.4
7.9
20.7
71.0
֡֡֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜

luscs T	ML	Liquid Limit	44	D90	0,328	D50	D10
AASHTO	A-7-6	Plastic Limit	28	D85	0.184	D30	Cu
USCS Group Name	Silt with sand	Plasticity Index	16	D60		D15	lCc l

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Sample Description: Silt with Sand Trace Mica Yellow Light Brown

Sample Source: B-03

Project No.: 01:31153 Depth (ft): 3.5 - 5 Sample No.: S-2

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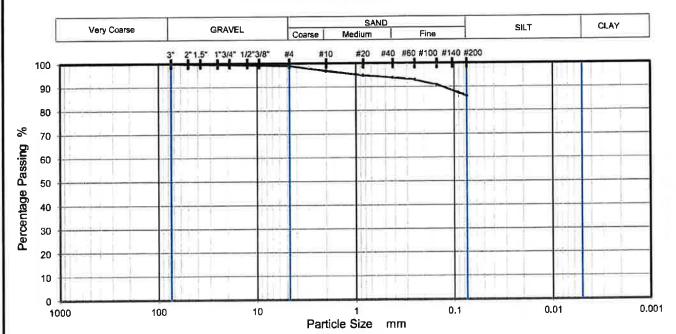
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jvong	Htran	Dtran	





Sleving		Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	99.0		
#10	96.7		
#20	94.9		
#40	93.9		
#60	93.0		
#100	90.9		
#200	86.0	-	

Dry Mass of sample, g	42,5

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	1.0
Coarse Sand, #4 to #10 sieve	2,3
Medium Sand, #10 to #40	2,8
Fine Sand, #40 to #200	7.9
Fines <#200	86.0

USCS	CH	ILiquid Limit	60	I Dedi	0.132	1050 T	D10	
AASHTO	A-7-6	Plastic Limit	28	D85		D30	Cu	
USCS Group Name	Fat clay	Plasticity Index	32	D60		D15	Cc	

Project: Warrenton Data Center

Client:

Sample Description: Fat Clay Light Brown

Sample Source: B-07

Project No.: 01:31153 Depth (ft): 6 - 7.5 Sample No.: S-3 Date Reported:



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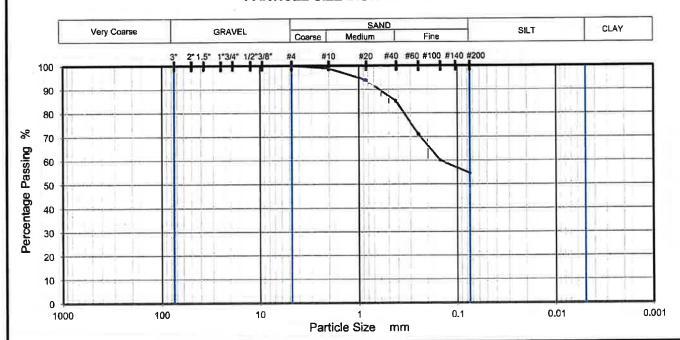
Address

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įvong	Htran	Dtran	



TEST RESULTS (ASTM D422-63(2007))

Sie	ving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	98.9		
#20	94.1		
#40	85.3		
#60	71,2		
#100	60.1		
#200	54.6		_
		_	

Dry Mass of sample, g 41.9

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	1.1
Medium Sand, #10 to #40	13.6
Fine Sand, #40 to #200	30.7
Fines <#200	54.6

luscs I	ML	Liquid Limit	NP	D90	0.615	D50	D10
AASHTO	A-4	Plastic Limit	NP	D85	0.420	D30	Cu
USCS Group Name	Sandy silt	Plasticity Index	NP	D60	0.148	D15	Cc

Project: Warrenton Data Center

Client:

Sample Description: Sandy Silt Trace Mica Yellowish Light Brown

Sample Source: B-16

Project No.: 01:31153 Depth (ft): 6 - 7.5 Sample No.: S-3

Date Reported:



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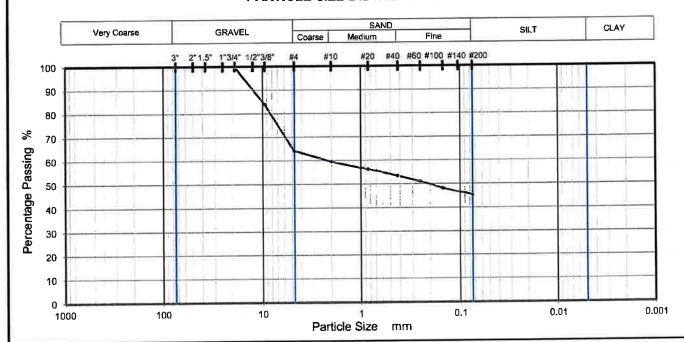
Address
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Suite 100 Chantilly, VA

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Tested by	Checked by	Approved by	Remarks
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TEST RESULTS (ASTM D422-63(2007))

Sieving		dimentation
% Passing	Particle Size mm	% Passing
100.0		
100.0		
83.9		
64.1		
59.5		
56.3		
53.5		
51.0		
48.3		
45.3		
	% Passing 100.0 100.0 83.9 64.1 59.5 56.3 53.5 51.0 48.3	% Passing Particle Size mm 100.0 100.0 83.9 64.1 59.5 56.3 53.5 51.0 48.3

Dry Mass of sample, g	41.9
	L

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	35.9
Coarse Sand, #4 to #10 sieve	4.6
Medium Sand, #10 to #40	6.0
Fine Sand, #40 to #200	8.2
Fines <#200	45.3

USCS	GM	Liquid Limit	61	D90	12.350	D50	0,207	D10	
AASHTO	A-7-5	Plastic Limit	38	D85	9.961	D30		Cu	
USCS Group Name	Silty gravel with sand	Plasticity Index	23	D60	2.197	D15		Cc	

Project: Warrenton Data Center

Client:

Sample Description: Silty Gravel with Sand Trace Mica Yellowish Brown

Sample Source: B-19

Project No.: 01:31153 Depth (ft): 6 - 7.5 Sample No.: S-3

Date Reported:



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Address

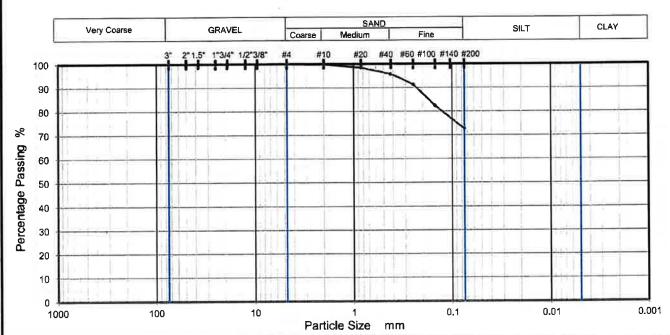
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Tested by	Checked by	Approved by	Remarks
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TEST RESULTS (ASTM D422-63(2007))

% Passing 100.0 100.0 99.8 98.5	Particle Size mm	% Passing
100.0 99.8 98.5		
99.8 98.5		
98.5		
05.0		
95.9		
91.5		
82.4		
72.7		
	82.4	82.4

Dry Mass of sample, g	41.7
-----------------------	------

0.0
0,0
0.0
0,2
3.9
23.2
72.7

USCS	ML	Liquid Limit	NP	D90	0,230	D50	D10
AASHTO	A-4	Plastic Limit	NP	D85	0.174	D30	Cu
USCS Group Name	Silt with sand	Plasticity Index	NP	D60		D15	JCc I

Project: Warrenton Data Center

Client:

Sample Description: Silt with Sand Trace Mica Yellow Light Brown

Sample Source: B-09

Project No.: 01:31153 Depth (ft): 8.5 - 10 Sample No.: S-4

Date Reported:



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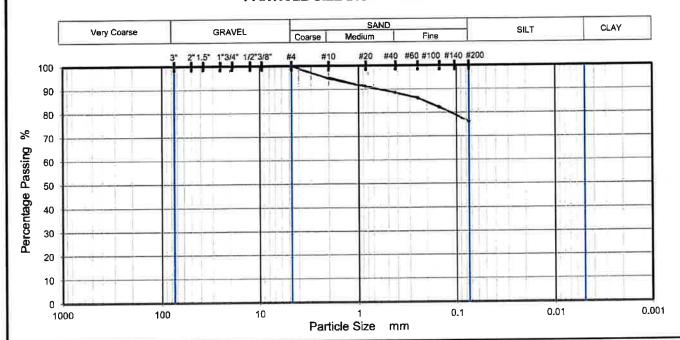
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TEST RESULTS (ASTM D422-63(2007))

ving	Hydrometer Se	dimentation
% Passing	Particle Size mm	% Passing
100.0		
100.0		
94.8		
91.2		
88.6		
86.4		
82.4		
76.2		
	% Passing 100.0 100.0 94.8 91.2 88.6 86.4 82.4	% Passing Particle Size mm 100.0 100.0 94.8 91.2 88.6 86.4 82.4

Sample Proportions	% dry mass		
/ery coarse, >3" sieve	0.0		
Gravel, 3" to # 4 sieve	0.0		
Coarse Sand, #4 to #10 sieve	5.2		
Medium Sand, #10 to #40	6.2		
ine Sand, #40 to #200	12.4		
ines <#200	76.2		

44.4

				_		7	
luscs	MH	Liquid Limit	63	[D90	0.617	[D50	D10
AASHTO	A-7-5	Plastic Limit	38	D85	0.209	D30	Cu
USCS Group Name	Elastic silt with sand	Plasticity Index	25	D60		D15	JCc J

Project: Warrenton Data Center

Client

Sample Description: Elastic Silt with Sand Trace Mica Yellowish Light Brown

Sample Source: B-20

Project No.: 01:31153 Depth (ft): 8.5 - 10 Sample No.: S-4

Dry Mass of sample, g

Date Reported:



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Address

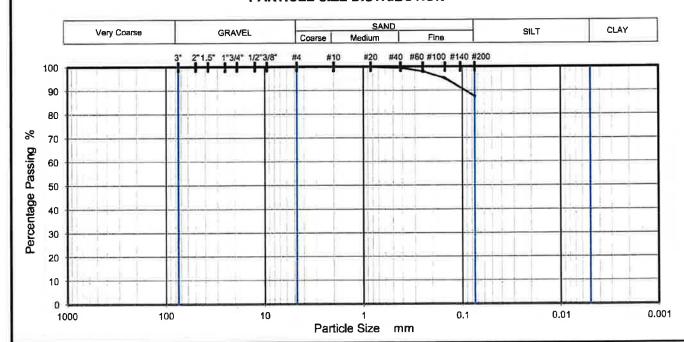
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TEST RESULTS (ASTM D422-63(2007))

Sie	eving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.5		
#60	98.1		
#100	95.2		
#200	87.5		
		_	

Dry Mass of sample, g	41.8
-----------------------	------

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	0.0
Medium Sand, #10 to #40	0.5
Fine Sand, #40 to #200	12.0
Fines <#200	87.5
Fines <#200	67.3

USCS	ML	Liquid Limit	45	D90	0.094	D50	D	10
AASHTO	A-7-5	Plastic Limit	30	D85		D30	Jic.	ı
USCS Group Name	Silt	Plasticity Index	15	D60		D15		

Project: Warrenton Data Center

Client:

Sample Description: Silt Trace Mica Yellow Light Brown

Sample Source: B-05

Project No.: 01:31153 Depth (ft): 33.5 - 35 Sample No.: S-9

Date Reported:



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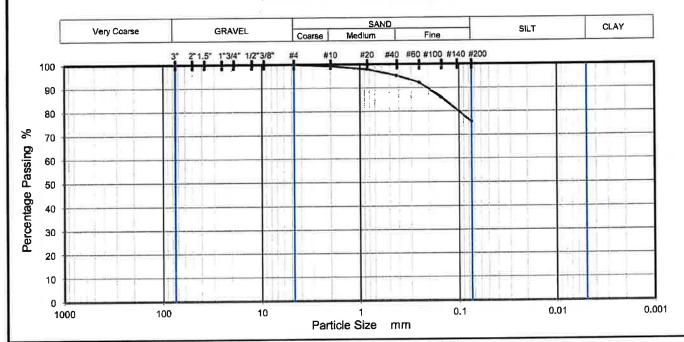
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TEST RESULTS (ASTM D422-63(2007))

Sle	ving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	99.3		
#20	97.9		
#40	95.3		
#60	92.4		
#100	86.1		
#200	75,6		

Dry Mass of sample, g	41.5

0.0
0.0
0.7
4.0
19.7
75.6

luscs	ML	Liquid Limit	NP	D90	0.206	D50	D10
AASHTO	A-4	Plastic Limit	NP	D85	0.140	D30	Cu
USCS Group Name	Silt with sand	Plasticity Index	NP	D60		D15	Cc

Project: Warrenton Data Center

Client:

Sample Description: Silt with Sand Trace Mica Yellow Light Brown

Sample Source: B-01

Project No.: 01:31153 Depth (ft): 38.5 - 39.75 Sample No.: S-10

Date Reported:



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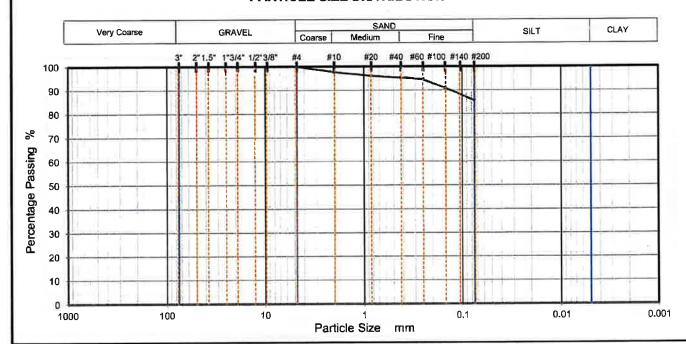
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TEST RESULTS (ASTM D422-63(2007))

Sic	eving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	97.6		
#20	96.1		
#40	95.3		
#60	94.5		
#100	91.0		
#200	85.7		

Dry Mass of sample, g	53.3
49	

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	2.4
Medium Sand, #10 to #40	2.3
Fine Sand, #40 to #200	9.6
Fines <#200	85.7

USCS	CL	Liquid Limit	49	D90	0.132	D50	D10
AASHTO	A-7-6	Plastic Limit	27	D85		D30	Cu
USCS Group Name	Lean clay	Plasticity Index	22	D60		D15	Cc

Project: Warrenton Data Center

Client:

Sample Description: Lean Clay with Sand Yellowisht Brown

Sample Source: B-14

Project No.: 01:31153

Depth (ft): 1 - 6

Sample No.: D3S-186

Date Reported:



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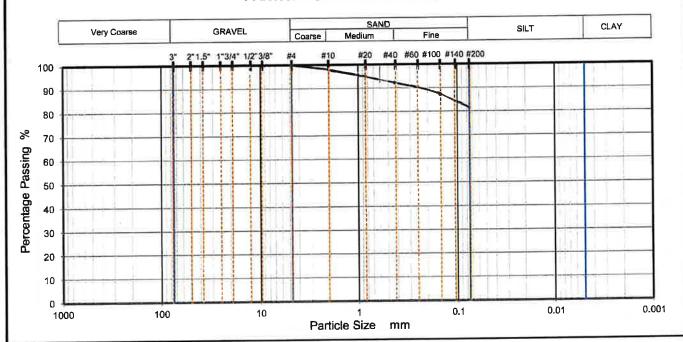
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TEST RESULTS (ASTM D422-63(2007))

Sie	eving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
#4	100.0		
#10	98.1		
#20	95.1		
#40	92.4		
#60	90.3		
#100	87.6		
#200	81.6		
		ll .	

Sample Proportions	% dry mass
/ery coarse, >3" sieve	0.0
ravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	1.9
fledium Sand, #10 to #40	5.7
ine Sand, #40 to #200	10.8
ines <#200	81.6

64.5

luscs	CL	Liquid Limit	45	D90	0.236	D50	D10
AASHTO	A-7-6	Plastic Limit	21	D85	0,111	D30	Cu
ISCS Group Name	Lean clay with sand	Plasticity Index	24	D60		D15) Cc

Project: Warrenton Data Center

Client:

Sample Description: Lean Clay with Sand Yellowish Brown

Sample Source: B-15

Project No.: 01:31153 Depth (ft): 1 - 6

Dry Mass of sample, g

Sample No.: D3S-187

Date Reported:



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Address

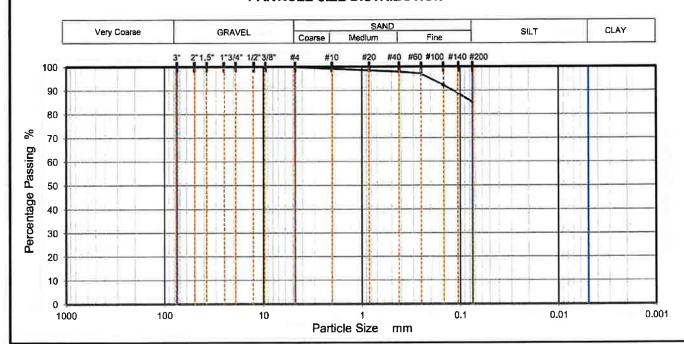
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TEST RESULTS (ASTM D422-63(2007))

Sie	ving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
2"	100.0		
1 1/2"	100,0		
1"	100,0		
3/4"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.2		
#20	98.5		
#40	97.9		
#60	97.1		
#100	92.5		
#200	85.1		

Dry Mass of sample, g	54,9

0.0
0.0
0.8
1.3
12,8
85.1

USCS	ML	Liquid Limit	NP	D90	0.119	D50	D10	
AASHTO	A-4	Plastic Limit	NP	D85		D30	Cu	
USCS Group Name	Silt	Plasticity Index	NP	D60		D15	Cc	

Project: Warrenton Data Center

Client:

Sample Description: Silt Trace Mica Yellowish Brown

Sample Source: B-04

Project No.: 01:31153

Depth (ft): 1 - 6

Sample No.: D3S-188

Date Reported:



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Address

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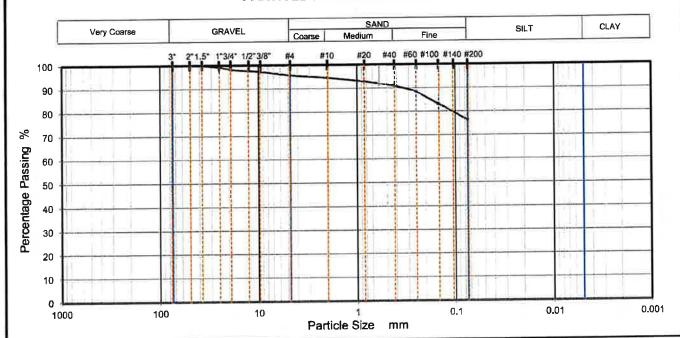
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20151-3232

Tested by	Checked by	Approved by	Remarks
	Htran	Dtran	



TEST RESULTS (ASTM D422-63(2007))

Sie	ving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
2"	100.0		
1 1/2"	100.0		
1"	99.2		
3/4"	98.2		
3/8"	97.3		
#4	95.7		
#10	94.6		
#20	92.9		
#40	91.1		
#60	88,6		
#100	83.4		
#200	76.4		
		-	

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	4.3
Coarse Sand, #4 to #10 sieve	1.1
ledium Sand, #10 to #40	3.5
ine Sand, #40 to #200	14.7
Fines <#200	76.4

5235.0

luscs I	ML	Liquid Limit	49	D90	0.337	D50	D10
AASHTO	A-7-6	Plastic Limit	28	D85	0.176	D30	Cu
USCS Group Name	Silt with sand	Plasticity Index	21	D60		D15	

Project: Warrenton Data Center

Client:

Sample Description: Silt with Sand Brwon

Sample Source: B-09

Project No.: 01:31153 Depth (ft): 1 - 6 Sample No.: D3S-189

Dry Mass of sample, g

Date Reported:



Office / Lab

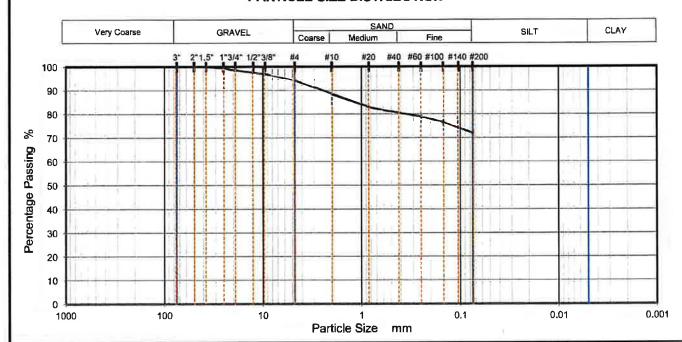
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įvong	Htran	Dtran	9



TEST RESULTS (ASTM D422-63(2007))

Sie	ving	Hydrometer Se	dimentation
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
2"	100.0		
1 1/2"	100.0		
1"	99.4		
3/4"	98.5		
3/8"	96.9		
#4	94.4		
#10	88.7		
#20	83.1		
#40	80.6		
#60	79.0		
#100	76.7		
#200	72. 0		
		=	

Dry Mass of sample, g 10996.0	Dry Mass of sample, g	10996,0
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Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	5.6
Coarse Sand, #4 to #10 sieve	5.7
Medium Sand, #10 to #40	8.1
Fine Sand, #40 to #200	8.6
Fines <#200	72.0

USCS	СН	Liquid Limit	55	D90	2.436	D50		10
AASHTO	A-7-6	Plastic Limit	24	D85	1.136	D30	jk	.u
USCS Group Name	Fat clay with sand	Plasticity Index	31	D60		D15		<u>c </u>

Project: Warrenton Data Center

Client:

Sample Description: Fat Clay with Sand Brown

Sample Source: B-19

Project No.: 01:31153 Depth (ft): 1 - 6 Sample No.: D3S-190

Date Reported:



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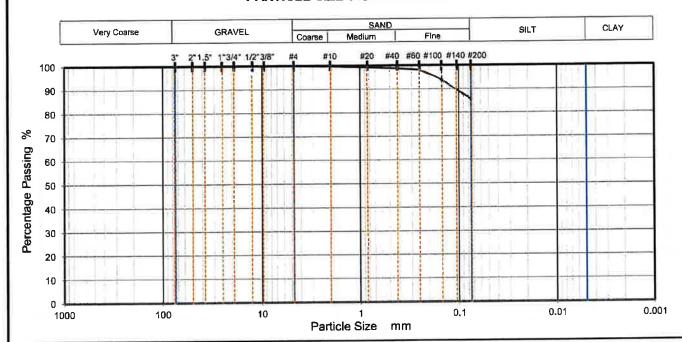
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Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



TEST RESULTS (ASTM D422-63(2007))

ring	Hydrometer Se	dimentation
% Passing	Particle Size mm	% Passing
100,0		
100.0		
99.8		
99.3		
98.8		
98.1		
94.0		
85.6		
	% Passing 100.0 100.0 99.8 99.3 98.8 98.1 94.0	% Passing Particle Size mm 100.0 100.0 99.8 99.3 98.8 98.1 94.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	0,2
ledium Sand, #10 to #40	1.0
ine Sand, #40 to #200	13.2
ines <#200	85.6

54.9

USCS	CL	ILiquid Limit	39	1090 T	0.108	D50	D10	
AASHTO	A-6	Plastic Limit	18	D85		D30	Cu	
USCS Group Name	Lean clay	Plasticity Index	21	D60		D15	lCc l	

Project: Warrenton Data Center

Client:

Sample Description: Lean Clay Yellowish Brown

Sample Source: B-02

Project No.: 01:31153 Depth (ft): 1 - 6 Sample No.: D3S-191

Dry Mass of sample, g

Date Reported:



Office / Lab

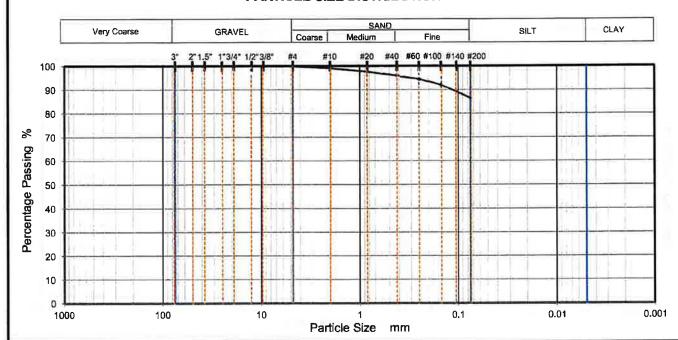
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Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



TEST RESULTS (ASTM D422-63(2007))

ving	Hydrometer Se	Hydrometer Sedimentation			
% Passing	Particle Size mm	% Passing			
100.0					
100.0					
99.1					
97.6					
96.0					
94.6					
92,2					
86.5					
	% Passing 100.0 100.0 99.1 97.6 96.0 94.6 92.2	% Passing Particle Size mm 100.0 100.0 99.1 97.6 96.0 94.6 92.2			

Dry Mass of sample, g	64.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	0.9
Medium Sand, #10 to #40	3.1
Fine Sand, #40 to #200	9.5
Fines <#200	86.5

USCS	CL	Liquid Limit	37	D90	0.115	D50	D10
AASHTO	A-6	Plastic Limit	19	D85		D30	Cu
USCS Group Name	Lean clay	Plasticity Index	18	D60		D15	JCc J

Project: Warrenton Data Center

Client:

Sample Description: Lean Clay Trace Mica Brown

Sample Source: B-07

Project No.: 01:31153 Depth (ft): 1 - 6

Sample No.: D3S-193

Date Reported:



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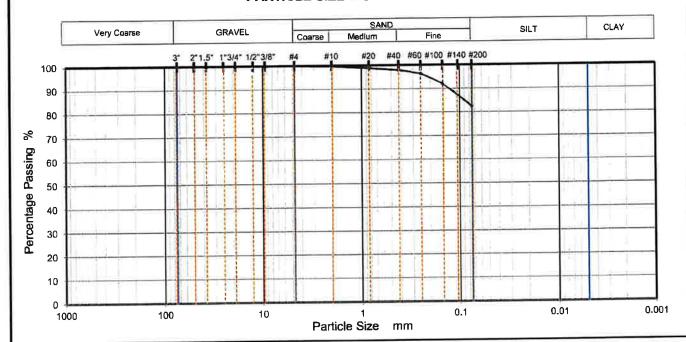
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Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



TEST RESULTS (ASTM D422-63(2007))

ving	Hydrometer Se	dimentation		
% Passing	Particle Size mm	% Passing		
100.0				
100.0				
99.7				
98.9				
97.9				
96,5				
92.3				
82.5				
	% Passing 100.0 100.0 99.7 98.9 97.9 96.5 92.3	% Passing Particle Size mm 100.0 100.0 99.7 98.9 97.9 96.5 92.3		

Dry Mass of sample, g	51.5

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	0.0
Coarse Sand, #4 to #10 sieve	0.3
Medium Sand, #10 to #40	1,8
Fine Sand, #40 to #200	15.4
Fines <#200	82.5

				_		7	
USCS	ML	Liquid Limit	41	[D90	0.128	[[D50	D10
AASHTO	A-7-6	Plastic Limit	27	D85	0.090	D30	Cu
USCS Group Name	Silt with sand	Plasticity Index	14	D60		D15	Сс

Project: Warrenton Data Center

Client:

Sample Description: Silt with Sand Trace Mica Yellowish Brown

Sample Source: B-11

Project No.: 01:31153 Depth (ft): 1 - 6 Sample No.: D3S-194

Date Reported:



Office / Lab

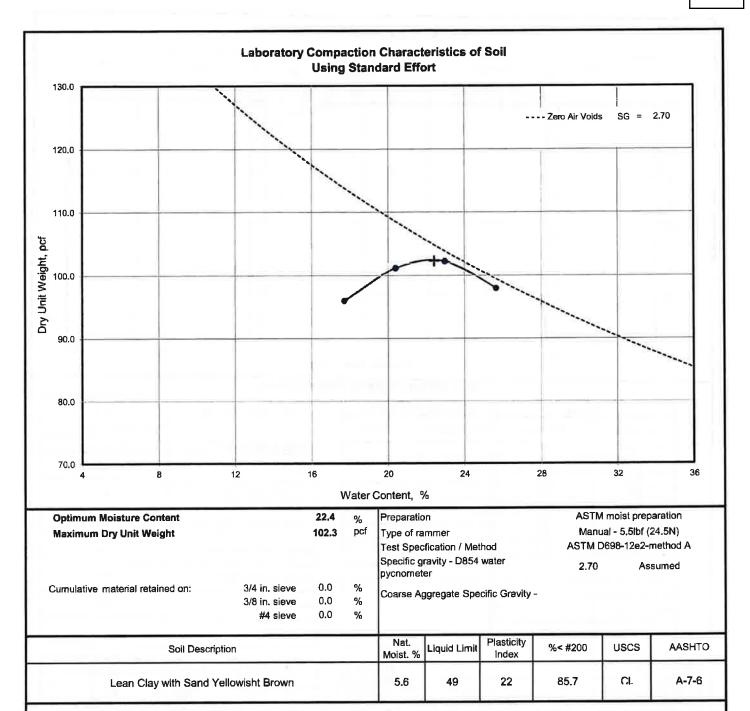
Address

Office Number / Fax

ECS Mid-Atlantic LLC - Chantilly

14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232 (703)471-8400

Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



Client:

Sample / Source B-14

Test Reference/No.:

Project No.: 01:31153 Depth (ft.): 1 - 6 Sample No.: D3S-186

Date Reported:



Tested by

jvong

Office / Lab

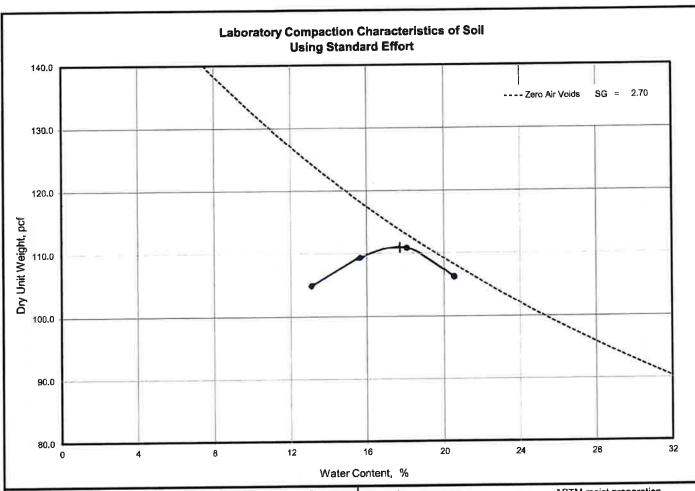
Address

Office Number / Fax

ECS Mid-Atlantic LLC - Chantilly

14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232 (703)471-8400 (703)834-552**7**

Checked by Approved by Remarks
Htran Dtran



Optimum Moisture Content	timum Moisture Content 17.7 % Preparation			Preparation	ASTM mo	oist preparation
Maximum Dry Unit Weight		111.0	pcf	Type of rammer Test Specfication / Method	Manual - 5.5lbf (24.5N) ASTM D698-12e2-method /	
				Specific gravity - D854 water pycnometer	2.70	Assumed
Cumulative material retained on:	3/4 in. sieve 3/8 in. sieve #4 sieve	0.0 0.0 0.0	% % %	Coarse Aggregate Specific Gravity -		

Soil Description		Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Lean Clay with Sand Yellowish Brown	5.6	45	24	81.6	CL	A-7-6

Client: Sample / Source B-15 Test Reference/No.: Project No.: 01:31153
Depth (ft.): 1 - 6
Sample No.: D3S-187
Date Reported:



Office / Lab

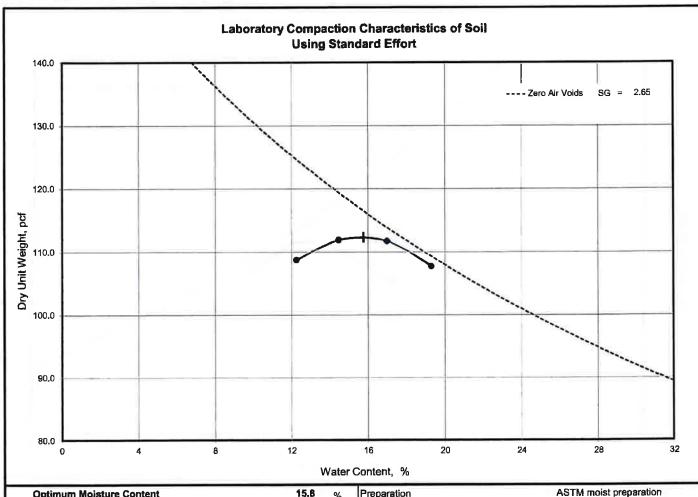
Address

Office Number / Fax

ECS Mid-Atlantic LLC - Chantilly

14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232

Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



Optimum Moisture Content Maximum Dry Unit Weight		15.8 112.3	% pcf	Preparation Type of rammer Test Specification / Method ASTM moist preparation Manual - 5.5lbf (24.5N) ASTM D698-12e2-method A		
				Specific gravity - D854 water pycnometer 2.65 Assumed		
Cumulative material retained on:	3/4 in. sieve 3/8 in. sieve #4 sieve	e 0.0	% % %	Coarse Aggregate Specific Gravity -		
Soil Descrip	tion		Nat. Nat. Liquid Limit Plasticity %< #200 USCS AASHTO)		

Soil Description		Liquid Limit	Plasticity Index	%< #200	uscs	AASHTO
Silt Trace Mica Yellowish Brown	2.2	NP	NP	85.1	ML	A-4

Client:

Sample / Source B-04

Test Reference/No.:

Project No.: 01:31153 Depth (ft.): 1 - 6 Sample No.: D3S-188

Date Reported:



Office / Lab

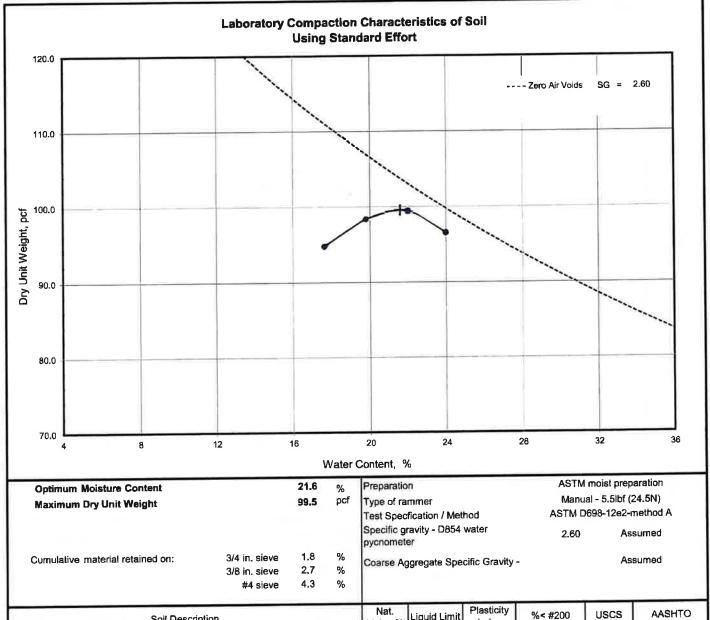
Address

Office Number / Fax

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Tested by	Checked by	Checked by Approved by		Remarks
	Htran	Dtran		



Soil Description

Nat. Moist. % Liquid Limit Plasticity Index %< #200 USCS AASHTO

Silt with Sand Brown

5.2 49 21 76.4 ML A-7-6

Project: Warrenton Data Center

Client: Sample / Source B-09 Test Reference/No.: Project No.: 01:31153 Depth (ft.): 1 - 6 Sample No.: D3S-189 Date Reported:



Office / Lab

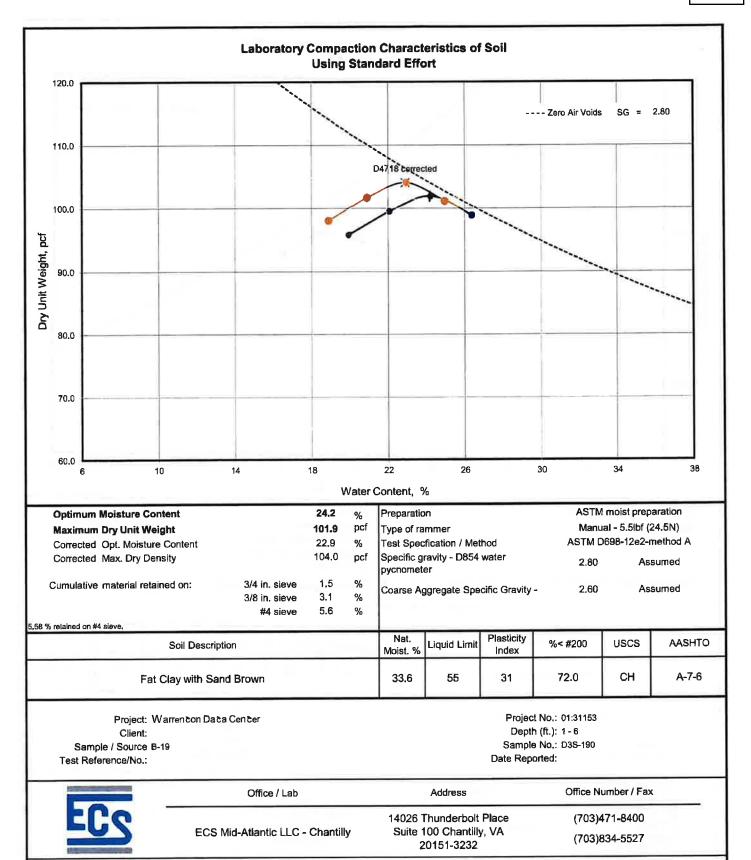
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Office Number / Fax

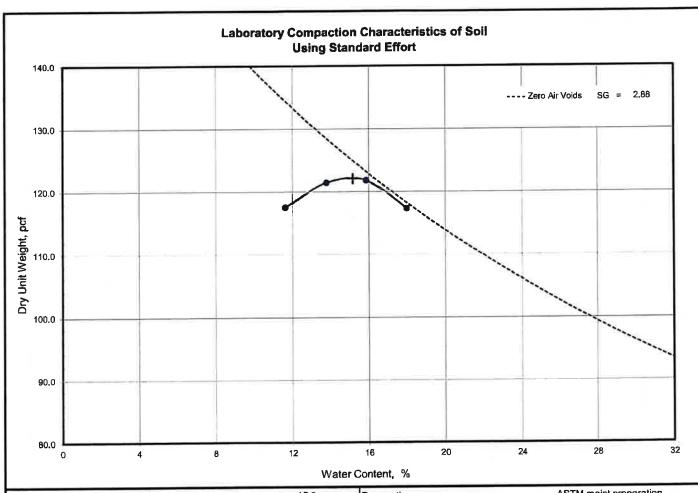
ECS Mid-Atlantic LLC - Chantilly

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Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



Optimum Moisture Content		15.2	%	Preparation	ASTM mo	ist preparation
Maximum Dry Unit Weight		122.1	pcf	Type of rammer Test Specfication / Method	Manual - 5.5lbf (24. ASTM D698-12e2-me	
				Specific gravity - D854 water pycnometer	2.88	Historical
Cumulative material retained on:	3/4 in. sieve 3/8 in. sieve #4 sieve	0.0 0.0 0.0	% % %	Coarse Aggregate Specific Gravity -		

Soil Description		Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Lean Clay Yellowish Brown	11.7	39	21	85.6	CL	A-6

Client: Sample / Source B-02 Test Reference/No.: Project No.: 01:31153 Depth (ft.): 1 - 6 Sample No.: D3S-191 Date Reported:



Office / Lab

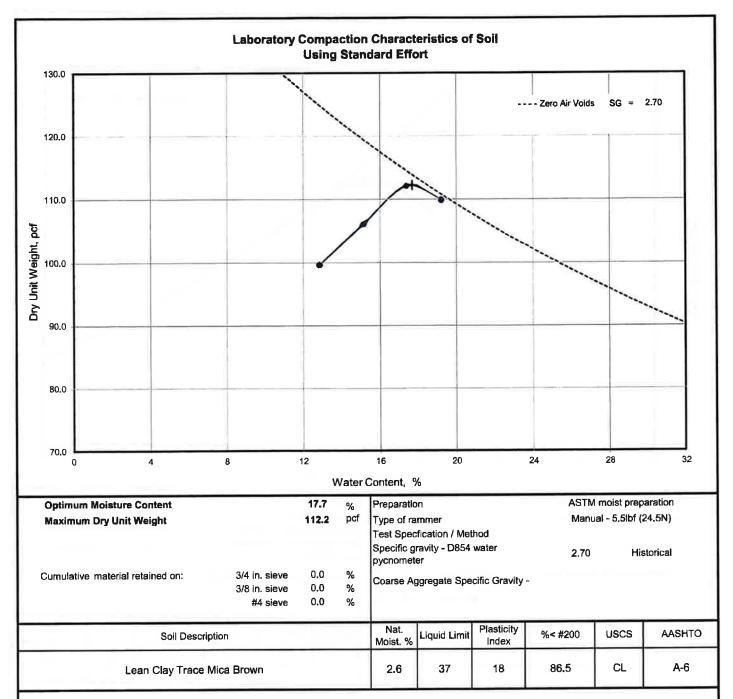
Address

Office Number / Fax

ECS Mid-Atlantic LLC - Chantilly

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Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	



ECS Mid-Atlantic LLC - Chantilly

Client: Sample / Source B-07 Project No.: 01:31153 Depth (ft.): 1 - 6 Sample No.: D3S-193

Date Reported:

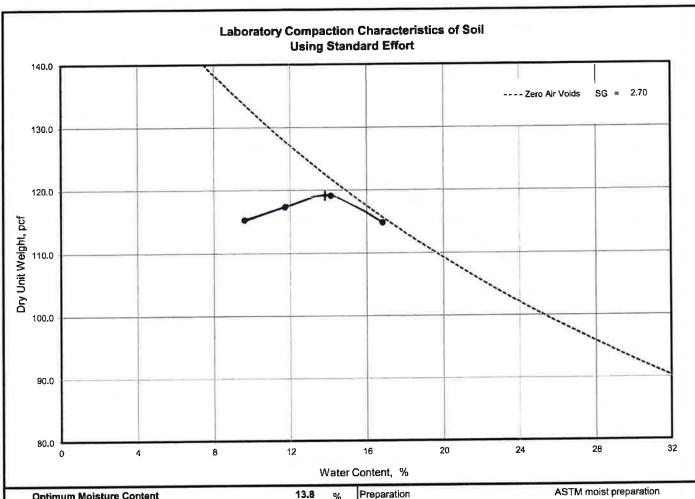


Test Reference/No.:

Office / Lab Address Office Number / Fax

14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232

Tested by Checked by Approved by		Remarks	
jvong	Htran	Dtran	



	Optimum Moisture Content Maximum Dry Unit Weight Cumulative material retained on: 3/4 in. sieve 3/8 in. sieve #4 sieve		13.8 119.2	% Preparation pcf Type of rammer Test Specification / Method Specific gravity - D854 water			ASTM [ASTM moist preparation ASTM D698-12e2-method A 2.70 Historical		
			0.0 % 0.0 % 0.0 %		pycnometer Coarse Aggregate Specific Gravity -					
r	Soil Description					Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
r	Silt with Sand Trace M	ica Yellowish Brown			2.1	41	14	82.5	ML	A-7-6

Project: Warrenton Data Center Client:

Silt with Sand Trace Mica Yellowish Brown

Sample / Source B-11 Test Reference/No.:

Project No.: 01:31153 Depth (ft.): 1 - 6 Sample No.: D3S-194 Date Reported:



Office / Lab

Address

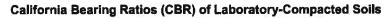
Office Number / Fax

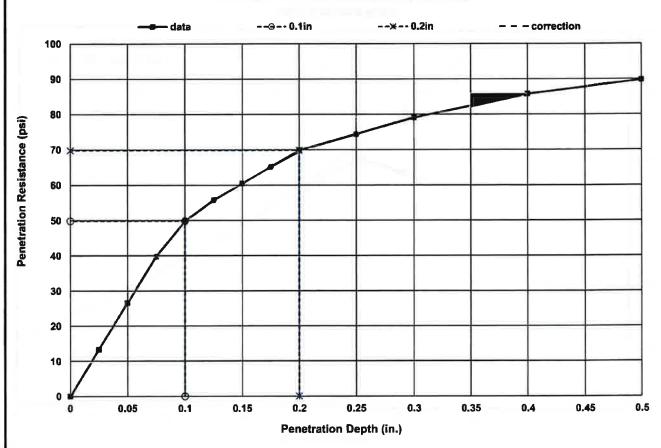
ECS Mid-Atlantic LLC - Chantilly

14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232

(703)471-8400 (703)834-5527

Remarks Approved by Tested by Checked by Dtran Htran jvong





TEST RESULTS (ASTM D1883-16)

	Molded			Soaked		CBF	र (%)					
Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max, Dens.	I MOISTURE (% II	0.1 in.	0.2 in.	Linearty Correction (in.)	Surci (lb	narge s.)		well (%)
101.8	99.5	22.3	91.1	89.1	33.8	5.0	4.7	0.00	1	0	2	.22
	М	aterial Description	on		AASHTO	USCS	MAX. Dens. (pcf)	Optimum Moisture (%)	LL	PI	% Fines	% Gravel
	Lean Clay w	ith Sand Yello	wish Browr		A-7-6	CL	102.3	22.4	49	22	85.7	0.0

Project: Warrenton Data Center

Client:

Sample / Source B-14 Test Reference/No.: 1

Project No.: 01:31153

Depth (ft.): 1 - 6 Sample No.: D3S-186

Date Reported:



Office / Lab

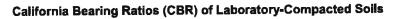
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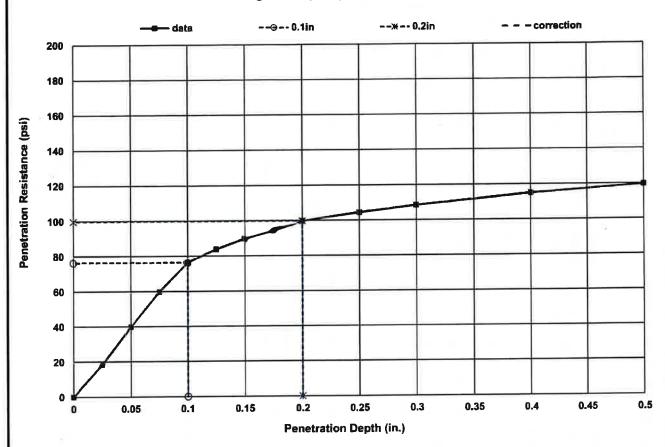
Office Number / Fax (703)471-8400

14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232

ECS Mid-Atlantic LLC - Chantilly

Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	





TEST RESULTS (ASTM D1883-16)

	Molded			Soaked		СВЕ	₹ (%)	l in analys	Curat		٠	well
Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	INACISTIMP (%) I	0.1 in.	0.2 in.	Linearty Correction (in.)	Surci (lb	s.)		(%)
110.5	99.5	17.6	100.2	90.3	27.3	7.6	6.6	0.00	1	0	1	.85
	M	aterial Description	on		AASHTO	USCS	MAX, Dens. (pcf)	Optimum Moisture (%)	J	PI	% Fines	% Gravel
	Lean Clay v	with Sand Yello	wish Brown	1	A-7-6	CL	111	17.7	45	24	81.6	0.0

Project: Warrenton Data Center

Client: Sample / Source B-15 Test Reference/No.: 1 Project No.: 01:31153 Depth (ft.): 1 - 6 Sample No.: D3S-187

Date Reported:



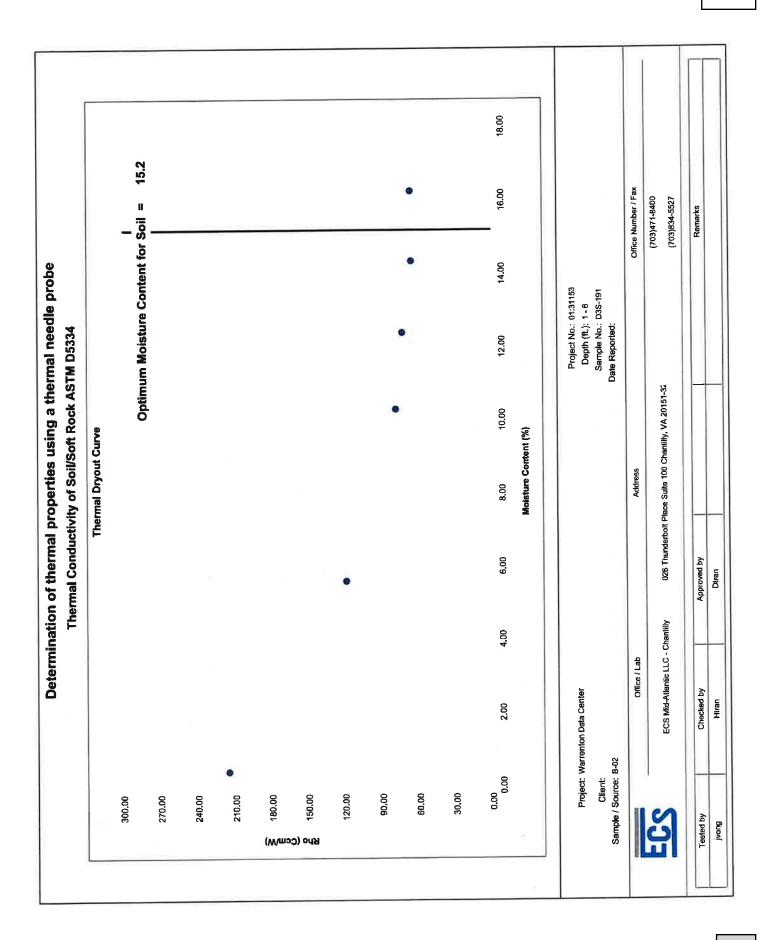
Office / Lab Address Office Number / Fax
14026 Thunderbolt Place (703)471-8400

ECS Mid-Atlantic LLC - Chantilly Suite 100 Chantilly, VA 20151-3232

Tested by	Checked by	Approved by	Remarks
jvong	Htran	Dtran	

					Cor	Corrected Conductivity	ivity				Average	Average
Test Point	Moisture Content %		1st Reading			2nd Reading			3rd Reading		Conductivity	Resistivity
		K=W/mK	Error Value	fnittal Temp	K=W/mK	Error Value	initial Temp	K=W/mK	Error Value	InNIa! Temp	K=W/mK	Rho≕C.cm/W
Dry Point	0.39	0.450	0.0024	21.3	0.467	0.0042	20.8	0.476	0.0042	20.9	0.464	215.471
Moist Point 1	5.60	0.836	0.0017	21.6	0.849	0.0026	21.3	0.845	0.0018	21.1	0.843	118.624
Moist Point 2	10.30	1,238	0.0020	19.4	1.294	0.0016	19,3	1.283	0.0015	19.3	1.272	78.642
Moist Point 3	12.41	1.353	0.0012	19.2	1,382	0.0013	19.1	1,359	0.0011	19.1	1.365	73.286
Moist Point 4	14.36	1,593	0.0029	19.1	1.480	0.0012	19	1,485	0,0012	19	1,519	65.821
Moist Point 5	16.26	1,534	0.0015	18.9	1.516	0.0013	18.9	1.473	0.0010	18.8	1.508	66.332
Moist Point 6												
Moist Point 7												
Moist Point 8												
Moist Point 9												
K Material (Standard)	idard)	0.2.	0.2730		Volume of Mold (cf)	(cf)	0.0	0.0333		1		39
K Measured		0.2	0.2980		Volume of Mold (Mr3)	(Mr3)	0.0	0.00094		Б		21
Calibration Factor	tor	6.0	0.9161		Weight of Test Sample (lb)	Sample (lb)	35	3,888		USCS Symbol		ರ
					Mass of Dry Soil (kg)	oil (kg)	.1	1.764				
Test Mate	Test Material screened with #4 sleve.	vith #4 sleve,										
Needle Ins	Needle Insertion Methor	Pre-drill										
Test per	Test performed at:	95	% compactive effort	ive effort @		blows per layer.	91.					
	100000	Designet Wassesston Data Conter	i special			-		Project No.: 01:31153	01:31153			
	iologo:		<u> </u>					Depth (ft.): 1 - 6	1-6			
E e C	Client: Sample / Source: B-02	ÇU-E						Sample No.: D3S-191 Date Reported:	D3S-191			
i i		4										

Office Number / Fax	(703)471-8400	(703)834-5527	Remarks	
Address	The state of the state of the state of	UZB I NUNGEROOL FIACE SUIR 100 CAARIIIIY, VA 20151-52	l by	
Office / Lab	6	s LLG - Chantilly	by Approved by	Olran
	2	ECS MIG-Atlanti	Tested by Checked by	Jvong



Average Conductivity K=W/mK 0.538 1.045 1,845 1.899 1,593 1.674 Initial Temp 20.8 18.6 20.4 19.5 18,7 18.7 Determination of thermal properties using a thermal needle probe 3rd Reading Error Value 0.0035 0.0019 0,0015 0,0012 0,0010 0.0011 Thermal Conductivity of Soil/Soft Rock ASTM D5334 K=W/mK 0.535 1.772 1.068 1,580 1.867 1,637 Initial Temp 20.8 20.4 19,5 18.6 18.7 18.7 Corrected Conductivity 2nd Reading Error Value 0.0016 0.0030 0.0018 0,0014 0.0016 0.0012 K=W/mK 0.531 1.058 1.572 1.692 1.852 1,895 hittai Temp 20.8 19,5 18.8 18,7 18.7 22 1st Reading Error Value 0.0045 0.0012 0.0013 0.0032 0.0016 0.0013 K=W/mK 1.010 0.548 1,625 1,909 1.692 1.936 Moisture Content % 15.45 17,15 13.78 19.24 6,39 0.00 Moist Point 8 Moist Point 9 Moist Point 5 Moist Point 6 Moist Point 7 Moist Point 1 Moist Point 2 Moist Point 3 Molst Point 4 **Test Point Dry Point**

Average Resistivity

Rho="C-cm/W 185,874 95.668 62,786

54,214 52,648

59.751

Volume of Mold (cf)	0.0333
Volume of Mold (M^3)	0.00094
Neight of Test Sample (lb)	3.573
Mass of Dry Soil (kg)	1.621

0.2730 0.2980 0.9161

K Material (Standard)

Calibration Factor

K Measured

37	18	占
=	Ы	USCS Symbol
Ⅎ	₫	nscs

Project: Warrenton Data Center

92 Test performed at:

Pre-dr

Needle Insertion Methor

Test Material screened with #4 sieve.

compactive effort @ %

blows per layer.

Depth (ft.): 1 - 6 Sample No.: D3S-193 Date Reported: Project No.: 01:31153

Office Number / Fax (703)471-8400 (703)834-5527

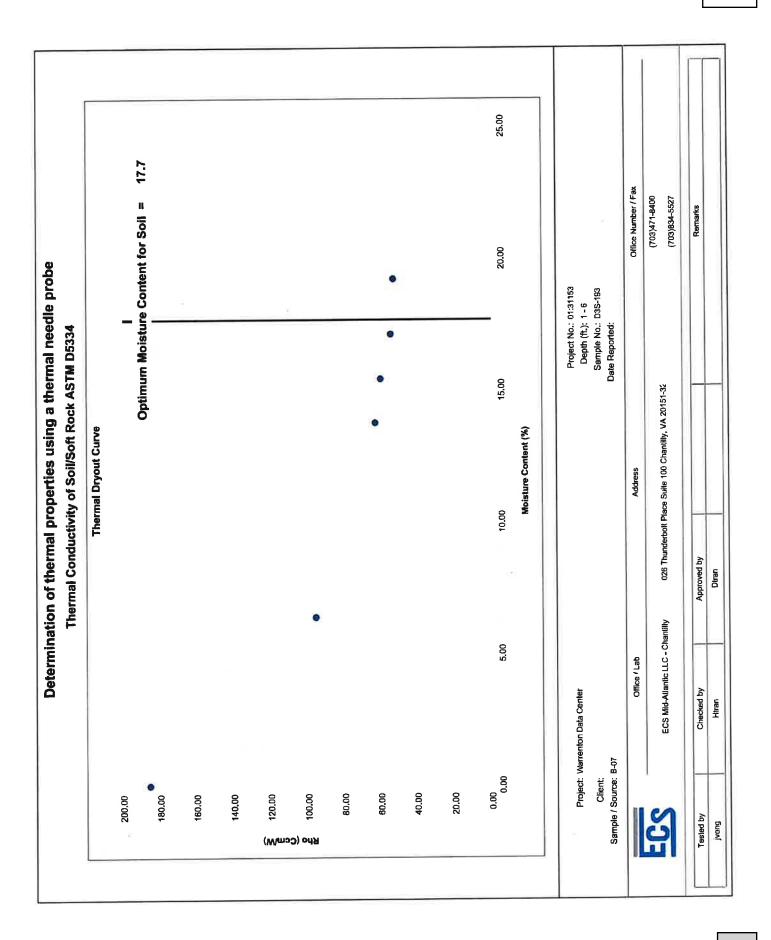
026 Thunderbolt Place Suite 100 Chantilly, VA 20151-32 Address ECS Mid-Atlantic LLC - Chantilly Office / Lab



Sample / Source: B-07

Client:

Remarks	
Approved by	Dtran
Checked by	Htran
Tested by	gnovi



Remarks

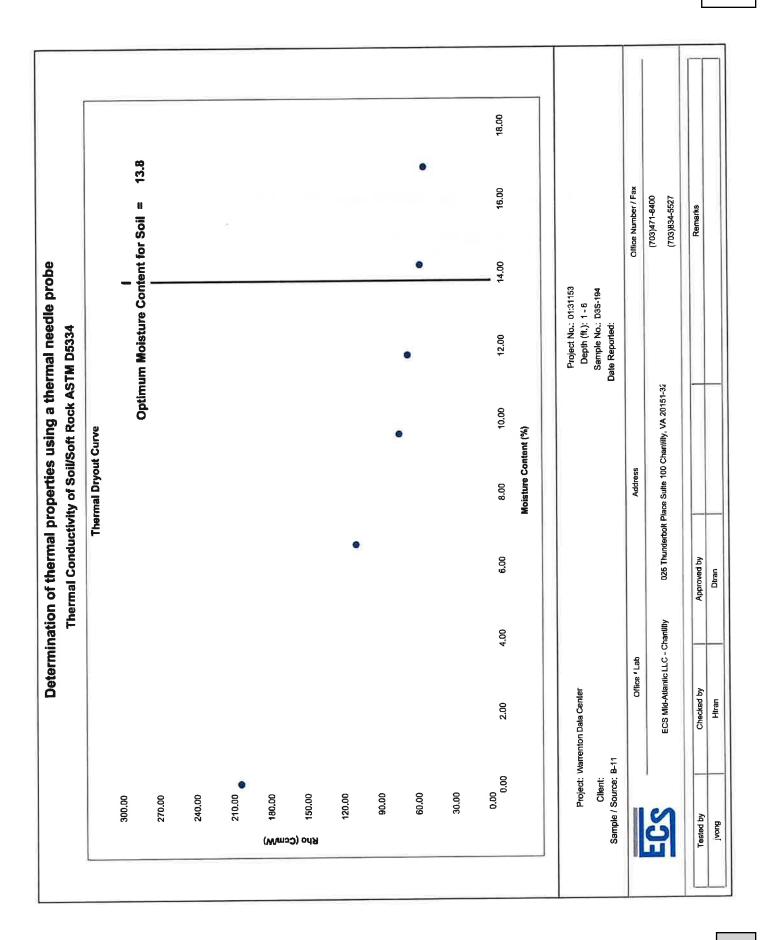
Approved by Dtran

Checked by Hfran

Tested by jvong

Determination of thermal properties using a thermal needle probe Thermal Conductivity of Soil/Soft Rock ASTM D5334

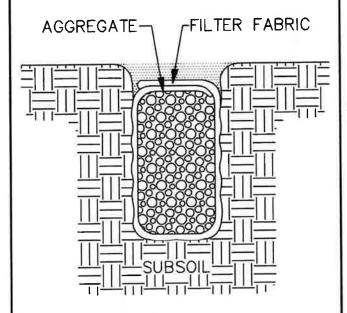
					Con	Corrected Conductivity	ivity				Average	Average
Test Point	Moisture Content %		1st Reading			2nd Reading			3rd Reading		Conductivity	Resistivity
		K=W/mK	Error Value	Initial Temp	K=W/mK	Error Value	Initial Temp	K=W/mK	Error Value	Initial Temp	K=W/mK	Rho≕°C·emW
Dry Point	0.04	0.494	0.0025	22	0.485	0.0033	22	0.489	0.0050	21.8	0.490	204.274
Moist Point 1	6.58	0.919	0.0026	20.3	0.916	0.0018	20.3	0.895	0.0019	20.5	0.910	109.864
Molst Point 2	9.60	1.332	0.0015	19.6	1.322	0.0015	19.5	1.355	0,0018	19.7	1.337	74.812
Moist Point 3	11.77	1.471	0.0022	18.8	1.481	0.0031	18.9	1.471	0.0022	18.5	1.474	67,835
Moist Point 4	14.23	1.741	0.0018	18,5	1.723	0,0018	18.7	1.731	0.0020	18.6	1.732	57.749
Moist Point 5	16.89	1.837	0,0015	18.8	1.843	0.0015	18.6	1.838	0,0012	18.5	1.839	54.365
Moist Point 6												
Molst Point 7												
Moist Point 8												
Moist Point 9												
K Material (Standard)	ndard)	0.2	0.2730		Volume of Mold (cf)	(cf)	0.0	0.0333		נו		41
K Measured		0.2	0.2935		Volume of Mold (M^3)	(M^3)	0.0	0.00094		Ы		14
Calibration Factor	tor	0.6	0.9302		Weight of Test Sample (Ib)	Sample (Ib)	4.	4.326		USCS Symbol		ML
					Mass of Dry Soil (kg)	oil (kg)	1.	1.962				
Test Mate	rial screened	Test Material screened with #4 sleve.										
Needle in:	Needle Insertion Methor	Pre-drill										
Test per	Test performed at:	95	% compactive	ive effort @		blows per layer.	rer.					
	Project:	Project: Warrenton Data Center	a Center					Project No.: 01:31153 Depth (ft.): 1 - 6	: 01:31153			
	Client							Sample No.: D3S-194	: D3S-194			
San	Sample / Source: B-11	B-11						Date Reported:	_			
			Office / Lab			Address				Office Number / Fax	×	
	V	ECS	ECS Mid-Atlantic LLC - Chantilly		026 Thunderbolt P	lace Suite 100 Ch	026 Thunderbott Place Suite 100 Chantilly, VA 20151-32	22		(703)471-8400		
		i								(703)834-5527		



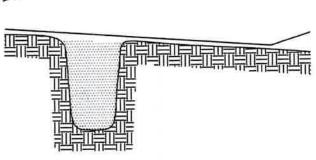
APPENDIX D – Supplemental Report Documents

French Drain Installation Procedure Zone of Influence Diagram

FINAL CONFIGURATION



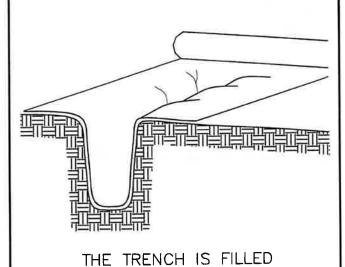
STEP 1



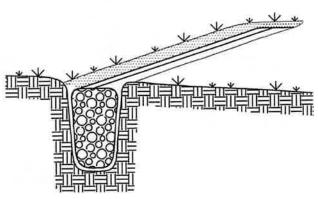
FABRIC IS UNROLLED DIRECTLY OVER TRENCH

STEP 2

SUBDRAIN USING FILTER FABRIC



STEP 3



THE FABRIC IS LAPPED CLOSED AND COVERED WITH SOIL



9409 Innovation Drive Manassas, Virginia 20110 703-396-6259 Fax 703-396-6298

WITH AGGREGATE

FRENCH DRAIN © INSTALLATION PROCEDURE

ZONE OF INFLUENCE DIAGRAM (EXTERIOR WALLS)

EXTERIOR WALLS)
NOT TO SCALE

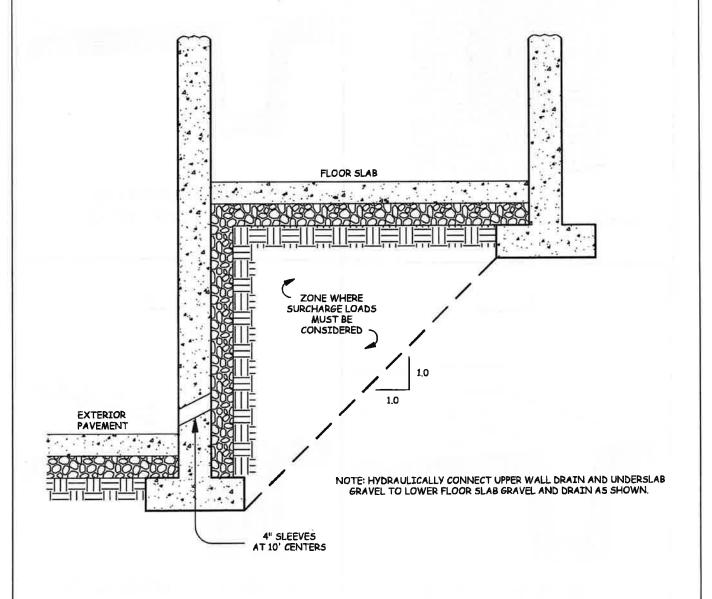




Exhibit 7

SPECIAL USE PERMIT CONDITIONS
Applicant: AMAZON DATA SERVICES, INC. (the "Applicant")
Owner: AMAZON DATA SERVICES, INC.
SUP2022-0003, Amazon Data Center

PIN # 6984-69-2419 (the "Property") Special Use Permit Area: ± 41.71 acres

> Zoning: INDUSTRIAL (I) Date: September 8, 2022

In approving a Special Use Permit, the Town Council may impose such conditions, safeguards, and restrictions as may be necessary to avoid, minimize, or mitigate any potentially adverse or injurious effect of such special uses upon other properties in the neighborhood, and to carry out the general purpose and intent of this Ordinance. The Council may require a guarantee or bond to ensure that compliance with the imposed conditions. All required conditions shall be set out in the documentation approving the Special Use Permit (SUP).

The Applicant shall file a site plan within one (1) year of approval of this Special Use Permit by the Town Council, and shall have up to five (5) years from the date of final site plan approval to commence the proposed use. Issuance of an occupancy permit constitutes commencement of the use.

- 1. <u>Site Development</u>: The Property shall be developed in substantial conformance with these conditions and the Special Use Permit Plan entitled, "Special Use Permit Plan for Amazon Data Services, Inc.," prepared by Bohler Engineering, dated \, and consisting of \ sheets, subject to minor modifications approved by the Town in connection with final site plan review and final engineering, and except as otherwise provided in these Conditions (the "SUP Plan"). The building and other structures to be constructed on the Property are referred to herein as the "Facility."
- 2. <u>Use Parameters. Use Limitation</u>: The use approved with this SUP shall be limited to a data center as set forth in § 3-4.12.3 of the Warrenton Zoning Ordinance.
- 3. Architecture: The architectural design of the data center shall substantially conform to the elevations entitled "Illustrative Elevations," shown on Sheet 6 of the SUP Plan. The Elevations shall be subject to minor modification approved by the Town in connection with site plan review. Additional changes to the design and materials may be made provided that any such changes are approved by the Town prior to the issuance of a building permit. Such approval shall be based on a determination that the changes result in equal to or better than quality than that shown on the Elevations.

- 4. <u>Height:</u> The Facility shall be no greater than 37 feet in height, as that term is defined in the Town Zoning Ordinance. The mechanical equipment installed on the roof of the building shall be screened with mechanical louver screens.
- 5. <u>Undergrounding of electrical lines from a substation to the Facility</u>: The Applicant shall underground all electrical lines extending from the substation serving the Facility to the Facility itself.
- 6. <u>Signage</u>: There shall be no signage except for a street address; provided that if any further signage is sought it shall comply with applicable sign ordinance requirements.
- 7. <u>Fencing</u>: All fencing on the Property shall be as depicted on the SUP Plan, and shall not exceed 8 feet in height.
- 8. External Fuel Storage Tanks: The Applicant shall install above-ground double-walled fuel tanks that meet the definition of secondary containment under the DEQ LPR-SRR-2019-03 Storage Tank Program Compliance Manual, Volume V AST Guidance, and pursuant to 40 CFR Part 112, Section 8.1.2.2, in the general locations shown on the SUP Plan, for the storage of fuel supplies necessary to maintain an Uninterruptible Power Supply in the event of a loss of external electrical power.
- 9. Parking: The Applicant shall provide not fewer than 56 parking spaces as shown on the SUP Plan, one of which shall be a loading space.
- 10. <u>Site Maintenance</u>: The Applicant shall maintain the Property in a clean and orderly manner, and shall provide an on-site masonry screened refuse container station in the location generally shown on the SUP Plan.
- 11. Access: Access to the site shall be provided as shown on the SUP Plan, subject to changes approved by the Town in consultation with the Virginia Department of Transportation. Mountable curbs shall be provided as required by the Town. There shall be no access from either Routes 17 or 29.
- 12. Water & Public Sewer Connection: The Property shall connect to public water and public sewer at the Applicant's expense. The Applicant shall limit its water use to internal domestic uses such as service to bathrooms, kitchens, humidification, and external irrigation. It shall not use public water for the general purposes of cooling the data center, but may use it for the initial charging of the cooling system, upon consultation with the Director of Public Works as to the scheduling thereof.
- 13. Emergency Services:

- a. The Applicant shall coordinate training between the Town's fire and rescue companies and those other companies and departments that have experience with data centers. Furthermore, the Applicant will provide the Town's first responders its "Data Center Response Manual" for use in training for emergencies at its Facility, and shall assist in advising those first responders how to implement its provisions.
- b. The Applicant shall assure that the water line systems at the Facility have sufficient fire flows, as determined by the Town Fire Marshal.
- c. The Applicant shall maintain Facility security personnel 24 hours a day, and each day of the year.
- 14. <u>Pedestrian access</u>: The Applicant shall construct a five-foot sidewalk on the east side of Blackwell Road along its frontage on that Road.
- 15. Noise: The Applicant shall ensure that all generators associated with the Facility are supplied with mufflers so as to reduce the sound generated during their operation in order to meet the requirements of the Town's Noise Ordinance, with such exception as may be approved by the Zoning Administrator for any area that is not zoned or developed for residential or commercial purposes.
- 16. <u>Lighting</u>: The Applicant shall submit a Lighting Plan pursuant to the provisions of § 9-8 et seq. of the Warrenton Zoning Ordinance in connection with its Site Development Plan. All exterior lighting shall utilize LED and be designed and constructed with cutoff and fully shielded fixtures that direct light downward and into the interior of the property and away from adjacent roads and adjacent properties. All building mounted lighting shall have a maximum height of 25', and the Applicant shall install controls on the site fixtures such that they dim to 50% output between 11 PM and dawn.