18072 Davidson Drive
Milton, DE 19968
T: 302-684-8030
F: 302-684-8054

www.pennoni.com

LINDER AND COMPANY, INC.

CASE NO. CU 2206

OWNER:

LINDER AND COMPANY, INC.
234 NORTH JAMES STREET
NEWPORT, DE 19804

DEVELOPER:

LINDER AND COMPANY, INC.
234 NORTH JAMES STREET
NEWPORT, DE 19804

LEGAL:

MORRIS JAMES LLP
107 W. MARKET STREET
GEORGETOWN, DE 19947
DAVID C. HUTT, ESQUIRE

PLANNER/ENGINEER/SURVEYOR:

PENNONI
18072 DAVIDSON DRIVE
MILTON, DE 19968
MARK H. DAVIDSON, PRINCIPAL LAND PLANNER
ALAN DECKTOR, PE., ENV SP
JOHN W. HAUPT, PLS
ERIC W. WAHL, RLA

ENVIRONMENTAL:

PENNONI
GREGORY R SAUTER, P.E. GEO-TECHNOLOGY ASSC. INC.
KENNETH W. REDINGER, P.W.S. ENVIRONMENTAL SVCS.



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Mark H. Davidson / Vice President

Principal Land Planner/Office Director

EDUCATION

University of Delaware; Civil Engineering, (1986-1990)

Land Surveying, Delaware Technical & Community College (1984-1986) and Wastewater Microbiology Diploma (1997)

Land Planning, Institute for Public Administration (2006)

CERTIFICATIONS

DNREC Class A Percolation Tester & Class B Septic Designer, (DE #2418)

Sediment & Stormwater Management, Responsible Personnel, DE (#8760) and MD (#4914)

DNREC Certified Construction Reviewer: DE (#1270)

Delaware Notary

TRAININGS

Hydrology, Delaware TR-20 (1993)

Reducing Flood Hazard in Coastal Development (1996)

Law for Managers/Supervisors (1999)

State and Federal Laws (2000)

Advanced Real Estate Law in Delaware (2002)

Land Conservation and Historic Preservation (2003)

Land Surveying Business Diploma (1998)

Project Manager Training I, Pennoni (2015)

PROFESSIONAL AFFILIATIONS

National Onsite Wastewater Recycling Association

Delaware Onsite Wastewater Recycling Association

American Planning Association

American Institute of Certified Planners

HONORS/AWARDS

Association of Professionals Philanthropy, Brandywine Chapter Fundraising Nominee (2014)

Notable Networker Award, BNI (2013)

EXPERIENCE SUMMARY

Mark H. Davidson serves as Vice President of Pennoni and Office Director for our Southern Delaware, Milton Office. Mark also serves as the Principal Land Planner for Pennoni. He has over 33-years of past experience in Surveying, Engineering, Consulting, Construction and Land Planning. For 12-years he owned a professional engineering, surveying, land planning, environmental and consulting firm that provided professional consulting and design in land planning for residential, industrial, institutional, municipal and commercial applications to a wide range of clients in Delaware and Maryland. Mr. Davidson's project experience includes land development planning, surveying, engineering, environmental design and permitting; construction and project consulting, management and inspection; water resource consulting, management and inspection and municipal consulting, planning and inspection for residential, industrial, institutional, municipal and commercial applications.

Mark is a past director of the Delaware Onsite Wastewater Recycling Association as well as a member of the American Planning Association, American Institute of Certified Planners and has served in the past as a committee member of Delaware Low Impact Development Roundtable Committee, Delaware Pollution Control Strategy Committee, Delaware Sediment & Stormwater Regulatory Advisory Committee, and the Delaware Technical & Community College A/E Curriculum Committee. He was also nominated for the Brandywine Chapter Association of Fundraising Professionals Philanthropy Award and has won the BNI Notable Networker Award.

Along with all the experience and education stated and with many years of combined experience in Surveying, Engineering, Consulting and Land Planning, he has been responsible for providing consulting, layout and design in surveying, engineering and land planning for residential, industrial, institutional, municipal and commercial applications to a wide range of clients in Delaware, Maryland, Virginia and West Virginia. He has project managed, studied, planned, surveyed, designed and engineered sustainable, master-planned communities, commercial and urban redevelopment projects, and the public infrastructure that supports them.

Mark has provided nationwide land planning consulting services to a variety of clientele to help coordinate project startups as well as final construction consulting services when it came to commercial, residential, industrial, municipal, educational and community land planning. Provided additional consulting in civil/site engineering, stormwater management, erosion and sediment control, wastewater collection and disposal, transportation, and environmental. Market areas practiced; Delaware, Maryland, West Virginia, Virginia, North Carolina, South Carolina, North Dakota, Puerto Rico, Canada and Panama.

Additional Project experience includes cutting edge design and technology as well as value engineering to help clients through the ever-changing market including but not limited to solar voltaic and wind generation projects.

He was currently appointed by the Secretary of DNREC to serve 3-years on the On Site Septic Advisory Board for the State of Delaware.

APPENDIX F

N

C/U 2085 (Approved, Multifamily)
Cedar Shores (Multifamily)
C/U 2131 (Approved, Multifamily)
Bethany Bay (Mixed Use)
Bay Forest (Mixed Use)
Bethany Marina (Multifamily)
C/U 1949 (Approved)
Bayside At Bethany Lakes (Multifamily)
C/U 2130 (Approved, Multifamily)
C/U 1913 (Approved)
Insight At Sunset Harbor (Multifamily)
The Salt Pond (Mixed Use)
C/U 2038 (Approved, Multifamily)
Windhurst Manor (Multifamily)
Creekside (Multifamily)
Tidewaters (Multifamily)
C/U 2196 (Pending)
C/U 1969 (Approved)
C/U 2166 (Approved)
Westwood (Multifamily)
Ocean Mist (Multifamily)
The Crossings At Bethany (Multifamily)
C/U 2195 (Pending, Multifamily)
Village At Bear Trap Dunes (Mixed Use)
Bishops Landing (Mixed Use)

Holts Landing Road
Fairway
Irons Lane
Old Mill Road
Brush Hook Road
Whites Neck Road
Murray Road
Vines Creek Road
Omar Road
Tranquility Lane
Roxana Road
Park Circle
Railway Road
Yeadon Drive
Club House Road
Bridge Lane
Chad Place
Birdhaven Street
Waterway Drive
Yacht Basin Road
Sandy Cove Road
Cedar Neck Road
Hickman Road
Orlando Avenue
Fred Hudon Road
Daisey Avenue
Hudson Avenue
Woodland Avenue
Dukes Drive
Windmill Drive
Cedar Drive
Atlantic Avenue
Heron Drive

0 0.25 0.5 1 Miles

Surdex Corp

Figure 21 of 21.	Area Land Use Applications & Multifamily Development	Pennoni	County Zoning	AR-1, CR-1, GR, M, B-1, AR-2, C-1, HR-2, MR
21	Evans Farm Apartments			
	PETIX19002			

Date: 1/7/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\21 Area Land Use Applications.mxd

EVANS FARM APARTMENTS

OCEAN VIEW, DELAWARE



0 100' 200'

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 **F** 302.684.8054

TAB 1

APPLICATION

File #: _____

Planning & Zoning Commission Application
Sussex County, Delaware

Sussex County Planning & Zoning Department
2 The Circle (P.O. Box 417) Georgetown, DE 19947
302-855-7878 ph. 302-854-5079 fax

Type of Application: (please check applicable)
Conditional Use ✔
Zoning Map Amendment ___

Site Address of Conditional Use/Zoning Map Amendment

31434 Railway Road, Ocean View DE 19970

Type of Conditional Use Requested:
Multi Family Residential within GR district

Tax Map #: 134-12.00-74.00 **Size of Parcel(s)**: 50.19

Current Zoning: GR **Proposed Zoning:** GR **Size of Building**: 248,700

Land Use Classification: AH

Water Provider: Tidewater **Sewer Provider:** Sussex County

Applicant Information

Applicant Name: Linder & Company, Inc. (Attn: Andrea Finerosky)
Applicant Address: 234 North James Street
City: Newport State: DE ZipCode: 19804
Phone #: (302) 999-0708 E-mail: AFinerosky@pettinaro.com

Owner Information

Owner Name: Linder & Company, Inc.
Owner Address: 234 North James Street
City: Newport State: DE Zip Code: 19804
Phone #: (302) 999-0708 E-mail: AFinerosky@pettinaro.com

Agent/Attorney/Engineer Information

Agent/Attorney/Engineer Name: Alan Decktor, PE | PENNONI
Agent/Attorney/Engineer Address: 18072 Davidson Drive
City: Milton State: DE Zip Code: 19968
Phone #: (302) 684-8030 E-mail: adecktor@pennoni.com

EQUAL HOUSING OPPORTUNITY

Check List for Sussex County Planning & Zoning Applications

The following shall be submitted with the application

✓ **Completed Application**

✓ **Provide eight (8) copies of the Site Plan or Survey of the property**
- Survey shall show the location of existing or proposed building(s), building setbacks, parking area, proposed entrance location, etc.
- Provide a PDF of Plans (may be e-mailed to a staff member)
- Deed or Legal description

✓ **Provide Fee $500.00**

___ **Optional - Additional information for the Commission/Council to consider** (ex. architectural elevations, photos, exhibit books, etc.) If provided submit 8 copies and they shall be submitted a minimum of ten (10) days prior to the Planning Commission meeting.

✓ **Please be aware that Public Notice will be sent to property owners within 200 feet of the subject site and County staff will come out to the subject site, take photos and place a sign on the site stating the date and time of the Public Hearings for the application.**

✓ **DelDOT Service Level Evaluation Request Response**

✓ **PLUS Response Letter** (if required)

The undersigned hereby certifies that the forms, exhibits, and statements contained in any papers or plans submitted as a part of this application are true and correct.

I also certify that I or an agent on by behalf shall attend all public hearing before the Planning and Zoning Commission and the Sussex County Council and any other hearing necessary for this application and that I will answer any questions to the best of my ability to respond to the present and future needs, the health, safety, morals, convenience, order, prosperity, and general welfare of the inhabitants of Sussex County, Delaware.

Signature of Applicant/Agent/Attorney

Andrea Finnesky for Tender + Company, Inc. Date: 9/5/19

Signature of Owner

Andrea Finnesky for Tender + Company, Inc. Date: 9/5/19

For office use only:

Date Submitted: _____ Fee: $500.00 Check #: _____

Staff accepting application: _____ Application & Case #: _____

Location of property: _____

Subdivision: _____

Date of PC Hearing: _____ Recommendation of PC Commission: _____

Date of CC Hearing: _____ Decision of CC: _____

18072 Davidson Drive
Milton, DE 19968
T: 302-684-8030
F: 302-684-8054

www.pennoni.com

PARTICULAR DESCRIPTION

LANDS NOW OR FORMERLY OF LINDER AND COMPANY, INC.

TAX MAP 134-12.00-74.00 P/O

All that certain piece, parcel and tract lying in the Baltimore Hundred of Sussex County, Delaware and being more particularly described as follows:

BEGINNING at a point, said point lying on the westerly right-of-way of Railway Road and being a corner for this Parcel and Lands now or formerly of Carl I. Habecker; thence by and with this Parcel and the westerly right-of-way of Railway Road the following (3) courses and distances:

1) **South 45 degrees, 30 minutes, 13 seconds West, 5.99 feet to a point,**
2) **South 44 degrees, 02 minutes, 42 seconds West, 754.49 feet to a point,**
3) **With a curve to the left, said curve having a radius of 725 feet, an arc distance of 209.67 feet, an interior angle of 16 degrees, 34 minutes, 11 seconds and a chord bearing and distance of South 35 degrees, 45 minutes, 37 seconds West, 208.94 feet to a point**,

said point lying on the westerly right-of-way of Railway Road and being a corner for this Parcel; thence by and with this Parcel and the northerly right-of-way of Old Mill Road the following (3) courses and distances:

1) **South 76 degrees, 53 minutes, 25 seconds West, 65.40 feet to a point,**
2) **North 51 degrees, 43 minutes, 07 seconds West, 442.80 feet to a point,**
3) **North 51 degrees, 32 minutes, 05 seconds West, 498.82 feet to an iron rod found,**

Said iron rod lying on the northerly right-of-way of Old Mill Road and being a corner for this Parcel and Bay Forest Subdivision; thence by and with this Parcel and Bay Forest Subdivision the following (13) courses and distances:

1) **North 28 degrees, 19 minutes, 29 seconds East, 23.96 feet to an iron rod found,**
2) **North 03 degrees, 15 minutes, 56 seconds West, 85.75 feet to a point,**
3) **North 02 degrees, 25 minutes, 40 seconds East, 142.98 feet to a point,**
4) **North 00 degrees, 17 minutes, 37 seconds West, 101.37 feet to a point,**
5) **North 06 degrees, 05 minutes, 19 seconds West, 114.25 feet to a point,**
6) **North 00 degrees, 53 minutes, 41 seconds West, 294.54 feet to a point,**

7) **North 02 degrees, 41 minutes, 47 seconds East. 158.12 feet to a point,**
8) **North 11 degrees, 09 minutes, 31 seconds East, 50.14 feet to a point,**
9) **North 17 degrees, 43 minutes, 55 seconds East, 92.88 feet to a point,**
10) **North 34 degrees, 20 minutes, 57 seconds East, 223.49 feet to a point,**
11) **North 38 degrees, 57 minutes, 58 seconds East, 140.61 feet to a point,**
12) **North 44 degrees, 38 minutes, 39 seconds East, 212.71 feet to a point,**
13) **North 45 degrees, 53 minutes, 00 seconds East, 0.05 feet to a PK nail found,**

Said PK nail, being a corner for this Parcel and Lands now or formerly of Linder and Company, Inc.; thence by and with this Parcel and Lands now or formerly of Linder and Company, Inc., **South 53 degrees, 29 minutes, 49 seconds East, 1,165.69 feet** to a concrete monument, said concrete monument being a corner for this Parcel and Lands now or formerly of Fred and Carol Coulson; thence by and with this Parcel and Lands now or formerly of Fred and Carol Coulson, **South 38 degrees, 26 minutes, 28 seconds East, 545.97 feet** to a point, said point being the **Point of Beginning** for this description.

This Parcel contains 48.36 acres, more or less.

36573

BK03171 PG091

Parcel No. 1-34-12.00-74.00
Prepared By:
Herlihy, Harker & Kavanaugh
1400 Market Street, Suite 200
Wilmington, DE 19801
Return To:
Linder & Company, Inc.
234 N. James Street
Newport, DE 19804
R2005-0297

THIS DEED, Made this 1st day of July, 2005.

BETWEEN, JANE E. BURTON, AND WALLACE C. EVANS, PERSONAL REPRESENTATIVES FOR THE ESTATE OF MABEL G. EVANS, of Sussex County and State of Delaware, parties of the first part

-AND-

Linder & Company, Inc., a corporation of the State of Delaware, party of the second part.

WITNESSETH, That the said parties of the first part, for and in consideration of the sum of Five Million Seven Hundred Thousand and 00/100 Dollars ($5,700,000.00) lawful money of the United States of America, the receipt whereof is hereby acknowledged, does hereby grant and convey unto the said party of the second part ,

Consideration: $5700000.0 Exempt Code: A

County	State	Total
85500.00	85500.00	171000.00

counter Date: 07/15/2005

Parcel No. 1:
ALL that certain tract, piece or parcel of land lying and being situated in what is known as Whites' Neck, in Baltimore Hundred, County of Sussex and State of Delaware, lying on the North side of the County Road leading from Millville to the Railway at Whites' Creek, adjoining lands of these Grantors, heirs of Elihu Rickards, and John W. Evans:

BEGINNING at the Northeast corner of a lot of land of this grantee in the aforesaid County Road and running with said road South fifty and three-quarters degrees (50 3/4°) West six chains and forty-nine links to another corner of lot of this grantee, thence with a new line through woodland, North thirty-three degrees West five chains and sixty-six links to a black gum six inches in diameter; thence with line North thirty-three degrees, West (33) twenty chains and forty links to the center of a private road, on line of lands of the heirs of the said Elihu Rickards; thence with said road, and line North forty-eight and three-quarters degrees East (48 3/4°) five chains and twenty-one links to corner of woodland of the said John W. Evans; thence with line of said Evans, South forty-seven degrees East (47° East) seventeen chains and fifty links to another corner of said Evans land; thence with a new line South thirty-three degrees East (33° East) eight chains and sixty links to the center of the aforesaid county road, thence with said road South fifty and three-quarters degrees West (50 3/4° West) two chains and ninety-seven links to the place of beginning.

PARCEL NO. 2: NO 1:
ALL that certain piece, parcel or tract of land lying and situate near Millville, Baltimore Hundred, Sussex County, State of Delaware, adjoining lands of this grantee and John G. Townsend, bounded and described as follows, to wit:

BEGINNING at a stob a corner for the lands formerly belonging to George H. Townsend and running South fifty and three quarters degrees West 6.3 chains down the County road leading from Millville to the Railway Farm; thence North thirty-three degrees West 23.02 chains to a stob along John G. Townsend's line; thence North seventeen degrees East 3.80 chains to a stob; thence along said lands North forty-four

and one-half degrees East 3.42 chains to a corner for other lands of the grantee herein; thence with the lands formerly belonging to George H. Townsend South thirty-three degrees East 25.52 chains back to the County road and place of beginning.

NO. 2:
ALL that certain piece an parcel or tract of land lying and being situate in Baltimore Hundred, Sussex County, State of Delaware, bounded and described as follows, to-wit:

BEGINNING at the center of the County road with a stone on the West side corner for Tract No. 1 (above), and running down said road South fifty-two and one-quarter degrees West one hundred twenty-two feet, South thirty-three and one-half degrees West two hundred forty-five feet to a stake; thence a new line North sixty and one-half degrees West nine hundred sixty-five feet to a stake in the center of an old cart road and the lands of John G. Townsend; thence with said land and down said old cart road North twenty-eight and seven-eights degrees East three hundred twenty-two feet North six and two-fifths degrees East eleven hundred twenty feet to Tract No. 1 (above); thence with said Tract No. 1 South thirty-one degrees East fifteen hundred twenty-two feet home to the place of beginning.

EXCEPTING from the Tract No. 2 that parcel of said tract heretofore sold by Archie A. Evans and Margaret E. Evans, now deceased, to the State of Delaware by deed dated the eleventh date of April, A.D. 1939 and now of record in the Office of the Recorder of Deeds in and for Sussex County, Delaware, at Georgetown in Deed Record No. 323, Page 170 and ALSO EXCEPTING herefrom the parcel of land heretofore sold by the said Archie A. Evans and Margaret E. Evans, now deceased, to Henry G. Graves and Louise B. Graves, trading under the firm name and style of Delaware Sand Company by deed dated the eleventh day of December, A.D. 1942 and now of record in the office of the Recorder of Deeds at Georgetown in Deed Record No. 338, page 538.

PARCEL NO. 3:
ALL that piece parcel or lot of land lying and being situate in Whites' Neck, Baltimore Hundred, Sussex County and State of Delaware bounded and described as follows to wit:

BEGINNING at a corner for lands of Jacob Banks and this tract and running with the Jacob Banks lands North thirty-four degrees West nine and one-tenth perches to the County road leading from Millville to Railway and with said Railway road North forty-nine and one quarter degrees East twenty-six perches to a point and lands of Phillip W. West, thence leaving said road and running with the lands of Philip W. West South twenty-nine and three quarters degrees East twenty-one and five-tenths perches to the lands of Jacob Banks thence with the lands of the said Banks lands, South eighty-six and three-quarters degrees West twenty-six perches and home to the place of beginning.

BEING the same lands and premises conveyed to J. Clifton Evans and Mabel G. Evans, his wife, by the following three Deeds recorded in the Office of the Recorder of Deeds in and for Sussex County, State of Delaware: Deed dated July 31, 1929 and recorded in Deed Record 318, Page 402, Deed dated October 10, 1942 and recorded in Deed Record 338, Page 199, Deed dated May 1, 1948 in Deed Record 387, Page 544.

SUBSEQUENTLY, the said J. Clifton Evans departed this life on January 9, 1986 leaving Mabel G. Evans as sole surviving tenant by the entirety (see Will Book 149-177). Mabel G. Evans departed this life on December 6, 2004 testate whereby Item Fifth of her Will she directed that her property, real and personal, be sold and distributed as further bequeathed (see Will Record 444-296). Jane E. Burton and Wallace C. Evans are the qualified and acting personal representatives of the Estate of Mabel G. Evans and execute and deliver this Deed pursuant to the direction in said Will.

GRANTEE'S ADDRESS: ***234 N. James Street***
Newport, DE 19804

IN WITNESS WHEREOF, the said parties of the first part has caused this Deed to be duly executed the day and year first above written.

Sealed and Delivered
in the Presence of:

Margaret H. Wilbourne

Jane E. Burton (SEAL)
JANE E. BURTON, PERSONAL
REPRENTATIVE OF THE ESTATE OF
MABEL G. EVANS

Wallace C. Evans (SEAL)
WALLACE C. EVANS, PERSONAL
REPRESENTATIVES OF THE ESTATE OF
MABEL G. EVANS

STATE OF DELAWARE)
SUSSEX) ss.:
~~NEW CASTLE~~ COUNTY)

BE IT REMEMBERED, That on this 1ST day of ~~June~~ July, 2005, before me, a Notary Public for the State and County aforesaid, Jane E. Burton, Personal Representive of the Estate of Mabel G. Evans, party to this Indenture, known to me personally to be such, and acknowledged this Indenture to be her act and deed .

WITNESS Hand and Seal this 1ST day of ~~June~~ July, 2005.

(SEAL)

NOTARY PUBLIC

STATE OF DELAWARE)
SUSSEX COUNTY) ss.:
~~NEW CASTLE~~ COUNTY)

EUGENE H. BAYARD, ESQ.
NOTARIAL OFFICER PURSUANT TO
29 DEL. CODE SECT. 4323
ATTORNEY AT LAW
DELAWARE

BE IT REMEMBERED, That on this 1ST day of ~~June~~ July, 2005, before me, a Notary Public for the State and County aforesaid, Wallace C. Evans, Personal Representive of the Estate of Mabel G. Evans, party to this Indenture, known to me personally to be such, and acknowledged this Indenture to be his act and deed .

WITNESS Hand and Seal this 1ST day of ~~June~~ July, 2005.

(SEAL)

NOTARY PUBLIC

RECORDER OF DEEDS
JOHN F. BRADY
05 JUL 15 PM 12:23
SUSSEX COUNTY
DOC. SURCHARGE PAID

EUGENE H. BAYARD, ESQ.
NOTARIAL OFFICER PURSUANT TO
29 DEL. CODE SECT. 4323
ATTORNEY AT LAW
DELAWARE

Received
JUL 18 2005
ASSESSMENT DIVISION
OF SUSSEX CTY

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. BOX 778
DOVER, DELAWARE 19903

JENNIFER COHAN
SECRETARY

August 21, 2019

Ms. Janelle Cornwell, Director
Sussex County Planning & Zoning
P.O. Box 417
Georgetown, DE 19947

Dear Ms. Cornwell:

The Department has completed its review of a Service Level Evaluation Request (SLER) for the **Pettinaro Construction Company, Inc.** conditional application, which we received on July 30, 2019. This application is for an approximately 50.19-acre parcel (Tax Parcel: 134-12.00-74.00). The subject land is located on the northwest corner of the intersection of Old Mill Road (Sussex Road 349) and Railway Road (Sussex Road 350). The subject land is currently zoned as GR (General Residential) and the applicant is seeking a conditional use approval to develop 198 apartments.

Per the 2018 Delaware Vehicle Volume Summary, the annual average and summer average daily traffic volumes along the segment of Old Mill Road where the subject land is located, which is from the northeast Millville limits to Whites Neck Road (Sussex Road 347), are 3,992 and 5,138 vehicles per day, respectively. As the subject land also has frontage along Railway Road, the annual average and summer average daily traffic volumes along that road segment, which is from northeast limits of Millville to the end of the road, are 3,219 and 4,143 vehicles per day, respectively.

Based on our review, we estimate that the proposed land use will generate more than 50 vehicle trips per a weekly peak hour or 500 vehicle trips per day, and would be considered to have a Minor impact to the local area roadways. In this instance, the Department considers a Minor impact to be when a proposed land use would generate more than either 50 vehicle trips per a weekly peak hour and / or 500 vehicle trips per day but fewer than 200 vehicle trips per a weekly peak hour and 2,000 vehicle trips per day. Because of this impact, we recommend that the applicant be required to perform a Traffic Impact Study (TIS) for the subject application. However, our Development Coordination Manual provides that where a TIS is required only because the volume warrants are met, and the projected trip generation will be fewer than 200 vehicle trips per a weekly peak hour and fewer than 2,000 vehicle trips per day, DelDOT may permit the developer to pay an Area-Wide Study Fee of $10 per daily trip in lieu of doing a TIS. For this application, if the County were agreeable, we would permit the developer to pay an Area-wide Study Fee.

According to the Institute of Transportation Engineers (ITE) Trip Generation Manual, a development of 198 apartments would generate 1,077 vehicle trips per day, 67 vehicle trips during the morning peak hour, and 85 vehicle trips during the evening peak hour. As stated above, because this development would generate fewer than 2,000 vehicle trips per day and fewer than 200 vehicle trips during a weekly peak hour, the applicant has the option to pay the Area-Wide Study Fee in lieu of doing a TIS. The Area-Wide Study Fee for the proposed development would be $10,770.00. Payment of the Area-Wide Study Fee does not preclude a developer from having to make or participate in off-site improvements.

Because the site would generate more than 200 vehicle trips per day, a Traffic Operational Analysis (TOA) may be required as part of the site plan review process, in accordance with Chapter 2 of the Development Coordination Manual.

If the County approves this application, the applicant should be reminded that DelDOT requires compliance with State regulations regarding plan approvals and entrance permits, whether or not a TIS is required.

Please contact Mr. Claudy Joinville, at (302) 760-2124, if you have questions concerning this correspondence.

Sincerely,



T. William Brockenbrough, Jr.
County Coordinator
Development Coordination

TWB:cjm
cc: Constance C. Holland, Coordinator, Cabinet Committee on State Planning Issues
Pettinaro Construction Company, Inc., Applicant
J. Marc Coté, Assistant Director, Development Coordination
Gemez Norwood, South District Public Works Manager, Maintenance & Operations
Susanne Laws, Sussex County Subdivision Coordinator, Development Coordination
Derek Sapp, Subdivision Manager, Development Coordination
Kevin Hickman, Subdivision Manager, Development Coordination
Brian Yates, Subdivision Manager, Development Coordination
John Andrescavage, Subdivision Manager, Development Coordination
Troy Brestel, Project Engineer, Development Coordination
Claudy Joinville, Project Engineer, Development Coordination

EVANS FARM APARTMENTS

(CU-2206)

PRELIMINARY SITE PLAN

SUSSEX COUNTY, DELAWARE

PREPARED FOR:

OWNER/DEVELOPER

LINDER AND COMPANY

234 NORTH JAMES ST.

NEWPORT, DELAWARE 19804

SITE DATA TABLE:

1. TAX MAP NUMBER: 134-12.00-74.00

2. OWNERS: LINDER & COMPANY INC
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

3. DEVELOPER: PETTINARO CONSTRUCTION COMPANY, INC.
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

4. TOWN/HUNDRED/COUNTY: OCEAN VIEW / BALTIMORE HUNDRED / SUSSEX

5. CURRENT ZONING: GR (GENERAL RESIDENTIAL DISTRICT)
PROPOSED ZONING: GR (GENERAL RESIDENTIAL DISTRICT)

6. PRESENT USE: AGRICULTURAL
PROPOSED USE: MULTIFAMILY DWELLINGS (115-39)

7. REQUIRED SETBACKS (B.R.L.): GR (115-42 B.)
DEPTH OF FRONT YARD (FEET) 40'
DEPTH OF CORNER SIDE YARD 30'
WIDTH OF SIDE YARD (FEET) 10'
DEPTH OF REAR YARD (FEET) 10'
MINIMUM LOT WIDTH 75'

8. DWELLING UNIT CALCULATIONS: (TABLE II)
GROSS AREA: 50.62 AC.
MIN. LOT AREA/UNIT: GR ZONING MINIMUM AREA: 10,000 S.F.
CU ZONING MINIMUM AREA: 3,630 S.F.(PER DWELLING UNIT)
PERMITTED UNITS: 200 UNITS
PROPOSED UNITS: 200 UNITS
PERMITTED DENSITY: GR ZONING MAXIMUM DENSITY: 4 UNITS / ACRE
CU ZONING MAXIMUM DENSITY FOR MULTIFAMILY:12 UNITS PER ACRE, ARTICLE XX SECTION 115-156B, TABLE II
PROPOSED DENSITY: 200 MULTIFAMILY UNITS: 3.95± UNITS / ACRE

9. WATER SUPPLIER: PUBLIC - TIDEWATER UTILITIES
SECTION 89:
SOURCE WATER PROTECTION
A. SUBJECT PROPERTY IS WITHIN AN AREA OF "FAIR AND GOOD" GROUND WATER RECHARGE.
B. SUBJECT PROPERTY IS NOT LOCATED IN A WELLHEAD PROTECTION AREA.

12. SANITARY SEWER PROVIDER: PUBLIC - SUSSEX COUNTY

13. STREETS: PRIVATE (99-18 D & E.)

14. POSTED SPEED LIMIT (OLD MILL ROAD): 45 MPH
(RAILWAY ROAD) 40 MPH

15. STATE INVESTMENT AREA: LEVEL 2/3

16. MAXIMUM BUILDING HEIGHT (115-25 D.): 42 FEET

17. SITE AREA AND ACREAGE:

GROSS ACREAGE:	50.62 AC (100%)	2,205,212	SF
SITE AREA WEST SIDE RAILWAY ROAD:	48.36 AC (95.54%)	2,106,540	SF
SITE AREA EAST SIDE RAILWAY ROAD:	2.27 AC (4.46%)	98,672	SF
DELDOT R.O.W. DEDICATION:	0.26 AC (0.51%)	11,497	SF
DELDOT PERMANENT EASEMENT:	1.13 AC (2.23%)	49,136	SF
IMPERVIOUS - ONSITE BUILDING :	3.26 AC (6.44%)	142,073	SF
IMPERVIOUS - ONSITE PAVEMENT:	5.92 AC (11.69%)	257,907	SF
OPEN SPACE:	40.05 AC (79.12%)	1,744,599	SF
TOTAL :	50.62 AC (100%)	2,205,212	SF

18. REQUIRED OPEN SPACE (99-21 D.): REQUIRED 10% OF GROSS AREA (5.06 AC)
PROPOSED OPEN SPACE AREA (40.05 AC)

19. EXISTING FORESTED AREA: 3.60 ACRES
FORESTED AREA TO REMAIN 3.60 ACRES

20. OPEN SPACE AREA BREAKDOWN:

LANDSCAPE BUFFER:	2.66 ± AC (6.64%)	116,042	± SF
ACTIVE RECREATION SPACE :	1.42 ± AC (3.55%)	61,734	± SF
PASSIVE RECREATION SPACE:	30.04 ± AC (75.01%)	769,198	± SF
STORMWATER MANAGEMENT:	4.63 ± AC (11.56%)	201,787	± SF
WETLAND AREA:	1.30 ± AC (3.25%)	56,451	± SF
TOTAL OPEN SPACE AREA:	40.05 ± AC (100%)	1,205,212	± SF

21. PARKING ANALYSES: PARKING RATIONAL: MULTI-FAMILY (115-162B) 2 SPACES/UNIT
PARKING REDUCTION: 15% AFTER FIRST 50 UNITS SATISFIED
PARKING REQUIRED: 355 SPACES
PARKING PROVIDED: 561 SPACES TOTAL
231 GARAGE SPACES
318 OFF STREET SPACES
10 ACCESSIBLE SPACES
2 VAN ACCESSIBLE SPACES

LOADING RATIONAL: APARTMENT BUILDING
LOADING REQUIRED: 100,000 - 200,000 3 SPACES
EACH 100,000 OVER 200,000 REQUIRES 1 ADDITIONAL SPACE
TOTAL LOADING REQUIRED: 4 SPACES
LOADING PROPOSED: 4 SPACES

22. LONGITUDE AND LATITUDE STATE PLANE COORDINATES: LONGITUDE: W 75°08'52.51"
LATITUDE: N 38°33'25.06"

23. PROPOSED DISCHARGE LOCATION: EXISTING DITCH AT NORTHEAST PROPERTY CORNER CONVEYED INTO RAILWAY ROAD DELDOT DRAINAGE SYSTEM

24. LIMIT OF DISTURBANCE:

EVANS FARM APARTMENTS:	41.33 AC. ±
MAINTENANCE SITE:	0.16 AC. ±
DELDOT RIGHT-OF-WAY:	2.89 AC. ±
TOTAL:	44.21 AC. ±

24. WATERSHED: WHITE CREEK - INDIAN RIVER BAY WATERSHED, ULTIMATELY TO ATLANTIC OCEAN

25. FLOOD ZONE: THIS PROPERTY IS LOCATED ON THE FEMA FLOOD INSURANCE RATE MAP NUMBER 10005C0511K, MAP REVISED MARCH 16, 2015. 100 YEAR FLOODPLAIN AREA: 0 +/- ACRES

26. WETLANDS AREA: 1.30 +\- ACRES OF PALUSTRINE WETLANDS(NON-TIDAL), RECEIVED JURISDICTIONAL DETERMINATION FROM THE DEPARTMENT OF THE ARMY, PHILADELPHIA DISTRICT CORPS OF ENGINEERS DATED MARCH 26, 2020.

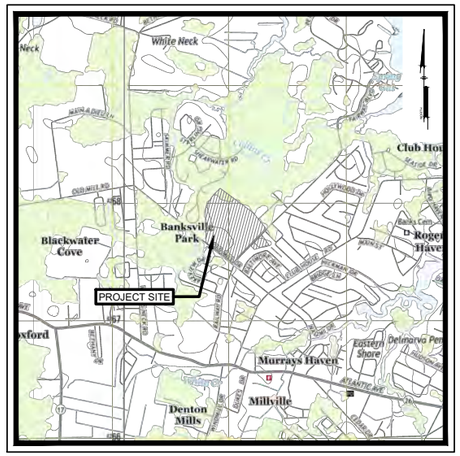
27. WETLAND AREA IMPACTED: 0 AC.

28. TOPOGRAPHY: NAVD 1988 STATE PLANE DATUM.

29. LOCAL GOVERNMENT RESPONSIBLE FOR LAND USE APPROVAL: SUSSEX COUNTY



SOILS MAP
Scale: 1" = 400'



LOCATION MAP
Scale: 1" = 2000'

LEGEND

EXISTING PROPERTY LINE
EASEMENT
LOT LINES
ROW / ADJACENT PROPERTY
EDGE OF ROAD / PAVEMENT
CENTERLINE OF ROAD
LANDSCAPE BUFFER
LANDSCAPE BUFFER
STREET LIGHT

OWNERS
LINDER & COMPANY INC
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

DEVELOPER
LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

ENGINEER/SITE DESIGNER
PENNONI ASSOCIATES INC.
18072 DAVIDSON DRIVE
MILTON, DE 19968
(302) 684-8030

SURVEYOR
PENNONI ASSOCIATES, INC.

LANDSCAPE ARCHITECT
PENNONI ASSOCIATES, INC.

SCHOOL DISTRICT
INDIAN RIVER

FIRE DISTRICT
MILLVILLE

POSTAL DISTRICT
OCEAN VIEW (19970)

WATER UTILITY
PUBLIC

SEWER UTILITY
PUBLIC

ZONING DATA TABLE - SUSSEX COUNTY

GR - GENERAL RESIDENTIAL DISTRICT

	REQUIREMENT		PROPOSED	
MIN. LOT SIZE	10,000	S.F.	21,800	S.F.
MIN. LOT WIDTH	75	FT.	100	FT.
MIN. LOT DEPTH	100	FT.	>100	FT.
MIN. FRONT YARD	40	FT.	40	FT.
MIN. CORNER FRONT YARD	15	FT.	15	FT.
MIN. SIDE YARD	10	FT.	10	FT.
MIN. REAR YARD	10	FT.	10	FT.
MAX. HEIGHT	42	FT.	42	FT.

EASEMENTS:

ALL SUBDIVISION LOTS SHALL HAVE FIVE-FOOT-WIDE EASEMENTS ALONG ALL LOT LINES FOR A TOTAL EASEMENT WIDTH OF AT LEAST 10 FEET ALONG A LOT LINE COMMON TO TWO LOTS. EASEMENTS OF GREATER WIDTH MAY BE REQUIRED ALONG LOT LINES OR ACROSS LOTS, WHERE NECESSARY. EASEMENTS ALONG PERIMETER BOUNDARIES OF THE SUBDIVISION SHALL BE NO LESS THAN 10 FEET IN WIDTH ON THE INTERIOR SIDE OF THE BOUNDARY.

SOILS

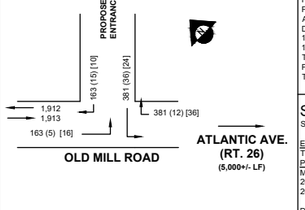
TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

SHEET LIST TABLE

SHEET NUMBER	DRAWING NUMBER	SHEET TITLE
1		COVER SHEET
2		PRELIMINARY SITE PLAN NOTES AND DETAILS
3		PRELIMINARY SITE PLAN

TRAFFIC GENERATION - OLD MILL RD (SCR 349)

(FULL MOVEMENT)



ROAD TRAFFIC DATA:

FUNCTIONAL CLASSIFICATION - S349 (OLD MILL RD.) - LOCAL ROAD
POSTED SPEED LIMIT - 45 MPH
AADT = 3,825 TRIPS (FROM 2019 DELDOT TRAFFIC SUMMARY)
DIRECTIONAL DISTRIBUTION [1]
10 YEAR PROJECTED AADT= 1.16 x = 3,825 TRIPS = 4,437 TRIPS
10 YEAR PROJECTED AADT + SITE ADT = 5,525 TRIPS
TRAFFIC PATTERN GROUP = 4 (FROM 2019 DELDOT TRAFFIC SUMMARY)
PEAK HOUR - 13.88% x 4,437 TRIPS = 616 TRIPS
TRUCK VOLUME - N/A

SITE TRAFFIC DATA:

SOURCE: ITE TRIP GENERATION MANUAL 10TH EDITION[2]

EXISTING LAND USE: VACANT FIELD
TOTAL ADT FOR SITE = 0 TRIPS
PROPOSED LAND USE:
MULTIFAMILY HOUSING (MID RISE) (ITE 221)
200 UNITS - T=5.45(X)-1.75 = 1,088 TRIPS (WEEKDAY)
200 UNITS - T=3.04(X)+417.11 = 1,025 TRIPS (SATURDAY)

PEAK HOUR OF ADJACENT STREET TRAFFIC:
AM: Ln(T) = 0.98Ln(X)-0.98 = 68 TRIPS (WEEKDAY) [26% / 74%]
PM: Ln(T) = 0.96Ln(X)-0.63 = 86 TRIPS (WEEKDAY) [61% / 39%]
T=0.42(X)+6.73 = 91 TRIPS (SATURDAY)
DIRECTIONAL DISTRIBUTION:
70% TO AND FROM THE EAST (762 TRIPS) (48)[60]
30% TO AND FROM THE WEST (326 TRIPS) (20)[26]
TOTAL NEW TRIPS = 1,088 ADT
TRUCK TRAFFIC FOR SITE = 54 TRIPS (5%)

TRAFFIC GENERATION DIAGRAM

ADT PEAK HOUR (A.M.), ADT PEAK HOUR [P.M.]

[1] DIRECTIONAL DISTRIBUTION PROVIDED BY DELDOT
[2] DIRECTIONAL DISTRIBUTION PROVIDED BY ITE MANUAL
DESIGN VEHICLE = WB-50 & SU-30

PREPARED BY:

PENNONI ASSOCIATES INC.

Pennoni

18072 Davidson Drive
Milton, DE 19968
T 302.684.8030
F 302.684.8054

CALL BEFORE YOU DIG
Call Miss Utility of Delmarva
800-282-8555
Ticket Number(s):

OWNER CERTIFICATION:
I HEREBY CERTIFY THAT I AM THE OWNER OF THE PROPERTY DESCRIBED AS SHOWN ON THIS PLAN, THAT THE PLAN WAS MADE AT MY DIRECTION, THAT I ACKNOWLEDGE THE SAME TO BE MY ACT, AND DESIRE THE PLAN TO BE RECORDED AS SHOWN IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS.

LINDER & COMPANY INC DATE
1605 WEST 13TH ST.
WILMINGTON, DE 19806

SUSSEX COUNTY

COUNTY ENGINEER DATE
AGREEMENT NO.

ENGINEER CERTIFICATION:
IT IS HEREBY CERTIFIED THAT I AM A REGISTERED ENGINEER IN THE STATE OF DELAWARE, THAT THE INFORMATION SHOWN HEREON HAS BEEN PREPARED UNDER MY SUPERVISION, AND TO MY BEST KNOWLEDGE AND BELIEF REPRESENTS GOOD ENGINEERING PRACTICES AS REQUIRED BY THE APPLICABLE LAWS OF THE STATE OF DELAWARE.

SIGNATURE DATE

ALAN M. DECKTOR, PE (DE PE#17771) (302) 684-8030
PENNONI ASSOCIATES, INC.
18072 DAVIDSON DRIVE MILTON, DE 19968

APPROVED BY

CHAIRMAN OR SECRETARY OF PLANNING & ZONING COMMISSION DATE

PRESIDENT OF SUSSEX COUNTY COUNCIL DATE

REFERENCE #: CU-2206

DEVELOPER CERTIFICATION:
I HEREBY CERTIFY THAT I AM THE DEVELOPER OF THE PROPERTY DESCRIBED AS SHOWN ON THIS PLAN, THAT THE PLAN WAS MADE AT MY DIRECTION, THAT I ACKNOWLEDGE THE SAME TO BE MY ACT, AND DESIRE THE PLAN TO BE RECORDED AS SHOWN IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS.

PETTINARO CONSTRUCTION COMPANY, Inc. DATE
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
31434 RAILWAY RD.
OCEAN VIEW, DE

COVER SHEET

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	BY

REVISIONS

ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATE; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

PROJECT	PETIX19002
DATE	2019-08-19
DRAWING SCALE	AS NOTED
DRAWN BY	FML
APPROVED BY	BRD

PP0001

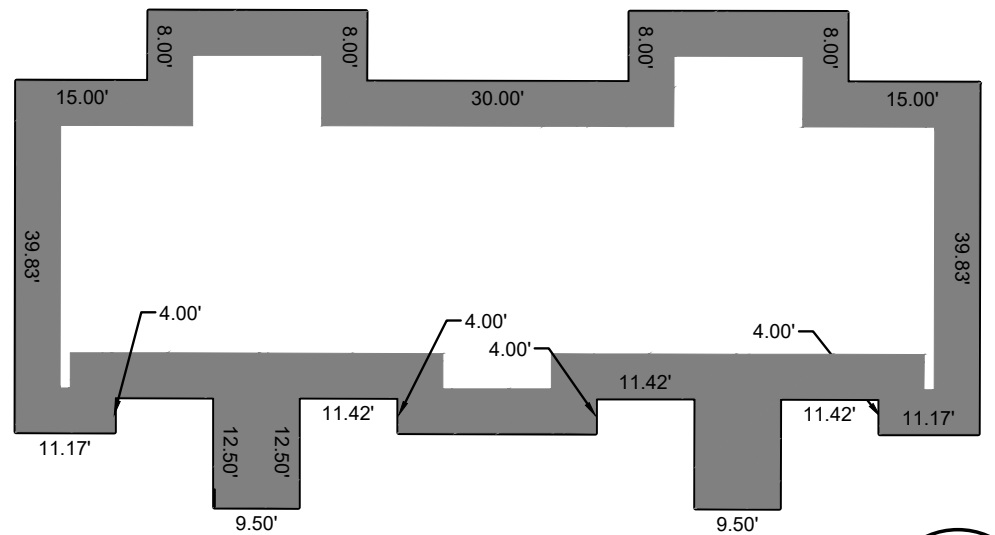
SHEET 1 OF 3

PROJECT STATUS: —
PLOTSTYLE: Pennoni NCS.ctb
PLOTTED: 2/3/2021 4:58 PM, BY: Logan Strickland
U:\Accounts\PETIX\PETIX19002 - Evans Farm Apartments\DESIGN_SHEETS\PP0001.dwg

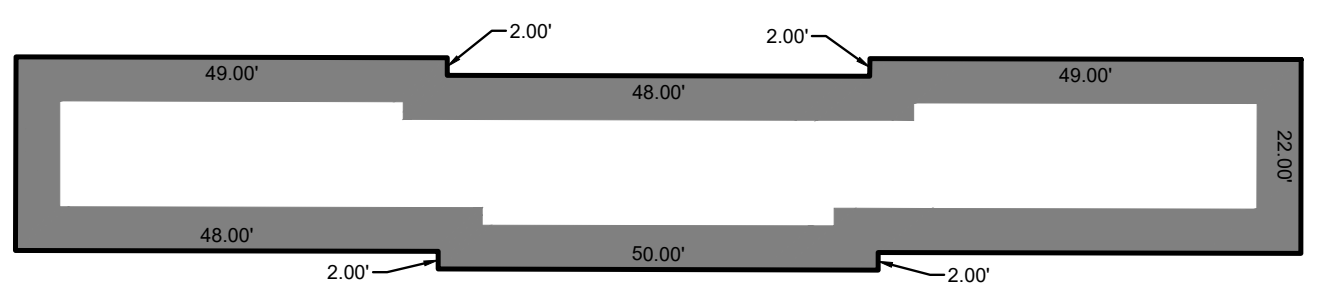
BUILDING AREA TABLE						
BUILDING	FOOTPRINT AREA (SF)	GFA (SF)	UNIT COUNT	ACCESSORY BUILDING	AREA (SF)	GARAGE PARKING COUNT
CLUBHOUSE	4,500	9,000				
A	4,700	14100	12 UNITS 3 STORIES	GA	3,200	15
B	4,700	14100	12 UNITS 3 STORIES	GB	3,200	15
C	4,700	14100	12 UNITS 3 STORIES	GC	3,200	15
D	4,700	14100	12 UNITS 3 STORIES	GD	3,200	15
E	4,700	14100	12 UNITS 3 STORIES	GE	3,200	15
F	4,700	14100	12 UNITS 3 STORIES	GF	3,200	15
G	4,700	14100	12 UNITS 3 STORIES	GG	3,200	15
H	4,700	14100	12 UNITS 3 STORIES	GH	3,200	15
I	4,700	14100	12 UNITS 3 STORIES	GI	3,200	15
J	4,700	14100	12 UNITS 3 STORIES	GJ	3,200	15
K	4,700	14100	12 UNITS 3 STORIES	GK	3,200	15
L	4,700	14100	12 UNITS 3 STORIES	GL	3,200	15
M	4,700	14100	12 UNITS 3 STORIES	GM	3,200	15
N	4,700	14100	12 UNITS 3 STORIES	GN	3,200	15
O	4,700	14100	12 UNITS 3 STORIES	GO	3,200	15
P	4,700	14100	12 UNITS 3 STORIES	GP	3,200	15
Q	4,700	9400	8 UNITS 2 STORIES	GQ	3,200	15
TOTAL	84,400	244,000	200 UNITS		54,400	255

* NOTE: THE 2 STORY BUILDING LOCATION MAY CHANGE THROUGHOUT THE ENGINEERING/CONSTRUCTION APPROVAL PROCESS. IT IS ONLY SHOWN FOR CALCULATION PURPOSES AT THIS TIME.

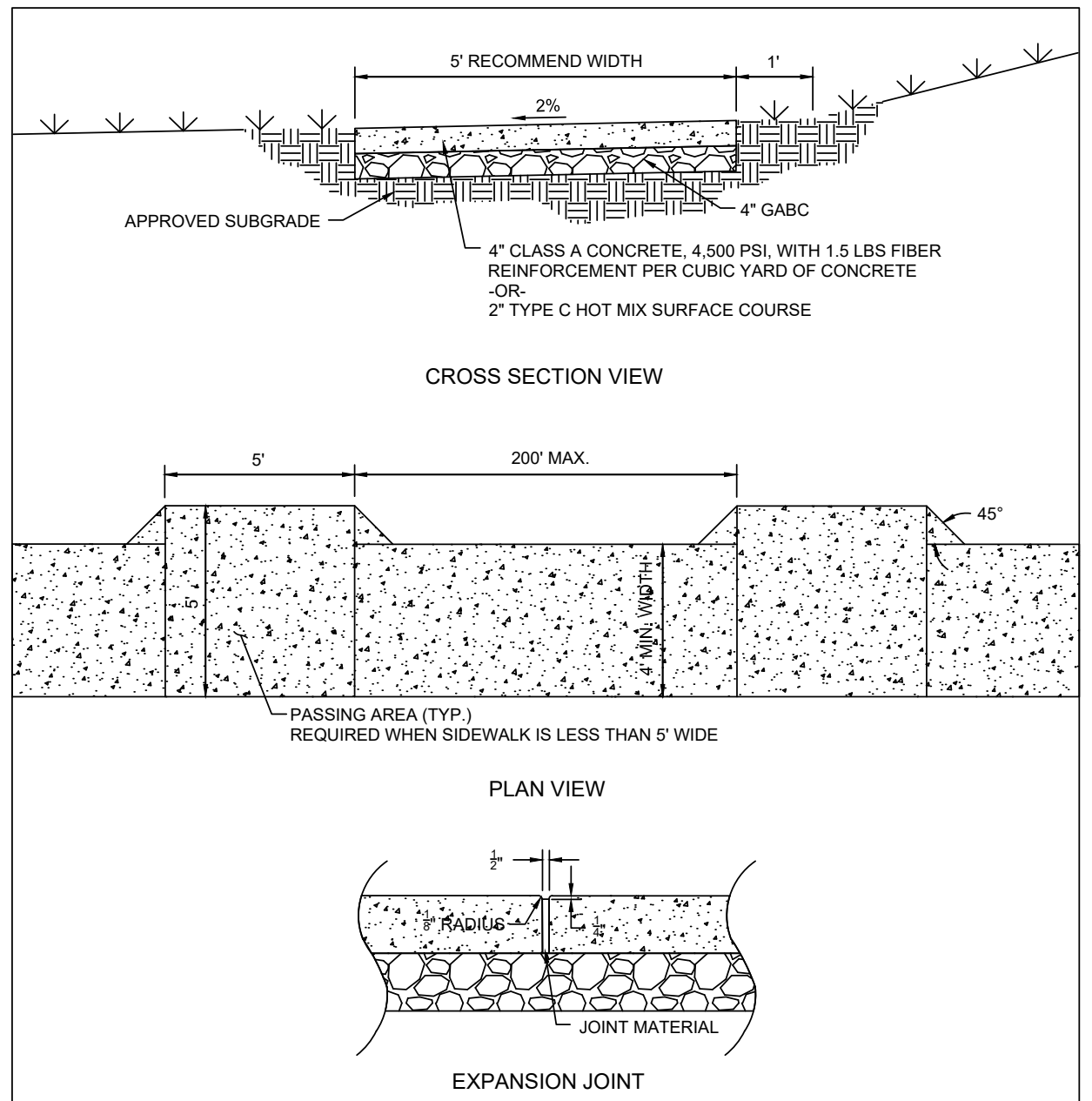
DETAIL- BUILDING AREA TABLE (1 / PP0002)
SCALE: 1"=20'



DETAIL- MULTIFAMILY DWELLING DIMENSIONS (2 / PP0002)
SCALE: 1"=20'



DETAIL- GARAGE DIMENSIONS (3 / PP0002)
SCALE: 1"=20'



NOTES:
1. CONCRETE SIDEWALKS SHALL BE CONTINUOUS AND SHALL NOT BREAK AT DRIVEWAY CROSSINGS.
2. CONCRETE SIDEWALKS SHALL BE MARKED INTO RECTANGULAR SLABS 5' LONG BY SCORING WITH APPROVED EDGING TOOLS.
3. EXPANSION JOINTS SHALL BE PLACED ACROSS CONCRETE SIDEWALKS NOT MORE THAN 20' APART.
4. WHEN A 5' WIDE SIDEWALK IS NOT POSSIBLE DUE TO SITE CONSTRAINTS, A 4' WIDE SIDEWALK MAY BE USED WITH 5'x5' PASSING AREAS SPACED AT 200' OR CLOSER INTERVALS. REFER TO THE LATEST ADA AND ABA ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES.

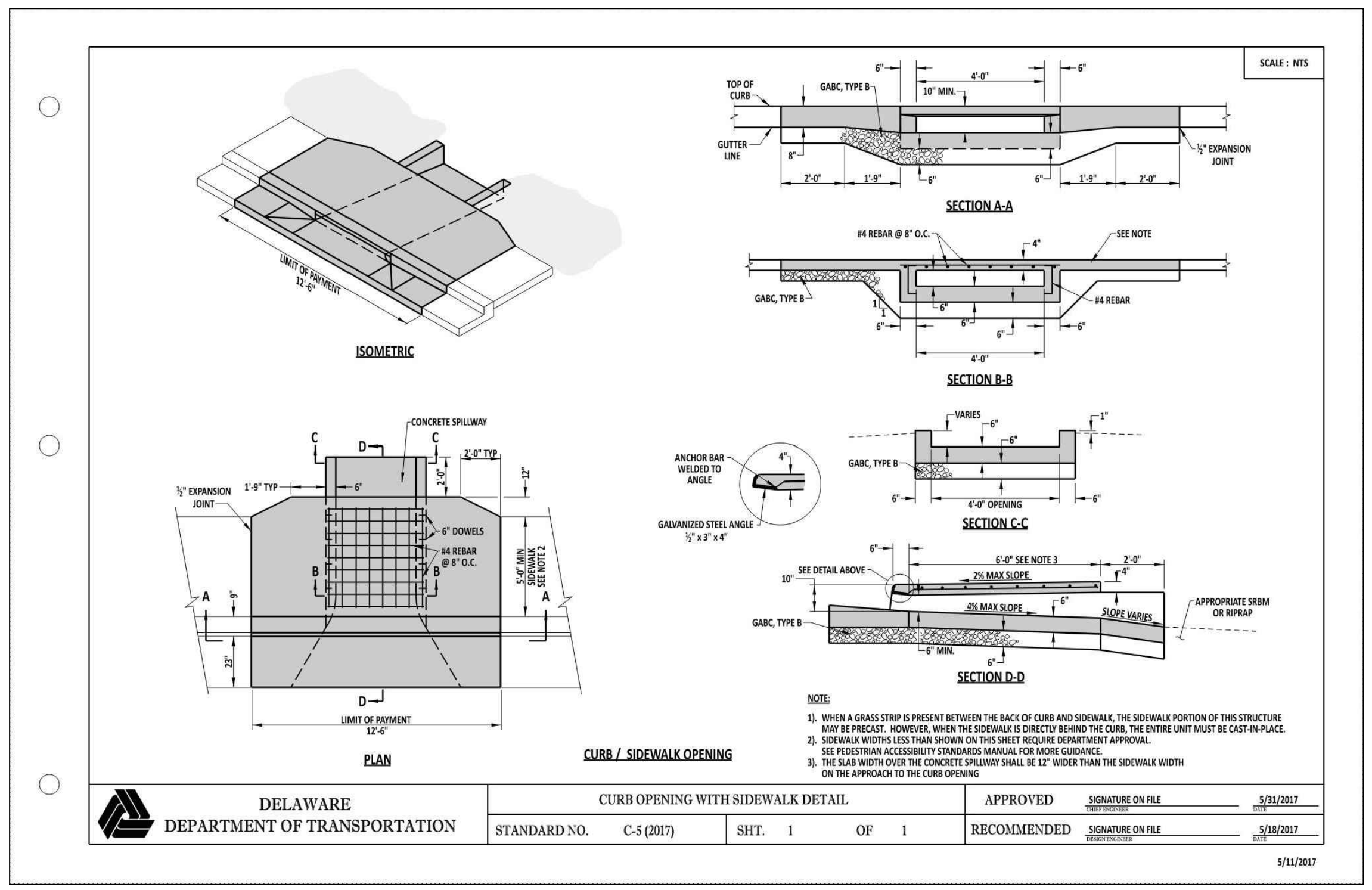
	Revised / Revised / 08/19/2008 Approved	Sussex County, Delaware Engineering Department Approved: Sussex County Engineer	Concrete Sidewalk	Detail R-5.01

DETAIL- CONCRETE SIDEWALK (5 / PP0002)
NOT TO SCALE

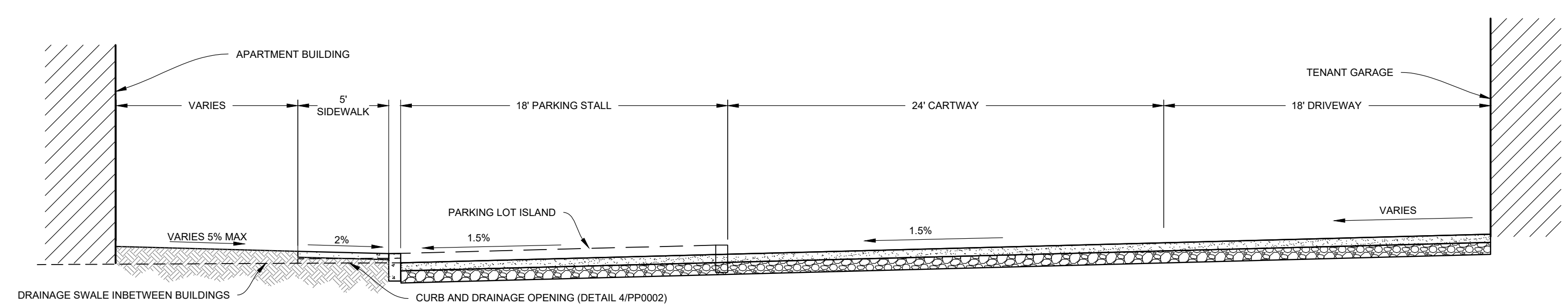
DELDOT RECORD / SITE PLAN NOTES:

(LAST REVISED MARCH 21 2019)

1. ALL ENTRANCES SHALL CONFORM TO THE DELAWARE DEPARTMENT OF TRANSPORTATION'S (DELDOT'S) CURRENT DEVELOPMENT COORDINATION MANUAL AND SHALL BE SUBJECT TO ITS APPROVAL.
2. NO LANDSCAPING SHALL BE ALLOWED WITHIN THE RIGHT-OF-WAY UNLESS THE PLANS ARE COMPLIANT WITH SECTION 3.7 OF THE DEVELOPMENT COORDINATION MANUAL.
3. SHRUBBERY, PLANTINGS, SIGNS AND/OR OTHER VISUAL BARRIERS THAT COULD OBSTRUCT THE SIGHT DISTANCE OF A DRIVER PREPARING TO ENTER THE ROADWAY ARE PROHIBITED WITHIN THE DEFINED DEPARTURE SIGHT TRIANGLE AREA ESTABLISHED ON THIS PLAN. IF THE ESTABLISHED DEPARTURE SIGHT TRIANGLE AREA IS OUTSIDE THE RIGHT-OF-WAY OR PROJECTS ONTO AN ADJACENT PROPERTY OWNER'S LAND, A SIGHT EASEMENT SHOULD BE ESTABLISHED AND RECORDED WITH ALL AFFECTED PROPERTY OWNERS TO MAINTAIN THE REQUIRED SIGHT DISTANCE.
4. UPON COMPLETION OF THE CONSTRUCTION OF THE SIDEWALK OR SHARED-USE PATH ACROSS THIS PROJECT'S FRONTAGE AND PHYSICAL CONNECTION TO ADJACENT EXISTING FACILITIES, THE DEVELOPER, THE PROPERTY OWNERS OR BOTH ASSOCIATED WITH THIS PROJECT, SHALL BE RESPONSIBLE TO REMOVE ANY EXISTING ROAD TIE-IN CONNECTIONS LOCATED ALONG ADJACENT PROPERTIES, AND RESTORE THE AREA TO GRASS. SUCH ACTIONS SHALL BE COMPLETED AT DELDOT'S DISCRETION, AND IN CONFORMANCE WITH DELDOT'S DEVELOPMENT COORDINATION MANUAL.
5. PRIVATE STREETS CONSTRUCTED WITHIN THIS SUBDIVISION SHALL BE MAINTAINED BY THE DEVELOPER, THE PROPERTY OWNERS WITHIN THIS SUBDIVISION OR BOTH (TITLE 17 §131). DELDOT ASSUMES NO RESPONSIBILITIES FOR THE FUTURE MAINTENANCE OF THESE STREETS.
6. THE SIDEWALK AND SHARED-USE PATH SHALL BE THE RESPONSIBILITY OF THE DEVELOPER, THE PROPERTY OWNERS OR BOTH WITHIN THIS SUBDIVISION. THE STATE OF DELAWARE ASSUMES NO RESPONSIBILITY FOR THE FUTURE MAINTENANCE OF THE SIDEWALK AND/OR SHARED-USE PATH.
7. TO MINIMIZE RUTTING AND EROSION OF THE ROADSIDE DUE TO ON-STREET PARKING, DRIVEWAY AND BUILDING LAYOUTS MUST BE CONFIGURED TO ALLOW FOR VEHICLES TO BE STORED IN THE DRIVEWAY BEYOND THE RIGHT-OF-WAY, WITHOUT INTERFERING WITH SIDEWALK ACCESS AND CLEARANCE.
8. THE DEVELOPER SHALL BE REQUIRED TO FURNISH AND PLACE RIGHT-OF-WAY MONUMENTS IN ACCORDANCE WITH DELDOT'S DEVELOPMENT COORDINATION MANUAL.
9. THE DEVELOPER SHALL BE REQUIRED TO FURNISH AND PLACE RIGHT-OF-WAY MARKERS TO PROVIDE A PERMANENT REFERENCE FOR RE-ESTABLISHING THE RIGHT-OF-WAY AND PROPERTY CORNERS ON LOCAL AND HIGHER ORDER FRONTAGE ROADS. RIGHT-OF-WAY MARKERS SHALL BE SET AND/OR PLACED ALONG THE FRONTAGE ROAD RIGHT-OF-WAY AT PROPERTY CORNERS AND AT EACH CHANGE IN RIGHT-OF-WAY ALIGNMENT IN ACCORDANCE WITH SECTION 3.2.4.2 OF THE DEVELOPMENT COORDINATION MANUAL.
10. A PERPETUAL CROSS ACCESS INGRESS/EGRESS EASEMENT IS HEREBY ESTABLISHED BY THIS PLAT. THE EXACT LOCATION OF SAID EASEMENT IS TO BE DETERMINED BY DELDOT AT A LATER DATE.



DETAIL- CURB OPENING WITH SIDEWALK DETAIL (4 / PP0002)
NOT TO SCALE



DETAIL- GARAGE DIMENSIONS (6 / PP0002)
SCALE: 1"=5'

GENERAL NOTES:

1. ALL PROPOSED ROADS SHOWN ARE PRIVATE AND ARE TO BE MAINTAINED BY THE DEVELOPER. THE STATE AND COUNTY ASSUMES NO RESPONSIBILITY FOR THE FUTURE MAINTENANCE OF THESE STREETS.
2. STORMWATER SHALL BE HANDLED THROUGH THE DESIGN OF BEST MANAGEMENT PRACTICE FACILITIES THAT WILL BE LOCATED ON SITE. THE MAINTENANCE OF ALL STORMWATER MANAGEMENT FACILITIES CONSTRUCTED WITHIN THIS SITE SHALL BE THE RESPONSIBILITY OF THE DEVELOPER .
3. THIS PROPERTY IS LOCATED ON THE FEMA FLOOD INSURANCE RATE MAP NUMBERS 10005C0511K, MAPS REVISED MARCH 16, 2015.

   100 YEAR FLOODPLAIN: NO PORTION OF THE SITE FALLS WITHIN THE 100 YEAR FLOODPLAIN.
4. 1.30 +/- ACRES PALUSTRINE WETLANDS (NON-TIDAL). RECEIVED JURISDICTIONAL DETERMINATION FROM DEPARTMENT OF THE ARMY, PHILADELPHIA DISTRICT CORPS OF ENGINEERS, DATED MARCH 26, 2020.
5. THE DEVELOPMENT WILL BE BUILT IN ONE PHASE.
6. THE SUSSEX CONSERVATION DISTRICT RESERVES THE RIGHT TO ADD, DELETE, OR MODIFY ANY EROSION AND SEDIMENT CONTROL MEASURES AS THEY DEEM NECESSARY.
7. ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY, BUT NOT IN PAVEMENT, SHALL BE TOPSOILED (6" MINIMUM), FERTILIZED AND SEEDED.
8. THE PROPOSED ENTRANCES/EXITS ARE PROPOSED ONLY, AND ARE SUBJECT TO REVIEW AND APPROVAL BY THE DELAWARE DEPARTMENT OF TRANSPORTATION BEFORE A CONSTRUCTION PERMIT IS ISSUED.
9. A 72 HOUR (MINIMUM) NOTICE SHALL BE GIVEN TO THE DISTRICT PERMIT SUPERVISOR PRIOR TO STARTING ENTRANCE CONSTRUCTION.
10. MISS UTILITY SHALL BE NOTIFIED THREE (3) DAYS PRIOR TO EXCAVATION.
11. ALL SIGNING FOR MAINTENANCE OF TRAFFIC IS THE CONTRACTORS RESPONSIBILITY, AND SHALL FOLLOW THE GUIDELINES SHOWN IN LATEST EDITION OF "DELAWARE TRAFFIC CONTROLS FOR STREETS AND HIGHWAY CONSTRUCTION, MAINTENANCE, UTILITY, AND EMERGENCY OPERATIONS."
12. DESIGN, FABRICATION, AND INSTALLATION OF ALL PERMANENT SIGNING SHALL BE AS OUTLINED IN THE "GUIDE FOR FABRICATION AND INSTALLATION OF TRAFFIC CONTROL DEVICES".
13. THIS PROPERTY IS LOCATED IN THE VICINITY OF LAND USED PRIMARILY FOR AGRICULTURAL PURPOSES UPON WHICH NORMAL AGRICULTURAL USES AND ACTIVITIES HAVE BEEN AFFORDED THE HIGHEST PRIORITY USE STATUS. IT CAN BE ANTICIPATED THAT SUCH AGRICULTURAL USES AND ACTIVITIES MAY NOW OR IN THE FUTURE INVOLVE DUST, NOISE, MANURE AND OTHER ODORS, THE USE OF AGRICULTURAL CHEMICALS, AND NIGHTTIME FARMING OPERATIONS. THE USE AND ENJOYMENT OF THIS PROPERTY IS EXPRESSLY CONDITIONED ON ACCEPTANCE OF ANY ANNOYANCE OR INCONVENIENCE WHICH MAY RESULT FROM ANY SUCH AGRICULTURAL USES AND ACTIVITIES.
14. NO BUILDING PERMIT SHALL BE ISSUED UNTIL EITHER ALL REQUIRED IMPROVEMENTS HAVE BEEN INSTALLED, CONSTRUCTED, OR PLACED FOR THE LOT FOR WHICH THE PERMIT WILL BE ISSUED IN A MANNER ACCEPTABLE BY THE COUNTY AND STATE, OR UNTIL THE DEVELOPER FILES A PERFORMANCE BOND OR OTHER GUARANTEE WITH THE COUNTY FOR ANY UNCOMPLETED PUBLIC OR PRIVATE STREET OR OTHER REQUIRED IMPROVEMENT.
15. ALL PROPOSED FOREST BUFFERS ARE TO BE MAINTAINED BY THE DEVELOPER.
16. ALL FIRE LANES, FIRE HYDRANTS AND FIRE DEPARTMENT CONNECTIONS SHALL BE MARKED IN ACCORDANCE WITH THE DELAWARE STATE FIRE PREVENTION REGULATIONS.
17. ALL MULTI-FAMILY HOMES TO BE WOOD FRAME CONSTRUCTION WITH A MAXIMUM BUILDING HEIGHT OF THREE STORIES, NOT TO EXCEED 42'.
18. COMMON AREA: AN AREA OWNED AND USED IN COMMON BY THE DEVELOPER FOR RECREATION, LANDSCAPING AND STORM WATER MANAGEMENT.
19. EXISTING UTILITIES ARE SHOWN IN ACCORDANCE WITH THE BEST AVAILABLE INFORMATION. COMPLETENESS OR CORRECTNESS THEREOF IS NOT GUARANTEED. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES INVOLVED IN ORDER TO SECURE THE MOST ACCURATE INFORMATION AVAILABLE AS TO UTILITY LOCATION AND ELEVATION. NO CONSTRUCTION AROUND OR ADJACENT TO UTILITIES SHALL BEGIN WITHOUT NOTIFYING THEIR OWNERS AT LEAST 48 HOURS IN ADVANCE. THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO PROTECT THE EXISTING UTILITIES AND MAINTAIN UNINTERRUPTED SERVICE AND ANY DAMAGE DONE TO THEM DUE TO HIS/HER NEGLIGENCE SHALL BE IMMEDIATELY AND COMPLETELY REPAIRED AT THE CONTRACTORS EXPENSE. TO LOCATE EXISTING UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONTACT MISS UTILITY OF DELMARVA.
20. NO EASEMENTS WERE VERIFIED PER THIS PLAT.
21. THE PROPOSED SIGN IS NOT APPROVED AS PART OF THIS SITE PLAN. A SEPARATE SUSSEX COUNTY PERMIT IS REQUIRED.
22. DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. ALL WORK MUST BE PERFORMED IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, AS AMENDED AND ALL RULES AND REGULATIONS THERETO APPURTENANT.
23. ALL OPEN SPACE AREAS ON SITE ARE INTENDED FOR LANDSCAPE, RECREATION AND STORMWATER MANAGEMENT PRACTICES AND ARE THE RESPONSIBILITY OF THE DEVELOPER.
24. TOPOGRAPHY: NAVD 1988 STATE PLANE DATUM.
25. DELAWARE DEPARTMENT OF TRANSPORTATION HAS IDENTIFIED IN A(N) AREA-WIDE STUDY IN A LETTER DATED OCTOBER 1 2019, AND REVISED OCTOBER 3 2019, THE FOLLOWING AREA-WIDE RECOMMENDATIONS ARE:
    A. THE PROPOSED DEVELOPMENT CONSISTS OF 200 MULTI-FAMILY RESIDENTIAL UNITS. PER LAND USE CODE 221 FROM THE 10TH EDITION OF THE INSTITUTE OF TRANSPORTATION ENGINEERS' TRIP GENERATION MANUAL, THE PROPOSED DEVELOPMENT WOULD GENERATE 1,088 AVERAGE DAILY TRIPS. THE FEE IS CALCULATED AT TEN DOLLARS PER DAILY TRIP. FOR THE PROPOSED DEVELOPMENT, THE FEE WOULD BE $10,880.00.
    B. THE DEVELOPER SHOULD IMPROVE OLD MILL ROAD, FROM RAILWAY ROAD TO THE WESTERN EDGE OF THE SITE FRONTAGE, TO LOCAL ROAD STANDARDS, WHICH INCLUDE 11-FOOT TRAVEL LANES AND 5-FOOT SHOULDERS, THE DEVELOPER SHOULD CONTACT DELDOT'S DEVELOPMENT COORDINATION SECTION ON THE DETAILS OF THIS IMPROVEMENT.
    C. THE DEVELOPER SHOULD IMPROVE RAILWAY ROAD, FROM OLD MILL ROAD TO THE NORTHERN EDGE OF THE SITE FRONTAGE, TO LOCAL ROAD STANDARDS, WHICH INCLUDE 11-FOOT TRAVEL LANES AND 5-FOOT SHOULDERS. THE DEVELOPER SHOULD CONTACT DELDOT'S DEVELOPMENT COORDINATION SECTION ON THE DETAILS OF THIS IMPROVEMENT.

NOT FOR CONSTRUCTION

Pennoni
PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
31434 RAILWAY RD.
OCEAN VIEW, DE

PRELIMINARY SITE PLAN NOTES AND DETAILS

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

DATE	NO.	REVISIONS	BY

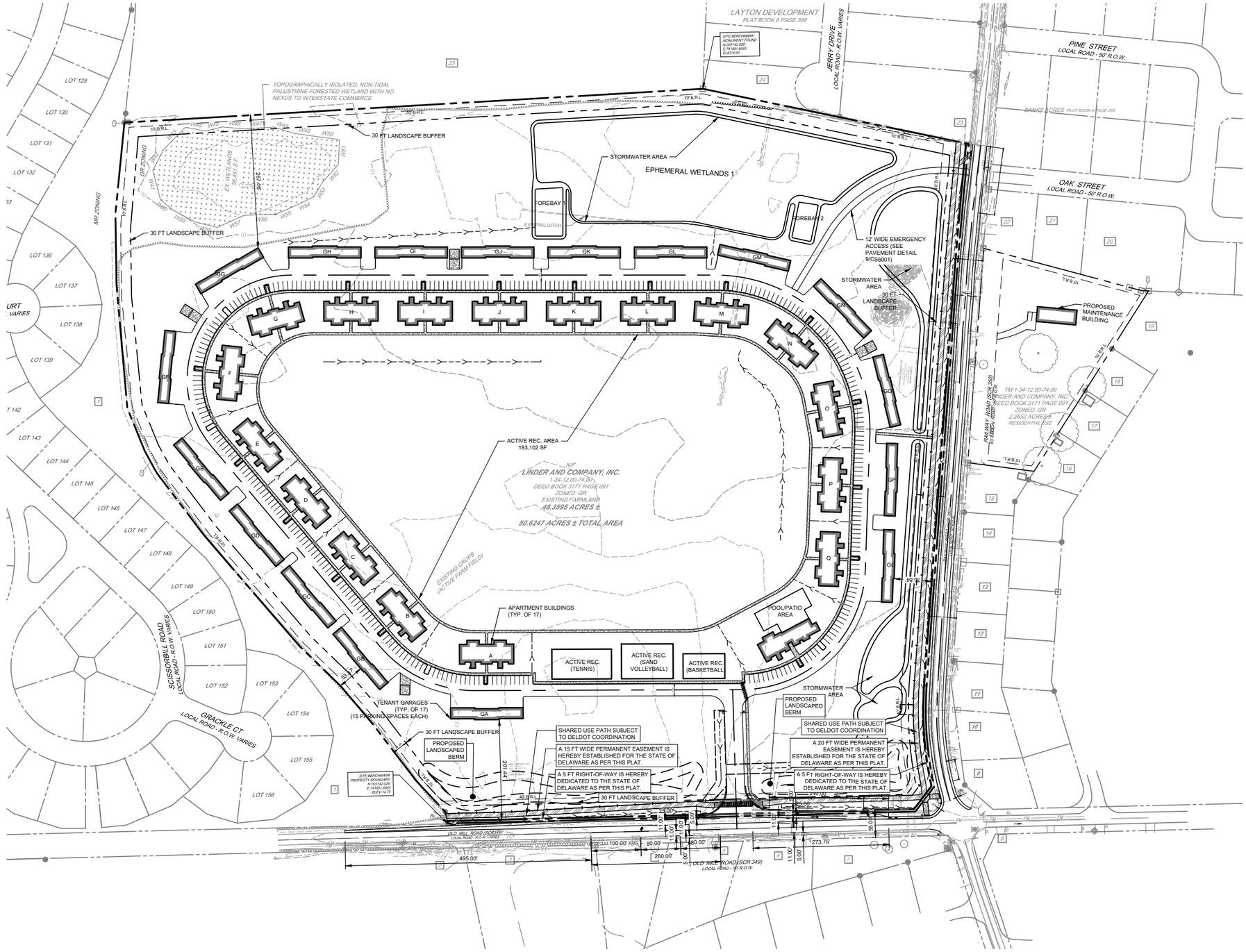
ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

PROJECT	PETIX19002
DATE	2019-08-16
DRAWING SCALE	AS SHOWN
DRAWN BY	BRD
APPROVED BY	BRD

PP0002

SHEET 2 OF 3

U:\Accounts\PETIX\PETIX19002 - Evans Farm Apartments\DESIGN_SHEETS\PP0002.dwg PLOTTED: 2/5/2021 4:57 PM, BY: Logan Strickland PLOTSTYLE: Pennoni NCS.stb PROJECT STATUS: ---



LEGEND

- PROPOSED SWALE
- EXISTING PROPERTY LINE
- EASEMENT
- LOT LINES
- ROW / ADJACENT PROPERTY
- EDGE OF ROAD / PAVEMENT
- CENTERLINE OF ROAD
- LANDSCAPE BUFFER
- LANDSCAPE BUFFER
- STREET LIGHT

SITE KEYED NOTES

G1	CO-POST STOP SIGN (R1-1) 36" X 36" AND STREET SIGN
G2	BUS STOP
G3	DEVELOPMENT SIGN
G4	COMMUNITY CENTER AND POOL
G5	CURB AND DRAINAGE OPENING (TYP.) (SEE DETAIL 4/PP0002)

OWNER CERTIFICATION:
I HEREBY CERTIFY THAT I AM THE OWNER OF THE PROPERTY DESCRIBED AS SHOWN ON THIS PLAN, THAT THE PLAN WAS MADE AT MY DIRECTION, THAT I ACKNOWLEDGE THE SAME TO BE MY ACT, AND DESIRE THE PLAN TO BE RECORDED AS SHOWN IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS.

LINDER & COMPANY INC — DATE
1605 WEST 13TH ST.
WILMINGTON, DE 19806

ENGINEER CERTIFICATION:
IT IS HEREBY CERTIFIED THAT I AM A REGISTERED ENGINEER IN THE STATE OF DELAWARE, THAT THE INFORMATION SHOWN HEREON HAS BEEN PREPARED UNDER MY SUPERVISION, AND TO MY BEST KNOWLEDGE AND BELIEF REPRESENTS GOOD ENGINEERING PRACTICES AS REQUIRED BY THE APPLICABLE LAWS OF THE STATE OF DELAWARE.

SIGNATURE — DATE

ALAN M. DECKTOR, PE (DE PE#17771) (302) 684-8030
PENNONI ASSOCIATES, INC
18072 DAVIDSON DRIVE MILTON, DE 19968

DEVELOPER CERTIFICATION:
I HEREBY CERTIFY THAT I AM THE DEVELOPER OF THE PROPERTY DESCRIBED AS SHOWN ON THIS PLAN, THAT THE PLAN WAS MADE AT MY DIRECTION, THAT I ACKNOWLEDGE THE SAME TO BE MY ACT, AND DESIRE THE PLAN TO BE RECORDED AS SHOWN IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS.

PETTINARO CONSTRUCTION COMPANY, Inc. — DATE
234 NORTH JAMES ST.
NEWPORT, DE 19804

Pennoni
PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS

31434 RAILWAY RD.
OCEAN VIEW, DE

PRELIMINARY SITE PLAN

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	BY

REVISIONS

ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

PROJECT	PETIX19002
DATE	2019-08-16
DRAWING SCALE	1"= 100'
DRAWN BY	BRD
APPROVED BY	BRD

PP1001

SHEET 3 OF 3

PROJECT STATUS: —
PLOTSTYLE: Pennoni NCS.ctb
PLOTTED: 2/2/2021 4:57 PM, BY: Logan Strickland
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TAB 2

PLUS APPLICATION STATE COMMENTS

STATE OF DELAWARE
EXECUTIVE DEPARTMENT
OFFICE OF STATE PLANNING COORDINATION

October 23, 2019 December 31, 2019

Ms. Constance C. Holland, AICP
Director, Office of State Planning Coordination
122 Martin Luther King, Jr. Blvd. South – Haslet Armory
Dover, Delaware 19901

Alan Decktor, P.E.
Pennoni
18072 Davidson Drive
Milton, DE 19968

RE: PLUS review 2019-09-01; Evans Farm Apartments
PLUS REVIEW RESPONSE FOR EVANS FARM APARTMENTS

Dear Mr. Decktor: Dear Ms. Holland:

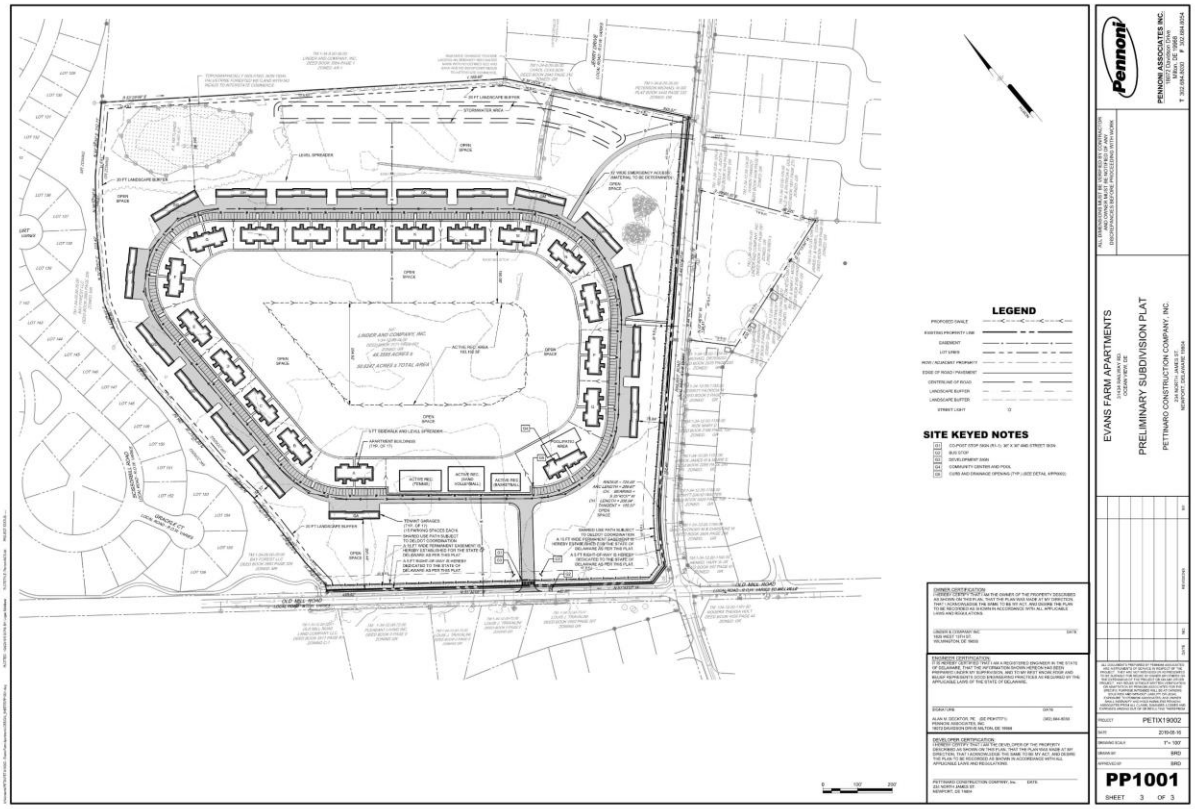
Thank you for meeting with State agency planers on September 25, 2019 to discuss the proposed plans for the Evans Farm Apartments project. According to the information received you are seeking review of a site plan for 198 residential units on 50.19 acres at the intersection of Railway Road and Old Mill Road in Sussex County

We are in receipt of your comments dated October 23, 2019 as it pertained to our presentation of the above referenced project on September 25, 2019. We thank you for the opportunity to present our clients project on properties located at the intersection of Old Mill Road and Railway Road, Baltimore Hundred, Sussex County, Delaware. The project presented was for 200 multi-family apartment building and is a conditional use in a GR zoned property. The proposed apartment complex lies within the Coastal Area as described within the Land Use Element and as shown on the Future Land Use Plan of the adopted Sussex County Comprehensive Plan, the total number of units permitted has been determined the zoning maximum density.

Please note that changes to the plan, other than those suggested in this letter, could result in additional comments from the State. Additionally, these comments reflect only issues that are the responsibility of the agencies represented at the meeting. **The developers will also need to comply with any Federal, State, and local regulations regarding this property. We also note that as Sussex County is the governing authority over this land, the developers will need to comply with any and all regulations/restrictions set forth by the County.**

This project is located in Investment Level 3 according to the Strategies for State Policies and Spending. Investment Level 3 reflects areas where growth is anticipated by local, county, and state plans in the longer-term future, or areas that may have environmental or other constraints to development. State investments may support future growth in these areas, but may have priorities for the near future. If developed, we would encourage you to design the site with respect for any environmental features which are present.

As presented, the project was designed to remove all proposed disturbance from the environmentally sensitive areas within the property, specifically the wetlands in the north corner.



Code Requirements/Agency Permitting Requirements

Department of Transportation – Contact Bill Brockenbrough 760-2109

- The site access, whether on Old Mill Road (Sussex Road 349) or Railway Road (Sussex Road 350), must be designed in accordance with DelDOT's Development Coordination Manual, which is available at http://www.deldot.gov/Business/subdivisions/index.shtml?dc=changes.
  NOTED

- Pursuant to Section P.3 of the Manual, a Pre-Submittal Meeting is required before plans are submitted for review. The form needed to request the meeting and guidance on what will be covered there and how to prepare for it is located at https://www.deldot.gov/Business/subdivisions/pdfs/Meeting_Request_Form.pdf?08022017.
  NOTED

- Section P.5 of the Manual addresses fees that are assessed for the review of development proposals. DelDOT anticipates collecting the Initial Stage Fee when the record plan is submitted for review and the Construction Stage Fee when construction plans are submitted for review.
  NOTED

- Per Section 2.2.2.1 of the Manual, Traffic Impact Studies (TIS) are warranted for developments generating more than 500 vehicle trip ends per day or 50 vehicle trip ends per hour in any hour of the day. From the PLUS application, the total daily trips are estimated at 1,077 vehicle trip ends per day. DelDOT confirms this number; the plan meets the warrants for a TIS.

  Section 2.2.2.2 of the Manual provides that for developments generating less than 2,000 vehicle trip ends per day and less than 200 vehicle trip ends per hour in any hour of the day, DelDOT may accept an Area Wide Study (AWS) Fee in lieu of the TIS if the local government does not require a TIS. If the County requires a TIS, DelDOT will support their requirement and will not accept the AWS Fee.

  NOTED

  The purpose of a TIS is to identify offsite improvements that the developer should build or contribute toward. Regardless of whether a TIS is done for this development, DelDOT anticipates requiring the developer improve both Old Mill Road and Railway Road within the limits of their site frontage to meet DelDOT's Local Road standards, which include 11-foot lanes and 5-foot shoulders. The AWS Fee, if paid, would not be counted toward those improvements. AWS Fees are used to fund traffic studies, not to build improvements.

  NOTED

  In June 2006 DelDOT commented to Sussex County on its review of a TIS for an earlier plan that included the development of these lands. The recommendations of that letter were discussed in the PLUS meeting. Subsequent to that meeting, DelDOT found that its 2006 letter had been superseded by a revised TIS and review letter in 2008, which addressed a revised and smaller plan. The requirements discussed in that 2008 letter, to the extent that they are still relevant, have been met. The apartments now proposed should be addressed as a separate project.

- As necessary, in accordance with Section 3.2.5 and Figure 3.2.5-a of the Manual, DelDOT will require dedication of right-of-way along the site's frontage on Old Mill Road and Railway Road. By this regulation, this dedication is to provide a minimum of 30 feet of right-of-way from the physical centerline along both roads. The following right-of-way dedication note is required, "**An X-foot wide right-of-way is hereby dedicated to the State of Delaware, as per this plat.**"
  NOTED

- In accordance with Section 3.2.5.1.2 of the Manual, DelDOT will require the establishment of a 15-foot wide permanent easement across the property frontage on Old Mill Road and Railway Road. The location of the easement shall be outside the limits of the ultimate right-of-way. The easement area can be used as part of the open space calculation for the site. The following note is required, "**A 15-foot wide permanent easement is hereby established for the State of Delaware, as per this plat.**"
  NOTED

- Referring to Section 3.4.2.1 of the Manual, the following items, among other things, are required on the Record Plan:

  - A Traffic Generation Diagram. See Figure 3.4.2-a for the required format and content.

  - Depiction of all existing entrances within 450 feet of the entrance on Old Mill Road and within 300 feet of the entrance on Railway Road (see below).

  - Notes identifying the type of off-site improvements, agreements (signal, letter) contributions and when the off-site improvements are warranted.

  NOTED

- Section 3.5 of the Manual provides DelDOT's requirements with regard to connectivity. The requirements in Sections 3.5.1 through 3.5.3 shall be followed for all development projects having access to state roads or proposing DelDOT maintained public streets for subdivisions. DelDOT recommends that a second entrance be built, located on Railway Road opposite Oak Street.
  NOTED, IN OUR PRE-SUBMITTAL MEETING WITH DELDOT, WE DISCUSSED A SECOND ACCESS BUT IT WOULD BE USED AS AN EMERGENCY ACCESS ONLY.

- Section 3.5.4.2 of the Manual addresses requirements for shared-use paths and sidewalks. For projects in Level 3 and 4 Investment Areas, installation of paths or sidewalks along the frontage on State-maintained roads may be required by DelDOT if the project abuts an existing facility. DelDOT anticipates requiring the developer to build Shared Use

Paths along their frontage on both Old Mill Road and Railway Road, tying in the path along Old Mill Road into the path along the Bay Forest frontage.
Preliminarily, the path shown on the plan is acceptable in most respects. However, DelDOT will require that connection to the intersection of Old Mill Road and Railway Road such that cyclists and pedestrians traveling from points south or east of the intersection can access the path there.
NOTED, A SHARED USE PATH IS BEING PROPOSED.

- Section 3.5.4.4 of the Manual addresses access-ways, essentially shared-use paths connecting subdivision streets either to each other or to the road on which the property fronts. DelDOT anticipates requiring the developer to build an access-way from the site driveway to Jerry Drive.
  WILL REVIEW WITH DELDOT.

- Referring to Section 3.5.5 of the Manual, existing and proposed transit stops and associated facilities as required by the Delaware Transit Corporation (DTC) or DelDOT shall be shown on the Record Plan.
  WILL REVIEW AND COORDINATE WITH DTC & DELDOT

- In accordance with Section 3.8 of the Manual, storm water facilities, excluding filter strips and bioswales, shall be located a minimum of 20 feet from the ultimate State right-of-way along Old Mill Road and Railway Road.
  NOTED

- In accordance with Section 5.2.9 of the Manual, the Auxiliary Lane Worksheet should be used to determine whether auxiliary lanes are warranted at the site entrances and how long those lanes should be. The worksheet can be found at http://www.deldot.gov/Business/subdivisions/index.shtml.
  NOTED

- In accordance with Section 5.14 of the Manual, all existing utilities must be shown on the plan and a utility relocation plan will be required for any utilities that need to be relocated.
  NOTED

Department of Natural Resources and Environmental Control – Contact Michael Tholstrup 735-3352

Sediment and Stormwater Management

- A detailed sediment and stormwater plan will be required prior to any land disturbing activity taking place on the site. Contact the reviewing agency to schedule a pre-application meeting to discuss the sediment and erosion control and stormwater management components of the plan. The site topography, soils mapping, pre- and post-

development runoff, and proposed method(s) and location(s) of stormwater management should be brought to the meeting for discussion. The plan review and approval as well as construction inspection will be coordinated through the Sussex Conservation District. Contact the Sussex Conservation District at (302) 856-7219 for details regarding submittal requirements and fees.
NOTED, WE HAVE HAD OUR PRE-SUBMITTAL STORMWATER ASSESSMENT STUDY REVIEW WITH THE SUSSEX CONSERVATION DISTRICT TO DISCUSS OUR PROPOSED PROJECT AND BMP METHODOLOGY.

Wetland and Hydric Soils

- The project area contains a potentially hydric soil mapping unit (Klej) and Statewide Wetland Mapping Project (SWMP) mapped non-tidal wetlands. Hydric soils are functionally important source of water storage; the loss of water storage through excavation, filling, or grading of intact native hydric soils increases the probability for more frequent and destructive flooding events exacerbated by projected increases in precipitation and sea-level rise due to climate change. The probability for flooding is further compounded by increases in surface imperviousness as building density in the area increases over time. Moreover, destruction of hydric soils increases the amount pollutant runoff (i.e., hydric soils sequester and detoxify pollutants) which contributes to lower observed water quality in regional waterbodies and wetlands.
  NOTED

- According to the PLUS application a wetlands delineation has been conducted; however, the delineation was not approved by the US Army Corp of Engineering. The applicant should obtain approval before commencing any construction activities in the vicinity of this project.
  NOTED, WE HAVE FIELD VERIFIED THE PREVIOUS WETLAND DELINEATION AND ARE SEEKING APPROVAL FROM US ARMY CORP OF ENGINEERING.

- The applicant should contact a licensed (Delaware Class D) soil scientist to make a site specific assessment (i.e., soil survey mapping) of the soils on this site. A list of licensed Class D soil scientists can be obtained at the following web link: http://www.dnrec.delaware.gov/wr/Information/GWDInfo/Pages/GroundWaterDischargesLicensesandLicensees.aspx
  NOTED, GEO-TECHNOLOGY ASSOCIATES, INC. (GTA) WAS RETAINED TO PERFORM SOIL BORINGS WITHIN THE PARCEL. THE PROPERTY HAS ALSO BEEN INVESITGATED BETWEEN 2010 THROUGH 2014 DURING THE PREVIOUS APPROVAL PROCESS.

- Contact the Subaqueous Lands section before “modifying” or “making improvements” to any ditches. The Subaqueous Lands section can be reached by phone at (302) 739-9943.
  NOTED

State Historic Preservation Office – Contact Carlton Hall 736-7400

- There are no known archaeological sites, or known National Register listed or eligible properties on the parcel. However, there are well-drained soils mapped for the parcel and surface water adjacent, so the potential for Native American archaeological sites is moderate or higher. An archaeological survey or sampling is recommended prior to ground disturbance.

- If any project or development proceeds, the developer should be aware of the Unmarked Human Burials and Human Skeletal Remains Law (Del. C. Title 7, Ch. 54).

- If there is federal involvement, in the form of licenses, permits, or funds, the federal agency, often through its client, is responsible for complying with Section 106 of the National Historic Preservation Act (36 CFR 800) and must consider their project's effects on any known or potential cultural or historic resources. For further information on the Section 106 process please review the Advisory Council on Historic Preservation's website at: www.achp.gov

Delaware State Fire Marshall's Office – Contact Duane Fox 259-7037

At the time of formal submittal, the applicant shall provide; completed application, fee, and three sets of plans depicting the following in accordance with the Delaware State Fire Prevention Regulation (DSFPR):

Fire Protection Water Requirements:

- Water distribution system capable of delivering at least 1000 gpm for 1-hour duration, at 20-psi residual pressure is required. Fire hydrants with 800 feet spacing on centers.
- Where a water distribution system is proposed for (business/educational/assembly/healthcare/multi-family) sites, the infrastructure for fire protection water shall be provided, including the size of water mains for fire hydrants and sprinkler systems.
  NOTED, TIDEWATER WILL SERVICE THE PROPERTY.

Fire Protection Features:

- All structures over 10,000 Sq. Ft. aggregate will require automatic sprinkler protection installed.
- Buildings occupied as apartments (multi-family living units comprising of 3 or more units) will require automatic sprinkler protection installed.
- Buildings greater than 10,000 sq. ft., 3-stories or more, over 35 feet, or classified as High Hazard, are required to meet fire lane marking requirements
- Show Fire Department Connection location (Must be within 300 feet of fire hydrant), and detail as shown in the DSFPR.
- Show Fire Lanes and Sign Detail as shown in DSFPR
  NOTED

Accessibility:

- All premises, which the fire department may be called upon to protect in case of fire, and which are not readily accessible from public roads, shall be provided with suitable gates and access roads, and fire lanes so that all buildings on the premises are accessible to fire apparatus.
- Fire department access shall be provided in such a manner so that fire apparatus will be able to locate within 100 ft. of the front door.
- The use of speed bumps or other methods of traffic speed reduction must be in accordance with Department of Transportation requirements.
- The local Fire Chief, prior to any submission to our Agency, shall approve in writing the use of gates that limit fire department access into and out of the development or property.

Gas Piping and System Information

- Provide type of fuel proposed and show locations of bulk containers on plan.

Required Notes:

- Provide a note on the final plans submitted for review to read "All fire lanes, fire hydrants, and fire department connections shall be marked in accordance with the Delaware State Fire Prevention Regulations"
- Proposed Use
- Alpha or Numerical Labels for each building/unit for sites with multiple buildings/units
- Square footage of each structure (Total of all Floors)
- National Fire Protection Association (NFPA) Construction Type
- Maximum Height of Buildings (including number of stories)
- Note indicating if building is to be sprinklered
- Name of Water Provider
- Letter from Water Provider approving the system layout
- Provide Lock Box Note (as detailed in DSFPR) if Building is to be sprinklered
- Provide Road Names, even for County Roads

Recommendations/Additional Information

This section includes a list of site specific suggestions that are intended to enhance the project. These suggestions have been generated by the State Agencies based on their expertise and subject area knowledge. **These suggestions do not represent State code requirements.** They are offered here in order to provide proactive ideas to help the applicant enhance the site design, and it is hoped **(but in no way required)** that the applicant will open a dialogue with the relevant agencies to discuss how the suggestions can benefit the project.

Department of Transportation – Contact Bill Brockenbrough 760-2109

- The applicant should expect a requirement that any substation and/or wastewater facilities will be required to have access from an internal driveway with no direct access to Old Mill Road or Railway Road.
  NOTED, ALL INFRASTURCURE IS WITHIN THE SITE WITH A SINGLE CONNECTION TO THE MAINS IN OLD MILL ROAD.

- The applicant should expect a requirement that all PLUS and Technical Advisory Committee (TAC) comments be addressed prior to submitting plans for review.
  NOTED

- Please be advised that the Standard General Notes have been updated and posted to the DelDOT website. Please begin using the new versions and look for the revision dates of March 21, 2019 and March 25, 2019. The notes can be found at https://www.deldot.gov/Business/subdivisions/.
  NOTED

Department of Natural Resources and Environmental Control – Contact Michael Tholstrup 735-3352

Wetlands and Hydric Soils

- A 100-foot buffer from all wetlands (via USACE approved wetland delineation) and ditches is strongly recommended; the 75-foot buffer proposed by the applicant is insufficiently protective of water quality.
  GIVEN THE UNCERTAINTY OF THE REGULATORY SOURCE OF THE RECOMMENDATION PROVIDED, PENNONI NOTES THE OPINION OF THE REVIEWER AND OFFERS THE FOLLOWING RESPONSE: WETLAND BUFFERS IN A WATERSHED CAN IMPROVE WATER QUALITY BY FILTERING SEDIMENT BEFORE IT REACHES SURFACE WATERS. THE VEGETATION AND SOILS OF NATURAL BUFFER AREAS HELP REMOVE EXCESS NUTRIENTS FROM SURFACE RUNOFF. BUFFERS ARE AN EFFECTIVE AND COST-EFFICIENT BEST MANAGEMENT PRACTICE THAT CAN BE USED TO IMPROVE WATER QUALITY. THEY CAN BE DIFFERENT-SIZED AREAS OR STRIPS IN PERMANENT VEGETATION THAT MINIMIZE SOIL EROSION BY REDUCING SURFACE RUNOFF. BUFFERS CAN BE USED ALONG WITH OTHER BEST MANAGEMENT PRACTICES TO PROTECT WATER QUALITY. BUFFERS ARE USED FOR WATER CONTROL AND WATER QUALITY IMPROVEMENT, SUCH AS FILTER STRIPS, GRASSED WATERWAYS, AND WETLANDS. ALL THESE PRACTICES HAVE ONE THING IN COMMON PREVENTION OF FURTHER DEGRADATION OF SOIL AND WATER QUALITY BY REDUCING SOIL EROSION AND NUTRIENT LOADING TO SURFACE AND GROUNDWATER, MODERATING WATER TEMPERATURES, AND PREVENTING WATER CONTAMINATION.

WELL-DESIGNED BUFFER STRIPS CAN EFFECTIVELY MINIMIZE THE MOVEMENT OF SOIL SEDIMENT, NUTRIENTS, PESTICIDES, AND PATHOGENS THROUGH THE SOIL PROFILE AND FROM THE FIELD AS RUNOFF, THEREBY IMPROVING WATER QUALITY. ALSO, WELL-DESIGNED BUFFER STRIPS IMPROVE WILDLIFE HABITAT AND AIR QUALITY BY REDUCING CHEMICAL EMISSIONS. THE COUNTY'S REQUIREMENT FOR WETLAND BUFFERS IS 50-FEET. THIS HOLDS TRUE TO MANY OTHER WETLAND BUFFER REQUIREMENTS WITHIN MANY MUNICIPALITIES IN THE STATE OF DELAWARE. DNREC'S STORMWATER REGULATIONS PROVIDES FOR A MINIMUM DESIGN OF 10-FEET FOR BMP FILTER STRIPS AS A METHOD FOR WATER QUALITY. THE STATES COMMENT THAT THE 75-FOOT BUFFER PROPOSED BY THE APPLICANT IS INSUFFICIENTLY PROTECTIVE OF WATER QUALITY PROVIDES FOR NO BASIS OF FACT AND IS NOT CONSISTENT WITH YOUR OWN DEPARTMENTS RECOMMENDED BMP FOR WATER QUALITY.

Groundwater Discharges

- A soil feasibility study should be completed and submitted to the Groundwater Discharges Section (GWDS) Small System Section, in Georgetown, for approval (Section 5.2.2 of the Regulations Governing the Design, Installation, and Operation of On-Site Wastewater Treatment and Disposal Systems).

- Current wastewater disposal is provided by Sussex County. If current disposal capacity is changing from the existing permit DNREC's GWDS Large System should be contacted at (302) 739-9948.

Sediment and Stormwater Management

- Responsibility for maintenance of stormwater ponds should be documented, preferably in property deed.

- The applicant should employ green-technology stormwater management and rain gardens (in lieu of open-water management structures) to mitigate or reduce nutrient and bacterial pollutant runoff.
  NOTED, WE ARE PROPOSING SHEET FLOW OVER GRASS & OPEN SPACE AREAS IN THE CENTER OF THE PROPERTY. THE RUNNF WILL BE CONVEYED DUE TO A SECOND PROPOSED BMP (TYPE TBD) AT THE REAR FOR STORAGE AND DISCHARGE.

Natural Habitat Protection

DNREC statewide mapping indicates that this proposal may impact 3.77 acres of forested wetlands including 3.3 acres of Barrier Islands/Coastal Plain Flatwoods.

- Avoid diverting surface water from roadways and stormwater facilities into the wetlands on site. Water quality could be detrimentally affected by run-off which can contain oil

and other pollutants (basically any substance a home owner may use on their lawn or driveway).

- Wherever practicable, the applicant can mitigate impacts from impervious cover via pervious pavers, as an alternative for conventional paving. Specifically, in those areas designated for parking.
- Maintain inputs to natural wetlands at pre-construction levels. Avoid causing increases or decreases in water levels.
- Small animals, such as salamanders have difficulty climbing vertical curbs. We recommend designing the development to exclude curbs is best for these species but if road curbing is part of the design, curbing that allows small animals to climb out of the roadbed (such as Cape Cod curbing) is preferred over steep, vertical curbing.
- Avoid installing sewers with grates, which can create a hazard for amphibians and reptiles.
- Any culverts installed should be open bottom box culverts to allow for natural substrate to remain and in-water passage of aquatic life. Additionally, culverts should be left as wide as possible to ensure that salamanders can travel through them.
- Perc test holes act as pitfall traps, collecting large numbers of amphibians, turtles, and other animals that will be unable to escape and will ultimately die. As such, perc test holes should be refilled to grade.
- Low spillage lights (those that reflect light directly downward onto the area to be illuminated) should be used on roads and homes within 750 ft. of the forested wetlands on site. Fluorescent and mercury vapor lighting should not be used.
  NOTED, ALL LIGHTING SHALL BE DOWNWARD SCREENED SO THAT IT DOES NOT SHINE ON NEIGHBORING PROPERTIES OR ROADWAYS.

Sustainable Development Recommendations

- The applicant should consider the use of recycled, energy efficient materials, and renewable energy infrastructure.

- The Division of Climate, Coastal, & Energy offers incentives for clean transportation (Workplace EV Charging) and energy efficiency. These programs address climate change goals of reducing greenhouse gas emissions and improving overall air quality (www.de.gov/greenenergy, www.de.gov/cleantransportation, www.de.gov/eeif).

Nuisance Waterfowl Avoidance Recommendations

- Wet ponds created for stormwater management purposes may attract resident Canada geese and mute swans that will create a nuisance for community residents. High concentrations of waterfowl in ponds create water-quality problems, leave droppings on lawn and paved areas, and can become aggressive during the nesting season. Short manicured lawns surrounding ponds provide attractive habitat for these species.

  1) To deter waterfowl from taking up residence in these ponds, we recommend planting the surrounding open space with a mix of native wildflower plantings (to be planted

in accordance with the Sediment and Stormwater Plan approval agency requirements).

2) It is best to mow the open space area surrounding the pond only once a year, either in February or March. If mowing must occur more often, it would be helpful to leave a minimum buffer of 15-30 ft. in width to be mowed annually. This area would be necessary to adequately deter the waterfowl from inhabiting the area. When the view of the surrounding area from the pond is blocked, geese cannot scan for predators and are less likely to reside and nest in the area of the pond. In addition to deterring nuisance waterfowl, the native wildflower mix will also serve to attract bees, butterflies, and other pollinators, and reduce run-off, which can contain oil and other pollutants that homeowners may use on their lawns and driveways.
NOTED

- For assistance in drafting a list of plants suitable for a stormwater management pond buffer, please contact DNREC's botanist, Bill McAvoy at (302) 735-8668 or William.McAvoy@delaware.gov.

Mosquito-Nuisance Avoidance

- Mosquito control issues are increasing as developments infringe on wetland areas which often lead to increased demands by the public for mosquito control services. These services are often underfunded as local property taxes do not support the State's mosquito control services. As a result, Homeowner's Association (HOA) often inherit the burden of dealing with mosquito issues. DRNEC provides the following helpful recommendations (1) achieving good control in an environmentally compatible manner requires technical knowledge, (2) the HOA will need concurrence from all their homeowners/residents for if, how, when and where any treatments will be done, (3) controlling mosquitoes can be quite costly and an on-going problem, and (4) the HOA should be aware that there can be liability issues that their treatment activities might cause, particularly in regard to any claims of chemical trespass, misapplications, or adverse impacts to human health or the environment from insecticide exposures. If the applicant has any questions regarding mosquito control issues, they can contact Dr. Bill Meredith, Mosquito Control Administrator at (302) 739-9917.

Delaware State Fire Marshall's Office – Contact Duane Fox 259-7037

- Preliminary meetings with fire protection specialists are encouraged prior to formal submittal. Please call for appointment. Applications and brochures can be downloaded from our website: www.statefiremarshal.delaware.gov technical services link, plan review, applications or brochures.
NOTED

Sussex County – Contact Rob Davis 302-855-7820

- The development is within Tier 1 - Sussex County Unified Sanitary Sewer District and sewer service is available. A sewer system concept evaluation must be requested to define a connection point for new areas that were not previously approved.
  NOTED, HAS BEEN SUBMITTED AND APPROVED.

- A "Use of Existing Infrastructure Agreement" is required for new areas and must be approved prior to approval of construction plans. Sussex County Code, Chapter 110, requires that the Engineer and/or Developer request a Sewer System Concept Evaluation (SSCE) from the Utility Planning Department for new areas of the project not previously approved by providing the parcel(s) estimated equivalent dwelling units (EDU) for the project, along with payment of a $1,000.00 fee for the evaluation. The fee is to be payable to Sussex County Council. The Utility Planning Department will review the parcel(s) and EDU, confirm capacity, provide the connection point and define any additional parcels that must be served as part of the project. Should it be determined that a pump station is required for the project, additional information may be requested. This information will be conveyed to the engineer and/or developer as well as the Sussex County Public Works department. The Public Works Division will use this information when reviewing construction drawings to verify that the correct connection point is used, and all required parcels are served.

- The proposed development will require a developer installed collection system in accordance with Sussex County standards and procedures.

- Onetime system connection charges will apply. Please contact the Utility Permits Division at 302 854-7719 for additional information on charges.

Following receipt of this letter and upon filing of an application with the local jurisdiction, the applicant shall provide to the local jurisdiction and the Office of State Planning Coordination a written response to comments received as a result of the pre-application process, noting whether comments were incorporated into the project design or not and the reason therefore.

Thank you for the opportunity to review this project. If you have any questions, please contact me at 302-739-3090.

Sincerely,

Constance C. Holland, AICP
Director, Office of State Planning Coordination

Alan M. Decktor, PE
Senior Engineer

CC: Sussex County Planning

SC Planning & Zoning

Preliminary Land Use Service (PLUS)

Delaware State Planning Coordination

122 Martin Luther King Jr. Blvd., South • Dover, DE 19901 • Phone: 302-739-3090 • Fax: 302-739-5661

Purpose of PLUS - -The PLUS process is intended to provide consolidated State comments regarding the proposed project. The Applicant is encouraged to submit the application during the concept stages of planning as this process often offers recommendations for changes to the plan. The application should be submitted after the pre-application meeting with the local jurisdiction but before formal application is made.

Please complete this PLUS application in its entirety. **All questions must be answered. If a question is unknown at this time or not applicable, please explain.** Unanswered questions on this form could lead to delays in scheduling your review. This form will enable the state staff to review the project before the scheduled meeting and to have beneficial information available for the applicant and/or developer at the time of review. If you need assistance or clarification, please call the State Planning Office at (302) 739-3090.

PLUS Number (to be completed by OSPC): _____

Investment Level Per Strategies for State Policies and Spending (to be determined by OSPC): _____

1. Project Title/Name: EVANS FARM APARTMENTS
2. Location (please be specific): 31434 RAILWAY RD
3. Parcel Identification #: 134.12.00-74.00
4. County or Local Jurisdiction Name: where project is located: SUSSEX
5. If contiguous to a municipality, are you seeking annexation:
6. Owner's Name: LINDER & COMPANY INC.

   Address: 234 NORTH JAMES STREET

   City: NEWPORT State: DE Zip: 19804

   Phone: Fax: Email:

7. Equitable Owner/Developer **(This Person is required to attend the PLUS meeting)**: PETTINARO CONSTRUCTION CO. INC.

   Address: 234 NORTH JAMES STREET

   City: NEWPORT State: DE Zip: 19804

   Phone: (302) 999-0708 Fax: Email: AFinerosky@pettinaro.com

8. Project Designer/Engineer: Pennoni - Attn Alan Decktor,PE

   Address: 18072 Davidson Drive

   City: Milton State: DE Zip: 19968

   Phone: (302) 684-8030 Fax: Email: adecktor@pennoni.com

9. **Please Designate a Contact Person, including phone number, for this Project:** Alan Decktor

Information Regarding Site:

10. Type of Review: ☐ Rezoning, if not in compliance with certified comprehensive plan ☒ Site Plan Review ☐ Subdivision

11. Brief Explanation of Project being reviewed: Multi-family apartment complex

If this property has been the subject of a previous LUPA or PLUS review, please provide the name(s) and date(s) of those applications. 2008-09-05

12. Area of Project (Acres +/-): 50.19 Number of Residential Units: 198 Commercial square footage:

13. Present Zoning: GR

14. Proposed Zoning: GR

15. Present Use: Agg.

16. Proposed Use: Multi-family

17. Water: ☐ Central (Community system) ☐ Individual On-Site ☒ Public (Utility)
Service Provider Name: Tidewater

Will a new public well be located on the site? ☐ Yes ☐ No

18. Wastewater: ☐ Central (Community system) ☐ Individual On-Site ☒ Public (Utility)
Service Provider Name: Sussex County

Will a new community wastewater system be located on this site? ☐ Yes ■ No

19. If residential, describe style and market segment you plan to target (Example- Age restricted): none

20. Environmental impacts: Stormwater Management

How many forested acres are presently on-site? 2+/- How many forested acres will be removed? 0.0

To your knowledge, are there any wetlands, as defined by the U.S. Army Corps of Engineers or the Department of Natural Resources and Environmental Control, on the site? ☒ Yes ☐ No

Are the wetlands: ☐ Tidal Acres:
☒ Non-tidal Acres: 2+/-

If "Yes", have the wetlands been delineated? ☒ Yes ☐ No Previous application

Has the Army Corps of Engineers signed off on the delineation? ■ Yes ☐ No

Will the wetlands be directly impacted and/or do you anticipate the need for wetland permits? ☐ Yes ☒ No If "Yes", describe the impacts:

How close do you anticipate ground disturbance to wetlands, streams, wells, or waterbodies? 75'+/-

21. Does this activity encroach on or impact any tax ditch, public ditch, or private ditch (ditch that directs water off-site)? ☒ Yes ☐ No
Private Ditch will be replaced with pipe system

22. List the proposed method(s) of stormwater management for the site:
Sheet Flow, infiltration (if possible)

23. Is open space proposed? ☒ Yes ☐ No If "Yes," how much? Acres: 34+/-

What is the intended use of the open space (for example, active recreation, passive recreation, stormwater management, wildlife habitat, historical or archeological protection)?
Active, passive, stormwater management

24. Are you considering dedicating any land for community use (e.g., police, fire, school)? ☐ Yes ☒ No

25. Please estimate How many vehicle trips will this project generate on an average weekday? A trip is a vehicle entering or exiting. If traffic is seasonal, assume peak season: 1077 trips

What percentage of those trips will be trucks, excluding vans and pick-up trucks? Negligible

26. Will the project connect to state maintained roads? ☒ Yes ☐ No Old Mill Road

27. Please list any locations where this project physically could be connected to existing or future development on adjacent lands and indicate your willingness to discuss making these connections.
Bay Forest is fully constructed, and Lands north must cross wetlands.

28. Are there existing sidewalks? ☐ Yes ☒ No; bike paths ☐ Yes ☒ No
Are there proposed sidewalks? ☒ Yes ☐ No; bike paths ☒ Yes ☐

Is there an opportunity to connect to a larger bike, pedestrian, or transit network? ☐ Yes ☒ No

29. To your knowledge, is this site in the vicinity of any known historic/cultural resources or sites? ☐ Yes ☒ No

Has this site been evaluated for historic and/or cultural resources? ☐ Yes ☒ No

Would you be open to a site evaluation by the State Historic Preservation Office? ☐ Yes ☒ No

30. To promote an accurate review of your parcel's features, would you permit a State agency site visit? ☒ Yes ☐ No
Person to contact to arrange visit: Developer phone number: _____

31. Are any federal permits, licensing, or funding anticipated? ☐ Yes ☒ No

I hereby certify that the information on this application is complete, true and correct, to the best of my knowledge.

For Andrea Finerosky — Douglas Bowman — 8/29/19
Signature of property owner — Date

ALAN DECKTOR — Alan Decktor — 8/29/19
Signature of Person completing form (If different than property owner) — Date

Signed application must be received before application is scheduled for PLUS review.

This form should be returned to the Office of State Planning **electronically** at plus@state.de.us **along with an electronic copy of any site plans and development plans for this site.** Site Plans, drawings, and location maps should be submitted as image files (JPEG, GIF, TIF, etc.) or as PDF files. GIS data sets and CAD drawings may also be submitted. If electronic copy of the plan is not available, contact The Office of State Planning Coordination at (302) 739-3090 for further instructions. A signed copy should be forwarded to the Office of State Planning, 122 William Penn Street, Dover, DE 19901. Thank you for this input. Your request will be researched thoroughly. **Please be sure to note the contact person** so we may schedule your request in a timely manner.

TAB 3

ENVIRONMENTAL SITE ASSESSMENT

18072 Davidson Drive
Milton, DE 19968
T: 302-684-8030
F: 302-684-8054

www.pennoni.com

February, 2021

ENVIRONMENTAL ASSESSMENT REPORT
EVANS FARM APARTMENT
Tax Map #: 134-12.00-74.00
Linder & Company, Inc.

BALTIMORE HUNDRED, SUSSEX COUNTY, DELAWARE

REPORT PREPARED FOR:
ANDREA FINEROSKY – LINDER & COMPANY, INC.;
234 NORTH JAMES STREET
WILMINGTON, DE 19804

REPORT PREPARED BY:
PENNONI ASSOCIATES INC.;
18072 DAVIDSON DRIVE,
MILTON, DE 19968
Phone: 302-684-8030
Fax: 302-684-8054

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I. INTRODUCTION

This report is intended to satisfy concerns of developing an apartment complex on a certain piece of property which is located within a Growth Area of Sussex County in regard to the environment and sustainable development. Designated as a Growth Area by the 2019 Sussex County Comprehensive Plan, the land involved in CU# 2206 is an application to grant a condition use of lands in a GR General Residential District located on 50.62 acres of land more or less in the Baltimore Hundred located on the north corner of Old Mill Road and Railway Road intersection.

The property was purchased in July 2005 by Linder & Company, Inc. and obtained final site plan approval on March 10, 2016 for 200 dwelling units. The property is bordered on the northwest by Bay Forest Subdivision, currently zoned MR; on the northeast by a vacant wooded parcel owned by the Bethany Bay HOA, zoned AR-1 and residential lots, zoned GR; on the southern frontages, Old Mill Road to the southwest and Railway Road to the southeast.

The purpose of the Conditional Use is for the development of 200 multi-family dwelling units, as was approved through the adoption of Ordinance 2176 in accordance with the Comprehensive Development Plan and promotes the health, safety, morals, convenience, order, prosperity, and welfare of the present and future citizens of Sussex County. This Conditional Use application updates the previous approval and encourages high quality design by providing both greater flexibility in living unit styles; preserves and enhances traditional village centers; provides more housing opportunities and choices and increases affordable housing opportunities; promotes pedestrian and bicycle travel; promotes sense of community; encourages economic investment; promotes efficient use of land and infrastructure; guides development toward established areas, protecting outlying rural areas and environmentally sensitive resources and embodies smart growth.

In addition, the purpose of a Conditional Use is to provide for certain uses which cannot be well adjusted to their environment in particular locations with full protection offered to surrounding properties by rigid application of the applicable zoning district's regulations. These uses are generally of a public or semipublic character and are essential and desirable for the general convenience and welfare but, because of the nature of the use, the importance of the relationship to the Comprehensive Plan and possible impact not only on neighboring properties but on a large section of the County, require the exercise of planning judgment on location and site plan.

The project designed under County requirements will not diminish or impair property values within the community; will not create a public nuisance; will not substantially increase the hazard from fire or other dangers to neighboring properties, unduly increase traffic congestion on the public highways, result in an increase in public expenditures, or otherwise impair the public health, safety, comfort, morals or general welfare of the public.

This report will address certain potential environmental issues this proposed Conditional Use Application will pose and it also attempts to establish a balance between the developer's need for straight-forward information upon which to base long-term financial decisions and community's need for protection of the environment.

Proposed Project Name: <u>EVANS FARM APARTMENTS – ANDREA FINEROSKY, LINDER & COMPANY, INC.</u>

Owner's Name: Linder & Company, Inc. | 234 North James Street, Wilmington, DE 19804

Developers Name: Andrea Finerosky – Pettinaro Construction Company, Inc. | 234 North James Street, Wilmington, DE 19804

Report prepared: by Alan M. Decktor, PE, Senior Engineer | Pennoni Associates, Inc; 18072 Davidson Drive, Milton, DE 19968

Reviewed prepared by: Mark H. Davidson, Principal Land Planner | Pennoni Associates Inc.; 18072 Davidson Drive, Milton, DE 19968

Tax Map Number: 134-12.00-74.00

Report written on: February 5, 2021;

II. SUMMARY

Pennoni Associates Inc. (Pennoni) has completed an Environmental Assessment Report (EAR) for Linder & Company, Inc., located at the corner of Old Mill Road and Railway Road in Baltimore Hundred, Sussex County pursuant to the guidelines set forth by Sussex County and the State of Delaware.

This report summarizes the findings of this Environmental Site Assessment and Pennoni's conclusion and recommendations in regard to the environmental condition and development sustainability of the existing site.

Pennoni conducted this EAR by reviewing selected historical, geographical/geologic, environmental regulatory information pertaining to this Site and Adjacent lands, site visits, interviews and based on continued research and knowledge of this project.

Tax Map Number	134-12.00-74.00	
Total Area for Development	50.62± Acres	
Proposed Use	Multi-Family Residential | Apartments	
Proposed G.L.F.A.	298,400+/- (6.85± Acres)	Apartments & Garages
Flood Zone	Zone X	
Wetland Area	1.30 Acres - See Appendix A	
Lands to be Dedicated to DelDOT	Right-Of-Way = 0.26± Acres	Permanent Easement = 1.12± Acres
Wooded Area	3.60± Acres	
Open Space		
Density	3.95 units per acre	
Utilities	Water Service by Tidewater	
	Sewer Service by Sussex County	

Wetland Evaluation (see appendix A) conducted by Pennoni and Kenneth W. Redinger Environmental Services has confirmed that the wetland boundaries located in the north corner and site conditions had not changed since the issuance of a 2007 Jurisdictional Determination and a 2010 wetland boundary delineation by Landmark/JCM, Inc. We have obtained a new Jurisdictional Determination (Appendix A1) as the one from 2007 was only valid for 5 years.

Mapping reviewed as part of this assessment indicates no limitations related to floodplains. (see FEMA Floodplain Map – Appendix B)

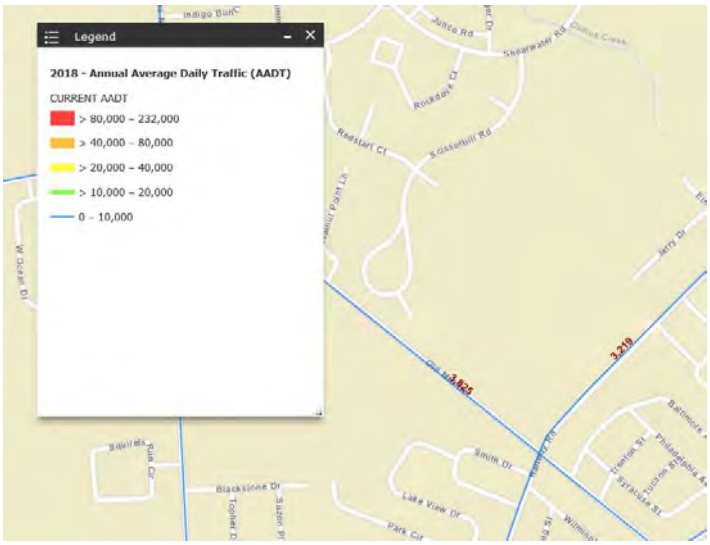
It is the stated goal of the project to provide in general, all Erosion & Sediment Control (ESC) and Stormwater Management (SWM) Best Management Practices (BMPs) which will comply with DNREC standards and specifications in accordance with current guidance documents and policies. Green Technologies and Pollution Control Strategies will be implemented to reduce nitrogen and phosphorus loads to their mandated levels.

Tax Ditch inquiries indicate no tax ditches exist on this property. There is a private ditch along the back property line,

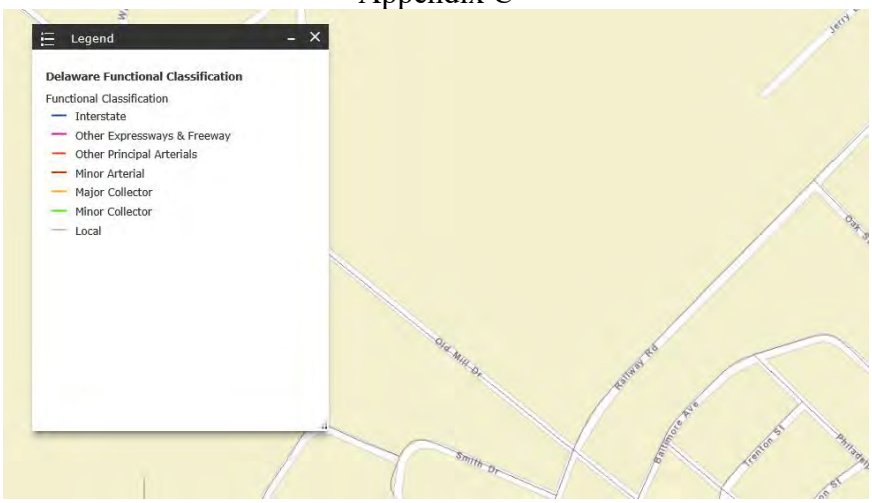
III. GENERAL CHARACTERICTICS OF SITE

A. SITE DESCRIPTION

This Property is located on the north corner of Old Mill Road (SCR 349) and Railway Road (SCR 350) intersection which are both a DelDOT Local Road with an existing right-of-way of 50-feet and currently has an Average Daily Trip count of 3,825 & 3,219 vehicles per day respectively. The property is located approximately 3,000 feet north of Atlantic Avenue (Route 26) which is a DelDOT Minor Arterial Highway with an existing right-of-way of 60-feet and currently has an Average Daily Trip count of 16,212 vehicles per day.



Appendix C

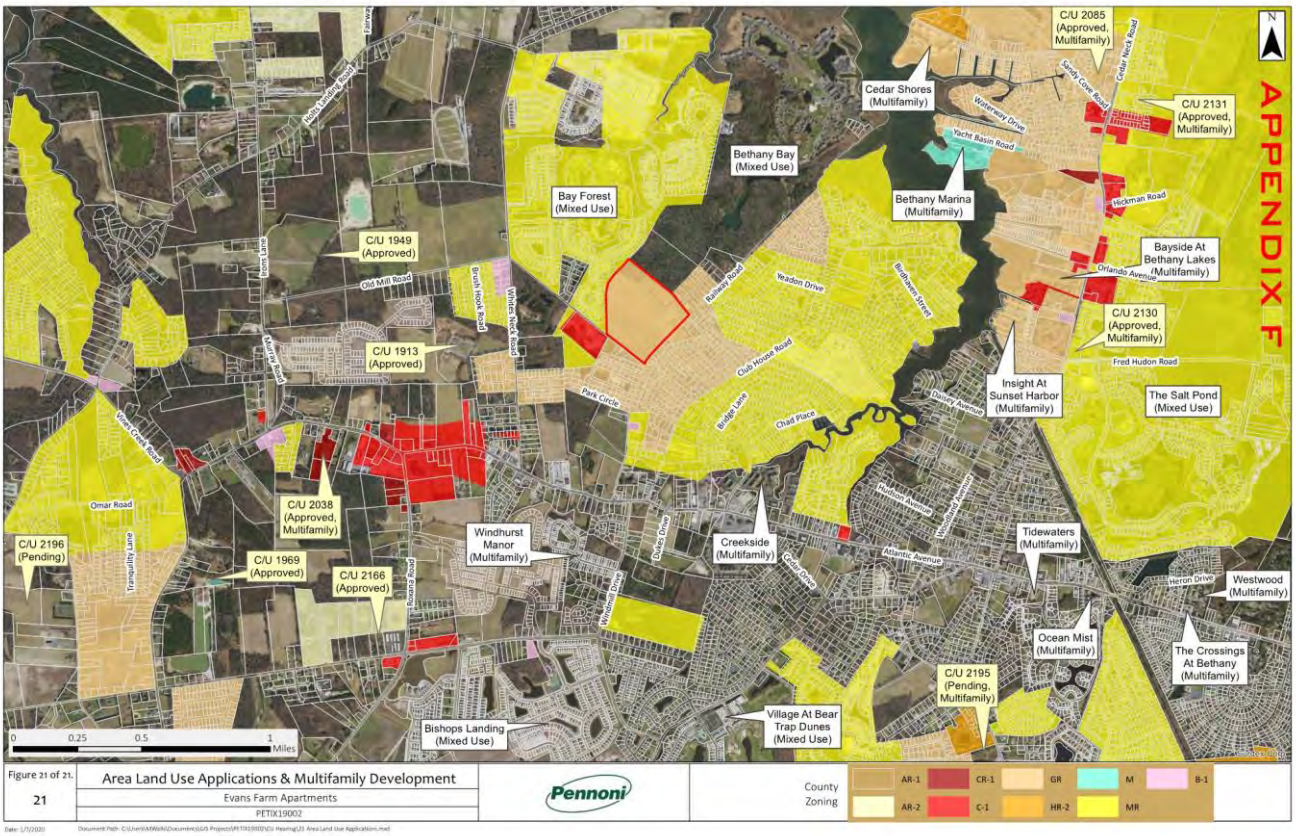


Appendix D

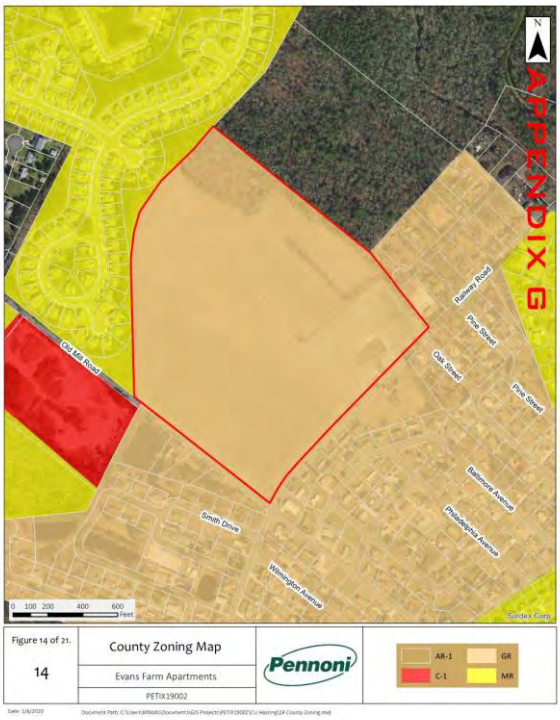
The project site was observed to be primarily flat farmland currently being farmed. The subject property has approximately 3.6+/- acres of woods along with a wooded drainage swale within the open farmland.



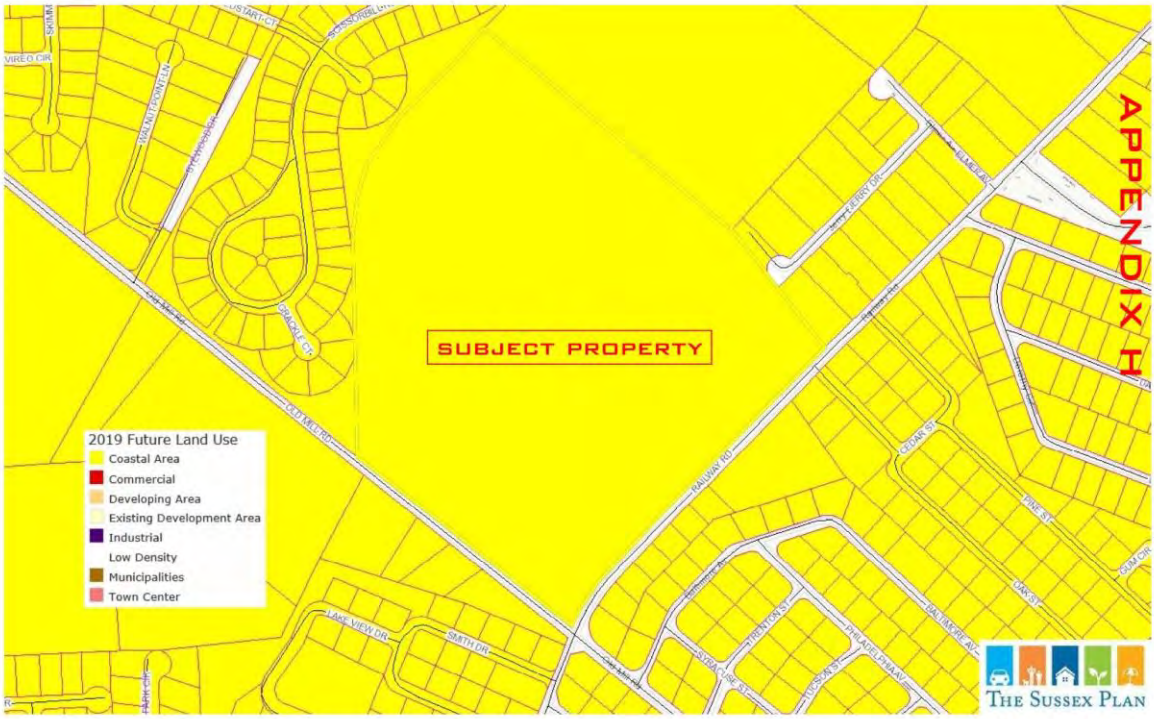
The property is located in a primarily residential area. The property is bordered on the northwest by Bay Forest Subdivision, currently zoned MR; on the northeast by a vacant wooded parcel owned by the Bethany Bay HOA, zoned AR-1 and residential lots, zoned GR; on the southern frontages, Old Mill Road to the southwest and Railway Road to the southeast. The proposed conditional use for a multi-family apartment complex will not diminish or impair property values within the neighborhood as it is adjacent to Bethany Bay which has 3-story multi-family apartments; will not create a public nuisance; or result in an increase in public expenditures.



The property is currently zoned General Residential, GR. (Appendix F)



The property is located within the Coastal Area which is a Growth Area as designated in the 2019 Comprehensive Plan (The Sussex Plan). The Sussex Plan is the County's official policy guide for future development-related decisions. The Plan is long-range in nature and provides a framework for County residents and decision-makers to "conceptualize" how the County should look and function. While the Comprehensive plan acts as a policy guide for future development and decision-making, County Code regulates the use of land. As shown below, the property is identified to be in a Coastal Area and in an area surrounded by other properties within the Coastal Area and Residential Areas.



The Sussex Plan encourages the County's most concentrated forms of new development to occur in Growth Areas.

Coastal Areas are areas that can accommodate development provided special environmental concerns are addressed. Medium and higher density (4-12 units per acre) can be appropriate in certain locations. Medium and higher density could be supported in areas: where there is central water and sewer; near sufficient commercial uses and employment centers; where it is in keeping with the character of the area; where it is along a main road or at/or near a major intersection; where there is adequate Level of Service; or where other considerations exist that are relevant to the requested project and density.

The Sussex Plan suggests that each application should be reviewed on its own merit so that what is proposed does not have a negative impact to the surrounding area or the county in general. Some of the stated strategies within the Plan for this type of Growth Area:

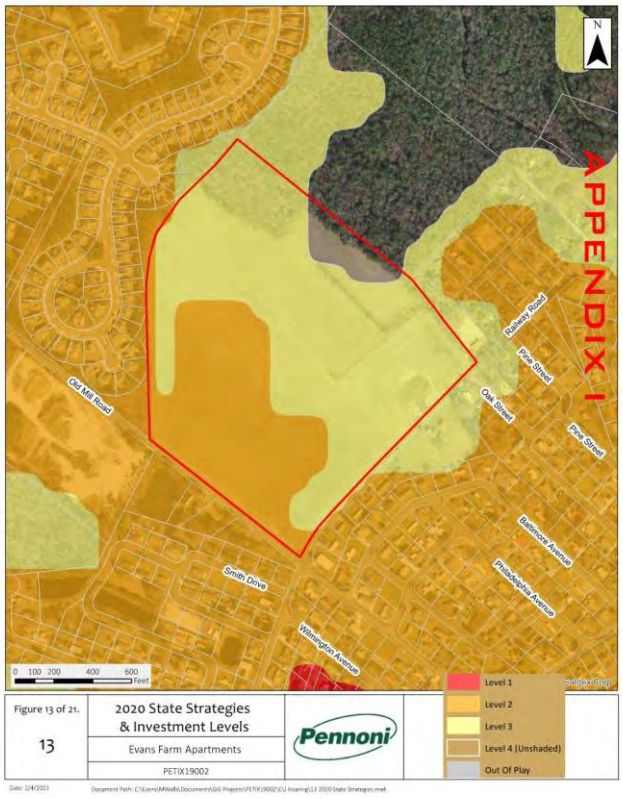
a. *Promote growth and development in areas where capital facilities and infrastructure are already available and adequate to support the growth* – [Tidewater (Domestic & Fire Protection Water Service) and Sussex County Sanitary Sewer are already present and both have the capacity for this proposed use.

b. *A range of housing types including single family, townhomes and multi-family units are permitted uses and appropriate in a primarily residential area which provides environmental protection to the existing landscape*. [Project consists of 200 apartment units which is a dwelling unit held in common ownership with other units in a building, and subject to a leasehold arrangement between the owner of the building and a tenant. Apartments is defined as multi-family under Chapter 115 of the Zoning Code. This project will have a large area of open space and minimal to zero disturbance of the existing environmental characteristics. Our proposed stormwater BMP facilities will enhance the existing runoff.

c. *Engage in planning that considers the efficient location of public services and infrastructure while establishing future public sewer service areas that will help preserve open space by promoting orderly growth rather than unplanned sprawl* – [this property is located in the Ocean View area and is in the Sussex County Tier1 – Coordinated CPCN Area for sanitary sewer. The property has access to both domestic and fire protection water service and sanitary sewer as well as access to a major roadway (Atlantic Avenue) that is 0.5 miles to south. This property in this location with a residential infill, will prohibit any unplanned sprawl that the Comprehensive Plan is discouraging]

d. *Coordinate with DelDOT on road improvements and other transportation projects* – [Although a TIS was not required as a part of this application, this project will provide roadway improvements along its frontage. To allow for future capacity, additional right-of-way dedication along both Old Mill and Railway roadways; permanent easements and additional stormwater management setbacks will be dedicated to the Public. This would increase the aesthetic benefits to the community]. The roadways will be widened to their required functional classification of a local road with 11' wide travel lanes and 5' wide shoulders along the property frontage on both sides of the road. A 10' wide shared use path will be constructed along the entire frontage of the property providing safe pedestrian and bicyclist movements in the area. In addition, an Area Wide Study (AWS) fee will be paid to DelDOT to further assist them in planning of this area. We will also be upgrading existing crossroad pipes and drainage swales to better enhance the runoff conveyance and drainage of the area. Pennoni and DelDOT conducted a site visit in December 2019 and walked all roadways to review in detail the existing conditions of pavement and drainage infrastructure.]

The 2020 Strategies for State Policies and Spending Map identifies the area as the transition from Investment Level 2 & 3 with the subject property split between both levels. Investment Level 2 reflects area where growth is anticipated by local, county and state plans in the near-term future. State investments will support growth in these areas. The priorities in the Level 3 Areas are for DelDOT to focus on regional movements between towns and other population centers. Developers and property owners will make local roadway improvements as development occurs. All infrastructure needs will be funded by the developer. Additional public infrastructure that will benefit the community, such as, road improvements and access improvements will be paid for by the developer.



Private utility companies are considered a viable option for water and wastewater treatment in areas where County or municipal services are non-existent or unplanned. Tidewater and Sussex County provides for water and sewer services for developments in the Ocean View area. These properties will be served by both public water and public sewer.

Electric service is present along both road frontages that serve the subject area and beyond.

This property is within the 5-year growth area to have a natural gas transmission pipeline located along the property. Currently the Millville extension project will bring it within 1 mile of the site. It is owned and operated by Chesapeake Utilities (Chesapeake).

There are various telecommunication providers operating in this service area.

All of these utilities ensure quality growth of development by the planning and developing of infrastructure and services in the County to complement State and local planning efforts with adequate water, sewer, electricity, natural gas, and fiber optic infrastructure to the property.

B. SOILS

Pennoni reviewed the USDA-NRCS Web Soil Survey published by the United States Department of Agriculture Natural Resource Conservation Service and surveyed in 2012 (see Appendix J) to evaluate general soil conditions at the Property. Geo-Technology Associates, Inc. (GTA) was retained to perform soil borings within the parcel. Soils mapped at the property include the following:

1) Fort Mott Loamy (FmA), with slopes ranging from 0-2 percent;
2) Hammonton Loamy Sand (HmA), with slopes ranging from 0-2 percent;
3) Klej loamy Sand (KsA), with slopes ranging from 0-2 percent;
4) Pepperbox-Rosedale complex (PsA), with slopes ranging from 0-2 percent;
5) Rosedale loamy sand (RoA), with slopes ranging from 0-2 percent;
6) Runclint loamy sand (RuA), with slopes ranging from 0-2 percent;

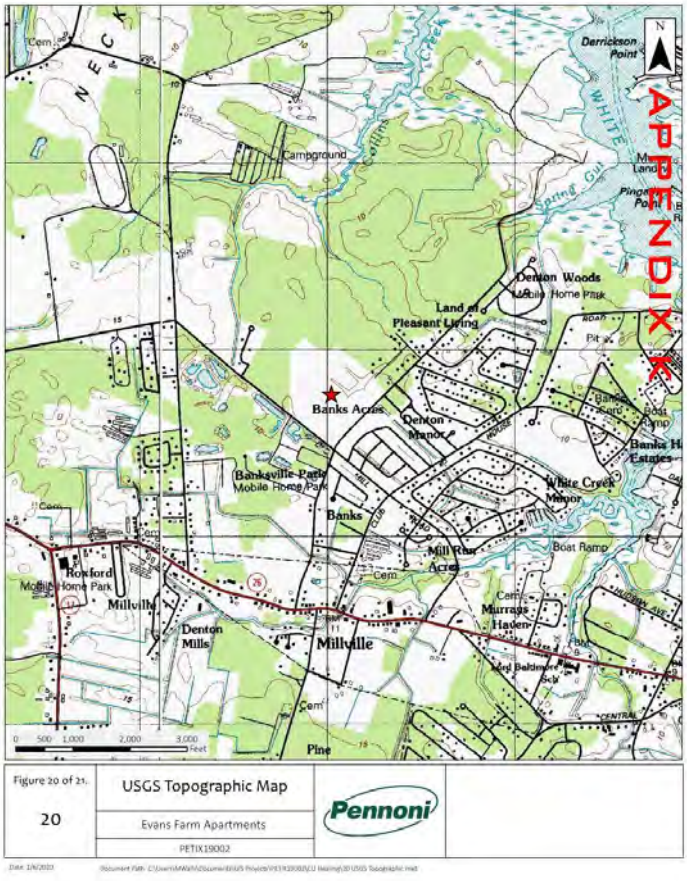


The soils encountered during this investigation correspond to an underlying geologic formation as Omar Formation deposits. With being so close to surface waters, the SHWT and GW is assumed to be at the same elevation which ranged from 18 to 60 inches within the proposed area.

It should be noted that this information was interpreted from present site conditions. There are limitations to this type of investigation. The information is provided given normal precipitation patterns. As the site conditions change the hydrology may change and this cannot be estimated from the existing soil profiles. Groundwater and saturation levels may be shallower than estimated in this study during significant, single storm events and compound events.

C. SURFACE TOPOGRAPHY AND SITE DRAINAGE.

The subject property is located on the Bethany Beach, Delaware 7.5-minute USGS quadrangle at an approximate elevation of 10 feet above mean sea level (see USGS Topographic Map – Appendix K).



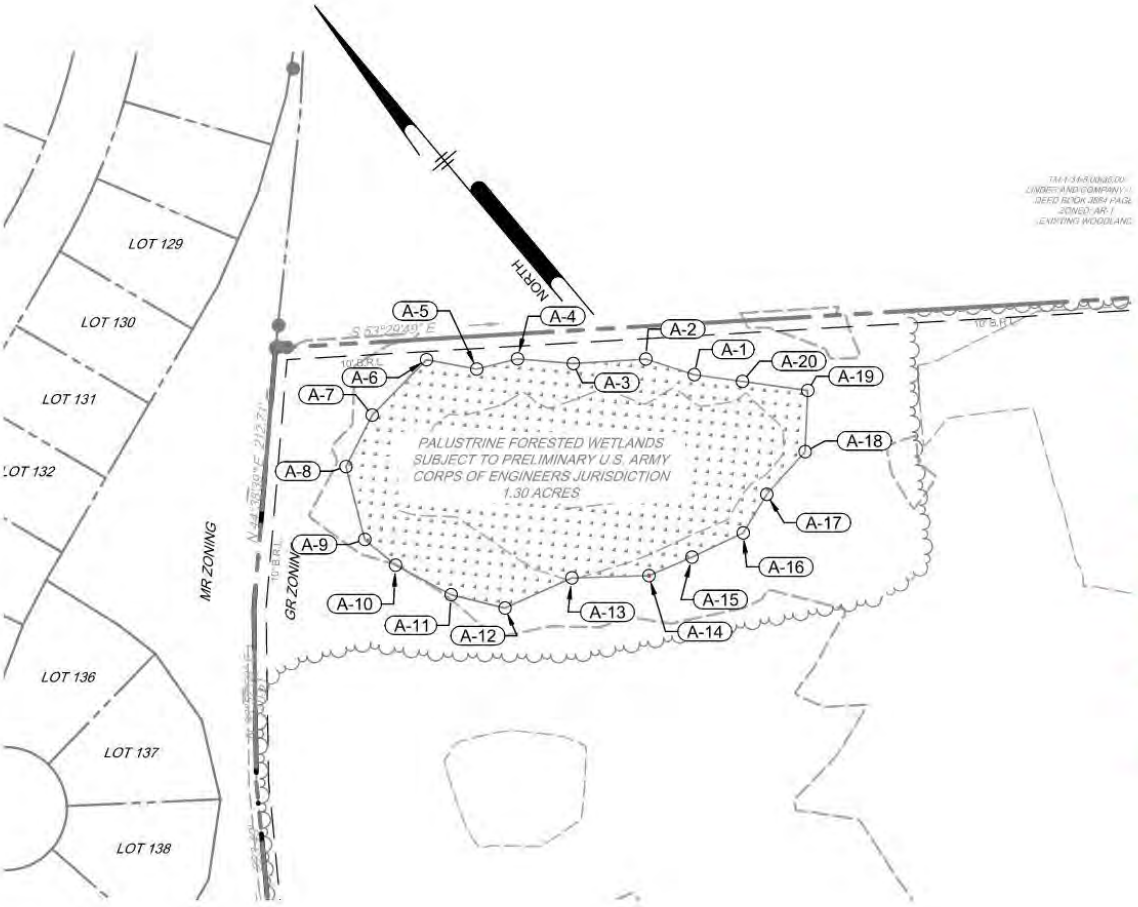
Additional topography is outline in Appendix L. The site is relatively flat with minor slopes within the entire parcel with some existing depressions throughout. Future drainage for the property will most likely follow the existing drainage flow as shown on Appendix L. The land drains from Old Mill Road towards the eastern corner through ditches along the back of the property and out to the Railway Road drainage system, ultimately to the White Creek – Indian River Bay.



When grading or adjusting site topography, there will be a number of best management practices to ensure healthy landscapes. The project will strive to balance the soil cut and fill in order to limit hauling away or bringing in soil thereby saving money and reducing the environmental impact. Utilizing the existing field ditches along the perimeter as part of the outfall drainage system for the site to help carry runoff to the existing point of analysis at the northeast corner of the property along Railway Road.

D. WETLANDS

There is a small pocket of wetlands at the north corner of the site. The Wetland Boundary was originally delineated by White Oaks Environmental, Inc. in April 2006 and a Jurisdictional Determination (JD) confirming those wetlands was issued on June 4, 2007. The wetland boundary was re-evaluated in July 2010 by Landmark/JCM, Inc. and remained unchanged compared to the 2007 JD as depicted on a Wetlands Plan prepared by Becker Morgan. A site visit was performed on December 21, 2019 to evaluate the current conditions and it was determined that the conditions had not changed, and a new JD has been obtained as they are only good for a five-year period. (See Appendix A, A1 & A2.)



APPENDIX A

Kenneth W. Redinger Environmental Services
P.O. Box 479 / Horntown, Virginia 23395
Phone: (757) 894-7032 / E-mail: kwredinger@gmail.com

January 8, 2020 - Via Email

Pettinaro Construction Company, Inc.
234 North James Street
Newport, Delaware 19804

Attn: Andrea Finerosky, Pettinaro Construction Company, Inc.
Re: Wetland Jurisdictional Determination Update - The Evans Farm (50.62 Acres)
Parcel 1-34-12.00-74.00, Old Mill Road & Railway Road
Ocean View, Baltimore Hundred, Sussex County, Delaware
Property Owner - Linder & Company, Inc.

Ms. Finerosky,

At your request I have reviewed the subject property for wetlands and other Waters of the United States that may be regulated by the Philadelphia District U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

Wetland boundaries within the subject property were originally delineated by White Oaks Environmental, Inc. in April 2006, and a Jurisdictional Determination confirming those wetland boundaries was issued by the USACE on June 4, 2007 (USACE Project Number CENAP-OP-R2007-591). That Jurisdictional Determination was valid for a period of 5 years and expired in June 2012.

The wetland boundaries were re-evaluated in July 2010 by Landmark/JCM, Inc. and remained unchanged from that approved by the 2007 Jurisdictional Determination, as depicted on a Wetlands Plan prepared by Becker Morgan Group on October 6, 2010.

To confirm that the site conditions had not changed since the issuance of the 2007 Jurisdictional Determination, the property was evaluated by Kenneth W. Redinger Environmental Services on December 21, 2019 in accordance with the 1987 Corps of Engineers Wetland Delineation Manual in conjunction with the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Atlantic and Gulf Coastal Plain Region; Version 2.0 (November 2010).

As the site conditions were confirmed to be unchanged from those present during the 2007 and 2010 investigations, a request to re-issue the Jurisdictional Determination verifying wetland boundaries within the subject property was submitted to the Philadelphia District U.S. Army Corps of Engineers on January 8, 2020. A copy of the re-issued Jurisdictional Determination will be provided to your office upon its receipt.

Please contact me with any questions you may have concerning this project in the meantime.

Sincerely,

Kenneth W. Redinger
Professional Wetland Scientist #2126

APPENDIX A1

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO ATTENTION OF

MAR 2 6 2020

Regulatory Branch
Application Section I

SUBJECT: CENAP-OP-R 2020-201-23 (PJD)
Project Name: Evans Farm Apartments SX
Latitude/Longitude: 38.558421° N /-75.114527° W

Kenneth W. Redinger
KWR Environmental Services, Incorporated
Post Office Box 479
Horntown, Virginia 23395

Dear Mr. Redinger:

The plan identified on the following page depicts all delineated waterways and wetlands on the subject site that may be jurisdictional under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbor Act.

Pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, a Department of the Army permit is required for work or structures in navigable waters of the United States and the discharge of dredged or fill material into waters of the United States including adjacent wetlands. Any proposal to perform the above activities within any waters of the United States requires the prior approval of this office.

This preliminary determination has been conducted to identify the location(s) of wetlands and waters that may be waters of the United States for the particular site identified in this request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are U.S. Department of Agriculture (USDA) program participants, or anticipate participating in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

This preliminary jurisdictional determination is non-binding and indicates that there may be waters of the United States, including wetlands on the parcel. Pursuant to Federal Regulations at 33 C.F.R. 331.2, preliminary JDs are advisory in nature and may not be appealed (see attached Notification of Appeal Form - Enclosure 1). However, the applicant retains the right to request an approved jurisdictional determination, which may be appealed. Also enclosed (Enclosure 2) is a copy of the Preliminary Jurisdictional Determination Form signed by the applicant or his agent agreeing to accept a preliminary jurisdictional determination. Please be aware that for purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will

APPENDIX A2

E. FLOOD ZONES

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) dated March 16, 2015, Map Number 10005C0511K, the subject property is located in a Zone “X” unshaded, which is an area outside the 500-year floodplain, less than 0.2% annual probability of flood (see FEMA Floodplain Map – Appendix B).

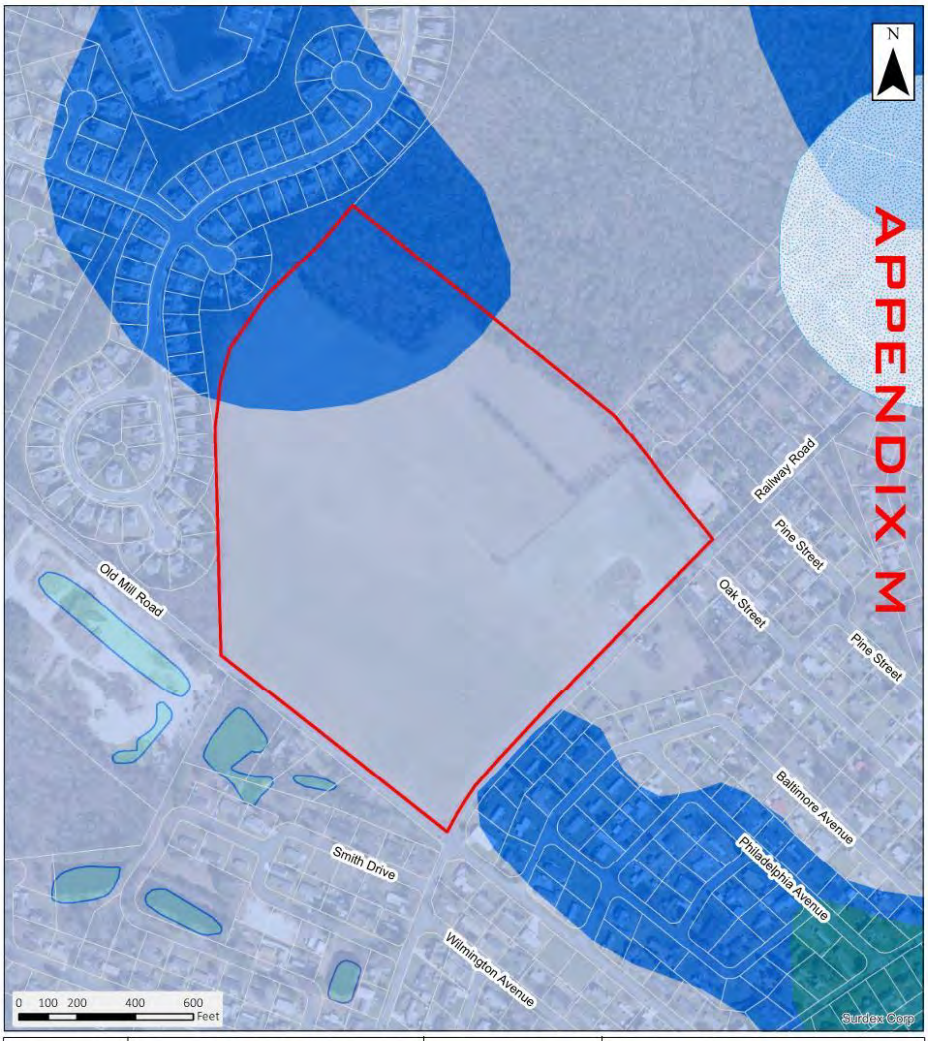


F. FORESTS

The Site consists of approximately 3.6+/- acres of woods within the property. The total forest stand area that connects to the limited wooded area measures 100+/-acres which consists of adjacent parcels to the northeast owned by Bethany Bay HOA. The total forest area associated with the proposed project is approximately 3.6+/- acres, which constitutes 3% of the existing forest stand. The only impact to the forested area is along an existing drainage ditch which may impact less than 1% of the overall forest stand. In addition, the proposed impacts shall occur on the fringe of forest stand and not the larger contiguous stand.

G. GROUNDWATER RECHARGE POTENTIAL

The entire site is located in a fair groundwater recharge area except for the north corner which is good, based on Pennoni's review of available maps (see Ground Water Recharge – Appendix M). The site primarily has a general Hydrologic Soil Group (HSG) A rating with approximately 0-2 percent slope while the back of the site has a mix of Group A, B & D soils. Group A soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. Group B/D soils will have a less infiltration rate and cause higher runoff. These soils have a high rate of water transmission. The north corner of the site is depicted as Hydrologic Soils Group A/D indicated drained vs undrained soils. The north corner of the site is undisturbed wooded wetlands which are classified as Group D for their natural condition. The site is not located in a Wellhead Protection Area.



IV. HISTORICAL INFORMATION

A. THE PROPERTY

The property was purchased 16-years ago, by Linder & Company, Inc. and has been consistently farmed.

Pennoni reviewed available historical information for indications of past usage that may have had an environmental impact on the Site This historical review included aerial photographs of the Site and surrounding vicinity for year 1937, 1954, 1961, 1968, 1992, 1997, 2002, 2007, 2012, and 2017 (see Orthophotos – Appendix N - W). Information depicted on aerial photographs indicates active farming of the Property around 1937. Today the property is still being used for farming as well.

According to the Division of Historical and Cultural Affairs, nothing of historical or cultural significance is known to exist within this parcel.

B. SURROUNDING NEIGHBORHOOD

The property is located in a primarily residential area. The property is bordered on the northwest by Bay Forest Subdivision, currently zoned MR; on the northeast by a vacant wooded parcel owned by the Bethany Bay HOA, zoned AR-1 and residential lots, zoned GR; on the southern frontages, Old Mill Road to the southwest and Railway Road to the southeast. The proposed conditional use for an apartment complex will not diminish or impair property values within the community; will not create a public nuisance; will not substantially increase the hazard from fire or other dangers to neighboring properties, unduly increase traffic congestion on the public highways, result in an increase in public expenditures, or otherwise impair the public health, safety, comfort, morals or general welfare of the public.

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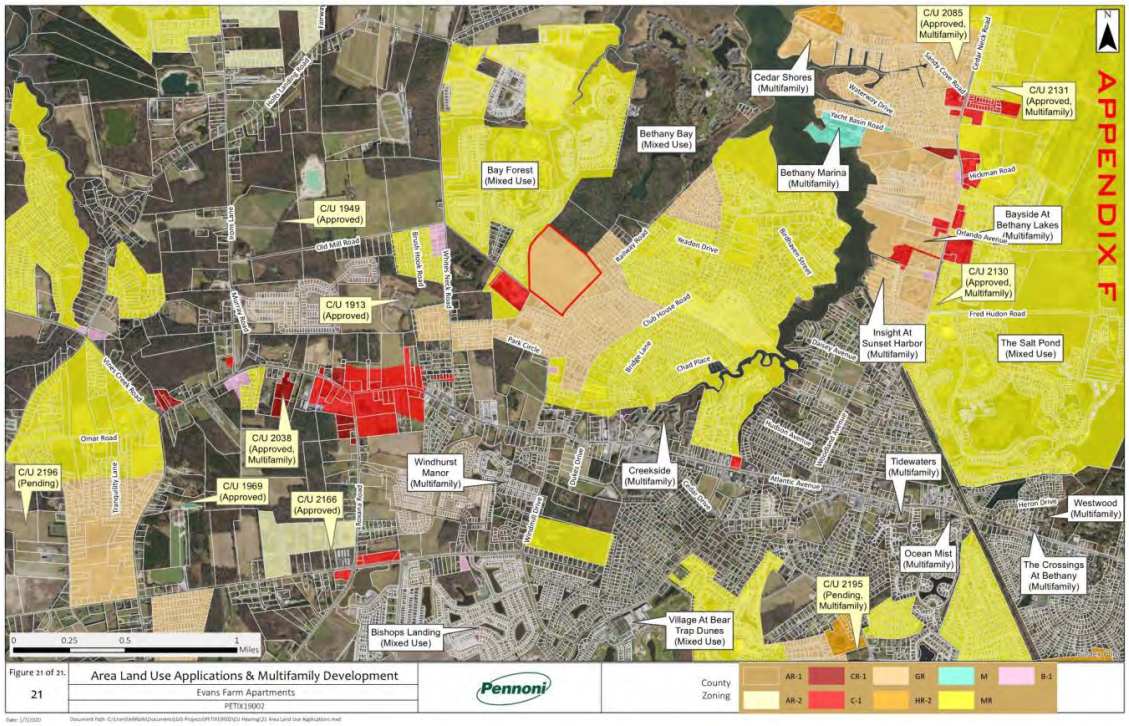


V. ANALYSIS OF REQUIRED INFORMATION

A. STORMWATER MANAGEMENT

Stormwater facilities are very effective techniques for providing channel protection and pollutant removal prior to entering the existing streams. The importance of stormwater facilities can be attributed to their proven ability to attenuate runoffs from design storm events. Stormwater facilities, existing wooded vegetation and wetlands are common practices for treating stormwater runoffs.

It is the stated goal of the project to provide in general, all Erosion & Sediment Control (ESC) and Stormwater Management (SWM) Best Management Practices (BMPs) which will comply with DNREC standards and specifications in accordance with current guidance documents and policies. Green Technologies and Pollution Control Strategies will be implemented to reduce nitrogen and phosphorus loads to their mandated levels.

Stormwater design for this site will primarily be contained onsite through a series of proposed BMP's. The project will strive to balance the soil cut and fill in order to limit hauling away or bringing in soil thereby saving money and reducing the environmental impact by using "Ephemeral Constructed Wetlands" for onsite stormwater quality and quantity management. We will utilize the existing field ditches along the perimeter as part of the outfall drainage system for the site to help carry runoff to the existing point of analysis at the northeast corner of the property along Railway Road. (See Appendix L). The entire Site is in a fair groundwater recharge area except for the north corner, which is good, based on Pennoni's review of available maps (see Ground Water Recharge – Appendix M). The site is not located in a Wellhead Protection Area. The site primarily has a general Hydrologic Soil Group (HSG) A rating with approximately 0-2 percent slope while the rear section of the property is a mix between Soil Groups A, B & D. Group A soils having a high infiltration rate (low runoff potential) when thoroughly wet while B & D has less permeability and will cause higher runoff potential. Soils A has a high rate of water transmission. The north corner of the site is depicted as Hydrologic Soils Group A/D indicated drained vs undrained soils. The north corner of the site is undisturbed wooded wetlands which are classified as Group D for their natural condition.

According to the DNREC…the Ephemeral Constructed Wetlands will mimic natural wetlands areas to treat urban stormwater runoff by incorporating permanent pools with shallow storage areas and water tolerant vegetation. The design of these BMP's allows for shallow ponding and long residence time for greater pollutant removal such as gravitational settling, biological uptake & microbial activity. The system allows for Total Nitrogen (TN) and Phosphorus (TP) reduction along with Total Suspended Solids (TSS) ranging from 20% to 60% respectively. Runoff from each rain event is detained and treated in the BMP until it is displaced by runoff from the next storm. By capturing and retaining runoff during storm events, BMP's control both storm water quantity and quality. A constructed wetland BMP works well with high groundwater tables and provides aesthetic and wildlife habitat benefits which will enhance the existing nature of the site and expand the presence of environmental wetlands.

During the design of the stormwater practices the designers and the developer have been and will continue to work with the Sussex Conservation District to achieve the best management practice for the development.

B. WATER SUPPLY

Tidewater has a water supply line along Railway Road along our property frontage. The utility connection will be used to provide the subject property with both fire and domestic water for the uses that will be planned for the property.

DNREC Water Supply Permits will be executed if dewatering is necessary to install the infrastructure within the project area. Irrigation Wells will also be permitted and installed for the landscaping of the project.

As part of our preparation of site utility plans for approvals by the Fire Marshal Office and the Office of Drinking Water (Public Health), an approval by Tidewater Utilities will be secured for this project.

C. WASTEWATER TREATMENT

As stated above, the property is located in the Tier 1 – Sussex County Unified Sanitary Sewer District and will serve this property. We have submitted and received acceptance per our Sewer Service Concept Evaluation (SSCE) from the Sussex County Utility Planning Division. All wastewater will be collected and conveyed to an existing main located in Old Mill Road.

D. TRAFFIC

Per the 2019 Delaware Vehicle Volume Summary, the annual average and summer average daily traffic volumes along the segment of Old Mill Road & Railway Road where the subject land is located, are 3,825 and 3,219 vehicles per day, respectively.

Old Mill Road (SCR 349) and Railway Road (SCR350) are both Local Roads. As a part of this project, roadway improvements will be made that will increase safety capacity along the property frontage. The primary access will be from Old Mill Road. Roadway improvements in the form of widenings, paving overlay and shoulders will be increased to accommodate the additional capacity on the roadway. To allow for future capacity, additional right-of-way dedication along both Old Mill and Railway roadways; permanent easements and additional stormwater management setbacks will be dedicated to the Public. This would increase the aesthetic benefits to the community]. The roadways will be widened to their required functional classification of a local road with 11’ wide travel lanes and 5’ wide shoulders along the property frontage on both sides of the road. A 10’ wide shared use path will be constructed along the entire frontage of the property providing safe pedestrian and bicyclist movements in the area. In addition, an Area Wide Study (AWS) fee will be paid to DelDOT to further assist them in planning of this area. We will also be upgrading existing crossroad pipes and drainage swales to better enhance the runoff conveyance and drainage of the area. Pennoni and DelDOT have conducted a Pre-Submittal Meeting along with a site visit in December 2019 and walked all roadways to review in detail the existing conditions of pavement and drainage infrastructure.

Additional setbacks and right-of-way dedications along both roadways will be increased to allow for future capacity.

E. SPECIES AND HABITAT

No critical habitat was identified within the project area. See Appendix A.

F. WETLANDS

There is a small pocket of wetlands at the north corner of the site. The Wetland Boundary was originally delineated by White Oaks Environmental, Inc. in April 2006 and a Jurisdictional Determination (JD) confirming those wetlands was issued on June 4, 2007. The wetland boundary was re-evaluated in July 2010 by Landmark/JCM, Inc. and remained unchanged compared to the 2007 JD as depicted on a Wetlands Plan prepared by Becker Morgan. A site visit was performed on December 21, 2019 to evaluate the current conditions and it was determined that the conditions had not changed, and a new JD has been obtained as they are only good for a five-year period. (See Appendix A, A1 & A2.)

Although no buffer setbacks are required for non-tidal wetlands, the project proposes a 75-foot buffer from the wetlands that is more than adequate to protect the buffers and are an effective and cost-efficient best management practice that can be used to improve water quality.

G. FORESTS

The Site consists of approximately 3.6+/- acres of woods within the property. The total forest stand area that connects to the limited wooded area measures 100+/-acres which consists of adjacent parcels to the northeast owned by Bethany Bay HOA. The total forest area associated with the proposed project is approximately 3.6+/- acres, which constitutes 3% of the existing forest stand. The only impact to the forested area is along an existing drainage ditch which may impact less than 1% of the overall forest stand. In addition, the proposed impacts shall occur on the fringe of forest stand and not the larger contiguous stand.

H. INFRASTRUCTURE

No matter the level of service, the developer is responsible for all infrastructure upgrades (roads, water, sewer, environment, etc.) onsite and off-site that will increase safety and orderly growth which will not only meet the needs of the project but for the prosperity of the community.

I. HISTORIC AND CULTURAL RESOURCES

A search of this property on the Division of Historical and Cultural Affairs Office data base showed that Nothing is known within this parcel.

J. TMDLs

The site consists mainly of well drained soils in the hydrologic soil group A and is located on the Inland Bays Low Reduction Area Watershed, specifically on the Indian River Bay which mandates a 40% reduction in Total Nitrogen and Phosphorus concentrations to meet set Total Maximum Daily Load (TMDL) goals. It is the stated goal of the project to provide in general, all Erosion & Sediment Control (ESC) and Stormwater Management (SWM) Best Management Practices (BMPs) which will comply with DNREC standards and specifications in accordance with current guidance documents and policies. Green Technologies and Pollution Control Strategies will be implemented to reduce nitrogen and phosphorus loads to their mandated levels.

The site will connect into a public wastewater utility and therefore lessen the burden of pollutants entering the groundwater.

K. FLOODPLAINS

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) dated March 16, 2015, Map Number 10005C0511K, the subject property is located in a Zone “X” unshaded, which is an area outside the 500-year floodplain, less than 0.2% annual probability of flood (see FEMA Floodplain Map – Appendix B).



L. OTHER RELATED TOPICS

VI. REFERENCES

1. Becker Morgan Boundary Survey
2. U.S. Department of Interior, Geological Survey, Topographic Map, Sussex County, Delaware
3. Federal Emergency Management Agency (FEMA), 2015. Flood Insurance Rate Map (FIRM), Sussex County, Delaware
4. U.S. Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, Sussex County
5. U.S. Department of Interior, Fish and Wildlife Service. National Wetlands Inventory, Sussex County, Delaware
6. Groundwater Recharge Potential, Sussex County, Delaware. Delaware Geological Survey
7. Landmark Engineering, Wetland Investigation Report, dated October 2010
8. Wetland Jurisdictional Determination Update, Kenneth W. Redinger Environmental Services
9. Wetland Jurisdictional Determination, Army Corp of Engineers
10. 2019 Sussex County Comprehensive Plan – The Sussex Plan
11. Delaware Department of Transportation Service Level Evaluation Request Review – April 21, 2019
12. Geo-Technology Associates, Inc (GTA) Subsurface Exploration Report, dated March 25, 2014 & GTA Supplemental Subsurface Exploration Report, dated February 14, 2020.

TAB 4

PREVIOUS APPROVALS

PETIX 19002

ORDINANCE NO. 2176

AN ORDINANCE TO GRANT A CONDITIONAL USE OF LAND IN A GR GENERAL RESIDENTIAL DISTRICT FOR MULTI-FAMILY DWELLING STRUCTURES TO BE LOCATED ON A CERTAIN PARCEL OF LAND LYING AND BEING IN BALTIMORE HUNDRED, SUSSEX COUNTY, CONTAINING 48.3595 ACRES, MORE OR LESS

WHEREAS, on the 30th day of July 2009, a conditional use application, denominated Conditional Use No. 1849 was filed on behalf of Linder & Company, Inc., c/o Andrea Finerosky; and

WHEREAS, on the 10th day of November 2010, a public hearing was held, after notice, before the Planning and Zoning Commission of Sussex County and on the 9th day of December 2010, said Planning and Zoning Commission recommended that Conditional Use No. 1849 be approved with conditions; and

WHEREAS, on the 30th day of November 2010, a public hearing was held, after notice, before the County Council of Sussex County and the County Council of Sussex County determined, based on the findings of facts, that said conditional use is in accordance with the Comprehensive Development Plan and promotes the health, safety, morals, convenience, order, prosperity and welfare of the present and future inhabitants of Sussex County, and that the conditional use is for the general convenience and welfare of the inhabitants of Sussex County.

NOW, THEREFORE, THE COUNTY OF SUSSEX HEREBY ORDAINS:

Section 1. That Chapter 115, Article VI, Subsection 115-39, Code of Sussex County, be amended by adding the designation of Conditional Use No. 1849 as it applies to the property hereinafter described.

Section 2. The subject property is described as follows:

ALL that certain tract, piece or parcel of land, lying and being situate in Baltimore Hundred, Sussex County, Delaware, and lying at the northwesterly corner of Railway Road (Road 350) and Old Mill Road (Road 349) and being more particularly described as follows:

BEGINNING at a point on the northwesterly right-of-way of Railway Road, a corner for these lands and lands of Carl I. Habecker; thence southwesterly 1292.66 feet along the northwesterly right-of-way of Railway Road to a point; thence south 76°53′25″ west 62.40 feet across the intersection of Railway Road and Old Mill Road to a point; thence northwesterly 941.62 feet along the northeasterly right-of-way of Old Mill Road to a point, a corner with Bay Forest Residential Planned Community; thence northerly 1640.8 feet along the meandering property line with Bay Forest Residential Planned Community to a point; thence south 53°29′49″ east 1165.74 feet along other lands of Linder and Company, Inc. to a point; thence south 38°26″28″ east 545.97 feet along lands of Fred and Carol Coulson, Jerry Drive, a street in Layton Development, and lands of Carl I. Habecher to the point and place of beginning, said property containing 48.3595 acres, more or less.

This Ordinance shall take effect immediately upon its adoption by majority vote of all members of the County Council of Sussex County, Delaware.

This Ordinance was adopted subject to the following conditions:

1. **There shall be no more than 200 units within the development.**
2. **All entrances, intersections, roadways and multi-modal improvements required by DelDOT shall be completed by the Applicant in accordance with DelDOT's determination.**
3. **Recreation amenities shall be completed within the project as follows:**
   a. **Community Center/Clubhouse, pool, playground and courts shall be completed on or before the issuance of the 50th Certificate of Compliance/Occupancy.**
   b. **Multi-modal recreational facilities shall be completed on or before the 100th Certificate of Compliance/Occupancy.**
4. **The development shall be served as part of the Millville Expansion of the Bethany Beach Sanitary Sewer District.**
5. **The development shall be served by a central water system providing adequate drinking water and fire protection as required by applicable regulations.**
6. **Stormwater management and erosion and sediment control shall be constructed in accordance with applicable State and County requirements, and the project shall utilize Best Management Practices to construct and maintain these fixtures.**

7. No wetlands shall be disturbed except as authorized by State and Federal permits.
8. Interior street design shall comply with or exceed Sussex County standards and shall include sidewalks or multi-modal pathways on one side of all streets with street lighting.
9. Road naming and addressing shall be subject to the review and approval of the Sussex County Mapping and Addressing Department.
10. The Applicant shall consult with the local school district's Transportation Manager to determine if a school bus stop is appropriate.
11. Construction, site work, excavation, grading and deliveries to or from the property shall only occur between the hours of 7:00 a.m. to 6:00 p.m. Monday through Saturday.
12. The Final Site Plan shall include a landscape plan for the development. Landscape and lawn maintenance shall be the responsibility of the developer or the condominium association.
13. For excavation of the large pond at the center of the development, which has similar characteristics to a borrow pit, the following conditions shall apply to protect the neighboring residential properties and roadways:
    a. No dredging shall be permitted.
    b. Water or a water truck shall be available to control dust when conditions require.
    c. No materials shall be brought from off-site for processing, mixing, or similar purposes.
    d. A construction entrance for the excavation operations shall be established and maintained in good condition.
14. The Final Site Plan for this development shall contain the approval of the Sussex Conservation District.

I DO HEREBY CERTIFY THAT THE FOREGOING IS A TRUE AND CORRECT COPY OF ORDINANCE NO. 2176 ADOPTED BY THE SUSSEX COUNTY COUNCIL ON THE 1ST DAY OF FEBRUARY 2011.

ROBIN A. GRIFFITH
CLERK OF THE COUNCIL

The Council found that the Conditional Use was appropriate legislative action based on the following Findings of Fact:

1. **This is an application for a Conditional Use of land in a GR General Residential District for multi-family dwelling structures to be located on a certain parcel of land lying and being in Baltimore Hundred, Sussex County, containing 48.3595 acres, more or less, lying at the northwesterly corner of Railway Road (Road 350) and Old Mill Road (Road 349).**
2. **DelDOT provided a Letter of No Objection to the entrance location for the project.**
3. **The County Engineering Department commented that this site is located in the Millville Expansion Area of the Bethany Beach Sanitary Sewer District; that Ordinance 38 construction will be required; that conformity to the South Coastal Area Planning Study 2005 Update will be required; that construction to the sewer system is mandatory; that the proposed project is in a recent expansion area; and that sanitary sewer service is available to the project.**
4. **The Sussex Conservation District commented that the Applicants will be required to follow recommended erosion and sediment control practices during construction and to maintain vegetation after construction; that no storm flood hazard areas or tax ditches are affected; that it may not be necessary for off-site drainage improvements; and that on-site drainage improvements will be necessary.**
5. **PLUS commented that the project is within Level 2 and 3 as defined by the Strategies for State Policies and Spending and that the State has no objections to the development of the site.**
6. **The proposed use is consistent with the County's Comprehensive Land Use Plan.**
7. **The project will be served or benefitted by amenities, which include a clubhouse, pool, playground, volleyball court, basketball court, tennis court and walking path.**
8. **With the conditions placed upon this recommendation, there will be no adverse impact upon traffic or the neighboring area.**
9. **The development is consistent with the general purpose of the Zoning Ordinance that promotes the orderly growth, convenience, order, prosperity and welfare of Sussex County.**

10. **The proposed density is less than the maximum density permitted in the GR zone.**

11. **Based on the above findings and the record and recommendation of the Planning and Zoning Commission, the Conditional Use was approved subject to fourteen conditions, which will serve to minimize any potential impact on the surrounding area or properties.**

PLANNING & ZONING COMMISSION

ROBERT C. WHEATLEY, CHAIRMAN
IRWIN G. BURTON, III
MICHAEL B. JOHNSON
MARTIN L. ROSS
RODNEY SMITH



Sussex County

DELAWARE
sussexcountyde.gov
302-855-7878 T
302-845-5079 F
LAWRENCE B. LANK
DIRECTOR

March 14, 2016

Jeffrey Harman P.E.
Becker Morgan Group Inc.,
Port Exchange, Suite 300
312 West Main St.
Salisbury, MD 21801

RE: Notice of Decision for Final Site Plan for Conditional Use (CU 1849) Village at Evans Pond located off of Gills Neck Rd.
Tax Parcel: 134-12.00-74.00

Dear Mr. Harman,

At their meeting of March 10, 2016 the Planning Commission approved the Final Site Plan for Conditional Use (CU 1849) Village at Evans Pond for the construction of seventeen (17) multi-family buildings for a total of 200 dwelling units to be located off of Gills Neck Rd. Staff is in receipt of all agency approvals and the road construction complies with the revision to Condition #8 that the Planning Commission approved on December 16, 2015.

You may now submit the Final Site Plan for endorsement by the Planning Office. Please submit a minimum of two (2) full size signed and sealed paper copies. If the plan is to be recorded in the Sussex County Recorder of Deeds Office an additional two (2) full sized signed and sealed paper copies shall also be submitted to the Planning Office for endorsement. Additional copies may be submitted for endorsement. After endorsement submit a PDF (via e-mail) showing the approval by the Planning Office and if recorded the approval by the Recorder of Deeds Office.

The Conditional Use was granted a time extension by the Sussex County Council on January 12, 2016. The Conditional Use is valid until July, 1, 2016. The site shall have a notice to proceed from the Sussex County Department of Engineering and shall be substantially underway prior to July 1, 2016 otherwise the plan shall expire.

The term "substantially underway" if the right-of-way has been cleared, the roadways, internal streets and/or parking areas have been rough-graded, the drainage system and/or stormwater management facilities have been rough-graded and erosion and sediment control measures are in place and being actively maintained. In a case where no new construction is required to implement the approved use, the use shall be deemed "substantially underway" if the activity permitted by the approved conditional use is actively underway. “Abandonment” shall mean that the subject parcel remains idle or unused, or that no construction activity is actively underway, for a continuous period of two years, whether or not equipment or fixtures are removed.

Please feel free to contact me with any questions during business hours 8:30am – 4:30pm Monday through Friday at 302-855-7878.

Sincerely,

Janelle M Cornwell

Janelle M. Cornwell, AICP
Planning & Zoning Manager

EQUAL HOUSING OPPORTUNITY

PLANNING & ZONING COMMISSION
ROBERT C. WHEATLEY, CHAIRMAN
IRWIN G. BURTON, III
MICHAEL B. JOHNSON
MARTIN L. ROSS

Sussex County
DELAWARE
sussexcountyde.gov
302-855-7878 T
302-845-5079 F
LAWRENCE B. LANK
DIRECTOR

April 16, 2016

Jeffrey Harman P.E.
Becker Morgan Group Inc.,
Port Exchange, Suite 300
312 West Main St.
Salisbury, MD 21801

RE: Notice of Decision for the Record Plan for The Village at Evans Pond CU 1849 to be located off of Railway Rd. and Old Mill Rd.
Tax Parcel: 134-12.00-74.00

Dear Mr. Harman,

At their meeting of March 10, 2016 the Planning Commission approved the Final Site Plan for Conditional Use (CU 1849) Village at Evans Pond for the construction of seventeen (17) multi-family buildings for a total of 200 dwelling units to be located off of Gills Neck Rd. Staff is in receipt of all agency approvals and the road construction complies with the revision to Condition #8 that the Planning Commission approved on December 16, 2015.

The Record Plan has been approved and may now be recorded in the Sussex County Recorder of Deeds Office. The Plans may be picked up in the Planning Office approved box. After recordation please submit a PDF (via e-mail) showing the approval by the Planning Office and approval by the Recorder of Deeds Office. Prior to the issuance of a Building Permit the Final Site Plan shall be approved by the Planning Office.

The Planning Office has reviewed the Final Site Plan. Staff notes that the Landscape Plan shall be signed by licensed Landscape Architect. The number of trees in the Plant List also needs to reflect number of trees shown on the Landscape Plan Sheet along with planting notes.

The Conditional Use was granted a time extension by the Sussex County Council on January 12, 2016. The Conditional Use is valid until July, 1, 2016. The site shall have a notice to proceed from the Sussex County Department of Engineering and shall be substantially underway prior to July 1, 2016 otherwise the plan shall expire.

The term "substantially underway" if the right-of-way has been cleared, the roadways, internal streets and/or parking areas have been rough-graded, the drainage system and/or stormwater management facilities have been rough-graded and erosion and sediment control measures are in place and being actively maintained. In a case where no new construction is required to implement the approved use, the use shall be deemed "substantially underway" if the activity permitted by the approved conditional use is actively underway. “Abandonment” shall mean that the subject parcel remains idle

or unused, or that no construction activity is actively underway, for a continuous period of two years, whether or not equipment or fixtures are removed.

Please feel free to contact me with any questions during business hours 8:30am – 4:30pm Monday through Friday at 302-855-7878.

Sincerely,

Janelle M Cornwell

Janelle M. Cornwell, AICP
Planning & Zoning Manager

ENGINEERING DEPARTMENT

ADMINISTRATION	(302) 855-7718
AIRPORT & INDUSTRIAL PARK	(302) 855-7774
ENVIRONMENTAL SERVICES	(302) 855-7730
PUBLIC WORKS	(302) 855-7703
RECORDS MANAGEMENT	(302) 854-5033
UTILITY ENGINEERING	(302) 855-7717
UTILITY PERMITS	(302) 855-7719
UTILITY PLANNING	(302) 855-1299
FAX	(302) 855-7799

Sussex County
DELAWARE
sussexcountyde.gov
HANS M. MEDLARZ, P.E.
COUNTY ENGINEER
MICHAEL E. BRADY
DIRECTOR OF PUBLIC WORKS

March 9, 2016

Mr. Jeffrey Harman, P. E.
Becker Morgan Group, Inc.
Port Exchange - Suite 300

312 West Main Street

REF: **THE VILLAGE AT EVANS POND (AKA EVANS FARM)**
MILLVILLE EXPANSION OF THE
BETHANY BEACH SANITARY SEWER DISTRICT
SUSSEX COUNTY TAX MAP NUMBER
134-12-PARCEL 74 - CLASS-1
AGREEMENT NO. 988

Dear Mr. Harman:

The above referenced project was approved on March 9, 2016 and one (1) set of the approved plan is enclosed. This approval is valid for three (3) years, unless prior to expiration of that three (3) year period, a time extension is requested and approved by the Department. Plans granted an extension beyond the three (3) period will be required to meet updated standards and specifications.

Also, it is your responsibility to secure approvals and/or permits that may be required by other regulatory agencies.

Please contact Mr. Gary Fleetwood of this Division to initiate pre-construction procedures for private roads and Mr. Keith Bryan in the Department's Division of Utility Engineering to initiate pre-construction procedures for sanitary sewer.

Should you have any questions, please do not hesitate to contact me.
Sincerely,

SUSSEX COUNTY ENGINEERING DEPARTMENT

Michael Brady
Director of Public Works

Enclosure

cc: Mr. Brad Hawkes, w/ 2 enclosures
Mr. Lawrence Lank, w/o enclosure
Ms. Andrea Finerosky, w/o enclosure
Public Works Field File, w/ 1 enclosure

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. BOX 778
DOVER, DELAWARE 19903

JENNIFER COHAN
SECRETARY

January 07, 2016

Mr. Lawrence Lank, Director
Sussex County Planning & Zoning Commission
Sussex County Administration Building
P.O. Box 417
Georgetown, Delaware 19947

BECKER MORGAN GROUP
JAN 20 2016
SBY
RECEIVED

SUBJECT: **Letter of No Objection to Recordation**
West Shores at New Milford
Tax Parcel # 330-11.00-6.06
Wilkins Road (SCR206)
Milford, Sussex County

Dear Mr. Lank:

The Department of Transportation has reviewed the Site Plan, dated September 10, 2003 (signed by the Engineer on December 22, 2015), for the above referenced site, and has no objection to its recordation as shown on the enclosed drawings. This "No Objection to Recordation" approval shall be valid for a period of **five (5) years**. If the Site Plan is not recorded prior to the expiration of the "No Objection to Recordation", then the plan must be updated to meet current requirements and resubmitted for review and approval.

This letter does not authorize the commencement of entrance construction. Entrance plans shall be developed in accordance with DelDOT's Development Coordination Manual and submitted to the Development Coordination Section for review and approval.

This "No Objection to Recordation" letter is not a DelDOT endorsement of the project discussed above. Rather, it is a recitation of the transportation improvements, which the applicant may be required to make as a pre-condition to recordation steps and deed restrictions as required by the respective county/municipality in which the project is located. If transportation investments are necessary, they are based on an analysis of the proposed project, its location, and its estimated impact on traffic movements and densities. The required improvements conform to DelDOT's published rules, regulations and standards. Ultimate responsibility for the approval of any project rests with the local government in which the land use decisions are authorized.

DelDOT

There may be other reasons (environmental, historic, neighborhood composition, etc.) which compel that jurisdiction to modify or reject this proposed plan even though DelDOT has established that these enumerated transportation improvements are acceptable.

If I can be of any further assistance, please call me at (302) 760-2266.

Very truly yours,

Steve Sisson
Sussex County Review Coordinator
Development Coordination

Enclosure (1)
cc: (1) Bill Luther, RB Land Holding LP
(4) Jeffrey Harman, Becker Morgan Group, Inc.
(1) Gemez W. Norwood, South District Entrance Permit Supervisor
(2) Rob Pierce, Milford City Manager
(1) File / Scan
Jessica L. Watson, Sussex Conservation District
Todd Sammons, Subdivision Engineer

AUTHORIZATION TO CONSTRUCT UNDER THE

LAWS OF THE STATE OF DELAWARE

PART I

1. **In compliance with the provisions of 7 Del. C., §6003,**

Sussex County Council
2 The Circle
P. O. Box 589
Georgetown, DE 19947

and

Linder & Company, Inc.
234 North James Street
Newport, DE 19804

are authorized, jointly and individually, to construct facilities consisting of the following:

Approximately four thousand, five hundred and forty (4,540') linear feet of eight (8") inch diameter PVC gravity sewer; twenty-seven (27) manholes; cleanouts, laterals and related facilities to serve the proposed apartment complex of the Village at Evans Pond, located in the northerly quadrant of the Old Mill Road (County Road 349) and Railway Road (County Road 350) intersection, Millville area, Baltimore Hundred, Sussex County, Delaware,

in accordance with plans and specifications as described below and limitations, requirements and other conditions set forth in Parts I, II and III hereof.

2. The plans and specifications consist of the following:

Eleven (11) drawings** prepared by Becker Morgan Group, Inc., titled "Village at Evans Pond – Baltimore Hundred – Sussex County, Delaware – Construction Plans", dated 1.27.15, revised XX XX, XXXX, endorsed by Mr. Michael A. Izzo, Sussex County Engineer, on XXXXX; the current Sussex County Standard Specifications for Design and Construction of Ordinance 38 Projects; and a letter, dated November 30, 2012, addressed to Molly J. Mackil, P.E., DNREC, from Mr. Michael A. Izzo, P.E., County Engineer, Sussex County.

Greg Pope, Engineer VI
Under agreement with Surface Water Discharges Section
Division of Water
State of Delaware Department of Natural Resources
and Environmental Control

3/28/16
Date Signed

** Sheet Nos. XX, C-001, C-300 through C-305, C-701, C-702 and C-903:
Sheet No. XX titled "XXXX"; Sheet No. C-001 titled "Cover Sheet"; Sheet No. C-300 titled "Utilities Plan (Water & Sewer) Key Plan"; Sheet Nos. C-301 through C-305 titled "Utilities Plan (Water & Sewer)"; Sheet Nos. C-701 and C-702 titled "Profiles"; and Sheet No. C-903 titled "Construction Details".

3. The liquid waste will be discharged through the existing wastewater collection and transmission facilities to the Sussex County South Coastal Wastewater Treatment Facility which discharges treated wastewater to the Atlantic Ocean in accordance with NPDES Permit No. DE0050008.

A. Effluent Limitations on Pollutants Attributable to Industrial Users

The use of the constructed facility is conditioned on meeting all applicable pretreatment standards under 40 CFR, Part 403, or toxic pollutant discharge limitations under Section 307(a) of the Clean Water Act of 1977, PL 95-217.

B. Flow and Usage Limitations

This permit authorizes a daily average discharge of N/A gallons*. The flow in the system shall be measured at least every N/A.

* This permit authorizes only the construction of the wastewater collection and conveyance facilities referenced herein.

The proposed construction is estimated to generate 61,149 gallons per day (gpd), based on 200 apartments @ 300 gpd/apartment + 1,149 gpd for community building and pool.

C. Monitoring and Reporting (When Required)

1. Representative sampling of the volume and nature of the monitored discharge shall be conducted at the request of the Division of Water.

2. Reporting

Monitoring results shall be reported to the:
Delaware Department of Natural Resources and Environmental Control
Division of Water, Surface Water Discharges Section
89 Kings Highway
Dover, DE 19901
302-739-9946

3. Definitions

a. "Daily average flow" means the total flow during a calendar month divided by the number of days in the month that the facility was operating.

b. "Daily maximum flow" means the highest total flow during any calendar day.

c. "Daily Peak Flow" means the flow which can be safely transported within the sewage system without causing an overflow or a backup into the building(s) or residence(s).

d. "Bypass" means the intentional diversion of wastes from any portion of a treatment facility.

e. "Measured flow" means any method of liquid volume measurement, the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.

f. "Estimate" means a value to be based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters and batch discharge volumes.

4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The date, exact place and time of sampling or measurement;

b. The person(s) who performed the sampling and/or measurement;

c. The date(s) and time(s) analysis was performed;

d. The individual(s) who performed each analysis;

e. The analytical technique(s) or method(s) used;

f. The results of each analysis; and

g. Appropriate quality assurance information.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed, all records of instrument calibration and maintenance and all charts from continuous monitoring instruments, shall be retained for three (3) years. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Department.

6. Test Procedures

Test procedures for the analysis of pollutants shall conform to the applicable test procedures identified in 40 CFR, Part 136, unless otherwise specified in this permit.

END OF PART I

PART II

A. Management Requirements

1. Duty to Comply

The permittee must comply with the terms and conditions of this permit. Failure to do so constitutes a violation of this permit, which is grounds for enforcement and the imposition of penalties as provided in 7 Del.C., Chapter 60, grounds for permit termination or loss of authorization to discharge or operate pursuant to this permit, grounds for permit revocation and reissuance or permit modification, or denial of a permit renewal application.

2. Notification

a. Changes in Authorized Activities

The permittee shall notify the Department of any proposed change in the activity authorized herein, of any proposed substantive change in the operation of the facility or facilities authorized herein, or of any anticipated facility expansions, production increases, or process modifications. Notification is required only when such alteration, addition or change may justify the inclusion of conditions that are absent or different from those specified in this permit. This includes, for example, the construction of additional wastewater collection, transmission or treatment facilities and changes which will result in new, different, or increased discharges of pollutants. Following such notice, the Department may require the submission of a new permit application and this permit may be reopened and modified to address the proposed changes.

b. Noncompliance

If, for any reason, the permittee does not comply with or will be unable to comply with any limitation specified in this permit, the permittee shall provide the Department with the following information, in writing, within five (5) days of becoming aware of such condition:

A description of the discharge and cause of noncompliance; and

The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. Facilities Operation

The permittee shall, at all times, maintain in good working order and operate as efficiently as possible all collection and treatment facilities and systems (and related appurtenances) installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes, but is not limited to, effective management, adequate operator staffing and training and adequate laboratory process controls, including appropriate quality assurance procedures.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the State resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and extent of the noncomplying discharge.

5. Bypassing

Any bypass or intentional diversion of waste streams from the facilities authorized by this permit, or any portion thereof, is prohibited, except (i) where unavoidable to prevent loss of human life, personal injury or severe property damage, or (ii) where excessive storm drainage or run-off would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. The permittee shall promptly notify the Department, in writing, of each such diversion or bypass.

6. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewater shall be disposed of in a manner such as to prevent any pollutant from such materials from entering the surface water or groundwater.

B. Responsibilities

1. Within 90 days following the completion of construction, the permittee shall submit to the Department an "as-built" set of plans of the facility or facilities constructed, bearing the seal and signature of a licensed Professional Engineer registered in the State of Delaware.

2. Right of Entry

The permittee shall allow the Secretary of the Department of Natural Resources and Environmental Control, or his authorized representative(s), upon the presentation of credentials:

a. To enter upon the permittee's premises for inspection of any records, flow measurements, construction or other activity authorized by this permit or any condition required under the terms of this permit; and

b. At reasonable times, to have access to and to copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and

c. To sample any discharge.

3. Transferability

This permit is transferable with the Department's consent, provided that an intention to transfer accompanied by a copy of the permit is provided to the Department, signed by both the transferor and the transferee at least ten (10) days prior to the actual transfer.

4. Availability of Reports

All reports submitted with the application and those reports required under the terms of this permit shall be available for public inspection at the offices of the Department of Natural Resources and Environmental Control. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in 7 Del. C., §6013. Any person who causes or contributes to the discharge of a pollutant into State waters either in excess of any conditions specified in this permit or in absence of a specific permit condition shall report such an incident to the Department required under 7 Del. C. §6028.

5. Permit Modification

This permit may be modified, suspended or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any term or condition of this permit;

b. Obtaining this permit by misrepresentation or failure to fully disclose all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized activity; or

d. Information that the permitted activity poses a threat to human health or welfare, or to the environment.

6. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under 7 Del. C., Chapter 60.

7. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation.

8. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

9. Severability

The provisions of this permit are severable. If any provision of this permit is held invalid, or if the application of any provision of this permit to any circumstances is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

END OF PART II

PART III

A. Special Conditions

1. This permit authorizes only the construction of the wastewater facilities and related work referenced herein.

2. If wellpointing is required during construction, the wells must be installed by a licensed well driller, and a permit to construct such wells must first be obtained from the Well Permits Branch of the Water Supply Section.

3. All construction shall be in agreement with plans and specifications submitted under this project and approved by the Department of Natural Resources and Environmental Control.

4. All construction shall be in accordance with Ten States Standards and other applicable local utility construction specifications and standards.

5. Connections or additions to the proposed system, other than those proposed on the plans, will not be allowed without prior approval from the Department.

END OF PART III

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES &
ENVIRONMENTAL CONTROL
DIVISION OF WATER
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

Surface Water Discharges Section
Construction Permits Branch

Telephone: (302) 739-9946
Facsimile: (302) 739-8369

March 28, 2016

Ms. Andrea Finerosky
Linder & Company, Inc.
234 North James Street
Newport, DE 19804

RE: Village at Evans Pond
Wastewater Construction Permit, State Permit No.: WPCC 3024/15

Dear Ms. Finerosky:

Please find enclosed a copy of the construction permit that was issued for the referenced project. We ask that you notify this office two (2) weeks before the permitted construction begins.

We expect the construction to be completed within the permit term. If construction cannot be completed within the three (3) year permit term, you may request a two (2) year no-cost permit extension, as long as we receive the request before the permit expires and there are no significant changes to the project scope, as determined by the Department.

Per Part II.A.2.a of the enclosed permit, notify the Department of any changes to the activities authorized therein. Per Part II.B.1 of the enclosed permit, you are to submit a set of "as-built" plans of the constructed wastewater facilities within ninety (90) days of construction completion. The as-built plans must be signed and sealed by a Professional Engineer licensed in Delaware.

If you have any questions, please contact me at (302) 739-9352 or via email at greg.pope@state.de.us.

Sincerely,

Greg Pope, P.E.
Engineer VI

Enclosure

email: Mr. Jeffrey A. Harman, P.E. – Becker Morgan Group, Inc.
mail: Mr. Michael Brady, Director of Public Works – Sussex County Department of Public Works, P.O. Box 589, Georgetown, DE 19947

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Regulatory Branch
Applications Section I

JUN 0 4 2007

SUBJECT: CENAP-OP-R2007-591 (JD)
Project Name: Bay Forest Parcels 36 & 42 and the Evens Property

William R. Kopajtic, RLA
White Oaks Environmental , Inc.
1304 Knopp Road
Jarrettsville, Maryland 21084

Dear Mr. Kopajtic:

The plan identified on the following page depicts the extent of Federal jurisdiction on the subject property. The basis of our determination of jurisdiction is also provided (Enclosure 1).

Pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, a Department of the Army permit is required for work or structures in navigable waters of the United States and the discharge of dredged or fill material into waters of the United States including adjacent and isolated wetlands. Any proposal to perform the above activities within the area of Federal jurisdiction requires the prior approval of this office.

This delineation/determination has been conducted to identify the limits of the Corps Clean Water Act jurisdiction for the particular site identified in this request. This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are U.S. Department of Agriculture (USDA) program participants, or anticipate participating in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

This letter is valid for a period of five (5) years. However, this jurisdictional determination is issued in accordance with current Federal regulations and is based upon the existing site conditions and information provided by you in your application. This office reserves the right to reevaluate and modify the jurisdictional determination at any time should the existing site conditions or Federal regulations change, or should the information provided by you prove to be false, incomplete or inaccurate.

This letter contains an approved jurisdictional determination for your subject site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR 331. Enclosed you will find a combined Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form (Enclosure 2). If you request to appeal this determination, you must submit a completed RFA form to the North Atlantic Division Office at the following address:

James W. Haggerty
Regulatory Appeals Review Officer
North Atlantic Division, U.S. Army Corps of Engineers
Fort Hamilton Military Community
General Lee Avenue, Building 301
Brooklyn, NY 11252-6700

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP.

It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this letter.

If you should have any questions regarding this matter, please contact me at 302-736-9763 between the hours of 1:00 and 3:30 p.m. or write to the above address.

Sincerely,

Kevin E, Faust
Biologist

****

SUBJECT PROPERTY: Bay Forest Parcels 36 & 42 and the Evans Property (50 acres), located on lands adjoining Old Mill Road and Railroad Road, Millville, Sussex County, Delaware. Parcels 36 and 42 are located west of Railway Road south of the existing Bethany Bay Community.

****

SURVEY DESCRIPTION: Waters of the United States are depicted on the plan prepared by White Oaks Environmental Inc., Jarrettsville, Maryland, one sheet date September 8, 2003, last revised April 13, 2005, entitled "Section 404" Key Sheet Jurisdiction Determination Plan..' This plan also identifies waters of the United States identified in the Consent Decree which are subject to conditions of the U.S. Environmental Protection Agency Region III, Philadelphia, Pennsylvania., Civil Action No. 97-123 LON, dated February 23, 1998.

****

COMMENTS:

1. Site inspection by representative of this office on May 25, 2006.

2. The distances and bearings of jurisdictional waters of the United States are found on the site plan prepared by White Oaks Environmental Inc., Jarrettsville, Maryland, five sheets dated June 6, 2006, unrevised, entitled: "Section "404" Key Sheet Jurisdiction Determination Plan."

****

Enclosures

JURISDICTIONAL DETERMINATION Revised 8/13/04
U.S. Army Corps of Engineers

DISTRICT OFFICE: CENAP-OP-R
FILE NUMBER: 2007-591JD)

PROJECT LOCATION INFORMATION:
State: DE
County: Sussex
Center coordinates of site (latitude/longitude): 38.33.59 N / 75.06.38 W
Approximate size of area (parcel) reviewed, including uplands: 50 acres.
Name of nearest waterway: Whites Creek
Name of watershed: Mid Atlantic Ocean

JURISDICTIONAL DETERMINATION
Completed: Desktop determination ☐ Date:
Site visit(s) ☒ Date(s): 25 May 2006

Jurisdictional Determination (JD):

☐ Preliminary JD - Based on available information, ☐ *there appear to be* (or) ☐ *there appear to be no* "waters of the United States" and/or "navigable waters of the United States" on the project site. A preliminary JD is not appealable (Reference 33 CFR part 331).

☒ Approved JD – An approved JD is an appealable action (Reference 33 CFR part 331).
Check all that apply:

☐ *There are* "navigable waters of the United States" (as defined by 33 CFR part 329 and associated guidance) within the reviewed area. Approximate size of jurisdictional area:

☐ *There are* "waters of the United States" (as defined by 33 CFR part 328 and associated guidance) within the reviewed area. Approximate size of jurisdictional area:

☐ *There are "isolated, non-navigable, intra-state* waters or wetlands" within the reviewed area.
☐ Decision supported by SWANCC/Migratory Bird Rule Information Sheet for Determination of No Jurisdiction.

BASIS OF JURISDICTIONAL DETERMINATION:
A. Waters defined under 33 CFR part 329 as "navigable waters of the United States":
☐ The presence of waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

B. Waters defined under 33 CFR part 328.3(a) as "waters of the United States":
☐ (1) The presence of waters, which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
☐ (2) The presence of interstate waters including interstate wetlands[1].
☐ (3) The presence of other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate commerce including any such waters (check all that apply):
☐ (i) which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ (ii) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ (iii) which are or could be used for industrial purposes by industries in interstate commerce.
☐ (4) Impoundments of waters otherwise defined as waters of the US.
☐ (5) The presence of a tributary to a water identified in (1) – (4) above.
☐ (6) The presence of territorial seas.
☐ (7) The presence of wetlands adjacent[2] to other waters of the US, except for those wetlands adjacent to other wetlands.

Rationale for the Basis of Jurisdictional Determination (applies to any boxes checked above). *If the jurisdictional water or wetland is not itself a navigable water of the United States, describe connection(s) to the downstream navigable waters. If B(1) or B(3) is used as the Basis of Jurisdiction, document navigability and/or interstate commerce connection (i.e., discuss site conditions, including why the waterbody is navigable and/or how the destruction of the waterbody could affect interstate or foreign commerce). If B(2, 4, 5 or 6) is used as the Basis of Jurisdiction, document the rationale used to make the determination. If B(7) is used as the Basis of Jurisdiction, document the rationale used to make adjacency determination:* All wetlands on-site manifests in the form of drainage swales and ditches that convey surficial runoff in a northeasterterly diretion intb Spring Gut and/or White Creek which are tributaries of Rehoboth Bay a tidal, navigable water of the United States. Three wetland/waters on-site are subject to the U.S. EPA Concent Decree Civil Action 97-123 LON dated February 23, 1998.

Lateral Extent of Jurisdiction: (Reference: 33 CFR parts 328 and 329)

☒ Ordinary High Water Mark indicated by:
- ☒ clear, natural line impressed on the bank
- ☐ the presence of litter and debris
- ☒ changes in the character of soil
- ☐ destruction of terrestrial vegetation
- ☐ shelving
- ☐ other:

☒ High Tide Line indicated by:
- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gages
- ☐ other:

☒ Mean High Water Mark indicated by:
☐ survey to available datum; ☐ physical markings; ☐ vegetation lines/changes in vegetation types.

☒ Wetland boundaries, as shown on the attached wetland delincation map and/or in a delineation report prepared by: White Oaks Environmental Inc., Jarrettsville, Maryland, dated June 6, 2006.

Basis For Not Asserting Jurisdiction:

☒ The reviewed area consists entirely of uplands.
☒ Unable to confirm the presence of waters in 33 CFR part 328(a)(1, 2, or 4-7).
☒ Headquarters declined to approve jurisdiction on the basis of 33 CFR part 328.3(a)(3).
☒ The Corps has made a case-specific determination that the following waters present on the site are not Waters of the United States:
- ☐ Waste treatment systems, including treatment ponds or lagoons, pursuant to 33 CFR part 328.3.
- ☐ Artificially irrigated areas, which would revert to upland if the irrigation ceased.
- ☐ Artificial lakes and ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.
- ☐ Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.
- ☐ Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States found at 33 CFR 328.3(a).
- ☐ Isolated, intrastate wetland with no nexus to interstate commerce.
- ☐ Prior converted cropland, as determined by the Natural Resources Conservation Service. Explain rationale:
- ☐ Non-tidal drainage or irrigation ditches excavated on dry land. Explain rationale:
- ☐ Other (explain):

DATA REVIEWED FOR JURSIDICTIONAL DETERMINATION (mark all that apply):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant.
☒ Data sheets prepared/submitted by or on behalf of the applicant.
- ☒ This office concurs with the delineation report, dated June 2006, prepared by (company): White Oaks Environmental Inc., Jarrettsvill, Maryland
- ☐ This office does not concur with the delineation report, dated , prepared by (company):

☒ Data sheets prepared by the Corps.
☒ Corps' navigable waters' studies:
☒ U.S. Geological Survey Hydrologic Atlas:
☒ U.S. Geological Survey 7.5 Minute Topographic maps: Bethany Beach, DE
☒ U.S. Geological Survey 7.5 Minute Historic quadrangles:
☒ U.S. Geological Survey 15 Minute Historic quadrangles:
☒ USDA Natural Resources Conservation Service Soil Survey: Sussex County
☒ National wetlands inventory maps: Bethany Beach, DE
☒ State/Local wetland inventory maps:
☒ FEMA/FIRM maps (Map Name & Date):
☒ 100-year Floodplain Elevation is: (NGVD)
☒ Aerial Photographs (Name & Date): USGS dated June 6, 2006.
☒ Other photographs (Date): Ground shots included in June 2006 Report
☒ Advanced Identification Wetland maps:
☒ Site visit/determination conducted on: 25 May 2006

☒ Applicable/supporting case law: U.S. Environmental Protection Agency, Region III, Philadelphia, Pennsylvana, Concent Dedree Civil Action 97-123 LON, dated February 23, 1998. .

☐ Other information (please specify):

[1]Wetlands are identified and delineated using the methods and criteria established in the Corps Wetland Delineation Manual (87 Manual) (i.e., occurrence of hydrophytic vegetation, hydric soils and wetland hydrology).

[2]The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes, and the like are also adjacent.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Linder & Company, Newport , Delaware	File Number: CENAP-OP-R-2007-591	Date: JUN 14 2007
Attached is:		See Section below
☐	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐	PERMIT DENIAL	C
☒	APPROVED JURISDICTIONAL DETERMINATION	D
☐	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the Philadelphia District Engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations (JD) associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the Philadelphia District Engineer. Your objections must be received by the Philadelphia District Engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the Philadelphia District Engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the Philadelphia District Engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the Philadelphia District Engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the North Atlantic Division Engineer, ATTN: CENAD-ET-O, Fort Hamilton Military Community, Building 301, General Lee Avenue, Brooklyn, NY 11252-6700. This form must be received by the North Atlantic Division Engineer within 60 days of the date of this notice with a copy furnished to the Philadelphia District Engineer.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the North Atlantic Division Engineer, ATTN: CENAD-ET-O, Fort Hamilton Military Community, Building 301, General Lee Avenue, Brooklyn, NY 11252-6700. This form must be received by the North Atlantic Division Engineer within 60 days of the date of this notice with a copy furnished to the Philadelphia District Engineer.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the North Atlantic Division Engineer, ATTN: CENAD-ET-O, Fort Hamilton Military Community, Building 301, General Lee Avenue, Brooklyn, NY 11252-6700. This form must be received by the North Atlantic Division Engineer within 60 days of the date of this notice with a copy furnished to the Philadelphia District Engineer.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Kevin E. Faust U.S. Army Corps of Engineers, Philadelphia District ATTN: CENAP-OP-R Wanamaker Building, 100 Penn Square East Philadelphia, PA 19107-3390 Telephone: 302-736-9763	James W. Haggerty Regulatory Appeals Review Officer North Atlantic Division, U.S. Army Corps of Engineers Fort Hamilton Military Community General Lee Avenue, Building 301 Brooklyn, NY 11252-6700 Telephone: (718) 765-7150 E-mail: James.W.Haggerty@nad02.usace.army.mil

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

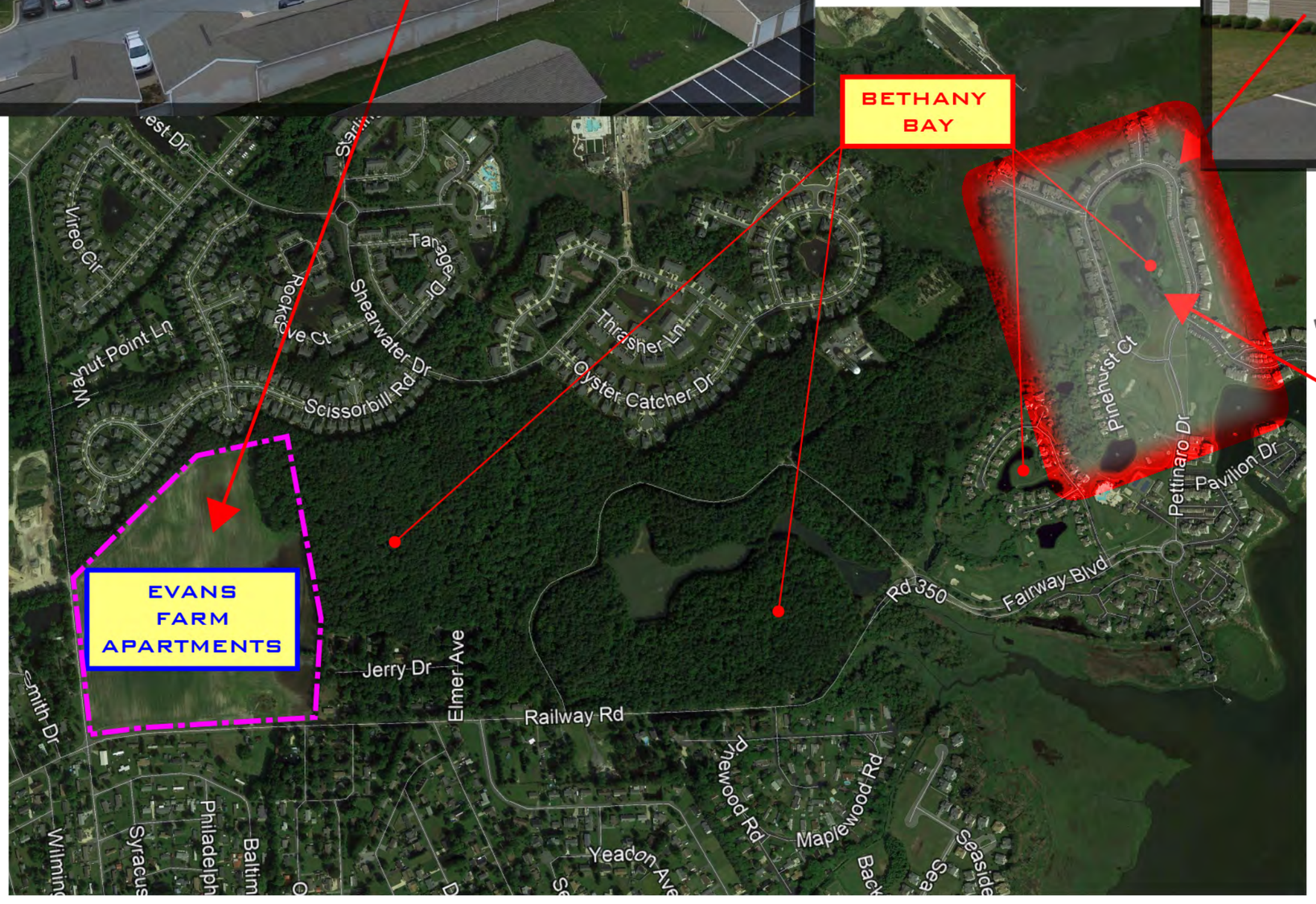
	Date:	Telephone number:
_____ Signature of appellant or agent.		

TAB 5

EXHIBITS









ADJACENT PROPERTIES AND SIMILAR USES

Pennoni
PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

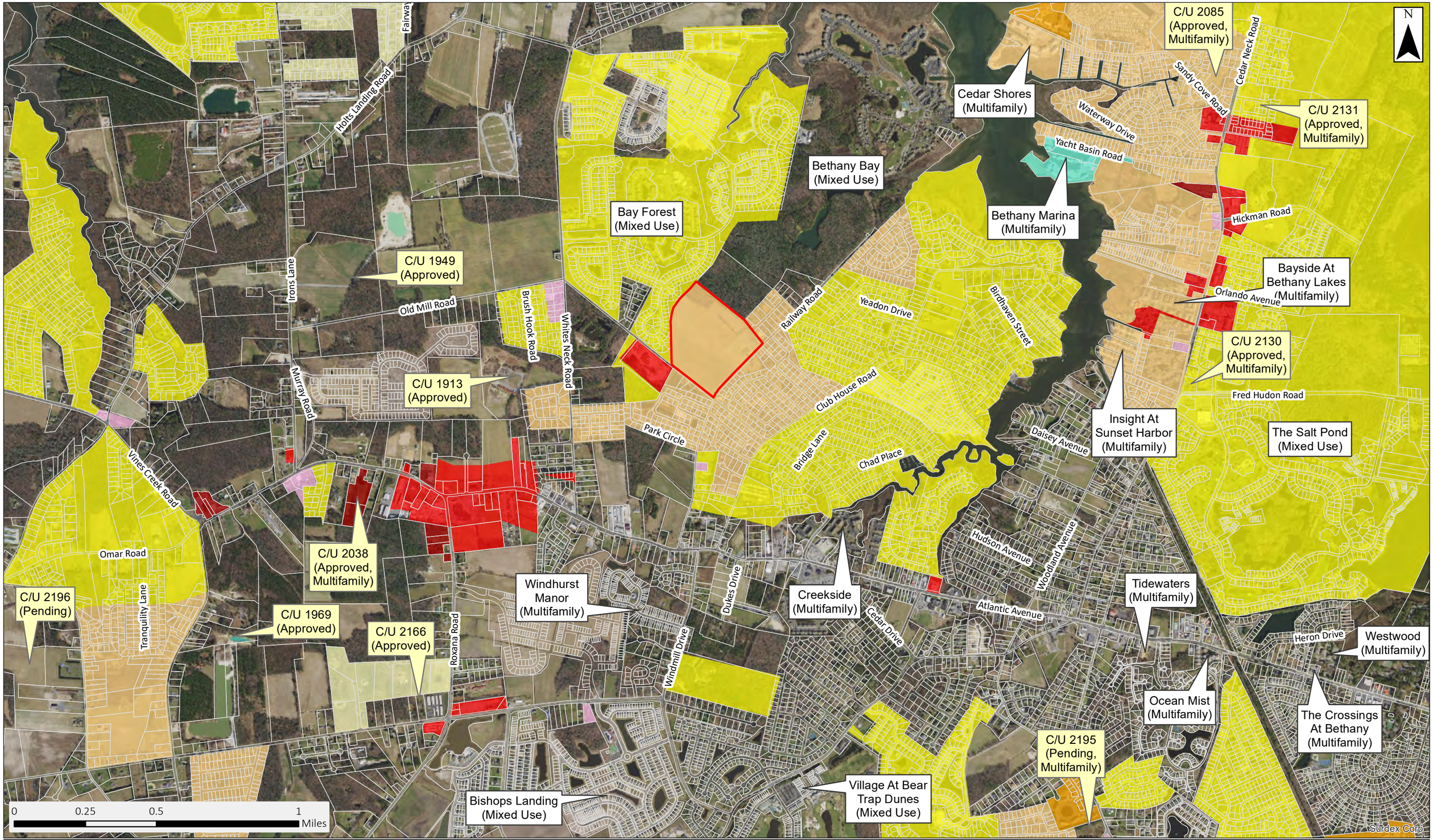


Figure 21 of 21.	Area Land Use Applications & Multifamily Development	Pennoni	
21	Evans Farm Apartments		
	PETIX19002		

Date: 1/7/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\21 Area Land Use Applications.mxd

TIDEWATER
UTILITIES, INC.
A Middlesex Water Company Affiliate

January 8, 2020

Mr. Alan Decktor, PE, ENV SP
Pennoni
18072 Davidson Drive
Milton, DE 19968

RE: Willing & Able Letter – Evans Farm Apartments

Dear Mr. Decktor:

Tidewater Utilities, Inc. (Tidewater) is willing and able to serve public water, *including fire protection*, to the proposed Evans Farm Apartments subdivision identified as Tax Map & Parcel 134-12.00-74.00 based on the terms and conditions of a water service agreement to be negotiated and agreed upon by Tidewater and the owner of this development. This development is located within Tidewater's existing Certificate of Public Convenience and Necessity (CPCN) franchised area. Tidewater has an existing 10 inch main on Railway Road.

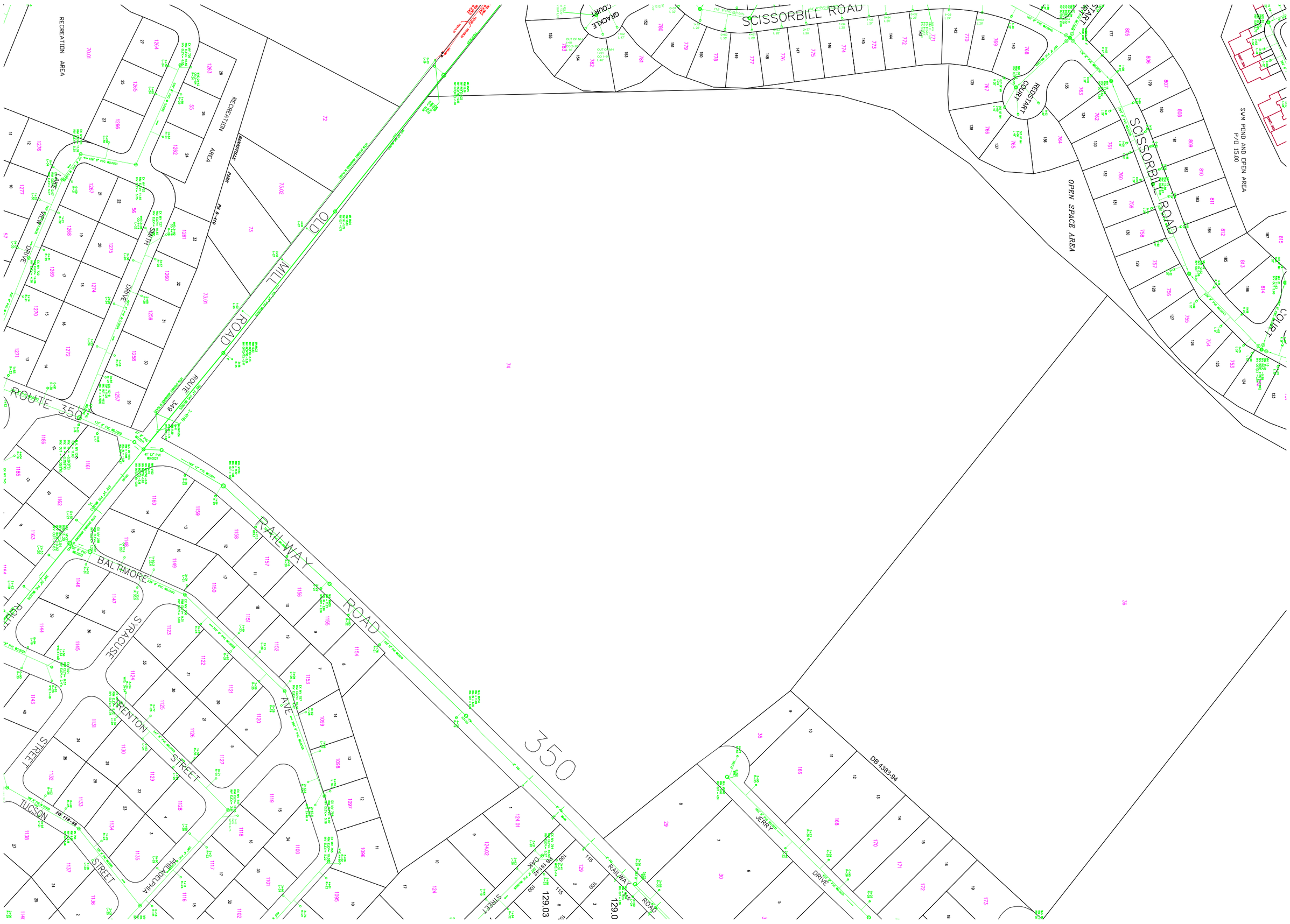
Water service will be provided under the conditions and terms stated in the water service agreement between Tidewater and the parcel owners. Tidewater will evaluate the most economically feasible method of providing domestic and fire protection water service to this project. Once the method of water service is determined, Tidewater will conduct a cost analysis that will determine the financial terms of the water service agreement.

Please send a preliminary site plan and construction schedule to TUI. For planning purposes, I also need to know when you expect you will need the first draft of the water service agreement from TUI. Please feel free to contact me at 302-747-1325 if you have any questions or concerns regarding this matter. Tidewater looks forward to meeting the water needs of this project.

Sincerely,

Kirsten E. Higgins

Kirsten Higgins
Director Contract Administration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OLD MILL ROAD
ROUTE 349
ROUTE 350
RAILWAY ROAD
350
BALTIMORE AVE
SYRACUSE STREET
TRENTON STREET
PHILADELPHIA STREET
TUCSON STREET
RECREATION AREA
OPEN SPACE AREA
SWM POND AND OPEN AREA P/O 15.00
DB 4383-94
JERRY DRIVE
GRACKLE COURT
REDSTART COURT
SMITH DRIVE
WREN DRIVE
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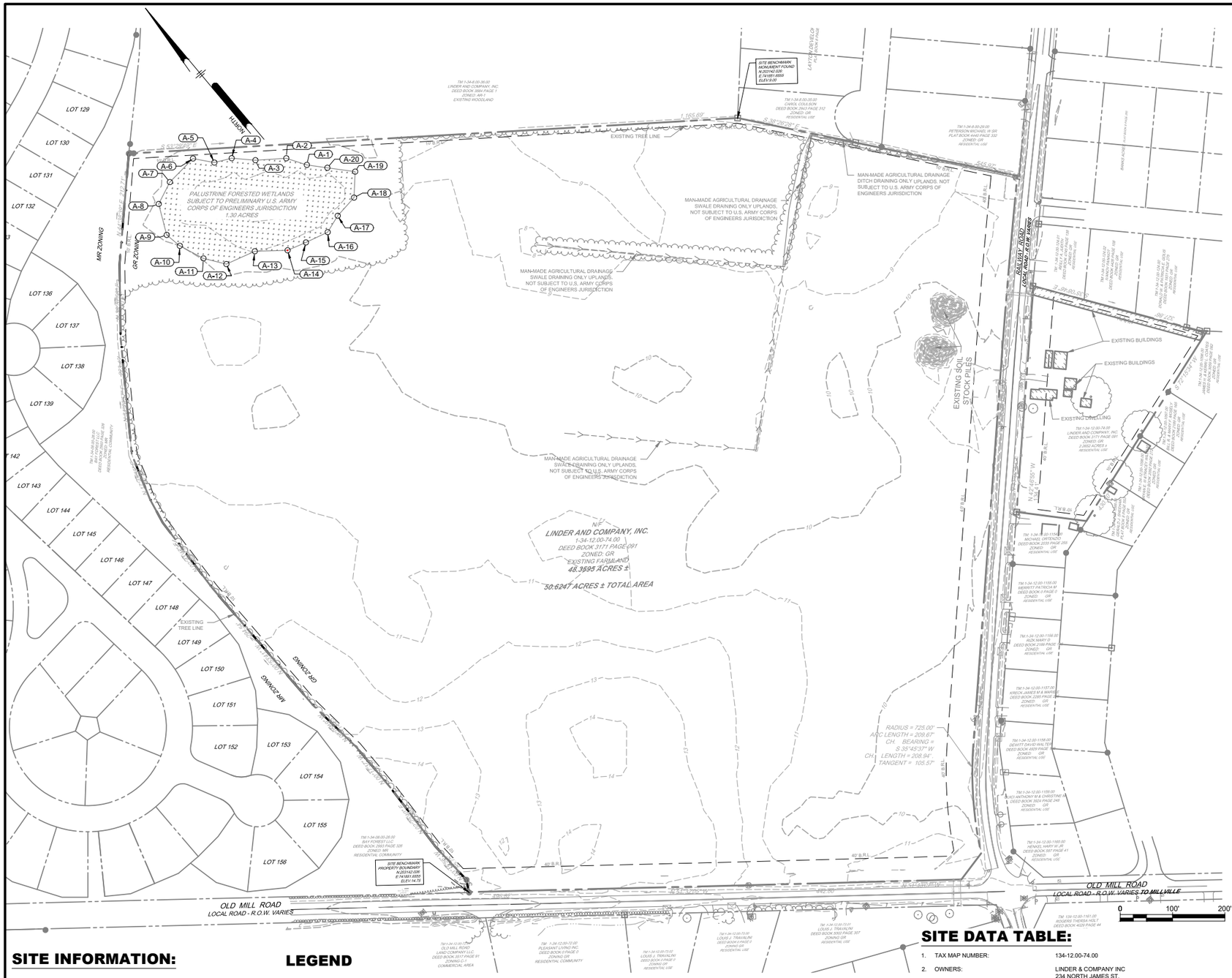
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EXISTING TREE LINE
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S 63°29'19" E
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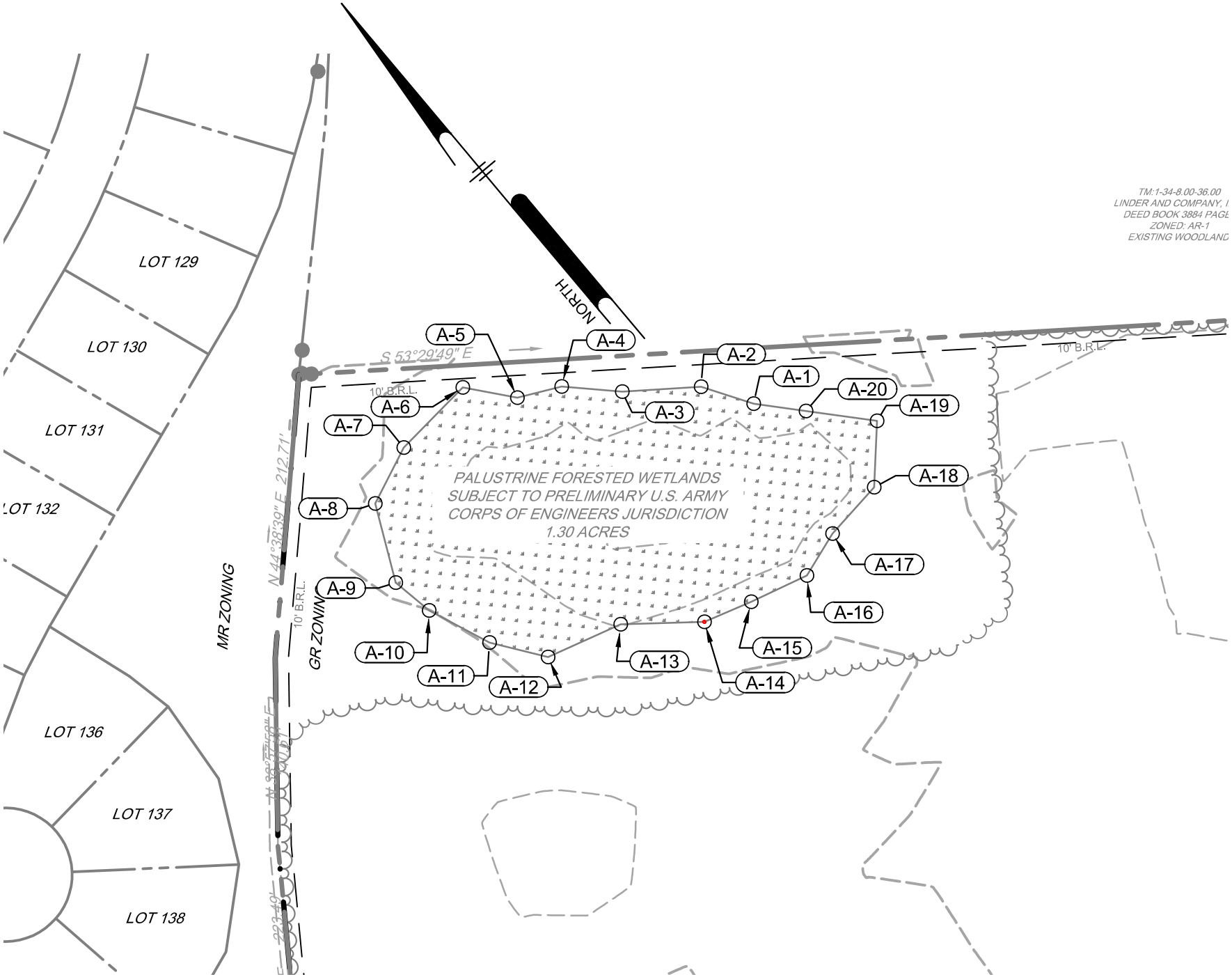
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LINDER AND COMPANY, I
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EXISTING WOODLAND
NORTH
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LOT 130
LOT 131
LOT 132
LOT 136
LOT 137
LOT 138
MR ZONING
GR ZONIN
S 53°29'49" E
10' B.R.L.
N 44°38'39" E 212.71'
PALUSTRINE FORESTED WETLANDS
SUBJECT TO PRELIMINARY U.S. ARMY
CORPS OF ENGINEERS JURISDICTION
1.30 ACRES
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A-2
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A-4
A-5
A-6
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A-10
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A-12
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A-19
A-20

APPENDIX A

Kenneth W. Redinger Environmental Services

P.O. Box 479 / Horntown, Virginia 23395

Phone: (757) 894-7032 / E-mail: kwredinger@gmail.com

January 8, 2020 - Via Email

Pettinaro Construction Company, Inc.
234 North James Street
Newport, Delaware 19804

Attn: Andrea Finerosky, Pettinaro Construction Company, Inc.
Re: Wetland Jurisdictional Determination Update - The Evans Farm (50.62 Acres)
Parcel 1-34-12.00-74.00, Old Mill Road & Railway Road
Ocean View, Baltimore Hundred, Sussex County, Delaware
Property Owner - Linder & Company, Inc.

Ms. Finerosky,

At your request I have reviewed the subject property for wetlands and other Waters of the United States that may be regulated by the Philadelphia District U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

Wetland boundaries within the subject property were originally delineated by White Oaks Environmental, Inc. in April 2006, and a Jurisdictional Determination confirming those wetland boundaries was issued by the USACE on June 4, 2007 (USACE Project Number CENAP-OP-R2007-591). That Jurisdictional Determination was valid for a period of 5 years and expired in June 2012.

The wetland boundaries were re-evaluated in July 2010 by Landmark/JCM, Inc. and remained unchanged from that approved by the 2007 Jurisdictional Determination, as depicted on a Wetlands Plan prepared by Becker Morgan Group on October 6, 2010.

To confirm that the site conditions had not changed since the issuance of the 2007 Jurisdictional Determination, the property was evaluated by Kenneth W. Redinger Environmental Services on December 21, 2019 in accordance with the 1987 Corps of Engineers Wetland Delineation Manual in conjunction with the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Atlantic and Gulf Coastal Plain Region; Version 2.0 (November 2010).

As the site conditions were confirmed to be unchanged from those present during the 2007 and 2010 investigations, a request to re-issue the Jurisdictional Determination verifying wetland boundaries within the subject property was submitted to the Philadelphia District U.S. Army Corps of Engineers on January 8, 2020. A copy of the re-issued Jurisdictional Determination will be provided to your office upon its receipt.

Please contact me with any questions you may have concerning this project in the meantime.

Sincerely,



Kenneth W. Redinger
Professional Wetland Scientist #2126

APPENDIX A1

APPENDIX A2

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Regulatory Branch
Application Section I

MAR 2 6 2020

SUBJECT: CENAP-OP-R 2020-201-23 (PJD)
Project Name: Evans Farm Apartments SX
Latitude/Longitude: 38.558421° N /-75.114527° W

Kenneth W. Redinger
KWR Environmental Services, Incorporated
Post Office Box 479
Horntown, Virginia 23395

Dear Mr. Redinger:

The plan identified on the following page depicts all delineated waterways and wetlands on the subject site that may be jurisdictional under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbor Act.

Pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, a Department of the Army permit is required for work or structures in navigable waters of the United States and the discharge of dredged or fill material into waters of the United States including adjacent wetlands. Any proposal to perform the above activities within any waters of the United States requires the prior approval of this office.

This preliminary determination has been conducted to identify the location(s) of wetlands and waters that may be waters of the United States for the particular site identified in this request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are U.S. Department of Agriculture (USDA) program participants, or anticipate participating in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

This preliminary jurisdictional determination is non-binding and indicates that there may be waters of the United States, including wetlands on the parcel. Pursuant to Federal Regulations at 33 C.F.R. 331.2, preliminary JDs are advisory in nature and may not be appealed (see attached Notification of Appeal Form - Enclosure 1). However, the applicant retains the right to request an approved jurisdictional determination, which may be appealed. Also enclosed (Enclosure 2) is a copy of the Preliminary Jurisdictional Determination Form signed by the applicant or his agent agreeing to accept a preliminary jurisdictional determination. Please be aware that for purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will

treat all waters and wetlands that would be affected in any way by the permitted activity as if they are jurisdictional waters of the U.S.

This letter is valid for a period of five (5) years. However, this preliminary jurisdictional determination is issued in accordance with current Federal regulations and is based upon the existing site conditions and information provided by you in your application. This office reserves the right to reevaluate and modify the preliminary jurisdictional determination at any time should the existing site conditions or Federal regulations change, or should the information provided by you prove to be false, incomplete or inaccurate.

If you have any questions regarding this matter, please contact me at (302) 736-9764, by email at john.g.brundage@usace.army.mil or by writing to the above address.

Sincerely,

John Brundage
Regulatory Branch

****

SUBJECT PROPERTY: 31434 Railway Road, Tax Map Parcel 134-12.00-74.00, Ocean View, Sussex County, Delaware.

****

SURVEY DESCRIPTION: Plan prepared by Pennoni Associates, Inc., dated August 19, 2019, and titled: *Evans Farm Apartments, Tax Map 134-12.00-74.00, 31434 Railway Rd., Ocean View, DE, Wetland Delineation Plan, Pettinaro Construction Company, Inc., 234 North James St., Newport, Delaware 19804*, one sheet.

****

COMMENTS: The above referenced site was inspected by a Corps of Engineers representative on May 25, 2006.

Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: January 8, 2020

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Kenneth W. Redinger

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Philadelphia District FORMERLY CENAP-OP-R2007-591
CENAP-OP-R-2020-201

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: DE County/parish/borough: Sussex County City: Ocean View

Center coordinates of site (lat/long in degree decimal format):

Lat.: 38.558421° Long.: -75.114527°

Universal Transverse Mercator:

Name of nearest waterbody: Collins Creek approx. 1,000' northeast of parcel.

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

■ Field Determination. Date(s): May 25, 2006

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
I	38.560954	-75.115406	1.30 AC.	PF0	Section 404

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- [x] Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
  Map: Wetland Delineation Plan - Pennoni 08/19/2019.
- [ ] Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - [ ] Office concurs with data sheets/delineation report.
  - [ ] Office does not concur with data sheets/delineation report. Rationale: _____.
- [ ] Data sheets prepared by the Corps: _____.
- [ ] Corps navigable waters' study: _____.
- [ ] U.S. Geological Survey Hydrologic Atlas: _____.
  - [ ] USGS NHD data.
  - [ ] USGS 8 and 12 digit HUC maps.
- [ ] U.S. Geological Survey map(s). Cite scale & quad name: _____.
- [ ] Natural Resources Conservation Service Soil Survey. Citation: _____.
- [ ] National wetlands inventory map(s). Cite name: _____.
- [ ] State/local wetland inventory map(s): _____.
- [ ] FEMA/FIRM maps: _____.
- [ ] 100-year Floodplain Elevation is: _____.(National Geodetic Vertical Datum of 1929)
- [x] Photographs: [ ] Aerial (Name & Date): _____.
  or [x] Other (Name & Date): Site photos by K.W. Redinger 12/21/2019.
- [x] Previous determination(s). File no. and date of response letter: CENAP-OP-R2007-591.
- [ ] Other information (please specify): _____.

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Signature and date of Regulatory staff member completing PJD
MAR 26 2020

Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]
1/8/2020

[1] Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Linder and Company		File Number: 2020-201	Date: 26 Mar 2020
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
	APPROVED JURISDICTIONAL DETERMINATION		D
X	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Mr. John Brundage U.S. Army Corps of Engineers, Philadelphia District ATTN: CENAP-OP-R Wanamaker Building, 100 Penn Square East Philadelphia, PA 19107-3390 Telephone: (302) 736-9763 Email: john.g.brundage@usace.army.mil	Mr. James W. Haggerty Regulatory Program Manager (CENAD-PD-OR) U.S. Army Corps of Engineers Fort Hamilton Military Community 301 General Lee Avenue Brooklyn, New York 11252-6700 Telephone number: 347-370-4650

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

	Date:	Telephone number:
_____ Signature of appellant or agent.		

LANDMARK ENGINEERING | JCM ENVIRONMENTAL
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Evans Farm
Wetland Investigation Report



This report was prepared for the exclusive use of Pettinaro Construction Company, Inc.
Unauthorized duplication is prohibited.

Evans Farm

Wetland Investigation Report

Prepared at the Request of:
Pettinaro Construction Company, Inc.
234 North James Street
Newport, Delaware 19804

Prepared for Review by:

United States Army Corps of Engineers
Philadelphia District
Wanamaker Building
Penn Square East
Philadelphia, Pennsylvania 19107

Sussex County
Planning and Zoning Department
2 The Circle, P.O. Box 589
Georgetown, Delaware 19947

State of Delaware
Division of Water Resources
Wetlands Section
89 Kings Highway
Dover, Delaware 19901

Prepared:
October 2010

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Summary

This document presents the findings from the wetland field investigation completed for Evans Farm (Sussex County Tax Parcel No. 1-34-12.00-74.00) located in the Ocean View area of Sussex County, Delaware. This report, which summarized the field observations and data analysis, is suitable for a submittal to local agencies. The wetland delineation must be verified by the U.S. Army Corps of Engineers (USACE) through a jurisdictional determination (JD) before it can be deemed official. All information contained within this report has been field collected and summarized by Landmark/JCM. Formal surveyed field delineations were performed within the property boundaries of the subject parcel as identified by Becker Morgan Group both in the field and on provided site drawings "Wetlands Plan for lands of Linder and Company, Inc." dated October 4, 2010.

The field delineation was performed within the approximate boundaries of the 50.62 acres subject property as shown on Figures 1 and 2. The subject property consisted primarily of active agricultural land with undeveloped woodlands in the northwestern portion. A 2.26 acre portion of the property with a dwelling and outbuildings is located on the south side of Railway Road.

A series of drainage swales was observed in the north-central portion of the property. A segment of these swales was flagged by White Oaks Environmental, Inc. during a wetland investigation in 2006. The U.S. Army Corps of Engineers issued a jurisdictional determination dated June 4, 2007, subsequently asserting jurisdiction over a portion of these swales. During the 2010 investigation by Landmark/JCM, these swales did not exhibit ordinary high water marks or evidence of flow. These swale features appear to be depressional areas that collect sheet flow runoff from the surrounding upland agricultural fields. The U.S. Army Corps of Engineers does not typically assert jurisdiction over swales or erosional features characterized by low volume, infrequent, or short duration flow.

The investigation concluded that a topographically isolated palustrine forested wetland was located in the northwestern portion of the subject property. This wetland has no connection to any other wetland or waterway and therefore no nexus to interstate commerce. The USACE does not regulate isolated wetlands with no nexus to interstate commerce.

The Delaware Department of Natural Resources and Environmental Control does not assert jurisdiction over isolated wetlands. It is the professional opinion of Landmark/JCM that no areas that would qualify as State Subaqueous Lands are located within the subject property boundaries.



Figure 1. Site Location Map (not to scale, for reference only)



Figure 2. 2009 Aerial Photograph (not to scale, for reference only)

Wetland Delineation History

A previous wetland delineation was performed on the subject property by White Oaks Environmental, Inc., in April 2006. White Oaks Environmental, Inc. identified Waters of the U.S. in the north-central portion of the property and the U.S. Army Corps of Engineers issued a jurisdictional determination in June 2007 based on this delineation. The wetland boundaries were re-evaluated by Landmark/JCM, Inc. in July 2010 to accurately define the limits of wetlands for jurisdictional and permitting purposes within the parcel. The field delineations have been completed, and the wetland lines have been surveyed and plotted for final verification.

Methods

This investigation used the techniques for Routine Determinations described in the 1987 USACE Wetland Delineation Manual (Y-87-1) and Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region. The field interpretations follow the definitions listed in the Public Notices from the Army Corp of Engineers, dates September 26, 1990, October 4, 1990, September 4, 1991, and December 2, 2008.

Delineation Criteria

The following criteria were used to delineate the natural resources described in this report. For the purpose of Section 404 of the Clean Water Act regulation, the term "waters of the United States" includes open water and wetlands (see Glossary for complete definitions). For the purpose of this report and common usage, "waters of the U.S." refers to regulated open water areas and wetlands refers to vegetated areas that meet the wetland criteria as defined below.

Waters of the United States

In order for an area to be classified as waters of the U.S., the feature must be consistent with the definitions as listed in 33 CFR (Code of Federal Regulations) Section 328.3 and the current guidance (see Glossary). In non-tidal, freshwater systems, in absence of adjacent vegetated wetlands, the limits of Federal jurisdiction extend to the ordinary high water mark (OHWM). In the absence of physical evidence depicting the location and elevation of the OHWM, a routing of the 2.3 year storm event through the channel will be accepted as the mean high water elevation.

Non-tidal and Tidal Vegetated Wetlands

In order for an area to be classified as wetlands under USACE methods, it must display: 1. Hydric Soils, 2. Hydrophytic Vegetation and 3. Indicators of Wetland Hydrology. The methodology for determining the dominant vegetation on the site was a hybridization of the methods described in the 1987 Manual and the 1989 Federal Manual for the Identification and Delineation of Jurisdictional Wetlands, as described below.

The diagnostic environmental characteristics of wetlands in accordance Part II, Number 26 b.(1), (2) and (3); and Number 26 c. are listed below:

1. Vegetation: The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions (as described below). Hydrophytic species, due to morphological,

physiological and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce and/or persist in anaerobic soil conditions.

Vegetation has been classified by the U.S. Fish and Wildlife Service according to the following categories:

Obligate Wetland Plants (OBL): Plants that occur almost always (estimated probability >99%) in wetlands under natural conditions.

Facultative Wetland Plants (FACW): Plants that occur usually (estimated probability >67% to 99%) in wetlands.

Facultative Plants (FAC): Plants with a similar likelihood (estimated probability 33% to 67%) of occurring in both wetlands and uplands (non wetlands).

Facultative Upland Plants (FACU): Plants that occur sometimes (estimated probability 1% to <33%) in wetlands.

Not Listed (NL or UPL): Plants that occur rarely (estimated probability <1%) in wetlands.

In order for an area to meet the technical criteria for hydrophytic vegetation, more than 50% of the dominant species must be classified as FAC, FACW and/or OBL.

2. Soil: Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions. Common hydric soil indicators include:

Organic Soil: A soil that is more than 50% organic material (peats and mucks).

Sulfidic Material: A soil that emits the odor of rotten eggs produced by sulfides formed in a reducing environment of saturated soils.

Aquic or Peraquic Moisture Regime: A soil that is permanently flooded and/or saturated close to the surface and is devoid of oxygen.

Soil Colors: Gleyed (Gray) soils and/or soils with low matrix chroma and bright mottles in the top 10-12 inches. A chroma of #2 in mottled soils or #1 in unmottled soils is considered hydric. (Colors are as defined in Munsell Color Book 1975).

Soil on Hydric Soils List: A soil that matches the profile description for a soil type defined as hydric by the National Technical Committee on Hydric Soils (NTCHS).

Iron and/or Manganese Concretions: Segregated oxides of iron or manganese are found close to the surface (within 7.5 cm).

3. Hydrology: The area is inundated either permanently or periodically at mean water depths of less than or equal to 6.6 feet, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.

Wetland hydrology may be indicated by drift lines, sediment deposition, watermarks, recorded well or stream gage data, visual observations, blackened leaves, or oxidized root channels with living roots.

The general guidance utilized at this time is that water must be within one foot of the surface consecutively greater than 5% of the growing season or more than 12 consecutive days during the growing season.

Except in certain situations..., evidence of a minimum of one positive wetland indicator from each parameter (vegetation, soils and hydrology) must be found in order to make a positive wetland determination.

Data Collection

Wetland parameters observed throughout the site were recorded in standard field note books. Representative wetland and upland borings were recorded at or near the wetland boundary as well as any representative areas of disagreement between this delineation and the United States Fish and Wildlife Service, National Wetlands Inventory (NWI) map or where deemed appropriate.

The soils exposed at each sample station were observed using a 2.5" Dutch auger. Borings were made to a depth of 18 inches. Soil texture information follows the United States Department of Agriculture (USDA) classification system and specific soil nomenclature follows the Sussex County Soil Survey (1974). The plants recorded at each sample station follow the nomenclature of Fernald (1950) and Kartesz and Kartesz (1981). Hydrological indicators follow the descriptions of the 1987 Wetland Delineation Manual. Wetland hydrology indicator nomenclature uses the system developed by Cowardin, et al. (1981) and the U.S. Fish and Wildlife Service National Wetland Inventory mapping program.

Data Sheets

The wetland analysis provided ample opportunity to express the typical conditions found in the field which determined where to place the wetland flags as well as to document any conditions found in areas of disagreement between the delineation and the NWI or SWMP designations. Conditions along the lines were characterized by representative wetland and upland samples which recorded the vegetation, apparent hydrology and existing soil conditions. These samples were documented on the Wetland Determination Data Forms from the Atlantic and Gulf Coastal Plain Region-Interim Regional Supplement which are attached in the Appendix. Sample locations and boring locations were estimated on the plans based on their relative location to physical features and surveyed wetland flags.

Jurisdiction

USACE and EPA

Section 10 Waters (Navigable Waters)

Section 10 of the Rivers and Harbors Act (RHA) of 1899 gives the Environmental Protection Agency (EPA) and USACE (the agencies) jurisdiction over traditional navigable waters (TNW). These waterways include tidal and certain non-tidal waters and are typically defined by the high tide line or the ordinary high water mark (OHWM). Mudflats and marshes below these water lines are regulated under this section (see Glossary). The USACE maintains a list of navigable waters.

Waters of the U.S. including Non-Tidal Vegetated Wetlands

Waters of the United States including non-tidal vegetated wetlands are regulated by the USACE under Section 404 of the Clean Water Act. In order to be jurisdictional, non-wetland waters of the United

States (typically referred to as just waters of the U.S.) must be consistent with the definitions listed in 33 CFR (Code of Federal Regulations) Section 328.3 and the current guidance. Non-tidal wetlands must display the three criteria (hydric soils, hydrophytic vegetation, and wetland hydrology) in order to be jurisdictional (see Glossary).

The agencies will assert jurisdiction over the following waters and wetlands:

- Wetlands adjacent to TNWs
- Non-navigable tributaries of TNWs that are relatively permanent (relative permanent waters - RPW) where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g. typically three months.)
- Wetlands that directly abut such tributaries

The agencies will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus (see Glossary) with a TNW:

- Non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary
- In addition, an USACE policy decision has been made to collect information relevant to a significant nexus evaluation for all "intermittent" non-navigable tributaries and their adjacent wetlands (i.e., even if the tributary's flow may be relatively permanent, but is not perennial).

The agencies generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow)
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water

The agencies will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream TNWs.
- Significant nexus includes consideration of hydrologic and ecologic factors (see Glossary)

Geographically isolated wetlands which do not have a significant nexus connection to interstate commerce are not jurisdictional. The USACE District office evaluates if these wetlands are isolated under the CWA. USACE headquarters must concur with an isolated wetlands evaluation for a non-jurisdictional determination.

Tidal Wetlands

Tidal wetlands regulated by the USACE under Section 10 of the Rivers and Harbors Act of 1899 are limited to the areas below the high tide line. All other wetlands are regulated under Section 404 of the Clean Water Act. Tidal wetland areas consist of hydrophytic vegetation on hydric soils that are subjected to regular or periodic tidal action and include most marshes and coastal lowland areas.

State of Delaware

State Subaqueous Lands

The State of Delaware regulates all perennial and intermittent watercourses as State Subaqueous Lands. Subaqueous Lands are water conveyances with defined banks and channels permanently or seasonally supported by groundwater, spring seeps, or surface waters in addition to precipitation and surface water runoff from storm events. Ephemeral streams are not typically considered Subaqueous Lands as they rely only on surface water runoff from storm events and are otherwise dry. A determination of the limits of regulated Subaqueous Lands is usually done on a case-by-case basis by the Delaware Department of Natural Resources and Environmental Control (DNREC). If Subaqueous Lands are determined to be present on the property, they will most likely be found to coincide with waters of the United States.

Tidal Wetlands

The State of Delaware regulates those tidal wetlands indicated on the Delaware Tidal Wetland maps in accordance with the Delaware Wetlands Title 7, Part VII, Chapter 66. These areas include tidal waters and adjacent areas "whose surface is at or below an elevation of 2 feet above local mean high water, and upon which may grow or is capable of growing" typical tidal water hydrophytes.

Sussex County

Perennial and Intermittent Streams

The Code of Sussex County, Delaware requires a 50-foot buffer zone from the ordinary high water line of perennial non-tidal rivers and non-tidal streams. Excluded from buffer zone designation are farm ponds, tax ditches and other man-made bodies of water where these waters are not located on or within perennial streams. A buffer zone shall not be required for agricultural drainage ditches if the adjacent agricultural land is the subject of a conservation farm plan established with the Sussex Conservation District.

Non-Tidal Wetlands

Sussex County, Delaware does not apply any additional regulations on non-tidal vegetated wetlands.

Tidal Wetlands

The Code of Sussex County, Delaware requires a 50-foot buffer for structures from the mean high water line on all tidal waters, tidal tributary streams and tidal wetlands.

Results

General Site Description

A background review was performed in the office prior to any site work. The results of this background review are described below.

Location

The field delineation was performed within the boundaries of the subject property situated north of Railway Road located at Latitude 38°-33'-31" North and Longitude 75°-06'-53" West as shown in Figure 1. The subject property is bordered by private residential and wooded lands to the north and east, Bay Forest Residential Subdivision to the west, and Old Mill Road, and Railway Road to the south. A 2.26 acre portion of the property is located on the south side of Railway Road.

Soils

According to the USDA Web Soil Survey (Figure 3) the subject property is underlain with Fort Mott loamy sand (FmA), Hammonton loamy sand (HmA), Klej loamy sand (KsA), Pepperbox-Rosedale Complex (PsA), Rosedale loamy sand (RoA), and Runclint loamy sand (RuA). The Fort Mott, Pepperbox, and Rosedale series consist of deep, well-drained soils. The Hammonton series consists of moderately well-drained soils on uplands. The Klej series consists of somewhat poorly drained soils on uplands. The Runclint series consists of deep, excessively drained soils on uplands. Of these soils listed, the Klej, Hammonton and Runclint series are known to contain hydric inclusions in depressional areas according the National Technical Committee on Hydric Soils.



Figure 3. USDA WEB Soil Survey (not to scale, for reference only)

Mapped Hydrology and Topography

The property drains gently to the north-central portion of the property. Site elevations within the property fall above and below the 10 foot contour line according to the Bethany Beach 7.5 Minute USGS Quadrangle (Figure 4).

No blue line drainage features are depicted by the USGS Quadrangle.

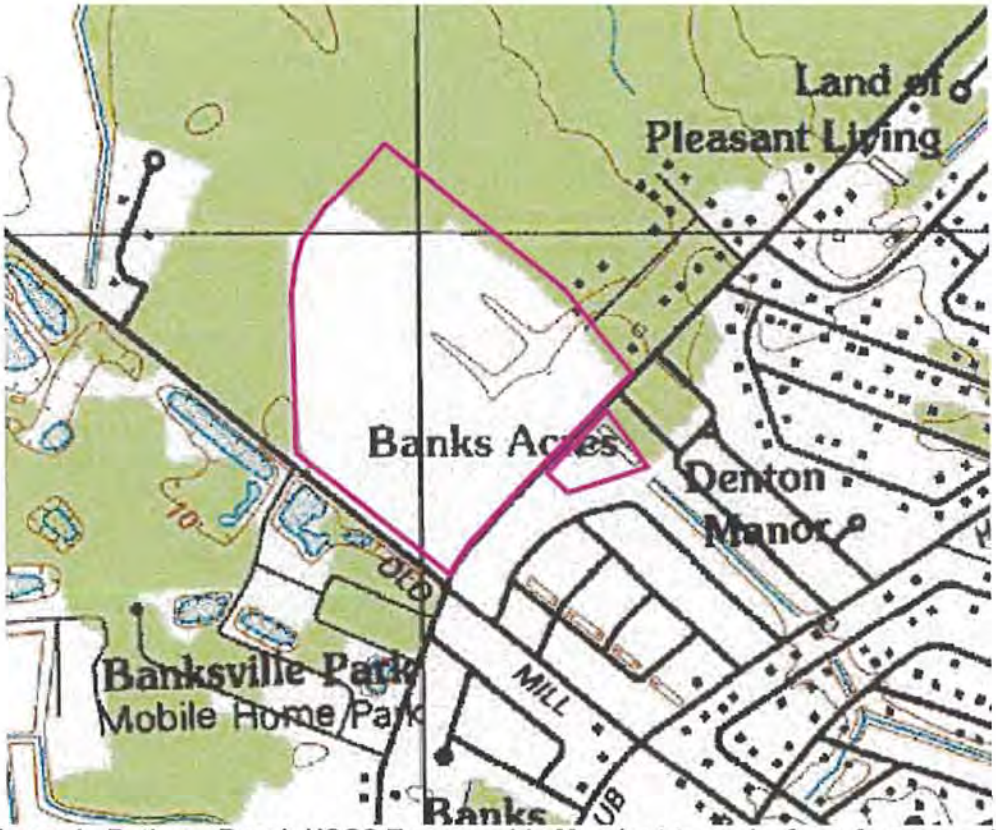

Figure 4. Bethany Beach USGS Topographic Map (not to scale, for reference only)

Mapped Wetlands

National Wetland Inventory Mapping

The U.S. Fish and Wildlife Service National Wetland Inventory (NWI) map (Figure 5) identifies palustrine forested wetlands (PFO1/4A) wetlands in the northwestern portion of the property.



Figure 5. National Wetlands Inventory Map (not to scale, for reference only)

Statewide Wetland Mapping Program

Similar to the NWI map, the Statewide Wetland Mapping Program (SWMP) map (Figure 6) identifies more extensive areas of palustrine forested wetlands (PFO1/4A) within the woodlands in the northwestern portion of the property.



Figure 6. Statewide Wetland Map (not to scale, for reference only)

Field Delineation Specifics

Upland Land Use and Land Cover Types

- Agricultural – The majority of the property consisted of an active cropland. At the time of the site investigation soy bean was planted in the fields. Other herbaceous plants observed within the field areas included Pigweed, Common Ragweed, Velvet-leaf, and Dogbane.



View looking southwest across agricultural field.



View looking northwest across agricultural field from Railway Road.

- Forest – Upland forest cover was observed along the northern and western property boundaries. Common tree species included White Oak, Southern Red Oak, Water Oak, and Red Maple with scattered Loblolly Pine. The understory consisted of Black Cherry, Post Oak, Pignut Hickory, Sassafras, Lowbush Blueberry, Highbush Blueberry, Sweet Pepperbush, American Holly, and Common Greenbrier.



Mixed Oak forest in the northwestern corner of the subject property.



Oak forest located in the northern portion of the subject property.

- Dwelling-An existing dwelling with several outbuildings surrounded by maintained lawn areas was situated on the 2.26 acres located south of Railway Road.



Existing dwelling located south of Railway Road.

- Agricultural Swales – A series of man-made drainage swales was observed in the central and north-central portions of the property. These swales did not exhibit defined bed and banks or an ordinary high water mark. Surveyed elevations within the swales (see attached wetland plan) indicate that water is not conveyed to the culvert at Railway Road or any off-site drainage feature.



View looking southeast along drainage swale in the central portion of the property.



Velvet-leaf growing in drainage swale in the central portion of the property.



Water-stained leaves within drainage swale in the north-central portion of the property.



Drainage swale in the north-central portion of the property near northern property boundary.

Wetland Line Specifications

The wetland lines were placed within the property boundaries as estimated during fieldwork based on physical features. All wetland features found within this area were flagged with vinyl, pink ribbon with black "WETLAND DELINEATION" letters. One line was marked with alpha numeric designators with a letter representing the line and numbers representing the positions along the line. This line was subsequently surveyed and plotted by Becker Morgan Group.

Line A delineated a topographically isolated forested wetland in the northwestern portion of the property. Line A began along the northern property boundary and continued northwesterly, then south, and east. Line A consisted of 20 flags.



View looking northwest through forested wetland in the northern portion of the property.



Water stained leaves and sedges emerging within forested wetland in the northwestern portion of the property.



Looking west through forested wetland in the northwestern corner of the property.



Hydric soils encountered within forested wetland in the northern portion of the property.

Waters of the United States (open water)

No areas that would be classified as relatively permanent Waters of the U.S. were observed within the boundaries of the subject property.

State Subaqueous Lands

No areas that qualify as State Subaqueous Lands were observed within the boundaries of the subject property. The State decides jurisdictional determinations at their own discretion.

Non-tidal Vegetated Wetlands

Non-tidal forested wetlands were observed in the northwestern portion of the property. Common vegetation observed within the wetland included Loblolly Pine, Sweetgum, Willow Oak, Black Gum, Pin Oak, and Red Maple. The understory consisted of Red Maple and Black Gum. The shrub layer was relatively open with scattered Highbush Blueberry, Sweet Pepperbush, and Common Greenbrier. Buttressed tree roots and water-stained leaves were observed within this area.

Section 10 Waters

No navigable waters applicable to Section 10 regulation were located within the property boundaries.

Tidal Wetlands

No tidal wetlands were encountered within the property boundaries.

Comparison to Mapped Wetlands

Palustrine forested and scrub-shrub wetlands were depicted by NWI and SWMP maps in the northwestern corner of the subject property. Although palustrine forested wetland were observed in this area, they were topographically isolated and did not continue off-site to the extent mapped.

Conclusions

The wetlands delineated within the site boundaries were flagged in July 2010. One line was used to demarcate the delineated wetland boundaries for review by the USACE and four data samples were collected to support the delineation.

A series of drainage swales was observed in the north-central portion of the property. A segment of these swales was flagged by White Oaks Environmental, Inc. during a wetland investigation in 2006. The U.S. Army Corps of Engineers issued a jurisdictional determination dated June 4, 2007, subsequently asserting jurisdiction over this feature. During the 2010 investigation by Landmark/JCM, these swales did not exhibit ordinary high water marks, a defined bed and bank or evidence of flow. These swale features appear to be depressional areas that collect sheet flow runoff from the surrounding agricultural fields. The U.S. Army Corps of Engineers does not typically assert jurisdiction over swales or erosional features characterized by low volume, infrequent, or short duration flow. In addition, surveyed elevations within the swales indicate that water is not conveyed to any off-site drainage features.

The investigation concluded that a topographically isolated palustrine forested wetland was located in the northwestern portion of the subject property. This wetland has no connection to any other wetland or waterway and therefore no nexus to interstate commerce. The USACE does not regulate isolated wetlands with no nexus to interstate commerce.

The Delaware Department of Natural Resources and Environmental Control does not assert jurisdiction over isolated wetlands. It is the professional opinion of Landmark/JCM that no State Subaqueous Lands are located within the subject property boundaries.

No tidal wetlands or Navigable Waters were present on the subject property.

The sole purpose of this delineation is to identify the limits of waters of the United States including wetlands, Tidal Waters, Navigable Waters, and Subaqueous Lands and to document the site conditions. This report contains the information necessary to accompany the JD information sheets when submitting to the USACE with a jurisdictional determination request.

Notes

The USACE regulates the placement of structures in Section 10 Waters and the placement of fill and/or dredge material into Waters of the United States including wetlands. No work of this nature should be performed without a permit from the USACE.

The State of Delaware regulates activities in Subaqueous Lands as well as State mapped tidal wetlands. No work in those areas should be performed without a permit from the State.

Sussex County requires buffers on county regulated waters and tidal wetlands. No work should be performed in these areas without approval from the County.

This study has been performed utilizing best professional judgment based on the conditions at the time of the investigation. The investigator is not responsible for changed conditions, either man made or natural, which change the wetland boundaries.

Wetland delineations must be verified by the USACE and Subaqueous Lands must be verified by DNREC in order to be considered "jurisdictional".

References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. "Classification of Wetlands and Deepwater Habitats of the United States." United States Department of the Interior – Fish and Wildlife Service. Washington, D.C.

Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Fernald, M.L. 1970. "Gray's Manual of Botany." D. Van Nostrand Co., New York, NY.

Kartesz, J.T. and R. Kartesz. 1980. "A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland." The University of North Carolina Press, Berkeley, CA. (2nd edition).

Resource Management Group, Inc. 1992. "National List of Plant Species That Occur in Wetlands, Region 1 – Northeast." Grand Haven, Michigan.

Tiner, R. W., Jr. 1988. "Field Guide to Nontidal Wetland Identification," Maryland Department of Natural Resources, Annapolis, MD and U.S. Fish and Wildlife Service, Newton Corner, MA. Cooperative Publication. 283 pp. + plates.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. The PLANTS Database (http://plants.usda.gov, 25 July 2006). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA. 1999. "Munsell Soil Color Chart," Washington, D.C.

USDA, Soil Conservation Service. 2006. "Hydric Soils of the United States." Washington, D.C.

The USDA Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Glossary

Waters of the U.S. *As defined by 33 CFR Part 328, Section 328.3.*

a. Waters of the United States
   1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
   2. All interstate waters including interstate wetlands;
   3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use degradation or destruction of which could affect interstate or foreign commerce including any such waters;
      a. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
      b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
      c. Which are used or could be used for industrial purposes by industries in interstate commerce;
   4. All impoundments of waters otherwise defined as waters of the United States under the definition;
   5. Tributaries of waters identified in paragraphs (a) (1)-(4) of this section;
   6. The territorial seas;
   7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1)-(6) of this section.
      Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.
   8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.

b. The term "wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

c. The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes and the like are "adjacent wetlands."

d. The term "high tide line" means the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

e. The term "ordinary high water mark" means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

f. The term "tidal waters" means those waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.

Navigable Waters of the U.S. *As defined by 33 CFR Part 328, Section 329.4*

Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity.

Tabulated lists of final determinations of navigability are to be maintained in each district office, and be updated as necessitated by court decisions, jurisdictional inquiries, or other changed conditions.

Traditional Navigable Water (TNW) *Per US Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook, dated May 30, 2007*

Traditional navigable water currently used or that have been used in the past, or may be susceptible to use, in interstate or foreign commerce, including but not limited to tidal waters. Such waters are those referred to in as "navigable-in-fact".

Non-navigable Tributaries of TNWs with Relatively Permanent Flow (RPF) *Per US Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook, dated May 30, 2007*

The guidance describes the second category – non-navigable tributaries with relatively permanent flow as waters, e.g. streams, that typically flow year-round or that have continuous flow at least seasonally (typically three months) excluding ephemeral tributaries and intermittent streams.

Significant Nexus Determination *Per US Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook, dated May 30, 2007*

The significant nexus evaluation will combine, for analytical purposes, the tributary, and all of its adjacent wetlands, whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. A significant nexus analysis will assess the flow characteristics and functions of the relevant reach of the tributary, in combination with functions collectively performed by all wetlands (if present) adjacent to the tributary, to determine if they have more than an insubstantial or speculative effect on the chemical, physical, and biological integrity of TNWs.

Consideration will be given to the distance between the tributary and the TNW. The tributary will not be so remote as to make the effect on the TNW speculative or insubstantial. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of a significant nexus.

Hydrologic factors will be considered, such as:

- volume, duration, and frequency of flow, including consideration of certain physical characteristics of the tributary
- proximity to the traditional navigable water
- size of the watershed
- average annual rainfall
- average annual winter snow pack

Ecologic factors will be considered, such as:

- the ability of the tributary and its adjacent wetlands (if any) to carry pollutants and flood waters to traditional navigable waters
- the ability of the tributary and its adjacent wetlands (if any) to provide aquatic habitat that supports biota of a traditional navigable water
- the ability for adjacent wetlands to trap and filter pollutants or store flood waters
- the ability to maintain water quality

Certain geographical features (e.g., ditches, canals) that transport relatively permanent (continuous at least seasonally) flow directly or indirectly into TNWs or between two (or more) waters of the U.S., including wetlands, are jurisdictional waters regulated under the CWA.

Certain geographic features (e.g., swales, ditches, pipes) may contribute to a surface hydrologic connection where the features:

- replace or relocate a water of the U.S., or
- connect a water of the U.S. to another water of the U.S., or
- provide relatively permanent flow to a water of the U.S.

Certain geographic features generally are not jurisdictional waters:

- swales, erosional features (e.g. gullies) and small washes characterized by low volume, infrequent, and short duration flow
- ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water
- uplands transporting over land flow generated from precipitation (i.e., rain events and snowmelt)

Appendices

GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing ASFE Member Firm

March 25, 2014

Pettinaro Construction Co., Inc.
234 North James Street
Newport, Delaware 19804

Attention: Ms. Andrea Finerosky

Re: Revised Report of Subsurface Exploration
Evans Farm
Sussex County, Delaware

Dear Ms. Finerosky:

Geo-Technology Associates, Incorporated (GTA) has performed a subsurface exploration for the proposed Evans Farm project located in Millville, Delaware. The purpose of the subsurface exploration was to evaluate the groundwater levels and borrow materials from the proposed pond at the site with the collected data used to evaluate the need for a pond liner, to refine the cut/fill balance and to evaluate the material for re-use as structural fill. Transmitted herein is the report of our findings and conclusions with respect to preliminary recommendations regarding site grading and pond construction. The services were performed in general accordance with our proposal dated February 14, 2014.

The following documents were referenced for this report:

- Report titled *Soil Investigation of Evans Farm*, prepared by Landmark Engineering/JCM Environmental and dated August 18, 2010;
- Plan titled *Evans Farm, Boring Location Map, Sheet Borings*, prepared by Becker Morgan Group (BMG) and dated May 1, 2009;
- Plans titled *Evans Farm, Erosion and Sediment Control Key Plan, Sheets C-400 through C-405, C-500, C-501 and C-502*, prepared by BMG and dated February 6, 2014;

- Plan titled *Evans Farm, Cut/Fill Volumes, Sheet C-500*, prepared by BMG and dated February 6, 2014; and
- A Cut/Fill Excel Spreadsheet prepared by Pettinaro Construction Co., Inc.

The site vicinity is shown on the attached Figure 1, Site Location Plan. The project is situated along the northwest side of Railway Road and the northeast side of Old Mill Road at the intersection between Railway Road and Old Mill Road in Millville, Delaware. The study area consists of an open farm field with woods surrounding the perimeter of the property. The existing ground surface ranges between approximate Elevation 10 and 12 feet Mean Sea Level (MSL) at the exploration locations.

Proposed construction consists of a residential community with an excavated wet pond situated within the center of the property and 2 to 3-story condominium type buildings and related detached one-story garages surrounding the pond perimeter. The pond bottom will be range between Elevation 2 and 3 MSL and the pond is planned to have a permanent pool at Elevation 8.5 MSL. Pond cut slopes are proposed at inclination of 3 Horizontal to 1 Vertical or flatter. Excavation will be needed to achieve pond bottom varying in depth between 8 and 10 feet below the existing ground surface. GTA understands that the pond will serve as an amenity feature and that no pumping will occur from the pond for irrigation purposes. To achieve grade within the roadway and residential buildings surrounding the pond, fill will generally be required ranging in depth upwards to generally 5 feet.

According to the Report of Investigations No. 58, The Pliocene and Quaternary Deposits of Delaware (1999), published by the Delaware Geological Survey, the project area is underlain by sediments of the Coastal Plain Physiographic Province. Coastal Plain sediments below the surficial deposits exposed in the site area were generally deposited in commonly estuarine environments of Quaternary geologic age. The Quaternary deposits are designated as the deposits of the Omar Formation. These deposits are characterized by "…medium and coarse sands interbedded with clayey sands, silts and clays." Please review the referenced publication and map for further details regarding this geologic unit.

According to the Hydrologic Investigations Atlas HA-122 (1964), published by the United States Geological Survey, the estimated average water table during 1960 in the vicinity of the site was approximately elevation 6 and varied between elevation 5 and 9 MSL when recorded during the period of 1950 through 1962. Please refer to the referenced publication for additional information. From review of the Delaware Geological Survey historic well data presented on their web site, the groundwater level at their monitoring well (Qc44-01) during February 2014 was normal and near the normal seasonal high level.

On February 27, 2014, GTA staff observed eight test pits, designated as TP-1 through TP-8, excavated to depths of 10 to 12 feet below the ground surface. Temporary piezometers were placed in each test hole and water readings were taken one and seven days after completion. The piezometers were removed after the longer term water readings. The exploration locations were selected by GTA and staked in the field with ground surface elevations determined by BMG. The relative locations of the exploration are shown on the attached Figure 2, Exploration Location Plan. The exploration locations indicated on the plan should be considered approximate.

Samples obtained from the test pits were returned to GTA's office for visual classification by GTA personnel. The soil layers were classified in accordance with the Unified Soil Classification System (USCS). Classifications provided on the log are visual descriptions. The exploration logs are attached. The interfaces indicated on the log may be gradual.

The test pits confirmed the underlying geologic formation as Omar Formation deposits. Beneath an approximately 6 to 12-inch thick surface topsoil layer, the explorations encountered native subsoils visually classified as predominately consisting of silty SANDs (USCS SM), clayey SANDs (SC) and poorly-graded SANDs with silt (SP-SM). At TP-4, TP-6, and TP-7, lean CLAY with sand (CL) was encountered between 4 and 5 feet at TP-4; 6 and 7 feet at TP-6; and between 2 and 7 feet at TP-7.

Water was encountered at a depth of 1.5 to 5 feet below the existing ground surface. Seven days after completion of the test pits, water was present at a depth of 1 to 3.5 feet below the ground surface and corresponding to average Elevation 9 MSL. Please note that groundwater levels are expected to fluctuate with seasonal changes, precipitation, and other factors such as development activity. Additionally, perched water conditions develop in granular soils overlying fine-grained soils during the “wet season” as well as during heavy periods of precipitation.

Selected samples obtained from the exploration were tested for grain-size analysis, Atterberg Limits, and natural moisture content. The grain-size analysis and Atterberg Limits testing were performed to determine the Unified Soil Classification System (USCS) and the American Association of State Highway and Transportation Officials (AASHTO) designations for the soil. USCS and AASHTO classifications provide information regarding soil behavior beneath foundation and pavement systems. The results of testing are as follows:

SUMMARY OF CLASSIFICATION TESTING

EXPLORATION NO.	DEPTH (ft.)	USCS CLASSIFICATION	AASHTO CLASSIFICATION	NATURAL MOISTURE (%)	LL %	PI %
TP-4	1 - 4	Silty SAND (SM)	A-2-4(0)	16.3	NP	NP
TP-4	4 - 5	Lean CLAY with Sand (CL)	A-7-6(17)	23.4	45	24
TP-5	1 - 5	Silty SAND (SM)	A-2-4(0)	18.6	NP	NP
TP-5	5 - 10	Silty SAND (SM)	A-2-4(0)	26.0	NP	NP
TP-6	1 - 6	Silty SAND (SM)	A-2-4(0)	14.0	NP	NP

Note: LL=Liquid Limit PI=Plastic Index NP=Non-Plastic

Four bulk samples were tested for moisture-density relationships in accordance with the Standard Proctor (ASTM D-698) test for use in evaluating the suitability of these soils for reuse as fill. Results of these tests are summarized in the following table.

SUMMARY OF COMPACTION TESTING
(ASTM D-698, the Standard Proctor)

TEST PIT NO.	DEPTH (FT)	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)	NATURAL MOISTURE (%)
TP-4	1 - 4	125.7	11.3	16.3
TP-5	1 - 5	123.1	11.3	18.6
TP-5	5 - 10	118.8	12.4	26.0
TP-6	1 - 6	122.8	9.7	14.0

Thirty samples were subjected to moisture content testing. The moisture content of the samples tested ranged from 8.8 to 32 percent and averaged 21.3 percent. Please refer to the attached laboratory test results for additional information.

CONCLUSIONS AND RECOMMENDATIONS

Pond Construction

GTA's estimate of the seasonal high groundwater level is based upon water levels at or a foot or so above normal seasonal highs, and soil coloring and mottling. The results of the groundwater level readings and GTA's opinion of the estimated normal seasonal high groundwater depth are summarized as follows:

GROUNDWATER DATA SUMMARY

Exploration No.	Existing Ground Surface Elevation (MSL)	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Encountered Water When Excavated	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Water At Seven Days After Completion	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Estimated Normal Seasonal High Groundwater
TP-1	11.3	5 / 6.3	1.5 / 9.8	2 / 9
TP-2	10.6	2 / 8.6	2 / 8.6	2 / 9
TP-3	12.2	5 / 7.2	3.5 / 8.7	3 / 9
TP-4	11.6	3 / 8.6	3 / 8.6	3 / 9
TP-5	10.2	3 / 7.2	1 / 9.2	1 / 9
TP-6	10.4	4 / 6.4	2 / 8.4	2 / 8
TP-7	11.8	1.5 / 10.3	3.5 / 8.3	4 / 8
TP-8	10.4	3 / 7.4	1.5 / 8.9	2 / 8

Based upon the results of GTA's exploration, it is our opinion that construction of the proposed pond as an excavated wet pond is feasible, given that the following recommendations are observed, and that the standard level of care is maintained during construction. At the exploration locations, the estimated seasonal high groundwater ranges between elevation 8 and 9 MSL. The presence of groundwater at current Elevation 8 to 9 MSL will impact the pond especially during pond construction.

Considering the groundwater depths and subsoil conditions at the test pits, it is our opinion that proposed pool Elevation 8.5 MSL will be feasible when groundwater levels are at or near seasonal highs, but, will likely drop two to three feet or so during drier seasons due to receding groundwater levels and evaporation (on the order of ½ –foot of evaporation is not unusual) of the pooled water. If the potential pool level fluctuation is acceptable considering that vegetation planted at the pond bench level may need to be replanted after extended dry periods, it is our opinion that a pond liner will not be necessary. An artificial water source to help maintain the permanent pool during the drier seasons of the year is not considered to be feasible due to potential seepage from the pond basin.

If there is a low tolerance to pool fluctuations, and it is desired to maintain the permanent pool to near Elevation 8.5 MSL, a pond liner will need to be installed and an artificial water source will need to be provided to help maintain the permanent pool during the drier seasons of the year. If it is elected to proceed with a pond liner, the liner construction will likely prove to be difficult and expensive considering the groundwater levels and problems associated with dewatering the excavation to facilitate the placement and compaction of a fine-grained soil liner. GTA has considered reuse of on-site materials conforming to USCS classification SC or CL, supplemented as required by similar, off-site borrow, to complete an approximate one foot thick pond liner. However, we have also considered a geosynthetic liner given the elevated moisture content of the soils which will likely prove difficult to dry readily in any but hot dry weather for reuse as a liner, especially considering the groundwater levels at this site. It is our opinion that a Geosynthetic Clay Liner (GCL; Bentonite matrix) provided with a one foot thick granular soil cover comprised of on-site USCS SM or SP-SM materials may be utilized as an alternative liner. If used, the GCL should be installed in accordance with manufacturer's recommendations.

Site Grading

Based upon the exploration data and from our past experience within the vicinity of the site, a shrinkage factor for the grading is estimated by GTA to be on the order of 1.1 to 1.15 for on-site soils excavated below the surface topsoil and placed in structural fill areas. An average shrinkage factor of 1.13 is recommended for use in the earthwork quantity analysis. The actual shrinkage factor will vary in magnitude. The recommended shrinkage factor may be used for budget estimating purposes. Due to the potential variability of soil moisture when compacted, the degree of compaction achieved in various areas of the site, among other factors, it is suggested that the estimated earthwork quantity favor generation of excess fill rather than being balanced or short. The actual quantity of cut and fill materials required to complete the earthwork grading at this site may vary from the estimated amount.

Prior to the placement of compacted fill, areas below proposed foundation, slab, and pavement should be stripped and grubbed to remove topsoil and materials with concentrated organic matter. Considering the topsoil thickness at the test pits, GTA recommends that for earthwork estimates, a stripping thickness of 1-foot be utilized. The actual stripping thickness will be dependent on localized topsoil development, previous plow depth, precipitation, soil moisture, construction traffic disturbance, and contractor care.

Beneath the upper humus/more organic topsoil, the deeper region of sandy topsoil (generally deeper than 4 to 6 inches below the ground surface) may potentially be segregated, screened and re-mixed with soils excavated from cut areas for use in structural fill areas. GTA will provide

additional recommendations for potential salvaging of deeper topsoil materials based upon conditions observed in the field at the time of construction.

After stripping, wet subgrade areas should not be proof-rolled with a loaded tandem-axle dump truck. Instead, the subgrade should be probed (test pits or hand augers) by the Geotechnical Engineer for approval prior to placement of the fill. No fill should be placed until the geotechnical engineer approves the subgrade.

During wet season construction, GTA anticipates that the existing surficial soils will soften and significant rutting will occur. The affected material will likely require removal or reworked prior to placement of fill. GTA recommends a summer season earthwork operation to reduce the economic impact of wet near surface soils.

For earthwork operations, temporary construction roads and construction traffic supervision should be provided to localize the extent of subgrade disturbance and resulting subgrade repairs. "Pans" or similar types of higher ground pressure equipment should not traverse earthwork areas with wet subgrade or shallow groundwater conditions. Trucks should only travel on established temporary construction roads. The vibratory function of the compaction equipment should only be used after at least 2 feet of structural fill has been placed above the native soil subgrade or any recommendation in the field by GTA.

Precipitation will result in standing water at low areas and in localized undercut areas. If the water is allowed to pond, the exposed subgrade materials may deteriorate and additional over excavation or subgrade improvement may be required at the affected areas. Positive drainage should be provided to protect exposed subgrades.

Most near surface on-site soils beneath the more organic surface topsoil are considered suitable for reuse as structural fill material. Excavated site materials conforming to SP, SP-SM, and SM classifications will be suitable for reuse in structural areas of mass earthwork construction. If the SC and CL materials will be considered for reuse as a pond liner, these materials should be segregated during construction and reserved for the pond liner construction. Materials conforming to USCS CL or SC are not recommended for reuse in structural fill construction during wet weather or in areas of shallow groundwater. During prevailing wet weather, fine-grained or clayey soils will likely require substantial drying by aeration after spreading over a large area and prior to compaction in fill construction. In addition, considering shallow groundwater and perched water conditions, it will likely prove difficult to maintain or improve stability of the subgrade using the fine-grained or clayey materials particularly during wet weather and in areas of near surface groundwater. GTA

will provide additional recommendations for potential selective use of CL and SC materials based upon conditions observed in the field at the time of construction.

The moisture content of the bulk sample materials tested ranged from approximately 4 to 14 percent above the optimum moisture. Of the 30 samples tested for moisture content, the average moisture content of 21.3 percent is approximately 10 percent above the average optimum value of 11.2 percent. At the tested moistures, excavated materials will require substantial drying by aeration after spreading over a large surface area to achieve proper compaction. When reusing materials excavated from pond and utility areas below the groundwater level and, in general, during wet weather, delays and expense will likely be associated with reducing soil moistures to acceptable levels. A contingency should be established for moisture adjustments, including potential chemical amendment using cement or Lime Kiln Dust (LKD; Calciment) to facilitate compaction and subgrade stability.

All fills should be constructed in maximum 8-inch thick loose lifts and be compacted to the following specifications:

COMPACTION SPECIFICATIONS

Structure / Fill Location	Compaction / Moisture Specification
Below foundations, floor slabs, pavement and within wall backfill	95% of ASTM D-698 Moisture: ± 3% of optimum

A soils-technician should monitor fill construction on a full time basis under the supervision of a geotechnical engineer. Compactive effort should be verified by in-place density testing.

LIMITATIONS

This report, including all supporting exploration logs, field data, field notes, estimates, and other documents prepared by GTA in connection with this project, has been prepared for the exclusive use of Pettinaro Construction Co., Inc. pursuant to the agreement between GTA and Pettinaro Construction Co., Inc., dated February 14, 2014 and in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreement are incorporated herein by reference. No warranty, express or implied, is given herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Pettinaro Construction Co., Inc. is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Explorations indicate soil and groundwater conditions only at specific locations and times and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between the exploration locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations in subsurface conditions from those described are noted during construction, recommendations in this report may need to be re-evaluated. In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. Geo-Technology Associates, Inc. is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Geo-Technology Associates, Inc.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be construed by the reader to imply approval by the writer.

We appreciate the opportunity to be of assistance on this project. Should you have any questions or require additional information, please contact our office at (302) 855-9761.

Sincerely,
GEO-TECHNOLOGY ASSOCIATES, INC.



Gregory R. Sauter, P.E.
Vice President

GRS/CMR/grs
140254
\\Gt-data\gta\1 Job File\Evans Farm\Report\Evans Farm- GTA Report of Subsurface Exploration.doc

Attachments: Site Location Plan (1 page)
Exploration Location Plan (1 page)
Notes for Exploration Logs (1 page)
Exploration Logs (8 pages)
Particle Size Distribution Report (5 pages)
Compaction Test Report (4 pages)
Moisture Content Test Data Summary (1 page)
ASFE Geotechnical Engineering Report (2 pages)



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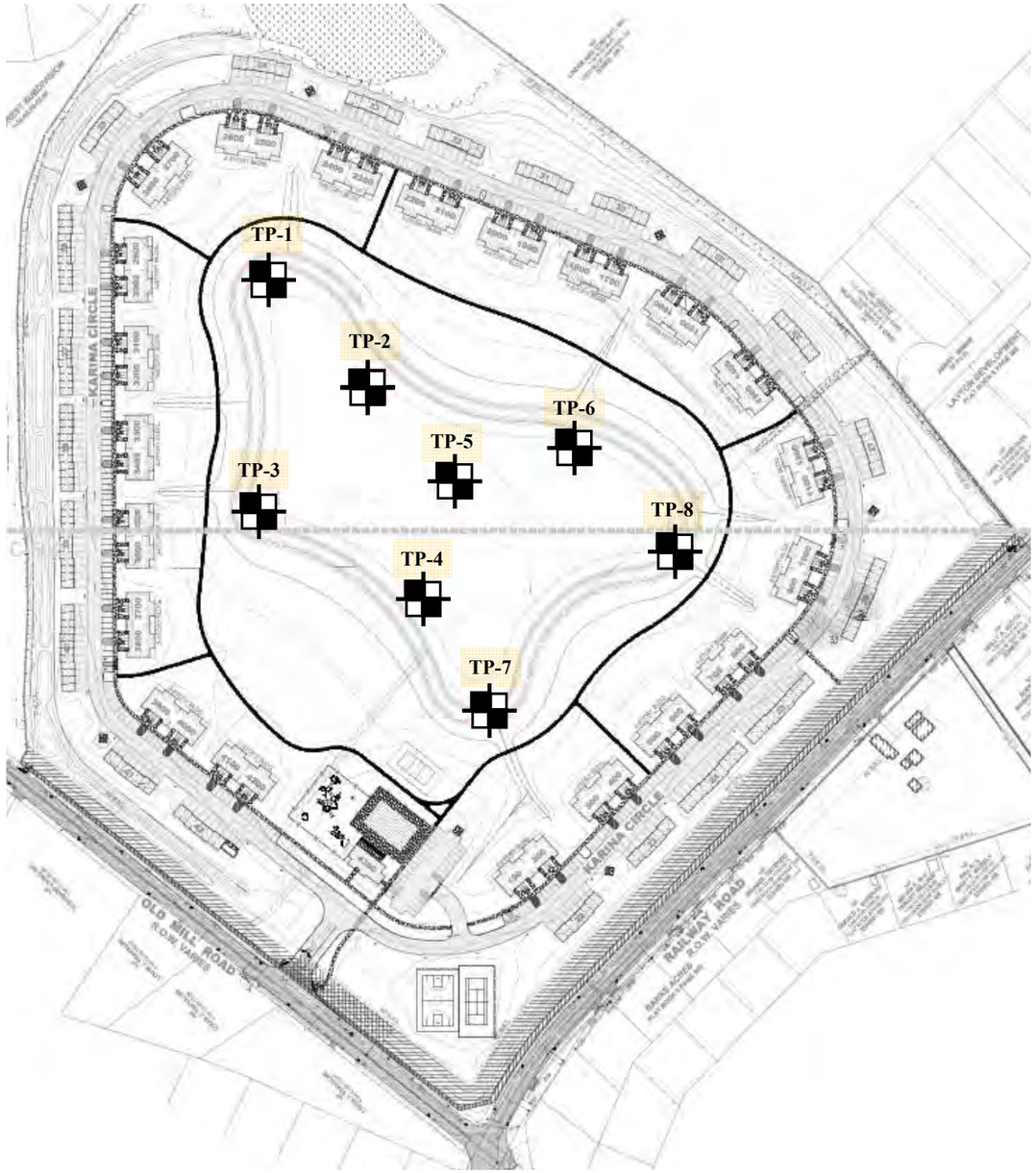
(302) 855-9761 Fax (302) 856-3388

Site Location Plan
Evans Farm
Sussex County, Delaware

SCALE	DATE	DRAWN BY	REVIEW BY	FIGURE	JOB NO.
Not To Scale	February 27, 2014	GTA	GRS	1	140254



Exploration Location Plan taken from a plan titled Evans Farm: Erosion and Sediment Control Key Plan, prepared by Becker Morgan Group and dated February 6, 2014. The exploration locations indicated on the plan should be considered approximate.

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Exploration Location Plan
Evans Farm
Sussex County, Delaware

SCALE	DATE	DRAWN BY	REVIEW BY	FIGURE	JOB NO.
1” ~ 250’ (11x17 Sheet)	February 27, 2014	GTA	GRS	2	140254

NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)				SYMBOLS GRAPHIC	SYMBOLS LETTER
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			GW
					GP
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			GM
					GC
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			SW
					SP
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			SM
					SC
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY (<15% RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE) SANDY OR GRAVELLY SILT OR CLAY (>30% RETAINED ON THE NO. 200 SIEVE)	SILTS AND LEAN CLAYS LIQUID LIMIT LESS THAN 50			ML
					CL
					OL
		ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50			MH
					CH
					OH
HIGHLY ORGANIC SOILS					PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

	DESCRIPTION		GRAPHIC SYMBOLS
ADDITIONAL DESIGNATIONS	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

COARSE-GRAINED SOILS
(GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS
(SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
WOH = WEIGHT OF HAMMER
WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	▽
UPON COMPLETION OF DRILLING	▼
24 HOURS AFTER COMPLETION	▼

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF TEST PIT NO. TP-1

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **11.3 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Light brown to gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1 ft.
	2				
	4				▼ 1 day after completion, water at 4.5 ft. 7 days after completion, water at 1.5 ft.
	6				
	8				
	10				
-0.7	12			Bottom of hole at 12 ft.	

NOTES:

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LOG OF TEST PIT NO. TP-1

LOG OF TEST PIT NO. TP-2

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **2 ft.**
GROUND SURFACE ELEVATION: **10.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6		SC		Gray-orange, moist to wet, Clayey SAND	Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 2 ft.
2.6	8	SP-SM		Gray-brown, wet, Poorly graded SAND with Silt	
1.6		SM		Gray, wet, Silty SAND	
0.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-2

LOG OF TEST PIT NO. TP-3

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **12.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				▼ 1 day after completion, water at 5 ft.
	6				7 days after completion, water at 3.5 ft.
	8				
2.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-3

LOG OF TEST PIT NO. TP-4

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **11.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Orange-brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6	4	CL		Orange-brown, moist to wet, Lean CLAY with Sand	Mottling at 4 ft.
6.6		SM		Gray-orange, wet, Silty SAND	1 day after completion, water at 4 ft.
	6				7 days after completion, water at 3 ft.
	8				
1.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-4

LOG OF TEST PIT NO. TP-5

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 1 ft.
	8				
0.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-5

LOG OF TEST PIT NO. TP-6

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **4 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Brown-gray-orange, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 2 ft.
	4				▼ 1 day after completion, water at 4 ft.
4.4	6	CL		Gray-orange, wet, Lean CLAY with Sand	7 days after completion, water at 2 ft.
3.4		SM		Lt. gray, wet, Silty SAND	
2.4	8	SC		Orange-gray, wet, Clayey SAND	
0.4	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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Georgetown, DE 19947

LOG OF TEST PIT NO. TP-6

LOG OF TEST PIT NO. TP-7

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **1.5 ft.**
GROUND SURFACE ELEVATION: **11.8 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-brown, moist to wet, Silty SAND	Topsoil: 6 inches
9.8	2	CL		Orange-gray, moist to wet, Lean CLAY with Silt	
	4				1 day after completion, water at 5 ft.
	6				
4.8		SP-SM		Orange-brown, wet, Poorly graded SAND with Silt	7 days after completion, water at 3.5 ft.
	8				
1.8	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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Georgetown, DE 19947

LOG OF TEST PIT NO. TP-7

LOG OF TEST PIT NO. TP-8

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1.5 ft. 1 day after completion, water at 3 ft. 7 days after completion, water at 1.5 ft.
0.4	10			Bottom of hole at 10 ft.	

NOTES:

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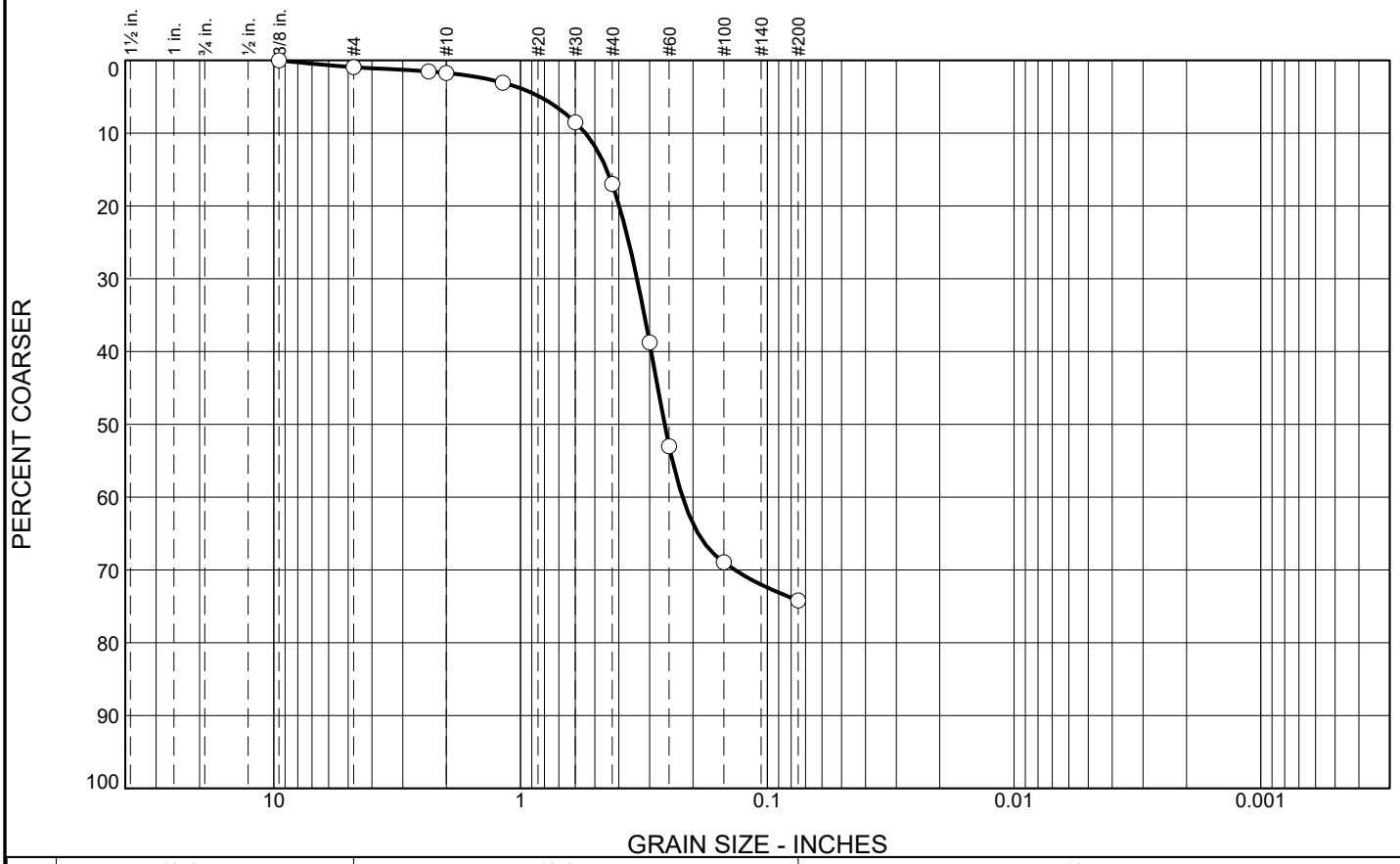
LOG OF TEST PIT NO. TP-8

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	0.8	15.3	57.2	25.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in	100.0		
# 4	99.1		
# 8	98.5		
# 10	98.3		
# 16	96.9		
# 30	91.5		
# 40	83.0		
# 50	61.3		
# 60	47.0		
# 100	31.1		
# 200	25.8		

* (no specification provided)

Soil Description

Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 16.3

Coefficients

D_{90}= 0.5455 D_{85}= 0.4476 D_{60}= 0.2954
D_{50}= 0.2607 D_{30}= 0.1352 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 16.3 %

Location: TP-4
Depth: 1 to 4 ft

Date: 2/28/14

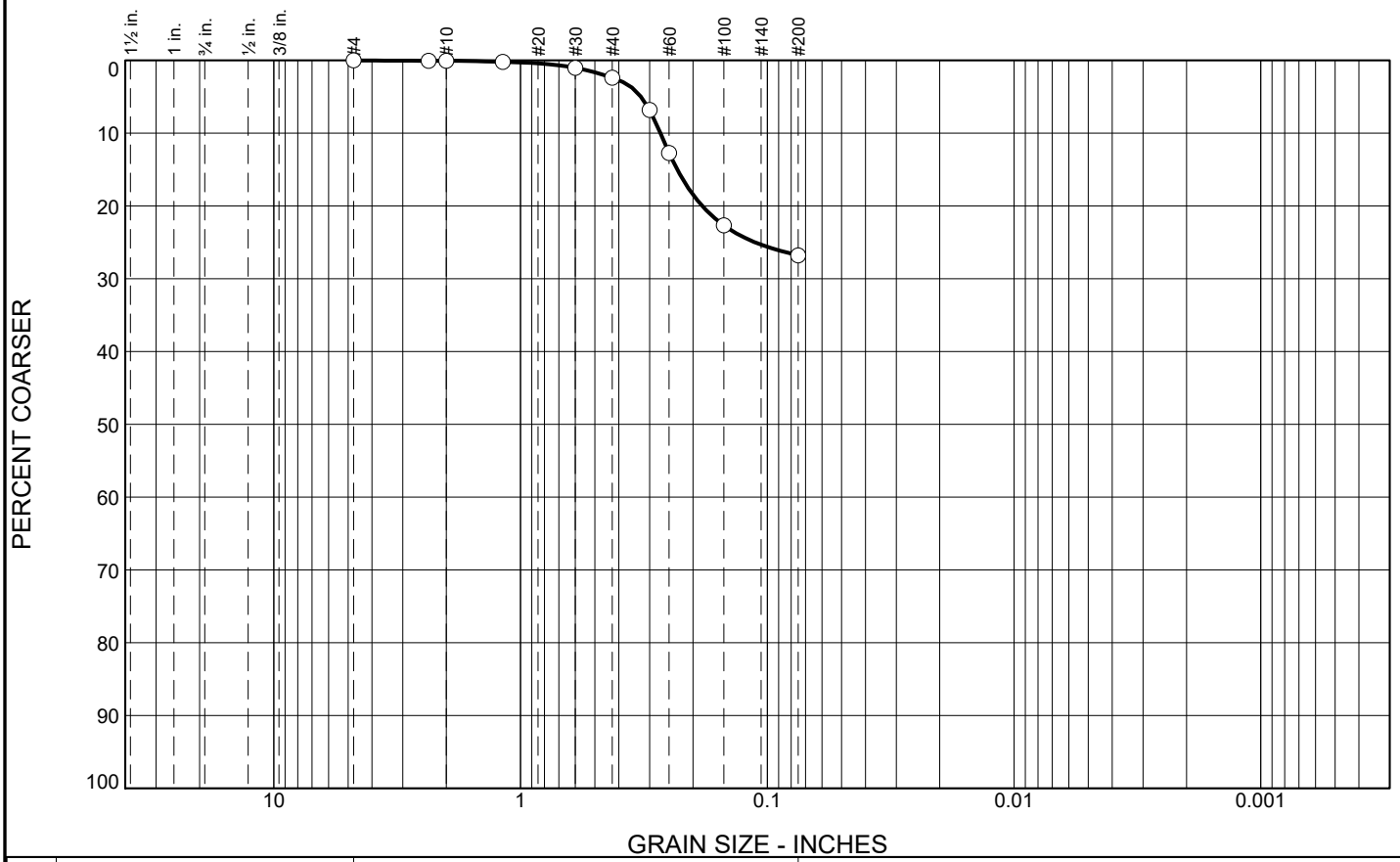
GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.3	24.4	73.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
# 4	100.0		
# 8	99.9		
# 10	99.9		
# 16	99.8		
# 30	99.0		
# 40	97.6		
# 50	93.2		
# 60	87.3		
# 100	77.3		
# 200	73.2		

* (no specification provided)

Soil Description

Lean CLAY with Sand

Atterberg Limits

PL= 21 LL= 45 PI= 24 NM= 23.4

Coefficients

D_{90}= 0.2712 D_{85}= 0.2317 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(17)

Remarks

Natural Moisture: 23.4 %

Location: TP-4
Depth: 4 to 5 ft

Date: 2/28/14

GEO-TECHNOLOGY ASSOCIATES, INC.
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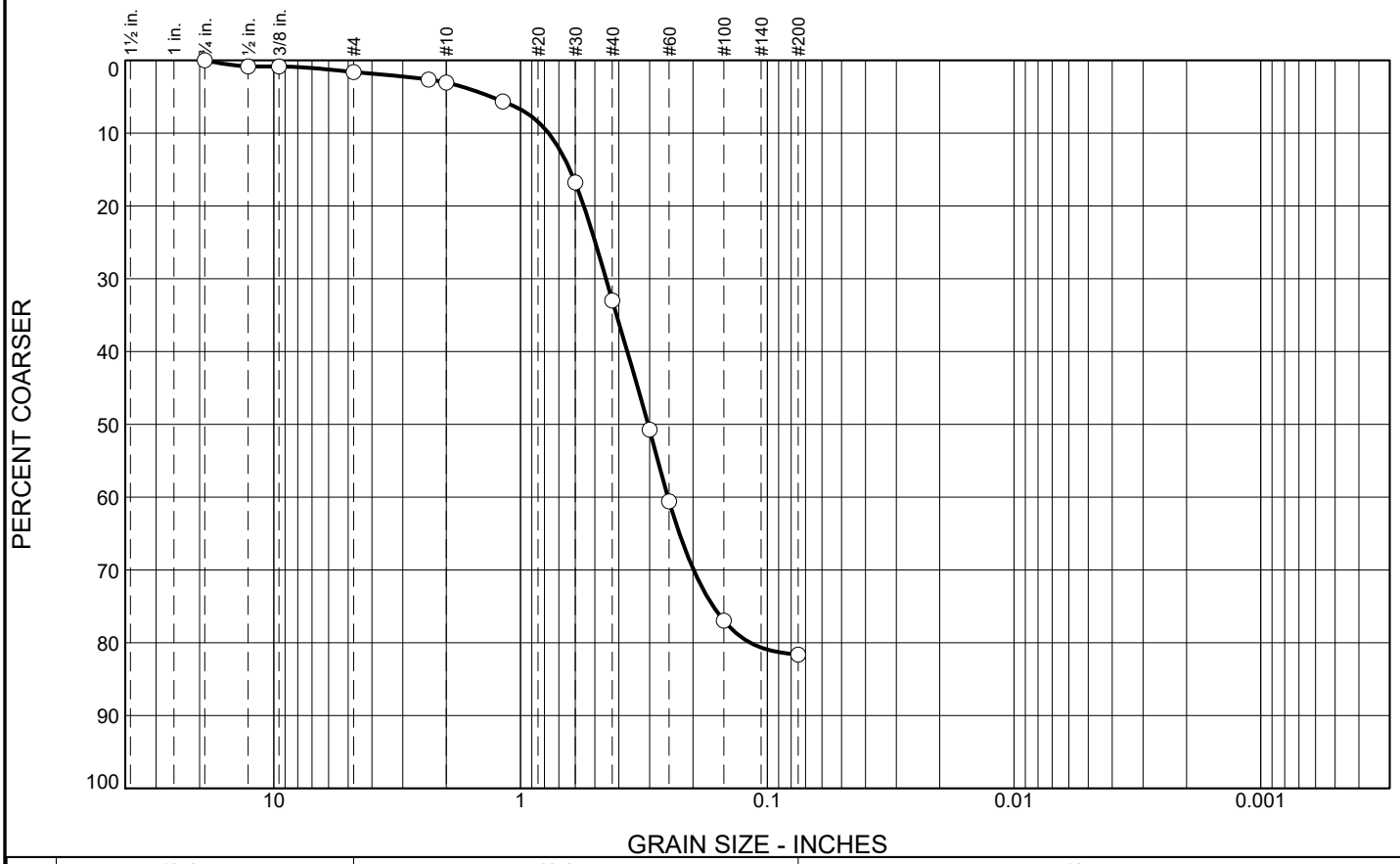
Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	1.4	30.0	48.6	18.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4 in	100.0		
1/2 in	99.2		
3/8 in	99.2		
# 4	98.4		
# 8	97.4		
# 10	97.0		
# 16	94.4		
# 30	83.2		
# 40	67.0		
# 50	49.3		
# 60	39.4		
# 100	23.0		
# 200	18.4		

* (no specification provided)

Soil Description

Gray-brown Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 18.6

Coefficients

D_{90}= 0.7694 D_{85}= 0.6312 D_{60}= 0.3694
D_{50}= 0.3041 D_{30}= 0.1989 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 18.6 %

Location: TP-5
Depth: 1 to 5 ft

Date: 2/28/14

GEO-TECHNOLOGY ASSOCIATES, INC.
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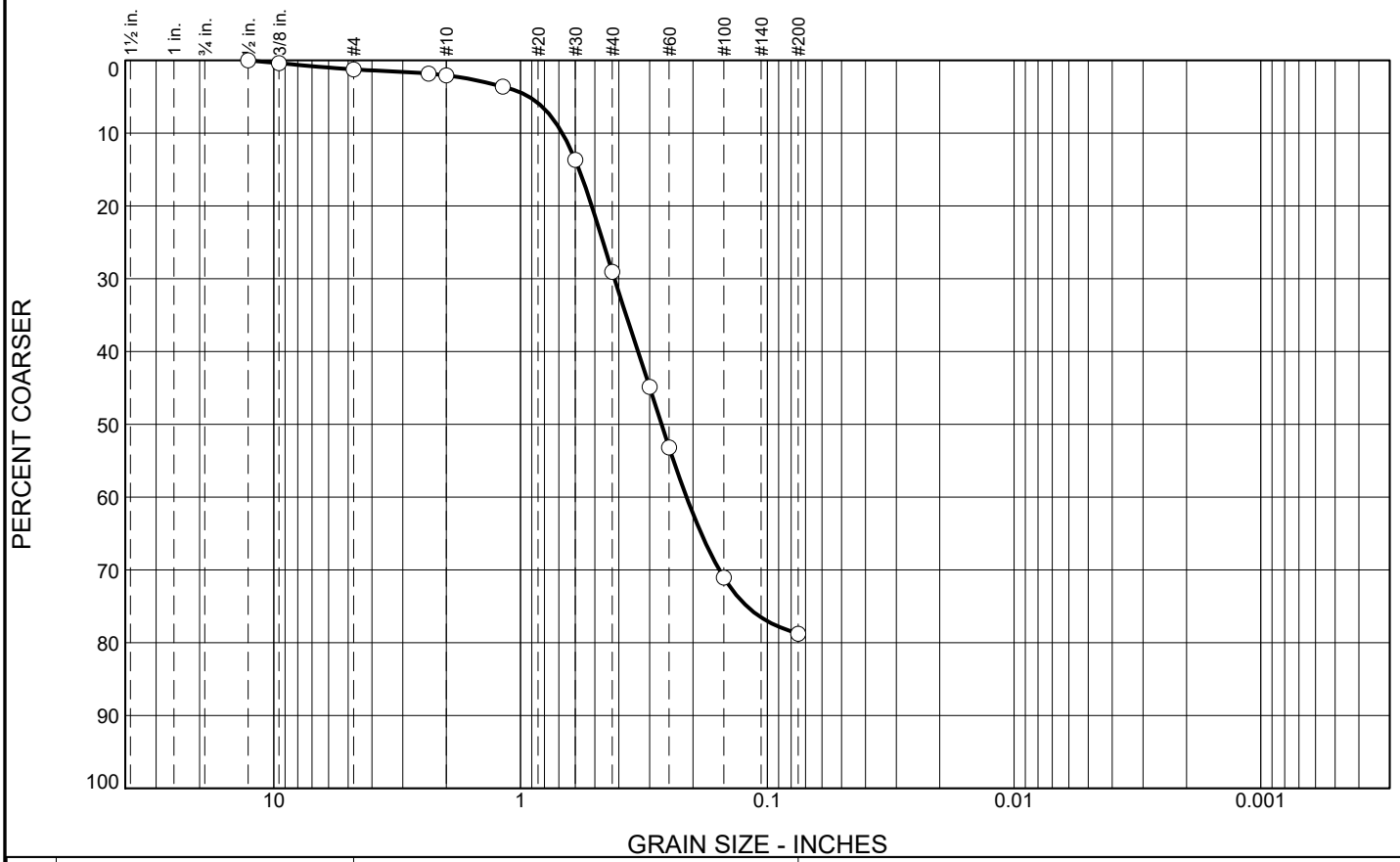
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	0.9	27.0	49.7	21.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in	100.0		
3/8 in	99.6		
# 4	98.8		
# 8	98.2		
# 10	97.9		
# 16	96.4		
# 30	86.3		
# 40	70.9		
# 50	55.1		
# 60	46.8		
# 100	28.9		
# 200	21.2		

* (no specification provided)

Soil Description

Gray-brown Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 26.0

Coefficients

D_{90}= 0.6771 D_{85}= 0.5790 D_{60}= 0.3341
D_{50}= 0.2682 D_{30}= 0.1566 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 26.0 %

Location: TP-5
Depth: 5 to 10 ft

Date: 2/28/14

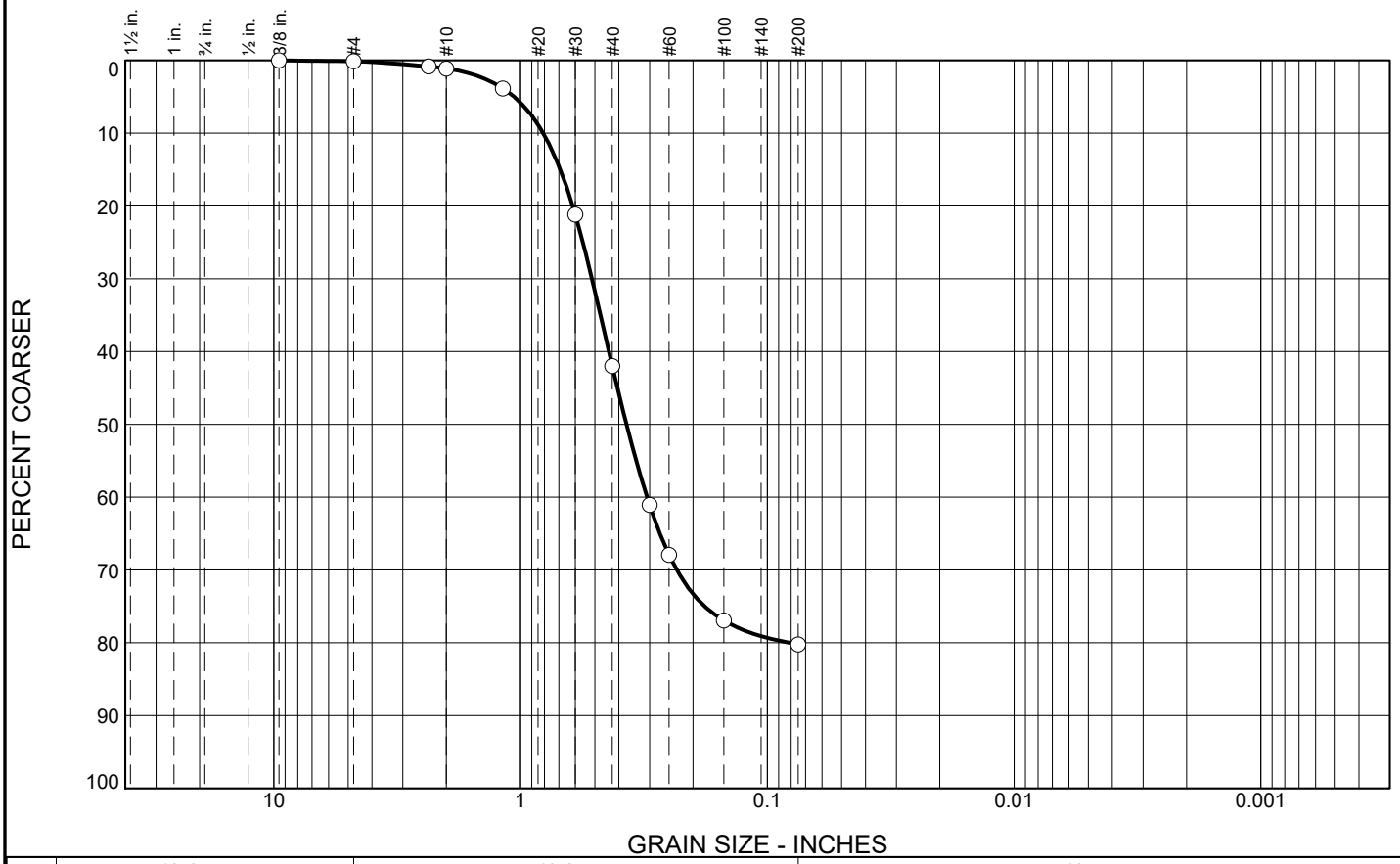
GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	1.0	40.9	38.2	19.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in	100.0		
# 4	99.9		
# 8	99.2		
# 10	98.9		
# 16	96.1		
# 30	78.8		
# 40	58.0		
# 50	38.9		
# 60	32.1		
# 100	23.1		
# 200	19.8		

* (no specification provided)

Soil Description

Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 14.0

Coefficients

D_{90}= 0.8094 D_{85}= 0.6906 D_{60}= 0.4387
D_{50}= 0.3722 D_{30}= 0.2326 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 14.0 %

Location: TP-6
Depth: 1 to 6 ft

Date: 2/28/14

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

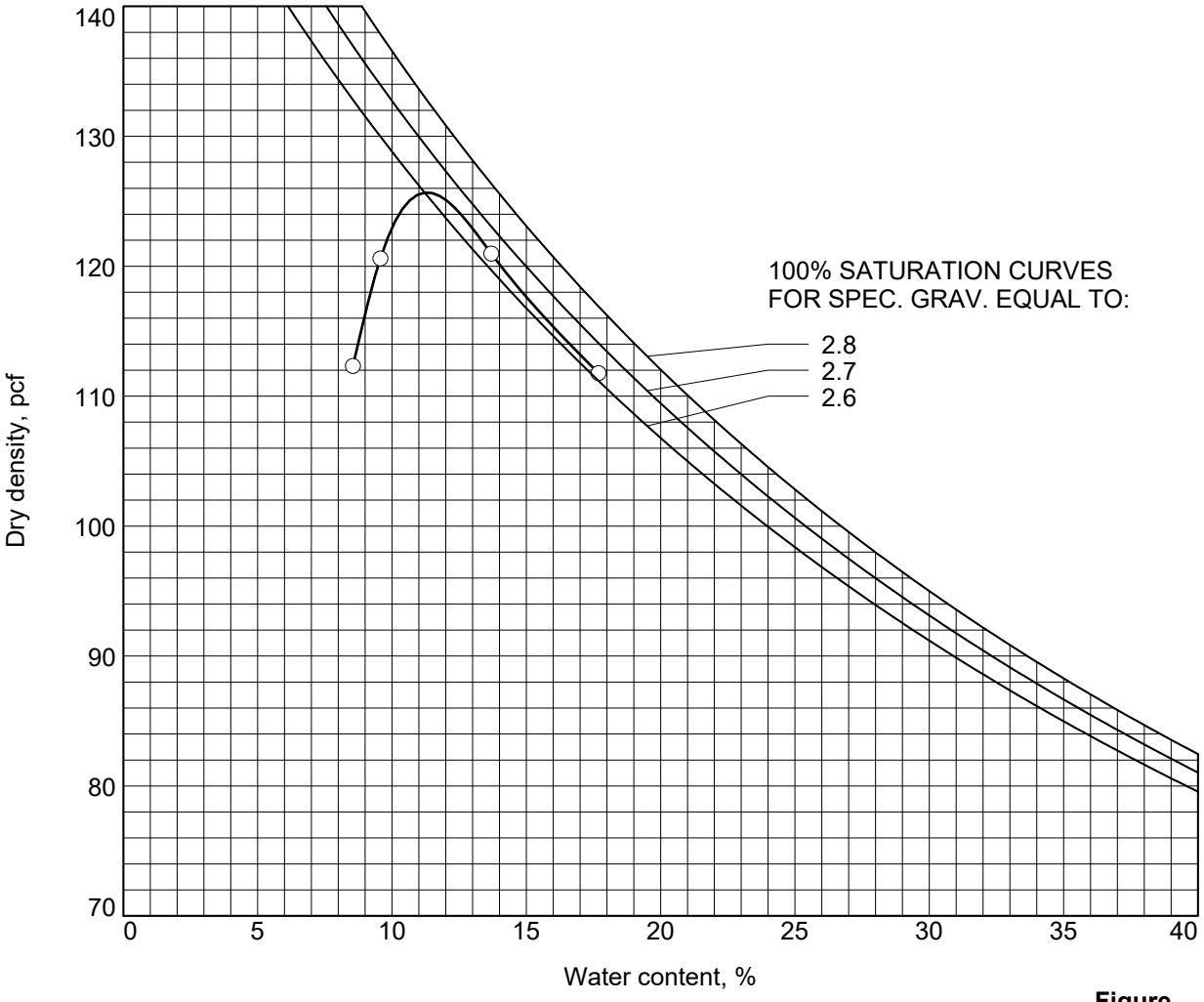
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-4
Depth: 1 to 4 ft
Remarks:

MATERIAL DESCRIPTION

Description: Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 16.3 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 25.8 %

TEST RESULTS
Maximum dry density = 125.7 pcf
Optimum moisture = 11.3 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

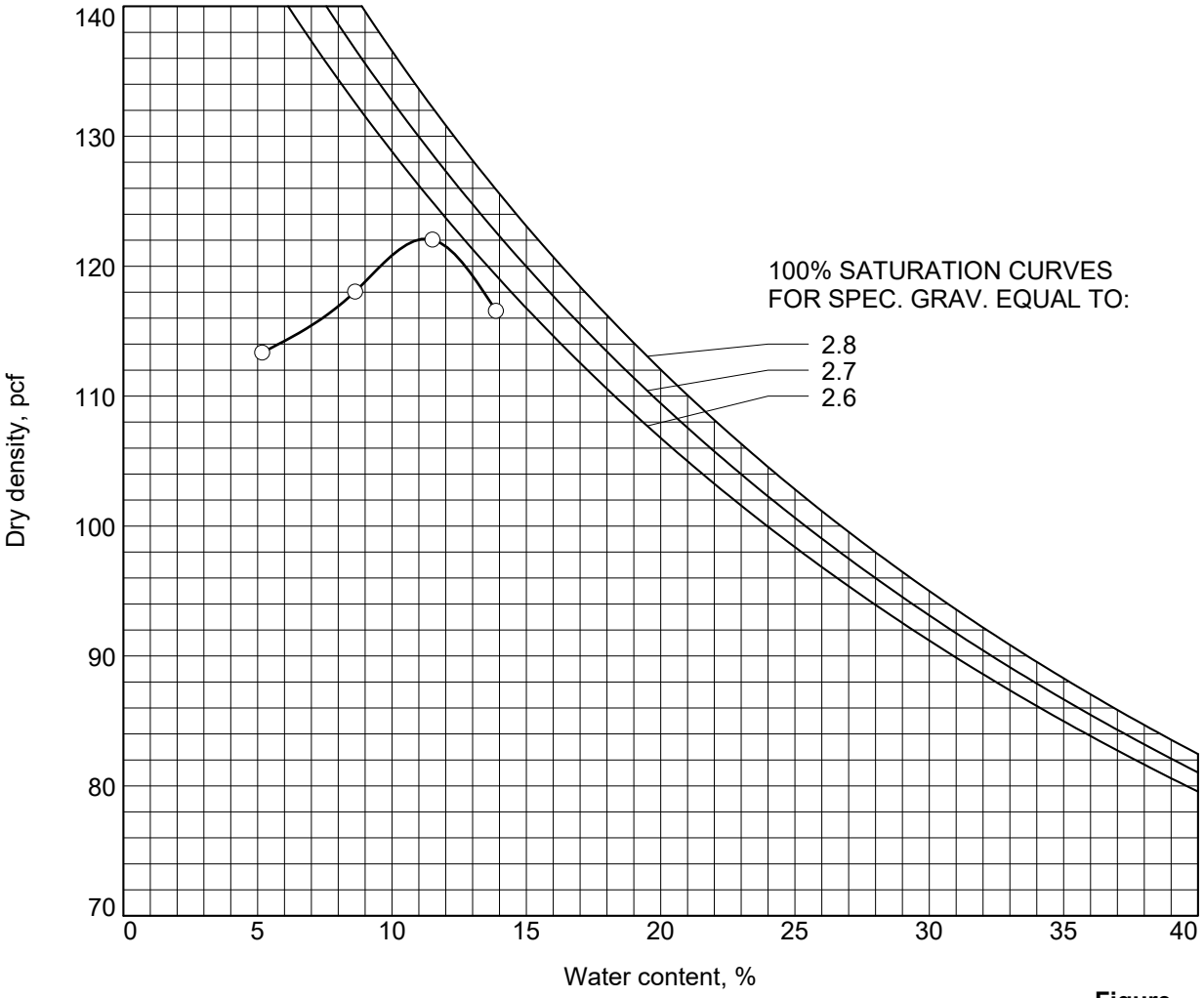
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-5
Depth: 1 to 5 ft
Remarks:

MATERIAL DESCRIPTION

Description: Gray-brown Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 18.6 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 18.4 %

TEST RESULTS
Maximum dry density = 122.1 pcf
Optimum moisture = 11.3 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

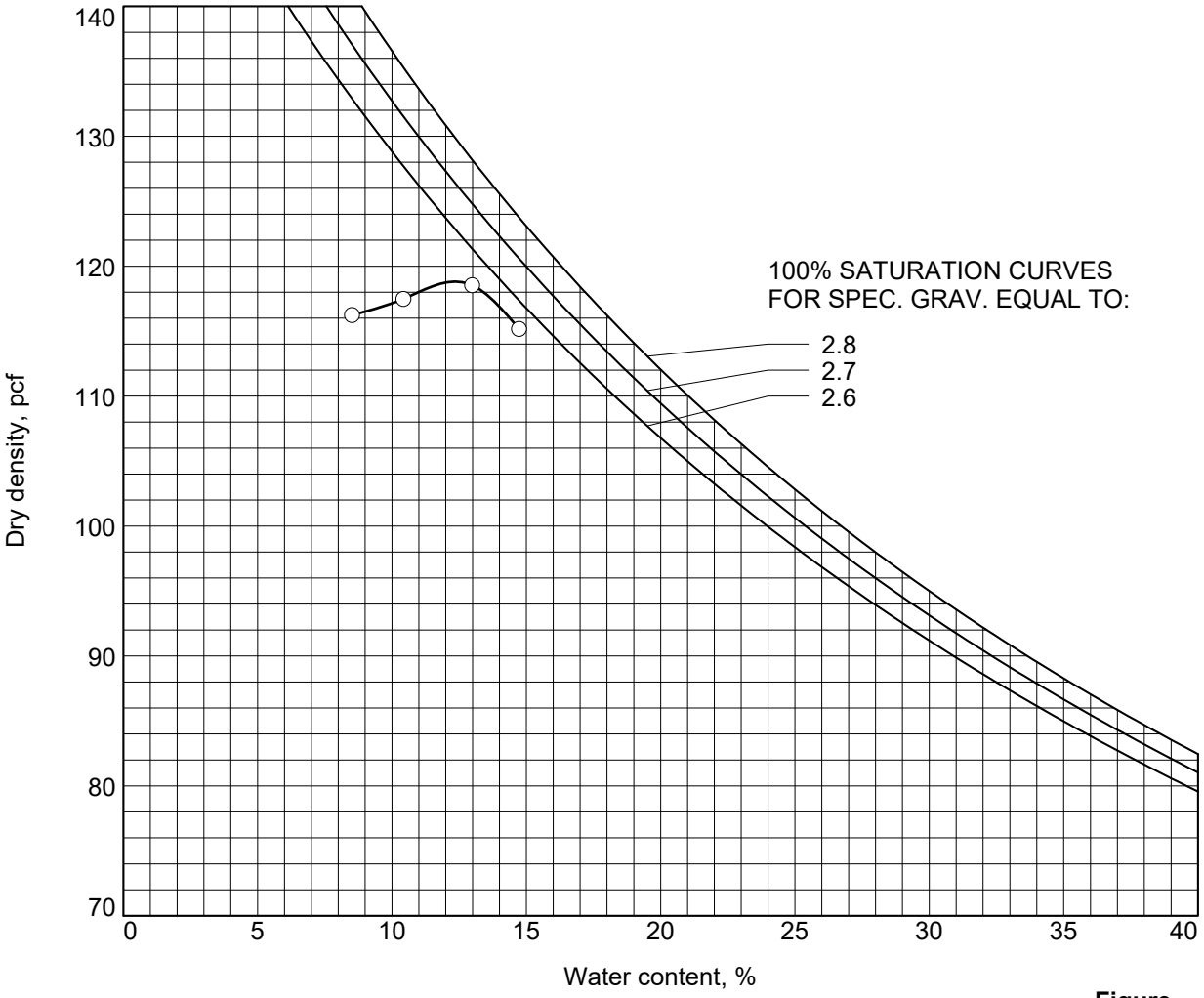
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-5
Depth: 5 to 10 ft
Remarks:

MATERIAL DESCRIPTION

Description: Gray-brown Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 26.0 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 21.2 %

TEST RESULTS
Maximum dry density = 118.8 pcf
Optimum moisture = 12.4 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

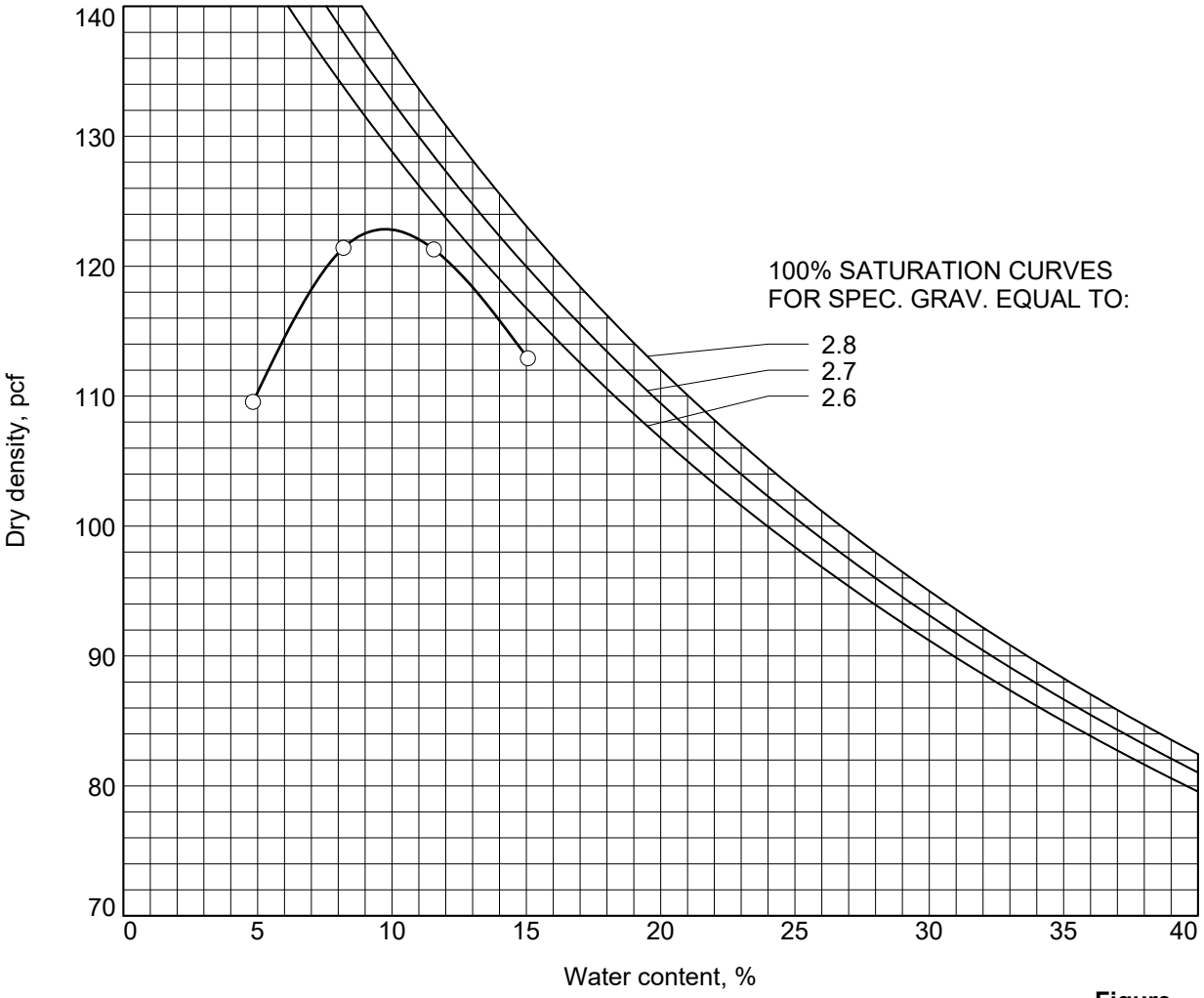
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-6
Depth: 1 to 6 ft
Remarks:

MATERIAL DESCRIPTION

Description: Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 14.0 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 19.8 %

TEST RESULTS
Maximum dry density = 122.8 pcf
Optimum moisture = 9.7 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

21133 Sterling Avenue, Suite 7
Georgetown, Delaware 19947
302-855-9761 302-856-3388 FAX

MOISTURE CONTENT TEST DATA SUMMARY

Evans Farm

Millville, Delaware

GTA Project No.: 140254

TEST PIT NO.	DEPTH (FT.)	NATURAL MOISTURE (%)	TEST PIT NO.	DEPTH (FT.)	NATURAL MOISTURE (%)
TP-1	1 - 5	13.9	TP-5	1 - 5	18.6
TP-1	5 - 6	17.6	TP-5	5 – 7	25.0
TP-1	6 - 10	16.0	TP-5	7 - 10	26.6
TP-1	10 - 12	25.7	TP-6	1 - 6	14.0
TP-2	1 - 3	12.9	TP-6	6 - 7	23.3
TP-2	3 - 8	18.5	TP-6	7 - 8	21.5
TP-2	8 - 9	27.8	TP-6	8 - 10	19.3
TP-2	9 – 10	32.0	TP-7	0.5 - 2	10.6
TP-3	1 - 3	8.8	TP-7	2 - 7	21.4
TP-3	3 - 7	15.3	TP-7	7 – 8.5	24.8
TP-3	7 - 10	22.3	TP-7	8.5 - 10	28.6
TP-4	1 - 4	16.3	TP-8	1 - 5	19.4
TP-4	4 - 5	23.4	TP-8	5 - 8	27.2
TP-4	5 - 8	26.3	TP-8	8 - 9	28.2
TP-4	8 - 10	24.3	TP-8	9 - 10	28.7

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing Geoprofessional Business Association Member Firm

February 14, 2020

Pettinaro Construction Co., Inc.
234 North James Street
Newport, Delaware 19804

Attn: Ms. Andrea Finerosky

RE: Report of Supplemental Subsurface Exploration
Evans Farm Apartments
Ocean View
Sussex County, Delaware

Ladies & Gentlemen:

In accordance with our agreement dated November 25, 2019, Geo-Technology Associates, Inc. (GTA) has performed a subsurface exploration for the above referenced project. The purpose of the subsurface exploration was to evaluate the estimated normal seasonal high groundwater elevation; discuss suitability of the subsoils to facilitate infiltration practices at selected test locations; and to present the subsoil conditions encountered at selected borings. A plan titled *Evans Farm Apartments* prepared by Pennoni Associates, Inc. and dated August 16, 2019, and our geotechnical report dated March 10, 2014, were referenced for this report. The results of our subsurface exploration are summarized below.

Referring to the attached Site Location Plan, the project is situated along the northwest side of Railway Road and the northeast side of Old Mill Road at the intersection between Railway Road and Old Mill Road in Millville, Delaware. The study area consists of an open farm field with woods surrounding the perimeter of the property. The existing ground surface at the exploration locations ranges between approximate Elevation 8 and 11 Mean Sea Level (MSL) as determined by Pennoni Associates, Inc.

According to the Geologic Map of the Bethany Beach and Assawoman Bay Quadrangles, Delaware (2012), published by the Delaware Geological Survey, the project area is underlain by sediments of the Coastal Plain Physiographic Province. Coastal Plain sediments below the surficial deposits exposed in the site area were generally deposited in commonly estuarine environments of Tertiary geologic age. The Tertiary deposits are designated as the deposits of the Beaverdam Formation. These deposits are characterized by "…very coarse sand with pebbles to silty clay." Please review the referenced publication for further details regarding this geologic unit.

From review of the USDA Soil Survey, the soils predominately conform to Klej loamy sand (0 to 2 percent slopes). Also present are soils that conform to Pepperbox-Rosedale complex (0 to 2

percent slopes), Rosedale loamy sand (0 to 2 percent slopes) and Runclint loamy sand (0 to 2 percent slopes). The soils map information is attached.

From review of the attached Monthly Groundwater Depth for Qe44-01, Columbia Aquifer, taken from the Delaware Geological Survey website, the groundwater depth at Well Qe44-01, was below the normal seasonal high during the period when the borings were performed in January 2020.

GTA performed seven hand auger borings, designated as A-1 through A-7, to depths where wet, caving conditions were encountered at 3 to 6 feet below the ground surface. Temporary piezometers were placed in each test hole and longer-term water readings were taken one day after completion. The piezometers were removed after the long-term readings. The exploration locations were selected by GTA. The boring locations staked with elevations determined by Pennoni. Relative locations of the current borings as well as previous explorations are shown on the attached Exploration Location Plan. The exploration locations indicated on the plan should be considered approximate.

The soils were visually classified in accordance with the Unified Soil Classification System (USCS) and the United States Department of Agriculture (USDA) classification system. Beneath an approximately 11 to 14-inch thick surface topsoil layer, the explorations generally encountered native subsoils visually classified as predominately consisting of Poorly-graded SANDs with Silt (USCS: SP-SM; USDA: Loamy Sand, Sand), Silty SAND (SM, Loamy Sand), and Clayey SAND (SC; Sandy Clay Loam).

GTA's estimate of the seasonal high groundwater level at the borings is based upon water levels below seasonal high; and soil coloring and mottling. The results of the groundwater level readings and GTA's opinion of the estimated seasonal high groundwater depth are summarized as follows:

GROUNDWATER DATA SUMMARY

Exploration No.	Existing Ground Surface Elevation (MSL)	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Groundwater at Completion	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Groundwater At One to Six Days After Completion	*Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Estimated Seasonal High Groundwater
A-1	8.5	2.6 / EL 5.9	1.7 / EL 6.8	1 / EL 8
A-2	8.1	2.5 / EL 5.6	1.3 / EL 6.8	0 / EL 8
A-3	8.4	2.7 / EL 5.7	1.7 / EL 6.7	0 / EL 8
A-4	8.7	3.9 / EL 3.8	2.1 / EL 6.6	1 / EL 8
A-5	8.3	3.0 / EL 5.3	1.0 / EL 7.3	0 / EL 8
A-6	10.5	4.0 / EL 6.5	3.3 / EL 7.2	2 / EL 9
A-7	10.1	4.0 / EL 6.1	3.5 / EL 6.6	1 / EL 9

*Seasonal high groundwater estimate based upon observed soil mottling, saturation and color and should be considered approximate.

From our previous exploration performed during February and March 2014, the estimated seasonal high is summarized as follows:

GROUNDWATER DATA SUMMARY

Exploration No.	Existing Ground Surface Elevation (MSL)	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Encountered Water When Excavated	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Water At Seven Days After Completion	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Estimated Normal Seasonal High Groundwater
TP-1	11.3	5 / 6.3	1.5 / 9.8	2 / 9
TP-2	10.6	2 / 8.6	2 / 8.6	2 / 9
TP-3	12.2	5 / 7.2	3.5 / 8.7	3 / 9
TP-4	11.6	3 / 8.6	3 / 8.6	3 / 9
TP-5	10.2	3 / 7.2	1 / 9.2	1 / 9
TP-6	10.4	4 / 6.4	2 / 8.4	2 / 8
TP-7	11.8	1.5 / 10.3	3.5 / 8.3	4 / 8
TP-8	10.4	3 / 7.4	1.5 / 8.9	2 / 8

The groundwater levels can be expected to fluctuate with seasonal changes, precipitation, and other factors such as development activity. Additionally, perched water conditions develop in granular soils overlying fine-grained soils during the "wet season" as well as during periods of precipitation. Please refer to the exploration logs and idealized subsurface profiles provided in the attachments for further information.

A selected sample obtained from the borings was tested for grain-size analysis, hydrometer, Atterberg Limits and natural moisture content. The grain-size analysis, hydrometer and Atterberg Limits testing was performed to evaluate the Unified Soil Classification System (USCS) and United States Department of Agriculture (USDA) soil classification system designations for the soil. The results of testing are as follows:

SUMMARY OF LABORATORY TESTING

EXPLORATION NO.	DEPTH (FT.)	USCS CLASSIFICATION	USDA CLASSIFICATION	LL (%)	PI (%)	NMC %
A-6	1 – 4	Silty SAND (SM)	Loamy Sand	NP	NP	9.1

Note: LL=Liquid Limit PI=Plastic Index NP=Non-plastic NMC=Natural Moisture Content

Please refer to the attached laboratory test results for additional information.

The guidelines established in the *Delaware Post Construction Stormwater BMP Standards & Specifications*, dated February 2019 indicate that the minimum infiltration rate for

all runoff reduction and infiltration practices is one-inch per hour. Also, a vertical separation of at least two-feet from the seasonal high groundwater elevation or limiting layer is required for all infiltration practices unless an underdrain is provided.

Predominant subsurface soils observed in the test borings consisted of Poorly-graded SANDs, Silty SANDs and Clayey SANDs which generally correspond to Loamy Sand, Sandy Loam and Sandy Clay Loam respectively, in accordance with the USDA Soil Classification System. These types of soils have good to poor infiltration characteristics. Based upon the boring data and considering the shallow groundwater, it is GTA's opinion that below grade infiltration facilities will generally not be feasible at this site. The subsoil and groundwater conditions appear to be more suitable for gravel wetland or wet pond construction.

For wet pond construction, a pond liner should be considered if needed to maintain proposed pool levels. It appears that a sufficient quantity of USCS CL or SC materials is not available on site and a manufactured pond liner may be deemed more suitable for a wet pond. If a manufactured liner is used, GTA recommends a Geosynthetic Clay Liner (GCL; Bentonite matrix) or an appropriate PVC liner with relief valves. Both types of liners will need to be provided with a 1-foot thick granular soil cover. The GCL or PVC liners should be installed in accordance with manufacturer's recommendations. On-site granular soils are considered suitable for use as a pond liner cover material if they are dried to near optimum. Pond liner cover materials should meet AASHTO classification designation A-2-4 or more granular and be approved by GTA.

If a pond fill embankment is planned, GTA recommends that prior to construction of pond fill embankment and after stripping the surface topsoil, GTA recommends to construct a four-foot deep (below stripped ground surface and stepped below the spillway invert) cutoff trench along the pond embankment length and extending to the 10-year event elevation at each end of the fill embankment alignment. Also, upon completion of the cutoff trench, an embankment core should extend to the top elevation of the 10-year event. The side slopes of the cutoff trench and embankment core should be at 1H:1V inclination or flatter. The bottom of the cutoff trench and the top of embankment core should be at least 4 feet wide. The cutoff and embankment core should be formed of USCS CL or SC materials. The balance of embankment may be constructed of onsite materials conforming to USCS SC, SM, SP-SM or SP.

Pond structural fill should be constructed in maximum 8-inch loose lifts and compacted to 95 percent of the maximum dry density as determined by ASTM D-698 (AASHTO T-99). If practical, GTA recommends reinforced concrete pipe be used as the principal spillway pipe. Also, a concrete cradle and anti-seep collar should be provided for the spillway pipe.

For wet pond construction, water levels will be above at least a portion of the pond bottom level during construction. The contractor should be prepared to stabilize and dewater pond excavations. Subgrades excavated below the water table will be prone to instability and softening.

All SWM pond construction should conform to *Delaware Conservation Practice Standard Pond Code 378* and *Code 521*, latest editions and *Delaware Sediment and Stormwater Regulations*, latest edition, as applicable.

Limitations

This report, including all supporting exploration logs, field data, field notes, estimates, and other documents prepared by GTA in connection with this project, has been prepared for the exclusive use of Pettinaro Construction Co. Inc. pursuant to the agreement between GTA and Pettinaro Construction Co. Inc. dated November 25, 2019, and in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreement are incorporated herein by reference. No warranty, express or implied, is given herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Stanley Halle Communities is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Explorations indicate soil and groundwater conditions only at specific locations and times and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between the exploration locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations in subsurface conditions from those described are noted during construction, recommendations in this report may need to be re-evaluated.

In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. Geo-Technology Associates, Inc. is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Geo-Technology Associates, Inc.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be constructed by the reader to imply approval by the writer.

We appreciate the opportunity to be of assistance on this project. Should you have any questions or require additional information, please contact our office at (302) 855-9761.

Sincerely,
GEO-TECHNOLOGY ASSOCIATES, INC.

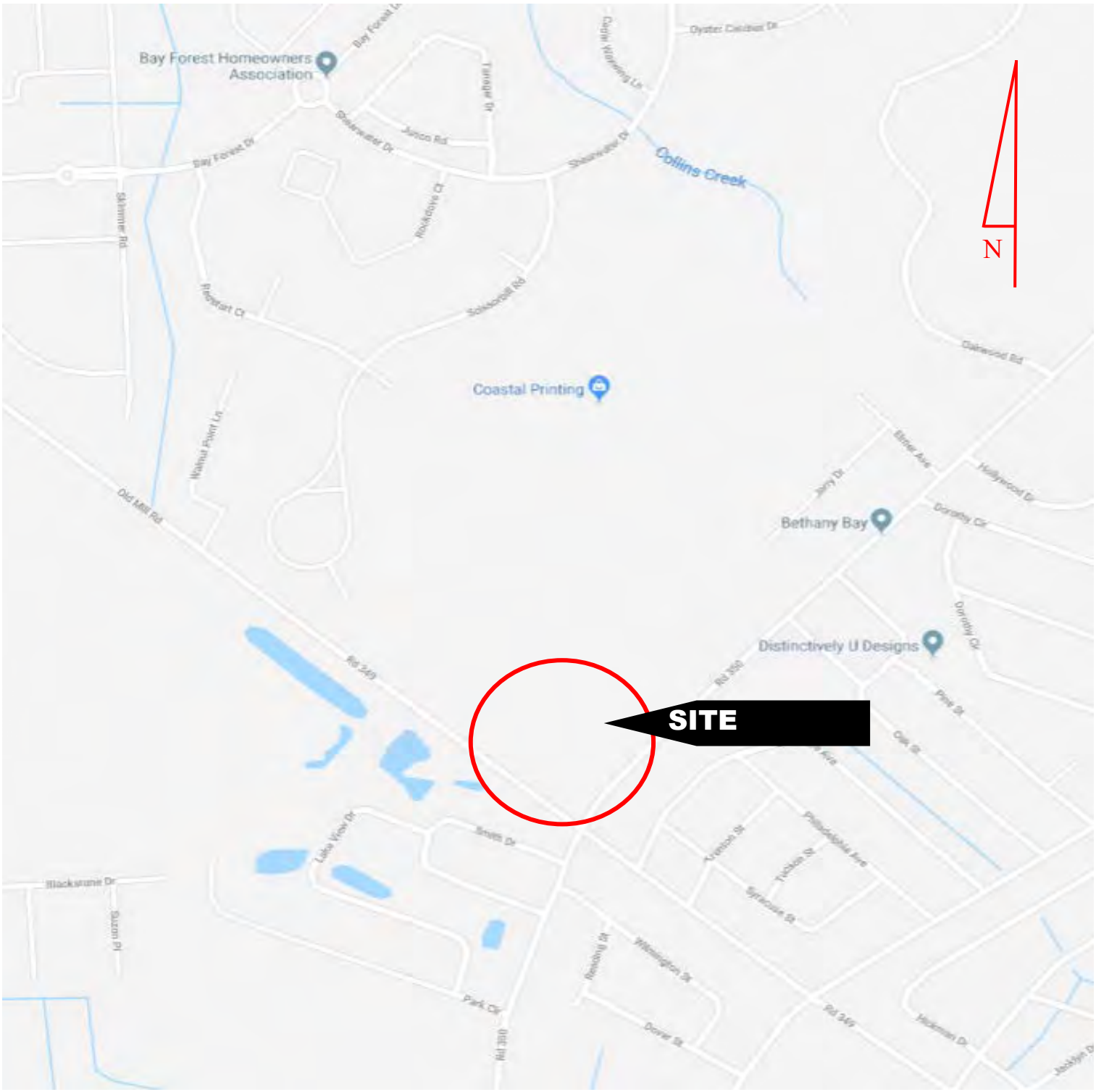
Travis P. Caraway, EIT
Project Geotechnical Professional



Gregory R. Sauter, P.E
Vice President

TPC/GRS/llh
31200065
S:\1 Job File\2020 Projects\31200065-Evans Farm\Report\Evans Farm- GTA Letter Report of Suburface Exploration.doc

Attachments: Site Location Plan (1 page)
Exploration Location Plan (1 page)
USDA Soil Survey Map (3 pages)
Qe44-01 Monthly Groundwater Depth (1 page)
Notes for Exploration Logs (1 page)
Exploration Logs (7 pages)
Particle Size Distribution Report (1 page)
Previous Exploration Logs (8 pages)
GBA – Important Information about your Geotechnical Engineering Report (2 pages)

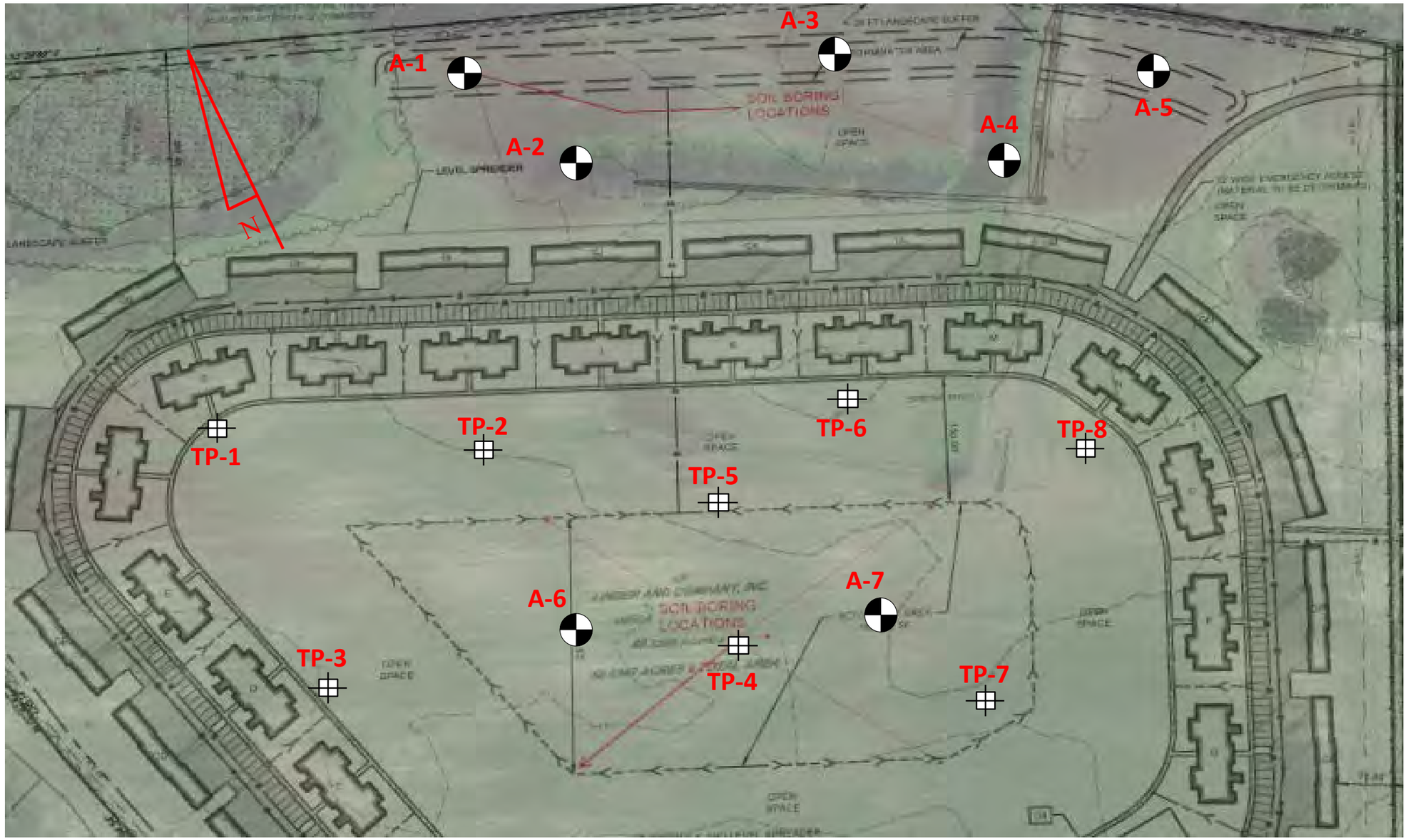


Site Location Plan taken from Google Maps

GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
21133 Sterling Avenue, Suite 7
Georgetown, Delaware 19947
(302) 855-9761 Fax (302) 856-3388

Site Location Plan
Evans Farm Apartments
Sussex County, Delaware

SCALE	DATE	DRAWN BY	DESIGN BY	REVIEW BY	JOB NO.
NTS	January 2020	GTA	Google Maps	GRS	31200065



Exploration Location Plan taken from a plan titled *Evans Farm Apartments* drawn by Pennoni Associates Inc. and dated August 16, 2019.
Previous explorations presented in our report dated March 10, 2014.

Exploration Location

Previous Exploration Locations

GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
21133 Sterling Avenue, Suite 7
Georgetown, Delaware 19947
(302) 855-9761 Fax (302) 856-3388

Exploration Location Plan
Evans Farm Apartment
Sussex County, Delaware

SCALE 11x17	DATE	DRAWN BY	DESIGN BY	REVIEW BY	JOB NO.	Figure
1"~115'	January 2020	GTA	Pennoni	GRS	31200065	2

Soil Map—Sussex County, Delaware
(Evans Farm)



Map Scale: 1:3,990 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sussex County, Delaware
Survey Area Data: Version 20, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2018—Mar 12, 2019

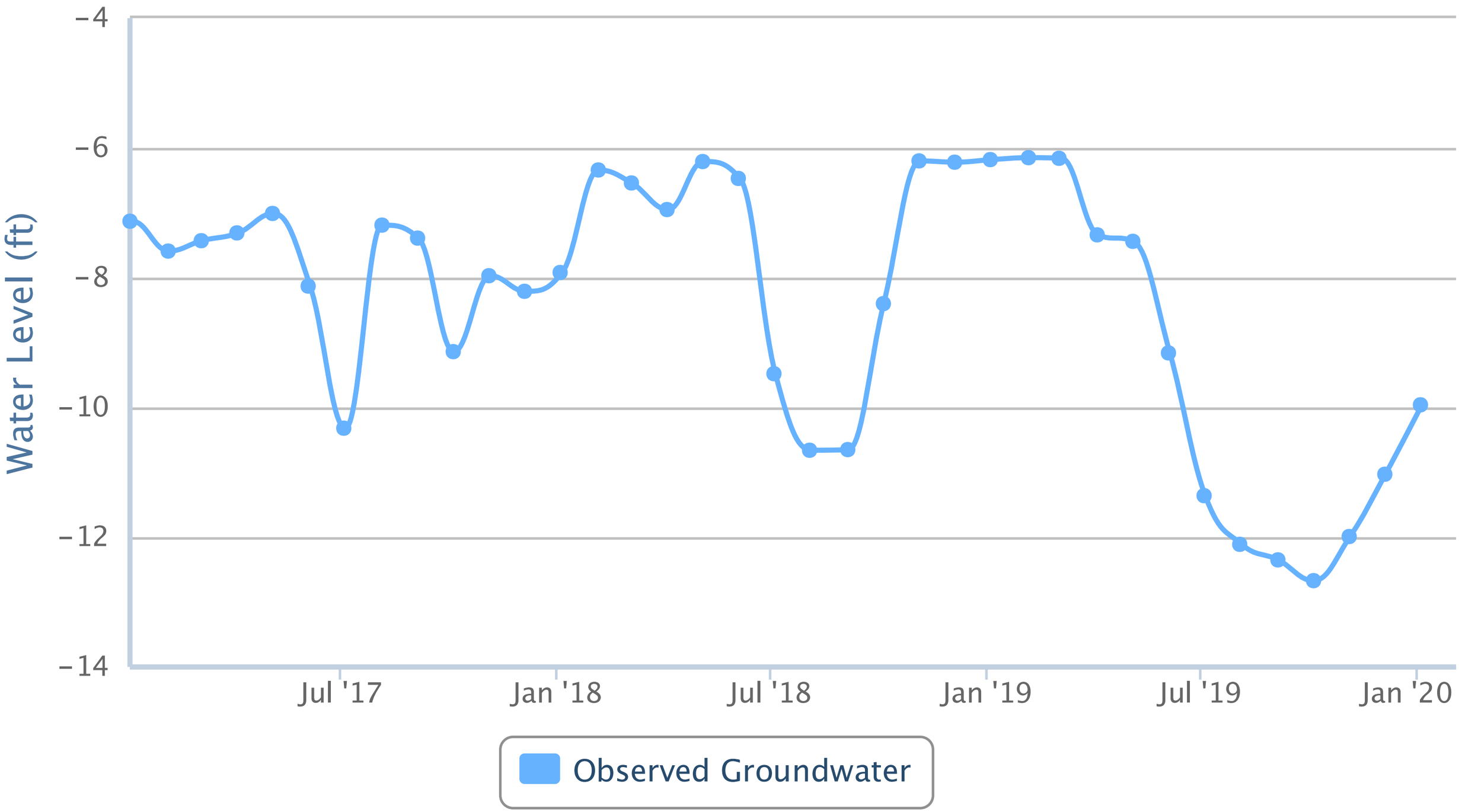
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	2.0	4.2%
HmA	Hammonton loamy sand, 0 to 2 percent slopes	4.8	10.1%
KsA	Klej loamy sand, 0 to 2 percent slopes	16.3	34.3%
PsA	Pepperbox-Rosedale complex, 0 to 2 percent slopes	8.5	17.9%
RoA	Rosedale loamy sand, 0 to 2 percent slopes	8.0	16.8%
RuA	Runclint loamy sand, 0 to 2 percent slopes	8.0	16.8%
Totals for Area of Interest		**47.7**	**100.0%**

Monthly Groundwater Depth for Qe44-01, Columbia Aquifer

Delaware Geological Survey



NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)				SYMBOLS GRAPHIC	SYMBOLS LETTER
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			GW
					GP
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			GM
					GC
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			SW
					SP
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			SM
					SC
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY (<15% RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE) SANDY OR GRAVELLY SILT OR CLAY (>30% RETAINED ON THE NO. 200 SIEVE)	SILTS AND LEAN CLAYS LIQUID LIMIT LESS THAN 50			ML
					CL
					OL
		ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50			MH
					CH
					OH
HIGHLY ORGANIC SOILS					PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

	DESCRIPTION		GRAPHIC SYMBOLS
ADDITIONAL DESIGNATIONS	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

COARSE-GRAINED SOILS
(GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS
(SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
WOH = WEIGHT OF HAMMER
WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	▽
UPON COMPLETION OF DRILLING	▼
24 HOURS AFTER COMPLETION	▼

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF EXPLORATION NO. A-1

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	2.6		1.7
DATE:	1/28/20		1/29/20
CAVED (ft):	4.0		4.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.5**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.5	0	TS		Topsoil: 13 inches	
				7.4		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				5.5		SC		Tan, wet, Clayey SAND USDA: Sandy Clay Loam	
				4.5	4			Bottom of hole 4.0 feet	Wet, caving conditions at 4.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 43, Precipitation Last 48 hours: 1.1 in** **Coords: 38 33'36.50"N, 75 6'50.49"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-1

LOG OF EXPLORATION NO. A-2

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	2.5		1.3
DATE:	1/28/20		1/29/20
CAVED (ft):	5.0		5.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.1**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.1	0	TS		Topsoil: 12 inches	
				7.1		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
					4				
				3.1				Bottom of hole 5.0 feet	Wet, caving conditions at 5.0 feet
					6			Dynamic Cone Penetrometer is the approximate average per interval.	
					8				
					10				
					12				

NOTES: **Air Temp: 43, Precipitation Last 48 hours: 1.1 in** **Coords: 38 33'34.85"N, 75 6'50.35"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-2

LOG OF EXPLORATION NO. A-3

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	2.7		1.7
DATE:	1/28/20		1/29/20
CAVED (ft):	3.0		3.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.4**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.4	0	TS		Topsoil: 12 inches	
				7.4		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				5.4				Bottom of hole 3.0 feet	Wet, caving conditions at 3.0 feet
					4			Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords: 38 33'34.05"N, 75 6'46.51"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-3

LOG OF EXPLORATION NO. A-4

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	3.9		2.1
DATE:	1/28/20		1/29/20
CAVED (ft):	4.0		4.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.7**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.7	0	TS		Topsoil: 14 inches	
				7.5		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				4.7	4			Bottom of hole 4.0 feet	Wet, caving condtions at 4.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **3833'31.84"N, 75 6'45.99"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-4

LOG OF EXPLORATION NO. A-5

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	3.0		1.0
DATE:	1/28/20		1/29/20
CAVED (ft):	4.0		4.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.3**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.3	0	TS		Topsoil: 11 inches	
				8.2		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				4.3	4			Bottom of hole 4.0 feet	Wet, caving conditions 4.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **3833'31.84"N, 75 6'43.53"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-5

LOG OF EXPLORATION NO. A-6

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	4.0		3.3
DATE:	1/28/20		1/29/20
CAVED (ft):	6.0		6.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **10.5**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				10.5	0	TS		Topsoil: 12 inches	
				9.5		SM		Tan, moist, Silty SAND USDA: Loamy Sand	
					2				
				6.5	4	SP-SM		Tan, wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
				4.5	6			Bottom of hole 6.0 feet	Wet, caving conditions at 6.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **38 33'30.81"N, 75 6'54.76"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-6

LOG OF EXPLORATION NO. A-7

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	4.0		3.5
DATE:	1/28/20		1/29/20
CAVED (ft):	6.0		6.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **10.1**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

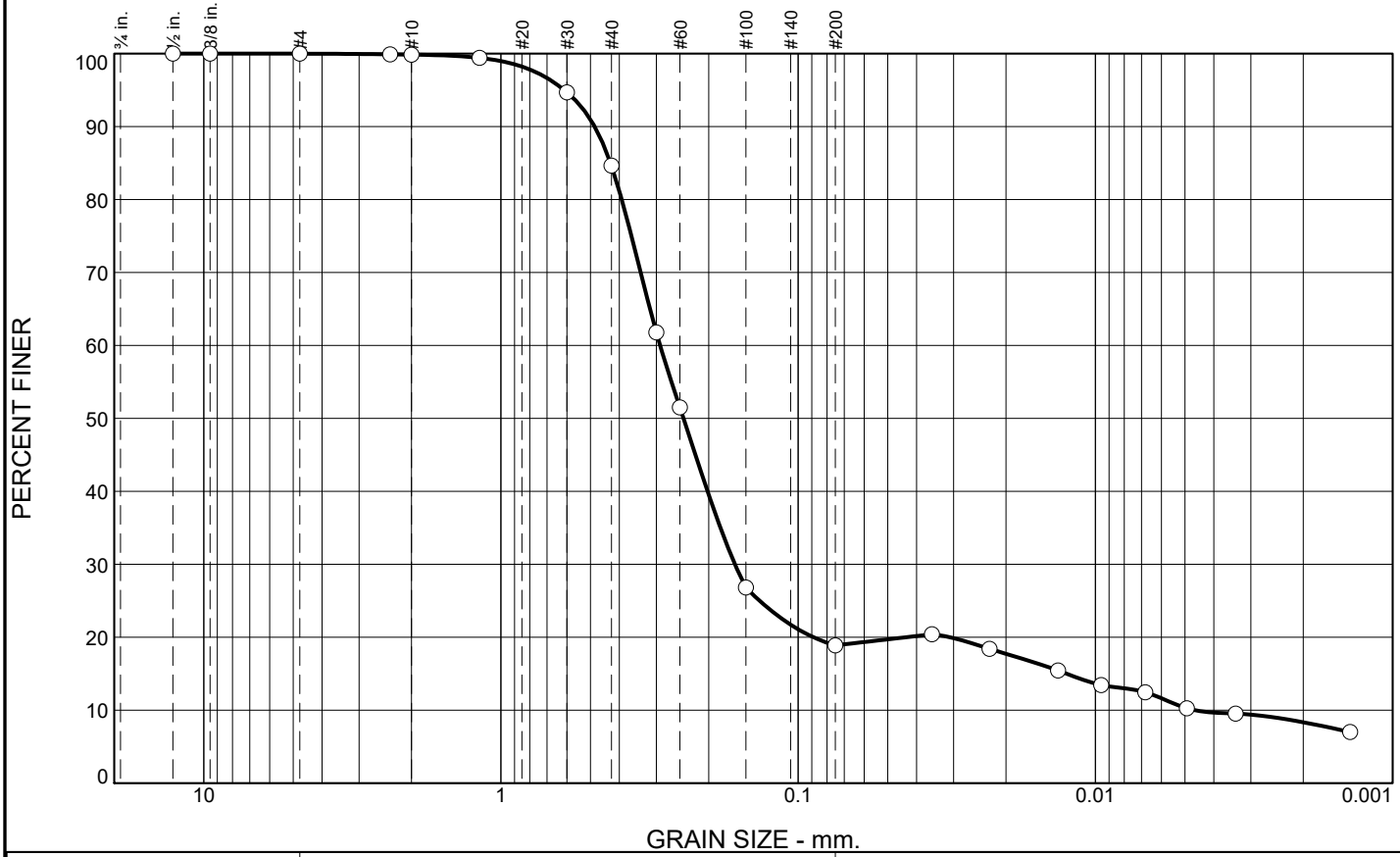
SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				10.1	0	TS		Topsoil: 12 inches	
				9.1		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
					4				
				4.1	6			Bottom of hole 6.0 feet	Wet, caving conditions at 6.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **38 33'28.97"N, 75 6'51.90"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-7

Particle Size Distribution Report



% Gravel		% Sand			% Fines	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	15.2	65.8	8.6	10.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in	100.0		
3/8 in	100.0		
# 4	100.0		
# 8	99.9		
# 10	99.9		
# 16	99.4		
# 30	94.7		
# 40	84.7		
# 50	61.8		
# 60	51.5		
# 100	26.8		
#200	18.9		
0.0355 mm.	20.4		
0.0227 mm.	18.4		
0.0134 mm.	15.4		
0.0096 mm.	13.4		
0.0068 mm.	12.5		
0.0049 mm.	10.3		
0.0034 mm.	9.5		
0.0014 mm.	7.0		

* (no specification provided)

Soil Description

Tan, Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 9.1

Coefficients

D_{90}= 0.4840 D_{85}= 0.4279 D_{60}= 0.2914
D_{50}= 0.2431 D_{30}= 0.1633 D_{15}= 0.0125
D_{10}= 0.0047 C_u= 62.66 C_c= 19.68

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

USDA: Loamy Sand

Location: A-6
Sample Number: S-20200131-01 **Depth:** 1.0' - 4.0' **Date:** 1/31/2020

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Co.
Project: Evans Farm Apartments
Project No: 31200065 **Figure**

Tested By: JNJ **Checked By:** GRS

LOG OF TEST PIT NO. TP-1

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **11.3 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Light brown to gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1 ft.
	2				
	4				▼ 1 day after completion, water at 4.5 ft. 7 days after completion, water at 1.5 ft.
	6				
	8				
	10				
-0.7	12			Bottom of hole at 12 ft.	

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-1

LOG OF TEST PIT NO. TP-2

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **2 ft.**
GROUND SURFACE ELEVATION: **10.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6		SC		Gray-orange, moist to wet, Clayey SAND	Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 2 ft.
2.6	8	SP-SM		Gray-brown, wet, Poorly graded SAND with Silt	
1.6		SM		Gray, wet, Silty SAND	
0.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-2

LOG OF TEST PIT NO. TP-3

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **12.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				▼ 1 day after completion, water at 5 ft.
	6				7 days after completion, water at 3.5 ft.
	8				
2.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-3

LOG OF TEST PIT NO. TP-4

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **11.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Orange-brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6	4	CL		Orange-brown, moist to wet, Lean CLAY with Sand	Mottling at 4 ft.
6.6		SM		Gray-orange, wet, Silty SAND	1 day after completion, water at 4 ft.
	6				7 days after completion, water at 3 ft.
	8				
1.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-4

LOG OF TEST PIT NO. TP-5

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 1 ft.
	8				
0.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-5

LOG OF TEST PIT NO. TP-6

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **4 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Brown-gray-orange, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 2 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 2 ft.
4.4		CL		Gray-orange, wet, Lean CLAY with Sand	
3.4		SM		Lt. gray, wet, Silty SAND	
2.4	8	SC		Orange-gray, wet, Clayey SAND	
0.4	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-6

LOG OF TEST PIT NO. TP-7

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **1.5 ft.**
GROUND SURFACE ELEVATION: **11.8 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-brown, moist to wet, Silty SAND	Topsoil: 6 inches
9.8	2	CL		Orange-gray, moist to wet, Lean CLAY with Silt	
	4				1 day after completion, water at 5 ft.
	6				
4.8		SP-SM		Orange-brown, wet, Poorly graded SAND with Silt	7 days after completion, water at 3.5 ft.
	8				
1.8	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-7

LOG OF TEST PIT NO. TP-8

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1.5 ft. 1 day after completion, water at 3 ft. 7 days after completion, water at 1.5 ft.
	2				
	4				
	6				
	8				
0.4	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-8

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation

everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed

and imes

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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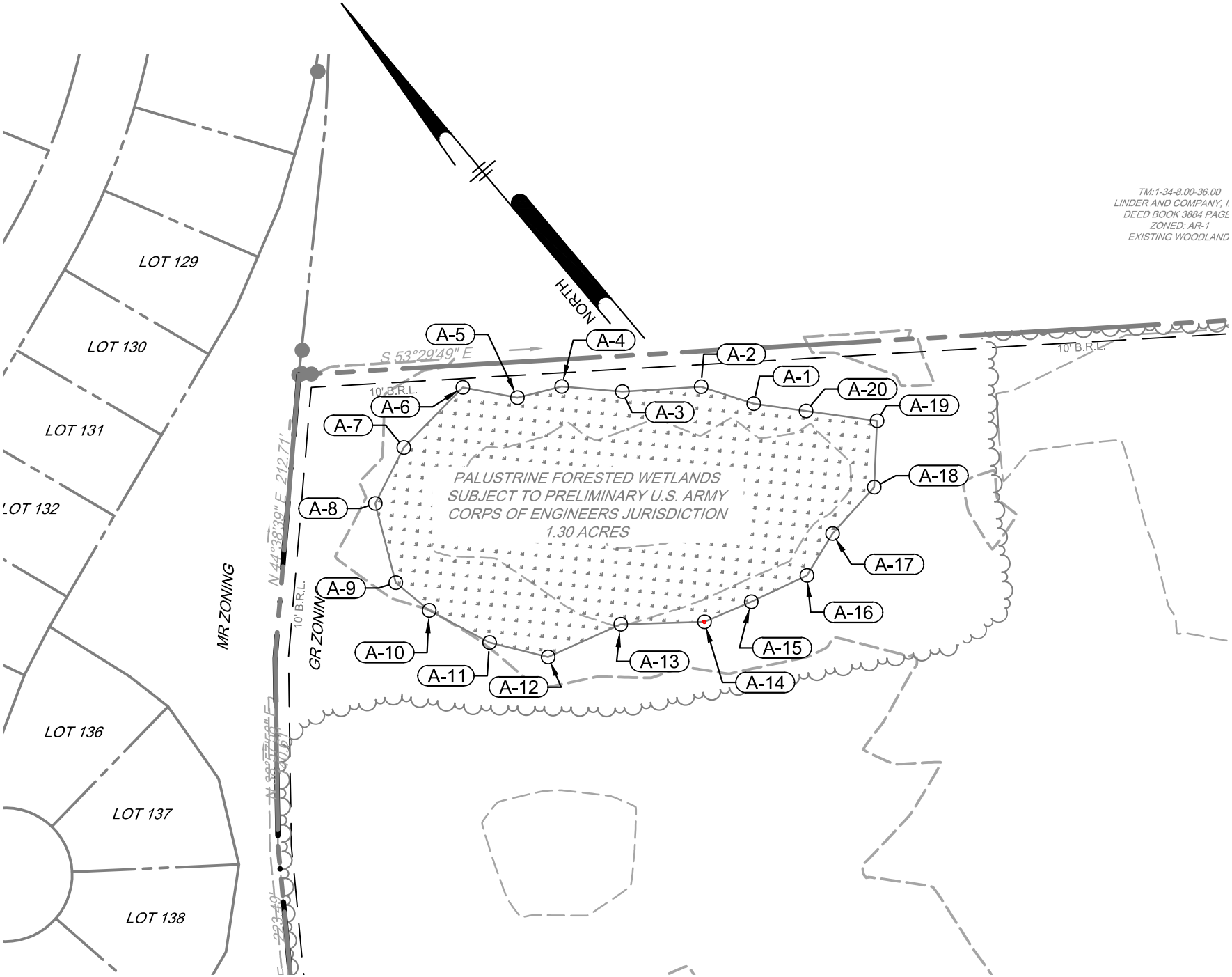
TAB 6

MAPS - APPENDICES A THRU W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LINDER AND COMPANY, I
DEED BOOK 3884 PAGE
ZONED: AR-1
EXISTING WOODLAND
NORTH
LOT 129
LOT 130
LOT 131
LOT 132
LOT 136
LOT 137
LOT 138
MR ZONING
GR ZONIN
S 53°29'49" E
10' B.R.L.
N 44°38'39" E 212.71'
PALUSTRINE FORESTED WETLANDS
SUBJECT TO PRELIMINARY U.S. ARMY
CORPS OF ENGINEERS JURISDICTION
1.30 ACRES
A-1
A-2
A-3
A-4
A-5
A-6
A-7
A-8
A-9
A-10
A-11
A-12
A-13
A-14
A-15
A-16
A-17
A-18
A-19
A-20

APPENDIX A

Kenneth W. Redinger Environmental Services

P.O. Box 479 / Horntown, Virginia 23395

Phone: (757) 894-7032 / E-mail: kwredinger@gmail.com

January 8, 2020 - Via Email

Pettinaro Construction Company, Inc.
234 North James Street
Newport, Delaware 19804

Attn: Andrea Finerosky, Pettinaro Construction Company, Inc.
Re: Wetland Jurisdictional Determination Update - The Evans Farm (50.62 Acres)
Parcel 1-34-12.00-74.00, Old Mill Road & Railway Road
Ocean View, Baltimore Hundred, Sussex County, Delaware
Property Owner - Linder & Company, Inc.

Ms. Finerosky,

At your request I have reviewed the subject property for wetlands and other Waters of the United States that may be regulated by the Philadelphia District U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

Wetland boundaries within the subject property were originally delineated by White Oaks Environmental, Inc. in April 2006, and a Jurisdictional Determination confirming those wetland boundaries was issued by the USACE on June 4, 2007 (USACE Project Number CENAP-OP-R2007-591). That Jurisdictional Determination was valid for a period of 5 years and expired in June 2012.

The wetland boundaries were re-evaluated in July 2010 by Landmark/JCM, Inc. and remained unchanged from that approved by the 2007 Jurisdictional Determination, as depicted on a Wetlands Plan prepared by Becker Morgan Group on October 6, 2010.

To confirm that the site conditions had not changed since the issuance of the 2007 Jurisdictional Determination, the property was evaluated by Kenneth W. Redinger Environmental Services on December 21, 2019 in accordance with the 1987 Corps of Engineers Wetland Delineation Manual in conjunction with the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Atlantic and Gulf Coastal Plain Region; Version 2.0 (November 2010).

As the site conditions were confirmed to be unchanged from those present during the 2007 and 2010 investigations, a request to re-issue the Jurisdictional Determination verifying wetland boundaries within the subject property was submitted to the Philadelphia District U.S. Army Corps of Engineers on January 8, 2020. A copy of the re-issued Jurisdictional Determination will be provided to your office upon its receipt.

Please contact me with any questions you may have concerning this project in the meantime.

Sincerely,



Kenneth W. Redinger
Professional Wetland Scientist #2126

APPENDIX A1

APPENDIX A2

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Regulatory Branch
Application Section I

MAR 2 6 2020

SUBJECT: CENAP-OP-R 2020-201-23 (PJD)
Project Name: Evans Farm Apartments SX
Latitude/Longitude: 38.558421° N /-75.114527° W

Kenneth W. Redinger
KWR Environmental Services, Incorporated
Post Office Box 479
Horntown, Virginia 23395

Dear Mr. Redinger:

The plan identified on the following page depicts all delineated waterways and wetlands on the subject site that may be jurisdictional under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbor Act.

Pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, a Department of the Army permit is required for work or structures in navigable waters of the United States and the discharge of dredged or fill material into waters of the United States including adjacent wetlands. Any proposal to perform the above activities within any waters of the United States requires the prior approval of this office.

This preliminary determination has been conducted to identify the location(s) of wetlands and waters that may be waters of the United States for the particular site identified in this request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are U.S. Department of Agriculture (USDA) program participants, or anticipate participating in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

This preliminary jurisdictional determination is non-binding and indicates that there may be waters of the United States, including wetlands on the parcel. Pursuant to Federal Regulations at 33 C.F.R. 331.2, preliminary JDs are advisory in nature and may not be appealed (see attached Notification of Appeal Form - Enclosure 1). However, the applicant retains the right to request an approved jurisdictional determination, which may be appealed. Also enclosed (Enclosure 2) is a copy of the Preliminary Jurisdictional Determination Form signed by the applicant or his agent agreeing to accept a preliminary jurisdictional determination. Please be aware that for purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will



Figure 18 of 21.

18

FEMA Floodplain Mapping

Evans Farm Apartments

PETIX19002

Pennoni

Zone AE

Zone X, Shaded

Zone X

Flood Map# 10005C0511K (3/16/15)

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\18 Floodplain Mapping.mxd

Legend

2018 - Annual Average Daily Traffic (AADT)

CURRENT AADT

- > 80,000 – 232,000
- > 40,000 – 80,000
- > 20,000 – 40,000
- > 10,000 – 20,000
- 0 – 10,000

APPENDIX

Legend

Delaware Functional Classification

Functional Classification

- Interstate
- Other Expressways & Freeway
- Other Principal Arterials
- Minor Arterial
- Major Collector
- Minor Collector
- Local

Old Mill Dr

Railway Rd

Smith Dr

Baltimore Ave

Trenton St

APPENDIX D



Figure 1 of 20. 1	2018 Aerial Image Evans Farm Apartments PETIX19002	Pennoni	Subject Property Other Tax Parcels

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\01 2018 Aerial Image.mxd

APPENDIX F

N

C/U 2085 (Approved, Multifamily)
Cedar Shores (Multifamily)
C/U 2131 (Approved, Multifamily)
Bethany Bay (Mixed Use)
Bay Forest (Mixed Use)
Bethany Marina (Multifamily)
C/U 1949 (Approved)
Bayside At Bethany Lakes (Multifamily)
C/U 2130 (Approved, Multifamily)
C/U 1913 (Approved)
Insight At Sunset Harbor (Multifamily)
The Salt Pond (Mixed Use)
C/U 2038 (Approved, Multifamily)
Windhurst Manor (Multifamily)
Creekside (Multifamily)
Tidewaters (Multifamily)
C/U 2196 (Pending)
C/U 1969 (Approved)
C/U 2166 (Approved)
Westwood (Multifamily)
Ocean Mist (Multifamily)
The Crossings At Bethany (Multifamily)
C/U 2195 (Pending, Multifamily)
Village At Bear Trap Dunes (Mixed Use)
Bishops Landing (Mixed Use)

Holts Landing Road
Fairway
Irons Lane
Old Mill Road
Brush Hook Road
Whites Neck Road
Murray Road
Vines Creek Road
Omar Road
Tranquility Lane
Roxana Road
Park Circle
Railway Road
Yeadon Drive
Club House Road
Bridge Lane
Chad Place
Birdhaven Street
Waterway Drive
Yacht Basin Road
Sandy Cove Road
Cedar Neck Road
Hickman Road
Orlando Avenue
Fred Hudon Road
Daisey Avenue
Hudson Avenue
Woodland Avenue
Dukes Drive
Windmill Drive
Cedar Drive
Atlantic Avenue
Heron Drive

0 0.25 0.5 1 Miles

Surdex Corp

Figure 21 of 21.	Area Land Use Applications & Multifamily Development	Pennoni	County Zoning	AR-1, CR-1, GR, M, B-1, AR-2, C-1, HR-2, MR
21	Evans Farm Apartments			
	PETIX19002			

Date: 1/7/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\21 Area Land Use Applications.mxd

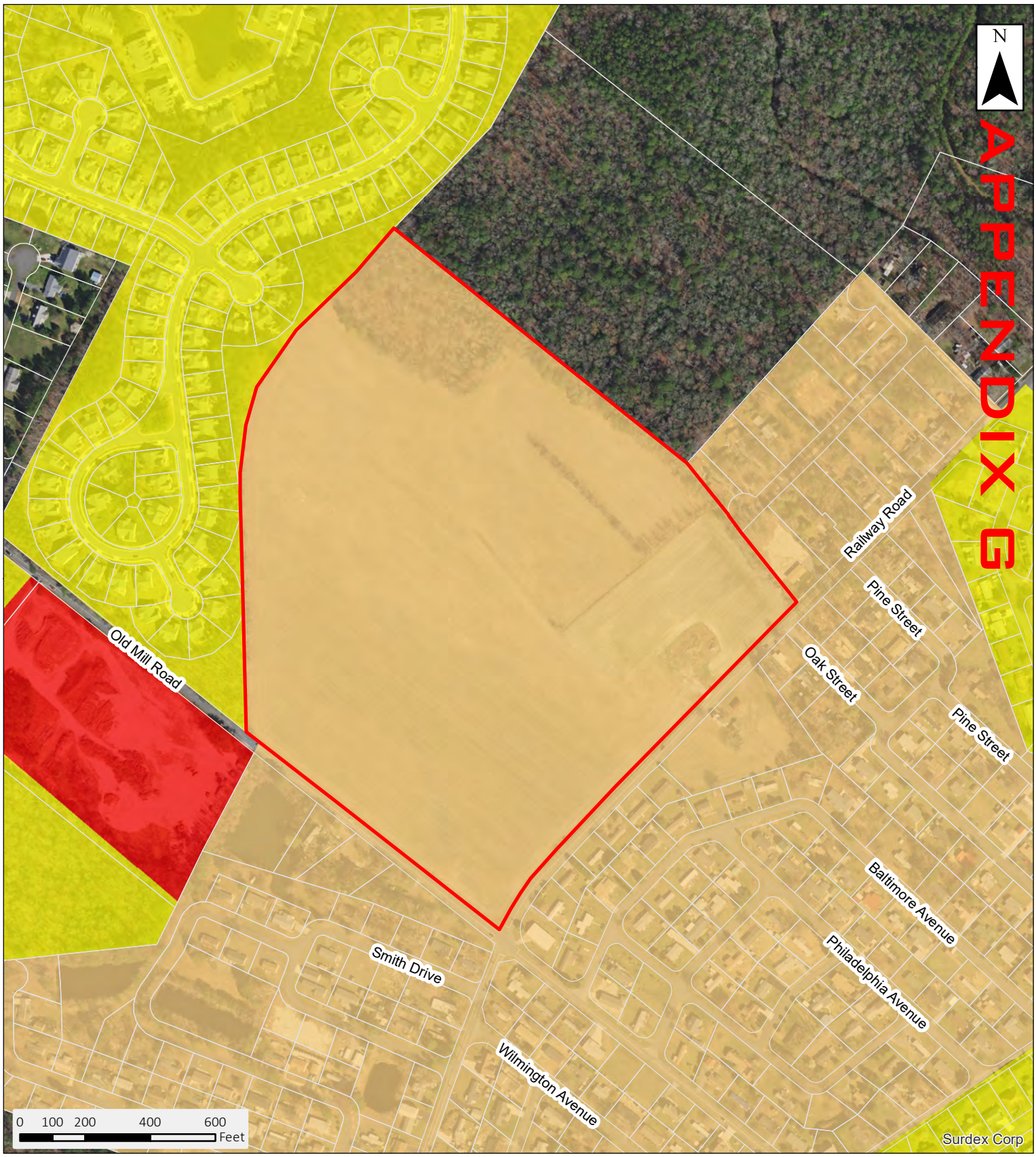
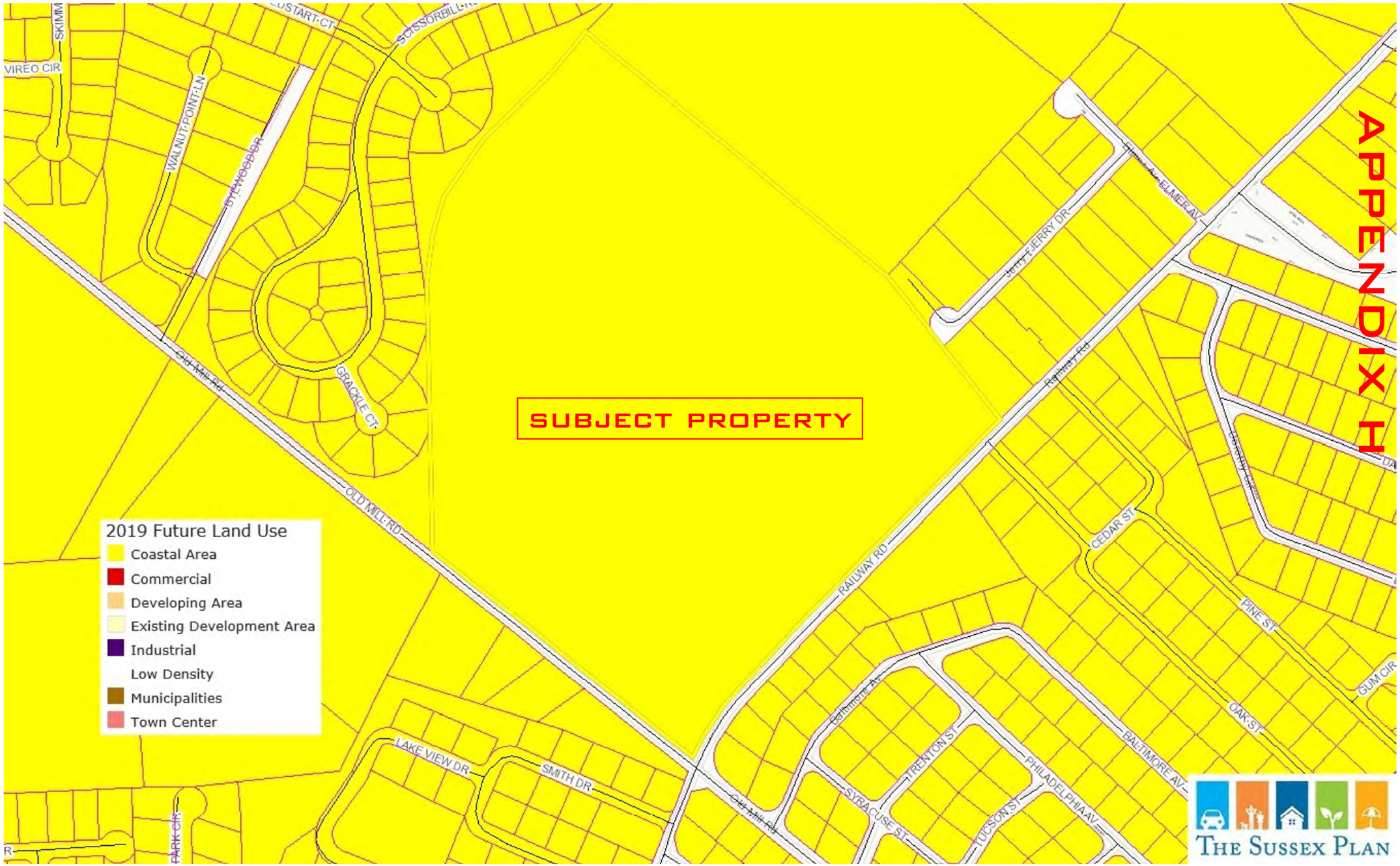


Figure 14 of 21. 14	County Zoning Map Evans Farm Apartments PETIX19002	Pennoni	AR-1 GR C-1 MR

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\14 County Zoning.mxd

APPENDIX H


SUBJECT PROPERTY
2019 Future Land Use
Coastal Area
Commercial
Developing Area
Existing Development Area
Industrial
Low Density
Municipalities
Town Center
VIREO CIR
WALNUT POINT LN
GRACKLE CT
OLD MILL RD
RAILWAY RD
Railway Rd
Jerry FJERRY DR
ELMER AV
CEDAR ST
PINE ST
OAK ST
GUM CIR
BALTIMORE AV
PHILADELPHIA AV
TUCSON ST
SYRACUSE ST
TRENTON ST
Baltimore Av
LAKE VIEW DR
SMITH DR
PARK CIR
THE SUSSEX PLAN

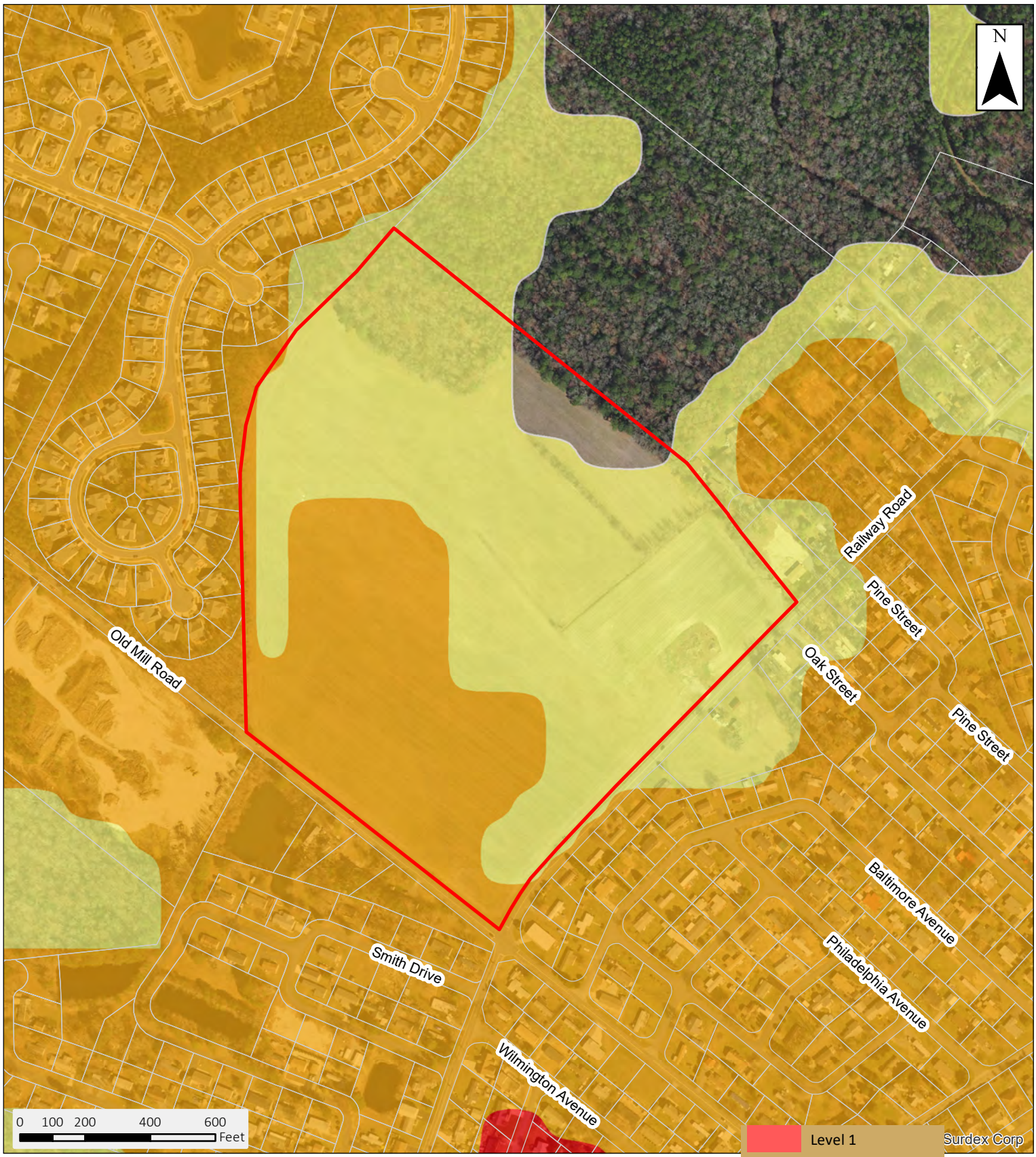


Figure 13 of 21.

13

2020 State Strategies & Investment Levels

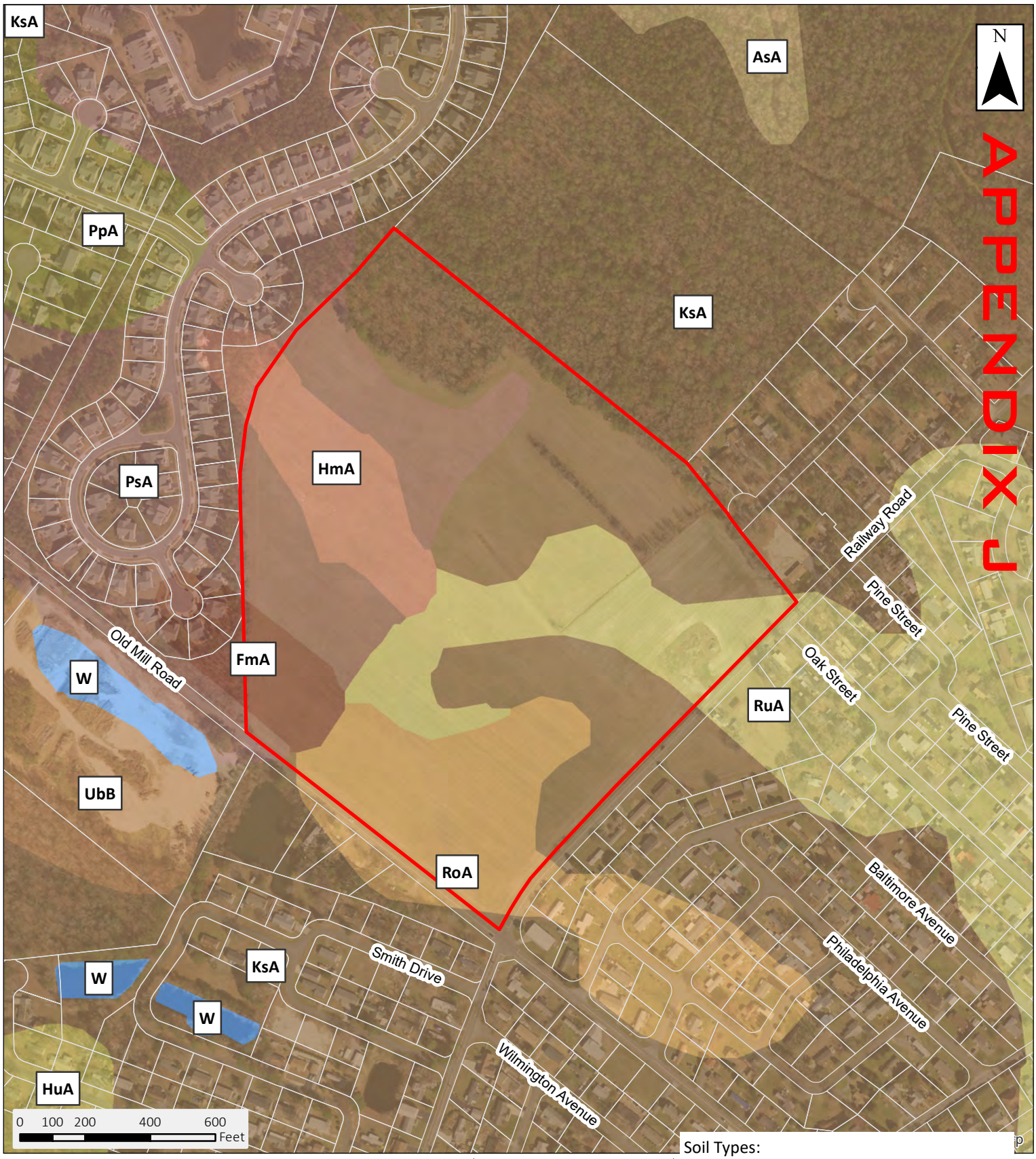
Evans Farm Apartments

PETIX19002

Pennoni

Date: 2/4/2021

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\13 2020 State Strategies.mxd



Soil Types:
FmA - fort Mott loamy sand, Group A
HmA - Hammonton loamy sand, Group B
KsA - Klej loamy sand, Group A/D
PsA - Pepperbox-Rosedale complex, Group A
RoA - Rosedale loamy sand, Group A
RuA - Runclint loamy sand, Group A

Figure 16 of 21.

16

NRCS Soils Map

Evans Farm Apartments

PETIX19002

Pennoni

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\16 NRCS Soils Map.mxd

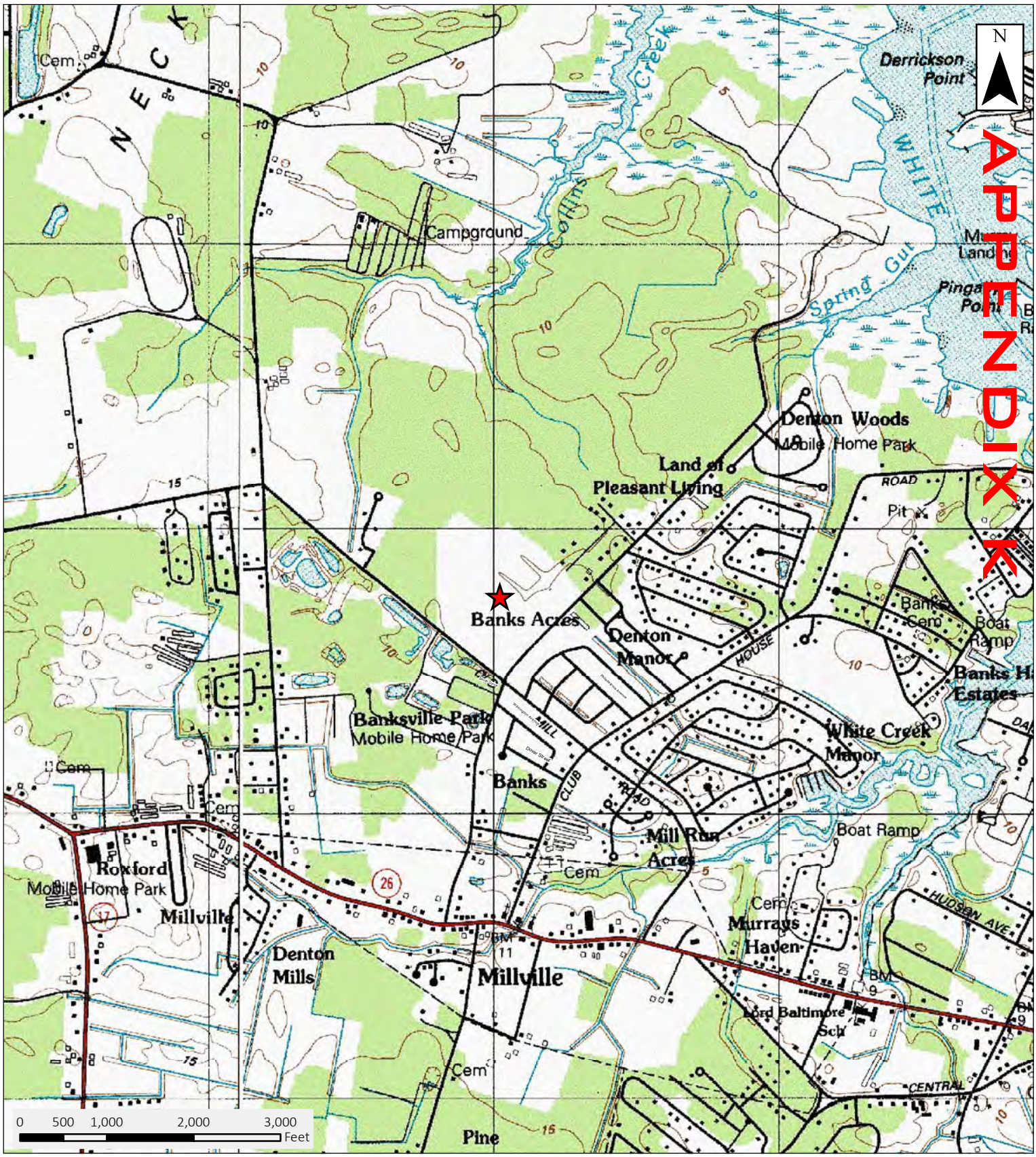


Figure 20 of 21. 20	USGS Topographic Map	Pennoni	
	Evans Farm Apartments		
	PETIX19002		

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\20 USGS Topographic.mxd



1	Site Location Map Evans Farm Apartments PETIX19002	Pennoni	LiDAR Contours Subject Property Other Tax Parcels

Date: 9/10/2019

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\1 Site Location Map.mxd

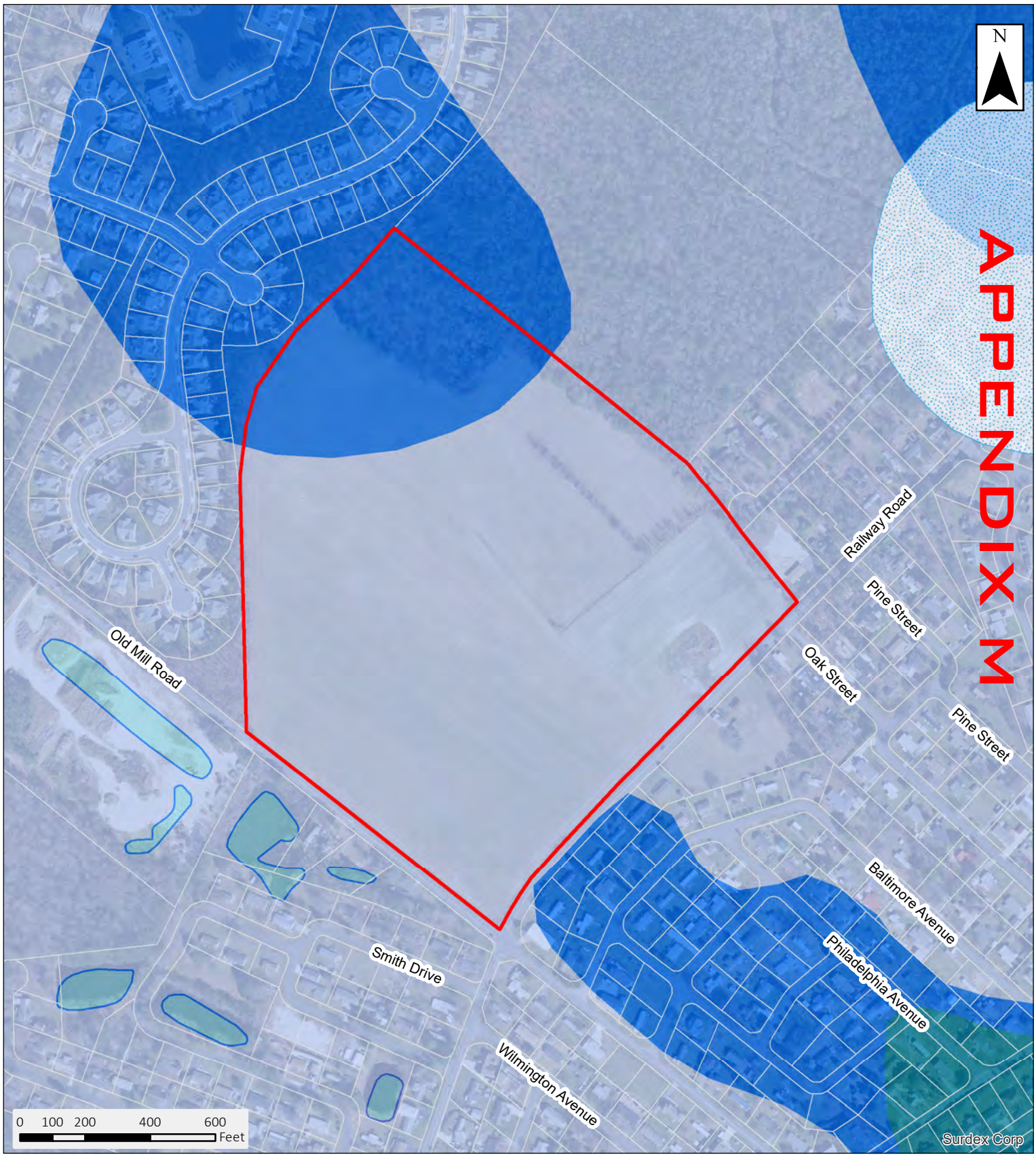


Figure 19 of 21. 19	Groundwater Recharge Potential Evans Farm Apartments PETIX19002	Pennoni	Fair Excellent Good Water Area Wellhead Protection Areas

Date: 1/28/2021

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\19 Groundwater Recharge.mxd



Figure 11 of 20. 11	1937 Orthophoto Evans Farm Apartments PETIX19002	Pennoni	Subject Property Other Tax Parcels

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\11 1937 Orthophoto.mxd



Figure 10 of 20. 10	1954 Orthophoto Evans Farm Apartments PETIX19002	Pennoni	Subject Property Other Tax Parcels

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\10 1954 Orthophoto.mxd



Figure 9 of 20.	1961 Orthophoto	Pennoni	Subject Property
9	Evans Farm Apartments		Other Tax Parcels
	PETIX19002		

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\09 1961 Orthophoto.mxd



Figure 8 of 20. 8	1968 Orthophoto Evans Farm Apartments PETIX19002	Pennoni	Subject Property Other Tax Parcels

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\08 1968 Orthophoto.mxd

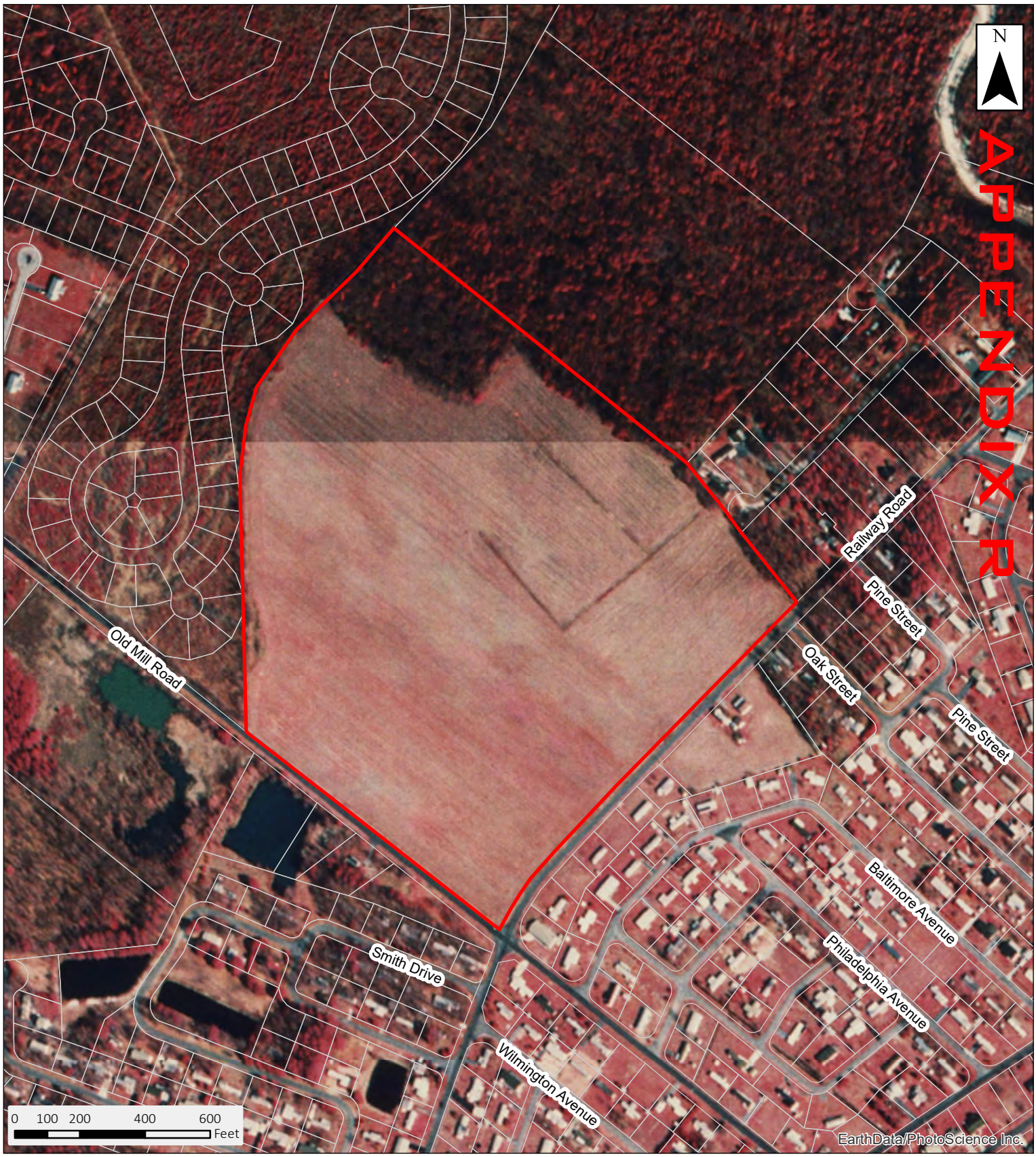


Figure 7 of 20.	1992 Orthophoto	Pennoni	Subject Property
7	Evans Farm Apartments		Other Tax Parcels
	PETIX19002		

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\07 1992 Orthophoto.mxd

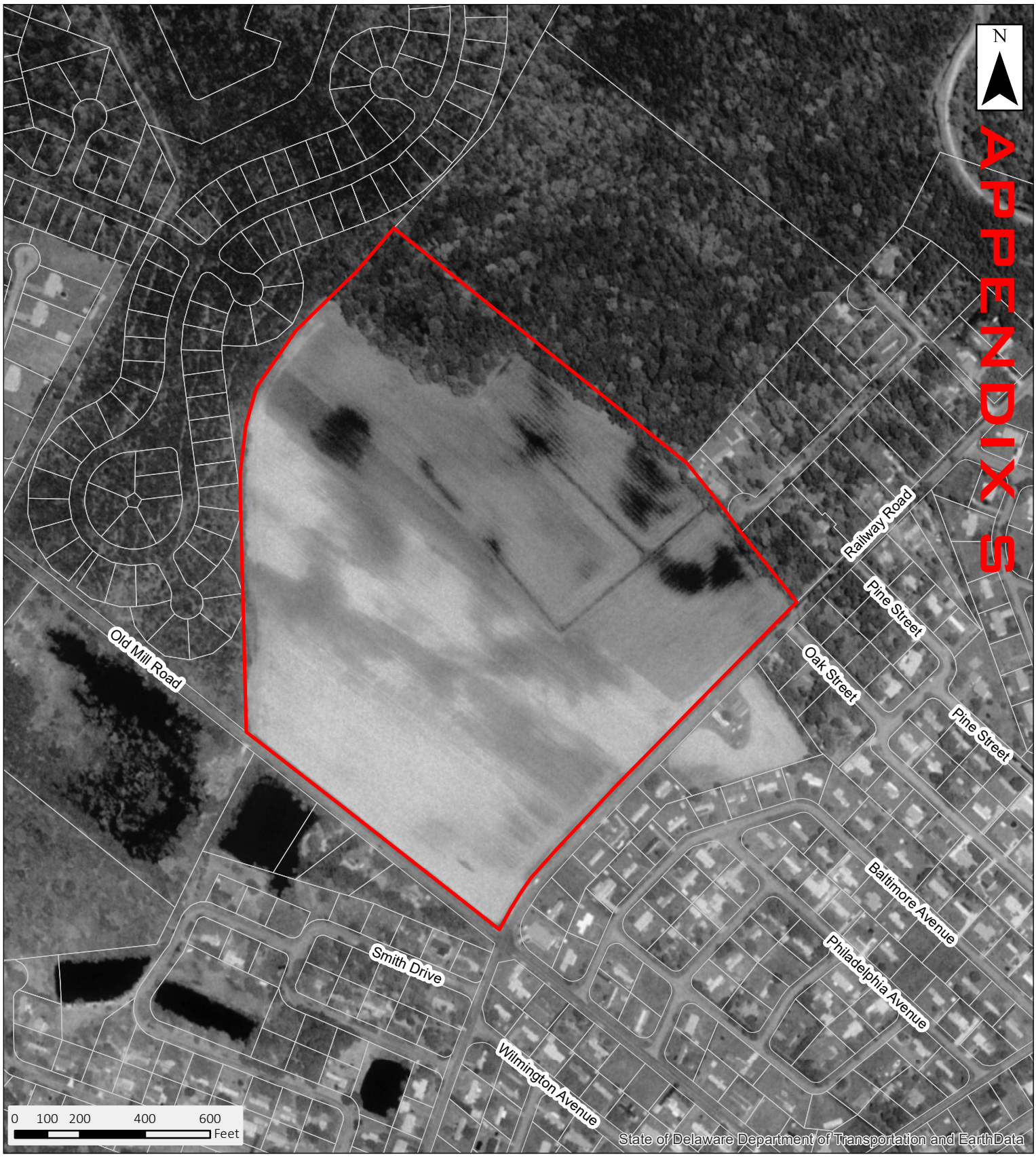


Figure 6 of 20. 6	1997 Orthophoto Evans Farm Apartments PETIX19002	Pennoni	Subject Property Other Tax Parcels

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\06 1997 Orthophoto.mxd



Figure 5 of 20. 5	2002 Orthophoto Evans Farm Apartments PETIX19002	Pennoni	Subject Property Other Tax Parcels

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\05 2002 Orthophoto.mxd



Figure 4 of 20.	2007 Orthophoto	Pennoni	Subject Property
4	Evans Farm Apartments		Other Tax Parcels
	PETIX19002		

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\04 2007 Orthophoto.mxd



Figure 3 of 20.	2012 Orthophoto	Pennoni	Subject Property
3	Evans Farm Apartments		Other Tax Parcels
	PETIX19002		

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\03 2012 Orthophoto.mxd



Figure 2 of 20.	2017 Orthophoto	Pennoni	Subject Property
2	Evans Farm Apartments		Other Tax Parcels
	PETIX19002		

Date: 1/6/2020

Document Path: C:\Users\MWalls\Documents\GIS Projects\PETIX19002\CU Hearing\02 2017 Orthophoto.mxd

TAB 7

SAMPLE BUILDING PHOTOS


LANE
FIRE


LANE
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FIRE


FIRE LANE
FIRE LANE


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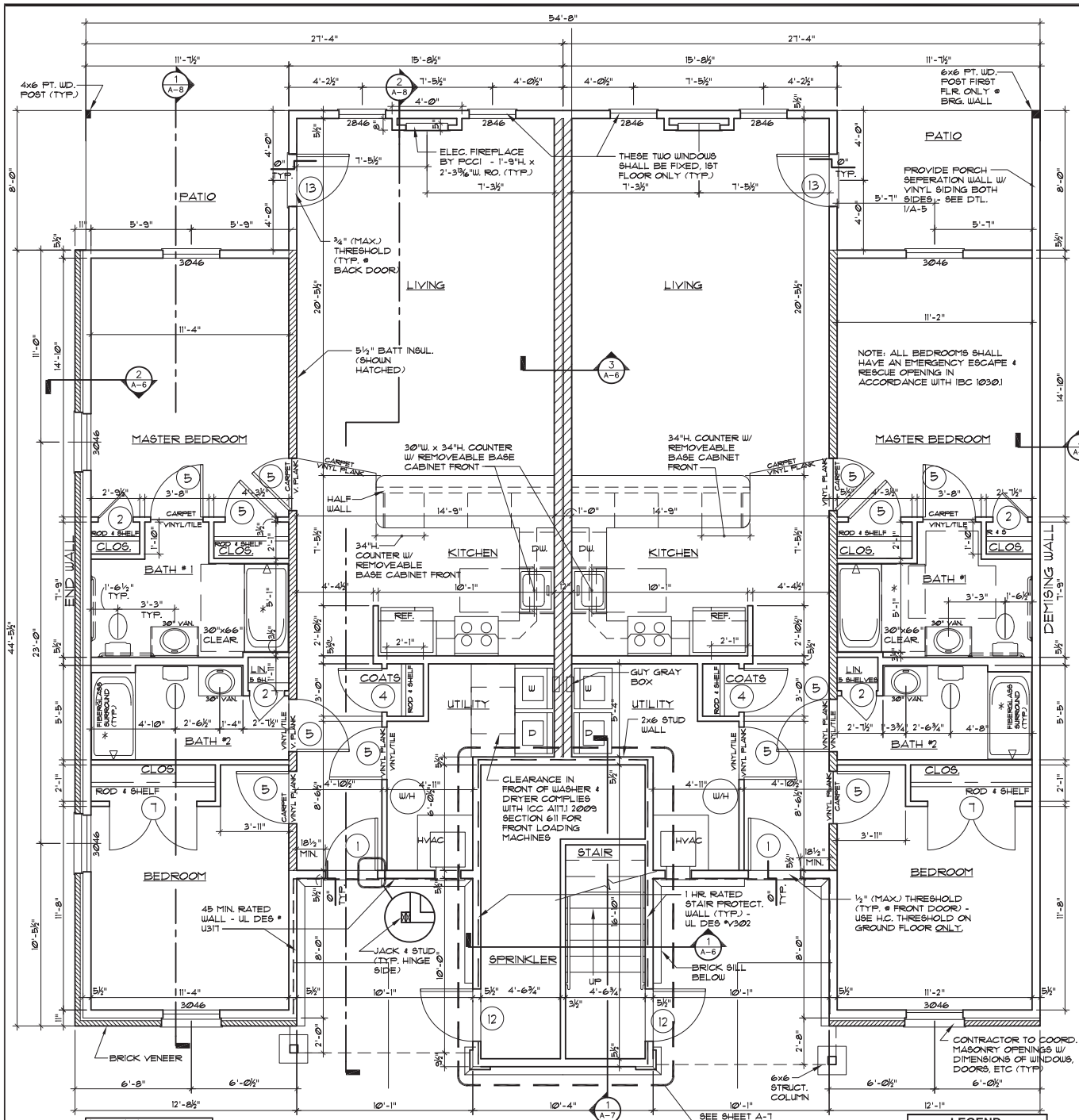
BAY FARM APARTMENTS
Legend
Harbor Ct
Pavilion Dr
Big Marsh Ct
Pettinaro Dr
Pinehurst Ct
Fox Drive
Assawoman Ct
Google Earth
© 2021 Google
900 ft


BAY FARM APARTMENTS
Legend
Google Earth
© 2021 Google
N
8.12 ft

TAB 8

SAMPLE FLOOR PLANS



1st FLOOR TYPE 'A' UNIT PLAN

SCALE: ¼"=1'-0"

NOTE: ALL INTERIOR PARTITIONS SHALL BE 2x4 STUDS @ 16" O.C. W/ ½" GWB. ON EACH SIDE UNLESS NOTED OTHERWISE (5½" PARTITIONS INDICATE 2x6 STUDS IN LIEU OF 2x4.) ALL 1ST FLR. BEARING WALLS TO BE 2X6 STUDS.

* VERIFY/COORDINATE DIMENSION W/ ROUGH OPENING REQUIREMENT OF TUB / SURROUND (TYP.)

LEGEND

- WALL W/ 3½" BATT INSUL.
- BRICK

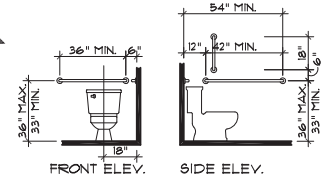
BRICK LINTELS:

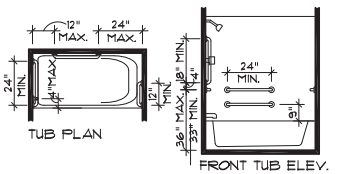
UNLESS OTHERWISE NOTED, PROVIDE THE FOLLOWING LINTELS FOR EA. 4" THICKNESS OF MASONRY WALL W/ 8" OF BRG. @ EA. END. FOR UNEQUAL LEG ANGLES, ORIENT THE LONG LEGS VERTICAL; GALVANIZE ALL LINTELS EXPOSED TO THE WEATHER OR PRIME & PAINT.

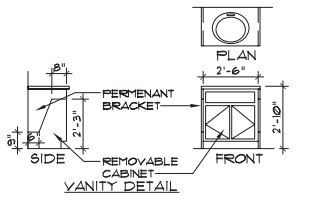
OPEN'G UP TO 4'-0"	L3½"x 3½"x 5/16"
OPEN'G UP TO 4'-6"	L4"x 3½"x 5/16"LLV
OPEN'G UP TO 6'-8"	L5"x 3½"x 5/16"LLV
OPEN'G UP TO 8'-10"	L6"x 3½"x 5/16"LLV

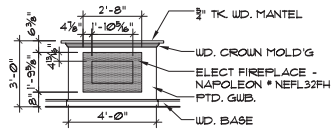
HANDICAP UNIT NOTES:
(TYPE 'A' UNITS ONLY)

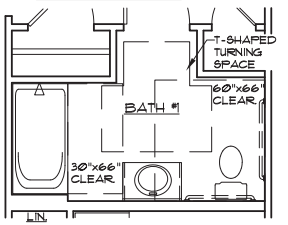
1. ALL LIGHT SWITCHES & THERMOSTATS TO BE @ 48" AFF.
2. SIDE-BY-SIDE REFRIGERATORS TO BE PROVIDED IN KITCHEN.
3. FRONT MTD. CONTROLS ON COOKTOP/RANGE TO BE PROVIDED.
4. FRONT LOAD WASHER AND DRYER WITH FRONT CONTROLS TO BE PROVIDED.
5. PROVIDE WD. BLKG. FOR TOILET & BATH GRAB BARS ONLY. - SEE DTLS. BELOW - GRAB BARS ARE NIC.
6. ALL DOOR HANDLE HARDWARE TO BE LEVER TYPE.
7. PROVIDE FINISH FLOORING UNDER ALL KITCHEN AND BATH ROOM REMOVEABLE CABINETS AND VANITIES.
8. ALL BATHROOM VANITIES TO BE 30"W. (CLR.) x 34" COUNTER HGT. W/REMOVEABLE BASE CABINET FRONT.











TYPE 'A' BATH

SCALE: ¼"=1'-0" A.D.A. CLEARANCES

PETTINARO
234 North James Street
Newport, Delaware 19804
(302) 999-0708

William Netta Architects, LLC
115 Christina Landing Drive
Apt. 1602
Wilmington, DE 19801
TEL: (302) 999-0708
FAX: (302) 999-1634

JOB NO. -
DRAWN BY: JRR/JFM
CHECKED BY: WTN
SCALE: AS SHOWN
DATE: -
CAD FILE: -

REVISIONS
- -

EVANS FARM APARTMENTS

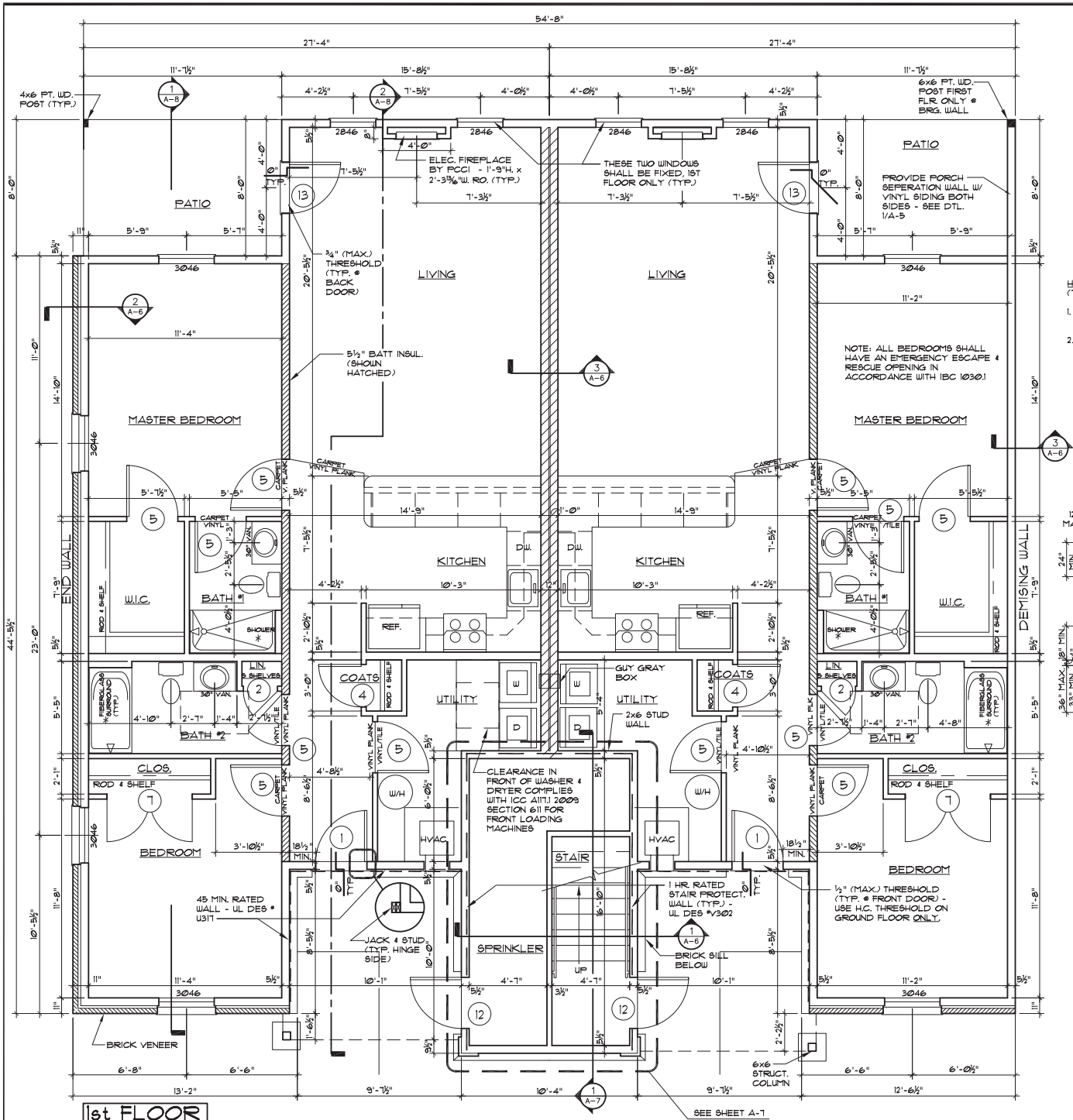
2BR-2BATH
TYPE 'A' & 'B' UNITS

FIRST FLOOR TYPE 'A' UNIT FLOOR PLAN

DRAWING TITLE:

A-1A

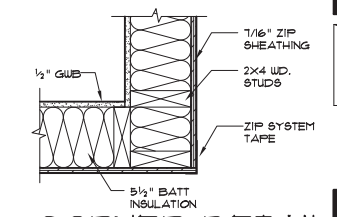
DRAWING NUMBER:



1st FLOOR TYPE 'B' UNIT PLAN

SCALE: ¼"=1'-Ø"

NOTE: ALL INTERIOR PARTITIONS SHALL BE 2x4 STUDS @ 16" O.C. W/ ½" GWB. ON EACH SIDE UNLESS NOTED OTHERWISE (5½" PARTITIONS INDICATE 2x6 STUDS IN LIEU OF 2x4.) ALL 1ST FLR. BEARING WALLS TO BE 2X6 STUDS.

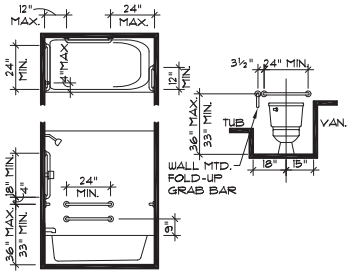


CORNER DETAIL

TYPICAL AT ALL EXTERIOR WALL CORNERS

HANDICAP UNIT NOTES:
(TYPE 'B' UNITS ONLY)

1. ALL LIGHT SWITCHES & THERMOSTATS TO BE @ 48" AFF.
2. PROVIDE WD. BLKG. FOR TOILET & BATH GRAB BARS ONLY - SEE DTLS. BELOW - GRAB BARS ARE NIC.



GRAB BAR MTD. DETAIL

* VERIFY/COORDINATE DIMENSION W/ ROUGH OPENING REQUIREMENT OF TUB / SURROUND (TYP.)

LEGEND

WALL W/ 3½" BATT INSUL.

BRICK LINTELS:

UNLESS OTHERWISE NOTED, PROVIDE THE FOLLOWING LINTELS FOR EA. 4" THICKNESS OF MASONRY WALL W/ 8" OF BRG. @ EA. END. FOR UNEQUAL LEG ANGLES, ORIENT THE LONG LEGS VERTICAL: GALVANIZE ALL LINTELS EXPOSED TO THE WEATHER OR PRIME & PAINT.

OPEN'G UP TO 4'-Ø"	L3½"x 3½"x 5/16"
OPEN'G UP TO 4'-6"	L4"x 3½"x 5/16"LLV
OPEN'G UP TO 6'-8"	L5"x 3½"x 5/16"LLV
OPEN'G UP TO 8'-10"	L6"x 3½"x 5/16"LLV

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SCALE: AS SHOWN
DATE: -
CAD FILE: -

REVISIONS
- -

EVANS FARM APARTMENTS

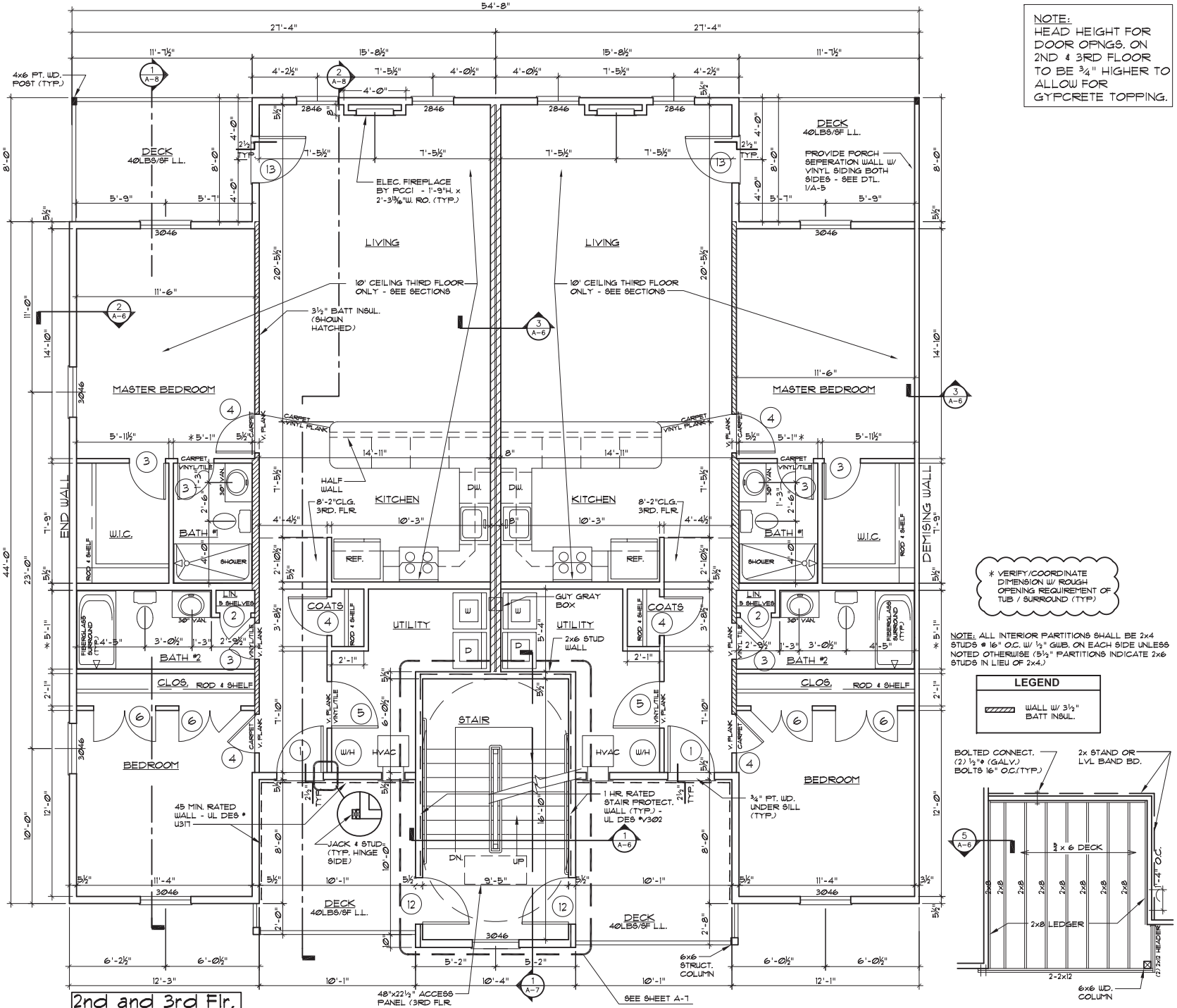
2BR-2BATH
TYPE 'A' & 'B' UNITS

FIRST FLOOR TYPE 'B' UNIT FLOOR PLAN

DRAWING TITLE:

A-1B

DRAWING NUMBER:



2nd and 3rd Flr.
UNIT PLAN
SCALE: ¼"=1'-0"

NOTE:
HEAD HEIGHT FOR DOOR OPNGS. ON 2ND & 3RD FLOOR TO BE ¾" HIGHER TO ALLOW FOR GYPCRETE TOPPING.

* VERIFY/COORDINATE DIMENSION W/ ROUGH OPENING REQUIREMENT OF TUB / SURROUND (TYP)

NOTE: ALL INTERIOR PARTITIONS SHALL BE 2x4 STUDS @ 16" O.C. W/ ½" GWB. ON EACH SIDE UNLESS NOTED OTHERWISE (5½" PARTITIONS INDICATE 2x6 STUDS IN LIEU OF 2x4.)

LEGEND
WALL W/ 3½" BATT INSUL.

1 DECK FRAMING PLAN
SCALE: ¼" = 1'-0"

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JOB NO. -
DRAWN BY: JRR/JFM
CHECKED BY: WTN
SCALE: AS SHOWN
DATE: -
CAD FILE: -

REVISIONS
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-
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EVANS FARM APARTMENTS

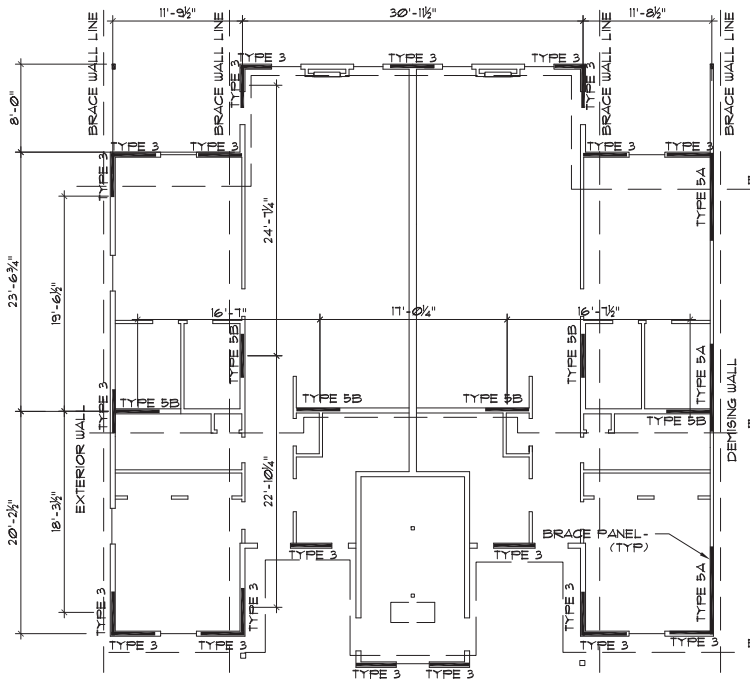
2BR-2BATH
TYPE 'A' & 'B' UNITS

SECOND AND THIRD FLOOR UNIT PLANS

DRAWING TITLE:

A-2

DRAWING NUMBER:



TYPE 3 - WOOD PANEL EXTERIOR SHEATHING, 48" WIDE MIN. FASTEN 3" ON EDGES, 6" FIELD.

TYPE 5A - ½" MIN. GYPSUM BD. ON ONE SIDE OF STUD. 96" WIDE MIN. FASTEN 7" O.C. ALONG EDGES AND FIELD.

TYPE 5B - ½" MIN. GYPSUM BD. ON BOTH SIDES OF STUD. 48" WIDE MIN. FASTEN 7" O.C. ALONG EDGES AND FIELD.

NOTE:
GYPSUM BD BRACING SHALL BE FASTENED USING 1 ⅝"L., SCREWS, TYPE W OR S @ 7" O.C. AT THE EDGES, INCLUDING TOP & BOT. PLATE AND 7" O.C. IN FIELD PER IBC TABLE 2308.6.3(1)

DESIGN LOADS :

FLOOR LIVE LOAD - FIRST FLOOR	40PSF
FLOOR DEAD LOAD:	22PSF (INCLUDING 7 PSF FOR GYPCRETE)
ROOF LIVE LOAD:	20PSF
ROOF SNOW LOAD:	
GROUND SNOW LOAD (Pg)	25PSF
SNOW EXPOSURE FACTOR:	0.9
SNOW IMPORTANCE FACTOR:	1.0

WIND LOAD:
ULTIMATE DESIGN WIND SPEED, VULT. = 115 MPH.
RISK CATEGORY = II

SEISMIC DESIGN DATA:
SITE CLASS = D
SEISMIC DESIGN CATEGORY = B

SOIL, CONCRETE & LUMBER :

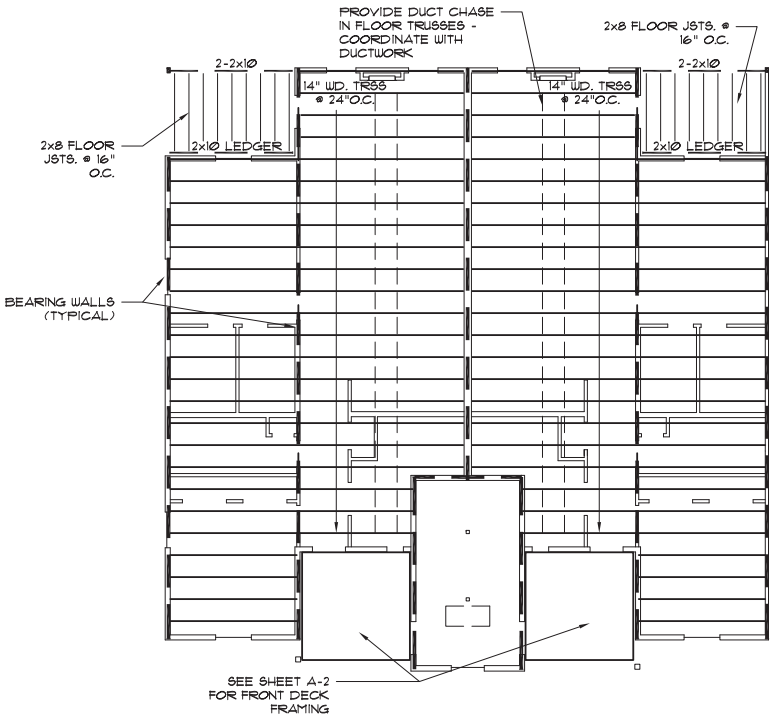
SOIL LOAD BEARING DESIGN VALUE = 2,000 PSF

CONCRETE STRENGTH = 3,000PSI (FLOOR SLAB & FOUNDATIONS)

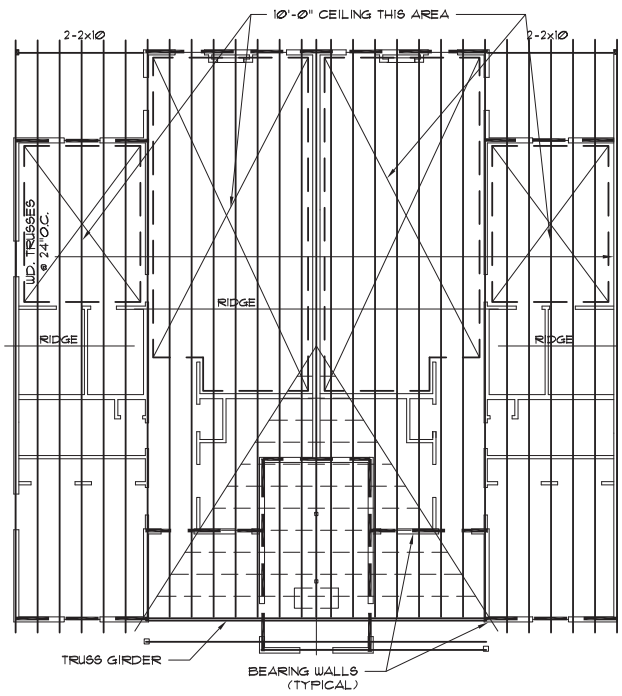
LUMBER FOR FLOOR, ROOF & WALL FRAMING = HEM-FIR NO. 2 MIN.
ALL TIMBER FRAMING SHALL COMPLY WITH SECTION 2308 OF IBC 2015.

ROOF & SHEATHING FASTENING :

FASTENING SHALL COMPLY WITH IBC TABLE 2304.10.1, FASTENING SCHEDULE.



2 FLOOR FRAMING PLAN
SCALE: 1/8" = 1'-0"



1 ROOF FRAMING PLAN
SCALE: 1/8" = 1'-0"

NOTE:
1. ALL WOOD FLOOR TRUSSES & DECK FLOOR JOISTS SYSTEMS ARE DESIGNED TO 40 PSF LIVE LOAD.

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CHECKED BY: WTN
SCALE: AS SHOWN
DATE: -
CAD FILE: -

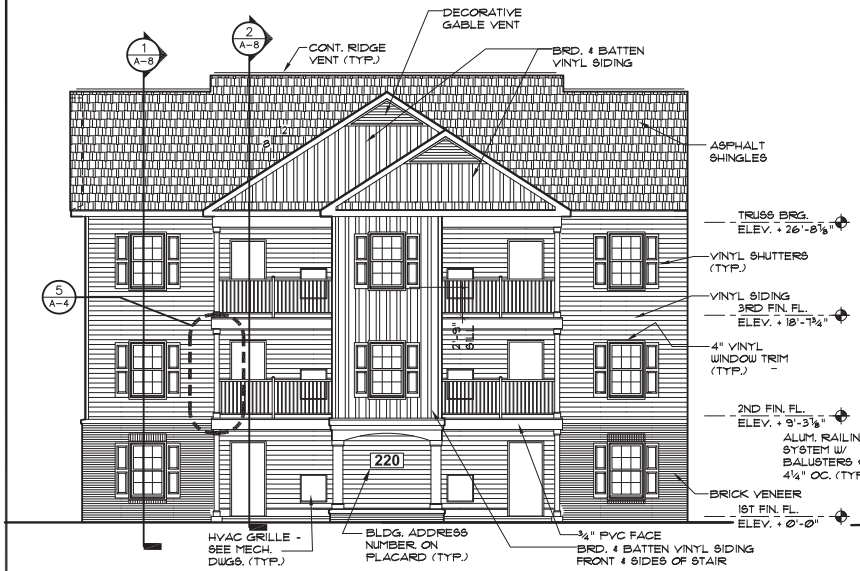
REVISIONS
- -

EVANS FARM APARTMENTS

2BR-2BATH
TYPE 'A' & 'B' UNITS

ROOF & FLOOR FRAMING PLANS, BRACING PLAN
DRAWING TITLE:

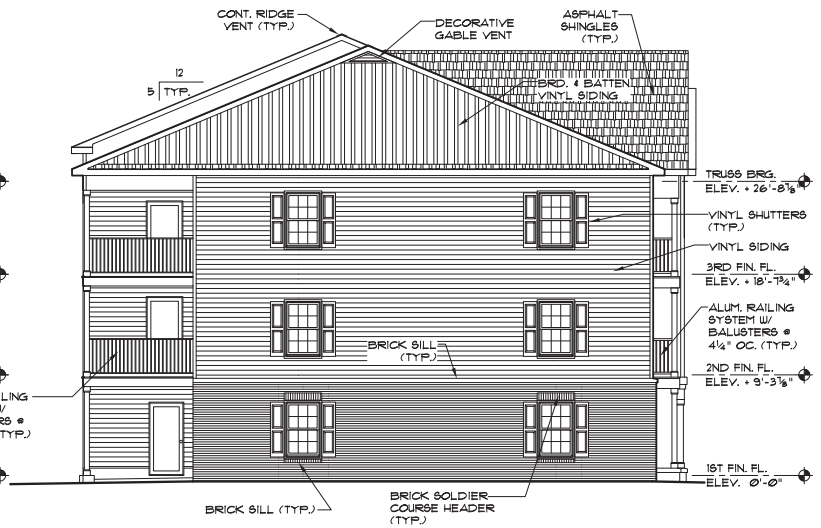
A-3
DRAWING NUMBER:



1 FRONT ELEVATION

SCALE: ⅛" = 1'-0"

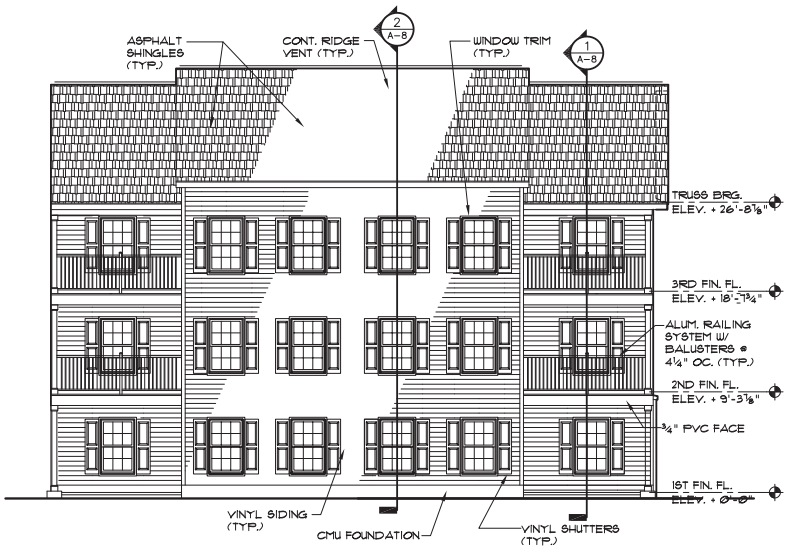
NOTE: SAFETY GLAZING REQUIRED AT STAIR WINDOWS - SEE 1/A-7



2 LEFT SIDE ELEVATION

SCALE: 1/8" = 1'-0"

NOTE: RIGHT BLDG. OPP. HAND



3 REAR ELEVATION

SCALE: ⅛" = 1'-0"

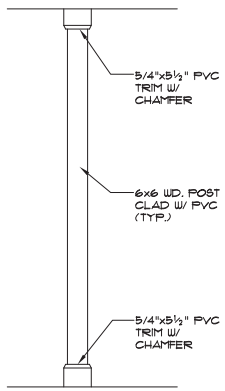
NOTE:
VINYL SIDING: ALL ACCESSORY TRIM SHALL MATCH VINYL SIDING COLOR UNLESS OTHERWISE NOTED. ALL WINDOWS AND DOORS TO RECEIVE 3½" WHITE VINYL TRIM.

VINYL SIDING SPECIFICATION:

HORIZONTAL SIDING
MANUFACTURER – CERTAINTEED "ENCORE"
1. PROFILE – DUTCHLAP
2. EXPOSURE – DOUBLE 4.5"
3. PROJECTION – ½"
4. THICKNESS - Ø40" (NOM.)
5. TEXTURE – WOODGRAIN
6. COLOR – SELECTED BY ARCHITECT
7. WARRANTY – 50 YEARS

BOARD & BATTEN SIDING
MANUFACTURER – CERTAINTEED "BOARD & BATTEN"
1. PROFILE – BOARD & BATTEN
2. EXPOSURE – 8"
3. PROJECTION – ½"
4. THICKNESS - Ø48" (NOM.)
5. TEXTURE – ROUGH CEDAR
6. COLOR – SELECTED BY ARCHITECT
7. WARRANTY – 50 YEARS

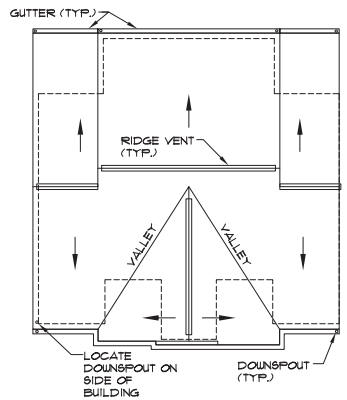
SHUTTER SPECIFICATIONS:
MANUFACTURER - ALSIDE "DINESOL"
1. PROFILE – RAISED PANEL
2. COLOR – BLACK (THRU COLORED)
NO SUBSTITUTIONS
BRICK:
MCAVOY FULL RANGE, FINE RED MATTEX - COLOR TO BE SELECTED BY ARCHITECT.



5 COLUMN DETAIL

SCALE: ½" = 1'-0"

NOTE:
1. SEE A-1 FOR BRICK LINTEL SCHEDULE FOR ALL BRICK OPENING.
2. CONTRACTOR TO COORD. MASONRY OPENINGS W/ DIMENSIONS OF WINDOWS, DOORS, ETC (TYP.)



4 ROOF PLAN

SCALE: 1/16" = 1'-0"

PROVIDE & INSTALL WHITE ALUMINUM Ø32 'K' GUTTER, Ø19 DOWN SPOUTS & 11X24 PVC SPLASH BLOCKS @ ALL D.S. ANCHOR /STRAP GUTTERS 2'-0" O.C. TYP. PROVIDE ALL ACCESSORIES REQ. FOR A COMPLETE INSTALLATION.

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Wilmington, DE 19801
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FAX: (302) 999-1634

JOB NO. -
DRAWN BY: JRR
CHECKED BY: WTN
SCALE: AS SHOWN
DATE: -
CAD FILE: -

REVISIONS
- -
- -
- -

EVANS FARM APARTMENTS

2BR-2BATH
TYPE 'A' & 'B' UNITS

ELEVATIONS
ROOF PLAN

DRAWING TITLE:

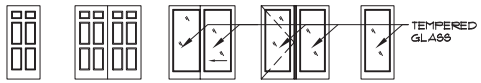
A-4

DRAWING NUMBER:

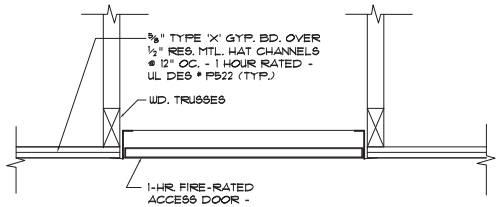
DOOR SCHEDULE

DOOR	DOOR SIZE W	H	TH	MATERIAL	THRESH	DOOR TYPE	REMARKS
1	3'-0"	6'-8"	1 3/4"	MTL. INSUL.	ALUM.	A	SPRING HINGE, 20 MIN. DR.
2	1'-8"	6'-8"	1 3/8"	HC. WD.	-	A	-
3	2'-4"	6'-8"	1 3/8"	HC. WD.	-	A	
4	2'-6"	6'-8"	1 3/8"	HC. WD.	-	A	-
5	3'-0"	6'-8"	1 3/8"	HC. WD.	-	A	-
6	4'-0"	6'-8"	1 3/8"	HC. WD.	-	B	-
7	5'-0"	6'-8"	1 3/8"	HC. WD.	-	B	-
8	NOT USED						
9	NOT USED						
10	NOT USED						
11	NOT USED						
12	3'-0"	6'-8"	1 3/4"	MTL. INSUL.	ALUM.	A	SPRING HINGE, 60 MIN. DR.
13	3'-0"	6'-8"	1 3/4"	MTL. INSUL.	ALUM.	E	

DOOR TYPES

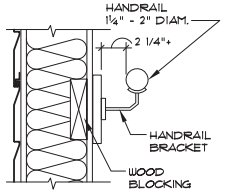


NOTE: ALL DOOR HARDWARE, INCLUDING LEVERS, LOCKSETS AND HINGES SHALL BE ANTIQUE BRONZE FINISH UNLESS OTHERWISE NOTED.



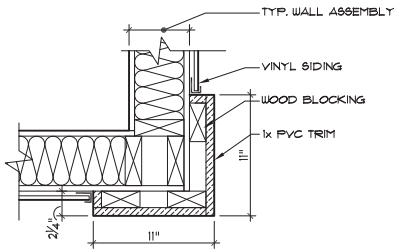
ATTIC ACCESS DETAIL

SCALE: 1½" = 1'-0"



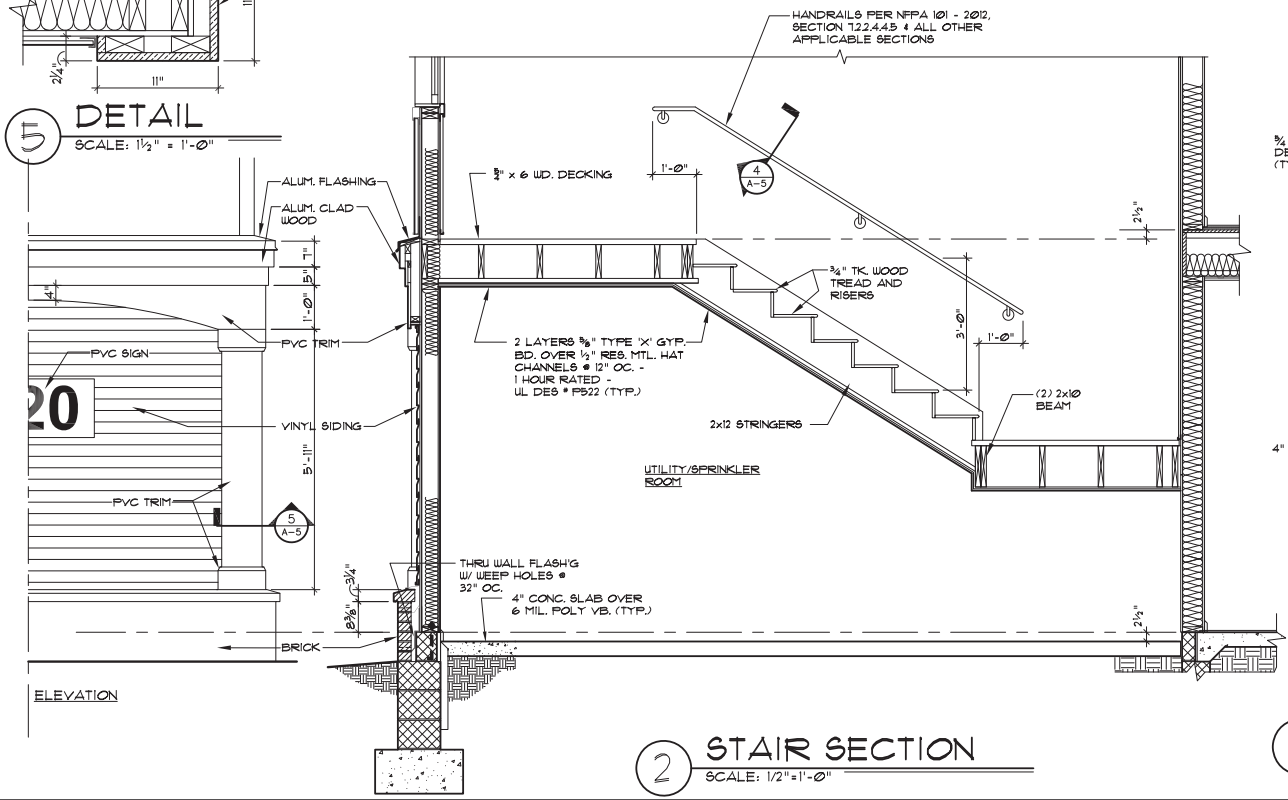
3 HANDRAIL DETAIL

SCALE: 1½"=1'-0"



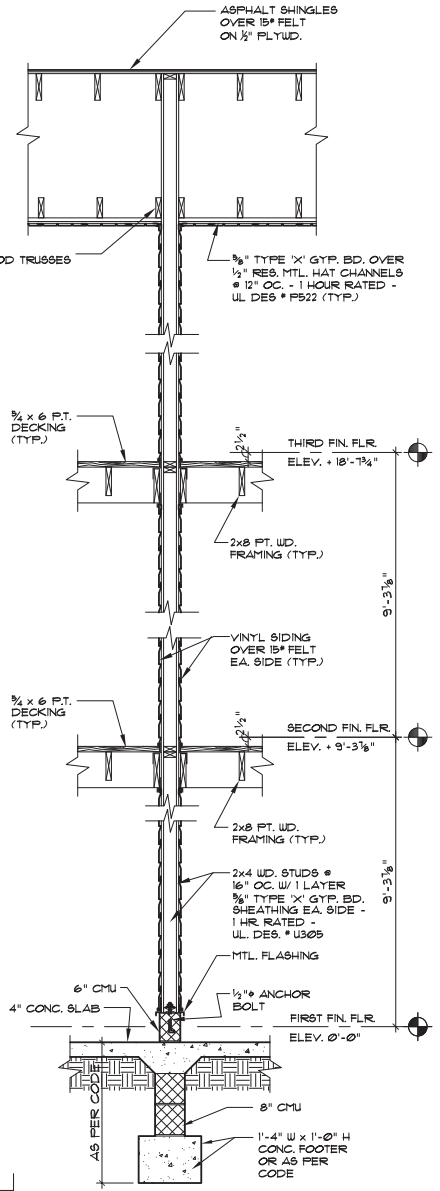
5 DETAIL

SCALE: 1½" = 1'-0"



2 STAIR SECTION

SCALE: 1/2"=1'-0"



REAR PATIO/DECK WALL SECTION

SCALE: 1/2" = 1'-0"

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JOB NO. -
DRAWN BY: JRR
CHECKED BY: WTN
SCALE: AS SHOWN
DATE: -
CAD FILE: -

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EVANS FARM APARTMENTS

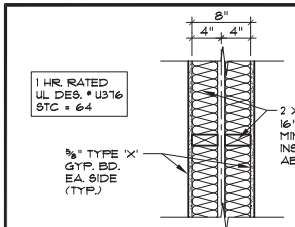
2BR-2BATH
TYPE 'A' & 'B' UNITS

WALL SECTIONS

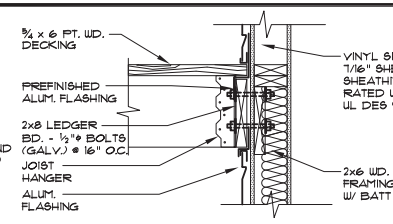
DRAWING TITLE:

A-5

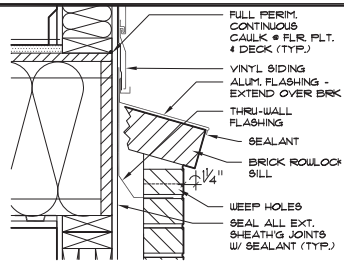
DRAWING NUMBER:



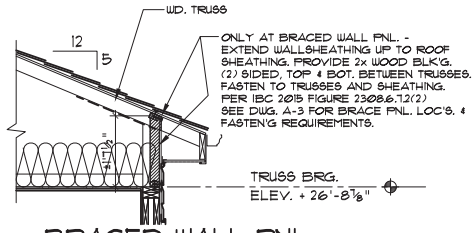
4 DETAIL
SCALE: 1"=1'-0"



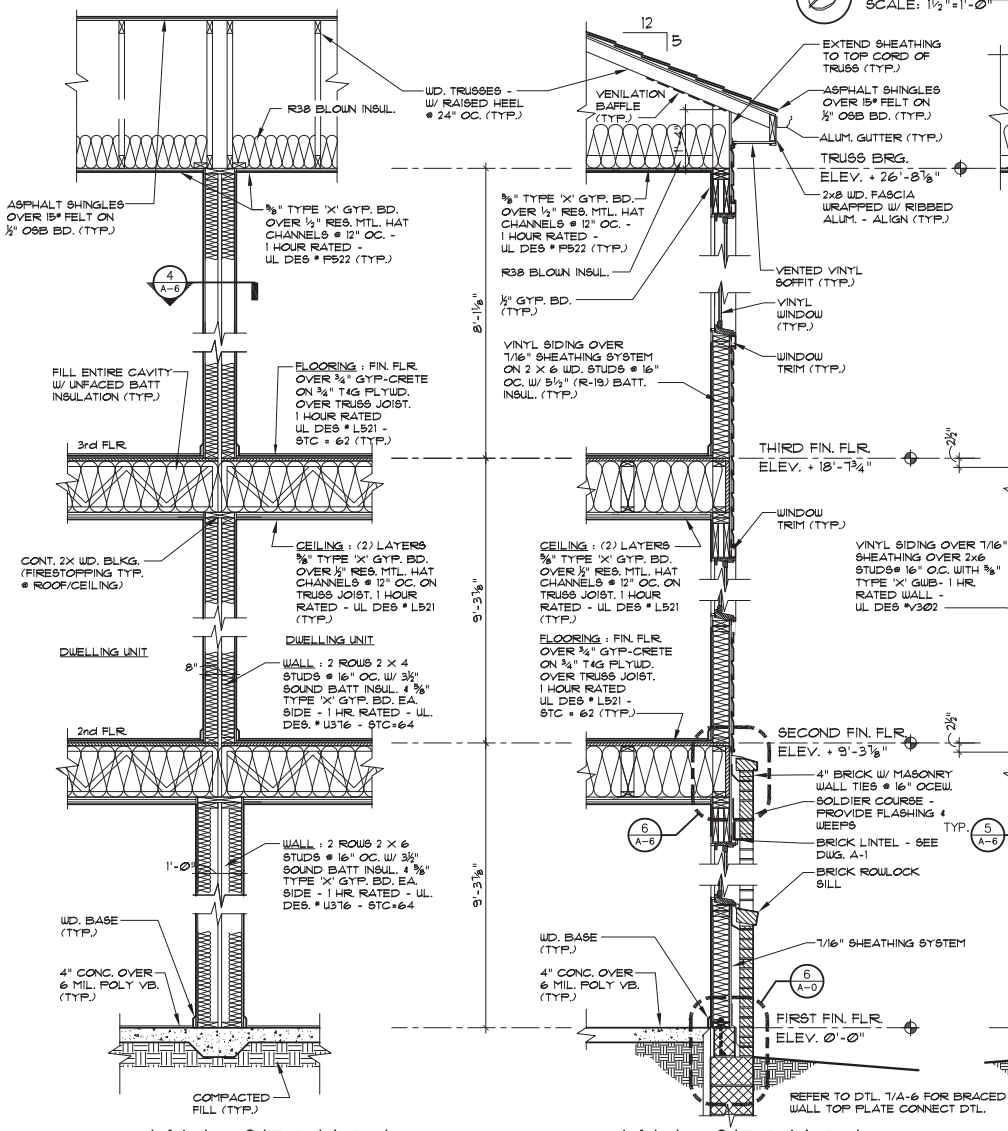
5 RIBBON BD. DTL.
SCALE: 1"=1'-0"



6 SILL DETAIL
SCALE: 1½"=1'-0"



7 BRACED WALL PNL. TOP PLATE CONNECT DTL.
SCALE: ½"=1'-0"



3 WALL SECTION
SCALE: 1/2"=1'-0"

2 WALL SECTION
SCALE: 1/2"=1'-0"

1 STAIR SECTION
SCALE: 1/2"=1'-0"

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DATE: -
CAD FILE: -

REVISIONS
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- -
- -
- -

EVANS FARM APARTMENTS

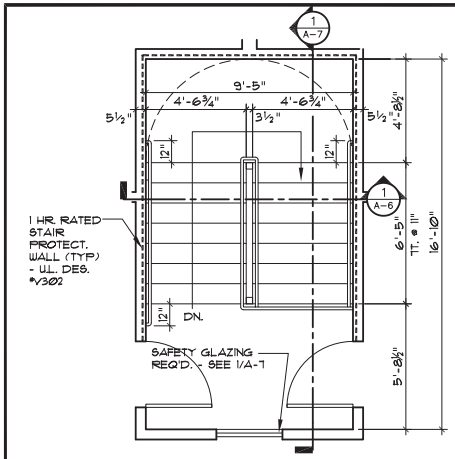
2BR-2BATH
TYPE 'A' & 'B' UNITS

WALL SECTIONS

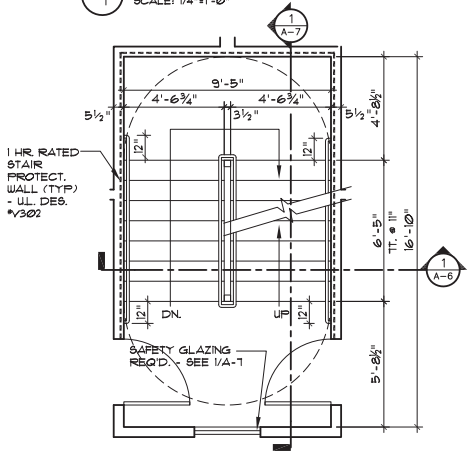
DRAWING TITLE:

A-6

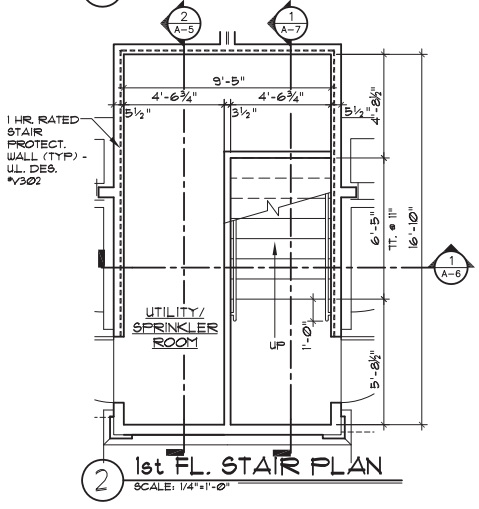
DRAWING NUMBER:



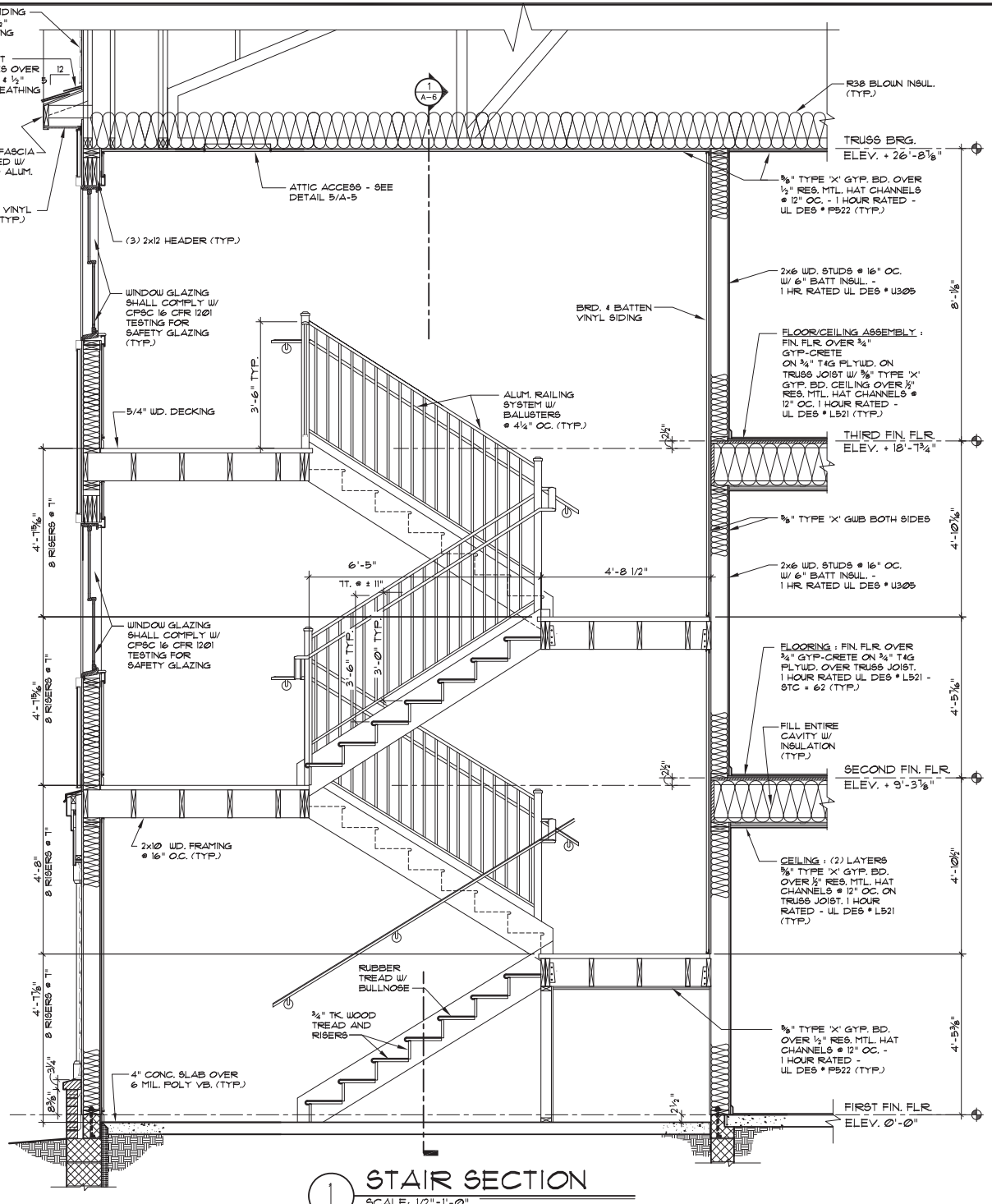
4 3rd FL. STAIR PLAN
SCALE: 1/4"=1'-0"



3 2nd FL. STAIR PLAN
SCALE: 1/4"=1'-0"



2 1st FL. STAIR PLAN
SCALE: 1/4"=1'-0"



1 STAIR SECTION
SCALE: 1/2"=1'-0"

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DRAWN BY: JRR/JFM
CHECKED BY: WTN
SCALE: AS SHOWN
DATE: -
CAD FILE: -

REVISIONS
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- -
- -
- -

EVANS FARM APARTMENTS

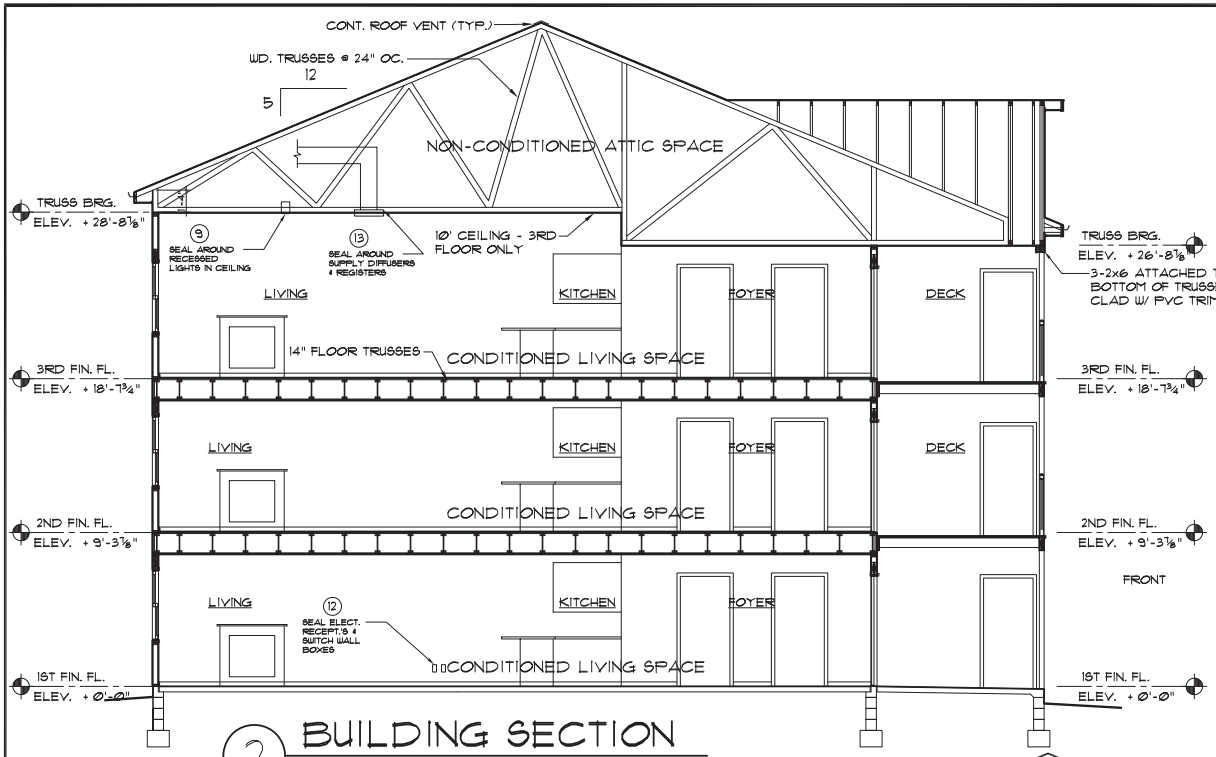
2BR-2BATH
TYPE 'A' & 'B' UNITS

STAIR PLANS & SECTION

DRAWING TITLE:

A-7

DRAWING NUMBER:



2 BUILDING SECTION

SCALE: 1/4" = 1'-0"

NUMBERS LISTED - REFER TO CORRESPONDING BUILDING AIR LEAKAGE/INFILTRATION NOTES

BUILDING AIR LEAKAGE/INFILTRATION NOTES

THE BUILDING THERMAL ENVELOPE SHALL BE CONSTRUCTED TO LIMIT AIR LEAKAGE IN ACCORDANCE WITH THE INTERNATIONAL ENERGY CODE COUNCIL (IECC) LATEST EDITION.

THE BUILDING THERMAL ENVELOPE IS THE BASEMENT WALLS, FLOOR, ROOF AND ANY OTHER BUILDING ELEMENTS THAT ENCLOSE CONDITIONED SPACE OR PROVIDE A BOUNDARY BETWEEN CONDITIONED SPACE AND UNCONDITIONED SPACE. SEAL ALL JUNCTION OF MATERIALS, PENETRATIONS, ETC. WITH TAPE, CAULK, SEALANT, SPRAY FOAM (NON-AIR PERMEABLE TYPE), RIGID INSULATION BOARD, GASKET OR COMBINATION OF THESE MATERIALS.

PROVIDE THE FOLLOWING:

1. EXTERIOR AIR BARRIER - A CONTINUOUS AIR BARRIER (SHEATHING) SHALL BE INSTALLED AROUND THE BUILDING ENVELOPE. BREAKS OR JOINTS IN THE AIR BARRIER SHALL BE SEALED.

2. CEILING/ATTIC - THE AIR BARRIER (GYP. BD.) IN THE DROPPED CEILING/SOFFIT SHALL BE ALIGNED WITH THE INSULATION AND ANY GAPS OR PENETRATION IN THE AIR BARRIER SEALED. ACCESS OPENINGS TO UNCONDITIONED ATTIC SPACE SHALL BE SEALED.

3. WALLS - CORNERS AND HEADERS SHALL BE INSULATED AND THE JUNCTURE OF THE FOUNDATION AND SILL PLATE SHALL BE SEALED. TOP PLATE AND TOP OF EXTERIOR WALLS SHALL BE SEALED.

4. WINDOWS & DOORS - SPACES BETWEEN WINDOW/DOOR JAMBS, HEADS & SILL FRAMING SHALL BE SEALED.

5. RIM JOISTS - INSULATE AND MAINTAIN SEALED AIR BARRIER.

6. FLOORS - INSULATION SHALL BE INSTALLED TO MAINTAIN CONTINUOUS AND PERMANENT CONTACT WITH UNDERSIDE OF SUB-FLOOR DECKING. AIR BARRIER SHALL BE INSTALLED AT ANY EXPOSED EDGE OF INSULATION.

7. SHAFTS & PENETRATIONS - DUCTS, SHAFTS, UTILITY PENETRATIONS, FLUES AND ANY OTHER OPENINGS TO EXTERIOR OR UNCONDITIONED SPACE SHALL BE SEALED.

8. NARROW CAVITY SPACES - INSULATE

9. RECESSED LIGHTING - ALL LIGHTING INSTALLED IN THE BUIDING THERMAL ENVELOPE SHALL BE AIR TIGHT AND SEALED TO GYP. BD.

10. PLUMBING AND WIRING - IN ADDITION TO SEALING, PROVIDE BATT INSULATION CUT NEATLY TO FIT AROUND OR BEHIND WIRING AND PLUMBING IN EXTERIOR WALLS OR THRU WALL PLATES.

11. TUB/SHOWER - PROVIDE INSULATION AND AIR BARRIER BEHIND AND UNDERNEATH TUB/SHOWER TO SEPARATE FROM EXTERIOR AND OR DEMISING WALL FOR CONTINUOUS BARRIER.

12. ELECTRICAL PANEL, PHONE, ELECT. SWITCH & RECEPT.'S & TV CABLE BOXES - PROVIDE AIR BARRIER BEHIND PANELS AND AIR SEAL WALL BOXES ON EXTERIOR OR DEMISING WALLS. AIR SEALED BOXES CAN BE INSTALLED. WALL BOX GASKETS ARE SECONDARY TO REQ'D. AIR BARRIER AND CAN BE INSTALLED ALSO.

13. HVAC - ALL SUPPLY AND RETURN AIR REGISTERS AND DIFFUSERS SHALL BE SEALED TO GYP. BD. CEILING AND OR WALLS. DUCTS ARE TO BE SEALED TO REG./DIFFUSER.

14. FIREPLACE - PROVIDE AIR BARRIER BEHIND MANUFACTURED ELECTRIC FIREPLACES.

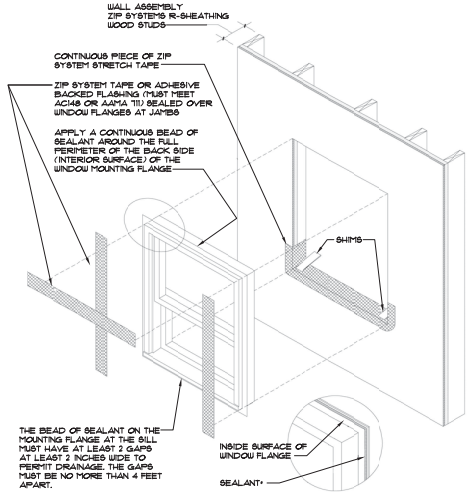
15. DAMPERS - PROVIDE DAMPERS AT ALL EXHAUST FAN AND DRYER VENTS TO LIMIT NEGATIVE AIR PRESSURE OR EXCESS AIR REMOVAL FROM CONDITIONED SPACE.

TEST

BLOWER DOOR TEST IN CLIMATE ZONE 4 - PRESSURE AT DOOR OF Ø.2 INCHES W.G. (50 PASCALS). TESTING SHALL BE PERFORMED AT ANY TIME AFTER CREATION OF ALL PENETRATIONS OF THE BUILDING THERMAL ENVELOPE.

DURING TEST

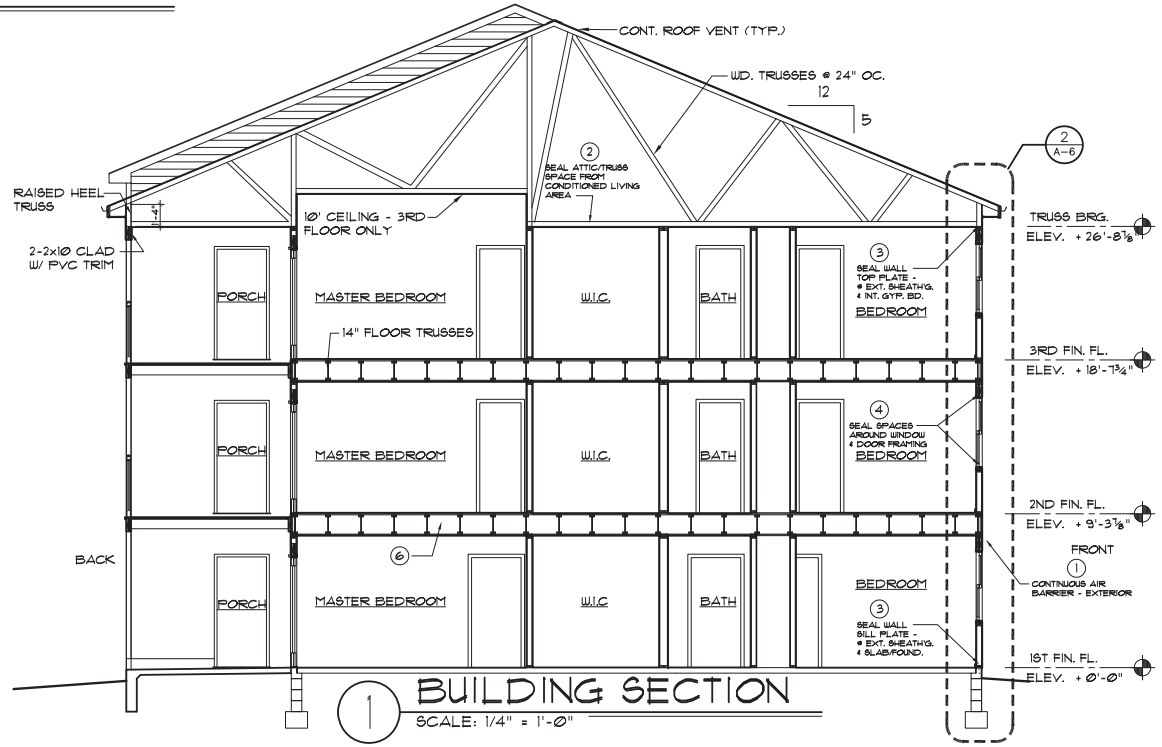
EXT. WINDOWS AND DOORS SHALL BE CLOSED. DAMPERS, INCLUDING EXHAUST, INTAKE MAKEUP AIR, BACKDRAFT & FLUE DAMPERS SHALL BE CLOSED. INTERIOR DOORS, IF INSTALLED AT TIME OF TEST, SHALL BE OPEN. EXT. DOORS FOR CONTINUOUS VENTILATION SYSTEMS AND HEAT RECOVERY VENTILATORS SHALL BE CLOSED AND SEALED. HEATING & COOLING SYSTEMS, IF INSTALLED AT TIME OF TEST, SHALL BE TURNED OFF. SUPPLY & RETURN REGISTERS, IF INSTALLED AT TIME OF THE TEST, SHALL BE FULLY OPEN.



* WHEN USING ZIP SYSTEM TAPE, BUTYL, 100% SILICONE OR POLYURETHANE SEALANTS ARE ACCEPTABLE. DO NOT USE LATEX SEALANTS WITH ZIP SYSTEM TAPE. IF USING ANOTHER FLASHING TAPE, FOLLOW THE FLASHING MANUFACTURER'S RECOMMENDATION IN SELECTING A SEALANT COMPATIBLE WITH THE FLASHING.

3 WINDOW FLASHING

SCALE: N.T.S.



1 BUILDING SECTION

SCALE: 1/4" = 1'-0"

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SCALE: AS SHOWN
DATE: -
CAD FILE: -

REVISIONS
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- -
- -
- -

EVANS FARM APARTMENTS

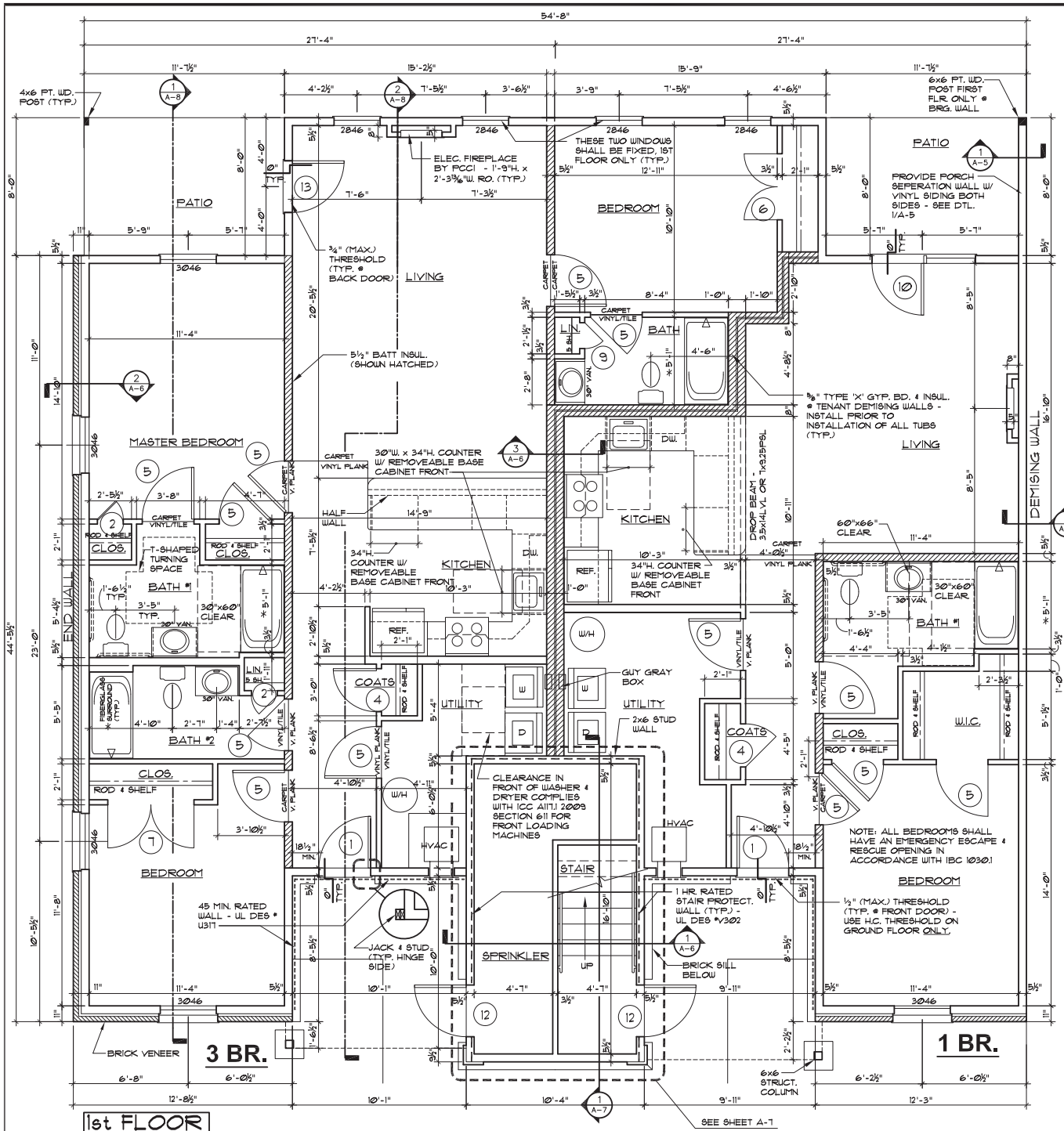
2BR-2BATH
TYPE 'A' & 'B' UNITS

BUILDING SECTIONS

DRAWING TITLE:

A-8

DRAWING NUMBER:



1st FLOOR TYPE 'A' UNIT PLAN

SCALE: ¼"=1'-0"

NOTE: ALL INTERIOR PARTITIONS SHALL BE 2x4 STUDS @ 16" O.C. W/ ½" GWB. ON EACH SIDE UNLESS NOTED OTHERWISE (5½" PARTITIONS INDICATE 2x6 STUDS IN LIEU OF 2x4.) ALL 1ST FLR. BEARING WALLS TO BE 2X6 STUDS.

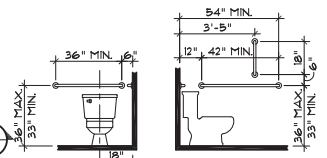
BRICK LINTELS:

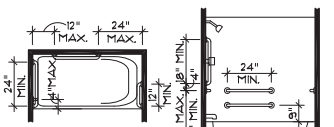
UNLESS OTHERWISE NOTED, PROVIDE THE FOLLOWING LINTELS FOR EA. 4" THICKNESS OF MASONRY WALL W/ 8" OF BRG. @ EA. END. FOR UNEQUAL LEG ANGLES, ORIENT THE LONG LEGS VERTICAL. GALVANIZE ALL LINTELS EXPOSED TO THE WEATHER OR PRIME & PAINT.

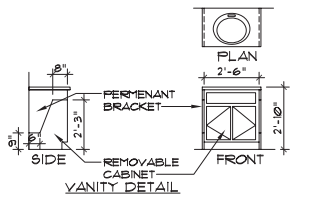
OPEN'G UP TO 4'-0"	L3½"x 3½"x 5/16"
OPEN'G UP TO 4'-6"	L4"x 3½"x 5/16"LLV
OPEN'G UP TO 6'-8"	L5"x 3½"x 5/16"LLV
OPEN'G UP TO 8'-10"	L6"x 3½"x 5/16"LLV

HANDICAP UNIT NOTES:
(TYPE 'A' UNITS ONLY)

1. ALL LIGHT SWITCHES & THERMOSTATS TO BE @ 48" AFF.
2. SIDE-BY-SIDE REFRIGERATORS TO BE PROVIDED IN KITCHEN.
3. FRONT MTD. CONTROLS ON COOKTOP/RANGE TO BE PROVIDED.
4. FRONT LOAD WASHER AND DRYER WITH FRONT CONTROLS TO BE PROVIDED.
3. PROVIDE WD. BLKG. FOR TOILET & BATH GRAB BARS ONLY - SEE DTLS. BELOW - GRAB BARS ARE NIC.
4. ALL DOOR HANDLE HARDWARE TO BE LEVER TYPE.
5. PROVIDE FINISH FLOORING UNDER ALL KITCHEN AND BATH ROOM REMOVEABLE CABINETS AND VANITIES.
6. ALL BATHROOM VANITIES TO BE 30"W. (CLR.) x 34" COUNTER HGT. W/REMOVEABLE BASE CABINET FRONT.

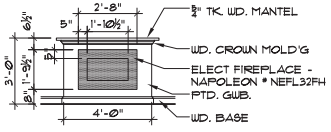






LEGEND

- WALL W/ 3½" BATT INSUL.
- BRICK



* VERIFY/COORDINATE DIMENSION W/ ROUGH OPENING REQUIREMENT OF TUB / SURROUND (TYP.)

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- -

EVANS FARM APARTMENTS

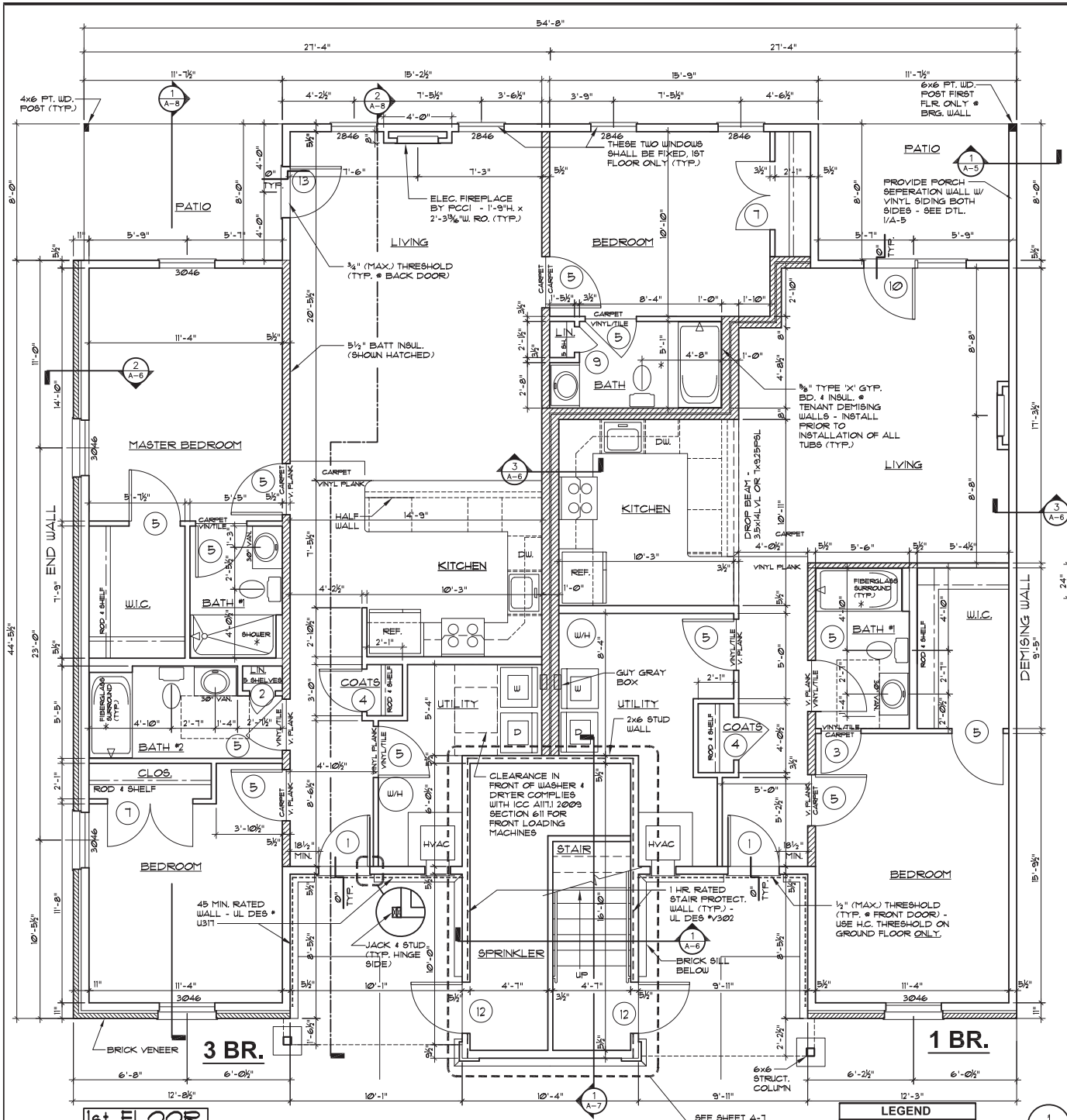
3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

FIRST FLOOR TYPE 'A' UNIT FLOOR PLAN

DRAWING TITLE:

A-1A

DRAWING NUMBER:



1st FLOOR TYPE 'B' UNIT PLAN

SCALE: ¼"=1'-0"

NOTE: ALL INTERIOR PARTITIONS SHALL BE 2x4 STUDS @ 16" O.C. W/ ½" GWB. ON EACH SIDE UNLESS NOTED OTHERWISE (5½" PARTITIONS INDICATE 2x6 STUDS IN LIEU OF 2x4.) ALL 1ST FLR. BEARING WALLS TO BE 2X6 STUDS.

LEGEND

- WALL W/ 3½" BATT INSUL.
- BRICK

BRICK LINTELS:

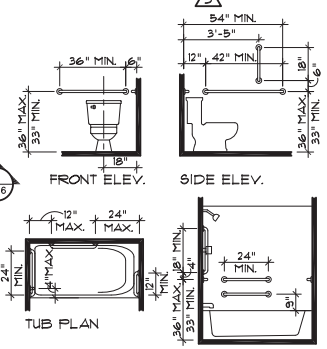
UNLESS OTHERWISE NOTED, PROVIDE THE FOLLOWING LINTELS FOR EA. 4" THICKNESS OF MASONRY WALL W/ 8" OF BRG. @ EA. END. FOR UNEQUAL LEG ANGLES, ORIENT THE LONG LEGS VERTICAL; GALVANIZE ALL LINTELS EXPOSED TO THE WEATHER OR PRIME & PAINT.

OPEN'G UP TO 4'-0"	L3½"x 3½"x 5/16"
OPEN'G UP TO 4'-6"	L4"x 3½"x 5/16"LLV
OPEN'G UP TO 6'-8"	L5"x 3½"x 5/16"LLV
OPEN'G UP TO 8'-10"	L6"x 3½"x 5/16"LLV

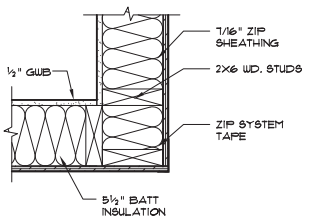
HANDICAP UNIT NOTES:
(TYPE 'B' UNITS ONLY.)

1. ALL LIGHT SWITCHES & THERMOSTATS TO BE @ 48" AFF.
2. PROVIDE WD. BLKG. FOR TOILET & BATH GRAB BARS ONLY - SEE DTLS. BELOW - GRAB BARS ARE NIC.

NOTE: ALL BEDROOMS SHALL HAVE AN EMERGENCY ESCAPE & RESCUE OPENING IN ACCORDANCE WITH IBC 1030.1



* VERIFY/COORDINATE DIMENSION W/ ROUGH OPENING REQUIREMENT OF TUB / SURROUND (TYP.)



1 CORNER DETAIL

SCALE: 1½" = 1'-0"

TYPICAL AT ALL EXTERIOR WALL CORNERS

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EVANS FARM APARTMENTS

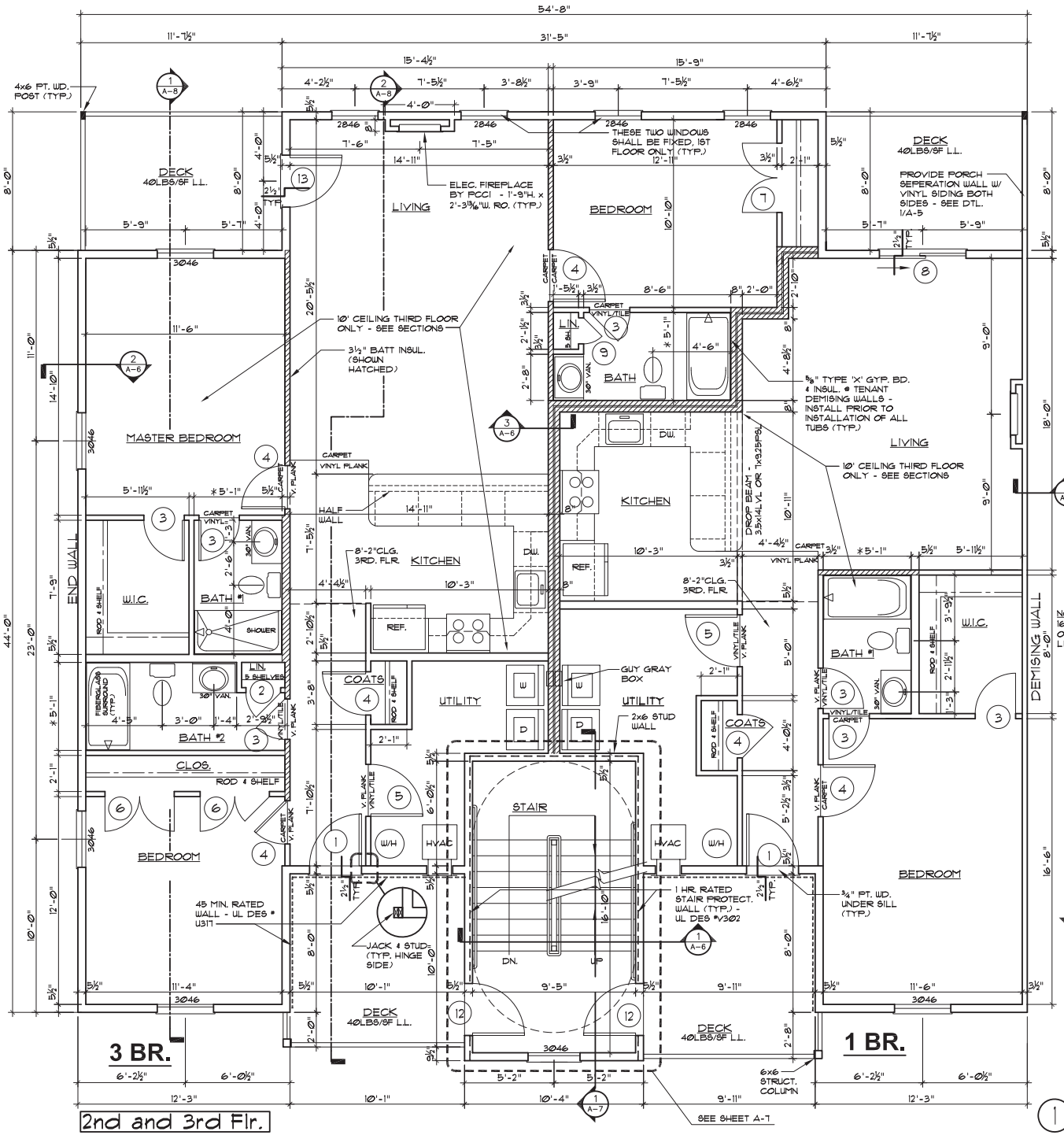
3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

FIRST FLOOR TYPE 'B' UNIT FLOOR PLAN

DRAWING TITLE:

A-1B

DRAWING NUMBER:



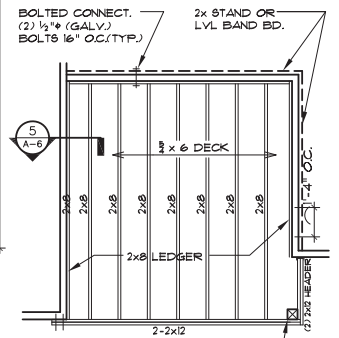
NOTE:
HEAD HEIGHT FOR DOOR OPNGS. ON 2ND & 3RD FLOOR TO BE ¾" HIGHER FOR GYPCRETE TOPPING.

* VERIFY/COORDINATE DIMENSION W/ ROUGH OPENING REQUIREMENT OF TUB / SURROUND (TYP)

NOTE: ALL INTERIOR PARTITIONS SHALL BE 2x4 STUDS @ 16" O.C. W/ ½" GWB. ON EACH SIDE UNLESS NOTED OTHERWISE (5½" PARTITIONS INDICATE 2x6 STUDS IN LIEU OF 2x4.)

LEGEND

- WALL W/ 3½" BATT INSUL.
- BRICK



5 A-6 DECK FRAMING PLAN
SCALE: ¼" = 1'-0"

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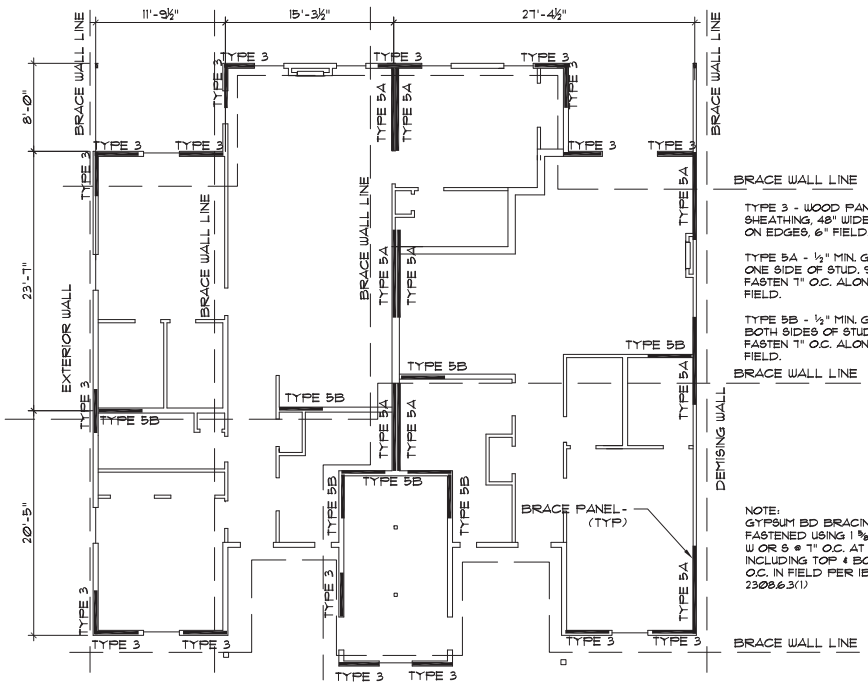
EVANS FARM APARTMENTS

3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

SECOND & THIRD FLOOR UNIT PLANS

DRAWING TITLE:

DRAWING NUMBER: A-2



3 WALL BRACING PLAN
SCALE: 1/8" = 1'-0"

DESIGN LOADS :

FLOOR LIVE LOAD - FIRST FLOOR	40PSF
FLOOR DEAD LOAD:	22PSF (INCLUDING 7 PSF FOR GYPCRETE)
ROOF LIVE LOAD:	20PSF
ROOF SNOW LOAD:	
GROUND SNOW LOAD (Pg)	25PSF
SNOW EXPOSURE FACTOR:	0.9
SNOW IMPORTANCE FACTOR:	1.0

WIND LOAD:
ULTIMATE DESIGN WIND SPEED, VULT., = 115 MPH.
RISK CATEGORY = II

SEISMIC DESIGN DATA:
SITE CLASS = D
SEISMIC DESIGN CATEGORY = B

SOIL, CONCRETE & LUMBER :

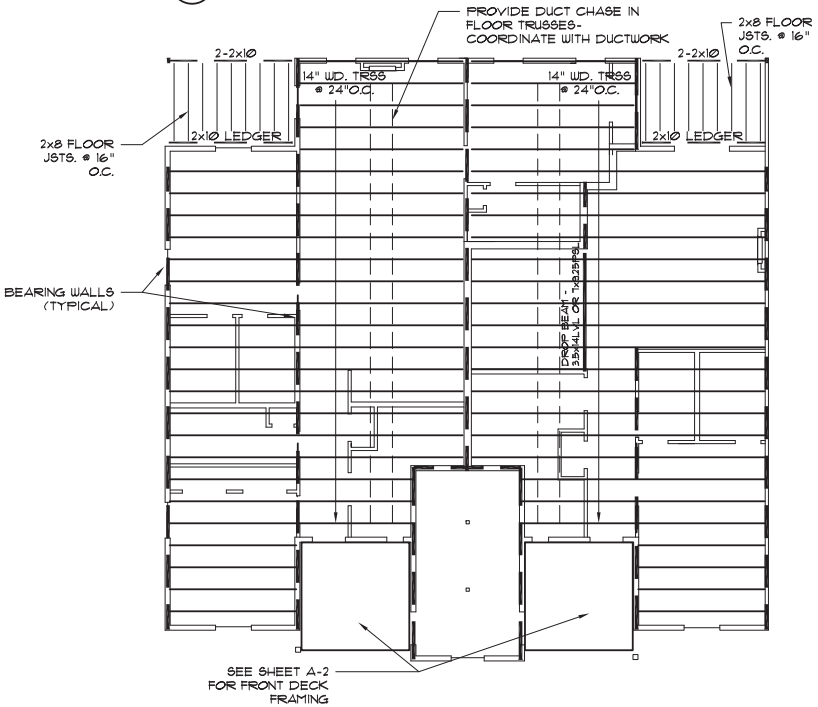
SOIL LOAD BEARING DESIGN VALUE = 2,000 PSF

CONCRETE STRENGTH = 3,000PSI (FLOOR SLAB & FOUNDATIONS)

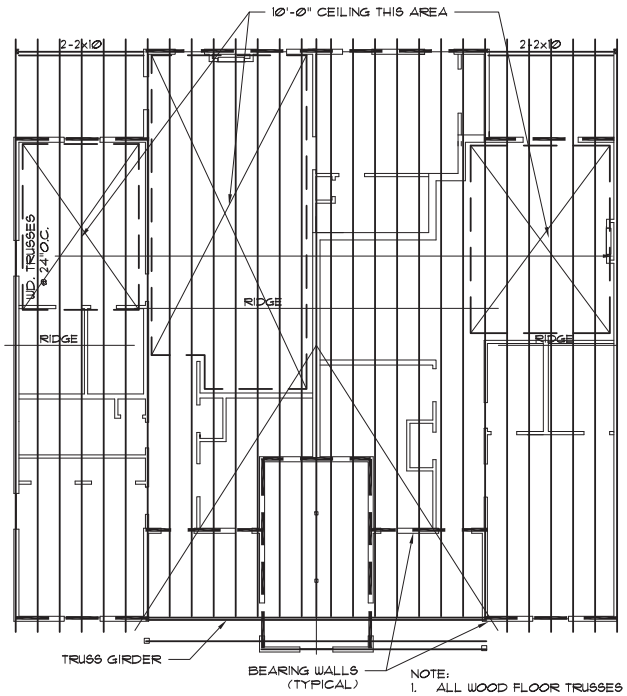
LUMBER FOR FLOOR, ROOF & WALL FRAMING = HEM-FIR NO. 2 MIN.
ALL TIMBER FRAMING SHALL COMPLY WITH SECTION 2308 OF IBC 2015.

ROOF & SHEATHING FASTENING :

FASTENING SHALL COMPLY WITH IBC TABLE 2304.10.1, FASTENING SCHEDULE.



2 FLOOR FRAMING PLAN
SCALE: 1/8" = 1'-0"



NOTE:
1. ALL WOOD FLOOR TRUSSES & DECK FLOOR JOISTS SYSTEMS ARE DESIGNED TO 40 PSF LIVE LOAD.

1 ROOF FRAMING PLAN
SCALE: 1/8" = 1'-0"

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EVANS FARM APARTMENTS

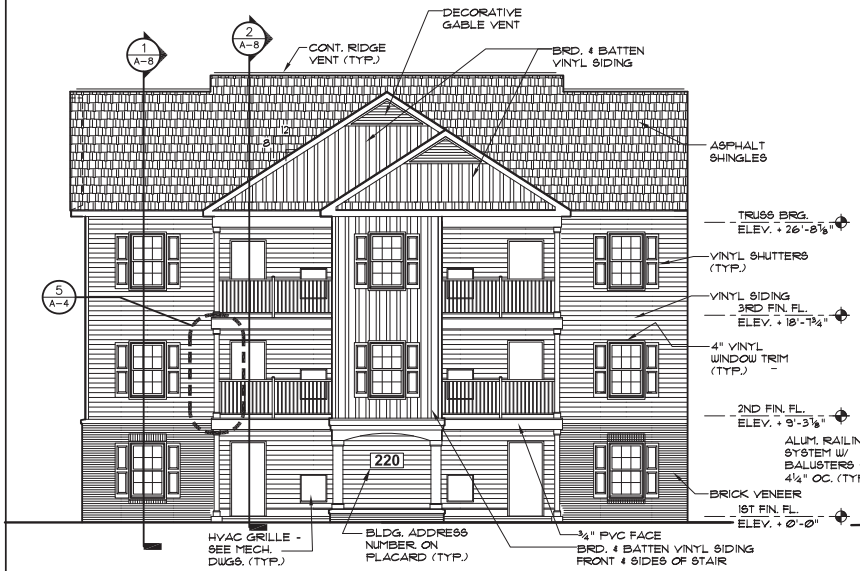
3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

ROOF & FLOOR FRAMING PLANS, BRACING PLAN

DRAWING TITLE:

A-3

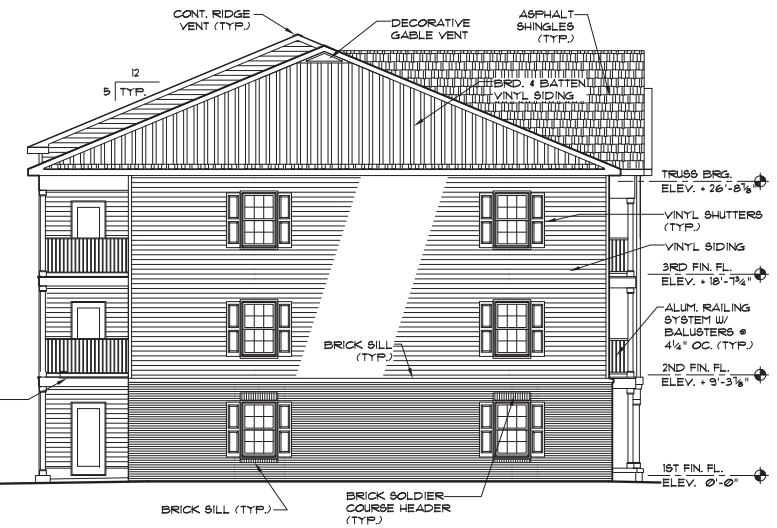
DRAWING NUMBER:



1 FRONT ELEVATION

SCALE: ⅛" = 1'-0"

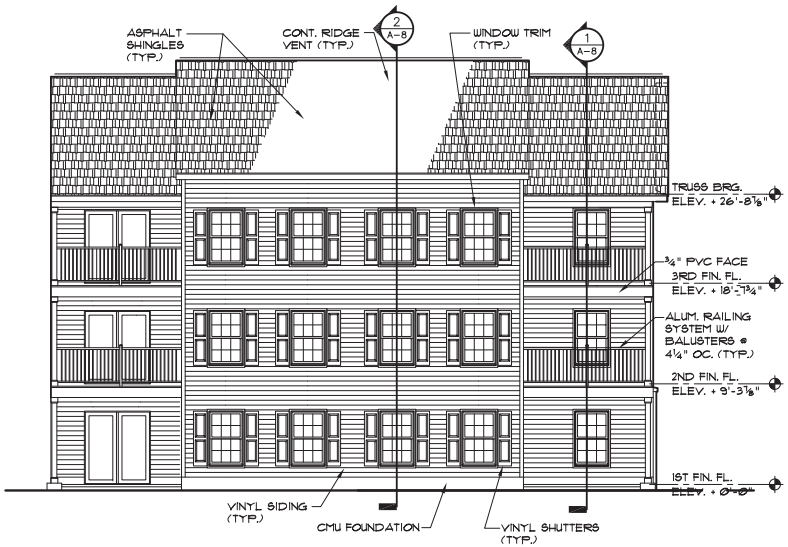
NOTE: SAFETY GLAZING REQUIRED AT STAIR WINDOWS - SEE 1/A-7



2 LEFT SIDE ELEVATION

SCALE: 1/8" = 1'-0"

NOTE: RIGHT BLDG. OPP. HAND



3 REAR ELEVATION

SCALE: ⅛" = 1'-0"

NOTE:
VINYL SIDING: ALL ACCESSORY TRIM SHALL MATCH VINYL SIDING COLOR UNLESS OTHERWISE NOTED. ALL WINDOWS AND DOORS TO RECEIVE 3½" WHITE VINYL TRIM.

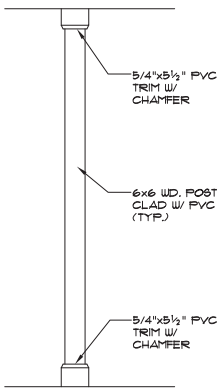
NOTE:
1. SEE A-1 FOR BRICK LINTEL SCHEDULE FOR ALL BRICK OPENING.
2. CONTRACTOR TO COORD. MASONRY OPENINGS W/ DIMENSIONS OF WINDOWS, DOORS, ETC (TYP.)

VINYL SIDING SPECIFICATION:

HORIZONTAL SIDING
MANUFACTURER - CERTAINTEED "ENCORE"
1. PROFILE - DUTCHLAP
2. EXPOSURE - DOUBLE 4.5"
3. PROJECTION - ½"
4. THICKNESS - .040" (NOM.)
5. TEXTURE - WOODGRAIN
6. COLOR - SELECTED BY ARCHITECT
7. WARRANTY - 50 YEARS

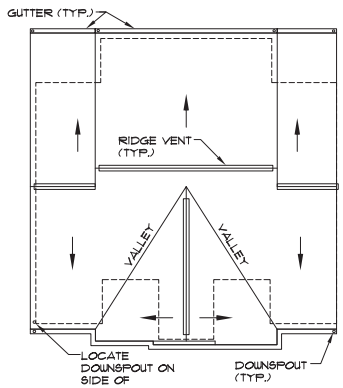
BOARD & BATTEN SIDING
MANUFACTURER - CERTAINTEED "BOARD & BATTEN"
1. PROFILE - BOARD & BATTEN
2. EXPOSURE - 8"
3. PROJECTION - ½"
4. THICKNESS - .048" (NOM.)
5. TEXTURE - ROUGH CEDAR
6. COLOR - SELECTED BY ARCHITECT
7. WARRANTY - 50 YEARS

SHUTTER SPECIFICATIONS:
MANUFACTURER - ALSIDE "DINESOL"
1. PROFILE - RAISED PANEL
2. COLOR - BLACK (THRU COLORED)
NO SUBSTITUTIONS
BRICK:
MCAVOY FULL RANGE, FINE RED MATTEX - COLOR TO BE SELECTED BY ARCHITECT.



5 COLUMN DETAIL

SCALE: ½" = 1'-0"



4 ROOF PLAN

SCALE: 1/16" = 1'-0"

PROVIDE & INSTALL WHITE ALUMINUM .032 'K' GUTTER, .019 DOWN SPOUTS & 11X24 PVC SPLASH BLOCKS @ ALL D.S. ANCHOR /STRAP GUTTERS 2'-0" O.C. TYP. PROVIDE ALL ACCESSORIES REQ. FOR A COMPLETE INSTALLATION.

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EVANS FARM APARTMENTS

3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

ELEVATIONS
ROOF PLAN

DRAWING TITLE:

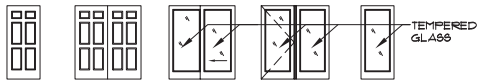
A-4

DRAWING NUMBER:

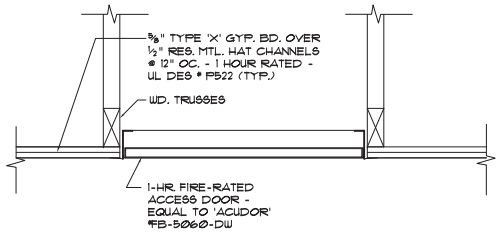
DOOR SCHEDULE

DOOR	DOOR SIZE W	H	TH	MATERIAL	THRESH	DOOR TYPE	REMARKS
1	3'-0"	6'-8"	1 3/4"	MTL. INSUL.	ALUM.	A	SPRING HINGE, 20 MIN. DR.
2	1'-8"	6'-8"	1 3/8"	HC. WD.	-	A	-
3	2'-4"	6'-8"	1 3/8"	HC. WD.	-	A	
4	2'-6"	6'-8"	1 3/8"	HC. WD.	-	A	-
5	3'-0"	6'-8"	1 3/8"	HC. WD.	-	A	-
6	4'-0"	6'-8"	1 3/8"	HC. WD.	-	B	-
7	5'-0"	6'-8"	1 3/8"	HC. WD.	-	B	-
8	6'-0"	6'-8"	1 3/4"	VINLY INSUL.	ALUM.	C	SLIDING DOOR
9	1'-6"	6'-8"	1 3/8"	HC. WD.	-	A	-
10	6'-0"	6'-8"	1 3/4"	MTL. INSUL.	ALUM.	D	(1) 3'-0" SIDELIGHT PANEL
11	NOT USED						
12	3'-0"	6'-8"	1 3/4"	MTL. INSUL.	ALUM.	A	SPRING HINGE, 60 MIN. DR.
13	3'-0"	6'-8"	1 3/4"	MTL. INSUL.	ALUM.	E	

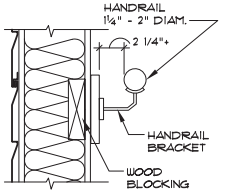
DOOR TYPES



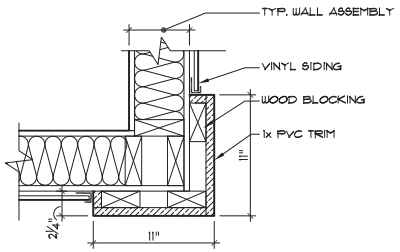
NOTE: ALL DOOR HARDWARE, INCLUDING LEVERS, LOCKSETS AND HINGES SHALL BE ANTIQUE BRONZE FINISH UNLESS OTHERWISE NOTED.



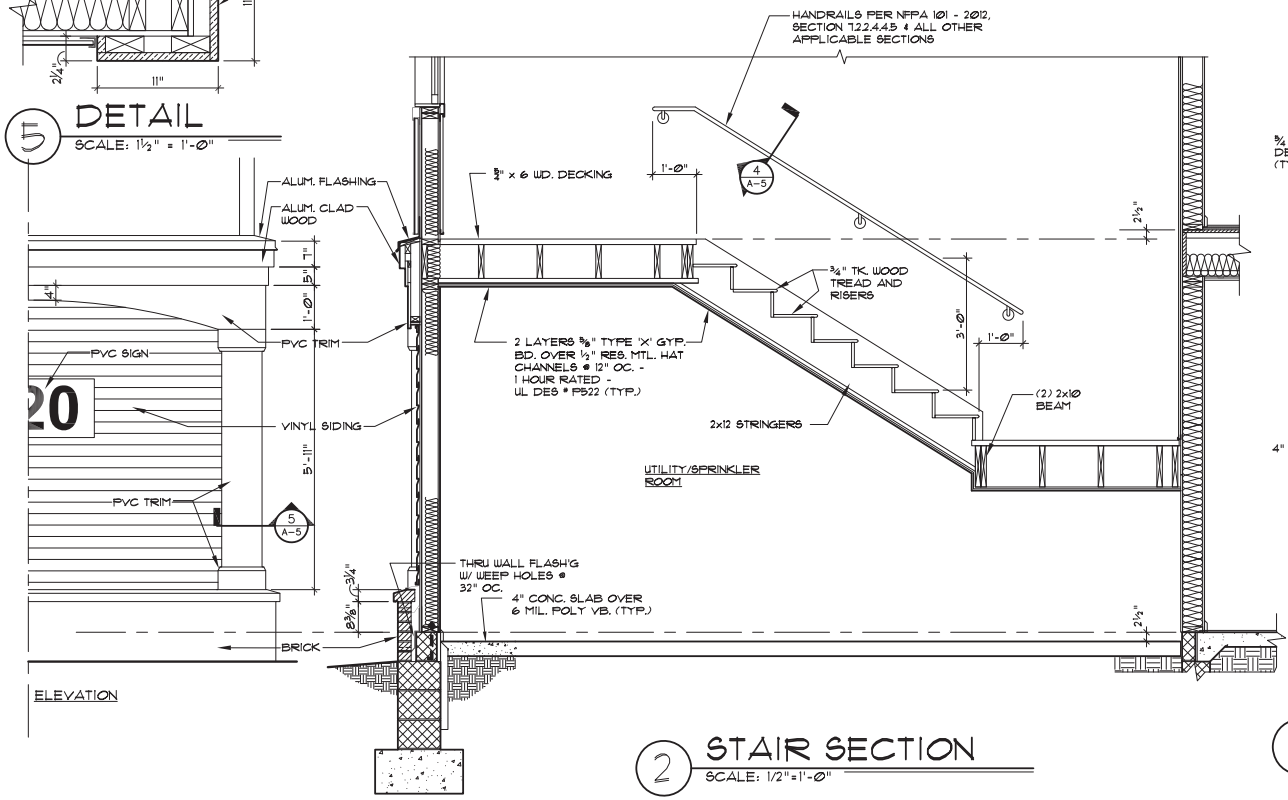
4 ATTIC ACCESS DETAIL
SCALE: 1½" = 1'-0"



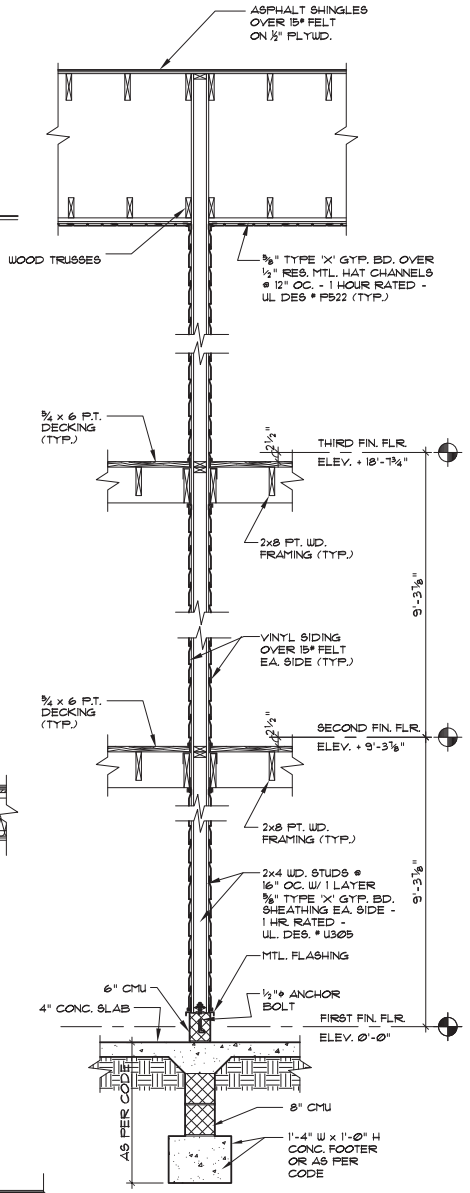
3 HANDRAIL DETAIL
SCALE: 1½"=1'-0"



5 DETAIL
SCALE: 1½" = 1'-0"



2 STAIR SECTION
SCALE: 1/2"=1'-0"



1 REAR PATIO/DECK WALL SECTION
SCALE: 1/2" = 1'-0"

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EVANS FARM APARTMENTS

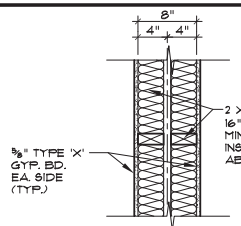
3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

WALL SECTIONS

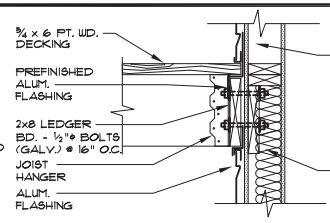
DRAWING TITLE:

A-5

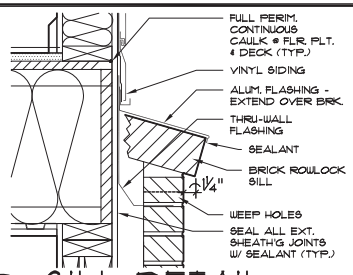
DRAWING NUMBER:



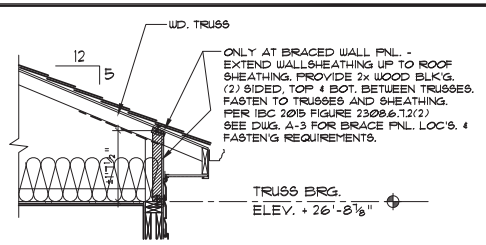
4 DETAIL
SCALE: 1"=1'-0"



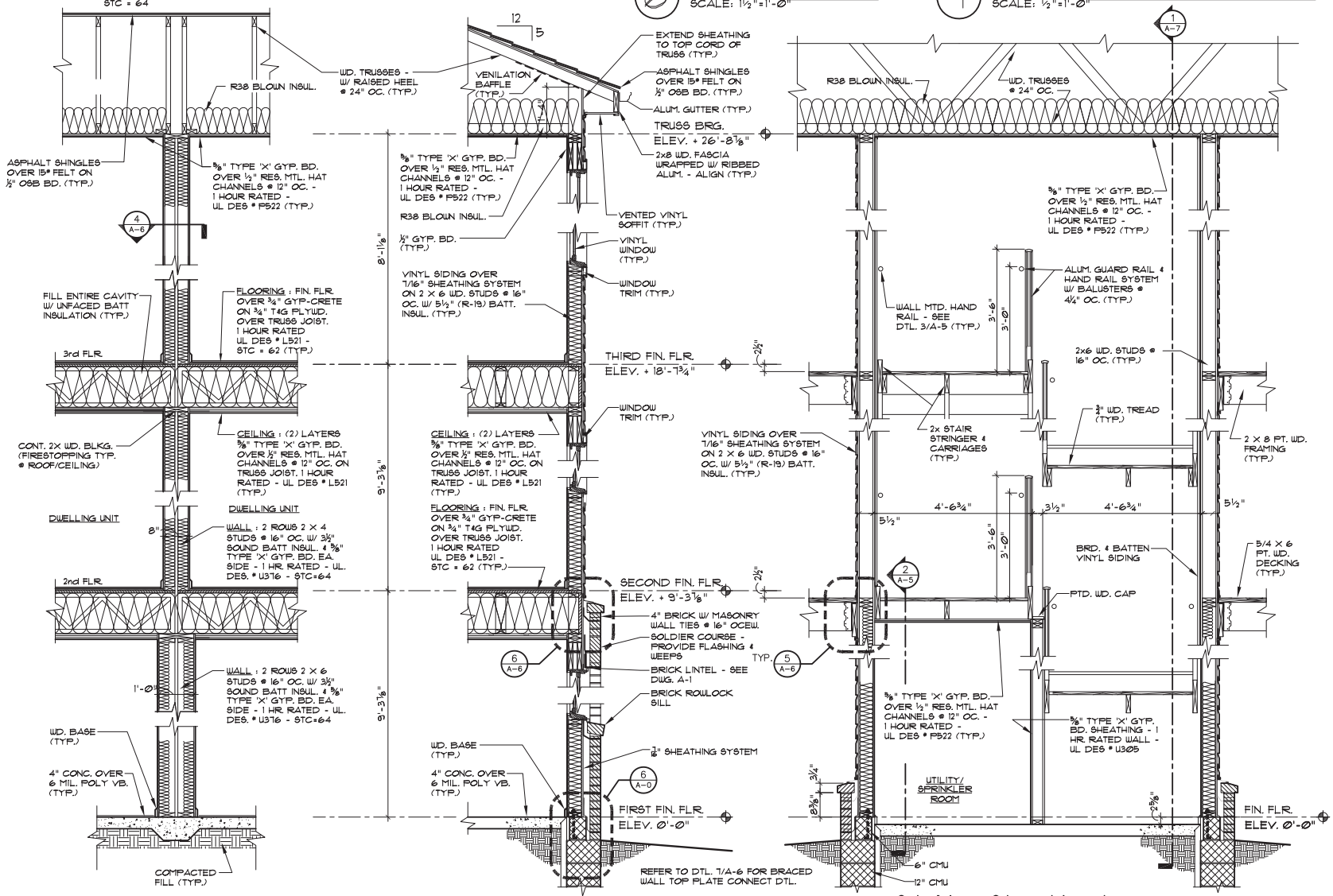
5 RIBBON BD. DTL.
SCALE: 1"=1'-0"



6 SILL DETAIL
SCALE: 1½"=1'-0"



7 BRACED WALL PNL. TOP PLATE CONNECT DTL.
SCALE: ½"=1'-0"



3 WALL SECTION
SCALE: 1/2"=1'-0"

2 WALL SECTION
SCALE: 1/2"=1'-0"

1 STAIR SECTION
SCALE: 1/2"=1'-0"

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EVANS FARM APARTMENTS

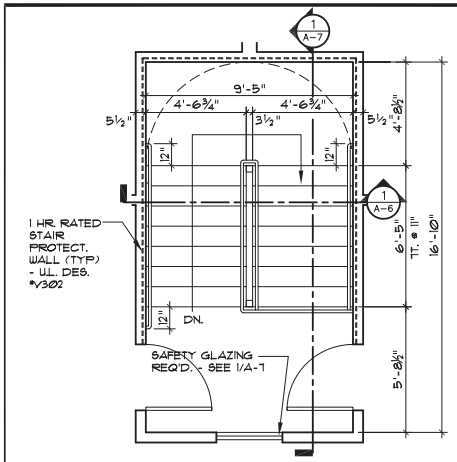
3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

WALL SECTIONS

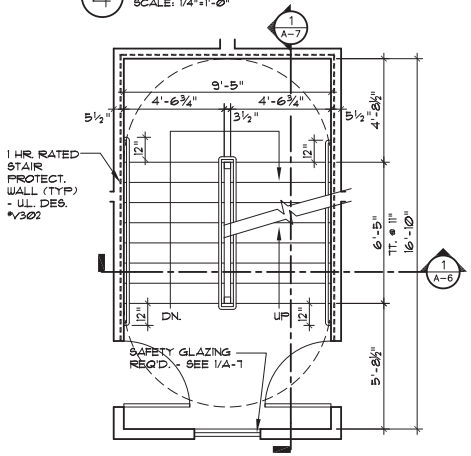
DRAWING TITLE:

A-6

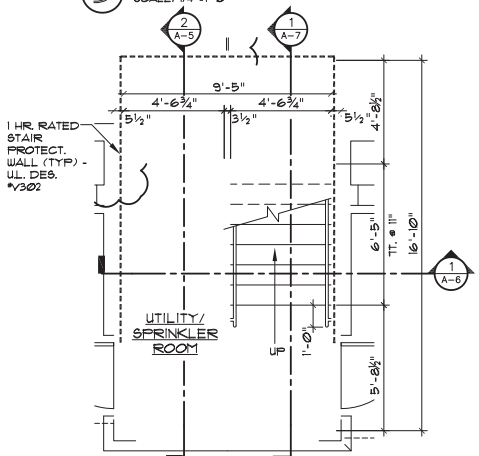
DRAWING NUMBER:



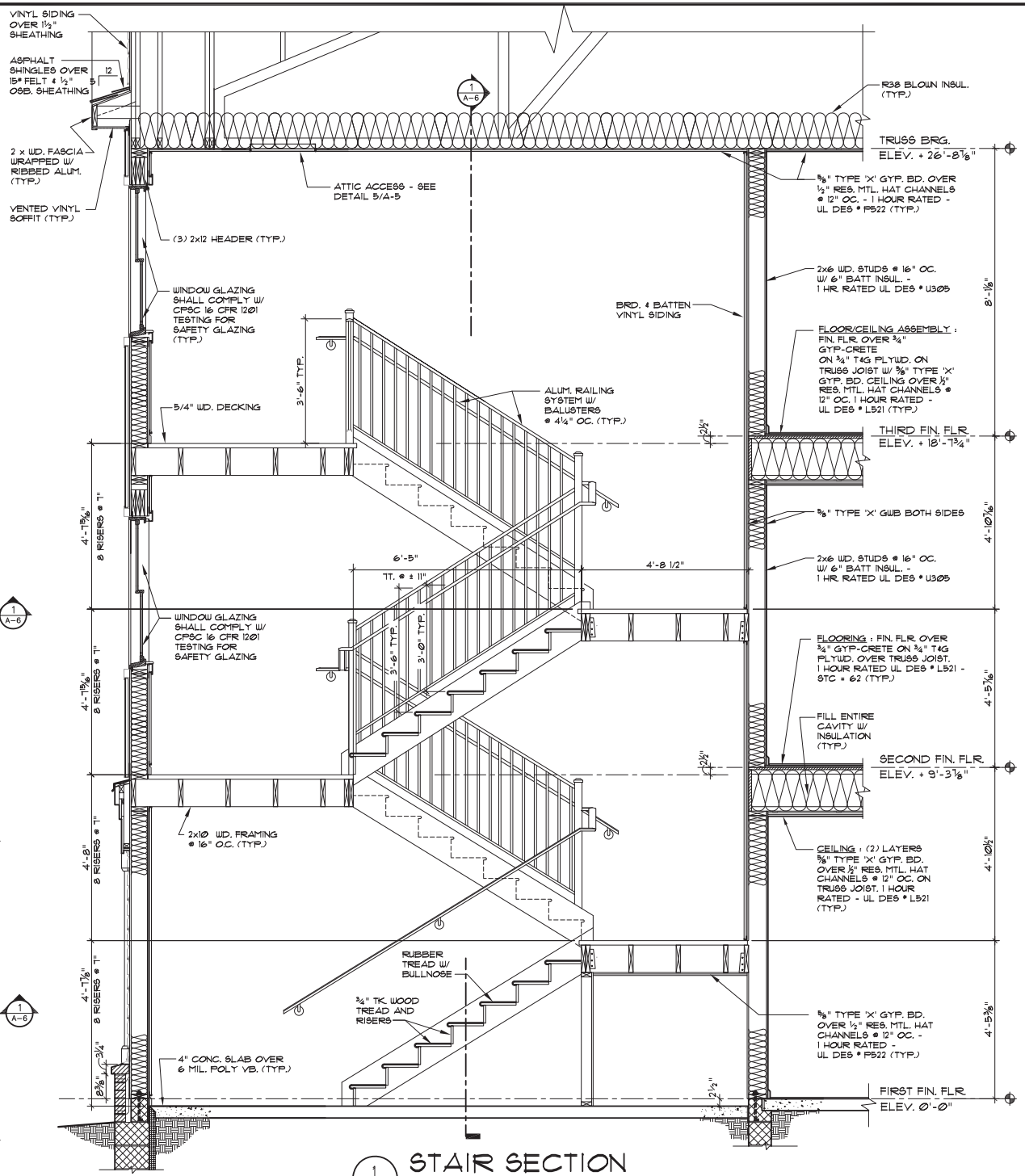
4 3rd FL. STAIR PLAN
SCALE: 1/4"=1'-0"



3 2nd FL. STAIR PLAN
SCALE: 1/4"=1'-0"



2 1st FL. STAIR PLAN
SCALE: 1/4"=1'-0"



1 STAIR SECTION
SCALE: 1/2"=1'-0"

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EVANS FARM APARTMENTS

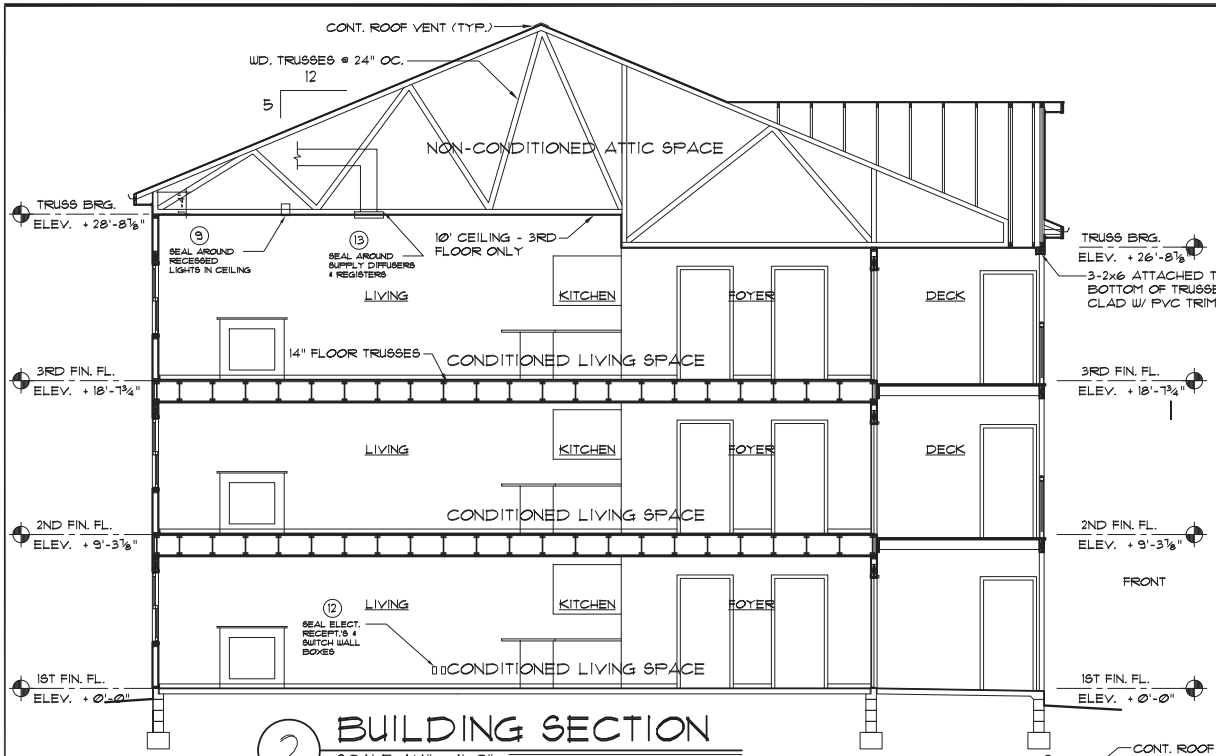
3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

STAIR PLANS & SECTION

DRAWING TITLE:

A-7

DRAWING NUMBER:



2 BUILDING SECTION

SCALE: 1/4" = 1'-0"

NUMBERS LISTED - REFER TO CORRESPONDING BUILDING AIR LEAKAGE/INFILTRATION NOTES

BUILDING AIR LEAKAGE/INFILTRATION NOTES

THE BUILDING THERMAL ENVELOPE SHALL BE CONSTRUCTED TO LIMIT AIR LEAKAGE IN ACCORDANCE WITH THE INTERNATIONAL ENERGY CODE COUNCIL (IECC) LATEST EDITION.

THE BUILDING THERMAL ENVELOPE IS THE BASEMENT WALLS, FLOOR, ROOF AND ANY OTHER BUILDING ELEMENTS THAT ENCLOSE CONDITIONED SPACE OR PROVIDE A BOUNDARY BETWEEN CONDITIONED SPACE AND UNCONDITIONED SPACE. SEAL ALL JUNCTION OF MATERIALS, PENETRATIONS, ETC. WITH TAPE, CAULK, SEALANT, SPRAY FOAM (NON-AIR PERMEABLE TYPE), RIGID INSULATION BOARD, GASKET OR COMBINATION OF THESE MATERIALS.

PROVIDE THE FOLLOWING:

1. EXTERIOR AIR BARRIER - A CONTINUOUS AIR BARRIER (SHEATHING) SHALL BE INSTALLED AROUND THE BUILDING ENVELOPE. BREAKS OR JOINTS IN THE AIR BARRIER SHALL BE SEALED.

2. CEILING/ATTIC - THE AIR BARRIER (GYP. BD.) IN THE DROPPED CEILING/SOFFIT SHALL BE ALIGNED WITH THE INSULATION AND ANY GAPS OR PENETRATION IN THE AIR BARRIER SEALED. ACCESS OPENINGS TO UNCONDITIONED ATTIC SPACE SHALL BE SEALED.

3. WALLS - CORNERS AND HEADERS SHALL BE INSULATED AND THE JUNCTURE OF THE FOUNDATION AND SILL PLATE SHALL BE SEALED. TOP PLATE AND TOP OF EXTERIOR WALLS SHALL BE SEALED.

4. WINDOWS & DOORS - SPACES BETWEEN WINDOW/DOOR JAMBS, HEADS & SILL FRAMING SHALL BE SEALED.

5. RIM JOISTS - INSULATE AND MAINTAIN SEALED AIR BARRIER.

6. FLOORS - INSULATION SHALL BE INSTALLED TO MAINTAIN CONTINUOUS AND PERMANENT CONTACT WITH UNDERSIDE OF SUB-FLOOR DECKING. AIR BARRIER SHALL BE INSTALLED AT ANY EXPOSED EDGE OF INSULATION.

7. SHAFTS & PENETRATIONS - DUCTS, SHAFTS, UTILITY PENETRATIONS, FLUES AND ANY OTHER OPENINGS TO EXTERIOR OR UNCONDITIONED SPACE SHALL BE SEALED.

8. NARROW CAVITY SPACES - INSULATE

9. RECESSED LIGHTING - ALL LIGHTING INSTALLED IN THE BUIDING THERMAL ENVELOPE SHALL BE AIR TIGHT AND SEALED TO GYP. BD.

10. PLUMBING AND WIRING - IN ADDITION TO SEALING, PROVIDE BATT INSULATION CUT NEATLY TO FIT AROUND OR BEHIND WIRING AND PLUMBING IN EXTERIOR WALLS OR THRU WALL PLATES.

11. TUB/SHOWER - PROVIDE INSULATION AND AIR BARRIER BEHIND AND UNDERNEATH TUB/SHOWER TO SEPARATE FROM EXTERIOR AND OR DEMISING WALL FOR CONTINUOUS BARRIER.

12. ELECTRICAL PANEL, PHONE, ELECT. SWITCH & RECEPT.'S & TV CABLE BOXES - PROVIDE AIR BARRIER BEHIND PANELS AND AIR SEAL WALL BOXES ON EXTERIOR OR DEMISING WALLS. AIR SEALED BOXES CAN BE INSTALLED. WALL BOX GASKETS ARE SECONDARY TO REG'D. AIR BARRIER AND CAN BE INSTALLED ALSO.

13. HVAC - ALL SUPPLY AND RETURN AIR REGISTERS AND DIFFUSERS SHALL BE SEALED TO GYP. BD. CEILING AND OR WALLS. DUCTS ARE TO BE SEALED TO REG./DIFFUSER.

14. FIREPLACE - PROVIDE AIR BARRIER BEHIND MANUFACTURED ELECTRIC FIREPLACES.

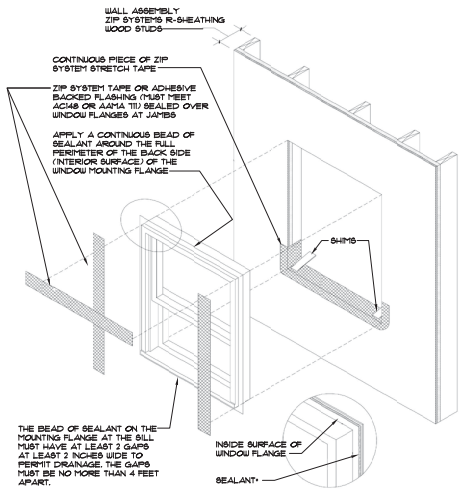
15. DAMPERS - PROVIDE DAMPERS AT ALL EXHAUST FAN AND DRYER VENTS TO LIMIT NEGATIVE AIR PRESSURE OR EXCESS AIR REMOVAL FROM CONDITIONED SPACE.

TEST

BLOWER DOOR TEST IN CLIMATE ZONE 4 - PRESSURE AT DOOR OF Ø.2 INCHES W.G. (50 PASCALS). TESTING SHALL BE PERFORMED AT ANY TIME AFTER CREATION OF ALL PENETRATIONS OF THE BUILDING THERMAL ENVELOPE.

DURING TEST

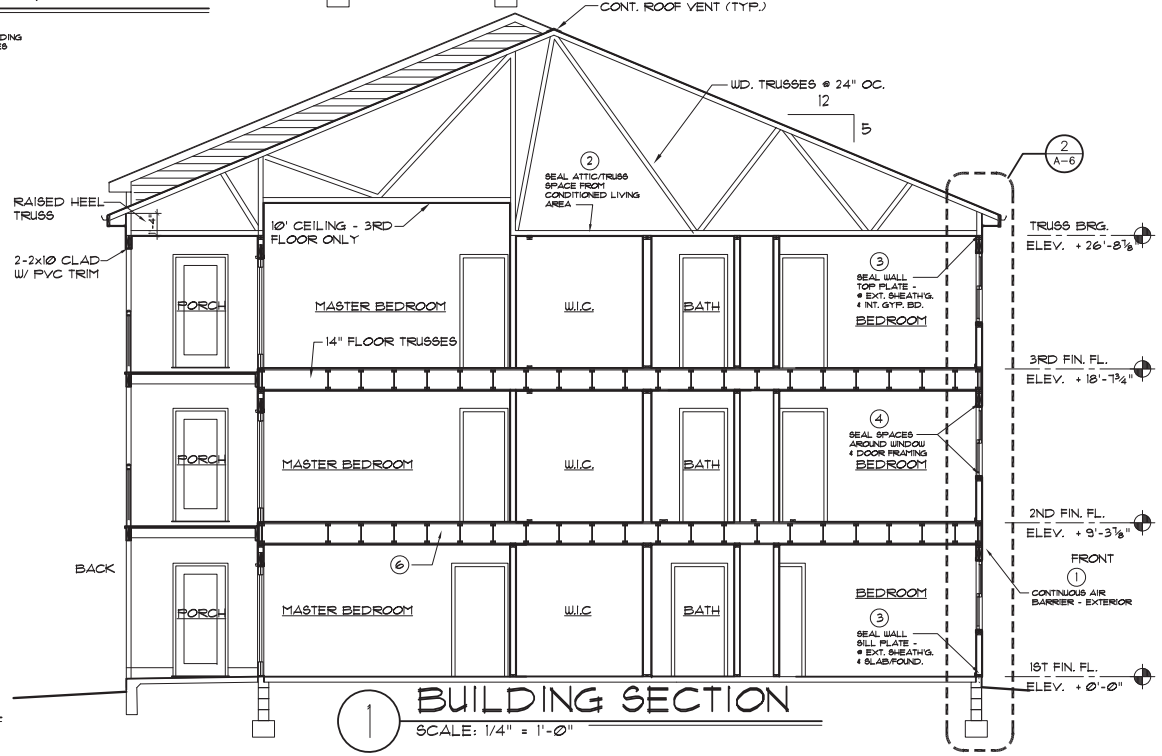
EXT. WINDOWS AND DOORS SHALL BE CLOSED. DAMPERS INCLUDING EXHAUST, INTAKE MAKEUP AIR, BACKDRAFT & FLUE DAMPERS SHALL BE CLOSED. INTERIOR DOORS, IF INSTALLED AT TIME OF TEST, SHALL BE OPEN. EXT. DOORS FOR CONTINUOUS VENTILATION SYSTEMS AND HEAT RECOVERY VENTILATORS SHALL BE CLOSED AND SEALED. HEATING & COOLING SYSTEMS, IF INSTALLED AT TIME OF TEST, SHALL BE TURNED OFF. SUPPLY & RETURN REGISTERS, IF INSTALLED AT TIME OF THE TEST, SHALL BE FULLY OPEN.



* WHEN USING ZIP SYSTEM TAPE, BUTYL, 100% SILICONE OR POLYURETHANE SEALANTS ARE ACCEPTABLE. DO NOT USE LATEX SEALANTS WITH ZIP SYSTEM TAPE. IF USING ANOTHER FLASHING TAPE, FOLLOW THE FLASHING MANUFACTURER'S RECOMMENDATION IN SELECTING A SEALANT COMPATIBLE WITH THE FLASHING.

3 WINDOW FLASHING

SCALE: N.T.S.



1 BUILDING SECTION

SCALE: 1/4" = 1'-0"

PETTINARO
234 North James Street
Newport, Delaware 19804
(302) 999-0708

William Netta Architects, LLC
115 Christina Landing Drive
Apt. 1602
Wilmington, DE 19801
TEL: (302) 999-0708
FAX: (302) 999-1634

JOB NO. -
DRAWN BY: JRR
CHECKED BY: WTN
SCALE: AS SHOWN
DATE: -
CAD FILE: -

REVISIONS
- -
- -
- -
- -

EVANS FARM APARTMENTS

3BR-3BATH / 1BR-1BATH
TYPE 'A' & 'B' UNITS

BUILDING SECTIONS

DRAWING TITLE:

A-8

DRAWING NUMBER:

TAB 9

LANDSCAPING

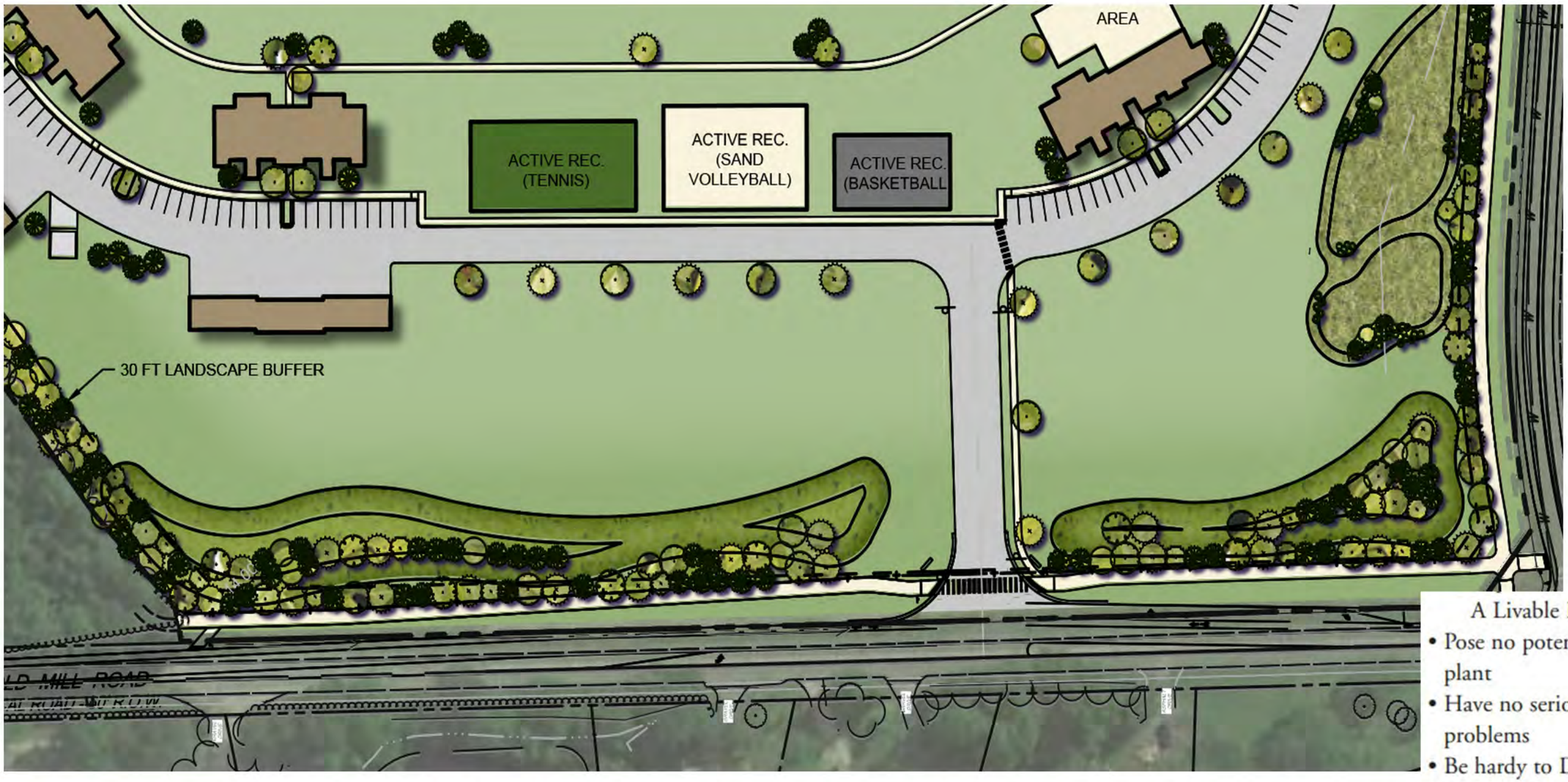
EVANS FARM APARTMENTS

OCEAN VIEW, DELAWARE



0 100' 200'

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 **F** 302.684.8054



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A Livable Delaware plant must

- Pose no potential threat as an invasive plant
- Have no serious disease or insect problems
- Be hardy to Delaware
- Possess adaptable characteristics to landscape situations (i.e. drought resistant, tolerant of poor soils, etc.)

DELAWARE Native Plant Society

- **80% of Berm and Buffer Plantings are Native Plants to Delaware. Native plants are better acclimated to our local conditions and experience better rates of success.**
- **Berm is slightly elevated from roadway and appears in scale with surroundings.**
- **Berm appears more elevated from behind as it slopes down to ephemeral wetlands.**
- **This provides maximum buffering of views from both sides.**

Plants for a Livable Delaware

Old Mill Road Berms & Plantings

Ephemeral Wetlands



Green infrastructure is an important and underutilized tool for increasing community resilience to the effects of climate change and natural disasters.

— U.S. Department of Housing and Urban Development

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Benefits

Wetlands protect and enhance water quality and water supply by:

- Recharging groundwater and replenishing local aquifers
- Filtering excess nutrients and contaminants from surface runoff

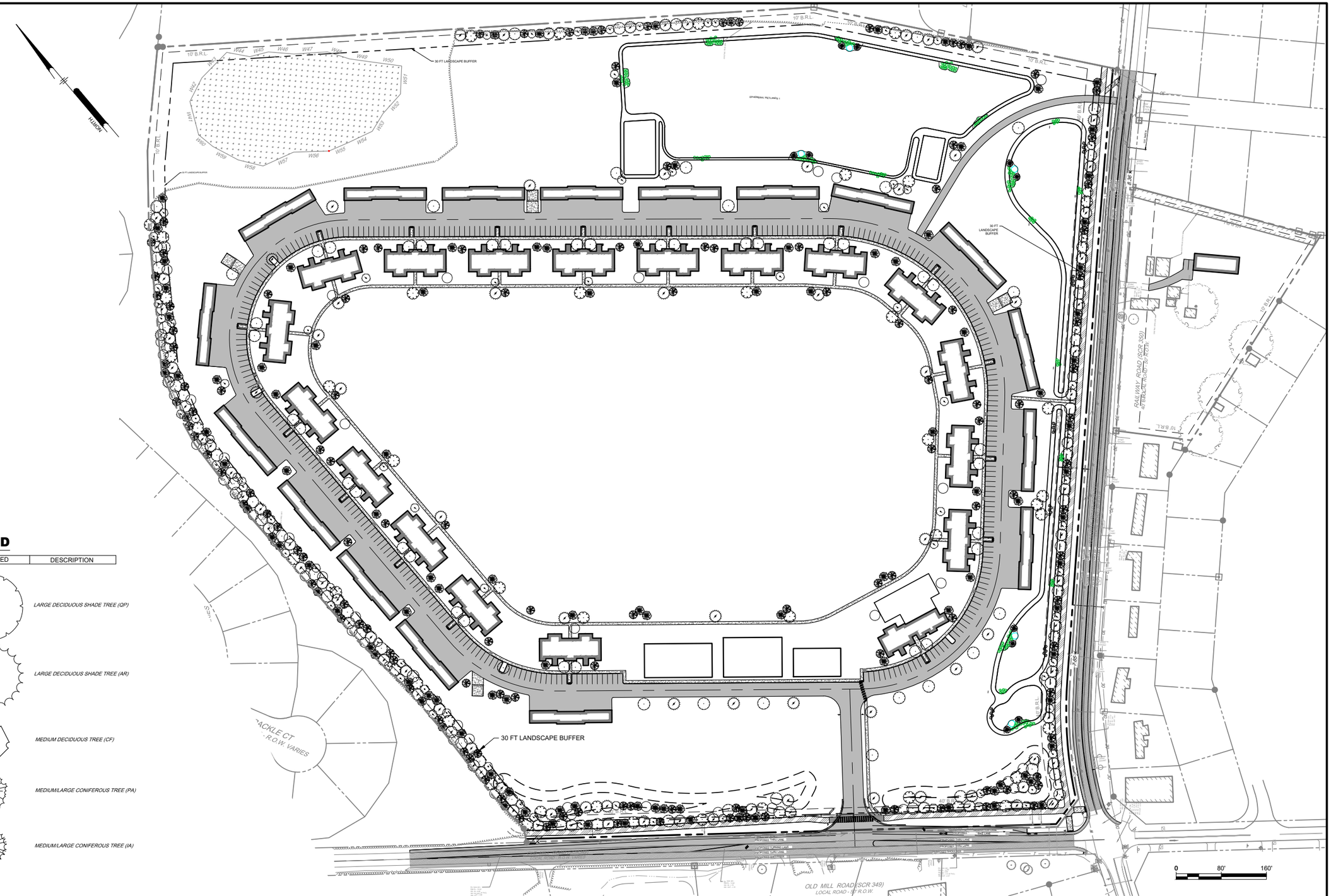
Wetlands provide flood and stormwater management benefits by:

- Absorbing floodwaters and buffering storm surges
- Dampening wave action and reducing erosion

Other benefits of wetlands:

- Capturing carbon dioxide from the atmosphere and storing it in plant tissues and soil
- Providing habitat for shorebirds, waterfowl, and other valuable wildlife and plant species

- Green Infrastructure Primer
(A Delaware Guide to using Natural Systems in Urban, Rural, and Coastal Settings)



LEGEND

PROPOSED	DESCRIPTION
	LARGE DECIDUOUS SHADE TREE (QP)
	LARGE DECIDUOUS SHADE TREE (AR)
	MEDIUM DECIDUOUS TREE (CF)
	MEDIUM/LARGE CONIFEROUS TREE (PA)
	MEDIUM/LARGE CONIFEROUS TREE (IA)

PLANT SCHEDULE

KEY	QTY	BOTANICAL NAME	COMMON NAME	HT	CONT.	SPACING
TREES						
QP	107	QUERCUS PALUSTRIS	PIN OAK	1.5" CAL	B&B	AS SHOWN
AR	107	ACER RUBRUM	RED MAPLE	1.5" CAL	B&B	AS SHOWN
CF	97	CORNUS FLORIDA	FLOWERING DOGWOOD	1.5" CAL	B&B	AS SHOWN
IA	130	ILEX X ATTENUATA 'FOSTERI'	FOSTER HOLLY	5' HGT	B&B	AS SHOWN
PS	129	PINUS STROBUS	WHITE PINE	5' HGT	B&B	AS SHOWN

*NOTE - USE PLANT SYMBOLS RESPECTIVELY TO IDENTIFY LOCATION OF PLANTS ON PLAN
- EXISTING VEGETATION TO BE UTILIZED AS MUCH AS POSSIBLE

Pennoni

PENNONI ASSOCIATES INC.
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ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
31434 RAILWAY RD.
OCEAN VIEW, DE

LANDSCAPE PLAN

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=80'
DRAWN BY	LS/TPM
APPROVED BY	AMD

CS2001

SHEET 13 OF 21

U:\Accounts\PETIX\PETIX19002 - Evans Farm Apartments\DESIGN_SHEETS\CS2001.dwg PLOTTED: 2/3/2021 12:33 PM, BY: Eric W. Wahl PLOTSTYLE: Pennoni NCS.ctb PROJECT STATUS: —

LANDSCAPE NOTES

1. ALL PLANTS TO BE TRUE TO SPECIES, IN A RIGOROUS STATE OF GROWTH, MEET WITH THE LATEST STANDARDS PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, AND BE FREE OF INSECTS, PESTS AND DISEASES. NO MATERIAL SUBSTITUTIONS ARE PERMITTED WITHOUT THE WRITTEN APPROVAL OF THE LANDSCAPE ARCHITECT

2. CONTRACTOR SHALL OBTAIN A DIGITAL FILE FROM LANDSCAPE ARCHITECT AS NEEDED TO PROPERLY STAKE OUT PROPOSED TREE LOCATIONS

3. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIREMENTS AND SUBMITTALS NOT COVERED IN THESE NOTES, DETAILS, AND DRAWINGS.

4. CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN THE PLANS, NOTES, AND SPECIFICATIONS.

5. MULCH:
   - 5.1. NATIVE SHREDDED HARDWOOD MIXED WITH NATIVE LEAF LITTER. SUBMIT SAMPLE TO LANDSCAPE ARCHITECT FOR APPROVAL.
   - 5.2. APPLY 1-2" DEPTH OF FINELY SHREDDED MULCH OVER GROUNDCOVER AND PERENNIAL BEDS.
   - 5.3. APPLY 2-3" DEPTH MULCH OVER SHRUB BEDS AND INSIDE SHRUB SAUCER RINGS.
   - 5.4. APPLY 4-5" DEPTH MULCH INSIDE TREE SAUCER RINGS.

6. FINE GRADING:
   FINE GRADE ALL GROUNDCOVER AND SHRUB BED PRIOR TO PLANTING. HAND GRADE ALL PROPOSED LAWN AREAS PRIOR TO HYDRO SEEDING OR LAYING SOD. REMOVE ALL ROCKS, CLUMPS, AND FOREIGN DEBRIS GREATER THAN 2" DIAMETER.

7. TOPSOIL:
   CONTRACTOR SHALL OBTAIN SOILS TESTS FROM THE DELAWARE DEPARTMENT OF AGRICULTURE EXTENSION OFFICE (OR EQUAL) AND FURNISH A COPY OF SAID REPORT TO LANDSCAPE ARCHITECT. PRE COUNTY REQUIREMENTS. 6" MINIMUM TOPSOIL SHALL BE PROVIDED THROUGHOUT THE SITE. PROVIDE 12" DEPTH TOP SOIL FOR ALL GROUNDCOVER PERENNIAL AND SEASONAL PLANTING BEDS. PROVIDE 18" DEPTH TOP SOIL FOR ALL TREE AND SHRUB BEDS.

8. PLANT PITS AND BACKFILL:
   - 8.1. ALL TREE PITS TO BE A MINIMUM OF 2.5 TIMES THE WIDTH OF THE ROOT BALL AND SHRUB PITS TO BE A MINIMUM OF 2 TIMES THE WIDTH OF THE CONTAINER OR ROOT BALL
   - 8.2. CONTRACTOR SHALL PERFORM A 24 HOUR PERK TEST ON TREE PITS. WATER SHOULD DRAIN FREELY FROM THE HOLE WITHIN A 24 HOUR PERIOD.
   - 8.3. SET TREE AND PIT DEPTH SUCH THAT THE TRUNK COLLAR OR WET LINE MATCHES THAT OF THE PROPOSED FINISH GRADE. IN POOR DRAINING SOILS CONDITIONS, SET TOPS OF ROOT BALLS APPROXIMATELY 2" ABOVE PROPOSED FINISH GRADE.
   - 8.4. FOR BALLED AND BURLAPPED TREES, REMOVE THE TOP 1/3 OF THE ROOT BALL CAGE PRIOR TO BACKFILL. REMOVE ALL TWINE AND TIES FROM THE TRUNK OF THE TREE.
   - 8.5. STANDARD PIT BACKFILL SHALL CONSIST OF 1/2 NATIVE SOIL, 1/4 COMPOST, AND 1/4 SPHAGNUM PEAT MOSS MIXED LIBERALLY TOGETHER. FOR POORLY DRAINING NATIVE SOIL CONDITIONS, PIT BACKFILL SHALL CONSIST OF 1/2 NATIVE SOIL, 1/4 COMPOST, AND 1/4 SAND MIXED LIBERALLY. ADJUST STANDARD FILL MATERIAL MIX WHERE STRUCTURAL SOILS ARE REQUIRED.
   - 8.6. AROUND EACH TREE SHAPE A 5-6" TALL SOIL SAUCER RING WITH THE INSIDE RING DIAMETER 12" WIDER THAN THE ROOT BALL. AROUND EACH SHRUB, SHAPE A 3-4" TALL SOIL SAUCER RING WITH AN INSIDE DIAMETER OF 8" WIDER THAN THE ROOT BALL.
   - 8.7. SETTLE TREE AND SHRUB PIT BACKFILL BY WATERING THE INTERIOR OF SAUCER RING TWICE BEFORE MULCHING.

9. TREE STAKING AND GUYING
   ALL TREES GREATER THAN 1.75" IN CALIPER OR 6' IN HEIGHT SHALL BE STAKED OR GUYED AS SHOWN IN DETAILS. LASSO TIES SHALL BE OF 1-1/4" WIDE NYLON STRAPS OR OF FLEXIBLE PLASTIC THAT WILL NOT CHAFE, SCAR OR DAMAGE TREE LIMBS. STAKE AND GUY CHORDS SHALL BE FLAGGED OR COVERED WITH APPROPRIATE MATERIALS SO THAT THEY ARE READILY VISIBLE. PROVIDE THREE (3) STAKES OR GUYS MINIMUM PER TREE, SPACED EQUALLY ABOUT THE TRUNK BASE. TWO (2) STAKES MINIMUM MAY BE USED IN NARROW, WIND-SHELTERED AREAS WHERE STANDARD STAKING OR GUYING WILL CANNOT FIT. CONTRACTOR SHALL REMOVE ALL STAKING AND GUYING MATERIALS AFTER ONE COMPLETE GROWING SEASON. ALTERNATIVE STAKING METHODS PROPOSED MUST BE SUBMITTED TO LANDSCAPE ARCHITECT FOR APPROVAL.

10. FERTILIZERS:
    FERTILIZERS FOR LAWNS, BEDS, AND TREE & SHRUB PITS SHALL BE DETERMINED THOUGH THIRD PARTY SOILS TESTING FURNISHED BY THE CONTRACTOR. CONTRACTOR SHALL SUBMIT SOILS TEST RESULTS AND PROPOSED FERTILIZER PRODUCT(S) SPECIFICATIONS TO LANDSCAPE ARCHITECT FOR APPROVAL.

11. LANDSCAPE DRAINAGE:
    THE LANDSCAPE PLAN HAS BEEN PREPARED WITH EXISTING AND PROPOSED GRADIENT DATA PER THE CIVIL ENGINEER. CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES IN EXISTING CONDITIONS OR PROPOSED GRADING THAT WOULD COMPROMISE THE PROPER INSTALLATION AND POSITIVE DRAINAGE OF PROPOSED LANDSCAPE PLANTINGS AND/OR SITE ELEMENTS.

12. SEEDED AREAS:
    THE LIMIT OF SEEDING SHALL EXTEND TO ALL NON SODDED AREAS DISTURBED BY CONSTRUCTION. CONTRACTOR SHALL SUBMIT APPROPRIATE NATIVE GRASS SEED MIX(ES) SPECIFICATIONS TO LANDSCAPE ARCHITECT FOR APPROVAL. AREA SEEDING SHALL BE AT A RATE OF APPROXIMATELY 1 LBS PER 2000 SF OR PER SEED MIX RECOMMENDATIONS TO ACHIEVE THE DESIRABLE PLS APPLICATION RATE. ALL SEED AREA SHALL APPLIED WITH HYDROMULCH OR WITH OTHER TACKIFYING METHODS TO ENSURE SOIL STABILITY THROUGH TO GERMINATION AND ESTABLISHMENT OF THE SEEDED AREA.

13. MAINTENANCE PERIOD AND GUARANTEE:
    CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIALS THROUGH ONE COMPLETE GROWING SEASON AFTER INITIAL PLANTING. NURSERY PLANT SELECTION MAY BE COORDINATED WITH LANDSCAPE ARCHITECT, BUT SHALL NOT EXEMPT CONTRACTOR FROM MAINTENANCE PERIOD RESPONSIBILITIES AND GUARANTEES. CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT 2 WEEKS IN ADVANCE TO SCHEDULE AN APPOINTMENT FOR FIELD SELECTION OF PLANT MATERIALS.

14. QUALIFICATIONS, INSPECTIONS, AND APPROVALS:
    A STATEMENT OF QUALIFICATION SHALL BE SUBMITTED TO LANDSCAPE ARCHITECT AND OWNER AT BID SUBMISSION. BONDING: AT OWNER'S DISCRETION, BONDING MAY BE REQUIRED BY THE CONTRACTOR, OR PROOF OF BONDABLE STATUS. REFER TO SPECIFICATIONS FOR LANDSCAPE INSPECTIONS SCHEDULE AND MATERIALS TESTING NOT COVERED IN THESE NOTES. RESULTS FROM ALL REQUIRED MATERIALS TESTING TO BE SUBMITTED TO THE LANDSCAPE ARCHITECT FOR APPROVAL. A NOTICE OF FINAL ACCEPTANCE SHALL BE ISSUED TO CONTRACTOR BY THE LANDSCAPE ARCHITECT UPON LANDSCAPE ARCHITECT AND OWNER APPROVAL OF ALL REQUIRED TESTING, MOCK-UPS AND SAMPLES, AND THE SATISFACTORY COMPLETION OF ALL LANDSCAPE CONSTRUCTION PUNCH-LIST ITEMS AND SUBMISSION OF WRITTEN GUARANTEES. A NOTICE OF CONDITIONAL ACCEPTANCE MAY BE ISSUED IN LIEU OF A FINAL ACCEPTANCE NOTICE BY LANDSCAPE ARCHITECT AT THE OWNER'S DISCRETION AND UNDER THE OWNER'S TERMS.

15. PER SUSSEX COUNTY ZONING ORDINANCE NO. 1984 SECTION 99-5 - FORESTED AND/OR LANDSCAPE BUFFER STRIP
    A. A MINIMUM TOTAL OF 15 TREES PER EVERY 100' OF STRIP
       70% DECIDUOUS SPECIES
       30% EVERGREEN SPECIES

16. QUALITY AND SIZE OF PLANTS, SPREAD OF ROOTS, AND SIZE OF BALLS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS OF THE AMERICAN ASSOCIATION OF NURSERYMEN "AMERICAN STANDARDS FOR NURSERY STOCK".

17. CONTRACTOR SHALL BE REQUIRED TO GUARANTEE ALL PLANT MATERIALS FOR A PERIOD OF ONE YEAR AFTER INSTALLATION IS COMPLETE AND FINAL ACCEPTANCE OF PHASE I SITE WORK HAS BEEN GIVEN. AT THE END OF ONE YEAR ALL PLANT MATERIAL WHICH IS DEAD OR DYING SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE AS ORIGINALLY SPECIFIED.

18. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO UTILITIES AND MAY MAKE MINOR ADJUSTMENTS IN SPACING AND/OR LOCATION OF PLANT MATERIALS. CONTRACTOR TO VERIFY "AS BUILT" LOCATION OF ALL UTILITIES.

19. NO SUBSTITUTIONS SHALL BE MADE WITHOUT APPROVAL OF THE OWNER.

20. ALL AREAS NOT STABILIZED IN PAVING OR PLANT MATERIALS SHOULD BE SEEDED AND MULCHED. (SEE EROSION & SEDIMENT CONTROL PLAN.)

21. EVERGREEN TREES SHALL HAVE A FULL, WELL-BRANCHED, CONICAL FORM TYPICAL OF THE SPECIES.

22. ALL DECIDUOUS SHADE TREES SHALL BRANCH A MINIMUM OF 12'-0" ABOVE GROUND LEVEL. TREES SHALL BE PLANTED AND STAKED IN ACCORDANCE WITH THE STAKING DETAIL SHOWN.

23. THE FULL EXTENT OF ALL PLANTING BEDS SHALL RECEIVE 4" OF TOPSOIL AND 3" OF BARK MULCH PER SPECIFICATIONS.

24. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTINGS SHOWN ON THIS DRAWING AND AS SPECIFIED.

25. ALL PLANTS SHALL BEAR THE SAME RELATIONSHIP TO FINISHED GRADE AS THE PLANT'S ORIGINAL GRADE BEFORE DIGGING.

26. THE CONTRACTOR IS EXPECTED TO MAINTAIN PLANTINGS, INCLUDING WATERING ALL PLANTS ANY TIME FROM APRIL TO DECEMBER WHEN NATURAL RAINFALL IS LESS THAN ONE INCH PER WEEK.

27. THE DEVELOPER OR HOME OWNERS ASSOCIATION SHALL BEAR THE RESPONSIBILITY OF REPLACING ANY LANDSCAPING WITHIN SUSSEX COUNTY SEWER EASEMENTS THAT IS DESTROYED OR DAMAGED DUE TO SEWER SYSTEM MAINTENANCE, REPLACEMENT, OR EXTENSION.

28. THE ACTUAL STREET TREE LOCATION SHALL BE COORDINATED DURING LOT CONSTRUCTION. STREET TREES SHALL BE LOCATED WITHIN A 20 FEET OF THE LOCATION SHOWN ON THE PLANS. A 10-FOOT HORIZONTAL CLEARANCE SHALL BE MAINTAINED FROM ALL WATER AND SEWER LATERALS.

29. ALL DECIDUOUS TREES THAT ARE PLANTED TO ESTABLISH THE BUFFER PLANTINGS SHALL HAVE A MINIMUM CALIPER OF 1.5 INCHES AND A MINIMUM HEIGHT OF SIX FEET ABOVE GROUND WHEN PLANTED IN ORDER TO INSURE THAT THE TREES WILL BE CAPABLE OF OBTAINING A MINIMUM HEIGHT OF 10 FEET ABOVE GROUND WITHIN FIVE YEARS OF BEING PLANTED.

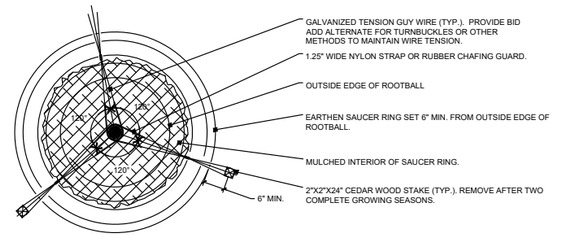
30. ALL EVERGREEN TREES THAT ARE PLANTED TO ESTABLISH THE BUFFER PLANTINGS SHALL HAVE A MINIMUM HEIGHT OF FIVE FEET ABOVE GROUND WHEN PLANTED IN ORDER TO INSURE THAT THEY ARE REASONABLY CAPABLE OF ATTAINING A MINIMUM HEIGHT OF 10 FEET ABOVE GROUND WITHIN FIVE YEARS OF BEING PLANTED.

31. THE BUFFER AREA SHALL HAVE A FINAL GRADE THAT CONTAINS A MINIMUM OF FOUR INCHES OF TOPSOIL AND A SUITABLE GRASS MIX PLANTED AS SACRIFICIAL COVER BETWEEN THE BUFFER TREES FOR SOIL STABILIZATION UNTIL THE NEWLY PLANTED TREES BECOME LARGER. THE PLAN MAY SUBSTITUTE WOOD CHIPS FOR PLANTED GRASS BETWEEN THE BUFFER TREES IN RESPECT TO BOTH NEWLY PLANTED AND EXISTING TREES, AS DETERMINED BY THE LANDSCAPE ARCHITECT.

32. THE FORESTED AND/OR LANDSCAPE BUFFER SHALL BE INSTALLED WITHIN 18 MONTHS FROM THE DATE SITE WORK IS AUTHORIZED TO COMMENCE, AS DOCUMENTED BY A NOTICE TO PROCEED LETTER FROM THE COMMISSION.

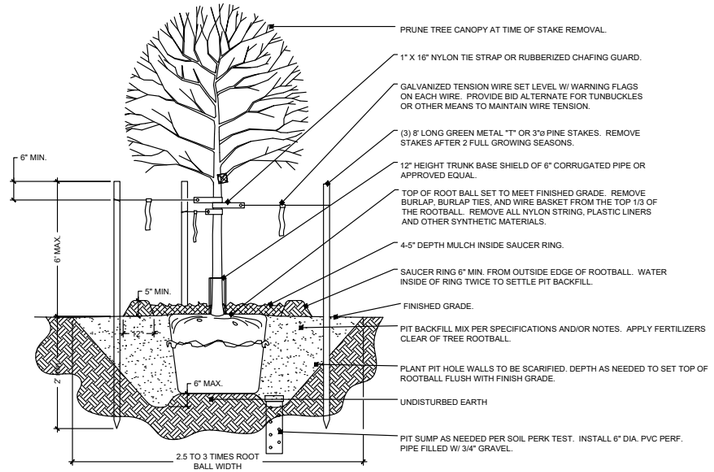
33. THE LAND DEVELOPER SHALL BE HELD RESPONSIBLE FOR THE HEALTH AND SURVIVAL OF THE TREES, INCLUDING REGULAR NECESSARY WATERING FOR A MINIMUM OF TWO YEARS OR UNTIL SUCH LATER DATE AS THE MAINTENANCE RESPONSIBILITIES ARE TRANSFERRED TO A HOMEOWNERS' ASSOCIATION; PROVIDED, HOWEVER, THAT THE DEVELOPER SHALL REPLACE ANY TREES THAT DIE DURING THE MINIMUM TWO-YEAR DEVELOPER MAINTENANCE PRIOR TO TRANSFERRING MAINTENANCE RESPONSIBILITIES TO A HOMEOWNERS' ASSOCIATION.

34. THE PERPETUAL MAINTENANCE OF THE BUFFER PLANTINGS BY A HOMEOWNERS' ASSOCIATION SHALL BE ASSURED THROUGH THE RESTRICTIVE COVENANTS AND/OR HOMEOWNERS' ASSOCIATION DOCUMENTS WHICH ARE OBLIGATORY UPON THE PURCHASERS THROUGH ASSESSMENTS BY THE HOMEOWNERS' ASSOCIATION.



PLAN

NOTE: SUFFICIENT CLEARANCE SHALL BE MAINTAINED BETWEEN TREES AND UTILITY FACILITIES SO AS TO NOT HINDER USE OR ACCESS TO SAID FACILITIES. CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITES PRIOR TO DIGGING.

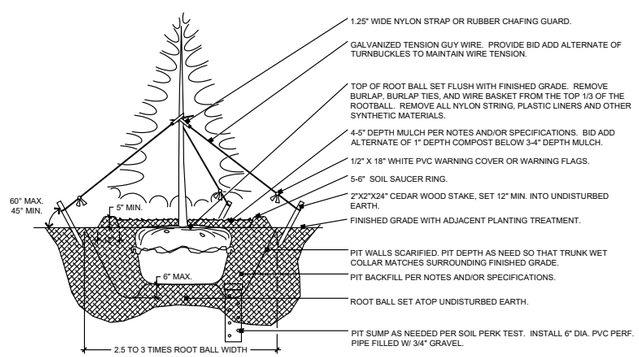


SECTION

A CANOPY TREE PLANTING AND GUYING
N.T.S.



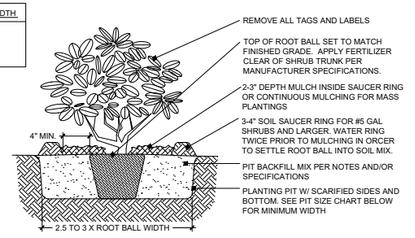
PLAN



SECTION

B EVERGREEN TREE PLANTING AND STAKING
N.T.S.

SHRUB SIZE	MIN. PIT WIDTH
#1 GALLON	18"
#3 GALLON	30"
#5 GALLON	42"



C SHRUB PLANTING
N.T.S.

PENNONI ASSOCIATES INC.
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T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
31434 RAILWAY RD.
OCEAN VIEW, DE

LANDSCAPE NOTES AND DETAILS

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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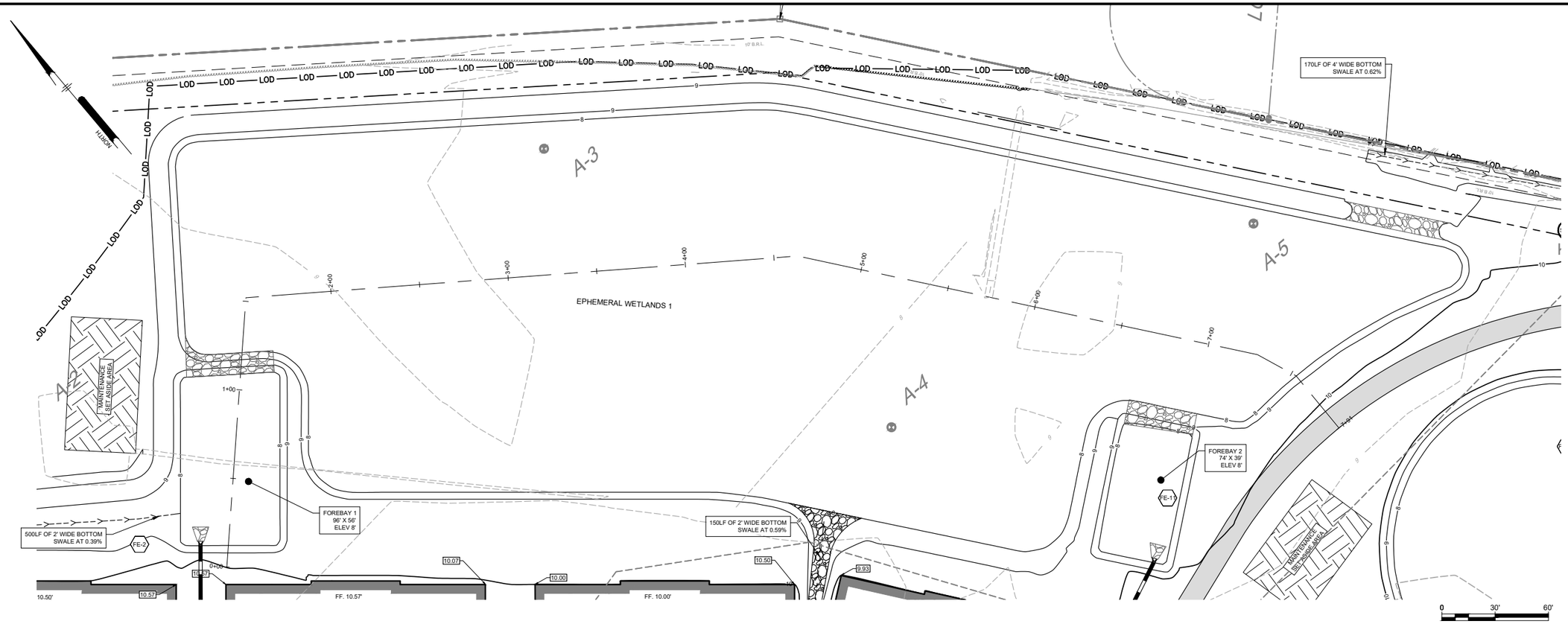
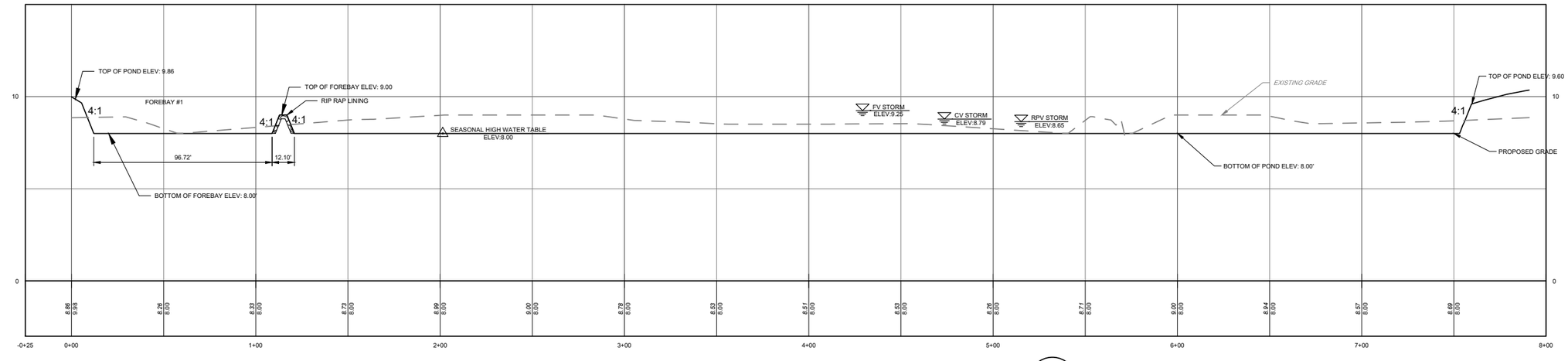
PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	AS SHOWN
DRAWN BY	LS/TPM
APPROVED BY	AMD

CS2002

SHEET 14 OF 21

U:\Accounts\PETIX\PETIX19002 – Evans Farm Apartments\DESIGN_SHEETS\CS2002.dwg PLOTTED: 2/4/2021 1:51 PM, BY: Eric W. Wahl PLOTSTYLE: Pennoni NCS.stb PROJECT STATUS: —





DETAIL- STORMWATER AREA PROFILE
SCALE: 1"-30'

1
CS8004

GROUNDWATER DATA SUMMARY

	SURFACE ELEVATION	DEPTH TO SHGW	GW AT COMPLETION	GW 1 DAY AFTER COMPLETION	SHGW ELEVATION	AVG ELEVATION	FW ELEVATION
A-1	8.50	1	2.6	1.7	8.0	5.9	6.8
A-2	8.10	0	2.5	1.3	8.0	5.6	6.8
A-3	8.40	0	2.7	1.7	8.0	5.7	6.7
A-4	8.70	1	3.9	2.1	8.0	4.8	6.6
A-5	8.30	0	3.0	1.0	8.0	5.3	7.3
A-6	10.5	2	4.0	3.3	9.0	6.5	7.2
A-7	10.1	1	4.0	3.3	9.0	6.1	6.8

NOTE:
1. FIELD WORK CONDUCTED IN JANUARY, 2020. SOILS REPORT PREPARED BY GEO-TECHNOLOGY ASSOCIATES, INC..
2. SHGW = DEPTH TO SEASONAL HIGH WATER TABLE.
3. AVG = ELEVATION AFTER COMPLETION
4. FW = ELEVATION ONE DAY AFTER COMPLETION

THE SITE IS IMPACTED BY THE 100-YEAR FLOOD PLAN (ZONE X) AS DEPICTED ON FEMA MAP PANEL 10005C0511K DATED, MARCH 16,2015

SOILS

TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

LIMIT OF DISTURBANCE TOTAL:44.57 AC. ±
EVANS FARM APARTMENTS:41.84AC. ±
MAINTENANCE SITE:0.16 AC. ±
DELDOT RIGHT-OF-WAY:2.89 AC. ±

SITE INFORMATION:

SITE ADDRESS:
NORTH CORNER OLD MILL ROAD
OCEAN VIEW, DELAWARE 19970
TAX MAP: 134-12.00-74.00

OWNER/DEVELOPER:
LINDER & COMPANY INC.
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

ENGINEER / SURVEYOR:
PENNONI ASSOCIATES INC.
18072 DAVIDSON DRIVE
MILTON, DELAWARE 19968
(302) 684-8030

FOREBAY CALCULATIONS:

PROPOSED FOREBAY 1:
VOLUME DRAINING TO FOREBAY (RPv STORM): 43,255 C.F.
STORAGE REQUIRED: (10% OF RPv STORM VOLUME) 43,255 C.F. X 0.10 = 4,326 C.F.
STORAGE PROVIDED: 5,998 C.F.
PROPOSED FOREBAY 2:
VOLUME DRAINING TO FOREBAY (RPv STORM): 22,956 C.F.
STORAGE REQUIRED: (10% OF RPv STORM VOLUME) 22,956 C.F. X 0.10 = 2,296 C.F.
STORAGE PROVIDED: 3,163 C.F.

MAINTENANCE SET-ASIDE DATA

PROPOSED FOREBAY 1:
FOREBAY VOLUME= 5,998 C.F.
STORAGE REQUIRED: (50% OF FOREBAY VOLUME) 5,998 C.F. X 0.50= 2,999 C.F.
REQUIRED MAINTENANCE SET-ASIDE AREA @
1FT. DEEP= 2,999 SQ. FT..
PROPOSED MAINTENANCE SET-ASIDE AREA = 3,000 S.F.
PROPOSED FOREBAY 2:
FOREBAY VOLUME= 3,163 C.F.
STORAGE REQUIRED: (50% OF FOREBAY VOLUME) 3,163 C.F. X 0.50= 1,582 C.F.
REQUIRED MAINTENANCE SET-ASIDE AREA @
1FT. DEEP= 1,582 SQ. FT..
PROPOSED MAINTENANCE SET-ASIDE AREA = 1,750 S.F.

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
OCEAN VIEW, DE

POST-CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN - WETLANDS 1

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

BY	REVISIONS	NO.	DATE

ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES. AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"= 30'
DRAWN BY	BRD
APPROVED BY	BRD

CS8004

SHEET 4 OF 11

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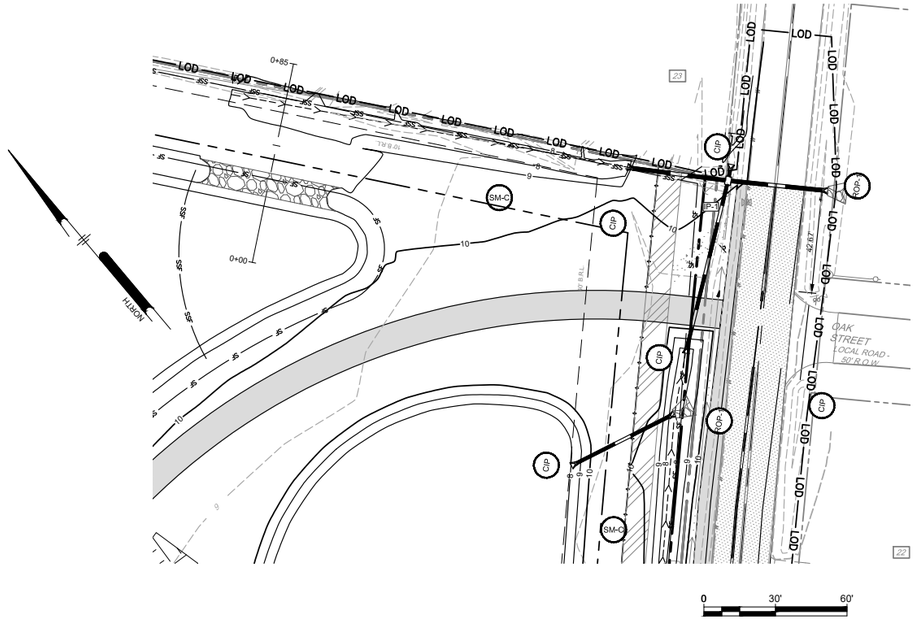
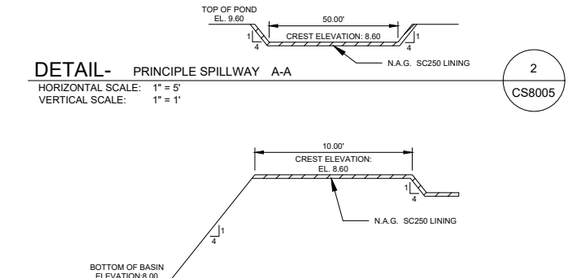
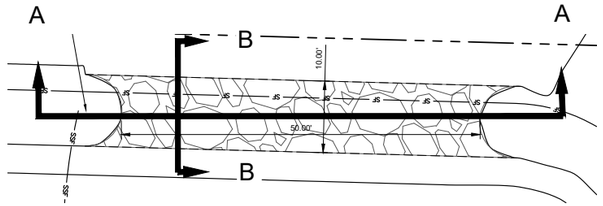




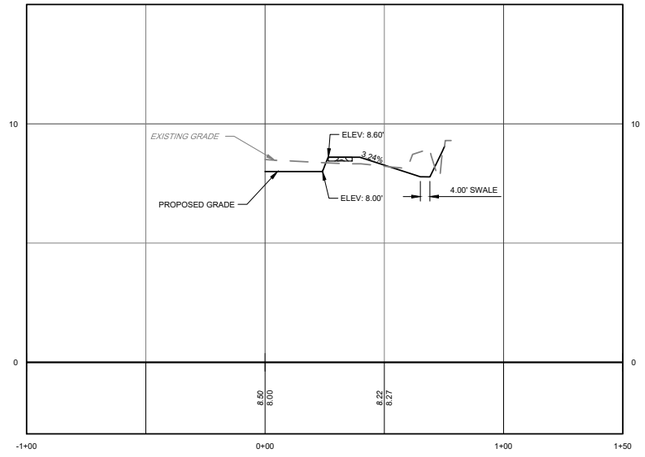
DETAIL- PRINCIPLE SPILLWAY A-A (2 / CS8005)
HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 1'

DETAIL- PRINCIPLE SPILLWAY B-B (3 / CS8005)
HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 1'



DETAIL- PRINCIPLE SPILLWAY (4 / CS8005)
NOT TO SCALE

NOTE:
1. REFER TO DNREC DETAILS 3.1.3.3 FOR ADDITIONAL INFORMATION ON CS8502.
2. THE SPILLWAY SHALL CONSIST OF R-4 STONE AND THICKNESS OF 14" MATCHING DEPICTED AREAS ON SHEET CS8005.
3. ALL RIPRAP SHALL BE UNDERLAIN W/ A GEOTEXTILE FABRIC OF TYPE GS-1 (A MIRAFI 600X) GEOTEXTILE MATERIAL MEETING THE CRITERIA ON DETAIL 3.



DETAIL- PRINCIPLE SPILLWAY AREA PROFILE (1 / CS8005)
SCALE: 1"-30'

BMP NOTIFICATION REQUIREMENTS

1. THE CONTRACTOR SHALL NOTIFY THE SUSSEX COUNTY CONSERVATION DISTRICT AND THE DESIGN ENGINEER 3 DAYS PRIOR TO THE CONSTRUCTION OF THE FOLLOWING STORMWATER BMP'S:
   - EPHEMERAL WETLANDS
2. THE DESIGN ENGINEER WILL REVIEW THE INSTALLATION OF THE BMP'S. REFER TO THIS SHEET FOR INDIVIDUAL SEQUENCE OF CONSTRUCTION FOR EACH PROPOSED BMP.
3. THE CONTRACTOR AND/OR GEOTECH/SOIL SCIENTIST TO COMPLETE THE SUSSEX CONSERVATION DISTRICT POST CONSTRUCTION BMP CONSTRUCTION CHECKLIST AND THE LICENSED PROFESSIONAL SHALL COMPLETE THE POST CONSTRUCTION VERIFICATION CHECKLIST.
4. THE CONTRACTOR SHALL PROVIDE AS-BULT DRAWINGS FOR THE STORMWATER MANAGEMENT FACILITIES TO THE DESIGN ENGINEER IN ACCORDANCE WITH THE SUSSEX COUNTY CONSERVATION DISTRICT STORMWATER MANAGEMENT REQUIREMENTS.

EPHEMERAL CONSTRUCTED WETLAND SEQUENCE OF CONSTRUCTION

1. THE DESIGNER, THE INSTALLER AND THE AGENCY CONSTRUCTION SITE REVIEWER SHALL HAVE A PRE-CONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CONTRIBUTING DRAINAGE AREA AND THE ACTUAL INLET ELEVATIONS TO ENSURE THEY CONFORM TO THE ORIGINAL DESIGN. DURING THE PRE-CONSTRUCTION MEETING, THE DESIGNER SHALL CLEARLY COMMUNICATE, IN WRITING, ANY PROJECT CHANGES DETERMINED TO THE INSTALLER AND THE PLAN REVIEW/INSPECTION AUTHORITY.
2. STABILIZE THE DRAINAGE AREA. EPHEMERAL CONSTRUCTED WETLANDS SHOULD ONLY BE CONSTRUCTED AFTER THE CONTRIBUTING DRAINAGE AREA IS COMPLETELY STABILIZED. IF THE PROPOSED EPHEMERAL CONSTRUCTED WETLAND WILL BE USED AS A SEDIMENT TRAP OR BASIN DURING THE CONSTRUCTION PHASE, THE CONSTRUCTION NOTES SHOULD CLEARLY INDICATE THAT THE FACILITY WILL BE DE-WATERED, DREDGED AND RE-GRADED TO DESIGN DIMENSIONS AFTER THE ORIGINAL SITE CONSTRUCTION IS COMPLETE.
3. ASSEMBLE CONSTRUCTION MATERIALS ON-SITE, MAKE SURE THEY MEET DESIGN SPECIFICATIONS, AND PREPARE ANY STAGING AREAS. ENSURE THAT APPROPRIATE COMPACTION AND DEWATERING EQUIPMENT IS AVAILABLE. LOCATE THE PROJECT BENCHMARK AND IF NECESSARY TRANSFER A BENCHMARK NEARER TO THE EPHEMERAL CONSTRUCTED WETLAND LOCATION FOR USE DURING CONSTRUCTION.
4. INSTALL EROSION AND SEDIMENT CONTROLS PRIOR TO CONSTRUCTION, INCLUDING TEMPORARY DE-WATERING DEVICES AND STORMWATER DIVERSION PRACTICES. ALL AREAS SURROUNDING THE EPHEMERAL CONSTRUCTED WETLAND THAT ARE GRADED OR DENUDED DURING CONSTRUCTION MUST BE PLANTED WITH TURF GRASS, NATIVE PLANTINGS, OR OTHER APPROVED METHODS OF SOIL STABILIZATION. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
5. INSTALL SUPER SILT FENCE. AS SHOWN TO PROTECT THE STORMWATER OVERFLOW WHILE BASIN IS USED AS A SEDIMENT TRAP DURING CONSTRUCTION. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
6. INSTALL PIPES, INCLUDING ANY FLARED END SECTIONS, HEADWALLS, AND DOWNSTREAM RIP-RAP OUTLET PROTECTION UNDERLAIN BY STABILIZATION GEOTEXTILE. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
7. EXCAVATE/GRADE UNTIL THE APPROPRIATE ELEVATION AND DESIRED CONTOURS ARE ACHIEVED FOR THE BOTTOM AND SIDE SLOPES OF THE EPHEMERAL CONSTRUCTED WETLAND. CONSTRUCT FOREBAYS AT THE PROPOSED INFLOW POINTS. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
8. STABILIZE EXPOSED SOILS WITH THE APPROVED SEED MIXTURES APPROPRIATE FOR THE EPHEMERAL CONSTRUCTED WETLAND PERIMETER AREA. STABILIZE THE POND AREA WITH TEMPORARY SEEDING MIX #3 OR ONE OF THE OTHER TEMPORARY SEEDING MIXES IN THE VEGETATIVE STABILIZATION SPECIFICATIONS ON DETAIL DE-ESC-3.4.3, SHEET 1 OF 4, ON SHEET CS8501, WHEN FUNCTIONING AS A SEDIMENT TRAP. UPON CONVERSION TO THE PERMANENT EPHEMERAL CONSTRUCTED WETLAND, THE POND SHALL BE PERMANENTLY STABILIZED IN ACCORDANCE WITH THE CONSTRUCTION SITE EPHEMERAL WETLANDS LANDSCAPE PLAN, ON SHEET CS8004. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
9. CONDUCT THE FINAL CONSTRUCTION INSPECTION, THEN LOG THE GPS COORDINATES FOR THE EPHEMERAL CONSTRUCTED WETLAND AND SUBMIT THEM FOR ENTRY INTO THE LOCAL MAINTENANCE TRACKING DATABASE.
10. AT THE CONCLUSION OF CONSTRUCTION, THE FOLLOWING VERIFICATION DOCUMENTS SHALL BE REQUIRED:
    10.1. SURFACE DIMENSIONS OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
    10.2. DEPTH OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
    10.3. VOLUME DIMENSIONS OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
    10.4. ELEVATIONS OF ANY STRUCTURAL COMPONENTS, INCLUDING INVERTS OF PIPES, WEIRS, ETC.
    10.5. CONTRACTOR TO COMPLETE THE SUSSEX CONSERVATION DISTRICT POST CONSTRUCTION BMP VERIFICATION CHECKLIST.
    10.6. DURING BMP ASBUILT REVIEW, SUSSEX CONSERVATION DISTRICT WILL PERFORM FINAL CONSTRUCTION REVIEW INCLUDING DEVELOPMENT OF A PUNCH LIST FOR FACILITY ACCEPTANCE.

SITE INFORMATION:

SITE ADDRESS:
NORTH CORNER OLD MILL ROAD
OCEAN VIEW, DELAWARE 19970
TAX MAP: 134-12.00-74.00

OWNER/DEVELOPER:
LINDER & COMPANY INC.
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

ENGINEER / SURVEYOR:
PENNONI ASSOCIATES INC.
18072 DAVIDSON DRIVE
MILTON, DELAWARE 19968
(302) 684-8030

THE SITE IS IMPACTED BY THE 100-YEAR FLOOD PLAN (ZONE X) AS DEPICTED ON FEMA MAP PANEL 10005C0511K DATED, MARCH 16,2015

SOILS

TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

LIMIT OF DISTURBANCE TOTAL:44.57 AC. ±
EVANS FARM APARTMENTS:41.84AC. ±
MAINTENANCE SITE:0.16 AC. ±
DELDOT RIGHT-OF-WAY:2.89 AC. ±

OPERATION AND MAINTENANCE PLAN REQUIREMENTS

1. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY RESERVES THE RIGHT TO ENTER PRIVATE PROPERTY FOR PURPOSES OF PERIODIC SITE REVIEWS.
2. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY SHALL BE NOTIFIED WITHIN 30 BUSINESS DAYS IF THE PROPERTY OWNERSHIP IS TRANSFERRED TO A NEW PERSON OR ENTITY.
3. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM [OR THE RELEVANT DELEGATED AGENCY] MAY SEEK ENFORCEMENT ACTION AGAINST ANY OWNER DEEMED NEGLIGENT UNFULFILLING THE OPERATION AND MAINTENANCE REQUIREMENTS OF THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS.
4. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM [OR THE RELEVANT DELEGATED AGENCY] SHALL BE NOTIFIED WHEN A CONCERN ARISES REGARDING ANY STORMWATER MANAGEMENT FACILITIES, BEFORE ANY NON-ROUTINE MAINTENANCE, OR IF MODIFICATIONS TO THE FACILITY ARE DESIRED.
5. ANY DESIGN MODIFICATIONS MADE TO THE STORMWATER SYSTEM SHALL REQUIRE THE CREATION OF A NEW POST CONSTRUCTION STORMWATER MANAGEMENT PLAN AND/OR OPERATIONS AND MAINTENANCE PLAN, WITH APPROVAL OF THE PLAN(S) BY THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM.
6. FOR ALL STORMWATER EASEMENT AREAS (I.E., ACCESS, MAINTENANCE, OR OFFSITE) AND THE MINIMUM 10-FOOT WIDE ACCESS WAYS TO ALL STORMWATER FACILITIES AND THEIR STRUCTURAL COMPONENTS, REGULAR MOWING SHALL BE PERFORMED TO KEEP THE GRASS 6" OR LESS; NO TREES OR SHRUBS SHALL BE PLANTED, AND ANY FOUND GROWING SHALL BE REMOVED; AND NO PERMANENT STRUCTURES, SUCH AS FENCES OR SHEDS, SHALL BE LOCATED WITHIN THE EASEMENT OR ACCESS WAY.
7. TREES SHALL NOT BE PLANTED, AND SHALL BE REMOVED IF FOUND GROWING, ON AND WITHIN 15 FEET OF ALL POND EMBANKMENTS, ON POND SLOPES OR SAFETY BENCHES, AND WITHIN 10 FEET OF STRUCTURAL COMPONENTS, SUCH AS PIPE INLETS.
8. WHEN THE FACILITY IS EXCAVATED TO REMOVE ACCUMULATED SEDIMENT, THE DISPOSAL AREA SHALL BE PERMANENTLY STABILIZED SO THAT IT DOES NOT RECREATE AN EROSION PROBLEM. ANY MATERIAL TAKEN OFF-SITE SHALL BE UTILIZED OR DISPOSED OF IN AN APPROVED SUSSEX CONSERVATION DISTRICT MANNER.
9. BEFORE ANY EARTHWORK OR EXCAVATION TAKES PLACE, THE CONTRACTOR SHALL CALL MISS UTILITY AT 811 OR 1,800,282,8555 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION, TO HAVE ALL EXISTING UTILITIES MARKED ONSITE.
10. DURING THE FIRST YEAR, THE OWNER IS RESPONSIBLE TO WATER THE BASIN AS NEEDED TO PROMOTE VEGETATION AND SURVIVAL. IN GENERAL, WATER EVERY 3 DAYS FOR THE FIRST MONTH, AND THEN WEEKLY DURING THE REMAINDER OF THE FIRST GROWING SEASON (APRIL-OCTOBER) DEPENDING ON RAINFALL. INSPECT THE BASIN AFTER EACH RAINFALL WITH A MINIMUM OF 0.5 INCHES AND STABILIZE AND REPAIR AND BARE AND ERODING AREAS.
11. EACH QUARTER AND AFTER ALL MAJOR STORMS, THE OWNER IS RESPONSIBLE TO REMOVE ANY SEDIMENT AND DEBRIS FROM THE BASIN AND OUTLET STRUCTURES, REPAIR ANY UNDERCUT, ERODED, AND BARE SOILS AREAS.
12. WHEN NEEDED, THE OWNER SHALL MOW AND MAINTAIN THE VEGETATED PERIMETER AREA AND BANKS.
13. ONCE A YEAR, THE OWNER SHALL CLEAN ANY TRASH, DEBRIS AND FLOATABLES FROM THE BASIN. A FULL MAINTENANCE REVIEW WILL BE REQUIRED EACH YEAR. INSPECT AND REPAIR OUTLET STRUCTURE IF NEEDED.
14. DURING THE SECOND YEAR, THE OWNER SHALL INSPECT AND PROVIDE PLANTING BED REPLACEMENT AND REINFORCEMENT PLANTING AS NEEDED.
15. NO MAINTENANCE SET ASIDE AREAS ARE PROVIDED, ALL SEDIMENT REMOVED DURING ROUTINE MAINTENANCE SHALL BE DISPOSED OF IN AN APPROVED MANNER.

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
OCEAN VIEW, DE

POST-CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN - SPILLWAY

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=30'
DRAWN BY	LS/TPM
APPROVED BY	AMD

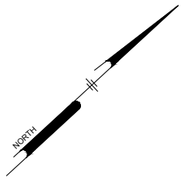
CS8005

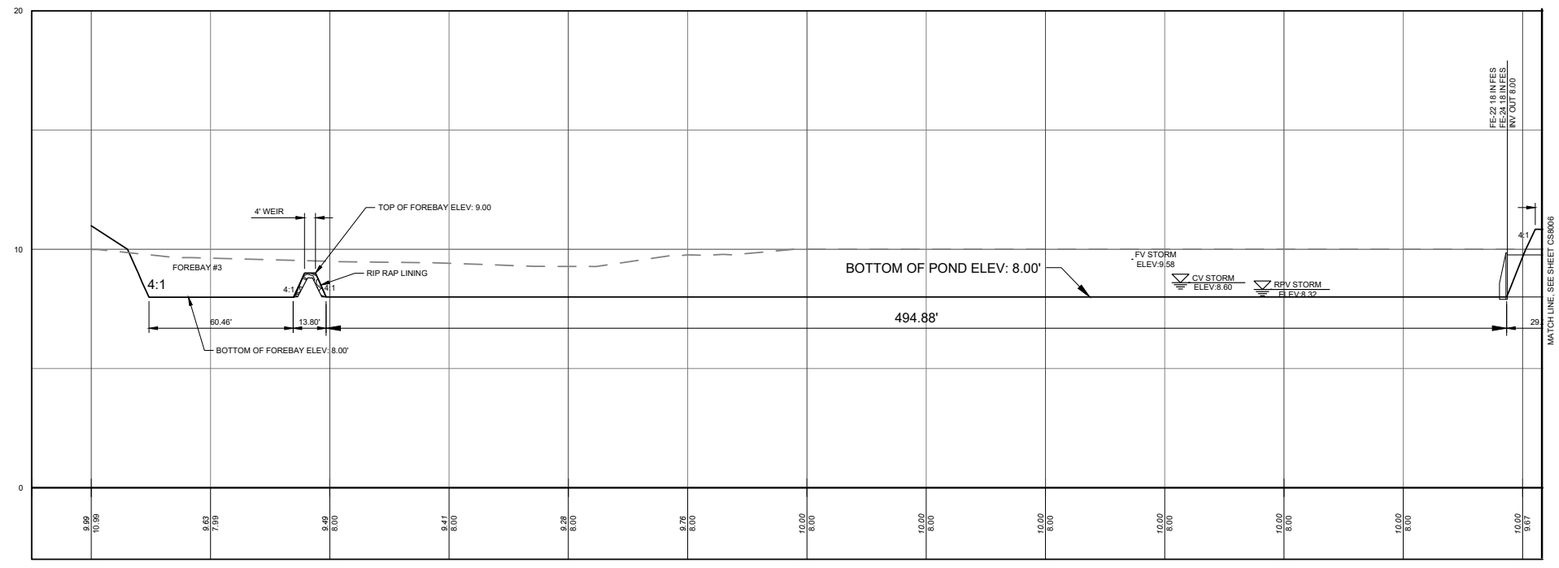
SHEET 5 OF 11

U:\Accounts\PETIX\PETIX19002 - Evans Farm Apartments\05CSHQ_SHEETS\CS8005.dwg PLOTTED: 2/3/2021 1:48 PM, BY: Logan Strickland PLOTSTYLE: Pennoni WCS.ctb PROJECT STATUS: —

STORMWATER CONVEYANCE

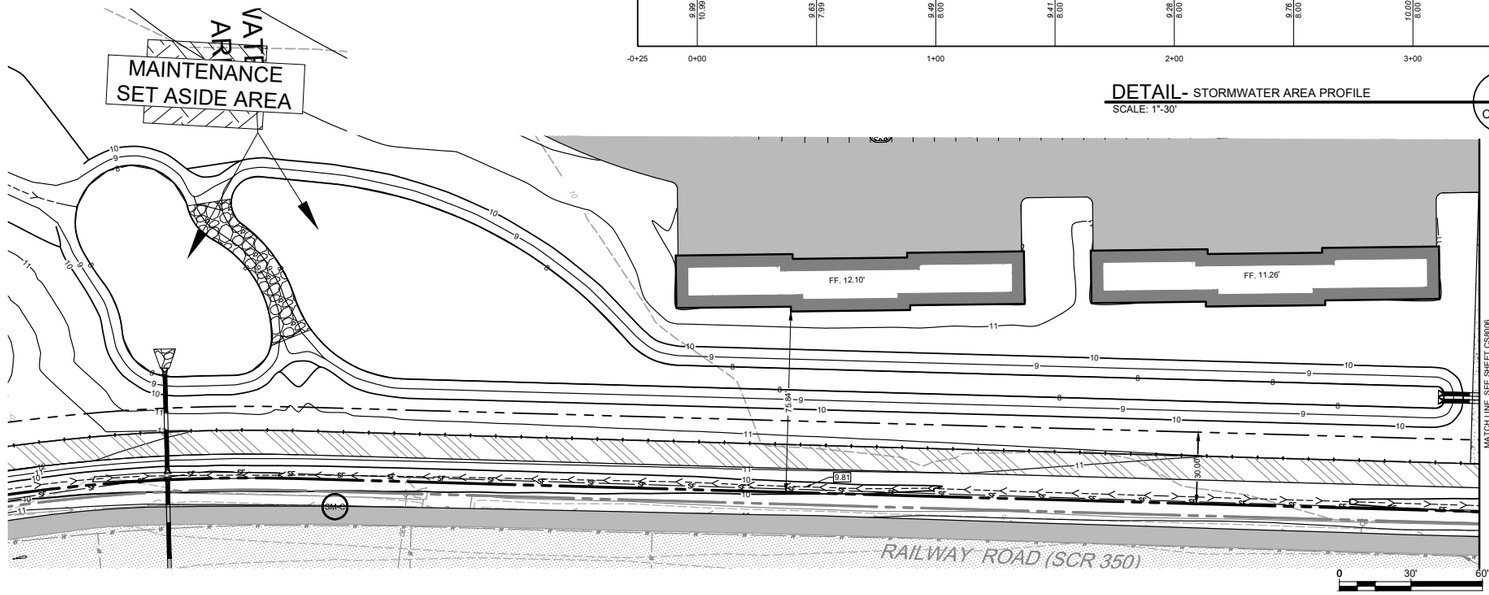
THIS PROPOSED FEATURE IS STRICTLY DESIGNED FOR THE CONVEYANCE OF STORMWATER. THE OPTION TO USE THIS FEATURE IS TO CONVEY STORMWATER FROM DELDOT RIGHT OF WAY. THE PROPOSED EPHEMERAL CONSTRUCTED WETLANDS ARE DESIGNED IN ACCORDANCE WITH STATE REQUIREMENTS. NO CREDIT FOR TREATMENT SHALL BE TAKEN FROM THE USE OF THIS TREATMENT FEATURE.





DETAIL- STORMWATER AREA PROFILE
SCALE: 1"-30'

1
CS8006



FOREBAY CALCULATIONS:

PROPOSED FOREBAY 3:
VOLUME DRAINING TO FOREBAY (RPv STORM): 49,834 C.F.
STORAGE REQUIRED: (10% OF RPv STORM VOLUME) 49,834 C.F. X 0.10 = 4,984 C.F.
STORAGE PROVIDED: 5,273 C.F.

MAINTENANCE SET-ASIDE DATA

PROPOSED FOREBAY 3:
FOREBAY VOLUME= 5,273 C.F.
STORAGE REQUIRED: (50% OF FOREBAY VOLUME) 5,273 C.F. X 0.50= 2,637 C.F.
REQUIRED MAINTENANCE SET-ASIDE AREA @
1FT. DEEP= 2,637 SQ. FT.
PROPOSED MAINTENANCE SET-ASIDE AREA = 2,730 S.F.

BMP NOTIFICATION REQUIREMENTS

1. THE CONTRACTOR SHALL NOTIFY THE SUSSEX COUNTY CONSERVATION DISTRICT AND THE DESIGN ENGINEER 3 DAYS PRIOR TO THE CONSTRUCTION OF THE FOLLOWING STORMWATER BMP'S:
   - EPHEMERAL WETLANDS
2. THE DESIGN ENGINEER WILL REVIEW THE INSTALLATION OF THE BMP'S. REFER TO THIS SHEET FOR INDIVIDUAL SEQUENCE OF CONSTRUCTION FOR EACH PROPOSED BMP.
3. THE CONTRACTOR AND/OR GEOTECH/SOIL SCIENTIST TO COMPLETE THE SUSSEX CONSERVATION DISTRICT POST CONSTRUCTION BMP CONSTRUCTION CHECKLIST AND THE LICENSED PROFESSIONAL SHALL COMPLETE THE POST CONSTRUCTION VERIFICATION CHECKLIST.
4. THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS FOR THE STORMWATER MANAGEMENT FACILITIES TO THE DESIGN ENGINEER IN ACCORDANCE WITH THE SUSSEX COUNTY CONSERVATION DISTRICT STORMWATER MANAGEMENT REQUIREMENTS.

OPERATION AND MAINTENANCE PLAN REQUIREMENTS

1. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY RESERVES THE RIGHT TO ENTER PRIVATE PROPERTY FOR PURPOSES OF PERIODIC SITE REVIEWS.
2. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY SHALL BE NOTIFIED WITHIN 30 BUSINESS DAYS IF THE PROPERTY OWNERSHIP IS TRANSFERRED TO A NEW PERSON OR ENTITY.
3. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM (OR THE RELEVANT DELEGATED AGENCY) MAY SEEK ENFORCEMENT ACTION AGAINST ANY OWNER DEEMED NEGLIGENT UNFULFILLING THE OPERATION AND MAINTENANCE REQUIREMENTS OF THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS.
4. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM (OR THE RELEVANT DELEGATED AGENCY) SHALL BE NOTIFIED WHEN A CONCERN ARISES REGARDING ANY STORMWATER MANAGEMENT FACILITIES, BEFORE ANY NON-ROUTINE MAINTENANCE, OR IF MODIFICATIONS TO THE FACILITY ARE DESIRED.
5. ANY DESIGN MODIFICATIONS MADE TO THE STORMWATER SYSTEM SHALL REQUIRE THE CREATION OF A NEW POST CONSTRUCTION STORMWATER MANAGEMENT PLAN AND/OR OPERATIONS AND MAINTENANCE PLAN, WITH APPROVAL OF THE PLAN(S) BY THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM.
6. FOR ALL STORMWATER EASEMENT AREAS (I.E., ACCESS, MAINTENANCE, OR OFFSITE) AND THE MINIMUM 10-FOOT WIDE ACCESS WAYS TO ALL STORMWATER FACILITIES AND THEIR STRUCTURAL COMPONENTS, REGULAR MOWING SHALL BE PERFORMED TO KEEP THE GRASS 6" OR LESS; NO TREES OR SHRUBS SHALL BE PLANTED, AND ANY FOUND GROWING SHALL BE REMOVED, AND NO PERMANENT STRUCTURES, SUCH AS FENCES OR SHEDS, SHALL BE LOCATED WITHIN THE EASEMENT OR ACCESS WAY.
7. TREES SHALL NOT BE PLANTED, AND SHALL BE REMOVED IF FOUND GROWING, ON AND WITHIN 15 FEET OF ALL POND EMBANKMENTS, ON POND SLOPES OR SAFETY BENCHES, AND WITHIN 10 FEET OF STRUCTURAL COMPONENTS, SUCH AS PIPE INLETS.
8. WHEN THE FACILITY IS EXCAVATED TO REMOVE ACCUMULATED SEDIMENT, THE DISPOSAL AREA SHALL BE PERMANENTLY STABILIZED SO THAT IT DOES NOT RECREATE AN EROSION PROBLEM. ANY MATERIAL TAKEN OFF-SITE SHALL BE UTILIZED OR DISPOSED OF IN AN APPROVED SUSSEX CONSERVATION DISTRICT MANNER.
9. BEFORE ANY EARTHWORK OR EXCAVATION TAKES PLACE, THE CONTRACTOR SHALL CALL MISS UTILITY AT 811 OR 1.800.282.8555 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION, TO HAVE ALL EXISTING UTILITIES MARKED ONSITE.
10. DURING THE FIRST YEAR, THE OWNER IS RESPONSIBLE TO WATER THE BASIN AS NEEDED TO PROMOTE VEGETATION AND SURVIVAL. IN GENERAL, WATER EVERY 3 DAYS FOR THE FIRST MONTH, AND THEN WEEKLY DURING THE REMAINDER OF THE FIRST GROWING SEASON (APRIL-OCTOBER) DEPENDING ON RAINFALL. INSPECT THE BASIN AFTER EACH RAINFALL WITH A MINIMUM OF 0.5 INCHES AND STABILIZE AND REPAIR AND BARE AND ERODING AREAS.
11. EACH QUARTER AND AFTER ALL MAJOR STORMS, THE OWNER IS RESPONSIBLE TO REMOVE ANY SEDIMENT AND DEBRIS FROM THE BASIN AND OUTLET STRUCTURES. REPAIR ANY UNDERCUT, ERODED, AND BARE SOILS AREAS.
12. WHEN NEEDED, THE OWNER SHALL MOW AND MAINTAIN THE VEGETATED PERIMETER AREA AND BANKS.
13. ONCE A YEAR, THE OWNER SHALL CLEAN ANY TRASH, DEBRIS AND FLOATABLES FROM THE BASIN. A FULL MAINTENANCE REVIEW WILL BE REQUIRED EACH YEAR. INSPECT AND REPAIR OUTLET STRUCTURE IF NEEDED.
14. DURING THE SECOND YEAR, THE OWNER SHALL INSPECT AND PROVIDE PLANTING BED REPLACEMENT AND REINFORCEMENT PLANTING AS NEEDED.
15. NO MAINTENANCE SET ASIDE AREAS ARE PROVIDED, ALL SEDIMENT REMOVED DURING ROUTINE MAINTENANCE SHALL BE DISPOSED OF IN AN APPROVED MANNER.

EPHEMERAL CONSTRUCTED WETLAND SEQUENCE OF CONSTRUCTION

1. THE DESIGNER, THE INSTALLER AND THE AGENCY CONSTRUCTION SITE REVIEWER SHALL HAVE A PRE-CONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CONTRIBUTING DRAINAGE AREA AND THE ACTUAL INLET ELEVATIONS TO ENSURE THEY CONFORM TO THE ORIGINAL DESIGN. DURING THE PRE-CONSTRUCTION MEETING, THE DESIGNER SHALL CLEARLY COMMUNICATE, IN WRITING, ANY PROJECT CHANGES DETERMINED TO THE INSTALLER AND THE PLAN REVIEW/INSPECTION AUTHORITY.
2. STABILIZE THE DRAINAGE AREA. EPHEMERAL CONSTRUCTED WETLANDS SHOULD ONLY BE CONSTRUCTED AFTER THE CONTRIBUTING DRAINAGE AREA IS COMPLETELY STABILIZED. IF THE PROPOSED EPHEMERAL CONSTRUCTED WETLAND WILL BE USED AS A SEDIMENT TRAP OR BASIN DURING THE CONSTRUCTION PHASE, THE CONSTRUCTION NOTES SHOULD CLEARLY INDICATE THAT THE FACILITY WILL BE DE-WATERED, DREDGED AND RE-GRADED TO DESIGN DIMENSIONS AFTER THE ORIGINAL SITE CONSTRUCTION IS COMPLETE.
3. ASSEMBLE CONSTRUCTION MATERIALS ON-SITE, MAKE SURE THEY MEET DESIGN SPECIFICATIONS, AND PREPARE ANY STAGING AREAS. ENSURE THAT APPROPRIATE COMPACTION AND DEWATERING EQUIPMENT IS AVAILABLE. LOCATE THE PROJECT BENCHMARK AND IF NECESSARY TRANSFER A BENCHMARK NEARER TO THE EPHEMERAL CONSTRUCTED WETLAND LOCATION FOR USE DURING CONSTRUCTION.
4. INSTALL EROSION AND SEDIMENT CONTROLS PRIOR TO CONSTRUCTION, INCLUDING TEMPORARY DE-WATERING DEVICES AND STORMWATER DIVERSION PRACTICES. ALL AREAS SURROUNDING THE EPHEMERAL CONSTRUCTED WETLAND THAT ARE GRADED OR DENUDED DURING CONSTRUCTION MUST BE PLANTED WITH TURF GRASS, NATIVE PLANTINGS, OR OTHER APPROVED METHODS OF SOIL STABILIZATION. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
5. INSTALL OUTLET PIPE, INCLUDING ANY FLARED END SECTIONS, HEADWALLS, AND DOWNSTREAM RIP-RAP OUTLET PROTECTION UNDERLAIN BY STABILIZATION GEOTEXTILE. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
6. EXCAVATE/GRADE UNTIL THE APPROPRIATE ELEVATION AND DESIRED CONTOURS ARE ACHIEVED FOR THE BOTTOM AND SIDE SLOPES OF THE EPHEMERAL CONSTRUCTED WETLAND. CONSTRUCT FOREBAYS AT THE PROPOSED INFLOW POINTS. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
7. STABILIZE EXPOSED SOILS WITH THE APPROVED SEED MIXTURES APPROPRIATE FOR THE EPHEMERAL CONSTRUCTED WETLAND PERIMETER AREA. STABILIZE THE POND AREA WITH TEMPORARY SEEDING MIX #3 OR ONE OF THE OTHER TEMPORARY SEEDING MIXES IN THE VEGETATIVE STABILIZATION SPECIFICATIONS ON DETAIL DE-ESC-3.4.3, SHEET 1 OF 4, ON SHEET CS8501, WHEN FUNCTIONING AS A SEDIMENT TRAP. UPON CONVERSION TO THE PERMANENT EPHEMERAL CONSTRUCTED WETLAND, THE POND SHALL BE PERMANENTLY STABILIZED IN ACCORDANCE WITH THE CONSTRUCTION SITE EPHEMERAL WETLANDS LANDSCAPE PLAN, ON SHEET CS8004. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
8. CONDUCT THE FINAL CONSTRUCTION INSPECTION, THEN LOG THE GPS COORDINATES FOR THE EPHEMERAL CONSTRUCTED WETLAND AND SUBMIT THEM FOR ENTRY INTO THE LOCAL MAINTENANCE TRACKING DATABASE.
9. AT THE CONCLUSION OF CONSTRUCTION, THE FOLLOWING VERIFICATION DOCUMENTS SHALL BE REQUIRED:
   - 9.1. SURFACE DIMENSIONS OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
   - 9.2. DEPTH OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
   - 9.3. VOLUME DIMENSIONS OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
   - 9.4. ELEVATIONS OF ANY STRUCTURAL COMPONENTS, INCLUDING INVERTS OF PIPES, WEIRS, ETC.
   - 9.5. CONTRACTOR TO COMPLETE THE SUSSEX CONSERVATION DISTRICT POST CONSTRUCTION BMP VERIFICATION CHECKLIST.
   - 9.6. DURING BMP AS-BUILT REVIEW, SUSSEX CONSERVATION DISTRICT WILL PERFORM FINAL CONSTRUCTION REVIEW INCLUDING DEVELOPMENT OF A PUNCH LIST FOR FACILITY ACCEPTANCE.

GROUNDWATER DATA SUMMARY

	SURFACE ELEVATION	DEPTH TO SHGW	GW AT COMPLETION	GW 1 DAY AFTER COMPLETION	SHGW ELEVATION	AVG ELEVATION	FW ELEVATION
A-1	8.50	1	2.6	1.7	8.0	5.9	6.8
A-2	8.10	0	2.5	1.3	8.0	5.6	6.8
A-3	8.40	0	2.7	1.7	8.0	5.7	6.7
A-4	8.70	1	3.9	2.1	8.0	4.8	6.6
A-5	8.30	0	3.0	1.0	8.0	5.3	7.3
A-6	10.5	2	4.0	3.3	9.0	6.5	7.2
A-7	10.1	1	4.0	3.3	9.0	6.1	6.8

NOTE:
1. FIELD WORK CONDUCTED IN JANUARY, 2020. SOILS REPORT PREPARED BY GEO-TECHNOLOGY ASSOCIATES, INC..
2. SHGW = DEPTH TO SEASONAL HIGH WATER TABLE.
3. AVG = ELEVATION AFTER COMPLETION
4. FW = ELEVATION ONE DAY AFTER COMPLETION

SITE INFORMATION:

SITE ADDRESS:
NORTH CORNER OLD MILL ROAD
OCEAN VIEW, DELAWARE 19970
TAX MAP: 134-12.00-74.00

OWNER/DEVELOPER:
LINDER & COMPANY INC.
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

ENGINEER / SURVEYOR:
PENNONI ASSOCIATES INC.
18072 DAVIDSON DRIVE
MILTON, DELAWARE 19968
(302) 684-8030

THE SITE IS IMPACTED BY THE 100-YEAR FLOOD PLAN (ZONE X) AS DEPICTED ON FEMA MAP PANEL 10005C0511K DATED, MARCH 16,2015

SOILS

TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

LIMIT OF DISTURBANCE TOTAL:44.57 AC. ±
EVANS FARM APARTMENTS:41.84AC. ±
MAINTENANCE SITE:0.16 AC. ±
DELDOT RIGHT-OF-WAY:2.89 AC. ±

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
OCEAN VIEW, DE

POST-CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN - WETLANDS 2

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=30'
DRAWN BY	LS/TPM
APPROVED BY	AMD

CS8006

SHEET 6 OF 11

U:\Accounts\PETIX\PETIX19002 - Evans Farm Apartments\DESIGN_SHEETS\CS8006.dwg PLOTTED: 2/3/2021 1:54 PM, BY: Logan Strickland PLOTSTYLE: Pennoni WCS.ctb PROJECT STATUS: —

STORMWATER CONVEYANCE

THIS PROPOSED FEATURE IS STRICTLY DESIGNED FOR THE CONVEYANCE OF STORMWATER. THE OPTION TO USE THIS FEATURE IS TO CONVEY STORMWATER FROM DELDOT RIGHT OF WAY. THE PROPOSED EPHEMERAL CONSTRUCTED WETLANDS ARE DESIGNED IN ACCORDANCE WITH STATE REQUIREMENTS. NO CREDIT FOR TREATMENT SHALL BE TAKEN FROM THE USE OF THIS TREATMENT FEATURE.

SITE INFORMATION:

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OCEAN VIEW, DELAWARE 19970
TAX MAP: 134-12.00-74.00

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A-5	8.30	0	3.0	1.0	8.0	5.3	7.3
A-6	10.5	2	4.0	3.3	9.0	6.5	7.2
A-7	10.1	1	4.0	3.3	9.0	6.1	6.8

NOTE:
1. FIELD WORK CONDUCTED IN JANUARY, 2020. SOILS REPORT PREPARED BY GEO-TECHNOLOGY ASSOCIATES, INC..
2. SHGW = DEPTH TO SEASONAL HIGH WATER TABLE.
3. AVG = ELEVATION AFTER COMPLETION
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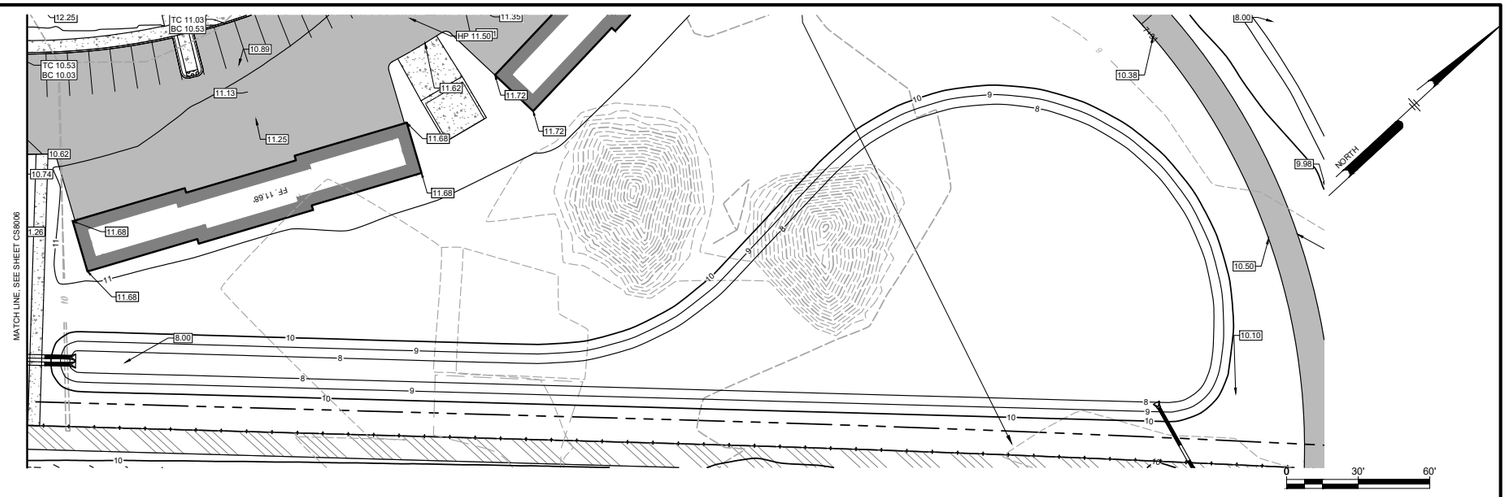

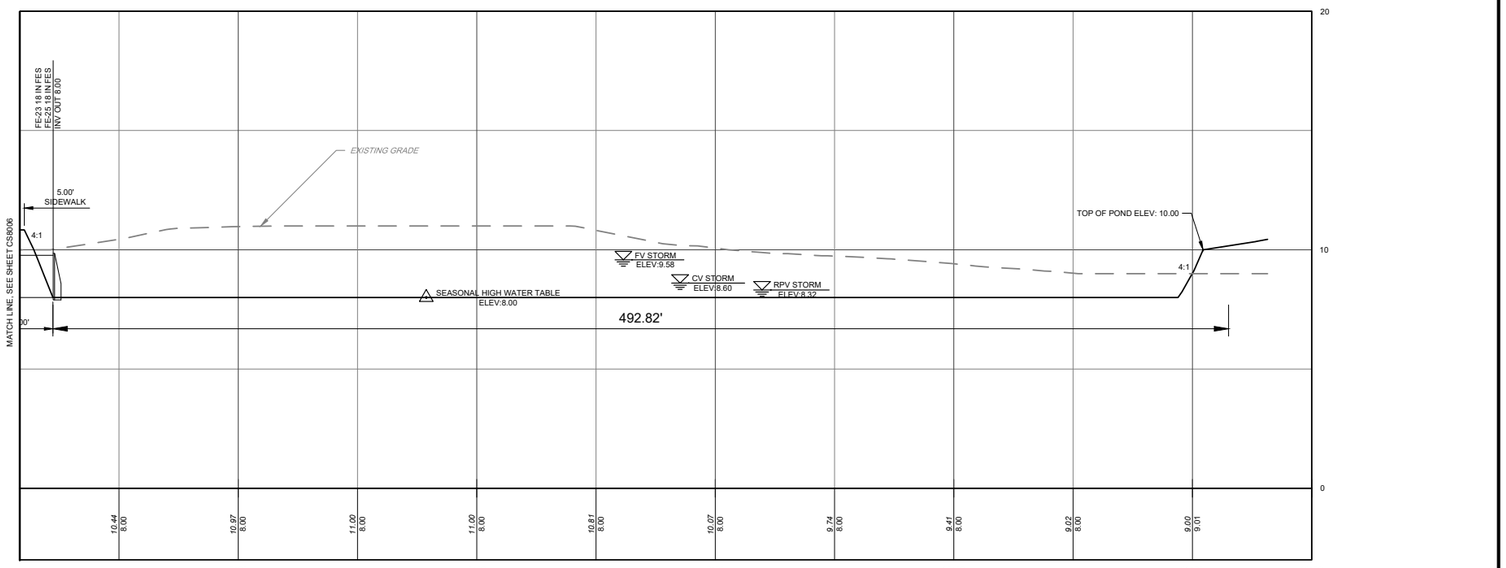

DETAIL- STORMWATER AREA PROFILE
SCALE: 1"-30'
1
CS8006

THE SITE IS IMPACTED BY THE 100-YEAR FLOOD PLAN (ZONE X) AS DEPICTED ON FEMA MAP PANEL 10005C0511K DATED, MARCH 16,2015

SOILS

TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
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RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

LIMIT OF DISTURBANCE TOTAL:44.57 AC. ±
EVANS FARM APARTMENTS:41.84AC. ±
MAINTENANCE SITE:0.16 AC. ±
DELDOT RIGHT-OF-WAY:2.89 AC. ±

BMP NOTIFICATION REQUIREMENTS

1. THE CONTRACTOR SHALL NOTIFY THE SUSSEX COUNTY CONSERVATION DISTRICT AND THE DESIGN ENGINEER 3 DAYS PRIOR TO THE CONSTRUCTION OF THE FOLLOWING STORMWATER BMP'S:
   - EPHEMERAL WETLANDS
2. THE DESIGN ENGINEER WILL REVIEW THE INSTALLATION OF THE BMP'S. REFER TO THIS SHEET FOR INDIVIDUAL SEQUENCE OF CONSTRUCTION FOR EACH PROPOSED BMP.
3. THE CONTRACTOR AND/OR GEOTECH/SOIL SCIENTIST TO COMPLETE THE SUSSEX CONSERVATION DISTRICT POST CONSTRUCTION BMP. CONSTRUCTION CHECKLIST AND THE LICENSED PROFESSIONAL SHALL COMPLETE THE POST CONSTRUCTION VERIFICATION CHECKLIST.
4. THE CONTRACTOR SHALL PROVIDE AS-BULT DRAWINGS FOR THE STORMWATER MANAGEMENT FACILITIES TO THE DESIGN ENGINEER IN ACCORDANCE WITH THE SUSSEX COUNTY CONSERVATION DISTRICT STORMWATER MANAGEMENT REQUIREMENTS.

OPERATION AND MAINTENANCE PLAN REQUIREMENTS

1. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY RESERVES THE RIGHT TO ENTER PRIVATE PROPERTY FOR PURPOSES OF PERIODIC SITE REVIEWS.
2. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY SHALL BE NOTIFIED WITHIN 30 BUSINESS DAYS IF THE PROPERTY OWNERSHIP IS TRANSFERRED TO A NEW PERSON OR ENTITY.
3. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM [OR THE RELEVANT DELEGATED AGENCY] MAY SEEK ENFORCEMENT ACTION AGAINST ANY OWNER DEEMED NEGLIGENT UNFULFILLING THE OPERATION AND MAINTENANCE REQUIREMENTS OF THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS.
4. THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM [OR THE RELEVANT DELEGATED AGENCY] SHALL BE NOTIFIED WHEN A CONCERN ARISES REGARDING ANY STORMWATER MANAGEMENT FACILITIES, BEFORE ANY NON-ROUTINE MAINTENANCE, OR IF MODIFICATIONS TO THE FACILITY ARE DESIRED.
5. ANY DESIGN MODIFICATIONS MADE TO THE STORMWATER SYSTEM SHALL REQUIRE THE CREATION OF A NEW POST CONSTRUCTION STORMWATER MANAGEMENT PLAN AND/OR OPERATIONS AND MAINTENANCE PLAN, WITH APPROVAL OF THE PLAN(S) BY THE SUSSEX CONSERVATION DISTRICT SEDIMENT & STORMWATER PROGRAM.
6. FOR ALL STORMWATER EASEMENT AREAS (I.E., ACCESS, MAINTENANCE, OR OFFSITE) AND THE MINIMUM 10-FOOT WIDE ACCESS WAYS TO ALL STORMWATER FACILITIES AND THEIR STRUCTURAL COMPONENTS, REGULAR MOWING SHALL BE PERFORMED TO KEEP THE GRASS 6" OR LESS; NO TREES OR SHRUBS SHALL BE PLANTED, AND ANY FOUND GROWING SHALL BE REMOVED; AND NO PERMANENT STRUCTURES, SUCH AS FENCES OR SHEDS, SHALL BE LOCATED WITHIN THE EASEMENT OR ACCESS WAY.
7. TREES SHALL NOT BE PLANTED, AND SHALL BE REMOVED IF FOUND GROWING, ON AND WITHIN 15 FEET OF ALL POND EMBANKMENTS, ON POND SLOPES OR SAFETY BENCHES, AND WITHIN 10 FEET OF STRUCTURAL COMPONENTS, SUCH AS PIPE INLETS.
8. WHEN THE FACILITY IS EXCAVATED TO REMOVE ACCUMULATED SEDIMENT, THE DISPOSAL AREA SHALL BE PERMANENTLY STABILIZED SO THAT IT DOES NOT RECREATE AN EROSION PROBLEM. ANY MATERIAL TAKEN OFF-SITE SHALL BE UTILIZED OR DISPOSED OF IN AN APPROVED SUSSEX CONSERVATION DISTRICT MANNER.
9. BEFORE ANY EARTHWORK OR EXCAVATION TAKES PLACE, THE CONTRACTOR SHALL CALL MISS UTILITY AT 811 OR 1.800.282.8555 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION, TO HAVE ALL EXISTING UTILITIES MARKED ONSITE.
10. DURING THE FIRST YEAR, THE OWNER IS RESPONSIBLE TO WATER THE BASIN AS NEEDED TO PROMOTE VEGETATION AND SURVIVAL. IN GENERAL, WATER EVERY 3 DAYS FOR THE FIRST MONTH, AND THEN WEEKLY DURING THE REMAINDER OF THE FIRST GROWING SEASON (APRIL-OCTOBER) DEPENDING ON RAINFALL. INSPECT THE BASIN AFTER EACH RAINFALL WITH A MINIMUM OF 0.5 INCHES AND STABILIZE AND REPAIR AND BARE AND ERODING AREAS.
11. EACH QUARTER AND AFTER ALL MAJOR STORMS, THE OWNER IS RESPONSIBLE TO REMOVE ANY SEDIMENT AND DEBRIS FROM THE BASIN AND OUTLET STRUCTURES, REPAIR ANY UNDERCUT, ERODED, AND BARE SOILS AREAS.
12. WHEN NEEDED, THE OWNER SHALL MOW AND MAINTAIN THE VEGETATED PERIMETER AREA AND BANKS.
13. ONCE A YEAR, THE OWNER SHALL CLEAN ANY TRASH, DEBRIS AND FLOATABLES FROM THE BASIN. A FULL MAINTENANCE REVIEW WILL BE REQUIRED EACH YEAR. INSPECT AND REPAIR OUTLET STRUCTURE IF NEEDED.
14. DURING THE SECOND YEAR, THE OWNER SHALL INSPECT AND PROVIDE PLANTING BED REPLACEMENT AND REINFORCEMENT PLANTING AS NEEDED.
15. NO MAINTENANCE SET ASIDE AREAS ARE PROVIDED, ALL SEDIMENT REMOVED DURING ROUTINE MAINTENANCE SHALL BE DISPOSED OF IN AN APPROVED MANNER.

EPHEMERAL CONSTRUCTED WETLAND SEQUENCE OF CONSTRUCTION

1. THE DESIGNER, THE INSTALLER AND THE AGENCY CONSTRUCTION SITE REVIEWER SHALL HAVE A PRE-CONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CONTRIBUTING DRAINAGE AREA AND THE ACTUAL INLET ELEVATIONS TO ENSURE THEY CONFORM TO THE ORIGINAL DESIGN. DURING THE PRE-CONSTRUCTION MEETING, THE DESIGNER SHALL CLEARLY COMMUNICATE, IN WRITING, ANY PROJECT CHANGES DETERMINED TO THE INSTALLER AND THE PLAN REVIEW/INSPECTION AUTHORITY.
2. STABILIZE THE DRAINAGE AREA. EPHEMERAL CONSTRUCTED WETLANDS SHOULD ONLY BE CONSTRUCTED AFTER THE CONTRIBUTING DRAINAGE AREA IS COMPLETELY STABILIZED. IF THE PROPOSED EPHEMERAL CONSTRUCTED WETLAND WILL BE USED AS A SEDIMENT TRAP OR BASIN DURING THE CONSTRUCTION PHASE, THE CONSTRUCTION NOTES SHOULD CLEARLY INDICATE THAT THE FACILITY WILL BE DE-WATERED, DREDGED AND RE-GRADED TO DESIGN DIMENSIONS AFTER THE ORIGINAL SITE CONSTRUCTION IS COMPLETE.
3. ASSEMBLE CONSTRUCTION MATERIALS ON-SITE, MAKE SURE THEY MEET DESIGN SPECIFICATIONS, AND PREPARE ANY STAGING AREAS. ENSURE THAT APPROPRIATE COMPACTION AND DEWATERING EQUIPMENT IS AVAILABLE. LOCATE THE PROJECT BENCHMARK AND IF NECESSARY TRANSFER A BENCHMARK NEARER TO THE EPHEMERAL CONSTRUCTED WETLAND LOCATION FOR USE DURING CONSTRUCTION.
4. INSTALL EROSION AND SEDIMENT CONTROLS PRIOR TO CONSTRUCTION, INCLUDING TEMPORARY DE-WATERING DEVICES AND STORMWATER DIVERSION PRACTICES. ALL AREAS SURROUNDING THE EPHEMERAL CONSTRUCTED WETLAND THAT ARE GRADED OR DENUDED DURING CONSTRUCTION MUST BE PLANTED WITH TURF GRASS, NATIVE PLANTINGS, OR OTHER APPROVED METHODS OF SOIL STABILIZATION. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
5. INSTALL OUTLET PIPE, INCLUDING ANY FLARED END SECTIONS, HEADWALLS, AND DOWNSTREAM RIP-RAP OUTLET PROTECTION UNDERLAIN BY STABILIZATION GEOTEXTILE. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
6. EXCAVATE/GRADE UNTIL THE APPROPRIATE ELEVATION AND DESIRED CONTOURS ARE ACHIEVED FOR THE BOTTOM AND SIDE SLOPES OF THE EPHEMERAL CONSTRUCTED WETLAND. CONSTRUCT FOREBAYS AT THE PROPOSED INFLOW POINTS. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
7. STABILIZE EXPOSED SOILS WITH THE APPROVED SEED MIXTURES APPROPRIATE FOR THE EPHEMERAL CONSTRUCTED WETLAND PERIMETER AREA. STABILIZE THE POND AREA WITH TEMPORARY SEEDING MIX #3 OR ONE OF THE OTHER TEMPORARY SEEDING MIXES IN THE VEGETATIVE STABILIZATION SPECIFICATIONS ON DETAIL DE-ESC-3.4.3, SHEET 1 OF 4, ON SHEET CS8501, WHEN FUNCTIONING AS A SEDIMENT TRAP. UPON CONVERSION TO THE PERMANENT EPHEMERAL CONSTRUCTED WETLAND, THE POND SHALL BE PERMANENTLY STABILIZED IN ACCORDANCE WITH THE CONSTRUCTION SITE EPHEMERAL WETLANDS LANDSCAPE PLAN, ON SHEET CS8004. THIS WORK WILL REQUIRE REVIEW BY THE AGENCY CONSTRUCTION SITE REVIEWER.
8. CONDUCT THE FINAL CONSTRUCTION INSPECTION, THEN LOG THE GPS COORDINATES FOR THE EPHEMERAL CONSTRUCTED WETLAND AND SUBMIT THEM FOR ENTRY INTO THE LOCAL MAINTENANCE TRACKING DATABASE.
9. AT THE CONCLUSION OF CONSTRUCTION, THE FOLLOWING VERIFICATION DOCUMENTS SHALL BE REQUIRED:
   - 9.1. SURFACE DIMENSIONS OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
   - 9.2. DEPTH OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
   - 9.3. VOLUME DIMENSIONS OF FOREBAYS AND EPHEMERAL CONSTRUCTED WETLAND.
   - 9.4. ELEVATIONS OF ANY STRUCTURAL COMPONENTS, INCLUDING INVERTS OF PIPES, WEIRS, ETC.
   - 9.5. CONTRACTOR TO COMPLETE THE SUSSEX CONSERVATION DISTRICT POST CONSTRUCTION BMP VERIFICATION CHECKLIST.
   - 9.6. DURING BMP ASBUILT REVIEW, SUSSEX CONSERVATION DISTRICT WILL PERFORM FINAL CONSTRUCTION REVIEW INCLUDING DEVELOPMENT OF A PUNCH LIST FOR FACILITY ACCEPTANCE.

PENNONI ASSOCIATES INC.
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ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
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POST-CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN - WETLANDS 2

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NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

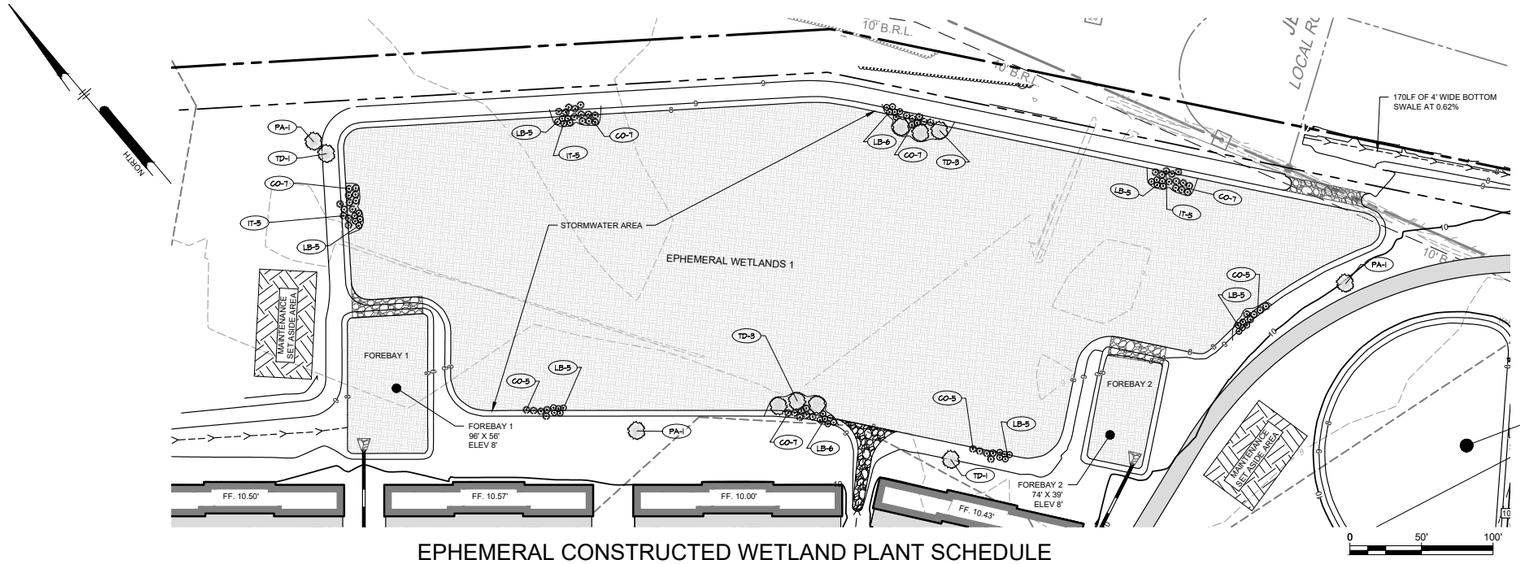
ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES. AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=30'
DRAWN BY	LS/TPM
APPROVED BY	AMD

CS8007

SHEET 7 OF 11

U:\Accounts\PETIX\PETIX 19002 - Evans Farm Apartments\DESIGN_SHEETS\CS8006A.dwg PLOTTED: 2/3/2021 3:37 PM, BY: Logan Strickland PLOTSTYLE: Pennoni NCS.ctb PROJECT STATUS: —



SITE INFORMATION:

SITE ADDRESS:
NORTH CORNER OLD MILL ROAD
OCEAN VIEW, DELAWARE 19970
TAX MAP: 134-12.00-74.00

OWNER/DEVELOPER:
LINDER & COMPANY INC.
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

ENGINEER / SURVEYOR:
PENNONI ASSOCIATES INC.
18072 DAVIDSON DRIVE
MILTON, DELAWARE 19968
(302) 684-8030

EPHEMERAL CONSTRUCTED WETLAND PLANT SCHEDULE

KEY	LATIN NAME	COMMON NAME	QUANTITY	SIZE	CONDITION & REMARKS
	SHADE TREES				
PA	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	3	2.5" CAL.	BALL & BURLAP
	TOTAL SHADE TREES		3		
	EVERGREEN TREES				
CA	CHAMAECYPARIS THYOIDES	ATLANTIC WHITE CEDAR	3	8-10'	BALL & BURLAP
TD	TAXODIUM DISTICHUM	BALD CYPRESS	2	8-10'	BALL & BURLAP
	TOTAL EVERGREEN TREES		5		
	SHRUBS				
CO	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	50	2-2.5'	BALL & BURLAP/CONTAINER
IT	ITEA VIRGINICA	VIRGINIA SWEETSPIRE	15	2-2.5'	BALL & BURLAP/CONTAINER
LB	LINDERA BENZOIN	SPICEBUSH	47	2-2.5'	BALL & BURLAP/CONTAINER
	TOTAL SHRUBS		117		
	SEED MIX				
WM	ERNST SEEDS - OBL WETLAND MIX	ERNST SEEDS - OBL WETLAND MIX	3.5	LBS SEED MIX	SEED AT 0.5 LB/1,000 SF, PER ERNST SPECS

ALTERNATE PLANTING FOR EPHEMERAL CONSTRUCTED WETLAND AREA

IN LIEU OF THE WETLAND SEED MIX SPECIFIED, PLANTING MAY BE DONE USING 2" PLUGS SPACED AT 18" O.C. PLANTING SHALL BE DONE USING THE FOLLOWING PLANT RATIOS:

40% CAREX PENNSYLVANICA - PENNSYLVANIA SEDGE
15% PONTEDERIA CORDATA - PICKERELWEED
15% SAGITTARIA LATIFOLIA - BROADLEAF ARROWHEAD
5% PELTANDRA VIRGINICA - ARROW ARUM
5% JUNCUS EFFUSUS - SOFT RUSH
4% IRIS VERSICOLOR - BLUE FLAG IRIS
4% SCHOENOPLECTUS PUNGENS - COMMON THREE SQUARE
4% MIMULUS RINGENS - SQUARE STEM MONKEY FLOWER
2% SAGITTARIA LANCIFOLIA - BULLTOUNGE ARROWHEAD
2% ASCLEPIAS INCARNATA - SWAMP MILKWEED
2% EUPATORIUM FISTULOSUM - JOE PYE WEED
2% LOBELIA CARDINALIS - CARDINAL FLOWER

NOTE:

SEE LANDSCAPE DETAILS ON SHEET CS8008.

PLANTING NOTES AND SPECIFICATIONS:

1. ALL TOPSOIL SHALL BE A MINIMUM 4" IN ALL SOD AREAS, 6" IN SEEDED AREAS AND 8" IN TREE, SHRUB AND GROUND COVER BEDS, INCLUDING PARKING LOT ISLAND BEDS.
2. PLANTING BEHIND PERPENDICULAR PARKING IS TO BE LOCATED A MINIMUM OF 5' BEHIND THE CURB LINE.
3. ALL LANDSCAPE AND GRASS AREAS ARE TO BE HAND RAKED AND LEFT CLEAR OF ALL STONES, ROCK, CONSTRUCTION DEBRIS AND ANY UNSUITABLE MATERIALS.
4. LANDSCAPE CONTRACTOR WILL LOCATE ALL UNDERGROUND UTILITIES PRIOR TO ANY EXCAVATION AND PLANTING INSTALLATION.
5. LANDSCAPE CONTRACTOR TO SUPPLY AND INSTALL A PERVIOUS WEED BARRIER (DEWITT, DUPONT OR APPROVED EQUAL) IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS WITHIN ALL LANDSCAPES, INCLUDING STONE AND MULCH BEDS. ALL WEED BARRIER WILL BE OVERLAPPED A MINIMUM OF 6" AT ALL SEAMS. AT PLANT LOCATIONS, BARRIER SHOULD BE CUT IN AN "X" PATTERN SO TO ACCOMMODATE ROOT BALL AND REPLACED AFTER PLANT HAS BEEN INSTALLED.
6. ALL PROPOSED LANDSCAPING TO BE NURSERY GROWN, TYPICAL OF THEIR SPECIES OR VARIETY. THEY ARE TO HAVE NORMAL VIGOROUS ROOT SYSTEMS, FREE FROM DEFECTS AND INFECTIONS AND IN ACCORDANCE WITH ANSI Z60.1
7. ALL PROPOSED PLANTINGS SHOULD BE INSTALLED PER STANDARDS OF THE "AMERICAN ASSOCIATION OF NURSERYMEN" AND STATE NURSERY/ LANDSCAPE ASSOCIATIONS WITH REGARD TO PLANTING, PIT SIZE, BACKFILL MIXTURE, STAKING AND GUYING.
8. ALL PLANTING CONTAINERS AND BASKETS SHALL BE REMOVED DURING PLANTING. ALL PLANTS SHALL BE SET PLUMB AND POSITIONED SO THAT THE TOP OF THE ROOT COLLAR MATCHES, OR IS NO MORE THAN THREE TO SIX (3-6") INCHES ABOVE, FINISHED GRADE - SEE DETAILS THIS SHEET. REPLACE AMENDED BACKFILL IN 6-INCH LAYERS AND COMPACT BACKFILL TO ELIMINATE VOIDS. CONTRACTOR SHALL PROVIDE A FOUR-INCH HIGH EARTHEN WATERING SAUCER ALONG THE PERIMETER OF EACH PLANTING PIT. CONTRACTOR SHALL WATER NEWLY PLANTED VEGETATION PRIOR TO MULCHING PLANTING PIT. ALL VOIDS SHALL BE FILLED AND SETTLING MITIGATED AS REQUIRED.
9. AFTER INITIAL WATERING AND PRIOR TO MULCHING, CONTRACTOR SHALL APPLY HERBICIDES AND PRE-EMERGENT HERBICIDES AS REQUIRED TO ELIMINATE ANY WEED SEEDS OR PLANTS PRESENT ON ROOT BALL.
10. ALL PLANTING BEDS AND PITS SHALL BE MULCHED WITH DOUBLE GROUND HARDWOOD MULCH AT A MINIMUM DEPTH OF 3".
11. SEEDBED PREPARATION:
    A. APPLY LIMESTONE AND FERTILIZER ACCORDING TO SOIL TESTS OR FERTILIZER MAY BE APPLIED AT THE RATE OF 260 POUNDS PER ACRE OR 6 POUNDS PER 1000 SQUARE FEET USING 10-20-10 OR EQUIVALENT. IN ADDITION, 300 POUNDS 4-1-2 PER ACRE OR EQUIVALENT OF SLOW RELEASE NITROGEN MAY BE USED IN LIEU OF TOPDRESSING.
    B. WORK LIME AND FERTILIZER INTO THE SOIL AS PRACTICAL TO A DEPTH OF 4-INCHES WITH A DISC, SPRING TOOTH HARROW OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISKING OPERATION SHOULD PARALLEL TO THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLE UNIFORM, FINE SEEDBED IS PREPARED. ALL BUT CLAY OR SILTY SOILS AND COARSE SANDS SHOULD BE ROLLED TO FIRM THE SEEDBED WHEREVER FEASIBLE.
    C. INSPECT SEEDBED JUST BEFORE SEEDING. IF TRAFFIC HAS LEFT THE SOIL COMPACTED, THE AREA MUST BE RETILLED AND FIRMED AS OUTLINED BELOW.
    D. GRASS SEEDING MIXTURE AND APPLICATION RATE:

PERCENTAGE OF TOTAL WEIGHT	APPLICATION RATE	SEED TYPE	MINIMUM GERMINATION ALLOWED
60%	5-7 LBS/1000 S.F.	"REBEL" TALL FESCUE	90 - 97
35%		"YORKTOWN" PERENNIAL RYE	90 - 98
5%		"STREEKER" REDTOP	90 - 92

    E. IN AREAS DESIGNATED AS SOD, FESCUE SOD IS TO BE INSTALLED ON MINIMUM 4" TOPSOIL. AREAS TO BE SODDED ARE TO BE PREPARED AS NOTED ABOVE FOR SEEDED AREAS.
12. TOPSOIL WITH A QUALITY ORGANIC SOIL AMENDMENT SHALL BE USED FOR ALL PLANTING AND SEEDING OPERATIONS.
13. NOTIFY ALL UTILITY COMPANIES AND LOCATE ALL UTILITIES PRIOR TO EXCAVATING PLANT PITS. PLANT LOCATIONS MAY BE ADJUSTED IN THE FIELD TO AVOID INTERFERENCE WITH UNDERGROUND UTILITIES.
14. SHOULD ANY DISCREPANCY ARISE BETWEEN THE PLANTING PLAN AND THE PLANTING SCHEDULE, THE PLAN SHALL GOVERN AS TO THE QUANTITY OF PLANT MATERIAL.
15. ALL SHADE TREES TO BE PRUNED OF SIDE BRANCHES TO A HEIGHT OF 6 FT ABOVE GRADE EXCEPT WHERE NOTED IN PLANT SCHEDULE.
16. ALL STREET TREES TO BE PRUNED OF SIDE BRANCHES TO A HEIGHT OF 8 FT ABOVE GRADE.
17. ALL PLANT MATERIAL SHALL BE APPROVED UPON ARRIVAL TO THE SITE, UNLESS OTHERWISE NOTIFIED.
18. PROPOSED PLANT MATERIAL MAY BE SUBSTITUTED BY SIMILAR PLANTS PRIOR TO INSTALLATION, SUBJECT TO APPROVAL BY THE LANDSCAPE ARCHITECT AND SUSSEX COUNTY.
19. DISTURBANCE OF EXISTING VEGETATION SHALL BE LIMITED TO WORK AREA CONTRACTOR IS RESPONSIBLE FOR FINE GRADING AND SEEDING ALL DISTURBED AREAS.
20. ALL PLANTS SPACED 7' O.C. OR CLOSER SHALL BE IN CONTINUOUS MULCHED BEDS.
21. SEED ALL DISTURBED AREAS WITH GRASS SEED MIX SPECIFIED IN SEDIMENT CONTROL REQUIREMENTS.

EPHEMERAL CONSTRUCTED WETLAND PLANTING NOTES AND SPECIFICATIONS:

1. THESE NOTES APPLY TO ALL AREAS THAT WILL BE PERMANENTLY OR SEASONALLY INUNDATED WITH STORMWATER.
2. PLANTING IN THESE AREAS MUST OCCUR IN THE SPRING GROWING SEASON, BETWEEN MARCH 15 AND JUNE 15, WEATHER PERMITTING. DO NOT PLANT IN FROZEN GROUND.
3. WATER LEVELS MUST BE DRAWN DOWN BELOW AREAS TO BE PLANTED UNTIL SEED MIX AND PLANTINGS HAVE BECOME ESTABLISHED.
4. PRE-IRRIGATE PLANTING SITES TO ENSURE THAT SOIL IS MOIST.
5. AFTER PLANTING CARE MUST BE TAKEN NOT TO DROWN PLANTS. OVER THE COURSE OF THE FIRST GROWING SEASON, AFTER PLANTS ARE ESTABLISHED, THE WATER LEVEL CAN SLOWLY BE INCREASED AS NOTED BELOW.
6. GENERALLY PLANTS SHOULD HAVE ONE QUARTER TO ONE THIRD OF THEIR TOPS ABOVE THE WATER LINE AS WATER LEVELS ARE BEING RAISED AS DESCRIBED BELOW.
7. FOR THE FIRST MONTH AFTER PLANTS HAVE BEEN ESTABLISHED AND HAVE STARTED TO GROW, THE BENCH AREA CAN BE FLOODED TO A 2-3" DEPTH. THE WATER CAN DRAIN DOWN TO THE BENCH BOTTOM OVER 7-10 DAYS, AND THEN BE REFILLED.
8. FOR THE SECOND MONTH, OR AS PLANTS GROW BASED ON NOTE 6 ABOVE, THE WATER LEVEL CAN BE INCREASED TO 6-8", USING THE SAME TIMEFRAMES AS THE FIRST MONTH.
9. FOR THE THIRD MONTH, OR AS PLANTS GROWN, THE WATER LEVEL CAN BE INCREASED TO 10-12".
10. IF PLANTS APPEAR TO BE STRESSED WITH RISING WATER LEVELS, REDUCE WATER LEVELS AND INCREASE THE TIME BETWEEN THE WATER LEVEL CHANGES.

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
OCEAN VIEW, DE

WETLANDS 1 LANDSCAPE NOTES AND DETAILS

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=50'
DRAWN BY	LS/TPM
APPROVED BY	AMD

CS8008

SHEET 8 OF 11

U:\Accounts\PETIX\PETIX19002 – Evans Farm Apartments\DESIGN_SHEETS\CS8001.dwg PLOTTED: 2/2/2021 5:21 PM, BY: Logan Strickland PLOTSTYLE: Pennoni NCS.ctb PROJECT STATUS: —

STORMWATER CONVEYANCE

THIS PROPOSED FEATURE IS STRICTLY DESIGNED FOR THE CONVEYANCE OF STORMWATER. THE OPTION TO USE THIS FEATURE IS TO CONVEY STORMWATER FROM DELDOT RIGHT OF WAY. THE PROPOSED EPHEMERAL CONSTRUCTED WETLANDS ARE DESIGNED IN ACCORDANCE WITH STATE REQUIREMENTS. NO CREDIT FOR TREATMENT SHALL BE TAKEN FROM THE USE OF THIS TREATMENT FEATURE.

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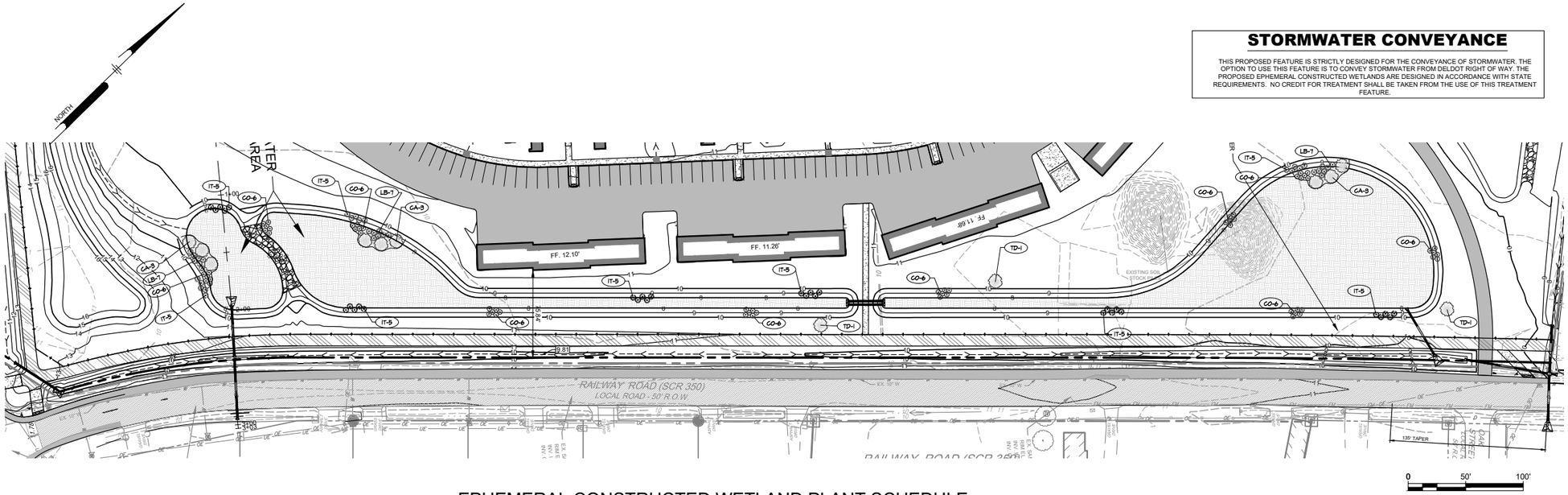

EPHEMERAL CONSTRUCTED WETLAND PLANT SCHEDULE

KEY	LATIN NAME	COMMON NAME	QUANTITY	SIZE	CONDITION & REMARKS
	SHADE TREES				
PA	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	3	2.5" CAL.	BALL & BURLAP
	TOTAL SHADE TREES		3		
	EVERGREEN TREES				
CA	CHAMAECYPARIS THYOIDES	ATLANTIC WHITE CEDAR	9	8-10'	BALL & BURLAP
TD	TAXODIUM DISTICHUM	BALD CYPRESS	3	8-10'	BALL & BURLAP
	TOTAL EVERGREEN TREES		12		
	SHRUBS				
CO	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	60	2-2.5'	BALL & BURLAP/CONTAINER
IT	ITEA VIRGINICA	VIRGINIA SWEETSPIRE	40	2-2.5'	BALL & BURLAP/CONTAINER
LB	LINDERA BENZOIN	SPICEBUSH	21	2-2.5'	BALL & BURLAP/CONTAINER
	TOTAL SHRUBS		121		
	SEED MIX				
WM	ERNST SEEDS - OBL WETLAND MIX	ERNST SEEDS - OBL WETLAND MIX	3.5	LBS SEED MIX	SEED AT 0.5 LB/1,000 SF, PER ERNST SPECS

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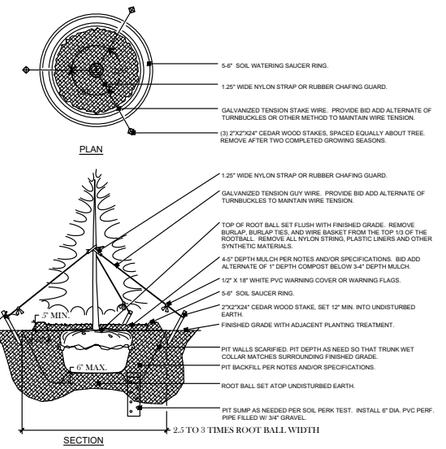
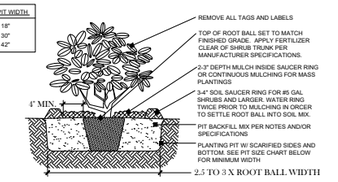
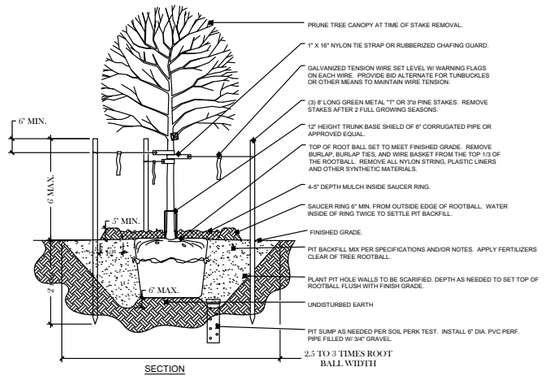


B EVERGREEN TREE PLANTING AND STAKING
N.T.S.

SHRUB SIZE	MIN. PIT WIDTH
#1 GALLON	18"
#3 GALLON	30"
#5 GALLON	42"



A SHRUB PLANTING
N.T.S.



C CANOPY TREE PLANTING AND GUYING
N.T.S.

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
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OCEAN VIEW, DE

WETLANDS 2 LANDSCAPE NOTES AND DETAILS

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=50'
DRAWN BY	LS/TPM
APPROVED BY	AMD

CS8009

SHEET 9 OF 11

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Appendix A-2. Stormwater BMP Landscaping Guidelines

Landscaping is critical to the performance and function of many stormwater management facilities. Therefore, a landscaping plan shall be provided for any practice that relies on vegetation as a key component.

Minimum plan elements should include the proposed template to be used, delineation of planting areas, the planting plan, including the size, the list of planting stock, sources of plant species, and the planting sequence, including post-nursery care and initial maintenance requirements. It is highly recommended that the planting plan be prepared by a landscape architect, wetland scientist, or horticulturalist in order to tailor the planting plan to the site-specific conditions; however, the plan must be overseen and signed by a qualified, licensed professional registered in the State of Delaware.

Native plant species are preferred over non-native species, but some ornamental species may be used for landscaping effect if they are not aggressive or invasive, and do not exceed 25% of the total landscaping plan. Under no circumstances can aggressive, invasive species be utilized. Native species suitable for stormwater management BMP's are listed below. **Table 1** provides native herbaceous plants, and **Table 2** lists native trees and shrubs. Additional information on Delaware native plants can be found at the following internet links:

- US Department of Agriculture: http://plants.usda.gov
- University of Delaware College of Agriculture and Natural Resources Cooperative Extension Native Plants: http://ag.udel.edu/extension/horticulture/pdf/NativePlants.pdf
- University of Delaware Water Resources Agency Flora of Delaware Online Database: http://www.wra.udel.edu/de-flora
- Delaware Native Plant Society: http://www.delawarenativeplants.org
- Delaware Nature Society Native Plants Resource Links: http://www.delawarenaturesociety.org/links.html#np

BMPs requiring a Landscape Plan:

Bioretention Facilities

The degree of landscape maintenance that can be provided will determine some of the planting choices for urban bioretention areas. Plant selection differs if the area will be frequently mowed, pruned, and weeded, in contrast to a site which will receive minimum annual maintenance. Typically the bioretention areas are covered with hardwood mulch and planted with a mixture of shrubs, herbaceous flowering plants, ferns, and other perennial species.

Constructed Wetlands

The landscape plan for a constructed wetland should outline a realistic, long-term planting strategy to establish and maintain desired wetland vegetation. The plan should indicate how wetland plants will be established within each inundation zone (e.g., wetland plants, seed-mixes, volunteer colonization, and tree and shrub stock) and whether soil amendments are needed to get

plants started. The plan should outline a detailed schedule for the care, maintenance and possible reinforcement of vegetation in the wetland and its buffer, particularly for the first 10 years of establishment.

Other Stormwater BMPs
Additional stormwater facilities besides bioretention and constructed wetland can and should be vegetated; these include wet ponds, vegetated filter strips and vegetated roofs. The landscape plan for each shall select appropriate plants, planting requirements, and maintenance requirements. Wet ponds, vegetated filter strips and other BMPs can use the recommended native plants listed in the tables below. Vegetated roofs, particularly extensive roofs, require a more drought and wind resistant plant, and shall refer to the specific landscaping requirements mentioned in the Vegetated Roof specification.

Planting Requirements:

1. The Plan view(s) of the Landscape Plan must have topography at a contour interval of no more than 1 foot and spot elevations throughout the cell showing the wetland configuration. The different planting zones (e.g., high marsh, deep pool, upland floodplain), must be noted with the plant species to be planted.
2. The Landscape Plan shall include a plant schedule corresponding to the planting plan, specifying emergent, perennial, shrub and tree species, quantity of each species, stock size, type of root stock to be installed, and spacing.
3. The Landscape Plan shall include notes and details regarding the site preparation, soil amendments, construction sequence, soil stabilization, planting specifications, and maintenance criteria.
4. The maintenance criteria must indicate how and when to remove and replace dead plants, eradicate invasive species, and restabilize eroded areas.
5. The planting plan should specify native plant species over non-native plant species. A minimum of 75% of the planting used must be a native species to Delaware, and in no instance can any aggressive invasive species be planted, such as cattails, Phragmites and purple loosestrife.
6. Planting and seeding of the facility to establish a vegetative cover must be completed as quickly as possible after completion of earthwork (following requirements of the Construction Site Stormwater Management Plan). Establishing a groundcover of herbaceous species or 2 to 4 inches of triple shredded hardwood mulch is important for erosion control and site stabilization. The planting of the remainder of the species, i.e., trees, shrubs and flowering herbaceous plants, can be delayed until the appropriate planting season, however, the project will not be closed out until all of the species on the Landscape Plan have been planted and 70% of the species on the Landscape Plan have been established for more than 1 growing season.
7. Trees and shrubs shall not be planted above or immediately adjacent to structural components of the facility such as underdrains, inflow or outflow pipes, structural embankments, or water control structures.
8. Trees must be planted in areas where the soil depth is a minimum of four feet to allow for

the root structure of mature trees.

9. If the stormwater management facility is to accept snow-melt runoff, salt tolerant species should be incorporated into the planting of those portions of the facility subject to prolonged inundation. A bioretention facility shall never to be used for prolonged snow storage.
10. For Constructed Wetlands, trees and shrubs must be incorporated into the design to provide both bank stabilization, shade and a diverse wetland community. By surface area, a minimum of 25% of the Constructed Wetland area must be planted with trees and shrubs. They can be planted in tree islands, peninsulas, high marsh, floodplain, and buffer areas depending on the inundation tolerance of the species. Willow or other live stakes may be planted to help stabilize stream and wetland banks.

Planting Recommendations:

1. Plant species should be located within the facility based on their wetland indicator status and tolerance to inundation and/or soil saturation. Generally, plants with an indicator status of "obligate" or "OBL" will be suitable for planting Zones 3 and 4; plants with an indicator status of "facultative wet" or "FACW" will be suitable for planting in Zones 4 and 5; and plants with an indicator status of "facultative" or "FAC" or "facultative upland" or "FACU" will be suitable for planting in Zone 5. Upland plant species not identified in this document may also be suitable for planting in Zone 5. Relatively few species are suitable for planting in Zones 1 and 2. Consult the inundation tolerance category in the tables within this document for guidance on plant species selection.
2. To increase the success of plant establishment, most plant species should be planted in the drier portion of their inundation tolerance range. Many plants can tolerate flooding or soil saturation only seasonally and do not establish successfully in flooded conditions. This is especially true of trees and shrubs.
3. A good planting strategy includes varying the size and age of the plant stock to promote a diverse structure. Using locally grown container and bare root stock is usually the most successful approach. It is recommended that buffer planting areas be over-planted with a small stock of fast growing successional species to achieve quick canopy closure and to shade out invasive plant species.
4. If trees and shrubs are incorporated in the plan, the recommended spacing between trees is 15 feet on center, and the recommended spacing between shrubs is 5 to 10 feet on center. Trees may be planted in clusters to share rooting space on compacted wetland side-slopes.
5. The recommended spacing for herbaceous plants should be approximately 1.5 feet on center.
6. In cases where herbaceous plants will be planted within the drip-line of trees, shade tolerant species should be considered.
7. Plants should be kept in containers of water or moist coverings to protect their root systems and keep them moist when transporting them to the planting location.
8. Plants should be ordered well in advance of the installation as several months of lead time may be needed to fill orders for native upland and wetland plant stock.

9. Planting holes should be amended with compost (a 2:1 ratio of loose soil to compost) prior to planting.
10. For Constructed Wetlands, to add diversity to the wetland and increase survivability, 5 to 7 species of emergent wetland plants should be planted, using at least four emergent species designated as aggressive colonizers. If the appropriate planting is achieved, the entire wetland should be colonized within three years. Individual plants should be planted 18 inches on center within each grouping of plants.

Inundation Zones:

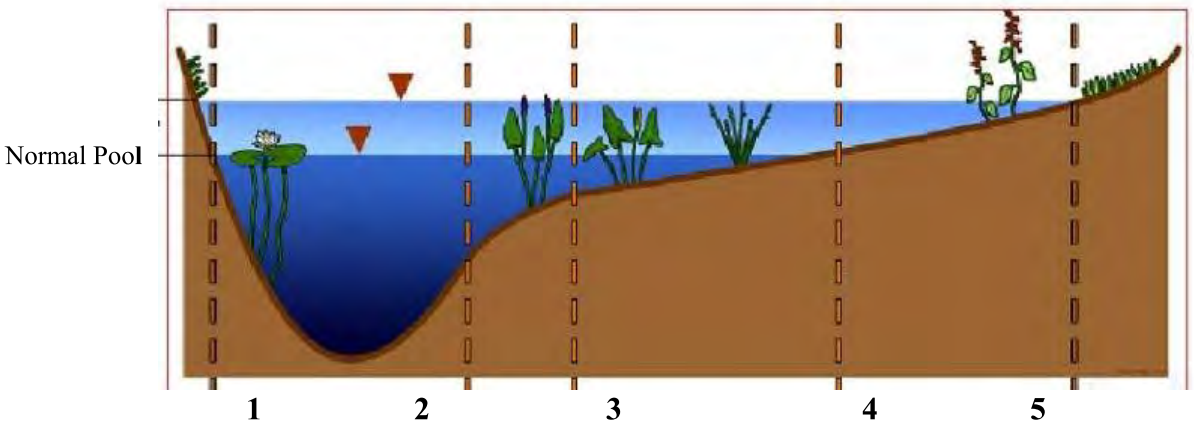


Figure 1. Inundation Zones: (1) Deep Pool (depth -36 to -18 inches), (2) Transition Zone (depth -18 to -6 inches), (3) Low Marsh Zone (depth -6 inches to normal pool), (4) High Marsh Zone (normal pool to +12 inches), and (5) Floodplain (+12 to +30 inches) (adapted from Hunt et al,. 2007). Bioretention Areas, and other facilities without a permanent pool, will only have Zones 4 and 5.

Native Species:

Table 1 and Table 2 below show native plants appropriate for use in stormwater BMPs. Only those species indicated for Zones 4 and 5 are appropriate for bioretention facilities and other BMPs that do not have a permanently saturated zone. Plants indicated for Zones 2 and 3 may be used in Constructed Wetlands and Wet Ponds in addition to the plants indicated for Zones 4 and 5. The plants inundation tolerance should be noted and located appropriately within the facility.

Table 1. Herbaceous Plants for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Arrow Arum (*Peltandra virginica*)	OBL	3, 4	Perennial	Full Sun-Part Shade	Berries are eaten by wood ducks; Inundation up to 1 ft
Arrowhead, Broad-Leaf (Duck Potato) (*Sagittaria latifolia*)	OBL	3, 4	Perennial	Full Sun	Aggressive colonizer; Inundation up to 1 ft
Arrowhead, Bulltongue (*Sagittaria lancifolia*)	OBL	3, 4	Perennial	Full Sun-Part Shade	Aggressive colonizer; Inundation up to 2 ft
Aster, New England *(Aster novae-angliae)*	FACW	4, 5	Perennial	Full Sun-Part Shade	Attractive flowers
Aster, New York *(Aster novi-belgii)*	FACW+	4, 5	Perennial	Full Sun-Part Shade	Attractive flowers; tolerates poor soils
Aster, October Skies *(Aster oblongifolius 'October Skies')*	UPL	5	Perennial	Full Sun	Masses of blue flowers in Sept/Oct
Aster, Perennial Saltmarsh *(Aster tenuifolius)*	OBL	4	Perennial	Full Sun-Part Shade	Salt tolerant
Aster, Raydons Favorite *(Aster oblongifolius 'Raydon's Favorite')*	UPL	5	Perennial	Full Sun	Masses of blue flowers in Sept/Oct
Aster, showy *(Eurybia spectabilis) (Aster spectabilis)*	FAC	4, 5	Perennial	Full Sun - Part Shade	Masses of blue flowers in Sept/Oct
Aster, smooth blue *(Symphyotrichum laeve) (Aster laevis)*	FAC	4, 5	Perennial	Full Sun - Part Shade	Blue cone-shaped clusters with yellow centers
Aster, white heath *(Symphyotrichum ericoides) (Aster ericoides)*	FAC	4, 5	Perennial	Full Sun - Part Shade	Drought tolerant
Beardtongue (*Penstemon digitalis)*	FAC	4, 5	Perennial	Full Sun	Tolerates poor drainage
Beebalm *(Monarda didyma)*	FAC+	4, 5	Perennial	Full Sun-Part Shade	Herbal uses; attractive flower
Black-Eyed Susan *(Rudbeckia hirta)*	FACU	5	Perennial	Full Sun-Part Shade	
Blue star, Blue Ice *(Amsonia 'Blue Ice')*	FACU	5	Perennial	Full Sun-Part Shade	Clusters of steely blue flowers in May
Blue star, Willow leaf *(Amsonia tabernaemontana)*	FACU	5	Perennial	Full Sun-Part Shade	

Table 1. Herbaceous Plants for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Blue vervain *(Verbena hastata)*	FACW	4, 5	Perennial	Full Sun	Tall thin spikes of violet blue
Bluebells, Virginia *(Mertensia virginica)*	FACW	4, 5	Perennial	Part Shade-Full Shade	Attractive flower; dormant in summer
Blueflag Iris (*Iris versicolor*)	OBL	3, 4	Perennial	Full Sun-Part Shade	Inundation up to 6 in.
Blueflag, Virginia *(Iris virginica)*	OBL	3, 4	Perennial	Full Sun-Part Shade	Tolerates standing water
Bluestem, Big *(Andropogon gerardii)*	FAC	5	Grass	Full Sun	Attractive in winter; forms clumps
Bluestem, Little *(Schizachyrium scoparium)*	FACU	5	Grass	Full Sun	Tolerates poor soil conditions
Broomsedge (*Andropogon virginicus*)	FACU+	5	Grass	Part Sun-Part Shade	Inundation up to 3 in., can be fluctuating; winter food and cover
Burreed (*Sparganium americanum*)	OBL	3, 4	Perennial	Full Sun-Part Shade	Inundation 0-6 in.
Cardinal Flower *(Lobelia cardinalis)*	FACW+	4, 5	Perennial	Full Sun-Part Shade	Long bloom time
Common Rush (*Juncus effusus*)	OBL	3, 4	Grass	Full Sun-Part Shade	Aggressive colonizer; Inundation up to 12 in.
Common Three Square (*Schoenoplectus pungens)*	OBL	3, 4	Grass	Full Sun	Aggressive colonizer; Inundation up to 6 in.
Coneflower, Orange *(Rudbeckia fulgida)*	FAC	5	Perennial	Full Sun-Part Shade	Bright gold with brown cone July to October
Coneflower, Purple *(Echinacea purpurea)*	FACU	5	Perennial	Full Sun - Part Shade	Purple flowers with large gold centers July and August
Coreopsis, Lanceleaf *(Coreopsis lanceolata)*	FACU	5	Perennial	Full Sun	Bright yellow 2.5" flowers May-August
Coreopsis, Threadleaf *(Coreopsis verticillata)*	FAC	5	Perennial	Full Sun-Part Shade	Drought tolerant
Fern, New York *(Thelypteris noveboracensis)*	FAC	5	Fern	Part Shade-Full Shade	Drought tolerant

Table 1. Herbaceous Plants for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Fern, Royal *(Osmunda regalis)*	OBL	4	Fern	Full Sun-Full Shade	Tolerates short term flooding; drought tolerant
Fescue, Red *(Festuca rubra)*	FACU	5	Grass	Full Sun-Full Shade	Moderate growth; good for erosion control
Goldenrod, Grassleaf *(Euthamia graminifolia)*	FAC	4, 5	Perennial	Full Sun - Part Shade	Yellow flowers
Goldenrod, Rough-leaf *(Solidago rugosa)*	FAC	4, 5	Perennial	Full Sun	Yellow flowers
Goldenrod, Seaside *(Solidago sempervirens)*	FACW	4, 5	Perennial	Full Sun	Salt tolerant yellow flowers
Hyssop-leaved thoroughwort *(Eupatorium hyssopifolium)*	FACU	5	Perennial	Full Sun - Part Shade	Flat-topped clusters of white fringed flowers in fall
Ironweed, New York *(Vernonia noveboracensis)*	FACW	4, 5	Perennial	Full Sun	Deep purple
Joe Pye Weed *(Eupatorium dubium)*	FACW	4, 5	Perennial	Full Sun - Part Shade	Purple rounded heads
Joe Pye Weed *(Eupatorium fistulosum)*	FACW	4, 5	Perennial	Full Sun - Part Shade	Pink lavender huge rounded heads
Joe Pye Weed *(Eupatorium purpureum)*	FACW	4,5	Perennial	Full Sun - Part Shade	Flat-topped clusters of white fringed flowers in fall; Periodic inundation
Lizard's Tail (*Saururus cernus*)	OBL	3, 4	Perennial	Shade Tolerant	Aggressive colonizer; Inundation up to 3 in.
Lobelia, Great Blue *(Lobelia siphilitica)*	FACW+	4, 5	Perennial	Part Shade-Full Shade	Blooms in late summer; bright blue flowers
Marsh Hibiscus (*Hibiscus moscheutos*)	OBL	3, 4	Perennial	Full Sun	Inundation up to 3 in.; can tolerate periodic dryness
Milkweed , Swamp *(Asclepias incarnata)*	OBL	4	Perennial	Full Sun-Part Shade	Drought tolerant
Milkweed, Butterfly *(Asclepias tuberosa)*	UPL	5	Perennial	Full Sun-Part Shade	Drought tolerant
Pickerelweed (*Pontederia cordata*)	OBL	3, 4	Perennial	Full Sun-Part Shade	Aggressive colonizer; Inundation up to 1 ft.

Table 1. Herbaceous Plants for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Phlox, Garden *(Phlox paniculata)*	FACU	5	Perennial	Full Sun-Part Shade	Large panicles of pink to purple flowers
Phlox, Meadow *(Phlox maculata)*	FACW	4, 5	Perennial	Full Sun	Aromatic; spreads
Pond Weed (*Potamogeton pectinatus*)		2			Full inundation; high wildlife value
Purple-top *(Tridens flavus)*	FACU	5	Grass	Full Sun - Part Shade	
Rice Cutgrass (*Leersia oryzoides*)	OBL	3, 4	Grass	Full Sun	Inundation up to 3 in.; shoreline stabilization
Sea-Oats (*Uniola paniculata)*	FACU-	5	Grass	Full Sun	Salt tolerant; attractive seed heads
Sedge, Broom *(Andropogon virginicus)*	FACU	3, 4	Grass	Full Sun	Drought tolerant; attractive fall color
Sedge, Muskingum *(Carex muskingumensis)*	OBL	3, 4	Grass	Full Sun - Part Shade	
Sedge, Pennsylvania *(Carex pennsylvanica)*	FAC	3, 4	Grass	Full Sun - Shade	
Sedge, Tussock *(Carex stricta)*	FACW	3, 4	Grass	Full Sun - part shade	
Smooth Saltmarsh Cordgrass *(Spartina alternifolia)*	OBL	4	Grass	Full Sun	Salt tolerant
Softstem Bulrush (*Scipus validus*)	OBL	3, 4	Grass	Full Sun	Aggressive colonizer; Inundation up to 2 ft.
Sunflower, Swamp *(Helianthus angustifolius)*	FACW	4, 5	Perennial	Full Sun	Bright yellow flowers late summer to fall covering the plant
Sunflower, Thin-leaved *(Helianthus decapetalus)*	FACU	5	Perennial	Full Sun - Part Shade	Single light yellow flowers in late summer
Swamp rosemallow *(Hibiscus moscheutos)*	OBL	4	Perennial	Full Sun - Part Shade	3-4" rose pink flowers Aug-Sept
Switchgrass (*Panicum virgatum*)	FAC	4, 5	Grass	Full Sun	Inundation up to 3 in.; Tolerates wet/dry conditions

Table 1. Herbaceous Plants for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Switchgrass, Coastal *(Panicum amarum)*	FAC	4, 5	Grass	Full Sun	Adaptable; great erosion control
Turtlehead, White *(Chelone glabra)*	OBL	4	Perennial	Full Sun-Part Shade	Excellent growth
Violet, Common Blue *(Viola papilionacea)*	FAC	5	Perennial	Full Sun-Full Shade	Stemless; spreads
Virginia mountain-mint (*Pycnanthemum virginianum)*	FACW	4, 5	Perennial	Full Sun-Part Shade	Showy silver bracts surround small clusters of pale lavender flowers
Water Lily *(Nymphaea odorata)*	OBL	2, 3	Perennial		
Waterweed (*Elodea canadensis*)	OBL	2	Perennial	Full Sun	High inundation
Wild celery (*Valisneria americana*)		2			High inundation
Wild Rice (*Zizania aquatica*)	OBL	3, 4	Annual	Full Sun	Inundation up to 1 ft.
Wild Rye, Canada *(Elymus canadensis)*	FACW-	4, 5	Grass	Full Shade	Adaptable
Wild Rye, Virginia *(Elymus virginicus)*	FACW-	4, 5	Grass	Part Shade-Full Shade	Adaptable
Woolgrass (*Scirpus cyperinus*)	OBL	3, 4	Grass	Full Sun	Aggressive colonizer; Inundation up to 3 in.

[1] Wetland Indicator:

FAC = Facultative, equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).

FACU = Facultative Upland, usually occurs in non-wetlands (estimated probability 67%-99%); occasionally found on wetlands (estimated probability 1%-33%).

FACW = Facultative Wetland, usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.

OBL = Obligate Wetland, occurs almost always (estimated probability 99%) under natural conditions in wetlands.

[2] Zone:

Zone 1: -48 to -18 inches below the normal pool elevation. Not planted due to poor survival rate.

Zone 2: -18 to -6 inches to the normal pool elevation (plants should not be planted lower than -12 inches).

Zone 3: -6 inches to the normal pool elevation.

Table 1. Herbaceous Plants for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Zone 4: Normal pool elevation to +12 inches. Zone 5: +12 to +30 inches above the normal pool elevation. Only species that are indicated for Zones 4 and 5 should be planted in bioretention facilities, raingardens, filter strips, and other stormwater facilities that lack a permanent water surface elevation.					

Table 2. Trees and Shrubs for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Arrow-wood *(Viburnum dentatum)*	FAC	4, 5	Shrub	Full Sun-Part Shade	Pollution Tolerant
Green Ash *(Fraxinus pennsylvanica)*	FACW	4, 5	Tree	Full Sun-Part Shade	
Azalea , Dwarf *(Rhododendron atlanticum)*	FAC		Shrub	Part Shade	High wildlife value
Azalea, Hoary *(Rhododendron canescens)*	FACW		Shrub	Part Shade	
Azalea, Pinxterbloom *(Rhododendron periclymenoides)*	FAC		Shrub	Part Shade	
Azalea, Swamp *(Rhododendron viscosum)*	OBL	3, 4	Shrub	Part Shade	
Bayberry, Northern *(Myrica pennsylvanica)*	FAC		Shrub	Full Sun-Part Shade	Tolerates some salt; can be maintained as hedge
Birch, River *(Betula nigra)*	FACW	4, 5	Tree	Full Sun-Part Shade	Very adaptable; early spring flowers
Black-Haw *(Viburnum prunifolium)*	FACU		Shrub	Full Sun-Part Shade	Forms thickets; edible nut
Blueberry, Highbush *(Vaccinium corymbosum)*	FACW-		Shrub	Full Sun-Part Shade	
Blueberry, Lowbush *(Vaccinium angustifolium)*	FACU-		Shrub	Full Sun-Part Shade	
Box Elder *(Acer Negundo)*	FACW-	5	Tree	Full Sun-Part Shade	
Button Bush (*Cephalanthus occidentalis*)	OBL	3, 4	Shrub	Full Sun-Part Shade	
Cedar, Atlantic White *(Charnaecyparis thyoides)*	OBL	3, 4	Tree	Full Sun	
Cedar, Eastern Red *(Juniperus virginiana)*	FACU		Tree	Full Sun	Pollution Tolerant
Choke Cherry *(Prunus virginiana)*	FACU		Shrub	Full Sun	Pollutant tolerant; salt tolerant
Chokeberry *(Aronia arbutifolia)*	FACW		Shrub	Part Shade-	

Table 2. Trees and Shrubs for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
				Full Shade	
Chokeberry, Black *(Aronia melanocarpa)*	FACW		Shrub	Part Shade-Full Shade	
Cotton-wood, Eastern *(Populus deltoides)*	FAC		Tree	Full Sun	Winter food source for birds
Cypress, Bald *(Taxodium distichum)*	OBL	3, 4	Tree	Full Sun - Part Shade	Drought tolerant; deciduous conifer
Dogwood, Grey *(Cornus racemosa)*	UPL		Shrub	Full Sun-Part Shade	
Dogwood, Red Twig *(Cornus sericea)*	FACW+		Shrub	Full Sun-Part Shade	
Dogwood, Silky *(Cornus amomum)*	FACW		Shrub	Full Sun-Part Shade	Salt tolerant
Elderberry (*Sambucus canadensis*)	FACW	4, 5	Shrub	Full Sun	
Fringetree, White *(Chionanthus virginicus)*	FAC+		Tree	Full Sun - Part Shade	
Gum, Black *(Nyssa sylvatica)*	FAC	4, 5	Tree	Full Sun-Part Shade	Salt tolerant
Gum, Sweet *(Liquidambar styraciflua)*	FAC	5	Tree	Full Sun - Part Shade	
Hackberry, Common *(Celtis occidentalis)*	FACU		Tree	Full Sun-Full Shade	Drought tolerant; attractive bark
Hazelnut, American *(Corylus americana)*	FACU		Shrub	Part Shade	Attractive bark
Holly, American *(Ilex opaca)*	FACU-		Shrub-Tree	Full Sun-Full Shade	Winter food source for birds
Holly, Inkberry *(Ilex glabra)*	FACW-		Shrub	Full Sun-Part Shade	
Holly, Winterberry *(Ilex laevigata)*	OBL		Shrub	Full Sun-Part Shade	Long lived

Table 2. Trees and Shrubs for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Holly, Winterberry Common *(Ilex verticillata)*	FACW+		Shrub	Full Sun-Full Shade	Edible Fruit
Inkberry *(Ilex glabra)*	FACW	5	Shrub	Full Sun	
Magnolia, Sweetbay *(Magnolia virginiana)*	FACW+	4, 5	Tree	Full Sun - Part Shade	
Maple, Red *(Acer rubrum)*	FAC	4, 5	Tree	Full Sun-Part Shade	Pollution Tolerant
Ninebark, Eastern *(Physocarpus opulifolius)*	FACW-		Shrub	Full Sun-Part Shade	Pollution tolerant
Oak, Pin *(Quercus palustris)*	FACW	4, 5	Tree	Full Sun	Pollution tolerant
Oak, Shingle *(Quercus imbricaria)*	FAC		Tree	Full Sun	
Oak, Swamp White *(Quercus bicolor)*	FACW+		Tree	Full Sun - Part Shade	
Oak, Willow *(Quercus phellos)*	FAC+	4, 5	Tree	Full Sun	
Pepperbush, Sweet *(Clethra alnifolia)*	FAC+	5	Shrub	Part Shade-Full Shade	Salt tolerant
Persimmon *(Diospyros virginiana)*	FAC-		Tree	Full Sun - Part Shade	
Shadblow *(Amelanchier canadensis)*	FAC		Tree	Full Sun-Part Shade	
Smooth Alder *(Alnus serrulata)*	OBL	3, 4	Shrub	Part Shade-Full Shade	
Spicebush *(Lindera benzoin)*	FACW-	3, 4	Shrub	Full Sun-Part Shade	
Swamp Rose *(Rosa palustris)*	OBL	3, 4	Shrub	Full Sun-Part Shade	
Sweetbells leucothoe *(Leucothoe racemosa)*	FACW		Shrub	Full Sun-Full Shade	

Table 2. Trees and Shrubs for Delaware Stormwater BMP's					
Plant	Wetland Indicator[1]	Zone[2]	Plant Form	Light	Notes
Sycamore, American *(Platanus occidentalis)*	FAC+	4, 5	Tree	Full Sun	
Viburnum, Nannyberry *(Viburnum lentago)*	FAC		Shrub	Full Sun-Full Shade	
Viburnum, Swamphaw *(Viburnum nudum)*	OBL		Shrub	Full Sun-Part Shade	
Virginia Sweetspire *(Itea virginica)*	OBL		Shrub	Full Sun-Part Shade	
Black Willow *(Salix nigra)*	UPL	4, 5		Full Sun	
Winterberry (*Ilex verticillatta*)	OBL	4, 5	Shrub	Full Sun	
Witch-Hazel, American *(Hamamelis virginiana)*	FAC-		Shrub	Part Shade-Full Shade	Excellent fall color

[1] Wetland Indicator:

FAC = Facultative, equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).

FACU = Facultative Upland, usually occurs in non-wetlands (estimated probability 67%-99%); occasionally found on wetlands (estimated probability 1%-33%).

FACW = Facultative Wetland, usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.

OBL = Obligate Wetland, occurs almost always (estimated probability 99%) under natural conditions in wetlands.

[2] Zone:

Zone 1: -48 to -18 inches below the normal pool elevation. Not planted due to poor survival rate.

Zone 2: -18 to -6 inches to the normal pool elevation (plants should not be planted lower than -12 inches).

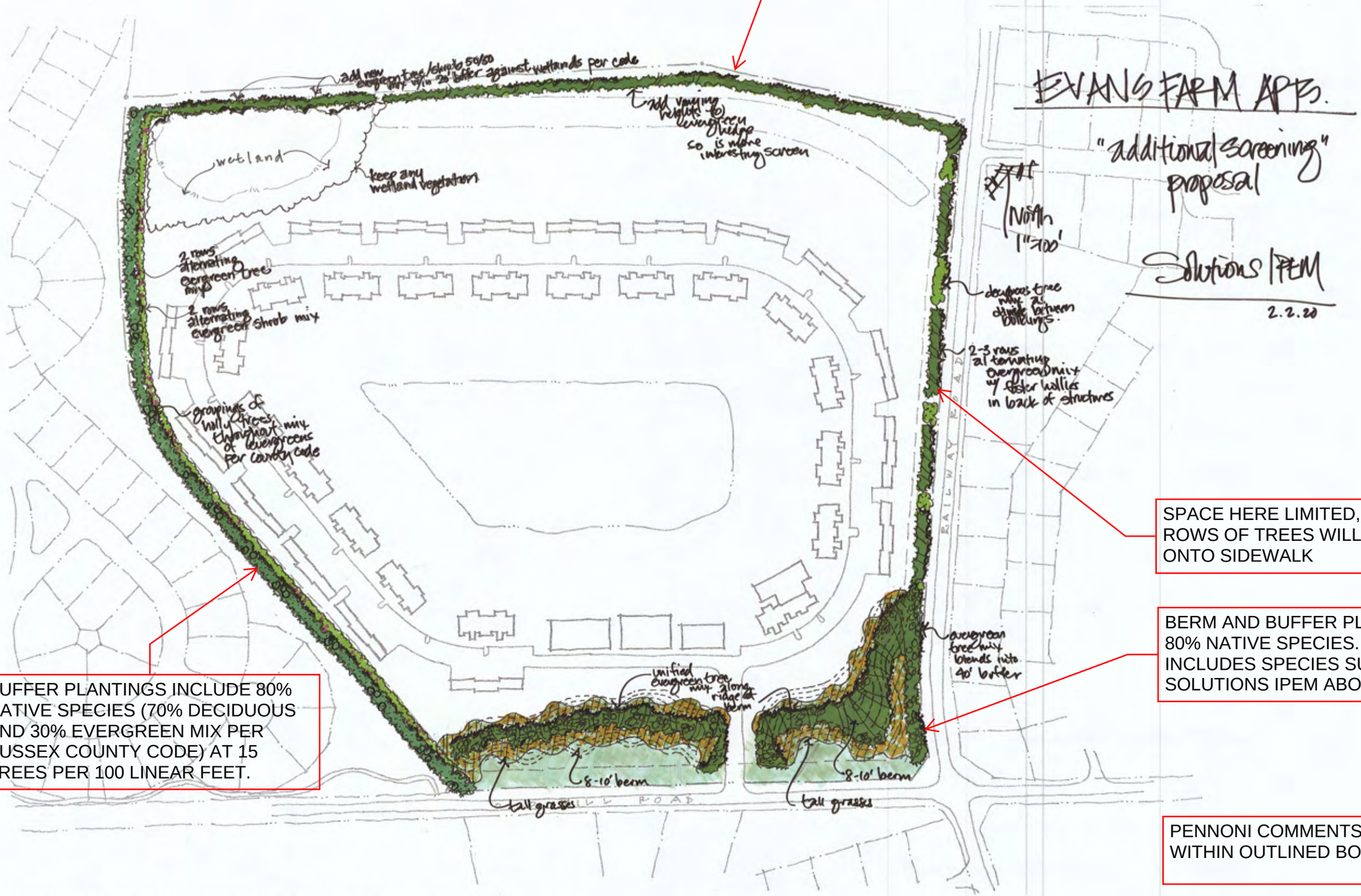
Zone 3: -6 inches to the normal pool elevation.

Zone 4: Normal pool elevation to +12 inches.

Zone 5: +12 to +30 inches above the normal pool elevation.

Only species that are indicated for Zones 4 and 5 should be planted in bioretention facilities, raingardens, filter strips, and other stormwater facilities that lack a permanent water surface elevation. If a Zone is not listed, professional judgment shall be utilized.

EXISTING VEGETATION COMBINED WITH PROPOSED PLANTINGS TO MEET BUFFER REQUIREMENTS



BUFFER PLANTINGS INCLUDE 80% NATIVE SPECIES (70% DECIDUOUS AND 30% EVERGREEN MIX PER SUSSEX COUNTY CODE) AT 15 TREES PER 100 LINEAR FEET.

SPACE HERE LIMITED, MULTIPLE ROWS OF TREES WILL ENCROACH ONTO SIDEWALK

BERM AND BUFFER PLANTINGS ARE 80% NATIVE SPECIES. PLAN INCLUDES SPECIES SUGGESTED BY SOLUTIONS IPEM ABOVE.

PENNONI COMMENTS APPEAR WITHIN OUTLINED BOXES ABOVE.

CONCEPTUAL PLAN FROM SOLUTIONS IPEM

TAB 10

DelDOT



Imagery ©2021 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2021 Google 200 ft

Google Maps 36328 Old Mill Rd

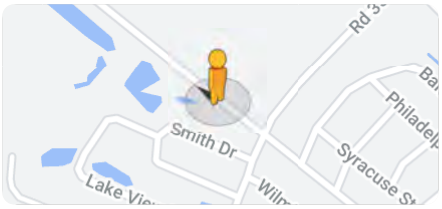


Image capture: Oct 2019 © 2021 Google

Ocean View, Delaware

Google

Street View



Google Maps 31414 Railway Rd

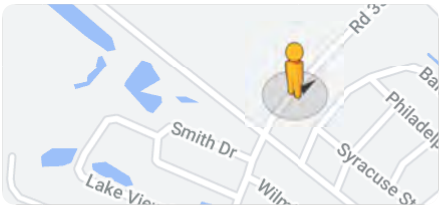


Image capture: Oct 2019 © 2021 Google

Ocean View, Delaware

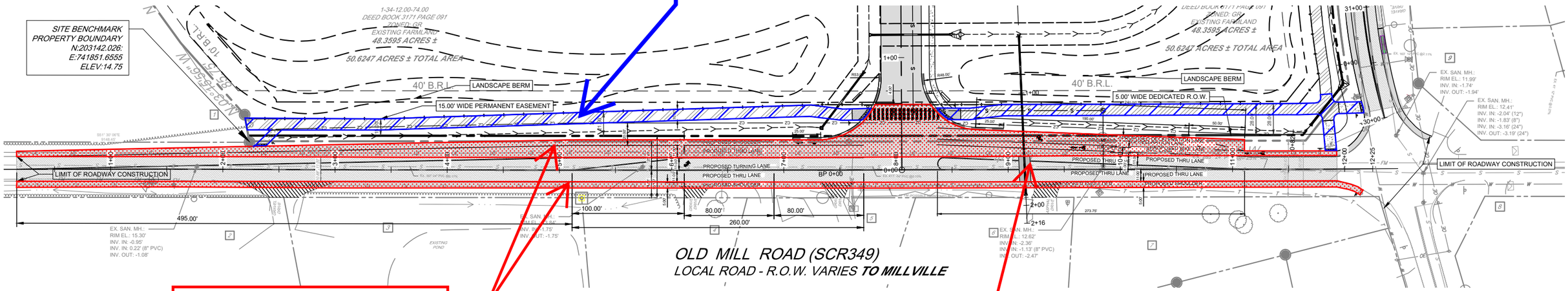
Google

Street View



DELDOT - OLD MILL RD. IMPROVEMENTS

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054



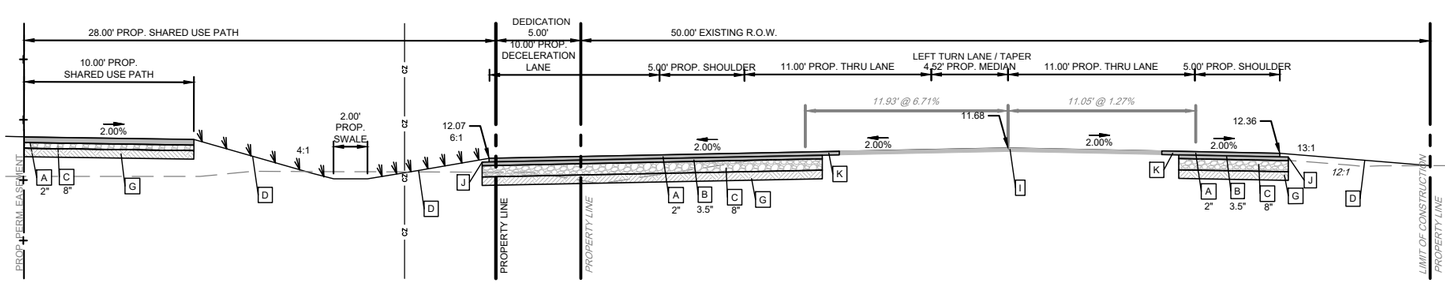
ROADWAY WIDENING TO ADD TURN LANES AND SHOULDERS

UPGRADED CROSS ROAD PIPE

200 APARTMENT UNITS = 1,088 TRIPS VS.
112 SINGLE FAMILES HOMES = 1,154 TRIPS

OLD MILL ROADWAY IMPROVMENTS

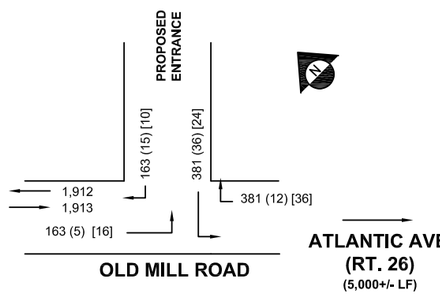
- PROPOSED COMMERCIAL 24' WIDE ENTRANCE
- ROADWAY WIDENING TO PROVIDE 11' TRAVEL LANES AND 5' SHOULDER PER DELDOT FUNCTIONAL CLASSIFICATION OF A LOCAL ROAD
- PROPOSED LEFT AND RIGHT TURN LANE
- PERFORMING MICROMILL AND OVERLAY – INCREASE STRUCUTRAL INTEGRITY
  - WEDGING AS NECESSARY TO ACEHIEVE 2% CROSS SLOPES
- UPGRADING DRAINAGE SWALES
- UPGRADING EXISTING CROSS ROAD PIPE
- 10' WIDE SHARED USE PATH ALONG FRONTAGE



OLD MILL ROAD TYPICAL SECTION
NOT TO SCALE

TRAFFIC GENERATION - OLD MILL RD (SCR 349)

(FULL MOVEMENT)



TRAFFIC GENERATION DIAGRAM

ADT PEAK HOUR (A.M.), ADT PEAK HOUR [P.M.]

[1] DIRECTIONAL DISTRIBUTION PROVIDED BY DELDOT
[2] DIRECTIONAL DISTRIBUTION PROVIDED BY ITE MANUAL

ROAD TRAFFIC DATA:

FUNCTIONAL CLASSIFICATION - S349 (OLD MILL RD.) - LOCAL ROAD
POSTED SPEED LIMIT - 45 MPH
AADT = 3,825 TRIPS (FROM 2018 DELDOT TRAFFIC SUMMARY)
DIRECTIONAL DISTRIBUTION [1]
10 YEAR PROJECTED AADT= 1.16 x = 3,825 TRIPS = 4,437 TRIPS
10 YEAR PROJECTED AADT + SITE ADT = 5,525 TRIPS
TRAFFIC PATTERN GROUP = 4 (FROM 2018 DELDOT TRAFFIC SUMMARY)
PEAK HOUR - 13.88% x 4,437 TRIPS = 616 TRIPS
TRUCK VOLUME - N/A

SITE TRAFFIC DATA:

SOURCE: ITE TRIP GENERATION MANUAL 10TH EDITION[2]

EXISTING LAND USE: VACANT FIELD
TOTAL ADT FOR SITE = 0 TRIPS
PROPOSED LAND USE:
MULTIFAMILY HOUSING (MID RISE) (ITE 221)
200 UNITS - T=5.45(X)-1.75 = 1,088 TRIPS (WEEKDAY)
200 UNITS - T=3.04(X)+417.11 = 1,025 TRIPS (SATURDAY)

PEAK HOUR OF ADJACENT STREET TRAFFIC:
AM: Ln(T) = 0.98Ln(X)-0.98 = 68 TRIPS (WEEKDAY) [26% / 74%]
PM: Ln(T) = 0.96Ln(X)-0.63 = 86 TRIPS (WEEKDAY) [61% / 39%]
T=0.42(X)+6.73 = 91 TRIPS (SATURDAY)
DIRECTIONAL DISTRIBUTION:
70% TO AND FROM THE EAST (762 TRIPS) (48)[60]
30% TO AND FROM THE WEST (326 TRIPS) (20)[26]
TOTAL NEW TRIPS = 1,088 ADT

ITE TRIP GENERATION MANUAL, 10TH EDITION

DELDOT - RAILWAY RD. IMPROVEMENTS

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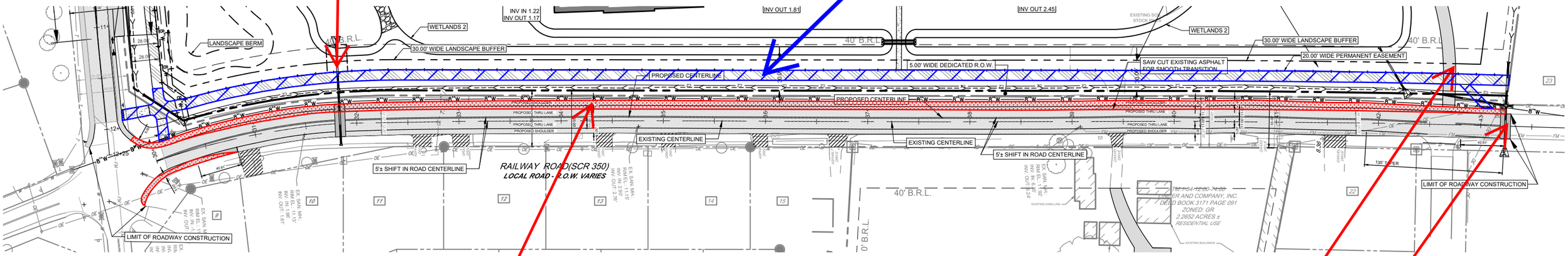

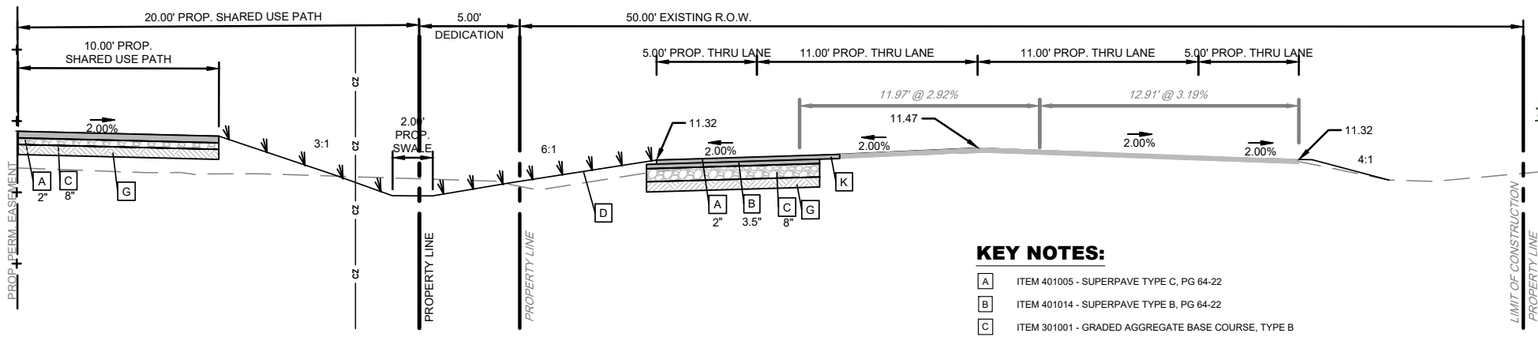

RAILWAY ROAD TYPICAL SECTION

NOT TO SCALE

KEY NOTES:

- A — ITEM 401005 - SUPERPAVE TYPE C, PG 64-22
- B — ITEM 401014 - SUPERPAVE TYPE B, PG 64-22
- C — ITEM 301001 - GRADED AGGREGATE BASE COURSE, TYPE B
- D — ITEM 908004 - TOPSOIL, 6" DEPTH OR ITEM 908010 - TOPSOILING, 6" DEPTH ITEM 908014 - PERMANENT GRASS SEEDING, DRY GROUND
- E — ITEM 209006 - BORROW, TYPE F
- F — ITEM 908020 - EROSION CONTROL BLANKET MULCH, TYPE 3 FOR 1 ROLL WITH MINIMUM 6' OF WIDTH
- G — PROOF ROLLED AND COMPACTED SUBGRADE TO 95% OF ASTM D1557
- H — ITEM 701014 - PORTLAND CEMENT CONCRETE CURB - TYPE 2
- I — ITEM 401036 - SUPERPAVE TYPE C, PG 64-22, WEDGE FOR ¾" MILLING AND 2" OVERLAY
- J — REQUIRED SAFETY EDGE PER STANDARD DELDOT DETAIL
- K — PAVEMENT TIE IN DETAIL (5/CT0202)

RAILWAY ROADWAY IMPROVMENTS

- ROADWAY WIDENING TO PROVIDE 11' TRAVEL LANES AND 5' SHOULDER PER DELDOT FUNCTIONAL CLASSIFICATION OF A LOCAL ROAD
  - ROAD CENTERLINE SHIFT TO EVANS FARM DUE TO CONFLICT AND LACK OF ROW ON OPPOSITE SIDE OF ROAD
- PERFORMING MICROMILL AND OVERLAY – INCREASE STRUCUTRAL INTEGRITY
  - WEDGING AS NECESSARY TO ACEHIEVE 2% CROSS SLOPES
- UPGRADING DRAINAGE SWALES
- UPGRADING EXISTING CROSS ROAD PIPE
- 10' WIDE SHARED USE PATH ALONG FRONTAGE
- 12' WIDE ACCESS FOR EMERGENCY VEHICLES

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. BOX 778
DOVER, DELAWARE 19903

JENNIFER COHAN
SECRETARY

MEMORANDUM

TO: Susanne Laws, Sussex Review Coordinator

FROM: Troy Brestel, Project Engineer TEB

DATE: October 1, 2019
Revised October 3, 2019

SUBJECT: **Evans Farm - Apartments (Protocol Tax Parcel #134-12.00-74.00)**
Area Wide Study Fee and Off-site Improvements

The subject development meets DelDOT's volume warrants to pay the Area Wide Study Fee in lieu of doing a Traffic Impact Study (TIS). This memorandum is to address the amount of that fee and the off-site improvements that should be required of the developer in the absence of a TIS. The fee and improvements presented below are an alternative to the developer doing a TIS and the improvements identified through DelDOT's review of that study.

1) The proposed development consists of 200 multi-family residential units. Per Land Use Code 221 from the 10th edition of the Institute of Transportation Engineers' Trip Generation Manual, the proposed development would generate 1,088 average daily trips. The fee is calculated at ten dollars per daily trip. For the proposed development, the fee would be $10,880.00.

2) The developer should improve Old Mill Road, from Railway Road to the western edge of the site frontage, to local road standards, which include 11-foot travel lanes and 5-foot shoulders. The developer should contact DelDOT's Development Coordination Section on the details of this improvement.

3) The developer should improve Railway Road, from Old Mill Road to the northern edge of the site frontage, to local road standards, which include 11-foot travel lanes and 5-foot shoulders. The developer should contact DelDOT's Development Coordination Section on the details of this improvement.

If you have any additional questions or comments, please let me know.

TB:km
cc: Andrea Finerosky, Pettinaro Construction, Inc.
Alan Decktor, Pennoni Associates, Inc.
Michael Simmons, Assistant Director, Project Development South, DOTS
J. Marc Coté, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Traffic Studies Manager, Traffic, DOTS
Gemez Norwood, South District Public Works Manager, South District, DOTS
Claudy Joinville, Project Engineer, Development Coordination
Brian Yates, Johnson, Mirmiran & Thompson, Inc.

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Milton, DE 19968
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www.pennoni.com

September 26, 2019
(Revised October 4, 2019)
PETIX19002

Date of Meeting:	September 26, 2019
Subject:	Pre-Submittal Project Meeting
Meeting Location:	DelDOT Office, Dover DE
Prepared by:	Alan Decktor

RE: DelDOT Meeting Minutes
Evans Farm Apartment Complex – Old Mill Road & Railway Road
Millville, DE

Attendees:

Susanne Laws – DelDOT
Brian Yates – DelDOT
James Argo – DelDOT
Alan Decktor – Pennoni
Doug Barry – Pennoni
Andrea Finerosky - Owner

Items Discussed:

1. Introduction of project; project site is 50+/- acre property consisting of grass fields and woods which will be developed in an apartment complex with 17 building and 200 units along with a clubhouse and other amenities. The property is located on the corner of Old Mill Road and Railway Road with the proposed entrance located on Old Mill Road. Proper dedication for local roads will be established along with the 15' wide PE.
2. The TGD was coordinated and accepted by DelDOT prior to this meeting; we are showing a total of 1078 trips which will apply to an Area Wide Study fee. An updated TGD was sent post meeting with 1088 trips to represent 200 units, not 198. The proposed trip generation requires a left and right turn lane per the Aux. worksheet. Due to the widening of the road not only for the aux lanes, but to bring the roadways up to functional classification along the property frontage on Old Mill Road and Railway Road and to the limits of the auxiliary lane tapers; a core request will be submitted to determine the condition of the existing roadway. DelDOT assumes a 2"overlay but will confirm with the lab. The butt joints will extend through the intersection.
3. The site will be viewed as a Commercial Entrance not a Subdivision Entrance when submitting in the PDCA and completing the initial stage fee calculation based upon the number of units. The AWS fee shall be paid in conjunction with the Initial Stage Fee.
4. The entrance will be designed for a WB-50 for construction equipment while only a SU-30 for typical use. The entrance will be used for construction activities as a long term second SCE is not viable.
5. We discuss a potential emergency access connecting onto Railway Road. We discussed how this is being required more and more from Sussex County P&Z Commission. We discussed how best to tie into the roadway and it was recommended with removable bollards on the back side of the SUP. The DelDOT lab will determine adequate pavement sections for the emergency access tie-in area.
6. The roadway will require widening and the clear zones must be calculated for correct distances between edge of rad and utility poles per AASHTO requirements.
7. We will be reaching out to DTC for potential bus stop requirements.

8. DelDOT will determine if the road is in good condition and if a overlay or mill/overlay will be required for either road. It was stated that any utility manholes located in the pavement would require a new 12" wide and 18" deep concrete collar.
9. The site is in a Level 3 State Investment area, but the SUP will be required due to the developing area and existing pathways adjacent to the property. A 10' wide SUP will be installed within the 15' PE along the property roadway frontage. We will connect the path to an existing path if legally allowed per established or obtainable easements. The SUP will a connection to Old Mill Road per our proposed entrance and an internal connection along the Railway Road frontage is required unless the emergency access road is ADA complaint. DelDOT is checking to see what type of ADA ramp may be required at the intersection.
10. ~~During the PLUS review, DelDOT reviewed an old TIS done for an adjacent property and all items were addressed except one. A recommendation which may be a requirement is to upgrade Railway Road from the intersection down to Atlantic Avenue. We reviewed the existing condition of the road and due to ROW acquisition, drainage issues, utility infrastructure and residential dwellings it may be unlikely to make happen. DelDOT is performing a more detailed review of this recommendation.~~ This item has been resolved and is no longer applicable.
11. A site plan with additional comments is located on the PDCA and has been downloaded for reference.

The summary listed above reflects our best recollection of the items presented and discussed. Please do not hesitate to advise us if any items are missing, incomplete or inaccurate.

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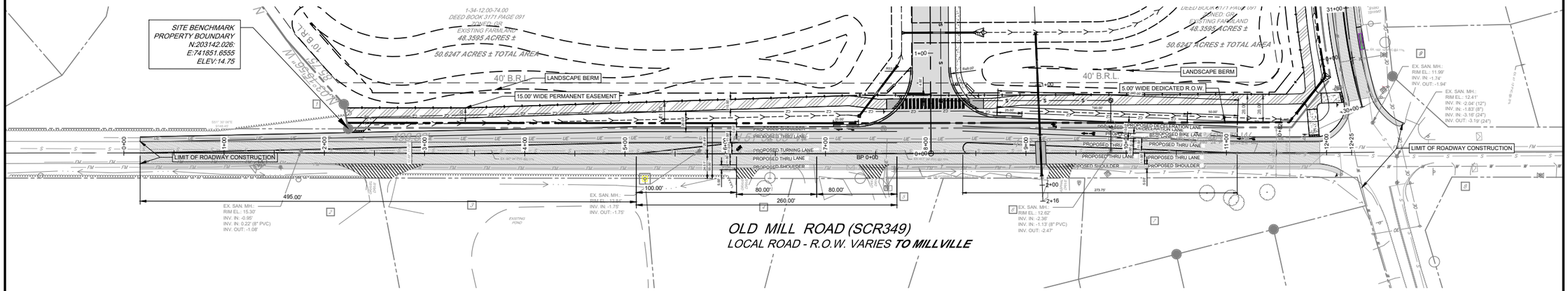

LEGEND

- STORMPIPE, INLET, MANHOLE & FLARED END
- FULL DEPTH PAVEMENT
- 2" OVERLAY WITH WEDGING AS NEEDED
- CONCRETE
- SHARED USE PATH
- CENTERLINE SWALE
- CLEAR ZONE

PENNONI ASSOCIATES INC.
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ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
OCEAN VIEW, DE

OLD MILL ROAD CONSTRUCTION PLANS

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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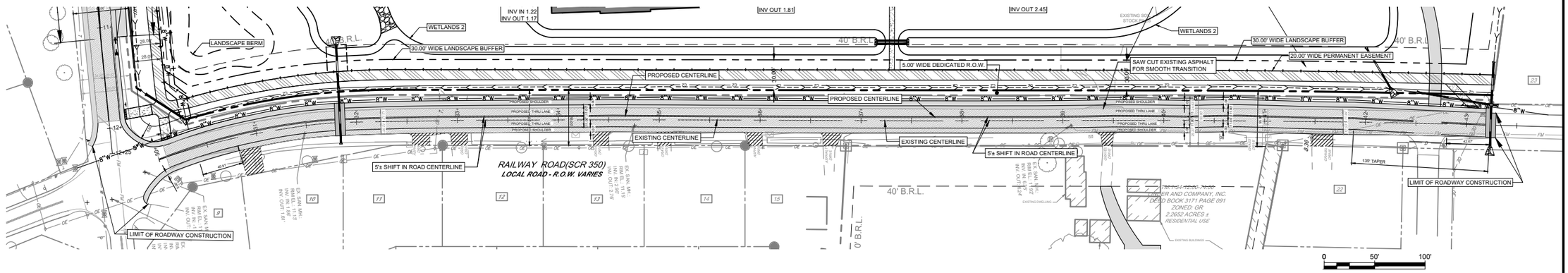
PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=50'
DRAWN BY	LS/TPM
APPROVED BY	AMD

EX0001

SHEET 1 OF 2

U:\Accounts\PETIX\PETIX19002 – Evans Farm Apartments\DESIGN_SHEETS\EX0001.dwg PLOTTED: 2/3/2021 4:22 PM, BY: Logan Strickland PLOTSTYLE: Pennoni NCS.ctb PROJECT STATUS: —



CONSTRUCTION PLAN

SCALE: 1" = 50'

LEGEND

- STORMPIPE, INLET, MANHOLE & FLARED END
- FULL DEPTH PAVEMENT
- 2" OVERLAY WITH WEDGING AS NEEDED
- CONCRETE
- SHARED USE PATH
- CENTERLINE SWALE
- CLEAR ZONE

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Milton, DE 19968
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ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
OCEAN VIEW, DE

RAILWAY ROAD CONSTRUCTION PLANS

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	1"=50'
DRAWN BY	LS/TPM
APPROVED BY	AMD

EX0002

SHEET 2 OF 2

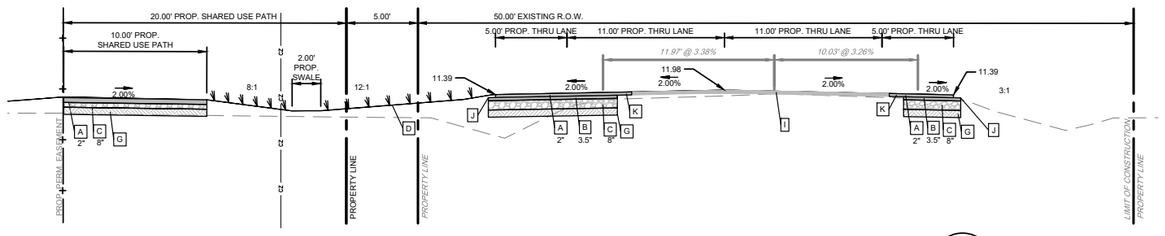
U:\Accounts\PETIX\PETIX19002 - Evans Farm Apartments\DESIGN_SHEETS\EX0002.dwg PLOTTED: 2/3/2021 4:23 PM, BY: Logan Strickland PLOTSTYLE: Pennoni WCS.ctb PROJECT STATUS: —

GENERAL NOTES:

1. THIS SITE WILL BE CONSTRUCTED AS A SINGLE PHASE.
2. THIS PLAN DOES NOT VERIFY THE EXISTENCE, OR NONEXISTENCE, OF EASEMENT OR RIGHT OF WAYS CROSSING THE SUBJECT PROPERTY.
3. BASED UPON FLOOD INSURANCE RATE MAP (FIRM) NUMBER 10005C0511K, DATED MARCH 16, 2015, THE PROPERTY IS LOCATED IN AN AREA DESIGNATED AS FLOOD ZONE 'X', UNSHADED, WHICH IS AN AREA DETERMINED TO BE OUTSIDE THE 500 YEAR FLOOD PLAIN AE.
4. TOPOGRAPHICAL SURVEY PERFORMED BY PENNONI ASSOCIATES, INC. MILTON, DE
5. THERE IS A SMALL AREA OF WETLANDS IN THE NORTHEAST CORNER OF THE PROPERTY.
6. DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. ALL WORK MUST BE PERFORMED IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, AS AMENDED AND ALL RULES AND REGULATIONS THERETO APPURTENANT.
7. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO LOCATE PROPERTY LINES AND RIGHT OF WAY LINES PRIOR TO CONSTRUCTION AND AVOID CONSTRUCTION ACTIVITIES ON PRIVATE PROPERTY AND/OR RIGHTS OF WAYS WHERE SAID CONSTRUCTION IS PROHIBITED. THE CONTRACTOR MAY CONDUCT CONSTRUCTION ACTIVITIES ON PRIVATE PROPERTY PROVIDED IF HE HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE PROPERTY OWNER AND HAS SUBMITTED A COPY OF SAID WRITTEN PERMISSION TO THE OWNER
8. FINAL SET OF APPROVED CONSTRUCTION PLANS AND SPECIFICATIONS SHALL BE MAINTAINED ON THE JOB SITE AT ALL TIMES. FAILURE TO COMPLY WITH THIS PROVISION SHALL BE CONSIDERED CAUSE TO STOP THE WORK.
9. THE CONTRACTOR SHALL MAINTAIN ONE COMPLETE SET OF CONTRACT DRAWINGS ON WHICH HE SHALL NOTE, IN RED, THE ALIGNMENTS AND INVERTS OF ALL UNDERGROUND UTILITIES INSTALLED OR ENCOUNTERED DURING THE PROSECUTION OF THE WORK. ALL DISCREPANCIES BETWEEN THE PLAN LOCATIONS AND ELEVATIONS OF BOTH EXISTING AND PROPOSED UTILITIES SHALL BE SHOWN ON THE AS-BUILT DRAWINGS TO BE MAINTAINED BY THE CONTRACTOR IN THE FIELD.
10. THE CONTRACTOR SHALL OPEN ONLY THAT SECTION OF TRENCH OR ACCESS PITS WHICH CAN BE BACKFILLED AND STABILIZED AT THE END OF EACH WORKING DAY. STEEL PLATES SHALL BE USED ON ANY TRENCH OR ACCESS PITS WHICH MUST REMAIN OPEN OVERNIGHT. THIS REQUIREMENT DOES NOT APPLY TO AREAS COMPLETELY CLOSED AND SECURE FROM VEHICULAR OR PEDESTRIAN TRAFFIC.
11. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS, AND PRODUCTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE INTENDED WORK.
12. ROUTINE PERIODIC INSPECTIONS DURING CONSTRUCTION WILL BE PROVIDED BY THE OWNER. THESE INSPECTIONS DO NOT RELIEVE THE CONTRACTOR FROM HIS OBLIGATION AND RESPONSIBILITY FOR CONSTRUCTING ALL WORK IN STRICT ACCORDANCE WITH ALL STANDARDS AND SPECIFICATIONS AND CONSTRUCTION DOCUMENTS.
13. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES, REGULATIONS AND ORDERS OF ANY PUBLIC BODY HAVING JURISDICTION. THE CONTRACTOR SHALL ERECT AND MAINTAIN, AS REQUIRED BY THE CONDITIONS AND PROGRESS OF THE WORK, ALL NECESSARY SAFEGUARDS FOR SAFETY AND PROTECTION.
14. THE CONTRACTOR SHALL NOTIFY THE FOLLOWING, TWO (2) WEEKS PRIOR TO THE START OF CONSTRUCTION:
    - THE OWNER
    - SUSSEX CONSERVATION DISTRICT
15. THE CONTRACTOR SHALL PROVIDE SEDIMENT CONTROL MEASURES TO PROTECT STOCKPILE AREAS AND STORAGE AREAS. ALL AREAS USED BY THE CONTRACTOR FOR STAGING OPERATIONS SHALL BE FULLY RESTORED BY THE CONTRACTOR UPON COMPLETION OF THE PROJECT. IF THE STAGING AREA IS PAVED, IT SHALL BE RESTORED TO ITS ORIGINAL CONDITION. IF THE STAGING AREA IS UNPAVED, IT SHALL BE RE-GRADED, TOPSOILED, SEEDED AND MULCHED TO THE SATISFACTION OF THE ENGINEER. ALL COSTS ASSOCIATED WITH RESTORATION OF THE STAGING AREA SHALL BE AT THE CONTRACTOR'S EXPENSE. IF THE ENGINEER DETERMINES THAT A SATISFACTORY STAND OF GRASS DOES NOT EXIST AT THE TIME OF FINAL INSPECTION, ALL COSTS ASSOCIATED WITH RE-ESTABLISHING A SATISFACTORY STAND OF GRASS SHALL BE AT THE CONTRACTOR'S EXPENSE.
16. EQUIPMENT AND/OR STOCKPILE MATERIAL SHALL NOT BE STORED IN THE DRIPLINE AREA OF ANY TREE.
17. THE CONTRACTOR SHALL PROVIDE TEMPORARY SEED AND MULCH FOR ALL AREAS WHERE SOIL IS EXPOSED AND SILT FENCE IS NOT SPECIFIED, BY THE CLOSE OF EACH BUSINESS DAY.
18. THE CONTRACTOR SHALL MAINTAIN PUBLIC ROADS AND STREETS IN A BROOM SWEPT CONDITION AT ALL TIMES.
19. DELAWARE REGULATIONS PROHIBIT THE BURIAL OF CONSTRUCTION DEMOLITION DEBRIS, INCLUDING TREES AND STUMPS ON CONSTRUCTION SITES. ANY SOLID WASTE FOUND DURING THE EXCAVATION FOR STRUCTURES AND UTILITY LINES ON AND OFF SITE MUST BE REMOVED AND PROPERLY DISCARDED. ANY REMEDIAL ACTION REQUIRED IS THE RESPONSIBILITY OF THE CONTRACTOR.
20. THE CONTRACTOR SHALL REMOVE AND IMMEDIATELY REPLACE, RELOCATE, RESET OR RECONSTRUCT ALL OBSTRUCTIONS IN THE WORK AREA, INCLUDING, BUT NOT LIMITED TO, MAILBOXES, SIGNS, LANDSCAPING, LIGHTING, PLANTERS, CULVERTS, DRIVEWAYS, PARKING AREAS, CURBS, GUTTERS, FENCES, OR OTHER NATURAL OR MAN-MADE OBSTRUCTIONS. TRAFFIC CONTROL REGULATORY, WARNING AND INFORMATION SIGNS SHALL REMAIN FUNCTIONAL AND VISIBLE TO THE APPROPRIATE LANES OF TRAFFIC AT ALL TIMES, WITH THEIR RELOCATION KEPT TO A MINIMUM DISTANCE.
21. CONTRACTOR TO STAKEOUT PROPERTY LINE AND ENSURE NO DISTURBANCE TAKES PLACE BEYOND PROPERTY LINE.
22. GUY WIRES ARE TO BE PROTECTED AND MAINTAINED.

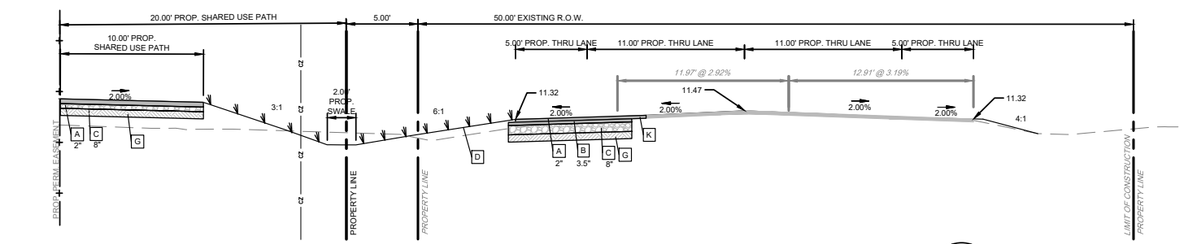
DELDOT GENERAL NOTES (REVISED 08/21/2019):

1. ALL ENTRANCES SHALL CONFORM TO THE DELAWARE DEPARTMENT OF TRANSPORTATION'S (DELDOT'S) CURRENT DEVELOPMENT COORDINATION MANUAL AND SHALL BE SUBJECT TO ITS APPROVAL.
2. ALL MATERIALS AND WORKMANSHIP WITHIN THE STATE OF DELAWARE RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH CURRENT STATE OF DELAWARE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SUPPLEMENTAL SPECIFICATIONS, STANDARD CONSTRUCTION DETAILS, SPECIAL PROVISIONS, PAS MANUAL AND DESIGN GUIDANCE MEMORANDUMS.
3. ALL DISTURBED AREAS WITHIN THE STATE RIGHT-OF-WAY, BUT NOT IN THE PAVEMENT, SHALL BE TOP-SOILED (6" MINIMUM), FERTILIZED, SEEDED AND MULCHED. IF SOD IS USED NEXT TO SIDEWALK OR SHARED-USE PATH, CONTRACTOR SHALL GRADE TOPSOIL ADJACENT TO THE SIDEWALK OR SHARED-USE PATH PRIOR TO PLACEMENT OF SOD TO ENSURE THAT SOD IS PLACED FLUSH OR JUST BELOW EDGE OF SIDEWALK OR SHARED-USE PATH TO AVOID WATER PONDING ON THE SIDEWALK OR SHARED-USE PATH.
4. A 72-HOUR (MINIMUM) NOTICE SHALL BE GIVEN TO THE DELDOT DISTRICT PERMIT SUPERVISOR PRIOR TO STARTING ENTRANCE CONSTRUCTION.
5. MISS UTILITY OF DELAWARE SHALL BE NOTIFIED THREE (3) CONSECUTIVE WORKING DAYS PRIOR TO EXCAVATION, AT 1-800-282-8555.
6. THE DEVELOPER SHALL BE REQUIRED TO FURNISH AND PLACE RIGHT-OF-WAY MONUMENTS IN ACCORDANCE WITH DELDOT'S DEVELOPMENT COORDINATION MANUAL.
7. AT THE DISCRETION OF THE PUBLIC WORKS INSPECTOR, ANY DAMAGED OR MISSING CURB OR SIDEWALK FOUND ON SITE WILL NEED TO BE REPAIRED OR REPLACED TO MEET CURRENT DELDOT STANDARDS.
8. ALL SIGNING, STRIPING AND MAINTENANCE OF TRAFFIC IS THE CONTRACTOR'S RESPONSIBILITY AND SHALL FOLLOW THE GUIDELINES SHOWN IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (DELAWARE MUTCD) FOR STREETS AND HIGHWAYS (LATEST EDITION AT THE DATE OF THE ENTRANCE PERMIT APPROVAL). THE DEVELOPER OR PROPERTY OWNERS SHALL BE RESPONSIBLE FOR MAINTENANCE OF ALL SIGNS INSTALLED AS PART OF THIS PROJECT.
9. PLAN LOCATION AND DIMENSIONS SHALL BE STRICTLY ADHERED TO UNLESS OTHERWISE DIRECTED BY THE DELDOT INSPECTOR.
10. A COPY OF THE-UP-TO DATE APPROVED CONSTRUCTION DOCUMENTS AND DELDOT APPROVAL LETTERS SHALL BE MAINTAINED ON THE PROJECT SITE AT ALL TIMES AND BE AVAILABLE FOR INSPECTION BY DELDOT PERSONNEL.
11. EXISTING UTILITIES ARE SHOWN IN ACCORDANCE WITH THE BEST AVAILABLE INFORMATION. COMPLETENESS OR CORRECTNESS THEREOF IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES INVOLVED IN ORDER TO SECURE THE MOST ACCURATE INFORMATION AVAILABLE AS TO UTILITY LOCATION AND ELEVATION. NO CONSTRUCTION AROUND OR ADJACENT TO UTILITIES SHALL BEGIN WITHOUT NOTIFYING THEIR OWNERS AT LEAST 48-HOURS IN ADVANCE. THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO PROTECT THE EXISTING UTILITIES AND MAINTAIN UNINTERRUPTED SERVICE AND ANY DAMAGE DONE TO THEM DUE TO HIS/HER NEGLIGENCE SHALL BE IMMEDIATELY AND COMPLETELY REPAIRED AT THE CONTRACTOR'S EXPENSE. TO LOCATE EXISTING UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONTACT MISS UTILITY OF DELAWARE (SEE NOTE #5).
12. SHOULD UTILITY RELOCATION BE REQUIRED, THE DEVELOPER MUST SUBMIT A UTILITY RELOCATION PLAN FOR DELDOT REVIEW, ALONG WITH CORRESPONDENCE FROM THE UTILITY COMPANIES STATING PRELIMINARY APPROVAL TO THE RELOCATION AND DESIGN OF THE UTILITIES PRIOR TO THE DELDOT PRE-CONSTRUCTION MEETING. NO PHYSICAL CONSTRUCTION CAN OCCUR UNTIL THE UTILITY PLANS ARE APPROVED, THE INDIVIDUAL UTILITY COMPANIES ISSUE FINAL APPROVAL, AND A DELDOT UTILITY PERMIT IS ISSUED TO THE UTILITY COMPANY.
13. UPON COMPLETION OF THE CONSTRUCTION OF THE SIDEWALK OR SHARED-USE PATH ACROSS THIS PROJECT'S FRONTAGE AND PHYSICAL CONNECTION TO ADJACENT EXISTING FACILITIES, THE DEVELOPER, THE PROPERTY OWNERS OR BOTH ASSOCIATED WITH THIS PROJECT, SHALL BE RESPONSIBLE TO REMOVE ANY EXISTING ROAD TIE-IN CONNECTIONS LOCATED ALONG ADJACENT PROPERTIES, AND RESTORE THE AREA TO GRASS. THESE DISTURBED AREAS SHALL BE TOP-SOILED (6" MINIMUM), FERTILIZED SEEDED AND MULCHED. SUCH ACTIONS SHALL BE COMPLETED AT DELDOT'S DISCRETION, AND IN CONFORMANCE WITH THE DEVELOPMENT COORDINATION MANUAL.
14. DELDOT WILL NOT PROVIDE THE RESPECTIVE LOCAL LAND USE AGENCY WITH A 'NO OBJECTION TO THE ISSUANCE OF THE CERTIFICATE OF OCCUPANCY NOTICE' UNTIL THE ENTRANCE(S) ARE COMPLETED TO THE SATISFACTION OF THE DEPARTMENT.
15. DESIGN, FABRICATION AND INSTALLATION OF ALL PERMANENT SIGNING SHALL BE AS OUTLINED IN THE LATEST VERSION OF THE DELAWARE MUTCD.
16. DESIGN AND INSTALLATION OF ALL PAVEMENT MARKINGS AND STRIPING SHALL BE AS OUTLINED IN THE LATEST VERSION OF THE DELAWARE MUTCD. FOR FINAL PERMANENT PAVEMENT MARKINGS:
    a. EPOXY RESIN PAINT SHALL BE REQUIRED FOR LONG LINE STRIPING.
    b. THERMO PLASTIC (EXTRUDED OR PREFORMED MATERIAL) WILL BE REQUIRED ON ASPHALT SURFACES, FOR SHORT LINE STRIPING, I.E. SYMBOLS/LEGENDS.
    c. PERMANENT PAVEMENT MARKING TAPE (PER DELDOT'S APPROVED MATERIALS LIST) WILL BE REQUIRED ON CONCRETE SURFACES, FOR SHORT LINE STRIPING, I.E. SYMBOLS/LEGENDS.
17. REMOVAL OF PAVEMENT MARKING PAINT OR TAPE SHALL COMPLY WITH SECTION 5.11.2 OF THE DEVELOPMENT COORDINATION MANUAL.
18. BREAKAWAY POSTS SHALL BE USED WHEN INSTALLING ALL SIGNS. REFERENCE DELDOT'S STANDARD CONSTRUCTION DETAILS, SECTION VIII - TRAFFIC, T-15.
19. MAINTENANCE OF THE STREETS WITHIN THIS SUBDIVISION WILL BE THE RESPONSIBILITY OF THE DEVELOPER, THE PROPERTY OWNERS WITHIN THIS SUBDIVISION, OR BOTH. THE STATE OF DELAWARE ASSUMES NO RESPONSIBILITY FOR THE FUTURE MAINTENANCE OF THESE STREETS.
20. THE ENDS OF ALL CURBS SHALL BE TRANSITIONED TO BE FLUSH WITH THE PAVEMENT AT A RATIO OF TWELVE TO ONE (12:1).
21. A DOUBLE YELLOW CENTERLINE WILL BE REQUIRED ALONG THE PAVED PORTION OF OLD MILL ROAD, AND RAILWAY ROAD. STRIPING OF THE CENTERLINE SHALL BE 5-INCH WIDE LINE SEPARATED BY A 6-INCH SPACE.
22. ALL FIXED OBJECTS ARE TO BE A MINIMUM OF 10-FEET FROM THE EDGE OF TRAVEL LANE AND 5-FEET FROM THE EDGE OF PAVEMENT. REFERENCE SECTION 5.5.5 OF THE DEVELOPMENT COORDINATION MANUAL. ANY FIXED OBJECT THAT DOES NOT MEET THIS REQUIREMENT SHALL BE RELOCATED.
23. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL PAVING WITHIN THE STATE OF DELAWARE RIGHT-OF-WAY IS INSTALLED TO THE ELEVATIONS SHOWN AND NO PONDING OF WATER EXISTS AFTER PAVING IS COMPLETE.
24. ALL STORM DRAIN PIPING DESIGNATED AS REINFORCED CONCRETE PIPE IS TO BE REINFORCED CONCRETE PIPE, MEETING AASHTO M-170 SPECIFICATIONS. SEE PLANS FOR SPECIFIC CLASS OF PIPE.
25. ALL PROPOSED CLOSED STORMDRAIN SYSTEMS SHALL BE VIDEO INSPECTED, REPAIRED AS NECESSARY AND APPROVED PRIOR TO THE INSTALLATION OF FINAL PAVING. IF REPAIRS ARE NEEDED, THE REPAIRED PIPE SECTIONS WILL NEED TO BE VIDEO INSPECTED AGAIN BEFORE THE REPAIR CAN BE APPROVED.
26. THE DEVELOPER AND EXISTING/FUTURE OWNER OF NON-STATE-MAINTAINED ROADWAYS SHALL ENSURE THAT THE TRAFFIC CONTROL DEVICES ON SAID ROADWAYS OPEN TO PUBLIC TRAVEL ARE IN COMPLIANCE WITH THE LATEST VERSION OF THE DELAWARE MUTCD.
27. ALL SUBGRADE SHALL BE COMPACTED TO 95% OF THE MAXIMUM STANDARD T-99 DRY DENSITY.
28. THE CONTRACTOR SHALL NOTIFY DART FIRST STATE AT DOT_DETOURS@DELAWARE.GOV AT LEAST 14 DAYS PRIOR TO THE START OF ANY DETOURS OR CONSTRUCTION, AND DOT_DTC_PROJECTDEVELOPMENT@DELAWARE.GOV AT SUCH TIME THE FACILITY IS COMPLETED AND OPERABLE FOR TRANSIT OPERATIONS. FOR EMERGENCY DETOUR INFORMATION ONLY PLEASE CONTACT DTC'S CHIEF SCHEDULER AT 302-576-6019.
29. FOR INFORMATION ON OBTAINING A UTILITY PERMIT IN SUSSEX COUNTY CONTACT M&O-SOUTH DISTRICT-PUBLIC WORKS AT (302) 853-1345.
30. FOR INFORMATION ON GETTING APPROVAL FOR PROPOSED OUTDOOR ADVERTISING IN SUSSEX COUNTY CONTACT M&O-SOUTH DISTRICT-OUTDOOR ADVERTISING & ROADSIDE CONTROL AT (302) 853-1327.
31. MAINTENANCE OF ALL LANDSCAPING SHOWN ON THIS PLAN WILL BE THE RESPONSIBILITY OF THE DEVELOPER, THE HOMEOWNERS ASSOCIATION OR BOTH. THE STATE ASSUMES NO RESPONSIBILITY FOR THE FUTURE MAINTENANCE OF THE LANDSCAPING. DELDOT MUST REVIEW AND APPROVE ANY PLANTINGS PROPOSED WITHIN THE RIGHT-OF-WAY PRIOR TO INSTALLATION. IF ANY PLANTINGS ARE PLANTED WITHOUT DELDOT'S KNOWLEDGE AND/OR APPROVAL, THEN DELDOT HAS THE RIGHT TO HAVE THE DEVELOPER REMOVE THE PLANTINGS, WITH ALL COSTS BEING PAID FOR BY THE DEVELOPER.
32. THE SUBJECT DEVELOPMENT MEETS DELDOT'S VOLUME WARRANTS TO PAY THE AREA WIDE STUDY FEE IN LIEU OF DOING A TRAFFIC IMPACT STUDY (TIS). THIS MEMORANDUM IS TO ADDRESS THE AMOUNT OF THAT FEE AND THE OFFSITE IMPROVEMENTS THAT SHOULD BE REQUIRED OF THE DEVELOPER IN THE ABSENCE OF A TIS. THE FEE AND IMPROVEMENTS PRESENTED BELOW ARE AN ALTERNATIVE TO THE DEVELOPER DOING A TIS AND THE IMPROVEMENTS IDENTIFIES THROUGH DELDOT'S REVIEW OF THAT STUDY.
    32.1. THE PROPOSED DEVELOPMENT CONSISTS OF 200 MULTI-FAMILY RESIDENTIAL UNITS. PER LAND USE CODE 221 FROM THE 10TH EDITION OF THE INSTITUTE OF TRANSPORTATION ENGINEERS' TRIP GENERATION MANUAL, THE PROPOSED DEVELOPMENT WOULD GENERATE 1,088 AVERAGE DAILY TRIPS. FOR THE PROPOSED DEVELOPMENT, THE FEE WOULD BE $10,880.00.
    32.2. THE DEVELOPER SHOULD IMPROVE OLD MILL ROAD, FROM RAILWAY ROAD TO THE WESTERN EDGE OF THE SITE FRONTAGE, TO LOCAL ROAD STANDARDS, WHICH INCLUDE 11-FOOT TRAVEL LANES AND 5 FOOT SHOULDERS. THE DEVELOPER SHOULD CONTACT DELDOT'S DEVELOPMENT COORDINATION SECTION ON THE DETAILS OF THIS IMPROVEMENT.
    32.3. THE DEVELOPER SHOULD IMPROVE RAILWAY ROAD, FROM OLD MILL ROAD TO THE NORTHERN EDGE OF THE SITE FRONTAGE, TO LOCAL ROAD STANDARDS, WHICH INCLUDE 11-FOOT TRAVEL LANES AND 5-FOOT SHOULDERS. THE DEVELOPER SHOULD CONTACT DELDOT'S DEVELOPMENT COORDINATION SECTION ON THE DETAILS OF THIS IMPROVEMENT.



RAILWAY ROAD TYPICAL SECTION A-A STA 30+00.00 -30+75.00
NOT TO SCALE

1
CT0201



RAILWAY ROAD TYPICAL SECTION B-B STA 30+75.00 -43.50.00
NOT TO SCALE

2
CT0201

KEY NOTES:

A	ITEM 401005 - SUPERPAVE TYPE C, PG 64-22
B	ITEM 401014 - SUPERPAVE TYPE B, PG 64-22
C	ITEM 301001 - GRADED AGGREGATE BASE COURSE, TYPE B
D	ITEM 908004 - TOPSOIL, 6" DEPTH OR ITEM 908010 - TOPSOILING, 6" DEPTH ITEM 908014 - PERMANENT GRASS SEEDING, DRY GROUND
E	ITEM 209006 - BORROW, TYPE F
F	ITEM 908020 - EROSION CONTROL BLANKET MULCH, TYPE 3 FOR 1 ROLL WITH MINIMUM 6' OF WIDTH
G	PROOF ROLLED AND COMPACTED SUBGRADE TO 95% OF ASTM D1557
H	ITEM 701014 - PORTLAND CEMENT CONCRETE CURB - TYPE 2
I	ITEM 401036 - SUPERPAVE TYPE C, PG 64-22, WEDGE FOR $\frac{3}{4}$" MILLING AND 2" OVERLAY
J	REQUIRED SAFETY EDGE PER STANDARD DELDOT DETAIL
K	PAVEMENT TIE IN DETAIL (5/CT0202)

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
OCEAN VIEW, DE

PROJECT PLAN NOTES AND DETAILS, RAILWAY ROAD

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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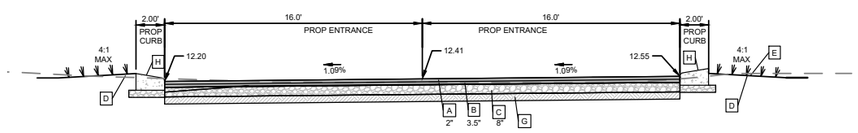
PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	N.T.S
DRAWN BY	LS/TPM
APPROVED BY	AMD

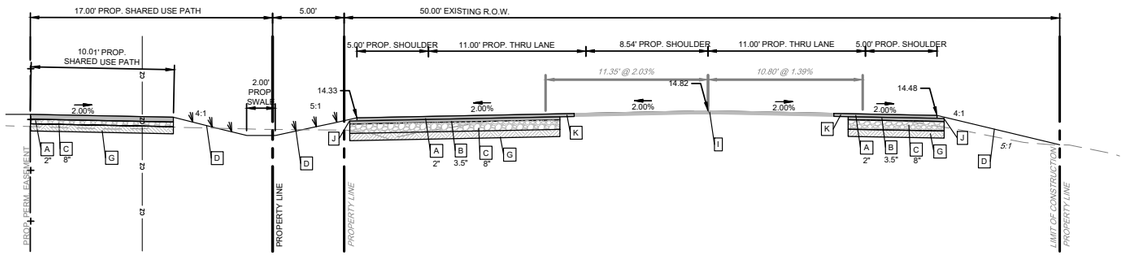
CT0201

SHEET 2 OF 28

U:\Accounts\PETIX\PETIX19002 - Evans Farm Apartments\DESIGN_SHEETS\CT0003.dwg PLOTTED: 2/2/2021 5:06 PM, BY: Logan Strickland PLOTSTYLE: Pennoni NCS.ctb PROJECT STATUS: —



TYPICAL ENTRANCE SECTION A-A — 1 / CT0202
NOT TO SCALE



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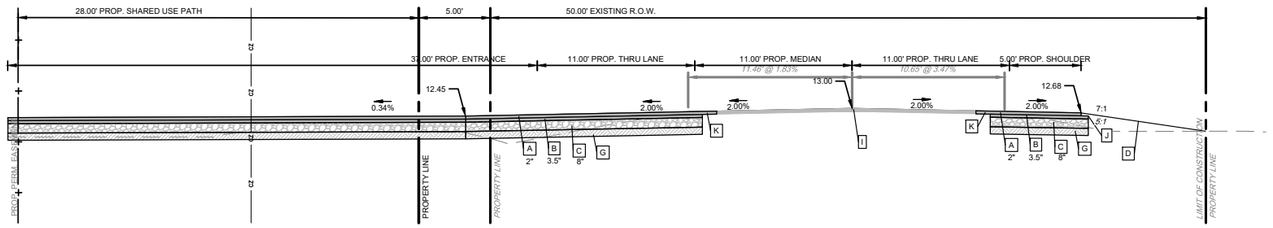
NOT TO SCALE



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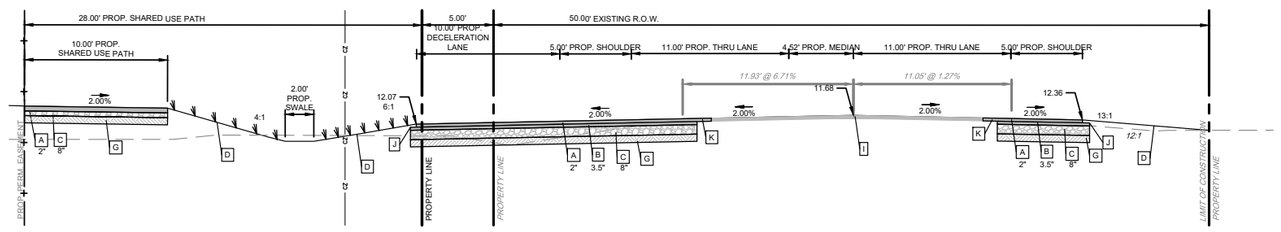
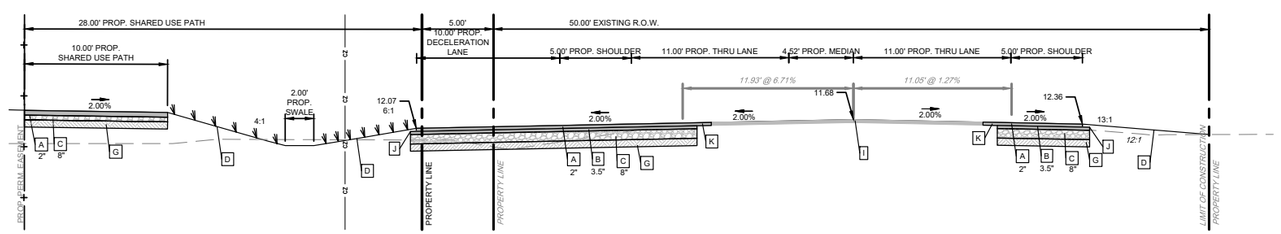
NOT TO SCALE



OLD MILL ROAD TYPICAL SECTION D-D STA 8+95.99 - 11+12.50 — 4 / CT0202
NOT TO SCALE

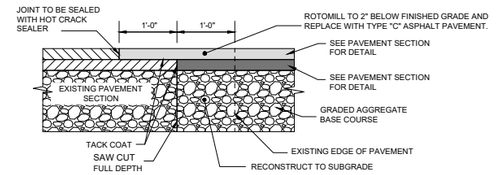


OLD MILL ROAD TYPICAL SECTION E-E STA 11+12.50 - 12+25.00 — 5 / CT0202
NOT TO SCALE

REFER TO SECTIONS ON PLAN VIEW SHEET CT0503

KEY NOTES:

- A — ITEM 401005 - SUPERPAVE TYPE C, PG 64-22
- B — ITEM 401014 - SUPERPAVE TYPE B, PG 64-22
- C — ITEM 301001 - GRADED AGGREGATE BASE COURSE, TYPE B
- D — ITEM 908004 - TOPSOIL, 6" DEPTH OR ITEM 908010 - TOPSOILING, 6" DEPTH ITEM 908014 - PERMANENT GRASS SEEDING, DRY GROUND
- E — ITEM 209006 - BORROW, TYPE F
- F — ITEM 908020 - EROSION CONTROL BLANKET MULCH, TYPE 3 FOR 1 ROLL WITH MINIMUM 6' OF WIDTH
- G — PROOF ROLLED AND COMPACTED SUBGRADE TO 95% OF ASTM D1557
- H — ITEM 701014 - PORTLAND CEMENT CONCRETE CURB - TYPE 2
- I — ITEM 401036 - SUPERPAVE TYPE C, PG 64-22, WEDGE FOR $\frac{3}{4}$" MILLING AND 2" OVERLAY
- J — REQUIRED SAFETY EDGE PER STANDARD DELDOT DETAIL
- K — PAVEMENT TIE IN DETAIL (5/CT0202)



SECTION- HOT-MIX ENTRANCE TIE-IN — 6 / CT0202
SCALE: 1"=1'

PENNONI ASSOCIATES INC.
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ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS
TAX MAP: 134-12.00-74.00
31434 RAILWAY RD.
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PROJECT PLAN NOTES AND DETAILS, OLD MILL ROAD

LINDER AND COMPANY
234 NORTH JAMES ST.
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NO.	DATE	REVISIONS	BY

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PROJECT	PETIX19002
DATE	2020-05-01
DRAWING SCALE	N.T.S
DRAWN BY	TPM/LFS
APPROVED BY	AMD

CT0202

SHEET 3 OF 28

PROJECT STATUS: —
PLOTSTYLE: Pennoni NCS.ctb
PLOTTED: 2/3/2021 5:08 PM, BY: Logan Strickland
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CORE RESULTS

Maintenance #S349 **Road Name:** Old Mill Road **Coring Date:** 10/14/2019

Limits: north of Railway Road and

Core #	Location Description	Lane	Offset	GPS Coordinates	HMA	PCC	ST	ATB	CTB	SC	CR	Stone	Sand	Other	Layer Order
1 NB	300' North of Railway Road	Travel	8 ft. Right Centerline		4.5						5+				
2 NB	787' North of Railway Road	Travel	5 ft. Right Centerline		4						7+				
3 SB	752' North of Railway Road	Travel	8 ft. Right Centerline		4						5			original	

Abbreviations: HMA -Asphalt PCC - Concrete ST - Surface Treatment ATB - Asphalt Treated Base CTB - Cement Treated Base SC - Soil Cement CR - Crusher Run

CORE RESULTS

Maintenance #S350 **Road Name:** Railway Road **Coring Date:** 10/14/2019

Limits: Old Mill Road and

Core #	Location Description	Lane	Offset	GPS Coordinates	HMA	PCC	ST	ATB	CTB	SC	CR	Stone	Sand	Other	Layer Order
1 EB	370' East of Old Mill Road	Travel	9 ft. Right Centerline		2									8+ dirty fill	
2 EB	789' East of Old Mill Road	Travel	5 ft. Right Centerline		2									8+ dirty fill	
3 WB	323' West of Oak Street	Travel	9 ft. Right Centerline		2									4+ dirty fill	

Abbreviations: HMA -Asphalt PCC - Concrete ST - Surface Treatment ATB - Asphalt Treated Base CTB - Cement Treated Base SC - Soil Cement CR - Crusher Run

Single-Family Detached Housing
(210)

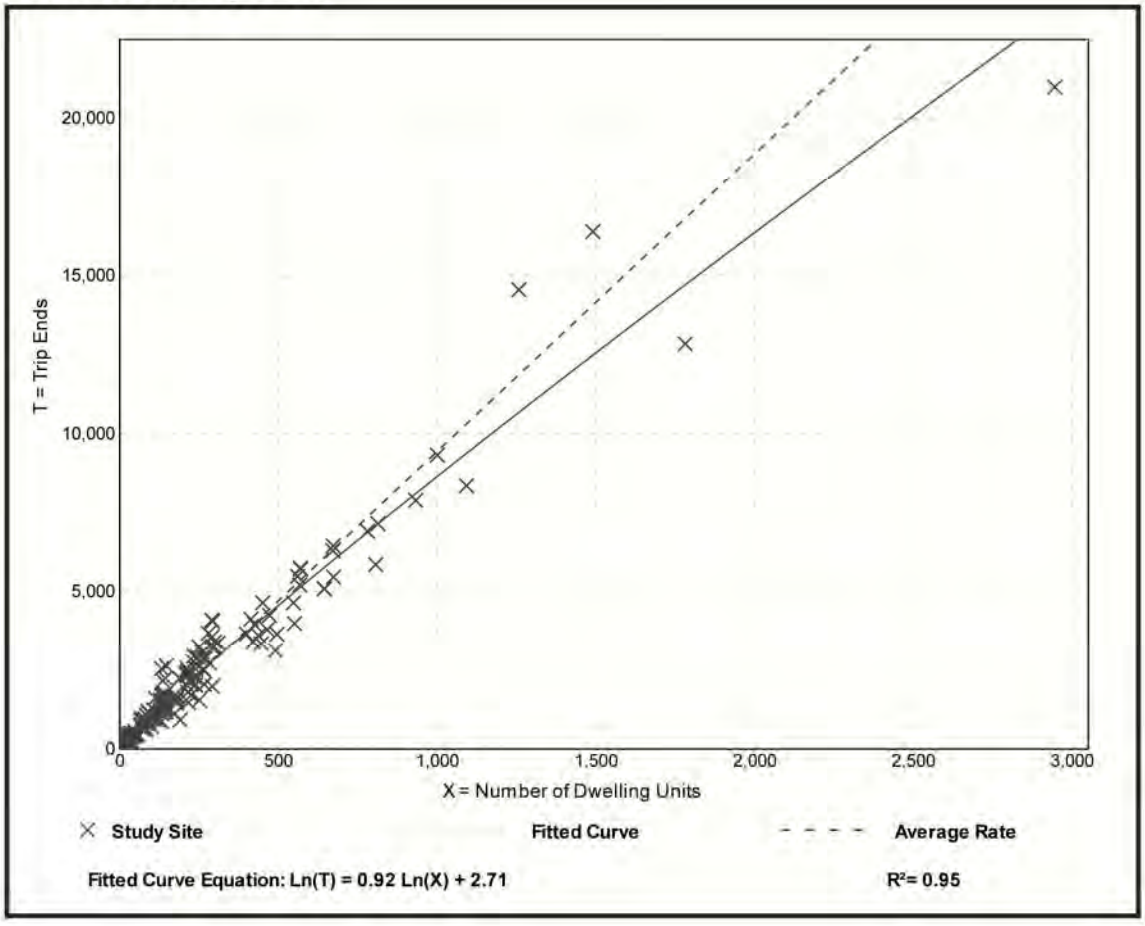
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Multifamily Housing (Mid-Rise)
(221)

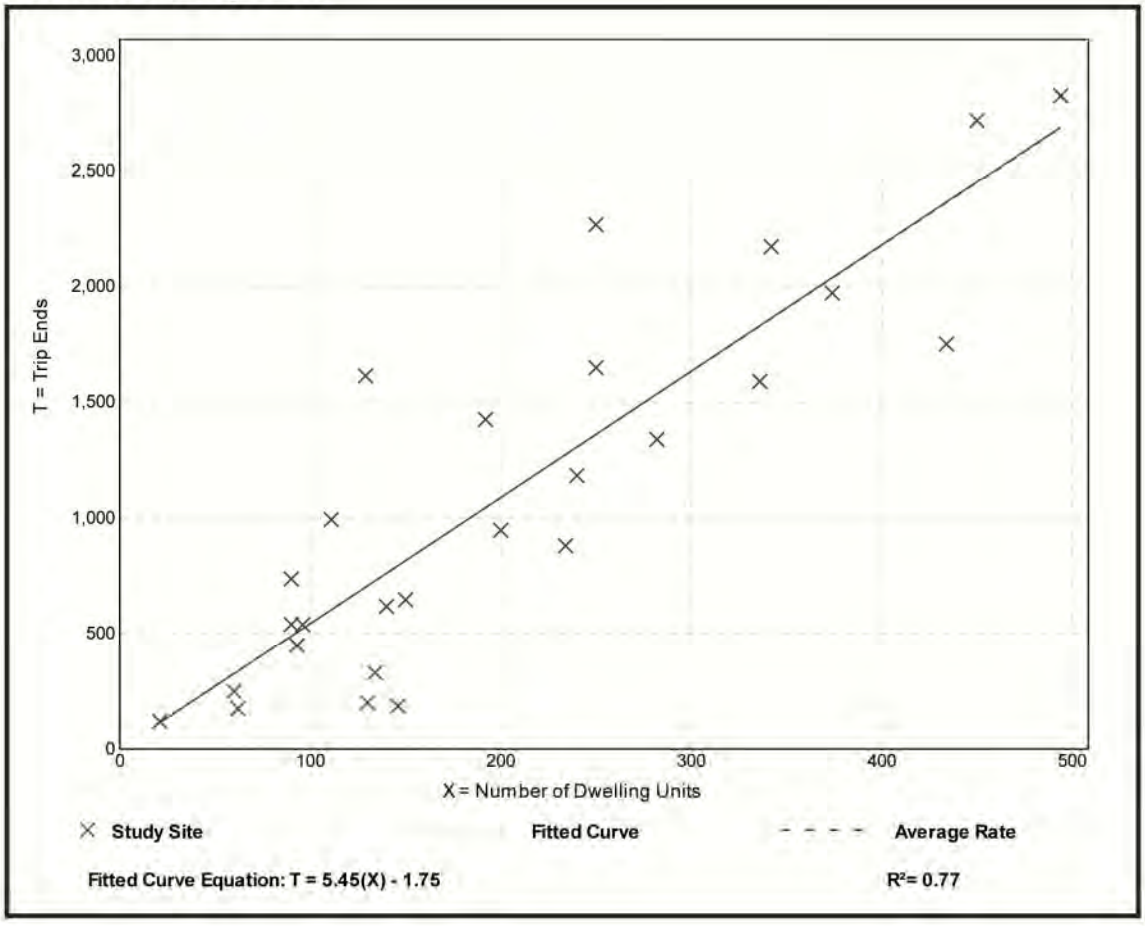
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 27
Avg. Num. of Dwelling Units: 205
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
5.44	1.27 - 12.50	2.03

Data Plot and Equation



TAB 11

STORMWATER

DRAINAGE ANALYSIS: PRE-DEVELOPMENT

Pennoni

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

EXISTING WETLANDS

ANALYSIS POINT

PROPERTY BOUNDARY LINE

BAY FOREST SUBDIVISION

EXISTING CROPS

AP-1

AP-2

DA-1

DA-2

1,237 LF CHANNEL FLOW @ 0.11% SLOPE

273 LF SHALLOW CONCENTRATION @ 0.37% SLOPE

485 LF SHALLOW CONCENTRATION @ 0.21% SLOPE

98 LF SHALLOW CONCENTRATION @ 1.02% SLOPE

350 LF SHALLOW CONCENTRATION @ 0.29% SLOPE

1.19 LF SHALLOW CONCENTRATION @ 1.2% SLOPE

TOPOGRAPHICALLY ISOLATED, NON-TIDAL PALUSTRINE FORESTED WETLAND WITH NO NEXUS TO INTERSTATE COMMERCE.

N/F LINDER AND COMPANY, INC. 1-34-10.00-74.00 DEED BOOK 3171 PAGE 081 ZONED: GR EXISTING FARMLAND 48.3595 ACRES ±

50.6147 ACRES ± TOTAL AREA

RADIUS = 725.00' ARC LENGTH = 209.67' CH. BEARING = S 35°45'37" W CH. LENGTH = 208.94' TANGENT = 105.57'

REDSTART COURT
LOCAL ROAD - R.O.W. VARIES

SCISSORBILL ROAD
LOCAL ROAD - R.O.W. VARIES

GRACKLE CT.
LOCAL ROAD - R.O.W. VARIES

OLD MILL ROAD
LOCAL ROAD - R.O.W. VARIES

RAILWAY ROAD

OLD MILL ROAD

RUNOFF CURVE NUMBER

DRINAGE AREA = 50+/- AC.
WEIGHTED CN = 70

LEGEND

	SOIL A	SOIL B	SOIL D
EXINSTING ROAD OUTSIDE LOD LINE			
GRASS OUTSIDE LOD LINE			
GRASS WITHIN LOD LINE			
ROW CROPS WITHIN LOD LINE			
ROW CROPS OUTSIDE LOD LINE			
WOODS OUTSIDE LOD LINE			
WOODS WITHIN LOD LINE			
1/4 ACRE LOTS			

DRAINAGE AREA REFERENCE LEGEND

- DRAINAGE AREA BOUNDARY
- 1S — SUBAREA DESIGNATION
- 1P — POND
- AP-1 — ANALYSIS POINT
- SOIL BOUNDARY LINE
- TC PATHWAY

SOILS		
TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

DRAINAGE ANALYSIS: POST-DEVELOPMENT

Pennoni

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EXISTING WETLANDS

ANALYSIS POINT

PROPOSED CONSTRUCTED EPHEMERAL WETLAND BMP'S

PROPERTY BOUNDARY LINE

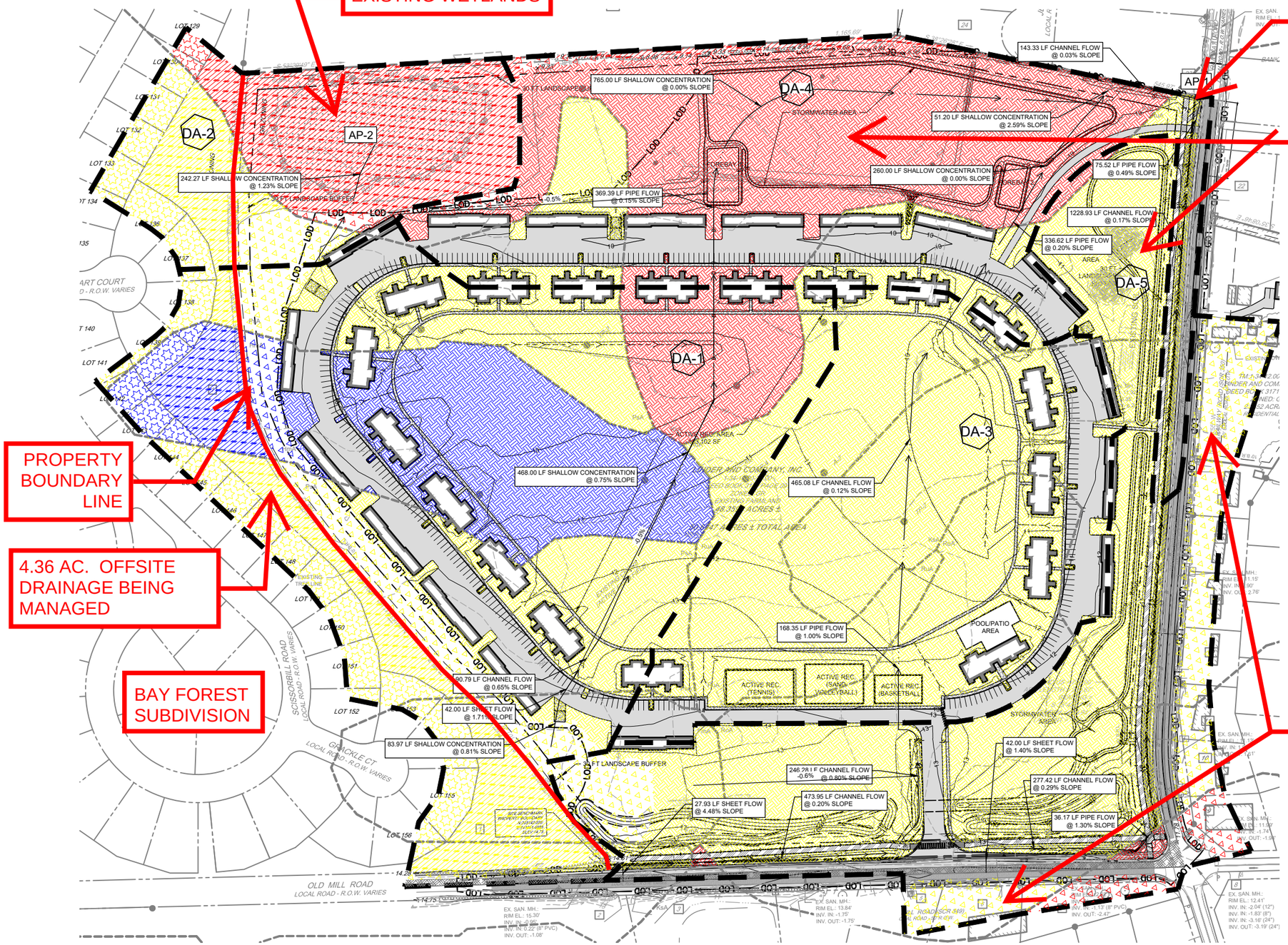
4.36 AC. OFFSITE DRAINAGE BEING MANAGED

BAY FOREST SUBDIVISION

ROADWAY & OFFSITE DRAINAGE BEING MANAGED ON SITE

RUNOFF CURVE NUMBER

DRINAGE AREA = 50+/- AC.
WEIGHTED CN = 60



LEGEND

EXINSTING ROAD OUTSIDE LOD LINE

	SOIL A	SOIL B	SOIL D
GRASS OUTSIDE LOD LINE			
GRASS WITHIN LOD LINE			
ROW CROPS WITHIN LOD LINE			
ROW CROPS OUTSIDE LOD LINE			
WOODS OUTSIDE LOD LINE			
WOODS WITHIN LOD LINE			
1/4 ACRE LOTS			

DRAINAGE AREA REFERENCE LEGEND

- DRAINAGE AREA BOUNDARY
- 1S — SUBAREA DESIGNATION
- 1P — POND
- AP-1 — ANALYSIS POINT
- SOIL BOUNDARY LINE
- TC PATHWAY

SOILS

TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

BMP - EPHEMERAL CONSTRUCTED WETLANDS

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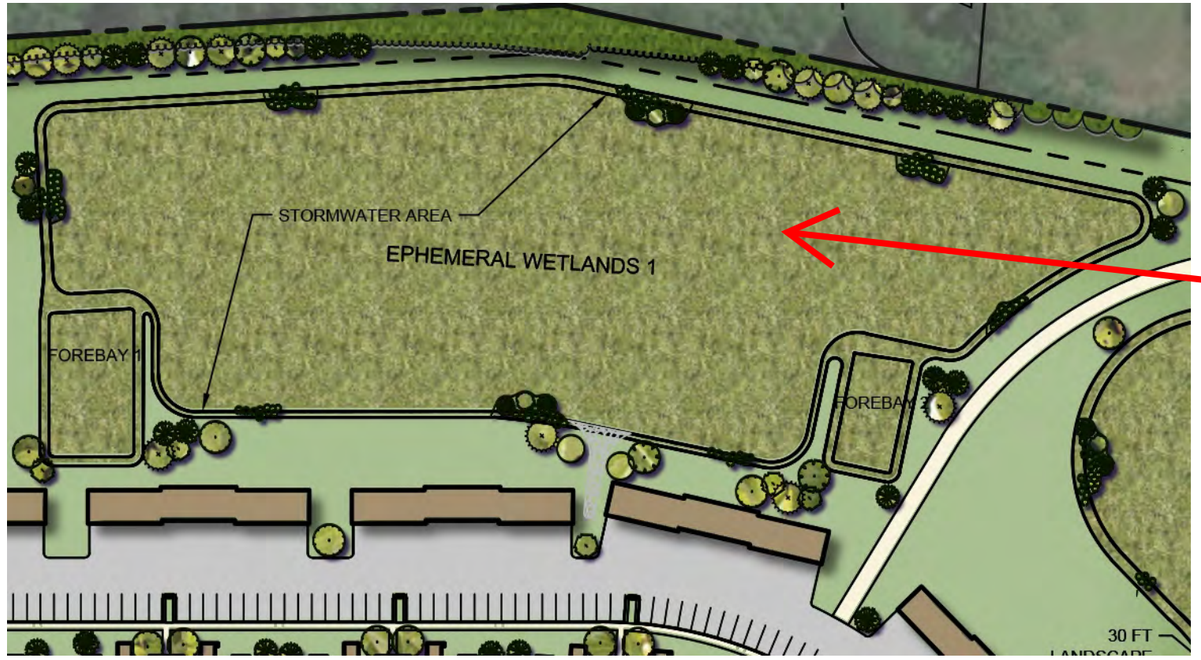

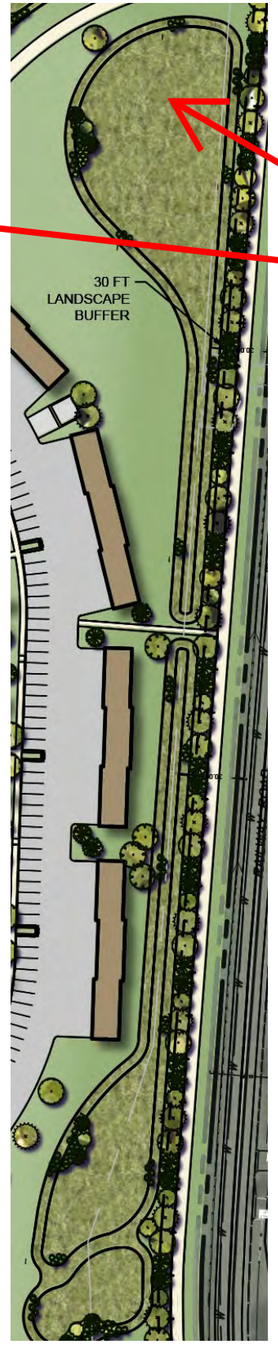

4.6+/- AC. OF PROPOSED CONSTRUCTED WETLANDS



TYPICAL IMAGE - CROSS SECTION

GREEN TECHNOLOGY BEST MANAGEMENT PRACTICES

- CONSTRUCTED WETLANDS MIMIC NATURAL WETLAND AREAS TO TREAT URBAN STORMWATER BY INCOPRORATING PERMANENT POOLS WITH SHALLOW STORAGE AREAS AND WATER TOLERANT VEGATATION
  - SHALLOW DEPTH – 1-2 FEET, NO PERMANENT POOL FOR SAFETY PURPOSES
- WATER QUALIY - PROVIDES LONG RESIDENCE TIME FOR GREATER POLLUTANT REMOVAL
  - GRAVITATIONAL SETTLING, BIOLOGICAL UPTAKE & MICROBIAL ACTIVITY
- REDUCES STORMWATER PEAK FLOWS
- DESIGNED TO WORK WITH HGH GROUNDWATER TABLE
- FOREBAYS FOR PRETREATMENT
- DESIGNED IN ACCORDANCE WITH THE USDA NRCS POND CODE 378
- PROVIDES AESTHETIC AND WILDLIFE HABITAT BENEFITS

- DELAWARE POST CONSTRUCTION STORMWATER BMP STANDARDS & SPECIFICATIONS, DNREC 2/2019

Pollutant Reduction	
TN Reduction	100% of Load Reduction + Not less than 20% Removal Efficiency
TP Reduction	100% of Load Reduction + Not less than 30% Removal Efficiency
TSS Reduction	100% of Load Reduction + Not less than 60% Removal Efficiency

12.0 Constructed Wetlands

Definition: **Practices that mimic natural wetland areas to treat urban stormwater by incorporating permanent pools with shallow storage areas. Constructed Wetlands may provide stormwater detention for larger storms (Cv and Fv) above the RPv storage.**



Design variants include:

- 12-A **Traditional Constructed Wetlands**
- 12-B **Wetland Swales**
- 12-C **Ephemeral Constructed Wetlands**
- 12-D **Submerged Gravel Wetlands**
- 12-E Floating Wetlands (to be added at a later date)

Constructed Wetlands are shallow depressions that receive stormwater inputs for water quality treatment. The majority of the wetland surface area is covered by shallow (<1-foot deep) wetland area, with greater depths in the forebay and pools within the wetland. Wetlands possess variable microtopography to promote dense and diverse wetland cover. Runoff from each new storm displaces runoff from previous storms, and the long residence time allows multiple pollutant removal processes to operate. The wetland environment provides an ideal environment for gravitational settling, biological uptake, and microbial activity.

Submerged Gravel Wetlands (SGW) treat stormwater runoff primarily through filtration, sedimentation, physical and chemical sorption, microbially mediated transformation, uptake, and attenuation. Sedimentation occurs in the pretreatment forebay as well as above the wetland surface. Filtration, sorption, and transformation occur as the stormwater passes through the gravel substrate via microbe rich environment. While uptake occurs from the wetland vegetation most of the treatment is within the gravel substrate in a "plug flow" type system.

The Constructed Wetlands design variants all share commonalities but are also unique in their performance credits.

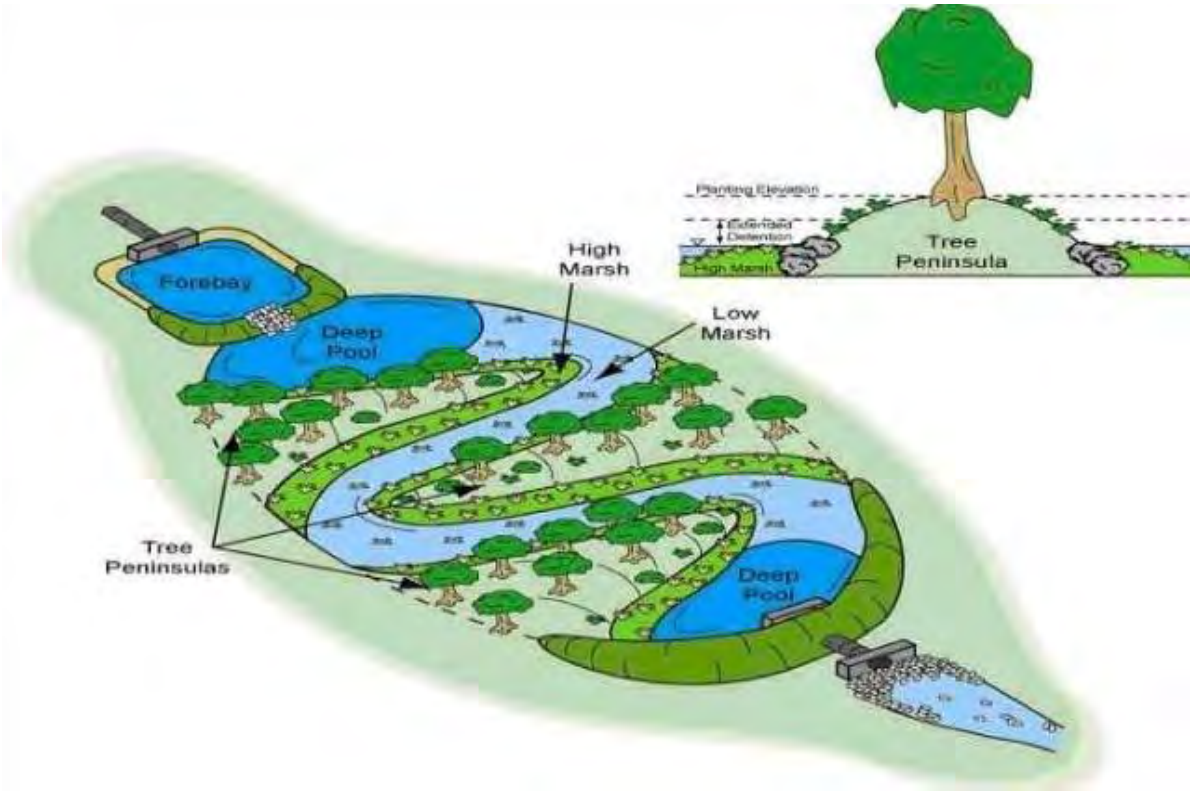

Figure 12.1 Typical Traditional Constructed Wetland

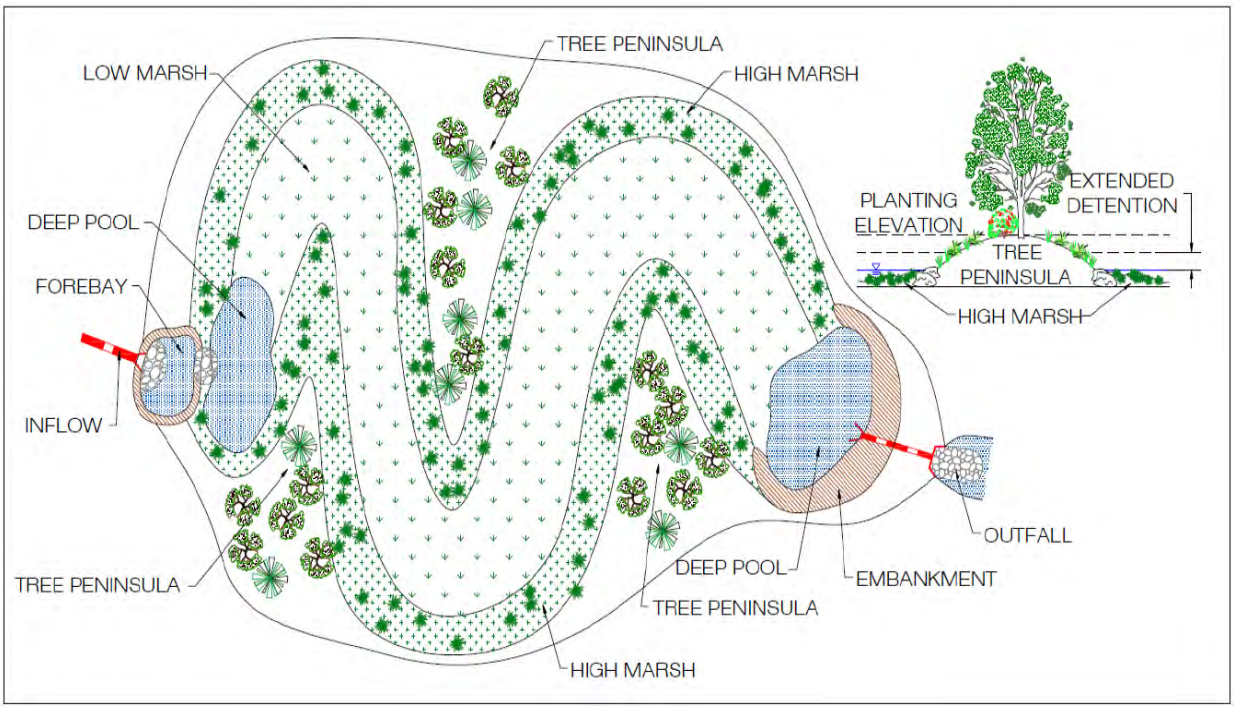

Figure 12.2 Typical Traditional Constructed Wetland Plan View



12.3 Typical Wetland Swale Section View

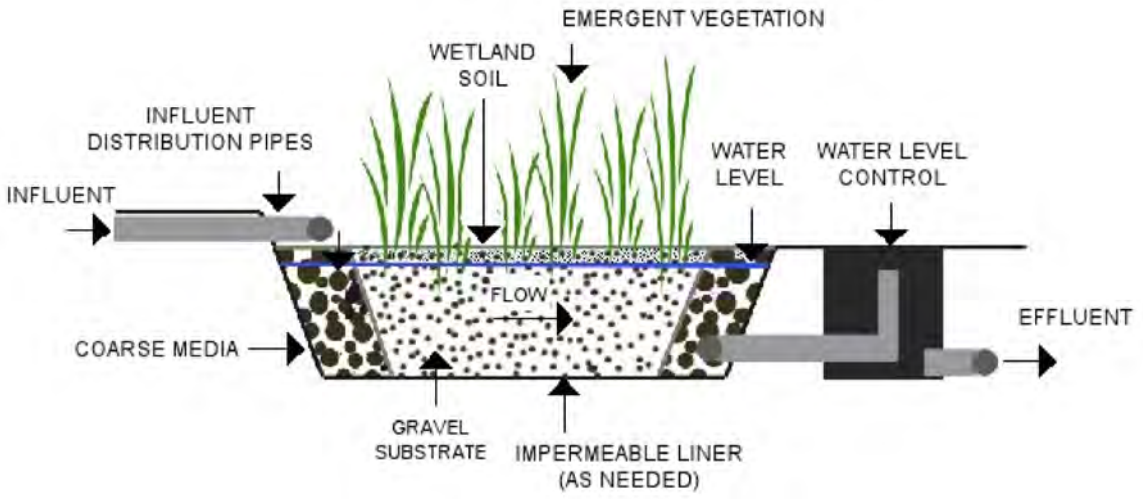

Figure 12.4 Typical Submerged Gravel Wetland Profile View

12.1 Constructed Wetland Stormwater Credits

Constructed wetlands receive 0% retention credit (R_v) and pollutant removals are outlined in Table 12.1.

Table 12.1-A
Traditional Constructed Wetlands Performance Credits

Runoff Reduction	
RPv	**100%**
Cv	**Not Less Than 1%**
Fv	**Not Less Than 0%**
Pollutant Reduction	
TN Reduction	**Not less than 30% Removal Efficiency**
TP Reduction	**Not less than 40% Removal Efficiency**
TSS Reduction	**Not less than 80% Removal Efficiency**

Table 12.1-B
Wetland Swale Performance Credits

Runoff Reduction	
RPv -A/B Soil	**15% Annual Runoff Reduction**
RPv - C/D Soil	**10% Annual Runoff Reduction**
Cv	**Not Less Than 1% of RPv Allowance**
Fv	**Not Less Than 0%**
Pollutant Reduction	
TN Reduction	**100% of Load Reduction + Not less than 20% Removal Efficiency**
TP Reduction	**100% of Load Reduction + Not less than 30% Removal Efficiency**
TSS Reduction	**100% of Load Reduction + Not less than 60% Removal Efficiency**

Table 12.1-C

Ephemeral Constructed Wetland Performance Credits

Runoff Reduction***	
RPv -A/B Soil	**40% Annual Runoff Reduction**
RPv - C/D Soil	**10% Annual Runoff Reduction**
Cv	**Not Less Than 1% of RPv Allowance**
Fv	**Not Less Than 0%**
Pollutant Reduction	
TN Reduction	**100% of Load Reduction + Not less than 20% Removal Efficiency**
TP Reduction	**100% of Load Reduction + Not less than 30% Removal Efficiency**
TSS Reduction	**100% of Load Reduction + Not less than 60% Removal Efficiency**

***NOTE: An Ephemeral Constructed Wetland constructed in accordance with the Sediment and Stormwater Plan Review Policy and Procedures for Poultry House Projects as a forebay having a volume equivalent to the full RPv shortfall volume is given full volume reduction credit. The Department will monitor the performance of the ephemeral constructed wetland forebays at these poultry house projects and may adjust the volume reduction credit as necessary.

Table 12.1-D

Submerged Gravel Wetland Performance Credits

Runoff Reduction	
Retention Allowance	**0%**
RPv	**100% of Detention Storage**
Cv	**100% of Detention Storage**
Fv	**100% of Detention Storage**
Pollutant Reduction	
TN Reduction	**Not less than 30% Removal Efficiency**
TP Reduction	**Not less than 40% Removal Efficiency**
TSS Reduction	**Not less than 80% Removal Efficiency**

12.2 Constructed Wetlands Practice Summary

Table 12.2 summarizes the various criteria for Constructed Wetlands.

Table 12.2 Constructed Wetlands Practice Summary

Feasibility Criteria (Section 12.3)	• **Constructed Wetlands shall not be located within existing jurisdictional wetlands.**
Conveyance Criteria (Section 12.4)	• **The principal spillway must be accessible from dry land.** • **A structure-pipe spillway shall be designed with anti-flotation, anti-vortex and trash rack devices on the structure.** • **The outfall pipe and all connections to the outfall structure shall be made watertight. Soil tight only joints are not acceptable.** • **Anti-seep collars shall be used in accordance with Pond Code 378, as amended.** • **When the principal spillway is composed of a weir wall discharging to a channel, the channel below the weir must be reinforced with riprap or other acceptable material to prevent scour.** • **When a low flow orifice is specified, it must be adequately protected from clogging by either an acceptable external trash rack or by internal orifice protection. Orifice diameters shall not be less than 3 inches.** • **The design shall specify an outfall that can discharge the maximum design storm event in a non-erosive manner at the project point of discharge.** • **Constructed Wetlands must be designed to pass the maximum design storm event (Fv) if the Fv is being routed through the Constructed Wetland rather than bypassing.** • **An earthen emergency spillway designed to convey the Fv shall be cut in natural ground or, if cut in fill, shall be constructed and stabilized with methods to prevent erosion and structural failure.** • **Inflow points into the Constructed Wetland must be stabilized to ensure that non-erosive conditions exist during storm events up to the conveyance event (Cv).** • **For Submerged Gravel Wetlands, the inflow volume shall enter the gravel substrate directly via a pipe manifold or inflow chimneys or as sheet flow through connected gravel layer.**

Pretreatment Criteria (Section 12.5)	• **Every inlet into a Constructed Wetland shall have pretreatment.**
	• **Exit velocities from the pretreatment shall be non-erosive during the largest design storm that is routed through the Constructed Wetland.**
	• **A forebay shall be located at each major inlet to trap sediment and preserve the capacity of the main treatment cell.**
	• **The following criteria apply to forebay design:**
	  ○ **A major inlet is defined as an individual storm drain inlet pipe or open channel conveying at least 10% of the Constructed Wetland's contributing RPv runoff volume.**
	  ○ **The forebay must be sized to contain 10% of the volume of runoff from the contributing drainage area for the Resource Protection event.**
	• **Discharge from the forebay shall be non-erosive.**

Design Criteria (Section 12.6)	• **Constructed Wetlands constructed to meet regulatory stormwater management requirements shall be designed and constructed in accordance with the USDA NRCS Pond Code 378 as amended.** • **Constructed Wetlands shall be designed so that they will dewater the Fv within 72 hours, or manage the Fv on site with no adverse impact. The extents of the Fv shall be clearly delineated.**

Design Criteria (Section 12.6) *cont.*	• **The lowest discharge elevation on the outlet device shall be located no lower than the seasonal high groundwater table as determined by the Soil Investigation Procedures.**
	• **All Traditional Constructed Wetlands shall be evaluated for feasibility and ability to maintain permanent pool, including the need for a liner, by a qualified, licensed geotechnical engineer or geologist. If the design professional chooses not to follow the recommendations of the geotechnical professional, a signed, sealed and dated letter from the design professional providing justification for removal of the liner from the design shall be provided to DNREC or their delegated Agency.**
	• **When the geotechnical engineer recommends a liner, acceptable options include the following:**
	  ○ **A clay liner having a minimum compacted thickness of six inches with an additional six inch layer of engineered wetland soil mix containing a minimum of 35% organic material above it. Clay used as a liner must meet the following specifications:**
	  ▪ **Permeability of 1x10-6 cm/sec using ASTM D-2434 procedure.**
	  ▪ **Plasticity index of not less than 15% using ASTM D-423/424 procedures.**
	  ▪ **Liquid limit of not less than 30% using ASTM D-2216 procedure.**
	  ▪ **Clay particles passing not less than 30% using ASTM D-422 procedure.**
	  ▪ **Compaction of 95% of standard proctor density using ASTM D-2216 procedure.**
	  ○ **Other acceptable measures as recommended by a qualified geotechnical professional.**
	• **Trash racks shall be provided for low-flow pipes and for all riser structure openings.**
	• **All metal trash racks shall be coated with a rust inhibitor to increase longevity of the device.**
	• **When a riser is used, it must be located such that it is accessible from the side slope for the purposes of inspection and maintenance.**
	• **Safety features:**
	  ○ **Any opening 12 inches or greater discharging to a closed drainage system shall include safety grates.**
	  ○ **The emergency spillway must be located so that downstream structures will not be impacted by spillway discharges.**
	  ○ **The emergency spillway exit channel must be designed to direct runoff to a point of discharge without impact to downstream structures.**
	• **All Constructed Wetlands must be designed so as to be accessible for maintenance.**
	• **Adequate maintenance access must extend to the forebay, safety bench, riser, and outlet structure.**
	• **A maintenance right-of-way or easement must extend to the Constructed Wetland from a public or private road.**
	• **Maintenance access must meet the following criteria:**
	  ○ **Minimum width of 15 feet.**
	  ○ **Profile grade that does not exceed 10H:1V.**
	  ○ **Minimum 10H:1V cross slope.**
	• **Maintenance set-aside area:**
	  ○ **The maintenance set-aside area shall accommodate the volume of 50% of the collective forebay volume.**
	  ○ **The maximum depth of the set aside area shall be 1 foot.**
	  ○ **The slope of the set aside area shall not exceed 5%.**

Variant Specific Design Criteria (Section 12.6)	*Traditional Constructed Wetland (12-A)*
	• **The permanent pool volume, or the volume below the normal water surface elevation, shall be equivalent to a minimum of 50% of theRPv volume.**
	• **Traditional Constructed Wetlands shall be sized so that the RPv has a maximum ponding depth of 12 inches above the normal water surface elevation. The RPv shall dewater within 48 hours.**
	• **The Cv maximum ponding depth shall not exceed 12 inches above the normal water surface elevation for more than 12 hours.**
	• **he total length of the flow path compared to the linear length through the Traditional Constructed Wetland shall be a minimum ratio of 2:1.**
	• **When an inlet is located near the outlet, the ratio of the shortest flow path through the system to the overall length shall be a minimum of 0.5:1.**
	• **The drainage area served by any inlets located less than a 0.5:1 ratio shall constitute no more than 20% of the total contributing drainage area.**
	• **Traditional Constructed Wetlands shall be composed of the following zones:**
	  ○ **Zone 1: Deep Pools**
	  ▪ **The volume of water stored in the deep pools, also referred to as micropools, shall be at least 20% of the RPv volume.**
	  ▪ **A minimum of two deep pools in addition to the forebay shall be provided, one of which shall be located prior to the outlet location to provide for additional sediment deposition.**
	  ▪ **The deep pools shall be hydraulically connected within the water flow path.**
	  ▪ **The deep pools shall be designed with a side slope not steeper than 3:1.**
	  ▪ **A safety bench is required for deep pool depths greater than four feet.**
	  ○ **Zone 2: Transition Zone**
	  ▪ **Zone 2 is a short transition zone between the deeper pools and the low marsh zone, and ranges from a minimum of 6 inches to a maximum of 30 inches below the normal pool elevation.**
	  ▪ **The volume of water stored in the transition zone shall be a minimum of 20% of the RPv volume.**
	  ▪ **The transition zone shall have a maximum side slope of 3:1from the deep pool to the low marsh zone.**
	  ○ **Zone 3: Low Marsh Zone**
	  ▪ **The low marsh zone ranges from a maximum of 6 inches below the normal pool elevation to the normal pool elevation.**
	  ▪ **The volume of water stored in the low marsh zone shall be a minimum of 10% of the RPv volume.**
	  ▪ **The side slope within the low marsh zone shall not be steeper than 4:1.**
	  ○ **Zone 4: High Marsh Zone**
	  ▪ **The upper end of the marsh zone is the high marsh zone, which ranges from the normal pool elevation to a maximum of 12 inches above the normal pool elevation, allowing the RPv to inundate to the top of the high marsh zone.**
	  ▪ **The side slope within the high marsh zone shall not be steeper than 4:1.**
	  ○ **Zone 5: Floodplain**
	  ▪ **A low floodplain shall range between a minimum of 12 inches and a maximum of 18 inches above the normal water surface elevation and be planted with plants suited for infrequent to**

Variant Specific Design Criteria (Section 12.6) *cont.*	**temporary saturations.** ▪ **The side slope within the floodplain shall not be steeper than 4:1.** • **A minimum 10-foot-wide vegetated perimeter around the wetland area shall be planted with appropriate grasses, trees, and shrubs.** • **A simple water balance calculation shall be performed, using Equation 12.2 (Hunt et al., 2007), to ensure that the deep pools will not go completely dry during a 30-day summer drought.** *Wetland Swale (12-B):* • **Wetland swales shall contain the Cv event.** • **If the Fv event is not contained within the Wetland swale top of bank, then the area of inundation and discharge route shall be delineated.** • **The maximum RPv water surface elevation shall be no greater than 6 inches above the normal water surface elevation.** • **The average groundwater elevation shall be below the bottom of the Wetland Swale. Only the seasonal high groundwater may intersect the bottom of the Wetland Swale.** • **Wetland Swales shall not have side slopes steeper than 3:1.** • **The maximum longitudinal slope shall be an average of 1%.** • **A minimum 10-foot-wide vegetated perimeter on both sides of the wetland swale shall be planted with appropriate grasses, trees and shrubs.** *Ephemeral Constructed Wetland (12-C)* • **The RPv event shall pond a minimum of 6 inches and a maximum of 12 inches of water above the ground surface of the Ephemeral Constructed Wetland.** • **The Fv water surface shall be a maximum of 30 inches above the ground surface of the Ephemeral Constructed Wetland.** • **The average groundwater elevation as determined by the Soil Investigation Procedures shall be below the wetland bottom of the Ephemeral Constructed Wetland.** • **Only the seasonal high groundwater as determined by the Soil Investigation Procedures may intersect the bottom of the Ephemeral Constructed Wetland.** • **If the seasonal high groundwater intersects the bottom of the Ephemeral Constructed Wetland, the wetland shall be modeled considering the elevation of the seasonal high groundwater.** • **The side slopes of the buffer area and within the wetland shall be 4:1 or flatter.** • **A minimum 10-foot-wide vegetated perimeter around the wetland area shall be planted with appropriate grasses, trees, and shrubs.** *Submerged Gravel Wetland (12-D)* • **The maximum surface ponding depth for the RPv shall not be greater than the tolerance depths of the wetland plantings selected, or two feet, whichever is less.** • **The Submerged Gravel Wetland shall store the RPv volume within the stone substrate and wetland soils and above the soils in surface ponding.** • **Submerged Gravel Wetlands shall have no minimum detention time.** • **The gravel substrate shall be a minimum of 2 feet and a maximum of 4 feet in depth.** • **The gravel substrate shall be sized to contain a minimum of 25% of the RPv volume considering 40% void ratio.** • **The gravel substrate shall be composed of clean washed gravel, with a maximum of 2.0% passing the #200 sieve.** • **Gravel shall have a maximum diameter of 2.5 inches and a minimum diameter of 0.5 inches.** • **A porosity value of 0.4 shall be used for areas of stone in the design of gravel substrate.** • **Sand shall not be an acceptable substitute for gravel.** • **An engineered wetland soil layer containing a minimum of 15% organic material and a**

Variant Specific Design Criteria (Section 12.6) *cont.*	**maximum of 15% clay content shall be included on the surface of the Submerged Gravel Wetland. The wetland soil layer shall be a minimum of 8 inches thick.** • **A minimum 4 inch thick layer of clean, washed nominal ¼" gravel with a maximum of 2.0% passing the #200 sieve shall be installed between the gravel substrate and the wetland soil layer.** • **An underdrain shall be provided at an elevation 3 inches above the invert of the gravel substrate. The underdrain shall be a minimum of 4-inch perforated high density polyethylene pipe (HDPE) or polyvinyl chloride pipe (PVC).** • **The underdrain shall connect to the outlet structure. The discharge elevation shall be 4 inches below the wetland soil surface.** • **There shall be a minimum of 15 feet separation distance between all gravel substrate inflow points and all underdrain outlet points.** • **Side slopes above the gravel substrate shall not be steeper than 3:1.**
Landscaping Criteria (Section 12.7)	• **A planting plan is required for all Constructed Wetlands.** • **Invasive species shall not be specified within Constructed Wetlands.** • **The planting plan shall be certified by a qualified professional with demonstrated knowledge in wetland species.** • **Plants used in Constructed Wetlands shall be supplied by a certified wetland nursery using plants selected for the region.**

Construction Criteria (Section 12.8)	• **Approval from the Department or the appropriate Delegated Agency must be obtained before any planned Constructed Wetlands can be used as a sediment basin.**
	• **If a Constructed Wetlands serves as a sediment basin during project construction, the volume of the sediment basin must be based on the more stringent sizing rule.**
	• **The Sediment and Stormwater Plan must include conversion steps from sediment basin to permanent Constructed Wetlands in the construction sequence.**
	• **The Department or Delegated Agency must be notified and provide approval prior to conversion from sediment basin to the final configuration of the Constructed Wetlands.**
	• **Appropriate procedures must be implemented to prevent discharge of turbid waters when the sediment basin is being converted into a Constructed Wetlands.**
	• **Construction reviews are required during the following stages of construction, and shall be noted on the plan in the sequence of construction:**
	  ○ **Pre-construction meeting**
	  ○ **Initial site preparation including installation of erosion and sediment controls**
	  ○ **Construction of the embankment, including installation of the principal spillway and the outlet structure as applicable**
	  ○ **Excavation and grading including interim and final elevations**
	  ○ **Construction of wetland features including grading of microtopography, introduction of soil amendments and staking of planting zones**
	  ○ **Construction of the underdrain, installation of gravel substrate and wetland soils as applicable**
	  ○ **Implementation of the planting plan and vegetative stabilization**
	  ○ **Final inspection including development of a punch list for facility acceptance**
	• **All areas surrounding the Constructed Wetlands that are graded or denuded during construction must be planted with turf grass, native plantings, or other approved methods of soil stabilization.**
	• **Temporary seed, such as annual rye or winter wheat, may be used to stabilize the soil within the Constructed Wetland, but permanent species shall then be planted or seeded at next optimum planting date.**
	• **Stabilization matting shall be utilized in Wetland Swales and in all areas of concentrated flow or slopes 3:1 or steeper.**

Construction Criteria (Section 12.8) *cont.*	• **Upon facility completion, the owner shall submit Post Construction verification documents to demonstrate that the Constructed Wetlands has been constructed within allowable tolerances in accordance with the approved Sediment and Stormwater Management Plan and accepted by the approving agency. Allowable tolerances for Constructed Wetlands practices are as follows:** ○ **The constructed top of bank elevation may be no lower than the design elevation for top of bank.** ○ **The constructed volume of the Constructed Wetlands surface storage shall be no less than 90% of the design volume.** ○ **The constructed volume of the gravel substrate storage for Submerged Gravel Wetlands shall be no less than 90% of the design volume.** ○ **The constructed elevation of any structure shall be within 0.15 foot of the design.**
Maintenance Criteria (Section 12.9)	• **Before project completion the Owner shall submit a final post construction stormwater management Operation and Maintenance Plan for the entire stormwater management system.** • **Operation and Maintenance Plans remain valid for the life of the stormwater management system.** • **During the first two years following construction, the Constructed Wetland shall be reviewed twice each year by a qualified professional with demonstrated knowledge of wetland species, once in the spring and once in the fall after a storm event that exceeds 1/2 inch of rainfall.** • **The Operation and Maintenance Plan shall outline a detailed schedule for the monitoring and possible reinstallation of vegetation in the wetland and its buffer for the first two years of establishment.** • **Repair of critical structural features such as embankments and risers shall be performed by responsible personnel that have successfully completed the Department Contractor Training Program.** • **Project closeout shall not occur until a minimum of 70% of the wetland area is permanently vegetated.** • **Sediment removal in the pretreatment forebay shall occur when 50% of total forebay capacity has been lost.** • **The Department or the Delegated Agency shall be notified before a Constructed Wetland is drained.**

12.3 Wetland Feasibility Criteria

Constructed wetland designs are subject to the following site constraints:

Adequate Water Balance. Traditional Constructed Wetlands (12-A) should have enough water supplied from groundwater, runoff or baseflow so that the permanent pools are designed to remain moist after a 30-day summer drought. See *Section 12.6. Water Balance Testing* for deep pool design criteria.

Contributing Drainage Area (CDA). The contributing drainage area should be large enough to sustain a permanent water level within the stormwater wetland. If the only source of wetland hydrology is stormwater runoff, then typically more than 2 to 3 acres of drainage area is needed to maintain constant water elevations. Smaller drainage areas are acceptable if the bottom of the wetland intercepts the groundwater table or if the designer and the landowner are willing to accept

periods of relative dryness (i.e., Ephemeral Constructed Wetlands, 12-C), and the plant species are chosen to accommodate this design variable. The minimum recommended drainage area for Submerged Gravel Wetlands, 12-D, is one acre.

Space Requirements. Constructed Wetlands normally require a footprint that takes up about 10% of the contributing drainage area, depending on the average depth of the wetland.

Site Topography. Wetlands are best applied when the grade of contributing slopes is less than 8%. Reference *Specification 6.0. Restoration Practices* for additional information on a step pool approach to Constructed Wetlands that can be applied on steep sloped areas.

Available Hydraulic Head. The permanent pool elevation is typically fixed by the elevation of the existing downstream conveyance system to which the wetland will ultimately discharge. Because the storage needed for storm events in Constructed Wetlands is shallow, the amount of head needed is typically less than for Wet Ponds, usually a minimum of 2 to 4 feet.

Minimum Setbacks. See Appendix 8 Stormwater Facility Setbacks for recommended setbacks.

Proximity to Utilities. See Appendix 8 Stormwater Facility Setbacks for recommended siting with respect to utilities.

Depth to Water Table. The depth to the groundwater table is not a major constraint for Constructed Wetlands because a high water table can help maintain the permanent pool elevation. However, designers should keep in mind that high groundwater inputs may reduce pollutant removal rates, increase excavation costs, and reduce the storage volume. For Ephemeral Constructed Wetlands, 12-C, the normal groundwater elevation should be below the bottom of the wetland although the seasonal high groundwater may fluctuate within the storage area.

Soils. Soil tests should be conducted in accordance with Soil Investigation Procedures to determine the infiltration rates and other subsurface properties of the soils underlying the proposed wetland. Highly permeable soils will make it difficult to maintain a healthy permanent pool. Underlying soils of HSG C or D should be adequate to maintain a permanent pool. Most HSG A soils and HSG B soils are only suitable for variants 12-B or 12-C.

Use of, or Discharges to, Natural Wetlands. **Constructed Wetlands shall not be located within existing jurisdictional wetlands**. Constructed wetland should be constructed off-line from and designed to avoid impacts to federal or state jurisdictional waters, including perennial and intermittent streams and ditches, and tidal and non-tidal wetlands. Designers should request a jurisdictional determination from the federal regulatory agency (U.S. Army Corps of Engineers, Philadelphia District, 215-656-6728) and the state regulatory agency (Delaware Department of Natural Resources and Environmental Control, Wetland and Subaqueous Lands Section, 302-739-9943) to ensure that all federal and state jurisdictional areas are identified. An environmental consultant can be hired to assist with the determination.

Wetlands swales are discouraged in residential subdivisions. Wetland swales will periodically contain standing water which can been viewed as an impediment to regular maintenance, including mowing and become a cause for concern of the residence with respect to mosquitos and odors.

12.4 Constructed Wetland Conveyance Criteria

The longitudinal slope profile within individual wetland cells should generally be flat from inlet to outlet, at 1% maximum. The recommended maximum elevation drop between wetland cells should be 1 foot or less.

While many different options are available for setting the normal pool elevation, it is strongly recommended that removable flashboard risers be used, given their greater operational flexibility to adjust water levels following construction (see Hunt et al, 2007). A weir or spillway can also be designed to accommodate passage of the larger storm flows at relatively low ponding depths.

Principal Spillway. The principal spillway may be composed of a structure-pipe configuration or a weir-channel configuration. **The principal spillway must be accessible from dry land. A structure-pipe spillway shall be designed with anti-flotation, anti-vortex and trash rack devices on the structure. The outfall pipe and all connections to the outfall structure shall be made watertight. Soil tight only joints are not acceptable. Anti-seep collars shall be used in accordance with Pond Code 378, as amended. When the principal spillway is composed of a weir wall discharging to a channel, the channel below the weir must be reinforced with riprap or other acceptable material to prevent scour.**

Non-Clogging Low Flow Orifice. **When a low flow orifice is specified, it must be adequately protected from clogging by either an acceptable external trash rack or by internal orifice protection. Orifice diameters shall not be less than 3 inches.**

Outfall Protection. **The design shall specify an outfall that can discharge the maximum design storm event in a non-erosive manner at the project point of discharge.** If necessary, the channel immediately below the Constructed Wetland outfall may be modified to prevent erosion and conform to natural dimensions in the shortest possible distance. This can be accomplished by placing appropriately sized riprap over stabilization geotextile in accordance with HEC-14 Hydraulic Design of Energy Dissipators for Culverts and Channels and Delaware Erosion and Sediment Control Handbook Specification 3.3.10 Riprap Outlet Protection or 3.3.11 Riprap Stilling Basin, which can reduce flow velocities from the principal spillway to non-erosive levels (3.5 to 5.0 fps) based upon the channel lining material. Flared pipe sections, which discharge at or near the stream invert or into a step pool arrangement, should be used at the spillway outlet.

When the discharge is to a manmade pipe or channel system, the system should be adequate to convey the required design storm peak discharge in a non-erosive manner. Care should be taken to minimize tree clearing along the downstream channel, and to reestablish a forested riparian zone in the shortest possible distance. Excessive use of rip-rap should be avoided. The final release rate of the facility should be modified if any increase in flooding or stream channel erosion would

result at a downstream structure, highway, or natural point of restricted streamflow unless downstream improvements are made to accommodate the increase.

Emergency Spillway. Constructed Wetlands must be designed to pass the maximum design storm event (Fv) if the Fv is being routed through the Constructed Wetland rather than bypassing. An earthen emergency spillway designed to convey the Fv shall be cut in natural ground or, if cut in fill, shall be constructed and stabilized with methods to prevent erosion and structural failure.
Inflow Points. **Inflow points into the Constructed Wetland must be stabilized to ensure that non-erosive conditions exist during storm events up to the conveyance event (Cv).** Inlet pipe inverts should generally be located at the permanent pool elevation. **For Submerged Gravel Wetlands, the inflow volume shall enter the gravel substrate directly via a pipe manifold or inflow chimneys or as sheet flow through connected gravel layer.**

12.5 Constructed Wetland Pretreatment Criteria

Sediment regulation is critical to sustain Constructed Wetlands. **Every inlet into a Constructed Wetland shall have pretreatment. Exit velocities from the pretreatment shall be non-erosive during the largest design storm that is routed through the Constructed Wetland. A forebay shall be located at each major inlet to trap sediment and preserve the capacity of the main treatment cell. The following criteria apply to forebay design:**

- **A major inlet is defined as an individual storm drain inlet pipe or open channel conveying at least 10% of the Constructed Wetland's contributing RPv runoff volume.**
- The preferred forebay configuration consists of a separate cell, formed by an acceptable barrier such as a concrete weir, riprap berm, gabion baskets, etc. Riprap berms are the preferred barrier material.
- The forebay should be 3 to 4 feet deep. **The forebay must be sized to contain 10% of the volume of runoff from the contributing drainage area for the Resource Protection event.** The relative size of individual forebays should be proportional to the percentage of the total inflow to the Constructed Wetland. The storage volume within the forebay may be included in the calculated required storage volume for the Constructed Wetland.
- The recommended minimum length of the forebay is 10 feet. The forebay should have a length to width ratio of 2:1 or greater. Length is measured with the direction of flow into the Constructed Wetland.
- The forebay should be equipped with a metered rod in the center of the pool (as measured lengthwise along the low flow water travel path) for long-term monitoring of sediment accumulation. Metered wooden stakes may need to be replaced frequently in Constructed Wetland forebays; alternative materials should be considered for longevity.
- Vegetation may be included within forebays to increase sedimentation and reduce resuspension and erosion of previously trapped sediment.
- **Discharge from the forebay shall be non-erosive.**

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2.6 Constructed Wetland Design Criteria

Constructed Wetlands constructed to meet regulatory stormwater management requirements shall be designed and constructed in accordance with the USDA NRCS Pond Code 378 as amended. Constructed Wetlands shall be designed so that they will dewater the Fv within 72 hours, or manage the Fv on site with no adverse impact. The extents of the Fv shall be clearly delineated. The lowest discharge elevation on the outlet device shall be located no lower than the seasonal high groundwater table as determined by the Soil Investigation Procedures.

Liners. All Traditional Constructed Wetlands shall be evaluated for feasibility and ability to maintain permanent pool, including the need for a liner, by a qualified, licensed geotechnical engineer or geologist. If the design professional chooses not to follow the recommendations of the geotechnical professional, a signed, sealed and dated letter from the design professional providing justification for removal of the liner from the design shall be provided to DNREC or their delegated Agency. When the geotechnical engineer recommends a liner, acceptable options include the following:

- **A clay liner having a minimum compacted thickness of six inches with an additional six inch layer of engineered wetland soil mix containing a minimum of 35% organic material above it. Clay used as a liner must meet the following specifications:**
  - **Permeability of 1x10-6 cm/sec using ASTM D-2434 procedure.**
  - **Plasticity index of not less than 15% using ASTM D-423/424 procedures.**
  - **Liquid limit of not less than 30% using ASTM D-2216 procedure.**
  - **Clay particles passing not less than 30% using ASTM D-422 procedure.**
  - **Compaction of 95% of standard proctor density using ASTM D-2216 procedure.**
- **Other acceptable measures as recommended by a qualified geotechnical professional.**

Trash Racks. Trash racks shall be provided for low-flow pipes and for all riser structure openings. Open weirs that discharge to an open channel will not require trash racks. Synthetic trash rack materials options are available and should be considered. **All metal trash racks shall be coated with a rust inhibitor to increase longevity of the device.**

Non-clogging Low Flow (Extended Detention) Orifice: The low flow extended detention orifice should be protected from clogging by an external trash rack. The preferred method is a hood apparatus over the orifice that reduces gross pollutants such as floatables and trash, as well as oil and grease and sediment.

Orifices less than 3 inches in diameter may require extra attention during design, to minimize the potential for clogging. As an alternative, internal orifice protection may be used (i.e., an orifice internal to a perforated vertical stand pipe with 0.5-inch perforations or slots that are protected by wirecloth and a stone filtering jacket). Floating skimmers, seepage berms, French drains or other

similar measures may be a better alternative to provide the 48-hour detention required for Wet ED Ponds if the orifice diameter is too small.

Riser: **When a riser is used, it must be located such that it is accessible from the side slope for the purposes of inspection and maintenance.** The riser may be located within the embankment for maintenance access, safety, and aesthetics. Where appropriate, access to the riser may be provided by manhole covers and manhole steps within easy reach of valves and other controls.

Pond Drain: Constructed Wetlands should have a drain pipe that can completely or partially drain the permanent pool. In cases where a low level drain is not feasible (such as in an excavated Constructed Wetland), the Operation and Maintenance Plan should include requirements for dewatering the Constructed Wetland.

- The drain pipe should have an upturned elbow or protected intake within the Constructed Wetland to help keep it clear of sediment deposition, and a diameter capable of draining the Constructed Wetland within 24 hours.
- The Constructed Wetland drain should be equipped with an adjustable valve located within the riser, where it will not be normally inundated and can be operated in a safe manner.

Care should be exercised during Constructed Wetland drawdowns to prevent downstream discharge of sediments or anoxic water and rapid drawdown. The Department or the Delegated Agency should be notified before a Constructed Wetland is drained.

Adjustable Gate Valve: If desired to adjust the pond permanent pool elevation, both the outlet pipe and the Constructed Wetland drain should be equipped with an adjustable gate valve (typically a hand wheel activated knife gate valve) or pump well and be sized one pipe size greater than the calculated design diameter. Valves should be located inside of the riser at a point where they (a) will not normally be inundated and (b) can be operated in a safe manner. To prevent vandalism, the hand wheel should be chained to a ringbolt, manhole step or other fixed object.

Safety Features:

- **Any opening 12 inches or greater discharging to a closed drainage system shall include safety grates.**
- **The emergency spillway must be located so that downstream structures will not be impacted by spillway discharges.**
- **The emergency spillway exit channel must be designed to direct runoff to a point of discharge without impact to downstream structures.**
- Fencing of the perimeter of Constructed Wetland is discouraged. The preferred method to reduce risk is to manage the contours of the Constructed Wetland to eliminate drop-offs or other safety hazards.
- Warning signs may be posted.

Maintenance Reduction Features: The following Constructed Wetland maintenance issues can be addressed during the design, in order to make on-going maintenance easier:

Maintenance Access. **All Constructed Wetlands must be designed so as to be accessible for maintenance.** Good access is needed so crews can remove sediments, make repairs and preserve Constructed Wetland treatment capacity.

- **Adequate maintenance access must extend to the forebay, safety bench, riser, and outlet structure.**
- **A maintenance right-of-way or easement must extend to the Constructed Wetland from a public or private road.**
- **Maintenance access must meet the following criteria:**
  - **Minimum width of 15 feet.**
  - **Profile grade that does not exceed 10H:1V.**
  - **Minimum 10H:1V cross slope.**
- Local ordinances and design criteria should be consulted to determine minimum setbacks to property lines. When not specified in local code, the top of bank of Constructed Wetlands should be set back at least 15 feet from property lines to ensure maintenance access.

- **Maintenance Set-Aside Area**: Adequate land area adjacent to the Constructed Wetland should be provided for in the Operation and Maintenance Plan as a location for disposal of sediment removed from the Constructed Wetland when maintenance is performed. The maintenance set-aside area is necessary on all sites adjacent to the Constructed Wetland to adequately dewater sediment removed from the pond prior to spreading and seeding or transporting from the site.
  - **The maintenance set-aside area shall accommodate the volume of 50% of the collective forebay volume.**
  - **The maximum depth of the set aside area shall be 1 foot.**
  - **The slope of the set aside area shall not exceed 5%**.

The area and slope of the set aside area may be modified if an alternative area or method of disposal is approved by the Department or Delegated Agency.

Variant 12-A, **Traditional Constructed Wetlands:**

Wetland Sizing. Traditional Constructed Wetlands provide water quality enhancement for stormwater volumes remaining after upstream practices have provided runoff reduction. Additionally, stormwater wetlands can be sized to control flows from the Cv and Fv storms. The available storage volume of storm events in Constructed Wetlands is equal to the volume provided above the permanent pool, or the normal water surface elevation. **The permanent pool volume, or the volume below the normal water surface elevation, shall be equivalent to a minimum of 50% of theRPv volume** to maintain a healthy system.

To reduce impact on the aquatic plantings, **Traditional Constructed Wetlands shall be sized so that the RPv has a maximum ponding depth of 12 inches above the normal water surface elevation. The RPv shall dewater within 48 hours**. **The Cv maximum ponding depth shall not exceed 12 inches above the normal water surface elevation for more than 12 hours.**

Internal Design Geometry. Traditional Constructed Wetlands can be designed in several ways, all of which promote diverse emergent and aquatic vegetation, as well as anaerobic and aerobic conditions within the water to promote pollutant removal. In all cases, varied topography within each component of the wetland is encouraged to provide diverse ecology (e.g., hummocks, forested peninsulas, horizontal tree stumps, boulders, etc). Research and experience have shown that the internal design geometry and depth zones are critical in maintaining the pollutant removal capability and plant diversity of stormwater wetlands. Wetland performance is enhanced when the wetland has multiple cells, longer flowpaths, and a high ratio of surface area to volume.

Flow Path. Whenever possible, constructed wetlands should be irregularly shaped with long, sinuous flow paths. **The total length of the flow path compared to the linear length through the Traditional Constructed Wetland shall be a minimum ratio of 2:1. When an inlet is located near the outlet, the ratio of the shortest flow path through the system to the overall length shall be a minimum of 0.5:1. The drainage area served by any inlets located less than a 0.5:1 ratio shall constitute no more than 20% of the total contributing drainage area.**

One continuous winding system can be designed that distributes the runoff through wetland areas and deeper permanent pools. The flow through the Traditional Constructed Wetland should be limited to maximum of 1% average slope excluding any drops or riffles. See below for more detailed information on the various components.

If a more varied range in elevation is desired, a more step-pool approach can be taken, where the different cells can be separated in elevation by bio or compost logs, sand berms anchored with rocks/boulders, or other stabilized protection. Forested peninsulas can also be extended across 95% of the width of the wetland, creating two separate zones. Riffles, or rock lined slopes of a maximum of 8%, can also be used to adjust the grades. The elevation difference between the wetland cells should not exceed 1 foot.

Inundation Zones.

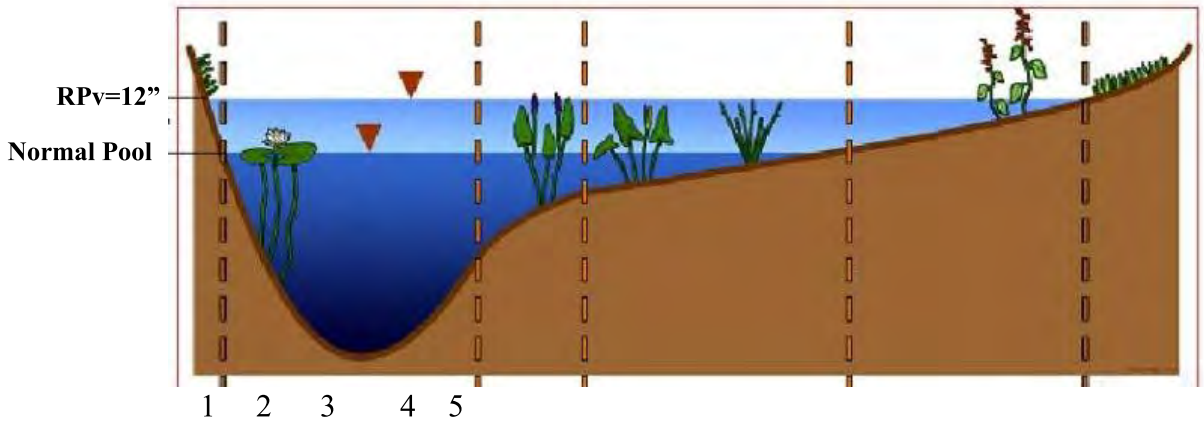

Figure 12.4. Traditional Constructed Wetland Inundation Zones: (1) Deep Pool (depth -36 to -18 inches), (2) Transition Zone (depth -18 to -6 inches), (3) Low Marsh Zone (depth -6 inches to

normal pool), (4) High Marsh Zone (normal pool to +12 inches), and (5) Floodplain (+12 to +30 inches) (adapted from Hunt et al,. 2007).

Traditional Constructed Wetlands shall be composed of the following zones:

***Zone 1: Deep Pools*. The volume of water stored in the deep pools, also referred to as micropools, shall be at least 20% of the RPv volume. A minimum of two deep pools in addition to the forebay shall be provided, one of which shall be located prior to the outlet location to provide for additional sediment deposition.** Deep pools can help to provide fish habitat, cooler water temperatures, energy dissipation, and sedimentation. **Deep pools shall range from a minimum of 30 inches to a maximum of 6 feet in depth below the normal pool elevation and shall be designed to remain permanently saturated.** If groundwater will not support the permanent pool elevation in the summer months, then the minimum deep pool elevation should be lowered to 22 inches. **The deep pools shall be hydraulically connected within the water flow path. The deep pools shall be designed with a side slope not steeper than 3:1. A safety bench is required for deep pool depths greater than four feet.**

***Zone 2: Transition Zone.* Zone 2 is a short transition zone between the deeper pools and the low marsh zone, and ranges from a minimum of 6 inches to a maximum of 30 inches below the normal pool elevation. The volume of water stored in the transition zone shall be a minimum of 20% of the RPv volume. The transition zone shall have a maximum side slope of 3:1from the deep pool to the low marsh zone.** It is advisable to install biodegradable erosion control fabrics or similar materials during construction to prevent erosion or slumping of this transition zone.

Zone 3: Low Marsh Zone. Most of the wetland surface area will exist between the two marsh zones, zones 3 and 4. **The low marsh zone ranges from a maximum of 6 inches below the normal pool elevation to the normal pool elevation.** Therefore, it should normally be saturated and planted with species that thrive in this wet condition. **The volume of water stored in the low marsh zone shall be a minimum of 10% of the RPv volume. The side slope within the low marsh zone shall not be steeper than 4:1.** Because this zone provides essential wetland function in between storm events, it should have a surface area between 75 and 125% of the high marsh zone surface area.

***Zone 4: High Marsh Zone*. The upper end of the marsh zone is the high marsh zone, which ranges from the normal pool elevation to a maximum of 12 inches above the normal pool elevation, allowing the RPv to inundate to the top of the high marsh zone.** Where conditions allow, the RPv ponding depth should be reduced to be closer to 6 inches, which will increase the plant survivability. **The side slope within the high marsh zone shall not be steeper than 4:1,** and typically much flatter marsh zones are designed to increase storage**.**

Zone 5: Floodplain. Any storm events above the RPv event should inundate into the floodplain area. **A low floodplain shall range between a minimum of 12 inches and a maximum of 18 inches above the normal water surface elevation and be planted with plants suited for**

infrequent to temporary saturations, depending on weather patterns. An upper floodplain of elevations ranges +18 to +30 inches provides storage for the higher storm events, including the Fv. The two floodplains areas can be combined for smaller drainage areas less than 10 acres. Also, if the Constructed Wetland is connected to a Wet Pond, then the Wet Pond can be used for the storage of the higher storm events, and the floodplain storage within the Constructed Wetland can be reduced. **The side slope within the floodplain shall not be steeper than 4:1,** and typically much flatter floodplains are designed to increase storage**.**

Vegetated Perimeter. **A minimum 10-foot-wide vegetated perimeter around the wetland area shall be planted with appropriate grasses, trees, and shrubs.** The emergency spillway should either be grass or riprap. Existing vegetation can and should remain in the perimeter area, so long as noxious species are eradicated and invasive species are controlled.

Water Balance Testing. Traditional Constructed Wetlands can be scaled to accommodate small drainage areas, although a water balance calculation shall be provided when the contributing drainage area is less than 5 acres.

A simple water balance calculation shall be performed, using Equation 12.2 (Hunt et al., 2007), **to ensure that the deep pools will not go completely dry during a 30-day summer drought.**

Equation 12.2. The Hunt Water Balance Equation for Acceptable Water Depth in a Stormwater Wetland

$$DP = RF_m * EF * WS/WL - ET - INF - RES$$

Where: DP = Depth of pool, inches
RF_m = Monthly rainfall during drought, inches (assume 1 inch, or use historically data)
EF = Fraction of rainfall that enters the stormwater wetland (Rational runoff coefficient)
WS/WL = Ratio of contributing drainage area to the normal pool wetland surface area
ET = Summer evapotranspiration rate, inches (assume 7 inches)
INF = Monthly infiltration loss (assume 7.2 inches, or 0.01 inch/hour for 30 days, unless a higher infiltration rate is known)
RES = Reservoir of water for a factor of safety, inches (assume 6 inches)

Variant 12-B, **Wetland Swales:**

Wetland Swale Sizing. Wetland swales are designed similar to traditional vegetated swales in that they should convey the Cv and Fv events with non-erosive velocities. **Wetland swales shall contain the Cv event** (no freeboard required). **If the Fv event is not contained within the Wetland swale top of bank, then the area of inundation and discharge route shall be delineated. The maximum RPv water surface elevation shall be no greater than 6 inches**

above the normal water surface elevation. There is no minimum or maximum drainage area, though typically swales are designed for less than 5 acres of contributing area.

Internal Geometry. Wetland swales should be designed as a two-stage system. The low-flow channel requires a minimum width of 1 foot, and should be designed with a permanent to semi-permanent water elevation of 4 to 6 inches. This can be accomplished through inception with the seasonal high groundwater or through the use of check dams or other control structures that back the water up to that level during wet conditions. The low-flow channel should support plants that tolerate mostly wet conditions. The width of the low-flow channel should be maximum 6 feet to prevent additional low-flow channels from forming within (or braiding); very large drainage areas may require increased widths, but typically the low-flow channel will fall in the 2 to 4-foot-width range. To increase functionality, the low-flow channel should be meandered within the total confines of the Wetland Swale (i.e., the top of bank does not need to meander, but the low-flow channel should).

At the water surface elevation of the RPv event (within +/- 0.1'), a shallow floodplain bench shall be provided, which alleviates shear stress on the sides of the banks. The total bench width should be minimum 4 feet and is generally split on either side of the low-flow channel, though the dimensions can alter as the low-flow channel meanders through the swale section, with increased bench widths on the inside of a curve. Vegetation planted on the benches should also support wet periods, though will be inundated less frequently then the plants in the low-flow channel.

Deep pools should not be incorporated into the Wetland Swales for safety purposes as most people assume swales are traversable and would not suspect a deep portion. **The average groundwater elevation shall be below the bottom of the Wetland Swale. Only the seasonal high groundwater may intersect the bottom of the Wetland Swale.**

Side Slopes. **Wetland Swales shall not have side slopes steeper than 3:1.**

Longitudinal Slope: **The maximum longitudinal slope shall be an average of 1%.** Grade breaks similar to variant 12-A can be used as necessary.

Vegetated Perimeter. **A minimum 10-foot-wide vegetated perimeter on both sides of the wetland swale shall be planted with appropriate grasses, trees and shrubs.** Existing vegetation can and should remain in the perimeter area, so long as invasive species are eradicated and invasive species are controlled.

Variant 12-C, **Ephemeral Constructed Wetlands:**

Ephemeral Constructed Wetland Sizing. Ephemeral Constructed Wetlands are designed without a permanent pool because the intent is for them to be wet only in the spring and fall months. **The RPv event shall pond a minimum of 6 inches and a maximum of 12 inches of water above the ground surface of the Ephemeral Constructed Wetland. The Fv water surface shall be a maximum of 30 inches above the ground surface of the Ephemeral Constructed Wetland.**

An emergency spillway may be necessary for the 100-year and larger events, but traditionally no other outlets are provided. If freezing in the winter is a concern, or for maintenance purposes, a drain pipe can be provided, but the Ephemeral Constructed Wetland should only be drained in late November after amphibian breeding seasons. The wetland can be modeled with the design infiltration rate and are allowed to hold the RPv event for greater than 48 hours.

Ephemeral Constructed Wetlands should mimic those found naturally, which typically are ponded low areas. These shallow areas fill up with runoff during wet conditions and will dry up during periods of little to no rain. These fluctuations typically provide more diversity in vegetation and animals. The shallow ponded area should be planted with a variety of vegetation that can tolerate both wet and dry conditions.

The seasonal high groundwater may fluctuate into the bottom of the Ephemeral Constructed Wetland**,** but **the average groundwater elevation as determined by the Soil Investigation Procedures shall be below the wetland bottom of the Ephemeral Constructed Wetland. Only the seasonal high groundwater as determined by the Soil Investigation Procedures may intersect the bottom of the Ephemeral Constructed Wetland. If the seasonal high groundwater intersects the bottom of the Ephemeral Constructed Wetland, the wetland shall be modeled considering the elevation of the seasonal high groundwater.**

Depending on the existing grades, an embankment may be required to contain the wetland pool. **Constructed Wetlands constructed to meet regulatory stormwater management requirements shall be designed and constructed in accordance with the USDA NRCS Pond Code 378 as amended.** A core trench should extend down to a limiting layer or minimum 4 feet below ground surface, which will help prevent lateral migration of water through the embankment, compromising the construction.

For Ephemeral Constructed Wetlands functioning as forebays on poultry house projects, forebays located in HSG C/D should be no deeper than 1 foot as measured from the invert of the overflow weir to the bottom of the forebay. Forebays located in HSG A/B should be no deeper than 2 feet as measured from the invert of the overflow weir to the bottom of the forebay.

Side Slopes. **The side slopes of the buffer area and within the wetland shall be 4:1 or flatter.**

Vegetated Perimeter. **A minimum 10-foot-wide vegetated perimeter around the wetland area shall be planted with appropriate grasses, trees, and shrubs** (the emergency spillway should either be grass or riprap). Existing vegetation can and should remain in the perimeter area, so long as noxious species are eradicated and invasive species are controlled.

Variant 12-D, **Submerged Gravel Wetlands**

Submerged Gravel Wetland Sizing. The maximum surface ponding depth for the RPv shall not be greater than the tolerance depths of the wetland plantings selected, or two feet, whichever is less. The Submerged Gravel Wetland shall store the RPv volume within the

stone substrate and wetland soils and above the soils in surface ponding. Submerged Gravel Wetlands shall have no minimum detention time.

Gravel substrate. The gravel substrate shall be a minimum of 2 feet and a maximum of 4 feet in depth. The gravel substrate shall be sized to contain a minimum of 25% of the RPv volume considering 40% void ratio. The gravel substrate shall be composed of clean washed gravel, with a maximum of 2.0% passing the #200 sieve. Gravel shall have a maximum diameter of 2.5 inches and a minimum diameter of 0.5 inches. A porosity value of 0.4 shall be used for areas of stone in the design of gravel substrate. Sand shall not be an acceptable substitute for gravel.

Wetland soil. **An engineered wetland soil layer containing a minimum of 15% organic material and a maximum of 15% clay contentshall be included on the surface of the Submerged Gravel Wetland. The wetland soil layer shall be a minimum of 8 inches thick.** The wetland soil layer should not be included in the storage volume computations.
A minimum 4 inch thick layer of clean, washed nominal ¼" gravel with a maximum of 2.0% passing the #200 sieve shall be installed between the gravel substrate and the wetland soil layer.

Underdrain. An underdrain shall be provided at an elevation 3 inches above the invert of the gravel substrate. The underdrain shall be a minimum of 4-inch perforated high density polyethylene pipe (HDPE) or polyvinyl chloride pipe (PVC). The underdrain shall connect to the outlet structure. The discharge elevation shall be 4 inches below the wetland soil surface.

Flow Path. **There shall be a minimum of 15 feet separation distance between all gravel substrate inflow points and all underdrain outlet points.**

Side Slopes. **Side slopes above the gravel substrate shall not be steeper than 3:1.**
Constructed Wetland Material Specifications:
Wetlands are generally constructed with materials obtained on-site, except for the plant materials, inflow and outflow devices (e.g., piping and riser materials), possibly stone for inlet and outlet stabilization, and stabilization fabric for lining banks or berms. In some instances, clay may need to be imported to provide a permanent pool elevation in certain areas of the constructed wetland that may not otherwise support a permanent pool. Plant stock should be nursery grown, unless otherwise approved by the local regulatory authority, and should be healthy and vigorous native species free from defects, decay, disfiguring roots, sun-scald, injuries, abrasions, diseases, insects, pests, and all forms of infestations or objectionable disfigurements, as determined by the local regulatory authority.

12.7 Constructed Wetland Landscaping Criteria

A planting plan is required for all Constructed Wetlands. Natives species are recommended and **invasive species shall not be specified within Constructed Wetlands. The planting plan shall be certified by a qualified professional with demonstrated knowledge in wetland**

species. Plants used in Constructed Wetlands shall be supplied by a certified wetland nursery using plants selected for the region. The planting plan should outline a detailed schedule for the care, maintenance and possible reinstallation of vegetation in the wetland and its buffer for the first 10 years of establishment.

The plan should outline a realistic, long-term planting strategy to establish and maintain desired wetland vegetation. The plan should indicate how wetland plants will be established within each inundation zone (e.g., wetland plants, seed-mixes, volunteer colonization, and tree and shrub stock) and whether soil amendments are needed to get plants started. Reference the Landscaping Criteria Appendix for additional Constructed Wetland landscaping specifications.

For Ephemeral Constructed Wetlands functioning as forebays on poultry house projects, since the forebay is likely to be subjected to prolonged periods of saturation especially on HSG C/D soils, the recommendations for Zone 4, High Marsh may be used to select plant materials for the forebay area under those soil conditions.

12.8. **Constructed Wetland Construction**

The construction sequence for the wetland variants depends on site conditions, design complexity, and the size and configuration of the proposed facility. The following two-stage construction sequence is recommended for installing a wetland facility and establishing vigorous plant cover.

Approval from the Department or the appropriate Delegated Agency must be obtained before any planned Constructed Wetlands can be used as a sediment basin. If a Constructed Wetlands serves as a sediment basin during project construction, the volume of the sediment basin must be based on the more stringent sizing rule.

The Sediment and Stormwater Plan must include conversion steps from sediment basin to permanent Constructed Wetlands in the construction sequence. The Department or Delegated Agency must be notified and provide approval prior to conversion from sediment basin to the final configuration of the Constructed Wetlands. Appropriate procedures must be implemented to prevent discharge of turbid waters when the sediment basin is being converted into a Constructed Wetlands.

Construction Review. Multiple construction reviews are critical to ensure that Constructed Wetlands are properly constructed. **Construction reviews are required during the following stages of construction, and shall be noted on the plan in the sequence of construction:**

- **Pre-construction meeting**
- **Initial site preparation including installation of erosion and sediment controls**
- **Construction of the embankment, including installation of the principal spillway and the outlet structure as applicable**
- **Excavation and grading including interim and final elevations**
- **Construction of wetland features including grading of microtopography, introduction of soil amendments and staking of planting zones**

- **Construction of the underdrain, installation of gravel substrate and wetland soils as applicable**
- **Implementation of the planting plan and vegetative stabilization**
- **Final inspection including development of a punch list for facility acceptance**

Stage 1 Construction Sequence: Wetland Facility Construction.
Step 1: Stabilize Drainage Area. Constructed wetlands should only be constructed after the contributing drainage area to the wetland is completely stabilized. If the proposed wetland site will be used as a sediment trap or basin during the construction phase, the construction notes should clearly indicate that the facility will be de-watered, dredged and re-graded to design dimensions after the original site construction is complete.
Step 2: Assemble Construction Materials on-site, make sure that they meet design specifications, and prepare any staging areas.

Step 3: Install Erosion and Sediment (E&S) Controls prior to construction, including temporary dewatering devices, sediment basins, and stormwater diversion practices. **All areas surrounding the Constructed Wetlands that are graded or denuded during construction must be planted with turf grass, native plantings, or other approved methods of soil stabilization.** In some cases, a phased or staged E&S Control plan may be necessary to divert flow around the stormwater wetland area until installation and stabilization are complete.

Step 4: Excavate the Core Trench for the Embankment and Construct the Embankment (if required). Install the Outlet Pipe and Emergency Spillway.

Step 5: Install the Riser or Outflow Structure and ensure that the top invert of the overflow weir is constructed level and at the proper design elevation (flashboard risers are strongly recommended by Hunt et al, 2007).
Step 6: Clear and Strip the wetland project area to the desired sub-grade.

Step 7: Construct any Internal Berms in 8 to 12-inch lifts and compact with appropriate equipment.

Step 8: Excavate/Grade until the appropriate elevation and desired contours are achieved for the bottom and side slopes of the wetland. This is normally done by "roughing up" the interim elevations with a skid loader or other similar equipment to achieve the desired topography across the wetland. Spot surveys should be made to ensure that the interim elevations are 3 to 6 inches below the final elevations for the wetland.

Step 9: Install Micro-Topographic Features and Soil Amendments within wetland area. Because most stormwater wetlands are excavated to sub-soil, they often lack the nutrients and organic matter needed to support vigorous growth of wetland plants. Therefore, it is strongly recommended to add compost, topsoil, or wetland mulch to all depth zones in the wetland. The importance of soil amendments in excavated wetlands cannot be over-emphasized; poor plant survival and sparse wetland plant coverage are likely if soil amendments are not added. The planting soil should be a high organic content loam or sandy loam, placed by mechanical methods, and spread by hand.

Planting soil depth should be at least 4 inches for shallow wetlands. No machinery should be allowed to traverse over the planting soil during or after construction. Planting soil should be tamped, but it should not be overly compacted.

Step 10: Stabilize Exposed Soils above the normal pool elevation with permanent seed mixtures appropriate for a wetland environment by hydro-seeding or seeding under straw per the Landscape Plan. Outside of optimum seeding and planting dates,**temporary seed, such as annual rye or winter wheat, may be used to stabilize the soil within the Constructed Wetland, but permanent species shall then be planted or seeded at next optimum planting date. Stabilization matting shall be utilized in Wetland Swales and in all areas of concentrated flow or slopes 3:1 or steeper.**

Step 11: Post Construction Verification Documentation. **Upon facility completion, the owner shall submit Post Construction verification documents to demonstrate that the Constructed Wetlands has been constructed within allowable tolerances in accordance with the approved Sediment and Stormwater Management Plan and accepted by the approving agency. Allowable tolerances for Constructed Wetlands practices are as follows:**

- **The constructed top of bank elevation may be no lower than the design elevation for top of bank.**
- **The constructed volume of the Constructed Wetlands surface storage shall be no less than 90% of the design volume.**
- **The constructed volume of the gravel substrate storage for Submerged Gravel Wetlands shall be no less than 90% of the design volume.**
- **The constructed elevation of any structure shall be within 0.15 foot of the design.**

When the allowable tolerances are exceeded for Constructed Wetlands surface area or volume or structure elevations, supplemental calculations must be submitted to the approval agency to determine if the Constructed Wetlands, as constructed, meets the design requirements.

Stage 2 Construction Sequence: Establishing the Wetland Vegetation.

Step 12: Open Up the Wetland Connection (if desired). Once the final grades are attained, the pond and/or contributing drainage area connection can be opened to allow the wetland cell to fill up to the normal pool elevation. Gradually inundate the wetland to minimize erosion of unplanted features. If the wetland area is connected, then it will need to be dewatered to the lowest planting elevation (i.e., the low marsh zone) prior to planting.

Step 13: Finalize the Wetland Landscaping Plan (if needed). At this stage the engineer, landscape architect, and wetland expert work jointly to refine the initial wetland landscaping plan *after* the Constructed Wetland has been constructed and the normal pool elevation has been established if there have been any changes to the planting zones from the initial design. This can allow the designer to select appropriate species and additional soil amendments, based on field confirmation of soils properties and the actual depths and inundation frequencies occurring within the wetland,

and also confirm plant availability

Step 14: Measure and Stake Planting Depths at the onset of the planting season. Depths in the wetland should be measured to the nearest inch to confirm the original planting depths of the planting zone. Surveyed planting zones should be marked on the post construction verification, and their locations should also be identified in the field, using stakes or flags. If necessary, dewater to the bottom of the low marsh zone prior to staking and planting.

Step 15: Propagate the Constructed Wetland. Three techniques are used in combination to propagate the emergent community over the wetland bed:

1. *Initial Planting of Container-Grown Wetland Plant Stock.* The transplanting window extends from early April to mid-June. Planting after these dates is quite chancy because emergent wetland plants need a full growing season to build the root reserves needed to get through the winter. If at all possible, the plants should be ordered at least 6 months in advance to ensure the availability and on-time delivery of desired species.
2. *Broadcasting Wetland Seed Mixes*. The higher wetland elevations should be established by broadcasting wetland seed mixes to establish diverse emergent wetlands. Seeding of wetland seed mixes as a ground cover is recommended for all zones above 3 inches below the normal pool elevation. Hand broadcasting or hydroseeding can be used to spread seed, depending on the size of the wetland cell.
3. *Allowing "Volunteer Wetland Plants to Establish*. The establishment of volunteer species should be encouraged with the exception of noxious weeds and invasive species. Typically, if properly managed, the constructed wetland will fill out with volunteer species and establishment of the planted and seeded species within 3 to 5 years.

Step 16: Install Goose Protection to Protect Newly Planted or Newly Growing Vegetation. This is particularly critical for newly established emergent and herbaceous plants, as predation by Canada geese can quickly decimate wetland vegetation. Goose protection can consist of netting, webbing, or string installed in a crisscross pattern over the surface area of the wetland, above the level of the emergent plants.

Step 17: Plant the Wetland Floodplain and Buffer Area. This zone generally extends from 1 to 3 feet above the normal pool elevation. Consequently, plants in this zone are less frequently inundated but still should be able to tolerate periods of flooding and soil saturation. The buffer area can be planted with species that do not need wet conditions, and can be planted in the spring or fall.

12.9 Constructed Wetland Maintenance Criteria

Before project completion the Owner shall submit a final post construction stormwater management Operation and Maintenance Plan for the entire stormwater management system. Operation and Maintenance Plans remain valid for the life of the stormwater management system. The Operation and Maintenance Plan will specify the property owner's

primary maintenance responsibilities and authorize the Department or Delegated Agency staff to access the property for maintenance review or corrective action in the event that proper maintenance is not performed.

Operation and Maintenance Plans should clearly outline how vegetation in the Constructed Wetland and its buffer will be managed or harvested in the future. Periodic mowing of the Constructed Wetland buffer is only required along the maintenance access and the embankment. The remaining buffer can be managed as a meadow (mowing every other year) or forest. The maintenance plan should schedule a shoreline cleanup at least once a year to remove trash and floatables.

Maintenance of a Constructed Wetland is driven by annual maintenance reviews that evaluate the condition and performance of the Constructed Wetland. Based on maintenance review results, specific maintenance tasks may be required. Additional reviews are required during the first two years of establishment.

During the first two years following construction, the Constructed Wetland shall be reviewed twice each year by a qualified professional with demonstrated knowledge of wetland species, once in the spring and once in the fall after a storm event that exceeds 1/2 inch of rainfall. The Operation and Maintenance Plan shall outline a detailed schedule for the monitoring and possible reinstallation of vegetation in the wetland and its buffer for the first two years of establishment.

Repair of critical structural features such as embankments and risers shall be performed by responsible personnel that have successfully completed the Department Contractor Training Program.

Additional trips to the project site are recommended for watering, maintenance, etc, which is described below.

- Spot Reseeding. Maintenance personnel should look for bare or eroding areas in the contributing drainage area, around the wetland buffer, and in the wetland cells, to ensure that they are immediately stabilized with grass cover.

- Watering. Trees and shrubs planted in the buffer and on wetland islands and peninsulas need watering during the first growing season. In general, consider watering every three days for first month, and then weekly during the first growing season (April - October), depending on rainfall. In the summer months, and times of prolonged drought, all of the plantings may need watering to ensure survival.

- Reinforcement Plantings. Regardless of the care taken during the initial planting of the wetland and buffer, it is probable that some areas will remain non-vegetated and some species will not survive. Poor survival can result from many unforeseen factors, such as predation, poor quality plant stock, water level changes, and drought. Thus, it is advisable to budget for an additional round of reinforcement planting after one or two growing seasons. Construction contracts should include a care and replacement warranty extending at least two growing seasons after

initial planting, to selectively replant portions of the wetland that fail to fill in or survive. **Project closeout shall not occur until a minimum of 70% of the wetland area is permanently vegetated**, which may take several growing seasons and additional plantings.

- Invasive Species. Designers should expect significant changes in wetland species composition to occur over time. Reviews should carefully track changes in wetland plant species distribution over time. Noxious plants and undesired invasive plants should be dealt with as soon as they begin to colonize the wetland. As a general rule, control of noxious weeds and undesirable invasive species (e.g., cattails and Phragmites) should commence as soon as they are spotted and before their coverage exceeds more than 5% of a wetland cell area. Herbicides must be applied by a Certified aquatic pesticide applicator through the Department of Agriculture and be aquatic safe (i.e., Glyphosate-based products). Extended periods of dewatering may also work because early manual removal provides only short-term relief from invasive species. While it is difficult to exclude invasive species completely from stormwater wetlands, their ability to take over the entire wetland can be reduced if the designer creates a wide range of depth zones and a complex internal structure within the wetland.

Annual, On-going Maintenance: Managing vegetation is an important ongoing maintenance task at every Constructed Wetland and for each inundation zone.

- Vegetation Management. Thinning or harvesting of excess forest growth will be needed periodically to guide the forested wetland into a more mature state and prevent it from becoming overgrown. Thinning or harvesting operations should be scheduled to occur approximately 5 and 10 years after the initial wetland construction. Removal of woody species on or near the embankment, structural components such as inflow and outflow pipes, and maintenance access areas should be conducted every 2 years.

- Mowing. Regular mowing operations only need to occur along maintenance accessways and should occur at minimum twice a year. Reference the Landscape Plan for additional requirements; some upland meadow areas may also require occasional mowing.

- Sediment Removal. **Sediment removal in the pretreatment forebay shall occur when 50% of total forebay capacity has been lost.** The owner can plan for this maintenance activity to occur every 5 to 7 years.

- Sediment Deposits. Sediment removed from the forebay should be deposited in the designated maintenance set aside area for dewatering, prior to leveling and stabilization or removal from the site. Sediments excavated from Constructed Wetlands are not usually considered toxic or hazardous. They can be safely disposed of by either land application or land filling. Sediment testing may be needed prior to sediment disposal if the contributing area serves a hotspot land use.
- Care should be exercised during Constructed Wetland drawdowns to prevent downstream discharge of sediments or anoxic water and rapid drawdown. **The Department or the Delegated Agency shall be notified before a Constructed Wetland is drained.**

12.10 References

Biebighauser, T., *A Guide to Creating Vernal Ponds: All the Information You Need to Build and Maintain an Ephemeral Wetland.* USDA Forest Service.

Cappiella, K., T. Schueler and T. Wright. 2006. *Urban Watershed Forestry Manual: Part 2: Conserving and Planting Trees at Development Sites*. USDA Forest Service. Center for Watershed Protection. Ellicott City, MD.

Hunt, W., C. Apperson, and W. Lord. 2005. "Mosquito Control for Stormwater Facilities." *Urban Waterways*. North Carolina State University and North Carolina Cooperative Extension. Raleigh, NC.

Hunt, W., M. Burchell, J. Wright and K. Bass. 2007. "Stormwater Wetland Design Update: Zones, Vegetation, Soil and Outlet Guidance." *Urban Waterways*. North Carolina State Cooperative Extension Service. Raleigh, NC.

Ladd, B and J. Frankenburg. 2003. Management of Ponds, Wetlands and Other Water Reservoirs. Purdue Extension. WQ-41-W.

Lenhart, H., W. Hunt. 2011. "Evaluating Four Storm-Water Performance Metrics with a North Carolina Coastal Plan Storm-Water Wetland." *Journal of Environmental Engineering* Vol 137, No.2.
Mallin, M. 2000. Effect of human development on bacteriological water quality in coastal watersheds. *Ecological Applications* 10(4):1047-1056.

Mallin, M.A., S.H. Ensign, Matthew R. McIver, G. Christopher Shank, and Patricia K. Fowler. 2001. Demographic, landscape, and meteorological factors controlling the microbial pollution of coastal waters. *Hydrobiologia* 460(1-3):185-193.

Messersmith, M.J. 2007. Assessing the hydrology and pollutant removal efficiencies of wet detention ponds in South Carolina. MS. Charleston, S.C. College of Charleston, Master of Environmental Studies.

Minnesota Stormwater Steering Committee (MSSC). 2005. *Minnesota Stormwater Manual*. Emmons & Oliver Resources, Inc. Minnesota Pollution Control Agency. St. Paul, MN.

Minnesota Urban Small Sites BMP Manual. *Constructed Wetlands: Wet Swales.* Metropolitan Council/Barr Engineering Co.

Santana, F., J. Wood, R. Parsons, and S. Chamberlain. 1994. *Control of Mosquito Breeding in Permitted Stormwater Systems*. Southwest Florida Water Management District. Brooksville, FL.

Schueler, T, 1992. *Design of Stormwater Wetland Systems*. Metropolitan Washington Council of Governments. Washington, DC.

VA Department of Conservation and Recreation (VA DCR). 1999. Virginia Stormwater Management Handbook, first edition.

12.0 Constructed Wetlands

Typical Maintenance Items and Frequency for Constructed Wetlands

Frequency	Maintenance Items
During establishment, as needed (first year)	• Stabilize any bare or eroding areas in the contributing drainage area, wetland buffer and in wetland cells. • Water trees and shrubs planted in the buffer and on wetland islands during the first growing season. In general, water every 3 days for first month, and then weekly during the remainder of the first growing season (April - October), depending on rainfall. • Provide reinforcement plantings as needed. • Noxious plants and undesired invasive plants should be dealt with as soon as they begin to colonize the wetland. As a general rule, control of noxious weeds and undesirable invasive species (e.g., cattails and Phragmites) should commence as soon as they are spotted and before their coverage exceeds more than 5% of a wetland cell area. Herbicides must be applied by a Certified aquatic pesticide applicator through the Department of Agriculture and be aquatic safe (i.e., Glyphosate-based products). Extended periods of dewatering may also work because early manual removal provides only short-term relief from invasive species.
Annually, On-Going	• Regular mowing operations only need to occur along maintenance access ways and should occur at minimum twice a year. • Reference the Landscape Plan for additional requirements; some upland meadow areas may also require occasional mowing.
Every 2 years	• Remove woody species on or near the embankment, structural components such as inflow and outflow pipes, and maintenance access areas
Every 5 to 7 years	• Thinning or harvesting of excess forest growth will be needed periodically to guide the forested wetland into a more mature state and prevent it from becoming overgrown. • **Sediment removal in the pretreatment forebays occur when 50% of total forebay capacity has been lost.** • **The Department or the Delegated Agency shall be notified before a Constructed Wetland is drained.**

TOPOGRAPHICALLY ISOLATED, NON-TIDAL PALUSTRINE FORESTED WETLAND WITH NO NEXUS TO INTERSTATE COMMERCE.

AP-2

AP-1

DA-2

DA-1

1,237 LF CHANNEL FLOW @ 0.11% SLOPE

273 LF SHALLOW CONCENTRATION @ 0.37% SLOPE

485 LF SHALLOW CONCENTRATION @ 0.21% SLOPE

98 LF SHALLOW CONCENTRATION @ 1.02% SLOPE

350 LF SHALLOW CONCENTRATION @ 0.29% SLOPE

1.19 LF SHALLOW CONCENTRATION @ 1.2% SLOPE

LINDER AND COMPANY, INC. 1-34-10.00-74.00 DEED BOOK 3171 PAGE 091 ZONED: GR EXISTING FARMLAND 48.3595 ACRES ± 50.6147 ACRES ± TOTAL AREA

TM-1-34-10.00-74.00 LINDER AND COMPANY, INC. DEED BOOK 3171 PAGE 091 ZONED: GR 2 ACRES ± RESIDENTIAL USE

EXISTING SOIL ROCK PILES

EXISTING BUILDINGS

EXISTING DWELLING

EXISTING TREELINE

EXISTING DITCH

EXISTING CROSS CULVERT (ACTIVE FIELD)

REDSTART COURT LOCAL ROAD - R.O.W. VARIES

SCISSORBILL ROAD LOCAL ROAD - R.O.W. VARIES

GRACKLE CT LOCAL ROAD - R.O.W. VARIES

OLD MILL ROAD LOCAL ROAD - R.O.W. VARIES

OAK STREET LOCAL ROAD - 50' R.O.W.

LOCAL ROAD - 50' R.O.W.

BANKS ACRES PLAT BOOK 8 PAGE 255

RADIUS = 725.00' ARC LENGTH = 209.67' CH. BEARING = S 35°45'37" W CH. LENGTH = 208.94' TANGENT = 105.57'

EX. SAN. MH.: RIM EL.: 10.15' INV. OUT: 2.85'

EX. SAN. MH.: RIM EL.: 11.92' INV. IN: 6.39' INV. OUT: 6.24'

EX. SAN. MH.: RIM EL.: 13.84' INV. IN: -1.75' INV. OUT: -1.75'

EX. SAN. MH.: RIM EL.: 13.13' (8" PVC) INV. OUT: -2.47'

EX. SAN. MH.: RIM EL.: 13' INV. IN: 1.56' INV. OUT: -1.61'

EX. SAN. MH.: RIM EL.: 11.15' INV. IN: -1.74' INV. OUT: -1.99'

EX. SAN. MH.: RIM EL.: 12.41' INV. IN: -2.04' (12") INV. IN: -1.83' (8") INV. IN: -3.16' (24") INV. OUT: -3.19' (24")

EX. SAN. MH.: RIM EL.: 15.30' INV. IN: -3.86' INV. IN: 0.22' (8" PVC) INV. OUT: -1.08'

SITE BENCHMARK ENGINEERED SOLUTIONS ELEV.=10.00' ELEV.=4.75'

0 100' 200'

NORTH

LEGEND

EXISTING PROPERTY LINE	
EASEMENT	
LOT LINES	
ROW / ADJACENT PROPERTY	
EDGE OF ROAD / PAVEMENT	
CENTERLINE OF ROAD	
LANDSCAPE BUFFER	
LANDSCAPE BUFFER	
STREET LIGHT	☼

SOILS		
TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

LEGEND

	SOIL A	SOIL B	SOIL D
EXINSTING ROAD OUTSIDE LOD LINE			
GRASS OUTSIDE LOD LINE			
GRASS WITHIN LOD LINE			
ROW CROPS WITHIN LOD LINE			
ROW CROPS OUTSIDE LOD LINE			
WOODS OUTSIDE LOD LINE			
WOODS WITHIN LOD LINE			
1/4 ACRE LOTS			

DRAINAGE AREA REFERENCE LEGEND

- DRAINAGE AREA BOUNDARY
- 1S — SUBAREA DESIGNATION
- 1P — POND
- AP-1 — ANALYSIS POINT
- SOIL BOUNDARY LINE
- TC PATHWAY

PENNONI ASSOCIATES INC.
18072 Davidson Drive
Milton, DE 19968
T 302.684.8030 F 302.684.8054

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

EVANS FARM APARTMENTS

3143A RAILWAY RD.
OCEAN VIEW, DE

PRE-CONSTRUCTION DRAINAGE AREA PLAN

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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PROJECT	PETIX19002
DATE	2019-08-19
DRAWING SCALE	1"=100'
DRAWN BY	BRD
APPROVED BY	BRD

CS9001

SHEET 1 OF 2

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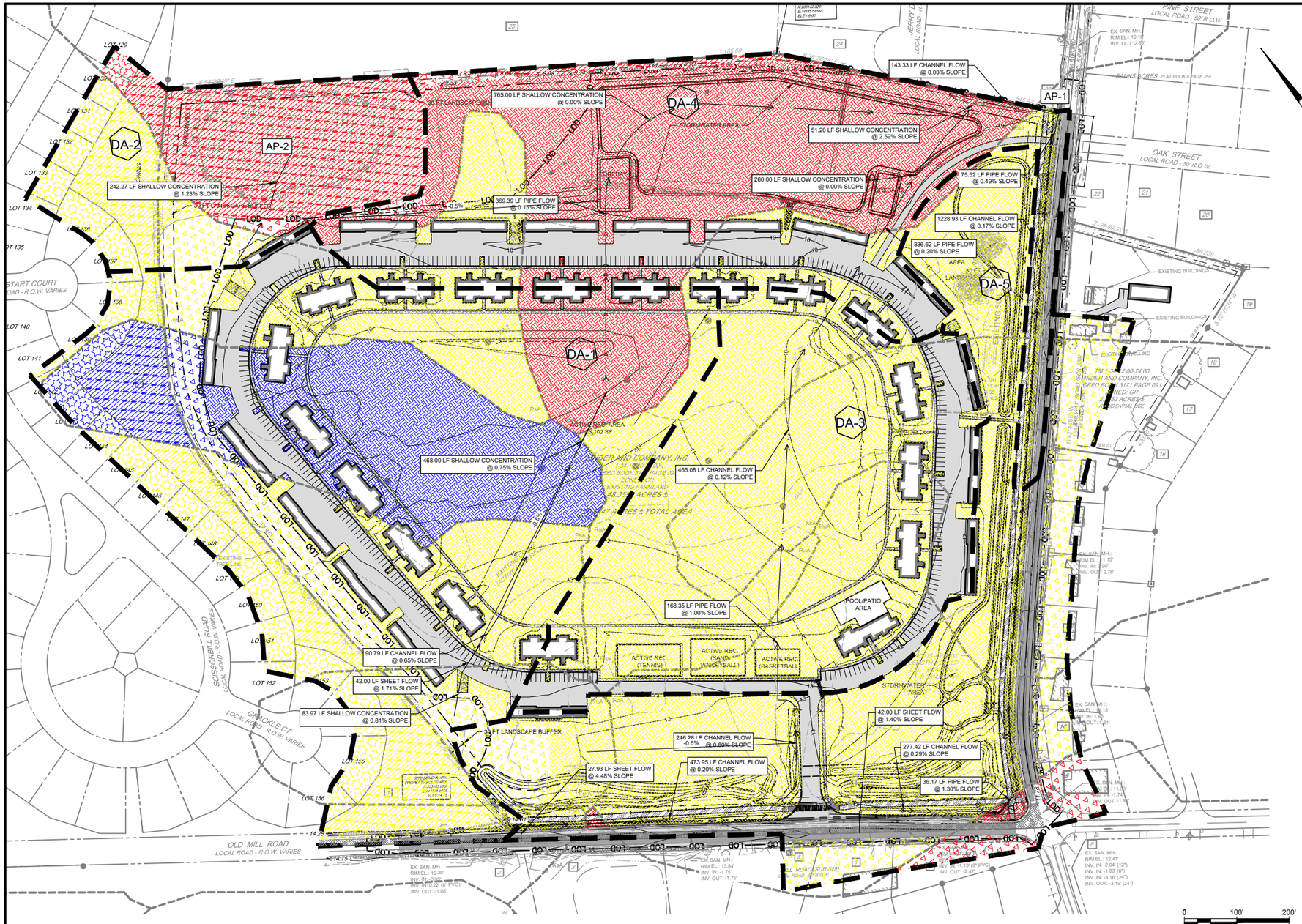

LEGEND

- EXISTING PROPERTY LINE
- EASEMENT
- LOT LINES
- ROW / ADJACENT PROPERTY
- EDGE OF ROAD / PAVEMENT
- CENTERLINE OF ROAD
- LANDSCAPE BUFFER
- LANDSCAPE BUFFER
- STREET LIGHT

SOILS		
TYPE	DESCRIPTION	HYDROLOGIC SOIL
FmA	FORT MOTT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
HmA	HAMMONTON LOAMY SAND, 0 TO 2 PERCENT SLOPES	B
KsA	KLEJ LOAMY SAND, 0 TO 2 PERCENT SLOPES	A/D
PsA	PEPPERBOX-ROSEDALE COMPLEX, 0 TO 2 PERCENT SLOPES	A
RoA	ROSEDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	A
RuA	RUNCLINT LOAMY SAND, 0 TO 2 PERCENT SLOPES	A

LEGEND

- IMPERVIOUS OUTSIDE LOD LINE
- IMPERVIOUS WITHIN LOD LINE
- GRASS OUTSIDE LOD LINE
- GRASS WITHIN LOD LINE
- WOODS OUTSIDE LOD LINE
- 1/4 ACRE LOTS

SOIL A | SOIL B | SOIL D

DRAINAGE AREA REFERENCE LEGEND

- DRAINAGE AREA BOUNDARY
- 1S — SUBAREA DESIGNATION
- 1P — POND
- AP-1 — ANALYSIS POINT
- SOIL BOUNDARY LINE
- TC PATHWAY

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EVANS FARM APARTMENTS

31434 RAILWAY RD.
OCEAN VIEW, DE

POST-CONSTRUCTION DRAINAGE AREA PLAN

LINDER AND COMPANY
234 NORTH JAMES ST.
NEWPORT, DELAWARE 19804

NO.	DATE	REVISIONS	BY

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PROJECT	PETIX19002
DATE	2019-08-19
DRAWING SCALE	1"=100'
DRAWN BY	BRD
APPROVED BY	BRD

CS9002

SHEET 2 OF 2

PROJECT STATUS: —
PLOTSTYLE: Pennoni WCS.stb
PLOTTED: 2/4/2021 5:13 PM, BY: Logan Strickland
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GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing ASFE Member Firm

March 25, 2014

Pettinaro Construction Co., Inc.
234 North James Street
Newport, Delaware 19804

Attention: Ms. Andrea Finerosky

Re: Revised Report of Subsurface Exploration
Evans Farm
Sussex County, Delaware

Dear Ms. Finerosky:

Geo-Technology Associates, Incorporated (GTA) has performed a subsurface exploration for the proposed Evans Farm project located in Millville, Delaware. The purpose of the subsurface exploration was to evaluate the groundwater levels and borrow materials from the proposed pond at the site with the collected data used to evaluate the need for a pond liner, to refine the cut/fill balance and to evaluate the material for re-use as structural fill. Transmitted herein is the report of our findings and conclusions with respect to preliminary recommendations regarding site grading and pond construction. The services were performed in general accordance with our proposal dated February 14, 2014.

The following documents were referenced for this report:

- Report titled *Soil Investigation of Evans Farm*, prepared by Landmark Engineering/JCM Environmental and dated August 18, 2010;
- Plan titled *Evans Farm, Boring Location Map, Sheet Borings*, prepared by Becker Morgan Group (BMG) and dated May 1, 2009;
- Plans titled *Evans Farm, Erosion and Sediment Control Key Plan, Sheets C-400 through C-405, C-500, C-501 and C-502*, prepared by BMG and dated February 6, 2014;

- Plan titled *Evans Farm, Cut/Fill Volumes, Sheet C-500*, prepared by BMG and dated February 6, 2014; and
- A Cut/Fill Excel Spreadsheet prepared by Pettinaro Construction Co., Inc.

The site vicinity is shown on the attached Figure 1, Site Location Plan. The project is situated along the northwest side of Railway Road and the northeast side of Old Mill Road at the intersection between Railway Road and Old Mill Road in Millville, Delaware. The study area consists of an open farm field with woods surrounding the perimeter of the property. The existing ground surface ranges between approximate Elevation 10 and 12 feet Mean Sea Level (MSL) at the exploration locations.

Proposed construction consists of a residential community with an excavated wet pond situated within the center of the property and 2 to 3-story condominium type buildings and related detached one-story garages surrounding the pond perimeter. The pond bottom will be range between Elevation 2 and 3 MSL and the pond is planned to have a permanent pool at Elevation 8.5 MSL. Pond cut slopes are proposed at inclination of 3 Horizontal to 1 Vertical or flatter. Excavation will be needed to achieve pond bottom varying in depth between 8 and 10 feet below the existing ground surface. GTA understands that the pond will serve as an amenity feature and that no pumping will occur from the pond for irrigation purposes. To achieve grade within the roadway and residential buildings surrounding the pond, fill will generally be required ranging in depth upwards to generally 5 feet.

According to the Report of Investigations No. 58, The Pliocene and Quaternary Deposits of Delaware (1999), published by the Delaware Geological Survey, the project area is underlain by sediments of the Coastal Plain Physiographic Province. Coastal Plain sediments below the surficial deposits exposed in the site area were generally deposited in commonly estuarine environments of Quaternary geologic age. The Quaternary deposits are designated as the deposits of the Omar Formation. These deposits are characterized by "…medium and coarse sands interbedded with clayey sands, silts and clays." Please review the referenced publication and map for further details regarding this geologic unit.

According to the Hydrologic Investigations Atlas HA-122 (1964), published by the United States Geological Survey, the estimated average water table during 1960 in the vicinity of the site was approximately elevation 6 and varied between elevation 5 and 9 MSL when recorded during the period of 1950 through 1962. Please refer to the referenced publication for additional information. From review of the Delaware Geological Survey historic well data presented on their web site, the groundwater level at their monitoring well (Qc44-01) during February 2014 was normal and near the normal seasonal high level.

On February 27, 2014, GTA staff observed eight test pits, designated as TP-1 through TP-8, excavated to depths of 10 to 12 feet below the ground surface. Temporary piezometers were placed in each test hole and water readings were taken one and seven days after completion. The piezometers were removed after the longer term water readings. The exploration locations were selected by GTA and staked in the field with ground surface elevations determined by BMG. The relative locations of the exploration are shown on the attached Figure 2, Exploration Location Plan. The exploration locations indicated on the plan should be considered approximate.

Samples obtained from the test pits were returned to GTA's office for visual classification by GTA personnel. The soil layers were classified in accordance with the Unified Soil Classification System (USCS). Classifications provided on the log are visual descriptions. The exploration logs are attached. The interfaces indicated on the log may be gradual.

The test pits confirmed the underlying geologic formation as Omar Formation deposits. Beneath an approximately 6 to 12-inch thick surface topsoil layer, the explorations encountered native subsoils visually classified as predominately consisting of silty SANDs (USCS SM), clayey SANDs (SC) and poorly-graded SANDs with silt (SP-SM). At TP-4, TP-6, and TP-7, lean CLAY with sand (CL) was encountered between 4 and 5 feet at TP-4; 6 and 7 feet at TP-6; and between 2 and 7 feet at TP-7.

Water was encountered at a depth of 1.5 to 5 feet below the existing ground surface. Seven days after completion of the test pits, water was present at a depth of 1 to 3.5 feet below the ground surface and corresponding to average Elevation 9 MSL. Please note that groundwater levels are expected to fluctuate with seasonal changes, precipitation, and other factors such as development activity. Additionally, perched water conditions develop in granular soils overlying fine-grained soils during the “wet season” as well as during heavy periods of precipitation.

Selected samples obtained from the exploration were tested for grain-size analysis, Atterberg Limits, and natural moisture content. The grain-size analysis and Atterberg Limits testing were performed to determine the Unified Soil Classification System (USCS) and the American Association of State Highway and Transportation Officials (AASHTO) designations for the soil. USCS and AASHTO classifications provide information regarding soil behavior beneath foundation and pavement systems. The results of testing are as follows:

SUMMARY OF CLASSIFICATION TESTING

EXPLORATION NO.	DEPTH (ft.)	USCS CLASSIFICATION	AASHTO CLASSIFICATION	NATURAL MOISTURE (%)	LL %	PI %
TP-4	1 - 4	Silty SAND (SM)	A-2-4(0)	16.3	NP	NP
TP-4	4 - 5	Lean CLAY with Sand (CL)	A-7-6(17)	23.4	45	24
TP-5	1 - 5	Silty SAND (SM)	A-2-4(0)	18.6	NP	NP
TP-5	5 - 10	Silty SAND (SM)	A-2-4(0)	26.0	NP	NP
TP-6	1 - 6	Silty SAND (SM)	A-2-4(0)	14.0	NP	NP

Note: LL=Liquid Limit PI=Plastic Index NP=Non-Plastic

Four bulk samples were tested for moisture-density relationships in accordance with the Standard Proctor (ASTM D-698) test for use in evaluating the suitability of these soils for reuse as fill. Results of these tests are summarized in the following table.

SUMMARY OF COMPACTION TESTING
(ASTM D-698, the Standard Proctor)

TEST PIT NO.	DEPTH (FT)	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)	NATURAL MOISTURE (%)
TP-4	1 - 4	125.7	11.3	16.3
TP-5	1 - 5	123.1	11.3	18.6
TP-5	5 - 10	118.8	12.4	26.0
TP-6	1 - 6	122.8	9.7	14.0

Thirty samples were subjected to moisture content testing. The moisture content of the samples tested ranged from 8.8 to 32 percent and averaged 21.3 percent. Please refer to the attached laboratory test results for additional information.

CONCLUSIONS AND RECOMMENDATIONS

Pond Construction

GTA's estimate of the seasonal high groundwater level is based upon water levels at or a foot or so above normal seasonal highs, and soil coloring and mottling. The results of the groundwater level readings and GTA's opinion of the estimated normal seasonal high groundwater depth are summarized as follows:

GROUNDWATER DATA SUMMARY

Exploration No.	Existing Ground Surface Elevation (MSL)	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Encountered Water When Excavated	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Water At Seven Days After Completion	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Estimated Normal Seasonal High Groundwater
TP-1	11.3	5 / 6.3	1.5 / 9.8	2 / 9
TP-2	10.6	2 / 8.6	2 / 8.6	2 / 9
TP-3	12.2	5 / 7.2	3.5 / 8.7	3 / 9
TP-4	11.6	3 / 8.6	3 / 8.6	3 / 9
TP-5	10.2	3 / 7.2	1 / 9.2	1 / 9
TP-6	10.4	4 / 6.4	2 / 8.4	2 / 8
TP-7	11.8	1.5 / 10.3	3.5 / 8.3	4 / 8
TP-8	10.4	3 / 7.4	1.5 / 8.9	2 / 8

Based upon the results of GTA's exploration, it is our opinion that construction of the proposed pond as an excavated wet pond is feasible, given that the following recommendations are observed, and that the standard level of care is maintained during construction. At the exploration locations, the estimated seasonal high groundwater ranges between elevation 8 and 9 MSL. The presence of groundwater at current Elevation 8 to 9 MSL will impact the pond especially during pond construction.

Considering the groundwater depths and subsoil conditions at the test pits, it is our opinion that proposed pool Elevation 8.5 MSL will be feasible when groundwater levels are at or near seasonal highs, but, will likely drop two to three feet or so during drier seasons due to receding groundwater levels and evaporation (on the order of ½ –foot of evaporation is not unusual) of the pooled water. If the potential pool level fluctuation is acceptable considering that vegetation planted at the pond bench level may need to be replanted after extended dry periods, it is our opinion that a pond liner will not be necessary. An artificial water source to help maintain the permanent pool during the drier seasons of the year is not considered to be feasible due to potential seepage from the pond basin.

If there is a low tolerance to pool fluctuations, and it is desired to maintain the permanent pool to near Elevation 8.5 MSL, a pond liner will need to be installed and an artificial water source will need to be provided to help maintain the permanent pool during the drier seasons of the year. If it is elected to proceed with a pond liner, the liner construction will likely prove to be difficult and expensive considering the groundwater levels and problems associated with dewatering the excavation to facilitate the placement and compaction of a fine-grained soil liner. GTA has considered reuse of on-site materials conforming to USCS classification SC or CL, supplemented as required by similar, off-site borrow, to complete an approximate one foot thick pond liner. However, we have also considered a geosynthetic liner given the elevated moisture content of the soils which will likely prove difficult to dry readily in any but hot dry weather for reuse as a liner, especially considering the groundwater levels at this site. It is our opinion that a Geosynthetic Clay Liner (GCL; Bentonite matrix) provided with a one foot thick granular soil cover comprised of on-site USCS SM or SP-SM materials may be utilized as an alternative liner. If used, the GCL should be installed in accordance with manufacturer's recommendations.

Site Grading

Based upon the exploration data and from our past experience within the vicinity of the site, a shrinkage factor for the grading is estimated by GTA to be on the order of 1.1 to 1.15 for on-site soils excavated below the surface topsoil and placed in structural fill areas. An average shrinkage factor of 1.13 is recommended for use in the earthwork quantity analysis. The actual shrinkage factor will vary in magnitude. The recommended shrinkage factor may be used for budget estimating purposes. Due to the potential variability of soil moisture when compacted, the degree of compaction achieved in various areas of the site, among other factors, it is suggested that the estimated earthwork quantity favor generation of excess fill rather than being balanced or short. The actual quantity of cut and fill materials required to complete the earthwork grading at this site may vary from the estimated amount.

Prior to the placement of compacted fill, areas below proposed foundation, slab, and pavement should be stripped and grubbed to remove topsoil and materials with concentrated organic matter. Considering the topsoil thickness at the test pits, GTA recommends that for earthwork estimates, a stripping thickness of 1-foot be utilized. The actual stripping thickness will be dependent on localized topsoil development, previous plow depth, precipitation, soil moisture, construction traffic disturbance, and contractor care.

Beneath the upper humus/more organic topsoil, the deeper region of sandy topsoil (generally deeper than 4 to 6 inches below the ground surface) may potentially be segregated, screened and re-mixed with soils excavated from cut areas for use in structural fill areas. GTA will provide

additional recommendations for potential salvaging of deeper topsoil materials based upon conditions observed in the field at the time of construction.

After stripping, wet subgrade areas should not be proof-rolled with a loaded tandem-axle dump truck. Instead, the subgrade should be probed (test pits or hand augers) by the Geotechnical Engineer for approval prior to placement of the fill. No fill should be placed until the geotechnical engineer approves the subgrade.

During wet season construction, GTA anticipates that the existing surficial soils will soften and significant rutting will occur. The affected material will likely require removal or reworked prior to placement of fill. GTA recommends a summer season earthwork operation to reduce the economic impact of wet near surface soils.

For earthwork operations, temporary construction roads and construction traffic supervision should be provided to localize the extent of subgrade disturbance and resulting subgrade repairs. "Pans" or similar types of higher ground pressure equipment should not traverse earthwork areas with wet subgrade or shallow groundwater conditions. Trucks should only travel on established temporary construction roads. The vibratory function of the compaction equipment should only be used after at least 2 feet of structural fill has been placed above the native soil subgrade or any recommendation in the field by GTA.

Precipitation will result in standing water at low areas and in localized undercut areas. If the water is allowed to pond, the exposed subgrade materials may deteriorate and additional over excavation or subgrade improvement may be required at the affected areas. Positive drainage should be provided to protect exposed subgrades.

Most near surface on-site soils beneath the more organic surface topsoil are considered suitable for reuse as structural fill material. Excavated site materials conforming to SP, SP-SM, and SM classifications will be suitable for reuse in structural areas of mass earthwork construction. If the SC and CL materials will be considered for reuse as a pond liner, these materials should be segregated during construction and reserved for the pond liner construction. Materials conforming to USCS CL or SC are not recommended for reuse in structural fill construction during wet weather or in areas of shallow groundwater. During prevailing wet weather, fine-grained or clayey soils will likely require substantial drying by aeration after spreading over a large area and prior to compaction in fill construction. In addition, considering shallow groundwater and perched water conditions, it will likely prove difficult to maintain or improve stability of the subgrade using the fine-grained or clayey materials particularly during wet weather and in areas of near surface groundwater. GTA

will provide additional recommendations for potential selective use of CL and SC materials based upon conditions observed in the field at the time of construction.

The moisture content of the bulk sample materials tested ranged from approximately 4 to 14 percent above the optimum moisture. Of the 30 samples tested for moisture content, the average moisture content of 21.3 percent is approximately 10 percent above the average optimum value of 11.2 percent. At the tested moistures, excavated materials will require substantial drying by aeration after spreading over a large surface area to achieve proper compaction. When reusing materials excavated from pond and utility areas below the groundwater level and, in general, during wet weather, delays and expense will likely be associated with reducing soil moistures to acceptable levels. A contingency should be established for moisture adjustments, including potential chemical amendment using cement or Lime Kiln Dust (LKD; Calciment) to facilitate compaction and subgrade stability.

All fills should be constructed in maximum 8-inch thick loose lifts and be compacted to the following specifications:

COMPACTION SPECIFICATIONS

Structure / Fill Location	Compaction / Moisture Specification
Below foundations, floor slabs, pavement and within wall backfill	95% of ASTM D-698 Moisture: ± 3% of optimum

A soils-technician should monitor fill construction on a full time basis under the supervision of a geotechnical engineer. Compactive effort should be verified by in-place density testing.

LIMITATIONS

This report, including all supporting exploration logs, field data, field notes, estimates, and other documents prepared by GTA in connection with this project, has been prepared for the exclusive use of Pettinaro Construction Co., Inc. pursuant to the agreement between GTA and Pettinaro Construction Co., Inc., dated February 14, 2014 and in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreement are incorporated herein by reference. No warranty, express or implied, is given herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Pettinaro Construction Co., Inc. is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Explorations indicate soil and groundwater conditions only at specific locations and times and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between the exploration locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations in subsurface conditions from those described are noted during construction, recommendations in this report may need to be re-evaluated. In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. Geo-Technology Associates, Inc. is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Geo-Technology Associates, Inc.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be construed by the reader to imply approval by the writer.

We appreciate the opportunity to be of assistance on this project. Should you have any questions or require additional information, please contact our office at (302) 855-9761.

Sincerely,
GEO-TECHNOLOGY ASSOCIATES, INC.



Gregory R. Sauter, P.E.
Vice President

GRS/CMR/grs
140254
\\Gt-data\gta\1 Job File\Evans Farm\Report\Evans Farm- GTA Report of Subsurface Exploration.doc

Attachments: Site Location Plan (1 page)
Exploration Location Plan (1 page)
Notes for Exploration Logs (1 page)
Exploration Logs (8 pages)
Particle Size Distribution Report (5 pages)
Compaction Test Report (4 pages)
Moisture Content Test Data Summary (1 page)
ASFE Geotechnical Engineering Report (2 pages)



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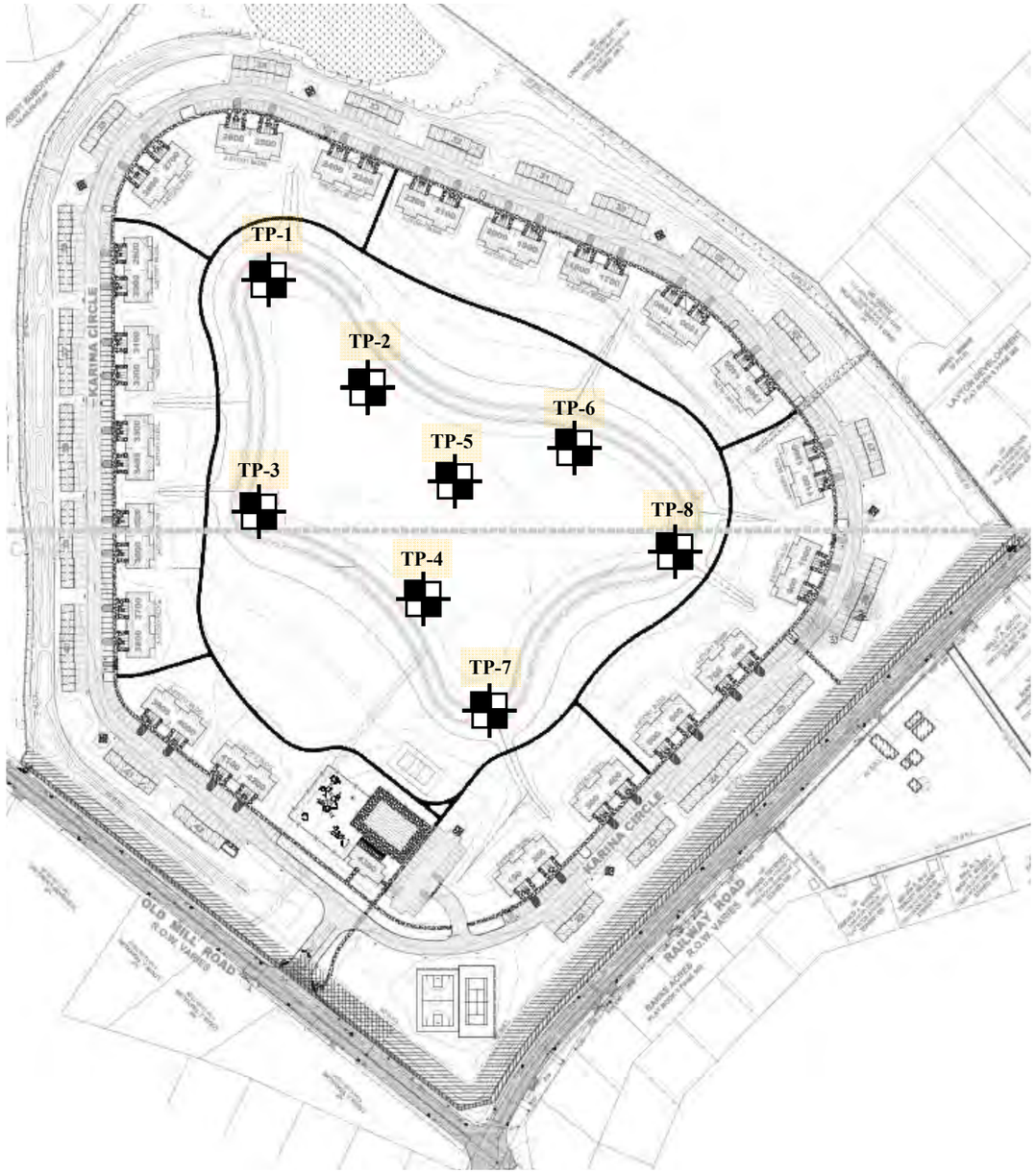
Site Location Plan
Evans Farm
Sussex County, Delaware

SCALE	DATE	DRAWN BY	REVIEW BY	FIGURE	JOB NO.
Not To Scale	February 27, 2014	GTA	GRS	1	140254



Exploration Location Plan taken from a plan titled Evans Farm: Erosion and Sediment Control Key Plan, prepared by Becker Morgan Group and dated February 6, 2014. The exploration locations indicated on the plan should be considered approximate.

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Exploration Location Plan
Evans Farm
Sussex County, Delaware

SCALE	DATE	DRAWN BY	REVIEW BY	FIGURE	JOB NO.
1” ~ 250’ (11x17 Sheet)	February 27, 2014	GTA	GRS	2	140254

NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)				SYMBOLS GRAPHIC	SYMBOLS LETTER
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			GW
					GP
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			GM
					GC
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			SW
					SP
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			SM
					SC
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY (<15% RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE) SANDY OR GRAVELLY SILT OR CLAY (>30% RETAINED ON THE NO. 200 SIEVE)	SILTS AND LEAN CLAYS LIQUID LIMIT LESS THAN 50			ML
					CL
					OL
		ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50			MH
					CH
					OH
HIGHLY ORGANIC SOILS					PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

	DESCRIPTION		GRAPHIC SYMBOLS
ADDITIONAL DESIGNATIONS	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

COARSE-GRAINED SOILS
(GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS
(SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
WOH = WEIGHT OF HAMMER
WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	▽
UPON COMPLETION OF DRILLING	▼
24 HOURS AFTER COMPLETION	▼

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF TEST PIT NO. TP-1

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **11.3 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Light brown to gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1 ft.
	2				
	4				▼ 1 day after completion, water at 4.5 ft. 7 days after completion, water at 1.5 ft.
	6				
	8				
	10				
-0.7	12			Bottom of hole at 12 ft.	

NOTES:

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LOG OF TEST PIT NO. TP-1

LOG OF TEST PIT NO. TP-2

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **2 ft.**
GROUND SURFACE ELEVATION: **10.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6		SC		Gray-orange, moist to wet, Clayey SAND	Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 2 ft.
2.6	8	SP-SM		Gray-brown, wet, Poorly graded SAND with Silt	
1.6		SM		Gray, wet, Silty SAND	
0.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-2

LOG OF TEST PIT NO. TP-3

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **12.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				▼ 1 day after completion, water at 5 ft.
	6				7 days after completion, water at 3.5 ft.
	8				
2.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-3

LOG OF TEST PIT NO. TP-4

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **11.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Orange-brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6	4	CL		Orange-brown, moist to wet, Lean CLAY with Sand	Mottling at 4 ft.
6.6		SM		Gray-orange, wet, Silty SAND	1 day after completion, water at 4 ft.
	6				7 days after completion, water at 3 ft.
	8				
1.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-4

LOG OF TEST PIT NO. TP-5

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 1 ft.
	8				
0.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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LOG OF TEST PIT NO. TP-5

LOG OF TEST PIT NO. TP-6

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **4 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Brown-gray-orange, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 2 ft.
	4				▼ 1 day after completion, water at 4 ft.
4.4	6	CL		Gray-orange, wet, Lean CLAY with Sand	7 days after completion, water at 2 ft.
3.4		SM		Lt. gray, wet, Silty SAND	
2.4	8	SC		Orange-gray, wet, Clayey SAND	
0.4	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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Georgetown, DE 19947

LOG OF TEST PIT NO. TP-6

LOG OF TEST PIT NO. TP-7

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **1.5 ft.**
GROUND SURFACE ELEVATION: **11.8 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-brown, moist to wet, Silty SAND	Topsoil: 6 inches
9.8	2	CL		Orange-gray, moist to wet, Lean CLAY with Silt	
	4				1 day after completion, water at 5 ft.
	6				
4.8		SP-SM		Orange-brown, wet, Poorly graded SAND with Silt	7 days after completion, water at 3.5 ft.
	8				
1.8	10			Bottom of hole at 10 ft.	
	12				

NOTES:

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21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-7

LOG OF TEST PIT NO. TP-8

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1.5 ft. 1 day after completion, water at 3 ft. 7 days after completion, water at 1.5 ft.
0.4	10			Bottom of hole at 10 ft.	

NOTES:

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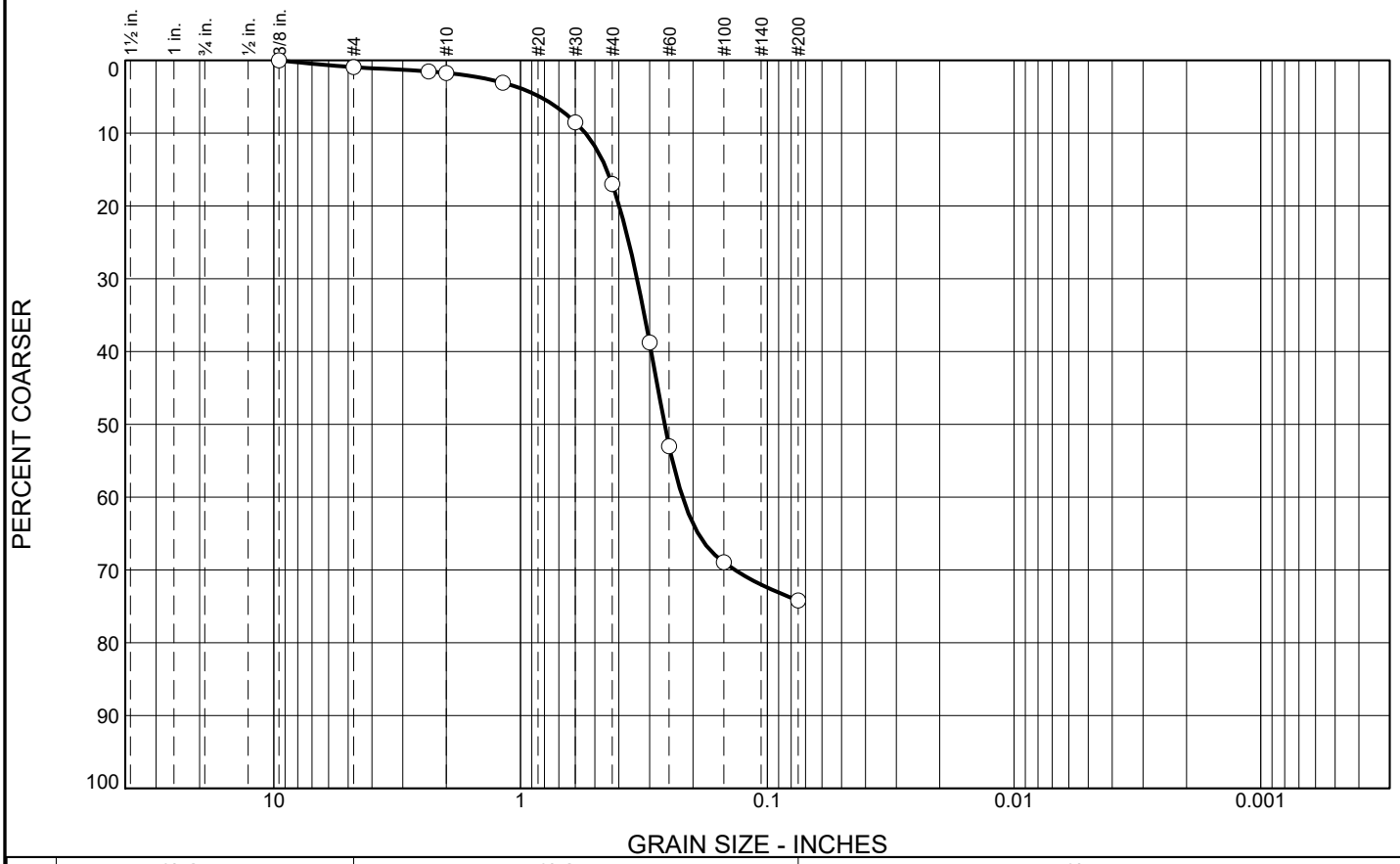
LOG OF TEST PIT NO. TP-8

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	0.8	15.3	57.2	25.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in	100.0		
# 4	99.1		
# 8	98.5		
# 10	98.3		
# 16	96.9		
# 30	91.5		
# 40	83.0		
# 50	61.3		
# 60	47.0		
# 100	31.1		
# 200	25.8		

* (no specification provided)

Soil Description

Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 16.3

Coefficients

D_{90}= 0.5455 D_{85}= 0.4476 D_{60}= 0.2954
D_{50}= 0.2607 D_{30}= 0.1352 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 16.3 %

Location: TP-4
Depth: 1 to 4 ft

Date: 2/28/14

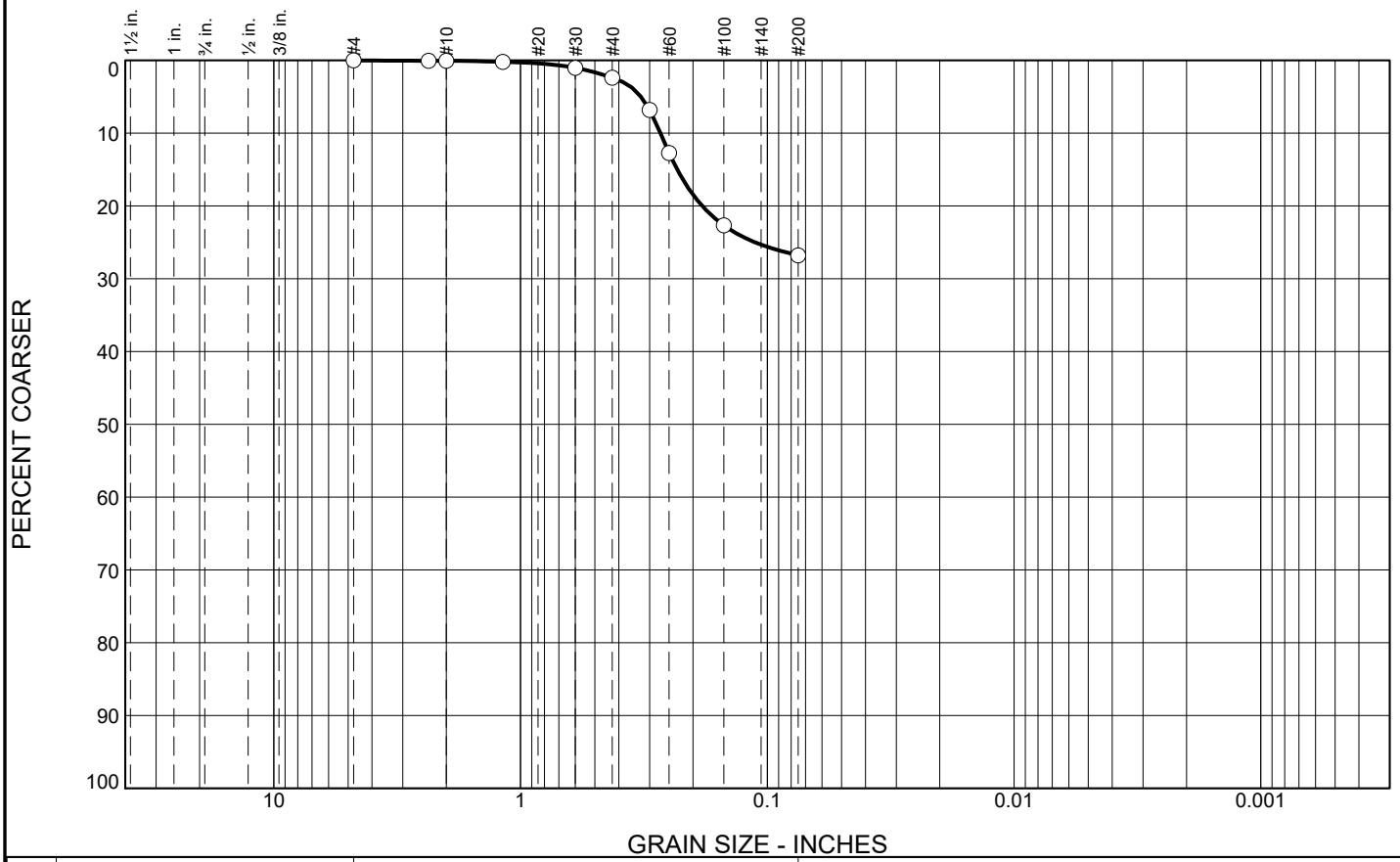
GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.3	24.4	73.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
# 4	100.0		
# 8	99.9		
# 10	99.9		
# 16	99.8		
# 30	99.0		
# 40	97.6		
# 50	93.2		
# 60	87.3		
# 100	77.3		
# 200	73.2		

* (no specification provided)

Soil Description

Lean CLAY with Sand

Atterberg Limits

PL= 21 LL= 45 PI= 24 NM= 23.4

Coefficients

D_{90}= 0.2712 D_{85}= 0.2317 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(17)

Remarks

Natural Moisture: 23.4 %

Location: TP-4
Depth: 4 to 5 ft

Date: 2/28/14

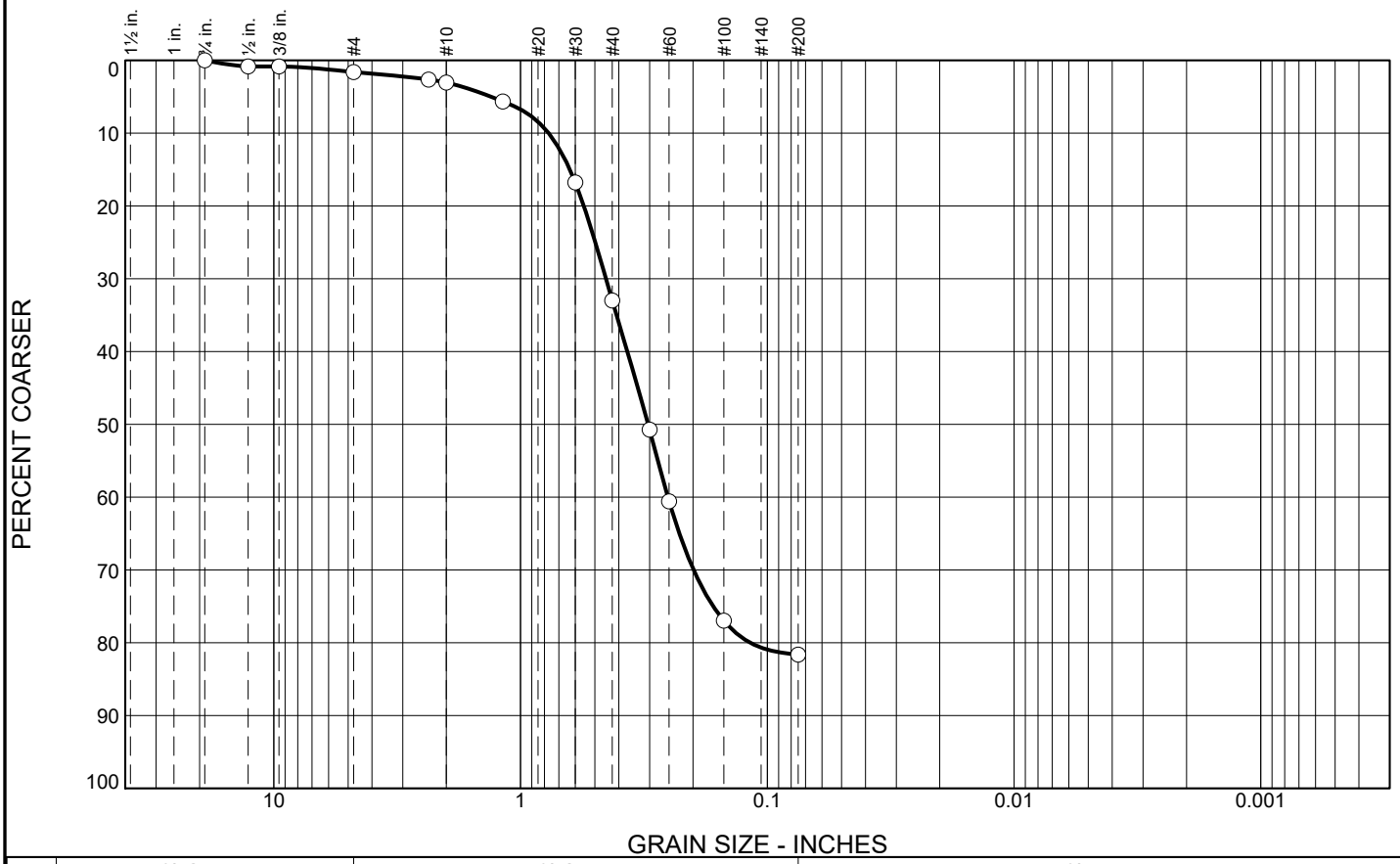
GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	1.4	30.0	48.6	18.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4 in	100.0		
1/2 in	99.2		
3/8 in	99.2		
# 4	98.4		
# 8	97.4		
# 10	97.0		
# 16	94.4		
# 30	83.2		
# 40	67.0		
# 50	49.3		
# 60	39.4		
# 100	23.0		
# 200	18.4		

* (no specification provided)

Soil Description

Gray-brown Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 18.6

Coefficients

D_{90}= 0.7694 D_{85}= 0.6312 D_{60}= 0.3694
D_{50}= 0.3041 D_{30}= 0.1989 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 18.6 %

Location: TP-5
Depth: 1 to 5 ft

Date: 2/28/14

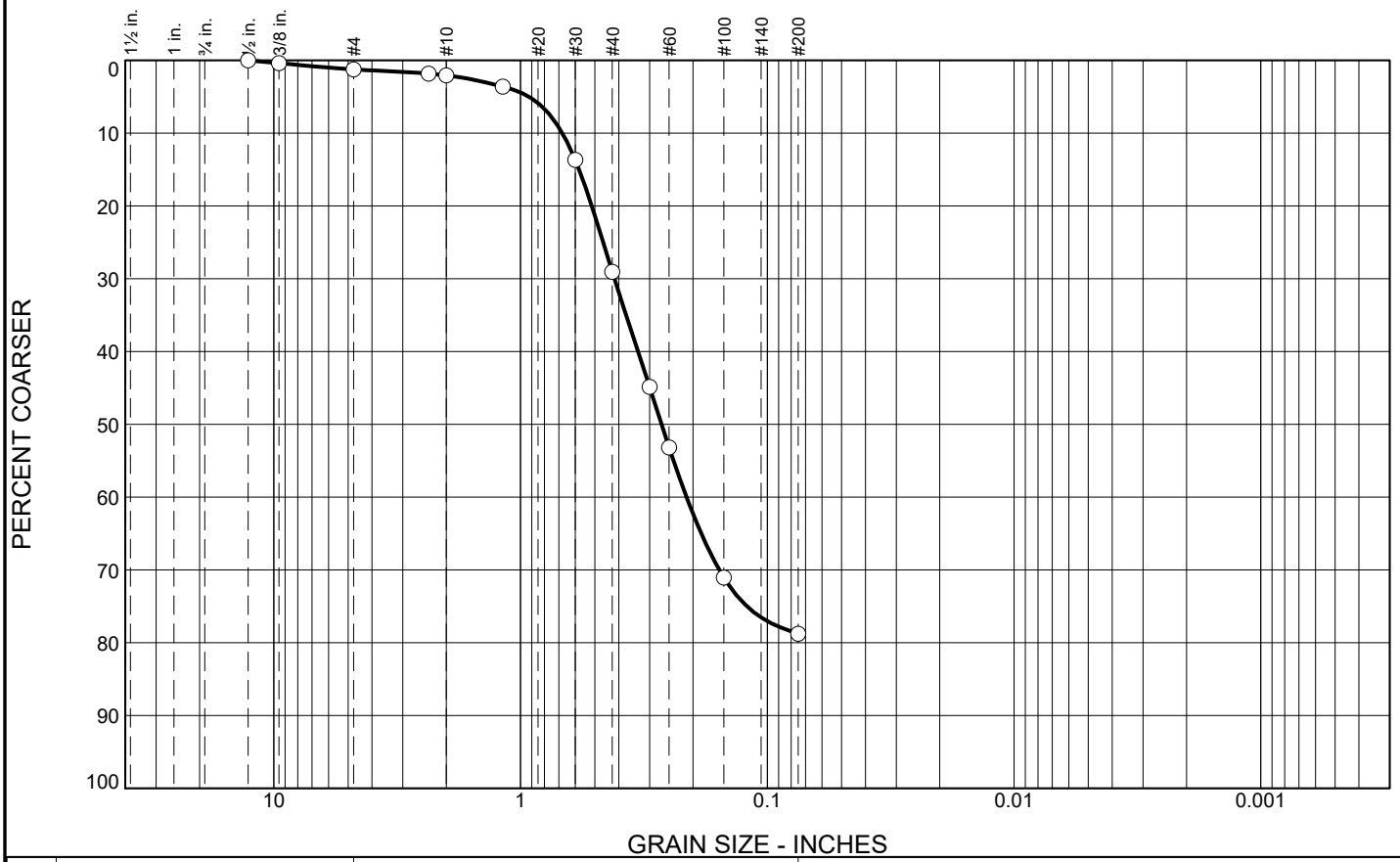
GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	0.9	27.0	49.7	21.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in	100.0		
3/8 in	99.6		
# 4	98.8		
# 8	98.2		
# 10	97.9		
# 16	96.4		
# 30	86.3		
# 40	70.9		
# 50	55.1		
# 60	46.8		
# 100	28.9		
# 200	21.2		

* (no specification provided)

Soil Description

Gray-brown Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 26.0

Coefficients

D_{90}= 0.6771 D_{85}= 0.5790 D_{60}= 0.3341
D_{50}= 0.2682 D_{30}= 0.1566 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 26.0 %

Location: TP-5
Depth: 5 to 10 ft

Date: 2/28/14

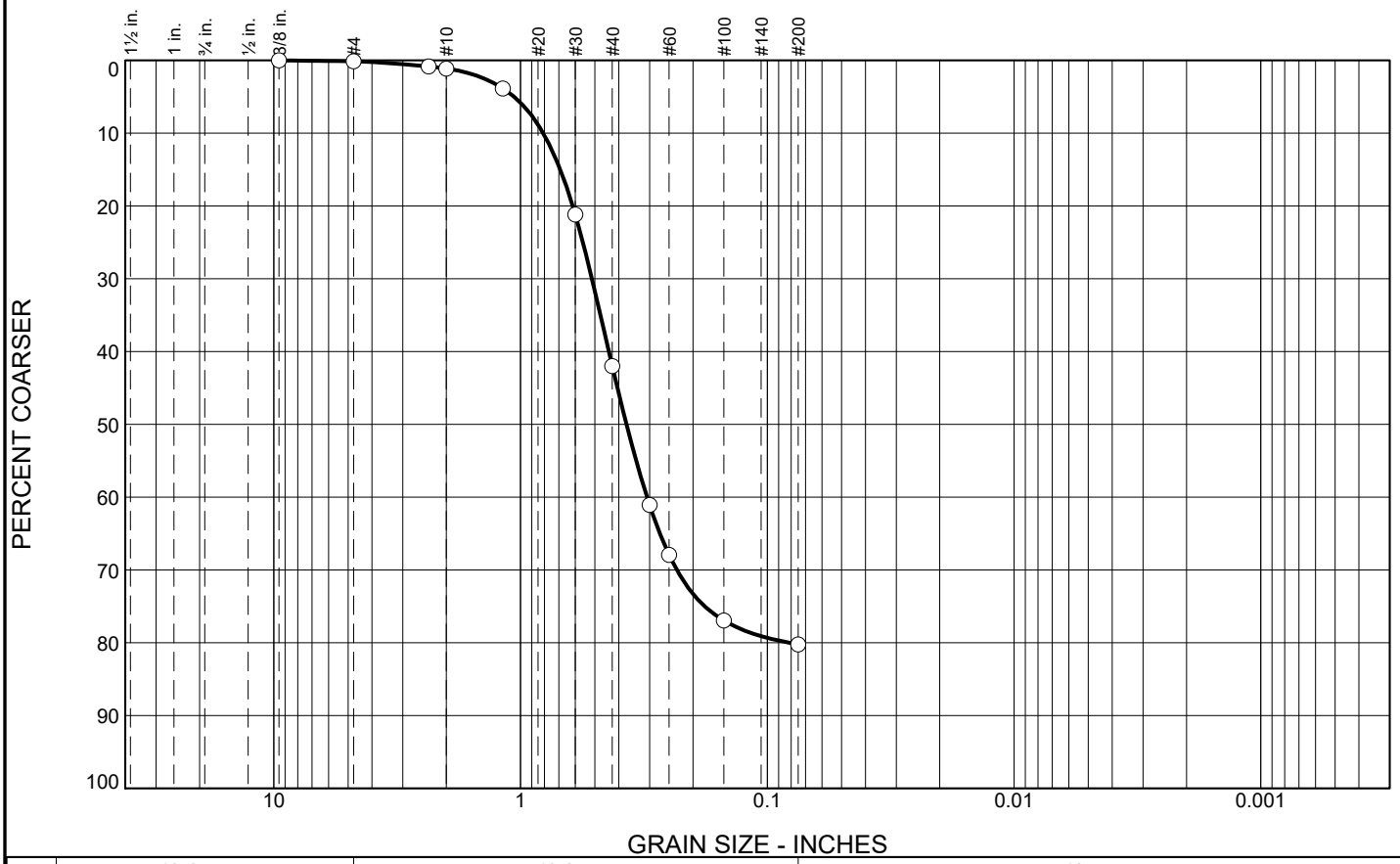
GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	1.0	40.9	38.2	19.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in	100.0		
# 4	99.9		
# 8	99.2		
# 10	98.9		
# 16	96.1		
# 30	78.8		
# 40	58.0		
# 50	38.9		
# 60	32.1		
# 100	23.1		
# 200	19.8		

* (no specification provided)

Soil Description

Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 14.0

Coefficients

D_{90}= 0.8094 D_{85}= 0.6906 D_{60}= 0.4387
D_{50}= 0.3722 D_{30}= 0.2326 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture: 14.0 %

Location: TP-6
Depth: 1 to 6 ft

Date: 2/28/14

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Company
Project: Evans Farm

Project No: 140254 **Figure**

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

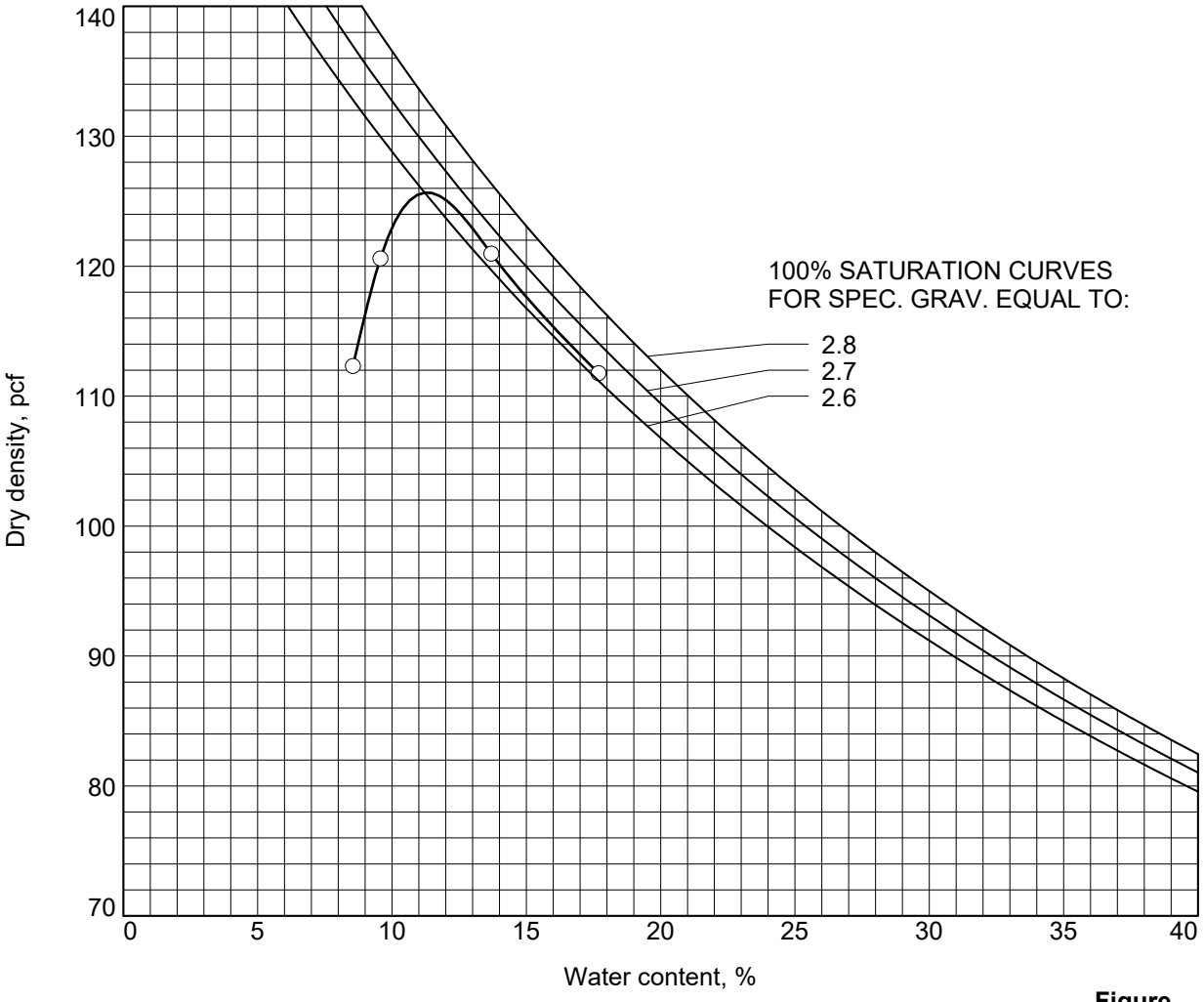
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-4
Depth: 1 to 4 ft
Remarks:

MATERIAL DESCRIPTION

Description: Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 16.3 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 25.8 %

TEST RESULTS
Maximum dry density = 125.7 pcf
Optimum moisture = 11.3 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

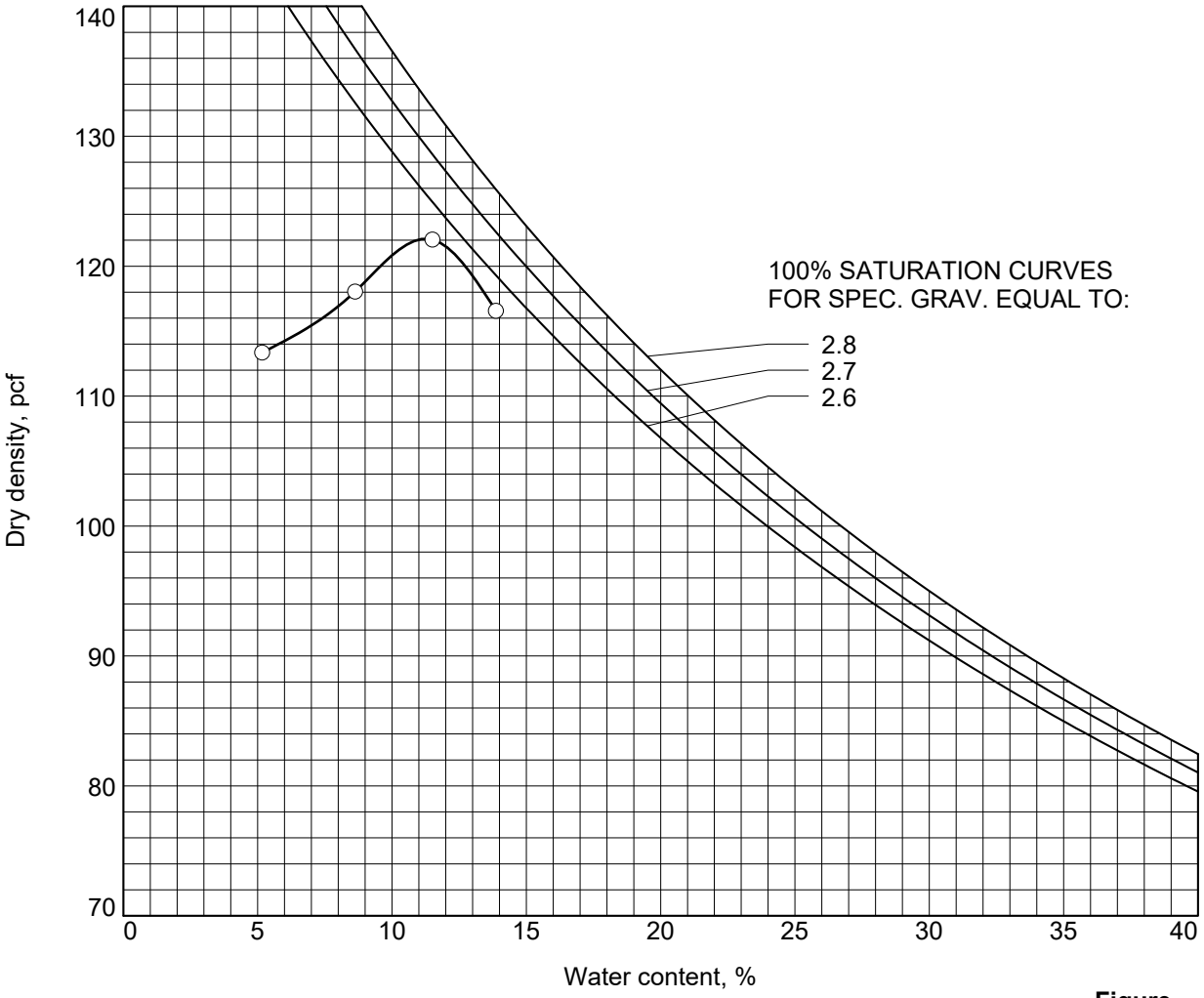
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-5
Depth: 1 to 5 ft
Remarks:

MATERIAL DESCRIPTION

Description: Gray-brown Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 18.6 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 18.4 %

TEST RESULTS
Maximum dry density = 122.1 pcf
Optimum moisture = 11.3 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

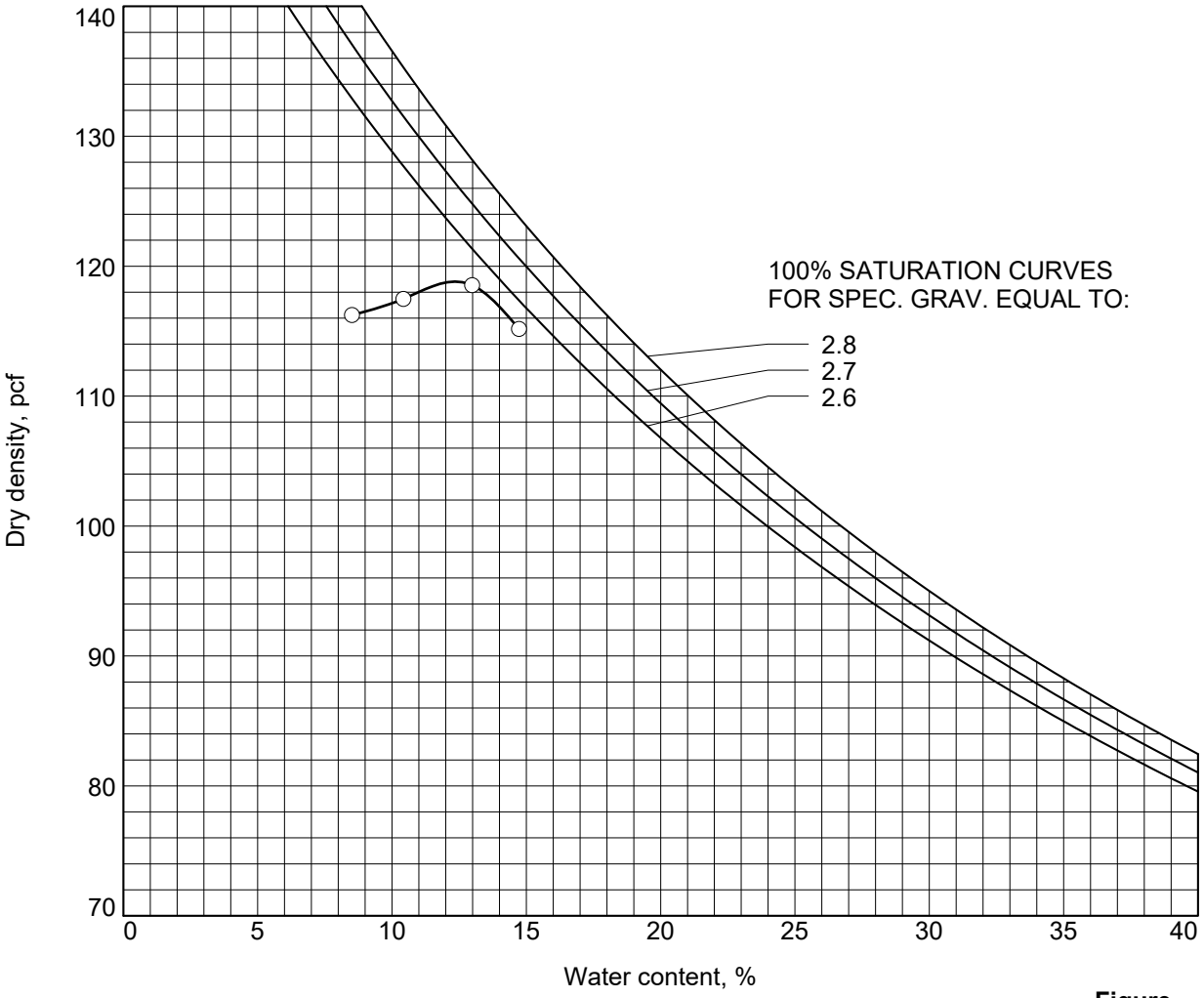
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-5
Depth: 5 to 10 ft
Remarks:

MATERIAL DESCRIPTION

Description: Gray-brown Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 26.0 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 21.2 %

TEST RESULTS
Maximum dry density = 118.8 pcf
Optimum moisture = 12.4 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

COMPACTION TEST REPORT
ASTM D 698-12 Method A Standard

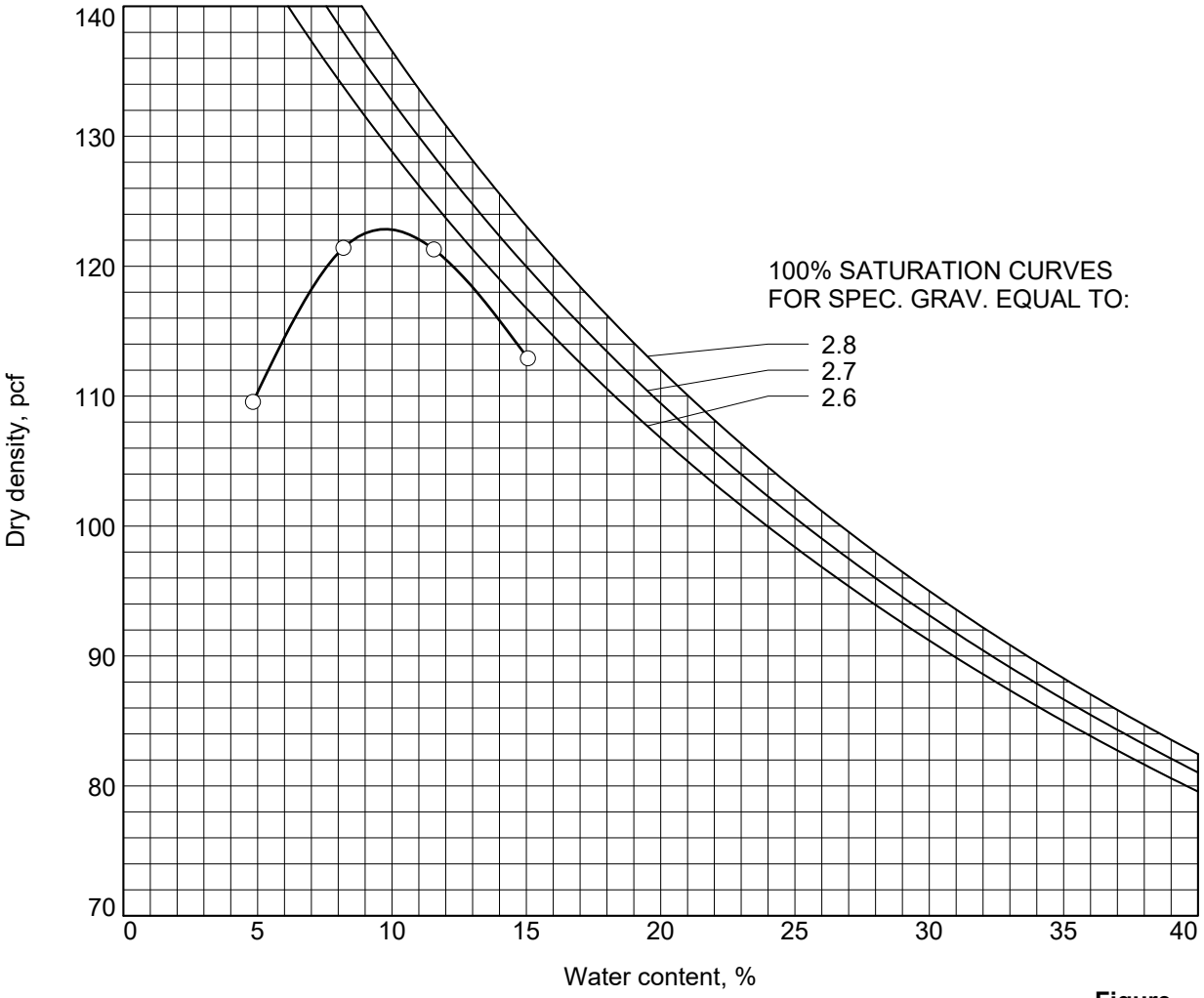
Project No.: 140254 **Date:** 2/28/14
Project: Evans Farm
Client: Pettinaro Construction Company
Location: TP-6
Depth: 1 to 6 ft
Remarks:

MATERIAL DESCRIPTION

Description: Silty SAND

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 14.0 % **Sp.G. =**
Liquid Limit = NP **Plasticity Index =** NP
% < No.200 = 19.8 %

TEST RESULTS
Maximum dry density = 122.8 pcf
Optimum moisture = 9.7 %



Figure

Geo-Technology Associates, Inc.

Tested By: RT **Checked By:** GS

GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

21133 Sterling Avenue, Suite 7
Georgetown, Delaware 19947
302-855-9761 302-856-3388 FAX

MOISTURE CONTENT TEST DATA SUMMARY

Evans Farm

Millville, Delaware

GTA Project No.: 140254

TEST PIT NO.	DEPTH (FT.)	NATURAL MOISTURE (%)	TEST PIT NO.	DEPTH (FT.)	NATURAL MOISTURE (%)
TP-1	1 - 5	13.9	TP-5	1 - 5	18.6
TP-1	5 - 6	17.6	TP-5	5 – 7	25.0
TP-1	6 - 10	16.0	TP-5	7 - 10	26.6
TP-1	10 - 12	25.7	TP-6	1 - 6	14.0
TP-2	1 - 3	12.9	TP-6	6 - 7	23.3
TP-2	3 - 8	18.5	TP-6	7 - 8	21.5
TP-2	8 - 9	27.8	TP-6	8 - 10	19.3
TP-2	9 – 10	32.0	TP-7	0.5 - 2	10.6
TP-3	1 - 3	8.8	TP-7	2 - 7	21.4
TP-3	3 - 7	15.3	TP-7	7 – 8.5	24.8
TP-3	7 - 10	22.3	TP-7	8.5 - 10	28.6
TP-4	1 - 4	16.3	TP-8	1 - 5	19.4
TP-4	4 - 5	23.4	TP-8	5 - 8	27.2
TP-4	5 - 8	26.3	TP-8	8 - 9	28.2
TP-4	8 - 10	24.3	TP-8	9 - 10	28.7

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing Geoprofessional Business Association Member Firm

February 14, 2020

Pettinaro Construction Co., Inc.
234 North James Street
Newport, Delaware 19804

Attn: Ms. Andrea Finerosky

RE: Report of Supplemental Subsurface Exploration
Evans Farm Apartments
Ocean View
Sussex County, Delaware

Ladies & Gentlemen:

In accordance with our agreement dated November 25, 2019, Geo-Technology Associates, Inc. (GTA) has performed a subsurface exploration for the above referenced project. The purpose of the subsurface exploration was to evaluate the estimated normal seasonal high groundwater elevation; discuss suitability of the subsoils to facilitate infiltration practices at selected test locations; and to present the subsoil conditions encountered at selected borings. A plan titled *Evans Farm Apartments* prepared by Pennoni Associates, Inc. and dated August 16, 2019, and our geotechnical report dated March 10, 2014, were referenced for this report. The results of our subsurface exploration are summarized below.

Referring to the attached Site Location Plan, the project is situated along the northwest side of Railway Road and the northeast side of Old Mill Road at the intersection between Railway Road and Old Mill Road in Millville, Delaware. The study area consists of an open farm field with woods surrounding the perimeter of the property. The existing ground surface at the exploration locations ranges between approximate Elevation 8 and 11 Mean Sea Level (MSL) as determined by Pennoni Associates, Inc.

According to the Geologic Map of the Bethany Beach and Assawoman Bay Quadrangles, Delaware (2012), published by the Delaware Geological Survey, the project area is underlain by sediments of the Coastal Plain Physiographic Province. Coastal Plain sediments below the surficial deposits exposed in the site area were generally deposited in commonly estuarine environments of Tertiary geologic age. The Tertiary deposits are designated as the deposits of the Beaverdam Formation. These deposits are characterized by "…very coarse sand with pebbles to silty clay." Please review the referenced publication for further details regarding this geologic unit.

From review of the USDA Soil Survey, the soils predominately conform to Klej loamy sand (0 to 2 percent slopes). Also present are soils that conform to Pepperbox-Rosedale complex (0 to 2

percent slopes), Rosedale loamy sand (0 to 2 percent slopes) and Runclint loamy sand (0 to 2 percent slopes). The soils map information is attached.

From review of the attached Monthly Groundwater Depth for Qe44-01, Columbia Aquifer, taken from the Delaware Geological Survey website, the groundwater depth at Well Qe44-01, was below the normal seasonal high during the period when the borings were performed in January 2020.

GTA performed seven hand auger borings, designated as A-1 through A-7, to depths where wet, caving conditions were encountered at 3 to 6 feet below the ground surface. Temporary piezometers were placed in each test hole and longer-term water readings were taken one day after completion. The piezometers were removed after the long-term readings. The exploration locations were selected by GTA. The boring locations staked with elevations determined by Pennoni. Relative locations of the current borings as well as previous explorations are shown on the attached Exploration Location Plan. The exploration locations indicated on the plan should be considered approximate.

The soils were visually classified in accordance with the Unified Soil Classification System (USCS) and the United States Department of Agriculture (USDA) classification system. Beneath an approximately 11 to 14-inch thick surface topsoil layer, the explorations generally encountered native subsoils visually classified as predominately consisting of Poorly-graded SANDs with Silt (USCS: SP-SM; USDA: Loamy Sand, Sand), Silty SAND (SM, Loamy Sand), and Clayey SAND (SC; Sandy Clay Loam).

GTA's estimate of the seasonal high groundwater level at the borings is based upon water levels below seasonal high; and soil coloring and mottling. The results of the groundwater level readings and GTA's opinion of the estimated seasonal high groundwater depth are summarized as follows:

GROUNDWATER DATA SUMMARY

Exploration No.	Existing Ground Surface Elevation (MSL)	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Groundwater at Completion	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Groundwater At One to Six Days After Completion	*Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Estimated Seasonal High Groundwater
A-1	8.5	2.6 / EL 5.9	1.7 / EL 6.8	1 / EL 8
A-2	8.1	2.5 / EL 5.6	1.3 / EL 6.8	0 / EL 8
A-3	8.4	2.7 / EL 5.7	1.7 / EL 6.7	0 / EL 8
A-4	8.7	3.9 / EL 3.8	2.1 / EL 6.6	1 / EL 8
A-5	8.3	3.0 / EL 5.3	1.0 / EL 7.3	0 / EL 8
A-6	10.5	4.0 / EL 6.5	3.3 / EL 7.2	2 / EL 9
A-7	10.1	4.0 / EL 6.1	3.5 / EL 6.6	1 / EL 9

*Seasonal high groundwater estimate based upon observed soil mottling, saturation and color and should be considered approximate.

From our previous exploration performed during February and March 2014, the estimated seasonal high is summarized as follows:

GROUNDWATER DATA SUMMARY

Exploration No.	Existing Ground Surface Elevation (MSL)	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Encountered Water When Excavated	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Water At Seven Days After Completion	Depth Below Existing Ground Surface (ft.)/ Elevation (MSL) to Estimated Normal Seasonal High Groundwater
TP-1	11.3	5 / 6.3	1.5 / 9.8	2 / 9
TP-2	10.6	2 / 8.6	2 / 8.6	2 / 9
TP-3	12.2	5 / 7.2	3.5 / 8.7	3 / 9
TP-4	11.6	3 / 8.6	3 / 8.6	3 / 9
TP-5	10.2	3 / 7.2	1 / 9.2	1 / 9
TP-6	10.4	4 / 6.4	2 / 8.4	2 / 8
TP-7	11.8	1.5 / 10.3	3.5 / 8.3	4 / 8
TP-8	10.4	3 / 7.4	1.5 / 8.9	2 / 8

The groundwater levels can be expected to fluctuate with seasonal changes, precipitation, and other factors such as development activity. Additionally, perched water conditions develop in granular soils overlying fine-grained soils during the "wet season" as well as during periods of precipitation. Please refer to the exploration logs and idealized subsurface profiles provided in the attachments for further information.

A selected sample obtained from the borings was tested for grain-size analysis, hydrometer, Atterberg Limits and natural moisture content. The grain-size analysis, hydrometer and Atterberg Limits testing was performed to evaluate the Unified Soil Classification System (USCS) and United States Department of Agriculture (USDA) soil classification system designations for the soil. The results of testing are as follows:

SUMMARY OF LABORATORY TESTING

EXPLORATION NO.	DEPTH (FT.)	USCS CLASSIFICATION	USDA CLASSIFICATION	LL (%)	PI (%)	NMC %
A-6	1 – 4	Silty SAND (SM)	Loamy Sand	NP	NP	9.1

Note: LL=Liquid Limit PI=Plastic Index NP=Non-plastic NMC=Natural Moisture Content

Please refer to the attached laboratory test results for additional information.

The guidelines established in the *Delaware Post Construction Stormwater BMP Standards & Specifications*, dated February 2019 indicate that the minimum infiltration rate for

all runoff reduction and infiltration practices is one-inch per hour. Also, a vertical separation of at least two-feet from the seasonal high groundwater elevation or limiting layer is required for all infiltration practices unless an underdrain is provided.

Predominant subsurface soils observed in the test borings consisted of Poorly-graded SANDs, Silty SANDs and Clayey SANDs which generally correspond to Loamy Sand, Sandy Loam and Sandy Clay Loam respectively, in accordance with the USDA Soil Classification System. These types of soils have good to poor infiltration characteristics. Based upon the boring data and considering the shallow groundwater, it is GTA's opinion that below grade infiltration facilities will generally not be feasible at this site. The subsoil and groundwater conditions appear to be more suitable for gravel wetland or wet pond construction.

For wet pond construction, a pond liner should be considered if needed to maintain proposed pool levels. It appears that a sufficient quantity of USCS CL or SC materials is not available on site and a manufactured pond liner may be deemed more suitable for a wet pond. If a manufactured liner is used, GTA recommends a Geosynthetic Clay Liner (GCL; Bentonite matrix) or an appropriate PVC liner with relief valves. Both types of liners will need to be provided with a 1-foot thick granular soil cover. The GCL or PVC liners should be installed in accordance with manufacturer's recommendations. On-site granular soils are considered suitable for use as a pond liner cover material if they are dried to near optimum. Pond liner cover materials should meet AASHTO classification designation A-2-4 or more granular and be approved by GTA.

If a pond fill embankment is planned, GTA recommends that prior to construction of pond fill embankment and after stripping the surface topsoil, GTA recommends to construct a four-foot deep (below stripped ground surface and stepped below the spillway invert) cutoff trench along the pond embankment length and extending to the 10-year event elevation at each end of the fill embankment alignment. Also, upon completion of the cutoff trench, an embankment core should extend to the top elevation of the 10-year event. The side slopes of the cutoff trench and embankment core should be at 1H:1V inclination or flatter. The bottom of the cutoff trench and the top of embankment core should be at least 4 feet wide. The cutoff and embankment core should be formed of USCS CL or SC materials. The balance of embankment may be constructed of onsite materials conforming to USCS SC, SM, SP-SM or SP.

Pond structural fill should be constructed in maximum 8-inch loose lifts and compacted to 95 percent of the maximum dry density as determined by ASTM D-698 (AASHTO T-99). If practical, GTA recommends reinforced concrete pipe be used as the principal spillway pipe. Also, a concrete cradle and anti-seep collar should be provided for the spillway pipe.

For wet pond construction, water levels will be above at least a portion of the pond bottom level during construction. The contractor should be prepared to stabilize and dewater pond excavations. Subgrades excavated below the water table will be prone to instability and softening.

All SWM pond construction should conform to *Delaware Conservation Practice Standard Pond Code 378* and *Code 521*, latest editions and *Delaware Sediment and Stormwater Regulations*, latest edition, as applicable.

Limitations

This report, including all supporting exploration logs, field data, field notes, estimates, and other documents prepared by GTA in connection with this project, has been prepared for the exclusive use of Pettinaro Construction Co. Inc. pursuant to the agreement between GTA and Pettinaro Construction Co. Inc. dated November 25, 2019, and in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreement are incorporated herein by reference. No warranty, express or implied, is given herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Stanley Halle Communities is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Explorations indicate soil and groundwater conditions only at specific locations and times and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between the exploration locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations in subsurface conditions from those described are noted during construction, recommendations in this report may need to be re-evaluated.

In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. Geo-Technology Associates, Inc. is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Geo-Technology Associates, Inc.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be constructed by the reader to imply approval by the writer.

We appreciate the opportunity to be of assistance on this project. Should you have any questions or require additional information, please contact our office at (302) 855-9761.

Sincerely,
GEO-TECHNOLOGY ASSOCIATES, INC.

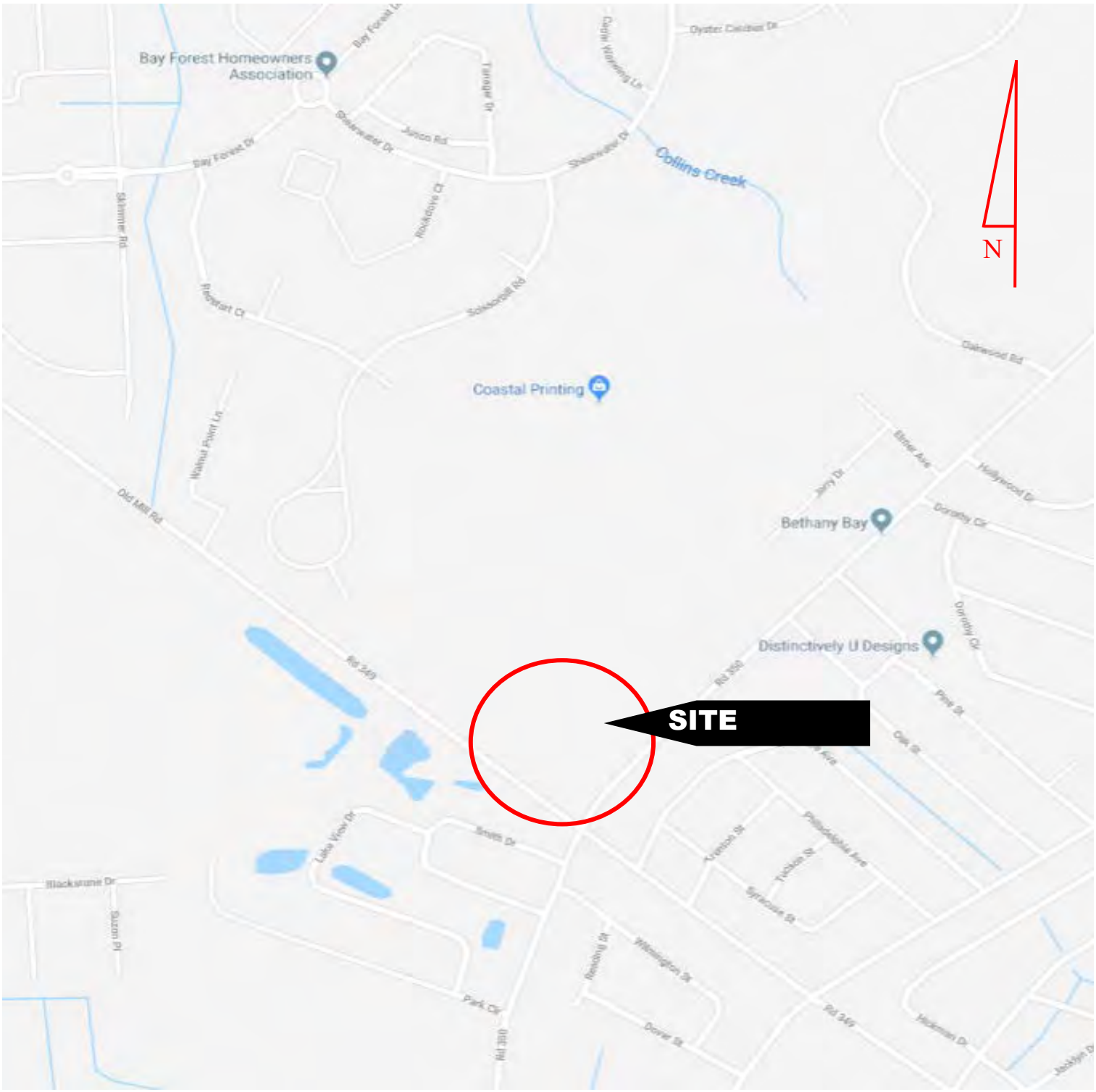
Travis P. Caraway, EIT
Project Geotechnical Professional



Gregory R. Sauter, P.E
Vice President

TPC/GRS/llh
31200065
S:\1 Job File\2020 Projects\31200065-Evans Farm\Report\Evans Farm- GTA Letter Report of Suburface Exploration.doc

Attachments: Site Location Plan (1 page)
Exploration Location Plan (1 page)
USDA Soil Survey Map (3 pages)
Qe44-01 Monthly Groundwater Depth (1 page)
Notes for Exploration Logs (1 page)
Exploration Logs (7 pages)
Particle Size Distribution Report (1 page)
Previous Exploration Logs (8 pages)
GBA – Important Information about your Geotechnical Engineering Report (2 pages)

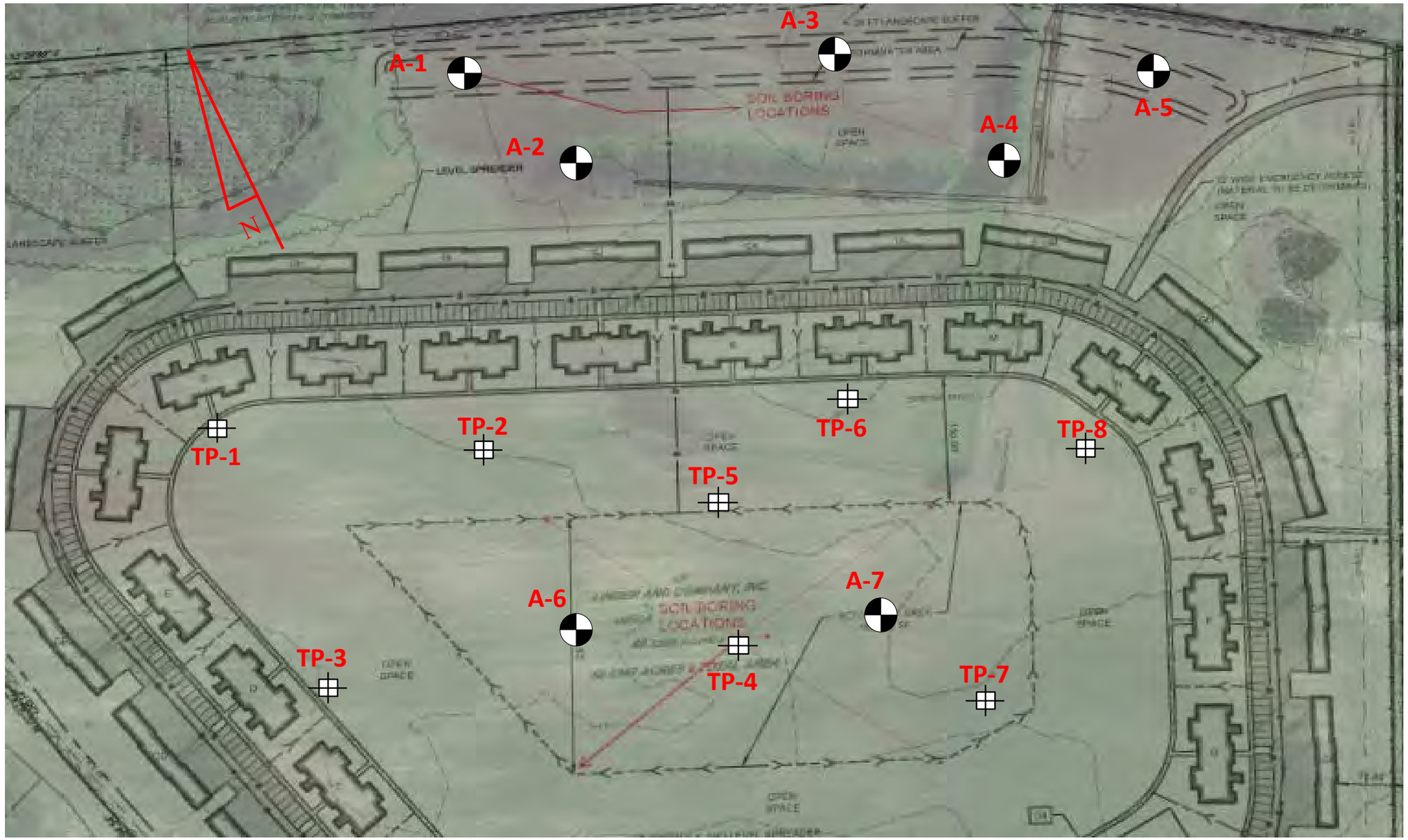


Site Location Plan taken from Google Maps

GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
21133 Sterling Avenue, Suite 7
Georgetown, Delaware 19947
(302) 855-9761 Fax (302) 856-3388

Site Location Plan
Evans Farm Apartments
Sussex County, Delaware

SCALE	DATE	DRAWN BY	DESIGN BY	REVIEW BY	JOB NO.
NTS	January 2020	GTA	Google Maps	GRS	31200065



Exploration Location Plan taken from a plan titled *Evans Farm Apartments* drawn by Pennoni Associates Inc. and dated August 16, 2019.
Previous explorations presented in our report dated March 10, 2014.

Exploration Location

Previous Exploration Locations

GEO-TECHNOLOGY ASSOCIATES, INC.
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Exploration Location Plan
Evans Farm Apartment
Sussex County, Delaware

SCALE 11x17	DATE	DRAWN BY	DESIGN BY	REVIEW BY	JOB NO.	Figure
1"~115'	January 2020	GTA	Pennoni	GRS	31200065	2

Soil Map—Sussex County, Delaware
(Evans Farm)



Map Scale: 1:3,990 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sussex County, Delaware
Survey Area Data: Version 20, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2018—Mar 12, 2019

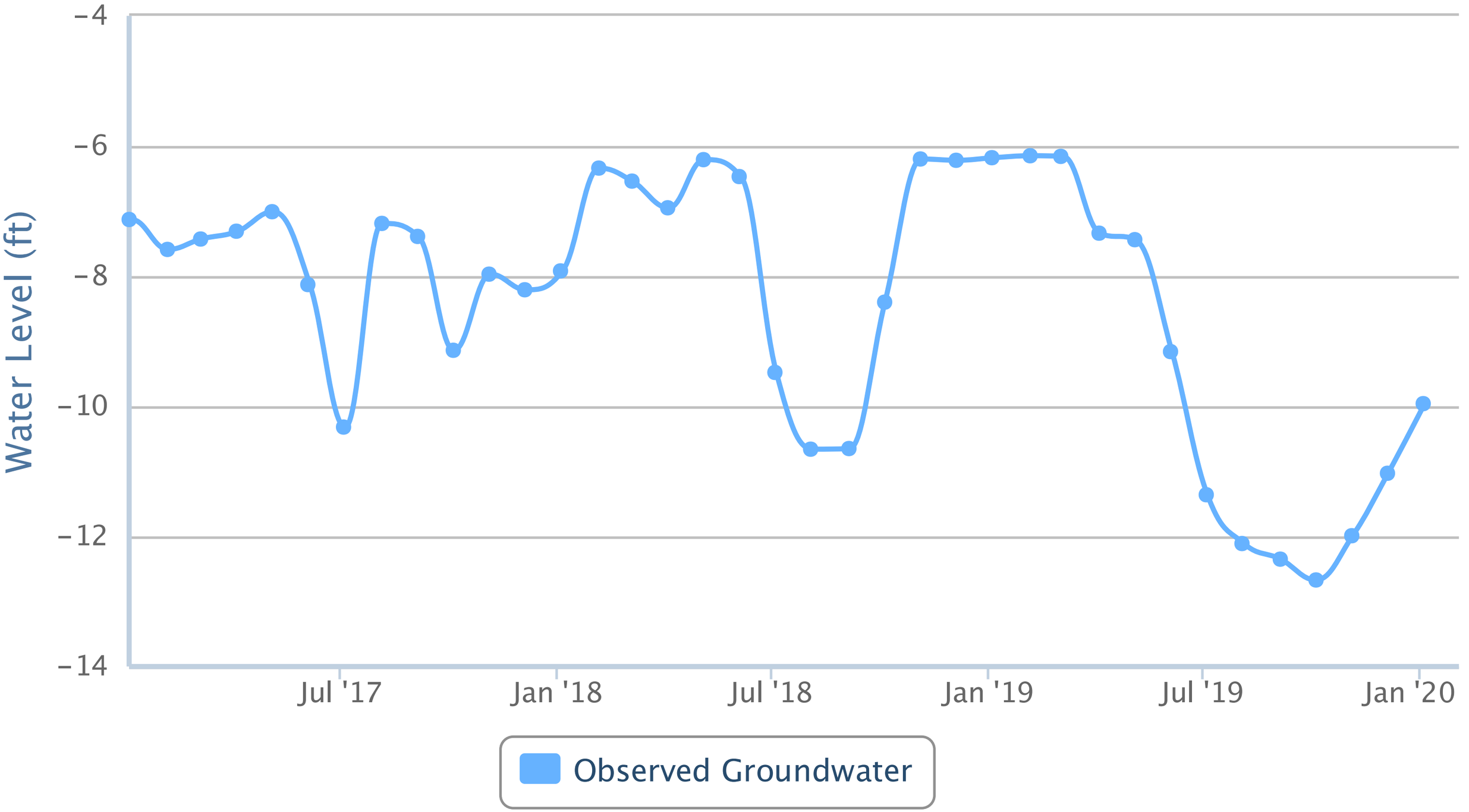
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	2.0	4.2%
HmA	Hammonton loamy sand, 0 to 2 percent slopes	4.8	10.1%
KsA	Klej loamy sand, 0 to 2 percent slopes	16.3	34.3%
PsA	Pepperbox-Rosedale complex, 0 to 2 percent slopes	8.5	17.9%
RoA	Rosedale loamy sand, 0 to 2 percent slopes	8.0	16.8%
RuA	Runclint loamy sand, 0 to 2 percent slopes	8.0	16.8%
Totals for Area of Interest		**47.7**	**100.0%**

Monthly Groundwater Depth for Qe44-01, Columbia Aquifer

Delaware Geological Survey



NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)				SYMBOLS GRAPHIC	SYMBOLS LETTER
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			GW
					GP
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			GM
					GC
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			SW
					SP
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			SM
					SC
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY (<15% RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE) SANDY OR GRAVELLY SILT OR CLAY (>30% RETAINED ON THE NO. 200 SIEVE)	SILTS AND LEAN CLAYS LIQUID LIMIT LESS THAN 50			ML
					CL
					OL
		ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50			MH
					CH
					OH
HIGHLY ORGANIC SOILS					PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

	DESCRIPTION		GRAPHIC SYMBOLS
ADDITIONAL DESIGNATIONS	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

COARSE-GRAINED SOILS
(GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS
(SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
WOH = WEIGHT OF HAMMER
WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	▽
UPON COMPLETION OF DRILLING	▼
24 HOURS AFTER COMPLETION	▼

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF EXPLORATION NO. A-1

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	2.6		1.7
DATE:	1/28/20		1/29/20
CAVED (ft):	4.0		4.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.5**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.5	0	TS		Topsoil: 13 inches	
				7.4		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				5.5		SC		Tan, wet, Clayey SAND USDA: Sandy Clay Loam	
				4.5	4			Bottom of hole 4.0 feet	Wet, caving conditions at 4.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 43, Precipitation Last 48 hours: 1.1 in** **Coords: 38 33'36.50"N, 75 6'50.49"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-1

LOG OF EXPLORATION NO. A-2

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	2.5		1.3
DATE:	1/28/20		1/29/20
CAVED (ft):	5.0		5.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.1**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.1	0	TS		Topsoil: 12 inches	
				7.1		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
					4				
				3.1				Bottom of hole 5.0 feet	Wet, caving conditions at 5.0 feet
					6			Dynamic Cone Penetrometer is the approximate average per interval.	
					8				
					10				
					12				

NOTES: **Air Temp: 43, Precipitation Last 48 hours: 1.1 in** **Coords: 38 33'34.85"N, 75 6'50.35"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-2

LOG OF EXPLORATION NO. A-3

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	2.7		1.7
DATE:	1/28/20		1/29/20
CAVED (ft):	3.0		3.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.4**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.4	0	TS		Topsoil: 12 inches	
				7.4		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				5.4				Bottom of hole 3.0 feet	Wet, caving conditions at 3.0 feet
					4			Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords: 38 33'34.05"N, 75 6'46.51"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-3

LOG OF EXPLORATION NO. A-4

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	3.9		2.1
DATE:	1/28/20		1/29/20
CAVED (ft):	4.0		4.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.7**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.7	0	TS		Topsoil: 14 inches	
				7.5		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				4.7	4			Bottom of hole 4.0 feet	Wet, caving condtions at 4.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **3833'31.84"N, 75 6'45.99"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-4

LOG OF EXPLORATION NO. A-5

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	3.0		1.0
DATE:	1/28/20		1/29/20
CAVED (ft):	4.0		4.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **8.3**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				8.3	0	TS		Topsoil: 11 inches	
				8.2		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
				4.3	4			Bottom of hole 4.0 feet	Wet, caving conditions 4.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					6				
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **3833'31.84"N, 75 6'43.53"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-5

LOG OF EXPLORATION NO. A-6

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	4.0		3.3
DATE:	1/28/20		1/29/20
CAVED (ft):	6.0		6.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **10.5**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				10.5	0	TS		Topsoil: 12 inches	
				9.5		SM		Tan, moist, Silty SAND USDA: Loamy Sand	
					2				
				6.5	4	SP-SM		Tan, wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
				4.5	6			Bottom of hole 6.0 feet	Wet, caving conditions at 6.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **38 33'30.81"N, 75 6'54.76"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-6

LOG OF EXPLORATION NO. A-7

PROJECT: **Evans Farm Apartments**
PROJECT NO.: **31200065**
PROJECT LOCATION: **Sussex County, Delaware**

WATER LEVEL (ft):	4.0		3.5
DATE:	1/28/20		1/29/20
CAVED (ft):	6.0		6.0

DATE STARTED: **1/28/2020**
DATE COMPLETED: **1/28/2020**
DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
DRILLER: **A. Pearson**
DRILLING METHOD: **Auger**
SAMPLING METHOD: **Discrete**

GROUND SURFACE ELEVATION: **10.1**
DATUM: **Survey**
EQUIPMENT: **Hand Auger**
LOGGED BY: **JOS**
CHECKED BY: **GRS**

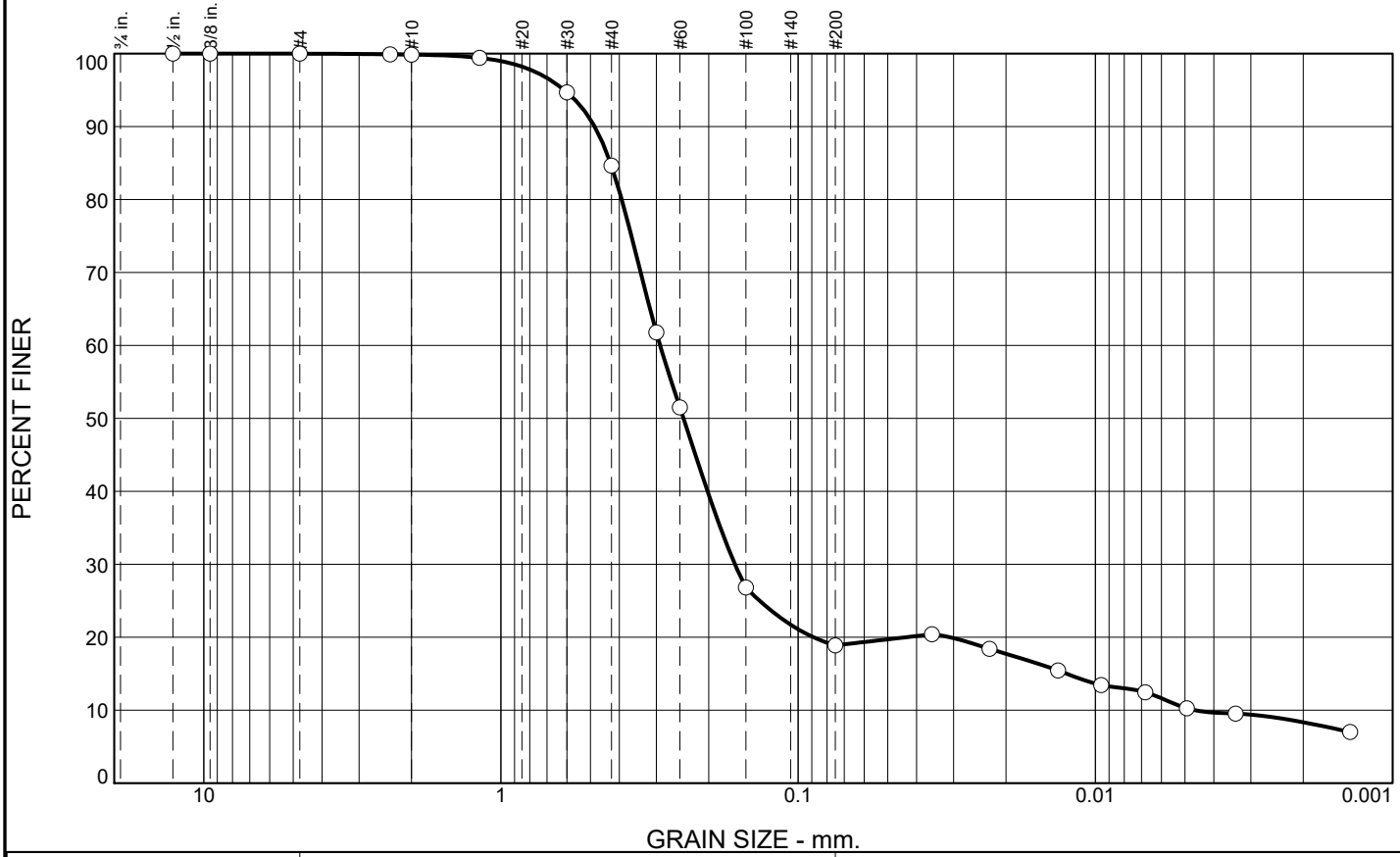
SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE BLOWS/1¾ inches	DCP (see notes)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
				10.1	0	TS		Topsoil: 12 inches	
				9.1		SP-SM		Tan, moist to wet, Poorly-graded SAND with Silt USDA: Loamy Sand	
					2				
					4				
				4.1	6			Bottom of hole 6.0 feet	Wet, caving conditions at 6.0 feet
								Dynamic Cone Penetrometer is the approximate average per interval.	
					8				
					10				
					12				

NOTES: **Air Temp: 39, Precipitation Last 48 hours: 1.1 in** **Coords:** **38 33'28.97"N, 75 6'51.90"W**
ASTM D-2488

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF EXPLORATION NO. A-7

Particle Size Distribution Report



% Gravel		% Sand			% Fines	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	15.2	65.8	8.6	10.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in	100.0		
3/8 in	100.0		
# 4	100.0		
# 8	99.9		
# 10	99.9		
# 16	99.4		
# 30	94.7		
# 40	84.7		
# 50	61.8		
# 60	51.5		
# 100	26.8		
#200	18.9		
0.0355 mm.	20.4		
0.0227 mm.	18.4		
0.0134 mm.	15.4		
0.0096 mm.	13.4		
0.0068 mm.	12.5		
0.0049 mm.	10.3		
0.0034 mm.	9.5		
0.0014 mm.	7.0		

* (no specification provided)

Soil Description

Tan, Silty SAND

Atterberg Limits

PL= NP LL= NP PI= NP NM= 9.1

Coefficients

D_{90}= 0.4840 D_{85}= 0.4279 D_{60}= 0.2914
D_{50}= 0.2431 D_{30}= 0.1633 D_{15}= 0.0125
D_{10}= 0.0047 C_u= 62.66 C_c= 19.68

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

USDA: Loamy Sand

Location: A-6
Sample Number: S-20200131-01 **Depth:** 1.0' - 4.0' **Date:** 1/31/2020

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

Client: Pettinaro Construction Co.
Project: Evans Farm Apartments
Project No: 31200065 **Figure**

Tested By: JNJ **Checked By:** GRS

LOG OF TEST PIT NO. TP-1

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **11.3 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Light brown to gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1 ft.
	2				
	4				▼ 1 day after completion, water at 4.5 ft. 7 days after completion, water at 1.5 ft.
	6				
	8				
	10				
-0.7	12			Bottom of hole at 12 ft.	

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-1

LOG OF TEST PIT NO. TP-2

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **2 ft.**
GROUND SURFACE ELEVATION: **10.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6		SC		Gray-orange, moist to wet, Clayey SAND	Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 2 ft.
2.6	8	SP-SM		Gray-brown, wet, Poorly graded SAND with Silt	
1.6		SM		Gray, wet, Silty SAND	
0.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-2

LOG OF TEST PIT NO. TP-3

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **5 ft.**
GROUND SURFACE ELEVATION: **12.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				▼ 1 day after completion, water at 5 ft.
	6				7 days after completion, water at 3.5 ft.
	8				
2.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-3

LOG OF TEST PIT NO. TP-4

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

PROJECT NO.: **140254**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **11.6 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Orange-brown, moist to wet, Silty SAND	Topsoil: 12 inches
	2				
7.6	4	CL		Orange-brown, moist to wet, Lean CLAY with Sand	Mottling at 4 ft.
6.6		SM		Gray-orange, wet, Silty SAND	1 day after completion, water at 4 ft.
	6				7 days after completion, water at 3 ft.
	8				
1.6	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-4

LOG OF TEST PIT NO. TP-5

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.2 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 3 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 1 ft.
	8				
0.2	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-5

LOG OF TEST PIT NO. TP-6

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **4 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	SM		Brown-gray-orange, moist to wet, Silty SAND	Topsoil: 12 inches
	2				Mottling at 2 ft.
	4				1 day after completion, water at 4 ft.
	6				7 days after completion, water at 2 ft.
4.4		CL		Gray-orange, wet, Lean CLAY with Sand	
3.4		SM		Lt. gray, wet, Silty SAND	
2.4	8	SC		Orange-gray, wet, Clayey SAND	
0.4	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-6

LOG OF TEST PIT NO. TP-7

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **1.5 ft.**
GROUND SURFACE ELEVATION: **11.8 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-brown, moist to wet, Silty SAND	Topsoil: 6 inches
9.8	2	CL		Orange-gray, moist to wet, Lean CLAY with Silt	
	4				1 day after completion, water at 5 ft.
	6				
4.8		SP-SM		Orange-brown, wet, Poorly graded SAND with Silt	7 days after completion, water at 3.5 ft.
	8				
1.8	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-7

LOG OF TEST PIT NO. TP-8

PROJECT: **Evans Farm**
PROJECT LOCATION: **Sussex County, Delaware**
CLIENT: **Pettinaro Construction Company**

PROJECT NO.: **140254**

DATE STARTED: **2/27/14**
DATE COMPLETED: **2/27/14**
CONTRACTOR: **Bunting & Murray Construction**
EQUIPMENT: **John Deere 790 Excavator**

GROUNDWATER ENCOUNTERED: **3 ft.**
GROUND SURFACE ELEVATION: **10.4 MSL**
DATUM: **Survey**
LOGGED BY: **R. Baker**
CHECKED BY: **G. Sauter**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
		SM		Light brown-gray, moist to wet, Silty SAND	Topsoil: 12 inches Mottling at 1.5 ft. 1 day after completion, water at 3 ft. 7 days after completion, water at 1.5 ft.
	2				
	4				
	6				
	8				
0.4	10			Bottom of hole at 10 ft.	
	12				

NOTES:

GEO-TECHNOLOGY ASSOCIATES, INC.
21133 Sterling Avenue, Suite 7
Georgetown, DE 19947

LOG OF TEST PIT NO. TP-8

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation

everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed

and imes

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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Evans Farm

01/15/2020 Designer Meeting Minutes & Subsequent Phone Call

Attendees: Alan Decktor- Pennoni Associates, Rob Fox- Pennoni Associates, Valerie Thompson- SCD, John Justice- SCD

- The intent of this meeting was for guidance/clarification of the proposed SWM. A pre-application meeting was held 10/23/19.
- DelDOT road & improvements will bypass the site.
- Water elevation in existing ditch at proposed outfall= <6" currently.
- VT stated the outfall pipe should be brought in above bottom of ditch and above water surface to ensure free discharge. AD stated they usually place the pipe 6"-1' above ditch bottom.
- AD stated that an ephemeral forebay may be used in the back for water quality.
- AD question how to handle runoff from the back of the buildings into the facility. JJ and VT stated that since it wasn't a point discharge into the pond, pre-treatment was not required.
- Any pipes into the ephemeral forebay are required to have a forebay.
- AD stated that post does not exceed pre at POA with change in CN from row crop to grass & impervious.
- AD called later for guidance concerning credit/shortfall calculations for the site.
- AD stated he would pursue filters strips instead of the ephemeral forebay to meet the RPv requirement for the site.
  VT questioned whether the site balanced without the borrow from a detention facility. AD stated that is was close to being balanced without a pond.
- VT and JJ determined the District would accept the PLD method to illustrate the total project shortfall and that each filter strip is to be entered in DURMM to demonstrate the BMP credits earned per facility.
- VT stated all filter strip BMP's can be shown in one Post Construction BMP plan with one sequence of construction and one set of O&M notes. Plan view scale should be no smaller than 1":50'. Each BMP area should be labeled.
- VT stated an exhibit should be created that shows all CDA's and their respective BMP for review.

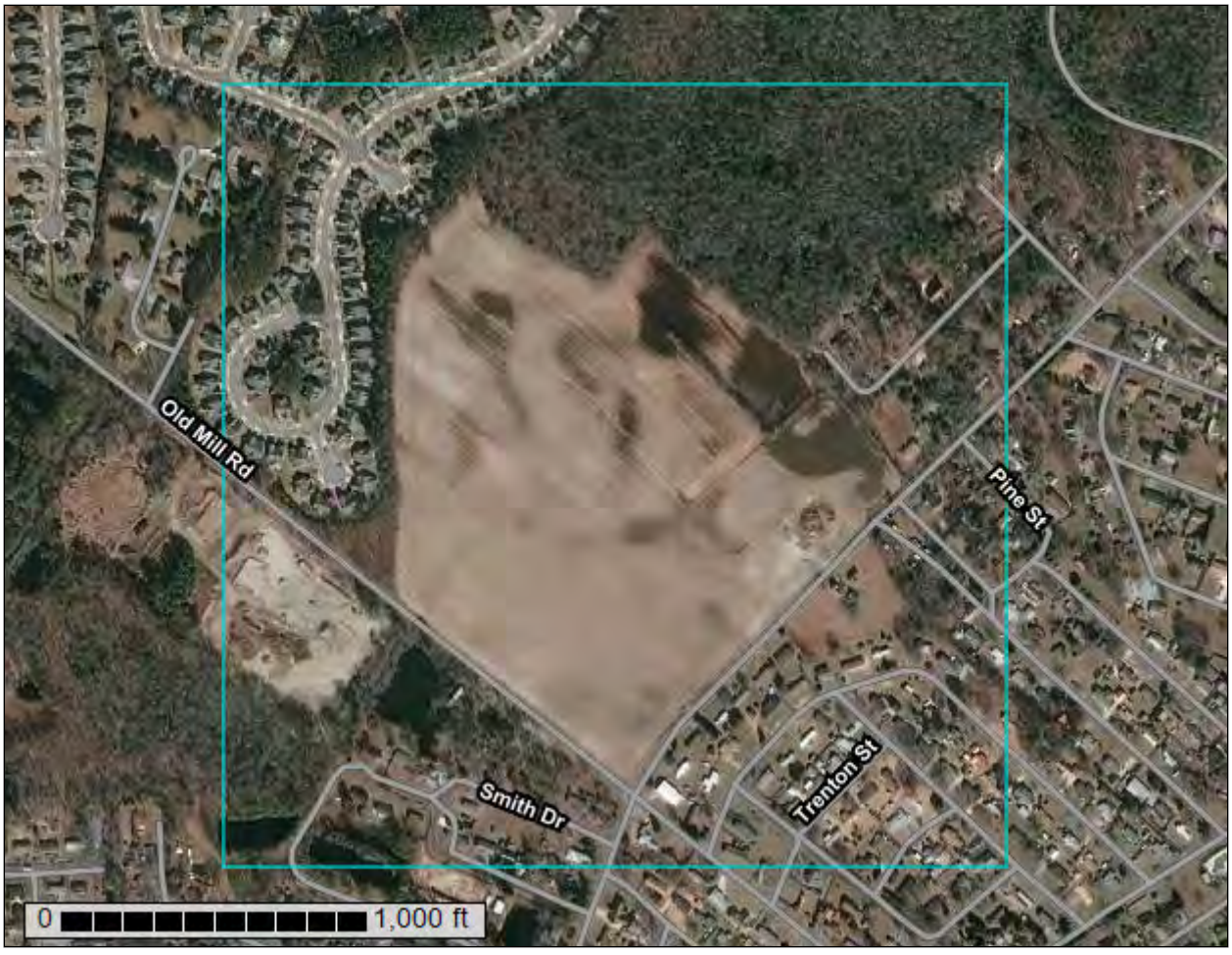
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Sussex County, Delaware



October 2, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

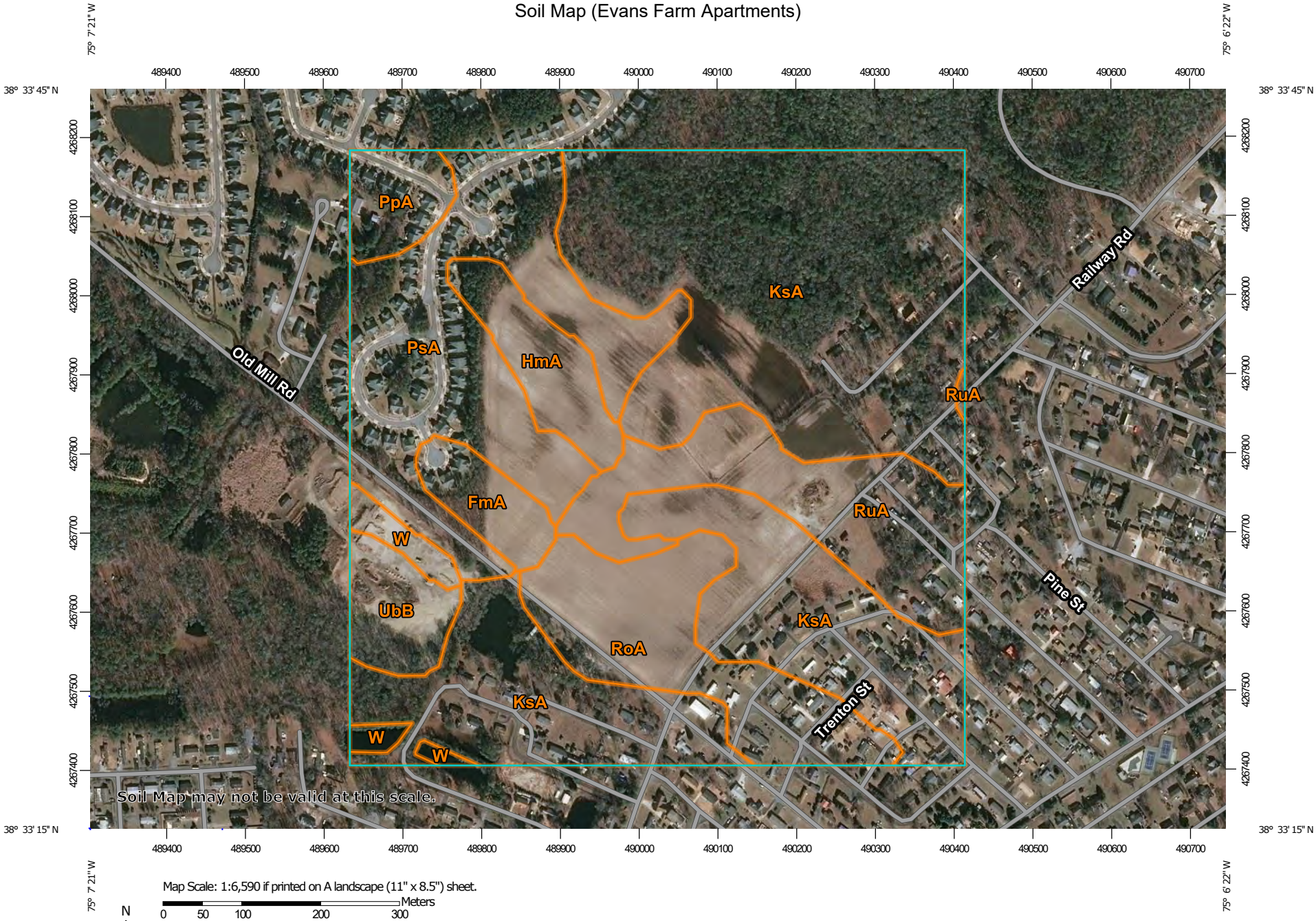
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (Evans Farm Apartments)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sussex County, Delaware
Survey Area Data: Version 20, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2018—Mar 12, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Evans Farm Apartments)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	3.8	2.5%
HmA	Hammonton loamy sand, 0 to 2 percent slopes	5.7	3.8%
KsA	Klej loamy sand, 0 to 2 percent slopes	74.5	49.5%
PpA	Pepperbox loamy sand, 0 to 2 percent slopes	3.9	2.6%
PsA	Pepperbox-Rosedale complex, 0 to 2 percent slopes	25.9	17.2%
RoA	Rosedale loamy sand, 0 to 2 percent slopes	14.7	9.7%
RuA	Runclint loamy sand, 0 to 2 percent slopes	15.2	10.1%
UbB	Udorthents, borrow area, 0 to 5 percent slopes	4.6	3.1%
W	Water	2.4	1.6%
Totals for Area of Interest		**150.7**	**100.0%**

Map Unit Descriptions (Evans Farm Apartments)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different

management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Sussex County, Delaware

FmA—Fort Mott loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qtgk
Elevation: 10 to 120 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Fort mott and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fort Mott

Setting

Landform: Flats, fluviomarine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits over fluviomarine sediments fluviomarine deposits

Typical profile

Ap - 0 to 10 inches: loamy sand
E - 10 to 24 inches: loamy sand
Bt - 24 to 36 inches: sandy loam
C - 36 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (1.28 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Ingleside

Percent of map unit: 5 percent
Landform: Depressions, flats, fluviomarine terraces

Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Rosedale

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Runclint

Percent of map unit: 5 percent
Landform: Flats, fluviomarine terraces
Landform position (three-dimensional): Dip, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Downer

Percent of map unit: 5 percent
Landform: Flats, fluviomarine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

HmA—Hammonton loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qth0
Elevation: 0 to 140 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Hammonton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hammonton

Setting

Landform: Drainageways, depressions, flats
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Loamy fluviomarine sediments

Typical profile

Ap - 0 to 11 inches: loamy sand
Bt - 11 to 30 inches: sandy loam
Cg - 30 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Ingleside

Percent of map unit: 5 percent
Landform: Depressions, flats, fluviomarine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Klej

Percent of map unit: 5 percent
Landform: Flats, depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Hurlock, drained

Percent of map unit: 5 percent
Landform: Depressions, flats, swales
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Rosedale

Percent of map unit: 5 percent
Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

KsA—Klej loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qthw
Elevation: 0 to 200 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Klej and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klej

Setting

Landform: Flats, depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Sandy eolian deposits and/or fluviomarine sediments

Typical profile

A - 0 to 7 inches: loamy sand
E - 7 to 14 inches: loamy sand
Bw - 14 to 20 inches: loamy sand
C - 20 to 62 inches: loamy sand
Cg - 62 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)
Depth to water table: About 10 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Hydric soil rating: No

Minor Components

Galloway
Percent of map unit: 10 percent
Landform: Flats, depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Berryland, drained
Percent of map unit: 5 percent
Landform: Flats, depressions, swales
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Hurlock, drained
Percent of map unit: 5 percent
Landform: Swales, flats, depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Runclint
Percent of map unit: 5 percent
Landform: Knolls, flats, dunes, fluviomarine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Hammonton
Percent of map unit: 5 percent
Landform: Flats, drainageways, depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

PpA—Pepperbox loamy sand, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 1qtjj
Elevation: 0 to 70 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pepperbox and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pepperbox

Setting

Landform: Depressions, flats
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits over fluvial marine sediments

Typical profile

A - 0 to 10 inches: loamy sand
E - 10 to 25 inches: loamy sand
Bt - 25 to 37 inches: sandy loam
2Btg - 37 to 65 inches: sandy clay loam
2Cg - 65 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Rosedale

Percent of map unit: 10 percent
Landform: Flats
Hydric soil rating: No

Fort mott

Percent of map unit: 5 percent
Landform: Flats, knolls
Landform position (three-dimensional): Rise
Hydric soil rating: No

Rockawalkin

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: No

PsA—Pepperbox-Rosedale complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qtjn
Elevation: 0 to 70 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Rosedale and similar soils: 45 percent
Pepperbox and similar soils: 45 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosedale

Setting

Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits over fluviomarine sediments

Typical profile

A - 0 to 9 inches: loamy sand
E - 9 to 25 inches: loamy sand
Bt - 25 to 38 inches: sandy loam
C - 38 to 68 inches: loamy sand
2Cg - 68 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 5.95 in/hr)
Depth to water table: About 40 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Pepperbox

Setting

Landform: Depressions, flats
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Sandy eolian deposits over fluviomarine sediments

Typical profile

A - 0 to 10 inches: loamy sand
E - 10 to 25 inches: loamy sand
Bt - 25 to 37 inches: sandy loam
2Btg - 37 to 65 inches: sandy clay loam
2Cg - 65 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Rockawalkin

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: No

Fort mott

Percent of map unit: 5 percent
Landform: Knolls, flats
Landform position (three-dimensional): Rise
Hydric soil rating: No

RoA—Rosedale loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qtjx

Elevation: 0 to 120 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Rosedale and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosedale

Setting

Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits over fluviomarine sediments

Typical profile

A - 0 to 9 inches: loamy sand
E - 9 to 25 inches: loamy sand
Bt - 25 to 38 inches: sandy loam
C - 38 to 68 inches: loamy sand
2Cg - 68 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 5.95 in/hr)
Depth to water table: About 40 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Evesboro

Percent of map unit: 10 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Galloway

Percent of map unit: 5 percent
Landform: Depressions, flats

Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Hambrook

Percent of map unit: 5 percent
Landform: Depressions, flats, fluviomarine terraces
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Klej

Percent of map unit: 5 percent
Landform: Depressions, flats
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

RuA—Runclint loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qtjz
Elevation: 0 to 120 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Runclint and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Runclint

Setting

Landform: Flats, fluviomarine terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits and/or fluviomarine sediments

Typical profile

Ap - 0 to 9 inches: loamy sand
E - 9 to 22 inches: sand
Bw - 22 to 39 inches: sand
BC - 39 to 59 inches: sand
2C - 59 to 80 inches: loamy coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches

Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)
Depth to water table: About 40 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups
Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Evesboro
Percent of map unit: 10 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hurlock, drained
Percent of map unit: 5 percent
Landform: Depressions, flats, swales
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Klej
Percent of map unit: 5 percent
Landform: Flats, depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Galloway
Percent of map unit: 5 percent
Landform: Flats, depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

UbB—Udorthents, borrow area, 0 to 5 percent slopes

Map Unit Setting
National map unit symbol: 1qtkp

Elevation: 0 to 150 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, borrow area, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Borrow Area

Setting

Landform: Knolls, flats
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Fluviomarine sediments fluviomarine deposits

Typical profile

AC - 0 to 2 inches: loam
C - 2 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 19.98 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Udorthents, loamy

Percent of map unit: 10 percent
Landform: Broad interstream divides
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Klej

Percent of map unit: 5 percent
Landform: Flats, depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Askecksy, drained

Percent of map unit: 5 percent
Landform: Flats, depressions, swales
Landform position (three-dimensional): Talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Water

Percent of map unit: 5 percent
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: 1qtkx
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit (Evans Farm Apartments)

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Map—Hydric Rating by Map Unit (Evans Farm Apartments)



Map Scale: 1:6,590 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sussex County, Delaware
Survey Area Data: Version 20, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2018—Mar 12, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydric Rating by Map Unit (Evans Farm Apartments)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	0	3.8	2.5%
HmA	Hammonton loamy sand, 0 to 2 percent slopes	5	5.7	3.8%
KsA	Klej loamy sand, 0 to 2 percent slopes	10	74.5	49.5%
PpA	Pepperbox loamy sand, 0 to 2 percent slopes	0	3.9	2.6%
PsA	Pepperbox-Rosedale complex, 0 to 2 percent slopes	0	25.9	17.2%
RoA	Rosedale loamy sand, 0 to 2 percent slopes	0	14.7	9.7%
RuA	Runclint loamy sand, 0 to 2 percent slopes	5	15.2	10.1%
UbB	Udorthents, borrow area, 0 to 5 percent slopes	5	4.6	3.1%
W	Water	0	2.4	1.6%
Totals for Area of Interest			**150.7**	**100.0%**

Rating Options—Hydric Rating by Map Unit (Evans Farm Apartments)

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Evans Farm Apartments)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

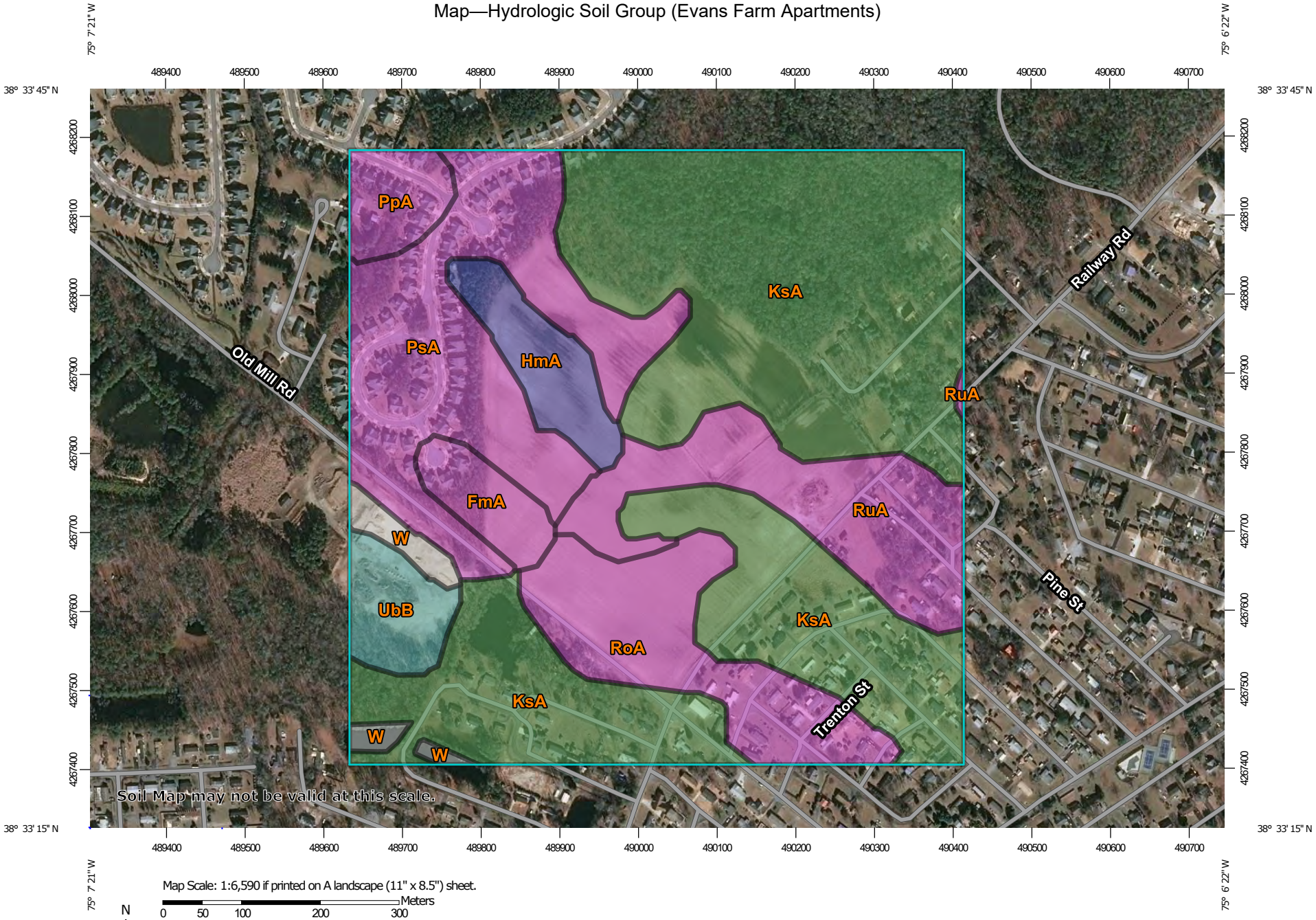
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at

or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group (Evans Farm Apartments)



Map Scale: 1:6,590 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sussex County, Delaware
Survey Area Data: Version 20, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2018—Mar 12, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group (Evans Farm Apartments)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	A	3.8	2.5%
HmA	Hammonton loamy sand, 0 to 2 percent slopes	B	5.7	3.8%
KsA	Klej loamy sand, 0 to 2 percent slopes	A/D	74.5	49.5%
PpA	Pepperbox loamy sand, 0 to 2 percent slopes	A	3.9	2.6%
PsA	Pepperbox-Rosedale complex, 0 to 2 percent slopes	A	25.9	17.2%
RoA	Rosedale loamy sand, 0 to 2 percent slopes	A	14.7	9.7%
RuA	Runclint loamy sand, 0 to 2 percent slopes	A	15.2	10.1%
UbB	Udorthents, borrow area, 0 to 5 percent slopes	C	4.6	3.1%
W	Water		2.4	1.6%
Totals for Area of Interest			**150.7**	**100.0%**

Rating Options—Hydrologic Soil Group (Evans Farm Apartments)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

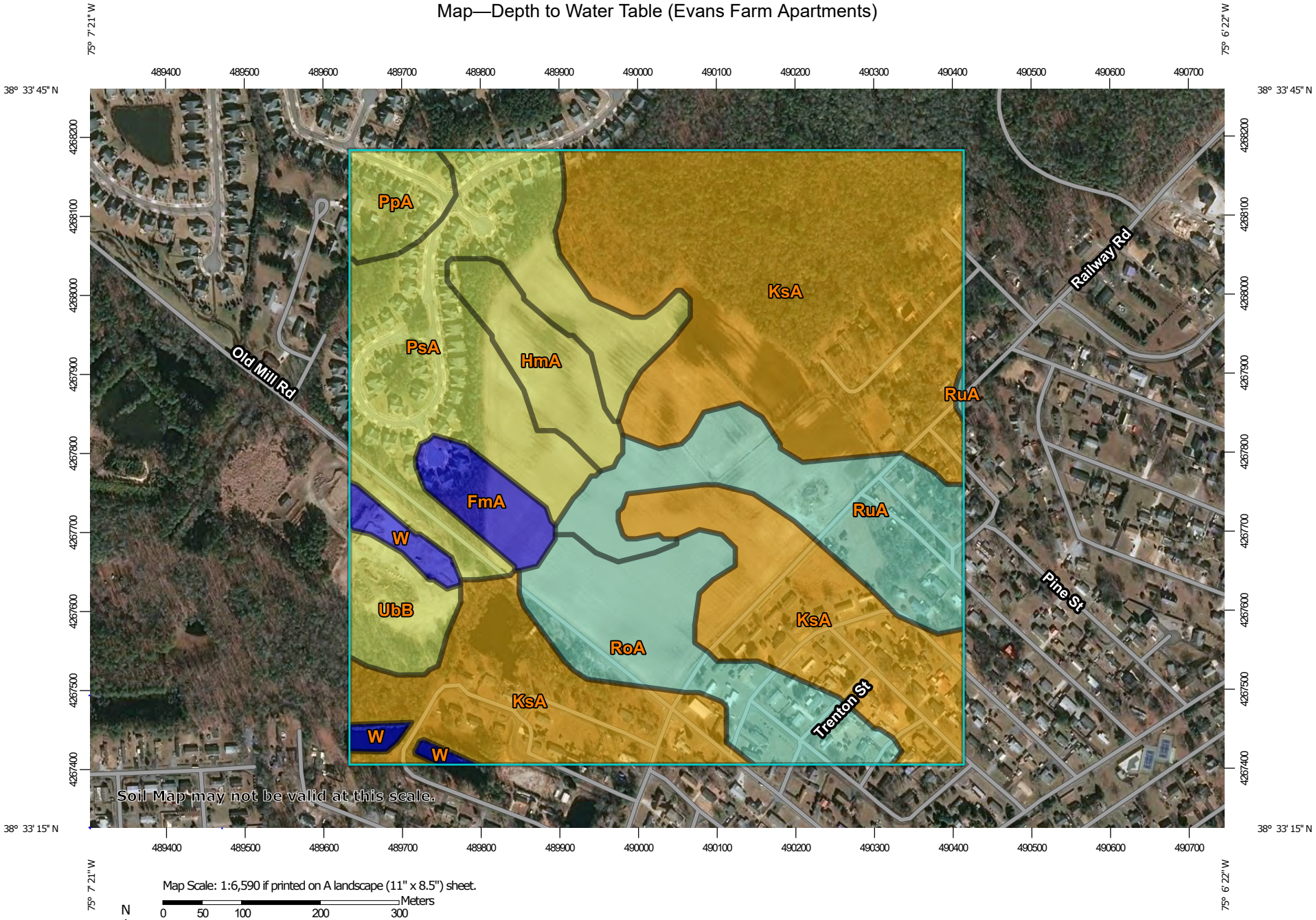
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table (Evans Farm Apartments)

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Depth to Water Table (Evans Farm Apartments)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sussex County, Delaware
Survey Area Data: Version 20, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2018—Mar 12, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table (Evans Farm Apartments)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	>200	3.8	2.5%
HmA	Hammonton loamy sand, 0 to 2 percent slopes	61	5.7	3.8%
KsA	Klej loamy sand, 0 to 2 percent slopes	30	74.5	49.5%
PpA	Pepperbox loamy sand, 0 to 2 percent slopes	61	3.9	2.6%
PsA	Pepperbox-Rosedale complex, 0 to 2 percent slopes	61	25.9	17.2%
RoA	Rosedale loamy sand, 0 to 2 percent slopes	114	14.7	9.7%
RuA	Runclint loamy sand, 0 to 2 percent slopes	114	15.2	10.1%
UbB	Udorthents, borrow area, 0 to 5 percent slopes	61	4.6	3.1%
W	Water	>200	2.4	1.6%
Totals for Area of Interest			**150.7**	**100.0%**

Rating Options—Depth to Water Table (Evans Farm Apartments)

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

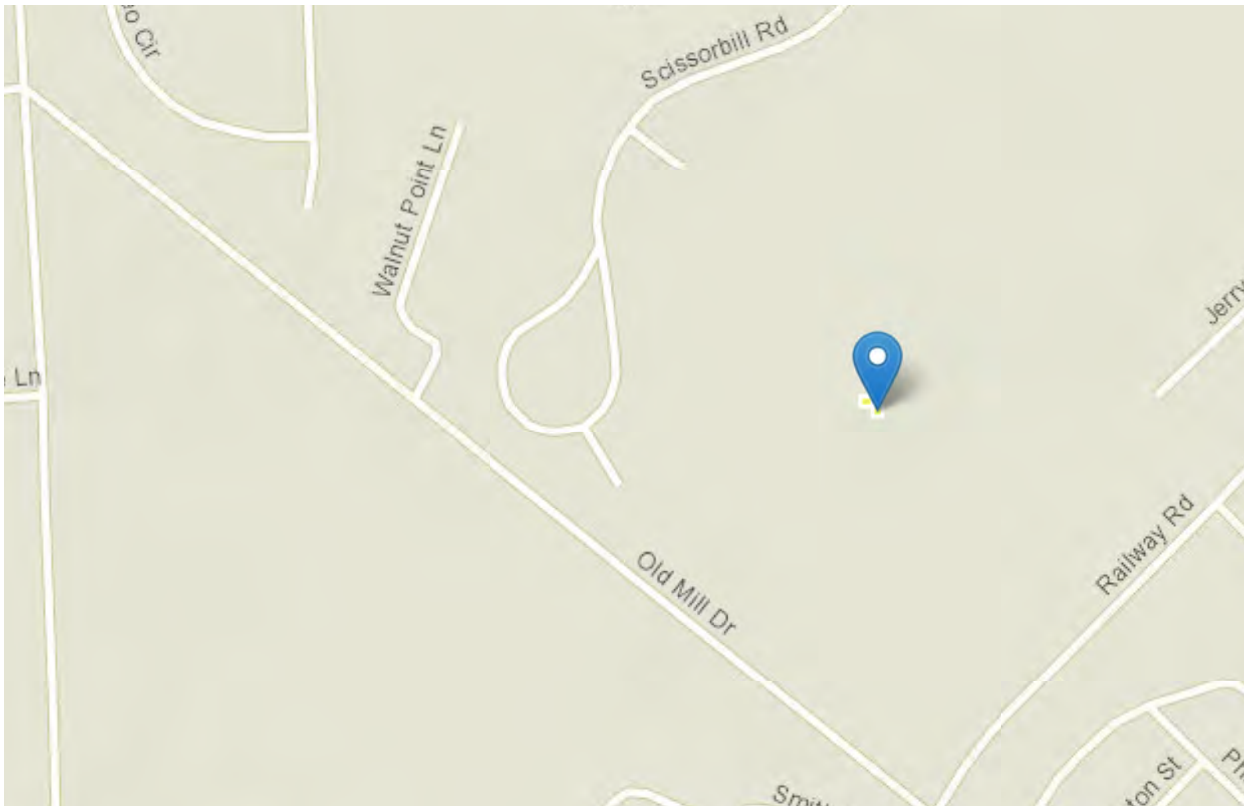
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

StreamStats Report

Region ID: DE
Workspace ID: DE20191002180035690000
Clicked Point (Latitude, Longitude): 38.55906, -75.11492
Time: 2019-10-02 14:00:52 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
STORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
SOILA	Percentage of area of Hydrologic Soil Type A		percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0	percent

Parameter Code	Parameter Description	Value	Unit
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	0	percent
FOREST	Percentage of area covered by forest	0	percent
DRNAREA	Area that drains to a point on a stream	0.0000772	square miles
BSLDEM10M	Mean basin slope computed from 10 m DEM	0.57	percent

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Application Version: 4.3.8