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December 12, 2024

Richard Fon, Chairmen Town of Yorktown Planning Board Yorktown Town Hall 363 Underhill Avenue Yorktown Heights, NY 10598 RECEIVED PLANNING DEPARTMENT DEC 1 8 2024 TOWN OF YORKTOWN

Re: 3850 Foothill Street

Dear Chairman and Board Members,

It is our pleasure to submit the Comparative Analysis for development options of the 16.8 acre parcel on Foothill Street. The property is within the R1-40 zone, which permits a 7-lot subdivision, referred to as the Residential Project. The location of the property across from the Solar Farm and the various site constraints has led the applicant to pursue a more efficient design to eliminate the suburban sprawl across the property. This in the form of an apartment alternative, in this case 20 units referred to as the Multi-family Project.

The study attached designs both projects, including grading, stormwater management and architectural components. The Residential Project is presented on drawing SY1 with a town road and individual driveways extending to house locations. Individual subsurface septic system and public water serve each lot. The project meets the regulations within the R1-40 zone. The drainage Overlay D2A is presented in a 11x17 format for technical review with the Existing Condition Overlay D1. The drainage meets the requirements of NYSDEC treatment in the form of an off-line Bio-retention Basin.

The Multi-family alternative is presented on drawing SY1A with the units located centrally along the lower edge of the property. The development concept is to connect to the sewer lines to the east through a pump station on site with public water service. The project provides 2 parking spaces per unit plus 5 visitor and handicapped parking spaces. The drainage Overlay D2B is presented in a 11x17 format for technical review. The drainage meets the requirements of NYSDEC treatment in the form of an off-line Infiltration Basin and a Treatment Swale. The plan also includes an emergency accessway extending from Foothill Street to the end of the common driveway. The reduced footprint for this alternative provides additional space for 0.40 acres of planted buffers and additional green spaces. The neighbors to the north, above this project, also have the benefit of twice the amount of open space where original forest area shall remain. Street lighting has been proposed facing the building or shielded with the tree buffers. The dumpster enclosures and other amenities have not been provided for clarity.

Architectural plans were submitted at previous meetings and are attached in 11x17 format for reference. A photographic representation of the buildings of a similar project completed in New

Fairfield, CT is also provided for reference. These unit floor plans are flexible for flat and step grade sites. At the presentation, full-size plans will be presented for further review.

Drawing SY2 has been provided to compare the two concepts with a parameter list for review. An additional text is provided dealing with concepts that are not readily clear in a tabular context. This can be discussed at the next meeting.

Please review the plans submitted. It is our wish that the Board share in our opinion that the site is better served with the Multi-family concept and that a positive referral is provided to the Town Board for a rezoning.

With regards,

Peder Scott

Peder W. Scott, P.E., R.A. President

# FOOTHILL SUBDIVISION

RECEIVED PLANNING DEPARTMENT DEC 1 8 2024 TOWN OF YORKTOWN

## STORMWATER MANAGEMENT REPORT COMPARATIVE ANALYSIS

Pre-Development Post-Development: R1-40 (7) Lots Post-Development: Multi-Family (20) Units

Prepared By:

Peder W. Scott, P.E., R.A.P.W. Scott Engineering & Architecture, P.C.3871 Danbury Road (Route 6)Brewster, NY 10509

December 10, 2024

### 3850 Foothill Street Development Town of Yorktown, NY

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### **Project Description**

The following is an analysis of the stormwater management systems proposed for the 3850 Foothill Street project; Tax Map 15.07-1-7; 16.80 acres

There are two proposals for the property consisting of a conforming 7 lot R1-40 zoning development and an alternative 20 unit multi-family project. The analysis presented is for the design of the two alternatives to meet the NYSDEC and NYCDEP regulations for stormwater attenuation and treatment for the first flush of each project. The analysis is completed using the TR-55 Pondpack computer modeling with proposed watersheds prepared on Drainage Overlays attached to this study. The report details the compliant treatment options for each proposal.

#### **Existing Condition**

The site is a large wooded site with a NYSDEC Wetland located on the west side of the lot. There are remnants of a single-family site including a house, garage and pool located on the west side and a dam(opened) on the east side. A watercourse extends along the east side within the confines of the wetland and extends through the dam to a culver beneath Foothill Street, extending to the south.

The soils within the site consist of class B soils along the street frontage, class D soils within the wetland and C soils on the upper reaches of the site. These are depicted on the drainage overlays per the NRCS soil program and are listed below.

SOIL TYPES		
<u>SYMBOL</u>	SOIL NAME	Hydraulic Soil Group
NoA	Natcham & Catden Mucks - Rends 0- 2%	D
Pnb	Paxton Fine Sandy Loam 3-8%	С
PnD	Paxton Fine Sandy Loam 15%-25%	С
Sh	Sun loam	C/D
SuB	Sutton Loam - 3-8%	В
LeB	Leicester Loam 3-8%	D
CHE	Charlton Loam - 25-35%	В
CIF	Charlton Loam - 35-45%	В
FF	Frequently flooded	D

The existing site is depicted on the Pre-Development Plan with 2-foot topography. The overall site watershed is detailed using the topographic mapping. The total watersheds are required to determine the existing and proposed drainage structures receiving these flows. The watershed

map prepared depicts the watershed areas that drain to the west to the existing culverts Analysis Points A and to the wetlands to the east, at the culvert beneath Foothill Street, Analysis Point B.

The drainage analysis determines the pre and post runoff to the Analysis Points. The analysis considers the total watersheds and the respective runoff paths for determination of Travel Times. The resulting watersheds at each Analysis point are determined for the Pre-development conditions for all the NYSDEC (Extreme precipitation) regulated Storm Events.

Runoff from the site is estimated using TR-55 method. The PondPack computer program developed by Haestad Methods is used for computing runoff hydrographs for the denoted Pre-development condition. Please refer to the Pre-Development Drainage Analysis and Pre- Development Drainage Overlays, Figure 1.0, (drawing D1).

#### **Proposed Condition- Residential Development**

The proposed subdivision consists of a town road of 650 lineal feet with a cul-de-sac and 7 house sites located along the roadway. The houses are served by municipal water and individual septic systems proposed is 3000 sf areas.

The typical development of a subdivision includes lawns in the front of the houses, concrete walkways, paved driveways and lawns along the shoulder of the proposed roadway. The remainder of the site remains woods, as noted by the edge of tree line provided and brush cover in areas where there are steep slopes and no trees. This includes most of the septic areas which are not mowed consistently. These coverages are provided in Excel worksheets for each watershed attached in the report.

The Proposed treatment is an off-line Bio-retention basin, with a splitter box to divert the flow through a ADS Barracuda Hydro-dynamic separator and the main flow to a non BMP detention basin at the entrance to the site. The soils are Charlton which means there may be some infiltration into the detention basin, this is not considered on this analysis.

Runoff from the site is estimated using TR-55 method. The PondPack computer program developed by Haestad Methods is used for computing runoff hydrographs for the denoted Post Development Condition. Please refer to the Post Development Drainage Analysis and Post Development Drainage Overlays, Figure 2.0, Drawing D2.

#### **Proposed Condition- Multi-Family Development**

The proposed subdivision consists of a private road of 650 lineal feet 20 units sites located along the roadway. The houses are served by municipal water and municipal sewer extension located to the east of the site. A pump station is required, the flow is gravity from the units with a pump over a high-point to the east of the driveway.

The typical development of a site plan includes lawns in the front of the units, concrete walkways, paved driveways and parking and lawns along the shoulder of the proposed roadway. The remainder of the site remains woods, as noted by the edge of tree line provided and brush cover in areas where there are steep slopes and no trees. These coverages are provided in Excel worksheets for each watershed attached in the report.

The Proposed treatment is an off-line Infiltration basin, with a splitter box to divert the flow through a ADS Barracuda Hydro-dynamic separator and the main flow to a non BMP detention

basin at the entrance to the site. The soils are Charlton which means there may be some infiltration in the detention basin, this is not considered on this analysis.

Runoff from the site is estimated using TR-55 method. The PondPack computer program developed by Haestad Methods is used for computing runoff hydrographs for the denoted Post Development Condition. Please refer to the Post Development Drainage Analysis and Post Development Drainage Overlays, Figure 3.0, Drawing D3.

#### Storm Events

The analysis is based upon the NRCC Storm Flows determined from the location of 101 Main Street Extreme Precipitation Tables, utilizing the event. The rain fall values are as follows, with the NRCC printout in the Appendix:

1-year	2.74 inch/24hrs
2-year	3.34 inch/24hrs.
10-year	5.04 inch/24hrs
100-year	9.15 inch/24hrs

### I. PRE-DEVELOPMENT ANALYSIS

#### WATERSHED DESCRIPTIONS & QUANTITIES

The Pre-Development watershed areas are listed as follows. Please also refer to the Pre-Development Drainage Overlay. The site is modeled at one drainage analysis point with each watershed below draining as noted below.

#### **Computer Input**:

WATERSHED #	AREA	CN	Tc HOUR	Tt HOUR	ANALYSIS POINT
EX1	10.28	54.5	.236	0.0	Point A
EX2	6.52	73.6	0.226	0.0	Point B

Total = 16.80 Acres to Point A and B, the acreage of the lot.

Refer to the tabular worksheets, Tc calculations and storm event hydrographs, for the above listed watershed areas in Appendix A.

#### TREATMENT ANALYSIS

WQv AnalysisThe following is the WQv analysis for the various alternatives. $WQv = \{(P)(Rv)(A)\}/12$ Where P = 90% Rainfall = 1.2 inchesWhere I = Percent of Impervious CoverReference Limit of Disturbance: Disturbed Area

#### Existing Site Condition to Point A Pre-development

1. WQv analysis

 $P=1.4 \text{ inches} \\ Area = 10.28 \text{ acres} \\ Impervious Area = 0.02 \text{ acres} \\ I = 0.2\% \\ Rv = 0.05 + 0.009 \text{ I} \\ Rv = 0.0518 \\ \end{tabular}$ 

 $WQv = \{(1.4)(.0518)(10.28)\} / 12 = .062$  Acre Feet

- 2A.  $\frac{\text{RRv} \text{Runoff Reduction Volume}}{\text{RRv} = \{(P)\text{Rv} * \text{A}i\}/12}$  Ai = (S) Aic = Total impervious area = 0.02 acres  $\text{Rv Based upon B/C Class:} \qquad S = 0.45$   $\text{Rv}^* \text{ (impervious)} = .05 + 0.009 \text{ (R)} = 0.95$  RRv = 1.4 (0.95) (0.45) (0.02) / 12 = 0.0010 acre-feet
- 2B.  $\frac{1 \text{Year Storm Event Calculation}}{P = 2.74(\text{NRCC})}$ Volume = .104 acre-ft = 4530 cf

No treatment on site

#### II. POST-DEVELOPMENT ANALYSIS -Residential

#### WATERSHED DESCRIPTIONS & QUANTITIES

The Post-Development Watersheds are listed as follows. Please also refer to the Post-Development Watershed Plan, and the tabular worksheets, Tc calculations and storm event hydrographs, for the watershed areas listed below in Appendix B.

#### **Computer Input: Model Analysis Point A**

WATERSHED #	AREA	CN	Tc HOUR	Tt HOUR	ANALYSIS POINT
WSR1	7.82	69.3	.210	0.1	Point A
WSR2	2.46	58.9	.149	0.1	Point A

Total = 10.28 Acres to Point A. The flow to Analysis Point B remains unchanged.

#### PRE & POST DEVELOPMENT DISCHARGE RATE

The Pre & Post Discharges are listed as follows:

Analysis Point A			
	1 YR	10 YR	100 YR
PRE	0.75	6.87	30.55
POST	0.31	6.52	30.53
NET	044	-0.35	02
%	-60%	-5.1%	-0.5%

#### **NYSDEC Attenuation Requirements**

 A) 1 Year Storm Event – Channel Protection Reduce by 50% from pre-development levels Attenuation level met.

- B) 10 Year Storm Event Overbank Control Attenuate to below Pre-Development Levels
- C) 100 Year Storm Event Extreme Flood Control Attenuate to below Pre-Development Levels.

#### TREATMENT ANALYSIS

#### Proposed Site Condition to Point A: Single Family Project(7 lots) Post-development

1. WQv analysis P=1.4 inches Area = 7.82 acres Impervious Area = 1.16 acres I = 14.8% Rv = 0.05 + 0.009 IRv = 0.183

 $WQv = \{(1.4)(.183)(7.82)\} / 12 = 0.167$  Acre Feet

- 2A.  $\frac{\text{RRv} \text{Runoff Reduction Volume}}{\text{RRv} = \{(P)\text{Rv} * \text{A}i\}/12}$  Ai = (S) Aic = Total impervious area = 1.16 acres  $\text{Rv Based upon B/C Class:} \qquad S = 0.45$   $\text{Rv}^* (\text{impervious}) = .05 + 0.009 \text{ (R)} = 0.95$  RRv = 1.4 (0.95) (0.45) (1.16) / 12 = 0.057 acre-feet
- 2B.  $\frac{1-\text{Year Storm Event Calculation}}{P = 2.74(\text{NRCC})}$ Volume = .356 acre-ft = 15,300 cf
- 3. Green Practices
  - A. Roof water is collected by stormwater leaders to collection piping.`
  - B. ADS Hydrodynamic separator treats first flush
  - C. Bio-retention Basin, Off-line treats the first flush(1 year)
  - D. Lot Perimeter areas and wetland remain untouched with wood cover
- 4. WQv REDUCTION ANALYSIS

Note: Bio-retention is 90% size of Af.

WS #	Treatment Type	Soil Class	Efficiency	WQv	<b>RRv Reduction</b>
1	<b>Bio-retention</b>	В	40%	0.356(90%)	0.128 acre-feet
			Total:		0.288 acre-feet

The treatment exceeds RRv min. of 0.057 acre-feet and is totally treated through filtration.

#### **III. POST-DEVELOPMENT ANALYSIS -Multi-family**

#### WATERSHED DESCRIPTIONS & QUANTITIES

The Post-Development Watersheds are listed as follows. Please also refer to the Post-Development Watershed Plan, and the tabular worksheets, Tc calculations and storm event hydrographs, for the watershed areas listed below in Appendix B.

WATERSHED #	AREA	CN	Tc HOUR	Tt HOUR	ANALYSIS POINT
WS1M	7.40	71.5	.207	0.1	Point A
WS2M	1.67	56.9	.136	0.0	Point A
WS3M	1.21	70.0	.149	0.1	Point A

#### **Computer Input: Model Analysis Point A**

Total = 10.28 Acres to Point A. The flow to Analysis Point B remains unchanged.

#### PRE & POST DEVELOPMENT DISCHARGE RATE

#### Comparison at Analysis Point A

The Pre & Post Discharges are listed as follows:

Analysis Point A				
	1 YR	10 YR	100 YR	
PRE	0.75	6.87	30.55	
POST	0.58	4.90	29.60	
NET	-0.17	-1.97	-0.95	
%	-22%	-29%	-3.1%	

#### **NYSDEC Attenuation Requirements**

- D) 1 Year Storm Event Channel Protection Reduce by 50% from pre-development levels Attenuation level not met due to large areas undisturbed.
- E) 10 Year Storm Event Overbank Control Attenuate to below Pre-Development Levels
- F) 100 Year Storm Event Extreme Flood Control Attenuate to below Pre-Development Levels.

#### TREATMENT ANALYSIS

#### Proposed Site Condition to Point A: Multi-Family Post-development: includes WS 1 &2, WS3 is undisturbed

1. WQv analysis

 $\begin{array}{l} P=1.4 \quad inches\\ Area=9.07 \; acres\\ Impervious \; Area=1.14 \; acres\\ I=12.5\%\\ Rv=0.05+0.009 \; I\\ Rv=0.117 \end{array}$ 

 $WQv = \{(1.4)(.117)(9.07)\} / 12 = 0.123$  Acre Feet

2A. <u>RRv – Runoff Reduction Volume</u> RRv =  ${(P)Rv*Ai}/{12}$   $Ai = (S) \ Aic = Total \ impervious \ area = 1.14 \ acres \\ RRv \ Based \ upon \ B \ Class: S = 0.40 \\ Rv* \ (impervious) = .05 + 0.009 \ (R) = 0.95 \\ RRv = 1.4 \ (0.95) \ (0.40) \ (1.14) \ / \ 12 = 0.050 \ acre-feet$ 

- 2B.  $\frac{1-\text{Year Storm Event Calculation}}{P = 2.74(\text{NRCC})}$ Volume = .416 acre-ft = 18120 cf
- 3. Green Practices
  - A. Roof water is collected by stormwater leaders to collection piping.
  - B. (2) ADS Hydrodynamic separator treats first flush
  - C. Offline discharge to Quality Swale in front yard- pre-treatment
  - D. Infiltration Basin, Off-line treats the first flush(1 year)
  - E. Large percentage of the Lot Perimeter areas and wetland remain untouched with wood cover
- 4. WQv REDUCTION ANALYSIS

Entire First Flush Volume is collected in the Infiltration Basin

WS#	Treatment Type	Soil Class	Efficiency	WQv	<b>RRv Reduction</b>
1	Water quality swale	В	20%	.393	.0786 acre-feet
2	Infiltration-direct	В	90%	.024	.0216 acre-ft
	Swale infiltration	В	80%(90%)	.393	0.283 acre-feet
				Total:	0.383 acre-ft

The treatment exceeds RRv min. of 0.050 acre-feet and is totally treated through infiltration.

## The Individual Stormwater Component Design Outlines for each project are provided in a separate package for Town engineer review.

### **COMPONENT DESIGN ANALYSIS- Residential Project**

### SPLITTER BOX DESIGN

The splitter boxes consist of the entrance pipe, discharge pipe to offline practice and weir plate with a top set at the top of the 1 year headwater for the diverter plate. Each splitter box is first analyzed to determine the headwater height for the 1 year storm event, then the depth above the plate is calculated for the 10 and 100 year storm events based upon inlet control of the diverter pipe and weir flow. This height is determined on an iterative basis in the Excell Worksheet provided in the drainage report, based upon entrance flow only. This data is then entered into the Pond Pack model where the diverter pipe and weir are simultaneously applied during the basin routing to complete the same analysis as the worksheet, defining the flow to the BMP and overflow across the weir for each storm event.

#### SYSTEM DESIGN DESCRIPTION: Splitter Box #1

Rim: 362.5 Pipe out(6") Inv: 360.0, Slope ).5% Pipe out(12") Inv: 358.0 Overflow weir: 360.70 X 3' wide steel plate.

Splitter calculations (CFS)				
Year Storm	1	2	10	100
Weir flow:	0	0.11	0.49	1.44
Pipe Flow(6")	0.57	0.61	0.68	0.78

The computer program provides the flow under category: weir Flow & cultic detention flow in Note: Stored Volume elevations within the cultic units are less than weir elevation, no back flow.

#### **DETENTION BASIN RESIDENTIAL**

SYSTEM DESIGN DESCRIPTION: Open basin, 2 on 1 side slopes, fence along perimeter

THIS IS NOT A TREATMENT BMP

DESIGN TYPE:	DETE	NTION STRUCTURE
HYDROGRAPH NAME;		CULTEC DETENTION (1, 2, 10, 100) CULTEC DETENTION (1, 2, 10, 100)
1) BASIN GEOMETRY	<u>.</u>	CULTEC RECHARGER MODEL 330 XLHD BOTTOM: UNIT INV: 357.0 WITH SAND BASE @356.0
		TOP OF STRUCTURE: 30.5"

#### WIDTH EACH UNIT: 52" + 12" SAND COVER

#### TOTAL SYSTEM: 147 lf (consisting of 21 units) 3 ROWS OF 7/ROW @ 5.0' ON CENTER CAPACITY IS: 2207 CF.

#### 2) OUTLET STRUCTURES: TYPE: CONCRETE MANHOLE WITH WEIR PLATE RIM ELEVATION: 360.5 x 3' wide Emergency only

#### 3) HYDRAULIC ROUTING STANDARD STORMS:

Storm Event	Input (CFS)	Discharge (CFS)	Elevation	
1 Year	0.0	0.0	356.0	
10 Year	0.11	0.0	356.28	
25 Year	0.49	0.0	357.38	
100 Year	1.44	1.02	360.23	

#### **BIO-RETENTION DESIGN- RESIDENTIAL**

#### **Bio-Retention Sizing Calculations**

The discharge to the Bio-Retention is the diverted flow from WS1. Area collected: 7.82 acres P=1.4 Area Impervious = 1.16 acre

WQV = 0.167 acre-ft = 7272 cf

Required Bio-retention geometry Af = (WQV) df / [(k) (hf + df) (tf)] df = 2.0 feet For using Mulch & sand mixture k = 1.0 f t/ day Bioretention values in 2022 NYSDEC Manual hf = 0.50 feet tf = 2.0 days

\*<u>Using Wood chips and sand mixture</u> Af = WQv (.40) = 6200 sf Provided: 5600 sf (332 contour)

Volume = 75% WQv = 4650 cf

The basin is routed for the 1, 10 and 100 year storm events with an infiltration rate of 0.5 inch /hour based upon k value. The first flush is 100% contained in the basin. Larger storms will discharge through the outlet structure to drainage on Foothill Street.

Refer to Appendix M for geometry and the sizing of anti-seep collars.

#### System Design Description

This is a treatment BMP

Soil Test: DT-BR3 basin moved lower down Existing grade at Soil Deep Test: 516.0 Depth to restricted layer: 3.5' to seep Grade at bio-retention – 515.5 Water at 511.5

Design Type:		Bio-Retention Basin			
Hydro	ograph Name:	Bio-Retention In (1, 2, 10, 100) Bio-Retention Out (1, 2, 10, 100)			
1)	Basin Geometry:	3,942 sf area at top Excavated at 3/1 Slope: 519 to 577.5 Top of Berm: 519.0			
		Total System Capacity: 0.114 acre-ft			
2)	Outlet Structures:	Type: 15" HDPE Riser Rim Elev: 518.50			
3)	Storage Confirmation Note: 1-year discharge is 0.0	Note: Underdrain in place: Discharge to Level Spreader cfs			
4)	Water Table Depth: Top of Berm: 519.0; top of Filter: 517.5 Bottom of Filter: 3.0 deep = 514.5 Bottom of Gravel: $12'' = 513.5$ Distance to Water Table: $513.5 - 511.5 = 2.0$ ft				
<u>Anti-S</u>	Seep Collars – 12" Ø Pipe @ 1	6%			
Ls = y (z + 4) $\left[1 + \frac{\text{Pipe Slope}}{.25 - \text{Pipe Slope}}\right]$ = 1.5 (3 + 4) $\left[1 + \frac{.16}{.07}\right] = 34.5$					
	Use 2 collars = $4.0 \times 4.0$ (@1				
<u>Anti-S</u>	Seep Collars – 8" Ø Pipe @ 0.5	5% under drain			
$Ls = y (z + 4) \left[ 1 + \frac{\text{Pipe Slope}}{.25 - \text{Pipe Slope}} \right]$					
	$= 1.5 (3+4) \left[ 1 + \underline{.005}_{.245} \right] = 11$				
Use 2 collars = $3.5 \times 3.5$ (@ 10.0' o.c.)					
	<u>Emergency Outlet Weir – Bio Retention Basin</u> Peak Input from Splitter 100-Year = 2.05 cfs				

Capacity of 15" riser – head 1.5 ft = 6.5 cfs- no emerg weir required

#### **Bio-Retention Routing**

	Flow In	Flow Out	Peak Elevation	Storage
1-Year	1.35	0.08	518.24	.051
10-Year	1.50	0.80	518.65	.083
100-Year	1.63	1.44	518.74	.091

\*Note: 1.0 in/hr infiltration applied

#### **Riparian Buffers**

There are two buffers on the property.

The west side of the project is not collected and remains undisturbed. This tree covered area drains to the neighbor below.

The lower house sites have septic systems area which are not collected by any treatment structures. The flow extends across the septic areas and brush buffer areas before discharging through a stone wall along Foothill Street and the street gutters. There is no impervious cover in this watershed and treatment is satisfied by the brush cover across this area.

### **COMPONENT DESIGN ANALYSIS- Multi-family Project**

#### SPLITTER BOX DESIGN

The splitter boxes consist of the entrance pipe, discharge pipe to offline practice and weir plate with a top set at the top of the 1 year headwater for the diverter plate. Each splitter box is first analyzed to determine the headwater height for the 1 year storm event, then the depth above the plate is calculated for the 10 and 100 year storm events based upon inlet control of the diverter pipe and weir flow. This height is determined on an iterative basis in the Excell Worksheet provided in the drainage report, based upon entrance flow only. This data is then entered into the Pond Pack model where the diverter pipe and weir are simultaneously applied during the basin routing to complete the same analysis as the worksheet, defining the flow to the BMP and overflow across the weir for each storm event.

#### SYSTEM DESIGN DESCRIPTION: Splitter Box #2

Rim: 362.5 Pipe out(6") Inv: 360.0, Slope ).5% Pipe out(12") Inv: 358.0 Overflow weir: 360.70 X 3' wide steel plate.

Splitter calculations (CFS)							
Year Storm	1	2	10	100			
Weir flow:	0	0.11	0.49	1.44			
Pipe Flow(6")	0.57	0.61	0.68	0.78			

The computer program provides the flow under category: weir Flow & cultic detention flow in Note: Stored Volume elevations within the cultic units are less than weir elevation, no back flow.

#### **DETENTION BASIN multi-family**

THIS IS NOT A TREATMENT BMP

SOIL TEST COMPLETED BY SOIL TESTING THROUGH THE USE OF A 2" BORING DRILL AT THE LOCATIONS NOTED ON THE PLANS.

EXISTING GRADE AT SOIL DEEP TEST: 362.0 Tests indicate sand to depths of 20 feet with no evidence of water or mottling.

Refer to detail sheet #: SY2

DESIGN TYPE:	DETENTION STRUCTURE
HYDROGRAPH NAME;	IN: CULTEC DETENTION (1, 2, 10, 100) OUT: CULTEC DETENTION (1, 2, 10, 100)

#### 1) BASIN GEOMETRY: CULTEC RECHARGER MODEL 330 XLHD BOTTOM: UNIT INV: 357.0 WITH SAND BASE @356.0

TOP OF STRUCTURE: 30.5"

#### WIDTH EACH UNIT: 52" + 12" SAND COVER

#### TOTAL SYSTEM: 147 lf (consisting of 21 units) 3 ROWS OF 7/ROW @ 5.0' ON CENTER CAPACITY IS: 2207 CF.

#### 2) OUTLET STRUCTURES: TYPE: CONCRETE MANHOLE WITH WEIR PLATE RIM ELEVATION: 360.5 x 3' wide Emergency only

#### 3) HYDRAULIC ROUTING STANDARD STORMS<sup>1</sup>

Storm Event	Input (CFS)	Discharge (CFS)	Elevation	
1 Year	0.0	0.0	356.0	
10 Year	0.11	0.0	356.28	
25 Year	0.49	0.0	357.38	
100 Year	1.44	1.02	360.23	

### **INFILTRATION BASIN multi-family**

#### SYSTEM DESIGN DESCRIPTION: OPEN BASIN WITH PRE-TREAT WITH ADS HYD SEPARATOR

THIS IS A TREATMENT BMP

SOIL TEST COMPLETED BY SOIL TESTING THROUGH THE USE OF A 2" BORING DRILL AT THE LOCATIONS NOTED ON THE PLANS.

EXISTING GRADE AT SOIL DEEP TEST: 362.0 Tests indicate sand to depths of 20 feet with no evidence of water or mottling.

Refer to detail sheet #: SY2

DESIGN TYPE: INFILTRATION STRUCTURE HYDROGRAPH NAME; IN: CULTEC INFILTRATOR (1, 2, 10, 100) OUT: CULTEC INFILTRATOR (1, 2, 10, 100) 1) BASIN GEOMETRY: CULTEC RECHARGER MODEL 330 XLHD BOTTOM: UNIT INV: 357.0 WITH SAND BASE @356.0

TOP OF STRUCTURE: 30.5"

#### WIDTH EACH UNIT: 52" + 12" SAND COVER

#### TOTAL SYSTEM: 84 lf (consisting of 21 units) 2 ROWS OF 6/ROW @ 5.0' ON CENTER CAPACITY IS: 1294 CF.

#### 2) OUTLET STRUCTURES: TYPE: CONCRETE MANHOLE WITH WEIR PLATE RIM ELEVATION: 360.5 x 3' wide Emergency only

#### 3) HYDRAULIC ROUTING STANDARD STORMS<sup>.</sup>

STANDARD STORAD.				
Storm Event	Input (CFS)	Discharge (CFS)	Elevation	
1 Year	0.57	0	360.08	
2 Year	0.61	0.03	360.51	
10 Year	0.68	0.46	360.63	
100 Year	0.78	0.78	360.70	

#### INFILTRATION RATE: 2.5"/ HOUR (50%) OF DETERMINED PERCOLATION RATE

#### SYSTEM DESIGN DESCRIPTION: Detention Contec Units

#### SYSTEM DESIGN DESCRIPTION: Level Spreader, flow from Cultec Detention system

The flows from the cultic units are(cfs):Storm event Yr110Discharge Flow:0.00.01.02

The concrete level spreader is sized to keep the I year flow under 2" in depth. The concrete level spreader is sized to keep the flow under the flow depth for the 100 year storm on a brush slope with a CN of 48 with P = 8.8 inch results in a flow depth of 2.51 inch.

Weir Flow:  $Q = CLH^{3/2}$  (Set C = 2.7) L reg'd = 3.5 feet Set L = 10.0' H = 1.3 inches

Elevation @: 354.0

#### V. <u>VEGETATED SWALE ANALYSIS</u> (Chapter 5)

Length = 200 lfSlope = 1.5%

Flow Area: Roof Greenhouses III & IV: 28,160 sf Brush Strip: 200 (20' including swale)

Refer to <u>Appendix B</u>  $CN = 1,000 / [10 + 5P + 10Q - 10 (Q^2 + 1.25 QP)^{\frac{1}{2}}]$  P = 1-Year Storm = 2.77 inches  $Q_{WV} = Runoff$  volume inches = (P<sub>90</sub>) Rv or (P<sub>1-year</sub>) Rv (water quality event) Watershed : 32,700 sf = 0.75 acres = .0012 sq miles I = 86% Rv = .05 + .009I = 0.824Qwv = 2.77 (.824) = 2.28 inches C<sub>N</sub> = 95.6 Using equation above S =  $1,000/\text{CN} \cdot 10 = .45$ Ia = .2 (S) = .09Ia/P = .009/2.77 = .032Refer to SCS Type III Unit Peak Discharge Chart

Tc Swale Flow as follows: = .1 hr. qv = 650 csm / inchQwq = qv (A) Qwv = 650 (.0012) (2.28) = 1.77 cfs

This is under 4.0 cfs with a 4 ft wide bottom/3 on 1 sides and 1.5% slope & 1.77 cfs Depth 4" N = (Figure L1) = .15 Velocity = .60 fps

 $\label{eq:capacity Analysis Sizing - Rationale - 10-Year Storm} \\ Area = .64 acre Roof C = .98 \\ .11 acre Brush C = .16 \\ C (Class C Soils) = .85 \\ I_{10-Year} = 170 / tc + 23 \\ Q = CiA = 3.20 \ cfs \\ With FlowMaster - 4' bottom / 3 on 1 side slopes / Depth 12" / Slope 1.5% \\ N (Figure: L-1) = .11 Flow Depth: 7" (overall depth 14") Velocity = 0.72 \ fps Safely passes 10-year Storm \\ \end{array}$ 

Time of Travel: 200' / .60 fps = 5.6 min. (with multiple roof leader discharge points at 100' o.c. time greater than 5.0 min. achieved)

Yr Storm event:	1	2	10	100
Swale in cfs:	1.37	1.78	3.01	5.90

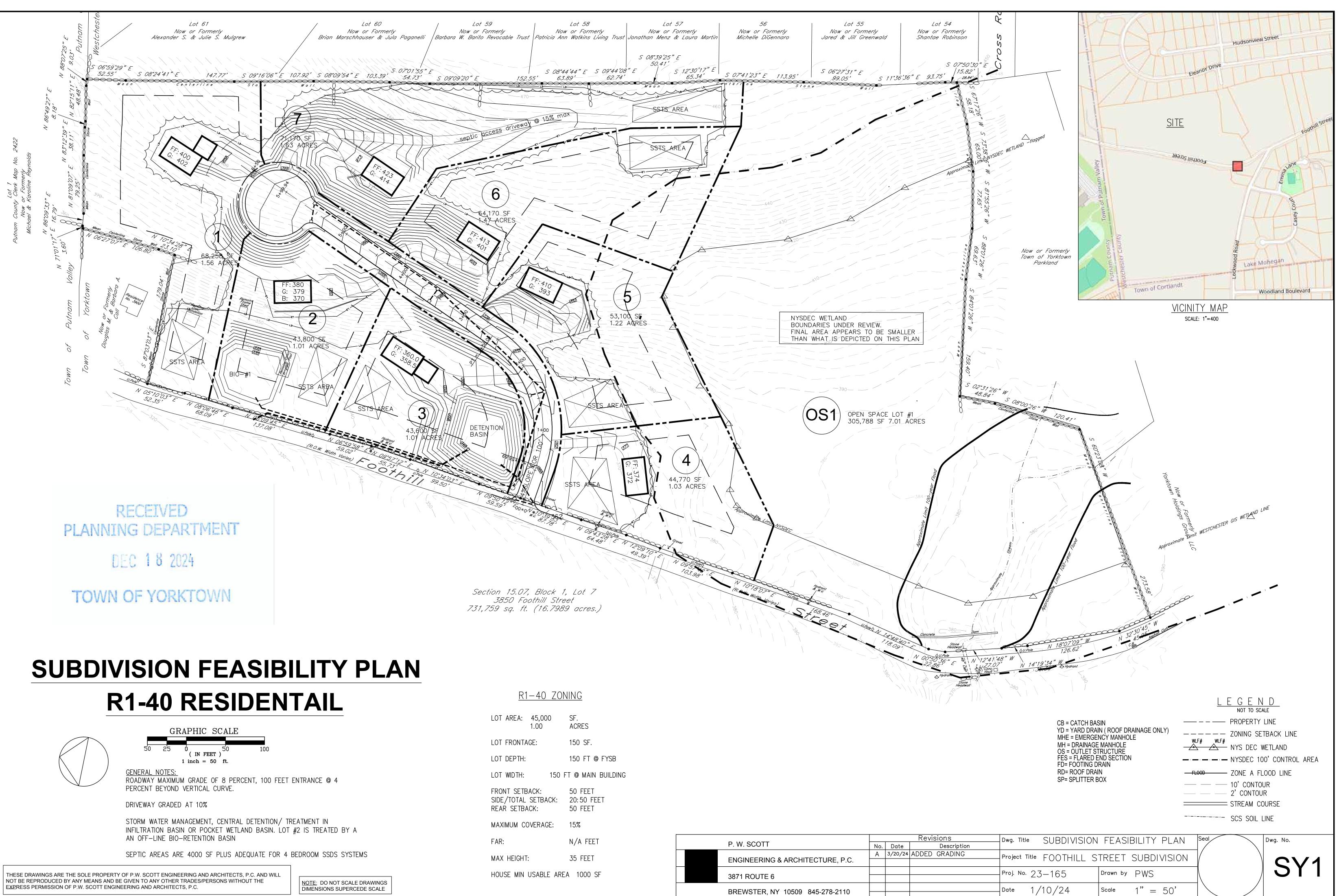
Treatment achieved as a green practice.

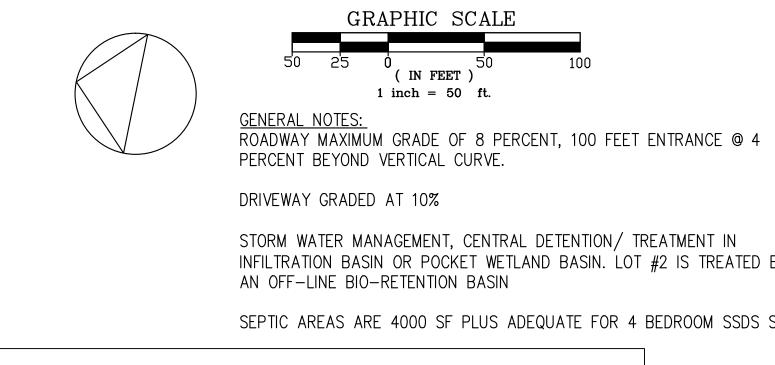
#### V. PIPING ANALYSIS

Limited to the connector pipes for the Infiltration and Detention Piping

Pipe max flow = Splitter input: 2.22 cfs. From the splitter box: flow to the infiltration System is 0.78 cfs for the 100 year storm. From the splitter box, the flow to the detention System is 1.44 cfs for the 100 year storm.

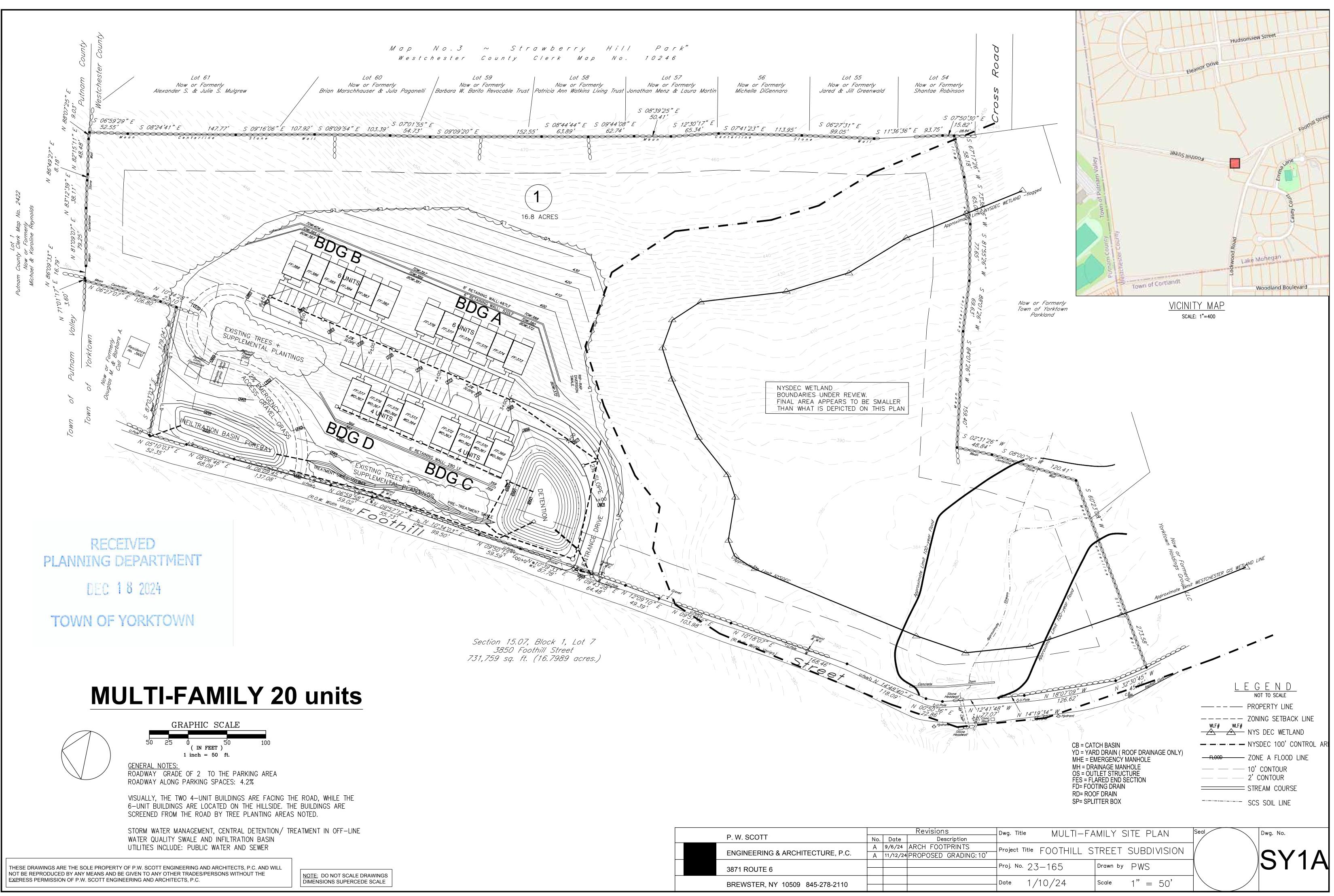
Connector piping is 12" at 1% min slope has a full capacity of 3.83 cfs which meets the peak flow.



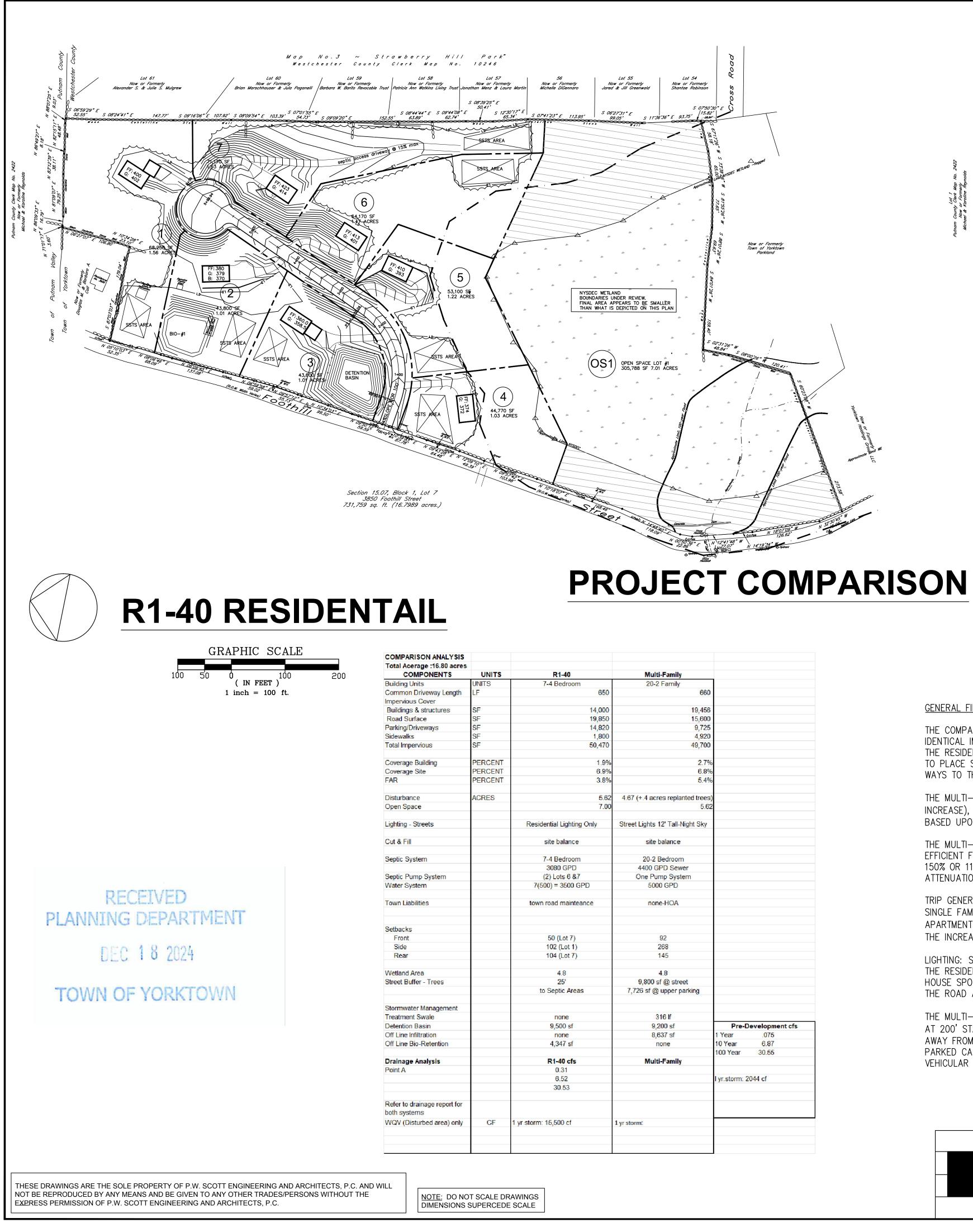


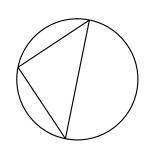
LOT AREA:	45,000 1.00	SF. ACRES	
LOT FRONTA	GE:	150 SF.	
LOT DEPTH:		150 FT @ FYSB	
LOT WIDTH:	150 F	T @ MAIN BUILDING	
FRONT SETBACK: SIDE/TOTAL SETBACK: REAR SETBACK:		50 FEET 20:50 FEET 50 FEET	
MAXIMUM CO	OVERAGE:	15%	
FAR:		N/A FEET	
MAX HEIGHT	:	35 FEET	
HOUSE MIN	USABLE ARE	A 1000 SF	

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BREWSTER, NY 10509 845-278-2110					



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		А	9/6/24	ARCH FOO	
		ENGINEERING & ARCHITECTURE, P.C.		11/12/24	PROPOSED
		3871 ROUTE 6			
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		BREWSTER, NY 10509 845-278-2110			





Now or Formerly Alexander S. & Julie S. Mulgrew

S 08'24'41" E 147.77' S 09'16'06" E 107.92' S 08'09'54" E 103.39' 54.73'

MULT	
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GENERAL	FINDINGS

THE COMPARISON REVEALS THAT THE TWO OPTIONS CREATE NEARLY IDENTICAL IMPERVIOUS AREAS AND ROADWAY LENGTH. THE DISTURBANCE FOR THE RESIDENTIAL PROJECT IS 0.5 ACRES GREATER DUE TO THE REQUIREMENT TO PLACE SSDS ON SLOPES LESS THAT 15% WHICH REQUIRES 15% ACCESS WAYS TO THE SSDS SITE ON THE UPPER PORTION OF THE LOT.

THE MULTI-FAMILY PROJECT CREATES MORE OPEN SPAC(+4.12 ACRES, 150%) INCREASE), LARGER BUFFER AREAS AND AREAS FOR STORM WATER BMPS BASED UPON SEWER SERVICE.

THE MULTI-FAMILY PROJECT USES AN INFILTRATION BASIN WHICH IS MORE EFFICIENT FOR TREATMENT, RESULTING IN ADDITIONAL RRV REDUCTION OF 150% OR 11,500 CF PER 1 YEAR STORM EVENT. THE STORM WATER ATTENUATION IS SIMILAR AND MEETS THE NYSDEC REQUIREMENTS.

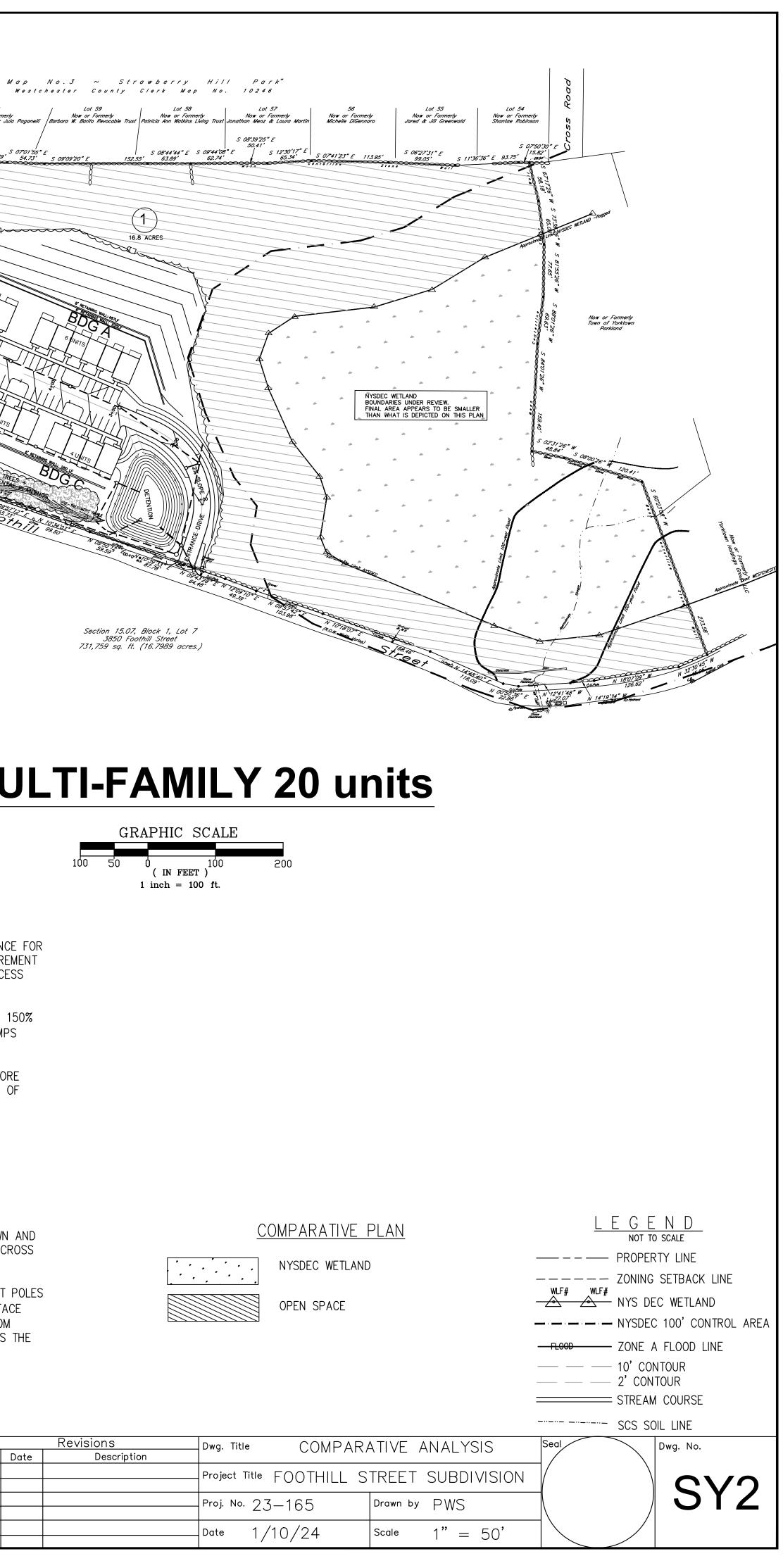
TRIP GENERATION- DAILY SINGLE FAMILY: 9.5 TRIPS/DU = 9.5(7)= 66.5 TRIPS/DAY APARTMENTS: 6.5 TRIPS/DU = 6.5(20) = 130 TRIPS/DAYTHE INCREASE IS 63 TRIPS /DAY, INSIGNIFICANT

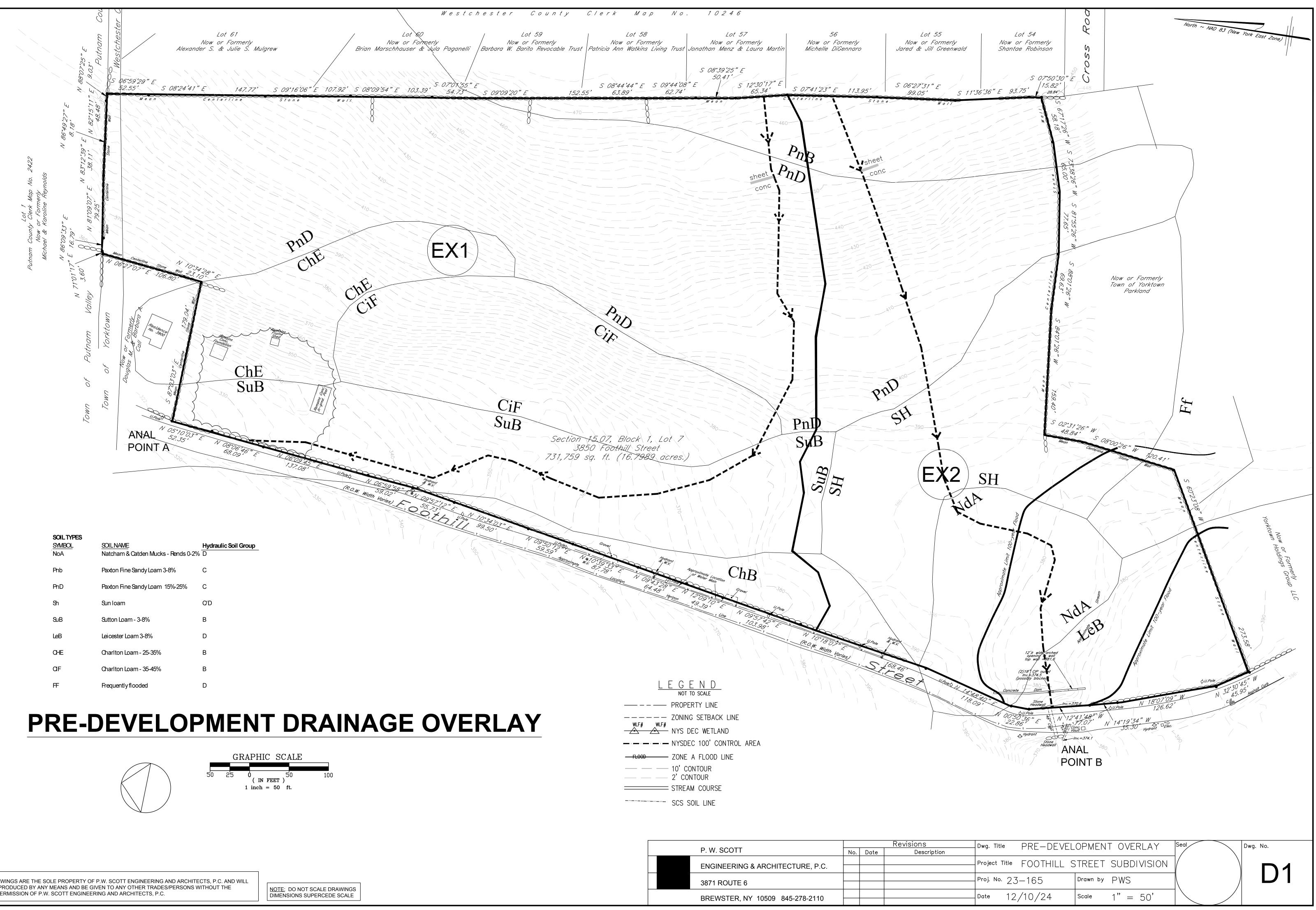
LIGHTING: STREET LIGHTS AND VEHICULAR HEAD LIGHTS THE RESIDENTIAL CONTAINS NO STREET LIGHTS, JUST RESIDENTIAL LAWN AND HOUSE SPOT LIGHTS. RESIDENTIAL TRAFFIC ON THE ROAD IS VISIBLE ACROSS THE ROAD AS IT CLIMBS UP 40 FEET TO THE CUL-DE-SAC.

THE MULTI-FAMILY PROJECT INCLUDES 12' NIGHT SKY COMPLIANT LIGHT POLES AT 200' STAGGERED ON THE ROAD. THE LIGHT POLES AT THE UNITS FACE AWAY FROM THE FRONTAGE OR TOWARDS A BUILDING. THE LIGHTS FROM PARKED CARS FACE THE BUILDINGS OR A TREE BUFFER WHICH SHIELDS THE VEHICULAR LIGHTING.

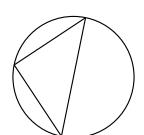
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Multi-Family	
20-2 Family	
660	
19,456	
15,600	
9,725	
4,920	
49,700	
10,100	
2.7%	
6.8%	
5.4%	
4.67 (+.4 acres replanted trees)	
5.62	
Street Lights 12' Tall-Night Sky	
the first from the second	
site balance	
20-2 Bedroom	
4400 GPD Sewer	
One Pump System	
5000 GPD	
none-HOA	
92	
268	
145	
4.8	
9,800 sf @ street	
7,726 sf @ upper parking	
316 lf	
9,200 sf	Pre-Development cfs
8,637 sf	1 Year .075
none	10 Year 6.87
	100 Year 30.55
Multi-Family	
	0011 5
	l yr.storm: 2044 cf
r storm:	





SOIL TYPES SMBOL NoA	<u>SOIL NAME</u> Natcham & Catden Mucks - Rends 0-2%	Hydraulic Soil Group
Pnb	Paxton Fine Sandy Loam 3-8%	С
PnD	Paxton Fine Sandy Loam 15%-25%	С
Sh	Sun Ioam	СД
SuB	Sutton Loam - 3-8%	В
LeB	Leicester Loam 3-8%	D
CHE	Charlton Loam - 25-35%	В
af	Charlton Loam - 35-45%	В
FF	Frequently flooded	D

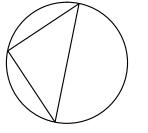


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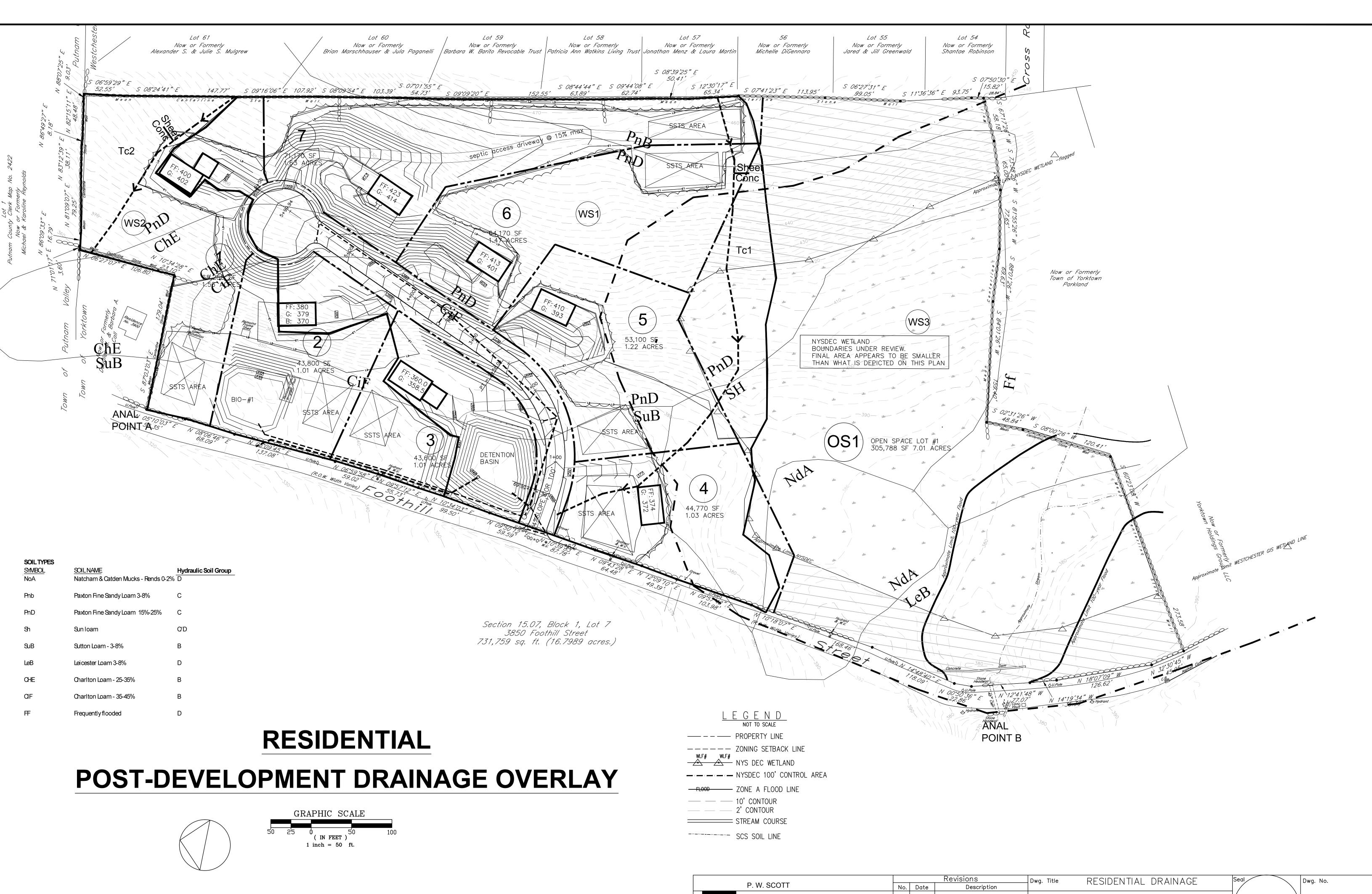
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NOTE: DO NOT SCALE DRAWINGS DIMENSIONS SUPERCEDE SCALE



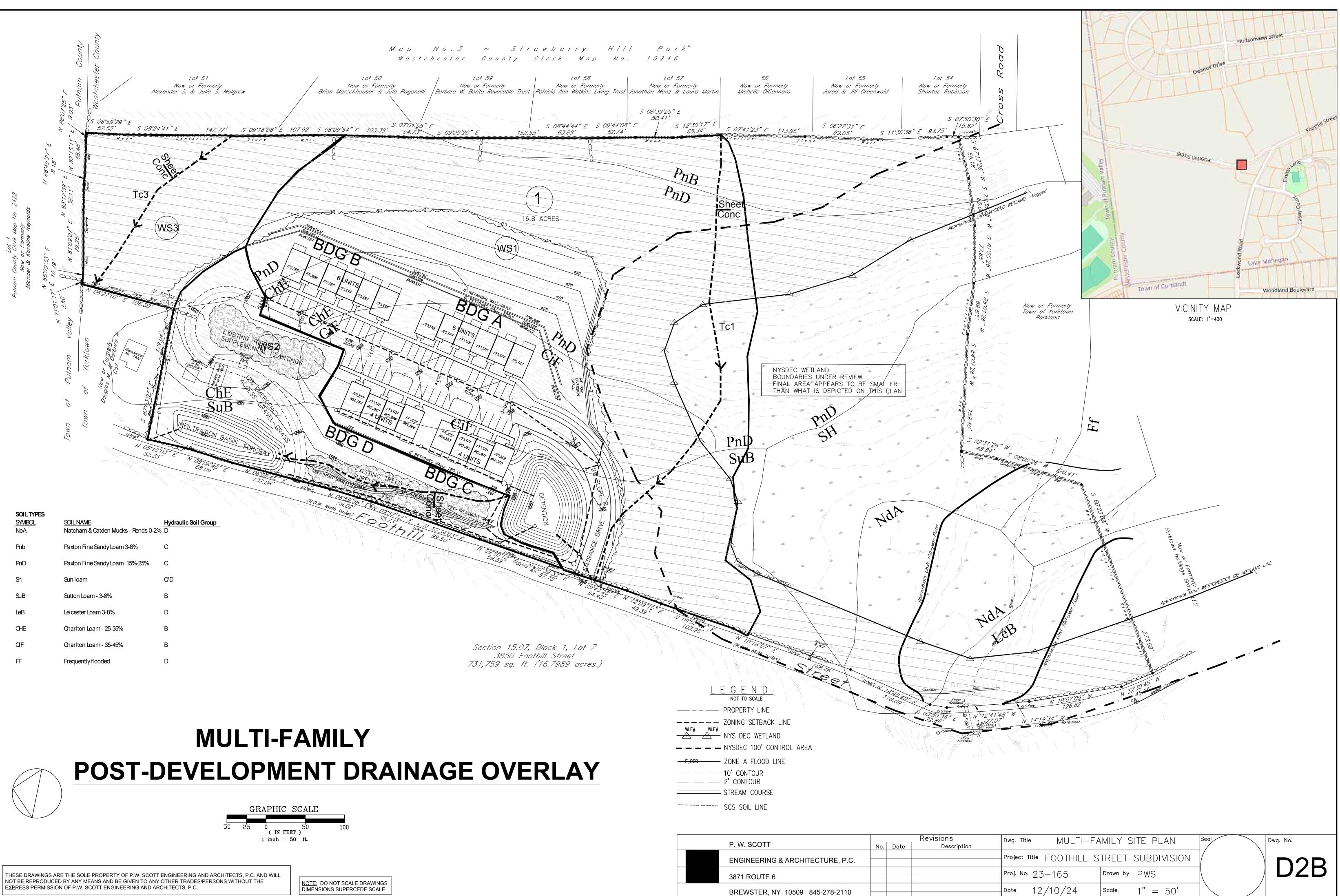
		GI	RAPHIC SCALE	
5	0	25	0 50 ( IN FEET ) 1 inch = 50 ft.	100

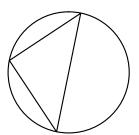
SOIL TYPES SYMBOL	SOILNAME	Hydraulic S
NoA	Natcham & Catden Mucks - Rends 0-2%	D
Pnb	Paxton Fine Sandy Loam 3-8%	С
PnD	Paxton Fine Sandy Loam 15%-25%	С
Sh	Sun Ioam	αD
SuB	Sutton Loam - 3-8%	В
LeB	Leicester Loam 3-8%	D
CHE	Charlton Loam - 25-35%	В
af	Charlton Loam - 35-45%	В
FF	Frequently flooded	D

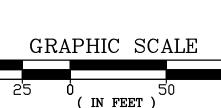


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sions	Dwg. Title	RESIDENT	IAI DRA	AINAGE	Seal	Dwg. No.
Description						J
	Project Title FC	OTHILL S	TREET S	SUBDIVISION		D2A
	Proj. No. 23—1	65	Drawn by	PWS		DZA
	Date 12/2	0/24	Scale	1" = 50'		

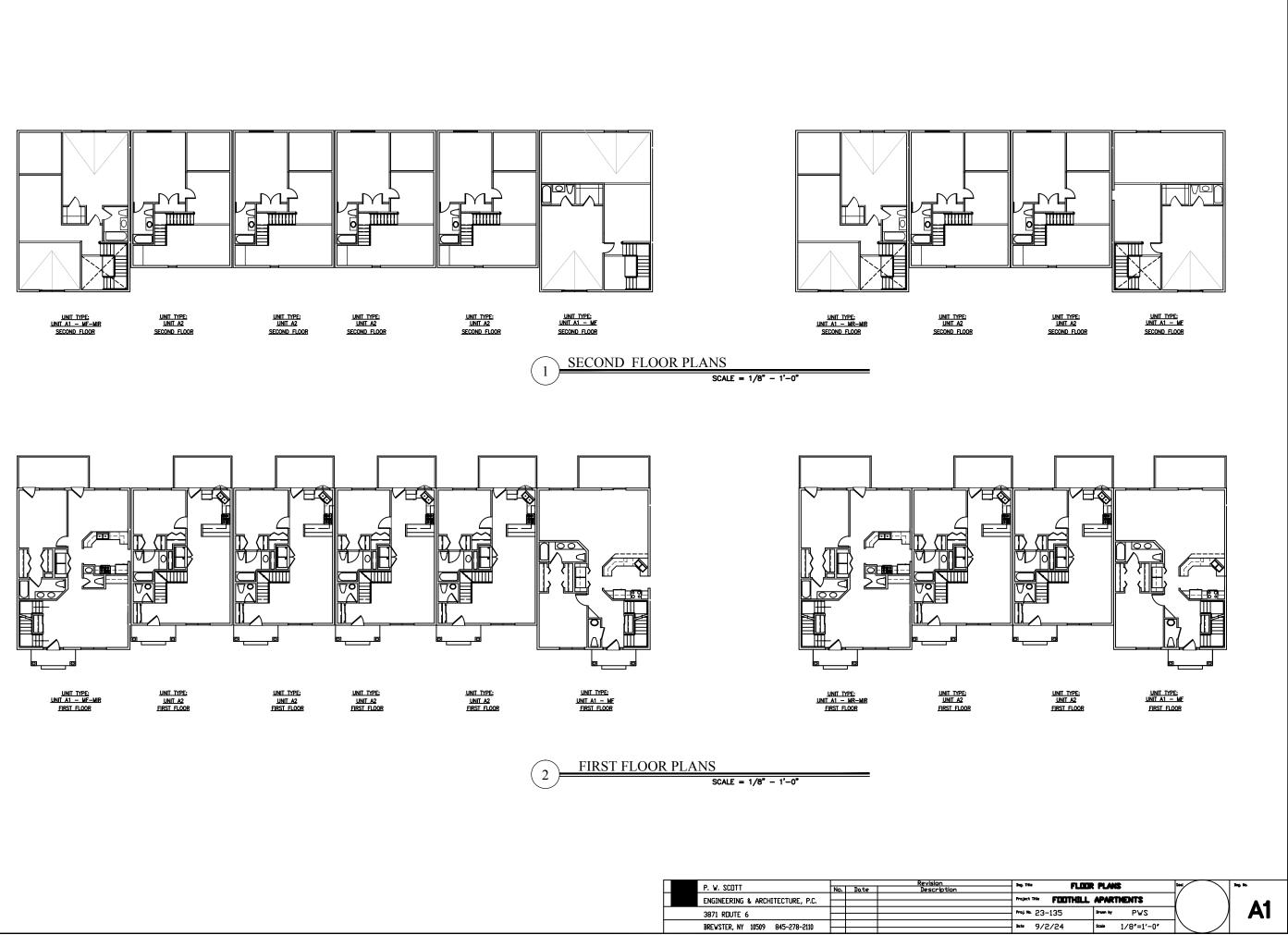




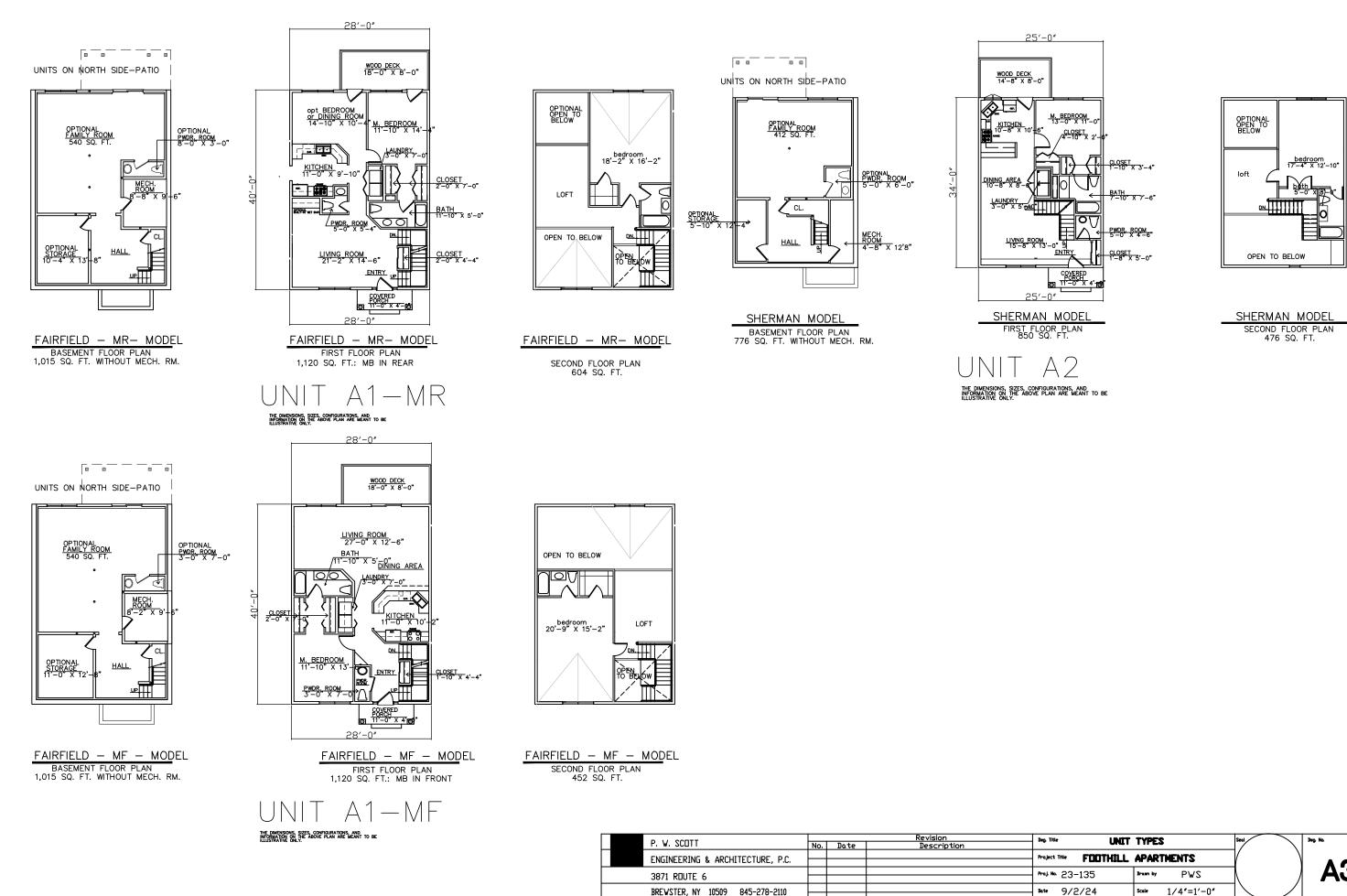


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DIMENSIONS SUPERCEDE SCALE







 Dug. Title UNIT	TYPES	Seal	Dug. No.
 Project Title FOOTHILL	APARTMENTS	$\langle \rangle$	
‱ 23-135	Drawn by PWS		A3
Date 9/2/24	Scale 1/4"=1'-0"	$  \setminus /$	



STREET VIEW



STREET VIEW





**REAR VIEW OF UNITS** 





## **REAR OF UNITS NORTH SIDE**



P. W. SCOTT			Revisions	Dwa.
		Date	Description	
ENGINEERING & ARCHITECTURE, P.C.				Proi
				,
3871 ROUTE 6				Proj
BREWSTER, NY 10509 845-278-2110				Date

## SINGLE UNIT ENTRY

## REAR OF UNIT SOUTH SIDE

9. Title PRELIMINARY ARCHITECTURAL DESIGN

Dwg. No.

PH

oject Title FOOTHILL STREET SUBDIVISION Drawn by MA ₀, № 23–135 <sup>ite</sup> 12/6/24 NTS Scale