SHADES OF GREEN

GREEN INFRASTRUCTURE & PAVEMENT REMOVAL STRATEGY FOR VAN NESS

CONNECTICUT AVENUE NW
WASHINGTON DC

JANUARY 2016

District of Columbia Office of Planning

Metropolitan Washington Council of Governments

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Created by:

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1
BACKGROUND

CONTEXT

PROJECT AREA

The project comprises a three-block segment of Connecticut Avenue between Albermarle Street on the north and Van Ness Street on the south.

Runoff from this area flows into the Soapstone Creek Watershed, a subset of the larger Rock Creek Watershed. Steep slopes and large areas of impervious surfaces along Connecticut Avenue have created runoff and erosion issues for this troubled watershed. This project aims to minimize some of the volume and improve the quality of stormwater coming off Connecticut Avenue.

INTRODUCTION

This study was funded by a 2014 Transportation/Land-Use Connections Technical Assistance Grant provided by the National Capital Region Transportation Planning Board of the Metropolitan Washington Council of Governments. The MWCOG funded and reviewed the development of the study. The District of Columbia Office of Planning (DCOP) led this study and retained Rhodeside & Harwell, planners and landscape architects, to collaborate with DCOP staff and community stakeholders on this study. A. Morton Thomas & Associates provided technical assistance with the utility survey and engineering concepts.

This report builds upon the 2011 report, *The Van-Ness-UDC: Commercial Corridor Enhancement Study*, which developed conceptual-level recommendations for improving the pedestrian experience along Connecticut Avenue.

The pavement removal strategy for Connecticut Avenue from Van Ness Street to Albemarle Street aims to improve the pedestrian experience by expanding the tree pit zone and identifying opportunities to include green infrastructure where possible. The Van Ness streetscape must serve a wide variety of needs and programs. The confluence of a major arterial road, the Metro line, underground utilities and variety of buildings place many demands on the sidewalk/pedestrian area. This study seeks to describe strategies for how all of these needs might be balanced in a functional, attractive sidewalk/pedestrian area.

This report has been developed concurrently with the Van Ness Commercial District Action Strategy using coordinated public engagement and recommendations. In particular, this report builds upon and assists implementation of the Action Strategy's public space and sustainability recommendations. Shades of Green is preliminary exploration of a design concept, taking the drawings to a 15% level. Implementation of these proposed streetscape changes will primarily be achieved through public space improvements completed incrementally by property owners in conjunction with the repositioning or redevelopment of buildings in the commercial district. The Van Ness Commercial District Action Strategy identifies a number of properties that are likely to be either redeveloped (given additional development capacity under zoning) or repositioned through capital investments.

PROJECT OBJECTIVES

- Identify opportunities to remove existing impervious paving
- Identify appropriate hardscape and landscape plant materials
- Develop a plan and designs for incorporating green infrastructure where feasible
- Ensure new LID facilities do not negatively impact existing underground utilities, including those supporting Metro

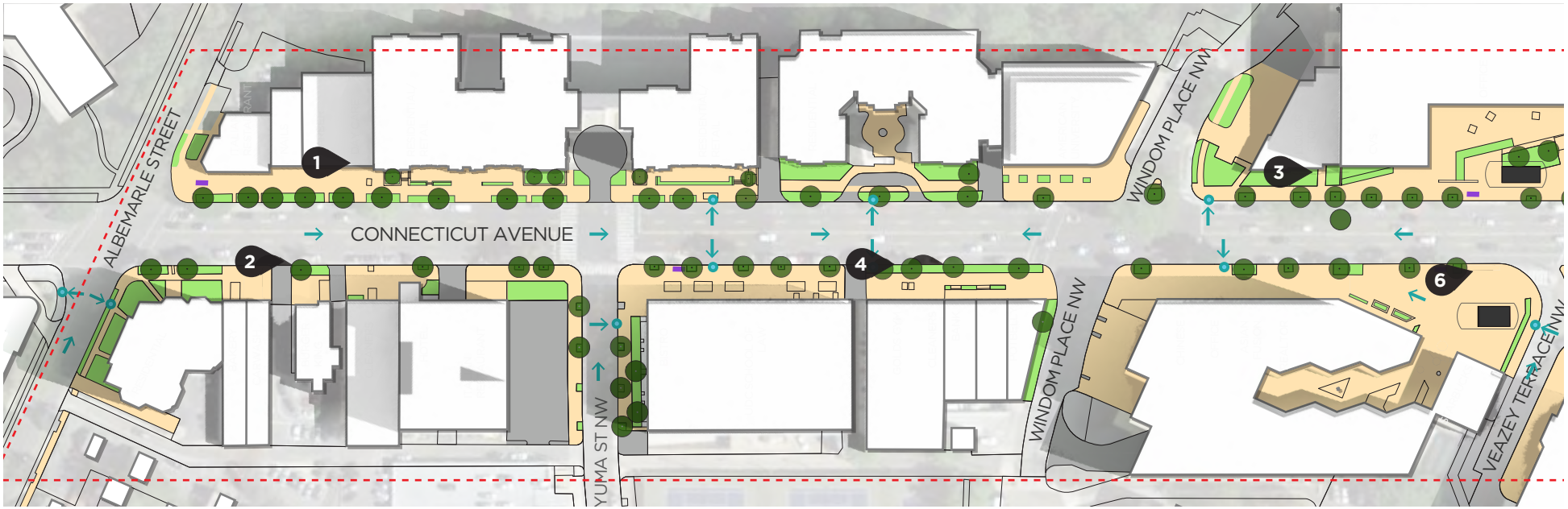
SCOPE OF STUDY:

- Illustrative Concept Plan
- 15% Design Document Package
- Strategies for incorporating green infrastructure
- Utility survey based on publicly available drawings requested from utilities and geo-rectified on a plan
- Typical sections for each type of LID facility

DOES NOT INCLUDE:

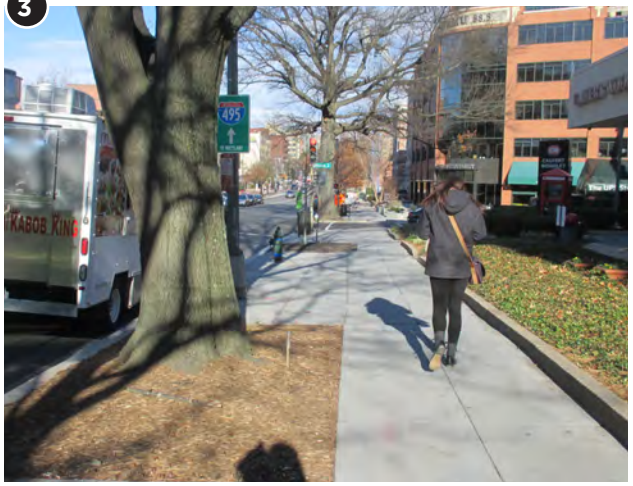
- Changes to curb alignment
- Changes to on-street parking or bus stop locations
- Stormwater engineering plans
- Hydrologic calculations
- Infiltration testing of soil
- Grading plans
- Full survey
- Construction documents

EXISTING CONDITIONS

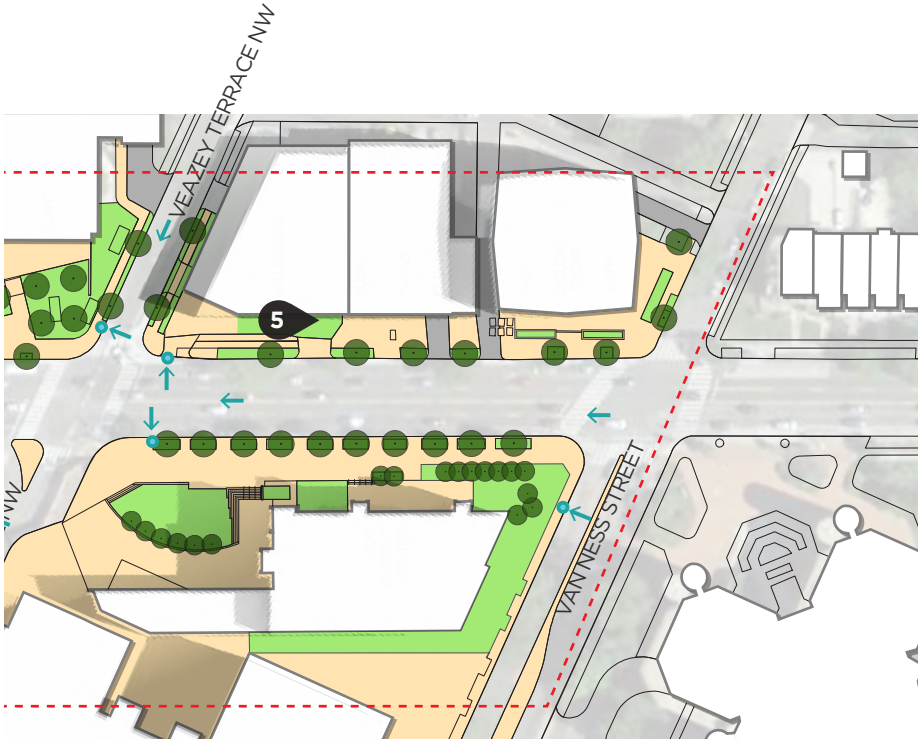


- Undefined pedestrian zone
- Planting along curb

- Defined pedestrian zone
- Planting along curb



- Defined pedestrian zone
- Tree boxes along curb
- Planting along buildings



LEGEND

- Pedestrian Zone
- Landscape Zone
- Existing Tree
- Project Boundary
- Stormwater Flow Lines
- Stormwater Inlets
- Photo Location

The project study area has many challenges as well as opportunities. Wide expanses of excess paving, inconsistent streetscape materials, and a lack of buffer between pedestrians and traffic all make parts of this study area inhospitable to pedestrians. In other areas, sidewalk paving has obstacles and areas of disrepair, complicating pedestrian accessibility. The location of the main pedestrian walkway varies from block to block, resulting in indirect connections. Finally, the heavy concentration of utilities on both sides of the road—a byproduct of the metro line and the historic streetcar alignment—creates challenges for locating green infrastructure and new trees.

4

- Undefined pedestrian zone
- Tree boxes along curb
- Excessively wide sidewalk

5

- Uneven paving due to construction
- Planting along buildings

6

- Metro plaza
- Undefined pedestrian zone
- No planting areas

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2
CONCEPT

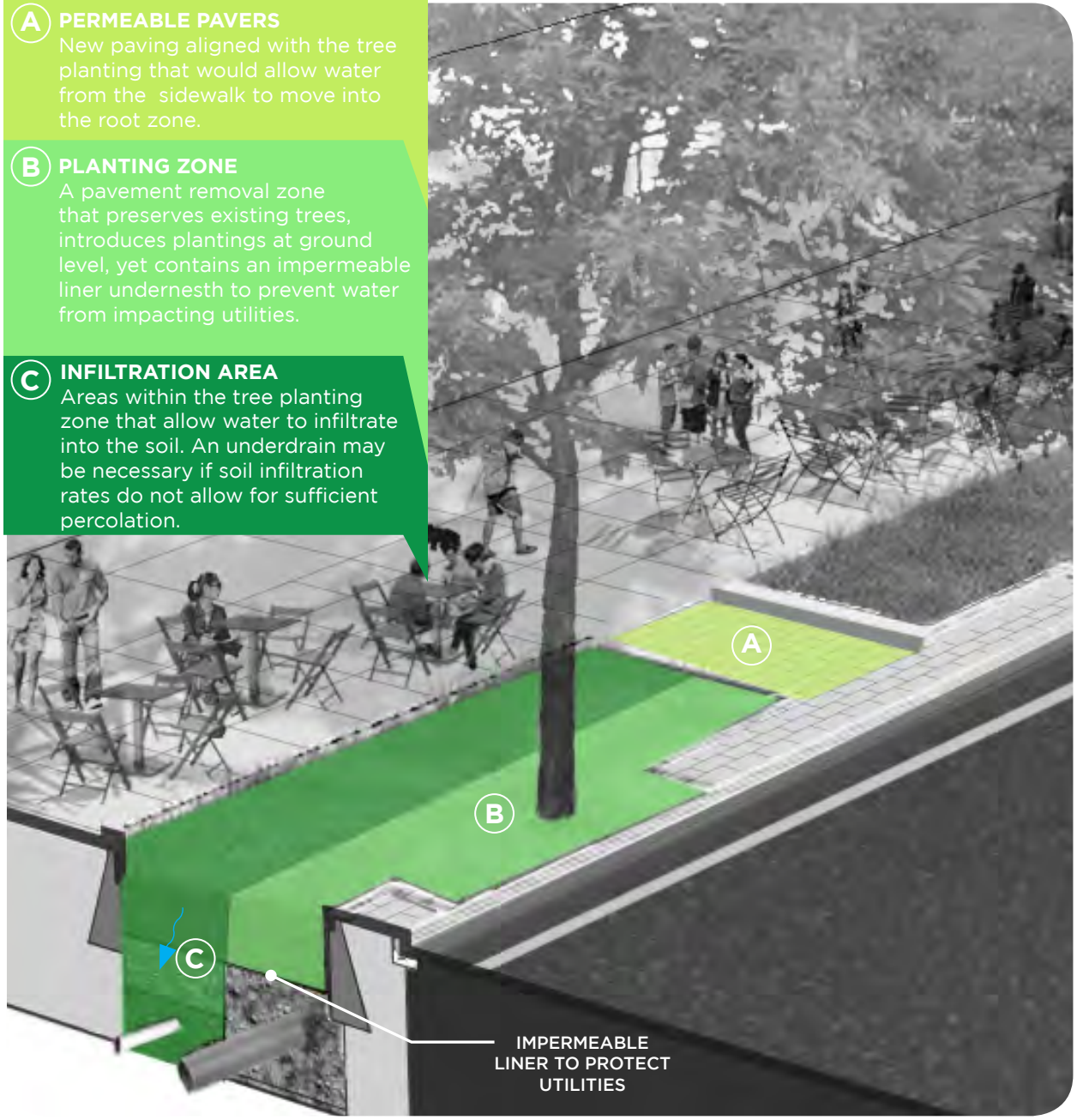
CONCEPTUAL APPROACH

PREFERRED APPROACH: SHADES OF GREEN

A PERMEABLE PAVERS
New paving aligned with the tree planting that would allow water from the sidewalk to move into the root zone.

B PLANTING ZONE
A pavement removal zone that preserves existing trees, introduces plantings at ground level, yet contains an impermeable liner undernesth to prevent water from impacting utilities.

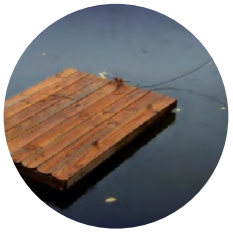
C INFILTRATION AREA
Areas within the tree planting zone that allow water to infiltrate into the soil. An underdrain may be necessary if soil infiltration rates do not allow for sufficient percolation.



The unusually wide sidewalks between the curb and the buildings provide a unique opportunity to create three separate zones within the sidewalk area: 1. a gracious sidewalk zone for pedestrian movement located along the face of the building, 2. an outdoor café zone, and 3. a plant zone for trees and ground level plantings. Infiltration areas within the planting allow water to infiltrate into the soil. This study looked at different configurations for each of these zones.

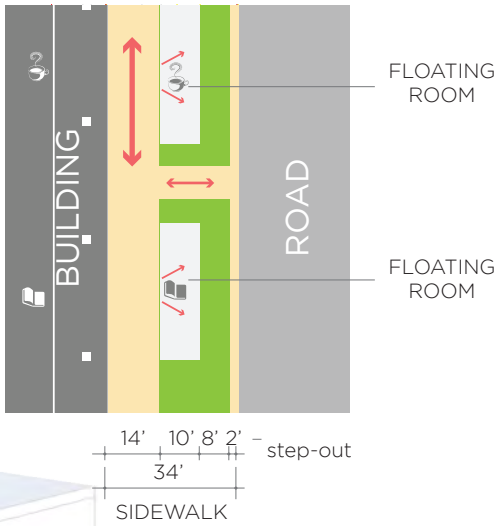
The cafe zone along the building face extends the retail experience creating a more active and engaging public realm. Replacing paved surfaces with planted surfaces helps reduce the impact of stormwater run-off and heat retention. The reduction of stormwater runoff is maximized by incorporating a multi-layered greening strategy we are calling the “Shades of Green” strategy. The planted zone is designed to buffer pedestrians from the impacts of traffic.

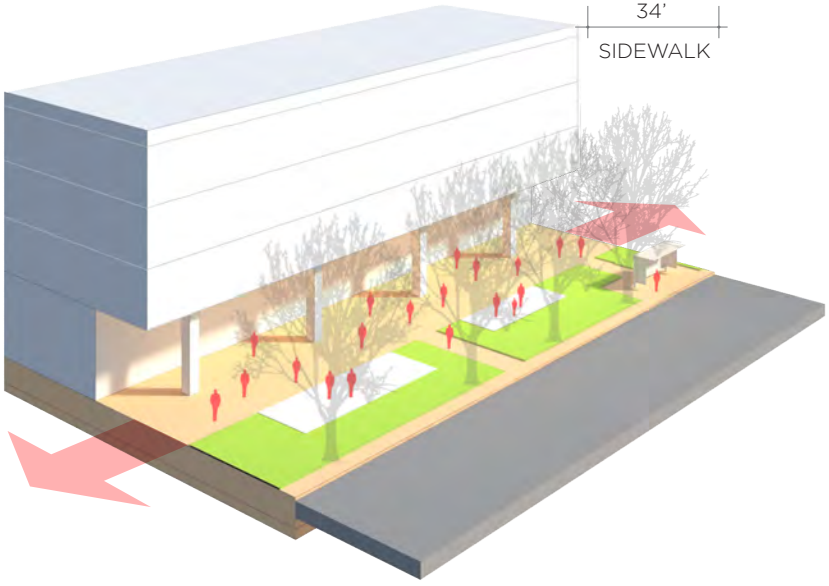
A variation of this approach is recommended for the west side of Connecticut Ave between Veazey Terrace and Yuma street where the public space and land use enable the order of the cafe zone and sidewalk to be switched. This alignment maximizes environmental sustainability outcomes while improving access to the Metro station and retailers.



FLOATING ROOMS

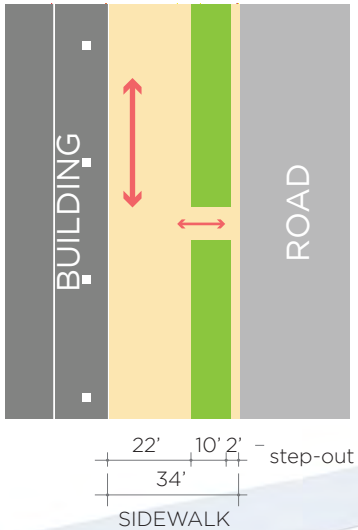
Floating rooms combine cafe and landscaping zones. The floating rooms concept promotes increased activity by enabling pedestrians to more easily travel between the Metro station and their destinations including UDC, residential areas and retailers.

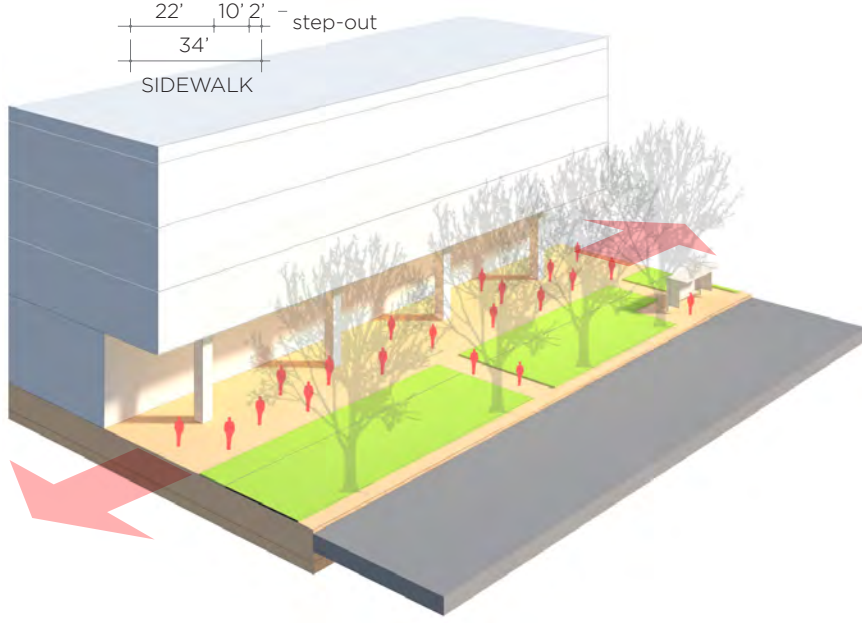




LINEAR GARDEN

Linear garden is the primary streetscape concept for Van Ness. This strategy maximizes pavement removal and green infrastructure opportunities by taking advatage of the existing mature trees.





BIRDS EYE VIEW BETWEEN YUMA STREET AND WINDOM PLACE

STREET LEVEL VIEW BETWEEN YUMA STREET AND WINDOM PLACE

SIDEWALK ZONE

Primary pedestrian passage way. Approximately 14-15’ in width. Paved with London pavers.

CAFE ZONE

Space dedicated to outdoor seating and dining. Approximately 7-8’ in width. Paved with London pavers to match the Sidewalk Zone. Consider using a slightly different shade of gray for pavers to differentiate this zone.

PLANTING ZONE

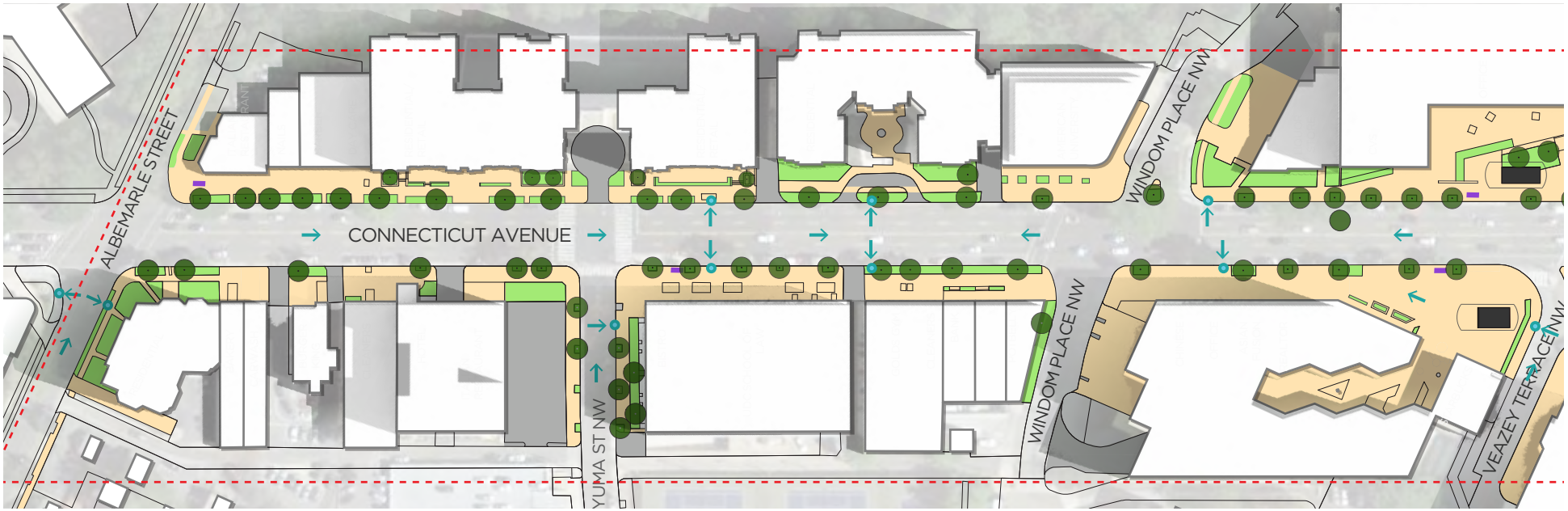
Widened planters (~10’ w) that incorporate existing trees and new proposed trees. Low curbs surround the planters. Inside, a matrix of low ornamental grasses fills the ground level and is accented with flowering perennials and shrubs.

STEP OUT ZONE

24” wide zone allows pedestrians to safely step out of the parking lane.

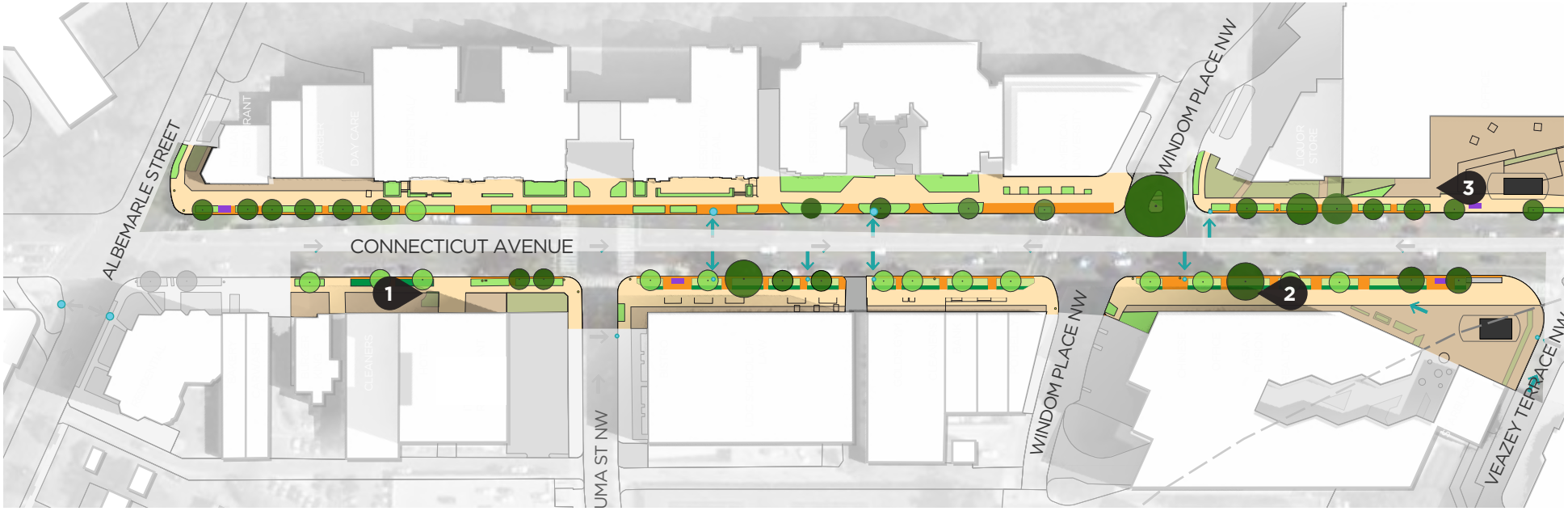
CONNECTICUT AVE.

EXISTING



0 75 150 FEET 1"=150'

PROPOSED CONCEPT



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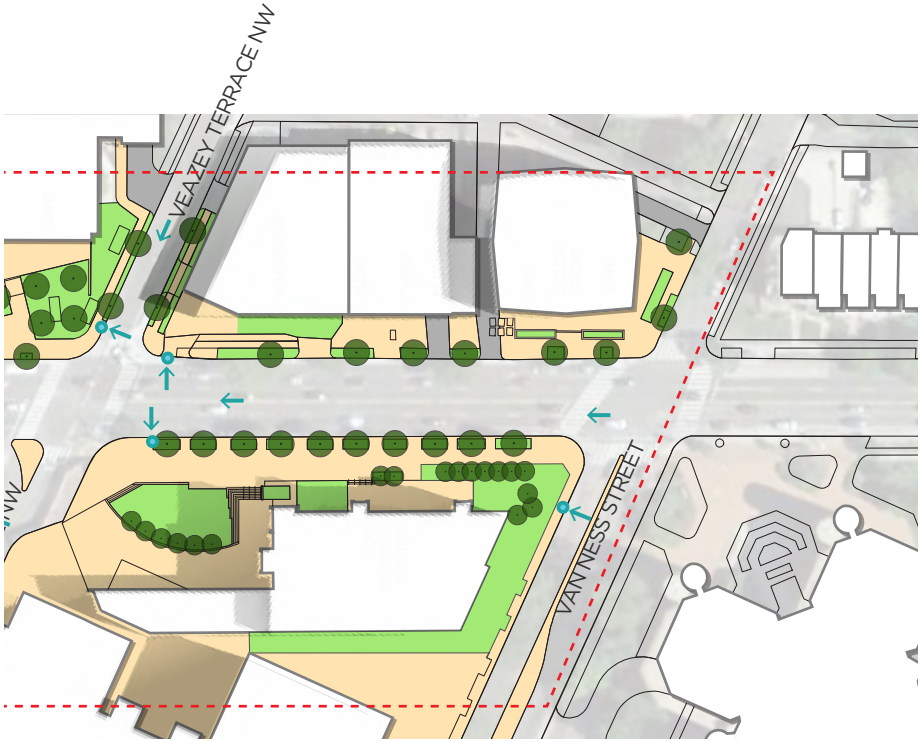
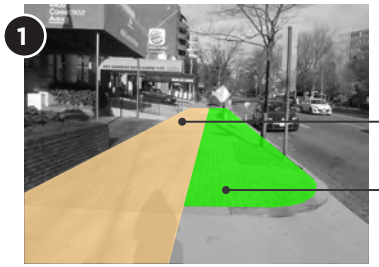


LEGEND

- Pedestrian Zone
- Landscape Zone
- Bus Stand*
- Existing Tree
- Stormwater Flow Lines
- Stormwater Inlets

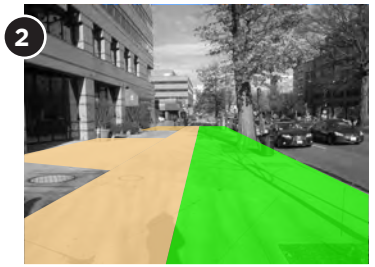
*Relocating the NE bus stand should be privately funded

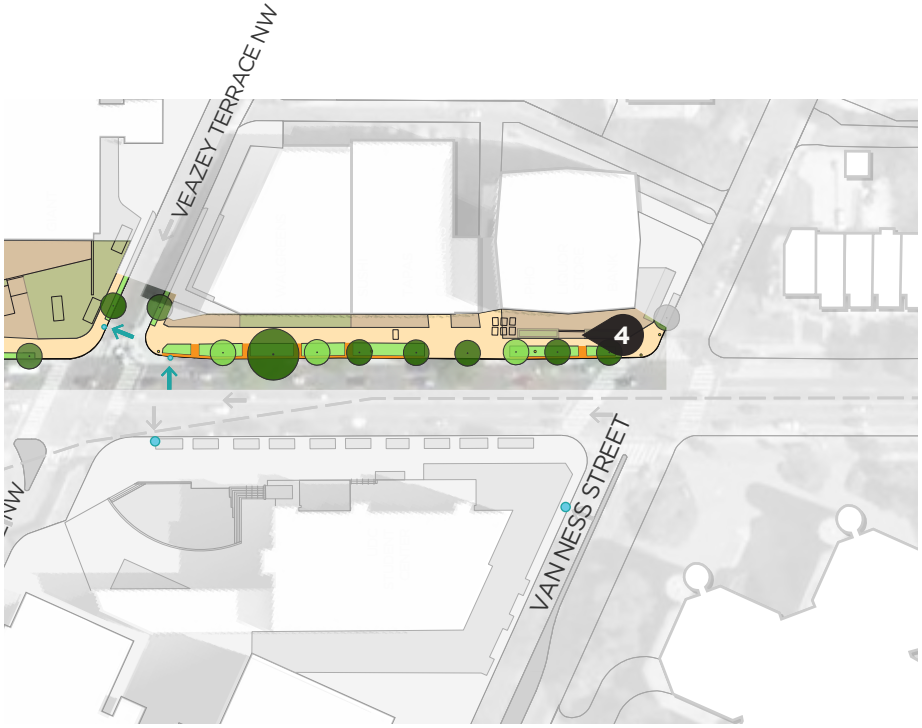
PROPOSED APPROACH



Defined pedestrian walkways

LID opportunity area / impervious pavement removal

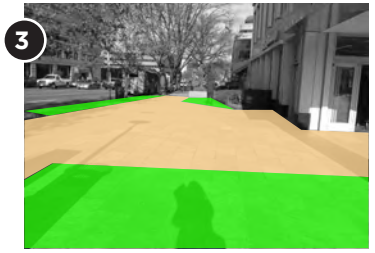


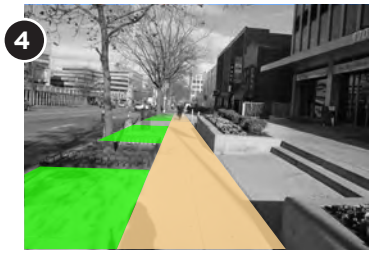


LEGEND

- Pedestrian Zone
- Access Zones Infiltration
- Infiltration Zone
- Planting Zone
- Building Amenity Zone
- Bus Stand*
- Existing Tree
- Potential New Tree
- Lights
- Stormwater Flow Lines
- Stormwater Inlets

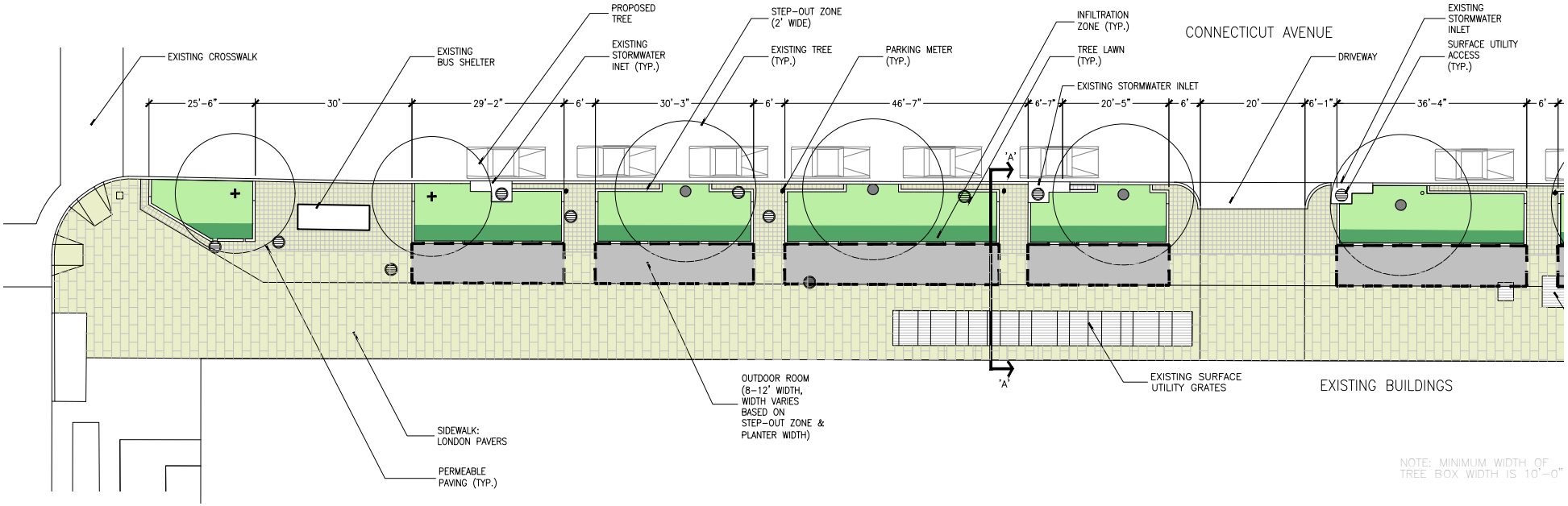
*Relocating the NE bus stand should be privately funded



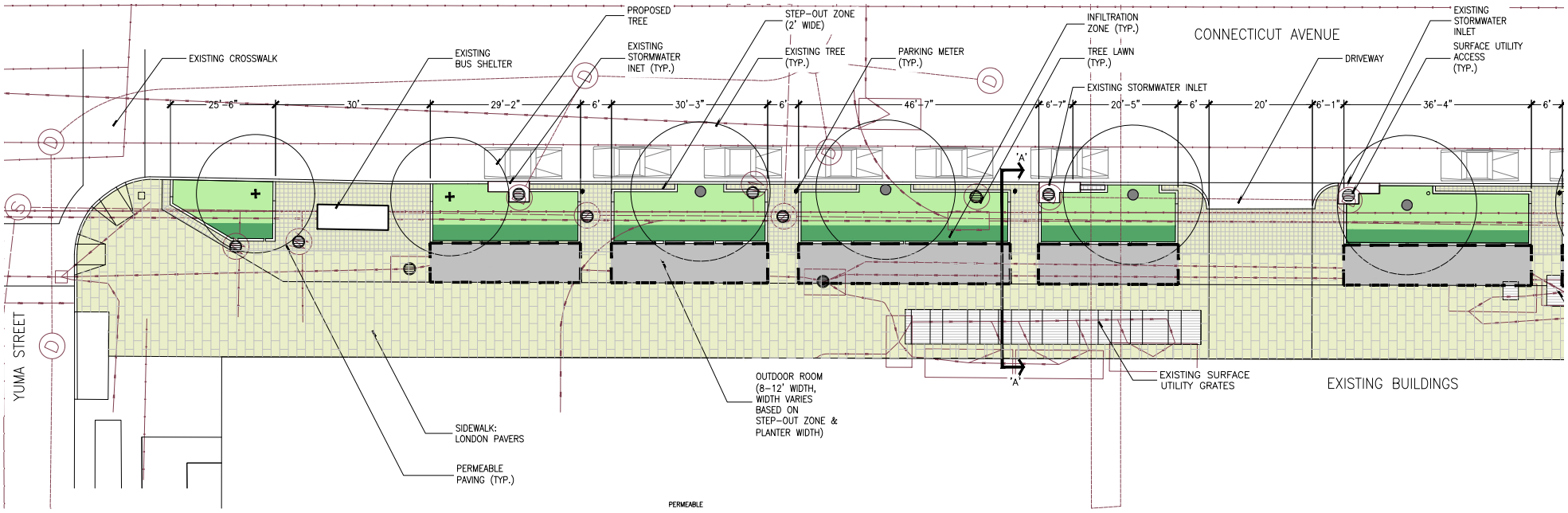


FOCUS AREA PLAN YUMA STREET TO WINDOM PLACE

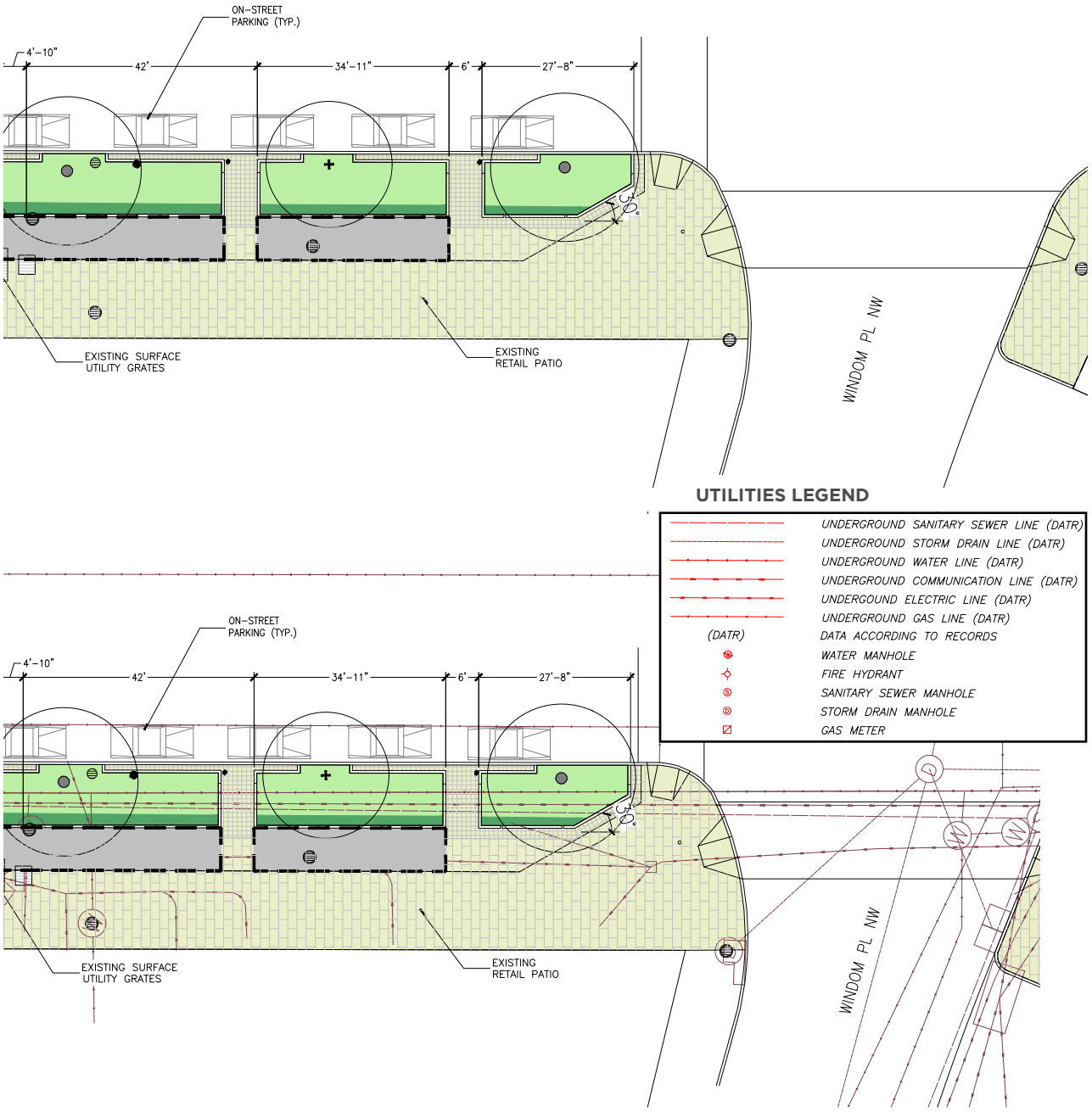
CONCEPT



CONCEPT WITH UTILITIES



Streetscape Treatments with Utility Overlay



WORKING AROUND UTILITIES

The density of underground utilities created a number of challenges for locating trees and infiltration zones. Ultimately, a strategy was developed to keep existing trees in their current location along the back of the street curb. New trees were only recommended where existing trees were insubstantial or not-thriving. Filtration zones can only be added when new trees are added or existing trees are replaced. As different portions of the streetscape are implemented, utilities should be consolidated and relocated away from the tree-boxes where possible. Further study is required to determine if stormwater can be collected from both the sidewalk and curb.

YUMA TO WINDOM STATISTICS

- 1,854 square feet of proposed cafe seating and 123 seats
- 3,115 square feet of proposed planted area (100% increase from existing)

PROPOSED TREE

EXISTING TREE

UNIT PAVER PAVING

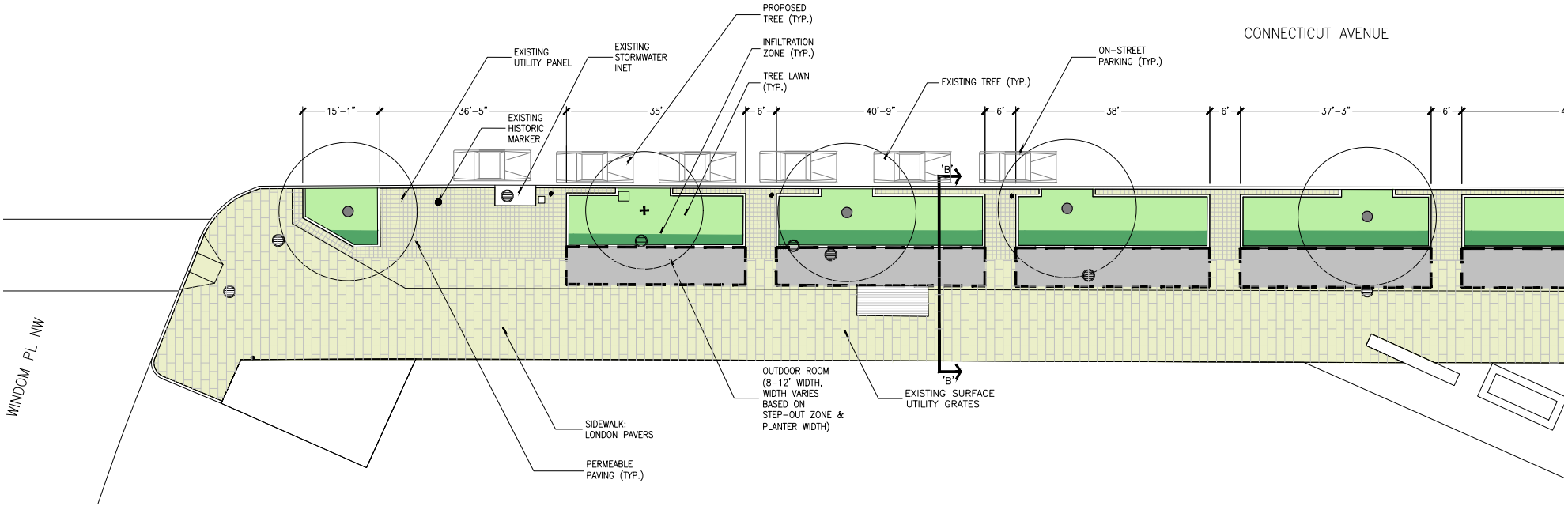
LONDON PAVERS

INFILTRATION AREA

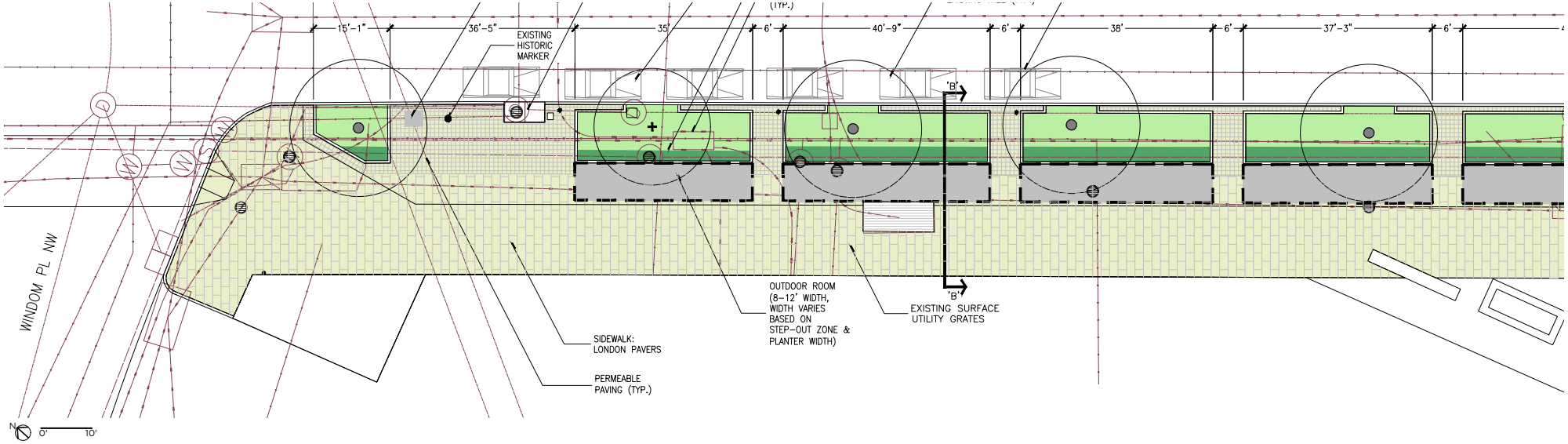
PLANTING ZONE (NON-INFILTRATION)

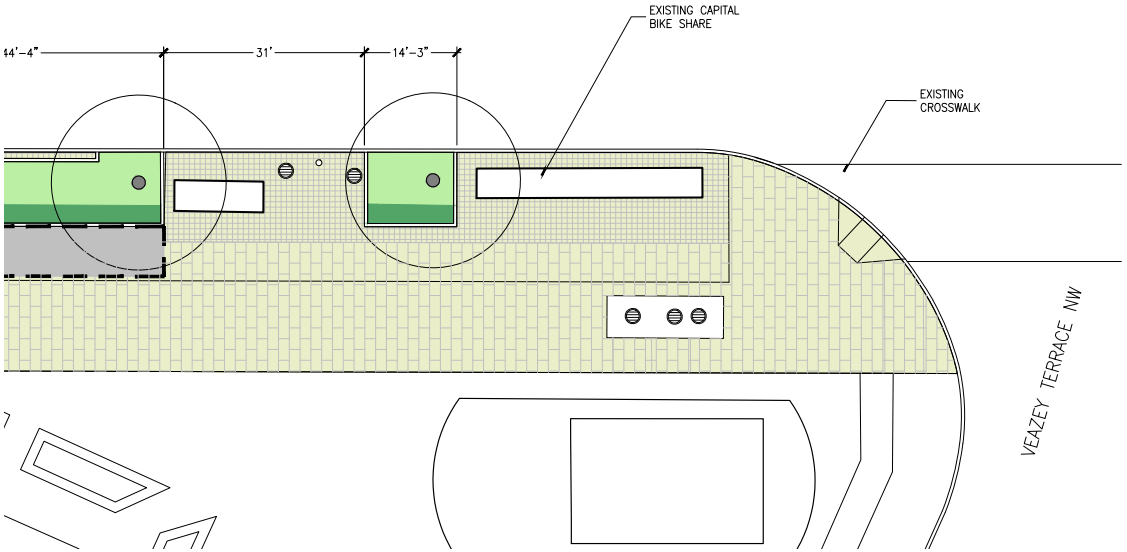
FOCUS AREA PLAN WINDOM PLACE TO VEAZEY TERRACE

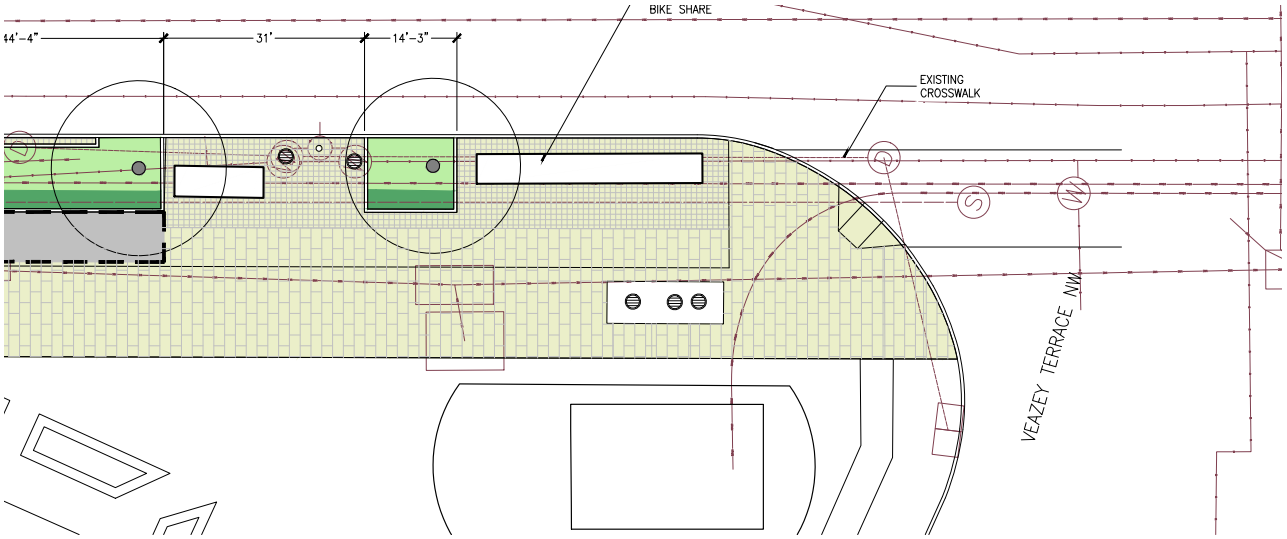
CONCEPT



CONCEPT WITH UTILITIES







WINDOM TO VEAZEY STATISTICS

- 1,468 square feet of proposed cafe seating and 97 cafe seats.
- 2,151 square feet of proposed planted area (75% increase in existing)

PROPOSED TREE

EXISTING TREE

UNIT PAVER PAVING

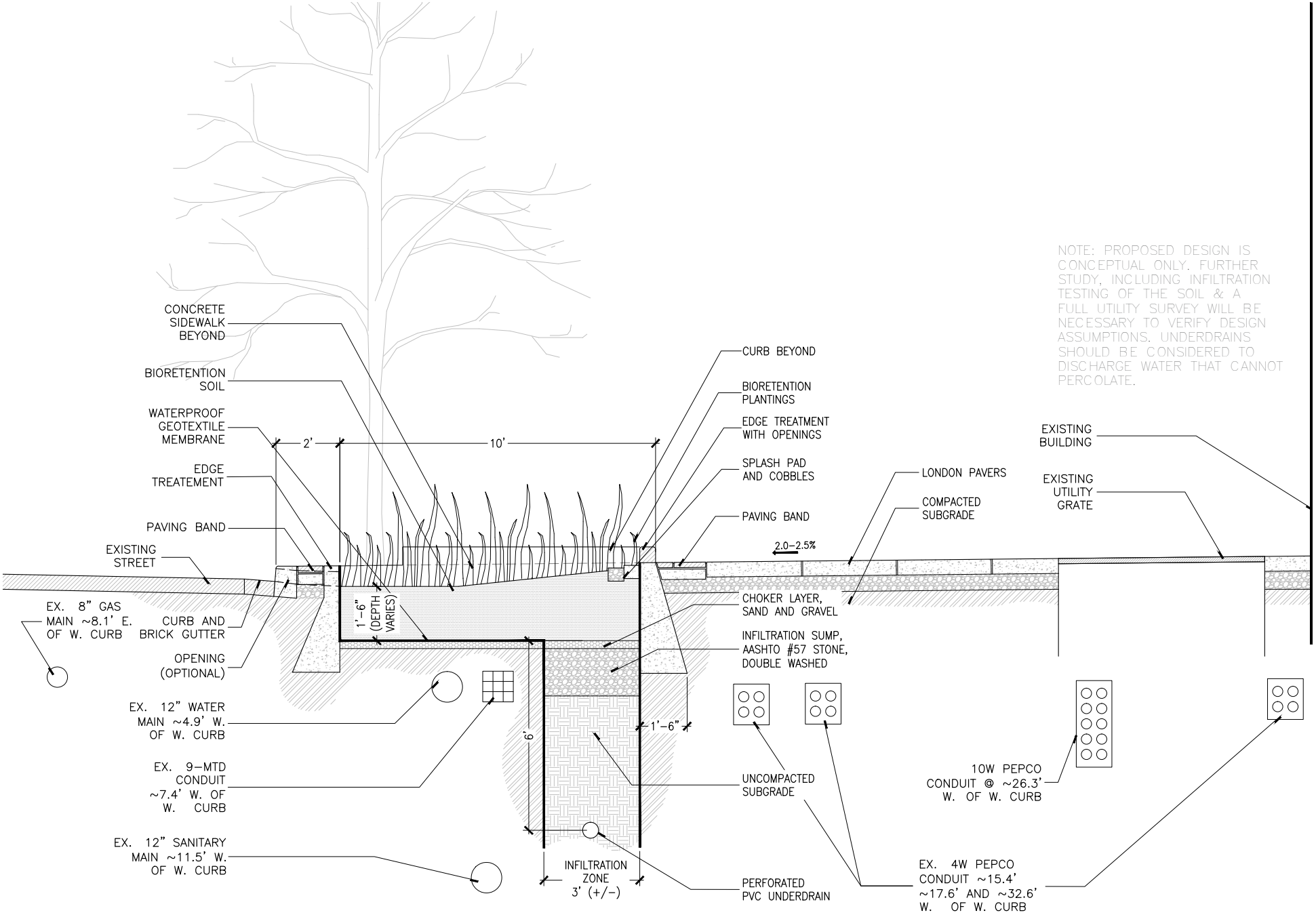
LONDON PAVERS

INFILTRATION ZONE

PLANTING ZONE (NON-INFILTRATION)

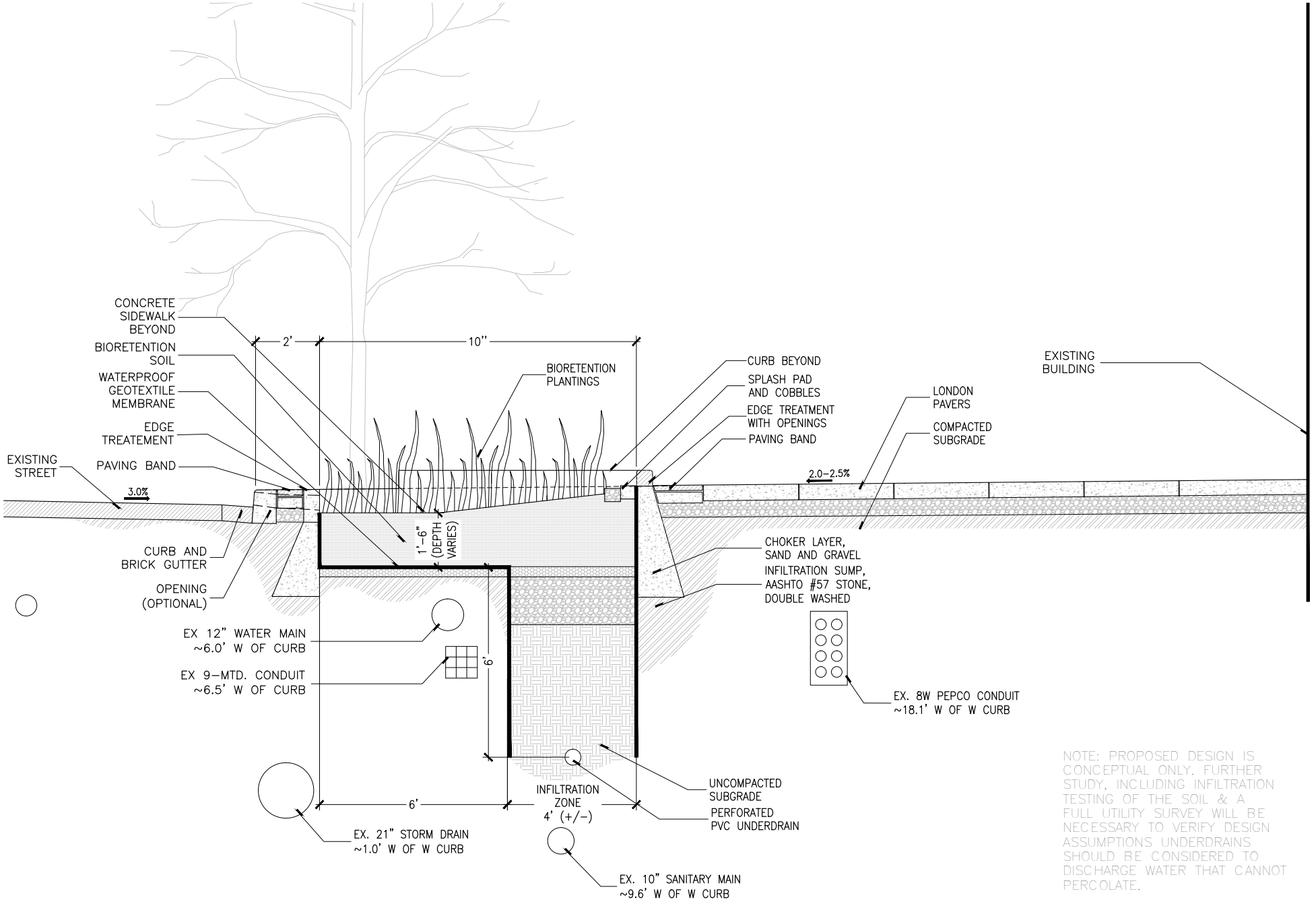
FOCUS AREA SECTION BETWEEN YUMA STREET AND WINDOM PLACE

TREE PLANTING WITH INFILTRATION ZONE 'A'



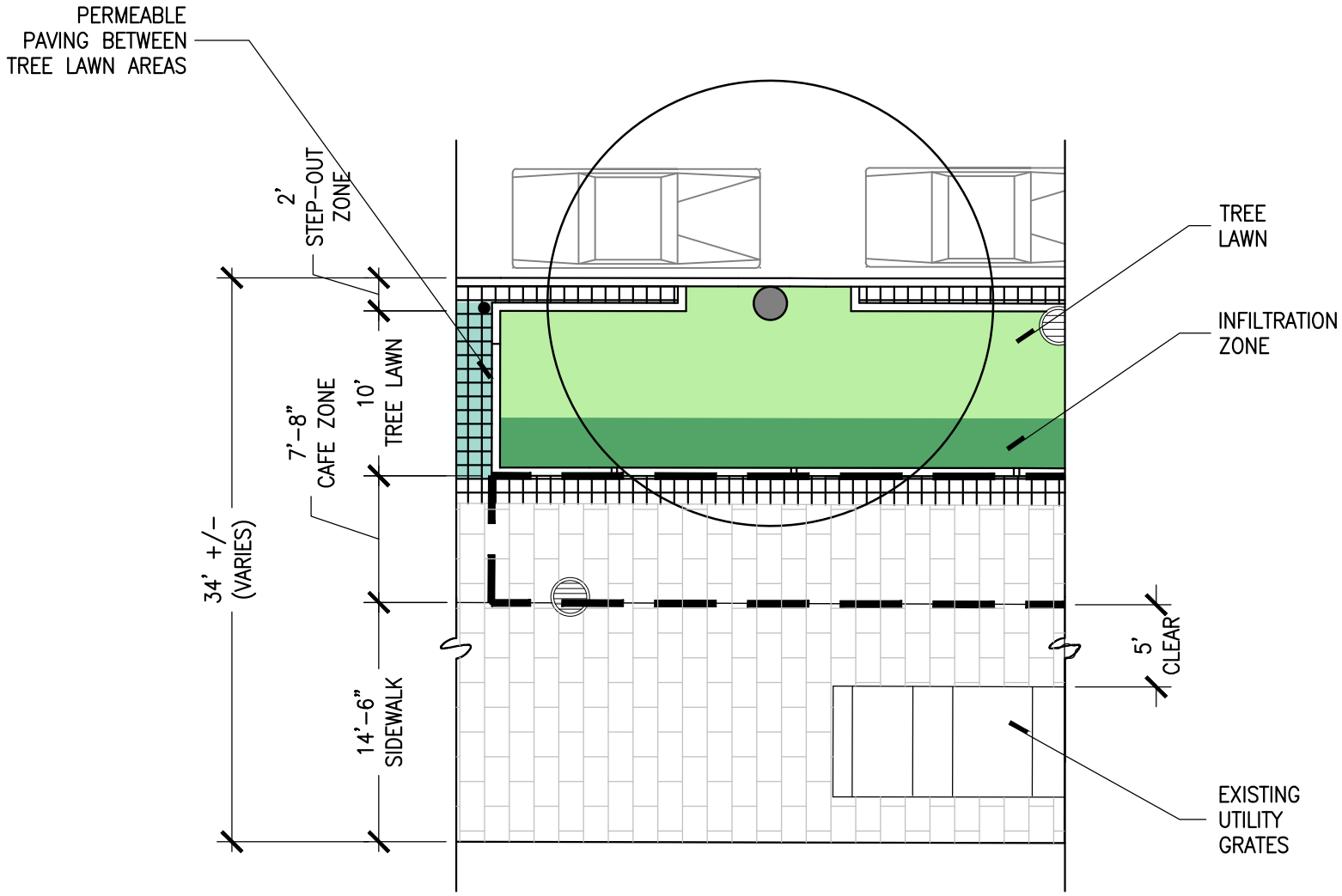
FOCUS AREA SECTION BETWEEN WINDOM PLACE AND VEAZEY TERRACE

TREE PLANTING WITH INFILTRATION ZONE 'B'



NOTE: PROPOSED DESIGN IS CONCEPTUAL ONLY. FURTHER STUDY, INCLUDING INFILTRATION TESTING OF THE SOIL & A FULL UTILITY SURVEY WILL BE NECESSARY TO VERIFY DESIGN ASSUMPTIONS. UNDERDRAINS SHOULD BE CONSIDERED TO DISCHARGE WATER THAT CANNOT PERCOLATE.

FOCUS AREA DETAIL PLAN BETWEEN YUMA STREET AND WINDOM PLACE



PROPOSED MATERIALS

UNIT PAVER PAVING
CAFE SEATING + PEDESTRIAN ZONE
TREE SPACE/PLANTING
INFILTRATION ZONE

UNIT PAVER PAVING [AROUND TREE PLANTERS]
PERMEABLE PAVERS (CONCRETE OR ASPHALT)
SQUARE IN SHAPE, GRAY IN COLOR
PERMEABLE WHERE INFILTRATION IS POSSIBLE


PEDESTRIAN ZONE
LONDON PAVERS
TO MATCH CURRENT DDOT STANDARD
BOTH SIDEWALK AND CAFE ZONES

TREE SPACE/PLANTING + INFILTRATION ZONE
PLANTING ZONE
THE INTENT IS TO PLANT A MATRIX OF LOW (24-36") SITE ADAPTIVE GRASSES TO CREATE A CLEAN, CONSISTENT GREEN BUFFER FROM THE ROAD. FLOWERING PERENNIALS CAN BED RANDOMLY DISTRIBUTED THROUGHOUT FOR ADDITIONAL SEASONAL INTEREST



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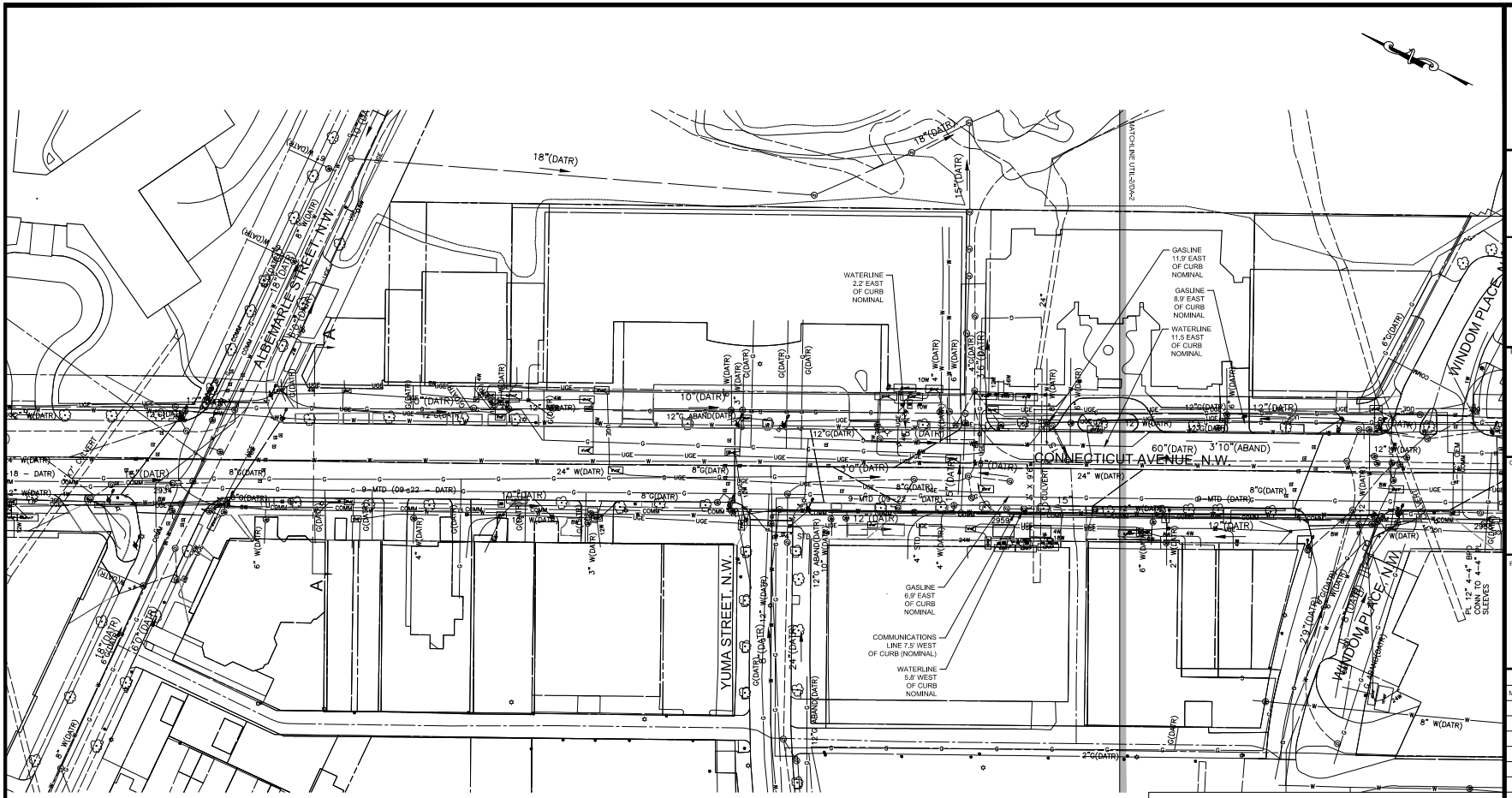
3
APPENDIX

EXISTING UTILITIES ALBEMARLE STREET TO WINDOM PLACE



CONNECTICUT AVENUE PLAN VIEW FROM ALBERMARLE STREET, NW TO WINDOM PLACE, NW

NOTE: ALL INFORMATION, INCLUDING HORIZONTAL AND VERTICAL UTILITY INFORMATION DATA ACCORDING TO RECORD AND SHOULD NOT BE USED FOR FINAL DESIGN UNTIL FIELD VERIFIED.

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

LEGEND:

——— ———	UNDERGROUND SANITARY SEWER LINE (DATR)
— — — — — —	UNDERGROUND STORM DRAIN LINE (DATR)
———W———	UNDERGROUND WATER LINE (DATR)
———COMM———	UNDERGROUND COMMUNICATION LINE (DATR)
———UGE———	UNDERGOUND ELECTRIC LINE (DATR)
———G———	UNDERGROUND GAS LINE (DATR)
(DATR)	DATA ACCORDING TO RECORDS
	WATER MANHOLE
	FIRE HYDRANT
	SANITARY SEWER MANHOLE
	STORM DRAIN MANHOLE
	GAS METER
	DRAINAGE DIVIDE
— — — — — —	PAVEMENT (IMPER)
— — — — — —	SIDEWALK (IMPER)
— — — — — —	BUILDING (IMPER)
~~	VEGETATION (PER)

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OWNER

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PROJECT TITLE

VAN NESS / CONNECTICUT AVENUE
GREEN INFRASTRUCTURE / PAVEMENT REMOVAL
WASHINGTON, DC 20011

REVISIONS

MARK	DATE	DESCRIPTION

AMT FILE NO.	114-637.001
DATE:	03/30/2015
SCALE:	1" = 40'

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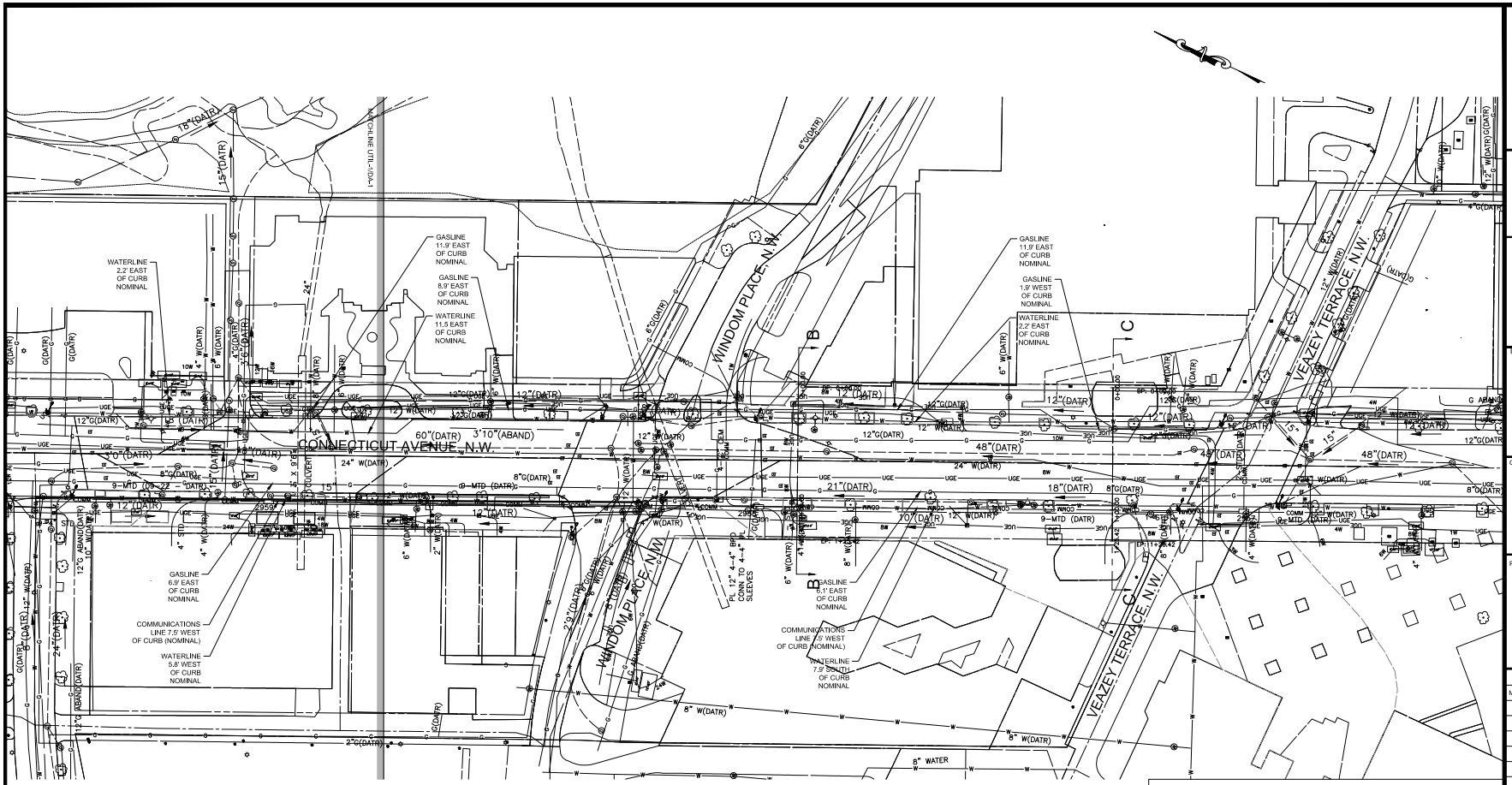
SHEET TITLE

EXISTING UTILITIES PLAN - FROM DATA ACCORDING TO RECORD

SHEET (24x36 ORIGINAL)

UTIL-1

SHEET 1 OF 2



CONNECTICUT AVENUE PLAN VIEW FROM YUMA STREET, NW TO VEAZEY TERRACE, NW

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GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

LEGEND:

——— ———	UNDERGROUND SANITARY SEWER LINE (DATR)
— — — — — —	UNDERGROUND STORM DRAIN LINE (DATR)
———W———	UNDERGROUND WATER LINE (DATR)
———COMM———	UNDERGROUND COMMUNICATION LINE (DATR)
———UGE———	UNDERGROUND ELECTRIC LINE (DATR)
———G———	UNDERGROUND GAS LINE (DATR)
(DATR)	DATA ACCORDING TO RECORDS
	WATER MANHOLE
	FIRE HYDRANT
	SANITARY SEWER MANHOLE
	STORM DRAIN MANHOLE
	GAS METER
	DRAINAGE DIVIDE
— — — — —	PAVEMENT (IMPER)
— — — — —	SIDEWALK (IMPER)
— — — — —	BUILDING (IMPER)
----------	VEGETATION (PER)

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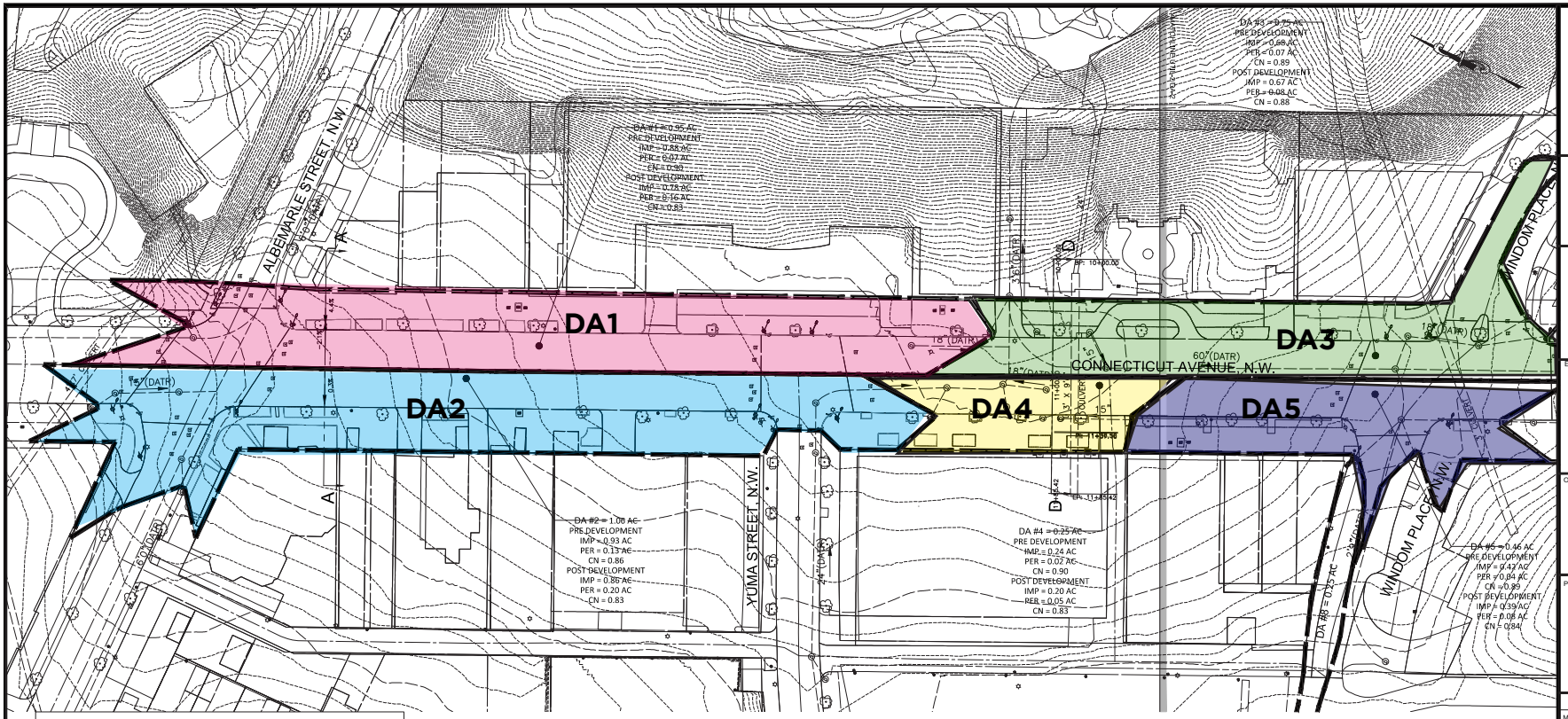
SHEET TITLE
EXISTING UTILITIES PLAN - FROM DATA ACCORDING TO RECORD

SHEET (24x36 ORIGINAL)
UTIL-2
SHEET 2 OF 2

DRAINAGE AREA TREATMENT BY BIORETENTION FACILITIES

ALBEMARLE STREET TO WINDOM PLACE



LEGEND:

- UNDERGROUND SANITARY SEWER LINE (DATR)
- UNDERGROUND STORM DRAIN LINE (DATR)
- W — UNDERGROUND WATER LINE (DATR)
- COMM — UNDERGROUND COMMUNICATION LINE (DATR)
- UGE — UNDERGOUND ELECTRIC LINE (DATR)
- G — UNDERGROUND GAS LINE (DATR)
- (DATR) DATA ACCORDING TO RECORDS
- WATER MANHOLE
- FIRE HYDRANT
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- GAS METER
- DRAINAGE DIVIDE
- PAVEMENT (IMPER)
- SIDEWALK (IMPER)
- BUILDING (IMPER)
- VEGETATION (PER)

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

CONNECTICUT AVENUE PLAN VIEW FROM ALBERMARLE STREET, NW TO WINDOM PLACE, NW

NOTE: ALL INFORMATION, INCLUDING HORIZONTAL AND VERTICAL UTILITY INFORMATION DATA ACCORDING TO RECORD AND SHOULD NOT BE USED FOR FINAL DESIGN UNTIL FIELD VERIFIED.

NOTE: COMPUTATIONS ASSUME NO DISTURBANCE WITHIN THE DRIVE LANES.

Drainage Area #	Land Area (sf)	SWRv Req. (cf)	SWRv Req. (gal)	Depth (ft)	Void Ratio	Required Area (sf)
1	17,670	1,180	8,830	5	0.25	944
2	15,059	1,271	9,506	5	0.25	1,017
3	7,788	511	3,819	5	0.25	408
4	4,240	243	1,821	5	0.25	195
5	8,338	553	4,139	5	0.25	443
6	16,121	1,068	7,985	5	0.25	854
7	19,499	1,376	10,295	5	0.25	1,101
	88,716	6,203	46,395			4,962

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#1

Site Information

Is Site an "AHOD Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
WWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	3,270
Impervious Cover	0	4,791
Water	0	0
Site Total	0	8,061

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	41%
% Impervious Cover	0%	59%
Site Rv	0.00	0.68

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	0	511
Stormwater Retention Volume, SWRv (gallons)	0	3,819
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#2

Site Information

Is Site an "AHOD Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
WWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	4,751
Impervious Cover	0	3,037
Water	0	0
Site Total	0	7,788

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	61%
% Impervious Cover	0%	39%
Site Rv	0.00	0.64

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	0	511
Stormwater Retention Volume, SWRv (gallons)	0	3,819
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#3

Site Information

Is Site an "AHOD Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
WWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	3,277
Impervious Cover	0	4,711
Water	0	0
Site Total	0	7,988

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	41%
% Impervious Cover	0%	59%
Site Rv	0.00	0.67

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	0	443
Stormwater Retention Volume, SWRv (gallons)	0	3,311
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#4

Site Information

Is Site an "AHOD Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
WWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	1,777
Impervious Cover	0	2,463
Water	0	0
Site Total	0	4,240

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	42%
% Impervious Cover	0%	58%
Site Rv	0.00	0.67

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	0	243
Stormwater Retention Volume, SWRv (gallons)	0	1,821
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#5

Site Information

Is Site an "AHOD Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
WWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	3,411
Impervious Cover	0	4,927
Water	0	0
Site Total	0	8,338

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	41%
% Impervious Cover	0%	59%
Site Rv	0.00	0.66

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	0	553
Stormwater Retention Volume, SWRv (gallons)	0	4,139
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

AMT, LLC CONSULTING ENGINEERS
410 G STREET, NE - WASHINGTON, DC 20002
PHONE: (202) 289-4545 FAX: (202) 289-5051

ENGINEER'S CERTIFICATE

OWNER

METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
TRANSPORTATION & LAND-USE COORDINATION
777 NORTH CAPITOL STREET, NE
SUITE 300
WASHINGTON, DC 20009

PROJECT TITLE

VAN NESS / CONNECTICUT AVENUE
GREEN INFRASTRUCTURE / PAVEMENT REMOVAL
WASHINGTON, DC 20011

REVISIONS

MARK	DATE	DESCRIPTION

AMT FILE NO. 114-637.001
DATE: 03/30/2015
SCALE: 1" = 40'

This document has undergone Quality Review by the following:

ENG:
PM:
QC:

SHEET TITLE

EXISTING DRAINAGE AREAS TO BE TREATED BY BIO-RETENTION FACILITIES (1 OF 2)

SHEET (24x36 ORIGINAL)

DA-1

SHEET 3 OF 6

DA#1: DRAINAGE AREA CALCULATIONS

Drainage areas are the total area of drainage for each culvert. These are calculated to help understand the potential volume of water that specific green infrastructure facilities may have to manage. Refer to the map on page 31.

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#1

NOTE: COMPUTATIONS ASSUME NO DISTURBANCE WITHIN THE DRIVE LANES.

Drainage Area #	Land Area (sf)	SWRv Req.(cf)	SWRv Req. (gal)	Depth (ft)	Void Ratio	Required Area (sf)
1	17,670	1,180	8,830	5	0.25	944
2	15,059	1,271	9,506	5	0.25	1,017
3	7,788	511	3,819	5	0.25	408
4	4,240	243	1,821	5	0.25	195
5	8,338	553	4,139	5	0.25	443
6	16,121	1,068	7,985	5	0.25	854
7	19,499	1,376	10,295	5	0.25	1,101
	88,716	6,203	46,395			4,962

Site Information

Is Site an "AWDZ Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches)	1.2
AWDZ only - Regulatory Rain Event for WQTv (inches)	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	7,118
Impervious Cover	0	10,553
BMP	0	0
Site Total	0	17,670

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	40%
% Impervious Cover	0%	60%
Site Rv	**0.00**	**0.67**

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	**0**	**1,180**
Stormwater Retention Volume, SWRv (gallons)	**0**	**8,830**
Water Quality Treatment Volume, WQTv (cubic feet)	**NA**	**NA**
Water Quality Treatment Volume, WQTv (gallons)	**NA**	**NA**

DA#2: DRAINAGE AREA CALCULATIONS

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#2

Site Information

Is Site an "AWDZ Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches)	1.2
AWDZ only - Regulatory Rain Event for WQTv (inches)	NA

Indicate Post-Development Land Cover

	Site Development	Public Right of Way
Cover Type	**Area (square feet)**	**Area (square feet)**
Natural Cover	0	0
Compacted Cover	0	8,751
Impervious Cover	0	11,074
BMP	0	0
Site Total	0	19,825

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	44%
% Impervious Cover	0%	56%
Site Rv	**0.00**	**0.64**

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	**0**	**1,271**
Stormwater Retention Volume, SWRv (gallons)	**0**	**9,506**
Water Quality Treatment Volume, WQTv (cubic feet)	**NA**	**NA**
Water Quality Treatment Volume, WQTv (gallons)	**NA**	**NA**

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#3

Site Information

Is Site an "AWDZ Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches)	1.2
AWDZ only - Regulatory Rain Event for WQTv (inches)	NA

Indicate Post-Development Land Cover

	Site Development	Public Right of Way
Cover Type	**Area (square feet)**	**Area (square feet)**
Natural Cover	0	0
Compacted Cover	0	3,275
Impervious Cover	0	4,513
BMP	0	0
Site Total	0	7,788

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	42%
% Impervious Cover	0%	58%
Site Rv	**0.00**	**0.66**

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	**0**	**511**
Stormwater Retention Volume, SWRv (gallons)	**0**	**3,819**
Water Quality Treatment Volume, WQTv (cubic feet)	**NA**	**NA**
Water Quality Treatment Volume, WQTv (gallons)	**NA**	**NA**

DA#4: DRAINAGE AREA CALCULATIONS

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#4

Site Information

Is Site an "AWDZ Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches)	1.2
AWDZ only - Regulatory Rain Event for WQTv (inches)	NA

Indicate Post-Development Land Cover

	Site Development	Public Right of Way
Cover Type	**Area (square feet)**	**Area (square feet)**
Natural Cover	0	0
Compacted Cover	0	2,277
Impervious Cover	0	1,963
BMP	0	0
Site Total	0	4,240

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	54%
% Impervious Cover	0%	46%
Site Rv	**0.00**	**0.57**

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	**0**	**243**
Stormwater Retention Volume, SWRv (gallons)	**0**	**1,821**
Water Quality Treatment Volume, WQTv (cubic feet)	**NA**	**NA**
Water Quality Treatment Volume, WQTv (gallons)	**NA**	**NA**

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#5

Site Information

Is Site an "AWDZ Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches)	1.2
AWDZ only - Regulatory Rain Event for WQTv (inches)	NA

Indicate Post-Development Land Cover

	Site Development	Public Right of Way
Cover Type	**Area (square feet)**	**Area (square feet)**
Natural Cover	0	0
Compacted Cover	0	3,411
Impervious Cover	0	4,927
BMP	0	0
Site Total	0	8,338

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	41%
% Impervious Cover	0%	59%
Site Rv	**0.00**	**0.66**

Rv Coefficients

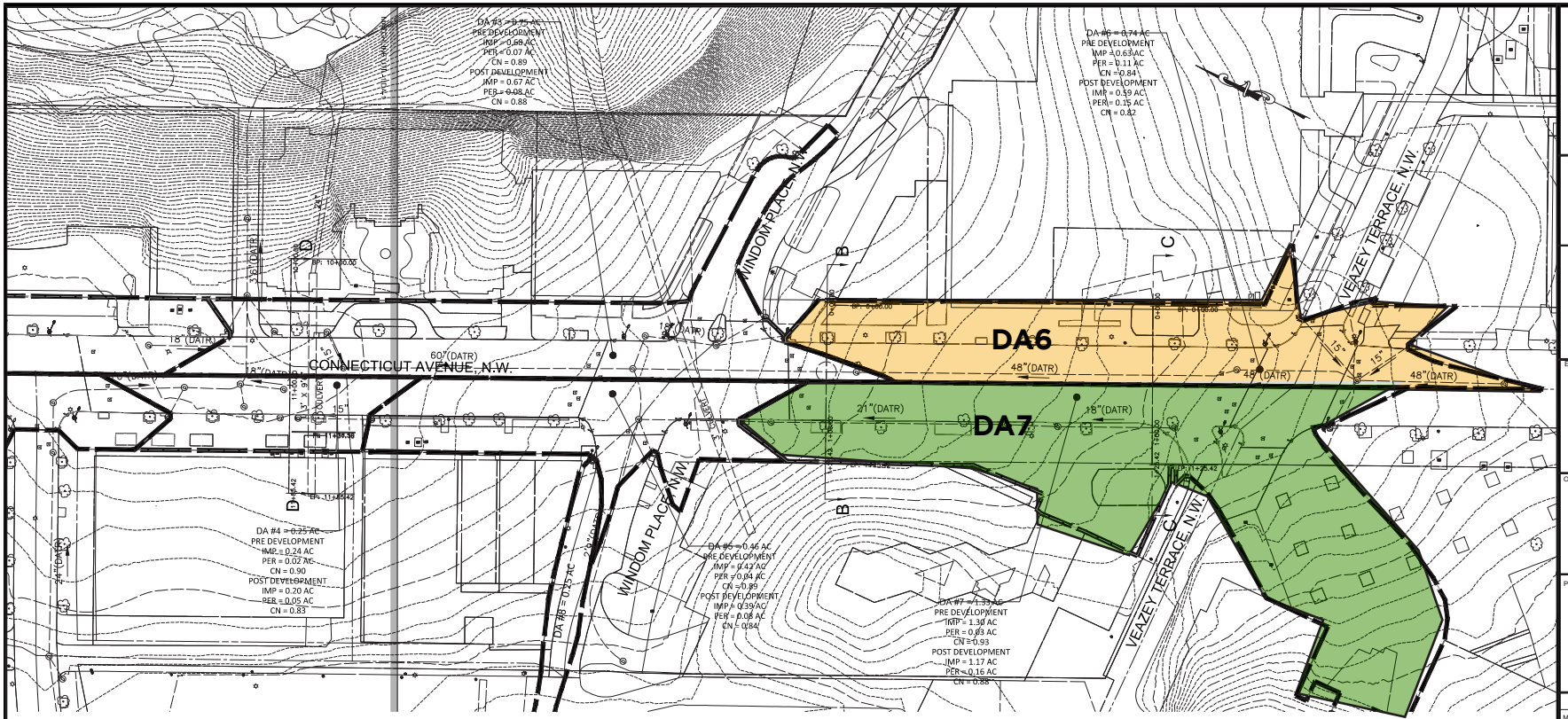
Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	**0**	**553**
Stormwater Retention Volume, SWRv (gallons)	**0**	**4,139**
Water Quality Treatment Volume, WQTv (cubic feet)	**NA**	**NA**
Water Quality Treatment Volume, WQTv (gallons)	**NA**	**NA**

DRAINAGE AREA TREATMENT BY BIORETENTION FACILITIES

YUMA STREET TO VEAZEY TERRACE



LEGEND:

- UNDERGROUND SANITARY SEWER LINE (DATR)
- UNDERGROUND STORM DRAIN LINE (DATR)
- W — UNDERGROUND WATER LINE (DATR)
- COMM — UNDERGROUND COMMUNICATION LINE (DATR)
- UGE — UNDERGOUND ELECTRIC LINE (DATR)
- G — UNDERGROUND GAS LINE (DATR)
- (DATR) DATA ACCORDING TO RECORDS
- WATER MANHOLE
- FIRE HYDRANT
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- GAS METER
- DRAINAGE DIVIDE
- PAVEMENT (IMPER)
- SIDEWALK (IMPER)
- BUILDING (IMPER)
- VEGETATION (PER)

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

NOTE: ALL INFORMATION, INCLUDING HORIZONTAL AND VERTICAL UTILITY INFORMATION DATA ACCORDING TO RECORD AND SHOULD NOT BE USED FOR FINAL DESIGN UNTIL FIELD VERIFIED.

CONNECTICUT AVENUE PLAN VIEW FROM YUMA STREET, NW TO VEAZEY TERRACE, NW

NOTE: COMPUTATIONS ASSUME NO DISTURBANCE WITHIN THE DRIVE LANES.

Drainage Area #	Land Area (sf)	SWRv Req. (cf)	SWRv Req. (gal)	Depth (ft)	Void Ratio	Required Area (sf)
1	17,670	1,180	8,830	5	0.25	944
2	15,059	1,271	9,506	5	0.25	1,017
3	7,788	511	3,819	5	0.25	408
4	4,240	243	1,821	5	0.25	195
5	8,338	553	4,139	5	0.25	443
6	16,121	1,068	7,985	5	0.25	854
7	19,499	1,376	10,295	5	0.25	1,101
	88,716	6,203	46,395			4,962

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#3

Site Information

Is Site an "AWQC Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
AWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	3,477
Impervious Cover	6,439	4,921
SWF	0	0
Site Total	6,439	8,398

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	41%
% Impervious Cover	100%	59%
Site Rv	0.95	0.86

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	511	853
Stormwater Retention Volume, SWRv (gallons)	3,819	6,139
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#4

Site Information

Is Site an "AWQC Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
AWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	2,272
Impervious Cover	0	19,196
SWF	0	0
Site Total	0	19,471

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	12%
% Impervious Cover	0%	88%
Site Rv	0.95	0.85

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	1,850	0
Stormwater Retention Volume, SWRv (gallons)	13,838	0
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#5

Site Information

Is Site an "AWQC Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
AWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	3,411
Impervious Cover	4,939	4,921
SWF	0	0
Site Total	4,939	8,332

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	41%
% Impervious Cover	100%	59%
Site Rv	0.95	0.86

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	553	853
Stormwater Retention Volume, SWRv (gallons)	4,139	6,139
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#6

Site Information

Is Site an "AWQC Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
AWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	6,630
Impervious Cover	9,439	6,691
SWF	0	0
Site Total	9,439	13,321

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	50%
% Impervious Cover	100%	50%
Site Rv	0.95	0.88

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	1,068	1,188
Stormwater Retention Volume, SWRv (gallons)	7,985	8,885
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#7

Site Information

Is Site an "AWQC Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches):	1.2
AWQC only - Regulatory Rain Event for WQTv (inches):	NA

Indicate Post-Development Land Cover

Cover Type	Site Development Area (square feet)	Public Right of Way Area (square feet)
Natural Cover	0	0
Compacted Cover	0	6,630
Impervious Cover	9,439	6,691
SWF	0	0
Site Total	9,439	13,321

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	50%
% Impervious Cover	100%	50%
Site Rv	0.95	0.88

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	1,376	1,188
Stormwater Retention Volume, SWRv (gallons)	10,295	8,885
Water Quality Treatment Volume, WQTv (cubic feet)	NA	NA
Water Quality Treatment Volume, WQTv (gallons)	NA	NA

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WASHINGTON, DC 20009

PROJECT TITLE

VAN NESS / CONNECTICUT AVENUE
GREEN INFRASTRUCTURE / PAVEMENT REMOVAL
WASHINGTON, DC 20011

REVISIONS

MARK	DATE	DESCRIPTION

AMT FILE NO. 114-637.001
DATE: 03/30/2015
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SHEET TITLE

EXISTING DRAINAGE AREAS TO BE TREATED BY BIO-RETENTION FACILITIES (2 OF 2)

SHEET (24x36 ORIGINAL)

DA-2

SHEET 4 OF 6

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#6

Site Information

Is Site an "AWDZ Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches)	1.2
AWDZ only - Regulatory Rain Event for WQTv (inches)	NA

Indicate Post-Development Land Cover

	Site Development	Public Right of Way
Cover Type	**Area (square feet)**	**Area (square feet)**
Natural Cover	0	0
Compacted Cover	0	6,629
Impervious Cover	0	9,493
BMP	0	0
Site Total	0	16,121

Land Cover Summary

	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	41%
% Impervious Cover	0%	59%
Site Rv	**0.00**	**0.66**

Rv Coefficients

Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	**0**	**1,068**
Stormwater Retention Volume, SWRv (gallons)	**0**	**7,985**
Water Quality Treatment Volume, WQTv (cubic feet)	**NA**	**NA**
Water Quality Treatment Volume, WQTv (gallons)	**NA**	**NA**

DA#7: DRAINAGE AREA CALCULATIONS

District of Columbia General Retention Compliance Calculator

data input cells
calculation cells
constant values

Site Data

Site Name: Connecticut Avenue, NW / Forest Hills Pavement Removal - Prelim SWRv - DA#7

Site Information

Is Site an "AWDZ Site"?	No
Is Site Located in the MS4?	No
What Type of Activity is Site Undergoing?	Major Land Disturbing
Regulatory Rain Event for SWRv (inches)	1.2
AWDZ only - Regulatory Rain Event for WQTv (inches)	NA

Indicate Post-Development Land Cover

	Site Development	Public Right of Way
Cover Type	**Area (square feet)**	**Area (square feet)**
Natural Cover	0	0
Compacted Cover	0	6,801
Impervious Cover	0	12,699
BMP	0	0
Site Total	0	19,499

Land Cover Summary

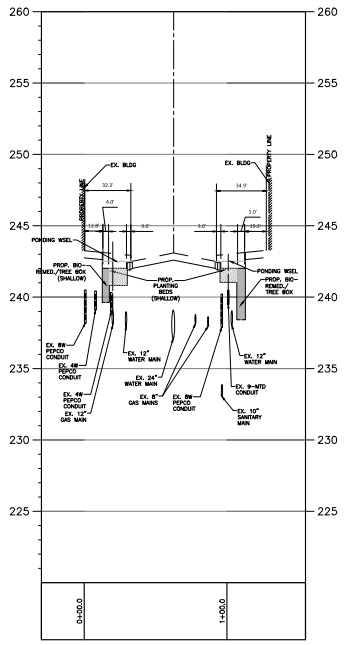
	Site Development	Public Right of Way
% Natural Cover	0%	0%
% Compacted Cover	0%	35%
% Impervious Cover	0%	65%
Site Rv	**0.00**	**0.71**

Rv Coefficients

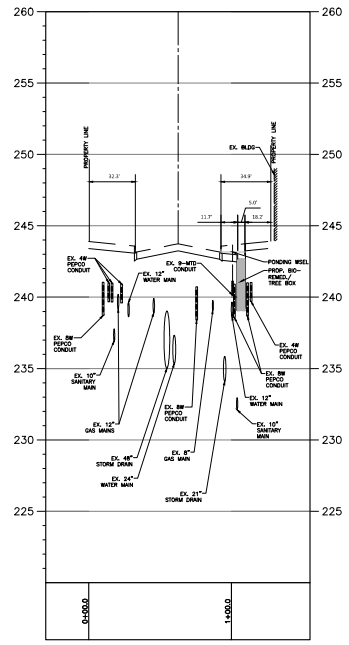
Land Cover Type	Rv
Natural Cover	0.00
Compacted Cover	0.25
Impervious Cover	0.95

SWRv and WQTv Summary

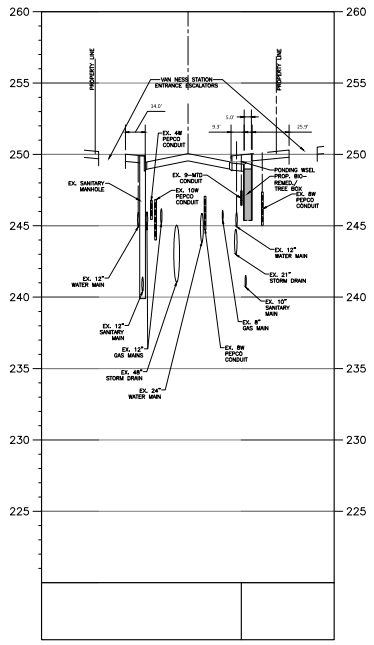
	Site Development	Public Right of Way
Stormwater Retention Volume, SWRv (cubic feet)	**0**	**1,376**
Stormwater Retention Volume, SWRv (gallons)	**0**	**10,295**
Water Quality Treatment Volume, WQTv (cubic feet)	**NA**	**NA**
Water Quality Treatment Volume, WQTv (gallons)	**NA**	**NA**



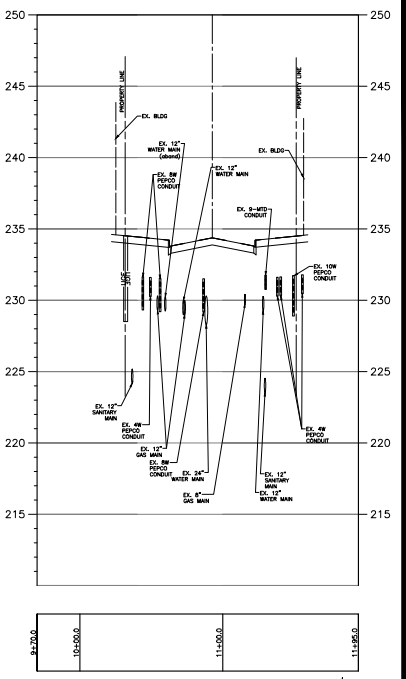
SECTION A-A ELEVATION



SECTION B-B ELEVATION



SECTION C-C ELEVATION

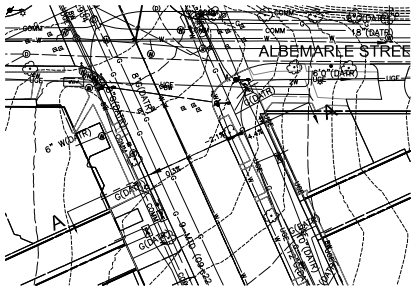


SECTION D-D ELEVATION

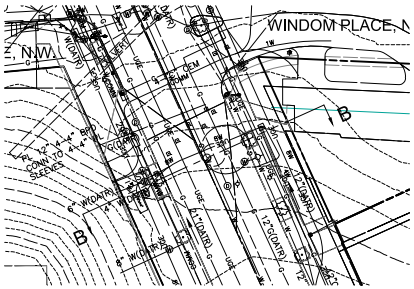
10:1 (V:H) EXAGGERATION

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.



SECTION A-A PLAN



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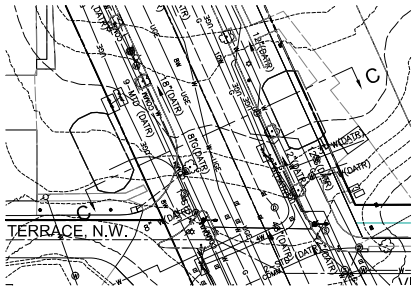

SECTION C-C PLAN

SECTION D-D PLAN

NOTE: ALL INFORMATION, INCLUDING HORIZONTAL AND VERTICAL UTILITY INFORMATION DATA ACCORDING TO RECORD AND SHOULD NOT BE USED FOR FINAL DESIGN UNTIL FIELD VERIFIED.

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PROJECT TITLE

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GREEN INFRASTRUCTURE / PAVEMENT REMOVAL
WASHINGTON, DC 20011

REVISIONS

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SHEET TITLE

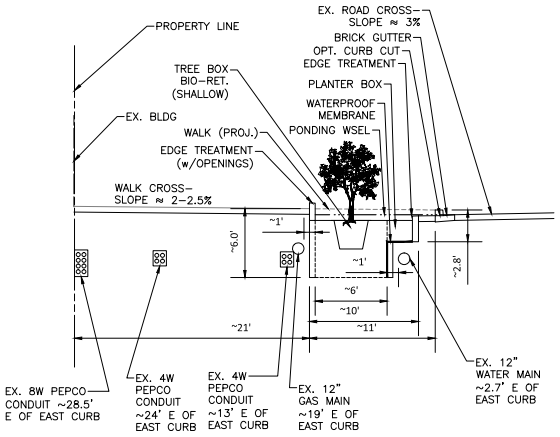
CROSS-SECTIONS FOR BIO-RETENTION TREE-BOXES

SHEET (24x36 ORIGINAL)

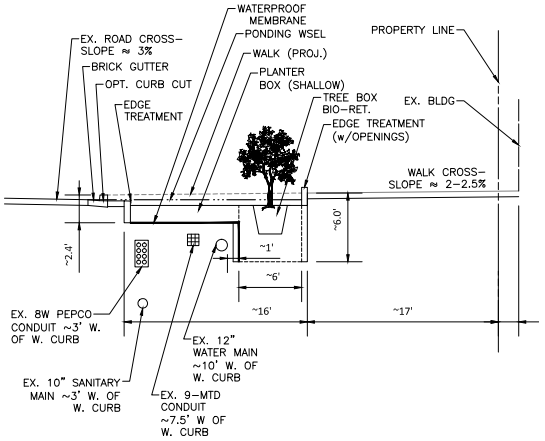
XSECT-1

SHEET 5 OF 6

SECTIONS



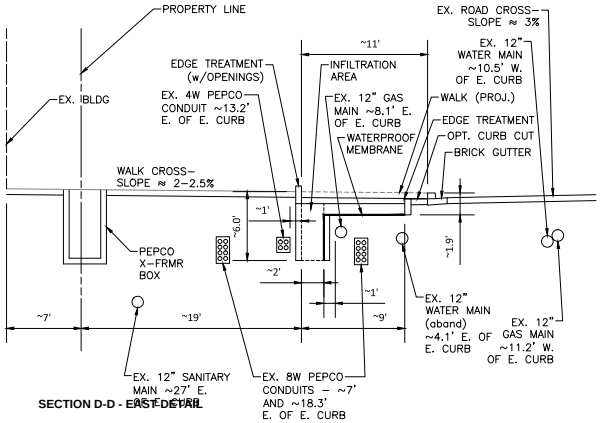
SECTION A-A - EAST DETAIL



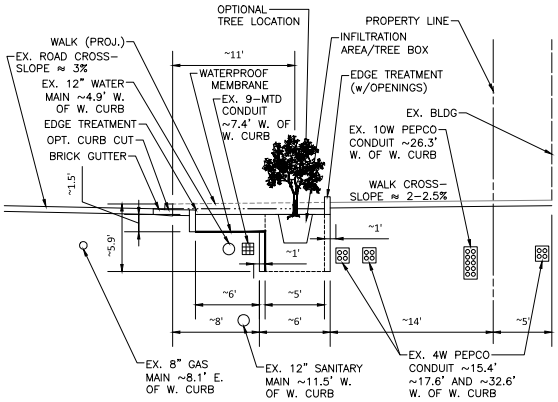
SECTION A-A - WEST DETAIL

GRAPHIC SCALE

(IN FEET)
1 inch = 5 ft.



SECTION D-D - EAST DETAIL



SECTION D-D - WEST DETAIL

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SHEET TITLE

DETAILED CROSS-SECTION INFORMATION

SHEET (24x36 ORIGINAL)

XSECT-2

SHEET 6 OF 6

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