

Green Area Ratio (GAR): Background, Administration & Process



Photo credit: Oculus, Inc.

Upcoming Trainings

- **Green Area Ratio**
 - Wednesday, July 25, 2018
- **Stormwater– General Compliance**
 - Wednesday, June 13, 2018
- **Using the Stormwater Database**
 - Friday, April 27, 2018
 - Tuesday, June 19, 2018
 - Thursday, July 26, 2018
- **Stormwater Retention Credit (SRC) Generation**
 - Thursday, April 26, 2018
 - Thursday, June 14, 2018
 - Friday, July 27, 2018
- **SRC Financial Return Calculator**
 - Thursday, June 7, 2018
- **Specialized BMP Design and Maintenance**
 - Permeable Pavement: Thursday, May 3, 2018

Agenda

- About GAR
- Zoning Regulations Review
- Related Regulations
- Regulatory Triggers
- Administrative Process
- GAR Plan Development
- Permitting Process
- Landscape Elements & Submission Requirements
- Examples

ABOUT GAR

Green Area Ratio

What is it?

- A flexible green site design requirement established in 2013 that varies by zone.



Menu items may include...

- Permeable pavement
- Vegetated roofs
- Native ground cover
- Rain gardens
- Trees & shrubs
- Green facades



GAR: How does it work?

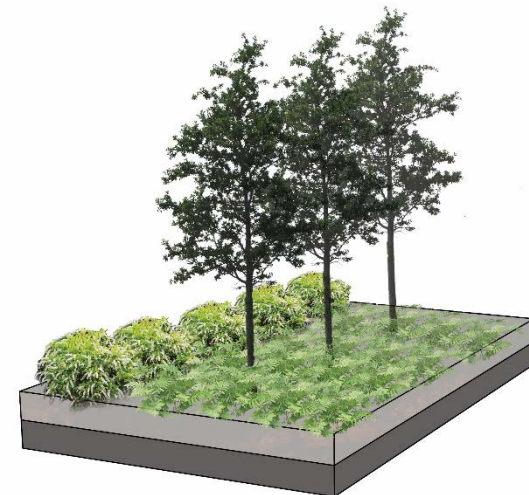
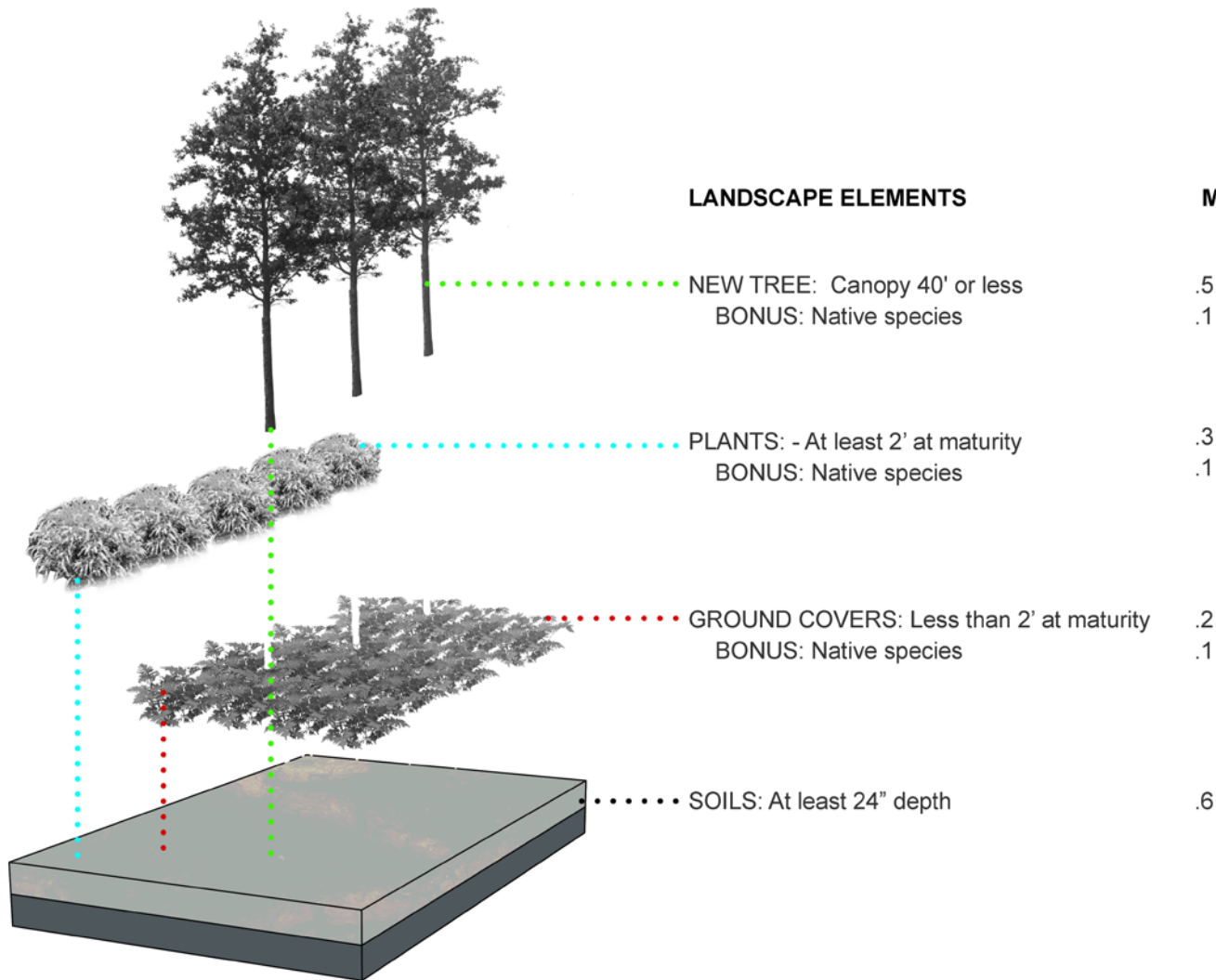
How to calculate:

- Add up landscape elements by number or size
 - # trees
 - Size of green roof
 - Size of rain garden
 - # of plants
 - Soil depths
- Divide by lot area
- = GAR score

$$\text{GAR} = \frac{(\text{area of landscape element 1} \times \text{multiplier}) + (\text{area of landscape element 2} \times \text{multiplier}) + \dots}{\text{Lot Area}}$$



Stackable Elements



GAR LANDSCAPE ELEMENTS

MULTIPLIER

Landscaped area (select one of the following for each area)

Landscaped areas with a soil depth of less than 24"	0.3
Landscaped areas with a soil depth of 24" or more	0.6
Bioretention facilities	0.4

Plantings

Ground covers, or other plants less than 2' tall at maturity	0.2
Plants at least 2' tall at maturity	0.3
Tree canopy for all new trees with mature canopy spread of 40' or less	0.5
Tree canopy for all new trees with mature canopy spread of 40' or greater	0.6
Tree canopy for preservation of existing trees 6" to 24" in diameter	0.7
Tree canopy for preservation of existing trees 24" diameter or larger	0.8
Vegetated wall, plantings on a vertical surface	0.6

Vegetated roofs

Extensive vegetated roof over at least 2" but less than 8" of growth medium	0.6
Intensive vegetated roof over at least 8" of growth medium	0.8

Permeable paving

Permeable paving over at least 6" and less than 2' of soil or gravel	0.4
Permeable paving over at least 2' of soil or gravel	0.5

Other

Enhanced tree growth systems	0.4
Renewable energy generation (area of)	0.5
Water features (using at least 50% recycled water)	0.2

Bonuses

Native plant species	0.1
Landscaping in food cultivation	0.1
Harvested stormwater irrigation	0.1

ZRR and Changes to GAR

- Zoning Regulations Review passed January 2016
- GAR regulation revisions became effective **September 6, 2016** for building permit applications submitted after this date or as otherwise noted in regulation
- For additional information on transition:
<http://dcoz.dc.gov>

RELATED REGULATIONS

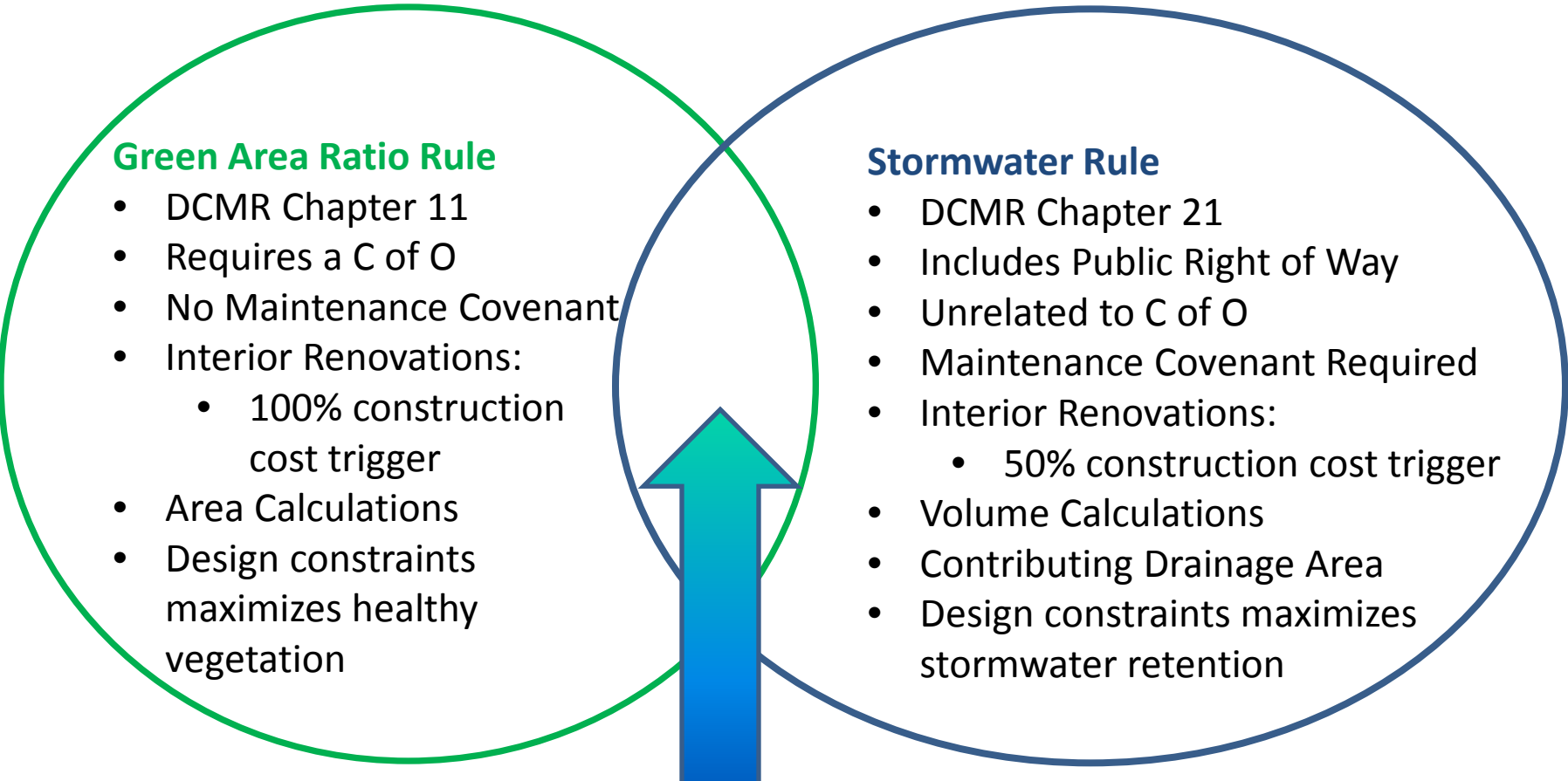
GAR & Stormwater Overlap

Green Area Ratio Rule

- DCMR Chapter 11
- Requires a C of O
- No Maintenance Covenant
- Interior Renovations:
 - 100% construction cost trigger
- Area Calculations
- Design constraints maximizes healthy vegetation

Stormwater Rule

- DCMR Chapter 21
- Includes Public Right of Way
- Unrelated to C of O
- Maintenance Covenant Required
- Interior Renovations:
 - 50% construction cost trigger
- Volume Calculations
- Contributing Drainage Area
- Design constraints maximizes stormwater retention



Overlap: to achieve stormwater environmental benefits
Landscape Elements often the same practices as LID BMPs

SWM BMPs vs Landscape Elements

Stormwater Best Management Practices	Landscape Elements
Bioretention	Only considers practice area
Vegetated Roofs (green roofs)	Assigns greater value based on depth
Permeable Paving	Only considers practice area
Rainwater Harvesting	Limited to irrigation
Tree Canopy (new and preserved)	Higher value, more variability
Land abstraction not a BMP	Ground cover plantings
May improve BMP or land abstraction	Soil depth for landscaping
Is it receiving stormwater runoff?	Green Walls
Is it receiving stormwater runoff?	Enhanced tree growth systems
Suggested not required	Native planting rewarded in scoring
Not considered	Food cultivation
Not consider unless a harvest demand	Water feature
Not considered	Renewable energy

Related Zoning Requirements

Pervious surface requirements

Landscaping for parking lots



Pervious Surface Requirements

- In zones R-1 through R-4
- Applies when increasing existing lot occupancy by 10%+ or 25%+ for historic structures
- Pervious = grass; mulched groundcover; plants; trees; permeable pavers; and decks or porches

ZONE DISTRICT AND STRUCTURE	MINIMUM PERCENTAGE OF PERVIOUS SURFACE
R-1 through R-4 Public recreation and community centers	30%
R-1-A, R-1-B All other structures	50%
R-2 All other structures	30%
R-3 All other structures	20%

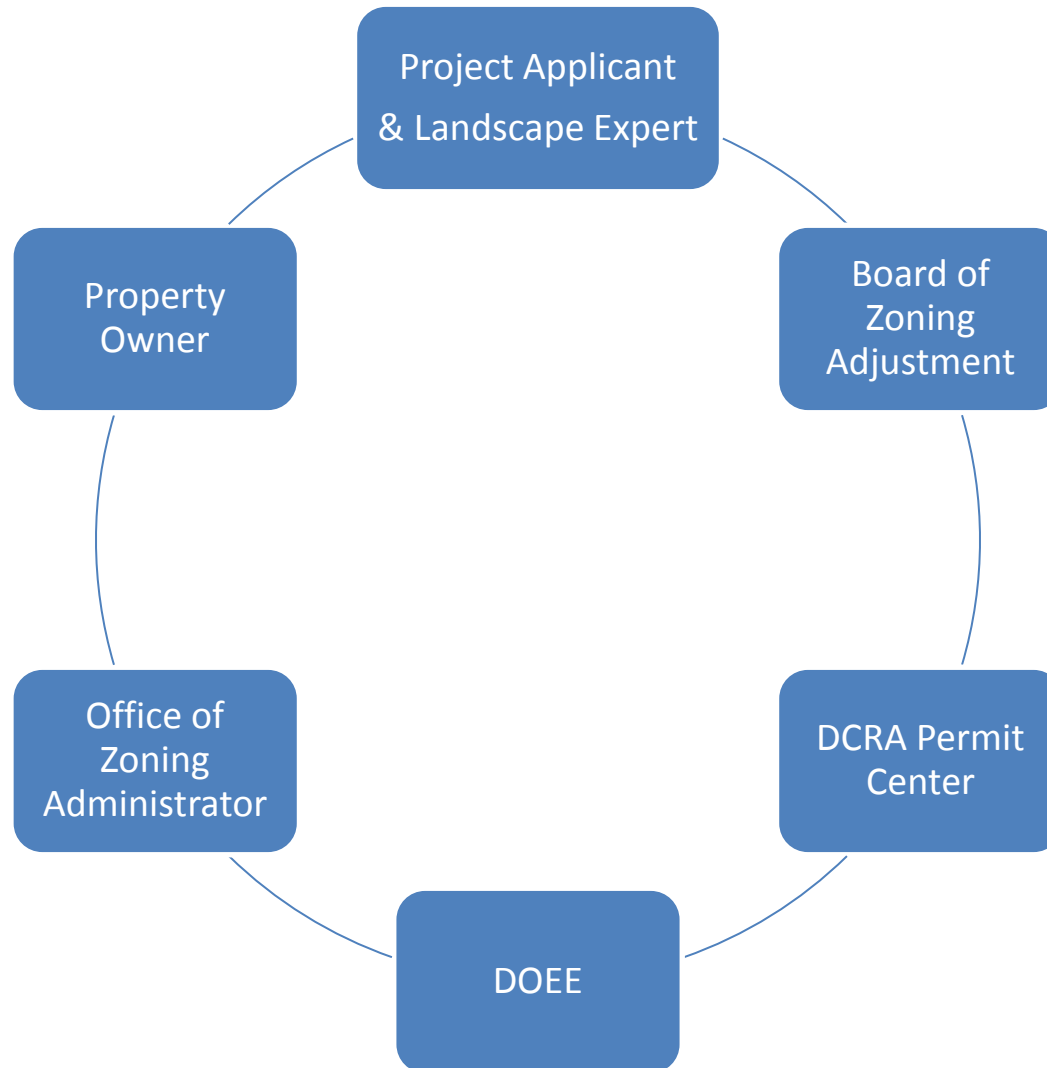
Landscaping for Surface Parking

- Minimum 10% of lot landscaped
- Landscape end islands of 9+ spaces
- Trees must be min. 2.5" DBH at planting
- Plant 4' from protective barriers
- Special exceptions if impracticable



REGULATION TRIGGERS & ADMINISTRATIVE PROCESS

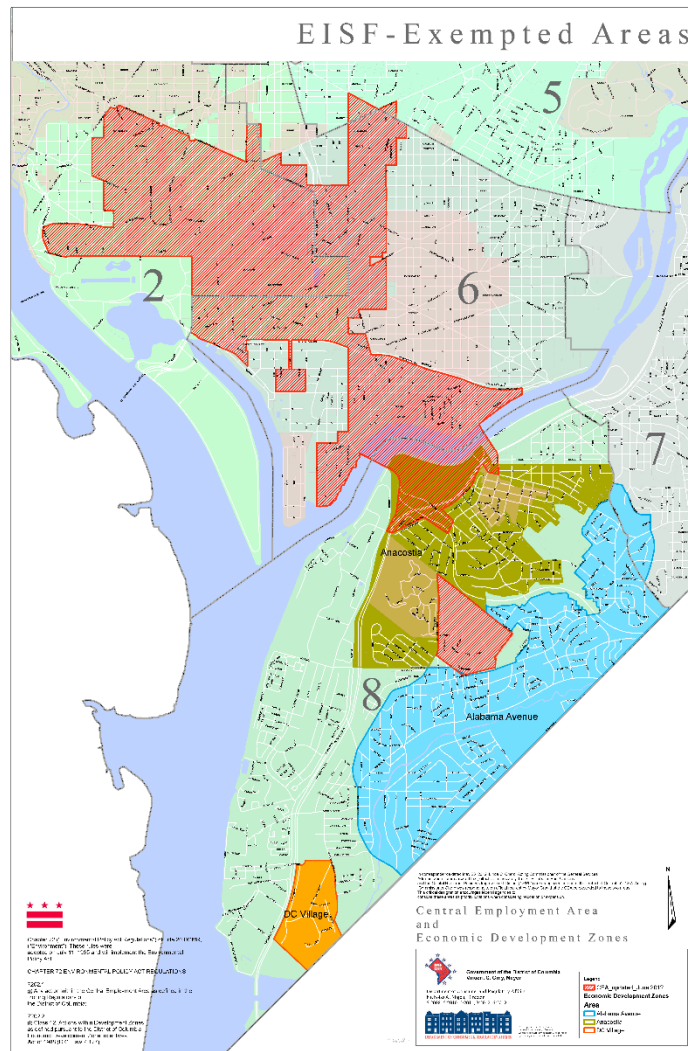
Involved Parties



Who does not have a GAR?

- Buildings that do not require a Certificate of Occupancy,
 - Single family residences
- Properties within R-, RF-, USN, STE, HE, WR-1, & WR-6
- DC Water wastewater treatment facilities.
- Interior renovations of existing buildings when
 - Located within the Central Employment Area,
 - 100 percent lot occupancy,
 - Existing roof not capable of supporting vegetated system,
and
 - Proposed work does not result in a roof capable of supporting vegetated roof.
- Buildings or structures deemed “historic resources”,
 - Except when additions increase the gross floor area by 50 percent.

Who does not have a GAR?



Exemption Form

<https://doee.dc.gov/node/619622>

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF CONSUMER REGULATORY AFFAIRS



APPLICATION FOR EXEMPTION STATUS
FROM D.C. ZONING REGULATION GREEN AREA RATIO

[APPLICANT TO FILL OUT]

I hereby request evidence of exemption from the Green Area Ratio (GAR) Subtitle C Chapter 6 of DCMR Title 11 for the proposed construction on the property identified below.

Address: _____

Square: _____ Lot: _____ Permit Number: _____

Allowable Exemptions (CHECK ONE):		Required Signatures
☐	Single dwelling unit (Subtitle A §302.2); buildings otherwise not requiring a certificate of occupancy (Subtitle C §601.3).	OZA
☐	Any property within a R-, RF-, USN, STE, HE, WR-1, and WR-6 Districts (Subtitle C §601.2).	OZA
☐	Municipal wastewater treatment facilities operated by DC Water and Sewer Authority (Subtitle C §601.3(b)).	DC Water and OZA
☐	Building(s) or structure(s) certified by the DC Inventory of Historic Sites, or State Historic Preservation Officer, as "historic resource(s)", additions increase the gross floor area by less than 50 percent (Subtitle C §601.3(d), §601.7).	Historic and OZA
☐	Additions, interior renovations, or both are less than 100 percent of the assessed building value as set forth in the records of the Office of Tax and Revenue as of the date of the building permit application (Subtitle C §601.3).	OZA
☐	Interior Renovations: (a) Central Employment Area, (b) 100 percent lot occupancy, (c) existing roof not capable of supporting vegetated system, and (d) proposed work does not result in a roof capable of supporting vegetated roof. (Note: all four conditions are required for this exemption), (Subtitle C §601.3).	Structural and OZA

Applicant Name: _____ Address: _____

Signature: _____ Date: _____ Phone: _____

[FOR DCRA USE ONLY]

DCRA STRUCTURAL

☐

- I find there is sufficient evidence the existing roof for the property is NOT capable of supporting a vegetated system.
I find there is sufficient evidence the proposed work will NOT result in a roof capable of supporting a vegetated system.

This review does not constitute an interpretation of zoning or building codes and does not entitle the applicant to any relief not authorized by zoning or building code officials pursuant to the applicable codes.

Signature: _____ Printed Name: _____ Date: _____

STATE HISTORIC PRESERVATION OFFICER

I hereby certify that this property is either a historic landmark or a building or structure contributing to the character of a historic district listed in the D.C. Inventory of Historic Sites. *This certification does not constitute an interpretation of zoning or building codes and does not entitle the applicant to any relief not authorized by zoning or building code officials pursuant to the applicable codes.*

Signature: _____ Printed Name: _____ Date: _____

OFFICE OF ZONING ADMINISTRATOR ONLY [Exemption Categories—Subtitle C §601]

☐
☐
☐
☐
☐

- Single dwelling unit or buildings otherwise not requiring a certificate of occupancy
R and RF zoning district
Municipal wastewater treatment facilities operated by DC WASA
Central Employment Area zoning district
Additions will NOT result in an increase to the gross floor area by more than 50 percent (Historic Site)
Additions, and/or interior renovations will NOT exceed 100 percent of the assessed building value

Signature: _____ Printed Name: _____ Date: _____

DC WATER AND SEWER AUTHORITY OFFICER

I hereby certify that this property is a municipal wastewater treatment facility operated by DC Water & Sewer Authority. *This certification does not constitute an interpretation of zoning or building codes and does not entitle the applicant to any relief not authorized by zoning or building code officials pursuant to the applicable codes.*

Signature: _____ Printed Name: _____ Date: _____

Transition Period: No GAR

- **Building Permit Filed prior to October 1, 2013,**
 - DCRA officially accepted as being complete.
- **Building Permit Filed on or after October 1, 2013,**
 - Unexpired approval, provided the vote to approve occurred prior to October 1, 2013,
 - *A first stage, second stage, or consolidated planned unit development,*
 - *A variance, special exception, design review under the CG or SEFC overlay, or*
 - *A concept design by the Historic Preservation Review Board or Commission of Fine Arts.*

Transition Period: No GAR

- **Building Permit Filed on or after October 1, 2013,**
 - Unexpired approval granted after October 1, 2013, provided a public hearing occurred prior to October 1, 2013,
 - *A variance, special exception, or design review under the CG or SEFC overlay.*
 - Unexpired approval granted after October 1, 2013, provided a set down for a public hearing occurred prior to October 1, 2013,
 - *A first stage, second stage, or consolidated planned unit development.*

Exemption Form

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF CONSUMER REGULATORY AFFAIRS



APPLICATION FOR EXEMPTION STATUS
FROM D.C. ZONING REGULATION GREEN AREA RATIO
BASED ON TRANSITION PERIOD FILING STATUS

I hereby request evidence of a transition period exemption from the Green Area Ratio (GAR) Subtitle C, Chapter 6 of DCMR Title 11 for the proposed construction on the property identified below.

Address: _____

Square: _____ Lot: _____ Building Permit #: _____

Allowable Transition Period Exemptions (CHECK ONE):

☐	Building Permit filed prior to October 1 st , 2013.
☐	Unexpired approval of a first stage, second stage, or consolidated planned unit development (PUD) when vote to approve occurred before October 1 st , 2013.
☐	Unexpired approval of a variance, special exception, design review under the CG or SEFC overlay when vote to approve occurred before October 1 st , 2013.
☐	Unexpired approval of a concept design by the Historic Preservation Review Board or Commission of Fine Arts when vote to approve occurred before October 1 st , 2013.
☐	Unexpired approval of a variance, special exception, design review under the CG or SEFC overlay when a public hearing occurred before October 1 st , 2013.
☐	Unexpired approval of a first stage, second stage, or consolidated planned unit development (PUD) when public hearing occurred before October 1 st , 2013.
☐	Property is not exempt from GAR. The applicable zone is _____, and the minimum required score is _____. The lot area is _____ square feet.

NOTE: When impervious surface or lot occupancy is increased by 20 percent or more, that increase is not covered under this exemption. The GAR is applied to the modification.

Applicant _____ Telephone _____

Address _____

Signature _____ Date _____

ZONING OFFICE USE ONLY

- ☐ Building Permit submitted prior 10/01/2013.
☐ PUD vote prior 10/01/2013.
☐ PUD with public hearing prior 10/01/2013.
☐ Variance, special exception, or design review under the CG or SEFC overlay vote prior 10/01/2013.
☐ Variance, special exception, or design review under the CG or SEFC public hearing prior 10/01/2013.
☐ Historic Preservation Review Board or Commission of Fine Arts vote prior 10/01/2013.
☐ Property is not exempt from GAR. The applicable zone is _____, and the minimum required score is _____. The lot area is _____ square feet.

Office of Zoning Administrator _____ Date _____

Transition Period: Reduced GAR

- **Building Permit Filed on or after October 1, 2013 but no later than July 14, 2014,**
 - A Large Tract Review (LTR) completed prior to July 1, 2012,
 - Application consistent with conditions of LTR,
 - GAR equals 0.1 or greater,
 - independent of zone district.

Campus Plan

- **College or university proposing new building or addition to existing building**
 - Demonstrates the extent to which GAR is met
 - Reviewed by the Zoning Commission

Reduced GAR

- A special exception from the Board of Zoning Adjustment (BZA) may be granted if the application meets sustainability goals through means outside the scope of the GAR.
- Full or partial reduction in GAR score requirement
- Upload BZA Order with reduced GAR requirements to the stormwater database
- 6 month process

Who has a GAR?

- **All New Buildings** that require a Certificate of Occupancy (C of O).
 - Submit during the Foundation-to-Grade (FD) or Civil (BCIV) permit application
- **Additions and Interior Renovations** to existing buildings,
 - When the construction cost exceeds 100% of the assessed building value within any 12 month period.
 - A “historic resource” with a 50 percent (or more) increase to the gross floor area.
 - Submit during the Building (B) permit application

GAR Required by Zone District: Effective September 6, 2016

Zone District	Green Area Ratio
RA-1, RA-2, RA-6, RA-7, RA-8 RC-1; WR-2, WR-3, WR-4, WR-5, WR-7, WR-8	0.40
RA-3, RA-4, RA-5, RA-9, RA-10 MU-1, MU-2, MU-3, MU-4, MU-5, MU-6, MU-12, MU-13, MU-14, MU-15, MU-16, MU-17, MU-18, MU-19, MU-23, MU-24, MU-25, MU-26, MU-27, NC-1, NC-2, NC-3, NC-4, NC-5, NC-7, NC-9, NC-10, NC-11, NC-14, NC-16, NC-17 SEFC-2, SEFC-3, CG-1, CG-2, RC-2, RC-3 ARTS-1, ARTS-2, D-2, CG-5	0.30
MU-7, MU-8, MU-28 NC-6, NC-8, NC-12, NC-13, NC-15, ARTS-3	0.25
MU-9, MU-10, MU-20, MU-21, MU-22, MU-29 D-3, D-4, D-5, D-1-R, D-4-R, D-5-R, D-6, D-6-R, D-7, D-8 SEFC-1, CG-4, ARTS-4, CG-3	0.20
PDR (all lots unless otherwise noted):	0.30
• Lot with principal building that is one (1) story in height	0.10
• Lot with principal building that is two (2) stories in height	0.20

Helpful reference for property summary: propertyquest.dc.gov/

PQ	1200 first st ne
Basic Information	
1200 1ST STREET NE	
SSL (Square, Suffix & Lot)	0672 0856
Lot type	tax lot
Ward	Ward 6
ANC	ANC 6C
SMD	SMD 6C06
Neighborhood Cluster	Cluster 25
Police District	Fifth Police District
Police Service Area	PSA 501
Voting Precinct	Precinct 83
Zoning	D-5
Downtown subarea	Noma
2010 census tract	106
2010 census block group	2
2010 census block	2023
No historic resources noted.	

Ownership and Taxes	
Tax lot	0672 0856
Premises	1200 1ST ST NE
Owner	VEF-VN CAPITOL PLAZA I LLC
	5530 WISCONSIN AVE STE 1000
	CHEVY CHASE, MD 20815-4330
Use	Commercial-Office-Large
Land area	34405 square feet
Tax class	Commercial, industrial
Tax rate	n/a
Current assessment (2016)	
land	\$16,101,540
improvements	\$147,076,840
total	\$163,178,380
Proposed assessment (2017)	
land	\$16,101,540
improvements	\$136,528,090
total	\$152,629,630

Definitions...

- ***Addition and interior renovation*** of existing building structure
 - Extension or increase in floor area or height.
 - Alteration, renovation or repair to the interior of the existing structure.
- ***Assessed value*** of the building, not including the land value
 - Office of Tax and Revenue records.
 - Date of the building permit application.
- ***Construction cost*** for an addition, alteration, or repair
 - Amount indicated by the applicant in the building permit application (Contract Agreement Form).
- ***Historic resource*** is a building or structure,
 - Certified by the DC Inventory of Historic Sites or State Historic Preservation Officer .

GAR Plan Development

GAR Plan Development

- **Do you know the project boundaries?**
- Have you hired a Landscape Expert?
- Do you know the score for your zone?
- Design considerations,
 - Stormwater obligations.
 - Energy goals.
 - Green building standards.

GAR Plan Development: Project Boundaries

- Based on the property's **Record Lot** boundary
 - If separated into tax lots, show how the whole record lot and each tax lot comply with GAR
- Multiple/phased lots within one permit
 - Each lot must meet its GAR score
 - Checklist sign-off occurs at each phase completion
- Multiple zones in one lot
 - Each zone must meet score, but whole lot may be used
 - Confirmed by OZA
- Lots with historic structures
 - The addition exceeds 50% of the existing gross floor area
 - The historic structure's footprint is excluded from lot area

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ANC	ANC 6C
SMD	SMD 6C06
Neighborhood Cluster	Cluster 25
Police District	Fifth Police District
Police Service Area	PSA 501
Voting Precinct	Precinct 83
Zoning	D-5
Downtown subarea	NoMa
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No historic resources noted.	

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- Do you know the project boundaries?
- **Have you hired a Landscape Expert?**
- Do you know the score for your zone?
- Design considerations,
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GAR Plan Development:

Who is a Landscape Expert?

- **Certified Landscape Expert is:**
 - Maryland or Virginia Licensed Landscape Architect
 - International Society of Arboriculture (ISA)
Certified Arborist
 - Maryland Certified Professional Horticulturist
 - Landscape Contractors Assoc. MD-DC-VA certified
Landscape Technician

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MU-7, MU-8, MU-28 NC-6, NC-8, NC-12, NC-13, NC-15, ARTS-3	0.25
MU-9, MU-10, MU-20, MU-21, MU-22, MU-29 D-3, D-4 , D-5, D-1-R, D-4-R, D-5-R, D-6, D-6-R, D-7, D-8 SEFC-1, CG-4, ARTS-4, CG-3	0.20
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Development Standards								
	Floor Area Ratio (max.) ^{1, 2}	Height (ft.) ²	Penthouse Height (ft.)/Stories	Lot Occupancy (percentage) ³	Rear Setback (ft.)	Side Setback (ft.)	Green Area Ratio	Zoning Regulation Reference
D-5	None	130 (fronts on right-of-way of at least 110 ft.)	20	100	2.5 in. per 1 ft. of vertical distance from the mean finished grade at the middle of the rear of the structure to the highest point of the main roof or parapet, but not less than 12 ft.	If provided, at least 2 in. wide for each 1 ft. of height of building but no less than 5 ft.	0.20	Subtitle I, Chapter 5
		120 (fronts on right-of-way of at least 100 ft. but less than 130 ft.)	1 plus mezzanine; Second story permitted for penthouse mechanical space					
	110 (fronts on right-of-way of at least 90 ft. but less than 120 ft.)							
	90 (historic landmark or contributing building within a historic district)							

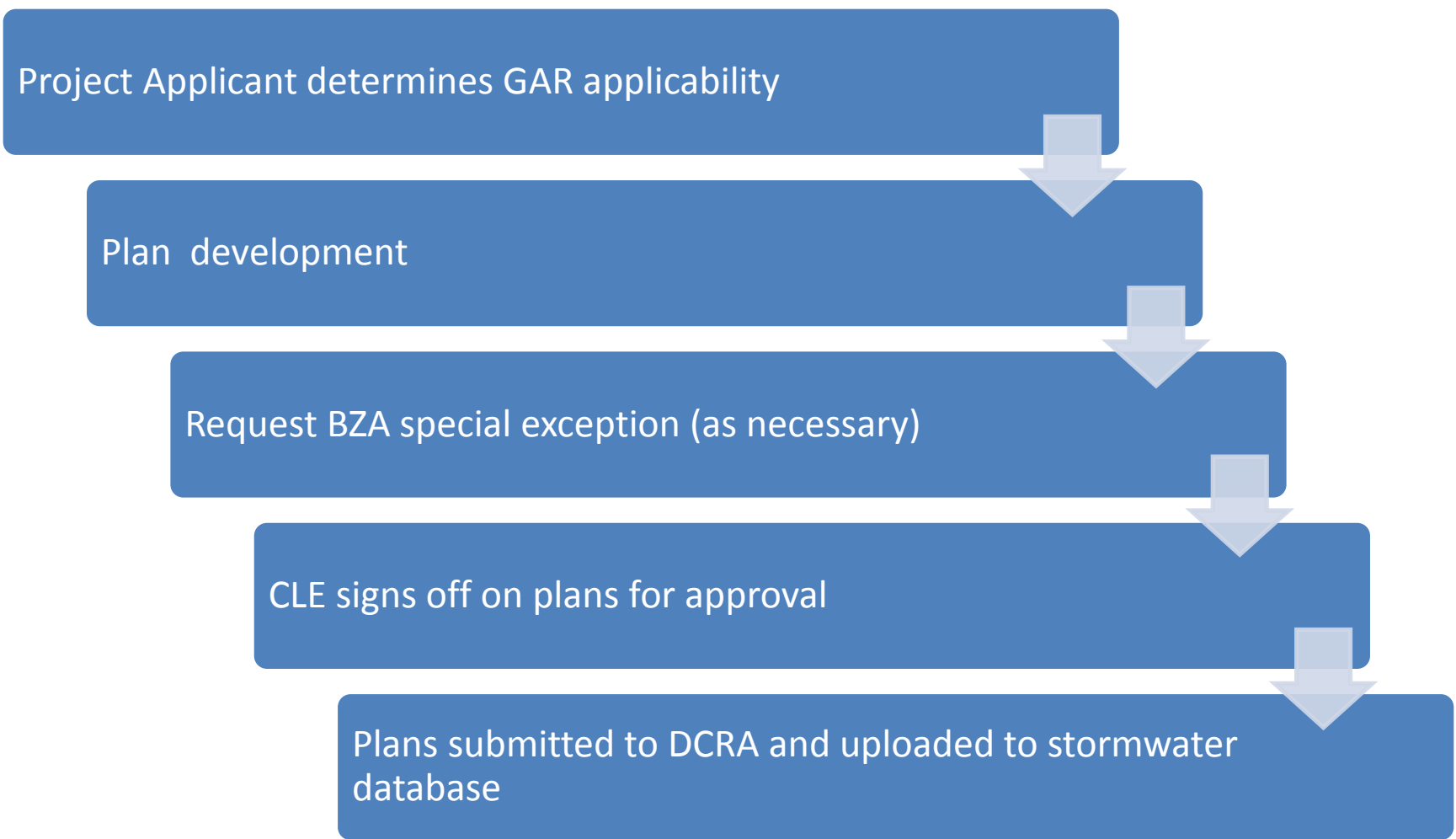
GAR Plan Development

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- **Design considerations,**
 - Stormwater obligations.
 - Energy goals.
 - Green building standards.

Permitting Process

Process - Development to Submittal

Project Applicant determines GAR applicability



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graph TD; A[Project Applicant determines GAR applicability] --> B[Plan development]; B --> C[Request BZA special exception (as necessary)]; C --> D[CLE signs off on plans for approval]; D --> E[Plans submitted to DCRA and uploaded to stormwater database];
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Plan development

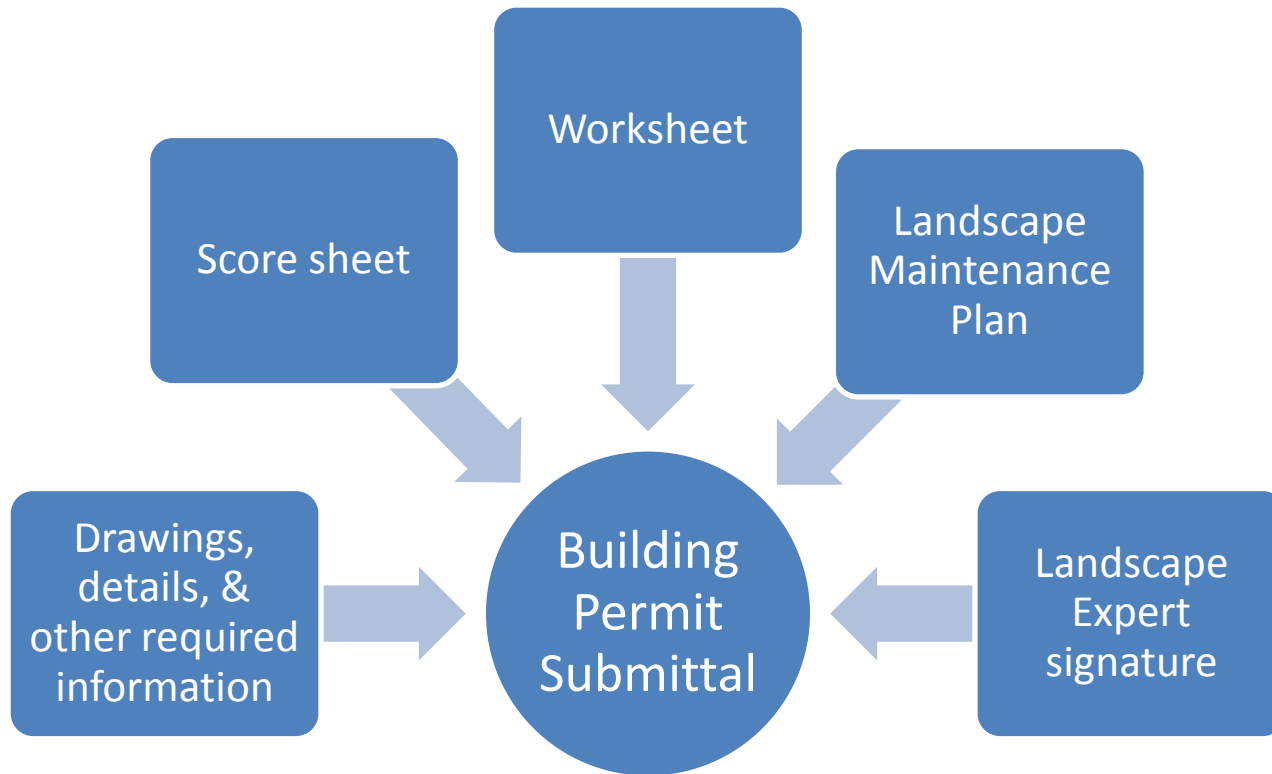
Request BZA special exception (as necessary)

CLE signs off on plans for approval

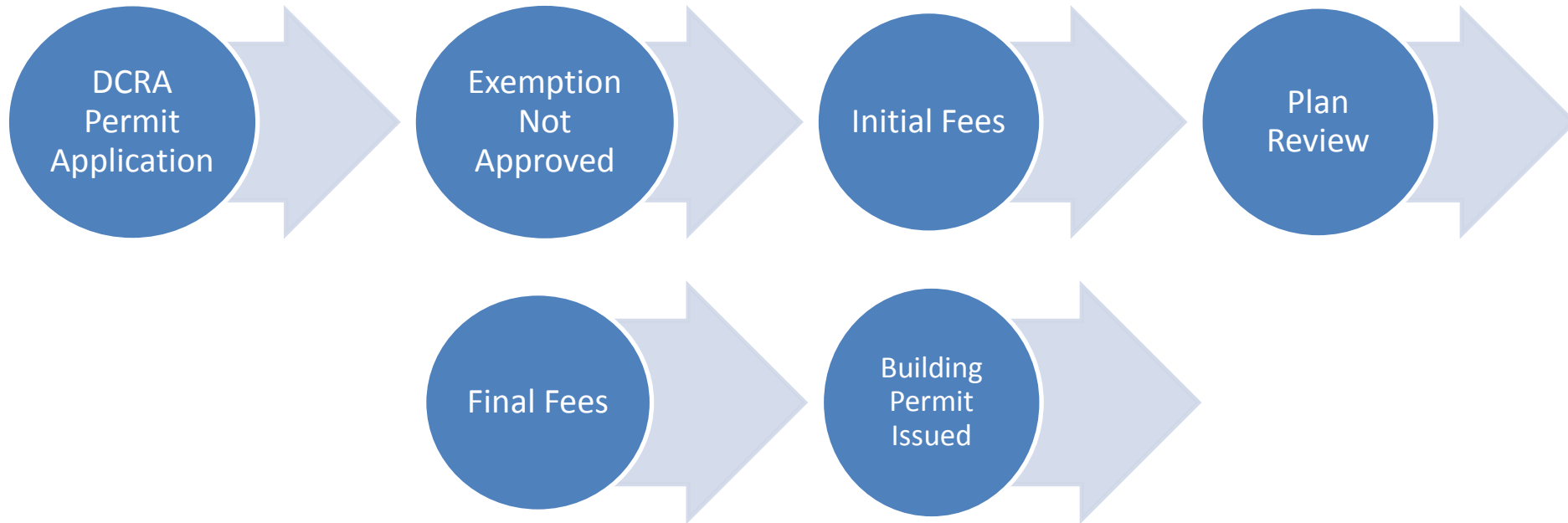
Plans submitted to DCRA and uploaded to stormwater database

Plan Submittals

- Synergy with stormwater and ESC plan submittals
- doee.dc.gov/swtraining



Intake Process



DOEE Review within DCRA Permit Process

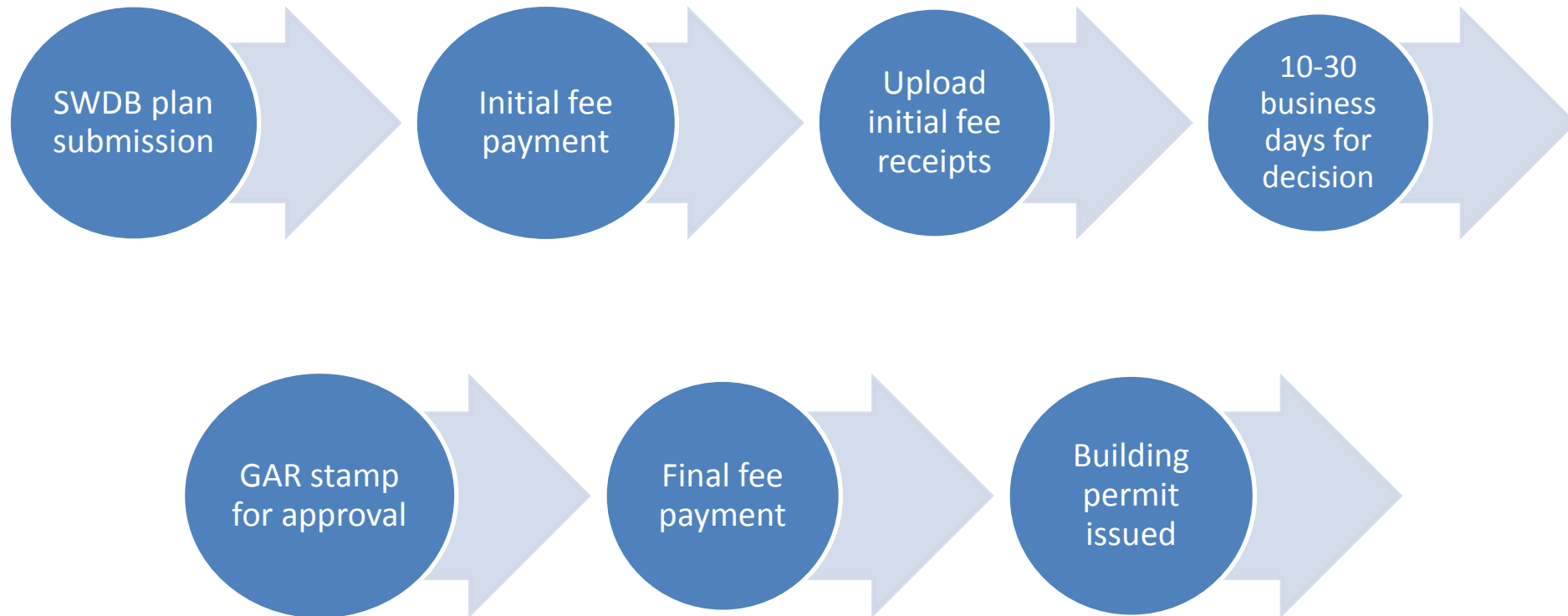
- Minor projects may be reviewed in ProjectDox, Database entry still required

DOEE Stormwater Database (<https://doee.dc.gov/swdb>)

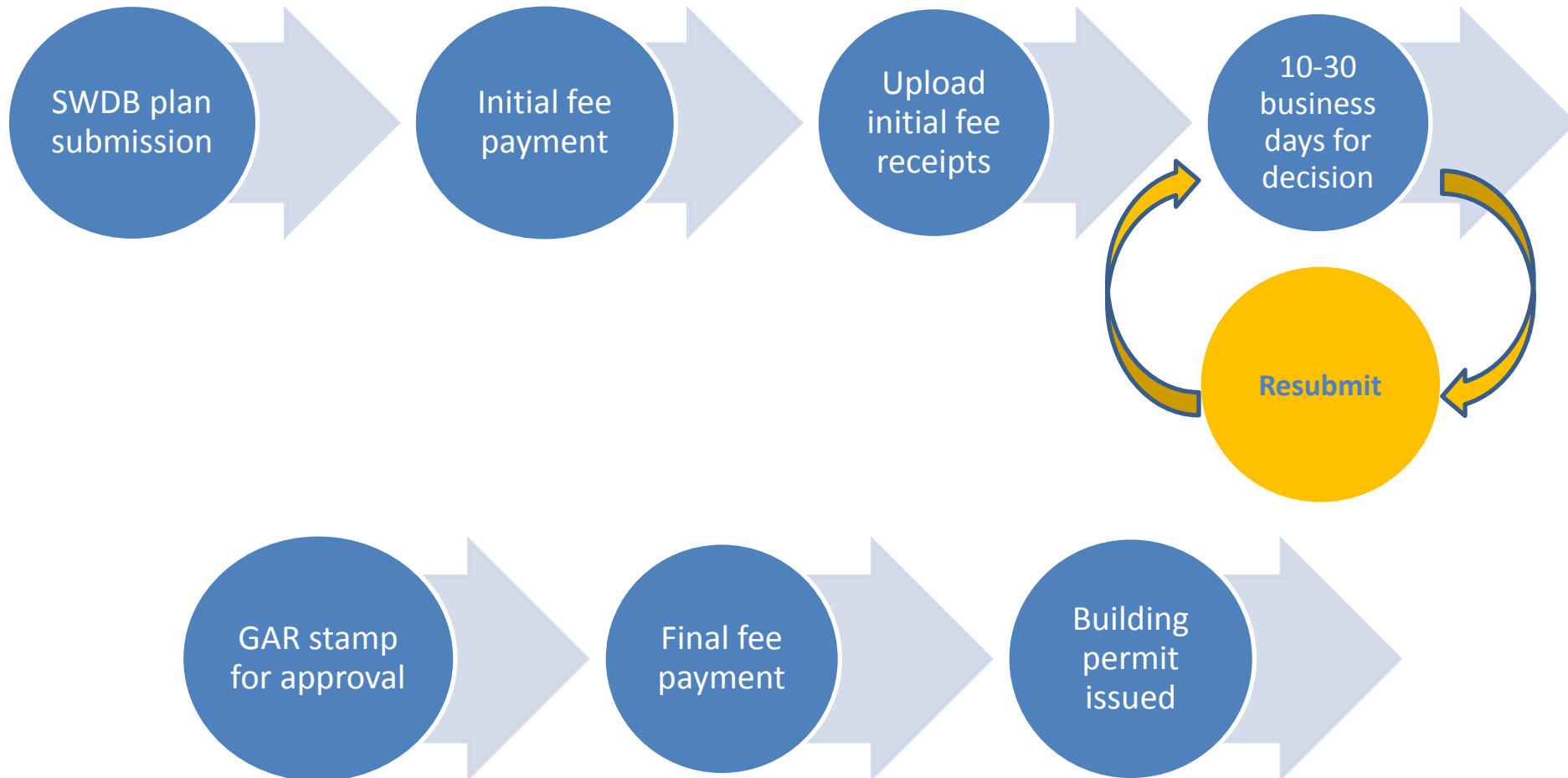
Provide site and plan information for DOEE review of DCRA permit applications for:

- Stormwater Management (SWMPs)
- Soil Erosion and Sediment Control (ESC)
- Green Area Ratio (GAR)

DOEE Plan Review



DOEE Plan Review



Fees

Payment Type	Payment Requirement	Fees by Land Disturbance Type or Building Footprint	
		≤10,000 ft ²	>10,000 ft ²
Initial*	Due upon filing for building permit	\$593.55	\$877.43
Final	Due before building permit is issued	\$129.03	\$206.45
Supplemental	For reviews after first resubmission	\$516.13	

-*Initial fee includes 1 hour pre-development meeting. Additional meetings are charged an hourly rate of \$72.26.

-DOEE Stormwater Management Regulations - Chapter 5, DCMR Title 21 § 501.10 - Fees adjusted annually for inflation - fees above effective April 21, 2017

Plan Revisions After Approval

An additional review is required if:

Reduce plant quantity

Change location of landscape element

Species substitution

Decrease in GAR score

Process – Approval to C of O

DOEE reviews and approves the GAR Plan



CLE oversees installation of GAR landscape elements



CLE / DOEE inspect site and sign Landscape Checklist



OZA receives Landscape Checklist and issues C of O



Property Owner maintains GAR landscape elements

Construction

Landscape Expert confirms
installation as per plan



DOEE
Inspection



Landscape Checklist



Certificate of Occupancy



GOVERNMENT OF THE DISTRICT OF COLUMBIA
DISTRICT DEPARTMENT OF ENVIRONMENT
WATERSHED PROTECTION DIVISION/INSPECTION & ENFORCEMENT BRANCH

Green Area Ratio - Landscape Checklist

I, _____, declare as follows:

Full Name of Certified Landscape Expert (Printed)

☐ I am a Certified Landscape Expert, as defined in DCMR Title 11, Chapter 34, responsible for confirming installation of the approved landscape plan for development located at:

_____, Washington, DC, and developed pursuant to:
Street Address (Printed)

Building Permit Number

DDOE Plan Number

Ward

Lot

Square

☐ The landscape elements shown on the DDOE-approved landscape plan or DDOE-approved modification for this property have been installed as approved and in a manner consistent with the standards of 11 DCMR Chapter 34. This includes the number size, and approximate location of plantings and other approved landscape elements.

☐ Any changes or species substitutions (if applicable) have been approved by DDOE.

☐ A completed Landscape Maintenance Plan has been submitted to the property owner.

I declare under penalty of perjury under the laws of the District of Columbia that the following is true and correct.

Signature of Certified Landscape Expert

Certification/Registration Number

Date

NOTE: If any landscape elements have been changed during installation, DO NOT SIGN OR SUBMIT this checklist until a revised landscape plan has been approved by the District Department of Environment. If you provide false information in this document, you will subject yourself to criminal liability.

[TO BE COMPLETED BY DDOE INSPECTOR]

Document received by:

Inspector Signature

Printed Name

Date

DDOE (WHITE)

OWNER/AGENT (YELLOW)

LANDSCAPE EXPERT (GOLDENROD)

INSPECTOR (PINK)

Temporary Certificate of Occupancy

- Apply to Office of Zoning Administrator
- Granted only twice, each time for 4 months.
- Considered by the DOEE inspector under the following conditions:

Weather

Seasonal restrictions

Site construction

Post-Construction Maintenance

Property owner responsible after granted Certificate of Occupancy

Follow landscape maintenance plan provided by Certified Landscape Expert

Must maintain GAR score

GAR plan submittal to DCRA not required after Landscape Checklist signed-off

LANDSCAPE ELEMENTS
&
SUBMISSION REQUIREMENTS

General Submission Requirements

Minimum Submittal Requirements:

- Completed GAR Scoresheet
- Completed GAR Worksheet, if landscape elements are divided between multiple pages
- GAR plan with landscape elements called out
- Completed CLE Signature Template
- Maintenance plan for all proposed landscape elements
- Construction sequence for each landscape element
- No invasive plant species permitted to be installed anywhere in GAR projects
- New plat if combining multiple record lots into one
- Graphic scale, north arrow, and dimensions

Score Sheet and Worksheet

Green Area Ratio Scoresheet					
***	Address	Square	Lot	Zone District	
***	Other	Lot area (sf)	Minimum Score	Multiplier	GAR Score
Lot size (enter this value first) *		SCORE: #DIV/0!			
Landscape Elements					
A Landscaped areas (select one of the following for each area)		Square Feet	Factor	Total	
1	Landscaped areas with a soil depth < 24"	square feet	0.30	-	
2	Landscaped areas with a soil depth ≥ 24"	square feet	0.60	-	
3	Bioretention facilities	square feet	0.40	-	
B Plantings (credit for plants in landscaped areas from Section A)		Square Feet	Native Bonus		
1	Groundcovers, or other plants < 2' height	square feet	0.20	-	
2	Plants ≥ 2' height at maturity - calculated at 9-sf per plant	# of plants	0.30	-	
3	New trees with less than 40-foot canopy spread - calculated at 50 sq ft per tree	# of trees	0.50	-	
4	New trees with 40-foot or greater canopy spread - calculated at 250 sq ft per tree	# of trees	0.60	-	
5	Preservation of existing tree 6" to 12" DBH - calculated at 250 sq ft per tree	# of trees	0.70	-	
6	Preservation of existing tree 12" to 18" DBH - calculated at 600 sq ft per tree	# of trees	0.70	-	
7	Preservation of existing trees 18" to 24" DBH - calculated at 1300 sq ft per tree	# of trees	0.70	-	
8	Preservation of existing trees 24" DBH or greater - calculated at 2000 sq ft per tree	# of trees	0.80	-	
9	Vegetated wall, plantings on a vertical surface	square feet	0.60	-	
C Vegetated or "green" roofs		Square Feet			
1	Over at least 2" and less than 8" of growth medium	square feet	0.60	-	
2	Over at least 8" of growth medium	square feet	0.80	-	
D Permeable Paving***		Square Feet			
1	Permeable paving over 6" to 24" of soil or gravel	square feet	0.40	-	
2	Permeable paving over at least 24" of soil or gravel	square feet	0.50	-	
E Other		Square Feet			
1	Enhanced tree growth systems***	square feet	0.40	-	
2	Renewable energy generation	square feet	0.50	-	
3	Approved water features	square feet	0.20	-	
Sub-total of sq ft =		0			
F Bonuses					
1	Native plant species	square feet	0.10	-	
2	Landscaping in food cultivation	square feet	0.10	-	
3	Harvested stormwater irrigation	square feet	0.10	-	
Green Area Ratio numerator =					
*** Permeable paving and structural soil together may not qualify for more than one third of the Green Area Ratio score.					
Total square footage of all permeable paving and enhanced tree growth.					

GREEN AREA RATIO

Worksheet*

ENVIRONMENT

★ ★ ★

		Quantity of GAR Features per Submitted Sheet															
		L100, L110, L121	L101	L200/L201 /L210	L202	L221	L300	L404-L405	L410	L501	L502	L600	L700/L701	CIV	TOTAL**		
A1	square feet														0		
A2	square feet														0		
A3	square feet														0		
B1	square feet		171												171		
B2	Total for B2		14		213		175	190			171				763		
B3	# of trees				19			20							39		
B4	# of trees														0		
B5	# of trees														0		
B6	square feet														0		
B7	square feet														0		
B8	square feet														0		
B9	square feet					146			79						225		
C1	square feet						1422					3429			4851		
C2	square feet			2875.5			1772	5445		5215			668		15975.5		
D1	square feet														0		
D2	square feet														0		
E1	square feet														0		
E2	square feet														0		
E3	square feet														0		
H1	square feet of native plants		27		626		325	1421			423				2822		
H2	square feet														0		
H3	square feet													18741	18741		

* See Green Area Ratio Scoresheet for category definitions

** Enter totals on the Green Area Ratio Scoresheet

* See Green Area Ratio Scoresheet for category definitions

** Enter totals on the Green Area Ratio Scoresheet

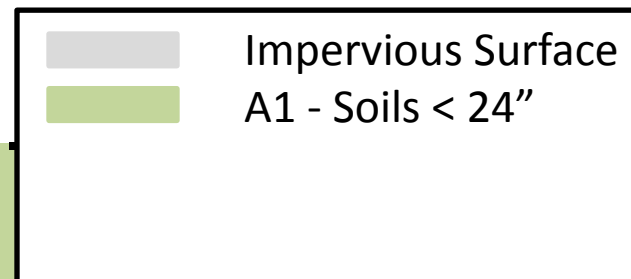
Credits A1-A2: Landscape Soils

A1: Soils < 2-foot depth (Multiplier: 0.3)	A2: Soils ≥ 2-foot depth (Multiplier: 0.6)
Credits planted areas without trees or vegetated walls	Credits planted areas with trees, vegetated walls, and/or soils preserved from compaction

Minimum Submittal Requirements:

- Soil depth and area shown on plans
- Soil protection measures and existing vegetation if claiming preservation credit
- Soil improvement specifications
- All planting areas next to vehicle access areas must show how vegetation is protected from vehicles (bollards, curbs, etc.)





Property Line

Lot = 3,000 sf

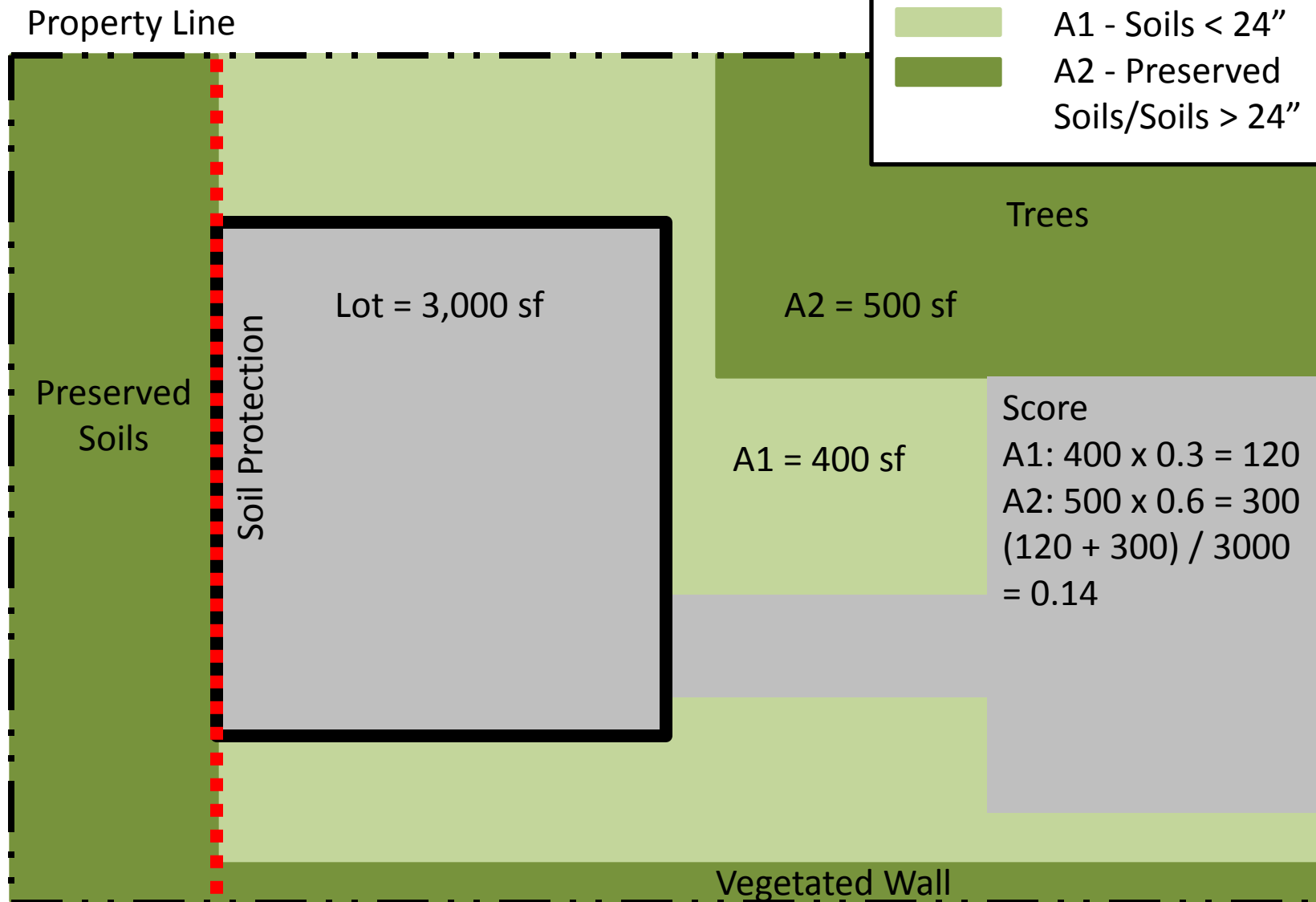
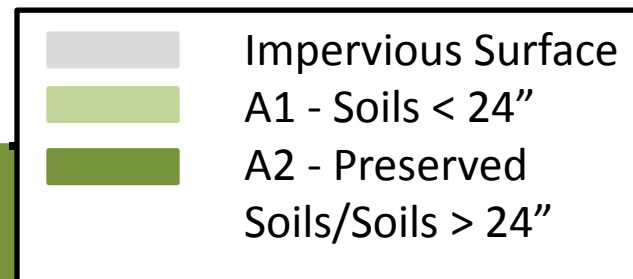
A1 = 900 sf

Score

A1: $900 \times 0.3 = 270$

$270 / 3000 = 0.09$

Not to scale



Not to scale

Credit A3: Bioretention

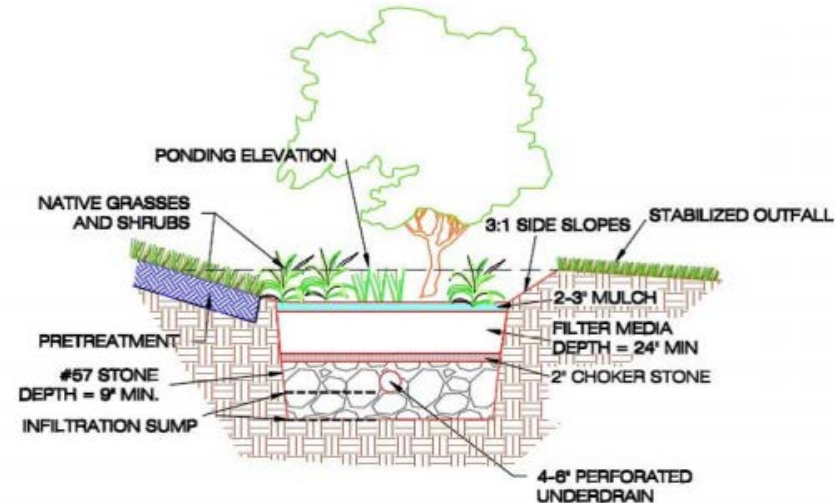
Multiplier: 0.4

Credit the area of filter bed (side slopes to be credited under “landscape soils”)

Native plant species recommended

Must follow SWM Guidebook feasibility, pretreatment, design, construction, and maintenance criteria, as well as DC Water guidelines.

Must submit geotechnical report to verify infiltration rates and groundwater table levels.



NOTE: If underlying soil infiltration rate $< 0.5'/hr$, the underdrain and infiltration sump option may be used. The infiltration sump option must be designed to infiltrate the design storm volume in less than 72 hours.

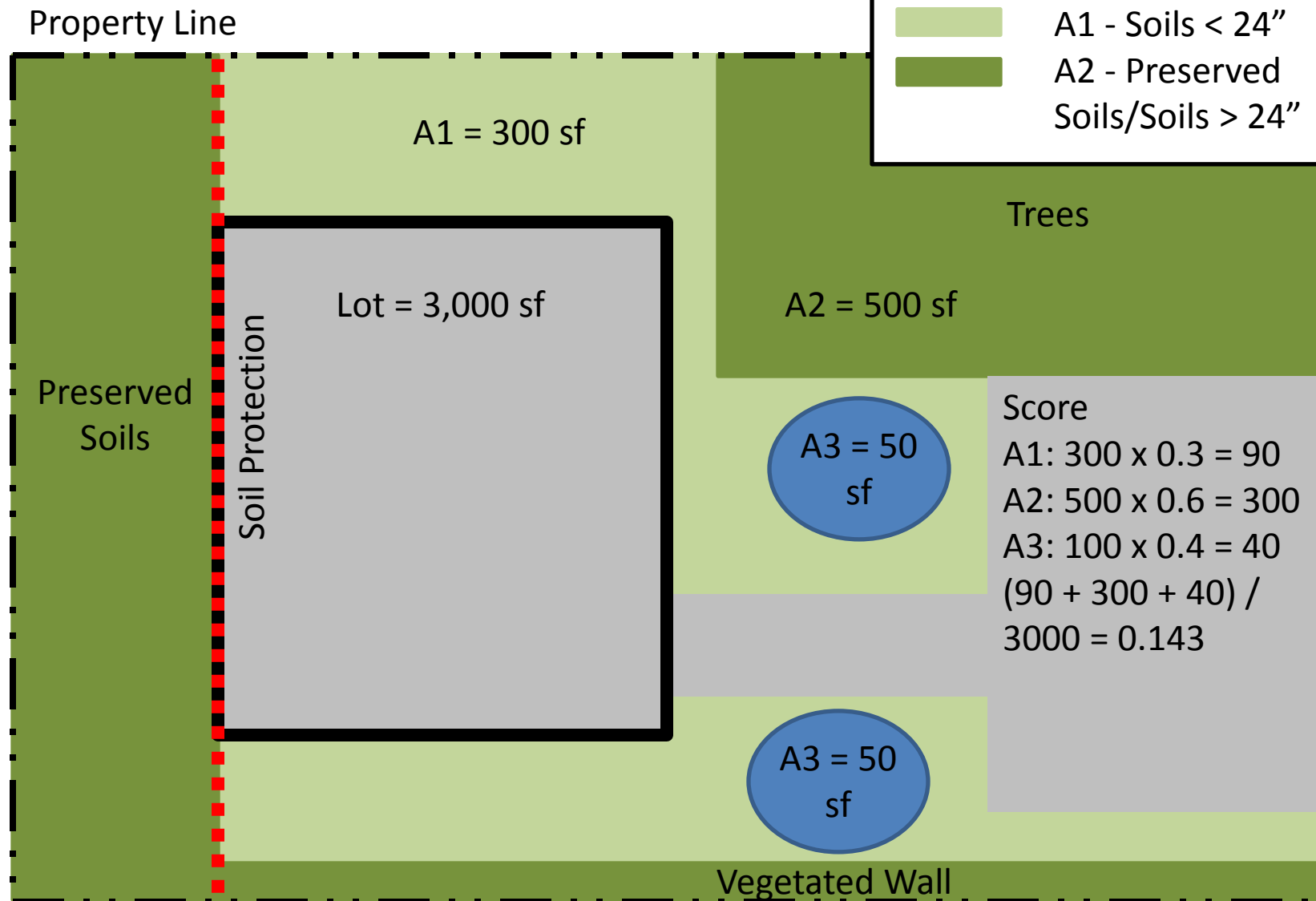
Minimum Submittal Requirements:

- Soil depth and area shown on plans
- Dimensioned details showing media depths
- Soil specifications
- Construction sequence, following SWM guidelines

Impervious Surface

A1 - Soils < 24"

A2 - Preserved
Soils/Soils > 24"



Not to scale

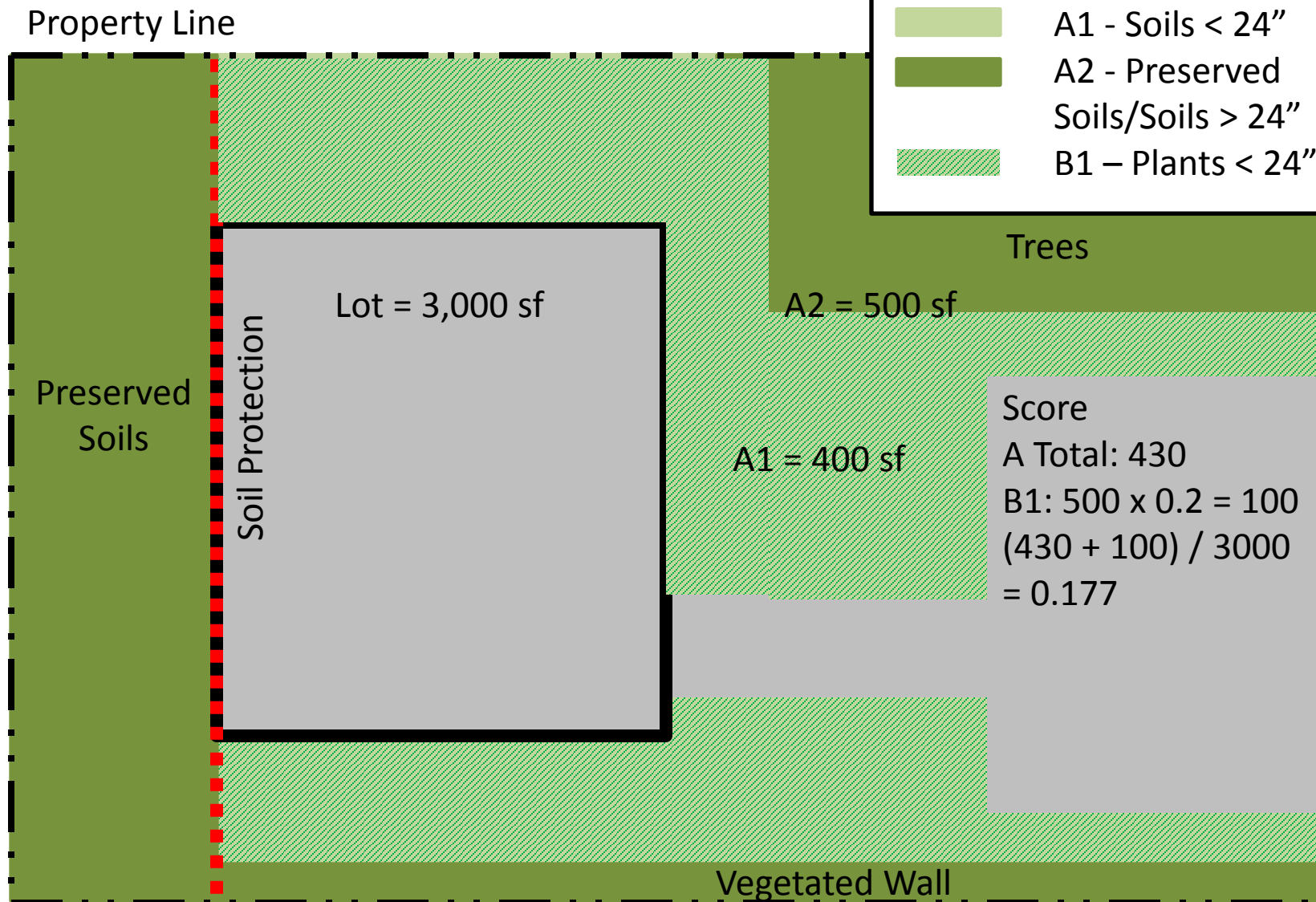
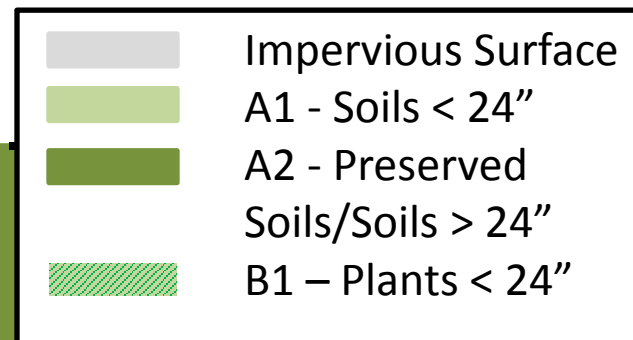
Credits B1-B2: Groundcovers and Plants $\geq$ 2-Foot Height

B1: Groundcovers (Multiplier: 0.2)	B2: Plants $\geq$ 2-foot height (Multiplier: 0.3)
All plants < 2 feet in height	Shrubs, herbaceous, and grass quantity credited on a one-for-one basis as shown on plan – 9 sf per plant
Credited by mature sf	Trees with less than 400 cf of soil volume or are less than minimum size are credited under B2
Annuals, bulbs, or plantings that require annual replanting not eligible, unless used for food cultivation purposes	



Minimum Submittal Requirements:

- Plant location and spacing
- Plant schedule containing: common and scientific name, container size, quantity, credit, native status, spacing
- Planting and other details illustrating soil depth, staking, planting hole



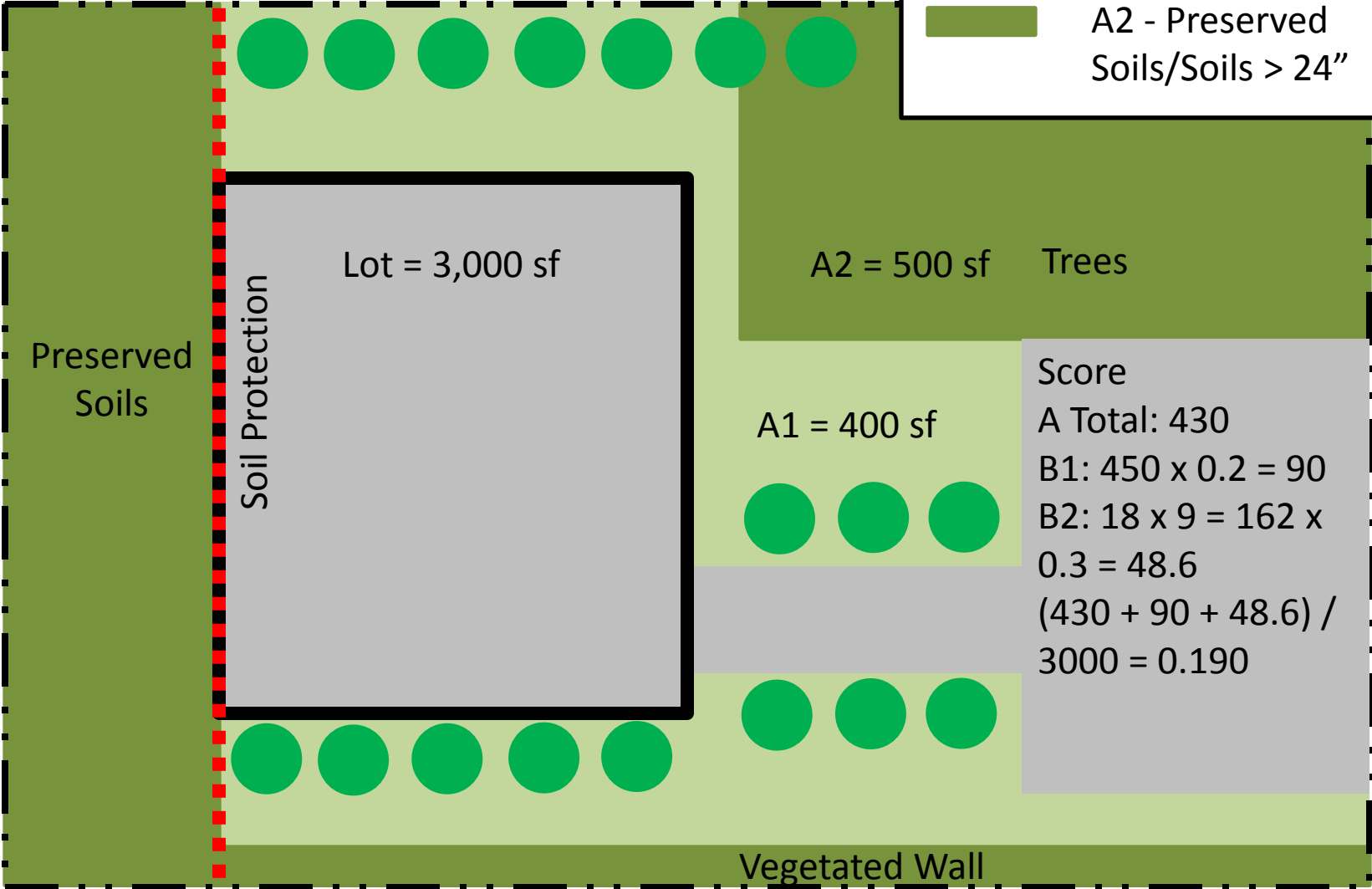
Not to scale

Impervious Surface

A1 - Soils < 24"

A2 - Preserved
Soils/Soils > 24"

Property Line



Not to scale

Credits B3-B4: New Tree Plantings

B3: Trees < 40-foot canopy spread* (Multiplier: 0.5)	B4: Trees ≥ 40-foot canopy spread* (Multiplier: 0.6)
Quantity credited on a one-for-one basin as shown on plan – 50 sf per tree	Quantity credited on a one-for-one basin as shown on plan – 250 sf per tree
Credit by canopy spread	Same
Minimum tree size: • Single trunk – 1.5 inch caliper • Multi-stem – 8-foot height	Same
Minimum soil volume requirements • Minimum 400-600 cf soil volume** • Measured within 16-foot radius	Minimum soil volume requirements • Minimum 1,000-1,500 cf soil volume • Measured within 27-foot radius

*Based on *average* canopy spread.

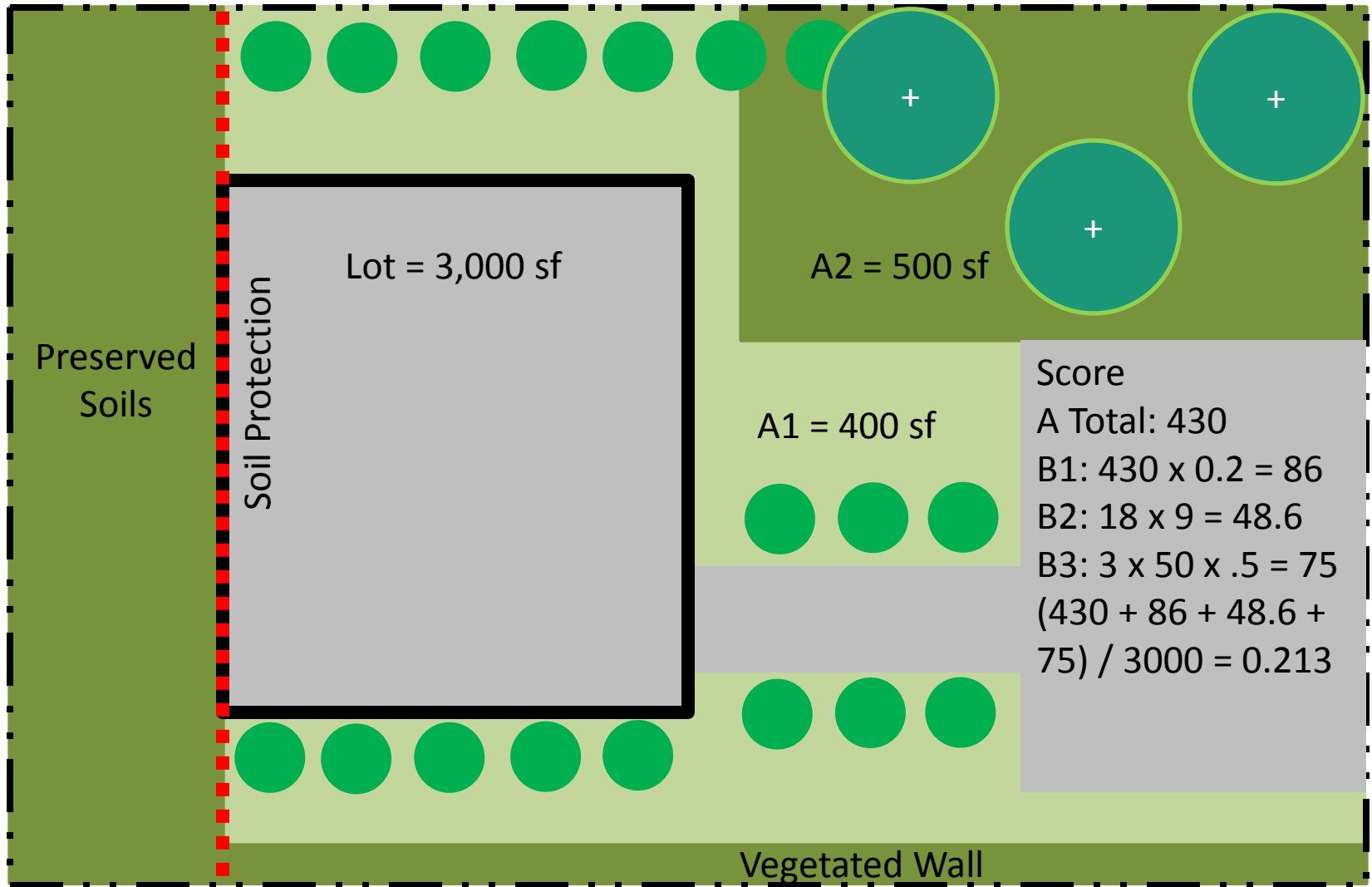
**Maximum depth used for calculations is 3 feet.

***Transplanted trees receive credit based on the classifications above.

Minimum Submittal Requirements:

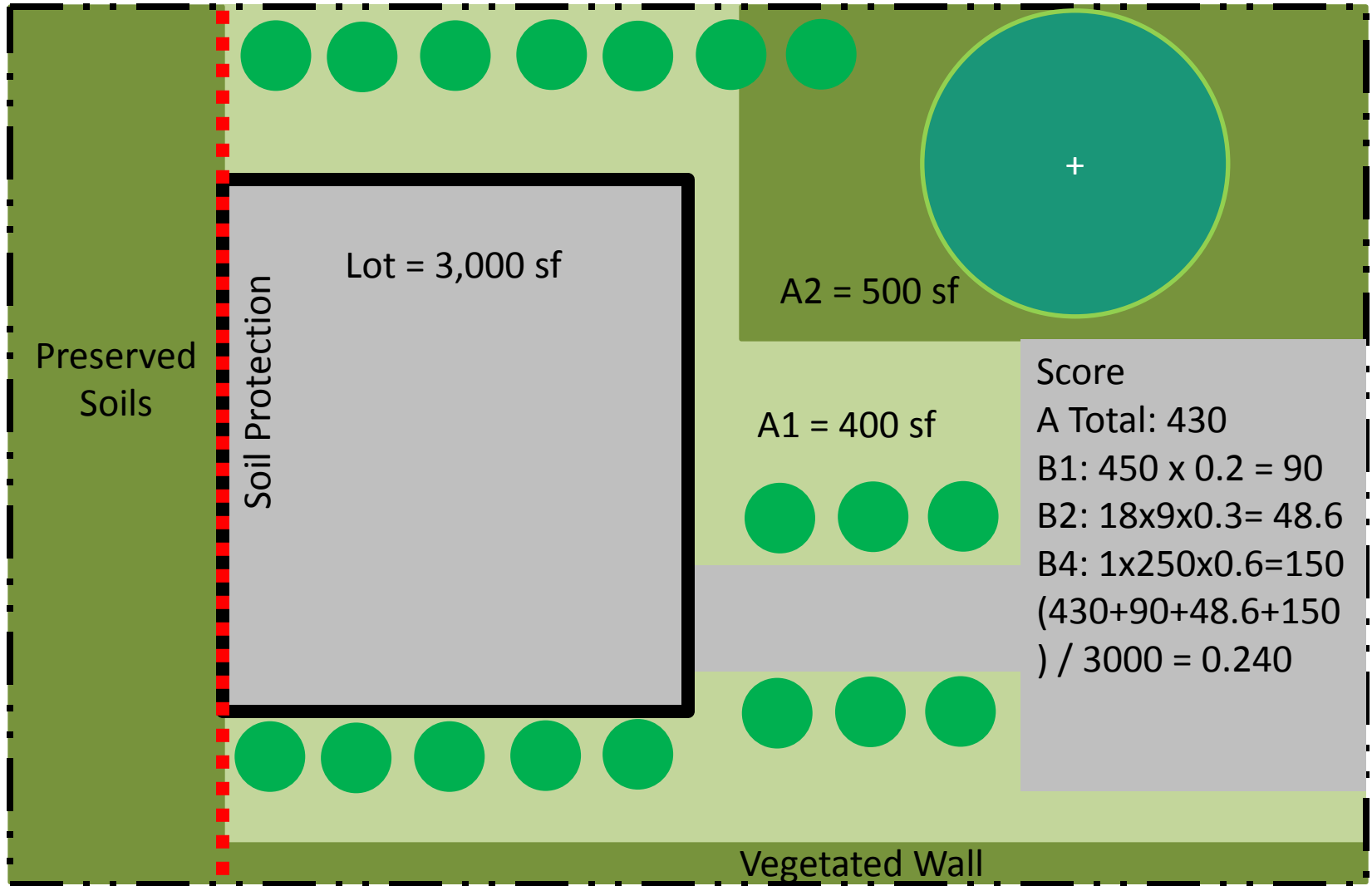
- Same as Credits B1-B2, plus:
- Soil volume areas and calculations

Property Line



Not to scale

Property Line



Score

A Total: 430

B1: $450 \times 0.2 = 90$

B2: $18 \times 9 \times 0.3 = 48.6$

B4: $1 \times 250 \times 0.6 = 150$

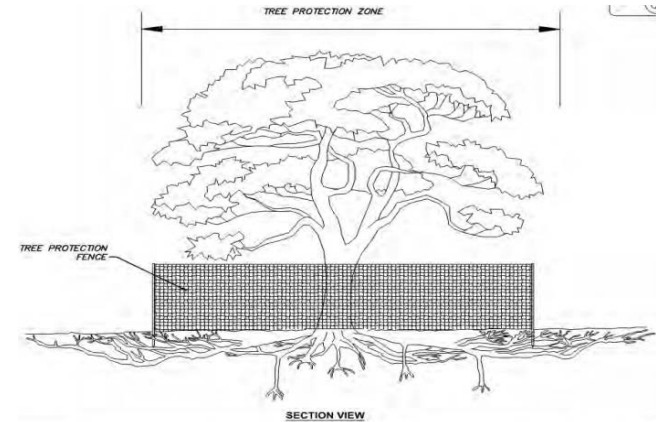
$(430 + 90 + 48.6 + 150)$

$)/ 3000 = 0.240$

Not to scale

Credits B5-B8: Tree Preservation

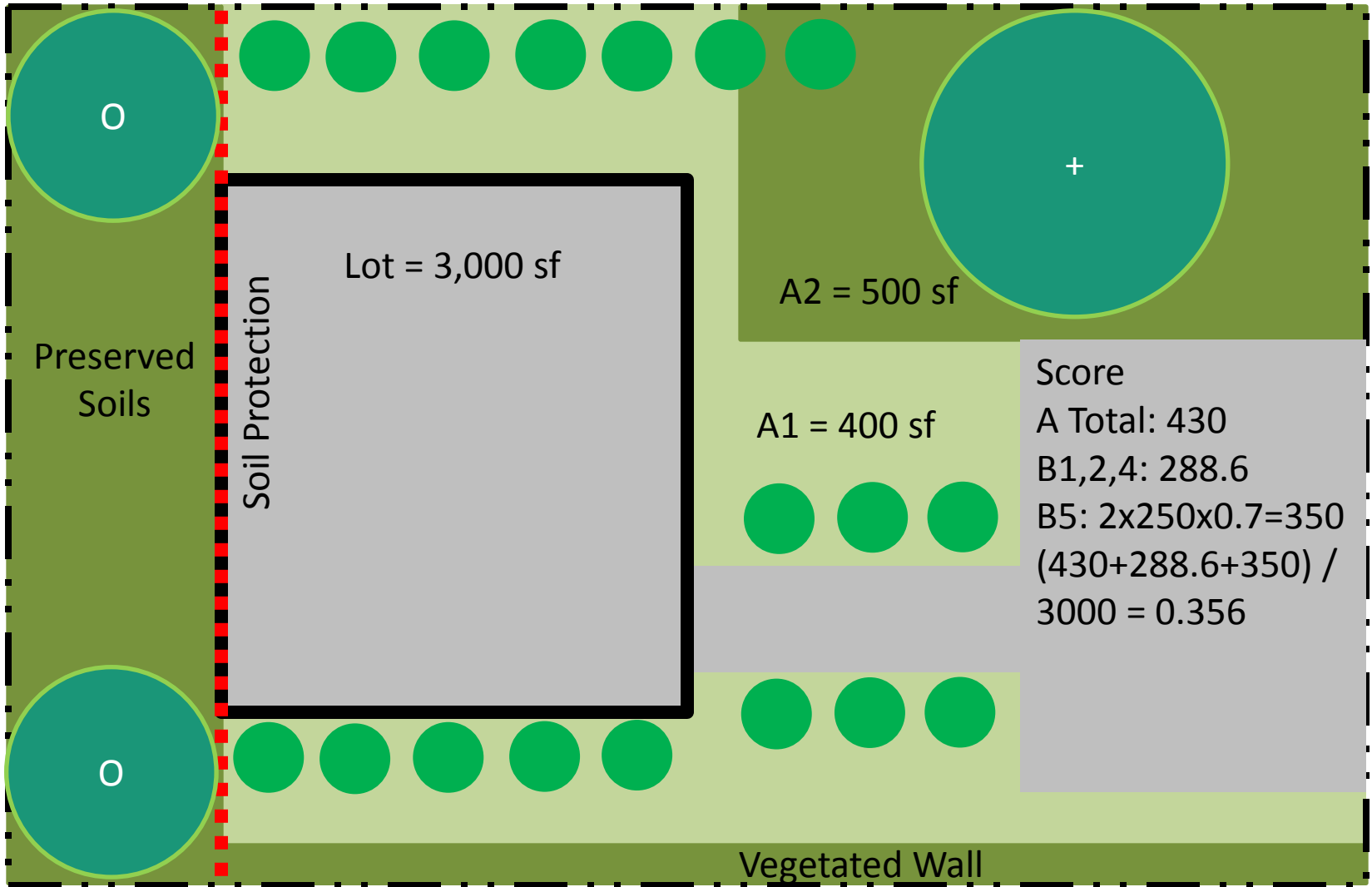
Credit for tree canopy for preserved tree, trunk at DBH:	Equivalent Square Footage	Multiplier
At least 6 in, less than 12 in	250	0.7
At least 12 in, less than 18 in	600	0.7
At least 18 in, less than 24 in	1,300	0.7
At least 24 in	2,000	0.8



Minimum Submittal Requirements:

- Tree survey of all preserved trees showing location, scientific and common name, trunk DBH, condition, and critical root zone (CRZ)
- Tree preservation plan for all construction phases
- Civil site plans showing extent of site work
- *CRZ must not be disturbed*

Property Line



Not to scale

Credit B9: Vegetated Walls

Multiplier: 0.6
Credited by vertical coverage
Soil volume - 1 cf / 10 sf of credited wall coverage
Max 30-foot height for green facades



Minimum Submittal Requirements:

- Same as Credits B1-B2, plus:
- Max growing height, growth habit
- Dimensioned façades and sections showing support structure
- Must be minimum of 5 feet from facing wall or property lines where the adjacent property has a zero-lot line allowance
- Irrigation plan or supplemental irrigation
- Harvested stormwater irrigation, if proposed, serves vegetated wall

Credit B9: Vegetated Walls

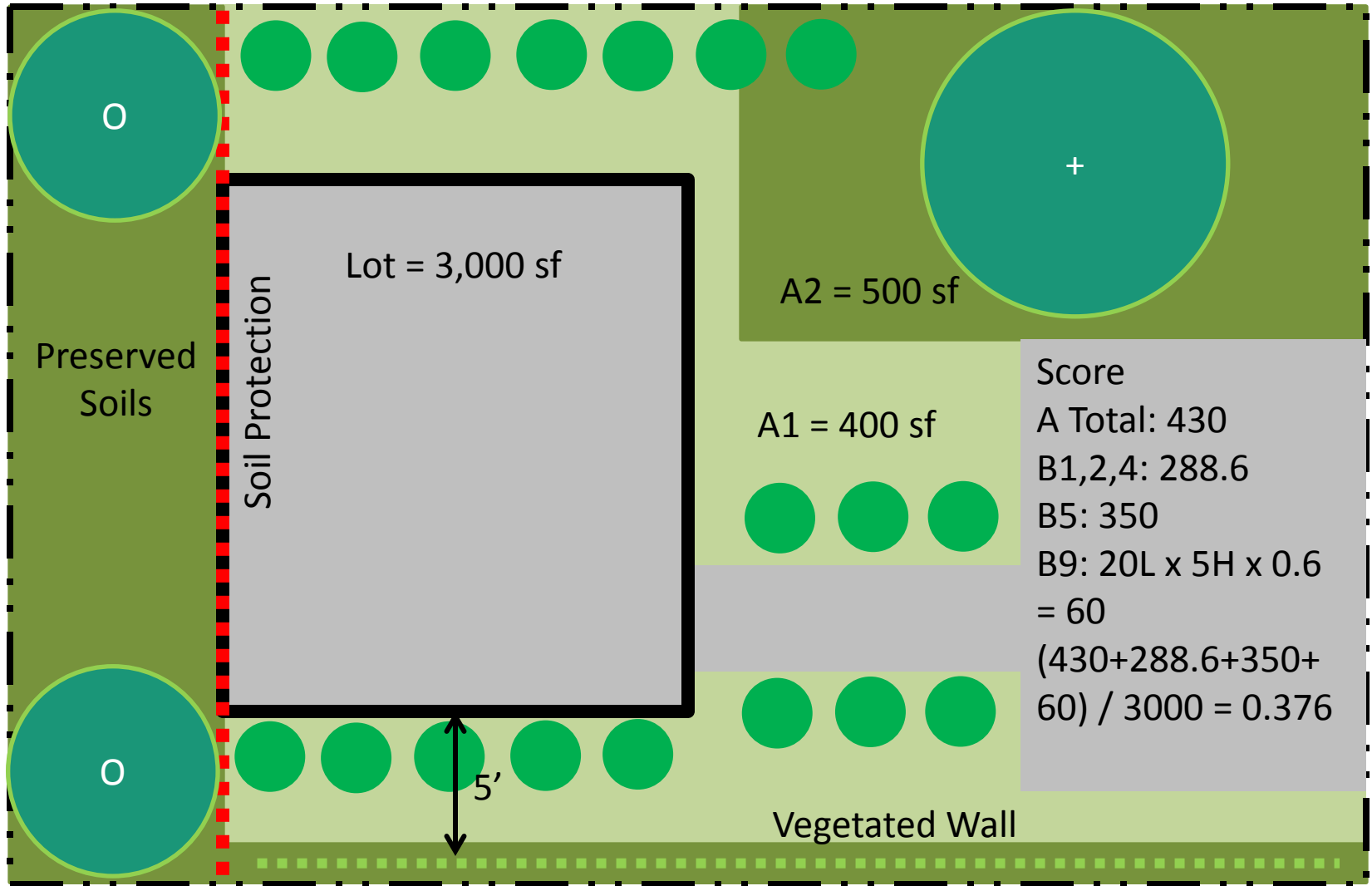
Multiplier: 0.6
Credited by vertical coverage
Soil volume - 1 cf / 10 sf of credited wall coverage
Max 30-foot height for green facades



Sample of proposed GAR plant list

Scientific Name	Common Name	Max. Height (ft.)	Attachment	Sun / Shade	Native	Notes
<i>Actinidia polygama</i>	Silver Vine	10-15	Twining	Sun / partial		
<i>Aristolochia macrophylla</i> (A. durior)	Dutchman's Pipe	20-30	Twining	Sun / partial	x	
<i>Bignonia capreolata</i>	Crossvine	30-50	Clinging/Twining	Sun / partial	x	
<i>Campsis radicans</i>	Common Trumpet creeper	30-40	Clinging	Sun / partial	x	

Property Line



Not to scale

Credits C1-C2: Vegetated Roofs

C1: Soils 2-8 inch depth (Multiplier: 0.6)	C2: Soils ≥ 8 inch depth (Multiplier: 0.8)
Credited by surface area	
Depth = soil media only*	
Container plantings over structure credited	
Plant type by soil media depth and irrigation provided	
Permanent irrigation needs dependent upon specified plant type and % coverage	
Multiplier accounts for soil media + groundcover vegetation – Plants > 2-foot credited separately	
Must follow SWM Guidebook feasibility, design, construction, and maintenance criteria, as well as applicable building codes	
Must achieve 80% coverage within 2 years	

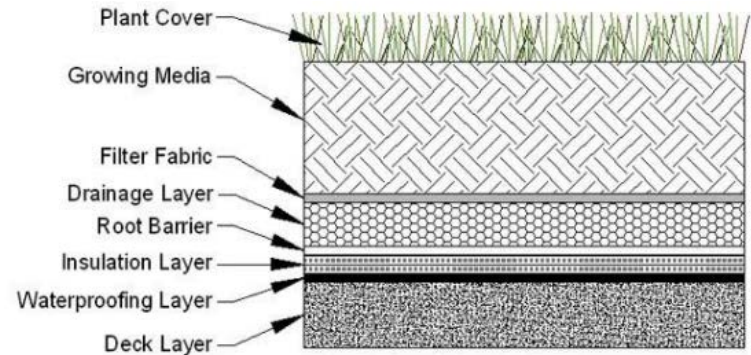
*Soil media 1 inch or greater and less than 2 inches may receive credit if supplied with an additional water retention layer with a depth of at least 1 inch.



Credits C1-C2: Vegetated Roofs

Minimum Submittal Requirements:

- Soil media depth and area shown on plans
- Details and product specifications
- Plant species, size, spacing, type of root system
- Irrigation plan or supplemental irrigation source
- Existing buildings must provide a statement signed by a structural engineer confirming the roof can support a vegetated roof
- Roof drainage and overflow plan
- Access points for maintenance
- Mechanical equipment and roof penetration locations
- Construction sequence, following SWM guidelines



Credits C1-C2: Vegetated Roofs:

Vegetated Roof Plant Coverage Guidelines

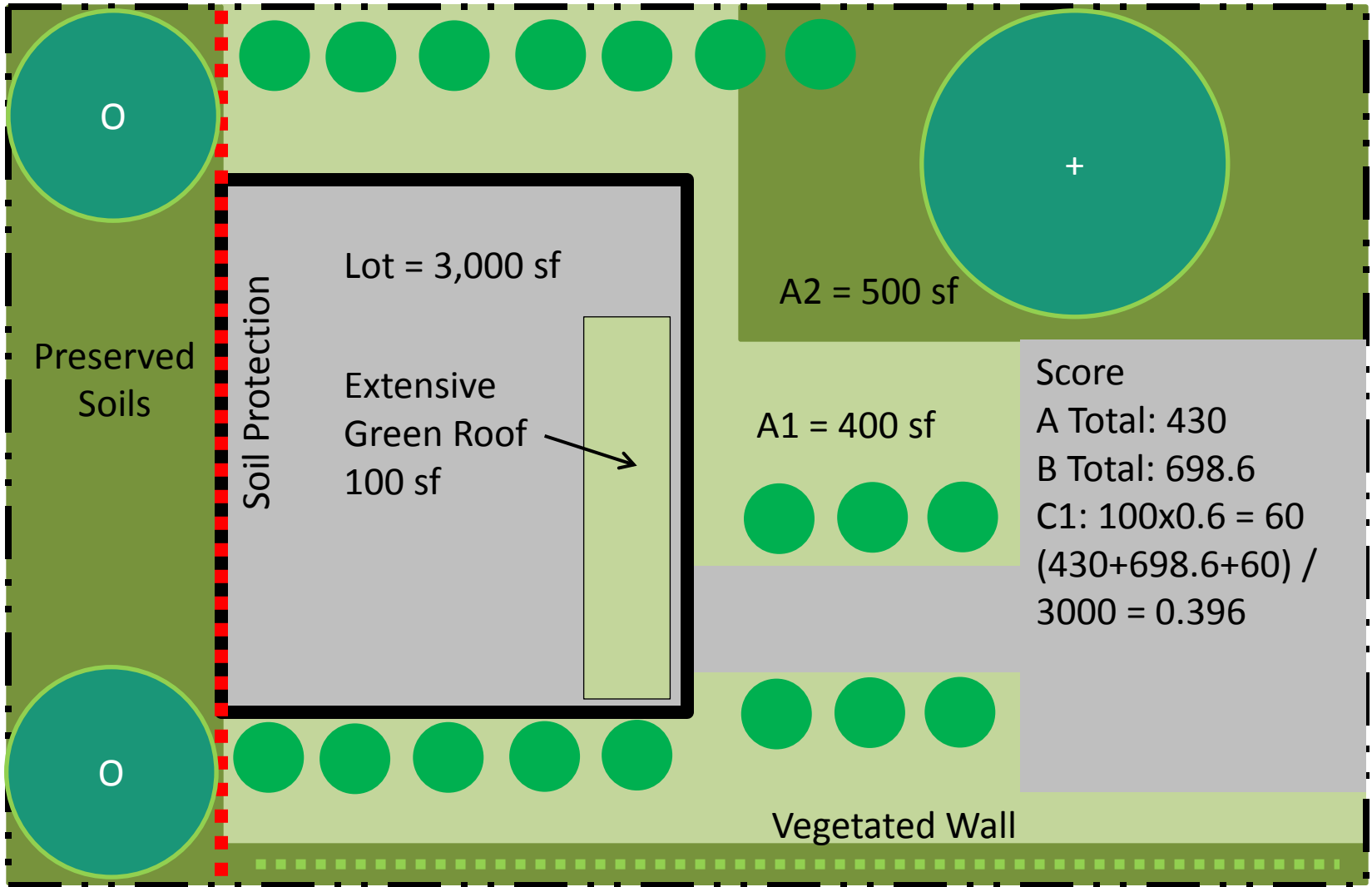
Vegetated roof coverage for plant species			Credited categories		
Soil media depth	No permanent irrigation	Permanent irrigation	Native (H1.)	Groundcover (B1.)	Plant ≥ 2' (B2.)
2–4" soil	Succulents Non-succulents (≤10% cover)	Succulents Non-succulents (≤10% cover)	30% max.	No (Included in green roof)	No
4–8" soil	Succulents-Grasses-Herbaceous Non-succulents (≤30% cover)	Succulents-Grasses-Herbaceous	50% max.		
8–12" soil	Succulents-Grasses-Herbaceous	Succulents-Grasses-Herbaceous - Small shrubs	100% max.		Yes
12–24" soil	Grasses-Herbaceous Succulents (≤10% cover)	Succulents-Grasses-Herbaceous-Shrubs			
24"+ soil		Succulents-Grasses-Herbaceous-Shrubs-Trees			

Credits C1-C2: Vegetated Roofs: Green Roof Plant Coverage Guidelines

Conditions:

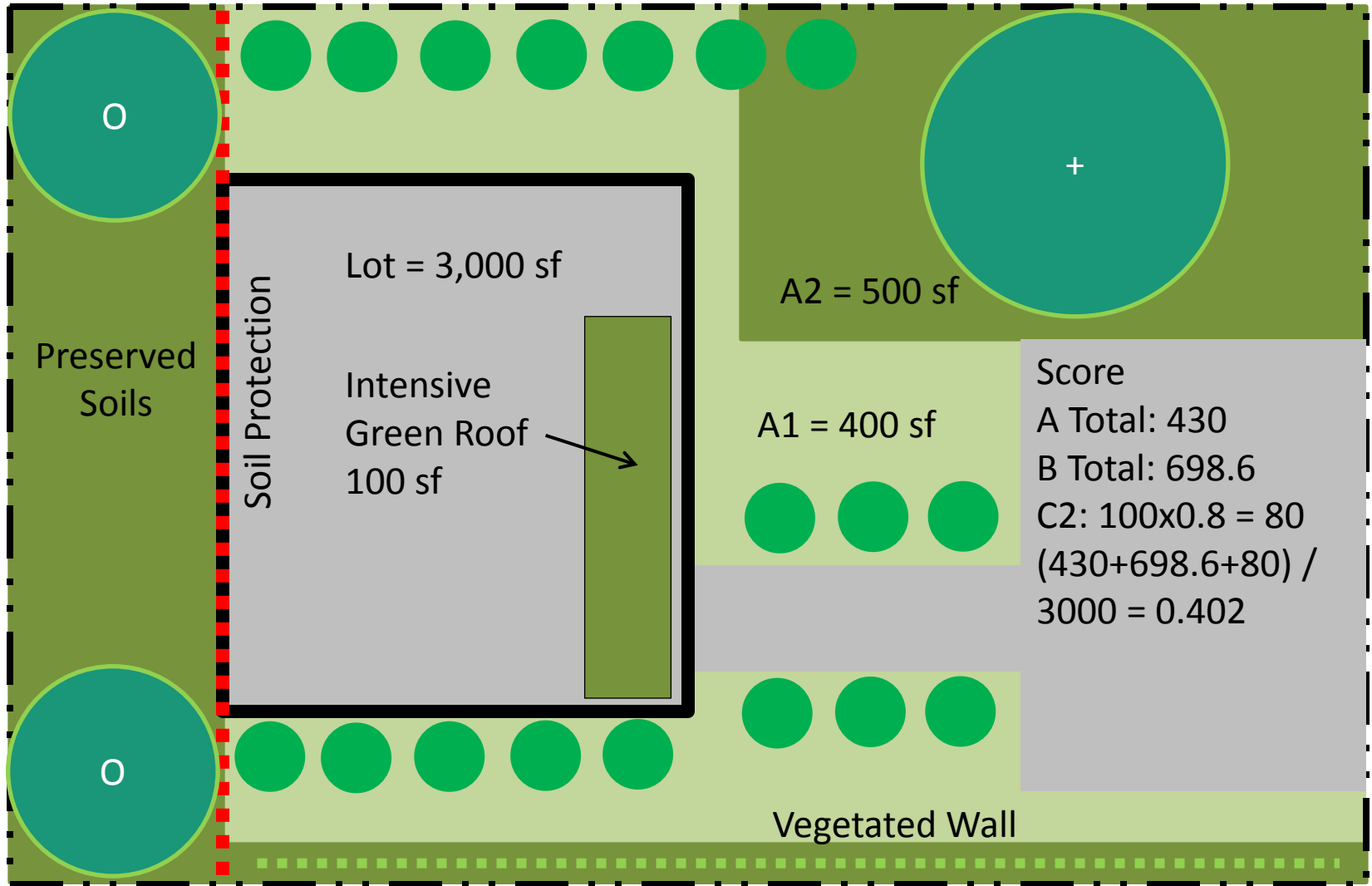
- Growing media consists of 70%–80% inorganic material and a maximum of 30% organic matter by volume. Growing media shall be capable of supplying all of the following in quantities sufficient to support plant growth: nutrient supply, water-holding capacity, drainage, root support, and ballast.
- Growing media less than 4 inches deep should have a water-retention layer 0.5 inches thick or greater unless otherwise provided with permanent irrigation. Growing media with a depth of 1 inch or greater and less than 2 inches may be credited if supplied with a water-retention layer 1 inch or greater. Only succulents may be specified and non-natives credited at less than 2-inch depth of growing media.
- Planting designs shall have a minimum of 5–7 species evenly mixed throughout the area to ensure suitability to varied rooftop microclimates. Non-succulent species in non-irrigated or shallow growing media should have demonstrated drought tolerance for vegetated roof conditions (refer to the GAR Plant List for species recommendations).
- Individual native species may compose no more than 20% of total vegetated roof coverage.

Property Line



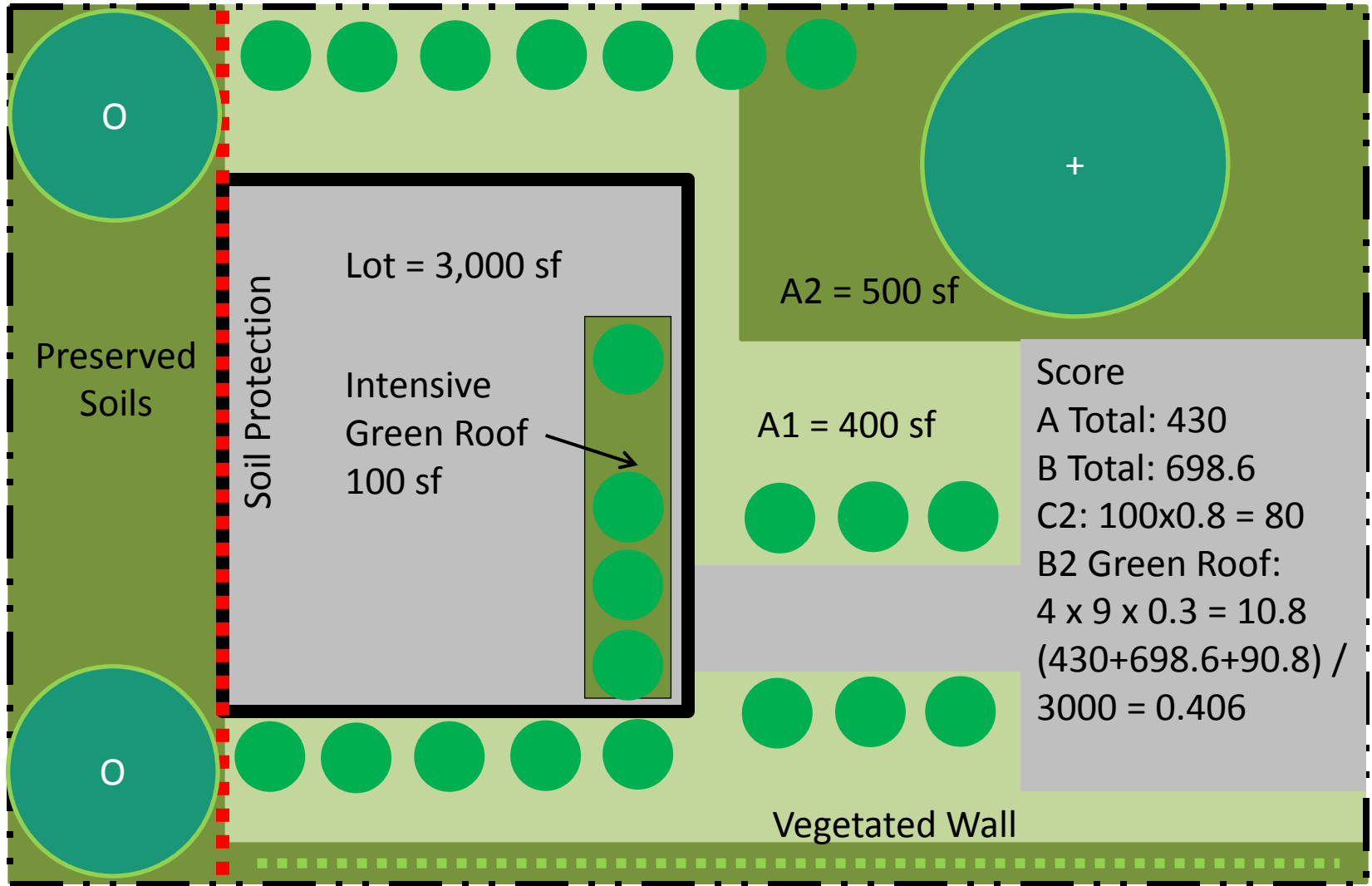
Not to scale

Property Line



Not to scale

Property Line



Not to scale

Credits D1-D2: Permeable Pavement

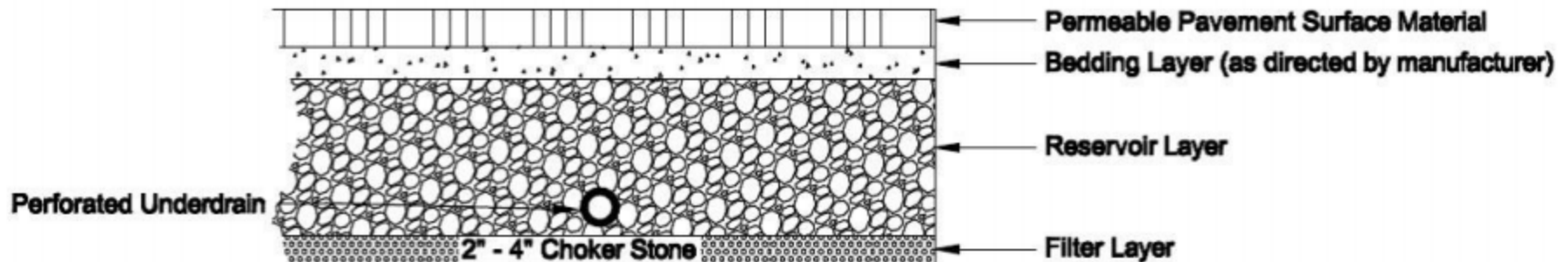
D1: Reservoir depth 6-24 inches (Multiplier: 0.4)	D1: Reservoir depth $\geq$ 24 inches (Multiplier: 0.5)
Area of pavers with reservoir layer beneath	
Cannot credit > 33% of GAR score (total for perm. pavement and enhanced tree growth)	
Credit based on reservoir plus sump (if applicable) depth	
Gravel and soil alone are not credited	
Permeable paving over structure may receive credit, if it drains in 36-48 hours, and a schematic plan showing the flow path of stormwater with the location and type of flow-control roof drains is provided	
Must follow SWM Guidebook feasibility, pretreatment, design, construction, and maintenance criteria, as well as DC Water guidelines.	
Must submit geotechnical report to verify infiltration rates and groundwater table levels.	



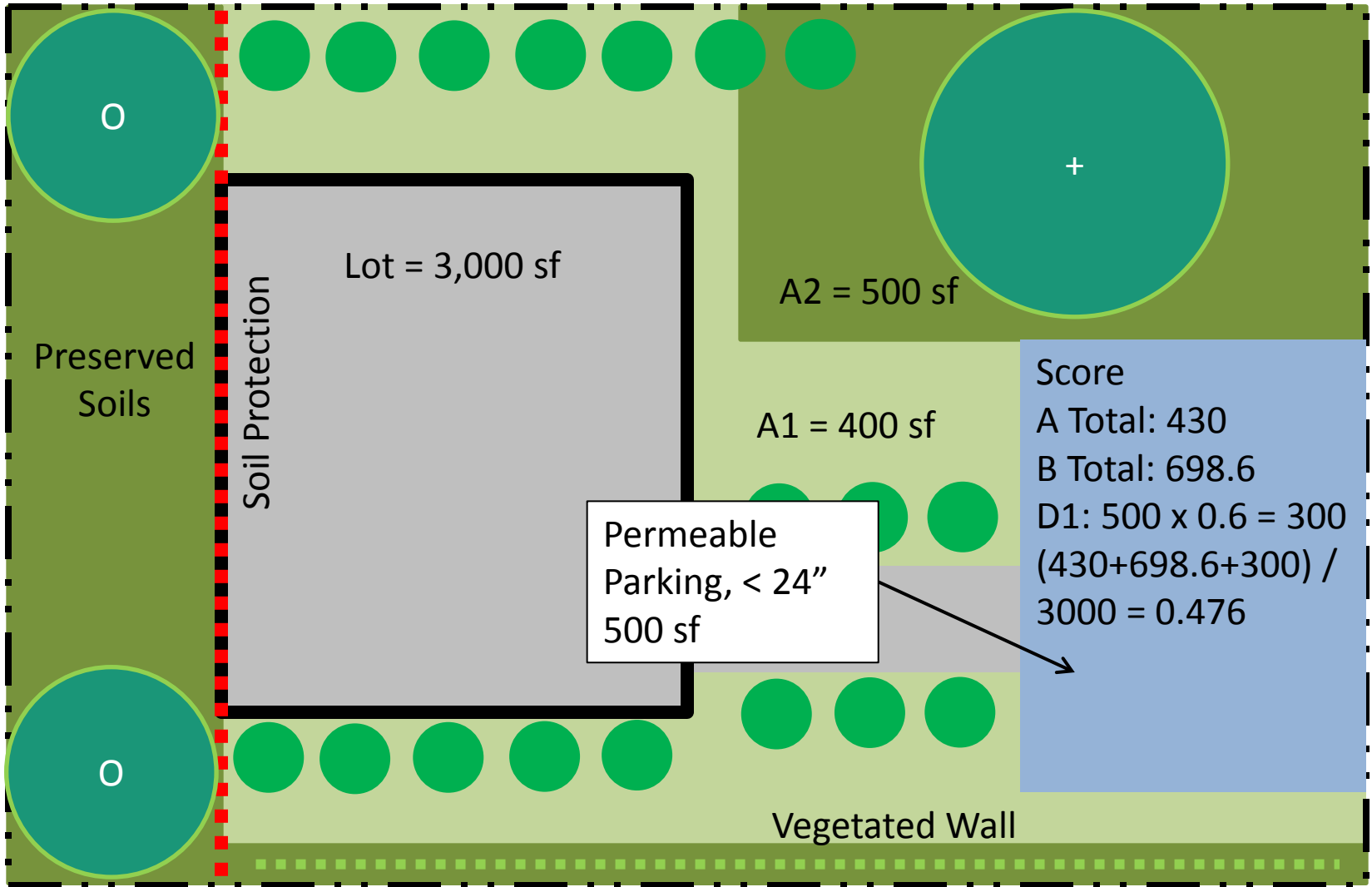
Credits D1-D2: Permeable Pavement

Minimum Submittal Requirements:

- Permeable pavement depth and area shown on plans
- Location of observation wells and underdrains (if underdrains required)
- Details showing material depths and types, type of permeable paving, underdrain (if applicable), observation wells
- Construction sequence, following SWM guidelines
- Drawdown calculations – must drain within 36-48 hours

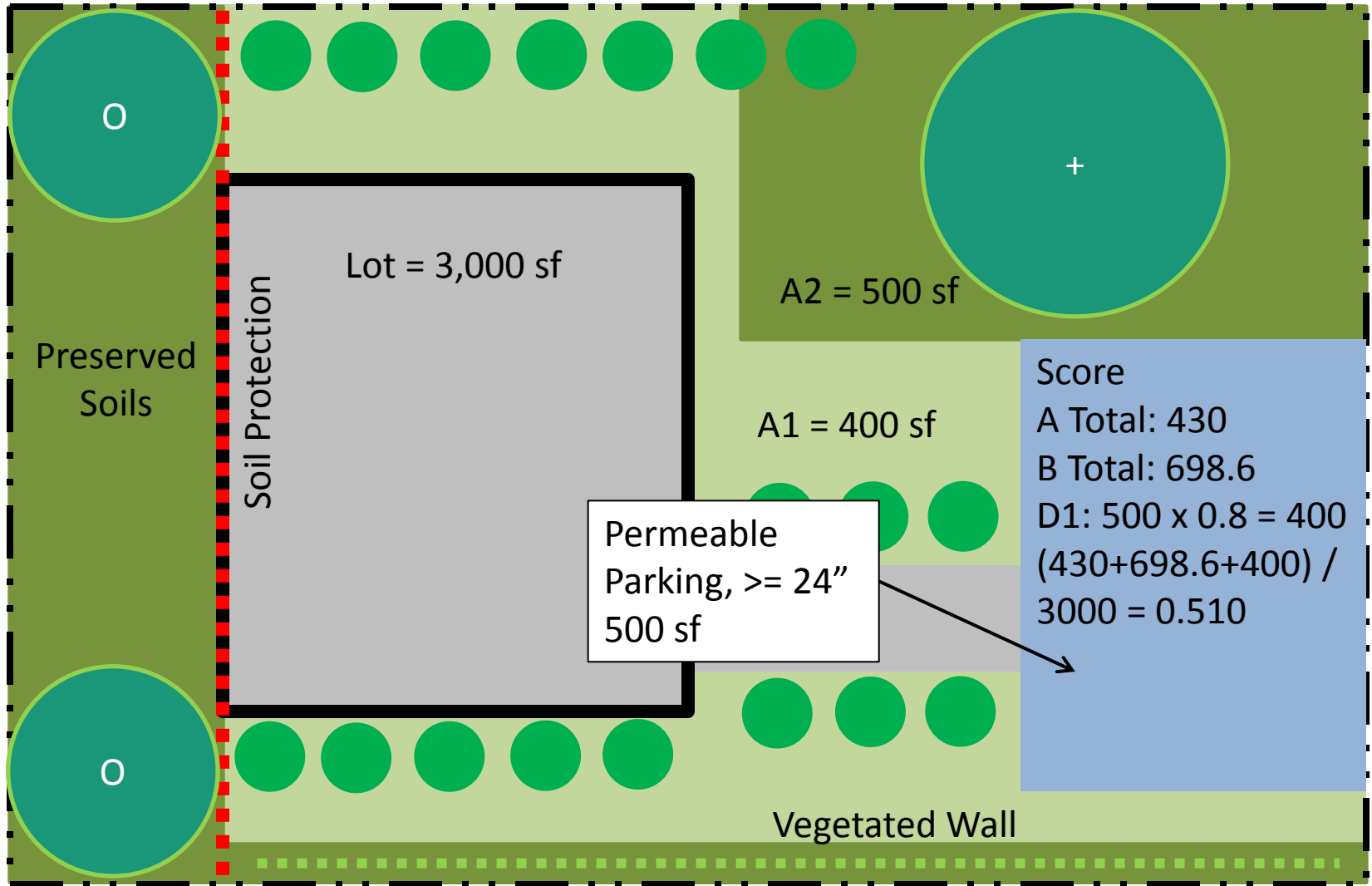


Property Line

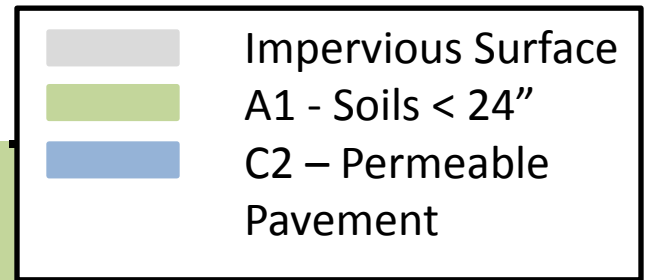


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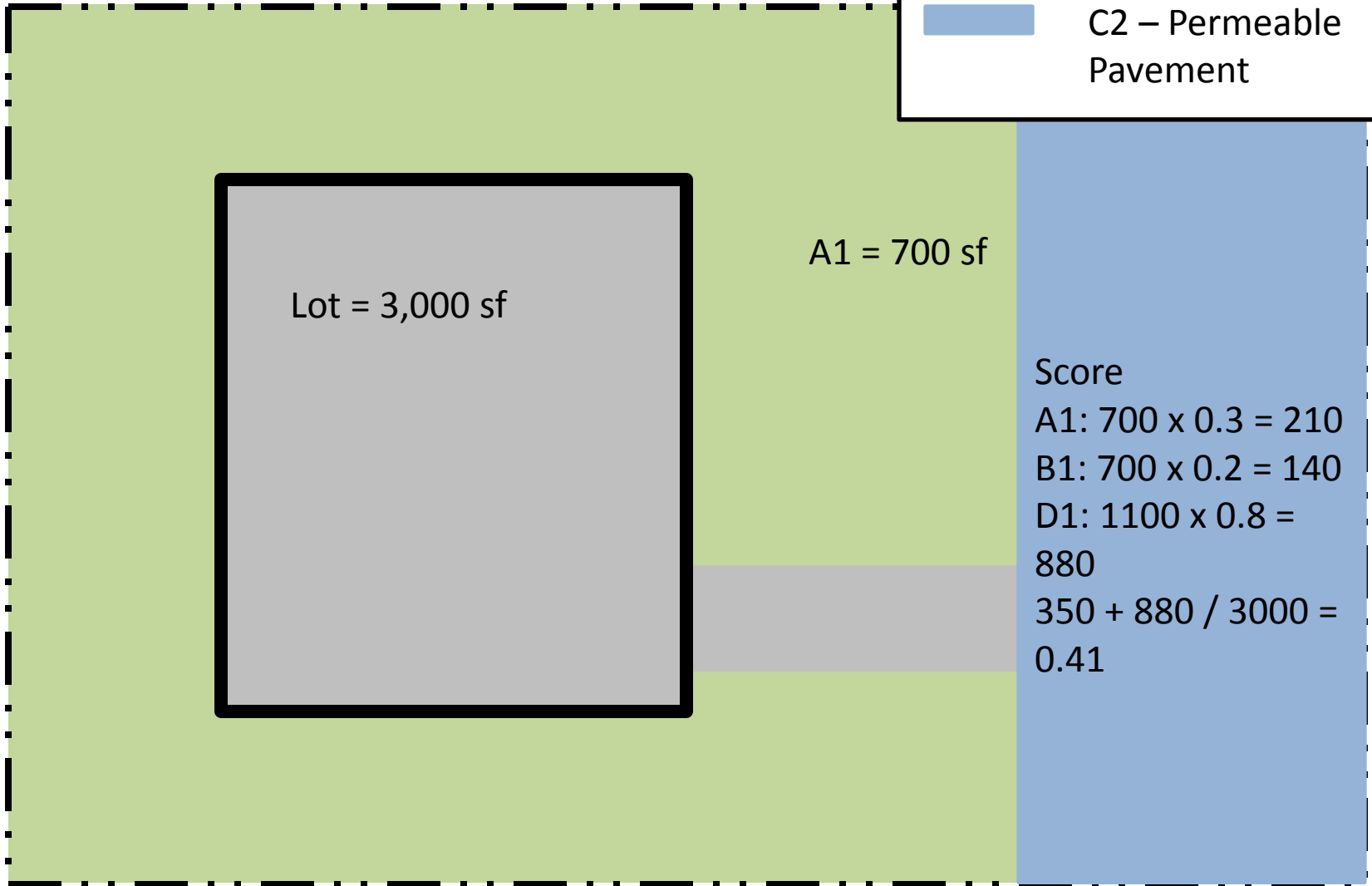
Property Line



Not to scale



Property Line



Score

A1: $700 \times 0.3 = 210$

B1: $700 \times 0.2 = 140$

D1: $1100 \times 0.8 = 880$

$350 + 880 / 3000 = 0.41$

Not to scale

Property Line

- Impervious Surface
- A1 - Soils < 24"
- C2 - Permeable Pavement

$$210 + 140 + 880 = 1230$$

$$880 / 1230 = 71.5\%$$

Permeable pavement & enhanced tree growth systems may not exceed 1/3 of the GAR score.

$$x 0.3 = 210$$

$$x 0.2 = 140$$

$$x 0.8 =$$

$$0 / 3000 =$$

Not to scale

Credit E1: Enhanced Tree Growth Systems

Multiplier: 0.4
Area of soil with structural capacity and located beneath pavers
Cannot credit > 33% of GAR score (total for perm. pavement and enhanced tree growth)
Depth of soil media – 2 feet minimum
Soil media may be credited to both permeable pavers and enhanced tree growth to provide stacked credit
Can contribute to soil volume requirements
Show provide minimum opening 2-3 times the size of mature trunk DBH
Follow SWM Guidebook engineered tree boxes for design guidance

Minimum Submittal Requirements:

- Soil volume areas and calculations
- Specify if using suspended pavement, sand-based structural soil (SS), or aggregate SS



Credit: Cornell University



Credit E2: Renewable Energy

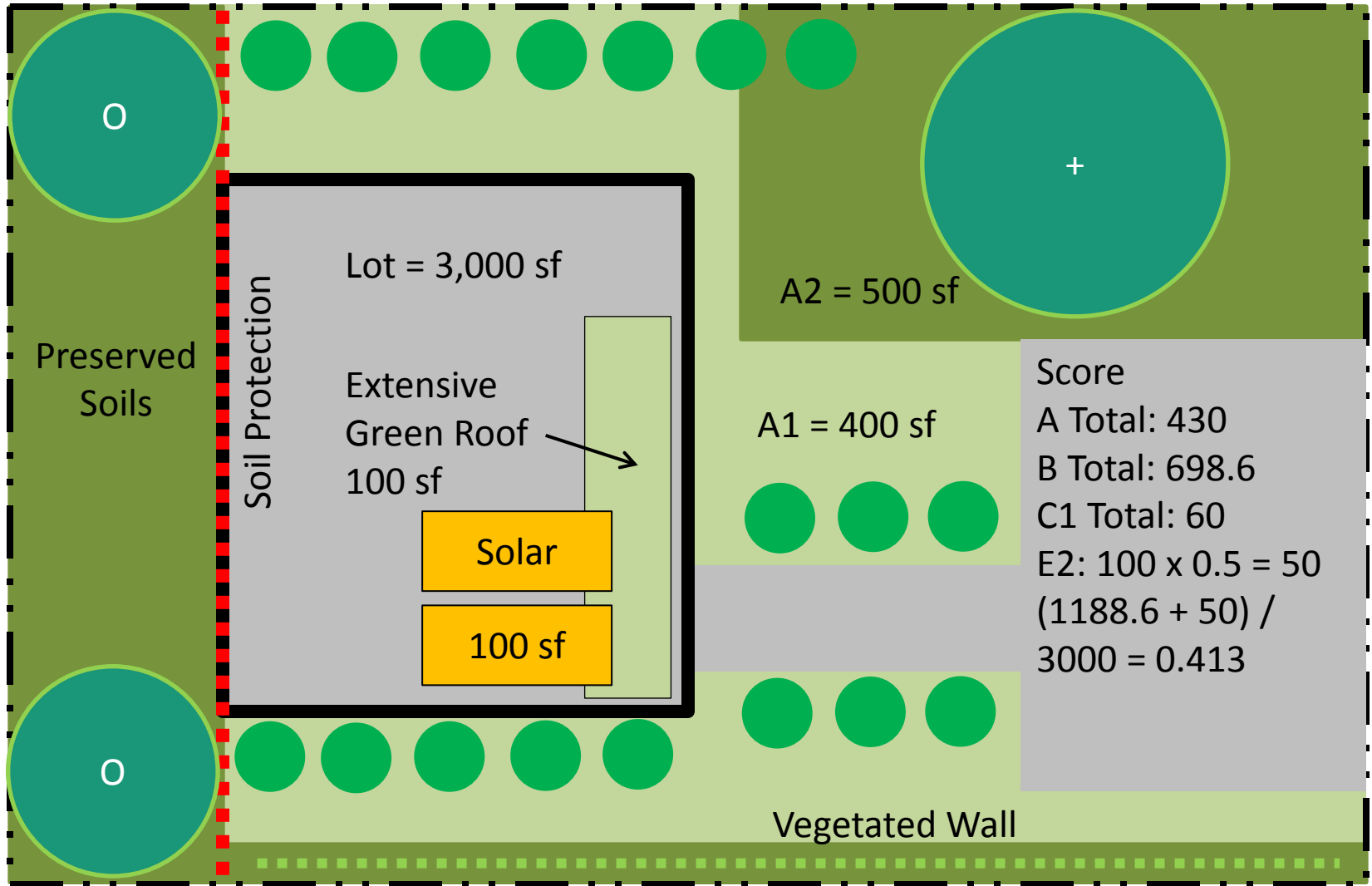
Multiplier: 0.5
Solar photovoltaic and solar thermal
Credit provided to area of array
Green roof below panels may receive full credit, must follow SWM 2017 Errata
Schematic plan for electrical or plumbing systems
Shall comply with applicable DCRA building codes



Minimum Submittal Requirements:

- Supplemental solar permit number
- Reference note on GAR plans listing all electrical, plumbing, mechanical, or other relevant solar sheets
- Schematic solar diagram and solar specifications
- Shading analysis

Property Line



Not to scale

Credit E3: Water Features

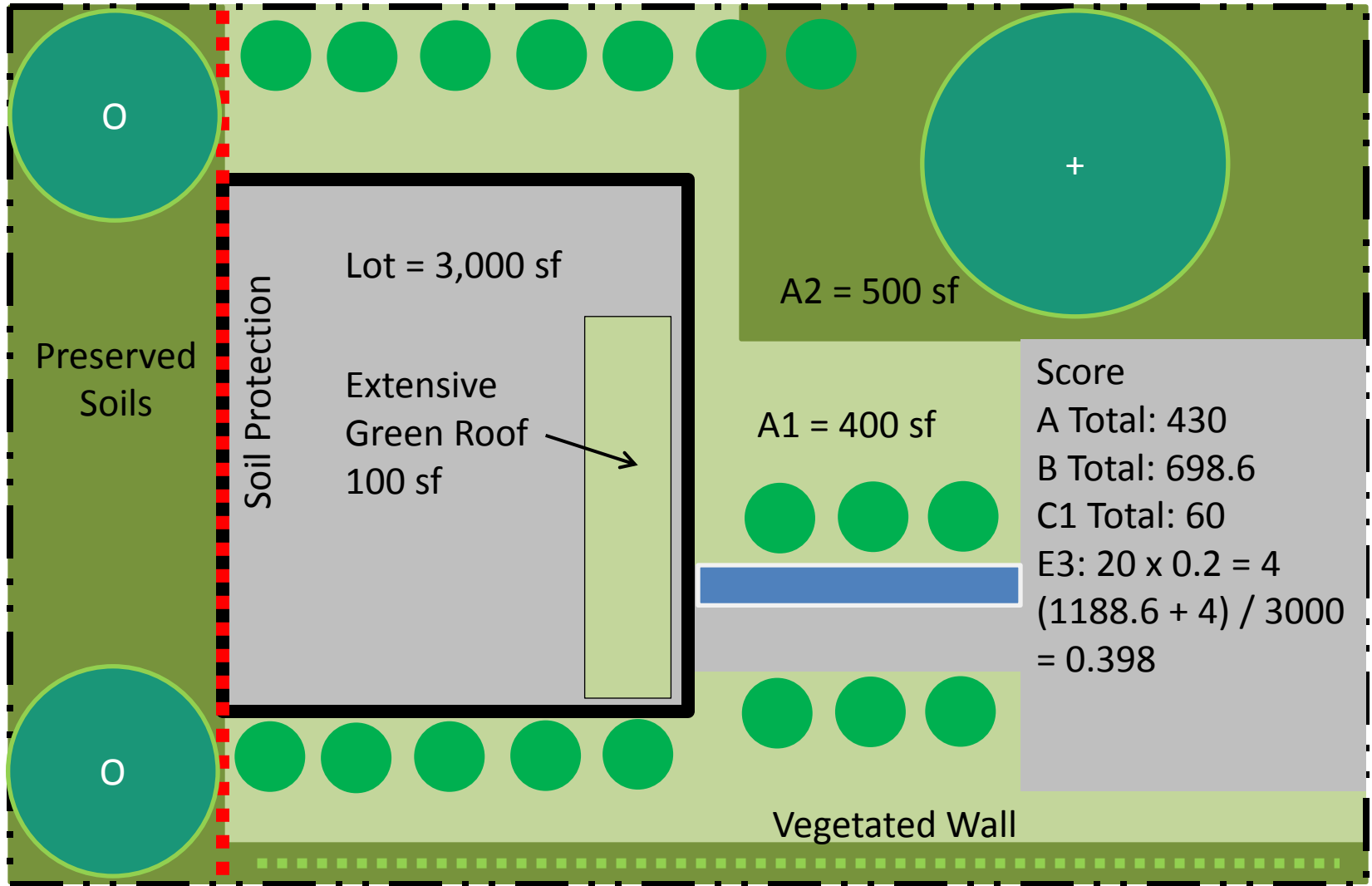
Multiplier: 0.2
Area of water feature to be under water ≥ 6 months per year
Harvested rainwater to provide $\geq 50\%$ of water supply
Schematic plan for electrical or plumbing systems
Must follow SWM Guidebook for harvested rainwater, as well as applicable building codes



Minimum Submittal Requirements:

- Demonstration that harvested stormwater provides at least 50% of annual irrigation
- Water budget indicating percentage of water demand met by rainwater, calculated on monthly and annual basis
- Construction sequence, following SWM guidelines

Property Line



Not to scale

Bonus Element F1: Native Plants

Bonus element (Multiplier: 0.1)	Bonus multiplier may be applied to the following elements
Native plants	New and existing plantings, tree preservation, vegetated wall, vegetated roof

Minimum Submittal Requirements:

- Must first be credited under the landscape element(s) defined above
- Must be listed in the GAR Plant List or the U.S. Fish and Wildlife Service's Native Plants for Wildlife Conservation Landscaping: Chesapeake Bay Watershed Guide
- Or provide 2 references showing the plant is native to the DC region



Native Species Lists

- U.S. Fish and Wildlife Service's Native Plants for Wildlife Conservation Landscaping: Chesapeake Bay Watershed Guide
<http://www.nps.gov/plants/pubs/chesapeake>
<http://nativeplantcenter.net/>

Invasive Species Lists

- Plant Invaders of Mid-Atlantic Natural Areas
 - <http://www.nps.gov/plants/alien/pubs/midatlantic/>
- Mid-Atlantic Exotic Pest Plant Council Plant List
- National Park Service Center for Urban Ecology – Exotic Plant Management Team
- Virginia Invasive Plant Species List

Bonus Element F2: Food Cultivation

Bonus element (Multiplier: 0.1)	Bonus multiplier may be applied to the following elements
Food cultivation	New and existing plantings, vegetated wall, vegetated roof

Minimum Submittal Requirements:

- Must first be credited under the landscape element(s) defined above
- Location, species, and areas designated for food cultivation
- Identify building access
- Identify type and location of water source
- Annual maintenance and crop cover plan

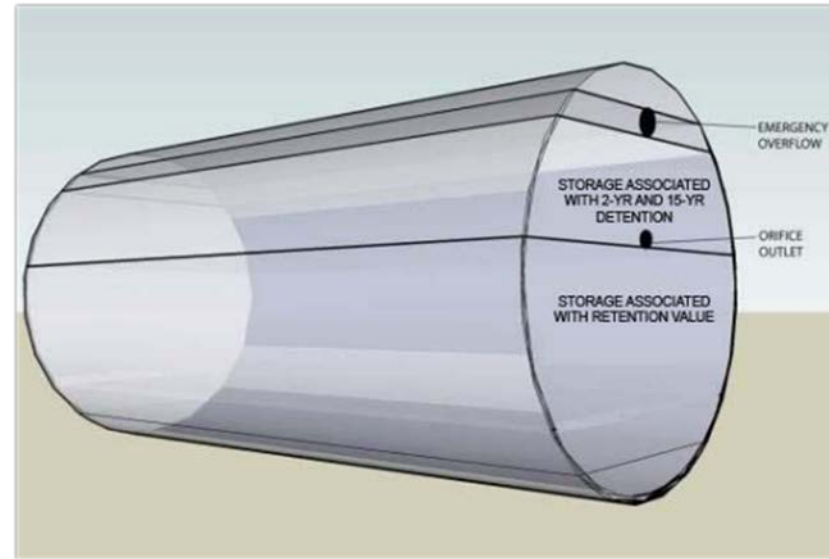


Bonus Element F3: Harvested Rainwater Irrigation

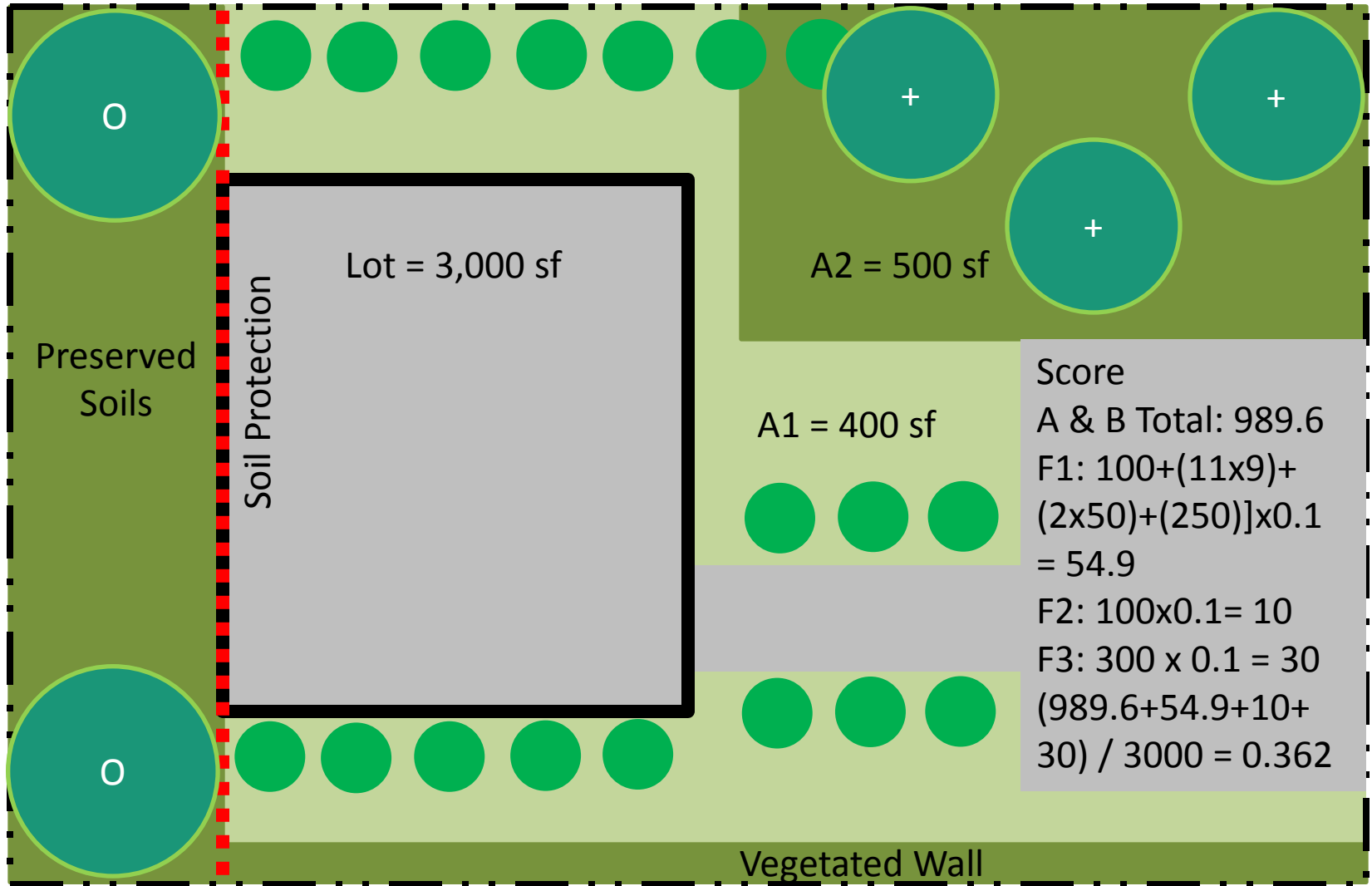
Bonus element (Multiplier: 0.1)	Bonus multiplier must first be applied the following elements
Harvested rainwater irrigation	Landscape soils, new and existing plantings, vegetated wall, vegetated roof

Minimum Submittal Requirements:

- Must first be credited under the landscape element(s) defined above
- Schematic irrigation and drainage plan showing: irrigated areas, delivery system (spray, drip), anticipated water demand, water budget calculated on monthly and annual basis, drainage plan
- Confirm cistern, filters, and pumps are size correctly
- Construction sequence, following SWM guidelines for harvest rainwater



Property Line



Not to scale

Landscape Maintenance Plan

SOILS AND AMENDMENTS

Seasonal application

Mulch – Apply yearly or as necessary to replace decomposed mulch.

Compost – Apply compost yearly at 1–2 inch depth. Coarse textured sand and clay soils require greater compost addition than loamy soils. The organic matter content of the chosen compost will determine the depth applied

Fertilizer – If choosing to apply fertilizer, perform a soil test for nutrient levels only after incorporating compost into topsoil. This will avoid over-application of nutrients, as compost itself will increase the nutrient content.

Material source

Compost should be well-decomposed material, stable, free of weeds, contaminants and foul odors. Compost may be derived from yard waste (decomposed leaves, grass clippings, branches) or food waste.

Mulch can be derived from organic sources such as shredded bark, or leaf mulch.

BIORETENTION

Frequency	Maintenance Tasks
Upon establishment	
For the first 6 months following construction, the practice and CDA should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization.	
Inspectors should look for bare or eroding areas in the contributing drainage area or around the bioretention area, and make sure they are immediately stabilized with grass cover.	
One-time, spot fertilization may be needed for initial plantings.	
Watering is needed once a week during the first 2 months, and then as needed during first growing season (April-October), depending on rainfall.	
Remove and replace dead plants. Up to 10% of the plant stock may die off in the first year, so construction contracts should include a care and replacement warranty to ensure that vegetation is properly established	
At least 4 times per year	
Mow grass filter strips and bioretention with turf cover	
Check curb cuts and inlets for accumulated grit, leaves, and debris that may block inflow	
Twice during growing season	
Spot weed and mulch	
Annually	
Conduct a maintenance inspection	
Supplement mulch in devoid areas to 3" depth	
Prune trees and shrubs	

LANDSCAPE AREAS ALL PLANTINGS

Provide supplemental watering if rainfall is less than 1 inch per week during the first two growing seasons.

Conduct weeding as necessary to reduce competition between weeds and new plantings for nutrients, soil moisture, and sunlight. Replace mulch as necessary to reduce competition for available moisture and nutrients.

Monitor the plantings for disease or stress and modify cultural practice as necessary. Employ an integrated pest management (IPM) approach if possible.

Remove dead plant material and replant in the next appropriate growing season.

TREES AND SHRUBS

For trees, install slow leak watering bags or tree buckets during the first two growing seasons and water as necessary to supplement precipitation if less than 1 inch per week.

Inspect trees for signs of dead, diseased, or crossing branches and prune accordingly. Remove hazard limbs especially from established trees. Never remove more than 20% of the tree canopy during pruning activities in any year.

Spread mulch to 2-4 inch depth.

Maintain the health of the tree by limiting all grade changes and other soil disturbance underneath the tree's Critical Root Zone.

PERENNIALS AND GROUNDCOVERS

In the early spring, deadhead top-growth from perennials and warm-season grasses.

Periodically divide perennials as necessary to encourage rejuvenated growth.

Spread mulch at a maximum 2-inch depth.

TURFGRASS

Test soil for pH and apply lime only as necessary.

Maintain turfgrass at an increased height to reduce weed germination. Never mow more than one third of the grass height. Leaving grass clippings in-place after mowing requires less fertilizer application.

Regularly monitor and over-seed bare spots to prevent weed establishment.

In late fall, core aerate and topdress with organic matter.

VEGETATED WALLS

Living Facades

Periodically inspect roof gutters and drains for clogging with vegetation or debris.

Cable systems may require re-tensioning or inspection of the

When using harvested stormwater irrigation, valves and fertilizer injectors should be checked for function, and the irrigation pipes checked for leaks. Schedule frequent irrigation inspections. Drip irrigation emitters should be checked during operation to ensure water is being delivered to all panels. Winterize irrigation systems as per the irrigation specification. Schedule regular plant maintenance during establishment and ongoing growth. Inspect the vegetated wall for signs of disease, inadequate irrigation, and erosion.

HARVESTED STORMWATER IRRIGATION

Cistern

The cistern must be cleaned yearly. To clean, use a submersible pump to remove the water. Brush walls with a hard bristle brush or use a high pressure cleaner.

Purpose of the maintenance is to remove the sediment that inevitably deposits on the cistern's floor and which may give rise to parasitic fermentation and odor. The rate at which the sediment accumulates depends on the region's atmospheric pollution (for dust), the roof type, and the quality of the set-up upstream from the cistern's storage compartment. A fine mesh filter placed between the roof gutter's main downspout and the sedimentation basin will substantially delay the accumulation of sediment in the barrel or cistern. Additionally, a sedimentation basin equipped with an appropriate trapped overflow that prevents the passage of floating impurities can work. Filters need to be cleaned monthly. Cisterns and rain barrels should be dewatered often to ensure available volume on the onset of rain events.

Irrigation

Conduct frequent inspections to verify integrity of irrigation system.

Periodically review the pressure regulators, filters, controller, sensors, valves, sprinkler heads and other system components to verify they meet original design criteria for efficient operation and uniform water distribution.

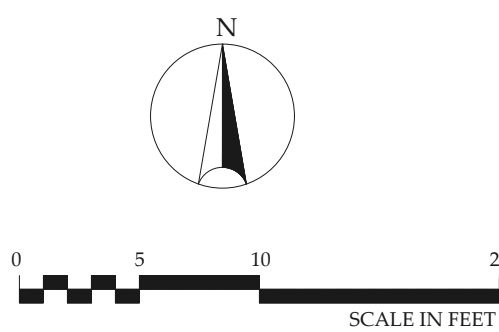
In-Class Demonstration & Examples



REVISIONS		
1	30% Coordination	2/1/18
2	1st Submission	2/12/18
3	2nd Submission	3/6/18

Green Area Ratio Plan

Sheet 1 of 5 (Site Plan & Planting Plan)



site plan

scale: 1/8" = 1'-0"

planting plan

scale: 1/8" = 1'-0"

PLANT SCHEDULE

qty.	common name	botanical name	size	spacing	comments
75	pennsylvania sedge (native)	carex pensylvanica	1 gal. container	12" o.c.	b&b
79	non-turf planting area	bed preparation	sf	on plan	see landscape specs - L102

GREEN AREA RATIO ELEMENTS BY ELEMENT & SIZE

category	landscape element	area
a. landscaped areas	a1 - landscaped areas with a soil depth of less than 24" inches	79 sf (non-turf planting areas)
b. plantings	b2 - plants > 24" at maturity	675 sf (75 grasses @ 9/sf, all native)
d. permeable paving	d2 - permeable paving over at least 24" of gravel	175 sf (rear parking, not including concrete edge)
h. bonuses	h1 - native plant species	675 sf (75 grasses)

STATEMENT BY CERTIFIED LANDSCAPE EXPERT

This is to certify that I have examined all required GAR plan submittals prior to submission. I further certify that all aspects of the submittal, including landscape elements within the Lot and the listed GAR score, meet the specifications required under Subtitle C, Chapter 6 of Title 11 of the District of Columbia Municipal Regulations.

Name and Title

Address

Phone No:

Date:

Certified Landscape Expert Signature: _____ Certifying Organization _____ Certification Number _____

Sheets: LP.101, LP.102, LP.103, LP.104, LP.105

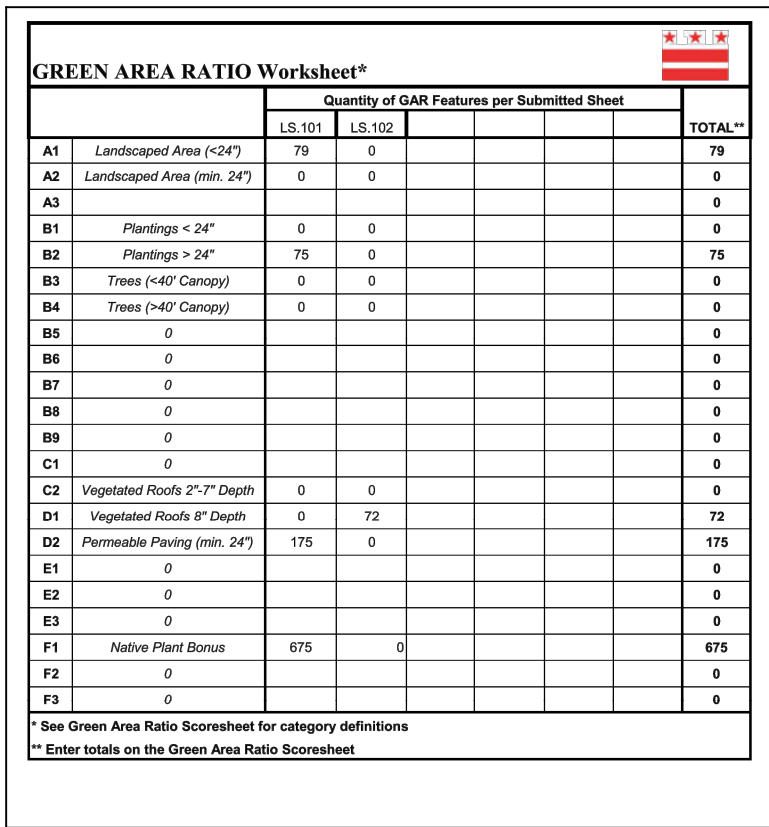
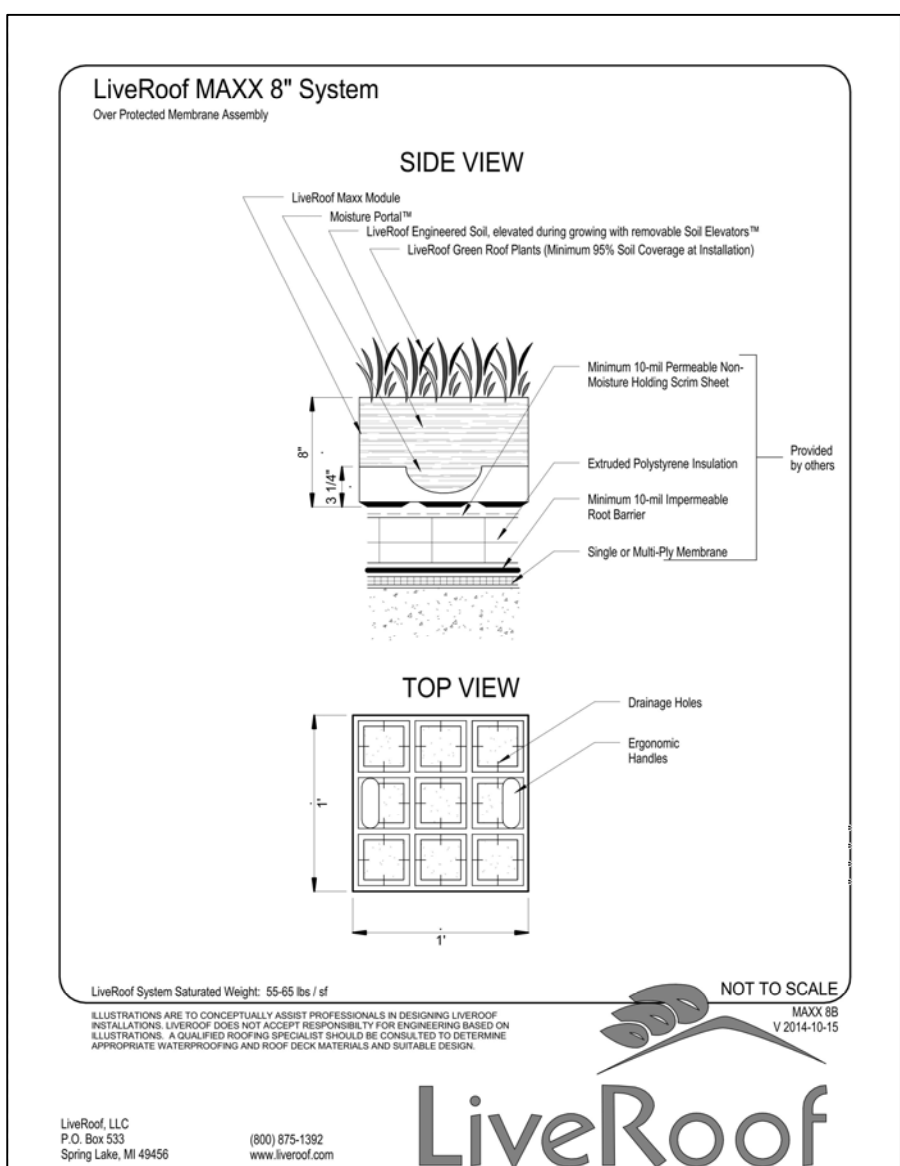
DATE: _____

SCALE:

$$1/8'' = 1'-0''$$

SHEET NUMBER:

L001



*****Lead Times can be as long as 14-16 weeks*****

REVISIONS		
1	30% Coordination	2/1/18
2	1st Submission	2/12/18
3	2nd Submission	3/6/18

Green Area Ratio Plan

Sheet 2 of 5 (Green Roof Planting Plans)



scale: 1/8" = 1'-0"

PLANT SCHEDULE

sf	sedum planting mix	botanical name	size	spacing	comments
72	"evergreen mix" by live roof		cuttings	45-50 per module	min. 95% coverage at installation
		sedum album 'coral carpet'			
		sedum rupestre 'angelina'			
		sedum floriferum 'weiherstephaner gold'			
		sedum sexangulare			
		sedum hybridum 'immergrunchen'			
		sedum spurium 'dragon's blood'			
		sedum reflexum blue blush			
		sedum spurium 'voo doo'			

GREEN AREA RATIO ELEMENTS BY ELEMENT & SIZE

category	landscape element	area
c. vegetated or green roof	c2. green roof (min. 8" deep)	72 sf

Sheets: LP.101, LP.102, LP.103, LP.104, LP.105

DATE: _____

SCALE

Varies

SHEET NUMBER:

L002

General Planting Installation Notes

1.

The contractor is responsible for verifying utility depths and avoiding conflicts when trenching over or across areas where utilities exist.
2.

Contractor to contact 'miss utility' 72 hours prior to the commencement of work on the site. No work is to begin until all utilities are marked. If utility line/tree conflicts are evident, please contact landscape architect.
3.

Verification of the accuracy of the total quantities shown in the plant schedule shall be the responsibility of the contractor. In the event of discrepancy, the planting plan shall govern. Any plant substitutions proposed require the approval of the owner or landscape architect.
4.

All plants shall be nursery grown, well branched, true to type specimen material, free of insect infestation, injury, disease or other defects. Plants are to conform to standards set in american standard for nursery stock and shall meet or exceed measurements specified in the plant schedule.
5.

The contractor shall warrant all new plantings for a period of one year from the date of final acceptance. All replacement plants shall conform to original specifications. When planting operations must be performed outside the normal planting season for the locality, this warranty may be renegotiated with the owner prior to planting.
6.

Planting and bed preparation are to be conducted under favorable weather conditions. Under no circumstances shall soil be worked, driven over, or walked upon while in a wet condition.
7.

The contractor is responsible for reporting to the landscape architect any conditions on site that vary from the plans and that effect installation.
8.

Prune only broken or crossing branches. Do not thin tree canopies.
9.

Contractor to install tree protection fencing as needed and is responsible for replacing any damaged trees on site.
10.

All new planting to be fed with an organic slow release fertilizer.
11.

Contractor is responsible for watering and insect control until the date of final inspection.
12.

The work area is to be kept reasonably neat and clean and all debris hauled away and disposed of legally, off site, in a timely manner.
13.

It shall be the contractor's responsibility to perform all work in a manner that protects completed work by others, such as curbs, utilities, drainage, fences, driveway aprons, drives, vegetation, etc. The contractor shall be responsible for the cost of satisfactory repair of all damage in kind resulting from his failure to comply.

Landscape Specifications

1.

Plant material shall conform in size and grade to american standards for nursery stock.
2.

Plant materials shall be of standard quality of their species or variety. Plants shall be carefully labeled and sizes noted. Right is reserved to reject plants considered as unsatisfactory. Rejected plants shall be removed from site. Plants should not be pruned prior to delivery. Heading- back plants to meet sizes indicated in drawing schedule will not be permitted.
3.

Grass seed / sod - all permanent grass seed / sod shall be listed on the current virginia turf grass variety recommendations and be blue tag certified. All newly laid sod to be rolled with water-filled metal drum to achieve uniform appearance. All sod should be cut and laid within 24 hours.

Plants and Trees

1.

Contractor shall stake the location of each tree and shrub in accordance with the locations shown on the drawing. Staking and layout shall be done sufficiently in advance of planting operation to permit the contracting officer to check, revise if desired, and approve the locations before digging operations begin.
2.

Excavate planting beds and pockets to a depth required for planting. At least 2/3 of ball below finished grade
3.

Remove the burlap, twine, and wire baskets from the top 1/3 of all b&b root balls. No plastic twine or burlap shall be permitted on b&b plants. Planting pits shall be the same depth as root balls.
4.

Any rock or other underground obstruction shall be removed to depth necessary to permit planting according to specification.
5.

Plants shall be treated at the time of planting with anti- desiccant as specified in full accordance with the directions furnished by the manufacturer.
6.

All plant labels and tags to be removed after final inspection.
7.

In general, contractor shall thoroughly water all planted areas after planting and in dry weather. Use enough water to thoroughly soak all tree pits before planting. Contractor shall make necessary arrangements in advance of start of work to insure that an adequate supply of water and watering equipment are available when required.

Mulching

1.

Mulch top of root ball and saucer within 48 hours to a minimum depth of 2" and to a depth not to exceed 3".
2.

All shade and flowering trees shall be mulched with 3 inches thick (settled and covering an area twelve inches greater than the diameter of pit.
3.

All plantings are to be provided with a 3" depth of triple shredded hardwood bark mulch (2" depth in ground cover areas). Mulch to bed lines where shown. Hedges are to be mulched as continuous beds of the width shown on plan (plants are not to be mulched individually). Trees shall be mulched within a minimum three (3) foot radius of each trunk. Re-mulch existing plantings.
4.

No mulch is to be placed in plant crowns or against tree trunks.

Soil and Amendment Specification

Topsoil Physical and Chemical Parameters

Topsoil characteristic	Test Method	Required Standard
Texture class		Loam, silt loam, sandy clay loam, sandy loam, clay loam
% Sand (0.05 mm-2.00 mm)	Hydrometer < 70%	
% Silt (0.002 mm-0.05 mm)	Hydrometer < 70%	
% Clay (<0.002 mm)	Hydrometer < 30%	
% Organic matter (by weight)	Loss of Ignition	Lawn areas (4%-6%), Planting beds (5-7%)
pH		6.0-7.2, specific plantings may require alternate values
Macronutrients & micronutrients		Determined by professional soil scientist

Soil Source

The topsoil and subgrade may be from a naturally occurring soil or soil that has been mixed to achieve the requirements of the plant selections.

Debris Content

Particles and stone greater than 1 inch in the longest dimension should not be allowed. This includes fragments of brick, concrete, wood, glass, metal, stone, and plastic. The total volume less than 1 inch long should not be more than 5% of the soil volume. Stones ranging from 0.5 to 1 inch (1.25 to 2.5 cm) should not exceed 5% of the soil volume, and gravel ¼ to ½ inches (0.6 to 1.25 cm) should not exceed 5% of the soil volume.

Contaminants Prohibited

The soil shall have no herbicides, heavy metals, biological toxins, or hydrocarbons that will impact plant growth.

Texture

Topsoil texture can be variable and include: loam, silt loam, sandy clay loam, sandy loam, clay loam. The percent composition must fall within this range: sand (< 70 %), silt (< 70%), and clay (<30%). Particle size is determined according to USDA Classification: sand (< 0.002mm), silt 0.002mm-0.05 mm, sand (0.05 mm-2 mm).

Soil texture triange (source: USDA NRCS)

Organic Matter

Organic matter should be a minimum of 4% in lawn soils and 5% in planting beds. Percentage organic matter is measured by weight. Incorporate compost to raise organic matter content.

Soil pH

Soil pH determines the availability of nutrients in the soil. The exact pH range is dependent on the plant species to be planted and should be tested and adjusted based on species prior to installation. The ideal pH for most landscape plants falls in the range of 6.0-7.0, however other plants prefer a pH outside this range. A pH of 6.5-7.2 is beneficial to microbial activity that converts nitrogen, phosphorous, and sulfur into forms most available to plants.

Nutrient Recommendations

Have a soil scientist provide recommendations for macronutrients and micronutrients.

Subgrade Preparation

Using a backhoe or similar device, scarify and loosen the subgrade. Remove from the area all debris or stones that are one inch or greater.

Percolation

After preparing the subgrade, conduct a percolation test. Water should readily drain from the soil. Percolation rates of 1-2 inches per hour are preferred if irrigation will be installed. A drainage system should be installed if the native subsoil has a drainage rate less than 1 inch per hour.

Handling, Storage, and Spreading Topsoil

Material shall not be handled or hauled when it is wet, as after a heavy rainfall or if frozen. Soil shall be handled only when the moisture content is less than at field capacity. The Landscape Expert or a professional soil scientist shall be consulted to determine if the soil is too wet to loam. Stockpiles shall be covered during wet weather. Spread topsoil in no greater than 12-inch lifts, using the lightest possible equipment. Compact the topsoil to the proper soil density so that it is suitable for root growth and plant stability.

Soil Density and Compaction

Soil density must be high enough to avoid settlement and low enough to encourage root growth. Using a rod penetrometer, soil and subsoil shall be less than 260 pounds per square inch (psi) throughout the depth of credited soil. Compaction completely inhibits root growth at 300 psi. A rod cone penetrometer should be used to measure compaction when soil moisture is at field capacity, after the soil is wetted but drained. The penetrometer shall be inserted at a rate of 72 inches per minute (1.2 inches/second), according to ASAE Soil Testing Specifications.

SOIL IMPROVEMENT SPECIFICATION (AMENDMENTS)

Compost

Compost shall be derived from plant material and provided by a member of the U.S. Composting Seal of Testing Assurance (STA) program. See www.compostingcouncil.org for a list of local providers. Alternative specifications and/or certifications, such as those administered by the Maryland Department of Agriculture or other agencies, may be substituted, as authorized by DDOE. In all cases, compost material must meet standards for chemical contamination and pathogen limits pertaining to source materials, as well as reasonable limits on phosphorus and nitrogen content to avoid excessive leaching of nutrients. The compost shall be the result of the biological degradation and transformation of plant derived materials under conditions that promote anaerobic decomposition. The material shall be well composted, free of viable weed seeds, and stable with regard to oxygen consumption and carbon dioxide generation. The compost shall have a moisture content that has no visible free water or dust produced when handling the material. It shall meet the following criteria, as reported by the U.S. Composting Council Seal of Testing Assurance Compost Technical Data Sheet provided by the vendor:

1.

100% of the material must pass through a 1/2-inch screen
2.

The pH of the material shall be between 6 and 8
3.

Manufactured inert material (plastic, concrete, ceramics, metal, etc.) shall be less than 1.0%
4.

by weight
5.

The organic matter content shall be between 35% and 65%
6.

Soluble salt content shall be less than 6.0 mmhos/cm
7.

Maturity must be greater than 80%
8.

Stability shall be 7 or less
9.

Carbon/nitrogen ratio shall be less than 25:1
10.

Trace metal test result = “pass”
11.

The compost must have a dry bulk density ranging from 40 to 50 lb/ft3

Compost Application Rate

To achieve a minimum 5% organic matter content, apply compost at the rate specified below.

Add 1.75 inches of compost per 8 inches of existing topsoil and incorporate by rototilling or mixing prior to resspreading stockpiled topsoil. Scarify the subgrade down to a 4-inch depth. Using 35% to 60% organic matter in compost, this will provide a topsoil organic matter rate of 5%. The amended soil and subsoil together provide 12 inches of amended topsoil. For deeper soils, such as planting beds, mix compost and topsoil at the same rate.

The DDOE 2013 Stormwater Management Guidebook, Appendix J, describes compost application rates for impervious cover disconnections and grass swales.

Additional Amendments

Limestone - dolomitic limestone containing no less than 50% total carbonates and 25% total magnesium with a neutralizing value of at least 100%. Acidulant - commercial grade sulfur, ferrous sulfate, and aluminum sulfate for horticultural use.

Fertilizer - granular or pelleted slow-release fertilizer consisting of 50% water-insoluble nitrogen, phosphorous, and potassium in a composition recommended by the soil testing laboratory.

Landscape Maintenance Plan:

Soils and Amendments

Decompaction: Decompact topsoil by tilling or subsoiling and incorporating compost throughout the depth of compacted soil. Do not till soils underneath existing trees; instead consider practices such as mulching under the canopy or air tilling to ameliorate compaction.

Mulch: Apply yearly or as necessary to replace decomposed mulch.

Compost: Apply compost yearly at 1-2 inch depth. Coarse textured sand and clay soils require greater compost addition than loamy soils. The organic matter content of the chosen compost will determine the depth applied

Fertilizer: If choosing to apply fertilizer, perform a soil test for nutrient levels only after incorporating compost into topsoil. This will avoid over-application of nutrients, as compost itself will increase the nutrient content.

Material source: Compost should be well-decomposed material, stable, free of weeds, contaminants and foul odors. Compost may be derived from yard waste (decomposed leaves, grass clippings, branches) or food waste. Mulch can be derived from organic sources such as shredded bark, or leaf mulch.

Landscape Areas

All Plantings:

1. Provide supplemental watering if rainfall is less than 1 inch per week during the first two growing seasons.
2. Conduct weeding as necessary to reduce competition between weeds and new plantings for nutrients, soil moisture, and sunlight.
3. Replace mulch as necessary to reduce competition for available moisture and nutrients.
4. Monitor the plantings for disease or stress and modify cultural practice as necessary. Employ an integrated pest management (IPM) approach if possible.
5. Remove dead plant material and replant in the next appropriate growing season.
6. Remove weeds on a regular basis.

Trees and Shrubs:

1. For trees, install 20-gallon slow leak watering bags (Tree Gator or equal) for the first two growing seasons and water as necessary to supplement precipitation if less than 1 inch per week.
2. Inspect trees for signs of dead, diseased, or crossing branches and prune accordingly. Remove hazard limbs especially from established trees. Never remove more than 20% of the tree canopy during pruning activities in any year.
3. Spread mulch to 2-4 inch depth.
4. Maintain the health of the tree by limiting all grade changes and other soil disturbance underneath the tree's Critical Root Zone.

Perennials and Groundcovers:

1. In the early spring, deadhead top-growth from perennials and warm-season grasses.
2. Periodically divide perennials as necessary to encourage rejuvenated growth.
3. Spread mulch at a maximum 2-inch depth.

Turfgrass:

1. Test soil for pH and apply lime only as necessary.
2. Maintain turfgrass at an increased height to reduce weed germination. Never mow more than one third of the grass height. Leaving grass clippings in-place after mowing requires less fertilizer application.
3. Regularly monitor and over-seed bare spots to prevent weed establishment.
4. In late fall, core aerate and topdress with organic matter.

Tree Preservation

1. The property owner must replace dead trees with an equivalent landscape element to meet the minimum-required GAR score for the site.
2. Where appropriate, spread 3 inches of organic mulch over the soil surface out to the drip line of preserved tree. If preserved trees are clustered, mulch the entire planting area.
3. Mulch should never be more than 4 inches deep or applied to the tree trunk.
4. Apply slow-decomposing organic mulches, such as shredded bark, compost, leaf mulch, or wood chips. Grass clippings and sawdust are not recommended as mulches because they decompose rapidly.
5. As needed, prune dead, diseased, broken or crossing branches. Elevate lower branches to provide clearance for pedestrian and vehicular below. Never prune more than 20% of a tree canopy per year.
6. Existing trees whose roots have been pruned during construction should be watered at least once a week during the first growing season after construction.
7. Water trees deeply and slowly to encourage deeper root growth. Soaker hoses and drip irrigation work best for deep watering of trees.
8. Consult with a qualified professional for tree pruning, fertilization, and hazard condition management.

STATEMENT BY CERTIFIED LANDSCAPE EXPERT

This is to certify that I have examined all required GAR plan submittals prior to submission. I further certify that all aspects of the submittal, including landscape elements within the Lot and the listed GAR score, meet the specifications required under Subtitle C, Chapter 6 of Title 11 of the District of Columbia Municipal Regulations.

Name and Title

Date: Address Phone No:

Certified Landscape Expert Signature: Certifying Organization Certification Number

Sheets: LP.101, LP.102, LP.103, LP.104, LP.105

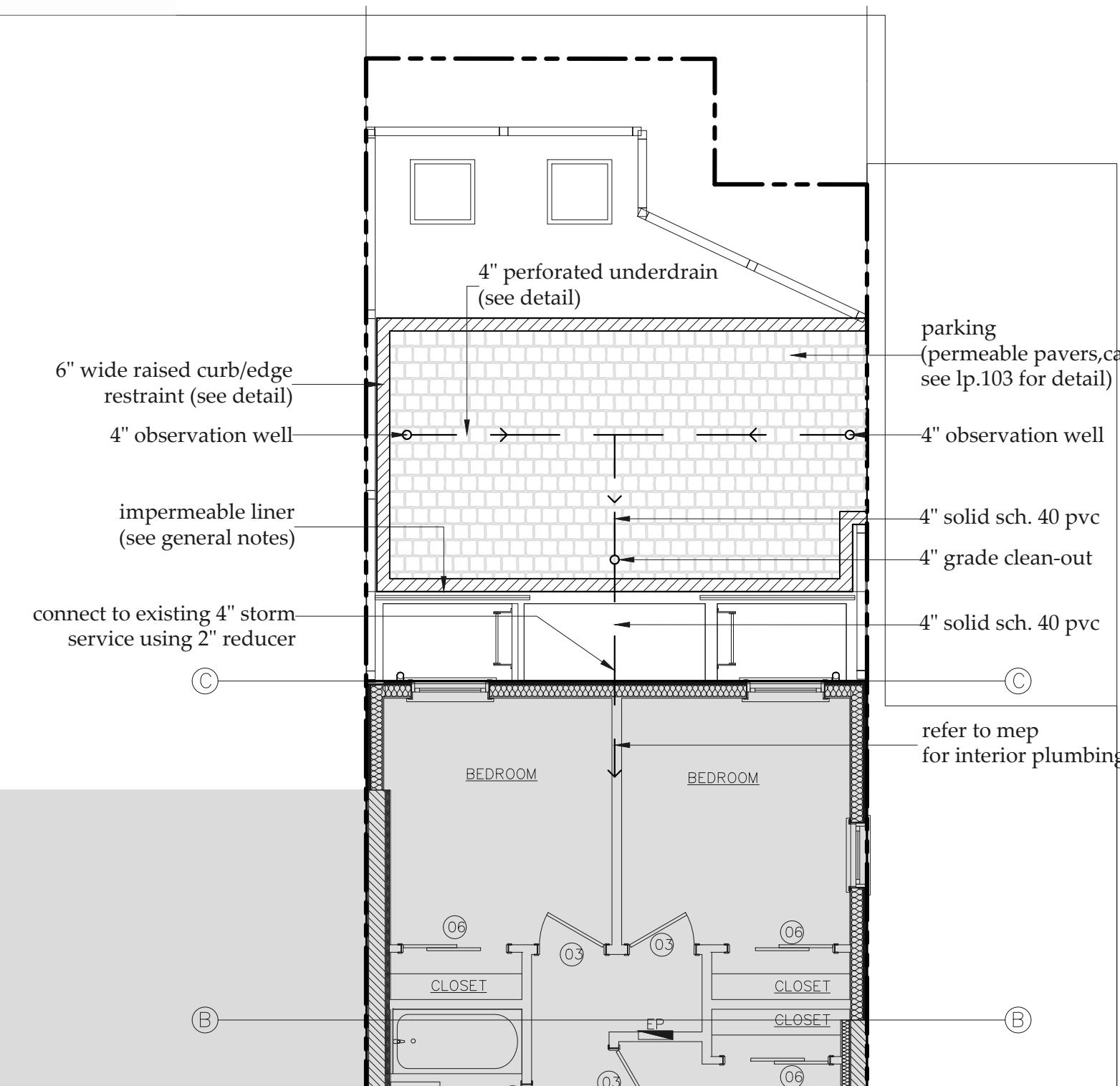
Green Area Ratio Plan
Sheet 3 of 5 (Landscape Specifications)

DATE:

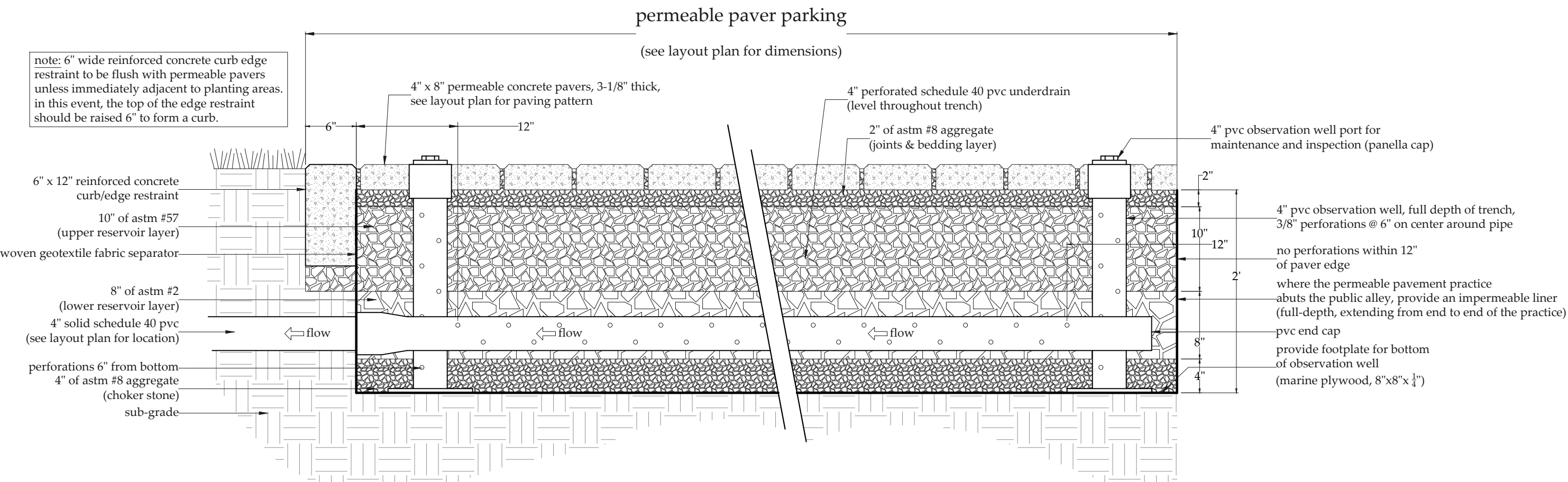
SCALE:
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SHEET NUMBER:

L003



PERMEABLE PAVER ENLARGEMENT PLAN
scale: 3/16" = 1'-0"



TYPICAL PERMEABLE PAVER DETAIL
scale: 1" = 1'-0"

Permeable Paver Installation

(Source: DDOE Stormwater Management Guidebook, Section 3.7, July 2013)

The following is a typical construction sequence to properly install permeable pavement, which may need to be modified depending on the particular type of permeable pavement that is being installed.

- Step 1: Stabilize Drainage Area.** Construction of the permeable pavement should only begin after the entire contributing drainage area has been stabilized. The proposed site should be checked for existing utilities prior to any excavation. Do not install the system in rain or snow and do not install frozen bedding materials.
- Step 2: Install Soil Erosion and Sediment Control Measures for the Bioretention.** As noted above, temporary soil erosion and sediment controls are needed during installation to divert stormwater away from the permeable pavement area until it is completed. Special protection measures, such as erosion control fabrics, may be needed to protect vulnerable side slopes from erosion during the excavation process. The proposed permeable pavement area must be kept free from sediment during the entire construction process. Construction materials contaminated by sediment must be removed and replaced with clean material.
- Step 3: Minimize Impact of Heavy Installation Equipment.** Where possible, excavators or backhoes should work from the sides to excavate the reservoir layer to its appropriate design depth and dimensions. For small pavement applications, excavating equipment should have arms with adequate extension so they do not have to work inside the footprint of the permeable pavement area (to avoid compaction). Contractors can utilize a cell construction approach, whereby the proposed permeable pavement area is split into 500- to 1,000-square foot temporary cells with a 10- to 15-foot wide earth bridge in between, so cells can be excavated from the side. Excavated material should be placed away from the open excavation so as to not jeopardize the stability of the side walls.
- Step 4: Promote Infiltration Rate.** The native soils along the bottom of the permeable pavement system should be scarified or tilled to a depth of 12 inches prior to the placement of the filter layer or geotextile fabric. In large-scale paving applications with weak soils, the soil subgrade may need to be compacted to 95 percent of the Standard Proctor Density to achieve the desired load-bearing capacity.

Note: This may reduce or eliminate the infiltration function of the installation, and it must be addressed during hydrologic design.

- Step 5: Order of Materials.** Geotextile fabric should be installed on the sides of the reservoir layer (and the bottom if the design calls for it). Geotextile fabric strips should overlap down-slope by a minimum of 2 feet and be secured a minimum of 4 feet beyond the edge of the excavation. Where the filter layer extends beyond the edge of the pavement (to convey runoff to the reservoir layer), install an additional layer of geotextile fabric 1 foot below the surface to prevent sediment from entering into the reservoir layer. Excess geotextile fabric should not be trimmed until the site is fully stabilized.
- Step 6: Install Base Material Components.** Provide a minimum of 2 inches of aggregate above and below the underdrains. The up-gradient end of underdrains in the reservoir layer should be capped. Where an underdrain pipe is connected to a structure, there shall be no perforations within 1 foot of the structure. Ensure there are no perforations in clean-outs and observation wells within 1 foot of the surface.
- Step 7: Stone Media.** Spread 6-inch lifts of the appropriate clean, double washed stone aggregate (usually No. 2 or No. 57 stone). Place at least 4 inches of additional aggregate above the underdrain, and then compact it using a vibratory roller in static mode until there is no visible movement of the aggregate. Do not crush the aggregate with the roller.
- Step 8: Reservoir Media.** Install the desired depth of the bedding layer, depending on the type of pavement, as indicated in Table 3.14.
- Step 9: Paving Media.** Paving materials shall be installed in accordance with manufacturer or industry specifications for the particular type of pavement.

General Permeable Paver Notes

- Contractor to verify that no utility conflicts exist. In the event of a conflict, contractor to notify owner and landscape architect.
- Permeable paver details and specifications are to be used as a guide by the contractor. Contractor to verify that permeable paver manufacturer 's recommended installation techniques before installation. In the event of a conflict, contractor to notify owner and landscape architect.
- Permeable pavers to be Techo-Bloc "Inflo" paver or approved equivalent.
- Reservoir layer to be clean, double-washed, aggregate. See Permeable Paver Material Specifications.
- Dimensions of permeable paver parking to be per approved GAR plan.
- Within 10 feet of buildings or structures, use an impermeable liner along the sides of the permeable pavement practice (extending from the surface to the bottom of the practice). See Permeable Paver Material Specifications.
- Along areas where the permeable pavement practice abuts a public alley, install an impermeable liner (full-depth, extending from end to end of the practice). See Permeable Paver Material Specifications.
- Provide a perforated 4" schedule 40 PVC underdrain. See Permeable Paver Material Specifications.

Permeable Paver Material Specifications:

- Bedding Layer: 2" of ASTM D448 size No. 8 stone (e.g., 3/8 to 3/16 inch in size). Must be double-washed and clean and free of all fines.
- Upper Reservoir Layer: 10" of ASTM D448 size No. 57 stone (e.g., 1 1/2 to 1/2-inch in size). Must be double-washed and clean and free of all fines
- Lower Reservoir Layer: 12" of No. 2 Stone (e.g., 3 inches to 3/4 inches in size). Must be double-washed and clean and free of all fines.

Material Specification Notes:

- Underdrain: Use 4 inch diameter perforated schedule 40 PVC pipe, with 3/8-inch perforations at 6 inches on center. Perforations to start 12" inside of the permeable pavement cell. Perforated pipe to be installed for the full length of the permeable pavement cell, and non-perforated pipe, as needed, is used to connect with the storm drain system. T's and Y's should be installed as needed, depending on the underdrain configuration. Observation wells to be located at each end of the underdrain and extend to the surface.
- Geotextile: The underlying native soils should be separated from the stone reservoir by geotextile. Use an appropriate geotextile fabric that complies with AASHTO M-288 Class 2, latest edition, requirements and has a permeability of at least an order of magnitude higher (10x) than the soil subgrade permeability.
- Impermeable Liner: Use a thirty mil (minimum) PVC Geomembrane liner (follow manufacturer's instructions for installation)
- Observation Well: Use a perforated 4-inch vertical, schedule 40 PVC pipe with panella type cleanout top.

Permeable Paver Maintenance

(Source: DDOE Stormwater Management Guidebook, Section 3.5.7, July 2013)

Maintenance is a required and crucial element to ensure the long-term performance of permeable pavement. The most frequently cited maintenance problem is surface clogging caused by organic matter and sediment. Periodic street sweeping will remove accumulated sediment and help prevent clogging; however, it is also critical to ensure that surrounding land areas remain stabilized. The following tasks must be avoided on ALL permeable pavements:

- Sanding
- Re-sealing
- Re-surfacing
- Power washing
- Storage of snow piles containing sand
- Storage of mulch or soil materials
- Construction staging on unprotected pavement

It is difficult to prescribe the specific types or frequency of maintenance tasks that are needed to maintain the hydrologic function of permeable pavement systems over time. The frequency of maintenance will depend largely on the pavement use, traffic loads, and the surrounding land use. One preventative maintenance task for large-scale applications (e.g., parking lots) involves vacuum sweeping on a frequency consistent with the use and loadings encountered in the site. Many experts consider an annual, dry-weather sweeping in the spring months to be important. The contract for sweeping should specify that a vacuum sweeper be used that does not use water spray, since spraying may lead to subsurface clogging. Typical maintenance tasks are outlined below:

Typical Maintenance Tasks for Permeable Pavement Practices

- After installation:**
- For the first 6 months following construction, the practice and CDA should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization.

Once every 1-2 months during the growing season:

- Mow grass in grid paver applications

As needed:

- Stabilize the CDA to prevent erosion
- Remove any soil or sediment deposited on pavement.
- Replace or repair any pavement surfaces that are degenerating or spalling

2-4 times per year (depending on use):

- Conduct a maintenance inspection
- Spot weed for grass applications

Annually:

- Conduct a maintenance inspection
- Spot weed for grass applications

Once every 2-3 years:

- Remove any accumulated sediment in pretreatment cells and inflow points

If clogged:

- Conduct maintenance using a regenerative street sweeper or a vacuum sweeper
- Replace any necessary joint material

Seasonal Maintenance Considerations:

- Winter maintenance for permeable pavements is similar to standard pavements, with a few additional considerations: Large snow storage piles should be located in adjacent grassy areas so that sediment and pollutants in snowmelt are partially treated before they reach the permeable pavement.
- Sand or cinders should never be applied for winter traction over permeable pavement or areas of standard (impervious) pavement that drain toward permeable pavement, since it will quickly clog the system.
 - When plowing plastic reinforced grid pavements, snow plow blades should be lifted 1/2 inch to 1 inch above the pavement surface to prevent damage to the paving blocks or turf. Porous asphalt (PA), pervious concrete (PC), and some permeable pavers (PP) can be plowed similar to traditional pavements, using similar equipment and settings.
 - Chloride products should be used judiciously to deice above permeable pavement designed for infiltration, since the salt will be transmitted through the pavement. Salt can be applied but environmentally sensitive deicers are recommended. Permeable pavement applications will generally require less salt application than traditional pavements.

When permeable pavements are installed on private residential lots, homeowners will need to (1) be educated about their routine maintenance needs and (2) understand the long-term maintenance plan. It is recommended that a qualified professional conduct a spring maintenance inspection and cleanup at each permeable pavement site, particularly at large-scale applications.

STATEMENT BY CERTIFIED LANDSCAPE EXPERT		
This is to certify that I have examined all required GAR plan submittals prior to submission. I further certify that all aspects of the submittal, including landscape elements within the Lot and the listed GAR score, meet the specifications required under Subtitle C, Chapter 6 of Title 11 of the District of Columbia Municipal Regulations.		
Name and Title		
Address		
Date:	Phone No:	
Certified Landscape Expert Signature: _____ Certifying Organization _____ Certification Number _____		
Sheets: LP.101, LP.102, LP.103, LP.104, LP.105		

Green Area Ratio Plan

Sheet 5 of 5 (Permeable Paver Details & Specs.)

DATE:
SCALE: Varies
SHEET NUMBER: L005

Questions & Answers

For additional information:

doee.dc.gov/GAR