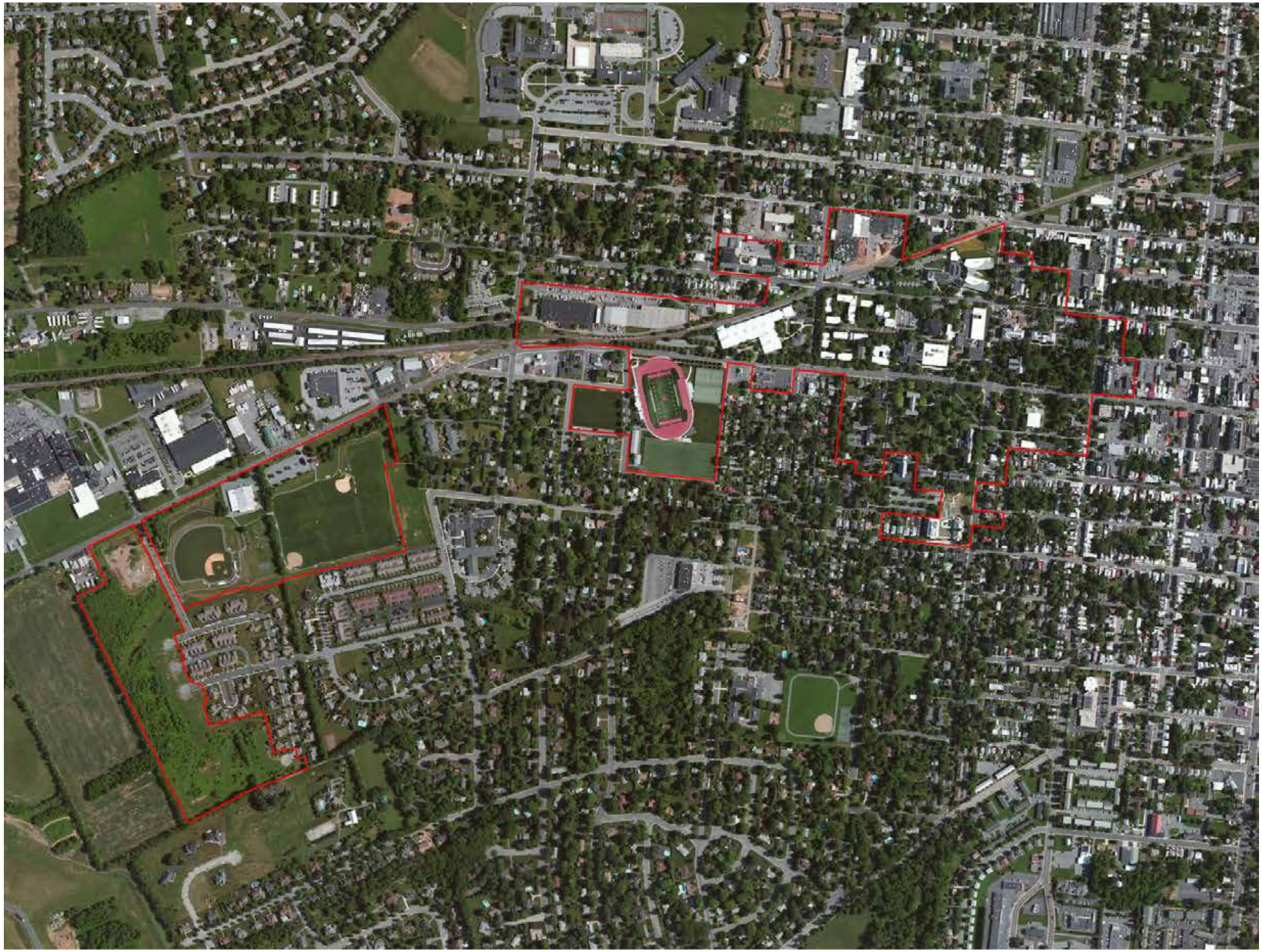

Dickinson

Landscape Design Guidelines

Dickinson is committed to educating for a sustainable world, reducing our ecological footprint, cutting our net emissions greenhouse gases to zero, and advancing sustainability goals globally, nationally and in the communities in which we reside, work and study. Our commitment follows from our long-standing mission – to prepare young people, by means of a useful education in the liberal arts and sciences, for engaged lives of citizenship and leadership in the service of society.

Guidelines Team + Acknowledgements

Dickinson College Acknowledgements

Nancy Roseman, President

Steering Committee

Sylvia Smith, Board of Trustees

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Vicki Rotz, Executive Assistant
Thomas Queenan, Former Vice President for Finance + Administration

Operations + Facilities Management

Ken Shultes, Associate Vice President for Campus Operations + Director of Facilities Management
Randall Nenninger, Manager of Grounds
Scott Nobel, Campus Arborist

Marketing + Communications

Stephanie Balmer, Vice President for Enrollment, Marketing +Communications + Dean of Admissions
Kim Nichols, Director of Design Services

Landscape Design Guidelines Team

Dickinson College Steering Committee

Sylvia Smith
Ken Shultes
Randall Nenninger

Andropogon Associates

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Donna Shumpert, Landscape Designer
Ekta Gupta, Landscape Designer

Publish Date: March 2014

Dickinson

Andropogon

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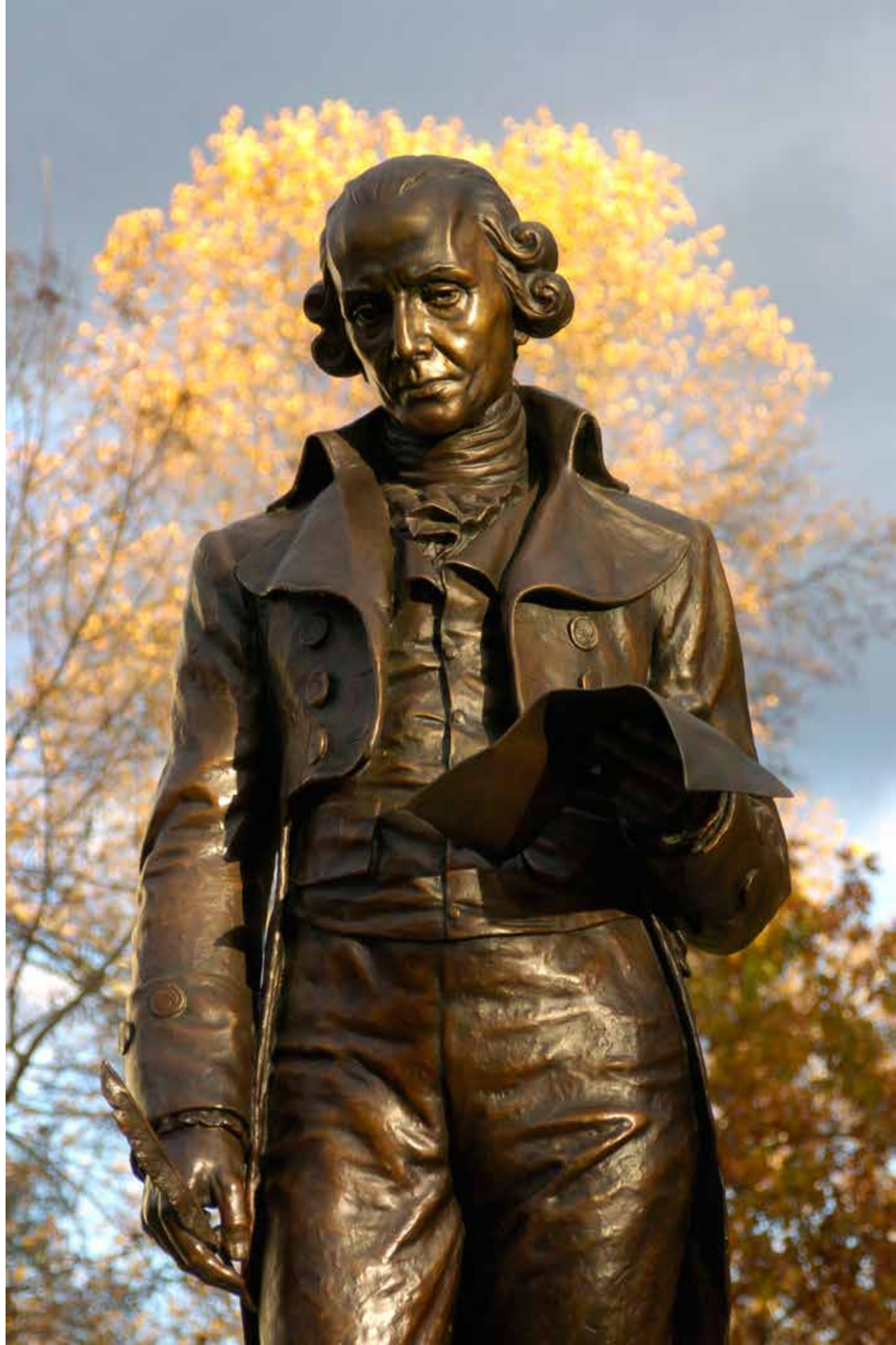


Introduction

Purpose + Goals

The purpose of the Landscape Management Guidelines and Landscape Management Plan is to provide Dickinson College a flexible, yet unifying framework for the design and management of the landscape. This guidance aims to balance several goals from the various stakeholders:

- Honor the character-defining features of the historic Dickinson College Campus,
- Unify the aesthetic of the Campus through material choices, and
- Reflect the values of the College through design and management, including the College's commitment to sustainability

Additionally, the purpose of the document is to serve as a "living document," a document which evolves and updates overtime as lessons are learned after implementation. The selection of this format is a recognition that master planning efforts never end at the time of printing and that such documents' purpose are not to be a prescriptive means to an end, but a flexible framework that communicates a conceptual framework to achieve one's goals and a canvas for record keeping.

Use

The guidelines are meant to be used by design teams and the university to ensure consistency in landscape design choices throughout the campus. The guidelines are not meant to restrict creativity or individual expression in building architecture and their immediate surroundings. The guidelines should be used to establish baselines for sustainability goals.

Scope

The scope of this effort is divided into 4 scope items:

1. Data Collections, Inventory + Review of Existing Information/ Reports
2. Site Analysis + Initial Recommendations
3. Landscape Design Guidelines Booklet
4. Landscape Management Plan

Process

The process of this effort to-date has occurred over the course of a year-and-a-half. Within that time frame, there have been a series of project update meetings, milestone presentations, and site visits with the Guidelines Team as listed below. The Steering Committee met at critical times within each phase to make major decisions. All meeting agendas, meeting notes, and site visit documentation can be found in the appendices.

Data Collections, Inventory + Review of Existing Information/ Reports

June 13, 2012	Site Visit
June 28, 2012	Site Visit
July 18, 2012	Campus Guidelines Kick-off and Presentation*

Site Analysis + Initial Recommendations

July 18, 2012	Site Visit
August 3, 2012	Initial Recommendations for Pavement Systems Presentation*
August 23, 2012	Stafford-Kline-Guidelines Meeting and Presentation and Site Visit
September 7, 2012	Initial Recommendations for Hardscape Systems Presentation and Site Visit*
October 22, 2012	Material and Site Furnishing Review Presentation
February 20, 2013	Update- Tasks A and B 95% Completion

Landscape Design Guidelines Booklet and Landscape Management Plan

April 4, 2013	Planting, Signage and Hardscape Guidelines Progress Presentation
November 8, 2013	Landscape Design Guidelines Update Presentation*

* Indicate steering committee meetings

Sustainability Goals

Dickinson College

- Adhere to sustainability goals set forth in the Master Plan and Dickinson Dimensions
- Create material palettes that create a unified outdoor environment and reflect the unique character of the College and region

Materials

- Choose landscape materials that are local and have a low impact on the environment
- Limit waste by reusing, recycling and composting

Climate + Energy

- Contribute to the President's Climate Commitment (ACUPCC) and aim for net-zero carbon emissions
- Reduce emissions
- Increase tree canopy cover and protect existing trees to sequester carbon and cool buildings

Healthy Community

- Create a healthy environment for employees, students and visitors Support a safe, pedestrian-oriented campus
- Create spaces for passive and active recreation and support social activity
- Be good neighbors by minimizing 'spillover' impacts to neighboring properties
- Create outdoor spaces that are educational

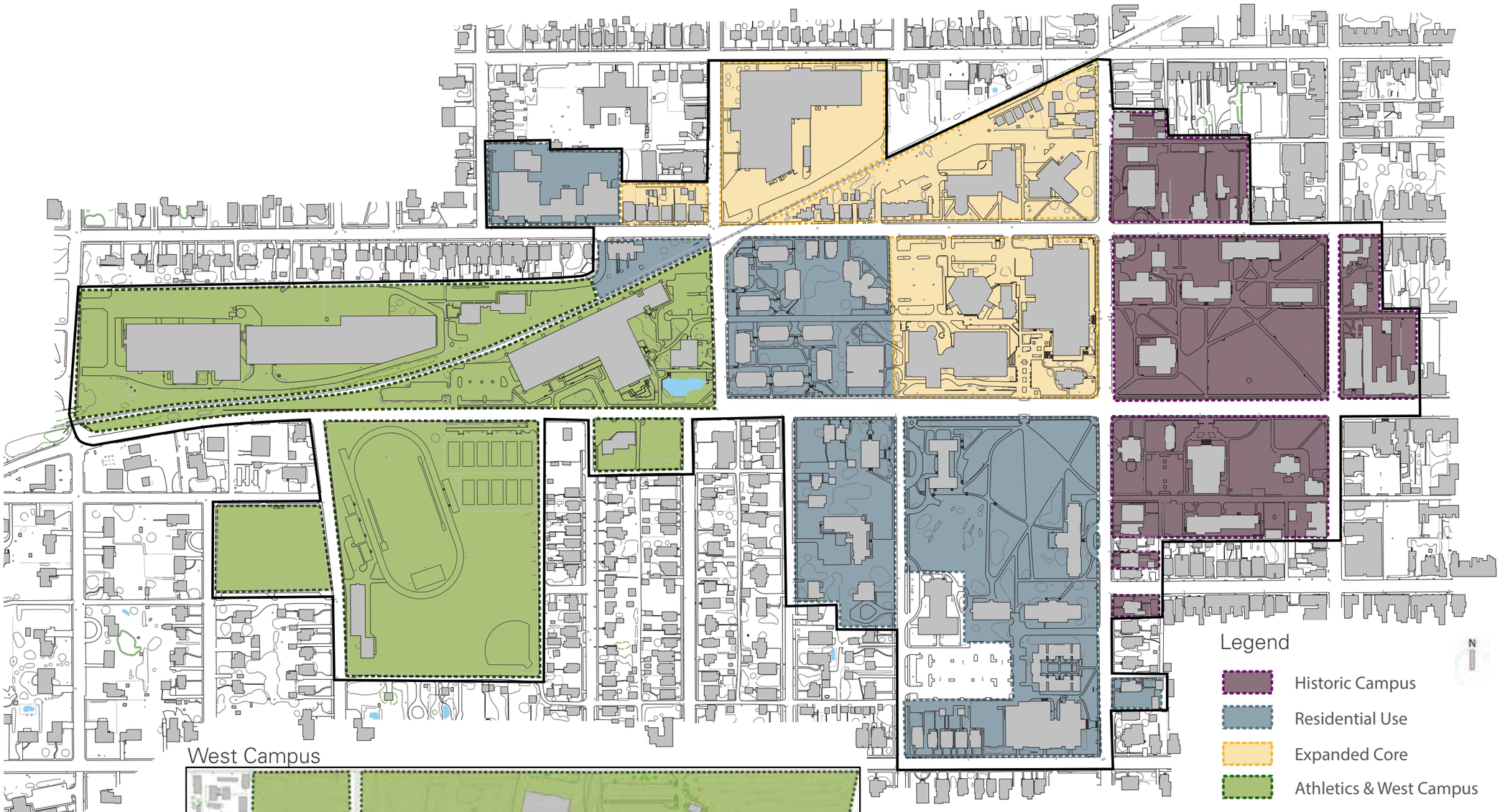
Ecology

- Reduce stormwater runoff and improve stormwater quality
- Create habitat for native wildlife that is also aesthetically pleasing

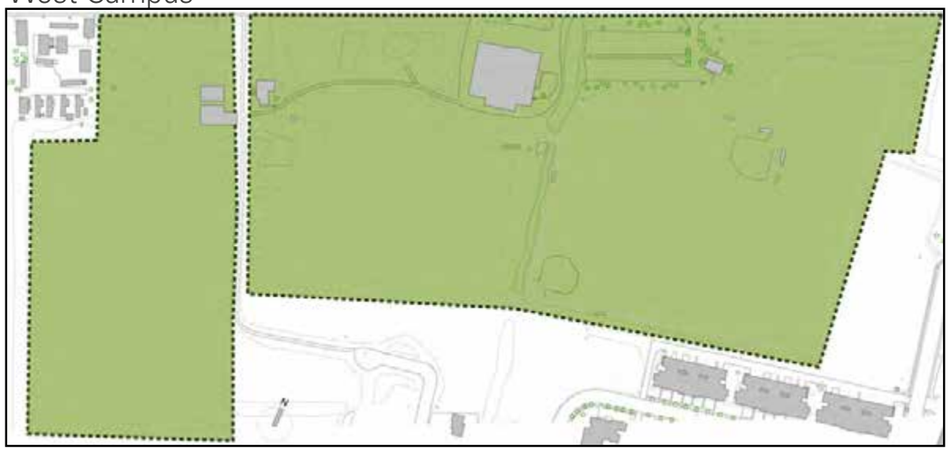
Part II: Landscape Design Guidance

Character Zones

Overall

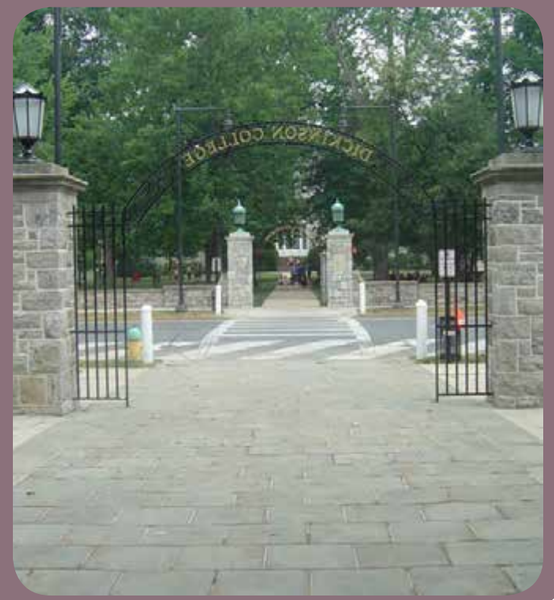


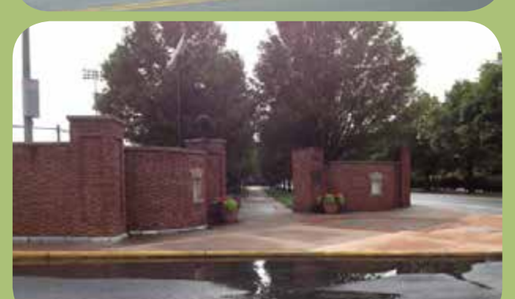
West Campus



Character Zones

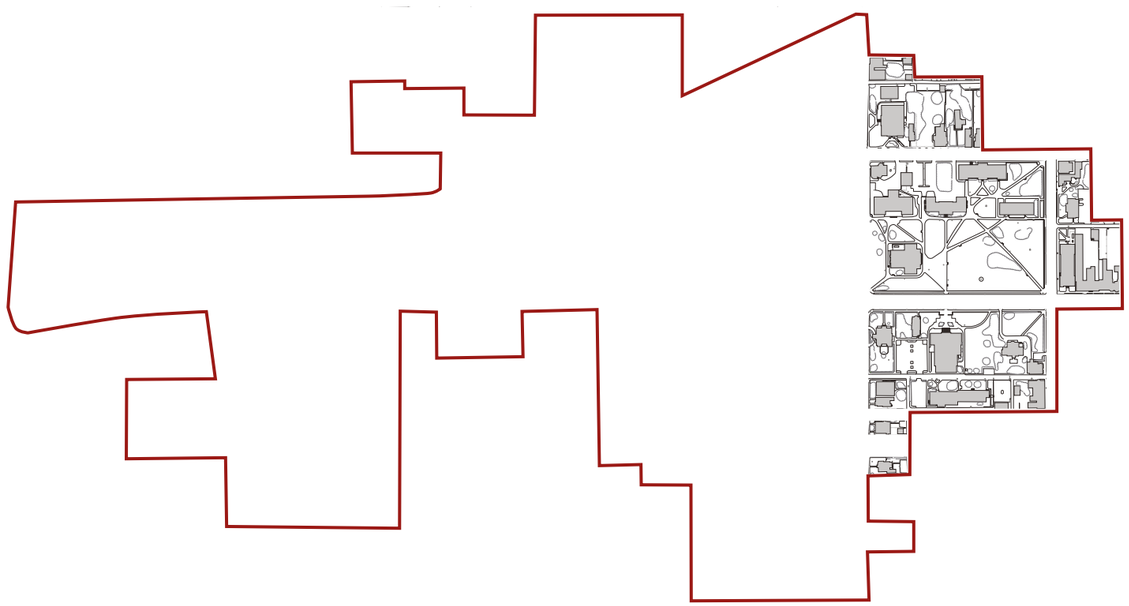
Existing Character

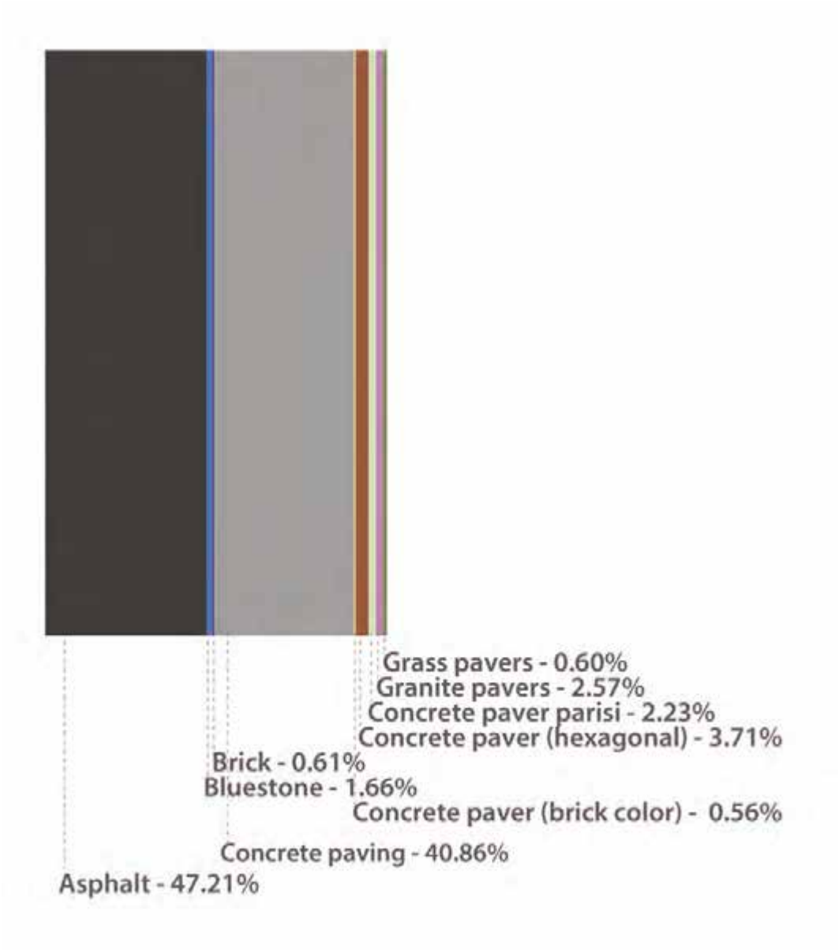




Hardscape

Inventory | Historic Campus

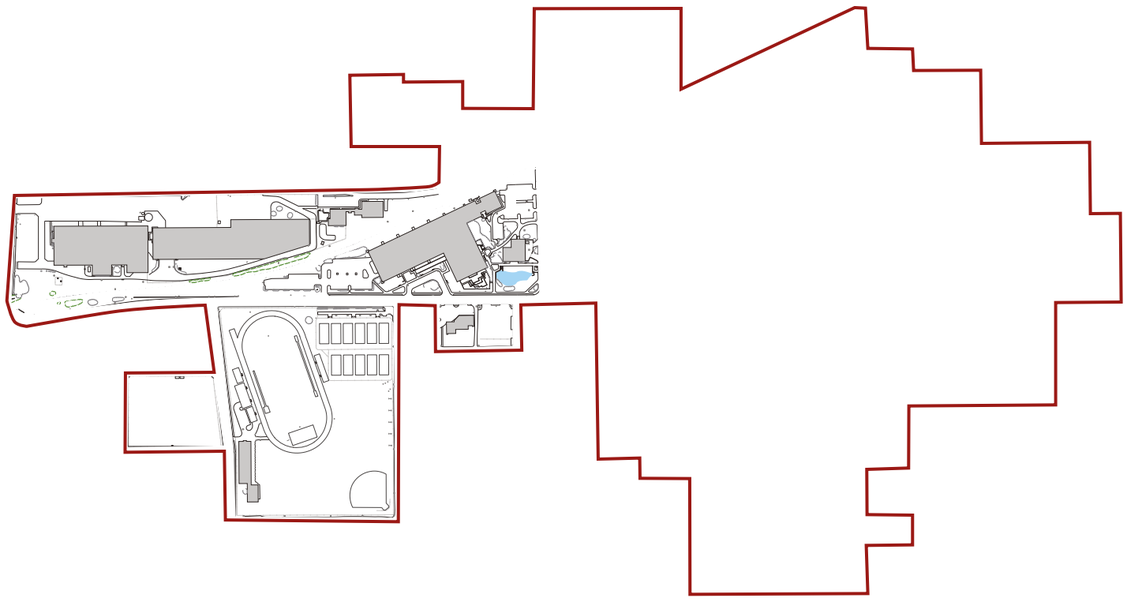


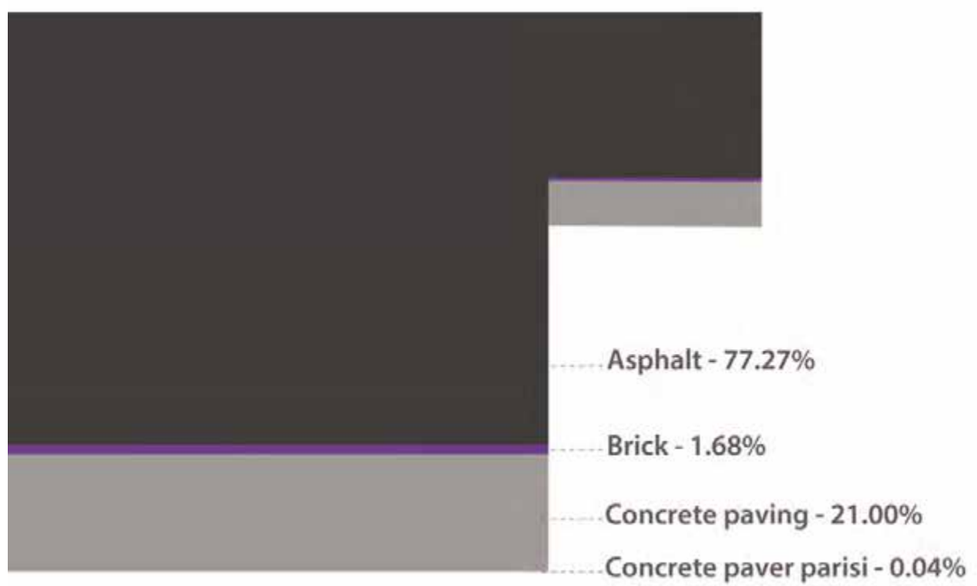


S.No.	MATERIALS	HISTORIC CAMPUS (sq km)	HISTORIC CAMPUS (%)
1	ASPHALT	0.6018	47.21 %
2	ASPHALT-CONCRETE COMBO	0	0.00 %
3	BLUESTONE	0.0211	1.66 %
4	BRICK	0.0078	0.61 %
5	CONCRETE	0.5208	40.86 %
6	CONCRETE PAVER- BRICK COLOR	0.0071	0.56 %
7	CONCRETE PAVER - HEXAGONAL	0.0473	3.71 %
8	CONCRETE PAVER PARISIAN	0.0284	2.23 %
9	GRANITE PAVERS	0.0327	2.57 %
10	GRASS PAVERS	0.0077	0.60 %

Hardscape

Inventory | West Campus

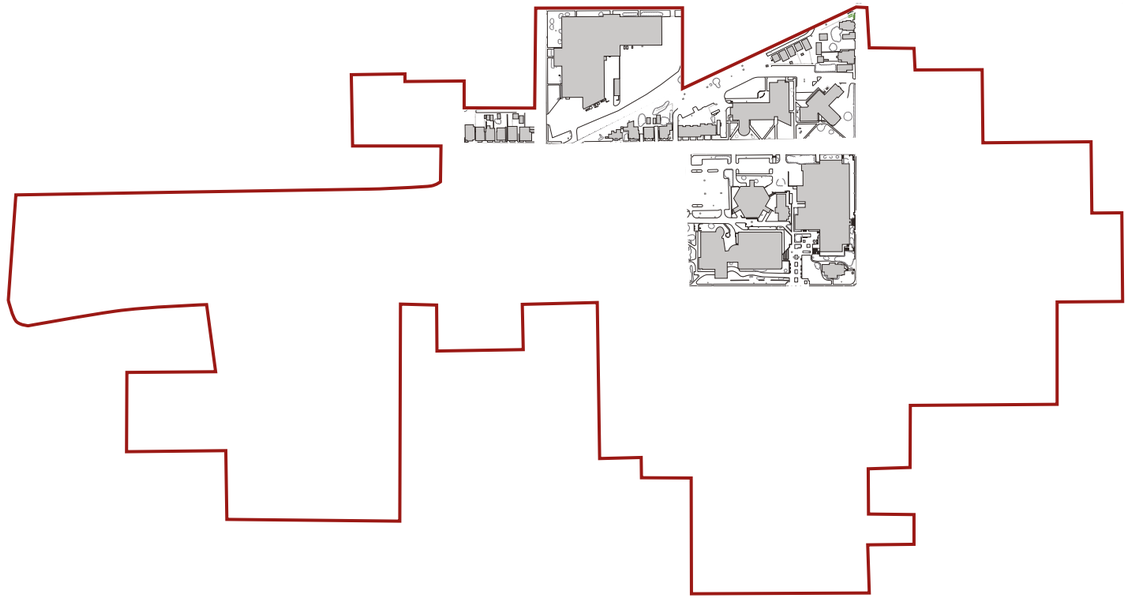




S.No.	MATERIALS	ATHLETICS (sq km)	ATHLETICS (%)
1	ASPHALT	3.3885	77.27 %
2	ASPHALT-CONCRETE COMBO	0	0.00 %
3	BLUESTONE	0	0.00 %
4	BRICK	0.0738	1.68 %
5	CONCRETE	0.921	21.00 %
6	CONCRETE PAVER- BRICK COLOR	0	0.00 %
7	CONCRETE PAVER - HEXAGONAL	0	0.00 %
8	CONCRETE PAVER PARISIAN	0.0018	0.04 %
9	GRANITE PAVERS	0	0.00 %
10	GRASS PAVERS	0	0.00 %

Hardscape

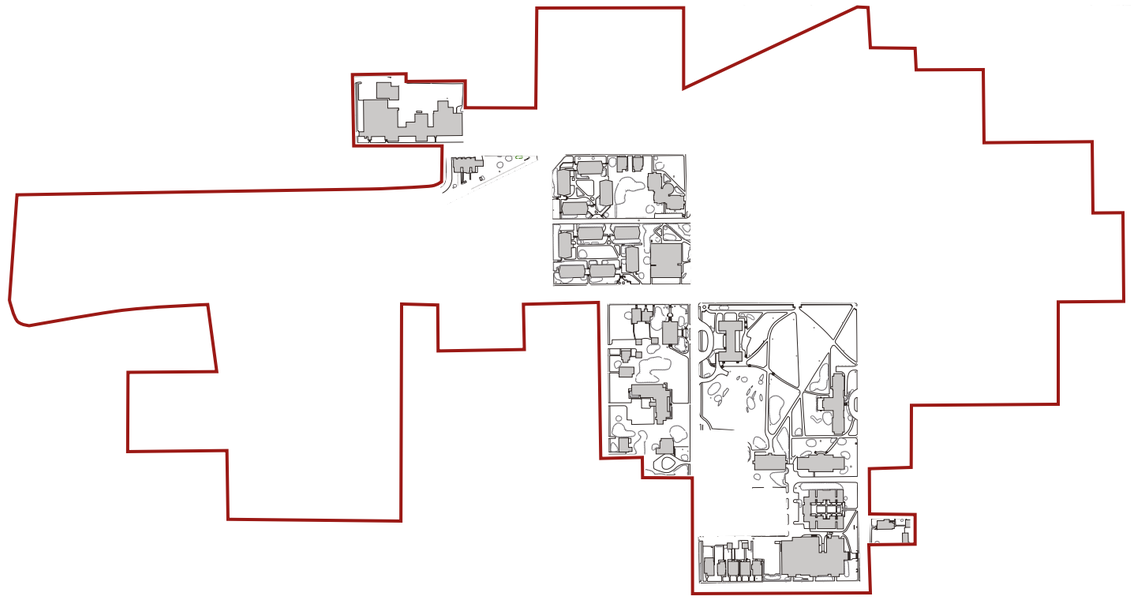
Inventory | Expanded Core



S.No.	MATERIALS	EXPANDED CORE (sq km)	EXPANDED CORE (%)
1	ASPHALT	2.4203	77.11 %
2	ASPHALT-CONCRETE COMBO	0.1305	4.16 %
3	BLUESTONE	0	0.00 %
4	BRICK	0	0.00 %
5	CONCRETE	0.5759	18.35 %
6	CONCRETE PAVER- BRICK COLOR	0.0046	0.15 %
7	CONCRETE PAVER - HEXAGONAL	0.0013	0.04 %
8	CONCRETE PAVER PARISIAN	0	0.00 %
9	GRANITE PAVERS	0.0061	0.19 %
10	GRASS PAVERS	0	0.00 %

Hardscape

Inventory | Residential



Granite pavers - 0.19%
Concrete paver (hexagonal) - 0.04%
Concrete paver (brick color) - 0.15%
Concrete paving - 18.35%
Asphalt - Concrete Combo - 4.16%
Asphalt - 77.11%

S.No.	MATERIALS	RESIDENTIAL (sq km)	RESIDENTIAL (%)
1	ASPHALT	2.2043	62.05 %
2	ASPHALT-CONCRETE COMBO	0.3012	8.48 %
3	BLUESTONE	0	0.00 %
4	BRICK	0.0009	0.03 %
5	CONCRETE	0.992	27.93 %
6	CONCRETE PAVER- BRICK COLOR	0.0243	0.68 %
7	CONCRETE PAVER - HEXAGONAL	0.002	0.06 %
8	CONCRETE PAVER PARISIAN	0	0.00 %
9	GRANITE PAVERS	0.0275	0.77 %
10	GRASS PAVERS	0	0.00 %

Hardscape

Proposed Paving Materials

CHARACTER ZONE	DOMINANT PATH MATERIALS	DOMINANT PLAZA MATERIALS	
Historic	Granite Cobble, Asphalt Pavement, Asphalt Paver	Granite Cobble, Granite Paver, Bluestone	
Expanded Core + Residential	Granite Cobble, Asphalt Pavement, Asphalt Paver	Granite Cobble, Granite Paver	
Athletics, West Campus + High Street	Concrete Pavement, Brick Paver, Limestone (adjacent to walls only)	Concrete Pavement, Brick Pavers, Granite Paver	
Connective Corridors	Granite Cobble, Asphalt Pavement, Asphalt Paver	Granite Cobble, Granite Paver	

Hardscape

Proposed | Paving Materials

BLUESTONE

12″ x 12″+ (1:1) Select

12″ x 24″+ (1:2)

12″ x 18″+ (1:1.5)

S: Endless Mtn

Color: Light Grey

LIMESTONE AGGREGATE

AASHTO #10

AASHTO #8

Fines/ Dust

S: Union Quarries

Color: Limestone

BLUESTONE

12″ x 12″+ (1:1) Select

12″ x 24″+ (1:2)

12″ x 18″+ (1:1.5)

S: Endless Mtn

Color: Light Grey

LIMESTONE AGGREGATE

AASHTO #10

AASHTO #8

Fines/ Dust

S: Union Quarries

Color: Limestone

Hardscape

Proposed | Major Paving Materials

GRANITE CURBS

4″

5″

6″

S: NC Granite

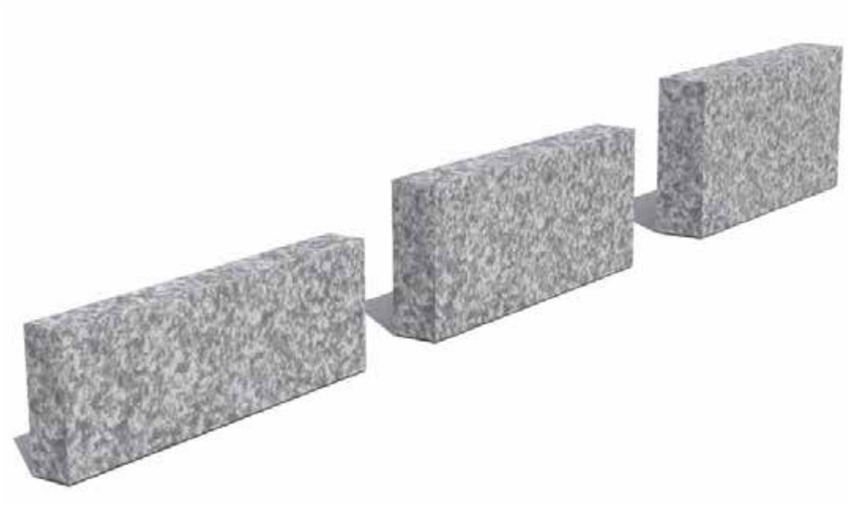
Color: VA Mist
Mount Airy White

GRANITE CURBS

4″

5″

6″



S: Swenson

Concord Gray

Hardscape

Proposed | Minor Paving Materials

PERMEABLE

4″ x 9″ x 3″

S: Hanover

Color:

3 1/2″ x 18″ x 4″

S: Hanover

Color:

BRICK

3 3/5″ x 2 1/4″ x 7 5/8″

4″ x 2 3/4″ x 8 1/2″

S: Norristown Brick

S: Glen-Gery

Color: Historic

Color: Asburn
Pennsbury
Staunton
Autumn
Iron Spot
Walnut Vel.

CONCRETE PAVERS

12″ x 24″+ (1:2)

18″ x 24″+ (1:1.3)

S: Hanover

Color: #M1742

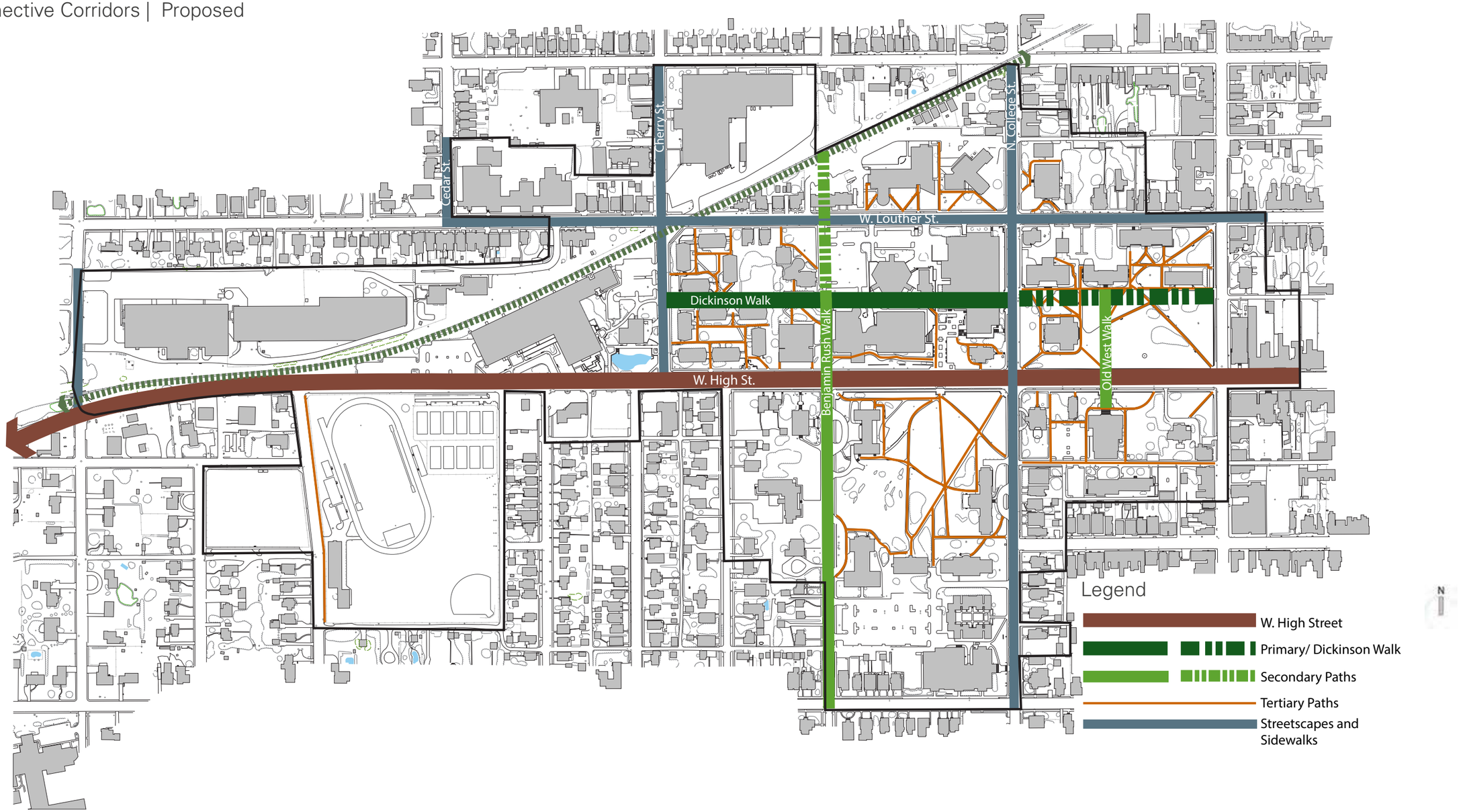
18″ x 36″+ (1:2)

24″ x 36″+ (1:1.5

Hardscape

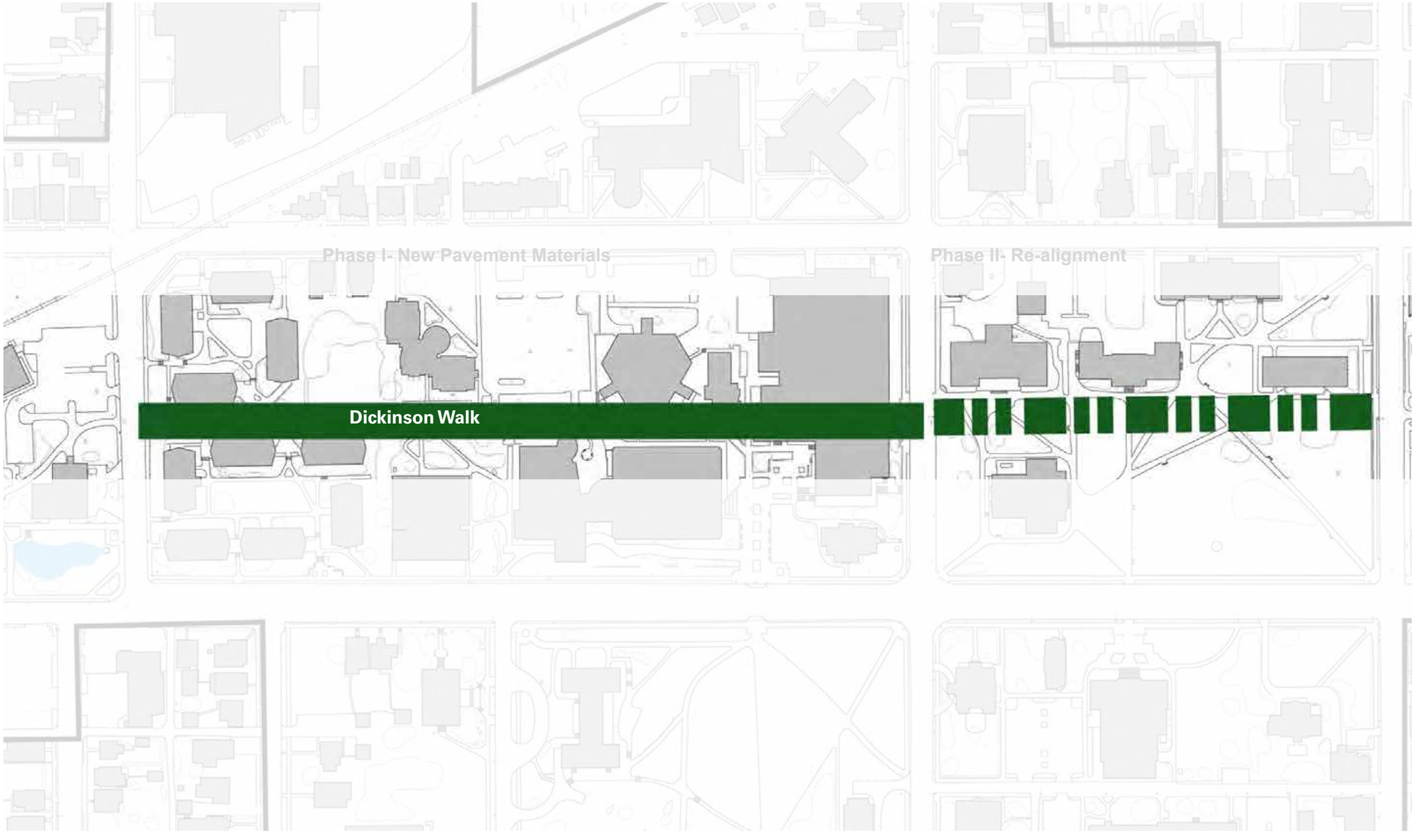
Hardscape

Connective Corridors | Proposed



Hardscape

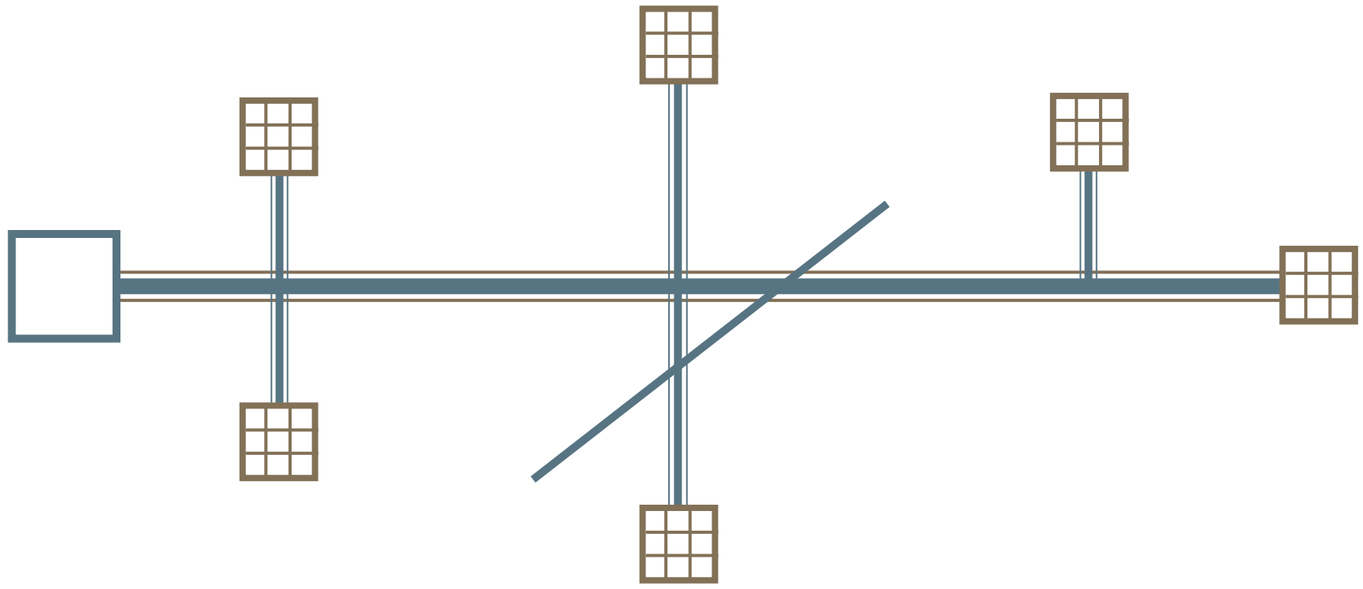
Proposed | Connective Corridors- Primary Path/ Dickinson Walk



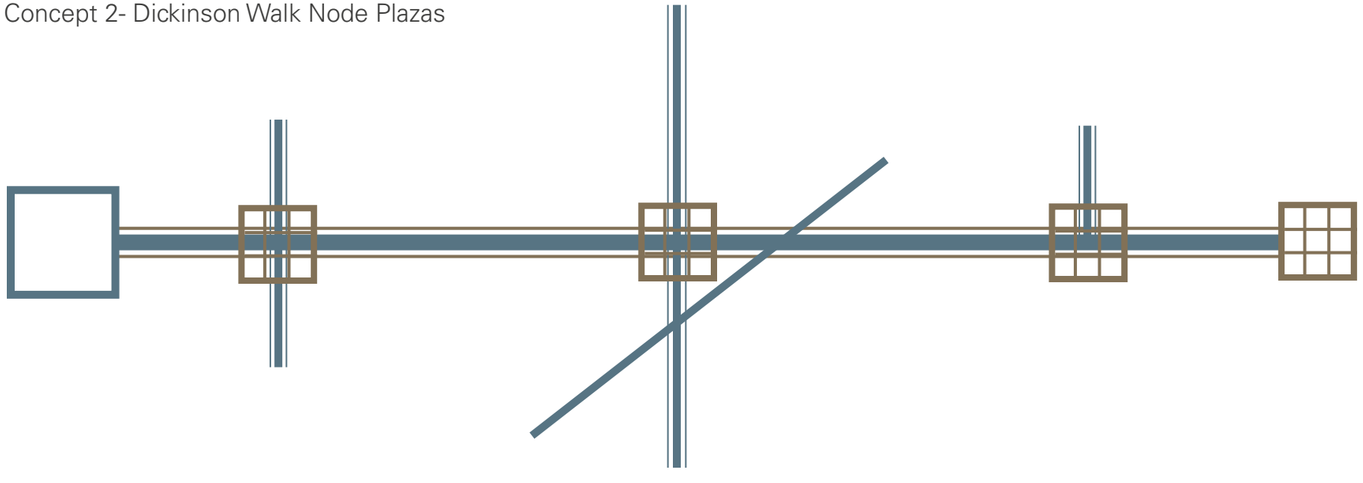
Hardscape

Proposed | Dickinson Walk Plaza Concepts

Concept 1- Building Entrance Plazas



Concept 2- Dickinson Walk Node Plazas



When an opportunity presents itself to renovate Dickinson Walk; whether it be to correct drainage problems, replace aging materials, or improve pedestrian safety; the renovation could occur in 2 phases (previous page). Phase I would include maintaining that section's alignment, but fine tuning the grading and drainage and replacing the pavement materials.

Phase II could include similar renovations of Phase I, or offer an opportunity to re-align the existing limit of Phase II to be continuously in-line with Phase I. This realignment would only be desireable if the majority of the exisiting, historic trees on the historic green could be protected. If this realignment in Phase II were desirable, it could offer an opportunity to either expand plazas in front of the existing buildings (concept 1- left) or add plazas at key intersection nodes (concept 2- left).

Hardscape

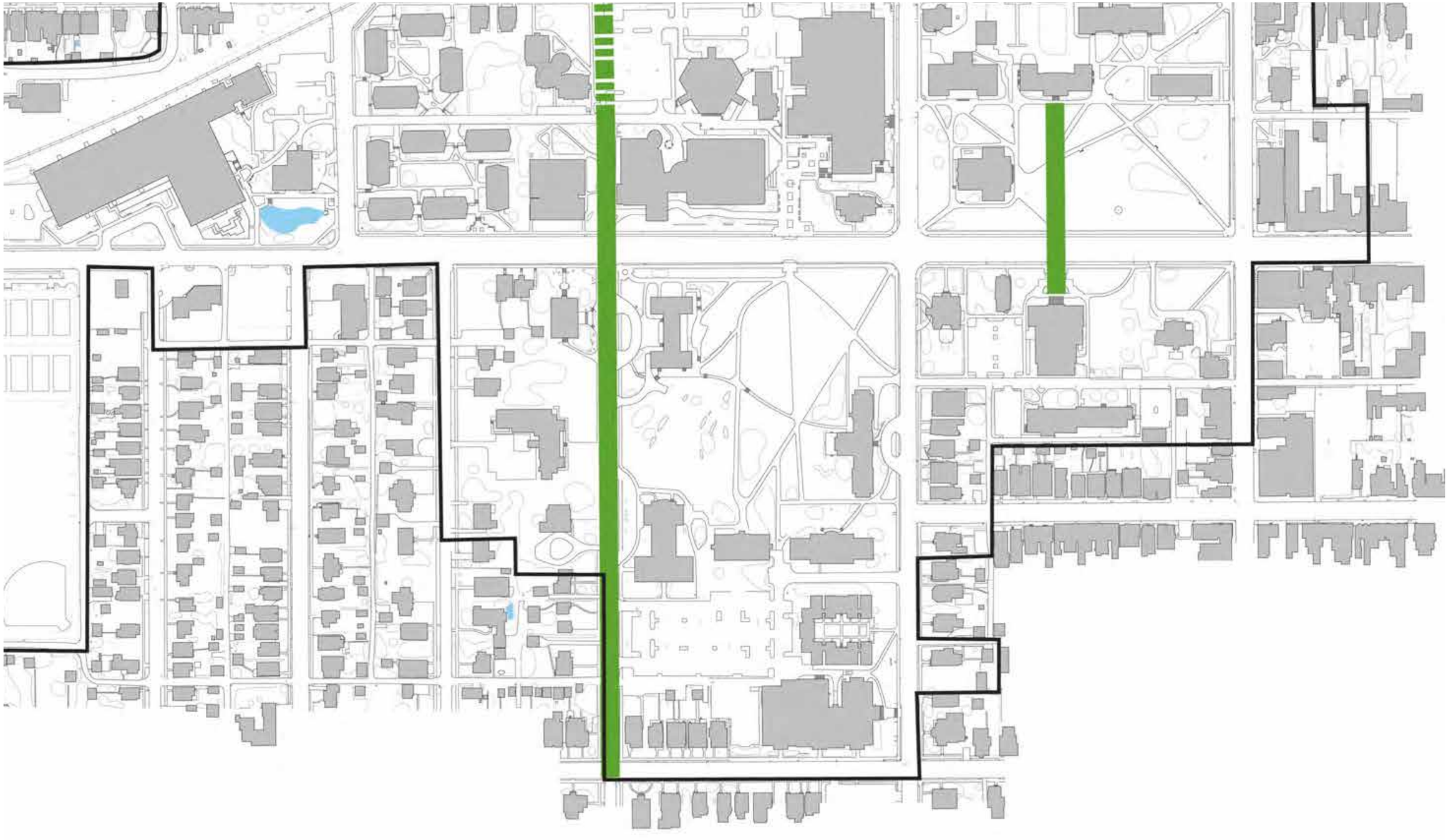
Dickinson Walk | Precedents

Hardscape

Dickinson Walk Concept

Hardscape

Proposed | Connective Corridors- Secondary Paths



Hardscape |

Proposed | Connective Corridors- Secondary Paths

Option 1

2-Jumbo
1.5 Landscape
Granite Blocks

6.5-12″ x 6″
Asphalt-Block Pavers
Running Bond

2-Jumbo
1.5 Landscape
Granite Blocks

Option 2

Triple Soldier
Course Jumbo
Blocks

6.5-12″ x 6″
Asphalt-Block Pavers
Running Bond

Triple Soldier
Course Jumbo
Blocks

Option 3

2-Jumbo
1.5 Landscape
Granite Blocks
1- Jumbo

6.5-12″ x 6″
Asphalt-Block Pavers

2-Jumbo
1.5 Landscape
Granite Blocks
1- Jumbo

Pattern Options for Secondary Walkways

Hardscape

Proposed | Connective Corridors- Secondary Paths and Major Building Entrances

Paths, Plazas and Alcoves- Granite Cobble Alcove Option

Hardscape

Proposed | Connective Corridors- Secondary Paths and Major Building Entrances

Paths, Plazas and Alcoves- Limestone Aggregate Alcove Option

Hardscape

Proposed | Connective Corridors- Secondary Paths and Major Building Entrances

Paths, Plazas and Alcoves- Recycled Concrete Alcove Option

Hardscape

Proposed | Connective Corridors- Secondary Paths and Major Building Entrances

Paths, Plazas and Alcoves- Granite Cobble Alcove Option

Hardscape

Proposed | Connective Corridors- Secondary Paths and Major Building Entrances

Paths, Plazas and Alcoves- Limestone Aggregate Alcove Option

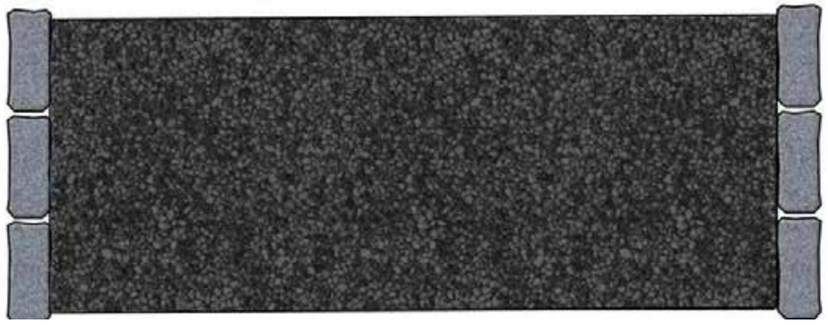
Hardscape

Proposed | Connective Corridors- Tertiary Paths

Hardscape

Proposed | Connective Corridors- Tertiary Paths

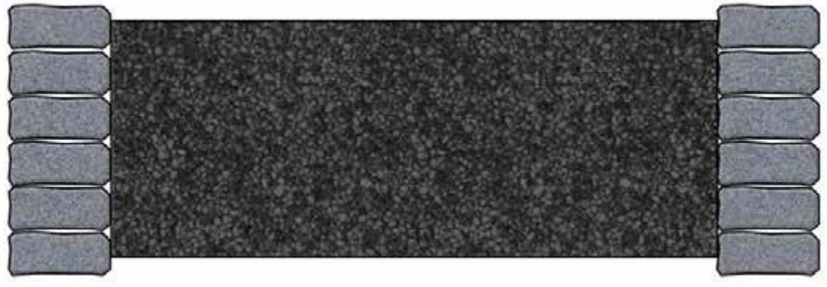
Option 1- approx. 6-8′ wide



1-Jumbo Granite Cobble | Asphalt Pavement | 1-Jumbo Granite Cobble

1-Jumbo Granite Cobble | 6- 12″ x 6″ Asphalt Block Pavers | 1-Jumbo Granite Cobble

Option 2- approx. 8′ wide

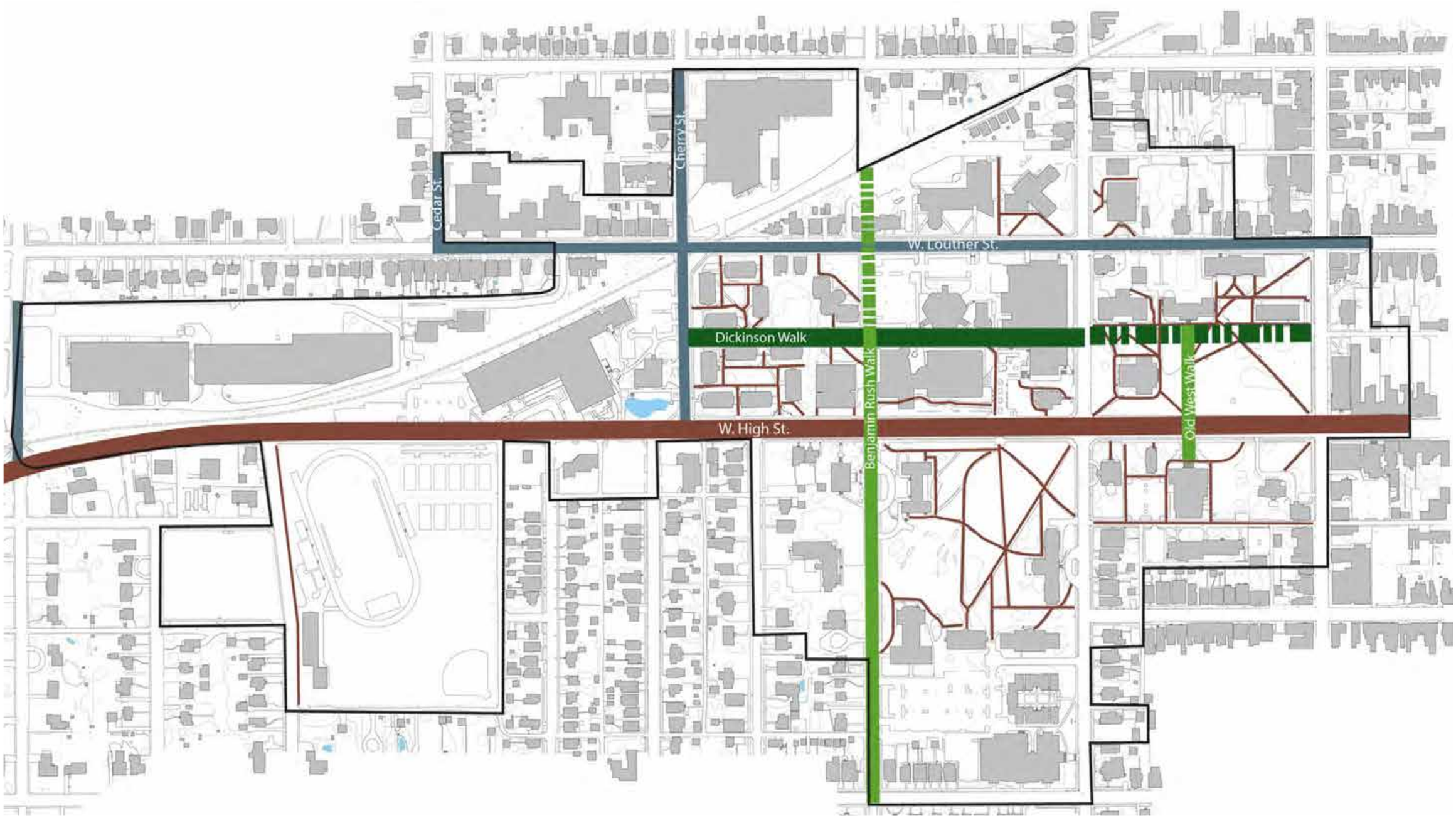


1-Jumbo Granite Cobble | Asphalt Pavement | 1-Jumbo Granite Cobble

1-Jumbo Granite Cobble | 6- 12″ x 6″ Asphalt Block Pavers | 1-Jumbo Granite Cobble

Hardscape

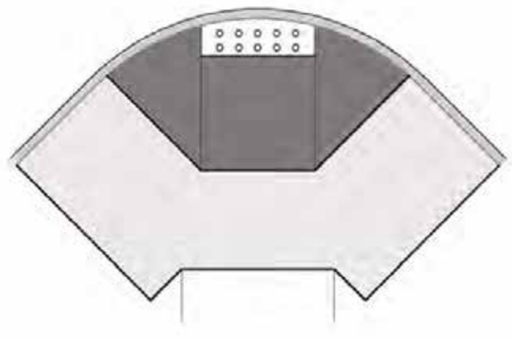
Proposed | Curb Ramp Locations



Hardscape

Proposed | Curb Ramp Materials

B



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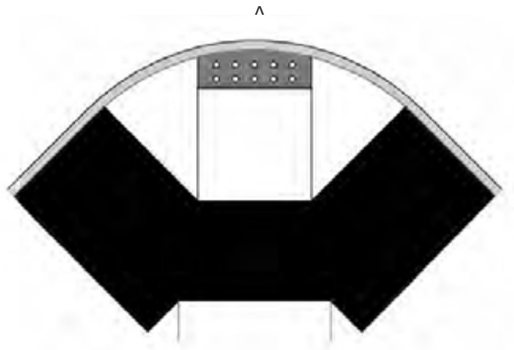

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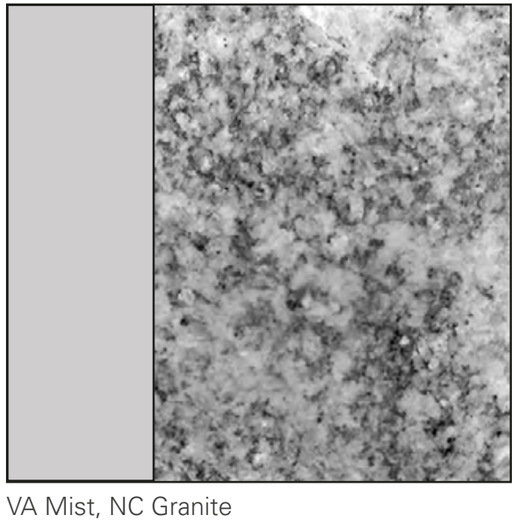
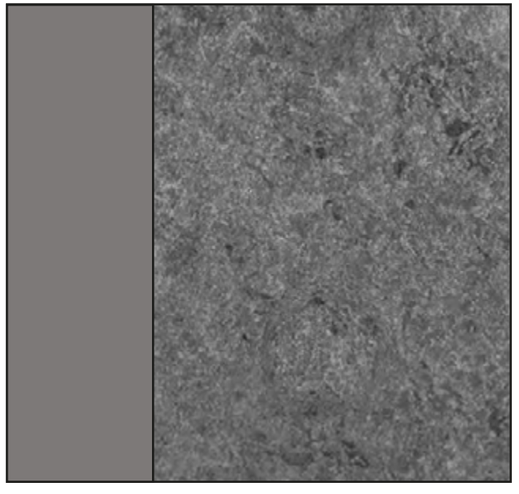


VA Mist, NC Granite

B

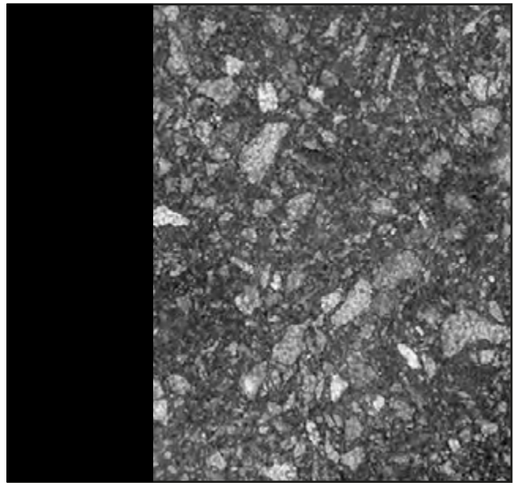
Mount Airy Granite, NC Granite

C



Basalt Black Granite, Hanover

D

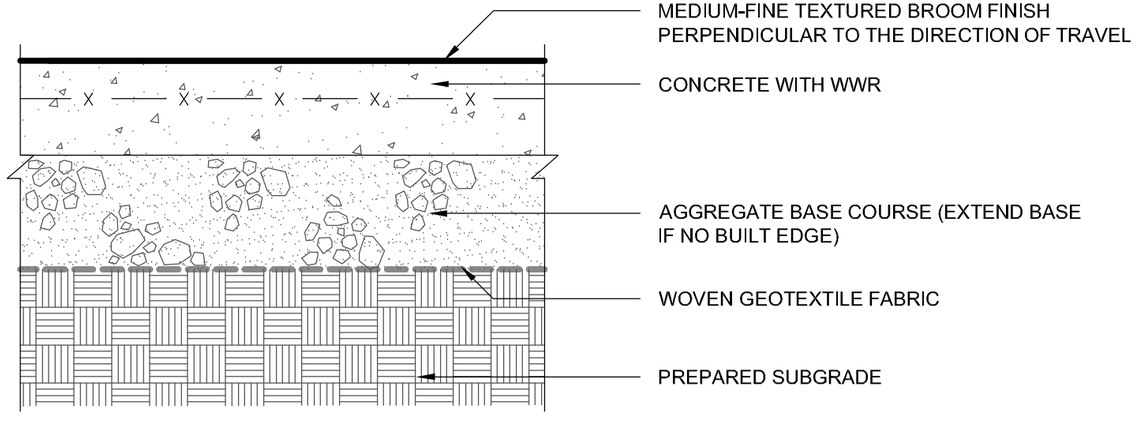


Asphalt Paver, Hanover

Hardscape | Details

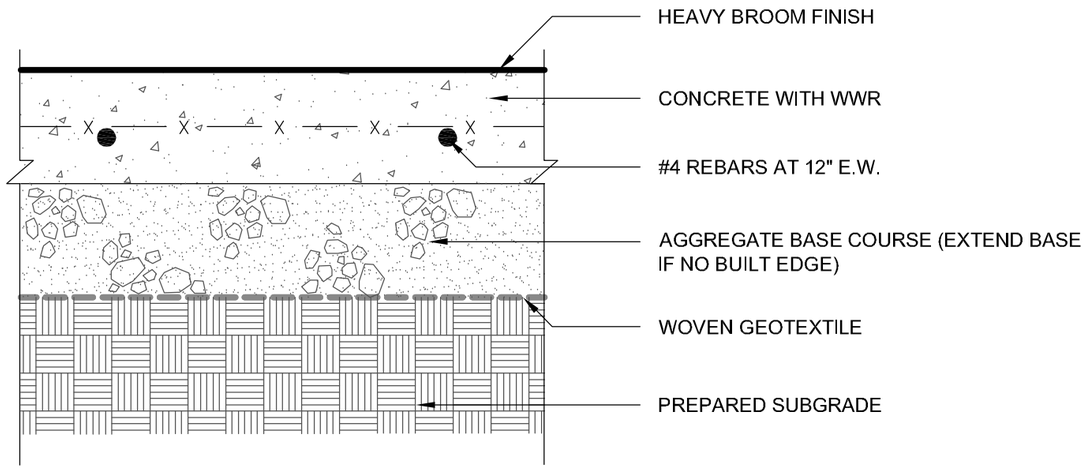
Unit Paving and Aggregate Paving

All details in this section are intended for preliminary design only. They are not to scale (N.T.S) and are not intended for bid or construction purposes. They are subject to modification based on design calculations, local practices, and all applicable codes and regulations.



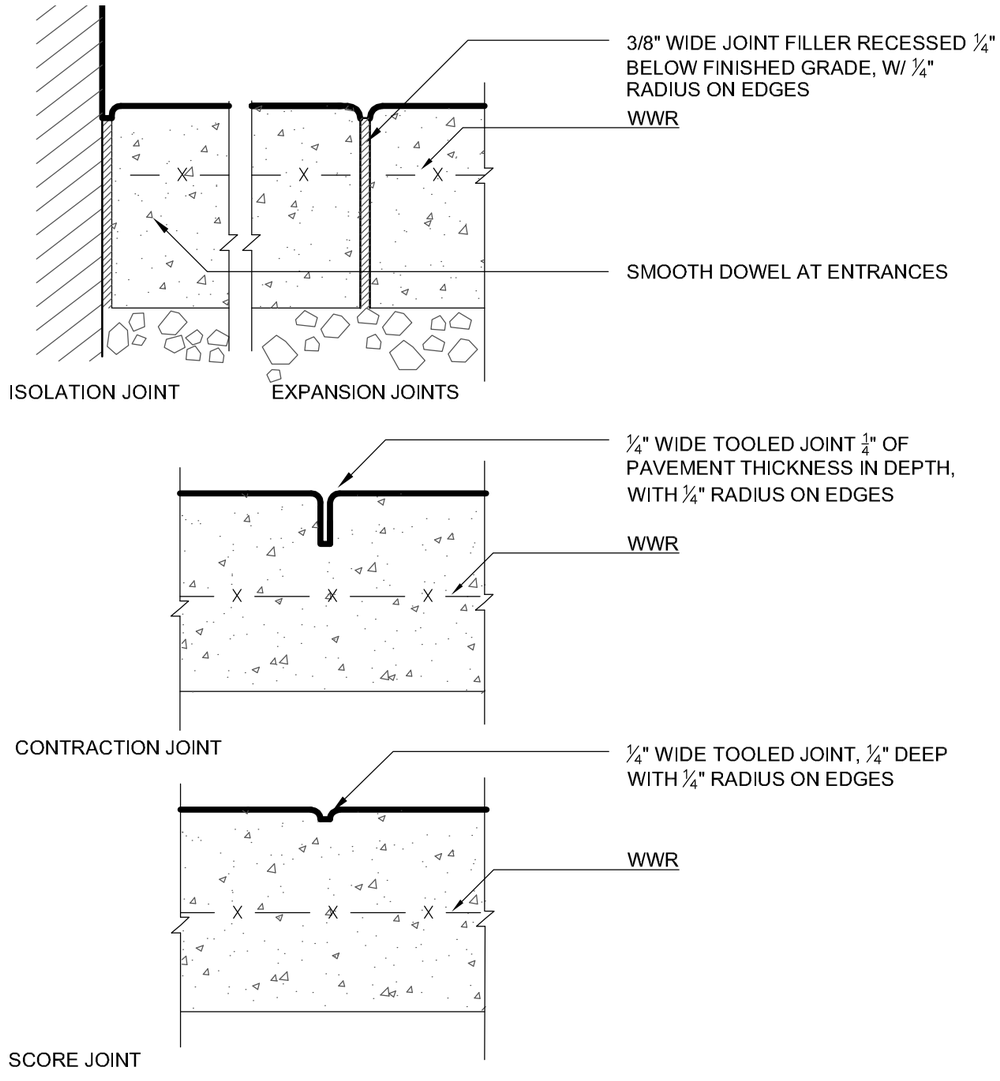
Concrete Pavement (Pedestrian)

Not for Construction



Concrete Pavement (Vehicular)

Not for Construction

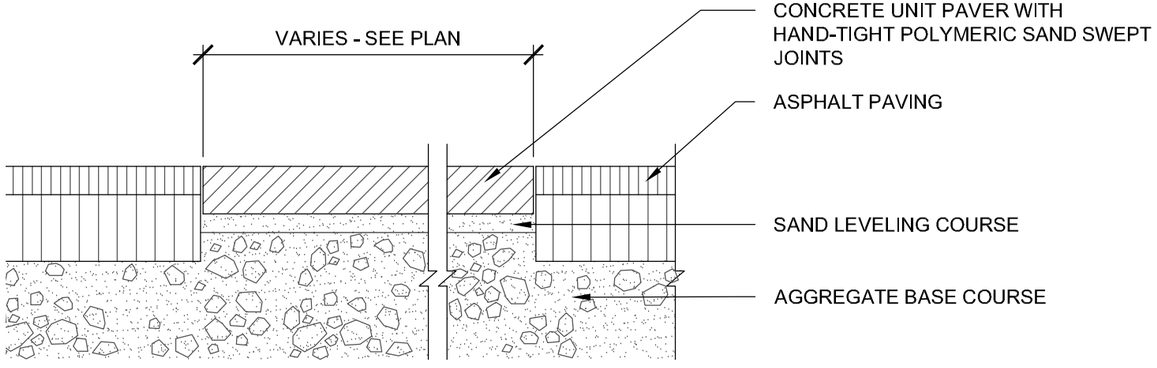


Concrete Pavement Joints

Not for Construction

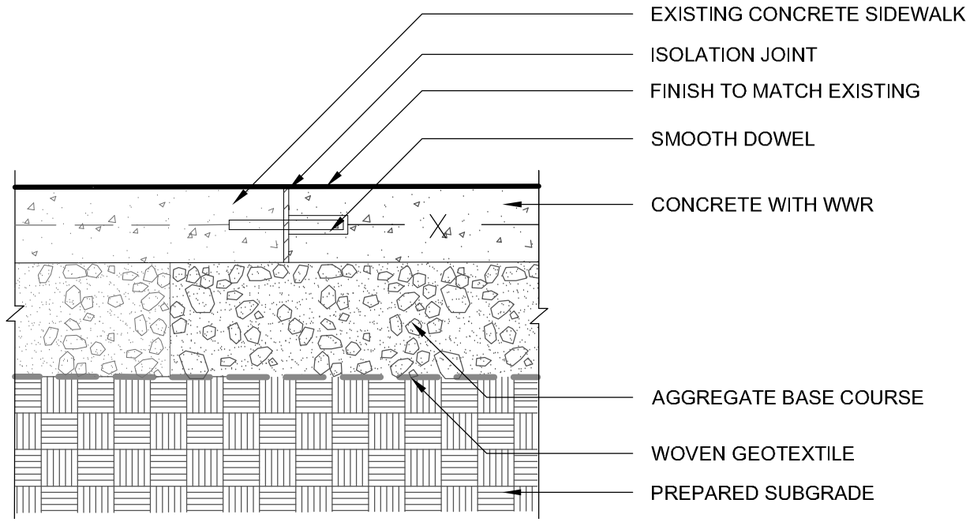
Hardscape | Details

Unit Paving and Aggregate Paving



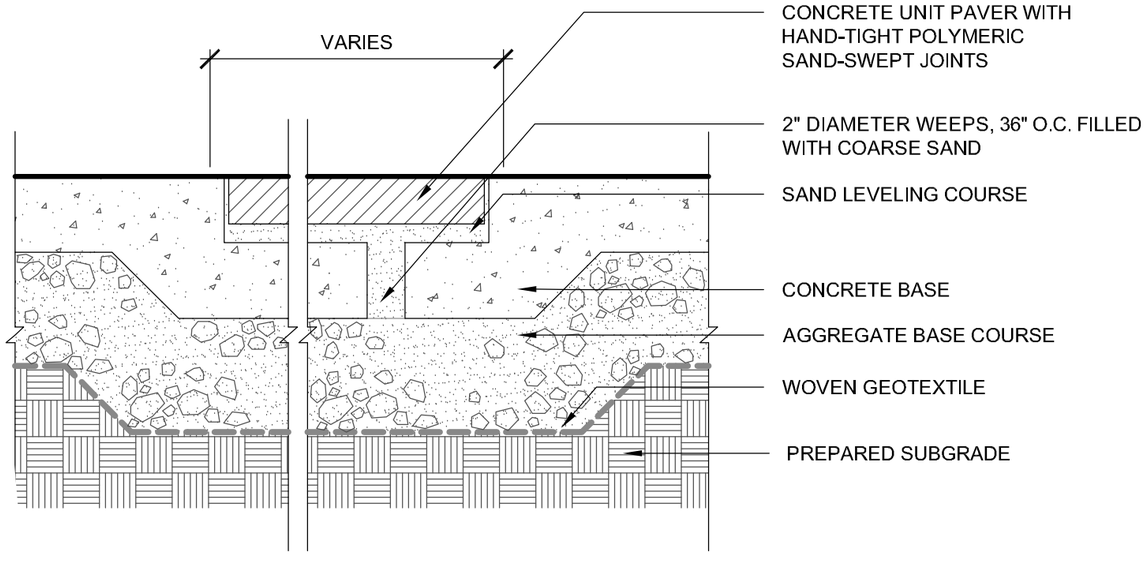
Concrete Unit Pavement Band on Aggregate Base

Not for Construction



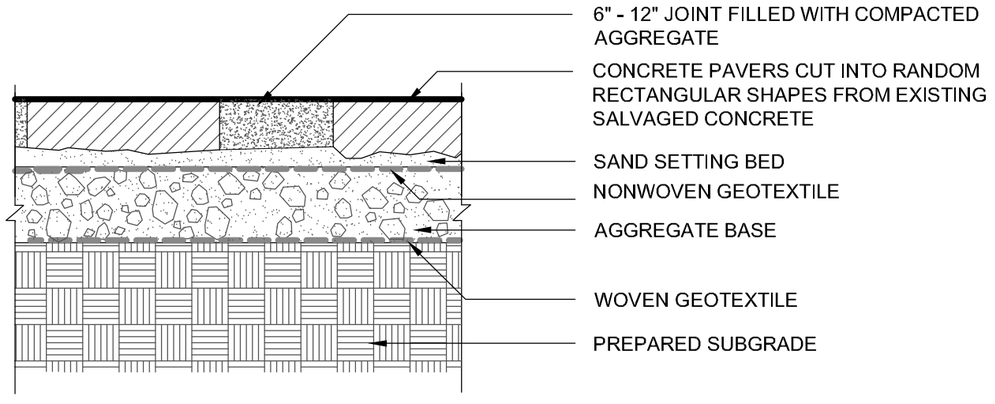
Concrete Pavement at Existing Sidewalk

Not for Construction



Concrete Unit Pavement Band on Concrete Base

Not for Construction

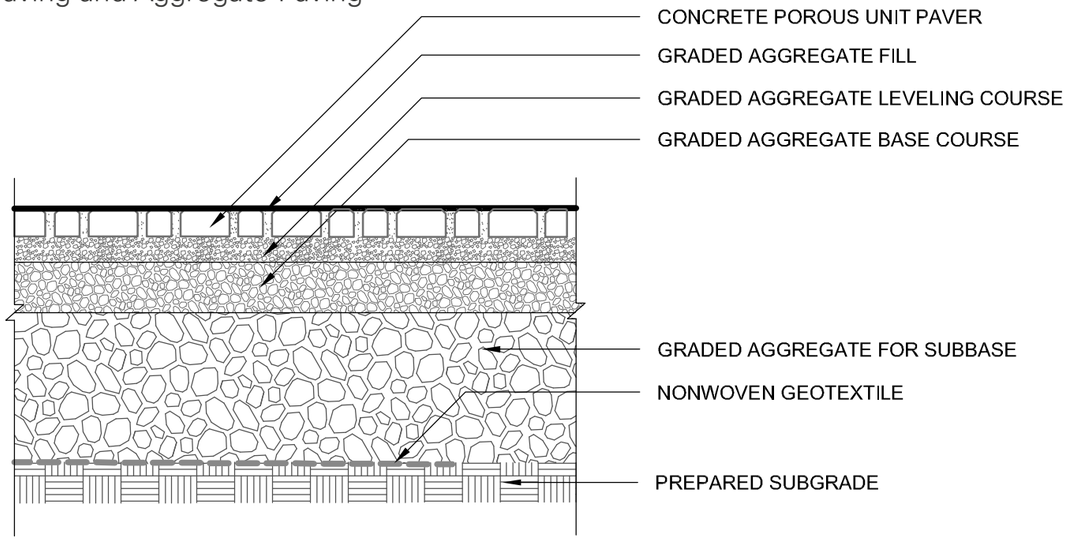


Salvaged Concrete Pavement

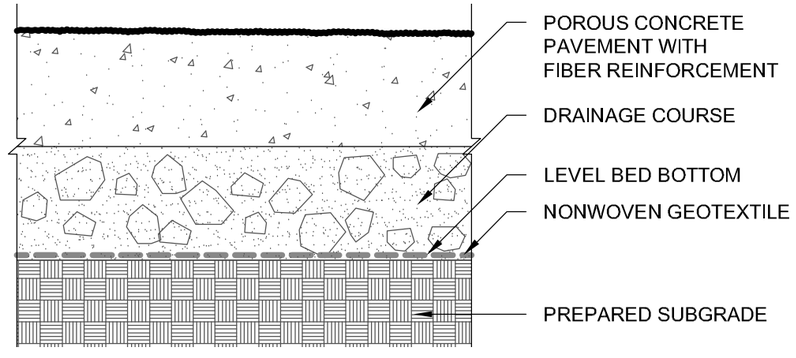
Not for Construction

Hardscape | Details

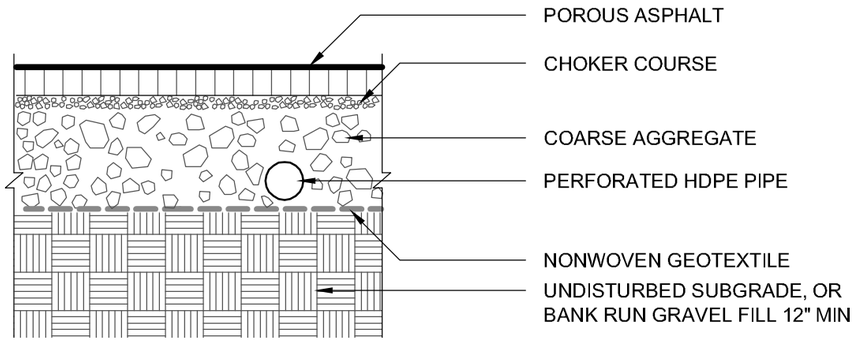
Unit Paving and Aggregate Paving



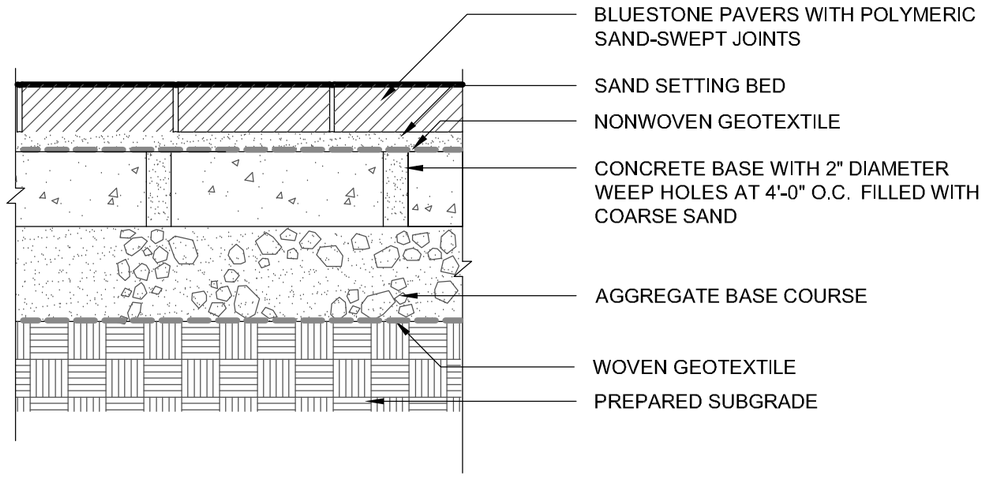
Porous Unit Pavers (Pedestrian/Vehicular)
Not for Construction



Porous Concrete Pavement (Pedestrian/Vehicular)
Not for Construction



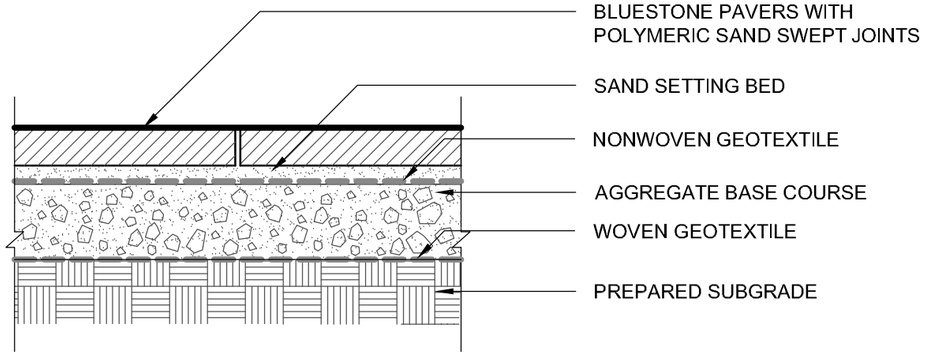
Porous Asphalt Pavement (Pedestrian/Vehicular)
Not for Construction



Bluestone Pavement on Concrete Base
Not for Construction

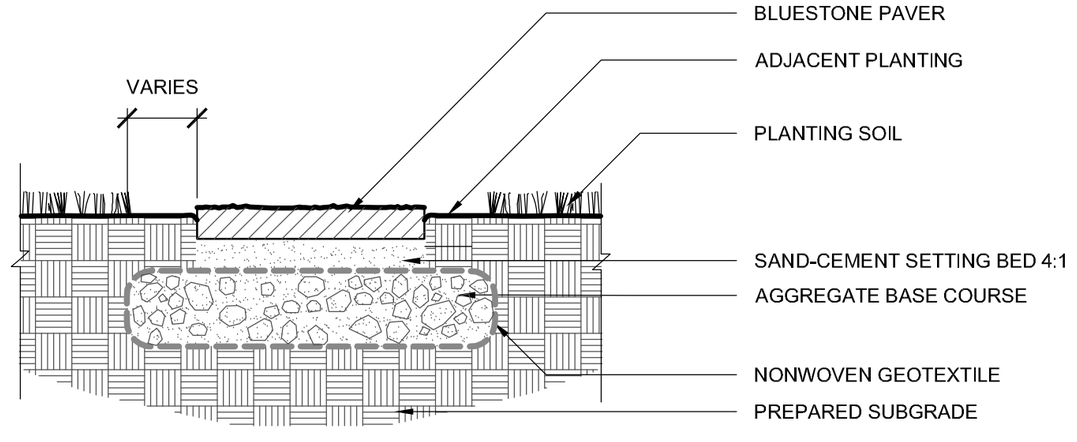
Hardscape | Details

Unit Paving and Aggregate Paving



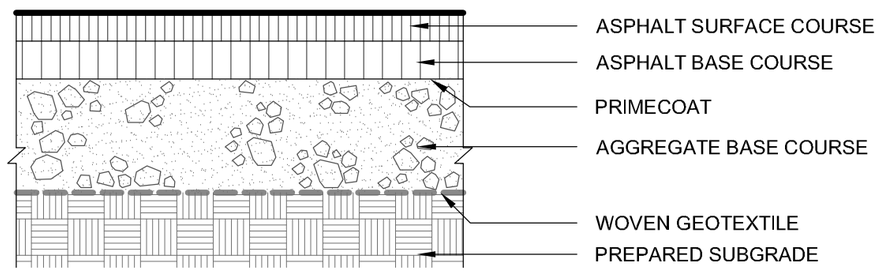
Bluestone Pavement on Aggregate Base (Pedestrian/Vehicular)

Not for Construction



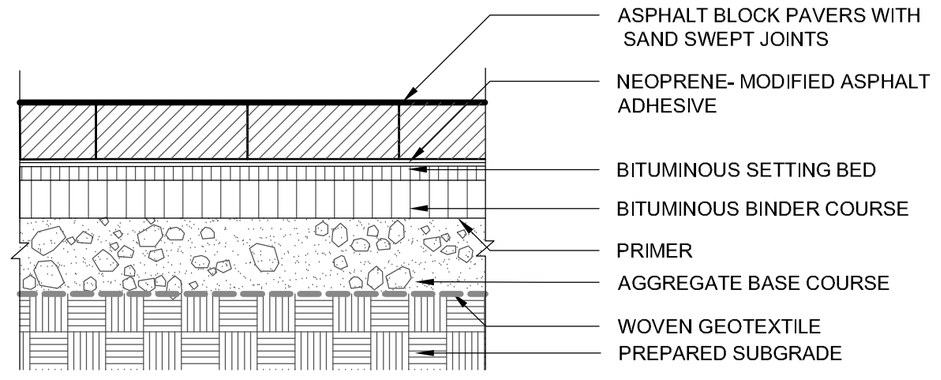
Bluestone Stepstone

Not for Construction



Asphalt Pavement (Light Duty)

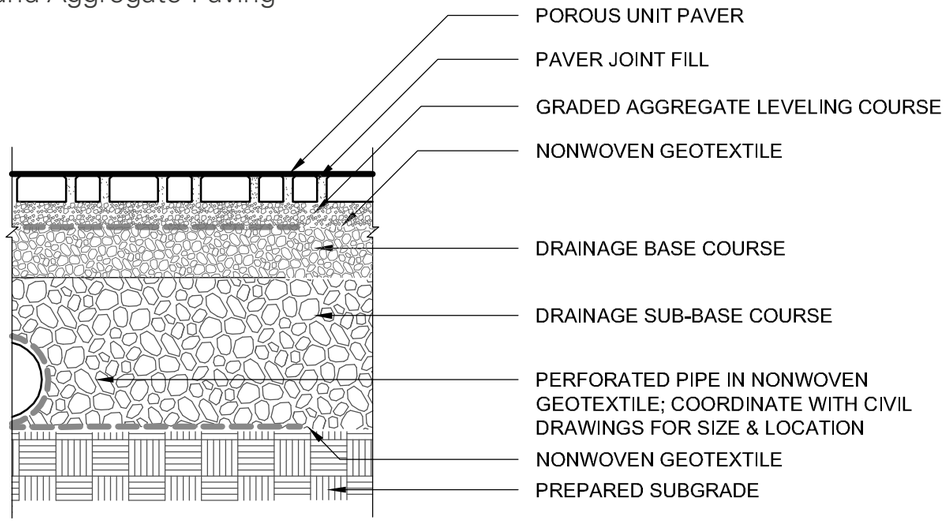
Not for Construction



Asphalt-Block Pavement on Bituminous Base (Pedestrian/ Vehicular)

Not for Construction

Unit Paving and Aggregate Paving

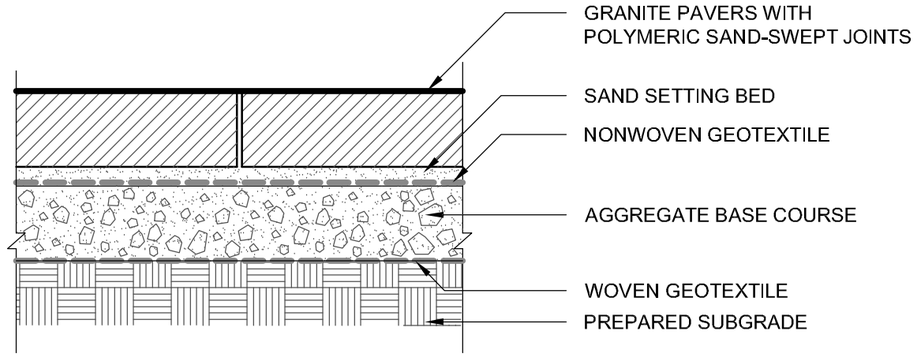


NOTE:

1. WOVEN GEOTEXTILE SHOULD BE USED TO PREVENT INFILTRATION WHERE EXISTING CONDITIONS DO NOT ALLOW FOR IT

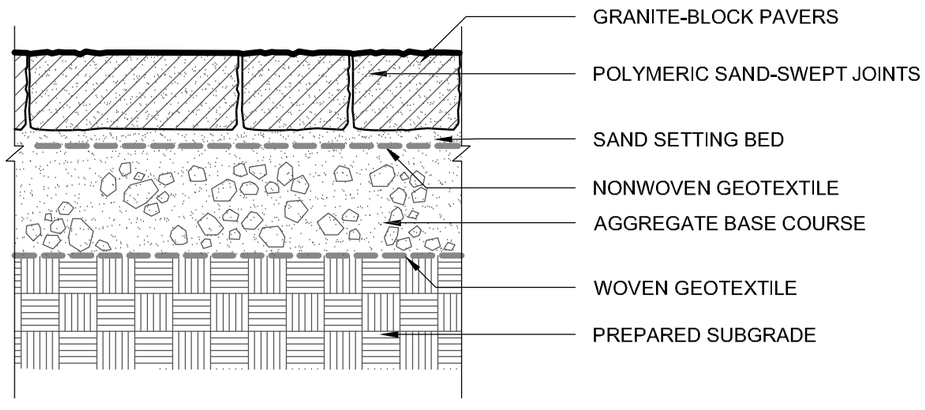
Porous Granite-Unit Pavement (Pedestrian)

Not for Construction



Granite-Unit Pavement

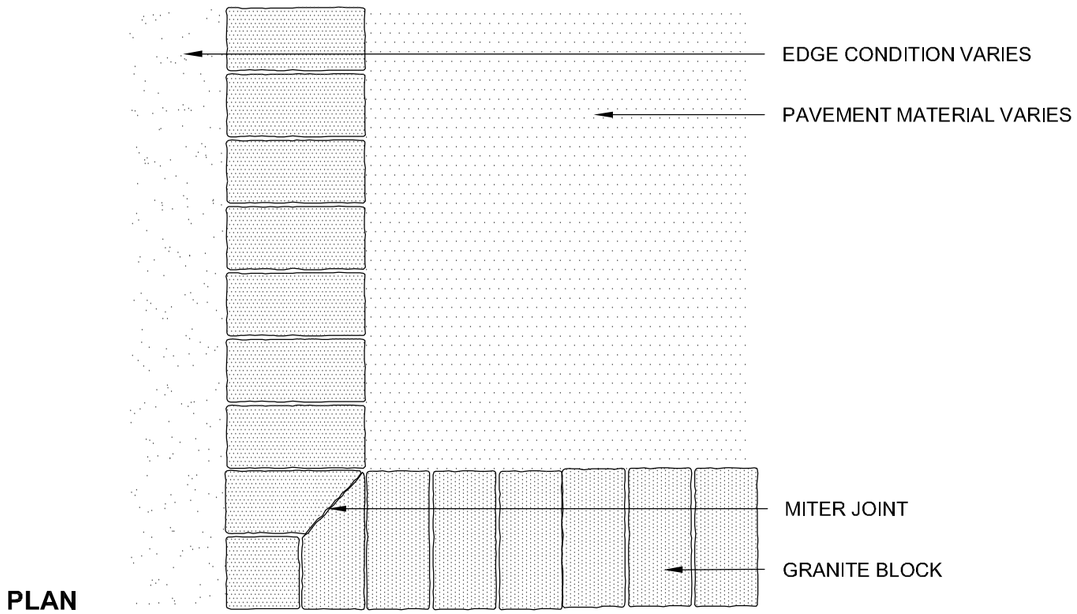
Not for Construction



Granite-Block Pavement on Aggregate Base (Pedestrian/Vehicular)

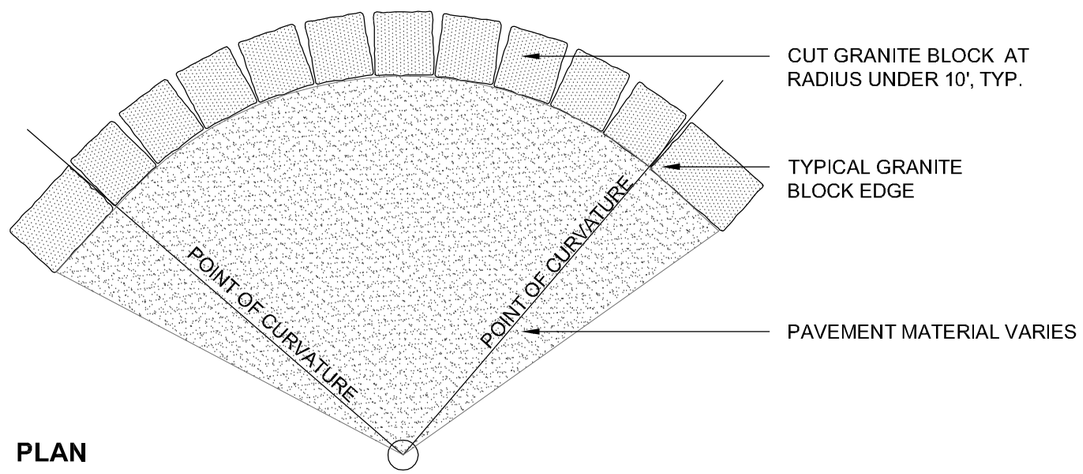
Not for Construction

Unit Paving and Aggregate Paving



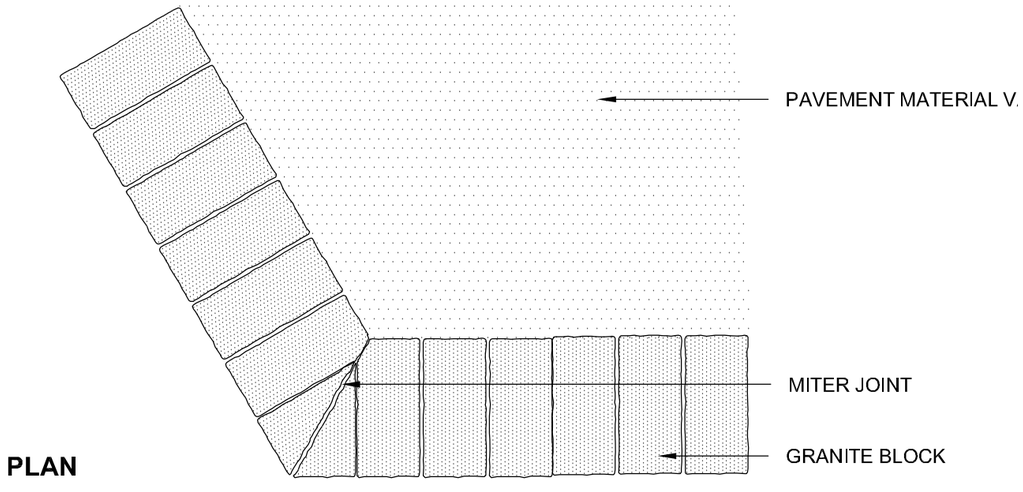
Granite - Block Edge: Right Angle Corner Detail

Not for Construction



Granite - Block Edge: Curve Detail

Not for Construction

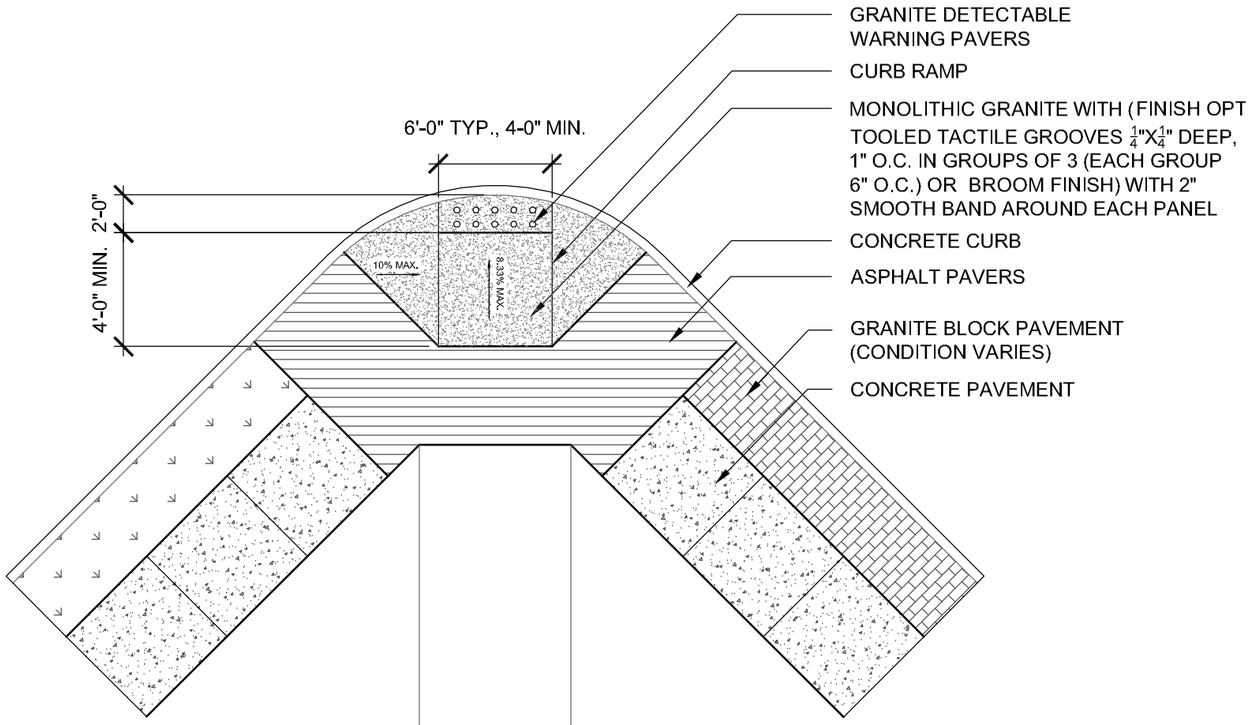


Granite - Block Edge: Obtuse Angle Corner Detail

Not for Construction

Hardscape | Details

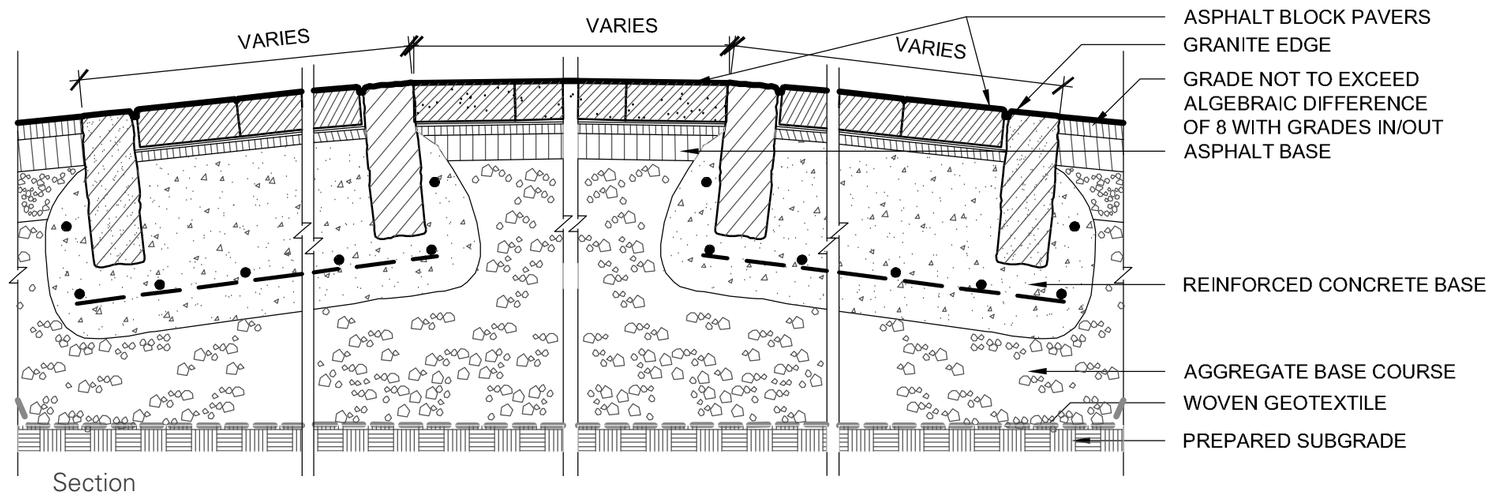
Unit Paving and Aggregate Paving



Plan

Granite Curb Ramp

Not for Construction

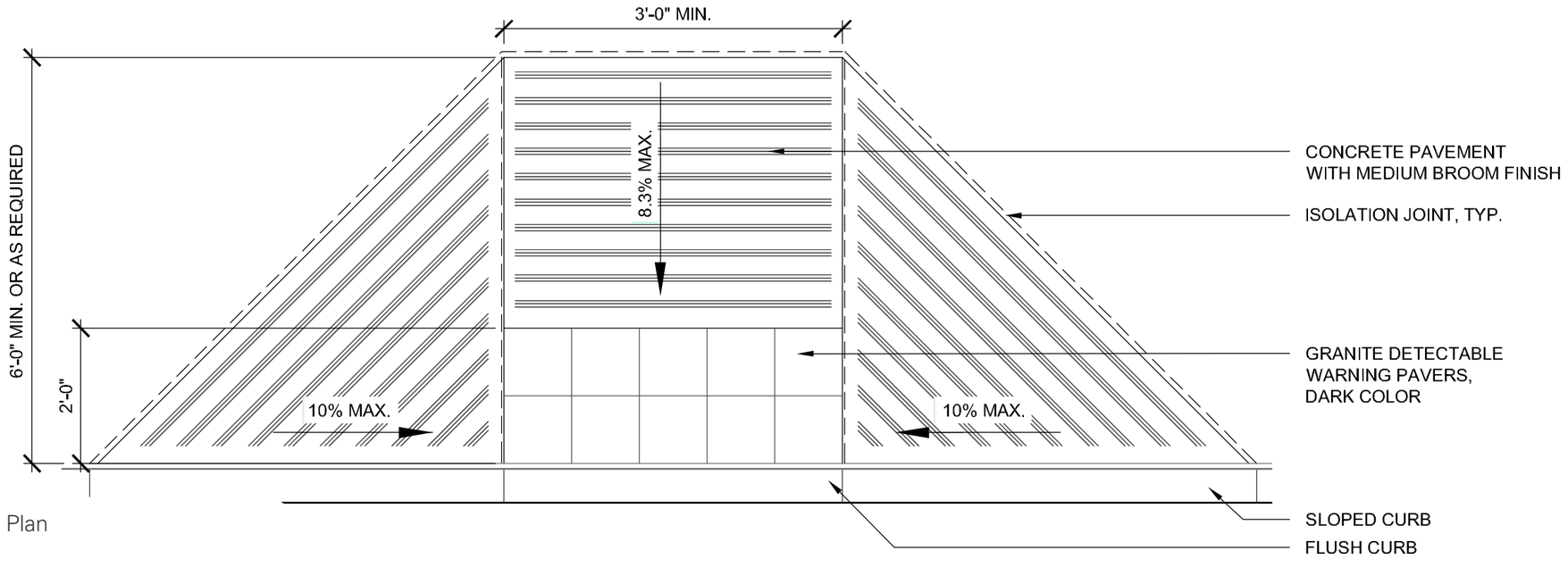


Section

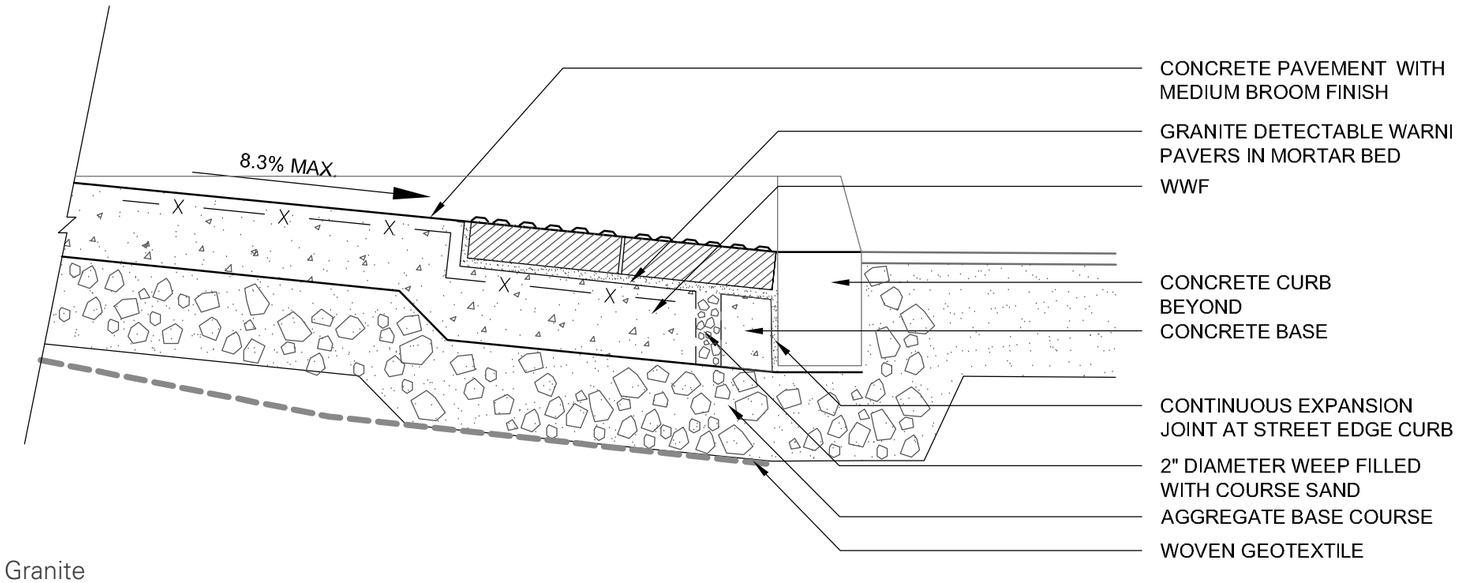
Raised Crosswalk

Not for Construction

Curb Ramps



Plan

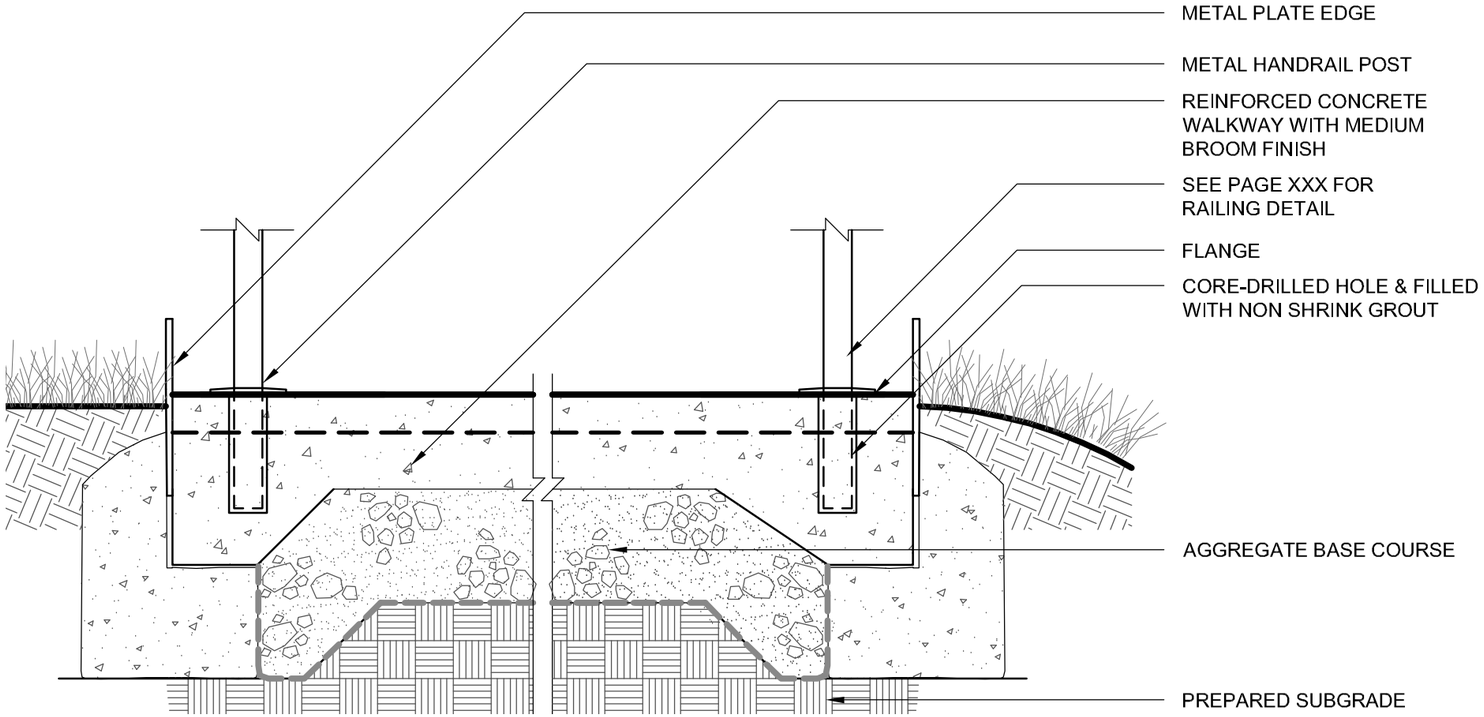


Section

Concrete Curb Ramp with Granite

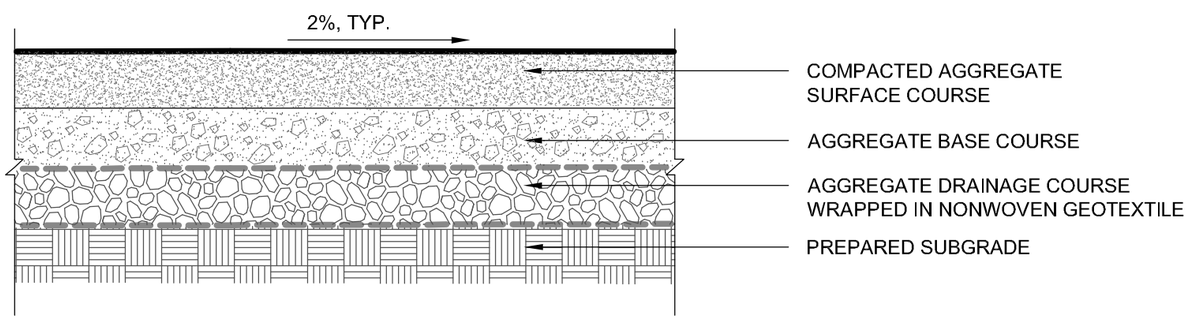
Not for Construction

Unit Paving and Aggregate Paving



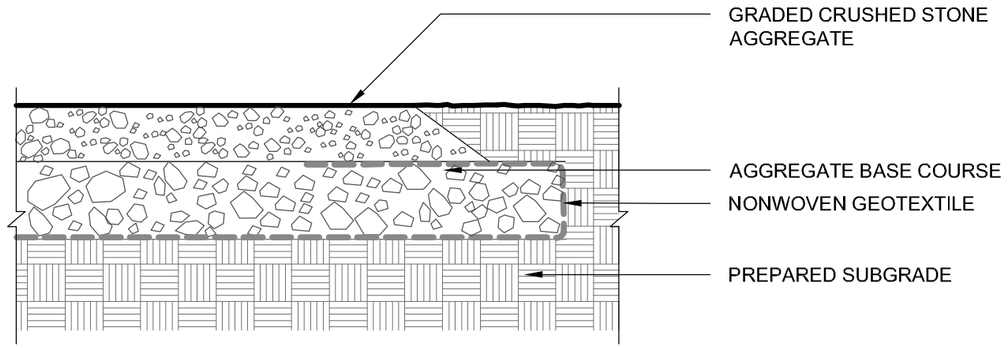
Accessibility Ramp

Not for Construction



Aggregate Pavement

Not for Construction

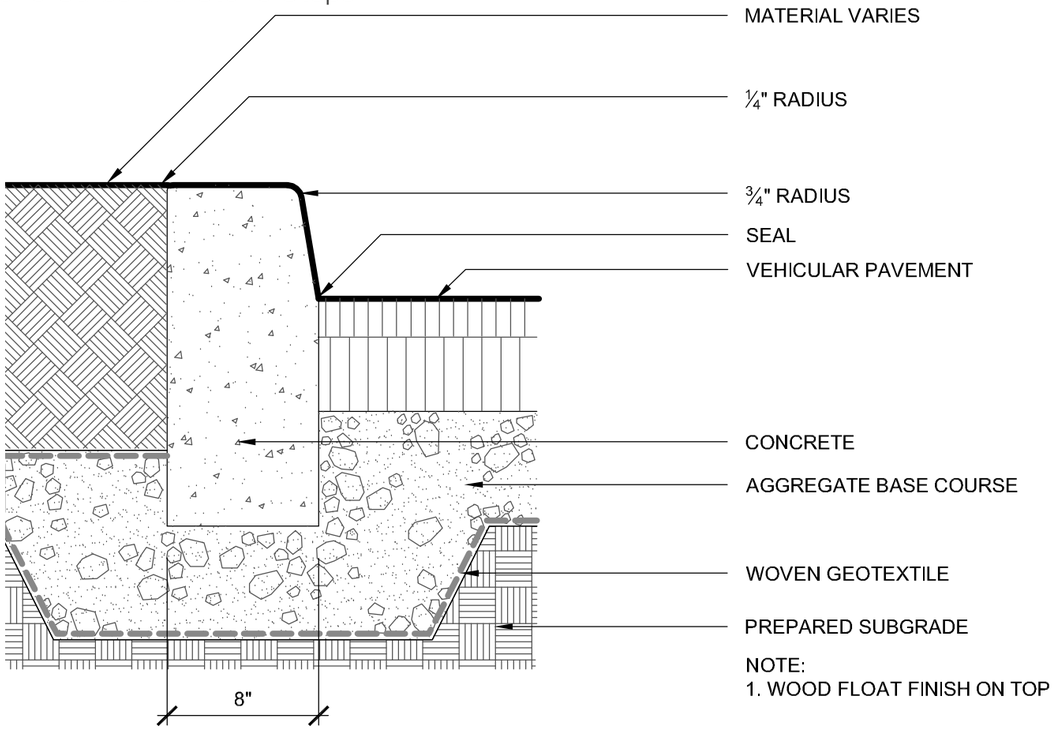


Crushed Gravel Pavement

Not for Construction

Hardscape | Details

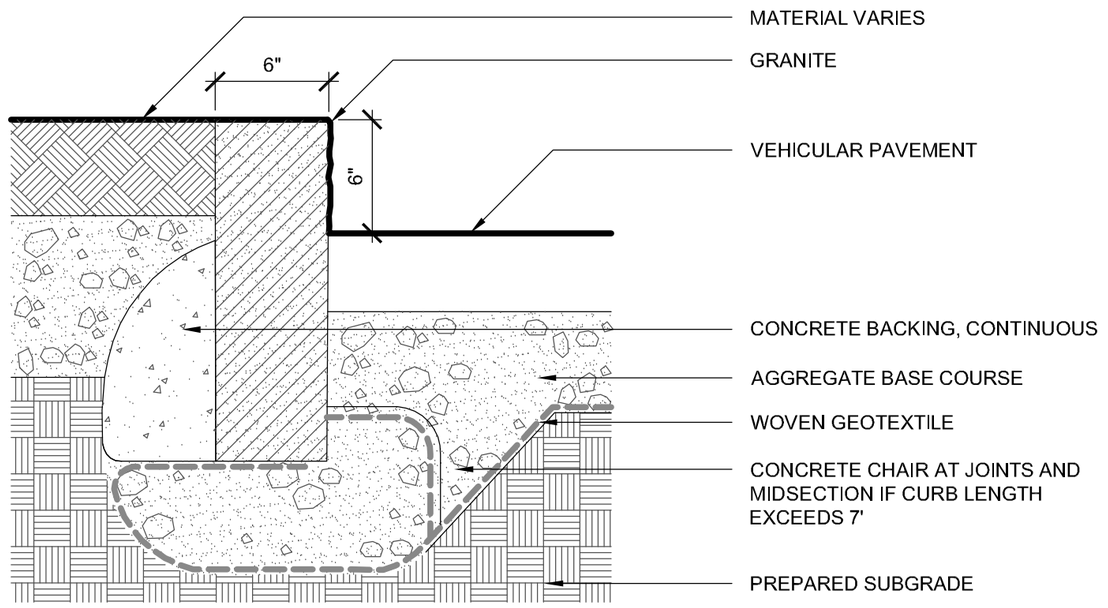
Stone Curbs and Stone Steps



NOTE:
1. WOOD FLOAT FINISH ON TOP

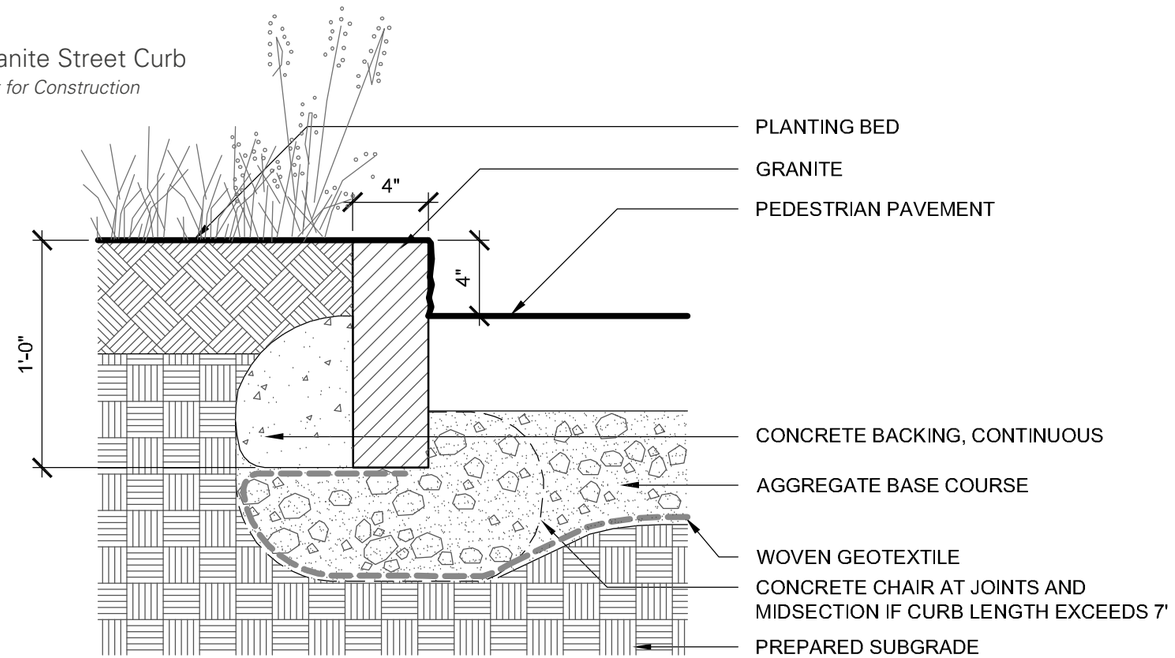
Concrete Street Curb

Not for Construction



Granite Street Curb

Not for Construction

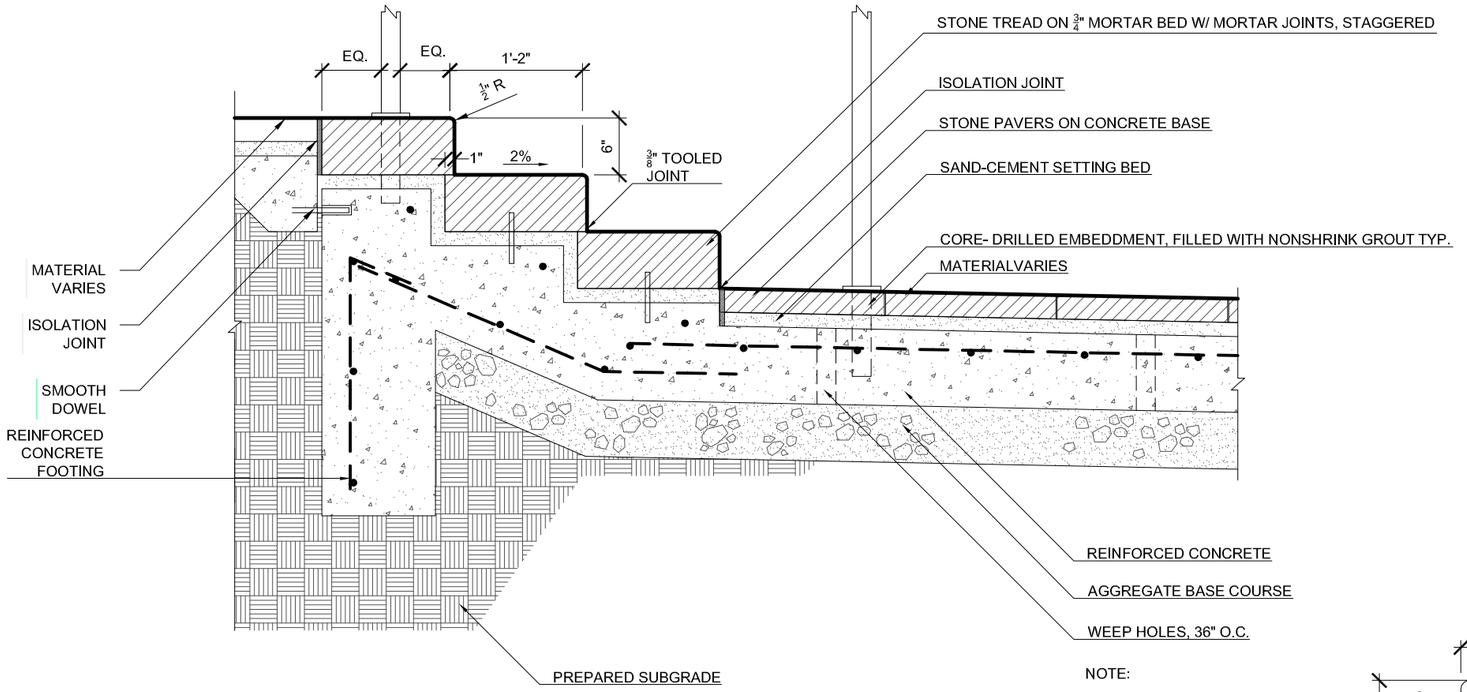


Granite Walkway Curb at Planting Edge

Not for Construction

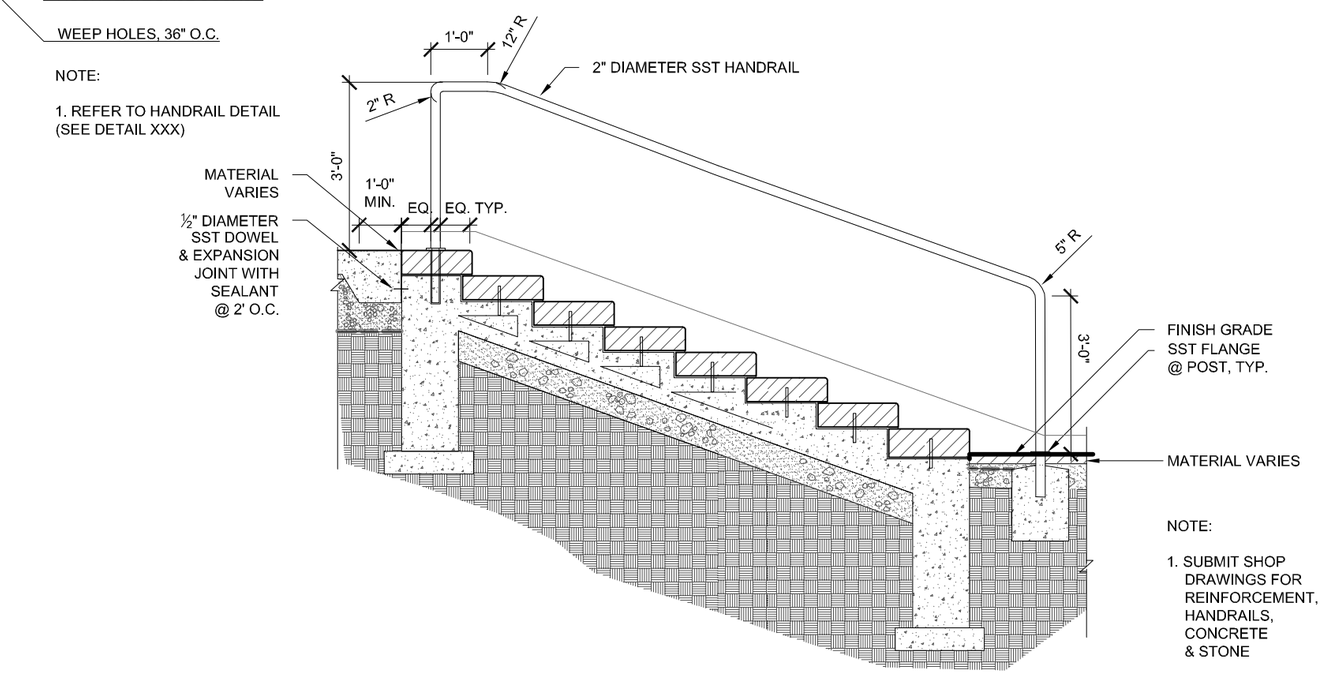
Hardscape | Details

Stone Curbs and Stone Steps



Stone Step

Not for Construction

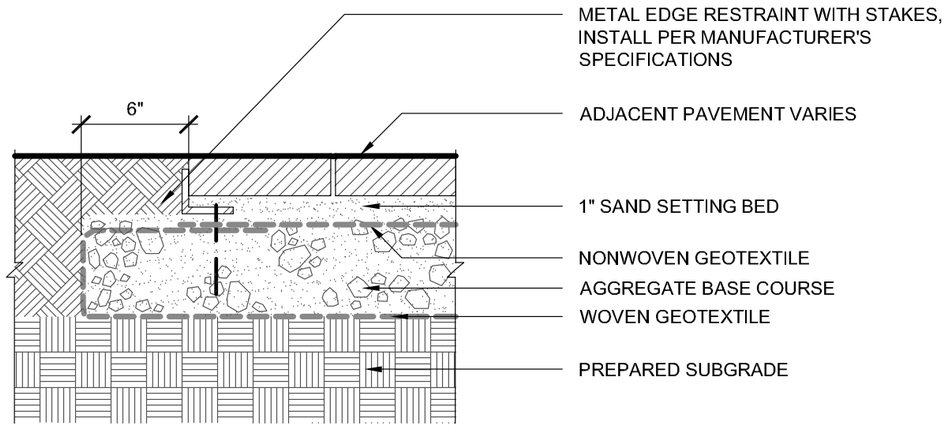


Railing

Not for Construction

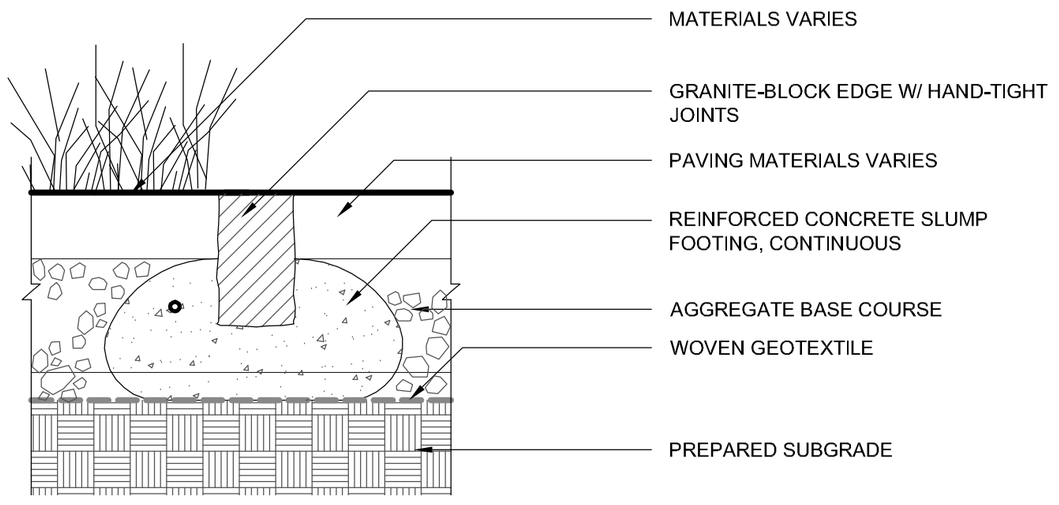
Hardscape | Details

Edge Restraints



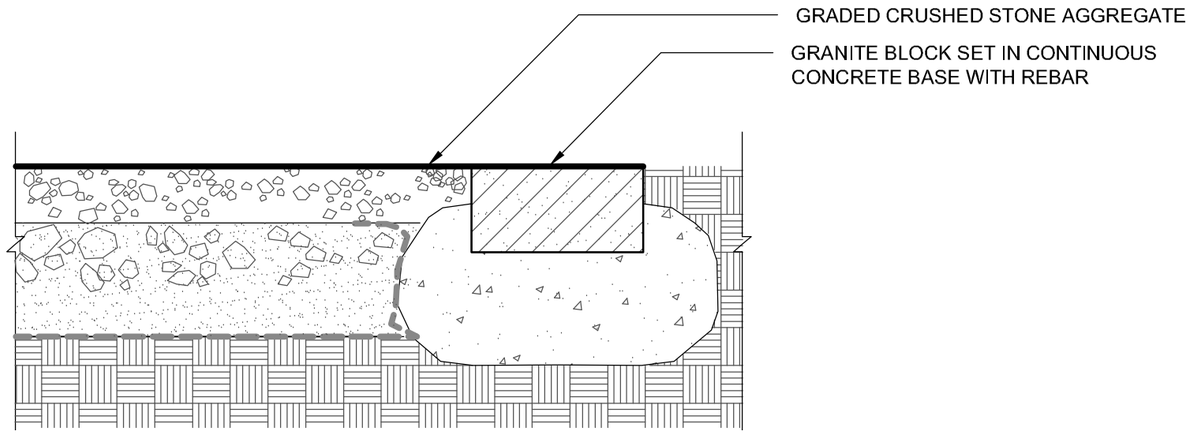
Metal Edge Restraint

Not for Construction



Grasnite-Block Edge Restraint

Not for Construction

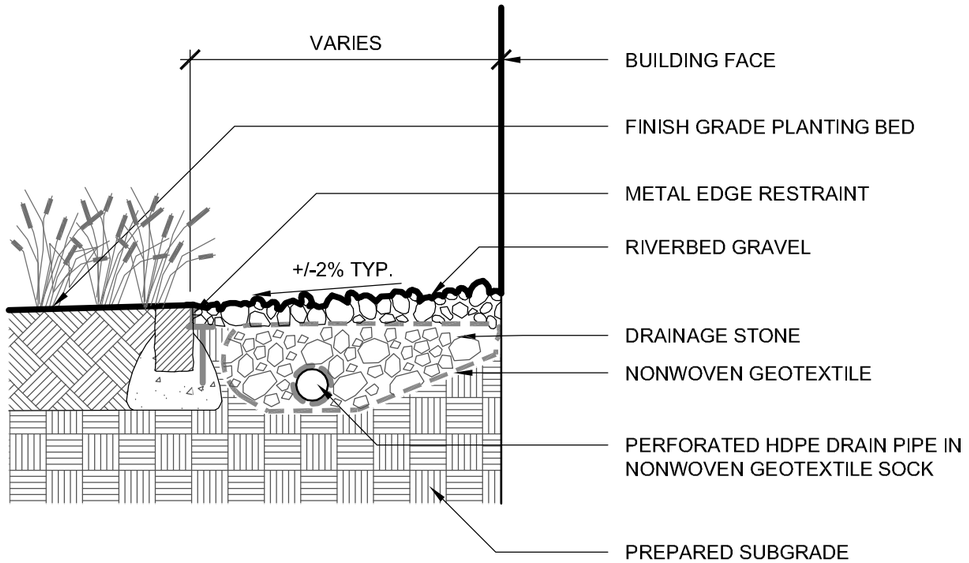


Crushed Gravel Pavement with Granite-Block Edge

Not for Construction

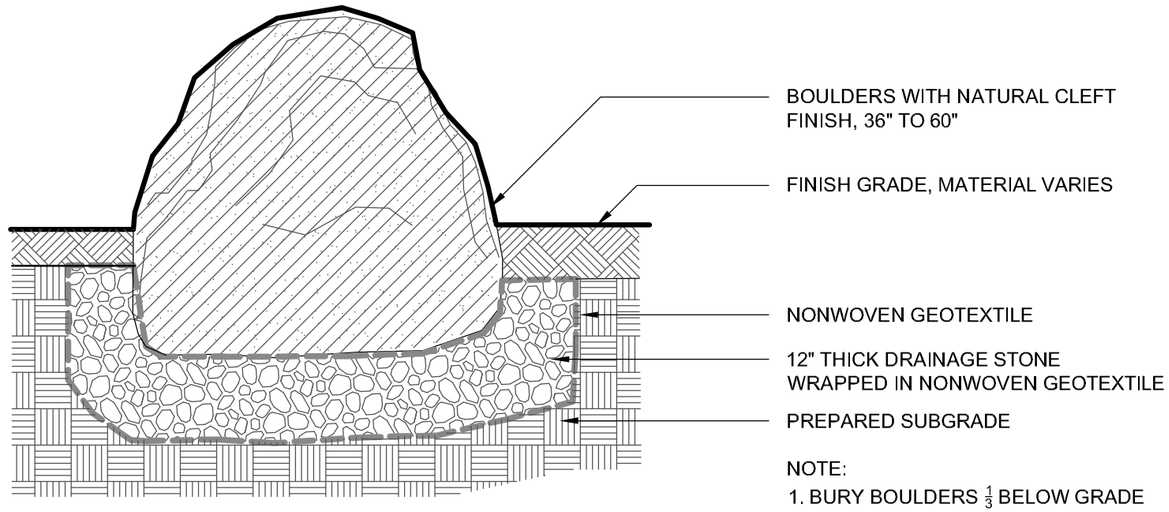
Hardscape | Details

Miscellaneous Stone Work



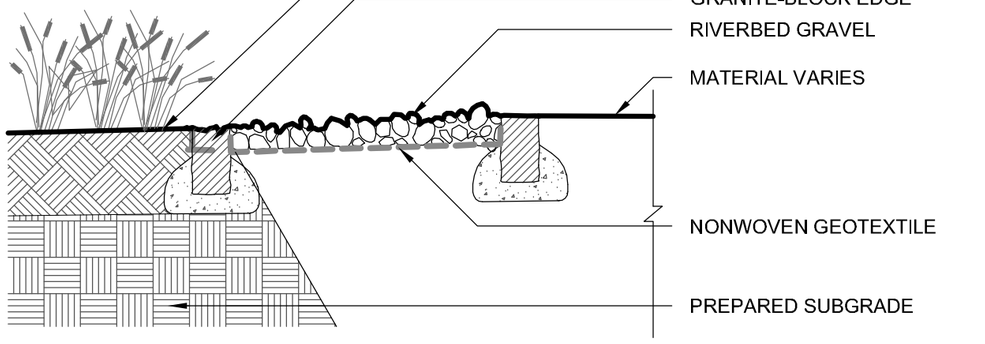
Stone Drip Strip with Metal Edge

Not for Construction



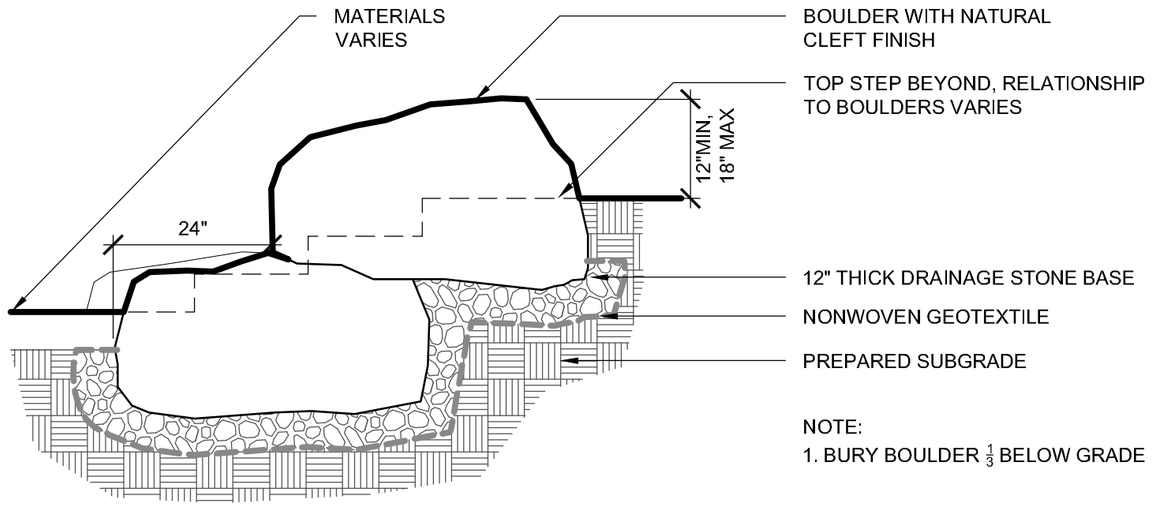
Boulders in Landscape

Not for Construction



Stone Mulch

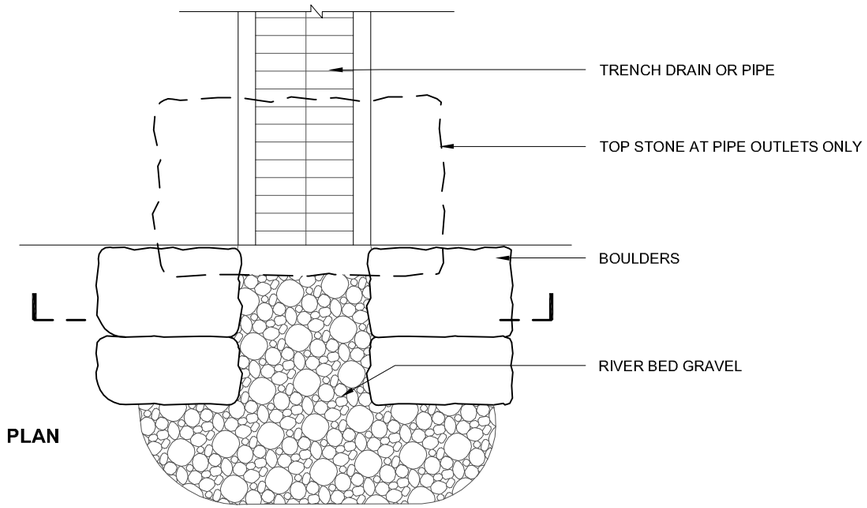
Not for Construction

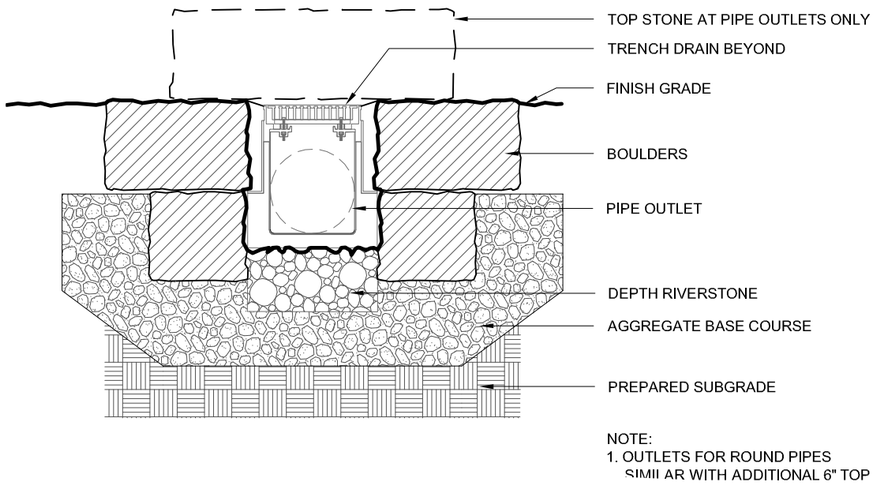


Stacked Boulders at Steps

Not for Construction

Miscellaneous Stone Work



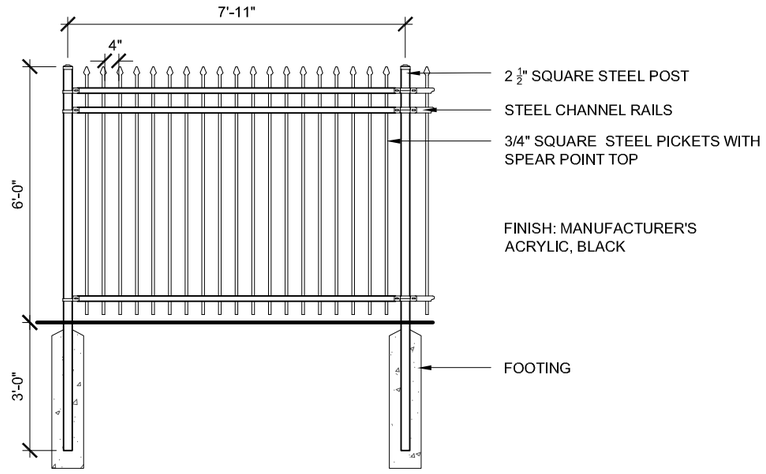


Stone Inlet and Outlet

Not for Construction

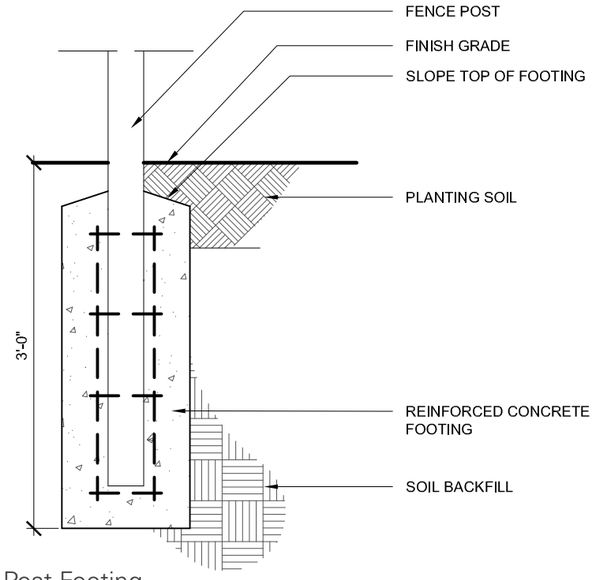
Hardscape | Details

Fences and Screens



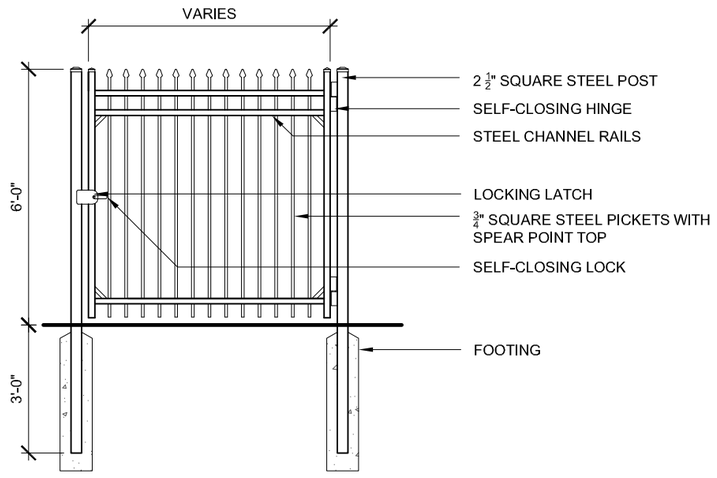
Decorative Metal Fence

Not for Construction



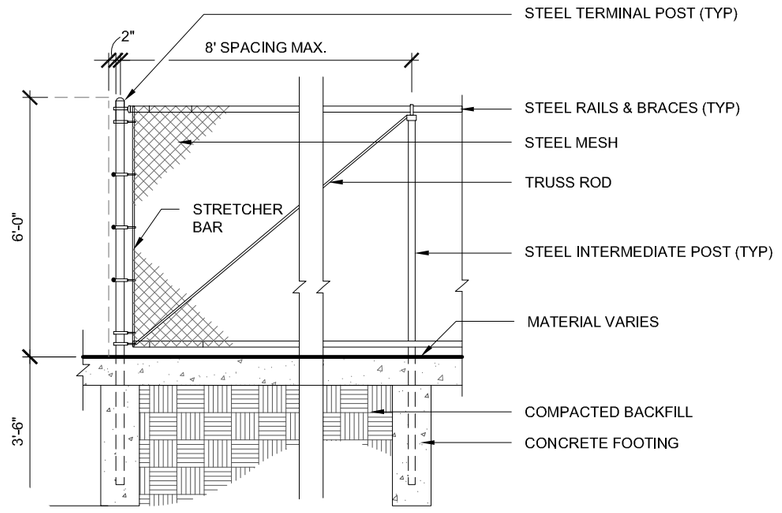
Decorative Metal Fence Post Footing

Not for Construction



Decorative Metal Gate

Not for Construction

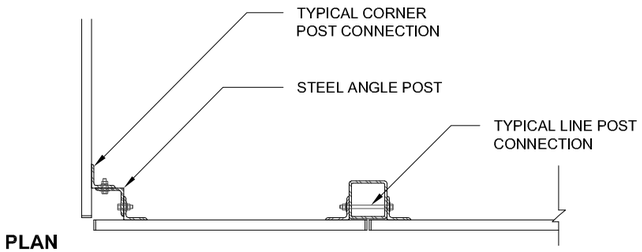


Chain Link Fence

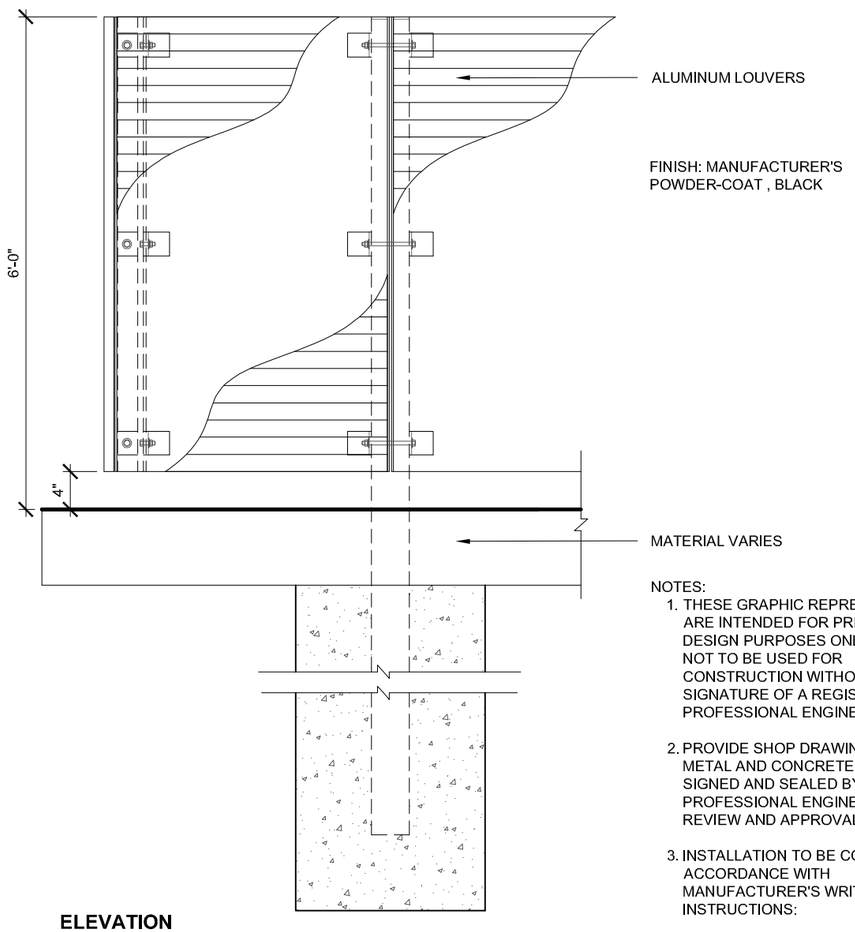
Not for Construction

Hardscape | Details

Fences and Screens



PLAN



ELEVATION

NOTES:

1. THESE GRAPHIC REPRESENTATIONS ARE INTENDED FOR PRELIMINARY DESIGN PURPOSES ONLY AND ARE NOT TO BE USED FOR CONSTRUCTION WITHOUT THE SIGNATURE OF A REGISTERED PROFESSIONAL ENGINEER.
2. PROVIDE SHOP DRAWINGS FOR METAL AND CONCRETE COMPONENTS SIGNED AND SEALED BY REGISTERED PROFESSIONAL ENGINEER FOR REVIEW AND APPROVAL.
3. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS:

Metal Screen Enclosure

Not for Construction

All details in this section are intended for preliminary design only. They are not to scale (N.T.S) and are not intended for bid or construction purposes. They are subject to modification based on design calculations, local practices, and all applicable codes and regulations.

Specifications

SECTION 321313 - CONCRETE PAVING

1.1 SUMMARY

A. Driveways.

B. Roadways.

C. Parking lots.

D. Curbs and gutters.

E. Walks.

1.2 QUALITY ASSURANCE

A. Quality Standard: ACI 301.

B. Mockups to demonstrate surface finish, texture, and color; curing; and standard of workmanship.

1.3 MATERIALS

A. Reinforcement:

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Welded Wire Reinforcement: Plain steel.
3. Reinforcing Bars: [**Deformed**] [**Epoxy-coated deformed**] [**Galvanized deformed**] steel.
4. Joint Dowel Bars: Epoxy-coated plain steel.

B. Concrete:

1. Portland Cement: ASTM C 150, gray.
2. Normal-weight aggregate.
3. Fly ash, pozzolan, blast-furnace, silica fume.
4. Air-entraining admixture.
5. Compressive Strength: 4000 psi at 28 days.

6. Detectable Warnings: Blockouts in concrete for detectable paving units.

C. Pavement Markings: **Latex** marking paint.

D. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

E. Wheel Stops: **Precast concrete** with galvanized-steel dowels; or other hardware as standard with whel-stop manufacturer.

1.4 FINISHING AND CURING

A. Pavement Finishes: Medium-to-fine-textured broom finish.

B. Cure concrete by moisture curing, moisture-retaining-cover curing, or curing compound.

1.5 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION 321313

SECTION 321400 - UNIT PAVING

1.1 SUMMARY

A. Concrete pavers set in aggregate and bituminous setting beds.

B. Salvaged concrete pavement set in aggregate setting beds.

C. Asphalt-block pavers set in bituminous setting beds.

D. Stone pavers set in aggregate setting beds.

E. Stone pavers set in mortar setting beds.

F. Aluminum edge restraints.

G. Precast concrete curbs.

1.2 QUALITY ASSURANCE

A. Mockups for each form and pattern of unit paver.

1.3 MATERIALS

A. Regional Materials for LEED:

1. For products having recycled content, Credit MR 4

2. For products and materials required to comply with requirements for regional materials, Credit MR 5

B. Concrete Pavers: Solid paving units.

1. Manufacturers: Hanover Architectural Products, Inc.; M1742, Finish 13.

2. Sizes:

a. Pedestrian:

1) Thickness: 2-1/2 inches.
2) Surface Dimensions/Shape: Maximum 36 inches; square or rectangular (not exceeding 1-1/2:1 proportion).

b. Vehicular:

1) Thickness: 3 inches.
2) Surface Dimensions/Shape: Maximum 12 inches, square.

C. Salvaged Concrete Pavers: Solid units cut from Owner's existing concrete pavement.

D. Asphalt-Block Pavers: Solid units with ground finish.

1. Manufacturer: Hanover Architectural Products, Inc.; "Ground Tudor," Matrix #A80016.
2. Sizes:

a. Pedestrian:

1) Thickness: 2-1/2 inches.
2) Surface Dimensions/Shape: 4 by 6 inches , 6 by 12 inches

b. Vehicular:

1) Thickness: 3 inches.
2) Surface Dimensions/Shape: 4 by 6 inches , 6 by 12 inches

E. Bluestone Pavers: Custom-cut paving units with thermal finish, made from quartz-based stone complying with ASTM C 616, Classification II Quartzitic Sandstone.

1. Manufacturers: Endless Mountain Stone Co., Susquehanna, PA. Color, "Light Grey Select."
2. Sizes:

a. Pedestrian:

1) Thickness: 2 inches
2) Surface Dimensions/Shape: Maximum 24 inches; square or rectangular (not exceeding 2:1 proportion).

b. Vehicular:
1) Thickness: 3 inches.
2) Surface Dimensions/Shape: Maximum 12 inches; square or rectangular (not exceeding 1-1/2:1)

F. Bluestone Stepping Stones: Custom-cut paving slabs with thermal finish, made from quartz-based stone complying with ASTM C 616, Classification II Quartzitic Sandstone.

1. Manufacturers: Endless Mountain Stone Co., Susquehanna, PA. Color, "Light Grey Select."
2. Sizes:

a. Thickness: 2-1/2 inches.
b. Surface Dimensions/Shape: Maximum 24 inches; square or rectangular (not exceeding 1-1/2:1 proportion).

G. Granite Pavers: Paving units made from granite with thermal finish, complying with ASTM C 615.

1. Products:

a. Champlain Stone; "Woodcreek."
b. North Carolina Granite Corporation; "Virginia Mist."
c. North Carolina Granite Corporation; "Mt. Airy White."

2. Sizes:

a. Pedestrian:

1) Thickness: 2 inches
2) Surface Dimensions/Shape: Maximum 24 inches; square or rectangular (not exceeding 2:1 proportion).

b. Vehicular:

1) Thickness: 3 (4) inches.
2) Surface Dimensions/Shape: Maximum 12 inches; square or rectangular (not exceeding 1-1/2:1)

H. Rough-Stone Pavers: Rectangular tumbled granite blocks, with split faces and edges, made from granite complying with ASTM C 615.

1. Manufacturers: High Bridge Stone Co.
2. Color: Grey with fine grain.
3. Finish: Light flame finish where indicated for ADA.
4. Sizes:

a. 8 inches by 4 inches by 4 inches.
b. 10 inches by 7 inches by 4 inches.
c. 12 inches by 7 inches by 4 inches.

I. Edge Restraints: Aluminum.

1. Manufacturers: Permaloc Corporation; "Asphalt Edge."

2. Color: Black

J. Curbs: Precast concrete. Made from normal-weight concrete with a compressive strength not less than 5000 psi and water absorption not more than 5 percent.

K. Aggregate Setting-Bed Materials:

1. Graded Aggregate for Base: Graded mixture of gravel, crushed stone, and sand with 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
2. Sand for Leveling Course: ASTM C 33.

3. Polymeric Sand for Joints: Manufacturer's mix of polymer binders and joint sand

   a. Color: Grey.

4. Separation Geotextile: Woven fabric.
5. Drainage Geotextile: Nonwoven fabric.

L. Bituminous Setting-Bed Materials

1. Sand for Setting Bed: Fine aggregate sand. ASTM D 1073, No. 2 or No. 3
2. Asphalt cement, ASTM D 3381
3. Neoprene-modified asphalt adhesive.
4. Sand for Joints: Fine aggregate sand.Mortar Setting Bed:

M. Mortar Setting-Bed Materials

1. Portland Cement-Lime and sand for setting-bed: Portand cement Type M complying with ASTM C 270,. levelling course consisting of a mix of 1 part sand and 4 parts cement.
2. Polymeric Sand for Joints: Manufacturer's mix of polymer binders and joint sand (Use only in bluestone application on concrete base and use sand-based product and not stone dust)

   a. Color: Grey.

1.4 INSTALLATION

A. Joint Pattern: As indicated

B. Aggregate Setting Bed:
1. Aggregate base over compacted subgrade and geotextile.
2. Leveling course of 1 to 1-1/2 inches over geotextile.
3. Pavers set with 1/16- to 1/8-inch polymeric sand-filled joints.

C. Bituminous Setting Bed:
1. Bituminous setting bed of 3/4-inch deep hot-mix asphalt on concrete slab or binder course.
2. Pavers set in neoprene-modified asphalt adhesive.
3. Pavers placed with hand-tight, one part cement and three parts sand and fill joints after concrete has set.

D. Mortar Setting Bed:
1. Portland Cement-Lime Setting-Bed Mortar: Type M complying with ASTM C 270.
2. Leveling course of 1 to 1-1/2 inches, consisting of a mix of 1 part sand and 4 parts cement.
3. Pavers placed with a minimum of 1/16 inch and a maximum of 1/8 inch joint width, one part cement and three parts sand and fill joints after concrete has set. Use polymeric sand in joints in case of bluestone applications only.

E. Wet Concrete Applications:
1. Place pavers before initial set of concrete occurs.
2. Pavers placed with hand-tight, sand-filled joints.
3. Sweep sand-cement mix into joints until joints are filled. Force mix into joints to fill voids and refill joints.

END OF SECTION 321400

SECTION 321343 – PERVIOUS CONCRETE PAVING

1.1 SUMMARY

A. Driveways.

B. Roadways.

C. Parking lots.

D. Walks.

1.2 QUALITY ASSURANCE

A. Quality Standard: ACI 301 and ACI 522.

B. Mockups to demonstrate surface finish, texture, and color; curing; and standard of workmanship.

1.3 MATERIALS

A. Concrete:
1. Portland Cement: ASTM C 150, gray, Type I/II.
2. Normal-Weight Aggregate: ASTM C 33, Class 5M; maximum ½-inch.
3. Fly ash, pozzolan, ground granulated blast-furnace slag.
4. Air-entraining admixture.
5. Water-reducing admixture.
6. Retarding admixture.
7. Hydration stabilizer.

B. Fiber Reinforcement: Monofilament, polypropylene.

1.4 INSTALLATION

A. Minimize shoveling and pulling concrete.

B. Strike-off with mechanical vibratory screed or hydraulically actuated pipe roller.

C. Curing: Absorptive cover, moisture-retaining-cover curing or a combination of these.

1.5 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION 321343

SECTION 321443 - POROUS UNIT PAVING

1.1 SUMMARY

A. Porous paving consisting of unit pavers set in aggregate setting beds.

B. Porous paving consisting of unit pavers set on soil.

C. Edge restraints for unit pavers.

1.2 QUALITY ASSURANCE

A. Mockups for each type and pattern of unit paver.

1.3 MATERIALS

A. Regional Materials:

1. Pavers manufactured within 500 miles of Project site from aggregates extracted and manufactured within 500 miles of Project site.
2. Granite curbs manufactured within 500 miles of Project site from materials extracted and manufactured within 500 miles of Project site.
3. Aggregate and soil extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Concrete: Solid interlocking concrete pavers of shapes that provide openings between units. Salvaged concrete paving units cut from Owner's existing concrete pavement

C. Brick: Solid brick paves of shapes that provide openings between units.

D. Edge Restraints: Aluminum.

E. Graded Aggregate for Subbase: Open graded for stormwater storage.

F. Graded Aggregate for Base: Well graded.

G. Leveling Course: Sand for Leveling Course,ASTM C 33. Crushed stone.

H. Paver Fill: Soil mix. Crushed stone.

1.4 INSTALLATION

A. Aggregate subbase over compacted subgrade and geotextile.

B. Aggregate base over compacted subbase and geotextile.

C. Leveling course of 1 to 1-1/2 inches over geotextile.

D. Pavers filled with crushed stone or soil mix.

END OF SECTION 321443

SECTION 321217 – POROUS ASPHALT PAVING

1.1 SUMMARY

A. Driveways.

B. Roadways.

C. Parking lots.

D. Walks.

1.2 MATERIALS

A. Asphalt Materials:

1. Asphalt Binder: AASHTO M 320, performance grade binder 76-22; modified with elastomeric polymer.

B. Auxiliary Materials:

1. Paving Geotextile: Nonwoven polypropylene.
2. Edge Restraint: L-shaped extruded aluminum.

C. Asphalt Mixes: Porous hot-mix asphalt plant mix, with history of satisfactory performance in the geographical area.

1. Bituminous Content: 5.75 to 6.0 percent by weight of total weight (dry aggregate)
2. Binder Draindown: ASTM D 6390, maximum 0.3 percent.
3. Air Voids: Minimum 18 percent.

1.3 INSTALLATION

A. Porous Hot-Mix Asphalt Paving:

1. Subgrade verified to support paving and imposed loads.
2. Single-Lift Course
3. Rolling limited to two passes.

1.4 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner**] [**Contractor**] engaged.

END OF SECTION 321217

SECTION 321216 - ASPHALT PAVING

1.1 SUMMARY

A. Driveways.

B. Roadways.

C. Parking lots.

D. Walks.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Commonwealth of Pennsylvania Department of Transportation (PENNDOT), Publication 408, latest revision with supplement, for asphalt paving work.

1.3 MATERIALS

A. Asphalt Materials:

1. Asphalt Binder: AASHTO M 320, performance graded.
2. Asphalt Cement: Class PG 64-22 complying with PADOT 408, Section 420.2 (a) 1
3. Prime Coat: Asphalt emulsion.
4. Tack Coat: Emulsified asphalt.
5. Fog Seal: Emulsified asphalt.

B. Auxiliary Materials:

1. Recycled Materials: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material.
2. Herbicide.
3. Paving Geotextile: Nonwoven polypropylene.

C. Mixes:

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent or more than 15 percent by weight.

a. Surface Course Limit: No more than 10 percent by weight.

D. Asphalt Mixes: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by PADOT; designed according to procedures in AI MS-2.

1. Base Course: Bituminous Binder Course ID-2 (Standard), complying with PADOT 408, Section 421.
2. Surface Course: Bituminous Wearing Course ID-2 (Standard), complying with PADOT 408, Section 420.

E. Emulsified-Asphalt Slurry: ASTM D 3910.

1.4 INSTALLATION

A. Cold Milling: 1-3 inches

B. Patching Hot-Mix Asphalt Pavement: Base mix for full thickness of patch.

C. Patching Portland Cement Concrete Pavement with Hot-Mix Asphalt:

1. Cracked slabs broken and rolled.
2. Rocking slabs stabilized with pumped asphalt.
3. Badly cracked pavement excavated and filled with base mix for full thickness of patchand covered with surface layer.

D. Repairs to Existing Pavements: [**Leveling course**] [**Cracks and joints filled**].

E. Hot-Mix Asphalt Paving:

1. Subgrade proof rolled.
2. Herbicide applied.
3. Prime coat over unbound-aggregate base course.
4. Base Course: As indicated
5. Surface Course: As indicated

F. Asphalt curbs.

G. Asphalt Traffic-Calming Devices: Speed tables.

H. Surface Treatment: Fog seal.

1.5 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION 321216

SECTION 321500 - AGGREGATE PAVING

1.1 SUMMARY

A. Aggregate paving, pedestrian (ADA).

1.2 QUALITY ASSURANCE

A. Mockups for each type of aggregate pavement.

1.3 MATERIALS

A. Regional Materials:

1. Aggregate extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Graded Aggregates for Surface Course: Local limestone.

1. AASHTO 10, unwashed.
2. AASHTO 8, unwashed.
3. Fines: Minus #200 (collector fines)

C. Surface Course Mix: Volume basis:
1. AASHTO 10: 4 parts.
2. AASHTO 8: 4 parts.
3. Fines: 1 part.

D. Geotextile: Woven fabric, Class 2.

E. Edge Restraints: Aluminum.

1.4 INSTALLATION

A. Aggregate drainage course over compacted subgrade and geotextile.

B. Aggregate surface course drainage course; single lift; 3-4 inches thick.

1.5 FIELD QUALITY CONTROL

A. Testing Agency: Contractor engaged.

B. Firmness and Stability Tests: Rotational penetrometer or narrow-wheeled bicycle or 40 pound stroller.

END OF SECTION 321500

SECTION 321726 - TACTILE WARNING SURFACING

1.1 QUALITY ASSURANCE

A. Mockups for each type of tactile warning surfacing.

B. Accessibility Requirements: [**The U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**] [**and**] [**ICC A117.1**].

1.2 MATERIALS

A. Regional Materials for LEED: For detectable warning unit pavers.

B. Detectable Warning Granite Unit Pavers: Solid paving units, made from granite complying with ASTM C 615

1. Manufacturers: Hanover Architectural Products, Inc. "Basalt Black"; North Carolina Granite Corporation; "Mt. Airy White.

2. Shapes and Sizes:

a. Face Size: Nominal 12 by 12 inches.

b. Thickness: 3 inches.

C. Setting Bed: Aggregate or Mortar as indicated on details.

END OF SECTION 321726

SECTION 321640 – STONE CURBS, EDGES AND STEPS

1.1 SUMMARY

A. Stone curbs and edges.

B. Stone steps.

1.2 QUALITY ASSURANCE

A. Mockups for each type of curb and edge.

Specifications

1.3 MATERIALS

A. Regional Materials for LEED: For products and materials required to comply with requirements for regional materials Credit MR 5 for materials that have been extracted, harvested, or recovered, as well as manufactured, with 500 miles of Project site.

B. Granite Curbs: Granite, ASTM C 615.

1. Products:

a. North Carolina Granite Corporation; “Mt. Airy White.”
b. Swenson Granite Works; “Concord Gray.”

2. Colors and Grains: White to light gray with medium grain.
3. Dimensions: , minimum 3 feet long.
4. Finish: Thermal top with split face.
5. (Back Finish)

C. Granite Edges: Granite, ASTM C 615.

1. Products:

a. North Carolina Granite Corporation; “Mt. Airy White.”
b. Swenson Granite Works; “Concord Gray.”

2. Colors and Grains: White to light gray with medium grain.
3. Dimensions: , minimum 3 feet long.
4. Finish: Thermal on top with split face.
5. (Back Finish)

D. Granite Steps: Granite, ASTM C 615.

1. Products:

a. North Carolina Granite Corporation; “Mt. Airy White.”
b. Swenson Granite Works; “Concord Gray.”

2. Colors and Grains: White to light gray with medium grain.
3. Dimensions: As indicated on drawings.
4. Finish: Thermal on exposed faces.

E. Concrete: Portland cement, ASTM C 150.

F. Mortar: Portland cement, ASTM C 150, Type I or Type II. Hydrated lime, ASTM C 207, Type S.

G. Grout: Job mixed, portland cement and sand; or prepackaged, standard sanded cement. (Color?)

H. Dowels: Stainless steel, Type 304.

1.4 INSTALLATION

A. Curbs and Edges:

1. Set on aggregate base with concrete chairs at joints and midsection.
2. ¼-inch joints, unfilled.

B. Stone Steps:

1. Mortar Setting Bed:

a. Portland cement-lime.

2. Step units placed with horizontal and vertical 3/8-inch joints filled with flexible joint material. Type S or M (single component / multiple component), Grade NS (non-sag), Class T (pedestrian/vehicular traffic), Joint substrate class O; Color to match color of granite

END OF SECTION 321640

SECTION 055213 - PIPE AND TUBE RAILINGS

1.1 SUMMARY

A. Steel pipe and tube railings.

1.2 PERFORMANCE REQUIREMENTS

A. Engineering design of railings by Contractor.

1.3 FABRICATION

A. Changes in Direction of Members: By bending or by inserting prefabricated fittings.

B. Connections: Welded.

1.4 MATERIALS

A. Regional Materials for LEED:

1. Comply with requirements for recycled content Credit MR 4; Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2. Comply with requirements for regional materials Credit MR 5 for materials that have been extracted, harvested, or recovered, as well as manufactured, with 500 miles of Project site.

Specifications

B. Stainless-steel pipe and tube railings; Type 316L.

1. Finish: Dull satin, No. 6.

C. Nonshrink, nonmetallic grout.

1.5 INSTALLATION

A. Set in formed or core-drilled holes; in nonshrink grout.

B. Base flange cover.

END OF SECTION 055213

SECTION 322113 – MISCELLANEOUS SITE STONEWORK

1.1 SUMMARY

A. Stone drip strip.

B. Boulders.

C. Stone benches.

1.2 QUALITY ASSURANCE

A. Mockups for stone benches.

1.3 MATERIALS

A. Regional Materials for LEED:

B. Rounded Riverbed Gravel: Natural, local stone; natural colors.

1. Size Ranges:

a. 1 inch to 3 inches.
b. 3 inches to 6 inches.

2. Sources: Pennsy Supply, Harrisburg, PA

C. Boulders and Stone Benches: Local limestone.

1. Sources:

a. Valley Quarries, Inc.
b. Dickinson College's quarry

2. Sizes and Shapes: As indicated on Drawings.
3. Finish: As indicated on Drawings.

D. Drainage Aggregate: Washed crushed stone, or crushed or uncrushed gravel; No. 57 stone.

E. Edge Restraints: Aluminum.

1. Product: Permaloc Corporation; "PermaStrip."

F. Geotextile: Nonwoven.

1.4 STONE FABRICATION

A. Fabricate stone in sizes and shapes indicated.

B. Tolerances: Projection Tolerances not greater than ¼-inch, variation in line not to exceed 3/8-inch and variation in joint thickness not more than 1/16 - inch

1.5 INSTALLATION

A. Stone Drip Strips:

1. Drainage aggregate with perforated pipe on geotextile on prepared subgrade.
2. Riverbed gravel over geotextile to depths as indicated on drawings.

B. Boulders:

1. Drainage aggregate on geotextile on prepared subgrade.
2. Boulders placed on drainage aggregate and reviewed by Architect.

C. Stone Benches:

1. Drainage aggregate on geotextile on prepared subgrade:
2. Stone benches placed on compacted drainage aggregate and reviewed by Architect.

END OF SECTION 322113

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

1.1 SUMMARY

A. Decorative metallic-coated-steel tubular picket fences.

B. Swing gates.

Specifications

1.2 QUALITY ASSURANCE

A. Mockups.

1.3 DECORATIVE METALLIC-COATED-STEEL TUBULAR PICKET FENCES

A. Manufacturer: Ameristar Fence Products; “Montage Plus System.”

B. ASTM F 2408 for industrial application (class).

C. Post Caps: Manufacturer’s standard.

D. Picket Tops: Spear point shape.

E. Picket Spacing: 4 inches clear, maximum.

F. Finish: Manufacturer’s multi-stage pretreatment/wash, epoxy primer and acrylic topcoat.

1.4 GATES

A. Swing Gate Configuration: Single leaf and double leaf as indicated.

1. Hinges: Hydraulic, self-closing.
2. Hardware: Magnetic gate lock, lever type, keyed, permitting operation from both sides of gate.

1.5 INSTALLATION

A. Post Setting: In concrete.

END OF SECTION 323119

SECTION 323113 - CHAIN LINK FENCES AND GATES

1.1 SUMMARY

A. Chain-link fences.

B. Swing gates.

1.2 CHAIN-LINK FENCES AND GATES

A. Fence Fabric: Steel wire mesh sized 2 inches.

B. Posts and Rails: Light industrial strength; round shape.

C. Horizontal Support: Rails.

D. Swing Gates: Steel.

E. Steel Finish: Zinc coated.

1.3 INSTALLATION

A. Chain-Link Fencing: ASTM F 567.

B. Post Setting: In concrete.

END OF SECTION 323113

SECTION 108200 – GRILLES AND SCREENS

1.1 SUMMARY

A. Infill panels.

B. Banding and/or tube framing.

C. Gates.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated design and engineering analysis by contractor-engaged professional engineer.

1.3 QUALITY ASSURANCE

A. Mockups.

1.4 METALLIC-COATED-METAL SCREEN

A. Manufacturer: BarnettBates Corporation; “STL-100 System.”

B. Materials:

1. Main Bars: Formed louver aluminum extrusion, ASTM B 221.
2. Crossbars: Expanded tubular extrusions, ASTM B 210.
3. Banding/Framing Bars: Rectangular aluminum extrusions.

4. Metals:

   a. Aluminum Plate and Sheet: ASTM B 209.
   b. Aluminum Extrusions: ASTM B 221.
   c. Aluminum Castings: ASTM B 26

C. Finish: Manufacturer's powder-coat system; black.

1.5 GATES

A. Swing Gate Configuration: Single leaf and double leaf as indicated.

1. Hinges: Hydraulic, self-closing.
2. Hardware: Magnetic gate lock, lever type, keyed, permitting operation from both sides of gate.
3. Cane Bolts.

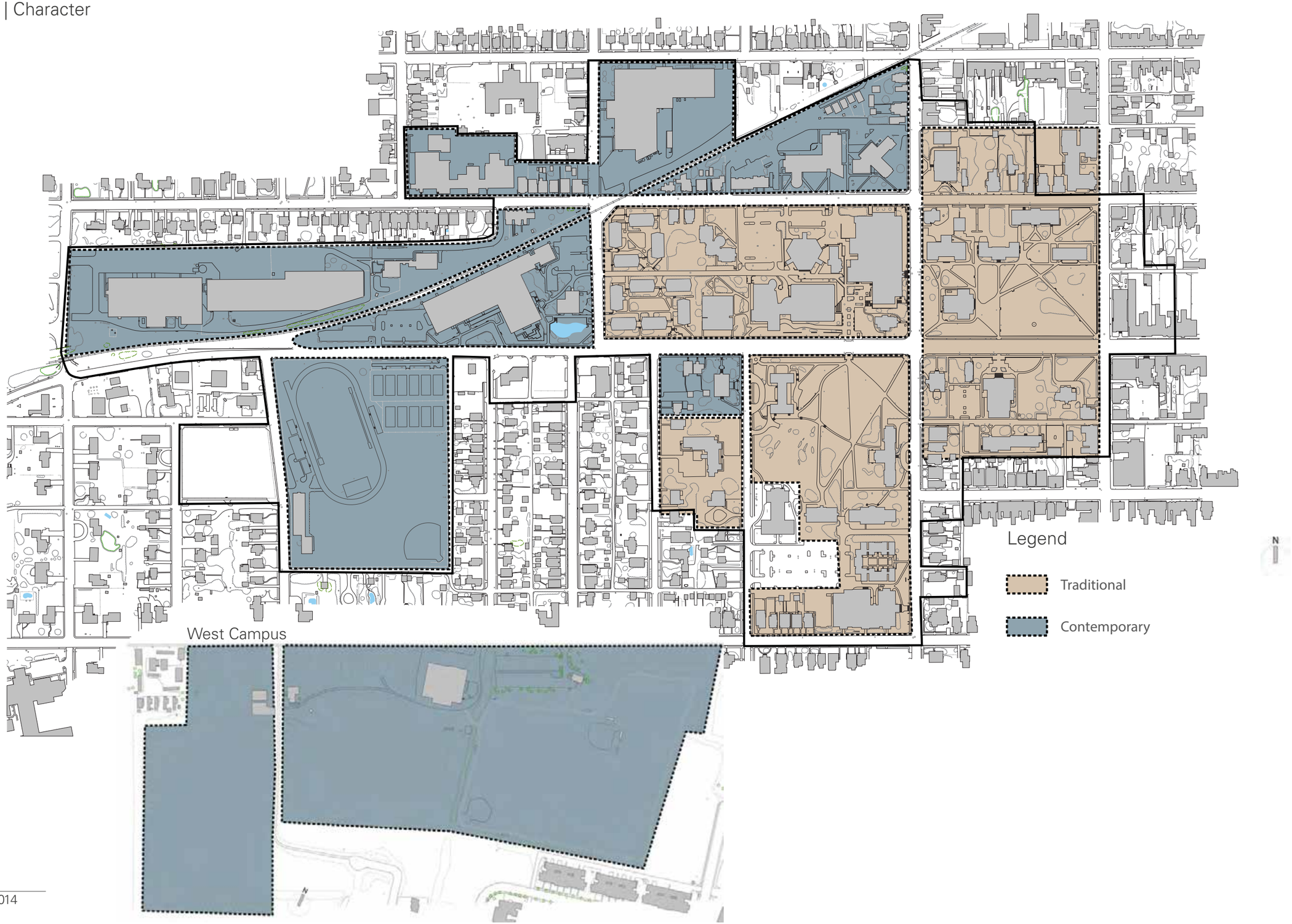
1.6 INSTALLATION

A. Post Setting: In concrete.

END OF SECTION 108200

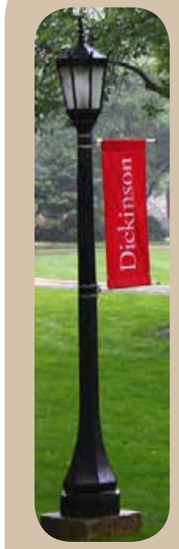
Lighting

Proposed | Character



Lighting

Existing Character





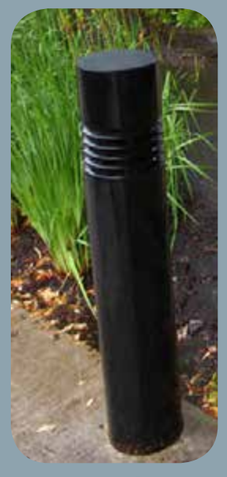

Historic Campus

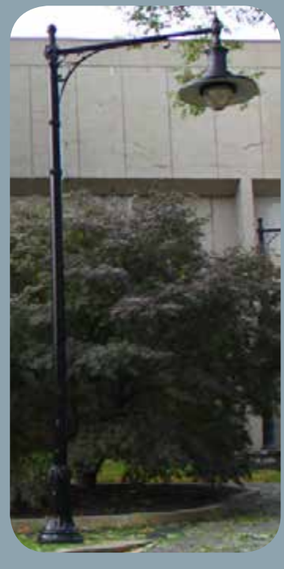
Residential

Traditional- to be maintained



Athletics & West Campus



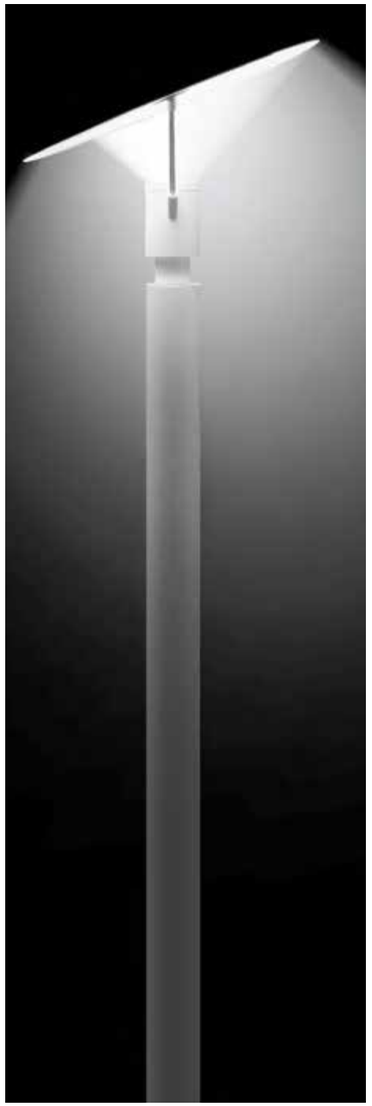


Expanded Core

Contemporary

Lighting

Proposed | Contemporary - Pedestrian



Bega

Location: Carpinteria, California

Cost: Medium

Lamp Options: LED

Height Options: 13’-22’

Notes:

Symmetric or Asymmetric

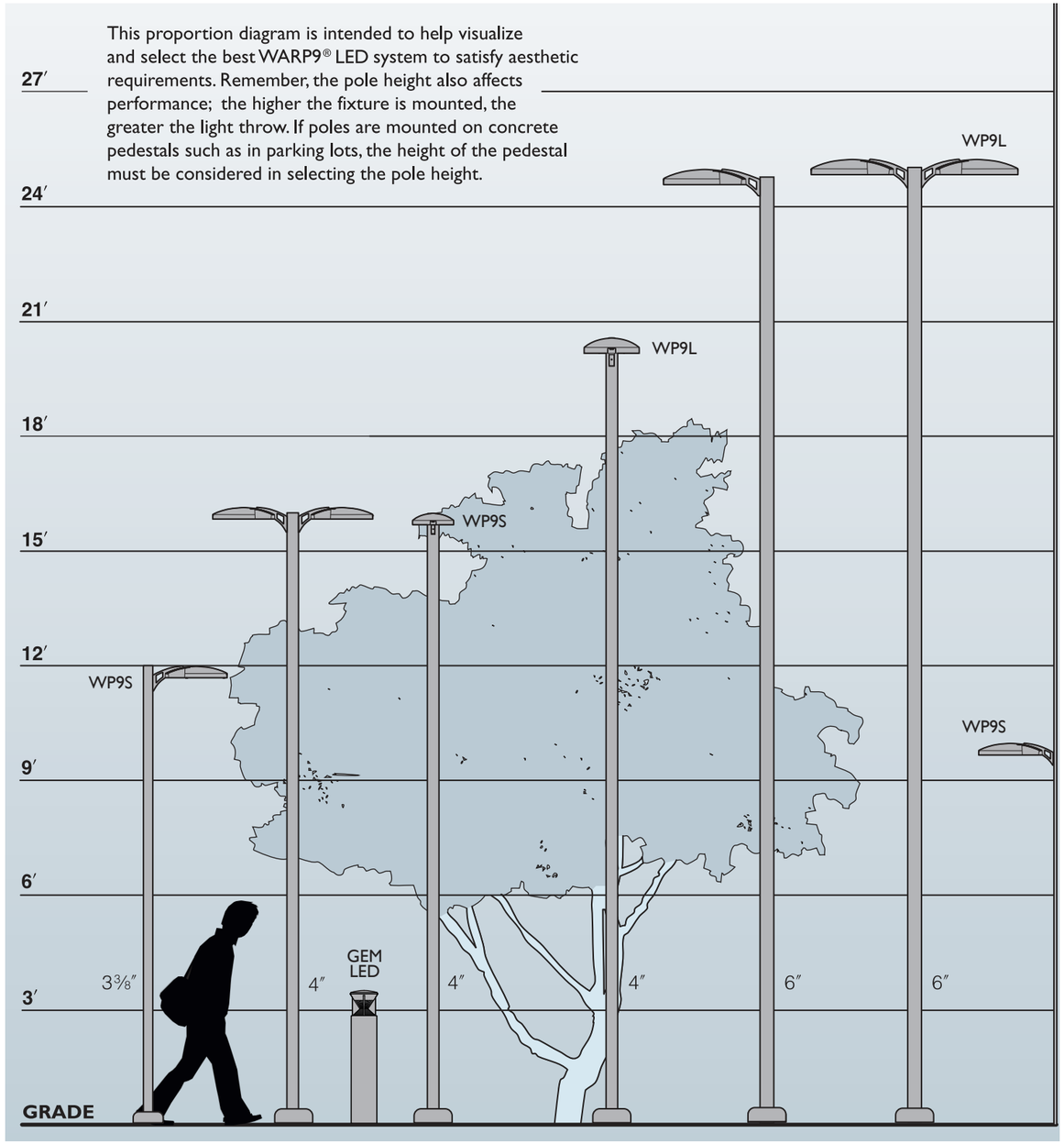
Adjustable Reflector

LEED EA2: Optimize Energy Performance

LEED ER Credit 4: Recycled Content (34%)

Lighting

Proposed | Contemporary - Vehicular



Kim Warp 9

Location: California

Cost: Medium

Lamp Options: LED

Height Options: 12′-24′

Notes:

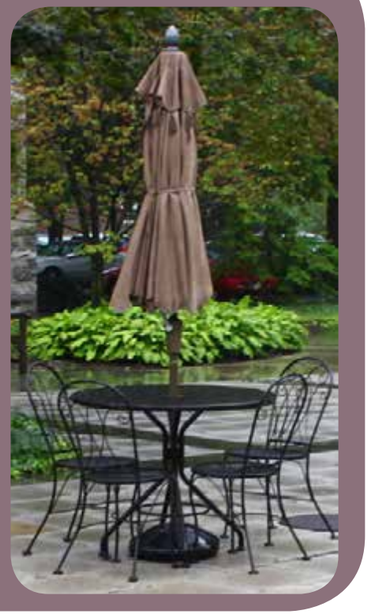
Dark Sky Compliant

LEED EA2: Optimize Energy Performance

LEED ER Credit 4: Recycled Content (34%)

Benches

Existing Conditions



Historic Campus

Athletics & West Campus

Expanded Core

Residential Use

Benches

Proposed | Contemporary

Landscape Forms

Neoliviano

Location:	Kalamazoo, MI
Cost:	$600 - 2020
Wood Options:	fsc black locust, fsc purple heart
Metal Options:	Aluminum
Notes:	100% Recyclable

Benches

Proposed | Contemporary

20"d x 17"h x 24"l

20" x 17" x 59"

20" x 17" x 118"

27" x 31" x 24"

27" x 31" x 69"

27" x 31" x 118"

27" x 31" x 118"

Neoliviano Bench

To order: Specify collection and product name. Select length, wood type, backed or backless, and with or without intermediate arm. Specify surface mount, embedded or freestanding. Supports are cast aluminum. Backed bench comes standard with end arms. Bench ships fully assembled. **FSC cert. Ipe wood** available for 25% upcharge. Check Materials/Colors link on website for species.

description	size (d x h x l)	Premium Exterior Woods w/ finish price (ship wt.)	Premium Interior Woods LF-80 price (ship wt.)
Neoliviano Backless Bench, 24"	20" x 17" x 24"	$ 800 (78)	$ 880 (78)
Neoliviano Backless Bench, 59"	20" x 17" x 59"	830 (150)	1090 (150)
Neoliviano Backless Bench, 118"	20" x 17" x 118"	1470 (228)	1730 (228)
Neoliviano Backed Bench, 24"	27" x 31" x 24"	760 (98)	1020 (98)
Neoliviano Backed Bench, 69"	27" x 31" x 69"	1250 (198)	1510 (198)
Neoliviano Backed Bench, 118"	27" x 31" x 118"	1970 (279)	2230 (279)
Neoliviano Backed Bench, 118" w/center arm	27" x 31" x 118"	2020 (290)	2280 (290)

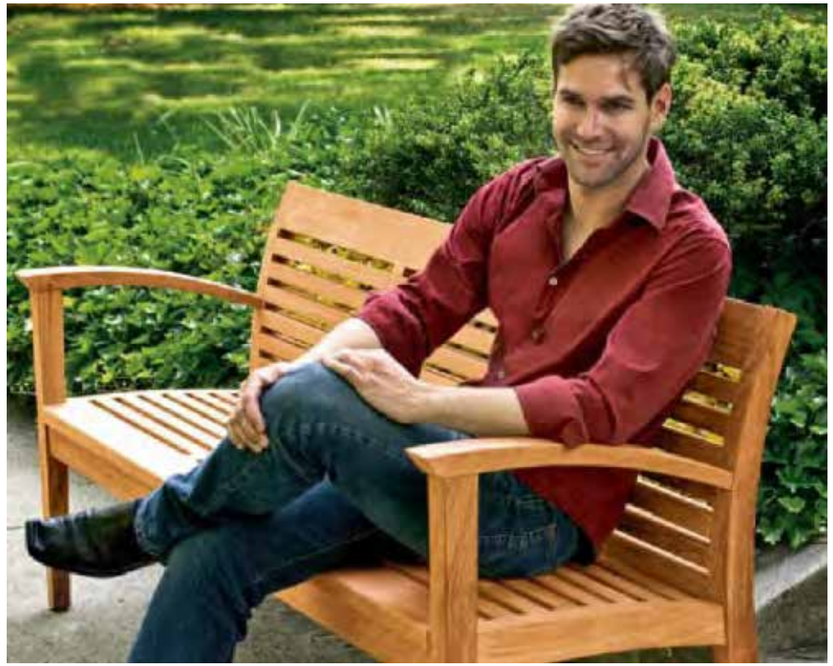
Benches

Proposed | Traditional

Landscape Forms

Wellspring

Location:	Kalamazoo, MI
Cost:	$530 - 1120*
Wood Options:	teak, fsc black locust*
Notes:	100% Recyclable
	* extra cost for black locust- approx. 2.5 times



Benches

Proposed | Traditional

freestanding/surface mount
24" bench

freestanding/surface mount
48" bench

freestanding/surface mount
48" bench with center arm

freestanding/surface mount
72" bench

freestanding/surface mount
72" bench with intermediate arms

Wellspring Bench

Wellspring bench design is protected by U.S. Patent Nos. D559,004; D564,247.

To order: Specify collection name, model description, length and seat height. Select freestanding or surface mount, and with or without center or intermediate arms. Bench comes standard in premium teak. Bench ships fully assembled with freestanding glides. **Wellspring meets ANSI/BIFMA performance and safety standards.**

description	*size (d x h x l)*	*price*	*(ship.wt.)*
Wellspring bench, 17.5" seat height, 24"	25" x 34" x 24"	$ 530	(60)
Wellspring bench, 19" seat height, 24"	25" x 36" x 24"	590	(60)
Wellspring bench, 17.5" seat height, 48"	25" x 34" x 48"	800	(90)
Wellspring bench, 19" seat height, 48"	25" x 36" x 48"	850	(90)
Wellspring bench, 17.5" seat height, 72"	25" x 34" x 72"	1060	(115)
Wellspring bench, 19" seat height, 72"	25" x 36" x 72"	1120	(115)

Bike Racks and Shelters

Existing Conditions

Historic Campus

Athletics & West Campus

Expanded Core

Residential

Bike Racks and Shelters

Proposed

Landscape Forms-Bola

Cora- Expo W Series Bicycle Rack

Waste Receptacles

Existing Conditions

Historic Campus

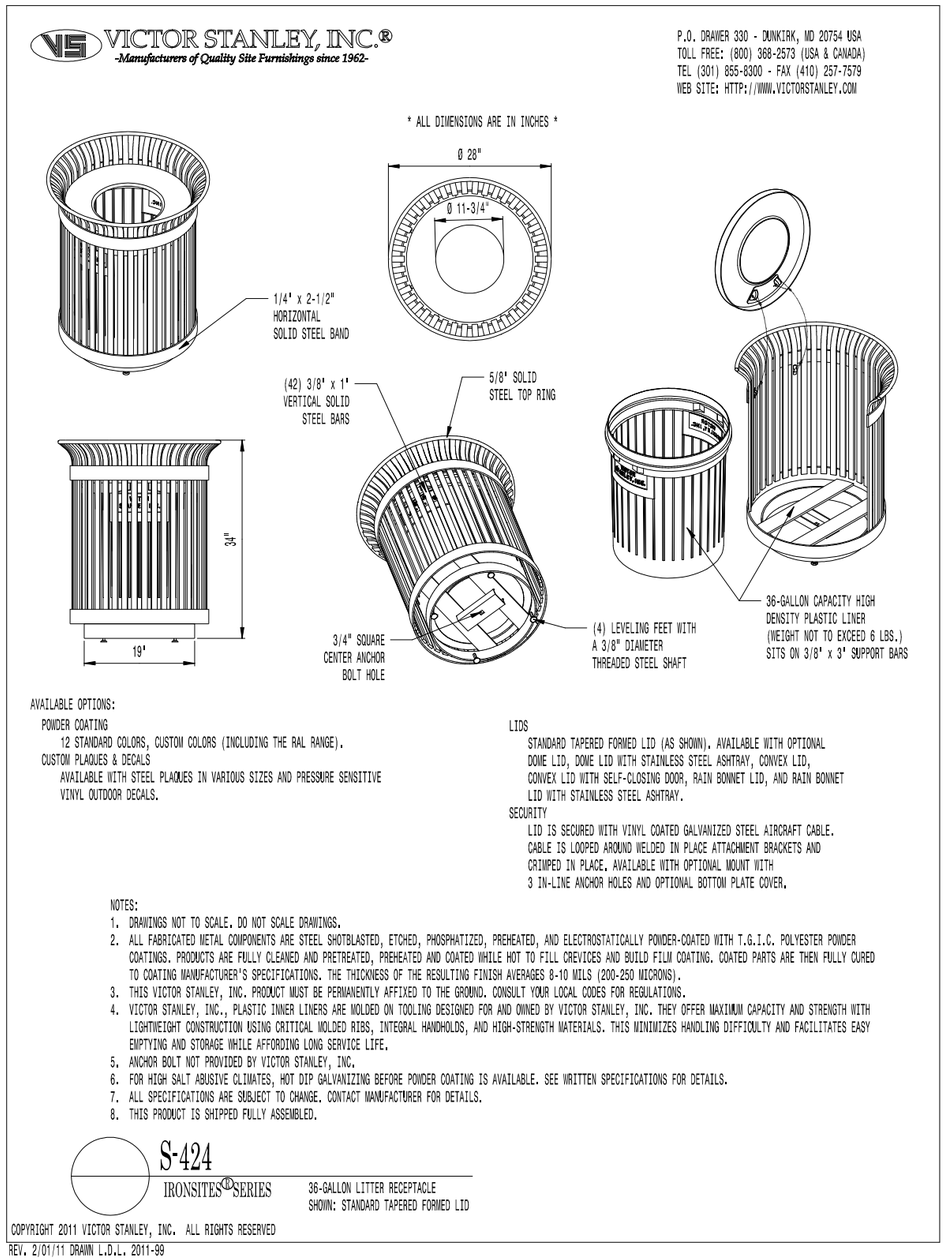
Athletics & West Campus

Expanded Core

Residential Use

Waste Receptacles

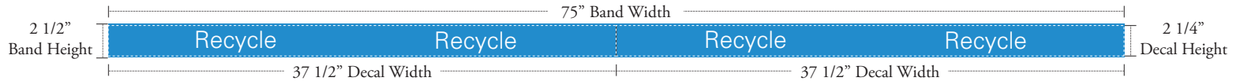
Proposed



Not for Construction

Recycle Bin Decal

Band Outside of Receptacle



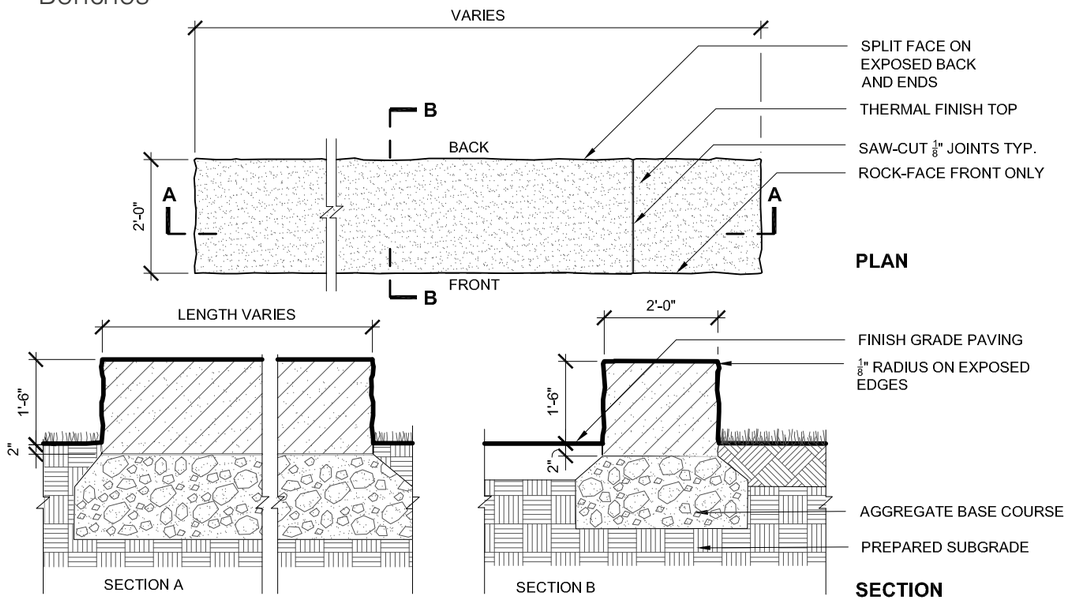
Approximate Size of text on decal

Lid

Notes:
Font should be Adobe Garamond Regular or Univers 45 Light

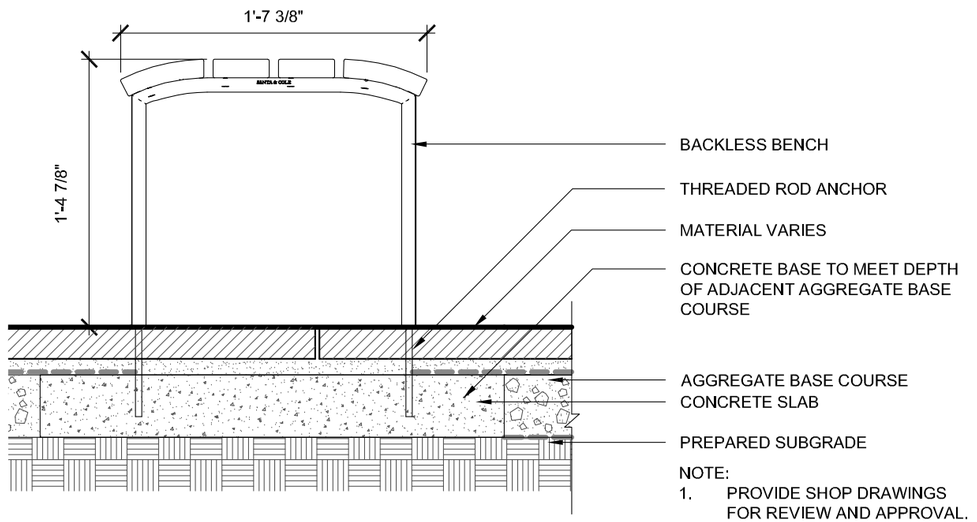
Site Furnishings | Details

Benches



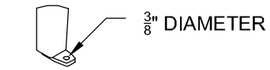
Stone Bench

Not for Construction

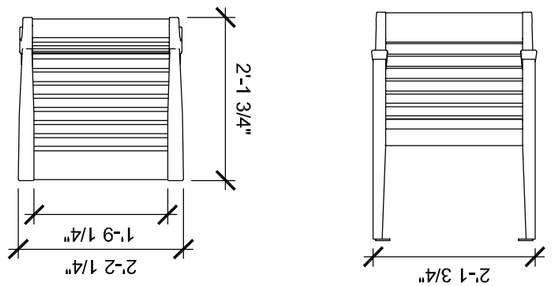


Neolinanao Backless Bench (Landscape Forms)

Not for Construction

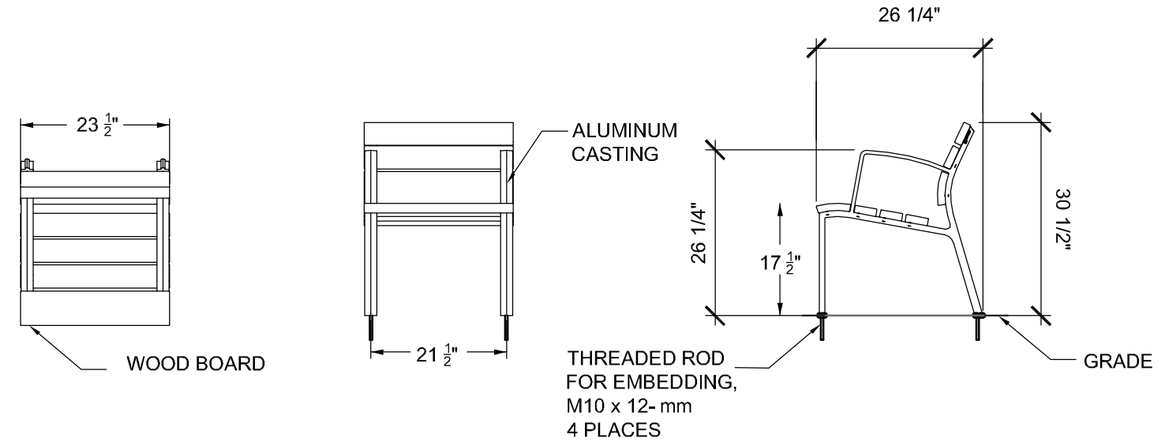


SURFACE MOUNT FOOT



Bench - Wellspring (Landscape Forms)

Not for Construction



Bench - Neolinano (Landscape Forms)

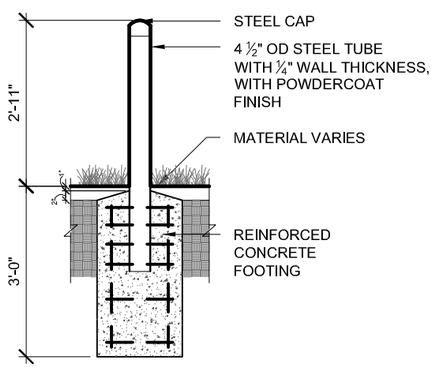
Not for Construction

Site Furnishings | Details

Site Furnishings

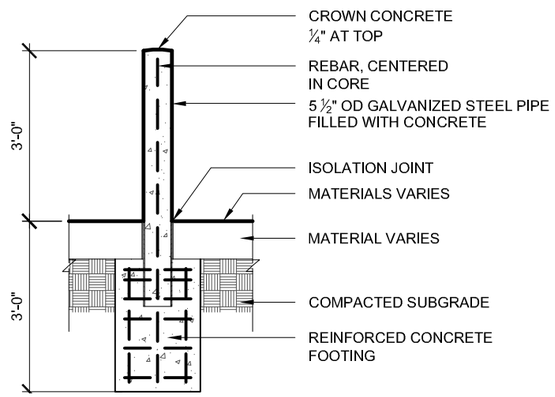
Cafe Table (Equinox Round Bistro Table) and Chairs (Florida Seating Chair AL-302 TK)

Not for Construction



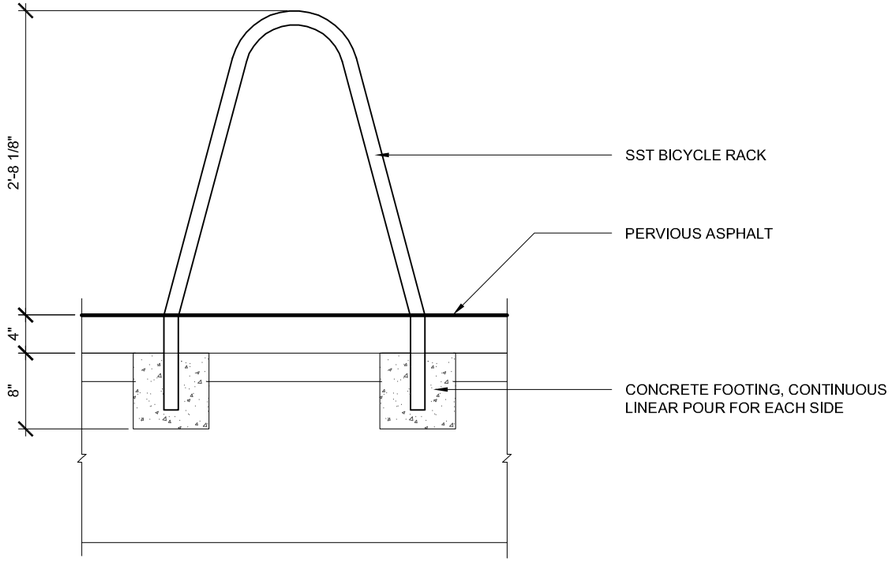
Metal Bollard Type A

Not for Construction



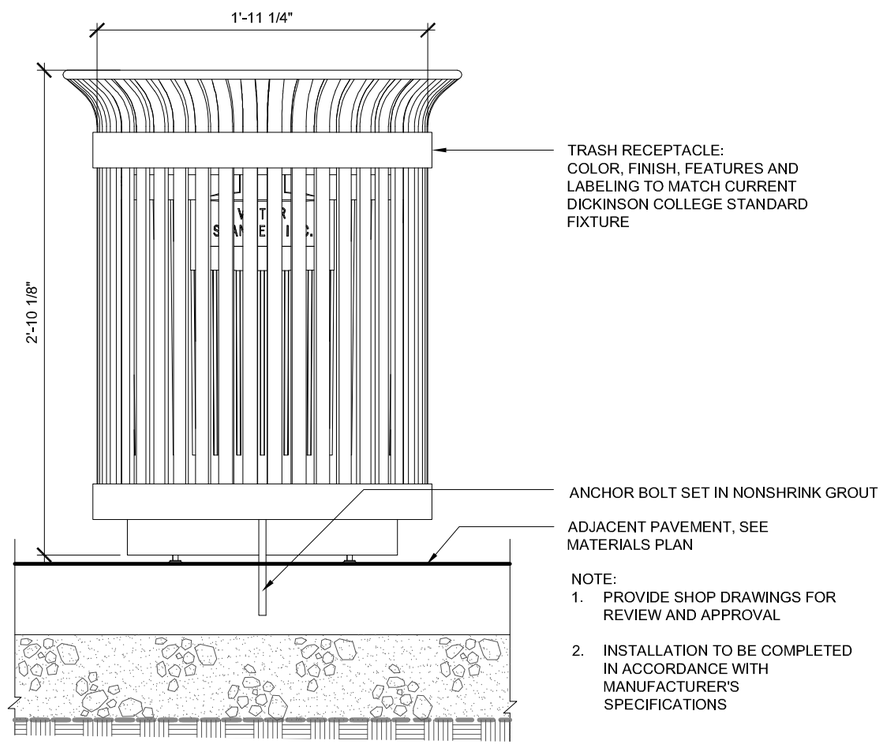
Metal Bollard Type B

Not for Construction



Bicycle Rack

Not for Construction

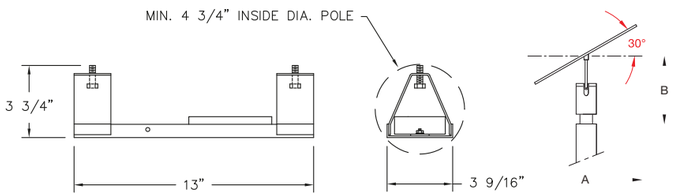


Waste Receptacle

Not for Construction

Site Furnishings | Details

Lighting

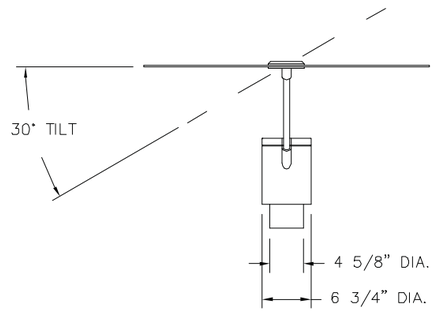


PBM ASSEMBLY DETAIL

Dimensions

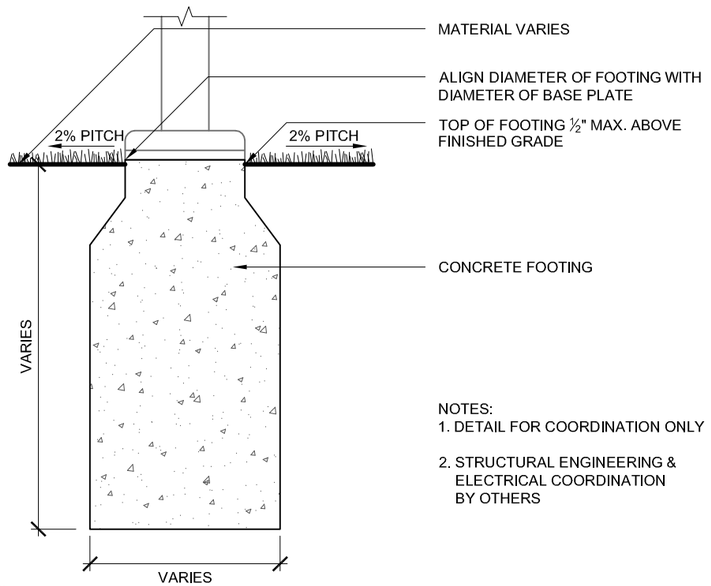
A: 39-3/8 "

B: 22-5/8 "



Pedestrian Light Pole Top

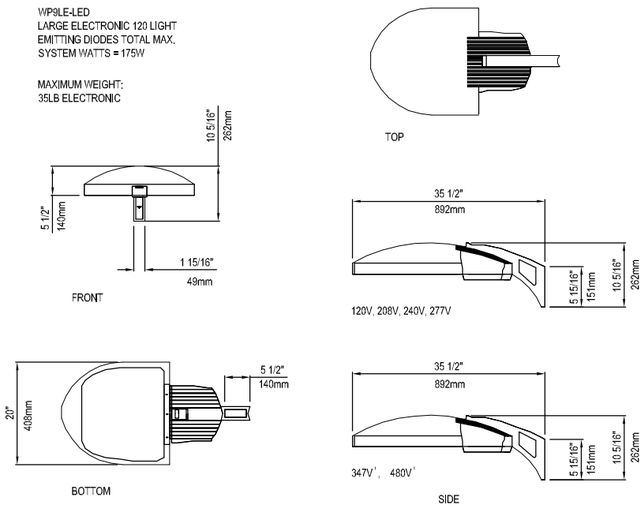
Not for Construction



NOTES:
1. DETAIL FOR COORDINATION ONLY
2. STRUCTURAL ENGINEERING & ELECTRICAL COORDINATION BY OTHERS

Pedestrian Light Pole Base

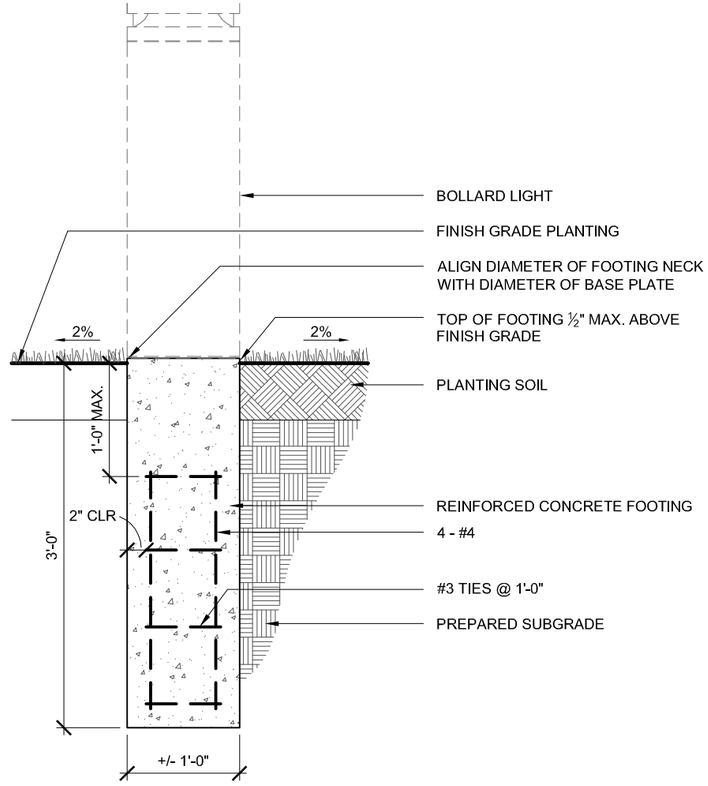
Not for Construction



NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.
3. CONTRACTORS NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.CADdetails.com/info REFERENCE NUMBER 433-101.

Vehicular Pole Top Light

Not for Construction



Bollard Light

Not for Construction

Lighting

Handrail light
Not for Construction

luxrail™

Application

ANSI and ADA compliant, **luxrail** is an indoor/outdoor LED-based handrail that delivers functional illumination. Two intensities may be specified: standard output and high output. The standard light output version delivers illuminance levels appropriate for exterior applications (2 footcandles at grade) as well as for dark interior environments with low ambient illumination levels (e.g., themed environments, theatres and residential areas). The high output version delivers illuminance levels applicable to interior environments – providing in excess of 10 footcandles along the path of egress (ANSI required for stair treads). Independent photometric test reports and IES Format data are available at **www.iolighting.com**.

luxrail's standard handrail gripping surfaces are circular in cross section and meet 2004 ADAAG (Americans with Disability Act Accessibility Guidelines). Patented optical assemblies deliver 10˚, 25˚, and 55˚ beam spreads, as well as a 90˚ asymmetric option. The 25˚ and 55˚ beam patterns are most suitable for illuminating pathways, while the 10˚ beam spread offers accent lighting for optional glass or stainless steel cable railing infills. Reference page 54 of this catalog for information regarding infill options. **io** ensures that each LED is provided thermal and electrical management properties in accordance with the LED manufacturers recommendations. Projected average rated life is 50,000 hours at 70% of lamp lumen output. Contact factory for IES LM-80 compliance. To ensure proper performance, architectural details should allow for ventilation and air flow around the fixture. Ambient temperature surrounding the fixture shall not exceed 120˚F *(48.9˚C).*

Light Output

Two luminous intensities are available for white light. All values below are initial lumens per foot. IES LM-79 format files may be obtained from the factory or downloaded from **www.iolighting.com.**

	Standard Output	Mid Output	High Output
2700K White:	63 lms/ft	171 lms/ft	234 lms/ft
3000K White:	67 lms/ft	182 lms/ft	250 lms/ft
3500K White:	71 lms/ft	194 lms/ft	265 lms/ft
4000K White:	71 lms/ft	194 lms/ft	265 lms/ft
5000K White:	80 lms/ft	217 lms/ft	296 lms/ft

Construction

luxrail may be post mounted or wall mounted. **io** recommends installation be completed by a qualified handrail installer. Mounting hardware (post or wall) is typically required up to 5' O.C., depending on the handrail alloy. Final post and wall bracket spacing must be determined by a licensed architect or structural engineer. **luxrail** is available in stainless steel and aluminum. **grab bars** are available in aluminum only. The lighting fixture component of the **luxrail** is a stand alone unit and is available in incremental nominal lengths that range from 6" to 60". Vandal resistant access chamber allows units to be removed for maintenance purposes.

All handrail component parts are engineered for quick installation. Field welding or cutting is typically not required. All parts are prefabricated to field dimensions and are assembled in the field with mechanical connection or epoxy. Contact **io** Lighting for recommended handrail installers.

The LED light fixture inside the caprail is UL Listed for wet locations. Handrail alloy options include stainless steel and aluminum. Contact factory for maintenance guidelines.

Electrical

luxrail houses a low voltage LED-based light fixture that is integrated into the underside of the handrail. 24 volt 100 watt power supplies are provided as a standard. For detailed information regarding daisy chain limitations, remote distance limitations, power supply options, and dimming options consult the **io** website **(www.iolighting.com)** or an **io** representative.

Driver Remote Distance
7'-0" (2.1m) w/22 AWG
18'-0" (5.5m) w/18 AWG
46'-0" (14.0m) w/14 AWG
71'-0" (21.6m) w/12 AWG

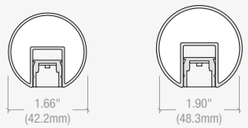
Dimming modules must be specified separately. For detailed information, see pages 106-107 of this brochure or download the power supply specification sheet from **www.iolighting.com**.

Power Consumption

Power consumption does not include power supply losses.

Standard Output: 1.58 w/ft **Midpoint Output: 3.96 w/ft** **High Output: 5.81 w/ft**

Dimensions



Label references 30° **luxrail** fixture with a 55˚ beam spread in High Output 3000K. Lighting Facts for additional beam spreads and light output levels may be obtained from **io** Lighting.

SECTION 129300 - SITE FURNISHINGS

1.1 SUMMARY

A. Chairs, benches and tables.

B. Bicycle racks.

C. Bicycle locker/shelters.

D. Trash receptacles.

E. Bollard Types 1 and 2.

1.2 MATERIALS

A. Adirondack Chairs: Owner's standard in size, configuration and color.

1. Installation Method: Free standing.

B. Benches:

1. Product: Landscape Forms; "Neoliviano," backless.
2. Frame: Cast aluminum, anodized.
3. Seat: FSC Black locust, unfinished; contoured.
4. Dimensions: 17 inches high, 19 inches wide by 9 feet 10 inches long.
5. Installation Method: Anchored to substrate.

C. Tables and Chairs:

1. Tables:

a. Product: Barlow Tyrie; "Equinox Round Pedestal Table."
b. Frame: Stainless steel, Type 316.
c. Table Top: FSC Teak, parallel slats.
d. Dimensions: 39.75 inches diameter, 27.5 inches high.
e. Installation Method: Free standing.

2. Chairs:

a. Product: Florida Seating; "FLS-A1-302."
b. Frame: Aluminum, anodized; with arms.
c. Seat and Back: Teak, ladder back.
d. Dimensions: 29 inches high, 19.5 inches wide, 18 inches deep.
e. Installation Method: Anchored to substrate.

D. Bicycle Racks:

1. Product: Landscape Forms; "Bola."
2. Frame: Stainless steel, Type 304; manufacturer's "Electropolish" finish.
3. Installation Method: Cast in concrete.

E. Trash/Recycle Receptacles:

1. Product: Victor Stanley; "Ironsites Series" S-424
2. Facing Surrounds: Steel, parallel flat straps.
3. Support Frames: Steel.
4. Lid with cable: Dual-flow lid for recycling receptacles, convex lids for trash only receptacles.
5. Capacity: 36 gal.
6. Finish: Galvanized and polyester-power coated

a. Colors:

1) Facing and Frame: Black, blue band for recycling only receptacles.
2) Lid: black

7. Lettering/Graphics:

a. Horizontal Band:

1) Copy: "Recycle" Hoefler font, white color for recycle receptacles only

b. Lid:

1) Copy: "Recycle" and "Trash" white color for for dual-flow receptacles only

8. Installation Method: Anchored to substrate.

F. Bollard Type A:

1. Product: Maglin Site Furniture Inc.; "MTB500-B1," fixed; "MTB500-B4," removable.
2. Tubing: High-strength steel, 4.5-inch diameter.
3. Dome top.
4. Height: 36 inches.
5. Finish: Powder-coat, black.
6. Installation Method: Cast in concrete.

G. Bollard Type B:

1. Pipe: Schedule 40 steel pipe, galvanized.
2. Height: 36 inches.
3. Installation Method: Anchored to substrate.

END OF SECTION 129300

Steps, Handrails, Ramps

Existing Conditions

Historic Campus

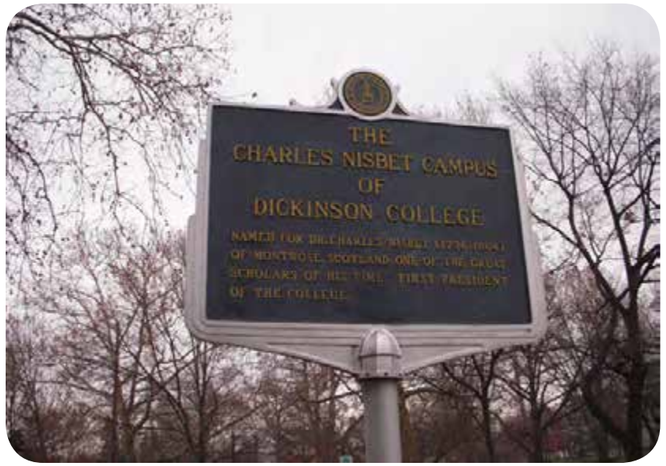
Expanded Core

Residential Use

Athletics & West Campus

Signage

Place | Historical



Signage

Place | Traditional

Signage

Wayfinding | Collegiate

Sustainable Features Integration

Signage

Place | Modern

Wayfinding | Regulatory

Dickinson

Dickinson

Dickinson

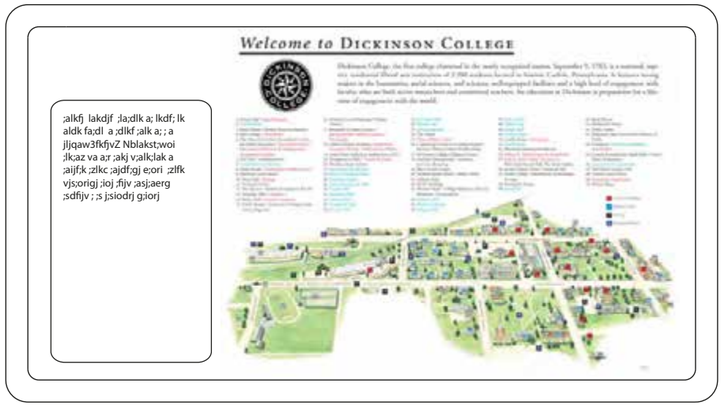
Dickinson

Dickinson

Water Planting Energy More Information

Environmental Signage

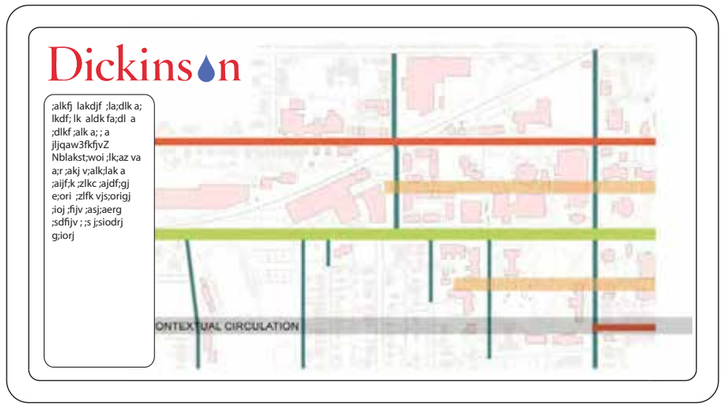
Graphic Design | Dynamic Signage



Campus Map

Construction Signage

Building Features



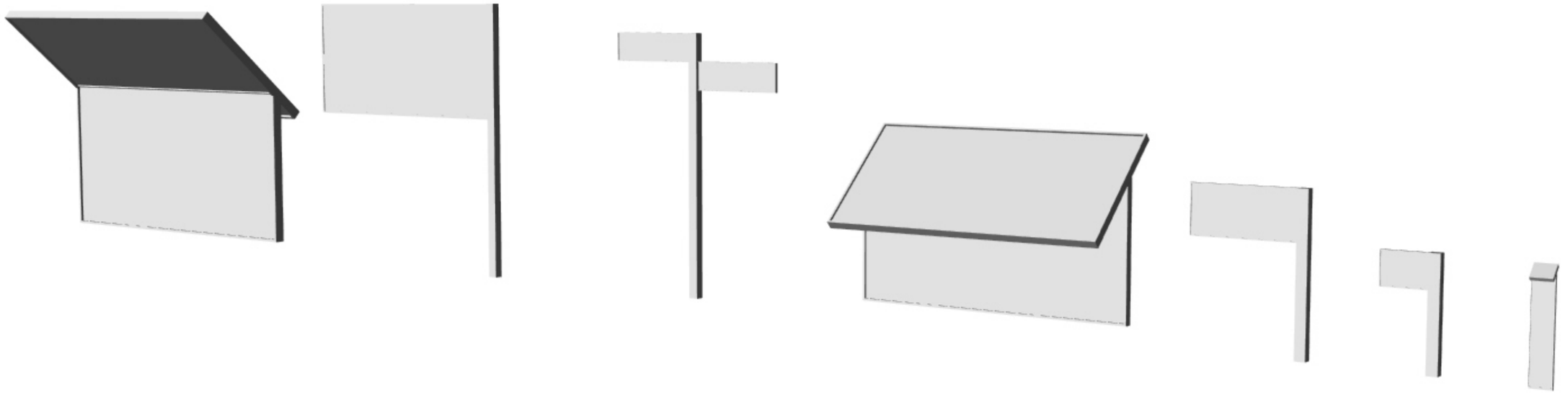
Systems Diagrams

Technology

District Features

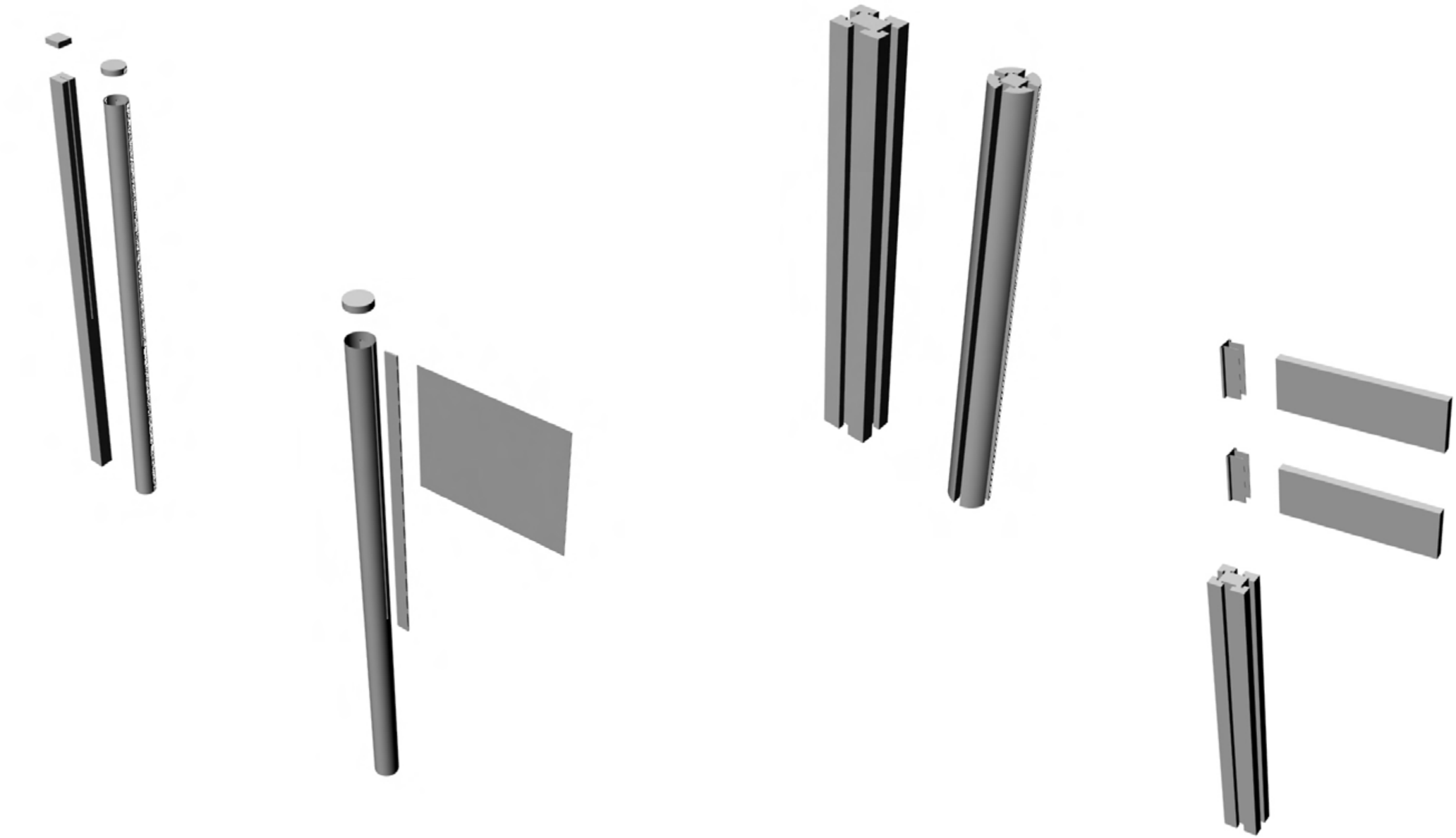
Environmental Signage

Forms | Modern Fleet



Environmental Signage

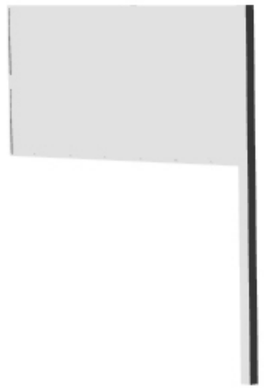
Options



Environmental Signage

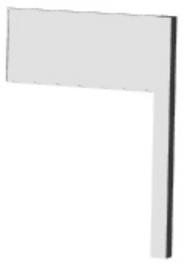
Types | Identification

Purpose: This type of signage is used to mark entrances, gateways, buildings but can also express the character of the campus



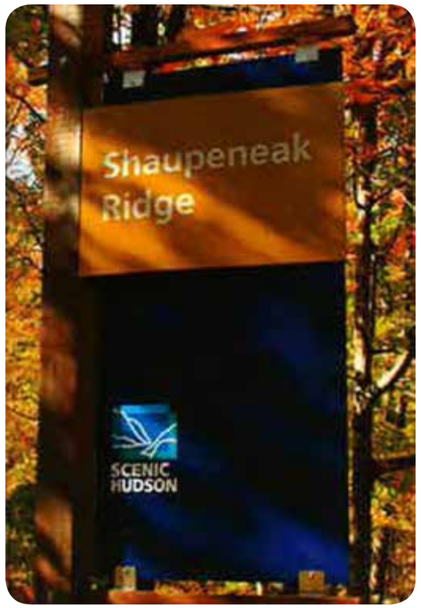
Primary

Height range: 5-10’



Secondary

Height range: 3-5’

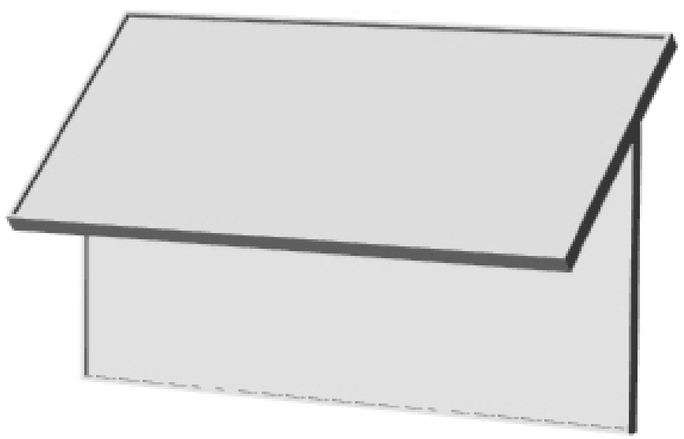


Precedents

Environmental Signage

Types | Orientation

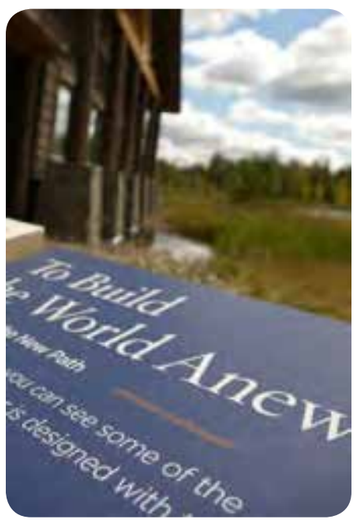
Purpose: These signs display contextual maps of the entire campus



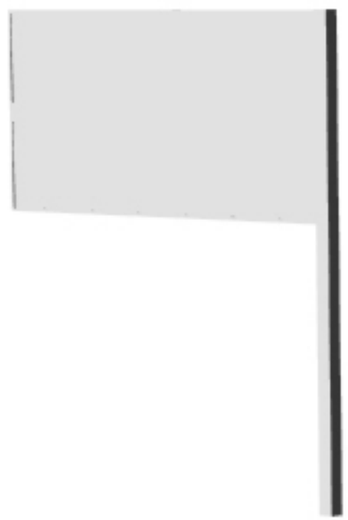
Tilted

for use where vie

allows visitor to lo



Height range: 3-4'



Horizontal

for use where space does not allow for an angled sign

When information needs to be prominent

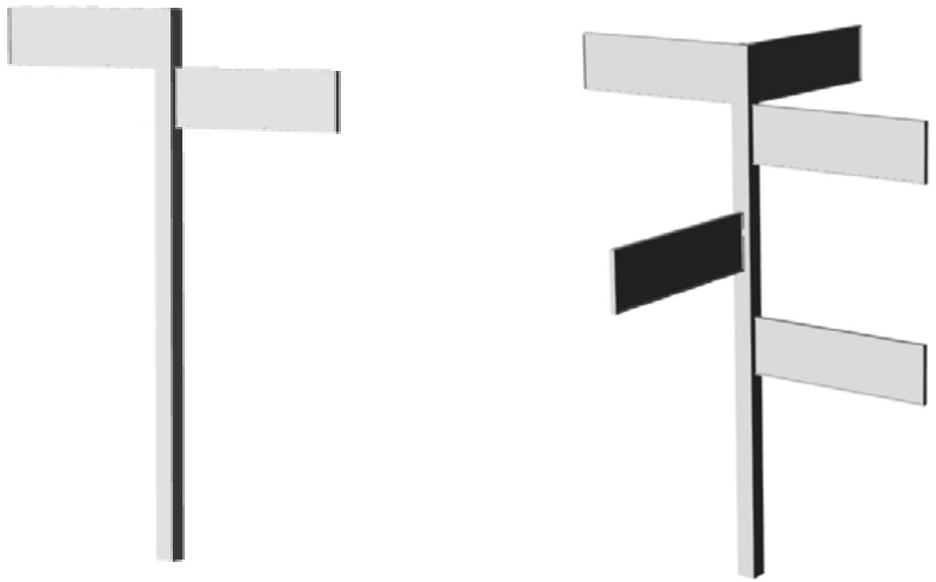
Height range: 5-7'

Precedents

Environmental Signage

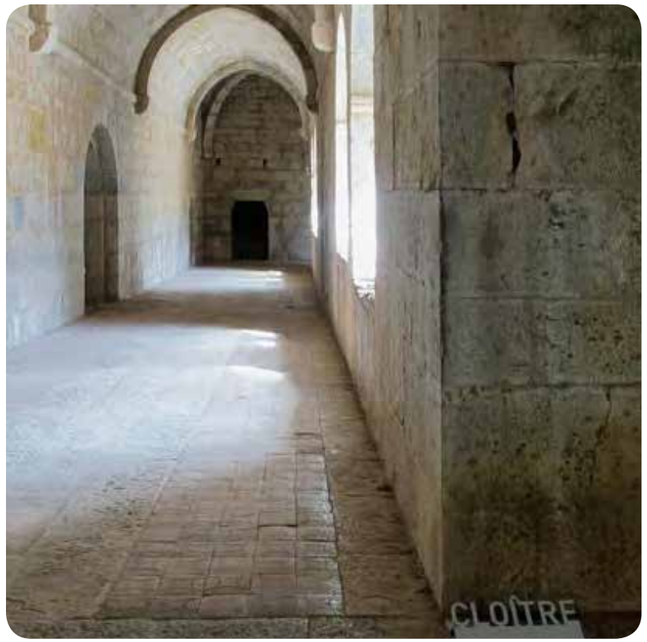
Types | Directional

Purpose: These signs are used for wayfinding.
They should be harmonious with surroundings while still remaining recognizable and obvious across the campus.



Can be designed for flexibilty in number of signs to account for future growth of the campus.

Height range: 8-15’

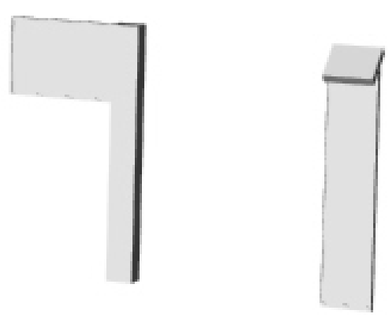


Precedents

Environmental Signage

Types | Regulatory

Purpose: These signs will communicate campus rules and etiquette.



Tilted

Regulation signs should be well integrated into the signage system, using the same typography and graphic language.

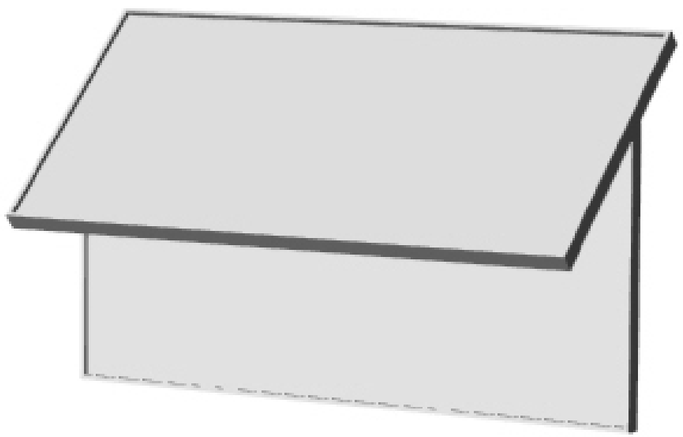
Height range: 2-3’

Precedents

Environmental Signage

Types | Sustainability

These signs will communicate natural processes and ecologically designed interventions across campus.



Systems Diagrams

to explain complex ecological process and engineering including rain gardens, green roofs, vegetative swales, permeable paving

Height range: 3-4’

Feature Labels

for individual plant indentification , native plant communities, sustainable materials and other smaller components

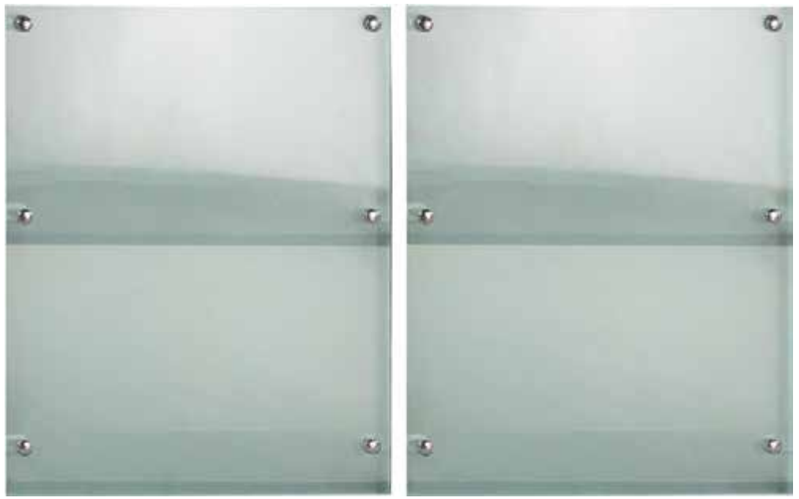
Height range: 3-4’

Precedents

Environmental Signage

Material Palette

stainless steel



glass

Pantone 186

Aluminum, black powder coat

Planting

Planting Palette Concept

The image of Dickinson College and its character, today and in the past, has long been associated with the iconic architecture nestled within the grand setting of a cathedral-like outdoor environment, which can be attributed to the invaluable tree collection of the campus. Favorite places, such as the past "Lover's Lane" and Old West, cannot be imagined without the mature canopy trees that frame each important space. The campus's tree collection should be cherished and built upon for future generations, just as the founders of the College provided for us.

Additionally, Dickinson College has a long history as a college who places heavy emphasis on the importance of high quality outdoor environments. Starting at the beginning, Benjamin Rush, one of the founders of the College and the father of American psychiatry, was known for advocating for a clean environment, as he saw it closely tied to human health. Rush also started his profession as a physician and an apothecary and tinkered with botanical home remedies. Today, this tie to human health and the environment is still extremely relevant, although it has expanded from direct human health to indirect human health benefits, such as ecosystem services.

In order to extend the campus character into the future and fulfill the values of the College on the campus through the landscape, the landscape character and plant choices should be carefully considered. Three main goals of the landscape which support the guiding principles of the College should guide all landscape interventions. The landscape should support and enhance the following landscape approaches:

- Building on the Historic Arboretum and possibly expanding it to other parts of the campus
- Supporting the local ecology of the region by supplementing the horticultural plantings of the landscape with native plants in order to advance the habitat value of the campus
- Provide educational landscapes, to make the landscape part of the learning experience, and edible landscapes, to maintain the utilitarian view of the landscape and promote sustainable food systems.


DICKINSON COL
Carlisle

Planting

Planting Palette Concept

Dickinson College Historic Arboretum

- Rush Campus Palette- 18th and 19th Century Campus Species

Native Plant Communities of the Region

- Reference Plant Communities- Mountain Creek, Tuscarora SP, LeTort Spring Run, Conodoguinet Creek, Cave Hill Nature Center, Mount Holly Marsh, Cactus Hill, Hoverter and Sholl Box Huckleberry Natural Area
- Seeps and Pools, Wet Meadow
- Floodplain and Wetland Forest
- Dry and Mesophytic Forest
- Shale and Limestone Bluffs
- Dry Woodland
- Quercus prinus - (Quercus coccinea, Quercus velutina) Forest Alliance

Educational and Edible Gardens

- Food and Herb Gardens
- Department-specific Gardens

Planting

Existing Character

Planting

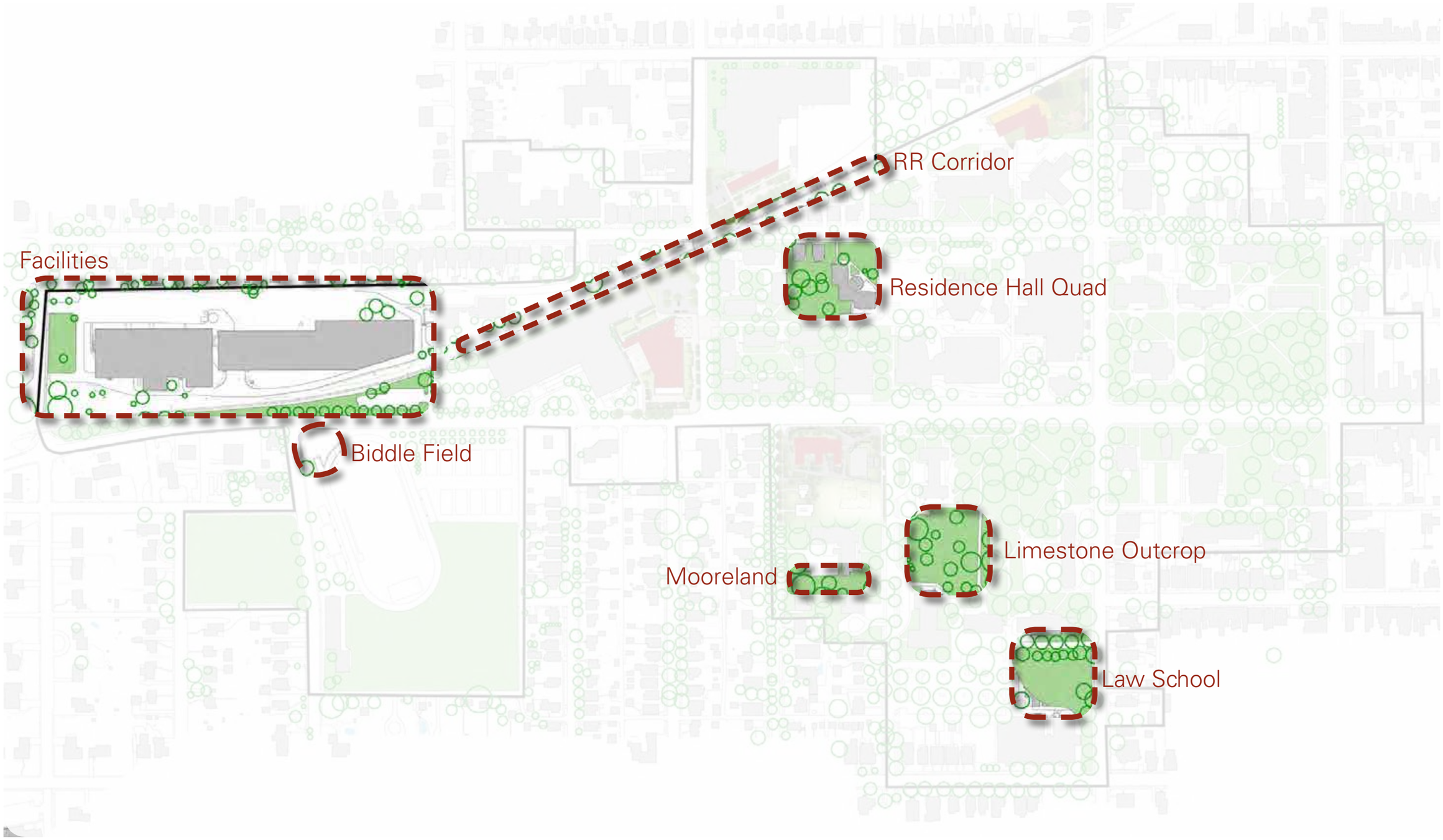
Existing Character

Planting

Existing Landcover

Planting

Opportunity Areas



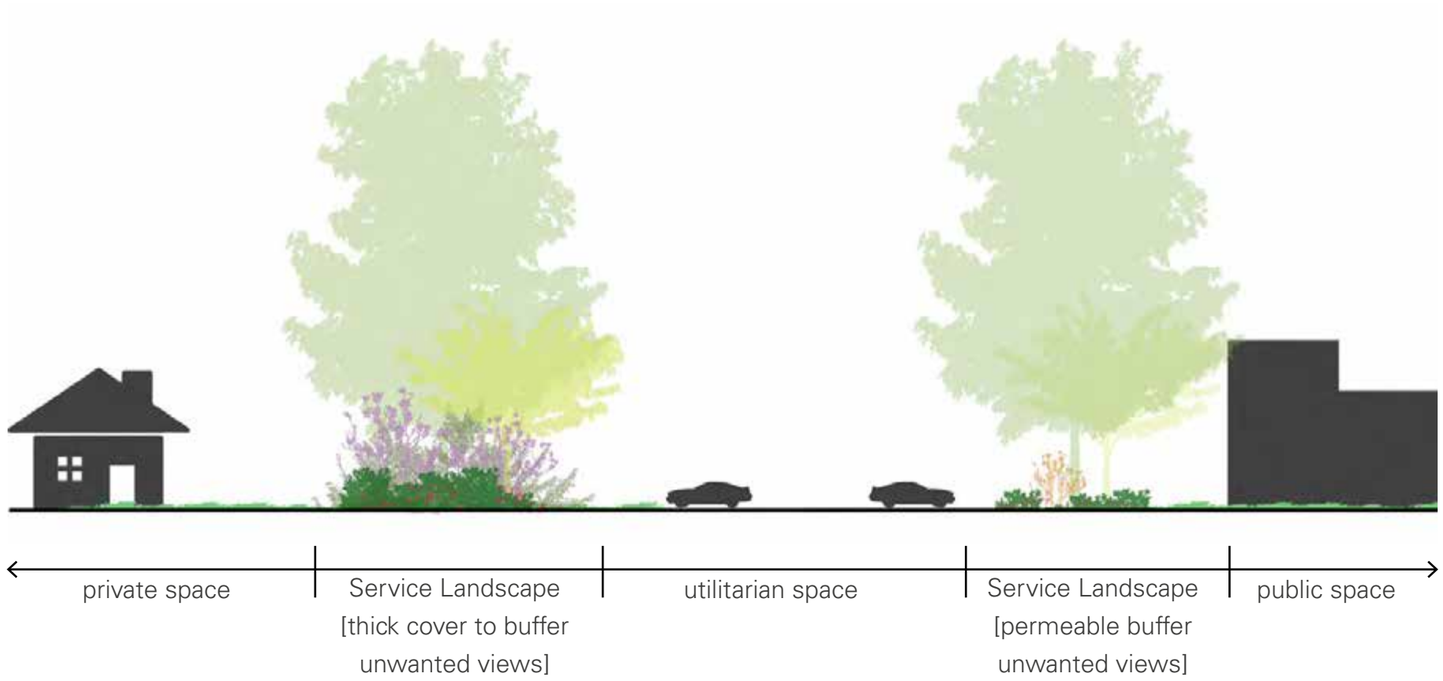
Planting

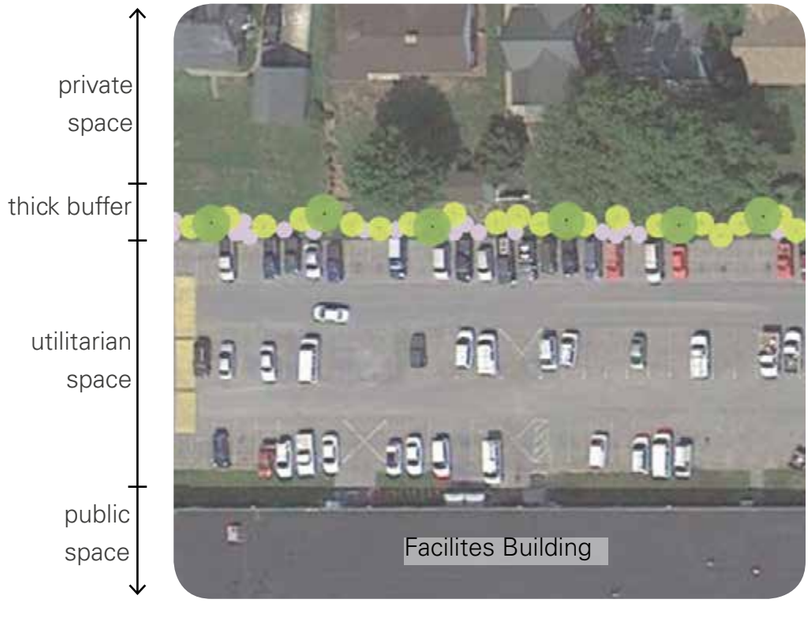
Proposed | Character Zones

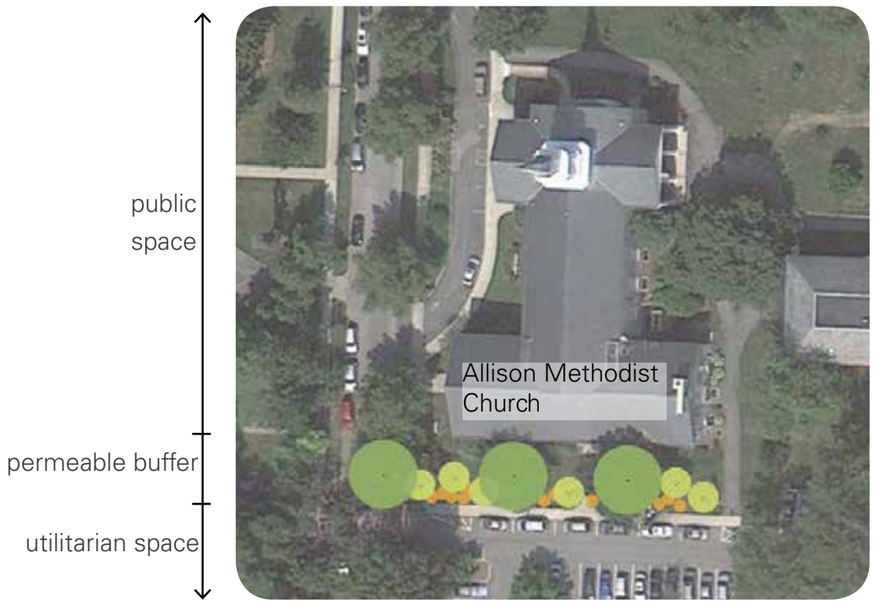
West Campus

Planting

Service Landscape Character | Description

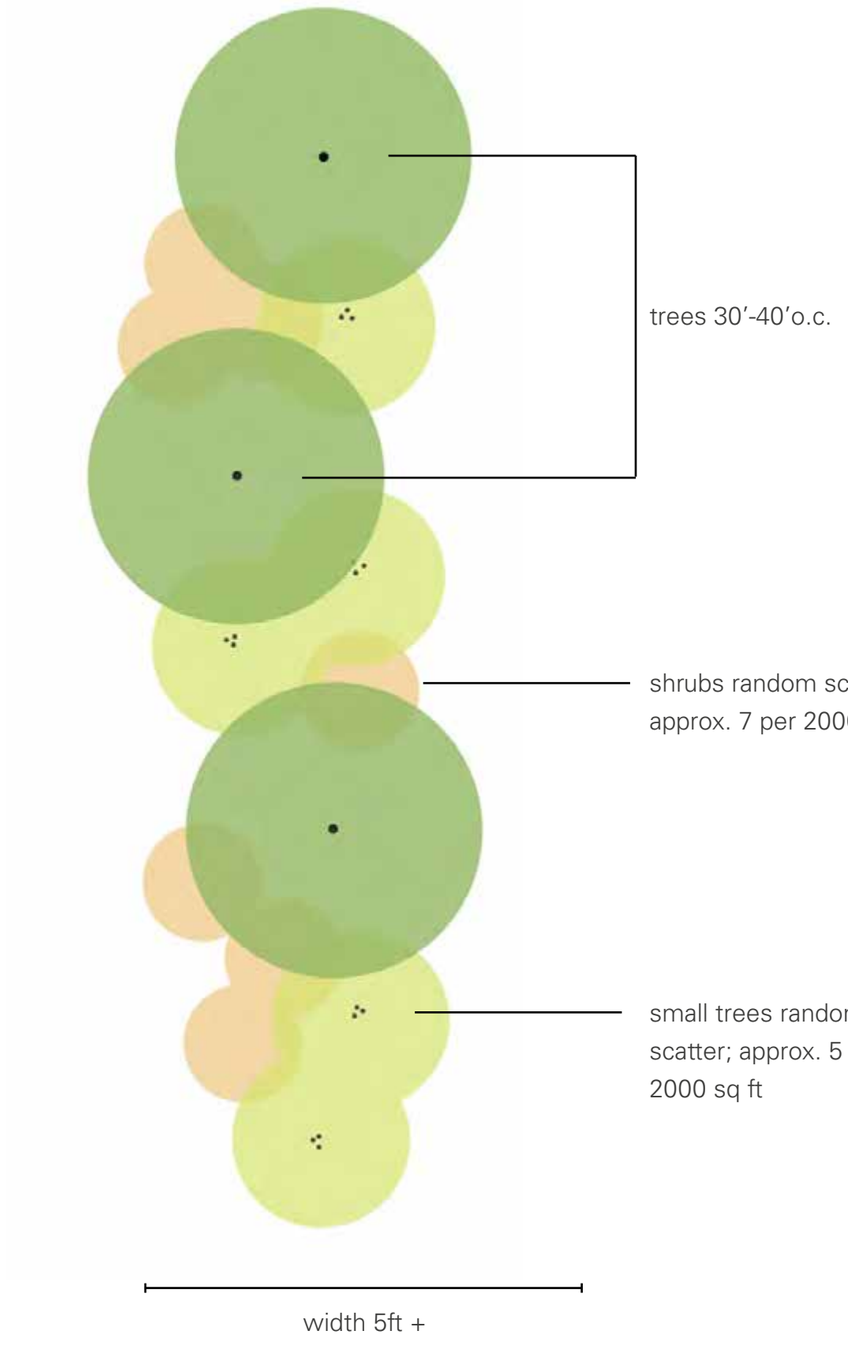


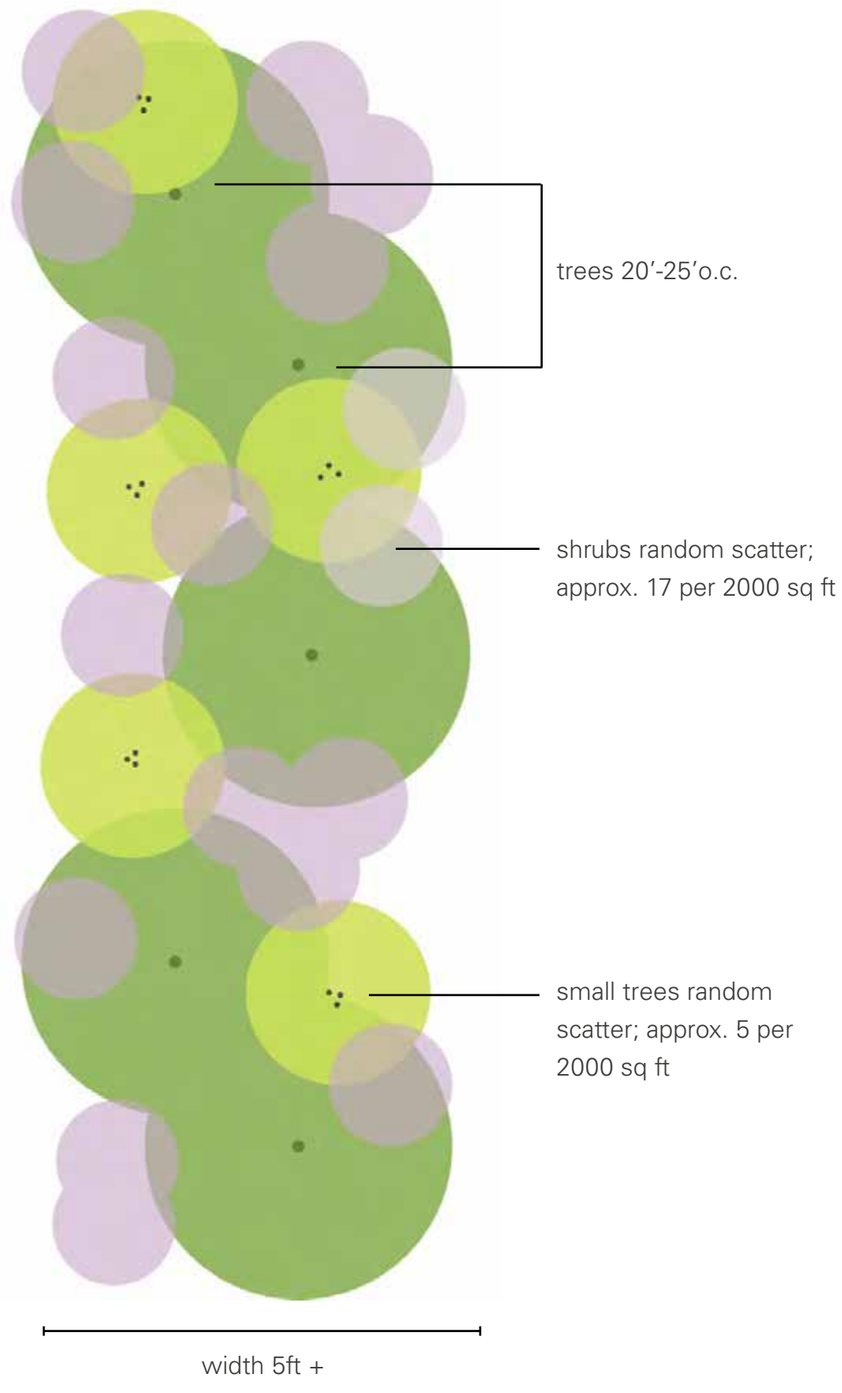




Planting

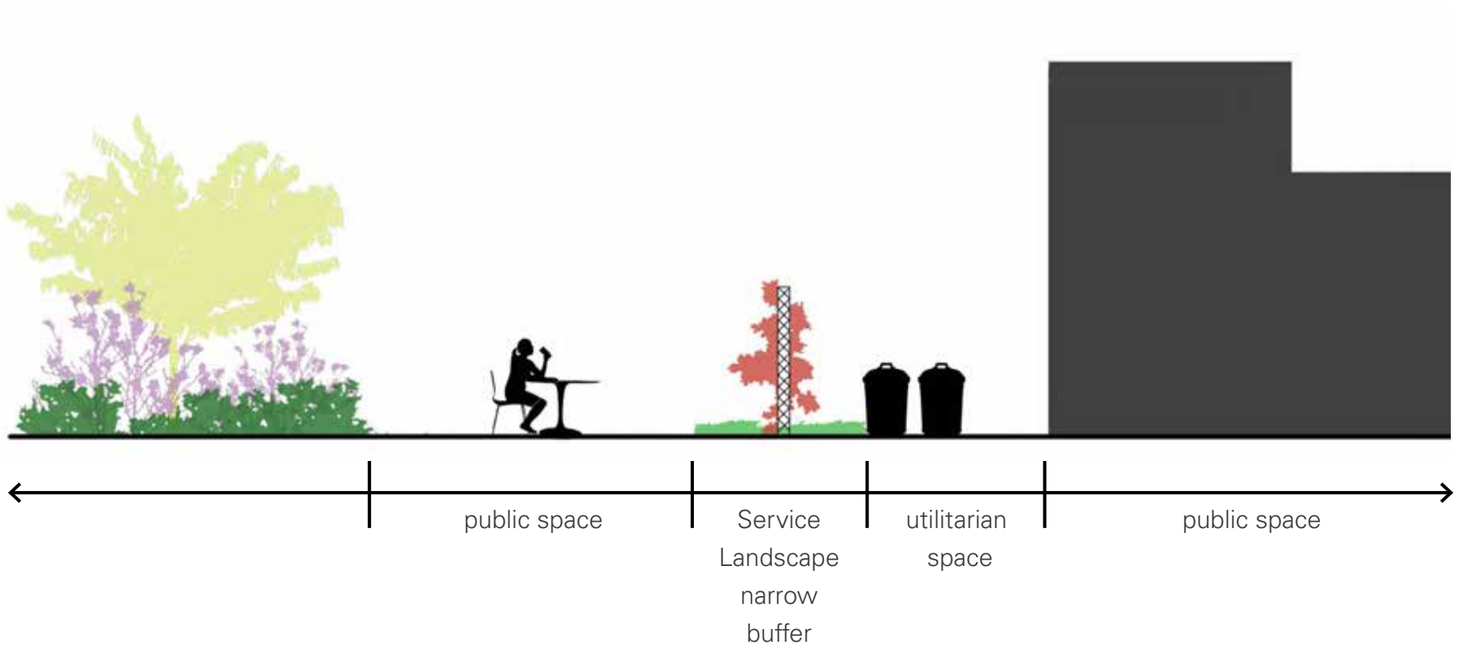
Service Landscape Character | Description

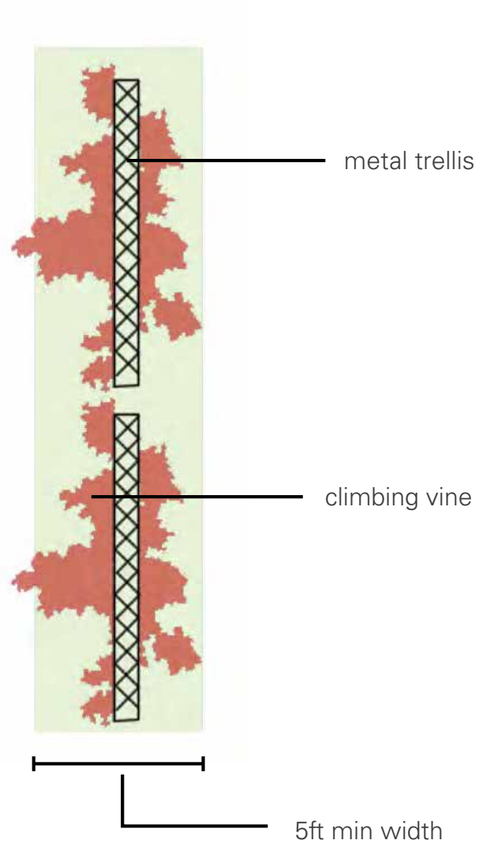




Planting

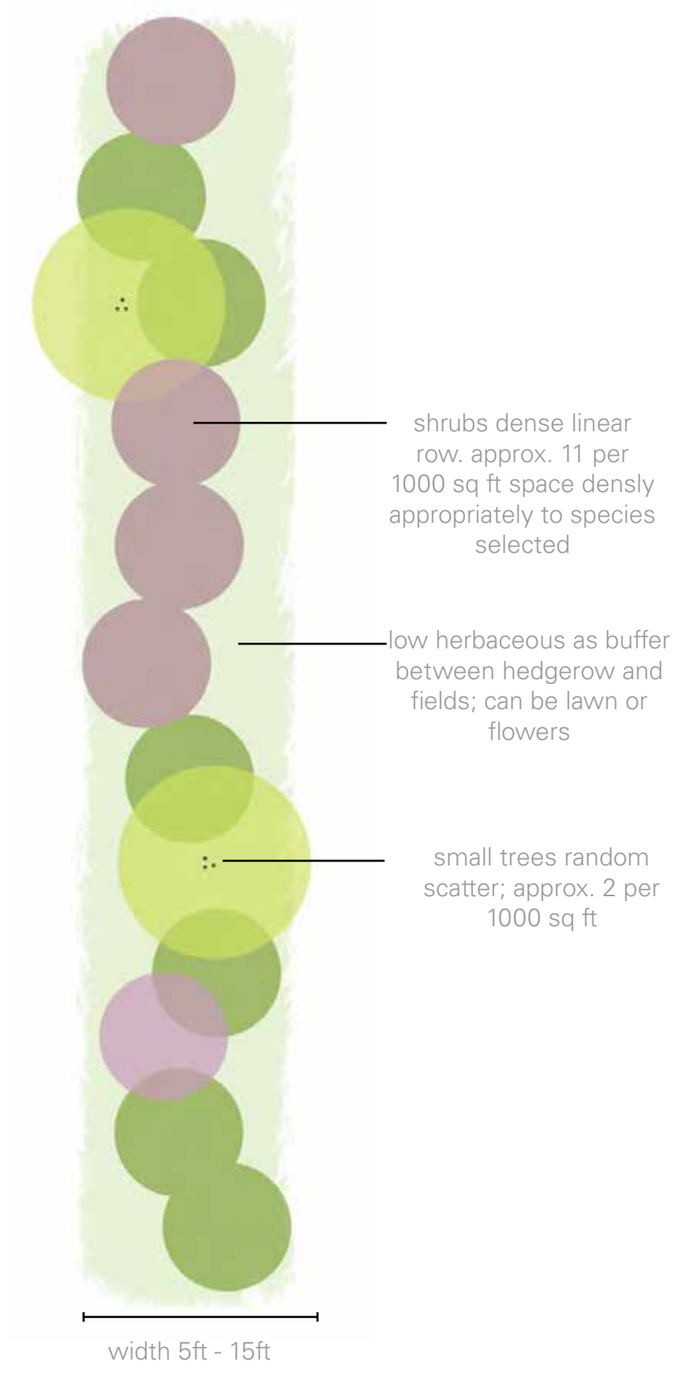
Service Landscape Character | Description





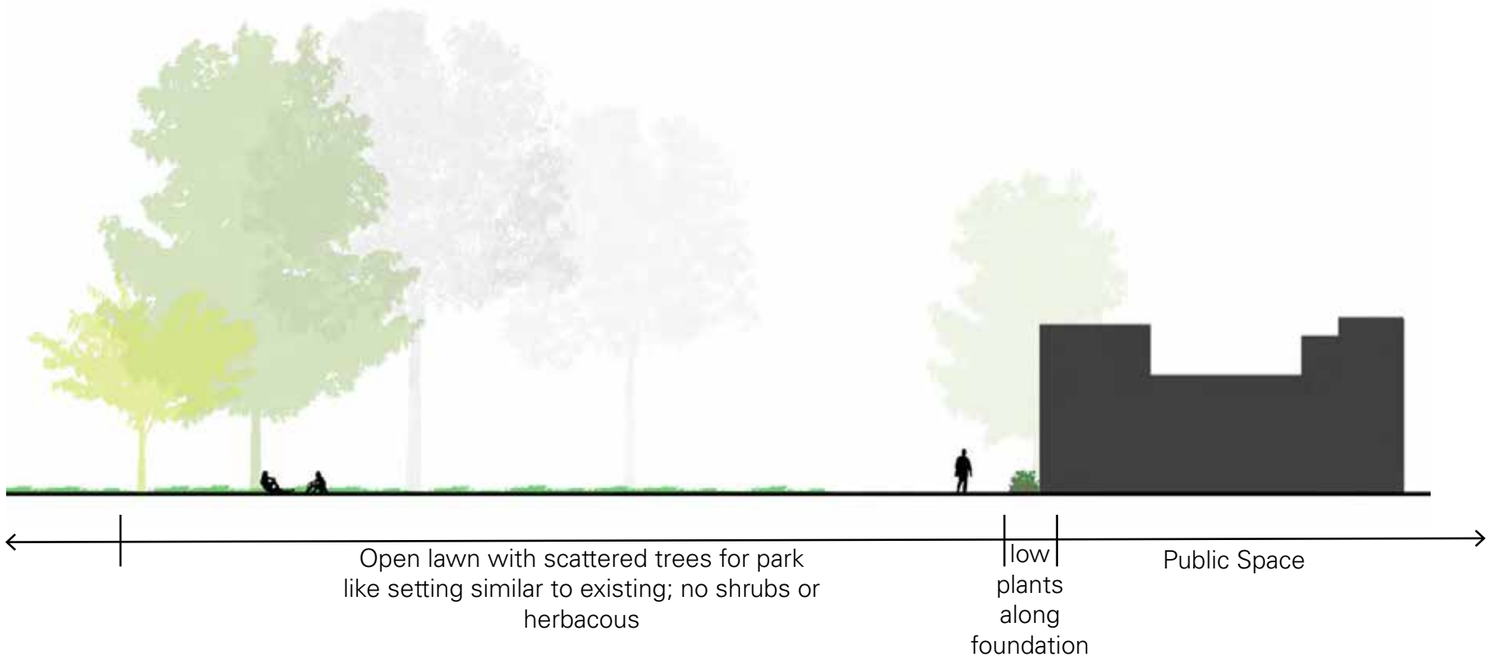
Planting

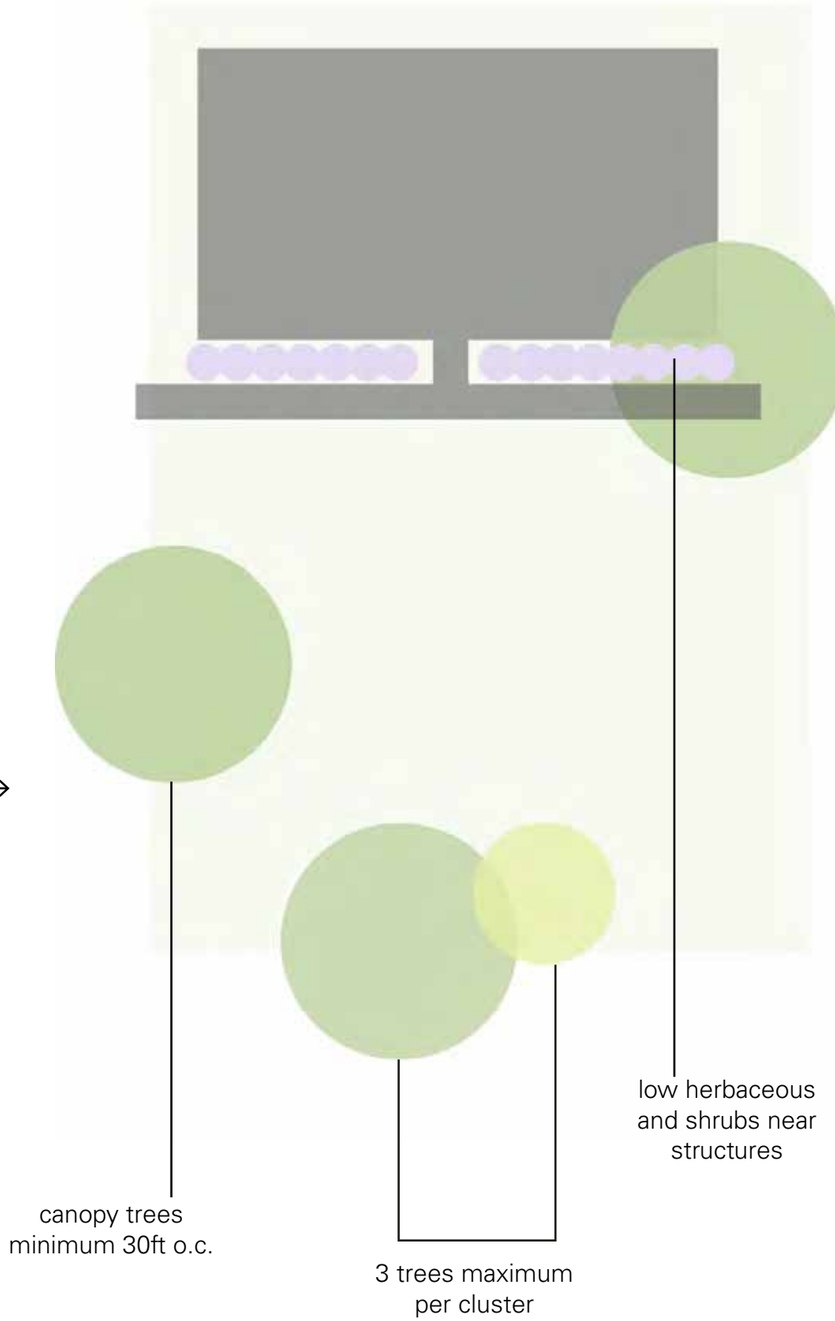
Athletic - Recreational | Landscape Character Description



Planting

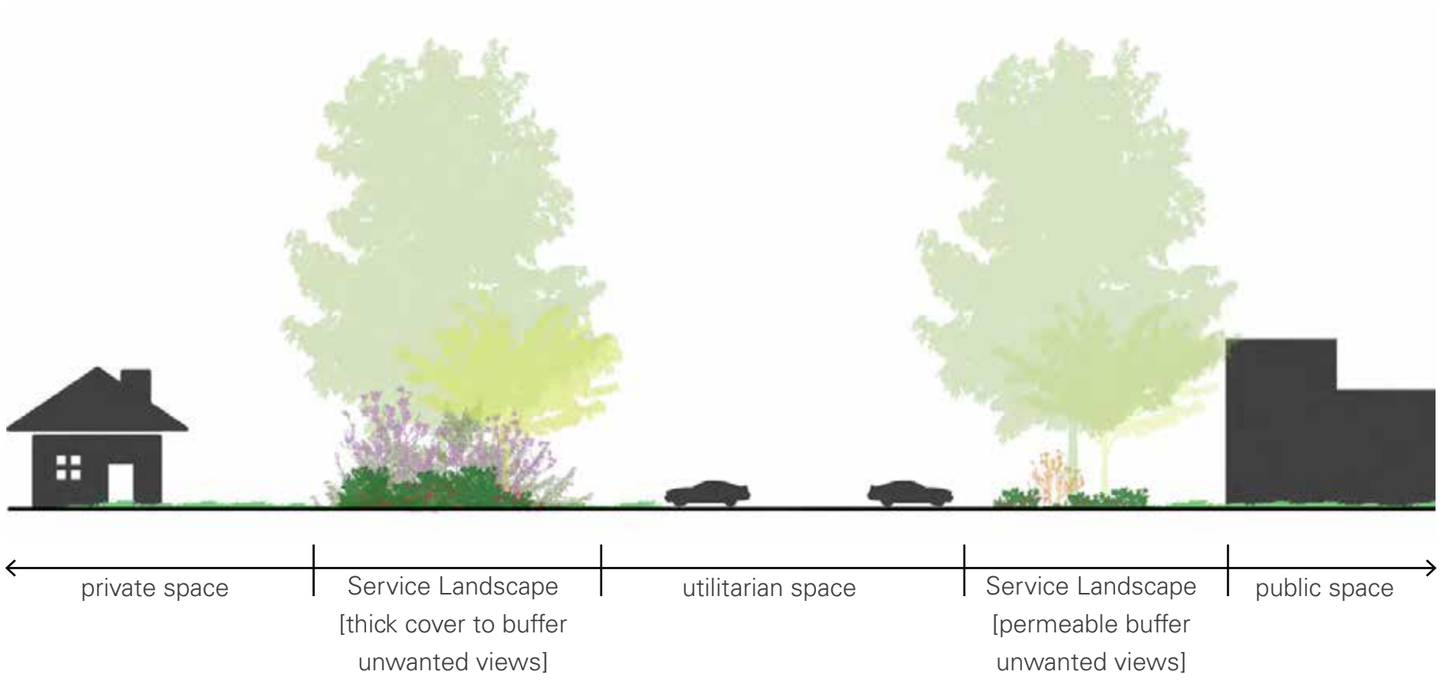
Historic Arboretum Character | Description





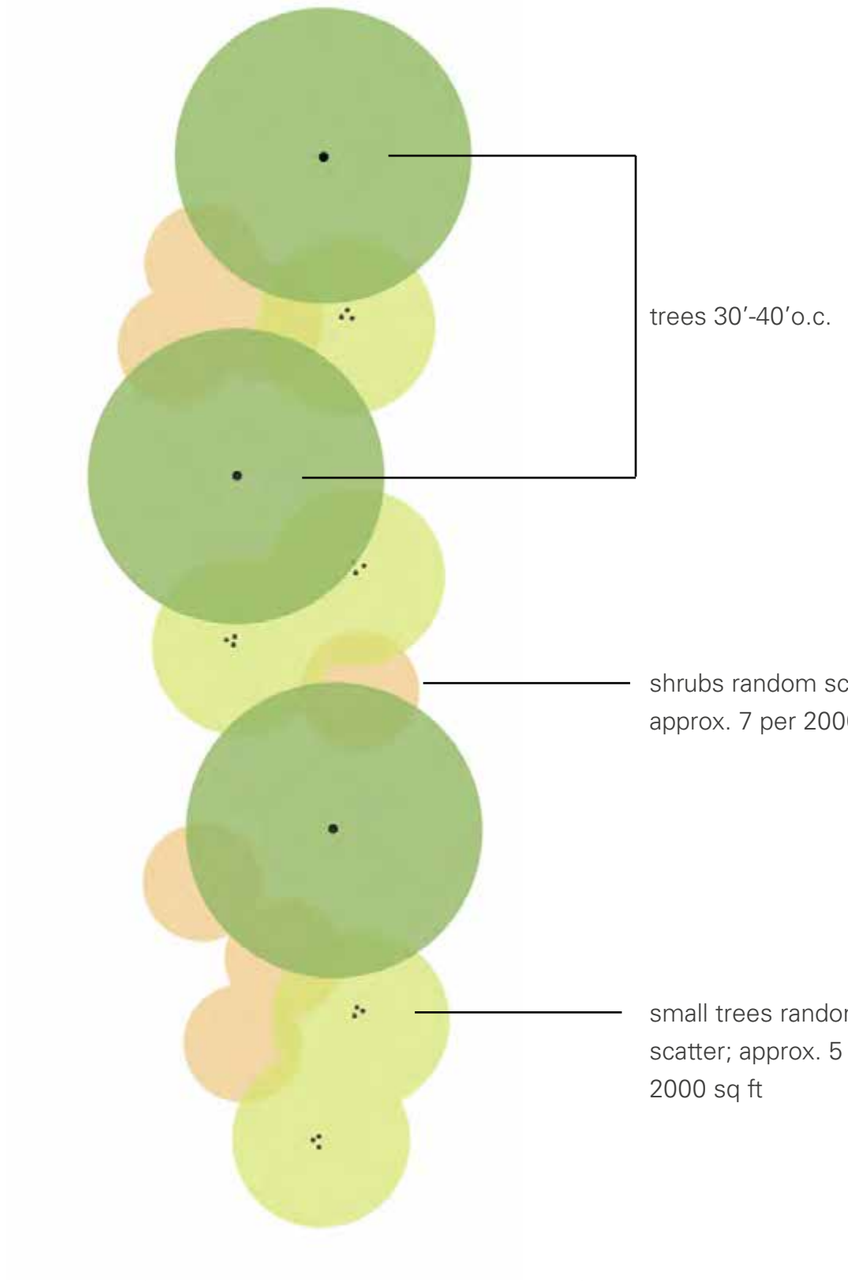
Planting

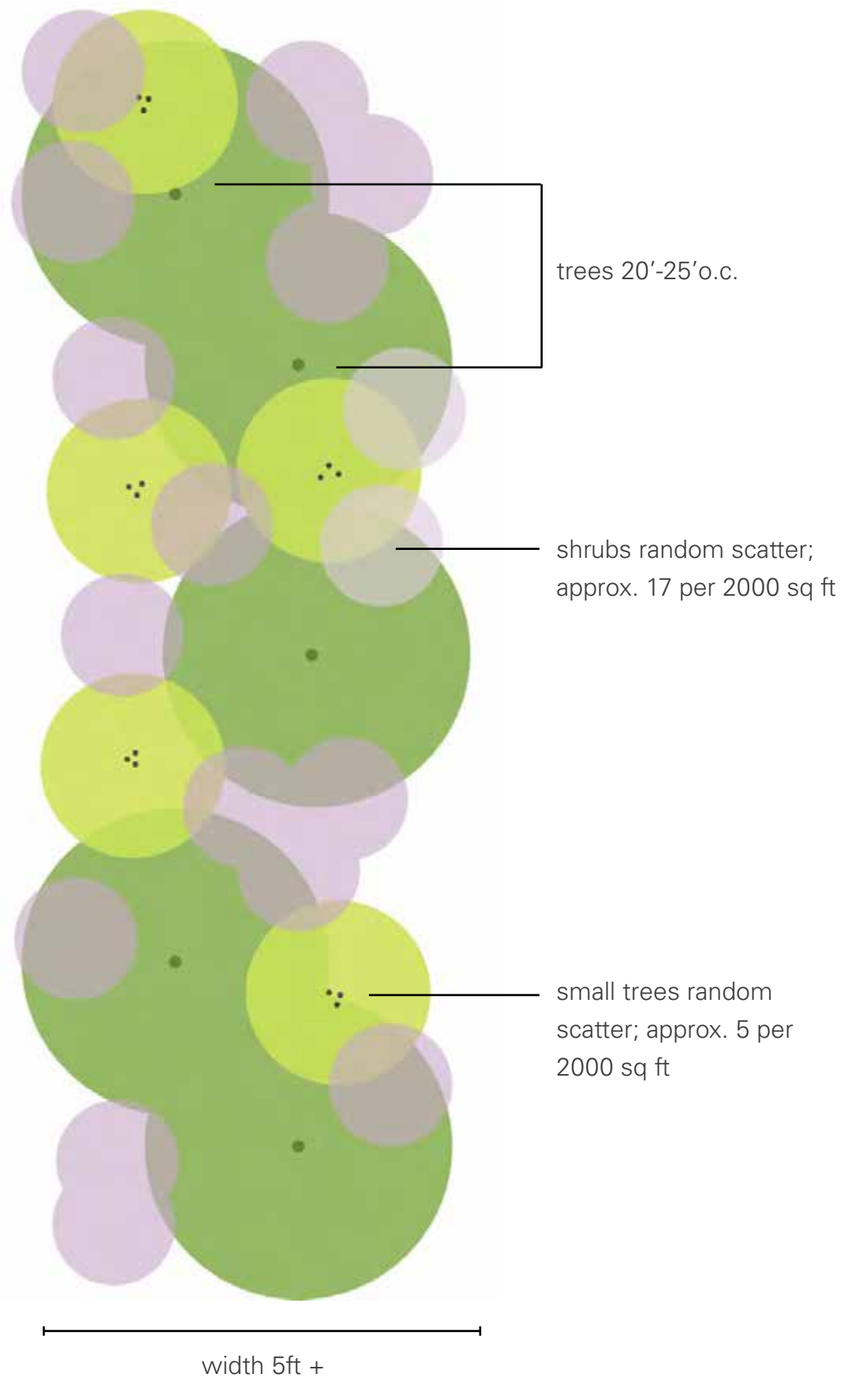
Service Landscape Character | Description



Planting

Service Landscape Character | Description





Planting

Streetscape and Green Corridor | Character Description

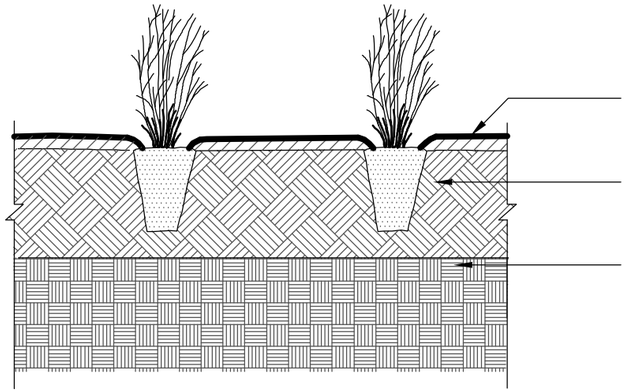
Planting

Building Threshold or Educational Landscape | Imagery

Planting | Details

All details in this section are intended for preliminary design only. They are not to scale (N.T.S) and are not intended for bid or construction purposes. They are subject to modification based on design calculations, local practices, and all applicable codes and regulations.

Planting

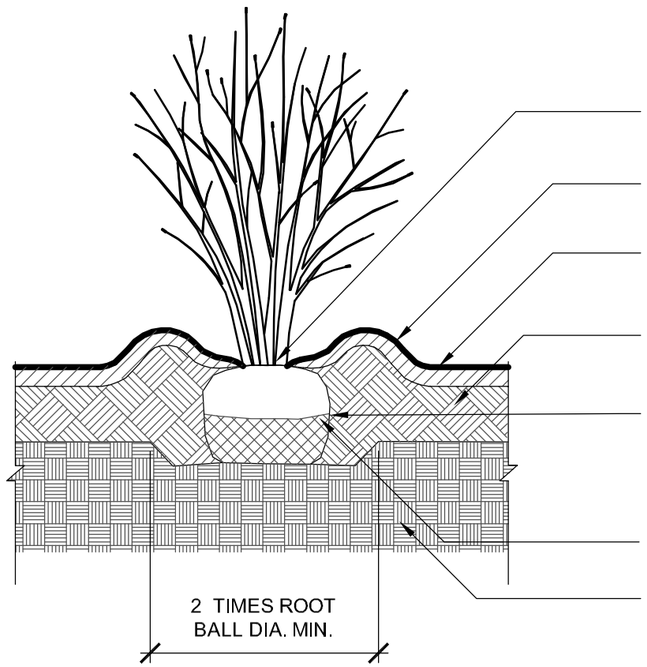


NOTES:
1. SEPARATE AND SPREAD POT-BOUND ROOTS.

2. PINCH TIPS OR DEAD-HEAD ONLY AFTER REVIEW WITH THE LANDSCAPE ARCHITECT

Herbaceous Planting

Not for Construction



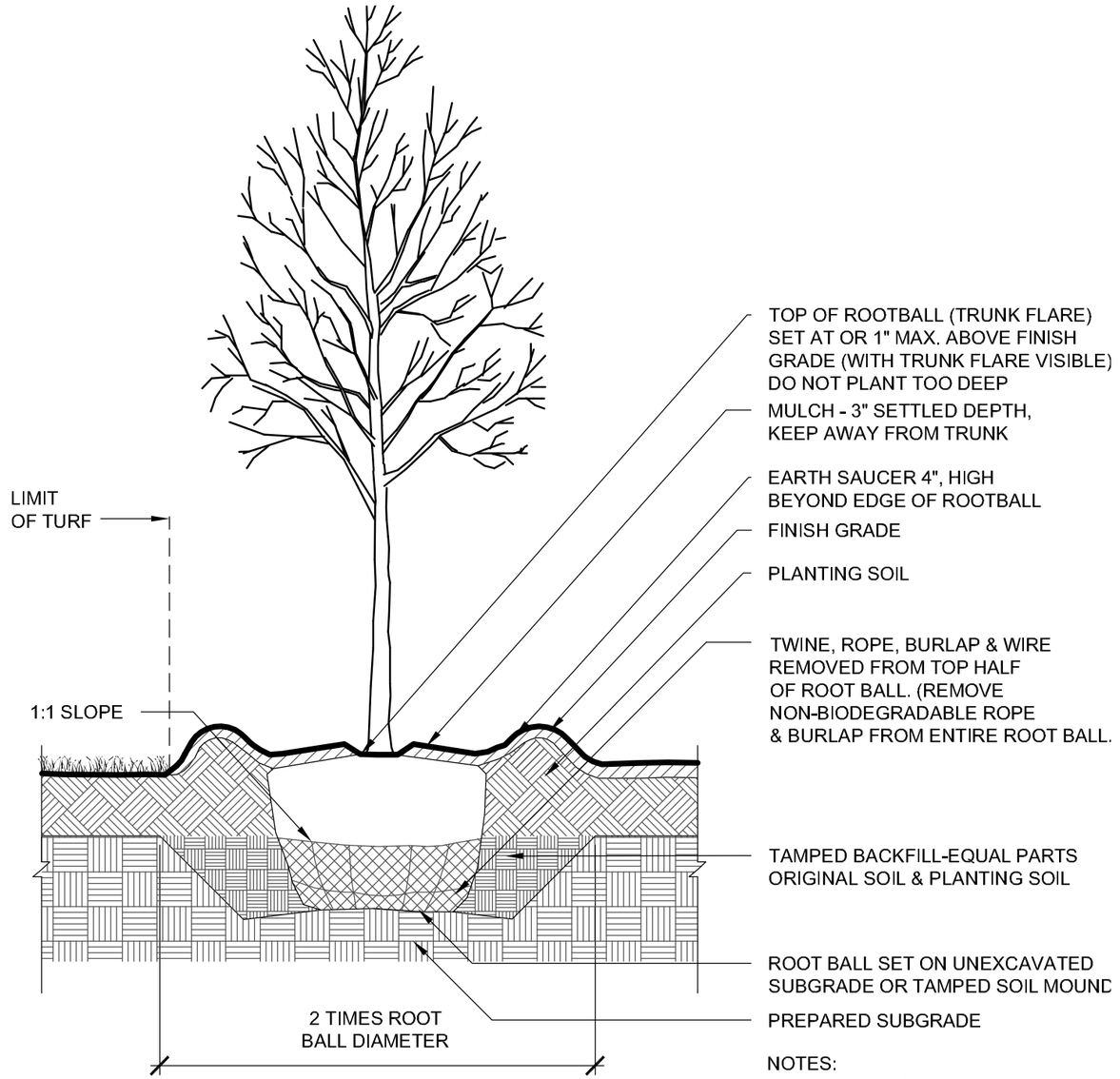
NOTES:
1. SEPARATE AND SPREAD POT-BOUND ROOTS.

2. PRUNE ONLY AFTER REVIEW WITH THE LANDSCAPE ARCHITECT.

3. AT END OF WARRANTY PERIOD REMOVE SAUCER, AND REDISTRIBUTE, ADD, AND/OR REPLACE MULCH AS NEEDED.

Shrub Planting

Not for Construction



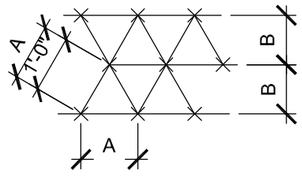
NOTES:
1. PRUNE ONLY FOR CORRECTION, DO NOT THIN

2. AT END OF WARRANTY PERIOD, REMOVE SAUCER AND DISTRIBUTE, ADD,AND/OR REPLACE MULCH AS NEEDED

B & B Tree Planting

Not for Construction

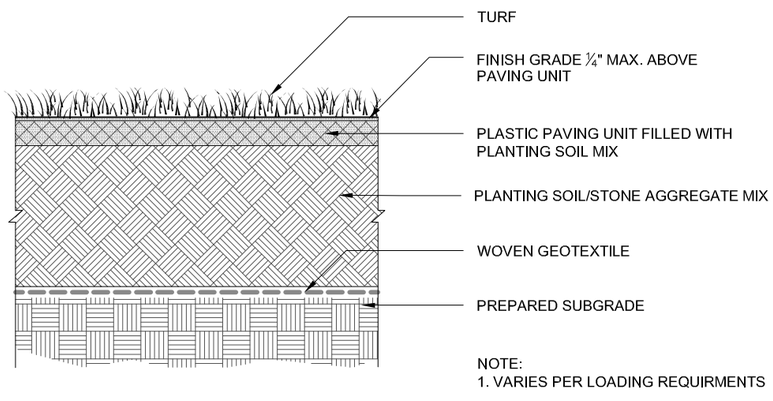
Planting



A O.C. SPACING	B ROW SPACING
8"	7"
9"	7 3/4"
10"	8 5/8"
12"	10 1/2"
15"	13"
18"	15 1/2"
24"	21"

Plant Spacing

Not for Construction

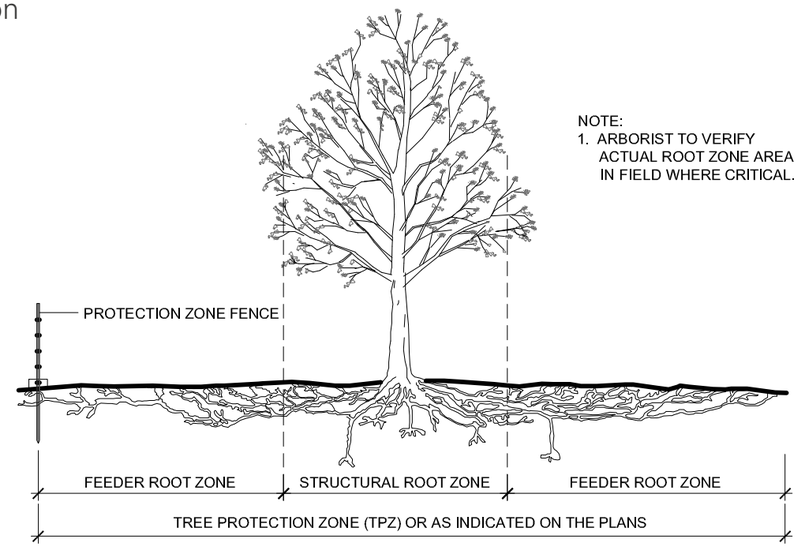


Reinforced Turf Pavement

Not for Construction

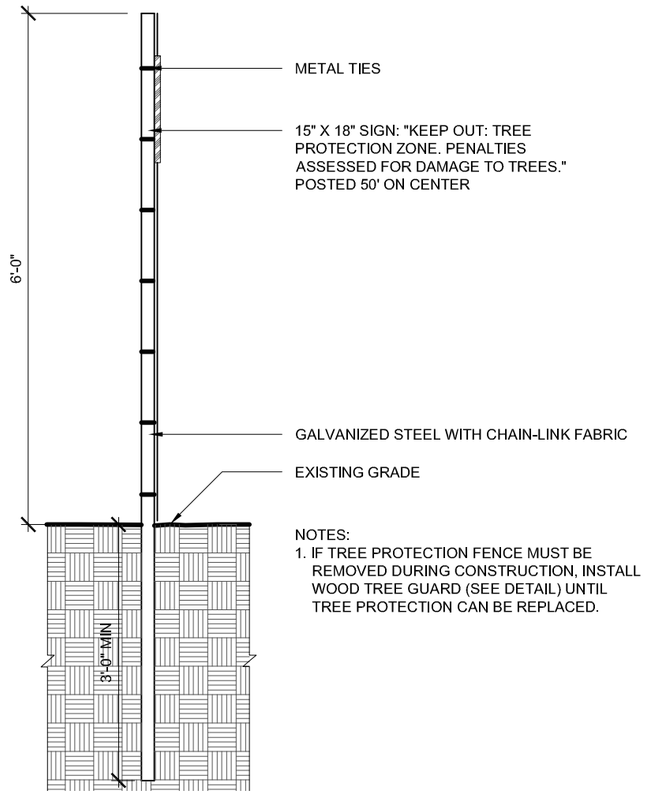
Planting | Details

Tree Protection



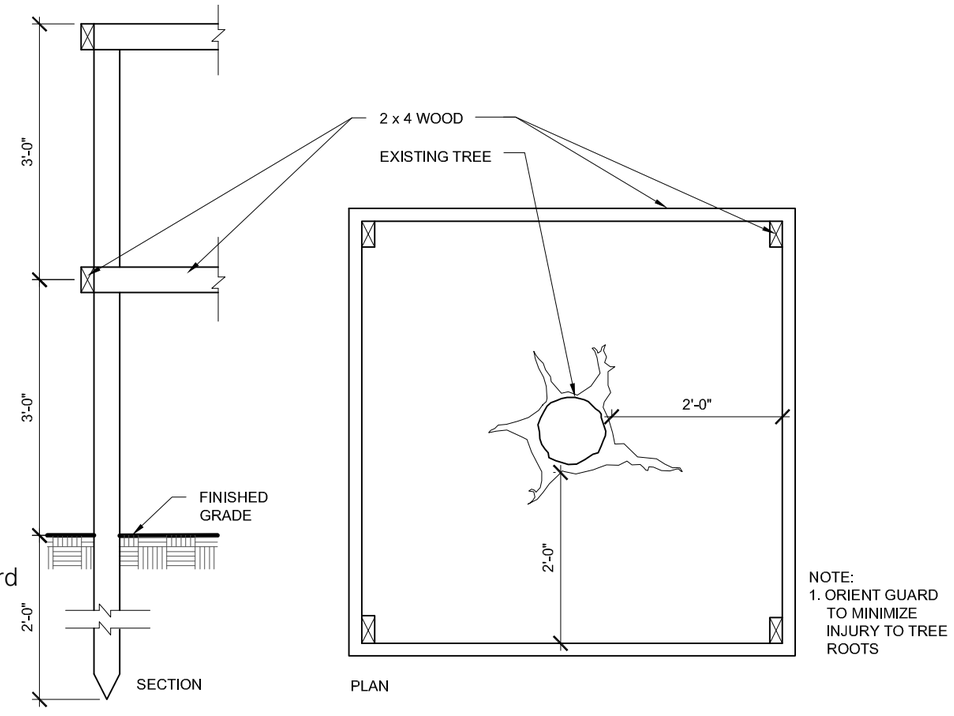
NOTE:
1. ARBORIST TO VERIFY ACTUAL ROOT ZONE AREA IN FIELD WHERE CRITICAL.

Tree Protection Zone
Not for Construction



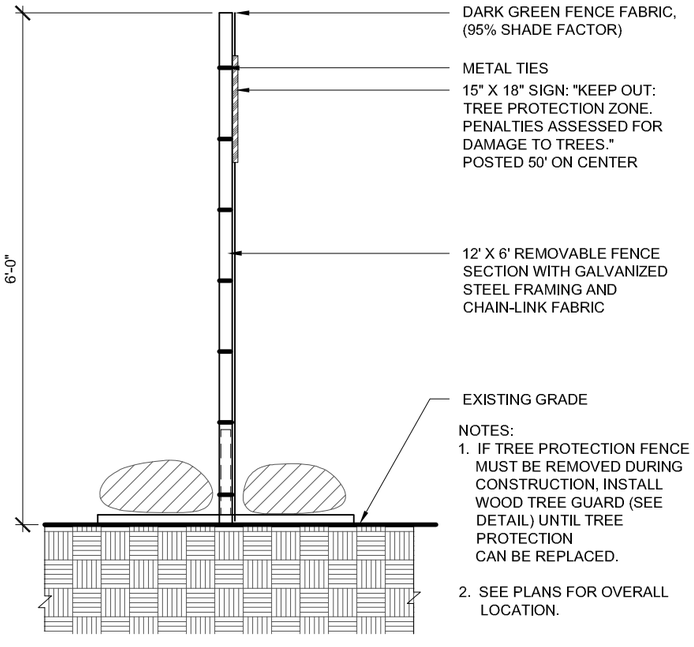
NOTES:
1. IF TREE PROTECTION FENCE MUST BE REMOVED DURING CONSTRUCTION, INSTALL WOOD TREE GUARD (SEE DETAIL) UNTIL TREE PROTECTION CAN BE REPLACED.

Tree Protection Fence-Non-Moveable
Not for Construction



NOTE:
1. ORIENT GUARD TO MINIMIZE INJURY TO TREE ROOTS

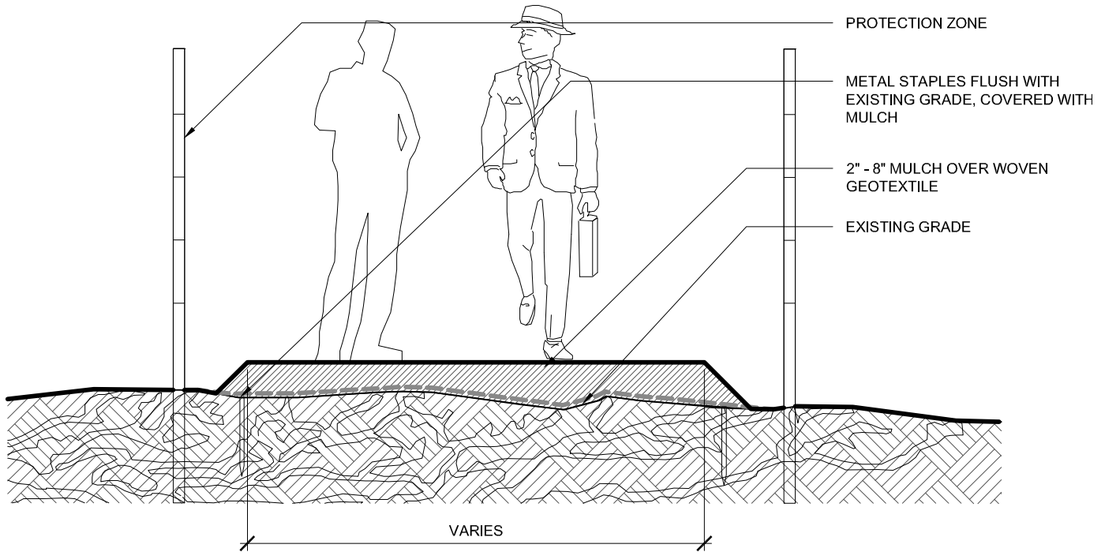
Wood Tree Gaurd
Not for Construction



NOTES:
1. IF TREE PROTECTION FENCE MUST BE REMOVED DURING CONSTRUCTION, INSTALL WOOD TREE GUARD (SEE DETAIL) UNTIL TREE PROTECTION CAN BE REPLACED.
2. SEE PLANS FOR OVERALL LOCATION.

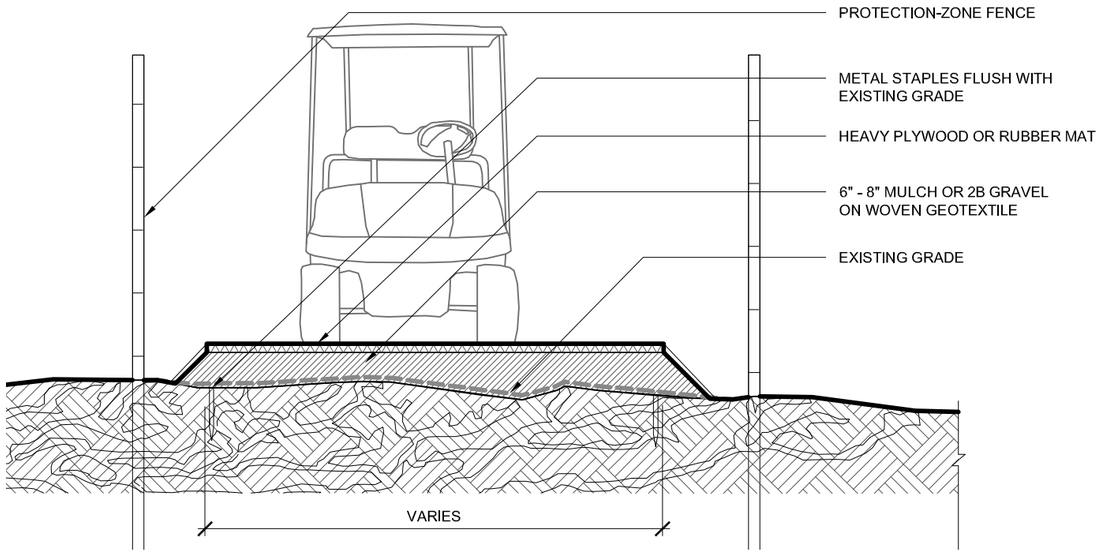
Tree Protection Fence-Moveable
Not for Construction

Tree Protection



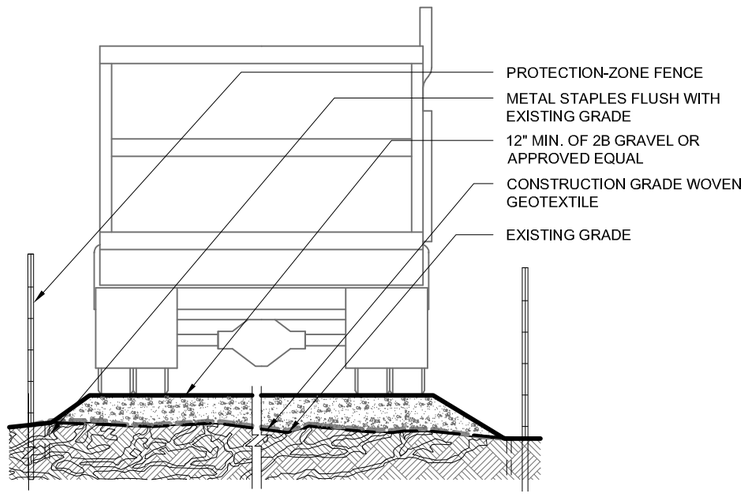
Root/Soil Protection-Pedestrian Access

Not for Construction



Root/Soil Protection-Heavy Duty Vehicles

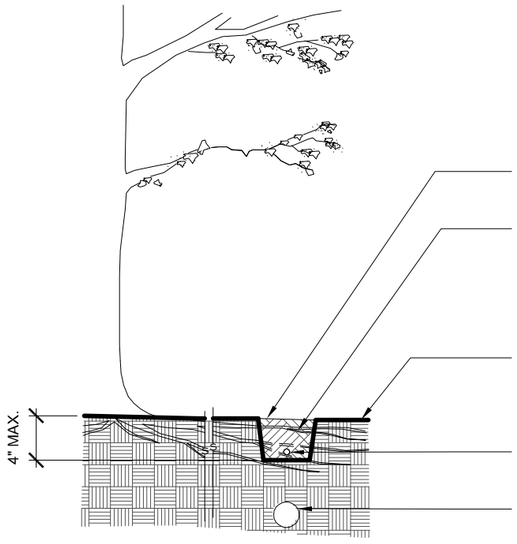
Not for Construction



Root/Soil Protection-Light Duty Vehicles

Not for Construction

Tree Protection



PLANTING SOIL BACKFILL, COMPACTION TO 85% MAX.

EXISTING ROOTS TO REMAIN. DO NOT CUT MAIN, LATERAL OR TAP ROOTS. CONTRACTOR WILL CUT ONLY MINOR ROOTS IN THE WAY OF PIPES/UTILITIES. MAINTAIN ROOTS ABOVE AND AROUND THE PIPES/UTILITIES.

EXISTING GRADE

SHALLOW UTILITY PIPE OR CONDUIT

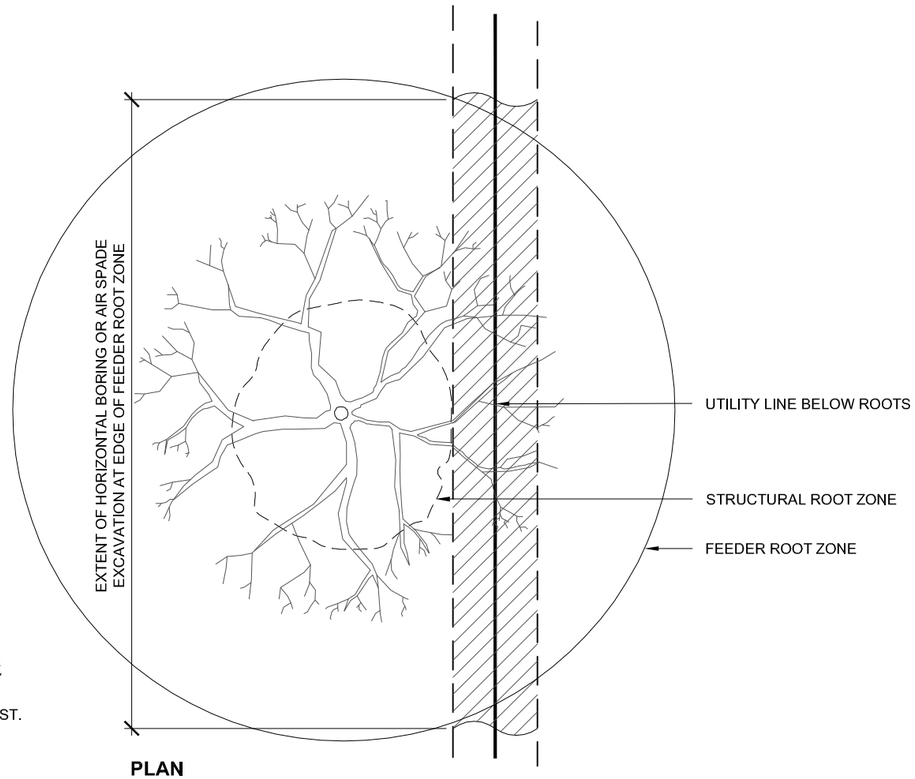
DEEP UTILITY PIPE

NOTES:

1. INSTALL SHALLOW UTILITY LINES USING AIR SPADE EXCAVATION. INSTALL DEEP UTILITY PIPES USING HORIZONTAL BORING, OR AIR SPADE PER RECOMMENDATION OF ARBORIST.

2. KEEP EXPOSED ROOTS MOIST

SECTION

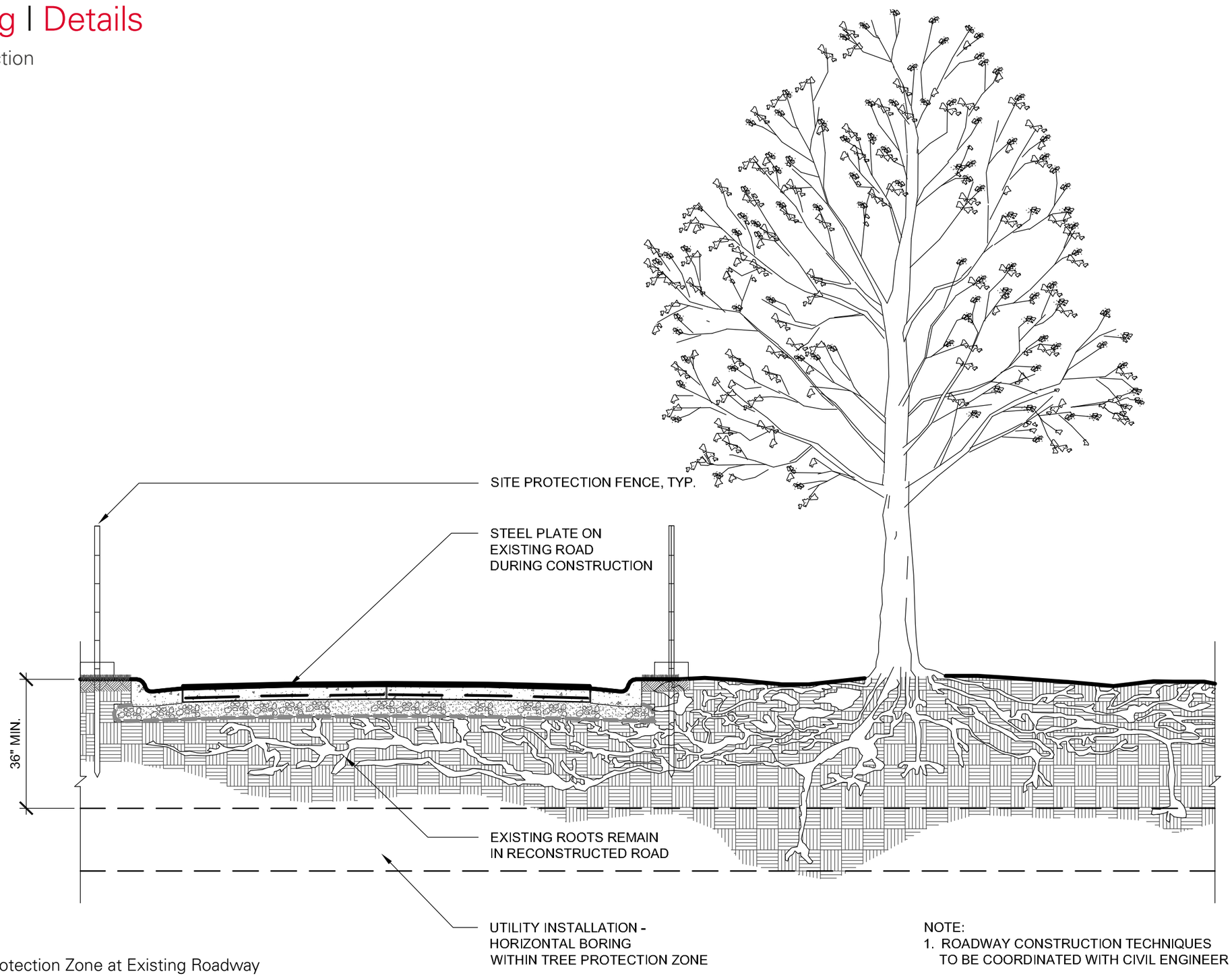


PLAN

Utility Installtion in Tree Protection Zone

Not for Construction

Tree Protection

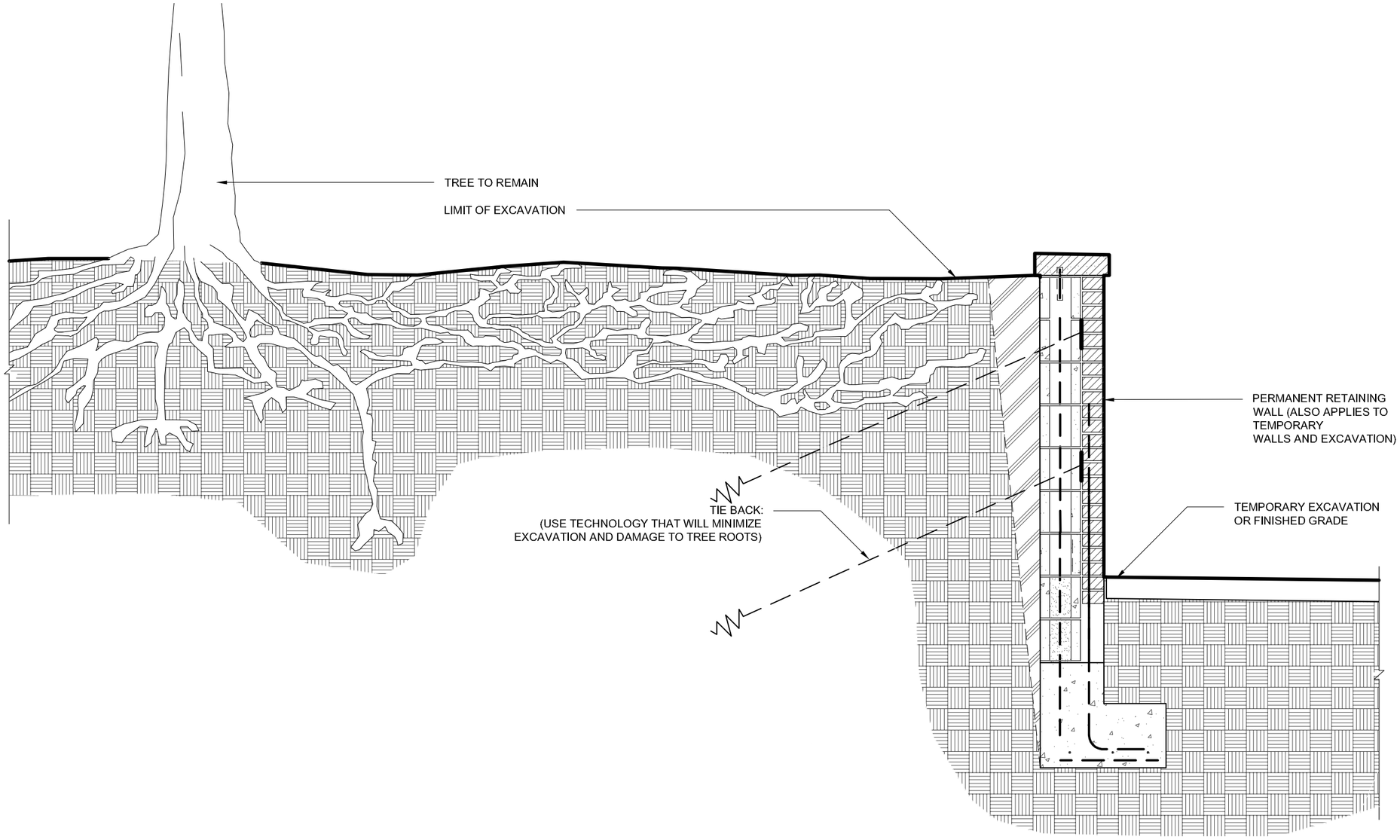


NOTE:
1. ROADWAY CONSTRUCTION TECHNIQUES TO BE COORDINATED WITH CIVIL ENGINEER

Tree/ Root Protection Zone at Existing Roadway

Not for Construction

Tree Protection



Tree/ Root Protection Zone at New Retaining Wall

Not for Construction

Planting

Specifications

SECTION 329300 - PLANTS

1.1 SUMMARY

A. Plants.

B. Tree-watering devices.

1.2 QUALITY ASSURANCE

A. Installer's Personnel Certifications: Landscape Industry Certified Technician - Exterior or Landscape Industry Certified Horticultural Technician.

1.3 WARRANTY

A. Trees, Shrubs, and Vines: 12 months.

B. Ground Covers, Perennials, and Other Plants: 12 months.

1.4 MATERIALS

A. Plants, General: Nursery-grown and complying with ANSI Z60.1.

B. Mulches: Ground or shredded bark. Color: Natural.

C. Pesticides: Registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Use Pre-Emergent Herbicide (Selective and Nonselective) for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer. Use Post-Emergent Herbicide (Selective and Nonselective) for controlling weed growth that has already germinated

D. Tree Stabilization: none

E. Landscape Edgings: [**Aluminum**] Shovel cut.

F. Tree-Watering Devices: Slow-release type. Color, Green.

G. Miscellaneous Products:

1. Burlap (plastic fabrics not permitted).
2. Mycorrhizal inoculant.
3. Root dip.

1.5 FIELD CONDITIONS

A. Planting Periods:

1. Deciduous Trees, Shrubs and Vines:

a. Spring: March 1 to May 15.
b. Fall: October 15 to November 30.

2. Evergreen Trees, Shrubs and Ground Covers:

a. Spring: March 1 to May 15.
b. Fall: August 1 to September 15.

3. Perennials:

a. Spring: March 1 to May 15.
b. Fall: October 15 to November 30.

4. Rhizomes, Bulbs and Tubers: March 1 to May 15.

1.6 INSTALLATION

A. Pruning: Prune to remove broken branches, correct branching structure and to shape. Do not thin.

B. Ground Cover and Plant Planting: Space ground cover and plants other than trees, shrubs, and vines as indicated.

C. Mulching:

1. Trees and Treelike Shrubs in Turf Areas: Organic mulch ring of 3-inch (75-mm) thickness, with 24-inch (600-mm) radius.
2. Planting Areas: 3-inch (75-mm) thickness of organic mulch over whole surface of planting area.

1.7 MAINTENANCE

A. Pruning, cultivating, watering, weeding, fertilizing, mulching resetting to proper grade or vertical position, pesticide treatments as required to maintain healthy plants.

1.8 MAINTENANCE SERVICE

A. Trees and Shrubs: 12 months.

B. Ground Cover and Other Plants: 12 months.

END OF SECTION 329300

Planting

Specifications

SECTION 329200 - TURF AND GRASSES

1.1 SUMMARY

A. Seeded and sodded turf.

B. Meadow grasses and wildflowers.

C. Turf renovation.

D. Erosion-control materials.

E. Grass paving.

1.2 QUALITY ASSURANCE

A. Turf Installer's Personnel Certifications: Certified Landscape Technician – Exterior, Certified Lawncare Manager or Certified Lawncare Technician.

B. Meadow Installer Qualifications: Qualified installer with minimum of 5 year's experience in meadow establishment.

1.3 MATERIALS

A. Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Turfgrass Sod Blend: 90 percent turf-type tall fescue (Festuca arundinacea), a minimum of three cultivars. 10 percent Kentucky bluegrass (Poa pratensis).

C. Wildflower and Native-Grass Seed: As indicated on drawings.

D. Mulches: Straw or fiber mulch and tackifier for hydroseeded areas.

E. Pesticides: Approved by EPA.

F. Erosion-Control Materials: Blankets, Fiber mesh, Mats.

G. Grass-Paving Materials: Cellular plastic mats with planting soil fill.

1.4 FIELD CONDTIONS

A. Planting Periods:
1. Turf: Spring (March 1 to May 31) or fall (August 15 to November 15).
2. Meadows: Late Spring or fall.

1.5 INSTALLATION

A. Seeding Method: Sow, Hydroseed.

B. Protect seeded areas with straw mulch or fiber mulch.

1.6 TURF MAINTENANCE

A. Water, fertilize, weed, mow, trim and replant as needed to establish healthy turf.

B. Watering: 1 inch per week unless rainfall precipitation is adequate.

C. Mowing: To maintain 1-1/2 to 2 inches grass height and never more than one-third of grass height.

1.7 MEADOW MAINTENANCE

A. Water, fertilize, weed, mow, trim and replant as needed to establish healthy viable meadow.

B. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards

C. Mowing: Throughout the first growing season, mow meadow to 6 inches high when weed height exceeds 9 inches.

1.8 MAINTENANCE SERVICE

A. Turf:

1. Seed: 60 days from date of Substantial Completion.
2. Sod: 30 days from date of Substantial Completion.

B. Meadows: 3 years from date of Substantial Completion.

END OF SECTION 329200

SECTION 329115 - SOIL PREPARATION (PERFORMANCE SPECIFICATION)

1.1 PRECONSTRUCTION TESTING

A. Preconstruction testing of existing, on-site soil and imported soil by Contractor's testing agency.

1.2 MATERIALS

A. Regional Materials for LEED: For products and materials required to comply with requirements for regional materials Credit MR 5 for materials that have been extracted, harvested, or recovered, as well as manufactured, with 500 miles of Project site.

B. Planting soils produced by modifying the following soil sources:

1. Existing, On-Site Surface Soil, Stockpiled On-Site.
2. Imported Soil
3. Manufactured Soil

1.3 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavate soil to a depth of 6 inches and stockpile until amended.

B. Screen soil with a 1 1/2-inch sieve to remove large materials.

1.4 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. Till subgrade to depth of 18 inches.

B. Spread unamended soil to total depth as indicated on planting plans and amend in place.

C. Compact each lift of planting soil to a maximum of 100lbs/sq in within the top 6 inches of soil profile.

1.5 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

A. Till subgrade to depth of 18 inches.

B. Spread planting soil to total depth as indicated on planting plans.

C. Compact each lift of planting soil to a maximum of 100lbs/sq in within the top 6 inches of soil profile.

1.6 BLENDING PLANTING SOIL IN PLACE

A. Till unamended, existing soil to depth of 18 inches.

B. Apply amendments and blend.

C. Compact blended planting soil to a maximum of 100lbs/sq in within the top 6 inches of soil profile.

1.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner engaged.

END OF SECTION 329115

SECTION 015639 - TEMPORARY TREE, PLANT AND SOIL PROTECTION

1.1 SUMMARY

A. Protection and pruning of existing trees, plants and soils that are affected by execution of the Work.

1.2 QUALITY ASSURANCE

A. Contractor's Arborist Qualifications: Certified Arborist as certified by ISA.

1.3 MATERIALS

A. Topsoil for Fill: Stockpiled or imported or manufactured and complying with ASTM D 5268.

B. Organic Mulch: Shredded hardwood or wood and bark chips.

C. Protection-Zone Fencing and Gates: Galvanized steel chain link with height of 6 feet, with dark green shade fabric and flagging tape on top of fence.

1. Moveable Sections: 6 feet high by 12 feet wide, with base to support sand bags.

D. Tree Guards: Wood cage of 2 by 4's constructed around tree trunk, 6 feet high.

E. Sand bags.

F. Protection-Zone Signage: Rigid plastic or metal sheet, 15 inches by 18 inches with 2-inch lettering.

G. Mats: Heavy plywood or rubber mat.

H. Gravel: 2B.

I. Geotextiles: Construction class, nonwoven.

1.4 EXECUTION

A. Pre-Construction Tree Care: Application of growth regulators, compost teas, and supplemental watering as determined by Arborist. Apply treatments one growing season in advance of construction and during the growing season(s) for the duration of construction.

B. Protection Zones: Enclosed with protection-zone fencing and signage.

C. Root and Soil Protection for Temporary Construction Access: Mulch, aggregate and mats.

D. Trenching near Trees:

1. Shallow Trenching: Hand excavated or air spaded under or around roots.
2. Deep Burial: Air spaded or tunnel under the roots.

E. Crown Pruning: ANSI A300 (Part 1) standard. Pruning to compensate for root loss and as follows:

1. Type of Pruning:Prune trees according to ANSI A300 (Part 1).
2. Specialty Pruning: For cleaning and clearance.
3. Removed branches chipped and stockpile in areas designated by Owner's Representative.

F. Root Punning: By Arborist.

G. Regrading: Minor cut or fill within protection zone.

H. Post-Construction Tree Care: Application of soil sprays and drenches, growth regulators, supplemental watering, fertilization and aeration as determined by Arborist.

I. Tree Replacement: Replacement of protected trees that are more than 25 percent dead or unhealthy due to construction operations.

1. Small Trees: New trees of same size and species as those being replaced that measure 6 inches or smaller in caliper size.
2. Large Trees: Tree(s) of 6-inch caliper size in sufficient quantity that the total aggregate diameter is equal to the diameter for each tree being replaced that measures more than 6 inches in caliper size. Species as selected by Owner.

1.5 FIELD QUALITY CONTROL

A. Owner-engaged arborist to direct plant-protection measures and prepare inspection reports.

END OF SECTION 015639

SECTION 329500 - VEGETATED ROOF ASSEMBLIES

1.1 SUMMARY

A. Continuous vegetated roof assemblies.

B. Tray-type vegetated roof assemblies.

C. Walkway pavers.

D. Geofoam fill.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: Approved, authorized, or licensed by membrane roofing manufacturer.

1. Professional Membership: Professional Landcare Network or the American Nursery and Landscape Association.
2. Personnel Certifications: Personnel assigned to the work shall be Certified Landscape Technician, CLT-Exterior or Certified Ornamental Landscape Professional, COLP, from the Professional Landcare Network.

1.3 WARRANTIES

A. Vegetated Roof Assembly: 15 years from date of Substantial Completion.

B. Plant Growth: 80 percent foliage cover over planting area commencing 24 months after planting through the duration of this warranty measured from date of Substantial Completion.

1. Trees and Shrubs: Two years.
2. Ground Covers, Perennials, Vines, and Ornamental Grasses: Two years.

1.4 MAINTENANCE SERVICE

A. Initial Maintenance Service: 24 months from date of Substantial Completion.

1.5 PRODUCTS

A. Continuous or Tray-Type Vegetated Roof Assembly:

1. Depth: Manufacturer's standard for required plantings, including growing medium.
2. Assembly Weight: Include growing medium and plants and saturated with captured water for the designed thickness.
3. Plantings: As shown on Drawings.

4. Manufactured Growing Medium: Vegetated roof assembly manufacturer's lightweight, manufactured soil

or designed for plants indicated on Drawings.

B. Walkway Pavers:

1. Walkway Pavers: As indicated on drawings
2. Heavyweight Concrete Walkway Pavers: As indicated on drawings
3. Setting Method: As indicated on drawings.
4. Geofoam Fill: Extruded-polystyrene board insulation.

C. Accessories:

1. Access Boxes: Manufacturer's standard boxes with removable, rigid covers for accessing drains, valves, and switches beneath the finish elevation of growing medium; secure each cover with four noncorrosive screws
2. Soil Retainer: Extruded-aluminum edging, with drainage openings in L-shaped or T-shaped configuration and in black color.

1.6 FLOOD TESTING

A. Flood test each area.

1.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Division 07 membrane roofing manufacturer's authorized service representative's inspection of vegetated roof assembly installation.

END OF SECTION 329500

SECTION 334713 - POND AND RESERVOIR LINERS

1.1 PERFORMANCE REQUIREMENTS

A. Geomembrane liners that prevent the passage of water in ponds and reservoirs.

1.2 WARRANTY

A. Materials and Workmanship: 10 year(s).

1.3 MATERIALS

A. Sheet: EPDM.

1. Seams: Manufacturer's standard.

1.4 SOURCE QUALITY CONTROL

A. Testing Agency: Contractor engaged.

B. Seams: Tested and inspected for peel adhesion and bonded seam strength according to ASTM D 4545.

1.5 INSTALLATION

A. Installation Method: In anchor trench or attached to concrete as indicated on Drawings.

1.6 FIELD QUALITY CONTROL

A. Testing: By Contractor-engaged agency per visual inspection and nondestructive seam testing.

END OF SECTION 334713

Stormwater Management

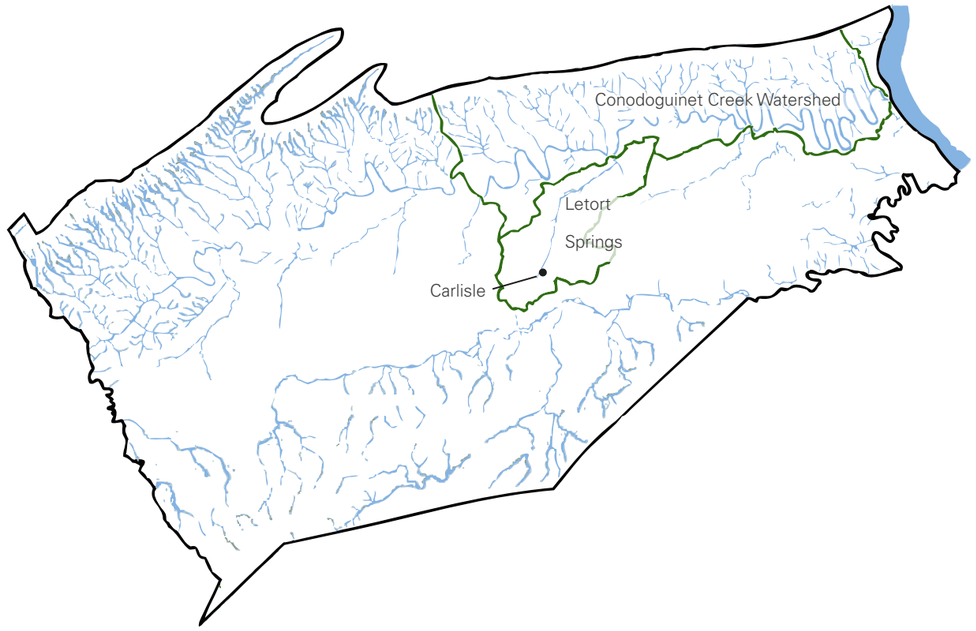
Watersheds

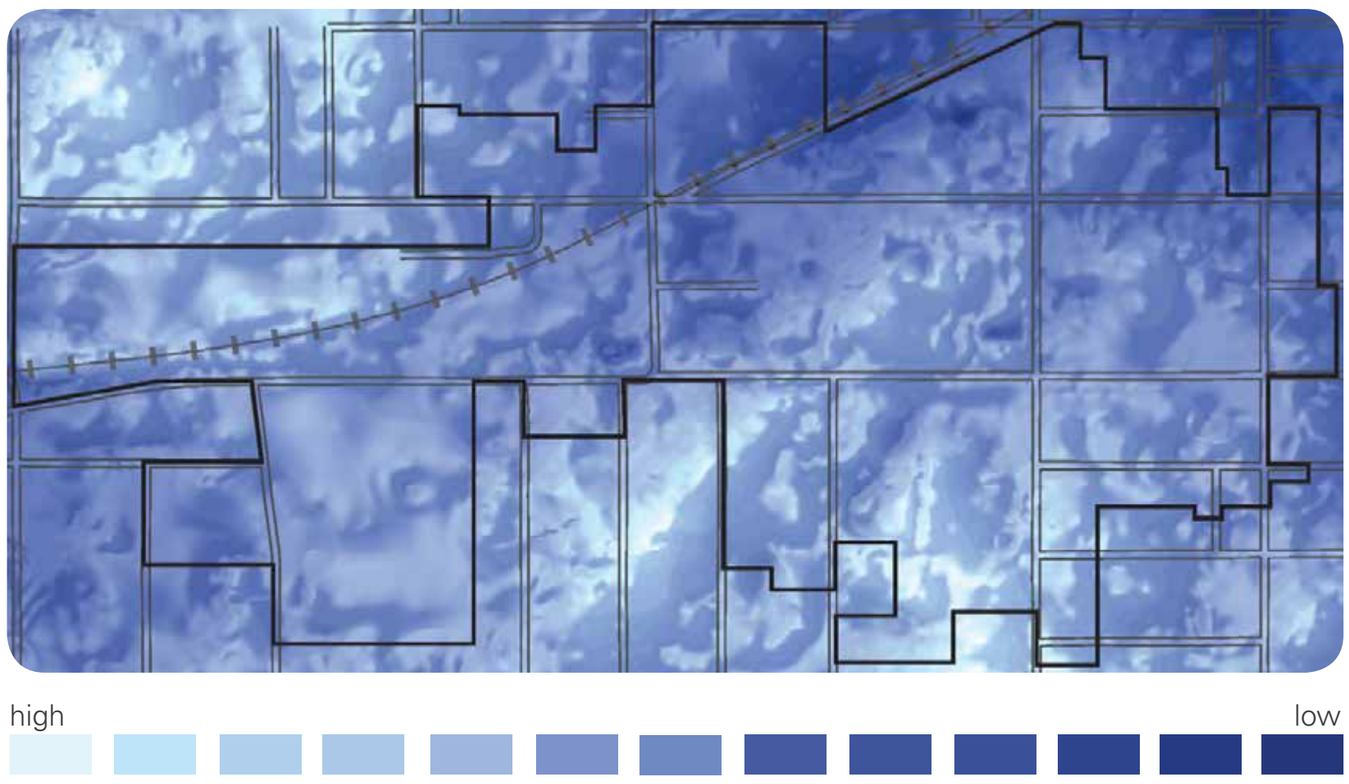
With a topographic gradient of white to dark blue, representing higher elevations in white and lower elevations increasing in blue, this map illustrates the landforms of Dickinson College. Ranging from approximately 465 to 490 feet across the campus, elevations decrease in gradient towards the northeast corner. This pattern replicates the overall flow directions in the larger landscape.

Within Cumberland County, the town of Carlisle drains to the Letort Spring watershed, a sub-watershed of the larger Conodoguinet Creek watershed. Letort Spring flows from the south to the north and is located to the east of Carlisle, hence the natural north-east drainage patterns of Dickinson College. "The stream is fed by an estimated 21 natural limestone springs, resulting in high quality water" (1). The limestone springs are a natural feature of the unique geology below the college. Underlaying the Dickinson College lands and surrounding area are largely sedimentary rocks- sandstone, shale, limestone, and dolomite. The limestone and dolomite rocks are highly soluble in acidic water, they can form sinkholes, underground streams, and other karst features. As a result of the karstic geology, surface drainage can directly pass into groundwater systems creating a high potential for groundwater contamination.

According to the EPA National Summary of Impaired Waters, Pennsylvania has the largest number of degraded streams. However, the surrounding areas of Letort Spring are fortunate to have naturally high quality water. Because of this, development within Dickinson College should meet or exceed regulatory policy to prevent excess runoff and pollutant loads from entering the surrounding watershed.

(1) Cumberland County Stormwater Management Plan. Prepared for Cumberland County Planning Commission, Carlisle PA. Prepared by Skelly and Loy, Inc., Harrisburg, PA. September 29, 2010.





Stormwater Management

Watersheds

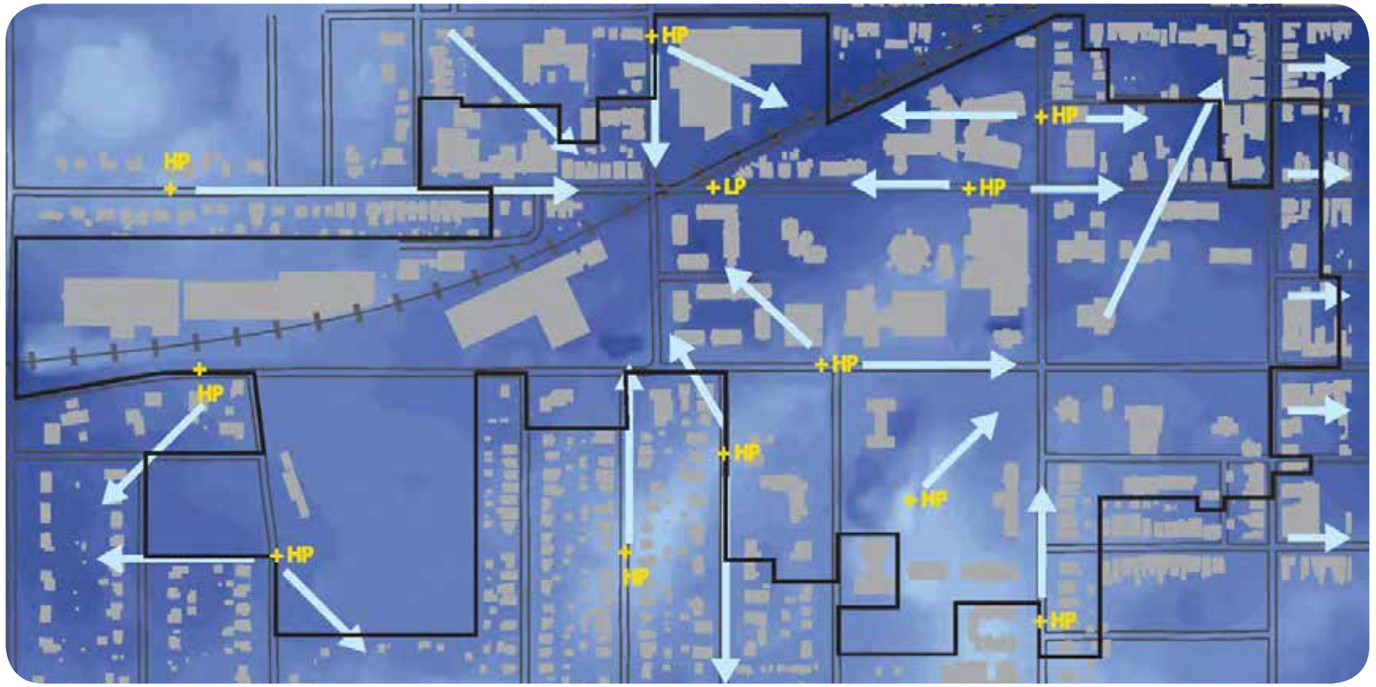
Zooming in closer to the site and analyzing the contours provides more detail on the hydrologic flow patterns within the campus boundaries. The campus can be divided into six larger sub-watersheds, with two draining interior to the campus boundary, the orange and the green, and three with sources interior to the campus but with major flow paths dispersing exterior to the campus boundary, the tan, pink, purple, and grey.

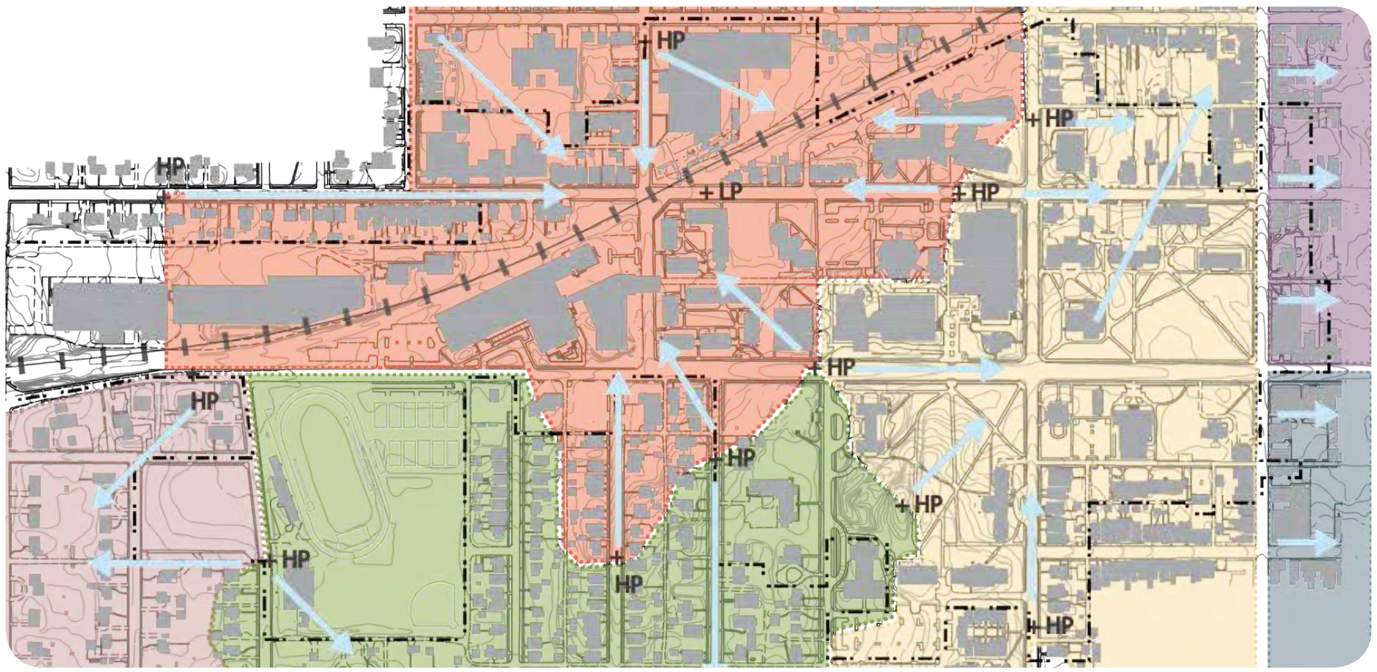
All of the roads throughout the college have a crowned slope, meaning the roads were designed to drain from the center to each side. This pattern essentially puts each block as its own sub-watershed. Looking beyond the individual block watersheds to understand the larger connections, high points within the landscape can be analyzed to determine dominant flow paths.

Water naturally runs perpendicular to the contour lines, for the purpose of summarization the flow lines depicted show the dominate direction the water will ultimately take.

Understanding major flow patterns and watersheds are important in future development scenarios for two primary reasons. First, to recognize areas that have flow patterns outside of campus boundaries, in which any construction without management practices will detrimentally effect the sites where water is going, including Letort Spring. Second, all of the water that is flowing interior to the campus boundary is all going to one low spot near the intersection of W. Louther and Cherry Streets. Surface ponding during storm events is already present and thus any future development in this sub-watershed will exacerbate the problem without proper management, even small storm events can have significant impacts.

> "Pennsylvania is the most flood prone state in the country. The average annual precipitation ranges from 37 inches to more than 45 inches per year, and reflects a humid pattern. Nearly all of the annual rainfall occurs in small storm events. Precipitation of an inch or less is frequent and well distributed throughout the year"
>
> - Pennsylvania Office of Watershed Management. Pennsylvania Best Management Practices Manual. Document Number 363-0300-002. Dec. 2006.





Stormwater Management

Best Management Practices

To mitigate stormwater during future development, stormwater best management practices should be included in the design process. The Pennsylvania Best Management Practices Manual outlines ten structural BMP's designed to reduce stormwater runoff volumes and water quality (http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305). Most are based on natural systems, but are given the designation of structural BMP's, as they often contain manufactured materials such as engineered soil media. Although BMP should be utilized whenever possible, due to the karst geology careful planning and design details should be evaluated to prevent the development of sinkholes. For example, rain garden and rain tanks should be lined and concrete cisterns should be used for underground storage near buildings, but these are general considerations and each intervention should be evaluated on a site specific basis prior to implementation.

All BMP implementations are useful to Dickinson College, however some are better suited to certain areas. For example, the high cost of tree trenches would make them more applicable in high profile areas, such as the Historic Arboretum, Plazas or Educational Landscape. Conversely, a less expensive rain gardens might be a better option in service landscapes.

The table below outlines five BMP practices and the most appropriate locations based on landscape character. The graph below ranks each system based on cost, percent runoff reduction, and percent Nitrogen removal. A rain garden would be the lowest cost option with the best runoff reduction and N removal, below that would be porous pavement, stormwater planters, cisterns, and green roofs would be the least effective at runoff reduction and N removal and be a higher cost option.

BMP FOR CHARACTER ZONES					
Historic Arboretum	●	●			
Expanded Arboretum / Quad	●	●			
Building Threshold or Educational Landscape	●	●	●	●	●
Special Garden or Plaza	●		●	●	●
Borough Residential Landscape				●	●
Streetscape + Green Corridors	●	●		●	
Service Landscape			●	●	●
Athletic Field			●	●	●

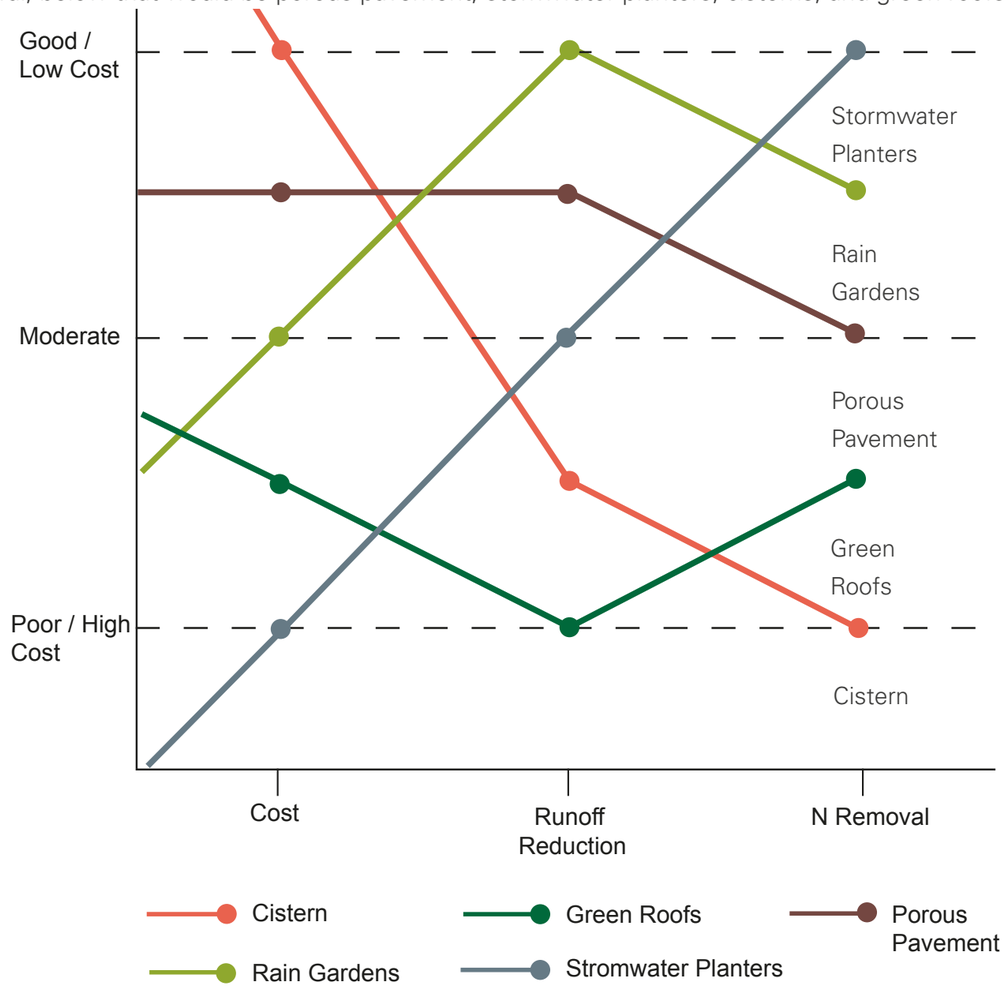
● tree trenches and bioretention street bump outs

● green roofs

● rain gardens

● cisterns or rain barrels

● pervious pavement



Schueler, Tom, and Chesapeake Stormwater Network. "Technical Memorandum: The Runoff Reduction Method."

Center for Waterhsed Protection. Ellicott City, MD www.stormwatercenter.net (2008).
Montalto, Franco, et al. "Rapid assessment of the cost-effectiveness of low impact development for CSO control."

Landscape and urban planning 82.3 (2007): 117-131.

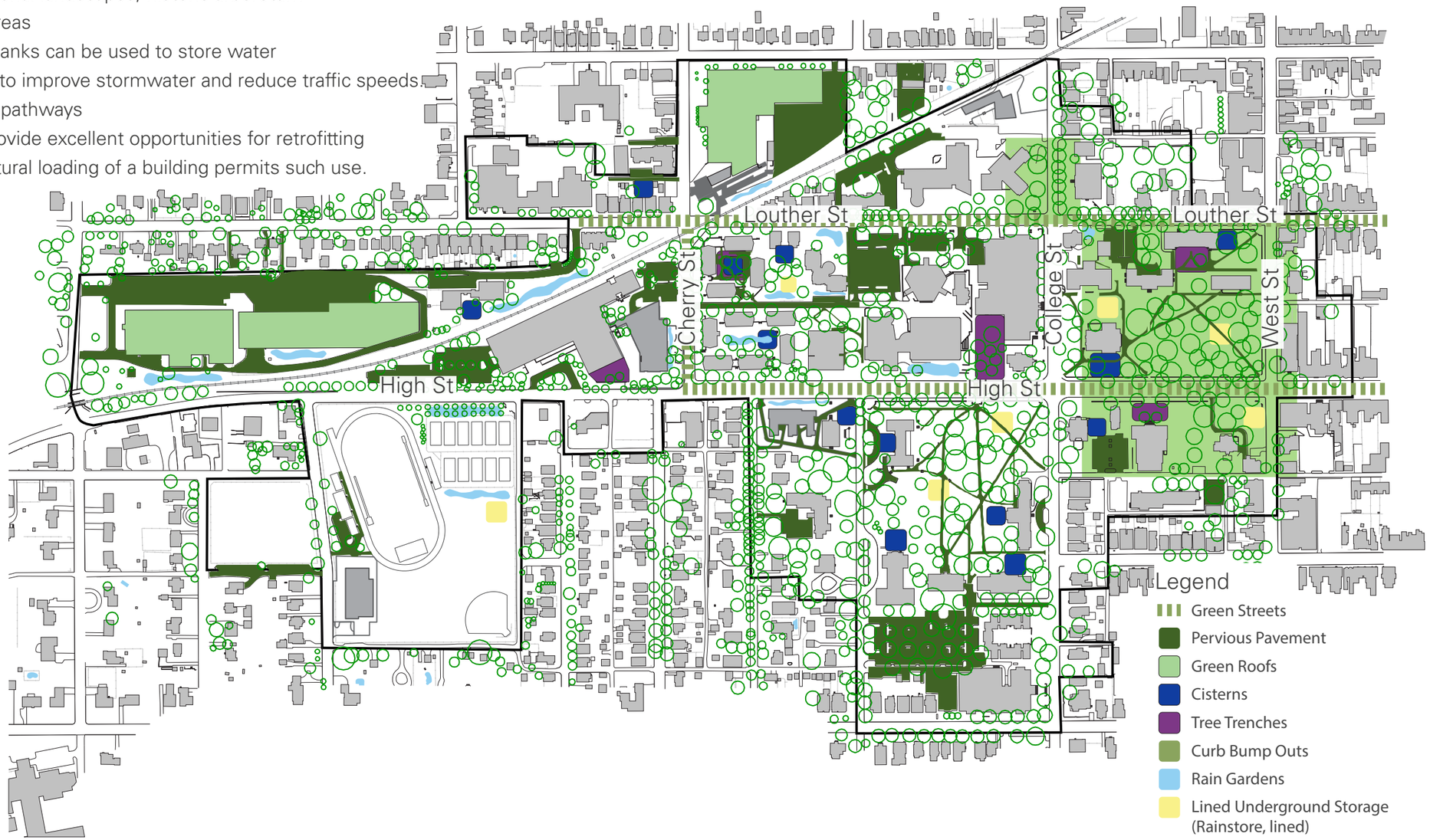
Stormwater Management

Best Management Practices

As noted in the matrix on the previous page, some BMP's are better suited in different locations around campus. This map identifies possible locations for the various BMP's, however many other opportunities may exist. During future construction implementation each site should be identified for its unique characteristics and potential opportunities, including soil tests. The unique character of the historic arboretum warrants special consideration in future design initiatives.

General location suggestions include:

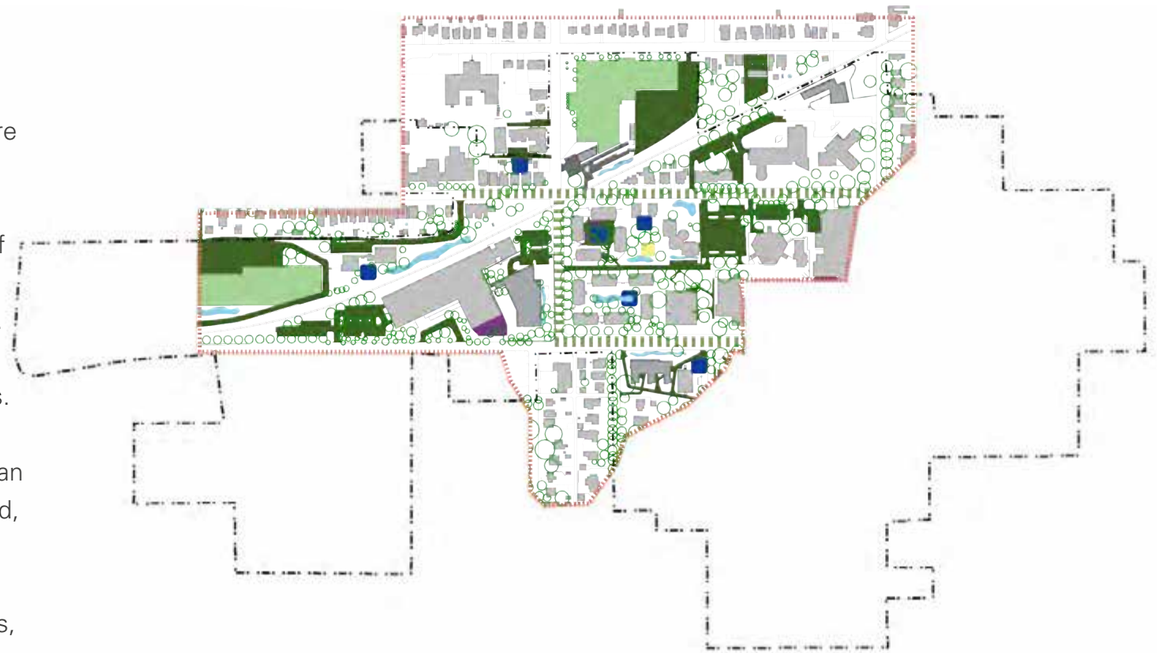
- Tree trenches: in plaza areas, educational landscapes, historic arboretum
- Rain gardens: in larger open space areas
- Cisterns + Rain Tanks: underground tanks can be used to store water
- Curb bump outs: adjacent to streets to improve stormwater and reduce traffic speeds.
- Porous Pavement: parking areas and pathways
- Green Roofs: large flat roof areas provide excellent opportunities for retrofitting with green roofs, when the structural loading of a building permits such use.



Stormwater Management

Best Management Practices

There are several structural BMPs that may be possible to implement within the lowest sub-watershed on the site, the orange sub-watershed, to alleviate existing surface ponding issues.



Flat roofs on larger buildings are excellent places to retrofit green roofs, if the existing structure can support it. The Public Safety building and the Facilities Management building are both large flat roofs that roughly total 160,000 sq ft. Estimating the media depth at 4" and accounting for 20% water holding pore space, if these areas were retrofitted with green roofs 10,675 cu ft or 1400 gal. of water could be captured

Parking areas and other impervious surfaces account for a large portion of stomrwater run off. If 293,000 sq ft of impervious surface was retrofitted to porous concrete or asphalt with a 3' stone sub-base, approximately 350,000 cu ft or 47,000 gal of water could be captured to reduce peak flows.

Rain gardens, lined or unlined, not only help reduce run off volumes but provide significant wildlife habitat. Although Dickinson College is in a densely populated area even small rain gardens can improve hydrology. If small rain gardens were installed in various locations throughout the watershed, totalling 14,000 sq ft and averaging 6ft deep of media depth, 16,800 cu ft or 2245 gal of stormwater could be captured.

Cisterns and lined rain tanks provide conservation opportunities throughout the campus, particularly in the quad spaces and arboreta. Concrete cisterns can be used underground adjacent to new and existing buildings to capture stormwater for site re-use, such as irrigation . Rain tanks are a less expensive option, with less infrastructure, that can provide storage in some of the open lawn areas without compromising the aesthetics of the arboreta, with careful consideration of tree root systems. The R-tank by ACF Environmental is a variable rain tank that can be costumed built to any shape and ranges in heights from 9" to 7'. Standard concrete cisterns range from 5000- 30,000 gals but can be made to varying specifications to fit the College's needs.

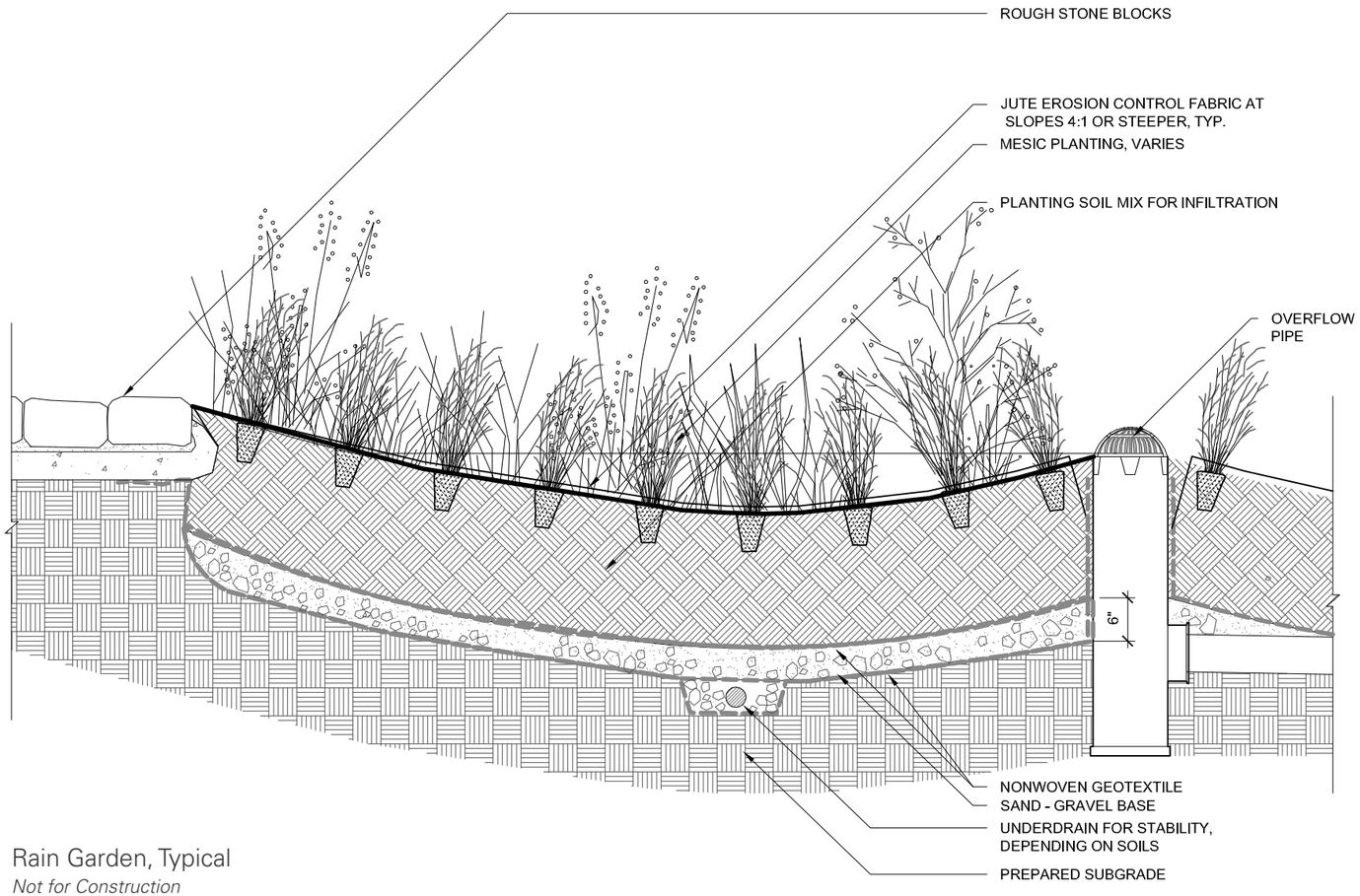
The pictures below were taken by Andropogon Associates at a site visit to the campus on July 19,2012. On that day rain totals for Harrisburg, PA were recorded at 1.02 inches, slightly below the 95th percentile storm event of 1.5-1.6 inches

W. Louther and Cherry St.

Courtyard

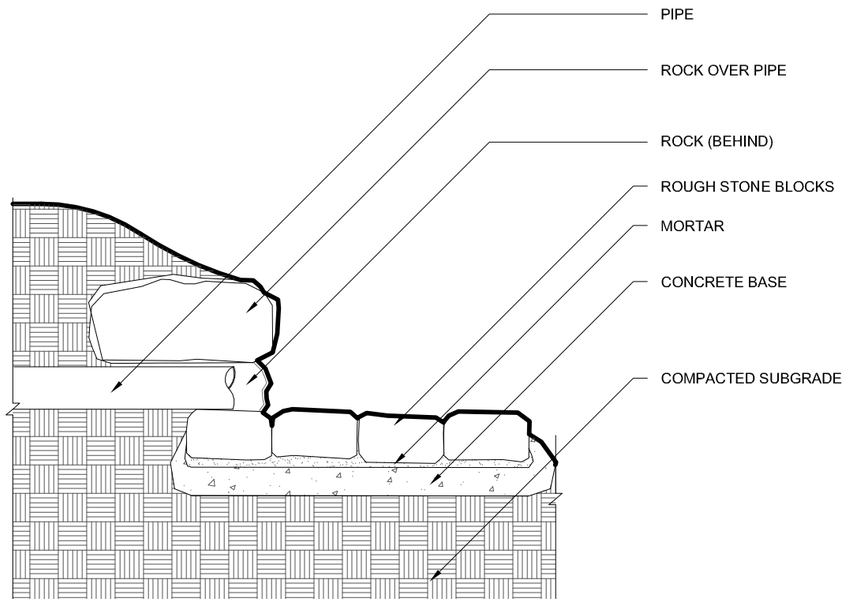
Stormwater

All details in this section are intended for preliminary design only. They are not to scale (N.T.S) and are not intended for bid or construction purposes. They are subject to modification based on design calculations, local practices, and all applicable codes and regulations.



Rain Garden, Typical

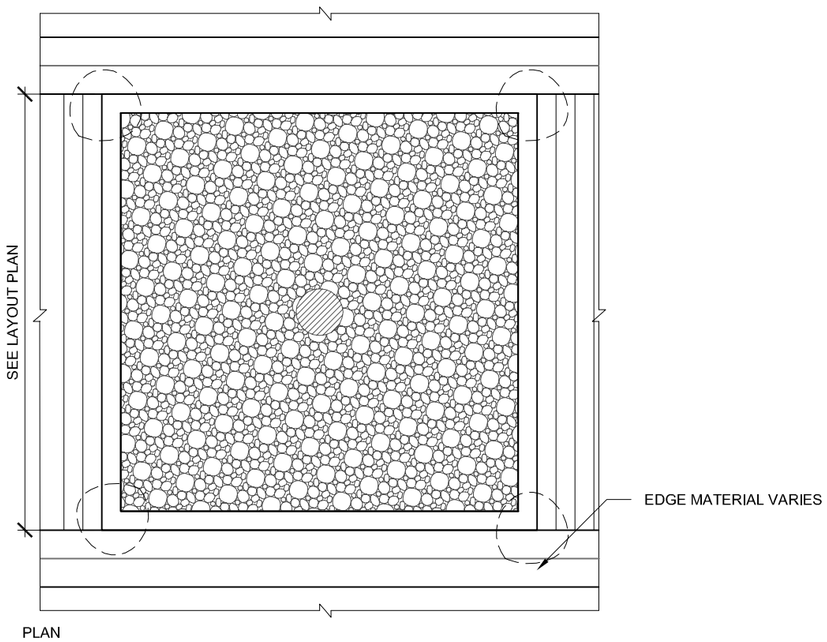
Not for Construction



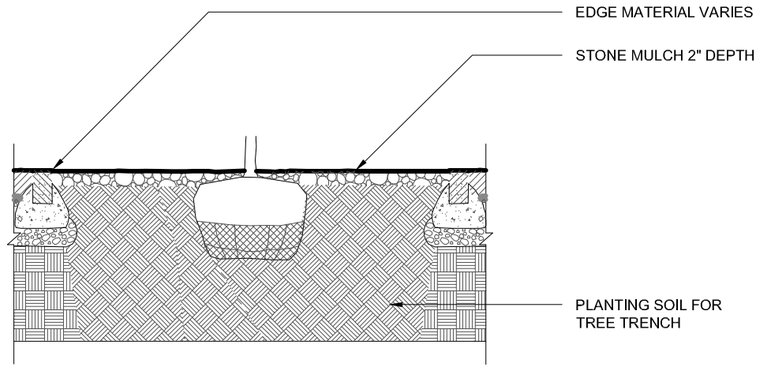
Rain Garden Outfall

Not for Construction

Stormwater



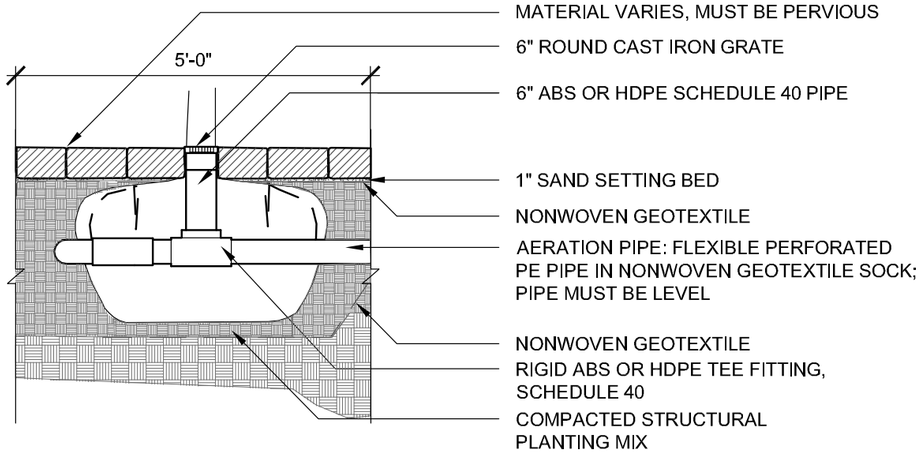
PLAN



SECTION

Tree Trench with Stone Mulch

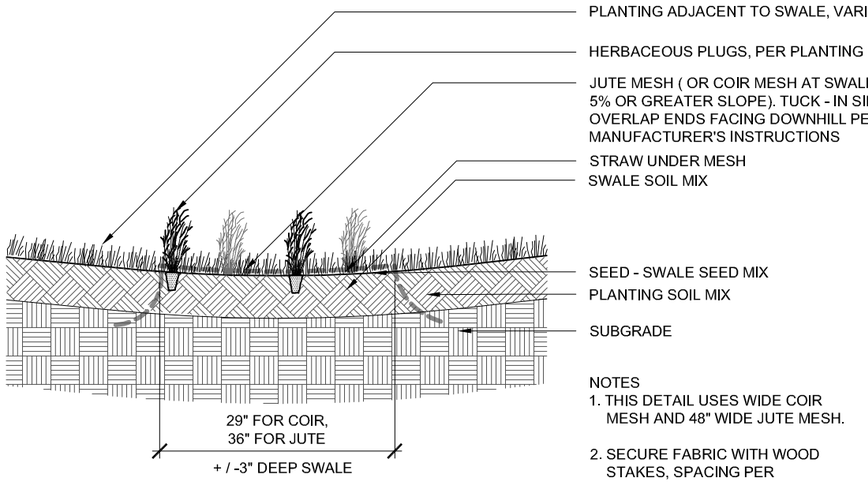
Not for Construction



Tree Trench

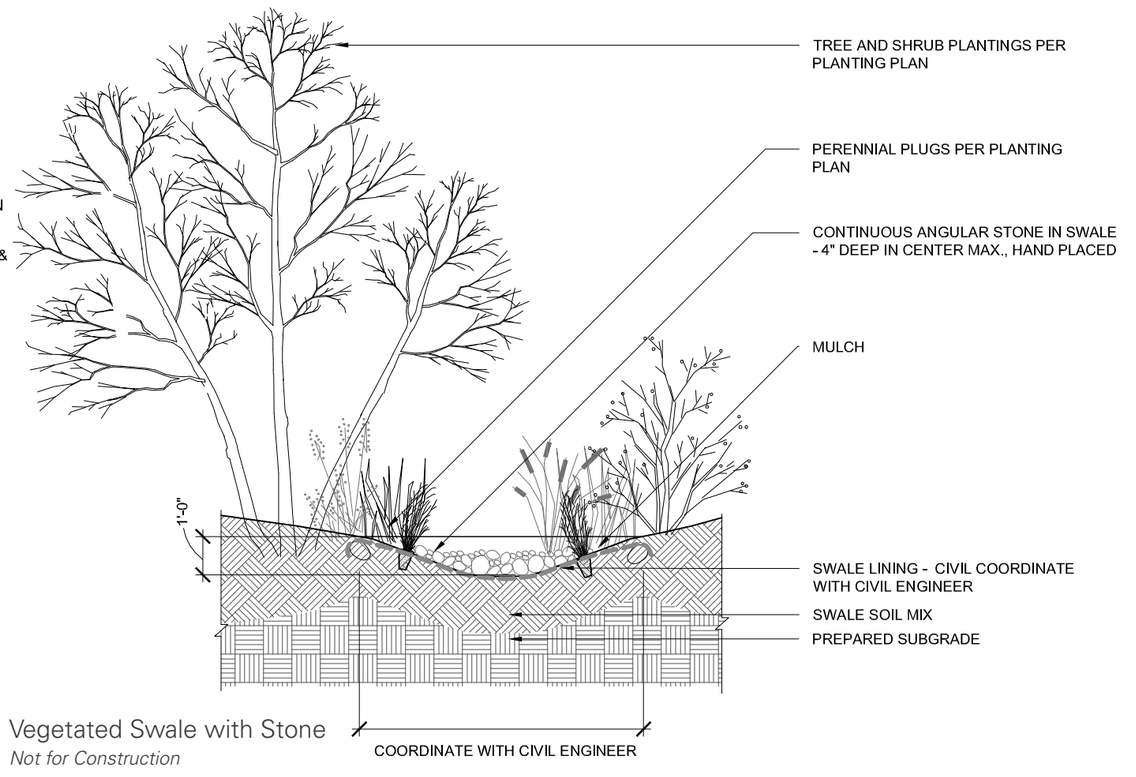
Not for Construction

Stormwater



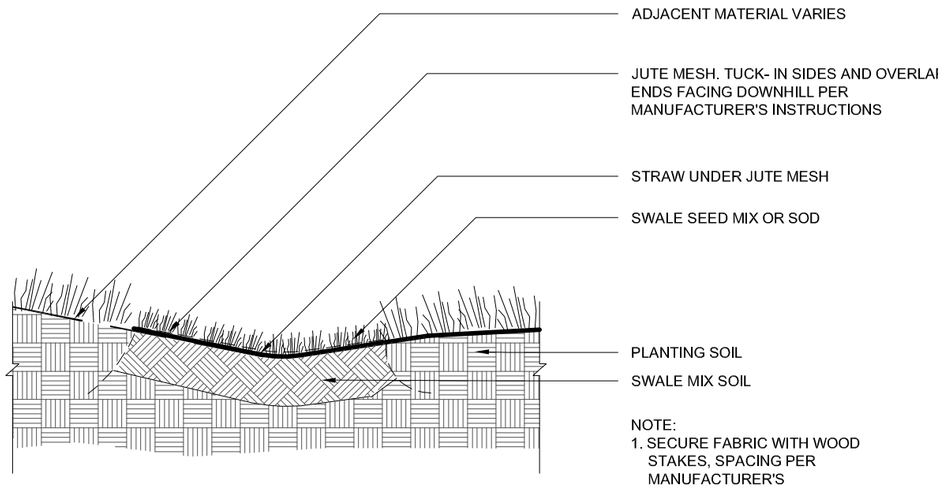
Shallow Vegetated Swale

Not for Construction



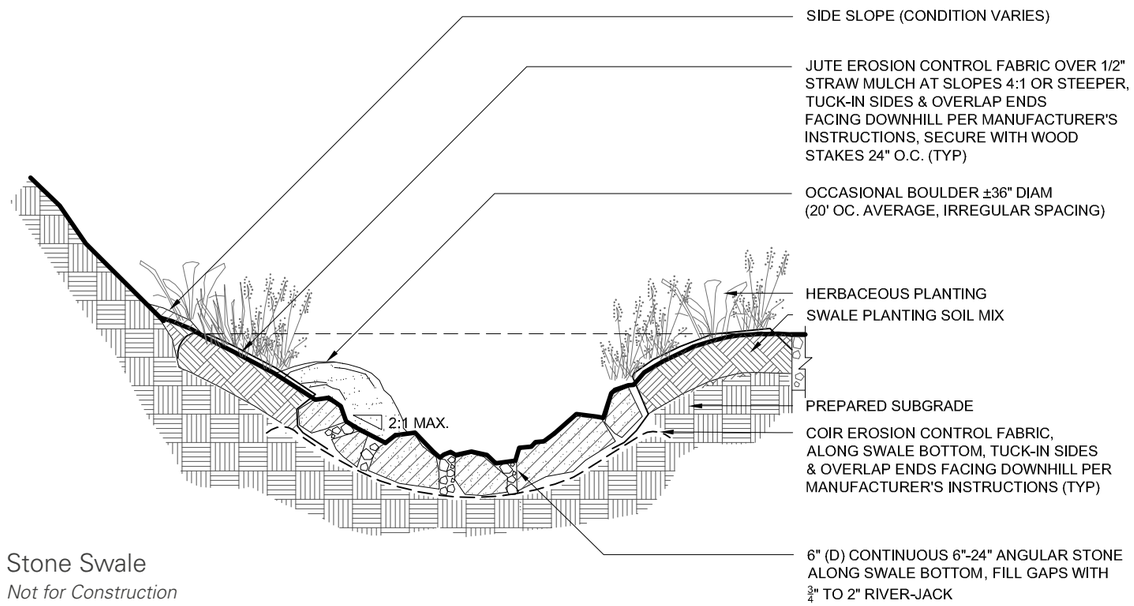
Vegetated Swale with Stone

Not for Construction



Grass Swale

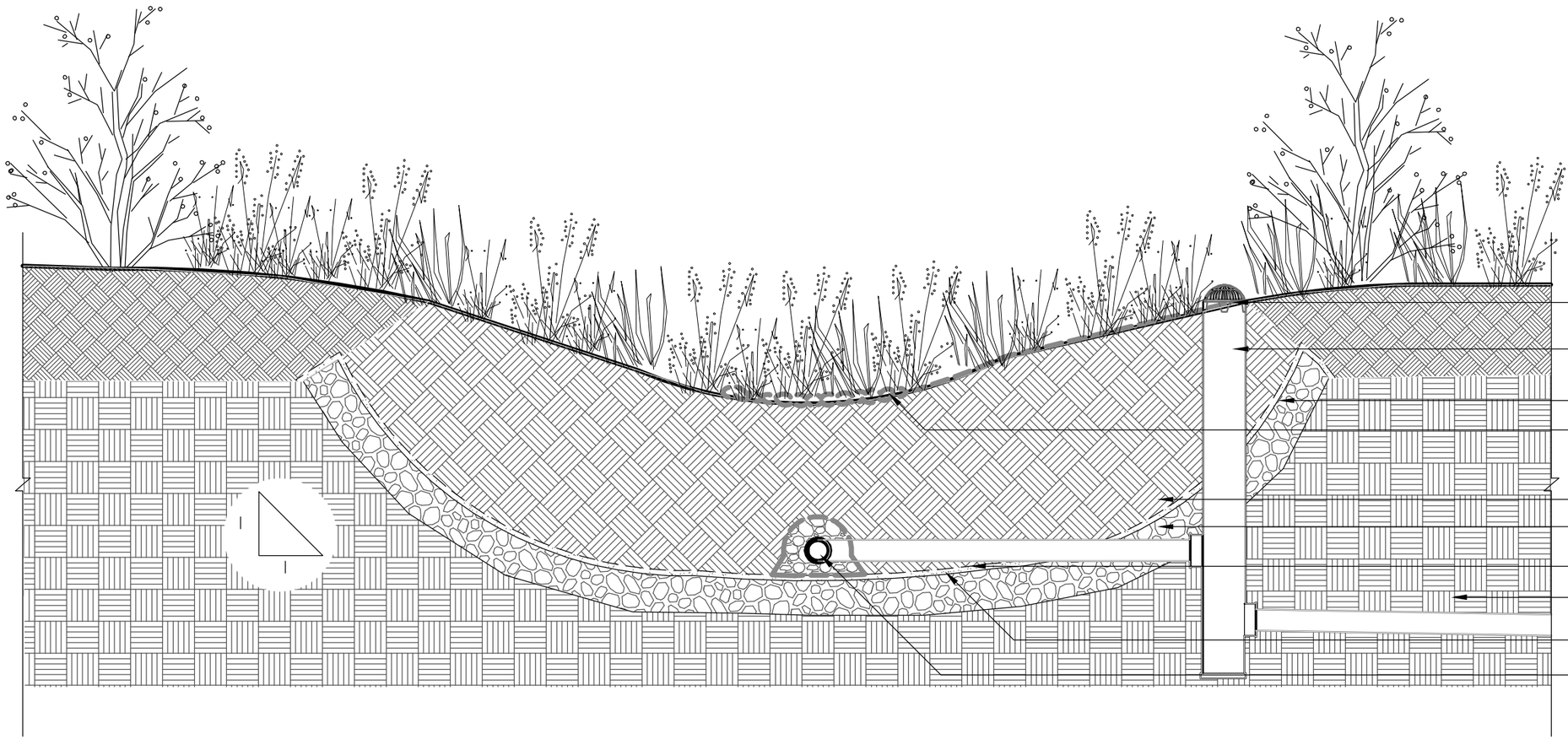
Not for Construction



Stone Swale

Not for Construction

Stormwater



LIGHT DUTY DOME W/ DOME STRAINER CAP. SEE CIVIL, (TYP.)

OUTFLOW PIPE TO WATER QUALITY FACILITY

EPDM LINER

JUTE EROSION CONTROL FABRIC, FROM OUTFALL TO LOW POINT OF RAIN GARDEN ALONG SWALE BOTTOM

INFILTRATION SOIL MIX

AGGREGATE BASE

PROTECTION FABRIC

EXISTING SUBGRADE

1" SAND SETTING BED

HDPE PERFORATED PIPE IN DRAINAGE AGGREGATE

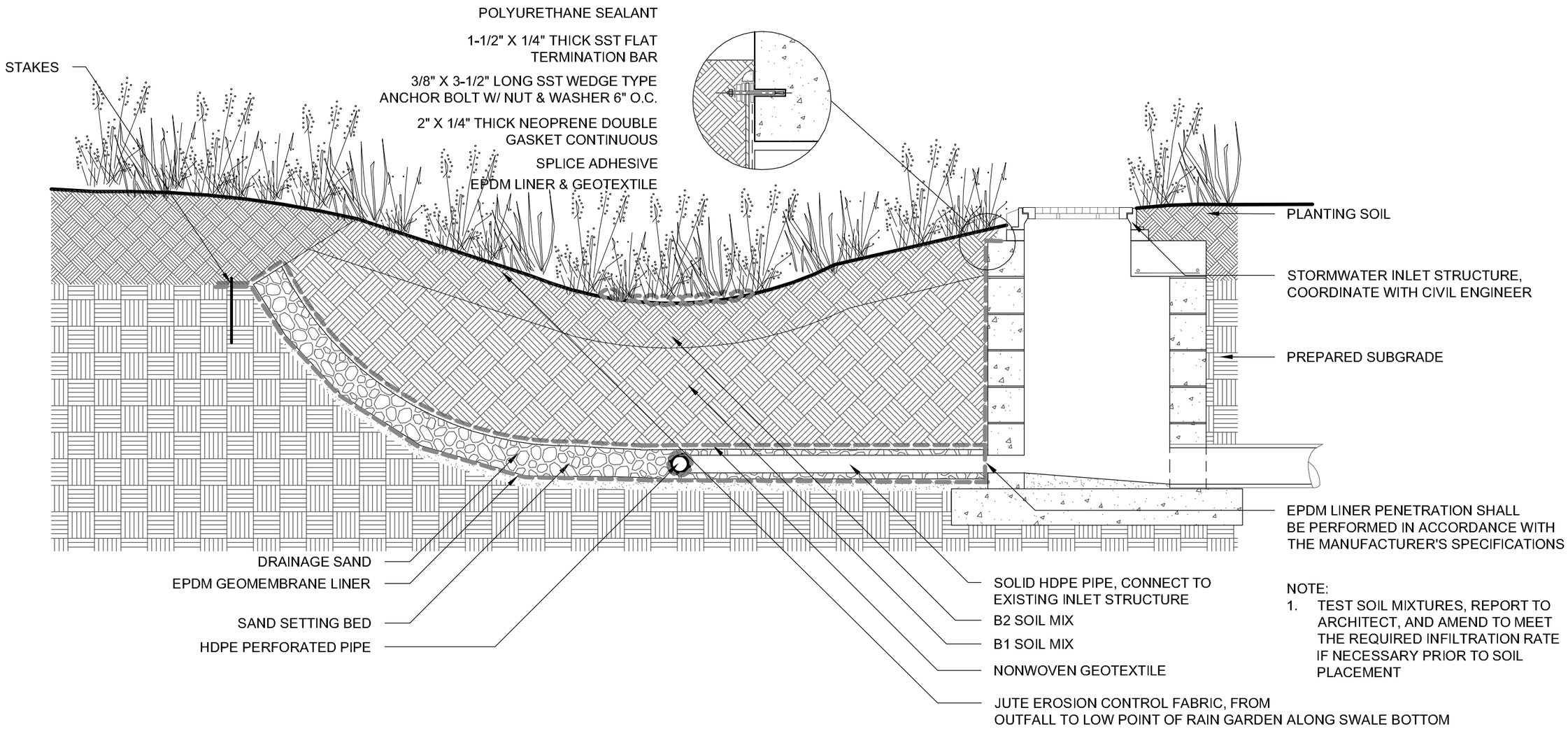
NOTE:
1. TEST SOIL MIXTURES, REPORT TO ARCHITECT, AND AMEND TO MEET THE REQUIRED INFILTRATION RATE IF NECESSARY PRIOR TO SOIL PLACEMENT

2. SEE C-SERIES DWGS. FOR PIPE, CONNECTIONS AND SIZING

Non-Curbed Rain Garden

Not for Construction

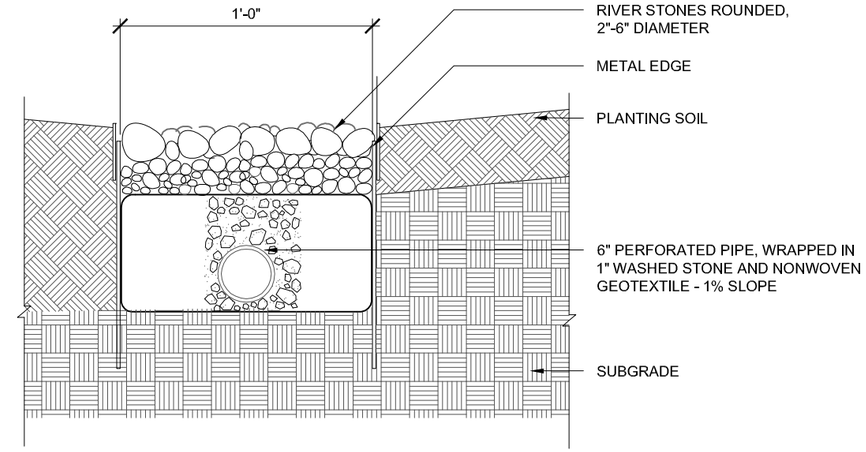
Stormwater



Rain Garden with Liner

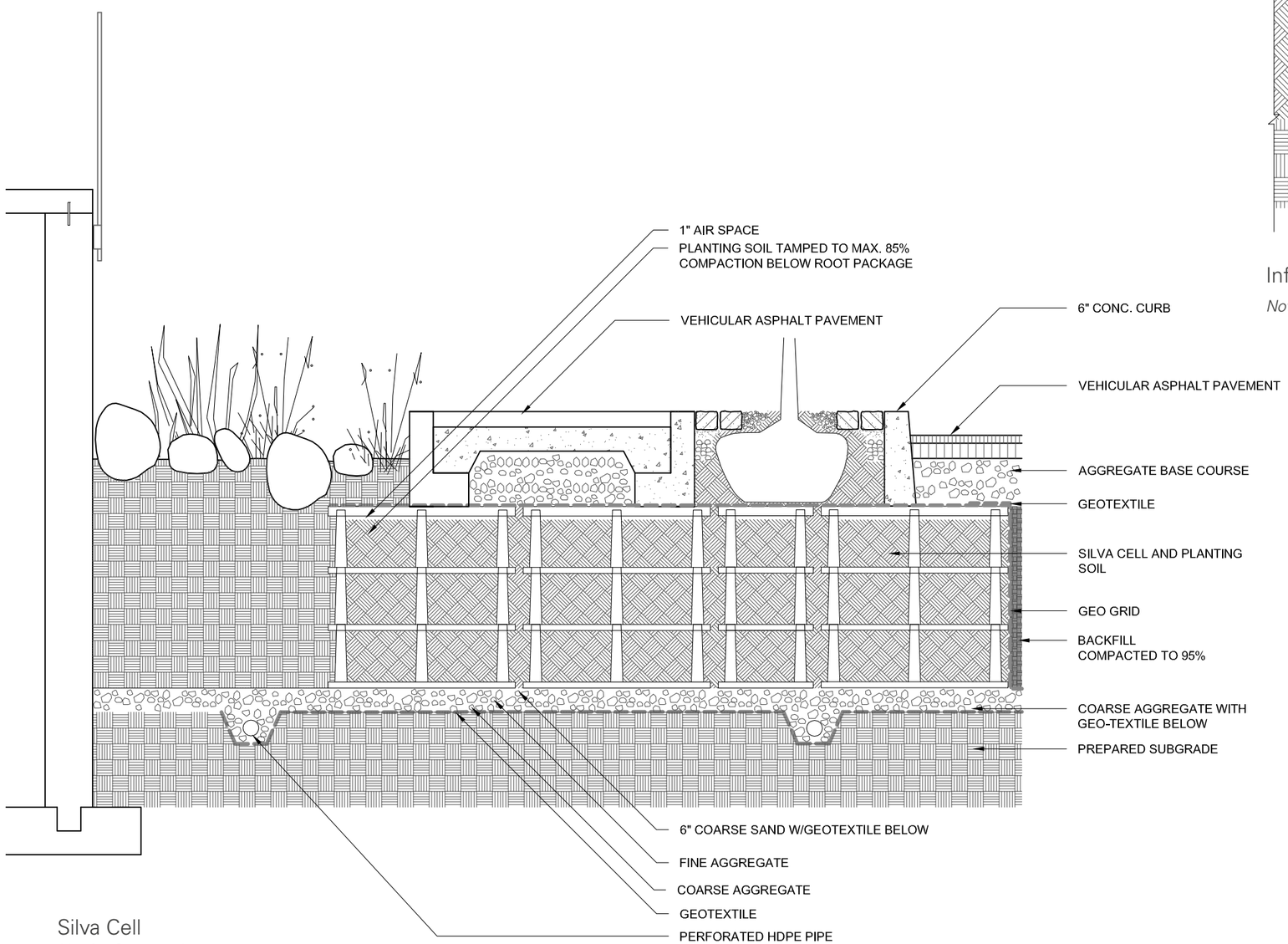
Not for Construction

Stormwater



Infiltration Trench

Not for Construction



Silva Cell

Not for Construction

Part III: Planting + Landscape Management Plan

Landscape Management

Proposed | Character Zones

Landscape Management

Purpose

The purpose of the Landscape Management Guidelines is to offer a framework for maintaining the aesthetic character and functionality of the proposed character zones. The intent of the guidelines is not to offer prescriptive direction for landscape management, but to offer a clear vision of what the agreed upon hopes and aspirations are for each character zone and an organizational framework for keeping records of management practices in each character zones. Essentially the goals are not to offer HOW, but WHAT, as the facilities staff are the experts of HOW.

The philosophy of this landscape management plan is derived from four sources. All four entities offer unique and varied experiences and approaches to landscape management and all were equally considered for inclusion in this document. These sources include:

- Dickinson College administration and the College's sustainability goals
- The knowledge and experiences of Dickinson College's staff
- Standards of practice and care of the professions of horticulture and landscape architecture
- The knowledge and experiences of Andropogon Associates

Finally, the management guidelines are organized to reflect the standards put forth through the Sustainable Sites Initiative (SITES), voluntary national guidelines and performance benchmarks for sustainable land design, construction and maintenance practice, formed by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center at The University of Texas at Austin and the United States Botanic Garden. The inclusion of the Sustainable Sites Initiative requirements and philosophy is two-fold-- the standards were created by the leaders in the horticulture and design professions and it streamlines the application process for any future Dickinson College landscape project that may wish to pursue the SITES certification.

The management plan offers the following sections:

- Management guidance
    - Plant stewardship
    - Organic materials management
    - Irrigation and water use
    - Recyclable materials
    - Maintenance equipment
    - Snow and ice
    - Sensitive site features
    - Adaptive management
    - Charazter zone specific considerations
- Record-keeping forms

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
PLANT STEWARDSHIP					
Plant maintenance **:**	Improving and maintaining overall plant health and vigor while maintaining the desired aesthetic for the noted landscape character.	Mulching Pruning Weeding Clean-up / Removal	Laborer with supervision	Mulching once a season with an organic non-dyed mulch. All exposed landscape beds should be mulched annually in spring. Mulch should be kept a minimum of 3" away from tree trunks. Pruning on all woody plant material should be done annually in late winter unless it is spring flowering and then it should be pruned shortly after flowering. Weeding weekly or bi-weekly as needed during the growing season. Herbaceous plant material should be cleaned up in late winter. The dormant plant material will provide wildlife value and aesthetic interest in the winter months.	manual methods for maintenance activities should be used to reduce fossil fuel usage Trees, shrubs and herbaceous materials should be maintained according to ANSI standards. Maintenance techniques will be more rigorous in the first 4 years of establishment to promote long term health. See tree pruning diagrams for additional details.
Plant health **:**	To ensure overall landscape health through the use of an Integrated Pest Management Program (IPM) that uses minimal to no synthetic products.	Monitoring Mechanical methods Biological methods Chemical methods	Certified Arborist State Extension Agent Trained Horticulturalist Laborer to the above noted professionals	Visual scouting inspections should be done weekly during the growing season to prevent infestations. Monitoring traps can be set for known pests to monitor infestation. Pests and diseases should be treated on a problem specific basis and in accordance with State guidelines when applicable. Treatment methods and timeline for treatment application will depend on the insect / disease life cycle and control method.	A log book should be kept in a central location to track all problems, treatment methods, and eradication results. Record keeping is a crucial component to a successful IPM program. All federal and state applicator qualifications should be adhered to for treatment applications.

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
PLANT STEWARDSHIP					
***Site safety*:**	The removal, maintenance, and monitoring of all landscaped areas to ensure proper visibility for site safety.	Pruning Removal	Trained Horticulturalist Laborer with supervision	Inspect and prune all vegetation along roadways and driveways in accordance with State Regulations at a minimum of two times during the growing season unless otherwise noted in State Regulations. Pruning should follow guidelines noted in plant maintenance section above. Regular inspections should be made with a representative from the Department of Public Safety and necessary actions completed as necessary.	Landscape plantings are designed to achieve multiple aesthetics, thus regular dialogs should be maintained between the College departments to ensure the best maintenance procedures that meet all user requirements.
***Plant replacement*:**	The usage of plant material appropriate and well adapted to the site environmental conditions to ensure plant health and longevity with minimal need for replacements in the landscape.	Vegetation Removal and Installation	Laborer with supervision	As needed during the spring and fall to avoid plant stress. Should installation be required during the season care should be taken to ensure water availability appropriate to the plant species.	See individual plant character zones for a list of plant material appropriate for that area.
Pest management	The use of a campus wide pest management protocol that eliminates the use of chemical and synthetic control methods with a focus instead on the use of monitoring and prevention methods to ensure aesthetic thresholds.	Mechanical methods Biological methods Cultural methods	Problem Appropriate Professional for monitoring and identification (horticulturalist, arborist, control specialist, etc.) Laborer with supervision for control task.	Utilize record keeping to determine when typical pests appear in the area and use control methods and timing appropriate to the species and control method. Hand pick and prune small infestations immediately upon identification. For multi-generational insect pests apply control methods early in the season. Weed landscape beds weekly or bi-weekly to remove alternate host material for pests. Use catch and release traps for larger pest species and preventative methods appropriate to the species.	Chemical or synthetic control measures should only be used as a last resort. If necessary all State and Product Safety regulations should be followed.

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
INVASIVE SPECIES MANAGEMENT					
Invasive Species List	Invasive plant species will most likely be a continual problem but can be controlled with non-chemical methods. Regular maintenance visits and informed personnel will prevent unwanted weeds and invasive plants. It is also anticipated that with correct soil biology the desired plants will outcompete any invasive intruders.	Mechanical methods Biological methods Cultural methods	Laborer with supervision	Landscapes should be monitored and treated as necessary on a weekly or bi-weekly basis with the regular maintenance scheduled weeding. Depending on methodology and plant phenology, treatment scheduling may vary and appropriate techniques should be utilized.	Department supervisors should monitor national and local government websites for invasive and noxious species alerts. A Federal list of Invasive Species can be found at the USDA website: http://plants.usda.gov/java/noxious A State list of Invasive Species can be found at the DCNR website: http://www.dcnr.state.pa.us/forestry/plants/invasiveplants/
Invasive Management Plan	The suppression of invasive and noxious plant species intrusion into the landscape through the use of preventative and non-chemical practices.	Monitoring Mechanical methods Biological methods Chemical methods	Laborer with supervision	Plants should be hand pulled when young and the root systems left to dry thoroughly before composting. Any plants with seeds must be disposed of and not composted. If weeds or invasive plants persist the plants can be treated with an organic control method. Invasive plant materials are separated from other organic material and properly disposed of in ways that are appropriate to the species.	It is imperative that invasive and problematic weeds be removed as soon as possible. All maintenance personnel should be instructed to know what the plants look like. At any site visit for any reason if invasive plants are seen it should be noted and if not pulled immediately must be communicated to the maintenance personnel so it can be treated at the next rotation visit.

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
ORGANIC MATERIALS MANAGEMENT					
Healthy plant material management	The recycling and re-use of all healthy plant material debris to add organic matter back to the landscape.	Use of mulching mowers. Regular collection of excess organic plant material during routine maintenance	Laborer	Turf areas should be mowed when it reaches 1/3 to 1/2 of the recommended height for the grass species. All clippings should be mulched in place with a mulching mower. Fallen leaves should be mulched back into the soil with use of a mulching mower as seasonally appropriate. Excess leaves and other healthy plant materials should be composted in a designated location.	It is recommended that all composting facilities be on site and by College staff. However if circumstances require an outside party to compost the plant debris that is then recycled for use on site, treatment methods and records certifying purity should be provided by the contractor to ensure clean compost.
Diseased plant disposal	The appropriate elimination of diseased plant material to prevent infestation.	Mechanical removal of diseased vegetation.	Laborer	Diseased plant material should be removed of immediately. All equipment used for removal should be sterilized with an organic sterilizer such as an alcohol based product. Diseased plant material should be collected in an area separate from healthy plant material and disposed of in a method appropriate to the species; example spores can sometimes be spread through burning and thus this would not be an appropriate disposal technique diseased plant material with such dispersal mechanisms was present.	

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
ORGANIC MATERIALS MANAGEMENT					
Soil amendments and fertilizers	Soil amendments and plant fertilizers should be used in a new or renovated landscape in order to build a healthy plant to soil structure. If there is a healthy, functioning system in place, additional amendments may not be necessary over time.	Compost applications Compost tea applications Soil testing Organic fertilizer applications	Certified Testing Facilities Laborer	All landscape beds should be tested upon installation, yearly for the first two years of establishment, and then every three years thereafter. Only materials approved by the Organic Materials Review Institute should be used.	Follow product specific application recommendations.
Use of fertilizers	see above	see above	Laborer	Amendment applications should occur after a regular irrigation cycle, or timed appropriate to weather if irrigation is not used. The soil should be moist prior to amendment applications to optimize plant uptake and prevent soil leaching.	Follow product specific application recommendations.

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
ORGANIC MATERIALS MANAGEMENT					
Erosion and compaction	An integration of maintenance best practices will be used to minimize soil erosion and compaction throughout the campus landscapes.	Compost tea applications Mechanical aeration Monitoring	Laborer	To aide in foot traffic compaction, compost tea applications should be made to the lawn areas after significant social gatherings. Lawns shall be aerated at a minimum every three years to prevent compaction. Manual methods should be utilized whenever possible to reduce the use of heavy machinery in the landscape. All maintenance should be reduced during wet weather to avoid compaction. Monthly monitoring and monitoring after sign cant rain events should occur within the first two years to identify and repair any areas prone to stormwater erosion. Stormwater control practices should be cleaned regularly to ensure proper drainage and prevent system overflows.	An additional dressing of organic compost or mulch can be applied in the fall to aide in soil health and prevent soil erosion over the winter months. Additional mulches should not be used if soil tests indicate nutrient levels to be too high. The total mulch volume in the bed should not exceed 3" in height, if additional winter mulches are to be used removal of old mulches may be necessary.

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
IRRIGATION AND WATER USE					
Irrigation	With proper planning and monitoring irrigation can be significantly reduced or eliminated in some areas.	Monitoring	Laborer Irrigation Specialist	Any systems in place should be shut down and blown out in the fall prior to freezing temperatures. Systems should be monitored monthly during the growing season to ensure proper functioning. Water turf areas a minimum of 1" per week during dry periods. Monitor soil sensors and/or tensiometers weekly to determine soil moisture capacity.	A good deal of money and time are lost due to the inefficient use of irrigation. Many plants can sustain themselves if properly established. Monitoring and understanding any irrigation system is key to its use and success in the healthy landscape.
STORMWATER MANAGEMENT FEATURES AND BMPS (includes water features)					
Storm water features and BMPs effectiveness :	All stormwater BMP's should be monitored and maintained according to local and state regulations.	Clean outs Monitoring	Laborer with supervision	Trench drains should be inspected after each significant rain event and debris removed from the system. Outlet structures should be checked monthly and cleared of debris. EPA guidelines can be found at http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=91	

Landscape Management

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
Water treatment :	The entire campus is part of a larger hydrologic system. To prevent negative impacts to the larger watershed all water features on site should be manually cleaned and only organic cleaning solutions used when necessary.	Clean outs Monitoring	Laborer with supervision	Decorative water features should be cleaned once season using OMRI approved cleaning solutions. Chlorine and bromine based products should not be used. All stormwater BMP's should be maintained regularly according to local and state regulations to ensure proper filtration. Sidewalks and other impervious surfaces should be swept regularly to prevent sediment build up and transport.	The use of good housekeeping methods and non-structural BMP's can improve site water quality. Resources include; http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=6 http://stormwaterpa.org/non-structural-bmps.html

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
MATERIALS MANAGEMENT					
Material replacement :	Replacement of any materials should be in-keeping with the aesthetic guidelines identified in the master plan.	Repair and / or replacement as necessary	Laborer with supervision	As needed.	All materials outlined in the master plan should be sourced from local vendors. All products outlined in the master plan have been selected for both their aesthetics and energy / environmental efficiency. Should alternative products be proposed only environmentally responsible products should be used such as, recycled content materials, certified wood, energy-efficient lightings, etc.
Functionality and extended use :	All hardscapes and other site amenities should be periodically surveyed for hazards and poor performance. Repairs and maintenance should be completed in a manor that reduces harm to human health and the environment.	Repair and / or replacement as necessary	Laborer with supervision	As needed. Skateboarding, bmx biking, and other recreational sports that can impact site furnishings should only be permitted in approved areas. Pavement stains should be removed with power washing. If a cleaning solution is necessary only OMRI certified products should be used. Only low-emitting adhesives, sealants, paints, and coatings should be used.	In addition to OMRI product guidelines additional guidelines are available from the US Green Building Council: http://www.usgbc.org/node/2639769

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
Disposal of harmful materials :	Harmful materials should be used as minimally as possible and alternatives used whenever plausible. Harmful materials can be detrimental to both human and environmental health both immediately and over time.	Any harmful materials used should be disposed of in a manner that meets OSHA regulations and complies with all manufactures MSDS instructions	Laborer with supervision	As needed.	Regulation and recommendations and harmful materials disposal can be obtained from local and state regulatory agencies. Additional guidelines can be found at the OSHA website; https://www.osha.gov/SLTC/hazardoustoxicsubstances/index.html
RECYCLABLE MATERIALS (at a minimum, for paper, glass, plastics, and metals)					
Recyclable materials :	The college should continue with its existing recycling program. All refuse is collected as either trash or recycling, which is single stream. Compostable materials are collected from the dining hall and recycled at the campus farm. As new environmental stewardship opportunities are identified they should be evaluated for use throughout the campus and incorporated where possible.	Monitoring and maintenance.	Laborer	Additional recyclable receptacles may be necessary during event times and dorm clean outs. Prior to renovations site elements should be evaluated for re-use and kept in a storage facility for future integration. Examples include: stone, benches, light posts, and bike racks.	

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
LANDSCAPE MAINTENANCE EQUIPMENT					
Equipment maintenance **:**	Using and maintaining landscape equipment in an efficient manner enhances the efficiency of equipment, thereby conserving energy and fuel and minimizing entire equipment replacements.	Monitoring and maintenance.	Laborer with supervision	Landscape maintenance activities should utilize manual methods primarily and supplemented with electrical machinery. Equipment that uses fossil fuels should only be used when there are no alternatives. Mowers and other landscape equipment should be serviced yearly and blades, belts, etc. should be replaced. Mower blades and other trimming equipment should be checked monthly and blades sharpened to maintain efficiency. Equipment used for invasive plant species removal should be washed thoroughly, including tires and human shoes. Any debris washed off should be collected and disposed of or treated on site to prevent germination.	
Site user experience **:**	Landscape maintenance activities can have adverse effects on the human enjoyment of a space. Noise and air pollution as well as other disturbances should be kept at a minimum during high use times.	General	Laborer with supervision	Each campus site utilized for relaxation and recreation should be monitored to determine high use times. The use of maintenance machinery should be restricted during those times. Low smoke oil should be used in all machines to reduce air pollution. Signage of maintenance activities should be posted on site and in nearby classroom buildings so users can schedule their activities accordingly.	
SNOW AND ICE					

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
Managing snow/ice (REQUIRED only for site receiving snow/ice): Describe the process (including stockpiling) for managing snow/ice in ways that limit degradation of water quality and surrounding plants and soil health. Also describe the process for stockpiling areas and managing any snow-melt that will be used as a water source on site.	To maintain safe campus roadways and pathways in a manner that reduces environmental impacts to water quality and the exposure of chemicals to humans and wildlife.	Application of traction substances and products to prevent ice. Plowing and stockpiling.	Laborer with supervision	Weather reports should be monitored and de-icing chemicals and other traction applications only applied when necessary. Sodium chloride and calcium chloride based products should not be used. Shoveling and plowing should occur prior to the use of de-icing chemicals to reduce the amount of chemical used. Snow stockpiling should occur in hardscape areas not used during winter months, such as a portion of sitting area. Snow should not be piled on vegetation. If possible snow should be stockpiled in an area that when it melts it will travel through a site BMP or be made available for re-use, such as draining to a system that connects to a cistern.	The EPA and other government organizations are continuously searching for the most environmentally appropriate de-icing compounds. Current accepted alternative include magnesium chloride based products, they are less toxic than sodium and calcium but are still a chloride based product. College officials should keep current on all studies and utilize the least toxic recommended products possible. http://water.epa.gov/scitech/wastetech/guide/airport/
SENSITIVE SITE FEATURES					
Protect habitat :	With appropriate plant species selection and maintenance wildlife habitat value can be increased throughout the campus.	Maintenance and monitoring	Wildlife specialist Laborer with supervision	During routine site maintenance care should be taken to identify and avoid any wildlife habitats. If the habitats are in a location that overtime may compromise human or animal health the wildlife should be moved humanely to an appropriate location. Vegetation should be left during winter months for wildlife shelter. Plant species should be selected and installed that promote wildlife interaction without harm to humans or wildlife.	

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
ADAPTIVE MANAGEMENT					
Update plan **:**	Keeping thorough maintenance records and reviewing them annually encourages efficient use of resources and best practice methods.				

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
CHARCTER ZONE SPECIFIC CONSIDERATIONS					
Athletic / Recreational :	Recreational turf areas may require additional aeration and compost tea applications to reduce soil compaction and promote healthy vegetation. Buffer plantings should be pruned minimally for optimal screening and wildlife habitat potential.				
Historic Arboretum :	Conflicts can arise between new technologies and the maintenance of historic structures and cultural landscapes. If significant conflicts occur, a feasibility study should be initiated to evaluate the most appropriate course of action. Any restoration products or plant material should be selected that is most environmentally appropriate.				
Special Garden or Plaza :	To maintain the character of the special garden or plaza additional maintenance may be necessary.				
Borough or Residential :	Buffer plantings should be pruned minimally for optimal screening and wildlife habitat potential.				
Streetscape / Green Corridor :	Additional pruning of vegetation may be necessary in areas of power lines and other overhead structures. All stormwater BMP's should adhere to State and Local maintenance regulations to ensure efficiency.				
Building Threshold :	Additional pruning and plant maintenance may be necessary along building thresholds.				

General Maintenance Plan Topics	10-year desired outcome from maintenance practices	Required actions to achieve 10 year desired outcome			
		Specific activities	Skill level required	Timeline/ Schedule	Other details
Green Roofs :	Green roofs not only aide in stormwater management but also can help with building heating and cooling efficiency. Extensive roof systems work well for building renovations and Intensive systems are best integrated into new construction. Maintenance regimes will vary depending on system type and all State and Local regulations should be adhered to ensure efficiency.				
Rain Gardens :	Rain gardens are one of the most cost effective stormwater BMPs and should be incorporated whenever possible into site renovations. Maintenance should be completed in accordance with all State and Local regulations to ensure efficiency.				
Service Landscape :	The service landcsape's main purpose is utilitarian-- it is a landscape whose purpose is to service buildings and provide buffers between adjacent land uses. The landscape should be desinged to withstand abuse (high foot traffic and large machinery), be low cost and low maintenance. Futrthermore,				

Appendices

LEED Guidelines

LEED Campus

Table 1. AGMBC Applicability for Credits and Prerequisites in LEED 2009 Design & Construction Rating Systems

APPLICABLE RATING SYSTEM									ELIGIBILITY	
LEED FOR NEW CONSTRUCTION	LEED FOR SCHOOLS	LEED FOR CORE AND SHELL	LEED FOR COMMERCIAL INTERIORS	LEED FOR HEALTHCARE	LEED FOR RETAIL: NEW CONSTRUCTION	LEED FOR RETAIL; COMMERCIAL INTERIORS	CREDIT	CREDIT NAME	CAMPUS CREDIT	GROUP CREDIT
SUSTAINABLE SITES										
							SSp1	Construction Activity Pollution Prevention		G
							SSp2	Environmental Site Assessment		G
							SSc1†	Site selection	C	G
							SSc2†	Development Density and Community Connectivity	C	G
							SSc3†	Brownfield Redevelopment	C	G
			SSc3.1		SSc4	SSc3	SSc4.1†	Alternative Transportation- Public Transportation Access	C	
			SSc3.2		SSc4	SSc3	SSc4.2	Alternative Transportation- Bicycle Storage and Changing Rooms	C	G
					SSc4	SSc3	SSc4.3	Alternative Transportation- LEV & FE vehicles	C	G
			SSc3.3		SSc4	SSc3	SSc4.4	Alternative Transportation- Parking Capacity	C	G
							SSc5.1†	Site Development- Protect or Restore Habitat	C	G
							SSc5.2	Site Development- Maximize Open Space	C	G
							SSc6.1	Storm water Design- Quantity Control	C	G
							SSc6.2	Stormwater Design- Quality Control	C	G
							SSc7.1	Heat Island Effect- Nonroof	C	G
							SSc7.2	Heat Island Effect- Roof		G
							SSc8†	Light Pollution Reduction	C	G
							SSc9	Tenant Design and Construction Guidelines		G
							SSc9	Site Master Plan	C	G
							SSc9.1	Connection to the Natural World- Places of Respite		G
							SSc9.2	Connection to the Natural World- Direct Exterior Access for Patients		G
							SSc10	Joint Use of Facilities		G
WATER EFFICIENCY										
							WEp1	Water Use Reduction		
							WEp2	Minimize Potable Water Use for Medical Equipment Cooling		
							WEc1	Water-Efficient Landscaping	C	G
							WEc2	Innovative Wastewater Technologies		G
							WEc2	Water Use Reduction - Measurement and Verification		
			WEc1			WEc1	WEc3	Water Use Reduction		G
							WEc4	Process Water Use Reduction		G
							WEc4.1	Water Use Reduction- Building Equipment		G
							WEc4.2†	Water Use Reduction - Cooling Towers	C	G
							Wec4.3†	Water Use Reduction - Food Waste Systems		G
ENERGY AND ATMOSPHERE										
							EAp1†	Fundamental Commissioning of Building Energy Systems		G
							EAp2	Minimum Energy Performance		G
							EAp3†	Fundamental Refrigerant Management	C	
							EAc1†	Optimize Energy Performance		G
							EAc1.1	Optimize Energy Performance- Lighting Power		
							EAc1.2	Optimize Energy Performance- Lighting Controls		
							EAc1.3†	Optimize Energy Performance- HVAC		G
							EAc1.4	Optimize Energy Performance- Equipment and Appliances		
							EAc1.5	Optimize Energy Performance- Building Envelope		
						EAc5	EAc2†	On Site Renewable Energy	C	G
				EAc2		EAc2	EAc3	Enhanced Commissioning		
							EAc4†	Enhanced Refrigerant Management	C	G
				EAc3		EAc3	EAc5	Measurement and Verification		G
							EAc5.1	Measurement and Verification- Base Building		G
							EAc5.2	Measurement and Verification- Tenant Submetering		G
				EAc4		EAc4	EAc6	Green Power	C	G
							EAc7†	Community Contaminant Prevention - Airborne Releases	C	
MATERIALS AND RESOURCES										
							MRp1	Storage and Collection of Recyclables	C	G
							MRp2	PBT Source Reduction- Mercury		G
							MRc1.1	Tenant Space - Long-Term Commitment		
		MRc1					MRc1.1	Building Reuse- Maintain Existing Walls, Floors, and Roof		G
							MRc1.2	Building Reuse- Maintain Interior Nonstructural Elements		G
							MRc2*	Construction Waste Management	C	G
							MRc3	Sustainably Sourced Materials and Products		G
				MRc3.1		MRc3.1	MRc3	Materials Reuse		G
							MRc3.2	Materials Reuse: Furniture and Furnishings		G
							MRc4	Recycled Content		G
							MRc4.1*	PBT Source Reduction- Mercury in Lamps	C	G
							MRc4.2	PBT Source Reduction- Lead, Cadmium and Copper		
							MRc5	Regional Materials		G
							MRc5	Furniture and Medical Furnishings		G
							MRc6	Rapidly Renewable Materials		G
							MRc6	Resource Use- Design for Flexibility		
		MRc6					MRc7	Certified Wood		G
INDOOR ENVIRONMENTAL QUALITY										
							IEQp1	Minimum Indoor Air Quality Performance		
							IEQp2†	Environmental Tobacco Smoke (ETS Control)	C	G
							IEQp3	Minimum Acoustical Performance		
							IEQp3	Hazardous Material Removal or Encapsulation (Renovations only)		
							IEQc1	Outdoor Air Delivery Monitoring		
							IEQc2	Increased Ventilation		
							IEQc2	Acoustic Environment		
		IEQc3					IEQc3.1	Construction Indoor Air Quality Management Plan - During Construction		G

LEED Guidelines

LEED Campus

							IEQc3.2	Construction Indoor Air Quality Management Plan- Before Occupancy		
							IEQc4*	Low-Emitting Materials	C	G
							IEQc4.1*	Low-Emitting Materials- Adhesives and Sealants	C	G
							IEQc4.2*	Low-Emitting Materials- Paints and Coatings	C	G
							IEQc4.3*	Low-Emitting Materials- Flooring Systems	C	G
							IEQc4.4*	Low-Emitting Materials- Composite Wood and Agrifiber Products	C	G
							IEQc4.5*	Low-Emitting Materials- Furniture and Furnishings	C	G
							IEQc4.5*	Low-Emitting Materials- System Furniture and Seating	C	G
							IEQc4.6	Low-Emitting Materials- Ceiling and Wall Systems		G
							IEQc5†	Indoor Chemical and Pollutant Source Control		G
					IEQc6	IEQc6	IEQc6.1	Controllability of Systems- Lighting		
		IEQc6			IEQc6	IEQc6	IEQc6.2	Controllability of Systems- Thermal Comfort		
		IEQc7		IEQc7			IEQc7.1	Thermal Comfort- Design		G
				IEQc7			IEQc7.2	Thermal Comfort- Verification		
							IEQc7.2	Thermal Comfort- Employee Verification		
							IEQc8.1	Daylight and Views- Daylight		
							IEQc8.2	Daylight and Views- Views		
							IEQc9	Enhanced Acoustical Performance		
							IEQc10	Mold Prevention		
INNOVATION AND DESIGN										
							IDp1	Integrated Project Planning and Design		G
							IDc1†	Innovation in Design	C	G
							IDc2	LEED Accredited Professional		G
							IDc3	The School as a Teaching Tool		G
							IDc3	Integrated Project Planning and Design		G
REGIONAL PRIORITY										
							RPc1†	Regional Priority	C	G

† Not eligible as campus or group credit for all compliance options. Please refer to application guidance for details.

* Only available as a campus credit for projects built/renovated simultaneously under the same construction contract.

Planting

Service Landscape | Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Street Tree Approved	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST													
Aesculus spp.	native species include: flava and parviflora	very showy white blooms be aware the red flowering species is a non-native cross and should not be used; can tolerate water edges; moderate salt tolerance	sun to part sun	50-75'														6.8 - 7.2
Alnus incana ssp. Rugosa	speckled alder	FACW; no salt tolerace; bogs and swamps; white flower in spring	Sun	20-30'														4.8 - 7.7
Carya spp.	species include: ovata, laciniosa, cordiformis, glabra, tomentosa	several native species of this plant exist however they are difficult to obtain commerically as they are difficlut to propogate; yellow orange fall color; nuts are edible	sun to part sun	50-75'														6.4 - 7.5
Celtis occidentalis	hackberry	good in windy areas and is resistant to dutch elm disease, may be suseptable to withces broom; FACU; edible fruit	sun to part sun	40-60'							purple berries							6 - 7.8
Liriodendron tulipifera	tulip poplar	fast growing tree with straigh upright habit; unique flowers in spring and seed pods in fall; FACU; no salt tolerance	sun part sun	85'+														4.5 - 7.5
Ostrya virginiana	hop-hornbeam	native understory tree; can tolerate varying conditions of clay, drought, salt, smooth grey bark is slightly attractive; trunk can grow askew	part sun to shade	25-40'													X	4.2 - 7.6
Robinia pseudoacacia	Black Locust	FACU; low salt tolerance but does well in poor soil sites; spreads from root sprouts and masses in floodplains, thickets, and reclamation sites; large white flowers and yellow fall color	sun	30-70'														4.6 - 8.2
Tilia americana	American basswood	fragrant white blooms; bees attracted to blooms; large stately tree with heart shaped leaves and good canopy; moderate soil conditions; not salt tolerant	sun to part sun	50-70'														4.5 - 7.5

Planting

Service Landscape Evergreen | Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**													
Juniperus virginiana	Eastern red cedar	readily colonises abandoned fields, can handle variable conditions; FACU	Sun	30-50'											blue berries		4.7-7.8
Thuja occidentalis	eastern arborvitae	a convient evergreen for small areas however there are multiple cultivars that have been crossed with non-native species and it can be difficult to purchase a true species	Sun	30-75'													6.8 - 7.2

Service Landscape | Vines

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					**SEASONAL INTEREST**											
Aristolochia macrophylla	Pipevine	vigerous vine with large unique flowers	Sun to Pt. Shade	30' +												
Campsis radicans 'Flava'	Trumpet Vine	orange tubular flowers in summer; strong woody vine, it will need a strong support	Sun	30' +												
Decumaria barbara	Woodvamp	native to southern states, not PA but is found in DE and NY; in warmer climates it is evergreen	Pt. Shade	20' +												
Lonicera sempervirens	Coral Honeysuckle	tubular flowers late spring/ ealry summer; good hummingird attractant	Sun to Pt. Shade	20' +												
Parthenocissus quinquefolia	Virginia Creeper	striking fall color in sunnier locations; can handle shade	Sun to Pt. Shade	30-50' +												

Planting

Service Landscape | Seed

Botanical Name	Common Name			min. size at planting	Light
Turf Seed- Pennington Summer Stress Mix	90% Tall Fescue, 10% Kentucky Bluegrass			5 lb/1000 sq. ft.	sun part sun
No-Mow Seed Mix- Prarie Nursery For no-mow turf appearance	Red Fescue, Sheep Fescue			5 lb/1000 sq. ft.	sun part sun
Native Detention Area Mix- ERNMX-183 For Areas where mowing is not anticipated				0.50 lb/ 1000 sq.ft.	sun
Woodland Mix- ERNMX-140 Partially Shaded Area Roadside Mix	25% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype) 5% Autumn Bentgrass, PA Ecotype (Agrostis perennans, PA Ecotype)	47% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga') 2% Ticklegrass (Rough Bentgrass), PA Ecotype (Agrostis scabra, PA Ecotype)	20% Fox Sedge, PA Ecotype (Carex vulpinoidea, PA Ecotype) 1% Path Rush, PA Ecotype (Juncus tenuis, PA Ecotype)	0.50 lb/ 1000 sq.ft.	part shade
	25% Little Bluestem, 'Camper' (Schizachyrium scoparium, 'Camper')	20% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype)	18% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga')		
	5% Partridge Pea, PA Ecotype (Chamaecrista fasciculata (Cassia f.), PA Ecotype)	4% Blackeyed Susan (Rudbeckia hirta)	3% Zigzag Aster, PA Ecotype (Aster prenanthoides (Symphyotrichum p.), PA Ecotype)		
	3% Tall White Beardtongue (Penstemon digitalis)	3% Purple Coneflower (Echinacea purpurea)	3% Marsh (Dense) Blazing Star (Spiked Gayfeather), PA Ecotype (Liatris spicata, PA Ecotype)		
	3% Golden Alexanders, PA Ecotype (Zizia aurea, PA Ecotype)	2% Ohio Spiderwort, PA Ecotype (Tradescantia ohiensis, PA Ecotype)	2% Thimbleweed, PA Ecotype (Anemone virginiana, PA Ecotype)		
	2% Autumn Bentgrass, Albany Pine Bush-NY Ecotype (Agrostis perennans, Albany Pine Bush-NY Ecotype)	2% Mistflower, VA Ecotype (Eupatorium coelestinum (Conoclinium c.), VA Ecotype)	1% Oxeye Sunflower, PA Ecotype (Heliopsis helianthoides, PA Ecotype)		
	1% Wild Bergamot, PA Ecotype (Monarda fistulosa, PA Ecotype)	1% Blue False Indigo, Southern WV Ecotype (Baptisia australis, Southern WV Ecotype)	1% Slender Lespedeza, VA Ecotype (Lespedeza virginica, VA Ecotype)		
	1% White (Silver Rod) Goldenrod, PA Ecotype (Solidago bicolor, PA Ecotype)				

Planting

Service Landscape | Shrubs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST											
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms						
Cornus racemosa	gray dogwood	rhizomateous shrub found natively in thickets	sun to shade	10-15'							white flowers					
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'										bright red stems in winter		
Diervilla sessilifolia	bush honeysuckle	PA is on its northernmost border; a tough plant that will naturalize if not maintained; suckering habit	sun	3-5'						yellow tubular flowers						
Gaylussacia brachycera	Black Huckleberry	found in moist sandy soils; dense groundcover / shrub; difficult to obtain commerically	part sun	1-2'					white or pink flowers turn to black berries in fall							
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter											
Lindera benzoin	Spicebush	deer tolerant species found in woodlands; FACW	sun to part sun	6-12'												
Rhus copallinum	winged sumac	naturalizing habit; intresting "winged" bark	sun to part sun	15-20'												
Salix sericea	silky willow	OBL; no salt tolerance; good for stream bank stabilization	sun	4-12'												
Sambucus canadensis	Common Elderberry	FACW; fast growing shrub with moderate salt tolerance; varying cultivars availible	sun	6-8'					white flowers							
Vaccinium angustifolium	Lowbush Blueberry	FACU; edible fruit; can be difficult to establish; strong fall color	sun	1-2'				small pale pink flowers					bright fall color			
Vaccinium corymbosum	highbush blueberry	FACW; native environments are acidic; edible fruits; strong fall color	sun to part sun					small pale pink flowers					bright fall color			
Viburnum acerifolium	Mapleleaf Viburnum	UPL found with Lindera and Hammamelis; widely used commercial native plant; pretty foliage, good fall color and bright blue berries	sun to shade	4-6'												
Viburnum dentatum	arrow wood viburnum	FAC; good fall color and bright blue berries; several culitvars avaible commercially	sun to part sun	10-12'												

Planting

Service Landscape | Small Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Street Tree Approved	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST													
Amelanchier arborea	shadbush	multi stem large shrub apperance; single stem availible; very popular landscape plant with seasonal intrest and edible fruit	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color					5.5-7.5
Asimina triloba	paw paw	slow growing tree with edible fruit	sun to part sun	15-40'			maroon flowers											5.2-7.2
Carpinus caroliniana	American hornbeam	plant has several common names; FAC; low drought tolerance and no salt tolerance; good fall color; trunks are often crooked a bit	Sun to Pt. Sun	20-40'									red purple fall foliage		grey bark		X	4.0-7.2
Celtis occidentalis	hackberry	tolerant of dry and windy conditions; unique bark; FACU; tree can look narled in time	Sun	25-50'									fall berries good wildlife food source					6-7.8

Planting

Service Landscape | Herbs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Allium cernuum	Nodding Onion	drought tolerant; white to light pink globe flowers	sun to part sun	1-3'												
Anemone candensis	anemone	sometimes called Canda anemone it is native to PA; fast growing ground cover	sun to part sun	1-1.5'												
Aquelgia canadensis	Wild Columbine	no cultivars; FAC; one of the first flowers to bloom in the spring; leafminers usually present on leafs	part shade	12-18"												
Asclepias incarnata	Swamp Milkweed	OBL		3-5'												
Asclepias verticillata	Whorled milkweed	very drought tolerant; good for difficult locations	sun	1-3'												
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'												
Aster divaricatus (Eurybia divaricata)	White Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2'												
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'												
Baptisia australis	Indigo	blue flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Baptisia tinctoria	Yellow Wild Indigo	yellow flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'												
Carex amphibola	Creek Sedge	a great native alternative to liriope, good clumping habit with wider distinctive blade than most carex sp.	sun to part sun	12"												
Carex eburnea	Bristleleaf Sedge	soft thread like foliage; small habit; good naturalizer	part sun	6-8"												
Carex pensylvanica	Pennsylvania sedge	native forest ground speceis, commonly found under oaks	shade	8-10"												
Carex sticta	Tussock Sedge	emergent aquatic plant found in wetlands; OBL; forms clumps with growth; no salt tolerance; spreads by rhizomes	sun to part sun	3'												
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'												
Cimicifuga racemosa	black snakeroot	large white flowers; best planted at the edge of a woodland for light shade	part sun to part shade	4-7'												
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'												
Dennstaedtia punctilobula	hay-scented fern	native woodland habit, moist to average soils; vigorous spreader and makes a good shaded groundcover; orange fall color to fronds;	shade	15-24"												
Deschampsia flexuosa	Wavy Hairgrass	good alternative to C.pennsylvanica in dry areas; semi-evergreen; tidy clumping habit	shade	6-18"												

Planting

Service Landscape | Herbs

Dryopteris marginalis	eastern wood fern	clumping fern; evergreen fern preferring shady edge conditions	shade	12-18"
Echinacea purpurea	purple coneflower	showy pink flowers in summer; unique seed heads in fall	sun to part sun	18-24"
Eupatorium purpurea	joe pye weed	many cultivars availible; native to open fields and woods; can tolerate varying conditions	sun part sun	2-6'
Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"
Helianthus divaricatus	woodland sunflower	hardy perrennial plant adaptable to varying conditions	sun to part sun	3-5'
Heuchera americana	American alumroot	semi evergreen foliage; drought tolerant; foliage remains low; good ground cover	shade	1-2'
Iris cristata	Dwarf Crested Iris	found along edges; do not bury rhizomes; white to blue flowers	part shade	4-16"
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'
Juncus effusus	soft rush	FACW; low salt tolerance; clump forming grass with strong upright habit; brown seed heads in late summer stand out against foliage	sun	4'
Liatris spicata	blazing star	adaptable to varying conditions; purple flower spikes in summer; feathery foliage and upright habit adds texture to the landscape	sun	24-36"
Lilium superbum	turk's cap lily	FACW; large flowers on tall upright stems; good hummingbird attractant; best to interplant with other perennials as flower heads can get heavy and weigh foliage down	sun	4-6'
Mertensia virginica	virginia blue bells	spring ephemeral with bright blue flowers; very attractive in massing; prefers moderately moist woodland locations; companion plant to provide seasonal interest	part sun	1-2'
Monarda didyma	beebalm	great plant for butterflies and hummingbirds; can tolerate varying conditions; reseeds regularly; bright red flowers in summer	su n	2'
Monarda fistulosa	Wild Bergamot	pale pink - lilac flowers in late summer; self seeds and tolerate varying conditions	sun	1-3'
Oenothera fruticosa	Sundrops	drought tolerant low growing plant; yellow flowers in early summer; tough plant for hot dry sites	sun	15-18"
Osmunda cinnamomea	cinnamon fern	clump forming fern;; native to moist woodland conditions; looks nice in an ornamental border; cinnamon color spikes in fall	shade to part shade	3-5'
Panicum clandestinum	Deer-tongue Grass	meadow grass; unique thick foliage; tolerates poor conditions	sun	2'
Panicum virgatum 'Shenandoah'	Red Switchgrass	tall clump forming native grass tolerant of varying conditions; used ornamentally for its strong fall color and structure in winter; FAC	sun	3-4'

Planting

Service Landscape | Herbs

Penstemon hirsutus	Hairy Beardtongue	dry fields and roadsides; drought tolerant; nice perennial border plant; lavender flowers in late May to early July	sun to part shade	16-24''													
Phlox stolonifera	Creeping Phlox	creeping evergreen groundcover with white or pinkish blue blooms in spring; moist soils	part shade to shade	8-10"													
Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6''													
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'													
Pteridium aquilinum	Braken Fern	FACU; found throughout most of the US; naturalizes along woodland edges and ditches; rhizomatous root growth creates natural massing effect	part sun to part shade	3-6'													
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"													
Schizachyrium scoparium	Little Bluestem	FACU; drought tolerant grass for poor soil areas; good in massing; native to early successional meadows	sun	2-4'													
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'													
Silene virginica	fire pink	red flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	12-18''													
Solidago bicolor	Silver-rod	silvery-white flowers in late summer; grows best in infertile soils; dry; wooded edges or road sides	part sun	1-3'													
Solidago nemoralis	Gray Goldenrod	yellow flowers in late summer; grows best in infertile soils; rhizomatous habit forms massings	sun	1-2'													
Sorghastrum nutans	Indian Grass	UPL; tolerant of varying conditions	sun	3-8'													
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'													
Tiarella cordifolia	foamflower	white flowers in spring; good groundcover; native to decidious woodlands; average to moist soils															
Verbena hastata	blue vervain	native to most of the eastern US; found in wet meadows; tall thin spikes of violet flowers; not salt tolerant	sun	4-6'													
Vernonia noveboracensis	New York ironweed	FAC; purple flowers in Aug; bright showy flowers in late season; good for wet meadow; not salt tolerant	sun to part sun	4-6'													
Viola pedata	Birdfoot Violet	tight spacing; feathery foliage; attractive purple flower in spring; may drop foliage in heavy sun; moist to average garden soil	part sun to part shade	4-10"													
Viola spp.		pansy-like miniture plant; used in dry meadows for spring color; reseeds	sun	6-10"													
Zizia aurea	Golden Alexanders	FAC; moist meadows and floodplains; great plant for wildlife	sun to part shade	1-3'													

Planting

Athletic - Recreational Landscape | Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Street Tree Approved	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**													
Carya spp.	species include: ovata, laciniosa, cordiformis, glabra, tomentosa	several native species of this plant exist however they are difficult to obtain commerically as they are difficlut to propogate; yellow orange fall color; nuts are edible	sun to part sun	50-75'														6.4-7.5
Cladrastis kentuckea	Yellowwood	nice park - campus tree; white showy flowers; low maintenance; yellow fall foliage	sun	30-50'													**X**	adaptable
Fraxinus americanus	white ash	showy white / purple flowers in spring and great fall color of reds, yellows, and purples; moderate drought tolerant; not good in windy areas; problems with emerald ash borer	sun	60-80'														5.0-7.5
Gleditsia triacanthos	Shademaster Honey Locust	poplar urban tree as its small leaves allow for filtered light underneath and grass grows easily; tolerant of varying conditions; some species have thorns; fruit can be considered a nuisance; yellow fall color; web worms can be a problem	sun to part sun	60-80'													**X**	adaptable
Liriodendron tulipifera	tulip poplar	fast growing tree with straigh upright habit; unique flowers in spring and seed pods in fall; FACU; no salt tolerance	sun part sun	85'+														4.5-7.5
Ostrya virginiana	hop-hornbeam	native understory tree; can tolerate varying conditions of clay, drought, salt, smooth grey bark is slightly attractive; trunk can grow askew	part sun to shade	25-40'													**X**	4.2-7.6
Quercus ilicifolia	Bear Oak	found on sandy, dry, and rocky areas; native to fire prone systems; askew trunk; forms a nice large shrub shape with single trunk; no fall color	Sun	3-12'														4.0-7.5
Quercus shumardii	Shumard Oak	UPL; drought tolerant and thrives in basic soils; red oak family and has various fall color	Sun	75' +													**X**	4.0-7.5

Planting

Athletic - Recreational Landscape | Evergreen Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
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Juniperus virginiana	Eastern red cedar	readily colonises abandoned fields, can handle variable conditions; FACU	Sun	30-50'											blue berries		4.7-7.8
Thuja occidentalis	eastern arborvitae	a convient evergreen for small areas however there are multiple cultivars that have been crossed with non-native species and it can be difficult to purchase a true species	Sun	30-75'													6.8-7.2

Athletic - Recreational Landscape | Vines

General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Botanical Name	**Common Name**	**Comments**	**Light**	**Average height at maturity**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Aristolochia macrophylla	Pipevine	vigerous vine with large unique flowers	Sun to Pt. Shade	30' +												
Campsis radicans 'Flava'	Trumpet Vine	orange tubular flowers in summer; strong woody vine, it will need a strong support	Sun	30' +												
Decumaria barbara	Woodvamp	native to southern states, not PA but is found in DE and NY; in warmer climates it is evergreen	Pt. Shade	20' +												
Lonicera sempervirens	Coral Honeysuckle	tubular flowers late spring/ ealry summer; good hummingird attractant	Sun to Pt. Shade	20' +												
Parthenocissus quinquefolia	Virginia Creeper	striking fall color in sunnier locations; can handle shade	Sun to Pt. Shade	30-50' +												

Planting

Athletic - Recreational Landscape | Small Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Street Tree Approved	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**													
Amelanchier arborea	shadbush	multi stem large shrub apperance; single stem availible; very popular landscape plant with seasonal intrest and edible fruit	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color					5.5-7.5
Carpinus caroliniana	American hornbeam	plant has several common names; FAC; low drought tolerance and no salt tolerance; good fall color; trunks are often crooked a bit	Sun to Pt. Sun	20-40'									red purple fall foliage		grey bark		**X**	4.0-7.2
Cercis canadensis	eastern redbud	single and multi stems availibe; good commerical plant with many cultivars with varying sesonal attributes; FACU	Sun to Pt. Sun	20-30'			flowers / berries in spring; white and pink cultivars		cultivars can have green, golden, or purple foliage					yellow fall color			**X**	>7.5

Planting

Athletic - Recreational Landscape | Shrubs

Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'	fragrant while blooms
Cornus racemosa	gray dogwood	rhizomateous shrub found natively in thickets	sun to shade	10-15'	white flowers
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'	bright red stems in winter
Corylus cornuta	beaked hazelnut	wide native range shrub in North America; females produce nuts for wildlife; thicket or border plant	sun to part sun	4-8'	
Diervilla sessilifolia	bush honeysuckle	PA is on its northernmost border; a tough plant that will naturalize if not maintained; suckering habit	sun	3-5'	yellow tubular flowers
Fothergilla gardenii	fothergilla	PA is on its northernmost border; low manintenance; spreads by suckers	sun	3-6'	bright shades of orange, yellow and red fall foliage
Hypericum kalmianum	St. John's Wort		sun to part sun	3'	yellow flowers
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter
Lindera benzoin	Spicebush	deer tolerant species found in woodlands; FACW	sun to part sun	6-12'	
Rhus aromatica	fragrant sumac	spreading / naturalizing habit; dwarf culticars availible	sun to part sun	2-6'	bright fall color; red berries in winter
Rhus copallinum	winged sumac	naturalizing habit; intresting "winged" bark	sun to part sun	15-20'	
Rosa carolina	Carolina Rose	also known as pasture rose this shrub is well suited for dry conditions	sun to part sun	1-3'	
Salix sericea	silky willow	OBL; no salt tolerance; good for stream bank stabilization	sun	4-12'	
Sambucus canadensis	Common Elderberry	FACW; fast growing shrub with moderate salt tolerance; varying cultivars availible	sun	6-8'	white flowers
Vaccinium angustifolium	Lowbush Blueberry	FACU; edible fruit; can be difficult to establish; strong fall color	sun	1-2'	small pale pink flowers; bright fall color
Vaccinium corymbosum	highbush blueberry	FACW; native environments are acidic; edible fruits; strong fall color	sun to part sun		small pale pink flowers; bright fall color
Viburnum acerifolium	Mapleleaf Viburnum	UPL found with Lindera and Hammamelis; widely used commercial native plant; pretty foliage, good fall color and bright blue berries	sun to shade	4-6'	
Viburnum dentatum	arrow wood viburnum	FAC; good fall color and bright blue berries; several culitvars avaible commercially	sun to part sun	10-12'	
Viburnum nudum var. cassinoides	smooth withrod	FACW; not salt tolerant; white flowers, blue fruit in fall	sun to shade	10-15'	

Planting

Athletic - Recreational Landscape | Seeds

Botanical Name	Common Name			min. size at planting	Light
Turf Seed- Pennington Summer Stress Mix	90% Tall Fescue, 10% Kentucky Bluegrass			5 lb/1000 sq. ft.	sun part sun
No-Mow Seed Mix- Prarie Nursery For no-mow turf appearance	Red Fescue, Sheep Fescue			5 lb/1000 sq. ft.	sun part sun
Native Detention Area Mix- ERNMX-183 For Areas where mowing is not anticipated				0.50 lb/ 1000 sq.ft.	sun
Woodland Mix- ERNMX-140 Partially Shaded Area Roadside Mix	25% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype) 5% Autumn Bentgrass, PA Ecotype (Agrostis perennans, PA Ecotype)	47% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga') 2% Ticklegrass (Rough Bentgrass), PA Ecotype (Agrostis scabra, PA Ecotype)	20% Fox Sedge, PA Ecotype (Carex vulpinoidea, PA Ecotype) 1% Path Rush, PA Ecotype (Juncus tenuis, PA Ecotype)	0.50 lb/ 1000 sq.ft.	part shade
	25% Little Bluestem, 'Camper' (Schizachyrium scoparium, 'Camper')	20% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype)	18% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga')		
	5% Partridge Pea, PA Ecotype (Chamaecrista fasciculata (Cassia f.), PA Ecotype)	4% Blackeyed Susan (Rudbeckia hirta)	3% Zigzag Aster, PA Ecotype (Aster prenanthoides (Symphyotrichum p.), PA Ecotype)		
	3% Tall White Beardtongue (Penstemon digitalis)	3% Purple Coneflower (Echinacea purpurea)	3% Marsh (Dense) Blazing Star (Spiked Gayfeather), PA Ecotype (Liatris spicata, PA Ecotype)		
	3% Golden Alexanders, PA Ecotype (Zizia aurea, PA Ecotype)	2% Ohio Spiderwort, PA Ecotype (Tradescantia ohiensis, PA Ecotype)	2% Thimbleweed, PA Ecotype (Anemone virginiana, PA Ecotype)		
	2% Autumn Bentgrass, Albany Pine Bush-NY Ecotype (Agrostis perennans, Albany Pine Bush-NY Ecotype)	2% Mistflower, VA Ecotype (Eupatorium coelestinum (Conoclinium c.), VA Ecotype)	1% Oxeye Sunflower, PA Ecotype (Heliopsis helianthoides, PA Ecotype)		
	1% Wild Bergamot, PA Ecotype (Monarda fistulosa, PA Ecotype)	1% Blue False Indigo, Southern WV Ecotype (Baptisia australis, Southern WV Ecotype)	1% Slender Lespedeza, VA Ecotype (Lespedeza virginica, VA Ecotype)		
	1% White (Silver Rod) Goldenrod, PA Ecotype (Solidago bicolor, PA Ecotype)				

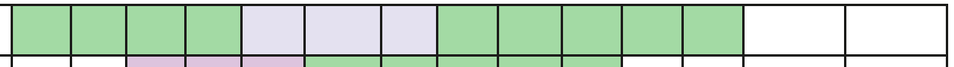
Planting

Athletic - Recreational Landscape | Herbs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec		
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST													
Anemone candensis	anemone	sometimes called Canda anemone it is native to PA; fast growing ground cover	sun to part sun	1-1.5'														
Arisaema triphyllum	Jack-in-the-pulpit	red berry clusters appear late summer to fall; unusual flower, spreads rapidly from seed; woodland native	part sun shade	1-3'														
Asclepias incarnata	Swamp Milkweed	OBL		3-5'														
Asclepias verticillata	Whorled milkweed	very drought tolerant; good for difficult locations	sun	1-3'														
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'														
Aster oblongifolius/ Symphyotrichu	Aromatic Aster	native to alcareous cliffs; fragrant leaves; longest blooming native aster; violet flowers; several commerical cultivars	sun	12-18"														
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'														
Baptisia australis	Indigo	blue flowers in spring; intresting seed pods for dried arrangements	sun	2-3'														
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'														
Carex amphibola	Creek Sedge	a great native alternative to liriope, good clumping habit with wider distinctive blade than most carex sp.	sun to part sun	12"														
Carex pensylvanica	Pennsylvania sedge	native forest ground speceis, commonly found under oaks	shade	8-10"														
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'														
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'														
Dennstaedtia punctilobula	hay-scented fern	native woodland habit, moist to average soils; vigorous spreader and makes a good shaded groundcover; orange fall color to fronds;	shade	15-24"														
Echinacea purpurea	purple coneflower	showy pink flowers in summer; unique seed heads in fall	sun to part sun	18-24"														
Eragrostis spectabilis	Purple Lovegrass	low maintenace clumping grass; drought tolerant and air pollution tolerant; used in dried flower arrangements; a good tough plant	sun	2-3'														
Eupatorium purpurea	joe pye weed	many cultivars availible; native to open fields and woods; can tolerate varying conditions	sun part sun	2-6'														
Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"														
Helianthus divaricatus	woodland sunflower	hardy perrennial plant adaptable to varying conditions	sun to part sun	3-5'														

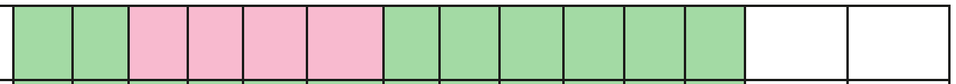
Planting

Athletic - Recreational Landscape | Herbs

Heuchera americana	American alumroot	semi evergreen foliage; drought tolerant; foliage remains low; good ground cover	shade	1-2'	
Iris cristata	Dwarf Crested Iris	found along edges; do not bury rhizomes; white to blue flowers	part shade	4-16"	
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'	
Juncus effusus	soft rush	FACW; low salt tolerance; clump forming grass with strong upright habit; brown seed heads in late summer stand out against foliage	sun	4'	
Juncus tenuis	path rush	FAC; low growing clump forming grass; does will with light foot traffic and can tolerate compacted soils; cannot handle short mowing	part sun	2'	
Liatris spicata	blazing star	adaptable to varying conditions; purple flower spikes in summer; feathery foliage and upright habit adds texture to the landscape	sun	24-36"	
Lilium superbum	turk's cap lily	FACW; large flowers on tall upright stems; good hummingbird attractant; best to interplant with other perennials as flower heads can get heavy and weigh foliage down	sun	4-6'	
Monarda didyma	beebalm	great plant for butterflies and hummingbirds; can tolerate varying conditions; reseeds regularly; bright red flowers in summer	su n	2'	
Monarda fistulosa	Wild Bergamot	pale pink - lilac flowers in late summer; self seeds and tolerate varying conditions	sun	1-3'	
Muhlenbergia mexicana	Satin Grass	fine blue green foliage with clouds of pink seed heads in fall; requires good drainage	sun to part sun	2-3'	
Oenothera fruticosa	Sundrops	drought tolerant low growing plant; yellow flowers in early summer; tough plant for hot dry sites	sun	15-18"	
Osmunda cinnamomea	cinnamon fern	clump forming fern;; native to moist woodland conditions; looks nice in an ornamental border; cinnamon color spikes in fall	shade to part shade	3-5'	
Osmunda regalis	Royal Fern	similar conditions to the cinnamon fern but without spore fronds and softer foliage	shade to part shade	2-4'	
Pachysandra procumbens	Allegheny spurge	semi evergreen groundcover; moist woodlands	shade to part shade	12-18"	
Panicum clandestinum	Deer-tongue Grass	meadow grass; unique thick foliage; tolerates poor conditions	sun	2'	
Panicum virgatum 'Shenandoah'	Red Switchgrass	tall clump forming native grass tolerant of varying conditions; used ornamentally for its strong fall color and structure in winter; FAC	sun	3-4'	
Penstemon hirsutus	Hairy Beardtongue	dry fields and roadsides; drought tolerant; nice perennial border plant; lavender flowers in late May to early July	sun to part shade	16-24"	
Phlox stolonifera	Creeping Phlox	creeping evergreen groundcover with white or pinkish blue blooms in spring; moist soils	part shade to shade	8-10"	

Planting

Athletic - Recreational Landscape | Herbs

Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6"	
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'	
Pteridium aquilinum	Braken Fern	FACU; found throughout most of the US; naturalizes along woodland edges and ditches; rhizomatous root growth creates natural massing effect	part sun to part shade	3-6'	
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"	
Schizachyrium scoparium	Little Bluestem	FACU; drought tolerant grass for poor soil areas; good in massing; native to early successional meadows	sun	2-4'	
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'	
Silene virginica	fire pink	red flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	12-18"	
Smilacina racemosa	false solomon's seal	woodland perennial with delicate white hanging bell shaped flowers at leaf tips in the spring; red berries follow flowers in late summer; prefers moist dappled shade	part shade	2-3'	
Solidago bicolor	Silver-rod	silvery-white flowers in late summer; grows best in infertile soils; dry; wooded edges or road sides	part sun	1-3'	
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'	
Thelypteris noveboracensis	new york fern	one of the most sun tolerant fern species; yellow green fronds; natualizes producing thick ground cover; prefers moist woodland conditions but will tolerate varying conditions	part sun to shade	1-2'	
Tiarella cordifolia	foamflower	white flowers in spring; good groundcover; native to decidious woodlands; average to moist soils			
Verbena hastata	blue vervain	native to most of the eastern US; found in wet meadows; tall thin spikes of violet flowers; not salt tolerant	sun	4-6'	
Vernonia noveboracensis	New York ironweed	FAC; purple flowers in Aug; bright showy flowers in late season; good for wet meadow; not salt tolerant	sun to part sun	4-6'	
Viola pedata	Birdfoot Violet	tight spacing; feathery foliage; attractive purple flower in spring; may drop foliage in heavy sun; moist to average garden soil	part sun to part shade	4-10"	
Viola spp.		pansy-like miniture plant; used in dry meadows for spring color; reseeds	sun	6-10"	

Planting

Historic Arboretum | Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Acer saccharum	sugar maple	beautiful red, orange, yellow, fall color; can be slow growing; moderate drought tolerance; no salt tolerance;FACU	sun to shade	60-75'													3.7-7.3
Celtis occidentalis	hackberry	good in windy areas and is resistant to dutch elm disease, may be suseptable to withces broom; FACU; edible fruit	sun to part sun	40-60'							purple berries						6-7.8
Gleditsia triacanthos	Shademaster Honey Locust	poplar urban tree as its small leaves allow for filtered light underneath and grass grows easily; tolerant of varying conditions; some species have thorns; fruit can be considered a nuisance; yellow fall color; web worms can be a problem	sun to part sun	60-80'													adaptable
Quercus alba	white oak	FACU; prefers deep moist well drained soils; moderate shade, drought, and salt tolerance; a very stately tree; slower growing then red oaks but live longer; mild fall color	Sun	50-60'													6.8-7.2
Tilia americana	American basswood	fragrant white blooms; bees attracted to blooms; large stately tree with heart shaped leaves and good canopy; moderate soil conditions; not salt tolerant	sun to part sun	50-70'													4.5-7.5
Ulmus americana	American Elm: Liberty, Princeton, Jefferson, New Harmony, or Valley Forge	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'													5.5-8.0

Planting

Historic Arboretum | Vines

General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Botanical Name	**Common Name**	**Comments**	**Light**	**Average height at maturity**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Aristolochia macrophylla	Pipevine	vigerous vine with large unique flowers	Sun to Pt. Shade	30' +												
Campsis radicans 'Flava'	Trumpet Vine	orange tubular flowers in summer; strong woody vine, it will need a strong support	Sun	30' +												
Decumaria barbara	Woodvamp	native to southern states, not PA but is found in DE and NY; in warmer climates it is evergreen	Pt. Shade	20' +												
Lonicera sempervirens	Coral Honeysuckle	tubular flowers late spring/ ealry summer; good hummingird attractant	Sun to Pt. Shade	20' +												
Parthenocissus quinquefolia	Virginia Creeper	striking fall color in sunnier locations; can handle shade	Sun to Pt. Shade	30-50' +												

Historic Arboretum | Small Trees

Botanical Name	**Common Name**	**Comments**	**Light**	**Average height at maturity**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**pH**
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Amelanchier arborea	shadbush	multi stem large shrub apperance; single stem availible; very popular landscape plant with seasonal intrest and edible fruit	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color				5.5 - 7.5
Asimina triloba	paw paw	slow growing tree with edible fruit	sun to part sun	15-40'			maroon flowers										5.2-7.2
Cercis canadensis	eastern redbud	single and multi stems availibe; good commerical plant with many cultivars with varying sesonal attributes; FACU	Sun to Pt. Sun	20-30'			flowers / berries in spring; white and pink cultivars		cultivars can have green, golden, or purple foliage					yellow fall color			>7.5
Magnolia tripetala	umbrella magnolia	PA is northern most range; moist well drained soils	Sun to Pt. Sun	20-30'			white flowers										5-7.5

Planting

Historic Arboretum | Shrubs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST											
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms						
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'										bright red stems in winter		
Fothergilla gardenii	fothergilla	PA is on its northernmost border; low manintenance; spreads by suckers	sun	3-6'									orange, yellow and red fall foliage			
Hydrangea arborescens	Smooth Hydrangea	Annabelle' is widely availible cultivar.	part sun	3-6'						white flowers						
Hydrangea quercifolia	oak leaf hydrangea	several commerical cultivars	sun to part sun	4-6'						white flowers			bright fall color			
Hypericum kalmianum	St. John's Wort		sun to part sun	3'						yellow flowers						
Ilex glabra	inkberry	FACW; several commerically avilible cultivars, even dwarf ones; can be semi evergreen	sun to part sun	3-6'												
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter											
Itea virginica	sweetspire	OBL; very widely used commerically and can tolerate varying conditions; fragrant flowers	sun to part sun	3-6'				white flowers					bright fall color			
Kalmia latifolia	Mountain Laurel	prefers wooded, sandy, acidic conditions; commerically availible	part shade	10-20'												
Rhododendron catawbiense [maximum]	Catawba rhododendron	evergreen foliage with pale pink flowers early summer	part sun	15-20'												
Sambucus canadensis	Common Elderberry	moderate salt tolerance; varying cultivars availible	sun	6-8'					white flowers							
Viburnum acerifolium	Mapleleaf Viburnum	UPL found with Lindera and Hammamelis; widely used commercial native plant; pretty foliage, good fall color and bright blue berries	sun to shade	4-6'												
Viburnum dentatum	arrow wood viburnum	FAC; good fall color and bright blue berries; several culitvars avaible commercially	sun to part sun	10-12'												

Planting

Historic Arboretum | Herbs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Anemone candensis	anemone	sometimes called Canda anemone it is native to PA; fast growing ground cover	sun to part sun	1-1.5'												
Arisaema triphyllum	Jack-in-the-pulpit	red berry clusters appear late summer to fall; unusual flower, spreads rapidly from seed; woodland native	part sun shade	1-3'												
Asarum canadense	Wild Ginger	dark green semi-evergreen attractive leaves; good groundcover for shaded areas	shade	4-8"												
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'												
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'												
Baptisia australis	Indigo	blue flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Baptisia tinctoria	Yellow Wild Indigo	yellow flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'												
Carex flaccosperma	blue wood sedge	slow spreader; blue green foliage; drought tolerant once established	part sun shade	6-10"												
Carex pensylvanica	Pennsylvania sedge	native forest ground speceis, commonly found under oaks	shade	8-10"												
Carex playphylla	Silver Sedge	softer blue foliage than other species; benefits from pruning in late winter; once established can tolerate dry shade	part shade to shade	8-12"												
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'												
Cimicifuga racemosa	black snakeroot	large white flowers; best planted at the edge of a woodland for light shade	part sun to part shade	4-7'												
Claytonia virginica	spring beauty	deicate small but showy flower; good in massing	shade	6-12"												
Dicentra eximia	Wild Bleeding Heart	repeat bloomer; prefers moist well drained soils	Shade	12-18"												
Echinacea purpurea	purple coneflower	showy pink flowers in summer; unique seed heads in fall	sun to part sun	18-24"												
Epigea repens	trailing arbutus	evergreen groundcover with fragrant flowers; hard to establish and needs mycorrhizal fungi association	shade	6"												
Erythronium americanum	trout lily	dainty woodland flower with spotted foliage; can handle dry woodlands once established; a common spring ephemral that is disappearing due to invasive trees shading too much	part sun shade	6"												
Eupatorium purpurea	joe pye weed	many cultivars availible; native to open fields and woods; can tolerate varying conditions	sun part sun	2-6'												

Planting

Historic Arboretum | Herbs

Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"													
Helianthus divaricatus	woodland sunflower	hardy perrennial plant adaptable to varying conditions	sun to part sun	3-5'													
Heuchera americana	American alumroot	semi evergreen foliage; drought tolerant; foliage remains low; good ground cover	shade	1-2'													
Iris cristata	Dwarf Crested Iris	found along edges; do not bury rhizomes; white to blue flowers	part shade	4-16"													
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'													
Juncus effusus	soft rush	FACW; low salt tolerance; clump forming grass with strong upright habit; brown seed heads in late summer stand out against foliage	sun	4'													
Juncus tenuis	path rush	FAC; low growing clump forming grass; does will with light foot traffic and can tolerate compacted soils; cannot handle short mowing	part sun	2'													
Liatris spicata	blazing star	adaptable to varying conditions; purple flower spikes in summer; feathery foliage and upright habit adds texture to the landscape	sun	24-36"													
Lobelia cardinalis	cardinal flower	found along stream edges; prefers moist part shaded woodland conditions; no salt tolerance	sun part shade	2-4'													
Mertensia virginica	virginia blue bells	spring ephemeral with bright blue flowers; very attractive in massing; prefers moderately moist woodland locations; companion plant to provide seasonal interest	part sun	1-2'													
Monarda didyma	beebalm	great plant for butterflies and hummingbirds; can tolerate varying conditions; reseeds regularly; bright red flowers in summer	su n	2'													
Oenothera fruticosa	Sundrops	drought tolerant low growing plant; yellow flowers in early summer; tough plant for hot dry sites	sun	15-18"													
Onoclea sensiblis	sensitive fern	rhizomatus fern that spreads easily in wet areas; good groundcover in moist woodlands	shade to part shade	12-18"													
Osmunda cinnamomea	cinnamon fern	clump forming fern;; native to moist woodland conditions; looks nice in an ornamental border; cinnamon color spikes in fall	shade to part shade	3-5'													
Osmunda regalis	Royal Fern	similar conditions to the cinnamon fern but without spore fronds and softer foliage	shade to part shade	2-4'													
Pachysandra procumbens	Allegheny spurge	semi evergreen groundcover; moist woodlands	shade to part shade	12-18"													
Panicum virgatum 'Shenandoah'	Red Switchgrass	tall clump forming native grass tolerant of varying conditions; used ornamentally for its strong fall color and structure in winter; FAC	sun	3-4'													

Planting

Historic Arboretum | Herbs

Penstemon hirsutus	Hairy Beardtongue	dry fields and roadsides; drought tolerant; nice perennial border plant; lavender flowers in late May to early July	sun to part shade	16-24"													
Phlox stolonifera	Creeping Phlox	creeping evergreen groundcover with white or pinkish blue blooms in spring; moist soils	part shade to shade	8-10"													
Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6"													
Polygonatum biflorum var. biflorum	Solomon's Seal	woodland perennial with delicate white hanging bell shaped flowers in the spring; red berries follow flowers in late summer; prefers moist dappled shade	part shade	2-3'													
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'													
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"													
Schizachyrium scoparium	Little Bluestem	FACU; drought tolerant grass for poor soil areas; good in massing; native to early successional meadows	sun	2-4'													
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'													
Silene caroliniana	Wild Pink	deep pink flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	6-8"													
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'													
Thelypteris noveboracensis	new york fern	one of the most sun tolerant fern species; yellow green fronds; natualizes producing thick ground cover; prefers moist woodland conditions but will tolerate varying conditions	part sun to shade	1-2'													
Tiarella cordifolia	foamflower	white flowers in spring; good groundcover; native to decidious woodlands; average to moist soils															
Trillium sp.	Trillium	native woodland spring ephemeral; does not do well with disturbance; best in rich well drained garden soils															
Verbena hastata	blue vervain	native to most of the eastern US; found in wet meadows; tall thin spikes of violet flowers; not salt tolerant	sun	4-6'													
Vernonia noveboracensis	New York ironweed	FAC; purple flowers in Aug; bright showy flowers in late season; good for wet meadow; not salt tolerant	sun to part sun	4-6'													
Viola pedata	Birdfoot Violet	tight spacing; feathery foliage; attractive purple flower in spring; may drop foliage in heavy sun; moist to average garden soil	part sun to part shade	4-10"													
Viola spp.		pansy-like miniture plant; used in dry meadows for spring color; reseeds	sun	6-10"													

Planting

Historic Arboretum | Seeds

Botanical Name	Common Name		min. size at planting	Light
Turf Seed- Pennington Summer Stress Mix	90% Tall Fescue, 10% Kentucky Bluegrass		5 lb/1000 sq. ft.	sun part sun
No-Mow Seed Mix- Prarie Nursery For no-mow turf appearance	Red Fescue, Sheep Fescue		5 lb/1000 sq. ft.	sun part sun

Planting

Special Garden or Plaza | Trees

Botanical Name	Common Name	Comments	Light	Avg height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Acer saccharum	sugar maple	beautiful red, orange, yellow, fall color; can be slow growing; moderate drought tolerance; no salt tolerance;FACU	sun to shade	60-75'													3.7 - 7.3
Fraxinus pennsylvanica	green ash	FACW; fast growing with attractive form; tolerant of pH, salt, and poor soils; susceptable to emerald ash borer; fall color is marginal	sun to part sun	60-80'													7.5 - 8.0
Gleditsia triacanthos	Shademaster Honey Locust	poplar urban tree as its small leaves allow for filtered light underneath and grass grows easily; tolerant of varying conditions; some species have thorns; fruit can be considered a nuisance; yellow fall color; web worms can be a problem	sun to part sun	60-80'													adaptable
Quercus alba	white oak	FACU; prefers deep moist well drained soils; moderate shade, drought, and salt tolerance; a very stately tree; slower growing then red oaks but live longer; mild fall color	Sun	50-60'													6.8 - 7.2
Robinia pseudoacacia	Black Locust	FACU; low salt tolerance but does well in poor soil sites; spreads from root sprouts and masses in floodplains, thickets, and reclamation sites; large white flowers and yellow fall color	sun	30-70'													4.6 - 8.2
Ulmus americana	elm	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'													5.5 - 8.0

Planting

Special Garden or Plaza | Evergreen Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Juniperus virginiana	Eastern red cedar	readily colonises abandoned fields, can handle variable conditions; FACU	Sun	30-50'											blue berries		4.7 - 7.8
Pinus pungens	table mountain pine	PA is the northernmost state of habitat; can be difficult to find commercially; it is a threaten species in NJ	Sun	25-50'													6.8 - 7.2
Pinus rigida	pitch pine	dry sites; native habitat is in fire dependent ecoysystems	Sun	40-60'													4.5 - 8.3
Pinus virginiana	Virginia pine	grows best on clay or loam sites; UPL	Full Sun	30-40'													4.6 - 7.9
Thuja occidentalis	eastern arborvitae	a convient evergreen for small areas however there are multiple cultivars that have been crossed with non-native species and it can be difficult to purchase a true species	Sun	30-75'													6.8 - 7.2

Planting

Special Garden or Plaza | Small Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Amelanchier arborea	shadbush	multi stem large shrub apperance; single stem availible; very popular landscape plant with seasonal intrest and edible fruit	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color				5.5 - 7.5
Asimina triloba	paw paw	slow growing tree with edible fruit	sun to part sun	15-40'			maroon flowers										5.2 - 7.2
Cercis canadensis	eastern redbud	single and multi stems availibe; good commerical plant with many cultivars with varying sesonal attributes; FACU	Sun to Pt. Sun	20-30'			flowers / berries in spring; white and pink cultivars		cultivars can have green, golden, or purple foliage					yellow fall color			> 7.5
Crataegus phaenopyrum	Washington hawthorn	PA is at its northern range; native to Missouri; cultivars can have thorns; good wildlife food source; tolerant of air pollution	Sun to Pt. Sun	25-30'						white flowers				red purple fall foliage		red berries in winter	6.8 - 7.2
Magnolia tripetala	umbrella magnolia	PA is northern most range; moist well drained soils	Sun to Pt. Sun	20-30'			white flowers										5 - 7.5

Planting

Special Garden or Plaza | Shrubs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST											
Cephalanthus occidentalis	Buttonbush	OBL; moderate salt tolerance; fun globe white flowers in summer		6-10'						white flowers						
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms						
Cornus amomum	silky dogwood	FACW; no salt tolerance; attractive flowers and berries	sun to part sun	6-10'							white flowers					
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'										bright red stems in winter		
Fothergilla gardenii	fothergilla	PA is on its northernmost border; low manintenance; spreads by suckers	sun	3-6'									bright shades of fall foliage			
Hydrangea arborescens	Smooth Hydrangea	Annabelle' is widely availible cultivar.	part sun	3-6'						white flowers						
Hydrangea quercifolia	oak leaf hydrangea	several commerical cultivars	sun to part sun	4-6'						white flowers			bright fall color			
Hypericum kalmianum	St. John's Wort		sun to part sun	3'						yellow flowers						
Ilex glabra	inkberry	FACW; several commerically avilible cultivars, even dwarf ones; can be semi evergreen	sun to part sun	3-6'												
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter											
Itea virginica	sweetspire	OBL; very widely used commerically and can tolerate varying conditions; fragrant flowers	sun to part sun	3-6'				white flowers					bright fall color			
Kalmia latifolia	Mountain Laurel	prefers wooded, sandy, acidic conditions; commerically availible	part shade	10-20'												
Rhododendron catawbiense [maximum]	Catawba rhododendron	evergreen foliage with pale pink flowers early summer	part sun	15-20'												
Rhus aromatica	fragrant sumac	spreading / naturalizing habit; dwarf culticars availible	sun to part sun	2-6'									bright fall color	red berries in winter		
Sambucus canadensis	Common Elderberry	FACW; fast growing shrub with moderate salt tolerance; varying cultivars availible	sun	6-8'					white flowers							
Vaccinium corymbosum	highbush blueberry	FACW; native environments are acidic; edible fruits; strong fall color	sun to part sun					small pale pink flowers					bright fall color			
Viburnum acerifolium	Mapleleaf Viburnum	UPL found with Lindera and Hammamelis; widely used commercial native plant; pretty foliage, good fall color and bright blue berries	sun to shade	4-6'												
Viburnum dentatum	arrow wood viburnum	FAC; good fall color and bright blue berries; several culitvars avaible commercially	sun to part sun	10-12'												

Planting

Special Garden or Plaza | Herbs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Anemone candensis	anemone	sometimes called Canda anemone it is native to PA; fast growing ground cover	sun to part sun	1-1.5'												
Arisaema triphyllum	Jack-in-the-pulpit	red berry clusters appear late summer to fall; unusual flower, spreads rapidly from seed; woodland native	part sun shade	1-3'												
Asarum canadense	Wild Ginger	dark green semi-evergreen attractive leaves; good groundcover for shaded areas	shade	4-8"												
Asclepias verticillata	Whorled milkweed	very drought tolerant; good for difficult locations	sun	1-3'												
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'												
Aster oblongifolius/ Symphyotrichum oblongifolium	Aromatic Aster	native to alcareous cliffs; fragrant leaves; longest blooming native aster; violet flowers; several commerical cultivars	sun	12-18"												
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'												
Baptisia australis	Indigo	blue flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Baptisia tinctoria	Yellow Wild Indigo	yellow flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'												
Carex pensylvanica	Pennsylvania sedge	native forest ground speceis, commonly found under oaks	shade	8-10"												
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'												
Cimicifuga racemosa	black snakeroot	large white flowers; best planted at the edge of a woodland for light shade	part sun to part shade	4-7'												
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'												
Deschampsia flexuosa	Wavy Hairgrass	good alternative to C.pennsylvanica in dry areas; semi-evergreen; tidy clumping habit	shade	6-18"												
Dryopteris marginalis	eastern wood fern	clumping fern; evergreen fern preferring shady edge conditions	shade	12-18"												
Echinacea purpurea	purple coneflower	showy pink flowers in summer; unique seed heads in fall	sun to part sun	18-24"												
Epigea repens	trailing arbutus	evergreen groundcover with fragrant flowers; hard to establish and needs mycorrhizal fungi association	shade	6"												
Erythronium americanum	trout lily	dainty woodland flower with spotted foliage; can handle dry woodlands once established; a common spring ephemral that is disappearing due to invasive trees shading too much	part sun shade	6"												
Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"												
Helianthus divaricatus	woodland sunflower	hardy perrennial plant adaptable to varying conditions	sun to part sun	3-5'												

Planting

Special Garden or Plaza | Herbs

Heuchera americana	American alumroot	semi evergreen foliage; drought tolerant; foliage remains low; good ground cover	shade	1-2'	
Iris cristata	Dwarf Crested Iris	found along edges; do not bury rhizomes; white to blue flowers	part shade	4-16"	
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'	
Liatris spicata	blazing star	adaptable to varying conditions; purple flower spikes in summer; feathery foliage and upright habit adds texture to the landscape	sun	24-36"	
Lilium superbum	turk's cap lily	FACW; large flowers on tall upright stems; good hummingbird attractant; best to interplant with other perennials as flower heads can get heavy and weigh foliage down	sun	4-6'	
Mertensia virginica	virginia blue bells	spring ephemeral with bright blue flowers; very attractive in massing; prefers moderately moist woodland locations; companion plant to provide seasonal interest	part sun	1-2'	
Monarda didyma	beebalm	great plant for butterflies and hummingbirds; can tolerate varying conditions; reseeds regularly; bright red flowers in summer	su n	2'	
Monarda fistulosa	Wild Bergamot	pale pink - lilac flowers in late summer; self seeds and tolerate varying conditions	sun	1-3'	
Oenothera fruticosa	Sundrops	drought tolerant low growing plant; yellow flowers in early summer; tough plant for hot dry sites	sun	15-18"	
Osmunda cinnamomea	cinnamon fern	clump forming fern;; native to moist woodland conditions; looks nice in an ornamental border; cinnamon color spikes in fall	shade to part shade	3-5'	
Osmunda regalis	Royal Fern	similar conditions to the cinnamon fern but without spore fronds and softer foliage	shade to part shade	2-4'	
Pachysandra procumbens	Allegheny spurge	semi evergreen groundcover; moist woodlands	shade to part shade	12-18"	
Penstemon hirsutus	Hairy Beardtongue	dry fields and roadsides; drought tolerant; nice perennial border plant; lavender flowers in late May to early July	sun to part shade	16-24"	
Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6"	
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'	
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"	
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'	
Silene caroliniana	Wild Pink	deep pink flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	6-8"	
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'	
Tiarella cordifolia	foamflower	white flowers in spring; good groundcover; native to decidious woodlands; average to moist soils			
Vernonia noveboracensis	New York ironweed	FAC; purple flowers in Aug; bright showy flowers in late season; good for wet meadow; not salt tolerant	sun to part sun	4-6'	
Viola pedata	Birdfoot Violet	tight spacing; feathery foliage; attractive purple flower in spring; may drop foliage in heavy sun; moist to average garden soil	part sun to part shade	4-10"	

Planting

Special Garden or Plaza | Vines

General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					**SEASONAL INTEREST**											
Botanical Name	**Common Name**	**Comments**	**Light**	**Average height at maturity**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Aristolochia macrophylla	Pipevine	vigerous vine with large unique flowers	Sun to Pt. Shade	30' +												
Campsis radicans 'Flava'	Trumpet Vine	orange tubular flowers in summer; strong woody vine, it will need a strong support	Sun	30' +												
Decumaria barbara	Woodvamp	native to southern states, not PA but is found in DE and NY; in warmer climates it is evergreen	Pt. Shade	20' +												
Lonicera sempervirens	Coral Honeysuckle	tubular flowers late spring/ ealry summer; good hummingird attractant	Sun to Pt. Shade	20' +												
Parthenocissus quinquefolia	Virginia Creeper	striking fall color in sunnier locations; can handle shade	Sun to Pt. Shade	30-50' +												

Planting

Special Garden or Plaza | Seed

Botanical Name	Common Name			min. size at planting	Light
Turf Seed- Pennington Summer Stress Mix	90% Tall Fescue, 10% Kentucky Bluegrass			5 lb/1000 sq. ft.	sun part sun
No-Mow Seed Mix- Prarie Nursery For no-mow turf appearance	Red Fescue, Sheep Fescue			5 lb/1000 sq. ft.	sun part sun
Native Detention Area Mix- ERNMX-183 For Areas where mowing is not anticipated				0.50 lb/ 1000 sq.ft.	sun
Woodland Mix- ERNMX-140 Partially Shaded Area Roadside Mix	25% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype) 5% Autumn Bentgrass, PA Ecotype (Agrostis perennans, PA Ecotype)	47% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga') 2% Ticklegrass (Rough Bentgrass), PA Ecotype (Agrostis scabra, PA Ecotype)	20% Fox Sedge, PA Ecotype (Carex vulpinoidea, PA Ecotype) 1% Path Rush, PA Ecotype (Juncus tenuis, PA Ecotype)	0.50 lb/ 1000 sq.ft.	part shade
	25% Little Bluestem, 'Camper' (Schizachyrium scoparium, 'Camper') 5% Partridge Pea, PA Ecotype (Chamaecrista fasciculata (Cassia f.), PA Ecotype) 3% Tall White Beardtongue (Penstemon digitalis) 3% Golden Alexanders, PA Ecotype (Zizia aurea, PA Ecotype) 2% Autumn Bentgrass, Albany Pine Bush-NY Ecotype (Agrostis perennans, Albany Pine Bush-NY Ecotype) 1% Wild Bergamot, PA Ecotype (Monarda fistulosa, PA Ecotype) 1% White (Silver Rod) Goldenrod, PA Ecotype (Solidago bicolor, PA Ecotype)	20% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype) 4% Blackeyed Susan (Rudbeckia hirta) 3% Purple Coneflower (Echinacea purpurea) 2% Ohio Spiderwort, PA Ecotype (Tradescantia ohiensis, PA Ecotype) 2% Mistflower, VA Ecotype (Eupatorium coelestinum (Conoclinium c.), VA Ecotype) 1% Blue False Indigo, Southern WV Ecotype (Baptisia australis, Southern WV Ecotype)	18% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga') 3% Zigzag Aster, PA Ecotype (Aster prenanthoides (Symphyotrichum p.), PA Ecotype) 3% Marsh (Dense) Blazing Star (Spiked Gayfeather), PA Ecotype (Liatris spicata, PA Ecotype) 2% Thimbleweed, PA Ecotype (Anemone virginiana, PA Ecotype) 1% Oxeye Sunflower, PA Ecotype (Heliopsis helianthoides, PA Ecotype) 1% Slender Lespedeza, VA Ecotype (Lespedeza virginica, VA Ecotype)		

Planting

Borough Residential Landscape | Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Acer saccharum	sugar maple	beautiful red, orange, yellow, fall color; can be slow growing; moderate drought tolerance; no salt tolerance;FACU	sun to shade	60-75'													3.7-7.3
Aeculus spp.	native species include: flava and parviflora	very showy white blooms be aware the red flowering species is a non-native cross and should not be used; can tolerate water edges; moderate salt tolerance	sun to part sun	50-75'													6.8-7.2
Fraxinus nigra	black ash	FACW; of all the ashes it is the most tolerant of varied and poor conditions; nice form; fall color is marginal	sun to part sun	60-80'													4.4-8.2
Fraxinus pennsylvanica	green ash	FACW; fast growing with attractive form; tolerant of pH, salt, and poor soils; susceptable to emerald ash borer; fall color is marginal	sun to part sun	60-80'													7.5-8.0
Gleditsia triacanthos	Shademaster Honey Locust	poplar urban tree as its small leaves allow for filtered light underneath and grass grows easily; tolerant of varying conditions; some species have thorns; fruit can be considered a nuisance; yellow fall color; web worms can be a problem	sun to part sun	60-80'													adaptable
Quercus alba	white oak	FACU; prefers deep moist well drained soils; moderate shade, drought, and salt tolerance; a very stately tree; slower growing then red oaks but live longer; mild fall color	Sun	50-60'													6.8-7.2
Tilia americana	American basswood	fragrant white blooms; bees attracted to blooms; large stately tree with heart shaped leaves and good canopy; moderate soil conditions; not salt tolerant	sun to part sun	50-70'													4.5-7.5
Ulmus americana	American Elm: Liberty, Princeton, Jefferson, New Harmony, or Valley Forge	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'													5.5-8.0

Planting

Borough Residential Landscape | Evergreen Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**												
Juniperus virginiana	Eastern red cedar	readily colonises abandoned fields, can handle variable conditions; FACU	Sun	30-50'											blue berries		4.7-7.8
Thuja occidentalis	eastern arborvitae	a convient evergreen for small areas however there are multiple cultivars that have been crossed with non-native species and it can be difficult to purchase a true species	Sun	30-75'													6.8-7.2

Planting

Borough Residential Landscape | Small Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**												
Amelanchier arborea	shadbush	multi stem large shrub apperance; single stem availible; very popular landscape plant with seasonal intrest and edible fruit	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color				5.5-7.5
Asimina triloba	paw paw	slow growing tree with edible fruit	sun to part sun	15-40'			maroon flowers										5.2-7.2
Cercis canadensis	eastern redbud	single and multi stems availibe; good commerical plant with many cultivars with varying sesonal attributes; FACU	Sun to Pt. Sun	20-30'			flowers / berries in spring; white and pink cultivars		cultivars can have green, golden, or purple foliage					yellow fall color			>7.5
Crataegus phaenopyrum	Washington hawthorn	PA is at its northern range; native to Missouri; cultivars can have thorns; good wildlife food source; tolerant of air pollution	Sun to Pt. Sun	25-30'						white flowers				red purple fall foliage	red berries in winter		6.8-7.2

Planting

Borough Residential Landscape | Shrubs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST											
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms						
Cornus amomum	silky dogwood	FACW; no salt tolerance; attractive flowers and berries	sun to part sun	6-10'							white flowers					
Cornus stolonifera or sericea	red twig dogwood	new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'										bright red stems in winter		
Diervilla sessilifolia	bush honeysuckle	PA is on its northernmost border; a tough plant that will naturalize if not maintained; suckering habit	sun	3-5'						yellow flowers						
Fothergilla gardenii	fothergilla	PA is on its northernmost border; low manintenance; spreads by suckers	sun	3-6'									bright shades of foliage			
Hydrangea arborescens	Smooth Hydrangea	Annabelle' is widely availible cultivar.	part sun	3-6'						white flowers						
Hydrangea quercifolia	oak leaf hydrangea	several commerical cultivars	sun to part sun	4-6'						white flowers			bright fall color			
Hypericum kalmianum	St. John's Wort		sun to part sun	3'						yellow flowers						
Ilex glabra	inkberry	FACW; several commerically avilible cultivars, even dwarf ones; can be semi evergreen	sun to part sun	3-6'												
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter											
Itea virginica	sweetspire	OBL; very widely used commerically and can tolerate varying conditions; fragrant flowers	sun to part sun	3-6'				white flowers					bright fall color			
Kalmia latifolia	Mountain Laurel	prefers wooded, sandy, acidic conditions; commerically availible	part shade	10-20'												
Rhododendron catawbiense [maximum]	Catawba rhododendron	evergreen foliage with pale pink flowers early summer	part sun	15-20'												
Rhododendron periclymenoides	pinxterbloom	can handle moist soils	part sun	6-12'												
Rhus aromatica	fragrant sumac	spreading / naturalizing habit; dwarf culticars availible	sun to part sun	2-6'									bright fall color	red berries		
Sambucus canadensis	Common Elderberry	FACW; fast growing shrub with moderate salt tolerance; varying cultivars availible	sun	6-8'					white flowers							
Vaccinium corymbosum	highbush blueberry	FACW; native environments are acidic; edible fruits; strong fall color	sun to part sun					small pale pink flowers					bright fall color			
Viburnum acerifolium	Mapleleaf Viburnum	UPL found with Lindera and Hammamelis; widely used commercial native plant; pretty foliage, good fall color and bright blue berries	sun to shade	4-6'												
Viburnum dentatum	arrow wood viburnum	FAC; good fall color and bright blue berries; several culitvars avaible commercially	sun to part sun	10-12'												

Planting

Borough Residential Landscape | Herbs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Anemone candensis	anemone	sometimes called Canda anemone it is native to PA; fast growing ground cover	sun to part sun	1-1.5'												
Aquelgia canadensis	Wild Columbine	no cultivars; FAC; one of the first flowers to bloom in the spring; leafminers usually present on leafs	part shade	12-18"												
Arisaema triphyllum	Jack-in-the-pulpit	red berry clusters appear late summer to fall; unusual flower, spreads rapidly from seed; woodland native	part sun shade	1-3'												
Asarum canadense	Wild Ginger	dark green semi-evergreen attractive leaves; good groundcover for shaded areas	shade	4-8"												
Asclepias verticillata	Whorled milkweed	very drought tolerant; good for difficult locations	sun	1-3'												
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'												
Aster divaricatus (Eurybia divaricata)	White Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2'												
Aster oblongifolius/ Symphyotrichu	Aromatic Aster	native to alcareous cliffs; fragrant leaves; longest blooming native aster; violet flowers; several commerical cultivars	sun	12-18"												
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'												
Baptisia australis	Indigo	blue flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Baptisia tinctoria	Yellow Wild Indigo	yellow flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'												
Carex flaccosperma	blue wood sedge	slow spreader; blue green foliage; drought tolerant once established	part sun shade	6-10"												
Carex pensylvanica	Pennsylvania sedge	native forest ground speceis, commonly found under oaks	shade	8-10"												
Carex plantaginea	Seersucker Sedge	ribbed blade adds texture to this species; semi-evergreen; habitat is moist woods	part shade to shade	8-10"												
Carex playphylla	Silver Sedge	softer blue foliage than other species; benefits from pruning in late winter; once established can tolerate dry shade	part shade to shade	8-12"												
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'												
Chrysogonum virginanum	Green and Gold	semi evergreen groundcover found on slopes and in alpine areas; yellow daisy flowers in May and then occassionally through summer; can tolerate drought	sun to part sun	6-8"												
Cimicifuga racemosa	black snakeroot	large white flowers; best planted at the edge of a woodland for light shade	part sun to part shade	4-7'												
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'												
Dennstaedtia punctilobula	hay-scented fern	native woodland habit, moist to average soils; vigorous spreader and makes a good shaded groundcover; orange fall color to fronds;	shade	15-24"												

Planting

Borough Residential Landscape | Herbs

Deschampsia flexuosa	Wavy Hairgrass	good alternative to C.pennsylvanica in dry areas; semi-evergreen; tidy clumping habit	shade	6-18"	
Dicentra eximia	Wild Bleeding Heart	repeat bloomer; prefers moist well drained soils	Shade	12-18"	
Dryopteris marginalis	eastern wood fern	clumping fern; evergreen fern preferring shady edge conditions	shade	12-18"	
Echinacea purpurea	purple coneflower	showy pink flowers in summer; unique seed heads in fall	sun to part sun	18-24"	
Eragrostis spectabilis	Purple Lovegrass	low maintenace clumping grass; drought tolerant and air pollution tolerant; used in dried flower arrangements; a good tough plant	sun	2-3'	
Eupatorium purpurea	joe pye weed	many cultivars availible; native to open fields and woods; can tolerate varying conditions	sun part sun	2-6'	
Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"	
Helianthus divaricatus	woodland sunflower	hardy perrennial plant adaptable to varying conditions	sun to part sun	3-5'	
Heuchera americana	American alumroot	semi evergreen foliage; drought tolerant; foliage remains low; good ground cover	shade	1-2'	
Iris cristata	Dwarf Crested Iris	found along edges; do not bury rhizomes; white to blue flowers	part shade	4-16"	
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'	
Juncus tenuis	path rush	FAC; low growing clump forming grass; does will with light foot traffic and can tolerate compacted soils; cannot handle short mowing	part sun	2'	
Liatris spicata	blazing star	adaptable to varying conditions; purple flower spikes in summer; feathery foliage and upright habit adds texture to the landscape	sun	24-36"	
Lilium superbum	turk's cap lily	FACW; large flowers on tall upright stems; good hummingbird attractant; best to interplant with other perennials as flower heads can get heavy and weigh foliage down	sun	4-6'	
Lobelia cardinalis	cardinal flower	found along stream edges; prefers moist part shaded woodland conditions; no salt tolerance	sun part shade	2-4'	
Mertensia virginica	virginia blue bells	spring ephemeral with bright blue flowers; very attractive in massing; prefers moderately moist woodland locations; companion plant to provide seasonal interest	part sun	1-2'	
Monarda didyma	beebalm	great plant for butterflies and hummingbirds; can tolerate varying conditions; reseeds regularly; bright red flowers in summer	su n	2'	
Monarda fistulosa	Wild Bergamot	pale pink - lilac flowers in late summer; self seeds and tolerate varying conditions	sun	1-3'	
Oenothera fruticosa	Sundrops	drought tolerant low growing plant; yellow flowers in early summer; tough plant for hot dry sites	sun	15-18"	
Osmunda cinnamomea	cinnamon fern	clump forming fern;; native to moist woodland conditions; looks nice in an ornamental border; cinnamon color spikes in fall	shade to part shade	3-5'	
Osmunda regalis	Royal Fern	similar conditions to the cinnamon fern but without spore fronds and softer foliage	part shade	2-4'	
Pachysandra procumbens	Allegheny spurge	semi evergreen groundcover; moist woodlands	part shade	12-18"	

Planting

Borough Residential Landscape | Herbs

Panicum virgatum 'Shenandoah'	Red Switchgrass	tall clump forming native grass tolerant of varying conditions; used ornamentally for its strong fall color and structure in winter; FAC	sun	3-4'													
Phlox stolonifera	Creeping Phlox	creeping evergreen groundcover with white or pinkish blue blooms in spring; moist soils	part shade to shade	8-10"													
Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6"													
Polygonatum biflorum var. biflorum	Solomon's Seal	woodland perennial with delicate white hanging bell shaped flowers in the spring; red berries follow flowers in late summer; prefers moist dappled shade	part shade	2-3'													
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'													
Pteridium aquilinum	Braken Fern	FACU; found throughout most of the US; naturalizes along woodland edges and ditches; rhizomatous root growth creates natural massing effect	part sun to part shade	3-6'													
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"													
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'													
Silene virginica	fire pink	red flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	12-18"													
Silene caroliniana	Wild Pink	deep pink flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	6-8"													
Smilacina racemosa	false solomon's seal	woodland perennial with delicate white hanging bell shaped flowers at leaf tips in the spring; red berries follow flowers in late summer; prefers moist dappled shade	part shade	2-3'													
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'													
Talinum teretifolium or calycinum	Fameflower	treatened speceis in PA; drought tolerant; good on rock outcroppings or alpine garden; self seeds; small pink flowers summer to fall	sun	6"													
Thelypteris noveboracensis	new york fern	one of the most sun tolerant fern species; yellow green fronds; natualizes producing thick ground cover; prefers moist woodland conditions but will tolerate varying conditions	part sun to shade	1-2'													
Tiarella cordifolia	foamflower	white flowers in spring; good groundcover; native to decidious woodlands; average to moist soils															
Uvularia grandiflora	large flowered bellwort	native to southeaster US, PA is at norhthermost border; drought tolerant shade perennial; yellow flowers in spring; low maintenance plant that will naturalize	shade to part shade	1-2'													
Vernonia noveboracensis	New York ironweed	FAC; purple flowers in Aug; bright showy flowers in late season; good for wet meadow; not salt tolerant	sun to part sun	4-6'													
Viola pedata	Birdfoot Violet	tight spacing; feathery foliage; attractive purple flower in spring; may drop foliage in heavy sun; moist to average garden soil	part sun to part shade	4-10"													
Viola spp.		pansy-like miniture plant; used in dry meadows for spring color; reseeds	sun	6-10"													

Planting

Borough Residential Landscape | Seed

Botanical Name	Common Name		min. size at planting	Light
Turf Seed- Pennington Summer Stress Mix	90% Tall Fescue, 10% Kentucky Bluegrass		5 lb/1000 sq. ft.	sun part sun
No-Mow Seed Mix- Prarie Nursery For no-mow turf appearance	Red Fescue, Sheep Fescue		5 lb/1000 sq. ft.	sun part sun

Borough Residential Landscape | Vines

General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.

					SEASONAL INTEREST											
Botanical Name	**Common Name**	**Comments**	**Light**	**Average height at maturity**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Aristolochia macrophylla	Pipevine	vigerous vine with large unique flowers	Sun to Pt. Shade	30' +												
Campsis radicans 'Flava'	Trumpet Vine	orange tubular flowers in summer; strong woody vine, it will need a strong support	Sun	30' +												
Decumaria barbara	Woodvamp	native to southern states, not PA but is found in DE and NY; in warmer climates it is evergreen	Pt. Shade	20' +												
Lonicera sempervirens	Coral Honeysuckle	tubular flowers late spring/ ealry summer; good hummingird attractant	Sun to Pt. Shade	20' +												
Parthenocissus quinquefolia	Virginia Creeper	striking fall color in sunnier locations; can handle shade	Sun to Pt. Shade	30-50' +												

Planting

Streetscape and Green Corridor | Trees

Botanical Name	Common Name	Comments	Light	Avg height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Acer saccharum	sugar maple	beautiful red, orange, yellow, fall color; can be slow growing; moderate drought tolerance; no salt tolerance;FACU	sun to shade	60-75'													pH 3.7 - 7.3
Betula papyrifera	Paper Birch	moist loam soils are best; longevity is poor in areas where temperature exceeds 75 F		50-70'													4.2–7.9; seedlings do poorly above 6.5
Cladrastis kentuckea	Yellowwood	nice park - campus tree; white showy flowers; low maintenance; yellow fall foliage	sun	30-50'													adaptable
Fraxinus pennsylvanica	green ash	FACW; fast growing with attractive form; tolerant of pH, salt, and poor soils; susceptable to emerald ash borer; fall color is marginal	sun to part sun	60-80'													7.5 - 8.0
Gleditsia triacanthos	Shademaster Honey Locust	poplar urban tree as its small leaves allow for filtered light underneath and grass grows easily; tolerant of varying conditions; some species have thorns; fruit can be considered a nuisance; yellow fall color; web worms can be a problem	sun to part sun	60-80'													adaptable
Tilia americana	American basswood	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'													4.5 - 7.5
Liriodendron tulipifera	tulip poplar	fast growing tree with straigh upright habit; unique flowers in spring and seed pods in fall; FACU; no salt tolerance	sun part sun	85'+													4.5-7.5
Ulmus americana	American Elm: Liberty, Princeton, Jefferson, New Harmony, or Valley Forge	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'													5.5 to 8.0

Planting

Streetscape and Green Corridor | Evergreen Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**											
Thuja occidentalis	eastern arborvitae	a convient evergreen for small areas however there are multiple cultivars that have been crossed with non-native species and it can be difficult to purchase a true species **pH 6.8-7.2**	Sun	30-75'												

Streetscape and Green Corridor | Small Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**												
Amelanchier arborea	shadbush	multi stem large shrub apperance; single stem availible; very popular landscape plant with seasonal intrest and edible fruit	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color				5.5 -7.5
Amelanchier laevis	shadbush	low maintenance tree tolerant of air pollution; tree has a wide range and can be found trhoughout North America; not as showy as other species	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color				6.6 - 7.5
Asimina triloba	paw paw	slow growing tree with edible fruit	sun to part sun	15-40'			maroon flowers										5.2 - 7.2
Cercis canadensis	eastern redbud	single and multi stems availibe; good commerical plant with many cultivars with varying sesonal attributes; FACU	Sun to Pt. Sun	20-30'			flowers, berries in spring; white and pink cultivars		cultivars can have green, golden, or purple foliage					yellow fall color			> 7.5
Crataegus phaenopyrum	Washington hawthorn	PA is at its northern range; native to Missouri; cultivars can have thorns; good wildlife food source; tolerant of air pollution	Sun to Pt. Sun	25-30'						white flowers				red purple fall foliage	red berries in winter		6.8 -7.2

Planting

Streetscape and Green Corridor | Shrubs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST											
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms						
Cornus amomum	silky dogwood	FACW; no salt tolerance; attractive flowers and berries	sun to part sun	6-10'							white flowers					
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'										bright red stems in winter		
Fothergilla gardenii	fothergilla	PA is on its northernmost border; low manintenance; spreads by suckers	sun	3-6'									bright shades of orange, yellow and red fall foliage			
Hydrangea arborescens	Smooth Hydrangea	Annabelle' is widely availible cultivar.	part sun	3-6'						white flowers						
Hydrangea quercifolia	oak leaf hydrangea	several commerical cultivars	sun to part sun	4-6'						white flowers			bright fall color			
Hypericum kalmianum	St. John's Wort		sun to part sun	3'						yellow flowers						
Ilex glabra	inkberry	FACW; several commerically avilible cultivars, even dwarf ones; can be semi evergreen	sun to part sun	3-6'												
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter											
Itea virginica	sweetspire	OBL; very widely used commerically and can tolerate varying conditions; fragrant flowers	sun to part sun	3-6'				white flowers					bright fall color			
Viburnum acerifolium	Mapleleaf Viburnum	UPL found with Lindera and Hammamelis; widely used commercial native plant; pretty foliage, good fall color and bright blue berries	sun to shade	4-6'												
Viburnum dentatum	arrow wood viburnum	FAC; good fall color and bright blue berries; several culitvars avaible commercially	sun to part sun	10-12'												

Planting

Streetscape and Green Corridor | Herbs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'												
Aster divaricatus (Eurybia divaricata)	White Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2'												
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'												
Baptisia australis	Indigo	blue flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'												
Carex pensylvanica	Pennsylvania sedge	native forest ground speceis, commonly found under oaks	shade	8-10"												
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'												
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'												
Dennstaedtia punctilobula	hay-scented fern	native woodland habit, moist to average soils; vigorous spreader and makes a good shaded groundcover; orange fall color to fronds;	shade	15-24"												
Echinacea purpurea	purple coneflower	showy pink flowers in summer; unique seed heads in fall	sun to part sun	18-24"												
Eragrostis spectabilis	Purple Lovegrass	low maintenace clumping grass; drought tolerant and air pollution tolerant; used in dried flower arrangements; a good tough plant	sun	2-3'												
Eupatorium purpurea	joe pye weed	many cultivars availible; native to open fields and woods; can tolerate varying conditions	sun part sun	2-6'												
Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"												
Iris cristata	Dwarf Crested Iris	found along edges; do not bury rhizomes; white to blue flowers	part shade	4-16"												
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'												
Juncus effusus	soft rush	FACW; low salt tolerance; clump forming grass with strong upright habit; brown seed heads in late summer stand out against foliage	sun	4'												
Juncus tenuis	path rush	FAC; low growing clump forming grass; does will with light foot traffic and can tolerate compacted soils; cannot handle short mowing	part sun	2'												
Muhlenbergia mexicana	Satin Grass	fine blue green foliage with clouds of pink seed heads in fall; requires good drainage	sun to part sun	2-3'												
Pachysandra procumbens	Allegheny spurge	semi evergreen groundcover; moist woodlands	shade to part shade	12-18"												
Panicum virgatum 'Shenandoah'	Red Switchgrass	tall clump forming native grass tolerant of varying conditions; used ornamentally for its strong fall color and structure in winter; FAC	sun	3-4'												
Penstemon hirsutus	Hairy Beardtongue	dry fields and roadsides; drought tolerant; nice perennial border plant; lavender flowers in late May to early July	sun to part shade	16-24"												

Planting

Streetscape and Green Corridor | Herbs

Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6''	
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'	
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"	
Schizachyrium scoparium	Little Bluestem	FACU; drought tolerant grass for poor soil areas; good in massing; native to early successional meadows	sun	2-4'	
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'	
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'	
Tiarella cordifolia	foamflower	white flowers in spring; good groundcover; native to decidious woodlands; average to moist soils			
Viola spp.		pansy-like miniture plant; used in dry meadows for spring color; reseeds	sun	6-10"	

Streetscape and Green Corridor | Seed

Botanical Name	Common Name		min. size at planting	Light
Turf Seed- Pennington Summer Stress Mix	90% Tall Fescue, 10% Kentucky Bluegrass		5 lb/1000 sq. ft.	sun part sun
No-Mow Seed Mix- Prarie Nursery For no-mow turf appearance	Red Fescue, Sheep Fescue		5 lb/1000 sq. ft.	sun part sun

Streetscape and Green Corridor | Vines

General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.

Botanical Name	Common Name	Comments	Light	Average height at maturity	SEASONAL INTEREST Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Aristolochia macrophylla	Pipevine	vigerous vine with large unique flowers	Sun to Pt. Shade	30' +												
Campsis radicans 'Flava'	Trumpet Vine	orange tubular flowers in summer; strong woody vine, it will need a strong support	Sun	30' +												
Decumaria barbara	Woodvamp	native to southern states, not PA but is found in DE and NY; in warmer climates it is evergreen	Pt. Shade	20' +												
Lonicera sempervirens	Coral Honeysuckle	tubular flowers late spring/ ealry summer; good hummingird attractant	Sun to Pt. Shade	20' +												
Parthenocissus quinquefolia	Virginia Creeper	striking fall color in sunnier locations; can handle shade	Sun to Pt. Shade	30-50' +												

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					SEASONAL INTEREST												
Acer saccharum	sugar maple	beautiful red, orange, yellow, fall color; can be slow growing; moderate drought tolerance; no salt tolerance;FACU	sun to shade	60-75'													3.7-7.3
Aeculus spp.	native species include: flava and parviflora	very showy white blooms be aware the red flowering species is a non-native cross and should not be used; can tolerate water edges; moderate salt tolerance	sun to part sun	50-75'													6.8-7.2
Fraxinus pennsylvanica	green ash	FACW; fast growing with attractive form; tolerant of pH, salt, and poor soils; susceptable to emerald ash borer; fall color is marginal	sun to part sun	60-80'													7.5-8.0
Gleditsia triacanthos	Shademaster Honey Locust	poplar urban tree as its small leaves allow for filtered light underneath and grass grows easily; tolerant of varying conditions; some species have thorns; fruit can be considered a nuisance; yellow fall color; web worms can be a problem	sun to part sun	60-80'													adaptable
Quercus alba	white oak	FACU; prefers deep moist well drained soils; moderate shade, drought, and salt tolerance; a very stately tree; slower growing then red oaks but live longer; mild fall color	Sun	50-60'													6.8-7.2
Tilia americana	American basswood	fragrant white blooms; bees attracted to blooms; large stately tree with heart shaped leaves and good canopy; moderate soil conditions; not salt tolerant	sun to part sun	50-70'													4.5-7.5
Ulmus americana	American Elm: Liberty, Princeton, Jefferson, New Harmony, or Valley Forge	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'													5.5-8.0

Planting

Building Threshold or Educational Landscape | Evergreen Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**											
Thuja occidentalis	eastern arborvitae	a convient evergreen for small areas however there are multiple cultivars that have been crossed with non-native species and it can be difficult to purchase a true species **pH 6.8-7.2**	Sun	30-75'												

Planting

Building Threshold or Educational Landscape | Small Trees

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**													
Amelanchier arborea	shadbush	multi stem large shrub apperance; single stem availible; very popular landscape plant with seasonal intrest and edible fruit	Sun to Pt. Sun	15-35'			white flowers		red purple edible berries				orange/ red/ yellow fall color				5.5-7.5
Asimina triloba	paw paw	slow growing tree with edible fruit	sun to part sun	15-40'			maroon flowers										5.2-7.2
Cercis canadensis	eastern redbud	single and multi stems availibe; good commerical plant with many cultivars with varying sesonal attributes; FACU	Sun to Pt. Sun	20-30'			flowers / berries in spring; white and pink cultivars		cultivars can have green, golden, or purple foliage					yellow fall color			>7.5
Crataegus phaenopyrum	Washington hawthorn	PA is at its northern range; native to Missouri; cultivars can have thorns; good wildlife food source; tolerant of air pollution	Sun to Pt. Sun	25-30'						white flowers				red purple fall foliage		red berries in winter	6.8-7.2
Magnolia tripetala	umbrella magnolia	PA is northern most range; moist well drained soils	Sun to Pt. Sun	20-30'			white flowers										5-7.5

Planting

Building Threshold or Educational Landscape | Shrubs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species. **bold botanical names indicate common availibility in the landsape trade**					**SEASONAL INTEREST**											
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms						
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'										bright red stems in winter		
Fothergilla gardenii	fothergilla	PA is on its northernmost border; low manintenance; spreads by suckers	sun	3-6'									bright shades of orange, yellow and red fall foliage			
Hydrangea arborescens	Smooth Hydrangea	Annabelle' is widely availible cultivar.	part sun	3-6'						white flowers						
Hydrangea quercifolia	oak leaf hydrangea	several commerical cultivars	sun to part sun	4-6'						white flowers			bright fall color			
Hypericum kalmianum	St. John's Wort		sun to part sun	3'						yellow flowers						
Ilex glabra	inkberry	FACW; several commerically avilible cultivars, even dwarf ones; can be semi evergreen	sun to part sun	3-6'												
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter											
Itea virginica	sweetspire	OBL; very widely used commericially and can tolerate varying conditions; fragrant flowers	sun to part sun	3-6'				white flowers					bright fall color			
Kalmia latifolia	Mountain Laurel	prefers wooded, sandy, acidic conditions; commerically availible	part shade	10-20'												
Rhododendron catawbiense [maximum]	Catawba rhododendron	evergreen foliage with pale pink flowers early summer	part sun	15-20'												
Rhododendron periclymenoides	pinxterbloom	can handle moist soils	part sun	6-12'												
Rhus aromatica	fragrant sumac	spreading / naturalizing habit; dwarf culticars availible	sun to part sun	2-6'									bright fall color	red berries in winter		
Vaccinium corymbosum	highbush blueberry	FACW; native environments are acidic; edible fruits; strong fall color	sun to part sun					small pale pink flowers					bright fall color			
Viburnum acerifolium	Mapleleaf Viburnum	UPL found with Lindera and Hammamelis; widely used commercial native plant; pretty foliage, good fall color and bright blue berries	sun to shade	4-6'												
Viburnum dentatum	arrow wood viburnum	FAC; good fall color and bright blue berries; several culitvars avaible commercially	sun to part sun	10-12'												

Planting

Building Threshold or Educational Landscape | Herbs

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Anemone candensis	anemone	sometimes called Canda anemone it is native to PA; fast growing ground cover	sun to part sun	1-1.5'												
Arisaema triphyllum	Jack-in-the-pulpit	red berry clusters appear late summer to fall; unusual flower, spreads rapidly from seed; woodland native	part sun shade	1-3'												
Asarum canadense	Wild Ginger	dark green semi-evergreen attractive leaves; good groundcover for shaded areas	shade	4-8"												
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'												
Baptisia australis	Indigo	blue flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Baptisia tinctoria	Yellow Wild Indigo	yellow flowers in spring; intresting seed pods for dried arrangements	sun	2-3'												
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'												
Carex flaccosperma	blue wood sedge	slow spreader; blue green foliage; drought tolerant once established	part sun shade	6-10"												
Carex pensylvanica	Pennsylvania sedge	native forest ground speceis, commonly found under oaks	shade	8-10"												
Carex plantaginea	Seersucker Sedge	ribbed blade adds texture to this species; semi-evergreen; habitat is moist woods	part shade to shade	8-10"												
Carex playphylla	Silver Sedge	softer blue foliage than other species; benefits from pruning in late winter; once established can tolerate dry shade	part shade to shade	8-12"												
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'												
Cimicifuga racemosa	black snakeroot	large white flowers; best planted at the edge of a woodland for light shade	part sun to part shade	4-7'												
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'												
Dryopteris marginalis	eastern wood fern	clumping fern; evergreen fern preferring shady edge conditions	shade	12-18"												
Echinacea purpurea	purple coneflower	showy pink flowers in summer; unique seed heads in fall	sun to part sun	18-24"												
Epigea repens	trailing arbutus	evergreen groundcover with fragrant flowers; hard to establish and needs mycorrhizal fungi association	shade	6"												
Eragrostis spectabilis	Purple Lovegrass	low maintenace clumping grass; drought tolerant and air pollution tolerant; used in dried flower arrangements; a good tough plant	sun	2-3'												
Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"												
Heuchera americana	American alumroot	semi evergreen foliage; drought tolerant; foliage remains low; good ground cover	shade	1-2'												
Iris cristata	Dwarf Crested Iris	found along edges; do not bury rhizomes; white to blue flowers	part shade	4-16"												
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'												

Planting

Building Threshold or Educational Landscape | Herbs

Liatris spicata	blazing star	adaptable to varying conditions; purple flower spikes in summer; feathery foliage and upright habit adds texture to the landscape	sun	24-36"													
Lilium superbum	turk's cap lily	FACW; large flowers on tall upright stems; good hummingbird attractant; best to interplant with other perennials as flower heads can get heavy and weigh foliage down	sun	4-6'													
Monarda didyma	beebalm	great plant for butterflies and hummingbirds; can tolerate varying conditions; reseeds regularly; bright red flowers in summer	su n	2'													
Muhlenbergia mexicana	Satin Grass	fine blue green foliage with clouds of pink seed heads in fall; requires good drainage	sun to part sun	2-3'													
Osmunda cinnamomea	cinnamon fern	clump forming fern;; native to moist woodland conditions; looks nice in an ornamental border; cinnamon color spikes in fall	shade to part shade	3-5'													
Osmunda regalis	Royal Fern	similar conditions to the cinnamon fern but without spore fronds and softer foliage	part shade	2-4'													
Pachysandra procumbens	Allegheny spurge	semi evergreen groundcover; moist woodlands	part shade	12-18"													
Panicum virgatum 'Shenandoah'	Red Switchgrass	tall clump forming native grass tolerant of varying conditions; used ornamentally for its strong fall color and structure in winter; FAC	sun	3-4'													
Penstemon hirsutus	Hairy Beardtongue	dry fields and roadsides; drought tolerant; nice perennial border plant; lavender flowers in late May to early July	sun to part shade	16-24"													
Phlox stolonifera	Creeping Phlox	creeping evergreen groundcover with white or pinkish blue blooms in spring; moist soils	part shade to shade	8-10"													
Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6"													
Polygonatum biflorum var. biflorum	Solomon's Seal	woodland perennial with delicate white hanging bell shaped flowers in the spring; red berries follow flowers in late summer; prefers moist dappled shade	part shade	2-3'													
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'													
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"													
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'													
Silene caroliniana	Wild Pink	deep pink flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	6-8"													
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'													
Talinum teretifolium or calycinum	Fameflower	treatened speceis in PA; drought tolerant; good on rock outcroppings or alpine garden; self seeds; small pink flowers summer to fall	sun	6"													
Tiarella cordifolia	foamflower	white flowers in spring; good groundcover; native to decidious woodlands; average to moist soils															
Trillium sp.	Trillium	native woodland spring ephemeral; does not do well with disturbance; best in rich well drained garden soils															
Viola pedata	Birdfoot Violet	tight spacing; feathery foliage; attractive purple flower in spring; may drop foliage in heavy sun; moist to average garden soil	part sun to part shade	4-10"													

Planting

Green Roofs | Acidic

Green Roof- Acidic																	
Aster oblongifolius/ Symphyotrichum oblongifolium	Aromatic Aster	native to alcareous cliffs; fragrant leaves; longest blooming native aster; violet flowers; several commerical cultivars	sun	12-18"													
Baptisia tinctoria	Yellow Wild Indigo	yellow flowers in spring; intresting seed pods for dried arrangements	sun	2-3'													
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'													
Danthonia spicata	Poverty Oatgrass	Upl grass for dry mesic conditions; easily grown from seed	sun	6"													
Eragrostis spectabilis	Purple Lovegrass	low maintenace clumping grass; drought tolerant and air pollution tolerant; used in dried flower arrangements; a good tough plant	sun	2-3'													
Oenothera fruticosa	Sundrops	drought tolerant low growing plant; yellow flowers in early summer; tough plant for hot dry sites	sun	15-18"													
Opuntia humifusa	Eastern Prickly Pear	rocky dry conditions; can be found on rock ledges; yellow flowers in spring; clump forming cactus	sun	8"													
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'													
Silene caroliniana	Wild Pink	deep pink flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	6-8"													
Silene virginica	fire pink	red flowers in late spring; low growing plant for ornamental borders; well drained soils	part shade	12-18"													

Planting

Green Roofs | Basic

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
General Notes: the horticultural trade provides numerous variations on the plants specified. Choose cultivars or varieties (indicated with quotations or var.) not hybrids (indicated with an "x") these have the potential to be a cross with a non-native species.					SEASONAL INTEREST											
Green Roof- Basic																
Allium cernuum	Nodding Onion	drought tolerant; white to light pink globe flowers	sun to part sun	1-3'												
Antennaria virginica	Shale Barren Pussytoes	a rare plant in PA; small groundcover found in alpine conditions	part shade	4-8"												
Aquelgia canadensis	Wild Columbine	no cultivars; FAC; one of the first flowers to bloom in the spring; leafminers usually present on leafs	part shade	12-18"												
Asclepias verticillata	Whorled milkweed	very drought tolerant; good for difficult locations	sun	1-3'												
Bouteloua curtipendula	Side-Oats Gramma	warm season ornamental grass; good wildlife shelter in winter; strong fall foliage and unique seed heads	sun	2-3'												
Cunila origanoides	Dittany	a member of the mint family native to Missouri but naturlized throughtout the the Eastern US. Low maintenance plant adaptable to a variety of conditions	sun to part shade	12"												
Monarda fistulosa	Wild Bergamot	pale pink - lilac flowers in late summer; self seeds and tolerate varying conditions	sun	1-3'												
Penstemon hirsutus	Hairy Beardtongue	dry fields and roadsides; drought tolerant; nice perennial border plant; lavender flowers in late May to early July	sun to part shade	16-24"												
Phlox subulata	Moss Phlox	evergreen groundcover with white or white flowers; best in rock or alpine garden; drought tolerant	sun	4-6"												
Schizachyrium scoparium	Little Bluestem	FACU; drought tolerant grass for poor soil areas; good in massing; native to early successional meadows	sun	2-4'												
Sedum mat				<6"												
Solidago bicolor	Silver-rod	silvery-white flowers in late summer; grows best in infertile soils; dry; wooded edges or road sides	part sun	1-3'												
Solidago nemoralis	Gray Goldenrod	yellow flowers in late summer; grows best in infertile soils; rhizomatous habit forms massings	sun	1-2'												
Sorghastrum nutans	Indian Grass	UPL; tolerant of varying conditions	sun	3-8'												
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'												
Talinum teretifolium or calycinum	Fameflower	treatened speceis in PA; drought tolerant; good on rock outcroppings or alpine garden; self seeds; small pink flowers summer to fall	sun	6"												

Planting

Rain Gardens | Sun

Botanical Name	Common Name	Comments	Light	Average height at maturity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	pH
SUN																	
Acer rubrum	red maple	a great park plant adaptable to most conditions; specimens in multi stem form are availible; FAC; not salt tolerant; strong red fall color	sun to shade	40-60'													6.0-7.0
Nyssa sylvatica	blackgum	very adaptable tree with great fall color and small leaflets; can be found natively in varying conditions of wet or dry; FAC; salt tolerant; strong fall color or purples and reds	sun to part sun	30-50'													5.5-6.5
Quercus bicolor	swamp white oak	FACW; rapid growing tree in wet areas; no salt tolerance; single stem with large arching canopy; no fall color	Sun	50-60'													4.0-6.8
Quercus coccinea	scarlet oak	UPL; found on dry rocky sites; drought tolerant; nice fall color;	Sun	70-75'													4.5-6.5
Ulmus americana	American Elm: Liberty, Princeton, Jefferson, New Harmony, or Valley Forge	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'													5.5-8.0
EVERGREEN TREES																	
Magnolia virginiana	sweetbay magnolia	semi-evergreen; benefits from acidic soils; wind susceptable; FACW	Sun to Pt. Shade	15-35'					large white fragrant flowers				red berries				5.4-6.8
UNDERSTORY TREES																	
Sassafras albidium	sassafras	multi stem large shrub; single stem availible; strong fall color; good wildlife food source	Sun to Pt. Sun	30-50'									orange red fall foliage				6.0-7.0
SHRUBS																	
Ceanothus americanus	New Jersey Tea	Dry shade; slow growing	pt. sun to shade	1-3'						white / purple blooms							
Cephalanthus occidentalis	Buttonbush	OBL; moderate salt tolerance; fun globe white flowers in summer		6-10'						white flowers							
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms							
Cornus amomum	silky dogwood	FACW; no salt tolerance; attractive flowers and berries	sun to part sun	6-10'							white flowers						
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'									bright red stems in winter				

Planting

Rain Gardens | Sun

Hamamelis virginiana	common witchhazel	multi stem large shrub form; FACU; unique flowers in late winter; several non native commerical varieties	Sun to Pt. Sun	15-30'		yellow flowers in winter						yellow fall foliage						
Hydrangea	Smooth Hydrangea	Annabelle' is widely availible cultivar.	part sun	3-6'						white flowers								
Ilex glabra	inkberry	FACW; several commerically avilible cultivars, even dwarf ones; can be semi evergreen	sun to part sun	3-6'														
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter													
Lindera benzoin	Spicebush	deer tolerant species found in woodlands; FACW	sun to part sun	6-12'														
Rhododendron periclymenoides	pinxterbloom	can handle moist soils	part sun	6-12'														
Rhododendron viscosum	swamp azalea	fragrant flowers in early summer; wide native range; OBL	sun to part sun	4-8'						white flowers								
Rhus aromatica	fragrant sumac	spreading / naturalizing habit; dwarf culticars availible	sun to part sun	2-6'										bright fall color		red berries in winter		
Sambucus canadensis	Common Elderberry	FACW; fast growing shrub with moderate salt tolerance; varying cultivars availible	sun	6-8'					white flowers									
Vaccinium angustifolium	Lowbush Blueberry	FACU; edible fruit; can be difficult to establish; strong fall color	sun	1-2'				small pale pink flowers					bright fall color					
HERBACEOUS																		
Allium cernuum	Nodding Onion	drought tolerant; white to light pink globe flowers;UPL	sun to part sun	1-3'														
Aquelgia canadensis	Wild Columbine	no cultivars; FAC; one of the first flowers to bloom in the spring; leafminers usually present on leafs	part shade	12-18"														
Asclepias incarnata	Swamp Milkweed	OBL	sun to part sun	3-5'														
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'														
Caltha palustris	Yellow Marsh Marigold	OBL		8-12"														
Carex amphibola	Creek Sedge	a great native alternative to liriope, good clumping habit with wider distinctive blade than most carex sp.	sun to part sun	12"														
Carex sticta	Tussock Sedge	emergent aquatic plant found in wetlands; OBL; forms clumps with growth; no salt tolerance; spreads by rhizomes	sun to part sun	3'														
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'														
Coreopsis verticillata	Threadleaf Coreopsis	bright yellow flowers in summer; very tolerant widely planted commerical perennial	sun	1-2'														
Elymus virginicus	Virginia Wildrye	FACW																
Eragrostis spectabilis	Purple Lovegrass	low maintenace clumping grass; drought tolerant and air pollution tolerant; used in dried flower arrangements; a good tough plant	sun	2-3'														
Eupatorium purpurea	joe pye weed	many cultivars availible; native to open fields and woods; can tolerate varying conditions	sun part sun	2-6'														

Planting

Rain Gardens | Sun

Helianthus divaricatus	woodland sunflower	hardy perrennial plant adaptable to varying conditions	sun to part sun	3-5'														
Iris versicolor	Blue Flag	OBL; great flowering perennial for wet areas; moderate salt tolerance		2-3'														
Juncus effusus	soft rush	FACW; low salt tolerance; clump forming grass with strong upright habit; brown seed heads in late summer stand out against foliage	sun	4'														
Juncus tenuis	path rush	FAC; low growing clump forming grass; does will with light foot traffic and can tolerate compacted soils; cannot handle short mowing	part sun	2'														
Liatris spicata	blazing star	adaptable to varying conditions; purple flower spikes in summer; feathery foliage and upright habit adds texture to the landscape	sun	24-36"														
Lobelia cardinalis	cardinal flower	found along stream edges; prefers moist part shaded woodland conditions; no salt tolerance	sun part shade	2-4'														
Monarda didyma	beebalm	great plant for butterflies and hummingbirds; can tolerate varying conditions; reseeds regularly; bright red flowers in summer	su n	2'														
Monarda fistulosa	Wild Bergamot	pale pink - lilac flowers in late summer; self seeds and tolerate varying conditions	sun	1-3'														
Oenothera fruticosa	Sundrops	drought tolerant low growing plant; yellow flowers in early summer; tough plant for hot dry sites	sun	15-18"														
Panicum virgatum 'Shenandoah'	Red Switchgrass	tall clump forming native grass tolerant of varying conditions; used ornamentally for its strong fall color and structure in winter; FAC	sun	3-4'														
Rudbeckia fulgida	coneflower	FAC; large decorative yellow daisy like flowers in summer; adabtable to traditional garden conditions	sun to part sun	18-24"														
Schizachyrium scoparium	Little Bluestem	FACU; drought tolerant grass for poor soil areas; good in massing; native to early successional meadows	sun	2-4'														
Senecio aureus	golden ragwort	yellow daisy flowers in early spring; evergreen in wet areas; can handle a wide range of conditions but native to woodland edges; thick tolerant groundcover	part shade	1-2'														
Solidago speciosa	Showy Goldenrod			1-3'														
Sporobolus heterolepis	Prarie Dropseed	a short ornamental grass with good structure and fine foliage; moderate drough tolerance	sun to part sun	2-3'														
Symplocarpus foetidus	Shkunk Cabbage	OBL; large leaved attractive foliage in wet areas; found in shaded swamps and along roadsides; moderate salt tolerance; difficult to obtain commercially	shade to part shade	2-3'														
Thelypteris noveboracensis	new york fern	one of the most sun tolerant fern species; yellow green fronds; natualizes producing thick ground cover; prefers moist woodland conditions but will tolerate varying conditions	part sun to shade	1-2'														
Uvularia grandiflora	large flowered bellwort	native to southeaster US, PA is at norhthermost border; drought tolerant shade perennial; yellow flowers in spring; low maintenance plant that will naturalize	shade to part shade	1-2'														
Verbena hastata	blue vervain	native to most of the eastern US; found in wet meadows; tall thin spikes of violet flowers; not salt tolerant	sun	4-6'														

Planting

Rain Gardens | Sun

Vernonia noveboracensis	New York ironweed	FAC; purple flowers in Aug; bright showy flowers in late season; good for wet meadow; not salt tolerant	sun to part sun	4-6'													
Viola pedata	Birdfoot Violet	tight spacing; feathery foliage; attractive purple flower in spring; may drop foliage in heavy sun; moist to average garden soil	part sun to part shade	4-10"													
Viola spp.		pansy-like miniture plant; used in dry meadows for spring color; reseeds	sun	6-10"													
Waldsteinia fragarioides	Appalachian Barren Strawberry	tolerates clay soils and varying conditions; naturalized to most of the easter US; low maintenance and will spread forming a thick groundcover	full sun to part shade	6"													
Zizia aurea	Golden Alexanders	FAC; moist meadows and floodplains; great plant for wildlife	sun to part shade	1-3'													

Planting

Rain Gardens | Shade

SHADE					
HERBACEOUS					
Asarum canadense	Wild Ginger	dark green semi-evergreen attractive leaves; good groundcover for shaded areas	shade	4-8"	
Aster cordifolus	Blue Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2-3'	
Aster divaricatus (Eurybia divaricata)	White Wood Aster	rocky woods, drought tolerant; rhizomatus habit	part shade	2'	
Athyrium filix-femina	Lady Fern	very tough easy to grow fern in part sun locations; found in swamps and thickets	part sun	1-2'	
Carex amphibola	Creek Sedge	a great native alternative to liriope, good clumping habit with wider distinctive blade than most carex sp.	sun to part sun	12"	
Carex eburnea	Bristleleaf Sedge	soft thread like foliage; small habit; good naturalizer	part sun	6-8"	
Carex plantaginea	Seersucker Sedge	ribbed blade adds texture to this species; semi-evergreen; habitat is moist woods	part shade to shade	8-10"	
Carex playphylla	Silver Sedge	softer blue foliage than other species; benefits from pruning in late winter; once established can tolerate dry shade	part shade to shade	8-12"	
Carex sticta	Tussock Sedge	emergent aquatic plant found in wetlands; OBL; forms clumps with growth; no salt tolerance; spreads by rhizomes	sun to part sun	3'	
Chelone glabra	White Turtlehead	OBL; white flowers in fall	sun to part sun	1-4'	
Chrysogonum virginanum	Green and Gold	semi evergreen groundcover found on slopes and in alpine areas; yellow daisy flowers in May and then occassionally through summer; can tolerate drought	sun to part sun	6-8"	
Dennstaedtia punctilobula	hay-scented fern	native woodland habit, moist to average soils; vigorous spreader and makes a good shaded groundcover; orange fall color to fronds;	shade	15-24"	
Dryopteris marginalis	eastern wood fern	clumping fern; evergreen fern preferring shady edge conditions	shade	12-18"	
Deschampsia flexuosa	Wavy Hairgrass	good alternative to C.pennsylvanica in dry areas; semi-evergreen; tidy clumping habit	shade	6-18"	
Geranium maculatum	Wild Geranium	many cultivars availible; will drop foliage early in full sun; pink flowers and light fragrant foliage; can handle dry soils; low maintenance	part shade	6-12"	
Geum fragaroides	Appalachian Barren Strawberry				
Heuchera americana	American alumroot	semi evergreen foliage; drought tolerant; foliage remains low; good ground cover	shade	1-2'	

Planting

Rain Gardens | Shade

Mertensia virginica	virginia blue bells	spring ephemeral with bright blue flowers; very attractive in massing; prefers moderately moist woodland locations; companion plant to provide seasonal interest	part sun	1-2'														
Onoclea sensiblis	sensitive fern	rhizomatus fern that spreads easily in wet areas; good groundcover in moist woodlands	shade to part shade	12-18"														
Osmunda cinnamomea	cinnamon fern	clump forming fern;; native to moist woodland conditions; looks nice in an ornamental border; cinnamon color spikes in fall	shade to part shade	3-5'														
Osmunda regalis	Royal Fern	similar conditions to the cinnamon fern but without spore fronds and softer foliage	shade to part shade	2-4'														
Pachysandra procumbens	Allegheny spurge	semi evergreen groundcover; moist woodlands	shade to part shade	12-18"														
Phlox stolonifera	Creeping Phlox	creeping evergreen groundcover with white or pinkish blue blooms in spring; moist soils	part shade to shade	8-10"														
Phlox divaricata	Wild Blue Phlox	fragrant pale blue flowers	part shade to shade	6-24"														
Podophyllum pelatum	Mayapple	spring ephemeral with large maple shaped leaves; found in average to moist woodlands in light canopies; large green fruit forms in May	part shade	6-8"														
Polystichum acrostichoides	Christmas fern	FACU; evergreen clumping ferm; strong habit shows well as a speciment fern; dry woodlands	part shade to shade	2'														
Thelypteris noveboracensis	new york fern	one of the most sun tolerant fern species; yellow green fronds; natualizes producing thick ground cover; prefers moist woodland conditions but will tolerate varying conditions	part sun to shade	1-2'														
Viola labradorica	Alpine Violet	low maintenacne groundcover that will spread by self seeding and creeping stems to form a thick cover; can be aggressive	shade to part shade	6"														
Woodwardia areolata	netted chain fern	native throughout the most of the US; medium to wet soils; will naturalize and form a dense ground cover; low maintenance	part to full shade	18-24"														
Zizia aurea	Golden Alexanders	FAC; moist meadows and floodplains; great plant for wildlife	sun to part shade	1-3'														
SHRUBS																		
Aronia arbutifolia	red chokeberry	FACW; tolerant of wet and moderate salt locations	sun	5-10'				white flowers						red berries through				
Asimina triloba	paw paw	slow growing tree with edible fruit	part sun	15-40'														

Planting

Rain Gardens | Shade

Ceanothus americanus	New Jersey Tea	Dry shade; slow growing	pt. sun to shade	1-3'						white / purple blooms							
Cephalanthus occidentalis	Buttonbush	OBL; moderate salt tolerance; fun globe white flowers in summer		6-10'						white flowers							
Clethra alnifolia	Summersweet	FAC+; white fragrant flowers summer; can handle wet soils and moist woodlands; commerical cultivars readily availble ; not salt tolerant	sun to part sun	3-6'						fragrant while blooms							
Cornus amomum	silky dogwood	FACW; no salt tolerance; attractive flowers and berries	sun to part sun	6-10'							white flowers						
Cornus stolonifera or sericea	red twig dogwood	attractive red twigs in winter several cultivars availble commerically; new growth produces brightest red; FACW+ good for stream bank restoration	sun to part sun	6-10'									bright red stems in winter				
Hamamelis virginiana	common witchhazel	multi stem large shrub form; FACU; unique flowers in late winter; several non native commerical varieties	Sun to Pt. Sun	15-30'		yellow flowers in winter						yellow fall foliage					
Ilex glabra	inkberry	FACW; several commerically avilible cultivars, even dwarf ones; can be semi evergreen	sun to part sun	3-6'													
Ilex verticillata	Winterberry	must include at least one male per 5-6 females; Use 'Jim Dandy' as male cultivar; yellow berry cultivars availible	part sun	6-10'	red berries in winter												
Itea virginica	sweetspire	OBL; very widely used commerically and can tolerate varying conditions; fragrant flowers	sun to part sun	3-6'				white flowers				bright fall color					
Kalmia latifolia	Mountain Laurel	prefers wooded, sandy, acidic conditions; commerically availible	part shade	10-20'													
Kalmia angustifolia	sheep laurel	less commercially availible than K. latifolia; found in pastures, barrens, slow wooded streams, swamp borders, bogs, thickets	part shade	2-3'													
Lindera benzoin	Spicebush	deer tolerant species found in woodlands; FACW	sun to part sun	6-12'													
Rhododendron periclymenoides	pinxterbloom	can handle moist soils	part sun	6-12'													
Rhododendron viscosum	swamp azalea	fragrant flowers in early summer; wide native range; OBL	sun to part sun	4-8'						white flowers							
Rhododendron catawbiense [maximum]	Catawba rhododendron	evergreen foliage with pale pink flowers early summer	part sun	15-20'													
Spirea tomentosa	steeplebush	FACW; wet meadows, moist fields, riparian buffers; no salt tolerance; rhizomatous shrub that naturalizes	sun to part sun	3'													
Sambucus canadensis	Common Elderberry	FACW; fast growing shrub with moderate salt tolerance; varying cultivars availible	sun to part sun	6-8'					white flowers								

Planting

Rain Gardens | Shade

CANOPY TREES																		
Acer rubrum	red maple	a great park plant adaptable to most conditions; specimens in multi stem form are availible; FAC; not salt tolerant; strong red fall color	sun to shade	40-60'														6.0-7.0
Amelanchier candensis	serviceberry	similar to A. laevis and A. arborea but the habit is more upright with suckering multi stem form. Native to bogs and swamps.	Sun to Pt. Sun	10-12'			white flowers		red purple edible berries				orange/ red/ yellow fall color					5.5-6.0
Carpinus caroliniana	American hornbeam	plant has several common names; FAC; low drought tolerance and no salt tolerance; good fall color; trunks are often crooked a bit	Sun to Pt. Sun	20-40'									red purple fall foliage		grey bark			6.8-7.2
Carya spp.	species include: ovata, laciniosa, cordiformis, glabra, tomentosa	several native species of this plant exist however they are difficult to obtain commerically as they are difficlut to propogate; yellow orange fall color; nuts are edible	sun to part sun	50-75'														6.4-7.5
Liriodendron tulipifera	tulip poplar	fast growing tree with straigh upright habit; unique flowers in spring and seed pods in fall; FACU; no salt tolerance	sun part sun	85'+														4.5-7.5
Nyssa sylvatica	blackgum	very adaptable tree with great fall color and small leaflets; can be found natively in varying conditions of wet or dry; FAC; salt tolerant; strong fall color or purples and reds	sun to part sun	30-50'														5.5-6.5
Ostrya virginiana	hop-hornbeam	native understory tree; can tolerate varying conditions of clay, drought, salt, smooth grey bark is slightly attractive; trunk can grow askew	part sun to shade	25-40'														4.2-7.6
Quercus bicolor	swamp white oak	FACW; rapid growing tree in wet areas; no salt tolerance; single stem with large arching canopy; no fall color	Sun	50-60'														4.3-6.5
Quercus coccinea	scarlet oak	UPL; found on dry rocky sites; drought tolerant; nice fall color;	Sun	70-75'														4.5-6.5
Quercus macrocarpa	Bur Oak	large canopy tree; can tolerate dry to wet; found naturally in floodplains; native to fire prone systems; no salt tolerance	Sun to part sun	40-60'														5.3-7.4
Quercus rubra	red oak	FACU; moderate drought tolerance; no salt tolerance; widely used landscape plant with many cultivars; good form; cultivars vary in fall color	Sun	60-75'														4.3-6.5
Tilia americana	American basswood	with heart shaped leaves and good canopy; moderate soil conditions; not salt tolerant	sun to part sun	50-70'														4.5-7.5
Ulmus americana	American Elm: Liberty, Princeton, Jefferson, New Harmony, or Valley Forge	adapts to wet and dry sites; tolerant of urban conditions; decorative fruit; very used landscape tree;some cultivars susceptable to dutch elm disease	sun	60-80'														5.5-8.0
EVERGREEN TREES																		
Ilex opaca (ID the cultivar)	American holly cultivar	slow growing; FACW+; wind susceptable	Sun to Pt. Shade	40-50'			white flws								red berries			5.0-6.5
Juniperus virginiana	Eastern red cedar	readily colonises abandoned fields, can handle variable conditions; FACU	Sun	30-50'											blue berries			4.7-7.8

Planting

Rain Gardens | Shade

Magnolia virginiana	sweetbay magnolia	semi-evergreen; benefits from acidic soils; wind susceptable; FACW	Sun to Pt. Shade	15-35'					large white fragrant flowers					red berries		5.0-6.0
Pinus virginiana	Virginia pine	grows best on clay or loam sites; UPL	Full Sun	30-40'												4.5-7.5
UNDERSTORY TREES																
Cercis canadensis	eastern redbud	single and multi stems availibe; good commerical plant with many cultivars with varying sesonal attributes; FACU	Sun to Pt. Sun	20-30'			wht. or pink flowers / berries in spring;		cultivars can have green, golden, or purple foliage					yellow fall color		>7.5
Chionanthus virginicus	white fringetree	low branched multi stem habit; tolerant of clay soils and pollution	Sun to Pt. Sun	15-20'				white flowers						yellow fall color		4.5-6.5
Cornus florida	dogwood	single stem shade tolerant tree; nativley found in moist shaded woodlands	Pt. Sun	15-30'				white flowers						red purple fall foliage		6.0-7.0
Sassafras albidium	sassafras	multi stem large shrub; single stem availible; strong fall color; good wildlife food source	Sun to Pt. Sun	30-50'										orange red fall foliage		6.0-7.0