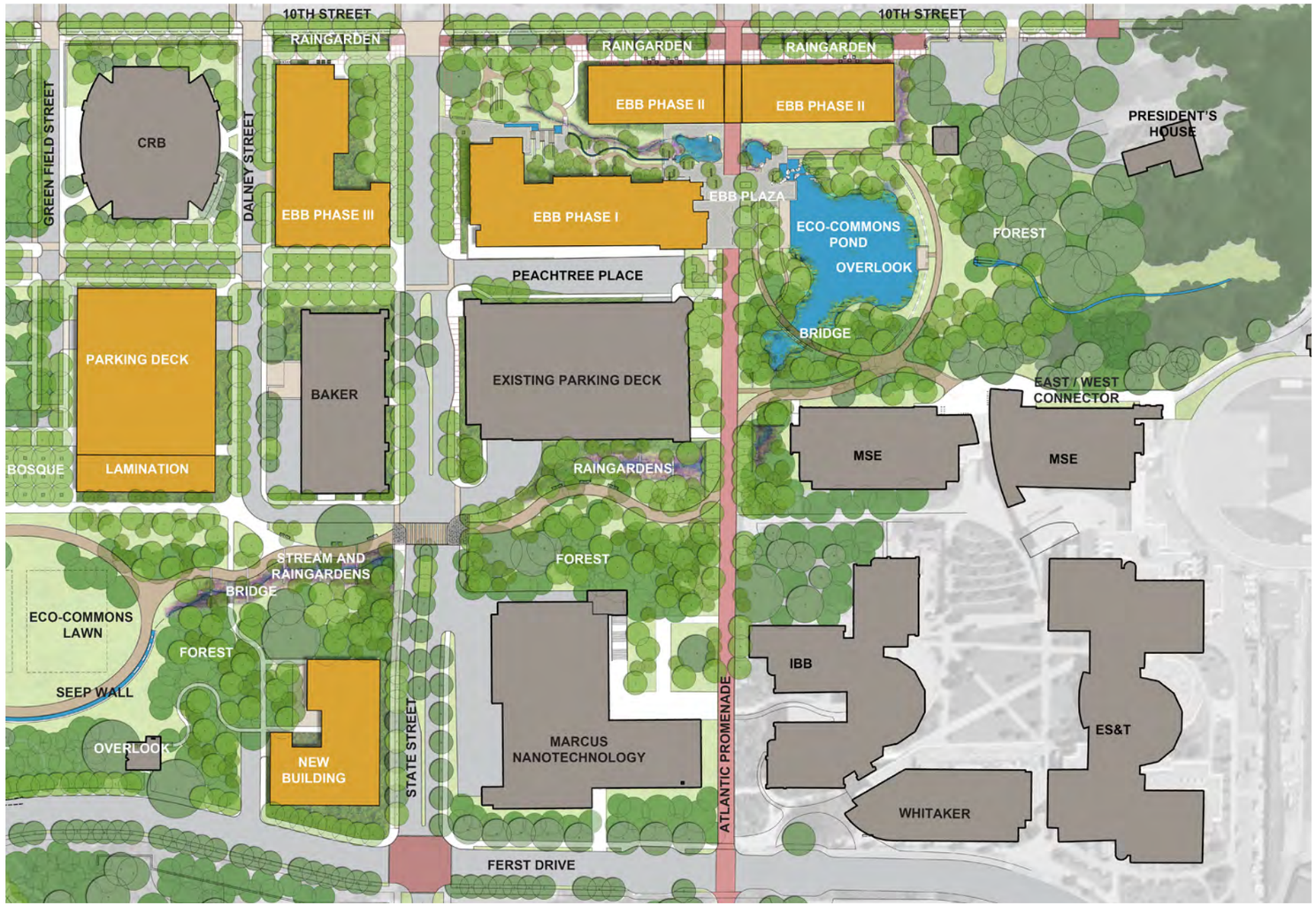
CONCEPTUAL DESIGN PLAN
ENGINEERED BIOSYSTEMS BUILDING (EBB) CAMPUS SECTOR



Georgia Institute of Technology

October 2013

ACKNOWLEDGEMENTS

Many thanks to the members of the Georgia Institute of Technology Campus Community who generously shared their time, expertise, and inspiration throughout this conceptual planning process. This plan is the result of a collaborative effort led by the Office of Capital Planning and Space Management.

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EXECUTIVE SUMMARY

Introduction & Overview

In the spring of 2013, Georgia Tech initiated a conceptual planning and design process for the portion of campus which immediately surrounds the Engineered Biosystems Building – Phase 1 (EBB-I). EBB-I was under construction at the time and is currently scheduled for completion in 2014. The focus of this conceptual planning effort was to refine and further develop key landscape, stormwater and infrastructure related elements of the previously completed EBB Sector Plan (2013). This conceptual study focused on six specific areas within the district. Building on the recently completed Stormwater Management Master Plan for Basin A, this effort also addressed aspects of the stormwater system required to support the Eco-Commons. And, finally, this document recommends additional design standards to be associated specifically with the Eco-Commons.

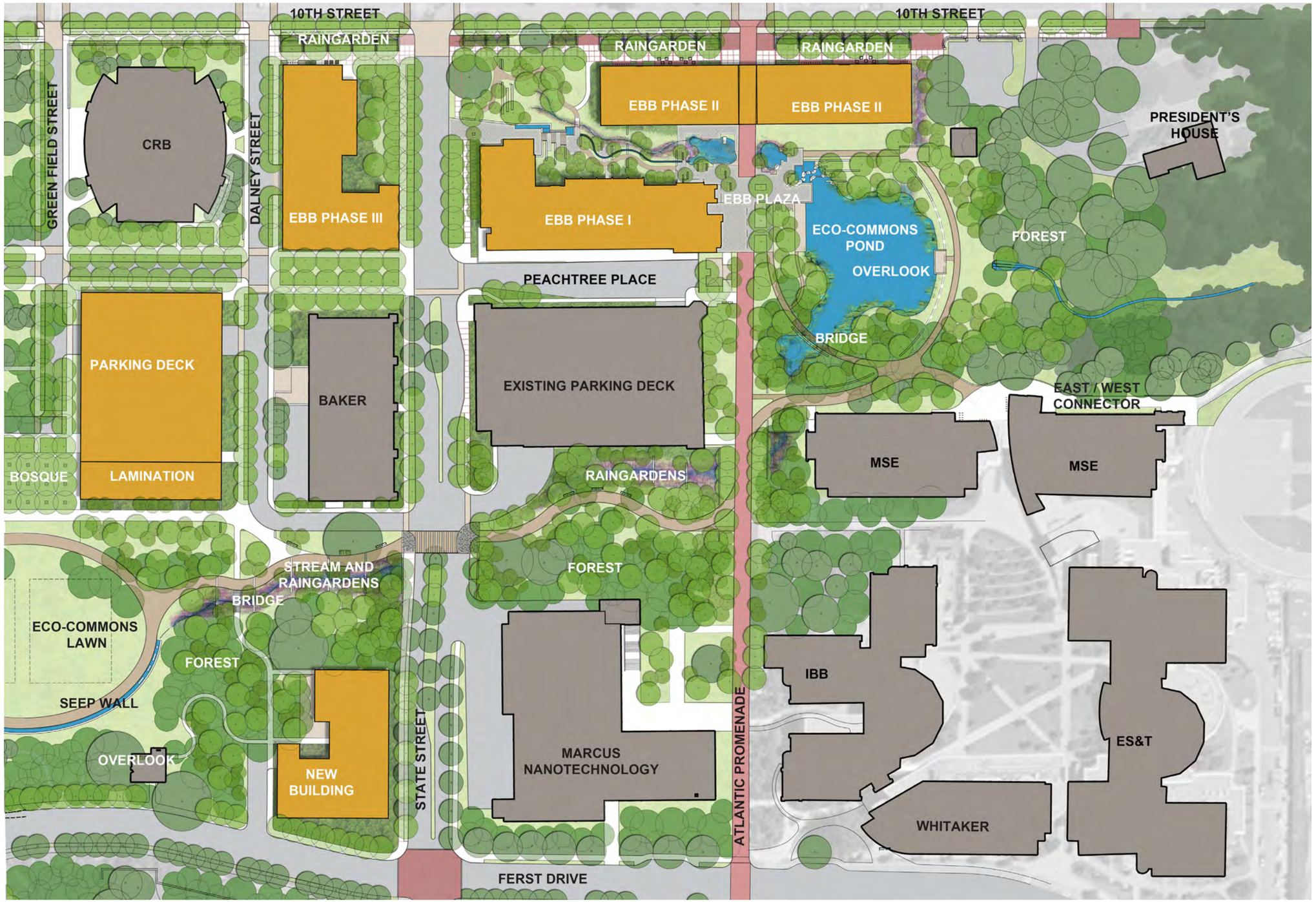
Key focus areas included:

- **The East-West Connector** – this is the first segment of a proposed pedestrian connector which will traverse the northern portion of campus ultimately linking the West Campus housing area with Fowler Street and the newly renovated McCamish Pavilion. The first phase of this connector will be built in the fall of 2013 and it will connect the North Deck and the Atlantic Promenade to the Tennis Complex.
- **Eco-Commons Pond** – This pond, also referred to as the Glade Pond, will be both the terminal feature of the Forest Ribbon Eco-Commons in this sector of campus and it will serve as a primary amenity and gathering place for the adjacent EBB and MSE research complexes. In addition to serving as a visual amenity, the pond will exist as a viable ecosystem and provide a stormwater management function. The Pond, and its adjacent plaza areas also serve as the northern open space corollary, or compliment, to Tech Green to the south.
- **Eco-Commons Thresholds** – The Eco-Commons connects with and crosses two major north-south corridors (State Street and the Atlantic Promenade) in this area of campus. The recommendation is that these connection points, or thresholds, be emphasized, through paving and plant species changes, to increase awareness of the overlapping urban and ecological systems.
- **8th Street Rain Gardens** – The proposed rain gardens on either side of State Street are an integral part of the Eco-Commons and will connect the oval lawn area near Hemphill Avenue to the Eco-Commons Pond. This area is currently largely a surface parking area and can only be converted back to open space when the proposed new parking deck is constructed. The intent is to provide a regular and relatively consistent surface water flow through these rain gardens utilizing captured stormwater.
- **10th Street Corridor** – A sixty foot setback was adopted in the EBB Sector Plan for the 10th Street campus edge. In this effort the focus has been a more detailed study of the eastern end of the setback zone, generally from Greenfield Street to the President's House, with a focus on how and where the setback zone transitions back to the existing condition at Holly Street and the Graduate Living Center (GLC).
- **North-South Street Corridors** – Three existing street corridors were also studied; Greenfield, Dalney and State. Dalney and Greenfield are and will remain for the foreseeable future relatively minor service streets. Their importance will increase somewhat when the proposed new deck is constructed as both streets will likely be utilized to access the deck. State Street is currently a major vehicular route into campus and will likely increase in importance, particularly with the closing of Atlantic Drive to vehicular traffic and with the reconfiguration of the North Deck to have its primary entry on State Street. Alternative configurations were developed for the busy State Street and Ferst Drive intersection.
- **Standards** – The design team has recommended that two additional elements, specific to the Eco-Commons, be incorporated into the Campus Landscape Standards. These elements are a new light and a new paving material intended to be utilized specifically for the Eco-Commons as a way of identifying and distinguishing the Eco-Commons within the larger campus landscape.
- **Stormwater** – A Stormwater Management Master Plan was developed for Basin A earlier this year (2013). This team has applied the concepts developed in that master plan to this process and further developed and refined the design for the system in the study area. Stormwater volumes, surface flows and subsurface piping systems were incorporated into the conceptual design of the Eco-Commons rain gardens and Pond.

As it redevelops this northern sector of the campus, Georgia Tech has the opportunity to implement a world-class campus environment here. One key aspect of that unique environment will be the Eco-Commons which will include the Eighth Street Rain Gardens, the 10th Street Campus Edge and the Eco-Commons Pond. These will all become iconic open spaces to which many in the campus community will be drawn to study, socialize, exercise, relax, and contemplate in or circulate through.

View southeast across the proposed Eco-Commons Pond from the Atlantic Promenade overlook towards MSE

View west along the proposed 10th Street Corridor (EBB Phase 2 on the left)



Illustrative Conceptual Design Plan for the Engineered Biosystems Building (EBB) Campus Sector

I. INTRODUCTION

Introduction

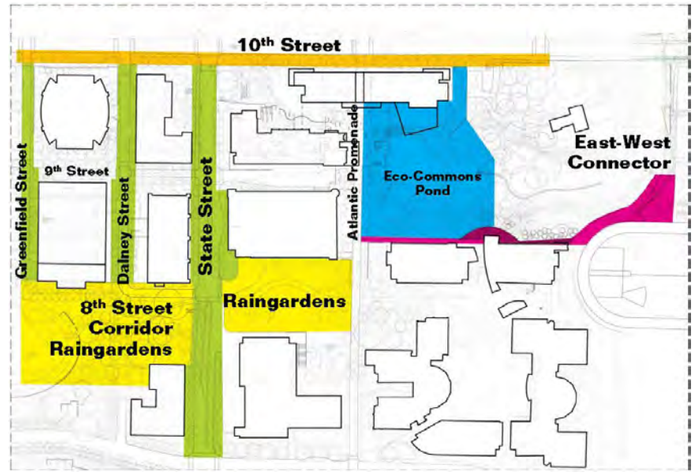
In association with the ongoing construction of the EBB – Phase I Building, the pending construction of a portion of the East-West Connector and other associated planning efforts for future improvements within the EBB District, Georgia Tech retained the consultant team to develop a concept level plan for the District. This effort has a predominately landscape emphasis and has been focused on the Eco-Commons and other key corridors within the District.

Framework

The Eco-Commons provides an underlying framework and structure to the EBB District. It is through this portion of campus where the Eco-Commons will be most evident and where it can perhaps have the greatest impact. The Eco-Commons reflects the campus's physiography and natural drainage pattern; in the EBB District it is comprised primarily of bottom lands; this is the area where surface water can be expressed; and it is the site of the Eco-Commons Pond – the Eco-Commons terminal feature. The primary circulation element in this portion of the Eco-Commons is the Loop Path which connects the Oval Lawn adjacent to Hemphill Avenue with the Eco-Commons Pond.

Juxtaposed against the organic form of the Eco-Commons in this EBB District is the urban grid of existing and former City streets. The major circulation elements of this grid include: Atlantic Promenade – as the major north-south pedestrian and bicycle spine; State Street – as the major vehicular entry into this north-central portion of campus; and the 10th Street campus edge which includes a building setback of 60' and enables provision for a bikeway and wide pedestrian walkway along with a street tree planting and rain garden zone. There are a series of campus thresholds along this 10th Street campus edge.

Design Corridors Diagram from the Landscape Master Plan Update (2011) by Georgia Tech Capital Planning and Space Management



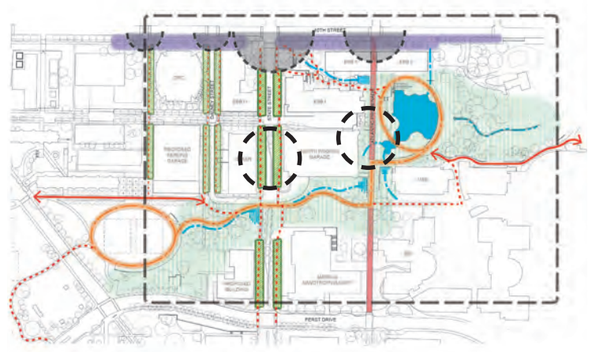
Focus Area Diagram

EBB SECTOR CONCEPTUAL DESIGN PROCESS DIAGRAMS

Eco-Commons Area Diagram - showing proposed forest areas and proposed hydrology

Eco-Commons Primary Pathway Diagram

EBB Sector Pedestrian Connectivity Diagram

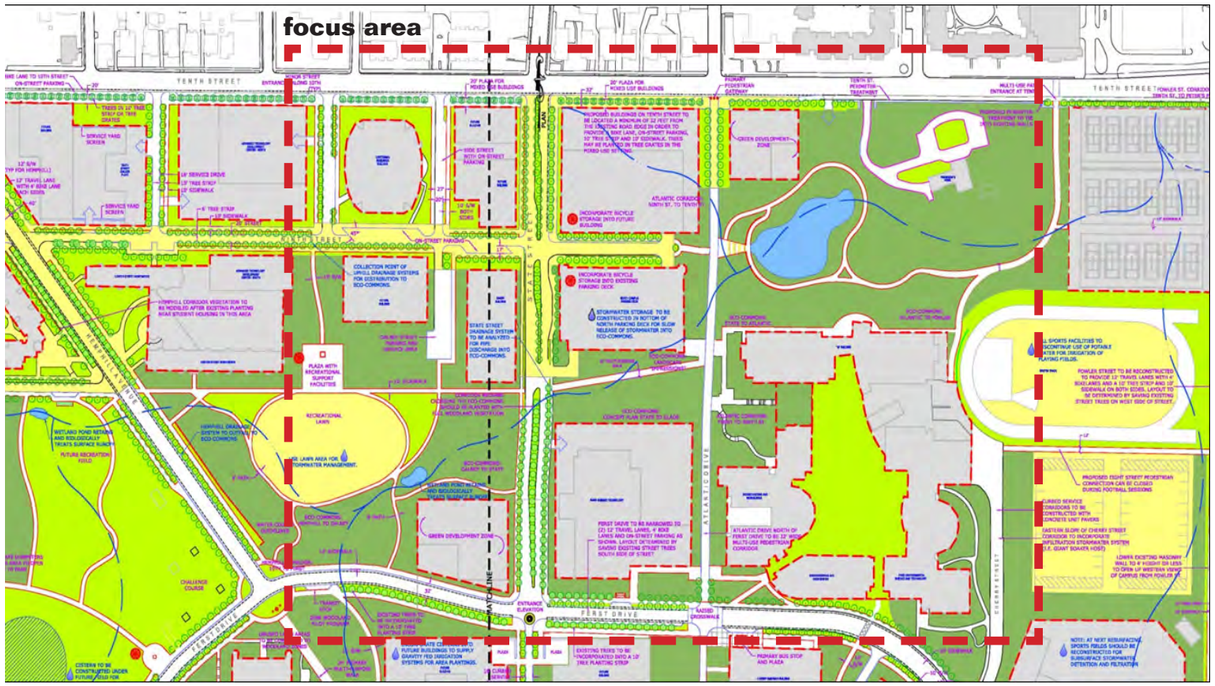


EBB Sector Design Corridors with Key Thresholds Diagram

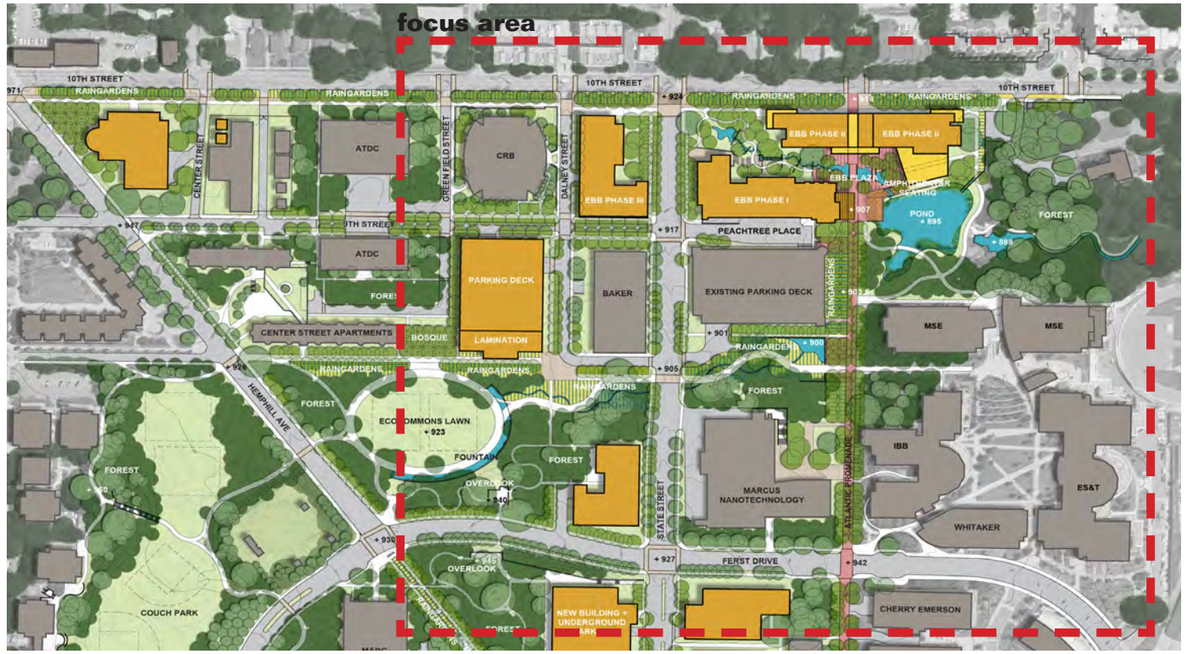
Basis of Design

Several documents have served as key guides for the design team during this conceptual design process. These documents include the Campus Landscape Master Plan Update (2011), the Engineered Biosystems Building Sector Plan Report (2013), and the Basin A Stormwater Management Master Plan (2013). Taken collectively these documents have served as a foundational basis of design for this effort – especially relative to the Eco-Commons.

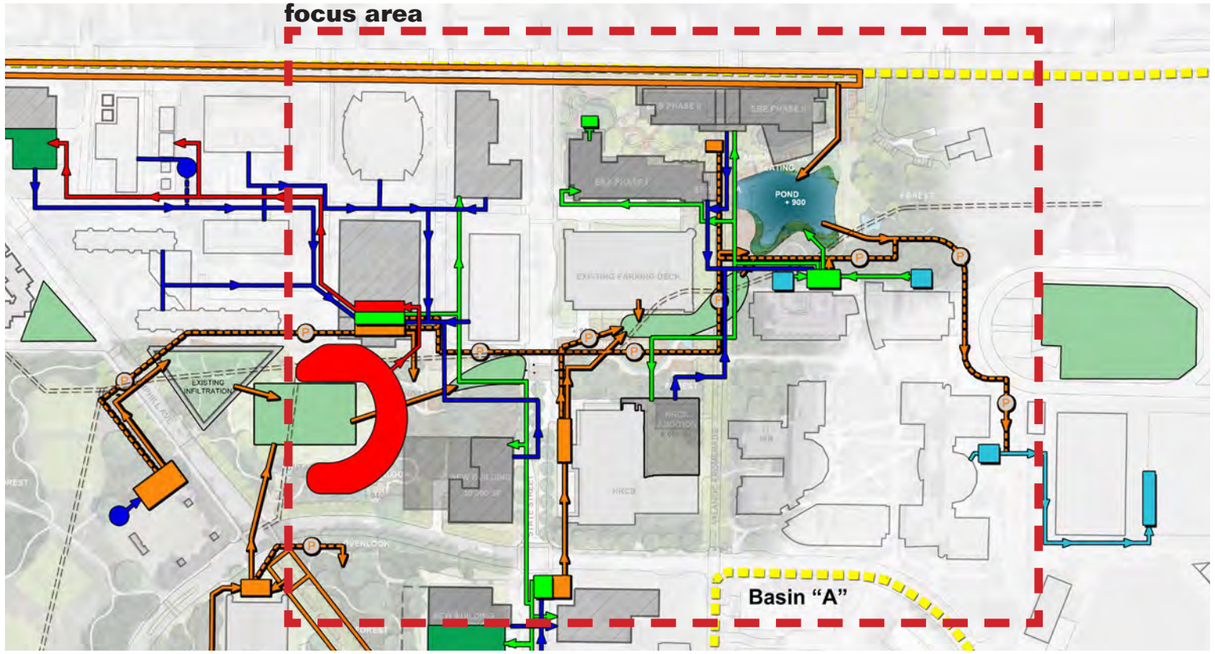
This design effort included a focus on several corridors which the Campus Landscape Master Plan identified as important Design Corridors. The Design Corridors define "a grid of movement and open space corridors that represent the most communally-shared part of the campus. The LMP highlights their potential to unify the campus, give it visual logic, and provide the 'street addresses' for all of Tech's buildings." Tenth Street, Atlantic Promenade, State Street and the East-West Connector all fall into this category.



Landscape Master Plan Update (2011) by Georgia Tech Capital Planning and Space Management



Engineered Biosystems Building (EBB) and South-Central Campus Sector Plans (2013) by NBW / jB+a / C+CS / VHB



Basin A Stormwater Management Plan (2013) by Jacobs Engineering, Inc.

II. EAST / WEST CONNECTOR

East / West Connector

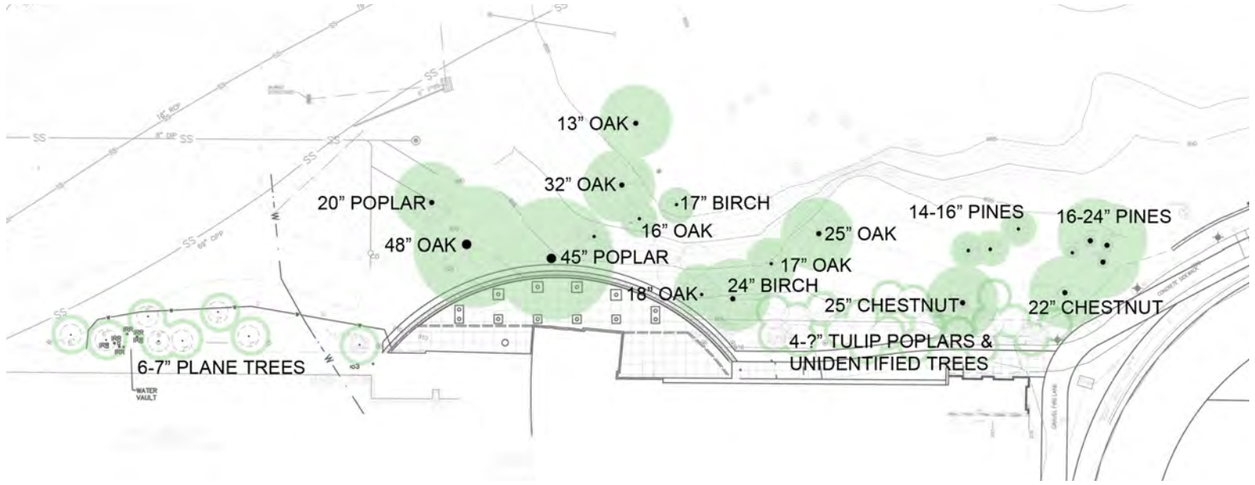
The first phase of a major east-west pedestrian connector for the northern portion of campus is due to be constructed later this year (2013). The primary purpose of this initial phase of the connector is to provide a safe, comfortable and convenient pedestrian route between the North Deck and the newly remodeled Hank McCamish Pavilion at Fowler and 10th Streets. This connector will serve attendees at basketball games and other special events and would likely be heavily utilized during the fall and winter months and during evening hours.

The route will begin as you exit the east-side of the North Deck at the Atlantic Promenade, pass along the north side of the Molecular Science Engineering Building (MSE), wrap around the end of the Griffin Track and alongside of the new Ken Byers Tennis complex stands, then up the steps and across Fowler Street to the pavilion.

The most challenging portion of the connector alignment lies along the north side of the MSE Building. This area is immediately adjacent to the future Eco-Commons Pond and abuts the back of the President's House and woodland glade which is both steep and heavily wooded. Currently the walkway is narrow, dark and unappealing. It needs to be open, well lit and provide a clear, intuitive and appealing connection to the McCamish Pavilion.

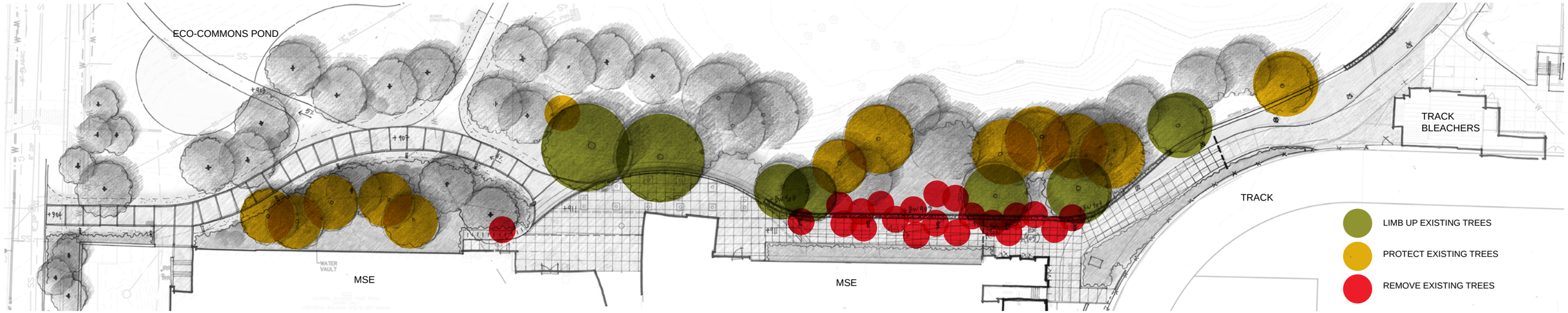
From Atlantic, the plan recommends constructing a 15' wide walkway which is pulled away from the building and will connect into the future Eco-Commons Pond walkway system. This walk will reflect and retain the existing emergency/fire access lanes which exist at both northern corners of the MSE building. The existing overlook terrace at MSE will also be retained but, in order to provide improved flow and greater visual continuity around MSE, the walkway will enter and exit the overlook further away from the building than it does currently.

Along the eastern portion of the connector, but still adjacent to MSE, the terrain gets steeper and the existing vegetation gets denser. As a result, the recommendation is to construct a continuous rubble retaining wall, 25' away from the face of the MSE building, connecting the existing walls along the back of the President's property with the MSE overlook terrace. In addition, to improve visibility a number of the smaller trees closest to the existing walk should be removed and several large trees should be limbed up so as to open up the sight-lines. There are several specimen trees in this area which should be protected during construction. The construction of a generous 15' wide sidewalk and an 8'planter separation from the building will improve the current cramped pedestrian experience in this area.

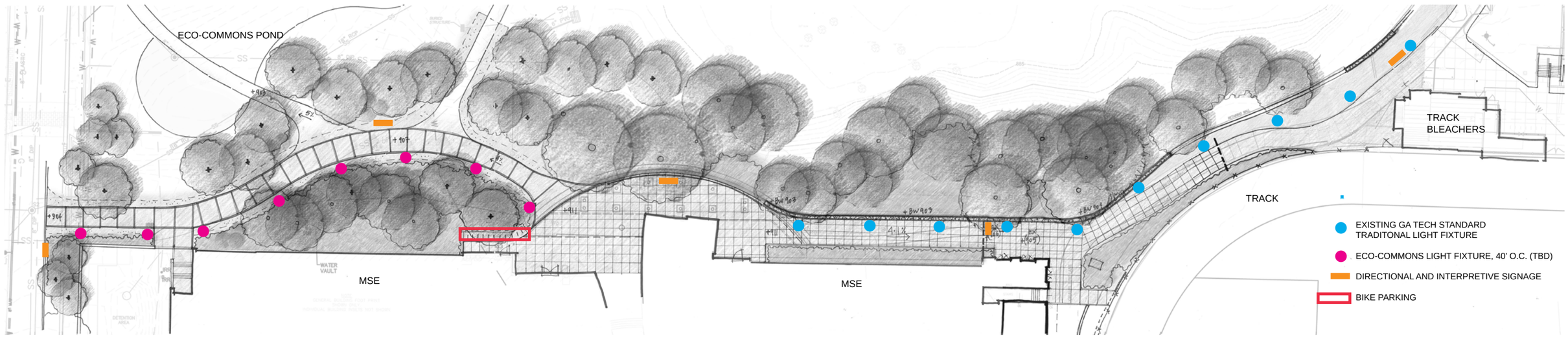


Existing Trees

Existing Conditions at proposed East / West Connector area

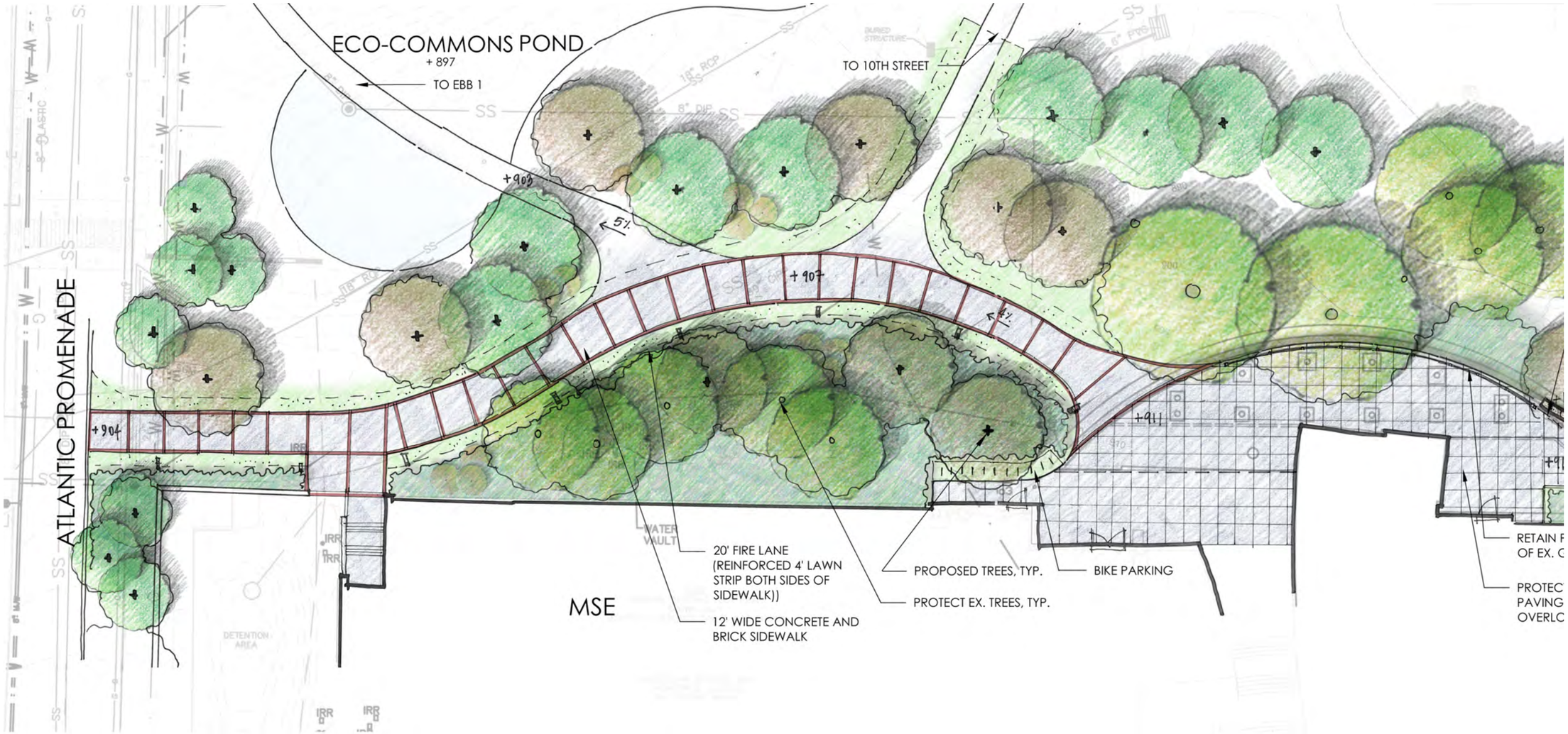


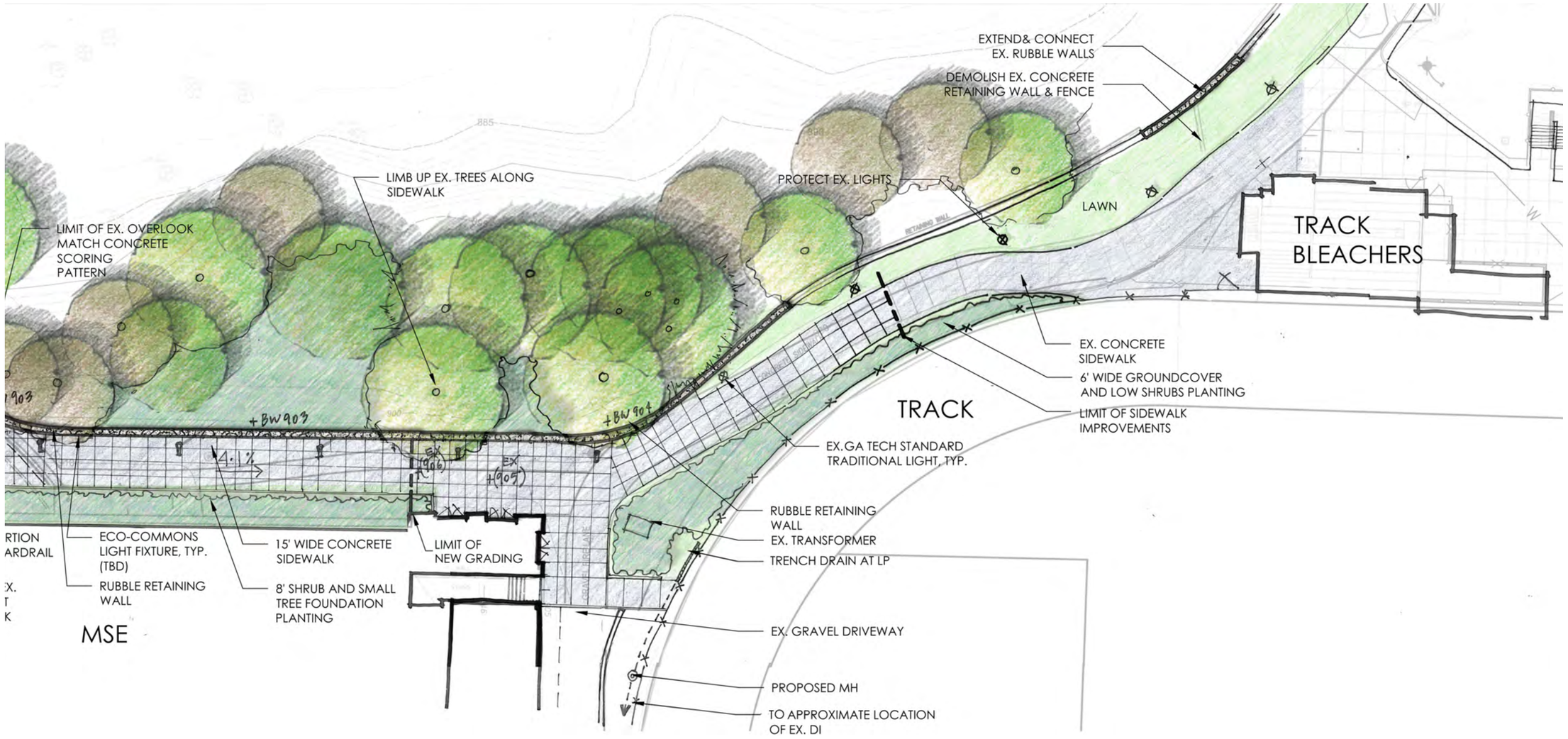
Proposed Tree strategies



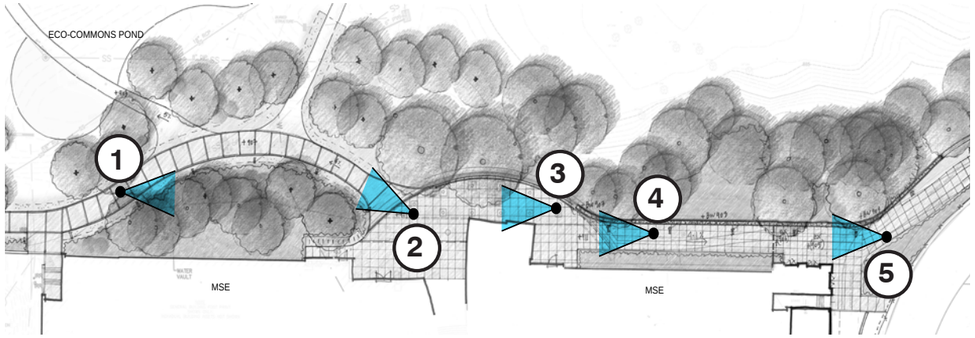
Proposed Lighting and Signage strategies

Proposed East / West Connector Plan

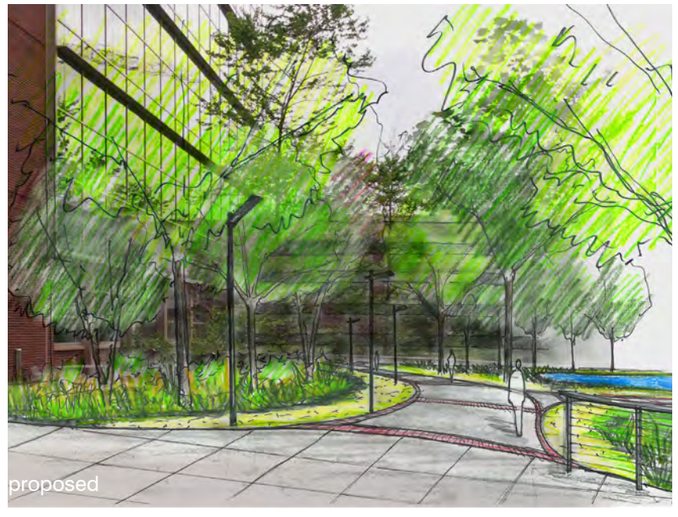



EXTEND& CONNECT
EX. RUBBLE WALLS
DEMOLISH EX. CONCRETE
RETAINING WALL & FENCE
PROTECT EX. LIGHTS
LIMB UP EX. TREES ALONG
SIDEWALK
LIMIT OF EX. OVERLOOK
MATCH CONCRETE
SCORING
PATTERN
LAWN
TRACK
BLEACHERS
EX. CONCRETE
SIDEWALK
6' WIDE GROUNDCOVER
AND LOW SHRUBS PLANTING
LIMIT OF SIDEWALK
IMPROVEMENTS
TRACK
EX. GA TECH STANDARD
TRADITIONAL LIGHT, TYP.
RUBBLE RETAINING
WALL
EX. TRANSFORMER
TRENCH DRAIN AT LP
EX. GRAVEL DRIVEWAY
PROPOSED MH
TO APPROXIMATE LOCATION
OF EX. DI
ECO-COMMONS
LIGHT FIXTURE, TYP.
(TBD)
RUBBLE RETAINING
WALL
15' WIDE CONCRETE
SIDEWALK
8' SHRUB AND SMALL
TREE FOUNDATION
PLANTING
LIMIT OF
NEW GRADING
MSE
+BW 903
+BW 904
4.1%
885
900

Proposed East / West Connector Perspective Views



Perspective Views Key Diagram

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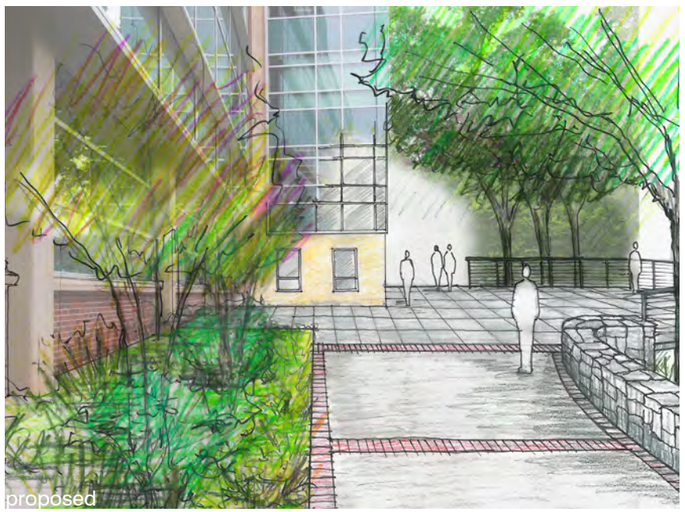
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III. ECO-COMMONS POND

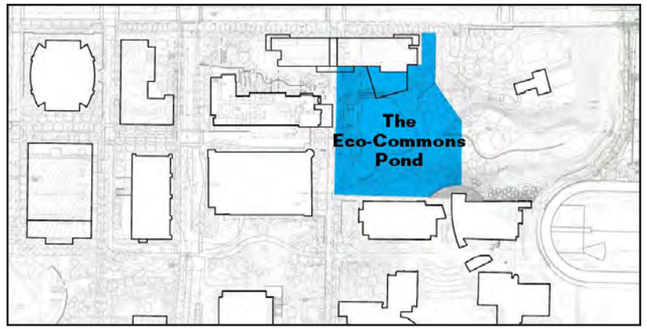
Eco-Commons Pond

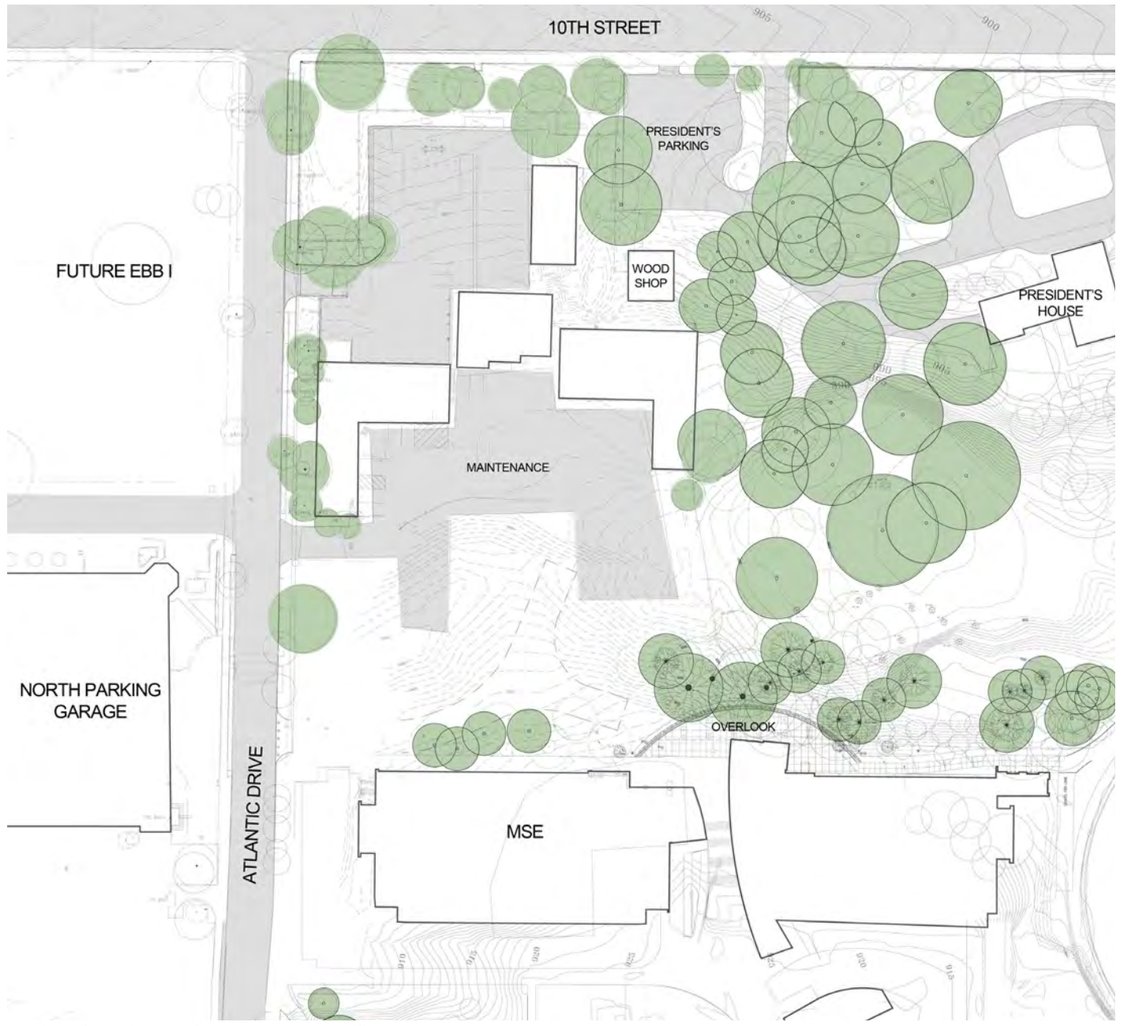
The Eco-Commons pond – also known as the Glade Pond – is the proposed terminus point and main focal feature of the Forest Ribbon Eco-Commons. The pond is sited where the Motor Pool and Campus Landscape Services buildings are currently located. This site is close to the lowest point in the EBB District and of the larger Basin A drainage area. The actual low point is behind the President's House near 10th Street.

The Eco-Commons Pond is proposed as the culminating expression of water within the Eco-Commons, as an expression of the natural surface water, as a natural eco-system in itself, and as a central campus gathering place framed by the MSE and EBB research complexes. The sector plan illustrates the concept of the Pond which is bounded to the west by the Atlantic Promenade – the campus's main north-south pedestrian spine. The pond includes a more structured urban edge along the northern EBB-II Plaza and a more natural edge, along the MSE side. Water will flow from two sources: the EBB-I wetland under the Atlantic Promenade and from the Eco-Commons area south of the parking deck into a forebay and ultimately into the Pond.

Existing view southeast towards the existing MSE building and overlook

Existing view northwest across proposed site of the future Eco-Commons Pond



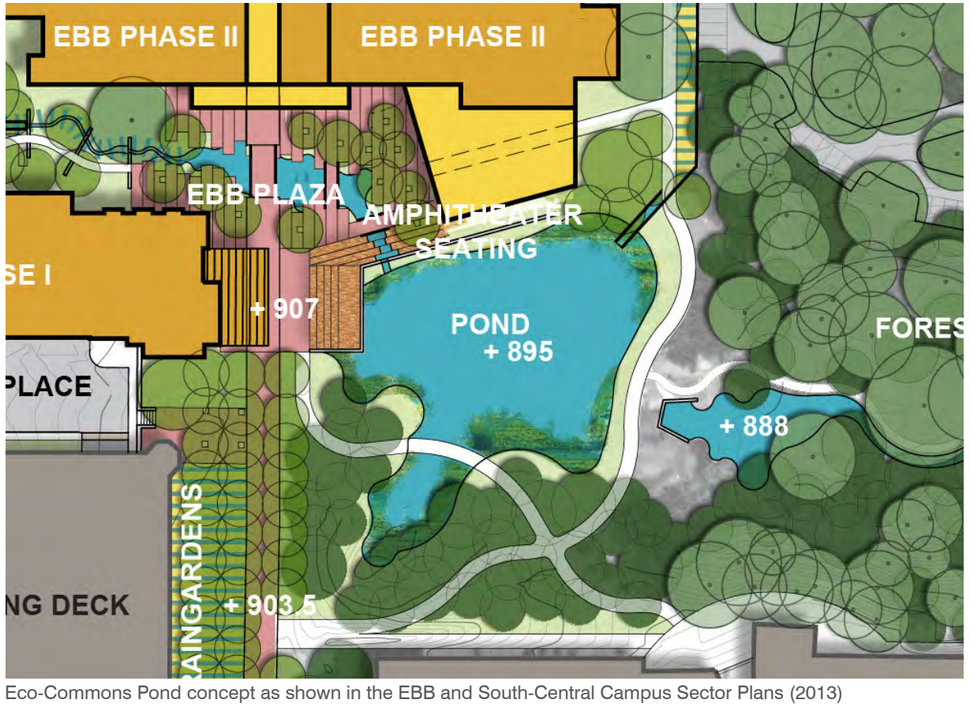


Existing Conditions in the proposed Eco-Commons Pond area

The proposed concept plan creates a structured edge in the Pond's northwestern corner, adjacent to the Atlantic Promenade and the two EBB entry plazas. The plan also provides a more natural southern edge while refining the pond's overall shape using a graceful arc as the eastern dam boundary. A generous walkway across the top of the dam provides for the continuation of the Eco-Commons path, carrying pedestrians and cyclists around the pond and connecting them back to the EBB-II entry Plaza and the Atlantic Promenade.

The Pond is set back from the anticipated future EBB-II building envelope by 50' in order to provide flexibility in the design of that future facility. Water from the EBB-I wetland pond immediately west of Atlantic will flow under the Promenade into a second wetland pool and then under the plaza and down through a series of terraced falls into the Pond. There will be an elevated overlook, approximately 9.5' above the water level adjacent to the Promenade and these falls. A series of adjacent amphitheater steps will take you down to a lower overlook approximately 3' above the water. ADA access to this lower overlook is provided by an adjacent pathway.

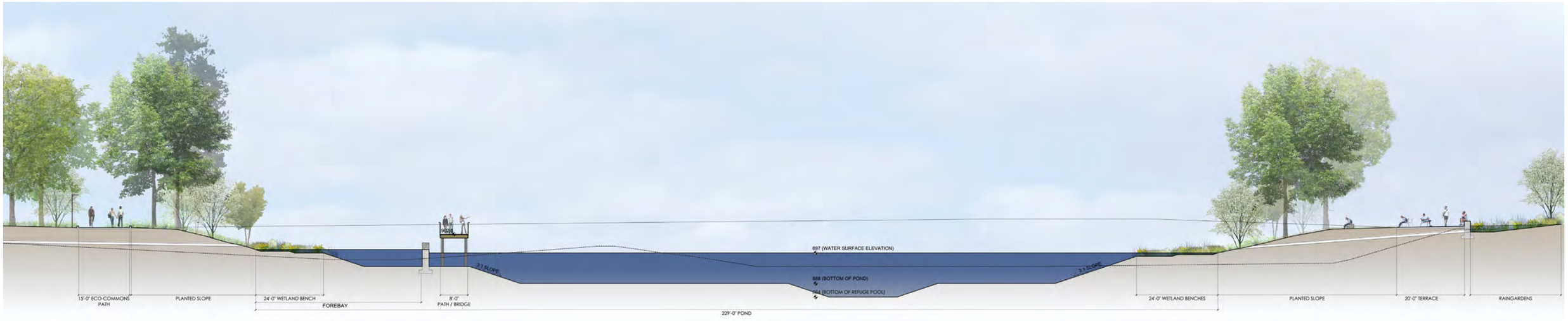
A sweeping bridge/path carries pedestrians over a small forebay at the pond's southwestern corner. The pond outlet structure and aeration systems (if required) will be concealed under an overlook structure located along the dam. The Pond may require additional mechanical aeration – this will be determined by turnover and natural flow volumes. If so, the design team recommends subsurface aeration to be located along the base of the overlook structures. The dam will be a concrete structure allowing for trees and other vegetation to be planted on the dam berm. The dam wall will be embedded in the earthen slope. It will emerge as a retaining granite rubble wall at both the southern and northern corners of the pond.



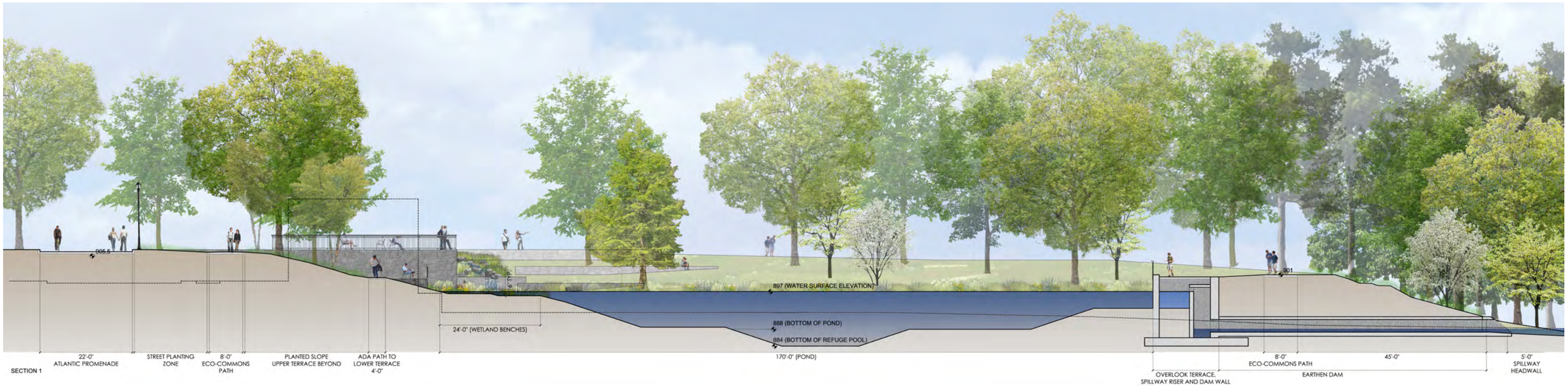
Eco-Commons Pond concept as shown in the EBB and South-Central Campus Sector Plans (2013)

Proposed Eco-Commons Pond Conceptual Plan as presented to PDC, June 2013

Proposed Eco-Commons Pond Cross Sections



SECTION A - North / South Cross Section of the Eco-Commons Pond looking west



SECTION B - East / West Cross Section of the Eco-Commons Pond looking north

Proposed plan for the Eco-Commons Pond area

Proposed Perspectives at the Eco-Commons Pond

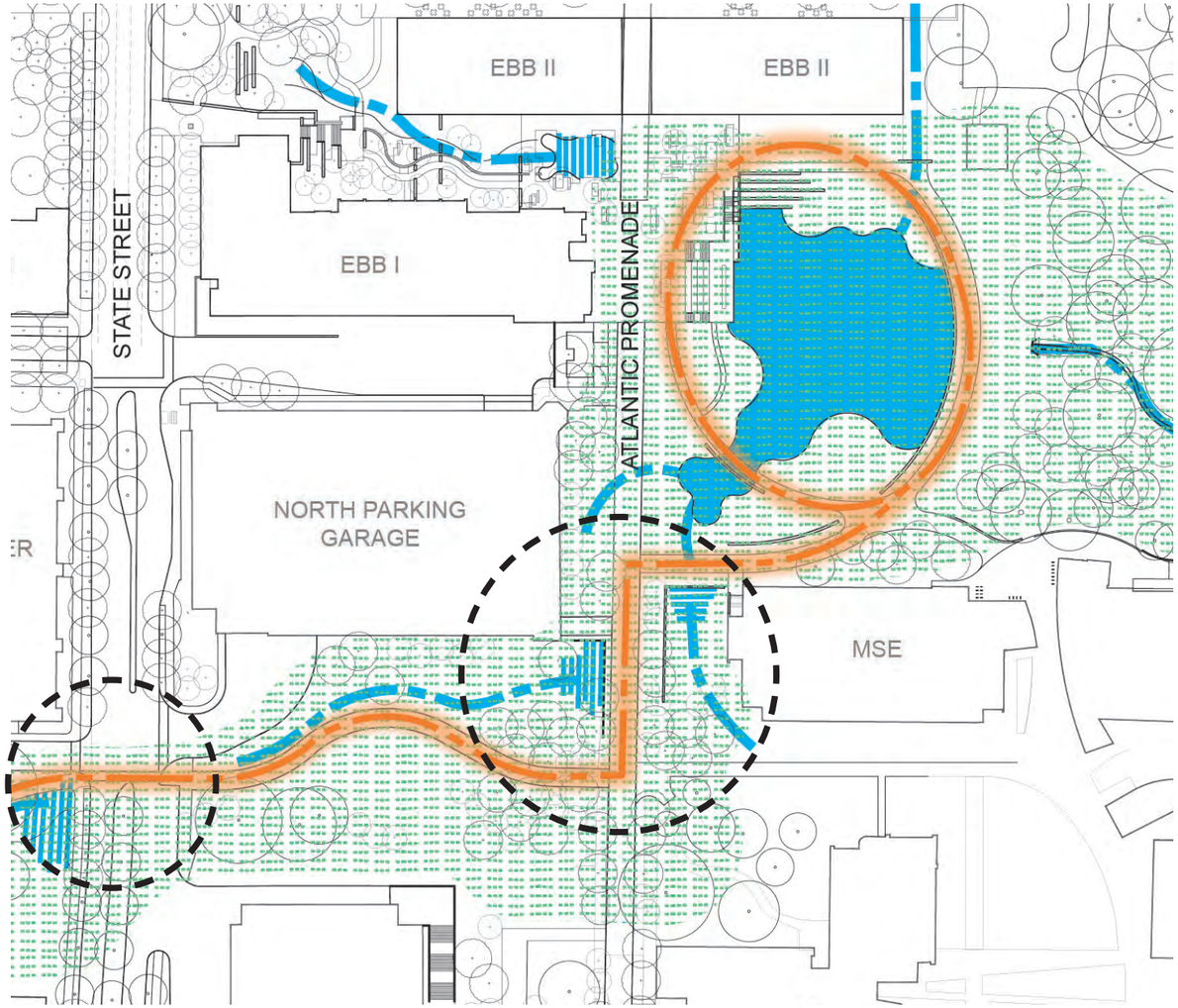
Proposed view southeast across the Eco-Commons Pond from the Atlantic promenade towards MSE

Proposed view northwest across the Eco-Commons Pond from the proposed dam overlook to the EBB plaza area

IV. ECO-COMMONS THRESHOLDS

Eco-Commons Thresholds

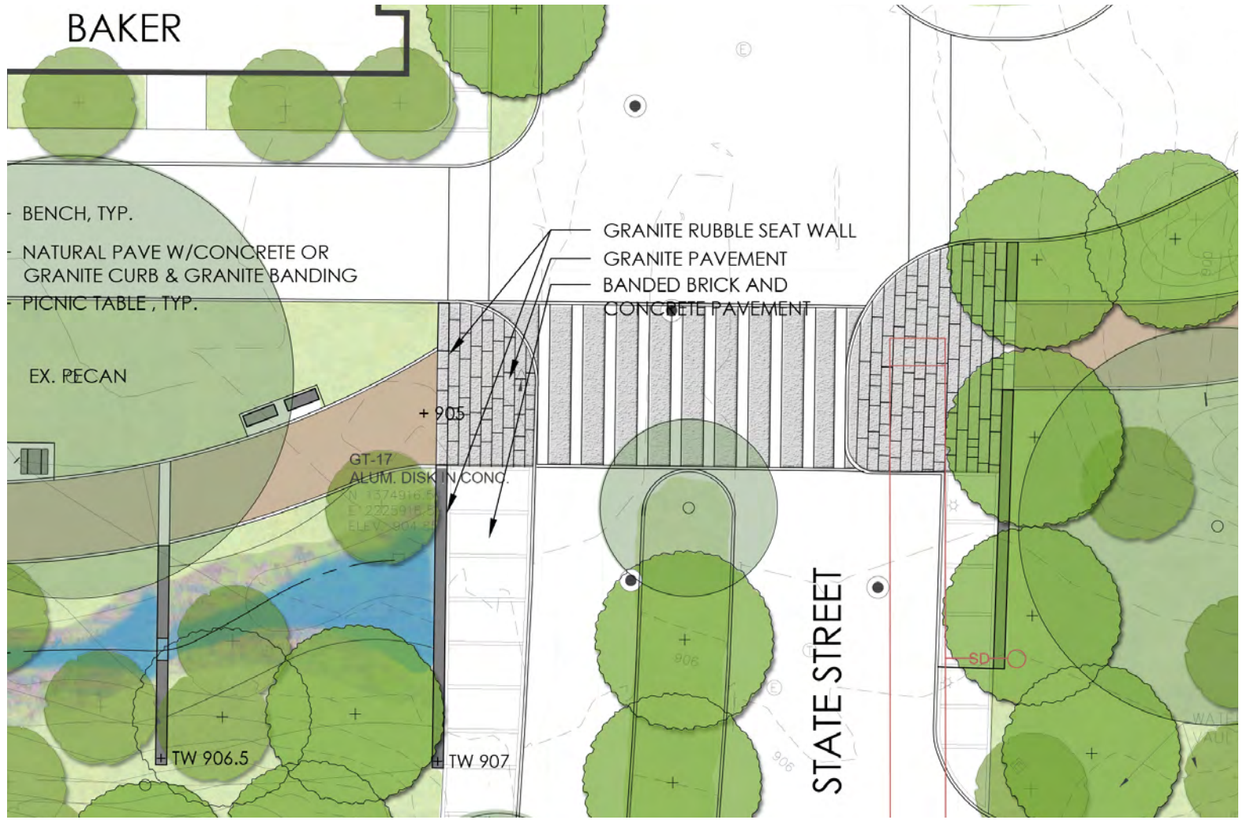
As a part of this concept plan effort, the team reviewed the manner in which the Eco-Commons connects with and moves across both State Street and the Atlantic Promenade. The Design Team feels it is important for the Forest Ribbon Eco-Commons concept to “read across” these two major north-south axes; pedestrians, cyclists and motorists on both of these corridors should all perceive that they are passing through an Eco-Commons threshold. This experience can be emphasized by layering the forest experience; low granite rubble walls and open parkland at major crossings giving way to denser Eco-Commons forests. It is also recommended that a paving material change be introduced where the Eco-Commons crosses these corridors. This material change may include the use of granite paver bands to highlight these key crossing points.



Eco-Commons Path Diagram highlighting major street corridor thresholds

Eco-Commons State Street Thresholds

Given the vehicular nature of State Street, this crossing should be treated as a type of mid-block cross-walk with appropriate low granite walls, signage and lighting. Consideration should be given to installing this crossing as a raised crossing which would serve as a type of traffic calming, speed table.

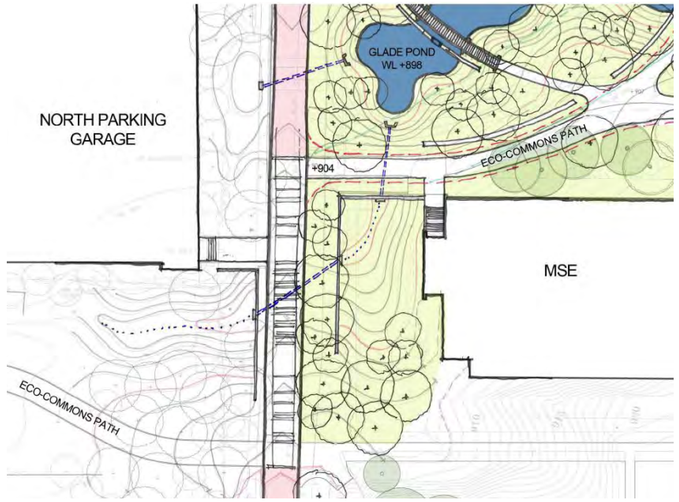


Proposed Eco-Commons / State Street Thresholds

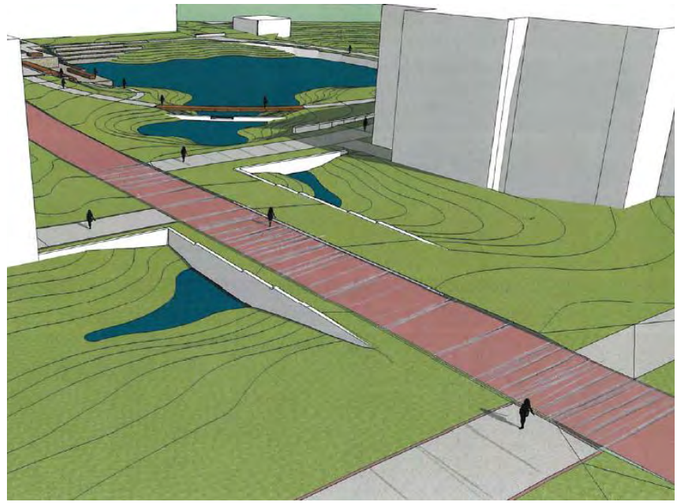
Eco-Commons Atlantic Promenade Threshold

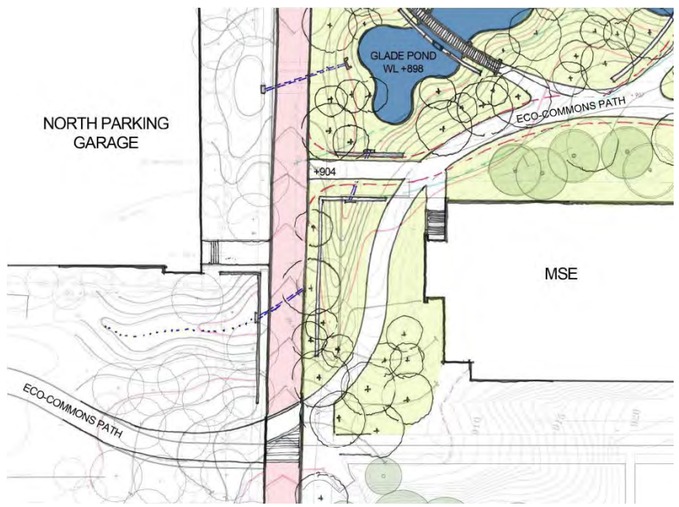
The design team looked at several potential configurations at the Atlantic crossing. The first maintains the proposed Eco-Commons path intersection with Atlantic Promenade at 90°, near the old 8th Street alignment. This option suggests a pavement material change along Atlantic as the two corridors run north together, for approximately 150', to the north side of the MSE Building where the Eco-Commons path splits off again to wrap around the proposed Eco-Commons Pond. The second option, which was the preferred option coming out of the PDC (Planning & Design Commission) presentation (June, 2013), brings the Eco-Commons path across Atlantic and around the western end of the MSE Building in a large sweeping curve. The crossing point still occurs near the old 8th Street alignment and could also be highlighted with a granite paver material change. The final solution is a hybrid of these two initial solutions.

ECO-COMMONS AT ATLANTIC PROMENADE THRESHOLD STUDIES

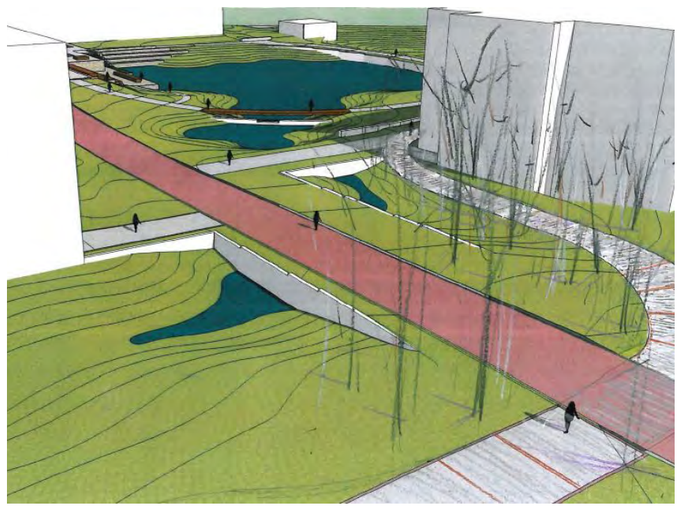


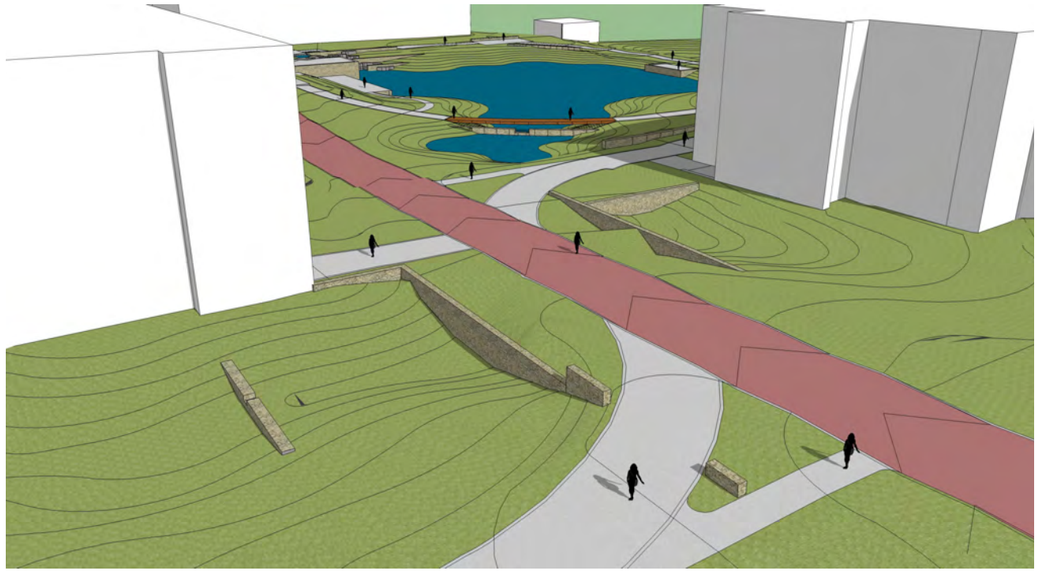
Scheme A - Paving pattern indicates transition zone



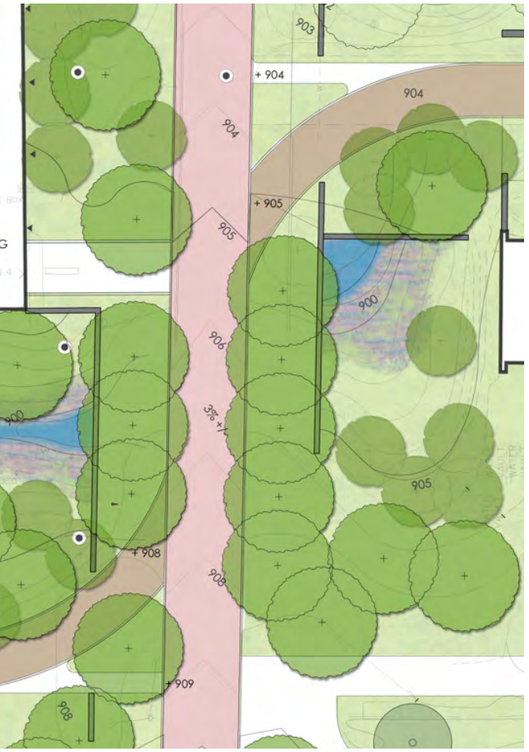


Scheme B - Eco-Commons path geometry continues past Atlantic Promenade





View of the Proposed Eco-Commons threshold at Atlantic Promenade

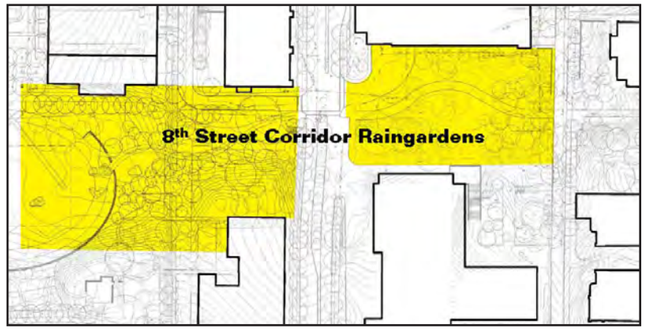


Proposed Plan for the Eco-Commons threshold at Atlantic Promenade

V. 8TH STREET CORRIDOR RAINGARDENS

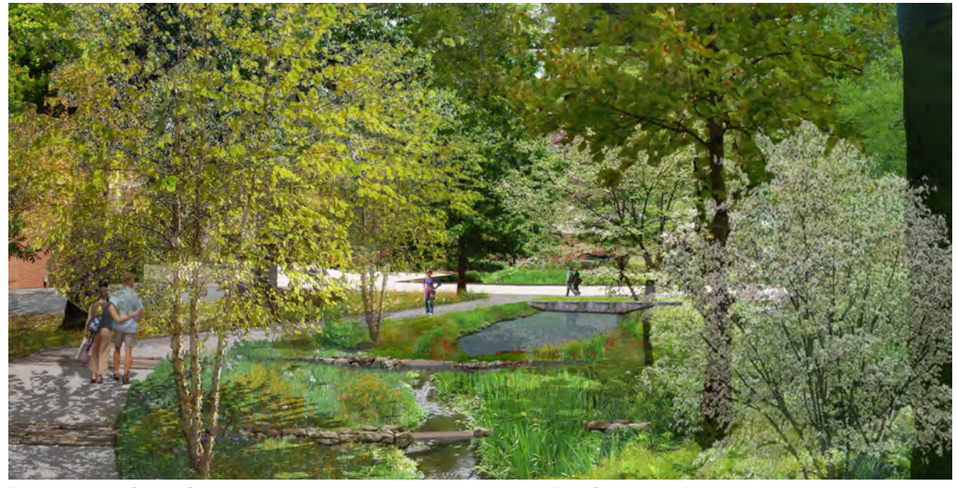
8th Street Corridor Raingardens

The 8th Street stream and rain gardens will connect the proposed Eco-Commons Lawn located east of Hemphill Avenue, with the Eco-Commons Pond just east of the Atlantic Promenade. This area is currently characterized by existing impervious surface parking lots. The topography in the area slopes generally from west to east and drops significantly (10' +/-) immediately west of Dalney Street. The long range plans call for the surface parking to be replaced with a new parking deck and for Dalney to be realigned to connect with State Street immediately south of the Baker Building. The connection to Ferst Drive will be removed. There are several large specimen trees (a 30" pecan and a 48" southern red oak) in the area between State and Dalney Streets which should be protected and preserved.

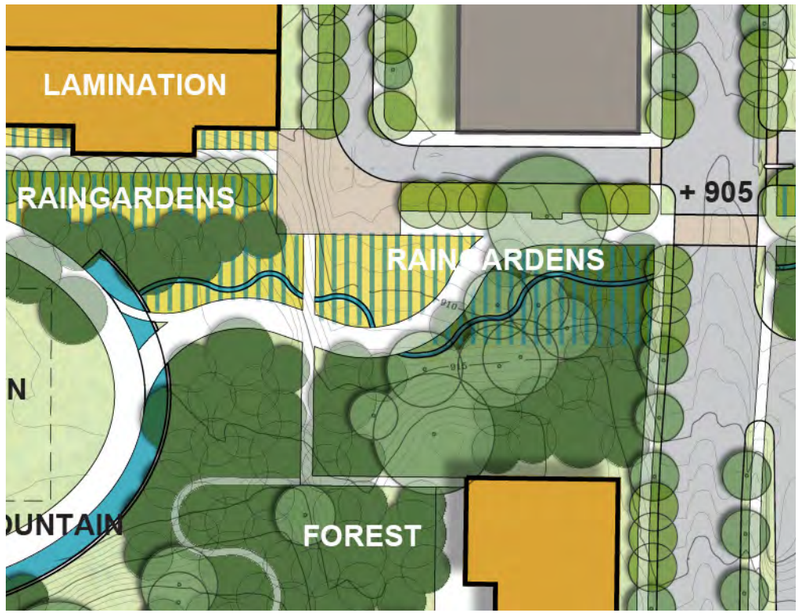


Existing Conditions in the proposed 8th Street Corridor area

Existing view east behind the Baker Building - site for the proposed Eco-Commons path



Proposed 8th Street Corridor stream and raingardens along the Eco-Commons Path



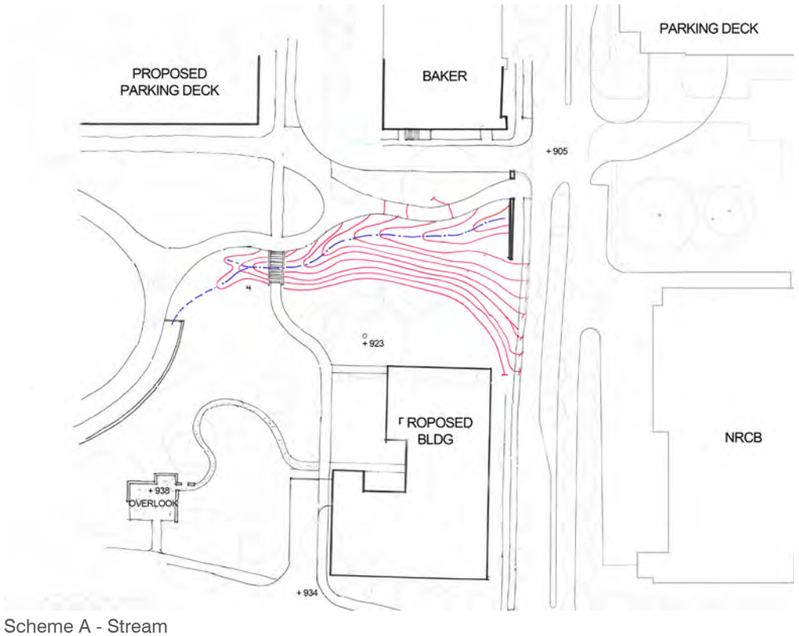
Stream and raingarden conceptual design from the EBB and South-Central Campus Sector Plans (2013)

The EBB Sector Plan proposed an active stream and a series of rain gardens in this area. The rain gardens are intended to include a surface expression of stormwater movement during rain events. They may also include permanent, stream-like water movement once critical elements of the stormwater management master plan have been implemented and can provide that permanent flow utilizing captured stormwater.

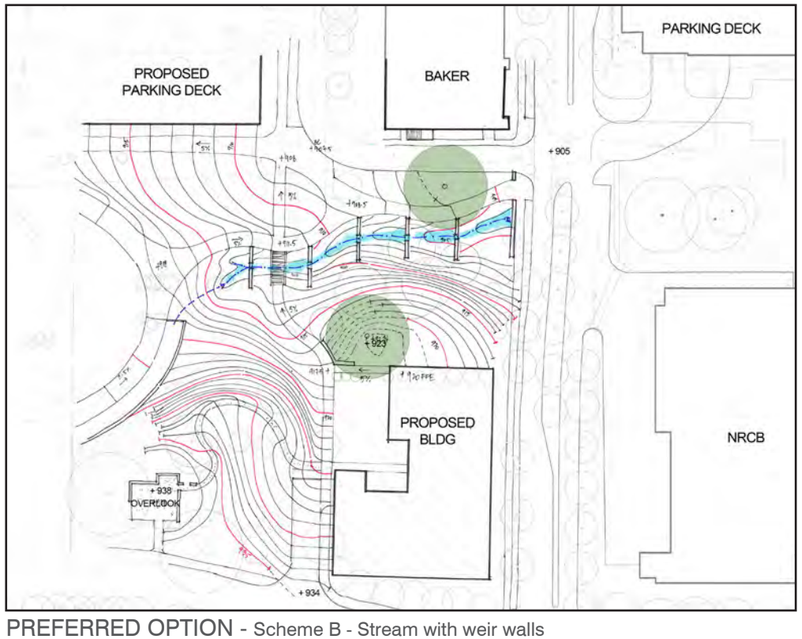
Three potential configurations were explored for the areas west of State Street. The first was a simple stream channel flowing down to a headwall at State Street. The second was a stream channel with a series of proposed weir walls which would step down the channel and detain and infiltrate water during storm events. And the third option was a series of three weir walls which would permanently detain water creating three small pools each stepping down the grade towards State Street. These options were reviewed with the PDC (June, 2013) and the consensus was to pursue the second option – the stream with the multiple weir walls.

Future adjustments to the proposed rain garden immediately south of the North Deck were also proposed. The long-range plan is to incorporate, permanent visible and flowing water into this rain garden. The proposal is to introduce two weir walls above the proposed headwall and introduce permanent flowing water to the top of this stream channel. As with the stream and rain gardens west of State Street, this will require the installation of portions of the stormwater management system in order to capture and release stormwater within this drainage basin.

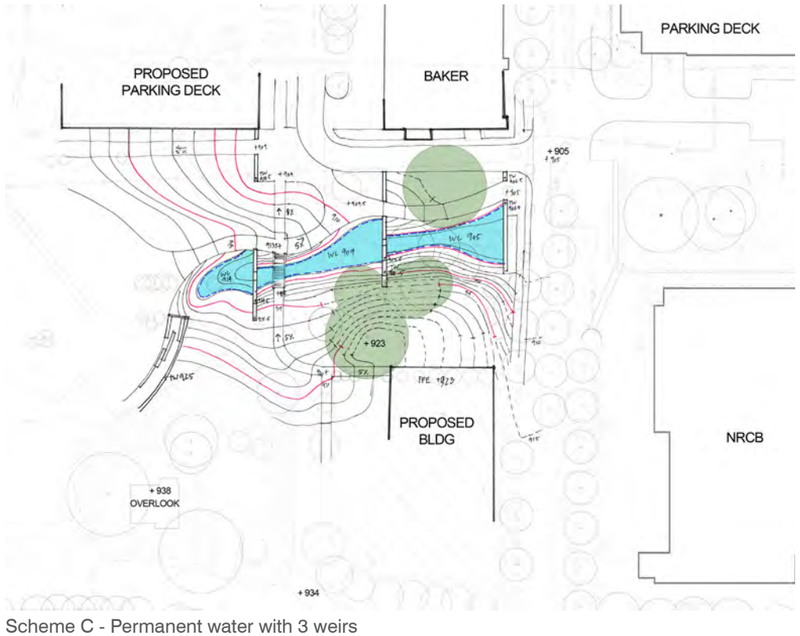
WEST RAINGARDEN STUDIES



Scheme A - Stream



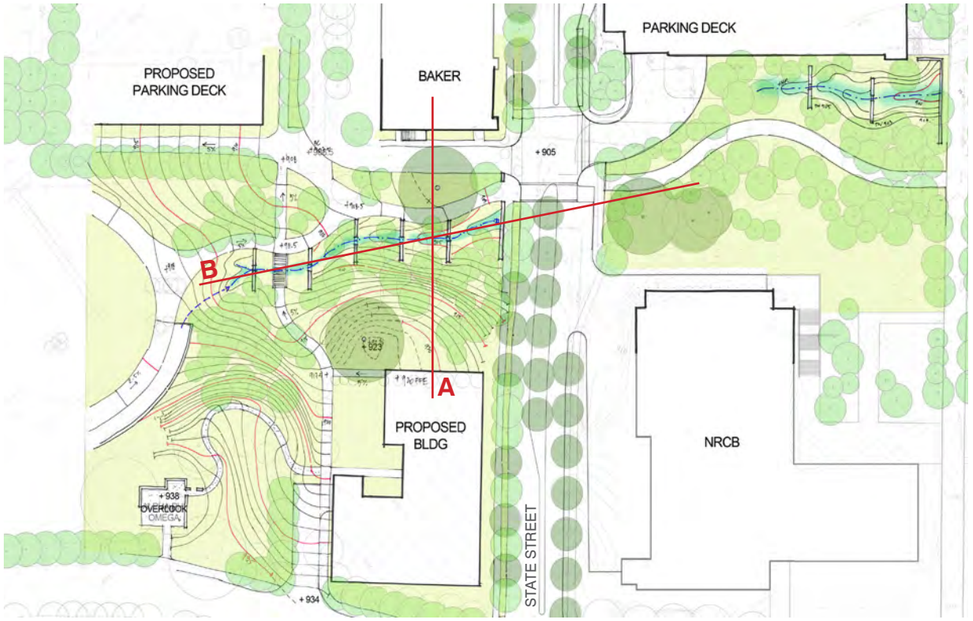
PREFERRED OPTION - Scheme B - Stream with weir walls



Scheme C - Permanent water with 3 weirs

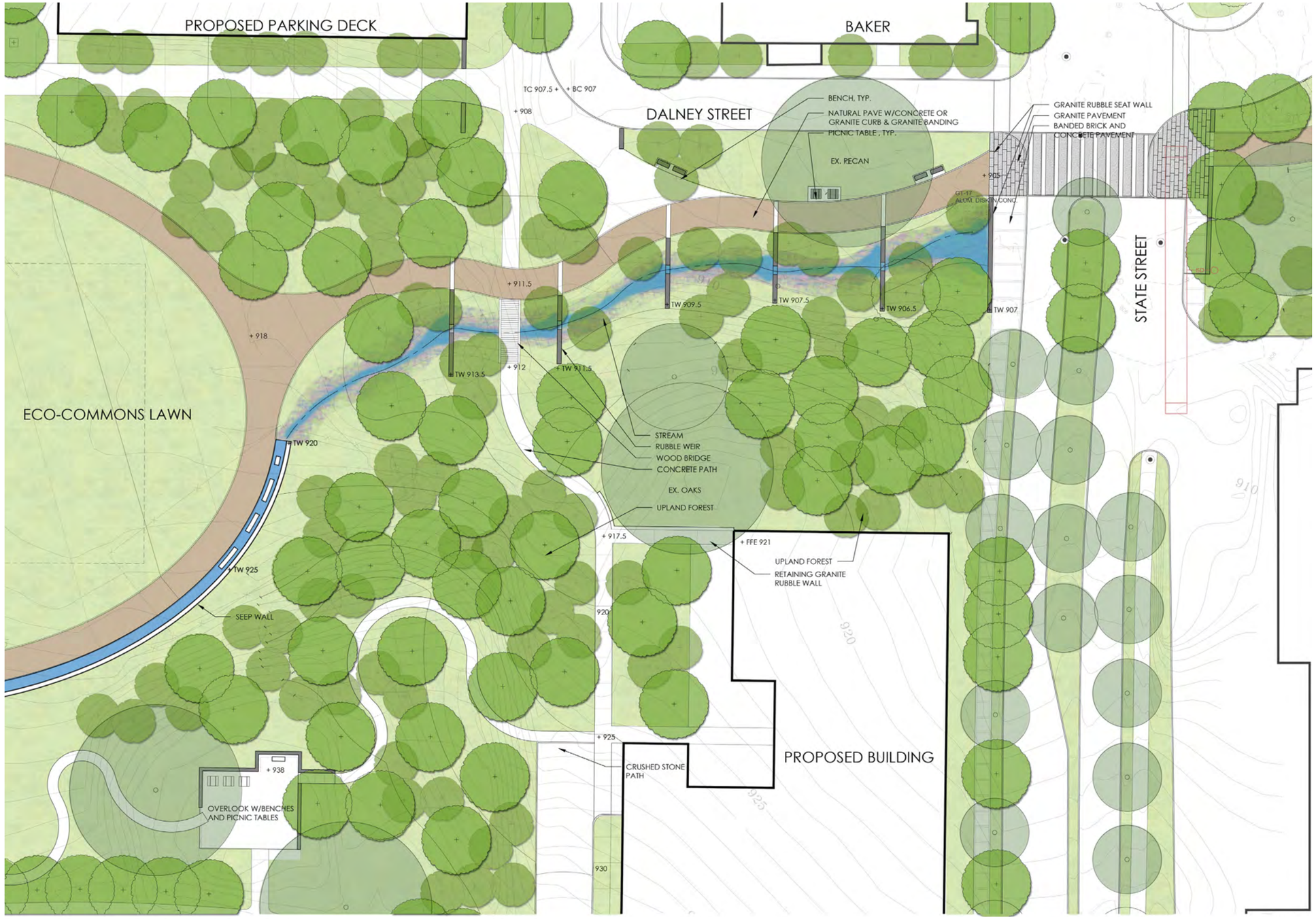
SECTION A - View west to Eco-commons stream and raingardens

SECTION B - View north through the Eco-commons stream and raingardens



Proposed Conceptual Plan for the 8th Street Corridor stream and raingardens as presented to PDC in June 2013

Proposed Conceptual Plans for the 8th Street Raingardens



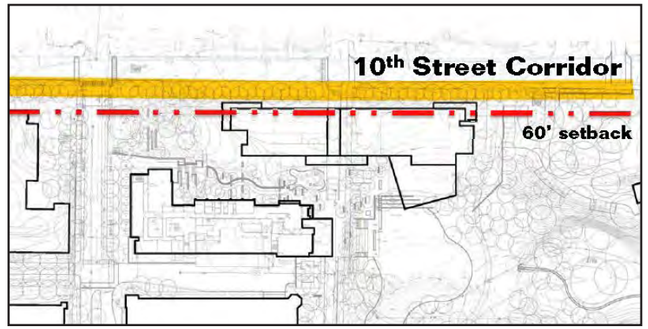
Proposed Conceptual Plan for the 8th Street Corridor stream and raingardens west of State Street

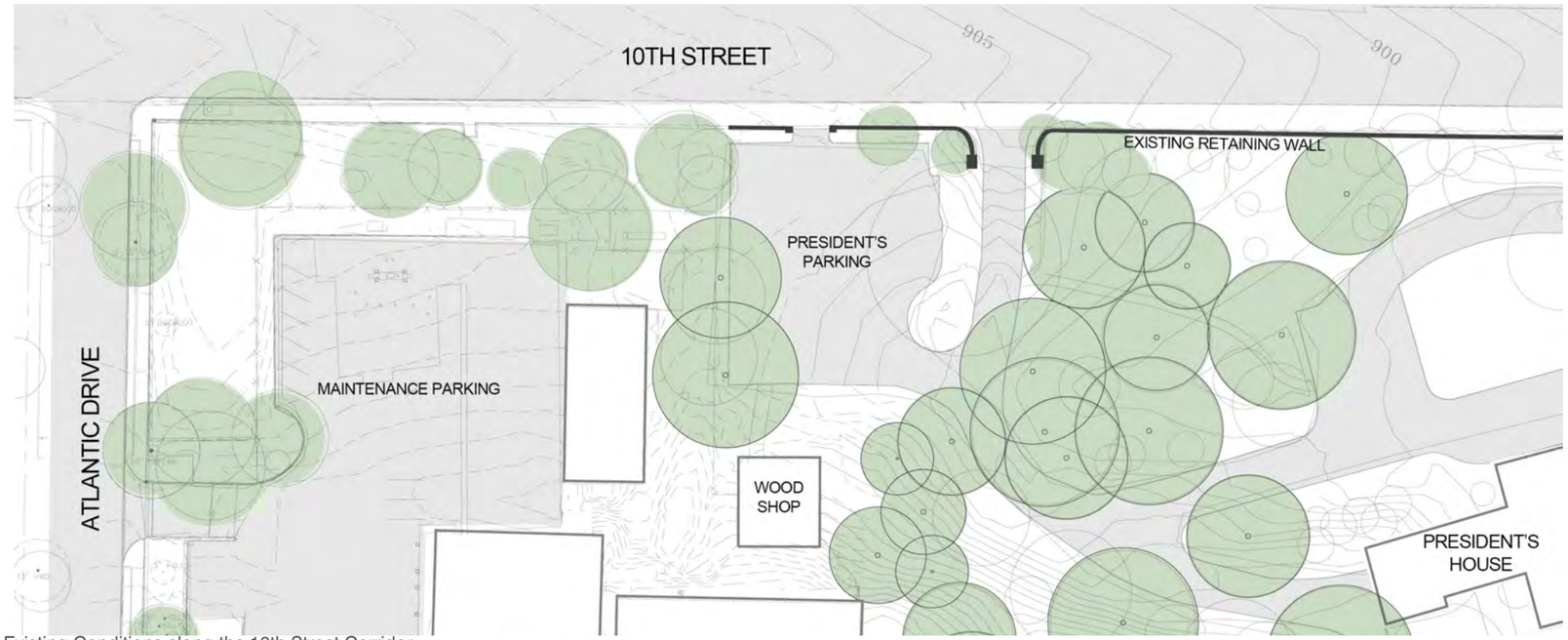
Proposed Conceptual Plan for the 8th Street Corridor stream and raingardens east of State Street

VI. 10TH STREET

10th Street Setback Zone

The EBB Sector Plan calls for a continuous 60’ setback zone along the campus’ northern 10th Street edge. This setback zone would run from Hemphill Avenue east to the President’s House and the Graduate Living Center at Holly Street. Ultimately, the long-term goal would be to continue the setback all the way to Fowler Street.

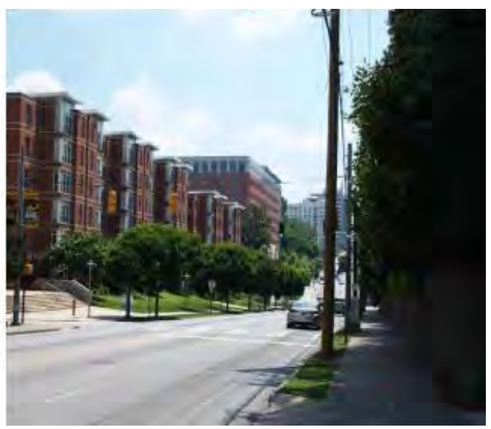




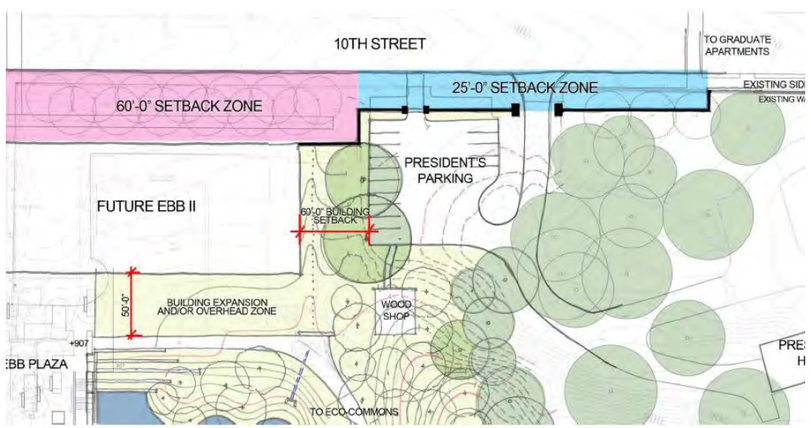
Existing Conditions along the 10th Street Corridor

Existing rubble wall at the President’s house parking lot

Existing rubble pier at the President’s house entry



Looking east on 10th Street past the existing retaining wall

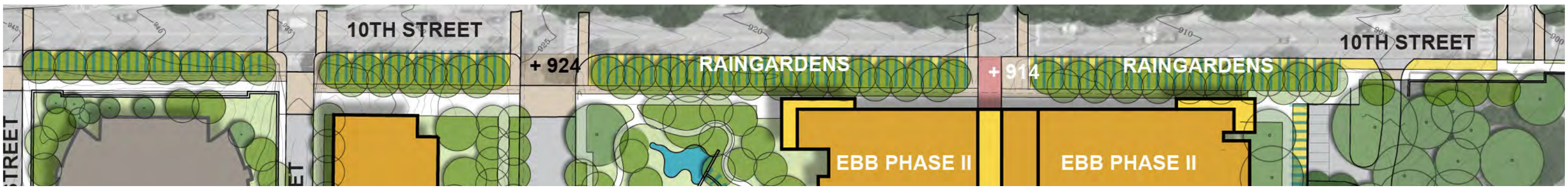


Setback Transition Diagram as presented to PDC, June 2013

10th Street is a busy and heavily traveled four lane City street. There is an established residential neighborhood called Home Park across the street. This neighborhood is made up primarily of small, one and two story wood frame homes. Along the south, Georgia Tech, side of the street there is currently a narrow sidewalk separated from the travel lanes by a very narrow grass strip with a series of wood overhead power and utility poles. This makes for an unpleasant, even unsafe, pedestrian and cyclist experience and provides an unattractive edge to campus. The Sector Plan proposes a 60' building setback – from the existing curb line – which is consistent with the existing CRB (Centennial Research Building) setback. This zone provides for a rain garden and street tree planting zone along the street, a two-way cycle track, a pedestrian walkway zone and a plaza and planting zone adjacent to the existing and future buildings. The Sector Plan also anticipated the possibility of a future dedicated streetcar lane along the Georgia Tech campus side of the street which would utilize approximately 15' of this 60' setback zone.

This concept planning effort focused on the eastern portion of this important campus edge; the area generally between Greenfield Street and Holly Street. The team has suggested two alternative configurations for this area with a focus at the critical State Street and Atlantic Promenade thresholds and on the eastern transition zone adjacent to the President's House, between Atlantic Promenade and Holly Street. The design team has proposed a modification of the prior sector plan cross section. The revised typical section recommends a 10' wide street tree planting zone, adjacent to a separated/dedicated 8' wide bikeway, adjacent to a 24' wide rain garden and street tree planting area, which would abut a 20' wide sidewalk/plaza/planting zone at the face of building.

10th Street Corridor section view from the EBB and South-Central Campus Sector Plans (2013)



10th Street Corridor per the EBB and South-Central Campus Sector Plans (2013)

DESIGN STUDIES

Scheme A - PREFERRED SCHEME - Dedicated bike lane connection to Holly Street apartments, wall at President's parking lot is realigned

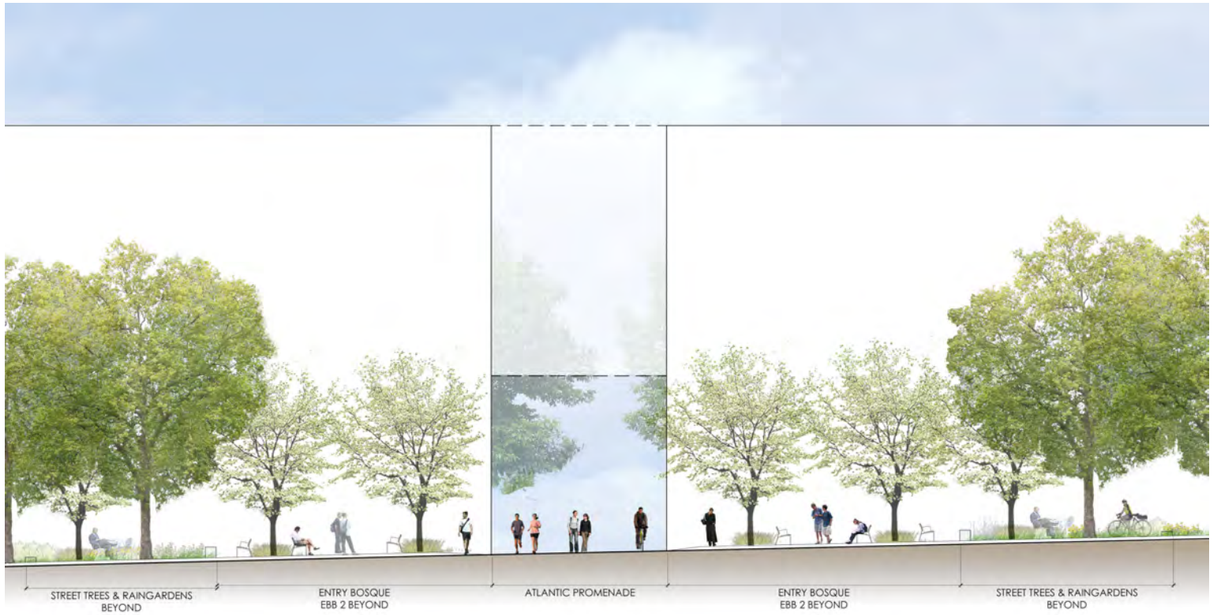
Scheme B - Dedicated bike lane stops at Atlantic Promenade, wall at President's parking lot is to remain

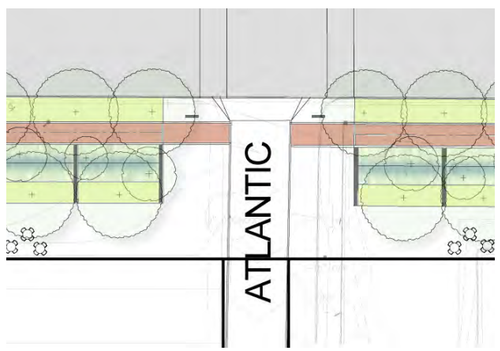
10th Street Corridor continued...

Scheme A - 10th Street Corridor treatment as presented to PDC, June 2013

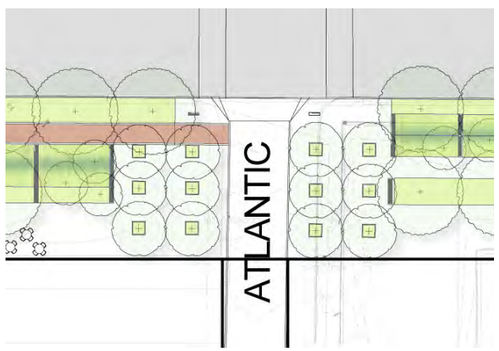
10th Street Corridor Threshold at Atlantic Promenade

THRESHOLD DESIGN STUDIES



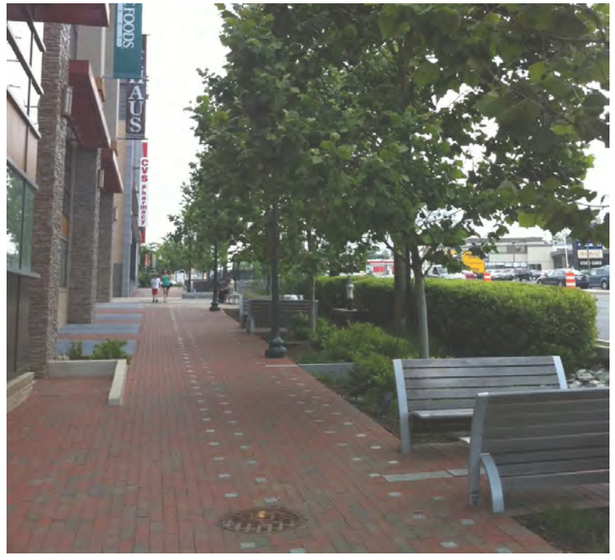


Scheme A - 10th Street Corridor Threshold at Atlantic Promenade

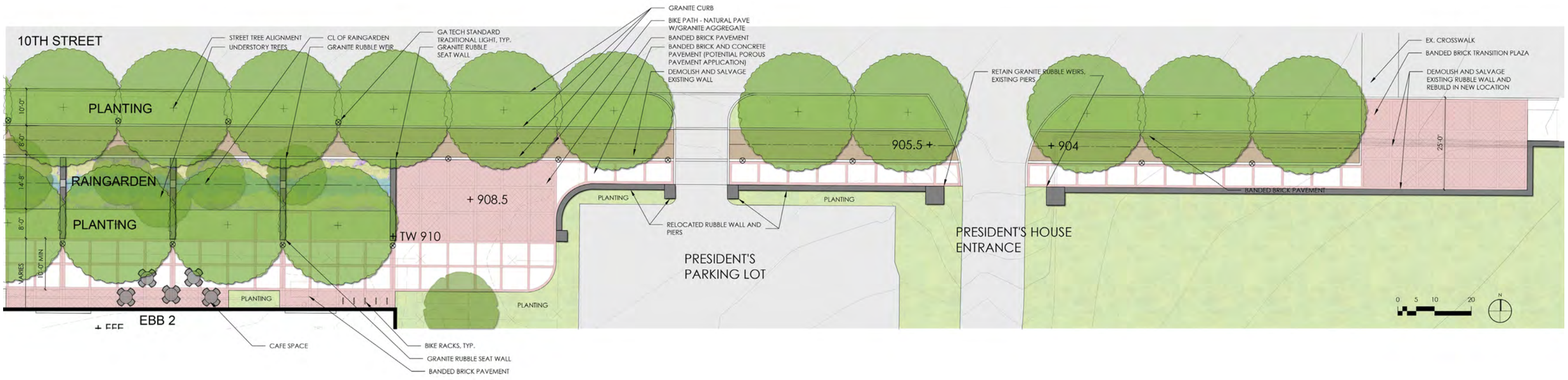


Scheme B - 10th Street Corridor Threshold at Atlantic Promenade

Proposed 10th Street Corridor



Precedent images informed the 10th Street Corridor design process



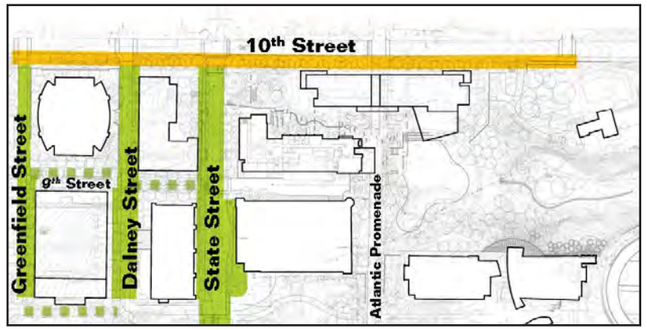
Proposed 10th Street Corridor Concept Plan for the setback transition area adjacent to the future EBB Phase 2 Building and the President's House

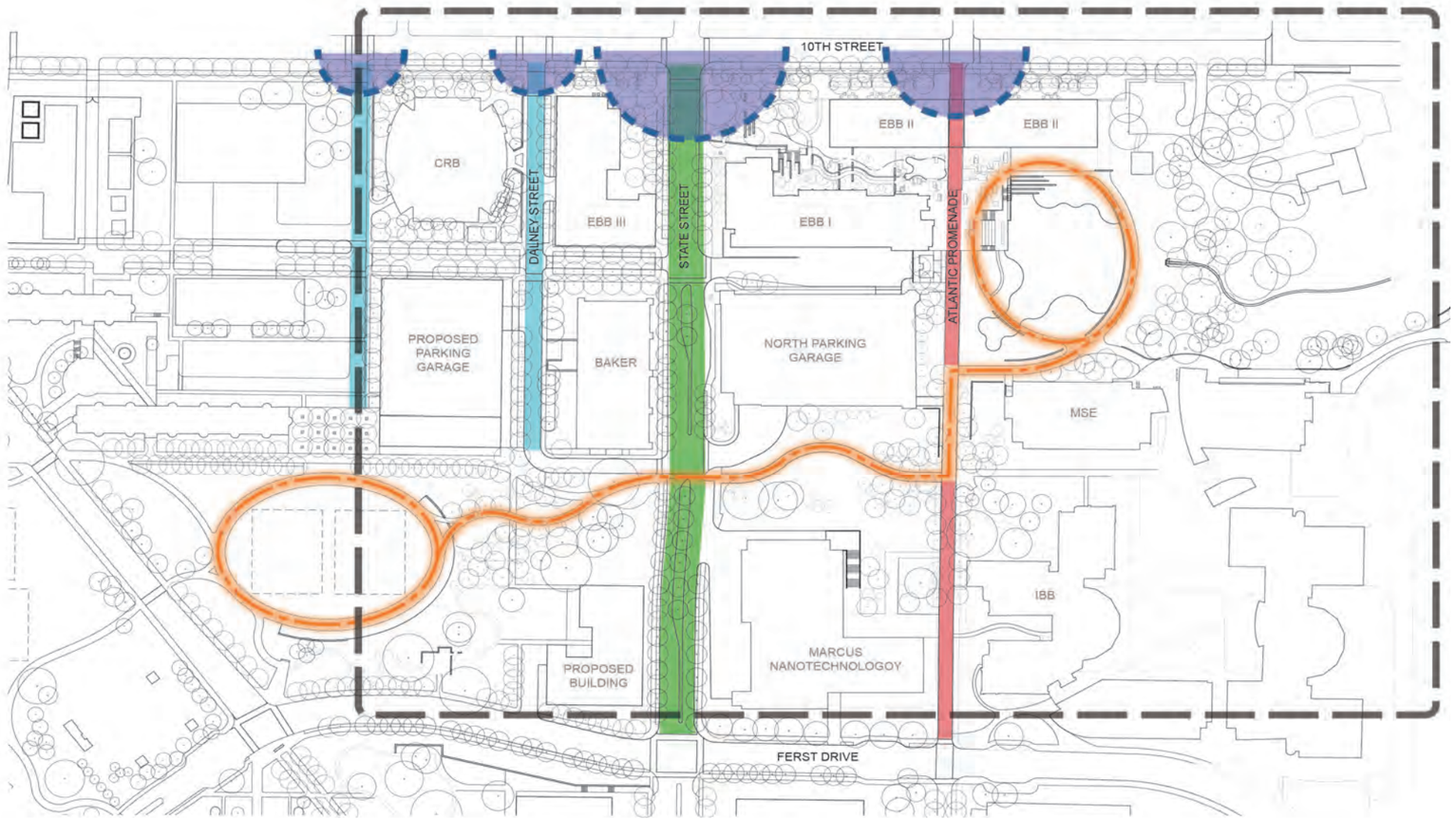
Proposed view West along the 10th Street Corridor showcases separate zones for pedestrians and bicyclists, dynamic raingarden network, shade trees and flexible use space at building edge

VII. STREET CORRIDORS

Street Corridors

There are a series of four north-south oriented street corridors in the EBB District study area. They include, from west to east, Greenfield Street, Dalney Street, State Street and Atlantic Drive – soon to become the pedestrian and bicycle-dedicated Atlantic Promenade. Each of these corridors serves as an important circulation corridor for the campus and each represents an entry point, or threshold, to the northern portion of the campus. The Campus Landscape Master Plan identifies 10th and State Streets and the Atlantic Promenade as key campus Design Corridors. With the closure of Atlantic Drive, State Street will become even more important as it serves as the campus's main vehicular entrance on 10th Street between Fowler Street and Hemphill Avenue. The new Atlantic Promenade will become the primary pedestrian and bicycle entrance to campus along 10th Street and will ultimately serve as the major north-south circulation spine connecting the EBB Sector with the Campus Green and the heart of campus. Greenfield and Dalney Streets are secondary vehicular streets and will remain relatively minor service-oriented streets with the qualification that they will both serve the proposed new parking garage (800 +/- spaces) to be located just south of the CRB and west of the Baker Building.





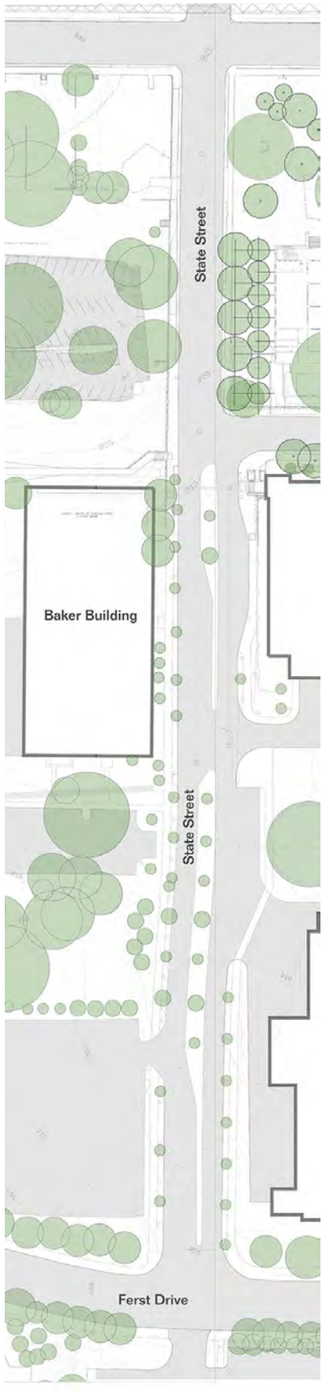
EBB campus sector focus areas diagram highlighting major street corridors, the Eco-Commons path and the campus thresholds along 10th Street

State Street Corridor

State Street is an important threshold along the campus's 10th Street edge. Serving as the primary vehicular entrance to the campus between Fowler Street and Hemphill Avenue, State Street provides access to the North Deck, the new EBB Research Complex, Ferst Drive, and the campus core. State Street also serves as a campus transit (Stinger) route with a stop at the North Deck, provides dedicated bike lanes, and 8' sidewalks on both sides of the street. Proposed future buildings will help further frame this main street; they include EBB I (currently under construction) and EBB III, and a proposed academic/research building at the State Street and Ferst Drive intersection.

The Eco-Commons crosses State Street roughly mid-way between 10th and Ferst at the street's low point. This crossing should be highlighted both by bringing the forest woodland plantings up to and across the street and by highlighting the crossing with a wide crosswalk – perhaps utilizing granite paving materials – and by flanking the crossing with low granite walls.

In terms of the proposed streetscape, given State Street's importance, the recommended campus prototype is the recent Fowler Street improvements. Recognizing that these improvements may not be accomplished in one single improvement project, the existing sidewalks should be upgraded over time to the new standard as routine maintenance and utility projects necessitate.

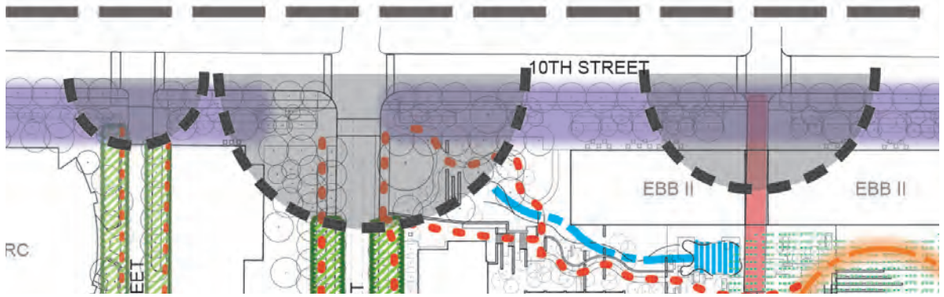


Existing conditions along the State Street Corridor

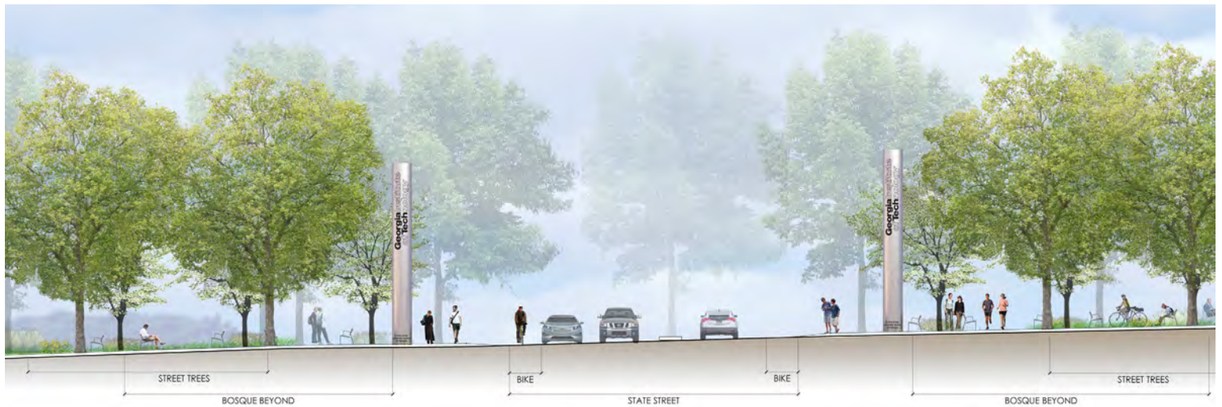
Proposed design is to be similar to existing Fowler Street

Proposed illustrative plan highlighting State Street

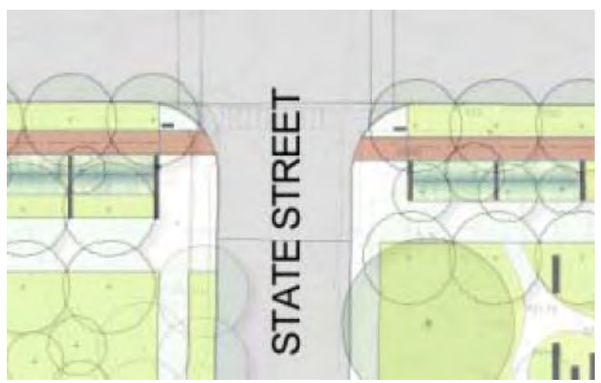
State Street Corridor Threshold at 10th Street



Campus Thresholds Diagram



Scheme A - Bosque interrupts 10th Street Corridor

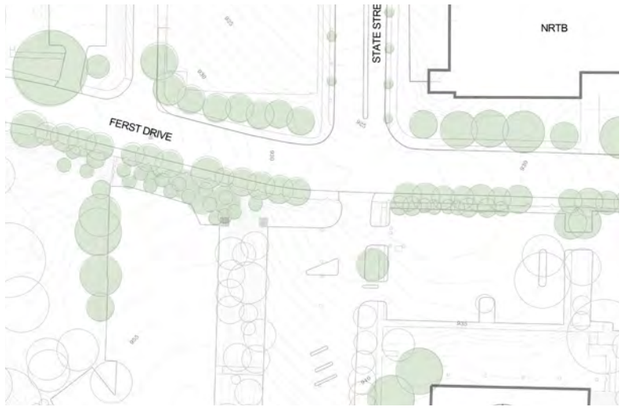


Scheme B - 10th Street Corridor continues through intersection

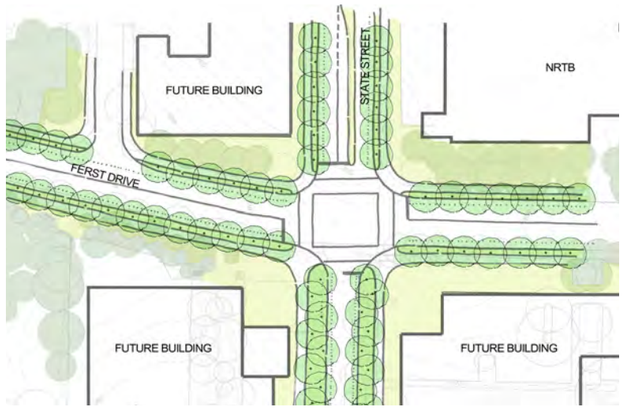
State Street / Ferst Drive Intersection

The intersection of State Street and Ferst Drive is a busy one. Currently operating as a four-way stop, the intersection is active during peak hours with high levels of vehicular, pedestrian, bicycle and transit users. During the 2012 EBB sector planning effort, a traffic impact assessment was completed by VHB. The assessment concluded, given the high traffic volumes, projected failing levels of service, and the significant amount of pedestrian activity, that this intersection might benefit from the installation of a traffic signal to actively control both traffic and pedestrian crossing movements.

Three concepts were studied for the potential configuration of this intersection. Scheme A illustrates a conventional four-way, fully signalized intersection complete with pedestrian crossing signals. Scheme B illustrates a similar intersection configuration with a raised, traffic-calming speed table in the center of the intersection. This scheme could also be fully signalized if desired. The final option shown is a roundabout. The recommended solution includes a fully signalized four-way intersection with a special paving treatment in the intersection.

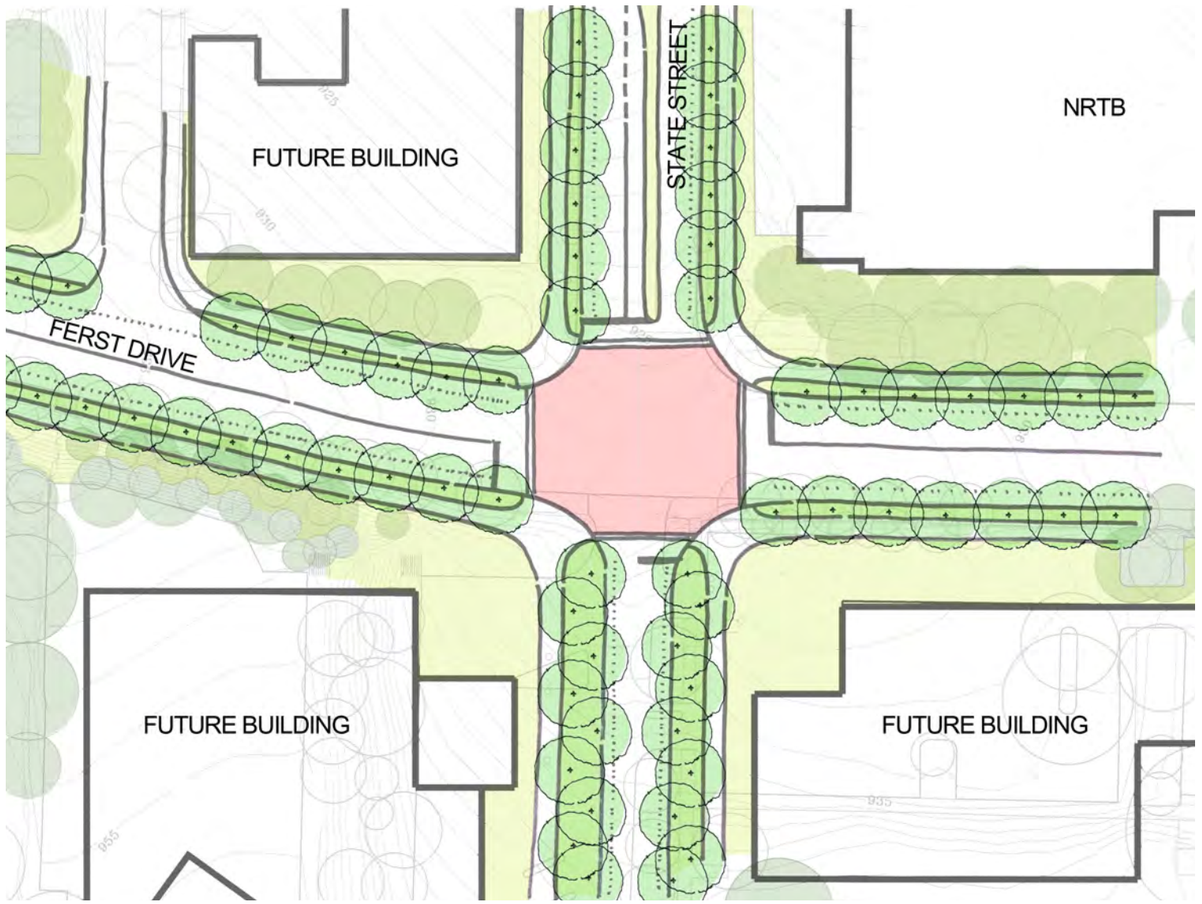


Existing Conditions at the State / Ferst intersection

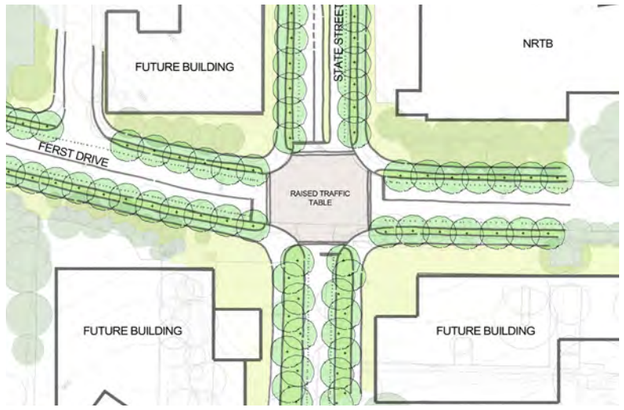


Scheme A - Standard signalized intersection with crosswalks

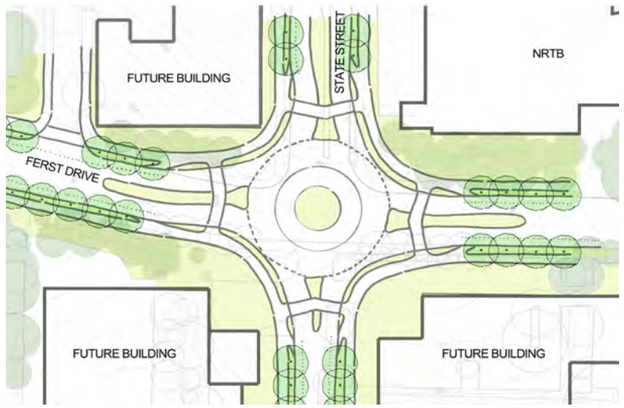
Existing photos at the State / Ferst intersection



Proposed Conceptual Plan for the State Street / Ferst Drive Intersection combines features from Scheme A and Scheme B to include signalization and an intersection-wide paving distinction to encourage pedestrian and bicycle traffic



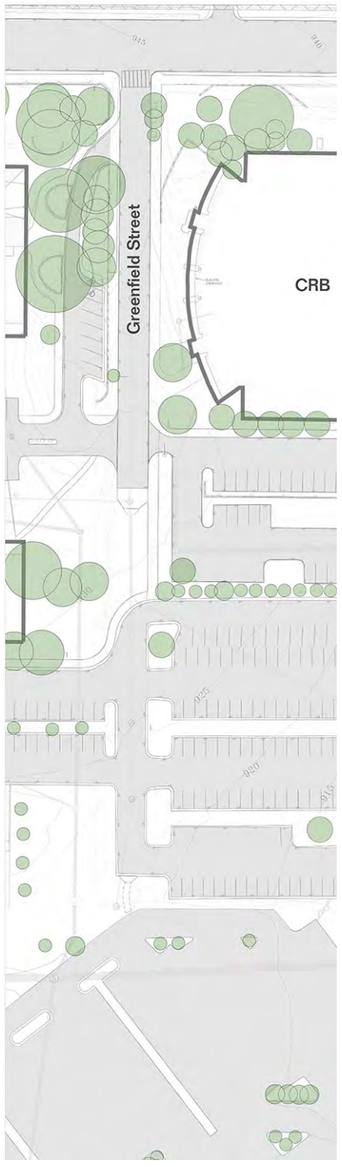
Scheme B - Intersection with raised traffic table



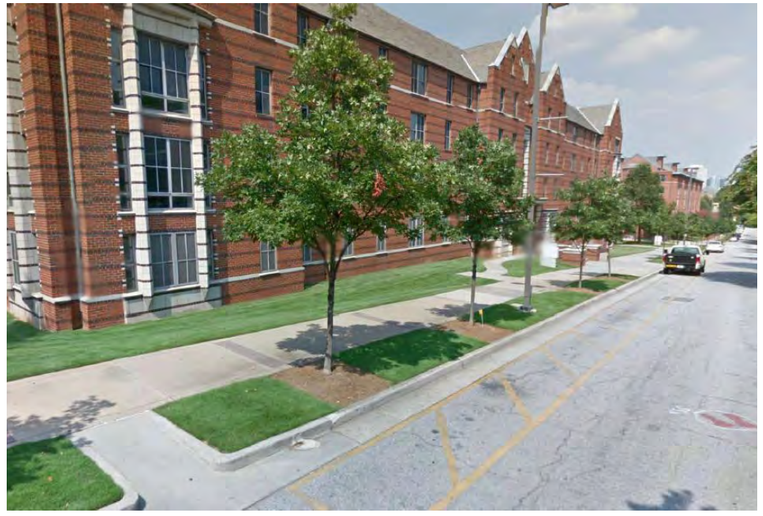
Scheme C - Roundabout

Dalney Street and Greenfield Street Corridors

The area adjacent to the Dalney and Greenfield Street corridors is currently dominated by surface parking lots. Large service areas for CRB (on Greenfield) and for the Baker Building (on Dalney) also dominate portions of both corridors. Currently, Dalney connects to Ferst Drive. The concept plan proposes the realignment of Dalney Street so that it wraps around the south end of Baker and provides a connection to State Street, opposite the recently expanded North Deck entry drive.



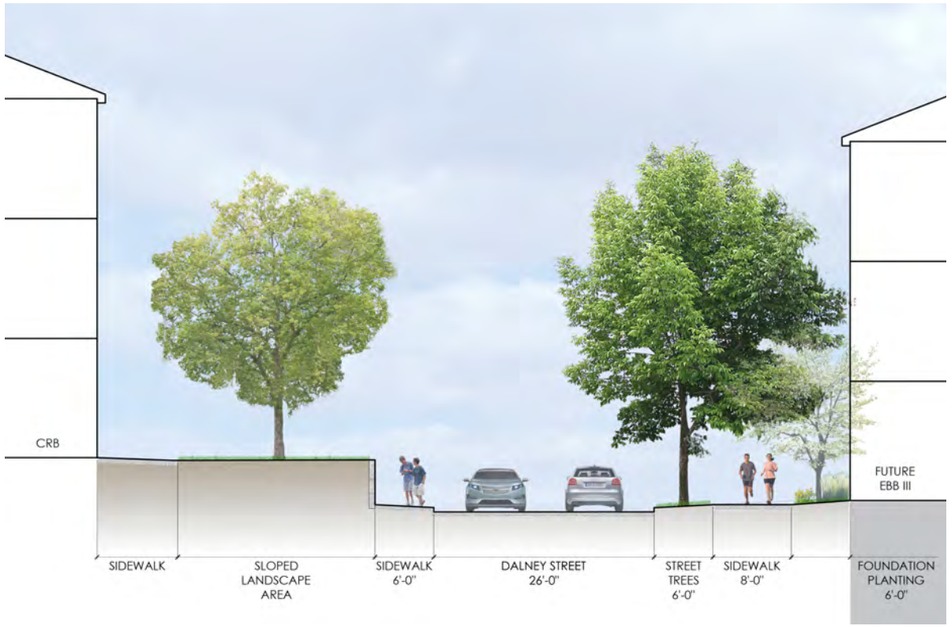
Existing Conditions at Dalney Street and Greenfield Street Corridors



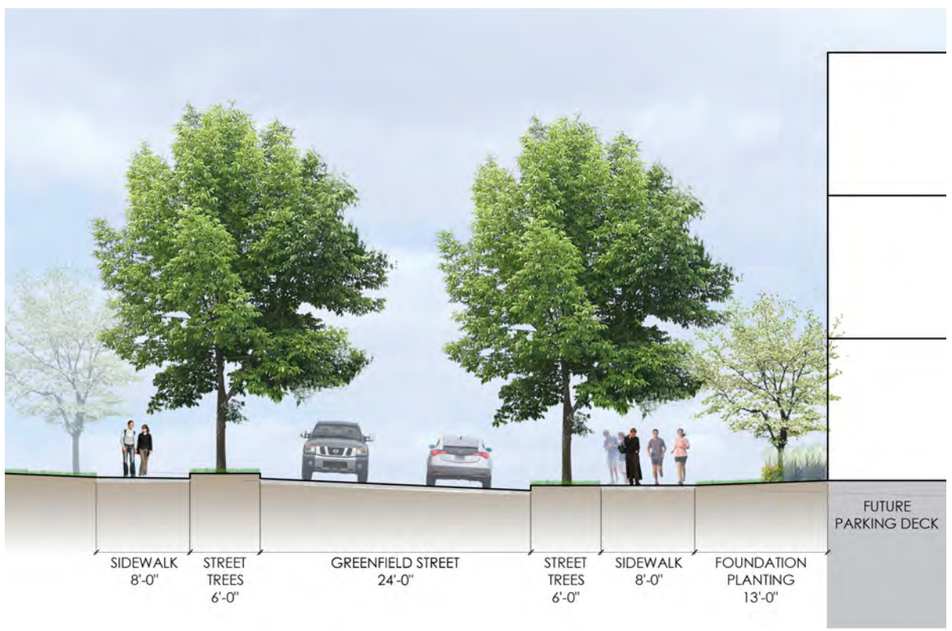
Proposed treatment should emulate existing 8th Street corridor

Dalney Street and Greenfield Street Corridors Continued...

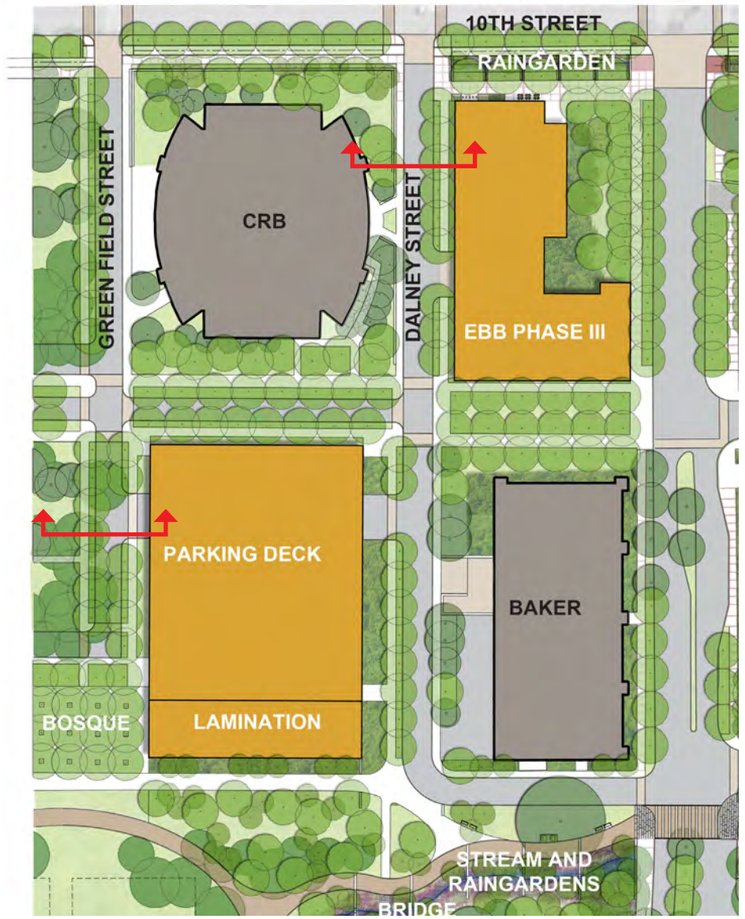
Three additional buildings will frame these streets in the future – the EBB III research building; a new academic/research building at the corner of Ferst Drive and State Street; and a large new parking deck. The new parking deck will be similar in size to the existing North Deck (approximately 800 spaces) and will be located between Dalney and Greenfield just south of the CRB. Given the proposed deck's size, entrances off of both streets into different deck levels are anticipated. The new deck enables the construction of the Eco-Commons lawn and a portion of the 8th Street rain gardens and seems likely to be developed in sequence with the next phases of the EBB research complex. As these streets are secondary, in terms of the campus street hierarchy, their proposed streetscape treatment should be simple. The primary goal should be to provide direct pedestrian access and circulation both to and from the new deck and to establish a uniform streetscape, with a consistent rhythm of street trees and lights. Perhaps the most appropriate campus prototype for the proposed Greenfield and Dalney Street sections is 8th Street adjacent to the west campus dormitories. The proposed section provides for two 12' travel lanes, a 6' wide street light and tree planting bed, and an 8' concrete sidewalk on both sides of the streets.



Proposed typical cross section of the Dalney Street Corridor



Proposed typical cross section of the Greenfield Street Corridor



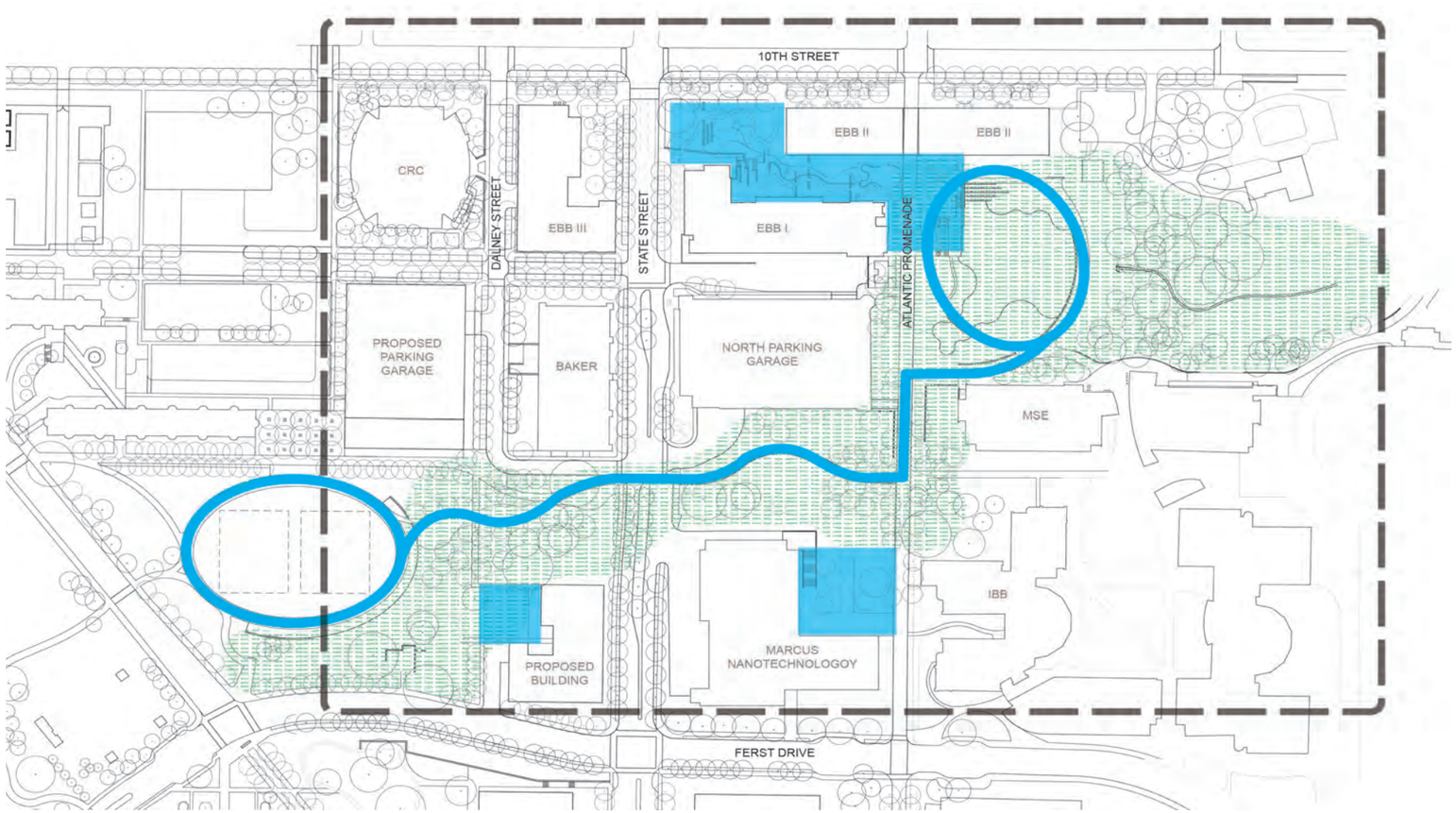
Proposed Conceptual Design Plan for the EBB Campus Sector Street Corridors

VIII. ECO-COMMONS STANDARDS

Eco-Commons Standards

Georgia Tech has an established set of campus design standards. These standards identify specific paving types, lighting requirements, walls, stairs, site furnishings and plant materials which are to be utilized across the campus. The intent of these standards is to help create a uniform and visually consistent campus landscape.

With the development and implementation of the Forest Ribbon Eco-Commons concept, a new landscape zone is introduced into the campus landscape. The design team proposes a series of additional standards which will complement the existing standards but be unique to the Eco-Commons. These new standards will therefore help identify and clarify the Eco-Commons as a unique and distinct zone within the campus landscape. The primary difference will be in the paving which will utilize a natural, resin-based system. All other site furnishings will be the campus standard.



Eco-Commons Campus Standard

Focus Area Diagram highlighting areas where the Proposed Eco-Commons Standard should be utilized in lieu of the traditional campus standards

Materials and Lighting Standards

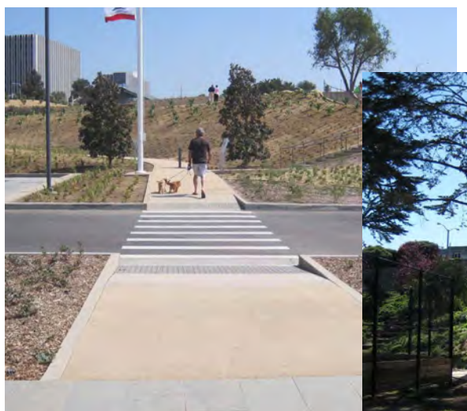
TRADITIONAL CAMPUS STANDARD (existing)

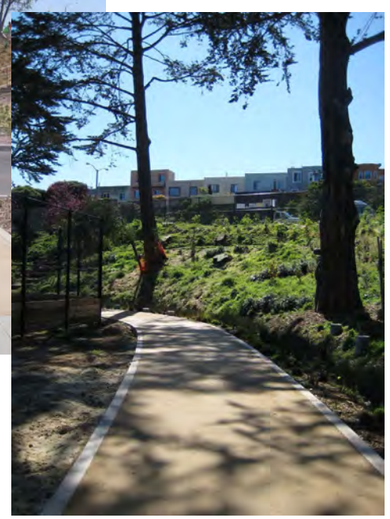
Traditional Path - Concrete with brick bands

Traditional Bench - Gretchen by Landscape Forms

Traditional Backless Bench - Gretchen by Landscape Forms

ECO-COMMONS CAMPUS STANDARD (proposed)



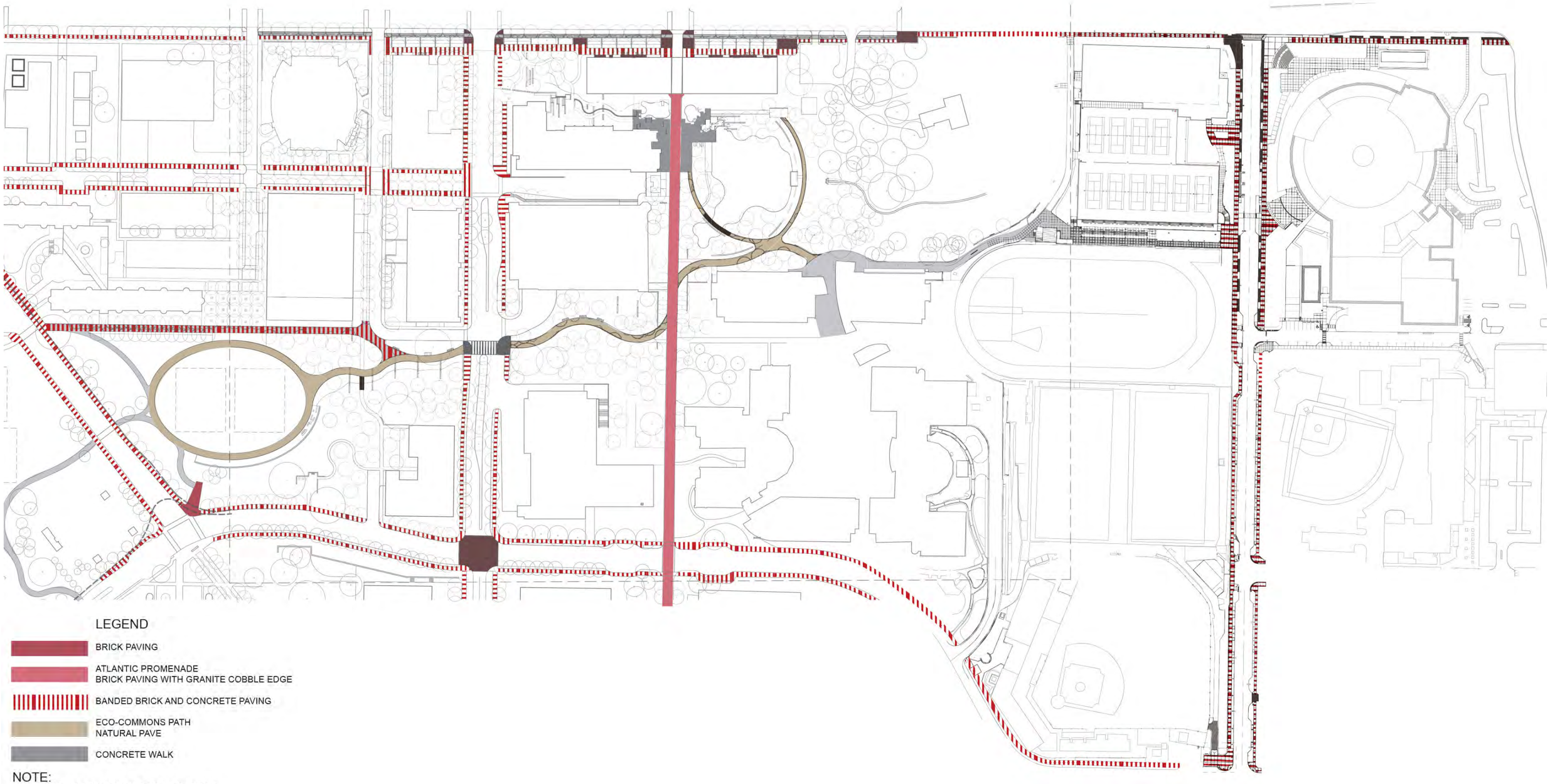


Eco-Commons Path -
Natural Resin Pavement

Eco-Commons Picnic Table - Gretchen Picnic Table by Landscape Forms
(Benches same as traditional)

Pedestrian Scale Light - by Holophane
(Lighting same for Eco-Commons and traditional)

Proposed Materials Diagram

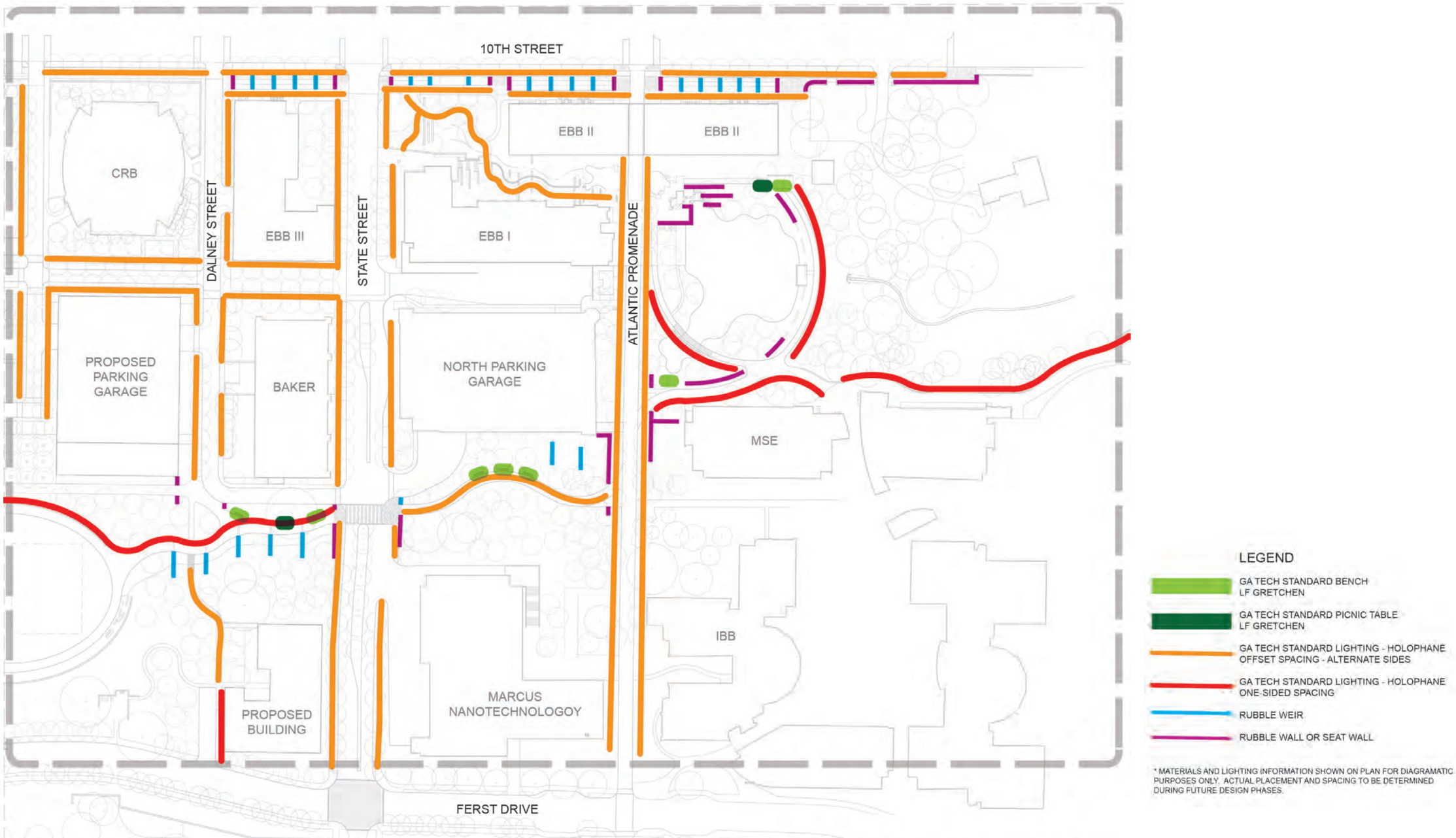


LEGEND

- BRICK PAVING
- ATLANTIC PROMENADE
  BRICK PAVING WITH GRANITE COBBLE EDGE
- BANDED BRICK AND CONCRETE PAVING
- ECO-COMMONS PATH
  NATURAL PAVE
- CONCRETE WALK

NOTE:
ALL OTHER SIDEWALK PAVING TO BE GA TECH
STANDARD SCORED CONCRETE
+ EXPLORE PERVIOUS PAVEMENT OPTIONS WHERE APPLICABLE

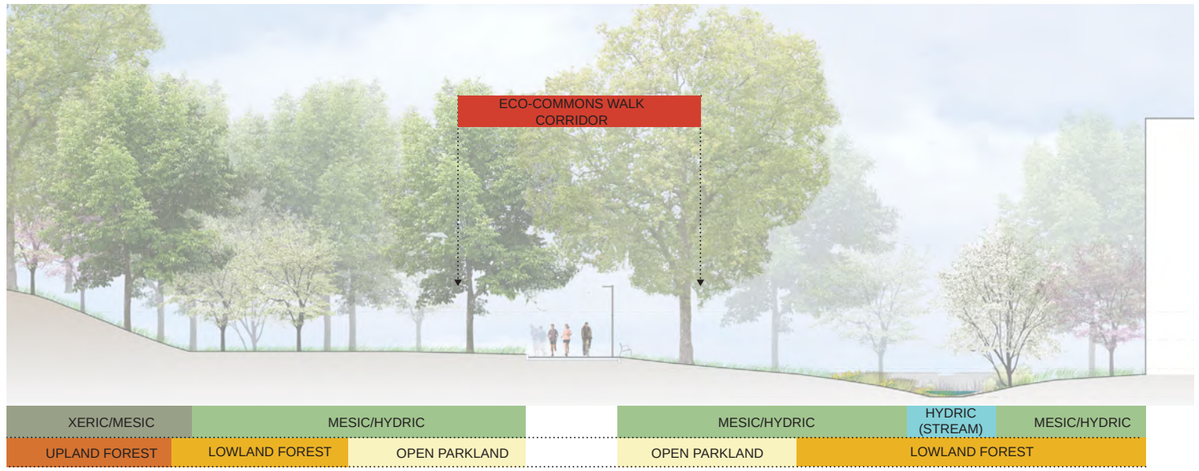
Proposed Furniture and Lighting Diagram



Planting Standards

The Eco-Commons is designed to be a permanent open space in the heart of the campus which can perform valuable ecological work while providing the opportunity for outdoor recreation and stormwater management. It will be a unique place within the campus and as a result it should contain a unique set of plant communities. The design team has identified a series of planting typologies for hydric, mesic, xeric areas of the Eco-Commons. A vegetation densities diagram has been developed to illustrate the density of the proposed forest plantings in the Eco-Commons. In addition, specific trees have been recommended for each of the corridors in the study area and a preliminary Eco-Commons Plant List has been developed which reflects the proposed plant community typologies. In addition, the Campus Landscape Master Plan Update serves as the foundation reference document for the Eco-Commons concept and contains additional detailed information.

Planting Standards for the Eco-Commons at Atlantic Promenade threshold

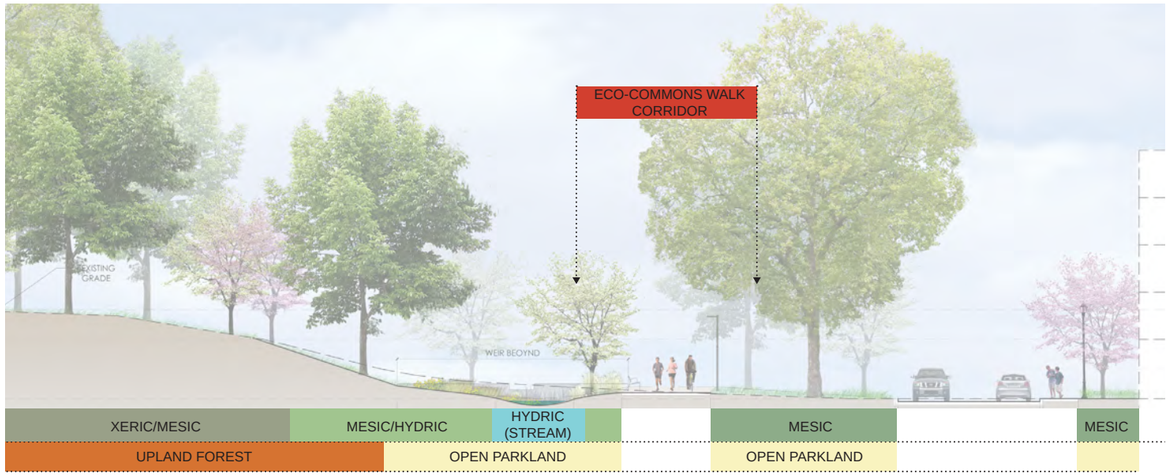


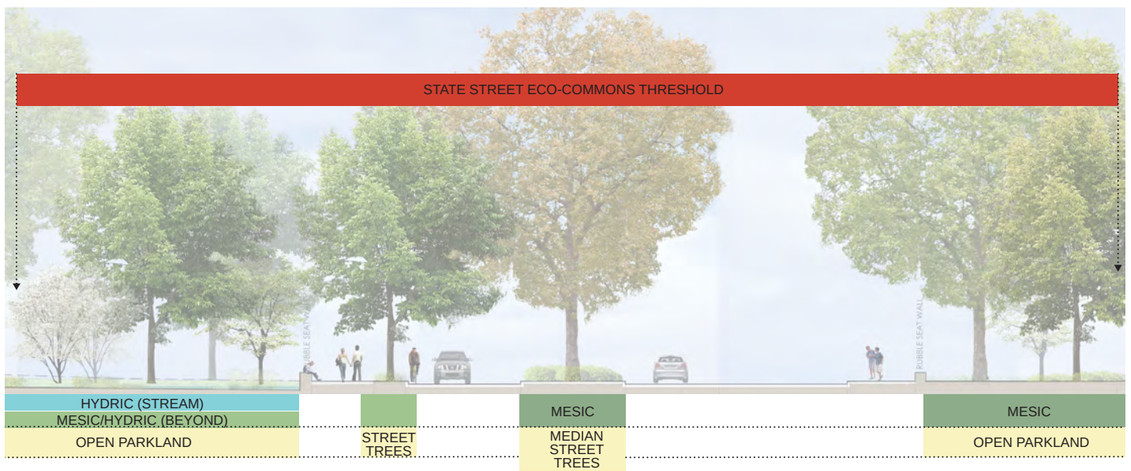
Proposed Planting Typologies at the Eco-Commons / Atlantic Promenade threshold

Atlantic - Eco Commons Threshold

TREES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Acer rubrum	Red maple	x	x	
Acer rubrum 'Bowhall'	Red maple		x	
Amelanchier spp.	Serviceberry	x	x	
Betula nigra 'Duraheat'	River birch	x	x	
Chionanthus virginicus	Fringe tree		x	
Fagus grandifolia	American beech		x	
Liriodendron tulipifera	Tulip poplar		x	
Magnolia virginiana	Sweetbay magnolia	x	x	
Nyssa sylvatica	Blackgum		x	
Ostrya virginiana	Hop hornbeam		x	x
Pinus taeda	Loblolly pine			x
Platanus occidentalis	Sycamore	x	x	
Platanus x acerifolia 'Columbia'	Plane tree		x	
Taxodium ascendens	Pond Cypress	x		
Taxodium distichum	Bald Cypress	x	x	
SHRUBS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Aesculus parvifolia	Bottlebrush buckeye		x	x
Aronia spp.	Chokeberry		x	x
Callicarpa americana	American beautyberry		x	x
Cornus sericea	Redosier dogwood	x	x	
Hydrangea quercifolia	Oakleaf hydrangea		x	
Ilex verticillata	Winterberry	x	x	
Itea virginica	Virginia sweetspire	x	x	
PERENNIALS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Echinacea spp.	Coneflower		x	
Iris spp.	Iris	x	x	
Heuchera spp.	Coralbells		x	
Lobellia spp.	Lobelia	x	x	
Rudbeckia spp.	Rudbeckia		x	x
FERNS/GRASSES/SEDGES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Athyrium filix-femina	Lady Fern	x	x	
Juncus effusus	Common rush	x		
Panicum virgatum	Switchgrass		x	
Polystichum acrostichoides	Christmas Fern		x	
Sporobolus heterolepis	Prairie dropseed		x	

Planting Standards for the Eco-Commons at State Street threshold



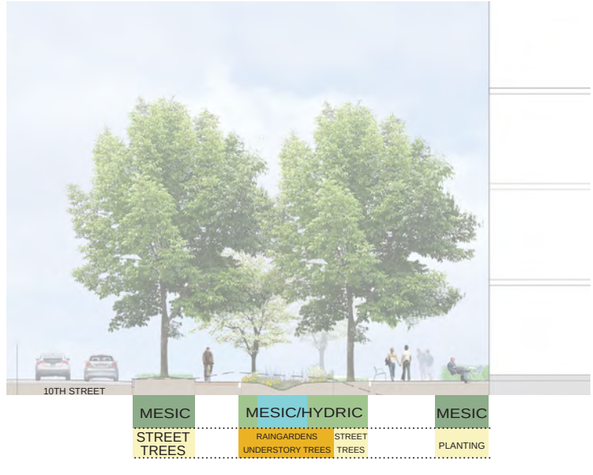


Proposed Planting Typologies at the Eco-Commons / State Street threshold

State Street - Eco Commons Threshold

TREES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Acer rubrum	Red maple	x	x	
Aesculus pavia	Red buckye		x	
Amelanchier spp.	Serviceberry	x	x	
Cercis canadensis	Redbud		x	
Cornus florida	Dogwood		x	
Crataegus viridis 'Winter King'	Hawthorn		x	x
Fagus grandifolia	American beech		x	
Hammamelis x intermedia	Witch hazel		x	
Liriodendron tulipifera	Tulip poplar		x	
Nyssa sylvatica	Blackgum		x	
Ostrya virginiana	Hop hornbeam		x	x
Pinus echinata	Shortleaf pine		x	x
Pinus taeda	Loblolly pine			x
Quercus coccinea	Scarlet oak		x	
Quercus nigra	Water oak	x	x	
SHRUBS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Aesculus parvifolia	Bottlebrush buckeye		x	x
Aronia spp.	Chokeberry		x	x
Callicarpa americana	American beautyberry		x	x
Cephalanthus occidentalis	Buttonbush	x		
Cornus sericea	Redosier dogwood	x	x	
Fothergilla spp.	Fothergilla		x	
Ilex verticillata	Winterberry	x	x	
Itea virginica	Virginia sweetspire	x	x	
Rhus aromatica	Fragrant sumac		x	
PERENNIALS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Heuchera spp.	Coralbells		x	
Lobellia spp.	Lobelia	x	x	
Rudbeckia spp.	Rudbeckia		x	x
Solidago spp.	Goldenrod		x	x
FERNS/GRASSES/SEDGES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Athyrium filix-femina	Lady Fern	x	x	
Carex spp.	Sedge	x	x	
Eleocaris spp.	Spike rush	x		
Juncus effusus	Common rush	x		
Panicum virgatum	Switchgrass		x	
Polystichum acrostichoides	Christmas Fern		x	
Schizachyrium scoparium	Little bluestem		x	
Scirpus spp.	Bullrush	x		

Planting Standards for the 10th Street Corridor



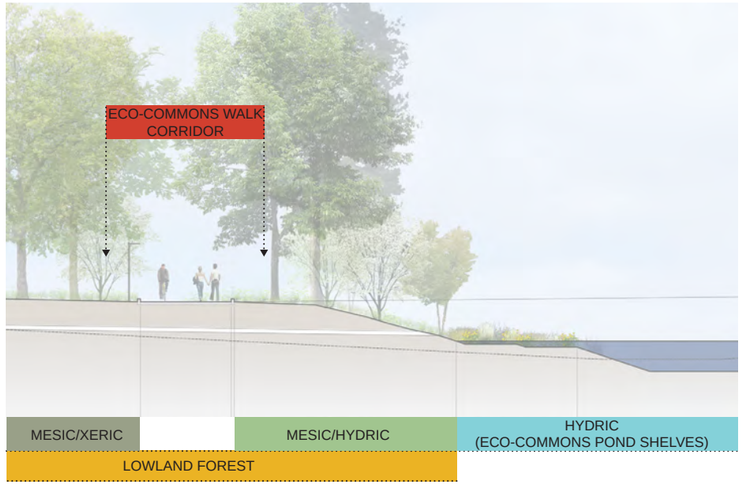
Proposed Planting Typologies at the 10th Street Corridor

10th Street

STREET PLANTING				
TREES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Amelanchier spp.	Serviceberry	x	x	
Ulmus americana 'Princeton'	American elm		x	
Ulmus parvifolia	Chinese elm		x	
SHRUBS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Fothergilla spp.	Fothergilla		x	
Hydrangea quercifolia	Oakleaf hydrangea		x	
Rhus aromatica	Fragrant sumac		x	
PERENNIALS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Echinacea spp.	Coneflower		x	
Rudbeckia spp.	Rudbeckia		x	x

RAINGARDENS				
TREES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Magnolia virginiana	Sweetbay magnolia	x	x	
SHRUBS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Ilex verticillata	Winterberry	x	x	
Itea virginica	Virginia sweetspire	x	x	
PERENNIALS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Echinacea spp.	Coneflower		x	
Iris spp.	Iris	x	x	
Hemerocallis spp.	Daylilly	x	x	
Lobellia spp.	Lobelia	x	x	
FERNS/GRASSES/SEDGES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Athyrium filix-femina	Lady Fern	x	x	
Carex spp.	Sedge	x	x	
Juncus effusus	Common rush	x		
Panicum virgatum	Switchgrass		x	

Planting Standards for the Eco-Commons Pond

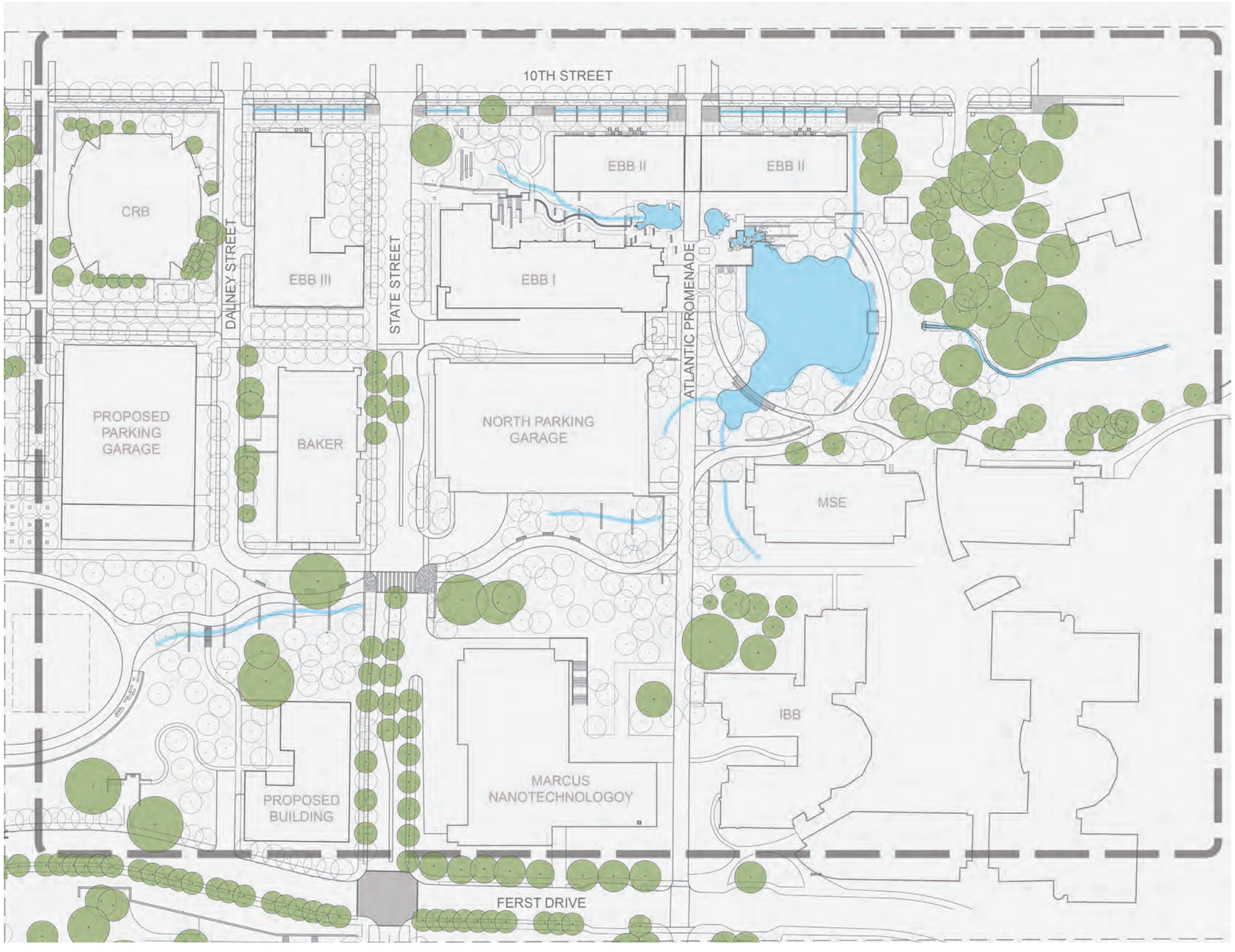


Proposed Planting Typologies at the Eco-Commons Pond

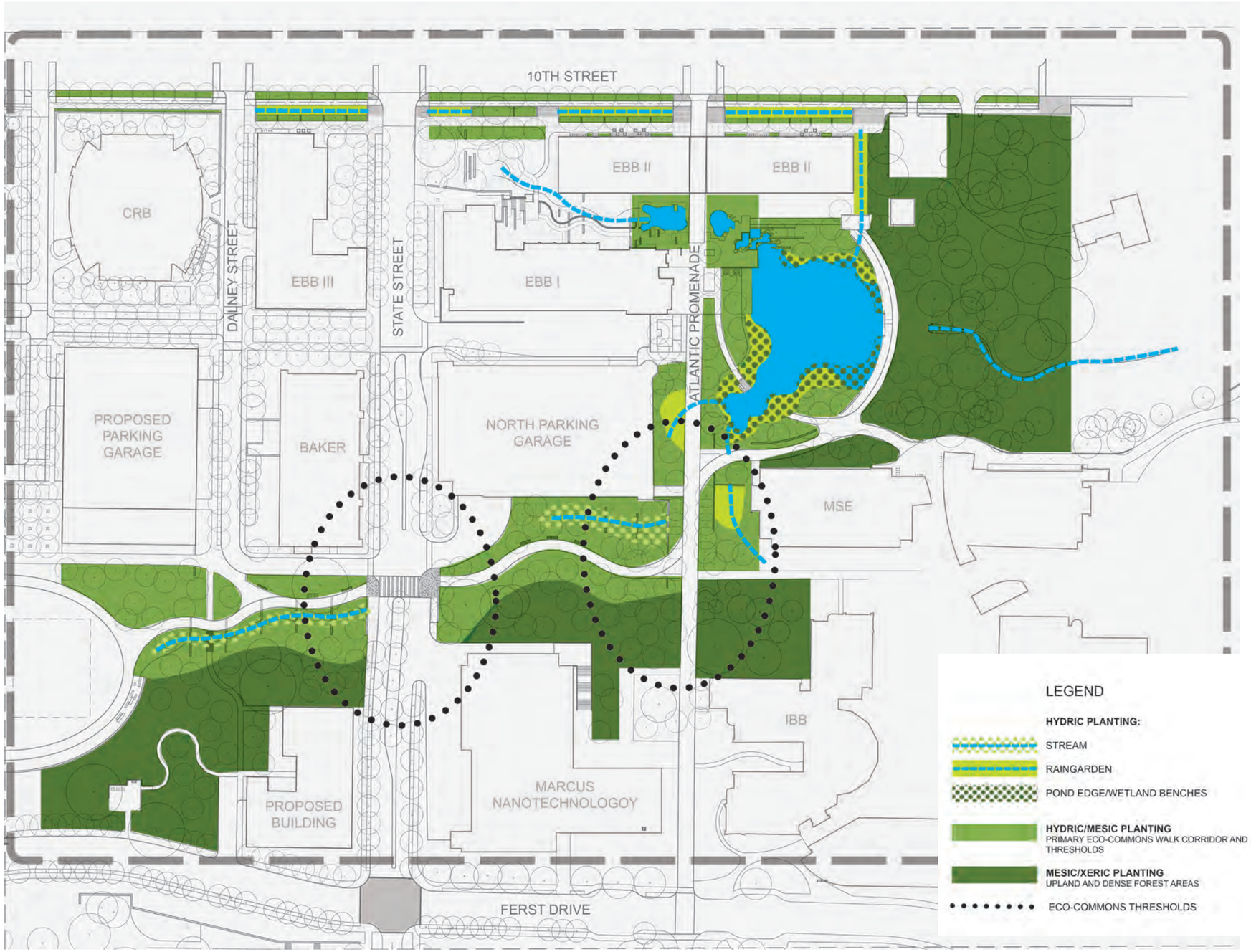
ECO-COMMONS POND

TREES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Acer rubrum species	Red maple		x	
Amelanchier spp.	Serviceberry	x	x	
Betula nigra 'Duraheat'	River birch	x	x	
Carpinus caroliniana	Musclewood	x	x	
Liriodendron tulipifera	Tulip poplar		x	
Magnolia virginiana	Sweetbay magnolia	x	x	
Nyssa aquatica	Water tupelo	x		
Nyssa sylvatica	Blackgum		x	
Quercus nigra	Water oak	x	x	
Quercus phellos	Willow oak		x	
Quercus bicolor	Swamp white oak		x	
Salix spp.	Willow	x	x	
Taxodium ascendens	Pond Cypress	x		
Taxodium distichum	Bald Cypress	x	x	
SHRUBS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Cephalanthus occidentalis	Butonbush	x		
Cornus sericea	Redosier dogwood	x	x	
Fothergilla spp.	Fothergilla		x	
Ilex verticillata	Winterberry	x	x	
Itea virginica	Virginia sweetspire	x	x	
Physocarpus opulifolius	Common ninebark	x	x	
PERENNIALS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Cephalanthus occidentalis	Butonbush	x		
Kostelezkya virginica	Virginia saltmarsh mallow	x		
Lobellia spp.	Lobelia	x	x	
Nymphaea spp.	Water lily	x		
Nuphar lutea	Yellow pond lily	x		
Peltandra virginica	Green arrow arum	x		
Pontederia cordata	Pickerelweed	x		
Saururus cernuus	Lizard's tail	x		
FERNS/GRASSES/SEDGES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Eleocaris spp.	Spike rush	x		
Juncus effusus	Common rush	x		
Onoclea sensiblis	Sensitive fern	x	x	
Polystichum acrostichoides	Christmas fern		x	
Scirpus spp.	Bullrush	x		

Existing Trees Diagram



Proposed Planting Typologies Diagram



Planting Typologies

Open Parkland is located at the Eco-Commons Thresholds where there is need for increased visibility and way-finding. Specimen trees in this zone should be between 2” and 4” caliper, the groundplane planted with low, preferably native groundcovers. The understory should remain open, allowing clear views into the Eco-Commons, and permitting the safe and secure crossing of streets.

State Street - Eco-Commons Threshold is defined by higher percentage of more mesic tulip poplars (Liriodendron tulipifera) to indicate that the crossing is a slightly higher elevation along the Eco-Commons Corridor than the Atlantic Promenade crossing. Plane trees (Platanus spp.), a more typical tree in hydric stream corridors, mark the Atlantic Promenade crossing. They reinforce the connection of the East Raingardens to the Eco-Commons Pond.

Lowland Forest at the Eco-Commons is comprised of hydric and mesic species. Sizes of trees vary from saplings (5 gal) to 2” caliper trees to simulate natural forest settings and to encourage succession and soil building. Canopy trees should be interspersed with understory trees.

Upland Forest dominates the Eco-Commons hillsides and stabilizes steep slopes, overlooking the 8th Street raingardens. It is composed of mesic and xeric species. Trees are planted densely in variety of sizes (saplings (5 gal) to 2” caliper), similar to the Lowland Forest. The spacing should be denser than the Open Parkland.

The Eco-Commons Walk connects multiple ecologies as it traverses from the Eco-Commons Lawn to the Pond. The walk provides recreational opportunities for exercise and informal outdoor study areas with picnic tables and benches. The tree cover along the walk should be high and open, creating views into the adjacent Eco-Commons forest and raingardens, and helping to create/establish a safe yet natural-feeling environment. Educational signage which explains the ecological and hydrologic functions of the Eco-Commons should be incorporated along the walk. Key Eco-Commons specimen trees should be identified for special care and preservation.

Proposed Vegetation Densities Diagram

Densities

Dense Forest is composed of maximum species diversity. Average spacing between trees should vary between 10' and 30'. It incorporates existing forested areas that are not adjacent to primary circulation routes.

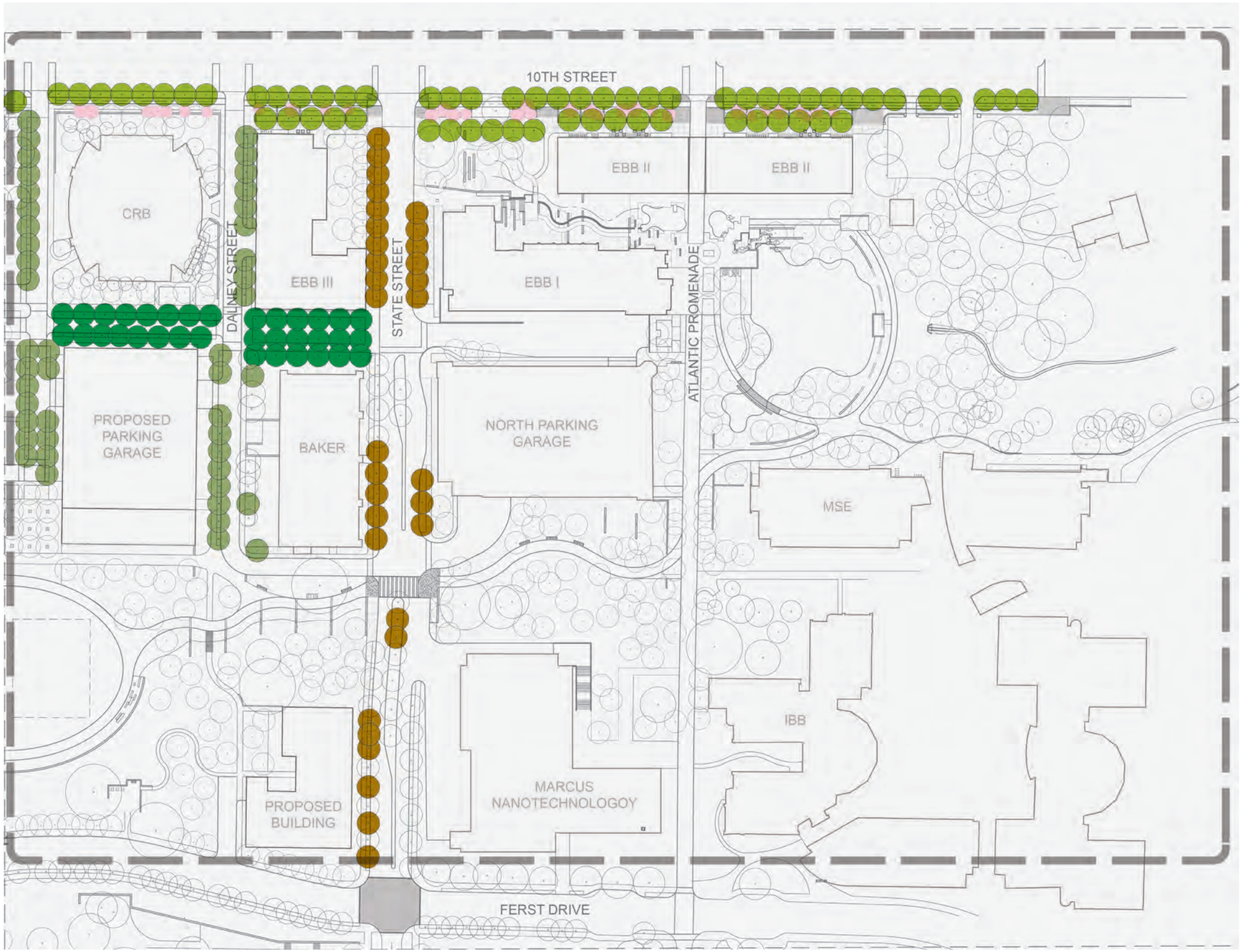
Intermediate Forest is primarily a condition to be established in the circulation core of Eco-Commons. It tends to overlap with both the denser upland forest, more open hydric forest and threshold areas. Average spacing of trees is 20'-40' on center.

Open Forest is forest area type that tends to coincide with the most open public threshold areas between the Eco-Commons and major design corridors, Atlantic Promenade and State Street. Spacing between trees should be more than 25' on center.

Overlapping Zones

As in natural forests, planting densities and typologies overlap in the Eco-Commons. These transitions subtly define user zones, important places, and circulation within the ecological system of the Eco-Commons. More open areas at crossings and near major circulation routes span hydric and mesic ecologies and provide clear way-finding. Their backdrop is increasingly denser lowland and upland forests, which span hydric/mesic/xeric conditions.

Proposed Corridor Trees Diagram



IX. STORMWATER

Stormwater Infrastructure

The proposed Eco-Commons improvements are directly related to the Basin A Stormwater Management system. A master plan for this system was completed earlier this year (2013) and proposes a series of interconnected cisterns which will enable the capture and reuse of a significant amount of water. The Eco-Commons will convey some surface stormwater into the Glade Pond and some portions of this captured water may be utilized as a source for an intermittent stream flow through the Eighth Street rain gardens and into the Glade Pond. A number of stormwater and utility related items specific to this current EBB conceptual planning study are discussed in some depth below.

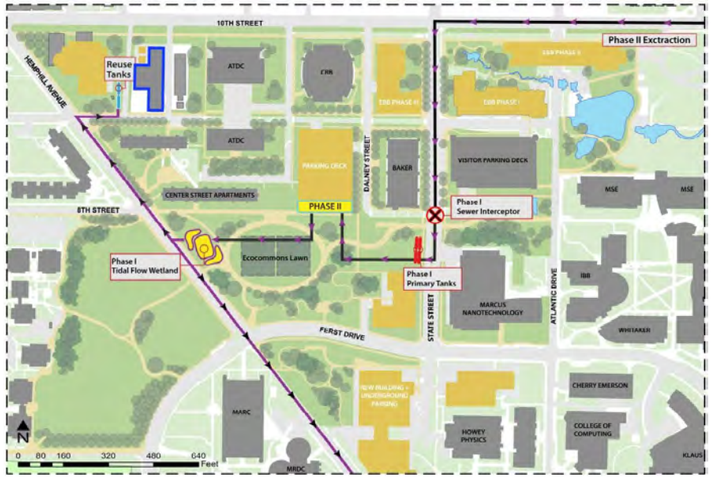
Eighth Street Rain Gardens:

Potential Stream Flows

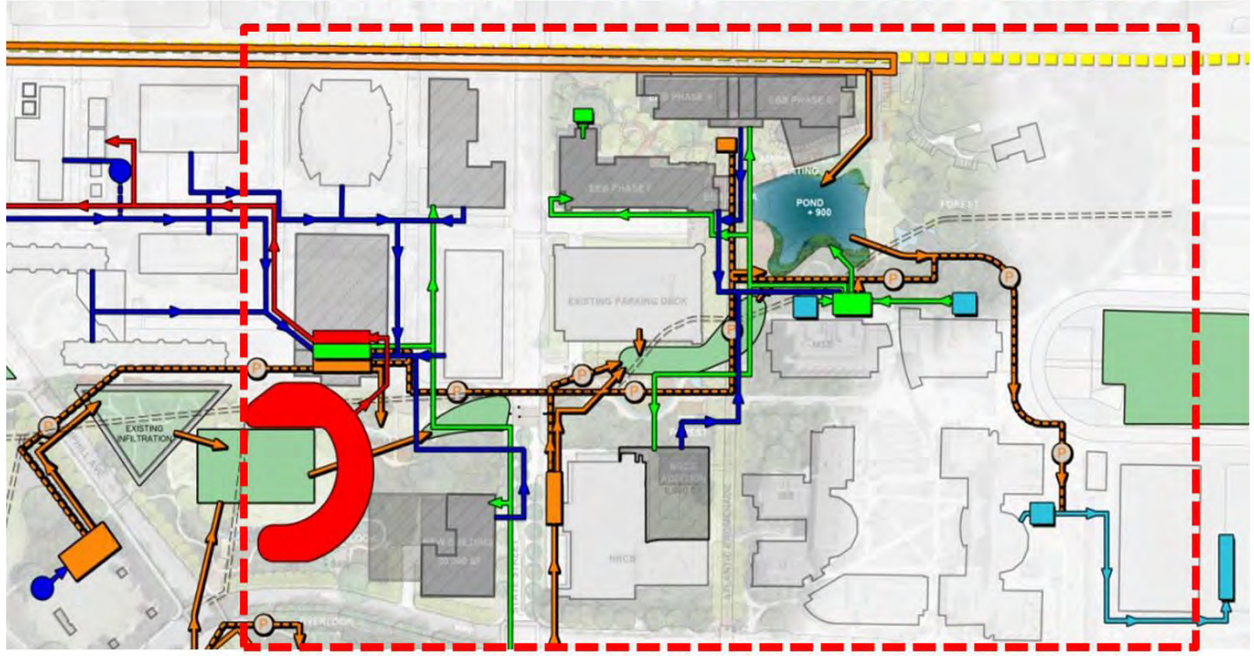
During drought or below normal rainfall, the rain gardens west of State Street and west of Atlantic Drive will likely to be dry pending the introduction of supplemental volume from condensate. The Stormwater Master Plan – Basin A states on page 53, “surface water features” that “the proposed cistern volumes include some additional volume for stormwater storage that could provide a supply to this surface feature following rainfall events when this excess volume is available. If this excess volume was allowed to flow out of the cisterns over a 7-day period, an average supply of 32 gallons per minute could provide flow to these surface water features for an estimated 228 days out of the year”. A continual flow of 32 gallons per minute could be provided if the rainwater/irrigation cisterns were increased in size. Or, alternatively, a continuous flow could be provided by pumping water to the top of the rain garden channel from either the Glade Pond or from the MSE condensate cisterns.

Additionally, the hydraulic characteristics of the 2, 5 and 100 year storm events were conceptually evaluated. The results are shown in the table below:

	Rain Garden	
	West of State Street	West of Atlantic Drive
2-year Flowrate (cfs)	25	11
Depth of flow	1.0	0.8
5-year Flowrate (cfs)	45	12
Depth of flow	1.5	0.9
100-year Flowrate (cfs)	79	14
Depth of flow	2.4	1.1



EBB Sector Area from the Blackwater Feasibility Study by Jacobs Engineering (2013)



EBB Sector Area from the Basin A Stormwater Management Plan (2013)

Eighth Street Rain Gardens continued...

Infiltration

Both of the rain gardens are expected to incorporate an infiltration feature. There are many options to accomplish this, but it is anticipated that the presence of flowing water (roughly 32 gallons per minute) could be contained in an impervious channel that is aesthetically natural. During rainfall events, the flow would overtop this channel and enter an infiltration area. The infiltration could be a stone chamber or void space that allows the water to infiltrate into the soil, recharging the groundwater and reducing stormwater volume into the City's combined sewer. Some of the infiltration volume could also be included on the surface if the ground adjacent to the channel were kept lower than the channel. The Stormwater Master Plan – Basin A calls for 10,000 cubic feet of void space for the State Street rain garden and 5,000 cubic feet for the Atlantic Drive rain garden. The current EBB construction documents incorporate the storage requirements within the Atlantic Drive rain garden.

State Street Crossing / Emergency Overflow

Due to the abundance of utilities in State Street, a very shallow 8" storm drain line is proposed to connect the rain garden west of State Street with the rain garden just west of Atlantic Drive. This line is intended to allow the presence of flowing water to begin at the westernmost end of the rain gardens and flow east to the Glade Pond. During and after rainfall events that generate flows greater than the capacity of the 8" pipe, the flow in the rain garden west of State Street enters an emergency overflow structure and is diverted to the combined sewer. The rain garden immediately west of Atlantic will drain directly to the Glade Pond during all storm events.

Nanotechnology Cistern Connection /Modification

The Nanotechnology cistern/detention facility is a 10' x 10' x 125' long vault. It gathers both condensate water and stormwater runoff from the Nanotechnology project. According to design drawings, a weir wall at one end contains a 1.5" orifice 4.5' above the vault bottom, a 2' long weir 7.6 feet above the bottom and a 10' weir 8.6' above the bottom. This results in 40,400 gallons of water contained below the 1.5" orifice where it is reused for irrigation. The remaining volume in the vault is used for stormwater detention to reduce peak flow in accordance with City requirements. The Stormwater Master Plan – Basin A calls for the conversion of this vault to a cistern by plugging the 1.5" orifice and lower (2' long) weir. This increases the cistern volume available for reuse to 77,200 gallons. The existing pumping configuration at the cistern could be modified to add a supply line to feed or supplement the base flow in the rain gardens west of Atlantic Drive and should be connected with the proposed stormwater system pressure line that will ultimately interconnect all of the regional cisterns. Due to high ground elevations in the area, the overflows from the cistern during rainfall events are anticipated to continue being discharged to the City's combined sewer system.

North Deck Roof Drain Decoupling

The north parking deck upper parking level discharges to detention pipes on the east side of the building. It is recommended that the roof drains be redirected within the crawl space beneath the deck to discharge to the rain garden west of Atlantic Drive to provide supplemental base flow. Routing flows to the rain garden would increase the amount of water infiltrated as well as provide additional volume to the Glade Pond.

Blackwater System Integration

Sustainable Water has developed a Blackwater Reuse Feasibility Study whereby wastewater is mined from the 18" sanitary sewer at State Street and the Orme Street Combined Sewer Relief line, treated in a decentralized water reclamation and reuse facility and used at the 10th Street Chiller Plant and the Holland Utility Plant. Besides piping, major facilities within the EBB Sector include the pump station and primary tanks at State Street and a greenhouse type structure on the south side of the proposed Dalney Street Parking Deck that would house hydroponic reactors. The feasibility study does not indicate that the treated water would be used for other purposes such as irrigation, flushing toilets or providing base flow in streams.

10th Street Rain Gardens:

City Standards

The City of Atlanta has a standard detail for a rain garden adjacent to a roadway that could appropriately be utilized along 10th Street. Runoff flowing east within the 10th Street gutter and along adjacent sidewalks would be diverted into a depressed infiltration area surrounded by a curb. The depth of the water trapped in the infiltration area is 6 inches. When this depth of water is surpassed, the flows are allowed to reenter the street and continue flowing east within the gutter. For steeper areas of 10th Street, weir walls can be installed periodically to step the water down the grade, reducing velocities and increasing infiltration volumes.

Stormwater off of 10th Street

The 10th Street rain gardens are generally fed from runoff from the south two lanes of 10th Street and the sidewalk area. As this area is improved to include tree planning/furniture zones, bicycle lanes and a wider sidewalk, the stormwater flows will increase. During drought or low rainfall months, the rain gardens will be dry. During more intense rainfall events, the following flow rates and flow depths are anticipated:

	Rain Garden
	10th Street
2-year Flowrate (cfs)	5
Depth of flow	0.3
5-year Flowrate (cfs)	6
Depth of flow	0.3
100-year Flowrate (cfs)	8
Depth of flow	0.4

Divert overflows into Eco-commons at major streets

Rather than diverting higher flows back into the curb as indicated on the City of Atlanta rain garden standard detail, these 10th Street rain garden flows should be diverted into the Eco-Commons at major north-south streets. This will reduce the volume and rate of flow entering the City's combined sewer system by diverting the flows to infiltration areas at State Street and Atlantic Drive and provide additional supplemental base flows within the Eco-Commons water features.

Glade Pond

Dam Construction

The Glade Pond dam is proposed to have a concrete inner core to provide an impervious barrier with earthen slopes on its upstream and downstream sides. The downstream (east) earthen slope will be landscaped and contain planted trees. Planting trees on the dam would not be recommended if it were not for the concrete core. The pond is anticipated to have synthetic or a bentonite clay liner to reduce water loss due to seepage.

Design Storm / Freeboard / Outlet structure

The 100 year peak flow rate from the Stormwater Master Plan, Basin A through the Glade Pond is 105 cubic feet per second. To limit the fluctuation in water level to about 12", the outlet control structure weir wall would need to be 35' in length, potentially in a "U" configuration with two 10' legs and one 15' connecting edge. The outlet pipe through the dam would be 48" diameter at 1% (143 cubic feet per second capacity). The outlet control structure can be creatively hidden from view by placing an overlook on top of it and a facade several feet outside of the weir wall that extends into the water. It is recommended that an additional 12" of freeboard be provided to the top of dam for a total difference of 24" between normal pool and top of dam.

Glade Pond Water Levels

The Glade Pond normal water surface elevation should remain at a fairly constant level. With the full implementation of the Stormwater Master Plan, Basin A, the abundant supply of water can be transferred throughout the watershed including the transfer to the Glade Pond to maintain normal water elevations. Within Couch Park and connected to the cistern system is a very prolific well (150 gallons per minute) that can also be utilized to supplement the pond if desired by Georgia Tech. During rainfall events, the following fluctuations are anticipated to occur based on an outlet control structure weir wall 35' in length:

2-year storm (40 cfs):	0.6 feet
5-year storm (67 cfs):	0.8 feet
100 year storm (105 cfs):	1.1 feet

It is desirable to maintain water levels in the Glade Pond at a relatively steady state level (+/- 4-6"). Based on the NOAA Technical Report NWS 34, Mean Monthly Seasonal and Annual Pan Evaporation for the United States, the peak evaporation rate is 7.1" in June and July. This results in approximately 180,000 gallons of evaporation for these months. It is assumed that the pond will be lined and seepage rates will be negligible. The calculated condensate volumes from the Molecular Science and Engineering building for the month of June is 180,000 gallons, offsetting the water lost to evaporation. The irrigation demand from the cisterns is not presently known but the average rainfall in June is 3.9" that would offset 55% of the evaporated water.

Sanitary Sewer Conflicts

An existing 18" diameter sanitary sewer and 69" storm or partially combined sewer traverse the southern side of the Glade Pond. The 18" sanitary sewer line location conflicts with the southern end of the proposed concrete dam and the line therefore will need to be relocated. The invert elevation of the sanitary sewer line in Atlantic Drive is approximately 877 and flows in an easterly direction while the invert of the 69" sewer is around 881 and also flows in an easterly direction. The elevations of the 69" sewer are very approximate as it is difficult to determine if manhole locations on existing surveys are on or adjacent to the main line. Existing and proposed ground elevations in the vicinity of the 18" sewer line relocation are approximately 904, which would require excavations about 30 foot deep. Rerouting the 18" line to avoid the proposed concrete dam would also require crossing beneath the 69" pipe, an expensive proposition. Additional field survey information and coordination with the City of Atlanta Department of Watershed Management is required to develop a detailed design approach for the relocation of the 18" pipe.

Stormwater Management System Implementation

The Stormwater Master Plan, Basin A is anticipated to be implemented over a 10-15 year period. The goal of the master plan is to harvest roof rainwater, condensate and foundation dewatering and reuse in new buildings to flush toilets. Additionally, surface rainwater is captured and used for irrigation, infiltration and peak rate reduction. The end result is potable water is no longer used for flushing toilets in new buildings or for irrigation, providing a reduction in water costs as well as providing a more sustainable approach to water use. Implementation of the master plan will reduce the peak runoff rate for the 25-year storm by 17% and the runoff volume into the City's combined sewer system by 60 million gallons. The master plan should be considered as a water system that captures, stores and transports reuse water and irrigation/stormwater to areas of Basin A where there is a demand. Transportation of this capture water is critical and without the piping infrastructure in place, cisterns will be under or over utilized.

Achieving "Stream" Flow

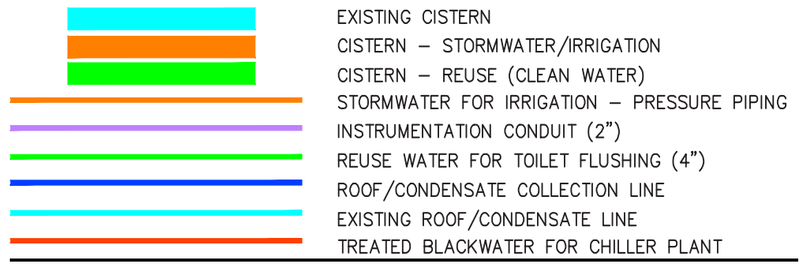
Prior to full completion of the Master Stormwater Plan – Basin A, it may be desirable to maintain a small base flow in the proposed Eighth Street rain garden "stream". Current discussion has identified a flow of 32 gallons per minute as a suitable flow rate. This equates to roughly 1.5 million gallons per month, more than double the condensate generated by the Nanotechnology building in a year. Potential means of achieving this flow is either a regional irrigation/stormwater cistern called for in the stormwater master plan or recirculating the flows from the Glade Pond to the western end of the State Street rain garden. It is not recommended that well water be used for this purpose as this option is not considered a sustainable use of water.

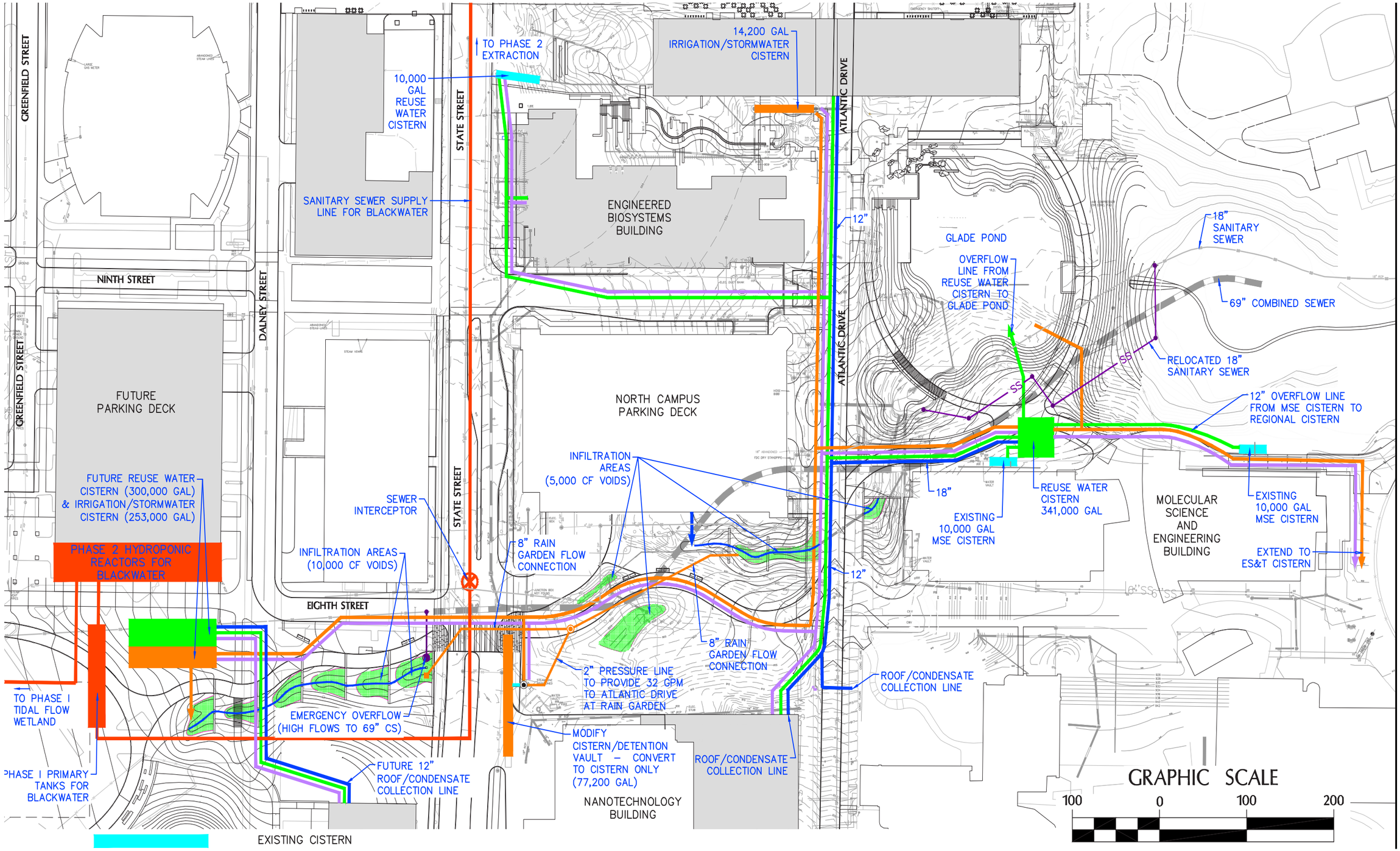
References:

Stormwater Master Plan – Basin A
This report dated June 2013 was prepared by jB+a, Jacobs and Long Engineering, Inc. for the 180 acre Basin A that includes the EBB Sector.

Blackwater Reuse Feasibility Study
This report was prepared by Sustainable Water to determine the feasibility of treating wastewater within the City's combined sewer system and reusing it for chiller plant makeup water.

LEGEND





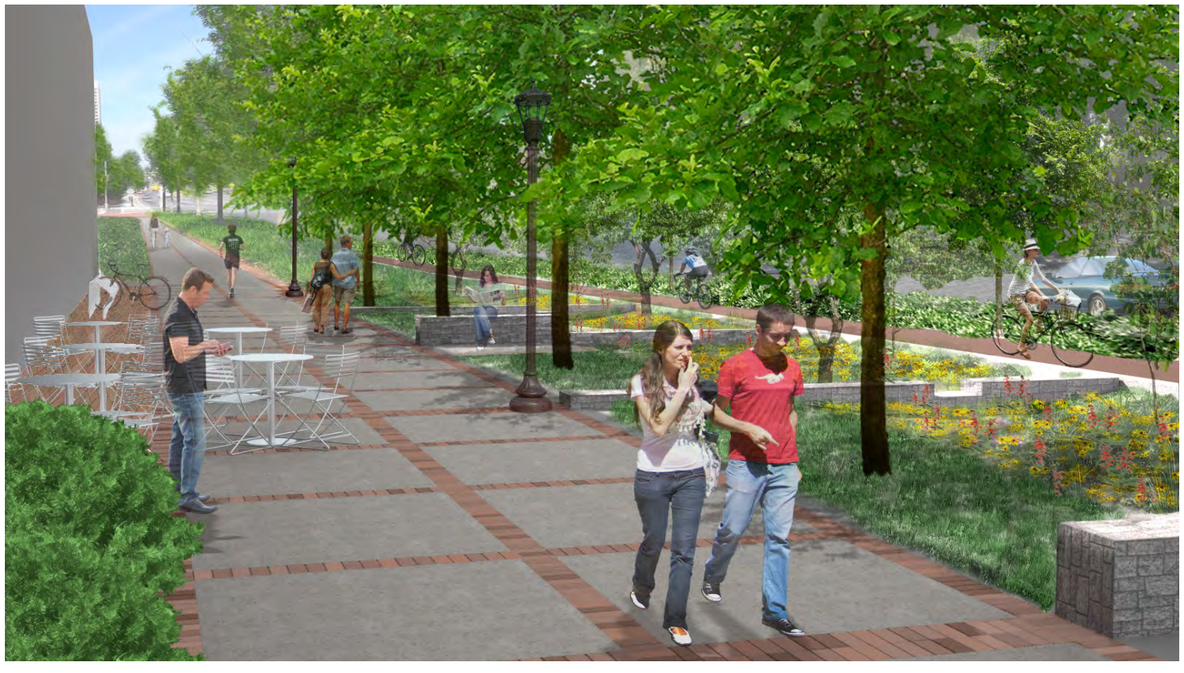
EBB Sector Area Conceptual Stormwater System Plan

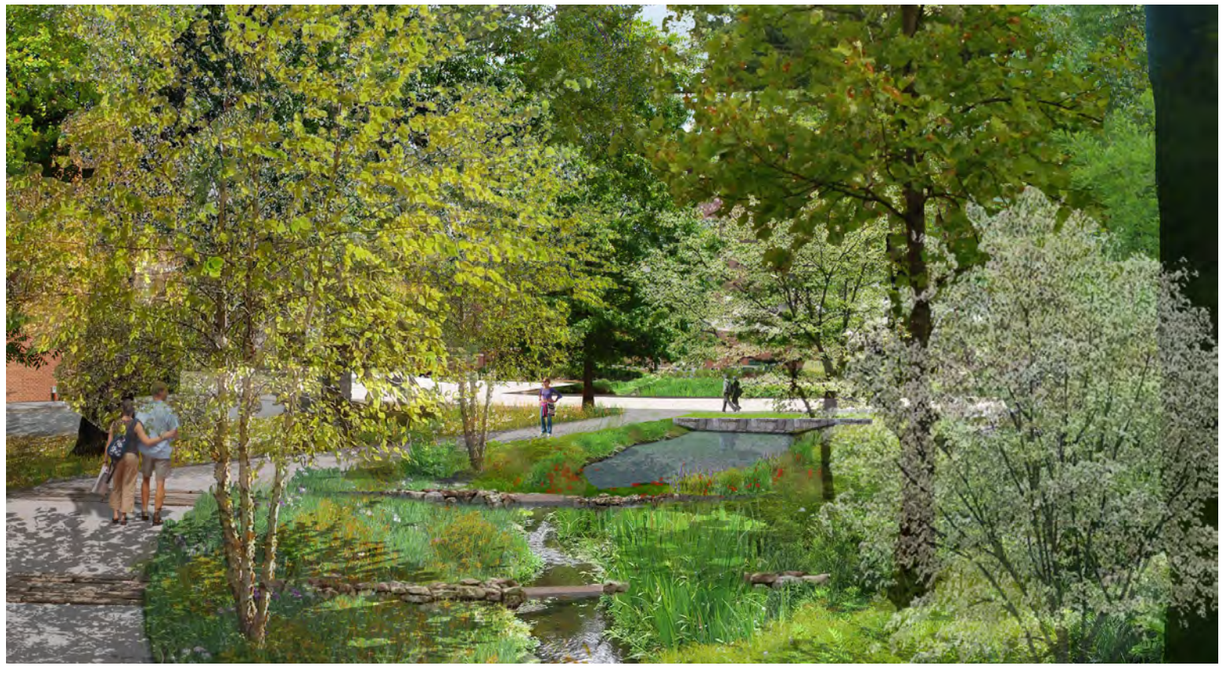
X. CONCLUSION

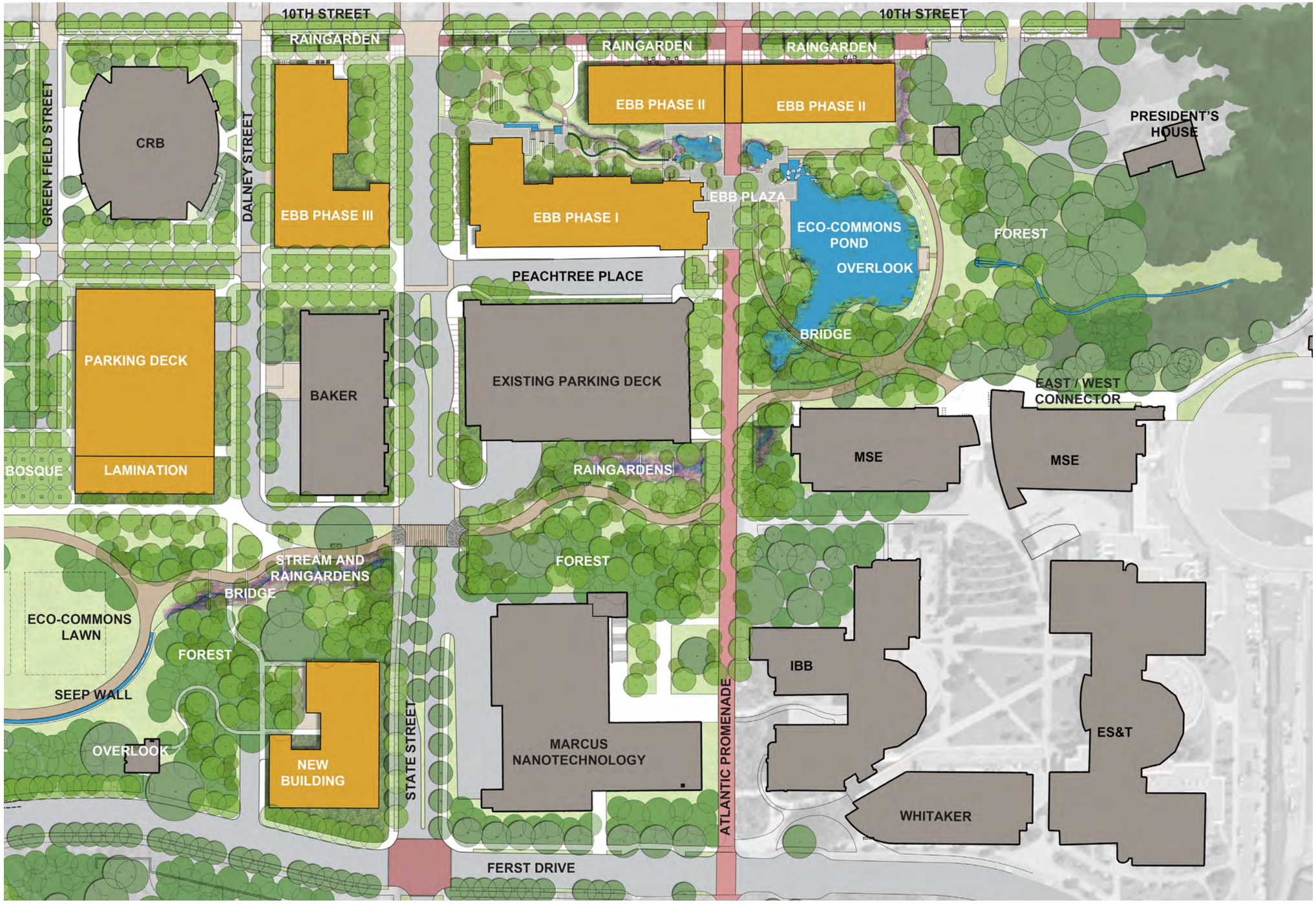
CONCLUSION

This conceptual design effort has focused on the primary campus common areas within the zone immediately surrounding the proposed EBB research complex. There are a number of important landscape elements here which taken collectively will help transform this northern portion of campus into a dynamic environment. This plan has further developed the design intent for a number of these elements. They include: the 10th Street campus edge; the State Street corridor, Phase One of the East-West Connector, the 8th Street Stream and Rain Gardens, and the Eco-Commons Pond.

Each of these landscapes will be important, highly functional, campus open spaces which will contribute greatly to the quality of the experience on this portion of the campus. These will become spaces to which many in the campus community will be drawn for studying, socializing, exercise, fresh air, sun, relaxation, contemplation and circulation. Georgia Tech has a great opportunity, as it redevelops this northern sector of campus, to create a world-class campus environment here framed around these core Eco-Commons elements.






10TH STREET
RAINGARDEN
RAINGARDEN
RAINGARDEN
10TH STREET
GREEN FIELD STREET
CRB
DALNEY STREET
EBB PHASE III
EBB PHASE II
EBB PHASE II
EBB PHASE I
EBB PLAZA
PRESIDENT'S HOUSE
ECO-COMMONS POND
OVERLOOK
FOREST
PEACHTREE PLACE
BRIDGE
PARKING DECK
BAKER
EXISTING PARKING DECK
EAST / WEST CONNECTOR
MSE
MSE
BOSQUE
LAMINATION
RAINGARDENS
STREAM AND RAINGARDENS
FOREST
BRIDGE
ECO-COMMONS LAWN
FOREST
IBB
SEEP WALL
STATE STREET
ATLANTIC PROMENADE
ES&T
OVERLOOK
NEW BUILDING
MARCUS NANOTECHNOLOGY
WHITAKER
FERST DRIVE