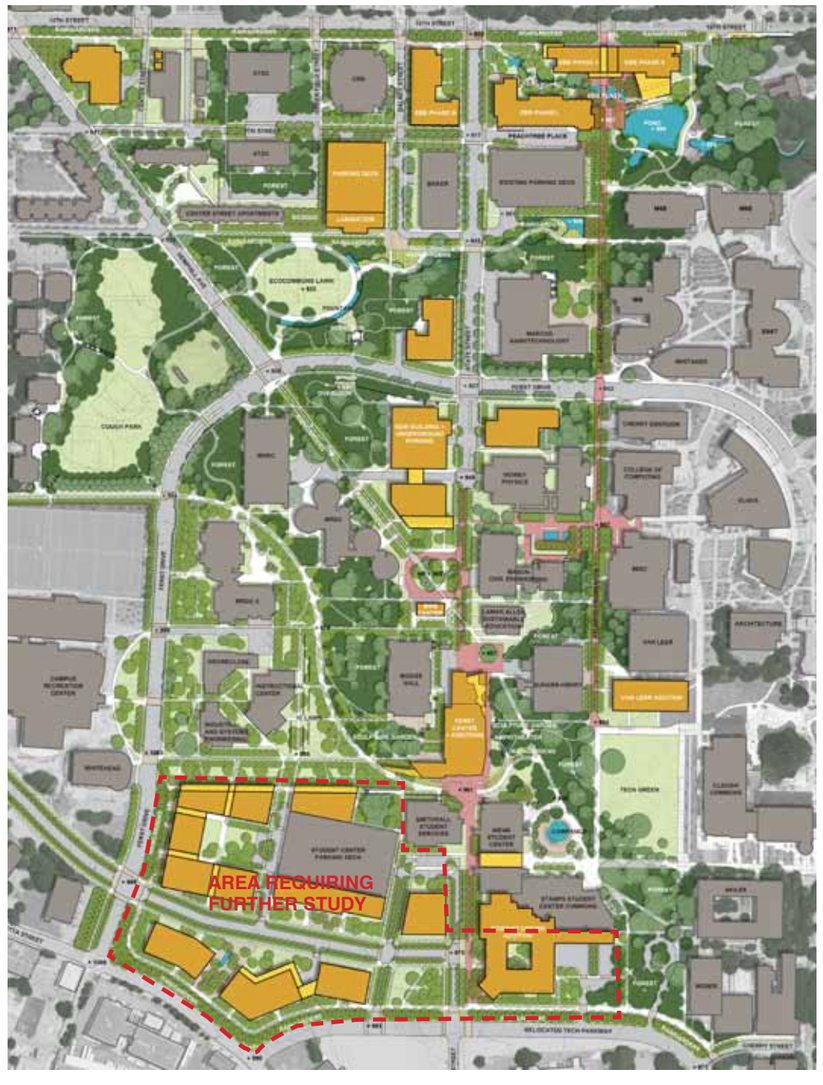
ENGINEERED BIOSYSTEMS BUILDING (EBB)
& SOUTH-CENTRAL CAMPUS SECTOR PLANS



Georgia Institute of Technology

May 2013

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EXECUTIVE SUMMARY

Introduction & Overview

In the fall of 2011, the Georgia Institute of Technology (Georgia Tech) initiated a sector planning process for a large, central portion of the campus. This planning process was intended to provide a “bridge” between the broad scale recommendations of the 2004 Campus Master Plan Update and the detailed site planning that is typically undertaken when specific buildings are designed. The sector study area encompasses more than 100 acres, or approximately twenty-five percent of the total Atlanta campus, and stretches from 10th Street on the northern edge of campus to Tech Parkway along the campus’s southern edge. The plan is divided into two separate but adjoining sector study areas – the EBB Sector (approximately 45 acres) located between 10th Street and Ferst Drive and the South-Central Sector (approximately 65 acres) located between Ferst Drive and Tech Parkway.

The catalyst for each of these sector planning efforts came from two important new campus building projects which were both just beginning programming and conceptual design in late 2011. Near the center of campus, in the South-Central Sector, the Ferst Center for the Arts was initiating a major renovation and potential expansion planning and design process. Along the northern, 10th Street edge of campus, the first major building of a potentially three building research laboratory complex – the Engineered BioSystems Building – was just beginning a fast-track design and construction process. The sector plans have been developed to help define the future campus context within which these projects are going to be built and as a means of establishing a “regional” campus vision around these two important projects.

Sector Plan Vision & Goals

A series of goals were developed early on in the process to help guide the sector planning. These goals evolve from the Institute’s Strategic Plan strategy to “Develop the campus and its neighborhood as a vibrant live-work-learn-play environment”. The Sector Plans achieve this by creating a framework plan for buildings and open spaces that supports and encourages the integration of academic, research, innovation, technology, the arts, business and community uses into a dynamic campus environment organized around a unifying central open space system.

From the outset, this sector planning process had a strong landscape focus and emphasis. The intent was to advance the vision of the Eco-Commons, a concept first conceived during the 2004 Campus Master Plan Update process and further articulated in the subsequent Campus Landscape Master Plan (CLMP), utilizing this campus-wide open space system as a key organizational structure for this central part of campus. According to the CLMP, the “goal of the Eco-Commons is to provide integrated stormwater management, outdoor recreation, enhancement of environmental values, and opportunities for research and education - in a way that contributes to Georgia Tech’s leadership in sustainability design.”

Building on these ideas, an overarching organizational design concept, called the “Forest Ribbon”, was developed early in this sector planning process and embraced as the guiding framework for the development of the future physical form of both sectors. The Forest Ribbon will function as an important ecological and hydrological element of campus, as the primary central park and open space, and as a primary pedestrian and bicycle circulation spine for this portion of the campus. The “Forest Ribbon” reflects the natural physiography of the campus and as such plays an important stormwater management role as well.

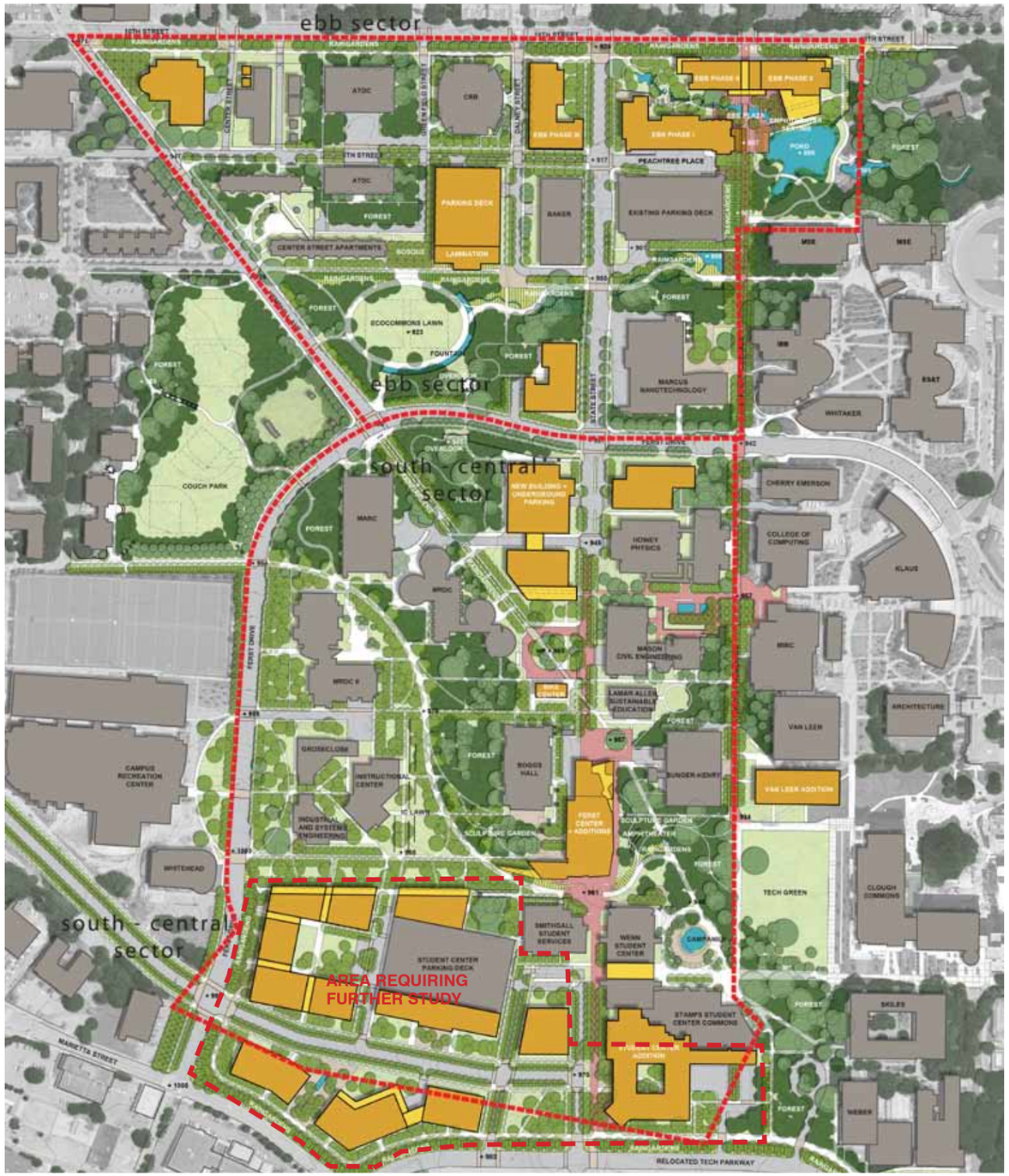
The Forest Ribbon concept also encourages the strengthening, and in some cases the reinstatement of, the City’s historic urban grid. This highlights the campus’ urban location and strengthens the contrast with the natural, organic form of the Forest Ribbon itself. This emphasis on the grid is a further reinforcement of the Landscape Master Plan’s focus on key Design Corridors within the campus.

Framework Elements

Guiding the development of these sector plans are a series of precedent, or framework, campus planning documents. These documents have been the basis for many important campus planning and design decisions since their respective completion dates. They include the 2004 Campus Master Plan Update, the 2011 Campus Landscape Master Plan Update, and the Parking and Transportation Master Plan completed in 2009.

Existing Conditions

The sector planning process began with a series of stakeholder work sessions and with an analysis of existing conditions within and immediately surrounding the two sectors. Topography, steep slopes, hydrology, existing tree canopy coverage, utility



Engineered BioSystems Building and South-Central Sectors Master Plan

infrastructure, parking and transit services, pedestrian and bicycle circulation routes, types of open space, existing building age and function were all reviewed in order to develop an understanding of the sectors and their respective possibilities for future growth and change.

Future Facilities

The Sector Plan has been informed by the future academic, research, and support facility plan contained in the 2004 Campus Master Plan Update. That Master Plan identified a number of potential building sites in these Sectors that would, combined with other future development on campus, provide the space required to support the growth of student, faculty and staff populations.

Since completion of the Master Plan, the overall growth of the Institute has closely tracked the assumptions embodied in the 2004 Campus Master Plan Update, with the total campus population in the fall of 2011 of 28,306 lying within the assumed 2014 total campus population range of 27,500 – 30,500 persons. However, while a significant amount of new construction has occurred since 2004, the amount of additional space needed/provided on-campus has not increased to the level embodied in the Master Plan.

As a result the Sector Planning team adopted the approach that the open space and landscape plan would redefine the potential future building sites, and thereby modify the development capacity of the Sector. That future capacity, described in a later chapter of this report, is somewhat less than the capacity illustrated in the 2004 Plan for this portion of campus. The development capacity defined in this Sector Plan can, if needed, be re-evaluated in subsequent Campus Master Plan Updates or when new assumptions/projections of future space need are developed.

Sector Plan - Concept Summary

The goal of the sector plan is to create a functional landscape that enhances student and faculty life on a technology campus and provides educational and recreational opportunities. The Forest / Ribbon Eco-Commons system connects these two sectors with the adjoining campus sectors, incorporates existing forested zones and proposes a number of revealed stormwater elements and water collection and conveyance systems. The LMP Ecological Performance Zones were adapted to meet goals for stormwater runoff reduction, tree coverage, impervious and pervious surfaces and woodland zones. Within the context of the Eco-Commons, the Sector Plans address locations and footprints of proposed new building development over the next 10 years along with internal circulation, path hierarchy and connectivity to the rest of the campus.

Landscape planting strategies for different topographical and user zones were examined. Hydric and mesic plant palettes have been created for each area in order to promote a variety of uses, circulation and biodiversity. Since the campus will need future densification and building opportunities beyond the next 10 years, the sector plans identify potential future building zones and establish minimum requirements for sacred spaces within the Eco-Commons framework.

South-Central Sector Plan

The South-Central Sector is the larger of the two sectors – approximately 65 acres – and sits in the central core of campus. It is generally bounded to the north, west and south by Ferst Drive and to the east by the Atlantic Promenade. The sector is anchored, in the southeastern corner, by the Student Center and Student Commons - which are immediately adjacent to Tech Green and just across the Green from Clough Commons. The Ferst Center for the Arts is also located in this area. This is a vital and active part of the campus. Northwest of the Ferst Center is a large central, approximately eight-acre, open space – the southernmost portion of which is known as the Instructional Center (IC) Lawn. This area provides a valuable, large open space for the center of campus and, in the Sector Plan, is established as a major component of the Forest Ribbon and Eco-Commons.

One area of the South-Central Sector involved significant additional discussion and exploration. This is the area referred to as the Southwest Quadrant – an area generally bounded by Ferst Drive, Means Street, Marietta Street and North Avenue. As the University has grown over the years, and in the process of looking for additional space, it has gradually acquired additional properties between Marietta Street and Tech Parkway. This southwestern edge of campus is an urban edge with an established community and fabric, especially along the Marietta Street frontage. This area is accessed currently by both Tech Parkway and Marietta Street which serve as important transportation arteries for this part of the City. While the area has tremendous potential for change and revitalization, that change process must be thoughtful and collaborative.

EBB Sector Plan

The EBB Sector is approximately 45 acres and is generally defined by 10th Street to the north, Hemphill Avenue to the west, Ferst Drive to the south and the Atlantic Promenade to the east. The 10th Street edge of this sector is the campus' northern boundary. The Bio-Technology Quadrangle is immediately east of this sector along the Atlantic Promenade. The Center Street Apartments and West Campus Housing areas straddle Hemphill Avenue anchoring the western edge of the sector. The sector is generally characterized by a more intact urban grid, a large surface parking area and a less dense development pattern which feels less campus-like than other areas of the campus. Approximately 20 acres (40%) of this sector are undeveloped or underutilized. The sector is dominated by surface parking lots, the North Deck and low intensity uses such as the motor pool and landscape maintenance operations. As a result, this area of campus contains tremendous potential to evolve into an active and vibrant new sector of the campus – one defined as the major research quadrant of the campus and characterized physically by major sections of the Forest Ribbon/Eco-Commons. The proposed Engineered BioSystems building (EBB) research complex will anchor and set the character of the new development in this sector. The first building is underway now so change in the sector is imminent. The Forest Ribbon has a major presence in this sector with the Eco-Commons Lawn and the Eco-Commons Pond serving as major open space ammenities for this area of campus.

Transportation & Infrastructure

Two transportation studies were undertaken in association with the sector plans; the first was a high-level, conceptual look at potential internal and external road and transit route configurations in the southwest quadrant of campus. The second transportation study was a more detailed traffic analysis of the EBB sector which focused primarily on projected circulation and access needs associated with the development of the Engineered BioSystems Building (EBB) complex along 10th Street. The findings and recommendations of this study were generally site specific to the area immediately surrounding the EBB Phase I project and are summarized in this document. The full study is included in Section 2, page 25 of the Appendix.

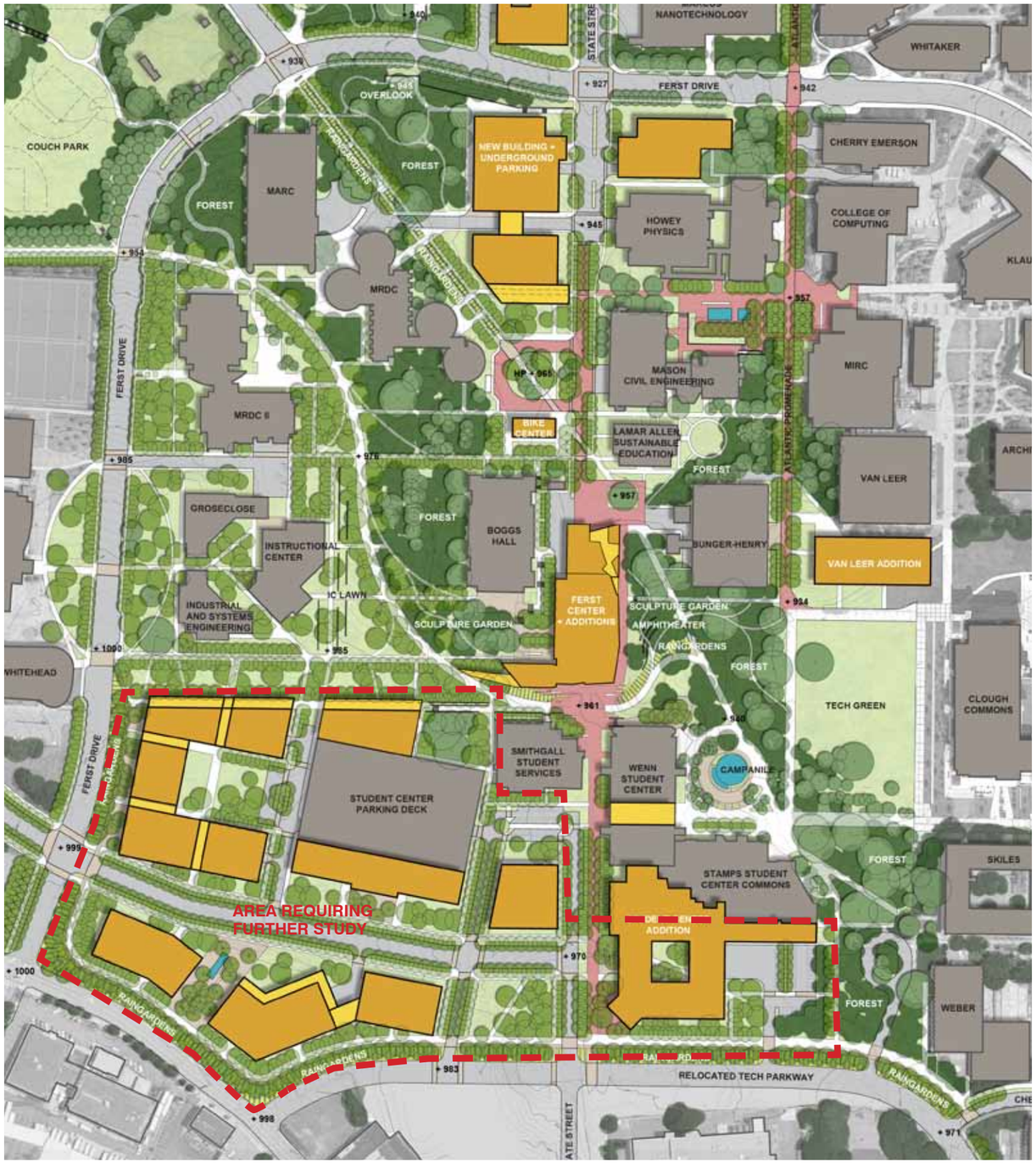
A utility master plan has been developed for each of the sectors and they are also included in the Appendix of this report. Within the EBB Sector, both 9th Street and Atlantic are major existing utility corridors; these utilities represent a major institutional investment in infrastructure and so care has been taken in the sector plans to minimize disruption to these critical utility corridors. It is worth noting here that the extension of 9th Street east to State Street has been explored in this plan and is shown as a long-range possibility.

Within the South-Central Sector, there are long-range plans for the creation of a new chiller plant to serve the expansion proposed in this area. While a specific site has not yet been designated for the new plant it is expected that it will be located along the southwestern edge of this sector between Tech Parkway and Marietta Street. As with the EBB Sector, the bulk of the utilities run under existing roads. Similarly, with the potential removal of portions of either Ferst Drive or Tech Parkway, the existing utilities which currently run under and adjacent to these streets will need to be studied prior to the construction of any future new facilities in this area.

Conclusion

The EBB and South-Central Sector Plans represent a new vision for the long-range development of these areas of the Georgia Tech campus. Portions of both sectors have significant opportunity for change and as a result offer the Institute the potential to enhance the overall campus environment and experience – consistent with its world-class reputation. These sector plans are both centered on the creation of a powerful central organizing element – the Forest-Ribbon Eco-Commons. The premise is that this central green space has the ability to greatly enhance the look, feel and function of these portions of campus. Going forward, the hope is that this space will be perceived as "sacred" and, to the extent possible, viewed dimensionally as a an open space "given" thus enabling it to become, over time, the campus's central green artery.

South-Central Sector



South-Central Sector Master Plan

Hemphill Pedestrian Corridor - proposed view looking south

Section through proposed multi-functional landscape east of Ferst Center

Instructional Center Lawn Eco-Commons Path - proposed view looking north

Executive Summary (continued)

EBB Sector

EBB Sector Master Plan

Proposed view across Eco-Commons Pond to EBB Phase I

Proposed view across Eco-Commons Lawn

Atlantic Promenade - proposed view looking south

Proposed Eco-Commons path south of the Baker Building

I. FRAMEWORK - BASIS OF DESIGN

1. Framework - Background

The Georgia Institute of Technology has, for more than a decade, made a commitment to a continuous and thoughtful campus planning, design and implementation process. There are a number of outcomes which have resulted from that commitment including a visibly improved physical campus environment. Guiding this process have been several "framework" documents and policy statements.

These framework documents include the:

- 2010 Strategic Plan,
- 2004 Campus Master Plan Update
- 2011 Campus Landscape Master Plan Update, and
- 2009 Parking and Transportation Master Plan

These plans all provided important initial guidance and have been continued points of reference throughout this Sector Planning process.

2. Framework - 2010 Strategic Plan

Georgia Tech's Strategic Plan outlines five over-arching goals that are designed to help take the Institute to its 150th anniversary in 2035.

VISION: Georgia Tech will define the technological research university of the 21st century. As a result, we will be leaders in influencing major technological, social, and policy decisions that address critical global challenges. "What does Georgia Tech think?" will be a common question in research, business, the media, and government.

MISSION: Technological change is fundamental to the advancement of the human condition. The Georgia Tech community—students, staff, faculty, and alumni—will realize our motto of "Progress and Service" through effectiveness and innovation in teaching and learning, our research advances, and entrepreneurship in all sectors of society. We will be leaders in improving the human condition in Georgia, the United States, and around the globe.

GOAL 1: Be among the most highly respected technology-focused learning institutions in the World

STRATEGY 3: Develop the campus and its neighborhood as a vibrant live-work-learn-play environment.

"Our community will include social and cultural aspects that complement our research and academic dimensions, perhaps through ventures such as a world-class immersive performance center that integrates technology and the arts, a faculty housing development, and expansion of Technology Enterprise Park from a specific location to a pervasive Midtown concept."

Signage at 10th Street and Fowler Street

View of the Midtown skyline from the steps of the Student Center Commons

Vision and Mission; 2010 Strategic Plan

3. Framework - 2004 Campus Master Plan Update

PLAN TIME FRAME: 2012 planning horizon = ten years from 2002 “base” year for data

GROWTH:

2003	2012
11,257 Undergraduates,	12-13,000 Undergraduates,
5,535 Graduates	8-10,000 Graduates
5,482 Faculty /staff	7,585 Faculty/staff
22,274 Total Campus Population	27,585-29,585 Total Campus Population

SPACE NEEDS: Tech staff estimated a need for 3.5 million gross square feet (gsf) additional instructional/research space to the year 2012, with a total space need of approximately 4.1 million gsf. Approximately 1.9 million gsf of instructional/research space was proposed in the EBB and Ferst Sectors.

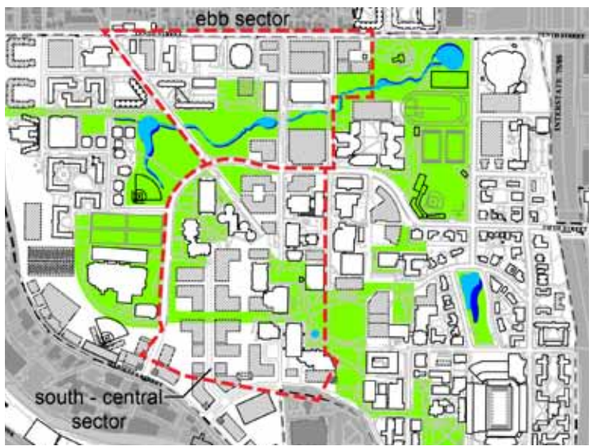
PARKING: The 2004 Campus Master Plan (CMP) assumed a ratio of parking spaces to persons of 52 spaces per 100 persons (ratio recommended in the 1998 CMP). This would require some 5,500 additional parking spaces, not counting any spaces removed to improve campus open space or provide additional building footprints. One new 750 space parking deck was proposed in the EBB sector, to be built in conjunction with a new research building. The Student Center Parking Deck (915 spaces) was proposed to be demolished and the parking relocated.

INFRASTRUCTURE: Georgia Tech staff determined that a site for an additional chiller would be required to support the additional 3.5 million gsf of instructional/research space. A site in the SW section of campus was identified for such a facility.

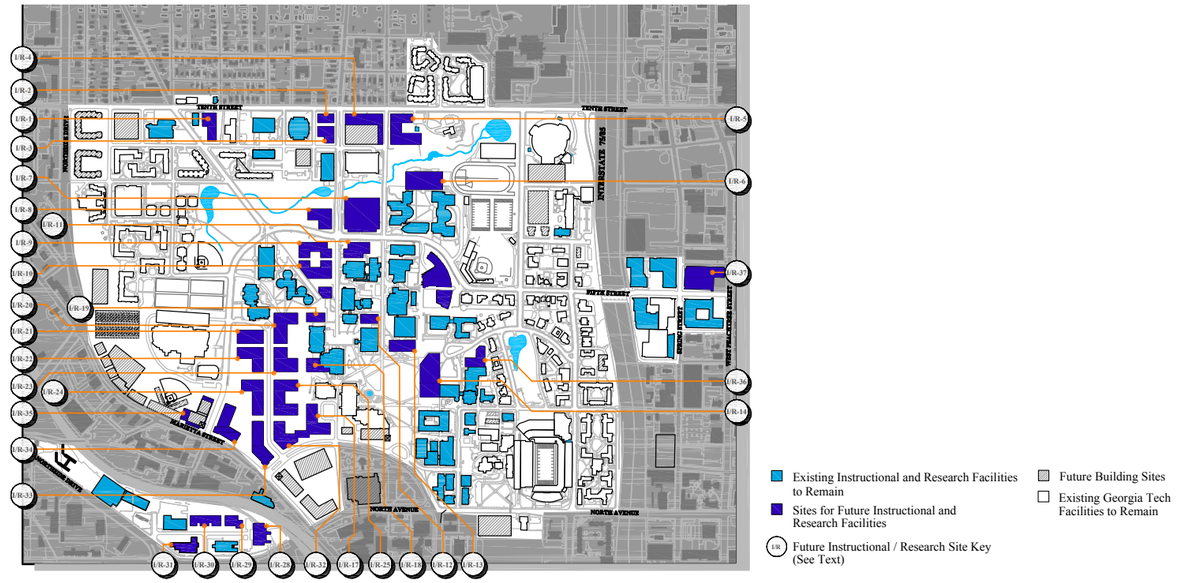
VEHICULAR CIRCULATION: As recommended in the 1998 CMP, the southwestern portion of Ferst Drive was proposed to be eliminated, along with Tech Parkway. A new roadway would be developed to connect North Avenue to Marietta and a new campus entrance would be developed at the future intersection of Ferst Drive and Marietta.

ECO-COMMONS: The 2004 CMP included the concept for developing an integrated “performance” landscape system called the “Eco-Commons”. This concept was further elaborated in the Campus Landscape Master Plan.

The 2004 Campus Master Plan Update is available online at: www.space.gatech.edu/masterplan/

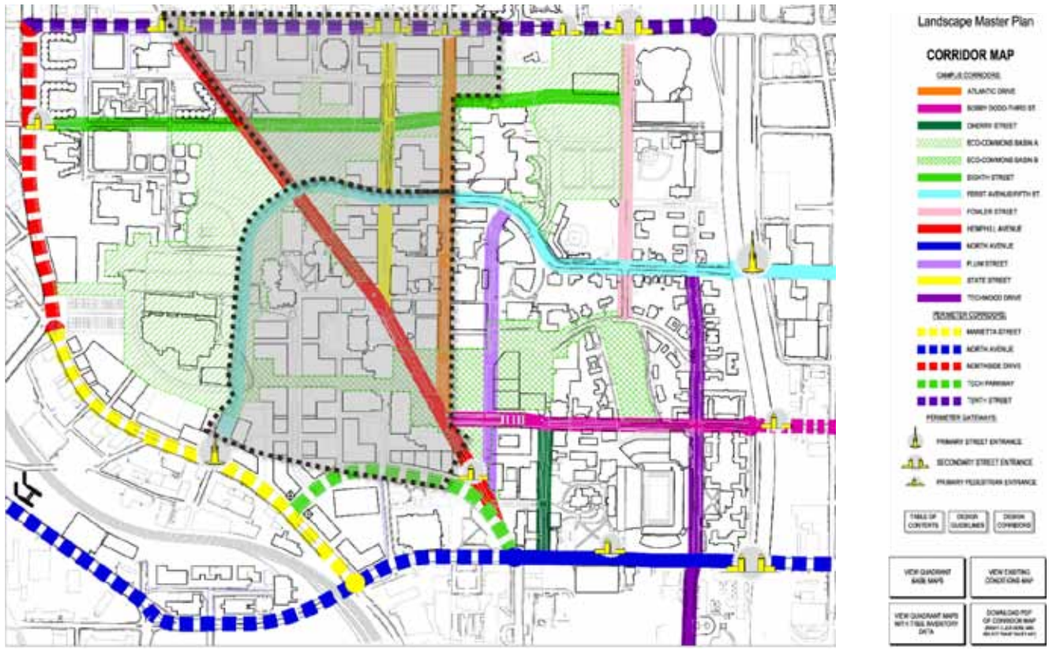


Eco-Commons plan; 2004 Campus Master Plan Update



Future Sites for Institutional/Research Facilities; 2004 Campus Master Plan Update

2004 Campus Master Plan Update



Campus Design Corridors; 2011 Campus Landscape Master Plan Update

4. Framework - 2011 Landscape Master Plan Update

The Landscape Master Plan grew out of the 2004 Campus Master Plan Update (CMPU), which highlighted the role of open space in achieving goals of sustainability and livability. It put forth the idea that the landscape could perform valuable ecological work for the Institute, and established the Eco-Commons as a permanent open space in the heart of campus for stormwater management and outdoor recreation. The CMPU defined the landscape as the sum of all open space, including roadways and parking, reasoning that only a comprehensive approach could address its environmental and social objectives.

There are three major goals for the Landscape Master Plan:

- Develop an integrated, ecologically-based landscape and open space system that helps Georgia Tech achieve its goal of environmental sustainability, specifically, a 50% reduction of current stormwater entering the Atlanta sewer system.
- Develop a landscape that enhances the living, working, and learning environment of the Institute.
- Develop a landscape that unifies the campus and gives it a distinct sense of place and expresses the identity of Georgia Tech.

The Landscape Master Plan is based on the concept that the campus represents two landscapes that are one - an ecological landscape, governed by biophysical processes, and two - a human landscape, governed by the social activities and experience of people. The purpose of the Master Plan is to engender the performance and value of both through a holistic approach, based on ecology.

The Landscape Master Plan establishes a vision of a landscape that is unique to Georgia Tech - a performance landscape - that joins technology and ecology to create a great sense of place. The master plan provides the data base, performance standards and design tools for an ongoing process of design, but it is not prescriptive. It encourages creativity and innovation by many to reach sustainable goals.

The 2011 Landscape Master Plan Update is available online at: www.space.gatech.edu/landscapeplan/

Ecological Performance Zones; 2011 Campus Landscape Master Plan Update

View of proposed Eco-Commons; 2011 Campus Landscape Master Plan Update

5. Framework - 2009 Parking and Transportation Master Plan

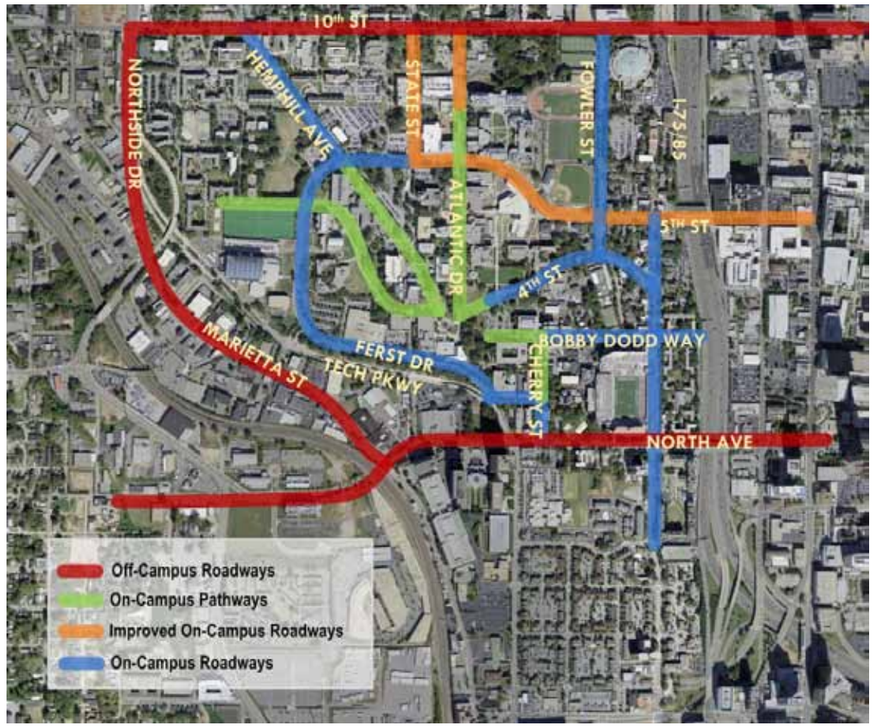
The 2009 Georgia Institute of Technology (Georgia Tech) Parking and Transportation Master Plan (PTMP) defined a comprehensive transportation strategy and implementation recommendations to enhance mobility for employees, students and visitors. The PTMP included recommendations to improve the overall transportation experience at Georgia Tech; address critical facilities and operations; and suggest investment priorities. The PTMP also summarized Parking & Transportation Department financial data and provided capital and operating cost projections for recommended actions.

The PTMP included both utilization and supply projections for the Georgia Tech parking system. To address campus population growth and increased parking demand, the PTMP recommended that Georgia Tech both replace approximately 2,500 parking spaces lost to development (through construction of new structured parking facilities) and implement transportation demand management measures to reduce parking demand. The plan indicated that the Georgia Tech campus would require approximately 13,000 on-campus parking spaces by 2019. Sites were identified for new parking facilities on the West Campus, Ferst Drive, 3rd Street to the east of I-75/85, and Bobby Dodd Way to balance regional traffic impacts, on-campus traffic and parking, and maximize opportunities to share parking resources.

The PTMP included proposals to improve the Georgia Tech campus transit system and address future ridership growth by constructing a centrally-located transit center, increasing service on Stinger and Tech Trolley routes, and dividing the Green Stinger route into two routes. New or expanded routes were identified to serve additional MARTA rail stations or other transit systems; serve campus parking structures and activity centers; increase the number of on and off-campus destinations; and improve the level of service provided to the Institute's constituents.

The PTMP addressed access and safety improvements for pedestrians and bicycles on the Georgia Tech campus. The plan identified the Tech Green, the Student Center, and the Clough Commons Building as a focal point for a "hub-and-spoke" system of improved pedestrian and bicycle corridors, including wider pathways, additional dedicated bicycle lanes, and conversions of some roadways to non-motorized facilities. Pedestrian and bicycle safety recommendations included traffic signal modifications/removal, bicycle accommodations, high-visibility crosswalks, pedestrian refuge islands, pedestrian signals, curb extensions at crosswalk locations, and additional signage for pedestrian crossings, and speed limit signage.

The 2009 Parking and Transportation Master Plan Update is available online at: www.space.gatech.edu/masterplan/



Recommended Bicycle and Pedestrian Improvement Corridors; 2009 Parking and Transportation Master Plan; Vanasse Hangen Brustlin, Inc., July 2009

Potential Parking Garage locations; 2009 Parking and Transportation Master Plan; Vanasse Hangen Brustlin, Inc., July 2009

Marietta Street Corridor Study; Kimley Horn and Associates, Inc., May 2008

View north along Atlantic Promenade

View southeast from the Instructional Center Lawn

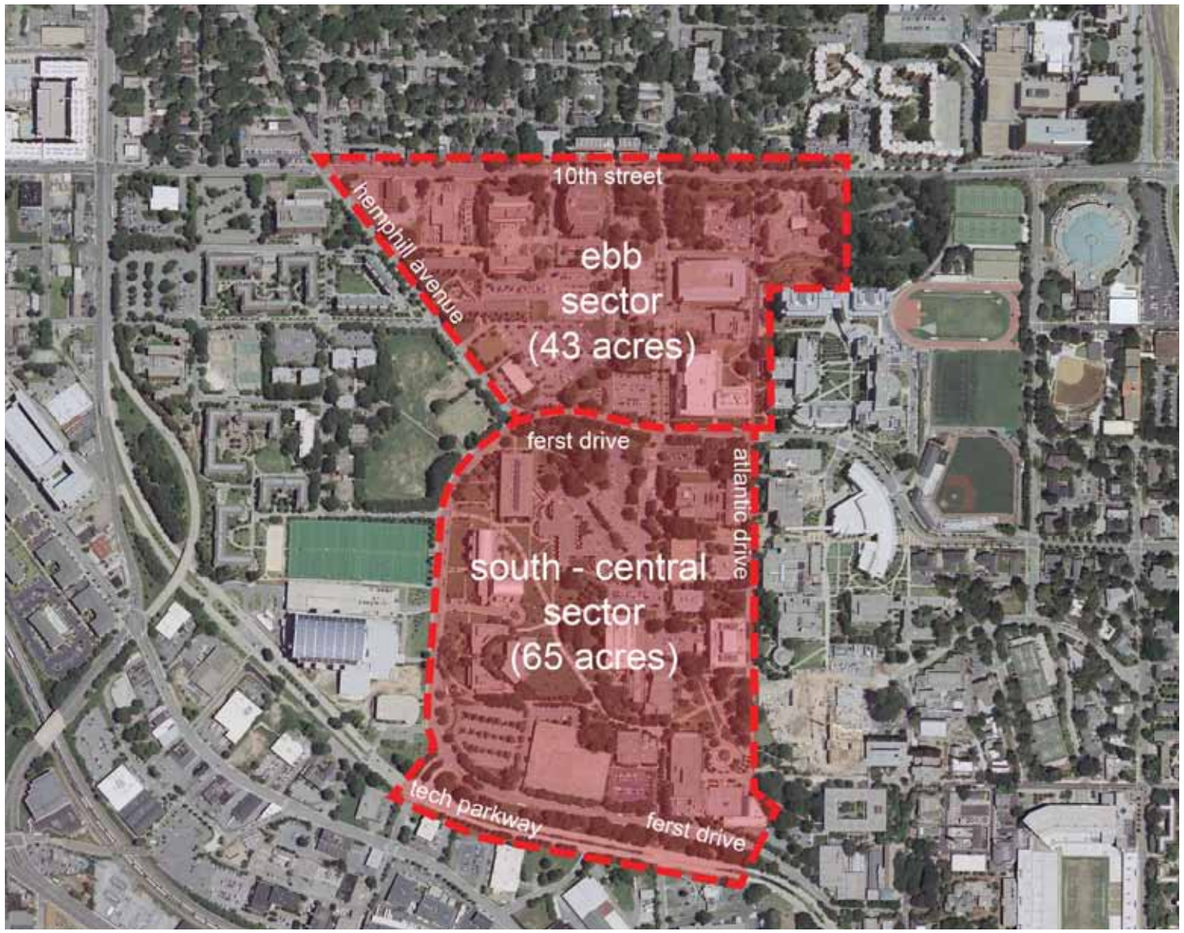
II. EXISTING CONDITIONS

1. EXISTING CONDITIONS-BACKGROUND

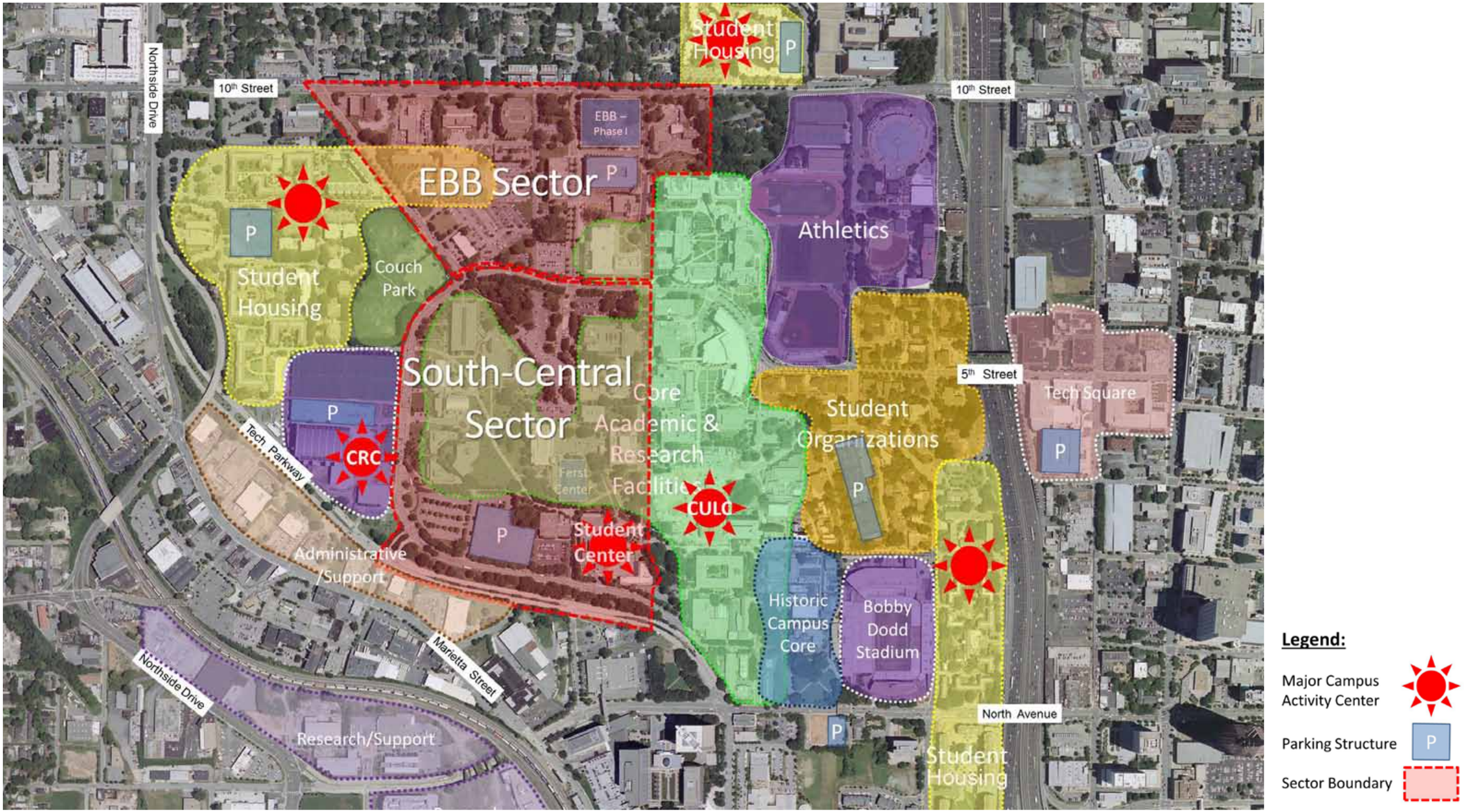
The study area for the two sectors encompasses more than 100 acres of the Georgia Tech campus. These sectors span the north-south breadth of the campus - from 10th Street on the northern edge of campus to Tech Parkway along its southern edge - and they lie strategically in the center of the core campus between one of the major campus housing complexes to the west and the academic core of campus to the east. The study area is approximately 3,100 feet (0.6 miles) north-south and approximately 1,500 feet (0.28 miles) wide.

The South-Central Sector (also referred to as the Ferst Sector) is approximately 65 acres in size and has a relatively traditional campus feel dominated as it is by the large central open space which includes the Instructional Center (IC) Lawn. The EBB Sector, approximately 45 acres, has less of a traditional campus feel which is the result of a large central surface parking lot and the still largely in-tact neighborhood-scale city grid.

Upon initiation of the sector planning process, the planning team reviewed a range of existing conditions within the study area. These existing condition components included: topography/steep slopes, canopy and turf coverage, parking facilities, circulation patterns for vehicles, pedestrians and bicycles, and utility infrastructure.



Sector plan boundaries



Existing core campus land use diagram

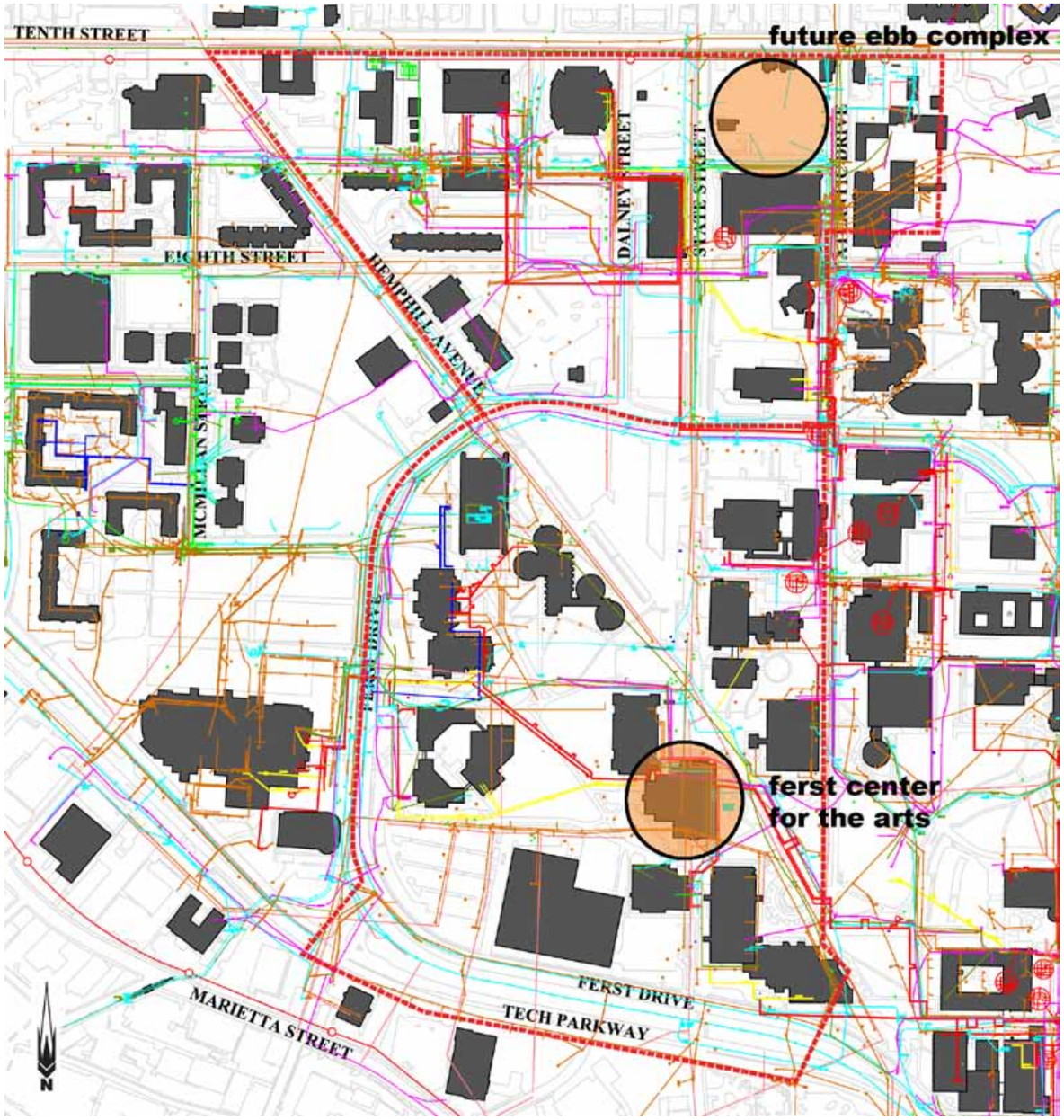
2. Existing Conditions - Utility Infrastructure

The utility infrastructure diagram shows the locations of existing utilities in both the EBB Sector and Ferst/South Central Sector. This information came from GA Tech's Campus Utilities digital CAD file.

In general, existing utilities follow the road alignments. Within the EBB Sector, 9th Street and Atlantic Drive are the main utility corridors. These corridors contain large concentrations of utilities. Within the Ferst/South Central Sector, the Hemphill Avenue extension, adjacent to the Manufacturing Related Disciplines Complex (MRDC) contains high concentrations of utilities. Utilities also wrap buildings such as the Ferst Center for the Arts which was placed on a site where State Street used to be located. Utilities in this area also run directly through the Boggs Building.

South-Central Sector

EBB Sector



Legend
CHILLED WATER DISTRIBUTION SYSTEM
DOMESTIC WATER DISTRIBUTION SYSTEM
ELECTRICAL DISTRIBUTION SYSTEM
FIBER COMMUNICATION (GTNet)
NATURAL GAS DISTRIBUTION SYSTEM
SANITARY/STORM SEWER SYSTEMS
STEAM DISTRIBUTION SYSTEM
TELEPHONE NETWORK
GT OWNED GAS

Utility Infrastructure diagram

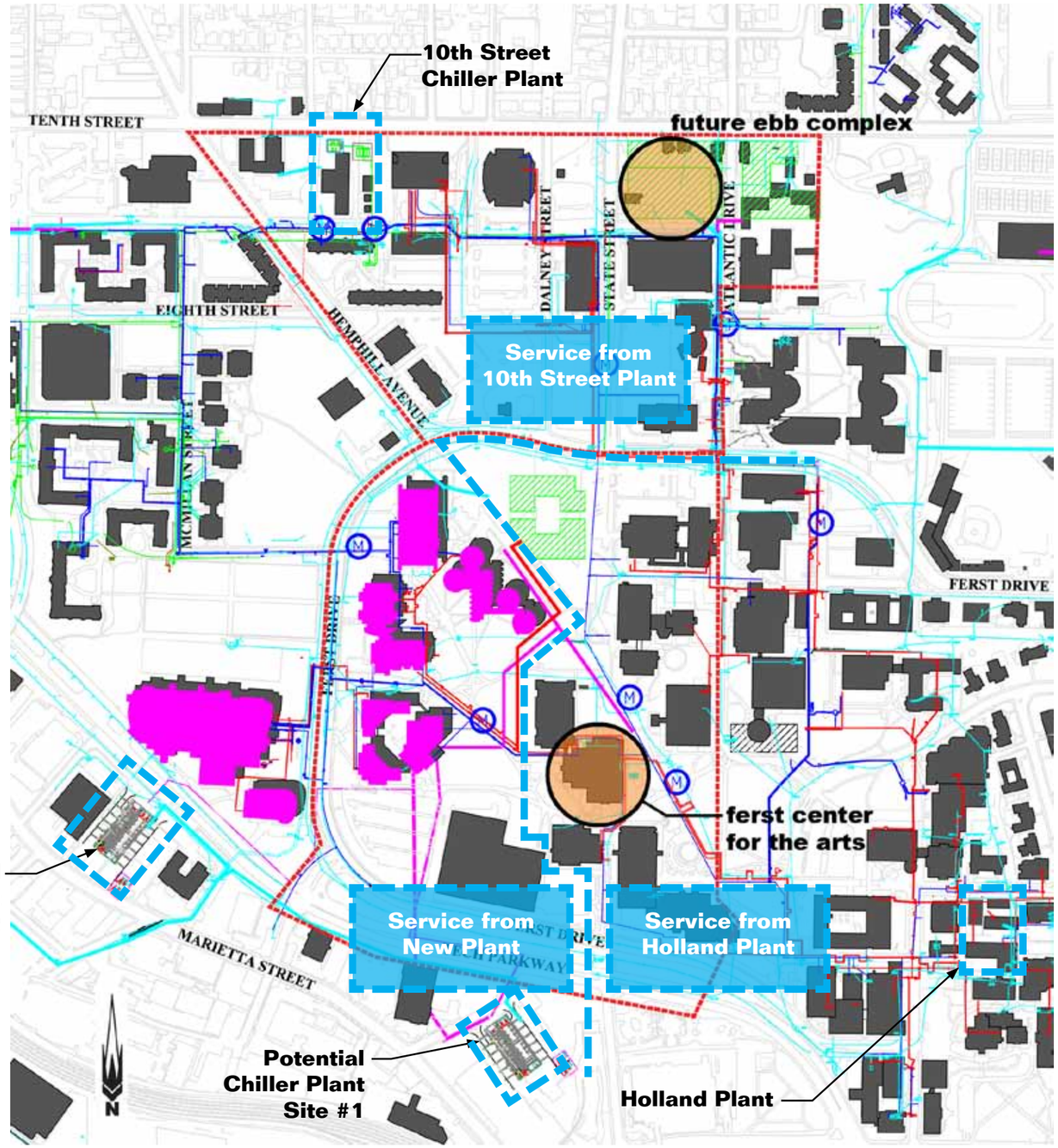
3. Existing Conditions - 2010 Future Utility Projects

The 2010 Future Utility Project diagram identifies proposed utility infrastructure projects that will provide relief and a solution to existing utility capacity issues. The Holland Plant, which is outside the two sectors, currently services the Ferst/South-Central Sector, the Aquatic Center and rest of campus with the exception of Klaus Advanced Computing Building. This plant is completely built out and there is no more room for another chiller within this plant.

Ferst Drive serves as a line of demarcation for how buildings will be heated on campus in the future. To the north of Ferst Drive, in general, future buildings such as the EBB complex are to be serviced by natural gas not steam lines. The Marcus Nanotechnology Building, however, broke this rule.

This diagram displays the location of a proposed potential location for a new southwest chiller plant with a stacked footprint, to the south of Tech Parkway between Wallace and State Street (site #1). This location was identified as a piece of land that GA Tech could possibly "get to", in terms of proximity to future facilities to be served, within reason and without major hurdles. This diagram identifies the buildings which would be removed from the Holland Plant and serviced by this new southwest chiller plant. A new steam line is shown to service the proposed Burdell Building sited to the east of Manufacturing Related Disciplines Complex (MRDC). The diagram also illustrates a new electrical system distribution concept to service the proposed southwest chiller plant.

In addition, Georgia Tech has also recently initiated a master plan to study the potential to expand the 10th Street Chiller Plant in order to for it to be able to serve future facilities within the EBB Sector, including the EBB Phase I Project.

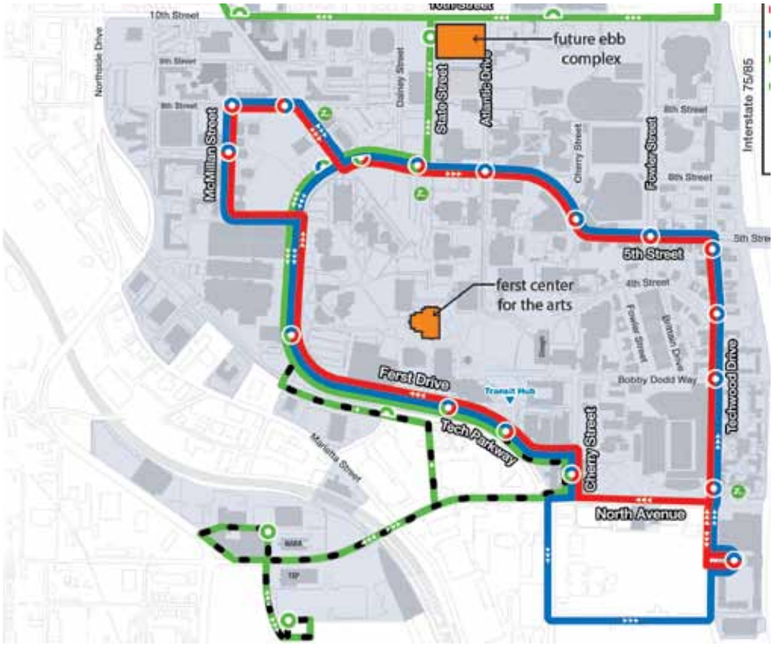


2010 Future Utility Project diagram

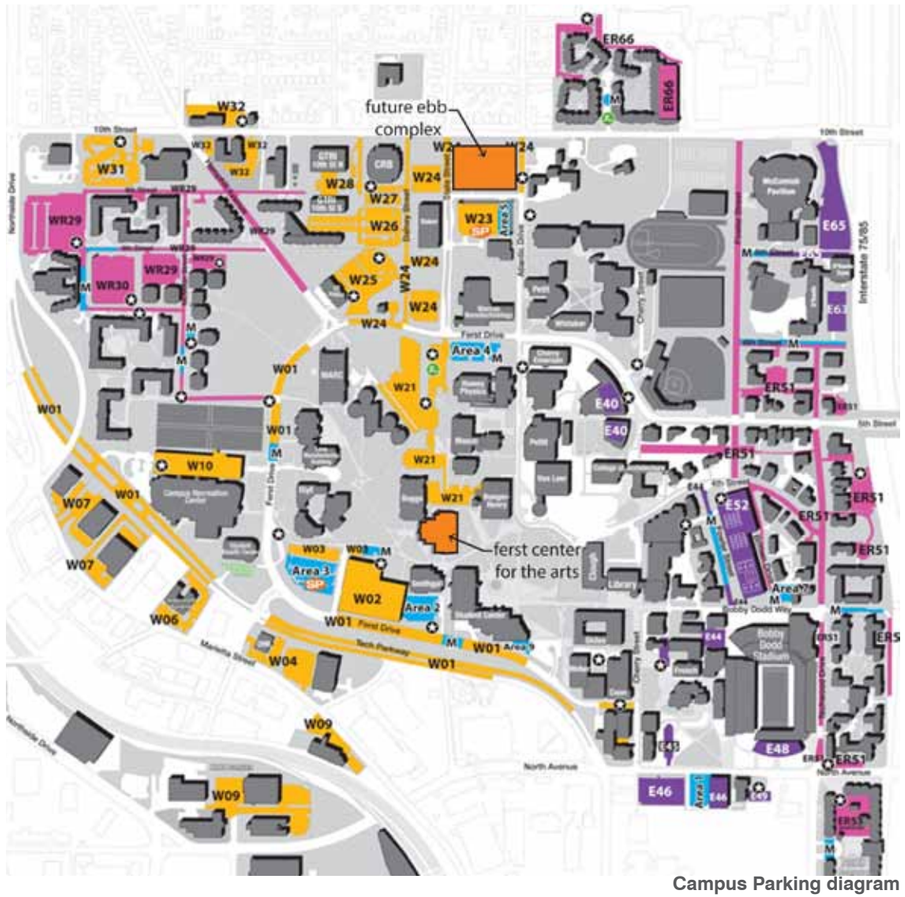
4. Existing Conditions - Parking and Transit

The Georgia Tech campus provides both surface and structured parking facilities within the EBB and South-Central Sectors. The North Deck (W23), located between State Street and Atlantic Promenade in the EBB Sector has 854 parking spaces. The Student Center Deck (W02), located immediately west of the Student Center and the Smithgall Student Services Center, provides 996 spaces. Currently there are a total of approximately 1,800 parking spaces in the EBB Sector and approximately 2,400 parking spaces in the South-Central Sector.

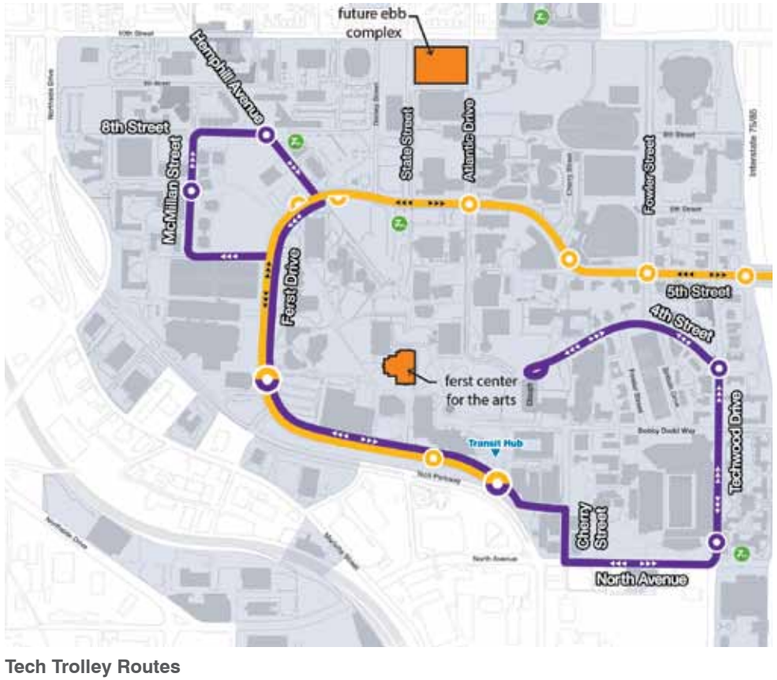
Georgia Tech provides two transit systems which serve the campus and both systems circulate through the sector study areas. The Stinger bus system circulates two primary routes through the campus core Monday through Friday, 7:00 AM to 10:00 PM. The Tech Trolley provides a transit connection through the campus core to Tech Square, the Midtown MARTA Station and other areas of Midtown. The Trolley runs Monday through Friday between 5:45 and 10:30 and on Saturday from 10:00 AM to 6:30 PM. In addition, Georgia Tech offers a Midnight Rambler service on Saturday and Sunday between the hours of 9:00 PM and 3:00 AM.



Stinger Shuttle Routes



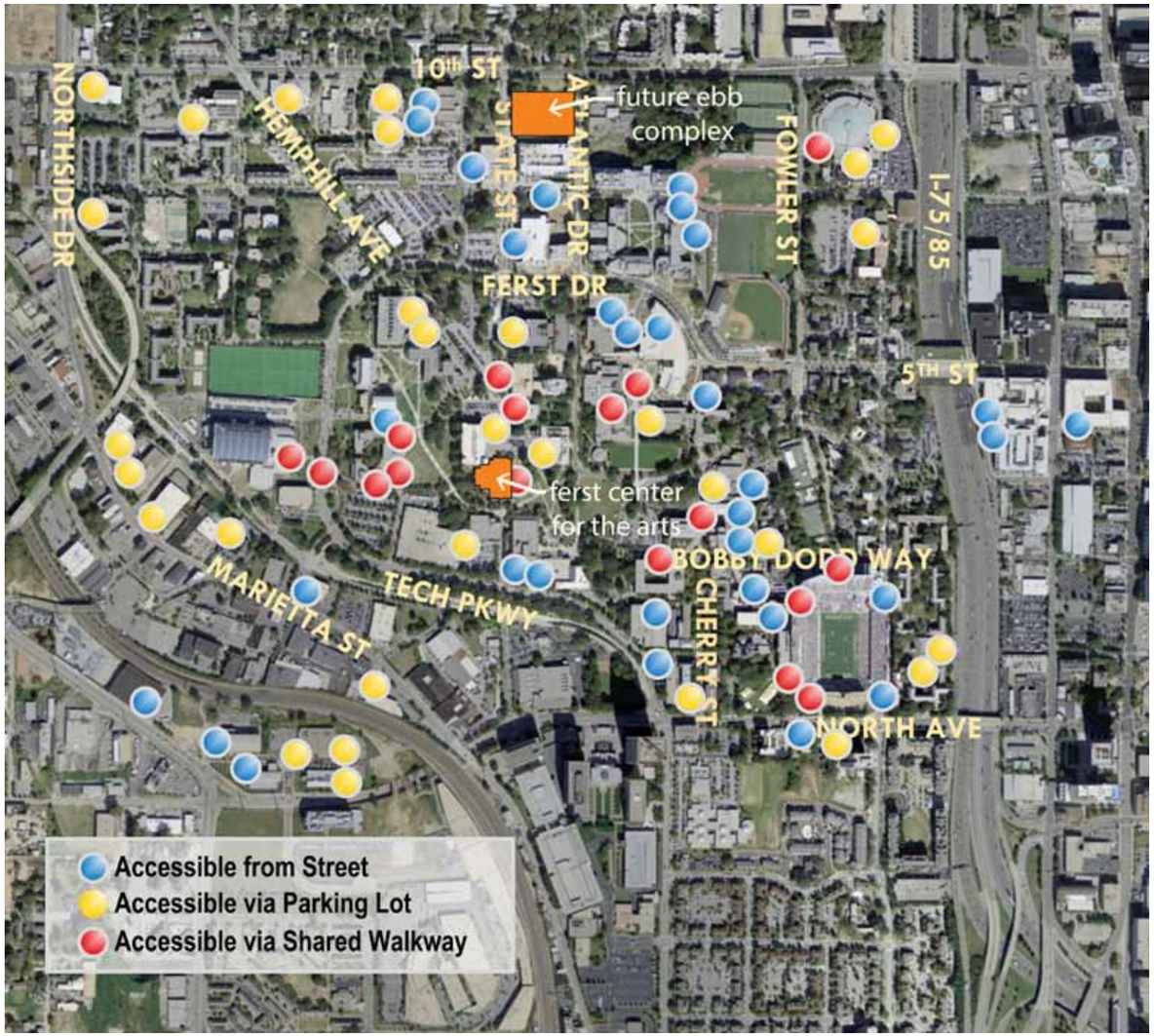
Campus Parking diagram



Tech Trolley Routes

5. Existing Conditions - Service

The diagram below, excerpted from the 2009 Parking and Transportation Master Plan, shows the location of the major loading and service points within the Georgia Tech campus. These service locations include loading docks, maintenance areas, and dumpsters. There are important service locations in both the EBB and Ferst Sectors which must be maintained as the campus evolves and circulation systems change. There is a higher concentration of service areas within the Ferst Sector and servicing these areas will likely become more challenging as the central core of campus becomes a true pedestrian core and private, single-occupancy vehicles are eliminated. The current campus model for servicing these kinds of pedestrian oriented spaces is the Plum Street Corridor. As Atlantic, State and Hemphill all become more pedestrian in character, these existing service needs will need to be met in a manner similar to that utilized on Plum Street.



Campus Major Loading and Service Points diagram; from the 2009 Parking and Transportation Master Plan

6. Existing Conditions - Reuse Water

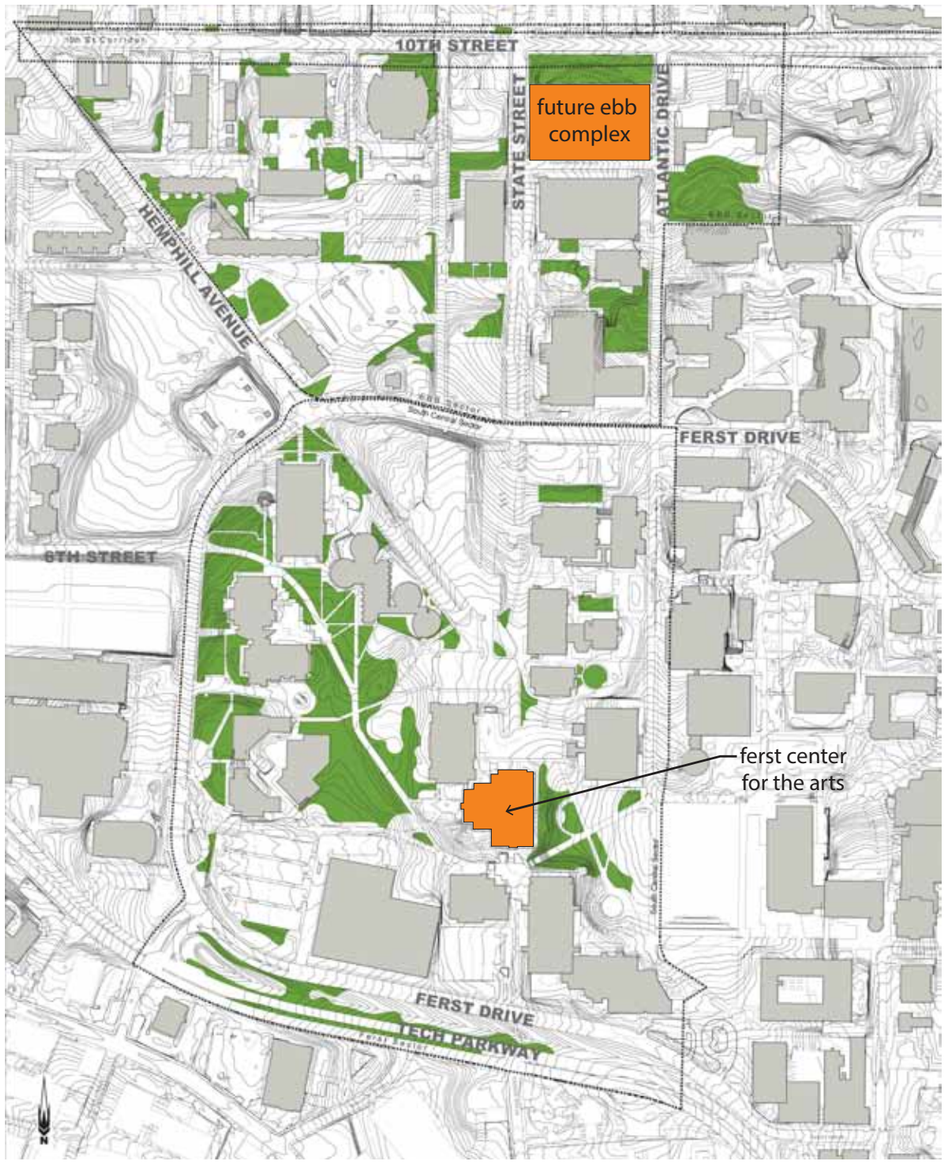
For a number of years now, Georgia Tech has made an institution-wide commitment to sustainability. As a part of that commitment the Institute has been utilizing different methods to capture and reuse water. Today water capture sources on the campus include stormwater, condensate and roof rain water. Much of the reuse water has been used for irrigation purposes across the campus off-setting the previous need for City metered, potable drinking water. More recently Georgia Tech has begun using the reuse water for non-potable water in buildings – most notable in the newly opened Clough Commons Building.

The diagram below shows the current location of existing water storage cisterns (both above and below ground) and the areas which are currently irrigated using reuse water.

Campus Reuse Water diagram

7. Existing Conditions - Open Lawn Area

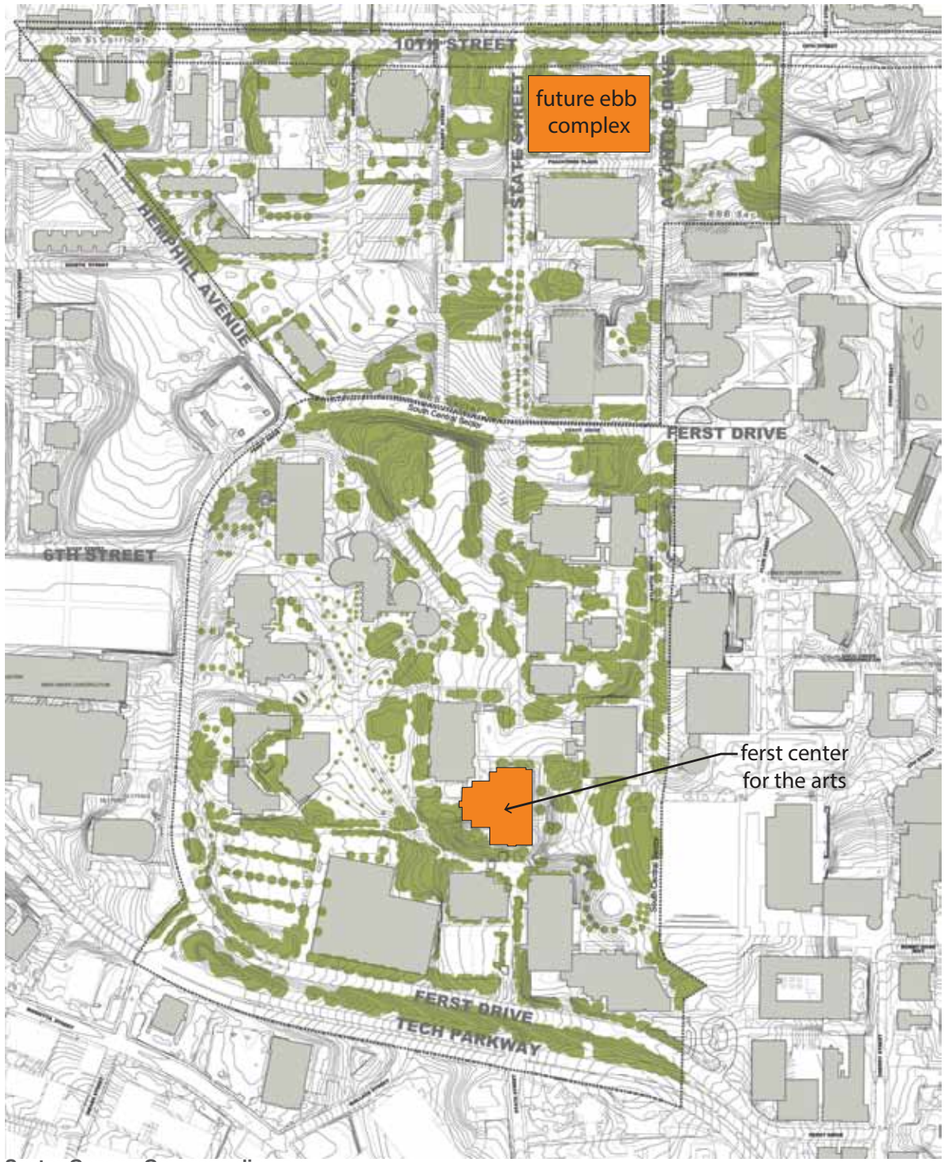
This diagram depicts locations within the two sectors that contain open grass areas without masses or clusters of trees. These areas were identified through viewing a Google aerial map. The diagram quantifies the open lawn area both in terms of acres and overall sector coverage. The purpose of this diagram is to illustrate the piecemeal nature of the green space. This sporadic sprinkling of lawn is especially evident in the EBB Sector in which lawn serves rather as a groundcover as opposed to an opportunity for a gathering space. The lawn area found in the South-Central Sector is more contiguous and the large lawn area between the Instructional Center and Boggs Building is utilized for tailgating activities.



Sector Open Lawn Areas diagram

8. Existing Conditions - Canopy Coverage

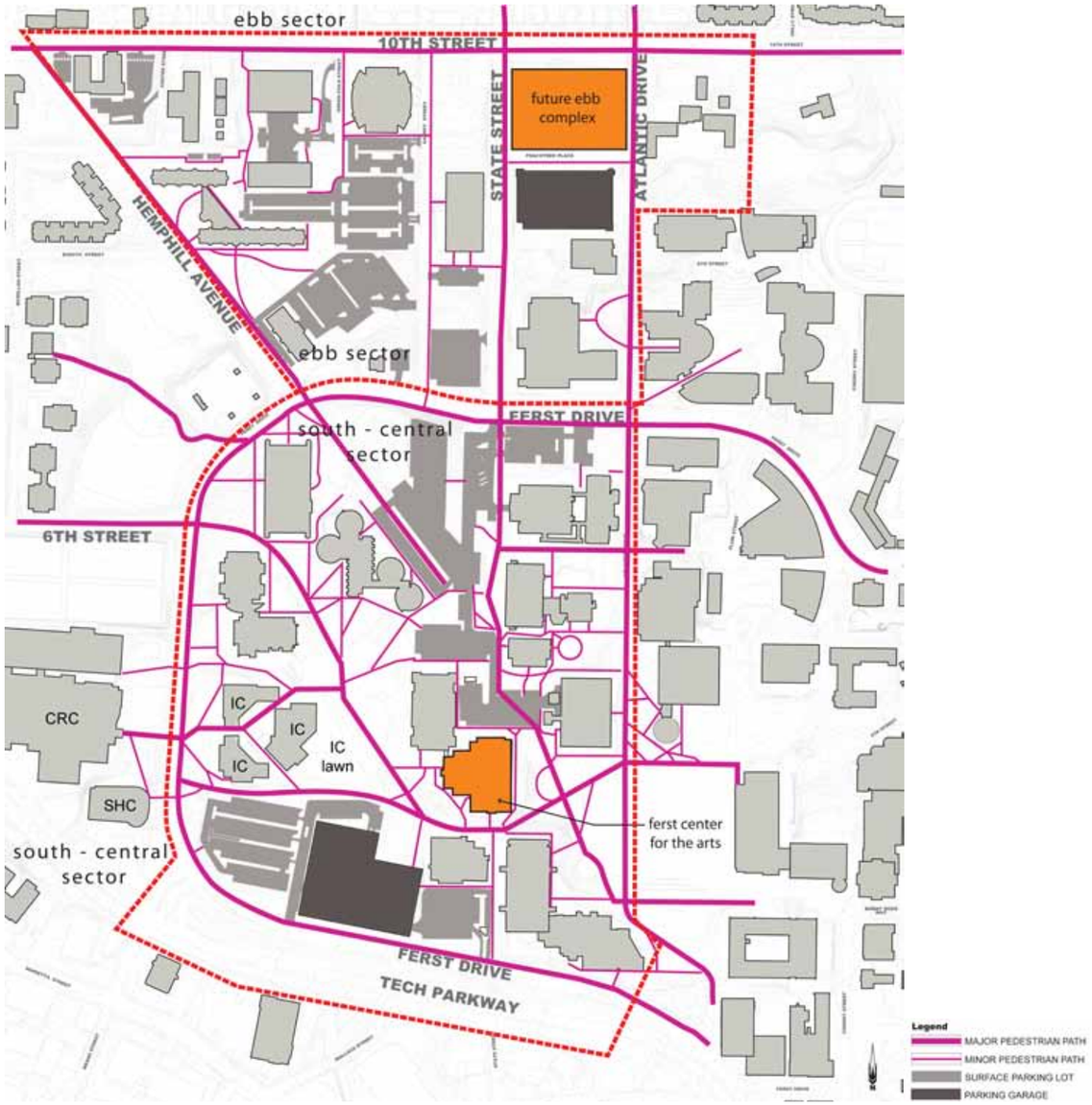
This diagram illustrates the actual canopy size of existing trees found within the two sectors. This diagram is derived from GA Tech's tree inventory digital file. The canopy coverage is quantified both in terms of acreage and a percentage of the sector area. The EBB Sector's total tree canopy is less than the South-Central Sector.



Sector Canopy Coverage diagram

9. Existing Conditions - Pedestrian Circulation with Parking Overlay

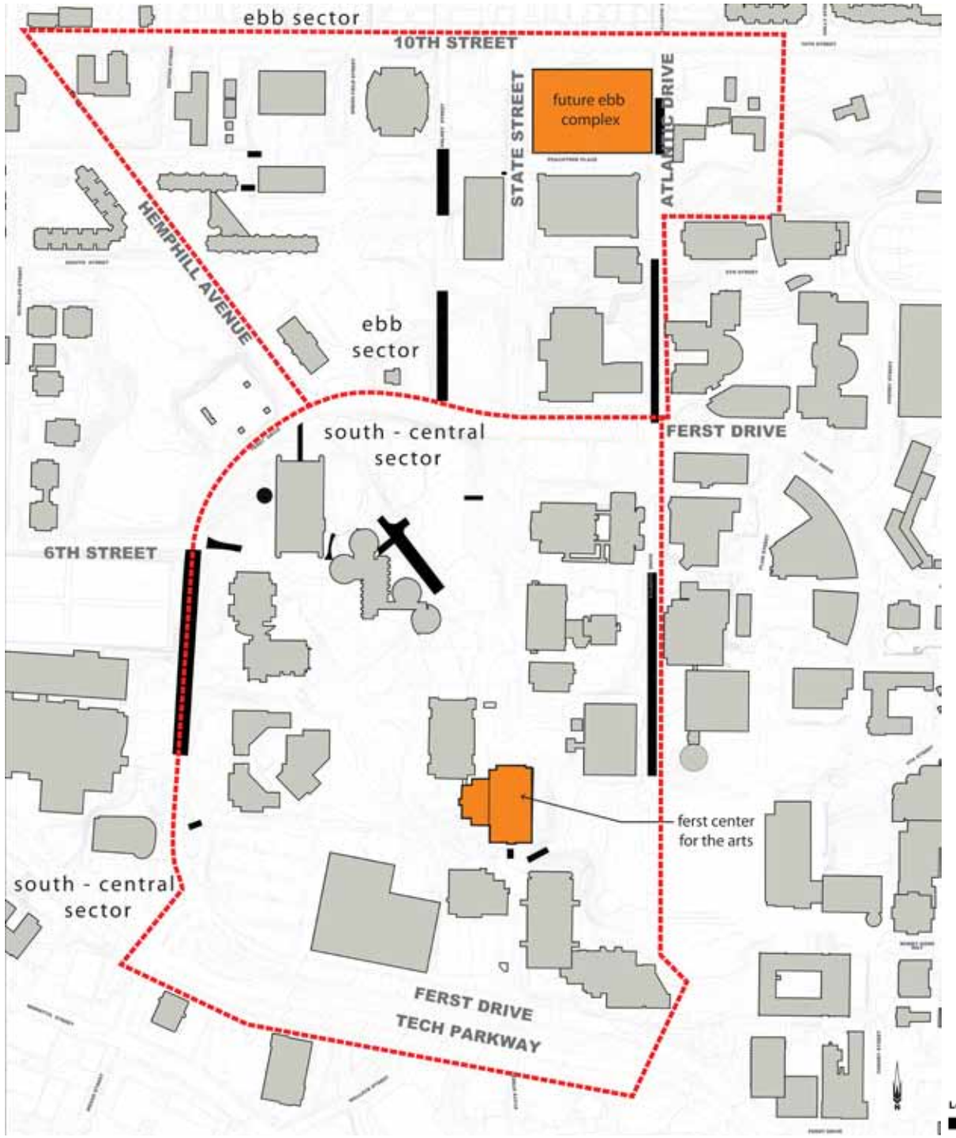
Pedestrian circulation within the two sectors is often confusing and interrupted by surface parking. Conflicts with cars are common, not only at street crossings of 10th and Ferst Streets but also within the sectors. The multitude of surface parking lots is the main obstacle to clear pedestrian flow. The primary pedestrian connectors include the Design Corridors identified in the 2011 Campus Landscape Master Plan Update: State and Atlantic Streets, Hemphill Ave, and Ferst Street. The diagram also identified three additional heavily used routes that lead to the center of Campus - 6th Street (traverses the IC Lawn), Student Health Center east-west connection, and CRC east-west connection (an informal path that is blocked by the IC building).



Sector Pedestrian Circulation and Parking diagram

10. Existing Conditions - Pedestrian Circulation and Steep Slopes

This diagram illustrates potential ADA accessibility issues that will need to be addressed. They are highlighted in black and include slopes that exceed 5% and stairways that could pose potential accessibility issues.



Sector Pedestrian Circulation and Steep Slopes diagram

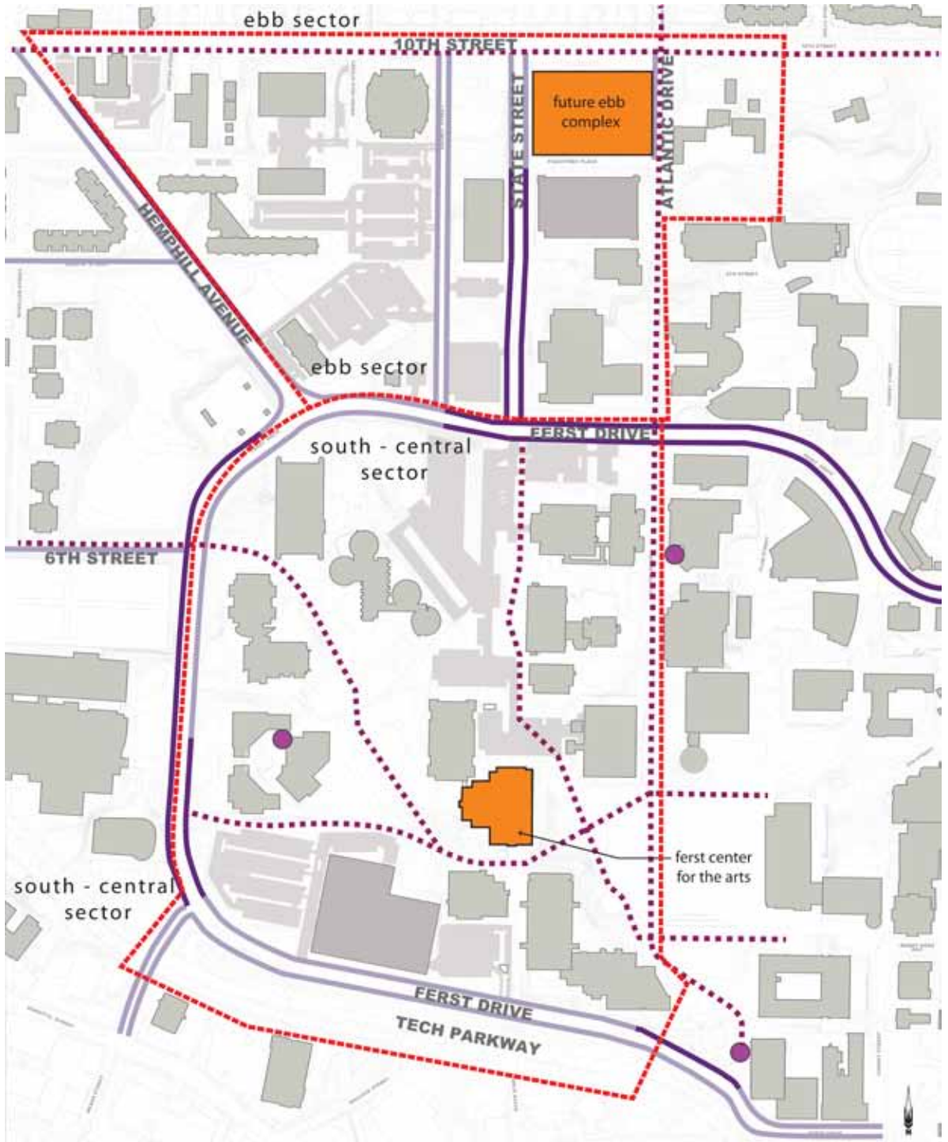
11. Existing Conditions - Shaded Paths

This diagram combines canopy coverage and pedestrian circulation analysis. Paths shown in dark green are shaded, yellow are in full sun. Shade is a highly desired quality on the Campus, as a relief on hot spring and summer days. In the South-Central Sector, the connector between 6th Street and the center of Campus, which traverses the IC Lawn, is an area where the shade is most absent. A number of secondary paths located on edges of surface parking lots near MRDC and Boggs Building are affected as well. Since there is much less formal pedestrian circulation in the EBB Sector, only a few paths between CRB and ATDC seem affected. This analysis may offer a slightly skewed perception since pedestrians do also circulate informally through surface parking lots.

Sector Canopy and Pedestrian Circulation diagram

12. Existing Conditions - Bicycle Circulation

Bicycle usage on the Campus has increased rapidly over the last few years. The Institute has actively responded to the growth - the main road access routes are marked with sharrows, dedicated bike lanes have been created where possible, and bicycle parking is installed as needed. A bike-share program is being tested on the Campus as well. Analysis found the bicycle traffic along Hemphill Avenue and Ferst Drive to be fragmented - sharrows and bike lanes flow into each other as response to on-street parking or a narrower street width. Bikers frequently use pedestrian paths. Although there has been no mention of circulation conflicts, with increased bike use the Institute should adopt a bike signage system on Campus.



Sector Bicycle Circulation diagram

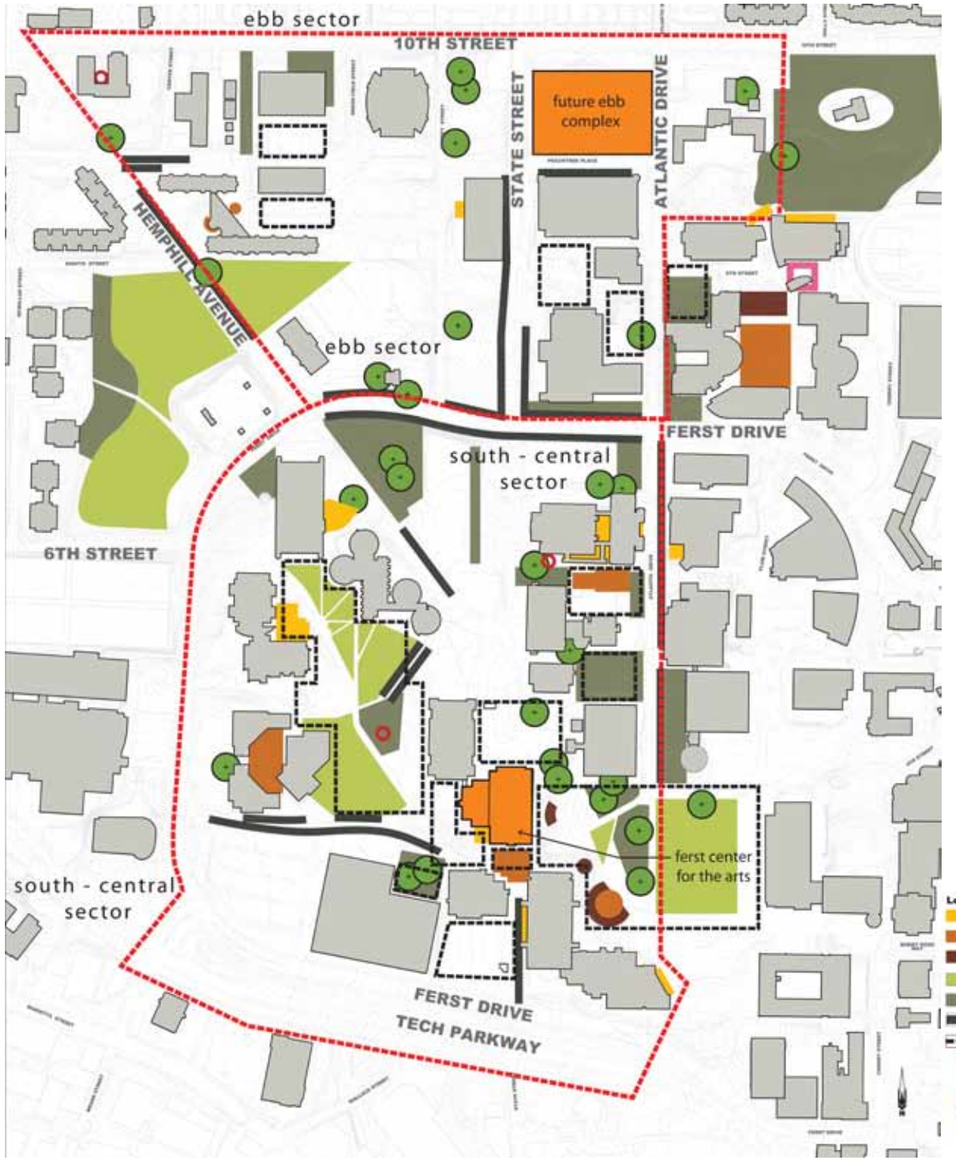
13. Existing Conditions - Quality of Space

The two sectors' quality of space ranges from poor to good. Poor designation goes to vast open parking lots without canopy cover, unmaintained/neglected spaces near or around buildings, areas with bad visibility that could be perceived as unsafe and sidewalks adjacent to high volume and speed of traffic. Indifferent spaces appear suburban in character, with planting at the wrong scale, large areas of lawn without a frame of reference to tree canopy or buildings. These spaces don't feel appropriate for a technology campus setting. Good spaces invite users to interact with the landscape, stay and linger. They are innovative, and reflect the Institute's commitment to provide high quality learning space.

Sector Quality of Space diagram

14. Existing Conditions - Student Space Use and Green Space Typologies

Students' interaction with exterior space on Campus is both formal and informal. It directly correlates with the quality of space, and the types of spaces provided. Today, these 'typologies' on Campus are a fragmented network of spaces - terraces, courtyards, study nooks and stepped seating areas. Along with green open spaces and wooded areas which invite informal uses - study and play - these 'typologies' could become a meaningful armature for student activities on Campus.



Sector Exterior and Green Space Use diagram

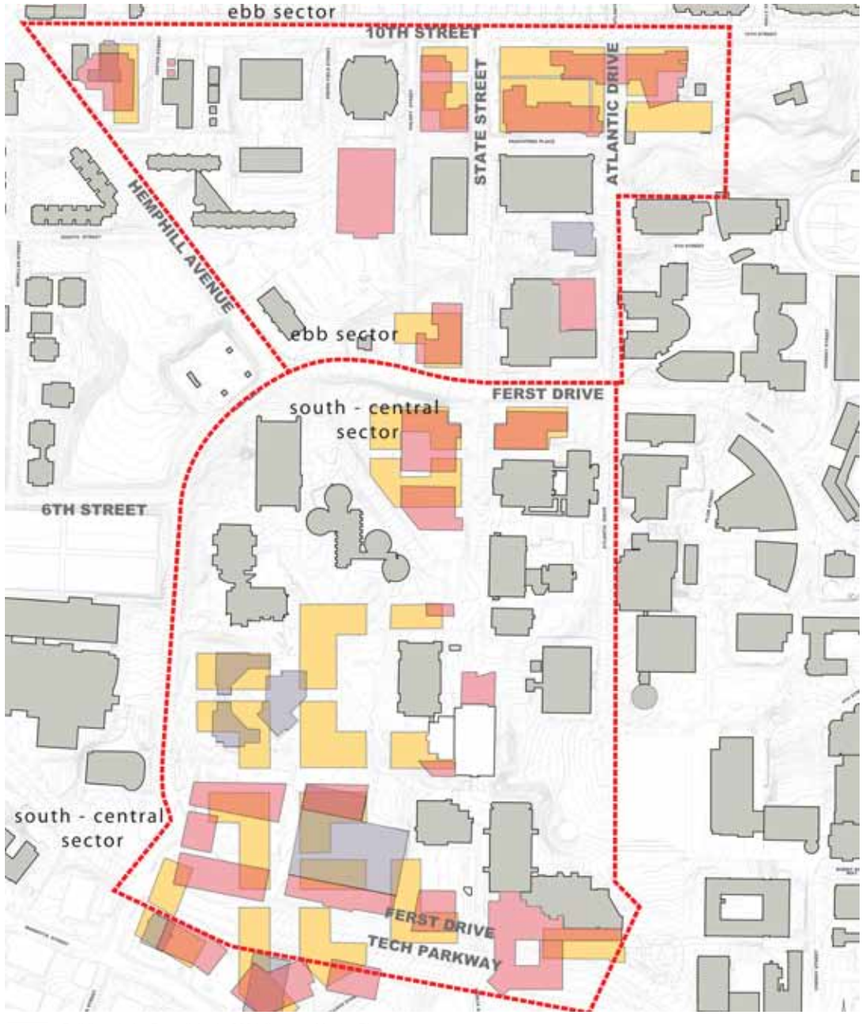
15. Existing Conditions - Building Age / Function

This graphic depicts building age and primary functions for all structures in both the EBB and South Central Sectors. Building age is shown in years, with darker colors indicating older structures. Notably, a number of structures, including both science/ laboratory buildings and the Student Center and its first addition are now over 40 years old. This age, combined with other factors of function and condition may indicate that those structures will need to undergo renovation / reconstruction or replacement in the future. Supplementing this data was information gathered in the interviews conducted during the early phase of work. In several of the interviews it was noted that the Student Center is recognized to be inadequate to meet the needs of the current size of the Georgia Tech campus community. Building functions shown in the diagram represent the primary or major functions of the facility, as listed on the Capital Planning and Space Management web site data base. Notably the Ferst Sector is quite different from the EBB sector in functional terms. While the EBB is occupied primarily by research facilities, the Ferst Sector includes academic, research and student life functions, which makes it a more active place in general.

Sector Building Age and Function diagram

16. Existing Conditions - Campus Master Plan – Demolition / Future Building Sites

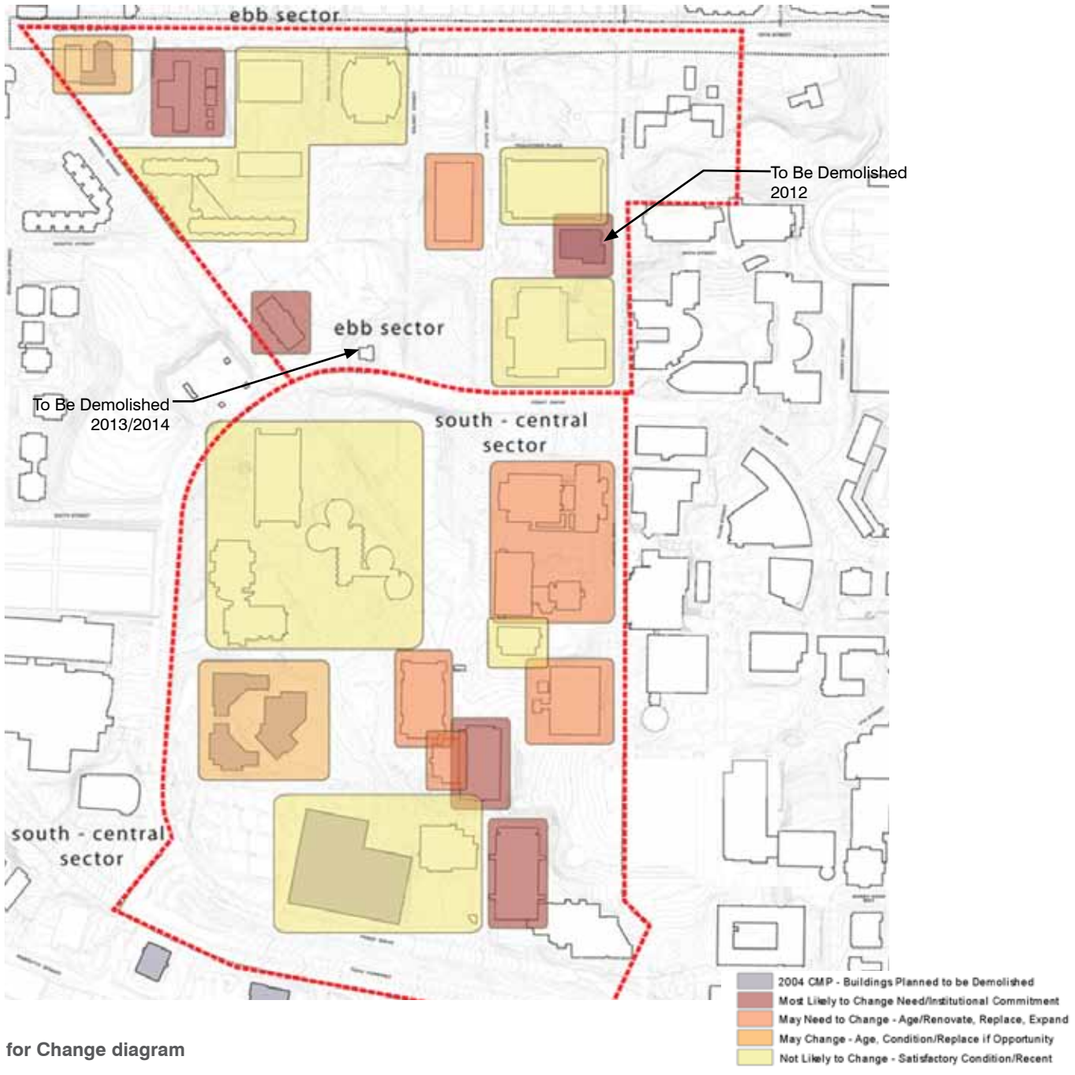
This graphic overlay shows, on the existing EBB and South Central Campus Sectors, the future building demolitions and new construction proposed in the 2004 Campus Master Plan Update. Overall six structures in the Sectors were proposed to be demolished in the future and replaced with new construction. Included among those were the Student Parking Deck (spaces to be relocated to a new parking deck to the south of the existing campus), and the Groseclose, ISYE Annex, and Instructional Center buildings. Based on the planning assumption that enrollment would increase from 16,700 in 2003 to between 20,000 and 23,000 in 2012, the 2004 Campus Master Plan also illustrated some 21 prospective sites for new buildings in these sectors. Combined, these sites could accommodate approximately 2.1 million gross square feet (gsf) of new space based on a three-story building height. Although specific sites were identified in the Master Plan, they were not assigned to a particular College, School or function.



Demolition/Future Building Sites plan

17. Existing Conditions - Potential for Change

This graphic combines the facts concerning building age, with the 2004 Campus Master Plan proposals for demolition and future building construction, and input received from interviews with faculty, staff and students, to identify buildings that are more or less likely to change over the next ten years. Buildings considered most likely to change include the Ferst Center for the Arts, the Student Center, the Neely Research Center, the Beringause Building and the Tenth Street chiller plant. These are all facilities that the Institute has committed to remove/replace or renovate/expand, or has recognized the need to address present inadequacies. At the other end of the “Potential for Change” spectrum are those facilities considered “Not Likely to Change”. Included in this category is the recently constructed Marcus Nanotechnology building, along with the MRDC, Love Manufacturing and MARC buildings. Although the Student Center Parking deck was indicated to be relocated in the 2004 Campus Master Plan, the Parking and Transportation Master Plan prepared in 2009 determined that given the size and potential cost to replace it, it was likely to remain until at least 2019. Hence, it is also shown in the “Not Likely to Change” category for purposes of the Sector Plan.



Sector Potential for Change diagram

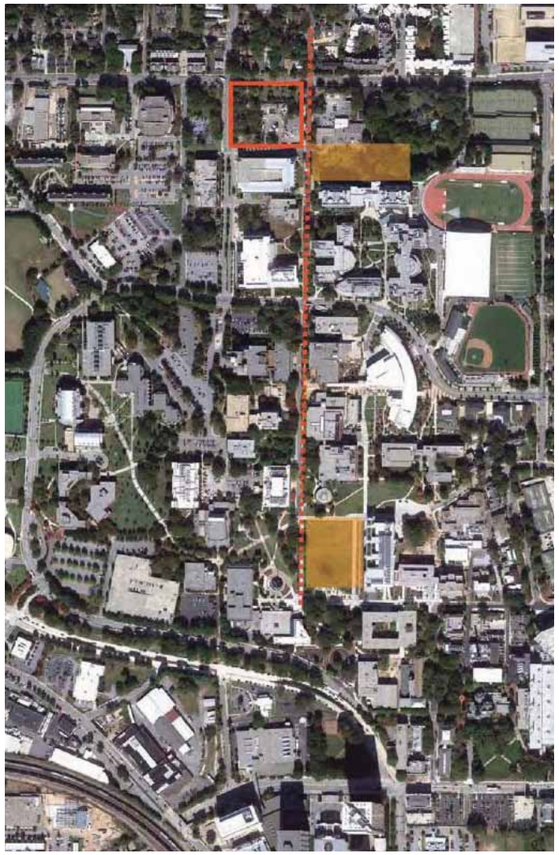
18. Existing Conditions - Engineered BioSystems Building (EBB)

The 2004 Campus Master Plan Update proposed a series of new buildings in the area around the North Deck and along 10th Street. In 2011 the Office of Capital Planning and Space Management initiated a more detailed study of the area in anticipation of the ultimate development of a three-building research complex in this area. The complex is known as the Engineered BioSystems Building (EBB) complex and plans for the development of the first building in this complex are currently underway.

The first phase building is estimated to be approximately 200,000 gross square feet and represents a major investment by the Institute along this critical 10th Street corridor and northern campus edge. The Phase One building site is highly visible and easily accessible; it is located on the block between 10th Street, Peachtree Place, State Street and Atlantic Drive. State Street, along with Hemphill Avenue and Fowler Streets, will serve as the primary vehicular entry point into campus along the 10th Street corridor. Atlantic will be transformed from a vehicular street to a pedestrian promenade which will link the 10th Street gateway to Tech Green - approximately one half mile to the south.

Campus Connections in the EBB Complex area

Birds eye sketch of Proposed EBB complex; view looking west



Campus Connections from EBB Complex to the Tech Green Central Greenspace

19. Existing Conditions - Summary: Issues, Opportunities, Questions

SUMMARY:
This graphic combines factors illustrated in the various inventory and analysis graphics contained in this report to illustrate the interrelationship and complexity of the issues, opportunities and questions that will be addressed in the Sector Plans.

ISSUES:

(a) Auto / pedestrian conflicts along Ferst Drive – particularly at the intersection with Hemphill

(b) Relocating parking, consolidating service access and accommodating necessary handicapped access along State Street, south of Ferst Drive

(-) Personal safety on campus

OPPORTUNITIES:

(c) Improving campus pedestrian connectivity in the east-west and north-south directions

(d) Improving the visibility, access and outdoor activity spaces for the Ferst Center for the Arts

(e) Improving the Hemphill pedestrian corridor south of Ferst Drive

(f) Improving the character, quality and functionality of the open space bounded by Boggs, MRDC, MARC, the Love Building and the Instructional Center (if not needed for future building construction)

(g) Improving the pedestrian environment along the south side of Tenth Street

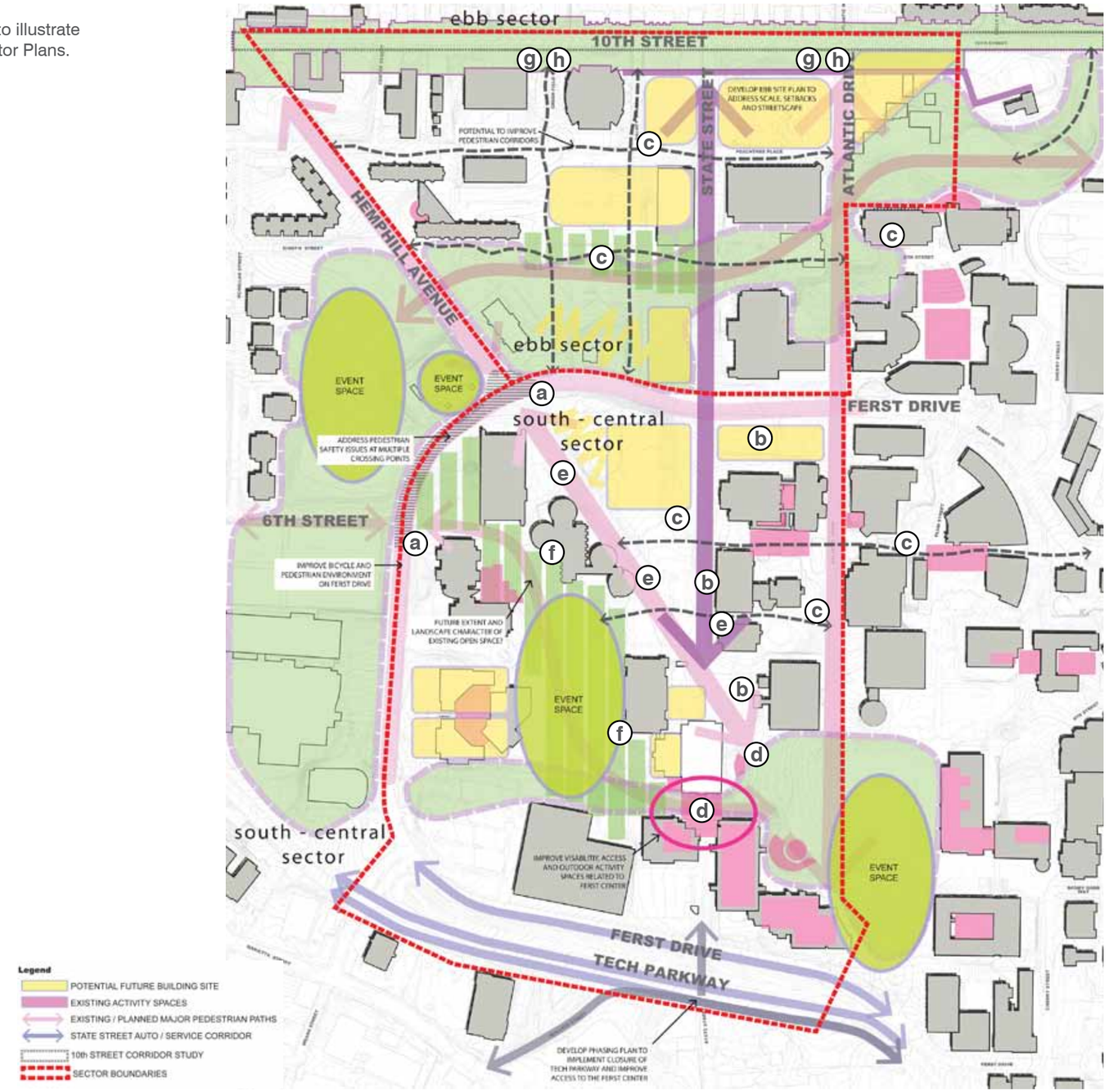
(h) Establishing a significant campus gateway along the south side of Tenth Street

QUESTIONS:

How much, if any, future construction should be planned for in the Sectors?

How much if any, “activity spaces” – both indoor and outdoor, should be accommodated in the EBB Sector?

Can surface water be accommodated in the future design of the Eco-Commons in an Appropriate, meaningful way, and if so, what character should it take?



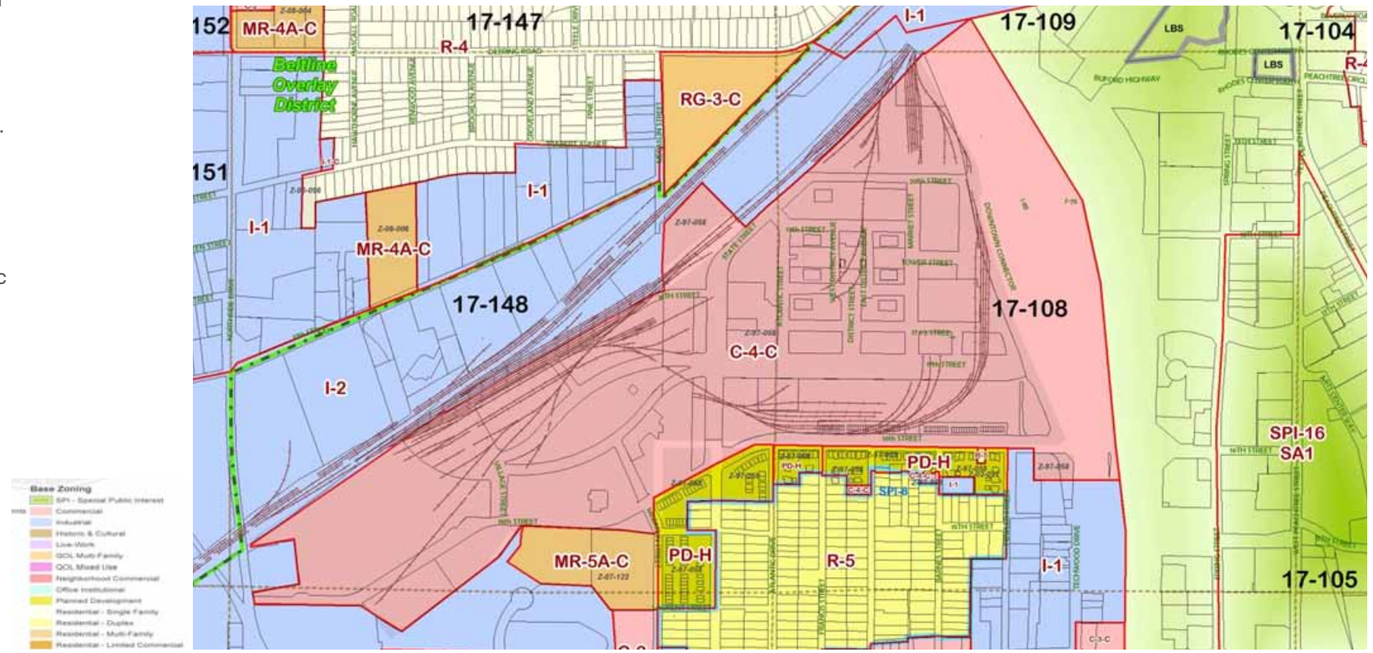
Issues Summary diagram

20. Existing Conditions - 10th Street Corridor and Home Park Neighborhood

The 10th Street corridor serves as the northern edge of the main body of the Georgia Tech campus. This boundary is approximately 4,800 feet long or 0.9 miles and extends from Northside Drive on the western side of the campus east to and across the Downtown Connector (I-75/I-85). Within the EBB Sector this boundary is approximately 3,200 feet (0.6 miles) and extends from the Hemphill Avenue intersection to the President's House. This is a heavily traveled city artery which will play an increasingly important role for the campus as Georgia Tech continues to make major capital investments along this corridor.

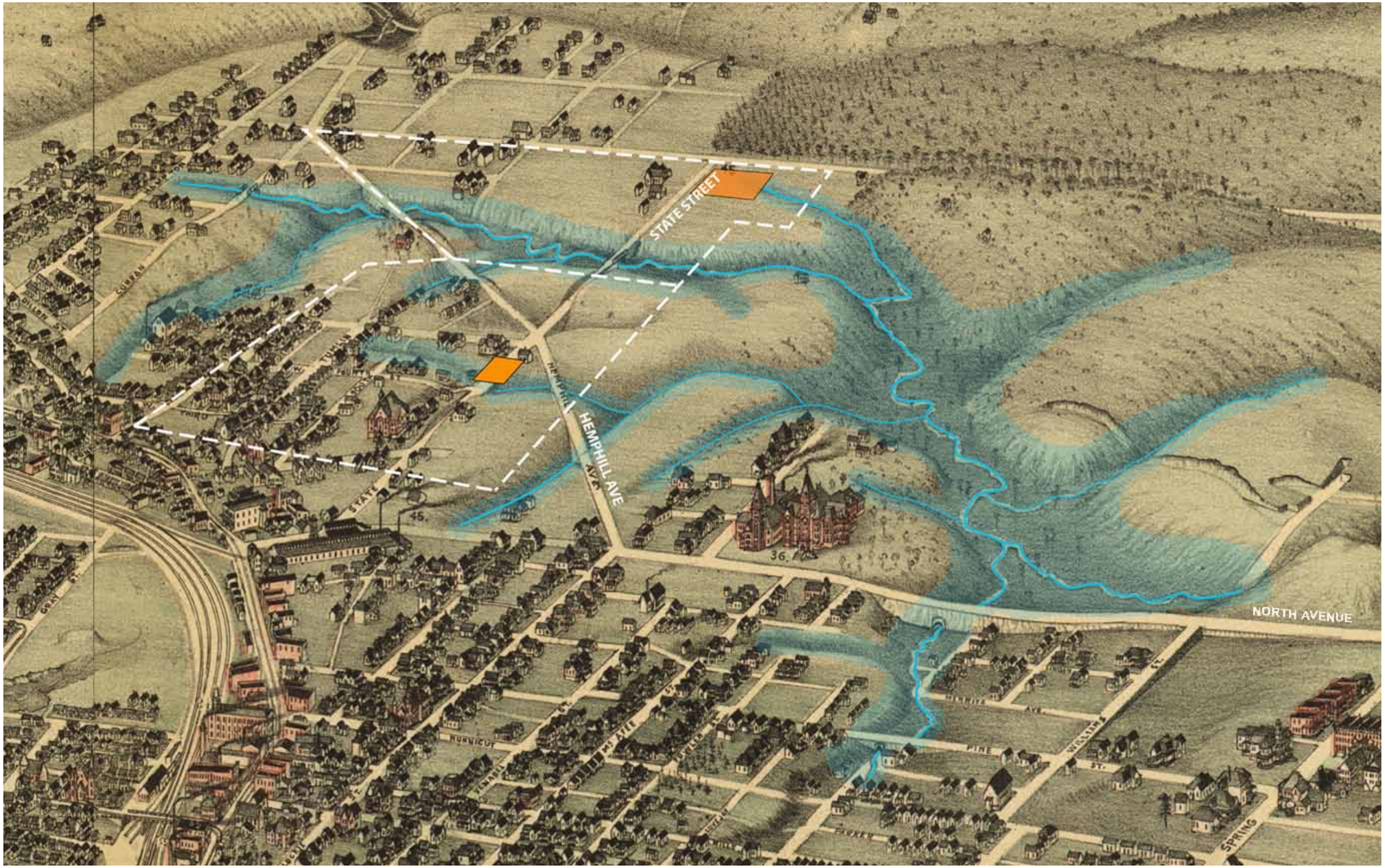
10th Street is also an important shared boundary with the adjacent Home Park Neighborhood. Home Park is a 100 year old community with an established residential character and scale along 10th Street - its southernmost boundary. Many Tech students live in the Home Park community and there is as a result a significant flow of traffic – vehicular, bicycle and pedestrian north-south across 10th Street at each of the intersecting streets along this corridor but especially at the Atlantic and State Street intersections.

The Atlanta Beltline has proposed a potential extension of the Atlanta Streetcar Project now under construction. This proposal would extend the streetcar, either along North Avenue or 10th Street, to connect downtown to Georgia Tech, Midtown and the West Atlanta Beltline. This project is still in long-range planning stages, but the Institute is making provisions for the streetcar as it plans for future improvements along 10th Street (See chapter VI. EBB Sector Plan -10th Street Corridor).



Current Zoning for the Greater Home Park Area, City of Atlanta

Aerial view of 10th Street Campus Edge; the distance is greater than half a mile between Hemphill Avenue and Fowler Street



1892 Aerial View of the sectors showing historic drainage patterns (aerial perspective with highlighted watersheds)

21. Existing Conditions - Campus Physiography and Hydrology

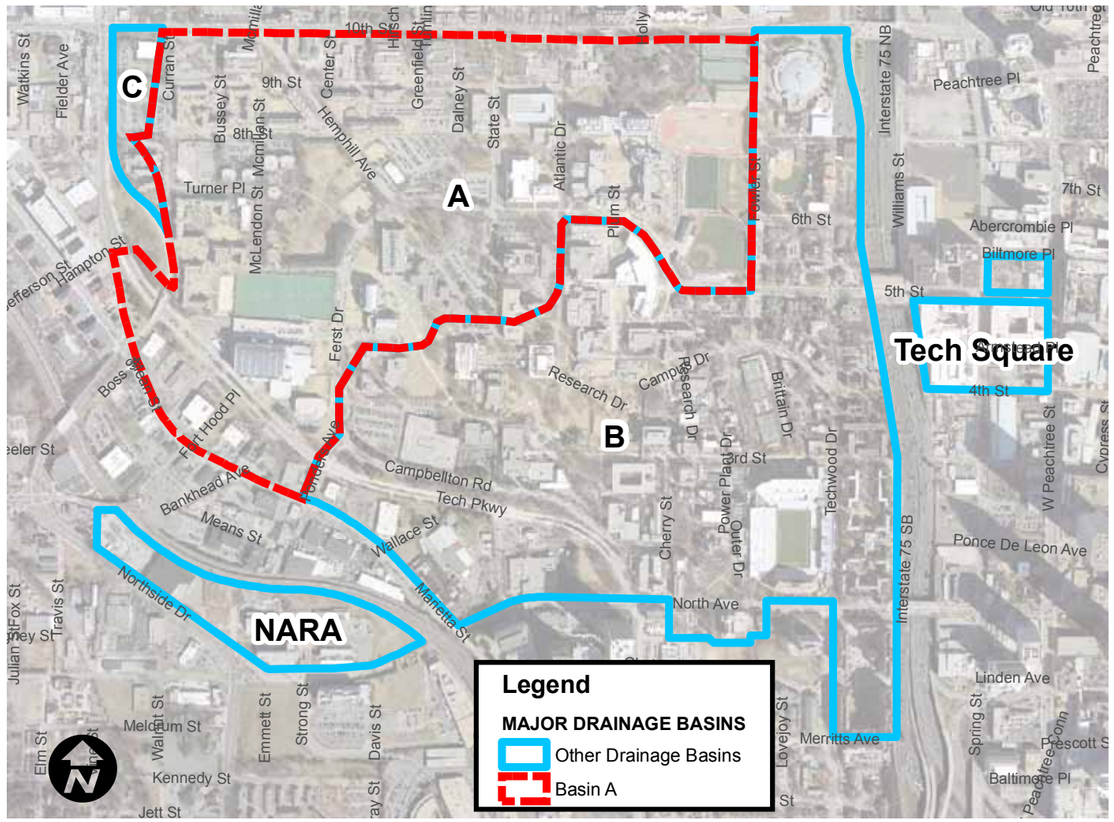
As the Landscape Master Plan points out, “Physiography and hydrology are the armature of Georgia Tech’s ecological landscape. The interface of surface and subsurface conditions underlies the concept of the Eco-Commons and holds the potential to sustain campus open space and development by the preservation or mimicry of natural systems”.

Hydrology - The Natural Drainage System:

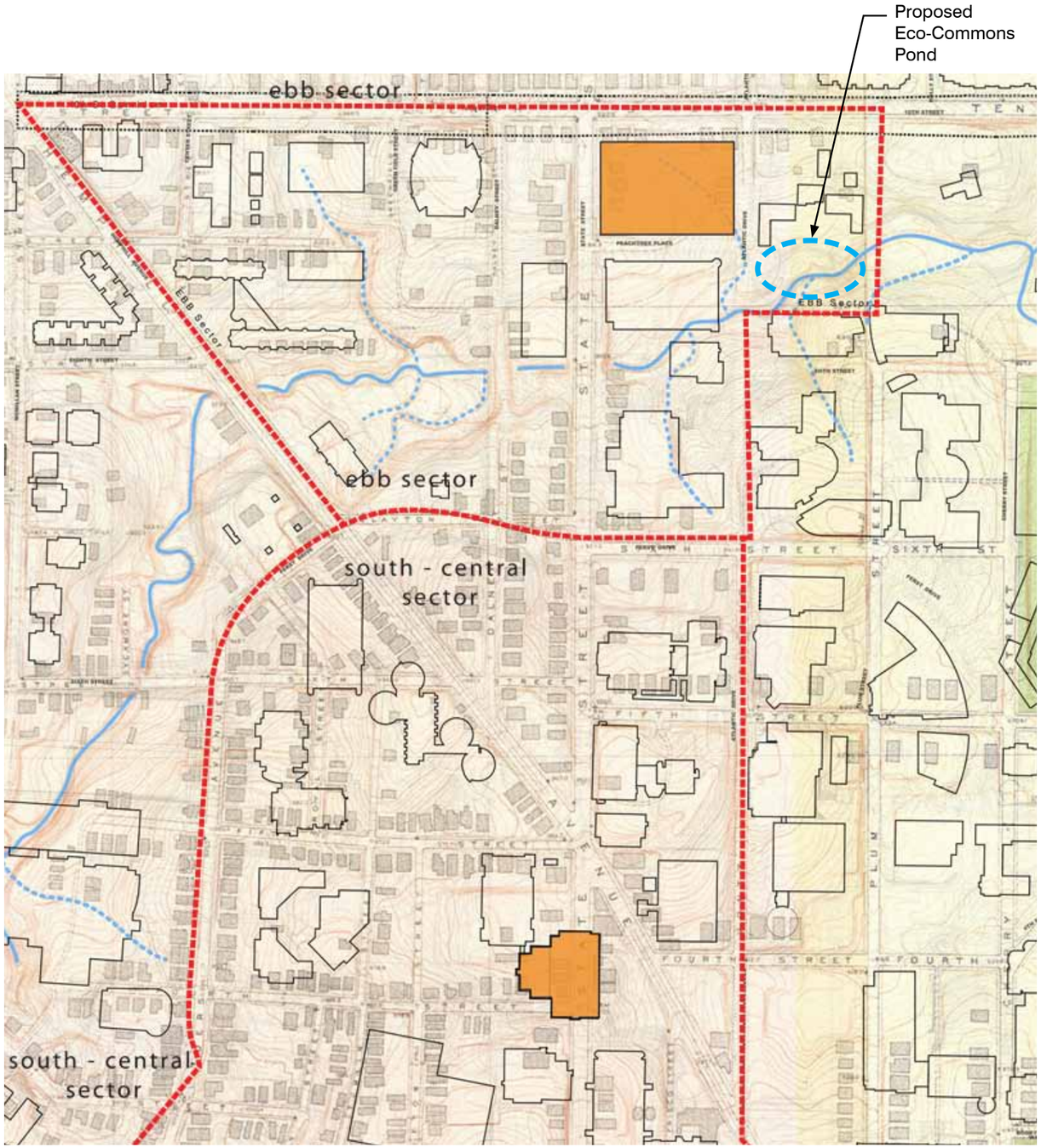
- The campus is composed primarily of three drainage basins. Basin A and B are at the top of a regional watershed which is Marietta Street.
- Georgia Tech can exert complete control over its surface hydrology and stormwater management in Basins A and B. Water flows north in a dendritic pattern of swales and bottomlands.
- All basins once had year-round flowing streams, which were buried by construction of the City of Atlanta combined sewer system and campus development.
- The sewer system follows the natural system and flows northward.
- The only surface water outlet for the campus is the combined sewer, which leaves the campus at the north end of Basin B.”

Topography:

- The campus is a water-shaped landscape, typical of the Appalachian Piedmont.
- 130 feet of vertical change.
- Marietta Street corridor is the high point.
- The Eco-Commons Pond is the low point.



Major Drainage Basins diagram



1927 Map - with future GA Tech campus overlay

III. SECTOR PLAN OVERVIEW

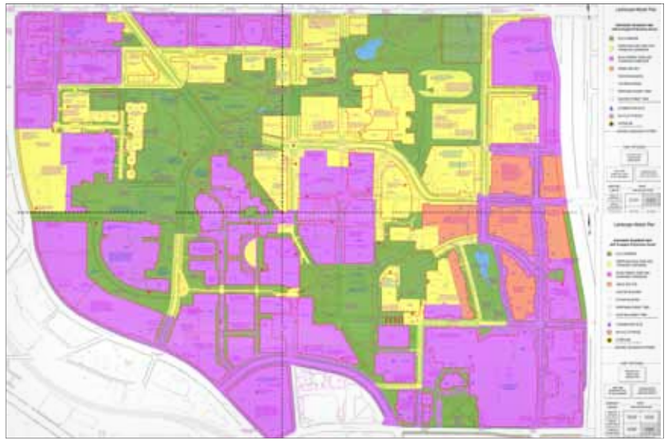
1. Sector Plan - Introduction

The development and evolution of the Sector Plans is driven by the three primary framework elements: the 2011 Campus Landscape Master Plan Update, the concept of the Eco-Commons and Design Corridors. The Sector Plan reinforces, interprets and challenges these components, as needed, based on current and near future building projects.

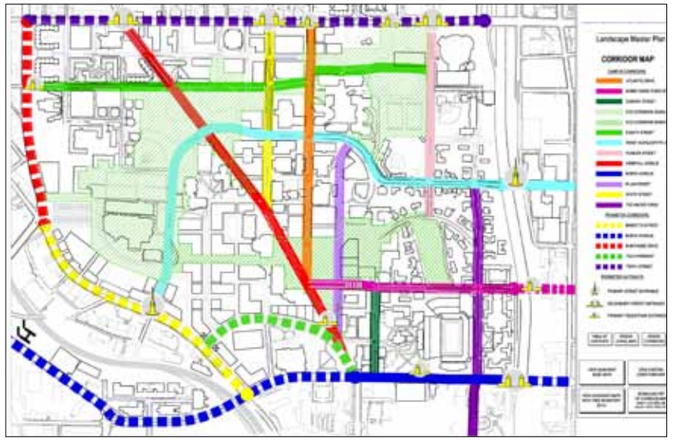
2011 CAMPUS LANDSCAPE MASTER PLAN UPDATE (LMP): THE LMP elaborated on the 2004 Campus Master Plan Update (CMPU) in focusing recommendations on the important role of open space on campus. It developed rigorous guidelines for the evolution of open and built space on campus. The design team studied these guidelines closely, especially the recommendations for the ecological performance zones and associated vegetation communities. The objective to reduce stormwater runoff into the Atlanta sewer system to 1950's levels was carefully considered in collaboration with Georgia Tech staff and consulting civil engineers.

ECO-COMMONS: The Eco-Commons is one of the main components of the ecological performance zones, shown in green in the diagram on the right. It is a performance landscape and its functional objective is not only to slow, filter, and collect stormwater but also to provide an alternative for pedestrian circulation through the campus that contrasts with the urban grid. The Eco-Commons creates new recreation and educational opportunities and is central to redefining and connecting the landscape to social and educational spaces on campus.

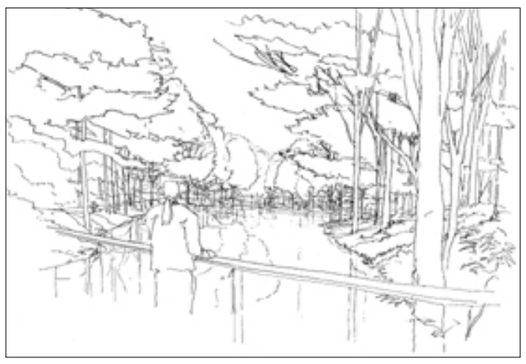
DESIGN CORRIDORS: The structure and character of the design corridors proposed in the LMP was also closely examined and considered. The design team explored the hierarchy and clarity of the circulation grid in relationship to the Eco-Commons and reinforced their presence throughout the sectors as significant and distinct landscape experiences.



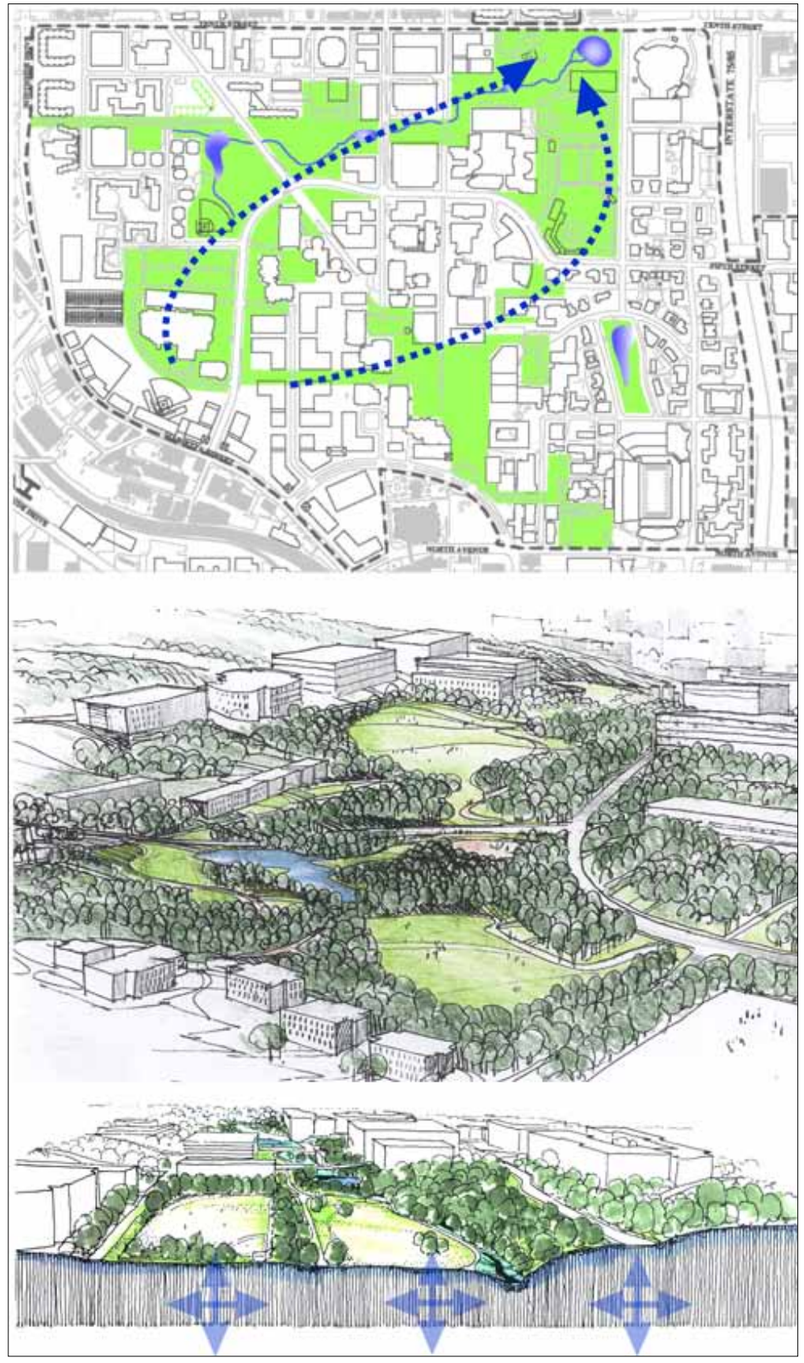
Ecological Performance Zones (LMP)



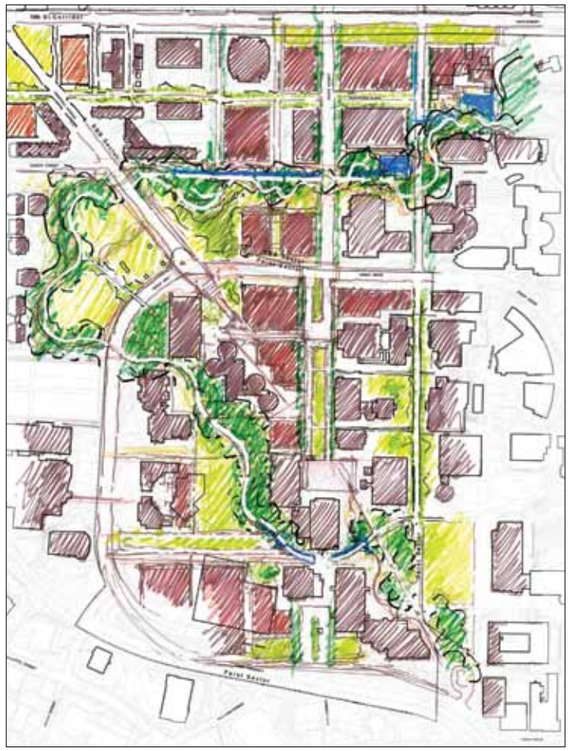
Design Corridors (LMP)



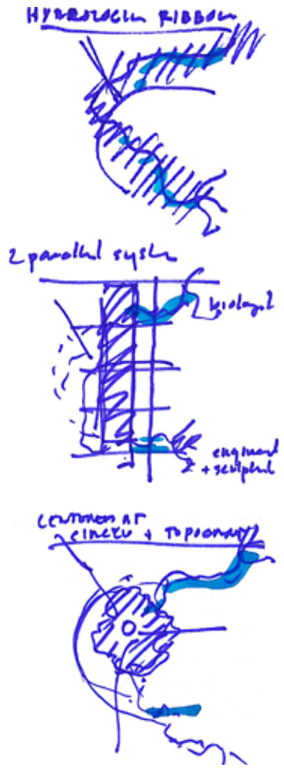
Conceptual vignette sketches of the Eco-Commons woodland (LMP - Robinson Fisher)



The Eco-Commons concept shown as central campus armature for recreation and stormwater management (LMP)



Eco-Commons Forest Ribbon concept evolution
Preferred Option



2. Sector Plan - Concept Development

Early in the design process, the design team explored three alternative schemes - the Forest Ribbon, Forest Center and Forest Transect - as an interpretation of the Eco-Commons concept. The Forest Ribbon was adopted and fully developed as the preferred scheme through PDC reviews, close collaboration with CPSM staff and the respective design teams for the Ferst Center Expansion and EBB Phase 1.

The Forest Ribbon is comprised of a sinuous woodland, pathways, and stormwater conveyance. These elements wind through the campus, structure adjoining sectors, and interpret the form of the Eco-Commons. Hydrologic performance can be traced by ephemeral water flows through the EBB Sector (Chapter VI). The Eco-Commons is comprised of forest, parkland and raingardens in the South-Central Sector (Chapter V). They follow the primary pathways and design corridors and take advantage of existing topography near the Ferst Center and Tech Green.

Alternative Schemes:

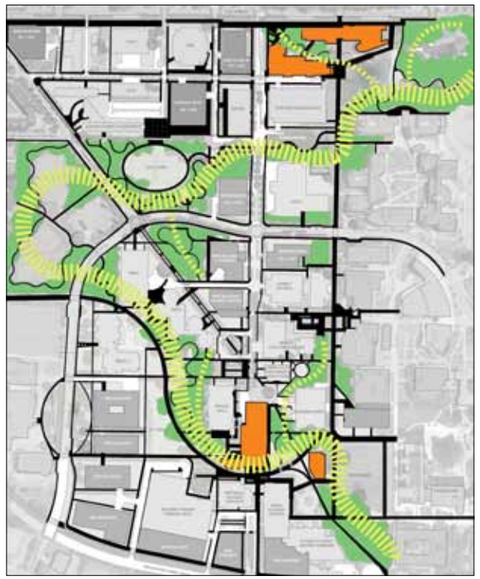
The Forest Transect is defined by north-south central forest band that follows the campus grid between extended Dalney and Greenfield Streets. Future building programs are structured along the edge of the transect.

The Forest Center scheme embraces the intersection of historic Hemphill Avenue and Ferst Drive. It connects the forested area along extended Hemphill Ave south of Ferst Drive (Hemphill Design Corridor), Couch Park and surface parking areas in the EBB sector.

Alternative Eco-Commons Configurations

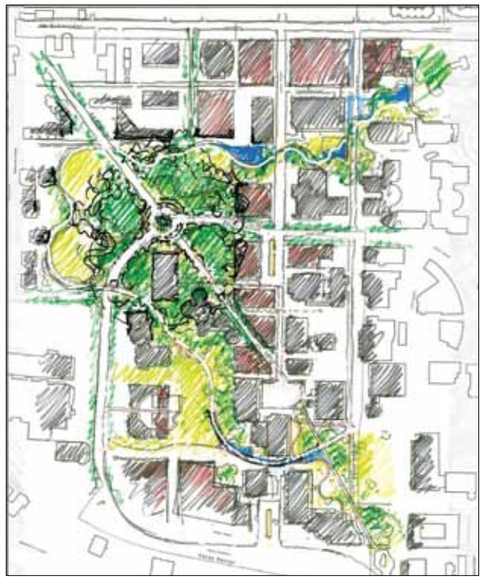
Campus grid and thresholds interact with the ribbon

Key building projects: Ferst Center Expansion and EBB Phase 1

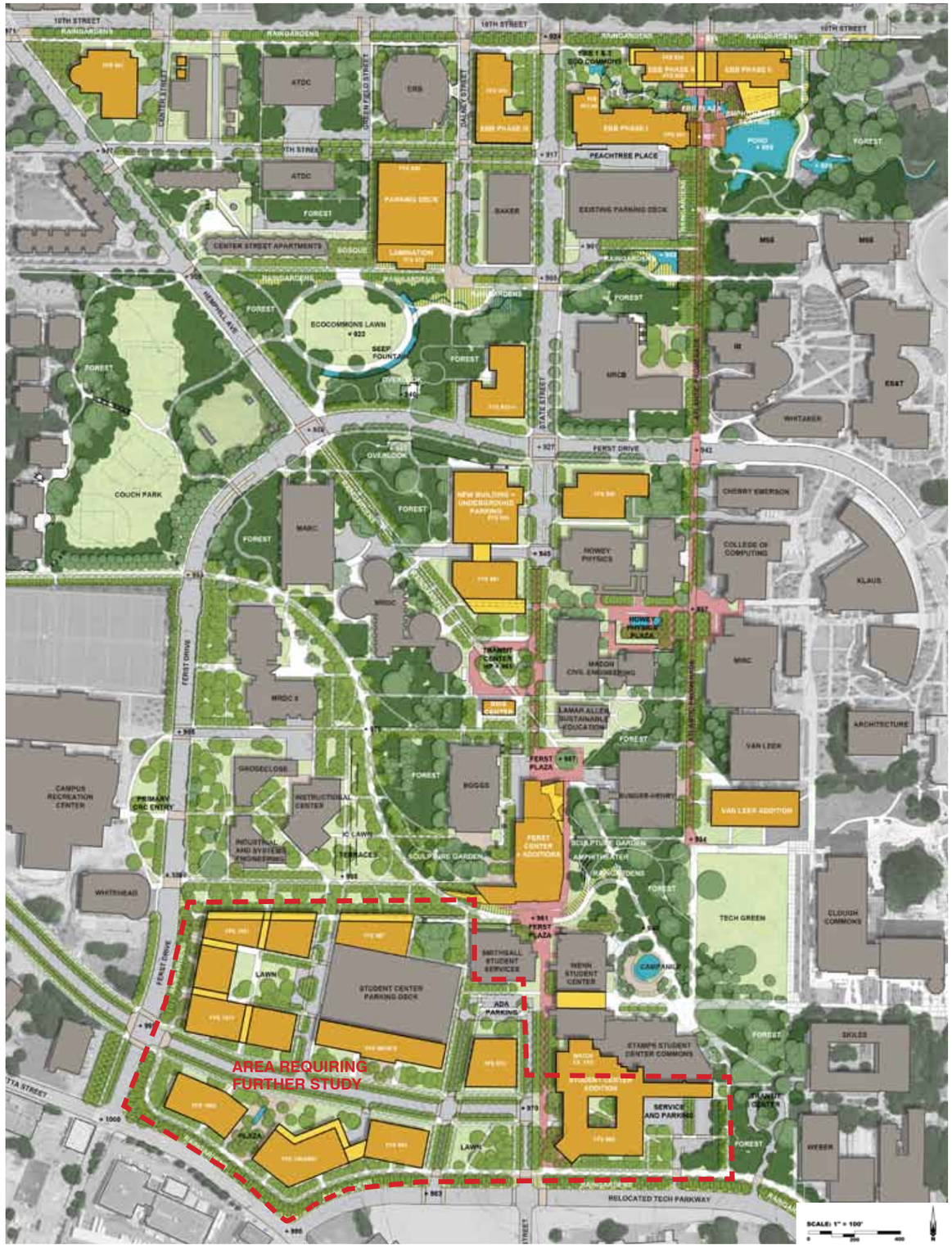


Primary and secondary Eco-Commons ‘ribbons’

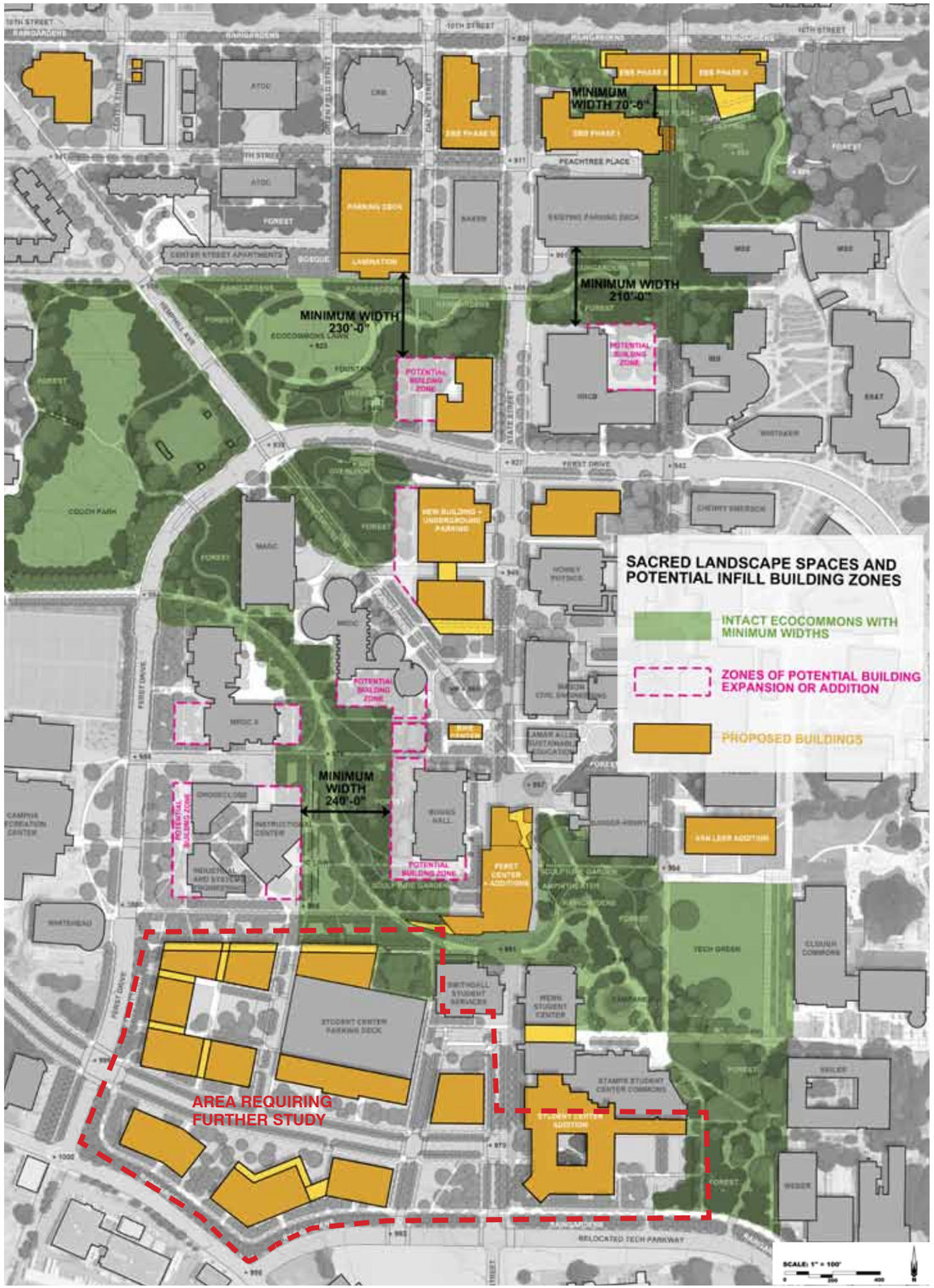
Forest Transect Scheme



Forest Center Scheme



Illustrative Sector Plan



Sacred landscape spaces and potential infill building zones

3. Sector Plan - Goal Statement

These goals were developed through analysis of existing conditions, stakeholder work sessions and review of precedent planning documents. The Plans for the EBB and South-Central Sectors of campus will:

1. Embody the Strategic Plan Strategy to “Develop the campus and its neighborhood as a vibrant live-work-learn-play environment” by planning for buildings and open spaces that support and encourage the integration of: academic units, interdisciplinary research and innovation centers, technology and the arts, and business and community partners.

2. Further the development of a Sustainable Campus by implementing the LMP, including the Eco-Commons, innovative water management strategies, physical structures and operational practices.

3. Provide an “armature” for future campus development by refining the plan for campus open space to include the definition of: landscape character, quality and connectivity; spatial composition and hierarchy; building relationships to site, open space, campus corridors, edges and gateways; and appropriate treatment of service access corridors.

4. Improve the accessibility and safety of the campus for pedestrians and bicycles, through specific design recommendations at key locations throughout the Sectors.

5. Develop concepts that link the physical design recommendations of the Plan to environmental education and research; creating a living lab environment.

6. Include a plan for the 10th Street campus edge that: “bridges” the different scales and uses along the corridor; improves pedestrian and bicycle safety; improves the aesthetic quality of this important campus edge; and enhances the perception of campus gateways.

7. Incorporate designs that improve access to, and use of, campus transportation systems as an alternative to automobile use.

8. Provide for future flexibility where appropriate through the use of temporary landscapes and other design considerations.

The Eco-Commons ribbon will transform single-use spaces into multi-functional performative landscapes

4. Sector Plan - Concept Summary

The goal of the Sector Plan is to create a functional landscape that enhances student and faculty life at Georgia Institute of Technology while providing educational and recreational opportunities. The Sector Plan focuses on three areas of the campus: South-Central Sector, the EBB Sector and the 10th Street boundary which terminates the EBB Sector. Each of these will be discussed in detail in the specific chapters that follow.

The Ribbon of Eco-Commons connects these areas, incorporating existing forested zones and proposes a number of revealed stormwater management elements, water collection and conveyance systems. The Ecological Performance Zones (LMP) were adapted to meet goals for stormwater runoff reduction, tree canopy coverage, impervious and pervious surfaces and woodland zones. Within the context of Eco-Commons, the Sector Plan proposes locations and footprints of new building development for the next 10 years (including EBB Phase 1 and Ferst Center expansion). Internal circulation, path hierarchy and connectivity to the rest of campus are also addressed.

Planting strategies for different topographical and user zones were examined. Hydric and mesic plant palettes have been created for each area in order to promote variety of uses, circulation and biodiversity (See section IV.7. Plant Palette).

Since the campus will need densification and building opportunities beyond the next 10 years, the infill diagram on the facing page identifies potential future building zones and establishes minimum requirements for preserving sacred spaces within the Eco-Commons framework.

The following chapter analyzes the Sector Plan through the following individual elements and concepts:

1. Harvesting rain water
2. Maximize shade on campus
3. Path hierarchies and materials
4. Soil building
5. Topography
6. Vegetation

Existing extensive surface parking lots do not support Georgia Tech’s ecological or social sustainability goals (Parking lot south of Baker Building)

5. 2004 Master Plan and Sector Plan Build-out Comparison

1. 2004 Campus Master Plan Building Capacity

The 2004 Campus Master Plan identified six sites in the EBB Sector and 13 sites in the South-Central Sector as candidates for construction of future academic, research and support space. At an assumed average height of three floors, these sites would provide approximately 821,000 gross square feet of additional building capacity in the EBB Sector and approximately 1,355,000 gross square feet of additional capacity in the South-Central Sector. This amount of space was based on the assumption of a total campus population (faculty, staff, undergraduate, graduate students) between 27,500 – 30,500 persons, and an estimate of approximately 4.1 million additional gross square feet of space – of all types – to meet the needs of that population. While the EBB and South-Central Sectors combined would provide over half of that total need, additional building sites were also identified in the 2004 Campus Master Plan - elsewhere on campus - to meet the remaining space needs.

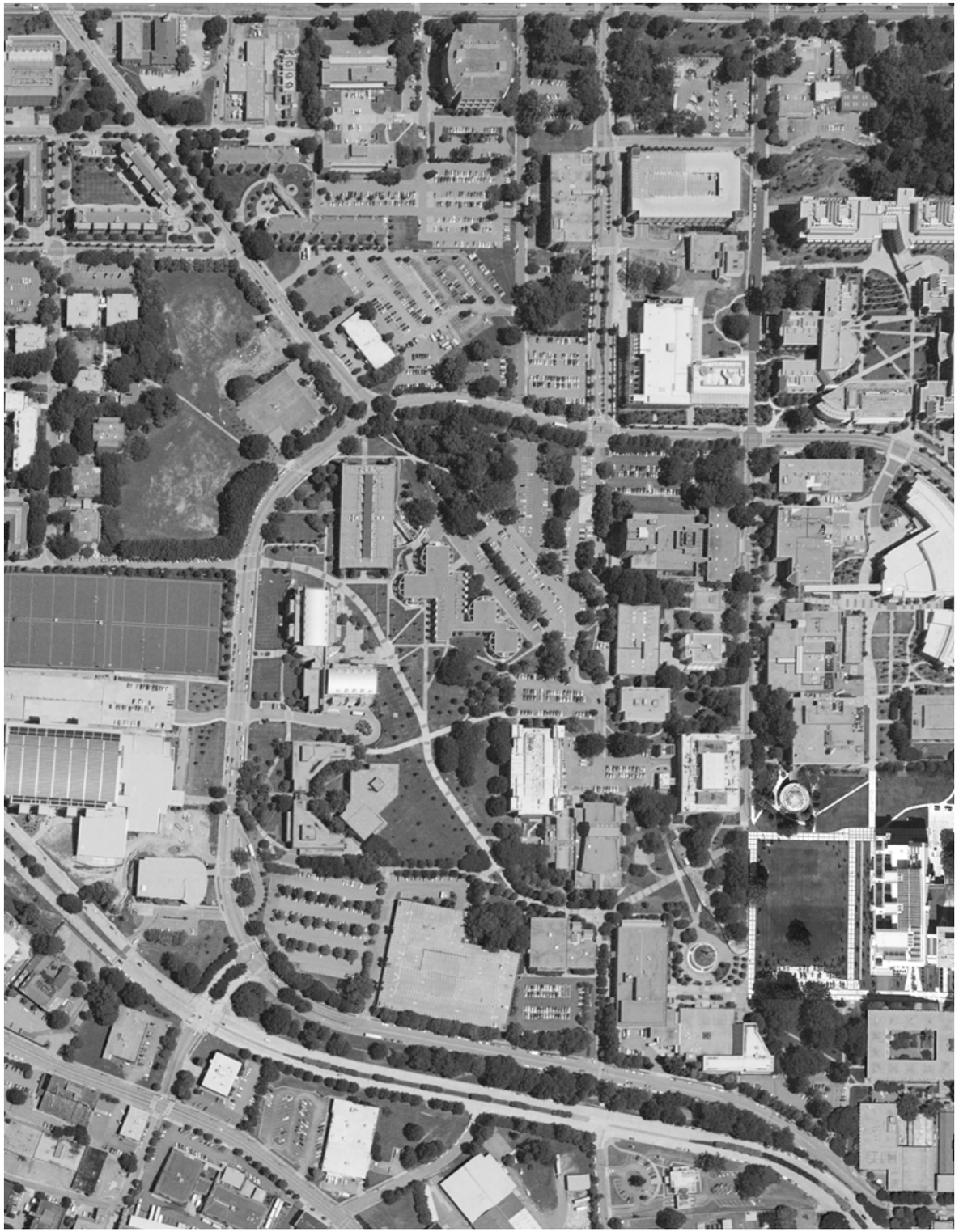
2. EBB Sector Plan Proposed Future Building Capacity

As proposed, the current EBB Sector Plan provides 8 building sites which can accommodate, at an assumed three story average, a combined future development capacity of approximately 975,000 gross square feet. This includes some 758,000 gross square feet of academic / research space and approximately 217,000 gross square feet of parking deck space. By comparison, the 2004 Campus Master Plan provided for approximately 558,000 gross square feet of academic / research space and approximately 262,500 gross square feet of parking deck space. While the Sector Plan proposes moving the parking deck shown in the 2004 Campus Master Plan to a different location, the academic / research sites in this sector are almost identical to those provided in the 2004 Campus Master Plan. Therefore the overall capacity for future development shown in the Sector Plan is very close to that shown in the previous Master Plan.

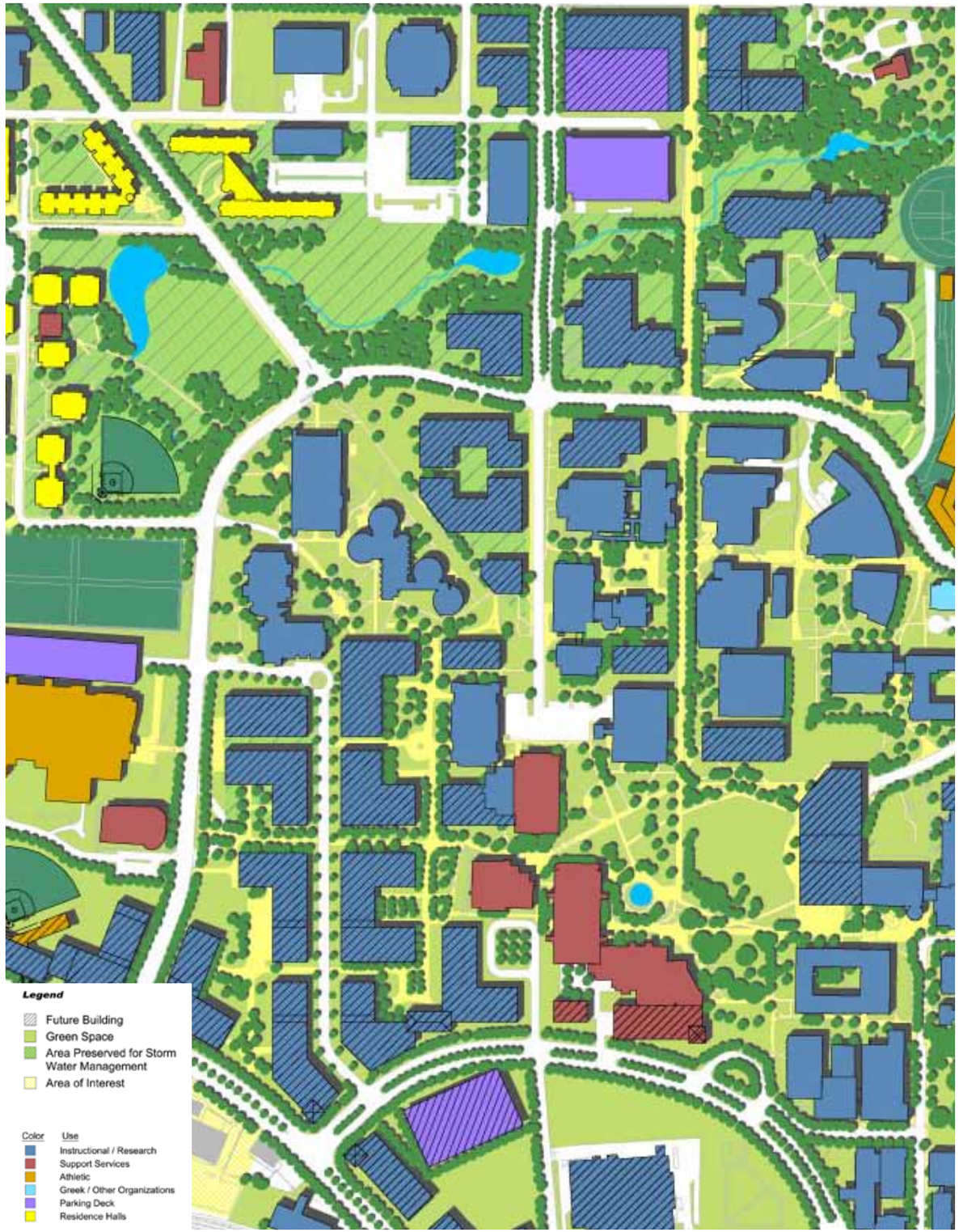
3. South-Central Sector Proposed Future Building Capacity

As proposed, the current South-Central Sector Plan provides for 12-14 major building sites which can accommodate, at an assumed three story average, a combined future development capacity of approximately 1,016,000 gross square feet. This includes some 851,000 gross square feet of academic / research space, approximately 136,000 gross square feet of additional student life space adjacent to the Student Center, and approximately 29,000 gross square feet of additions to the Ferst Center. By comparison the 2004 Campus Master Plan provided for approximately 1,300,000 gross square feet of academic / research space and approximately 78,000 gross square feet of space adjacent to the Student Center. In the 2004 Campus Master Plan, parking for this region of campus was to be relocated to a site south of the South-Central Sector boundary, in conjunction with the proposed realignment of Tech Parkway (which is not included in the above-mentioned square footages). In the current sector plan the existing Student Center Parking Deck is retained. Consequently additional parking needs (if any) for the new development proposed in this Sector will have to be verified based on the specific program defined for the future buildings.

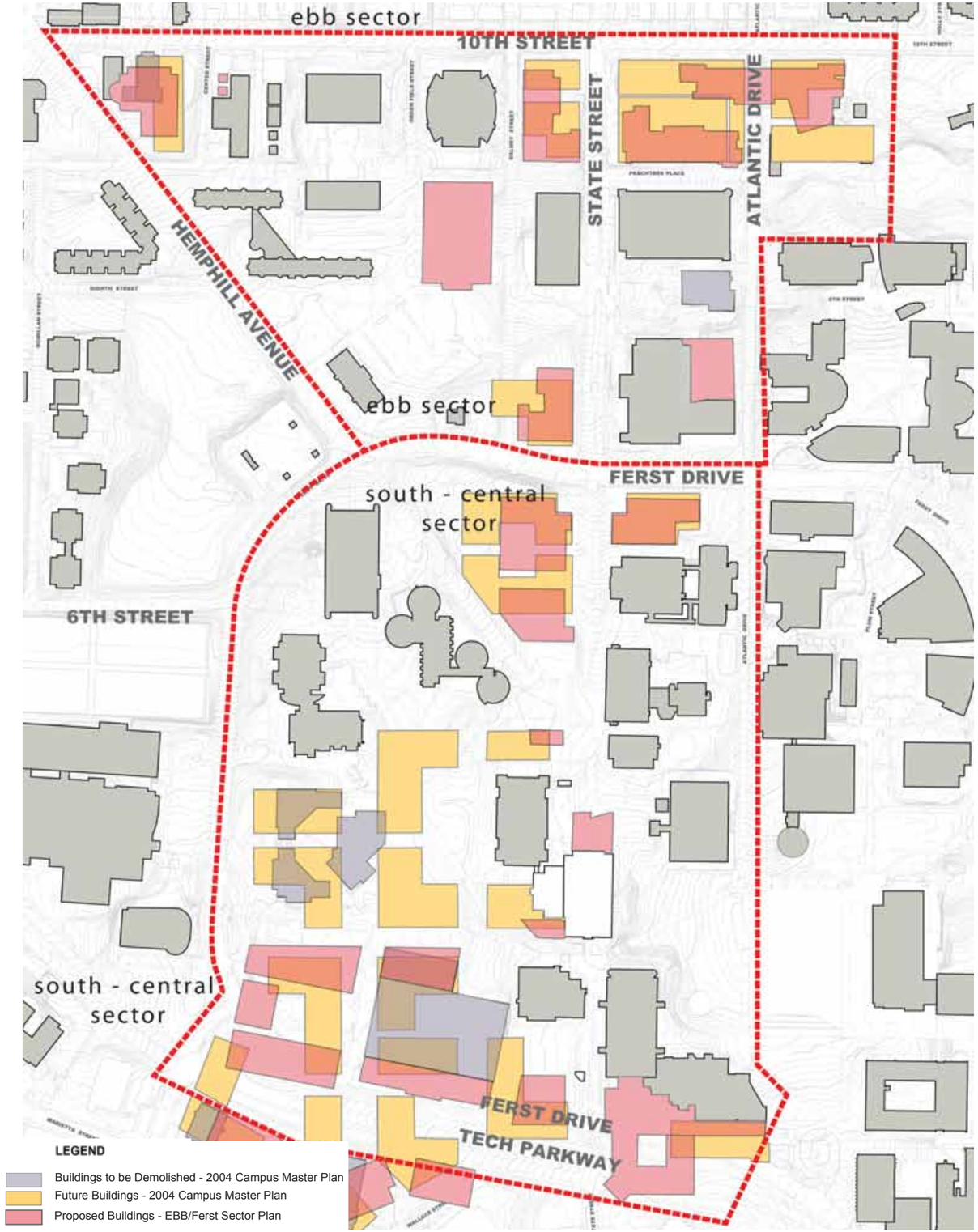
While the Sector Plan incorporates approximately the same number of building sites as the 2004 Master Plan, it provides approximately 425,000 gross square feet less building capacity for academic / research space. This is the result of the fact that the 2004 Master Plan included more and larger building footprints than the current Sector Plan. While the fewer / smaller building footprints reduce the overall future building capacity of the Sector, they also allow for retention of more open space, an increase in campus tree canopy, and provide for more manageable funding “packages” than larger buildings.



2010 aerial photograph



2004 Campus Master Plan Update



Sector Plan and 2004 Campus Master Plan Update building comparison

IV. Primary Components of the Sector Plan

1. Harvesting Water

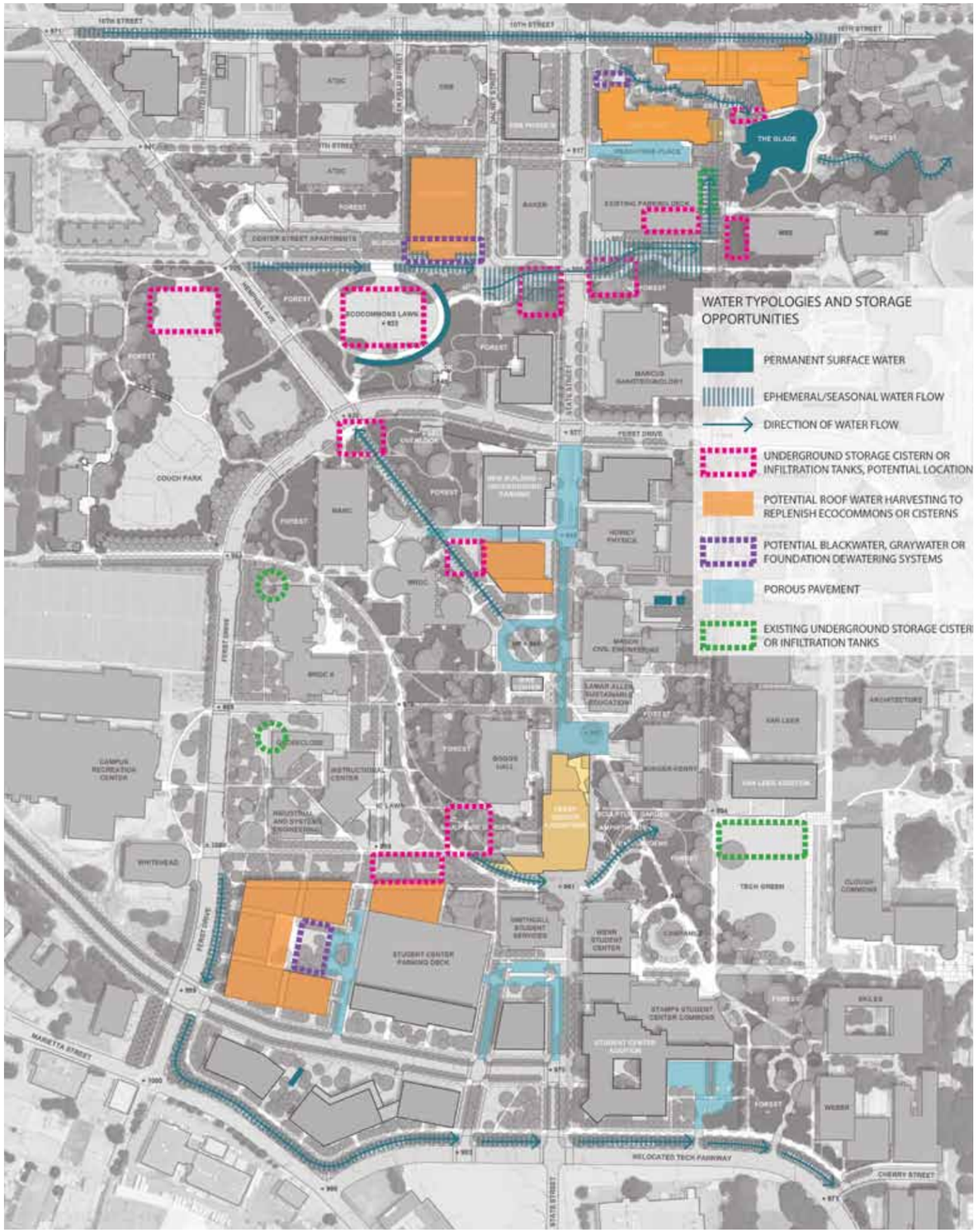
One of the main goals of the Eco-Commons is to responsibly and sustainably convey, collect, and reuse stormwater. This includes harvesting, reuse and infiltration of all sources of water in order to maximize the water leaving the Georgia Tech campus. In addition to achieving positive benefits on campus, this strategy will help protect the creeks and the Chattahoochee River down stream of campus. Visible collection strategies on campus also provide educational and recreational opportunities. The design team collaborated with civil engineers to develop strategies that would help achieve the LMP goal of reducing stormwater runoff to 1950's levels.*

Summary of Sector Plan strategies:

- PERMANENT SURFACE WATER is proposed in the Eco-Commons Pond, on the EBB site and surrounding the Eco-Commons Lawn. By utilizing recirculating water features fed by stormwater cisterns, building mechanical system condensate, foundation de-watering, and potentially black water treatment facilities**, these water bodies can be permanent physical expressions of sustainable water reuse.
- EPHEMERAL SEASONAL WATER AT CAMPUS EDGES is located along 10th Street and along the realigned Tech Parkway. These raingardens are fed by stormwater runoff from the street which create a similar campus edge condition on the north and south and frame new campus gateways along the proposed 60' setback. Excess water from the EBB Sector is eventually directed into the Eco-Commons Pond.
- EPHEMERAL SEASONAL WATER AT CAMPUS CORE appears along many Eco-Commons paths, the Hemphill Design Corridor (historic extension of Hemphill Avenue south of Ferst Drive) and on the south side of Ferst Center. These raingardens are fed by stormwater collection and building runoff. Many of these collection points are located in areas that provide recreational opportunities (running, group sports, bird watching, picnicking etc.) and can be enhanced by interpretive signage and educational components. It may be appropriate to consider the recirculation of water associated with some raingardens and water features in the campus core. These features can further reveal stormwater collection and function, as well as, create permanent surface water bodies which offer year-round aesthetic and educational opportunities.
- CISTERNS AND INFILTRATION CELLS: The Sector Plan proposes different types of storage cisterns for clean (condensate)and dirty (storm) water. A potential black water treatment facility** is under consideration as an integrated part of a new parking deck in the EBB Sector, north of the Eco-Commons lawn.

*Refer to Stormwater Master Plan for updated strategies and calculations (See appendix for Executive Summary).
**Blackwater treatment is not currently incorporated into the Institute's Stormwater Master Plan for Basin A; however, a blackwater treatment feasibility study has been completed recently (See appendix for Executive Summary).

Examples of permanent, ephemeral water and raingardens



Stormwater collection systems and harvesting opportunities

2. Maximizing Shade on Campus

Implementation of shaded pedestrian and bicycle paths throughout the sector is one of the priorities of the plan. A number of locations in need of shade were identified, including near the IC Lawn path and throughout the EBB sector, where the landscape is currently dominated by surface parking lots. Shade trees along the design corridors and main circulation routes are proposed in varying forms - permanent and temporary forests, street and pathway tree alignments, as well as bosques and informal groupings of trees in a park-like setting.

Proposed Canopy Coverage Area

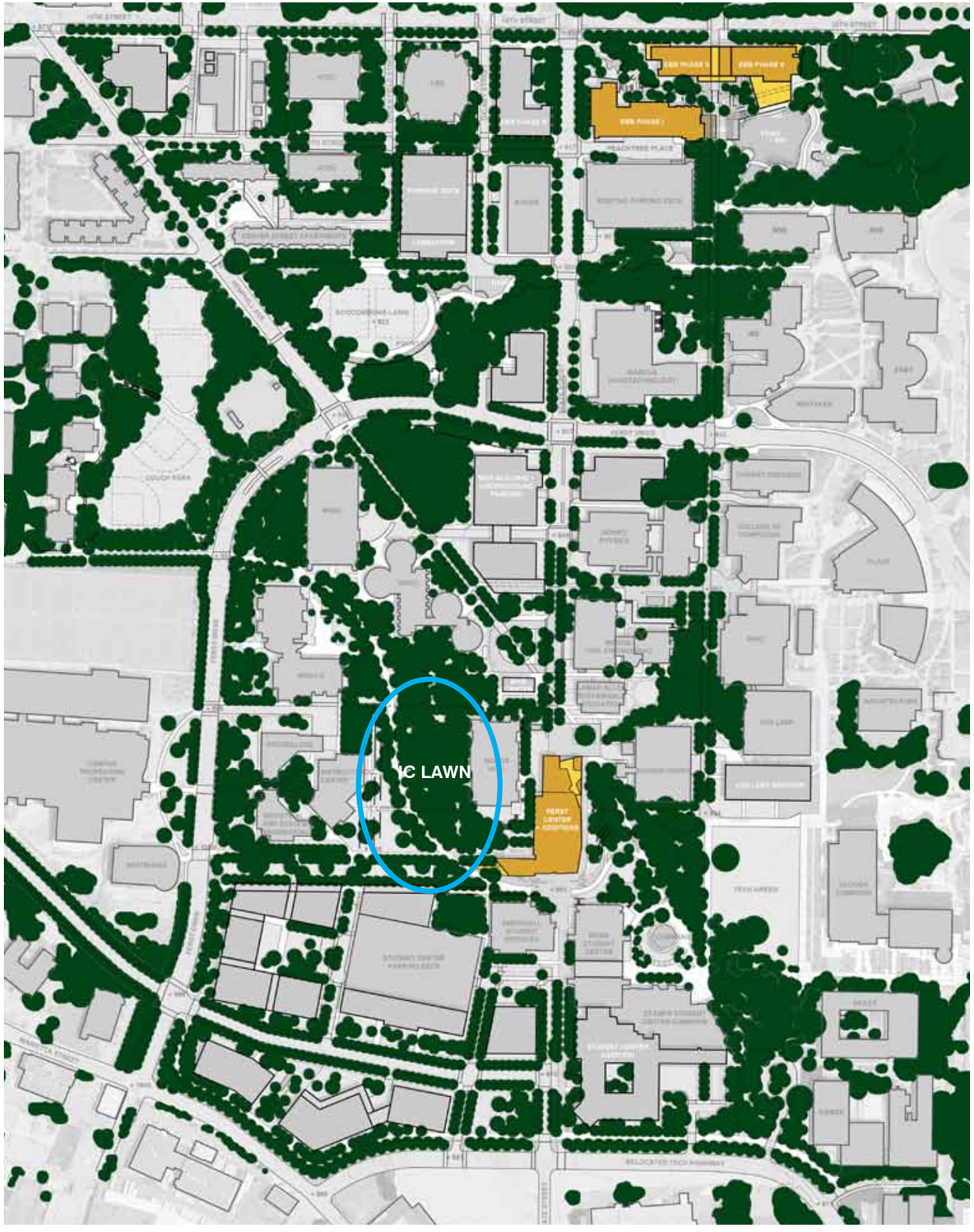
EBB Sector:
Total Canopy Area – 33 Acres
Total Canopy Cover – 50%

South-Central Sector:
Total Canopy Area – 48 Acres
Total Canopy Cover – 66%

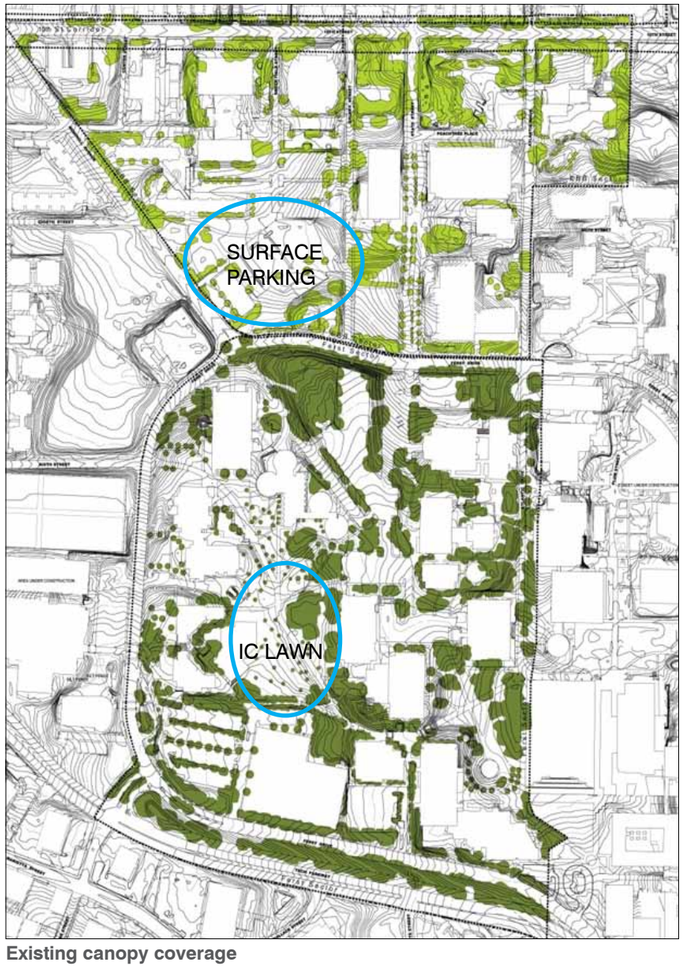
Existing Canopy Coverage Area

EBB Sector:
Total Canopy Area – 11.9 Acres
Total Canopy Cover – 25%

South-Central Sector:
Total Canopy Area – 20.8 Acres
Total Canopy Cover – 31%



Proposed canopy coverage



Existing canopy coverage

Surface parking in the EBB Sector

Shadeless path through IC Lawn

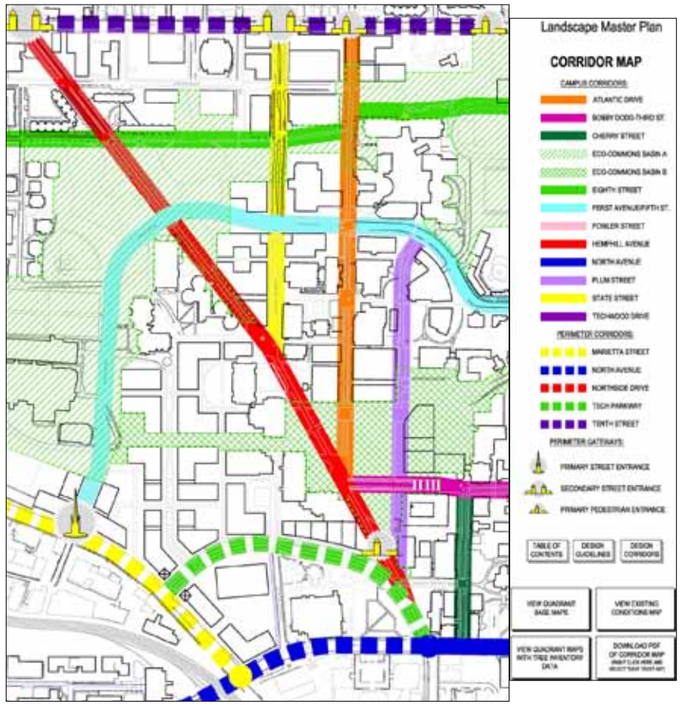
3a. Path Hierarchy

The design corridor guidelines proposed in the LMP were reviewed and elaborated to further develop the circulation hierarchy and materials palette. The proposed path hierarchy diagram on the right shows the following:

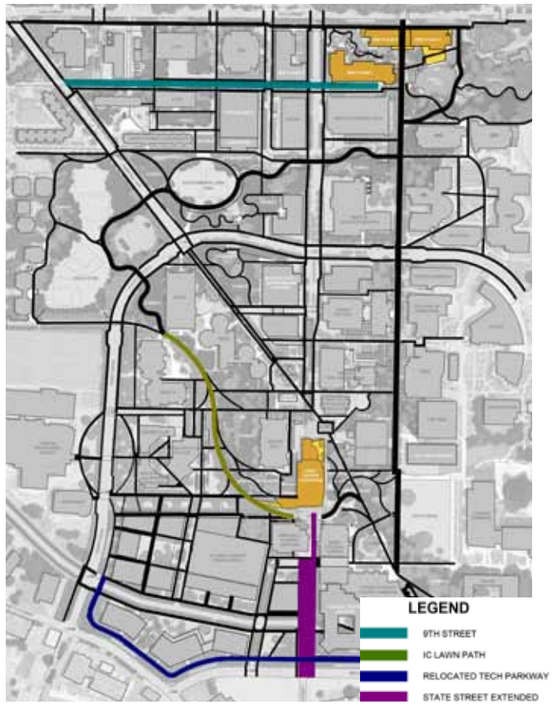
- ATLANTIC PROMENADE (currently designated as Atlantic Drive) is the primary pedestrian and bicycle access route from the north edge of campus and the Eco-Commons Pond to Tech Green/Clough Commons Building. It connects two central green spaces in their respective sectors.
- ECO-COMMONS PATHWAY follows the ribbon of forest and open space that winds through campus and connects the Pond to the Eco-Commons Lawn, Couch Park, IC Lawn, Ferst Center and Tech Green.
- PRIMARY PATHWAYS - Orthogonal and direct walkways create clear circulation patterns associated with the urban grid, Eco-Commons Path accomplishes this goal as well.
- SECONDARY PATHWAYS are a combination of gridded and meandering paths. These paths provide recreational opportunities within the Eco-Commons and alternative, indirect routes through the campus.

The LMP identified several important Design Corridors, as shown in the diagram below. The Sector Plan proposes adding:

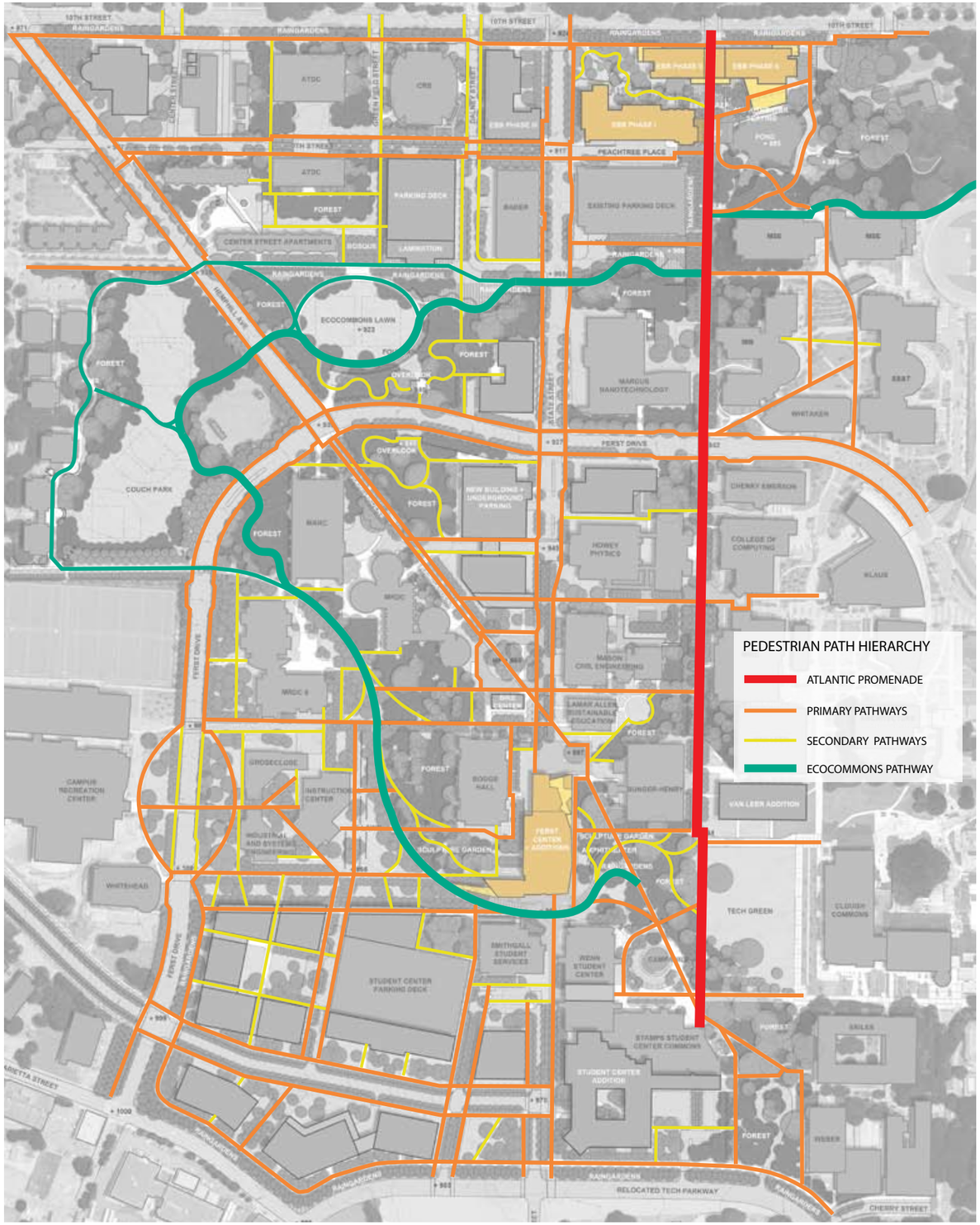
- 9TH STREET - access to the proposed parking deck and to the center of the EBB sector
- IC LAWN PATH - follows the Eco-Commons forest ribbon
- RELOCATED TECH PARKWAY - At the campus's southern boundary, this edge condition mirrors the proposed 60' setback along 10th Street and provides a unique pedestrian and bicycle friendly campus edge with gateways
- STATE STREET EXTENDED - clear, signed and direct access to the Ferst Center



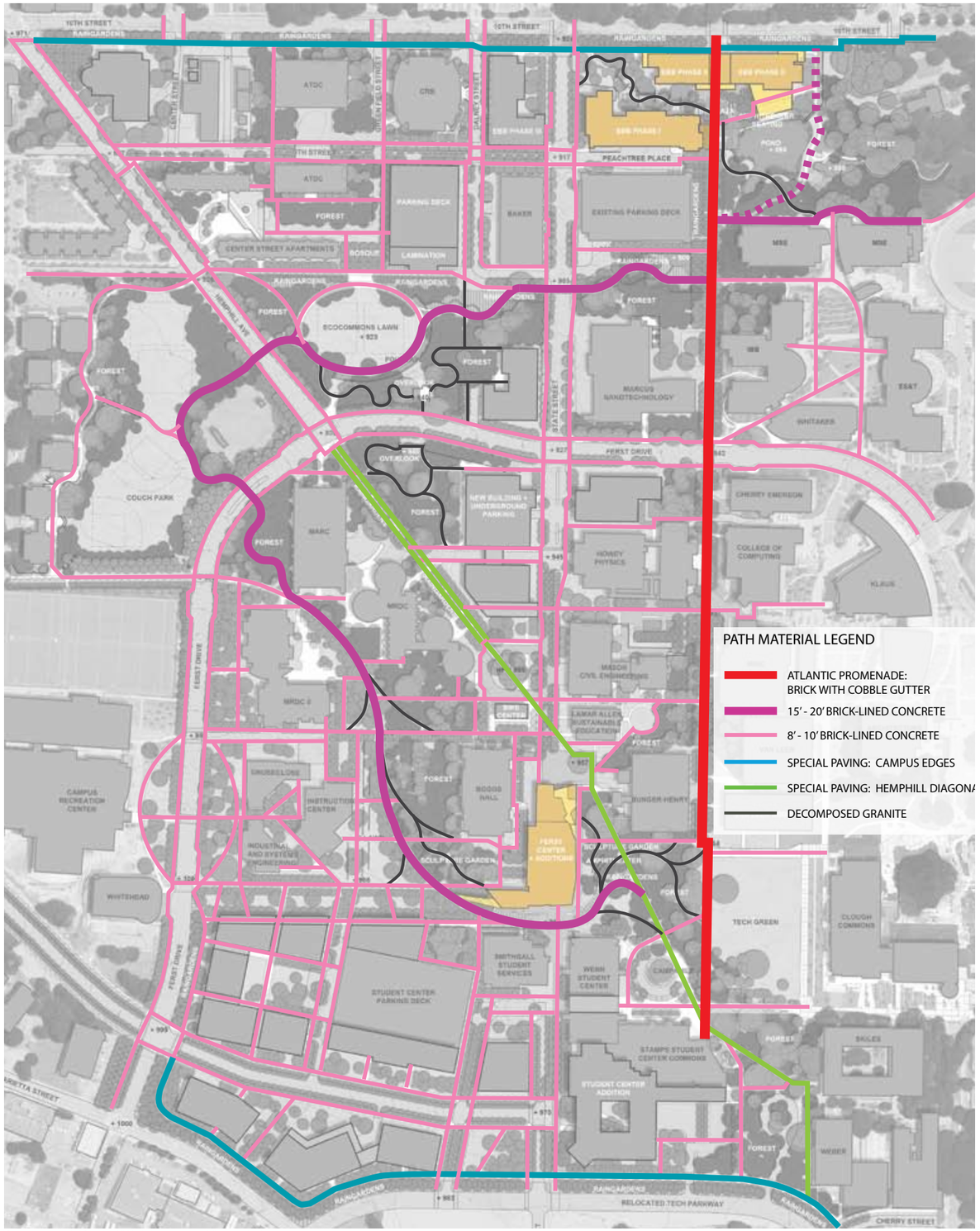
Design Corridors (LMP)



Additional proposed Design Corridors



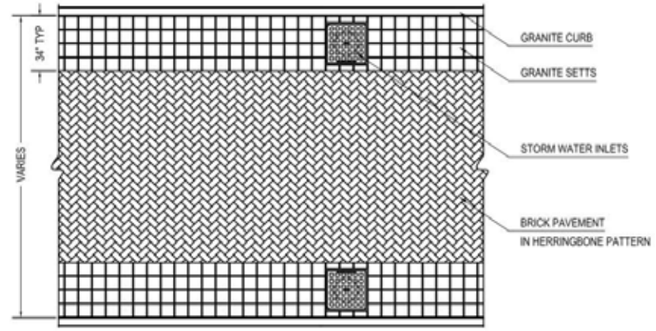
Proposed path hierarchy



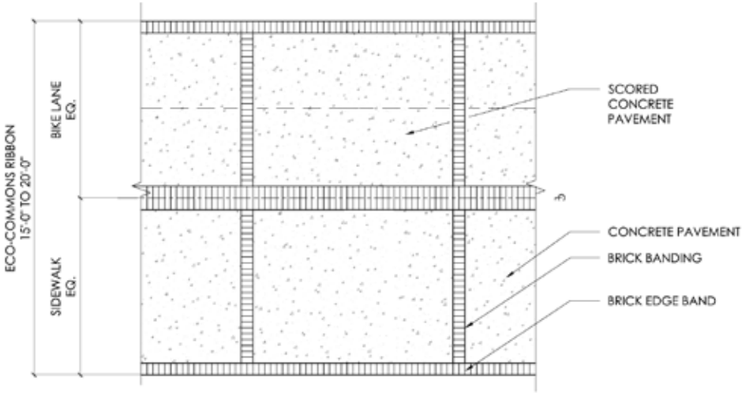
Proposed Path Widths and Materials

3b. Distinct Pathway Materials

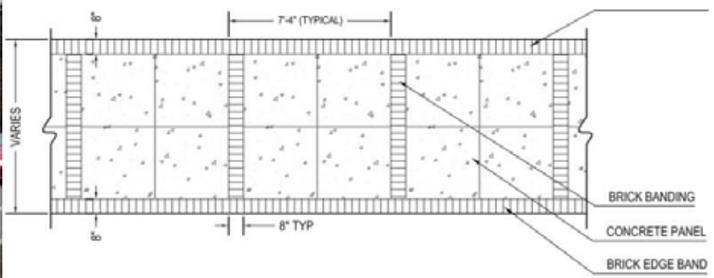
The proposed paving patterns incorporate and elaborate on the material language established in the LMP to create a unified hierarchical system of campus paths. They further differentiate uses, by incorporating modular options such as the separation of bicycle and pedestrian circulation and potential spill-out plaza spaces along the 60' setback campus edges.



Atlantic Promenade - LMP detail 'A'- brick pavement with cobble edging

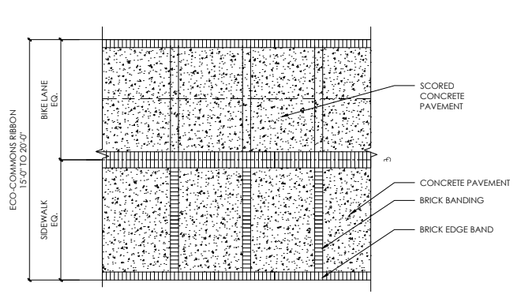


15'-20' Eco-Commons Ribbon Path - differentiate bicycle and pedestrian circulation, use pervious pavement when possible.

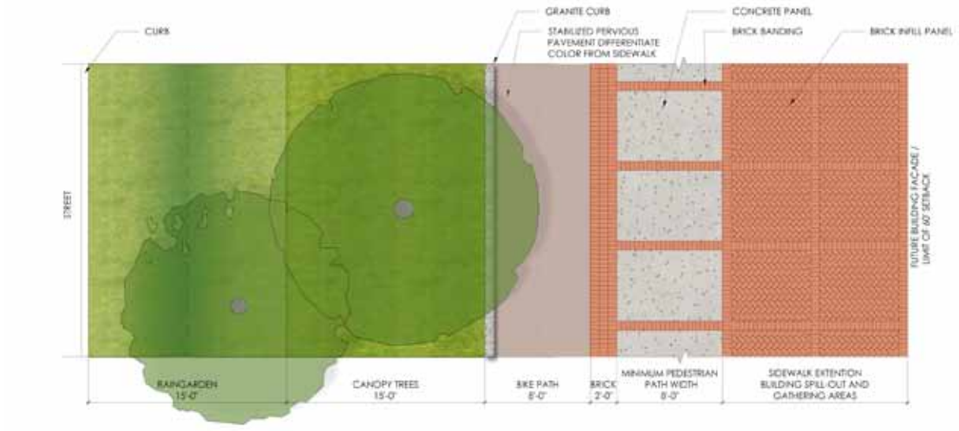


Primary campus paths - Concrete with Brick bands - LMP Pavement 'C'

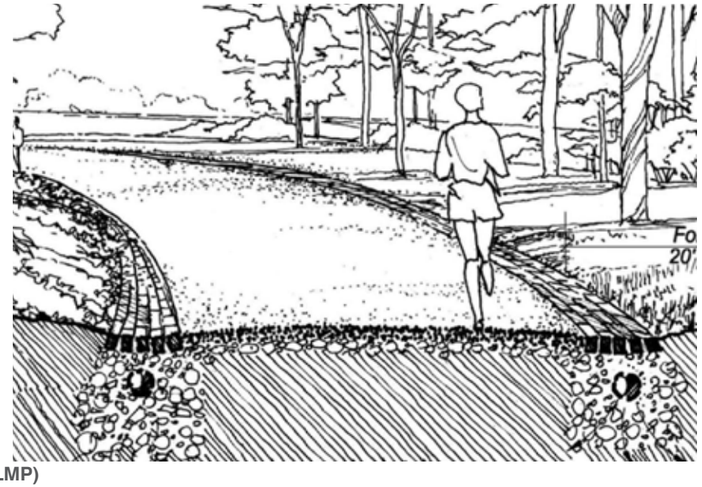
3b. Distinct Pathway Materials



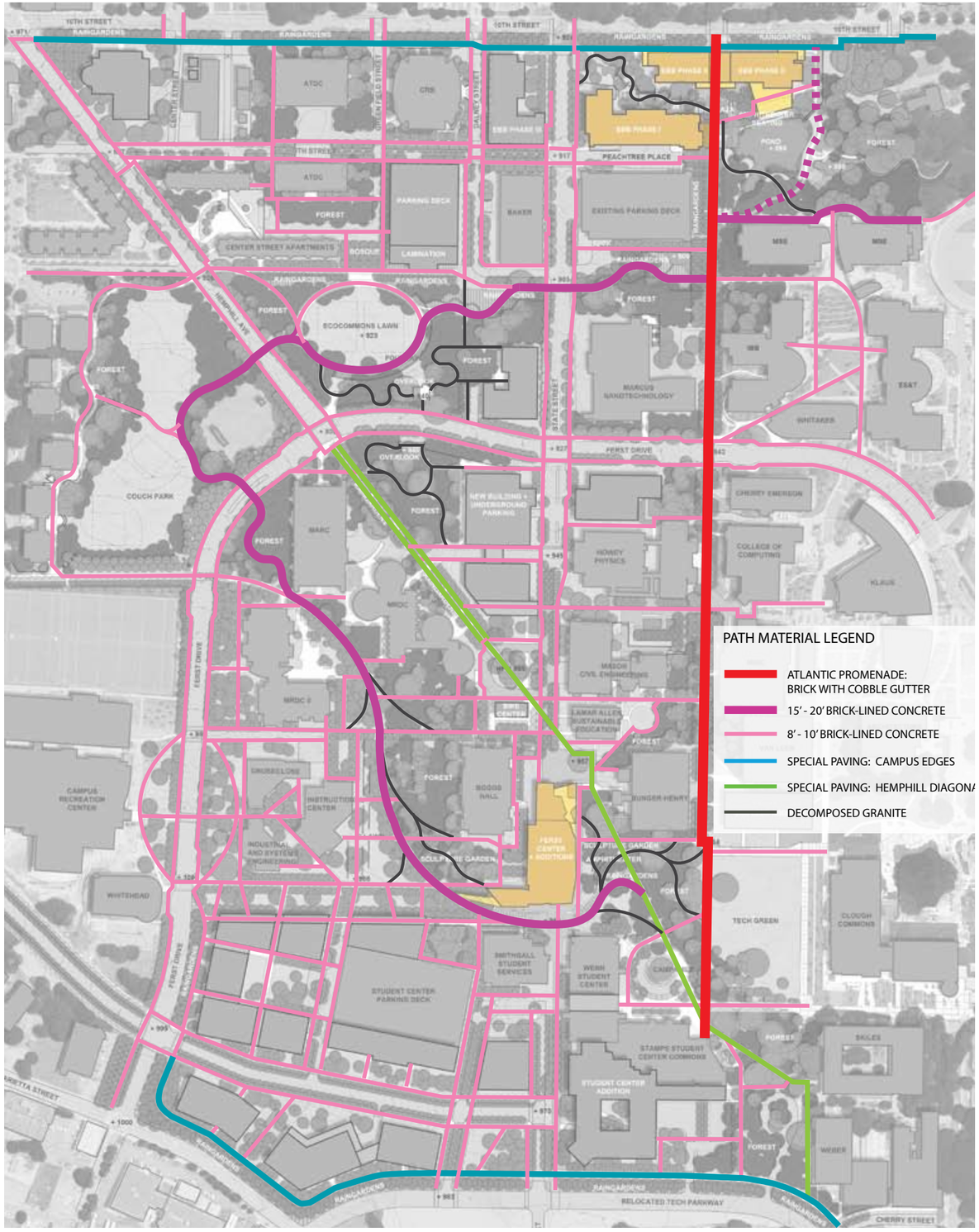
Hemphill Design Corridor - brick path with brick bands



60' Campus Edge -bicycle and pedestrian - concrete and brick path (modular)



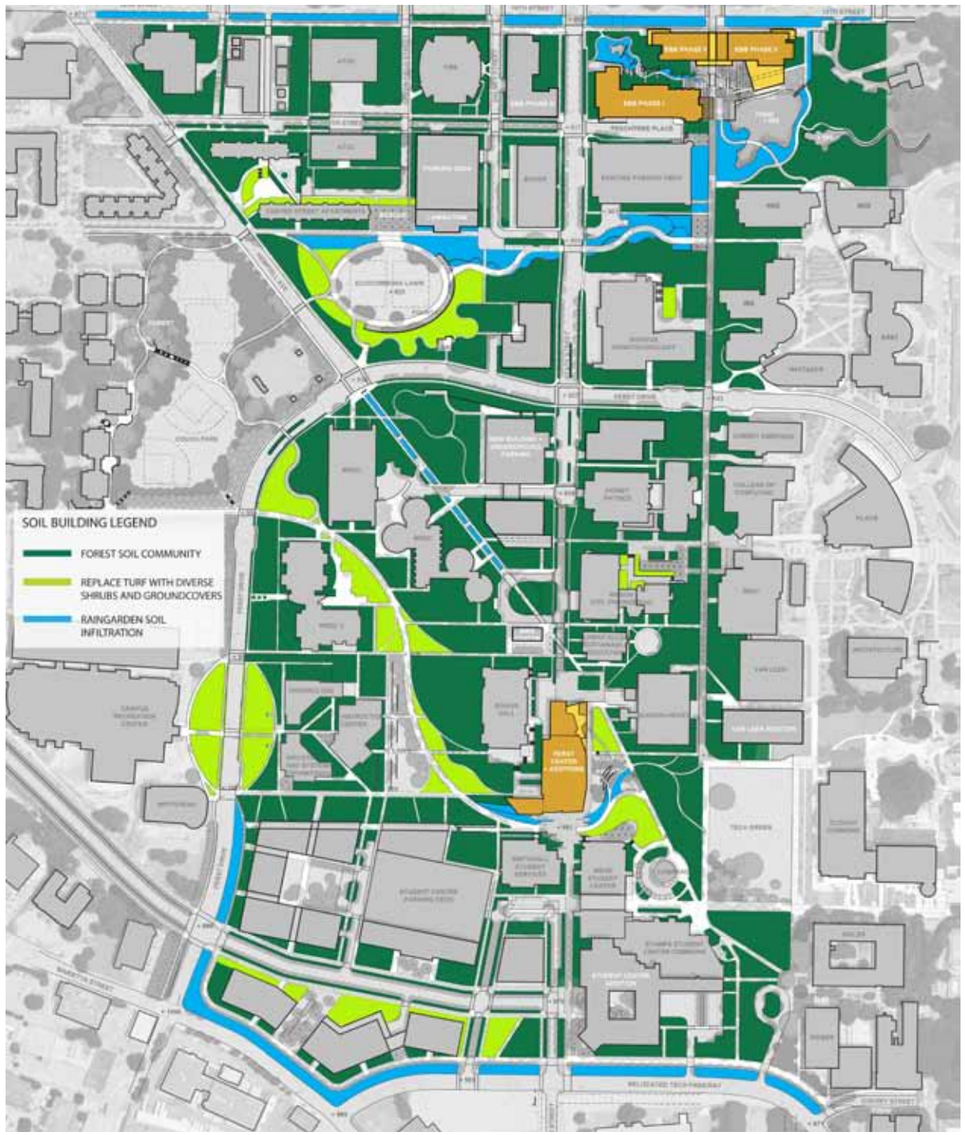
Decomposed granite recreational paths (LMP)



Proposed Path Widths and Materials

4. Soil Building

The sectors can benefit from a number of planting strategies that will enhance the quality of soil on campus. Soil rehabilitation can accompany planting projects, on a tree-by-tree or project basis. The goal is to increase biodiversity on campus, promote infiltration of water, and reduce air pollution through tree planting and improvement of soils. Reforestation reintroduces organic matter to the ground plane and water infiltration to the soil, and adds shade to existing paved areas. Reducing large expanses of lawn and replacing them with diverse native, drought tolerant shrub masses and groundcovers also aids soil building and reduces irrigation requirements. Raingarden soils promote water infiltration.

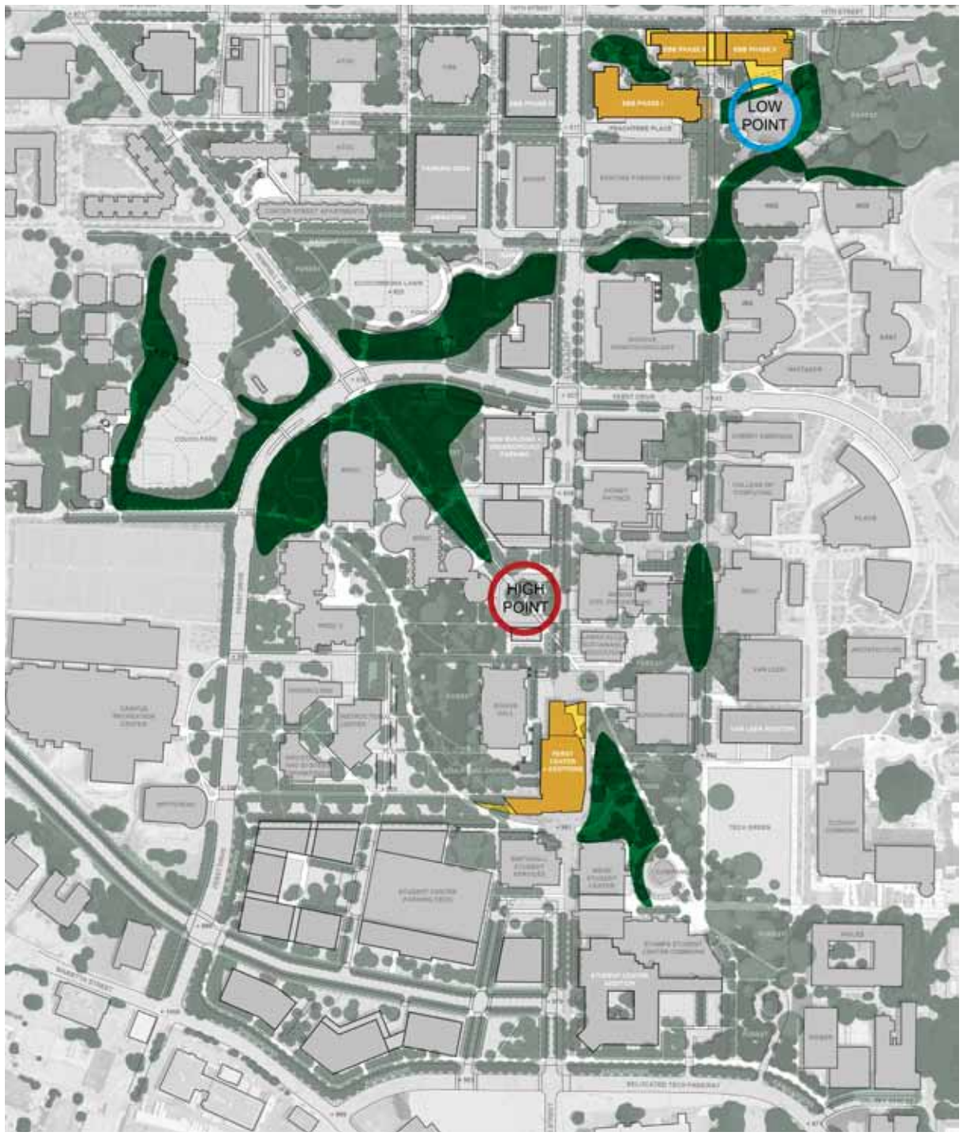


Diversified groundplane planting contributes to soil regeneration

5. Topography

The existing topography of the campus provides a number of challenges and opportunities. The Sector Plan addresses the following:

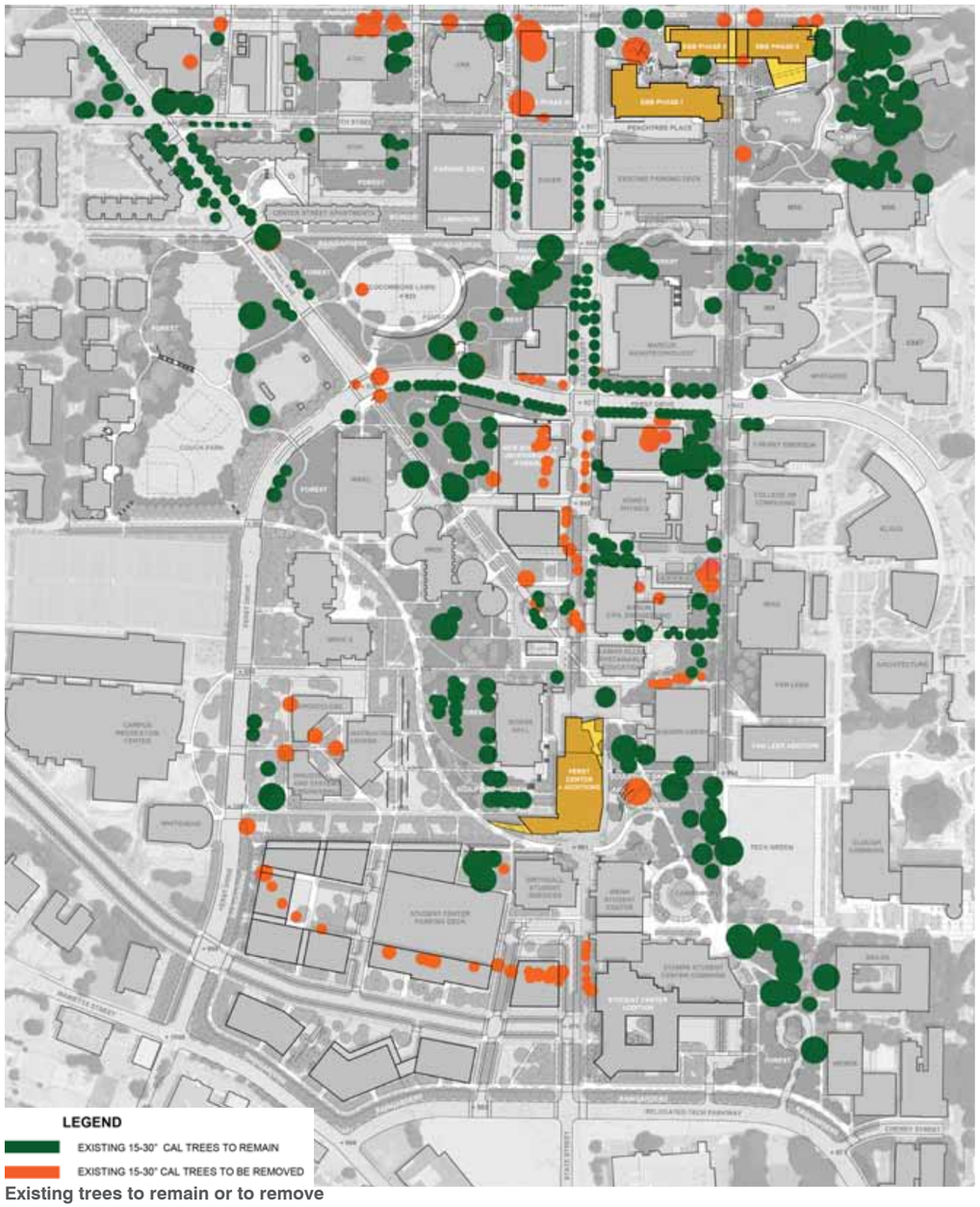
- ADA accessibility, particularly in the vicinity of the Ferst Center and EBB Phase 1
- Proposed building finished floor elevations (FFE) and their relationship to new/existing spaces
- Planting palettes that respond to high and low topographic points (mesic vs. hydric)
- Stormwater flows through the Eco-Commons that follow gravity-based movement



Key topographic places, green shading shows steep slopes

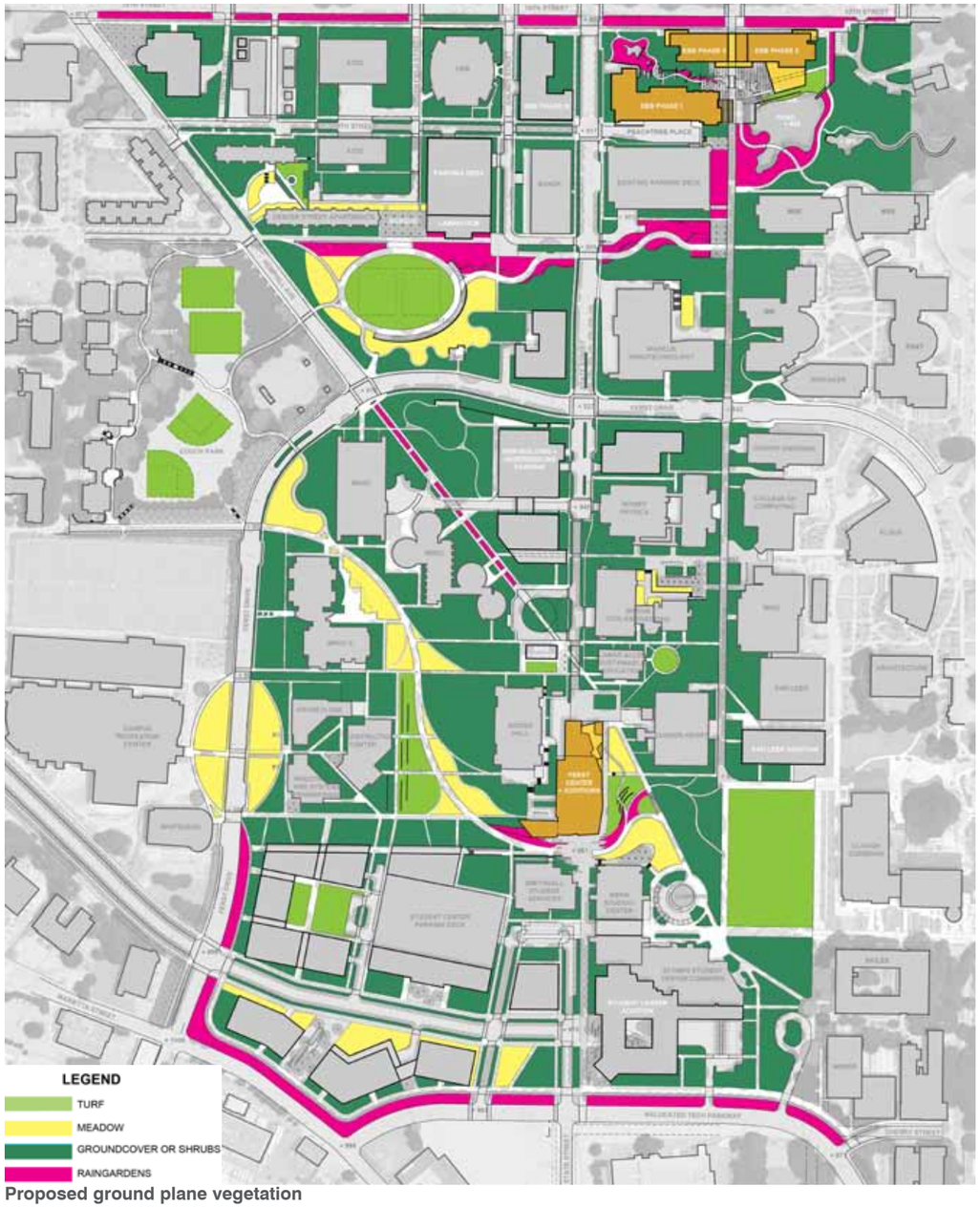
6. Vegetation

A. Existing Trees
The Sector Plan proposes preserving large numbers of existing trees that are considered to be of significant size and good health. Within the proposed Eco-Commons ribbon these trees will become the armature of the future forest. Trees that are removed can be selectively salvaged and reused on future campus building projects.



Existing trees to remain or to remove

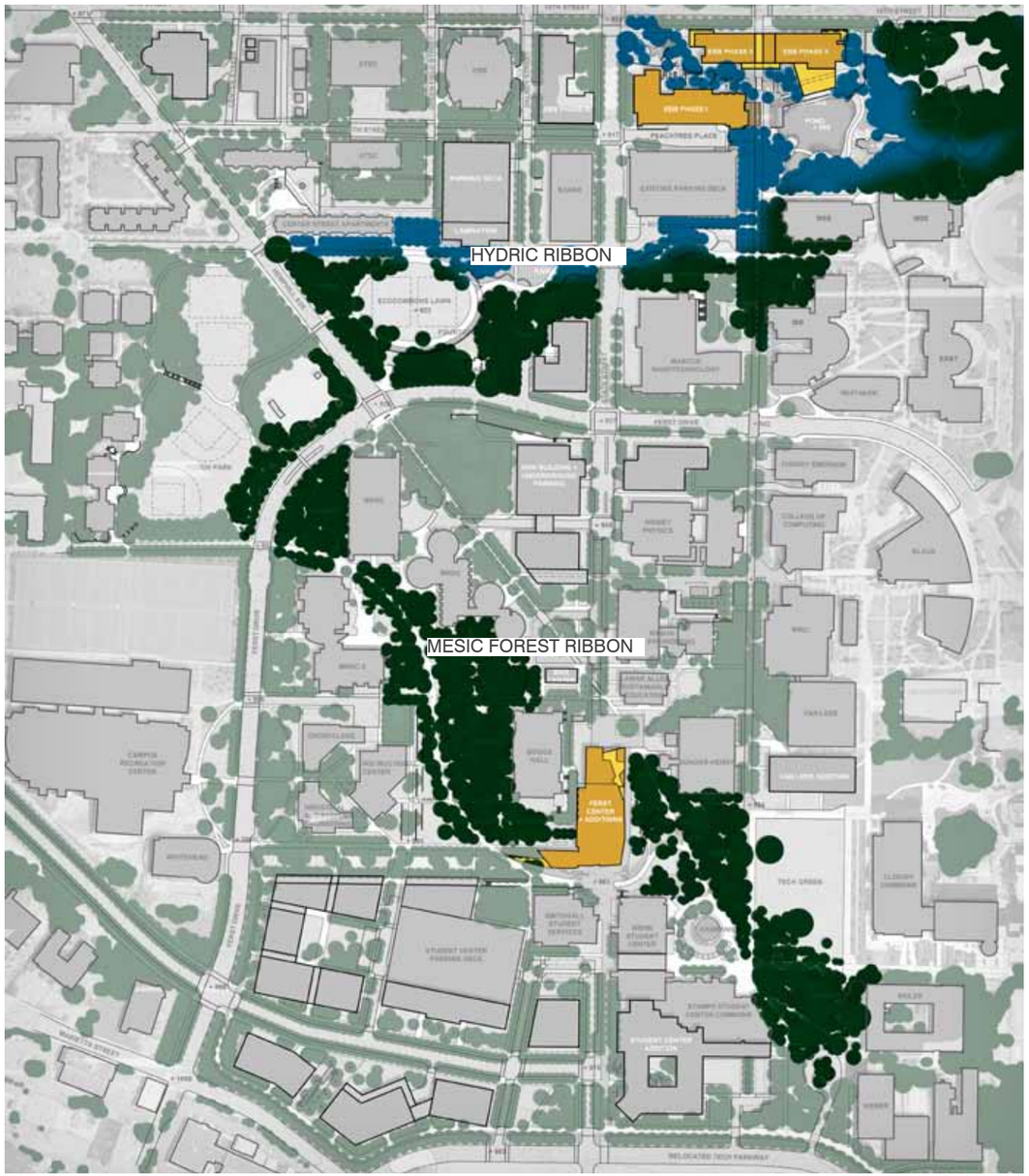
B. Ground Plane Vegetation
A major goal of the plan is to minimize turf and excessive irrigation on campus. The Sector Plan maximizes use of ground cover, and emphasizes use of native species, taking into account drought, storm events, soil generation, biodiversity, and heat-island effect reduction.



Proposed ground plane vegetation

C. Planting Strategies

The planting of the Eco-Commons is divided into two distinct areas: the Hydric and Mesic Ribbons. Hydric planting relates to the lower elevations of the EBB Sector which tends to retain water. Mesic plants are adapted to or thrive in a moderately moist habitat and inhabit higher elevations. Distinct places and destinations are also defined with particular planting schemes relating to their topography and hydrology. See suggested plant palette on the next page, as well as descriptions of planting character in each focus area. The LMP is also an excellent reference for suggested plants

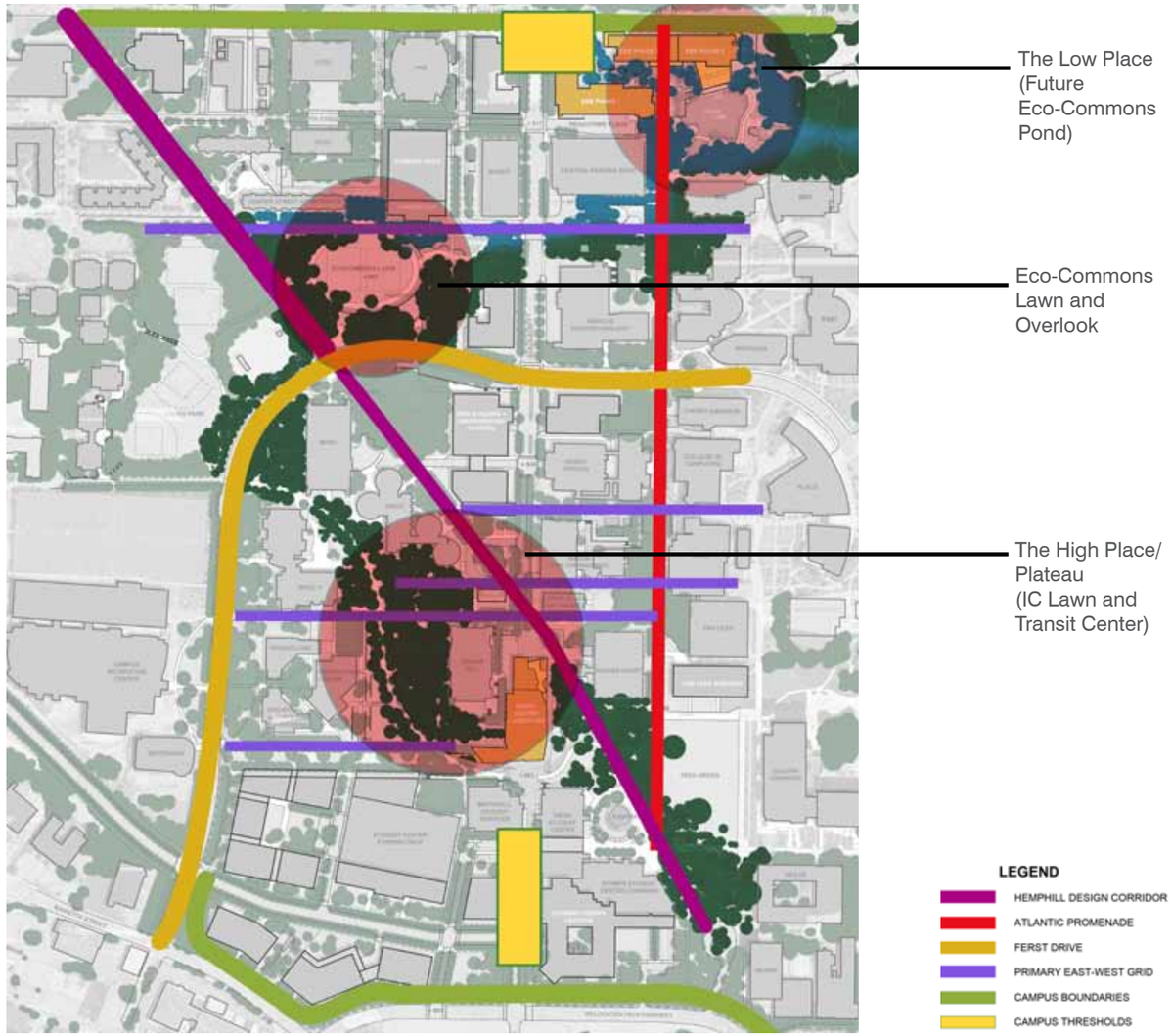


Eco-Commons Plant Zones

D. Distinct Places and Street Planting

Topography and adjacent uses inform the planting palette of the main campus circulation grid.
The planting schemes for each of these areas will be explored in more depth in the South-Central and EBB Sector Plan chapters.

- HEMPHILL DESIGN CORRIDOR- central raingardens, allees of native tree species.
- ATLANTIC PROMENADE (currently called Atlantic Drive) - a transect of campus plant communities that changes with topography, hydrology and its relationship with the Eco-Commons ribbon
- FERST DRIVE - infill alignments of native trees
- HORIZONTAL GRAIN (east - west grid) - differentiated character of planting from the vertical grain (north - south streets and paths) - shade trees, mixed flowering perennials and shade gardens between buildings and along pathways; more intimate landscapes reflecting their relatively small scale.
- CAMPUS BOUNDARIES AND GATEWAYS: 10th Street and realigned Tech Parkway - raingardens and mesic street tree planting with special planting at main gateways



Distinct places on campus and street tree planting

7. Plant Palette

TREES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Acer rubrum	Red maple	x	x	
Acer rubrum 'Bowhall'	Red maple		x	
Acer saccharum	Sugar maple		x	
Aesculus pavia	Red buckye		x	
Amelanchier spp.	Serviceberry	x	x	
Betula nigra 'Duraheat'	River birch	x	x	
Carpinus caroliniana	Musclewood	x	x	
Carya spp.	Hickory		x	x
Chionanthus virginicus	Fringe tree		x	
Celtis laevigata	Sugarberry		x	
Cercis canadensis	Redbud		x	
Cornus florida	Dogwood		x	
Crataegus viridis 'Winter King'	Hawthorn		x	x
Fagus grandifolia	American beech		x	
Halesia tetraptera	Carolina silverbell		x	
Hammamelis x intermedia	Witch hazel		x	
Liriodendron tulipifera	Tulip poplar		x	
Magnolia virginiana	Sweetbay magnolia	x	x	
Nyssa aquatica	Water tupelo	x		
Nyssa sylvatica	Blackgum		x	
Ostrya virginiana	Hop hornbeam		x	x
Pinus echinata	Shortleaf pine		x	x
Pinus taeda	Loblolly pine			x
Platanus occidentalis	Sycamore	x	x	
Platanus x acerifolia 'Columbia'	Plane tree		x	
Quercus coccinea	Scarlet oak		x	
Quercus nigra	Water oak	x	x	
Quercus phellos	Willow oak		x	
Quercus spp.	Oak		x	
Taxodium ascendens	Pond Cypress	x		
Ulmus americana 'Princeton'	American elm		x	
Ulmus spp.	Elm		x	

Acer rubrum
Red Maple

Acer rubrum 'Bowhall'
Bowhall Maple

Acer saccharinum
Sugar Maple

Aesculus pavia
Red Buckeye

Amelanchier spp.
Serviceberry

Betula nigra 'Duraheat'
Duraheat River Birch

Carpinus caroliniana
Musclewood

Carya spp.
Hickory

Chionanthus virginicus
Fringetree

Celtis laevigata
Sugarberry

Cercis canadensis
Redbud

Cornus florida
Dogwood

Crataegus viridis 'Winter King'
Winter King Hawthorn

Fagus grandifolia
American Beech

Halesia tetraptera
Carolina Silverbell

Hamamelis x intermedia
Witch hazel

Liriodendron tulipifera
Tulip Poplar

Magnolia virginiana
Sweetbay Magnolia

Nyssa sylvatica
Black Gum

Ostrya virginiana
Hop Hornbeam

Pinus echinata
Shortleaf Pine

Pinus taeda
Loblolly Pine

Platanus occidentalis
Sycamore

Platanus x acerfolia 'Columbia'
Columbia Planetree

Quercus coccinea
Scarlet Oak

Quercus nigra
Water Oak

Quercus phellos
Willow Oak

Quercus spp.
Oaks

Taxodium ascendens
Pond Cypress

Ulmus americana 'Princeton'
Princeton Elm

Ulmus spp.
Elms

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	
Hydrangea quercifolia	Oakleaf hydrangea		x	
Ilex verticillata	Winterberry	x	x	
Itea virginica	Virginia sweetspire	x	x	
Physocarpus opulifolius	Common ninebark	x	x	
Rhus aromatica	Fragrant sumac		x	
Salix spp.	Willow	x		
Vaccinium spp.	Blueberry	x	x	
Viburnum dentatum	Arrowood v+A1iburnum	x	x	

PERENNIALS				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Echinacea spp.	Coneflower		x	
Iris spp.	Iris	x	x	
Hemerocallis spp.	Daylilly	x	x	
Heuchera spp.	Coralbells		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		
Rudbeckia spp.	Rudbeckia		x	x
Saururus cernuus	Lizard's tail	x		
Solidago spp.	Goldenrod		x	x

FERNS/GRASSES/SEDGES				
Botanical Name	**Common Name**	**Hydric**	**Mesic**	**Xeric**
Carex spp.	Sedge	x	x	
Dryopteris marginalis	Marginal woodfern		x	
Eleocaris spp.	Spike rush	x		
Juncus effusus	Common rush	x		
Panicum virgatum	Switchgrass		x	
Polystichum acrostichoides	Christmas fern		x	
Scirpus spp.	Bullrush	x		
Sporobolus heterolepis	Prairie dropseed		x	

Aesculus parviflora
Bottlebrush Buckeye

Aronia spp.
Chokeberry

Callicarpa americana
American Beautyberry

Cephalanthus occidentalis
Buttonbush

Cornus sericea
Redosier Dogwood

Fothergillla spp.
Fothergilla

Hydrangea quercifolia
Oakleaf Hydrangea

Ilex verticillata
Winterberry

Itea virginica
Sweetspire

Physocarpus opulifolius
Common Ninebark

Rhus aromatica
Fragrant Sumac

Salix spp.
Willow

Vaccinium spp.
Blueberry

Viburnum dentatum
Arrowwood

Echinachea spp.
Coneflower

Iris spp.
Iris

Hemerocallis spp.
Daylily

Heuchera spp.
Coral Bells

Kostelezkya virginica
Virginia Saltmarsh Mallow

Lobelia spp.
Cardinal Flower

Nymphaea spp.
Water Lily

Nuphar lutea
Yelllow Pond-Lily

Peltandra virginica
Green Arrow Arum

Pontederia cordata
Pickerelweed

Rudbeckia spp.
Black-eyed Susan

Saururus cernuus
Lizard's Tail

Solidago spp.
Goldenrod

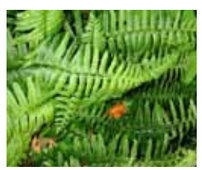
Carex spp.
Sedges

Dryopteris marginalis
Marginal Woodfern

Eleocaris spp.
Spike Rush

Juncus effusus
Common Rush

Panicum spp.
Switchgrass



Polystichum acrostichoides
Christmas Fern

Scirpus spp.
Bull rush

Sporobolus heterolepis
Prarie Dropseed

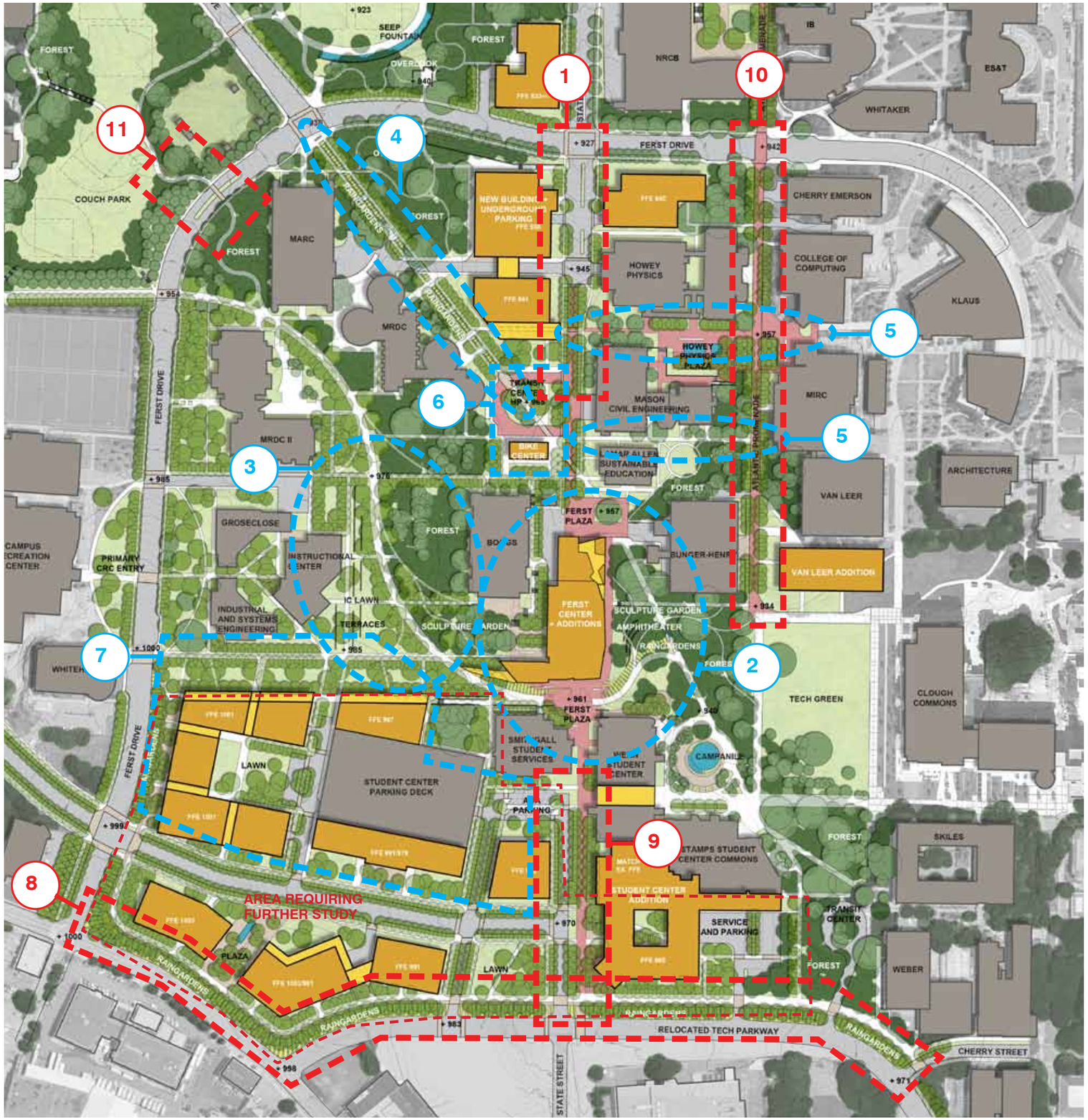
V. SOUTH-CENTRAL SECTOR PLAN

1. Sector Overview

The South-Central Sector is the larger of the two sectors – approximately 65 acres – and occupies the central core of campus. It is generally bounded to the north, west and south by Ferst Drive and to the east by the Atlantic Drive (proposed in the Sector Plan as Atlantic Promenade). The sector is anchored, in the southeastern corner, by the Student Center and Student Commons - which are immediately adjacent to Tech Green and just across the Green from Clough Commons Building. The Ferst Center for the Arts is also located in this area. The Ferst Center is a vital and active part of the campus core. Northwest of the Ferst Center is a large central open space (approximately 8 acres) – the southern-most portion which is known as the Instructional Center (IC) Lawn. This area provides a valuable, large open space for the center of campus and, in the Sector Plan, is established as a major component of the Forest Ribbon and Eco-Commons.

A number of significant changes are anticipated in the South-Central Sector Plan:

- Creation of a campus-wide “Center for the Arts” in an expanded Ferst Center
- Reconfiguration of the Ferst Center entry plaza; conversion of the major east-west circulation route through that plaza into an accessible route; and clarification of the north-south pedestrian access route
- Elevation of State Street as a primary Campus Entrance with the provision of State Street as the new address for the Ferst Center for the Arts
- Development of the IC Lawn as dedicated open space and as a key expression of the Eco-Commons Forest Ribbon
- Conversion and re-expression of the Hemphill Design Corridor through the sector – north to south – as a central pedestrian and bicycle artery
- Reinforcement of Ferst Drive as the perimeter boundary of the campus core - an area dedicated primarily to pedestrian and bicycle circulation
- Reinforcement of the State Street axis through the Sector: functioning north of the Ferst Center primarily as a bicycle and pedestrian-friendly transit-way and service corridor; and south of the Ferst Center functioning primarily as a pedestrian and bicycle artery and campus gateway
- Creation of a transit hub and bicycle resource center at the high point and intersection of the State Street and Hemphill Avenue axes
- Elimination of Ferst Drive where it currently duplicates the east-west alignment of Tech Parkway; a reduction of the current Tech Parkway to an internal campus two-lane street; and the extension and realignment of Luckie Street across an expanded southern campus boundary as the Relocated Tech Parkway
- Provision for significant additional future building space in the southwestern quadrant of this sector, indicated as orange building footprints in the Sector Plan
- Retention of the West Parking Deck and laminating it with new programmed building space



Components:

1) STATE STREET - transit and service access, connection to transit hub and bike center, unified street plantings, special pavement areas.

2) FERST CENTER EXPANSION - new entry plazas, improved accessibility, outdoor performance opportunities, raingardens, sculpture garden and continuation of the Eco-Commons path to Tech Green.

3) IC LAWN and FOREST RIBBON - continuation of Eco-Commons ribbon, gathering and recreation spaces, meandering paths through a combination of open parkland and dense forest plantings.

4) HEMPHILL DESIGN CORRIDOR - reuse of a historic street corridor, pedestrian shaded walkway, and centralized stormwater collection and filtration gardens.

5) EAST-WEST GRID CONNECTIONS - improved paving and planting, increased shade. At Howey Physics Plaza - places for study, demonstrations, informal gathering, and fountain.

6) TRANSIT HUB and BIKE CENTER - centrally located transit hub and multi-purpose Bike Resource Center serving the campus core; mesic plantings reflective of this local topographic high point.

7) SOUTHWEST CAMPUS EXPANSION- removal of surface parking, addition of courtyard spaces, classroom and administrative buildings, plazas, courtyards, and shaded pathways.

8) RELOCATED TECH PARKWAY - large 60' setbacks, campus edge similar to 10th Street, stormwater filtration and conveyance, dedicated bike paths

9) STATE STREET SOUTH - new campus gateway, Ferst Center drop off, Student Center addition, accessible and VIP parking, consistent street tree plantings, and special pedestrian paving areas.

10) ATLANTIC PROMENADE - consistent continuous special brick paving, enhanced plantings, and pedestrian scaled lighting and furnishings

11) COUCH PARK CONNECTION - accessible route, continuation of Eco-Commons path, forest improvements and additions, increased safety at Ferst Drive crossing.

Ferst Center's primary entrance from south lacks visibility

Low point west of Ferst Center is an opportunity for revealing and collecting stormwater

State Street entry to South-Central Sector from Ferst Drive

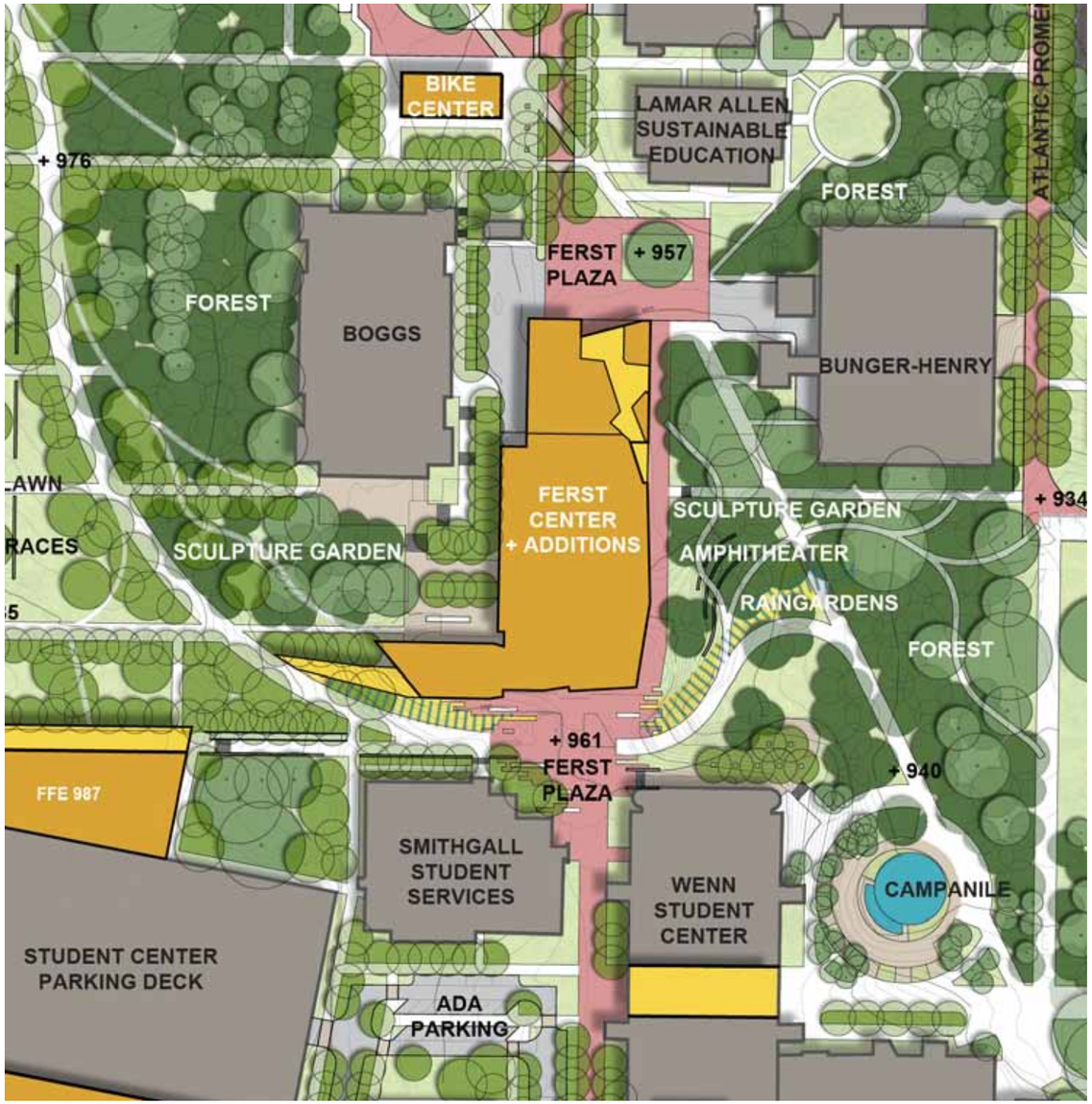
Pedestrian access to Tech Green from north crosses multiple parking lots

Primary pedestrian access from north via Hemphill Design Corridor

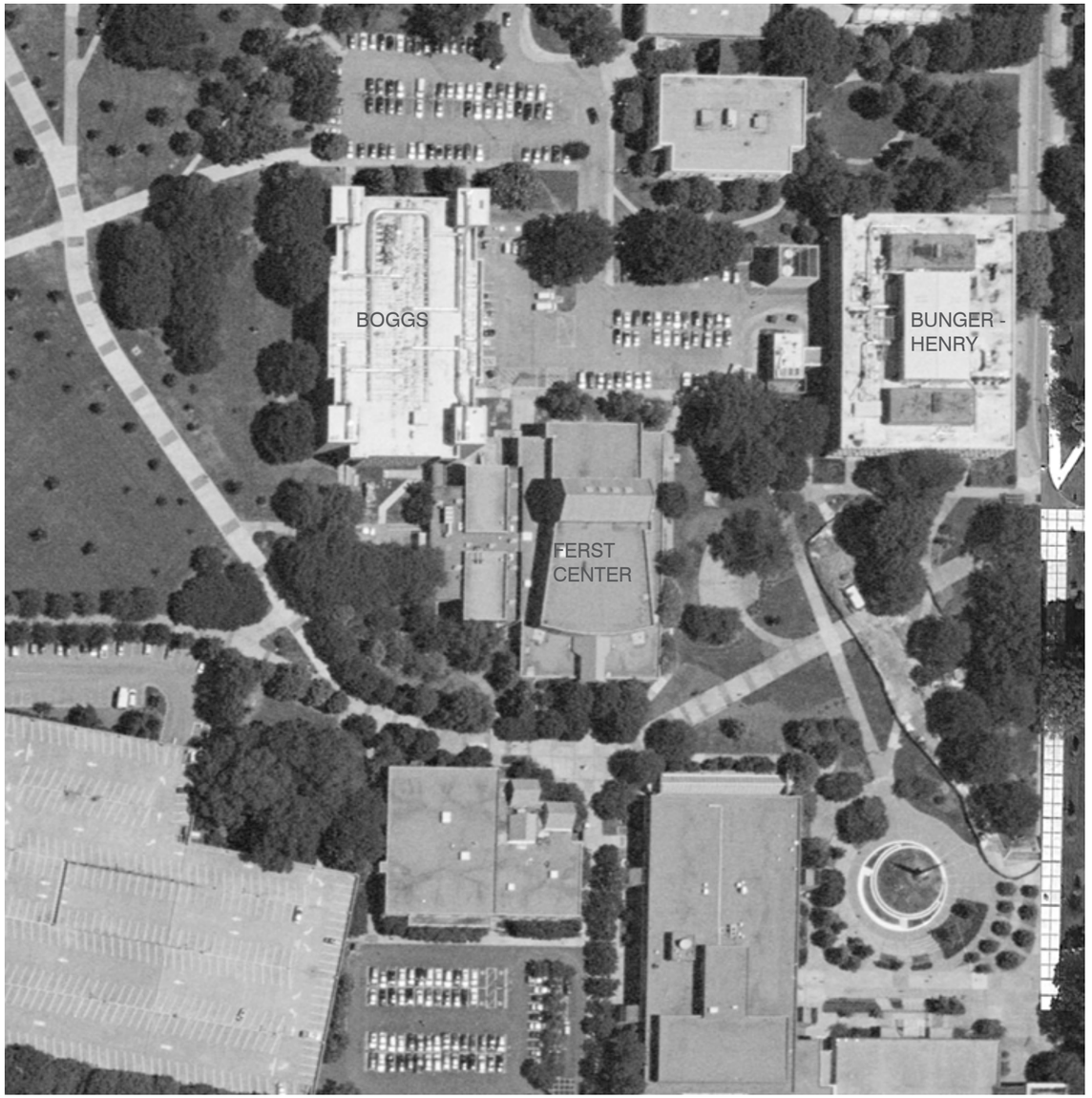
Shaded walk south of Howey Physics Building

2. Ferst Center Expansion

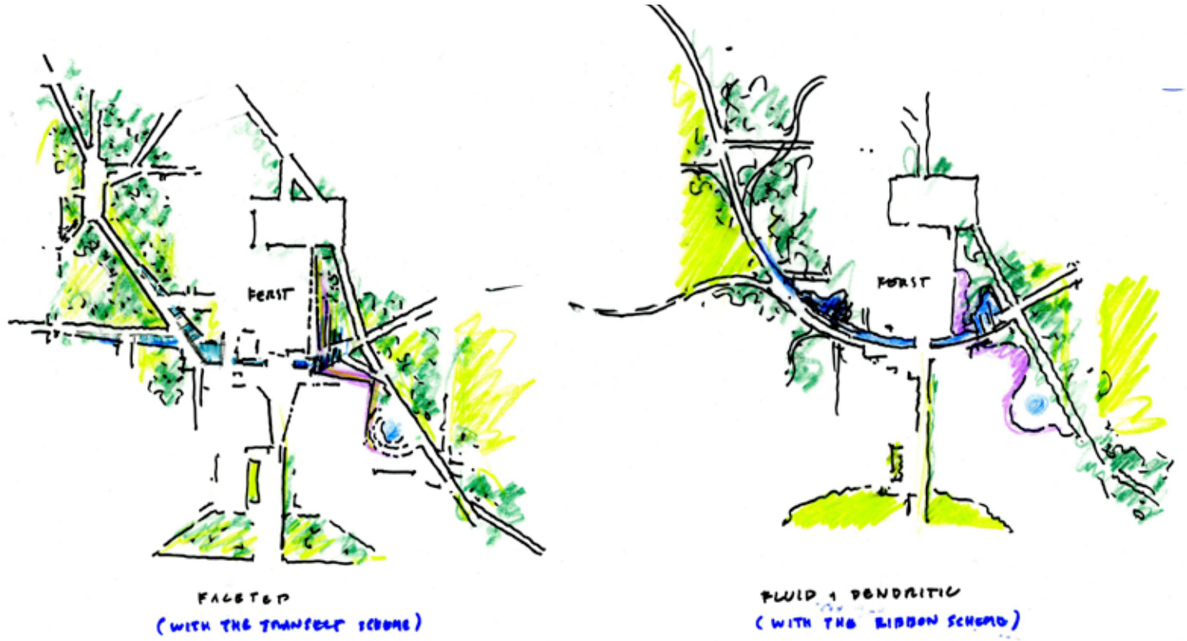
The Sector Planning Team worked closely with the HILL Works and BLDGS design team on the proposed Ferst Center expansion. Together the teams addressed wider sector circulation issues and the complexity of tying together State Street, Tech Green, the IC Lawn and the Student Center to Ferst Center. ADA accessibility to the Center from Tech Green and the IC Lawn was explored with a number of different schemes because of the challenging topography. The studies on the following page show options for ADA access by replacing the existing stairs from the plaza to Tech Green with a 5% accessible path. The terrain is built up to accommodate the proposed landforms. The path winds along raingardens that collect and convey stormwater from the south-west corner of the building. Water is piped underneath the plaza and again revealed along the primary pathway, creating an educational opportunity at this central cultural arts location. The importance of outdoor venues and performance spaces is addressed in the reconfigured amphitheater that includes areas for a sculpture garden. The Ferst Center Plaza is also seen as a potential performance venue. It should be planted with shade trees due to its southern orientation. The plaza responds to the need for a Ferst Center address: the arrival sequence via the reconfigured State Street is now clear and inviting. The north end of the building opens up to a plaza that terminates State Street and is adjacent to the proposed transit and bike center, providing an alternative arrival sequence. It remains accessible to maintenance and delivery vehicles that service the Ferst Center, Boggs Building and Bunger-Henry Building.



Sector Plan of Ferst Center and vicinity

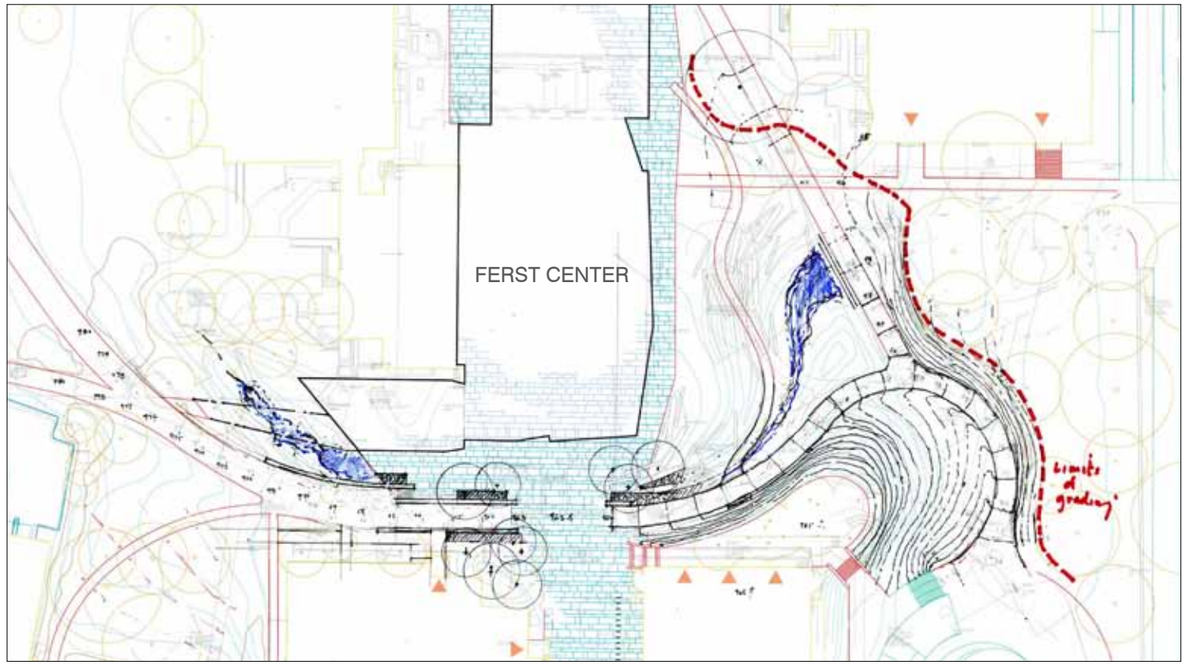


2010 Aerial photograph of Ferst Center and vicinity

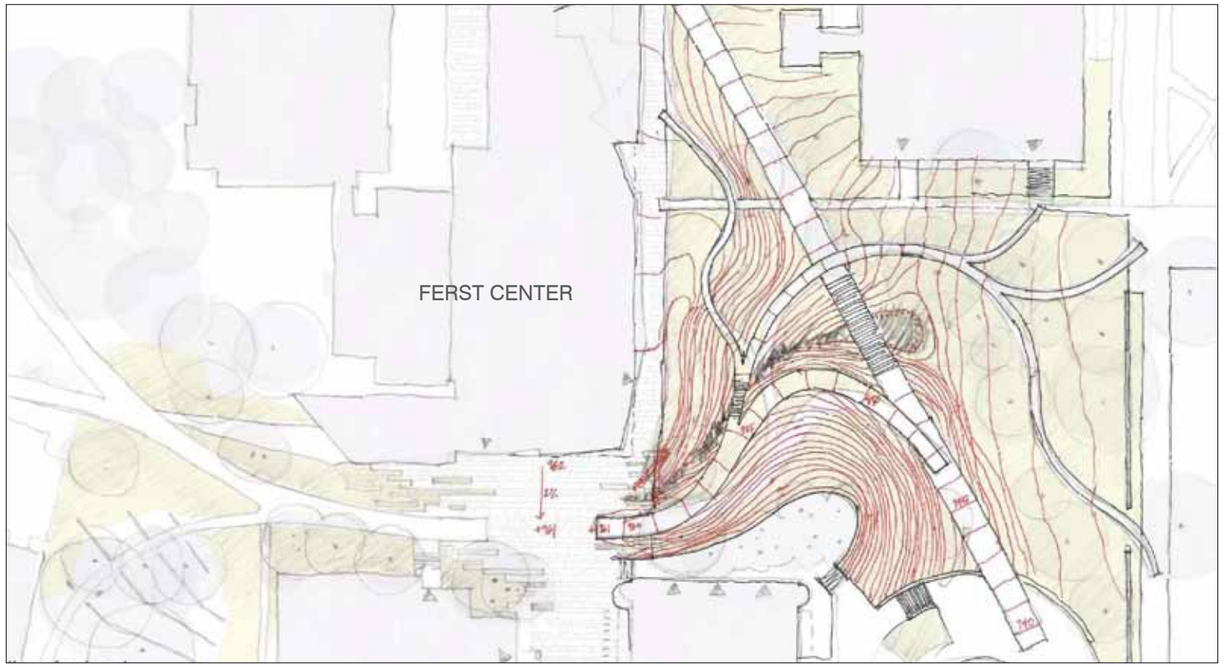


Initial concept sketches of Ferst Center circulation and stormwater conveyance (NBW)

Schematic Site Plan (HILL Works)



ADA access grading studies (NBW)

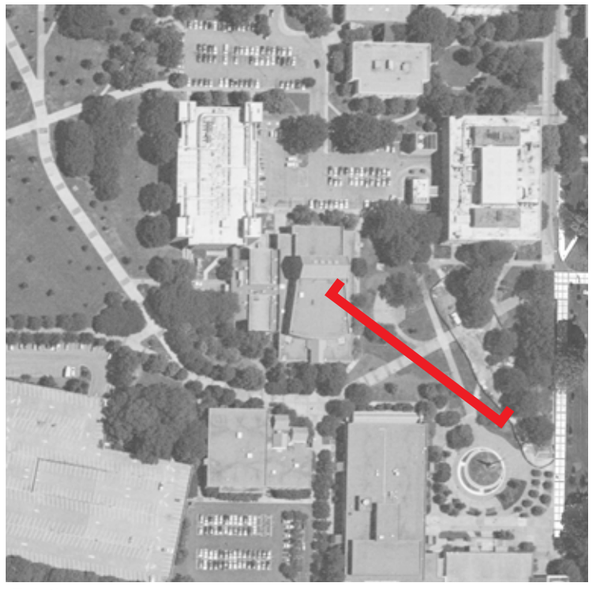


ADA access grading studies (HILL Works)

2. Ferst Center Expansion (continued)

In order to continue the Eco-Commons Path from the Ferst Center Plaza to Tech Green as a primary accessible route, a significant amount of regrading is proposed east and west of the expanded Ferst Center. It creates opportunities to not only convey and filter stormwater along the primary pathway but to integrate amphitheater seating, areas for sculpture display, meadow plantings and forest expansion into the new hillsides. Currently, the Ferst Center and Student Center are accessible through multiple stairs and an often confusing path structure. The proposed plan simplifies these access points and clarifies the paths of travel.

Proposed



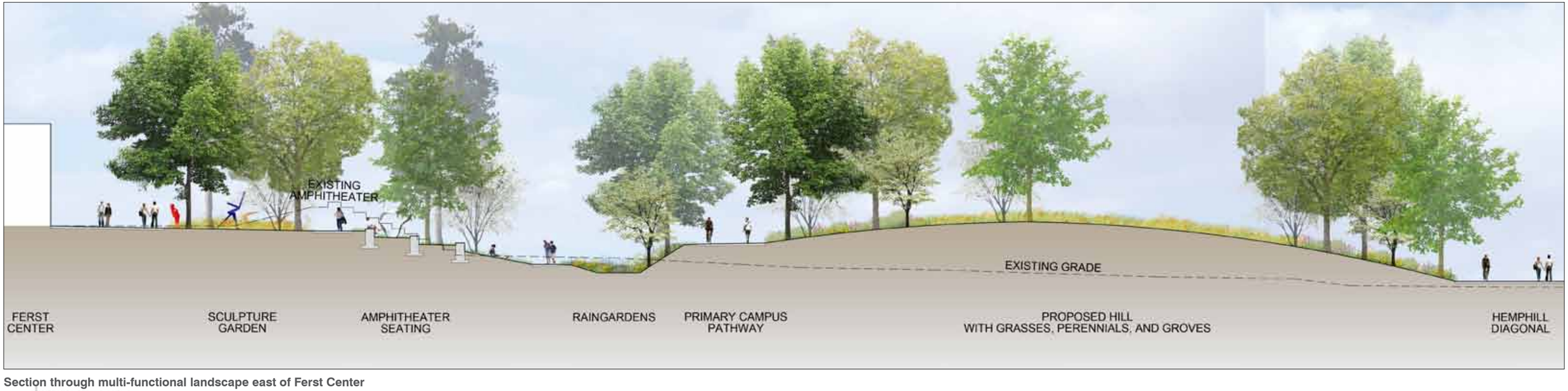
Existing

View to Ferst Center from Tech Green

Main Stair from Ferst Plaza looking toward Tech Green

Surface parking north of Ferst Center interrupts one of the primary pedestrian access routes from north campus

Existing amphitheater east of Ferst Center



Section through multi-functional landscape east of Ferst Center

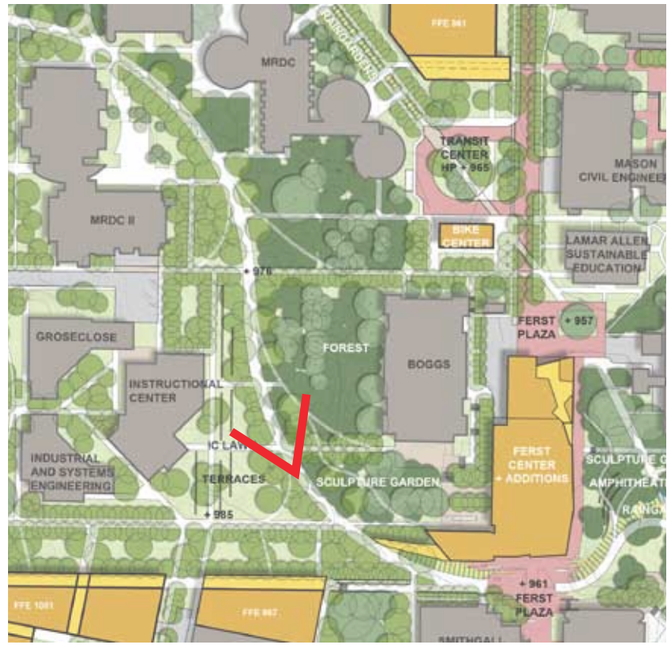
Primary entry courtyard increases visibility and presence of Ferst Center (Design: HILL Works/BLDGS, Watercolor painting by Barbara Ratner)

ADA accessible path from the east connects Tech Green and Student Center (Design: HILL Works/BLDGS, Watercolor painting by Barbara Ratner)

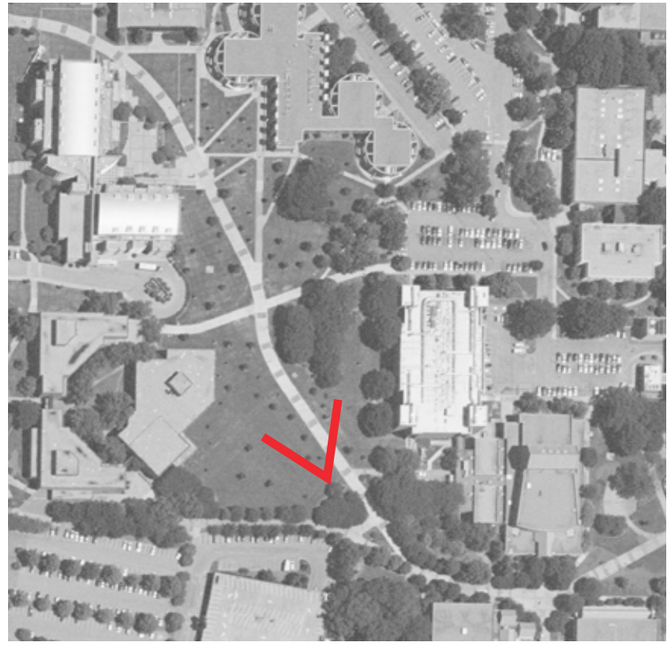
3. IC Lawn and Forest Ribbon

Proposed IC Lawn Eco-Commons path is shaded, dynamic, cool

Existing conditions at the IC Lawn are open, singular, hot



Proposed view looking northwest along the Eco-Commons pathway



Existing view of IC Lawn looking northwest from near the existing sidewalk

3. IC Lawn and Forest Ribbon

The IC Lawn is currently a space without identity or clear boundaries and is vastly underutilized. The large lawn is bisected by a 20' wide concrete path that is in desperate need of shade and is framed by the backs of buildings. The 2004 Campus Master Plan identified the IC Lawn as a building infill area. The Sector Team believes there is an opportunity to continue the functional Eco-Commons ribbon through this space, creating new gathering places and performative landscapes.
The sector plan calls for more shade along the primary circulation route and replacement of certain lawn areas with more diverse, drought-tolerant planting. Parkland planting along the edges of a redefined central path used by both pedestrians and bicycles would provide continuous shade coverage. Secondary pathways are located throughout forested zones to the east of the main path. Shaded terraced seating is located to the west of the path, providing opportunity for gathering and outdoor classes. The planting palette for this area incorporates mesic shade and understory tree species, shade tolerant low-shrubs and groundcovers (See also the Plant Palette in Section IV.7)

Trees

Aesculus pavia
Red Buckeye

Cercis canadensis
Redbud

Cornus florida
Dogwood

Fagus grandifolia
American Beech

Liriodendron tulipifera
Tulip Poplar

Nyssa sylvatica
Black Gum

Quercus spp.
Oaks

Low shrubs and groundcovers

Carex spp.
Sedges

Dryopteris marginalis
Marginal Woodfern

Fothergillla spp.
Fothergilla

Heuchera spp.
Coralbells

Hydrangea quercifolia
Oakleaf Hydrangea

Polystichum acrostichoides
Christmas Fern

Rhus aromatica
Fragrant Sumac

Sisyrinchium spp.
Blue-eyed Grass

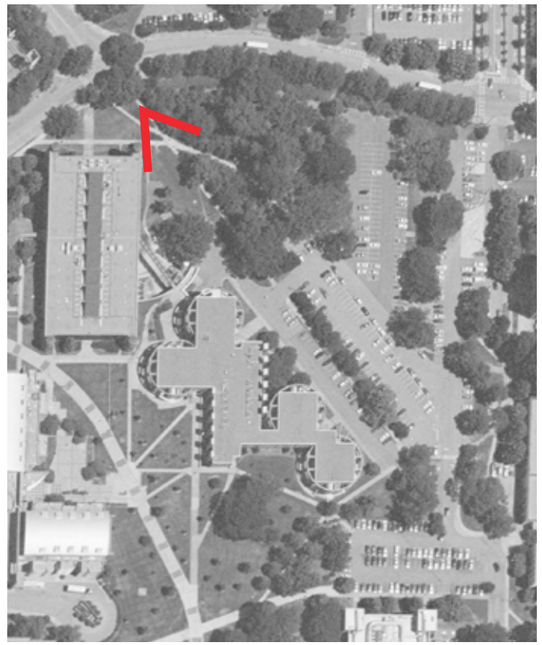
Vaccinium spp.
Blueberry

4. Hemphill Design Corridor

Proposed dynamic, textural, shaded and memorable historic design corridor - a working landscape

Proposed view looking uphill to the southeast

Existing utilitarian and singular character with confusing circulation patterns



Existing view looking uphill to the southeast

4. Hemphill Design Corridor

Historically, Hemphill Avenue was one of the primary streets through this area; it appeared on maps as early as 1892. Today it serves as an important internal pedestrian circulation route through the heart of the campus that connects the EBB Sector to the South-Central Sector. As one of the primary design corridors identified in the LMP, it's character and functionality were carefully considered. The Sector Plan highlights its importance in the function of Eco-Commons by revealing and collecting stormwater. A series of raingarden terraces with ephemeral water bisect the path. Excess stormwater is stored in underground systems for potential irrigation use. The Eco-Commons defines the edges of the path, adjacent buildings become part of the landscape, and much needed shade is provided along the path. The corridor connects to the Transit Center and State Street at the high point (elevation 965') of the South-Central Sector. Hemphill's undulating topography is reflected in the plant palette which should range from hydric-mesic at the lowest point to mesic planting at the high point. Plants for raingardens should also be carefully selected to provide year-round interest and to tolerate the fluctuation of moisture (see also the Plant Palette in Section IV.7).

Trees and Shrubs

Acer rubrum
Red Maple

Amelanchier spp.
Serviceberry

Liriodendron tulipifera
Tulip Poplar

Quercus spp.
Oaks

Fothergilla spp.
Fothergilla

Hamamelis x intermedia
Witch hazel

Itea virginica
Sweetspire

Vaccinium spp.
Blueberry

Viburnum dentatum
Arrowwood

Raingarden and Groundcover Plants

Echinachea spp.
Coneflower

Hemerocallis spp.
Daylily

Heuchera spp.
Coral Bells

Iris spp.
Iris

Juncus effusus
Common Rush

Lobelia spp.
Cardinal Flower

Onoclea sensibilis
Sensitive Fern

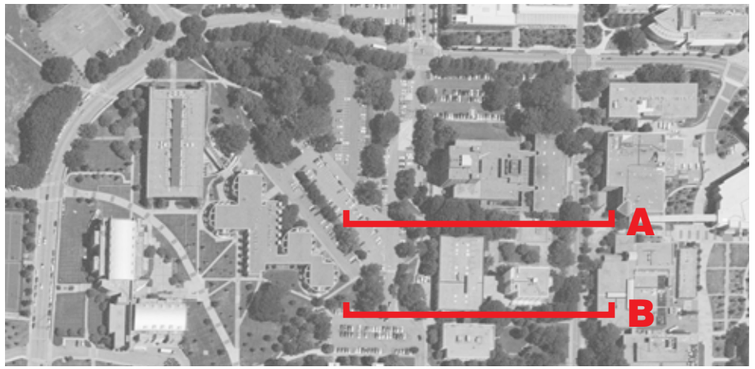
Rhus aromatica
Fragrant Sumac

Sporobolus heterolepis
Prarie Dropseed

5. East - West Grid Connections

Atlantic Promenade and State Street Connectors
Section A runs east-west south of Howey Physics Building. It is one of the primary east-west connections between Atlantic and State Streets. The plaza is a large open paved space that lacks shade and is underutilized. It should be redesigned to be fully ADA compliant when Atlantic Drive is repaved and converted to Atlantic Promenade. It should function as an extension of Atlantic promenade. Water design elements, integrated seating and gathering areas, and native plantings, including plenty of shade trees are suggested for this space. Existing willow oaks (beyond the plaza) and a grove of pine trees along State Street should be preserved.

Plaza south of Howey Physics Building



Existing

Section A) Proposed section through State Street and Atlantic Promenade at the Howey Physics Plaza

Section B) Proposed section through State Street and Atlantic Promenade at the Bike Resource Center

Proposed


Courtyard south of Mason Civil Engineering

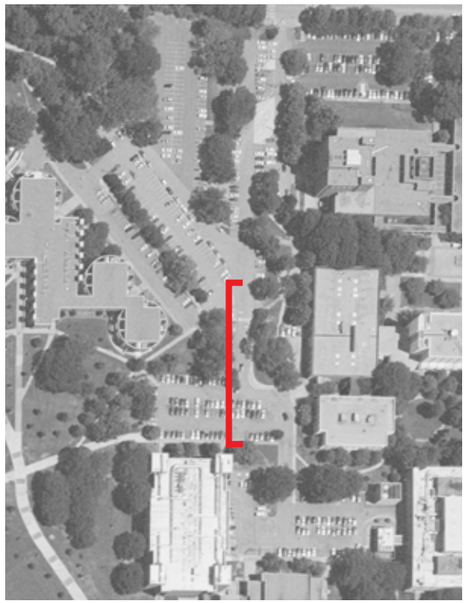
Atlantic Promenade and State Street Connectors

Section B cuts across a forested edge along the Atlantic Promenade, passes through the Mason Engineering Courtyard and, at State Street intersects the proposed Bike Resource Center. Flowering trees and shrubs should be planted to infill the courtyard with color and texture, and the ground plane planted with low groundcovers. Benches should be placed along the courtyard path. The existing forested edge along the Atlantic Promenade should be preserved and planted with native groundcover and shrub planting. This edge should be mirrored on the east side of Atlantic Promenade as well, to create consistent canopy cover.

6. Transit Hub and Bike Resource Center

The Sector Plan proposes a new transit hub in the heart of the South-Central Sector, at the intersection of Hemphill Design Corridor and State Street. Students and visitors can arrive / depart here from parking decks or other campus destinations via a number of bus routes. Since Georgia Tech has seen an exponential rise in the use of bicycles over the past few years, one of the central elements of this area is a proposed Bike Resource Center, a new enclosed secure storage and bike repair facility on campus. The bike center also encourages bicyclists to store bikes in one location all day which minimizes potential bike / pedestrian conflicts. It might also serve as a resource center for other alternative transportation methods - a place for meetings, workshops, and informal events. The Bike Resource Center and structures associated with the Transit Hub would be great candidates for Architecture School student design-build projects.

Proposed



Existing

Bike Resource Center Precedents - functional, central and a potential architecture school project

Proposed section through Transit and Bike Resource Center

Suggested Plant Palette

The palette around the Transit Hub and Bike Center should reflect its location as a high point of South-Central Sector with mesic-xeric plantings. The plant palette will enhance and expand the existing planting areas with additional color and textures. The existing pine trees should be preserved in the center of the transit court. These pine trees are a focal view point from Hemphill Design Corridor as students walk south towards the Student Center and Tech Green. (See Plant Palette in Section IV.7)

Trees

Carya spp.
Hickory

Cornus florida
Dogwood

Crataegus viridis 'Winter King'
Winter King Hawthorn

Nyssa sylvatica
Black Gum

Ostrya virginiana
Hop Hornbeam

Pinus echinata
Shortleaf Pine

Pinus taeda
Loblolly Pine

Quercus spp.
Oaks

Shrubs, Grasses + Perennials

Aronia spp.
Chokeberry

Callicarpa americana
American Beautyberry

Echinachea spp.
Coneflower

Heuchera spp.
Coral Bells

Hydrangea quercifolia
Oakleaf Hydrangea

Panicum spp.
Switchgrass

Rhus aromatica
Fragrant Sumac

Rudbeckia spp.
Black-eyed Susan

Solidago spp.
Goldenrod

7. Southwest Campus Expansion Collaboration

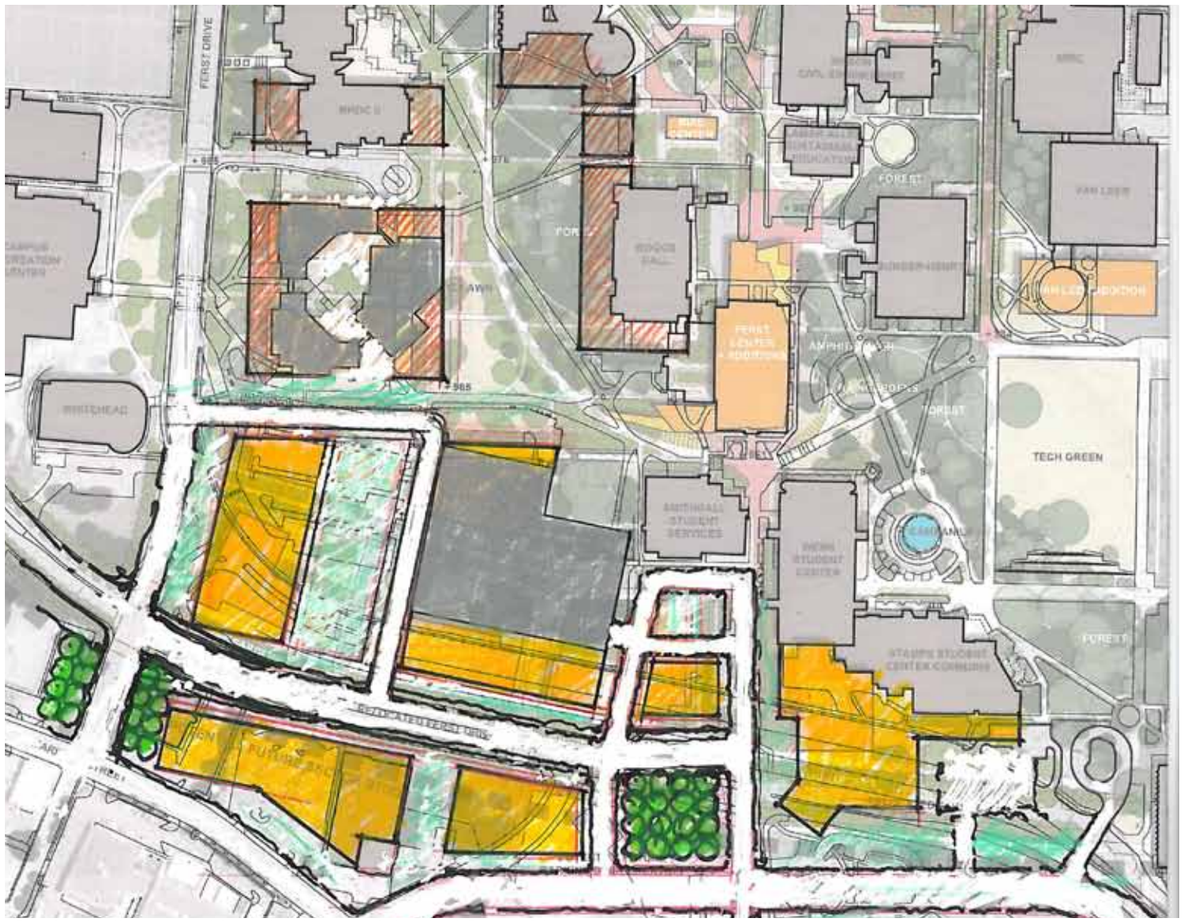
One area of the South-Central Sector involved significant additional discussion and exploration. This is the area referred to as the Southwest Quadrant – an area generally bounded by Ferst Drive, Means Street, Marietta Street and North Avenue. The resulting plan is a place holder and will require additional study. As the University has grown over the years, and in the process of looking for additional space, it has gradually acquired additional properties between Marietta Street and Tech Parkway. This southwestern edge of campus is an urban edge with an established community and fabric, especially along the Marietta Street frontage. This area is accessed currently by both Tech Parkway and Marietta Street which serve as important transportation arteries for this area of the City. While the area has tremendous potential for change and revitalization, that change process must be thoughtful and collaborative.

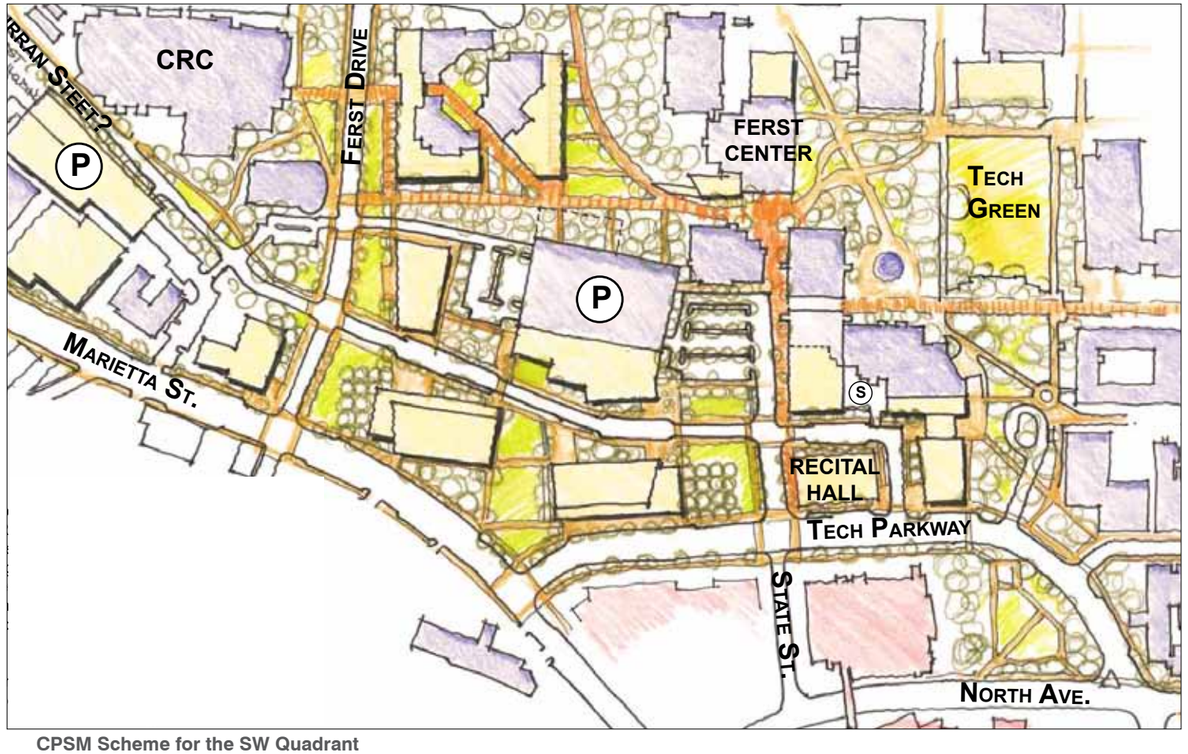
As Tech begins to explore the possibilities for change in this area, the potential becomes clear. With the possible closure of the southern-most portion of Ferst Drive, a similar possible closure of the northern section of Tech Parkway, and the realignment of the southern portion of Tech Parkway to intersect with Marietta Street, the Institution may have an opportunity to create a new expanded campus precinct in this southwestern quadrant. It may need to be more contextual, perhaps more urban than other parts of the campus and perhaps more mixed-use in character. These potential changes in the road network would establish a new southern edge for the campus and provide greater access and visibility to certain key facilities in the area including the Ferst Center for the Arts.

While the Sector Plan currently illustrates one potential configuration for this area, there are many variables and the team explored multiple potential configurations for this area with the Institute. The design discussion for this area was a collaborative process between many parties: the Sector Plan Design Team, consulting traffic engineers, and multiple Georgia Tech stakeholders. A number of options and alternatives were explored for this area and some of these ideas are presented here in a variety of draft forms.

It is clear that this is a dynamic area and that conditions will continue to evolve and therefore further study will be necessary. It is also clear that any change in this zone will require significant land acquisition and much collaboration with adjacent neighbors and stakeholders – but the opportunities for the Institute and for the adjacent community are exciting.

Draft Sector Plan approach to the SW Quadrant

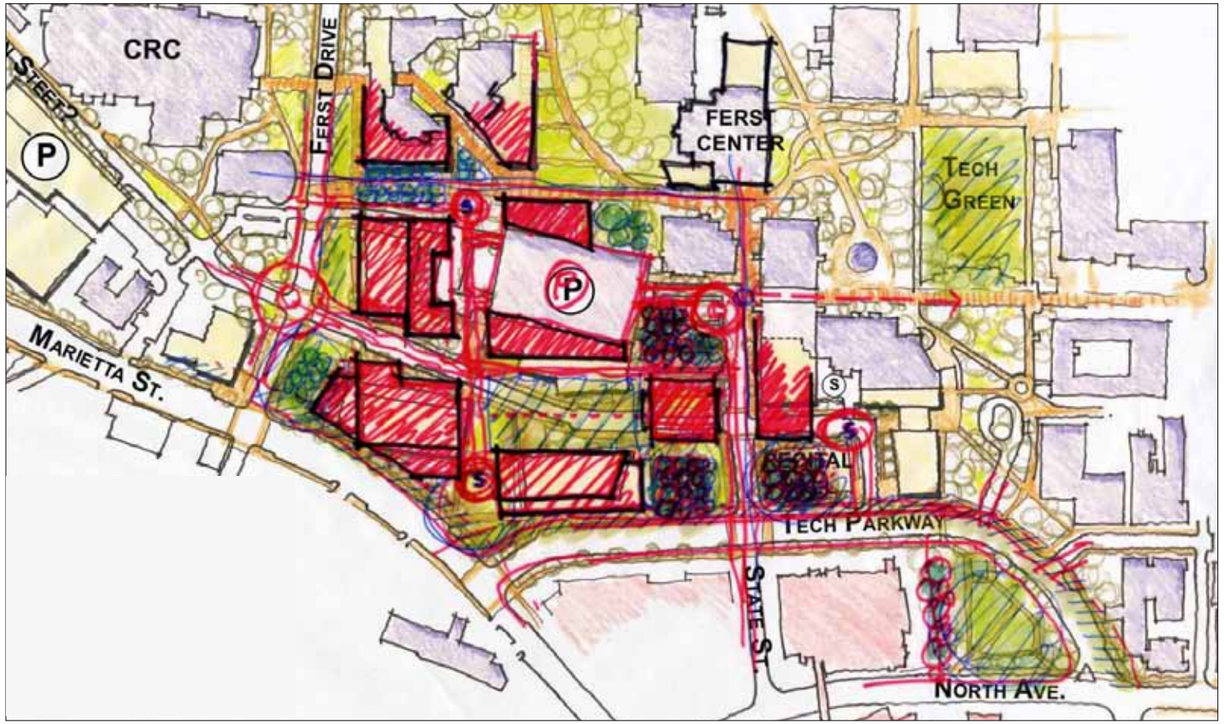

Synthesis diagram of ideas that informed the final Sector Plan



CPSM Scheme for the SW Quadrant

NBW April 2012 sketch for an expanded SW Quadrant

C+CS (Alyn Pruett) Sketch of a SW Quadrant solution



jB+a overlay sketch of a CPSM scheme

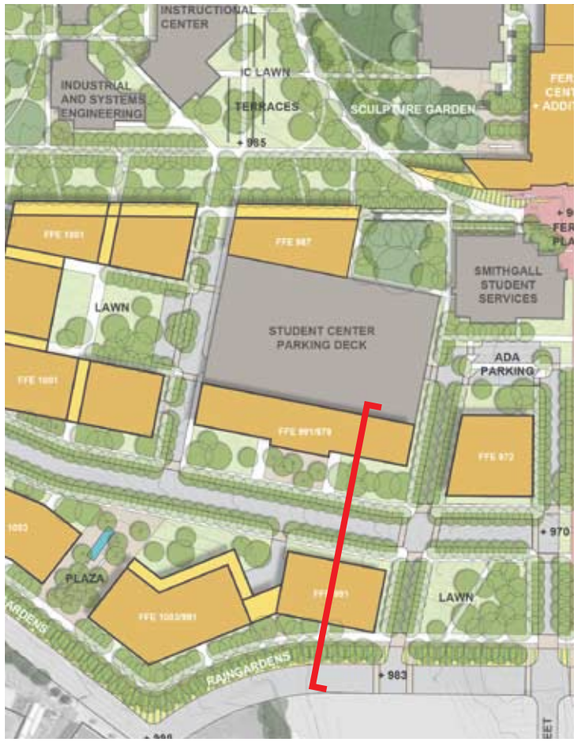
8. Southwest Campus Expansion

The southwest campus expansion represents the most significant potential for change and addition relative to the current campus conditions in the South-Central Sector. This is primarily due to the fact that the southwest corner of campus is currently dominated by surface parking lots and redundant roadways.

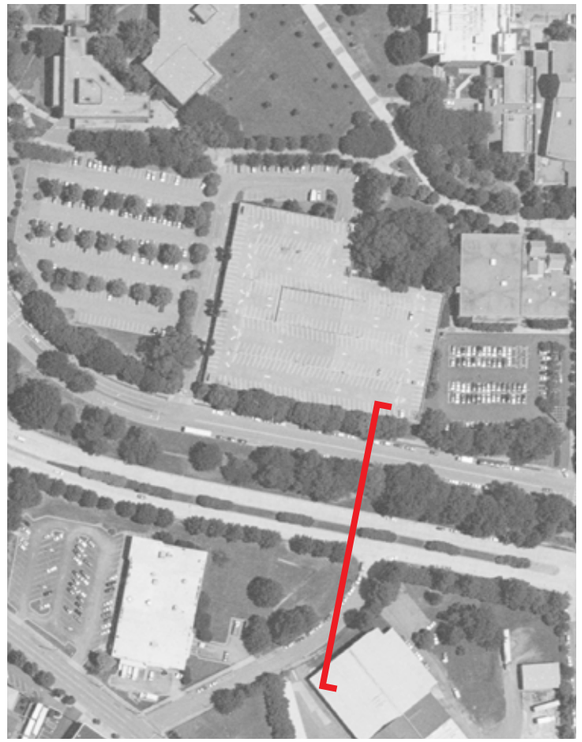
The Sector Plan proposes relocating Tech Parkway and establishing it as the southwestern edge of campus. As a campus edge it will incorporate a 60' building setback that includes dedicated bike lanes, large shade trees, and a series of raingardens for stormwater filtration and conveyance. Another critical component of this section of the Sector Plan is the establishment of a southern campus gateway along the relocated Tech Parkway at State Street Extended. This will serve as the primary pedestrian entrance to this part of campus, providing a grander entry sequence to the Ferst Center for the Performing Arts and an expanded Student Center. Accessible and VIP parking spaces will be located in this area as well as a passenger drop-off for events at the Ferst Center.

The interior of the southwest campus expansion embodies the characteristics of the larger Sector Plan: increased canopy cover, efficient building footprints, welcoming gathering places for students and staff, and clear, shaded pedestrian routes to major campus destinations. Besides the proposed building densities and footprints, two additional components of the interior are worth noting: 1) the former Tech Parkway now becomes an intimate interior campus street for both transit and pedestrians and incorporates shade trees and campus standard paving patterns, and 2) a strengthened east-west pedestrian connection between the Ferst Center to the east and the Campus Recreation Center to the west. This shaded "mall" will incorporate large shade trees and occupiable swaths of lawn while connecting two major campus destinations with the Eco-Commons Ribbon.

The proposed building density in this area is intended to absorb much of the future growth anticipated by the Institute. Multiple building footprints are proposed in this Sector in a way that integrates new public spaces (in the form of plazas and courtyards and forest expansion) with clear, direct, and shaded pedestrian connections to the rest of campus.



Proposed



Existing

Section through realigned Tech Parkway, proposed buildings, courtyard, and parking deck

Street and Understory Trees

Carpinus caroliniana
Musclewood

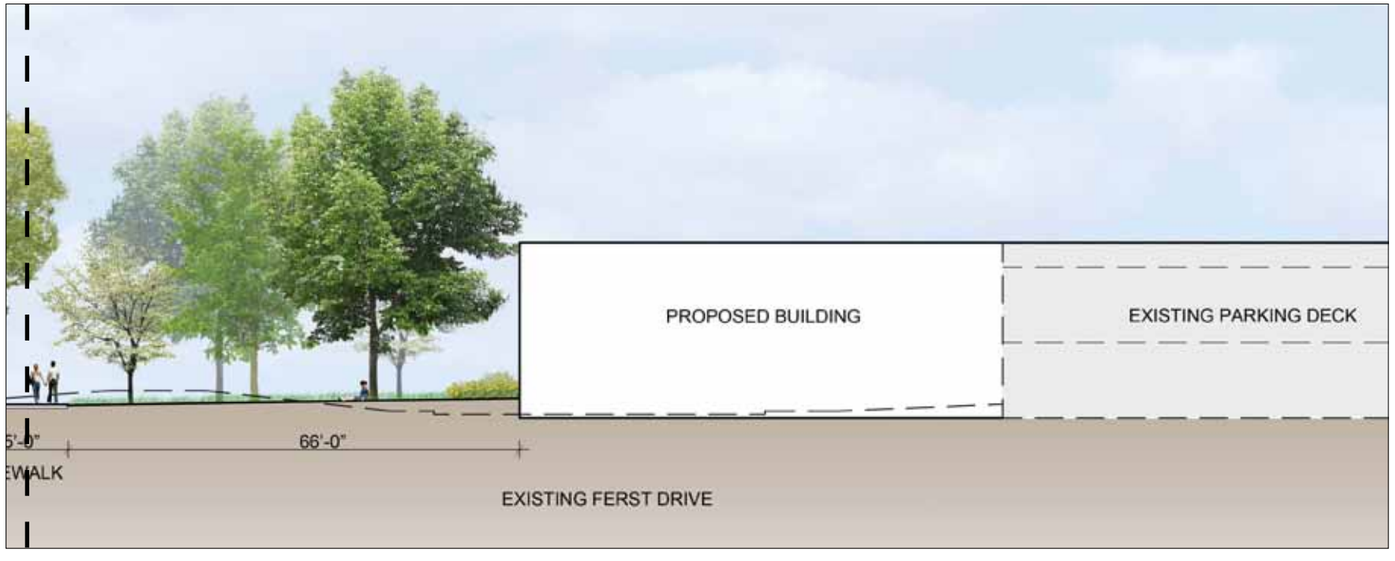
Celtis laevigata
Sugarberry

Cercis canadensis
Redbud

Craetagus viridis 'Winter King'
Winter King Hawthorn

Quercus coccinea
Scarlet Oak

Ulmus americana 'Princeton'
Princeton Elm



Suggested Plant Palette for Realigned Tech Parkway

The palette should include mesic street trees and understory and raingarden species that tolerate drought and pollution (See Plant Palette in Section IV.7).

Raingarden species

Hemerocallis spp.
Daylily

Iris spp.
Iris

Juncus effusus
Common Rush

Itea virginica
Sweetspire

Panicum virgatum 'Shenandoah'
Shenandoah Switchgrass

Scirpus spp.
Bull rush

Linear raingarden precedents

9. Southwest Campus Expansion Transportation Planning Guidance

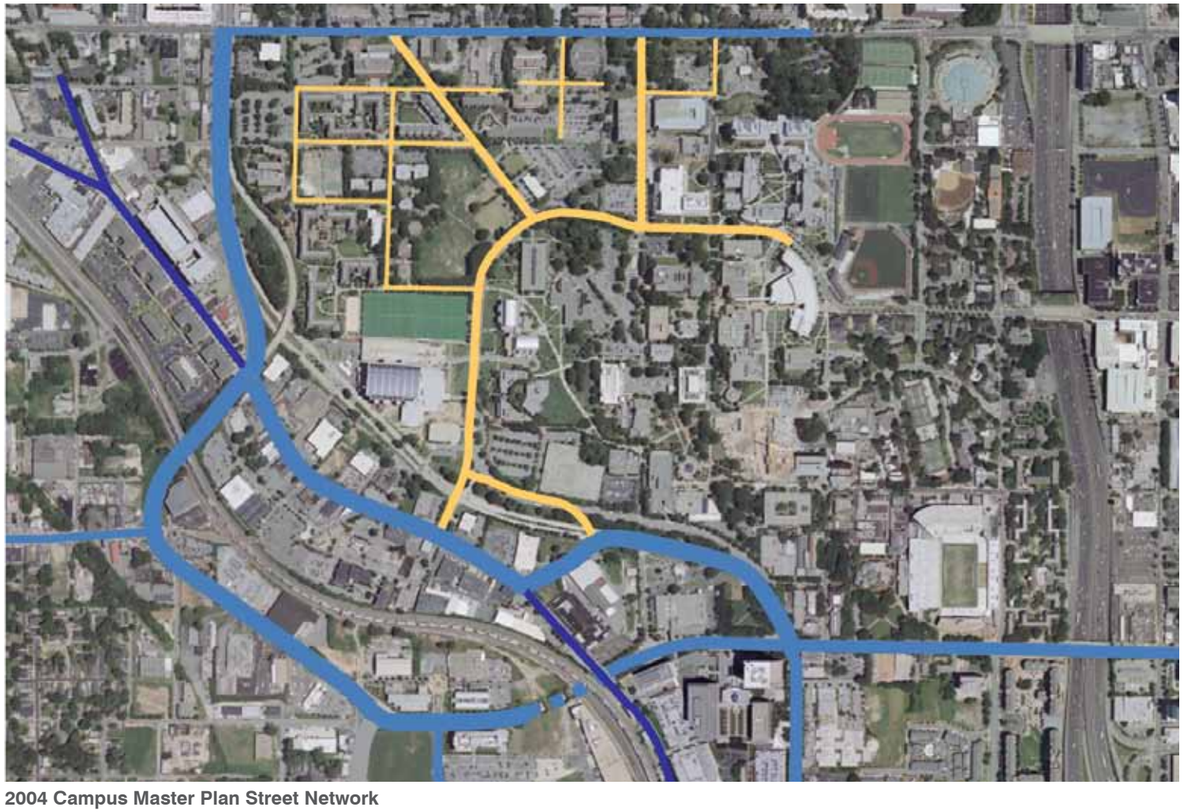
As has been mentioned earlier, during the course of the sector planning process, there was significant discussion about the range of potential changes which could occur, over a long-range planning horizon, to the transportation network in the area known as the Southwest Quadrant. This is an area generally bounded by Ferst Drive, Means Street, Marietta Street and North Avenue.

This area of campus has the potential to experience significant change in terms of the transportation network. Two important roadway changes were considered in this exercise and both have the potential to significantly alter future development patterns in the area – both on and off campus. The first change explored the possibility of removing the portion of Ferst Drive which parallels the southern leg of Tech Parkway. This action would eliminate the duplication of a parallel roadway system and provide additional potential usable land for the campus – both for additional building space and for additional open space. The second, and potentially more dramatic street network change, explored the possibility of the northern portion of Tech Parkway being removed and the southern portion being realigned so as to connect Luckie Street to Marietta Street. This idea was first explored in the 2004 Campus Master Plan. This realignment and removal action could also create additional land area for future campus development, and consolidate land holdings on either side of the Parkway, but it would require significant land acquisition and extensive coordination both with the City and with adjacent community stakeholders. The illustrative sector plan currently illustrates one potential reconfiguration of the street network in this area of campus. This sector plan concept shows the southern portion of Tech Parkway being realigned to connect directly with Marietta Street while a portion of the northern section is retained as narrower internal campus street and/or transit-way. This is a complex area involving many variables and will require further, more detailed study.

The guiding principles, for this initial exercise, for the Southwest Quadrant transportation plan, were to minimize excessive intrusion of external traffic on the Georgia Tech campus; improve connectivity for pedestrians, bicycles, and transit vehicles; and support development opportunities and expansion of the campus to the southwest.

The southwest quadrant transportation plan proposes to realign Ferst Drive along the existing Means Street corridor and terminate it at Marietta Street. A new roadway connection, will link Marietta Street to North Avenue and Luckie Street, minimizing disruptions for commuters to Coca-Cola or other employers to the south. The new roadway will provide access to development parcels and the existing transit center east of the Student Center. The plan considers Marietta Street to be the edge of the Georgia Tech campus, maintaining a four-lane cross-section and providing opportunities for mixed-use development and corporate partnership.

Existing Street Network

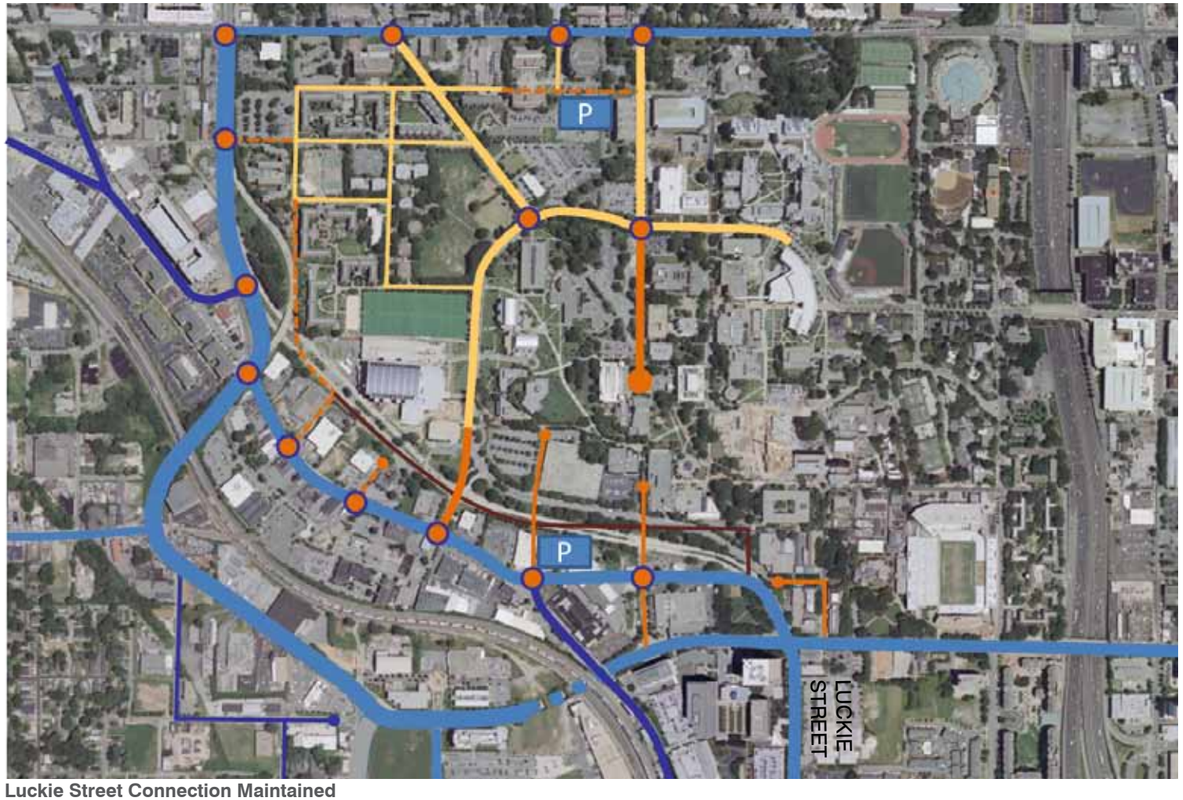

2004 Campus Master Plan Street Network

The plan extends State Street between North Avenue and the Student Center drop-off area, creating a new southern portal to the campus. A limited-access transit and multi-use pathway corridor will connect Ferst Drive to State Street (at the Student Center), enhancing alternative mode access and mobility along the axis between the Campus Recreation Center, Student Center, and the historic campus core. The dedicated transit facility will provide the opportunity for future extension of dedicated transit service west of Ferst Drive, via new corridor pedestrian / bicycle / shuttle corridor roughly following the alignment of Tech Parkway.

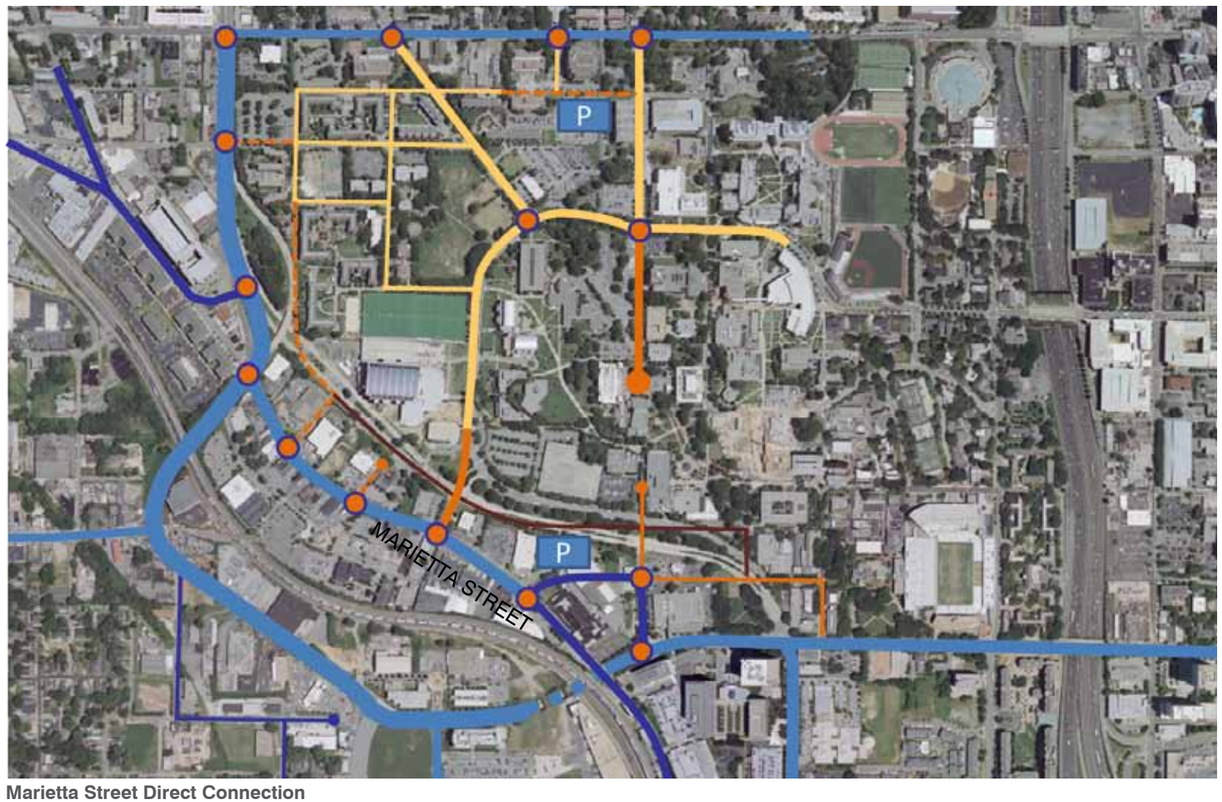
The plan explored the long-term possibility of eliminating the Student Center parking deck, replacing the parking use of the site with academic, or student support buildings. A new parking structure to serve the South-Central Sector is proposed at the campus periphery, south of the new roadway that replaces Tech Parkway and Ferst Drive, and also accessible from State Street. This planned future parking location would limit vehicle intrusion into the campus core and minimize vehicle interaction with pedestrians and bicyclists within the campus. The design of the parking facilities and streets will need to focus special attention on the quality of pedestrian crossings so that this facility and accompanying development is effectively linked into the larger campus.

Legend:

- Internal Campus Street
- New Campus Street
- Future Campus Street
- Internal Campus Transit-way
- Parking Structure (P)
- City Street
- Signalized Intersection



Luckie Street Connection Maintained



Marietta Street Direct Connection

10. Utility Infrastructure Plan

A preliminary utility master plan was prepared for each sector in parallel with the development of the sector plan. Existing utilities within the South-Central sector include: natural gas, power, sanitary sewer, water, chilled water and steam, and cistern locations.

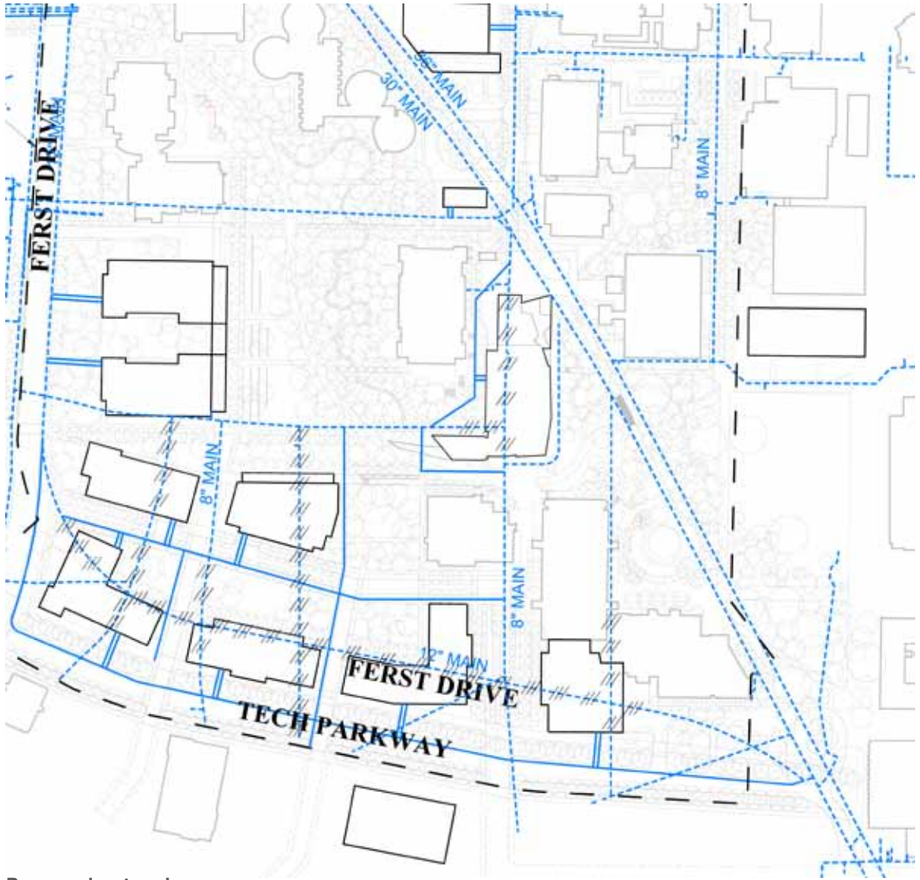
In both sectors, most of the utilities are located within the existing street “rights-of-way”. As a result, in the South-Central sector, both Ferst Drive and the Hemphill Avenue alignment are major utility corridors. There are several areas where streets have been removed or abandoned but the utility corridors remain in place. The primary example of this, in the South-Central Sector, is the Hemphill / State corridor, south of Ferst Drive. Here, particularly south of the Allen Building, little trace of the former streets remains on the surface but the utility corridor continues in its original sub-surface location.

When the Ferst Center for the Arts was built in 1992 it was constructed across the old State Street alignment causing the utilities to be rerouted in close proximity to the new building and, as a result, potentially constraining the Ferst Center’s ability to expand today. There is a lesson to be learned from this experience. The sector plan illustrates the potential development of new facilities over existing road and utility corridors. With the potential removal of portions of both Ferst Drive, along its southern-most alignment, and/or portions of Tech Parkway, and the subsequent potential re-development of these areas a challenge similar to that currently facing the Ferst Center will be faced. Existing utilities will need to be relocated and careful thought given to ensure that utilities are relocated appropriately in order to facilitate the future expansion of these new buildings.

There are two major regional City of Atlanta water transmission lines which run through this sector. They lie generally parallel to each other along the Hemphill Avenue alignment, diagonally all the way through the center of campus. They are large, 30” and 36” diameter lines respectively, and old – so care must be taken when constructing improvements nearby.

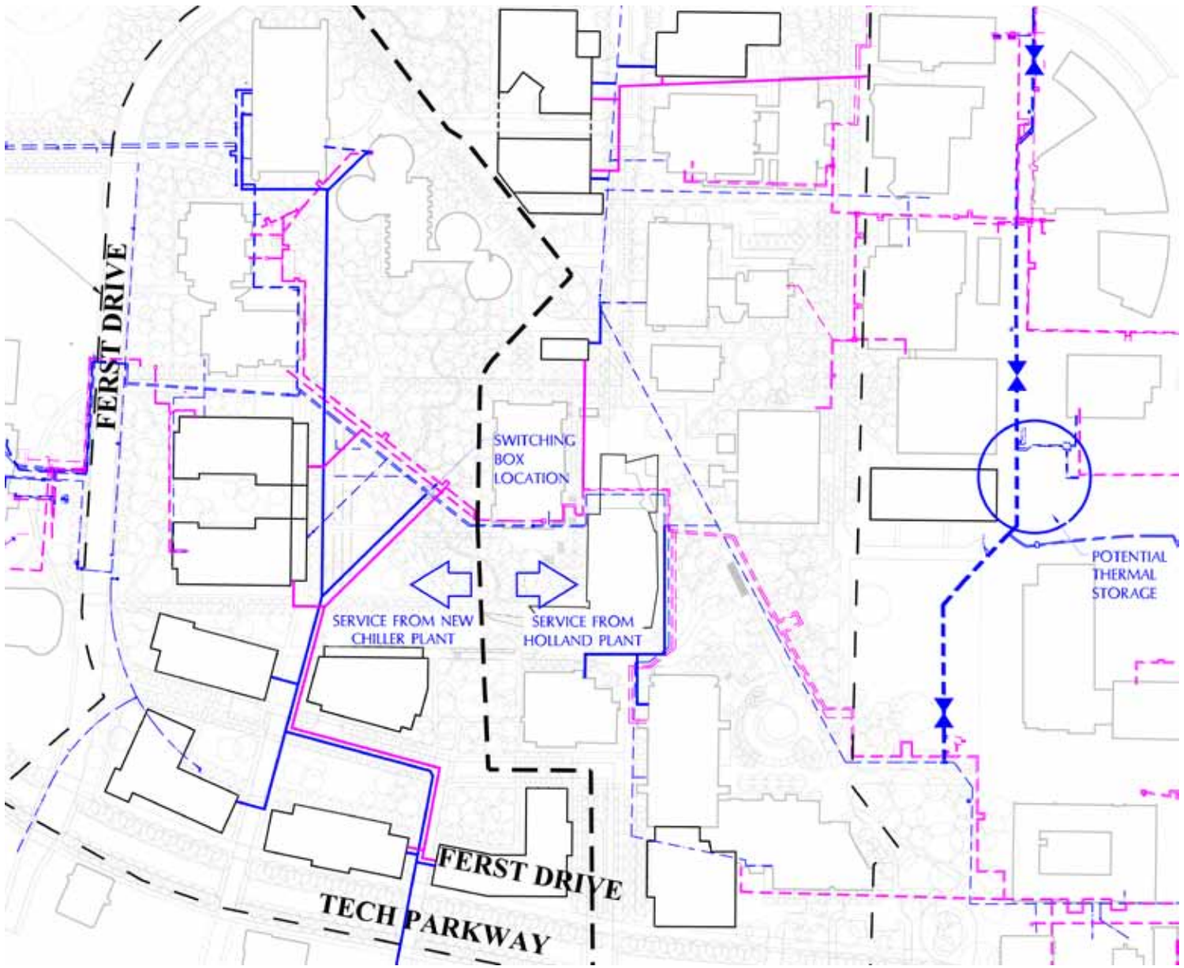
Within, or immediately adjacent to, the South-Central Sector, there are long-range plans for the creation of a new chiller plant to serve the expansion currently proposed in this southwestern portion of the campus. While a specific site has not yet been designated for the new plant it is expected that it will be located along the southwestern edge of this sector between Tech Parkway and Marietta Street.

A summary utility infrastructure report, prepared by Long Engineering, is included in Section 3 of the Appendix.

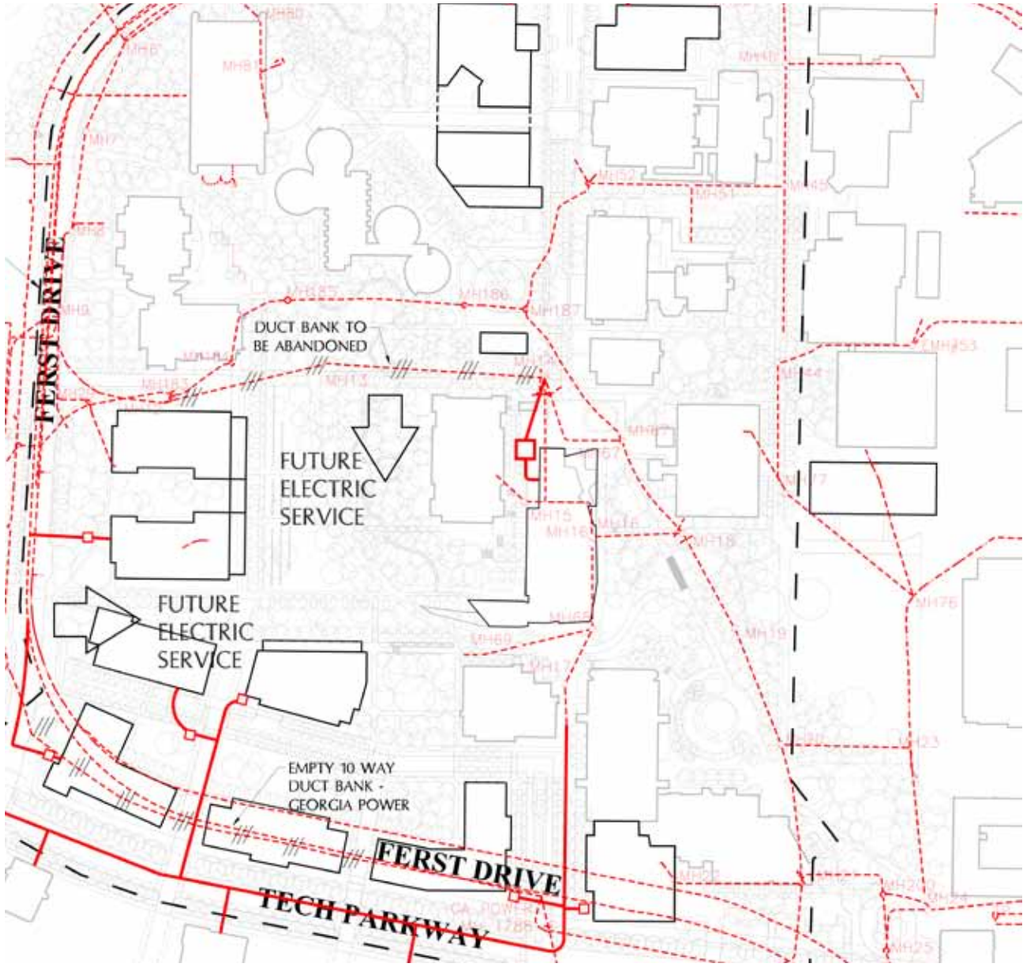


Proposed water plan

Existing utilities in South-Central Sector: stormwater, water/fire protection, power/lighting

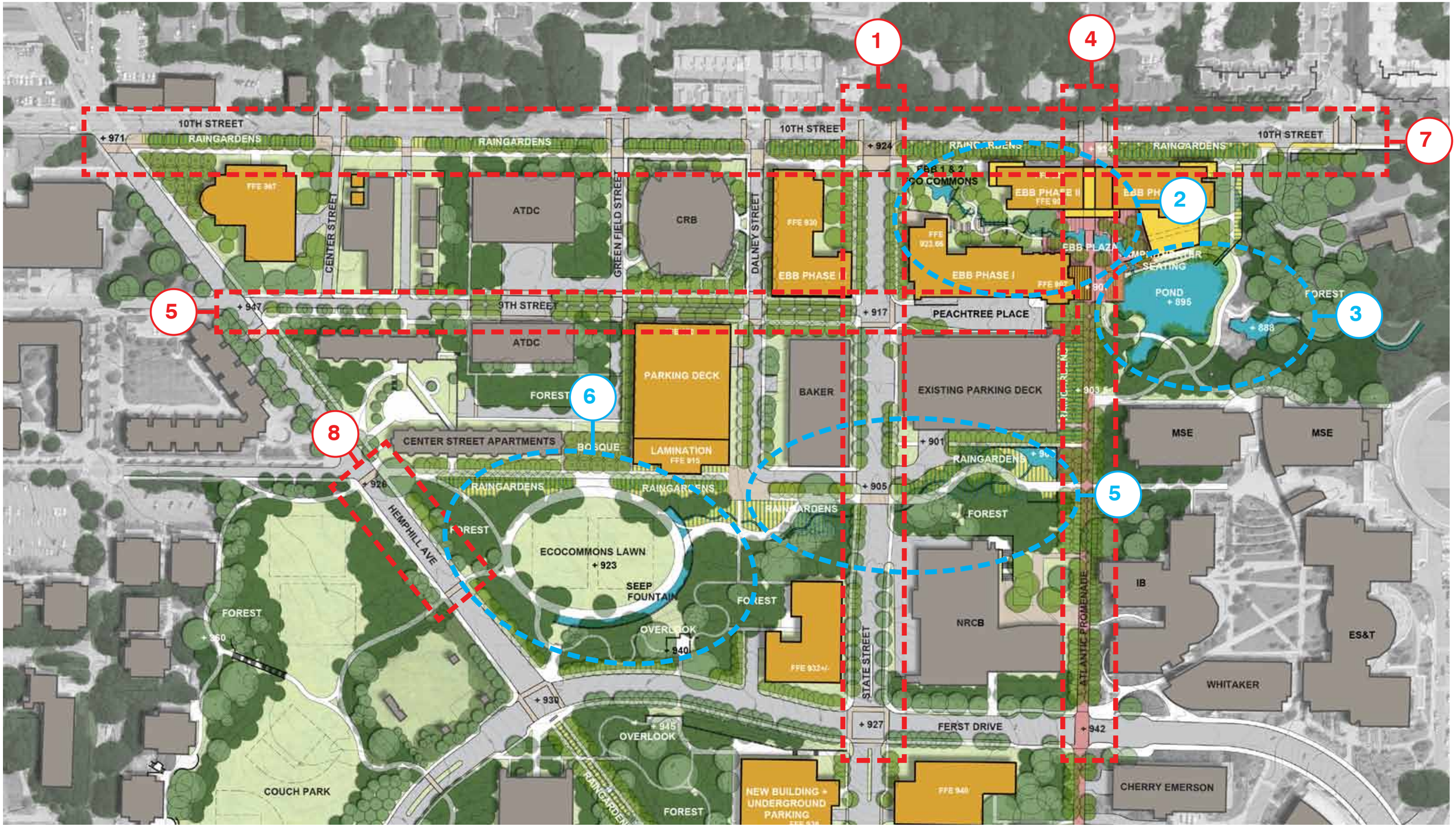


Proposed chilled water plan



Proposed electrical plan

VI. EBB SECTOR PLAN



Components:

1) STATE STREET - consistent setbacks, important campus gateway, vehicle/transit/service spine with dedicated bike lanes and sidewalks

2) EBB COMPLEX - major new research complex, water harvesting, public plaza, courtyard gardens, relationship to the Eco-Commons Pond and Atlantic Drive

3) ECO-COMMONS POND - terminus of water storage and conveyance system in the Sector, native pond-edge and wetland plantings, recreational paths that connect the EBB Complex to existing parts of campus

4) ATLANTIC DRIVE - raising the elevation at EBB at the Eco-Commons, conversion to a pedestrian promenade, coherent and consistent planting strategy

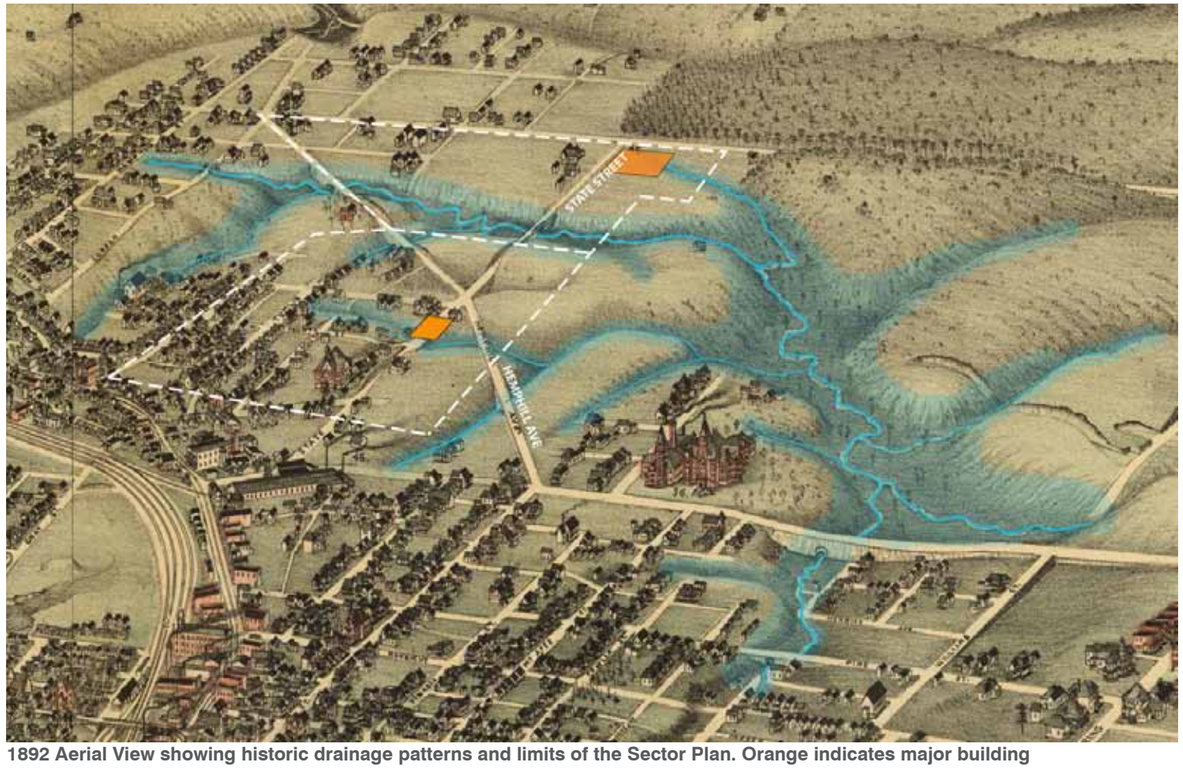
5) 9TH STREET - a continuous east-west service-oriented connection through the EBB Sector, consistent paving and street trees.

5) ECO-COMMONS - forest and water presence, recreational pathways, informal gathering spaces, visible water and water conveyance, increased forest canopy and shaded pedestrian routes

6) ECO-COMMONS LAWN - large recreation space, informal gatherings, visible and permanent celebration of water

7) 10TH STREET - large 60' setbacks, potential future streetcar impact on the setback, campus edge appearance with integrated bike paths, large shade trees and raingardens for stormwater filtration and conveyance

8) COUCH PARK CONNECTIONS - improved street crossings and pathway clarity



1892 Aerial View showing historic drainage patterns and limits of the Sector Plan. Orange indicates major building projects in these two sectors.

1. Sector Overview

The EBB Sector is approximately 45 acres and is generally defined by 10th Street to the north, Hemphill Avenue to the west, Ferst Drive to the south and Atlantic Drive (proposed as Atlantic Promenade in this Sector Plan) to the east. The 10th Street edge of this sector is the campus' northern boundary. The Bio-Technology Quadrangle is immediately east of this sector along Atlantic Drive and the Center Street Apartments and West Campus Housing areas straddle Hemphill Avenue and anchor the northwestern edge. The sector is generally characterized by a more intact urban grid but nevertheless has a suburban, less campus-like feel. Approximately 40% (20 acres) of this sector is undeveloped or underutilized - dominated by surface parking lots, the North Parking Deck and low intensity uses such as the motor pool and landscape maintenance operations.

As a result, this is an area of campus which contains tremendous potential to evolve into an active and vibrant sector of the campus – one perhaps defined as the major research quadrant and characterized physically by the EBB research building complex and by major sections of the Eco-Commons Forest Ribbon

The primary elements of the EBB Sector Plan include:

- Definition of a new campus edge along 10th Street – a linear greenway with shared bicycle and pedestrian zones, raingardens and entry plazas at major facilities.
- Engineered BioSystems Building (EBB) complex – a major new, state-of-the-art research complex which will complete construction of the first of three potential buildings in 2014.
- Closure of Atlantic Drive to vehicular traffic and the implementation of a permanent Pedestrian Promenade which will run one-half mile from 10th Street south to Tech Green.
- Consideration of the extension of 9th Street from Hemphill Avenue to State Street; this extension would facilitate transit and service access and general vehicular traffic circulation throughout the sector without forcing internal traffic onto 10th Street.
- Definition of several major components of the Eco-Commons and Forest Ribbon open space system that include:

  - Eco-Commons Oval and Lawn
  - Eco-Commons Water Conveyance Areas, and
  - The Eco-Commons Pond (as a stormwater management system terminus) located just west of the President's Residence between the existing Molecular Science and Engineering (MSE) Quadrangle and the proposed and developing EBB Quadrangle.

- Addition of a second large parking deck structure – (approximately 800 spaces)
- Addition of a large new, multi-use facility to anchor the important Hemphill Avenue campus gateway at 10th Street; this facility may include ground-level retail to help activate the Hemphill corner.

View of Atlantic Drive, looking south past the parking deck

Looking south on State Street

2. EBB Site Design Development

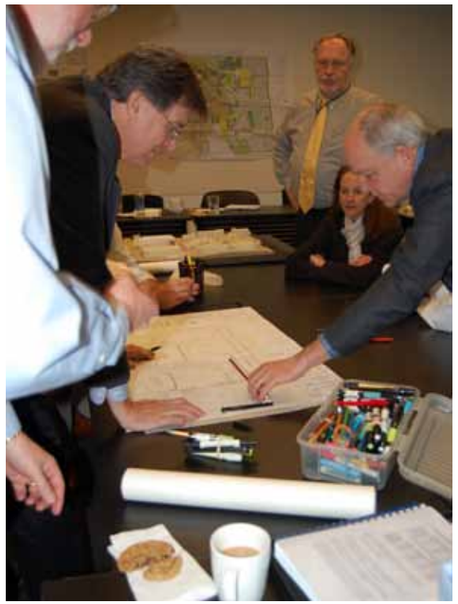
The Sector Plan and the EBB Phase 1 design teams (Cooper Carry and Lake Flato) along with a group of Georgia Tech stakeholders participated in a number of charrettes and discussions to develop programming, the footprint and the landscape concepts for the EBB sites; one of the major catalysts for this Sector Plan. A number of building configurations, setback options and connections to the Eco-Commons were explored.

The relationship of the proposed building to the Eco-Commons Pond was identified as one of the most important components. Connections between pedestrian paths and a functional stormwater conveyance system were established between the proposed EBB building sites and the corner of State and 10th Streets. The plan for the EBB I site is currently in development and scheduled for completion in 2014.

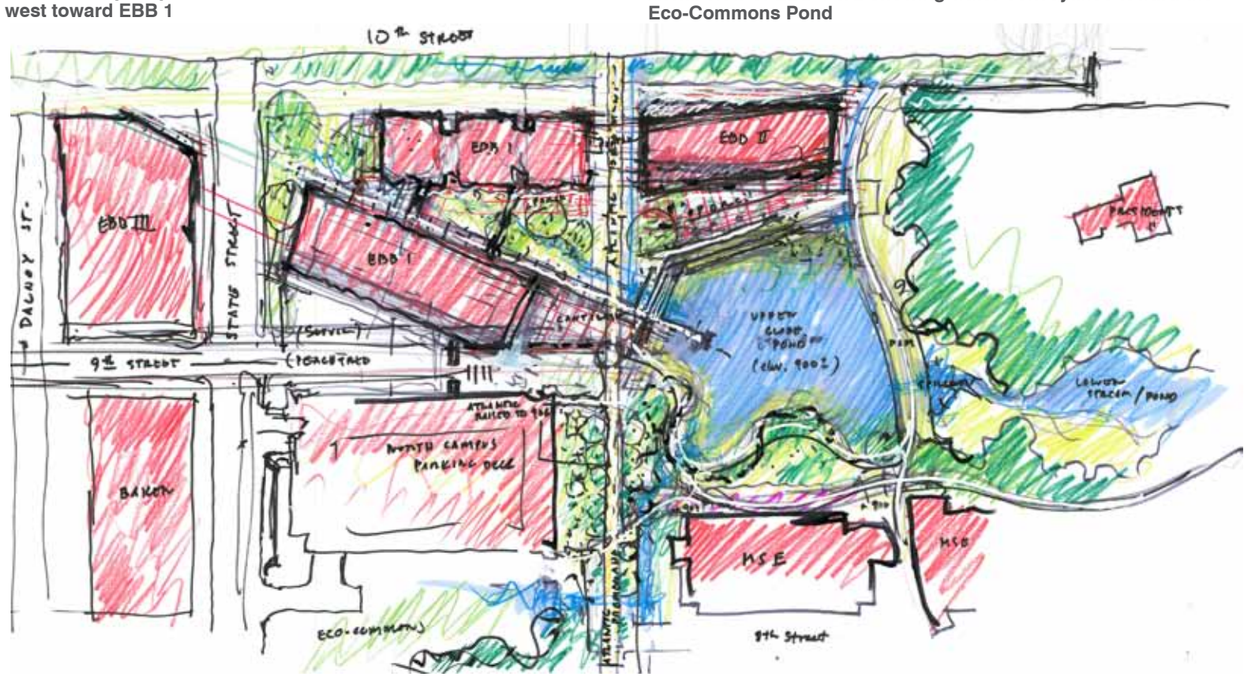
Lake Flato perspectives: **View from the Eco-Commons Pond west toward EBB 1**

Aerial view of EBB 1 & 2 showing water conveyance toward the Eco-Commons Pond

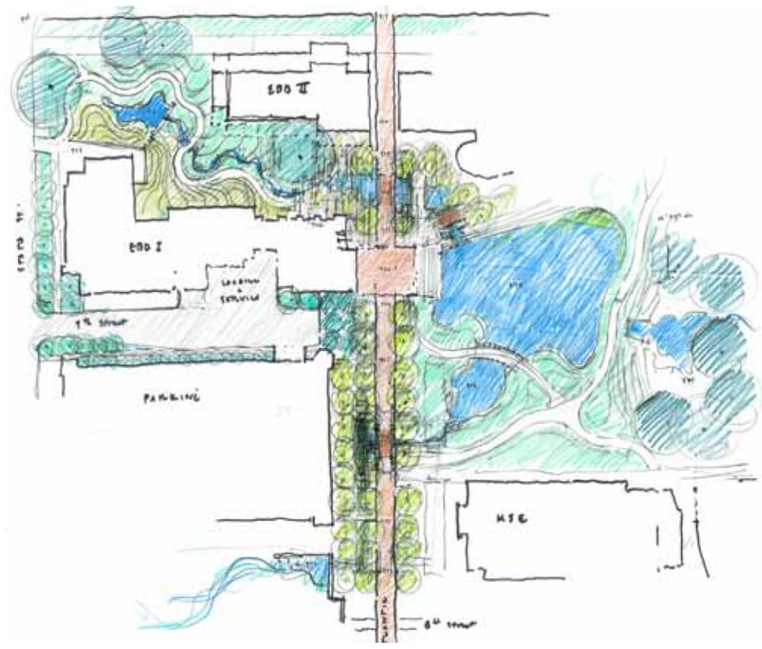
Stormwater course through EBB Sector



January 2012 Design Charrette



January 2012 EBB Charrette concept sketch

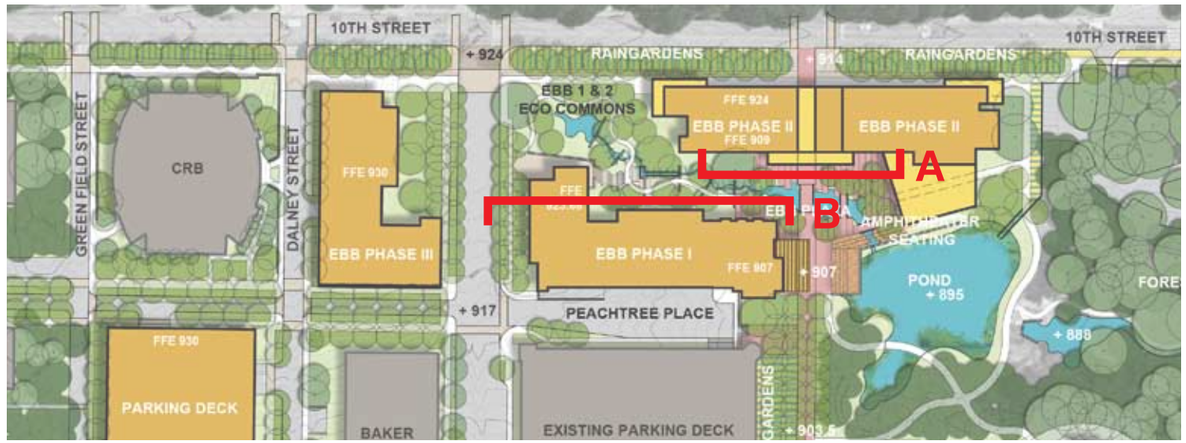


May 2012 EBB Charrette concept sketch

3. EBB Phase 1 Landscape Plan

The EBB plaza and courtyard merges social and educational spaces with ecological performance. A shaded path at 5% maximum grade meanders along a water channel from the campus gateway at the intersection of 10th and State Streets to the Atlantic Promenade. Raingardens absorb and transfer stormwater runoff and channel it to the Pond. An underground cistern harvests clean water from the EBB buildings and supplies a water course (series of basins and runnel) that are adjacent to the raingardens. The EBB Plaza extends over Atlantic Promenade to create a large gathering space that transitions from an intimate space at EBB Phase 1 to the open Eco-Commons Pond.

Water tells the main story in this space. It flows through the EBB courtyard into a wetland at the Atlantic plaza. It Is then conveyed under the Atlantic Promenade and reaches the Pond, the low point in the EBB sector, via a stepped waterfall. The shaded courtyard and plaza incorporate a number of informal sitting and study areas. Paving and planting designs are derived from the building architecture and from the research focus of EBB while integrating with the Eco-Commons and the rest of campus.



Section A) Proposed Section through EBB Plaza at Atlantic Promenade

Section B) Proposed section/elevation of EBB 1 courtyard

Suggested Plant Species for EBB 1 Landscape and Atlantic Promenade

The planting in this zone should emphasize mesic-hydric species as well as bioengineering-related plant species. Wetland and stream species are proposed north of the plaza near the Atlantic Promenade bridge. Plants in the EBB courtyard should be shade tolerant. A temporary forest / tree nursery will be planted at the future EBB II building site until construction on that phase begins. These trees can be planted at other locations on campus, particularly surrounding the Eco-Commons Pond (See also the Plant Palette in Section IV.7).

Trees and Shrubs

Acer rubrum 'Bowhall'
Bowhall Maple

Amelanchier spp.
Serviceberry

Betula nigra 'Duraheat'
Duraheat River Birch

Platanus x acerfolia 'Columbia'
Columbia Planetree

Taxodium ascendens
Pond Cypress

Aronia spp.
Chokeberry

Cephalanthus occidentalis
Buttonbush

Cornus sericea
Redosier Dogwood

Fothergilla spp.
Fothergilla

Shrubs, Grasses, Perennials

Ilex verticillata
Winterberry

Itea virginica
Sweetspire

Physocarpus opulifolius
Common Ninebark

Salix spp.
Willow

Viburnum dentatum
Arrowwood

Iris spp.
Iris

Juncus effusus
Common Rush

Panicum virgatum 'Shenandoah'
Shenandoah Switchgrass

Scirpus spp.
Bull rush

4. The Eco-Commons Pond

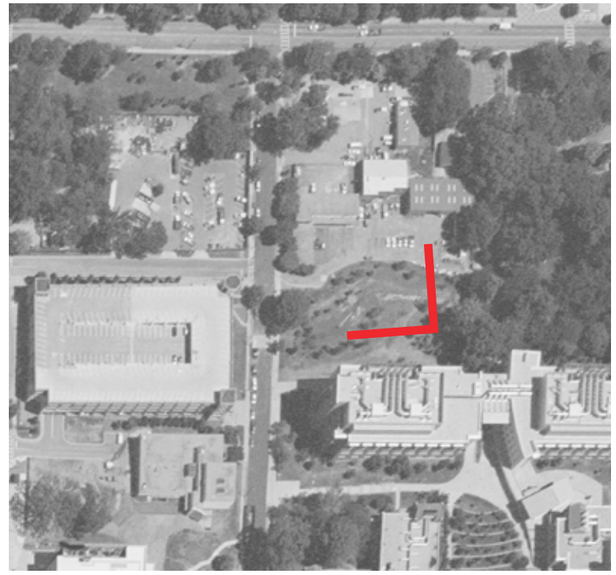
The Pond is the culmination of the Eco-Commons system, located at its low point. It is the ultimate public space of the stormwater sequence, both for the EBB complex and the entire Eco-Commons. The pond edges are defined by amphitheater seating on the north and west, and native aquatic vegetation along the south and east. Stored and conveyed stormwater collected at higher elevations flows to the Pond which provides spaces for reflection, teaching and study. A direct ADA-compliant path connection is established between the MS&E, EBB building complex, and Atlantic Promenade.

Proposed view toward the Eco-Commons Pond and EBB complex

Current view from near the MSE buildings

Precedents - constructed and natural pond edges

Proposed

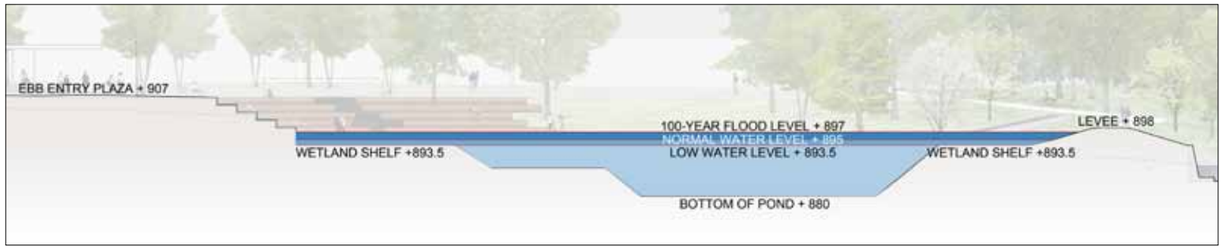


Existing

4. The Eco-Commons Pond (continued)

The dam overflow is located on the east side of the Pond. An alternate and secondary campus entry from 10th Street crosses over the dam between EBB Phase 2 and the forest that surrounds the President's house. Water collected from the raingardens along 10th Street can be visible along the path and will spill ultimately into the Pond. Structured and natural edges, including a bridge on the south side, overlap and provide an opportunity to experience the Eco-Commons while traversing the EBB sector landscape. Wetland shelves support varied vegetation that will eventually become wildlife habitat.

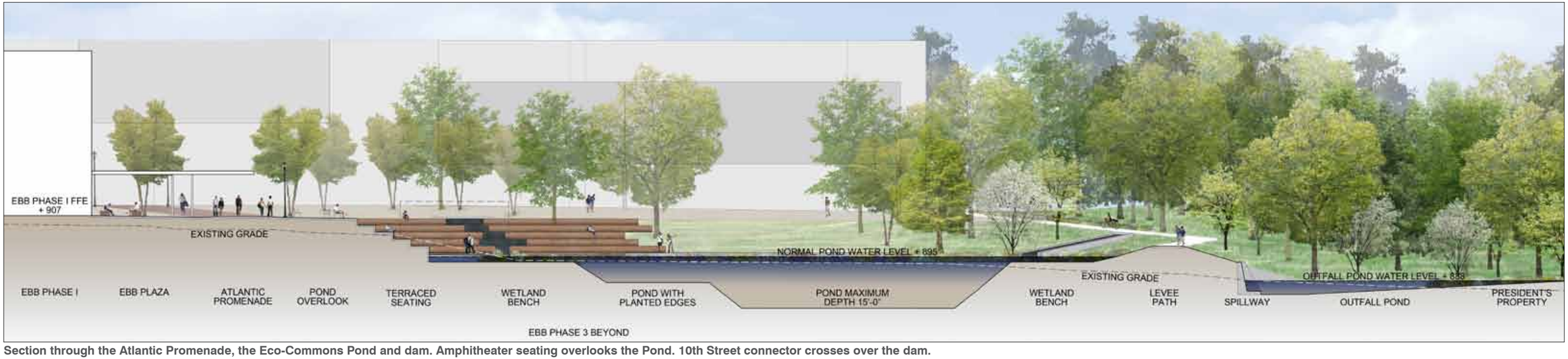
University of Virginia Dell, NBW



Proposed Water Levels Diagram

Proposed view north from Atlantic Promenade

Existing conditions



Section through the Atlantic Promenade, the Eco-Commons Pond and dam. Amphitheater seating overlooks the Pond. 10th Street connector crosses over the dam.

Suggested Plant Species for the Eco-Commons Pond

Since the Pond is the low point of the Eco-Commons, the vegetation should include primarily hydric-associated plants. Aquatic plants line the wetland shelves along the natural edges of the Pond. This planting promotes biodiversity through the creation of habitat and also provides educational, research and recreation opportunities. Interpretive and educational signage describing plant and stormwater relationships should be encouraged in the Pond and throughout the Eco-Commons. The plantings located uphill from the Pond should be reflective of a hydric-mesic forest, changing species closer to the water's edge. Meandering paths will traverse this woodland, connect the various sides of the Pond, and connect the surrounding research buildings. (See also the Plant Palette in Section IV.7).

Trees and Shrubs

Acer rubrum 'Bowhall'
Bowhall Maple

Acer saccharinum
Sugar Maple

Amelanchier spp.
Serviceberry

Magnolia virginiana
Sweetbay Magnolia

Nyssa aquatica
Water Tupelo

Quercus nigra
Water Oak

Quercus phellos
Willow Oak

Salix spp.
Willow

Taxodium ascendens
Pond Cypress

Pond-edge and Wetland Plants

Eleocaris spp.
Spike Rush

Juncus effusus
Common Rush

Kostelezkya virginica
Virginia Saltmarsh Mallow

Nuphar lutea
Yelllow Pond-Lily

Nymphaea spp.
Water Lily

Peltandra virginica
Green Arrow Arum

Pontederia cordata
Pickerelweed

Saururus cernuus
Lizard's Tail

Scirpus spp.
Bull Rush

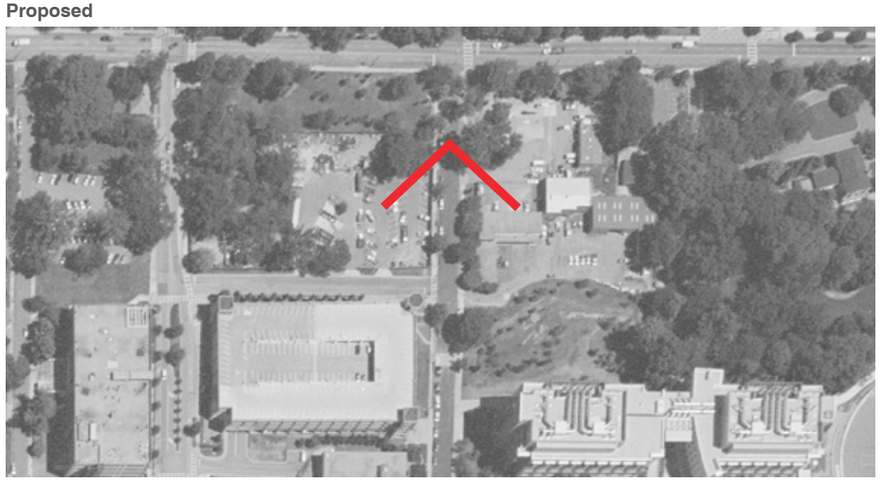
5. Atlantic Promenade

As stated previously, the promenade is currently known as Atlantic Drive and partially open to vehicular traffic. It was designated as a main pedestrian / bicycle circulation Design Corridor in the LMP. The Sector Plan further developed the concept of this important campus spine that connects 10th Street and the EBB Complex to Tech Green located in the South-Central Sector. The promenade traverses a variety of Eco-Commons vegetation zones that relate to the undulating topography. To improve the accessible route to and through the Eco-Commons, a portion of Atlantic will be raised up to eight feet at the Eco-Commons crossing (east of the existing parking deck).

A. Atlantic Promenade at EBB I and the Eco-Commons Pond

Brick paving with granite cobble edges is the established material for the promenade (refer to page 35). To signal the presence of the Eco-Commons, the Pond, and the presence of EBB phase 1, the promenade is interrupted by a granite plaza at the EBB complex. The promenade steps down to the water level and engages with water flow from the EBB courtyard. Shade trees planted along the promenade direct views toward the Pond and MS&E.

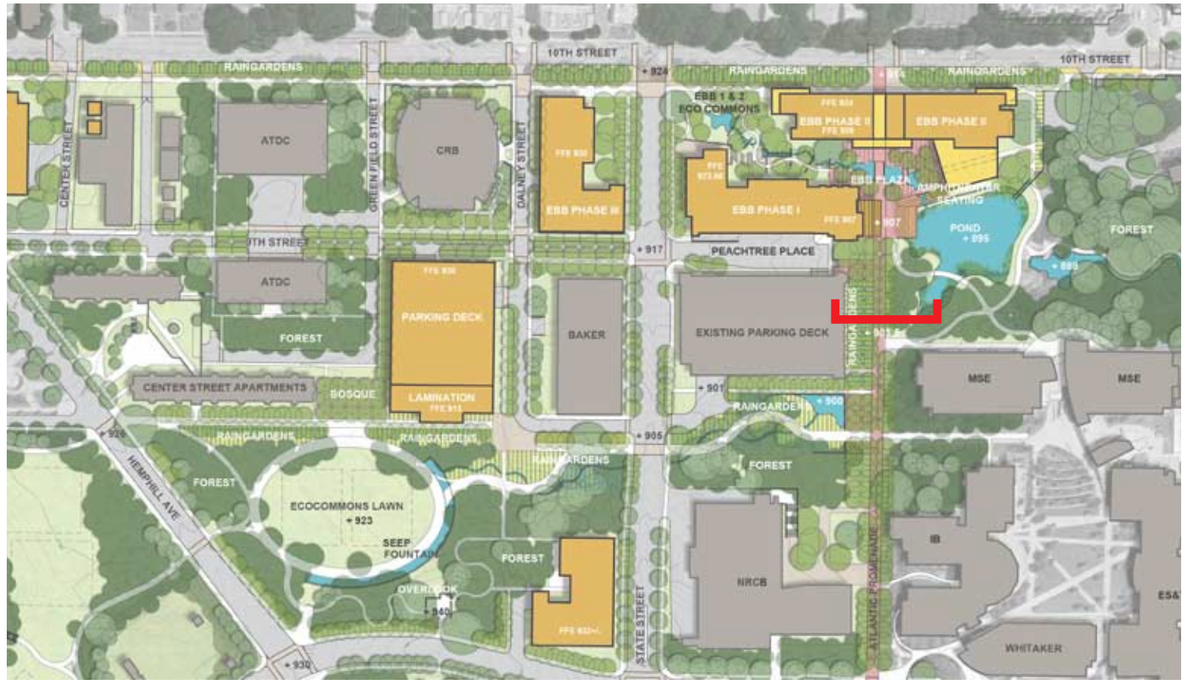
Proposed



Existing

Proposed view looking South on Atlantic Promenade toward the Eco-Commons Pond

Existing view looking south on Atlantic Drive, EBB 1 building site is on the right



B. Bridge and Eco-Commons Water Crossing

The grade of Atlantic Promenade is proposed to be raised by eight feet near the existing parking deck to create a more accessible route. A raingarden located along Atlantic collects and treats stormwater runoff from south of the deck and can be augmented by a cistern that collects water from the deck and other adjacent buildings. The water is then conveyed by gravity under the Atlantic Promenade to the Eco-Commons Pond. Bridges or crossing points that punctuate Atlantic Promenade mark important events in collection of stormwater. Further improvements include adjusting access to the parking deck to accommodate the change in grade of Atlantic Promenade, which eliminates the need for stairs or ramps.

Existing parking deck from Atlantic Promenade, looking north

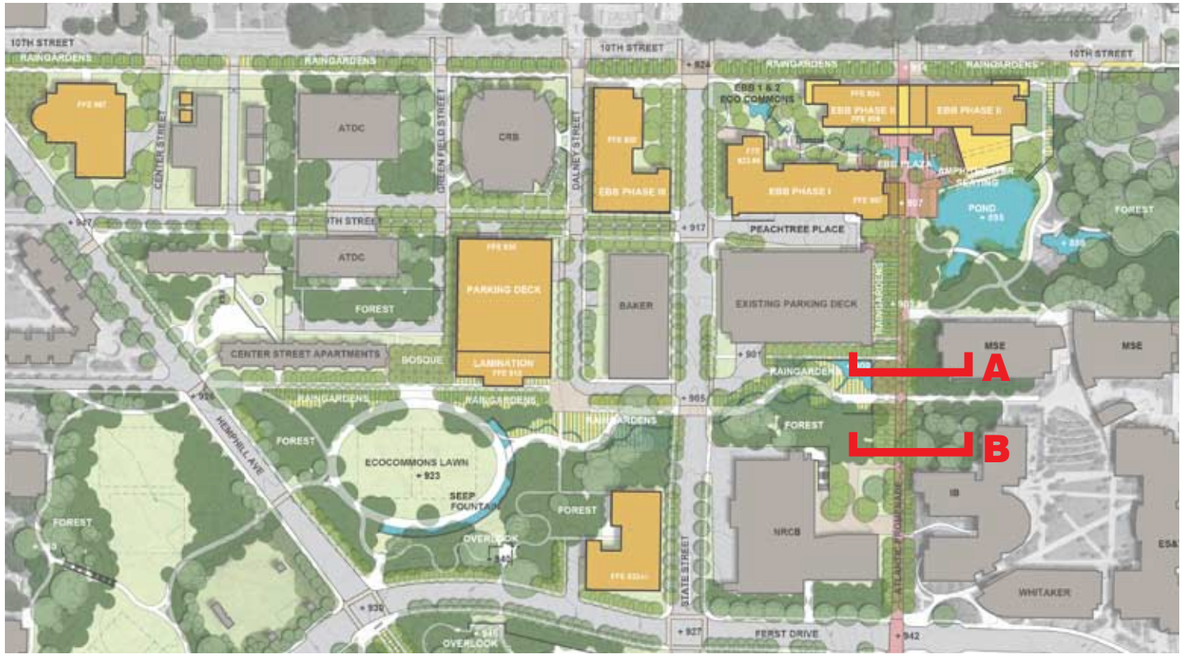
ADA access to the parking deck, looking south

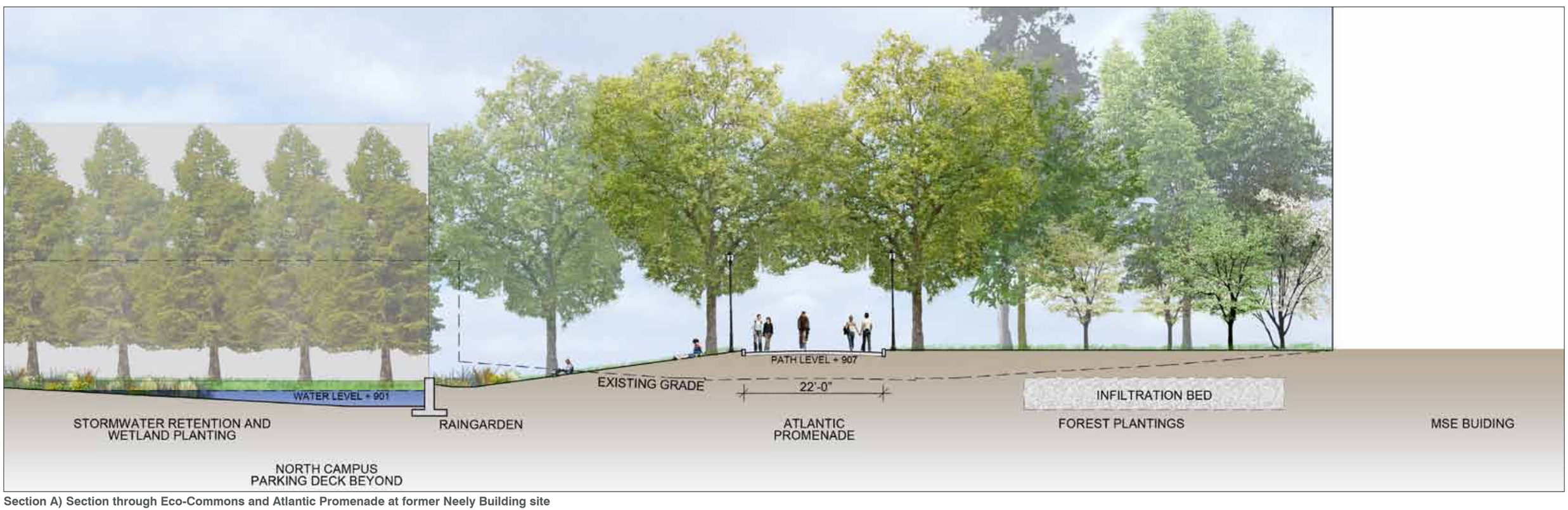
Section through Atlantic Promenade bridge at parking deck. Raingardens collect stormwater and convey it to the Pond

C. Atlantic Promenade at Former Neely Building

A stormwater collection basin commemorates and reclaims the location of the demolished Neely Building by tracing the former foundation with new basin walls. Stormwater is slowed, collected and pooled within the footprint of the former Neely Building. The stormwater traces the Eco-Commons pathway in this area from State Street to Atlantic Promenade. Infiltration cells are also located on the east side of Atlantic to collect rainwater from adjacent buildings and store it for use in the Eco-Commons Pond. These cells cannot be located under Atlantic due to existing utility infrastructure. This area of the Eco-Commons is a narrow 220 feet between the parking deck and the current Marcus Nanotechnology Building and because of this dimension it is designated a sacred space within the Eco-Commons ribbon.

View north on Atlantic Drive; Neely Building at left is slated for demolition





Section A) Section through Eco-Commons and Atlantic Promenade at former Neely Building site

Quercus phellos
Willow Oak

Betula nigra 'Duraheat'
Duraheat River Birch

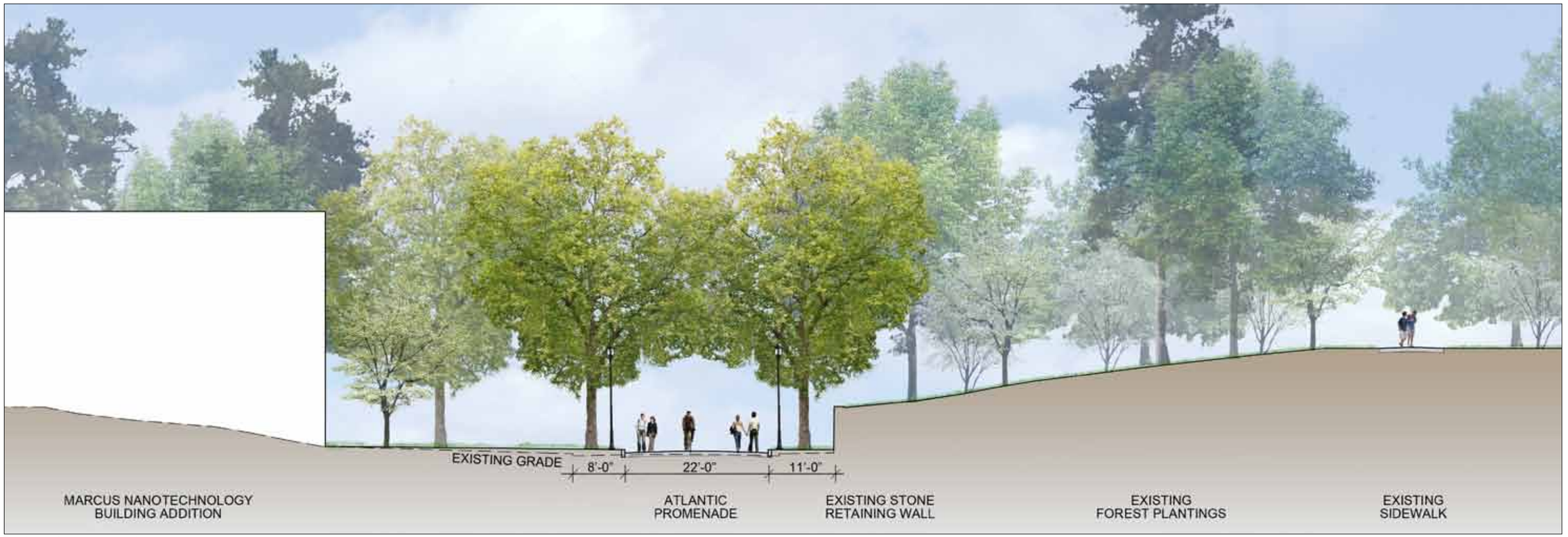
Platanus spp.
Planetree / Sycamore

D. Atlantic Promenade Forest

At this point, the raised Atlantic Promenade meets existing grade. Just south of this proposed section are the existing prototype pavement and planting improvements that the rest of the Promenade will adopt: brick and cobble edges, with a forested edge planting. As the grade climbs, the Promenade enters an existing and enhanced forested area north of the EBB building.

Unimproved Atlantic Promenade at Marcus Nanotechnology Building

Improved paving and planting at Atlantic Promenade



Section B) Forest section

6. Eco-Commons at Baker Building

The surface parking lot south of the Baker Building is converted into a seasonal raingarden with structured weirs for slowing, infiltrating and revealing stormwater. An infiltration cell will be potentially placed under the terminus of the raingardens, refer to the Stormwater Master Plan for specific recommendations. A number of existing mature trees in this location will be incorporated as armature of the adjacent Eco-Commons forest. The path is part of the 8th Street Design Corridor which connects the west and east ends of the EBB sector with the primary Eco-Commons pathway and passes through the Eco-Commons Lawn. It is intended as a cool, shaded alternative pedestrian route through campus. Existing surface parking is relocated to the proposed parking deck west of Baker Building and the existing North parking deck is accessible across State Street.

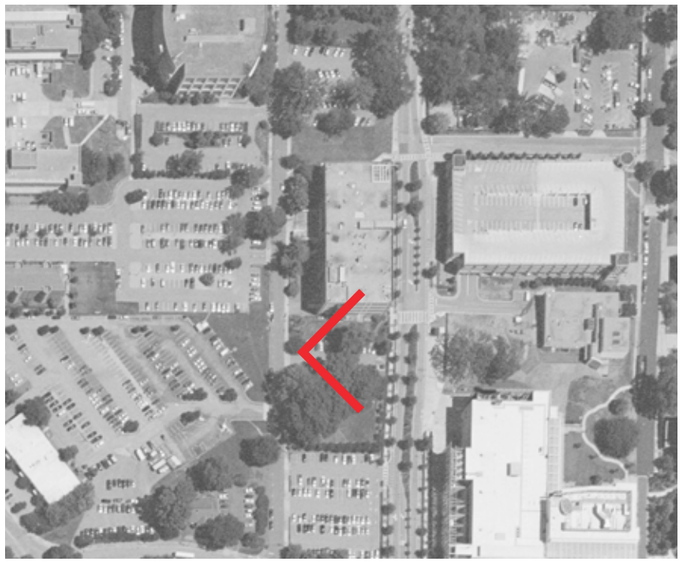
Proposed - Eco-Commons connection passes by an ephemeral stream

Proposed

Raingarden with weirs - spring (NBW)

Raingarden with weirs - summer (NBW)

Existing - surface parking lot south of the Baker Building



Existing

Trees along Dalney Street

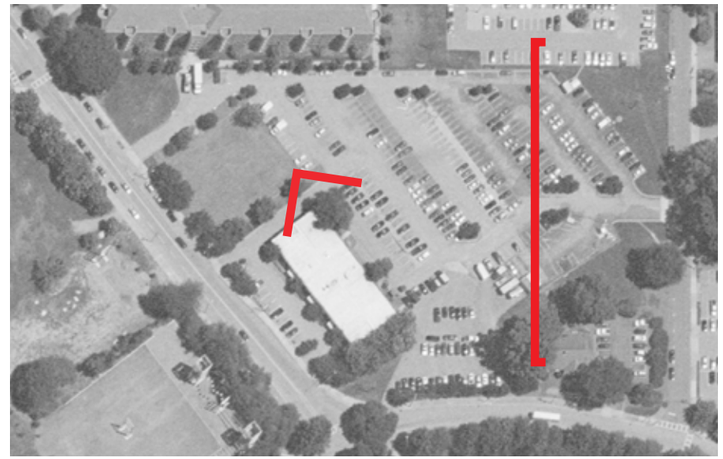
Existing mature trees surround Baker parking lot

7. Eco-Commons Lawn

The location of the proposed recreational lawn is currently an extensive surface parking lot and building (the Georgia Tech Police Department). It is adjacent to student housing and the busy intersection of Hemphill Avenue and Ferst Drive. The location benefits from topography that obscures Ferst Drive on the south side. It is central to the Eco-Commons ribbon and the primary pedestrian connector to the EBB sector from Couch Park. The playing fields and lawn area accommodates two informal intramural playing fields. A seep fountain on the south side of the lawn also functions as a retaining wall. A large stormwater collection cistern and infiltration cells may be located under the playing fields and lawn. Additionally, a potential black water treatment location has been identified south of the proposed parking deck making this area central to accomplishing the Institute's water reuse and stormwater reduction goals.

Potential passive and active uses of the Eco-Commons Lawn

Proposed Eco-Commons Lawn with underground cisterns and black water treatment



Existing surface parking lot

Eco-Commons playing fields, lawn, overlook and seep fountain

7. Eco-Commons Lawn (continued)

Proposed - Eco-Commons Lawn replaces extensive surface parking and provides student recreation opportunities and a new underground stormwater storage cistern

Existing - extensive surface parking lot east of Hemphill Avenue

Suggested Plant Palette for the Eco-Commons Lawn

The palette in this area of the Eco-Commons should reflect hydric to mesic open park conditions, as well as a diverse, mesic forest edge hillside. This is one of the few open lawn areas the Sector Plan proposes within the Eco-Commons to accommodate larger recreation opportunities within a clearing in the Forest Ribbon. Once again, shade is an important aspect of the proposed design, with park specimen trees planted along the edge of the oval. The hillside should be planted with native shrub understory and trees that reflect the Eco-Commons forest setting (See Plant Palette in Section IV.7).

Trees at Play Lawn Edge and Hillside Trees

Liriodendron tulipifera
Tulip Poplar

Nyssa sylvatica
Black Gum

Platanus spp.
Planetree

Ulmus spp.
Elms

Amelanchier spp.
Serviceberry

Carpinus caroliniana
Musclewood

Carya spp.
Hickories

Cercis canadensis
Redbud

Chionanthus virginicus
Fringetree

Hillside Trees and Shrubs

Fagus grandifolia
American Beech

Halesia tetraptera
Carolina Silverbell

Quercus spp.
Oaks

Aesculus parvifolia
Bottlebrush Buckeye

Hamamelis x intermedia
Witch Hazel

Hydrangea quercifolia
Oakleaf Hydrangea

Polystichum acrostichoides
Christmas Fern

Vaccinium spp.
Blueberry

Viburnum dentatum
Arrowwood

8. 10th Street Corridor - Campus Edge

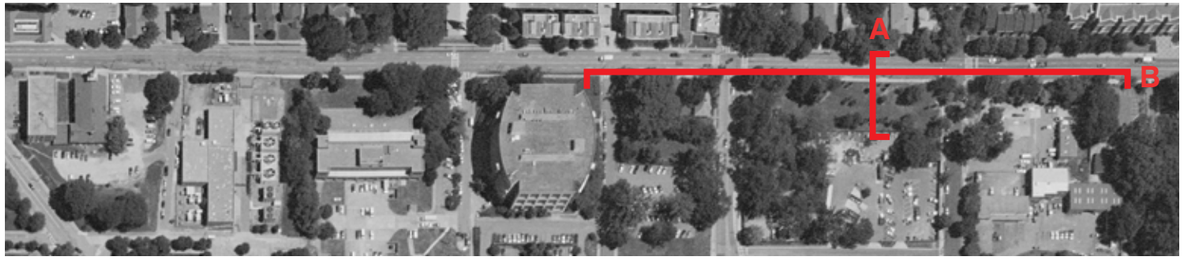
The north campus edge of 10th Street is a busy four-lane road that divides the campus from the Home Park residential neighborhood. Currently the campus presence along this edge is not well defined and presents a fragmented character with a partially built edge, sites where buildings have been demolished, the Chiller Plant, and a narrow sidewalk with overhead utilities. The Sector Plan proposes all overhead utilities be placed underground. The ultimate goal is to create a unified and welcoming face for Georgia Tech with gateways to mark the main access points to campus (Hemphill Avenue, State Street, Atlantic Promenade).

To achieve this goal, the Sector Plan proposes a continuos 60' setback from the Hemphill Avenue intersection to the eastern edge of the EBB Phase 2 building site. In a January 2012, EBB design charrette, with Lake Flato and Cooper Carry, the sector team explored three setback options: 30' (urban character), 60' (parkland campus edge) and 90' (deep parkland edge). The 60' parkland campus edge is the recommendation.

The 60' setback is composed of the following elements:

- 15' wide raingarden that harvests water from 10th Street and conveys it to the Eco-Commons Pond
- 15' wide planting strip with street trees to shade the adjacent dedicated bike lanes and walkways
- 8' wide dedicated two-way bike lane
- 22' wide flexible sidewalk / cafe / plaza/ building activity zone adjacent to current and proposed buildings

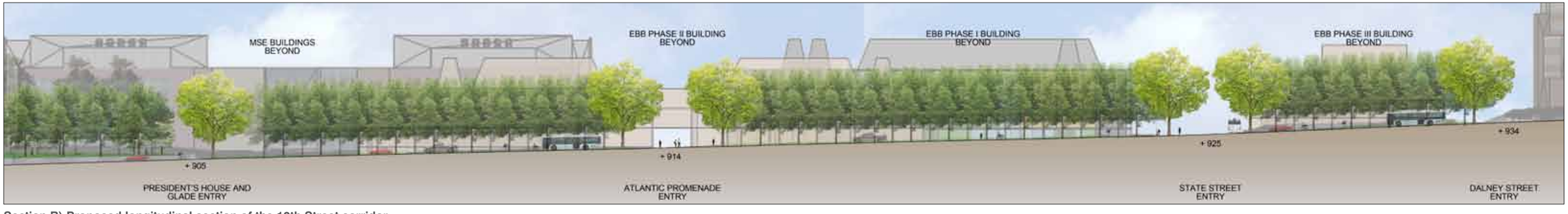
Proposed



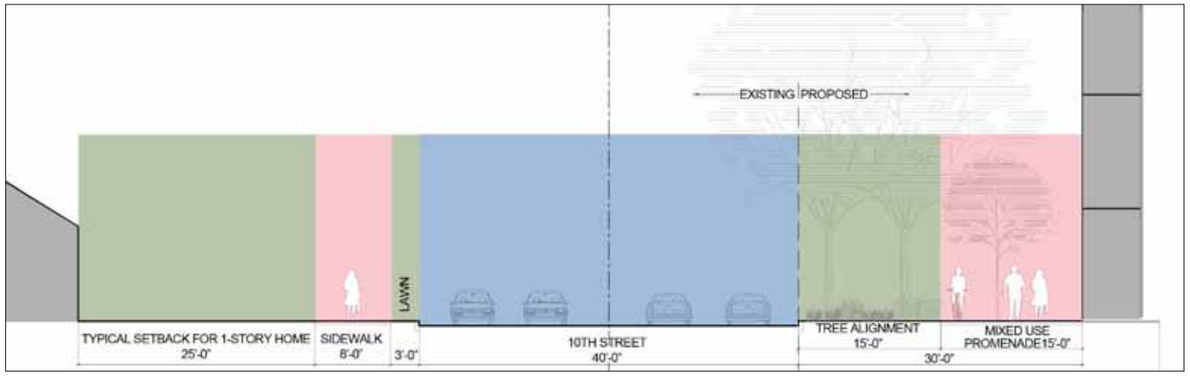
Existing

Section A) Proposed typical cross-section through 10th Street with 60' setback

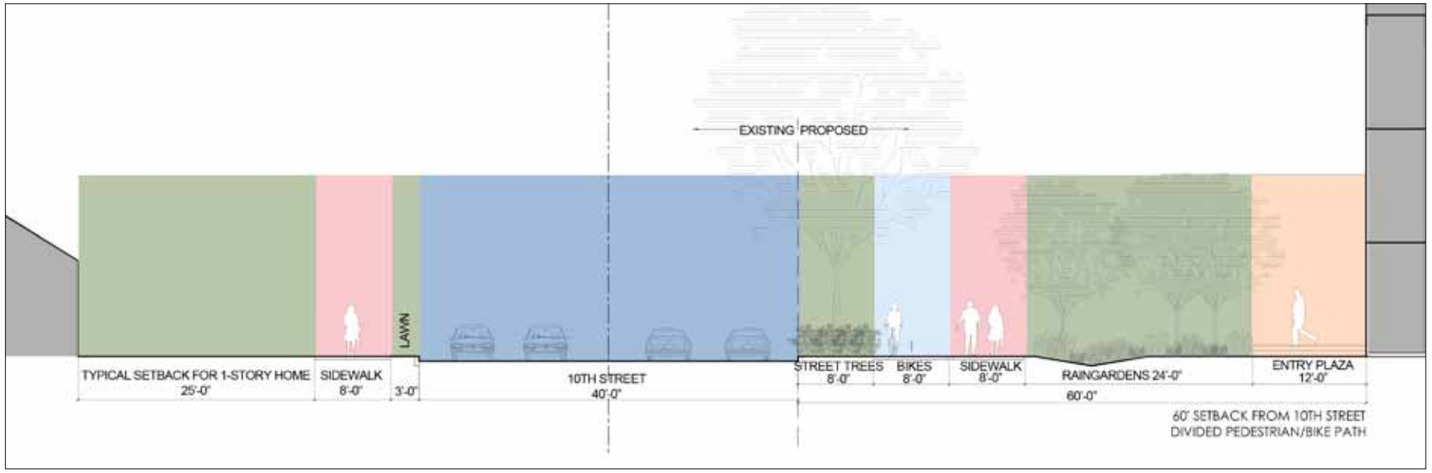
Home Park residential neighborhood on the north side of 10th Street



Section B) Proposed longitudinal section of the 10th Street corridor

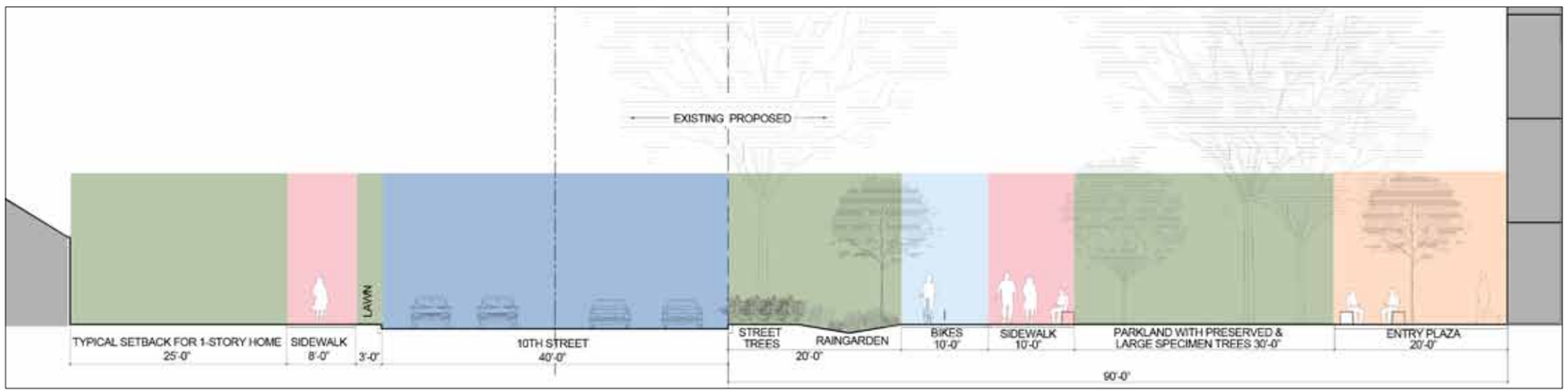


30' setback shows urban campus edge with shared bike and pedestrian path

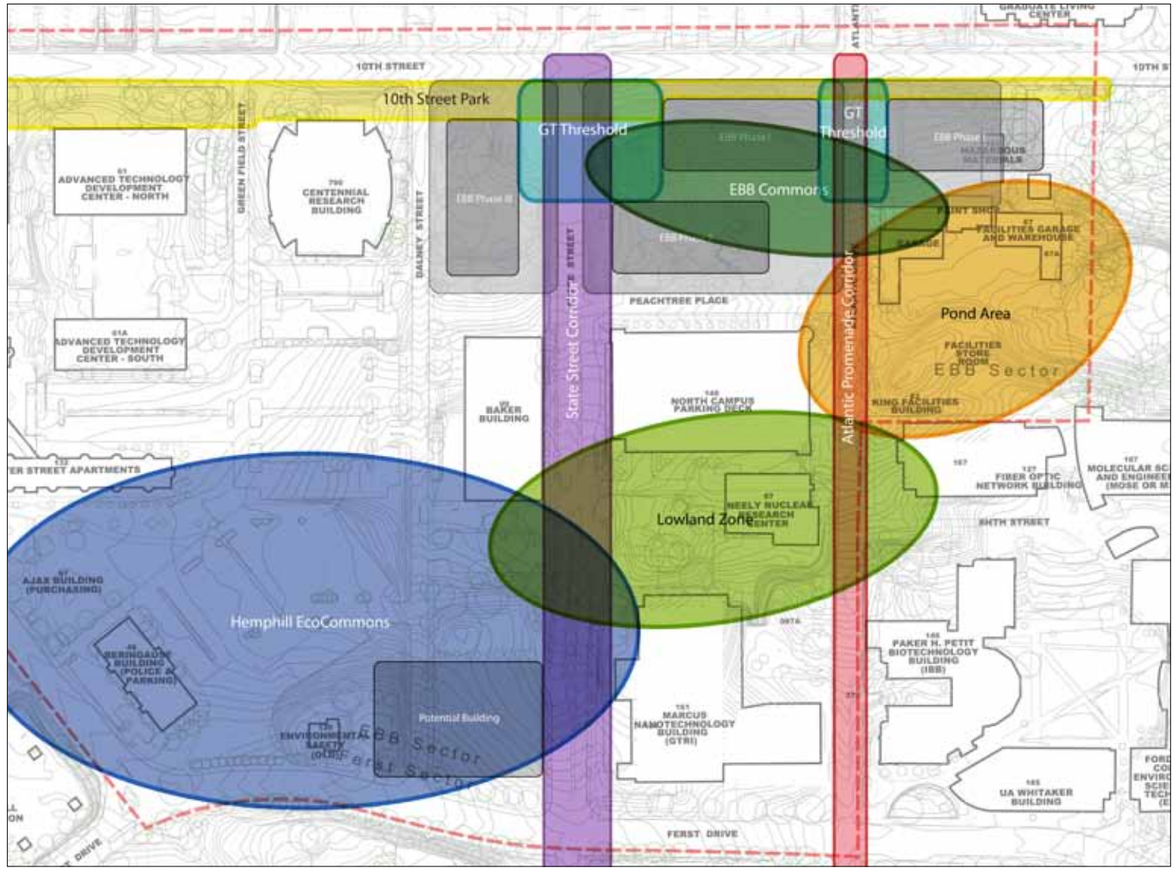


60' setback variation with raingardens, parkland character and dedicated bike lane

Precedents of street and path edge planting



90' setback proposes a parkland edge with dedicated bike lane and extended entry plazas



10th Street as part of the larger campus framework and its relationship to the Eco-Commons

10th Street Corridor - Setbacks and Potential Streetcar

The design team was asked to study the potential of incorporating a streetcar along the 10th Street corridor. The renderings presented here show the streetcar's impact on the proposed 60' setback. By adding a 15' dedicated streetcar ROW on the south side of the street the planted edge separating the street pedestrians and bicyclists is reduced to 15'. The raingardens would be potentially eliminated. The north side of 10th Street would have a shared streetcar / travel lane.

10th Street with continuous 60' setback and raingardens

10th Street with potential streetcar lane and 45' setback

Existing 10th Street edge conditions at CRB

10th Street at ATDC

Parking lot at Greenfield Street and 10th Street intersection

Corner of 10th Street and Hemphill Avenue

Suggested Plant Palette for 10th Street Corridor

The palette should include mesic street trees as well as understory and raingarden species that tolerate drought and pollution. It should be simple and unified in character. It should visually relate to the streetscape along relocated Tech Parkway. The raingardens will convey stormwater from 10th Street to the Eco-Commons Pond. (See Plant Palette in Section IV.7)

Trees

Carpinus caroliniana
Musclewood

Celtis laevigata
Sugarberry / Hackberry

Cercis canadensis
Redbud

Crataegus viridis 'Winter King'
Winter King Hawthorn

Quercus coccinea
Scarlet Oak

Ulmus americana 'Princeton'
Princeton Elm

Raingarden Species

Hemerocallis spp.
Daylily

Iris spp.
Iris

Juncus effusus
Common Rush

Panicum virgatum 'Shenandoah'
Shenandoah Switchgrass

Scirpus spp.
Bull rush

Itea virginica
Sweetspire

9. EBB Traffic Impact Assessment Summary and Conclusions

A traffic impact study (TIS) for the EBB sector assessed existing conditions operations at key intersections, provided future trip projections, evaluated future conditions traffic operations, and provided recommendations regarding appropriate roadway/ intersection capacity and design elements. The purpose of the TIS was to support both the design of the Engineered BioSystems Building (EBB) and overall sector development. The study considered increased traffic activity in the EBB sector based on planned parking supply expansion, parking facility locations, EBB service/loading activity, visitor activity, and the elimination of Atlantic Drive as a roadway open to public travel. The findings of the TIS provide guidance for transportation facility design to maintain acceptable traffic operations after implementation of the sector plan development.

The evaluation indicated that Georgia Tech should construct two lanes on northbound State Street at 10th Street, eliminate on-street parking, and construct a median separating the northbound and southbound lanes. Access to the southwest corner of North Deck parking garage from State Street should be widened and relocated opposite a planned 8th Street approach on the west side of State Street. Continuous bicycle lanes on State Street should be extended to 10th Street, the campus border.

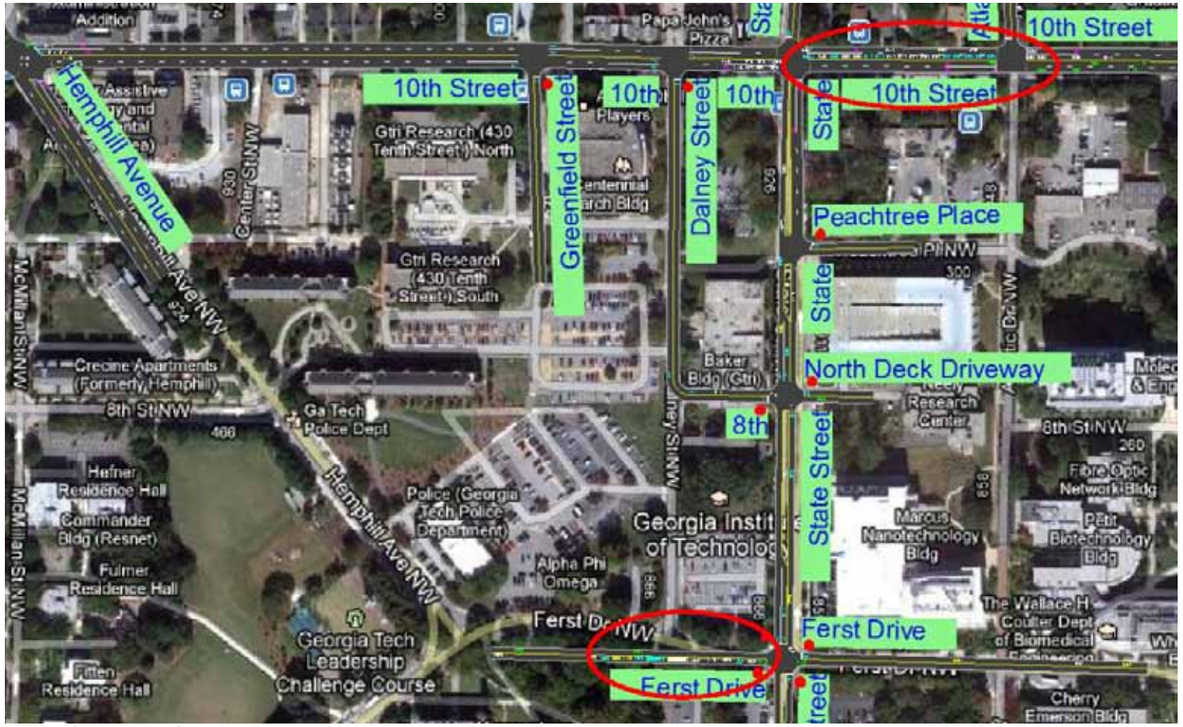
The evaluation indicated that widening 10th Street to provide access or operational improvements is unnecessary, but traffic signal upgrades at both the 10th Street / State Street and 10th Street/Atlantic Drive intersections will be necessary to address the modified lane geometry on State Street and closure of Atlantic Drive to vehicle traffic. The evaluation indicates that the 9th Street corridor is also unlikely to be necessary to address projected traffic operations in the EBB sector, but could support expanded campus shuttle service within the campus and provide a more robust circulation plan in general.

Traffic signals at both the 10th Street / Greenfield Street and 10th Street / Dalney Street intersections are unwarranted based on Manual of Uniform Traffic Control Devices (MUTCD) criteria. A new traffic signal at the Ferst Drive / State Street intersection, which experiences significant pedestrian crossing activity, is recommended to actively control both traffic and pedestrian crossing movements.

Additionally, the EBB sector plan includes significant modifications to campus parking facilities and supply in and around the EBB sector. Planned parking system changes under the plan include the following:

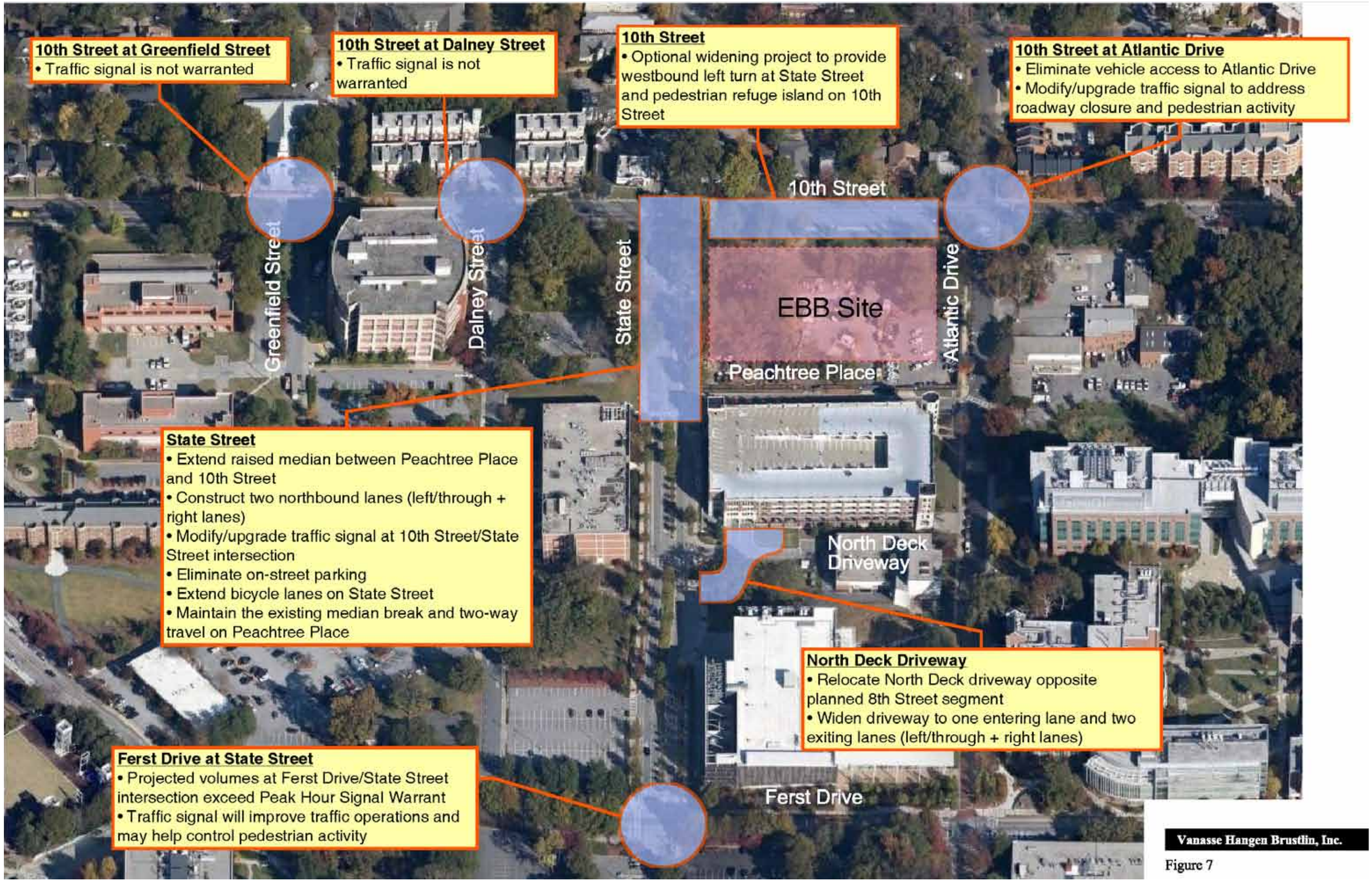
- Approximately 1,475 existing surface parking spaces in the EBB and Ferst Sectors are planned to be eliminated for development of new campus facilities and the Eco-Commons.
- The sector plans currently propose to construct two new parking facilities in the EBB and Ferst sectors, including:
  - A new free-standing parking structure between Greenfield Street and Dalney Street, west of Baker Hall (assumed capacity of up to 850 vehicles for analysis purposes). This parking structure is assumed to be accessible from both 10th Street and State Street via several campus roadway connections, including Greenfield Street, Dalney Street, and a planned 8th Street segment, as shown on the EBB sector plan.
  - A new parking structure within the proposed building in the southwest quadrant of the Ferst Drive/State Street intersection (assumed capacity of up to 200 vehicles for analysis purposes), accessible from State Street.
- Georgia Tech intends to fully utilize approximately 500 underutilized spaces in the Graduate Living Center (GLC) parking garage to support parking demands in the EBB sector.

A copy of the full TIS is included in Section 1 of the Appendix. Section 2 includes a summary presentation of the full report.



Future Conditions Queuing (AM Peak Hour)

Future Conditions Queuing (PM Peak Hour)



Vanasse Hangen Brustlin, Inc.

Figure 7

Summary of Proposed Transportation Modifications

10. Utility Infrastructure Plan

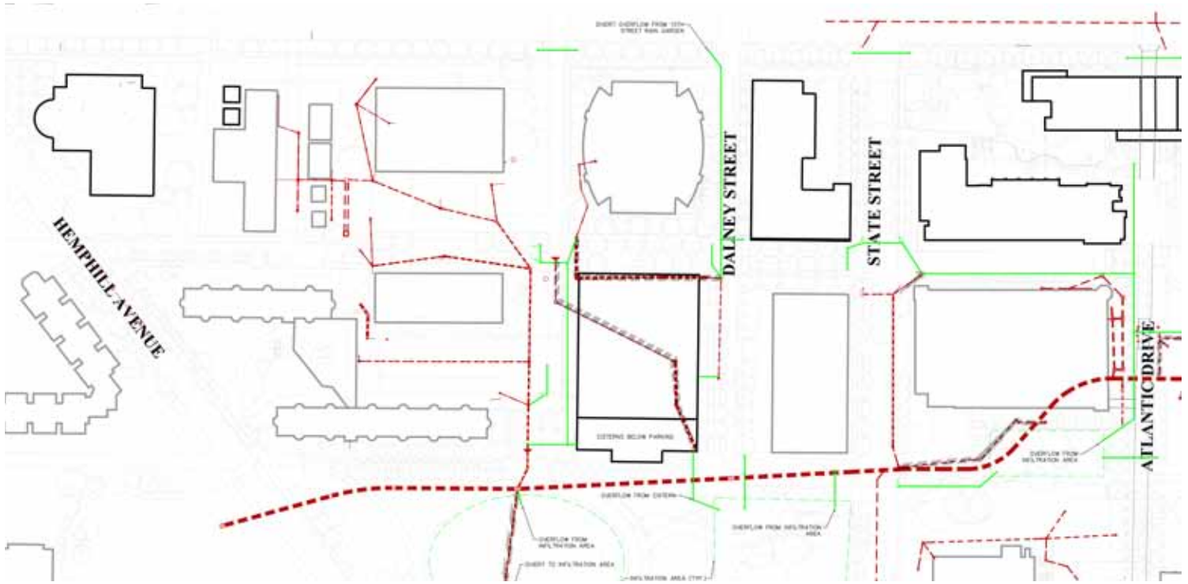
A preliminary utility master plan was prepared for each sector in parallel with the development of the sector plan. Existing utilities within the EBB sector include: natural gas, power, sanitary sewer, water, chilled water and steam, storm and communications.

Both 9th Street and Atlantic are major existing utility corridors within the EBB Sector. Some portion of each of these streets carries virtually all of the utilities mentioned above. These utilities represent a major institutional investment in infrastructure and so care has been taken in the sector plans to minimize disruption to these critical utility corridors. It is worth noting here that the extension of 9th Street east to State Street has been explored in this sector plan and is shown as a long-range possibility. However, given both the topographic grade change and the telecommunications infrastructure located in this area there would be significant expense involved in making that connection.

There is one major regional, City of Atlanta, utility line which runs through this sector; it is a 72" reinforced concrete pipe which serves as a combined storm and sewer line. This large line runs generally southwest to northeast across this sector and lies within the Eco-Commons zone.

It is also important to note that the existing Chiller Plant located at 10th Street and Center Street will be expanded shortly in order to accommodate the new development in this sector. A significant portion of that future demand will come on-line in 2014 with the completion of the first phase of the Engineered BioSystems Building complex located at State and 10th Streets. A master plan for the expansion of the 10th Street Chiller Plant is underway now.

A summary utility infrastructure report, prepared by Jacobs Engineering, is included in Section 4 of the Appendix.



Proposed water plan

Existing utilities in the EBB Sector; stormwater, communications, sanitary sewer

Existing chiller plant slated for expansion

VII. CLOSING

This Plan has explored the potential for future growth and expansion in both the South-Central and the EBB Sectors. While quite different in size, function and physiography, each of these sectors holds the potential to evolve more fully into exciting and diverse academic campus communities. The plan recommends physically organizing these expanded communities around a dedicated central open space – the Forest-Ribbon Eco-Commons – while also emphasizing and reinforcing the traditional urban grid. Each sector has the capacity for significant future growth with the plans showing the potential for 1.9 million square feet of new academic and/or research space.

Sector Overview – Forest Ribbon/Eco-Commons as Organizing Concept

This sector planning effort has taken a strong landscape orientation from the outset – building on the Eco-Commons concept articulated in the Landscape Master Plan Update. The Eco-Commons is intended as a permanent open space in the heart of campus providing for both stormwater management and outdoor recreational uses. The implementation of the Eco-Commons is to be given top priority on campus, so that it can become a permanent functional entity. The sector plans embrace this concept and have proposed the Forest Ribbon as a further refinement of the idea and as the primary physical organizing element within this central portion of the campus.

The Forest Ribbon is to be comprised of sinuous woodland, pathways, open lawn areas and stormwater conveyances which wind through the campus providing a large, continuous and functional open space system connecting many parts of the campus. This Forest Ribbon Eco-Commons is intended to be a sacred, dedicated and permanent open space.

South-Central Sector Plan

The South-Central Sector includes a number of important and potentially catalytic projects. These include the Ferst Center for the Arts expansion, the redevelopment of the IC Lawn as a key component of the Forest Ribbon; the conversion of the Hemphill and State Street Corridors, inside of Ferst Drive, to a linear, green pedestrian/bicycle/transit/service environment; and, perhaps most important, in the southwestern corner of the sector there is the potential to reconfigure the campus road network making significant redevelopment and expansion in this area of the campus possible.

EBB Sector Plan

The EBB Sector, while smaller than its southern neighbor, also holds great potential for growth and change. In fact, change is already coming to this sector in the form of the first building in a major new three-building research complex. The EBB Phase 1 project will bring increased visibility, activity and presence to the 10th Street campus edge. EBB Phase 1 has been the driver of the planning for this sector and has resulted in a new unified vision for the 10th Street campus edge. Growth in this sector will also stimulate the need for other new facilities including the expansion of the 10th Street Chiller Plant and ultimately the addition of a new parking structure. Serving as the major open space element, the Forest Ribbon has a major presence in this sector with the large level Eco-Commons Lawn, near Hemphill Avenue, and a final celebration of the campus-wide Eco-Commons system at the proposed Eco-Commons Pond just east of the Atlantic Promenade.

Ongoing or Recently Completed Projects

A series of related master planning projects have also been underway in parallel with this sector planning effort. They include the:

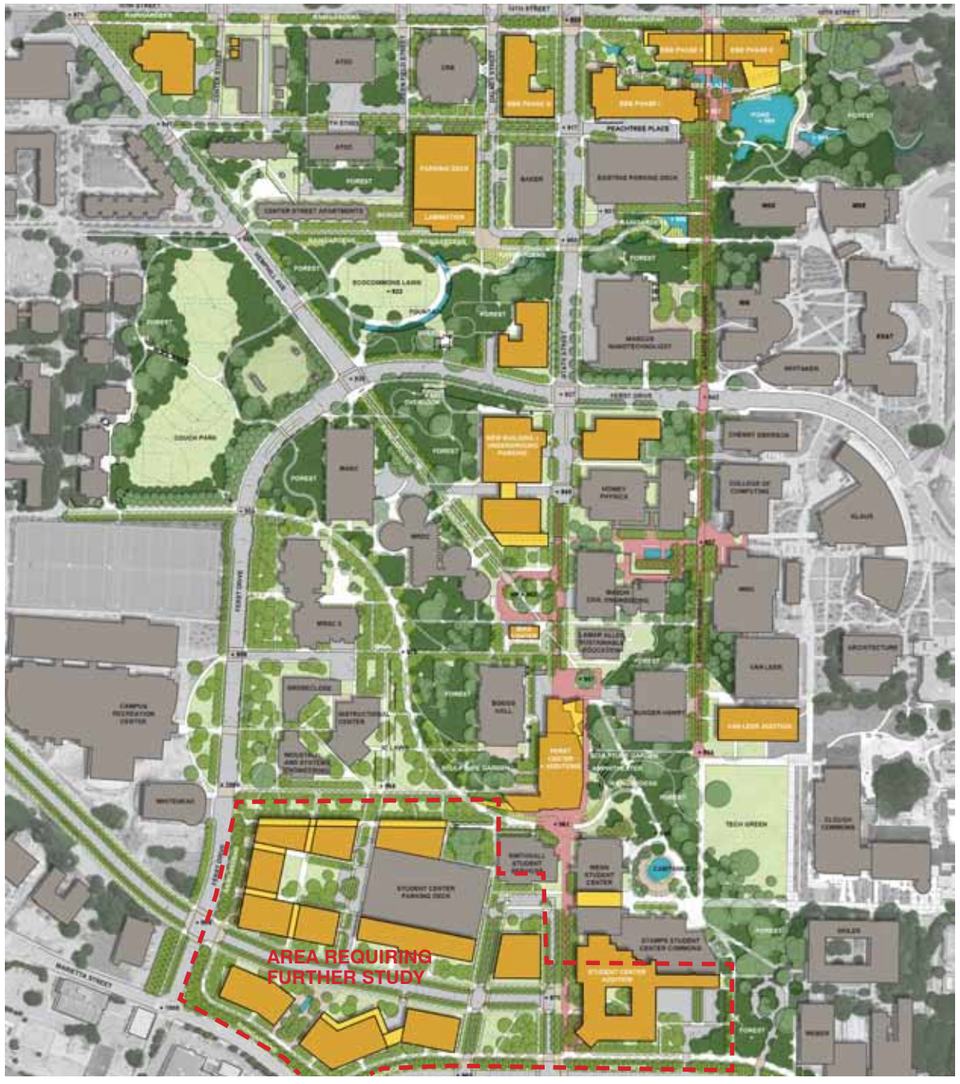
- Basin A Stormwater Master Plan (Jacobs/Long Engineering/jB+a)
- Blackwater Feasibility Study (Sustainable Water)
- 10th Street Chiller Plant Master Plan and Expansion (RMF Engineering)

A copy of the Executive Summaries for each of these studies is included in the Appendix.

Closing

Both sectors, while different in character, provide a significant opportunity for change in the coming decade. These sectors represent a transect through the center of the campus and, as a result, provide connectivity and continuity with most of the core campus. The sectors have the potential for significant expansion and growth – providing for a potentially denser campus environment and therefore emphasizing the need for a strong focus on and commitment to the implementation, preservation and enhancement of the Forest Ribbon Eco-Commons.

The first major component of the EBB Sector is already underway with the construction of the EBB – Phase I project and it will be exciting to see how these plans sectors evolve overtime. The EBB and South-Central Sectors, as envisioned in this plan, will help the Institute continue its development of a campus environment worthy of the Institute's world class reputation.



Engineered BioSystems Building and South-Central Sectors Master Plan

APPENDIX
ENGINEERED BIOSYSTEMS BUILDING (EBB) & SOUTH-CENTRAL CAMPUS SECTOR PLANS

Georgia Institute of Technology

May 2013

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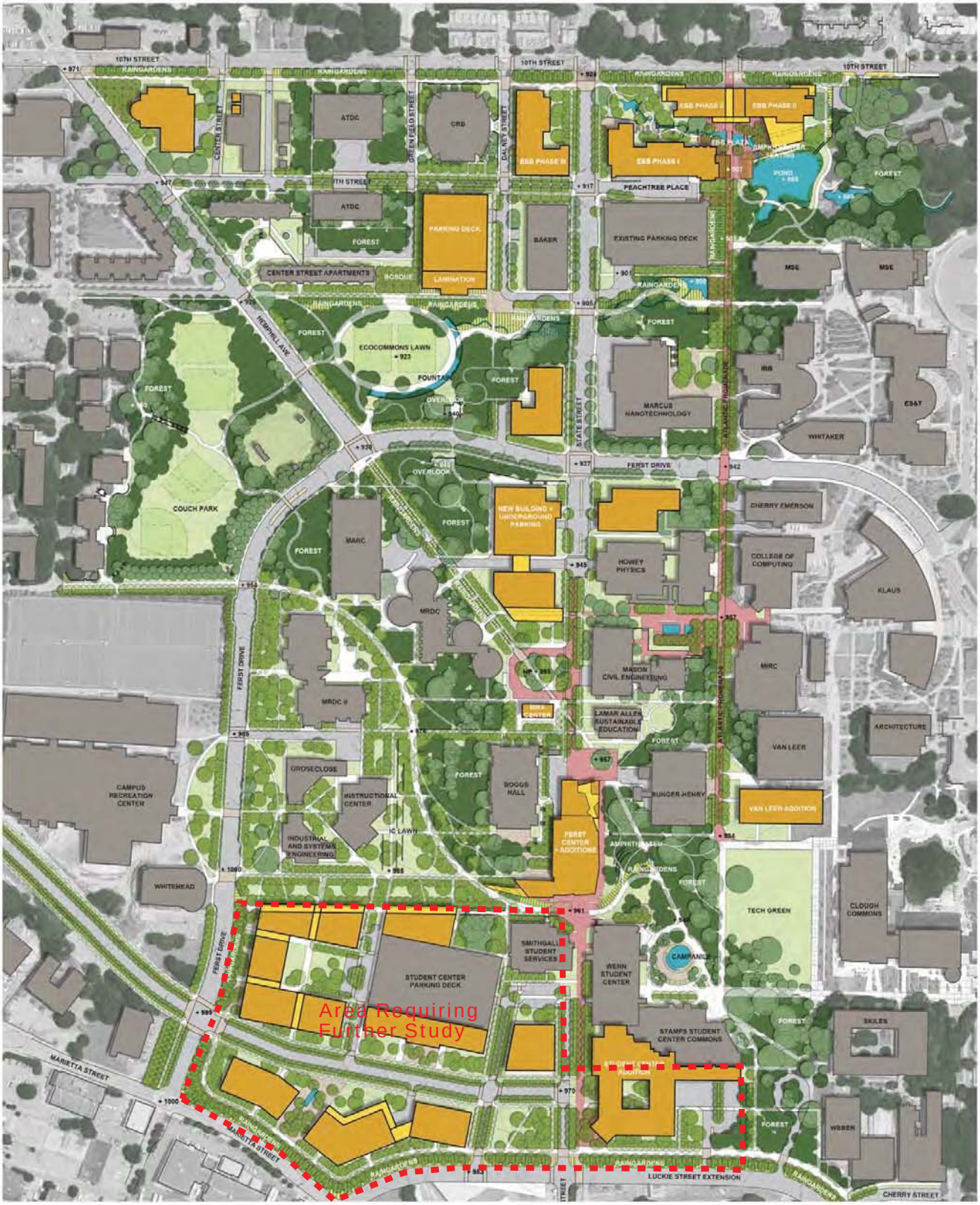


NELSON BYRD WOLTZ LANDSCAPE ARCHITECTS

JBa

GCS Campus + Community Strategies LLC

Vanasse Hangen Brustlin, Inc.

RENDERED SITE PLAN

August 21, 2012

SCALE: 1" = 100'

0 200 400

N

May 2013

Section 1

Technical Memorandum; EBB Sector Plan Traffic Impact Assessment; Vanasse Hangen Brustlin, Inc. (VHB), May 30, 2012

Transportation
Land Development
Environmental
Services

Vanasse Hangen Brustlin, Inc.

8601 Georgia Avenue
Suite 710
Silver Spring, MD 20910
(301) 562-9433
FAX: (301) 562-8706

Technical Memorandum

To: John M. Fish, ASLA, APA
jB+a, inc.

Date: May 30, 2012

Project No.: 38082.00

From: Daniel L. Lovas, P.E.
Christopher Conklin, P.E.

Re: Draft - EBB sector plan Traffic Impact Assessment
Georgia Institute of Technology
Atlanta, GA

INTRODUCTION

Vanasse Hangen Brustlin, Inc. (VHB) has conducted an evaluation of the traffic impacts associated with planned development in the EBB sector of the Georgia Institute of Technology campus in Atlanta, GA. This evaluation is intended to assess existing conditions operations at key location in the EBB sector, provide future trip projections, evaluate future conditions traffic operations, and provide recommendations regarding appropriate roadway/intersection capacity and design elements.

The findings of this evaluation are anticipated to support both the design of the Engineered Biosciences Building (EBB) and overall sector development. The EBB will be one of the first major buildings constructed along the 10th Street corridor since the adoption of the most recent campus master plan. The building represents a major investment in new research and academic facilities to support the expanding biosciences program at the Georgia Institute of Technology. The proposed building is also adjacent to the proposed Eco-Commons, identified in the Landscape Master Plan, the North Parking Deck (W23 in Georgia Tech parking records), a major campus parking facility, and is in an area identified as suitable for new campus parking facilities. The EBB project will ultimately occupy multiple blocks, starting with Phase 1 on the block defined by 10th Street, Peachtree Place, State Street, and Atlantic Drive, and expanding over two additional phases to the parcels west of State Street and east of Atlantic Drive.

The following is a summary of the primary findings of this traffic impact assessment, in brief:

- The evaluation indicates that the following roadway and intersection geometry modifications are appropriate:
    - Construct a raised median along State Street between Peachtree Place and 10th Street. This assumes the Institute intends to retain the existing raised median treatment along the southern portions of State Street.
    - Construct two northbound lanes on State Street (left/through + right lane) approaching 10th Street.
    - Eliminate on-street parking on State Street between 10th Street and Peachtree Place.

- Eliminate approximately 50-100 feet of on-street parking along northbound State Street, north of 10th Street, to provide an adequate receiving lane for traffic exiting the campus (this is dependent on the median width and final alignment/lane geometry for State Street within the campus).
- Extend bicycle lanes along State Street between Peachtree Place and 10th Street (or further to the north based on coordination with the City of Atlanta).
- Relocate the North Deck driveway intersecting with State Street approximately 80 feet to the south to align opposite the planned 8th Street approach.
- Construct one lane for entering traffic and two lanes for exiting traffic (left/through + right lanes) from the North Deck on the driveway intersecting State Street.

- The evaluation indicates that widening 10th Street to provide a westbound left-turn lane at State Street is unnecessary to maintain adequate intersection operations but could provide the opportunity to construct a median treatment on 10th Street between State Street and Atlantic Drive, which would provide a pedestrian refuge to improve pedestrian safety for crossings at the planned Atlantic Drive pedestrian corridor.

- Traffic signal modifications and upgrades at both the 10th Street/State Street and 10th Street/Atlantic Drive intersections will be necessary to address the modified lane geometry on State Street, closure of Atlantic Drive to vehicle traffic, and any planned modifications to 10th Street.

- The evaluation indicates that the 9th Street corridor is unlikely to be necessary to address projected traffic operations in the EBB sector, assuming the planned parking garage west of Baker Hall is accessible from both10th Street and State Street as shown in the draft EBB sector plans.

- Traffic signals at both the 10th Street/Greenfield Street and 10th Street/Dalney Street intersections are unwarranted based on Manual of Uniform Traffic Control Devices (MUTCD) criteria.

- The Ferst Drive/State Street intersection does not meet the standard MUTCD peak hour warrant thresholds, but may be considered to satisfy the warrant based on an alternative methodology provided in the MUTCD and may benefit from installation of a traffic signal to actively control of both traffic and pedestrian crossing movements.

EXISTING CONDITIONS TRAFFIC VOLUMES

The traffic impact assessment was focused on the following intersections which provide access to the EBB sector and accommodate vehicle circulation in proximity to the EBB:

1. 10th Street at Atlantic Drive - signalized
2. 10th Street at State Street - signalized
3. 10th Street at Dalney Street - unsignalized
4. 10th Street at Greenfield Street - unsignalized
5. 10th Street at Hemphill Avenue - signalized
6. Ferst Drive at State Street - unsignalized

7. State Street at North Deck driveway/8th Street (planned) - unsignalized
8. State Street at Peachtree Place/9th Street (planned) - unsignalized

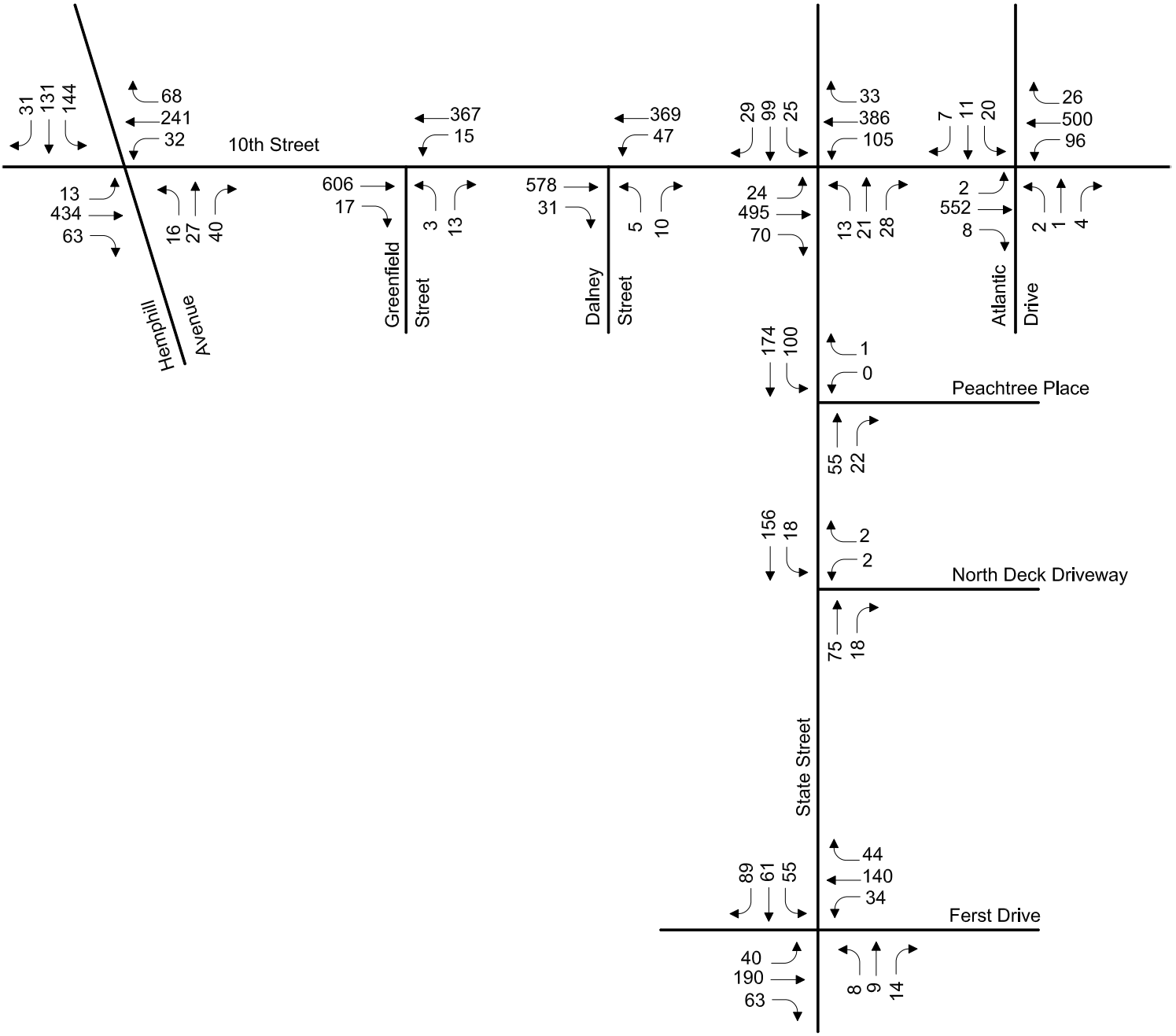
Traffic count data for the first six study intersections listed above was collected on Tuesday, April 24, 2012. Traffic volumes for the remaining two locations were estimated based on traffic count data from adjacent intersections and traffic volume data from access gates at the North Deck. To provide a conservative evaluation of intersection operations, the individual intersection peak hours (as opposed to a network peak hour) were used for analysis purposes. The Existing conditions traffic volumes are summarized in Figures 1 and 2.

As part of the traffic counts, pedestrian crossing volumes were also collected for each approach at the study intersections. Table 1 summarizes the peak hour pedestrian activity data.

Table 1
Pedestrian Crossing Volume Summary

Intersection	Peak Hour	Pedestrian Crossing Volume, by Intersection Approach				Total
		North Leg	South Leg	East Leg	West Leg	
10th Street at Atlantic Drive	Weekday Morning	5	6	57	5	73
	Weekday Evening	10	25	94	24	153
10th Street at State Street	Weekday Morning	3	9	7	24	43
	Weekday Evening	13	30	26	25	94
10th Street at Dalney Street	Weekday Morning	6	7	0	2	15
	Weekday Evening	21	23	0	3	47
10th Street at Greenfield Street	Weekday Morning	7	14	9	10	40
	Weekday Evening	17	23	1	5	46
10th Street at Hemphill Avenue	Weekday Morning	9	4	29	23	65
	Weekday Evening	12	14	52	47	125
Ferst Drive at State Street	Weekday Morning	82	38	22	53	195
	Weekday Evening	118	73	45	40	276

The pedestrian volume data indicates that the Ferst Drive/State Street intersection experiences significantly higher pedestrian activity than the other intersections. Additionally, with the exception of the Ferst Drive/State Street intersection, the data indicate that pedestrian crossings are generally more prevalent at the signalized intersections than the unsignalized locations.



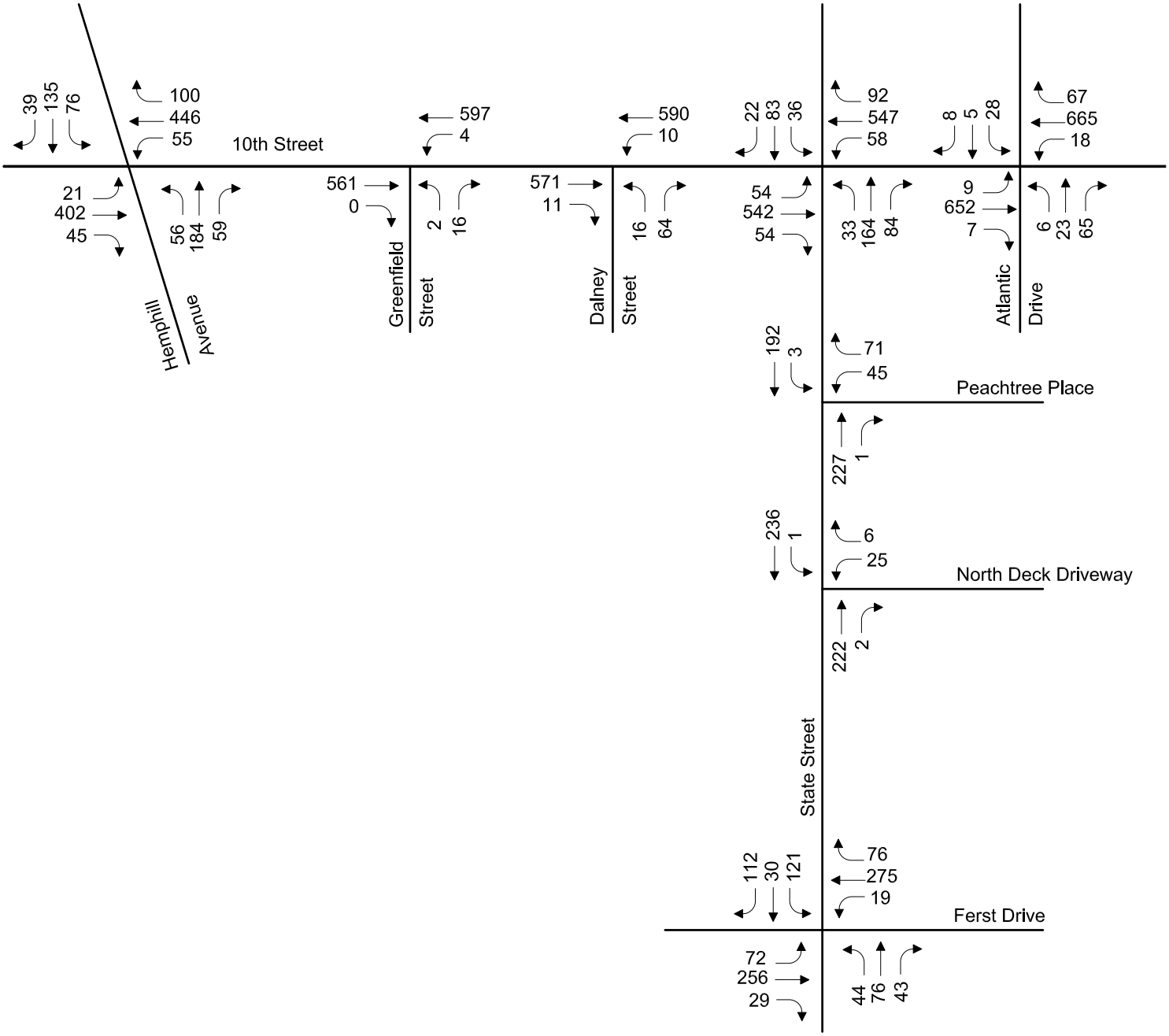
Vanasse Hangen Brustlin, Inc.

2012 Existing Weekday Morning Peak Hour Traffic Volumes

Figure 1

Not to Scale

Georgia Tech EBB Sector TIS
Atlanta, GA



Vanasse Hangen Brustlin, Inc.

2012 Existing Weekday Evening Peak Hour Traffic Volumes

Figure 2

Not to Scale

Georgia Tech EBB Sector TIS
Atlanta, GA

FUTURE CONDITIONS

The purpose of this study is to develop future conditions traffic projections for the study area and evaluate future traffic operations based on planned access modifications to the campus and sector plan development. Two future conditions scenarios are considered in this assessment:

- 2022 EBB sector plan conditions without the 9th Street corridor
- 2022 EBB sector plan conditions with the 9th Street corridor

The primary difference between the two future conditions considered in this study is the inclusion vs. exclusion of the planned 9th Street corridor, proposed to connect Hemphill Avenue to State Street in the EBB sector. The 9th Street corridor is considered a desirable connection for vehicle circulation, but entails significant construction costs associated with utility relocation and topographical constraints.

The traffic analysis presented in this memorandum has been prepared in conformance with the Institute of Transportation Engineers (ITE) guidelines for traffic impact assessment, including methods for forecasting future traffic operations. The future conditions forecasts are based on a 10-year planning horizon, which is consistent with the planning horizon for the EBB sector plan.

Historical Traffic Growth

Traffic growth on public roadways is a function of the expected land development, economic activity, and changes in demographics. While no significant off-campus development was identified in proximity to the EBB sector during the planning horizon, a moderate level of traffic volume growth was applied to existing traffic volume data.

Review of historical traffic volume data for the closest Georgia DOT permanent count station to the Georgia Tech campus (Northside Drive to the west of the campus) indicates that traffic volumes have declined between 2008 and 2012, which is the longest period of data available for this location. More recent trends indicate annual traffic growth of approximately 0.8 percent. To provide a modest estimate of traffic growth over the 10-year planning horizon, an annual growth rate of one percent was applied to the 10th Street corridor, including all traffic movements to and from streets north of the campus but not entering or exiting the Georgia Tech campus. Traffic growth on campus roadways is anticipated to result from future campus development, which is addressed separately through trip generation forecasts, rather than external factors affecting traffic on public roadways.

Planned Access and Parking Modifications

As part of the EBB planning process, several programming decisions have been made that will directly affect vehicular access and circulation in the EBB sector. These plans include:

- Atlantic Drive will be closed to vehicle traffic south of 10th Street and converted to a pedestrian corridor
- To limit interaction and conflict between garage traffic and EBB-related service/loading activity, access to the North Deck parking garage located on State Street immediately south

of the EBB site will be modified to exclusively provide garage access/egress from the driveway in the southwest corner of the garage.

Both of the planned vehicular access/circulation modifications on the Georgia Tech campus have been included in all future analysis scenarios. The result of these planned modifications is a shift in existing traffic activity from both Atlantic Drive and Peachtree Place to State Street and the southwest driveway serving the North Deck garage in future condition traffic forecasts.

Additionally, the draft EBB sector plan includes significant modifications to campus parking facilities and supply in and around the EBB sector. Planned parking system changes under the plan include the following:

- Approximately 1,475 existing surface parking spaces in the EBB and Ferst Sectors are planned to be eliminated for development of new campus facilities and the Eco-Commons.
- The sector plans currently propose to construct two new parking facilities in the EBB and Ferst sectors, including:
    - A new free-standing parking structure between Greenfield Street and Dalney Street, west of Baker Hall (assumed capacity of up to 850 vehicles for analysis purposes). This parking structure is assumed to be accessible from both 10th Street and State Street via several campus roadway connections, including Greenfield Street, Dalney Street, and a planned 8th Street segment, as shown on draft EBB sector plans.
    - A new parking structure within the proposed building in the southwest quadrant of the Ferst Drive/State Street intersection (assumed capacity of up to 200 vehicles for analysis purposes), accessible from State Street.
- Georgia Tech intends to fully utilize approximately 500 underutilized spaces in the GLC parking garage (ER66) to support parking demands in the EBB sector.

Trip Generation

Trip activity associated with these parking facilities provides the primary basis for trip generation related to the EBB sector plan. Based on gate activity data for the North Deck parking garage provided by the Georgia Tech Parking & Transportation Department, peak hour trip generation projections were developed for the three major parking facilities proposed to support the EBB sector.

Additionally, ITE Trip Generation data for the College/University land use code was reviewed to develop an estimate of overall trip generation for the entire Georgia Tech campus based on historical student enrollment trends. This data was used to compare to the parking-related trip generation projections for the EBB sector and to develop an estimate for EBB sector cut-through traffic originating or departing from other parts of the campus. Table 2 provides a summary of the trip generation estimates for the three parking facilities and cut-through traffic.

Table 2
EBB Sector Trip Generation Summary

Time Period	Movement	Planned Baker Hall Parking Deck Trips	Planned Ferst-State Parking Garage Trips	GLC Parking Trips	EBB Sector Cut-through Trips [a]	Gross Trip Generation
Weekday Daily [b]	Enter	1,463	344	861	920	3,408
	Exit	1,434	337	844	920	3,355
	Total	2,897	682	1,704	1,840	6,763
Weekday Morning	Enter	362	85	213	127	788
Peak Hour [c]	Exit	11	3	6	53	73
	Total	373	88	219	180	860
Weekday Evening	Enter	9	2	5	70	86
Peak Hour [c]	Exit	263	62	155	114	594
	Total	272	64	160	184	680

Source: Georgia Tech Parking & Transportation records and ITE Trip Generation, 8th Edition
a Daily trip generation estimated based on an assumed PM peak hour K factor of 10%
b vehicles per day
c vehicles per hour

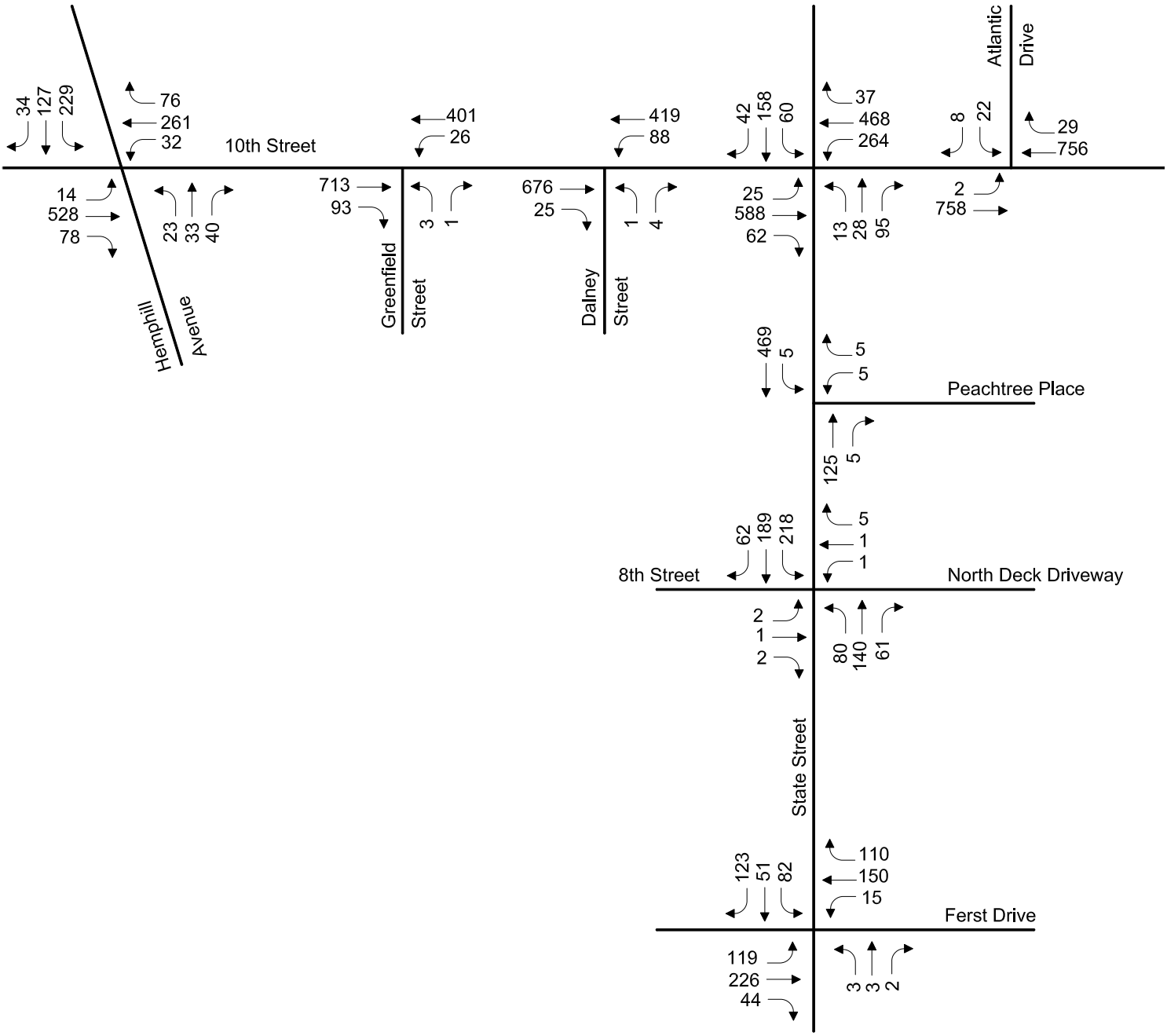
Trip Distribution

Trip distribution patterns developed for the EBB sector as part of this study were based on evaluation of the exiting traffic count data at all study intersections and trip distribution data based on campus population residence data contained in the 2009 Georgia Tech Parking and Transportation Master Plan (PTMP). The projected trip distribution for EBB sector trips traffic is summarized in Table 3.

Table 3
Vehicle Trip Distribution Summary

Direction (From/To)	Travel Route	Percentage of Site-Generated Trips
East	10th Street	32%
West	10th Street	16%
North	Hemphill Avenue	15%
North	State Street	15%
Southwest	Ferst Drive	10%
Southeast	Ferst Drive	12%
Total	*All Routes*	*100%*

Future condition traffic forecasts for the study were calculated by applying historical growth, trip reductions associated with eliminated surface parking, trip reassignments related campus and parking access modifications, and site-generated trip projections (based on the trip distribution in Table 3) to the existing conditions traffic volumes. The resulting 2022 Future conditions traffic volumes (both with and without 9th Street) are shown in Figures 3-6.



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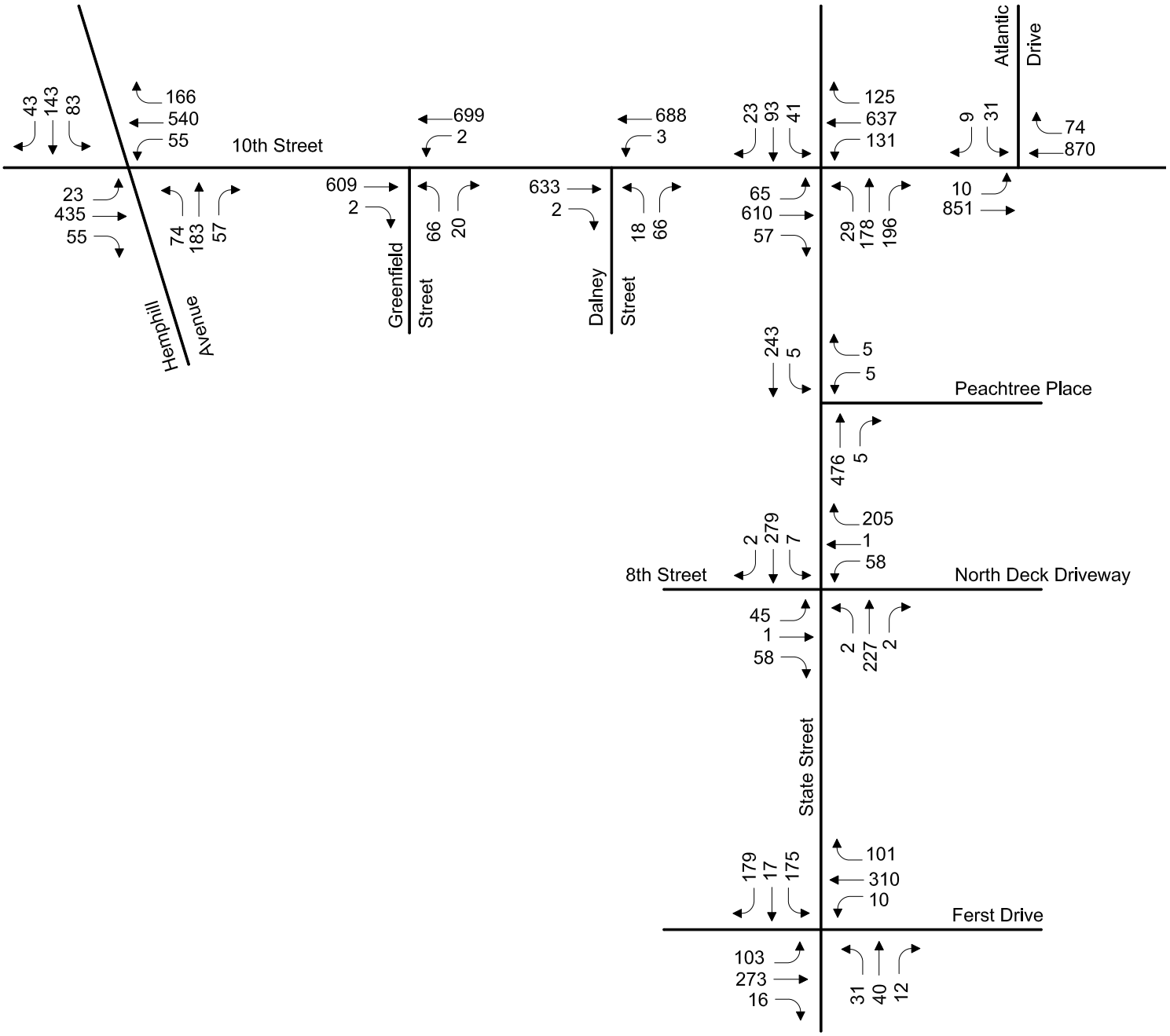
2022 Full Build w/o 9th Street Figure 3
Weekday Morning Peak Hour Traffic Volumes

Not to Scale

Georgia Tech EBB Sector TIS
Atlanta, GA

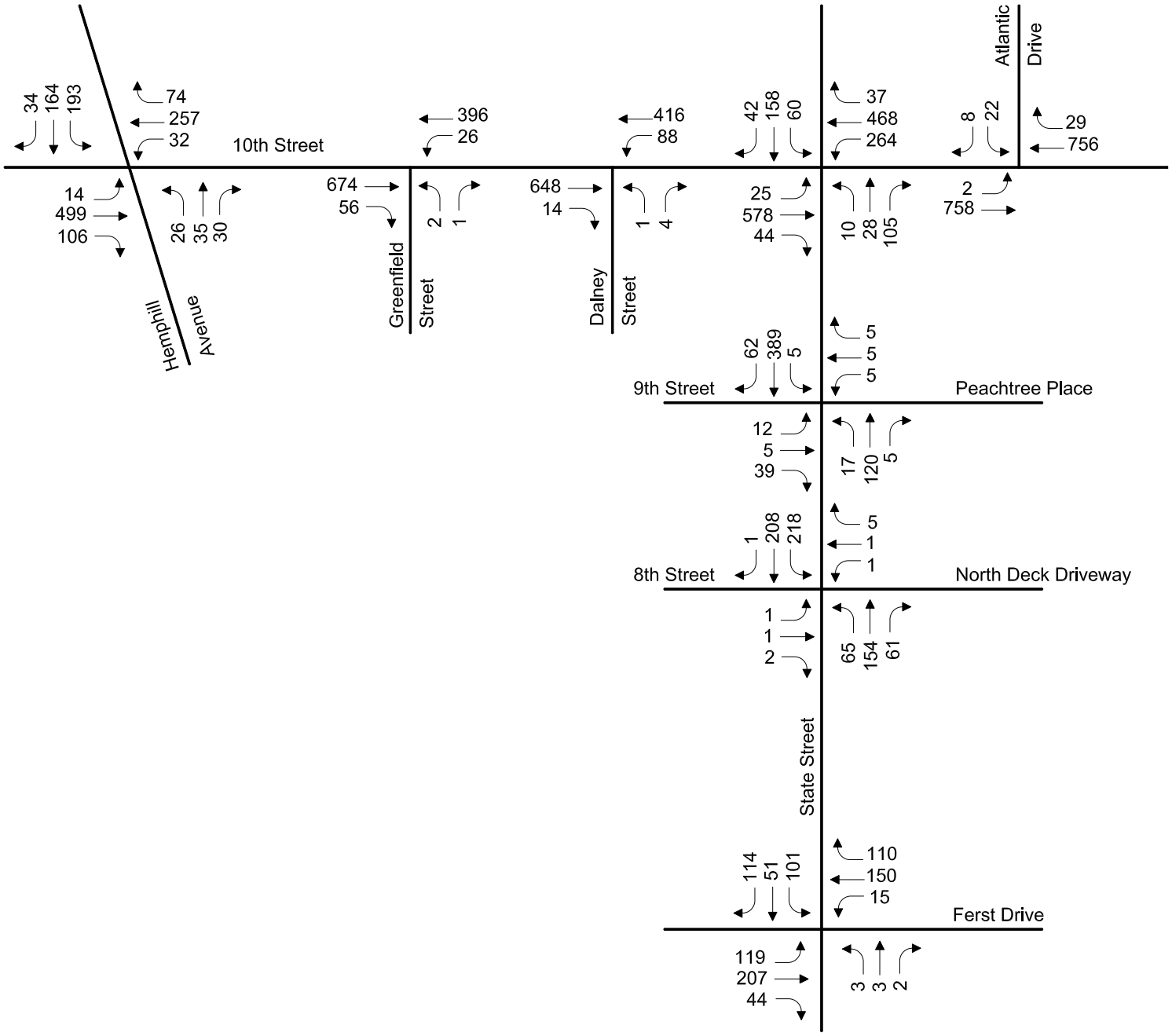


Vanasse Hangen Brustlin, Inc.

2022 Full Build w/o 9th Street Figure 4
Weekday Evening Peak Hour Traffic Volumes

Not to Scale

Georgia Tech EBB Sector TIS
Atlanta, GA

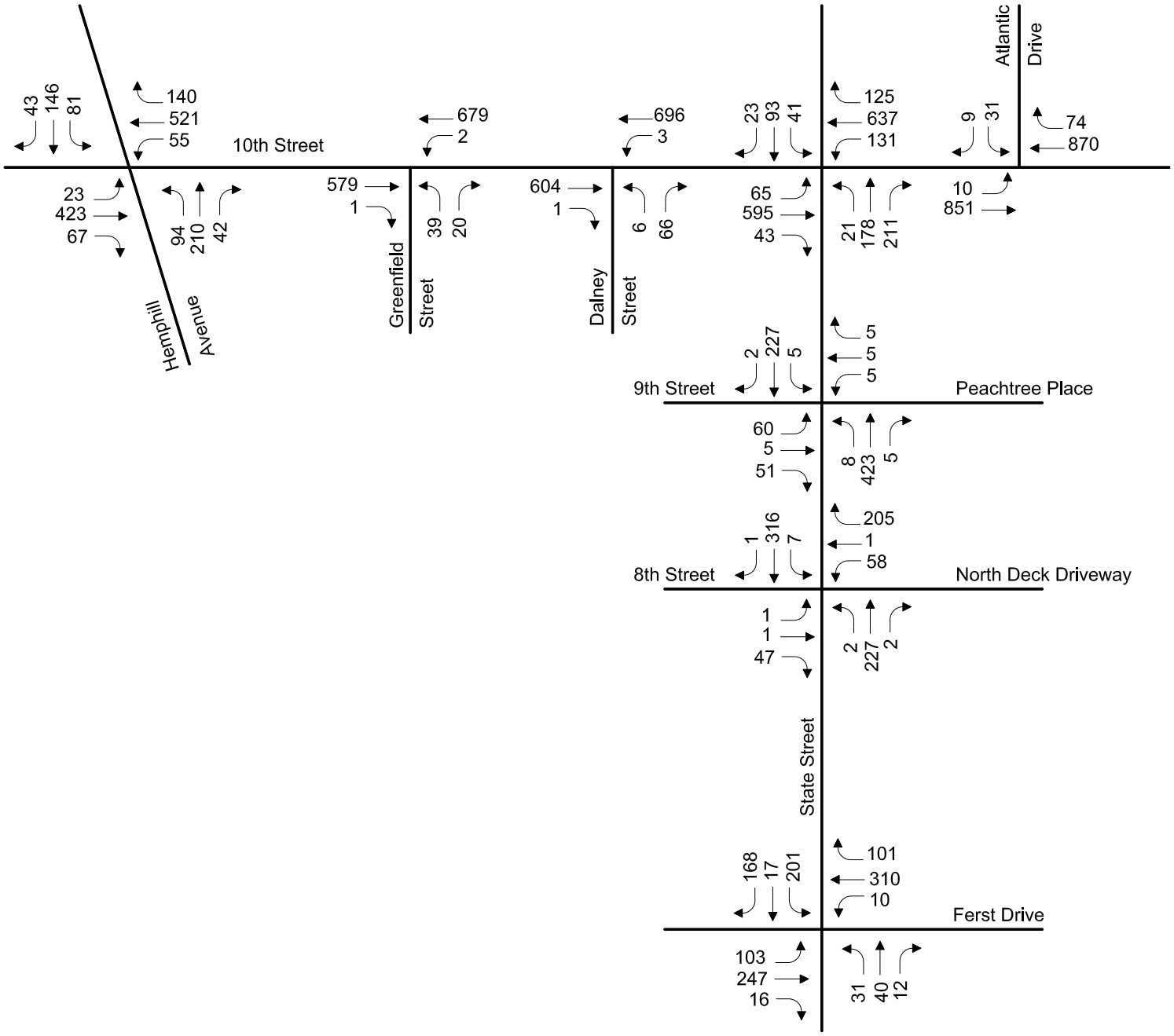


Vanasse Hangen Brustlin, Inc.

2022 Full Build with 9th Street Figure 5
Weekday Morning Peak Hour Traffic Volumes

Not to Scale

Georgia Tech EBB Sector TIS
Atlanta, GA



Vanasse Hangen Brustlin, Inc.

2022 Full Build with 9th Street Figure 6
Weekday Evening Peak Hour Traffic Volumes

Not to Scale

Georgia Tech EBB Sector TIS
Atlanta, GA

TRAFFIC OPERATIONS ANALYSIS

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess the quality of operations, roadway capacity analyses were conducted for the existing and future conditions traffic projections. Capacity analyses provide an indication of the adequacy of the roadway facilities to serve the anticipated traffic demands. Roadway operating conditions are classified by calculated levels of service.

Level-of-Service Criteria

The evaluation criteria used to analyze area intersections and roadways in this traffic evaluation are based on the 2000 Highway Capacity Manual (HCM)[1]. Level-of-service (LOS) is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure of the effect of a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Level-of-service provides an index to the operational qualities of a roadway segment or an intersection. Level-of-service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

Under the HCM methodology, the level-of-service designation is reported differently for signalized intersections and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for overall conditions at the intersection. For unsignalized intersections, the analysis assumes that traffic on the mainline is unaffected by traffic on the side streets, which are typically the critical movement at unsignalized intersections based on the greatest delay associated with left turns out of the side street.

Level of Service Analysis

VHB conducted capacity analyses using the evaluation criteria recommended in the HCM to determine the traffic capacity impacts related to the EBB sector plan. These analyses were conducted for the weekday morning and weekday evening peak hours during the following conditions for the study area:

- 2012 Existing conditions
- 2022 EBB sector plan conditions without the 9th Street corridor
- 2022 EBB sector plan conditions with the 9th Street corridor

The capacity analysis results identify volume-to-capacity ratios, average vehicle delay, LOS, and queuing projections for the study area intersections. The capacity analysis results are summarized in Tables 4, 5, 6 and 7.

[1] Transportation Research Board, Highway Capacity Manual, Washington, D.C., 2000

Table 4
Signalized Intersection HCM Capacity Analysis Summary

		2012 Existing			2022 Sector Plan w/o 9th Street			2022 Sector Plan with 9th Street		
Location/Time Period	Movement	v/c [a]	Delay [b]	LOS [c]	v/c	Delay	LOS	v/c	Delay	LOS
10th Street at Atlantic Drive										
Weekday Morning	EB LTR	0.23	1.4	A	0.30	1.9	A	0.30	1.9	A
	WB LTR	0.34	3.4	A	0.32	2.7	A	0.32	2.7	A
	NB LTR	0.02	36.9	D	n/a	n/a	n/a	n/a	n/a	n/a
	SB LTR	0.38	39.8	D	0.31	40.8	D	0.31	40.8	D
	Overall	0.34	4.5	A	0.31	3.4	A	0.31	3.4	A
Weekday Evening	EB LTR	0.28	6.5	A	0.35	5.1	A	0.35	5.2	A
	WB LTR	0.32	3.6	A	0.36	3.3	A	0.36	3.3	A
	NB LTR	0.30	37.8	D	n/a	n/a	n/a	n/a	n/a	n/a
	SB LTR	0.49	41.0	D	0.33	39.4	D	0.33	39.4	D
	Overall	0.34	8.8	A	0.36	5.3	A	0.36	5.3	A
10th Street at State Street										
Weekday Morning	EB LTR	0.28	3.3	A	0.37	5.1	A	0.35	5.4	A
	WB LTR	0.31	3.2	A	0.61	8.8	A	0.61	8.5	A
	NB LT	0.25	34.6	C	0.19	28.6	C	0.17	28.5	C
	NB R	0.03	32.8	C	0.10	27.8	C	0.11	28.0	C
	SB LTR	0.61	40.2	D	0.74	40.3	D	0.75	40.5	D
	Overall	0.36	9.3	A	0.65	13.8	B	0.64	13.9	B
Weekday Evening	EB LTR	0.39	6.2	A	0.47	8.5	A	0.45	7.7	A
	WB LTR	0.37	3.5	A	0.61	6.9	A	0.59	6.3	A
	NR LT	0.70	40.8	D	0.69	38.8	D	0.66	38.2	D
	NB R	0.06	29.8	C	0.31	31.0	C	0.35	32.0	C
	SB LTR	0.73	44.6	D	0.81	52.0	D	0.84	57.5	E
	Overall	0.46	13.8	B	0.65	16.5	B	0.64	16.6	B
10th Street at Hemphill Avenue										
Weekday Morning	EB LTR	0.38	18.0	B	0.46	19.1	B	0.46	19.1	B
	WB LTR	0.31	19.6	B	0.33	25.2	C	0.33	25.4	C
	NB LT	0.12	24.9	C	0.17	25.6	C	0.19	25.9	C
	NB R	0.03	23.8	C	0.03	23.8	C	0.02	23.7	C
	SB LTR	0.27	16.3	B	0.36	17.4	B	0.35	17.3	B
	Overall	0.32	18.5	B	0.40	20.7	C	0.40	20.7	C
Weekday Evening	EB LTR	0.36	17.8	B	0.40	18.4	B	0.40	18.4	B
	WB LTR	0.50	17.1	B	0.62	22.3	C	0.59	21.4	C
	NR LT	0.61	34.5	C	0.69	38.3	D	0.85	50.2	D
	NB R	0.04	24.0	C	0.04	24.0	C	0.03	23.8	C
	SB LTR	0.26	16.3	B	0.29	16.6	B	0.30	16.8	B
	Overall	0.51	20.0	B	0.61	22.6	C	0.64	24.6	C

Note: EB = eastbound, WB = westbound, NB = northbound, SB = southbound
a volume-to-capacity ratio
b average delay, in seconds per vehicle
c level of service

Table 5
Unsignalized Intersection HCM Capacity Analysis Summary

Location/Time Period	Critical Movement	2012 Existing v/c [b]	2012 Existing Delay [c]	2012 Existing LOS [d]	2022 Sector Plan w/o 9th Street v/c	2022 Sector Plan w/o 9th Street Delay	2022 Sector Plan w/o 9th Street LOS	2022 Sector Plan with 9th Street v/c	2022 Sector Plan with 9th Street Delay	2022 Sector Plan with 9th Street LOS
10th Street at Dalney Street										
Weekday Morning	EB TR	0.24	0.0	A	0.28	0.0	A	0.26	0.0	A
	WB LT	0.04	1.2	A	0.18	2.0	A	0.18	2.0	A
	NB LR	0.04	13.4	B	0.02	13.7	B	0.02	13.3	B
Weekday Evening	EB TR	0.24	0.0	A	0.27	0.0	A	0.25	0.0	A
	WB LT	0.24	0.2	A	0.28	0.1	A	0.28	0.0	A
	NB LR	0.21	13.3	B	0.23	14.3	B	0.17	12.1	B
10th Street at Greenfield Street										
Weekday Morning	EB TR	0.24	0.0	A	0.29	0.0	A	0.27	0.0	A
	WB LT	0.16	1.1	A	0.17	0.7	A	0.17	0.7	A
	NB LR	0.06	12.5	B	0.03	19.8	C	0.02	18.1	C
Weekday Evening	EB TR	0.24	0.0	A	0.26	0.0	A	0.25	0.0	A
	WB LT	0.24	0.1	A	0.28	0.0	A	0.27	0.0	A
	NB LR	0.05	11.3	B	0.45	26.2	D	0.27	19.7	C
Ferst Drive at State Street										
Weekday Morning	EB LTR	*	15.1	C	*	28.9	D	*	25.6	D
	WB LTR	*	11.7	B	*	14.1	B	*	14.0	B
	NB LTR	*	9.6	A	*	10.3	B	*	10.2	B
	SB L + TR	*	10.0	B	*	11.5	B	*	11.4	B
Weekday Evening	EB LTR	*	31.9	D	*	45.6	E	*	38.0	E
	WB LTR	*	33.6	D	*	52.6	F	*	51.5	F
	NB LTR	*	16.6	C	*	14.8	B	*	14.6	B
	SB L + TR	*	14.6	B	*	18.8	B	*	20.0	C
State Street at 8th Street/North Deck Dwy.										
Weekday Morning	EB LTR	n/a	n/a	n/a	0.04	26.2	D	0.02	22.0	C
	WB LTR	0.01	9.8	A	0.03	17.1	C	0.03	16.6	C
	NB LTR	0.08	0.0	A	0.10	3.1	A	0.08	2.5	A
	SB L + TR	0.11	0.8	A	0.20	4.0	A	0.21	4.4	A
Weekday Evening	EB LTR	n/a	n/a	n/a	0.41	24.8	C	0.10	11.8	B
	WB LTR	0.07	12.5	B	0.54	18.4	C	0.55	19.0	C
	NB LTR	0.15	0.0	A	0.00	0.1	A	0.00	0.1	A
	SB L + TR	0.19	0.0	A	0.22	0.2	A	0.25	0.2	A
State Street at 9h Street/Peachtree Place										
Weekday Morning	EB LTR	n/a	n/a	n/a	n/a	n/a	n/a	0.15	13.9	B
	WB LTR	0.00	8.7	A	0.03	13.2	B	0.06	16.8	C
	NB LTR	0.06	0.0	A	0.11	0.0	A	0.03	1.3	A
	SB LTR	0.09	3.2	A	0.00	0.1	A	0.00	0.1	A
Weekday Evening	EB LTR	n/a	n/a	n/a	n/a	n/a	n/a	0.38	20.2	C
	WB LTR	0.23	12.2	B	0.04	16.5	C	0.07	19.5	C
	NB LTR	0.16	0.0	A	0.33	0.0	A	0.01	0.2	A
	SB LTR	0.00	0.1	A	0.01	0.2	A	0.01	0.2	A

Note: EB = eastbound, WB = westbound, NB = northbound, SB = southbound; L = left-turn movement, T = through movement, R= right-turn movement
a volume-to-capacity ratio
b average delay, in seconds per vehicle
c level of service
* unavailable

Table 6
Signalized Intersection Queuing Analysis Summary

Location/Time Period	Movement	Lane Storage [a]	2012 Existing Avg. Queue	2012 Existing 95% Queue	2022 Sector Plan w/o 9th Street Avg. Queue	2022 Sector Plan w/o 9th Street 95% Queue	2022 Sector Plan with 9th Street Avg. Queue	2022 Sector Plan with 9th Street 95% Queue
10th Street at Atlantic Drive								
Weekday Morning	EB LTR	375	14	34	19	79	20	82
	WB LTR	445	46	106	53	127	53	127
	NB LTR	315	2	13	n/a	n/a	n/a	n/a
	SB LTR	290	29	37	20	29	20	29
Weekday Evening	EB LTR	375	90	116	115	147	121	154
	WB LTR	445	51	114	65	149	65	149
	NB LTR	315	21	44	n/a	n/a	n/a	n/a
	SB LTR	290	29	41	26	38	26	38
10th Street at State Street								
Weekday Morning	EB LTR	170	35	63	83	119	75	110
	WB LTR	375	19	39	128	232	126	228
	NB LT	305	25	41	27	41	25	38
	NB R	50	0	16	0	18	0	18
	SB LTR	300	83	139	146	211	146	212
Weekday Evening	EB LTR	170	70	132	92	165	82	157
	WB LTR	375	26	34	135	135	129	82
	NR LT	305	123	171	127	176	122	170
	NB R	50	0	33	29	76	34	85
	SB LTR	300	91	124	104	138	106	140
10th Street at Hemphill Avenue								
Weekday Morning	EB LTR	850	100	141	127	175	125	173
	WB LTR	420	56	117	85	147	84	145
	NB LT	395	21	47	28	58	31	62
	NB R	150	0	23	0	23	0	20
	SB LTR	770	56	84	75	123	75	108
Weekday Evening	EB LTR	850	94	133	106	148	105	147
	WB LTR	420	95	141	127	234	115	214
	NR LT	395	130	213	143	236	179	328
	NB R	150	0	30	0	29	0	25
	SB LTR	770	50	65	55	70	55	71

Note: EB = eastbound, WB = westbound, NB = northbound, SB = southbound; L = left-turn movement, T = through movement, R= right-turn movement
a lane storage and queue lengths reported in feet

Table 7
Unsignalized Intersection Queuing Analysis Summary

Location/Time Period	Movement [a]	Lane Storage [b]	2012 Existing 95% Queue	2022 Sector Plan w/o 9th Street 95% Queue	2022 Sector Plan with 9th Street 95% Queue
10th Street at Dalney Street					
Weekday Morning	NB LR	265	3	1	1
Weekday Evening	NB LR	265	19	22	15
10th Street at Greenfield Street					
Weekday Morning	NB LR	250	4	2	1
Weekday Evening	NB LR	250	4	55	27
Ferst Drive at State Street [c]					
Weekday Morning	EB LTR	190	196	480	407
	WB LTR	365	150	177	228
	NB LTR	150	51	34	32
	SB L	150	55	73	70
	SB TR	450	95	101	94
Weekday Evening	EB LTR	190	616	685	611
	WB LTR	365	914	725	884
	NB LTR	150	127	58	63
	SB L	150	117	151	244
	SB LTR	450	85	154	149
State Street at 8th Street/North Deck Dwy.					
Weekday Morning	(EB LTR)	175	n/a	3	2
	WB LTR	60	0	2	2
	SB L	115	1	19	19
Weekday Evening	(EB LTR)	175	n/a	47	8
	WB LTR	60	6	81	83
	SB L	115	0	1	1
State Street at 9h Street/Peachtree Place					
Weekday Morning	(EB LTR)	175	n/a	n/a	13
	WB LTR	165	0	2	5
Weekday Evening	(EB LTR)	175	n/a	n/a	44
	WB LTR	165	21	3	6

Note: EB = eastbound, WB = westbound, NB = northbound, SB = southbound; L = left-turn movement, T = through movement, R= right-turn movement
a () – parentheses indicate a proposed future storage lane listed as a programmed improvement; storage lane length is assumed based on similar existing lanes
b lane storage and queue lengths reported in feet; for approaches without auxiliary turn lanes, the lane storage refers to the block length
c results for the Ferst Drive/State Street intersection were generated in SimTraffic (Synchro does not report queues for All Way Stop intersections)

The capacity analysis results generally indicate that the study intersections operate under acceptable levels of service and queuing during existing and both future conditions. The results of the future conditions analyses indicate that all study locations are anticipated to operate at acceptable levels of service, both with or without the inclusion of the 9th Street corridor.

The only location experiencing failing levels of service is the Ferst Drive/State Street intersection during the weekday evening peak hour under both future conditions. Queuing results at this location also indicate that the eastbound and westbound queues are anticipated to significantly exceed available block lengths.

Queuing results for the driveway exiting the North Deck also indicate that consolidation of all exiting traffic at the southwest garage gate will significantly increase anticipated queuing for vehicles turning onto State Street during the weekday evening peak hour under future conditions. The projected maximum queues may affect garage entry, exit, and internal circulation operations.

SIGNAL WARRANT ANALYSIS

The Manual on Uniform Traffic Control Devices (MUTCD)[2] lists specific criteria, or warrants, for the consideration of installation of a traffic signal at an intersection. The MUTCD also notes that, "the satisfaction of a traffic signal warrant or warrants shall not, in itself, require the installation of a traffic control signal." The traffic signal warrant analysis provides guidance regarding locations where signals would not be appropriate and locations where they could be considered further.

A signal warrant analysis based on Warrant 3 (Peak Hour Volume) was conducted for several intersections in the study area under future conditions. The determination of the signal warrant is based on a comparison of major street and minor street volumes to the volume threshold curves provided in Figure 4C-3 of the MUTCD. The signal warrant analysis results are summarized in Table 8.

Table 8
Peak Hour Traffic Signal Warrant Analysis Summary

	2022 Sector Plan w/o 9th Street		2022 Sector Plan with 9th Street	
Location	AM	PM	AM	PM
10th Street at Dalney Street				
Number of Lanes (Major/Minor)	2/1	2/1	2/1	2/1
Major Street Volume (vph)	1,208	1,326	1,166	1,304
Highest Minor Street Lane Volume (vph)	5	84	5	72
Meets Warrant?	No	No	No	No
10th Street at Greenfield Street				
Number of Lanes (Major/Minor)	2/1	2/1	2/1	2/1
Major Street Volume (vph)	1,233	1,312	1,152	1,261
Highest Minor Street Lane Volume (vph)	4	86	3	59
Meets Warrant?	No	No	No	No
Ferst Drive at State Street				
Number of Lanes (Major/Minor)	1/2	1/2	1/2	1/2
Major Street Volume (vph)	664	813	645	787
Highest Minor Street Lane Volume (vph)	82	175	101	201
Meets Warrant?	No	No	No	No

The warrant analyses indicate that the typical traffic volume warrant standards are unmet for all of the unsignalized intersections evaluated. However, the MUTCD provides an alternative evaluation category for satisfying the Peak Hour Warrant:

- If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

[2] MUTCD, Part 4 – Highway Traffic Signals, USDOT/FHWA, November 2003.

1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and
2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and
3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

The Ferst Drive/State Street intersection is controlled with an All-way Stop condition (i.e., traffic control typical for the minor-street approach) and the eastbound and westbound approaches exceed the alternative Peak Hour Warrant criteria under both future conditions. Based on the criteria, the Ferst Drive /State Street intersection may be considered to meet the Peak Hour Warrant requirements in the future.

Traffic volume projections for the other unsignalized intersections are insufficient to satisfy the alternative warrant methodology. However, the combined traffic volumes exiting Dalney Street and Greenfield Street onto 10th Street are sufficient to approach the borderline requirements for the peak hour signal warrant.

FINDINGS

The findings of this traffic impact assessment provide guidance regarding the appropriate transportation infrastructure and elements to accommodate planned development in the EBB sector. The following is a detailed summary of the findings of the EBB sector traffic impact assessment:

- The traffic volume data collected at the six study locations indicated lower volume levels than originally anticipated, and as a result, intersection operations are generally acceptable at all locations under both existing and future conditions

- The evaluation indicates that the following intersection geometry modifications are appropriate at the 10th Street/State Street intersection to support planned development for the Institute, including the EBB and related parking facilities:
    - Construct a raised median along State Street between Peachtree Place and 10th Street. This assumes the Institute intends to retain the existing raised median treatment along the southern portions of State Street.
    - Construct two northbound lanes on State Street (left/through + right lane) approaching 10th Street.
    - Eliminate on-street parking on State Street between 10th Street and Peachtree Place.
    - Eliminate approximately 50-100 feet of on-street parking along northbound State Street, north of 10th Street, to provide an adequate receiving lane for traffic exiting the campus (this is dependent on the median width and final alignment/lane geometry for State Street within the campus).
    - Extend bicycle lanes along State Street between Peachtree Place and 10th Street (or further to the north based on coordination with the City of Atlanta).

- The evaluation indicates that while widening 10th Street to provide a westbound left-turn lane would support State Street as a gateway to the campus, this roadway project does not appear necessary to maintain acceptable operations at the 10th Street/State Street intersection. Projected traffic volume increases on the westbound left turn movement may result in additional queuing on 10th Street, but is unlikely to significantly impact adjacent intersections, and future vehicle delay and levels-of-service remain acceptable. While the westbound left turn lane improvement is not necessary for vehicle operations, widening 10th Street would also provide the opportunity to construct a raised median pedestrian refuge treatment to improve pedestrian safety for crossings at the planned Atlantic Drive pedestrian corridor. A median treatment on 10th Street designed would require widening 10th Street generally between Dalney Street and 350 feet east of Atlantic Drive.

- Traffic signal modifications and upgrades at both the 10th Street/State Street and 10th Street/Atlantic Drive intersections will be necessary to address the modified lane geometry on State Street, closure of Atlantic Drive to vehicle traffic, and any planned modifications to 10th Street.

- The evaluation indicates that the following intersection geometry modifications are appropriate at the State Street/8th Street/North Deck driveway intersection:
    - Relocate the North Deck driveway intersecting with State Street approximately 80 feet to the south to align opposite the planned 8th Street approach, without adversely impacting the service/loading access to the Marcus Nanotechnology Building
    - Construct one lane for entering traffic and two lanes for exiting traffic (left/through + right lanes) from the North Deck on the driveway intersecting State Street

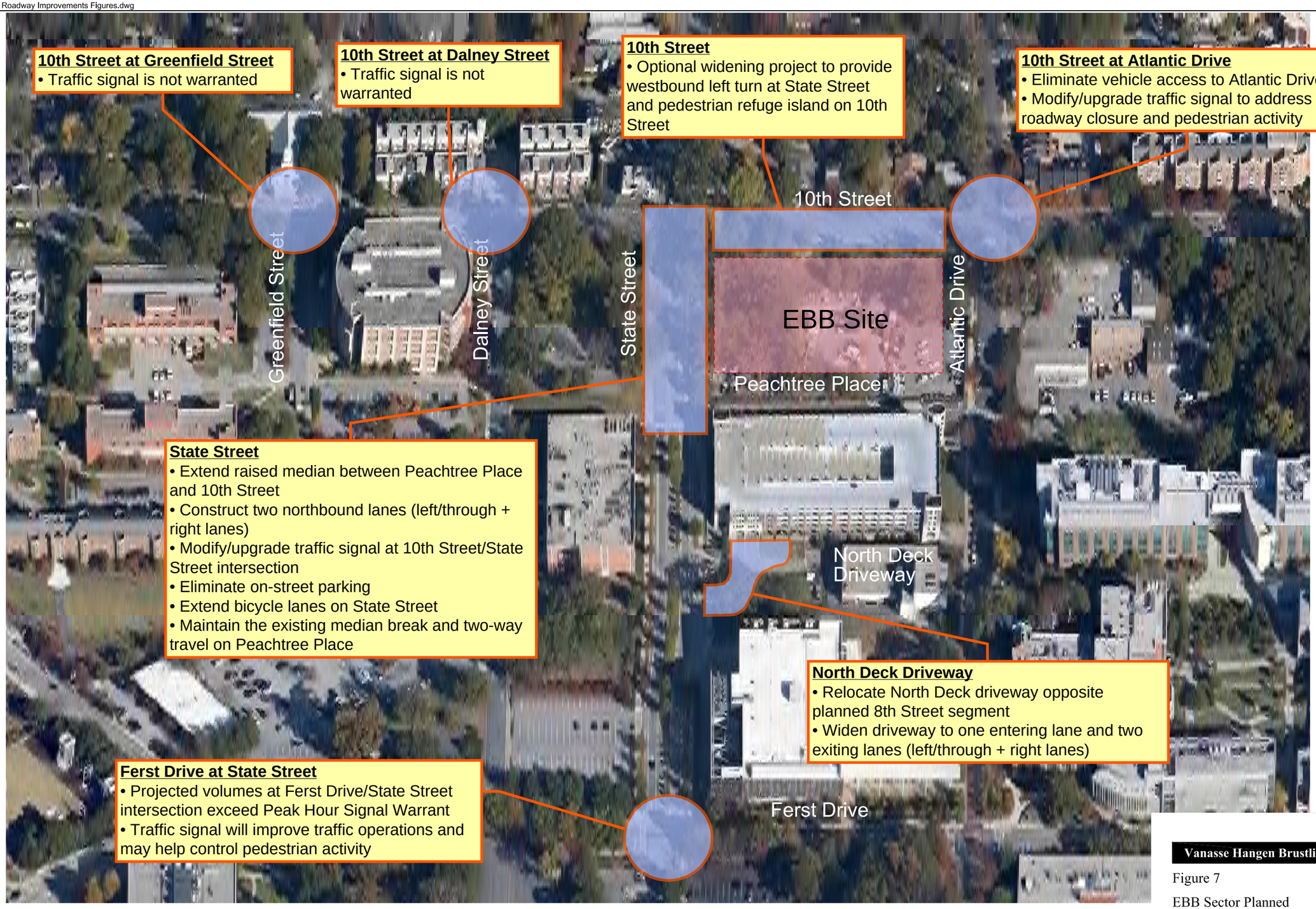
- The evaluation included assessment of the planned 9th Street corridor to determine whether the planned roadway is necessary to address increased traffic activity associated with the closure of Atlantic Drive and planned parking facilities within the EBB sector. The 9th Street corridor evaluation indicated the following:
    - Assuming that access to the planned parking structure located west of Baker Hall is provided from both 10th Street (via Dalney Street and/or Greenfield Street) and State Street (via the planned 8th Street connection), the 9th Street corridor is unlikely to be necessary to address projected traffic operations in the EBB sector.
    - It should be noted, the 9th Street corridor remains a valuable long-term transportation corridor to manage internal circulation demands within the campus and provide efficient and high-quality transit access to and through the EBB sector.

- The evaluation considered the potential for traffic signal control at the 10th Street/Dalney Street and 10th Street/Greenfield Street intersections, based on projected traffic volume increases associated with the planned parking structure west of Baker Hall, and indicates the following:
    - Analysis results indicate acceptable operations at these locations under future conditions without a traffic signal
    - The Institute should demonstrate satisfaction of at least one Manual on Uniform Traffic Control (MUTCD) signal warrant to the City of Atlanta to construct a traffic signal at either location.

- Under the existing and planned EBB sector plan circulation configurations, the traffic volume forecasts for these intersections will not satisfy the Manual on Uniform Traffic Control (MUTCD) peak hour traffic volume warrant for signalization.
- Should the Institute implement a more limited access configuration between 10th Street and the planned parking structure (i.e., restricting Dalney Street to one-way southbound travel to shift northbound exiting garage traffic to Greenfield Street) the traffic forecasts for the 10th Street/Greenfield Street intersection approach the borderline of satisfying the peak hour signal warrant.

- The evaluation considered the potential for traffic signal control of the Ferst Drive/State Street intersection and indicates the following:
  - The analysis indicates failing levels of service for eastbound and westbound approaches during the weekday evening peak hour without a traffic signal, and queuing on both Ferst Drive approaches is anticipated to be excessive during both peak hours
  - The intersection processes significant pedestrian activity, particularly during the evening peak period (276 crossing pedestrians)
  - Pedestrian activity will continue to impact traffic operations and queuing at the intersection under the existing all-way Stop control configuration.
  - The intersection does not meet the standard MUTCD peak hour warrant thresholds, but may be considered to satisfy the warrant based on an alternative methodology provided in the MUTCD.
  - Reconfiguration of the southbound approach lane geometry to eliminate a turning lane would push the intersection's volumes very close to meeting the standard peak hour warrant threshold and improve pedestrian safety by minimizing the crossing distance on the north leg.
  - This intersection may benefit from installation of a traffic signal to actively control of both traffic and pedestrian crossing movements.

Conceptual diagrams summarizing the planned roadway improvements discussed in this section are summarized in Figures 7 and 8. Roadway design improvement for State Street are summarized in more detail in Figure 8.



Not to Scale

Vanasse Hangen Brustlin, Inc.

Figure 7

EBB Sector Planned
Roadway Improvements
Georgia Tech EBB Sector TIS
Atlanta, GA

Vanasse Hangen Brustlin, Inc.

Figure 8

State Street Planned
Roadway Improvements
Georgia Tech EBB Sector TIS
Atlanta, GA

Not to Scale

Section 2

Summary of EBB Sector Analysis Presentation; Vanasse Hangen Brustlin, Inc. (VHB), June 30, 2012

Summary of EBB Sector Traffic Analysis

June 4, 2012

VHB

Summary of Findings

- Intersection capacity is generally adequate within the EBB sector, both under existing and future conditions
  - State Street at Ferst Street begins to experience longer delays
- There are some long queues:
  - 10th Street at State Street in the AM
  - Ferst Drive at State Street in the AM/PM
- Extension of the State Street cross-section and implementation of the Atlantic Promenade require signal replacements/modifications on 10th Street
- 9th Street is beneficial, but does not change traffic conditions

Summary of Findings (continued)

- Extend State Street cross-section to 10th Street
  - Provide two northbound lanes on State Street.
  - Eliminate on-street parking on State (north and south of 10th Street)
  - Extend bicycle lanes along State Street to 10th Street
- Relocate the North Deck driveway intersecting with State Street to align opposite the planned 8th Street approach.
  - Construct one lane for entering traffic and two lanes for exiting traffic (left/through + right lanes) on the North Deck driveway
- Traffic Signals at Dalney and Greenfield appear to be unwarranted
- A traffic signal at State and Ferst appears to meet alternative warrant conditions (and would address the queuing condition)

VHB

Summary of Findings (continued)

- Left-turn lane from 10th Street WB to State Street:

PRO:

- Clear campus entrance
- If coupled with EB left-turn prohibition, provides a pedestrian island
- Addresses WB queuing in the AM peak hour

CON:

- Is not needed to address capacity at the intersection
- Involves extensive utility coordination/relocation
- Cost

VHB

Pedestrian Volumes – Existing Conditions

- Ferst Drive at State Street has the highest pedestrian crossing volume:
  - 195 AM crossings
  - 275 PM crossings

- 10th Street Pedestrian Crossings:
  - Atlantic Drive is the highest - 75 AM, 150 PM crossings
  - Hemphill Avenue is second highest - 65 AM, 125 PM crossings
  - State Street is the third highest - 45 AM, 95 PM crossings

VHB

Traffic Volumes – Existing Conditions

- Ferst Drive (west of State St.)
  - 530 AM
  - 790 PM
- State Street (south of 10th St.)
  - 330 AM
  - 495 PM
- 10th Street (between State and Atlantic)
  - 1,075 AM
  - 1,360 PM
- Dalney Street (south of 10th St.)
  - 95 AM
  - 100 PM
- Greenfield Street (south of 10th St.)
  - 50 AM
  - 25 PM

Analysis Assumptions

Analysis Scenarios

- 2012 Existing Conditions, 2022 EBB Sector with and without 9th Street

Background Growth

- 0.8 percent general growth applied (Northside Dr. count station)
- Specific campus trip generation for non-EBB growth (180 AM, 185 PM trips)

Network Assumptions

- Atlantic Drive Closed and traffic reassigned
- North Deck access assigned only to "8th Street" entrance

Trip Distribution

- 48 % to 10th Street (E/W)
- 22 % to Ferst Drive (E/W)
- 15% to Hemphill Drive (N)
- 15 % to State Street (N)

Parking Assignments

Trip Generation

- North Deck entry/exit data used for per-space trip generation

Parking Assumptions

- 1,475 existing surface spaces eliminated
- Full utilization of the 500-space GLC parking deck (ER66)
- 850 space “Baker” garage
- 200 space “Core-North” garage/State Street south of Ferst Drive
- Conservatively-high trip generation:
  - Facilities slightly larger than depicted in the plan
  - High parking utilization in these facilities (90%)

VHB

Trip Generation Summary

Table 2
EBB Sector Trip Generation Summary

Time Period	Movement	Planned Baker Hall Parking Deck Trips	Planned Ferst-State Parking Garage Trips	GLC Parking Trips	EBB Sector Cut-through Trips [a]	Gross Trip Generation
Weekday Daily [b]	Enter	1,463	344	861	920	3,408
	Exit	1,434	337	844	920	3,355
	Total	2,897	682	1,704	1,840	6,763
Weekday Morning	Enter	362	85	213	127	788
Peak Hour [c]	Exit	11	3	6	53	73
	Total	373	88	219	180	860
Weekday Evening	Enter	9	2	5	70	86
Peak Hour [c]	Exit	263	62	155	114	594
	Total	272	64	160	184	680

Source: Georgia Tech Parking & Transportation records and ITE Trip Generation, 8th Edition
a Daily trip generation estimated based on an assumed PM peak hour K factor of 10%
b vehicles per day
c vehicles per hour

VHB

Traffic Volumes – Future Conditions

- Ferst Drive (west of State St.)
  - 530 AM/790 PM (Existing)
  - 665 AM/915 PM (2022)
- State Street (south of 10th St.)
  - 330 AM/495 PM (Existing)
  - 620 AM/685 PM (2022)
- 10th Street (between State and Atlantic)
  - 1,075 AM/1,360 PM (Existing)
  - 1,515 AM/1,740 PM (2022)
- Dalney Street (south of 10th St.)
  - 95 AM/100 PM (Existing)
  - 120 AM/90 PM (2022)
- Greenfield Street (south of 10th St.)
  - 50 AM/25 PM (Existing)
  - 125 AM/90 PM (2022)

VHB

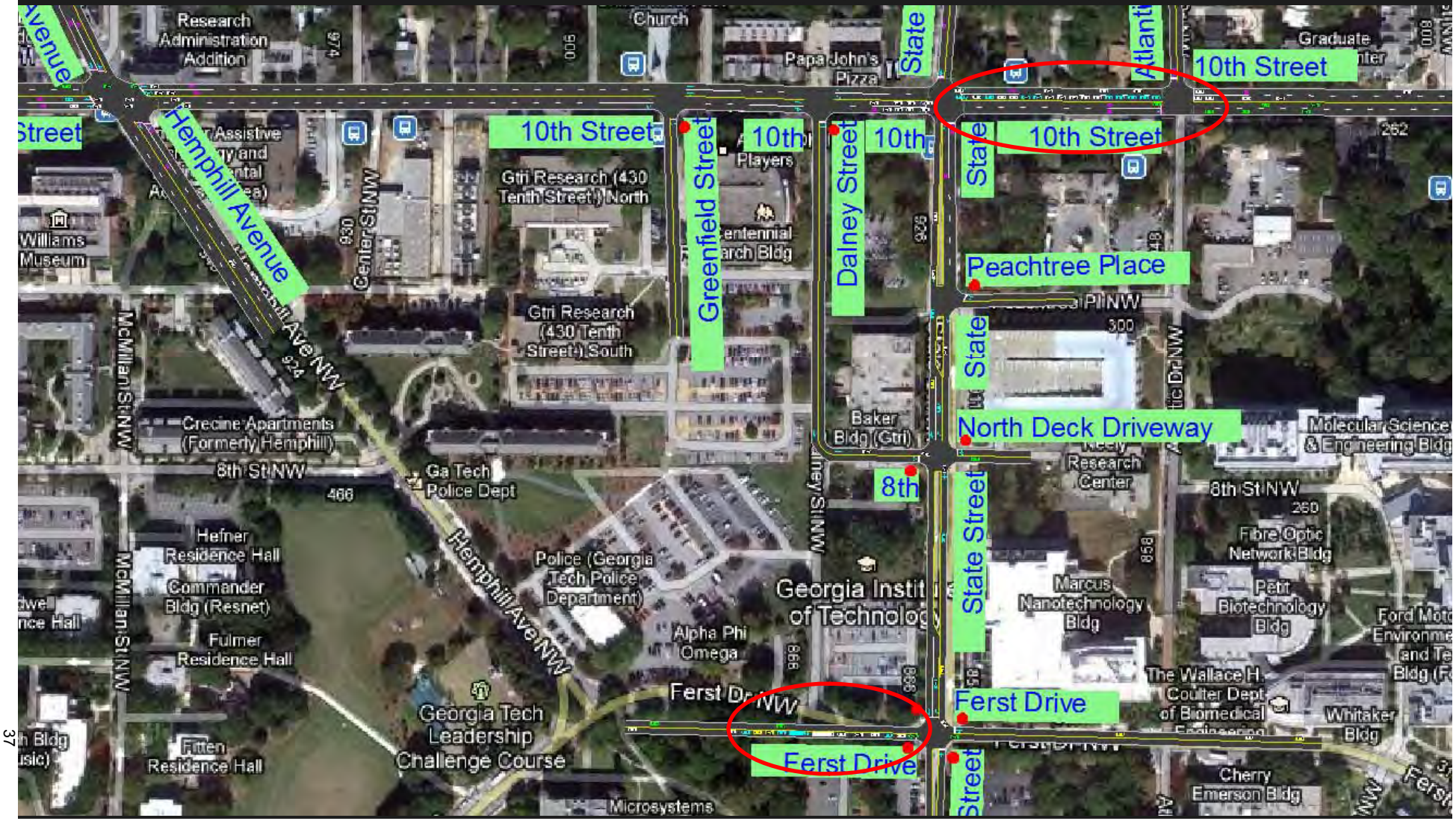
Levels of Service

- AM Peak/PM Peak (overall or worst critical movement)

Intersection	2012 Existing	2022 Sector Plan w/o 9th Street	2022 Sector Plan with 9th Street
10th Street at Atlantic Drive	A/A	A/A	A/A
10th Street at State Street	A/B	B/B	B/B
10th Street at Hemphill Avenue	B/B	C/C	C/C
10th Street at Dalney Street	B/B	B/B	B/B
10th Street at Greenfield Street	B/B	C/D	C/C
Ferst Drive at State Street	C/D	D/**F**	D/**F**
State Street at 8th Street/North Deck Dwy.	A/B	D/C	C/C
State Street at 9th Street/Peachtree Place	A/B	B/C	C/C

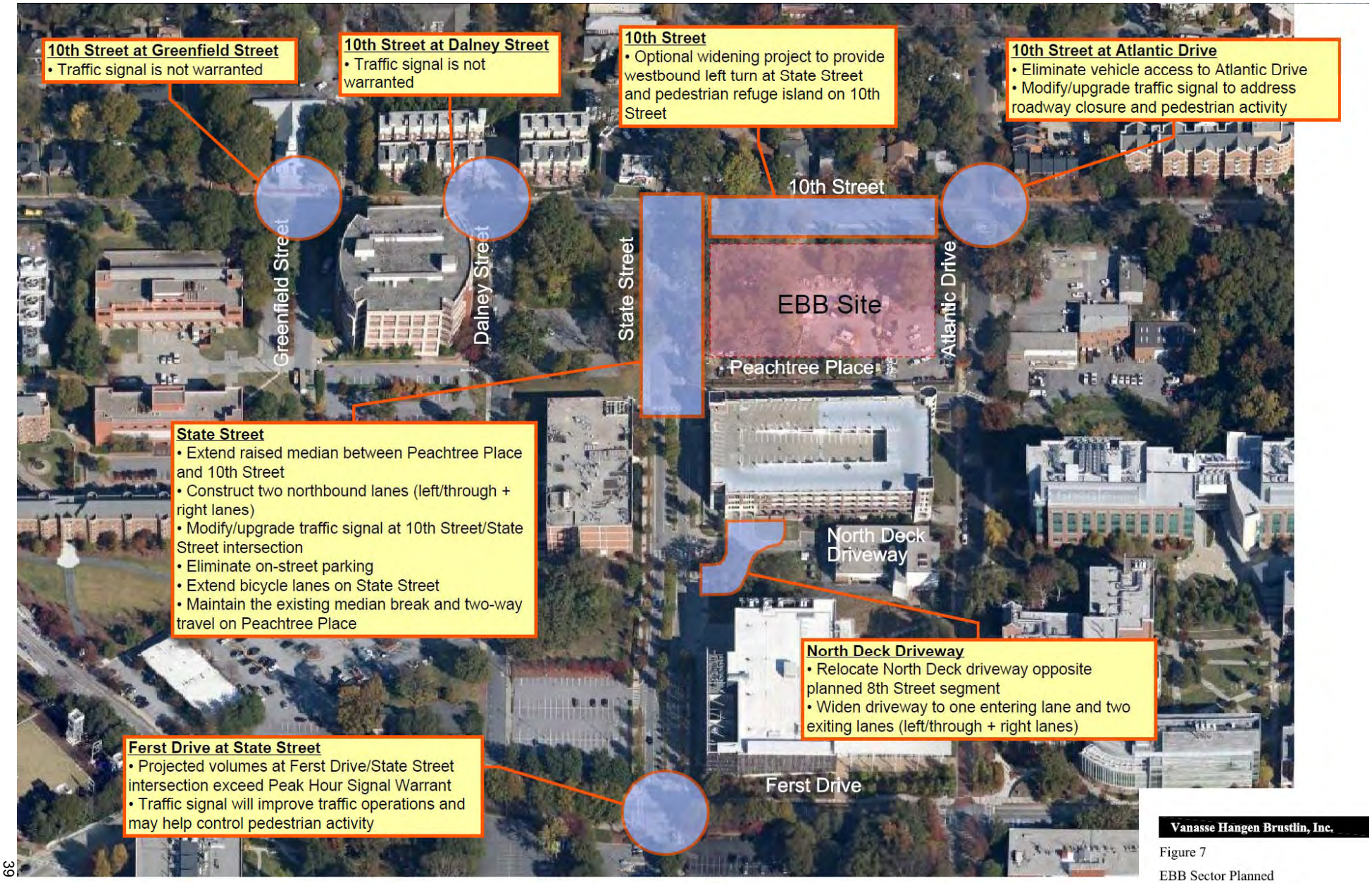
VHB

Future Conditions Queuing (AM Peak Hour)



Future Conditions Queuing (PM Peak Hour)

Summary of Transportation Modifications



Vanasse Hangen Brustlin, Inc.

Figure 7

EBB Sector Planned Roadway Improvements
Georgia Tech EBB Sector TIS
Atlanta, GA

10th Street/State Street Potential Configuration

Vaasse Hangen Brustlin, Inc.

Figure 8

State Street Planned Roadway Improvements
Georgia Tech EBB Sector TIS
Atlanta, GA

Section 3

South - Central Sector Utility Master Plan; Long Engineering, Inc.

Utility Master Plan Introduction

The narrative information provided below compliments and is an addition to the information provided in the South-Central Sector Master Plan Utility Exhibits. An exhibit and related narrative section has been developed for each of the following utilities; chilled water and steam, natural gas, water, sanitary sewer, power, and water reuse cisterns.

Chilled Water and Steam (C1.0)

Currently the South-Central Sector is served by the Holland Plant for chilled water service. Studies done by Georgia Tech personnel indicate that the Holland Plant is at or near capacity for chilled water service and an additional chiller plant will need to be constructed as part of the growth of the South-Central Sector. The Sector has been bisected by a division line for plant service. The eastern portion of the sector will continue to be served by the Holland Plant, while the western portion of the sector will be served by the new proposed plant. Existing buildings within the western portion scheduled to remain will need to be transitioned for service by the new chiller plant. The service division line is indicated as the bold dashed line in the attached exhibit C1.0, Chilled Water and Steam.

Georgia Tech has indicated that the location for the new chiller plant will be south of Tech Parkway. We are recommending the chiller plant be constructed on the parcel of land bordered by Tech Parkway to the north, Marietta Street to the South, Wallace Street to the West, and State Street to the east. This parcel is approximately the right size in area, 4.5 acres, to accommodate the construction and future expansion of the chiller plant as it grows with the campus. Also, the plant has been located to minimize the service runs for both chilled water and steam lines, an estimated cost of $3,000 to $4,500 per linear foot.

Also shown as part of the attached exhibit C1.0 is an expansion of the existing steam network within the South-Central Sector to serve the proposed buildings. Alternative solutions for heat source to proposed buildings on campus have been suggested including implementation of a hot water system or point source systems (boilers) at each building. Included in our presentation is an expansion of the campus's current steam system; however we feel this issue needs additional discussion between user groups at Georgia Tech and that a strategy of how to move forward is agreed upon.

Natural Gas (C2.0)

The attached exhibit C2.0 indicates the existing natural gas network within Georgia Tech's campus and the recommended expansion of that system to serve the future buildings. The southern portion of Ferst Drive is scheduled to be abandoned as part of the future South-Central Sector expansion. This portion of Ferst Drive currently contains several utilities, including natural gas, which will need to be relocated as part of the abandonment of Ferst Drive. Sizes of service lines are not indicated and will need to be determined at the time the building load is known.

Water (C3.0)

Water services and known sizes are indicated on the attached exhibit C3.0. The water utility on campus is a public utility owned and maintained by the City of Atlanta. Proposed points of service for the future buildings are indicated for both fire and domestic services. An existing 12" water main is located within the current Ferst Drive alignment scheduled for abandonment and will need to be relocated prior to building construction in that area. The City of Atlanta has developed a master plan for expansion and improvement of their water utility in the area of Georgia Tech's campus with upsizing of current 6" mains to 8" diameter, however this master plan has been pushed back indefinitely due to funding issues within the City and is not incorporated within our exhibit.

An item to note as development proceeds within the South-Central Sector is the age and fragile condition of the 30" and 36" water mains within the former Hemphill Avenue right of way. Any construction in the general vicinity of these mains should proceed cautiously with effort to limit the disturbance on these mains.

Sanitary Sewer (C4.0)

Sanitary sewer service for the South-Central Sector is provided by the Hemphill Avenue Outfall combined sewer that discharges into the Orme Street Combined Trunk Sewer. The sewer basin for the South-Central sector is not capacity limited; however at the time of construction the City of Atlanta requests that detention of the 1-year storm event be provided in an amount to offset any anticipated increase in sanitary sewer flows due to development. The attached exhibit C4.0 indicates the existing sanitary sewer network and the proposed points of service for the future buildings. The current main indicated within the section of Ferst Drive scheduled for abandonment is called out to be removed and flows diverted to the existing main within Tech Parkway.

Power (C5.0)

The attached exhibit C5.0 indicates the existing power network for the South-Central Sector and the proposed points of service for proposed buildings within the sector. Duct banks within the area of Ferst Drive scheduled to be abandoned have been relocated with Tech Parkway. The relocated utility will extend from MH 191 through Tech Parkway and into MH 17 near the student center to create a loop of service in the event of failure. This relocated utility within Tech Parkway will provide service to the human resources and central receiving buildings located on Tech Parkway, removing them from Georgia Power service. The relocated utility will also serve the proposed chiller plant. Consideration needs to be made regarding the planting of landscaping within the general vicinity of future and existing power manholes for access and maintenance.

Cistern (C6.0)

The South-Central Sector falls within two distinct drainage basins on campus, designated as Basin A and Basin B in previous Georgia Tech studies. Rainwater capture, storage, and reuse have been a goal for Georgia Tech and this goal has been incorporated into our master plan. Cisterns have been conceptually sized based on the individual basin sizes and characteristics. Sizes of cisterns are anticipated to be refined as part of the ongoing campus stormwater master plan. A regional cistern has been located strategically at low points of the basin to maximize the contributing area for volume collection. We are currently indicating a 1 million gallon cistern be constructed within Basin B adjacent to the Ferst Center, an existing low point of collection on site. We are also indicating a 640,000 gallon cistern be constructed adjacent to Ferst Drive near the Callaway Manufacturing Research Center, a strategic low point within Basin A and the South-Central Sector. Regional Cisterns for general campus use have been indicated on our exhibit C6.0, however local, more building specific cisterns for specific building use have not been indicated but are recommended for consideration during the design process of each new building on campus.

8TH STREET

TURNER PLACE

MCMILLAN STREET

FERST DRIVE

640,000 GALLON CISTERN

SOUTH-CENTRAL SECTOR LIMITS
57.2 ACRES
PERCENT IMPERVIOUS = 63%

CHERRY STREET

FOWLER

12"CS

21"CS

18"CS

10"CS

CS

1,500 GALLON CISTERN

SOUTH CENTRAL SECTOR

BASIN A

BASIN B

1,500 GALLON CISTERN

1,000,000 GALLON CISTERN

1.4 MILLION GALLON CISTERN

4TH STREET

FOWLER ST

BOBBY DO

TECH PARKWAY

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- PROPOSED CISTERN
- EXISTING CISTERN
- BASIN DELINEATION
- EXISTING SEWER

GRAPHIC SCALE
100 0 100 200
(IN FEET)
1 inch = 100 ft.

REVISIONS

DESCRIPTION	DATE

LEI #####

2550 Heritage Ct
Suite 100
Atlanta, Georgia 30339
Tel 770.951.2495
Fax 770.951.2496
www.longeng.com

LONG ENGINEERING, INC.

GEORGIA TECH SOUTH CENTRAL SECTOR
UTILITY PLAN
ATLANTA, FULTON COUNTY
CISTERN

DATE:	#####
DESIGN QC:	
CADD QC:	
DESIGNED BY:	#####
DRAWN BY:	#####

SHEET
C6.0

8TH STREET

TURNER PLACE

MCMILLAN STREET

FERST DRIVE

CHERRY STREET

FOWLER ST

4TH STREET

BOBBY DO

TECH PARKWAY

SOUTH CENTRAL SECTOR

DUCT BANK TO BE ABANDONED

FUTURE ELECTRIC SERVICE

FUTURE ELECTRIC SERVICE

EMPTY 10 WAY DUCT BANK - GEORGIA POWER

GEORGIA POWER

GT

FEED TO HOLLAND PLANT

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- DEMOLISH UTILITY LINE
- EXISTING POWER
- PROPOSED POWER
- PROPOSED TRANSFORMER
- SOUTH CENTRAL SECTOR LIMITS

GRAPHIC SCALE

100 0 100 200

(IN FEET)

1 inch = 100 ft.

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LONG ENGINEERING, INC.

GEORGIA TECH SOUTH CENTRAL SECTOR

UTILITY PLAN

ATLANTA, FULTON COUNTY

POWER

DATE:	####
DESIGN QC:	
CADD QC:	
DESIGNED BY:	####
DRAWN BY:	####

SHEET

C5.0

8TH STREET

TURNER PLACE

MCMILLAN STREET

FERST DRIVE

CHERRY STREET

FOWLER

12"CS

21"CS

18"CS

10"CS

CS

SOUTH CENTRAL SECTOR

FERST DRIVE

TECH PARKWAY

4TH STREET

FOWLER ST

BOBBY DO

N

GRAPHIC SCALE

100 0 100 200

(IN FEET)

1 inch = 100 ft.

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- DEMOLISH UTILITY LINE
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- SOUTH CENTRAL SECTOR LIMITS

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GEORGIA TECH SOUTH CENTRAL SECTOR UTILITY PLAN

GEORGIA

ATLANTA, FULTON COUNTY

SANITARY

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DRAWN BY:	#####

SHEET

C4.0

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By: Stephen Lee

Plot Date: 2/7/2013 3:53 PM.
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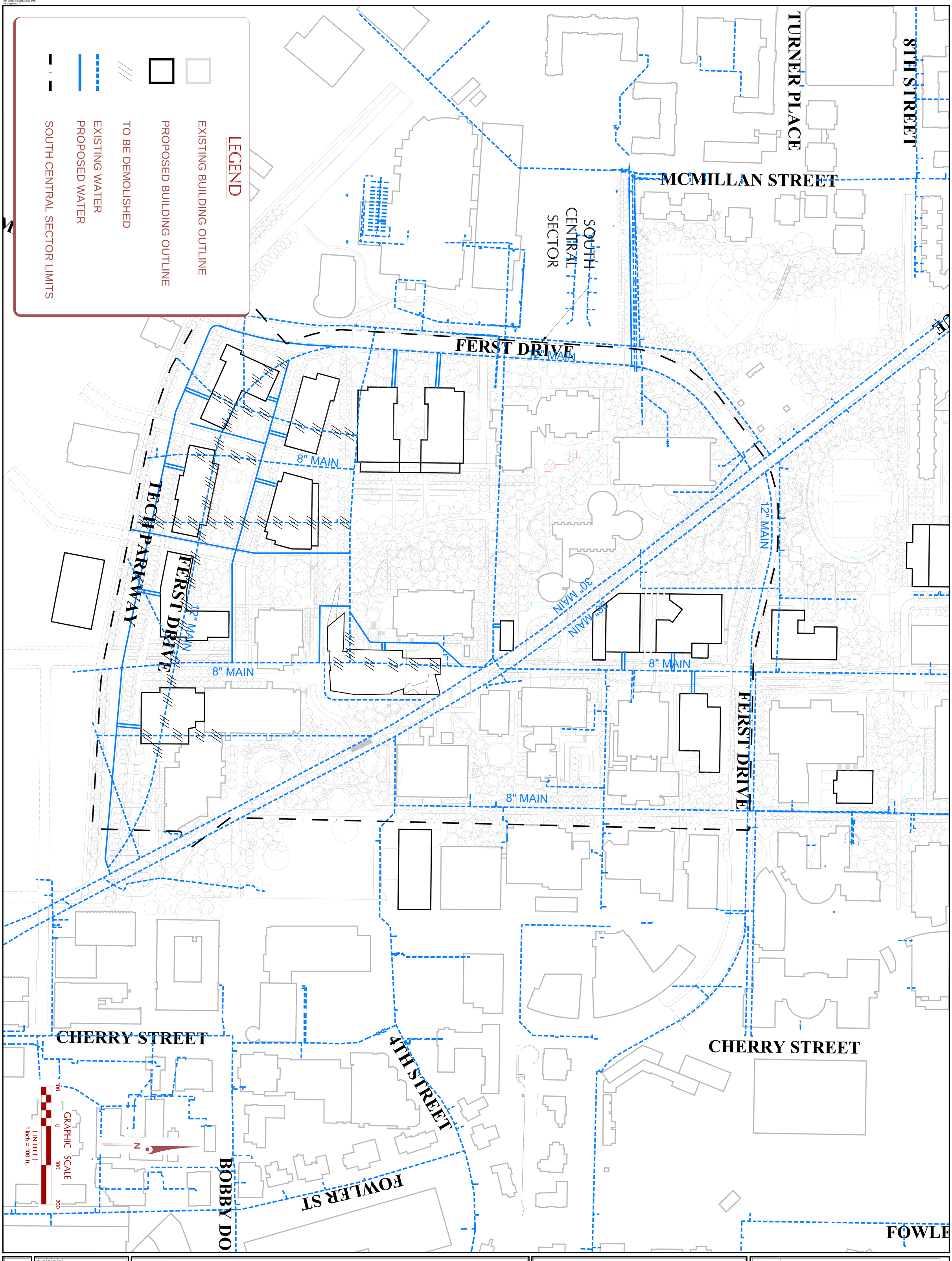

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GEORGIA TECH SOUTH CENTRAL SECTOR
UTILITY PLAN

ATLANTA, FULTON COUNTY GEORGIA

WATER

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REVISIONS

DATE	DESCRIPTION

LEI #####

8TH STREET

TURNER PLACE

MCMILLAN STREET

FERST DRIVE

CHERRY STREET

FOWLER ST

SOUTH CENTRAL SECTOR

TECH PARKWAY

4TH STREET

BOBBY DO

AGL

GAS

G

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- DEMOLISH UTILITY LINE
- EXISTING GAS
- PROPOSED GAS
- SOUTH CENTRAL SECTOR LIMITS

GRAPHIC SCALE

100 0 100 200

(IN FEET)

1 inch = 100 ft.

N

REVISIONS

DESCRIPTION	DATE

LEI #####

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LONG ENGINEERING, INC.

GEORGIA TECH SOUTH CENTRAL SECTOR
UTILITY PLAN
ATLANTA, FULTON COUNTY GEORGIA
GAS

DATE:	#####
DESIGN QC:	
CADD QC:	
DESIGNED BY:	#####
DRAWN BY:	#####

SHEET
C2.0

Plot Date: 2/7/2013 3:59 PM
File Name: C2.0.dwg

TURNER PLACE

MCMILLAN ST

FERST DRIVE

CHERRY S

SOUTH CENTRAL SECTOR

FERST DRIVE

SWITCHING BOX LOCATION

SERVICE FROM NEW CHILLER PLANT

SERVICE FROM HOLLAND PLANT

POTENTIAL THERMAL STORAGE

4TH STREET

FOWLER ST

BOBBY DOD

MARIETTA STREET

ET

FERST DRIVE

TECH PARKWAY

NEW CHILLER PLANT

CHERRY STREET

NORTH AVENUE

N

GRAPHIC SCALE

100 0 100 200

(IN FEET)

1 inch = 100 ft.

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- TO BE DEMOLISHED
- EXISTING CHILLED WATER
- PROPOSED CHILLED WATER SERVICE AND RETURN
- EXISTING STEAM
- PROPOSED STEAM SERVICE AND RETURN
- SOUTH CENTRAL SECTOR LIMITS

Plot Date: 2/7/2013 3:08 PM
By: cwilson

REVISIONS

DESCRIPTION	DATE

LEI #####
SO

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LONG ENGINEERING, INC.

GEORGIA TECH SOUTH CENTRAL SECTOR
UTILITY PLAN

GEORGIA
ATLANTA, FULTON COUNTY
CHILLED WATER AND STEAM

DATE: #####
DESIGN QC:
CADD QC:
DESIGNED BY: #####
DRAWN BY: #####

SHEET
C1.0

IV. Section 4

EBB Sector Utility and Development Assessment Plan; Jacobs Engineering, Inc., Revised August 20, 2012

draft report

March 5, 2012 – Revised August 20, 2012

Utility and Development Assesment

Georgia Tech EBB Sector Plan

Prepared for:

JB+A

JACOBS®

This report summarizes the evident utility issues within the limits of the EBB Sector Planning area of the Georgia Tech campus. This area includes the area from 10th Street south to Ferst Drive, and from Hemphill Avenue east to Atlantic Dr, and also the area between Atlantic Drive and the President's House, and North of the MS&E Building. The proposed Engineered Biosystems Building (EBB), a large research facility, is under design and will be the centerpiece of the redevelopment of this area of campus. In planning for the construction of EBB and the future projects within this area the existing, proposed and required utility systems have a significant impact on the project scope and cost.

This area has an existing network of utilities providing service to existing buildings, and also acting as connections to facilities further into campus. These utilities provide varying levels of service from systems that vary in age from the 30" water main on Hemphill Avenue which was installed in 1891 to underground electrical and fiber optic communications installed in spring of 2012.

The following list represents the wide variety of utilities and their owners, which exist within the study boundary:

1. Combined Sewer – City of Atlanta
2. Storm Sewers – both the City of Atlanta and Georgia Tech
3. Sanitary Sewers - both the City of Atlanta and Georgia Tech
4. Water Distribution – City of Atlanta
5. Above Ground Electrical - both Georgia Power and Georgia Tech
6. Underground Electrical – Georgia Tech
7. Above Ground Communication – AT&T, Comcast, Georgia Tech and others
8. Underground Communication - AT&T, Comcast, Georgia Tech and others
9. Steam Distribution – Georgia Tech
10. Chilled Water Distribution – Georgia Tech
11. Gas Distribution – Georgia Tech and Atlanta Gas Light

A short summary of known conditions, capacities, and planned or recommended upgrades follows. These descriptions are based on experience with other projects in this area of campus, review of available survey information, discussions with Georgia Tech staff, interaction with City of Atlanta staff, and review of limited inspection reports.

1. Combined Sewer – The combined sewer system on this area Georgia Tech campus drains west to east from a high point along Marietta Street, crosses Hemphill Avenue at the low point of the street, continuing east to a point where it passes below the Neely Building and the North Campus Parking Deck, and thru the 'Glade' to a point where it discharges into the original portion of the City of Atlanta's Orme Street Trunk Sewer. The main combined sewer trunk varies

in size from 30" to 72", and is feed by various sanitary, storm and combined sewers of 8" to 42" diameter. This system was installed starting in the mid-1930's, with the main trunk sewers being installed. The system continued to expand along the route of the natural stream channel, connecting several existing roadway culverts and allowing the stream valleys to be filled which resulted in the topography evident today. Several issues of note concerning the main trunk in this area of campus are:

a. The portion upstream from the Orme Street Trunk connection (adjacent to the tennis center) to State Street was rehabilitated by the installation of a Cured in Place Pipe (CIPP) liner system in the spring of 2012. After completion of this project an encroachment agreement between the Board of Regents (BOR) and the City of Atlanta will be entered into, this will formalize the conditions of the encroachment of the North Campus Parking Deck. This liner will greatly extend the service life of the sewer protecting both the parking deck and the President's 'Glade'.
b. At the point where this system crosses Hemphill Avenue the concrete pipe transitions to an egg-shaped brick culvert. This was likely in place a number of years before the other sections of the sewer, and functioned originally as a culvert carrying the stream under the road. The condition of this culvert and particularly the transitions between the differing materials and shapes at the upstream and downstream ends is a concern. A failure of the sewer in this area puts the City of Atlanta's water transmission mains in Hemphill Avenue at risk. A failure of these mains would put several of GT's buildings at risk, a more detailed discussion of these mains is included in section 4.
c. The portion of this system upstream of the original Orme Street Sewer is listed as a storm sewer by the City of Atlanta, it is however a combined sewer. There are sanitary connections which allow sewage to flow into this main at several points:
    i. Center Street Apartments – The sanitary lateral was connected to the storm sewer near the northern edge of the existing parking lot behind the Police Station.
    ii. Couch Park – The sewer that was installed for the maintenance building at the old substation connected to the storm sewer. It is understood that this was relocated to connect to the parallel sanitary sewer during the renovation of the park, and is currently being used by the pavilion at the Challenge Course.
    iii. Upstream of Couch Park – Based on odor at existing manholes other cross connections are believed to exist. Complete separation will require further investigation in areas off campus.

2. Storm Sewers – The existing storm sewer system within the sector collects and conveys storm water runoff to the large diameter combined sewer discussed above, which discharges into the original City of Atlanta Orme Street trunk sewer. Prior to the construction of the Orme Street Relief sewer this area of campus experienced flooding in many areas due to the inadequate capacity of the original trunk sewer. Flooding has not occurred, the consultant has not been able to find any reports of flooding from Institute staff, in the storm events experienced since completion of the system improvements. Areas of interest are:

Section 1

EBB Sector Planning Utility Assessment

a. The drainage along 10th Street, the northern boundary of the sector, the drainage system is inadequate and poorly maintained. Runoff from rain events leaves 10th Street and flows south along the streets or onto property adjacent to the street. Improvements to this system should be undertaken during development of parcels along 10th Street, this can include additional inlets, upgrading pipes, or diverting flow into stormwater management systems which could include storage for reuse.
b. This area also contains 5 underground detention systems.
    i. NRCB includes the newest system which includes a concrete box culvert providing storage, and is located within the loading zone along State Street.
    ii. A 30" pipe with a control structure is located within State Street adjacent to the North Campus Parking Deck; this will provide minimal storage and rate reduction.
    iii. A set of underground pipes were installed under the grass area east of the North Campus Parking Deck which discharge directly into the trunk sewer.
    iv. Within the parking areas south of CRB two pipe storage systems exist. These systems provide only a small amount of volume and removal should be considered during redevelopment of these areas. Rerouting of flows to a regional facility providing multiple functions would better serve this area.
c. Just east of the sector boundary two small above ground stormwater facilities were constructed with the MS&E Building project. These facilities will be removed during construction of the Eco Commons Upper Glade and the Atlantic Promenade projects.

3. Sanitary Sewers – This area of campus is served by dedicated sanitary sewers within the existing street network that discharge into a larger diameter trunk sewer, the Exposition Outfall, which flows from east to west roughly parallel to the large combined sewer discussed into section 1.
    a. The small diameter sewers provide a complete network which can be connected to for future projects within the EBB Sector boundaries. However, much of the system was installed between 1910 and 1940, and is believed to be Vitrified Clay Pipe. New connections to VCP can be difficult and costly, where feasible mains should be replaced or lined to extend service life.
    b. The City of Atlanta Exposition Outfall (15" and 18" mains) is to the north of and roughly parallel to the large combined sewer previously discussed. This alignment passes thru the 'Upper Glade' area where the pond is proposed. An accurate location has not been determined by any previous surveys of the area. The actual location of this sewer will impact the available area for the pond, as the City of Atlanta will not allow this type of facility to be constructed above a sanitary sewer.
    c. The City of Atlanta Exposition Outfall (15" and 18" mains) also runs between the existing parking lots west of Dalney St. This will limit the site area for the proposed parking deck.
4. Water Distribution – This area of campus has an existing grid of water mains within the streets (except for Dalney St which has only a 2" main), which are supplied by large transmission mains on Hemphill Ave and 10th St. The distribution mains are either 6" or 8" and vary in age greatly.
    a. The City of Atlanta has planned a replacement project which replaces all mains less than 8" diameter, and larger mains installed prior to the 1960's. This project has been

delayed until 2023 to 2025 due to the City's reassessment of capital program budgets and subsequent amendment of the federal consent decree. The planned replacements are as follows:

i. State St from 10th St to Ferst Dr
ii. Peachtree Pl from Atlantic Dr to State St
iii. Dalney St from 10th St to Ferst Dr
iv. Greenfield St from 10th St to approximately 9th St
v. Center St from 10th St to 9th St
vi. 9th St from Hemphill Ave to east of Center St
vii. 10th St from Hemphill Ave to I-75/85

Therefore, the Institute should take into account the future impact of this project on the streetscape portions of any projects and decide how this replacement needs to take place:

i. Wait for the City of Atlanta's project to occur and work with the impacts to the streetscape elements that will be affected.
ii. Under take the replacement as a part of the building or streetscape project.
iii. Negotiate with the City to move up the schedule on specific projects. This was accomplished in 2008, for the replacement of the main on Atlantic Drive, from 10th St to Ferst Dr. The rationale for this was that it would cost the City more money in the future to replace the streetscape elements. It should be considered that at the time of this construction the remaining work was still scheduled for the following year, not 10 years in the future.

b. Within the Hemphill Ave right of way there are two large water transmission mains which supply downtown Atlanta from the Hemphill water treatment facility. The mains were constructed in 1891 (30" main) and 1928 (36" main). These mains require significant consideration during nearby construction activities to protect them from vibration or damage during and excavation. The mains have nearly 100 year old lead joints which can begin leaking due only to vibrations from construction activities. A failure of one of these mains would cause significant damage to roads and buildings in the area, along with the impacts to the downtown area being served by the mains. These mains are scheduled to be removed from service by 2020 and replaced by a new transmission main system off campus. Discussions with the City of Atlanta need to be maintained to insure that a replacement for these mains is available. These mains provide a significant portion of the water available for fire protection on campus, this source within the center of campus needs to be replaced. More details on this issue can be found in the campus fire protection study by Jacobs.

5. Above Ground Electrical – Campus policy is for above ground utilities to be buried during any development project. To that end the following exist within the Sector boundaries:
    a. Georgia Power owns above ground distribution lines along the south side of 10th St. These lines have been buried from I-75/85 to the Cherry St alley the remainder will need to be buried going west. The fewer sections that this work is split into the more economical the total cost will be.

b. Georgia Tech has above ground distribution lines along the Greenfield St right of way that will need to be relocated underground during the proposed parking deck project.

6. Under Ground Electrical – Georgia Tech's underground distribution network allows access to 20kV service for all proposed building sites within the sector. Appropriate transformers and switch gear will need to be provided for each project.
7. Above Ground Communication – Campus policy is for above ground utilities to be buried during any development project. To that end the following exist within the Sector boundaries:
    a. Several companies own above ground communication lines along the south side of 10th St. These lines have been buried from I-75/85 to the Cherry St alley the remainder will need to be buried going west. The fewer sections that this work is split into the more economical the total cost will be.
    b. Georgia Tech has above ground distribution lines along the Greenfield St right of way that will need to be relocated underground during the proposed parking deck project.
8. Under Ground Communication – Georgia Tech's underground communication network allows access to pathway for cable installation for all proposed building sites within the sector. New cables will need to be installed from a hub to the new building.
9. Steam Distribution – Georgia Tech's steam distribution system supplies several buildings within the sector (IBB, Nanotechnology, Baker, the two buildings at 430 10th St and CRB). The distribution and condensate recovery mains were replaced prior to the construction of the Nanotechnology Building and provide a significant remaining service life. The available supply and distribution capacity does not allow for use of steam in any new facilities. However, the existing mains which run along State St, the 9th St corridor and Dalney St are an issue for future construction projects.
10. Chilled Water – Georgia Tech's chilled water system supplies all existing buildings, except the church, from the 10th St chiller plant. The system in this area of campus was constructed in 19**XX**, and included connections for future development. The only proposed development areas requiring extension of the system would be the Dalney St parking deck (if required) and the building at the NW corner of State St and Ferst Dr. The Institute is currently studying the expansion of the 10th St chiller plant. The final build out of the plant will provide the following additional capacity to the sector area;
    a. 2000 tons for EBB 1 &2
    b. 1000 tons for Nanotechnology Phase 2
    c. 6000 tons for additional development
11. Gas – Gas service is available along all the existing streets within the sector from either Atlanta Gas Light or Georgia Tech's systems, or both. The Institute's preference would be connection to the campus system where practical.
    a. The campus system should be extended along State St to provide service to the buildings proposed on the south side of Ferst Dr.

Section 2

EBB Sector Planning Site Development Assessment

The Engineered Biosystems Building (EBB) Sector Planning goal is to produce an updated plan for the redevelopment of a section Georgia Tech's campus between Hemphill Ave and Atlantic Dr, and 10th St and Ferst Dr. This plan shall incorporate the Institute's goals for sustainability, landscape design, academic and research programming, and stormwater management. This report will summarize information available for each development location.

Engineered Biosystems Building (EBB-1) at 10th St between Atlantic Dr and State St. This research facility will be the first building constructed within the sector.

1. **Site Design Issues**
    a. 10th Street streetscape – Need to address sidewalk/greenspace width issues in relation to available right of way and existing structures. Upgrade/repair existing drainage along 10th St and consider diverting runoff for harvesting onsite.
    b. State St streetscape – Determine final road section and alignment with north side of 10th St.
    c. North Campus Parking Deck access/EBB service entrance – The reuse/reconstruction/ regarding of Peachtree Pl to function as in a strictly service capacity needs close study, along with relocation of primary access to the parking deck.
    d. Closure of Atlantic Dr – Closing Atlantic Dr to become a pedestrian corridor requires several issues to be coordinated.
        i. Maintain emergency vehicle access
        ii. Complete abandonment of Right of way thru City of Atlanta
        iii. Provide City of Atlanta appropriate easements for water and sewer during abandonment process
2. **Utility Issues**
    a. Water service is available on several sides of the site; it is recommended that the services come from the east side. The 8" main in Atlantic is only about 3 years old.
    b. Sanitary Sewer is available within Atlantic Dr, State St and Peachtree Pl. A new manhole for the connection can be placed as needed; the main on Peachtree Pl will be difficult to access due to other utilities north of the sanitary sewer.
    c. Chilled water service is available at the SE corner of the site. Existing valves and service stub outs are located here for both EBB-1 and EBB-2 (see below). The service stub outs should be extended for EBB-2 during the development of EBB-1 and the completion of the Atlantic Promenade.
    d. Manholes for both electrical and communication services are available at the intersection of Peachtree Pl and both Atlantic Dr and State St.
    e. Gas service is available along Atlantic Dr, State St and Peachtree Pl.
    f. The campus steam system will not be available for this project.

g. The above ground utilities (Georgia Power electrical and various communication lines) along 10th St will be required to be relocated underground.
h. No required relocation of existing campus utilities is apparent.

3. Stormwater Issues

a. Stormwater detention and retention for reuse should be provided on this site, the goals should be aggressive based on the site's inclusion in the green building zone:
    i. Provide storage for reuse in excess of the City of Atlanta's pending requirement of 1.2". The total volume and availability should be based on stormwater and condensate flows. Volume of storage should be based on reuse requirements. Overflows from this system should be routed to the upper glade pond and connected cistern.
    ii. Reduction in peak flows should also exceed the City of Atlanta's requirement of 30%. It is recommended that rate reduction focus on the smaller, more frequent storms.
b. Drainage along 10th Street is poor from Hemphill Avenue to Fowler St; this is due to the lack of inlets and poor maintenance.
    i. The addition of inlets during the streetscape portion of the project will reduce the amount of water flowing in the street.
    ii. The diversion of the runoff into the project's collection and storage system will improve the localized flooding of 10th Street east of the site, and provide an additional source of reuse water.
    iii. A 'green street' approach to the streetscape of 10th Street will provide an opportunity for a pre-treatment of the road runoff prior to discharge into a cistern or the pond.

4. Miscellaneous Issues

a. According to the 1928 City of Atlanta topographic maps a valley and stream crossed this site from the NW to the SE. This could result in:
    i. Poor fill has been encountered in many areas across campus in areas which were filled since this survey was performed.
    ii. The natural stream in this area could indicate ground water issues for any below grade areas of the proposed building.
b. Vehicular and pedestrian access during construction.
    i. Both Atlantic Dr and State St are heavily used by students to enter campus from Home Park. This is both a pedestrian and vehicular issue, these two streets are the only signalized intersections at cross streets between Fowler St and Hemphill Ave.

Engineered Biosystems Building Phase 2 (EBB-2) at 10th St east of Atlantic Dr. This research facility will be an expansion of EBB-1 and will share service access.

1. Site Design Issues

a. 10th Street streetscape – Need to address sidewalk/greenspace width issues in relation to available right of way and existing structures. Upgrade/repair existing drainage along 10th St and consider diverting runoff for harvesting onsite.
b. Service entrance – The service entrance constructed with EBB-1 will need to be designed to accommodate the EBB-2 expansion. A tunnel under Atlantic Dr will need to be constructed. This tunnel will need to cross City of Atlanta water and sanitary sewer, a gas main and an AT&T ductbank.
c. Closure and reconstruction of Atlantic Dr – Construction of the EBB-2 facility needs to be coordinated with the efforts to create a pedestrian corridor along Atlantic Dr. Access during construction will be limited and damage to new construction along Atlantic will be considerable if the reconstruction occurs during the EBB-1 project.

2. Utility Issues

a. Water service is available on 10th St and Atlantic Dr; it is recommended that the services come from the west side. The 8" main in Atlantic is only about 3 years old and the City plans include replacement of the main on 10th St, which could cause service interruptions.
b. Sanitary Sewer is available within Atlantic Dr; also a trunk main is located to the south of the project site within the Eco Commons. A new manhole can be installed on either main to provide a service connection. Installation will be more difficult and expensive on the trunk main to the south due to the size of main and the high normal flows.
c. Chilled water service is available at the SW corner of the site. Existing valves and service stub outs are located here for both EBB-1 and EBB-2 (see below). The service stub outs should be extended for EBB-2 during the development of EBB-1 and the completion of the Atlantic Promenade.
d. Manholes for both electrical and communication services are available at the intersection of Peachtree Pl and Atlantic Dr.
e. Gas service is available along Atlantic Dr, State St and Peachtree Pl.
f. The campus steam system will not be available for this project.
g. The above ground utilities (Georgia Power electrical and various communication lines) along 10th St will be required to be relocated underground.
h. No required relocation of existing campus utilities is apparent.

3. Stormwater Issues

a. Stormwater detention and retention for reuse should be provided on this site, the goals should be aggressive based on the site's inclusion in the green building zone:
    i. Provide storage for reuse in excess of the City of Atlanta's pending requirement of 1.2". The total volume and availability should be based on stormwater and condensate flows. Volume of storage should be based on reuse requirements. Overflows from this system should be routed to the upper glade pond and connected cistern.
    ii. Reduction in peak flows should also exceed the City of Atlanta's requirement of 30%. It is recommended that rate reduction focus on the smaller, more frequent storms.

b. Drainage along 10th Street is poor from Hemphill Avenue to Fowler St; this is due to the lack of inlets and poor maintenance.
    i. The addition of inlets during the streetscape portion of the project will reduce the amount of water flowing in the street.
    ii. The diversion of the runoff into the project's collection and storage system will improve the localized flooding of 10th Street east of the site, and provide an additional source of reuse water.
    iii. A 'green street' approach to the streetscape of 10th Street will provide an opportunity for a pre-treatment of the road runoff prior to discharge into a cistern or the pond.
c. A blackwater reclamation system could be provided with this project. A location on the south side of the building would allow diversion of the sanitary flows from the EBB-1 project to the system and easy inter-connection to a cistern system collecting water from various sources within the project.

4. Miscellaneous Issues

a. According to the 1928 City of Atlanta topographic maps this site naturally sloped from north to south to the main stream crossing campus. The majority of fill placed since these maps were created should be to the south of the site, within the Eco Commons.
b. Vehicular and pedestrian access during construction.
    i. Atlantic Dr is heavily used by students to enter campus from Home Park.
    ii. Construction access from 10th St will need to use Atlantic Dr closing the street and limiting access to the east side of EBB-1.
c. The recommendations above will require the installation of significant utilities below the Atlantic Promenade and public areas outside of EBB-1 and EBB-2. A large number of manholes will be required to provide access to these systems and allow for valves and branching of the utilities. An alternative to this design would be to provide for the extension of chilled water, electrical and communication infrastructure thru the service connections leading from BB-1 to EBB-2.

Centennial Research Building Phase 2 (CRB-2) at 10th St between State St and Dalney St.

1. Site Design Issues

a. 10th Street streetscape – Need to address sidewalk/greenspace width issues in relation to available right of way and existing structures. Upgrade/repair existing drainage along 10th St and consider diverting runoff for harvesting onsite.
b. Service entrance – The service entrance location will be provided from either State Street or Dalney Street, and will need to be north of the utility corridor along the north side of the Baker Building.
c. Site grading – the area south of the site is a major utility corridor. Lowering grades in this area will be expensive and disruptive to campus due to necessary relocations. The current elevations create a challenge for the grading along State Street and relating the building to the street.

2. **Utility Issues**
    a. Water service is available on 10th St and State Street. Both of these mains are in the City of Atlanta's water main replacement project.
    b. Sanitary Sewer is available within both State Street and Dalney Street. A new manhole can be installed on either main or a connection to an existing manhole can be made to provide a service connection. Reuse of blackwater could be included on site, space permitting, or if the sanitary sewer is connected to the Dalney Street main the flow can possibly be collected in a large regional facility farther downstream.
    c. Chilled water service is available at the south side of the site, near State St.
    d. Manholes for both electrical and communication services are available at the intersection of Peachtree Pl and State Street.
    e. Gas service is available along State St.
    f. The campus steam system will not be available for this project.
    g. The above ground utilities (Georgia Power electrical and various communication lines) along 10th St and Dalney Street will be required to be relocated underground.
    h. No required relocation of existing campus utilities is apparent.
3. **Stormwater Issues**
    a. Stormwater detention and retention for reuse should be provided for this site, the goals should be based on the site's inclusion in the campus development building zone:
        i. Provide storage for reuse meeting the City of Atlanta's pending requirement of 1.2". The total volume and availability should be based on stormwater and condensate flows. Volume of storage should be based on reuse requirements. If possible overflows from this system should be routed to another storage system prior to discharge into the sewer system.
    b. Drainage along 10th Street is poor from Hemphill Avenue to Fowler St; this is due to the lack of inlets and poor maintenance.
        i. The addition of inlets during the streetscape portion of the project will reduce the amount of water flowing in the street.
        ii. The diversion of the runoff into the project's collection and storage system will improve the localized flooding of 10th Street east of the site, and provide an additional source of reuse water.
        iii. A 'green street' approach to the streetscape of 10th Street will provide an opportunity for a pre-treatment of the road runoff prior to discharge into a cistern or the pond.
    c. This site's small size makes the installation of a blackwater reclamation system likely inefficient from a cost perspective. Diverting as much flow as possible into the existing sanitary main on Dalney St and an improved drainage system for the street would allow connection to a regional cistern and/or blackwater system located on the site of the new parking deck.
4. **Miscellaneous Issues**

a. According to the 1928 City of Atlanta topographic maps this site is still at the grades show for that time. Lower levels on the northern portion of the site may encounter rock during excavation.
b. Vehicular and pedestrian access during construction.
    i. Construction access from 10th St will need to use Dalney Street, which provides the only access from the north to the Baker Building loading dock and parking lot, and a parking lot south of CRB-1.

Church Site at Southeast corner 10th St and Hemphill Ave

1. **Site Design Issues**
    a. 10th Street streetscape – Need to address sidewalk/greenspace width issues in relation to available right of way and existing structures.
    b. Intersection improvements – Coordination of northbound turn lane with streetscape of Hemphill Ave, and possible requirement for a pedestrian refuge island at the intersection which would require dedication of right of way.
    c. Center St – Assessment of this site and the 10th Street Chiller Plant expansion should look at moving Center St west to align with the existing portion north of 10th St.
    d. Service entrance – The service entrance will be located on 9th St or Center St, both are narrow and provide challenges due to significant grade drop from front of building at 10th St.
    e. Site grading – There is a significant grade drop from 10th St to 9th St across the site. The intersection is at 970 and 9th St is at elevation 946. An assessment of the large existing trees north of 9th St needs to be made and a decision made whether or not to save them. These trees are about 7' above 9th St. and saving them will impact the grading of the site and design of the future facility.
2. **Utility Issues**
    a. Water service is available on 10th St and Center St. Both of these mains are in the City of Atlanta's water main replacement project.
    b. Sanitary Sewer is currently connected to a main in 10th St.; however service could be connected to a manhole at 9th St. and Center St., which would allow gravity service to lower levels of a facility. Use of the manhole on 9th St also provides the opportunity to divert flows to a regional blackwater system.
    c. Chilled water service is available at the south side of the site, mid-block.
    d. Manholes for both electrical and communication services are available at the intersection of 9th St and Center St. Also, ductbanks cross the northeast portion of the site to a pair of existing manholes. These facilities will need to remain to serve the facility on the north side of 10th St. Gas service is available along Center St.
    f. The campus steam system will not be available for this project.
    g. The above ground utilities (Georgia Power electrical and various communication lines) along 10th St will be required to be relocated underground. Also, the above ground utilities on site will be replaced by connections to the campus system.

h. No required relocation of existing campus utilities is apparent.

3. Stormwater Issues

a. Stormwater detention and retention for reuse should be provided for this site, the goals should be based on the site's inclusion in the campus development building zone:
    i. Provide storage for reuse meeting the City of Atlanta's pending requirement of 1.2". The total volume and availability should be based on stormwater and condensate flows. Volume of storage should be based on reuse requirements. If possible overflows from this system should be routed to another storage system prior to discharge into the sewer system. This site's storage could be located at the regional facility located at the proposed parking deck. The stormwater flows could be diverted along 9th St to Greenfield St, and to the facility.

b. Drainage along 10th Street is poor from Hemphill Avenue to Fowler St; this is due to the lack of inlets and poor maintenance.
    i. The addition of inlets during the streetscape portion of the project will reduce the amount of water flowing in the street.
    ii. The diversion of the runoff into the project's collection and storage system will improve the localized flooding of 10th Street east of the site, and provide an additional source of reuse water.
    iii. A 'green street' approach to the streetscape of 10th Street will provide an opportunity for a pre-treatment of the road runoff prior to discharge into a cistern or the pond.

c. Drainage improvements along Hemphill Ave should not be undertaken unless the existing water transmission mains are out of service at the time of redevelopment. It is recommended that the amount of runoff from the site entering the Hemphill right of way be limited during the design of this site.

4. Miscellaneous Issues

a. According to the 1928 City of Atlanta topographic maps this site naturally sloped from north to south at approximately the current grades. Excavations for levels lower than 10th St may encounter rock.

Building Site at Northwest corner State St and Ferst Dr

1. Site Design Issues

a. Service entrance – The service entrance would be located on State St, and due to the existing median would likely only be accessible from the southbound lane of the street.

b. Site grading – There is a significant grade drop just north of the site which the building should be planned to be to the south of. This will maintain the natural floodplain area as the Eco Commons.

c. Improvements to the streetscape along Ferst Dr will be made prior to or during development of this area. These improvements will likely result in significant excavation in order to widen sidewalks and planting areas along the street.

2. **Utility Issues**
    a. Water service is available on Ferst Dr and State St. It is recommended that water service be connected to the existing 12" main in Ferst Dr. The State St main is in the City of Atlanta's water main replacement project and future service interruptions can be expected.
    b. Sanitary Sewer is available in State St., the main does drain the physics building and can be used to drain the future buildings south of Ferst Dr. Diversion of this main to a blackwater system would provide substantial flows for reuse.
    c. Chilled water will require a larger service be installed along State St from Peachtree Pl to the site.
    d. Manholes for both electrical and communication services are available at the intersection of State St and Ferst Dr.
    e. The campus steam system will not be available for this project.
    f. Campus gas distribution should be extended across Ferst Dr when streetscape in this area is undertaken, this will provide service to the planned buildings south of Ferst Dr which will not have steam available.
    g. No required relocation of existing campus utilities is apparent.
3. **Stormwater Issues**
    a. Stormwater detention and retention for reuse should be provided for this site, the goals should be aggressive based on the site's inclusion in the campus green building zone:
        i. Provide storage for reuse exceeding the City of Atlanta's pending requirement of 1.2". The total volume and availability should be based on stormwater and condensate flows. Volume of storage should be based on reuse requirements. If possible overflows from this system should be routed to another storage system prior to discharge into the sewer system. These overflows are most likely able to be routed to infiltration cells located below the site and within the Eco Commons.
        ii. This site is isolated from other proposed development by grades and existing infrastructure, and therefore is more difficult to connect to a regional facility. If space permits a regional reuse facility can be planned for this site. The future buildings south of Ferst Dr could be designed to divert sanitary flow to a blackwater treatment system on this site. Also, drainage from Ferst Dr, the new facilities and remaining parking behind the Physics building could be diverted and collected for additional reuse volume.
4. **Miscellaneous Issues**
    a. According to the 1928 City of Atlanta topographic maps this site sits on the natural grade overlooking the floodplain of the stream which crossed campus. Shallow rock is a possibility; however existing fills would be limited.

New Dalney Street Parking Deck between Dalney St. and Greenfield St.

1. **Site Design Issues**

a. Significant existing utilities pass the site on both the north and south side of the selected location.
b. Site grading – there is sufficient grade change at the site, between Dalney St and an extension of Greenfield St., to provide entrances on two levels of the deck.
c. The footprint of the deck should be kept to a minimum to allow as much adjacent area to be available for regional detention/cisterns/blackwater treatment facilities as possible.
d. Greenfield St will need to be extended to provide a second access point for the deck; standard streetscape improvements will be required. During this extension infrastructure for diversion of storm and sanitary flows to a regional reuse facility, and a force main to provide reuse water to the 10th St Chiller Plant should be installed.
e. Dalney St. will need to be improved to meet campus standard streetscape requirements.

2. Utility Issues

a. Water service is available on Greenfield St. on a dead end line running south from 10th St. the City of Atlanta's replacement project calls for the replacement of this main, and also the replacement of a 2" main on Dalney St.
b. Manholes for both electrical and communication services are available for connection to the campus systems at the north side of the site adjacent to both Dalney St. and Greenfield St.
c. The above ground utilities (Georgia Power electrical and various communication lines) along Dalney Street and Greenfield St. will be required to be relocated underground.
d. Campus utility relocations may be required along the north and south boundaries of the site, depending on the footprint of the deck and required area for regional reuse systems. On the north side underground communication, gas and chilled water could require relocation, and on the south side underground communication and sanitary sewer may be impacted. In addition, storm drainage including two pipe detention systems, one along the north side of the site and the other passing through the site will need to be relocated.

3. Stormwater Issues

a. This site should include a regional reuse facility. A facility at this location can make use of one pump station to provide reuse water to the 10th St Chiller Plant and the CRB-2 facility, and irrigation water to the Eco Commons in a much more efficient system than several local systems at each project. Depending on further study additional sites may be feasible to supply from this system.
    i. Harvesting of sanitary sewer flows can be accomplished in this area to provide a reuse source. The existing CRB, 430 10th St., and Center St Apartments (southern portion) can provide based on 2009 records 6,800,000 gal/year. In addition, the new facilities at Hemphill Ave and 10th St. and the CRB-2 can be connected to the system.
    ii. Condensate, roof drainage and surface drainage should be collected from all sources that allow flow by gravity to a storage facility.

b. Drainage improvements along Dalney St. and Greenfield St. should concentrate on collecting as much runoff as possible for discharge to the cistern(s) in the regional system.
c. Overflows from the portions of the system storing storm water should be discharged first to infiltration cells within the Eco Commons. Even larger overflows from very large storms then need to be discharged safely to the trunk sewer within the Eco commons.

4. Miscellaneous Issues

a. According to the 1928 City of Atlanta topographic maps this site is still at the grades shown for that time. The south west corner of the proposed site may include some deep fills that should be investigated.

NRCB 2 Atlantic Dr NE of NRCB PH 1

1. Site Design Issues

a. Site grading – there is sufficient grade change dropping from south to north to allow entrances from 2 different levels of the building.
b. The site will encroach upon the location of the Neely Research Facility's containment building. The 6 foot foundation slab will remain in place after the completion of the completion of building demolition. It is planned that this structure will be incorporated into the foundation design of the proposed NRCB-2 building.
c. Access for construction will need to coordinate with the use of the relocated North Campus Parking Deck entrance and with the construction schedule of the Atlantic Promenade (as building construction will likely severely damage any final hardscape treatments).

2. Utility Issues

a. Water service is available on Atlantic Dr, this is a new 8" main.
b. Sanitary Sewer is available in Atlantic Dr, the main is thought to be VCP and installation of a new manhole will be difficult due to the density of utilities existing in the street.
c. Chilled water will require a set of taps and a new valve manhole be installed along the main in Atlantic Dr, which will be difficult due to the number of utilities in the street.
d. Manholes for both electrical and communication services are available for connection to the campus systems on Atlantic Dr, but require new ductbank to cross the street and run along Atlantic Dr to the south. Due to the large amount of utilities within the street it is suggested that connection to the existing infrastructure of NRCB-1 be considered.
e. The campus steam system will not be available for this project.
f. Campus gas distribution is available along Atlantic Dr.
g. No required relocation of existing campus utilities is apparent.

3. Stormwater Issues

a. The stormwater goals should be aggressive based on the site's location along the Eco Commons zone:
    i. Provide storage for reuse exceeding the City of Atlanta's pending requirement of 1.2". The total volume and availability should be based on stormwater and condensate flows. Volume of storage should be based on reuse requirements. Overflows from this system should be routed to the water feature north of the building within the planned Eco Commons, this will provide interlinked storage with other portions of the Eco Commons. This system within the Eco Commons allows water from several sources to be stored and limit the amounts bypassed into the City sewer system.

Ninth St Reconstruction between Center St. and State St.

1. **Site Design Issues**
    a. Significant utilities exist within the corridor proposed for the re-establihment of the street.
    b. Site grading – The west side of the intersections at both State St and Dalney St require significant cuts to bring the road to grade. Also, at the west end of the ATDC site a significant fill is required to meet grade behind the 10th St Chiller Plant. Raising the grade in this area will impact the access to the loading docks on both of the ATDC buildings, making most of these unusable and requiring retaining walls and drainage systems to avoid significant changes to the buildings.
2. **Utility Issues**
    a. Significant utility relocations will be required due to the lowering of the grades at the intersection with both State St and Dalney St.
        i. Electrical distribution and services will be impacted from State St to Greenfield St and also within the ATDC site. New ductbanks, manholes and relocated transformers and switch gear will all be required, with new cable being installed and spliced where connections are to be made.
        ii. Communication lines will need to be replaced in the same areas as the electrical facilities discussed above. The cables will need to be spliced or replaced to reconnect to the new adjusted alignment. Replacing the cables will require pulling new lines from the MS&E building all the way to the west campus dorms.
        iii. Chilled water mains will need to be replaced from State St to Dalney St to accommodate the grade changes.
    b. In addition to the significant replacement of utilities discussed above scheduling will be an important concern for this project. The order of installation and demolition will determine the location of the new utility alignments, and this will be driven by the scheduled time of year for construction. Determination of allowable service outages for each utility will need to be made and used to coordinate design and construction of the new road.
3. **Stormwater Issues**

a. The design of the new Ninth St should include a drainage system that allows collection of stormwater in such a way as to maximize the collection of runoff from the road and adjacent sites for reuse. Plans for regional reuse locations need to be set prior to this project commencing.

4. Miscellaneous Issues

a. According to the 1928 City of Atlanta topographic maps a deep stream channel existed just west of Greenfield St and may contain poor fills.

b. Impact on the existing CRB site and proposed CRB-2 site caused by the significant cuts required need to be assessed in depth prior to proceeding with design and construction of the new road.

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- EXISTING GAS LINE
- PROPOSED GAS LINE
- EBB SECTOR LIMITS

HEMPHILL AVENUE

DALNEY STREET

STATE STREET

FERST DRIVE

ATLANTIC DRIVE

0 60' 120'

N

THIS LINE IS ONE INCH LONG WHEN PLOTTED FULL SCALE

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

PROJECT NO: EGXH7500

DATE: AUGUST 2012

DISC. LEAD: EW | DESIGNER: JA | CHECKER:

SHEET TITLE: UTILITY PLAN GAS

SHEET: CU101

REV	DATE	REVISION DESCRIPTION

EBB SECTOR UTILITIES

GEORGIA INSTITUTE OF TECHNOLOGY

955 FOWLER STREET NW, ATLANTA, GA 30332

NOT FOR CONSTRUCTION

JACOBS

6801 Governors Lake Pkwy
Building 200
Norcross, GA 30071 | t 770.455.8555

CREATED: 8/17/2012 LAST SAVED: 2/6/2013 BY: AUDREY.HACKMAN PLOT DATE: 2/7/2013

LEGEND

EXISTING BUILDING OUTLINE

PROPOSED BUILDING OUTLINE

EXISTING POWER LINE

PROPOSED POWER LINE

EBB SECTOR LIMITS

HEMPHILL AVENUE

DALNEY STREET

STATE STREET

FERST DRIVE

ATLANTIC DRIVE

NOTE: POWER CONNECTS BUILDINGS VIA UTILITY TUNNEL

0 60' 120'

N

SHEET CU102

UTILITY PLAN POWER

SHEET TITLE

DISC. LEAD: EW DESIGNER: JA CHECKER:

DATE: AUGUST 2012

PROJECT NO: EGXH7500

THIS LINE IS ONE INCH LONG WHEN PLOTTED FULL SCALE

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

REV	DATE	REVISION DESCRIPTION

EBB SECTOR UTILITIES

GEORGIA INSTITUTE OF TECHNOLOGY

955 FOWLER STREET NW, ATLANTA, GA 30332

NOT FOR CONSTRUCTION

JACOBS

6801 Governors Lake Pkwy
Building 200
Norcross, GA 30071 | t 770.455.8555

LEGEND

EXISTING BUILDING OUTLINE

PROPOSED BUILDING OUTLINE

EXISTING SANITARY SEWER

PROPOSED SANITARY SEWER

EBB SECTOR LIMITS

HEMPHILL AVENUE

72" COMBINED SEWER

DALNEY STREET

STATE STREET

FERST DRIVE

ATLANTIC DRIVE

0 60' 120'

N

SHEET CU103

UTILITY PLAN
SANITARY SEWER

SHEET TITLE

EW DISC. LEAD:

AUGUST 2012 DATE:

JA DESIGNER:

CHECKER:

PROJECT NO: EGM7500

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THIS LINE IS ONE INCH LONG WHEN PLOTTED FULL SCALE

REV	DATE	REVISION DESCRIPTION

EBB SECTOR UTILITIES

GEORGIA INSTITUTE OF TECHNOLOGY

955 FOWLER STREET NW, ATLANTA, GA 30332

NOT FOR CONSTRUCTION

JACOBS

6801 Governors Lake Pkwy
Building 200
Norcross, GA 30071 | t 770.455.8555

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- EXISTING WATER
- PROPOSED WATER
- EBB SECTOR LIMITS

NOTE: THE 30" AND 36" TRANSMISSION MAINS ALONG THE HEMPHILL ALIGNMENT ARE APPROXIMATELY 100 YEARS OLD AND EXTREME CARE SHOULD BE TAKEN DURING ANY NEARBY CONSTRUCTION.

HEMPHILL AVENUE

DALNEY STREET

STATE STREET

FERST DRIVE

ATLANTIC DRIVE

0 60' 120'

N

SHEET	UTILITY PLAN WATER
CU104	SHEET TITLE: EW
	DISC. LEAD: DESIGNER: JA
	CHECKER:
	DATE: AUGUST 2012
	PROJECT NO: EGXH7500

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THIS LINE IS ONE INCH LONG WHEN PLOTTED FULL SCALE

REV	DATE	REVISION DESCRIPTION

EBB SECTOR UTILITIES

GEORGIA INSTITUTE OF TECHNOLOGY

955 FOWLER STREET NW, ATLANTA, GA 30332

NOT FOR CONSTRUCTION

JACOBS

6801 Governors Lake Pkwy
Building 200
Norcross, GA 30071 | t 770.455.8555

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- EXISTING CHILLED WATER
- PROPOSED CHILLED WATER
- EXISTING STEAM
- PROPOSED STEAM
- EBB SECTOR LIMITS

HEMPHILL AVENUE

APPROXIMATE LOCATION

DALNEY STREET

STATE STREET

FERST DRIVE

ATLANTIC DRIVE

APPROXIMATE LOCATION

NOTE: CHILLED WATER CONNECTS BUILDINGS VIA UTILITY TUNNEL

0 60' 120'

N

SHEET CU105

UTILITY PLAN CHILLED WATER AND STEAM

SHEET TITLE

DISC. LEAD: EW DESIGNER: JA CHECKER:

DATE: AUGUST 2012

PROJECT NO: EGXH7500

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

THIS LINE LONG WHEN PLOTTED FULL SCALE IS ONE INCH

REV	DATE	REVISION DESCRIPTION

EBB SECTOR UTILITIES

GEORGIA INSTITUTE OF TECHNOLOGY

955 FOWLER STREET NW, ATLANTA, GA 30332

NOT FOR CONSTRUCTION

JACOBS

6801 Governors Lake Pkwy
Building 200
Norcross, GA 30071 | t 770.455.8555

CREATED: 8/17/2012 LAST SAVED: 2/7/2013 BY: AUDREY.HACKMAN PLOT DATE: 2/7/2013

LEGEND

- EXISTING BUILDING OUTLINE
- PROPOSED BUILDING OUTLINE
- EXISTING STORM
- DEMO EXISTING STORM
- PROPOSED STORM
- EBB SECTOR LIMITS

HEMPHILL AVENUE

DIVERT TO INFILTRATION AREA

OVERFLOW FROM INFILTRATION AREA

INFILTRATION AREA (TYP.)

OVERFLOW FROM CISTERN

CISTERNS BELOW PARKING

DIVERT OVERFLOW FROM 10TH STREET RAIN GARDEN

DALNEY STREET

OVERFLOW FROM INFILTRATION AREA

STATE STREET

FERST DRIVE

OVERFLOW FROM INFILTRATION AREA

ATLANTIC DRIVE

DIVERT OVERFLOW FROM 10TH STREET RAIN GARDEN

0 60' 120'

N

SHEET CU106

UTILITY PLAN STORM

SHEET TITLE

DISC. LEAD: EW | DESIGNER: JA | CHECKER:

DATE: AUGUST 2012

PROJECT NO: EGN7500

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

THIS LINE IS ONE INCH LONG WHEN PLOTTED FULL SCALE

REV	DATE	REVISION DESCRIPTION

EBB SECTOR UTILITIES

GEORGIA INSTITUTE OF TECHNOLOGY

955 FOWLER STREET NW, ATLANTA, GA 30332

NOT FOR CONSTRUCTION

JACOBS

6801 Governors Lake Pkwy
Building 200
Norcross, GA 30071 | t 770.455.8555

CREATED: 8/17/2012 LAST SAVED: 2/7/2013 BY: AUDREY.HACKMAN PLOT DATE: 2/7/2013

LEGEND

EXISTING BUILDING OUTLINE

PROPOSED BUILDING OUTLINE

EXISTING COMMUNICATION

PROPOSED COMMUNICATION

UTILITY LINE TO BE DEMOLISHED

EBB SECTOR LIMITS

HEMPHILL AVENUE

DALNEY STREET

STATE STREET

FERST DRIVE

ATLANTIC DRIVE

NOTE:- COMMUNICATION CONNECTS BUILDINGS VIA UTILITY TUNNEL

0 60' 120'

N

SHEET CU107

UTILITY PLAN COMMUNICATION

SHEET TITLE

DISC. LEAD: EW DESIGNER: JA CHECKER:

DATE: AUGUST 2012

PROJECT NO: EGXH7500

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

THIS LINE IS ONE INCH LONG WHEN PLOTTED FULL SCALE

REV	DATE	REVISION DESCRIPTION

EBB SECTOR UTILITIES

GEORGIA INSTITUTE OF TECHNOLOGY

955 FOWLER STREET NW, ATLANTA, GA 30332

NOT FOR CONSTRUCTION

JACOBS

6801 Governors Lake Pkwy
Building 200
Norcross, GA 30071 | t 770.455.8555

V. Section 5

Executive Summary, Stormwater Master Plan - Basin A; Jacobs Engineering, Inc., Long Engineering, Inc., and jB+a, inc.,May, 2013

EXECUTIVE SUMMARY

The Georgia Institute of Technology is committed to developing its campus with "an integrated, ecologically based landscape and open space system that helps them achieve their goal of environmental sustainability." This goal is reflected in the 2004 Campus Master Plan Update and expanded upon in the Landscape Master Plan (Revised September 2011). Stormwater is recognized as having a significant role in improving the ecological process occurring in the campus' urban environment, and this Stormwater Master Plan for Basin A is meant to be a practical guide for the campus to further advance Georgia Tech towards environmental sustainability.

- The Stormwater Master Plan for Basin A (Figure ES-1) encompasses approximately 180 acres of the northern portion of the Georgia Tech campus; this represents 45 percent of the campus.
- Key Goals for the Stormwater Master Plan include: water capture and reuse, volume reduction, mimicking the natural process, a campus "regional" approach, and exceeding regulatory requirements.
- The development of the Stormwater Master Plan – Basin A utilizes a GIS based computer modeling software that simulates the runoff characteristics of the basin and hydraulic components (land use cover, pipes, streams, cisterns, detention ponds/vaults, infiltration basins etc.).

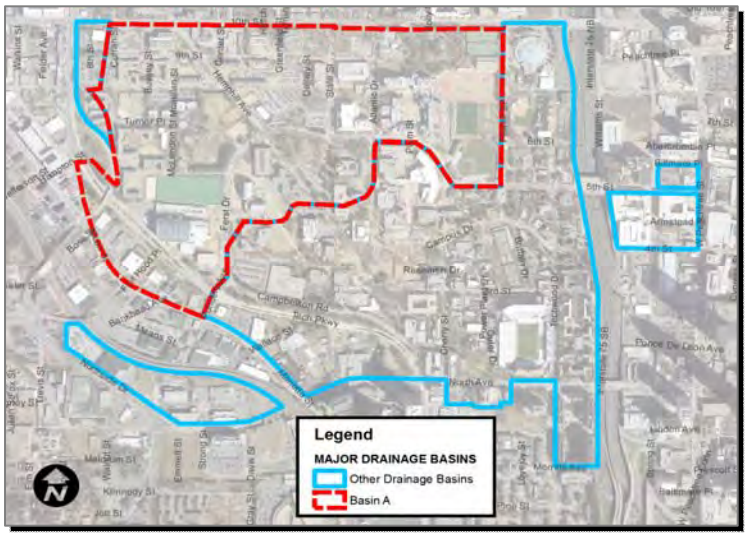


Figure ES-1: Basin A Overview

- The Stormwater Master Plan analyzed Basin A to determine the runoff volume and peak rates during the 1950's (residential, 44 percent impervious), under current 2012 conditions (institutional, 53 percent impervious), and a future condition (institutional, 50 percent impervious) based on the 2004 Campus Master Plan and relevant sector plans for comparison between scenarios and with undeveloped conditions.
- In the future, if Georgia Tech were to decide only to meet the minimum City of Atlanta Stormwater regulations, it is estimated that 2.4 million gallons of storage would be necessary to provide for 1" of runoff for water reuse, channel protection and peak rate reduction volumes. The cost of this approach over a 25-year period would be approximately $28.3 million. This includes the cost of using potable water for irrigation and flushing toilets, and the construction and maintenance of stormwater storage facilities.

- The Stormwater Master Plan – Basin A proposes to generally capture and reuse, infiltrate or evaporate the first 1.2” of rainfall using the following approach to water management:
  - Harvest rainwater from rooftops, building condensate and foundation dewatering, store in a “clean” water cistern and reuse for toilet flushing in future buildings. Excess water typically overflows to an irrigation/stormwater cistern (Figure ES-2).
  - The irrigation/ stormwater cistern receives surface stormwater and overflows from the clean water cistern and supplies water for irrigation and Eco-Commons surface water features. Excess water typically overflows to an infiltration system.

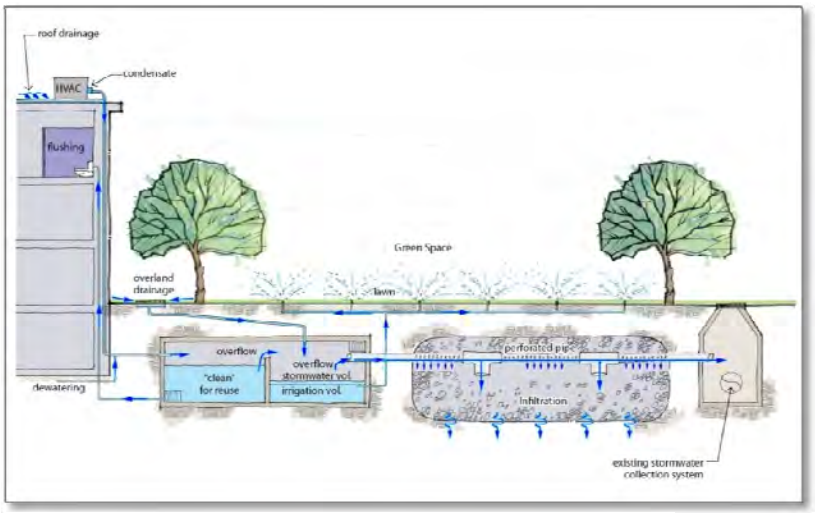


Figure ES-2: Stormwater Master Plan General Approach

  - The infiltration systems, while incorporated in this plan into the Eco-Commons area, are strongly encouraged as a stormwater management tool throughout Basin A. Stormwater flows are infiltrated into the soils further reducing the volume that enters the City’s combined sewer system.
  - The cisterns are generally regionally located and interconnected. The terminal feature of the stormwater system is proposed as the Glade Pond in the Engineered Biosystems Building complex.
- The cost of constructing and maintaining the improvements proposed in the Stormwater Master Plan – Basin A is $26.3 million, a slight savings over the option of meeting the minimum City of Atlanta stormwater regulations. The cost savings is due primarily from the reduction in potable water used for irrigation and toilet flushing in new buildings.
- The ultimate value in implementing the stormwater master plan, however, is realized in a number of additional benefits associated with it, namely:
  - Capture, reuse, infiltrate or evaporate nearly the entire 1.2” event and preventing that stormwater from entering the City’s combined sewer system. The volume reduction is over four times what would be realized if the City’s minimum stormwater regulations were followed.
  - This 60 MG reduction in runoff volume will save the City approximately $120,000 in annual treatment cost savings.
  - The peak runoff rate for the 25-year storm event from Basin A is reduced by 17 percent, over twice the reduction as meeting the minimum City regulations for the 42 acres of future redevelopment in the basin.

  - The clean water cisterns will supply water for toilet flushing in all future buildings in the basin, reducing potable water usage by 10.9 MG, saving about $90,000 annually.
  - Using harvested rainwater to satisfy the 16 MG of anticipated annual irrigation demand saves approximately $130,000 each year.
- Water supply for surface water features within the Eco-Commons can be supported by the implementation of the Master Plan. The proposed Glade Pond can be managed to maintain consistent water levels. The Master Plan system can also supply other small surface water conveyances by more slowly releasing stormwater flows after rainfall events. In an average year, 32 gallons per minute could be released over a 7-day period, providing visible flow in the water features for approximately 60 percent of the year. This percentage could be increased by enlarging the irrigation/stormwater cisterns.
- Operationally, the cisterns should be interconnected and have a robust control system to continually balance flows and monitor system performance. Dedicated personnel should be provided to operate and maintain the system.
- A funding vehicle should be established to ensure that the Stormwater Master Plan – Basin A is fully and timely implemented.
- There are also important research and educational opportunities, which should be integrated into the Stormwater Management system as it is implemented.
- Ideally, at some point in the future, Georgia Tech would complete a comprehensive Stormwater Master Plan for the entire campus thus allowing a truly campus-wide approach to stormwater management and potentially leveraging greater benefits both for the Institution and for the larger community.

VI. Section 6

Executive Summary, Blackwater Feasibility Study; Sustainable Water, LLC, 2013

Abstract

Sustainable Water was retained by the Georgia Institute of Technology (GT) to explore the feasibility of installing a decentralized water reclamation and reuse facility to help lower the Institute's dependence on potable water. This facility would have positive environmental and economic benefits for GT and the surrounding community, as well as multiple educational- and research-related benefits. The following summarizes the Blackwater Reuse Feasibility Report, which validated the practicality and economic viability of a water reclamation program on campus. The study confirmed that decentralized water reclamation using ecologically-based treatment technologies is both feasible and economically viable. In total, GT uses over 420 million gallons of water per year, of which approximately 177 million gallons is considered non-potable demand. Displacing 60% of this demand (112 M gallons per year) presents the Institue with nearly $24 million in potential savings over a 20-year period, with no upfront capital requirements. The findings in this study recommend pursuing a two-phase water reclamation and reuse program to address a majority of GT's non-potable water demand.

In 2012, GT used an estimated 424 million (M) gallons of water at an average rate of 1.16 M gallons per day (GPD). Nearly 44% of campus water use, over 177 M gallons annually, is considered non-potable demand; and, can thus be replaced with alternative sources of water. Approximately 84% of non-potable demand (148 M gallons annually) is used for campus HVAC/utility functions. GIS-based flow modeling indicates a substantial volume of wastewater feedstock available for reuse on-site. Conservative estimates indicate an average 570,000 GPD of flow from Institute-owned campus buildings. If non-Institute-owned buildings are included, the total available volume of reclaimable wastewater is conceivably much higher.

With immediate cost savings available for reclaiming campus wastewater, Sustainable Water recommends designing a two-phase water reclamation facility that serves both current and future needs. An expandable system allows GT to begin reclaiming water today and provide additional capacity at a later date. Based on siting considerations, available wastewater feedstock, and end-use water demand, a Phase I facility is recommended to be designed at a capacity of 150K GPD and utilize a passive Tidal Flow Wetland (TFW) technology patented by Living Machine. Over the next five years, an additional 250K GPD of capacity can be added using hydroponic reactors, as part of a Phase II expansion.

In Basin A, the 10th Street Chiller Plant becomes the logical end-use destination for reclaimed water. It currently uses 160,000 GPD on average, with projected demand exceeding 230,000 GPD in the next five years. A 150K GPD TFW would displace approximately 70% of future demand at the 10th Street Chiller Plant (after its Phase I expansion). With the addition of the 10th Street well, 86% of the plant's make-up demand would be satisfied – saving 46 M gallons annually.

The Phase I TFW requires approximately 11,000 ft² of open space, which can be flexibly integrated into the existing landscape around the proposed eco-commons lawn. A wastewater extraction point located along an 18" sanitary collector at State Street should provide sufficient feedstock for a 150K GPD facility. However, flow rates one block to the west on Atlantic Drive should have larger flows, with added discharge from the Marcus Nanotechnology Building.

A proposed Phase II facility can be designed to accommodate an additional 250,000 GPD of capacity, at only 2,100 ft² of building space. The proposed Phase II facility would utilize hydroponic reactors housed in a

greenhouse-type structure in order to minimize the total footprint of the system. The structure would also house mechanical elements, and provide additional research or academic space if requested by GT. The location of the Phase II facility is recommended as a lamination to the parking deck proposed in conjunction with the EBB II building. Figure 1 and Map 1, attached, shows a concept drawing and site plan of the complete two-phase build-out integrated into the eco-commons site.

Despite its distance from the proposed eco-commons area, the Holland Utility Plant – utilizing 154,000 GPD on average – is the second largest single consumer of water on campus, and a logical location to displace potable water with minimum infrastructure costs. A 400K GPD facility, used in conjunction with the 10th Street Well, will displace 90% of demand at both the 10th Street Chiller Plant (after its Phase II expansion) and the Holland Utility Plant. The expanded system would reclaim approximately 112 M gallons annually. A more robust wastewater extraction location will be needed to accommodate the Phase II Facility. The most attractive alternate extraction point is along the Orme Street Relief Sewer.

Sustainable Water offers to build the proposed two-phase water reclamation system as a turn-key construction project through a Water Purchase Agreement (WPA). A WPA requires no upfront capital and offers the lowest risk to GT. Under a WPA, the Phase I Facility could immediately save GT over $380,000 dollars in Year one. A conservative 3% rise in annual water costs, would result in annual savings exceeding $630,000 in Year 20. Over the course of 20 years, this facility would produce approximately $9.75 M in cumulative savings – with zero upfront capital requirements. If savings from the 10th Street well are incorporated into this scenario, total savings reach $480,000 annually in year 1 alone.

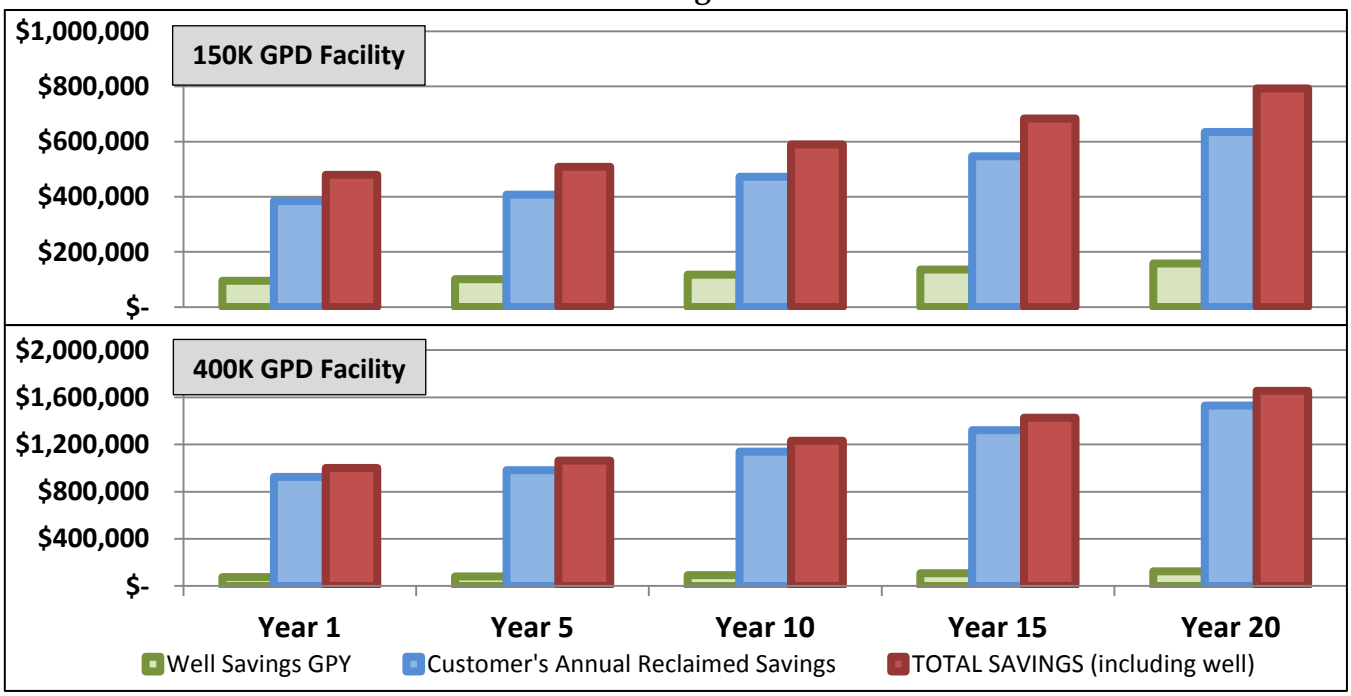
Assuming similar economic conditions, a 400K GPD facility could produce an estimated $925,000 in annual savings year 1, and produce in excess of $23.5 M cumulative savings over the course of 20 years. Total cumulative savings, which include savings from the well, amount to $25.4 M over 20 years. Charts 1 and 2, attached, show annual and cumulative savings associated with the Phase 1 and 2 facilities. In both scenarios, savings are predicated on the assumption that the City honors a 100% rebate on sewer services.

The ecological treatment system proposed for GT provides tangible synergies with the proposed eco-commons theme in the north campus. Implementation of this project will greatly reduce reliance on city water, protect the Institute in periods of drought, significantly decrease annual water costs and improve the Institute's overall environmental footprint. As a result, Sustainable Water recommends that GT move forward with the detailed engineering design of a decentralized water reclamation and reuse facility. Before proceeding into Engineering and Design, Sustainable Water recommends performing the following tasks:

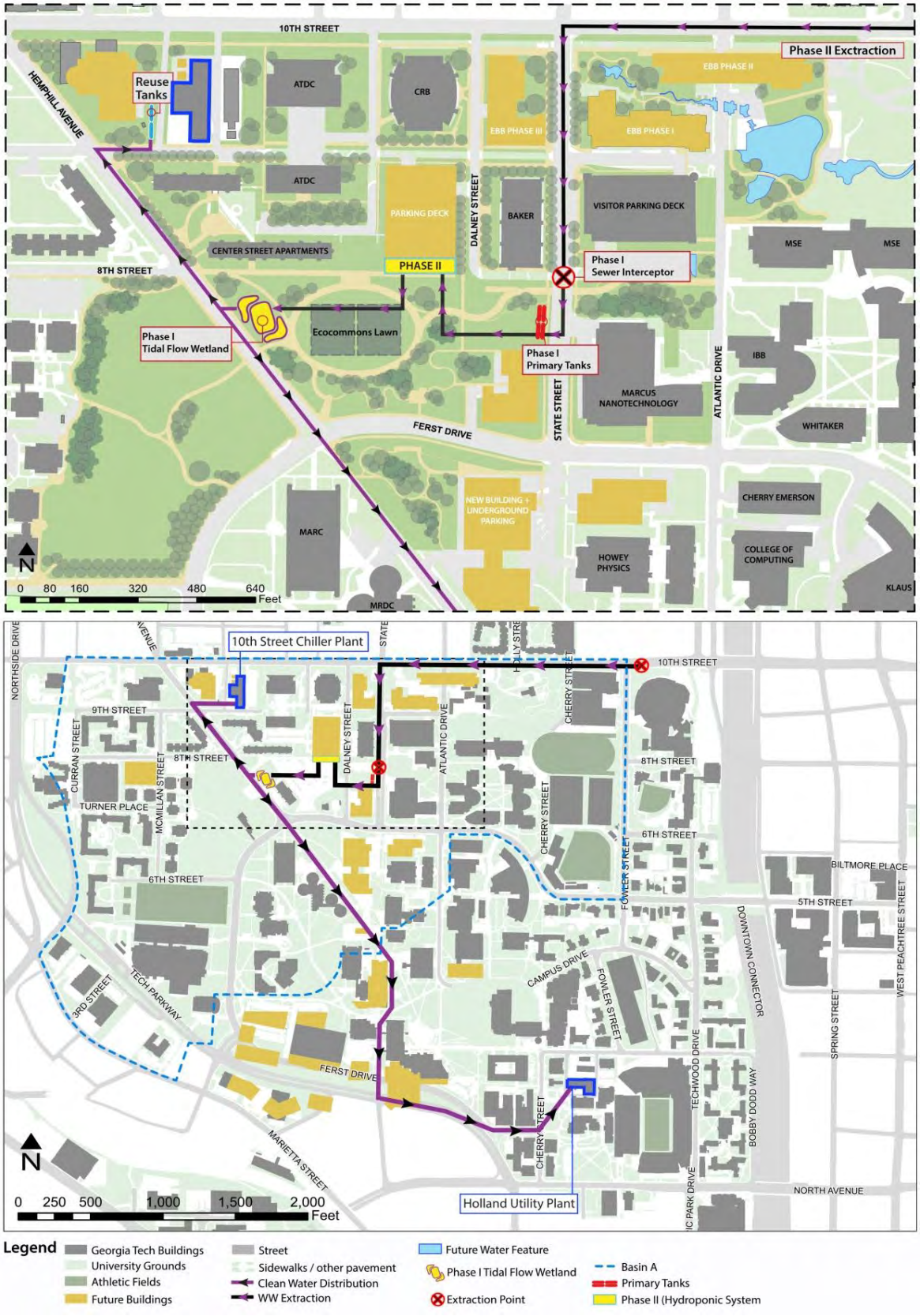
1. Perform a detailed flow-measurement study to validate available feedstock;
2. Evaluate and validate economic models for various financing scenarios; and,
3. Present this project to the City of Atlanta Department of Watershed Management.

Figure 1: Complete Two-Phase Build-Out in Proposed Eco-Commons Area

Charts 1 & 2: Annual Net Savings Over 20 Years under WPA



Map 1: Proposed Site Plan for Complete Build-Out (Phases I & II)



VII. Section 7

10th Street Chiller Plant Expansion; RMF Engineering, 2013

DIVISION NO. 1 - EXECUTIVE SUMMARY

1.1 OBJECTIVE

The current campus planning for the Georgia Institute of Technology (Georgia Tech), in Atlanta, GA, includes multiple new facilities to be constructed within the vicinity of the 10th Street Chilled Water system. These projects total nearly 1.1 million gross square feet (gsf). Concerns regarding the ability of the existing chilled water system to support the future campus planning has prompted the following chilled water study and evaluation. This report includes an assessment of the existing chilled water systems and proposes recommendation to ensure an efficient and reliable campus chilled water infrastructure.

1.2 EXISTING CHILLED WATER SYSTEM

1.2.1 10th Street Chiller Plant

The evaluation of the existing chilled water systems included a visual inspection of the existing equipment, review of existing operating schemes, an analysis of energy consumption and capacity modeling of the chiller systems. The following is a summary of the existing conditions of the chilled water systems.

The chilled water equipment within the 10th Street Chiller Plant includes six electric centrifugal chillers, along with six sets of cooling towers. The total available chiller capacity of the 10th Street Chiller Plant is 12,200 tons with a firm capacity of 9,200 tons. Firm capacity is defined as the total output without the availability of the largest individual chiller unit. To ensure an adequate reliability level, most facilities maintain a firm capacity greater than the peak load. All six of the chillers utilize the refrigerant HFC-134a.

The 10th Street Chiller Plant chilled water pumping system is a primary/secondary system and includes six primary pumps to circulate chilled water through the 10th Street Chiller Plant and four secondary pumps to circulate chilled water through the distribution system.

In order to evaluate the existing chilled water system, the logs for 2011 were reviewed in order to establish a monthly cooling load profile. The peak cooling load for the system for the 10th Street Plant is 8,650 tons, which is below the firm capacity of the system (9,200 tons).

1.2.2 Chilled Water Distribution

The chilled water generated within the 10th Street Plant is distributed to various buildings on campus by a supply and return piping system via a set of secondary distribution pumps. The 10th Street Plant currently serves 27 buildings on campus; however, the distribution system is interconnected with the system of the Holland Chilled Water Plant and the two systems are isolated from each other by valves in the piping.

A computerized hydraulic model was utilized to simulate the piping network during peak flow conditions and determine piping capacity of the existing distribution system. Each pipe segment was evaluated based upon the flow and velocity. A limiting velocity criterion for Schedule 40 steel piping (>12" in diameter) of 16 feet per second (fps) was utilized to assess the capacity of the existing piping systems. This velocity limitation is based upon the potential for water hammer, noise and excessive distribution losses. The maximum velocities within the existing chilled water distribution system are below the recommended velocity criteria.

1.3 FUTURE CAMPUS PLANNING

Two future building projects, Engineered Bio-Systems Building (EBB) Phase I and II have prompted the need to additional chiller capacity at the 10th Street Plant. It has been established that these first two phases of the EBB building project will have a combined peak load of 2,500 tons.

Georgia Tech has identified seven additional major campus projects, as well as the first two phases of the EBB, to occur over the next ten years to be constructed within the proximity of the 10th Street Plant chilled water system. The total building for these projects is approximately 1.1 million gross square feet (gsf).

1.4 FUTURE CHILLED WATER DISTRIBUTION CAPACITY

It was established that the EBB Phase I and II would have a combined peak load of 2,500 tons. It is anticipated that there will be an additional 7,300 tons of cooling required in the future. The existing chilled water distribution system was modeled for the future building projects to establish the system hydraulic limitations. Future building loads were added to the model one at a time to determine if any of the main piping goes beyond the recommended velocity criterion of 16 feet per second (fps).

The velocity of the 24-inch East Main goes beyond the recommended velocity (16.9 fps) when the New Lab Building 2 comes online. Once all of the building projects are connected to the 10th Street Chilled Water System, the velocity within the East Main will be approximately 19 fps.

Because the 10th Street Plant is interconnected to the Holland Street Plant, it would be possible to un-isolate the two systems to allow less flow through the existing 24" East Main. The Holland chilled water system is currently at its maximum capacity within the plant, so more capacity would have to be added to the system, possibly in the southwest portion of campus.

1.5 FUTURE CHILLER CAPACITY

Precipitated by an Engineering Biosciences Building, an additional 3,000 tons cooling is needed at the 10th Street Chiller Plant. While various electrical chiller types were evaluated, the recommended chiller is a 4,160 volt variable speed centrifugal based on lowest life-cycle cost, simplicity of maintenance, and capacity optimization. This unit allows maximum capacity in the

western expansion shell, offers excellent efficiency, has a single main compressor, and uses preferred R-134a refrigerant.

1.6 ALTERNATIVE OPTIONS

1.6.1 Thermal Storage

A chilled water thermal storage system is based upon generating and storing chilled water during non-peak electric rates. The chilled water is exported to the system during the on-peak rate periods to provide system cooling in lieu of electric chiller operation.

A present value analysis was performed to determine the capacity of the thermal storage tank that would be optimum for the site. Based upon a 25-year present value, the option that has the highest net present values of savings is a thermal storage tank with a storage capacity of 60,000 ton-hours; however, the options that yield the lowest simple payback are either a 30,000 or 40,000 ton-hour tank at 19 years.

1.6.2 Chiller Variable Speed Drive

Application of 4,160 volt variable speed chiller motor controllers was evaluated for energy savings in a new 3,000 ton chiller and a retrofit of existing Chiller No. 3 or 4. Equipping the new chiller with variable speed drive yields a four year simple payback and is recommended. Adding a second variable speed drive via retrofit has a six year simple payback and is a more marginal investment given fewer hours of operation a more limited machine life.

1.6.3 Condenser Water Treatment Options

Water conservation techniques were analyzed to reduce city water and sewer use. Two key systems were evaluated including filtered recovery of blow-down water and zero liquid discharge (ZLD) water chemistry. Blowdown recovery filtration systems would utilize traditional chemical treatment systems then capture blow-down from each tower and recycle it with a series of multi-media and a reverse osmosis (RO) filters. Zero liquid discharge technology by Water Conservation Technologies Inc. (WCTI) changes the complete water treatment strategy for the plant. The WCTI system uses a high efficiency softener to remove hardness from make-up water then employs sodium silicate to function as a polymer at high PH and high levels of total-dissolved solids. Blow-down is eliminated using this technology.

Both conservation technologies provide city water and sewer savings and have strong financial returns. Advantages of the WCTI system include maximum water and sewer savings, zero chemical use, simplicity of maintenance, and reduced corrosion rates. Based on system potential and two year simple payback, WCTI will be utilized as the design basis.

1.6.4 Blackwater Treatment Considerations

Two options for treating campus sewer were explored as they relate to the 10th Street plant. Preliminary cost estimating was performed for both the Organica and the Living Machine

system, based on a size that would provide a majority of the make-up water for the chiller plant. Both options indicate a payback of less than six years.

1.6.5 Water Side Economizer (Free Cooling)

Free Cooling options were developed for the 10th Street Plant. Based on 2011 weather data, 1.4 million ton-hours of load be served with a water-side economizer. An economizer in the 1,500 to 2,000 ton size range showed the best savings potential and yielded a simple payback of eight years.

1.6.6 Variable Pump Speed (Secondary Pumps)

Four secondary plant pumps currently operate at a constant pressure differential of 32 pounds per square inch gauge (psig). If the pump speed were to be varied based upon the system curve, then less pumping energy would be required to distribute the chilled water to campus. It is estimated that the annual savings that could be achieved by varying the pumps speed based upon the system curve is approximately $40,000 per year.

1.6.7 Reliability Options

Plant system reliability was evaluated and options were developed to mitigate down time risk. Options included back-up transformer, switchgear, emergency generator, pipe cross connections and back-up condenser water pumps. While electrical upgrades are currently cost prohibitive, pipe cross connections and redundant pumps would provide benefits at minimal costs.

1.7 RECOMMENDATIONS AND COST

The analysis of the chilled water systems has resulted in the following recommendations:

Option No. 1 Phase A (2013)

Base Cost: $5.00 M

- Install a 3,000 ton chiller (No. 7) with VFD and a field erected cooling tower. Note: Architectural screen wall costs are not included.

Optional Costs

Water Treatment System:	**$0.50 M**
Free Cooling HX:	**$0.25 M**
Header Cross Connections:	**$0.25 M**

- Install a new condenser water treatment system and free cooling system for water and energy savings. Header cross connections should also be designed for improved plant reliability.

Total Phase A Cost: $6.00 M

Cost summary tables for Option No. 1 Phase A base scope along with energy and water saving options are presented on Table No. 1-1 For the first free cooling and Chiller No. 3 or 4 retrofit, the projected savings are based upon a new chiller VFD in place. A cost summary of plant reliability upgrade options has been included in Table No. 1-2.

Option No. 1 Phase B (2018 - Estimated) **Phase B Cost: $4.6 M**

- Install a 3,000 ton chiller (Chiller No. 8) with VFD and field erected cooling tower.

Option No. 1 Phase C (2023 - Estimated) **Phase C Cost: $8.7 M**

- Replace 1,500 ton chillers No. 1 and No. 2 with two new 3,000 ton chillers, towers, and pumps.

TABLE NO. 1-1: 3,000 TON EXPANSION - COST SUMMARY

GEORGIA INSTITUTE OF TECHNOLOGY

SCOPE TYPE	DESCRIPTION	CONSTRUCTION COST ($)	10% SOFT COST ($)	10% CONT. COST ($)	TOTAL COST ($)	PROJECTED SAVINGS[1] ($/YR)	SIMPLE PAYBACK (YRS)	ROI (%)
BASE	3,000 TON VFD CHILLER[1,2]	4,160,000	416,000	416,000	4,992,000	210,000	24	4%
	FIELD ERECTED COOLING TOWER AND PUMP							
	ASSOCIATED CIVIL, STRUCTURAL, AND ELECTRICAL							
OPTIONAL	WCTI WATER TREATMENT SYSTEM[1,3]	420,000	42,000	42,000	504,000	300,000	2	60%
	FREE COOLING HX (1,500 TONS, CH-1/CH-2)[1,4,6]	210,000	21,000	21,000	252,000	30,000	8	12%
	CHILLER 3 OR 4 RETROFIT VFD[1,5]	450,000	45,000	45,000	540,000	45,000	12	8%
	SECOND FREE COOLING HX (1,670 TONS CH-4/CH-5)[1,6,7]	330,000	33,000	33,000	396,000	10,000	40	3%

NOTES:

1. ENERGY AND WATER SAVINGS BASED ON PLANT PEAK LOAD OF 11,750 TONS.
2. BASE CHILLER ENERGY SAVINGS AS COMPARED TO EXISTING EQUIPMENT EFFICIENCY.
3. WCTI SAVINGS INCLUDES USE OF WELL WATER AND REDUCED SEWER USE.
4. FIRST FREE COOLING SAVINGS IS BASED ON NEW CHILLER VFD IN PLACE.
5. CHILLER 3 OR 4 RETROFIT SAVINGS BASED ON INSTALLATION OF NEW CHILLER VFD.
6. FREE COOLING OPTIONS UTILIZE EXISTING CHILLED WATER AND CONDENSER WATER PUMPS.
7. SECOND FREE COOLING HX SAVINGS IS BASED ON NEW CHILLER VFD, AND 1,500 TON FREE COOLING IN PLACE.

TABLE NO. 1-2: RELIABILITY UPGRADE OPTIONS - COST SUMMARY

GEORGIA INSTITUTE OF TECHNOLOGY

SCOPE TYPE	DESCRIPTION	CONSTRUCTION COST ($)	10% SOFT COST ($)	10% CONT. COST ($)	TOTAL COST ($)
RELIABILITY	HEADER CROSS CONNECT (CH-5 AND CH-6)	80,000	8,000	8,000	96,000
	HEADER CROSS CONNECT (CH-3 AND CH-4)	100,000	10,000	10,000	120,000
	REDUNDANT CONDENSER WATER PUMP	110,000	11,000	11,000	132,000
	DOUBLE ENDED TRANSFORMER & SWITCH	3,500,000	350,000	350,000	4,200,000
	EMERGENCY GENERATOR (3,000 TONS)	4,300,000	430,000	430,000	5,160,000
MAINTENANCE	CONDENSER WATER FILTRATION (SUSP SOL)	90,000	9,000	9,000	108,000

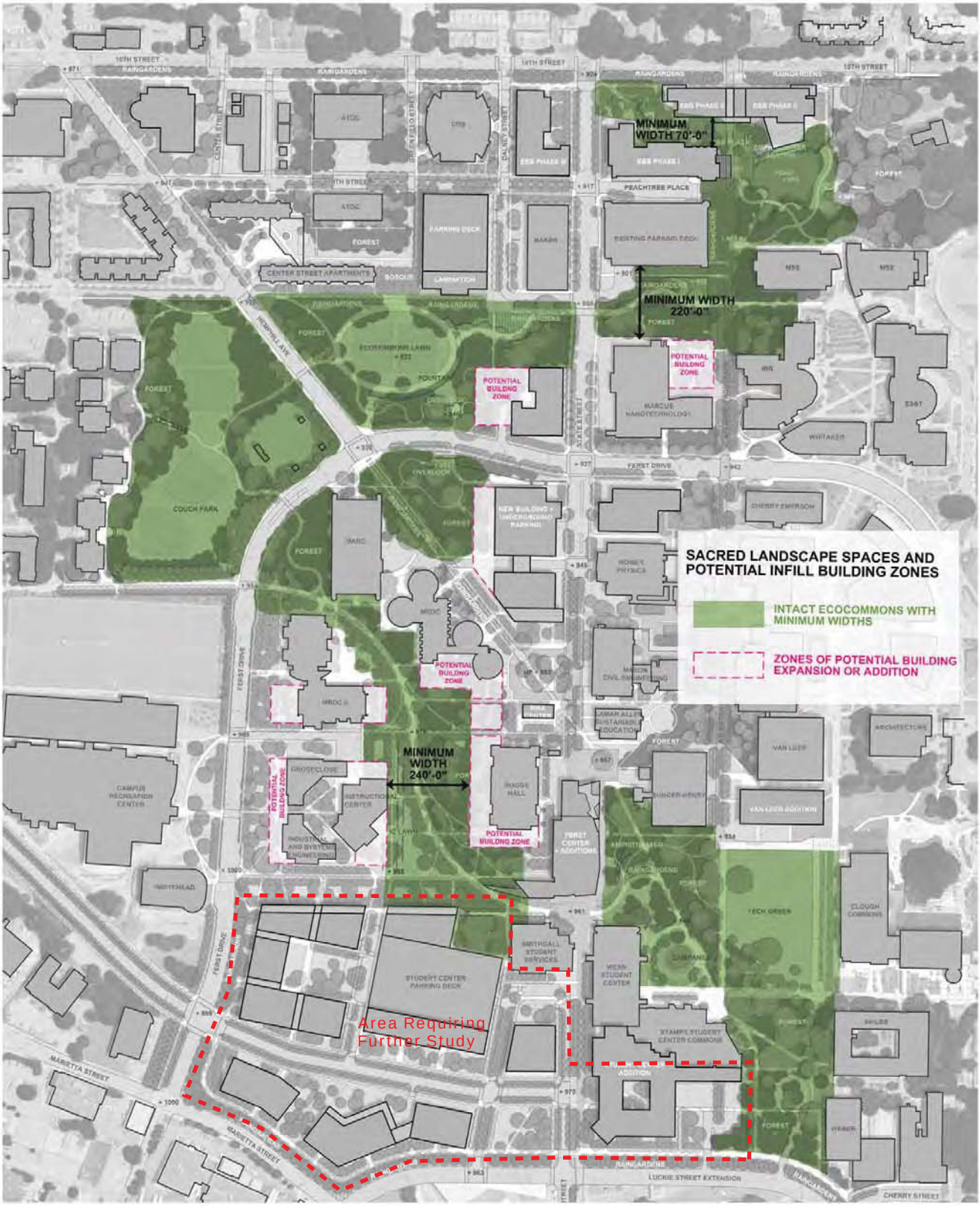
VIII. Section 8

Key Sector Plan Graphics; Nelson, Byrd, Woltz Landscape Architects, jB+a, inc., Campus + Community Strategies, Vanasse, Hangen, Brustlin, Inc., May 2013

Georgia Institute of Technology
Capital Planning & Space Management

EBB AND SOUTH-CENTRAL SECTOR PLANS

Master Planning / Landscape Architecture



NELSON BYRD WOLTZ LANDSCAPE ARCHITECTS

JBa

GCS Campus + Community Strategies LLC

Vanasse Hangen Brustlin, Inc.

INFILL FRAMEWORK PLAN DIAGRAM

August 21, 2012

SCALE: 1" = 100'

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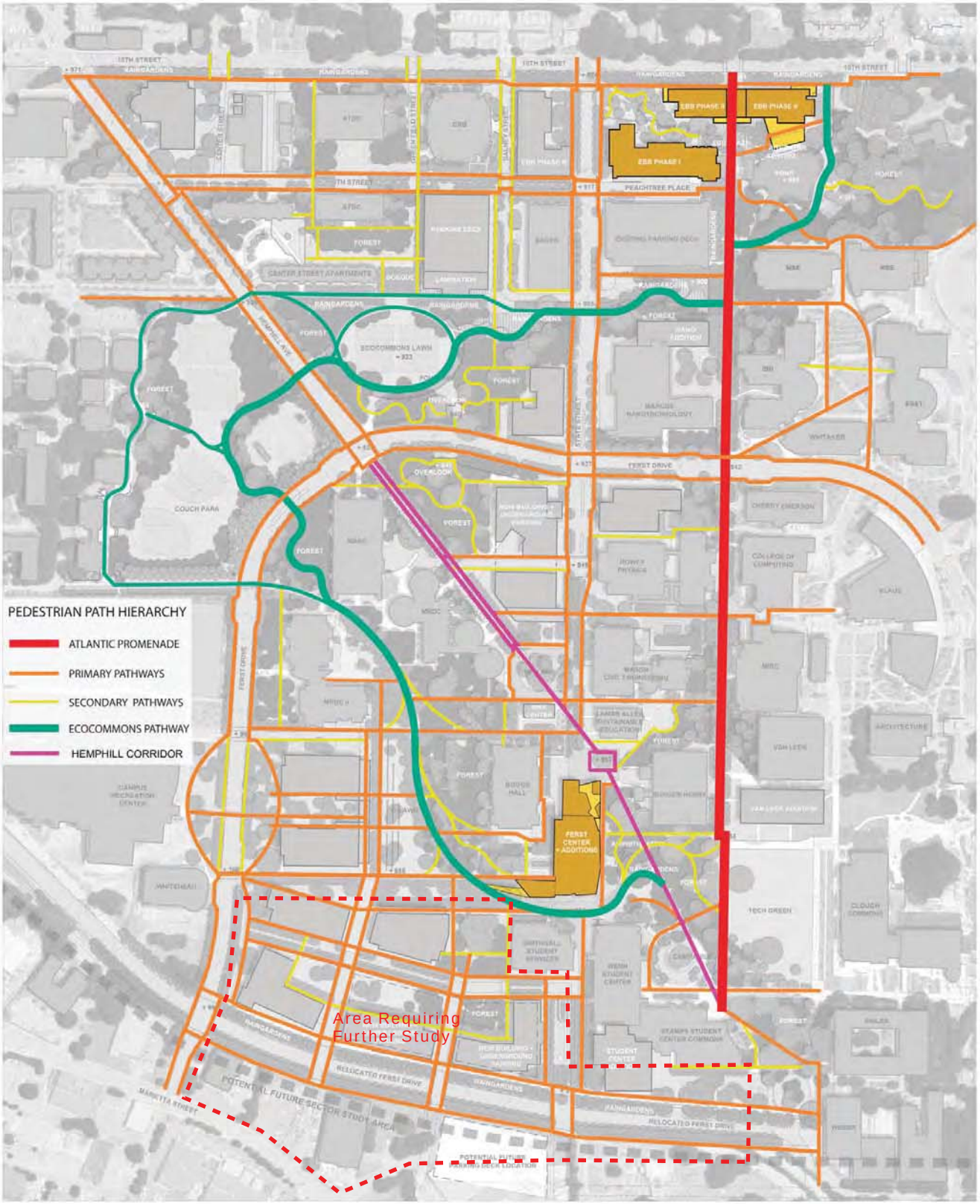
May 2013

Georgia Institute of Technology
Capital Planning & Space Management

EBB AND SOUTH-CENTRAL SECTOR PLANS

Master Planning / Landscape Architecture



NELSON BYRD WOLTZ LANDSCAPE ARCHITECTS
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GCS Campus + Community Strategies LLC
Vanasse Hangen Brustlin, Inc.

PATH HIERARCHY
August 21, 2012

SCALE: 1" = 100'
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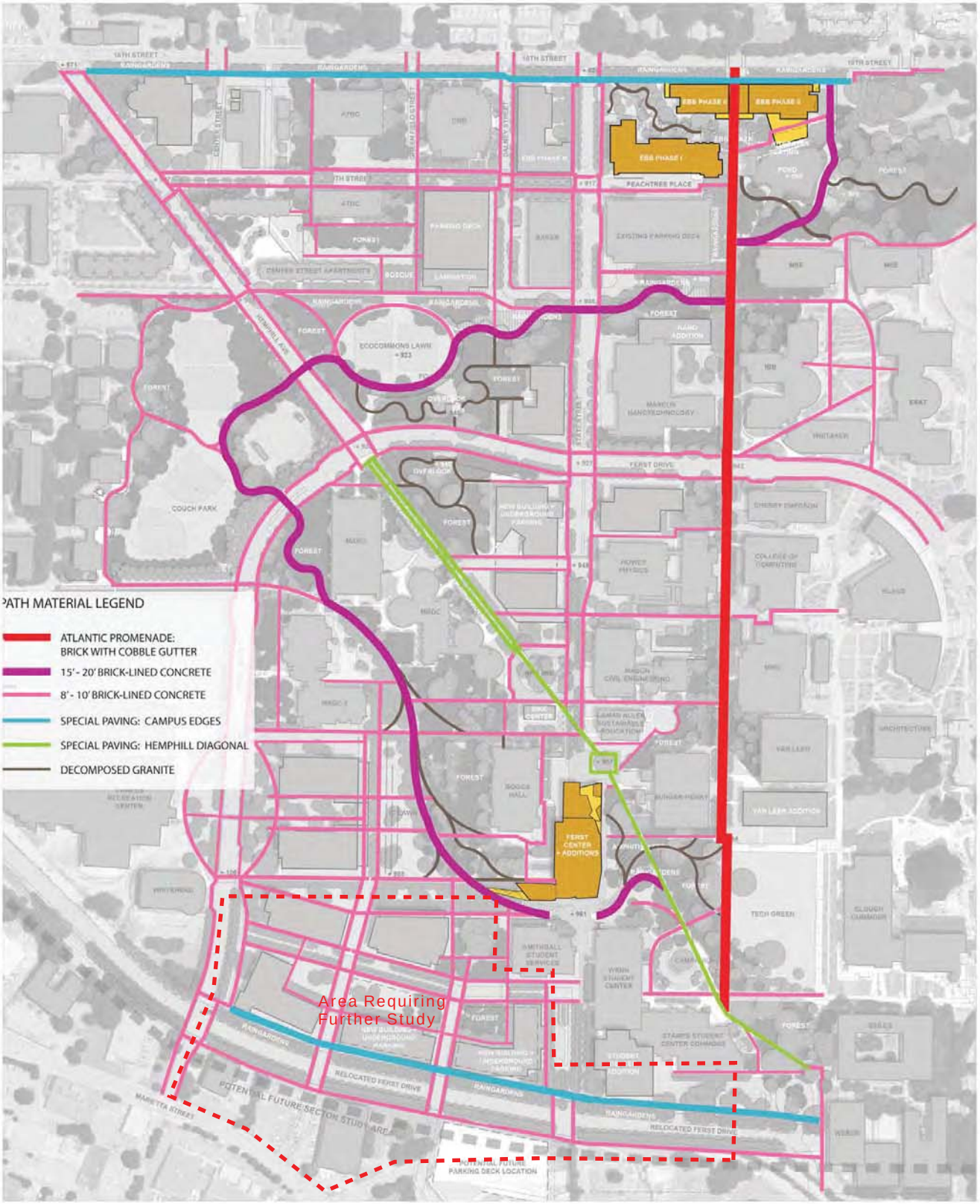
May 2013

Georgia Institute of Technology
Capital Planning & Space Management

EBB AND SOUTH-CENTRAL SECTOR PLANS

Master Planning / Landscape Architecture



NELSON BYRD WOLTZ LANDSCAPE ARCHITECTS

JBa

GCS Campus + Community Strategies LLC

Vanasse Hangen Brustlin, Inc.

PATH MATERIALS

August 21, 2012

SCALE: 1" = 100'

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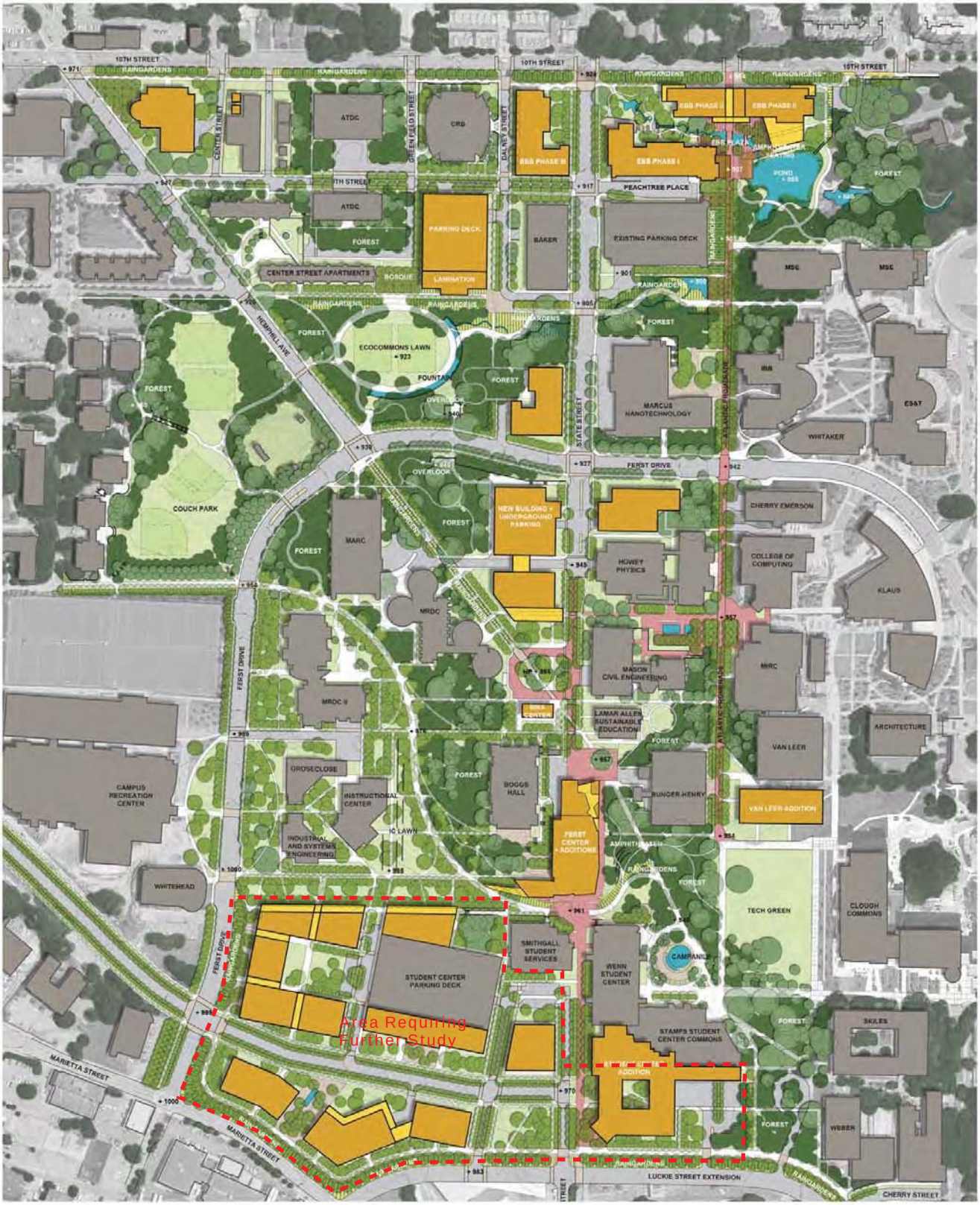
May 2013

Georgia Tech
Capital Planning &
Space Management

EBB AND SOUTH-CENTRAL SECTOR PLANS

Master Planning / Landscape Architecture



NELSON BYRD WOLTZ LANDSCAPE ARCHITECTS

JBa

GCS Campus + Community Strategies LLC

Vanasse Hangen Brustlin, Inc.

RENDERED SITE PLAN

August 21, 2012

SCALE: 1" = 100'

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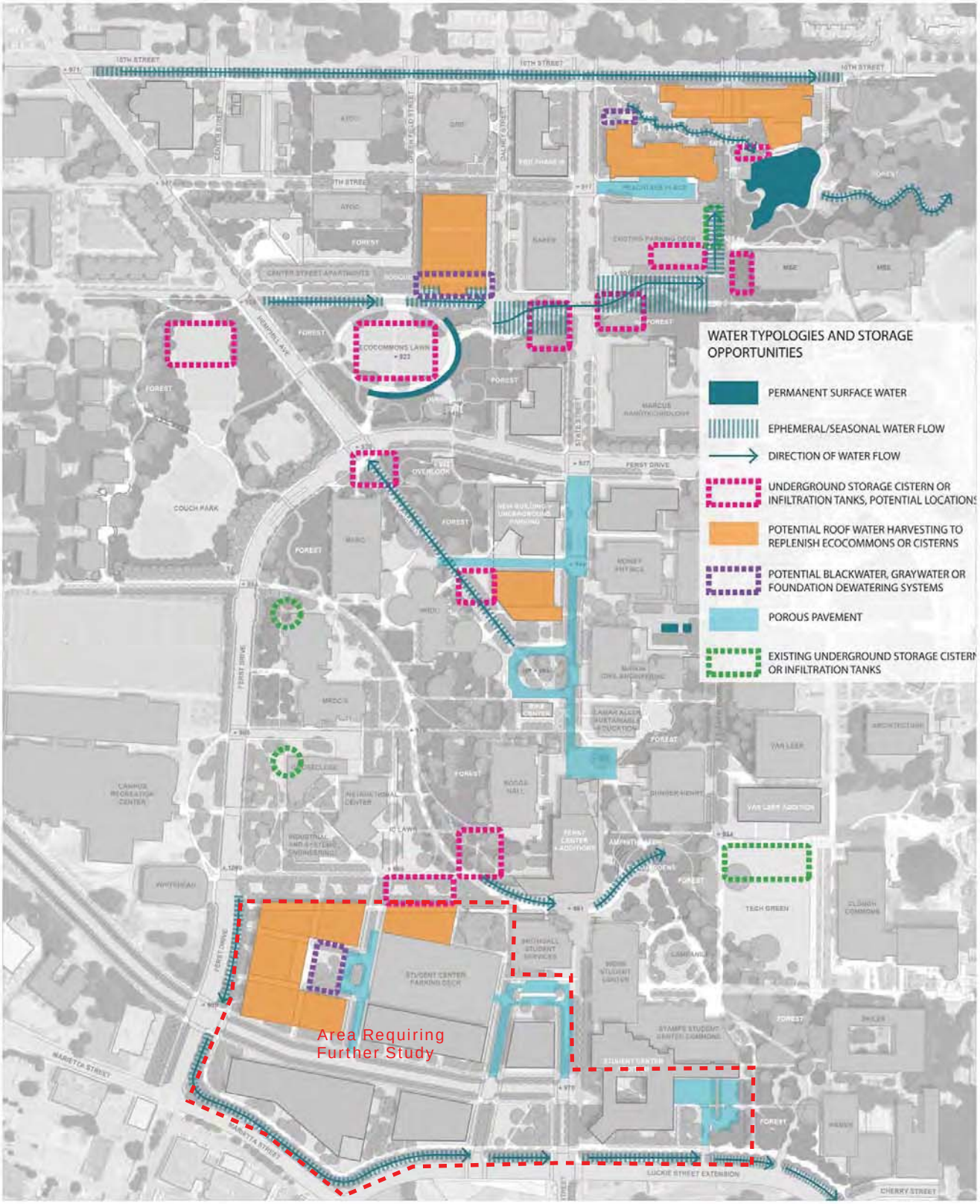
May 2013

Georgia Institute of Technology
Capital Planning & Space Management

EBB AND SOUTH-CENTRAL SECTOR PLANS

Master Planning / Landscape Architecture



NELSON BYRD WOLTZ LANDSCAPE ARCHITECTS
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STORMWATER COLLECTION SYSTEMS

August 21, 2012

SCALE: 1" = 100'
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May 2013