

CAMPUS MASTER PLAN UPDATE 2010-2020

FIU | FLORIDA
INTERNATIONAL
UNIVERSITY

Infrastructure Element Focus Group Meeting #3

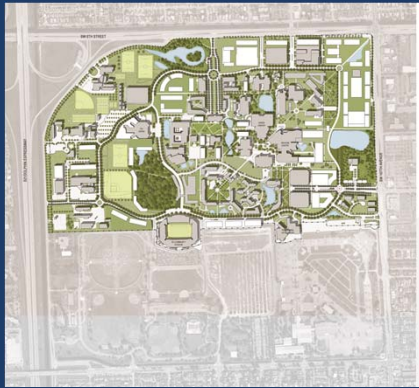


5 December 2012

PERKINS+WILL

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Campus Master Plan 2010-2020 : Infrastructure Agenda



1. MMC



2. EC



3. BBC

- a. Inventory & Analysis Review
- b. Campus Vision Plan Review
- c. Campus Change since 2010

4. Implementation Strategies & Concepts

- a. Concept 1
- b. Concept 2
- c. Concept 3

Master Planning Schedule

Inventory & Analysis

July-Oct 2012

Preliminary Alternative Concepts

Nov-Dec 2012

Concept Plan Development

Jan 2013

Draft Comprehensive Master Plan

Feb-July 2013

Final Comprehensive Master Plan

Aug-Dec 2013

BOT Approval of Master Plan

Dec 2013

INVENTORY & ANALYSIS OVERVIEW

1a

Infrastructure, Utilities & Maintenance Issues - MMC

STORMWATER MANAGEMENT DATA AND ANALYSIS REQUIREMENTS

Stormwater Management System Inventory

The stormwater management system consists of:

- Percolation
- Overland flow
- Exfiltration systems
- Positive drainage systems with outfalls to onsite lakes

Existing Facility Demand and Capacity Analysis

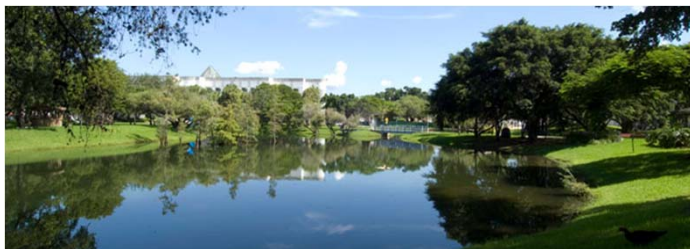
- The capacity of the existing stormwater system at MMC is sufficient for present development.
- All of the lakes on the campus are not interconnected, which does not allow the drainage subbasins

to compensate each other for inconsistencies in rainfall and runoff areas. As a result, some areas

within the campus have drainage problems.



Projected Facility Demand and Capacity Analysis / Recommendations



- Future development will require additional exfiltration trench and/or a lake outfall systems
- All water bodies should be interconnected
- BMP should be incorporated into design

Infrastructure, Utilities & Maintenance Issues - MMC

POTABLE WATER DATA AND ANALYSIS REQUIREMENTS

Potable Water System Inventory

- System connects to 12" and 36" water mains located on SW 8th Street and SW 117th Avenue.
- All water mains owned and maintained by WASD

Existing Facility Demand and Capacity Analysis

- Physical condition of water main distribution system is adequate
- FY 2011-2012 consumption: 406,232 GPD
- FY 2011-2012 annual consumption: 148,274,577 gallons
- LOS: 10.4 Gallons per Capita per day



Projected Facility Demand and Capacity Analysis / Recommendations

- Onsite primary distribution system will need expansion for future development and missing links to provide a "looped" system.
- New secondary systems required
- Elimination of dead end systems will be required.
- FY 2014-2015 consumption: 432,588 GPD
- FY 2019-2020 consumption: 461,410 GPD



Infrastructure, Utilities & Maintenance Issues - MMC

SANITARY SEWER

Sanitary Sewer System Inventory

The system consists of:

- Gravity sewer lines
- Force mains
- Series of lift stations
- System connects to 36" Diameter WASD force main
- Located on west perimeter of campus



Existing Facility Demand and Capacity Analysis

- Existing infiltration & inflow problems being addressed by FIU
- FY 2011-2012 sanitary sewage flow: 326,187 GPD
- LOS: 10.4 Gallons per Capita per day

Projected Facility Demand and Capacity Analysis / Recommendations



- Four (4) existing lift stations need to be replaced by one (1) East Master Lift Station (LS E-1)
- FY 2014-2015 sanitary sewage flow: 347,652GPD
- FY 2019-2020 consumption: 370,815 GPD

Infrastructure, Utilities & Maintenance Issues - MMC

SOLID WASTE DATA AND ANALYSIS REQUIREMENTS

Solid Waste Collection Facilities Inventory

- Solid Waste collection and disposal is accomplished through a combination of utilizing:
 - University staff
 - Private contractors
 - Public entities
- Trash is collected in dumpsters at various on-campus locations (approx. 65 dumpsters/compactors)
- Recycling program is executed by the Custodial Services Department
 - Single stream recycling

Existing Facility Demand and Capacity Analysis

- FY 2011-2012 solid waste produced: 4,138 Tons
- FY 2011-2012 recycling produced: 1,589 Tons

Projected Facility Demand and Capacity Analysis

- FY 2014-2015 solid waste & recycling produced: 6,503 Tons
- FY 2019-2020 solid waste & recycling produced: 7,239 Tons



Infrastructure, Utilities & Maintenance Issues - EC

STORMWATER MANAGEMENT DATA AND ANALYSIS REQUIREMENTS

Stormwater Management System Inventory

The stormwater management system consists of:

- Percolation
- Overland flow
- Exfiltration systems
- Positive drainage systems
- Dry retention areas
- Drainage swales

Existing Facility Demand and Capacity Analysis

- The capacity of the existing stormwater system at BBC is sufficient for present development.

Projected Facility Demand and Capacity Analysis / Recommendations

- Future development will require additional exfiltration trench and/or a lake outfall systems
- The campus has sufficient area to provide additional lake area and/or exfiltration trench for future development
- BMP should be incorporated into the drainage infrastructure design



Infrastructure, Utilities & Maintenance Issues

POTABLE WATER DATA AND ANALYSIS REQUIREMENTS

Potable Water System Inventory

- System connects to 30" water main located on SW 107th Avenue.
- All water mains owned and maintained by WASD

Existing Facility Demand and Capacity Analysis

- Physical condition of water main distribution system is adequate.
- FY 2011-2012 consumption: 36,724 GPD
- FY 2011-2012 annual consumption: 13,404,228 gallons
- LOS: 14.5 Gallons per Capita per day



Projected Facility Demand and Capacity Analysis / Recommendations



- Onsite primary distribution system will need expansion for future development and missing links to provide a "looped" system.
- New secondary systems required
- Elimination of dead end systems will be required.
- FY 2014-2015 consumption: 38,947 GPD
- FY 2019-2020 consumption: 43,718 GPD

Infrastructure, Utilities & Maintenance Issues – EC

SANITARY SEWER DATA AND ANALYSIS REQUIREMENTS

Sanitary Sewer System Inventory

The system consists of:

- Gravity sewer lines
- Series of lift stations
- System connects to WASD force main located on SW 107th Avenue

Existing Facility Demand and Capacity Analysis

- Sanitary sewer system is in good condition.
- FY 2011-2012 sanitary sewage flow: 36,724 GPD
- LOS: 10.4 Gallons per Capita per day

Projected Facility Demand and Capacity Analysis / Recommendations

- Modifications to the existing system may be necessary due to the site plan and/or system configuration
- FY 2014-2015 sanitary sewage flow: 38,840 GPD
- FY 2019-2020 sanitary sewage flow: 43,597 GPD



Infrastructure, Utilities & Maintenance Issues – EC

SOLID WASTE DATA AND ANALYSIS REQUIREMENTS

Solid Waste Collection Facilities Inventory

- Solid Waste collection and disposal is accomplished through a combination of utilizing:
 - University staff
 - Private contractors
 - Public entities
- Trash is collected in dumpsters at various on-campus locations (approx. 65 dumpsters/compactors)
- Recycling program is executed by the Custodial Services Department
 - Single stream recycling

Existing Facility Demand and Capacity Analysis

- FY 2011-2012 solid waste produced: 241 Tons
- FY 2011-2012 recycling produced: 93 Tons

Projected Facility Demand and Capacity Analysis

- FY 2014-2015 solid waste & recycling produced: 376 Tons
- FY 2019-2020 solid waste & recycling produced: 436 Tons



Infrastructure, Utilities & Maintenance Issues - BBC

STORMWATER MANAGEMENT DATA AND ANALYSIS REQUIREMENTS

Stormwater Management System Inventory

The stormwater management system consists of:

- Percolation
- Overland flow
- Exfiltration systems
- Positive drainage systems with outfalls to onsite lakes
- Outfalls to north and east sides of site

Existing Facility Demand and Capacity Analysis

- The capacity of the existing stormwater system at BBC is sufficient for present development.
- The water bodies on the campus are not interconnected, which does not allow the drainage subbasins to compensate each other for inconsistencies in rainfall and runoff areas. As a result, some areas within the campus have drainage problems.

Projected Facility Demand and Capacity Analysis / Recommendations

- Future development will require additional exfiltration trench and/or a lake outfall systems
- All water bodies should be interconnected
- BMP should be incorporated into design



Infrastructure, Utilities & Maintenance Issues - BBC

POTABLE WATER DATA AND ANALYSIS REQUIREMENTS

Potable Water System Inventory

- System connects to 16" and 30" water mains located on NW 151th Street and NW 135th Street.
- All water mains owned and maintained by the City of North Miami
- Utilizes irrigation quality, treated effluent from the North Regional Wastewater Treatment Plant.

Existing Facility Demand and Capacity Analysis

- Physical condition of water main distribution system is adequate.
- FY 2011-2012 consumption: 75,668 GPD (plus 8,806 GPD of reclaimed water)
- FY 2011-2012 annual consumption: 27,618,725 gallons (plus 44,609,972 ga of reclaimed water)
- LOS: 10 Gallons per Capita per day

Projected Facility Demand and Capacity Analysis / Recommendations

- The onsite primary distribution system is sufficient for future development
- New secondary systems required
- FY 2014-2015 consumption: 80,085 GPD
- FY 2019-2020 consumption: 94,208 GPD



Infrastructure, Utilities & Maintenance Issues - BBC

SANITARY SEWER DATA AND ANALYSIS REQUIREMENTS

Sanitary Sewer System Inventory

The system consists of:

- Gravity sewer lines
- Master pump station
- System connects to WASD force main

Existing Facility Demand and Capacity Analysis

- Pump station requires upgrades
- FY 2011-2012 sanitary sewage flow: 75,660 GPD
- LOS: 10.4 Gallons per Capita per day

Projected Facility Demand and Capacity Analysis / Recommendations



- Modifications to the existing system may be necessary due to the site plan and/or system configuration
- Due to the age of the system, infiltration and pump station conditions may need to be evaluated
- Elimination of dead end systems will be required.
- FY 2014-2015 sanitary sewage flow: 80,109 GPD
- FY 2019-2020 sanitary sewage flow: 94,236 GPD



Infrastructure, Utilities & Maintenance Issues - BBC

SOLID WASTE DATA AND ANALYSIS REQUIREMENTS

Solid Waste Collection Facilities Inventory

- Solid Waste collection and disposal is accomplished through a combination of utilizing:
 - University staff
 - Private contractors
 - Public entities
- Trash is collected in dumpsters at various on-campus locations (approx. 65 dumpsters/compactors)
- Recycling program is executed by the Custodial Services I
 - Single stream recycling

Existing Facility Demand and Capacity Analysis

- FY 2011-2012 solid waste produced: 676 Tons
- FY 2011-2012 recycling produced: 260 Tons

Projected Facility Demand and Capacity Analysis

- FY 2014-2015 solid waste & recycling produced: 1,055 Tons
- FY 2019-2020 solid waste & recycling produced: 1,261 Tons





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UTILITIES I&A OVERVIEW

1b

Modesto Maidique Campus



Infrastructure, Utilities & Maintenance Issues

CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

Chilled Water System Inventory

The MMC chilled water system consists of three chilled water plants connected to a common piping distribution loop.

- **Plant #1 – Main Chiller Plant**

- Centrally located on campus
- Five centrifugal chillers
 - Chiller #1 Trane 1,500 Tons
 - Chiller #2 Trane 1,500 Tons
 - Chiller #3 Carrier 1,500 Tons
 - Chiller #4 Trane 1,500 Tons
 - Chiller #5 Carrier 1,500 Tons
- Main Chiller Plant Capacity 7,500 Tons
- No available space for additional chillers

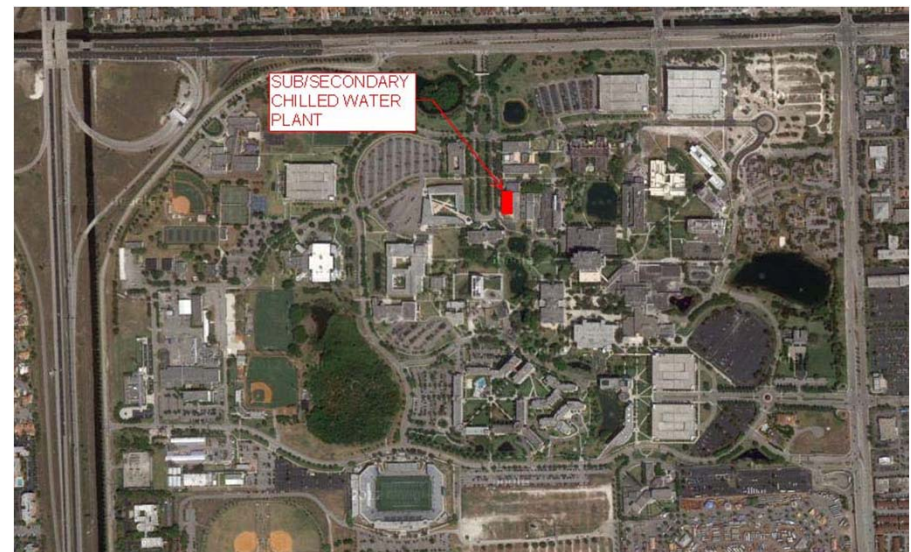


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CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

Chilled Water System Inventory

- Plant #2 – Sub / Secondary Chiller Plant
 - Located adjacent to Main Chiller Plant
 - Two centrifugal chillers
 - Chiller #1A Carrier 1,500 Tons
 - Chiller #2A Carrier 1,500 Tons
 - Sub/Sec Chiller Plant Capacity 3,000 Tons
 - Available space in existing building for one future 1,500 Ton Chiller

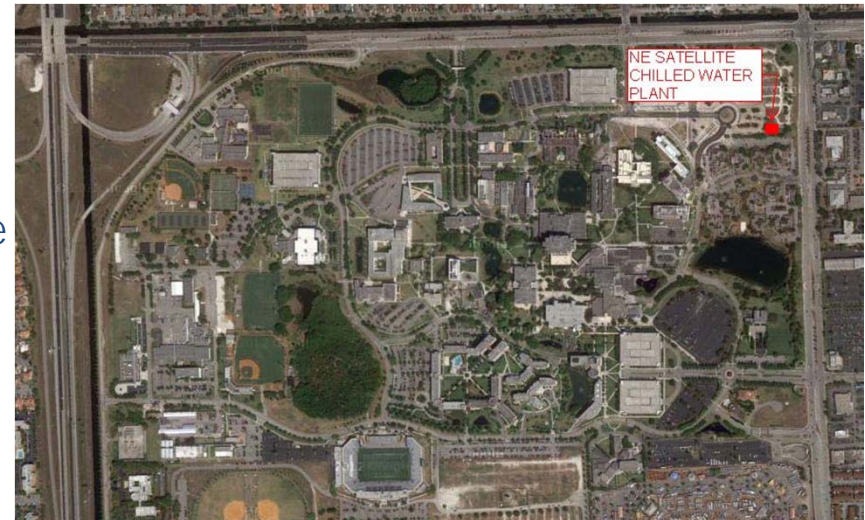


Infrastructure, Utilities & Maintenance Issues

CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

Chilled Water System Inventory

- Plant #3 – NE Satellite Chiller Plant
 - Currently under construction
 - Located on the NE corner of campus in the future medical research district
 - Two centrifugal chillers
 - Chiller #1B 1,500 Tons
 - Chiller #2B 1,500 Tons
 - NE Satellite CW Plant Capacity 3,000 Tons
 - Available space to accommodate three additional 1,500 Ton Chillers



Infrastructure, Utilities & Maintenance Issues

CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

Chilled Water System Inventory

Current Campus Chilled Water (CW) Plant Capacity

- Main CW Plant (Current) 7,500 Tons
- Sub/Sec CW Plant (Current) 3,000 Tons
- NW Satellite CW Plant (Current) 3,000 Tons
- Total Current CW Plant Capacity 13,500 Tons

Available Chilled Water (CW) Plant Expansion Capacity

- Main CW Plant (Future Growth) 0 Tons
- Sub/Sec CW Plant (Future Growth) 1,500 Tons
- NW Satellite CW Plant (Future Growth) 4,500 Tons
- Total Current Chiller Plant Capacity 6,000 Tons

Total Existing CW Plant Capacity including Future Growth

19,500 Tons

Total Existing CW Plant Capacity with N+1 Redundancy

18,000 Tons



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CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

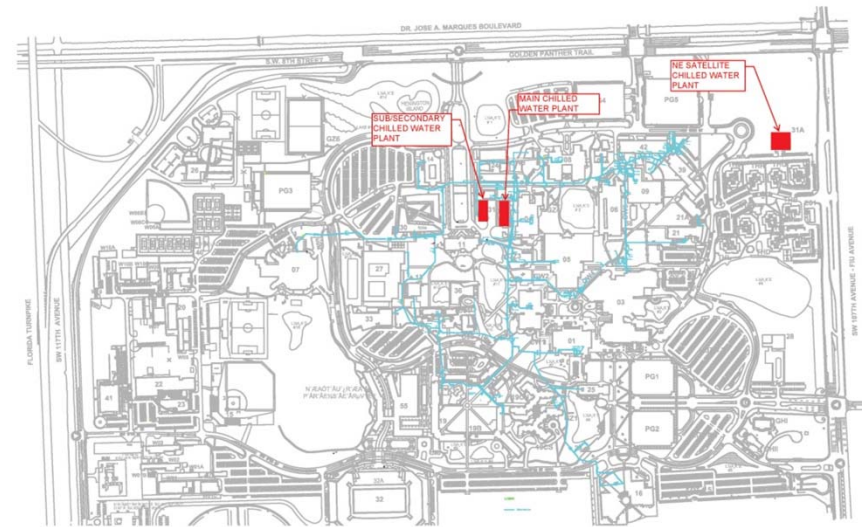
Chilled Water System Inventory

Current Campus Chilled Water (CW) Plant Capacity

- Total Current CW Plant Capacity 13,500 Tons
- Estimated CW Peak Demand (incl. SCC and Stempel Complex) 12,000 Tons
- Remaining Current Capacity 1,500 Tons
(Provides N+1 Redundancy – No available capacity)

Current Campus Chilled Water Peak Demand Density

- The current campus chilled water system serves approximately 3 million square feet of conditioned space (including SCC and Stempel Complex)
- The estimated peak CW demand is 12,000 Tons
- Current Chilled Water Peak Demand Density ~ 250 SF/Ton



Infrastructure, Utilities & Maintenance Issues

CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

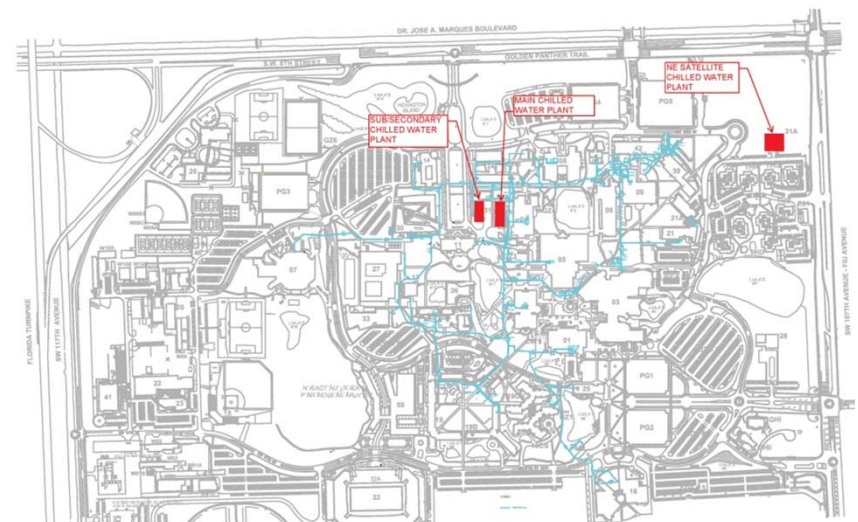
Chilled Water System Inventory

Current Campus Chilled Water (CW) Pumping Capacity

- Plant #1 – Main CW Plant 19,305 GPM
- Plant #2 – Sub/Secondary CW Plant 12,870 GPM
- Plant #3 – NE Satellite CW Plant 6,000 GPM
- Total Current CW Pumping Capacity 38,175 GPM

Current Campus Chilled Water (CW) Piping Distribution Capacity

- 16" CW Cross-Connect between Main/Sub CW Plants and the new NE Satellite CW Plant
- Underground CW piping upgrades based on 2009 CW Distribution Study by Anderson-Williams completed



Infrastructure, Utilities & Maintenance Issues

ELECTRICAL POWER AND OTHER FUELS DATA AND ANALYSIS REQUIREMENTS

Electrical Power and Other Fuels System Inventory

Florida Power and Light provides electrical service to the campus from five 13.2 KV feeders.

- Three underground feeders originating from the International Substation located on the SW corner of campus serve the majority of buildings within the campus core.
- One overhead feeder routed on SW 117th Ave originating from the International Substation serves the FIU Arena, Sports Fields, Parking Garages and Modular Classrooms located on the west portion of campus.
- One overhead feeder routed on SW 107th Ave originating from the Tropical substation currently serves the housing district located on the east portion of campus.

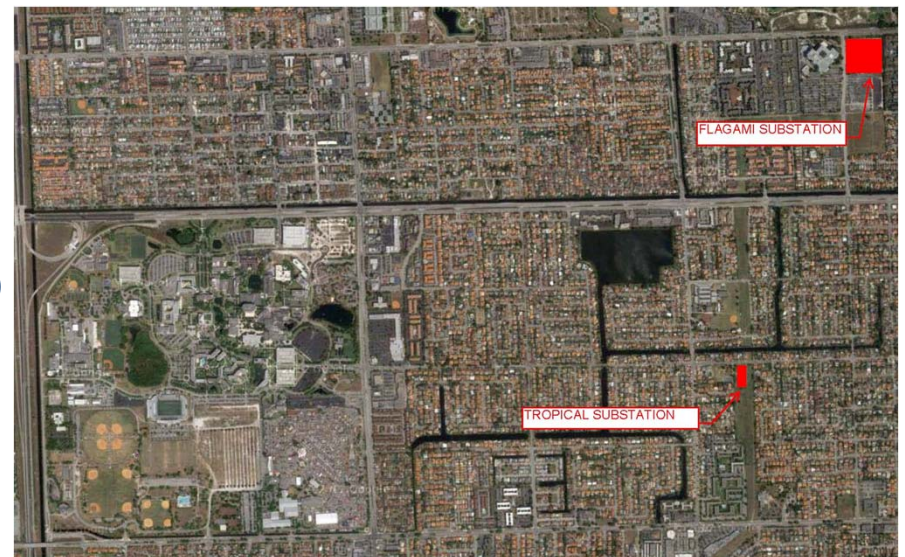


Infrastructure, Utilities & Maintenance Issues

ELECTRICAL POWER AND OTHER FUELS DATA AND ANALYSIS REQUIREMENTS

Electrical Power and Other Fuels System Inventory

- The Tropical Substation is fully built out
- The new Medical Research District will be served from one of the three underground feeders originating from the International Substation.
- The Tropical Substation feeder in the new Medical Research District will remain as a back-up feeder.
- FP&L is considering a new feeder from the Flagami Substation to replace the Tropical Substation feeder to back-up the new Medical Research District.



Infrastructure, Utilities & Maintenance Issues

ELECTRICAL POWER AND OTHER FUELS DATA AND ANALYSIS REQUIREMENTS

Electrical Power and Other Fuels System Inventory

- The annual peak demand recorded between July 2011 and June 2012 was 23,670 KW (April 2012).
- The current electrical distribution has sufficient capacity for campus growth. FP&L will ensure appropriate level of service to all campus buildings.
- The current electrical distribution serves approximately 6.5M square feet of buildings.
- The Main Chiller Plant is on the CILC (Commercial/Industrial Load Control) Rate. Interruption of service has been called 3 to 4 times in the past 2 years. FP&L provides warning 4 hours prior to interruption of service. The CILC rate provides value to FIU.
- **Current Campus Electrical Demand Density ~ 3.6 W/sf**



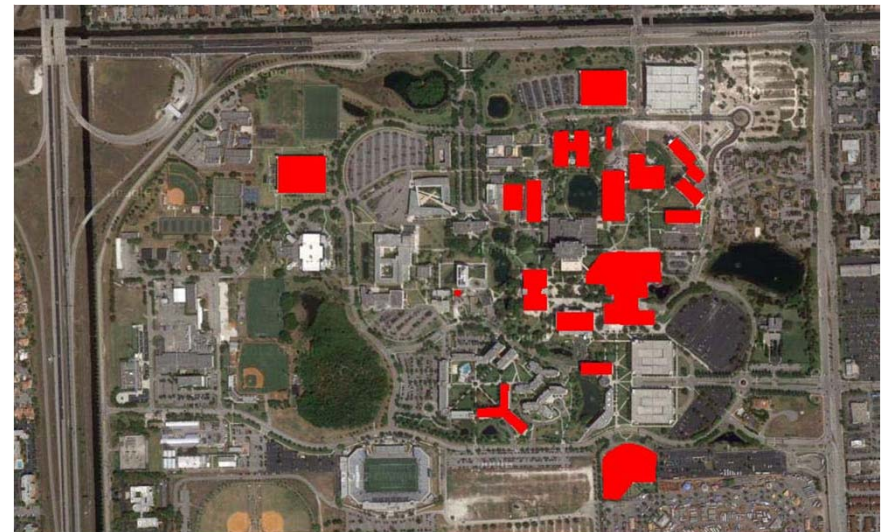
Infrastructure, Utilities & Maintenance Issues

ELECTRICAL POWER AND OTHER FUELS DATA AND ANALYSIS REQUIREMENTS

Electrical Power and Other Fuels System Inventory

Emergency and Standby Power is provided from diesel engine-generator sets serving the following buildings:

- Science Classroom Complex
- Stempel Complex
- Engineering and Computer Sciences
- Wertheim Conservatory
- Owa Ehan
- Chemistry and Physics
- University Tower
- Herbert and Nicole Wertheim Performing Arts Center
- Management and Advanced Research Center
- Deuxiem Maison
- Health and Life Sciences
- Everglades Hall
- Central Utilities
- Viertes Haus
- Charles E. Perry
- Parking Garage 3
- Parking Garage 4
- Ernest R. Graham Center
- Various Campus Support Buildings

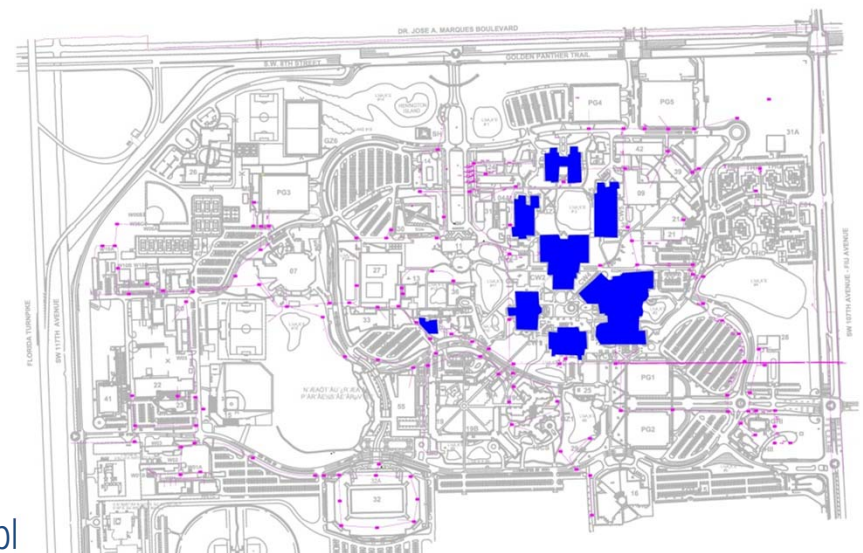


Infrastructure, Utilities & Maintenance Issues

TELECOMMUNICATIONS DATA AND ANALYSIS REQUIREMENTS

Telecommunications System Inventory

- Voice communication system (Telephone) has been converted to VOIP.
- Data communication system is comprised of two networks:
 - FIUnet – Fiber Optic Based System which links:
 - Primera Casa
 - Deuxieme Maison
 - Owa Ehan
 - Engineering and Computer Science
 - Viertes Haus
 - Graham Center
 - Green Library
 - Health Wellness Center
 - Physical Science
 - Administration Network – Twisted Pair, Copper Cable Based System located at the Primera Casa Building



Biscayne Bay Campus



Infrastructure, Utilities & Maintenance Issues

CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

Chilled Water System Inventory

The BBC chilled water system consists of one chilled water plants.

- Main Chiller Plant
 - Centrally located on campus in WUC
 - Three centrifugal chillers
 - Chiller #1 Carrier 1,200 Tons
 - Chiller #2 Trane 1,280 Tons
 - Chiller #3 McQuay 600 Tons
 - Main Chiller Plant Capacity 2,480 Tons
 - Chiller #3 is currently out of commission. Refrigerant had been removed from chiller.
 - Existing demand is approximately 600 Tons
 - Remaining available capacity is 600 Tons with the remaining 1,280 Ton Chiller as N+1 Redundancy

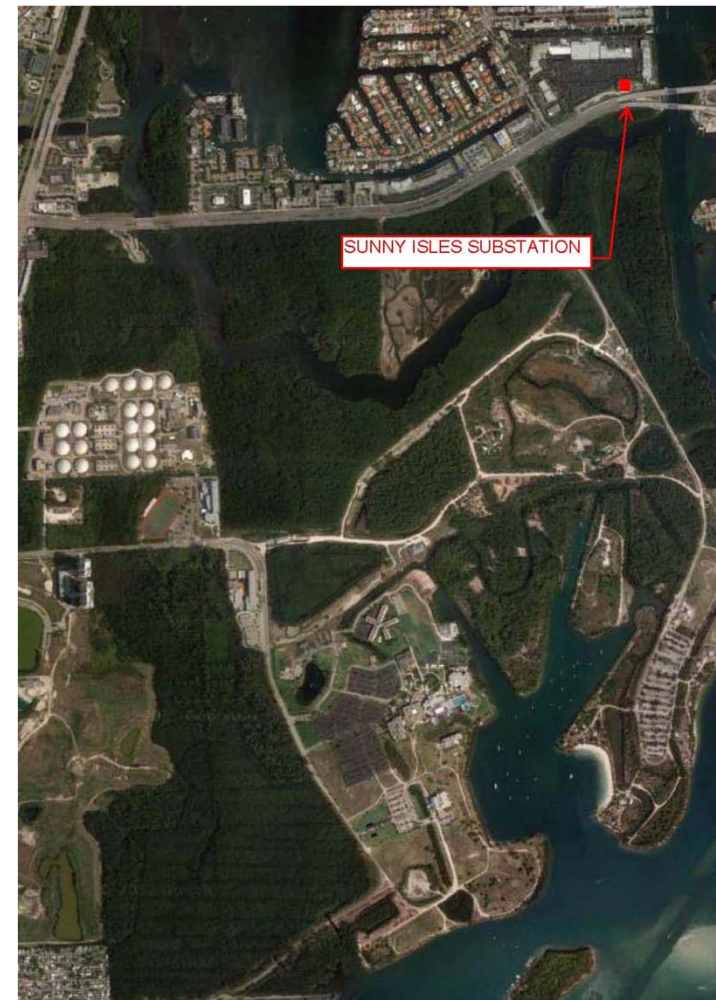


Infrastructure, Utilities & Maintenance Issues

ELECTRICAL POWER AND OTHER FUELS DATA AND ANALYSIS REQUIREMENTS

Electrical Power and Other Fuels System Inventory

- Florida Power and Light provides electrical service to the campus from two 13.2 KV feeders originating from the Sunny Isles (Sp?) Substation
- Each feeder has sufficient capacity to serve the entire campus.
- One feeder is designated as the primary service feeder. The other feeder is designated as an alternate feed with an automatic throwover switch to maintain power in the event one feeder fails.
- Florida Power and Light is responsible for maintaining the level of service to accommodate future growth on campus.



Infrastructure, Utilities & Maintenance Issues

ELECTRICAL POWER AND OTHER FUELS DATA AND ANALYSIS REQUIREMENTS

Electrical Power and Other Fuels System Inventory

- Emergency and Standby Power are provided by two diesel engine-generators serving:
 - Academic Building One
 - Wolfe University Center
 - Central Utility Building
 - Kovens Conference Center

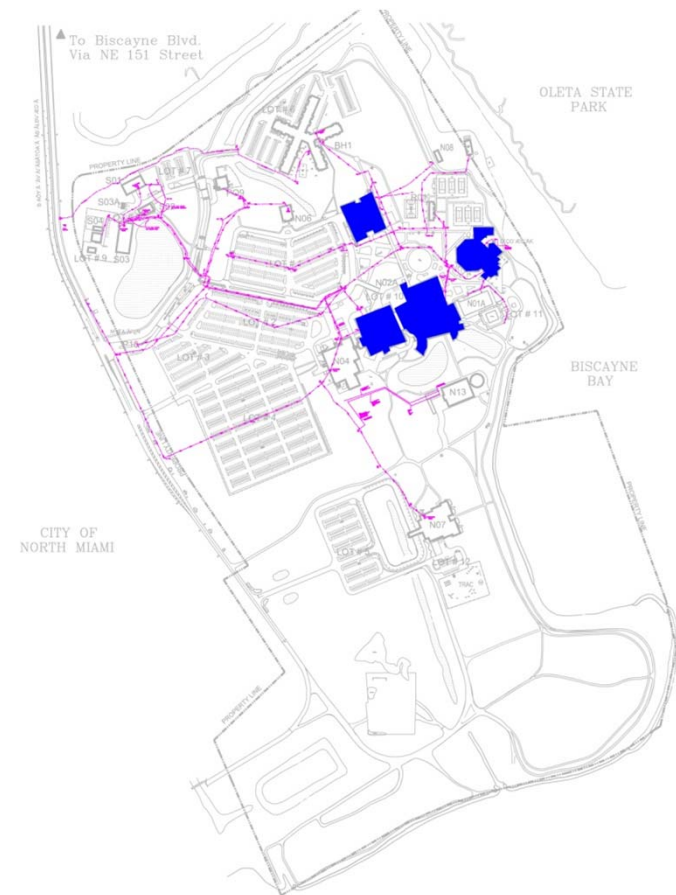


Infrastructure, Utilities & Maintenance Issues

TELECOMMUNICATIONS DATA AND ANALYSIS REQUIREMENTS

Telecommunications System Inventory

- Voice communication system (Telephone) has been converted to VOIP.
- Data communication system is comprised of two networks:
 - FIUnet – Fiber Optic Based System which links:
 - Academic One
 - Hospitality Management
 - Library
 - Wolfe University Center
 - Administration Network – Twisted Pair, Copper Cable Based System



Engineering Center



Infrastructure, Utilities & Maintenance Issues

CHILLED WATER DATA AND ANALYSIS REQUIREMENTS

Chilled Water System Inventory

The EC chilled water system consists of one chilled water plant

- Main Chiller Plant

- Three centrifugal chillers

• Chiller #1	Trane	1,300 Tons
• Chiller #2	Trane	1,300 Tons
• Chiller #3	York	<u>1,000 Tons</u>

- Main Chiller Plant Capacity 3,600 Tons

- Existing demand is approximately 600 Tons

- Remaining available capacity is 2,000 Tons with the remaining 1,000 Ton Chiller as N+1 Redundancy



Infrastructure, Utilities & Maintenance Issues

ELECTRICAL POWER AND OTHER FUELS DATA AND ANALYSIS REQUIREMENTS

Electrical Power and Other Fuels System Inventory

- Florida Power and Light provides electrical service from two feeders originating from two separate substations, Flagami Substation and Sweetwater Substation, which serves the Main Classroom Building.
- The two feeders are manually selectable in the event of a power failure via a manual tie circuit breaker.
- The Wall of Wind is served from a single feeder originating from the Flagami Substation.



Infrastructure, Utilities & Maintenance Issues

TELECOMMUNICATIONS DATA AND ANALYSIS REQUIREMENTS

Telecommunications System Inventory

- Voice communication system (Telephone) has been converted to VOIP.
- Data communication system is comprised of two networks:
 - FIUnet – Fiber Optic Based System which links:
 - CEAS Building
 - Utility Buildings
 - EICnet – Combination Fiber Optic Based / Twisted Pair, Copper Cable Based System
 - Links all users within the EICnet system
 - System is operated, maintained and managed by the College of Engineering



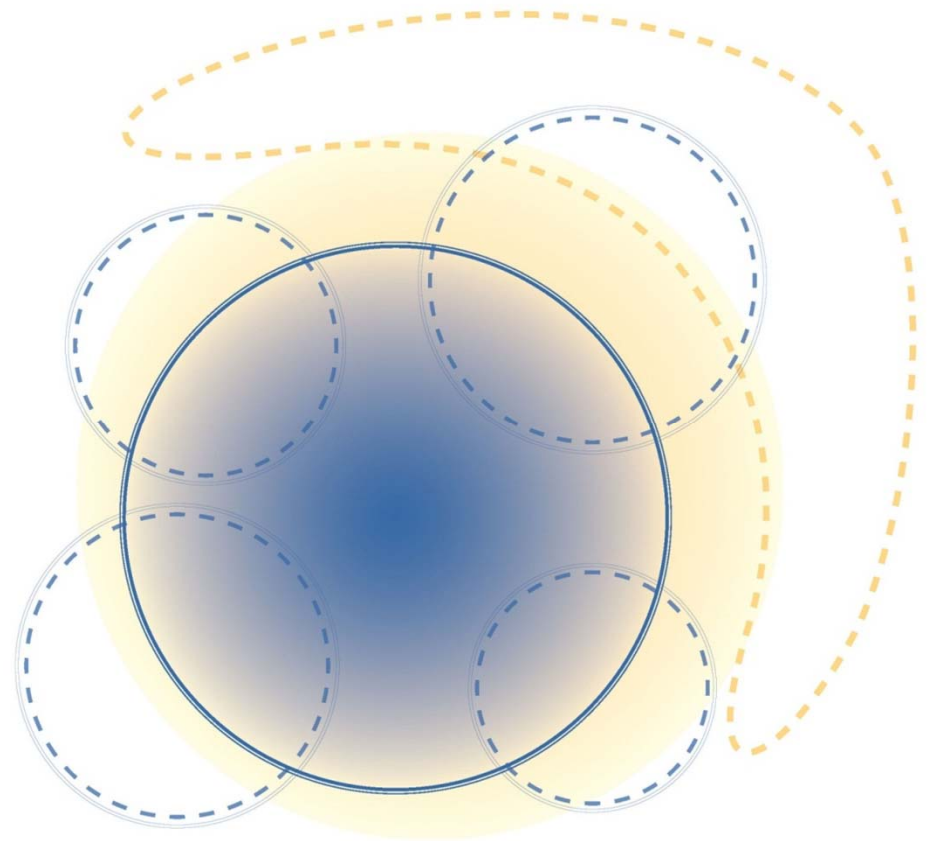
OPTION #1 Expand in Place / Create a Strong Core

4a

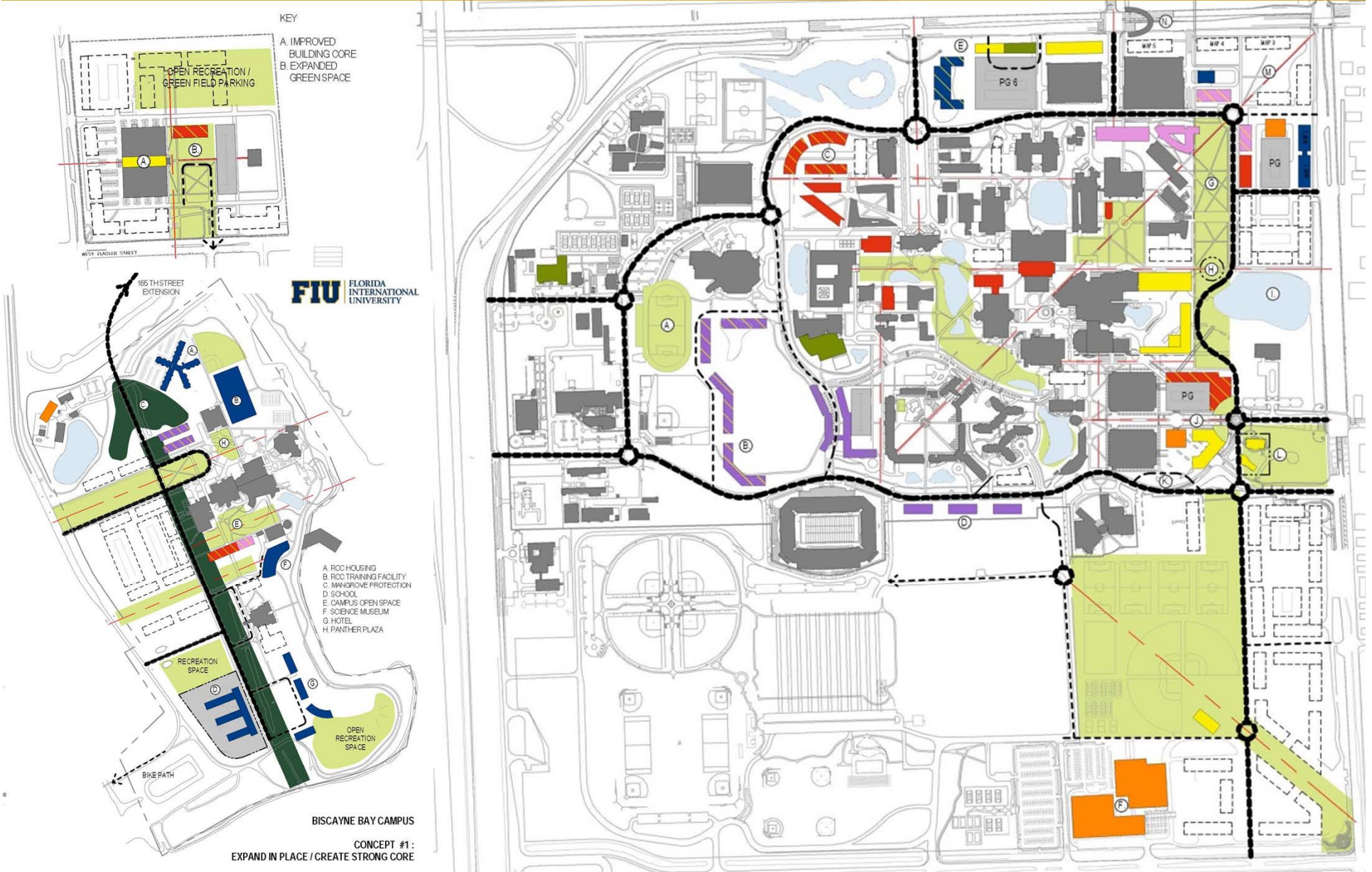
Expand in Place | Create a Strong Core

Key Characteristics

- **Program expansion consolidates current campus districts**
- **Infill buildings and additions strengthen each campus core**
- **Preserves future perimeter building sites at each campus**
- **Maximizes growth at MMC**
- **Minimizes growth at EC and BBC**



Concept 1



CONCEPT #2

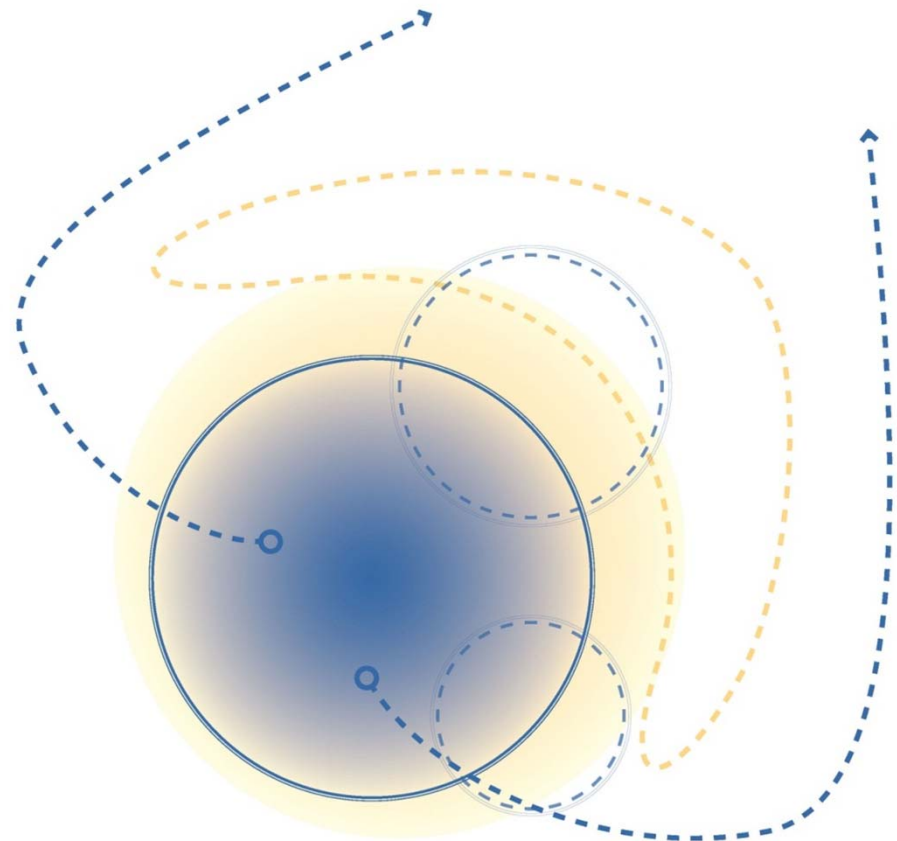
Shift Programs / Reinforce Campus Identity

4b

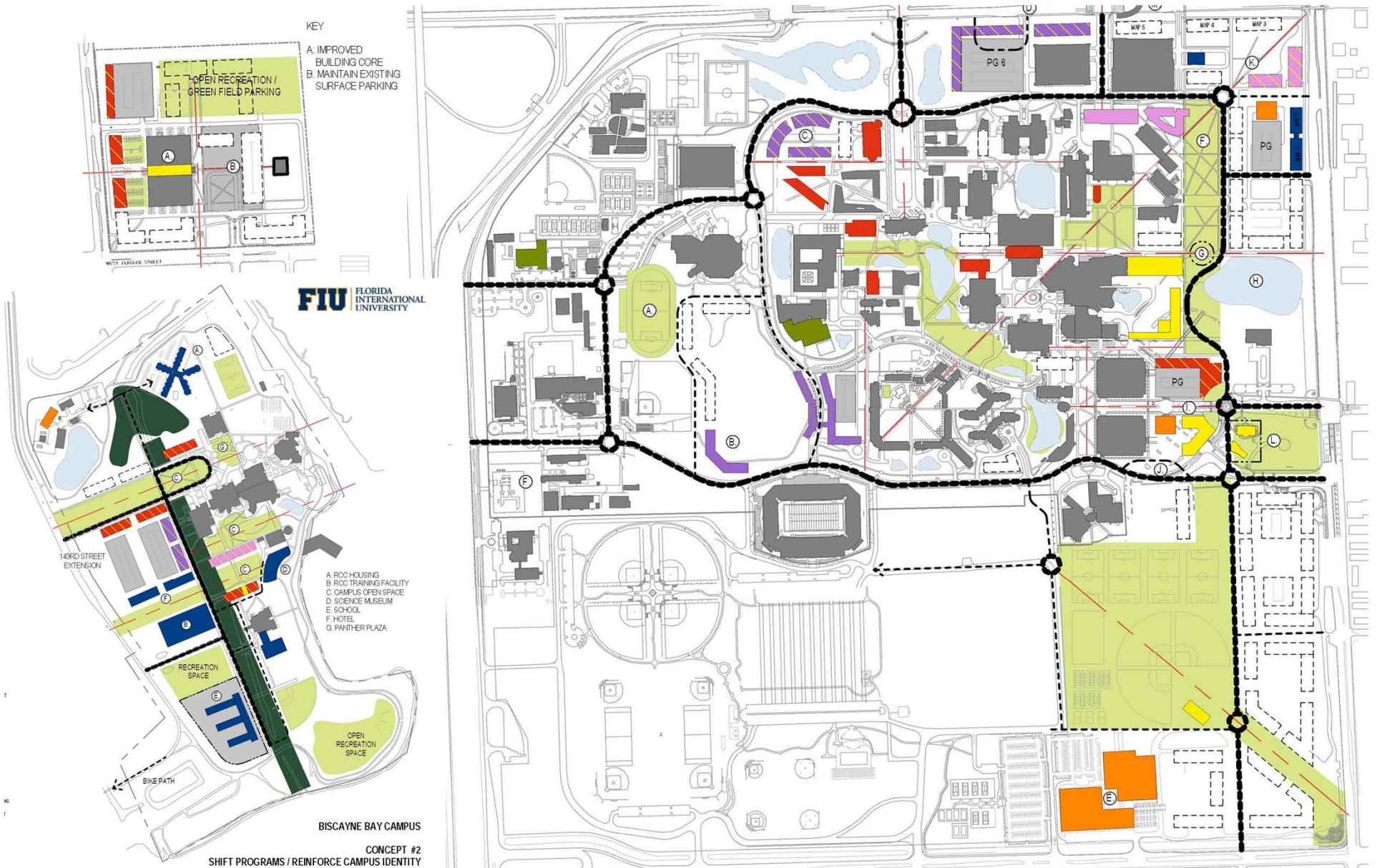
Shift Programs | Reinforce Campus Identity

Key Characteristics

- **Academic Health programs strengthen MMC identity**
- **Engineering, Math and Computing programs strengthen EC identity**
- **Hospitality, Education and Environmental Science programs strengthen BBC identity**
- **Maximizes future MMC flexibility**
- **Maximizes balanced growth across campus**



Concept 2



OPTION #3

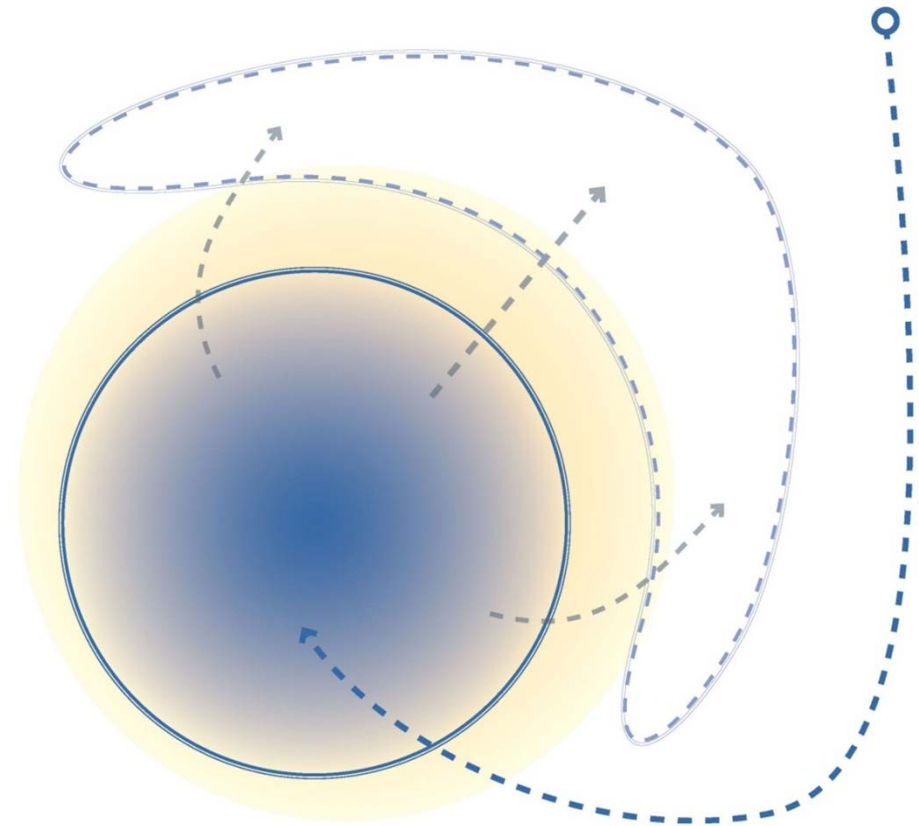
Expand at the Perimeter / Reinforce Partnerships

4c

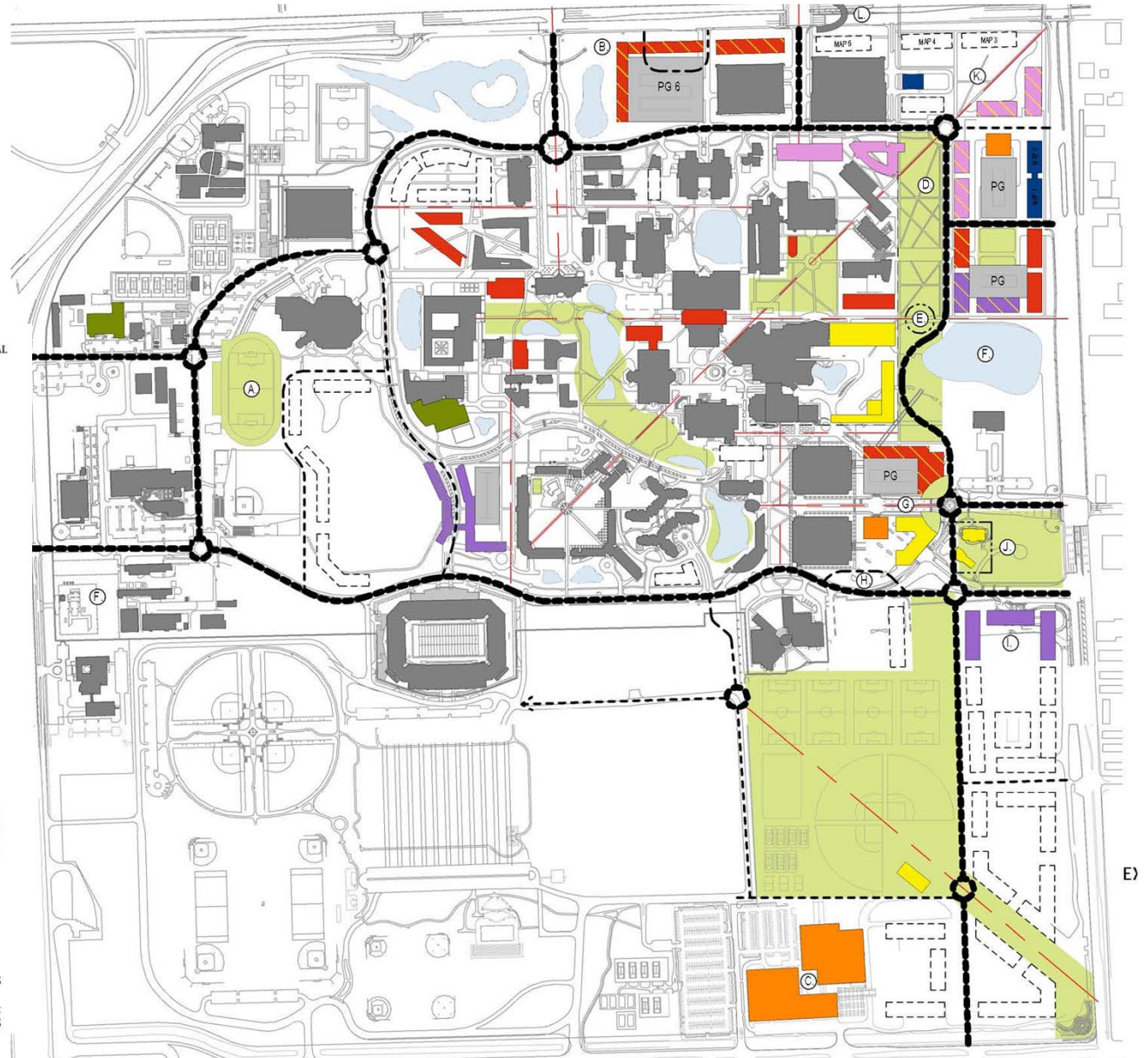
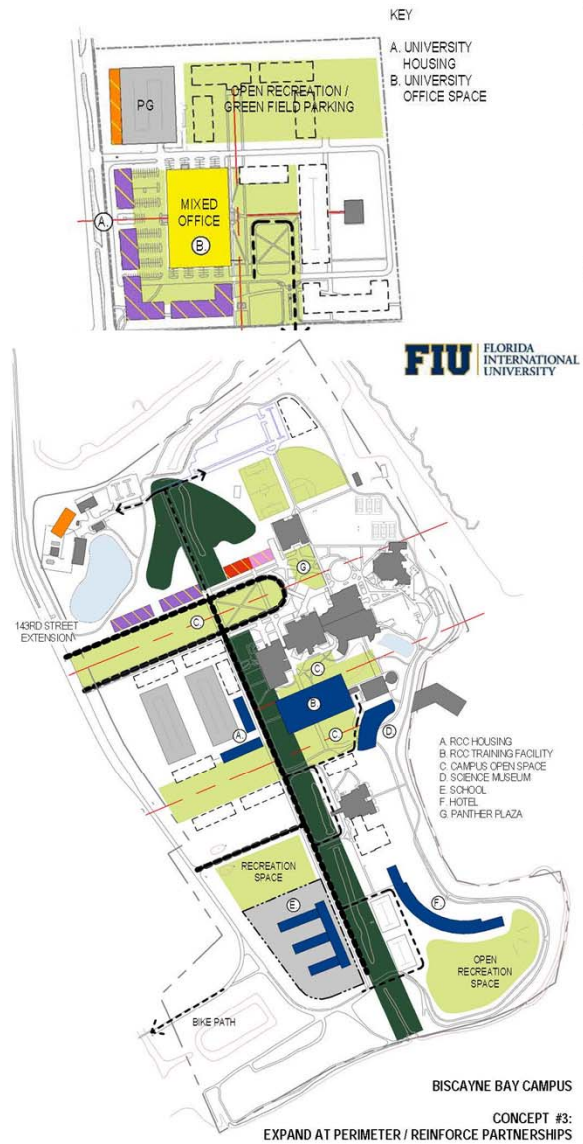
Expand at the Perimeter | Reinforce Partnerships

Key Characteristics

- **Focuses growth at each campus perimeter**
- **Strengthens sites for visible partnerships**
- **Repositions EC highest and best use**
- **Shifts Engineering to MMC**
- **Maximizes future campus core infill opportunities**



Concept 3





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DISCUSSION

8