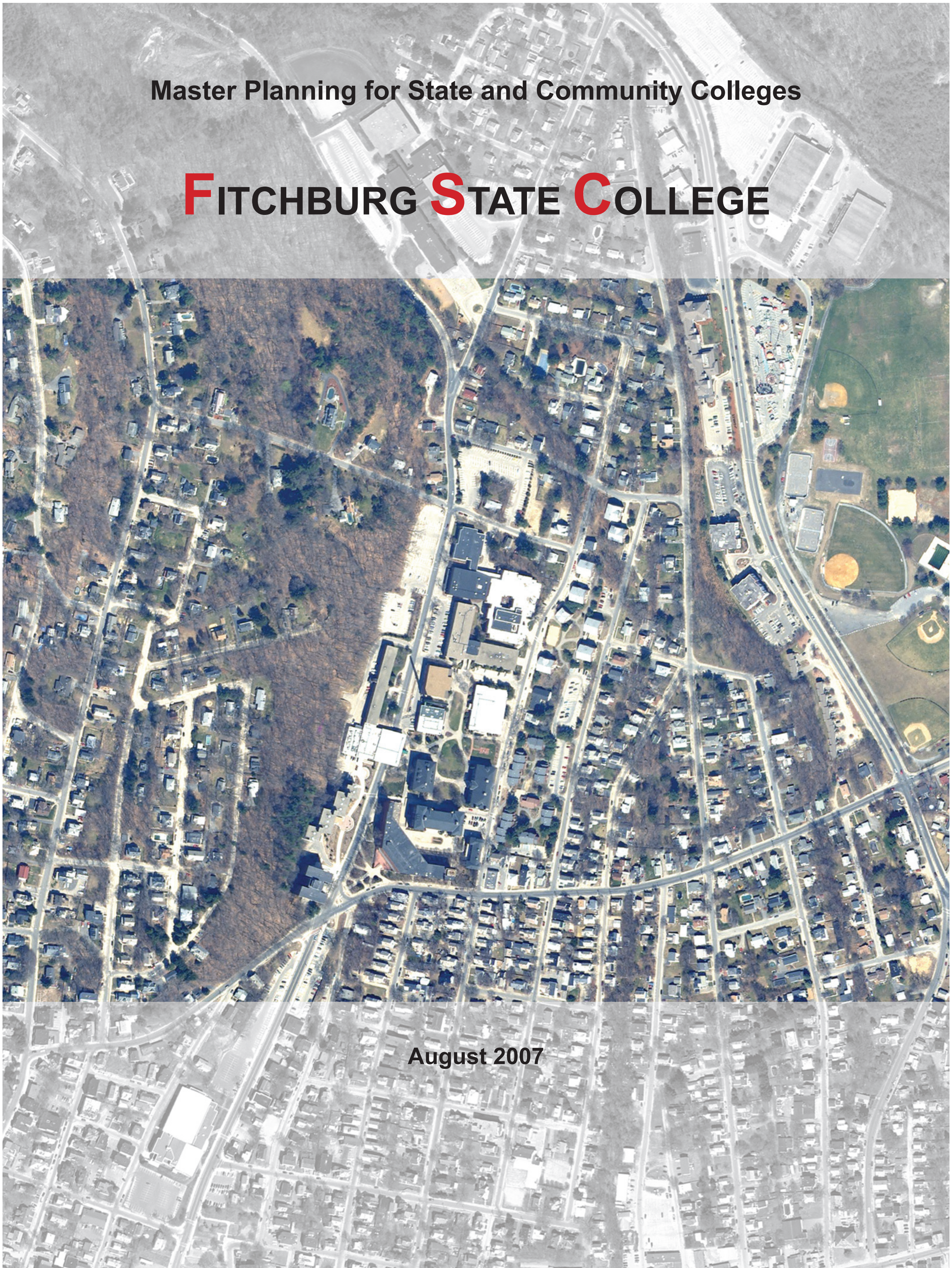
Master Planning for State and Community Colleges

FITCHBURG STATE COLLEGE



August 2007

CHAN KRIEGER SIENIEWICZ

Master Planning for State and Community Colleges

FITCHBURG STATE COLLEGE

Prepared for:

DIVISION OF CAPITAL ASSET MANAGEMENT
and
BOARD OF HIGHER EDUCATION

Prepared by:

CHAN KRIEGER SIENIEWICZ, Inc.

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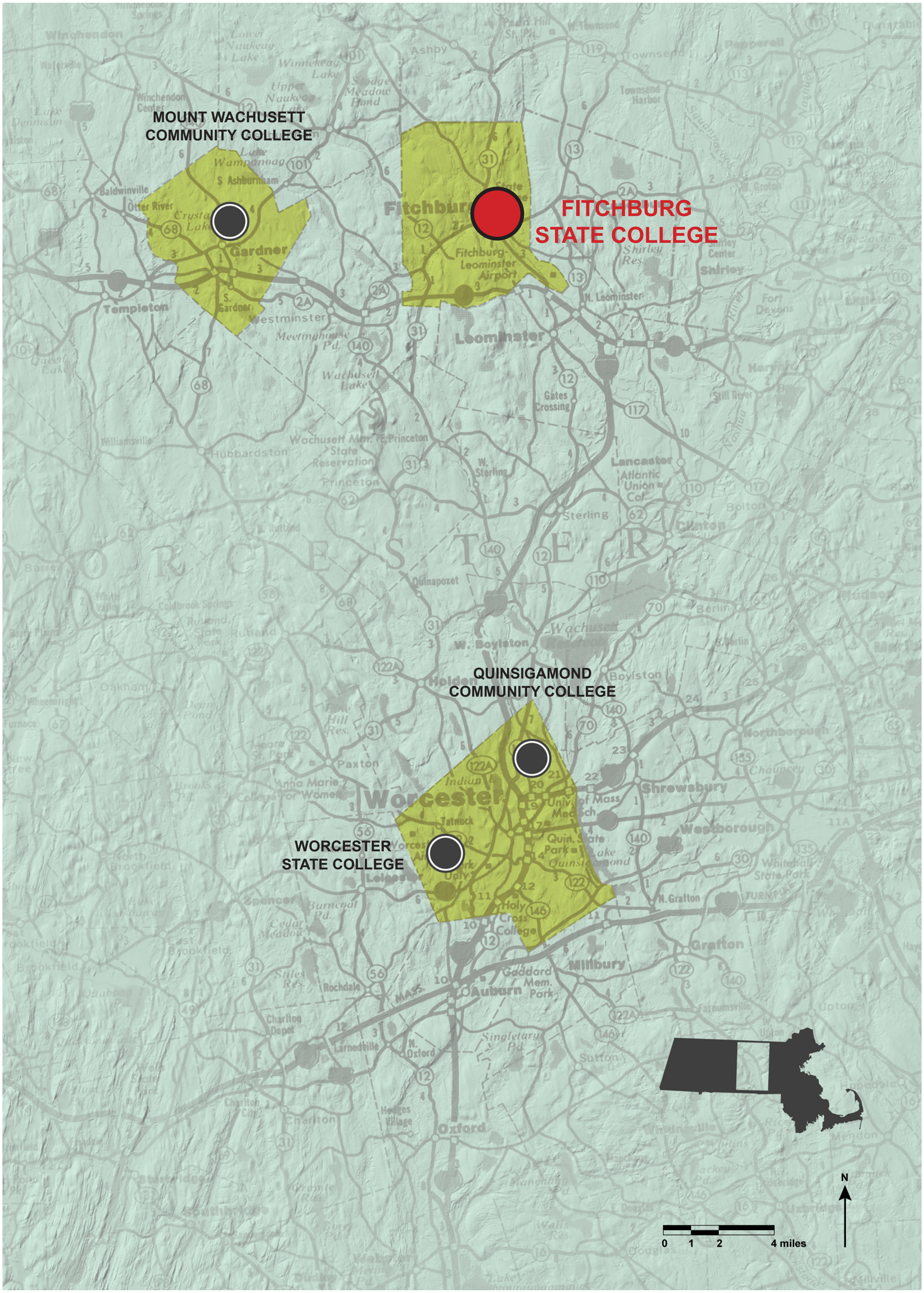
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STATE COLLEGE
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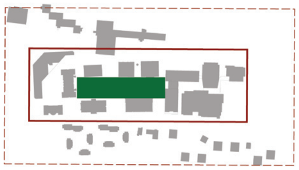
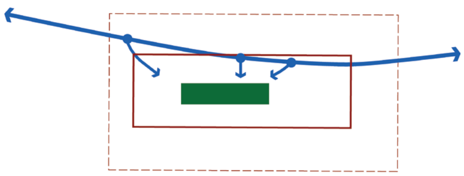
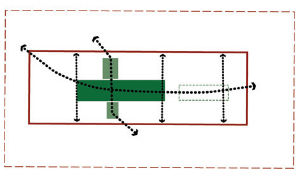


A Focus on the Quad and Core Campus Precinct



Tying North Street to the Quad



Maintaining a Robust Pedestrian Network

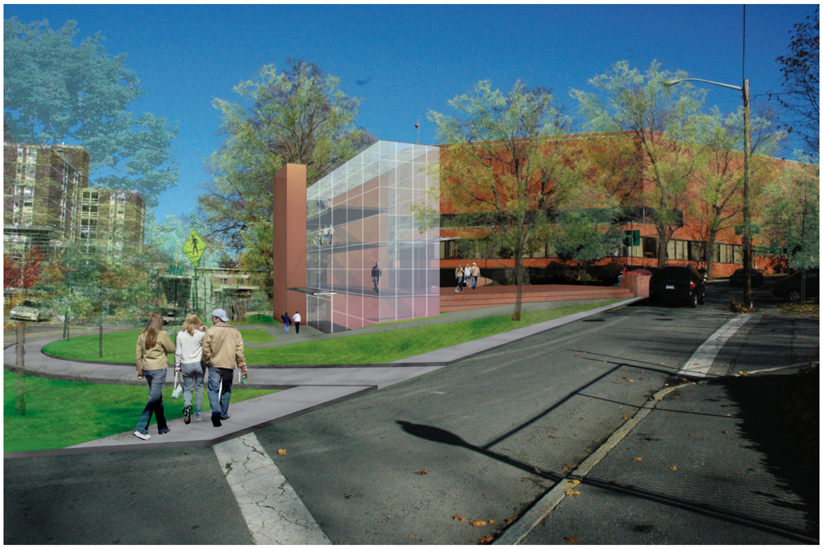
The Fitchburg State College (FSC) campus has a dense, urban core, yet its smaller activity centers are geographically spread out along the principal public thoroughfare of North Street. The college's most defining open space is the collegiate quadrangle in the central campus, surrounded by the original brick campus buildings of the State Normal School.

Three main conceptual moves guide the future of the Fitchburg State College campus. First, campus energy and investment is focused in the existing core campus precinct, a well-defined rectangle of programmatic density surrounding the central quad. Second, the main public thoroughfare of North Street is better connected to the central quad through new iconic gateways while it continues to serve as a key link to the Recreation Center and McKay Campus. Finally, the campus's already robust pedestrian and open space network is maintained and enhanced to permeate the core precinct.

Several capital projects contribute significantly to the realization of this campus vision, described briefly below:

1 New Science Center: the CBT-studied scenario for improved science instructional space that most supports the goals of the campus framework involves the modernization of both the Condike and Sanders Buildings and a new wet lab addition to Condike built over the site of Parkinson Gymnasium and Condike parking lot. The expanded Science Center will anchor the north end of the quad and create a modern focal point along North Street.

2 New iconic "Smokestack Atrium": included in the Science Center project will be a glazed atrium between the wet lab addition and the Dupont Facilities Building, using the iconic 250-foot smokestack as a centerpiece and wayfinding landmark for visitors. The atrium will lead visitors from parking along North Street up to the central quad and Anthony Building one-stop center.



View of a New Lobby for the Hammond Campus Center

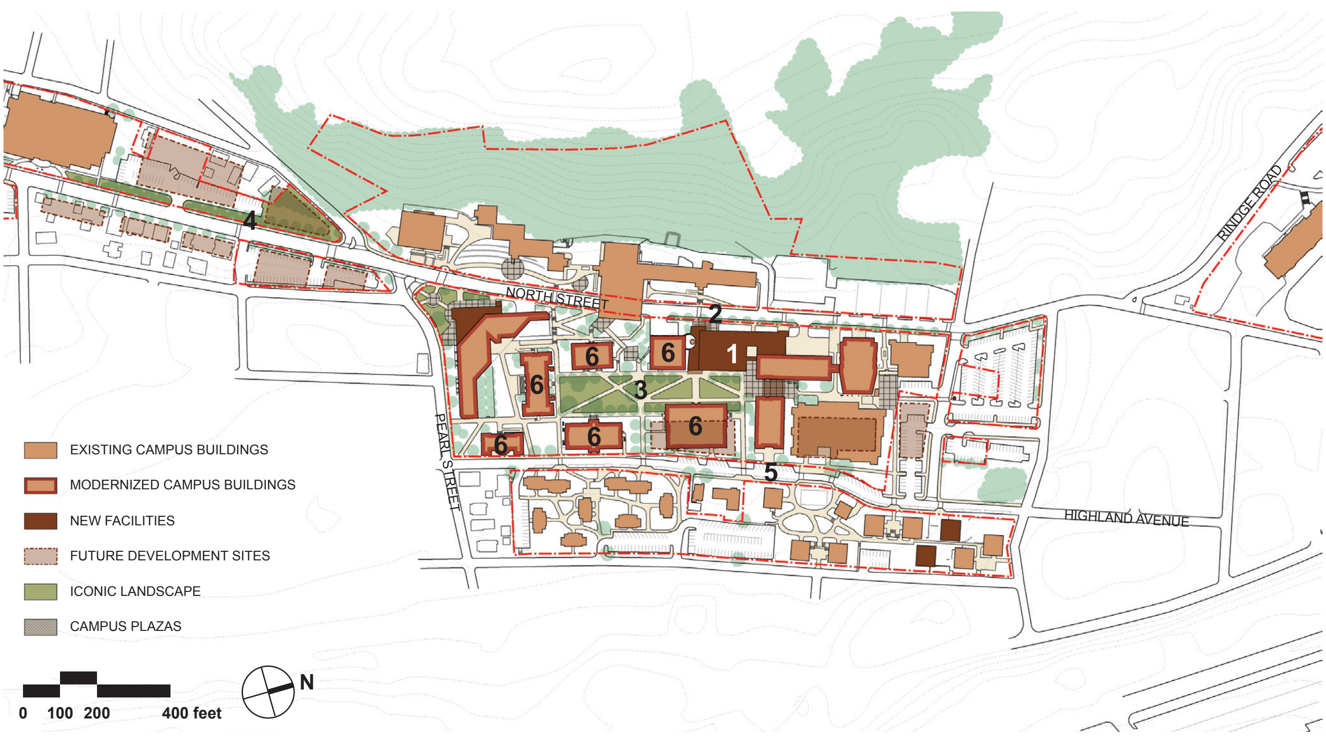
3 Central quad landscape improvements: the 1.5-acre central quad is FSC's signature landscape, though it shows signs of wear. As part of the Science Center building and modernization project, improvements to quad plantings, amenities, and pedestrian paths will create a fresh and coordinated outdoor environment. Additionally, the Science Center project will reconsider the Condike-Sanders breezeway, reopening the northern courtyard to direct pedestrian access from the quad.

4 North Street linear park connector: pedestrian access to the isolated Recreation Center on North Street has been a persistent issue since the building's completion in 2001. A new half-acre linear park edge on the western side of North Street will provide a better aesthetic environment and improved pedestrian safety.

5 Highland Avenue improvements: retaining through traffic on Highland Avenue is not at odds with increased pedestrian safety. A redesigned streetscape employing "neck-downs," raised and textured crosswalks, and diagonal parking will make Highland Avenue a safe pedestrian environment without closing off the street to public access.

6 Modernization of the historic campus buildings: much of the visual character of the quad relies on the historic buildings that define its southern, eastern, and western bounds. Thompson Hall, Edgerly Hall, Percival Hall, and Miller Hall, as well as newer Anthony Hall and Dupont Facilities Building, are all slated for modernization and exterior restoration.

View of a New "Smokestack Atrium" and Science Center Addition



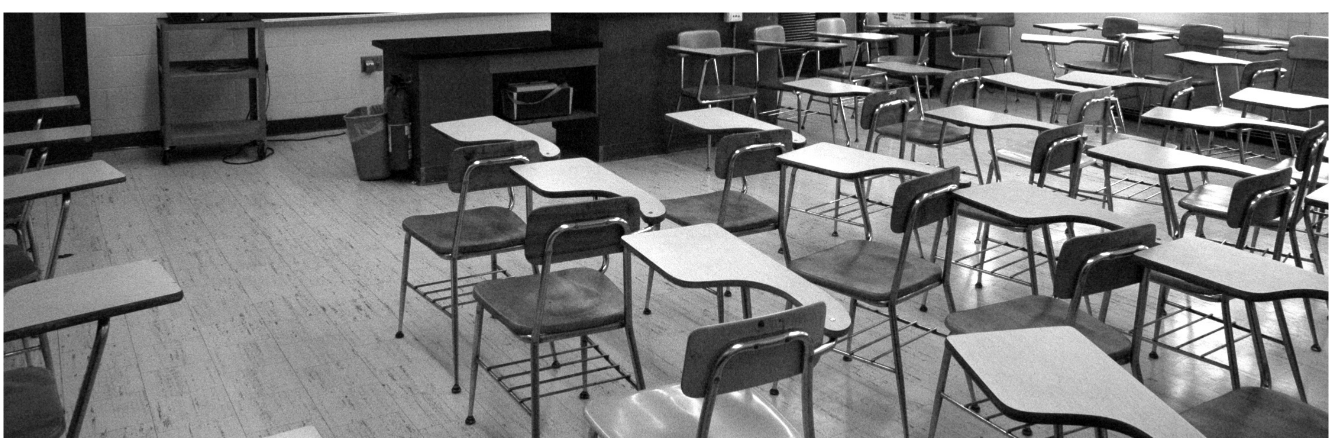
Fitchburg State College Framework Plan

INTRODUCTION

The 2003 report by Eva Klein & Associates, *Matching Facilities to Missions: Strategic Capital Program,* provides an amazingly strong and comprehensive foundation for capital planning at the Commonwealth's 24 state and community colleges. Through the report, each college has a thorough, prioritized list of capital projects and their estimated cost, and that list is a *living document*—it still serves as the basis for continual updates and reprioritization as some projects are completed and others are added to the list.

What the 2003 *Strategic Capital Program* does not do, nor could it have been expected to do for such an expansive and diverse group of institutions, was give each list of capital projects a conceptual *vision* and a physical *framework* for determining how each individual project could participate in an overall campus narrative. The 2003 *Strategic Capital Program* identified the elements or ingredients that could be drawn on to create each campus's future. The task of this study, and the subject of this report, is how those ingredients can be organized and strategically deployed towards the creation of a better campus environment with a clear and unique identity.

The report is broken into three principal sections that roughly parallel the sequence of exploration in the study. The first section, "Understanding the Existing Campus," discusses analysis of existing campus conditions and relates those conditions back to core themes, challenges, opportunities, and needs. "Strategies for Campus Planning," the second section, folds into the discussion conceptually-driven planning scenarios that use capital projects and their development to "tell a story" about the future of campus. In the third section, "A New Campus Framework," a preferred framework for the campus emerges and is described in greater detail. Technical appendices are included at the end of the report to provide greater analytic detail about landscape, mechanical, plumbing, and electrical systems on the existing campus.



I. Understanding the Existing Campus: Conditions, Needs & Plans

Crafting an effective framework for Fitchburg State College's future requires a broad understanding of not only the conditions on the ground today, but also the needs expressed by college constituencies and the plans already underway to serve those needs. The following chapter provides a "snapshot" of the campus and the college leadership's ambitions for the future.

A New Entrance Addition and Landscape at the Russell Towers Residence Hall (from www.mass.gov)

An Industrial Arts Shop in the Conlon Arts Building

The Campus at a Glance

The following is a list of "fast facts" regarding Fitchburg State College and its campus[1]:

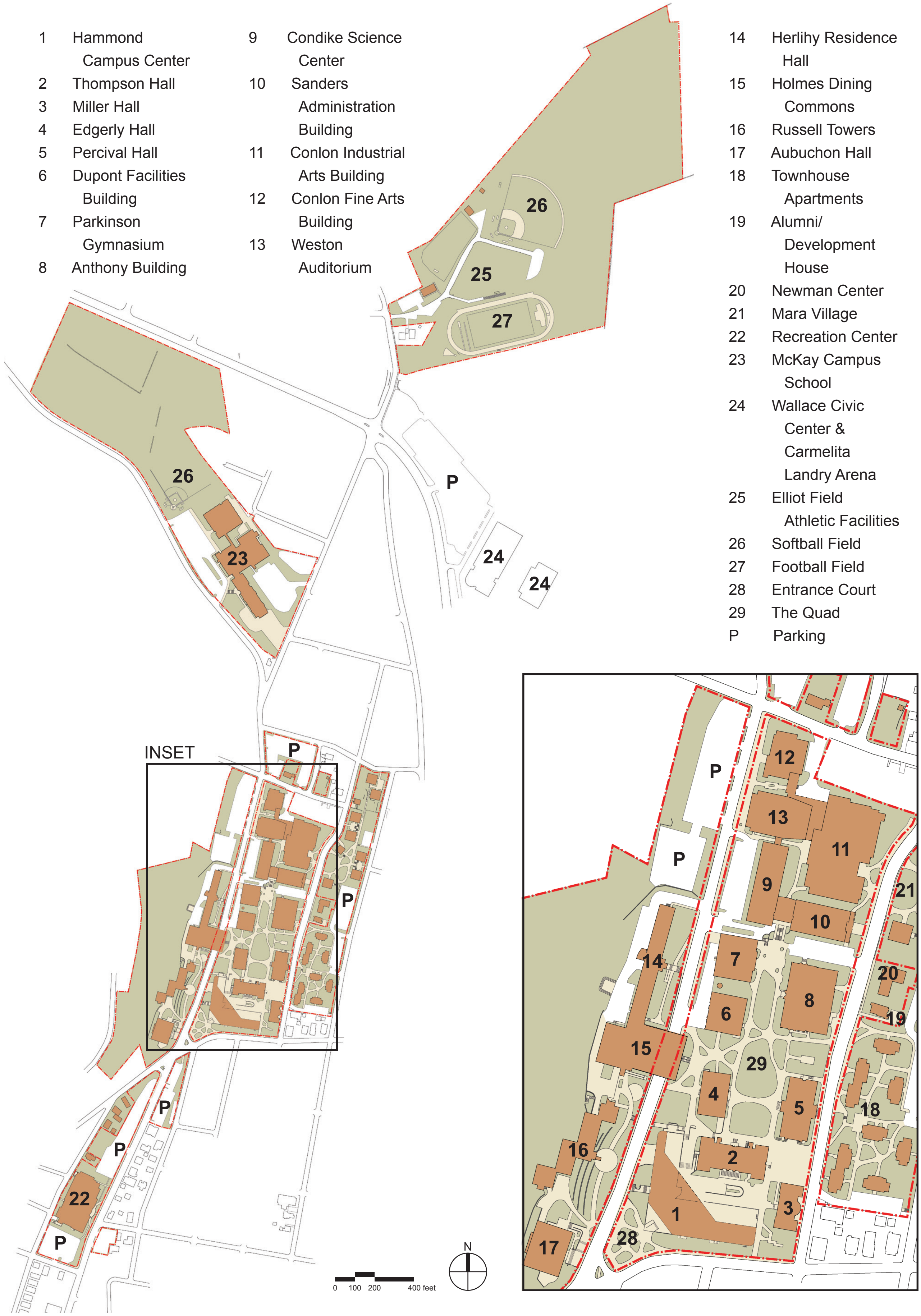
- In Fall 2005, FSC had a full-time enrollment of 3,196, a part-time enrollment of 2,144, and an FTE of 5,340.[2]
- FSC has over 33,500 alumni.
- There are 171 full-time faculty, 87% of which have at least a doctorate in their respective field.
- The Fitchburg State College is one of the biggest employers in Worcester County with 585 employees.
- Undergraduate tuition is $110 per credit hour and graduate tuition is $150 per credit hour, discounting fees.
- The College has 18 academic departments which offer 49 undergraduate degrees, as well as 20 master's degree programs.
- The library allows students access to over 228,000 books as well as over 478,000 periodicals on microfilm.
- The land area of campus is approximately 92.6 acres, broken into four main pieces: the 29.4-acre central campus, the 23.0-acre McKay campus, 5.4 acres along North Street south of the central campus, and the 34.8-acre Elliot Field athletic complex. FSC also owns an additional 120 acres of land in neighboring towns used for nature and ecological study.
- There are 857,414 square feet of assignable space on campus[2], and 1,005,415 square feet of gross building area on campus.[3]
- There are approximately 1,693 surface parking spaces on campus, 559 reserved for resident students, 314 dedicated for faculty and staff, 342 for commuting students, and 478 general-use spaces.

1 All unreferenced facts are derived from information available at www.fsc.edu

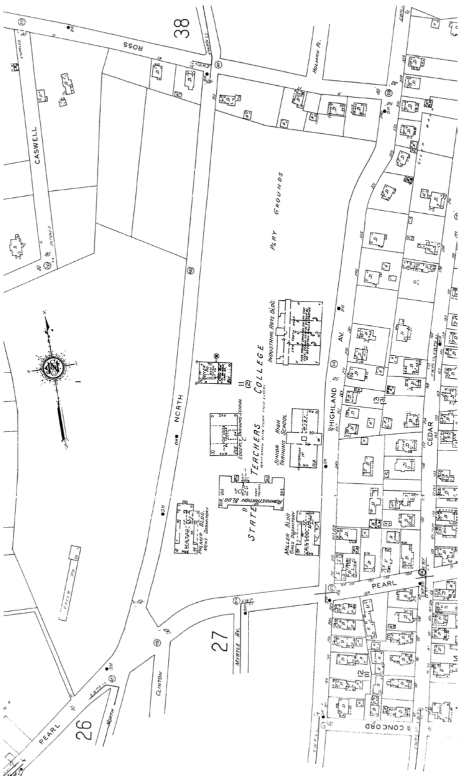
2 *Fitchburg State College Space Utilization Analysis,* April 2006 draft, Rickes Associates, Inc.

3 Commonwealth of Massachusetts MAssets real property database

1 Hammond Campus Center
2 Thompson Hall
3 Miller Hall
4 Edgerly Hall
5 Percival Hall
6 Dupont Facilities Building
7 Parkinson Gymnasium
8 Anthony Building
9 Condike Science Center
10 Sanders Administration Building
11 Conlon Industrial Arts Building
12 Conlon Fine Arts Building
13 Weston Auditorium
14 Herlihy Residence Hall
15 Holmes Dining Commons
16 Russell Towers
17 Aubuchon Hall
18 Townhouse Apartments
19 Alumni/ Development House
20 Newman Center
21 Mara Village
22 Recreation Center
23 McKay Campus School
24 Wallace Civic Center & Carmelita Landry Arena
25 Elliot Field Athletic Facilities
26 Softball Field
27 Football Field
28 Entrance Court
29 The Quad
P Parking



The Campus as it Appeared in 1949
(from www.sourcebook.fsc.edu/archive)



1936 Historical Map of the Campus
(from www.sanborn.umi.com)

Regional and Historical Situation

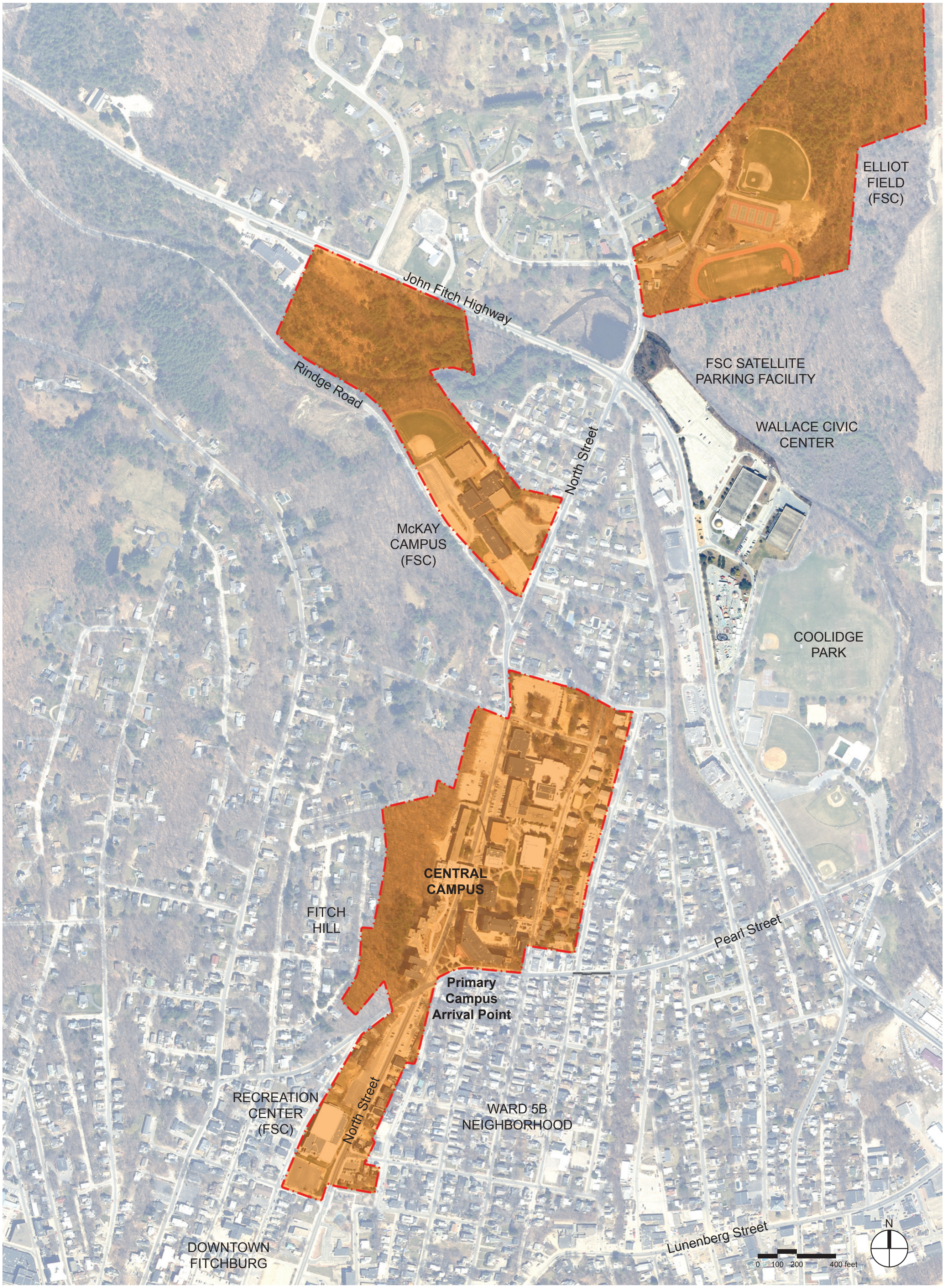
Summary

- The Fitchburg State College campus is the most dense and urban of central region public colleges
- Northward expansion of the original normal school defined the current central campus quad
- The continued health of FSC is key in its ability to serve the City of Fitchburg

Fitchburg State College (FSC) is located adjacent to downtown Fitchburg, a city of nearly 40,000 inhabitants and a former center of industry in north central Massachusetts. In marked contrast to its nearest public higher education neighbor, Mount Wachusett Community College, the FSC campus is by far the most dense, urban public college campus in the central region. Situated amidst residential neighborhoods, the FSC campus is formed and infused by the city's street grid. North Street provides the most direct and highly-trafficked link to campus from the city center, though John Fitch Highway on the eastern edge of the city provides a quicker link to Route 2, the major traffic thoroughfare in north central Massachusetts.

FSC was founded as the State Normal School in Fitchburg in 1894, and began occupying its current site with the construction of Thompson Hall in 1896. Previous to the normal school, the site had been pasture and wetlands on the northern edge of an established residential neighborhood. Hemmed in by an undevelopable slope to the west and neighborhoods to the east and south, the school was forced to accommodate expansion by pushing further north towards a swampy field. The central campus quad evolved from a backyard recreational area into the principal open space on campus, an evolution that was solidified with significant construction in the early 1960's that defined the northern edge of the space.

It is important to recognize the role the institution plays in the City of Fitchburg, not simply as the location for publicly available amenities like the Weston Auditorium, the new Recreation Center, and the Elliot Field sports complex, but as a stabilizing presence for flagging inner city neighborhoods and an economic engine for the city—the college is the largest non-municipal employer in Fitchburg. The college's continued health and prosperity as a local institution is key in its ability to continue in this role, and a solidification of the college's identity is an important part of that prosperity.



Fitchburg State College's Regional Context

Main Campus Arrival Gateway at the Intersection of North and Pearl Streets

Holmes Dining Hall Bridging North Street

The Campus Smokestack Stretching 250 ft Above North Street

Elements of Campus Identity

Summary
- The main arrival gateway, the Holmes Dining Hall bridge, and the smokestack are important campus visual icons
- North Street, and the campus arrival sequence along it, could be strengthened by using these icons for orientation
- The campus quad, with its collection of historic and modern buildings, is the signature campus open space

A number of factors contribute to the physical character, identity, and sense of place of the campus. As briefly noted earlier, the campus's immersion in the urban neighborhoods of Fitchburg plays a part in that identity. There are also several iconic features of the visual experience of the campus, including the main arrival gateway at the Hammond Campus Center, the bridging Holmes Dining Hall, the campus smokestack, and the historic campus core with its quad. Together, these features create an orienting entrance sequence along North Street, the principal roadway through campus, that makes the experience of the FSC campus unique and memorable.

Main Campus Arrival Gateway:
Most visitors' first impressions of the FSC campus will be formed at the intersection of North and Pearl Streets, in front of the Hammond Campus Center, a fact which has been both an opportunity and a disappointment for the college. The Hammond Campus Center presents an impressively-scaled façade to the intersection, yet its architectural design is cold and isolating, and until recently, the generous landscaped area at its foot has been bland and unhelpful in presenting a clear indication of being in the campus realm. Yet impending improvements to both building and landscape promise to capitalize on this outdoor campus vestibule and call out clearly the entrance to campus.

Holmes Dining Hall Bridge:
The Holmes Dining Hall itself is an uninspiring architectural work, but the simple fact that it spans North Street as a pedestrian connection makes it an important visual landmark for visitors as well as a center for activity and circulation.

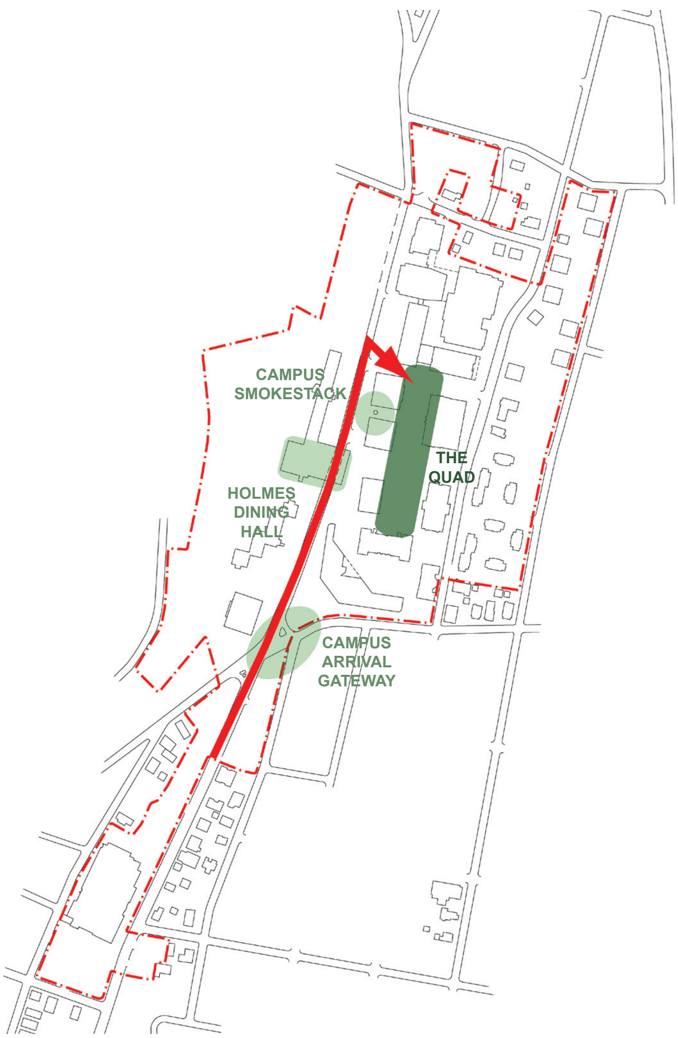
The Campus Smokestack:
The power plant smokestack is without equal in tying the visual character of Fitchburg State College to the industrial heritage of the surrounding city. The 250-foot functional monument can be seen from many places throughout Fitchburg, serving as a pervasive visual reminder of the school's presence and a useful orienting device for visitors.

North Street and the Arrival Sequence:
Recent and ongoing streetscaping improvements to North Street from downtown Fitchburg northward has changed the perception of the institution from being isolated and hard to find to being accessible

and fresh. Unfortunately, few visual cues on North Street indicate what is the appropriate “front door” to campus, but opportunity lies in the continued redesign of North Street to integrate the campus icons mentioned above into a stronger arrival sequence that brings visitors to a specific point on North Street from which they can enter the campus quad.

The Historic Campus Core and Quad:

When referring to the historic campus buildings and the central quad they frame, FSC President Dr. Robert Antonucci noted that the quad environment is what sells the campus to visitors. Indeed, the coordinated historic brick character of Thompson, Percival, and Edgerly Halls and the abundant planting of the quad has the character, but lacks the refinement, of the traditional, ideal New England campus that makes the region a popular destination for higher education. The central quad is the signature space on campus, the one place that most embodies the identity of the institution. The fact that historic structures share the quad with newer development reaffirms that FSC is not a static institution with a precious campus, but a living and evolving entity that mixes old with new.



Campus Icons


North Street Arrival Sequence

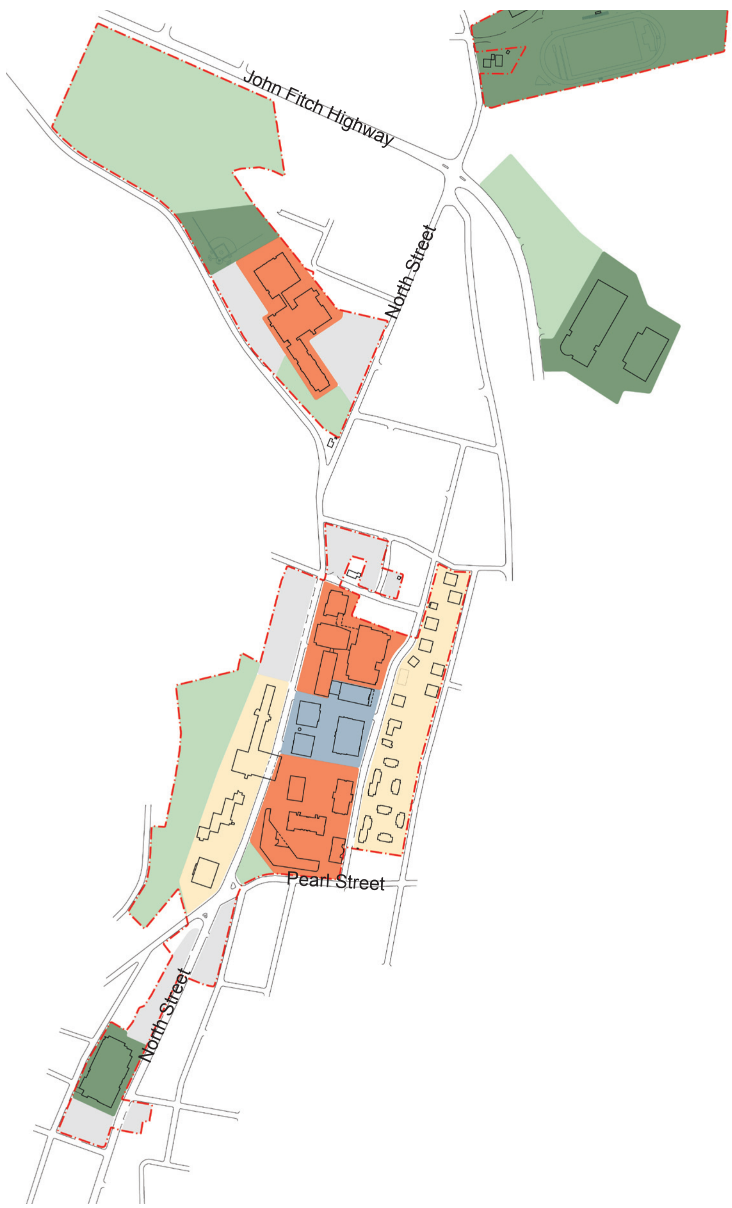

The Central Quad: the Signature Space on Campus

Land Use

Summary

- Though an urban campus, almost half of FSC's land area is unused natural open space
- FSC utilizes a small portion of campus for parking and circulation compared to other public colleges in the region

Despite being the most dense, urban public college campus in the central region, 44.6% of FSC's 92.6-acre campus land area, or 41.2 acres, is unused open space in largely forested or topographically intense areas on the campus edges. Facilities and their immediate landscapes account for 20.1% of campus land, or 18.7 acres. Sports fields comprise 16.8 acres of land, or 18.1% of campus, while parking and roadways utilize a relatively restrained 13.7%, or 12.7 acres, of campus land in comparison to other central region colleges. FSC's key campus landscapes, including the central quad, account for only 3.5%, or 3.24 acres, of campus land.



ACADEMIC AREAS
CAMPUS SUPPORT
"STUDENT LIFE" AREAS
RECREATIONAL FACILITIES
PARKING
OPEN SPACE

Campus Land Use

Programmatic Zones

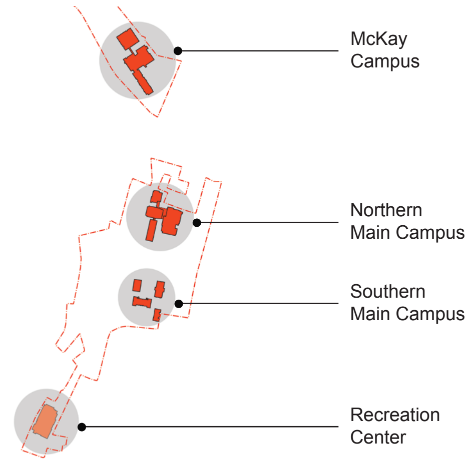
Summary

- There are three distinct main academic areas of campus distributed along North Street
- Campus support programs are clustered in the middle of the central campus
- Student housing is concentrated close to the central campus while athletics are at the outer edges

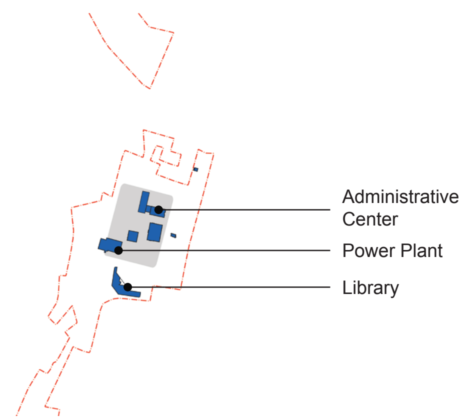
<u>Academic Precincts:</u>
Academic instructional space at FSC is divided amongst three different centers: the McKay Campus School in the north, the science and arts area at the northern half of the central campus, and the liberal arts area located in the historic campus core. Additionally, the Recreation Center houses athletics-related academic programs.

<u>Campus Support Areas:</u>
Campus support programs are largely clustered in the middle of the central campus, including the Administration center, power plant and Facilities Department, receiving, main dining hall, and Weston Auditorium. Additional student service offices and the campus library are located in the Hammond Campus Center.

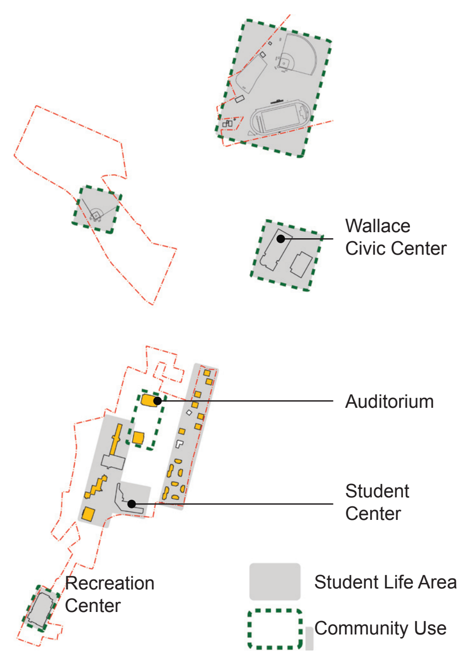
<u>Student & Community Life Areas:</u>
Housing at FSC brackets the central campus with two linear north-south strips, and the Hammond Campus Center becomes a middle ground for student activities on the central campus. Athletic facilities are isolated at the extreme north and south edges of campus. Community use of the campus includes these athletic facilities as well as events at Weston Auditorium and the Boys & Girls Club housed in the Parkinson Gymnasium.



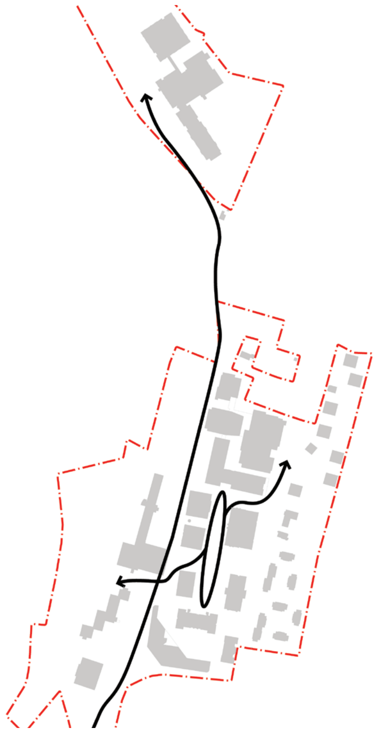
Academic Precinct



Campus Support Areas



Student and Community Life Areas



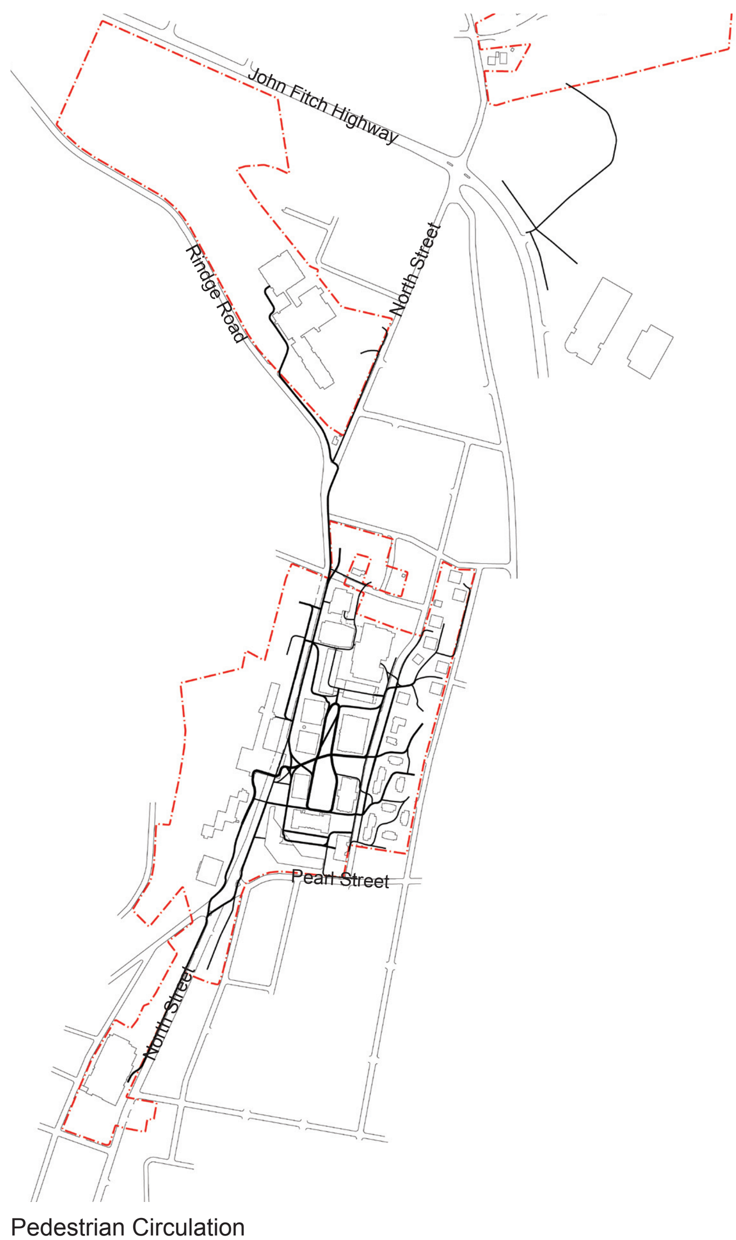
Primary Pedestrian Routes Through the Campus

Pedestrian Network

Summary

- The central campus offers a robust pedestrian pathway network
- A direct north-south pedestrian axis on campus is blocked by buildings
- North Street is an integral pedestrian link throughout the campus

The central campus, anchored by a formal quad greenspace, offers a robust pedestrian pathway network with many options for traversing campus, both north-south and east-west. Currently, however, both the Hammond Campus Center and the enclosed breezeway under the Science Lecture Hall are obstacles to a direct north-south axis. North Street serves as an integral pedestrian link between the Recreation Center in the south, the central campus, the McKay campus in the north, and the various parking lots along the route. A secondary axis traverses the quad to link the Holmes Dining Hall and its pedestrian bridge over North Street with the eastern residential side of campus.



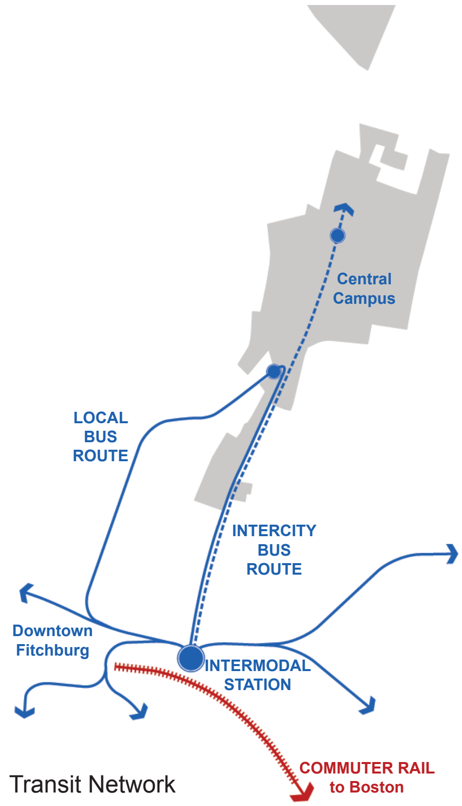
Pedestrian Circulation

Transit and Shuttle Network

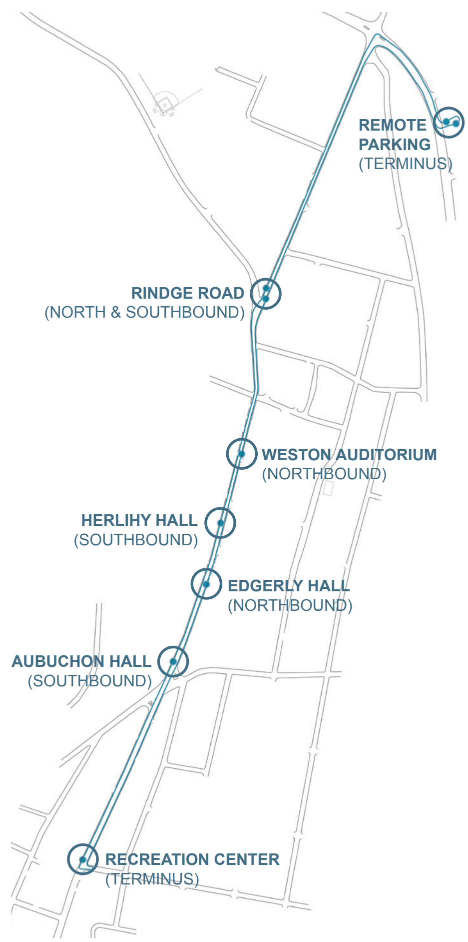
Summary
- FSC is situated in proximity to a new hub of regional transportation in downtown Fitchburg
- A shuttle bus loop on North Street connects the campus to its remote parking facility

Transit:
The FSC campus is situated in proximity to Fitchburg's new Intermodal Transportation Center, which serves as the hub for Montachusett Regional Transit Authority bus lines and is the western terminus for the MBTA's Fitchburg commuter rail line. Two bus routes connect the campus to the intermodal hub, with one continuing on as an intercity connector to Leominster and the Mount Wachusett Community College campus at Gardner. Bus stops are located at the North Street/Pearl Street intersection and in front of the Parkinson Gymnasium.

Shuttle Network:
FSC operates a shuttle bus loop along North Street to connect the college's remote parking facility at Wallace Civic Center to the McKay campus, central campus, and the Recreation Center. The shuttle loop makes eight stops in its 15-minute run and operates five days a week.



Transit Network



Shuttle Route

MONTACHUSETT REGIONAL TRANSIT AUTHORITY
BUS INFORMATION:

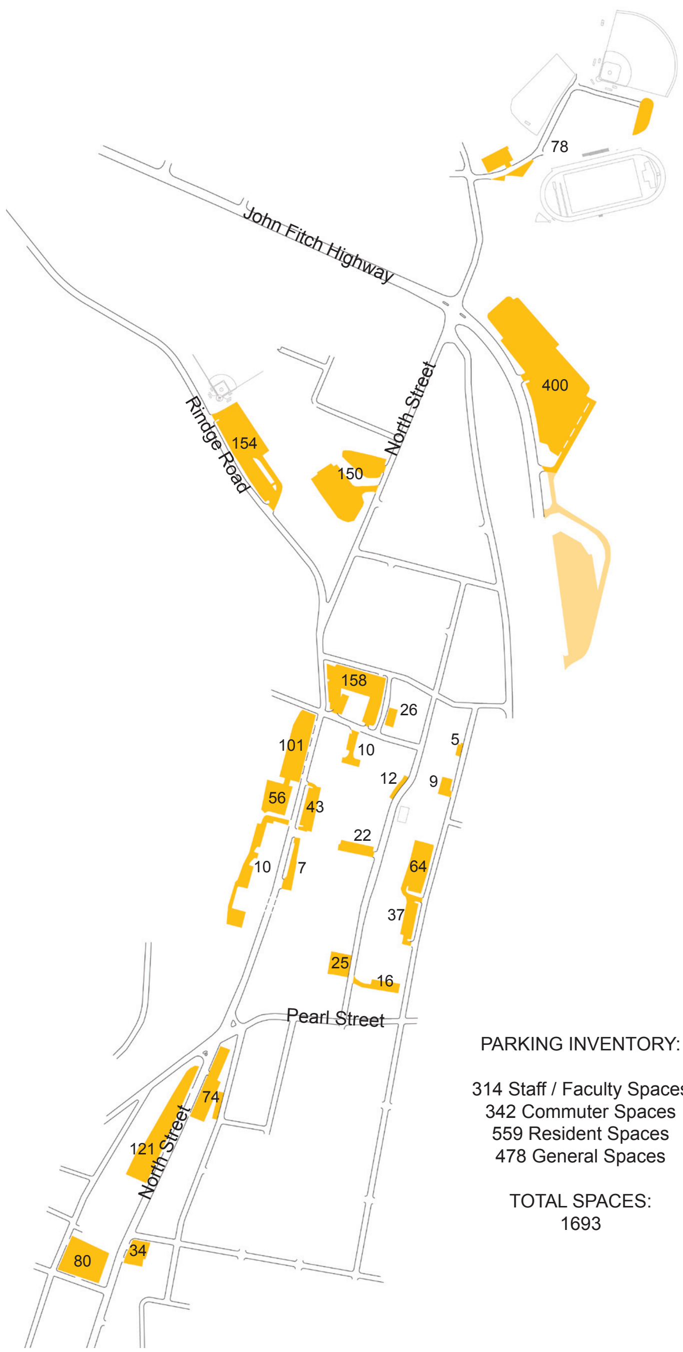
LOCAL SERVICE
1 bus every 60 min., 7:00 am - 5:00 pm

INTERCITY SERVICE
Four times daily; 7:00 am, 8:00 am, 2.00 pm, 3:00 pm

Parking, Traffic, and Services

Summary

- Most campus parking lots are small or moderately-sized
- Half of campus parking is located along North Street
- FSC operates a moderately-utilized remote parking lot containing 400 spaces
- FSC traffic circulates largely on the city street grid
- North Street is a significant north-south neighborhood arterial serving campus and a primary service access route
- Major receiving functions have been moved to an off-site facility



PARKING INVENTORY:

314 Staff / Faculty Spaces
342 Commuter Spaces
559 Resident Spaces
478 General Spaces

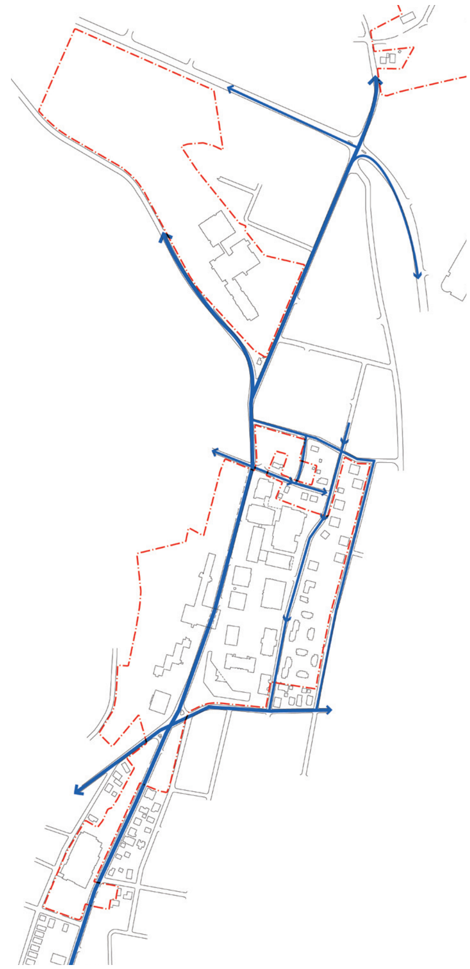
TOTAL SPACES:
1693

Parking

Parking:
FSC is served by 1,693 surface parking spaces distributed throughout the sprawling campus in mostly small and moderately-sized lots. Nearly half of the campus parking reserve has direct access or immediate adjacency to North Street. The largest parking area, containing approximately 400 spaces, is FSC's shuttle-accessed remote parking lot at the Wallace Civic Center, about 0.6 miles northeast of the central campus. An October 13, 2006, *Worcester Telegram & Gazette* article reported on conflicts between FSC students and the City of Fitchburg over parking in adjacent residential neighborhoods, suggesting that the remote lot is still not considered an attractive parking alternative to the risks of residential street parking.

Vehicular Traffic:
Most FSC vehicular traffic circulates on the public city street grid that permeates the campus. North Street, a significant neighborhood arterial, serves the bulk of north-south traffic flow in the area, while Pearl Street, Ross Street, Holman Street, and Rindge Road serve as east-west feeders for North Street. Highland Avenue runs through the heart of the central campus as a one-way residential street with parallel parking.

Service Traffic:
Service traffic accesses the Hammond Campus Center, Holmes Dining Hall, and the Dupont Facilities Building from North Street, with the Hammond Center's loading docks fronting directly on the street. To the extent that the Anthony Building continues to serve as a receiving and maintenance facility for campus, Highland Avenue will continue as a minor campus service roadway, however, major receiving functions have been moved off-site.


Vehicular Traffic

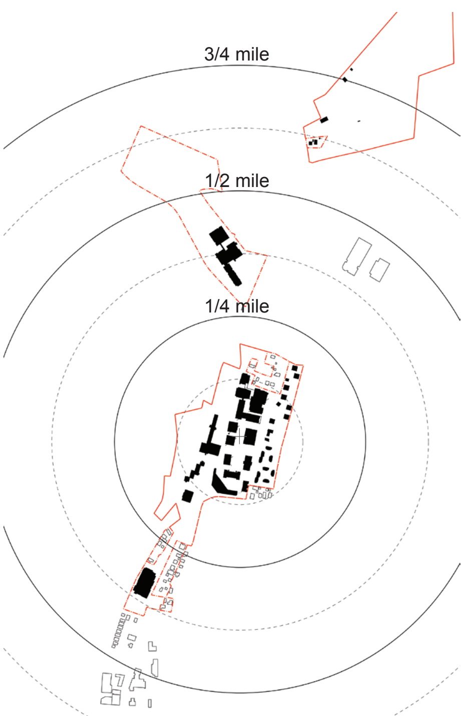

Service Traffic

Campus Form

Summary

- The central campus of FSC is very dense, with an FAR exceeding 1.0
- Campus expansion has tended toward geographic sprawling, reducing overall density

A figure-ground diagram of campus buildings reinforces two important points about campus form. First, the density of the center of this urban campus becomes strikingly apparent, with building footprint occupying nearly half of the land area defined by North Street, Ross Street, Highland Avenue, and Pearl Street. The overall density of campus area in this rectangle exceeds a floor area ratio (FAR) of 1.0, even given its generous quad space. Second, the diagram shows the seemingly paradoxical geographic sprawling of FSC out from its central core, a move towards lower overall density of facilities that are separated inefficiently.



Campus Distances

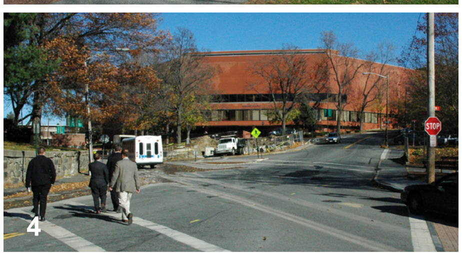
Campus Figure Ground Diagram

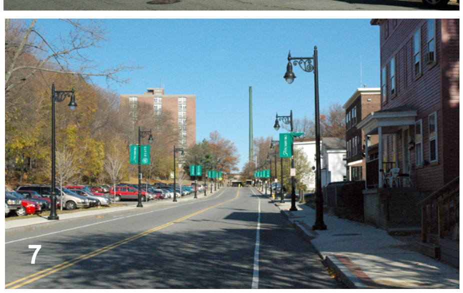
Campus Landscape

Summary
- Unlike other public colleges in the central region, FSC is based around a traditional campus quad
- The central quad evolved through institutional development
- Smaller spaces link to the quad in an open space network

FSC has the advantage of a traditional campus landscape and associated pedestrian network, a characteristic unique amongst public colleges in the central region. The college began similarly to other State Normal Schools as a single central building (Thompson Hall) presiding over a formal front lawn, but as the institution grew and Thompson Hall was flanked by additional buildings, a central space was formed behind the building. Today, the FSC central campus is based around a clearly-defined if somewhat oddly-shaped collegiate quadrangle that runs from Thompson Hall north to the Sanders Administration Building. Smaller sub-quads and patios link to the main quad, while open spaces in the residential areas form their own landscape systems.

Campus Landscape





Campus Needs and Plans

Interviews with college leadership and campus observations resulted in the following list of campus needs and current proposed solutions to accommodate those needs. These needs and plans may be refinements and elaborations on capital projects already called out in the 2003 *Strategic Capital Program*, or may be completely new based on issues that have arisen since 2003. The following list is not necessarily ranked or prioritized.

1 <u>Modernized, replaced, or additional science instructional space:</u>
Condike Science Center is aging and becoming obsolete for modern science instruction. Extensive renovations to the existing facility, a new addition, and complete replacement are all options that have been studied recently by CBT Architects.

2 <u>Modernization/reuse or demolition of Parkinson Gymnasium:</u>
Since being replaced as the primary indoor athletic facility on campus by the Recreation Center, the Parkinson Gym has remained largely unused except for lingering athletic uses and as a home for the local Boys & Girls Club. Options include renovating the building for new campus uses or demolishing the structure.

3 <u>Modernization of Anthony Building as a one-stop student services center:</u>
The college currently lacks a combined one-stop shop for admissions and student services. After the extraction of receiving from the Anthony Building, current campus plans suggest renovating the vacated space for use as a one-stop services center.

4 <u>Modernization of Hammond Center with new North Street entrance:</u>
The Hammond Campus Center has been plagued by building skin maintenance problems and is also in need of replanning of interior spaces. Prellwitz/Chilinski Associates has studied building modernization for the Hammond Center, and proposals for an improved, prominent building entrance at the North Street/Pearl Street intersection have been studied by both PCA and Chan Krieger Sieniewicz.

5 <u>Modernization of historic core campus buildings:</u>
Thompson Hall, Edgerly Hall, Percival Hall, and Miller Hall are the oldest campus structures, built over a period of fourteen years at the turn of the 20th Century. All four buildings require significant modernization and maintenance to systems, building shell, and interiors.

6 <u>Completion of Mara Village with an additional 100 beds:</u>
An additional 100 resident student beds are needed to accommodate demand. Current campus plans call for the completion of the original Mara Village plan of two more suite-style dorms.

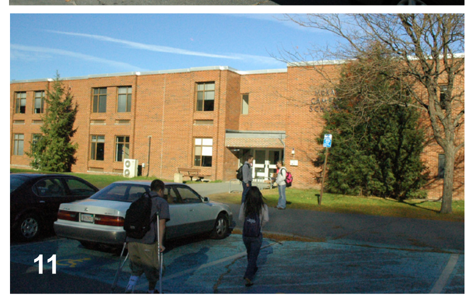
7 <u>Streetscaping of North Street:</u>
The continuation of a federally-funded project to improve streetscaping on North Street is expected, with the stretch of roadway between Pearl Street and Ross Street as the next to be addressed.

8 <u>Acquisition of adjoining private parcels for campus use:</u>
A number of neighborhood private properties adjacent to the campus are currently being targeted for acquisition by the college.

9 <u>Potential parking deck construction:</u>
The college leadership has expressed interest in siting a one-level parking deck over either the Weston Lot or the North Street Lot to increase parking capacity close to the campus.

10 <u>Discontinuation of through traffic on Highland Avenue:</u>
Owning nearly all the property on both sides of Highland Avenue as it runs past the campus, FSC has indicated a desire to close the avenue to through traffic and use the right-of-way for expanded campus landscape, pedestrian space, and new parking lots.

11 <u>Disposition of McKay Campus School:</u>
FSC has suggested that the disposition of the McKay Campus School to the City of Fitchburg is probable in the medium-term to long-term future.



Plan Diagram Identifying Campus Needs


B

The campus framework is built not only on an understanding of how the campus operates, but also on a conceptual vision that can bind seemingly unrelated planning moves into a single narrative. The following chapter summarizes the process of creating and evaluating possible planning strategies and begins to lay out the narrative that best fits the future of Fitchburg State College.

Project Process

The framework plan initiative and concurrent space utilization analysis for Central Region colleges began in late June 2005 with a kickoff meeting at Worcester State College. Following that meeting, each school in the Central Region assembled a broad array of data on both the physical aspects of its campus as well as the planned administrative and pedagogical initiatives of the college. In November 2005, project managers from the Division of Capital Asset Management (DCAM) and the Board of High Education (BHE) then introduced the planning consultant team, headed by Chan Krieger Sieniewicz (CKS), to administrative officials, faculty and staff representatives, and students of Fitchburg State College at a day-long series of interviews. The interviews and campus tour provided the consultant team with an understanding of how the campus operates, how it needs to improve, what facilities are lacking, and how future development moves on campus could contribute to a better environment for higher education.

CKS, DCAM, and BHE returned to Fitchburg State College in late February 2006 to lead a framework planning workshop with college officials, with the goal of condensing abstract notions of campus needs into the foundation of a physical plan for future campus development. During the course of the introductory presentation, the consultant team presented their analysis of existing conditions and discussed the 2003 *Strategic Capital Program,* by Eva Klein Associates, as a basis for a fine-tuned list of capital projects reflecting a more up-to-date understanding of FSC's needs.

During the workshop, CKS presented two alternate visions, or scenarios, for the future of Fitchburg State College. These scenarios, described in detail on the following pages, were an effort to solve the major challenges of FSC's campus while transforming or enhancing the campus's identity. Both scenarios and their possible hybrids attempt to leverage features or qualities of the existing campus in conjunction with new development and landscape enhancements to create a new conceptual framework for FSC.

Pedestrian Safety at the North Street/ Pearl Street and North Street/Rindge Road Intersections was a Major Concern Described During the Campus Tour

The Hammond Center Loading Docks on North Street Reinforce A Service-Oriented Character of that Corridor

The Open Space Framed by Condike, Sanders and Conlon Buildings is Hidden Behind Service Accesses and a Reappropriated Breezeway

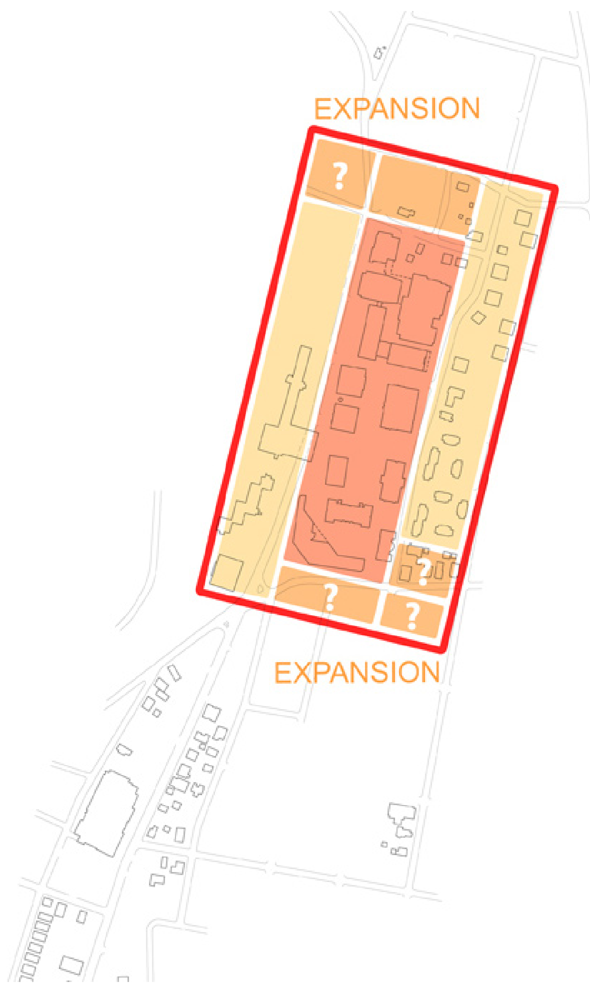
Structural Problems Plague Many Buildings on Campus, Like the Conlon IA Building Pictured Above

Harvard Yard in Cambridge, MA: The Quintessential “Completed Precinct” (from www.mass.gov/mgis)

Scenario 1: The Completed Precinct

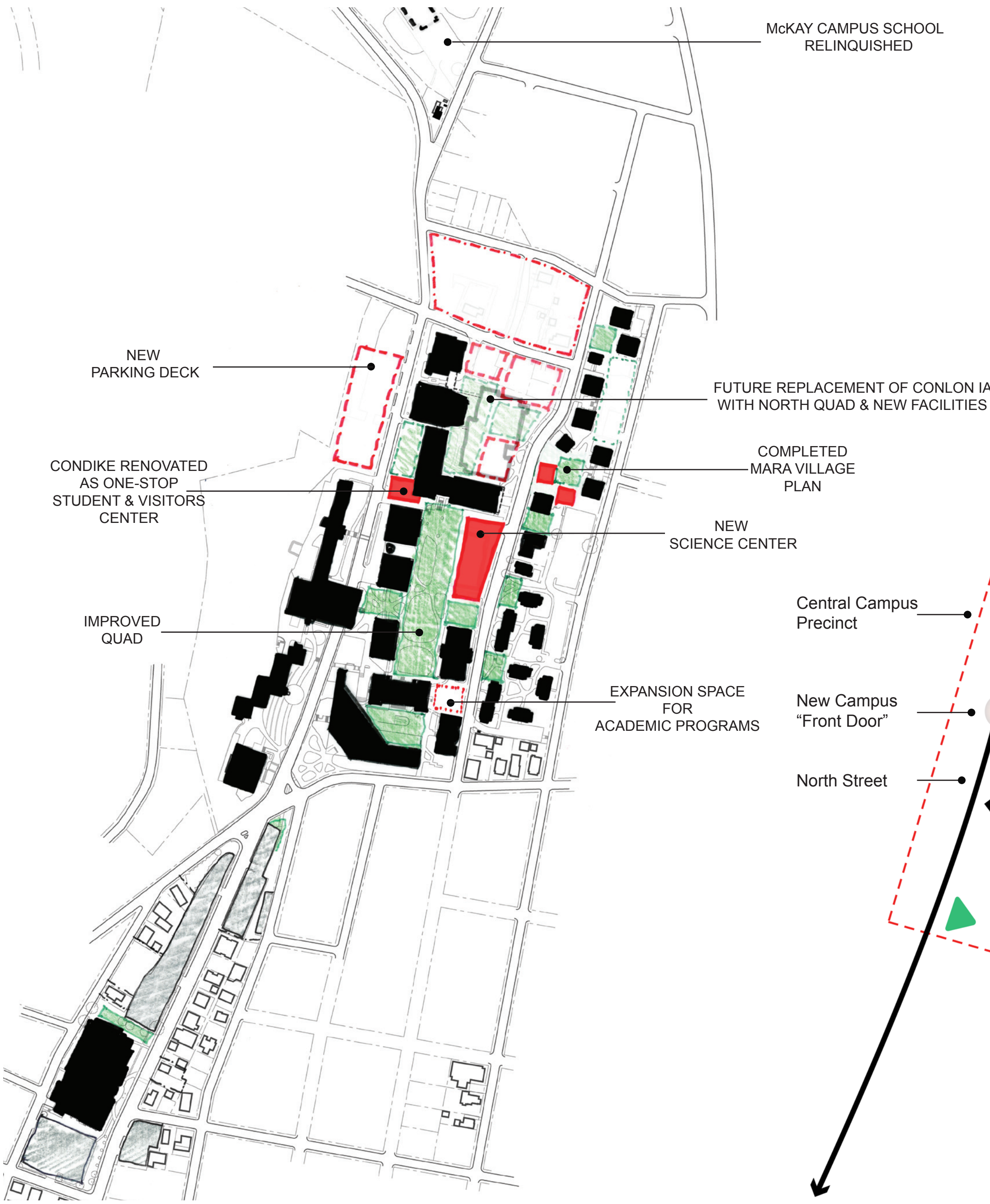
The traditional form of FSC’s central campus and its historic brick architecture beg comparisons with other noted, historic New England campuses, like Harvard Yard in Cambridge, Massachusetts. The early development of Harvard University around the Yard—compact and dense, but aesthetically refined—is a good model for controlled and strategic institutional growth in an urban setting. Its strongly delineated formal boundaries created a distinct precinct within which carefully-sited facilities and landscape development contribute to an overall sense of order. By focusing on the strongly-defined rectangle of the central campus, this scenario seeks to create a more complete institutional precinct for FSC.

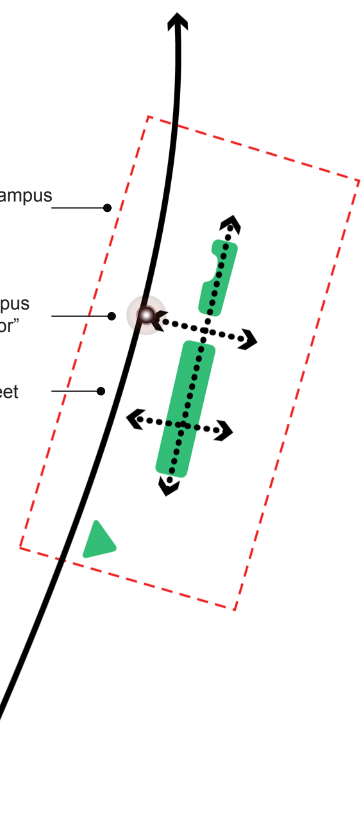
The scenario begins with the replacement of the Anthony Building—a low density, one-story shop structure—with a new Science Center that would allow a better formal definition of the quad rectangle. The Condike Science Center is then free for renovations as a campus one-stop center, visitor center, and office space. A new parking deck at the Weston Lot would increase parking capacity in the campus core precinct, and the completion of Mara Village would accommodate housing demand close to the campus center. Future potential exists to replace the Conlon IA Building with new facilities that frame an enlarged northern quad, and the eventual disposition of the McKay



The Completed Precinct Scenario Focuses Growth and Improvement in a Compact, Formal Area campus could be accommodated through new development in land north of Ross Street. The lower level link between the Condike and Sanders Buildings may be reopened to extend the pedestrian network of the central quad northward to future facilities.

Advantages of the Completed Precinct scenario include a better-defined central campus quad, a programmatic link between the two academic halves of the central campus with the new Science Center, a new campus "front door" at the Condike visitor center, and a central pedestrian spine that runs the length of the central campus. The primary disadvantage of the scenario is the continued isolation of the Recreation Center from the central campus.



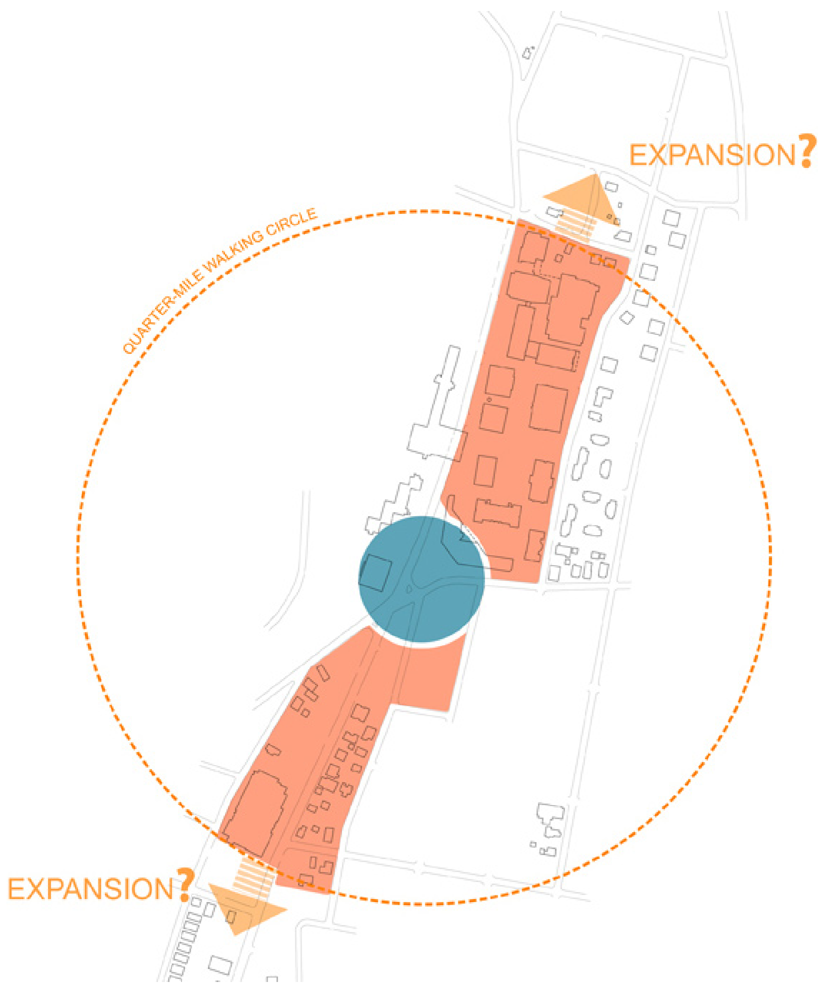


The Completed Precinct Strategy Diagram

Scenario 2: The Propeller

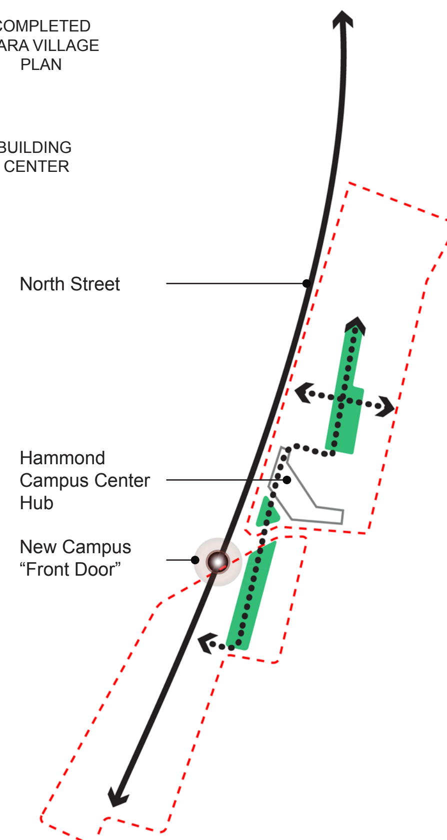
FSC has demonstrated a commitment to changing the face of North Street by partnering with the City of Fitchburg and the Montachusett Regional Transit Authority in various aesthetic and land use improvements to the corridor. The Propeller Scenario explores the college's current desired trajectory southward along North Street in creating a plan that uses the Hammond Campus Center as a central hub for a two-winged campus.

Addressing the pedestrian safety issues of the North Street/Pearl Street intersection is the first major step in facilitating a southward expansion of campus. The most significant move of campus programs to North Street would be in the form of a new Science Center, built as a bridge between the isolated Recreation Center and the Hammond Campus Center. Cleared sites on North Street become appropriate locations for new partnership developments, including student housing, retail, and visitor center functions. A parking deck immediately south of the Recreation Center increases parking capacity for this southern wing of campus. Modernization of the Hammond Campus Center would provide a clearer link between the central campus quad and North Street. Disposition of the McKay campus could be accommodated by new development around a quad south of Pearl Street.



The Propeller Scenario Would Recenter the Campus on the Hammond Campus Center

Advantages to this scenario include recasting the Hammond Campus Center as a true hub of college activity and the potential of creating public/private "college town" development opportunities on North Street. Disadvantages of the Propeller Scenario include the isolation of science and health programs from other academic programs on the central campus, the need to acquire several private neighborhood properties, and a continuing reliance on local developers and the City of Fitchburg to make North Street a successful and attractive environment. Also, the Propeller Scenario postpones refinement of the central quad and stretches the physical resources of the college over nearly twice the length of the current campus core.



The Propeller Strategy Diagram

Linking to the Isolated Recreation Center has Been an Impetus for the College's Interest in Expanding Southward

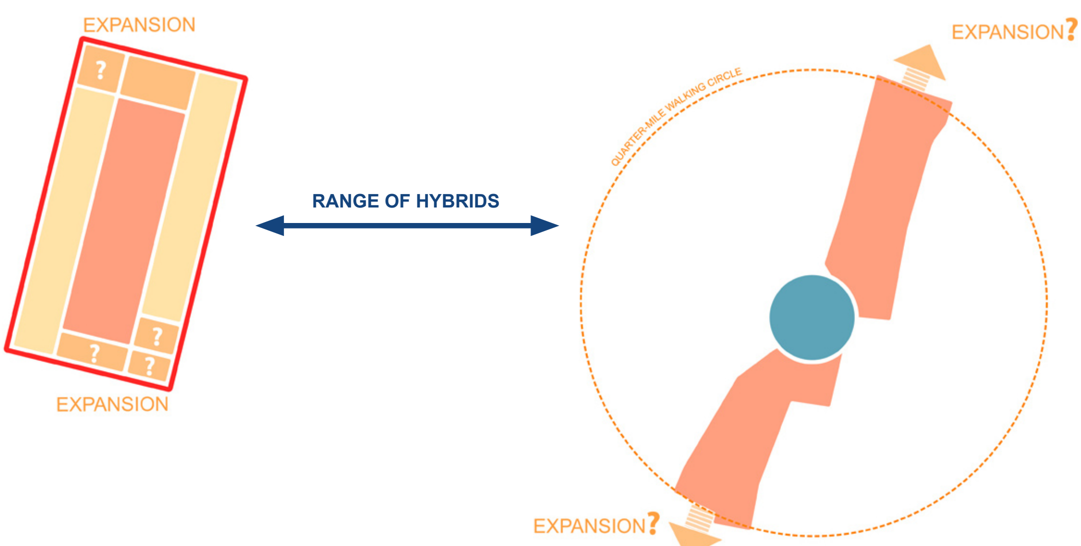
Campus Workshop Conclusions

Both scenarios were presented to college officials as a basis for discussion at the February workshop. The consultant team noted during the presentation that neither of the scenarios were intended as exclusive choices from which the college has to pick, but acted rather as a way of channeling comments and suggestions for the final campus framework based on visions and narratives that seemed to characterize the college's goals. In addition, the consultant team presented two separate hybrids of the scenarios to illustrate how both models of campus development could be intertwined over the course of time. An important component of the discussion was acknowledging the similarities of both scenarios and their hybrids, which included the following:

- the construction of a new free-standing Science Center facility to accommodate modern science instructional space
- locating a campus one-stop shop for efficient student services
- completing the Mara Village plan to accommodate immediate housing demands
- modernization of the Hammond Campus Center for improved circulation and space utilization
- anticipating future development as sited on new academic quads
- accommodating the disposition of the McKay campus through development closer to the central campus rather than farther north or east

Below is a summary of paraphrased key comments made at the workshop that influenced the direction of framework planning for FSC:

- A new free-standing science facility at the site of the Anthony Building might be too massive to fit with the context of the quad and residential neighbors
- Hammond Campus Center is the current de facto front door to campus
- Admissions and other student services need a new home immediately

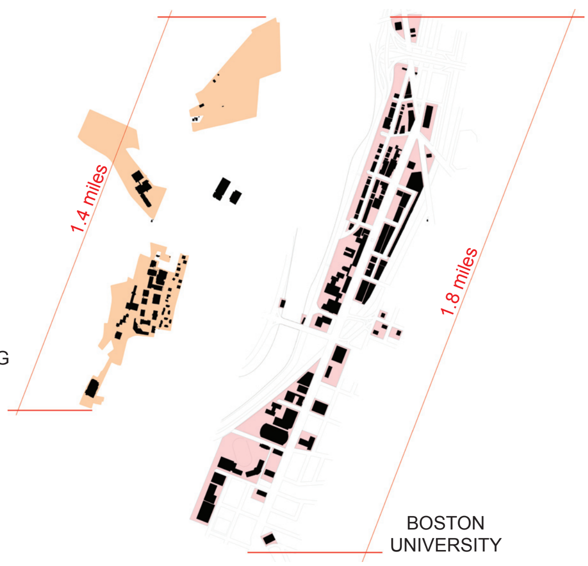


The Two Scenarios Represent Two Conceptual Extremes with a Range of Hybrids Between

- Integrating the Recreation Center into campus is an important goal, as is reinforcing the core campus
- Waiting on North Street development might work best for the college's interests and give the city more time for partnership
- The Parkinson Gymnasium is a candidate for demolition

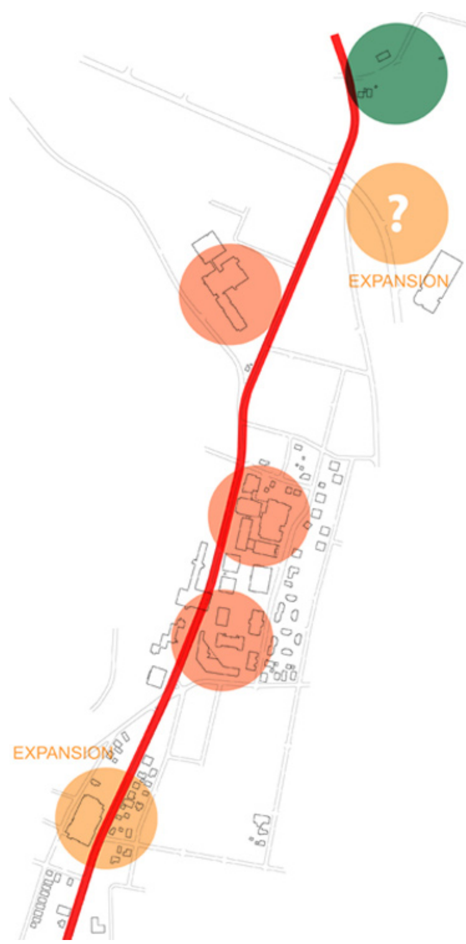
In responding to the two scenarios, the college leadership stated a preference for the concepts underlying the Propeller Scenario, restating their belief that the future of FSC lies in movement south toward downtown Fitchburg. The importance of the central campus and its quad was acknowledged, though its use as a setting for new development was questioned.

The consultant team, during the course of the presentation and discussion, presented a cautionary metaphor for the current trend of FSC's campus development that is appropriate given the college leadership's interest in further southward expansion. The campus has been growing to resemble a charm bracelet, a string of individual nodes along North Street that is being continually stretched. While some colleges, like Boston University, have grown in a similar linear fashion, it is important to note that the intensity of programming and the size of the student population at Boston University, as well as the public transportation infrastructure that serves it, provide each node with the resources necessary to stand alone as a center of activity. FSC, as a smaller institution, would have a harder time sustaining several active nodes with its level of resources and the logistical effort involved in a small city with limited public transportation. In addition, given the limited financial resources available to the school, a large expenditure of funds for a new, free-standing Science Center in the south campus area will leave few, if any, resources to improve the campus core, where the majority of student activity resides. Lastly, the Space Utilization Analysis conducted by Rickes Associates indicates that there is excess classroom space on campus that could magnify the space surplus and their cost of maintenance if a new, free-standing Science Center is built rather than added to the existing Condike Building.



FSC's Geographic Sprawl is Comparable to Boston University's Linear, Multi-Centered Campus


The Recently Upgraded Eliot Field, a Full Mile North of the Recreation Center on North Street



The FSC Campus is Beginning to Resemble a Charm Bracelet of Isolated Nodes Along North Street

III. A New Campus Framework

A hybrid strategy for campus planning was refined and elaborated to become a road map for the college's future. The following chapter introduces the new campus framework for Fitchburg State College and describes both its component projects and overarching narrative.

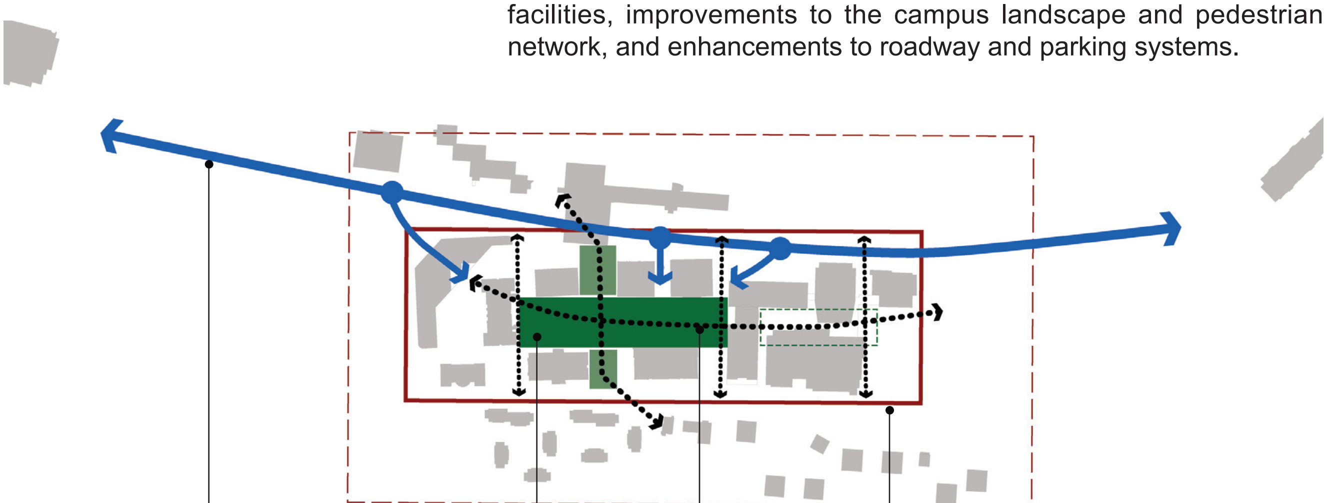
The Campus Quad Maintains its Significance as the Center of Campus

Campus Framework Plan

Fitchburg State College's central quadrangle and core academic precinct already give the institution a clear physical identity. Although the quad was born more from fortuitous campus evolution than as a grand organizing scheme, the space's power to capture the character and activity of the place is undeniable. The new framework for FSC capitalizes on this already existing jewel-in-the-rough, attempting to focus resources and energy around it to create a dense, compact, and character-rich central core.

New facilities and building modernization on campus will be concentrated in this core campus precinct. Though several smaller projects will reinvigorate the campus's core, none will have the transformative impact of a new Science Center considered for the northwest corner of the quad. The Science Center will breathe new design life into the more staid northern half of the quad and help to bring two academic ends of the quad closer together. A pronounced glazed atrium anchored to the Science Center will connect the public conduit of North Street with the academic life of the quad while using the landmark campus smokestack as a centerpiece and beacon for visitors. The college's image on North Street will be further enhanced through a lobby addition to the Hammond Campus Center, which will provide direct access from the main campus arrival gateway to the central campus landscape network. The campus's robust pedestrian network will be preserved to maintain the permeability of the core precinct from the flanking residential areas of campus, and a linear north-south pedestrian axis will be re-established through the Condike/Sanders breezeway to link to smaller open spaces on the north end of campus. The focus on the FSC's core precinct will not mean ignoring the larger institutional campus spread along North Street. Landscape and roadway improvements between the activity nodes of campus will improve pedestrian safety and walkability. Enhancements to the shuttle system and convenience of remote parking will also improve connections to the Wallace Civic Center and Elliot Field sports complex.

On the following pages, the framework plan is explained in greater detail by breaking out the plan's component elements: new and modernized facilities, improvements to the campus landscape and pedestrian network, and enhancements to roadway and parking systems.



Campus Framework Concept Diagram

Fitchburg State College
Framework Plan

Phase 1

1 New Science Center
- **1A.** Condike and Sanders Building modernization
- **1B.** New wet lab addition
- **1C.** New "Smokestack Atrium" campus gateway
- **1D.** North Street Linear Park

2 Anthony Building modernization as a One-Stop Student Center
- **2A.** Highland Avenue streetscaping improvements
- **2B.** Mara Village expansion and landscape connections

3 Central quad landscape improvements

4 Edgerly Hall modernization

5 Thompson Hall modernization

6 Hammond Campus Center modernization and new North Street lobby
- **6A.** Main campus arrival gateway and Hammond Patio improvements

Phase 2

7 Percival Hall modernization

8 Miller Hall modernization and new courtyard

9 Dupont Facilities Building modernization and service access improvement

10 Weston Auditorium modernization

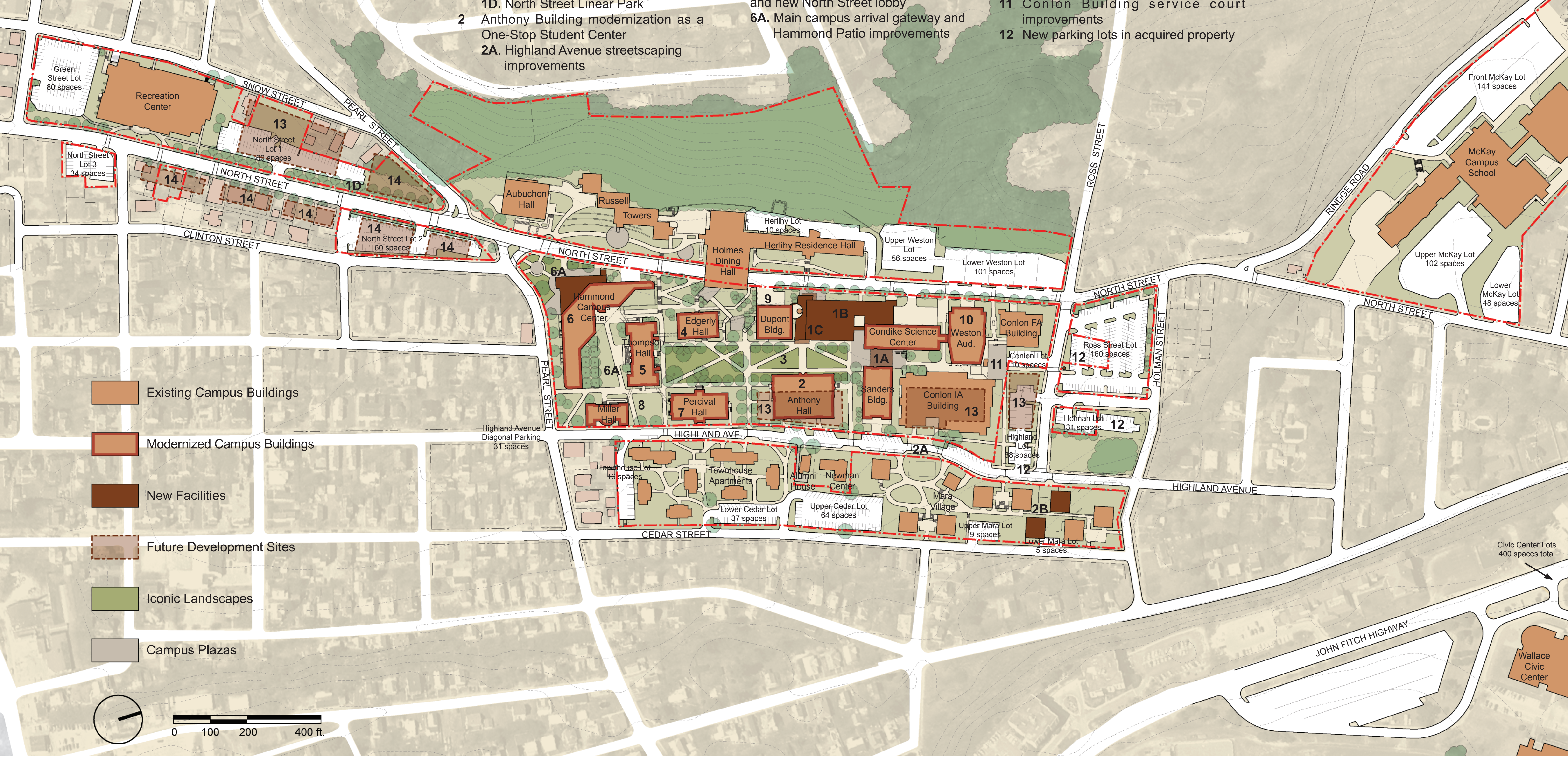
11 Conlon Building service court improvements

12 New parking lots in acquired property

Phase 3: beyond the framework horizon

13 Future campus facility sites

14 Future North Street public/private partnership development sites



New Facilities and Building Modernization

Phase 1

1 Modernization of Anthony Building as a one-stop student services center: Admissions and other student services and administrative offices are in immediate need of a new, more prominently-located home on campus. With receiving and maintenance functions removed, the Anthony Building will be renovated to house a combined one-stop student services center.

2 New Science Center addition and modernization of Condike and Sanders Buildings: the CBT-studied scenario for improved science instructional space that most supports the goals of the campus framework involves the modernization of both the Condike and Sanders Buildings and a new wet lab addition to Condike built over the site of Parkinson Gymnasium and Condike parking lot. The expanded Science Center will anchor the north end of the quad and create a modern focal point along North Street.

3 New iconic “Smokestack Atrium”: included in the Science Center project will be a 3,000 GSF glazed atrium between the wet lab addition and the Dupont Facilities Building, using the iconic 250-foot smokestack as a centerpiece and wayfinding landmark for visitors. The atrium will lead visitors from parking along North Street up to the central quad and Anthony Building one-stop center.

4 Modernization of Edgerly Hall: as one of the original Normal School buildings on the campus, Edgerly Hall is aging and needs significant interior, exterior, and systems upgrades. Folded into the modernization project will be accommodation of an elevator, not only for interior building circulation, but to facilitate accessible circulation to Holmes Dining Hall. Swing space for this modernization and the renovations of the other historic campus facilities will rely on retaining the McKay Campus School to ensure space utilization flexibility.

A Massing View of the New Science Center Addition and “Smokestack Atrium” on the Quad

5 Modernization of Thompson Hall: Thompson Hall is the original flagship building of campus and is one of the campus facilities most in need of major renovations and upgrades.

6 Hammond Campus Center modernization and North Street lobby: Current modernization plans already under consideration for the building will be supplemented with a prominent 6,800 GSF three-story glass lobby addition to provide an easy pedestrian connection between the campus core and North Street.

7 Completion of Mara Village housing plan: FSC will accommodate immediate housing demand by completing the full Mara Village plan, adding two new suite-style residence halls for the addition of approximately 100 beds.

Phase 2

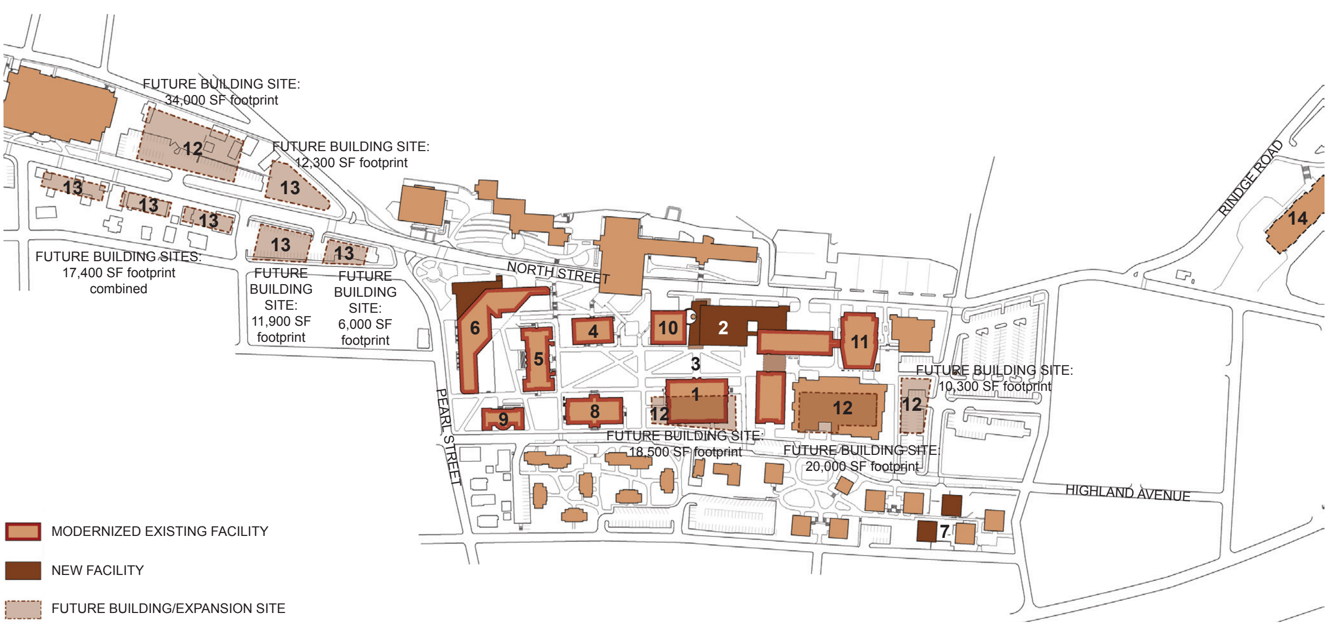
8 Modernization of Percival Hall: Percival Hall is an important instructional center on campus and is need of access improvements, systems upgrades, exterior restoration and interior remodeling.

9 Modernization of Miller Hall: The last of the four historic buildings requiring modernization, Miller Hall is also in the poorest shape. Its predominant role as a faculty office building rather than as an instructional facility allows greater time flexibility in its modernization.

10 Modernization of Dupont Facilities Building: relatively minor upgrades to the Dupont Building's systems are needed, as is continued maintenance of the smokestack.

11 Modernization of Weston Auditorium: Weston Auditorium requires air conditioning and exterior shell maintenance.

The "Smokestack Atrium" Will be a Bright Pedestrian Pass-Through Similar to the Apple Store in New York, above, and the Akademie de Kunste in Berlin, Germany, below, connecting North Street to the Central Quad (from www.designws.com and www.flickr.com)



New Facilities and Modernization Key Plan

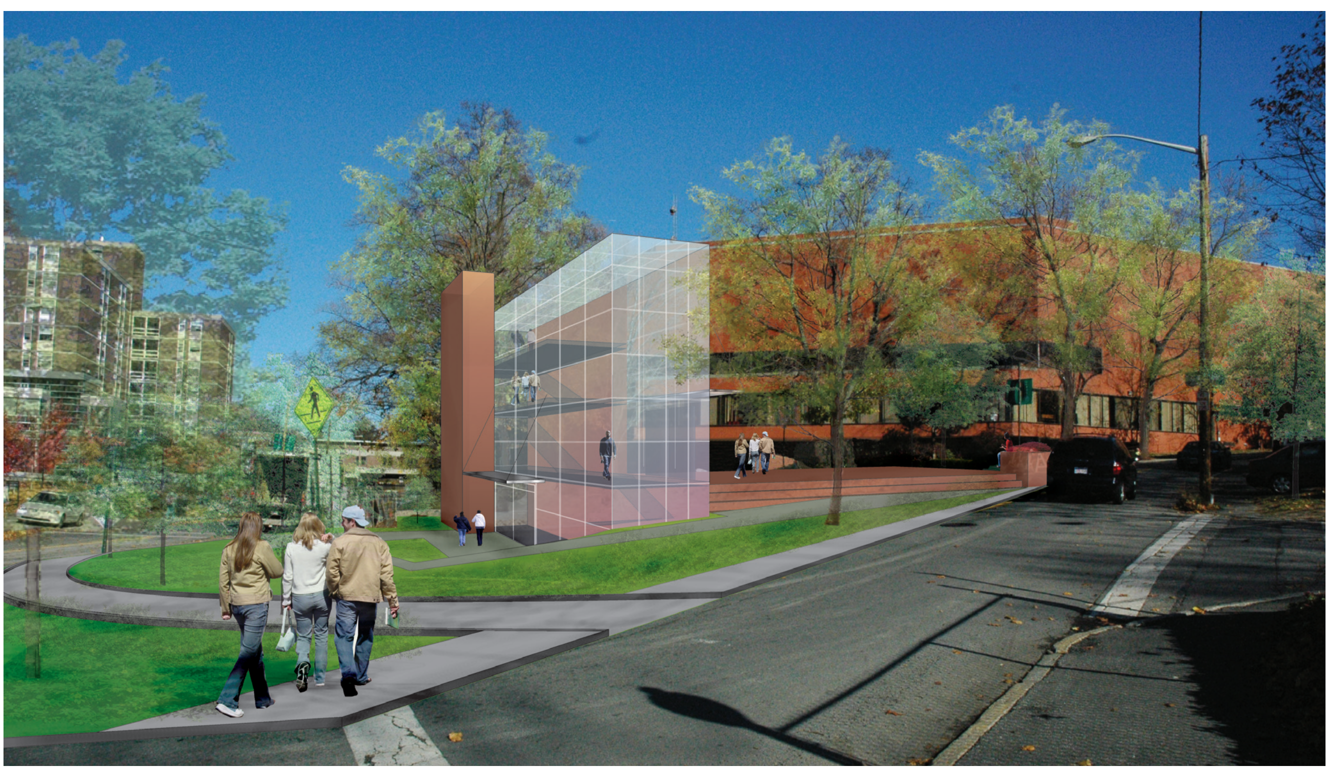
The New Lobby for Hammond Center Will Have a Similar Function as HKT Architects Recent Entry Addition to FSC's Russell Towers (from www.mass.gov)

Phase 3: beyond the framework horizon

12 Future campus facility sites: the framework plan identifies four sites for possible future campus redevelopment or expansion, two of which involve the replacement of existing facilities within the core campus precinct.

13 North Street public/private partnership development sites: anticipating the acquisition of additional North Street frontage south of Pearl Street, potential exists for partnerships between FSC, the city, and local developers for student or faculty housing, retail and restaurant uses, and other commercial functions in a "college town" environment on North Street.

14 Disposition of McKay Campus School: after serving as swing space for the modernization of the core campus academic buildings, the McKay Campus School can be considered for disposition to the City of Fitchburg.



A Vision for a New Iconic Lobby Addition for the Hammond Campus Center

Landscape and Pedestrian Improvements

Phase 1

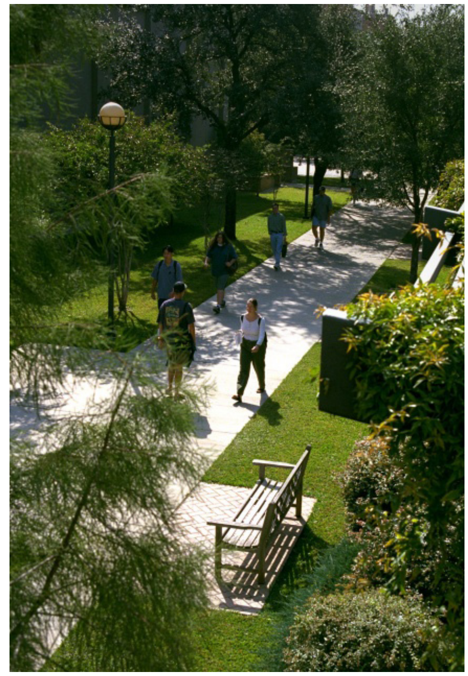
1 Campus-wide accessibility study: like most other Central Massachusetts institutional campuses, FSC has a varying topography that complicates outdoor accessibility, as well as historic buildings not appropriately modified to meet contemporary universal standards. A campus-wide accessibility study is in order.

2 North Street linear park connector: pedestrian access to the isolated Recreation Center on North Street has been a persistent issue since the building's completion in 2001. A new half-acre linear park edge on the western side of North Street will provide a better aesthetic environment and improved pedestrian safety.

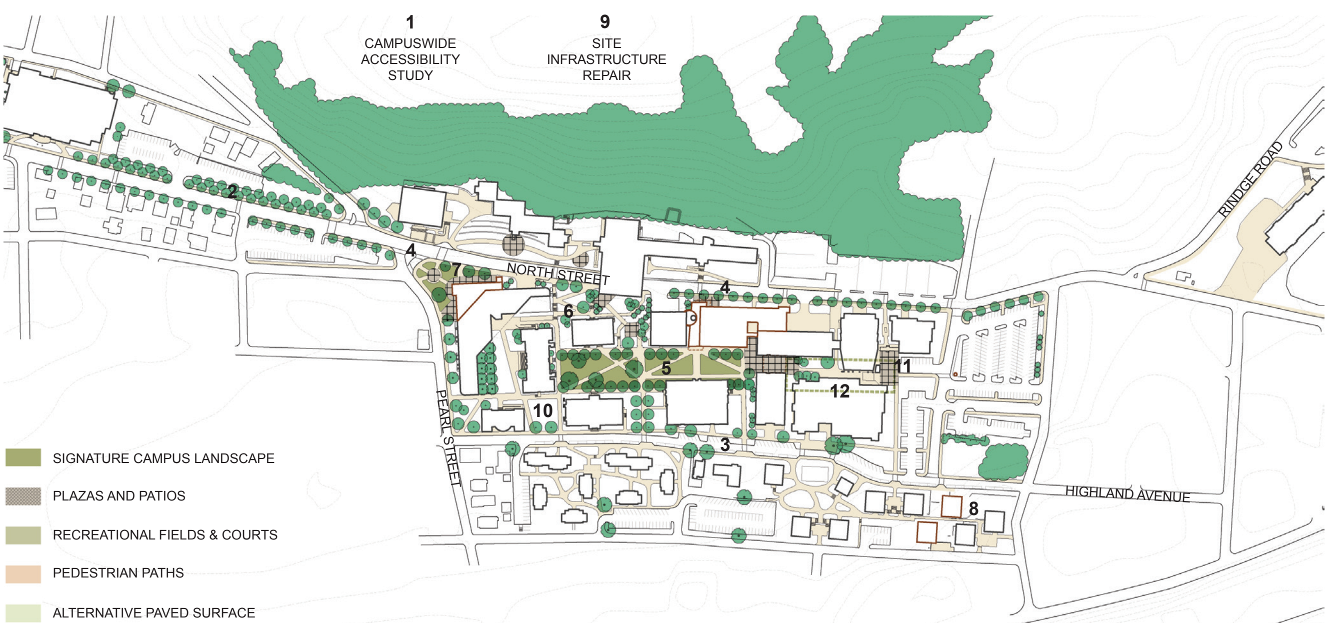
3 Highland Avenue streetscaping improvements: as part of the modernization of Anthony Hall, Highland Avenue's pedestrian character will be enhanced with landscaped "neck-downs" and improved crosswalks.

4 North Street streetscaping and safety improvements: as capital projects are conducted along North Street, including the Hammond Campus Center modernization and the Science Center addition, provisions will be made for improved sidewalks and streetscaping at the North Street frontage. Pedestrian safety enhancements to the North Street/Pearl Street and North Street/Rindge Road intersections should also be considered above levels currently planned by the federally-funded North Street Corridor Improvements project.

5 Central quad landscape improvements and re-establishment of circulation north to Condike courtyard: the 1.5-acre central quad is FSC's signature landscape, though it shows signs of wear. As part of the Science Center building and modernization project, improvements to quad plantings, amenities, and pedestrianpaths will create a fresh and coordinated outdoor environment. Additionally, the Science Center project will reconsider the Condike-Sanders breezeway, reopening the northern courtyard to direct pedestrian access from the quad.



A Linear Park, Like this One at the University of Texas at Arlington, is a Simple Yet Attractive Way to Connect the Recreation Center on North Street With the Central FSC Campus (from www.uta.edu)



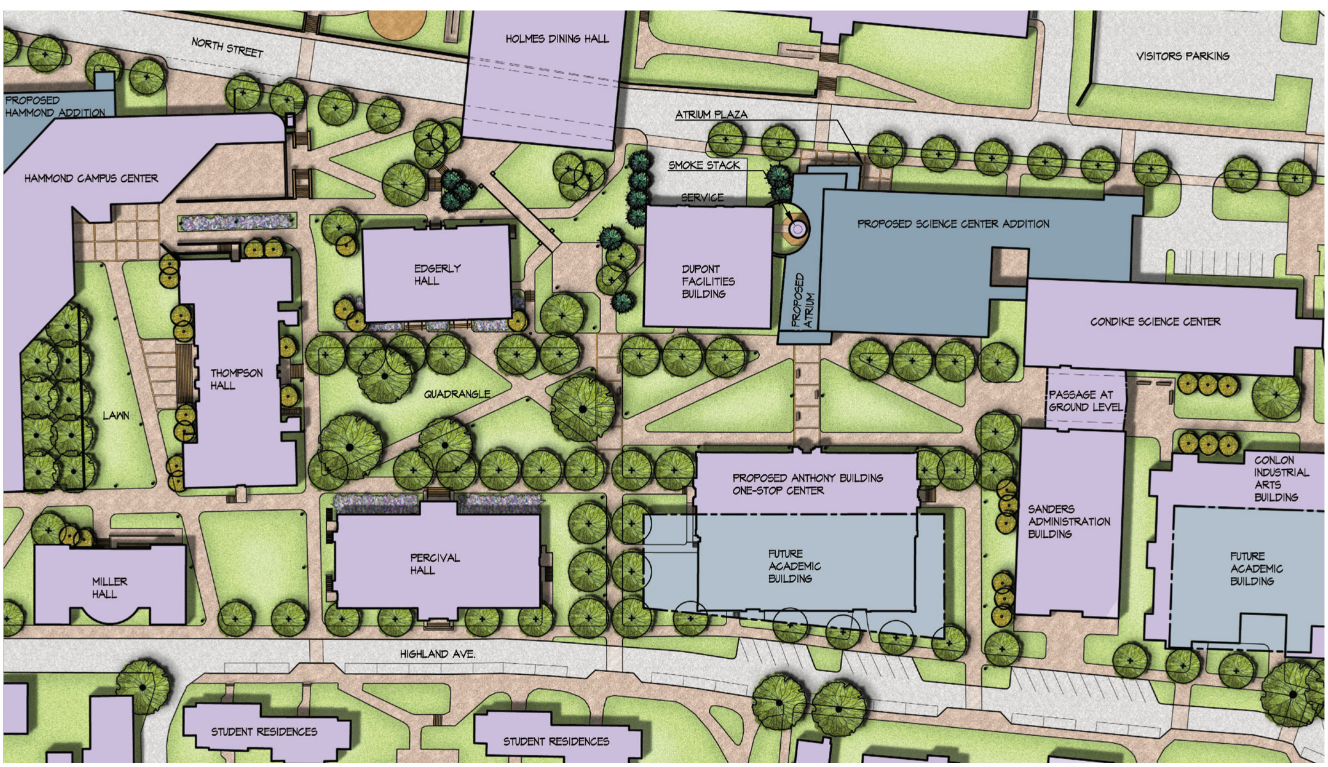
Landscape and Pedestrian Improvements Key Plan

Enhancements to the Central Quad Should Draw From a Simple Palette and Have Clear Lines, Like Denig Design Associates Redesign of Bridgewater State College's Library Quadrangle in 2001 (from www.denigdesign.com)

6 Edgerly & Thompson Hall landscape accessibility improvements: during the modernizations of Edgerly and Thompson Halls, the buildings' immediate landscape should be redesigned to facilitate universal access from North Street and the Hammond Patio to the central quad.

7 Campus arrival gateway and Hammond patio improvements: the success of the Hammond Campus Center modernization and lobby addition will rely on a successful modification of the 17,000 square foot main campus arrival gateway at the North Street/Pearl Street intersection as a mix of outdoor patio space and attractive landscaping, with a prominent and artfully-designed welcoming sign. The Hammond Patio to the north of the Campus Center will also be reconsidered in the modernization, becoming an obstruction-free planted area.

8 Mara Village pedestrian connection: during the construction of new Mara Village residences, improved pedestrian connections will better link the area affectionately referred to as "Guam" to the rest of campus.



Conceptual Landscape Plan for the Central Quad

Phase 2

9 Retaining wall and sidewalk repair: much of the site infrastructure on campus is aging and in need of repair or replacement.

10 Miller & Percival Hall courtyard: modernization of Percival and Miller Halls will include the replacement of the Miller parking lot with a landscaped green.

11 Conlon Building service court improvements: the service lot for the Conlon Buildings and Weston Auditorium is currently a disappointing terminus for the former north-south pedestrian axis that once ran from the quad through to Ross Street. The lot will be redesigned as a service court, with improved paving and landscaping.

Phase 3: beyond the framework horizon

12 Northern Quad: the potential of a northern campus quad, suggested by the layout of the Condike Science Center, Sanders Administration Building, and Weston Auditorium—all built in 1963—was compromised by the huge building mass of the Conlon IA Building, built over a decade later. Anticipating the eventual replacement of Conlon IA due to structural deterioration, siting new facilities around an expanded open space will recapture the latent opportunity for a northern quad.

The Redesign of the Campus Arrival Gateway Will Need to Blend Elements of a Formal Welcoming Landscape, Like University of Delaware's Hullihen Circle, Above, With a Usable Outdoor Living Space, Like the Health Sciences Patio at the University of Iowa (from www.udel.edu and www. uiowa.edu)

This Image Depicts a Service Court that Combines Paving, Landscaping, and Lighting in an Attractive and Functional Way, as Recommended for the Conlon Building Service Area (from www.kastel-zagreb.hr)

A Well-Designed Streetscape, Like this One in Anderson, South Carolina, Including Brick Crosswalks, Landscaped “Neck-Downs”, and Diagonal Parking, is Proposed for Highland Avenue
(from www.contextsensitivesolutions.org)

Roadway and Parking Improvements

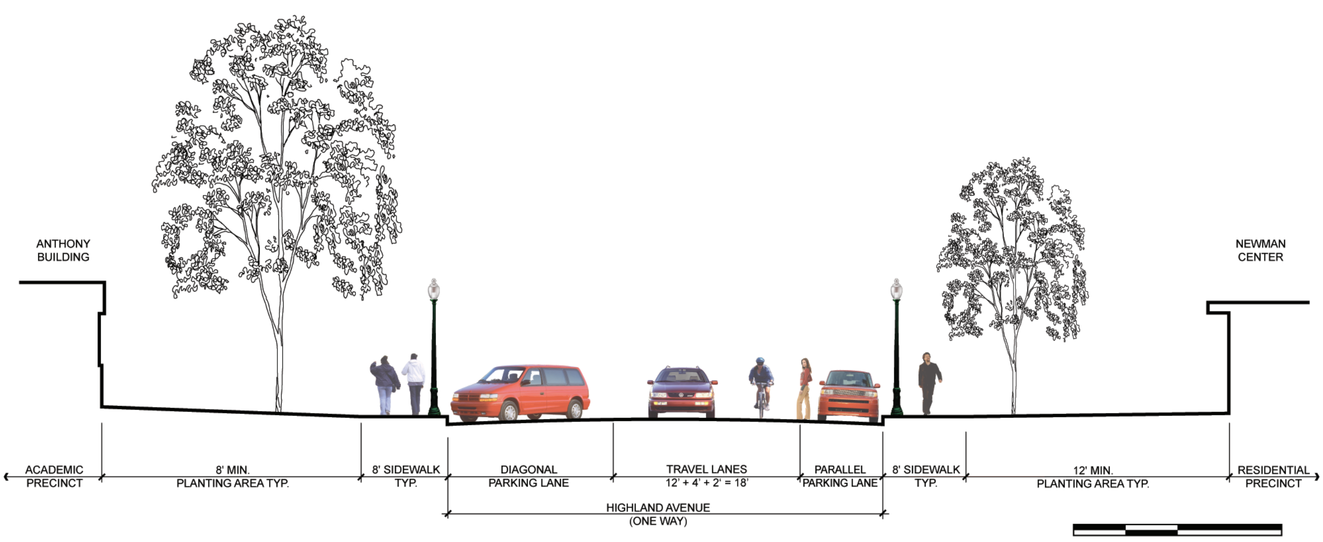
Phase 1

1 Existing parking lot improvements: several parking lots close to the campus core are in need of landscape and surfacing improvements, most notably the North Street Lots, Lower Weston Lot, Ross Street Lot, and Holman Lot.

2 Highland Avenue traffic calming & parking expansion: retaining through traffic on Highland Avenue is not at odds with increased pedestrian safety. A redesigned streetscape employing “neck-downs,” raised and textured crosswalks, and diagonal parking will make Highland Avenue a safe pedestrian environment without closing off the street to public access.

3 North Street corridor improvements & intersection safety modifications: the federally-funded project to widen and improve the North Street corridor will continue into the roadway stretch between Pearl and Ross Streets. Additional consideration should be made for reconfiguration of the North Street/Pearl Street and North Street/Rindge Road intersections for pedestrian and traffic safety as part of the corridor improvement project.

4 Hammond Campus Center service access improvements: the Hammond Campus Center service platform on North Street is perhaps one of the most glaring obstacles to the improved character and traffic flow of the street. A reconfiguration of service access that could include a simple parallel pull-off and new access ramp will be integrated as part of the Campus Center modernization.



Proposed Highland Avenue Roadway Section

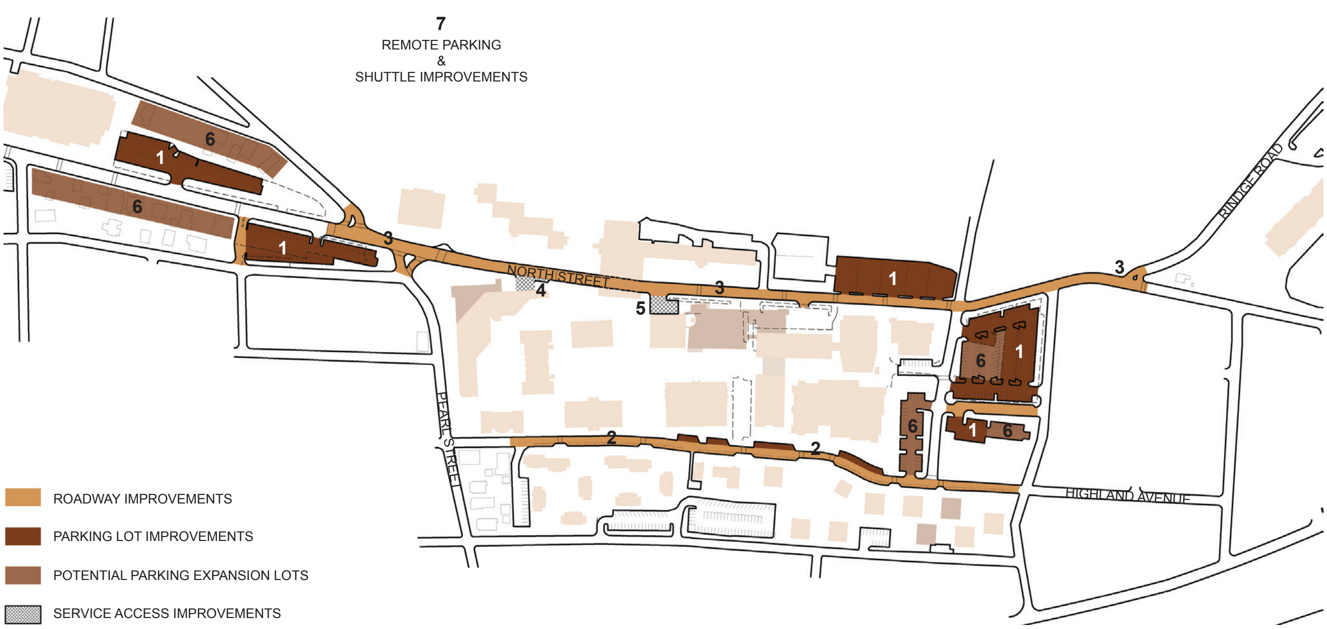
Phase 2

5 Dupont Facilities Building service access improvements: similar to the Hammond Campus Center service access, the Dupont Facilities Building garage is an unfortunate visual blemish on North Street. Landscape screening and a smaller, more discrete parking area will improve this length of North Street.

6 New parking lots in acquired parcels: several neighborhood properties targeted for acquisition by FSC will be useful in expanding existing parking capacity while "holding" sites for potential future institutional growth. New acquisitions along North Street near the Recreation Center can replace parking capacity lost through the creation of the linear park connector, while the Ross Street lot can be expanded to fill an entire block. A new lot can be located at the corner of Highland Avenue and Ross Street.

7 Additional remote parking and improved shuttle & transit stops: due to the density of the FSC campus and its urban environs, locating ample surface parking close to the campus core will be a continuing problem. FSC's move toward remote parking at the Wallace Civic Center is a great step in solving the parking problem, and securing additional capacity at other local parking reserves like the Intermodal Transportation Center south of campus will be useful. Improvements to shuttle operations and both shuttle and transit stops will make remote parking an attractive alternative for students.

With Simple Lines, an Interesting Material Palette, and Social Seating, this Bus Shelter in Milwakee, Wisconsin, is a Good Precedent for Improvements to Bus Stops at the FSC Campus (from www.aiaw.org)



Roadways and Parking Key Plan

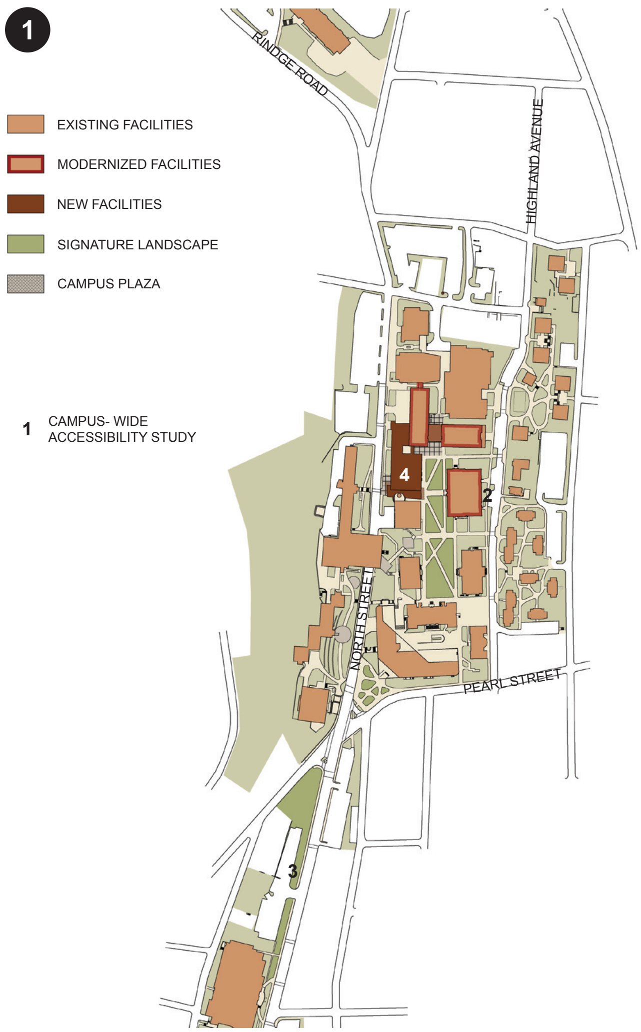
Phasing the Framework

Stage 1

1. Conduct a **campus-wide accessibility study** to plan for universal accessibility around campus.
2. Modernize the **Anthony Building** for use as a one-stop student services center. Include in the project landscaping, traffic calming and parking modifications to **Highland Avenue**.
3. Create a **new linear park** pedestrian connection to the Recreation Center from the central campus along the western side of North Street. Improve pedestrian safety at major North Street intersections.
4. Construct a **new Science Center** wet lab addition and renovate Condike and Sanders Buildings for modern science instruction. Integrate in the project landscape enhancements to the **central quad**, streetscaping improvements along **North Street**, and a **new glazed atrium lobby** connecting North Street to the quad under the landmark smokestack.

Stage 2

5. Modernize **Edgerly Hall** using excess assignable area on campus and the McKay School as swing space; include landscape modifications to facilitate accessibility from North Street to both the quad and Holmes Dining Hall.
6. Modernize **Thompson Hall** using excess assignable area on campus and the McKay School as swing space. Coordinate improvements to immediate paths to create accessible pathways to Hammond Campus Center and the central quad.
7. Modernize the **Hammond Campus Center**, including the construction of a new **North Street lobby atrium**, improvements to the main campus arrival gateway landscape, and reconfiguration of the building's service access. Redesign the **Hammond Patio** as a more usable landscaped open space.
8. Complete the **Mara Village** plan to add an additional 100 student beds to campus and improve pedestrian connections through the residential village.



Stage 3

9 Modernize **Percival Hall** and restore its historic exterior, using excess assignable area on campus and the McKay School as swing space.

10 Modernize **Miller Hall** to complete the modernization of the campus's original historic core. Use excess assignable area on campus and the McKay School as swing space. Replace the Miller Parking Lot with a landscaped green to improve the campus open space network.

Stage 4

11 Modernize the **Dupont Facilities Building** and improve the garage service access and adjacent streetscaping to improve the visual quality of North Street.

12 Modernize the **Weston Auditorium** and upgrade the adjacent North Street streetscaping.

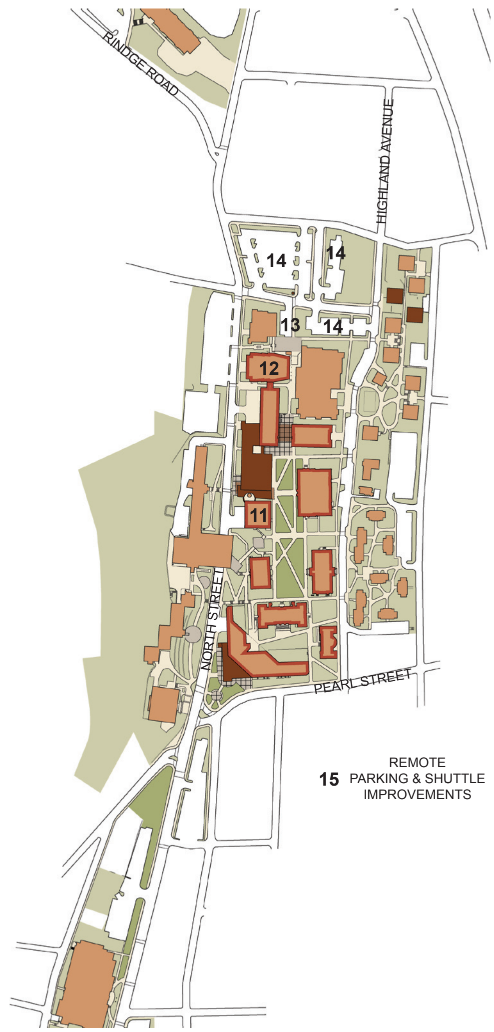
13 Improve the **Conlon Building service lot** as an attractive service court with pedestrian access through to the central campus quad.

14 Site **new parking lots** in acquired adjacent properties to relieve parking demand near the campus core.

15 Improve **shuttle service** to existing and new **remote parking lots** and construct improved bus stops along the route.

3

4



A Current Take on the *Strategic Capital Program* of 2003

As noted in the report introduction, the current campus framework planning initiative takes the Eva Klein Associates 2003 *Strategic Capital Program* as its basis for recommending capital projects. The revised capital projects list on the following page updates the 2003 list based on the needs, initiatives, and framework concepts described throughout this report.

The revised capital projects list prioritizes campus projects within the framework horizon, with alternatively-funded and longer-term projects under consideration listed separately. Project budgets have been updated to reflect 2006 dollars as well as changes in project scope, where applicable.

The projects represented in the revised list are grouped and prioritized based on the college's immediate needs balanced with long-term goals, as well as an understanding of what steps in the process of campus building will have the greatest effect in reaching the conceptual vision illustrated earlier in the report. A new Science Center addition and modernization of Condike Science Center and Sanders Administration Building is the largest and most transformative capital project on the immediate horizon for FSC, as its successful execution relies on integrating a number of smaller projects, including the demolition of Parkinson Gymnasium and the refitting of Anthony Hall as a one-stop student services center. The Science Center project, in order to have the greatest impact on campus's core precinct, should also include a substantial budget for improving the landscape condition of the main campus quad.

PLEASE NOTE:

The Capital Project Summary that follows was revised after the report was completed and is current as of the date indicated. Any differences between it and the Campus Framework Plan on pp. 38-49 represent changes in college or BHE priorities and/or resources since the report was completed. Further revisions of the Capital Project Summary may be anticipated and will be appended to the report as necessary.

Issues raised by any of these changes in the context of the Campus Framework Plan narrative in the report will be identified and resolved by individual building studies when specific projects have been approved for funding.

Fitchburg State College

Capital Projects Summary

14 August 2007

Capital Project			Space Type										2006 Costs					
		CAMIS # (where available)	General Purpose Classroom	Specialized Instructional Space - Labs	Specialized Instructional Space - Studios	Library	Office	Student Support	Auxiliary Services	Other	Total Units	Unit	Unit Cost	Size or Inflation Adjustment Factor	Location Adjustment Factor	Estimated Construction Cost (ECC)	Total Project Cost (TPC)	Escalated Total Project Cost (2010 TPC)
	Existing Campus Surplus/(Deficit) 1		29,027	25,330							54,357	GSF					51.96%	27.44%
Priority	*Project*																	
1	New Science Center																	
	Demolition: Parkinson Gymnasium	304FSC0070						(20,910)			20,910	GSF	$8	1	0.95	$158,916	$241,489	$307,753
	Building Addition: Science Laboratory			89,558							89,558	GSF	$340	1	0.95	$28,927,234	$43,957,825	$56,019,852
	Building Addition: "Smokestack" Atrium Campus Entrance									3,000	3,000	GSF	$230	1.15	0.95	$753,825	$1,145,512	$1,459,841
	Comprehensive Modernization: Condike Science Center	304FSC0110									45,716	GSF	$210	1	0.95	$9,120,342	$13,859,272	$17,662,256
	Comprehensive Modernization: Sanders Building	304FSC0011									26,624	GSF	$210	1	0.95	$5,311,488	$8,071,337	$10,286,112
	Surplus Campus ASF Modernization 2										54,357	GSF	$100	1	0.95	$5,163,891	$7,847,049	$10,000,279
	Landscaping, Paving, Walks: adjacent landscapes										40,000	GSF	$6	1	0.95	$209,000	$317,596	$404,745
	Street Trees, Lawn, Pedestrian Lighting: adjacent landscapes										800	LF	$130	1	0.95	$98,800	$150,136	$191,334
	Landscaping, Paving, Walks: North Street Linear Park										57,000	GSF	$6	1	0.95	$297,825	$452,575	$576,761
	Street Trees, Lawn, Pedestrian Lighting: North Street Linear Park										2,000	LF	$130	1	0.95	$247,000	$375,341	$478,335
	subtotal															$50,288,321	**$76,418,133**	**$97,387,269**
2	Anthony Building Modernization	304FSC0050																
	Comprehensive Modernization: Offices - Campus One-Stop Service Center										21,168	GSF	$210	1	0.95	$4,223,016	$6,417,295	$8,178,201
	Landscaping, Paving, Walks: Sanders Parking Lot conversion to landscape										13,200	GSF	$6	1	0.95	$68,970	$104,807	$133,566
	Street Trees, Lawn, Pedestrian Lighting: Highland Avenue Streetscape										1,600	LF	$130	1	0.95	$197,600	$300,273	$382,668
	subtotal															$4,489,586	**$6,822,375**	**$8,694,435**
3	Central Quadrangle Landscape Improvements																	
	Landscaping, Paving, Walks: Central Quadrangle										65,400	GSF	$6	1	0.95	$341,715	$519,270	$661,758
	Street Trees, Pedestrian Lighting: Central Quadrangle										700	LF	$125	1	0.95	$83,125	$126,317	$160,978
	subtotal															$424,840	**$645,587**	**$822,736**
4	Edgerly Hall Modernization	304FSC0060																
	Comprehensive Modernization: Classrooms, Labs, Offices										27,576	GSF	$210	1	0.95	$5,501,412	$8,359,946	$10,653,915
	subtotal															$5,501,412	**$8,359,946**	**$10,653,915**
5	Thompson Hall Modernization	304FSC7771																
	Comprehensive Modernization: Classrooms, Labs, Offices										51,000	GSF	$210	1	0.95	$10,174,500	$15,461,170	$19,703,715
	subtotal															$10,174,500	**$15,461,170**	**$19,703,715**
6	Hammond Campus Center Modernization	304FSC0272																
	Interior Upgrade: Student Center, Library										167,392	GSF	$90	1	0.95	$14,312,016	$21,748,540	$27,716,339
	Building Addition: North Street Lobby Entrance									6,800	6,800	GSF	$230	1.15	0.95	$1,708,670	$2,596,495	$3,308,973
	Landscaping, Paving, Walks: adjacent landscapes										65,200	GSF	$6	1	0.95	$340,670	$517,682	$659,734
	Street Trees, Pedestrian Lighting: adjacent landscapes										1,200	LF	$125	1	0.95	$142,500	$216,543	$275,962
	Roadways, Site Prep/Grading: Hammond Service Access										5,000	GSF	$9	1	0.95	$42,750	$64,963	$82,789
	subtotal															$16,546,606	**$25,144,222**	**$32,043,797**
7	Percival Hall Modernization	304FSC7773																
	Comprehensive Modernization: Classrooms, Offices										33,218	GSF	$210	1	0.95	$6,626,991	$10,070,376	$12,833,687
	subtotal															$6,626,991	**$10,070,376**	**$12,833,687**
8	Miller Hall Modernization	304FSC0012																
	Comprehensive Modernization: Offices										23,460	GSF	$210	1	0.95	$4,680,270	$7,112,138	$9,063,709
	Landscaping, Paving, Walks: adjacent landscapes										20,200	GSF	$6	1	0.95	$105,545	$160,386	$204,396
	subtotal															$4,785,815	**$7,272,524**	**$9,268,105**
9	Dupont Facilities Building Modernization	304FSC0090																
	Comprehensive Modernization: Offices 3										10,000	GSF	$210	1	0.95	$1,995,000	$3,031,602	$3,863,474
	Roadways, Site Prep/Grading: Dupont Service Access										4,400	GSF	$9	1	0.95	$37,620	$57,167	$72,854
	subtotal															$2,032,620	**$3,088,769**	**$3,936,328**
10	Weston Auditorium Modernization	304FSC0120																
	Interior Upgrade: Performance Art Studio - Auditorium										14,762	GSF	$100	1	0.95	$1,402,390	$2,131,072	$2,715,838
	Landscaping: adjacent landscapes										8,000	GSF	$2	1	0.95	$11,400	$17,323	$22,077
	subtotal															$1,413,790	**$2,148,395**	**$2,737,915**
11	Conlon Building Service Court Improvements																	
	Asphalt Pavers										5,400	GSF	$10	1	0.95	$51,300	$77,955	$99,346
	Storm Drains, Pedestrian Lighting, Bollards										120	LF	$250	1	0.95	$28,500	$43,309	$55,192
	subtotal															$79,800	**$121,264**	**$154,539**
12	Property Acquisition & Parking Lot Development																	
	Property Acquisition 4													1.274		$1,528,800	$1,528,800	$1,948,303
	Surface Parking										308	spaces	$5,000	1	0.95	$1,463,000	$2,223,175	$2,833,214
	subtotal															$2,991,800	**$3,751,975**	**$4,781,517**
	Total															$105,356,081	**$159,304,737**	**$203,017,956**
	Future Program Surplus/(Deficit)		29,027	114,888				(20,910)		9,800	132,805	GSF						

Notes

1. Based on Rickes Associates Space Utilization Analysis dated November 2006; ASF figures grossed by 175% to calculate GSF
2. Consolidation and modernization of current surplus space (as defined by Space Utilization Analysis) as multi-project swing space
3. Partial building modernization
4. Cost figure based on 2003 Eva Klein Strategic Capital Program allotment escalated to 2006 dollars

Recommended projects not included in cost estimation:

- North Street Corridor Improvements & Intersection Modifications (Federal and City investment)
- Highland Avenue Traffic Calming & Parking (City investment)
- Mara Village Residence Hall - 100 beds (MSCBA project)
- North Quad Landscape Development (future project)
- North Street Development (future project; public/private partnership)
- Weston Lots Parking Deck (future project)

Acknowledgements

The preparation of this Framework Plan has benefitted from the involvement of many individuals and groups in the initial analysis, the discussion of issues, the development of plan recommendations, the drafting of the final document, and the review of that final draft.

Below are listed the key individuals and organizations that participated in the planning process. Any omission or errors are unintentional.

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TECHNICAL APPENDICES

Contents:

Appendix A
GIS ANALYSIS

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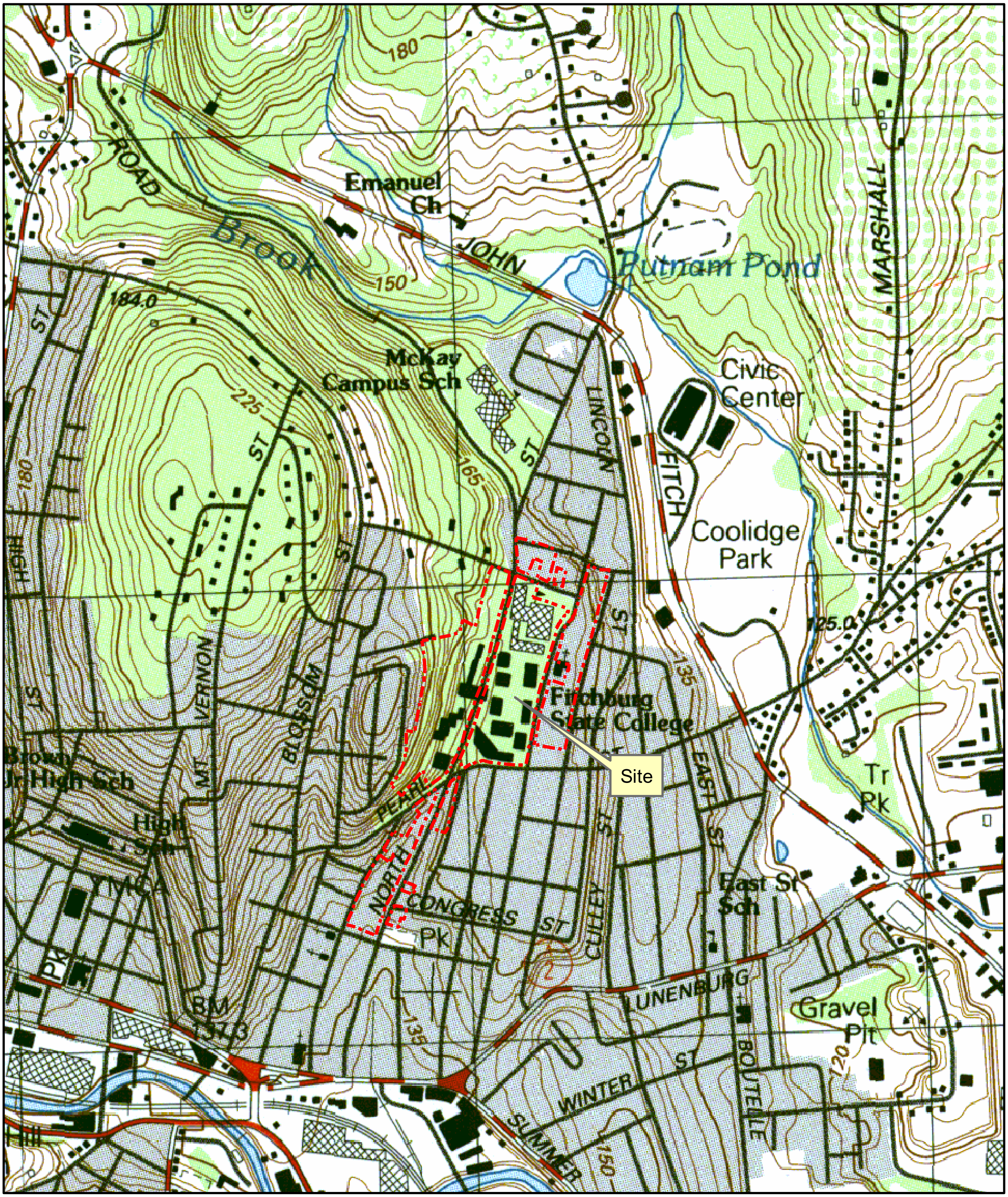

Fitchburg State College
Fitchburg,MA

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USGS Topographic Map

October 25, 2006

Data Source: "Office of Geographic and Environmental Information (MASSGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs"

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Wellesley, MA 02481

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Aerial Photo

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Fitchburg,MA

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Topography Map

October 25, 2006

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Wellesley, MA 02481

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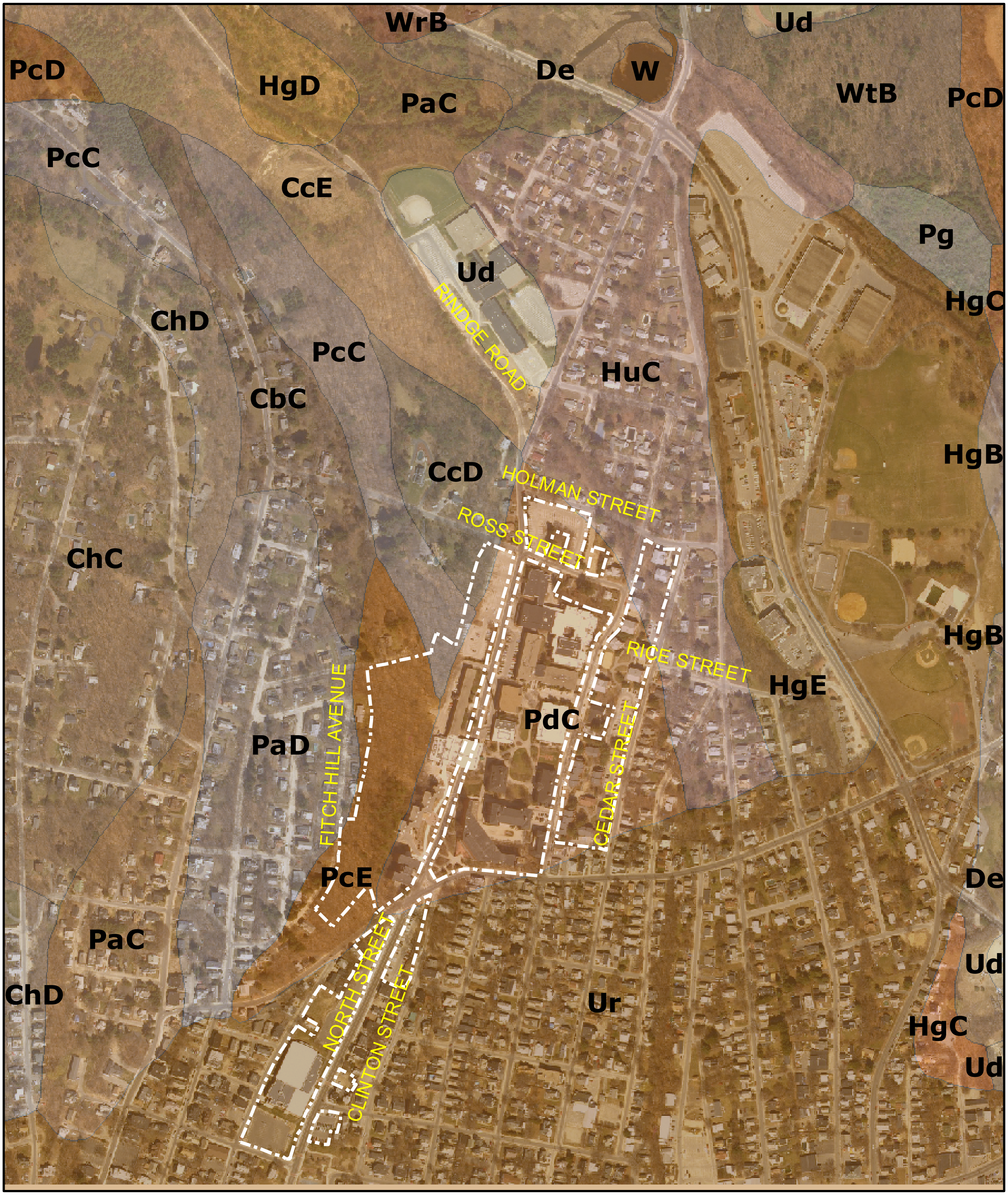

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Soils Map
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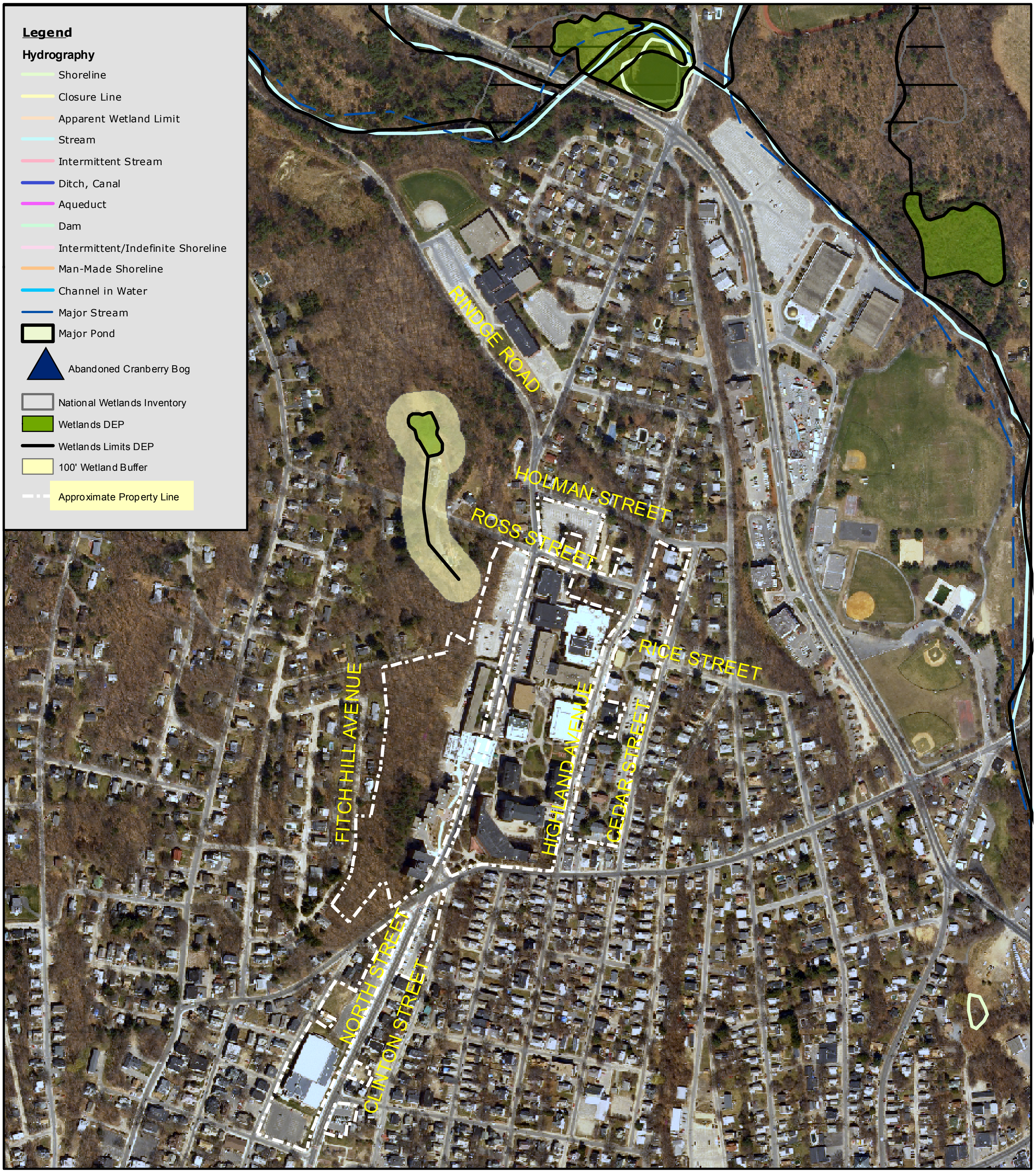

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Hydrology Map

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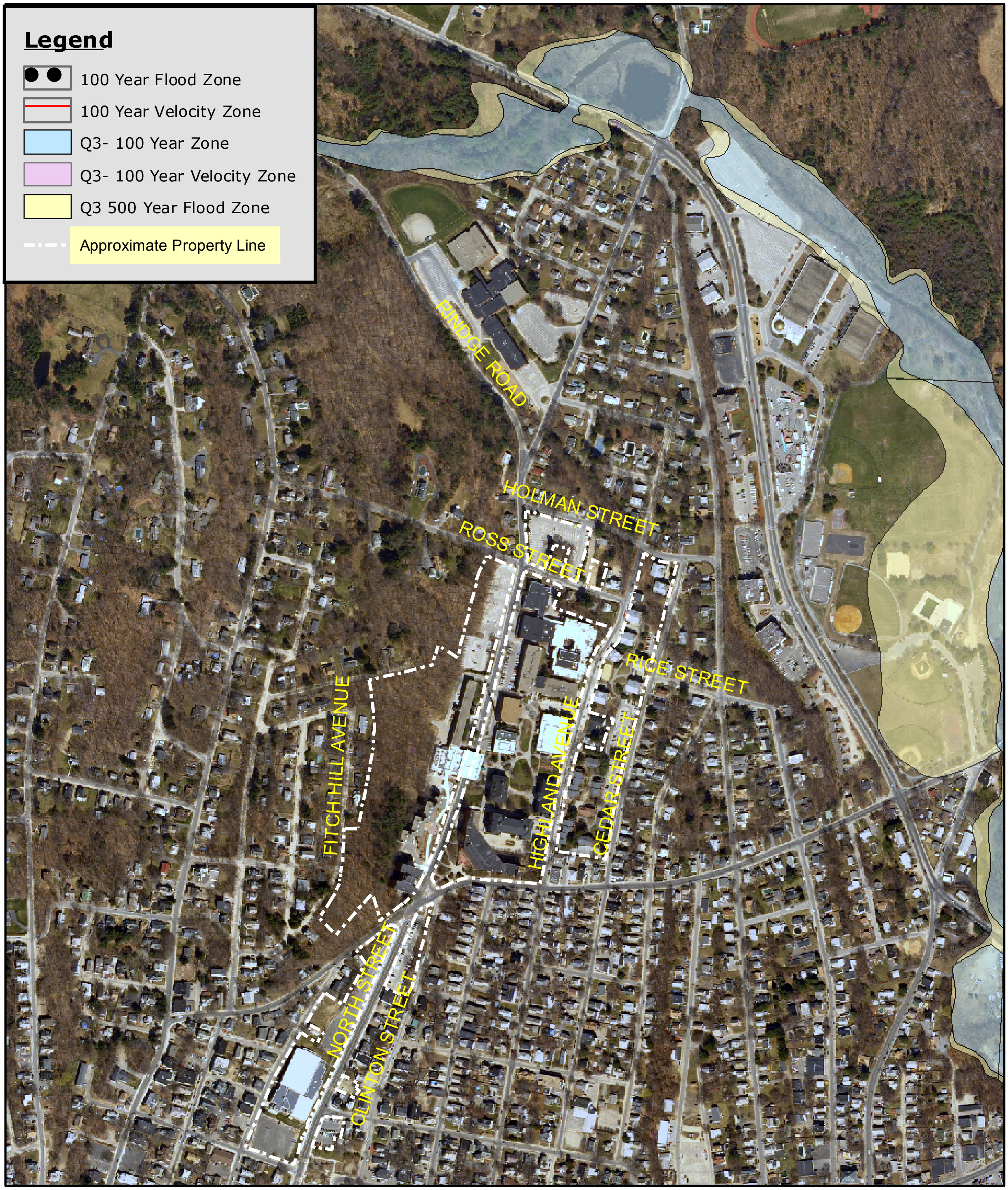

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Flood Zones Map

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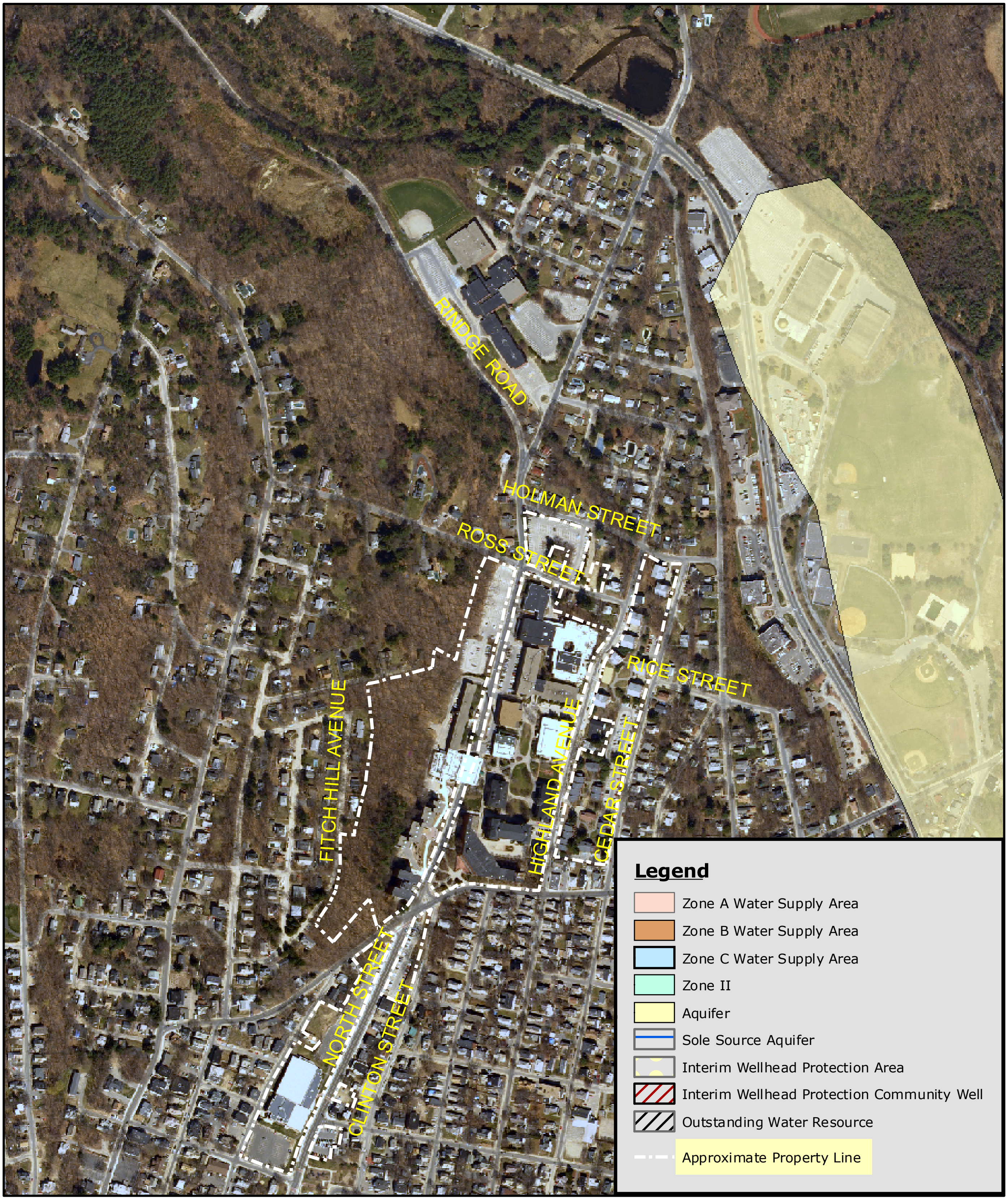

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Water Supply Map

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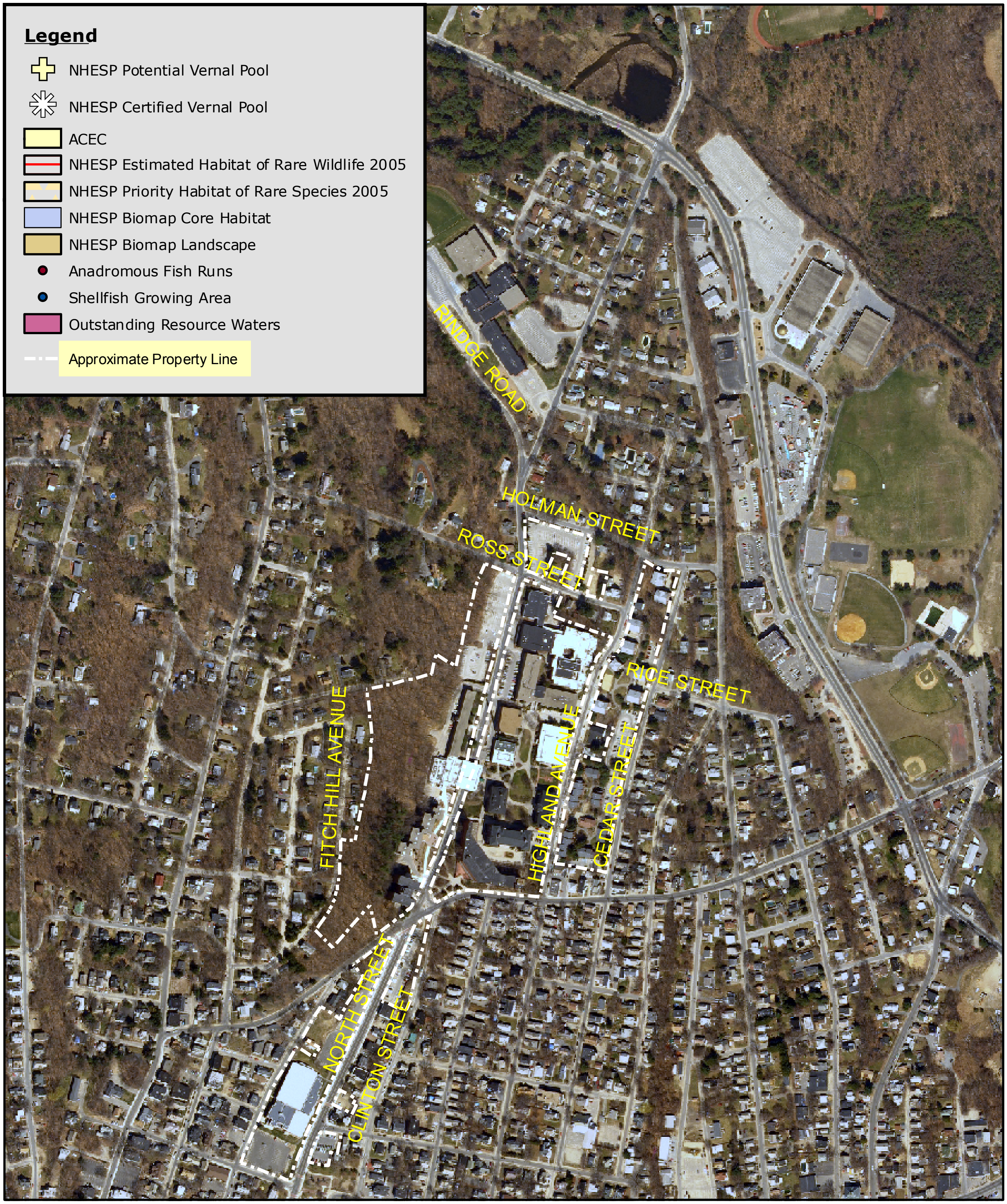

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Protected Areas Map

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Solid Waste/Hazardous Materials Map

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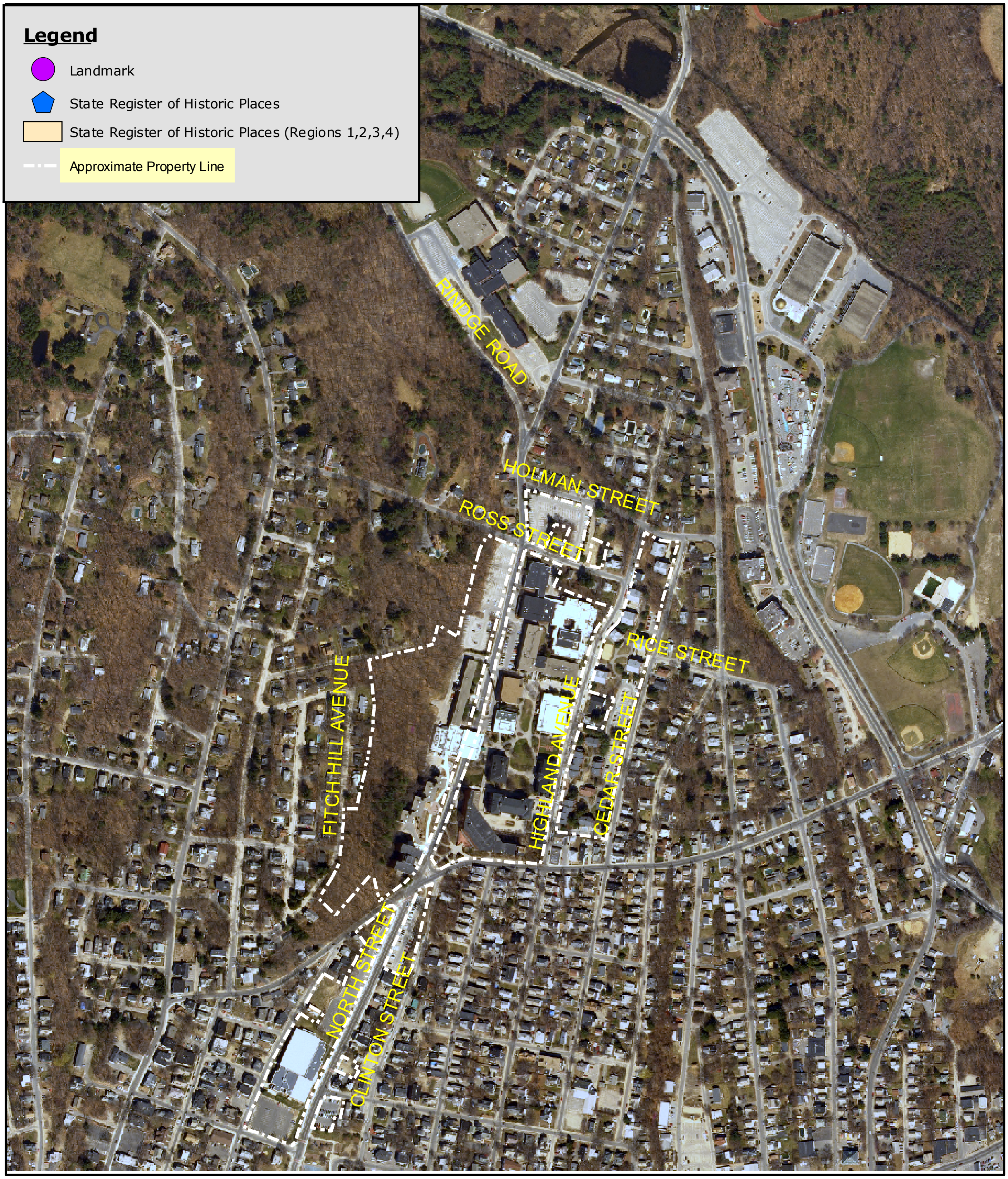

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Historic Places Map

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Appendix B
SPACE UTILIZATION ANALYSIS
SUMMARY OF FINDINGS AND RECOMMENDATIONS

Prepared by:

RICKES ASSOCIATES, Inc.

Fitchburg State College
Instructional Space Utilization Analysis
Summary of Findings and Recommendations

Enrollment

- Full-time enrollment of 3,196
- Part-time enrollment of 2,144
- FTE of 3,753
- Unduplicated headcount enrollment decreased 6.6% between 2000 and 2005
- FTE production increased 12.9% between 2000 and 2005 – part-time enrollment declined by one-third as full-time enrollment increased by more than one-third

Findings: General-Purpose Classrooms

- 67 general-purpose classrooms in 56,649 asf of space (7% of campus space)
- 2,505 student stations (mean station size is 22.6 asf)
- Classroom capacity ranges from 20 to 53 seats
- Course enrollment ranges from 2 to 52 students
- 60% of the classroom seats are occupied when a classroom is in use (below target rate of 67%)
- 46% of classroom time is in use during the day (below target rate of 67%)

Recommendations: General-Purpose Classrooms

- Current course offerings could be accommodated in 46 appropriately sized and mediated classrooms, in contrast to the 67 classrooms that now exist. This represents an *excess* of 16,587 asf, based upon current enrollments.

Recommended General-Purpose Classrooms
By Size Grouping

# of Seats	Current # of Rooms	Projected # of Rooms
1-9	0	0
10-19	0	8
20-29	9	7
30-39	27	12
40-49	28	12
50-59	3	6
60-69	0	1
70-79	0	0
80-89	0	0
90-99	0	0
100+	0	0
TOTAL	***67***	***46***

- Based on available square footage, FSC currently has the capacity to renovate and update instructional space in a phased manner, thereby allowing for conversion of particularly poor instructional spaces to other use as well as the ability to reconstitute current classroom capacities. This will then bring all classrooms up to date in terms of size, style, and mediated amenities.
- As spaces are renovated, room conditions and space quality should be updated to promote better usability, such as larger writing tablets or tables as well as electrical and wireless support of laptop usage in a classroom.
- One suggestion is to review the two rooms that were not scheduled as well as those rooms that are minimally used. These rooms may be initial candidates for removal from the classroom pool.

Distribution of General-Purpose Classrooms
by Percent Seat Occupancy and Percent Time Scheduled

<table>
<tr><th colspan="2"></th><th colspan="2">% Time Scheduled</th></tr>
<tr><th colspan="2"></th><th>High (≥ 87%)</th><th>Low (≤ 47%)</th></tr>
<tr><th rowspan="2">% Seat Occupancy</th><th>High (≥ 87%)</th><td></td><td>174
202
312
323</td></tr>
<tr><th>Low (≤ 47%)</th><td></td><td>170
179
199
203
301 (unscheduled)
339D (unscheduled)</td></tr>
</table>

Findings: Specialized Instructional Spaces (SIS)

- There are 42 SIS rooms in 62,214 asf of space (7% of campus space)
- 1,133 student stations (mean station size is 54.9 asf)
- Room capacity ranges from 14 to 49 seats
- Course enrollment ranges from 1 to 39 students
- 59% of the seats in SIS rooms are occupied when a room is in use (below the 80% target)
- 25% of SIS time is in use during the day (below the 50% target rate)

Recommendations: Specialized Instructional Spaces (SIS)

- Current need is for 47,740 asf of SIS rooms, or 14,474 asf *less* than currently exists. This is partially a function of the low seat occupancy demand in many of the existing spaces.
- Current instructional space needs can be accommodated within the existing campus footprint. This is subject to modifications as pedagogy, curriculum, and/or enrollments change.
- The six nonscheduled rooms as should be reviewed in detail, as should other low use rooms.

Distribution of Specialized Instructional Spaces by Percent Seat Occupancy and Percent Time Scheduled

% Seat Occupancy	% Time Scheduled: High (≥ 70%)	% Time Scheduled: Low (≤ 30%)
High (≥ 90%)		Humanities (A): CNFA 330 CIS/IT (A): MCK 175 Geo/Physical Science (B): MCK 279
Low (≤ 60%)		Bio (B): CDSC 103, 305A *(unscheduled)*, 305B *(unscheduled)* Chem (B): CDSC 301, 304 *(unscheduled)*, 313 CIS/IT (A): EDG 301 *(unscheduled)* Comm/Media (B): CNFA 101 *(unscheduled)*, 300, 332, 304A *(unscheduled)* Geo/Physical Science(B): CDSC 126 Industrial Tech (D): CNFA 103, 104, 108, 113 Physics (B): MCK 287, 293

Appendix C
SUSTAINABLE DEVELOPMENT

Prepared by:

CHAN KRIEGER SIENIEWICZ, Inc.

Master Planning for State and Community Colleges

FITCHBURG STATE COLLEGE

Sustainable Development

GREEN BUILDING GUIDELINES
for
Campus Development
and
Existing Facilities Improvements

October 2006

CHAN KRIEGER SIENIEWICZ

Sustainable Development

Green Building Guidelines for Campus Development and Existing Facilities Improvements:

The following sustainability guidelines for new buildings are based upon the US Green Building Council's LEED-NC version 2.2 for new construction. The goals summarized below follow the recommended design credits as established by the LEED (Leadership in Energy and Environmental Design) rating system.

The point system defined by LEED is broken down into the following categories:

- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation in Design

Sustainable Sites:

Since development and construction practices are inherently destructive to the environment and local ecology, it is important to choose and develop a building site to minimize the adverse effects of new construction.

Erosion and Sedimentation Control
Site clearing and earth moving in preparation for construction can result in serious erosion problems causing degradation of property and pollution of local water bodies. An erosion control plan should be implemented prior to construction, which will minimize site erosion during and after construction, resulting in less pollution of the local environment.

Site Selection
Future site selection for growth, as outlined in the growth recommendations section of the master plan should adhere to the following guidelines:
- Select sites that minimize wetland impact and increase impervious surfaces
- Select sites that avoid the development of land whose elevation is lower than 5' above the 100-year flood plain
- Select sites that encourage and enable pedestrian circulation and reduce the need for vehicular traffic
- Select sites that enable the improvement and reuse of existing facilities
- Select sites that maintain and preserve existing campus open space and tree coverage

Development Density and Community Connectivity
Construct or renovate buildings on previously developed sites that reinforce connections to existing communities with a minimum density of 60,000 sf per acre net, or on previously developed sites within ½-mile radius of a residential zone or neighborhood with an average density of 10 units per acre.

Brownfield Redevelopment
Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment) or on a site defined as a brownfield by a local, state or federal agency.

Alternative Transportation – Public Transportation
All future planning endeavors should encourage expanded public transportation service both on the main campus and to-and-from off-campus sites. The USGBC recommendations suggest locating development within ½-mile of an existing commuter rail, light rail or subway station, or within a ¼-mile radius of one or more stops for two or more public or campus bus lines.

Alternative Transportation – Bicycle Storage and Changing Rooms
In an effort to reduce pollution by encouraging less dependence on vehicular transportation, proper bicycle storage facilities should be provided. Complementary changing facilities should be provided within reasonable distance of the bicycle storage.

Alternative Transportation – Low Emission & Fuel Efficient Vehicles
In an effort to reduce pollution and land development impacts from automobile use, the LEED guidelines recommend providing low-emitting and fuel-efficient vehicles for 3% of FTE occupants and preferred parking for those vehicles. Another alternative is to provide preferred parking for such vehicles for 5% of the total parking capacity.

Alternative Transportation – Parking Capacity
In an effort to reduce pollution and land development impacts from single occupancy automobile use, the LEED guidelines recommend sizing parking capacity to meet but not exceed minimum local zoning requirements and preferred parking for van pools or carpools for 5% of the total parking spaces. A detailed transportation study will help understand how to balance these goals with the needs of the demographic commuters.

Reduced Site Disturbance
Construction disturbance should be limited to the immediate vicinity of the new building and should be decreased to the extent possible in order to help conserve the natural environment adjacent to the building. In addition, the footprint of new buildings and surrounding paving should be reduced beyond the local zoning requirements for the site.

Stormwater Management
Disturbance of natural water flows should be limited to the extent possible. This can be achieved by decreasing the rate of stormwater runoff from existing to developed conditions. At the very least, there should be no net increase in the rate and quantity of stormwater runoff in developed conditions. To help alleviate local water supply contamination, treatment systems can be implemented to filter stormwater runoff prior to it leaving the site.

Reduction of Heat Islands – Non-Roof
Temperature differences between developed areas and their undeveloped surroundings should be reduced to minimize impact on human and wildlife habitats. There are various ways to reduce

heat islands in the landscape. Light-colored paving materials, which reflect radiant heat, should be used wherever possible. Shade can be used to reduce heat islands on paved areas that cannot be light-colored. Vehicular access to buildings and large areas of parking may be located underground to shield them from the effects of the sun's radiant heating.

Reduction of Heat Islands – Roof
Roofing materials should be lightly colored, of high reflectance, and of high emissivity products that will reduce temperature fluctuations between developed and undeveloped portions of the site. Another method for reducing roof heat islands is to develop vegetated, or green, roofs, which reduce heat absorption on roof surfaces.

Light Pollution Reduction
Every effort should be made to keep exterior and interior light from leaving the immediate vicinity of the building and the site. While safety should not be compromised, exterior light levels should not exceed standard requirements. In addition, interior and exterior lighting should be designed to keep direct-beam illumination from leaving the immediate site.

<u>Water Efficiency:</u>

Using large volumes of water increases building operation and maintenance costs and also increases municipal delivery and treatment costs. In addition, fresh water supply, such as aquifers, rivers, and lakes can become depleted if more water is taken from them than is returned to them. Water efficiency can help to reduce costs to building owners and to the environment.

Water Efficient Landscaping
Use of potable water for landscape irrigation should be reduced or eliminated on a building site. This can be accomplished through the use of high-efficiency irrigation equipment or by using captured rainwater for irrigation.

Innovative Wastewater Technologies
Traditional wastewater systems require large amounts of potable water to function correctly, which places a burden on the fresh water supply. Greywater from fixtures and collected rainwater from the roof can be used to reduce the amount of potable water that is required to carry waste from the building. In addition, the use of special fixtures can be used to help reduce the amount of sewage and reduce the amount of water required to carry it away.

Water Use Reduction
The selection of fixtures that use lower volumes of water will help maximize water efficiency throughout the building and will help reduce municipal water costs. Water efficiency should be increased beyond the standards established in the Energy Policy Act of 1992.

<u>Energy and Atmosphere:</u>

Energy production and fuel consumption are generally very destructive to the environment. Many of the fuels used for energy, such as gas and coal are nonrenewable sources of energy that we must conserve for future use. There are various measures that can be taken to reduce energy use and ensure efficient use of the energy that is used within buildings.

Fundamental Building Systems Commissioning
System commissioning ensures that a building's energy systems are operating efficiently, which reduces operating and maintenance costs as well as provides a more comfortable environment for building occupants. A building system commissioning plan should be created during the design process and executed upon building completion to ensure that all building systems are functioning as they were designed. Ideally, a third-party engineer, who is not responsible for the design of the building and its systems, should complete the commissioning plan and report.

Minimum Energy Performance
Energy efficiency reduces the burden on the environment from the extraction of fuels. Since buildings consume large quantities of energy, it is imperative to design with a strategy that will minimize overall energy use. All buildings should be design to meet minimum ASHRAE standards for energy-efficient building design.

CFC Reduction in HVAC Equipment
Ozone-depleting substances such as CFCs are widely used in Heating, Ventilating, and Air Conditioning equipment and are slowly being replaced by non-depleting substitutes. During the design phase of new buildings, equipment that does not contain CFCs or any ozone-depleting substance should be selected. In building renovation projects, a phase-out plan should be implemented, which will ensure that all CFC-based refrigerants will be removed from the building prior to the end of construction. In addition to the removal of CFCs, every attempt should be made to select HVAC equipment that does not use HCFCs as a substitute to CFCs, since HCFCs are also ozone-depleting substances.

Optimize Energy Performance
Energy saving measures should be incorporated into the design of new buildings to reduce the design energy cost beyond the baseline requirements of ASHRAE regulated components. Optimizing the building systems, including HVAC systems, the building envelope, hot water systems, and lighting systems, will reduce energy costs and preserve natural resources.

Renewable Energy
Wherever possible, the building should use on-site renewable sources of energy to help alleviate the use of non-renewable resources. Such sources include wind, water, solar, and geothermal energy sources, all of which can reduce the total energy cost to the building owner. Since on-site renewable sources will not generally handle the energy load of a building, purchased power may also be from renewable sources.

Enhanced Commissioning
In addition to fundamental building commissioning that is described as a pre-requisite for LEED certification, the USGBC also recommends additional commissioning, by an independent agent, to be performed during the design phase of a project. This is a quality control process that involves the design team, the owner, the maintenance staff,

the occupant, the contractor and the mechanical, electrical and plumbing sub-contractors, and includes the review of submittals by the Commission Agent.

Measurement and Verification
While initial building commissioning will ensure that all systems are operating efficiently and as designed, over long periods of time the system efficiency may be reduced. Providing for long-term measurement and verification of systems in the design plan will ensure that all systems are operating as designed into the future.

Materials and Resources:

The process of manufacturing building materials is detrimental to the natural environment. Everything from extraction, processing, and transportation has an effect on the environment. Assigned architects should be made aware of this issue and should incorporate materials that have a reduced effect on the environment.

Storage and Collection of Recyclable Waste
Recycling has become an integral part of American culture over the past few years, however most people are more apt to recycle when the facilities are convenient. Since recycling reduces the waste sent to landfills, it saves landfill cost and helps improve the environment. Recycling locations should be incorporated into all buildings and should be located so they are easily accessible.

Building Reuse
Reusing building components alleviates the negative impact on the environment and reduces the cost of new materials. When renovating buildings, the reuse of existing components should be maximized.

Construction Waste Management
The construction process is extremely wasteful by nature and sends large quantities of material to landfills. A Construction Waste Management plan should be developed and implemented to recycle or salvage as much construction, demolition, and land-clearing debris as possible.

Resource Reuse
In addition to sending construction debris to salvage yards, salvaged or refurbished materials should be considered during the design phase to help reduce the amount of waste sent to landfills.

Recycled Content
Many construction materials contain recycled content and companies are continuously introducing new materials made from recycled content. During the design phase of any new or renovated building, such materials should be considered whenever possible.

Local and Regional Materials
Reduce the negative effects of transportation on the environment by specifying materials that are extracted and manufactured locally. Choosing local materials reduces the stress on the environment and improves the local economy.

Rapidly Renewable Materials
Choosing materials that renew themselves in less than 10 years helps reduce the adverse effects that harvesting slow-renewing building materials has on the environment and helps reduce the loss of materials that take longer to renew themselves. Whenever possible, select products that renew rapidly.

Certified Wood
Forests are an important part of global environmental health. Many forest-extracting practices are detrimental to the sustenance of forests and reduce the quality of the World's air and water supply. The Forest Stewardship Council provides guidelines for the proper harvesting are renewal of forests. FSC-certified wood products should be considered during the design phase of new construction and renovations of existing buildings.

Indoor Environment Quality:

Americans spend a majority of their time indoors and, as a result, the quality of the indoor environment has a significant impact on health, productivity, and quality of life. There are a number of things that can be done to help improve the quality of the indoor environment.

Minimum Air Quality Performance
Proper ventilation is an important part of maintaining air quality within buildings. All buildings should adhere to the minimum requirements of ASHRAE's Ventilation for Acceptable Indoor Air Quality. Increasing the ventilation effectiveness (E) as much as possible will help ensure proper airflow.

Environmental Tobacco Smoke Control
Every effort should be made to minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke. The most effective way to achieve this is to prohibit smoking in all buildings, and to locate designated smoking areas at least 25' away from entries, outdoor air intakes and operable windows.

Outdoor Air Delivery Monitoring
Permanent monitoring systems that provide feedback on ventilation system performance should be installed to ensure that systems maintain design minimum ventilation requirements. This monitoring system will help sustain occupant comfort and well-being. These systems will monitor Carbon Dioxide concentrations within all densely occupies spaces as well as the ability to provide a direct outdoor airflow measurement device capable of measuring a minimum outdoor airflow rate.

Carbon Dioxide Monitoring
Some building systems produce carbon monoxide as a waste product, which is harmful to building occupants. A permanent carbon monoxide monitoring system should be installed to reduce the potential for illness within the building.

Increased Ventilation
The goal of this particular recommendation is to provide additional outdoor air ventilation to improve air quality for improved occupant

comfort, well-being and productivity. The guideline recommends providing outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE standards for mechanically ventilated spaces. For naturally-ventilated spaces, the recommendation is to design natural ventilation systems that meet the standards set forth in the "Carbon Trust Good Practice Guide 237.

Construction IAQ Management Plan

Air quality not only affects a building's end users, but it also affects users during the construction process. A Construction Air Quality Management Plan should be implemented to maintain minimum air quality levels through the use of filtering and ventilation. In addition, a two-week "flush-out" period after the end of construction allows for air contaminants to be reduced and will allow high-emitting products to off-gas prior to occupancy.

Low-Emitting Materials

Many building materials contain compounds that have a negative effect on air quality and can cause illness in building occupants. Whenever possible, low-emitting materials should be selected to reduce the negative effects of these products. Examples of materials that can be purchased in low-emitting versions include adhesives, paints, carpets, and composite wood products.

Indoor Chemical and Pollutant Source Control

Buildings should be designed to reduce cross-contamination of regularly occupied spaces with chemical pollutants, such as janitor closets and copy rooms. Such spaces should be closed off from other occupied spaces. Permanent entry systems should be installed to capture dirt and other pollutants. Finally, special basins and drains should be provided for disposal of liquid waste in areas where chemicals are used. These strategies help reduce the contamination of spaces occupied by humans and improve of the quality of life for building occupants.

Controllability of Systems

Occupant productivity and comfort is related to their ability to control the systems to meet their health and comfort needs. To the extent possible, personal controls for thermal comfort, ventilation, and lighting systems should be provided to accommodate varying occupant needs.

Thermal Comfort

Systems should be designed to maintain a thermally-comfortable environment to improve occupant productivity and overall health. While some specialized building types require different conditions, ASHRAE provides standards for humidity and temperature control for human occupied spaces.

Daylight and Views

Spaces that have significant levels of natural light create a more comfortable and productive environment for building occupants. In addition, daylight reduces the energy costs associated with heating and lighting. Daylight and views provide occupants with a connection to their environment creating a more unified neighborhood and a more productive environment. Every attempt should be made to incorporate daylight and views into each space regularly used by building occupants.

Innovation and Design Process:

LEED Accredited Professionals
It is recommended that in order to ensure the design and execution of the sustainable goals identified above, as described within the USGBC LEED-NC reference guide, a LEED-accredited professional should be involved in the design of new construction and renovation projects. It is also recommended that the construction team also have a LEED-accredited professional involved in the process to ensure the implementation of the recommended practices and the proper documentation of the various sustainable components.

Innovation in Design
In addition to the specific LEED credits summarized above, the USGBC also encourages innovation in design and encourages creative approaches to augmenting or exceeding the goals established in the LEED rating system. These can include design innovations, construction innovations, decisions made by an owner or the team collectively. This component of the rating system also recognizes design and performance that greatly exceeds the standards established by the USGBC in the LEED rating system.

All of the goals and recommendations described above are described in greater detail, along with the USGBC requirements for documentation, in the LEED-NC V.2.2 Reference Guide, published in October of 2005 by the US Green Building Council.

Appendix D

MECHANICAL AND PLUMBING SYSTEMS

Prepared by:

VAV INTERNATIONAL, Inc.

FITCHBURG STATE COLLEGE

A. General:

1. Mechanical: with exception of a few new buildings, virtually every building in this College are 30 years to over 100 years old, with its mechanical system being the original, with very little upgrade done. It would be safe to say that all but very few of the buildings are due for a major gut out renovations. Some of the new buildings were recently built without replacing the underground steam piping passing through or close by these buildings.

2. Plumbing: all of the above buildings' plumbing system are old and tired but are functioning. Minimum of fixture replacements are in order with bathroom modernizations and ADA compliance. The Condike Science building needs a major renovations to the Code required Acid Neutralization system, highly recommended tempered emergency eye wash and showers, and to address the poor water pressure issues.

3. Fire Protection: All of the buildings are classified as Business Use, as per State Building Code 780 CMR. None of the buildings, with exception of the New Library are sprinklered. The Building Code's 780 CMR Chapter 34 has some gray area in the requirement for sprinkler addition to the existing building. As long as the building use group remains the same, renovation can be made without adding sprinkler system, as long as cost of sprinkler system installation is considered a significant portion of the renovation cost. It is accepted by most fire protection engineers that ruling and interpretation of this Code is in the jurisdiction of local building official. Decision regarding this matter will be by City of Worcester Fire Department.

B. **Dupont Building** (Map #7):

1. Building function: first floor is central campus steam plant, and the second floor houses facilities department offices.

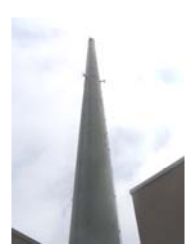
2. Building Built & Type: 1976, Masonry/ steel frame, flat roof.


Window AC units.

3. Number of Floors & Total Floor Area: 2 Floors slab on grade, 13, 577 SF.

4. Mechanical System:
   a. Heating Plant- two 1976 Cleaver Brooks 1,100-HP #6 oil fired HPS boilers are old but are in excellent shape. One 1997 600-HP HPS #6 oil fired Cleaver Brooks boiler is used to carry the lighter summer loads. Two 40,000-gallon UG double wall tanks installed in 1998.





1997 Boiler. Two 1976 Boilers. Recently replaced boiler stack.


Boiler Room Unit heater


Fuel Oil Transfer Pumps.

Offices are heated by fintube radiation (FTR) fed from a steam-to-hot water converter located on the ground floor.

b. Air Conditioning- some split AC units and window AC units.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
   a. Mechanical- Ventilation is limited to operable windows. A new central air conditioning system with mechanical ventilation and ASHRAE 25-30% filtration is required for the second floor. Positive pressurization of the inhabited space is recommended when it has immediate adjacency with utility space generating potential harmful gases or nuisance odor. A rooftop packaged cooling-only VAV unit with VAV boxes and hot water heating coils would fit this building's second floor very well (Rough estimate is $150,000).
   b. Plumbing- Fixtures are all 30+ years old, and are tired but are in working order.

C. **Edgerly Building** (Map #9):

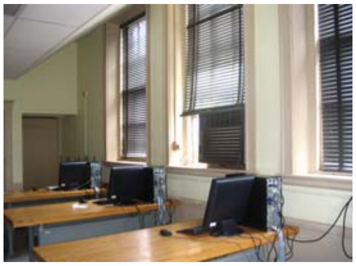
1. Building function: classes, offices & data center.

2. Building Built & Type: masonry bearing walls, sloped roof, and timber frame.

3. Number of Floors & Total Floor Area: 4 including basement and attic. Total floor area is 25,609 SF.

4. Mechanical System:
   i. Heating Plant- high-pressure steam from Dupont Plant via underground tunnel through Thompson. HPS reduced to LPS through a single stage PRV and converted to hot water. Hot water unit ventilators in classes and cast iron radiators in other spaces.
   ii. Air Conditioning & Ventilation- combination of window AC units, ductless splits and roomtop AC units. Ventilation is limited to passive grilles in space connected to masonry airshaft running to roof and operable windows. The original pneumatic

controls on unit ventilators have all but stopped working and mechanical ventilation component has not worked for years.


Note Window AC Units.


Passive EG


Original Unit Ventilator.

5. Known Plumbing System Problems: Very old and tired but all are in working order.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
    i. Mechanical- Unit ventilators are way past their useful life and its ventilation function has not worked for years. Original pneumatic controls have been maintained minimally to sustain the heating controls. A total replacement of the entire HVAC system is required. An air-cooled chiller would be located on ground with sound enclosure, and new 2-pipe unit ventilators for classes with cooling capabilities, and hot water from steam-to-hot water converter would provide the full HVAC. Offices would have fancoil units. The Data center would continue to have its own DX cooling system to meet its year-round cooling requirements. (Rough estimate is $0.5M).
    ii. Plumbing- total bathroom upgrade and piping replacement is warranted for the next renovation project.

D. **Elliott Field House** (Not on Campus Map):

1. Building function: Locker rooms.

2. Building Built & Type: 2001, metal building with gable roof.

3. Number of Floors & Total Floor Area: one floor slab on grade; 3,200 SF.

4. Mechanical System:
    i. Heating Plant- hot air gas furnace.
    ii. Air Conditioning- none.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
    i. Mechanical- NA.
    ii. Plumbing- NA.

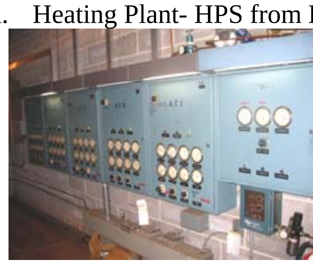
E. **Hammond Library, Campus Center** (Map #12):

1. Building function: Library, Book Store, Student Activities Offices, Student Union, Lecture Halls, & Commuter Cafe.

2. Building Built & Type: built in 1975. Masonry & glass façade, steel frame, flat roof.

3. Number of Floors & Total Floor Area: 3 plus basement; 165,250 SF.

4. Mechanical System:
   i. Heating Plant- HPS from Dupont converted to hot water for heating.


Original pneumatic control panels.

   ii. Air Conditioning- is produced by a Trane single-effect steam absorption chiller driven by steam received from the Dupont Plant. Existing air handling systems and VAV boxes are very noisy. Frequent IAQ complaints. Original pneumatic controls with very limited DDC overlay, resulting in very poor thermal comfort controls.


600-ton steam absorption Chiller. Low Eff.


Pumps in fair shape.


Built up AHUs in good shape.


Original cooling tower ACM panels?


CT Frame corrosions.


CT Corroded through warm basin

5. Known Plumbing System Problems: None.

6. Sprinkler System: No sprinkler system but there is two 4" standpipes in stairwells and there are fire hose cabinets.

7. Conceptual recommendation and budget:
   i. Mechanical- Air noise level is unacceptable for this building usage, and must be addressed. Noise complaints we observed during the brief visit were both solid born fan vibration from the top mechanical room, as well as air born noise from AHUs (fix for this work can cost anywhere between $50,000 up to $300,000). The cooling tower should be replaced with a new tower within next two years, and should be selected for 78F WB, with 304SS cold and warm basins and VFD for its fans with premium efficiency inverter duty motors (a rough budget for this work would be around $150,000). The 21 years old Trane single effect steam absorption chiller should be

replaced within next 5 years with a new double effect steam absorption chiller, which would have twice the efficiency (a rough budget for this work would be around $0.6M to $1.0M). At a minimum, the main systems should have DDC control system (a rough budget for this work would be $0.3M)

ii. Plumbing- NA.

F. **Conlon Industrial Arts & Fine Arts Building** (Map #1):

1. Building function: Offices, Classes, Industrial Arts shops, FSC Press, TV Studio, Art Studios, Music Rooms, and Recital Hall.

2. Building Built & Type: 1975, Masonry façade, steel frame, flat roof.


Conlon to Weston Bridge.

3. Number of Floors & Total Floor Area: IA=3, FA=2 floors. 137,300 SF.

4. Mechanical System:
   i. Heating & Ventilating- HPS from Dupont via Parkinson & Condike Buildings. Steam is converted to hot water with heat exchangers. Industrial Arts side has many H&V system, which were designed for shops but are now oversized for current use.


IA Dust collector used for metal shop.


MER with hung heat exchangers.


Abandoned Exhaust fans.


And more fans, and MAU for Kitchen

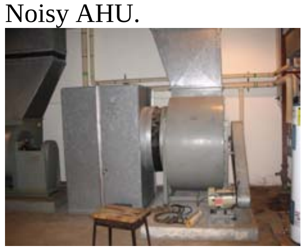
Industrial capacity air compressor set.

ii. Air Conditioning- Fine Arts side is air-conditioned but is very noisy. Industrial Arts side is heated and ventilated only.


Noisy AHU.


AAF AHU Tag


Typical Krueger CAV Box.


Return Fan in good shape.



Large H&V AHU in good shape.


Mech Room


York 250 ton absorption chiller


Large patch on cooling tower.


Corroded Frames.


Corroded slats.


Corroded spring supports.


More Patches.


Corroded Fan sheave.


Cooling tower cold sump.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
   i. Mechanical- cooling tower needs to be replaced within next two years (Budget $150, 000). Fine Arts side HVAC system noise problem needs to be resolved ($100,000 to $300,000). Unused exhaust fans on roof should be removed ($10,000). Industrial Arts side H&V system needs to be replaced with HVAC system, and the York 250-ton absorption chiller needs to be replaced with a larger capacity double-effect absorption chiller to handle the entire building. ($2M to $3M).
   ii. Plumbing- NA.

G. **McKay Campus Building** (Map #24):

1. Building function: Classes, offices, Labs, studios, Cafeteria, Kitchen, Auditorium, Gym and Library.

2. Building Built & Type: 1969; 194,770 SF.

3. Number of Floors & Total Floor Area: 3 stories. Reinforced concrete and steel frames.

4. Mechanical System:
   i. Heating & Ventilating- the building is served by two 250-HP #2 fuel oil fired Ray fire tube steam boilers. The were originally designed to fire on #5 oil, but due to neighbor complaint of odor, it was switched to #2 oil. The boiler is equipped with dual fuel, but gas service to building was never completed. The boilers have proven to be unreliable and they are in very poor shape. H&V AHUs and Unit ventilators serve majority of the building.

(2) 250 HP Ray FT Boilers.

Dual fuel capability but gas was never connected.


Feed water system.


Boilers are in very poor shape.


#2 Fuel oil transfer system.

ii. Air Conditioning- a 40-ton and a 15-ton water-cooled chiller conditions a very small portion of the building.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
    i. Mechanical- everything in this building is 36 years old and have past its useful life. The entire HVAC system needs to be replaced. (Budget $3M to $4M).
    ii. Plumbing- Fixtures are old and tired, but are still functioning. Level of renovation planned would determine the extent of plumbing replacement.

H. **Miller Hall** (Map #11):

1. Building function: classes and offices.

2. Building Built & Type: 1895. Brick bearing walls and timber frame, and sloped roof. Stairwell added in 1952, 3-1/2" water main added in 1952, fire alarm upgrades in 1956 and 1964.

3. Number of Floors & Total Floor Area: 3 plus basement; 23,460 SF.

4. Mechanical System:
    i. Heating & Ventilating- HPS from Dupont via Edgerly and Thomson tunnels. One pipe steam system feeds cast iron radiators equipped with Danfoss thermostatic vents. One motorized valve is cycled by DDC. Passive exhaust grilles lead to shafts, which run up to roof. Unit ventilators in classes.
    ii. Air Conditioning- window units and ductless split units.

5. Known Plumbing System Problems: Old but functioning. Needs total replacement.

6. Sprinkler System: Basement, and a standpipes.

7. Conceptual recommendation and budget:
    i. Mechanical- total replacement is required. (Budget $0.4M to $0.6M).
    ii. Plumbing- total replacement is required (budget $150,000).

I. **Parkinson Gymnasium** (Map #5):

1. Building function: Gym, lockers & 3 offices.

2. Building Built & Type: 1956. Brick face on CMU, steel frames & flat roof.


Quadrangle side.


North Street side.


Adj. to Dupont Boiler stack.


Gymnasium.

3. Number of Floors & Total Floor Area: 2 floors, slab on grade. 20,910 SF.

4. Mechanical System:
   i. Heating & Ventilating- HPS from Dupont, which is right next, to this building's basement level ceiling. Reduced to LPS and distributed to 2-pipe steam radiators. Gym is heated and ventilated by an AHU located in Mezzanine mechanical room, which has direct access to outdoors with a double door, proposing an ready access for replacement work. They're also some passive ventilation shafts.
   ii. Air Conditioning- A few window AC units.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
   i. Mechanical- the building heating system is now 50 years old and has gone through 200% of expected life. Since office space is very limited in numbers, continued use of Window AC in these few spaces would be acceptable. The remainder of the building can remain to be served by H&V system with more modern standards and controls. ($0.2M to $0.5M).
   ii. Plumbing-

J. **Percival Hall** (Map #8):

1. Building function: Classes, offices, and storage.

2. Building Built & Type: Built in 1909; Exterior stairs added in 1952; shingles replaced in 1998. Brick bearing wall, timber framing, sloped roof.

Front Entry

Note Vent. Shafts to roof, and UV wall louvers.

3. Number of Floors & Total Floor Area: 2 + Basement. Basement is connected to Thompson. Attic is unoccupied. 31,544 SF.

4. Mechanical System:
   i. Heating & Ventilating- HPS from Dupont via Thompson and Edgerly tunnels. Reduced to LPS and 2-pipe steam piping to unit ventilators and cast iron radiators. There are two passive ventilation shafts to roof, which connects to passive exhaust grilles in each classroom.

Unit Ventilators (UV)

Convectors

   ii. Air Conditioning- split DX ductless types in classes.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
   i. Mechanical- although the operable windows meet the Code requirement for fresh air ventilation, it is a rather outdated and impractical solution, except during ideal Spring/Fall seasons. A total replacement is recommended. (Budget $0.5M to $0.7M).
   ii. Plumbing- Total replacement is recommended. (Budget $0.2M)

K. **Sanders Administration Building** (Map #4):

1. Building function: Offices, Lecture Hall, and Records Storage.

2. Building Built & Type: built in 1963; converted from Library to offices in 1983; AC added to President's office in 1991; city water cooled AC added to Executive offices in 2005.

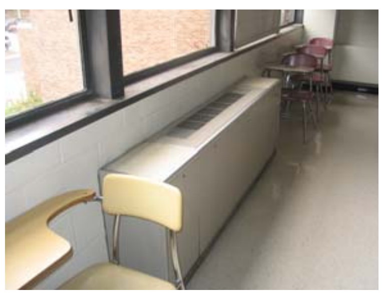
Pedestrian bridge to upper level. Left side of this building is the Condike Science Building.

3. Number of Floors & Total Floor Area: 2 levels. 26,800 SF.

4. Mechanical System:
   i. Heating & Ventilating- HPS from DuPont via Parkinson Basement ceiling and Condike MER. The Lecture Hall is heated and ventilated only (no AC!) with severely undersized 43 years old AHU with antique controls.

Lecture Hall

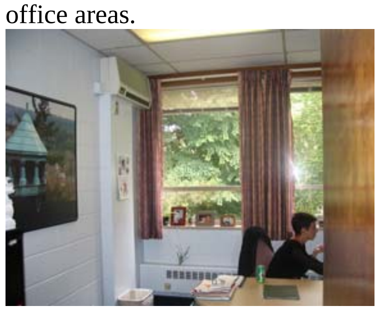
Very old Lecture Hall H&V Unit.



Unit Ventilator.

Very old, original controllers.

   ii. Air Conditioning- ductless split DX units and some ducted split units serve the executive office areas.



5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
   i. Mechanical- the base H&V system is now 43 years old and is in need of total replacement (budget $0.3M to $0.6M). An investigation can be made to see if piping can be reused. The lecture hall needs to be air conditioned with a Code mandated ventilation system using a new rooftop packaged air conditioning unit (budget $150,000 if this work is done separately).
   ii. Plumbing- NA.

L. **Thompson Hall** (Map #10):

1. Building function: Classes, offices.

2. Building Built & Type: built in 1895; Stairwells added in 1952; 3-1/2" city water service added in 1952; fire alarm system installed in 1956; fire alarm system upgraded in 1964. Brick bearing wall, timber framing, sloped roof.

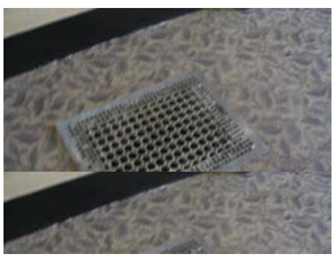
Entry.


Lobby, early done with Renov.


New hung ceiling. Note timber.

3. Number of Floors & Total Floor Area: 4 plus basement. 51,000 SF.

4. Mechanical System:
   i. Heating Plant-


Floor Grille over steam radiator
Box below.


Unit ventilator.

   ii. Air Conditioning-


Ceiling Ductless AC.

Window AC units.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
    i. Mechanical- heating system is believed to be around 50 years old. The entire new system would be required. (Budget $0.7 to $1.0M).
    ii. Plumbing- new system would be required. (Budget $0.2M to $0.3M)

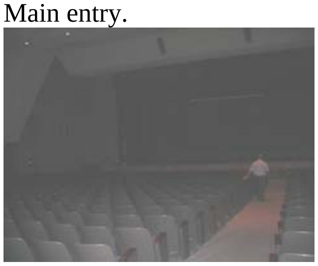
M. Weston Auditorium (Map #2):

1. Building function: Assembly, performing arts.

2. Building Built & Type: 1963. Masonry façade, steel frame, flat roof.

Main entry.

Weston to Condike connector.



Auditorium interior.

Inadequate lighting for lectures.

3. Number of Floors & Total Floor Area: one. 16,188 SF.

4. Mechanical System:
    i. Heating & Ventilating- HPS from Dupont via Parkinson basement ceiling and Condike mechanical room. One ceiling hung air handling unit with steam coil provides heating and ventilating.

Ceiling hung AHU. Ladder up to service platform.

    ii. Air Conditioning- some window and split DX AC units.

5. Known Plumbing System Problems: None.

6. Sprinkler System: None.

7. Conceptual recommendation and budget:
    i. Mechanical- Auditorium can be converted to air-conditioning with replacement of AHU with rooftop packaged cooling only unit. Heat can continue to be accomplished with duct mounted steam heating coil. A heat wheel type heat recovery system is a candidate for this short duration high occupancy space. Remaining areas can be conditioned with

split AC units having mechanical ventilation. (Rough estimate would be $0.3M to $0.4M).

ii. Plumbing- NA.

N. **Condike Science Building** (Map #3):

1. Building function: science labs and classes.

2. Building Built & Type: Built in 1963; potable and non-potable water sources separated in 1980's. Masonry façade, steel framing, flat roof.

Front entry, with shared pedestrian bridge with Sanders.

3. Number of Floors & Total Floor Area: 2. 41,000 SF.

4. Mechanical System:

i. Heating & Ventilation- HPS from Dupont via Parkinson basement. Fume hood duct systems are improperly designed and installed using unsealed galvanized low-pressure ductwork. Classes and Labs have unit ventilators. There is no make-up air system for the fume hoods; therefore, windows are required to be opened in order to achieve adequate draft.

Mechanical room with steam PRV, Gas meter, converter, and ejectors.

Fume hood with Galvanized ductwork.

Gang of 3 FH's w/ improper Ductwork.

Note orange sash height marks.

ii. Air Conditioning-

 Window AC units, no make-up air.

5. Known Plumbing System Problems: original lab waste system was specified with dura-iron piping but there exists mix of such and standard cast iron piping, which all joints into a common sanitary waste line without the Code required acid neutralization system. Any renovations in this building's first step would most likely be required by State Plumbing Board to install the neutralization system, and propose a plan of upgrading the lab waste system. Very poor water pressure.



Original Lab benches & Gas piping.

untempered emergency eye wash and showers. Outdated and considered unsafe.

6. Sprinkler System: limited to hose cabinets.

7. Conceptual recommendation and budget:
   i. Mechanical- this 43 years old system was designed not as labs but as standard classes. Fume hoods were added at a later date without appropriate make-up air system. Fume hood exhaust system must be replaced with proper materials and fans to assure proper safety. Air conditioning would be required, and total replacement would be required. (Budget $0.9M to $1.2M).
   ii. Plumbing- Installation of acid neutralization and separation of waste from sanitary system is Code mandated and, based on our experience at UMass Amherst and a few meetings with the State Plumbing Board, it will be strictly enforced. (Budget $0.3M to $0.5M).

O. **Anthony Building** (Map #6):

1. Building function: Grounds Department offices, vehicle repairs, Health Clinic, Materials Management.

2. Building Built & Type: Masonry bearing walls, flat roof

 Front & Loading dock.

3. Number of Floors & Total Floor Area: 1 + Basement. 21,400 SF.

4. Mechanical System:
   i. Heating & Ventilating- HPS from Dupont via underground piping. Two pipe steam heat. Mixture of passive and power exhaust fans.

   ii. Air Conditioning-some window and split units.

5. Known Plumbing System Problems: None.

6. Sprinkler System: 4" service. Level of coverage is unknown.

7. Conceptual recommendation and budget:
   i. Mechanical- full HVAC replacement of office areas would be required. (Budget $0.2M).
   ii. Plumbing- NA.

+ + + END OF REPORT + + +

Prepared by:

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Appendix E
ELECTRICAL SYSTEMS

Prepared by:

THOMPSON ENGINEERING COMPANY

Thompson Engineering Company performed a thorough walk-through inspection of the electrical systems for the entire campus of Fitchburg State College on August 2 and 24, 2006. The following are TEC's observations of the current state of the campus electrical systems.

Existing Conditions Evaluations:

Campus/Site

Electrical Service

The main incoming primary electric service for the main campus is provided by National Grid at 13.8 KV 3-phase feeding two college-owned full height indoor metal enclosed switchgear line-up of manually operated fused switches, located in the DuPont Building basement. The incoming13.8 KV primary electric service serves two 13.8 KV load centers. The electric service is primary metered. In addition, all buildings are metered separately to monitored energy consumption.

The 2500A, 13.8 KV Dupont load center serves the following buildings:

1. Dupont Hall
2. Anthony Hall
3. Edgerly Hall
4. Parkinson Hall
5. Miller Hall
6. Percival Hall
7. Thompson Hall

The 2500A, 13.8 KV Herlihy load center serves the following buildings:

1. Conlon Buildings
2. Hammond Hall
3. Russell Hall
4. Herlihy Hall
5. Holmes Hall
6. Townhouse and Mara Villages

In addition, there is a 4160-volt electric service in Herlihy Hall that serves Aubuchon Hall and Condike Science Buildings including Sander and Weston.

Two switchboards in Dupont provide 120/208-volt power to several buildings including Parkinson, Edgerly, Dupont, Anthony, Percival, Miller, Thompson. Any major renovation in these buildings would require an upgrade to the Dupont 120/208-volt switchboards. The rest of the buildings listed above are served directly by 13.8KV electric services, each building has a 13.8 KV load center with primary switch, transformer and distribution section.

Based on comments from staff, several building's electric service equipment and cables are near their electric capacity. In addition, it appears that all primary and secondary cables are the original cables. The 13.8 KV primary cables that serve Conlon from Dupont were replaced in 2003 after a failure. A large majority of feeders are at or near their life expectancy of 40 years. A comprehensive plan to inspect and replace these cables by the Owner must be implemented in the next few years.

All major 13.8 KV equipment, load centers and transformers were manufactured by Federal Pacific. The Federal Pacific equipment is antiquated and spare parts are not readily available. All equipment and feeders are the original equipment except for minor repairs when circuit breakers have failed. equipment is original.

The McKay Campus, Recreation Center and the Athletic fields are served by separate dedicated electric services and metering. The McKay campus system was installed in 1969 and is the existing equipment. The McKay campus is served by an underground 13.8 KV electric service that terminates in a 13.8 KV load center in building C. The load center consists of 13.8 KV primary switch, 138KV primary-277/480-volt secondary transformer, and 480-volt distribution section.

Fire Alarm System/Life Safety

All building fire alarm systems are manufactured by Simplex. The City of Fitchburg is served by a radio master box system and each building fire alarm system is connected directly to a radio fire alarm transmitter. All alarm, supervisory, and trouble alarms reports to the Fitchburg Fire Department. The campus fire alarm systems are not networked together and each building reports directly to the Fitchburg Fire Department.

Site Lighting

The site lighting system consists of an assortment of different types of lighting It appears that the campus does not have set guidelines on lighting fixture types or controls. It is our understanding that all campus site lighting fixtures are owned and maintained by the College. It is our understanding that all campus lighting is connected to the nearest building electric system and the site lighting is controlled by a combination of photocells and timeclocks. TEC did not observe the lighting at night and we are unable to verify that the site lighting meets all required lighting and security code requirements.

The lighting poles and fixtures appear to be the original installation. It was not determined if the parking lot lighting fixtures meet the requirements for IESNA full cut-off or partial cut-off.

All site lighting wiring is the original wiring. The staff indicated that the site lighting wiring is deteriorating rapidly. The site lighting wiring periodically fails during heavy rain storms.

Communication System

The campus is served by one campus wide telephone system. The telephone system PBX is located in the Condike. The campus is served by a fiber optic data network. All buildings are connected to the network and the head end servers are located in Percival. All voice and data wiring is installed in underground ductbank and manhole system.

Lighting

As part of an ongoing energy efficiency program, the T12 lamps in existing fixtures have been retrofitted with T12 lamps and ballasts. In most classes the existing fixture was retrofitted. In some areas new fixtures with T8 or compact fluorescent lamps.

Condike Science Building

Electrical Service

The Condike Building is presently served with a 4160-volt primary electric service derived from Herlihy Hall. The electrical service is rated at 2000-ampere, 120/208 volts, 3-phase, 4-wire, 60-hertz. The original main electric service consists of a 5KV primary switch, transformer and 120/208-volt distribution system and the equipment was installed in 1963.

It appears that existing electrical service capacity is inadequate to serve additional major electrical loads and due to age should be replaced during a major renovation to the building. The electric service entrance equipment and all panelboards and feeders are original and are approximately 43 years old. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It appears that existing electrical panels are inadequate to serve additional major electrical loads and due to age should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator located in the basement. The natural gas-driven, radiator-cooled emergency generator is rated at 55 KW, 120/208-volts, 3-phase, 4-wire, 60-hertz. It appears that the generator is the original unit installed in 1963.

It appears that the generator provides emergency lighting only In Condike, Weston and Sanders. The buildings appear to be served by a combination of emergency only fixtures and normal/emergency fixtures. There is no emergency lighting provide in laboratories and classrooms.

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed.

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 2' lens troffers. Occupancy sensors have been installed in the majority of classrooms only. It appears that some lamps in some fixtures have been changed from T12 to T8. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is not sprinkled. Since the building does not have a sprinkler system, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is a Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and non-ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Some of the exit signs appear to be original incandescent type units. In a few areas, new LED exit signs have been installed.

Lecture Hall Lighting and Sound Systems

The Lecture lighting system is a Creston dimming and sound system. The dimmer rack is located in a closet at stage left with the controls located in the control booth and stage. The lighting consists of quartz downlighs and fluorescent strip fixtures. Lighting levels are poor in the lecture hall.

The lecture hall sound system consists of speakers, amplifiers and microphones. TEC did not observe the system in operation.

Because of the age, quality of light and the condition of the system, we recommend that a new Lighting and A/V system be installed.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

Edgerly Hall

Electrical Service

Edgerly Hall electric service is rated at 120/208-volt and is served from the Dupont 120/208-volt switchboard and service electrical feeders are run between buildings in the tunnel system. The building is served by a 400-ampere main distribution panel, however the building electric service is served from a 175-ampere circuit breaker in the Dupont switchboard. The manufacturer for the majority of panels appears to be General Electric.

It appears that existing electrical service capacity is inadequate to serve additional major electrical loads and due to age should be replaced during a major renovation to the building. The electric service entrance equipment and all panelboards and feeders are original and are approximately 35 years old. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

<u>Electrical Distribution</u>

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It is unknown if any knob and tube wiring or cloth insulated wiring is still used in the building. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

<u>Emergency Light and Power System</u>

The emergency power for the building is derived from an emergency generator located Dupont Hall. The building does not have an automatic transfer switch, it appears multiple buildings share the same transfer switch.

It appears that the generator serve emergency lighting only. The emergency lighting system consists of emergency-only lighting fixtures located in the corridors and stairwells only. The lighting coverage in these areas appears to be inadequate. Exit signs in public areas appear to be connected to the emergency system.

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed including an automatic transfer switch dedicated to this building..

<u>Lighting and Receptacle Systems</u>

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 4' lens troffers. There are no occupancy sensors installed in the building. It appears that some lamps in some fixtures have been changed from T12 to T8. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. As required, receptacles have been added to serve equipment in classroom using surface metal raceways. The quantity of receptacles is insufficient for classroom and office requirements.

<u>Fire Alarm System</u>

The building is not sprinkled. Since the building does not have a sprinkler system, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is a Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. Original horn/light units were replaced with ADA horn/strobe units, however the new devices were installed in the original locations and do not meet ADA/NFPA mounting requirements. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. All exit signs appear to be original incandescent type units.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. The majority of classrooms have A/V systems consisting of LCD projectors, speakers and computer. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

Miller Hall

Electrical Service

Miller Hall electric service is rated at 120/208-volt and is served from the Dupont 120/208-volt switchboard and service electrical feeders are run between buildings in the ductbank system. The building is served by a 400-ampere disconnect switch and panel, however the building electric service is served from a 250-ampere circuit breaker in the Dupont switchboard. The manufacturer for the main disconnect switch and panel is the defunct Frank Adams Company..

It appears that existing electrical service capacity is inadequate to serve additional major electrical loads and due to age should be replaced during a major renovation to the building. The electric service entrance equipment and all panelboards and feeders are original and are approximately 35-40 years old. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. A few new panels have been installed over the years to serve areas renovated including the elevator. It is unknown if any knob and tube wiring or cloth insulated wiring is still used in the building. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator located Dupont Hall. The building does not have an automatic transfer switch, it appears multiple buildings share the same transfer switch.

It appears that the generator serve emergency lighting only. The emergency lighting system consists of emergency-only lighting fixtures located in the corridors and stairwells only. The lighting coverage in these areas appears to be inadequate. Exit signs in public areas appear to be connected to the emergency system.

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed including an automatic transfer switch dedicated to this building..

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 4' lens troffers. There are no occupancy sensors installed in the building. In renovated areas, 2' x 4" lens troffers were used In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. As required, receptacles have been added to serve equipment in classroom using surface metal raceways. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is not sprinkled, except for one standpipe. Since the building does not have a sprinkler system, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is a Edwards 5700 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and non-ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. All exit signs appear to be of the LED type units.

<u>Communications</u>

The building is served by a PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per workstation. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. The building does appear to have a wireless data network. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

Holmes Dining Hall

During the summer of 2006, this building was being extensively renovated and was not inspected by our office.

Parkinson Gymnasium

<u>Electrical Service</u>

Parkinson Gymnasium electric service is rated at 120/208-volt and is served from the Dupont 120/208-volt switchboard and service electrical feeders are run between buildings in the ductbank system. The building is served by a 400-ampere main distribution panel, however the building electric service is served from a 225-ampere circuit breaker in the Dupont switchboard.

The electric service entrance equipment and all panelboards and feeders are original and are approximately 50 years old. There appears to be a minimal number of spare circuits available in the panels. The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

<u>Electrical Distribution</u>

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

<u>Emergency Light and Power System</u>

The emergency power for the building is derived from an emergency generator located Dupont Hall. The building does not have an automatic transfer switch, it appears multiple buildings share the same transfer switch.

It appears that the generator serve emergency lighting only. The emergency lighting system consists of emergency-only lighting fixtures located in the corridors and stairwells only. The lighting coverage in these areas appears to be inadequate. In addition, several areas are protected by self contained emergency battery lights. Exit signs in public areas appear to be connected to the emergency system.

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed including an automatic transfer switch dedicated to this building..

Lighting and Receptacle Systems

It appears that lighting fixtures in corridors, offices, locker rooms and toilets, and offices are surface or pendent mounted 1' x 4' linear fixtures and HID pendent fixtures in the gym. There are ono occupancy sensors in the building. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is adequate.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all spaces.

Fire Alarm System

The building is not sprinkled. Since the building does not have a sprinkler system, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is an Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. All exit signs appear to be of the incandescent and LED type units.

Communications

The building is served by an Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per workstation.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

Thompson Hall

Electrical Service

Thompson Hall electric service is rated at 120/208-volt and is served from the Dupont 120/208-volt switchboard and service electrical feeders are run between buildings in the tunnel system. The building is served by a 400-ampere main distribution panel, however the building electric service is served from a 250-ampere circuit breaker in the Dupont switchboard. Distribution panel appears to have been installed fairly recently.

It appears that existing electrical service capacity is inadequate to serve additional major electrical loads and due to age should be replaced during a major renovation to the building. The electric service entrance equipment and the majority of panelboards and feeders are original and are approximately 30 to 40 years old. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It is unknown if any knob and tube wiring or cloth insulated wiring is still used in the building. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator located Dupont Hall. The building does not have an automatic transfer switch, it appears multiple buildings share the same transfer switch.

It appears that the generator serve emergency lighting only. The emergency lighting system consists of emergency-only lighting fixtures located in the corridors and stairwells only. The lighting coverage in these areas appears to be inadequate. Exit signs in public areas appear to be connected to the emergency system.

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed including an automatic transfer switch dedicated to this building..

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface or pendent mounted 1' x 4' linear fixtures and 2' x 4' lens troffers. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. As required, receptacles have been added to serve equipment in classroom using surface metal raceways. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is not sprinkled. Since the building does not have a sprinkler system, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is a Edwards 5700 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. All exit signs appear to be of the LED type units.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. The majority of classrooms have A/V systems consisting of LCD projectors, speakers and computer. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

Percival Hall

Electrical Service

Percival Hall electric service is rated at 120/208-volt and is served from the Dupont 120/208-volt switchboard and service electrical feeders are run between buildings in the tunnel system. The building is served by a 400-ampere main distribution panel, and the building electric service is served from a 400-ampere circuit breaker in the Dupont switchboard.

It appears that existing electrical service capacity is inadequate to serve additional major electrical loads and due to age should be replaced during a major renovation to the building. The electric service entrance equipment and all panelboards and feeders are original and are approximately 30 to 40 years old. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It is unknown if any knob and tube wiring or cloth insulated wiring is still used in the building. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator located Dupont Hall. The building does not have an automatic transfer switch, it appears multiple buildings share the same transfer switch.

It appears that the generator serve emergency lighting only. The emergency lighting system consists of emergency-only lighting fixtures located in the corridors and stairwells only. The lighting coverage in these areas appears to be inadequate. Exit signs in public areas appear to be connected to the emergency system.

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed including an automatic transfer switch dedicated to this building..

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface or pendent mounted 1' x 4' linear fixtures and 2' x 4' lens troffers. There are occupancy sensors installed in classrooms only. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. As required, receptacles have been added to serve equipment in classroom using surface metal raceways. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is not sprinkled. Since the building does not have a sprinkler system, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is a Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. Original horn/light units were replaced with ADA horn/strobe units in corridors only. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Exit signs appear to be a mixture of incandescent and LED type units.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. The majority of classrooms have A/V systems consisting of LCD projectors, speakers and computer. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

<u>Auditorium Lighting and Sound Systems</u>

The auditorium lighting system is a 24 dimmer Strand dimming system. The dimmer rack is located on the stage with the controls located on the stage and control booth. The system appears to only control the theatrical lighting only. House lighting is controlled by switches.

The auditorium house lights consist of recessed fluorescent “skylight” fixtures that are controlled by local switch. The theatrical lighting system consists of border lights hung on light pipes with connector strips above each light pipe and each light pipe contains portable spots or flood lights. All connector strips and light bridge fixtures are dimmer controlled. There does not appear to be aisle lightings in the auditorium.

Since the system is poorly design and installed, we recommend that a new proper theatrical lighting system be installed.

The auditorium sound system equipment consists of speakers, 100w amplifier and four microphone inputs. The system does not provide assistive listening for ADA and appears to be very limited in scope.

Anthony Hall

<u>Electrical Service</u>

Anthony Hall electric service is rated at 120/208-volt and is served from the Dupont 120/208-volt switchboard and service electrical feeders are run between buildings in the manhole and ductbank system. The building is served by a 400-ampere main distribution panel, and the building electric service is served from a 200-ampere circuit breaker in the Dupont switchboard. It appears that the electric service panels were installed during renovations in 1960 and 1982.

It appears that existing electrical service capacity is inadequate to serve additional major electrical loads and due to age should be replaced during a major renovation to the building. The electric service entrance equipment and all panelboards and feeders are original and are approximately 30 to 40 years old. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

<u>Electrical Distribution</u>

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator located Dupont Hall. The building does not have an automatic transfer switch, it appears multiple buildings share the same transfer switch.

It appears that the generator serve emergency lighting only. The emergency lighting system consists of emergency-only lighting fixtures located in the corridors and stairwells only. The lighting coverage in these areas appears to be inadequate. Exit signs in public areas appear to be connected to the emergency system.

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed including an automatic transfer switch dedicated to this building..

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface or pendent mounted 1' x 4' linear fixtures and 2' x 4' lens troffers. There are occupancy sensors installed in classrooms only. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is adequate.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in the garage and offices. As required, receptacles have been added to serve equipment in offices using surface metal raceways. The quantity of receptacles is insufficient for office requirements.

Fire Alarm System

The building is partially sprinkled, approximate 75% coverage. Since the building does not have 100% sprinkler coverage, fire alarm system heat detectors have been installed in most rooms. The fire alarm system is an Edwards 2400 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Exit signs appear to be a mixture of incandescent and LED type units.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per workstation. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

Hammond Library and Campus Center Building

Electrical Service

The Hammond Building is presently served with a 13.8 KV primary electric service derived from Herlihy Hall. The electrical service is rated at 2000-ampere, 277/480-volts, 3-phase, 4-wire, 60-hertz. The original main electric service consists of a 13.8 KV primary switch, transformer and 277-480-volt distribution system and the equipment was installed in 1975. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It appears that existing electrical panels are inadequate to serve additional major electrical loads and should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator located in the basement. The diesel driven, radiator-cooled emergency generator is rated at 200 KW, 120/208-volts, 3-phase, 4-wire, 60-hertz. It appears that the generator is the original unit installed in 1975. The buildings appear to be served by a combination of emergency only fixtures and normal/emergency fixtures. The emergency generator is located in the basement mechanical room. Per present day codes, the generator and associated life safety emergency equipment should be located in an 2 hour emergency

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed.

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 2' lens troffers. It appears that some lamps in most fixtures have been changed from T12 to T8. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is not sprinkled. Since the building does not have a sprinkler system, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is a Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and non-ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Some of the exit signs appear to be original incandescent type units. In a few areas, new LED exit signs have been installed.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

Conlon Industrial and Fine Arts Building

Electrical Service

The Conlon Building is presently served with a 13.8 KV primary electric service derived from Dupont Hall. The electrical service is rated at 2000-ampere, 277/480-volts, 3-phase, 4-wire, 60-hertz. The original main electric service consists of a 13.8 KV primary switch, transformer and 277-480-volt distribution system and the equipment was installed in 1975. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It appears that existing electrical panels are inadequate to serve additional major electrical loads and should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an exterior emergency generator located outside under an elevated walkway. The natural gas driven, radiator-cooled emergency generator is rated at 100 KW, 120/208-volts, 3-phase, 4-wire, 60-hertz. It appears that the generator is the original unit installed in 1975. The buildings appear to be served by a combination of emergency only fixtures and normal/emergency fixtures. The emergency automatic transfer switch and panelboards are located in the basement electric room. Per present day codes, the automatic transfer switch and associated life safety emergency equipment should be located in an 2 hour emergency

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed.

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 2' lens troffers. It appears that some lamps in most fixtures have been changed from T12 to T8. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is partially sprinkled. Since the building does not have 100% sprinkler system, fire alarm system heat detectors have been installed in most rooms. The fire alarm system is a Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and non-ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units in other spaces. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Some of the exit signs appear to be original incandescent type units. In a few areas, new LED exit signs have been installed.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

Dupont Facilities and Power Plant Building

Electrical Service

The Dupont building serves as the electric service distribution point for several buildings on campus, refer to the campus/site information on page 1. The building also provides emergency power for several buildings. In addition, the building also provide heat and steam for several buildings. All load centers and switchboards in the building are Federal Pacific equipment. Federal Pacific unit load center equipment is obsolete and it is difficult to find replacement parts. It is our understanding that circuit breakers in the unit load centers have failed. This equipment should be replaced during a renovation project.

The Dupont electrical service is rated at 2500-ampere, 277/480-volts, 3-phase, 4-wire, 60-hertz. The original main electric service consists of a 13.8 KV primary switch, transformer and 277-480-volt distribution system and the equipment was installed in 1976. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. The equipment is manufatured by Federal Pacific and is beginning to fail. It appears that existing electrical panels are inadequate to serve additional major electrical loads and should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator in the mechanical room. The diesel driven, radiator-cooled emergency generator is rated at 250 KW, 120/208-volts, 3-phase, 4-wire, 60-hertz. It appears that the generator is the original unit installed in 1975. This generator in addition serves multiple surrounding buildings. The buildings appear to be served by a combination of emergency only fixtures and normal/emergency fixtures. The emergency automatic transfer switch and panelboards are located in the basement electric room. Per present day codes, the automatic transfer switch and associated life safety emergency equipment should be located in an 2 hour emergency

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed.

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 2' lens troffers. It appears that some lamps in most fixtures have been changed from T12 to T8. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is partially sprinkled. Since the building does not have 100% sprinkler system, fire alarm system heat detectors have been installed in most rooms. The fire alarm system is an Edwards 6500 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and non-ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There appears to be a deficiency of A/V units in other spaces. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Some of the exit signs appear to be original incandescent type units. In a few areas, new LED exit signs have been installed.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per workstation. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

McKay Campus Building

Electrical Service

The McKay Building is presently served with a 13.8 KV primary electric service derived from National Grid. The electrical service is rated at 2000-ampere, 277/480-volts, 3-phase, 4-wire, 60-hertz. The original main electric service is located in building “B” consists of a 13.8 KV primary switch, transformer and 277-480-volt distribution system and the equipment was installed in 1969

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced.

Emergency Light and Power System

The emergency power for the building is derived from an emergency generator located in the basement. The diesel driven, radiator-cooled emergency generator is rated at 250 KW, 120/208-volts, 3-phase, 4-wire, 60-hertz. It appears that the generator is the original unit installed in 1969. The buildings appear to be served by a combination of emergency only fixtures and normal/emergency fixtures. The emergency generator is located in the basement mechanical room. Per present day codes, the generator and associated life safety emergency equipment should be located in an 2 hour emergency

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed.

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 2' lens troffers. It appears that some lamps in most fixtures have been changed from T12 to T8. In all rooms including corridors, lighting fixtures are controlled by local switches. Lighting in the gymnasium is HID high bay fixtures. Overall quality of lighting in the building is adequate.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is partially sprinkled. Since the building does not have 100% sprinkler coverage, fire alarm system heat detectors have been installed in all rooms. The fire alarm system is a Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and non-ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Some of the exit signs appear to be original incandescent type units. In a few areas, new LED exit signs have been installed.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

Auditorium Lighting and Sound Systems

The auditorium lighting system is a 96 dimmer Strand CD80 dimming system. The dimmer rack is located on the stage with the controls located on the stage and control booth. The system appears to control the theatrical lighting and house lighting. The system appears to be 15 to 20 years old. The equipment rack is filled with dust and must be cleaned immediately. This could be a fire hazard..

The auditorium house lights consist of recessed incandescent down light fixtures.. The theatrical lighting system consists of three rows of electric border lights hung on light pipes with connector strips above each light pipe on the stage. There is a catwalk above the house which provide one row of theatrical lighting locations.. All connector strips and light bridge fixtures are dimmer controlled. There does not appear to be aisle lightings in the auditorium.

Since the system is old, we recommend that a new proper theatrical lighting system be installed.

The auditorium sound system equipment consists of speakers, amplifiers, and microphone inputs. The system was installed approximately five years ago. The system has only two speakers (left and right of the proscenium) but does not have a center speaker cluster or fill-in speakers. Speakers appear to be approximately 5 years old. The sound system equipment is located in the control both and is a combination of old and new equipment. There does not appear to be an assistive listening system. We recommend that a new sound system consisting of left, right, center and fill-in speakers, amplifiers, equalizers, assistive listening system, wireless microphone.

Conlon Industrial and Fine Arts Building

Electrical Service

The Conlon Building is presently served with a 13.8 KV primary electric service derived from Dupont Hall. The electrical service is rated at 2000-ampere, 277/480-volts, 3-phase, 4-wire, 60-hertz. The original main electric service consists of a 13.8 KV primary switch, transformer and 277-480-volt distribution system and the equipment was installed in 1975. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 40 to 50 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It appears that existing electrical panels are inadequate to serve additional major electrical loads and should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from an exterior emergency generator located outside under an elevated walkway. The natural gas driven, radiator-cooled emergency generator is rated at 100 KW, 120/208-volts, 3-phase, 4-wire, 60-hertz. It appears that the generator is the original unit installed in 1975. The buildings appear to be served by a combination of emergency only fixtures and normal/emergency fixtures. The emergency automatic transfer switch and panelboards are located in the basement electric room. Per present day codes, the automatic transfer switch and associated life safety emergency equipment should be located in an 2 hour emergency

Based on the condition of the existing emergency generator and emergency distribution system, a new emergency generator and new lighting and power emergency distribution systems should be installed.

Lighting and Receptacle Systems

It appears that lighting fixtures in classrooms, corridors, and offices are surface mounted 1' x 4' linear fixtures and 2' x 2' lens troffers. It appears that some lamps in most fixtures have been changed from T12 to T8. In all rooms including corridors, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in all classrooms and offices. The quantity of receptacles is insufficient for classroom and office requirements.

Fire Alarm System

The building is partially sprinkled. Since the building does not have 100% sprinkler system, fire alarm system heat detectors have been installed in most rooms. The fire alarm system is a Simplex 4002 series zoned system consisting of a control panel, annunciator, manual pull stations, heat detectors, smoke detectors, and non-ADA horn/light notification devices. All alarms signals are transmitted to the Fire Department via radio master box system. There are no horn/strobe light units in classrooms and there appears to be a deficiency of A/V units in other spaces. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

Exit Signs

There are exit signs located in all paths of egress. Some of the exit signs appear to be original incandescent type units. In a few areas, new LED exit signs have been installed.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

Sanders Administration Building

Electrical Service

Sanders electric panels are served from the Condike Building and are rated at 120/208-volt. All panelboards and feeders are either the original equipment installed in 1963 or during the renovation project in 1983.

The life expectancy for electrical equipment including feeders is approximately 35 to 45 years. During a major renovation to the building the original electric distribution system equipment installed in 1963 should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced since installation. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from the Condike building generator. It appears that the generator serve emergency lighting only. TEC did not observe the emergency lighting system in operation and therefore we assumes that the lighting coverage in these areas appears to be inadequate. Exit signs in public areas appear to be connected to the emergency system.

Based on the age, a new emergency lighting system shall be installed when the building is renovated.

Lighting and Receptacle Systems

The majority of lighting fixtures in offices and classrooms are 2' x 4' linear T8 lighting fixtures. There are no occupancy sensors installed in the building. In all rooms including corridors, changing rooms, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is adequate.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in the building..

Fire Alarm System

The building is not sprinkled. The fire alarm devices are connected to the Condike building fire alarm system and the manufacturer is Simplex 4002. There are heat detectors in most spaces, however the building requires 100% smoke detector coverage due to the lack of a sprinkler system. There is a deficiency of A/V units in the building. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

A new Simplex fire alarm system consisting of smoke detectors, heat detectors, A/V notification devices shall be installed..

Exit Signs

There are exit signs located in all paths of egress. Exit signs appear to be the original incandescent edge lit type units.

Communications

The building is served by a Avaya PBX-type telephone system. Telephones have been installed at all office workstation locations.

There is typically one data outlet per classroom and one data outlet per workstation. There is one computer lab in the building. The data network consists of Cat 5 wiring and there is at least one IDF closet per floor. The majority of classrooms have A/V systems consisting of LCD projectors, speakers and computer. IDF closets are connected to the MDF room with multi-strand fiber optic cable.

There does not appear to be a security system in the building.

All clocks appear to be 120-volt standalone clocks.

Lecture Hall Lighting and Sound Systems

The lecture hall lighting system is a Crestron dimming system. The dimmer rack is located in a closet with the controls located on the stage and control booth. The system appears to control all lighting. The system appears to be approximately 10 years old. The crestron lighting system appears to be integrated into a Crestron audio/visual control system.

The house lighting consist of recessed incandescent down light fixtures and linear fluorescent fixtures.

The auditorium sound system equipment consists of speakers, amplifiers, and microphone inputs. The system was installed approximately five to ten years ago. The system has only two speakers (left and right) but does not have a center speaker cluster or fill-in speakers. Speakers appear to be approximately 5 years old. The sound system equipment is located in the control both and is a combination of old and new equipment.

Weston Auditorium

Electrical Service

Weston Auditorium electric panels are served from the Condike Building and are rated at 120/208-volt. All panelboards and feeders are the original equipment and was installed in 1963.

The building at this times is not air conditioned. It appears that existing electrical service capacity is inadequate to serve additional major electrical loads (air conditioning) and due to age should be replaced during a major renovation to the building. The electric service entrance equipment and all panelboards and feeders are original and are over 40 years old. There appears to be a minimal number of spare circuits available in the panels.

The life expectancy for electrical equipment including feeders is approximately 35 to 45 years. During a major renovation to the building the electric distribution system should be replaced.

Electrical Distribution

During one walk-through of the building it appeared to us that the majority of the existing panelboards and associated feeders have not been upgraded or replaced. It appears that existing electrical panels are inadequate to serve additional major electrical loads and dues age should be replaced during a major renovation to the building.

Emergency Light and Power System

The emergency power for the building is derived from the Condike building generator. It appears that the generator serve emergency lighting only. TEC did not observe the emergency lighting system in operation and therefore we assumes that the lighting coverage in these areas appears to be inadequate. Exit signs in public areas appear to be connected to the emergency system.

Based on the age, a new emergency lighting system shall be installed when the building is renovated.

Lighting and Receptacle Systems

The house lighting in the Auditorium consists of recessed incandescent downlights. The auditorium does not have aisle lighting. In stage areas including storage rooms and changing rooms, lighting fixtures are surface or pendent mounted 1' x 4' linear fixtures. There are no occupancy sensors installed in the building. In all rooms including corridors, changing rooms, lighting fixtures are controlled by local switches. Overall quality of lighting in the building is poor.

When areas of the building are renovated, we recommend that a new lighting system be installed consisting of lighting fixtures, switches, and occupancy sensors that meet the requirements of the State Energy Code.

There is a very limited number of receptacles in the building..

Fire Alarm System

The building is not sprinkled. The fire alarm devices are connected to the Condike building fire alarm system and the manufacturer is Simplex 4002. There are heat detectors in most spaces, however the building requires 100% smoke detector coverage due to the lack of a sprinkler system. There is a deficiency of A/V units in the auditorium and a voice evacuation system is required.. In addition, it appears that the mounting heights of some fire alarm system devices do not meet the requirements of NFPA 72 and MAAB.

A new Simplex fire alarm system consisting of smoke detectors, heat detectors, A/V notification devices shall be installed. The system shall be a voice evacuation system.

Exit Signs

There are exit signs located in all paths of egress. Exit signs appear to be the original incandescent edge lit type units.

Communications

There are no telephones in the building and we were unable to find any data outlets in the building. It appears that the building may have wireless data network coverage from Condike, but this was not confirmed. .

There does not appear to be a security system in the building.

Auditorium Lighting and Sound Systems

The auditorium lighting system is a 96 dimmer Strand CD80 dimming system. The dimmer rack is located on the stage with the controls located on the stage and control booth. The system appears to control the theatrical lighting and house lighting. The system appears to be 15 to 20 years old. The equipment rack is filled with dust and must be cleaned immediately. This could be a fire hazard..

The auditorium house lights consist of recessed incandescent down light fixtures.. The theatrical lighting system consists of three rows of electric border lights hung on light pipes with connector strips above each light pipe on the stage. There is a catwalk above the house which provide one row of theatrical lighting locations.. All connector strips and light bridge fixtures are dimmer controlled. There does not appear to be aisle lightings in the auditorium.

Since the system is old, we recommend that a new proper theatrical lighting system be installed.

The auditorium sound system equipment consists of speakers, amplifiers, and microphone inputs. The system was installed approximately five years ago. The system has only two speakers (left and right of the proscenium) but does not have a center speaker cluster or fill-in speakers. Speakers appear to be approximately 5 years old. The sound system equipment is located in the control both and is a combination of old and new equipment. There does not appear to be an assistive listening system. We recommend that a new sound system consisting of left, right, center and fill-in speakers, amplifiers, equalizers, assistive listening system, wireless microphone.

Major Renovation and Modernization - Electrical Scope of Work:

Estimated electrical construction cost do not include escalation cost.

Condike Science Building

Estimated Electrical Construction Cost: $1,100,000 (41,000 sq. ft estimate)

1. Furnish and install underground primary electric service conduits and 15 KV primary feeders from the existing Dupont 15KV substation to the new 15 KV load center.

2. Furnish and install new a 15KV load center consisting of two primary switches, 13.8 KV primary-277/480-volt secondary transformer, main circuit breaker cubicle and 480-volt distribution section. Provide metering that is compatible with Owner's energy management system.

3. Furnish and install the required lighting and power panels, including the associated feeders in conduit and step down transformers. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms. Provide a power panel in each science laboratory.

4. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

5. Furnish and install the power wiring in conduit for the elevator.

6. Furnish and install power wiring in conduit for the sprinkler system fire pump, include a fire pump cubicle in load center (if required).

7. Furnish and install a MEC Article 700 life safety emergency light and power system including a diesel-driven emergency generator and automatic transfer switch. The system shall consist of lighting fixtures, exit signs, conduit, wire, transfer switch, supervisory relays, panelboards, and cabinets. The generator shall be rated at 277/480 volts, 3-phase, 4-wire, 60-hertz. Generator to be furnished with sub-base diesel tank. Furnish and install a MEC Article 702 non-essential standby power system including automatic transfer switch, panelboards, conduit and wire.

8. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in conclead locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

9. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

10. Furnish and install a variable voltage system in the physic rooms.

11. Furnish and install pole-mounted and wall mounted lighting fixtures for walkways and parking areas.

12. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

13. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

14. Furnish and install a building lighting management system for all corridors, stairwells, common toilets and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

15. Furnish and install voice/data/cable TV system throughout the building. Furnish and install audio/visual systems in all classrooms.

16. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

17. Furnish and install lighting occupancy sensors in all toilets, storage, offices and classrooms, and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

18. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations is a part of the Electrical Subcontract.

19. Campus telephone system is located in the basement, maintain the campus telephone system during construction.

Edgerly Hall

Estimated Electrical Construction Cost: $500,000 (25,609 sq. ft estimate)

1. Furnish and install the multiple secondary electric service cables from the Dupont 120/208-volt switchboard via service tunnel.

2. Furnish and install new circuit breaker in Dupont Building 120/208 distribution switchboard.

3. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner’s energy management system.

4. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install the power wiring in conduit for the elevator (if required).

7. Furnish and install the power wiring in conduit and switchboard fire pump cubicle for the sprinkler system fire pump (if required).

8. Furnish and install self contained battery light units in all paths of egress.

9. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

10. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

11. Furnish and install wall mounted or pole-mounted lighting fixtures for walkways.

12. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

13. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

14. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

15. Furnish and install voice/data/cable TV system throughout the building. Furnish and install audio/visual systems in all classrooms.

16. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

17. Furnish and install lighting occupancy sensors in all toilets, classrooms, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

18. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

19. The campus main computer system servers are located on the third floor of the building. Servers would need to be relocated or maintained in place during construction.

Miller Hall

Estimated Electrical Construction Cost: $470,000 (23,460 sq. ft estimate)

1. Furnish and install the multiple secondary electric service cables from the Dupont 120/208-volt switchboard via service tunnel.

2. Furnish and install new circuit breaker in Dupont Building 120/208 distribution switchboard.

3. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner's energy management system.

4. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install the power wiring in conduit for the elevator (if required).

7. Furnish and install the power wiring in conduit and switchboard fire pump cubicle for the sprinkler system fire pump (if required).

8. Furnish and install self contained battery light units in all paths of egress.

9. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the new building.

10. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

11. Furnish and install wall mounted or pole-mounted lighting fixtures for walkways.

12. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

13. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

14. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

15. Furnish and install voice/data/cable TV system throughout the building. Furnish and install audio/visual systems in all classrooms.

16. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

17. Furnish and install lighting occupancy sensors in all toilets, classrooms, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

18. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

Thompson Hall

Estimated Electrical Construction Cost: $975,000 (51,000 sq. ft estimate)

1. Furnish and install the multiple secondary electric service cables from the Dupont 120/208-volt switchboard via service tunnel and Edgerly Hall.

2. Furnish and install new circuit breaker in Dupont Building 120/208 distribution switchboard.

3. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner's energy management system.

4. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install the power wiring in conduit for the elevator (if required).

7. Furnish and install the power wiring in conduit and switchboard fire pump cubicle for the sprinkler system fire pump (if required).

8. Furnish and install self contained battery light units in all paths of egress.

9. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

10. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

11. Furnish and install wall mounted or pole-mounted lighting fixtures for walkways.

12. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct

detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

13. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

14. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

15. Furnish and install voice/data/cable TV system throughout the building. Furnish and install audio/visual systems in all classrooms.

16. Acceptance test shall be performed on the main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

17. Furnish and install lighting occupancy sensors in all toilets, classrooms, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

18. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

Parkinson Building

Estimated Electrical Construction Cost: $400,000 (20,910 sq. ft estimate)

1. Furnish and install the multiple secondary electric service cables from the Dupont 120/208-volt switchboard via service tunnel.

2. Furnish and install new circuit breaker in Dupont Building 120/208 distribution switchboard.

3. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner’s energy management system.

4. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install the power wiring in conduit for the elevator (if required).

7. Furnish and install the power wiring in conduit and switchboard fire pump cubicle for the sprinkler system fire pump (if required).

8. Furnish and install self contained battery light units in all paths of egress.

9. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

10. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

11. Furnish and install wall mounted or pole-mounted lighting fixtures for walkways.

12. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

13. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

14. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

15. Furnish and install voice/data/cable TV system throughout the building.

16. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

17. Furnish and install lighting occupancy sensors in all toilets, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

18. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

Campus Security System

Estimated Construction Cost: $4,000 to $5,000 per pole mounted emergency phone includes installation, trenching, pole base and underground wiring. It is difficult to provide a total cost without location and quantities.

1. Furnish and install poles for the exterior emergency phone system, as required.

2. Furnish and install new underground wiring system including conduit and wire. Extend wiring back to security campus office, as required.

Underground Tunnel Repairs

Estimated Construction Cost: $5,000 to $15,000. It is difficult to provide a total cost without the scope of work being defined.

1. Furnish and install new lighting fixtures, conduit and wire, as required.

2. Furnish and install new underground wiring system including conduit and wire.

Hammond Building

Estimated Electrical Construction Cost: $400,000 (3,300,000 sq. ft estimate)

1. Furnish and install underground primary electric service conduits and 15 KV primary feeders from the existing Dupont 15KV substation to the new 15 KV load center.

2. Furnish and install new a 15KV load center consisting of two primary switches, 13.8 KV primary-277/480-volt secondary transformer, main circuit breaker cubicle and 480-volt distribution section. Provide metering that is compatible with Owner's energy management system.

3. Furnish and install the required lighting and power panels, including the associated feeders in conduit and step down transformers. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms. Provide a power panel in each science laboratory.

4. Furnish and install all heating, ventilating, air-conditioning, plumbing and kitchen power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

5. Furnish and install emergency power wiring in conduit for the elevator. Elevator shall be connected to the emergency generator

6. Furnish and install power wiring in conduit for the sprinkler system fire pump, include a fire pump cubicle in switchboard (if required).

7. Furnish and install a MEC Article 700 life safety emergency light and power system including a diesel-driven emergency generator and automatic transfer switch. The system shall consist of lighting fixtures, exit signs, conduit, wire, transfer switch, supervisory relays, panelboards, and cabinets. The generator shall be rated at 277/480 volts, 3-phase, 4-wire, 60-hertz. Generator to be furnished with sub-base diesel tank. Furnish and install a MEC Article 702 non-essential standby power system including automatic transfer switch, panelboards, conduit and wire. The elevator, kitchen, refrigeration, DDC system shall be connected to the standby system.

8. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in conclead locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

9. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

10. Furnish and install pole-mounted and wall mounted lighting fixtures for walkways and parking areas.

11. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

12. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

14. Furnish and install a building lighting management system for all corridors, stairwells, common toilets and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

15. Furnish and install voice/data/cable TV system throughout the building.

16. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

17. Furnish and install lighting occupancy sensors in all toilets, storage, library spaces, offices and classrooms, and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

18. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations is a part of the Electrical Subcontract.

Anthony Hall

Estimated Electrical Construction Cost: $395,000 (21,400 sq. ft estimate)

1. Furnish and install the multiple secondary electric service cables from the Dupont 120/208-volt switchboard via service tunnel.

2. Furnish and install new circuit breaker in Dupont Building 120/208 distribution switchboard.

3. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner's energy management system.

4. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install self contained battery light units in all paths of egress.

7. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC

cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

8. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

9. Furnish and install wall mounted or pole-mounted lighting fixtures for walkways.

10. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

11. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

12. Furnish and install voice/data system throughout the building.

13. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

14. Furnish and install lighting occupancy sensors in all toilets, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

15. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

Percival Hall

Estimated Electrical Construction Cost: $600,000 (31,544 sq. ft estimate)

1. Furnish and install the multiple secondary electric service cables from the Dupont 120/208-volt switchboard via service tunnel thru Edgerly Hall.

2. Furnish and install new circuit breaker in Dupont Building 120/208 distribution switchboard.

3. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner's energy management system.

4. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install self contained battery light units in all paths of egress.

7. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

8. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

9. Furnish and install wall mounted or pole-mounted lighting fixtures for walkways.

10. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. Voice evacuation system required in the auditorium. All fire alarm system wiring shall be installed in conduit raceways.

11. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

12. Furnish and install a complete theatrical dimming system in the auditorium. System shall consists of a dimmer rack, wall-mounted control stations, control console, outlet boxes, connector strips, theatrical lighting fixtures, conduit, and wire.

13. Furnish and install a new theatrical sound system in the auditorium. The system shall consist of sound rack, amplifiers, equalizer, auto-mixer, processors, left/right speakers, center cluster speakers, rear fill-in speakers, wireless microphones and transmitter, assistive listening system with receivers, sound control boards, conduit, and wire.

14. Furnish and install voice/data system throughout the building.

15. Furnish and install power wiring in conduit for the elevator.

16. Furnish and install power wiring in conduit for the sprinkler system fire pump, include a fire pump cubicle in load center (if required)

17. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

18. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

19. Furnish and install lighting occupancy sensors in all toilets, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

20. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

Conlon Building

Estimated Electrical Construction Cost: $2,400,000 (137,300 sq. ft estimate)

1. Furnish and install underground primary electric service conduits and 15 KV primary feeders from the existing Dupont 15KV substation to the new 15 KV load center.

2. Furnish and install new a 15KV load center consisting of two primary switches, 13.8 KV primary-277/480-volt secondary transformer, main circuit breaker cubicle and 480-volt distribution section. Provide metering that is compatible with Owner's energy management system.

3. Furnish and install the required lighting and power panels, including the associated feeders in conduit and step down transformers. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

4. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

5. Furnish and install the power wiring in conduit for the elevator.

6. Furnish and install power wiring in conduit for the sprinkler system fire pump, include a fire pump cubicle in load center (if required).

7. Furnish and install a MEC Article 700 life safety emergency light and power system including a diesel-driven emergency generator and automatic transfer switch. The system shall consist of lighting fixtures, exit signs, conduit, wire, transfer switch, supervisory relays, panelboards, and cabinets. The generator shall be rated at 277/480 volts, 3-phase, 4-wire, 60-hertz. Generator to be furnished with sub-base diesel tank. Furnish and install a MEC Article 702 non-essential standby power system including automatic transfer switch, panelboards, conduit and wire.

8. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in conclead locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

9. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

10. Furnish and install pole-mounted and wall mounted lighting fixtures for walkways and parking areas.

11. Furnish and install a complete theatrical dimming system in the TV studio. System shall consists of a dimmer rack, wall-mounted control stations, control console, outlet boxes, connector strips, theatrical lighting fixtures, conduit, and wire.

12. Furnish and install a complete dimming system in the TV studio. System shall consists of a dimmer rack, wall-mounted control stations, control console, lighting fixtures, conduit, and wire.

13. Furnish and install a new sound system in the lecture hall. The system shall consist of sound rack, amplifiers, equalizer, auto-mixer, processors, left/right speakers, center cluster speakers, wireless microphones and transmitter, assistive listening system with receivers, sound control boards, conduit, and wire.

14. Furnish and install a new sound system in the band and chorus rooms. The system shall consist of sound rack, amplifiers, equalizer, processors, speakers. And wired microphones.

15. Furnish and install the required electrical feeders for speciality equipment in the TV studio, and student newspaper.

16. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

17. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

18. Furnish and install a building lighting management system for all corridors, stairwells, common toilets and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

19. Furnish and install voice/data/cable TV system throughout the building. Furnish and install audio/visual systems in all classrooms.

20. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

21. Furnish and install lighting occupancy sensors in all toilets, storage, offices, classrooms, and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

22. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations is a part of the Electrical Subcontract.

DuPont Facilities Building

Estimated Electrical Construction Cost: $500,000 to $1,500,000 (13,577 sq. ft estimate)

1. Engage the services of a testing company to test and clean the existing 15K load center. Replace all fuses in load center.

2. Furnish and install ne 15 KV primary cables to the National Grid utility pole via metering cabinet from the main 15 KV load center.

3. Furnish and install new a 15KV load center consisting of two primary switches, 13.8 KV primary-120/208-volt secondary transformer, main circuit breaker cubicle and 208-volt distribution section. Provide metering that is compatible with Owner's energy management system.

4. Furnish and install the required lighting and power panels, including the associated feeders in conduit and step down transformers. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms. Provide a power panel in each science laboratory.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install the power wiring in conduit for the elevator.

7. Furnish and install a MEC Article 700 life safety emergency light and power system including a diesel-driven emergency generator and automatic transfer switch. The system shall consist of lighting fixtures, exit signs, conduit, wire, transfer switch, supervisory relays, panelboards, and cabinets. The generator shall be rated at 277/480 volts, 3-phase, 4-wire, 60-hertz. Generator to be furnished with sub-base diesel tank. Furnish and install a MEC Article 702 non-essential standby power system including automatic transfer switch, panelboards, conduit and wire. Heating plant including boilers shall be connected to the generator.

8. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in conclead locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

9. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

10. Furnish and install pole-mounted and wall mounted lighting fixtures for walkways and parking areas.

11. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

12. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

13. Furnish and install a building lighting management system for all corridors, stairwells, common toilets and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

14. Furnish and install voice/data system throughout the building.

15. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

16. Furnish and install lighting occupancy sensors in all toilets, storage, offices, and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

17. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations is a part of the Electrical Subcontract.

McKay Campus Buildings

Estimated Electrical Construction Cost: $3,750,000 (194,770 sq. ft estimate)

1. Furnish and install underground primary electric service conduits and 15 KV primary feeders from the existing the National Grid utility pole to the new 15 KV load center via metering cabinet.

2. Furnish and install new 15KV load centers for each buildingconsisting of primary switches, 13.8 KV primary-277/480-volt secondary transformer, main circuit breaker cubicle and 480-volt distribution section. Provide metering that is compatible with Owner's energy management system.

3. Furnish and install the required lighting and power panels, including the associated feeders in conduit and step down transformers. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms. Provide a power panel in each science laboratory.

4. Furnish and install all heating, ventilating, air-conditioning, plumbing and kitchen power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

5. Furnish and install the power wiring in conduit for the elevator.

6. Furnish and install power wiring in conduit for the sprinkler system fire pump, include a fire pump cubicle in load center (if required).

7. Furnish and install a MEC Article 700 life safety emergency light and power system including a diesel-driven emergency generator and automatic transfer switch. The system shall consist of lighting fixtures, exit signs, conduit, wire, transfer switch, supervisory relays, panelboards, and cabinets. The generator shall be rated at 277/480 volts, 3-phase, 4-wire, 60-hertz. Generator to be furnished with sub-base diesel tank. Furnish and install a MEC Article 702 non-essential standby power system including automatic transfer switch, panelboards, conduit and wire. Kitchen, cafeteria and kitchen refrigeration shall be connected to standby power.

8. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

9. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

10. Furnish and install pole-mounted and wall mounted lighting fixtures for parking, walkways and parking areas.

11. Furnish and install a complete theatrical dimming system in the auditorium. System shall consists of a dimmer rack, wall-mounted control stations, control console, outlet boxes, connector strips, theatrical lighting fixtures, conduit, and wire.

12. Furnish and install a new sound system in the auditorium. The system shall consist of sound rack, amplifiers, equalizer, auto-mixer, processors, left/right speakers, center cluster speakers, wireless microphones and transmitter, assistive listening system with receivers, sound control boards, conduit, and wire.

13. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

14. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

15. Furnish and install a building lighting management system for all corridors, stairwells, common toilets and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

16. Furnish and install voice/data/cable TV system throughout the building. Furnish and install audio/visual systems in all classrooms.

17. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

18. Furnish and install lighting occupancy sensors in all toilets, storage, offices, classrooms, and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

19. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations is a part of the Electrical Subcontract.

Sanders Hall

Estimated Electrical Construction Cost: $450,000 (26,800 sq. ft estimate)

1. Maintain existing 1983 switchboard and panels. Replace 1963 panel with new panels.

2. Furnish and install the required lighting and power panels including the associated feeders in conduit to replace 1962 panels. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

3. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

4. Furnish and install a MEC Article 700 life safety emergency light and power system, connect to existing generator in Condike Building. The system shall consist of lighting fixtures, exit signs, conduit, wire, supervisory relays, panelboards, and cabinets.

5. Furnish and install a new lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards, as required. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

6. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

7. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. Voice evacuation system required in the auditorium. All fire alarm system wiring shall be installed in conduit raceways.

8. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

9. Furnish and install a complete theatrical dimming system in the auditorium. System shall consists of a dimmer rack, wall-mounted control stations, control console, outlet boxes, connector strips, theatrical lighting fixtures, conduit, and wire.

10. Furnish and install a new theatrical sound system in the auditorium. The system shall consist of sound rack, amplifiers, equalizer, auto-mixer, processors, left/right speakers, center cluster speakers, rear fill-in speakers, wireless microphones and transmitter, assistive listening system with receivers, sound control boards, conduit, and wire.

11. Furnish and install voice/data system throughout the building.

12. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

13. Furnish and install lighting occupancy sensors in all toilets, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

14. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

Upgrading Heating Distribution System, Various Areas

Estimated Construction Cost: $100,000. It is difficult to provide a total cost without the scope of work. .

1. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

2. Furnish and install new panels and associated feeders as required and connect to existing switchboard.

Central Chilling

Estimated Construction Cost: $100,000. It is difficult to provide a total cost without the scope of work. .

1. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

2. Furnish and install new panels and associated feeders as required and connect to existing switchboard.

Campus Entrance Improvements

Estimated Construction Cost: $6,000 to $8,000 per lighting fixture/pole includes installation, trenching, pole base and underground wiring. It is difficult to provide a total cost without the scope of work. .

1. Furnish and install pole mounted lighting fixtures, as required.

2. Furnish and install a lighting management system for new site lighting.

3. Furnish and install new underground site lighting wiring system.

Site Lighting Improvements

Estimated Construction Cost: $6,000 to $8,000 per lighting fixture/pole includes installation, trenching, pole base and underground wiring. It is difficult to provide a total cost without the scope of work. .

1. Furnish and install pole mounted lighting fixtures for the parking areas and roadways.

2. Furnish and install a lighting management system for new site lighting.

3. Furnish and install new underground site lighting wiring system.

Parking Improvements

Estimated Construction Cost: $6,000 to $8,000 per lighting fixture/pole includes installation, trenching, pole base and underground wiring. It is difficult to provide a total cost without the scope of work. .

1. Furnish and install pole mounted lighting fixtures, as required.

2. Furnish and install a lighting management system for new site lighting.

3. Furnish and install new underground site lighting wiring system.

Quad Improvements

Estimated Construction Cost: $6,000 to $8,000 per lighting fixture/pole includes installation, trenching, pole base and underground wiring. It is difficult to provide a total cost without the scope of work. .

1. Furnish and install pole mounted lighting fixtures, as required.

2. Furnish and install a lighting management system for new site lighting.

3. Furnish and install new underground site lighting wiring system.

Weston Auditorium

Estimated Electrical Construction Cost: $345,000 (16,188 sq. ft estimate)

1. Furnish and install the multiple secondary electric service cables from the Condike 120/208-volt switchboard.

2. Furnish and install new circuit breaker in Condike Building 120/208 distribution switchboard.

3. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner's energy management system.

4. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms.

5. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

6. Furnish and install a MEC Article 700 life safety emergency light and power system, connect to existing generator in Condike Building. The system shall consist of lighting fixtures, exit signs, conduit, wire, supervisory relays, panelboards, and cabinets.

7. Furnish and install a new lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards, as required. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

8. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

9. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. Voice evacuation system required in the auditorium. All fire alarm system wiring shall be installed in conduit raceways.

10. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

11. Furnish and install a complete theatrical dimming system in the auditorium. System shall consists of a dimmer rack, wall-mounted control stations, control console, outlet boxes, connector strips, theatrical lighting fixtures, conduit, and wire.

12. Furnish and install a new theatrical sound system in the auditorium. The system shall consist of sound rack, amplifiers, equalizer, auto-mixer, processors, left/right speakers, center cluster speakers, rear fill-in speakers, wireless microphones and transmitter, assistive listening system with receivers, sound control boards, conduit, and wire.

13. Furnish and install voice/data system throughout the building.

14. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

15. Furnish and install lighting occupancy sensors in all toilets, offices, storage and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

16. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations are a part of the Electrical Subcontract.

Project for Consideration Beyond 10-Year Plan

Parking Garage

Estimated Electrical Construction Cost: $200,000

1. Furnish and install the multiple secondary electric service cables for the switchboard.

2. Furnish and install a main secondary switchboard rated at 120/208-volts, 3-phase, 4-wire, 60-hertz. The switchboard shall consist of a main breaker section, metering section, and 208-volt feeder section. Provide metering that is compatible with Owner's energy management system.

3. Furnish and install the required lighting and power panels including the associated feeders in conduit. Lighting panels shall be installed in the electric room.

4. Furnish and install all heating, ventilating, air-conditioning, power wiring, magnetic starters and disconnect switches for the elevator lobby. All power wiring shall be installed in conduit.

5. Furnish and install an emergency lighting system.

6. Furnish and install a new lighting system in the parking garage. All wiring shall be installed in rigid steel conduit. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the garage.

7. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

8. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors,, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

9. Furnish and install a building lighting management system for all corridors, stairwells, common toilets, and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

10. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical

New Science and Technology Center

Estimated Electrical Construction Cost: $25.00 per square foot.

1. Furnish and install underground primary electric service conduits and 15 KV primary feeders from the existing Dupont 15KV substation to the new 15 KV load center.

2. Furnish and install new a 15KV load center consisting of two primary switches, 13.8 KV primary-277/480-volt secondary transformer, main circuit breaker cubicle and 480-volt distribution section. Provide metering that is compatible with Owner's energy management system.

3. Furnish and install the required lighting and power panels, including the associated feeders in conduit and step down transformers. Lighting panels shall be installed in storage rooms and electric closets. Power panels shall be located in electric room and mechanical rooms. Provide a power panel in each science laboratory.

4. Furnish and install all heating, ventilating, air-conditioning, and plumbing power wiring, magnetic starters and disconnect switches. All power wiring shall be installed in conduit.

5. Furnish and install the power wiring in conduit for the elevator.

6. Furnish and install power wiring in conduit for the sprinkler system fire pump, include a fire pump cubicle in load center (if required).

7. Furnish and install a MEC Article 700 life safety emergency light and power system including a diesel-driven emergency generator and automatic transfer switch. The system shall consist of lighting fixtures, exit signs, conduit, wire, transfer switch, supervisory relays, panelboards, and cabinets. The generator shall be rated at 277/480 volts, 3-phase, 4-wire, 60-hertz. Generator to be furnished with sub-base diesel tank. Furnish and install a MEC Article 702 non-essential standby power system including automatic transfer switch, panelboards, conduit and wire.

8. Furnish and install a lighting and receptacle system in each of the areas within the building including all branch circuit wiring from the respective panelboards. All lighting and receptacle branch circuit wiring installed exposed, concealed in concrete floor slabs, and underground shall be installed in conduit raceways. All wiring in concealed locations shall be type MC

cable. In general, fluorescent-type lighting fixtures shall be installed in all areas throughout the building.

9. Furnish and install an internally illuminated exit sign system at all paths of egress within the buildings.

10. Furnish and install a variable voltage system in the physic rooms.

11. Furnish and install pole-mounted and wall mounted lighting fixtures for walkways and parking areas.

12. Furnish and install a complete addressable-type Simplex 4100U fire alarm system throughout the building. The system shall consist of pull stations, smoke detectors, heat detectors, duct detectors, annunciator, standby batteries, and horns with strobe lights. All fire alarm system wiring shall be installed in conduit raceways.

13. Furnish and install a complete lightning protection system consisting of a lightning terminals, down conductors and ground grid. The system shall be a UL master label certificate system.

14. Furnish and install a building lighting management system for all corridors, stairwells, common toilets and all other common areas. System shall consists of control panel, time-clock, relays, and low-voltage switches. All wiring to be either MC cable or installed in EMT conduit.

15. Furnish and install voice/data/cable TV system throughout the building. Furnish and install audio/visual systems in all classrooms.

16. Acceptance test shall be performed on the new main switchboard. The testing of the switchboard shall be done by a testing company and shall be part of the Electrical Subcontract.

17. Furnish and install lighting occupancy sensors in all toilets, storage, offices, laboratories, classrooms, and common rooms. The system shall be furnished with the required passive infrared sensors, ultrasonic sensors, dual technology sensors, power packs, slave packs, conduit, wire, and junction boxes.

18. All cutting, drilling and channeling required for the installation of the electrical work shall be performed by the Electrical Subcontractor. Fire-proofing of all such penetrations is a part of the Electrical Subcontract.

END OF SECTION