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INTRODUCTION

Planning Purpose

From a planning perspective, MTU is approaching a new frontier. With the successful completion of the four proposed capital outlay projects, the main academic campus will approach 2 million gross square feet (gsf) of buildings within a land area of 48 acres. The resulting configuration is very compact and urban in its density, yielding a very efficient campus arrangement. While many campuses are pushing for greater consolidation, MTU will soon be forced to begin looking beyond its current central campus land holdings to meet future academic-related development needs. There are a limited number of future development options within the central academic core to meet the institution’s needs beyond what we know today. After the current capital outlay proposals are in place, MTU’s historic rate of growth in the academic core (approximately 180,000 to 200,000 gsf every five years) will consume all future development options in the next 15 to 20 years.

The campus has been building from a comprehensive master plan completed in 1966 through a series of administrative updates addressing capital outlay requirements on an as needed basis. This process has served it well; however, as MTU approaches development saturation within the academic core and moves through its current visioning/strategic planning initiative, it is due for a comprehensive master plan update. Significant changes have occurred both on and off campus during the past 33 years that must be considered in order to successfully anticipate the future.

With a keen focus on student admissions and retention, the proposed capital outlay requests are critical planning priorities for Michigan Tech as they are focused to enhance the University’s undergraduate programs. The current Master Plan administrative update is addressing the following four capital outlay requests:

- A new Manufacturing Center of approximately 45,000 gsf
- Expansion of the Memorial Union by approximately 55,000 gsf
- An innovative Center for Integrated Learning and Information Technology intended to upgrade and modernize the institution’s undergraduate facilities. The Center includes an estimated Library expansion of 80,000 gsf and 120,000 gsf of undergraduate academic facilities and/or renovations to Fisher Hall. In addition, the current planning charge is to accommodate an additional 80,000 gsf for future Library expansion.
Planning Parameters and Process

The primary purpose of a master plan is to establish a framework of opportunities within which MTU can accommodate new facilities, modify existing systems, and achieve its vision in an efficient and effective manner. By establishment of an orderly direction for change, the campus can improve its unique learning environment and achieve its primary purpose: education. The 1999 amendment will allow the University to understand the planning implications inherent in the four proposed capital outlay projects.

The MTU Campus Master Plan 1999 Amendment’s study area was restricted to the campus’ academic core and more specifically to the integration of the four capital outlay projects into the campus fabric. However, due to the interrelationship of the academic core to the facilities and land south of US-41, the study did include a cursory look at this area for the establishment of pedestrian linkages and location of parking structures.

To ensure a solid understanding of existing dynamics, programmatic needs, and forces of change, an interactive planning process was utilized to engage consultants and University decision-makers who maintain a stake in the proposed capital outlay projects, including administrators, faculty, staff, and students. The results are planning recommendations that are tailored to address the many physical and programmatic issues facing Michigan Tech. The planning process included the following steps:

- **Step 1 – Project Initiation**: collection of programmatic data, critical academic adjacencies, and interrelationships; inventory of existing campus conditions; and, identification of physical planning issues
- **Step 2 – Campus Analysis**: assessment of existing conditions, critical planning issues, and identification of priority planning objectives
- **Step 3 – Exploration of Alternatives**: development and assessment of alternative organizational options for the campus core to assimilate the proposed capital outlay projects
- **Step 4 – Refinement**: development of a singular framework plan based upon the input received from the campus community
- **Step 5 – Documentation**: final refinement of the Master Plan, planning recommendations, and preparation of a written report
Planning Goals

Building Location
- Locate development consistent with the Master Plan.
- Strengthen the spatial definition of the academic core.
- Reinforce existing land use patterns and zoning.
- Optimize development capacity within the academic core.
- Establish enclosed pedestrian connections between buildings.

Campus Image
- Minimize parking lots along the public edge.
- Provide consistent open space treatment along US-41.
- Beautify campus vehicular gateways (east and west ends).
- Establish a single major identifiable visitor entrance.
- Minimize service zones along the public edge.
- Reinforce visual and physical connections with Portage Lake.
- Create visual portals into the academic core at major intersections and pedestrian entrances.

Open Space
- Strengthen the unification and hierarchy of spaces (based on its usage) within the academic core, enhancing existing unique qualities.
- Maintain open space portals into the academic core from the public edge.
- Establish a unified treatment on both sides of US-41.

Environmental
- Provide wind protection through use of buildings, plantings, and enclosed walkways.
- Optimize solar gain.
- Utilize snow creatively to mitigate extreme winter conditions and maintenance costs.

Pedestrian Linkage
- Close College Avenue and create a new linkage/campus entrance.
- Interconnect buildings with enclosed walkways.
- Establish major connections from parking to campus core.
- Provide an elevated walk across US-41 for improved pedestrian safety.
- Improve US-41 at-grade crossings.

Parking
- Consider parking structures to mitigate for parking losses from new buildings.
- Concentrate parking vs. stringing it along US-41.
- Improve visitor parking (quantity and convenience).
- Utilize a five-minute walk to major campus destinations for locating new parking facilities.
EXISTING CAMPUS CONTEXT

Proper planning for the capital outlay building expansion projects must begin with an assessment of current conditions and physical planning issues. This will allow the University to address its planning goals through the composition of these new facilities within the campus fabric. The interrelationship of campus systems will impact the location and configuration of future buildings, and as such, we must understand their existing context.

Master Plan Relationships
Campus Image

From an Image standpoint, the current capital outlay projects have the potential to transform the campus’ public edge along US-41. Today the campus presents itself within a moat of surface parking further complemented by weak to non-existent landscaping. Considering that first and last impressions are important relative to selecting an institution (according to current student surveys), MTU must do a better job of putting its best face forward.

Either end of campus (east and west) is critical in the establishment of a high-quality image befitting the University’s academic reputation. MTU must focus resources to improve these gateways and the lasting impression they afford visitors, students, employees, and passers-by alike.

The campus suffers from numerous, poorly defined entrances that are confusing to University visitors. Establishment of a singular, well-defined entrance that acts as a public vehicular portal to the institution’s heart is necessary.

The campus’ location alongside Portage Lake is often difficult to perceive. This physical and visual linkage should be amplified in order to highlight the University’s unique location. Views from the open space in front of the Library across the lake valley must be maintained.
Open Space

From an open space standpoint, the campus' organization around a strong central open space should be reinforced and, wherever possible, areas of special focus should be provided for student gatherings and activities. This hierarchy of space will improve the character and orientation of the campus structure.

Distinctive campus areas should be emphasized in order to provide spatial sequencing and hierarchy. Open space portals that physically and visually link the academic core to the highway and campus land uses beyond should be maintained and strengthened in order to unite the campus and break up the monotony of architectural façades along US-41.
Environmental Influences

From an environmental standpoint, the campus' impacts from strong winter conditions and often gale force winds that funnel through the open spaces need to be addressed. Building massing and placement should mitigate the wind tunnel effects; solar pockets should be created that extend the comfortable outdoor environment through micro climates; and, facilities should be interconnected to provide a comfortable and safe pedestrian environment responsive to MTU's unique climatic conditions.

The campus' layout must serve to mitigate the effort required for storage and removal of snow. The large equipment required for maintaining the campus throughout the winter months requires a simple yet graceful landscape. Creative utilization of the snow mounds could provide some unique solutions for buffering winds or channeling views.
Pedestrian Linkages

From a linkage standpoint, the campus' compact nature is ideal; however, connecting with facilities south of US-41 and the potential for future growth in this direction place greater importance on establishment of elevated walkways. The opportunity exists to begin establishment of a second-level, weather-enclosed pedestrian corridor system throughout the entire campus. It can be started within the current planning initiatives, and in fact is ideal due to the inherent programmatic connectivity of the Union, Library, and Fisher Hall. Increasing connectivity to enhance environmental comfort, safety, as well as increased interaction between students and faculty, is a key goal of the Framework Plan.

It is not inconceivable that the University would benefit from multiple elevated walkways across US-41. These would not only address the existing need to provide safe access from the student residences to the east, but also to connect future academic facilities that may develop south of the highway as the academic core reaches development saturation.

At-grade crossings will still be necessary and need to be as well-defined as possible, including pavement demarcation, warning signage/flashers, and boulevard landing areas for safe harborage as the two vehicular travel lanes are negotiated.
Parking

From a parking standpoint, as new academic facilities displace parking within the academic core, a strategy for replacement is required. Parking must be in balance with the goal of maintaining the focus of the campus core for academic functions while also maximizing convenience and safety. A five-minute walk from parking to major campus destinations was established as a planning objective.

Parking adjacent to the Union and Library is also necessary for access to these public resources. A growing desire to utilize the Memorial Union for special banquets will also require adequate and convenient parking.

Given the probability that a parking structure will occur along the campus' public edge, it will require attention to the architectural detailing so as to further enhance the University's image rather than detract from it.
Facility and Utility Assessment

MTU's campus development plan was prepared in the mid-60's to provide for orderly and meaningful development of the academic programs and physical plant at MTU. In conjunction with this plan, a campus utility study was conducted to develop a master plan for providing adequate utility services to all physical plant facilities.

The campus development plan and utility study was prepared for a campus enrollment of 10,000 students and a campus size of 5,300,000 gsf. Current campus enrollment is 6,300 students with a campus size of 2,890,000 gsf.

FACILITIES

The campus development plan directed demolition and reconstruction of the then 60 year old academic core of the campus. The core was expanded by relocating a U.S. highway and relocating athletic facilities to a new location south of the core. Only two buildings serving academic needs remain from the original campus. One is the Academic Office Building and the other functions as the ROTC center. One of the present academic buildings was constructed in the 1950s, three in the 1960s, two in the 1970s, two in the 1980s, and two in the 1990s. The library and general classroom facility are in the most need of programmatic updating and expansion to meet today's educational mission.

University housing facilities were built during the 1930s through the 1960s. While they continue to be maintained, meeting original program functions, they are in need of programmatic, mechanical, electrical, communication, and architectural updates.

MTU's athletic facilities were constructed in the 1970s and 1980s and, with improvements, continue to meet the programmatic needs of the campus.

Campus student service needs are provided through space in the Union Building, Administration Building, and the Career Center. The Career Center was purchased and renewed in 1997, the Union was renovated and expanded in 1989, and the Administration Building was constructed in 1969, with numerous programmatic revisions over the years. Despite the efforts to provide new and expanded facilities, the demand for student services continues to be unmet. An expansion to the Union Building is anticipated to provide this need.

Maintenance and renewal is critical as MTU's campus crosses the threshold from new low-maintenance facilities to older facilities that require a significant increase in renovation and maintenance. With a square-foot average age of 30 years, the campus has just reached the age (25-30 years) of programmatic obsolescence, the age when major maintenance costs begin to escalate. Although our facilities are in reasonably good condition, they are demanding higher levels of funding for maintenance and renewal.

UTILITIES

Installation of campus utilities and expansion of the Central Heating Plant, which began in 1969, followed the utility study recommendations developed in the Utility Master Plan.
Central Heating Plant

MTU has a central heating plant and steam distribution system serving the University's central campus. The plant has a total connected boiler capacity of 250,000 lbs. of steam per hour with a reliable capacity of 120,000 lbs. per hour, maintaining 100% backup capacity. The steam distribution system consists of a tunnel system from the plant to the academic core, which then runs the entire length of the core, and south to the athletic area. The services to the individual buildings are tapped into this tunnel and run in a mini-tunnel system. The distribution system was designed in accordance with the plant's connected capacity in anticipation of plant growth. New facilities in the academic core typically would be within a couple hundred feet of the tunnel. The plant and distribution system are in good condition, and with a reasonable amount of renewal and maintenance, it should continue to provide reliable service for the next 10 to 15 years. The plant is presently serving 2,600,000 gsf of campus facilities with an instantaneous peak load of 90,000 lbs. per hour and a one hour average peak load of 85,000 lbs. The present connected load includes instructional, research, administrative, housing, athletic, and service facilities. It is projected that the plant can reliably provide the steam services for an additional 1,100,000 square feet. Energy conservation opportunities and enhanced technology have created the plant's ability to service the additional space.

Electric Communications

MTU's incoming electrical service is provided by Upper Peninsula Power Company at 69 KV to MTU's primary electrical substation where the voltage is reduced to 124,707,200 volts for distribution to the campus. The electrical/communications distribution system consists of a concrete encased duct bank, which runs through the entire length of the academic core and south to the athletic area. The electrical/communication system essentially mirrors the steam system with facility connections tapped from this main duct bank.

The electrical system is a dual line radial feed system providing 100% backup. The system capacity is 7,500 KVA. Peak demand experienced to date is 5,500 KW at approximately .9 power factor. Based on this operational data, it is projected that the system can reliably service an additional 600,000 square feet.

MTU's communication system consists of six (6) conduits, which have provided adequate space for University communication. The advent of new technology (fiberoptic) will enable the system to meet foreseeable future needs.

Water

MTU's water system is a combined fire and domestic looped manifold system with an 8-inch main around the circumference of the campus. Water usage today on campus is 28% below what it was in the late 70's as a result of conservation efforts. The water is provided by the City of Houghton with no present capacity problems. MTU water mains were sized for annual usage of 375,000,000 gallons and peak demand of 1,100 gallons. Current usage is approximately 130,000,000 gallons annually. The City of Houghton completed the construction of a new water plant and made distribution improvements in 1996 that will meet MTU's needs into the foreseeable future.
Sewers

MTU’s sewers are separated into storm and sanitary systems. The storm system provides some flow regulation and drains into Portage Lake at various locations. A 15-inch sanitary main capable of handling 3,500,000 gallons per day ties directly to Portage Lake Water and Sewage Authority’s new transmission mains. This new 48-inch gravity main with a capacity of 19,000,000 gallons per day extends from the City of Houghton and passes through the campus at the waterfront on its way to the treatment facility east of campus. The size of MTU’s sanitary main and the new sewage treatment plant’s capacity of 18,000,000 gallons per day provide sufficient additional capacity for MTU’s foreseeable future needs.
FRAMEWORK RECOMMENDATIONS

General

It is important to understand that the recommendations provided herein are made within the context of integrating the four capital outlay projects into the campus fabric. Furthermore, within the Master Plan, building architecture is not determined, rather building zones are identified within which architecture can occur. Additionally, the capacity of the campus to integrate the new programs from a gross square footage (gsf) standpoint is tested.

A primary goal of the Master Plan update is to provide a planning strategy for integrating the four capital outlay projects in a manner that will work within the existing campus context and also maintain flexibility for future growth south of US-41. The planning recommendations are essentially “balancing on the fence.” On one side the challenge is finding the optimal physical solution for integration of the four projects into the campus setting, while on the other side being cognizant of the future without a full vision for it. The University must embark upon a comprehensive master plan update to fully realize the potential of the campus to support its long-range vision.

These four projects are keystones for the campus both from a physical and social perspective. Physically, they occupy strategic real estate with a strong ability to impact the campus’ public image along US-41. In addition, with the campus’ academic core reaching development saturation, future growth south of the highway becomes increasingly more likely. The real estate and facilities along this edge must encourage future connectivity to the south in support of future unknowns. Therein lies one of the biggest challenges relative to this study. Socially, the facilities being expanded are very much the soul of the campus and the academic experience. Strengthening their ability to foster academic and social interaction as well as access to information is critical. The physical development recommendations that will be documented as a part of this study must do all they can to optimally organize the University’s assets for enriching the environment within which the student is placed.

The result is a framework plan identifying the organization of critical campus systems. Existing buildings are shown in tan with the proposed envelopes in blue. At-grade pedestrian circulation corridors are shown in orange, and red indicates the development of an interconnected, second-level interior corridor. Open space is shown in dark green. Vehicular circulation is shown in black with potential parking facilities in gray. Asterisks indicate open spaces of special interest. The green half circles illustrate important image portals.
Campus Framework Plan
Master Plan Update

Houghton, Michigan
Manufacturing Center

The Manufacturing Center is nestled between Chemical and Electrical Engineering. Understanding the need for part of the facility to incorporate high-bay space, this site takes maximum advantage of the grade change between the academic core central open space and parking to its north. Vehicular access necessary for the program is effectively accommodated from Cliff Drive. The following development guidelines should be incorporated into the final design:

- The facility should be set back from Cliff Drive a minimum of 30 feet or approximately an equal distance, as is the Electrical Engineering Building.
- The building’s western most edge should not project beyond the western edge of the existing parking lot #3.
- Internal connectivity (between Chemical and Electrical Engineering) at the second level would be ideal, helping to form a wind baffle along the edge of the open space. Sensitivity to maintaining views out across the Portage Lake valley must be an integral theme to the architecture. A basement connection should also be incorporated for the movement of materials and service.
- Outdoor storage should not be permitted, or at least contained by screen walls that are an integral extension of the architecture.
- At two stories, this development envelope has the ability to provide approximately 38,000 gsf of space to accommodate program needs. Office uses should be stacked into a multiple story arrangement adjacent to and/or around the high-bay space.
- Access into the facility from the academic core’s central open space should be integrated in a sensitive manner.
- Internal pedestrian connectivity of this facility to the future development zone B-2 should be incorporated.

Memorial Union Building

The Memorial Union, JR Van Pelt Library, and Fisher Hall are proposed as an interconnected series of core academic campus functions, enabling a unique environment for both undergraduate- and graduate-level learning.

The Union has expansion potential in three directions. To the northwest, a connection with the Mechanical Engineering Building helps establish a gateway into the academic core while also serving to buffer ground-level winds. To the south, a large zone of expansion is available that will establish the Union as a welcoming icon for what should become the campus’ primary public entrance. To the northeast, another development zone allows connectivity with the Library and is most suitable for uses that bridge between these two facilities, such as informal study space, student activities/organizations, or possibly dining. This central node of campus activity also serves as a point of reference for a future elevated pedestrian connector linking the campus on both sides of the highway. The following development guidelines should be incorporated into the final design:

- The development zone linking the Union with the Mechanical Engineering Building should provide a welcoming image for this major campus gateway. The architectural massing should be studied so as to mitigate winds. The architecture should be expressive of its
purpose, which is to invite and greet visitors and campus residents. A second-level pedestrian connection should be planned to link the two adjacent buildings. Site development should include a plaza space serving to transition from the vehicular drop-off area into the building and campus open space beyond. At two stories, this development zone has the potential to provide 10,000 gsf of semi-programmable space. The campus visitor center should be located here.

- The development zone between the Library and Union is located at a critical social and academic fulcrum. Not only does it serve to link the Union and Library, two very important elements of university life, but it also provides an ideal location for launching a second-level enclosed pedestrian corridor over US-41 to future potential academic uses. Imagine the impact of crossing the highway from the south (heading north) and arriving at a glassed, atrium-style second-level balcony with elevated views of the central open space and the Portage Lake valley beyond. Given the need to address environmental influences and blend two different architectural styles, a glassed, almost winter garden concept is envisioned. The uses appropriate to this space would be those that are common to a variety of the University population, such as student groups, dining, informal gathering, and study. Service to the Library and Union will need to be accommodated and the existing vehicular drop-off removed. At one story, with a generous two-story ceiling, this development zone provides approximately 29,000 gsf of programmable space.

- The development zone to the south provides the majority of expansion potential. A two-story facility, or possibly two stepping up to three in concert with the existing Union building, is appropriate. Because this development zone occupies a critical image corner alongside the proposed main public entrance to the campus, it must address this prominence in its final detailing and massing. The design should integrate, not preclude, incorporation of the elevated pedestrian corridor across the highway. The architecture should not encroach closer than 50 feet of the highway with preferably more setback being desirable. At two stories, this development zone has the potential to provide 57,000 gsf of future programmable space.

Center for Integrated Learning and Information Technology

The Library and Fisher Hall become intricately entwined into the Center for Integrated Learning and Information Technology via an architectural link that serves to bridge the facilities with useable space while maintaining and enhancing this important open space portal into campus.

The Library has adequate expansion potential to the south, allowing it to maintain its current front door and presence on the academic core’s central open space while also enabling it to establish a prominent new image along US-41. The planned program size encourages taller architectural massing that will provide an accent along the University’s public edge and encourages a variety of building façade movement, avoiding a monotonous building mass. As a key component of the Center, connectivity with Fisher Hall is fundamental. The following development guidelines should be incorporated into the final design:

- The development zone to the south of the Library can handle the proposed 80,000 gsf of initial program expansion and additional capacity to add another 80,000 gsf in the future.
- A building height of six stories is acceptable to the user group.
• Architectural massing should step up and away from the highway as appropriate to meet programmatic requirements.
• The open space portal located east of this development zone is to be preserved and enhanced by future architecture. Entrances, window fenestration, and architectural articulation at the pedestrian level are necessary to blend the building with the open space.
• The linkage of the Library with Fisher Hall (enabling the Center for Integrated Learning and Information Technology concept) must be handled sensitively to maintain the visual and physical penetration into the campus at this critical open space portal. The bridge should incorporate programmable space that functionally connects these two facilities, while maintaining their operational identity (i.e., Library security). Informal gathering and study lounges would provide a nice bridging use.

Fisher Hall has expansion potential in three locations. A small lobby space is proposed to the north in an effort to set apart the two distinctive open space characteristics that occur to its east and west. This lobby space also allows the potential for a future enclosed pedestrian linkage at the second level to the Minerals & Materials Engineering Building. To the east, the building can expand approximately as far as the western most façade of Wadsworth Hall. This will allow for establishment of a second pedestrian open space portal into the central open space and set up the opportunity for an additional building development site adjacent to the Walker Arts & Humanities Center. To the west, expansion can occur out to the western most façade of the existing Fisher Hall classroom wing, helping define the open space portal previously described under the Library’s expansion potential. In total, these expansion zones provide approximately 140,000 gsf of future programmable space. The following development guidelines should be incorporated into the final design:

• Expansion to Fisher Hall should include renovation of interior classrooms to bring them up to modern teaching requirements.
• The character of the Fisher Hall expansion should build from its current architectural character while maintaining its presence on the central open space and providing a face lift to the southern façade in keeping with establishment of a high quality image along the campus’ public edge.
• Development should not encroach closer than 50 feet of the highway right-of-way.
• The incorporation of an elevated, enclosed pedestrian bridge across the highway must be incorporated. The opportunity to improve the safe and efficient crossing of this highly traveled vehicular corridor at this location is critical for establishment of a safe and cohesive pedestrian circulation system on campus. This location provides good access for the residence halls to the east and access up to the athletic facilities and the Forest & Wood Products Institute.
• Expansion should not extend further north than the existing classroom wing into the central open space (other than the proposed lobby extension).

Parking

The current capital outlay projects will displace approximately 250 surface spaces from a supply that is currently at capacity. In addition, these are the most convenient parking spaces for accessing the academic core. In order to meet the parking needs of campus, work with the challenging topography, and protect future development zones within the campus core for
academic uses, structured parking is warranted. It is important to note that because of its remote location in northern Michigan, MTU has a higher student parking requirement than other similar sized institutions. In addition, the campus' urban density is compatible with structured parking. Three deck locations are identified, each with their own inherent planning issues that will be studied by an independent parking consultant.

**Location PD-1**
- Good central location to most campus facilities
- Allows transition of the topography, providing the potential for unimpeded accessibility at the upper elevation (i.e., Forestry Building) to the proposed second-level pedestrian corridor system
- Largest footprint affords the greatest capacity (approximately 170 spaces per level, 680 spaces at 4 stories to 850 at 5 stories)
- Stepping the facility will blend with the hillside
- Requires the purchase of non-University property

**Location PD-2**
- Good central location
- Displaces an additional 120 spaces
- Capacity for up to 135 spaces per level (at 4 stories = 540 spaces or 420 net new)
- Occupies land within the academic core
- Occupies a critical image zone at the main public entrance requiring more attention to architectural aesthetics (i.e., could increase costs)

**Location PD-3**
- Peripheral location
- Capacity for 70 spaces per level (at 4 stories = 280 spaces)
- Requires the purchase of non-University property
- Occupies a critical image zone from downtown which can be mitigated by stepping down the hillside rather than building up

**Site Development**

While the campus is well maintained and presents a positive overall image, there are a number of improvements that are justified in conjunction with new building development. These recommendations are intended to improve the campus' public image along US-41 and to strengthen its unique characteristics within the academic core.

- The addition of major trees and ground level landscaping is desirable to reduce the impact of winter winds on pedestrians and to screen building and service areas. An informal arrangement of landscaping along the highway can effectively improve the institution's image, especially impacting first and last impressions. Landscaping in conjunction with architecture can also strengthen open space hierarchy and spatial sequence of the central open space. Unique existing qualities should be preserved and enhanced by site improvements.
- Students, faculty, and administrators alike have identified the need for a major open space and student gathering space on campus. Embellishing Library Plaza with an interactive plaza that could double during winter months as the Broom Ball court would add life to a space currently lost within the overall homogeneous landscape character of the central open space. During the summer months this plaza could we used for special events to enrich the social and academic life on campus. Within the understanding that campuses exist for people, spaces for people are critical to the campus fabric.

- The closure of College Avenue to vehicular circulation and parking has and continues to be identified as a desirable improvement. Transforming this parking lot into an open space corridor, welcoming pedestrians into the campus from downtown and the fraternities along US-41 will provide a significant visual and physical improvement to the campus. At the culmination of the open space corridor, proposed new vehicular entrance, and proposed visitor center, a substantial plaza/welcome mat for the academic core can occur. The concept of an alumni plaza at this location and relocation of the President’s office into the ROTC Building has been proposed for future consideration.

The Next Twenty Years

As the current capital outlay projects come to fruition, the academic core will near development saturation with few opportunities remaining for future academic-related building needs. The following table identifies existing, currently proposed, and future development capacities for the areas identified on the Master Plan. It is important to remind ourselves that after the current capital outlay proposals are in place, the University’s historic rate of growth in the academic core (approximately 180,000 gsf per every five years) will consume all future development options within another 15 to 20 years. The time is right for an updated comprehensive campus master plan to ensure guided and effective growth of the MTU campus for years to come.
### Academic Core Development Capacity

#### EXISTING FACILITIES

<table>
<thead>
<tr>
<th>Bldg. No.</th>
<th>Bldg. Name</th>
<th>GSF</th>
<th>NSF</th>
<th>Date Built</th>
</tr>
</thead>
<tbody>
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<td>Administration &amp; Student Services</td>
<td>71,100</td>
<td>40,831</td>
<td>1969</td>
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<td>4</td>
<td>ROTC</td>
<td>19,600</td>
<td>14,723</td>
<td>1904</td>
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<td>5,6</td>
<td>Academic Offices</td>
<td>38,900</td>
<td>24,972</td>
<td>1908</td>
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<td>7</td>
<td>Electrical Energy Resources</td>
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<td>93,171</td>
<td>1976</td>
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<td>Dow Environmental Sciences &amp; Engineering</td>
<td>167,000</td>
<td>95,100</td>
<td>1998</td>
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<td>9</td>
<td>Alumni House</td>
<td>7,784</td>
<td>4,880</td>
<td>1961</td>
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<td>10</td>
<td>Rosza Performing Arts &amp; Education Center</td>
<td>80,271</td>
<td>43,636</td>
<td>2000</td>
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<td>Walker Arts &amp; Humanities</td>
<td>83,100</td>
<td>59,760</td>
<td>1986</td>
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<td>Hamar House Counseling Center</td>
<td>4,032</td>
<td>3,430</td>
<td>1940</td>
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<td>14</td>
<td>Dillman Hall (civil - geology)</td>
<td>86,300</td>
<td>49,533</td>
<td>1957</td>
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<td>15</td>
<td>Fisher Hall</td>
<td>112,100</td>
<td>60,134</td>
<td>1984</td>
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<td>17</td>
<td>J R Van Pelt Library</td>
<td>81,000</td>
<td>49,347</td>
<td>1966</td>
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<tr>
<td>19</td>
<td>Chemical Sciences &amp; Engineering</td>
<td>162,500</td>
<td>90,492</td>
<td>1968</td>
</tr>
<tr>
<td>20</td>
<td>R L Smith (ME-EM)</td>
<td>162,500</td>
<td>88,187</td>
<td>1971</td>
</tr>
<tr>
<td>31</td>
<td>Douglas Houghton Hall</td>
<td>92,500</td>
<td>78,625</td>
<td>1938</td>
</tr>
<tr>
<td>34</td>
<td>Memorial Union Building</td>
<td>81,000</td>
<td>56,000</td>
<td>1989</td>
</tr>
<tr>
<td>41</td>
<td>Central Heating Plant</td>
<td>11,900</td>
<td>11,400</td>
<td>1951</td>
</tr>
<tr>
<td>42</td>
<td>Physical Plant Storage</td>
<td>5,200</td>
<td>4,650</td>
<td>1942</td>
</tr>
<tr>
<td>43</td>
<td>Lakeside Lab</td>
<td>9,800</td>
<td>5,304</td>
<td>1908</td>
</tr>
<tr>
<td>44</td>
<td>Service &amp; Storage Building</td>
<td>18,600</td>
<td>16,909</td>
<td>1952</td>
</tr>
<tr>
<td></td>
<td><strong>Total Existing Facilities</strong></td>
<td><strong>1,670,837</strong></td>
<td><strong>1,013,784</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### CURRENT CAPITAL OUTLAY PLANNING PRIORITIES

<table>
<thead>
<tr>
<th>Bldg. No.</th>
<th>Bldg. Name</th>
<th>GSF</th>
<th>NSF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturing Center</td>
<td>45,000</td>
<td>27,450</td>
</tr>
<tr>
<td></td>
<td>Memorial Union Expansion</td>
<td>55,000</td>
<td>37,950</td>
</tr>
<tr>
<td></td>
<td>Library Expansion</td>
<td>80,000</td>
<td>48,800</td>
</tr>
<tr>
<td></td>
<td>Fisher Hall Expansion</td>
<td>120,000</td>
<td>64,800</td>
</tr>
<tr>
<td></td>
<td><strong>Total Current Planned</strong></td>
<td><strong>300,000</strong></td>
<td><strong>179,000</strong></td>
</tr>
</tbody>
</table>

#### FUTURE DEVELOPMENT OPPORTUNITIES

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Description</th>
<th>GSF*</th>
<th>NSF*</th>
<th>Stories</th>
<th>Site Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>North of College Avenue</td>
<td>63,750</td>
<td>38,888</td>
<td>3</td>
<td>25000</td>
</tr>
<tr>
<td>B-2</td>
<td>North of Chemical Engineering</td>
<td>220,150</td>
<td>134,292</td>
<td>7</td>
<td>37000</td>
</tr>
<tr>
<td>B-3</td>
<td>Portage Lake</td>
<td>190,400</td>
<td>116,144</td>
<td>4</td>
<td>56000</td>
</tr>
<tr>
<td>B-4</td>
<td>East of Fisher Hall</td>
<td>114,750</td>
<td>69,998</td>
<td>3</td>
<td>45000</td>
</tr>
<tr>
<td></td>
<td>Future Library Expansion</td>
<td>80,000</td>
<td>48,800</td>
<td>6</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td><strong>Total Future Opportunities</strong></td>
<td><strong>669,050</strong></td>
<td><strong>408,121</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*All capacities assume 85% efficiency factors for building development within identified envelopes

**All Net assignable square footages utilize a net to grossing factor of 1.61

**TOTAL ACADEMIC CORE CAPACITY** | **2,639,887** | **1,600,905**