# Executive Summary

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>2</td>
</tr>
<tr>
<td>A Brief Background</td>
<td>3</td>
</tr>
<tr>
<td>Important Definitions</td>
<td>4</td>
</tr>
<tr>
<td>Information Recorded</td>
<td>5</td>
</tr>
<tr>
<td>Information Reported</td>
<td>9</td>
</tr>
</tbody>
</table>

# Condition Reports

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Information</td>
<td>10</td>
</tr>
<tr>
<td>Summary</td>
<td>14</td>
</tr>
<tr>
<td>Individual Building Reports</td>
<td>16</td>
</tr>
</tbody>
</table>

# Appendices

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendices</td>
<td>53</td>
</tr>
<tr>
<td>Appendix A</td>
<td></td>
</tr>
<tr>
<td>Appendix B</td>
<td></td>
</tr>
<tr>
<td>Appendix C</td>
<td></td>
</tr>
<tr>
<td>Appendix D</td>
<td></td>
</tr>
<tr>
<td>Appendix E</td>
<td></td>
</tr>
</tbody>
</table>

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**Introduction**

**Assessment Scope**
SHW Group, in conjunction with the Michigan Technological University Facilities staff, performed a high-level facility condition assessment of all campus buildings in May 2011.

This assessment included interviews with campus facility staff and building engineers, visual inspections of each assessed facility and a review of previously developed reports. The assessment focused on buildings only, without invasive or destructive testing, and did not include campus land, parking lots, roadways or infrastructure between buildings. Existing conditions, maintenance history, potential problems, and projected life expectancy of systems and components (including structural, mechanical, and electrical systems) were recorded.

Collected information was analyzed to develop estimates of repair and replacement costs in a database format for record-keeping, long-range planning, prioritizing and cost projection.

This report contains the printed version of that database.

**Report Components**
In addition to the executive summary, this report in comprised of the following information:

**Condition Reports**
Highlights of this data are presented in the Condition Reports section to provide an overview of the condition of the University’s major building facilities and major campus systems.

of the condition of the entire University, each facility, and major campus systems. Funding recommendations, both immediate and long term, are provided along with recommendations for low-cost, high-impact improvements.

**Database Report Pages**
The underlying data used to develop this report and the budgeting recommendations are included in Appendix A. This is the detailed assessment data for use and regular updating by facilities staff. This information is also useful as a permanent record of often unrecorded conditions, only known by those working in a particular building or on a particular system, and as an “owner’s manual” for new employees.

The database Report Pages include additional details, including a breakdown of costs by project classification and priority (see the Reported Information Page for more details).

**Karr Tuckpointing Report**

**Central Energy Plan Request for Critical Maintenance Funding Report**
The report, updated with new values in 2011, explains and quantifies the critical maintenance needs for continued successful operation of the Central Energy Plant, with a focus on reliability, safety, maintenance costs and energy conservation.

**BAS-DDC Upgrade Report**
This report, developed by Johnson Controls, proposes recommended updates and associated costs for upgrade of the campus-wide building control system to a modern, integrated digital system.

**Elevator Report**
This report lists the current condition, priorities, problems and approximate repair cost for maintaining and replacing elevators throughout campus.
Purpose of the Study
This Facilities Assessment and Project Total Planning Study, developed through a combination of personnel interviews, facility walk-throughs and building system analysis, was performed to accomplish the following objectives:

- Provide an inventory of the University’s facilities in a database format, updateable and maintainable by university personnel, allowing quick access to facilities information.

- Determine the general condition of the buildings and grounds of the university and provide the data in a concise format, allowing quick determination of the current replacement value and condition of each facility.

- Determine a Facilities Condition Needs Index (FCNI) for each building and the University as a whole. The FCNI is a benchmark index that rates the condition of existing University buildings and is used by facilities managers to quantify and prioritize project totals for capital planning purposes.

- Assist the University in meeting the goals of its Mission Statement through timely maintenance of the physical backbone of the University – the campus buildings.
A Brief Background
The problem of Project Totals at colleges and universities has been studied and better understood over the last two decades. From an article by Dan Hounsell, in the magazine Maintenance Solutions, discussing how colleges and universities are addressing the issue of deferred maintenance:

“Maintenance management professionals, who once seemed to be one of the few parties giving serious thought to the issue, now have been joined in the debate by growing numbers of sympathetic voters and far-sighted facility decision makers.”


$5.7 billion of that $26 billion backlog is classified as “urgent project totals” – projects that require immediate attention and that will cost far more if they are not completed within a year. Although spending this sum will eliminate current urgent needs, in only a few years there will be a new roster of items to replace them – if future budget planning is not undertaken. According to the APPA report, the current backlog “represents a threat to the capability of higher education facilities to support University and university missions.”

Other conclusions from the report include:

- More than 50 percent of all university types reported that project totals increased or stayed the same since 1988; only 25 percent reported decreases.
- 20 percent of the universities in the study accounted for nearly 60 percent of the accumulated project totals.
- Public universities typically have a greater project totals backlog than private universities, with 78 percent of the public research universities reporting an increase in project total backlogs.
- By assuming that infrastructure project totals – site repairs, road and parking lot maintenance, exterior lighting, etc. – was not included in the figures provided by the campuses in the study, the estimated cost to eliminate accumulated project totals increases to $32.5 billion – with urgent needs increasing to $7.1 billion.
- When senior school administrators made project totals a priority, the institution made progress in reducing its backlog.

The most important point to remember is that even if colleges and universities spend these amounts, this will only eliminate the existing project totals backlog. There needs to be a coordinated, funded plan put into place at universities to maintain the condition of the facilities once they have been repaired – or time will again take its toll.
Important Definitions

Current Replacement Value (CRV)
The cost to construct a typical replacement building in today’s dollars, based on the square footage of the current facility and the estimated current construction cost for that type of building. Buildings comprised of significantly different uses, such as a library with a theater component, will have the CRV based on a blend of costs for each use type.

Facilities Condition Needs Index (FCNI)
Simply put, the FCNI is total estimate to resolve maintenance issues in a building divided by the Current Replacement Value (CRV). The resulting percentage is compared against industry standards and used to determine the condition of the building, campus or University.

The Association of Higher Education Facilities Officers (APPA) recommends that the FCNI for any given building should not exceed 5% for the building to be considered in “Good” condition. The rating of “Fair” indicates that the building requires some attention to bring it up to standard, with some problems areas potentially requiring immediate attention. The rating of “Poor” indicates that the building needs urgent attention to prevent the existing problems from affecting other building systems and compounding future repair costs.

The APPA FCNI Ratings, indicating the general condition of the building, are shown here along with the corresponding “traffic signals” that give a quick visual indication of the FCNI rating.

The FCNI also varies over time. When looking at critical items only (those items currently in need of repair or replacement), the FCNI is frequently in the Good range because few high-value systems (structure, HVAC, etc.) are in immediate danger of failure.

When looking forward, however, the FCNI can increase considerably, driven by major systems that are past the end of their useful service life, common on buildings with HVAC, electrical or window systems over 40 years old.

Projected Annual Maintenance Budget
The projected annual maintenance budget is the estimated cost to maintain the current FCNI in a stable state, regardless of the current condition of the building.

The number is based on a reinvestment range of 2% to 4% of a reduced value CRV (at 80%), assumes that building components have a 50-year renewal cycle and depreciate along a straight line. The assumptions were made to simplify calculations; in reality, building components DO NOT expire according to straight-line depreciation, and many components require replacement within 30-40 years (excluding structure and foundation).

To restate – this annual investment will only maintain the existing FCNI and do little or nothing to reduce any existing backlog.

End of Useful Service Life
This term is used throughout the report to indicate when a system has reached its expected life span, regardless of whether it is operating as designed. All building systems have a life span which varies greatly depending on the system and how it is used. For example, a building structure can last several hundred years, while door hardware or HVAC systems last 25-40 years depending on quality and type. A rubber roof might have a 15-20 year lifespan, while carpet in high traffic areas seldom survives 10 years.
Information Recorded

Information recorded by the assessing teams includes the following data and is used in database calculations, including the Current Replacement Value and Facility Condition Index for each building and the entire institution.

**General Building Information**
- Building Name
- Building Number
- Campus Name
- Year Built
- Building Area (in square feet)
- Number of Floors
- Building Engineer Name
- General Building Notes (building description, special circumstances, etc.)
- Major Renovations/Additions (year and brief description)

**Building Use Types**
Each building is comprised of one or more use types with a unique per-square-foot cost. This information is used to develop a Current Replacement Value (CRV) for each building. Most buildings are a single use type, but buildings comprised of significantly different uses, such as a library with a theater component, will have the CRV based on a blend of costs for each use type.

The table below shows building use types and their respective current construction costs per square foot used to develop this database. As some of these use types are not found on all campuses, not all use types are used in the database. These costs are for typical construction quality buildings and derived from regionally weighted, preliminary construction cost data provided by contractors, SHW historical cost databases and data from RS Means.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost per SQFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>$190</td>
</tr>
<tr>
<td>Athletics (non-recreation)</td>
<td>$225</td>
</tr>
<tr>
<td>Auxiliary</td>
<td>$190</td>
</tr>
<tr>
<td>Classroom</td>
<td>$200</td>
</tr>
<tr>
<td>Greenhouse</td>
<td>$150</td>
</tr>
<tr>
<td>Health Facility</td>
<td>$315</td>
</tr>
<tr>
<td>Hotel/Conference Center</td>
<td>$210</td>
</tr>
<tr>
<td>Laboratory/Research</td>
<td>$370</td>
</tr>
<tr>
<td>Library</td>
<td>$230</td>
</tr>
<tr>
<td>Physical Plant/Utility</td>
<td>$1000</td>
</tr>
<tr>
<td>Police Station</td>
<td>$230</td>
</tr>
<tr>
<td>Recreation/Gym</td>
<td>$225</td>
</tr>
<tr>
<td>Student Life/Residential Housing</td>
<td>$190</td>
</tr>
<tr>
<td>Storage</td>
<td>$110</td>
</tr>
<tr>
<td>Theatre</td>
<td>$270</td>
</tr>
<tr>
<td>Food Service</td>
<td>$250</td>
</tr>
</tbody>
</table>
Building Systems
Details about each major building system, including construction, system type, current operation and general condition are recorded from the interviews and observations.

These building systems are the basic components having a major influence on the replacement value of a building.

<table>
<thead>
<tr>
<th>Category</th>
<th>Component Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>Structure</td>
</tr>
<tr>
<td>Shell</td>
<td>Roof</td>
</tr>
<tr>
<td></td>
<td>Glazing</td>
</tr>
<tr>
<td></td>
<td>Cladding</td>
</tr>
<tr>
<td>HVAC System</td>
<td>HVAC</td>
</tr>
<tr>
<td></td>
<td>Stream Production Equipment</td>
</tr>
<tr>
<td></td>
<td>HVAC Controls</td>
</tr>
<tr>
<td>Electrical System</td>
<td>Electrical Power</td>
</tr>
<tr>
<td></td>
<td>Standby Power</td>
</tr>
<tr>
<td></td>
<td>Lighting</td>
</tr>
<tr>
<td></td>
<td>Clock System</td>
</tr>
<tr>
<td></td>
<td>Data/Telecom System</td>
</tr>
<tr>
<td>Plumbing System</td>
<td>Domestic Water/Plumbing</td>
</tr>
<tr>
<td>Interior Construction</td>
<td>Interior Partitions</td>
</tr>
<tr>
<td></td>
<td>Doors</td>
</tr>
<tr>
<td></td>
<td>Interior Finishes</td>
</tr>
<tr>
<td></td>
<td>Floors</td>
</tr>
<tr>
<td></td>
<td>Ceilings</td>
</tr>
<tr>
<td>Code Compliance</td>
<td>Code/Life Safety</td>
</tr>
<tr>
<td>Safety</td>
<td>Sprinklers</td>
</tr>
<tr>
<td></td>
<td>Emergency Lighting</td>
</tr>
<tr>
<td></td>
<td>Fire Alarm</td>
</tr>
<tr>
<td>Conveying Systems</td>
<td>Elevators</td>
</tr>
<tr>
<td>Adjacent Site</td>
<td>Immediate Site</td>
</tr>
</tbody>
</table>

Building System Rating
Each building system is given a number rating indicating its general condition and to assist in database calculations. These ratings are:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Missing and Needed / ADA-not compliant</td>
</tr>
<tr>
<td>1</td>
<td>Unreliable</td>
</tr>
<tr>
<td>2</td>
<td>Poor</td>
</tr>
<tr>
<td>3</td>
<td>Adequate ADA-compliant when built</td>
</tr>
<tr>
<td>4</td>
<td>Functional / ADA compliant</td>
</tr>
<tr>
<td>5</td>
<td>Excellent</td>
</tr>
<tr>
<td>NA</td>
<td>Not Needed</td>
</tr>
</tbody>
</table>

System missing, but required in facility. For accessibility, does comply with current codes.
System needs to be fixed.
System barely operating. Repair/replace in next renovation.
System functioning, but review for repair/replacement in next renovation. For ADA accessibility, was compliant when constructed, review compliance for next renovation.
System functioning well and maintained as intended, no major reported issues. For accessibility, item complies with current codes.
System in excellent operating condition. No reported issues.
System not required for this facility.
Observed Issues
Beyond reviewing the general condition of each building system, when specific issues are observed, details regarding the particular issue for that system are recorded. Each is also prioritized, classified by project type and an order-of-magnitude resolution cost estimate was made.

Priority
Each Observed Issue is given a priority to record how critical it is and to group work into time frames. This information is used to calculate the Facility Condition Index for each time frame. Priorities used are as follows:

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Currently Critical (Current Year)</td>
</tr>
<tr>
<td>2</td>
<td>Potentially Critical (Year 1)</td>
</tr>
<tr>
<td>3</td>
<td>Not yet Critical (Year 2-5)</td>
</tr>
<tr>
<td>4</td>
<td>Watch List (Year 6-10)</td>
</tr>
<tr>
<td>5</td>
<td>Long Term (Year 11+)</td>
</tr>
</tbody>
</table>

Certain systems, such as structure or HVAC are seldom listed as currently critical as they are seldom in imminent danger of immediate failure. When a system is replaced, the priority should be changed to reflect that change (a new roof should be listed at Priority 5).

Items that are typically listed as Currently Critical include systems that are failed or those that could cause collateral damage, such as a leaking roof that is damaging ceilings, floors and electrical system.

Project Classification
Each observed issue is classified by type of project to determine if it is Deferred Maintenance, Planned Maintenance or Facility Adaptation. This report does not track ongoing maintenance costs, as that is budgeted out of general operating funds.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deferred Maintenance</td>
<td>Refers to expenditures for repairs which were not accomplished as a part of normal maintenance or capital repair which have accumulated to the point that facility deterioration is evident and could impair the proper functioning of the facility. Costs estimated for deferred maintenance projects should include compliance with applicable codes even if such compliance requires expenditures beyond those essential to effect the needed repairs. Deferred maintenance projects represent catch up expenses.</td>
</tr>
<tr>
<td>Planned Maint/Capital Renewal</td>
<td>A subset of regular or normal facility maintenance which refers to major repairs or the replacement / rebuilding of major facility components (e.g., roof replacement at the end of its normal useful life is capital repair; roof replacement several years after its normal useful life is deferred maintenance).</td>
</tr>
<tr>
<td>Facility Adaptation</td>
<td>Expenditures required to adapt the physical plant to the evolving needs of the institution and to changing codes or standards. These are expenditures beyond normal maintenance. Examples include compliance with changing codes (e.g., accessibility), facility alterations required by changed teaching or research methods, and improvements occasioned by the adoption of modern technology.</td>
</tr>
</tbody>
</table>
Special Note Regarding Facility Adaptation

Facility Adaptation issues are a unique situation, often including accessibility and code compliance issues. While full accessibility for all occupants is important, it is understood that existing buildings, especially historic buildings, are challenging and costly to update. Typically, updating the building to meet current standards is only expected when significant renovations occur.

These issues and their associated costs are recorded in the database to assist the institution in budgeting for these costs. While they are part of the calculation of FCNI, they are given a low priority (typically Priority 5) to place them in the distant future. This is why the "All Priorities FCNI" is sometimes significantly higher than the "Priority 1 FCNI".

Resolution Budget

Each observed issue is evaluated to determine an order-of-magnitude cost to resolve the issue, whether through repair or replacement. For each building system, all Resolution Budget amounts are totaled to determine the resolution cost for that system.

If projects are already funded, they are checked off as so, removing that cost from the calculation of the FCNI.

When an issue is resolved, it can be checked off for completion, including date and actual cost.
Information Reported
The report is separated into two sections. This front section is the executive summary

Vital Statistics
Basic building information—building use types (classroom, library, administration, etc.), year built, building area in square feet, and number of floors.

Observation Highlights
A partial list of field observations, highlighting major repair/replacement items and recently completed work are included in the Conditions Report. A more complete list of observations and recommendations are found in the database report.

Current Replacement Value (CRV)
The cost to construct a typical replacement building in today’s dollars, based on the square footage of the current facility and the estimated current construction cost for that type of building. Refer to the Definitions Page for additional information.

Projected Annual Maintenance Budget
The projected annual maintenance budget is the estimated cost to maintain the current FCNI in a stable state, regardless of the current condition of the building. Refer to the Definitions Page for additional information.

Priority 1 Project Total (Current Year)
Project Totals are the value of all maintenance issues that are deferred or projected to require addressing immediately in order to safely maintain facilities and related infrastructure for their current use. The Priority One amounts shown are for items requiring immediate attention to fix critical problems. A long-term investment strategy should also include items that require repair or replacement within 5 years, thus avoiding the increased repair costs resulting from deferred repairs (i.e. leaky roof damaging interior finishes).

Priority 1 FCNI (Current Year)
The Facility Condition Needs Index is reported separately for the total of all Priority One items to indicate the immediate condition of the building. This number is usually much lower than the FCNI for later priority classes, as costly systems seldom are in danger of immediate failure.

Priorities 1-3 Cumulative Project Total and FCNI (0-5 Years)
The Priority 1-3 Cumulative Project represents the total value of projects, in today’s dollars, that will require attention within the next five years, including those that fall under the Priority 1 Project Total. This value is included to help determine the investment required over the next five years to resolve issues before they become critical.

The Zero-Five Year is often more telling of a buildings’ condition than the One Year DMB, since the first year number focuses primarily on life safety, code compliance and collateral damage. Most maintenance issues are not so critical as to fall into this category but often become so within 5 years.

For example, if the building condition survey indicated $100,000 in immediate issues and an additional $250,000 in repairs from years 1-5, then the 0-5 Year would total $350,000 (including $100,000 from the first year).

All Priorities Cumulative Project Total and FCNI (0-11 Years+)
The All Priorities value combines all potential issues the institution should be concerned with to ensure proper functioning of their facilities, and includes items projected to reach the end of their useful life beyond the five year window.
Special note regarding All Priority Cumulative Project Totals and FCNI

These numbers are often high as they include major systems and building infrastructure projected to reach the end of their expected useful service life and are projected to need replacement. HVAC systems, for example, can be maintained to operate well beyond their expected life of 25-40 years, but usually at an increasing cost with reduced effectiveness. Replacement of these systems should be budgeted to maintain safe, efficient and reliable use of campus buildings.

Some systems, like roofing, can also be included in this category even if new, as their projected lifespan is within 20 years. These will be listed as Priority 5 (long term) and Planned Maintenance, indicating they are in good condition, but should be budget for regular replacement.

Database Report – Institution Summary Page

This report collects all the basic building data and calculations on a single page, allowing the reader to compare multiple buildings at once, determining which buildings are contributing more to the institutional FCNI than their size or age would dictate.

Database Report - Building Pages

The database report provides additional information, including a matrix of project totals broken down by Project Priority and Project Classification. This additional detail will allow the reader to determine separate upcoming project totals for Deferred Maintenance, Planned Maintenance and Facility Adaptation.

The adjacent table is an example of a Project Total Matrix from the database report.
Vital Statistics:
Michigan Technological University (Michigan Tech), established in 1885, is located in the Keweenaw Peninsula of Michigan in the town of Houghton. Michigan Tech comprises thirty four major buildings and several small outbuildings (not included in this report) on 925 acres overlooking Portage Lake. The thirty seven properties included in this report total approximately 3,135,000 square feet with a total current replacement value estimated at over $766,000,000. Currently, the general condition of the facilities at Michigan Tech varies greatly, ranging from good to poor, depending on age and original construction type/quality.

In many cases, the useful life expectancy of building materials and systems has been reached, but solid construction and good maintenance practices have helped to keep those materials (e.g., brick exteriors, doors, and HVAC systems) in as good condition as can be expected. Several original systems including roofs, windows, doors, and HVAC system components are beginning to reach the end of useful service life and are being addressed by the University in a timely manner.

Several areas of concern, including fire alarm, fire suppression and egress system issues are currently being addressed with approximately half of the campus already reaping the benefits of these upgrades.

Significant issues to be addressed include: the entire window system at the R. L. Smith Building ME-EM; various roofing issues; HVAC issues in the Memorial Union Building, the Academic Offices Building, the Student Development Complex; and modernization of systems and finishes in significant buildings and general classroom facilities that are not current with respect to supporting modern instructional teaching methods.

Accessibility and life safety issues are generally being addressed as part of ongoing campus project work.

The 0-5 year cumulative project totals and FCNI at Michigan Tech is projected to exceed approximately 10%, above the national average of 7%. This represents a need to increase capital investment over the next several years to maintain the facilities through repair and replacement of major systems. Most of these projected expenses at Michigan Tech fall into the category of planned maintenance items. As stated in the Project Totals Background, the investment solution has two facets:

- The funds needed for immediate repair projects – repairs and/or replacements that will prevent further deterioration of the buildings and infrastructure.
- The funds required to maintain and/or improve the condition of the buildings prior to system failure. These funds need to be budgeted in advance to allow for repairs at the appropriate time - before items become critical or cause additional damage.

This data, when compared to the APPA benchmark, shows that while Michigan Tech is currently in good condition, the issues predicted to become critical in the next five years will potentially move the institution’s facilities out of “good” condition and just into the edge of the APPA range of “poor”. This is not a unique situation on campuses of this age, and institutions that set aside adequate funding to address these problems before system failure have been making noticeable improvements in their Facility Condition Index.

The next section of this report breaks this data down into a building-by-building review to clarify where attention is needed.
Priority areas:

**Roofing:** Several roofing replacements are not functioning as intended. Areas of concern include adhesion problems and billowing of the roofing membrane in a number of facilities. Some of these issues are on roofs still under warranty and should be addressed by the manufacturer.

**Window Systems:** In general many glazing systems are failing in part or in whole. Gaskets and seals are at or past the end of useful service life and require attention, repair or replacement. A number of facilities with double paned glass assemblies have failed seals, resulting in windows that are ‘fogged’. The entire original single paned window system in ME-EM is due for replacement in order to control moisture infiltration as well as allowing better operation of the HVAC system. This area will become more critical as the institution begins to cool spaces as opposed to the heating-only philosophy that has been the policy to date.

The large full-height windows at McNair Hall appear to be plate glass and not tempered glass as current building codes would require. If one were to break, the glass would not shatter into small, safe pieces, but potentially break in large, sharp sections that could be a safety hazard.

**HVAC:** The most critical HVAC challenge noted on campus is the Memorial Union Building. This building includes guest facilities, meeting and event spaces, bookstore, and the campus food court. The only air-conditioned space is the Ballroom, leaving a majority of the building uncomfortable. In addition, the existing HVAC systems lack economizer function, making them inefficient. The result is an uncomfortable building. While these issues are not related to Deferred Maintenance, the HVAC system in Memorial Union will reach the End of Useful Service Life within the next five years. Combined with the architectural deficiencies from the previous addition/renovation, the report data indicates that the building should be considered for replacement.

**Electrical:** The most critical issue noted is the Central Heating Plant generator. This 38-year-old generator was recently refitted with new dual starters when both failed to start the engine. This generator serves two critical functions:

- Providing emergency power for the Dow Building for life safety equipment. Other building systems are not supported.
- Providing switching power to the campus primary substation; allowing it to disconnect from the local power company (UPPCO).

When the primary breakers and campus feeder breakers do not open, campus generators are prevented from starting. These breakers can be manually opened by a service electrician, but this results in a one to two hour delay.

The above scenario can be prevented by installation of an uninterrupted power supply (UPS) to provide switching power at the Primary Substation. Faster and more reliable switching can be provided for approximately $10,000.

There were no critical issues noted from the building-level interview and observation standpoint. However, the knob-and-tube wiring in the ROTC Building attic should be replaced with modern wiring and light fixtures.
Plumbing: While not an issue per se for the City of Houghton, roof drain piping on many buildings on campus are connected directly to the sanitary connection from the building to the street with a single gravity drainage pipe. Referred to as a “combined system”, most authorities having jurisdiction prohibit these. The issue is excess rainwater and snowmelt that challenges the rate of flow in the city sanitary system. When excessive flow to the sanitary connection occurs, the result is water backing up into the building. All sanitary plumbing systems are effectively “open” systems, such that when the water level backs up into the building there is a direct path through floor drains, sinks, and bathroom fixtures that allow water to flow backward into the building space. Future building changes should include a separate connection for roof drain piping to the city sanitary connection at the street.

Accessibility: The facilities at Michigan Tech were built to the standards and codes of the time of their design and construction. Many of these facilities do not meet the increased regulations of today’s standards. Providing universal access to facility entrances and internal spaces can be a critical element to manage for any institution. While not outside of compliance relative to grandfathering, many Universities are establishing compliance budgets to begin the process of upgrading areas where accessibility is restricted or eliminated due to any number of circumstances. It is also a general practice to upgrade and provide full compliance to all spaces in and serving areas scheduled for renovation, with reasonable consideration being given to hardships (e.g., ratio of total project cost to compliance cost, structural interference, etc.). The approach taken by Michigan Tech is to work with handicapped individuals to address each of their specific access problems, changing programs and/or facilities as needed to provide equal access as well as updating facilities undergoing substantial renovation.

Central Heating Plant: The Central Heating Plant provides high-pressure steam to most campus buildings. This in turn provides thermal heating of building air, radiant heat along windows and stairwells, domestic water heating for bathrooms and maintenance, and a variety of other uses in laboratory buildings. It is the heart of the campus-wide heat system. Originally built in 1951, the boiler ages are 1950, 1957, 1964, and 1970. A recent study indicates that approximately 90% of the system’s condensate returns to the plant, with the remaining 10% lost to minor leaks and consumption that does not return to the plant. Associated with the plant is the campus-wide, centrally located Building Automation Control (BAC) System. The Appendix contains a Michigan Tech internal report related to costs for operational, energy efficiency, safety, on-going maintenance, and replacement issues.
Summary:
Improved maintenance and timely replacement practices are recommended to improve the overall FCNI for the University, resulting in a reduced “0-5 Year FCNI” below the projected 10.1% and closer to the current FCNI of 1.7%

Many systems will require replacement or upgraded in the near future. Year 0-5 FCNI issues are spread out over the entire University facility portfolio and will require attention across a number of systems throughout the campus. The building detail pages highlight the handful of issues greatly affecting this number.

As stated in the Project Totals Backlog background, the investment solution has two facets:

- The funds needed for immediate repair projects – repairs and/or replacements that will prevent further deterioration of the buildings and infrastructure and help the University stay ahead of life-safety concerns.
- The funds required to maintain and/or improve the condition of the buildings. These funds need to be budgeted in advance to allow for repairs at the appropriate time - before items become critical or cause additional damage.

The following pages of this report break this data down into a building-by-building review to clarify where attention is most needed.

Recommendations:
Short Term Recommendation
The University should review the items that comprise the Priority One Project Totals of approximately $13,295,000 and address those affecting life/safety issues, those having the greatest potential for future damage to other building components, and those that are code compliance issues.

In addition to the first year issues that will carry over into the next five years, the University should also emphasize budgeting for the projected $77 million in predicted project totals issues over the next five years and evaluate alternative solutions where the cost outweighs the benefit of repair.

Long Term Recommendation
The University should develop a plan to set aside as much as possible of the annual CRV maintenance fund of $18 million for resolution of upcoming issues and ongoing repairs to maintain the buildings. While this benchmark is difficult for most institutions to attain, the goal of setting aside this amount annually is to ensure the buildings remain in stable condition and that funds are available in advance when systems reach the End of Useful Service Life.
Facility: Administration Building (1)

Use Type(s): Administration
Built: 1969
Area: 73,389 SF
Floors: 6, plus penthouse

Observation Highlights:
- Building is not sprinkled and not air-conditioned. The occupancy of the building is 12 months continuous. Floor to floor height is short. The air to the Administration Building occupied space is supplied by ceiling ducts. The return air is removed from the spaces via return air registers in the walls, which feed into a return air plenum in the space above the ceiling below.
- 9”x9” floor tile reported to have A.C.M. as well as A.C.M. fire proofing on steel at deck, which has been partially encapsulated above 1st and 2nd floor ceilings. The plenum space between the lay-in ceiling and the steel deck is being used as air supply and return. Mastic containing A.C.M. reported at 9”x9” vinyl tile. A.C.M. reported on elbows on piping and tees. Lead paint throughout building reported.
- Toilet partitions due for replacement – most likely original. Toilet fixtures are original and have no automatic flush.
- Minor coping repairs needed.
- Tuck-pointing needed.
- Sealant joints are at End of Useful Service Life.
- Aluminum east entry doors on ground floor are at End of Useful Service Life.
- Dover elevator no. 1 and 2: controls relay logic and dc generators are reaching the End of Useful Service Life. Modernization is required for improved reliability and energy efficiency.
- Water and air infiltration at window frames. Sealant at frames is failing. Seals at glazing are not functioning. Entire glazing system is at End of Useful Service Life.
- Reheat coils are plugged – both air-side and water-side should be inspected and cleaned if needed.
- Fire Alarm system is old, does not meet today’s code-should be replaced.
- Transformer is dust covered-needs cleaning; breakers have not been tested in 20 years, need testing and replacement of trip mechanism.

Current Replacement Value | Projected Annual Maintenance Budget
---|---
$13,943,910 | $334,654

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$0</td>
<td>0.0%</td>
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<tr>
<td>1-3 (years 0-5)</td>
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<td>16.5%</td>
</tr>
<tr>
<td>All</td>
<td>$5,829,800</td>
<td>41.8%</td>
</tr>
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</table>
Facility: Michigan Tech Lakeshore Center (3)

Use Type(s): Administration
Built: 1991
Area: 61,365 SF
Floors: 3

Observation Highlights:
- Original building dates from early 1900’s as a warehouse use.
- Building was extensively remodeled in 2009, inside and out.
- Sealant joints between EIFS and stone sills are at End of Useful Service Life. EIFS building joints are at End of Useful Service Life.
- Damage to EIFS observed, repair.
- Exterior doors at rooms 114 and 121 are missing thresholds. Replace thresholds.
- Areas observed where sections of perimeter concrete walkway have heaved upward. Remove and replace heaved concrete.
- Geo-thermal system installed in 1991. The ground water temperature has begun to increase within the system and may need to be dealt with in the future. ASHRAE life expectancy for water-to-air heat pumps is 20 - 25 years. The ground water temperature increase should be evaluated by an engineer.

Current Replacement Value: $11,659,350
Projected Annual Maintenance Budget: $279,824

<table>
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<tr>
<td>All</td>
<td>$920,000</td>
<td>7.9%</td>
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</tbody>
</table>

Michigan Technological University 2011
Facility: ROTC Building (4)

Use Type(s): Administration, Student Union
Built: 1904
Area: 21,584 SF
Floors: 2, plus basement

Observation Highlights:
- No ventilation at building.
- Building steam pipe goes directly thru the basement rooms (B006 Conference Room). Recommend to add additional insulation on piping.
- Windows are near the End of Useful Service Life.
- Some deterioration at brick observed. Tuckpointing is required.
- Some deterioration of Jacobsville Sandstone at grade level. Repair individual units.
- EIFS at north entry (loading area) is showing some damage, repair.
- Replace sealant joints.
- Wood on running track is aging predictably, due for repair and refinish.
- Carpet over wood is at the End of Useful Service Life.
- VCT near end the End of Useful Service Life.
- 2x2 suspended ceiling at the End of Useful Service Life.
- Old cable bus panel found at stairs going to attic. This is not energized but could potentially be re-energized.
- Original knob and tube lighting is still being used in attic and should be replaced.
- Reheat coils are plugged. Provide air and water side inspection.
- Replace attic AHU – at end of useful service life.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4,289,820</td>
<td>$102,956</td>
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PRIORITY PROJECT TOTALS FCNI

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<thead>
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<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$109,500</td>
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<td>1-3 (years 0-5)</td>
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<tr>
<td>All</td>
<td>$1,650,250</td>
<td>38.5%</td>
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</tbody>
</table>
Facility: Academic Offices Building (5)

Use Type(s): Administration
Built: 1908
Area: 27,405 SF
Floors: 2, plus basement

Observation Highlights:
- No ventilation at south entry lobby.
- Building not ventilated – overheating in Spring/Fall. Basement level needs cooling (steam line goes thru vending area at West entry).
- Minor coping repairs needed.
- Water and air infiltration due to gasketing issues. Gaskets at the End of Useful Service Life.
- Missing mortar and cracking at brick veneer and stone. Brick veneer and stone due for substantial tuck pointing.
- Water infiltration problems reported at basement level at grade.
- Some Jacobsville Stone deterioration observed at south entry and building façade.
- Exterior sealant joints are at the End of Useful Service Life.
- Otis freight elevator: controls, relay logic and dc generator are reaching the End of Useful Service Life. Modernization is required for improved reliability and energy efficiency.
- Piping is at End of Useful Service Life.
- Need to address control issues and zoning in North wing. AHUs need to be replaced in next 5 years.

Current Replacement Value
$5,206,950

Projected Annual Maintenance Budget
$124,967

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<td>1 (year 0)</td>
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<td>$2,424,000</td>
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<tr>
<td>All</td>
<td>$2,964,000</td>
<td>56.9%</td>
</tr>
</tbody>
</table>
Facility: Annex Building (6)

Use Type(s): Administration, Library
Built: 1936
Area: 10,956 SF
Floors: 2, plus basement

Observation Highlights:
- No air conditioning at the basement – air conditioning is critical given basement is used for archives and archeology samples storage. A dehumidifier and a gas-heater observed in the basement along with a sanitary line that drains into the sump pump. The sump pump was not functioning.
- Humidity issues reported. New bathroom, kitchen, and barrier free unisex toilet room is planned for the second floor level. Existing cabinetry will be reorganized. Radiators along the perimeter walls present.
- New fire escape constructed from second floor level.
- Many bad coping sections. Correct or replace.
- Some hardware is malfunctioning. Glazing and some window sills at End of Useful Service Life.
- Building sealant joints and some stone sills due for repair.
- Air and water infiltration at brick veneer on perimeter at line of ceiling. Extensive tuck-pointing required.
- Exterior hollow metal door is at End of Useful Service Life. Hollow metal frame is due for re-painting.
- Need to add additional exit signs for egress.
- Need to add strobes and replace Siemens FA panel with EST.
- Basement transformer and disconnects need to be replaced.
- No elevator.

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<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
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</thead>
<tbody>
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<td>1 (year 0)</td>
<td>$260,000</td>
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<td>$490,000</td>
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<tr>
<td>All</td>
<td>$734,000</td>
<td>33.2%</td>
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</table>

Current Replacement Value: $2,213,112
Projected Annual Maintenance Budget: $53,115
Facility: Electrical Energy Resources Center (7)

Use Type(s): Administration, Classrooms, Lab

Built: 1976

Area: 162,170 SF

Floors: 9, plus basement and sub-basement

Observation Highlights:
- Building in general is aging predictably and showing wear. Building is due for modernization.
- Classrooms are aging predictably and showing wear. Classrooms are due modernization to continue top instructional delivery.
- Active leak at northwest stairway. EPDM is beyond End of Useful Service Life.
- 2007 roofing membrane isn’t adhering to roof.
- Water in pillbox of sub-basement.
- Glazing in classroom 427 has moisture @ sill.
- Rubber nosing is deteriorating under heavy use. Nosing at the End of Useful Service Life.
- Provide exit lighting in classrooms.
- Provide code compliant fire alarm system.
- Provide power operated door switch.
- Path of travel in SB34 exceeds code limits.
- Battery room for UPS should have ventilation with full exhaust.
- Duct-board ductwork is leaking air into ceiling spaces.
- Older Fisher Steam PRVs/controls need replacement.

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<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$2,500</td>
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<tr>
<td>1-3 (years 0-5)</td>
<td>$1,506,500</td>
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<tr>
<td>All</td>
<td>$10,901,500</td>
<td>24.4%</td>
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</table>

Current Replacement Value | $44,596,750
Projected Annual Maintenance Budget | $1,070,322
**Facility:**  Dow Environmental Sciences & Engineering (8)

**Use Type(s):**  Administration, Lab, Auditorium

**Built:**  1998

**Area:**  167,100 SF

**Floors:**  9

**Observation Highlights:**
- Building is functional and showing wear appropriate to age.
- Building is subject to water infiltration at window head on east façade and at exterior door thresholds. Maintenance efforts have been made to correct these issues, entire building window system should be reviewed for proper flashing details.
- Provide lighting protection.
- Flashing of roof terrace on north is failing at door threshold. Water infiltration was observed, further investigation is required to determine full scope of work required to remedy.
- Driving rain infiltration is observed on all levels, especially bad on level 9.
- Damage to copper coping on south elevation causing staining and water infiltration into wall. Repair coping.
- Staining on 9th floor at east elevation windows. Repair and paint.
- Water damage in north corridor near roof terrace entry. Repair and paint.
- Leaking at threshold of 9th floor east roof access door and north terrace access door.
- North entry on floor one showing excessive wear due to high volume of traffic. End of Useful Service Life.
- VCT cracking in auditorium where the slope of floor changes. End of Useful Service Life.
- Rubber nosing on stairs is at End of Useful Service Life.
- Provide power operated door switch.
- Medical-grade air compressors are at 10,000 run-time hour lifespan and require rebuild. Confirm with manufacturer’s representative.

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<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
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<tbody>
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<td>1 (year 0)</td>
<td>$45,000</td>
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<td>1-3 (years 0-5)</td>
<td>$252,500</td>
<td>0.5%</td>
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<tr>
<td>All</td>
<td>$332,500</td>
<td>0.6%</td>
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</table>

**Current Replacement Value:**  $52,970,700

**Projected Annual Maintenance Budget:**  $1,271,297
Facility: Rosza Performing Arts & Education Center (10)

Use Type(s): Auditorium, Classroom, Administration

Built: 2000

Area: 80,000 SF

Floors: 4, plus basement

Observation Highlights:
- Settling of brick in south west corner near areaway.
- Recently replaced 26 - 27 insulated glass panels due to leaking gaskets.
- History of water damage in main lobby. Roof has been repaired.
- G002 finned tube radiation is not covered and has been damaged from objects placed against it.

Current Replacement Value: $21,600,000
Projected Annual Maintenance Budget: $518,400

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<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
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<tbody>
<tr>
<td>1 (year 0)</td>
<td>$1,000</td>
<td>0.0%</td>
</tr>
<tr>
<td>1-3 (years 0-5)</td>
<td>$11,000</td>
<td>0.1%</td>
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<tr>
<td>All</td>
<td>$636,000</td>
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</table>
**Facility:** Walker Arts and Humanities Center (11)

**Use Type(s):** Administration, Classroom, Auditorium

**Built:** 1986

**Area:** 87,094 SF

**Floors:** 3, plus basement

**Observation Highlights:**
- Porous brick selected for exterior of building. Degradation of brick in several areas near grade. Replace broken brick and tuck-point where necessary.
- 40% of 2x2 suspended ceiling system near End of Useful Service Life.
- VCT in south corridor on main floor is beyond End of Useful Service Life.
- Water fountains not compliant.
- Interior finishes on levels 2/3 are at End of Useful Service Life. Classrooms are due for modernization to continue top instructional delivery.
- De-watering sump pump cord is connected to convenience outlet. Permanent AC power connection for de-watering sump should be provided.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
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<tbody>
<tr>
<td>$18,812,304</td>
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<th>PROJECT TOTALS</th>
<th>FCNI</th>
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</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
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<td>0.0%</td>
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<tr>
<td>1-3 (years 0-5)</td>
<td>$3,070,500</td>
<td>16.3%</td>
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<tr>
<td>All</td>
<td>$3,890,000</td>
<td>20.7%</td>
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</tbody>
</table>
Facility: Minerals & Materials Engineering Building (12)

Use Type(s): Administration, Lab
Area: 172,800 SF
Floors: 8

Observation Highlights:
- Original roofing leaking. End of Useful Service Life.
- Membrane at parapet is not adhering and causing membrane to billow in many areas.
- Some windows are leaking.
- Degradation of sand stone coping.
- Excessive staining of sand stone on south elevation below windows.
- Exterior sealant joints at stone and brick are near End of Useful Service Life.
- Collision damage of sand stone at south east entry. Replace or repair damaged sand stone.
- VCT is not adhering well to corridors. Several chips in tile caused by high foot traffic and movement of lab equipment. Consider alternative material for floor covering. End of Useful Service Life.
- Smoke purge fan for stair and atrium needed.
- New sock drain put in place at foundation wall on east to reduce water infiltration (appears ok now).

<table>
<thead>
<tr>
<th>Priority</th>
<th>Project Totals</th>
<th>FCNI</th>
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<tr>
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<td>1-3 (years 0-5)</td>
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<tr>
<td>All</td>
<td>$2,385,000</td>
<td>4.0%</td>
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</tbody>
</table>

Current Replacement Value: $59,270,400
Projected Annual Maintenance Budget: $1,422,490
Facility:  Minerals and Materials Undergrad Building (13)

Use Type(s):  Classroom, Lab, Auditorium
Built:  1955
Area:  44,400 SF
Floors:  2, plus basement

Observation Highlights:
- Seating in U113 at End of Useful Service Life. Seating in U115 in poor condition.
- Rooms U113 & U115 are at End of Useful Service Life to maintain curriculum distribution at modern level.
- Provide lightning protection.
- Degradation of sand stone coping.
- Exterior sealant joints at stone and brick are near End of Useful Service Life.

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
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</thead>
<tbody>
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<td>1 (year 0)</td>
<td>$500</td>
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<tr>
<td>1-3 (years 0-5)</td>
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<td>All</td>
<td>$457,500</td>
<td>3.9%</td>
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<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>$11,877,000</td>
<td>$285,048</td>
</tr>
</tbody>
</table>
Facility: Grover Dillman Hall (14)

Use Type(s): Administration, Classrooms, Lab
Built: 1957
Area: 86,300 SF
Floors: 3, plus basement

Observation Highlights:
- Some settling of brick in NE corner above steam tunnel.
- Few leaks reported but nothing of concern.
- Air infiltration at frames throughout. End of Useful Service Life.
- Air and water infiltration at stairwells. End of Useful Service Life.
- Minimal re-pointing needed.
- Egress doors into stairwell open into the door closure of adjacent door. Provide alternate solution.
- Provide code compliant fire alarm system.
- Classrooms are due for modernization to continue top instructional delivery.
- Fire Alarm no horns or strobes.
- Large AHU is at End of Useful Service Life.
- Replace steam PRV station. Life expectancy per ASHRAE is 25 to 35 years.

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<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
</tr>
</thead>
<tbody>
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<tr>
<td>All</td>
<td>$4,258,000</td>
<td>17.9%</td>
</tr>
</tbody>
</table>

Current Replacement Value: $23,732,500
Projected Annual Maintenance Budget: $569,580
Facility: Fisher Hall (15)

Use Type(s): Administration, Classroom, Auditorium
Built: 1964
Area: 112,100 SF
Floors: 3, plus basement

Observation Highlights:
- Multiple renovations of classroom spaces has left building with a variety of finish conditions and hardware conditions. In general classrooms are in good condition.
- Office areas finishes are at End of Useful Service Life throughout.
- Assembly lecture halls are at End of Useful Service Life.
- North east corner of north stair at basement level is cracking and water infiltration is present.
- Substrate on roof is delaminating.
- Ponding water on main roof and north entry canopy.
- Concealed spline acoustic ceiling system is at End of Useful Service Life.
- Hollow metal door at connection to Reki does not close properly. Replace rated assembly to meet code compliancy.
- Carpets in auditorium and lecture halls are near End of Useful Service Life.
- Rubber nosing on stairs is failing. Incorrect installation. At End of Useful Service Life.
- Fire alarm system needs update.
- Provide code compliant horns and strobes.
- AHU units are at End of Useful Service Life. ASHRAE life expectancy is 25 to 35 years.

Current Replacement Value | Projected Annual Maintenance Budget
---------------------------|-----------------------------------
$22,251,850               | $534,044

PRIORITY | PROJECT TOTALS | FCNI
---------|----------------|-------
1 (year 0) | $75,000 | 0.3%
1-3 (years 0-5) | $6,181,500 | 27.8%
All | $7,719,500 | 34.7%
Facility: J.R. Van Pelt Library (17)

Use Type(s): Administration, Library
Built: 1966
Area: 130,031 SF
Floors: 4

Observation Highlights:
- Lighting in archival area is excessive in visible & UV spectrum. Shielding was funded and installed, but lighting still excess in those spectrums.
- Provide lightning protection.
- 20% of lamps have expired. Potential short in lighting fixtures is causing many fluorescent lamps to burn out prematurely.
- Overhead fire shutter on third floor is potentially dangerous. Shutter is located more than 3’ from window and could potentially entrap someone in the event of emergency.
- Egress stair in original 1966 building is not code compliant, requires guardrail and compliant hand railing.
- Nosing on stair at loading dock is failing. End of Useful Service Life.
- Original Van Pelt electrical power substation, switchgear, transformers, etc. due for evaluation.
- Original PRVs for 15# steam should be replaced.
- Original Van Pelt AC-1 in basement MER is at End of Useful Service Life. ASHRAE life expectancy is 25 to 35 years.
- Original Van Pelt AC-2 and AC-3 in Penthouse MER are at End of Useful Service Life. ASHRAE life expectancy is 25 to 35 years.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
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<tbody>
<tr>
<td>$29,907,130</td>
<td>$699,047</td>
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<th>PROJECT TOTALS</th>
<th>FCNI</th>
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<tr>
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<tr>
<td>1-3</td>
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<tr>
<td>All</td>
<td>$3,402,250</td>
<td>11.4%</td>
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</table>
Facility: U.J. Noblet Forestry Building (18)

Use Type(s): Administration, Lab, Classroom
Built: 1967
Area: 95,337 SF
Floors: 2

Observation Highlights:
- Major addition and renovation in 2000.
- Building reported as having A.C.M.
- Most of the piping insulation with A.C.M. is reported as being removed.
- Water infiltration problem reported at ground level at rooms adjacent to G003 – due for repair.
- Parts of the building are air-conditioned.
- Roof leaks reported.
- All sealant joints and flashing must be inspected at the roof. Membrane flashing is loose in several locations. Repair as necessary.
- Reported water and air infiltration at 50% of original (1967) glazing. Original windows are at the End of Useful Service Life.
- All wood siding is due for regular maintenance and repair.
- Sealed wood siding on building addition is splitting in multiple locations. Some areas of siding is curling. Due for repair.
- Exterior sealant joints are at the End of Useful Service Life.
- 12x12 VCT over 9x9 tile at corridor along lab 143 is at the End of Useful Service Life. 9x9 tile must be removed as well.
- Need additional outlets on separate circuits.
- AHUs should be replaced in next 5 years in older part of the building. ASHRAE life expectancy is 25 to 35 years.

Current Replacement Value: $26,932,703
Projected Annual Maintenance Budget: $646,385

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Facility: Chemical Sciences & Engineering Building (19)

Use Type(s): Administration, Labs, Classrooms
Built: 1968
Area: 162,500 SF
Floors: 7, plus basement and sub-basement

Observation Highlights:
- At east and south entry there are unit heaters at the ceiling which are difficult to access and maintain. Servicing the penthouse is also difficult.
- Millwork throughout the entire building in relatively fair condition w/ some minor problematic areas.
- Building has been reported to have A.C.M.
- Water infiltration at south stair at sub-basement level. Concrete basement wall due for repair.
- Air and water infiltration at glazing system. Glazing system at the End of Useful Service Life
- Most exterior building joints are failing. Joints are the End of Useful Service Life.
- VCT is at the End of Useful Service Life.
- Carpet is at the End of Useful Service Life.
- Otis freight elevator: original controls, motors and other mechanical and electrical components have not been replaced, modernization should be planned for.
- Renovation of the freight elevator cab recommended.
- Steam valves cannot be sealed and need to be replaced.
- Fire pump was found to be in manual position-needs to be in automatic.
- Need to replace Federal Pacific switchboards-switches starting to fail.
- Chiller should be replaced original. Humidifiers in penthouse need to be replaced-leaking. HV-3 needs to have filters installed, and cooling tower needs to be replaced.

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
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</thead>
<tbody>
<tr>
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Current Replacement Value: $45,906,250
Projected Annual Maintenance Budget: $1,101,750
Facility: R.L. Smith Building (MEEM) (20)

Use Type(s): Administration, Classroom, Lab
Built: 1971
Area: 162,500 SF
Floors: 12, plus basement and sub-basement

Observation Highlights:
- Windows on the east and west elevations leak with driving rain. Window system near End of Useful Service Life.
- KARR report on exterior façade maintenance recommendations is attached for reference.
- Some tuck pointing necessary.
- Bottom of overhead door freezes to the floor in winter. Provide alternative solution.
- Replace T12 fixture with T8. Re-ballast and add lamps.
- SF-2 belts were loose and belt guard not in place.

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
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<tr>
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<tr>
<td>All</td>
<td>$10,058,400</td>
<td>19.6%</td>
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</tbody>
</table>
Facility: Student Development Complex (24)

Use Type(s): Athletic, Classrooms, Natatorium, Administration

Built: 1972
Area: 313,690 SF
Floors: 3

Observation Highlights:
- Most roof areas at the End of Useful Service Life.
- Some glazing is failing, fogging is present. Sealant around windows is at the End of Useful Service Life. Glazing is at the End of Useful Service Life.
- Exterior plaster at entry soffit is damaged and stained. Due for repair.
- Minor damage to brick veneer at entry. Brick due for repair.
- Building joints at the End of Useful Service Life.
- Extensive deterioration of ceramic tile at pool due to elevated humidity levels and chlorine. Replace.
- Interior sealant joints in Natatorium are at the End of Useful Service Life.
- Stained carpet near the End of Useful Service Life.
- VCT tile in corridors and gym at the End of Useful Service Life.
- Remove and replace some exterior concrete slabs.
- 4 HV units in arena should be replaced at End of Useful Service Life.
- Replace exhaust fans for toilet rooms, increase ventilation.
- Replace condensate pumps.
- Provide additional lights on generator to get 1 fc minimum.
- Replace panel boards and distribution boards.
- Overhaul both generators.
- Lighting and ceiling in Natatorium are in poor shape and need replacement.
- The existing pool equipment is 15 years old and is near the End of Useful Service Life.
- The ice arena concrete slab and the refrigeration system, at the End of Useful Service Life.

Current Replacement Value: $69,796,025
Projected Annual Maintenance Budget: $1,430,426

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<tr>
<td>All</td>
<td>$19,266,500</td>
<td>27.6%</td>
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</tbody>
</table>
Facility: Kanwal and Ann Rekhi Hall (28)

Use Type(s): Administration, Classroom
Built: 2005
Area: 51,439 SF
Floors: 3, plus basement

Observation Highlights:
- Hollow metal door at connection to Fisher does not close properly. Replace rated assembly to meet code compliancy.
- Solid core doors with hollow metal frame in entry lobby leading to office suite are not rated assemblies.
- Overhead fire shutter on third floor is potentially dangerous. Shutter is located more than 3' from window and could potentially entrap someone in event of emergency.
- VCT over raised floor in server rooms is delaminating and may become tripping hazard. Provide alternative floor cover system in server rooms. System at the End of Useful Service Life.
- Doors at 100A are not code compliant.
- Door into office suites from corridor 100, 200 or 300 are not code compliant.
- Basement VAVs in main corridor were never balanced or commissioned properly due to inaccessibility. This may contribute to noise problem in the Distance Learning space.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
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<tbody>
<tr>
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<tr>
<td>All</td>
<td>$189,000</td>
<td>1.9%</td>
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</table>
Facility: Douglas Houghton Hall (31)

Use Type(s): Student Housing, Administration
Built: 1938
Area: 92,500 SF
Floors: 3, plus basement

Observation Highlights:
- Addition built in 1946 (east wing) and another in 1966 (food service).
- Original piping throughout building showing excessive leakage.
- Building is not air-conditioned, except in one office. Full kitchen, with a make-up air unit, not air conditioned.
- Building has been reported to contain A.C.M.
- Ice dams reported at eaves - damaged copper roofing. Repair roofing and correct ice dam condition. 1980 Asphalt shingles @ main roof due for replacement.
- Broken window seals causing clouding in many areas of building. Window assembly at the End of Useful Service Life.
- Brick veneer damage observed. Water infiltration observed on exterior wall of G30. Brick veneer is due for repair.
- Mold has been present inside dorm rooms due to water infiltration (ice damming at roof).
- 25% of wood doors splitting down the middle of the door edge. Replace damaged doors. 25% of wood frames reported being loose. Provide additional blocking at jambs and re-anchor door frames.
- Bull nose tile at stairwell is chipping away. Tile at the End of Useful Service Life.
- Quarry tile at laundry room is deteriorating. Quarry tile is at the End of Useful Service Life.
- Otis and Heller elevators: controls relay logic and dc generator are reaching the End of Useful Service Life. Modernization is required for improved reliability and energy efficiency.
- Replace old Square D panels and switches.
- Weight room has no ventilation.
- DW and sanitary are in poor shape and need to be replaced, storm sewer tied into sanitary, backflow preventers used.

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>1-3 (years 0-5)</td>
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<td>31.8%</td>
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<tr>
<td>All</td>
<td>$7,367,000</td>
<td>41.9%</td>
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</tbody>
</table>

Current Replacement Value: $17,575,000
Projected Annual Maintenance Budget: $421,800
Facility: Memorial Union Building (34)

Use Type: Student Union, Administration, Kitchen/Food Service

Built: 1952

Area: 89,791 SF

Floors: 4, plus basement

Observation Highlights:
- Building cannot be repurposed or renovated in current configuration; while most of the building is aging predictably due to resilient nature of materials (CMU walls) it does not serve the current needs of contemporary students. Renovation is difficult or impossible without a complete gut requiring full upgrade to M/P system and much of the E.
- Bowling alley is underused, slated for demo.
- The original HVAC units are at End of Useful Service Life. ASHRAE life expectancy is 25 to 35 years.
- Provide lightning protection.
- Several ceiling tiles from 1987 renovation at End of Useful Service Life.
- Broken handle on operable partition wall at ball room needs replacement.
- VCT in cafeteria cracking near columns. At the End of Useful Service Life.
- Water fountain not compliant.
- T12s should be replaced with T8s in most fixtures.
- 1/3 – 2/3 PRV steam piping needs re-insulation.
- City water back flow preventer is leaking to floor drain.

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>1-3 (years 0-5)</td>
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<td>23.5%</td>
</tr>
<tr>
<td>All</td>
<td>$4,734,000</td>
<td>24.5%</td>
</tr>
</tbody>
</table>
Facility:  Wadsworth Hall (37)
Use Type(s):  Student Housing, Student Union
Built:  1955
Area:  300,239 SF
Floors:  5, plus basement

Observation Highlights:
- Reported settlement - windows at west wing would crack due to movement, even though expansion joints are present.
- Ice damming reported at the roof of the 2nd floor roof monitor over the main lobby entrance stair.
- Settlement cracks observed in brick at south elevation.
- Most exterior building joints are failing. Beyond the End of Useful Service Life.
- Limestone panels are damaged, repair.
- Grout at ceramic tile showers is failing causing water damage to gypsum board ceiling and walls below. At the End of Useful Service Life.
- Otis elevator no. 1: original equipment is reaching the End of Useful Service Life. Otis elevator no. 2, 3, 4: controls relay logic and machine external gear are reaching the End of Useful Service Life. Modernization is required for improved reliability and energy efficiency.
- Replace original Square D panel boards.
- Remove lights over stairs and replace with pendant fixtures with lower devices.
- Hot water heating main zone valve needed, no shut off valves installed to isolate system.

Current Replacement Value | Projected Annual Maintenance Budget
$57,045,410 | $1,369,090

Priorities and FCNI:

<table>
<thead>
<tr>
<th>Priorities</th>
<th>Projected Total Costs</th>
<th>FCNI</th>
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<tbody>
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<td>1 (year 0)</td>
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<tr>
<td>1-3 (years 0-5)</td>
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<tr>
<td>All</td>
<td>$5,418,000</td>
<td>9.5%</td>
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</tbody>
</table>
Facility: West McNair Hall (38)
Use Type(s): Student Housing, Student Union
Built: 1966
Area: 54,000 SF
Floors: 3

Observation Highlights:
- Large-sized non-tempered insulated and single glazed units are safety hazard. Replace all non-tempered glazing units (Activities Area).
- Original plumbing.
- No ventilation in restrooms at levels 1 and 2.
- Open coping joints due for repair.
- Water infiltration at single glazed windows reported. Window system at the End of Useful Service Life.
- Architectural repair in (40) stall showers for replacement of mixing valves.
- Site re-grading necessary to the south to divert water away from the building.
- Unsafe trash chute.
- Labeling of electrical panels is bad. Check loads in panel and label with correct loads.
- Need to replace and increase size of exhaust fans for gang toilets.
- Pneumatic system has leaks.

Current Replacement Value | Projected Annual Maintenance Budget
$10,260,000 | $246,240

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<th>PRIORITY</th>
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</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$11,000</td>
<td>0.1%</td>
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<tr>
<td>1-3 (years 0-5)</td>
<td>$3,031,000</td>
<td>29.5%</td>
</tr>
<tr>
<td>All</td>
<td>$4,396,000</td>
<td>42.8%</td>
</tr>
</tbody>
</table>
Facility: McNair Hall Food Services (39)
Use Type(s): Kitchen/Food Service, Student Union
Built: 1966
Area: 18,000 SF
Floors: 2

Observation Highlights:
- Large-sized non-tempered insulated and single glazed units are safety hazard. Replace all non-tempered glazing units.
- Aluminum window with glazed units at the End of Useful Service Life.
- In general, poor flashing details at the roof/glazing systems allows for water infiltration. Repair/replace flashings.
- Plumbing is original and leaks. Reported A.C.M. present at piping insulation. Kitchen was remodeled 8 years ago and has an exhaust hood.
- Dining room is air conditioned. However, dining feels cold during winter (due to non-insulated glazing). Replace with insulated glazing. Flush radiation water piping and inspect conectors. System may be undersized.
- Entrance heater at West vestibule does not heat the entrance; instead it heats the kitchen – due for repair.
- Water infiltration through ceiling reported due to leaking pipes.
- Door at aluminum storefront system at west vestibule to dining room does not close properly. Replace door closer.
- Dover kitchen elevator: elevator controls are reaching the End of Useful Service Life. Modernization is required for improved reliability and energy efficiency.
- Provide GFCI outlets for all outlets without ground wires.
- Refrigeration piping above ceiling in Dining is leaking.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
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</thead>
<tbody>
<tr>
<td>$4,500,000</td>
<td>$108,000</td>
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<tr>
<td>1-3</td>
<td>$972,500</td>
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<tr>
<td>All</td>
<td>$1,315,500</td>
<td>29.2%</td>
</tr>
</tbody>
</table>

Michigan Technological University 2011
Facility: East McNair Hall (40)
Use Type(s): Student Housing, Student Union
Built: 1968
Area: 71,300 SF
Floors: 6

Observation Highlights:
- Original plumbing.
- Toilet rooms along main corridors are quite tight (non-accessible) and overused with inadequate ventilation.
- Radiators along perimeter walls typical at residential units.
- Glazing system at the End of Useful Service Life.
- Large spans of non-tempered glazing, potential safety hazard.
- Damage observed at brick veneer. Repair as needed.
- Gypsum board ceiling is delaminating in restrooms due to humidity.
- 2x2 suspended ceiling system at activities room and lounge is near End of Useful Service Life.
- Unsafe trash chute.
- Labeling of panels is bad.
- Check loads in panel and label with correct loads.
- Replace all shower mixing valves, replace DW piping and sanitary.
- Gang toilet room humidity problem.
- Need to replace and increase size of exhaust fans for gang toilet.

Current Replacement Value: $13,547,000
Projected Annual Maintenance Budget: $325,128

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<tr>
<td>All</td>
<td>$5,819,000</td>
<td>43.0%</td>
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</table>
Facility: Central Heating Plant (41)
Use Type(s): Maintenance
Built: 1951
Area: 11,900 SF
Floors: 4, plus basement

Observation Highlights:
- 1 million gallon oil tank is too large and not necessary. Current location of tank would make for ideal future expansion for campus. Place new above ground @ location of building to the west of central heating plant (remove existing).
- Some settling of brick in south west corner above steam tunnel.
- Roof drains potentially emptying into main sewer. May be causing back flow of drains in floor of plant.
- No overflow drains.
- Water infiltration at sills of original 1951 windows causing damage to brick. Past End of Useful Service Life.
- Water and air infiltration at 70% of 1964 alum hopper windows. Many windows do not close securely. At End of Useful Service Life.
- Some degradation at soil line of brick veneer. Water damage at sills. Minimal re-pointing needed.
- 20% of vertical metal trim is due for replacement. Existing metal siding is due for replacement.
- Aluminum storefront doors at east loading dock near End of Useful Service Life.
- Fire suppression needed for boiler and oil tank.
- Provide code compliant fire alarm system.
- Emergency lights are at End of Useful Service Life. Heat at plant ruins battery. Provide alternative solution.
- Poor drainage in steam tunnel and remote vaults. Rusty ladders with broken rungs pose dangerous working conditions.
- Upgrade and add code compliant horns and strobes.
- Operational efficiency, reliability, and safety issues are noted in an internal Michigan Tech report provided in the Appendix.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
</tr>
</thead>
<tbody>
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<td>$11,900,000</td>
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<tbody>
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<td>$5,000</td>
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<tr>
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<td>All</td>
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<td>8.6%</td>
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<tr>
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<td></td>
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</tbody>
</table>
**Facility:** Facilities Building (44)

**Use Type(s):** Maintenance

**Built:** 1952

**Area:** 21,176 SF

**Floors:** 1

**Observation Highlights:**
- 50% of roof is not draining properly.
- 30% of roof drains clogged. Clean drains.
- Steel window frames at End of Useful Service Life.
- All sealant at steel window frames is beyond End of Useful Service Life.
- Minimal re-pointing needed in brick.
- Sealant at expansion joints on exterior cladding is beyond End of Useful Service Life.
- Overhead door into 105 is beyond End of Useful Service Life.
- Provide code compliant fire alarm system.
- Wood framed mezzanine may not be compliant.
- Water flowing toward overhead door on east elevation. Re-grade slope to repel water.
- Upgrade and add code compliant horns and strobes.
- Heat exchanger in Car Wash area should be insulated.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
</tr>
</thead>
<tbody>
<tr>
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</thead>
<tbody>
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<tr>
<td>All</td>
<td>$940,500</td>
<td>35.2%</td>
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</table>
Facility: Hillside Place (48)
Use Type(s): Student Housing, Student Union
Built: 2010
Area: 77,926 SF
Floors: 7

Observation Highlights:
- Building is fully air-conditioned.
- At similar areas around the building, the through wall metal flashing appears to be improperly installed. i.e. the drip edge is bent at non-constant angle between floors 3 & 4 at the north elevation. The flashing does not extend far enough out beyond the face of the brick veneer. Repair is required.
- Some exterior building joints are improperly installed at south elevation at precast window sills. Repair and replace as necessary.

Current Replacement Value $14,805,940
Projected Annual Maintenance Budget $355,343

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<tr>
<td>1-3 (years 0-5)</td>
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<td>0.1%</td>
</tr>
<tr>
<td>All</td>
<td>$20,000</td>
<td>0.1%</td>
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</tbody>
</table>
**Facility:** Gates Tennis Center (50)

**Use Type(s):** Athletic

**Built:** 1975

**Area:** 29,610 SF

**Floors:** 1

**Observation Highlights:**
- Water penetration at NE exterior wall.
- Provide lightning protection.
- Where brick slopes away from building, water infiltration is causing sprawling and brick failure. Provide alternate solution.
- Some collision damage in brick. Replace and repair large openings and broken brick.
- Corrugated metal leaks with driving rain.
- Sagging suspended ceiling tiles in locker rooms and showers. At End of Useful Service Life. Replace with hard ceiling.
- Due for re-painting.
- Carpet is dirty. Near End of Useful Service Life.
- Water infiltration at west elevation. Re-grade to redirect flow of water.
- Add additional Egress lights.
- Add horns and strobes.
- Heating hot water pumps and piping are missing insulation.
- Insulation on PRV valve and piping is missing

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6,662,250</td>
<td>$159,894</td>
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<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$12,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>1-3 (years 0-5)</td>
<td>$1,218,000</td>
<td>18.3%</td>
</tr>
<tr>
<td>All</td>
<td>$1,737,500</td>
<td>26.1%</td>
</tr>
</tbody>
</table>
Facility: KRC Engineering Design Center (69)
Use Type(s): Administration, Voc-Tech
Built: 2010
Area: 10,100 SF
Floors: 1

Observation Highlights:
- No overflow drains at flat roof.
- The hollow metal door with hollow metal frame at the high bay space needs sealant around frame at CMU. Provide sealant where necessary.
- Piping through janitor’s closet and receiving dock office ceiling is not fire sealed. Remediate.

<table>
<thead>
<tr>
<th>PRIORITY</th>
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<th>FCNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$1,000</td>
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<tr>
<td>1-3 (years 0-5)</td>
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<td>0.1%</td>
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<tr>
<td>All</td>
<td>$7,000</td>
<td>0.3%</td>
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</tbody>
</table>

Current Replacement Value $2,100,800
Projected Annual Maintenance Budget $50,419
Facility: Harold Meese Center (84)

Use Type(s): Administration

Built: 1973

Area: 15,020 SF

Floors: 2, plus basement

Observation Highlights:

- Extensively remodeled and completely repurposed in 1996.
- It was reported that sprinklers discharged (in the past) and the carpet was not dried. Carpet is damaged. There is a “foreign” smell throughout the building.
- No ventilation at entry (Feels excessively hot).
- Window hardware is malfunctioning, due for repair.
- EIFS deterioration, damage and cracking observed around the perimeter of the building. Open sealant joints between panels. Due for repair.
- Multiple EIFS panels are damaged probably due to sprinkler discharge near north west corner. Due for Replacement.
- Carpet at offices and corridor on second level is End of Useful Service Life.
- Make-up air units 15 years old and due for replacement.

Current Replacement Value: $2,853,800

Projected Annual Maintenance Budget: $68,491

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<th>PRIORITY</th>
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</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$0</td>
<td>0.0%</td>
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<tr>
<td>1-3 (years 0-5)</td>
<td>$512,000</td>
<td>17.9%</td>
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<tr>
<td>All</td>
<td>$680,000</td>
<td>23.8%</td>
</tr>
</tbody>
</table>
Facility: Sands Pilot Plant (90)
Use Type(s): Voc-Tech
Built: 1975
Area: 11,520 SF
Floors: 1

Observation Highlights:
- Pre-engineered buildings typically have a life expectancy in the range of 40-years. Structure is approaching the End of Useful Service Life.
- Damaged panels observed. No flashing at base of metal siding. Due for repair.
- All exterior sealant joints are at End of Useful Service Life. Some fasteners at metal siding are deteriorating.
- Hollow metal doors with hollow metal frames due for re-painting.
- Composite sectional overhead doors at End of Useful Service Life.
- Provide fire alarm system.
- Replace fixture with T8 HO strips.
Facility:  Advanced Technology Development Complex (95)
Use Type(s):  Voc-Tech, Lab, Administration
Built:  2004
Area:  24,000 SF
Floors:  1

Observation Highlights:
- Concrete plank system missing fire sealant at expansion joint. Provide proper fire blocking.
- Fire blocking missing at top of CMU wall and roof deck between offices and mechanical chase. Provide proper fire blocking.
- Provide lightning protection.
- Some leaking at exhaust penetrations. Repair.
- Roof not fully adhered.
- Weather stripping between individual metal panels is falling out at joints. Provide alternative solution.
- Operable partition walls in conference room when closed don't allow for required means of egress.
- Overhead door at offices and corridor does not act as a means of egress. Provide second compliant means of egress.
- Means of egress in high bay space to be verified during each subsequent interior renovation/fit out.
- Security gate between 217 and GH1 corridor makes space non-compliant when closed.
- No fire protection or fire stopping in storage rooms.
- Update exit signage and emergency lighting per code requirements.
- Piping and ductwork through mezzanine walls into tenant spaces are not fire sealed. Remediate

<table>
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<tbody>
<tr>
<td>1 (year 0)</td>
<td>$14,000</td>
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<td>1-3 (years 0-5)</td>
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<tr>
<td>All</td>
<td>$382,000</td>
<td>5.0%</td>
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</tbody>
</table>

Current Replacement Value: $7,584,000
Projected Annual Maintenance Budget: $182,016
Facility: Blizzard Building (102)
Use Type(s): Voc-Tech, Lab
Built: 1999
Area: 68,231 SF
Floors: 1, with mezzanine

Observation Highlights:
- In general warehouse is aging predictably.
- All finishes in 101A are at End of Useful Service Life.
- Most office finishes are aging predictably.
- Non insulated CMU in warehouse causing thermal bridging, moisture infiltration, and deterioration of block especially at horizontal bond beam.
- Flashing on warehouse at parapet is coming loose.
- VCT in break room is stained and cracking. Beyond End of Useful Service Life.
- Travel distance to means of egress in warehouse is compromised with addition. Provide compliant means of egress.
- Non complaint exiting in warehouse, new exit doors required.
- Doors from mezzanine to warehouse have no fall protection.
- Windows between original warehouse and new addition are not rated.
- Internal access from office to warehouse is non-compliant.
- No horns or strobes noted.
- Add strobes and horns.

<table>
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<tr>
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<th>Current Replacement Value</th>
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<td>$23,403,233</td>
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<td>1 (year 0)</td>
<td>$0</td>
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<tr>
<td>1-3 (years 0-5)</td>
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<td>All</td>
<td>$385,500</td>
<td>1.6%</td>
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</table>
**Facility:** Daniel Heights Apartments (Lower Heights) (32)

**Use Type(s):** Student Housing

**Built:** 1960

**Area:** 87,650 SF

**Floors:** 2

**Observation Highlights:**
- Daniel Heights Apartments (Lower Heights) consists of 25 Duplexes.
- The storage space at each building houses the boilers, which is a safety concern. Moreover, if during the winter months the storage door is left open, the domestic water heaters freeze.
- Domestic water valves do not close due to high city water pressure.
- Replace 50% of kitchen cabinets (metal) with new plastic laminate cabinets and plastic laminate countertops (both base cabs and wall cabs).
- Exterior doors showing heavy wear and damage. Doors are at End of Useful Service Life.
- Damage of tile at Lower Daniel Heights observed at bathrooms. Tile is at End of Useful Service Life.
- Provide egress lighting outside of units.
- Remove and replace deteriorated exterior metal stairs and railings. End of Useful Service Life.
- Asphalt shingles at End of Useful Service Life.
- The existing 4” sanitary running from the building to the main line is in poor shape and should be replaced.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
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<tr>
<td>$16,653,500</td>
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<th>PRIORITY</th>
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<tbody>
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<td>1 (year 0)</td>
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<tr>
<td>1-3 (years 0-5)</td>
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<td>15.9%</td>
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</tbody>
</table>
**Facility:** Daniel Heights Apartments (Upper Heights) (32-1)

**Use Type(s):** Student Housing

**Built:** 1968

**Area:** 66,352 SF

**Floors:** 2

**Observation Highlights:**
- Daniel Heights Apartments (Upper Heights) consists of 13 Duplexes.
- The storage space at each building houses the boilers which is a safety concern. Moreover, if during the winter months the storage door is left open, the domestic water heaters freeze.
- Original (1968) double pane operable awning aluminum frame windows at End of Useful Service Life. Aluminum frame is falling apart, showing condensation and the lack of thermal break.
- Replace 50% of kitchen cabinets (metal) with new plastic laminate cabinets and plastic laminate countertops (both base cabs and wall cabs).
- Exterior doors showing heavy wear and damage. Doors are at End of Useful Service Life.
- Provide egress lighting outside of units.
- The existing 4” sanitary running from the building to the main line is in poor shape and should be replaced.

<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
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</thead>
<tbody>
<tr>
<td>$12,606,880</td>
<td>$302,565</td>
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</table>

<table>
<thead>
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<th>PRIORITY</th>
<th>PROJECT TOTALS</th>
<th>FCNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$765,000</td>
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<td>1-3 (years 0-5)</td>
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<td>All</td>
<td>$1,587,000</td>
<td>12.6%</td>
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</table>
**Facility:**  Daniel Heights Apts. (Upper Heights–Ad) (32-2)

**Use Type(s):**  Student Housing

**Built:**  1969

**Area:**  63,354 SF

**Floors:**  2

**Observation Highlights:**
- Daniel Heights Apartments (Upper Heights - Addition) consists of 13 Duplexes.
- The storage space at each building houses the boilers which is a safety concern. Moreover, if during the winter months the storage door is left open, the domestic water heaters freeze.
- Original (1968) double pane operable awning aluminum frame windows at End of Useful Service Life. Aluminum frame is falling apart, showing condensation and the lack of thermal break.
- Replace 50% of kitchen cabinets (metal) with new plastic laminate cabinets and plastic laminate countertops (both base cabs and wall cabs).
- Exterior doors showing heavy wear and damage. Doors are at End of Useful Service Life.
- Provide egress lighting outside of units.
- The existing 4" sanitary running from the building to the main line is in poor shape and should be replaced.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1 (year 0)</td>
<td>$765,000</td>
<td>6.4%</td>
</tr>
<tr>
<td>1-3 (years 0-5)</td>
<td>$1,313,000</td>
<td>10.9%</td>
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<tr>
<td>All</td>
<td>$1,943,000</td>
<td>16.1%</td>
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<table>
<thead>
<tr>
<th>Current Replacement Value</th>
<th>Projected Annual Maintenance Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>$12,037,260</td>
<td>$288,894</td>
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</table>