# 3.

# Project Description

# PROJECT DESCRIPTION

# 1. PROJECT INTENT

## PURPOSE AND RATIONALE

Section 2 outlined how this project fits into the campus, curriculum, Board of Trustees' Strategic Framework, and academic master plan. It also detailed how the project will right-size classrooms and contribute to the campus's 85% utilization.

## PROCESS

Watkins and Gildemeister have not experienced significant upgrades since their opening in 1964. Past actions have been limited to ongoing maintenance and repair. The Comprehensive Facilities Plan [link] identifies these buildings as in need of significant repairs or replacement.

When considering how to address the aging building systems in Gildemeister and Watkins, WSU explored renovations with small additions in a pre-design submitted in Fall 2016. The proposed renovation and additions would have added 1,800 GSF to Watkins and 5,000 GSF to Gildemeister, resulting in an increase in GSF on campus that was not desirable from a space efficiency standpoint. The projects were focused around department programming and code upgrades, rather than pursuing efficiency and utilization improvements or a look to the future of education and needs of WSU. These projects were not funded, giving WSU an opportunity to think about the two buildings in a more future-oriented way.

In spring 2018, during Schematic Design for Laird Norton, a study of bringing all art programs into Watkins Hall was tested. 8,200 new NSF would have been needed to accommodate the full program in Watkins. Moving the entire arts program to Watkins would have lost the community connection to campus that is a guiding principle of the Laird Norton project, and ultimately the cost to renovate for a less than ideal result did not justify this path forward.

After these previous studies, WSU began to look more broadly at the current and future needs on campus, and the trends in higher education learning environments, informing the approach to this project taken here. The process for this predesign, including representation from WSU departments, faculty and staff, Workshops and meetings, is outlined in Section 2.

## COPE IMPACTS

In September 2018, a COPE (Construction Occupancy Projection Exposure) inspection was completed and found no relevant action required related to this project.

## DESIGN INTENT

The project vision outlined in Section 2 was summarized into the following vision statement:

> Inspiring collaboration, transformation and innovation through community engagement; a gateway to learning

Project goals represent a need to improve efficiency and address the aging existing buildings, while balancing a forward thinking approach to both sustainability and new learning pedagogy. Key goals included:

- Address aging infrastructure, energy inefficiency and maintenance and energy costs in Watkins and Gildemeister.
- Welcome the community to campus with a gateway bridging the main quad with the neighborhood.
- Provide a flexible and adaptable resource that can support evolving needs with minor renovations in the future.
- Foster collaboration through interdisciplinary classrooms, labs, and collaborative commons spaces.

## 2. PROGRAM NEEDS

This project aims to help faculty, students, and the greater community think outside the box, working across silos with a collaborative, hands-on learning style. The design of space considers the opportunity for short-term flexibility and long-term adaptability through the use of space modules. Design intent is driven by the vision and activities that will happen in the space.

### ACTIVITIES

A variety of users in this building—students, faculty, staff, community partners—will need the space to support their activities. If the building is to inspire innovation and collaboration, activities related to innovation and collaboration must be supported by the environment, easy, and intuitive. Based on a series of workshops with the pre-design team and WSU, key activities in this space have been identified as follows:

#### SHOWCASE

Highlight, display, and emphasize the innovative work that is happening in the building, on campus, and with partners. Showcase is the WOW factor, inspiring the users and viewers to amplify their efforts even further.

#### MEET

People coming together to meet, in the purest sense of the word.

#### COLLABORATE

Whether formal or informal, scheduled or by chance, collaborate is the connection between people who are working together on a shared problem or goal.

#### TINKER

Make, experiment, play, create.

#### FOCUS

Quiet, focused work that requires deep concentration and thinking, whether alone or with others.

#### SPARK

Inspired to think outside the box, to teach, learn, and work differently. The space will spark interactions, creativity, curiosity, the desire to dig deeper and learn. This project seeks to be transformational, a catalyst for innovation and change. The entire space should feel that energy and opportunity.

## SPACE NEEDS

The space program was developed to support the activities described above. Rather than evaluating only traditional needs for classrooms, labs, and studio spaces, the predesign program proposes modules for learning spaces. These modules are treated as a kit-of-parts that can be combined to create spaces of various sizes, allowing for long-term adaptability of the building so that the facilities team can make modifications and adjustments over time by combining or separating rooms.

An important note regarding the existing buildings: the square footage identified in the Comprehensive Facilities Plan for the two buildings to be replaced is identified as a total of 73,080 SF (Gildemeister: 37,699 and Watkins: 35,805). However, after reviewing the methodology presented in Minnesota State Space Planning Guidelines for calculating total Gross Square footage, the design team reviewed the existing Revit drawings for Gildemeister and Watkins and found the total square footage to be a total of 78,333. This square footage counts vertical circulation on all levels and includes all MEP and crawl spaces.

As the proposed new total GSF includes a mechanical penthouse and MEP space in the basement, existing GSF calculations should include MEP and crawl spaces for an apples-to-apples comparison. This results in a gross reduction of 5,316 SF, or approximately a 7% reduction. Given the high sustainability goals for the project, the mechanical and electrical space needs are greater in the proposed new building, resulting in a usable square footage reduction greater than 10%.

The following pages outline the space needs program for the building and NASF per occupant in the learning modules. This program shows spaces as assigned to Mathematics & Statistics, Computer Sciences, and Art & Design. However, future building tenants could be any department that is prioritizing interdisciplinary learning, or any department or individuals interested in working in the building for a period of time to foster collaboration with other groups outside of their typical partners and collaborators. Departments with offices in the building are not the only users of the classrooms and labs in the building; rather, all learning spaces will be schedulable for all five colleges, with priority potentially given to classes with interdisciplinary approaches, active learning needs, innovative pedagogy, and other desirable attributes.

To demonstrate the flexibility of the program, the following page illustrates how the spaces would be allocated for Mathematics & Statistics, Computer Sciences, Art & Design, and Student Support Services. These are the three departments currently housed in Watkins and Gildemeister and would become the first tenants in this building.  While these departments would be the first tenants, the program is flexible and could easily accommodate a different department in the future.

| | *Total GSF* | *Crawl Space GSF* | *MEP GSF (incl. Crawl Space)* | *GSF Less Crawl Space* |
|---|---|---|---|---|
| Gildemeister | 40,395 | 1,411 | 3,650 | 38,984 |
| Watkins | 37,938 | 2,087 | 3,023 | 35,851 |
| *Exg. Total* | *78,333* | *3,498* | *6,673* | *74,835* |
| | | | | |
| *Proposed Total** | *73,017* | | *8,200* | *65,000* |

*Includes penthouse and basement

## SPACE NEEDS PROGRAM - BASELINE

The Baseline space program below illustrates the mix of space type modules proposed for the new building. The space program on the opposite page illustrates how these space type modules can be distributed to support the four groups who will be the first tenants of the building. As campus needs change over time, the space modules can be redistributed with minimal impact and disruption.

| | | | | *ACTIVITIES* | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Space Type | SF | Qty | Ttl SF | *Showcase* | *Meet* | *Collaborate* | *Tinker* | *Focus* | *Spark* |
| Lobby/reception | 1,000 | 1 | 1,000 | x | | | | | x |
| Coat room | 100 | 1 | 100 | | | | | | |
| Commons | 4,000 | 1 | 4,000 | x | x | x | | x | x |
| Learning module (classroom) | 1,000 | 14 | 14,000 | | | x | x | | x |
| High tech learning module (lab) | 1,000 | 4 | 4,000 | | | x | x | | x |
| VIrtual reality lab | 100 | 4 | 400 | x | | x | x | x | x |
| High touch learning module (studio) | 1,600 | 5 | 8,000 | | | x | x | | x |
| Furniture storage | 800 | 1 | 800 | | | | | | |
| Classroom supply | 200 | 2 | 400 | | | | | | |
| Conference room | 600 | 1 | 600 | | x | x | | | |
| Student lockers | 200 | 1 | 200 | | | | | | |
| Office support | 200 | 1 | 200 | | | | | | |
| Department home | 300 | 4 | 1,200 | | x | x | | | x |
| Office | 100 | 50 | 5,000 | | x | | | x | |
| **Total Net Assignable Square Feet (NASF)** | | | **39,900** | | | | | | |
| Net to Gross Multiplier | | | 1.83 | | | | | | |
| **Total Gross Square Feet (GSF)** | | | **73,017** | | | | | | |
| Building Efficiency Ratio (NASF/GSF) | | | 54.64% | | | | | | |

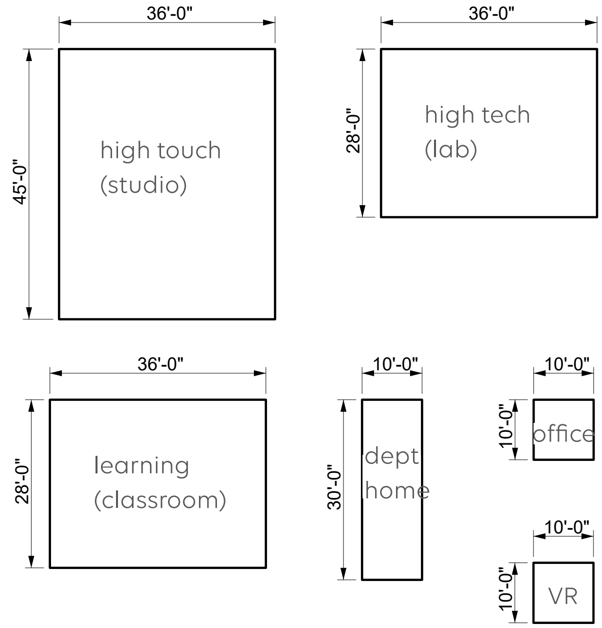
## SPACE NEEDS PROGRAM - MATH & STATISTICS, ART & DESIGN, COMPUTER SCIENCES, & STUDENT SUPPORT SERVICES

| | | | | *ACTIVITIES* | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Space Type | SF | Qty | Ttl SF | *Showcase* | *Meet* | *Collaborate* | *Tinker* | *Focus* | *Spark* |
| Lobby/reception | 1,000 | 1 | 1,000 | x | | | | | x |
| Coat room | 100 | 1 | 100 | | | | | | |
| Commons | 4,000 | 1 | 4,000 | x | x | x | | x | x |
| Learning module (classroom) - 3/4 module | 750 | 1 | 750 | | | x | x | | x |
| Learning module (classroom) - 1 module | 1,000 | 9 | 9,000 | | | x | x | | x |
| Learning module (classroom) - 1 1/4 module | 1,250 | 1 | 1,250 | | | x | x | | x |
| High tech learning module (lab) | 1,000 | 7 | 7,000 | | | x | x | | x |
| VIrtual reality lab | 100 | 4 | 400 | x | | x | x | x | x |
| High touch learning module (studio) | 1,600 | 5 | 8,000 | | | x | x | | x |
| Furniture storage | 800 | 1 | 800 | | | | | | |
| Classroom supply | 200 | 2 | 400 | | | | | | |
| Conference room | 600 | 1 | 600 | | x | x | | | |
| Student lockers | 200 | 1 | 200 | | | | | | |
| Office support | 200 | 1 | 200 | | | | | | |
| Department home - Art & Design | 300 | 1 | 300 | | x | x | | | x |
| Department home - Computer Science | 300 | 1 | 300 | | x | x | | | x |
| Department home - Math & Statistics | 300 | 1 | 300 | | x | x | | | x |
| Department home - Student Support Services | 300 | 1 | 300 | | x | x | | | x |
| Office - Art & Design | 100 | 9 | 900 | | x | | | x | |
| Office - Computer Science | 100 | 12 | 1,200 | | x | | | x | |
| Office - Math & Statistics | 100 | 22 | 2,200 | | x | | | x | |
| Office - Student Support Services | 100 | 7 | 700 | | x | | | x | |
| **Total Net Assignable Square Feet (NASF)** | | | **39,900** | | | | | | |
| Net to Gross Multiplier | | | 1.83 | | | | | | |
| **Total Gross Square Feet (GSF)** | | | **73,017** | | | | | | |
| Building Efficiency Ratio (NASF/GSF) | | | 54.64% | | | | | | |

## SPACE TYPES

The building core and shell is intended to support a variety of configurations of spaces within it. In order for this modular, adaptable interior planning approach to be successful, the core building blocks require standardization. The graphics to the right are typical sizes used for the fit planning represented in this report.

Innovation is a primary project goal, and in order for a building to foster innovation, the design must be rooted in a deep understanding of the activities that will create an innovative environment, and how to encourage those activities through design. This is an objective of these space prototype diagrams - to highlight key attributes that will best support the activities in those spaces, be it special finishes, technology, MEP, or key adjacencies. Most program spaces support more than one of the primary activities of showcase, meet, collaborate, tinker, focus, and spark. The requirements to support these activities, as well as floor plan examples for several of the key spaces, are outlined on the following pages.




## THE PROGRAM CONSTITUTES THE FOLLOWING LEARNING MODULES
## NET ASSIGNABLE SQUARE FEET PER OCCUPANT

| | | | | NASF/OCCUPANT | | |
|---|---|---|---|---|---|---|
| | SF | Qty | Total SF | SF/ Occupant | Occupant/ Module | Total Occupants |
| Learning module (classroom) | 1,000 | 14 | 14,000 | 25 | 40 | 560 |
| High tech learning module (lab) | 1,000 | 4 | 4,000 | 40 | 25 | 100 |
| Virtual reality lab | 100 | 4 | 400 | 33 | 3 | 12 |
| High touch learning module (studio) | 1,600 | 5 | 8,000 | 100 | 16 | 80 |

## LOBBY/RECEPTION

showcase | meet | collaborate | tinker | focus | spark

Welcoming to the public, the reception area will bridge the exterior and interior, the Winona community and the center of campus.

Finishes:

Durable

Sense of place, welcome

Connected to WSU brand identity

MEP

Daylight sensors

Accent pendants or other lighting

Lighting to highlight display elements

Waiting area with power

Technology:

Potential for digital signage

Furniture, Fixtures & Equipment (FF&E):

Built-in casework desk

KEY ADJACENCIES:

Near commons spaces

Near entry

## COMMONS

showcase | meet | collaborate | tinker | focus | spark

Like a town square or coffee shop, this space will be the central hub of this building. May include a variety of furniture settings in one area, or be broken up into small lounge and collaboration settings throughout the building. Space can be flexibly designed with all movable furniture and partitions, or have a series of built environments creating small rooms for impromptu meetings, larger spaces open for lectures and gatherings, and walls for student work to be displayed in an active gallery setting.

Finishes

Attractive, comfortable, durable, UV resistant

MEP:

Explore flexible power for movable furniture settings

Daylight sensors

Technology:

Potential for digital signage

Furniture, Fixtures & Equipment (FF&E):

Flexible furniture to provide a variety of work styles and settings:

- Booths
- Lounge furniture
- Tables and chairs

KEY ADJACENCIES:

Near the reception/lobby

Learning spaces

## CONFERENCE ROOM


Conference room for faculty/staff to meet with each other and/or students. To be determined whether this room is open to student groups for scheduling.

Finishes:

Keep acoustic control in mind

Possibly tackboard or markerboard

MEP:

Power on all walls for easy reconfiguration of the room

Thermostat for individual rooms

Daylight

Dimming

Variable switching and multiple lighting zones

Occupancy sensor

Technology:

Monitor or projector/screen

May need AV rack

Furniture, Fixtures & Equipment (FF&E):

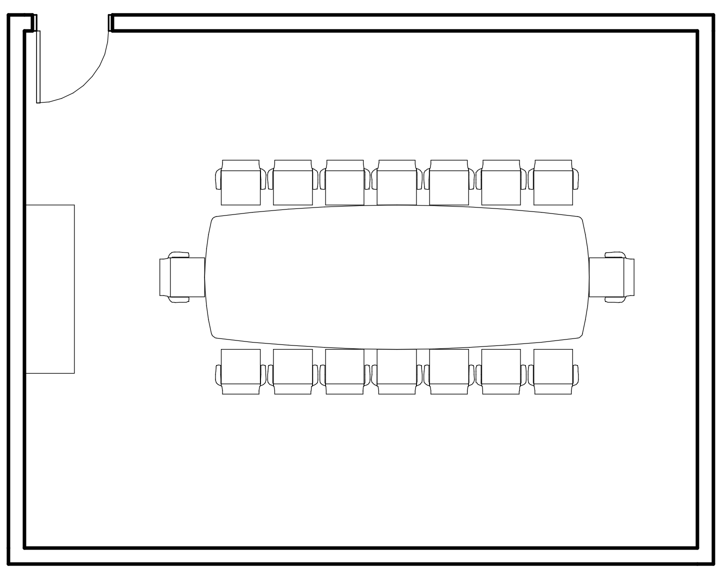
Table(s) & chairs

Credenza

Waste, recycling, compost

KEY ADJACENCIES:

Near offices



## OFFICE

showcase meet collaborate tinker focus spark

At this time, the program includes 100 SF private offices to support both the confidential interactions between faculty, staff and students, and the quiet focus time needed for intellectual work. If office workspace needs change over time, the modular nature of the program allows this space to be converted to collaborative workspace or learning space without major disruption.

Finishes:

Carpet

ACT

Possibly tackboard or markerboard

MEP:

Daylight sensors

Dimming

Occupancy sensor:

Power on all walls for easy reconfiguration of the room

Thermostat for individual rooms

Technology:

Computer, monitor

Furniture, Fixtures & Equipment (FF&E):

Desk

Storage

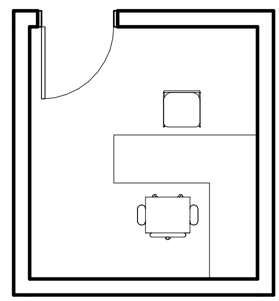
Task Chair

Guest chair(s)

KEY ADJACENCIES:

Near conference room

Near commons



## DEPARTMENT HOME

showcase meet collaborate tinker focus spark

While this building will foster collaboration across disciplines and generally discourage ownership of portions of the building, students and faculty desire a home-base for their majors. Each department home will serve like a lounge for a specific department. Branding and specialized furniture and/or finishes may be used for placemaking.

Finishes:

Keep acoustic control in mind

Possibly tackboard or markerboard

Branded welcome wall or signage

MEP:

Daylight sensors

Dimming

Occupancy sensor

Technology:

Potential for digital signage

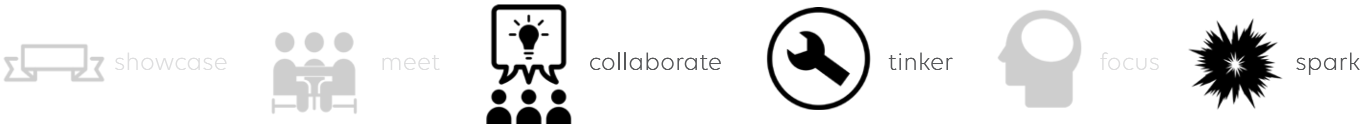
Furniture, Fixtures & Equipment (FF&E):

Flexible lounge furniture
Potential for storage or bookshelves, depending on department needs

KEY ADJACENCIES:

Near offices

## LEARNING MODULE (CLASSROOMS)




Serving the activities of collaborate, tinker, and spark, the learning module will support hands-on learning opportunities to maximize engagement and retention. All learning spaces will follow an active learning model to maximize opportunities for hands-on learning. A module of 1000 square feet (25 NSF per person) will be used to make up single rooms (40 students), double (80) or even 1.5 module rooms (60). In the design process, the team can explore whether some rooms should have movable partitions for day-to-day flexibility. The building planning will utilize a variety of strategies to allow for relatively low cost and low effort adaptability of these modules, so a wall can come up or come down to create larger rooms or smaller rooms. These strategies may include:

- Building structural grid set up to allow for two or four rooms to be combined with no columns in the center
- No/minimal building systems running through walls separating classrooms
- Ceiling grid set up per module, with gypsum soffit at locations where walls could be added later
- Lighting to be designed so no major renovation will be required if rooms are combined or separated

Finishes:

Keep acoustic control in mind

ACT

Carpet tile

Possibly tackboard

Markerboard

MEP:

Power on all walls for easy reconfiguration of the room

Wireless charging

Thermostat for individual rooms

Daylight controls

Indirect lighting

Dimming

Variable switching and multiple lighting zones

Occupancy sensor

Technology:

2-4 monitors per room and/or projectable surfaces and projectors

Plug and play technology for student iPads, phones, and/or laptops to connect to screens around the room

Furniture, Fixtures & Equipment (FF&E):

Flip-top tables and stackable or nesting chairs

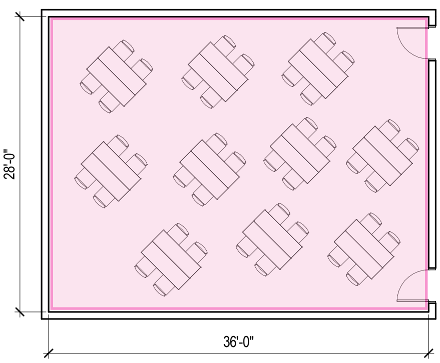
Teaching podium or table, movable

Potential for mobile whiteboards or tackboards

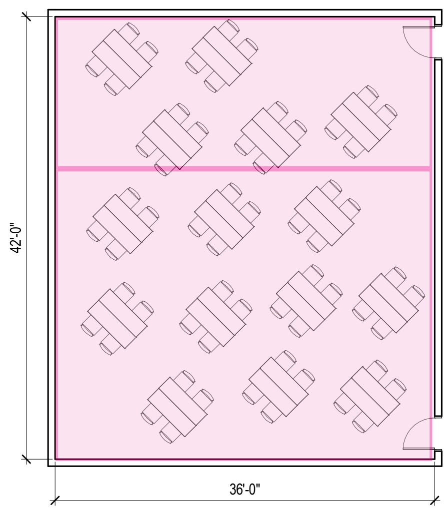
Waste, recycling, compost

KEY ADJACENCIES:

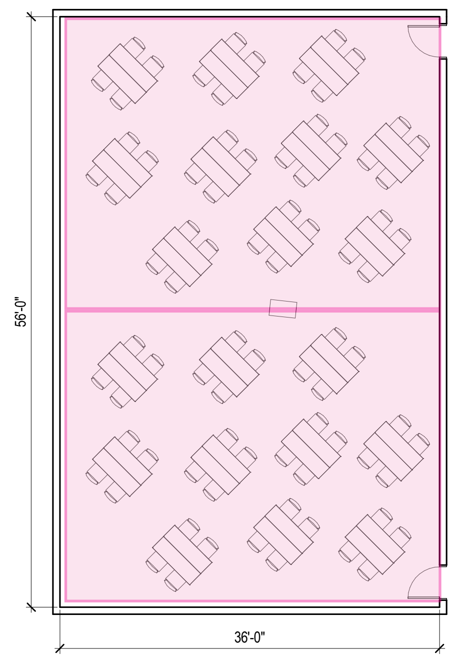
Separate from offices to reduce likelihood of departments “claiming” learning rooms




1 module (40 person)




1.5 modules (60 person)




2 modules (80 person)

1000-SF (40 person) module

## HIGH TOUCH LEARNING MODULE (STUDIO)

showcase meet collaborate tinker focus spark

Serving the activities of collaborate, tinker, and spark, the high touch learning module will support hands-on, making learning opportunities to maximize engagement and retention.  These spaces will have specialized MEP requirements to meet program and safety standards. A module of 1600 square feet (100 NSF per person) will be used. This module includes all storage and support spaces needed, resulting in the higher square footage per person. In design, it is strongly recommended that these spaces be zoned together to maximize efficiency by grouping together building systems. The predesign cost modeling assumes this approach.

Several of these modules will likely serve the need for art fundamentals studios (drawing and painting, 3D sculpture). One or two modules together could serve as a makers space. There are no plans for a specialized ceramics studio in this building, though there may be a need for a small kiln to support 3D ceramics printing.

### Finishes:

Keep acoustic control in mind

Hard surface floor, cleanable and durable

Possibly tackboard and/or markerboard

### MEP:

Sinks will be required in some spaces

Power for personal devices

Equipment with specialized electrical needs

Thermostat for individual rooms

Daylight controls

Direct lighting at work zones, indirect overall

Dimming

Variable switching and multiple lighting zones

Occupancy sensor

Fresh air (no recirculating) with hoods for exhaust

### Technology:

Monitor and/or projector

Specialized equipment may be used (i.e. 3D printer)

### Furniture, Fixtures & Equipment (FF&E):

Flexible studio furniture, easels, etc.

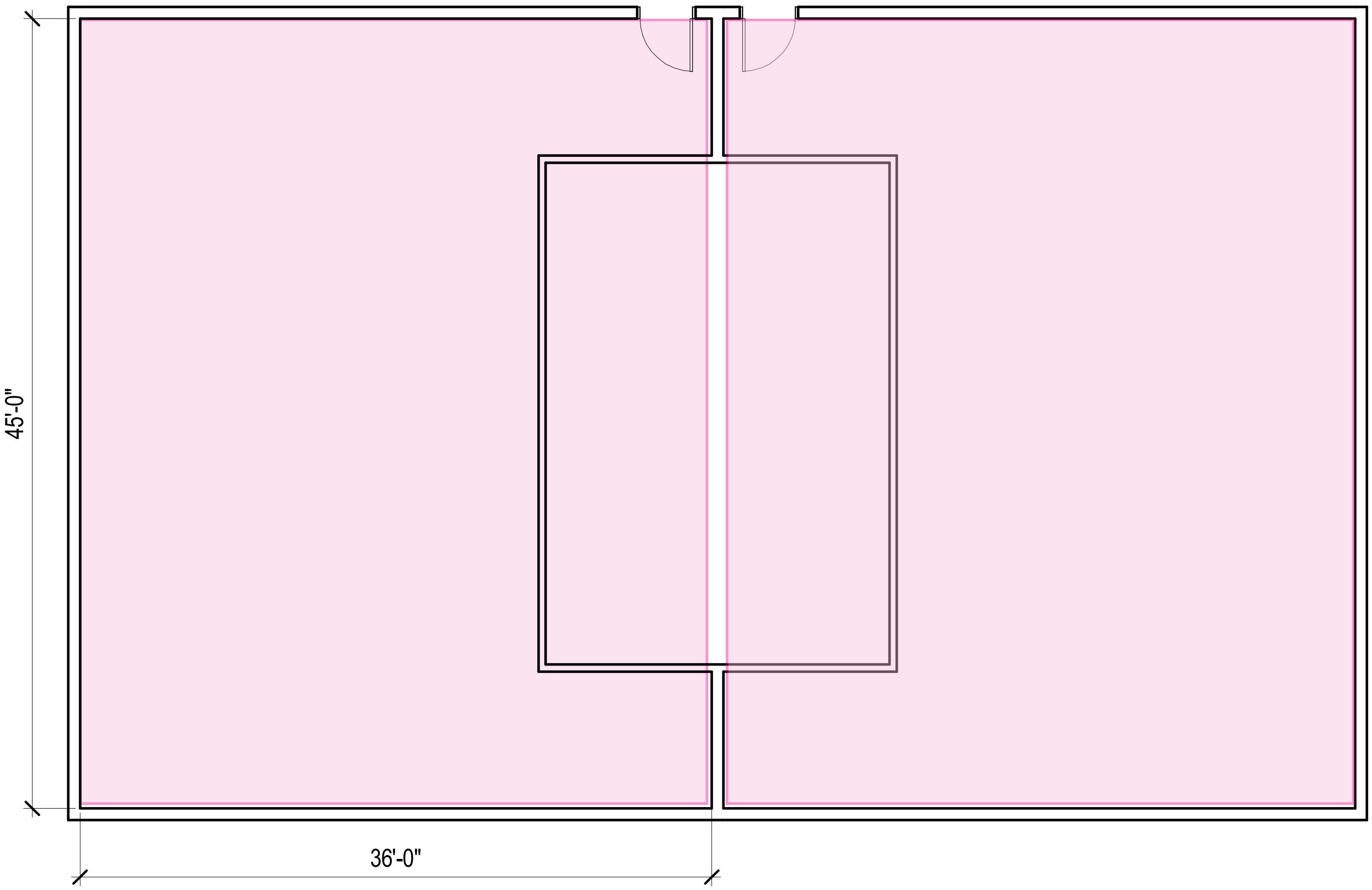
Teaching podium or table, movable

Potential for mobile whiteboards or tackboards

Waste, recycling, compost

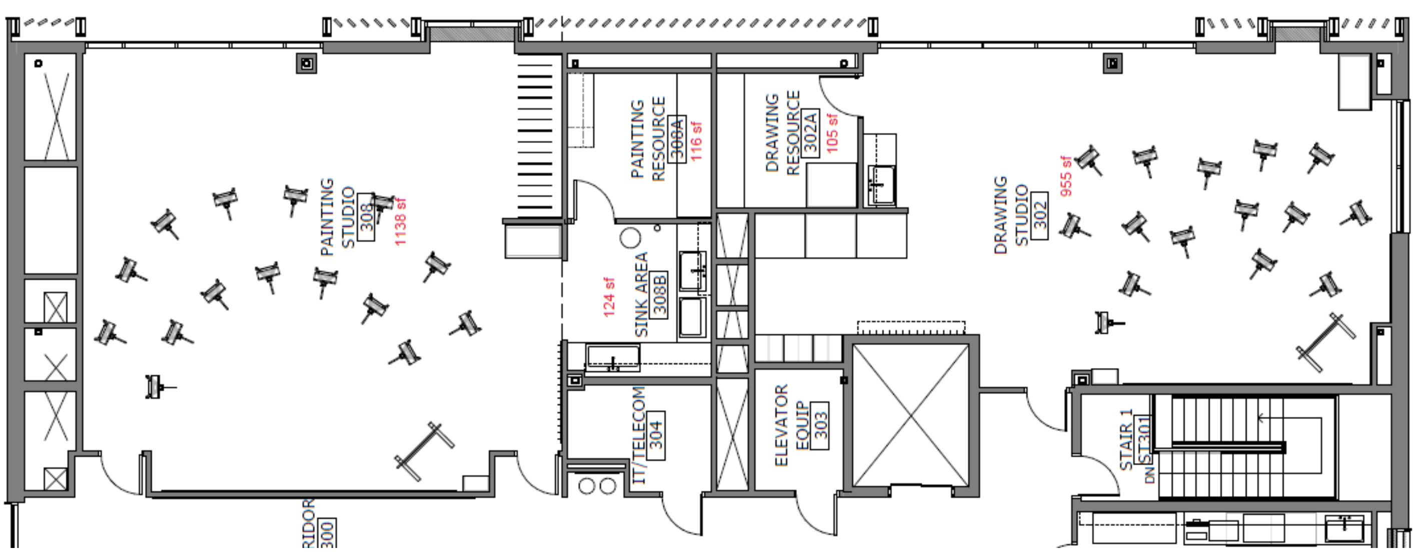
### KEY ADJACENCIES:

Recommend zoning all high touch learning modules together for HVAC efficiency




Example: 2 modules

Note: Module SF includes support spaces and functions. This example shows support spaces that could potentially be shared by studios, or at minimum placed adjacent to minimize MEP runs.




Painting & Drawing Studio Benchmark Illustrating Support Spaces Needed for Specialized Art Studios

## HIGH TECH LEARNING MODULE (LAB)

showcase meet collaborate tinker focus spark

Serving the activities of collaborate, tinker, and spark, the high tech learning module will support hands-on, technology-based learning opportunities to maximize engagement and retention. A module of 1000 square feet (40 NSF per person) will be used. As high tech and learning modules use the same SF module, they can be intermixed in location and function can easily switch in the future should more high tech labs be needed, or more learning modules.

**Finishes:**

Keep acoustic control in mind

ACT

Carpet tile

Possibly tackboard

Markerboard

**MEP:**

Power on all walls for easy reconfiguration of the room

Possibly in-floor power

Wireless charging

Thermostat for individual rooms

Daylight controls

Indirect lighting

Dimming

Variable switching and multiple lighting zones

Appropriate cooling for heavy computer use spaces

Occupancy sensor

**Technology:**

May need multiple monitors per room and/or projectable surfaces and projectors

May require desktop computers

May need VR sensors

Plug and play technology for student iPads, phones, and/or laptops to connect to screens around the room

**Furniture, Fixtures & Equipment (FF&E):**

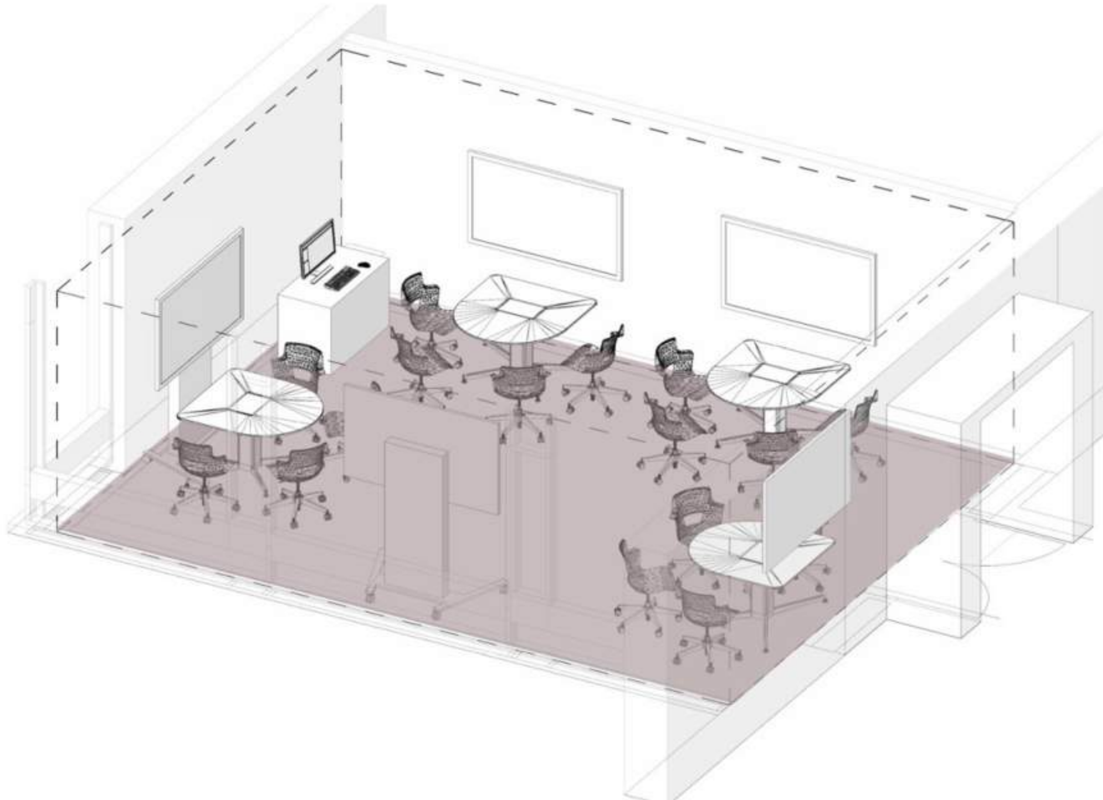
Furniture to meet needs of room. Some rooms may have flip-top tables and stackable or nesting chairs with power in tables. Others may have tables as shown in the example image with a half-ellipse facing a screen. Others may have fixed seating with power for computer lab settings.

Teaching podium or table, movable

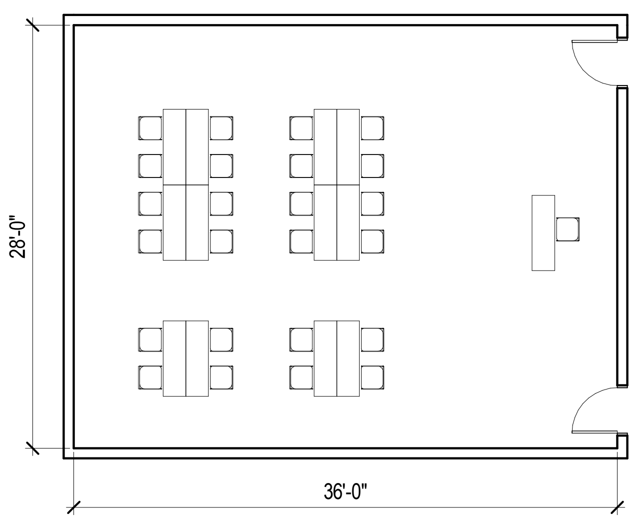
Waste, recycling, compost

**KEY ADJACENCIES:**

Flexible location, though some adjacency to learning modules for easy adaptable use in the future may be desired.



Example: 1 module




1 module (25 person)

## VIRTUAL REALITY LAB

showcase meet collaborate tinker focus spark

The Virtual Reality Labs serve multiple activities, depending on the use. From showcasing the most innovative technologies to collaborating across disciplines, testing virtual environments designed by students to doing focused work, these rooms exemplify the future of learning. A module of 100 square feet (33 NSF per person) will be used.. These spaces will be zoned together to maximize efficiency by grouping together building systems.

Several VR labs may be zoned together for a suite, or multiple modules could be combined for a larger space that offers flexibility in the technology within the space.

Finishes:

ACT

Carpet tile

Paint

MEP:

Power on all walls for easy reconfiguration of the room

Power from above to connect headsets without creating a tripping hazard

Thermostat for individual rooms

Indirect lighting

Dimming

Variable switching and multiple lighting zones

Appropriate cooling for heavy computer use spaces

Occupancy sensor

Technology:

Projector(s) or monitor

May require desktop computer(s)

May need VR sensors

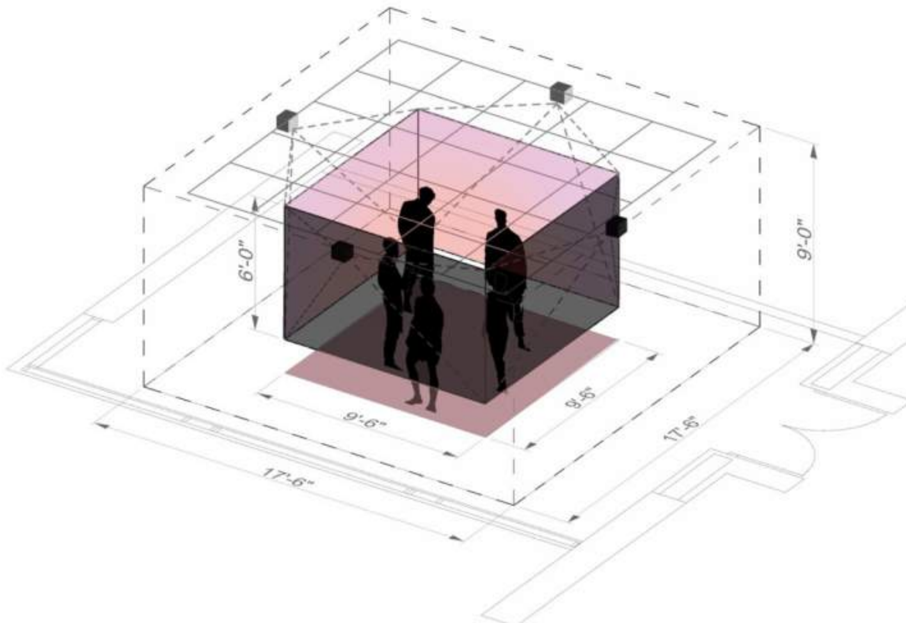
Furniture, Fixtures & Equipment (FF&E):

Very little (if any) furniture

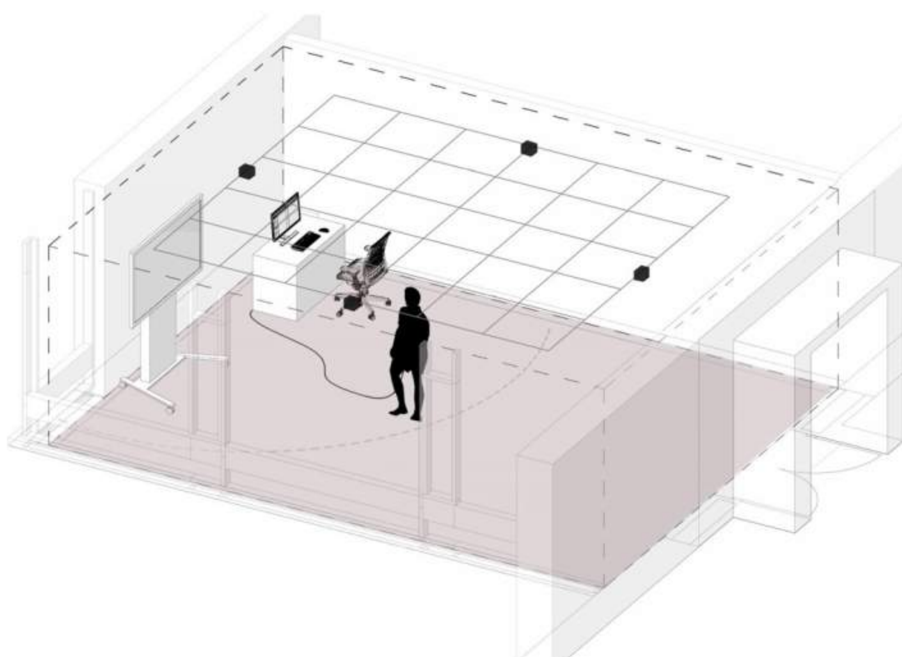
KEY ADJACENCIES:

Interior space desirable - no daylight access

Zone all VR labs together




Example: 4 modules (VR Cave)



Example: 1 or more modules

## 3. BUILDING PROPOSAL

As discussed in section 2, the first phase of this predesign involved a thorough investigation of whether the project should involve a complete renovation of Gildemeister and Watkins, a partial renovation and partial demolition and new construction addition, or complete demolition and new construction.

The following site plans were presented at Workshop 2 and analyzed the strengths and weaknesses of various scenarios from renovation of the existing buildings, to a renovation and addition of Gildemeister, and finally to a new building. The results of the analysis led to the selection of a new building as the best choice for this project.

### SCENARIO 1: NEW BUILDING

The massing for a new building addresses the site and the program in the following ways:

- All the program will be housed in one building allowing for maximum efficiency of shared spaces and functions with little redundancy due to separate facilities
- The new structure can be laid out for optimal column spacing, program planning, and floor to floor heights for WSU's long-term goals
- The new building will be oriented for significant southern exposure and contribute toward WSU's goal of a net-zero facility
- Provides a welcoming and highly visible gateway that allows entry to both the building and campus, addressing the desire to strengthen WSU's connection with and relationship to the surrounding community
- Contributes to a more pedestrian-friendly campus

Issues raised:

- Will have an initial cost per square foot higher than renovating the existing Gildemeister and Watkins Halls
- New construction is favorable for WSU's long-term goals of adaptability and flexibility
- The shape as shown may not be flexible enough for reconfiguration

Scenario 1: New Building

## SCENARIO 2: RENOVATION + ADDITION

In this scenario, the floor slabs and columns of the 3-story wing of Gildemeister Hall is retained and renovated completely on the interior and exterior. The one-story wing and entry link is demolished, as is Watkins Hall across the street. A new major addition is added onto Gildemeister. This scenario addresses the campus site and program in the following ways:

- Provides a welcoming and highly visible gateway that allows entry to both the building and campus, addressing the desire to strengthen WSU's connection with and relationship to the surrounding community
- All the program will be housed in one building allowing for maximum efficiency of shared spaces and functions with little redundancy due to separate facilities
- Contributes to a more pedestrian-friendly campus
- The new wing of the structure can be laid out for optimal column spacing, program planning, and floor to floor heights for WSU's long-term goals

Issues raised:

- The floor to floor heights of the existing wing are approximately 12 feet. Ramps will be needs to link to the new addition floor to floor height of approximately 15-16 feet
- The floor to floor height of the existing Gildemeister will limit head room and space for overhead duct runs. May require fitting out that wing with program spaces that are smaller
- The orientation of the addition is oriented north/ south which is less ideal than east/west for passive solar energy saving strategies

Scenario 2: Renovation + Addition

## SCENARIO 3: RENOVATION

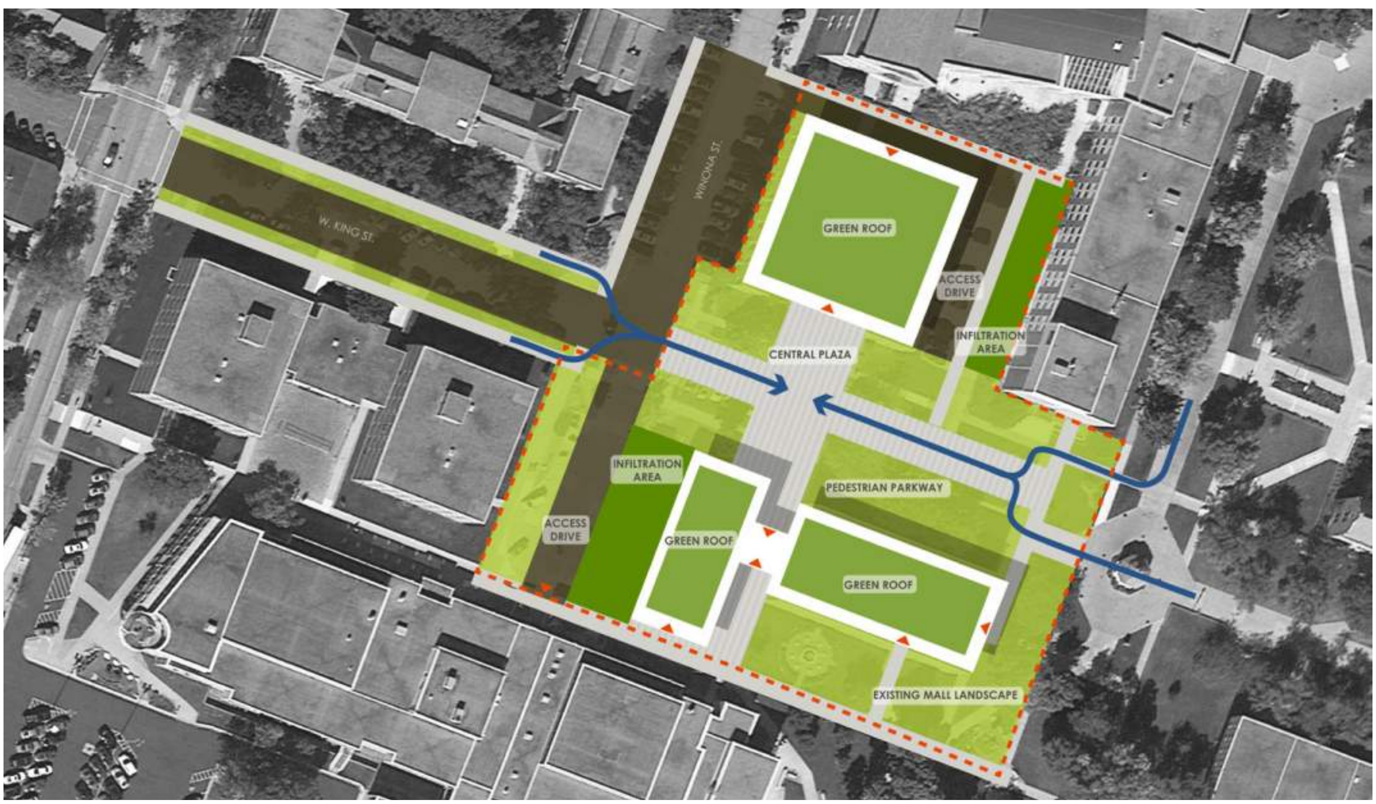
Both Gildemeister and Watkins Halls would be demolished to the structure – slabs and columns – and refitted with exterior walls, windows, roof and all new interior construction. This scenario addresses the campus site and program in the following ways:

- The street between the two buildings is converted to a walkable campus zone. The landscaping will create a connection between the two buildings to strengthen the programmatic link between them
- Contributes to a more pedestrian-friendly campus
- New planning, materials and finishes will update the buildings and provide program specific spaces
- New exterior walls, roof and windows as well as mechanical and electrical systems will move the project toward net-zero energy goals

Issues raised:

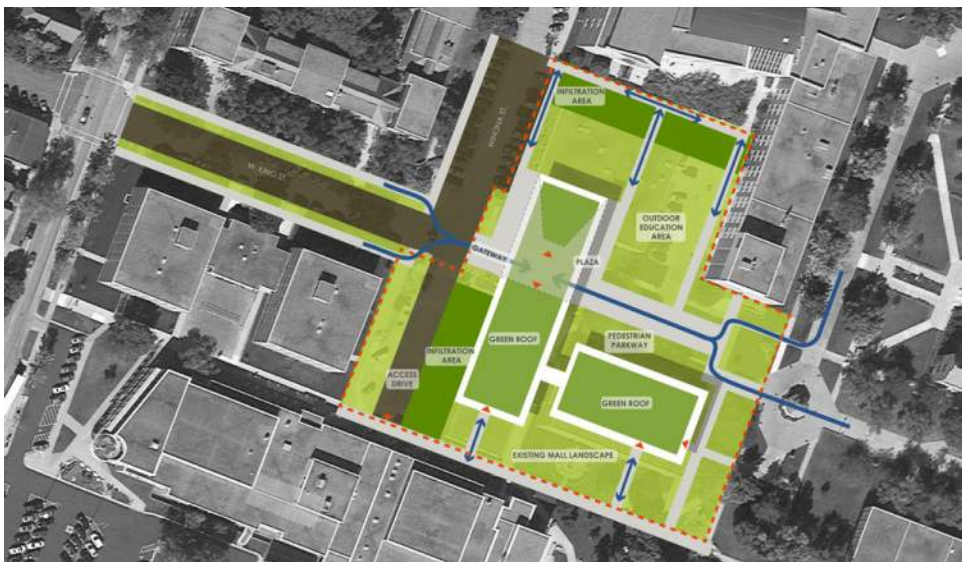
- The existing structure – floor to floor heights and column spacing – will require compromises to the planning in terms of room configurations and adjacencies. The overall effect of the lower space use efficiency will result in potentially more square footage overall to fit the program properly
- While there likely will be first cost savings compared to other scenarios, the existing structure may be inflexible to future change and costlier over the long run
- Two buildings will require redundancy of infrastructure over one building
- The low floor to floor will limit ceiling heights that are not up to today's standards especially for larger spaces
- Unforeseen structural issues related to major renovations could be discovered later that are not yet identified
- The orientation of the two existing buildings and their entrances from the street approach is problematic. Clearly communicating a sense of welcome and openness to the surrounding community, as this program proposes, will be challenging given the lack of a welcoming and visible entry
- The low floor to floor will result in a lower volume of air to condition, and help lower energy costs. However, the low ceilings will be a hindrance to the proper function of some of the larger spaces

Scenario 3: Renovation

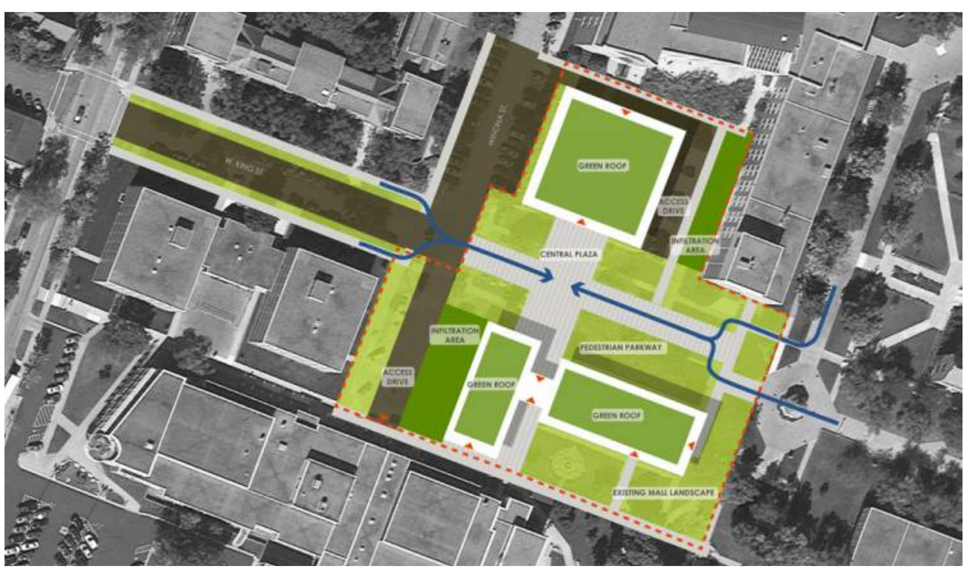


Scenario 1: New Building


Scenario 2: Renovation + Addition




Scenario 3: Renovation



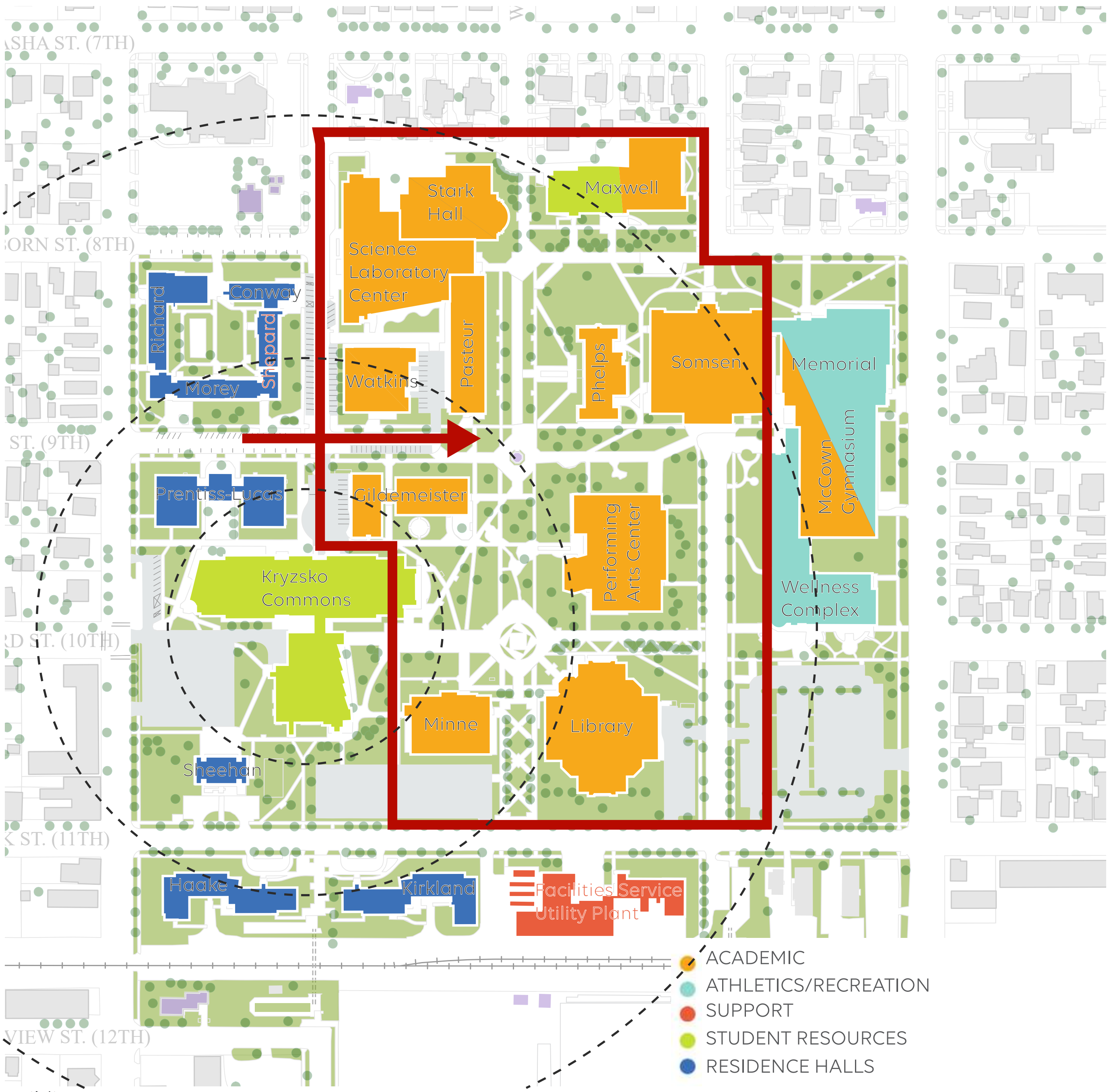
## SUMMARY

As illustrated in section 2, the existing conditions systems analysis, and the studies presented above, the new building scenario is most cost effective and best able to achieve the project's sustainability and program goals.

The remainder of this predesign will illustrate the process for exploring design options and considerations for a new building.

## CAMPUS CONTEXT AND APPROACH

As a center for innovation and interdisciplinary collaboration, this building should connect the campus to the greater Winona community, serving as a beacon and gateway to campus. The primary approach to the site is from King Street to the West. While currently visitors are greeted by the back of these buildings, including the loading docks, the new building can create a connection to the quad, welcoming them to campus.

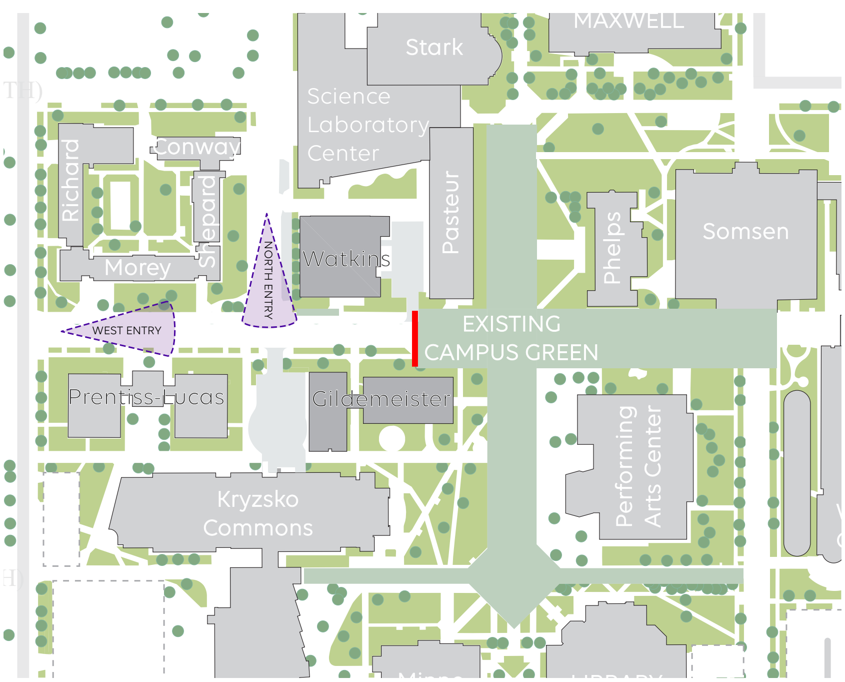


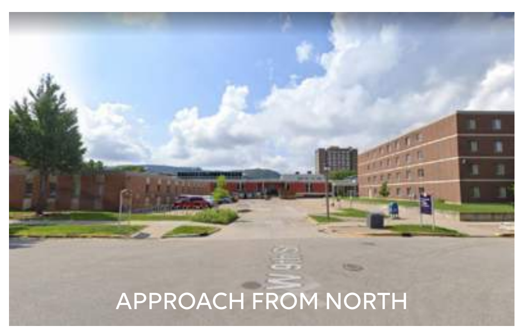

Building Use

In the initial analysis of the site, the design team identified weaknesses of the approach to campus, the sense of gateway, and poor visibility of the entry points to the existing buildings. From an experiential point of view, most approaches are not clear and do not create a "front door" to campus. The diagram below illustrates an example of a strong campus green with a sense of a gateway to campus and to a new building. The development of building scenarios was informed by this analysis.

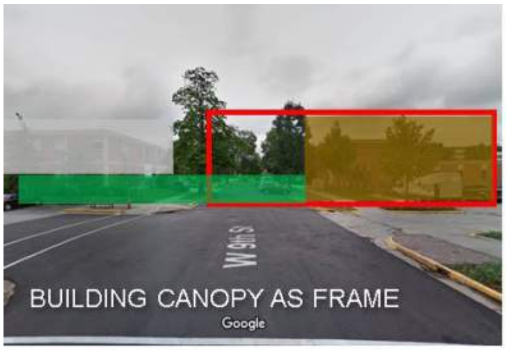
Existing Views Into Campus


Existing Views To Site



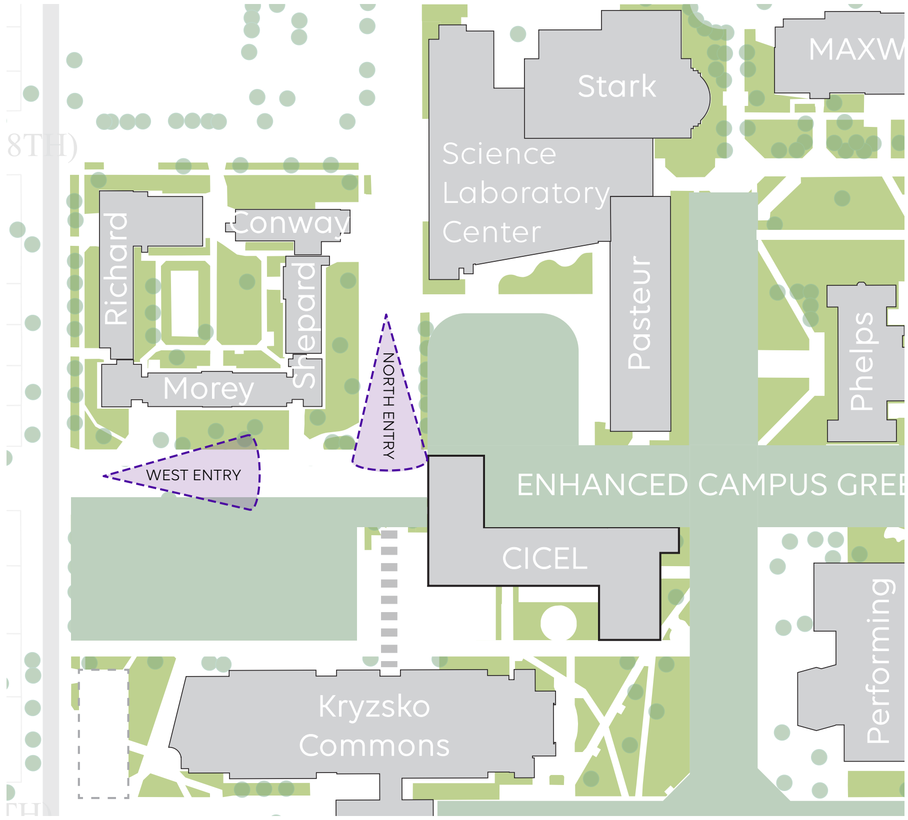




Site Approach



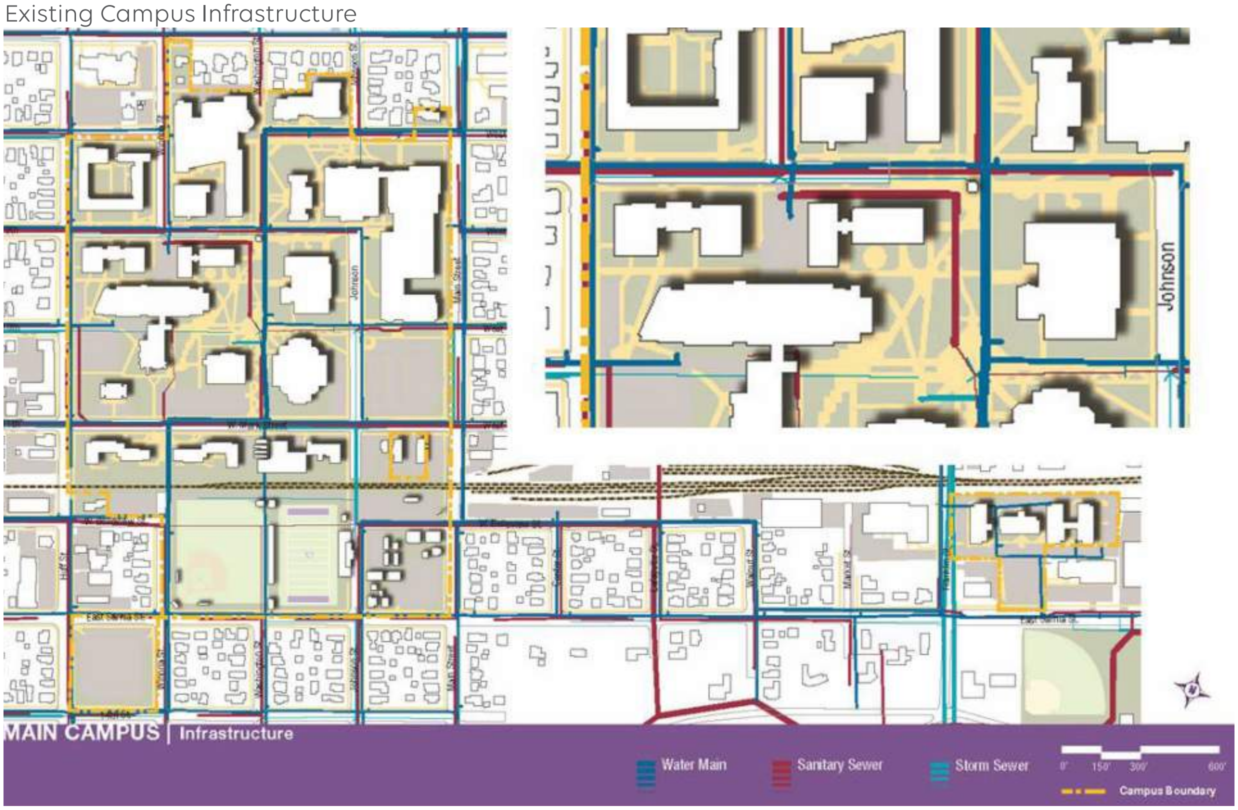

The initial approach should be an experience that leaves an impact and sets the tone for the campus environment. Currently visitors are greeted by the back of buildings, including loading docks. The existing views down West King Street, sets up a dramatic opportunity for a gateway experience to be created by the building form.

Proposed Site Approach By Vehicle (Option B shown)

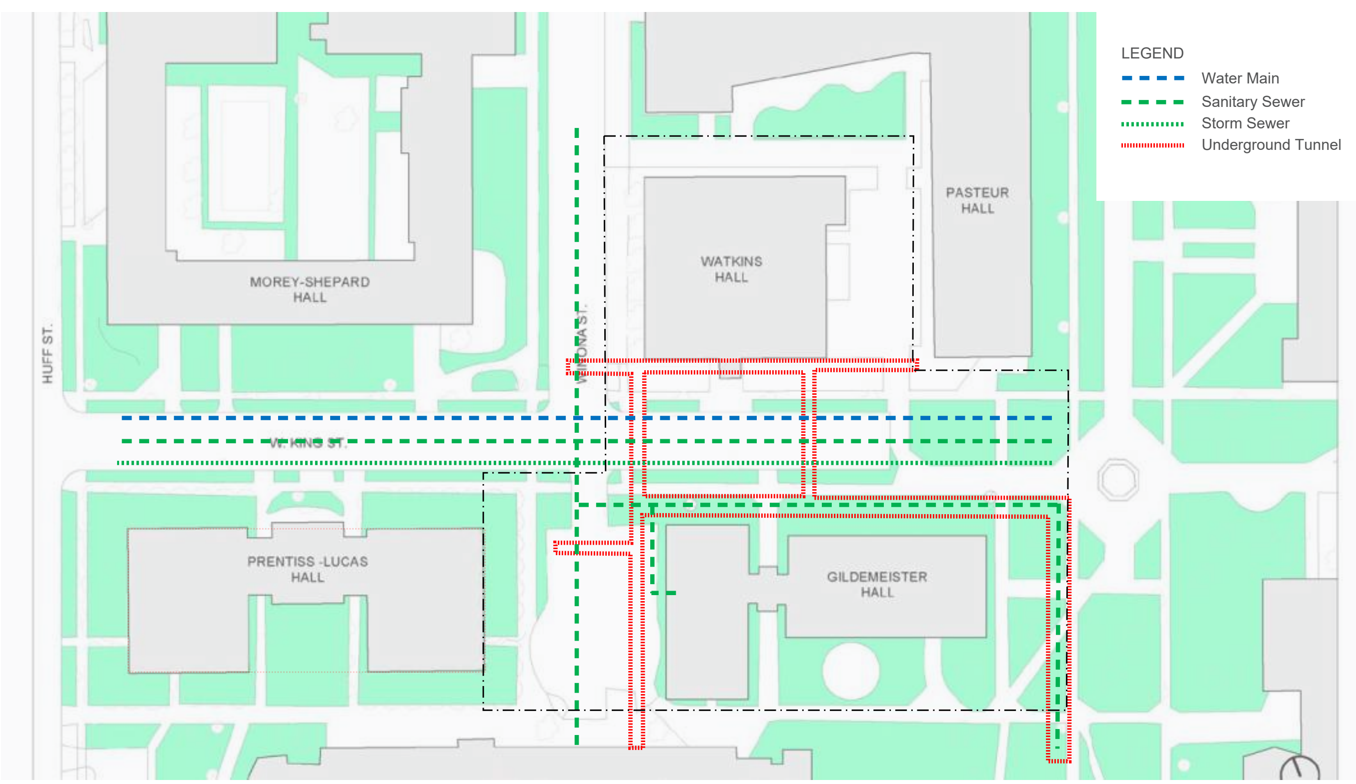


Underground utilities and tunnels in the vicinity of the project site influence the location of the building footprint. While the utilities need to be more specifically located and understood, awareness of their existence influenced the evaluation of the different scenarios.

Existing Campus Infrastructure




Existing Known Underground Utilities



## MASSING AND ORIENTATION:

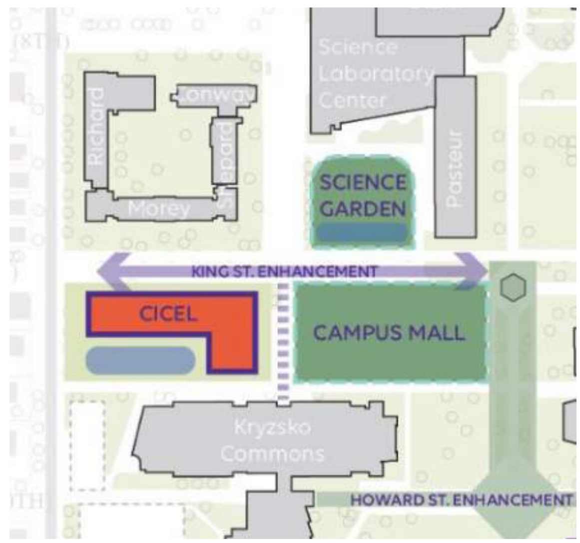
Several scenarios were studied in terms of massing and orientation on the site, with the following goals:

- Create a sense of arrival and entry to campus, and new facility welcoming the public with a literal or figural gateway.
- Minimize moving underground utilities
- Phasing so the art program can remain in Watkins while the building is under construction, minimizing cost of fitting out swing space for studios
- Maximize daylight and minimize glare to optimize solar strategies.
- Minimize E/W exposure and maximize N/S exposure

The two most viable options are listed below, other studies can be found in the Appendix.

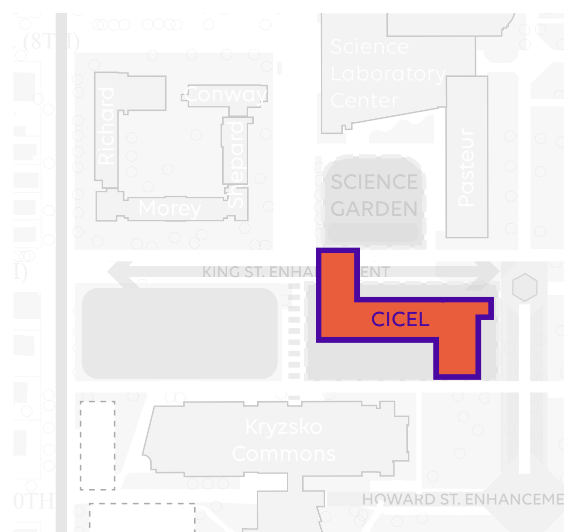
## OPTION A

Option A location of CICEL will replace Prentiss-Lucas Hall to define the western edge of campus along Huff Street. This highly visible and community facing location of CICEL will serve as a welcoming and energizing gateway that brings community into the heart of campus. Coupled with the development of a new campus mall and science garden, where geothermal wells will be installed, CICEL and the enhanced King Street corridor will further strengthen the connection between campus and the community. The elongated east-west massing of CICEL takes advantage of passive thermal strategies to reduce energy load and support the campus' goal to become carbon neutral by 2050.




## OPTION B

Option B location of CICEL will replace Gildemeister Hall and anchor the campus core along the north-south campus corridor. The central location of CICEL will activate the campus core. Its adjacency to Kryzsko Commons and the Library will attract students from all disciplines to visit and utilize the facility. Installed with underground geothermal wells, the new central green is a gathering hub for sharing information and flexible programming. The elongated east-west massing of CICEL takes advantage of passive thermal strategies to reduce energy load and support the campus' goal to become carbon neutral by 2050.



The exterior massing and design will need to balance both the functional requirements of a highly sustainable building and the aesthetic context of the campus community. Below are sketches illustrating different aesthetic approaches for the building.

Exterior Sketch - Roof Option 1

Exterior Sketch - Roof Option 2

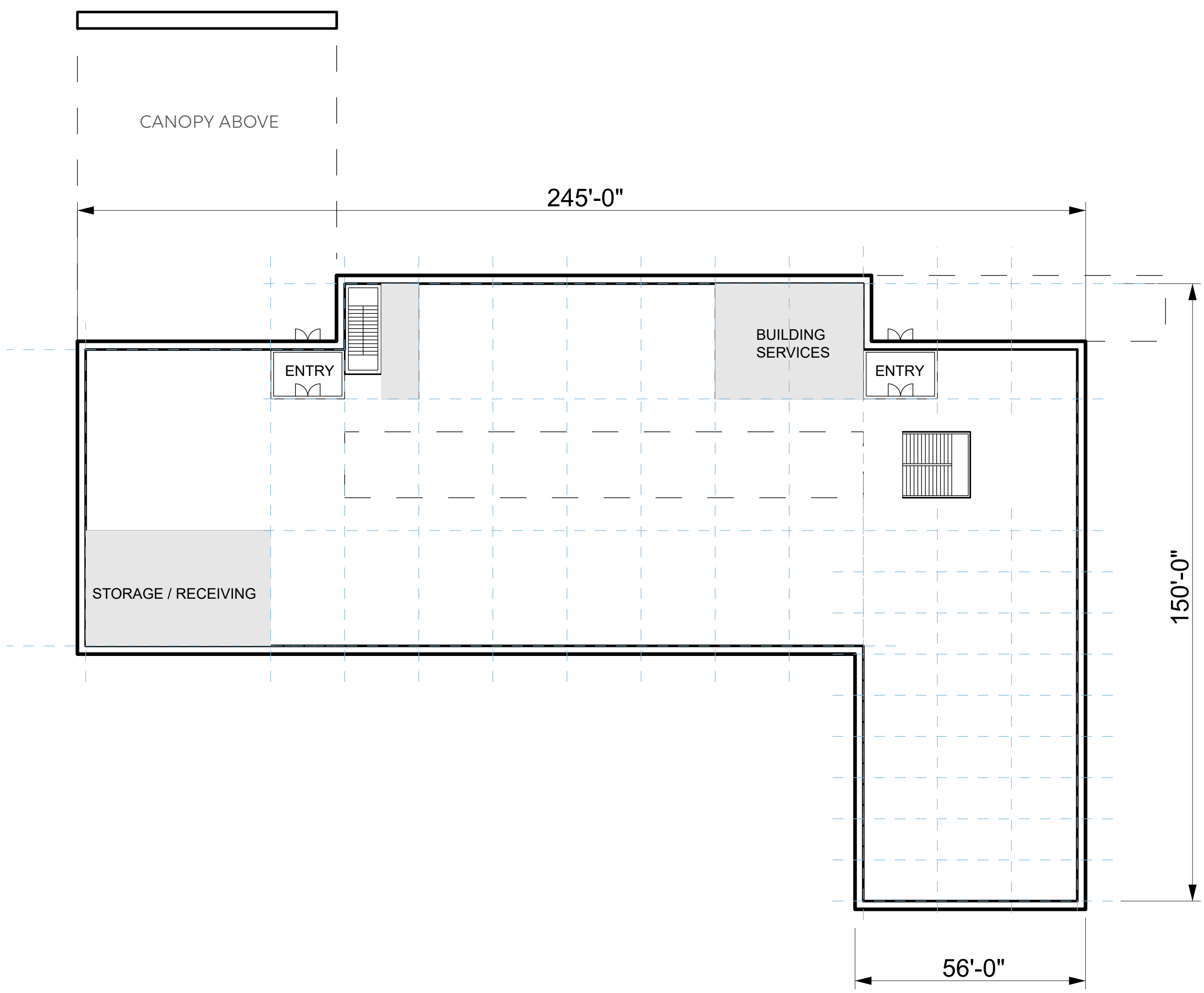
## PLANNING

The scheme was further developed to both meet the extreme project sustainability goals and provide a core and shell that allows for adaptable interior planning. Levels 1-3 are shown, identifying overall dimensions, the grid, and building core components (basement and rooftop penthouse are not shown). The following pages show three options for interior planning, using the same program as identified earlier in this section, to illustrate the variety of planning solutions that could be implemented in design.

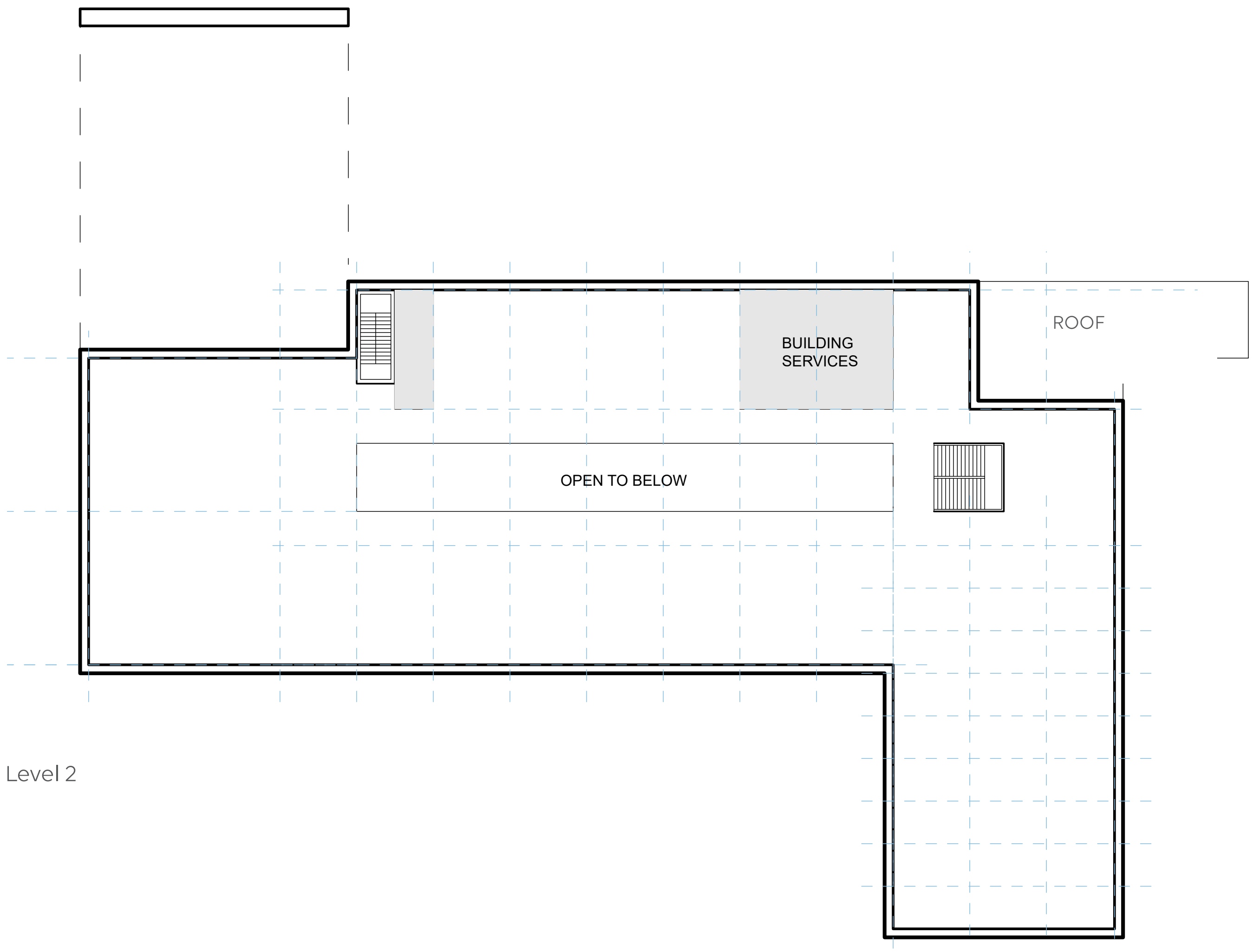
The basic plan of the building is organized around the modules from the program best suited to classrooms and labs. A secondary smaller module relates to offices and is compatible with the classroom module. A modular plan suggests an efficient use of space and an overall building that allows numerous possible configurations of the floor plans.

Rooms may consist of one, two, or three modules (though most use two) and multiple offices plus circulation can also occupy a similar module. Examples of different program layouts using the same floor plan are provided on subsequent pages.

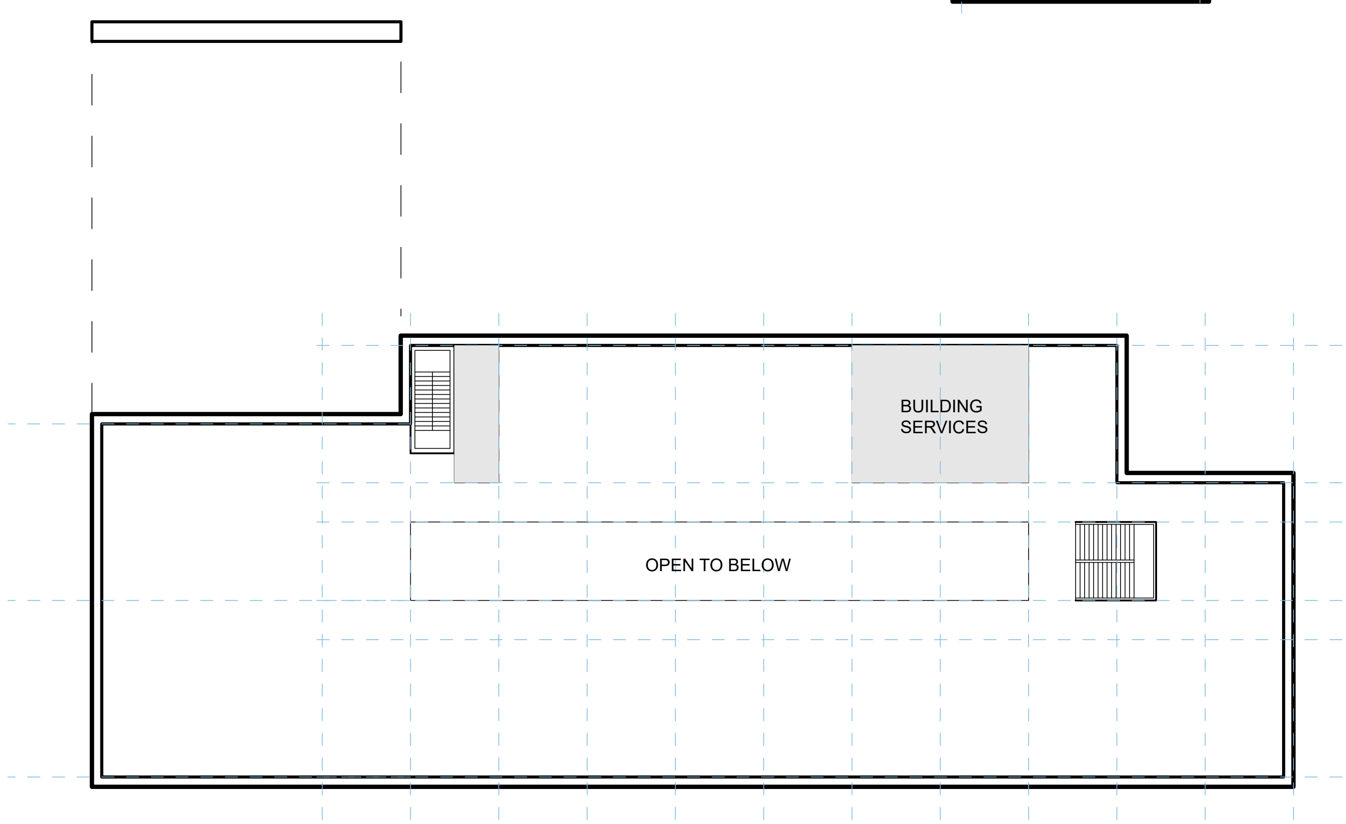
Building infrastructure, such as Structural, HVAC, wiring, lighting, and sprinklers may be arranged according to the module for flexibility and aid in reconfiguring rooms in the future.




Level 1



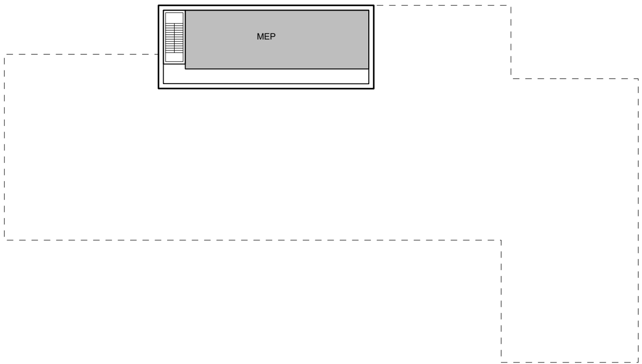

Level 2



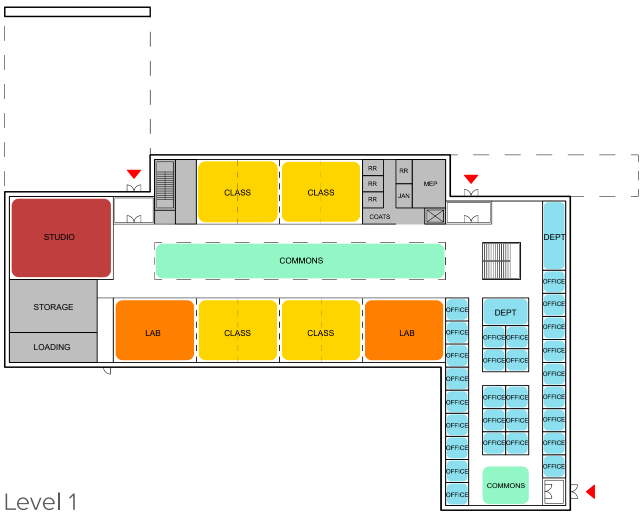

Level 3

# TEST FIT A

- Office/Dept Home
- Learning Module
- Commons
- Core/Support
- High Touch Module
- High Tech Module



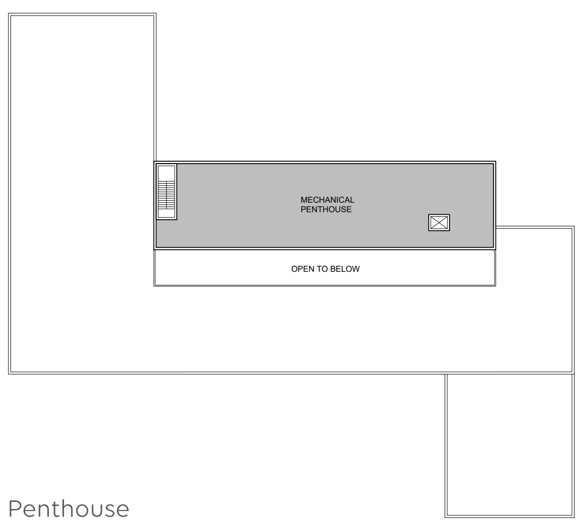

Basement




Level 1


Level 3

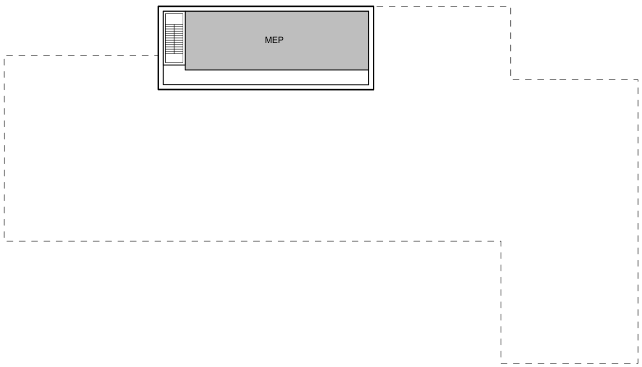

Level 2




Penthouse

# TEST FIT B

| | |
|---|---|
| Office/Dept Home | Core/Support |
| Learning Module | High Touch Module |
| Commons | High Tech Module |

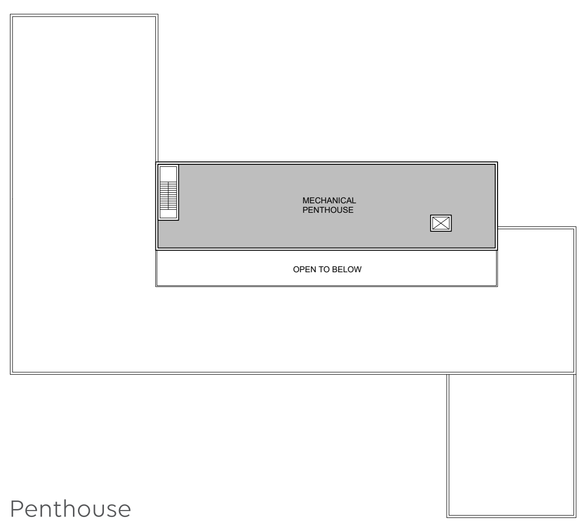



Basement


Level 1


Level 3

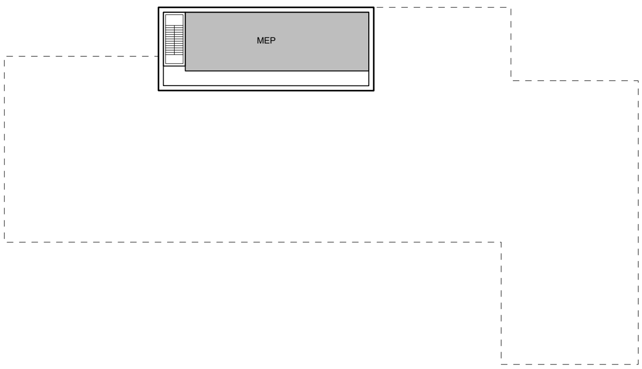

Level 2



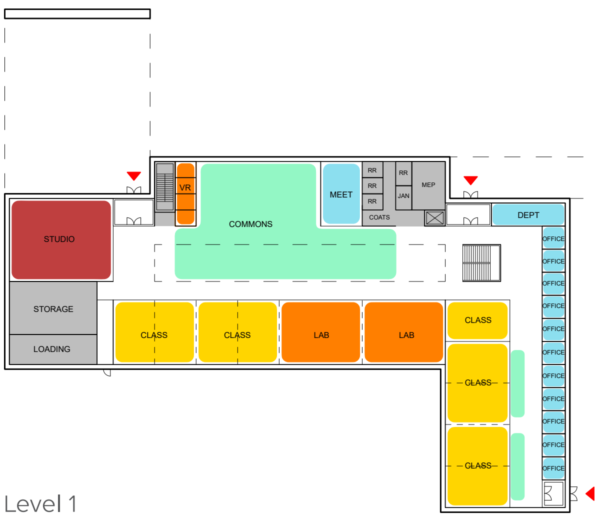

Penthouse

# TEST FIT C

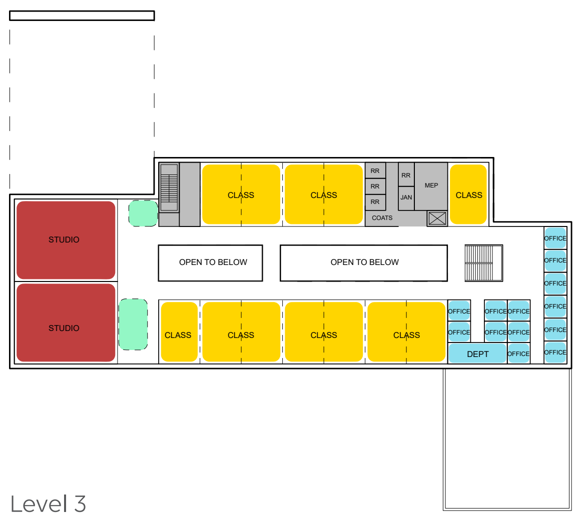
- Office/Dept Home
- Learning Module
- Commons
- Core/Support
- High Touch Module
- High Tech Module



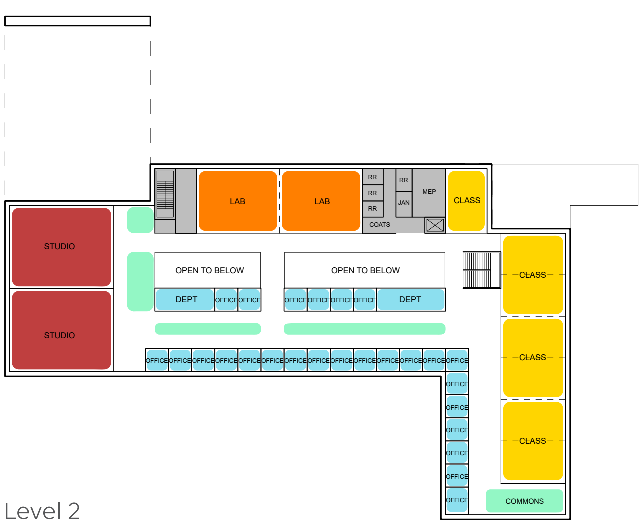

Basement



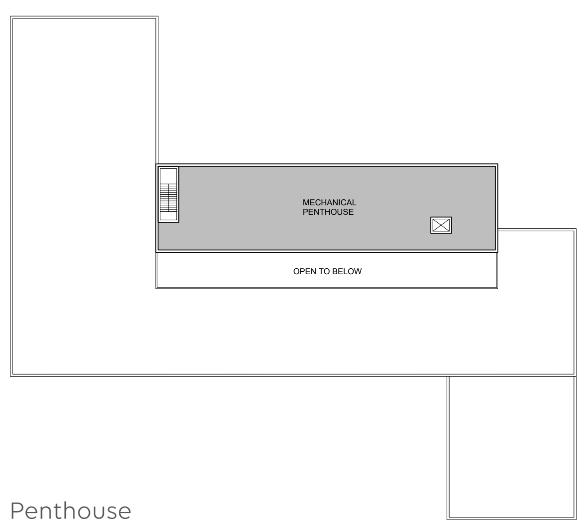

Level 1




Level 3




Level 2




Penthouse

## INTERIOR CONCEPT

At predesign workshops, WSU discussed an interest in exploring permeability of the spaces surrounding the commons. Conceptually, movable partitions could be explored for some of the walls on the first floor, resulting in the potential for spaces to be opened or closed, depending on the need and use. This sketch loosely illustrates how these spaces may feel when partitions are open.

## PLANNING FOR RESILIENCE

Workshop #2 included a resilience workshop, exploring the potential risks that this project site may face in the lifespan of the building. See the Appendix for the full assessment tool, identifying risks with associated relative threat calculations. While the future cannot be predicted, and events that were not planned for can always occur, the intent of this exercise was for the team to consider a broader list of potential risks when evaluating the potential project design options.

Resilience thinking supported decision-making in a variety of ways, including:

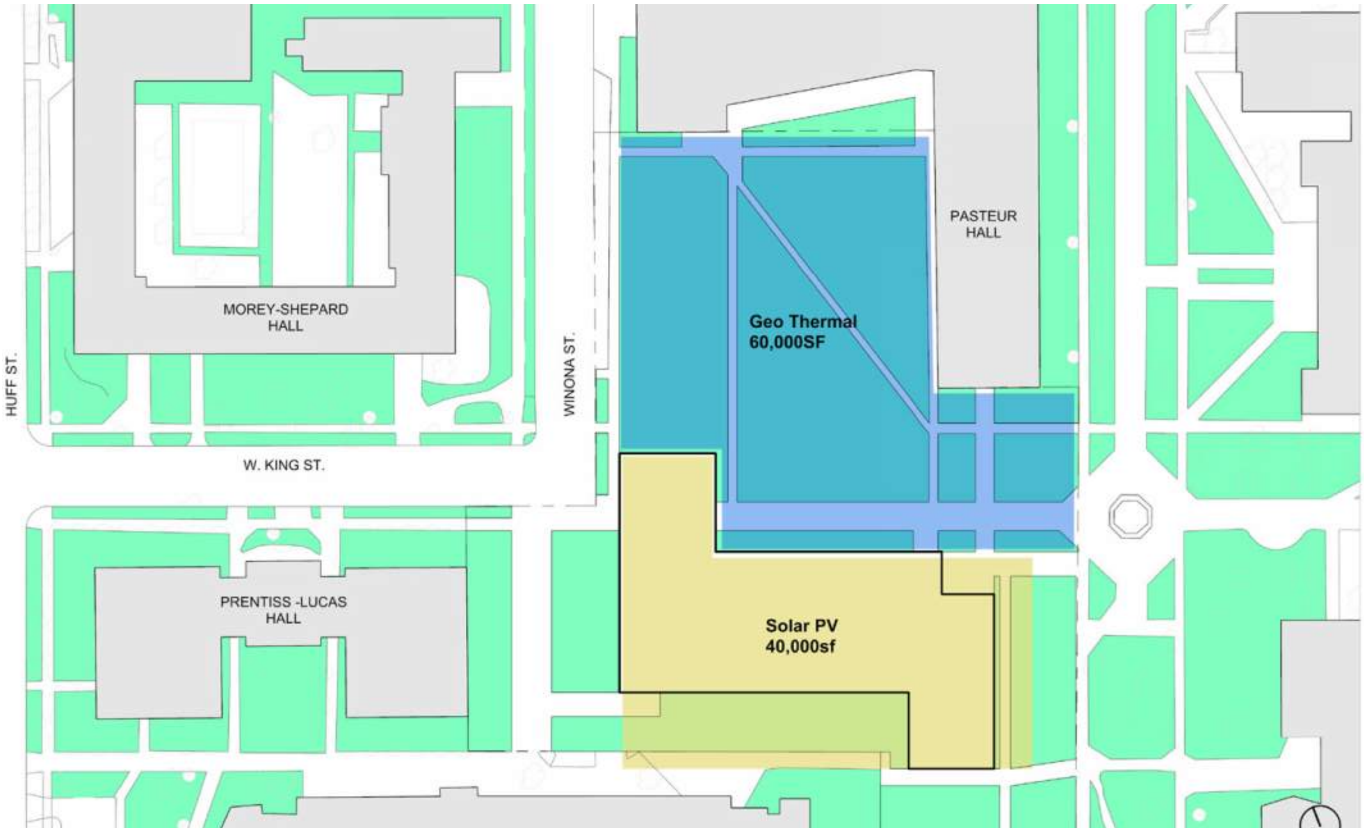
- Elevating critical building services to the penthouse level
- Minimizing hardscape and suggesting native plantings to better absorb rain from extreme precipitation events
- Assume a back-up connection to the central plant, should the on-site renewable energy generation be disrupted for any reason
- Explore opportunities for excess power generation to be distributed elsewhere on campus

As the design phase begins, the team should evaluate the critical risks identified in predesign and identify additional critical risks. All design decisions should balance the need for long-term resilience with other project goals. The design team is expected to use future climate projections and extreme precipitation projections to inform design decisions.

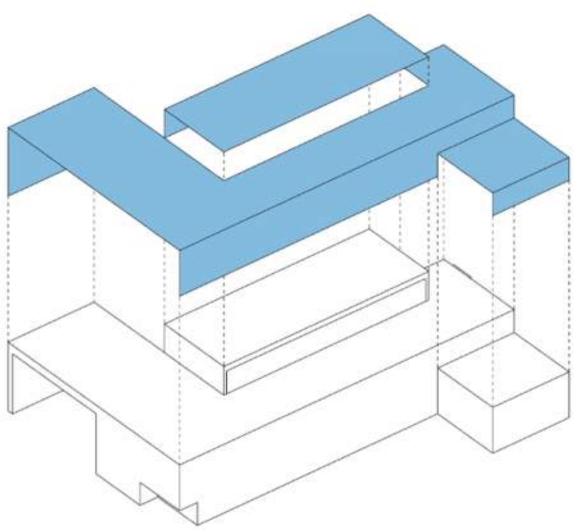
## RENEWABLE ENERGY

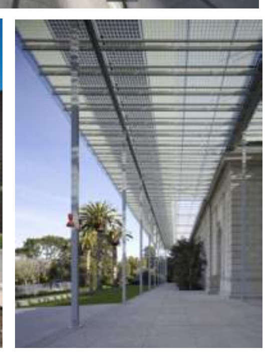
Scenario Z can accommodate the majority of the needed photovoltaic panels on the roof, but will need to utilize additional surface area to hit the target SF. This diagram suggests panels could wrap down a portion of the side of the building (remaining out of reach from ground level) and canopy to become a design feature, meeting the additional SF needs. Ground-source heating and cooling is planned on the Watkins site as shown below. See section 4 for more details.

Scenario Z: Net Zero Space Requirements




40,000 SF of Photovoltaic Panels





## SITE

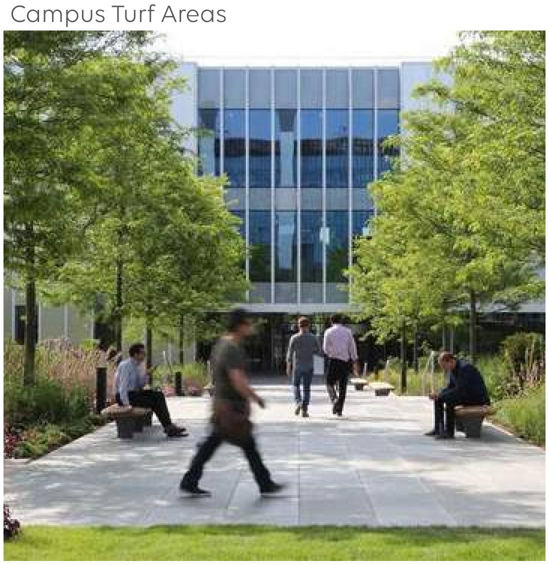
LANDSCAPE PERFORMANCE

The site and its relationship to the building is integral to the stainability goals of the project.  Stormwater runoff from the proposed development will be managed using Best Management Practices and sustainable design solutions.

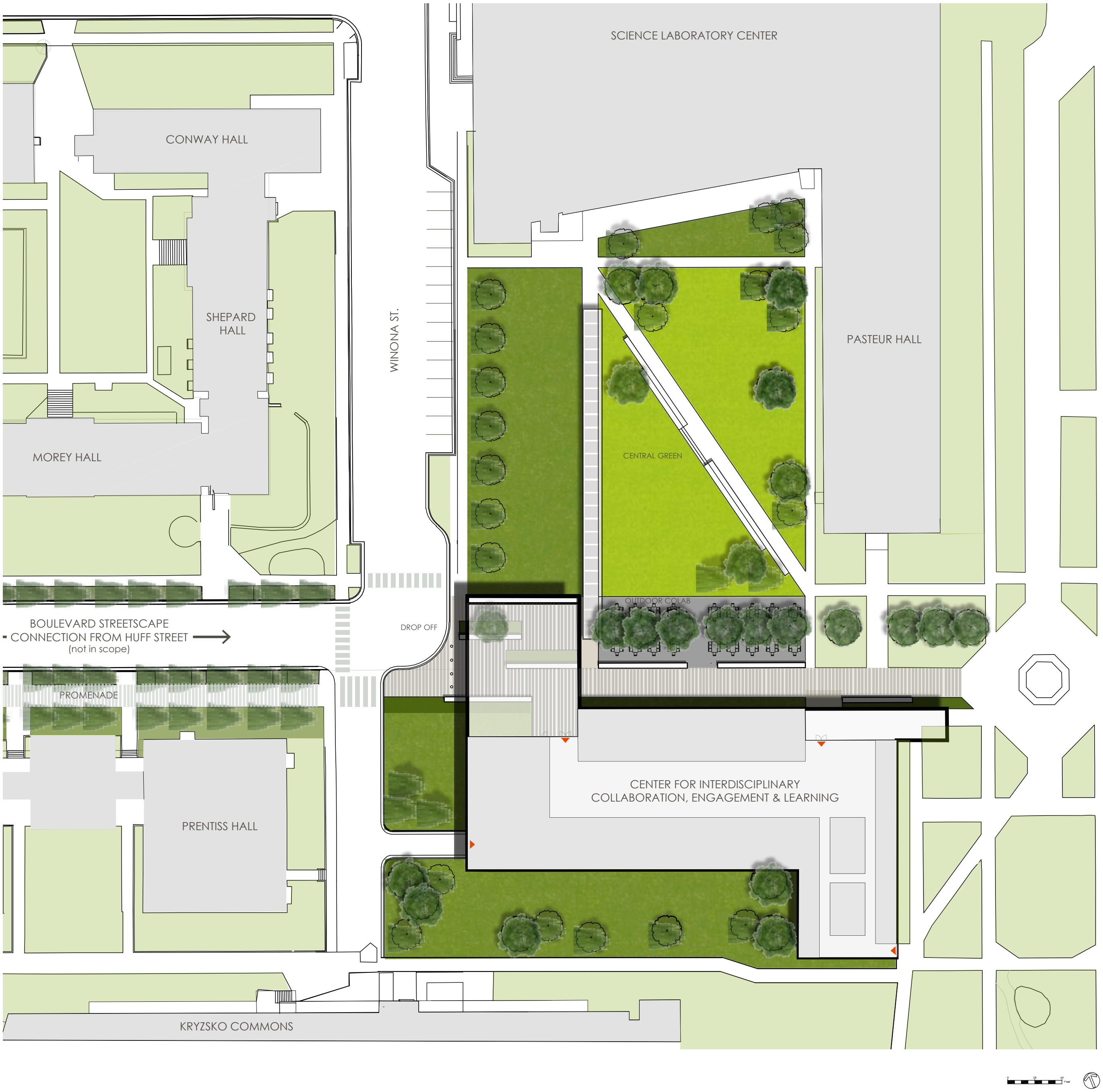
- 27,500 square feet of stormwater bioretension basins, as well as rain water harvesting for irrigation.
- Leveraging a diverse palette of native plants with low water needs to create a native regional landscape of its place.
- 30% of landscape space will be dedicated toward pollinator-friendly, native plantings in according with Design Priorities.
- Permeable paving on all pedestrian walkways

Campus Pollinator-Friendly, Native Planting Areas

Campus Turf Areas



Landscape Areas




Stormwater Bioretention Areas- "Stormwater Bioretention Areas - Campus Pollinator-Friendly, Native Planting Areas

Campus Turf Areas

INTERFACE WITH ENERGY SYSTEMS

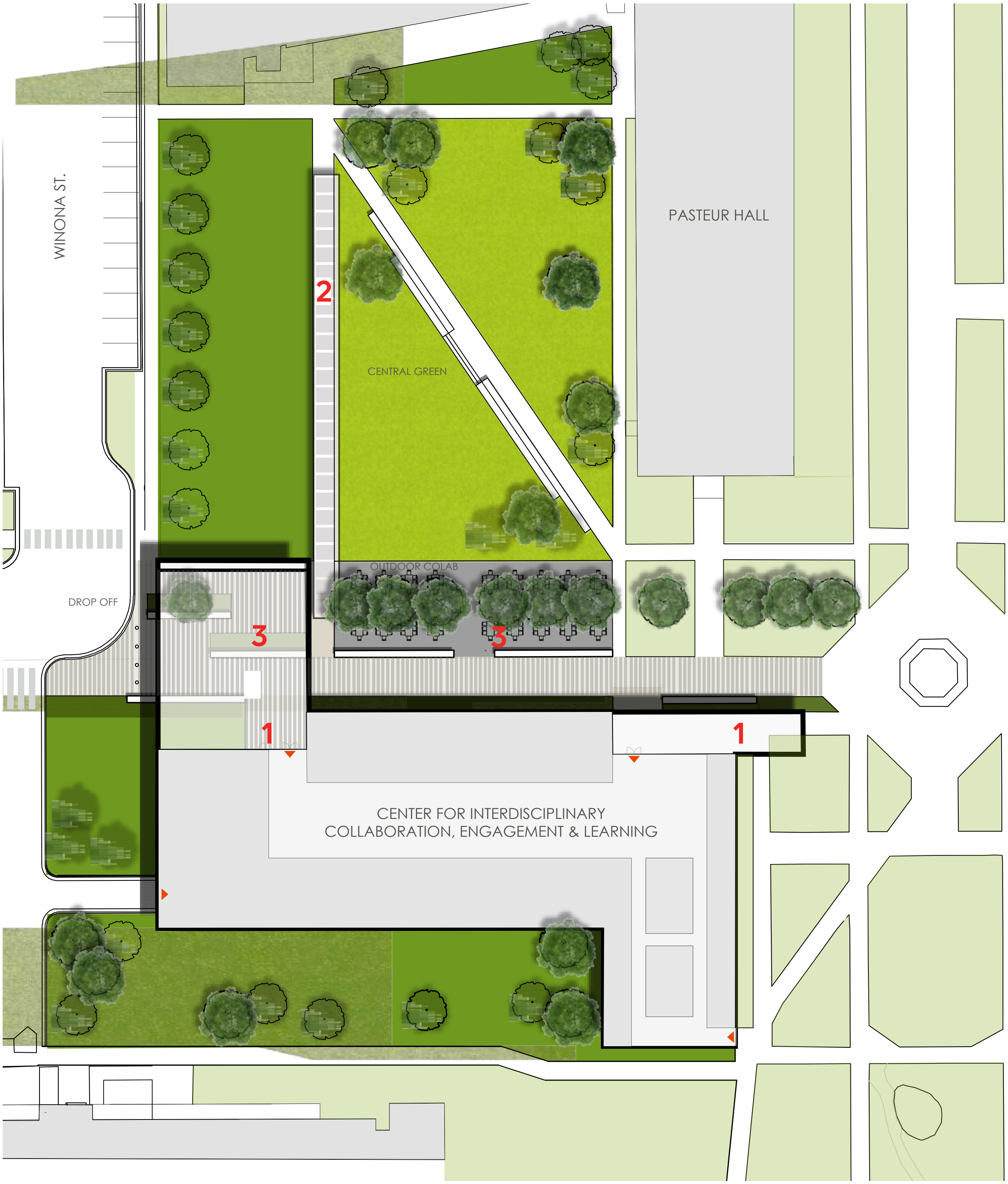
The energy goals will require a strong presence of PV in the landscape. Creating opportunities for students, staff, and visitors to interact with the energy systems spreads awareness of the sustainable mission of WSU and MNState.

1. Extension of canopies to increase square footage of photovoltaic paneling, as well as creating dynamic relationship of the building to landscape.

2. 2,000 square feet of photovoltaic pergola, that allows on-the-ground engagement with the energy systems.

3. Solar-powered hot-spot amenities incorporated into site furnishings

PV + Landscape




1. Photovoltaic Canopy Structure
2. Photovoltaic Pergola
3. Photovoltaic-Powered Hot-spot Site Furnishings

CAMPUS LIFESTYLE

The proposed site design provides a highly visible gateway, as the focal point of West King Street. A tree lined boulevard streetscape, though not in the scope of this project, can reinforce this connection from Huff Street, welcoming the community to both the new building and campus. The entrance experience addresses the desire to strengthen WSU's connection and relationship to the surrounding community.

Collaboration and learning expands into the landscape, as the "Outdoor Colab", a gathering hub for sharing information, and the "Central Green", a space for flexible programming, adds to the vibrant campus life.

SAFETY

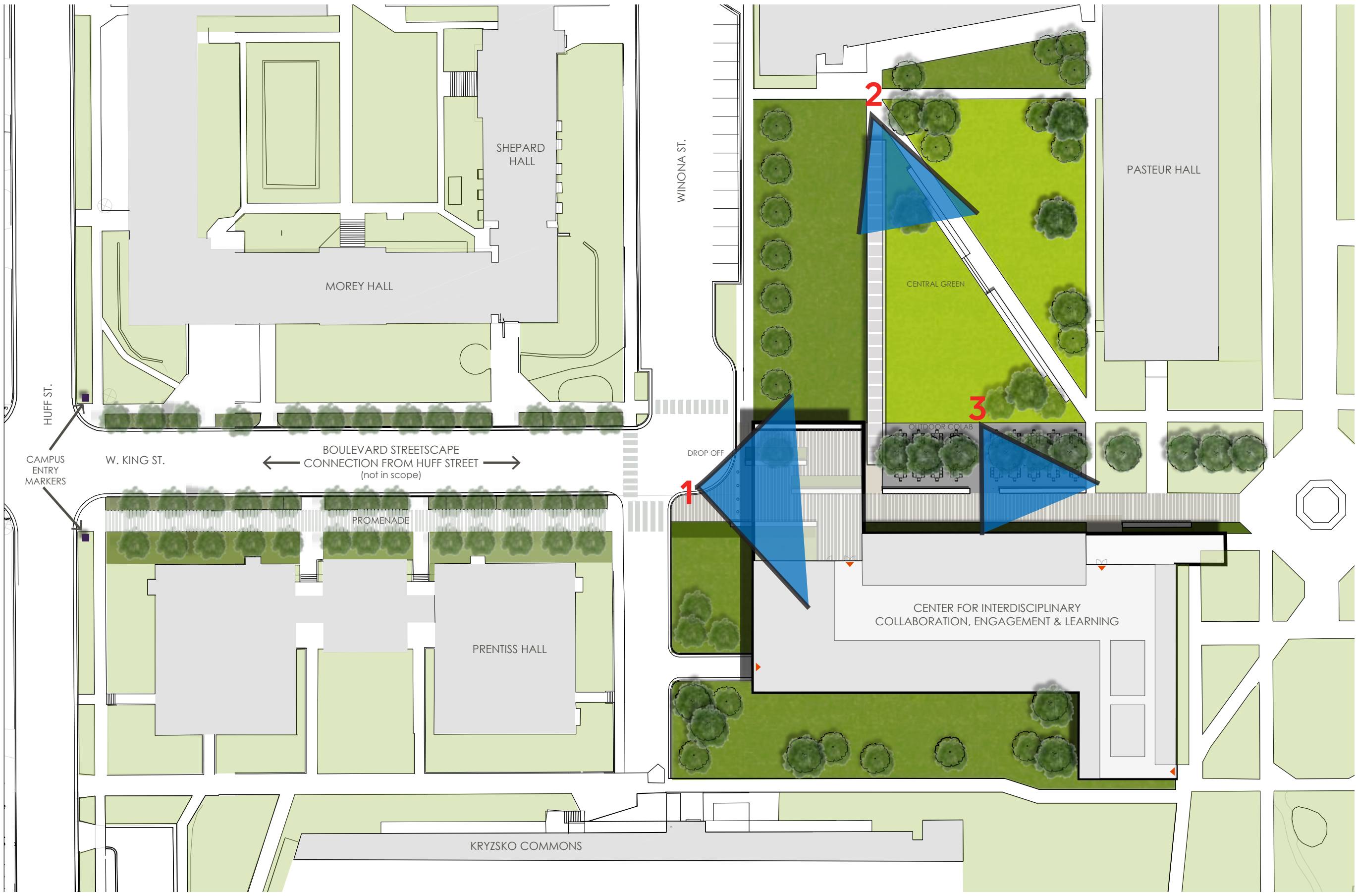
The pedestrianization of the eastern portion of West King Street minimizes the automobile presence in the campus core zone. Security bollards secure the entrance to the pedestrian mall at the corner of West King Street and Winona Street . A new vehicular drop-off zone allows for vehicles to be removed from the traffic flow while dropping off visitors. Crosswalk striping at intersection creates safe access to the pedestrian mall.

1.

Gateway View: Approach from King St

2.

Central Green View




3.

Outdoor Colab

**Instructions: Fill out one copy of this form for each new building proposed by this project. Include the completed form(s) within the project's predesign. Note: This form does not apply to building *additions*, only entirely new buildings.**

| **Code Information** | | | | |
|---|---|---|---|---|
| Occupancy Group(s): | Business B: Business | | | |
| Primary space types (office, classroom, etc.): | Classroom, Offices, Flexible Space | | | |
| Type of construction (per current MN Building Code): | Type IIB, sprinklered | | | |
| Building Size (GSF): | Allowable height (feet/stories): | 55 feet, 3 stories | Proposed height: | 55 feet, 3 stories |
| | Allowable area/floor: | 23,000 sf | Proposed area/floor: | ~21,000 sf |
| | Total building area: | 73,000 | Space efficiency (%): | 54.64% |

| **Building Systems** | | | |
|---|---|---|---|
| Roofing type(s): | TPO or EPDM | Structural system type(s): | Steel framing and bracing |
| Mechanical system type(s): | Ground source heat pump, fin tube radiant heat, ventilation air unit with heat recovery, chilled beams | Fire protection type(s): | Wet pipe sprinkler, emergency voice/alarm communication system |
| Electrical system type(s): | Campus medium voltage loop, sub-station transformer that serves interior switchboards, LED lighting | Exterior wall type(s): | Brick cladding with concrete/CMU back-up wall |
| Interior wall type(s): | Steel stud walls | Technology systems: | Telecom rooms |
| Conveying system(s): | Passenger Elevator | Sustainability/energy: | PV panels |
| Life expectancy of building and systems: | 50+ years | | |
| Notes on proposed FF&E: | Not included in costs | | |

| **Utilities and Infrastructure** | |
|---|---|
| Describe the locations of existing utilities and infrastructure (water, sewer, power, roads, etc.) that will be extended/connected to this new building. | Existing chilled water, steam heating, domestic water, compressed air, natural gas, sanitary sewer, and stormwater systems.<br>Utility tunnel on the south side of the building for service to the building.<br>Existing utility between Winona Street and Washington Street: sanitary sewer immediately north of Gildemeister Hall, 4" gas main, 12" storm sewer, 8" sanitary sewer, 6" water main |

*Note: Predesigns may use this template but its use is not required. All information noted above must be included for each new building.*
*Form updated 02/21/19*

THIS PAGE INTENTIONALLY LEFT BLANK

# 4. BUILDING SYSTEMS

## CODES AND STANDARDS

The following codes will be used for the design of this project. Local Authorities Having Jurisdiction will also be consulted in their specific areas for guidance and input in the design of the systems for the building.

- 2020 Minnesota Building Code (2018 IBC with Minnesota Amendments)

    Building Risk Category: III
- Current Minnesota Mechanical Code
- Current Minnesota Plumbing Code
- 2015 Minnesota Energy Code with ANSI/ASHRAE Standard 90.1-2010
- 2010 ASME A17.1 Safety Code for Elevators and Escalators
- Minnesota Fire Prevention Code
- 2020 NFPA 70 National Electrical Code
- NFPA Standards 13, 14, 20, 25, and 90a
- B3 Minnesota Sustainable Building Guidelines, Version 3.2
- MPCA Minnesota NPDES/SDS Construction Stormwater General Permit
- WSU Comprehensive Facilities Plan, 2022 [link]
- City of Winona Ordinance 4019, Chapter 68 Stormwater Management
- AISC Design Guide 11: Vibration of Steel Framed Structural Systems Due to Human Activity, Second Edition

Depending on when the project enters design, current codes should be used.

## MINNESOTA STATE FACILITIES DESIGN GUIDELINES AND STANDARDS

WSU and Minnesota State standards and guidelines shall be used and incorporated into the project as appropriate. While the codes listed above are applicable today, they serve as points of reference only for this study - these codes guided the design decisions and recommendations outlined in this report.

## STRUCTURAL

### DESIGN CRITERIA

**Floor Live Loads:**

40 PSF Classroom

50 PSF Office

60 PSF Lecture Hall / Assembly Fixed Seating

80 PSF Corridors Above First Floor

125 PSF Arts Studio / Light Storage

100 PSF Lobby, Stairs and Corridors, Public Assembly

125 PSF Mechanical Equipment Room

100 PSF Outdoor Terrace

**Snow Loads:**

Ground Snow Load: 50 psf

Snow Exposure Factor: 1.0

Snow Thermal Factor = 1.1 at heated areas, 1.2 unheated at canopy

Snow Importance Factor = 1.1

Flat Roof Snow Load = 40 psf Ground Snow Load

**Wind Design Data:**

Basic wind speed (3 second gust) = 120 MPH

Wind Importance Factor: 1.0

Wind Exposure Category: B

Internal Pressure Coefficient: 0.18

**Seismic Design Data:**

Seismic is not a design requirement in Minnesota Building Code.

**Vibration Design Data:**

The structural systems will be analyzed to meet the vibration serviceability criterion outlined in AISC Design Guide 11 Second Edition. Structural floor framing systems for classrooms, public lobby areas and offices will be designed for to mitigate vibrations due to walking excitation by having fundamental natural frequency greater than 5 Hz.

An adjacent classroom building experiences vibration excitation induced by a nearby rail line. The trains proximity to the new proposed building and possible vibration mitigation practices will be further investigated during the next phase of design

### FOUNDATION SYSTEMS

Gildemeister Hall presently occupies the current site. Drawings of the existing building by Lang Raugland and Brunet dated July 10th, 1963 indicate the foundations supporting the building are spread footings on undisturbed soil with an allowable soil bearing pressure of 2500 psf. The allowable bearing capacity will need to be determined based on a geotechnical exploration program during the schematic design phase, but probably will be close to 2500 psf. There will be below grade concrete basement walls surrounding the partial basement along a portion of the north side of the building.

### STRUCTURAL FRAMING SYSTEMS

**General:** A structural steel framing system will result in lighter less costly structure because of the long-span requirements for the large classrooms and studio spaces. Construction time will be shorter for structural steel and shoring requirements will be greatly reduced. The typical framing for the intermediate floors will be a 4 ½" thick concrete slab on a 3" composite steel deck [total thickness 7 ½"] supported by steel beams and girders using steel headed studs to cause the concrete and steel beam to act together compositely. The present pre-design program fits well with a typical bay spacing of 36' x 30'. Larger 40' spans will be required over the studio spaces. Typical roof framing will consist of 1 ½" deep steel roof deck spanning approximately 4'-6' to open web joists. Floor and roof framing will be supported by steel beams and columns. In the future, heavy timber should be explored to reduce environmental impact to the building.

**Multiple Roof Elevations:** The proposed building will have a low roof over a 2-story office wing, the main spine of the building will have a roof over the 3rd level, and there will be a high roof over the mechanical and light monitor penthouse volume above the 4th floor. Each roof is anticipated to be roof deck with open web joists. There will be snow drift accumulation on adjacent low roofs that will be required to be documented for the open web joist manufacturer's designer.

**Photovoltaic Panels:** An additional dead load of 35 psf will be accommodated in the design of the roof framing systems to account for a fully ballasted photovoltaic panel array on the roof. As the design progresses, the photovoltaic panel layout will be refined and most likely the magnitude of dead load will be reduced coincident with an increase in wind load and snow drift load.

**Building Canopy over Drive:** The building canopy over the drive will be framed with 1 ½" roof deck and long span open web steel joists with an overall minimum structural depth of 58". The spandrel framing elements will be wide flange beams. The end wall construction could be either hollow structural steel, (HSS) tube steel spaced or a solid grouted CMU wall with reinforcing every cell. As the design progresses this feature wall will be further investigated.

**Lateral Framing System:** Above grade, wind loads will be resisted by steel braced frames located within partitions. Walls of the large classrooms provide ideal bracing locations. The atrium volume between floors will create a large opening in the center of the floor diaphragm. A system of chord and collector beams will be designed in order to transfer the lateral loads around the floor openings.

## CIVIL

### SITE PLANS:

The WSU Comprehensive Facilities Plan includes a proposed framework for site development with design priorities for landscape preservation, storm water management, campus gardens and campus design standards.

Minnesota State has Facilities Design Standards that identify basic requirements for topographic surveys, geotechnical investigations, earthwork, exterior improvements and utilities.

UTILITIES:

Gildemeister and Watkins Halls are located at the southeast and northeast corners of the intersection of W. King Street and Winona Street. The WSU Comprehensive Facilities Plan indicates that there are existing public utilities including sewer and water systems in each of these streets.

- The original construction drawings for Watkins Hall (from 1962) indicate a utility tunnel on the south side of the building for service to the building.
- The City of Winona has records of utilities in King Street between Winona Street and Washington Street including:
    - 18" sanitary sewer immediately north of Gildemeister Hall
    - 4" gas main
    - 12" storm sewer
    - 8" sanitary sewer on centerline
    - 6" water main
- Utility tunnel along the north edge of King Street and the east edge of Winona Street
- A complete boundary, topographic and utility survey should be completed prior to the schematic design phase

STORMWATER:

Storm water runoff from the redeveloped or renovated site must be managed in accordance with applicable regulations and goals including those listed in the Codes and Standards section above.

Best Management Practices (BMPs) must be used to control the impacts of storm water runoff from the site. WSU has a stated interest in protecting the Mississippi River and Lake Winona watersheds from campus-generated pollution.

Temporary storm water pollution controls are required during the construction phase, and must comply with the requirements of the MPCA Construction Stormwater General Permit and the MnSCU Facilities Design Standards Division 01 57 23.

Permanent storm water controls must comply with the requirements of the B3 Minnesota Sustainable Building Guidelines as noted below:

- Runoff Rate and Volume: 1. Control the rate of runoff from the post-development site to match the runoff rates for the native soil and vegetation conditions for the 2-year and 10-year, 24-hour design storms
- No discharge from the site for the first 1.1 inches of runoff from all new or redeveloped impervious (non-vegetated) areas
- Runoff Quality: Provide treatment systems to remove 80% of the post-development Total Suspended Solids (TSS), and treatment systems to remove 60% of the post-development Total Phosphorus (TP)

Potential BMPs to achieve the required storm water control include:

- Bioretention basins can reduce the volume of runoff, however the amount of the reduction that this practice can provide is dependent on the existing soil characteristics. For 36,000 SF of roof a bioretention basin area of 2,220 SF with an 18" depth is needed to capture 1.1" of runoff
- Rainwater harvesting for irrigation supply (for 36,000 SF of roof a 25,000 gallon tank will capture 1.1" of runoff). The rainwater harvesting system should include provisions for filtration, disinfection & pumping to irrigate an area of at least 0.9 acres
- Permeable paving
- Underground infiltration chambers
- Vegetated roofs

SOILS

The original construction drawings for Watkins Hall (from 1962) include a diagram that summarizes five soil boring tests. Site soils consist of black sandy clay underlain by dark brown sandy loam and brown coarse sand. The ground water is indicated at about 13-feet below the ground surface.

A geotechnical investigation to characterize the suitability of site soils to support structures, pavement, utilities and infiltrate storm water should be completed prior to the schematic design phase.

## MECHANICAL

MECHANICAL SYSTEM DESIGN CRITERIA

Outdoor Design Conditions

- **Summer:** 90.8°F dry-bulb / 74.5°F wet-bulb temperature
- **Winter:** -15°F dry-bulb

Interior Design Conditions

- General Space Design Conditions:
    - **Summer:** 75°F and 50% RH
    - **Winter:** 70°F and no winter humidification
- Classroom and Studios Space Design
    - **Summer:** 75°F and 50% RH
    - **Winter:** 70°F and no winter humidification
- Communications Closet
    - **Summer:** 75°F and 50% RH
    - **Winter:** 60°F and no winter humidification
- Vestibules, Loading Docks:
    - **Cooling:** 80°F
    - **Heating:** 65°F
- Mechanical and Electrical Rooms:
    - **Cooling:** 80°F
    - **Heating:** 65°F
- Spaces requiring 24/7 conditioning, routine weekend or holiday ventilation cooling and/or heating requirements, or spaces of such a critical nature as to necessitate redundant cooling and/or heating previsions will be provided with appropriate year-round cooling systems and/or heating systems. Rooms containing heating emitting electrical devices shall use ambient air for cooling whenever possible

Ventilation Air Requirements:

Commercial Building Code and Per ASHRAE 62.1 Standards. Densely occupied spaces will have carbon dioxide sensors and automated control per codes to adjust outdoor air quantities based on air quality measurements.

Toilet Room Exhaust:

Minimum of 75 CFM per Water Closet, 50 CFM per Urinal, or 1.5 CFM per SF, whichever is greater.

Studio Exhaust:

Studios shall be designed with exhaust systems appropriate for space needs. At a minimum, general exhaust shall be available to serve future general exhaust air needs.

CAMPUS UTILITIES AND SYSTEMS

The mechanical systems shall be connected to the available campus utilities: Chilled water, steam heating, domestic water, compressed air, natural gas, sanitary sewer, and stormwater systems.

Mechanical heating and cooling systems shall be designed as much as possible to limit the need of the use of central heating and cooling systems to minimize energy consumption and long term impact on campus utilities and distribution.

NEW MECHANICAL AND PLUMBING SYSTEMS

Heating, cooling, ventilating and plumbing systems shall be designed to the highest level of energy efficiency, water efficiency and total life cycle of building while being sensitive to first costs.

In order to provide the highest level of energy efficiency, a water to water ground source heat pump system will be used to produce chilled and hot water for building conditioning. The local site area and geology appear to be receptive to vertical heat exchangers, as sand and gravel drift with significant groundwater to around 150 feet down transitioning to Mount Simon Sandstone is in the area. Bore depth is conservatively estimated at 200 feet, but could be as deep at 350 feet if the sandstone at the site is competent. Larger depths would allow for a reduced site footprint required for ground-source heat exchange systems.

Energy use with ground source heat pump plant is expected to be 40% lower than the use of traditional systems. In addition to being more energy efficient, the use of a local ground-source heating and cooling system will reduce the new building's burden on the existing central plant's total capacity and distribution.

Note: As the ground-source vertical heat exchangers can have a higher first cost impact, there may also be opportunities to use the connection of the building to the campus central heating and cooling system to provide some peak cooling and heating capacity to further reduce the size of the ground-source heat exchange system and to optimize costs. Further optimization would be expected as the project design progresses.

Remaining HVAC systems shall use central station air handling units, with zone air terminal unit VAV boxes with reheat coils, and perimeter heating-only systems to provide proven comfort control for modern high institution facilities.

Plumbing systems shall utilize industry-leading water-efficient fixtures with electronic controls to minimize water consumption.

New mechanical and plumbing systems shall utilize digital controls, electronic monitoring and metering. Classrooms, studios, and conference rooms shall have individual controls. Offices shall utilize at most, 3 offices per zone.

New mechanical and plumbing systems shall be commissioned by a commissioning agent to meet Minnesota energy code requirements and to ensure the most optimal building operation at the beginning of the building use.

### NEW FIRE PROTECTION SYSTEMS

A new water-based fire protection system with sprinklers shall be designed and implement for the new building. System shall be code and local jurisdiction requirements. Dry type systems shall be used in areas subject to freezing.

### NEW ENVELOPE SYSTEMS

New envelope systems shall utilize a combination of proven systems with advanced technologies to achieve the most cost effective and energy efficient design.

The new roof system shall exceed code minimum roof insulation levels by having a continuous assembly insulating value of R-40. The roof system shall be a high albedo roof with a reflective roof membrane.

The new wall systems shall exceed code minimum wall insulation levels by having a minimum assembly insulating value of R-20. The wall system shall use continuous insulation systems as much as practical to achieve minimum insulation value.

New glazing systems shall be a minimum of a double-paned system with a fully thermally broken frame. Overall glazing system insulating value including the frame shall be designed to have a U value of 0.33 or less.

New glazing systems shall have an overall Solar Heat Gain Coefficient of 0.4 or less on North and South exposures and 0.3 or less on East and West exposures by incorporating the most effective low-E coatings, tints and frit gradients. The glazing design shall be arranged to reduce peak solar heat gain, reduce glare, control daylight as much as practical, and maximize winter passive solar heating.

### LIFE EXPECTANCY OF NEW BUILDING SYSTEMS

The new building shall be designed to be in effective operation for 50 years of more. Building systems shall be designed for the longest practical life expectancy by incorporating systems, equipment, and components that effectively balance first costs, operating costs, maintenance costs and replacement costs.

## ELECTRICAL

### ELECTRICAL SERVICES

The Campus medium voltage loop will provide electrical power to the building from its distribution system in the area. An underground service will be developed for the site from the utility electrical distribution system located in the tunnels. A WSU-owned primary loop switch will be located in the building.

### TRANSFORMERS

The building will have an interior WSU-owned sub-station transformer that serves interior switchboards. The transformers will step the voltage down to 480Y/277 volt, 3 phase, 4 wire to serve the interior switchboards.  Local transformers that are distributed throughout the building will be 480 volt primary and a 208Y/120 volt, 3 phase, 4 wire secondary.

### EMERGENCY POWER DISTRIBUTION

The emergency power distribution will be fed from the Campus generator loop. The generator loop voltage is 480/277 volts, 3-phase, 4-wire, 60 hertz grounded. An emergency automatic transfer switch and all associated appurtenances shall be located inside the building.

### DISTRIBUTION SYSTEM

Distribution to the electrical rooms is via conduit and feeders.  The switchboards contain breakers to serve electric rooms on each floor as well as the major mechanical systems directly.  The electrical rooms may contain, but not be limited to, the following:  480 Y/277 volt distribution panel, 480Y/277 volt lighting panel, lighting control panel, 480-208Y/120 volt step down transformers for receptacle loads, and 208Y/120 volt distribution panels serve local panels on each floors.

### OFFICE LIGHTING

The major source of illumination for this project will be LED fixtures.  Lights shall have high color rendering index (CRI) and feature integral, intelligent dimming.

Manual-on occupancy sensors shall be located in the ceiling whenever possible.  Day lighting sensors will be used on spaces within 15' of exterior windows in open office areas.  Lights located within these areas shall be dimmable.  Daylight harvesting may also be used in atriums, lobbies, or other areas where energy savings can be realized.

### FIRE ALARM SYSTEM

The fire system will be an emergency voice/alarm communication system. The emergency voice/alarm communication system will be designed and installed to meet the requirements of the applicable local codes and ordinances. In addition, the emergency voice/alarm communication system will be capable of originating and distributing voice instructions as well as alert and evacuation signals pertaining to fire or other emergencies to the occupants of the building.

## TECHNOLOGY

Future IT infrastructure should be located in dedicated spaces with telecom rooms place on each floor. Telecom rooms shall be secured with card access and shall be conditioned to 70 degrees.

The campus tunnel system has cable tray for the support of voice/data backbone cabling and can be re-used to serve the buildings.  The new voice/data backbone cabling shall include 24-strand OM4 multimode, 24-strand OS2 single mode, 50-pair copper routed to the main Telecom Room and from the main Telecom Room to the floor Telecom Rooms. All new backbone and horizontal cabling is recommended and should meet campus standards.

# 4.

# Sustainability and Energy

# SUSTAINABILITY AND ENERGY

## 1. OVERVIEW

In 2022, WSU completed a Comprehensive Facilities Plan [link], including a roadmap to carbon neutral operational carbon by the year 2050 on the Winona campus. The roadmap suggested the sequence of projects that provide the greatest impact and the relative timing of carbon reduction projects with relevant facilities projects and/or with anticipated infrastructure improvements. Gildemeister and Watkins were identified as high priority existing buildings to address due to their high energy use. This predesign determines that replacing Gildemeister and Watkins Halls with a new structure will help WSU achieve their carbon neutral goal, reduce operational costs, and better serve WSU academically.

## 2. PROJECT SUSTAINABILITY GOALS

This project hopes to be the first in the MN State system to achieve net zero energy, contributing to WSU's goal of carbon neutrality by 2050. The below "roadmap" from the Comprehensive Facilities Plan identifies the likely impact of carbon reduction projects, suggesting the sequence of projects that provide the greatest impact and the relative timing of carbon reduction projects as aligned with relevant facilities projects and/or anticipated infrastructure improvements. The CICEL project is included as a "short term" project, accounting for a significant drop in campus carbon footprint.

Achieving campus carbon neutrality, in a manner that is both the most meaningful for the campus' participation in climate change mitigation and is the most life-cycle cost-effective, will require coordination amongst four major infrastructure categories: managing the carbon performance of campus at the building level, transitioning the existing fossil-fuel based campus heating infrastructure to low-carbon heating, minimizing the campus electrical demand via cooling efficiency improvements, and continued deployment of on-campus renewable energy projects. The roadmap also indicates the contributions of the University's continued partnership with Xcel Energy on the development of renewable energy projects and the anticipated carbon benefit of the proposed campus landscaping plan.

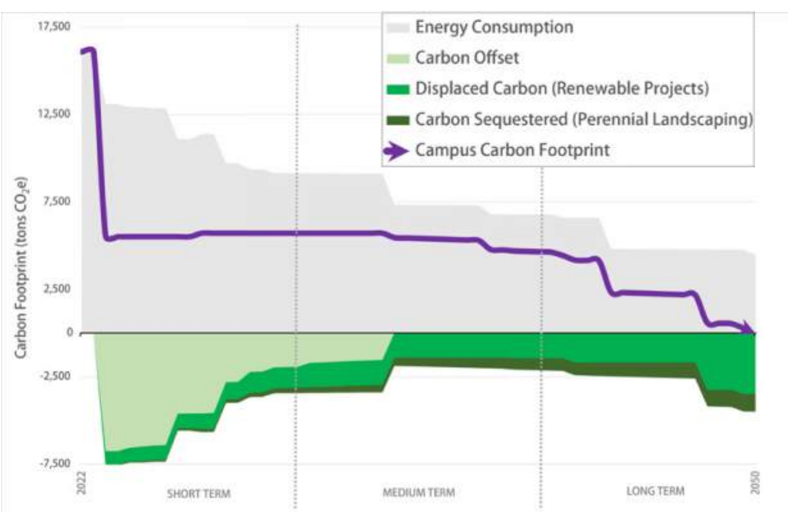
For more information, see the Comprehensive Facilities Plan [link].

In addition, using the WSU Design Priorities, part of the Comprehensive Facilities Plan, as a framework, five project specific sustainability goals were set:

- Human: 90% Occupant Satisfaction
- Energy: Net Zero Energy
- Water: Net Positive Water
- Waste: 95% Construction Waste Diversion
- Materials: 75% of Specified Materials to be Environmentally Preferrable Products (EPPs)

These goals reflect WSU's approach to sustainability, which aims to move from reducing negative environmental and human impacts of construction toward asking how a project can create a positive impact on the community and environment.

Carbon Neutral Roadmap




**SHORT-TERM**

CAMPUS PERFORMANCE MANAGEMENT

- Guaranteed Energy Savings Program (GESP)
- Phase 1 Building Energy Audit (e.g. Krueger Library, Larid Norton, Sheehan)
- CICEL and Mark & Main Housing Construction
- Gildemeister and Watkins Demolition

LOW CARBON HEATING

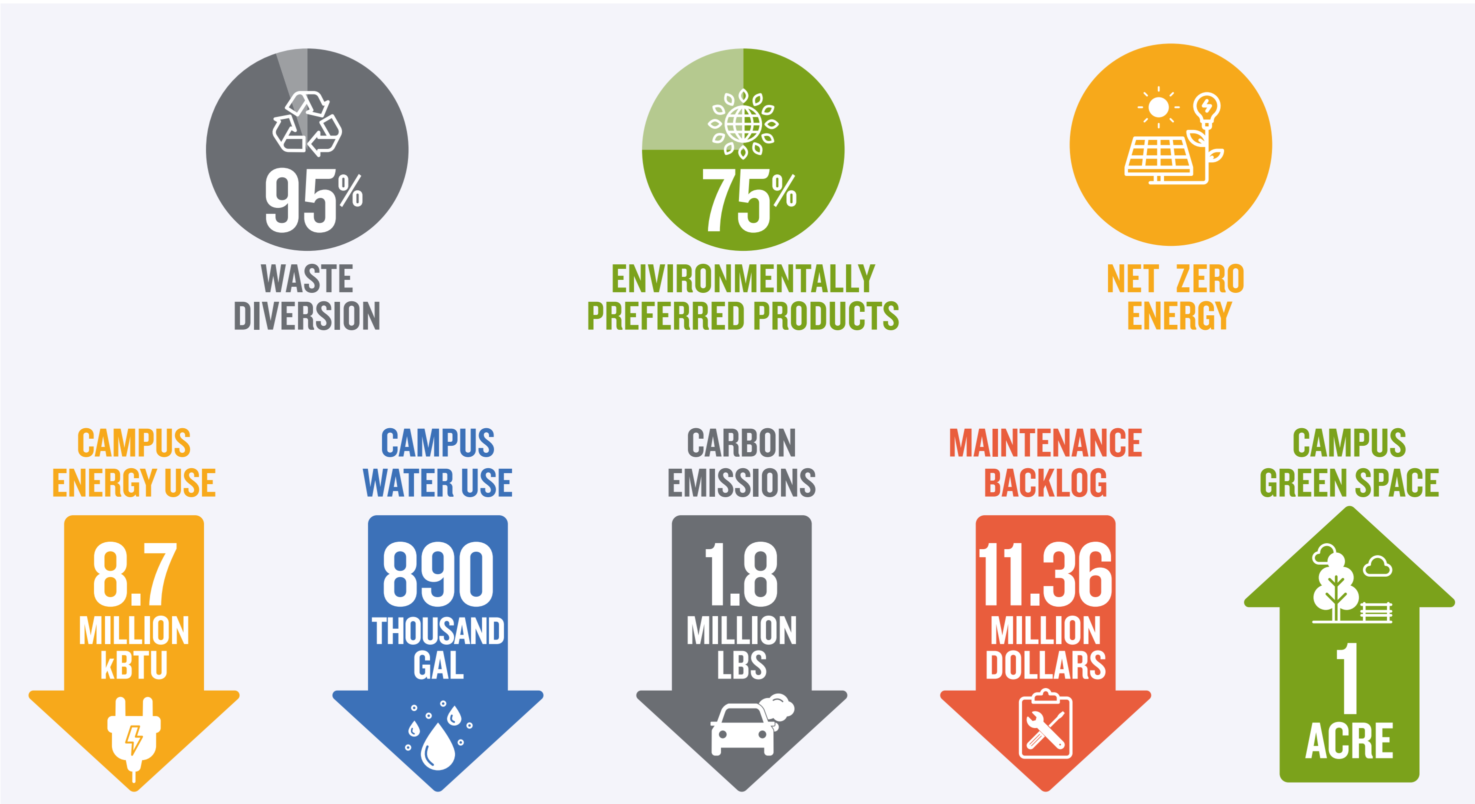
- Phase 1 Central Heating Modernization

LOW DEMAND CAMPUS COOLING

- Cooling Plant Optimization

ON CAMPUS RENEWABLE ENERGY

- Guaranteed Energy Savings Program (GESP)
- CICEL and Mark & Main Housing
- Helble, Laird Norton, Memorial Retrofits




Project Sustainability Goals

| | WSU Design Priorities<br>Baseline (if applicable) | Required Target<br>*(B3 Compliance)* | Project Target | Aspirational Future Vision |
|---|---|---|---|---|
| Human | DISCOVERY, WELL-BEING, EQUITABLE COMMUNITIES | 80% SATISFIED | 90% SATISFIED<br>BUILDING AS TEACHING TOOL | HEALTHY COMMUNITY |
| Energy | ENERGY<br>SB2030 Baseline 150 EUI<br>ENERGYSTAR: 154 EUI | 30 EUI<br>80% LESS THAN SB2030 Baseline | NZE<br>WITH ONSITE RENEWABLE ENERGY | CARBON NEUTRAL CAMPUS |
| Water | WATER<br>CAMPUS: 20 GAL/SF<br>BLDGS: 7 GAL/SF (4 & 12) | ZERO POTABLE FOR IRRIGATION<br>LESS IRRIGATION | NET POSITIVE WATER<br>ZERO POTABLE WATER FOR IRRIGATION<br>WATER BUDGET: 3.5 GAL/SF | RENEWS WATER |
| Waste | RESOURCES | 75% CONSTRUCTION WASTE DIVERSION | 95% CONSTRUCTION WASTE DIVERSION | ZERO WASTE<br>WASTE = RESOURCE |
| Materials | WELL-BEING, RESOURCES | 55% EPP | 75% EPP | RED-LIST FREE<br>CIRCULAR ECONOMY |

## HUMAN

| | WSU Design Priorities<br>Baseline (if applicable) | Required Target<br>*(B3 Compliance)* | Project Target | Aspirational Future Vision |
|---|---|---|---|---|
| **Human** | DISCOVERY, WELL-BEING, EQUITABLE COMMUNITIES | 80% SATISFIED | 90% SATISFIED<br>BUILDING AS TEACHING TOOL | HEALTHY COMMUNITY |

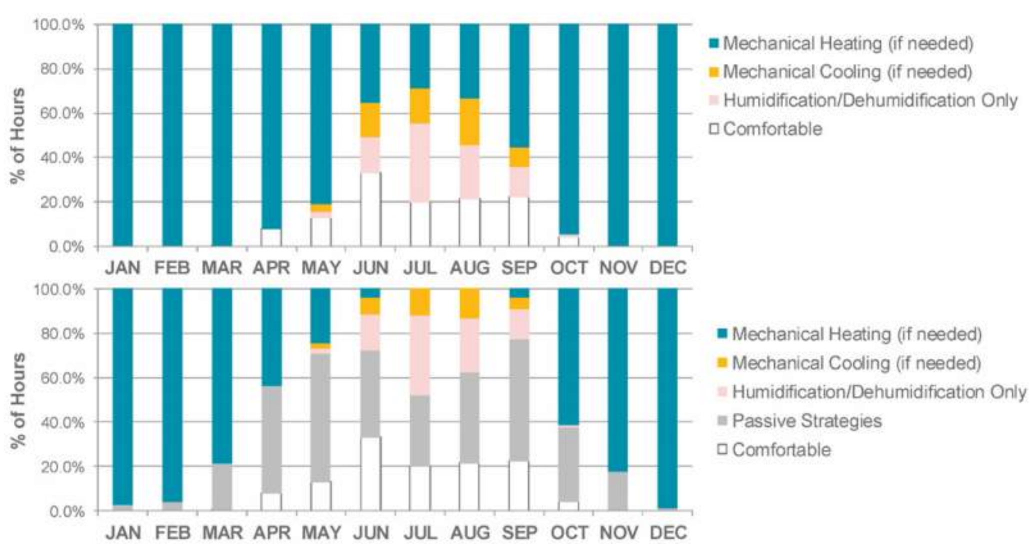
The human experience is central to the project. It is recommended that occupant evaluations be discussed early in the design process and a pre-occupancy and post-occupancy evaluation process be determined in advance so WSU can evaluate the building occupants' needs and satisfaction in their existing space(s) as compared to the new building.

1. B3 Target: 80 percent of staff satisfied (overall satisfaction).
2. Project Target: 90% overall satisfaction, perception of wellness and perception of improvement to job performance.

Weather data for the area of the project was used in a simulation software called Climate Consultant and then processed into the charts below. This method of simulation shows potential for passive and active systems to achieve human comfort for each occupied hour of the year. The top chart shows a heating dominated condition. Cooling is only needed some of the time in summer months. Even summer months require heating at times. The chart below shows gray bars that indicate the hours that passive strategies can meet human comfort needs.

The new building will serve as an active tool for teaching and research about sustainability.

Human Comfort Needs Met by Passive Strategies




Passive strategies include:

- Thermal mass with night flush
- Passive solar heat gain
- Sun shading of windows to reduce cooling loads

## ENERGY


The project is intended to achieve its goals by:

- Low EUI design maximizing passive strategies and energy conservation measures
- Renewable Energy Production: 550 kw on-site (on campus) solar photovoltaic (PV) and ground source thermal exchange (GSHX) systems. See Section 3 for diagram of areas needed.
- Energy Allowances (budgets) for subsystems and operational uses.

### ENERGY PLAN

The energy goals for the project are based on benchmarking and early conceptual simulations.

- Baseline: 150 EUI. SB2030 Baseline.
- B3 Target: 54 EUI (Site) The proposed design meets this EUI goal for minimum compliance.
    - Project Target: 30 EUI (Site). This is the target for the year 2020 which will be applicable for this project, given that design will start before 2025.

| **Energy Budget (Prelminary)** | |
|---|---|
| SYSTEM | EUI |
| Heating | 9 |
| Cooling | 6 |
| Lighting | 8 |
| Plugs/Equipment | 7 |
| **TOTAL** | **30** |

A recent report published by the New Buildings Institute shows a significant increase in zero energy buildings around the country. The Midwest has very few NZE buildings. This information also shows a median range of EUI for ZE buildings between 18 and 24. This helps validate the goals for this project. The EUI Target for this project is well within the range of other ZE projects around the country. Plus, education is a building type where there has been rapid growth of ZE buidlings. This is a good time for WSU to pursue its carbon neutral zero energy goals for this building.

Solar PV systems are intended to be installed. It is intended the renewable systems will be connected to a local utility system using a net metering approach. Consider an area in the building to be reserved for battery storage as part of the resiliency and NZE plan for the building.

### LOW COST ENERGY EFFICIENCY MEASURES

The project approach was "Start at Zero". This means the team first considered how passive strategies can benefit the building. Low cost passive strategies include, but are not limited to:

- Massing
- Solar Orientation
- Daylight. Design to a default condition where electric lights are turned off during daylit hours.
- Solar heat gain
- Shading
- Thermal mass

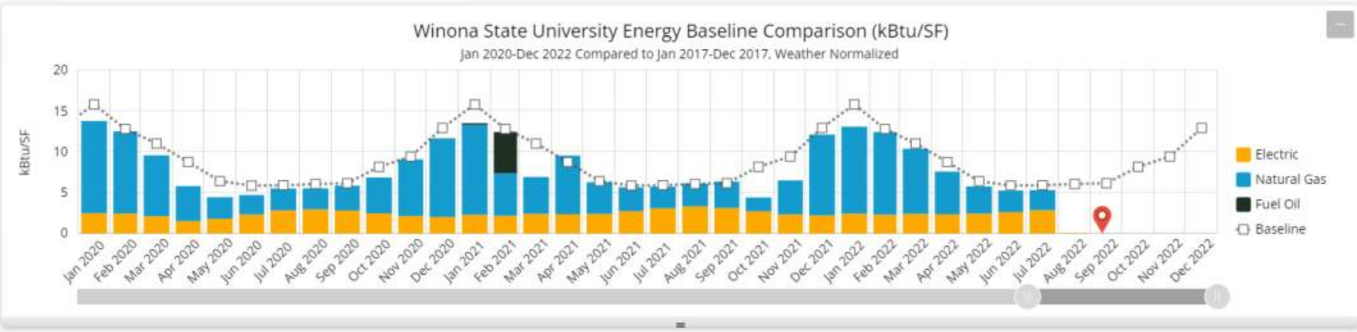
This project integrates the best practices of NZE building design. Achieving NZE requires a holistic approach, with the NZE goals guiding all design decisions. This project includes: optimum building massing and orientation, envelope design, window to wall ratio and product performance, lighting and controls, efficient plug loads and management, metering and monitoring with verification of performance, user education and behavior change, efficient heating and cooling systems. As an example, daylighting design is maximized. After that, efficient LED lighting is provided. The new assumed default is "lights are off" whenever possible during the day. An action is needed to turn the lights on and then after use the lights automatically default to off.

B3 ENERGY BENCHMARKING

The WSU site uses slightly more energy than the B3 Benchmark. WSU is operating 12% below the baseline period.

The recently completed Guaranteed Energy Savings Project Leading Energy Savings and Sustainability (LESS) is projected to reduce energy usage over 20% when fully implemented in 2023, see sidebar for more information.

Below are the campus B3 benchmarking data. This data is from the B3 site and represents actual use for the campus. WSU does not separately meter their buildings currently, so data for Gildemeister and Watson are not available separately.

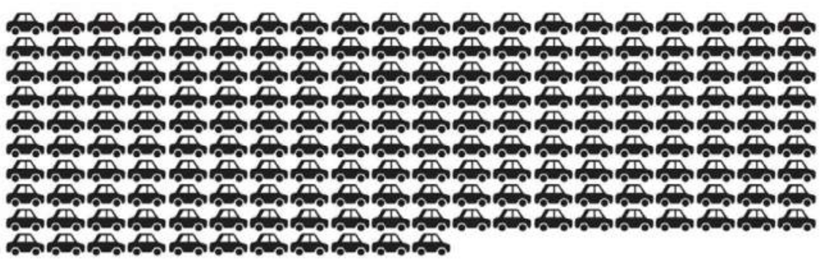



Annual Summary

| Period | Days | % Complete | SF | *Actual (kBtu/SF) | *Baseline (kBtu/SF) | Change | % Change |
|---|---|---|---|---|---|---|---|
| Jan 2020-Dec 2020 | 366 | 100% | 1,634,032 | 95.53 | 109.57 | -14.04 | -12.81% |
| Jan 2021-Dec 2021 | 365 | 100% | 1,634,032 | 95.82 | 109.57 | -13.75 | -12.55% |
| Jan 2022-Dec 2022 | 365 | 58.2% | 1,634,032 | 60.04 | 109.57 | -49.52 | -45.20% |

## Carbon emissions based on existing energy use, annual

=



1.8 million LBs CO2 (1)

175 Passenger cars annual emissions

## Proposed target

=

Net positive carbon

175 Passenger cars avoided emissions

(1) Calculated using data reported to MN B3, which shows 21.35 lbs/CO2e per square foot as a campus average for 2022
Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

SOLAR RESOURCE ANALYSIS

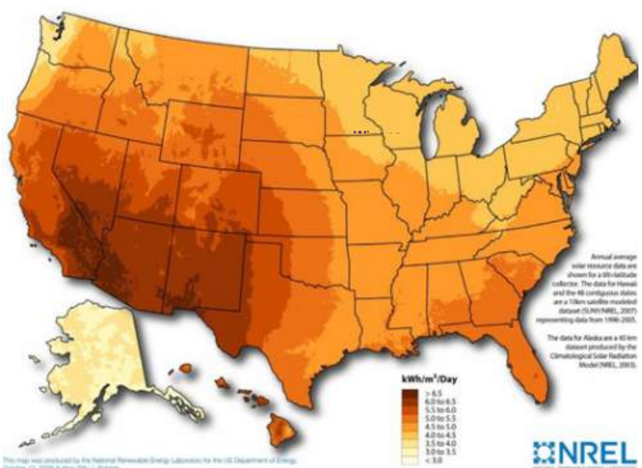
Solar:

The sun provides an abundant resource for solar PV electricity generation. In addition, the sun provides outside daylight of about 5000 foot candles (fc) at the highest during the summer and a low of about 3,000 foot candles during the winter. Building space lighting needs require only about 1% to 2% of this daylight to be harvested and used to daylight spaces at about 30 fc to 80 fc. Providing natural light helps improve user satisfaction and lowers energy use by allowing artificial lights to be off during daylight hours if daylight controls are installed and operated correctly.

The buildings should be designed to optimize daylight harvesting with the default for lighting controls to have all lights off unless daylight is inadequate during the day and during night operating hours. Optimizing insulation and glazing helps reduce solar heat gain during the hot summers.  Solar electricity generation potential according to NREL maps is 4.0 to 4.5 Kwh/sq m/day.

The orientation of the site is slightly rotated from optimal south exposure but massing and design of the building should consider solar orientation for daylighting as well as solar PV panels.

Photovoltaic Solar Resource of the United States




Optimizing Solar Orientation

## WSU'S DEDICATED COMMITMENT TO SUSTAINABILITY

**Learn MORE about LESS** The Leading Energy Savings and Sustainability (LESS) project uses the Guaranteed Energy Savings Program to implement 10 energy savings areas of impact that will save Winona State University $26 million over its lifespan and will pay for itself within 18 years. The project reduces WSU's environmental impact, improves educational experiences, increases comfort and aesthetics, makes significant building efficiency improvements, and addresses deferred maintenance.

### Fast Facts

Project includes solar panels on six rooftops and four carports-the largest solar energy system on any Minnesota State campus. 12-13% of WSU's annual electricity consumption will be met by on-site solar PV

- Construction provides jobs that contribute money back to the community
- Removes $7,500,000 of deferred maintenance from backlog
- Project includes replacing 21,000 light fixtures with more efficient LED technology
- Project replaces every toilet, shower head, urinal and faucet aerator with water saving fixtures
- New irrigation system uses smart controls to adjust sprinklers by using real time weather data

**Project Impact**

- Carbon Emissions Reduction Per Year = 25.4%
- Water Savings in Gallons= 16.4%
- $26 million cumulative savings anticipated over the 25-year project lifespan
- Utility Cost Savings = 23.8%

**Energy and Water Savings**

- Electricity: 4,975,121 kWh saved per year
- Natural Gas: 225,809 Therms saved per year
- Water. 9,816,000 Gallons saved per year

**Project Scope**

10 Energy Conservation Areas of Impact

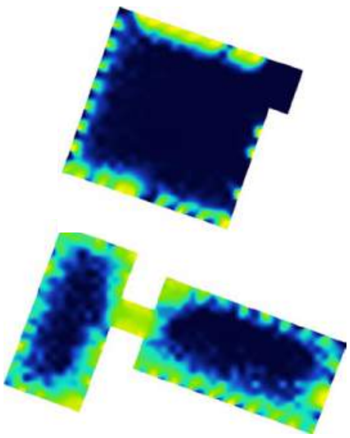
- Interior & exterior lighting
- Solar PV
- Water conservation
- HVAC Automation Controls
- Irrigation controls
- Pipe Insulation
- Pool control upgrades
- Building weatherproofing
- Backup generators efficiency improvements
- Destratification fans

## DAYLIGHTING SIMULATION

The existing buildings were simulated for daylighting. The images show results as percent of hours during the year when daylight in the spaces are above 28 foot candles. This light level is believed to allow electric lights to be off. Darker colors represent low daylight.

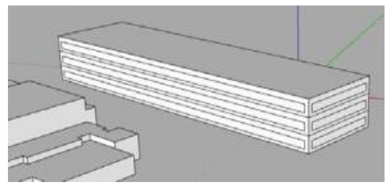
Yellow, lighter blue and green shows adequate daylight throughout the year. The image on the left shows a poorly daylit building. Several options for massing and orientation were compared to this, showing significant improvements to daylighting potential. The “Z” Scheme balances daylight, program, and site considerations most effectively.

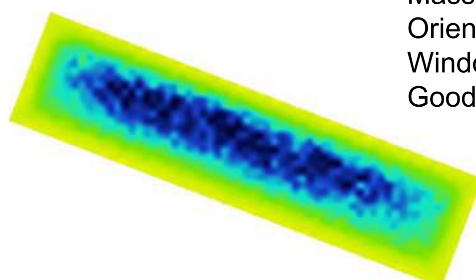
Existing Watkins and Gildemiester Halls



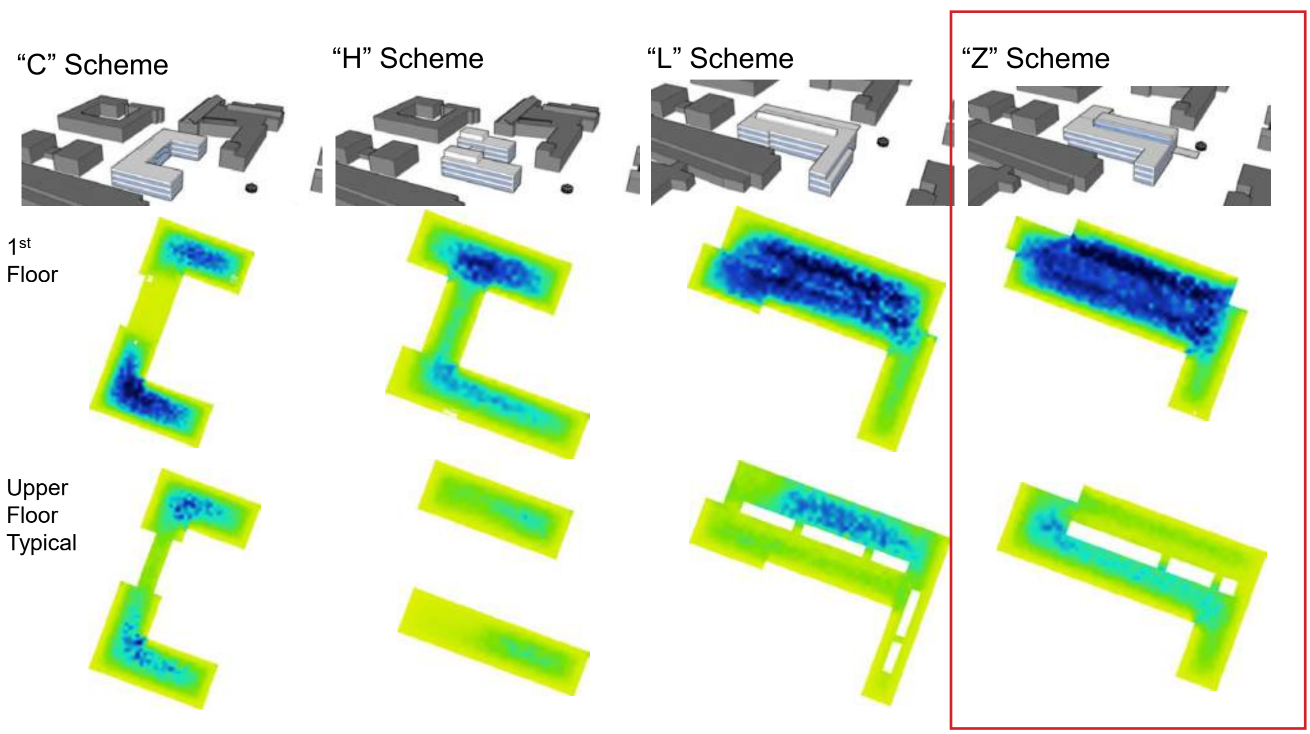
Deep floor plate
Low floor height
Very dark

East-West Mass - Campus Grid





Massing
Orientation
Window design
Good daylight




*Percentage of occupied hours where illuminance is at least 28 fc, measured at 2.79 feet above the floor plate*

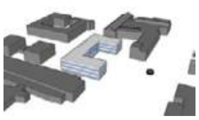
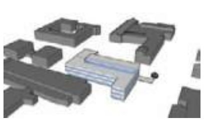
0% 25% 50% 75% 100%

PERFORMANCE SIMULATION

Conceptual energy simulations were performed on 3D models of the existing building using Sefaira, the same software used to simulate performance of the new schemes. This shows that renovating and improving the existing building does not achieve the SB2030 goals nor the project goals. The best case scenario for the existing building stops quite short of the project goal of 30 EUI. In addition to higher operating costs, renovating the existing building would require higher first costs to integrate renewable energy production than a new building with a lower EUI. The new building will perform better than renovating the two existing buildings.

The "Z" Scheme is the best for massing, orientation and optimizing performance. Conceptual simulation shows potential for an EUI of 26 compared to the goal of 30. This leaves room for contingency in the energy use allowance to account for variations in actual use.

A new building designed to operate at 30 EUI or less helps to reduce annual campus energy use by 8.7 million kBTU annually. Photovoltaic panels offer the potential to operate the building energy positive.

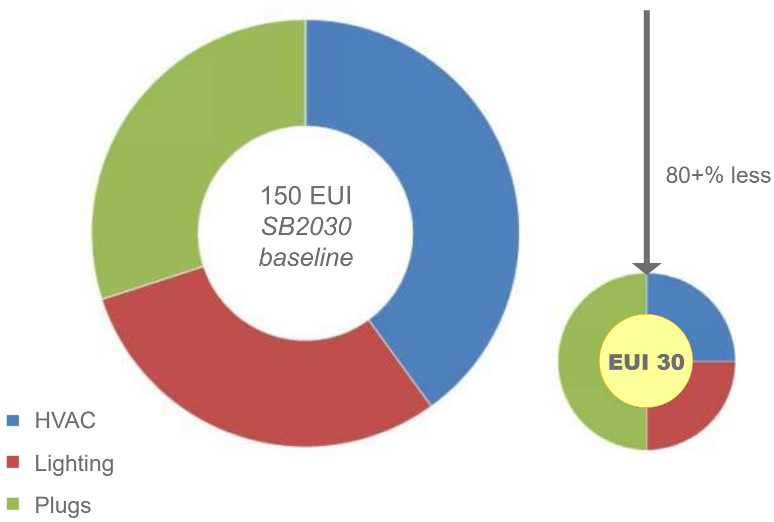
| | B3 Benchmark | Code | Optimized | +GSHP | Cost (2022) |
|---|---|---|---|---|---|
| Existing  | | 76 | 52 | 42 | $105k |
| "C" Scheme  | | 55 | 46 | 29 | $84k |
| "H" Scheme  | 105/$113k | 57 | 48 | 30 | $87k |
| "L" Scheme  | | 61 | 51 | 31 | $85k |
| "Z" Scheme  | | 67 | 51 | 26 | $67k |

| **Key** | |
|---|---|
| B3 Benchmark | The energy use shown on the MN B3 website for WSU |
| Code | A simulation of energy use if the existing building were designed to meet minimum code requirements |
| Optimized | A renovation that maximizes the improvement to the building by designing to standards beyond code minimum. |
| GSHP | The optimized condition with the addition of a ground source heat exchange system |

## ACHIEVING NZE IS MORE THAN DESIGN

As the building design becomes more energy efficient, reducing energy used for HVAC and Lighting, the percentage of the total energy from plug loads and human activity in the building has a larger percent impact of the reduced total energy. The single biggest factor determining if a building design achieves NZE is how the building is operated and how people interact with the building. Occupant education is needed so these buildings perform as intended. Building operator training needs to be more than start-up orientation but rather ongoing technical support for a period of at least 2 years or longer as part of the commissioning contract.

Contributors to EUI: The Big Three
(HVAC, Lighting, Plug Loads)




## OPERATIONS, MONITORING, AND REPORTING

A critical part of achieving net zero energy is ongoing operations. How the people use the building and monitoring the performance of the building are essential in achieving NZE goals. Design by itself can only give an owner the potential for NZE. The achievement of the goal comes in operating and human behavior. To accomplish this monitoring systems are needed beyond a simple building energy meter. Each building should be separately metered but within each building major sub systems need to be monitored. At a minimum lights, heating and cooling and plug loads should be separately reported to allow monitoring progress toward NZE.

Occupant Behaviors Required to Achieve EUI Goal:

- Equipment: Install only energy-efficient equipment: Laptop computers, energy efficient computer monitors, Energy Star office equipment
- "Normally Off" behaviors – lighting, equipment, etc.
- Plug Load Reduction: behavior modifications to reduce plug loads. (Plug Loads = equipment plugged into an outlet and consuming energy)
- Temperature: Consider interior temperatures range of: 68ºF to 75ºF

Occupant engagement strategies are a key element in meeting operating goals. Behavior change is the result of many simultaneous efforts that are each individually focused on generating a culture of conservation. The diagram to the left shows as a building design becomes more efficient and uses less energy, the behaviors of people (plug loads) have a larger impact of total energy use.

Required Elements of Change Management:

- Education & awareness delivered in a consistent manner designed for busy people
- Meaningful "calls for action" that deliver the desired outcomes such as lower EUI
- Incentivize and socialize the user experience
- Measurable Results at utility meters

Delivered on a platform that is accessible on any device, anyplace, at any time

- Cloud-based portals
- Smart Phone Apps

NZE Verification Actions:

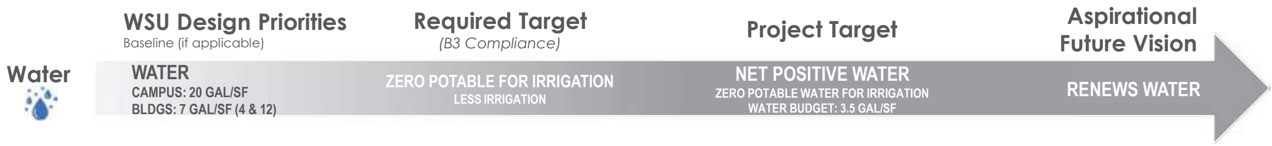
Verifying actual achievement of NZE performance has several steps, starting during design and continuing through actual operations.

- Design: Optimize the design, providing the potential for reduced annual electric (energy) consumption.
- Renewable Energy: Provide renewable energy to offset the annual energy consumption. Determine quantity of contingency renewable energy to accommodate variations in annual energy use to assure NZE performance year to year.

- M & V: Develop a Measurement and Verification Plan (M&V) during construction documents phase. The M&V Plan identifies the approach and controls for monitoring discrete end uses and total energy relative the energy use predicted during design. It will also identify tasks needed during the first year of operations, when they should be done, and who will be doing which tasks. The plan should be consistent with the International Performance Measurement and Verification Protocol.
- Commissioning: Include NZE criteria into the Commissioning Plan.
- After two months of occupancy, update the energy model with the as-built plans, installed plug loads, updated occupancy profile, and chosen HVAC set-points. Calibrate the model to actual weather. This updated energy model predicts the energy uses for the first year of M&V.
- Energy Management: identify energy consumption and energy production by whole building and major sub-systems for building operators to manage energy use.
- Energy Dashboard and Occupant Behavior: Display energy consumption and production for building occupants to see and engage occupants in achieving energy goals.
- First Year of NZE Operation (usually months 3 through 14): Follow through on monitoring and troubleshooting the project with special emphasis on the first year start-up and tuning phase. Year one of any building requires some period for adjusting and tuning, learning and understanding the new building. This is especially true for a NZE building. Allow time for the use of the building to stabilize and for user and operators to understand how to operate the new building.
- Ongoing Operations: Once you achieve the first 12 months of NZE it's not over. Continuous operation monitoring and occupant behaviors need to be maintained. Ongoing monitoring and continuing the M&V plan for the life of the project is essential to continued NZE performance.

| **CODE COMPARISON TO NZE OPTIONS** | | |
|---|---|---|
| | CODE (BASELINE) | PROPOSED |
| Massing | No requirement | Passive solar design |
| Walls | Low mass building<br><br>Assembly U-Value: 0.064 (R-15.6) | High mass building<br><br>Assembly U-Value: 0.05 (R-20) |
| Roof | Assembly U-Value: 0.032 (R-31.3) | Assembly U-Value: 0.025 (R-40) |
| Windows | Assembly U-Value: 0.43 | Assembly U-Value: 0.33 |
| Lighting | LPD = 1.2 W/sf<br><br>Occupancy sensors | LPD  0.6 W/sf<br><br>Vacancy Sensors, Default condition-electric light off during daylight hours. |
| Daylighting | No requirement | Architectural design for daylighting; automated controls |
| HVAC | District chilled and hot water; water-side economizer; standard control sequences. | Water-water heat pumps with ground-loop (geothermal) heat exchange; air-side economizer; high-performance control sequences. |
| Internal Loads | 1.0 W/sf; no plug load management | 0.7 W/sf; aggressive plug load management through technological and behavioral measures |
| Airtightness | 0.40 cfm/sq.ft. at 0.3 in.w.g. | 0.25 cfm/sq.ft. at 0.3 in.w.g. |
| Domestic Water Heating | Natural gas; Energy Factor per DOE 10 CFR Part 430 | Heat pump; COP > 6.0 |
| Renewable Energy | 0.5 W/sf | > 6 W/sf for 100% of energy use |

## WATER




This project proposes to accelerate SB2030 goals by achieving carbon neutral performance. Once achieved on this project lessons learned can be applied to the WSU campus, throughout the MN State System and beyond.

- B3 Target: Carbon avoided due to energy efficiency and low EUI compared to baseline.
- Project Target: Carbon Neutral.

Water use reduction is an important issue for the community. The area experiences challenges with water supply. Water balance planning is the intent of this goal.

- Water Budget: 3.5 gallons per square foot. Calculated based on gallons of annual rain water that falls on the area of the site.
- Landscape Water Use Goal: No potable water for irrigation system
- Building Water Use Goal: 50% reduction below baseline

Annual rain water calculated based on site area. Rain fall in inches was converted to gallons per year using the following website: https://water.usgs.gov/edu/activity-howmuchrain.php

The below chart shows a water balance plan. Water balance is achieved when water used in the building and for landscape irrigation is less than or equal to the number of gallons of rain water falling on the site. The rain water falling on the site is calculated using 2.5 acres of area around the new building site and the average rain fall in inches shown above. The result is a water use allowance of 1.5 million gallons per year for all uses. Using data from B3 site the campus uses and average of 20 gallons of water per square foot of building. The existing buildings for this site use an average of 7 gallons per square foot. The new design proposes a 50% reduction in indoor water use below baseline. The center bars show the main water uses on the project. The actual water use for these uses is not known because water use is not separately metered. The new project considers capturing condensate water. The landscape water uses for existing is shown and a proposed rain water capture system is included in this project. The new landscape design is proposed to use less water and the water that is used would be from captured rain water so the new project will use no potable water for irrigation.

## WATER: BALANCE PLANNING

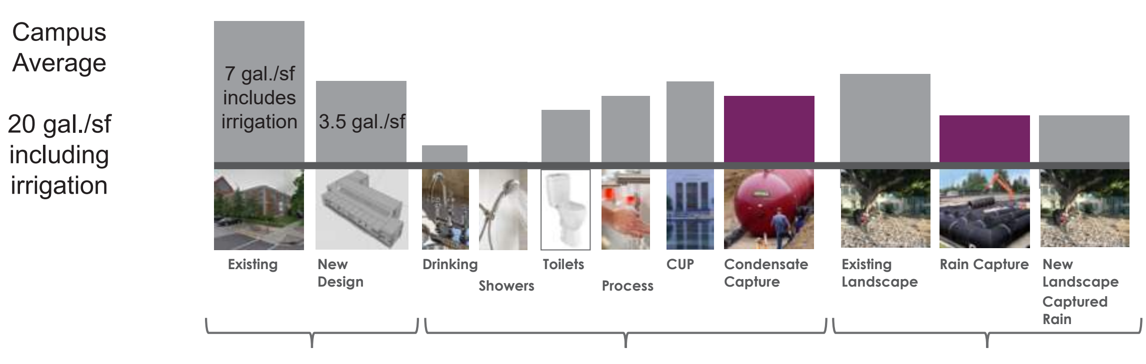
44 inches average

**CALCULATED RAIN WATER**

1.5 million gallons/year at
44 inches annual rainwater over 2.5 acres

60 million gal over 50 acre campus

https://water.usgs.gov/edu/activity-howmuchrain.php



## WASTE

| | WSU Design Priorities<br>Baseline (if applicable) | Required Target<br>*(B3 Compliance)* | Project Target | Aspirational Future Vision |
|---|---|---|---|---|
| Waste | RESOURCES | 75% CONSTRUCTION WASTE DIVERSION | 95% CONSTRUCTION WASTE DIVERSION | ZERO WASTE<br>WASTE = RESOURCE |

Eliminating waste wherever possible should be the primary goal followed by waste recovery and recycling to divert solid waste from landfill. Developing policies regarding waste are tasks for subsequent phases and implementation by Owner. Significantly reducing solid waste can save money in disposal costs, avoids carbon from hauling and landfill gases generated and land area used for disposal.

- Construction Waste Diversion from Landfill:
  - B3 Target: 75% + diversion
  - Project Target : Zero Waste. 95% minimum construction waste diversion
- Operational Waste Reduction: Zero waste for operations

See Appendix for complete Demolition and Recycling Plan.

## MATERIALS

| | WSU Design Priorities<br>Baseline (if applicable) | Required Target<br>*(B3 Compliance)* | Project Target | Aspirational Future Vision |
|---|---|---|---|---|
| Materials | WELL-BEING, RESOURCES | 55% EPP | 75% EPP | RED-LIST FREE<br>CIRCULAR ECONOMY |

WSU is aiming to achieve 75% Environmentally Preferable Products (EPP), 20% higher than the B3 required target. EPPs include those that that:

- contain recycled content
- are sourced locally
- document their greenhouse gas impact with Environmental Product Declarations
- document their human health impact with material inventories (ex: Health Product Declaration)
- contain FSC certified wood

## 3. STATUTORY REQUIREMENTS AND COMPLIANCE

### MINNESOTA B3

The project will meet all the applicable B3 requirements. The project goals exceed more than 50% of the B3 requirements and recommend strategies, and exceeds requirements within each category. See the table below for more information and detailed plan in the Appendix.

# Buildings Benchmarks and Beyond (B3 ) Guidelines, version 3.2

| PERFORMANCE MANAGEMENT | | Baseline Compliance | Project Goals and Plans | Meets B3 | Exceeds B3 |
|---|---|---|---|---|---|
| P.1 | Design and Construction Process | REQUIRED | Integrated project team delivery | ✓ | |
| P.2 | Operations Commissioning | REQUIRED | Post occupancy energy evaluation + Monitoring and retro Cx | | ✓ |
| **SITE AND WATER** | | | | | |
| **S.1** | Site and Water Connections | REQUIRED | Site is developed and will be restored + No critical areas | ✓ | |
| **S.2** | Site Water Quality and Efficiency | REQUIRED | Meet stormwater parameters + Net positive water | | ✓ |
| **S.3** | Soil | REQUIRED | Survey and amend soils to thresholds | ✓ | |
| **S.4** | Vegetation | REQUIRED | 50%+ biodiversity + 100% native plantings + Increased trees | | ✓ |
| **S.5** | Animal Habitat Support | REQUIRED | Analyze and support bird and other animal risk factors | ✓ | |
| **ENERGY AND ATMOSPHERE** | | | | | |
| E.1 | Energy Efficiency | REQUIRED | Targeting 30 EUI + 100% renewable energy offset (PV) | | ✓ |
| E.2 | Renewable Energy | REQUIRED | Targeting 30 EUI + 100% renewable energy offset (PV) | | ✓ |
| E.3 | Efficient Equipment and Appliances | REQUIRED | Energy Star + Plug load monitoring/control | | ✓ |
| E.4 | Atmospheric Protection | REQUIRED | Exceed limits based on very low refrigerant use | | ✓ |
| E.5 | EV-Ready | N/A | N/A | | |
| **INDOOR ENVIRONMENTAL QUALITY** | | | | | |
| I.1 | Low-Emitting Materials | REQUIRED | Specify low VOC products per category and standard | ✓ | |
| I.2 | Moisture Control | REQUIRED | Specify and detail intrusion and content limits | ✓ | |
| I.3 | Ventilation Design | REQUIRED | Meet ASHRAE 62.1 standard + Increase OA in critical spaces | ✓ | |
| I.4 | Thermal Comfort | REQUIRED | Meet ASHRAE 55 standard + Occupancy comfort surveying | ✓ | |
| I.5 | Lighting and Daylighting | REQUIRED | Lighting quality metrics + Extensive daylighting | | ✓ |
| I.6 | Effective Accoustics | REQUIRED | Meet acoustical metrics | ✓ | |
| I.7 | View Space and Window Access | REQUIRED | Provide views and window access in all regularly occupied spaces | | ✓ |
| I.8 | Ergonomics and Physical Activity | REQUIRED | Design space to facilitate movement | ✓ | |
| I.9 | Wayfinding and Universal Access | REQUIRED | Maximize equity with universal design strategies | | ✓ |
| **MATERIALS AND WASTE** | | | | | |
| M.1 | Life Cycle Assessment of Materials | REQUIRED | Perform LCA with resulting reduction | | ✓ |
| M.2 | Environmentally Preferable Materials | REQUIRED | Select 75% qualifying materials | | ✓ |
| M.3 | Waste Reduction and Management | REQUIRED | Divert 95% of construction and demolition waste | | ✓ |
| M.4 | Health | REQUIRED | Analyze minimim of 10 products + No mercury lamps | | ✓ |

STATUTORY REQUIREMENTS FOR ENERGY

### Analysis and Plan for Application of Alternative Energy Systems:

MN §16b.32 Subd 1a: Energy Use—2% renewable energy for new buildings or renovation of 50% of building/ energy systems.

The project intends to provide renewable energy production for onsite electricity generation using high efficiency PV panels to offset the electricity provided by the electrical utility. Project goal is to be net zero energy providing 100%, or more, of its energy from renewable resources over the course of a year. In addition, energy consumption will be reduced by using a ground source heat pump system. Achieving a low EUI uses less energy, reduces operating costs from utility bills and reduces the size of renewable energy systems needed to achieve net zero energy.

The design of renewable systems has been integrated into the site and building layout. See Section 3 for Solar PV and Ground Source system square footage requirements to achieve the maximum target EUI of 30.

### MN §16b.32 Subd 2: Energy Conservation Goals

(may participate in program, not mandatory)

The project has set an annual energy use intensity (EUI) target of 30 EUI (kBtu/sf/yr) which, for a 73,000 gsf building, equates to 2,200 MMBtu/yr or 642 MWh/ yr. This will be accomplished through a combination of bio-climatic architecture, efficient HVAC & lighting systems and optimized building operation. See Energy heading on following pages and Sustainability Goals for more information.

### MN §16b.323: Solar PV cost/benefit analysis

Cost/benefit analysis of solar energy system (solar PV modules installed in conjunction with a solar thermal system) for new buildings or major renovations, cost of up to 5% of the appropriation.

To offset 100% of the annual energy use, a PV system of approximately 550 kW is required. At an estimated cost of $3 per installed watt, the system cost would be approximately $1,650,000 which is less than 5% of the total project cost. Renewable energy system costs are declining and technology is improving. System cost may potentially decline further before this project needs to purchase the system or panel efficiency may improve. It is recommended to wait to purchase the PV panels as long as practical.

### MN §16b.325: Sustainable Building Guidelines - New Buildings and Major Renovations (B3 Guidelines)

Per agreement with the MN Department of Adminstration, the project will comply with MN B3 v3.2 Strategies for meeting sustainability goals for site, water, energy, indoor environment, materials, and waste are outlined on the following pages and in the Appendix.

### MN §16b.326: Consider geothermal or solar energy heating & cooling systems

For new buildings, new HVAC systems, or when replacing an HVAC system:

Provide written plan to consider providing geothermal or solar energy heating & cooling systems

Solar resources are unreliable for use for space heating. Therefore a fully redundant heating and cooling system would still need to be provided which makes solar heating and cooling system financially unattractive. Solar domestic hot water systems, have relatively low cost and favorable paybacks. The building is anticipated to use very little domestic hot water so a solar thermal system is not recommended.

On the other hand, ground-source (geothermal) heat exchange GSHX system utilizing water-to-water heat pumps is currently proposed as part of the HVAC system design. This system will be able to provide the HVAC efficiency above what is available from the campus district heating and cooling system, thus reducing the aggregate energy consumption of the building. The local geology, sand and gravel drift with significant groundwater at about 150 feet depth transitioning to Mount Simon Sandstone, appears to be receptive to vertical heat exchangers. Wells approximately 200 feet to 350 feet are considered likely if the sandstone is competent. A test bore would be needed to confirm geology and well depth. GSHX were studied using conceptual energy simulations using Sefaira software and found to provide a 40-50% less total energy consumption compared to an optimized building connected to the campus central plant. This system is recommended for this project instead of solar thermal systems.

## 4. PROCESS SUMMARY

The following pages detail the process to determine and set the sustainability goals outlined above.

### THE BIG PICTURE: FUTURE FORCES AND ASPIRATIONS

When this year's kindergarten class are college freshmen in the year 2035 what will be happening then. The pre-design report considers the future rather than simply what is the current condition. This is a transformative time and the project has the opportunity to accelerate the transformation from the dirty past to the clean renewable energy future that promotes individual and community health and wellness.

A survey was distributed to WSU staff and faculty. 32 people responded of about 70 who received the electronic survey. The survey was intended to identify the top influencers and major forces considered likely to affect the future 50 years from now. The image below shows all responses . The larger the words, the more respondents believed that topic would drive the future for WSU and this project.

Top forces


Survey responses included the following comments::

- "Social learning. We are in it together as one - should be the theme....In 60 years, climate change alone could drive built environment design, with few new buildings created only for university use. These buildings would have to be multi use and self-sustaining...
- Unpredictable weather patterns will disrupt outdoor sports and increase virtual gaming and indoor sports.
- If we actually succeed in assigning realistic costs to externalities, the changes that need to be made will largely happen automatically as firms and individuals try to keep their costs down...
- Free and open meeting spaces near public transportation will be in high demand with the ability to simultaneously live broadcast on social media.
- Spacious rooms with a real or faux view of a pastoral landscape will help reduce anxiety.
- Spaciousness will feel like a luxury as the population continues to grow, even if the numbers of students at WSU remains the same or decreases.
- Produce more than it consumes.
- We must prioritize thoughtful management of our resources in order to attain the maximum value for the overall costs of our consumption. Profit taking must eventually take a back seat to the common good.

- Maximum flexibility and efficiency.
- Spaces should enhance collaboration both among small groups and among people from different disciplines.  Provide features to incorporate different types of technical expertise together (e.g. data with design and production)
- We need to have a building that focuses on computational science where students engage with faculty on analyzing data, building relationships, and exploring how to improve our world. The ability to analyze data and think critically is the wave of the future.
- The design will be predicated on economic austerity. The USA is already declining as the #1 economic force in the world and we will, first and foremost have to learn how to psychologically deal with less - as a nation. Any new designs will be simple, efficient, and have minimal environmental impact…”

During Workshop #1, attendees discussed and ranked the top three topics that needed to be addressed in the pre-design work.

Wealth gap was the top response during the survey. During the workshop, attendees described sensitivity to cost of education, text books, less time to work jobs, community that has a wide variety of income levels, debate and conflict over education system in the area and being sensitive to the appearance of the building fitting into the socioeconomic context of the community. There is a drive to get a higher education but an acknowledgement of the rising costs.  WSU is working to attract diverse students. Almost 44% of students enrolled at WSU are first generation college students.

Top forces, ranked


TOP FORCES & STRATEGIES

Renewable Energy:

1. Solar panels
2. Ground source heating /cooling
3. Heat recovery

Technology:

1. Educate the users
2. Production in the building: energy and content
3. Optimize efficiency, flows of heat and energy
4. Visible energy and water use monitors
5. Building as teaching tool for sustainability

Climate Change, Human Impact, Consumption, Waste:

1. Document up-front cost vs. life cycle
2. Make recycling visible, including education and presentation/display
3. Plugs that turn off
4. Go paperless or less paper – make it less convenient to waste paper

WSU is a place of research and education; new ideas should be explored while being selective with where to take risks.  1.7 million square feet rely on the plant; nothing can disrupt operations, especially in winter.


EXIT

# 5.

# Financial Information - Capital Expenditures

# FINANCIAL INFORMATION CAPITAL EXPENDITURES

## 1. OVERVIEW OF BUDGETING PROCESS

### PREDESIGN COST AND BUDGETING PROCESS

HGA employs a process of benchmarking, iteration, and verification to establish comprehensive early phase estimates and properly set project budgets. As programming and design work progress we are able to develop detailed estimate modeling for the sitework and systems of the building. Working with the Owner and project team, this model is then tested and revised to further identify the scope and quality of the project. We then use these models to inform project funding and to complete the MN State Capitol Budget Request form for the project. Details and documentation of the steps in the process are provided in this section.

| Project Cost Summary | | | |
|---|---|---|---|
| | 2022 Costs | Inflation to Midpoint of Expenditure (per MMB) | Costs @ Midpoint of Expenditure |
| Building & Site Constr Cost | $47,503,000 | $18,127,000 | $65,630,000 |
| Project Soft Costs | $13,452,000 | $4,650,000 | $18,102,000 |
| **TOTAL** | $60,955,000 | $22,777,000 | **$83,732,000** |

### PROJECT COSTING PARAMETERS & METRICS

- 73,000 gross square foot building.
- Construction Manager At-Risk delivery method.
- Single demolition and construction phase of approx. 20 months.
- Cost modeling is based on current 2022 costs for the Twin Cities metro area construction market.
- Inflation is applied using the MN State Capital Budget Request form using current data from the office of Minnesota Management and Budget, and is subject to future revisions.

### BENCHMARKING

Our process on this project began by compiling similar sized and usage type projects from our extensive database of past completed projects.  We can then analyze and sort that data into a representative project set that guides us to selection of a cost per square foot target for the project.  Our resultant target cost metric for this project is $835/sf.

### COST MODELING

Early modeling is a key to project success because it allows for clear definition of project scope, identification of design limitations, overall quality, and feasibility of goals. Attainable project quantities are used to create line-item breakdown of building systems, this structure is then enhanced and expanded using historical database information and past experience to create a comprehensive estimate modell.

### PROJECT SOFT COSTS

Additional expenditures beyond the cost of site and building construction are estimated using a typical project soft cost model for buildings of this type and usage. These costs will ultimately be determined as the funding and construction process progresses but can be modeled based on past project history and experience. These costs include professional service fees, management fees, permitting & testing, furnishings & equipment, art allowance, technology systems, AV, security.

### PROJECT FUNDING

The project qualified capital expenditures will be funded by general obligation bonds as allowed state statute and policy. Qualified capital expenditures included in this project: design, building demolition, construction, furniture, fixtures and equipment (FF&E), and information technology systems. Non-qualified expenditures will be funded by the campus operating budget. Non-qualified expenditures included in this project: predesign fees, moving and relocation expenses, software, personal property, and consumable office and teaching supplies and equipment.

At this time, no other alternate funding sources are being pursued. WSU will work with Minnesota State to identify opportunities for incentives or other rebates to assist with reaching its Net Zero Energy goals. The project team is investigating applicable grants, rebates and utility incentives for the sustainable design strategies utilized on this project.

## 2. PROJECT PROCUREMENT AND DELIVERY

### CMAR DELIVERY

This report assumes the project will be constructed using a construction manager at-risk delivery. Past experience in similar projects of this size and type tell us that this is the recommended method. By engaging a construction partner early in the process (SD/DD design phase) the project can benefit from engagement with the CM in design, phasing, advanced cost estimating, and value assessment. This delivery method offers several advantages, including the following:

- Many aspects of project risk execution are passed to the CMAR, reducing the owner's potential overall risks
- Development and management of alternative, balanced construction schedules
- Estimating, value engineering and cost analysis
- Construction time reductions
- Professional expert focused on the construction progress
- Increased cost control and accountability as the construction budget will be discussed as an open book relationship with the owner
- Early and/or phased bid package preparation

### SCHEDULE / PHASING

The schedule developed and included with this report identifies a single phase of construction set to begin as soon as bond funding is available in 2026 This coincides with the end of the 2025-2026 school year, giving site access to contractors for construction through the summer of 2026. Cost modeling has been completed taking into consideration this schedule and sequence of construction, as follows :

- Demolition of Gildemeister Hall
- Continued operation of Watkins Hall
- Construction of new CICEL building w/ connection to central utility plant
- Completion and occupancy of new building
- Vacation and demolition of Watkins Hall
- Ground-source bore and general site construction and connection to new building, discontinue CP utility usage.

### CONSTRUCTION BUDGET ACCOMMODATIONS

The following table is provided for clarification of specialty scopes of work addressed within this budget and report. Summary costs are broken out for these specific areas of scope as a means of highlighting the included dollars for reference.

| **CONSTRUCTION BUDGET ACCOMMODATIONS** | |
|---|---|
| On-site photovoltaic energy production system (500 kW) | $2,000,000 |
| On-site stormwater storage cistern and re-use system | $280,000 |
| Geothermal closed-loop well field for heating/cooling source energy | $1,120,000 |
| Furnishings : office, workstation, casual, classroom, lab, storage | $3,700,000 |
| Technology/AV Equipment | $780,000 |
| Security Equipment | $392,000 |
| Utility relocations/connection and connection for temp CP use | $910,000 |
| Hazardous Materials Abatement | Minor abatement incl w/bldg demo costs |
| Site Remediation | No remediation req'd per Phase 1 Site Assessment |

## QUALITY CONTROL

Extended commissioning of all building systems is planned for this project.

This project will also require the design teams and construction teams to have experience in these types of buildings. Confirmation of qualifications of those participating are essential to quality control.

As a net zero project a lot of extra attention should be taken by the design team to document to B3 metrics in addition to the project goals. Design priorities, adopted by the University, include additional quality control items.

## RISK MITIGATION

We are trying to structure the project with the demolition of Gildemeister, new construction and followed by the demolition of Watkins to help with project phasing, lower risks involved with using swing space, and minimizes schedule risks.

Parallel cost estimates with reconciliation in the early design phases is planned. Additionally, contingencies are in place in the project budget to account for unknown design and market factors.

Many aspects of project risk execution are passed to the CMAR, reducing the owner's potential overall risks.

Pre-purchasing of equipment will be explored to lock-in pricing early and lower risk in a volitile market.

HGA

## WSU Classroom
## Preliminary Project Budgeting

| | Systems Cost Summary | | |
|---|---|---|---|
| ***New Construction*** | ***73,000 GSF*** | | |
| **Building Demo/Removal** | *78,333 sf* | *$25.00* | ***$1,958,325*** |
| **Sitework** | *allowance* | | ***$2,150,000*** |
| **Structure** | *73,000 sf* | *$67.00* | ***$4,891,000*** |
| **Enclosure** | *48,000 sf* | *$138.00* | ***$6,624,000*** |
| **Interiors** | *73,000 sf* | *$89.00* | ***$6,497,000*** |
| **Bldg Equip** | *73,000 sf* | *$7.00* | ***$511,000*** |
| **Conveying** | *73,000 sf* | *$4.00* | ***$292,000*** |
| **Mechanical** | *73,000 sf* | *$114.00* | ***$8,322,000*** |
| **Electrical** | *73,000 sf* | *$58.00* | ***$4,234,000*** |
| **Renewable Energy (PV)** | *500,000 watt* | *$4.00* | ***$2,000,000*** |
| **Contingency** | *10%* | | ***$3,747,933*** |
| **Total Project Budget (Q3-2022** | ***$565*** | ***$41,227,258*** | |

HGA

**WSU Classroom**
**Preliminary Project Budgeting**

**Systems Cost Detail**

| | | |
|---|---|---|
| Basement | 3,100 | sqft |
| 1st Flr | 22,600 | sqft |
| 2nd Flr | 21,500 | sqft |
| 3rd Flr | 18,700 | sqft |
| Penthouse | 6,500 | sqft |
| **Total Bldg GSF :** | 72,400 | sqft |
| Roof Area : | 29,081 | sqft |
| Canopy Area : | 6,800 | sqft |
| Enclosure Wall : | 47,820 | sqft |
| Site Area : | 110,000 | sqft | 

Site Area: 2.53 acres

| LINE ITEM | BASIS OF ESTIMATE | QUANTITY | | UNIT $ | TOTAL COST |
|---|---|---|---|---|---|
| **SITEWORK** | | | | | |
| *SITE PREP* | | | | | |
| SITE CONTROLS / PROTECTIONS / E&S MEASURES | Perimeter/silt fence, storm filters, constr entrance, etc. | 1 | allow | $50,000.00 | $50,000 |
| SITE CLEARING / ROUGH GRADING / CUT-STORE TOPSOIL | Typical, pre-development | 64,800 | sqft | $0.70 | $45,604 |
| CUT & FILL GRADING | Minor earth moving to create grades | 4,074 | cuyd | $16.89 | $68,813 |
| BASEMENT EXCAVATION | Typical - no rock | 2,480 | cuyd | $22.52 | $55,851 |
| RE-SPREAD TOPSOIL / FINE GRADING | Soft scape areas | 87,400 | sqft | $0.35 | $30,755 |
| *UTILITY SERVICES* | | | | | |
| CENTRAL PLANT UTILITY TIE-IN | Temp connection for geothermal well field construction | 1 | lsum | $75,000.00 | $75,000 |
| DOMESTIC & FIRE WATER CONNECTION | 6" & 8" DIP - incl. valves, trenching, etc. | 150 | lnft | $175.94 | $26,391 |
| SANITARY SEWER CONNECTION | 8" PVC - incl. valves, trenching, etc. | 150 | lnft | $140.75 | $21,113 |
| STORM SEWER CONNECTIONS | Assumes 12/15/18" RCP - incl. trenching, etc. | 800 | lnft | $119.64 | $95,713 |
| STORM SEWER COLLECTION SYSTEM | Cistern, treatment - for irrigation | 20,000 | gal | $14.08 | $281,509 |
| ELECTRICAL UTILITY CONNECTION | (4)-4" conduits , 400A med voltage service | 150 | lnft | $492.64 | $73,896 |
| TELECOMMUNICATIONS UTILITY CONNECTION | 2" conduits, fiber | 150 | lnft | $105.57 | $15,835 |
| GAS UTILITY CONNECTION | Allowance | 150 | lnft | $49.26 | $7,390 |
| UTILITY CONNECTIONS TO EXISTING | Campus distributions | 5 | each | $3,518.86 | $17,594 |
| UTILITY STRUCTURES | Manholes & catch basins, outfalls | 10 | each | $5,419.05 | $54,190 |
| SITE SURFACING | | | | | |
| DRIVE LANE PAVING | Heavy duty, roads - 5" bit/8" agg | 4,560 | sqft | $14.08 | $64,184 |
| COVERED COURTYARD | Upgraded surfacing and landscape | 3,740 | sqft | $49.26 | $184,248 |
| PEDESTRIAN PAVERS | Decorative surfacing | 5,000 | sqft | $35.19 | $175,943 |
| CONCRETE PEDESTRIAN PAVING | Campus standard | 16,000 | sqft | $11.26 | $180,166 |
| MISC SITE STAIRS/WALLS/RAMPS/CURBS | Typical | 1 | allow | $50,000.00 | $50,000 |
| LANDSCAPING | | | | | |
| TREE PLANTINGS | Large cal. | 50 | each | $1,407.54 | $70,377 |
| PLANTING AREAS | Typical mix, beds | 8,000 | sqft | $10.56 | $84,453 |
| TURF GRASS | Typical, incl. topsoil & fine grading | 25,050 | sqft | $1.06 | $26,444 |
| PRAIRIE SEEDING | Typical, incl. topsoil & fine grading | 25,050 | sqft | $0.35 | $8,815 |
| IRRIGATION SYSTEMS | All turf & planting areas, drip | 50,100 | sqft | $2.11 | $105,777 |
| SITE FEATURES & FURNISHINGS | | | | | |
| DECORATIVE SITE FEATURE / STRUCTURE | Allowance | 1 | lsum | $50,000.00 | $50,000 |
| SITE & PEDESTRIAN POLE LIGHTING | Pole type lighting | 32 | each | $3,941.12 | $126,116 |
| ACCENT & LANDSCAPE LIGHTING | Uplights, tree lights, etc. | 1 | allow | $28,150.89 | $28,151 |
| SITE FURNISHINGS | Benches, tables, trash, etc. | 35 | each | $1,055.66 | $36,948 |
| | | | | | **$2,111,277** |
| | | | | | ***$29.16/sf bldg*** |
| | | | | | ***$836,066/acre*** |
| **FOUNDATION** | | | | | |
| EXCAVATION & BACKFILL FOR FOOTINGS & SLAB PREP | Assumes good soils | 19,500 | sqft | $3.52 | $68,618 |
| SLAB ON GRADE | 6", VB, sand base | 22,600 | sqft | $12.67 | $286,295 |
| SLAB TRANSITIONS, RAMPS, STAIRS, PADS | On grade bldg areas | 1 | allow | $35,000.00 | $35,000 |
| PAD FOOTINGS | Assumes good soils | 66 | each | $1,759.43 | $116,122 |
| CONTINUOUS WALL FTG/FNDTN WALL- TYP | 3'x1'-4" | 1,020 | lnft | $316.70 | $323,031 |
| MISC. COLUMN/STRIP FOOTINGS | Canopy columns, steps, etc. | 1 | lsum | $35,000.00 | $35,000 |
| CONCRETE BASEMENT WALL | 14" | 4,000 | sqft | $54.19 | $216,762 |
| FOUNDATION WATERPROOFING & INSUL | 60mil MB + 2" rigid insul | 4,000 | sqft | $8.45 | $33,781 |
| ELEVATOR PIT MAT FOUNDATION & WALLS | Incl WP & insul | 1 | each | $35,188.61 | $35,189 |
| | | | | | **$1,149,798** |
| | | | | | ***$15.88/sf bldg*** |

HGA

***WSU Classroom***
***Preliminary Project Budgeting***

**Systems Cost Detail**

| | |
|---|---|
| **Basement** | ***3,100 sqft*** |
| **1st Flr** | ***22,600 sqft*** |
| **2nd Flr** | ***21,500 sqft*** |
| **3rd Flr** | ***18,700 sqft*** |
| **Penthouse** | ***6,500 sqft*** |
| **Total Bldg GSF :** | ***72,400 sqft*** |
| **Roof Area :** | ***29,081 sqft*** |
| **Canopy Area :** | ***6,800 sqft*** |
| **Enclosure Wall :** | ***47,820 sqft*** |
| **Site Area :** | ***110,000 sqft*** ***2.53 acres*** |

| LINE ITEM | BASIS OF ESTIMATE | | | QUANTITY | | UNIT $ | TOTAL COST |
|---|---|---|---|---|---|---|---|
| **STRUCTURE** | | | | | | | |
| CONCRETE CURBS & PADS | Typical | | | 1 | allow | $50,000.00 | $50,000 |
| STEEL COLUMNS | W-beams | | ##### | 72.40 | ton | $5,419.05 | $392,339 |
| STEEL FLOOR STRUCTURE | Typical | | ##### | 161.85 | ton | $5,419.05 | $877,073 |
| STEEL ROOF STRUCTURE | Typical, deck only | | ##### | 56.45 | ton | $5,419.05 | $305,919 |
| STEEL BRACING | Braced frames | | ##### | 54.30 | ton | $5,419.05 | $294,254 |
| PENTHOUSE FRAMING | Light | | ##### | 16.25 | ton | $5,419.05 | $88,059 |
| STEEL FRAMING - PREMIUMS @ SPECIAL AREAS | Clerestory, open to below, canopy | | | 11,360 | sqft | $28.15 | $319,794 |
| METAL ROOF DECK | Typical | | | 22,581 | sqft | $6.12 | $138,259 |
| SLAB ON METAL DECK | Typical | | | 49,800 | sqft | $17.59 | $876,196 |
| EXTERIOR WALL STRUCTURAL SUPPORT | At 2-story walls & misc. | *47,820 sqft* | ##### | 52.60 | ton | $5,419.05 | $285,053 |
| MISC STRUCTURAL ANGLES, PLATES, CHANNELS, ETC. | Typical | | | 2,000 | lnft | $39.41 | $78,822 |
| INTERIOR CONSTRUCTION STRUCTURAL SUPPORT | Posts, stairs, equipment, etc. | | | 1 | allow | $5,000.00 | $5,000 |
| | | | | | | | **$3,710,769** |
| | | | | | | | ***$51.25/sf bldg*** |
| **ENCLOSURE** | | | | | | | |
| EXTERIOR CARPENTRY, SEALANTS, ETC. | Typical | | | 47,820 | sqft | $3.52 | $168,272 |
| CONC/CMU BACK-UP WALL | Structural @ canopy | | | 3,072 | sqft | $63.34 | $194,579 |
| STR STUD BACK-UP FRAMING | Typical, exterior wall | | | 23,087 | sqft | $22.52 | $519,936 |
| STR STUD SUPPLEMENTAL BACK-UP FRAMING | Thickened walls, window frames, canopy, fins, soffits, etc. | | | 6,800 | sqft | $28.15 | $191,426 |
| INSULATION & MOISTURE BARRIER @ CAVITY WALL | Enhanced insul | | | 29,887 | sqft | $9.15 | $273,437 |
| BRICK CLADDING | Campus standard or similar | | *65%* | 22,087 | sqft | $45.75 | $1,010,374 |
| BRICK RETURNS/JAMBS/DETAILING | Allowance | | | 1 | lsum | $150,000.00 | $150,000 |
| METAL PANEL CLADDING | Accents, canopies | | | 2,000 | sqft | $91.49 | $182,981 |
| CAST STONE BASE/ACCENT | Artstone or similar | | | 1,000 | sqft | $91.49 | $91,490 |
| ALUMINUM WINDOW GLAZING SYSTEM | Typical, fixed windows | | *35%* | 14,637 | sqft | $112.60 | $1,648,178 |
| CUSTOM DOUBLE CURTAINWALL GLAZING SYSTEM | 24" system depth, 2-story butt glazed | | | 5,000 | sqft | $168.91 | $844,527 |
| PENTHOUSE CLADDING/LOUVER/GRATE | Mechanical | | | 5,840 | sqft | $50.67 | $295,922 |
| CANOPY SOFFITS | Overhangs | | | 6,800 | sqft | $33.78 | $229,711 |
| EXTERIOR ENTRY DOORS | Monumental alum clad & glass, security hardware | | | 8 | leaf | $5,630.18 | $45,041 |
| EXTERIOR EXIT DOORS | Typical alum & glass/HM, security hardware | | | 8 | leaf | $2,815.09 | $22,521 |
| SPECIAL EXTERIOR FEATURES/FINISHES | Allowance | | | 1 | allow | $250,000.00 | $250,000 |
| | | | | | | | **$6,118,395** |
| | | | | | | | ***$127.95/sf wall*** |
| | | | | | | | ***$84.51/sf bldg*** |
| **ROOF** | | | | | | | |
| ROOF BLOCKING & FLASHING | Typical | | | 2,129 | lnft | $22.52 | $47,947 |
| WALL CAP/COPING | Typical | | | 660 | lnft | $30.97 | $20,438 |
| PARAPET CONSTRUCTION | Plywood, flashing, membrane, etc. | | | 660 | lnft | $70.38 | $46,449 |
| MEMBRANE ROOFING SYSTEM | TPO or EPDM, sloped insul, brd, etc. | | | 29,081 | sqft | $19.00 | $552,593 |
| ROOF EQUIPMENT | Pavers, ladders, hatches | | | 1 | allow | $35,000.00 | $35,000 |
| | | | | | | | **$702,426** |
| | | | | | | | ***$9.70/sf bldg*** |

HGA

**WSU Classroom**
**Preliminary Project Budgeting**

**Systems Cost Detail**

| | | |
|---|---|---|
| Basement | 3,100 | sqft |
| 1st Flr | 22,600 | sqft |
| 2nd Flr | 21,500 | sqft |
| 3rd Flr | 18,700 | sqft |
| Penthouse | 6,500 | sqft |
| **Total Bldg GSF :** | 72,400 | sqft |
| Roof Area : | 29,081 | sqft |
| Canopy Area : | 6,800 | sqft |
| Enclosure Wall : | 47,820 | sqft |
| Site Area : | 110,000 | sqft — 2.53 acres |

| LINE ITEM | BASIS OF ESTIMATE | QUANTITY | | UNIT $ | TOTAL COST |
|---|---|---|---|---|---|
| **INTERIOR** | | | | | |
| *FINISHES (FLOOR, WALL, CEILING) - PER PRELIM FINISH PLAN & SCHEDULE* | | | | | |
| LOBBY/COMMONS | Some special wall/clg finishes | 17,400 | sqft | $88.25 | $1,535,603 |
| CLASSROOMS | Open, typical | 12,000 | sqft | $73.54 | $882,530 |
| LAB/STUDIO | Open, typical | 13,000 | sqft | $80.90 | $1,051,682 |
| OFFICE SPACES | Typical | 10,000 | sqft | $58.84 | $588,354 |
| PUBLIC TOILETS | Unisex | 1,200 | sqft | $139.73 | $167,681 |
| MECH, ELEC, STORAGE ROOMS | Typical, incl. basement & penthouse | 12,000 | sqft | $29.42 | $353,012 |
| PUBLIC CORRIDOR/COMMONS SPACES | Typical | 6,800 | sqft | $51.48 | $350,070 |
| BALCONY RAILING | SS & glass | 580 | lnft | $591.17 | $342,878 |
| P-LAM CASEWORK - BASE, C-TOP, UPPER | Typical | 240 | lnft | $563.02 | $135,124 |
| SPECIALTY CASEWORK | Custom design, lab, classroom | 36 | each | $14,075.44 | $506,716 |
| SPECIAL DECORATIVE FINISHES | Allowance | 1 | lsum | $250,000.00 | $250,000 |
| MISC BUILDING SPECIALTIES | Display brds, signage, fire ex, shades, lockers, etc. | 72,400 | sqft | $3.52 | $254,766 |
| RESTROOM SPECIALTIES | Allowance | 12 | each | $2,111.32 | $25,336 |
| | | | | | **$6,443,751** |
| | | | | | ***$89.00/sf*** |
| **SPECIAL CONSTRUCTION, EQUIPMENT, FURNISHINGS** | | | | | |
| FEATURE STAIR | Custom | 3 | flt | $70,377.22 | $211,132 |
| EXIT STAIR | Typical | 3 | flt | $35,188.61 | $105,566 |
| AV/DISPLAY EQUIPMENT | Allowance | 1 | lsum | $50,000.00 | $50,000 |
| WINDOW SHADING | Manual, roller | 14,637 | sqft | $7.04 | $103,011 |
| | | | | | **$469,709** |
| | | | | | ***$6.49/sf bldg*** |
| **CONVEYING** | | | | | |
| PASSENGER ELEVATOR | Hydraulic, 3500# | 4 | stop | $59,820.63 | $239,283 |
| | | | | | **$239,283** |
| | | | | | ***$3.31/sf bldg*** |
| **MECHANICAL** | | | | | |
| FIRE PROTECTION SYSTEM | Typical wet pipe | 72,400 | sqft | $5.63 | $407,625 |
| PLUMBING SYSTEMS EQUIPMENT | Pumps, water heater, softener, etc. | 1 | allow | $200,000.00 | $200,000 |
| PLUMBING SYSTEM PIPING & FIXTURE LOCATION | Piping connection & install | 35 | each | $6,333.95 | $221,688 |
| PLUMBING SYSTEM SPECIAL FIXTURE LOCATION | Piping connection & install | 5 | each | $7,952.63 | $39,763 |
| ROOF DRAINAGE | Internal w/ overflow | 72,400 | sqft | $2.82 | $203,812 |
| GEOTHERMAL WELL FIELD | 250+' wells on site | 200 | each | $5,630.18 | $1,126,035 |
| WATER TO WATER GEOTHERMAL HEAT PUMPS | Large basement units | 250 | ton | $1,689.05 | $422,263 |
| FLUID COOLER | Roof Mounted | 50 | ton | $563.02 | $28,151 |
| H/C WATER PUMPS, ETC. | Typical system trim | 1 | lsum | $200,000.00 | $200,000 |
| SUPPLEMENTAL NATURAL GAS BOILER | Condensing - incl pumps, trim, etc. | 1,000 | mbh | $260.40 | $260,396 |
| HYDRONIC PIPING | Complete system | 72,400 | sqft | $9.15 | $662,390 |
| FIN TUBE RADIANT HEATING | Complete system | 2,000 | lnft | $239.28 | $478,565 |
| MISC. FCU/CUH | Supplemental at maintenance spaces, computer, etc. | 10 | loc | $7,037.72 | $70,377 |
| VENTILATION AIR UNIT | Typical AHU | 20,000 | cfm | $11.26 | $225,207 |
| VENTILATION AIR UNIT W/ HEAT RECOVERY | Double energy recovery wheel | 20,000 | cfm | $16.89 | $337,811 |
| CHILLED BEAM DISTRIBUTION UNITS | Cooling only | 2,000 | lnft | $499.68 | $999,356 |
| AIR DISTRIBUTION SYSTEM FOR CHILLED BEAMS | Small/minimal ductwork | 72,400 | sqft | $16.89 | $1,222,875 |
| EXHAUST/SPECIAL SYSTEMS | Typical | 3 | loc | $21,113.16 | $63,339 |
| CO2 & OCC SENSOR OA CONTROLS | Classroom & Offices | 60 | loc | $1,407.54 | $84,453 |
| SPECIAL CONTROLS SYSTEMS | Digital interactive t-stats, metering, interconnect w/ electrical | 160 | loc | $2,111.32 | $337,811 |
| HVAC CONTROLS SYSTEM | BAS | 72,400 | sqft | $7.04 | $509,531 |
| TEST & BALANCE/START-UP | Typical contractor | 72,400 | sqft | $2.11 | $152,859 |
| | | | | | **$8,254,308** |
| | | | | | ***$114.01/sf*** |

HGA

***WSU Classroom***
***Preliminary Project Budgeting***

**Systems Cost Detail**

| | |
|---|---|
| **Basement** | ***3,100 sqft*** |
| **1st Flr** | ***22,600 sqft*** |
| **2nd Flr** | ***21,500 sqft*** |
| **3rd Flr** | ***18,700 sqft*** |
| **Penthouse** | ***6,500 sqft*** |
| **Total Bldg GSF :** | ***72,400 sqft*** |
| **Roof Area :** | ***29,081 sqft*** |
| **Canopy Area :** | ***6,800 sqft*** |
| **Enclosure Wall :** | ***47,820 sqft*** |
| **Site Area :** | ***110,000 sqft*** ***2.53 acres*** |

| LINE ITEM | BASIS OF ESTIMATE | QUANTITY | | UNIT $ | TOTAL COST |
|---|---|---|---|---|---|
| **ELECTRICAL** | | | | | |
| MAIN BLDG DISTRIBUTION GEAR/TRANSFORMERS | Building transf/dist in main elec rm | 1 | allow | $450,000.00 | $450,000 |
| EMERGENCY POWER SYSTEM | Life safety loads | 250 | kw | $964.17 | $241,042 |
| POWER DISTRIBUTION | Panels, circuiting & outlets | 72,400 | sqft | $11.26 | $815,250 |
| PANEL METERING & CIRCUITING | Premium for extensive metering | 20 | loc | $2,111.32 | $42,226 |
| GENERAL BUILDING LIGHTING | LED | 72,400 | sqft | $22.52 | $1,630,499 |
| SPECIALTY LIGHTING & CONTROLS | Decorative lighting & advanced daylighting controls | 38,586 | sqft | $3.52 | $135,779 |
| FIRE ALARM SYSTEM | Typical | 72,400 | sqft | $4.93 | $356,672 |
| TELECOMMUNICATION DISTRIBUTION | Pathways, cable, racks | 72,400 | sqft | $3.17 | $229,289 |
| SPECIALTY SYSTEMS - PA/TV/INTERCOM/BLDG AUTOMATION | Pathways, cable, racks | 72,400 | sqft | $2.82 | $203,812 |
| AUDIO/VISUAL SYSTEMS @ CLASSROOMS | Pathways, cable, racks | 25,000 | sqft | $2.11 | $52,783 |
| | | | | | **$4,157,352** |
| | | | | | ***$57.42/sf*** |
| ***SUB-TOTAL CONSTRUCTION COST*** | | | | | ***$33,117,784*** |

HGA

## *Construction Cost Comparables*
## *Academic/Classroom Project Cost Camparables*

| Projects | GSF | Const Cost | Date | Const. Cost Adjusted to: MSP Q3-2022 midpt of constr | Cost / SF | Program Type | Sustainability Goal |
|---|---|---|---|---|---|---|---|
| *1* | 219,409 (reno) | $26,787,649 | 12/27/2010 | **$50,343,155** | **$229** | Science? | B3? |
| *2* | 108,932 / 74,613 (new / reno) | $17,183,285 | 4/1/2003 | **$45,392,442** | **$247** | Visual Arts | |
| *3* | 46,355 (reno) | $5,150,000 | 1/1/2003 | **$12,202,318** | **$263** | Science | B3 |
| *4* | 44,184 (reno) | $6,882,917 | 12/20/2007 | **$12,984,566** | **$294** | Visual Arts | |
| *5* | 78,850 (reno) | $8,556,019 | 8/1/2000 | **$23,759,344** | **$301** | Dance | |
| *6* | 127,448 (new) | $18,000,702 | 9/1/2001 | **$45,909,657** | **$360** | High School | |
| *7* | 107,148 (new) | $20,920,000 | 10/31/2016 | **$38,873,849** | **$363** | Nursing, Sim Lab | |
| *8* | 38,140 / 62,205 (new / reno) | $21,338,531 | 11/19/2008 | **$38,557,589** | **$384** | Classroom | LEED (Gold?) |
| *9* | 71,392 / 46,267 (new / reno) | $24,657,000 | 1/1/2010 | **$47,234,004** | **$320** | Visual Arts / Classroom | LEED? |
| *10* | 68,095 (reno) | $14,536,664 | 8/1/2006 | **$27,453,137** | **$403** | Classroom | |
| *11* | 44,930 (new) | $11,803,069 | 6/17/2015 | **$19,243,851** | **$428** | Classroom | |
| *12* | 22,523 / 43,862 (new / reno) | $16,798,336 | 5/1/2005 | **$31,349,170** | **$472** | Science / Classroom | LEED (Silver?) |
| *13* | 75,074 (new) | $12,014,800 | 1/1/2003 | **$37,708,055** | **$502** | Science | |
| *14* | 62,106 / 48,678 (new / reno) | $22,875,890 | 3/1/2005 | **$56,637,322** | **$511** | Visual & Perf Arts | |
| *15* | 26,869 (new) | $8,828,000 | 6/12/2008 | **$14,056,544** | **$523** | Visual Arts | |
| *16* | 53,086 (new) | $14,593,283 | 4/1/2005 | **$28,126,262** | **$530** | Classroom / Commons | |
| *17* | 87,283 (new) | $29,410,816 | 10/1/2006 | **$46,404,182** | **$532** | Science / Classroom | |
| *18* | 124,700 (new) | $34,445,000 | 1/1/2011 | **$66,424,211** | **$533** | Classroom | |
| *19* | 240,000 (new) | $35,000,000 | 1/1/1988 | **$128,425,016** | **$535** | Science | |
| *20* | 89,400 (reno) | $17,476,000 | 1/1/1999 | **$47,953,934** | **$536** | ?? | |
| *21* | 86,000 (new) | $15,474,000 | 6/1/2002 | **$48,918,483** | **$569** | Science | |
| *22* | 14,604 / 5,615 (new / reno) | $3,736,229 | 12/1/2003 | **$11,517,755** | **$570** | Science | |
| *23* | 96,710 (reno) | $19,671,804 | 12/1/2002 | **$59,636,400** | **$617** | Science | |
| *24* | 50,231 / 20,101 (new / reno) | $24,356,142 | 5/31/2010 | **$43,377,986** | **$617** | Visual & Perf Arts | |
| *25* | 139,975 (new) | $59,599,457 | 1/30/2016 | **$91,055,608** | **$651** | Science | LEED (Gold?) |
| *26* | 53,000 (new) | $12,500,000 | 1/1/2001 | **$34,739,239** | **$655** | Classroom / Commons | |
| *27* | 40,869 / 23,163 (new / reno) | $21,602,070 | 1/22/2008 | **$43,094,203** | **$673** | Visual Arts | |
| *28* | 24,860 (new) | $11,282,000 | 10/31/2016 | **$17,228,972** | **$693** | Visual & Perf Arts | |
| *29* | 135,000 (new) | $56,300,000 | 7/1/2012 | **$94,317,301** | **$699** | Classroom / Commons | LEED (Silver?) |
| *30* | 134,709 (new) | $39,569,500 | 6/1/2002 | **$99,386,007** | **$738** | Science | |
| *31* | 115,000 (new) | $49,936,025 | 3/1/2011 | **$85,344,742** | **$742** | Classroom | LEED Gold |
| *32* | 98,437 (new) | $39,982,322 | 2/1/2015 | **$73,821,504** | **$750** | Visual Arts | |
| *33* | 122,300 (new) | $54,362,788 | 10/1/2005 | **$105,008,963** | **$859** | Visual Arts | |
| *34* | 73,767 (new) | $44,370,844 | 1/20/2014 | **$70,877,875** | **$961** | Science | LEED Platinum / NZE |
| | | | | **Average $/SF** | **$531** | | |
| | | | | **Average High $/SF** | **$608** | | |
| | | | | **Average Low $/SF** | **$422** | | |

HGA **WSU Classroom**
**Preliminary Project Budgeting**

## Soft Costs Model

| PROJECT COST ITEMS | | | | |
|---|---|---|---|---|
| | | | **CONSTRUCTION COST** | **$41,227,258** |
| **Consultant Services** | | | | |
| *Pre-Design Services* | 1 | lsum | $250,000.00 | $250,000 |
| *Architect's/Engineering Fee* | | | | |
| A&E Fee | | | 8.50% | $3,504,317 |
| Reimbursable Expenses (Printing, Photography, Mileage, Etc.) | | | 1.00% | $412,273 |
| *Specialty Consultants (Allowance)* | | | 0.50% | $206,136 |
| *Pre-Construction/Owners Rep/CM Management Fees* | | | 3.00% | $1,236,818 |
| **Equipment** | | | | |
| *Furniture, Fixtures & Equipment* | | | | |
| Work Stations/ Offices | 80 | each | $6,500.00 | $520,000 |
| Large Classrooms / Labs | 34 | each | $45,000.00 | $1,530,000 |
| Specialty Furn/Equip - Art, Tech, VR | 1 | lsum | $125,000.00 | $125,000 |
| Open Space/Commons | 4000 | sqft | $25.00 | $100,000 |
| Modular Casework / Files | 1 | lsum | $65,000.00 | $65,000 |
| *A/V Technology Equipment* | | | | |
| Work Stations/ Offices | 80 | each | $1,250.00 | $100,000 |
| Large Classrooms / Labs | 34 | each | $45,000.00 | $1,530,000 |
| Specialty Furn/Equip - Art, Tech, VR | 1 | lsum | $125,000.00 | $125,000 |
| Open Space/Commons | 1 | lsum | $35,000.00 | $35,000 |
| Misc. A/V & Equipment | 1 | lsum | $125,000.00 | $125,000 |
| I.T. Distribution Network & Systems | | | 1.00% | $412,273 |
| Security / Card Reader / Video | | | 1.00% | $412,273 |
| **Other Owner Costs** | | | | |
| *Soil Borings Allowance* | | | 0.25% | $103,068 |
| *Constr. Inspections, Soils & Matl. Testing* | | | 0.25% | $103,068 |
| *Site Survey* | | | 0.25% | $103,068 |
| *Permits (SAC & WAC, Bldg.)* | | | 0.65% | $267,977 |
| *Commissioning* | | | 0.50% | $206,136 |
| *Owners Project Management* | | | 0.80% | $329,818 |
| *Sustainability Compliance / Tracking - Allowance* | | | 0.50% | $206,136 |
| *Art Allowance* | | | 1.00% | $412,273 |
| ***SOFT COST TOTAL*** | | | | **$12,420,633** |
| | | | | ***30.13%*** |

THIS PAGE INTENTIONALLY LEFT BLANK


cherokee

# 6.

# Financial Information - Operating Expenses

# FINANCIAL INFORMATION OPERATING EXPENSES

## 1. ONGOING REPAIR, REPLACEMENT, AND MAINTENANCE

Gildemeister Hall and Watkins Hall have not experienced significant upgrades since their opening in 1964. Past actions have been limited to ongoing maintenance and repair. The building enclosure, MEP systems, interior construction and finishes are original to the 1964 construction and beyond their useful life. The result is the two buildings have the highest Facility Condition Index (Gildemeister Hall: FCI 0.30 and Watkins Hall: FCI 0.41) among the non-residential buildings on the campus. It also results in the buildings being very inefficient and costly to operate.

Because the existing Gildemeister and Watkins Halls are not separately metered, a campus average is used to reflect existing operating expenditures. Based on these campus averages, the two buildings cost $600,000 annually to operate, including custodial, maintenance, and energy costs.

**Construction of a new building is anticipated to save WSU $308,524 annually through a reduction of energy costs as well as some custodial and grounds costs.** One advantage is that by consolidating the square footage from two buildings to one, the costs for custodial and maintenance is expected to decrease.

### Building Operating Expenditures

(based on FY2018-FY2022 average)

| | Existing | | New Constr | | Difference |
|---|---|---|---|---|---|
| **Gildemeister Hall GSF** | | **40,395** | | **-** | |
| **Watkins Hall GSF** | | **37,938** | | **-** | |
| **Total GSF** | | **78,333** | | **73,000** | (5,333) |
| **Site Area (Acres)** | | **2.53** | | **2.53** | - |
| **Maintenance Personnel** | **GSF/Acres Per FTE** | **FTE** | | **FTE** | **FTE** |
| Custodial Services (GSF) | 35,000 | 2.24 | | 2.09 | (0.15) |
| Grounds (Acres) | 18.0 | 0.14 | | 0.14 | 0.00 |
| Maintenance (GSF) | 55,000 | 1.42 | | 1.33 | (0.10) |
| Premium for Watkins Ceramics & Art | | 0.25 | | 0.00 | (0.25) |
| | **Total FTE** | 4.05 | | 3.55 | (0.50) |
| **Annual Maintenance & Operations Costs (avg of Main Campus)** | **$ Per SF** | **Annual Cost** | | **Annual Cost** | **Annual Cost** |
| Personnel | $ 3.35 | $ 262,790 | $ 2.54 | $ 185,244 | $ (77,546) |
| Maintenance | $ 2.88 | $ 225,643 | $ 1.31 | $ 95,915 | $ (129,727) |
| Energy & Utilities | $ 1.43 | $ 111,657 | $ 0.14 | $ 10,405 | $ (101,251) |
| | $ 7.66 | $ 600,089 | $ 3.99 | $ 291,565 | $ (308,524) |
| **Backlog** | **2022 Facility Cost Index (FCI)*** | **Deferred Maintenance** | | **Deferred Maintenance** | **Deferred Maintenance** |
| **Gildemeister Hall** | 30% | $ 4,941,406 | | $ - | $ (4,941,406) |
| **Watkins Hall** | 41% | $ 6,415,143 | | $ - | $ (6,415,143) |
| ** Based on MNSCU Sightlines data* | | $ 11,356,549 | | | |
| **Cost Replacement Value (CRV)** | **$/GSF** | **CRV** | | **CRV** | |
| **Gildemeister Hall** | $ 409 | $ 16,516,433 | $ 651 | $ 47,503,000 | |
| **Watkins Hall** | $ 413 | $ 15,686,647 | | $ - | |
| | | $ 32,203,080 | | $ 47,503,000 | |
| **FY2028 Projected Annual Capital Renewal Needs (Sherman-Dergis Model)** | | $ 1,078,184 | | $ 24,851 | $ (1,053,334) |

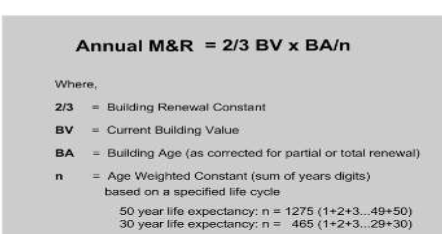
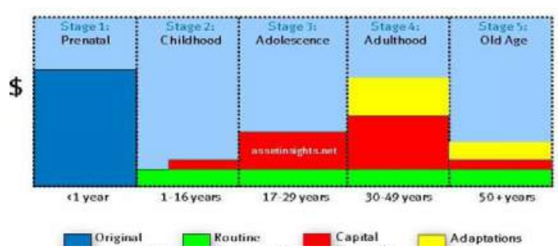



Fig. The Sherman Dergis (1981) formula for estimating facility reinvestment requirements.

| Sherman-Dergis F | Existing | | Post-Renovation |
|---|---|---|---|
| **Building Renewal Constant** | **Building Age Budget Year** | **Age Weighted Constant** | **Building Age Budget Year** |
| 0.667 | 64 | $ 1,275.00 | 1 |



THIS PAGE INTENTIONALLY LEFT BLANK

## 2. CAMPUS FINANCIAL STATUS

WSU's FY2022 annual debt payments totaled approximately $887,000. Upon project completion in FY2029, WSU's annual debt payments will increase to $1,665,000. This represents 1.69% of the University's current operating budget. WSU is financially well positioned to handle this debt.

WSU is currently subject to a Financial Recovery Plan and is meeting regularly with the System Office to review progress. The CICEL Project will contribute to financial recovery by reducing campus operating costs and making the campus more attractive to prospective students and high-quality faculty and staff.

## 3. LIFE CYCLE COST ANALYSIS

In order to inform diligent decision making and as a tool in forming recommendations, the team used the cost analysis and sustainability work described in this report to perform several life cycle cost comparisons.

### TOTAL COST OF OWNERSHIP

Renovation of the existing buildings and the new construction option were compared using net-present-value analysis to calculate the total cost of ownership, in today's dollars, for each option over the expected (50yr) lifespan of the building. This analysis includes the first cost of construction, yearly operations and maintenance costs, energy and water costs, and any periodic renewal or replacements expected.

- Total Cost of Ownership of the new construction project is over $5,500,000 less than that of the renovation.

| | *Existing Building* | *Renovation* | *New Construction* |
|---|---|---|---|
| **TOTAL COST OF OWNERSHIP*** | No first cost; N/A | $83,916,003 | $78,239,170 |
| Adjusted Payback | | | 9.5 years |

***net-present-value, 50-yr period**

### OPERATIONAL COSTS

Analysis was also done on the relative operations-only cost between the existing building, the renovations option, and the new construction. Operational cost savings over the 50-year period equate to nearly $17,000,000 from the existing building to the renovations, and over $24,000,000 in the new construction.

| | *Existing Building* | *Renovation* | *New Construction* |
|---|---|---|---|
| **OPERATIONAL COSTS*** | $37,029,789 | $20,138,003 | $12,730,170 |

***net-present-value, 50-yr period**

## Life-Cycle Cost Analysis

**Whole Building Comparison - New Constr. vs. Renovation**

HGA Architects and Engineers, Inc.

10/17/2022

### Project Information

| | |
|---|---|
| Project Name: | WSU CICEL |
| Location: | Winona, MN |
| Description: | Classroom Building |
| User: | Higher Education |
| Region / Sector | Midwest / Commercial |
| Second Fuel: | None |

### Analysis Variables

| | |
|---|---|
| Analysis Year | 2027 |
| Occupancy Year: | 2027 |
| Operational Period: | 50 years |
| Nominal Discount Rate: | 2.60% |
| Inflation Rate: | 2.00% |
| Real Discount Rate: | 0.59% |

### Alternates

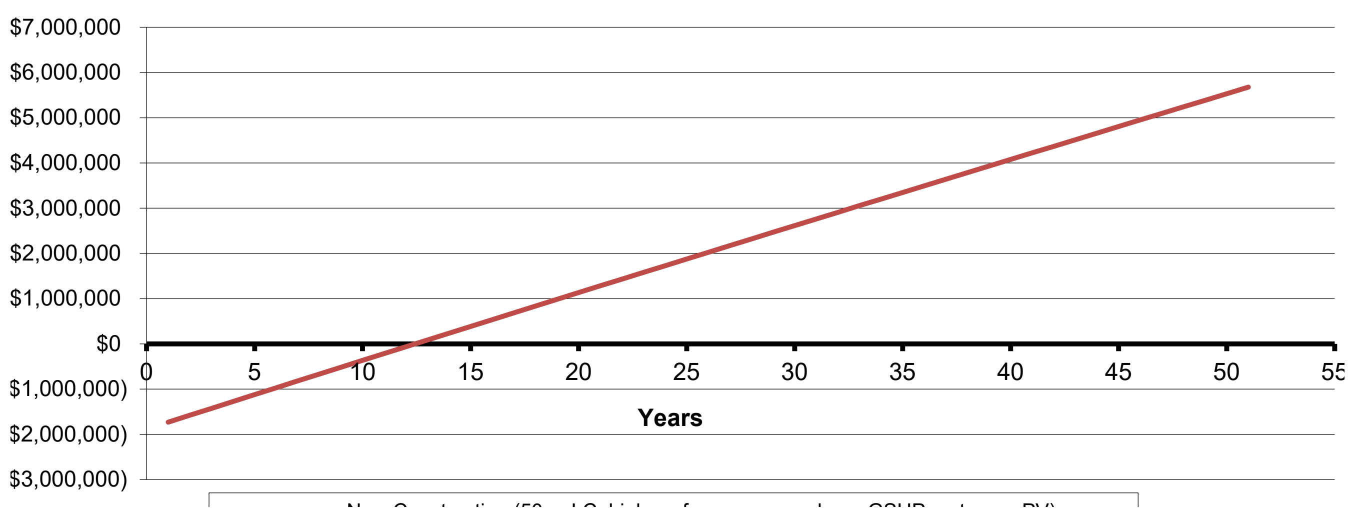
| Option | Description | First Cost | Annual Costs: O & M | Annual Costs: Energy & Water | |
|---|---|---|---|---|---|
| Renovation | Full Renovation (50 yr LC, best valu | $63,778,000 | $371,290 | $73,260 | |
| New | New Construction (50 yr LC, high pe | $65,509,000 | $281,160 | $10,405 | |
| | | | | | |
| | | | | | |

### Analysis Results

| | Renovation | New |
|---|---|---|
| **Present Value Investment Related Costs** | $ 63,778,000 | $ 65,509,000 |
| **Present Value Operational Costs** | $ 20,138,003 | $ 12,730,170 |
| **Net Present Value : Total Cost of Ownership** | **$ 83,916,003** | **$ 78,239,170** |
| **Savings-to-Investment Ratio** | - | 4.3 |
| **Simple Payback** | - | 27.5 years |
| **Discounted Payback** | **-** | **11.4 years** |
| **Adjusted Internal Rate of Return** | **-** | **3.6%** |

*NOTE : Present Value Investment Related Costs based on 73,000GSF building.*

### Cumulative Life-Cycle Savings



# Life-Cycle Cost Analysis

**Operating Cost Comparison**

HGA Architects and Engineers, Inc.

10/17/2022

## Project Information

| | |
|---|---|
| Project Name: | WSU CICEL |
| Location: | Winona, MN |
| Description: | Classroom Building |
| User: | Higher Education |
| Region / Sector | Midwest / Commercial |
| Second Fuel: | None |

## Analysis Variables

| | |
|---|---|
| Analysis Year | 2023 |
| Occupancy Year: | 2023 |
| Operational Period: | 50 years |
| Nominal Discount Rate: | 2.60% |
| Inflation Rate: | 2.00% |
| Real Discount Rate: | 0.59% |

## Alternates

| | | | Annual Costs | | |
|---|---|---|---|---|---|
| **Option** | **Description** | **First Cost** | **O & M** | **Energy & Water** | |
| Existing | Existing Building | $0 | $488,432 | $111,657 | |
| Renovation | Full Renovation (50 yr LC, best valu | $0 | $371,290 | $73,260 | |
| New | New Construction (50 yr LC, high pe | $0 | $281,160 | $10,405 | |
| | | | | | |

*NOTE : Annual Costs as listed above are derived from information in Section 6 of this report (Building Operating Expenditures*

## Analysis Results

| | Existing | Renovation | New |
|---|---|---|---|
| **Present Value Investment Related Costs** | $ 13,557,516 | $ | $ |
| **Present Value Operational Costs** | $ 27,345,850 | $ 20,138,003 | $ 12,730,170 |
| **Net Present Value : Total Cost of Ownership** | **$ 37,029,789** | **$ 20,138,003** | **$ 12,730,170** |
| **Savings-to-Investment Ratio** | | | |
| **Simple Payback** | | | |
| **Discounted Payback** | | | |
| **Adjusted Internal Rate of Return** | | | |

# 7.

# Schedule

# SCHEDULE

## 1. PROJECT SCHEDULE

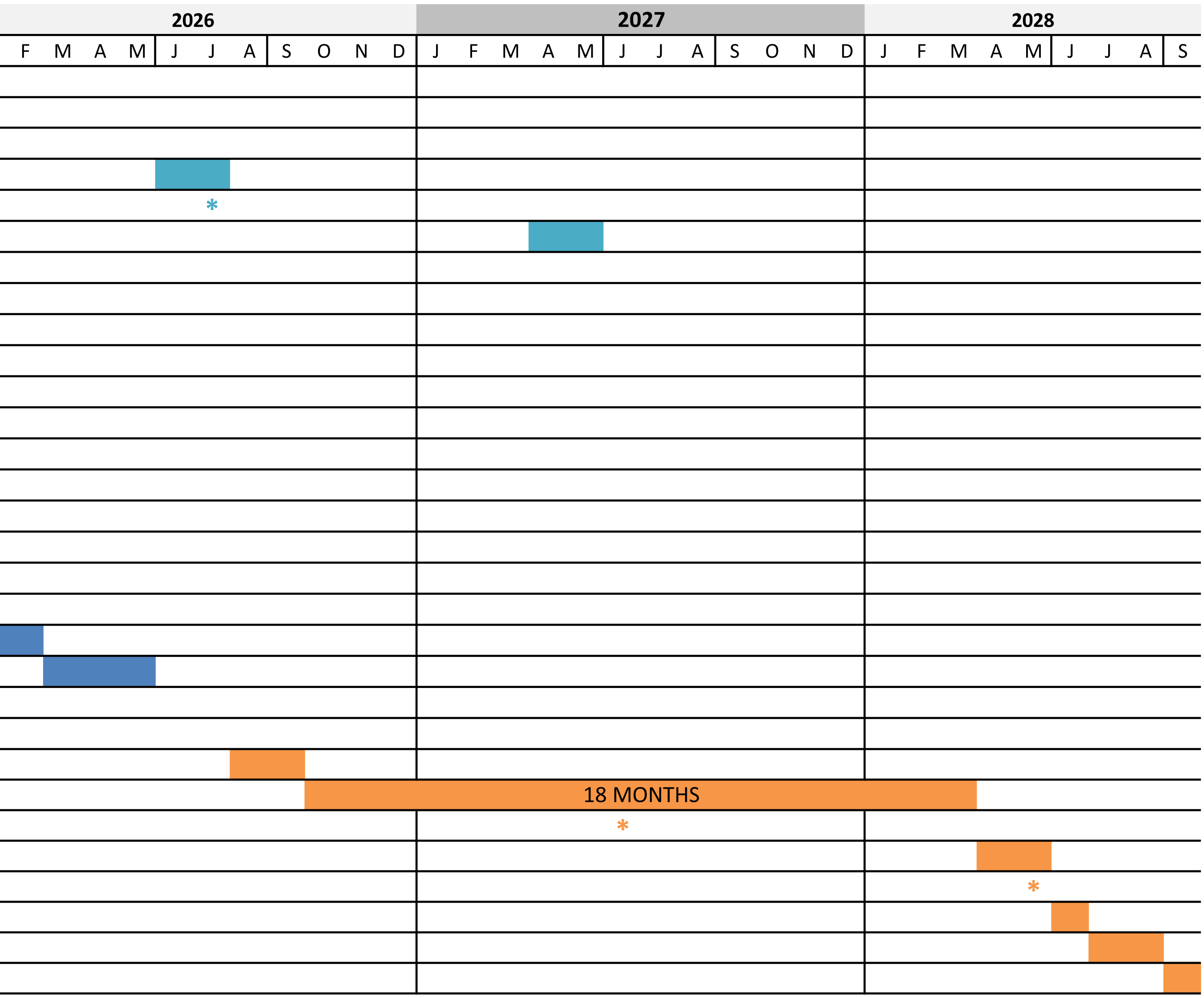
The project schedule is based around dividing the project between two Capital Bonding request cycles. Design work will happen on the project after the project bonding request is approved in the summer of 2024. Construction would start after the bonding request is approved in 2026.

## 2. PROJECT PHASING

New construction is planned to occupy the footprint of Gildemeister Hall. Current occupants of Gildemeister Hall will be relocated into temporary facilities prior to the beginning of construction.

To avoid costs for temporary relocation of existing Watkins Hall occupants, Watkins Hall will stay in use until after construction is complete. Once the new Center for Interdisciplinary Collaboration, Engagement and Learning is complete, residents will vacate Watkins Hall, either moving into the new building or into the Laird Norton project. At this time, the demolition of Watkins and the construction of the ground source heat pump and related site work can occur. The ground source heat pump will be tied into the system of the new building at this time. Note that the new building will need to be run off the central plant until this connection is made.

| | 2024 | | | | | | 2025 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J |
| **MN STATE/WSU** | | | | | | | | | | | | | | | | | | | |
| 2024 Funding Received (July 2024) | * | | | | | | | | | | | | | | | | | | |
| Architectural Selection | | | | | | | | | | | | | | | | | | | |
| Existing Gildemeister Move-Out into Temp Facilities | | | | | | | | | | | | | | | | | | | |
| 2026 Funding Received (July 2026) | | | | | | | | | | | | | | | | | | | |
| Existing Watkins Move-Out into New Building | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **SCHEMATIC DESIGN** | | | | | | | | | | | | | | | | | | | |
| Ground-Source Test Bore | | | | * | | | | | | | | | | | | | | | |
| Schematic Design Documents | | | | 3 MONTHS | | | | | | | | | | | | | | | |
| MN State Review | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **DESIGN DEVELOPMENT** | | | | | | | | | | | | | | | | | | | |
| Design Development Documents | | | | | | | | 4 MONTHS | | | | | | | | | | | |
| MN State Review | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **CONSTRUCTION DOCUMENTS** | | | | | | | | | | | | | | | | | | | |
| Construction Documents | | | | | | | | | | | | | 6 MONTHS | | | | | | |
| MN State Review | | | | | | | | | | | | | | | | | | | |
| Bidding and Permitting | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **CONSTRUCTION** | | | | | | | | | | | | | | | | | | | |
| Gildemeister Demolition | | | | | | | | | | | | | | | | | | | |
| New Construction | | | | | | | | | | | | | | | | | | | |
| Midpoint of Construction (June 2027) | | | | | | | | | | | | | | | | | | | |
| New Building Move-in | | | | | | | | | | | | | | | | | | | |
| New Building Occupancy (May 2028) | | | | | | | | | | | | | | | | | | | |
| Watkins Demolition | | | | | | | | | | | | | | | | | | | |
| Tie-in Ground Source Heat Pump to New Building | | | | | | | | | | | | | | | | | | | |
| Project Complete (September 2028) | | | | | | | | | | | | | | | | | | | |


2026
2027
2028
F M A M J J A S O N D
J F M A M J J A S O N D
J F M A M J J A S
18 MONTHS
*
*
*

# 8.

# Occupancy Plan

# OCCUPANCY PLAN

## 1. CAMPUS UTILITY INFRASTRUCTURE

The project will have a positive impact on the existing campus utility infrastructure as it will reduce the loads imposed on all major utility systems:

- Campus steam and chilled water: the new building will utilize a highly efficient ground source heat pump (GSHP) system for heating and cooling and therefore reduce the load on the campus central steam and chilled water plants. If the building is connected to the central steam and chilled water, it will only be to mitigate extreme weather events and for redundant backup in case of emergency outages.
- Campus medium voltage electric: the new building will be designed to produce more electricity than it consumes with the use of photovoltaic arrays, daylighting, and highly efficient lighting and electrical equipment. Therefore, it will reduce the overall load on the campus electric grid.
- City water and sanitary sewer: the new building will utilize highly efficient plumbing systems and rainwater capture to reduce water use by 50% compared to the existing buildings. Correspondingly, sanitary sewer volumes will reduce 50%.
- City storm sewer: the building site will be designed to capture, filter, and absorb all storm water that falls on the site reducing the current load on the storm water infrastructure. If possible, excess infiltration capacity will be utilized to capture storm water from adjacent site areas.

The 2022 Comprehensive Facilities Plan includes this site and energy infrastructure in the short-term timeframe. See the following illustrations:


Comprehensive Facilities Plan, Short-term Site Plan

Comprehensive Facilities Plan, Short-term Energy Infrastructure

## 2. CAMPUS TECHNOLOGY INFRASTRUCTURE

### EXISTING TECHNOLOGY PLAN AND IT INFRASTRUCTURE

Existing technology within both buildings is retrofitted into spaces that were not originally intended for modern AV and IT equipment. Mobile AV carts were utilized in some rooms to useful effect. (Figure 10) Ideally, new spaces will have more accommodations for AV and IT that are consistent with WSU's technology Master Plan.

Figure 9: Tunnel cable tray for IT infrastructure

Figure 10: Typical AV mobile cart

### PROBLEMS THIS PROJECT ADDRESSES

WSU sees technology as a strategic tool to meet its academic and administrative vision. In 1997, WSU launched its e-Warrior: Digital Life and Learning Program, providing all students with a laptop computer to enhance their studies on the Winona campus. The program has been woven into the fabric of the institution. Our graduates, many of whom continue to work and learn in the State of Minnesota, have benefited from the knowledge, skills, and abilities gained through their participation in the program.

WSU continues to build on a solid foundation of past initiatives and looks to advance the efforts around several key teaching and learning technology issues. The plan lays out a series of activities to enhance the digital and information literacy of our students; educate the campus community on effective practices around accessibility and universal design; leverage the work around open educational resources; augment the support of online and blended teaching and learning; continue to evolve the efforts around learning spaces; promote adaptive teaching and learning practices; and leveraging the evaluation and implementation of emerging technologies. Work in these key areas will move the institution forward in its efforts to have an impact on student success.

The technology master plan continues to provide a framework for integrating and prioritizing technology related issues at WSU. It was developed to articulate a common vision for technology and provide a guide for future technology implementations. The Technology Master Plan represents WSU's effort to continue to pioneer the intersection of teaching, learning, technology, and engagement.

Key aspects of the technology master plan include:

- Mission Statement: Information Technology Services (ITS) provides the technology-based foundation to support and empower the WSU community to meet and exceed their educational and business needs.
- Vision: Information Technology Services endeavors to position WSU as a national leader in the innovative and effective use of technology to support the academic enterprise.
- Values: People, Performance, and Innovation
- Pillars:
  - Teaching and Learning. Information Technology Services will empower technology-enriched teaching, learning, and student success.

- Service and Support. Information Technology Services will enhance customer relationships to realize the promise of "the trusted partner for your digital life.
- Infrastructure. Information Technology Services provides the necessary foundation for the other four pillars.
- Data Privacy and Security. Information Technology Services will safeguard the privacy, integrity, reliability, and appropriate use of information resources.
- Academic and Business Workflows. Information Technology Services will provide technologies that foster collaboration in support of academic and business administrative processes.

The project will have alignment with the following strategies identified in the technology master plan:

**1.1. Support high-quality learning experiences**

1.1.4 Enhance the ability of faculty to be agile in delivery of course activities and content.

1.1.6 Leverage the power of adaptive and personalized learning technologies to improve student learning.

**1.3 Enrich learning spaces**

1.3.2 Enhance methods and strategies to deliver on-premise courses remotely.

1.3.3 Enhance our ability to support events using large venues (e.g., streaming) and multi-room events (e.g., Frozen River).

1.3.4 Enhance support for the use of technology in active learning classrooms.

**1.4 Sustain innovation**

1.4.1 Establish scalable application of extended reality in specific disciplines.

1.4.4 Evaluate adaptive and next generation learning environments and trends (e.g., gamification, personalized learning).

**4.2 Improve and augment infrastructure systems**

The IT infrastructure will include WSU's leading wireless, display, cloud and computing technology. Aligning with the teaching and learning strategies, this project will be a "sandbox" for developing and evaluating new technology solutions.

## TECHNOLOGY ALTERNATIVES AND POSITIVE OUTCOMES

Technology is in a constant state of evolution. As an effective means of supporting the best in class technology, it's recommended a budget be determined early in the planned stages and delay design and procurement until the end of project design. This allows for the latest technologies to be implemented within a facility.

IT and Audio/Video technologies will provide support for learning and daily activities on campus. These technologies will support access to information in the data rich university environment. IT and Audio/Video Systems will support communications and collaboration to support the current pedagogy.

## 3. OCCUPANT ORIENTATION AND TRAINING

WSU's Teaching, Learning, and Technology (TLT) Services provides a wide range of services to empower faculty and staff to develop teaching methodologies and course content. These services include Training & Professional Development, Project Support and Learning Space Design.

TLT offers programs designed to meet specific faculty and staff needs such as:

- WeTeach - A program for instructors interested in teaching high-quality online courses. Featuring both a Foundations and Advanced track, this program is designed to support instructors at all levels of experience.
- New2WSU - A program for new instructors that introduces them to campus technology and how to integrate it into their courses to best support their pedagogical goals.
- OAS Community of Practice - A program for office administrative assistants that focuses on the effective use of collaboration, productivity, and assessment technology in an office environment.
- Scheduled Workshops - Onsite and online workshops covering a variety of topics.
- 20-Minute eClinics - Weekly, brief online sessions focused on time-sensitive topics.
- Customized Student Training - TLT works with instructors to develop and deliver student training that is customized to meet their specific course needs.
- WSU Technology Knowledge Base - A growing wiki library of technology information, documentation, demonstrations, tips, tricks and good practices.
- WSU LyndaCampus - Members of the WSU community can access a library of over 2000 online courses taught by industry experts covering technology and other related topics.

TLT provides support for projects involving instructional support such as:

- Integrating a specific tool or technique into an existing course
- Designing and evaluating online, blended, or flipped courses, activities, or learning materials
- Supporting group projects using blogs, wikis, and other collaboration tools
- Using technology to engage students during class meetings
- Researching, developing or implementing new instructional methods
- Evaluating the accessibility of your tools and methods

TLT's staff will be working closely with the Colleges and Departments as they begin to utilize the new active, project-based and simulation-based learning environments. Knowledge gained working with faculty in these new learning environments will be shared with WSU's academic community.

## 4. OCCUPANCY COSTS

Non-qualified expenditures such as software, personal computers, and consumable office and teaching supplies and equipment will be funded through campus operating funds.  Campus technology is funded through both campus operating funds and student technology fees. The technology budget is updated annually and will include funds for purchase, operation and maintenance of technology in the building.