

# **UMass Chan Medical School**

## **Office of Facilities**

### **Sustainability & Resiliency Standards**

Office of Sustainability & Design Technology Group  
March 2026

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## OVERVIEW

### 1.1 EXECUTIVE SUMMARY

- UMass Chan seeks to ensure that new and renovated buildings meet student, staff, and faculty needs as effectively and efficiently as possible. UMass Chan's Design Technology Group has outlined a thorough Project Delivery Process (PDP) that addresses all aspects of planning, budgeting, design and construction.
- Included in the PDP is the integrations of Sustainability & Resiliency Standards (SRSs) that are intended to establish a basic framework for project requirements to address sustainability and resiliency that is consistent university wide for all UMass Chan properties. These standards align with Executive Order 594 Leading by Example: Decarbonizing and Minimizing Environmental Impacts of State Government to ensure UMass Chan projects meet the building and infrastructure requirements under this Order. The SRSs additionally provide guidelines to drive projects to pursue enhanced sustainability and resilience elements beyond base requirements. With an understanding that every project is unique in scale and scope, the standards feature a three-pathway model tailored to different project types.
- These standards are relevant to multiple stakeholders, including UMass Chan's leadership and representatives, UMass Chan Capital Program offices, and associated design professionals and facilities and asset managers.
- To provide feedback or ask to follow up questions, please contact the UMass Chan Office of Sustainability or the Design Technology Group.

## **1.2 INTENDED USE OF SUSTAINABILITY AND RESILIENCY GUIDELINES (SRS)**

- The SRSs apply to both new construction and renovation projects (building and non-building) of any square footage or monetary value. The SRSs are intended to be used by architects, engineers, planners and contractors working on capital projects for UMass Chan or working on tenant alterations or development projects on UMass Chan property.
- In addition, the SRSs outline UMass Chan's goals, priorities, and regulatory obligations to make a project more sustainable, energy efficient and resilient and to meet the University and State sustainability and energy goals. These standards are not meant to fully capture all sustainability and resiliency elements of a project but instead serve as a starting point for the integration of sustainability concepts within a project. The SRSs are intended to set minimum standards that all UMass Chan projects must attain and to ensure projects comply with Executive Order 594. The SRSs apply to all projects, even those that intend to seek third party verification such as Leadership in Energy and Environmental Design (LEED)® certification.
- This document is meant to be used in coordination with and not to supersede any other standards, codes, or regulations applicable to UMass Chan capital projects.

### **1.3 POLICY CONTEXT**

- The SRSs outline sustainability, energy and resiliency elements that reflect the extensive state and local policy context for sustainability and support the desire of UMass Chan to reduce environmental impacts and enhance campus resiliency to adapt to an already changing climate.
- The SRSs for UMass Chan properties are shaped by the local and state level policies and initiatives, including Executive Order 569 (EO594) Leading by Example: Decarbonizing and Minimizing Environmental Impacts of State Government which set ambitious goals for reducing greenhouse gas emissions and transitioning to clean energy sources across state facilities. EO594 focuses on the reduction of fossil fuel consumption on-site and building energy efficiency by establishing reduction targets and defining energy criteria for building system replacement, renovations, and new construction.

### **1.4 SUSTAINABILITY AT UMASS CHAN**

- In 2021, UMass Chan updated and released its Sustainability and Climate Action Plan (SCAP), which serves as a roadmap for prioritizing focus areas and defining initiatives and goals for a more sustainable future. The SCAP guides UMass Chan's sustainability programs and initiatives, reinforcing its ongoing commitment to sustainability and climate action.
- Additionally, UMass Chan is guided by the ten principles of the UMass Sustainability Policy, signed by the Board of Trustees in 2016. This policy exemplifies the long-term commitment of all five UMass campuses to be responsible stewards of fiscal and environmental resources. By positioning the campuses as leaders in sustainability, UMass Chan aims to fulfill its mission of advancing knowledge and improving the lives of people in the Commonwealth, the nation, and the world.

#### **1.4.1 UMASS CHAN VISION FOR SUSTAINABILITY**

- UMass Chan promotes well-being for all the people in the Commonwealth, nation, and the world through its operations, education, and research by providing health care education and research that strengthens sustainability, mitigates climate change, and preserves resources for future generations.
- Defining sustainability in an inclusive and holistic manner, the definition of sustainability encompasses human and ecological health, social justice, secure livelihoods, and a commitment to creating a better world for all generations. UMass Chan's dedication includes implementing sustainable practices that address its impact on environmental, social, and economic issues.

## 1.4.2 SUSTAINABILITY GOALS

→ As part of the SCAP, UMass Chan committed to several focus areas and goals designed to help drive the direction and track success of UMass Chan's sustainability programs.



### BUILDINGS AND ENERGY

#### GREENHOUSE GAS EMISSIONS REDUCTION GOAL

Reduce Scopes 1 and 2 greenhouse gas emissions 15 percent by 2026

#### ENERGY USE INTENSITY REDUCTION GOAL

Reduce EUI of UMass Chan buildings 20 percent by 2026



### GROUNDS AND WATER MANAGEMENT

#### GROUNDS MANAGEMENT GOAL

Increase UMass Chan community access and use of the grounds as well as biodiversity on campus

#### WATER REDUCTION GOAL

Reduce water use at UMass Chan



### MATERIALS AND RESOURCE MANAGEMENT

#### WASTE MINIMIZATION GOAL

Reduce overall waste disposal by 20 percent and increase waste diversion

#### SUSTAINABLE PURCHASING GOAL

Implement environmentally preferable purchasing guides and standards

#### SUSTAINABLE FOOD AND DINING GOAL

Integrate sustainable food into campus services to support student learning and community health



### TRANSPORTATION

#### CAMPUS FLEET GOAL

Reduce emissions from UMass Chan fleet by half

#### COMMUTING GOAL

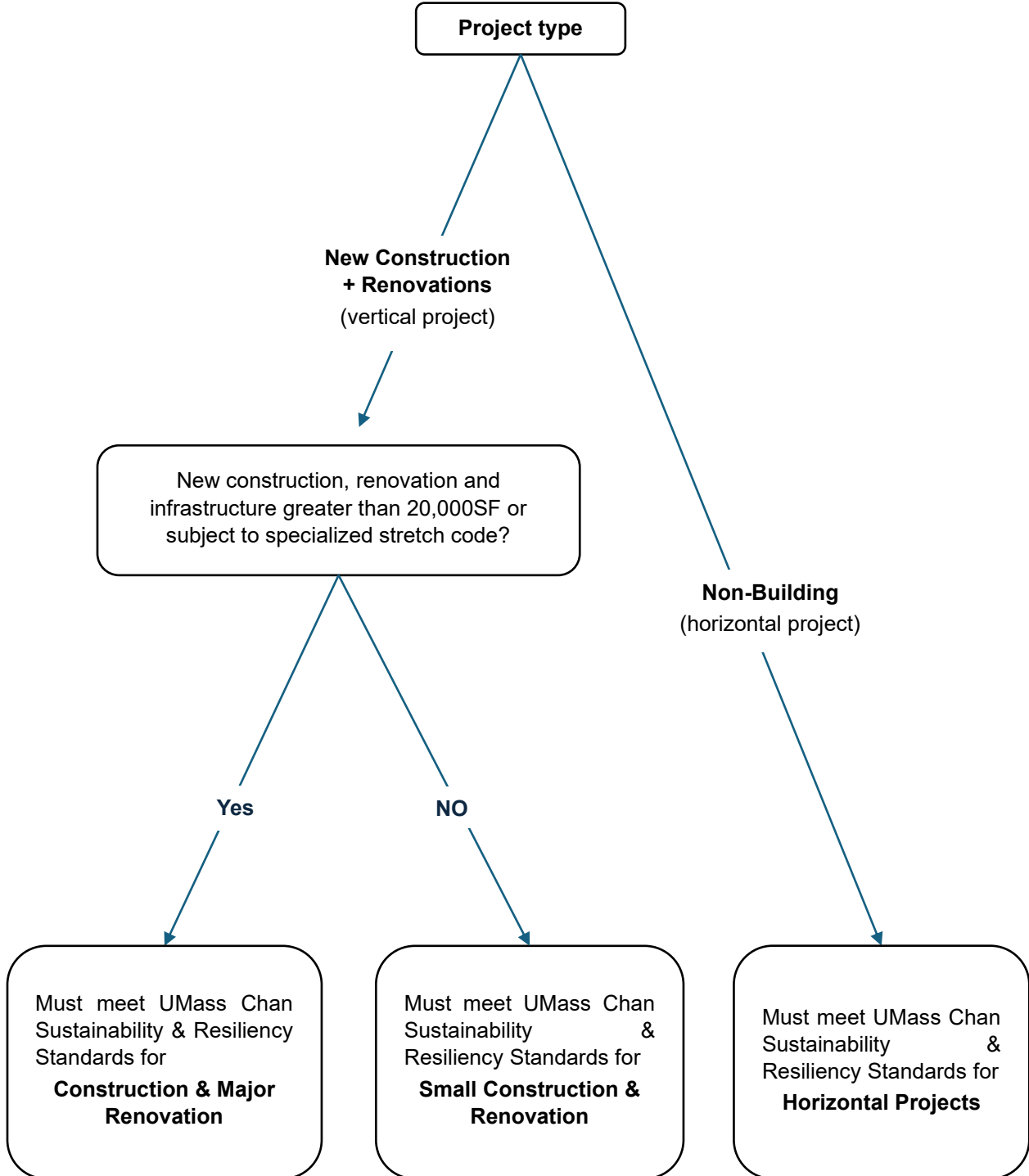
Decrease commuting emissions and support low-emission commuting options

## 1.5 USER GUIDE

- The Sustainability and Resiliency Standards establish a baseline required standard for sustainability for all UMass Chan projects by formalizing the practices that UMass Chan is looking to achieve. The standards feature a three-pathway model tailored to different project types to assist users in determining the relevant standards.
- UMass Chan's SRSs outline the minimum requirements for all projects, but also include recommended measures, guidelines, to support higher levels of achievement in sustainability and resiliency.
- In the case required standards for the project pathway are not relevant to the project, the user must submit justification to the Design Technology Review Committee as part of the SRSs submission.
- If conflict with code requirement and these standards arise, code requirements take precedence.

### 1.5.1 HOW TO USE THIS DOCUMENT

Project Teams must first determine which of three pathways outlined in the SRSs to follow based on project type and consultation with the UMass Chan's Sustainability Office. The following decision tree is helpful in guiding the project teams through the pathway selection process.



## 1.6 MODIFICATIONS TO THESE STANDARDS

- The SRSs is a dynamic document subject to ongoing review and continuous improvement. It resides on UMass Chan's external website UMass Chan Facilities Management. Modifications to this document such as, but not limited to, amendments, additions, or changes will be issued by UMass Chan. All changes to these guidelines will be underlined.

## 1.7 CONTACT INFORMATION

- Group Name: Office of Sustainability
  - Email: Sustainability@umassmed.edu
- Group Name: UMass Chan Design Technology Group
  - Email: DesignTechGroup@umassmed.edu
- Group Name: Facilities Engineering and Construction Management
  - Email: FECRequests@umassmed.edu

**SUSTAINABILITY AND RESILIENCY STANDARDS**

**2.1 CONSTRUCTION AND MAJOR RENOVATION PATHWAY**

➔ The construction and major renovation pathway is applicable to all new construction, renovation and infrastructure greater than 20,000SF or subject to specialized stretch code. These standards integrate the requirements with EO 594 and the Massachusetts LEED Plus 2.0 Standard for New Construction.

**2.1.1 LEED CERTIFICATION**

Description	Program/Resource	Construction and Major Renovation Pathway
Certify buildings to the Silver Level or higher of the most recent version of the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) Standard	MA LEED Plus	Required

**2.1.2 RESILIENCY**

Description	Program/Resource	Construction and Major Renovation Pathway
Maximize resilient design to protect critical infrastructure and continued operation when modeled for long-term climate impacts	MA LEED Plus	Required
Design Flood Elevation (DFE): DFE used to determine design elements (loads, structural calculations, elevations for floodproofing of critical infrastructure).		Required
Project Siting: project team must identify hazards, including but not limited to, unstable slopes, and areas prone to flooding and assess and report alternatives.		Required
Protect pervious surfaces: Identify and protect any natural buffers (wetlands, undeveloped floodplains) and maintain any other pervious surfaces, where an infrastructure project interferes with such surfaces, which could mitigate impacts through retention/filtration of stormwater runoff during a storm event. Viable permeable pavement options must be used. Add locally appropriate vegetation to otherwise undeveloped areas.		Required

Description	Program/Resource	Construction and Major Renovation Pathway
Backup Power: All critical buildings/facilities must have back-up power sources (generators and/or alternative energy options such as solar panels, wind turbines) and/or battery storage capability in the event of power loss during an extreme storm		<b>Required</b>
MEP System Review: All projects that connect to existing MEP infrastructure and change or may change the loads to MEP systems, must complete a review demonstrating that impacted the MEP system(s) can handle the new loads without risk of system failure or overload. MEP system risks that must be addressed are part of the project.		<b>Required</b>
Debris Protection: Building exteriors must contain design features that protect structures from air-borne storm debris, extreme winds, and water: -Materials must resist potential damages, to the most practical extent possible -Windows, doors, and other openings must be water intrusion resistant. -Roof must be constructed in accordance with FEMA Wind Zone II velocities		<b>Required</b>
Incorporate long-term climate resiliency into design and siting decisions. This includes the use of the worst case ASHRAE design day to develop heating and cooling requirements.	MA LEED Plus	<b>Required*</b>
Backup Power Supply: Backup power sources, such as generators, should be fueled from reliable, dependable sources. However, if possible, the use of renewable or alternative fuel sources to power emergency generators should be examined.		<i>Guideline</i>
Building Management System: Establish a cloud-based monitoring system for critical building operations that provide warnings when operations are stressed or projected to be stressed in the near future. Ensure system has a backup power source in case of power loss.		<i>Guideline</i>

\* Required for all new construction and building renovations where electrical, heating, ventilation, or air conditioning infrastructure are included in the project scope

**2.1.3 ENERGY & GHG EMISSIONS**

Description	Program/Resource	Construction and Major Renovation Pathway
Energy modeling: projects must follow UMass Chan's Energy Modeling Guidelines to simulate the energy consumption and performance of the building and, if applicable, of the renovated space.	UMass Chan Energy & GHG Emissions Modeling Guidelines (in development)	<b>Required</b>
<p>EUI Reduction: Reduce proposed building EUI by at least 20% lower than an equivalent building that meets the Massachusetts Energy Code Stretch or below existing energy consumption for renovation projects. Suggested documentation: narrative describing energy efficient equipment and energy efficiency measures with estimates for performance improvement</p> <p>Required EUI reductions shall be achieved by prioritizing:</p> <ul style="list-style-type: none"> <li>- Improved envelop performance</li> <li>- Reduced air infiltration</li> <li>- Ventilation heat recovery</li> <li>- External shading and reduction in solar heat gains</li> </ul>	MA LEED Plus	<b>Required</b>
Greenhouse Gas Emissions Impact: Report the estimated greenhouse gas emission impacts from both project construction and the first year of full operation of facility. Incorporate the greenhouse gas impact reporting throughout the project's design and construction in order to understand how design and construction decisions impact greenhouse gas emissions. <i>Suggested documentation: Greenhouse gas emissions by source and scope. Energy related emissions may be documented as part of energy and/or transportation models. An online calculator may support quantification of additional project sources.</i>	UMass Chan Energy & GHG Emissions Modeling Guidelines (in development)	<b>Required</b>
Commissioning: Coordinate with owner and third party Commissioning Agent to verify energy, HVAC, and lighting and occupancy control systems have been installed, calibrated, and perform according to design specifications at project completion through 10 months post-occupancy	LEED v4.1 Fundamental Commissioning	<b>Required</b>
Building Management System: All buildings must have BMS System and lighting controls		<b>Required</b>

with programmed setbacks for HVAC and lighting systems		
Installation of VFDs: All pumps and fans, 5HP and above, must operate on variable frequency drives		<b>Required</b>
Space Heating and Cooling: For building not on district energy system, use only efficient electric or renewable thermal technologies as defined in Leading by Example Guidelines (LBE Guidelines), for all space heating and cooling. For buildings on the district energy system use efficient or renewable thermal technology for heating and cooling.	MA LEED Plus	<b>Required</b>
Water Heating: Use only efficient electric or renewable thermal technologies as defined in LBE Guidelines for service water heating to the greatest extent possible.	MA LEED Plus	<b>Required</b>
High Efficiency Lighting: Install high efficiency lighting systems, notably LED lighting, for all light uses to achieve a reduction in lighting power. Maximum candela value of all interior lighting must fall within the building and exterior lighting must fall within site limits <i>Suggested documentation: A photometric plan is required to demonstrate compliance.</i>	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
Exterior Lighting: In an effort to reduce light pollution, select fixtures with low BUG rating. <i>Required documentation: A photometric plan is required to demonstrate compliance.</i>	LEED v4.1 Light pollution reduction	<b>Required</b>
Lighting Sensor: Install photo and/or motion sensors on all interior and exterior non-emergency lighting. Dimming lights may be used to maintain security and/or meet operational requirements where appropriate	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
Energy Efficient Equipment: Where available, purchase and install ENERGY STAR-certified appliances and equipment.	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
Reduce Idling: Design roadways and curbside layout to minimize wait times/the need for idling. Install anti-idling signage.		<b>Required</b>
Onsite Renewable Distributed Energy: Conduct a Lifecycle cost analysis for the inclusion of onsite renewable energy. Target a of 2.5% of a project's projected energy requirements for building projects over 20,000 sq. ft.		<b>Required</b>

Installation of Renewable Energy: Maximize installation of onsite renewable energy and, when not possible, ensure that the project is solar-ready as defined by the Massachusetts Building Energy Code. Extent of solar readiness should exceed minimum code requirements as much as possible. <i>Suggested documentation: Lifecycle Cost Analysis</i>	MA LEED Plus	<b>Required</b>
Building Envelop Upgrades: Evaluate building envelope upgrades and implement said upgrades where technically and fiscally feasible <i>Suggested documentation: Lifecycle Cost Analysis</i>	MA LEED Plus	<b>Required*</b>

<b>Description</b>	<b>Program/Resource</b>	<b>Construction and Major Renovation Pathway</b>
Renewable Energy and Storage: Where appropriate, design and install renewable energy and energy storage, while building the infrastructure necessary to support future renewable energy and storage installations <i>Suggested documentation: Lifecycle Cost Analysis</i>	MA LEED Plus	<b>Required*</b>
Low- or zero-carbon fuels: Include as a design option an alternative to fossil fuels for thermal energy that includes low- or zero-carbon fuels or alternative electricity technologies that meet the minimum performance specifications as defined in LBE guidance and implement said option where technically and fiscally feasible * When such options are not practicable, projects shall ensure that steps are taken to develop and incorporate plans to facilitate the future transition to low- or zero-carbon fuels <i>Suggested documentation: Lifecycle Cost Analysis</i>	MA LEED Plus	<b>Required*</b>
Energy Storage: Implement energy storage wherever possible, especially when paired with onsite renewables	MA LEED Plus	<i>Guideline</i>
Net Zero: Strive to achieve zero net energy, where sufficient renewable energy is generated onsite to offset the building's annualized energy consumption	MA LEED Plus	<i>Guideline</i>
Vehicle Pollution Filters: Strive to have all non-road pre-2007 construction equipment retrofitted with pollution control devices, such as Diesel Oxidation Catalysts (DOC) or Diesel Particulate Filters (DPF).		<i>Guideline</i>

\* Required for all new construction and building renovations where electrical, heating, ventilation, or air conditioning infrastructure are included in the project scope

**2.1.4 WATER USE**

Description	Program/Resource	Construction and Major Renovation Pathway
Reduce overall potable water consumption on the project and encourage the use of greywater, recycled water, and/or stormwater to meet water use needs. <i>Suggested documentation: Water use calculations</i>		<b>Required</b>
Indoor Water Use: Target water use reduction by 20% below Massachusetts plumbing code <i>Suggested documentation: Water use calculations</i>	LEED v4.1 Indoor Water Use Reduction	<b>Required</b>
Water Sense Fixtures: Where available, purchase and install Water Sense-certified fixtures.		<b>Required</b>
Outdoor Water Use: Maximize landscaped area and use native plant materials that require less use of irrigation/watering where appropriate with the goal of reducing irrigation water by 50%. <i>Suggested documentation: irrigation water use calculations</i>	LEED v4.1 Outdoor Water Use Reduction	<b>Required</b>
Rainwater Capture: conduct feasibility analysis of rainwater capture and reuse for landscaping and graywater systems. <i>Suggester documentation: feasibility report</i>		<b>Required</b>

**2.1.5 UTILITY METERING**

Description	Program/Resource	Construction and Major Renovation Pathway
Metering: Install metering and sub-metering for electrical, water and heating/cooling distribution in accordance with UMass Chans specifications	LEED v4.1 Building Level Energy Metering	<b>Required</b>
Preconstruction metering and balancing: For renovation projects, install preconstruction metering (where needed) and collect air balancing data to capture projects energy savings		<b>Required</b>
Water Metering for renovation projects: install pre-construction metering (where needed) to capture water use associated with the project and calculate water savings		<b>Required</b>

**2.1.6 INDOOR ENVIRONMENTAL QUALITY**

<b>Description</b>	<b>Program/Resource</b>	<b>Construction and Major Renovation Pathway</b>
Low-Emitting Materials: Use low-VOC (or, where applicable, no-VOC) sealants, adhesives, paints, coatings, carpet systems, composite wood and agrifiber products. Specify that all shop finished materials are to be low- or no-VOC, including where applicable, primed steel, finished metals including aluminum, finished millwork and finished steel and wood doors, frames and windows. Specify wood and agrifiber products with no added urea-formaldehyde resins.		<b>Required</b>
Environmental Smoke Control: Prohibit smoking/vaping inside the building and on campus.	LEED v4.1 Environmental Tobacco Smoke	<b>Required</b>
Daylight: Provide manual or automatic (with manual override) glare-control devices for all regularly occupied spaces. Design to allow daylight into occupied spaces in order to connect building occupants with the outdoors and reduce the use of electrical lighting.	LEED v4.1 Daylight	<i>Guideline</i>
Quality Views: Give building occupants a connection to the natural outdoor environment by providing quality views. Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area.	LEED v4.1 Quality Views	<i>Guideline</i>
Indoor Access to Landscaping: Any combination of indoor plants (e.g., potted plants, plant beds, plant walls) are within a direct line of sight of at least 75% of all workstations and seating within shared areas and rooms (e.g., conference rooms, education spaces, common spaces), as applicable.	WELL v2 Pilot - Enhanced Access to Nature	<i>Guideline</i>

**2.1.7 MATERIAL SELECTION**

<b>Description</b>	<b>Program/Resource</b>	<b>Construction and Major Renovation Pathway</b>
Life-Cycle Cost Assessment: Complete a life-cycle cost assessment where energy resources, mechanical systems, electrical systems, plumbing systems, lighting systems, siting/massing, and envelop are included in the project scope to support related decision-making, as it would quantify total costs including those related to material purchase, installation, maintenance, and eventual replacement.	UMass Chan LCA Standards (in development)	<b>Required</b>
Material Content: A minimum of 20% (by weight, volume, or cost) of construction materials are reused, repurposed, or have recycled content. <i>Suggested documentation: List of materials with those being reused or repurposed and recycled content value of new materials</i>		<b>Required</b>
Warm mix asphalt: utilize 100% warm mix asphalt (WMA) in place of hot mix asphalt (HMA) in order to improve site conditions for workers, protect neighborhood air quality, and reduce use of fossil fuels.		<b>Required</b>
Low Carbon Concrete: Reduce embodied carbon of concrete by 20% from baseline mix, based on GSA embodied carbon concrete standards. <i>Suggested documented: EPD for all concrete mixes</i>	U.S. General Services Administration - Embodied Carbon Concrete Standards	<b>Required</b>
Material Durability: Give preference to durable materials (for example, silica fume as a replacement for 5 to 7% of Portland cement or recycled wood/plastic composite lumber), which may have higher first costs but are likely to have lower long-term costs due to their longer life-expectancy.		<b>Required</b>
Embodied Carbon: Evaluate and implement strategies to reduce embodied carbon contained in building materials	MA LEED Plus	<i>Guideline</i>
Sustainably Sourced Wood: Use sustainably sourced wood such as Forest Stewardship Council (FSC)-certified products and, to the extent practicable, rapidly renewable materials such as agriboard and cotton-batting insulation in temporary and permanent construction.	LEED v4.1 Sourcing of Raw Materials	<i>Guideline</i>

<p>Low Carbon Steel: Reduce the embodied carbon of steel by using only American Steel in building projects, to the extent feasible Suggested documented: EPD for all steel</p>		<p><i>Guideline</i></p>
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<p><b>Description</b></p>	<p><b>Program/Resource</b></p>	<p><b>Construction and Major Renovation Pathway</b></p>
<p>Produce Declarations: Where feasible, utilize materials that have Environmental Product Declarations (EPDs) or documented material ingredients (e.g., Health Product Declarations, Cradle to Cradle certification, or similar). <i>Suggested documentation: Copies of EPDs for materials used on the project</i></p>	<p>LEED v4.1 Environmental Product Declarations</p>	<p><i>Guideline</i></p>
<p>Locally Sourced Materials: Source materials manufactured or prepared within Massachusetts or the larger New England region to reduce greenhouse gas emissions associated with material/product transport and support the local and regional economies.</p>		<p><i>Guideline</i></p>
<p>Prefabrication: Design out waste by utilizing prefabrication and other off-site construction techniques to the greatest extent practicable. These processes reduce waste generation through factory-controlled and more efficient construction processes</p>		<p><i>Guideline</i></p>
<p>Permeable pavement: maximize the use of permeable paving material to reduce stormwater run-off and decrease pollution of local water bodies, increase ground water infiltration, and lessen the potential for heat island impacts.</p>	<p>LEED v4.1 Rainwater Management</p>	<p><i>Guideline</i></p>

**2.1.8 REFRIGERANT MANAGEMENT**

<p><b>Description</b></p>	<p><b>Program/Resource</b></p>	<p><b>Construction and Major Renovation Pathway</b></p>
<p>Refrigerant Management: Use non-CFC and non-HCFC based refrigerants in mobile and stationary AC equipment <i>Suggested Documentation: List of refrigerants used in HVAC equipment and replacement, recharge, and disposal procedures that minimize leak potential</i></p>		<p><b>Required</b></p>

**2.1.9 WASTE MANAGEMENT**

Description	Program/Resource	Construction and Major Renovation Pathway
<p>Waste Management Plan: Develop a waste management plan, and at a minimum, divert 75% or more of four material streams of construction waste. The waste management plan should identify roles and responsibilities, along with an estimate of waste to be generated by waste type, actions to reduce waste, and actions to avoid waste going to a landfill.</p> <p><i>Suggested Documentation: Waste management plan</i></p>		<b>Required</b>
<p>Waste Ban: Comply with 310 CMR 19.017, Solid Waste Management – Waste Bans, which restricts or prohibits the disposal, or transfer for disposal, of certain components of the solid waste stream, including but not limited to: asphalt pavement, brick, and concrete; metal; wood; and clean gypsum wallboard.</p>	MA Waste Ban	<b>Required</b>
<p>Collection: Ensure dedicated and appropriately-sized collection, storage, and disposal areas for mixed recycling, food waste/organics, and trash that are convenient and safe to access for building occupants and waste service providers (i.e., janitorial staff and waste haulers). Where feasible and appropriate, provide trash and recycling chutes and elevator access to exterior haul containers.</p>	UMass Chan bin standards (in development)	<b>Required</b>
<p>Co-location of waste containers: Ensure the building design supports the co-location of trash and recycling, along with organics - as applicable, interior bins and exterior haul containers.</p>	UMass Chan bin standards (in development)	<b>Required</b>
<p>Centralized Trash: For office and cubicles, provide deskside recycling bins and small "mini" trash bins. Design office areas to accommodate centralized trash locations where occupants empty trash generated at office and cubicles.</p>	UMass Chan bin standards (in development)	<b>Required</b>
<p>Surplus: prioritize the resale or donation of items and materials that have remaining useful life.</p>		<b>Required</b>

Specialized Waste Collection: Provide for the safe collection, storage, and disposal of specialized waste streams, such as universal, electronic, and hazardous wastes, as applicable.		<b>Required</b>
Waste coordinator: Designate a waste coordinator to facilitate the waste management plan and provide waste management: training for all construction personnel.		<i>Guideline</i>
Construction and demolition waste: Strive for 100% recycled or salvaged materials from construction waste.		<i>Guideline</i>

<b>Description</b>	<b>Program/Resource</b>	<b>Construction and Major Renovation Pathway</b>
Material Reuse: Identify reuse opportunities for existing materials that do not pose a contamination or health risk prior to any demolition activities (for example, crushed concrete).		<i>Guideline</i>
Take-back Programs: To the extent practicable, work with suppliers that have a take-back program for unused building materials; where no take-back program exists, consider reusing or donating materials that would otherwise be disposed upon project completion (for example, unused paint to local graffiti removal programs).		<i>Guideline</i>
On-Site Earth Work: Keep all removed earthwork on-site to reduce off-site hauling or work with UMass Chan to identify potential reuse opportunities among its inventory of facilities and properties.		<i>Guideline</i>

**2.1.10 SURROUNDING SITE**

Description	Program/Resource	Construction and Major Renovation Pathway
<p>Erosion and sediment control: Use of sediment and erosion control practices at construction sites including minimizing disturbed areas, protecting natural resources, and stabilizing the construction site. Construction waste must be managed to prohibit the discharge of such wastes to the stormwater drainage system. Stormwater Pollution Prevention Plan (SWPPP) is required for all projects that impact more than 1 acre. Projects disturbing under 1 acre must follow Construction Period Pollution Prevention and Erosion and Sedimentation Controls best practices.</p>	<p>Construction Site Runoff Control for UMass Chan Projects</p> <p>Construction Period Pollution Prevention and Erosion and Sedimentation Controls Best Practices</p>	<p><b>Required</b></p>
<p>Native landscaping: Use only native plantings in landscape design, prioritizing pollinator plants. Native plants typically require less irrigation than non-native plants, as they are adapted to the natural rainfall patterns and drought cycles of the region.</p>		<p><b>Required</b></p>
<p>Heat Island Reduction: Use light-colored and reflective materials on roofs and exposed surface areas, e.g., parking lots, unless otherwise precluded by regulation. <i>Suggested documentation: SRI value of roof or other surfaces</i></p>	<p>LEED v4.1 Heat Island reduction</p>	<p><b>Required</b></p>

Description	Program/Resource	Construction and Major Renovation Pathway
<p>Rainwater Management: For open spaces and building projects with site area, where feasible, strive for maximum onsite rainwater infiltration.</p>	<p>LEED v4.1 Rainwater Management</p>	<p><b>Required</b></p>
<p>Install at least one electric vehicle supply equipment (EVSE) charging ports in parking areas up to 25 spaces and at least two EVSE charging ports in parking areas greater than 25 spaces. In parking areas with more than 10 spaces, at least 20% of the spaces must be “EV Ready” as defined by the latest edition of the Massachusetts Building Energy Code. EVSE spaces may be included in EV Ready space requirements. 5% of EVSE spaces must be accessible according MassEVIP accessibility requirements</p>	<p>MA LEED Plus</p>	<p><b>Required</b></p>

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Prioritize sites that provide access to public transportation and alternative modes of transportation.	MA LEED Plus	<i>Guideline</i>
Covered Bike Storage: Provide covered short-term bicycle storage within 200 feet walking distance of any main entrance, and long-term bicycle storage within 300 feet walking distance of any functional entry.	LEED v4.1 Bicycle Facilities	<i>Guideline</i>
Walking Paths: Ensure that all projects have safe pedestrian pathways to all primary building entrances from public sidewalks, parking facilities or adjacent properties (where applicable).		<i>Guideline</i>
Healthy Communities: Incorporate strategies for improved environmental health for UMass Chan employees and the surrounding community.		<i>Guideline</i>
Public Education: Incorporate public education around sustainability and/or healthy communities through signage, interactive displays or recurring programming.	LEED v4.1 Innovation: Green Building Education	<i>Guideline</i>

## 2.2 SMALL CONSTRUCTION AND RENOVATION PATHWAY

- The small construction and renovation pathway is applicable to all small construction and renovations projects that are less than 20,000SF and are not subject to specialized stretch code. These standards integrate the requirements with EO 594 and the Massachusetts LEED Plus 2.0 Standard for New Construction where relevant.

### 2.2.1 LEED CERTIFICATION

Description	Program/Resource	Small Construction & Renovation Pathway
Certify buildings to the Silver Level or higher of the most recent version of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Standard.	MA LEED Plus	<i>Guideline</i>

### 2.2.2 RESILIENCY

Description	Program/Resource	Small Construction & Renovation Pathway
Project Siting: project team must identify hazards, including but not limited to, unstable slopes, and areas prone to flooding and assess and report alternatives.		<b>Required</b>
Protect pervious surfaces: Identify and protect any natural buffers (wetlands, undeveloped floodplains) and maintain any other pervious surfaces, where an infrastructure project interferes with such surfaces, which could mitigate impacts through retention/filtration of stormwater runoff during a storm event. Viable permeable pavement options must be used. Add locally-appropriate vegetation to otherwise undeveloped areas.		<b>Required</b>
Backup Power: All critical buildings/facilities must have back-up power sources (generators and/or alternative energy options such as solar panels, wind turbines) and/or battery storage capability in the event of power loss during an extreme storm.		<b>Required</b>
MEP System Review: All projects that connect to existing MEP infrastructure and change or may change the loads to MEP systems, must complete a review demonstrating that impacted the MEP system(s) can handle the new loads without risk of system failure or overload. MEP system risks must be addressed are part of the project.		<b>Required</b>

Description	Program/Resource	Small Construction & Renovation Pathway
Incorporate long-term climate resiliency into design and siting decisions. This includes the use of the worst case ASHRAE design day to develop heating and cooling requirements.	MA LEED Plus	<b>Required*</b>
Maximize resilient design to protect critical infrastructure and continued operation when modeled for long-term climate impacts.	MA LEED Plus	<i>Guideline</i>
Design Flood Elevation (DFE): DFE used to determine design elements (loads, structural calculations, elevations for floodproofing of critical infrastructure).		<i>Guideline</i>
Debris Protection: Building exteriors must contain design features that protect structures from air-borne storm debris, extreme winds, and water: -Materials must resist potential damages, to the most practical extent possible -Windows, doors, and other openings must be water intrusion resistant. -Roof must be constructed in accordance with FEMA Wind Zone II velocities		<i>Guideline</i>
Backup Power Supply: Backup power sources, such as generators, should be fueled from reliable, dependable sources. However, if possible, the use of renewable or alternative fuel sources to power emergency generators should be examined.		<i>Guideline</i>
Building Management System: Establish a cloud-based monitoring system for critical building operations that provide warnings when operations are stressed or projected to be stressed in the near future. Ensure system has a backup power source in case of power loss.		<i>Guideline</i>

\* Required for all new construction and building renovations where electrical, heating, ventilation, or air conditioning infrastructure are included in the project scope

### 2.2.3 ENERGY & GHG EMISSIONS

Description	Program/Resource	Small Construction & Renovation Pathway
<p>EUI Reduction: Reduce proposed building EUI by at least 20% lower than an equivalent building that meets the Massachusetts Energy Code Stretch or below existing energy consumption for renovation projects. <i>Suggested documentation: narrative describing energy efficient equipment and energy efficiency measures with estimates for performance improvement</i></p> <p>Required EUI reductions shall be achieved by prioritizing:</p> <ul style="list-style-type: none"> <li>- Improved envelop performance</li> <li>- Reduced air infiltration</li> <li>- Ventilation heat recovery</li> <li>- External shading and reduction in solar heat gains</li> </ul>	MA LEED Plus	<b>Required</b>
<p>Building Management System: All buildings must have BMS System and lighting controls with programmed setbacks for HVAC and lighting systems</p>		<b>Required</b>
<p>Installation of VFDs: All pumps and fans, 5HP and above, must operate on variable frequency drives</p>		<b>Required</b>
<p>High Efficiency Lighting: Install high efficiency lighting systems, notably LED lighting, for all light uses to achieve a reduction in lighting power. Maximum candela value of all interior lighting must fall within the building and exterior lighting must fall within site limits. <i>Suggested documentation: A photometric plan is required to demonstrate compliance.</i></p>	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
<p>Exterior Lighting: In an effort to reduce light pollution, select fixtures with low BUG rating. <i>Required documentation: A photometric plan is required to demonstrate compliance.</i></p>	LEED v4.1 Light pollution reduction	<b>Required</b>
<p>Lighting Sensor: Install photo and/or motion sensors on all interior and exterior non-emergency lighting. Dimming lights may be used to maintain security and/or meet operational requirements where appropriate</p>	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
<p>Energy Efficient Equipment: Where available, purchase and install ENERGY STAR-certified appliances and equipment.</p>	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
<p>Energy modeling: projects must follow UMass Chan's Energy Modeling Guidelines to simulate the energy consumption and performance of the building and, if applicable, of the renovated space.</p>	UMass Chan Energy & GHG Emissions Modeling Guidelines (in development)	<b>Required*</b>

Description	Program/Resource	Small Construction & Renovation Pathway
<p>Building Envelope Upgrades: Evaluate building envelope upgrades and implement said upgrades where technically and fiscally feasible. <i>Suggested documentation: Lifecycle Cost Analysis</i></p>	MA LEED Plus	<b>Required*</b>
<p>Renewable Energy and Storage: Where appropriate, design and install renewable energy and energy storage, while building the infrastructure necessary to support future renewable energy and storage installations. <i>Suggested documentation: Lifecycle Cost Analysis</i></p>	MA LEED Plus	<b>Required*</b>
<p>Low- or zero-carbon fuels: Include as a design option an alternative to fossil fuels for thermal energy that includes low- or zero-carbon fuels or alternative electricity technologies that meet the minimum performance specifications as defined in LBE guidance and implement said option where technically and fiscally feasible * When such options are not practicable, projects shall ensure that steps are taken to develop and incorporate plans to facilitate the future transition to low- or zero-carbon fuels. <i>Suggested documentation: Lifecycle Cost Analysis</i></p>	MA LEED Plus	<b>Required*</b>
<p>Greenhouse Gas Emissions Impact: Report the estimated greenhouse gas emission impacts from both project construction and the first year of full operation of facility. Incorporate the greenhouse gas impact reporting throughout the project's design and construction in order to understand how design and construction decisions impact greenhouse gas emissions. <i>Suggested documentation: Greenhouse gas emissions by source and scope. Energy related emissions may be documented as part of energy and/or transportation models. An online calculator may support quantification of additional project sources.</i></p>	UMass Chan Energy & GHG Emissions Modeling Guidelines (in development)	<i>Guideline</i>
<p>Commissioning: Coordinate with owner and third party Commissioning Agent to verify energy, HVAC, and lighting and occupancy control systems have been installed, calibrated, and perform according to design specifications at project completion through 10 months post- occupancy.</p>	LEED v4.1 Fundamental Commissioning	<i>Guideline</i>
<p>Building Envelope Upgrades: Evaluate building envelope upgrades and implement said upgrades where technically and fiscally feasible. <i>Suggested documentation: Lifecycle Cost Analysis</i></p>	MA LEED Plus	<i>Required*</i>

Description	Program/Resource	Small Construction & Renovation Pathway
Space Heating and Cooling: For building not on district energy system, use only efficient electric or renewable thermal technologies as defined in Leading by Example Guidelines (LBE Guidelines), for all space heating and cooling. For buildings on the district energy system use efficient or renewable thermal technology for heating and cooling.	MA LEED Plus	<i>Guideline</i>
Water Heating: Use only efficient electric or renewable thermal technologies as defined in LBE Guidelines for water heating service to the greatest extent possible.	MA LEED Plus	<i>Guideline</i>
Onsite Renewable Distributed Energy: Conduct a Lifecycle cost analysis for the inclusion of onsite renewable energy. Target a goal of 2.5% of a project's projected energy requirements.		<i>Guidelines</i>
Installation of Renewable Energy: Maximize installation of onsite renewable energy and, when not possible, ensure that the project is solar-ready as defined by the Massachusetts Building Energy Code. Extent of solar readiness should exceed minimum code requirements as much as possible. <i>Suggested documentation: Lifecycle Cost Analysis</i>	MA LEED Plus	<i>Guideline</i>
Energy Storage: Implement energy storage wherever possible, especially when paired with onsite renewables.	MA LEED Plus	<i>Guideline</i>
Net Zero: Strive to achieve zero net energy, where sufficient renewable energy is generated onsite to offset the building's annualized energy consumption.	MA LEED Plus	<i>Guideline</i>
Reduce Idling: Design roadways and curbside layout to minimize wait times/the need for idling. Install anti-idling signage.		<i>Guideline</i>
Vehicle Pollution Filters: Strive to have all non-road pre-2007 construction equipment retrofitted with pollution control devices, such as Diesel Oxidation Catalysts (DOC) or Diesel Particulate Filters (DPF).		<i>Guideline</i>

\* Required for all new construction and building renovations where electrical, heating, ventilation, or air conditioning infrastructure are included in the project scope

**2.2.4 WATER USE**

Description	Program/Resource	Small Construction & Renovation Pathway
Reduce overall potable water consumption on the project and encourage the use of greywater, recycled water, and/or stormwater to meet water use needs. <i>Suggested documentation: Water use calculations</i>		<b>Required</b>
Water Sense Fixtures: Where available, purchase and install Water Sense-certified fixtures.		<b>Required</b>
Indoor Water Use: Target water use reduction by 20% below Massachusetts plumbing code. <i>Suggested documentation: Water use calculations</i>	LEED v4.1 Indoor Water Use Reduction	<i>Guideline</i>
Outdoor Water Use: Maximize landscaped area and use native plant materials that require less use of irrigation/watering where appropriate with the goal of reducing irrigation water by 50%. <i>Suggested documentation: Irrigation water use calculations</i>	LEED v4.1 Outdoor Water Use Reduction	<i>Guideline</i>
Rainwater Capture: Conduct feasibility analysis of rainwater capture and reuse for landscaping and graywater systems. <i>Suggested documentation: Feasibility report</i>		<i>Guideline</i>

**2.2.5 UTILITY METERING**

Description	Program/Resource	Small Construction & Renovation Pathway
Building Envelope Upgrades: Evaluate building envelope upgrades and implement said upgrades where technically and fiscally feasible. <i>Suggested documentation: Lifecycle Cost Analysis</i>	MA LEED Plus	<b>Required*</b>
Metering: Install metering and sub-metering for electrical, water and heating/cooling distribution in accordance with UMass Chans specifications.	LEED v4.1 Building Level Energy Metering	<b>Required</b>
Preconstruction metering and balancing: for renovation projects, install preconstruction metering (where needed) and collect air balancing data to capture projects energy savings.		<b>Required</b>

Water Metering for renovation projects: install pre-construction metering (where needed) to capture water use associated with the project and calculate water savings.		<b>Required</b>
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## 2.2.6 INDOOR ENVIRONMENTAL QUALITY

Description	Program/Resource	Small Construction & Renovation Pathway
Low-Emitting Materials: Use low-VOC (or, where applicable, no-VOC) sealants, adhesives, paints, coatings, carpet systems, composite wood and agrifiber products. Specify that all shop finished materials are to be low- or no-VOC, including where applicable, primed steel, finished metals including aluminum, finished millwork and finished steel and wood doors, frames and windows. Specify wood and agrifiber products with no added urea-formaldehyde resins.		<b>Required</b>
Environmental Smoke Control: Prohibit smoking/vaping inside the building and on campus.	LEED v4.1 Environmental Tobacco Smoke	<b>Required</b>
Daylight: Provide manual or automatic (with manual override) glare-control devices for all regularly occupied spaces. Design to allow daylight into occupied spaces in order to connect building occupants with the outdoors and reduce the use of electrical lighting.	LEED v4.1 Daylight	<i>Guideline</i>
Quality Views: Give building occupants a connection to the natural outdoor environment by providing quality views. Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area.	LEED v4.1 Quality Views	<i>Guideline</i>
Indoor Access to Landscaping: Any combination of indoor plants (e.g., potted plants, plant beds, plant walls) are within a direct line of sight of at least 75% of all workstations and seating within shared areas and rooms (e.g., conference rooms, education spaces, common spaces), as applicable.	WELL v2 Pilot - Enhanced Access to Nature	<i>Guideline</i>

**2.2.7 MATERIAL SELECTION**

Description	Program/Resource	Small Construction & Renovation Pathway
<p>Material Content: A minimum of 20% (by weight, volume, or cost) of construction materials are reused, repurposed, or have recycled content.</p> <p><i>Suggested documentation: List of materials with those being reused or repurposed and recycled content value of new materials</i></p>		<b>Required</b>
<p>Material Durability: Give preference to durable materials (for example, silica fume as a replacement for 5 to 7% of Portland cement or recycled wood/plastic composite lumber), which may have higher first costs but are likely to have lower long-term costs due to their longer life-expectancy.</p>		<b>Required</b>
<p>Life-Cycle Cost Assessment: Complete a life-cycle cost assessment where energy resources, mechanical systems, electrical systems, plumbing systems, lighting systems, siting/massing, and envelope are included in the project scope to support related decision-making, as it would quantify total costs including those related to material purchase, installation, maintenance, and eventual replacement.</p>	UMass Chan LCA Standards (in development)	<i>Guideline</i>
<p>Produce Declarations: Where feasible, utilize materials that have Environmental Product Declarations (EPDs) or documented material ingredients (e.g., Health Product Declarations, Cradle to Cradle certification, or similar).</p> <p><i>Suggested documentation: Copies of EPDs for materials used on the project</i></p>	LEED v4.1 Environmental Product Declarations	<i>Guideline</i>
<p>Warm mix asphalt: utilize 100% warm mix asphalt (WMA) in place of hot mix asphalt (HMA) in order to improve site conditions for workers, protect neighborhood air quality, and reduce use of fossil fuels.</p>		<i>Guideline</i>
<p>Embodied Carbon: Evaluate and implement strategies to reduce embodied carbon contained in building materials.</p>	MA LEED Plus	<i>Guideline</i>
<p>Low Carbon Concrete: Reduce embodied carbon concrete by 20% from baseline mix, based on GSA embodied carbon concrete standards.</p> <p><i>Suggested documentation: EPD for all concrete mixes</i></p>	U.S. General Services Administration - Embodied Carbon Concrete Standards	<i>Guideline</i>

Low Carbon Steel: Reduce the embodied carbon of steel by using only American Steel in building projects, to the extent feasible. <i>Suggested documentation: EPD for all steel</i>		<i>Guideline</i>
<b>description</b>	<b>Program/Resource</b>	<b>Small Construction &amp; Renovation Pathway</b>
Sustainably Sourced Wood: Use sustainably-sourced wood such as Forest Stewardship Council (FSC)-certified products and, to the extent practicable, rapidly renewable materials such as agriboard and cotton-battling insulation in temporary and permanent construction.	LEED v4.1 Sourcing of Raw Materials	<i>Guideline</i>
Locally Sourced Materials: Source materials manufactured or prepared within Massachusetts or the larger New England region to reduce greenhouse gas emissions associated with material/product transport and support the local and regional economies.		<i>Guideline</i>
Prefabrication: Design out waste by utilizing prefabrication and other off-site construction techniques to the greatest extent practicable. These processes reduce waste generation through factory-controlled and more efficient construction processes.		<i>Guideline</i>
Permeable pavement: maximize the use of permeable paving material to reduce stormwater run-off and decrease pollution of local water bodies, increase ground water infiltration, and lessen the potential for heat island impacts.	LEED v4.1 Rainwater Management	<i>Guideline</i>

### 2.2.8 REFRIGERANT MANAGEMENT

<b>Description</b>	<b>Program/Resource</b>	<b>Small Construction &amp; Renovation Pathway</b>
Refrigerant Management: Use non-CFC and non-HCFC based refrigerants in mobile and stationary AC equipment. <i>Suggested documentation: List of refrigerants used in HVAC equipment and replacement, recharge, and disposal procedures that minimize leak potential</i>		<b>Required</b>

**2.2.9 WASTE MANAGEMENT**

Description	Program/Resource	Small Construction & Renovation Pathway
<p>Waste Management Plan: Develop a waste management plan, and at a minimum, divert 75% or more of four material streams of construction waste. The waste management plan should identify roles and responsibilities, along with an estimate of waste to be generated by waste type, actions to reduce waste, and actions to avoid waste going to a landfill. <i>Suggested documentation: Waste management plan</i></p>		<b>Required</b>
<p>Waste Ban: Comply with 310 CMR 19.017, Solid Waste Management – Waste Bans, which restricts or prohibits the disposal, or transfer for disposal, of certain components of the solid waste stream, including but not limited to: asphalt pavement, brick, and concrete; metal; wood; and clean gypsum wallboard.</p>	MA Waste Ban	<b>Required</b>
<p>Collection: Ensure dedicated and appropriately-sized collection, storage, and disposal areas for mixed recycling, food waste/organics, and trash that are convenient and safe to access for building occupants and waste service providers (i.e., janitorial staff and waste haulers). Where feasible and appropriate, provide trash and recycling chutes and elevator access to exterior haul containers.</p>	UMass Chan bin standards (in development)	<b>Required</b>
<p>Co-location of waste containers: Ensure the building design supports the co-location of trash and recycling, along with organics - as applicable, interior bins and exterior haul containers.</p>	UMass Chan bin standards (in development)	<b>Required</b>
<p>Centralized Trash: For office and cubicles, provide deskside recycling bins and small "mini" trash bins. Design office areas to accommodate centralized trash locations where occupants empty trash generated at office and cubicles.</p>	UMass Chan bin standards (in development)	<b>Required</b>
<p>Surplus: prioritize the resale or donation of items and materials that have remaining useful life.</p>		<b>Required</b>
<p>Specialized Waste Collection: Provide for the safe collection, storage, and disposal of specialized waste streams, such as universal, electronic, and hazardous wastes, as applicable.</p>		<b>Required</b>

Waste coordinator: Designate a waste coordinator to facilitate the waste management plan and provide waste management training for all construction personnel.		<i>Guideline</i>
Construction and demolition waste: Strive for 100% recycled or salvaged materials from construction waste.		<i>Guideline</i>

<b>Description</b>	<b>Program/Resource</b>	<b>Small Construction &amp; Renovation Pathway</b>
Material Reuse: Identify reuse opportunities for existing materials that do not pose a contamination or health risk prior to any demolition activities (for example, crushed concrete).		<i>Guideline</i>
Take-back Programs: To the extent practicable, work with suppliers that have a take-back program for unused building materials; where no take-back program exists, consider reusing or donating materials that would otherwise be disposed upon project completion (for example, unused paint to local graffiti removal programs).		<i>Guideline</i>
On-Site Earth Work: Keep all removed earthwork on-site to reduce off-site hauling or work with UMass Chan to identify potential reuse opportunities among its inventory of facilities and properties.		<i>Guideline</i>

**2.2.10 SURROUNDING SITE**

<b>Description</b>	<b>Program/Resource</b>	<b>Small Construction &amp; Renovation Pathway</b>
Erosion and sediment control: Use of sediment and erosion control practices at construction sites including minimizing disturbed areas, protecting natural resources, and stabilizing the construction site. Construction waste must be managed to prohibit the discharge of such wastes to the stormwater drainage system. Stormwater Pollution Prevention Plan (SWPPP) is required for all projects that impact more than 1 acre. Projects disturbing under 1 acre must follow Construction Period Pollution Prevention and Erosion and Sedimentation Controls best practices.	Construction Site Runoff Control for UMass Chan Projects  Construction Period Pollution Prevention and Erosion and Sedimentation Controls Best Practices	<b>Required</b>

<p>Native landscaping: Use only native plantings in landscape design, prioritizing pollinator plants. Native plants typically require less irrigation than non-native plants, as they are adapted to the natural rainfall patterns and drought cycles of the region.</p>		<p><b>Required</b></p>
<p>Heat Island Reduction: Use light-colored and reflective materials on roofs and exposed surface areas, e.g., parking lots, unless otherwise precluded by regulation. <i>Suggested documentation: SRI value of roof or other surfaces</i></p>	<p>LEED v4.1 Heat Island reduction</p>	<p><b>Required</b></p>

Description	Program/Resource	Small Construction & Renovation Pathway
<p>Rainwater Management: For open spaces and building projects with site area, where feasible, strive for maximum onsite rainwater infiltration.</p>	<p>LEED v4.1 Rainwater Management</p>	<p><i>Guideline</i></p>
<p>Install at least one electric vehicle supply equipment (EVSE) charging port in parking areas up to 25 spaces and at least two EVSE charging ports in parking areas greater than 25 spaces. In parking areas with more than 10 spaces, at least 20% of the spaces must be “EV Ready” as defined by the latest edition of the Massachusetts Building Energy Code. EVSE spaces may be included in EV Ready space requirements. 5% of EVSE spaces must be accessible according MassEVIP accessibility requirements</p>	<p>MA LEED Plus</p>	<p><i>Guideline</i></p>
<p>Prioritize sites that provide access to public transportation and alternative modes of transportation.</p>	<p>MA LEED Plus</p>	<p><i>Guideline</i></p>
<p>Covered Bike Storage: Provide covered short-term bicycle storage within 200 feet walking distance of any main entrance, and long-term bicycle storage within 300 feet walking distance of any functional entry.</p>	<p>LEED v4.1 Bicycle Facilities</p>	<p><i>Guideline</i></p>
<p>Walking Paths: Ensure that all projects have safe pedestrian pathways to all primary building entrances from public sidewalks, parking facilities or adjacent properties (where applicable).</p>		<p><i>Guideline</i></p>
<p>Healthy Communities: Incorporate strategies for improved environmental health for UMass Chan employees and surrounding community.</p>		<p><i>Guideline</i></p>
<p>Public Education: Incorporate public education around sustainability and/or healthy communities through signage, interactive displays or recurring programing</p>	<p>LEED v4.1 Innovation: Green Building Education</p>	<p><i>Guideline</i></p>

## 2.3 HORIZONTAL PROJECT PATHWAY

- The horizontal pathway is applicable to non-building infrastructure that primarily lies on the ground level. This includes roads, bridges, pipelines, and other structures that connect various locations.

### 2.3.1 RESILIENCY

Description	Program/Resource	Horizontal projects
Project Siting: project team must identify hazards, including but not limited to, unstable slopes, and areas prone to flooding and assess and report alternatives.		<b>Required</b>
Protect pervious surfaces: Identify and protect any natural buffers (wetlands, undeveloped floodplains) and maintain any other pervious surfaces, where an infrastructure project interferes with such surfaces, which could mitigate impacts through retention/filtration of stormwater runoff during a storm event. Viable permeable pavement options must be used. Add locally appropriate vegetation to otherwise undeveloped areas.		<b>Required</b>
Incorporate long-term climate resiliency into design and siting decisions. This includes the use of the worst case ASHRAE design day should be used to develop heating and cooling requirements.	MA LEED Plus	<i>Guideline</i>
Design Flood Elevation (DFE): DFE used to determine design elements (loads, structural calculations, elevations for floodproofing of critical infrastructure).		<i>Guideline</i>
Backup Power Supply: Backup power sources, such as generators, should be fueled from reliable, dependable sources. However, if possible, the use of renewable or alternative fuel sources to power emergency generators should be examined.		<i>Guideline</i>

**2.3.2 ENERGY & GHG EMISSIONS**

Description	Program/Resource	Horizontal projects
<p>High Efficiency Lighting: Install high efficiency lighting systems, notably LED lighting, for all light uses to achieve a reduction in lighting power. Maximum candela value of all interior lighting must fall within the building and exterior lighting must fall within site limits. <i>Suggested documentation: A photometric plan is required to demonstrate compliance.</i></p>	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
<p>Exterior Lighting: In an effort to reduce light pollution, select fixtures with low BUG rating. <i>Required documentation: A photometric plan is required to demonstrate compliance.</i></p>	LEED v4.1 Light pollution reduction	<b>Required</b>
<p>Lighting Sensor: Install photo and/or motion sensors on all interior and exterior non-emergency lighting. Dimming lights may be used to maintain security and/or meet operational requirements where appropriate.</p>	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
<p>Energy Efficient Equipment: Where available, purchase and install ENERGY STAR-certified appliances and equipment.</p>	LEED v4.1 Optimize Energy Performance, Option 3	<b>Required</b>
<p>Reduce Idling: Design roadways and curbside layout to minimize wait times/the need for idling. Install anti-idling signage.</p>		<b>Required</b>
<p>EUI Reduction: Reduce proposed building EUI by at least 20% lower than an equivalent building that meets the Massachusetts Energy Code Stretch or below existing energy consumption for renovation projects. <i>Suggested documentation: narrative describing energy efficient equipment and energy efficiency measures with estimates for performance improvement</i></p> <p>Required EUI reductions shall be achieved by prioritizing:</p> <ul style="list-style-type: none"> <li>- Improved envelop performance</li> <li>- Reduced air infiltration</li> <li>- Ventilation heat recovery</li> <li>- External shading and reduction in solar heat gains</li> </ul>	MA LEED Plus	<i>Guideline</i>

Description	Program/Resource	Horizontal projects
<p>Greenhouse Gas Emissions Impact: Report the estimated greenhouse gas emission impacts from both project construction and the first year of full operation of facility. Incorporate the greenhouse gas impact reporting throughout the project's design and construction in order to understand how design and construction decisions impact greenhouse gas emissions.</p> <p><i>Suggested documentation: Greenhouse gas emissions by source and scope. Energy related emissions may be documented as part of energy and/or transportation models. An online calculator may support quantification of additional project sources.</i></p>	<p>UMass Chan Energy &amp; GHG Emissions Modeling Guidelines (in development)</p>	<p><i>Guideline</i></p>
<p>Renewable Energy and Storage: Where appropriate, design and install renewable energy and energy storage, while building the infrastructure necessary to support future renewable energy and storage installations.</p> <p><i>Suggested documentation: Lifecycle Cost Analysis</i></p>	<p>MA LEED Plus</p>	<p><i>Guideline</i></p>
<p>Low- or zero-carbon fuels: Include as a design option an alternative to fossil fuels for thermal energy that includes low- or zero-carbon fuels or alternative electricity technologies that meet the minimum performance specifications as defined in LBE guidance and implement said option where technically and fiscally feasible.</p> <p>* When such options are not practicable, projects shall ensure that steps are taken to develop and incorporate plans to facilitate the future transition to low- or zero-carbon fuels</p> <p><i>Suggested documentation: Lifecycle Cost Analysis</i></p>	<p>MA LEED Plus</p>	<p><i>Guideline</i></p>
<p>Installation of Renewable Energy: Maximize installation of onsite renewable energy and, when not possible, ensure that the project is solar-ready as defined by the Massachusetts Building Energy Code. Extent of solar readiness should exceed minimum code requirements as much as possible.</p> <p><i>Suggested documentation: Lifecycle Cost Analysis</i></p>	<p>MA LEED Plus</p>	<p><i>Guideline</i></p>
<p>Energy Storage: Implement energy storage wherever possible, especially when paired with onsite renewables.</p>	<p>MA LEED Plus</p>	<p><i>Guideline</i></p>

Net Zero: Strive to achieve zero net energy, where sufficient renewable energy is generated onsite to offset the building's annualized energy consumption.	MA LEED Plus	<i>Guideline</i>
Vehicle Pollution Filters: Strive to have all non-road pre-2007 construction equipment retrofitted with pollution control devices, such as Diesel Oxidation Catalysts (DOC) or Diesel Particulate Filters (DPF).		<i>Guideline</i>

### 2.3.3 WATER USE

Description	Program/Resource	Horizontal projects
Reduce overall potable water consumption on the project and encourage the use of greywater, recycled water, and/or stormwater to meet water use needs. <i>Suggested documentation: Water use calculations</i>		<b>Required</b>
Water Sense Fixtures: Where available, purchase and install Water Sense-certified fixtures.		<b>Required</b>
Outdoor Water Use: Maximize landscaped area and use native plant materials that require less use of irrigation/watering where appropriate with the goal of reducing irrigation water by 50%. <i>Suggested documentation: Irrigation water use calculations</i>	LEED v4.1 Outdoor Water Use Reduction	<b>Required</b>
Rainwater Capture: Conduct feasibility analysis of rainwater capture and reuse for landscaping and graywater systems. <i>Suggested documentation: Feasibility report</i>		<i>Guideline</i>

### 2.3.4 UTILITY METERING

Description	Program/Resource	Horizontal projects
Metering: Install metering and sub-metering for electrical, water and heating/cooling distribution in accordance with UMass Chans specifications.	LEED v4.1 Building Level Energy Metering	<b>Required</b>
Water Metering for renovation projects: Install pre-construction metering (where needed) to capture water use associated with the project and calculate water savings.		<b>Required</b>

**2.3.5 INDOOR ENVIRONMENTAL QUALITY**

Description	Program/Resource	Horizontal projects
<p>Low-Emitting Materials: Use low-VOC (or, where applicable, no-VOC) sealants, adhesives, paints, coatings, carpet systems, composite wood and agrifiber products. Specify that all shop finished materials are to be low- or no-VOC, including where applicable, primed steel, finished metals including aluminum, finished millwork and finished steel and wood doors, frames and windows. Specify wood and agrifiber products with no added urea-formaldehyde resins.</p>		<b>Required</b>
<p>Environmental Smoke Control: Prohibit smoking/vaping inside the building and on campus.</p>	LEED v4.1 Environmental Tobacco Smoke	<b>Required</b>

**2.3.6 MATERIAL SELECTION**

Description	Program/Resource	Horizontal projects
<p>Material Durability: Give preference to durable materials (for example, silica fume as a replacement for 5 to 7% of Portland cement or recycled wood/plastic composite lumber), which may have higher first costs but are likely to have lower long-term costs due to their longer life-expectancy.</p>		<b>Required</b>
<p>Warm mix asphalt: utilize 100% warm mix asphalt (WMA) in place of hot mix asphalt (HMA) in order to improve site conditions for workers, protect neighborhood air quality, and reduce use of fossil fuels.</p>		<b>Required</b>
<p>Low Carbon Concrete: Reduce embodied carbon of concrete by 20% from baseline mix, based on GSA embodied carbon concrete standards. <i>Suggested documentation: EPD for all concrete mixes</i></p>	U.S. General Services Administration - Embodied Carbon Concrete Standards	<b>Required</b>
<p>Life-Cycle Cost Assessment: Complete a life-cycle cost assessment where energy resources, mechanical systems, electrical systems, plumbing systems, lighting systems, siting/massing, and envelop are included in the project scope to support related decision-making, as it would quantify total costs including those related to material purchase,</p>	UMass Chan LCA Standards (in development)	<i>Guideline</i>

installation, maintenance, and eventual replacement.		
Material Content: A minimum of 20% (by weight, volume, or cost) of construction materials are reused, repurposed, or have recycled content. <i>Suggested documentation: List of materials with those being reused or repurposed and recycled content value of new materials</i>		<i>Guideline</i>
Produce Declarations: Where feasible, utilize materials that have Environmental Product Declarations (EPDs) or documented material ingredients (e.g., Health Product Declarations, Cradle to Cradle certification, or similar). <i>Suggested documentation: Copies of EPDs for materials used on the project</i>	LEED v4.1 Environmental Product Declarations	<i>Guideline</i>
Embodied Carbon: Evaluate and implement strategies to reduce embodied carbon contained in building materials.	MA LEED Plus	<i>Guideline</i>
Low Carbon Steel: Reduce the embodied carbon of steel by using only American Steel in building projects, to the extent feasible. <i>Suggested documentation: EPD for all steel</i>		<i>Guideline</i>

<b>Description</b>	<b>Program/Resource</b>	<b>Horizontal projects</b>
Sustainably Sourced Wood: Use sustainably-sourced wood such as Forest Stewardship Council (FSC)-certified products and, to the extent practicable, rapidly renewable materials such as agriboard and cotton-batting insulation in temporary and permanent construction.	LEED v4.1 Sourcing of Raw Materials	<i>Guideline</i>
Locally Sourced Materials: Source materials manufactured or prepared within Massachusetts or the larger New England region to reduce greenhouse gas emissions associated with material/product transport and support the local and regional economies.		<i>Guideline</i>
Prefabrication: Design out waste by utilizing prefabrication and other off-site construction techniques to the greatest extent practicable. These processes reduce waste generation through factory-controlled and more efficient construction processes.		<i>Guideline</i>

<p>Permeable pavement: maximize the use of permeable paving material to reduce stormwater run-off and decrease pollution of local water bodies, increase ground water infiltration, and lessen the potential for heat island impacts.</p>	<p>LEED v4.1 Rainwater Management</p>	<p><i>Guideline</i></p>
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**2.3.7 WASTE MANAGEMENT**

Description	Program/Resource	Horizontal projects
<p>Waste Management Plan: Develop a waste management plan, and at a minimum, divert 75% or more of four material streams of construction waste. The waste management plan should identify roles and responsibilities, along with an estimate of waste to be generated by waste type, actions to reduce waste, and actions to avoid waste going to a landfill. <i>Suggested documentation: Waste management plan</i></p>		<p><b>Required</b></p>
<p>Waste Ban: Comply with 310 CMR 19.017, Solid Waste Management – Waste Bans, which restricts or prohibits the disposal, or transfer for disposal, of certain components of the solid waste stream, including but not limited to: asphalt pavement, brick, and concrete; metal; wood; and clean gypsum wallboard.</p>	<p>MA Waste Ban</p>	<p><b>Required</b></p>

Description	Program/Resource	Horizontal projects
<p>Collection: Ensure dedicated and appropriately-sized collection, storage, and disposal areas for mixed recycling, food waste/organics, and trash that are convenient and safe to access for building occupants and waste service providers (i.e., janitorial staff and waste haulers). Where feasible and appropriate, provide trash and recycling chutes and elevator access to exterior haul containers.</p>	<p>UMass Chan bin standards (in development)</p>	<p><b>Required</b></p>
<p>Specialized Waste Collection: Provide for the safe collection, storage, and disposal of specialized waste streams, such as universal, electronic, and hazardous wastes, as applicable.</p>		<p><b>Required</b></p>

Co-location of waste containers: Ensure the building design supports the co-location of trash and recycling, along with organics - as applicable, interior bins and exterior haul containers.	UMass Chan bin standards (in development)	<i>Guideline</i>
Surplus: prioritize the resale or donation of items and materials that have remaining useful life.		<i>Guideline</i>
Waste coordinator: Designate a waste coordinator to facilitate the waste management plan and provide waste management: training for all construction personnel.		<i>Guideline</i>
Construction and demolition waste: Strive for 100% recycled or salvaged materials from construction waste.		<i>Guideline</i>
Material Reuse: Identify reuse opportunities for existing materials that do not pose a contamination or health risk prior to any demolition activities (for example, crushed concrete).		<i>Guideline</i>
Take-back Programs: To the extent practicable, work with suppliers that have a take-back program for unused building materials; where no take-back program exists, consider reusing or donating materials that would otherwise be disposed upon project completion (for example, unused paint to local graffiti removal programs).		<i>Guideline</i>
On-Site Earth Work: Keep all earthwork removed on-site to reduce off-site hauling or work with UMass Chan to identify potential reuse opportunities among its inventory of facilities and properties.		<i>Guideline</i>

### 2.3.8 SURROUNDING SITE

<b>Description</b>	<b>Program/Resource</b>	<b>Horizontal projects</b>
Erosion and sediment control: Use of sediment and erosion control practices at construction sites including minimizing disturbed areas, protecting natural resources, and stabilizing the construction site. Construction waste must be managed to prohibit the discharge of such wastes to the stormwater drainage system. Stormwater Pollution Prevention Plan (SWPPP) is required for all projects that impact more than 1 acre. Projects disturbing under 1 acre must follow Construction Period Pollution Prevention and Erosion and Sedimentation Controls best practices.	Construction Site Runoff Control for UMass Chan Projects  Construction Period Pollution Prevention and Erosion and Sedimentation Controls Best Practices	<b>Required</b>

Native landscaping: Use only native plantings in landscape design, prioritizing pollinator plants. Native plants typically require less irrigation than non-native plants, as they are adapted to the natural rainfall patterns and drought cycles of the region.		<b>Required</b>
Heat Island Reduction: Use light-colored and reflective materials on roofs and exposed surface areas, e.g., parking lots, unless otherwise precluded by regulation. <i>Suggested documentation: SRI value of roof or other surfaces</i>	LEED v4.1 Heat Island reduction	<b>Required</b>
Rainwater Management: For open spaces and building projects with site area, where feasible, strive for maximum onsite rainwater infiltration.	LEED v4.1 Rainwater Management	<b>Required</b>
Install at least one electric vehicle supply equipment (EVSE) charging port in parking areas up to 25 spaces and at least two EVSE charging ports in parking areas greater than 25 spaces. In parking areas with more than 10 spaces, at least 20% of the spaces must be "EV Ready" as defined by the latest edition of the Massachusetts Building Energy Code. EVSE spaces may be included in EV Ready space requirements.	MA LEED Plus	<b>Required</b>
Prioritize sites that provide access to public transportation and alternative modes of transportation.	MA LEED Plus	<i>Guideline</i>
Covered Bike Storage: Provide covered short-term bicycle storage within 200 feet walking distance of any main entrance, and long-term bicycle storage within 300 feet walking distance of any functional entry.	LEED v4.1 Bicycle Facilities	<i>Guideline</i>
Walking Paths: Ensure that all projects have safe pedestrian pathways to all primary building entrances from public sidewalks, parking facilities or adjacent properties (where applicable).		<i>Guideline</i>

<b>Description</b>	<b>Program/Resource</b>	<b>Horizontal projects</b>
Healthy Communities: Incorporate strategies for improved environmental health for UMass Chan employees and surrounding community		<i>Guideline</i>
Public Education: Incorporate public education around sustainability and/or healthy communities through signage, interactive displays or recurring programming	LEED v4.1 Innovation: Green Building Education	<i>Guideline</i>

END OF DOCUMENT