

MIT KENDALL SQUARE INITIATIVE PROJECT SUSTAINABILITY STRATEGIES

PURPOSE: The Kendall project is designed to be a leader in urban sustainability revitalization and renewal. The site will be designed to contribute to a public realm that will offer a diversity of destinations and program opportunities for residents, neighbors, workers, visitors, and students. It will serve as a gathering space for the community. Active movement through buildings and the open spaces will be encouraged through good design to increase appeal of physical activity for some occupants while still providing accessibility for all to enhance live, work, learn and play opportunities. The project will be demonstrative in its efforts to (i) minimize its environmental impacts, including greenhouse gases that contribute to climate change, and (ii) to adapt to future changes in the climate including increased temperatures and flooding. The project will contribute positively towards climate change mitigation and adaptation not only within its own borders but also within the Kendall Square district as a whole.

PROCESS: The project design team has embraced an integrated design process and includes sustainability experts who are engaged in the comprehensive design of the development and in the designs of the individual projects. This comprehensive view allows the development to consider district sustainability opportunities such as best practices in design and operation, stormwater capture and reuse, and landscape strategies.

ALIGNMENT: In collaboration with the MIT Office of Sustainability, the Kendall development will incorporate the sustainability vision outlined by MIT's 2015 Sustainability Working Group Recommendations.

CONSISTENCY WITH CITY OF CAMBRIDGE ZONING AND SUSTAINABILITY INITIATIVES: MIT's Kendall Square Project is designed to be consistent with the City of Cambridge's zoning requirements with respect to sustainability broadly in Article 22 of the Ordinance and more specifically described in Section 13.89.4 of the PUD-5 zoning. In addition, the City of Cambridge has ongoing initiatives that expand its leadership role in sustainability. MIT has participated with the City in these initiatives and the Kendall Square Project's approach to energy, stormwater management, transportation, etc., is consistent with the goals and objectives of these City initiatives as follows.

MIT participated in the City's "Getting to Net Zero" public process which culminated in a City Council-adopted Net Zero Action Plan for the City of Cambridge. Net zero is a target for carbon-neutral building operations and is defined as a community of buildings for which, on an annual basis, all greenhouse gas emissions produced through building operations are offset by carbon-free energy production.

Cambridge was one of the first municipalities to adopt the Commonwealth's Stretch Energy Code, and in recent years the City has become more energy efficient, earning an official designation as a Green Community. During the net zero process, MIT provided expertise, shared best practices and knowledge, and assisted in shaping the recommendations, along with residents, sustainability professionals, and other property owners.

MIT was invited by the City to participate in the planning of a proposed Kendall Square EcoDistrict. An EcoDistrict is a neighborhood committed to sustainability that links green buildings, smart infrastructure and behavior to meet ambitious sustainability goals over time. Staff attended a training workshop at the Portland Sustainability Institute in Portland, Oregon, and then joined a City- led working group with other Kendall Square stakeholders. The group is exploring strategies and actions aimed at creating a more sustainable district in Kendall Square, and is working with consultant teams to prepare an energy study and a stormwater study. MIT is providing expertise, knowledge, and is helping to frame the next steps.

CLIMATE & RESILIENCY: Resiliency considerations will be made in accordance with the findings of the City's Climate Change Vulnerability Assessment. Such considerations will include locating mission critical equipment above elevation 26 feet. Residential buildings will be designed to allow for more passive façade design to resist temperature changes and provide user controllability during significant regional outages.

ANALYSIS: The project team performed site and building studies on a broad range of sustainability subjects such as energy, stormwater management, urban heat island effect, and water use.

SUSTAINABILITY STRATEGIES

Buildings and Energy: MIT is one of the first institutions to commit to pursuing the newest and most stringent version of LEED, LEED v4, on all future major construction projects. The Buildings authorized by this Development Plan (the “Kendall Square Buildings” or “Buildings”) will pursue LEED v4, which requires benchmarking against a more efficient baseline building, as compared to previous versions of LEED. The baseline itself establishes a roughly 17% improvement from the LEED v3 baseline performance. Each Kendall Square Building, depending on the building use, is targeting a range of 10-20% further reduction in energy consumption from the more stringent LEED v4 baseline, achieved solely by efficiency improvements installed within each building’s footprint.

Design and engineering must address building energy consumption and loads first in order to maximize energy efficiency and reduce environmental footprints. Once loads are reduced, opportunities for district systems and building interconnections can be investigated to find the optimal solution for meeting energy needs. The buildings will benchmark performance above peer buildings in the region and seek to serve the community as a guide for how to develop high performance buildings. For example, The Genzyme building, one of the earliest LEED version 2.0 Platinum certified projects and often the benchmark case study for sustainable building in Cambridge and beyond, has a site energy use intensity of 90.3 kBtu/sf (2010 data, “The World’s Greenest Buildings: Promise Versus Performance in Sustainable Design,” p71). By comparison, Building 5 is projecting less than 70 kBtu/sf for site energy use intensity, 20% less than the Genzyme building. With performance tracking and energy education programs, these buildings strive to become the new sustainable performance standard for both the community and international peers.

Sustainable buildings must weigh factors such as daylight availability, reduced electric lighting consumption, and preservation of views and connection to the outdoors for occupant health with building solar gains or heat losses through the façade. Likewise, not all buildings are driven primarily by façade performance. All buildings in the Kendall Square development will be specifying high performance glazing, including but not limited to low-e coatings, frit coverage, and well insulated double or triple pane glazing, in conjunction with shading devices, operable windows for natural ventilation, and opaque wall areas. All buildings will utilize numerous cutting-edge sustainable practices and technology in building design and operation.

In addition, buildings will achieve the most significant energy reductions through efficient HVAC equipment and conditioning systems utilizing heat recovery and heat exchange, installed equipment power density reductions (such as office and lab equipment reductions and/or efficient residential appliances), advanced lighting and controls, and possible district energy connections. High performance design for energy efficiency in Kendall Square takes a holistic look at each building's specific needs to determine the most effective energy efficiency measures while meeting other programmatic or sustainability goals.

As equipment efficiency and controls are continuously improving, we can expect to see a reduction in energy use of the future fitout beyond even today's best performing buildings. Building tenants will be encouraged to achieve a 10-20% reduction in energy consumption for equipment through the use of more innovative controls and efficient equipment selections and strategies.

District Energy: The project team performed a comprehensive district energy study which evaluated a wide range of energy options against multiple criteria, including energy use, emissions, spaces requirements, regulatory context, market drivers, phasing, and cost. The team evaluated several options including steam, chilled water, gas, and electricity sourced from on-site district energy plants (including geothermal and photovoltaic), MIT's central utility plant, local steam providers, building by building plants, the local energy utility, and combinations of those different sources. Based on this analysis, MIT will use a combination of approaches to provide energy to the buildings. Building 4 will be connected to the existing efficient MIT Central Utility Plant. The current plan for commercial buildings south of Main Street is to pursue a hybrid district energy strategy and the project team will continue to evaluate opportunities to broaden district utility options including opportunities to share heating and cooling systems and be evaluated against the following criteria: efficiency improvements energy cost savings, emissions reductions, regulatory opportunities, phasing and feasibility.

Stormwater Management: The Kendall Square Project is being designed to collect and store stormwater for reuse within the sites to minimize potable water consumption. The reuse system will be designed to capture the 95th percentile rain event and will reuse up to 5 million gallons of water yearly. This will reduce site runoff rate and volume and improve water quality to City drainage systems while reducing potable water demands on public supplies by using reclaimed water for non-potable uses such

as fixtures and irrigation.

Water Savings: LEED v4 takes a holistic look at building water consumption, including not just building fixtures but also process water which was not previously included in LEED v3. Therefore, each building will target 30-40% potable water use reduction across the board for fixtures and equipment water uses. Reuse strategies for process water will help maximize water reductions.

Open Space: The Open space will be designed to foster healthful interaction with the surroundings. Landscape - The landscape vision includes increasing the amount of open space by more than 2 acres. The landscape plan also includes boosting softscape, tree cover and utilizing 100% native or adapted species to create a more vibrant and engaging urban landscape and canopy. This will help create comfortable microclimates and shaded spaces to encourage outdoor activities throughout the seasons. The Kendall Square development parcels will be used to demonstrate high performance and sustainable goals possible on a multiple-site scale.

Resiliency: The Kendall Square Project will embrace climate resilient strategies including locating mission-critical equipment and residential units above elevation 26 feet, incorporating stormwater mitigation strategies, and providing back-up systems for vital operations.

Social Sustainability: The mixed-use aspect of the Kendall Square Project also strives to achieve a social sustainability in its context that helps support a thriving community of students, workers, residents, and visitors. By providing connections and amenities, this development will create a destination that will perpetually enhance Kendall Square, serving as an educational and regional model of how sustainability can integrate into urban existing contexts. The development will create a public educational program for green initiatives.

City's Net-Zero Target: The City's current target for energy performance for new construction references a 22% improvement on the current baseline (i.e. LEED v3). The Kendall Square development is pursuing a more stringent version of LEED, LEED v4, and will achieve an equivalent 25-35% improvement over LEED v3. The City's Net Zero Action Plan sets out a goal of improved energy performance over time, with new construction meeting net zero greenhouse gas emissions standards by 2030.

Transportation: Site infrastructure will be provided to encourage multimodal transportation, including connections to public transit buses, the Kendall MBTA station, and enhancing existing bicycle networks. Parking garages will include electric charging stations and preferred parking for low-emitting vehicles and carpools to reduce the emissions from vehicles on the road.

Healthy Buildings: Healthy buildings will be encouraged by material palette and promotion of active design for occupant health. The project teams will examine materials for building content to ensure products are being specified that create healthy indoor environments. Materials will be low-emitting, avoiding hazardous chemicals too often found in building materials, and selected based on their reduced embodied emissions as they make their way to be installed on-site. Lastly, active movement through buildings and the open spaces will be encouraged through good design to increase appeal of physical activity for some occupants while still providing accessibility for all, to enhance live, work, learn and play opportunities.