

**MITIMCo Kendall Square
Sustainability Design Review Narrative – Site**
07 October 2016

Introduction

MIT's Kendall Square Initiative is designed to be a leader in urban sustainability revitalization and renewal. MIT has made sustainability an integral part of the Kendall Square design process. MIT is committed to developing a district that is sustainably designed, energy efficient, environmentally conscious and healthy for the occupants and visitors that enhance the community.

The site design team has embraced an integrated process and includes technical experts who are actively engaged in the with the design process of both the site and overall SoMa District. This comprehensive view allows the development to incorporate sustainability best practices in design and operation, stormwater capture and reuse, transportation and landscape strategies.

Sustainability Design Review Overview

This memo provides an overview of the sustainability efforts and decisions related to the Kendall Square Initiative site south of Main Street ("SoMa").

In working with the City of Cambridge to shape the PUD-5 Zoning Requirements, MIT established a minimum commitment to Leadership in Energy and Environmental Design (LEED) Gold. The team's efforts have been in developing a project that is sustainably designed, energy efficient, environmentally conscious, and healthy for the occupants, visitors, and community and committed to earning points as a LEED Master Site to be filed along with individual building projects. Projects will certify under the more stringent LEED v4 system, for LEED Gold ratings. MIT's Kendall Square Initiative will be one of the largest LEED v4 collections of projects on the east coast that incorporates the latest energy standards and new sustainability initiatives such as material content disclosure to encourage healthy buildings and indoor environments.

In addition to achieving the LEED project goals, the site design team has addressed the City of Cambridge's Sustainability requirements and guidelines throughout the design process, as detailed in the following.

- Chapter 1: Consistency with Zoning Requirements
- Chapter 2: Consistency with Sustainability Guidelines
- Chapter 3: LEED Benchmarking

Chapter 1: Consistency with Zoning Requirements

The Kendall Square Initiative site incorporates best practices for Energy and Emissions, Urban Site and Landscaping, Healthy Living & Working, Transportation, Promotion of Sustainability Awareness, Cool Roofs, and Monitoring. The team has achieved this through the following integrated design measures to enhance the project's environmental performance.

Energy + Emissions

Energy and emissions are outlined in individual building narratives as related to the Zoning Requirements. The design teams have evaluated collective strategies for district energy as well as individual building and site level energy conservation measures.

As part of the design process, MIT is exploring the opportunities to improve energy efficiency and reduce greenhouse gas emissions. An integral part of this process is the study of the projected energy demands of the future building and how to best meet them. First and foremost, the design teams are focused on reducing the energy demand of the site and buildings through the integration of high performance facades, efficient building systems, reduced lighting power consumption, advanced controls, efficient equipment, and occupant education programs.

In tandem with exploring opportunities for building level efficiency improvements, the district team performed a comprehensive district energy study that evaluated a wide range of options against multiple criteria, including energy use, emissions, space requirements, regulatory context, market drivers, phasing, and cost. The options evaluated included steam, chilled water, gas, and electricity sourced from on-site district energy plants, MIT's central utility plant, local district steam providers, building by building plants, the local energy utility, and combinations of those different sources. While the design for many of the SoMa buildings is still ongoing, the current results of the study provide a clear direction for further development. Based on the analysis of all criteria, a hybrid approach to the SoMa buildings results in the optimum overall performance including greenhouse gas emissions.

As an active and engaged member in City committees and initiatives such as the Net Zero working group, MIT is committed to exceeding local energy standards by incorporating a whole system, integrated approach and to continually revise and reevaluate design strategies to stay at the forefront of technical developments and improve environmental performance. Energy efficiency and resource conservation are at the heart of the sustainability framework developed for Kendall Square, and will remain a focus for the entire team as the project develops.

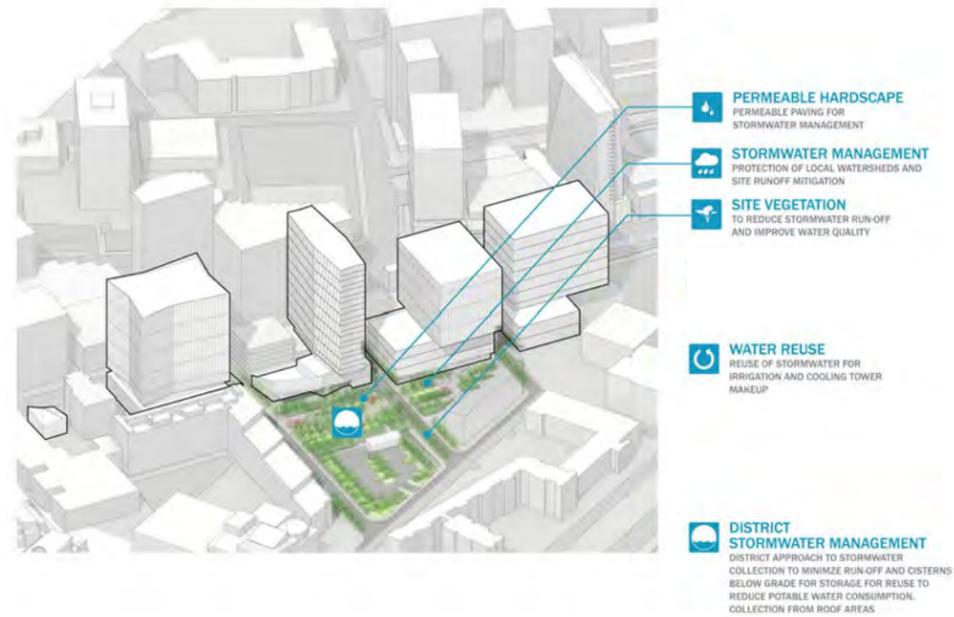
Urban Site + Landscaping – Water Management

The SoMa site design improves upon existing paved surface area with a landscape that provides habitat and pedestrian tree canopy cover, active outdoor recreation areas, and stormwater management and reuse strategies. As the centerpoint of the overall development, the site will achieve sustainability in water management and site landscaping strategies while managing domestic potable water consumption.

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DOHA
BANGKOK
SINGAPORE
SYDNEY

45 East 20th Street, 4th Floor
New York, New York 10003
T +1 (212) 254 4500
F +1 (212) 254 1259
nyc@atelierten.com
atelierten.com

The current design incorporates potable water use reductions, stormwater management in SoMa open space areas, native vegetation, and includes reuse of stormwater for site irrigation and non-potable demands in an adjacent building as outlined in the Zoning Requirements.



The landscape design via native vegetation and drip irrigation will achieve at least 50% reduction in potable water for irrigation. 50% of the remaining irrigation demand will be met by stormwater reuse.

There will be a SoMa district rainwater management approach. Overall, the Kendall SoMa site will achieve a 68-70% annual average reduction in site runoff through stormwater reuse and site infiltration. All stormwater falling on the SoMa site area will either be infiltrated through permeable paved areas into the fill between the garage and surface hardscape, directed to planted areas that include low level native plantings or numerous trees within the open space, or

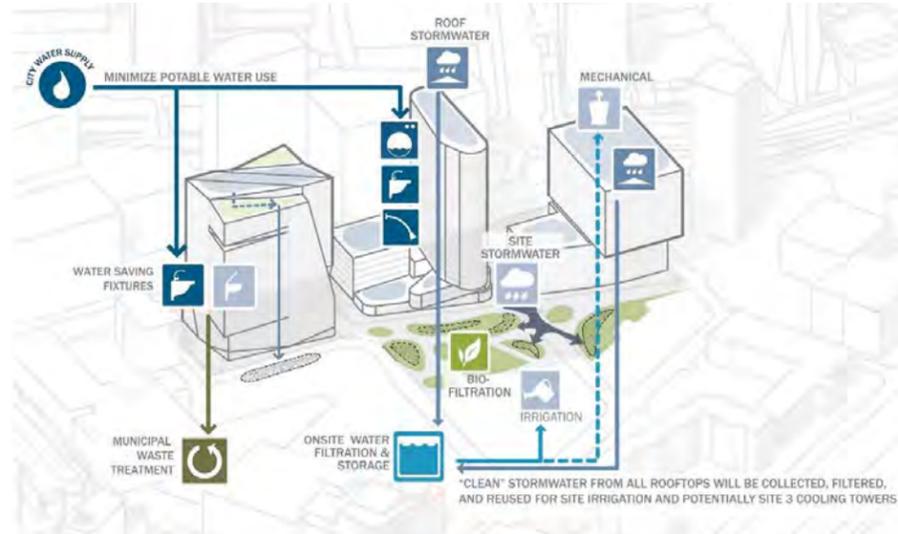


directed to catchment grilles that will direct runoff into a district stormwater tank.

Roadway surface runoff will be treated via porous pavement and/or infiltration catch basins according to the City of Cambridge's standards.



All water from roof areas on new Kendall Square Initiative buildings 3, 4, and 5 (and potentially 2 and 6) will be diverted along with site runoff from the open space areas into a district stormwater tank located in the below grade garage. This district collection of water will be filtered and stored to be diverted from the already strained regional sewers and instead reused as site irrigation and potentially for cooling tower makeup water on the roof of the neighboring Site 3 building for year-round building heat rejection.



Cooling tower makeup water is the primary demand for water in the SoMa district, over building domestic water and irrigation water. In addition, comparing seasonal rainfall to demand profiles for irrigation reuse versus cooling tower reuse shows that the demand for cooling tower makeup water is a better fit to maximize the amount of recycled stormwater. Moreover, cooling towers do not require drinkable (potable) water, while stormwater requires less treatment than greywater (sink/shower water) or blackwater (toilet/kitchen water) before being reused in building applications. Therefore, stormwater reuse for the cooling towers on Site 3 has the potential to significantly reduce potable water consumption and improve rainwater management for the SoMa district. The team will continue to explore opportunities to divert stormwater from participating SoMa building roofs into a district cistern for cooling needs as a district water management strategy.

The current design will meet DPW requirements for the design storms as well as treatment and management for the 95th Percentile storm for the LEED v4 Rainwater Management credit. Overall, the current design is projected to reduce runoff by 45% from the existing condition.

Healthy Living + Working

Providing healthy living and working environments is a further defining factor of high performance buildings. The site area encourages active outdoor activities and community connectivity. Individual building narratives address the comprehensive approach to healthy living and working environments through active design, environmental quality, and occupant comfort measures.

Transportation

Located within a dense urban area, the Kendall Square Initiative aims to reduce traffic impact on the community while accommodating alternative transportation strategies to reduce effective emissions associated with this new destination. The buildings and the district below grade garage support multimodal transportation and reductions in emissions associated with

transit. The SoMa district's advantageous position in Kendall Square positions itself at a nexus of MBTA Redline, bus, local shuttle and transit connectivity.

In order to move away from reliance on personal vehicles in transit, MIT will support and extend the successful bicycle infrastructure and connectivity of the Cambridge and Boston metro areas through improved bicycle infrastructure. Bicycle parking is provided in designated areas in the garage dedicated to each building including the residents of Building 4 while street level bicycle racks will provide accessibility for visitors. Moreover, there will be 2 new Hubway stations located in the SoMa district to encourage use of the regional bikeshare system.

By moving all existing parking below grade from the existing surface lots covering the majority of the district, the development is able to provide an expansive open space with vegetation, room for programming and community engagement, and quality exterior environments. Buildings sit adjacent to this open space which will benefit the connection to community, access to amenities and retail, and pedestrian connectivity for residents, occupants, and visitors.

Meanwhile, low-emitting and fuel-efficient vehicles will be provided preferred locations in the below grade garage. Charging stations for electric vehicles have been provided in the garage, and the team has designed for flexibility to increase the number of charging stations in the future.

Promotion of Sustainability Awareness

The site will include signage that calls out sustainability features in the landscape to promote environmental design and education.

Cool Roofs

Site hardscape materials will be chosen for high SRI values, in order to reduce urban heat island effects in hardscape over the below grade garage. A mix of vegetation, permeable pavers, trees for shade, and light colored materials will be used to reduce urban heat island effects.

Monitoring

Site consumption of water and energy will be metered holistically for the site for ongoing operations tracking. Monitoring of building energy and water consumption will occur at the building level and is further described in the individual building narratives.



Chapter 2: Consistency with Sustainability Guidelines

This section outlines the site design team's considerations, strategies, and benchmarks with respect to MIT's Kendall Square Initiative Sustainability Guidelines.

The site design process included integrated design efforts to incorporate proposed strategies from the Net-Zero Action Plan and likely climate conditions as described in the Cambridge Climate Vulnerability Assessment, while considering how such environmental design measures may evolve over time with the changing climate.

A detailed breakdown of the decision making process is outlined below for the primary sustainability guidelines, including how the design investigated and incorporated strategies or where the investigation demonstrated a more efficient or feasible opportunity.

Energy Storage

As energy storage technologies improve in the future, there may be opportunities in the future as program needs and uses change in buildings or within the site. Ideally, incorporating energy storage could also pair with advancements in solar renewable technologies to generate clean energy to be stored. The team will continue to look for future opportunities for energy storage.

Energy Supply

In addition to building-level investigations for renewable energy installations, the team considered district ground source heat pump or river source heat exchange opportunities.

The team investigated opportunities for geothermal, or ground source heat pumps, during the early design phases of the project. Ground source heat pumps allow buildings to reject heat to the ground when in cooling and remove heat from the ground for heating during cooler months. Wells are drilled vertically into the ground and require a significant spacing to avoid any interaction between wells underground to maintain efficiency. The site area that would be required to install ground source heat pumps to meet a significant portion of the buildings' heating and cooling loads is greater than the SoMa district. The design team investigated installing a limited number of wells as a demonstration project but the excavated below grade garage would limit access to well heads, significantly complicate future maintenance on such a system, and limit future flexibility in use of the garage space.

Heat rejection to the Charles River was considered given the proximity to the waterfront, but it was determined that this was likely not feasible nor permitted under environmental regulations.

The team discussed where it sees energy supply and decarbonization in the future, particularly with improvements from the grid electricity sources. The makeup of the Massachusetts energy grid is anticipated to shift more towards renewable energy sources in the coming decades. Thus, the electricity component consumed by the site under the current design could see an improvement in emissions factor, thus reduction the overall emissions from operation of the building. The team considered the possibility of a Day-1 all-electric design for the site and district components; however, the current utility mix of the Massachusetts grid electricity would increase our projected emissions.

Resilience

To reduce flooding potential, the site's ability to infiltrate stormwater and storage system will assist in reducing strain on sewer systems. The design team is currently evaluating surface flows through the open space to maximize the runoff capture potential for peak rain events seen recently with short, high volume rain events.

Evolving Standards

As the design has progressed, the design team has continued to evaluate the site stormwater performance against new guidelines and standards.

MIT and the design team members continue to be engaged with City initiatives and are prepared to respond to new environmental design expectations for the design and operation of the building. MIT and the design teams look forward to continued collaboration with the City and Cambridge community to develop a sustainable destination in Kendall Square.



Chapter 3: LEED Benchmarking

MIT is committed to LEED Gold projects, suggesting a more stringent benchmark above the City of Cambridge's standard requirement for minimum LEED Silver performance. Reinforcing their commitment, the Kendall Square Initiative projects will achieve LEED Gold. The team has decided to pursue LEED version 4 which is more stringent than the previous version of LEED, LEED v3 (2009).

MIT will register an overall LEED Master Site for the Kendall Square Initiatives buildings south of Main Street that will take advantage of combined site, landscape, and transportation strategies. Then, the individual project will achieve the remaining credits required for a Gold rating under the LEED v4 for New Construction system (for Site 4).

The site will be registered with the USGBC as a Master Site and target several credits which span the 4 of the LEED version 4 categories (Integrative Process, Location & Transportation, Sustainable Sites, Water Efficiency, and potentially Innovation in Design Process and the additional Regional Priority Credits) to enable the project to meet the zoning requirements as outlined in the Appendix.

All points below are being pursued unless noted as a maybe/possible credit, if it is determined that some of the credits under consideration will not be attainable.

All LEED Minimum Program Requirements and Prerequisites will be met.

LEED CREDIT SUMMARY - MASTER SITE CREDITS

Master Site credits are likely applicable to Buildings 2, 3, 4, 5, and 6. All buildings will share central site amenities. Buildings will meet the credit requirements for these credits with shared amenities as well as local amenities to insure minimum requirements are met for each building's designated occupants and visitors.

Master Site: 29 points targeted in total, +6 Medium probability points to be studied further

Location & Transportation

The project site is located on a previously developed site in urban Cambridge, close to several public transportation services including a Massachusetts Bay Transportation Authority subway stop, and public bus services. Occupants shall have access to bicycle racks and showers, as well as preferred parking for hybrid and/or low-emitting vehicles.

Credit 1 LEED for Neighborhood Development Location

The Master Site is not part of, or applicable to pursue a LEED for Neighborhood development, so this credit is not possible.

Credit 2 Sensitive Land Protection

The site is located on a previously developed urban site in Cambridge that is currently impervious paved parking area.

Credit 3 High Priority Site

Cleanup work will be required on site before construction to remediate the open site area. Team to confirm if this is a brownfield site. A site environmental survey will be required to confirm soil classification.

Credit 4 Surrounding Density and Diverse Uses

The site is the center of Kendall Square in urban Cambridge, Massachusetts. The surrounding community is replete with housing, restaurants, shops, grocery stores, educational and religious institutions, performance venues and other community amenities. In addition, the project itself will add residential, office, lab, retail and services to the community.

Credit 5 Access to Quality Transit

The Kendall development sits directly over a head house for the MBTA Kendall Square T-station. In addition, local bus routes connect the location to other areas of the community and Boston. Finally, campus shuttle services will continue to serve the MIT community in Kendall Square, linking to other regions of MIT's campus and student community.

Credit 6 Bicycle Facilities

Short term and long term bicycle parking will be provided for occupants and visitors. Residential buildings will include secure bicycle storage as needed. In addition, the district will host a Hubway bike share hub, which is the current bike-share system of Cambridge and the City of Boston. Site and roadway access will be provided to enhance the bicycle network already so prevalent in the city of Cambridge.

Showers will be provided in all applicable buildings for occupants based on LEED v4 credit guidelines for full time occupants and residents, where applicable.

Credit 7 Reduced Parking Footprint

A centralized garage will be provided for the South of Main properties. The top level of the garage will provide preferred parking for carpools for 5% of all Master Site full time occupants.

Credit 8 Green Vehicles

The project will designate 5% of parking spaces for fuel-efficient vehicles and the garage infrastructure will provide charging stations for 2% of all parking spaces. Team to confirm capacity and number of spaces required through design phases.

Sustainable Sites

The team is taking a comprehensive approach to site, landscape, habitat creation, stormwater management, and human use.

Prerequisite 1 Construction Activity Pollution Prevention

The contractor shall follow best practice construction methods and submit and implement an Erosion and Sedimentation Control (ESC) Plan for construction activities related to the construction of the new building specific to this project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit and specific municipal requirements for the City of Cambridge.

Credit 1 Site Assessment



The civil and landscape teams will conduct a comprehensive site survey to study topography, hydrology, climate, vegetation, soils, human use, and human health effects to achieve credit requirements.

Credit 2 Site Development, Protect or Restore Habitat

MAYBE

The team is investigating opportunities for restoring landscape in what is currently a primarily hardscaped surface site. The design team is evaluating design options that to specify native or adapted vegetation for trees and green roofs to meet credit requirements and limit turf grass. This credit is not currently anticipated.

Credit 3 Open Space

This development acts as an urban infill project that will enhance the landscape while providing significant services and a thriving 24/7 mixed-use community to the sometimes deserted Kendall Square area. Maintaining pedestrian oriented open space that is inviting and engaging is a top priority for this project for the amount of open space that will be provided. Credit not currently anticipated with provided amount of open space as a Master Site credit.

Credit 4 Rainwater Management

The current design considers a water reuse strategy with stormwater capture from roof and site surfaces for reuse in cooling towers and possibly fixtures. The intent will be to design the system such that the reuse strategy and landscape design meets the more stringent LEED v4 requirements as well as local watershed requirements. The stormwater treatment strategy will include treatment of a majority of stormwater falling on site, including collection from roof and site/landscape runoff strategies, for 80% reduction in total suspended solids (TSS).

Credit 5 Heat Island Reduction

All roofs will be designed with high-albedo materials to reflect heat and mitigate the urban heat island effects. In addition, all parking on site will be below grade in a shared garage for South of Main properties. The design will include high SRI and permeable pavers, which would comply with the requirements for this credit. Trees and shading elements are being explored to further reduce heat island effects on hard scape areas.

Credit 6 Light Pollution Reduction

MAYBE

This credit will be pursued under dark-sky lighting strategies. Credit compliance will be fully evaluated in the next phase to determine if team will pursue. Efforts will be made to design the site with night sky friendly fixtures, while maintaining safety and security with the adjacency to the MIT campus.

Water Efficiency

Most projects will pursue Water Efficiency credits on a building-by-building approach. However, the Master Site area will have a single approach to outdoor water use for the shared open space. In addition, each building will seek to reduce potable water for any outdoor water use via efficient irrigation systems or elimination of irrigation systems entirely where possible.

Credit 1 Outdoor Water Use Reduction, 50%/No Potable Water

The project will target a minimum of 50% reduction through efficient irrigation and/or stormwater reuse for irrigation. Full elimination of potable water for irrigation is not anticipated at this point in the design. To meet the credit requirements of 50% or 100% reduction in potable water use for irrigation, potable water use for irrigation will be limited and reuse strategies feasible for irrigation will be explored, including stormwater, cooling coil condensate, or other reuse water available for irrigation AND/OR use of native, drought resistant vegetation. Baseline design includes conservation strategies and no reuse.

Regional Priority Credits

Regional Priority Credits (RPC) are established LEED credits designated by the USGBC to have priority for a particular area of the country. When a project team achieves one of the designated RPCs, an additional credit is awarded to the project. Up to four RPCs can be achieved on a project. The following RPCs are applicable to the Kendall Square Development area in LEED v4, under a Master Site approach. Additional Regional Priority credits are only applicable to individual buildings, and can be found under the building specific narratives.

Credits Pursued

High Priority Site (2 pts required, 2 possible)

Rainwater Management (2 pts required, up to 3 points)



LEED v4 - Kendall Master Site

last updated: April 23, 2015

Achievability			
hi	med	low	NP
29	6	4	0

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 or more points
 Achievability rating: Hi = 90%, Med = 60%, Low = 10%, NP = not possible.

30 Projected Points

Prerequisites Standard

Y						
Y				SS Prereq 1	Construction Activity Pollution Prevention	Create and implement erosion control plan that meets the 2003 EPA Construction General Permit.
Y				WE Prereq 1	Outdoor Water Use Reduction: 30%	Reduce outdoor water use by 30% over the baseline specified in LEED.
Y				EA Prereq 4	Fundamental Refrigerant Management	Eliminate CFCs in building HVAC&R.
Y				MR Prereq 2	Construction and Demolition Waste Management Planning	Develop and implement a construction and demolition waste management plan
Y				IEQ Prereq 2	Environmental Tobacco Smoke (ETS) Control	Prohibit smoking inside building, and locate exterior smoking areas at least 25 feet away from building.

Location & Transportation Standard

17	0	3	0			
				20	LT Credit 1	LEED for Neighborhood Development Location
					LT Credit 2	Sensitive Land Protection
			3		LT Credit 3	High Priority Site
					LT Credit 4	Surrounding Density and Diverse Uses
					LT Credit 5	Access to Quality Transit
					LT Credit 6	Bicycle Facilities
					LT Credit 7	Reduced Parking Footprint
					LT Credit 8	Green Vehicles

Sustainable Sites Standard

6	3	1	0			
				1	SS Credit 1	Site Assessment
					SS Credit 2	Site Development: Protect or Restore Habitat
					SS Credit 3	Open Space
					SS Credit 4	Rainwater Management
					SS Credit 5	Heat Island Reduction
					SS Credit 6	Light Pollution Reduction

Water Efficiency Standard

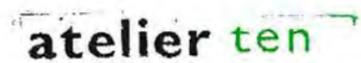
1	1	0	0			
				1	WE Credit 1	Outdoor Water Use Reduction: 50% Reduction
					WE Credit 1	Outdoor Water Use Reduction: No Potable Water

Innovation in Design Standard

4	1	0	0			
				1	ID Credit 1.1	Innovation in Design, Green Education
				1	ID Credit 1.2	Innovation in Design, Green Cleaning
				1	ID Credit 1.3	Innovation in Design, Organic Landscape Management
					ID Credit 1.4	Innovation in Design, Integrated Pest Management
				1	ID Credit 2	LEED™ Accredited Professional

Regional Priority Standard

1	1	0	0			
				1	RP Credit 1.3	Regional Priority, High Priority Site
				1	RP Credit 1.4	Regional Priority, Rainwater Management



October 24, 2016



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LEED SCORECARD**

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