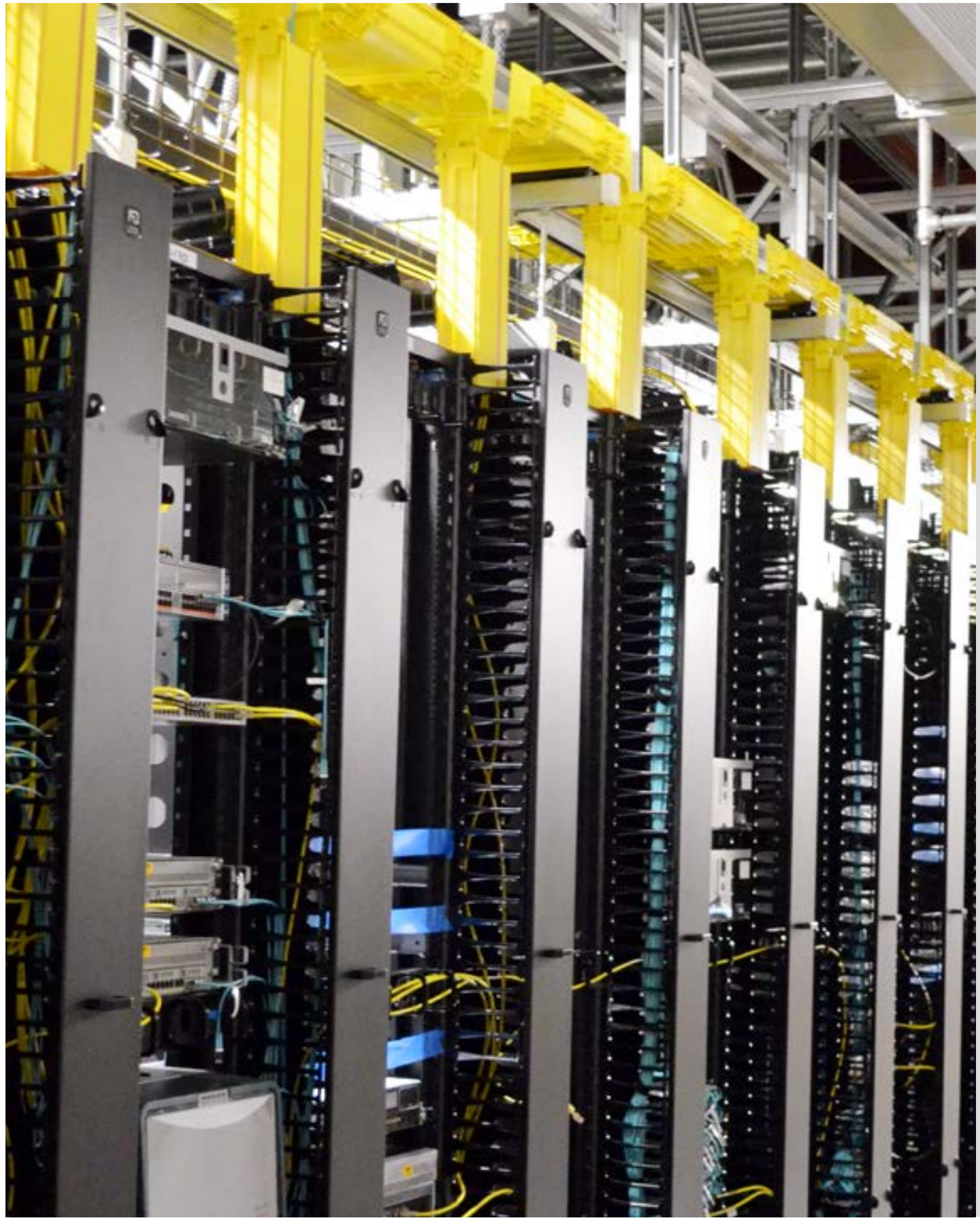


COMPASS
BOS I-A DATA CENTER
NORTHBOROUGH, MA

Green Building Education: Case Study

Prepared for Compass Datacenters

by Callison LLC

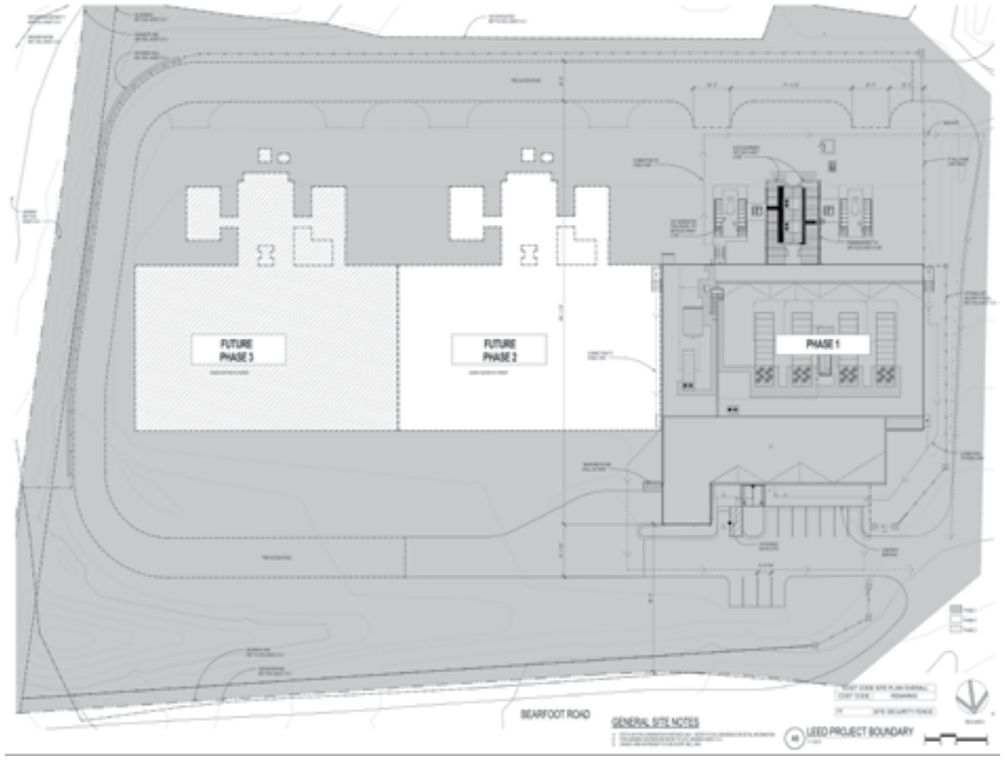
COMPASS™
datacenters

COMPASS MISSION

DEVELOP AN ENERGY EFFICIENT AND ENVIRONMENTALLY SUSTAINABLE DATA CENTER CAPABLE OF EARNING LEED™ GOLD CERTIFICATION FOR OUR CUSTOMERS.

> The built environment has a profound impact on our natural environment, economy, health, and productivity.
> - USGBC

COMPASS™ datacenters



COMPASS GOALS:

- Reduce operating costs for our customers
- Improve comfort and well-being for occupants
- Improve facility performance through commissioning
- Increase building value and longevity
- Reduce the impact of construction and operation on the environment

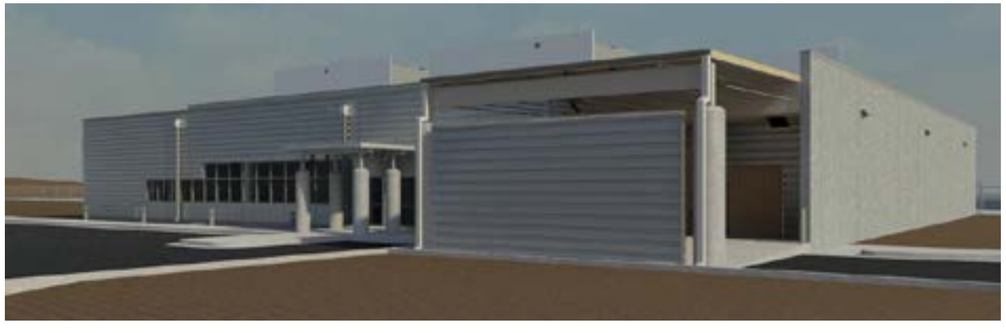
Compass Datacenters is the developer and owner of stand-alone data centers using a standardized data center design. As an all included product, a Compass data center is dedicated exclusively to its customer, hardened to serve as a permanent solution, and is Tier III certified for reliability. It is designed and registered in the LEED™ 2009 Core and Shell rating system targeting Gold certification for its efficiencies in energy, water, and material use, and other green attributes.

Major components of the standardized data center include:

1. CompassPod™ - the server room or data hall
2. CompassStructure™ - the supporting facility to the CompassPod
3. CompassSupport™ - includes office, network operations, security, loading dock, and the main lobby
4. CompassPowerCenter™ - supplies power to the overall facility

COMPASS™ datacenters

Components of the Compass Stand-Alone Data Center



THE LEED™ PROGRAM

LEED™, or Leadership in Energy and Environmental Design, provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. LEED is an internationally recognized mark of excellence.

LEED certification provides independent, third-party verification that a building is designed and built using strategies aimed at achieving high performance in key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

LEED 2009 for Core and Shell Development

Project Checklist

Compass BOS I-A Data Center, Northborough MA

7.2.14

Y	?	N			
14		**14**	**Sustainable Sites**	**Possible Points:**	**28**
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
		5	Credit 2	Development Density and Community Connectivity	5
		1	Credit 3	Brownfield Redevelopment	1
		6	Credit 4.1	Alternative Transportation—Public Transportation Access	6
2			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	2
2			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
3			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
		1	Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
1			Credit 8	Light Pollution Reduction	1
1			Credit 9	Tenant Design and Construction Guidelines	1
8		**2**	**Water Efficiency**	**Possible Points:**	**10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
4			Credit 3	Water Use Reduction	2 to 4
26		**11**	**Energy and Atmosphere**	**Possible Points:**	**37**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
16		5	Credit 1	Optimize Energy Performance	3 to 21
		4	Credit 2	On-Site Renewable Energy	4
		2	Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
3			Credit 5.1	Measurement and Verification—Base Building	3
3			Credit 5.2	Measurement and Verification—Tenant Submetering	3
2			Credit 6	Green Power	2

Y	?	N			
7		**6**	**Materials and Resources**	**Possible Points:**	**13**
Y			Prereq 1	Storage and Collection of Recyclables	
		5	Credit 1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 5
2			Credit 2	Construction Waste Management	1 to 2
		1	Credit 3	Materials Reuse	1
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
1			Credit 6	Certified Wood	1
9		**3**	**Indoor Environmental Quality**	**Possible Points:**	**12**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			Credit 1	Outdoor Air Delivery Monitoring	1
1			Credit 2	Increased Ventilation	1
1			Credit 3	Construction IAQ Management Plan—During Construction	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
		1	Credit 6	Controllability of Systems—Thermal Comfort	1
1			Credit 7	Thermal Comfort—Design	1
		1	Credit 8.1	Daylight and Views—Daylight	1
		1	Credit 8.2	Daylight and Views—Views	1
6			**Innovation and Design Process**	**Possible Points:**	**6**
1			Credit 1.1	Innovation in Design: IEQc4.6 Walls and Ceilings	1
1			Credit 1.2	Innovation in Design: SS 6.2 Stormwater Quality	1
1			Credit 1.3	Low Mercury lighting	1
1			Credit 1.4	Innovation in Design: Green Building Education	1
1			Credit 1.5	Innovation in Design: SSc5.2 Maximize Open Space	1
1			Credit 2	LEED Accredited Professional	1
1		**3**	**Regional Priority Credits**	**Possible Points:**	**4**
1			Credit 1.1	Regional Priority: SSc6.2 Stormwater Quality Control	1
		1	Credit 1.2	Regional Priority: Specific Credit	1
		1	Credit 1.3	Regional Priority: Specific Credit	1
		1	Credit 1.4	Regional Priority: Specific Credit	1
71		**39**	**Total**	**Possible Points:**	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

LEED™ IS AN INTERNATIONALLY RECOGNIZED MARK OF EXCELLENCE.

COMPASS BOS I-A DATA CENTER LEED SCORECARD: POINTS TARGETED

- 14 Points - Sustainable Sites
- 8 Points - Water Efficiency
- 26 Points - Energy & Atmosphere
- 7 Points - Materials & Resources
- 9 Points - Indoor Environmental Quality
- 6 Points - Innovation & Design
- 1 Points - Regional Priority

71 POINTS TOTAL

(Gold certification = 60 to 79 Points)

SUSTAINABLE SITES

Building context: Project Site

SITE SELECTION

Located in an existing data center facility, the project site was previously developed and the former home to parking for the original data center facility. Compass redeveloped the property to create a secure site for three data center projects, the first of which is “Compass BOS 1-A Data Center”.

HEAT ISLAND- ROOF

To mitigate against the ‘heat island effect,’ the entire roof uses a white membrane system to reflect the sun’s heat. This roof system has an SRI (Solar Reflectance Index) value of 104, well above the SRI theshold of 78 required to meet the credit. This reduces the cooling load because the roof is reflecting the sun’s heat rather than absorbing it. It also improves the surrounding temperatures for natural habitat.

CUSTOMER DESIGN & CONSTRUCTION GUIDELINES

Customer Design & Construction Guidelines were prepared for our customer with the intent to: educate them about LEED; describe the sustainable goals and green building attributes that we designed into this project; and to encourage them to likewise design their spaces more sustainably.

ALTERNATIVE TRANSPORTATION

Compass encourages alternative transportation over single occupancy vehicles. To promote alternative transporation, the data center is equipped with:

- On-site bicycle storage and showering facilities;
- Dedicated preferred parking spaces for carpoolers and occupants driving low-emitting, fuel-efficient vehicles; and
- Parking that meets the needs of the facility without exceeding the zoning requirements. This is turn reduces stormwater and allows greater recharge of the groundwater on the site.

VEGETATED OPEN SPACE

Prior to redevelopment, much of the project site was paved with asphalt. The project team was diligent about preserving as much of the existing trees and vegetation on site as possible to contribute to the open space. As a result, half of the site is now preserved or has permanently installed vegetated open space (50% or 181,612 SF). Since the open space exceeded 40%, the project earned an Innovation Credit for exemplary performance for the LEED credit SSc5.2 Maximize Open Space. Compass has committed to maintaining this open space for the life of the building.

2 MILLION ACRES OF OPEN FARMLAND IS DISAPPEARING EACH YEAR IN THE U.S. DUE TO BUILDING DEVELOPMENT, AN AREA 2X THE SIZE OF RHODE ISLAND.

STORMWATER MANAGEMENT

The civil engineers used a comprehensive approach to reducing stormwater by implementing Low Impact Development (LID) practices to capture and treat stormwater runoff from the entire development footprint. As a result the site achieves peak discharge rates equivelent to pre-settlement site conditions.

HALF OF THE SITE IS NOW PERMANENT OPEN SPACE (50%) FOR BIRDS AND NATURAL HABITAT.

WATER EFFICIENCY

WATER USE REDUCTION

The data center uses low-flow faucets and shower heads, and low-flush urinals and toilets to reduce potable water use by 40.15% (34,370 gallons) annually. This is critical in this location where drought is common during the summer months. The project earned a 'Regional Priority Credit' for Stormwater Quality Control.

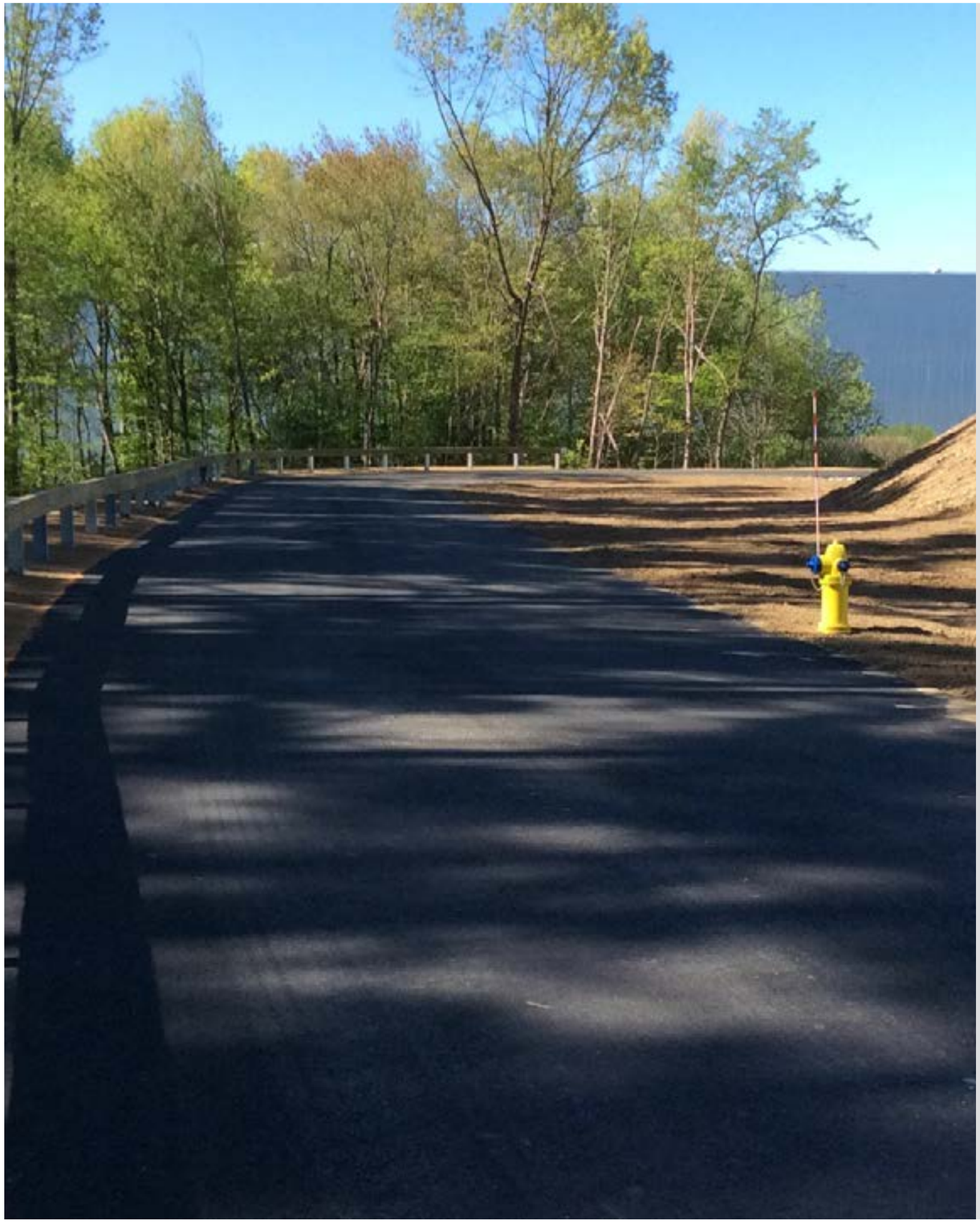
WATER-EFFICIENT LANDSCAPING

The landscape design uses a mix of native and drought tolerant plants and trees, and uses mulch to preserve moisture from rainfall. As a result, the landscape does not rely on a permanent irrigation system and thus completely eliminates the need for permanent irrigation. This saves thousands of gallons of water annually for the community.

The landscape not only conserves water, but the attractive natural landscape palette provides habitats and food for local birds and serves as pleasant scenery for employees to enjoy.

IN THE UNITED STATES ALONE, BUILDINGS ACCOUNT FOR 14% OF POTABLE WATER CONSUMPTION.

-USGBC



THE COMPASS DATA CENTER BUILDING REDUCES WATER USE BY 34,370 GALLONS A YEAR (40.15%).

THE LANDSCAPE DESIGN FOR THE SITE CONSERVES OVER 1 MILLION GALLONS OF POTABLE WATER ANNUALLY BECAUSE IT DOES NOT REQUIRE PERMANENT IRRIGATION.

ENERGY & ATMOSPHERE

Reducing greenhouse gas emissions & energy conservation

OPTIMIZE ENERGY

Data centers are historically energy-intensive facilities. This is due to traditional parameters requiring very narrow temperature and humidity control limits in the computer rooms. For this facility, Compass chose to utilize LEED™ and ASHRAE 90.1-2007 standards to establish more stringent goals for the energy conservation performance for the buildings' architecture and engineering systems that will support the overall data center and the server equipment.

Energy conservation strategies and savings for the data center include:

- High-performance glazing with a Solar Heat Gain Coefficient (SHGC) of 0.218 and a NFRC U-value of 0.474 is used for the occupied areas. Glazing is approximately 3% of the total wall area.
- Envelope insulation exceeds ASHRAE and/or local standards for minimum roof and wall insulation values.
- Lighting power density (LPD) was reduced by using large windows in the occupied areas providing natural daylight. Occupancy sensors and LED lighting fixtures are used throughout the facility reducing the interior lighting power by 63% or 134,854 kWh annually.

Mechanical/Plumbing Systems:

- Fan loads were reduced by 44.15% or 883,951.5 kWh annually:
  - Data Center: - 9.9 EER VAV RTU
  - Power Centers: 12.0 EER VAV RTU
  - Office & support: 10 EER VAV RTU
- Cooling load was reduced by 11.9% or 25,256 kWh annually..

According to the EPA Greenhouse Gas Equivalencies Calculator*, the Compass Data Center reduces CO_2 emissions for the core and shell building by almost 14% or 688 metric tons annually compared to a data center designed to baseline code standards. This is equivalent to the electricity emissions produced by 145 passenger vehicles a year.

In summary, the Compass Data Center uses 13.95%* less electricity than the baseline case, saving 998,191 kWh of energy use annually. The energy use intensity (EUI) for the final design shows 991.801 kBtu per square foot. This equates to a cost savings of approximately $139,647 annually (based on U.S. Department of Energy, EIA cost information).

COMMISSIONING

An extensive commissioning plan was employed in the construction process. Major systems and controls were thoroughly tested and corrected as required to ensure the building was functioning at optimal performance as the design intended. Thorough training was provided to the Compass/customer facility team as part of the commissioning process to ensure continued performance after the hand-off of the building.

IN THE UNITED STATES ALONE, BUILDINGS ACCOUNT FOR 72% OF ELECTRICITY CONSUMPTION.

*Note: These metrics are based on the core and shell building and the equipment installed by the owner/developer. Energy conservation of the 'process load' (server equipment) is the responsibility of the tenant. At full capacity, the tenants' server equipment accounts for 75% of the building's annual energy use. As a result, Compass was awarded 16 points for the alternative compliance path for *Percent of Energy Cost Influenced or Directly Controlled by the CS Owner/Developer*.

ENERGY & ATMOSPHERE

ENHANCED REFRIGERANT MANAGEMENT

The refrigerant R410-A, a low-ozone depletion and low global warming potential refrigerant, was used as an alternative to traditional refrigerants for the data center HVAC&R equipment to further reduce potential harm to the ozone layer.

MEASUREMENT & VERIFICATION, BASE BUILDING AND TENANT SUB-METERING

Base Building -

A *Measurement & Verification Plan* was developed for the base building in accordance with the *International Performance Measurement & Verification Protocol* (IPMVP) using the Option D - Calibrated Simulation. The base building has been designed to accommodate for metering equipment - using a master utility meter, remote panel meters, and PDU meters. This metering equipment has been specified for all electrical and plumbing equipment (lighting, HVAC, process equipment, and general power loads). Guidelines have also been provided for carrying out tenant submetering.

Tenant Sub-Metering -

A *Tenant Measurement and Verification Plan* was also developed that documents and advises future tenants of this opportunity and the means of how this can be achieved. Future tenants are encouraged to install their own current transformer(s) and/or transducers to measure the energy usage on their new panels or server racks. The centrally located HVAC design is such that the energy consumed shall be prorated by the tenant lease area. Equipment recommendations and procedures have been provided for monitoring energy use and information provided for taking corrective action if the M&V plan indicates that energy savings are not being met.

THE COMPASS DATA CENTER CORE AND SHELL REDUCES ELECTRICITY USE BY 998,191 KWH ANNUALLY.

> Energy efficient systems save almost $140,000 annually in operations costs.

MATERIALS & RESOURCES:

Implementing positive resource practices &
addressing waste concerns

RECYCLING

To encourage recycling at the facility, Compass installed a compactor at the loading dock to accommodate corrugated cardboard, the largest waste stream anticipated for this type of facility. Bins for collecting the remaining recyclables - paper, glass, metal, and plastics - have also been provided at the loading dock and within the facility.

RECYCLED CONTENT

Giving preference to products with recycled content (both postconsumer and preconsumer) reduces the impact of resource depletion on virgin materials. The Compass data center team set a goal for at least 20% of the total building materials costs (CSI MasterFormat Divisions 03-10, 31) to contain recycled materials for the data center at Northborough. This goal was incorporated in the specifications and carried out during the construction phase.

REGIONAL MATERIALS

The intent of using products whose contents are harvested and manufactured within a 500-mile radius of the project is twofold: support the local economy by using products that are extracted and manufactured locally, and reduce greenhouse gas emissions in the transport of materials. Like the recycled content, The Compass data center team set a goal for at least 20% of the total construction hard costs (CSI MasterFormat Divisions 03-10, 31) to come from locations within a 500-mile radius of the project.

CERTIFIED WOOD

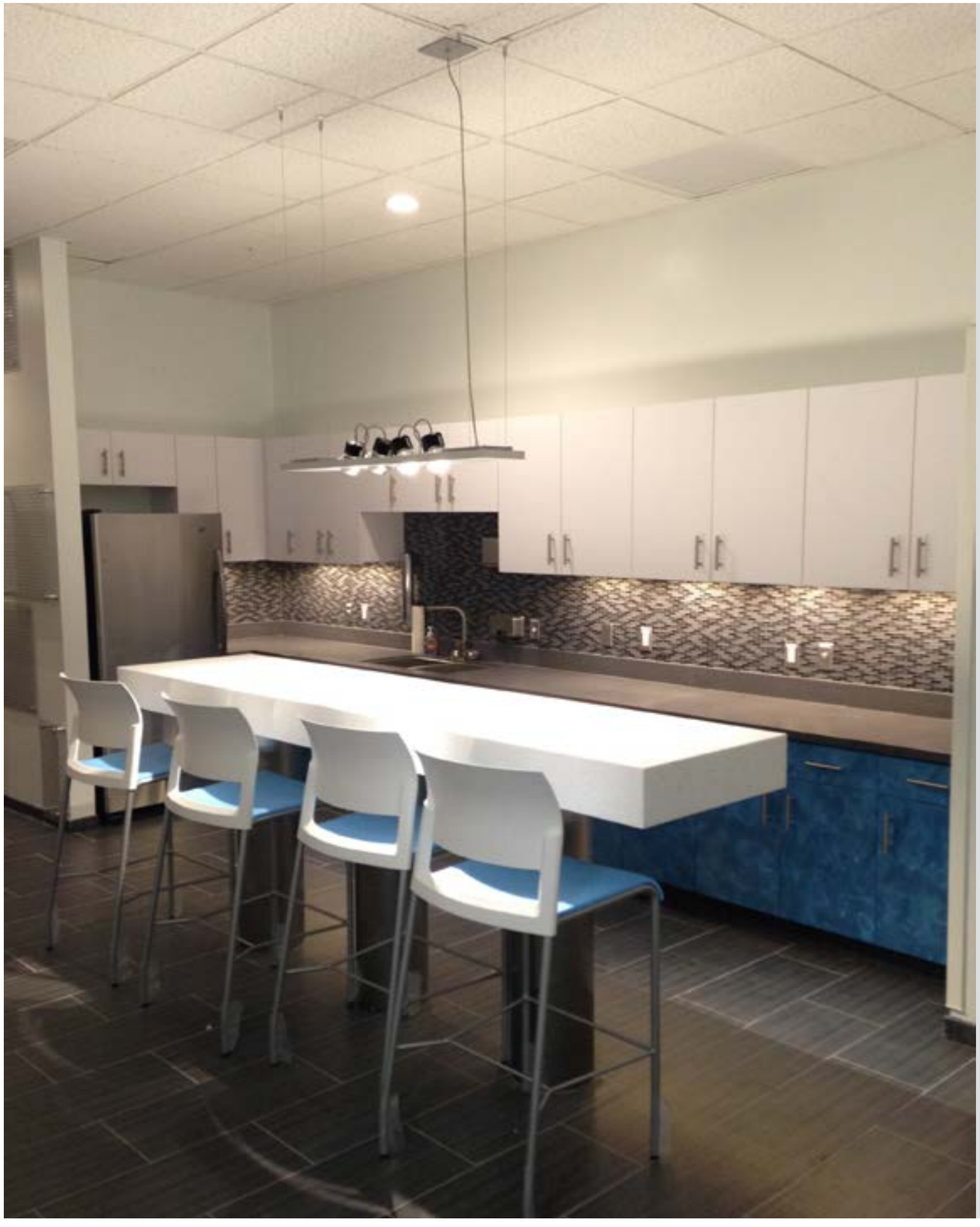
Irresponsible forest practices have negative environmental impacts including forest destruction, loss of wildlife habitat, soil erosion, stream sedimentation, water and air pollution, and waste generation. By promoting the puchase of wood products from environmentally-responsible forests certified by the Forest Stewardship Council (FSC), the team is reducing these impacts while also preventing resource depletion and the harvest of endangered or old growth timber. The team set a goal of using FSC-Certified wood products for a minimum 50% of the purchase of all new wood products.

CONSTRUCTION WASTE MANAGEMENT

50% of landfill waste comes from construction sites. To mitigate this, the building contractor used a co-mingled strategy for recycling construction waste at the project site for the duration of the construction phase. As a result, the contractor (with careful coordination with their hauler/recycler) is targeting a diversion rate over 75% of the construction waste for this project.

IN THE UNITED STATES ALONE, BUILDINGS ACCOUNT FOR 40% OF RAW MATERIALS USE AND 30% OF WASTE OUTPUT. -USGBC

50% OF OUR LANDFILLS ARE FILLED WITH CONSTRUCTION WASTE - 136 MILLION TONS ANNUALLY.



OUR PROJECT GIVES PREFERENCE TO PRODUCTS WITH BOTH PRECONSUMER AND POSTCONSUMER RECYCLED CONTENT.

> The facility uses products manufactured locally, supporting the local economy and reducing greenhouse gas emissions from the transport of materials.

INDOOR ENVIRONMENTAL QUALITY:

Commitment to occupant comfort & well-being

MINIMUM IAQ / INCREASED VENTILATION

Meeting the minimum requirement for indoor air quality performance improves occupancy comfort and productivity compared with buildings with poor IAQ performance. Under-ventilated buildings can be stuffy, odorous, uncomfortable, and/or unhealthy for occupants. In the case of the Compass Data Center, the design went beyond the minimum IAQ performance to provide 30% more outdoor air than code requires to ensure occupant comfort and health.

ENVIRONMENTAL TOBACCO SMOKE CONTROL

The Compass Data Center is a non-smoking facility. To protect occupants from the exposure to environmental tobacco smoke, Compass set a policy of enforcing no smoking within 25 feet of building entrances. This is a policy for all facilities at this site. Signage posted on facility entrances as well as the main gate states this policy. Designated smoking locations have been identified for each project site to keep smoke away from building openings.

INDOOR CHEMICAL POLLUTANT SOURCE CONTROL

Several measures have been designed and installed in the building to reduce occupant exposure to pollutants and particulates. A walk-off mat has been provided in the main entrance to trap and collect debris from occupants entering the building. The janitor's closet is designed and separately exhausted to prevent volatile organic compounds (VOC) from escaping. Storage and mixing of cleaning products will only occur in this location. MERV 14 filtration media for the AHU's has been installed before occupancy.

INDOOR IAQ MANAGEMENT PLAN, DURING CONSTRUCTION

Good construction practices entail a clean construction site that reduces exposure to harmful chemicals and VOC's, improves air quality by protecting ducts and HVAC systems from dust and particulates, and protects new materials from water damage and potential for mold and mildew. The construction team implemented a rigorous daily checklist to ensure these requirements were met throughout the construction phase.

THERMAL COMFORT DESIGN

Thermal comfort of occupants ultimately affects their productivity and well-being in the space. The mechanical ventilation systems were designed to maintain the thermal comfort of the data center occupants by addressing environmental conditions (air temperature, radiant temperature, humidity, and air speed) and personal factors (metabolic rate, clothing, and preference) to develop a strategy that meets the ASHRAE Standard 55 for thermal comfort and their specific conditions.

LOW-EMITTING MATERIALS

The team pursued all four credits for low-emitting materials to continue to mitigate occupant exposure to dangerous off-gassing of VOC's. This specifically addresses products in the following categories:

AMERICANS SPEND AN AVERAGE OF 90% OF THEIR TIME INDOORS, SO THE QUALITY OF THE INDOOR ENVIRONMENT IS VITAL.

adhesives and sealants; paints and coatings; flooring systems; and composite wood and agrifiber products. All products for these four categories were carefully specified to not exceed their designated thresholds of VOCs and/or contain no added urea formaldehyde, particularly for the flooring systems and wood products. The contractor team adhered to the architectural specifications and validated that these products met the LEED criteria and various industry standards for measuring VOCs.

OUTDOOR AIR DELIVERY MONITORING

The Compass Data Center is equipped with CO_2 monitoring equipment that alerts facility staff through the building automation system should the CO_2 change more than 10% beyond the design thresholds.

PROVIDING OPTIMAL INDOOR AIR QUALITY PERFORMANCE IMPROVES OCCUPANCY COMFORT AND PRODUCTIVITY...

> All categories of the low-emitting materials were pursued in addition to an innovation credit for low-emitting ceiling and wall systems.

INNOVATION & DESIGN:

Innovative features and practices

MAXIMIZE OPEN SPACE- EXEMPLARY PERFORMANCE

The Compass Northborough site earned an “Exemplary Performance” point for *SSc5.2 - Maximize Open Space* for exceeding 40% open space for the site. 25% was the minimum requirement for this credit. Because the buildings use firewalls to separate the first and future buildng expansions on this site, this resulted in a larger percentage of open space for occupants and natural habitat and reduced site disturbance.

LOW-EMITTING CEILING & WALL SYSTEM

This innovation goes beyond the four low-emitting material credits to also address the VOC content in all ceiling and wall systems installed in the Compass data center. All qualifying products specified for the project meets the third-party certification Greenguard for Schools and/or the CHPS - California Section 03150 by not exceeding set VOCs levels and don’t contain any added urea formaldehyde. This pertains to all gypsum board, acoustical ceiling systems, insulation, and wall coverings installed in the building.

STORMWATER QUANTITY CONTROL - EXEMPLARY PERFORMANCE

The civil engineers used a comprehensive approach to reducing stormwater by implementing Low Impact Development (LID) practices to capture and treat stormwater runoff from the entire development footprint, and achieve peak discharge rates equivelent to pre-settlement site conditions.

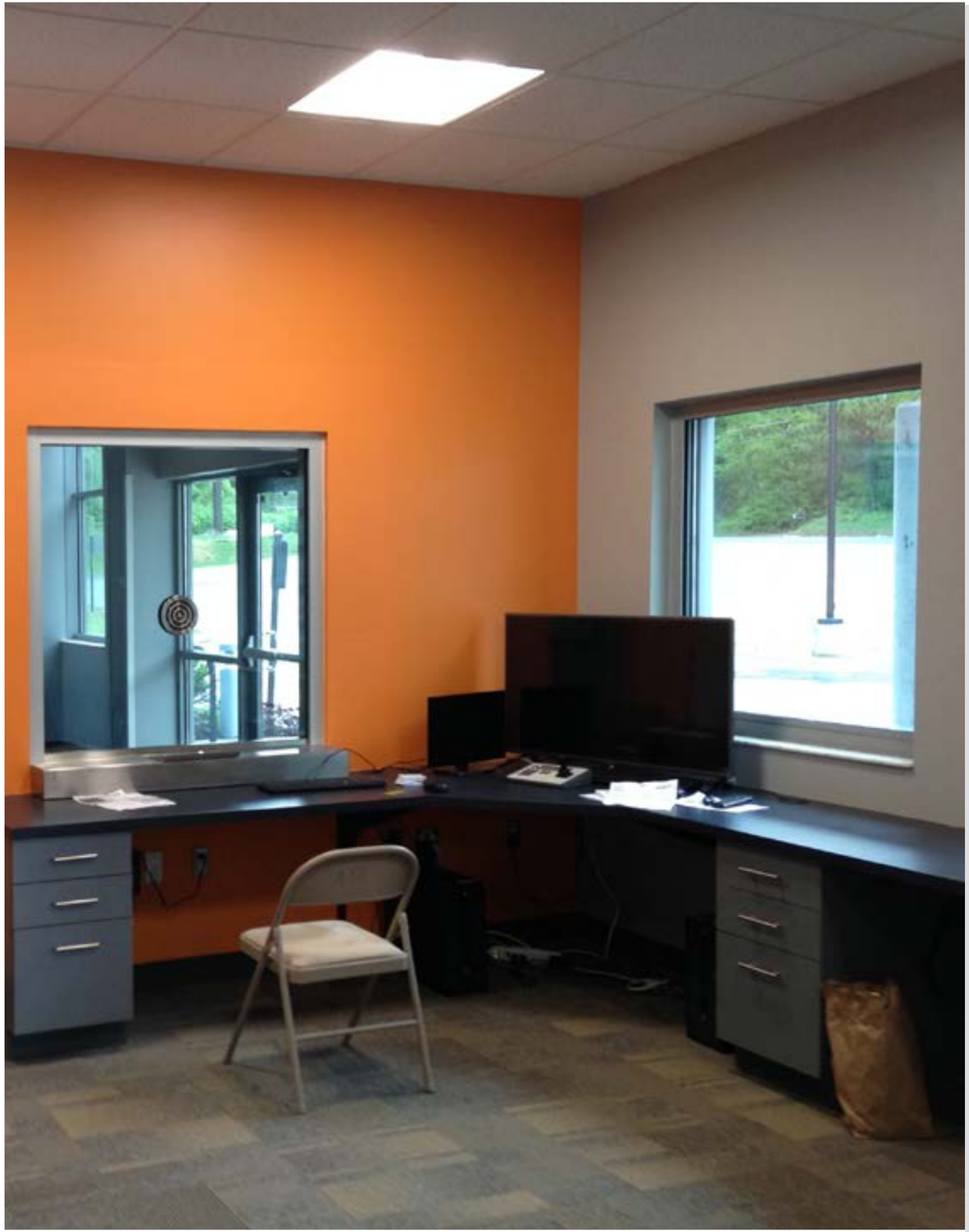
LED LIGHTING

The lighting design for the data center uses energy efficient fixtures and lamps with LED. The team followed the *LEED 2009 Existing Building Operations and Maintenance Reference Guide* for MRc4 and has set a target average of 80 picograms or less of mercury. The team eliminated the use of mercury in lighting in this facility as a result of using all LED lighting while also reducint the lighting load.

GREEN BUILDING EDUCATION

This case study is a demonstration of the Compass team commitment to green building and effort to educate others about the energy conservation and environmental measures incorporated into this facility. Compass will also devote a section of their website to educate both present and future customers/occupants, the community, and the general public about the green building attributes of the Compass data center in Northborough in hopes of encouraging others to do the same.

THIS CATEGORY REWARDS PROJECTS FOR **INNOVATIVE BUILDING FEATURES AND SUSTAINABLE BUILDING PRACTICES** AND/OR EXEMPLARY PERFORMANCE ON LEED CREDITS.



THE LIGHTING DESIGN ELIMINATES MERCURY IN THE WORKPLACE BY USING LED LIGHTING INSTEAD OF COMPACT FLUORESCENT LAMPS.

> To reduce hazardous materials in the workplace, Compass committed to purchase only LED lamps for the first year for the customer and has encouraged them to do the same thereafter.

COMPASS BOS I-A DATA CENTER NORTHBOROUGH, MA

Green Building Education: Case Study

COMPASS DATACENTERS
Owner & Developer
Dallas, Texas

ROSENDIN
Electrical & Lighting Engineers
Austin, Texas

BALFOUR BEATTY U.S.
General Contractor
Charlotte, North Carolina

CALLISON DESIGN LLC
Architect & LEED Administration
Seattle, Washington

JORDAN SKALA ENGINEERS
Energy Modeling, Mechanical & Plumbing Engineers
Dallas, Texas

LITTLE JOHN ENGINEERING
Civil Engineering & Landscape Design
Nashville, Tennessee

ENGINEERS NORTHWEST
Structural Engineer
Seattle, Washington

EYP/HP
Commissioning Agent

COMPASS™ datacenters

BIBLIOGRAPHY

Browning, William. “Greening the Building and the Bottom Line.” Rocky Mountain Institute, 1994. http://www.rmi.org/Knowledge-Center/Library/D94-27_GreeningBuildingBottomLine

U.S. Environmental Protection Agency (EPA), “Power Profiler,”ss http://www.epa.gov/cleanenergy/energy-and-you/how-clean.html. April 28, 2014.

U.S. Environmental Protection Agency (EPA). “Greenhouse Gas Equivalencies Calculator.” http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results. April 28, 2014.

U.S. Green Building Council. “LEED Reference Guide for Green Building Design and Construction.” USGBC: Washington, D.C., 2009 Edition.

U.S. Green Building Council, “Green Building by the Numbers.” USGBC: Washington, D.C., 2009.