Pinnacle Advisory Group | Touloukian Touloukian Inc. | McDermott Ventures | CHMWarnick

Economic Analysis and Planning

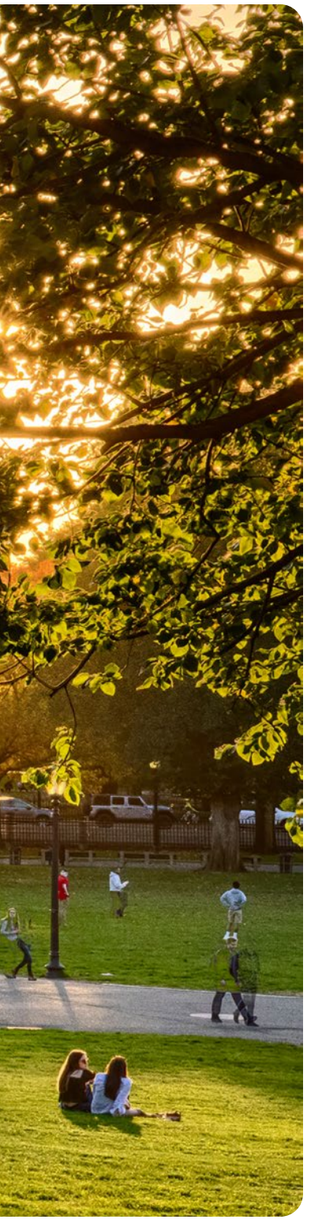
Chapter 5: Boston Common Garage

MASSACHUSETTS CONVENTION CENTER AUTHORITY

Boston, MA

March 2025

Boston Common Garage Headhouse | Credit: Signature Boston



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Executive Statement

An Improved User Experience

The garage business in downtown Boston is facing a transformation. With fewer spaces available due to redevelopment and rising parking rates, garages are under pressure to increase electric charging amenities and improve public facing conditions. The Boston Common Garage (BCG) is a vital 24/7 facility beneath the Boston Common, providing 1,350 spaces and serving as a resource for park visitors, local businesses, and residents.

Chapter 5 is dedicated to the analysis and future development of the BCG. The Economic Analysis and Planning RFR, established by A&F, outlined key opportunities for growth and development, which served as the framework for this study. Our team has structured the assessment, scope, and findings for the BCG into a comprehensive report focused on key areas impacting ongoing operations, sustainability initiatives, capital planning opportunities, and community engagement, particularly within the surrounding neighborhoods of the Back Bay and Beacon Hill. The report highlights specific opportunities for the BCG to engage with and better serve the diverse community within these neighborhoods as well as the broader Boston and Massachusetts regions.

Additionally, a market and financial analysis has been developed to support the continued competitive and financial success of the BCG, aiming to both sustain and enhance its inherent aspects. Our findings outline guiding principles for interdisciplinary advancement of the facility, with recommendations that build upon the MCCA's ongoing efforts to maintain and elevate the BCG' success, and the Economic Development objectives for The Commonwealth.

Key Findings:

- Selling the Boston Common Garage is not recommended.
- A 3% price increase is recommended starting in 2026.
- Garage management (ProPark) should provide MCCA Leadership with quarterly reports on key performance and benchmarking metrics.
- Work with the State's arts and cultural communities to use the interior of the Garage as a platform to share the diverse and cultural attributes of Massachusetts and promote diversity in line with the other exhibits on the Boston Common.
- Improve public facing edge conditions by constructing planters on top of the garage walls and along un-useable concrete sidewalks in order to prevent pedestrians from walking along dangerous routes and limit confusion on how to access the garage.
- Improve bicycle safety and access into the garage bike storage areas by creating striped bike lanes at the entrance and exit ramps.
- Increase electric vehicle charging amenities at the main level of the garage. Upgrade the electrical service as required.
- Install digital signage at the entrance and other locations throughout the facility. Allow for ROI opportunities.

Boston Common | Photo Credit: Adobe Stock

02

Inventory of Existing Land & Buildings

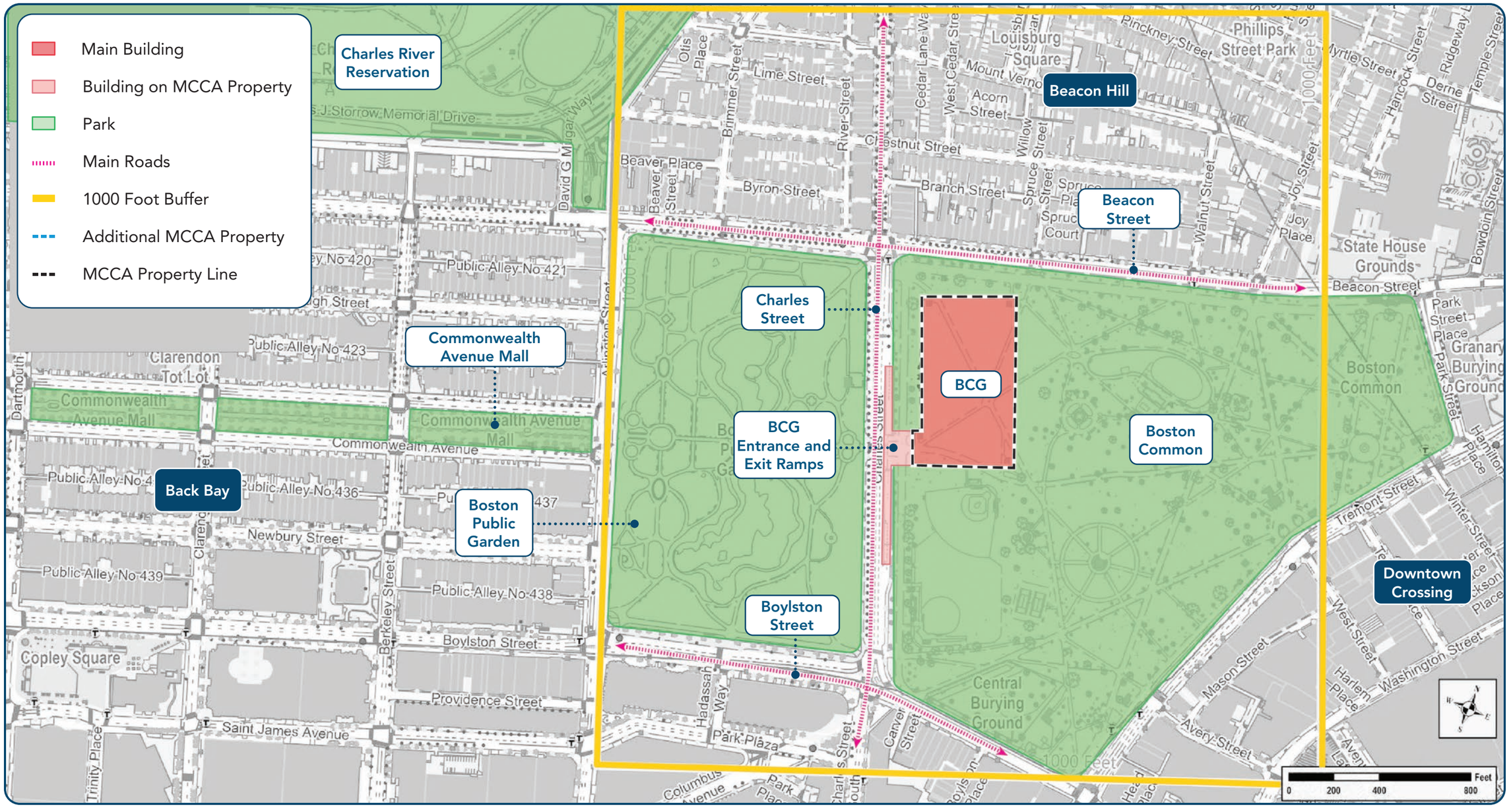
The Boston Common Parking Garage is located almost entirely underground beneath Boston Common, with four headhouse structures at grade within the Common providing access to the garage structure below. Entry and exit access drive lanes are located along Charles Street. Adjacent to Boston's Back Bay and Beacon Hill historic neighborhoods, the garage is well served by both the community and visitors.

The facility's unique underground location below a protected open space creates discrepancies between the existing land use classification and zoning districts, and the facility's actual function. Per Boston's tax parcel data, the area where the garage is located is shown as Open Space. The study area features mainly Open Space for the Common, with commercial and residential uses bordering the park. The site is located with the Boston Proper Zoning District, specifically within the Open Space subdistrict. Overlays on the site include the Restricted Parking District, which requires developers to demonstrate the need for any new parking, and the Coastal Flood Resilience Overlay, which mandates additional resilience standards for areas susceptible to coastal flooding.

While the site is not currently within any FEMA floodplain, the Coastal Flood Resilience Overlay indicates areas on the site that could be at risk for a 2070 100-year flood event. City of Boston urban heat island index mapping shows that the property has lower risk for heat, as the garage's subterranean setting and the green cover provided by Boston Common contribute to a relatively low rating on the intensity scale. The grass, trees, and relatively low ratio of impervious surfaces on the Common help mitigate heat absorption that would typically occur with paved surfaces.

Key Findings:

- Open 24 hours a day and 7 days a week.
- 1,350 parking spaces, 57 of which are dedicated to motorcycles. It includes preferential parking spaces for hybrid vehicles with 25 EV charging stations.
- Weather-protected bike parking with 38 long-term spaces in a secure room on the Middle Level of the garage near the parking ramp.
- Bluebikes stations are conveniently located nearby, including at Beacon Street and Charles Street.



Existing Conditions Map | Credit: Touloukian Touloukian

03
Community Engagement

The Boston Common Garage serves an important role for both the City and the State. It is a critical, revenue-producing asset for the Commonwealth, as well as providing working capital for the Boston Common.

The Boston Common is the nation's first public park. In addition, the Garage is part of an active ecosystem for public and cultural events, given its location near the Parkman Bandstand and the new Embrace sculpture and 1965 Freedom Plaza.

Findings

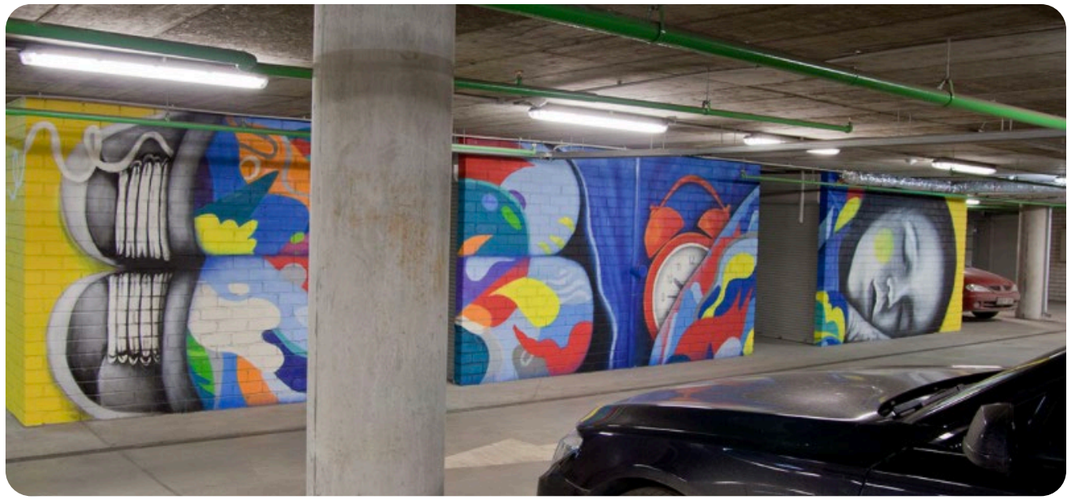
The Parkman Bandstand and Boston common vicinity have a long history of hosting civic gatherings and rallies, around many issues of public discourse. Nearby is the Commonwealth Shakespeare Company stage, home to plays, arts festivals and opportunities for local students to learn about the performing arts. The Embrace Memorial and 1965 Freedom Plaza are an important cultural symbol of equity and justice for Boston residents and all those who visit the city.

Each of these important civic and cultural places adds to the cultural and civic embodiment of this area of the Common.

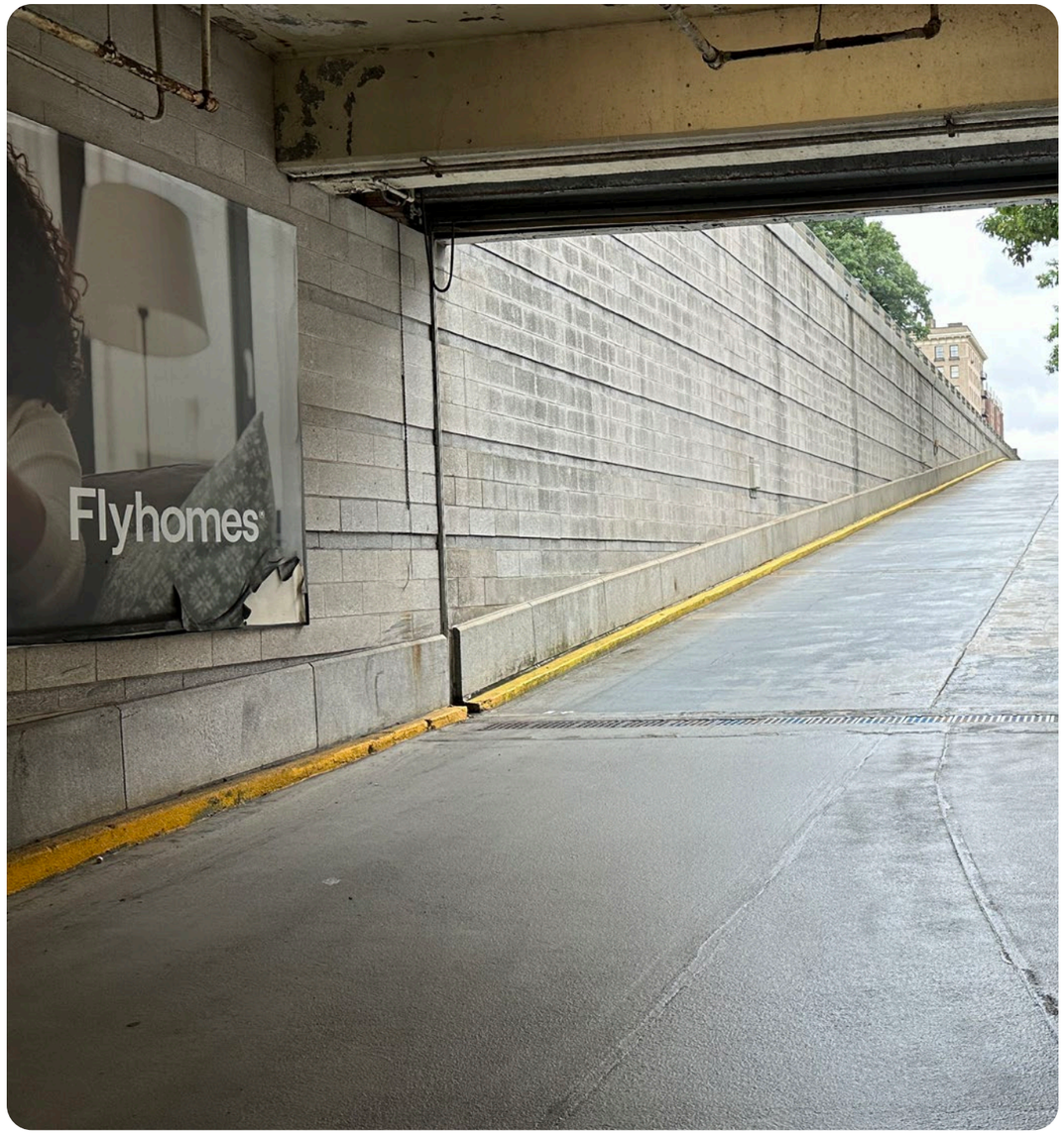
As part of this ecosystem, it is important to have the Boston Common Garage recognize this unique position, by using art inside and outside the Garage, a continuation of the recommendations for all the MCCA facilities. These installations should reflect the importance of the history of events that have taken place on the Common, and celebrate diversity, equity and inclusion.

Discounted parking for patrons of the Shakespeare Company is currently provided in the Boston Common Garage. The Garage could offer discounted rates for the EMBRACE memorial, as well as non-profits and students attending conventions, so that they can explore these installations, as well as nearby attractions such as the Freedom Trail, historic landmarks, and the Boston Public Garden.

In addition, community residents expressed the need to expand EV charging at the garage and ultimately move to “V to G”, which builds extra capacity for the system and provides for more bike sharing/electric bikes. Ongoing maintenance of the charging facilities needs to be addressed, to share the MCCA’s commitment to sustainability.



Mural Wall | Photo Credit: unknown



Existing Ramp Wall as Potential Mural Location | Photo Credit: VHB

04
Financial Analysis

This section of the report provides an analysis of the financial performance and capital requirements of the Boston Common Garage.

The Boston Common Garage ("BCG") is an underground parking facility with 1,350 spaces located beneath Boston Common, the oldest public park in the United States. The BCG provides a vital service for visitors to the park, as well as for those accessing downtown Boston's numerous attractions, businesses, and government buildings. It also serves as a key source of revenue for the Massachusetts Convention Center Authority (MCCA), generating approximately $12 million annually.

Key Findings:

- Implement a 3% price increase starting in 2026, which would generate an additional $3.9 million in revenue from 2026 to 2035, contributing $2.8 million in incremental profit for the facility.
- Propark should provide MCCA Leadership with quarterly reports on key performance metrics. This would enable close monitoring of financial performance and identify opportunities for on-going optimization of revenue and expense management.
- Selling the garage at this time is not recommended due to its current value and financial contribution to the MCCA's portfolio.

Boston Common | Photo Credit: Wikimedia Commons

Market Overview & BCG Financial Trends

Evolving Garage Business in Downtown Boston Amidst Urban Redevelopment

The garage business in downtown Boston is undergoing significant changes due to ongoing construction and redevelopment projects. These projects are reducing the number of available parking spaces while improving garage amenities, quality, and overall condition, which is driving parking rates higher. For instance, the demolition of the Government Center Garage, part of a $1.5 billion urban renewal project, is transforming the area with new high-rise developments. This has reduced public parking, disrupted traffic, and affected local businesses.

Despite these challenges, parking facilities such as The Garage at Post Office Square continue to command premium rates by offering 24-hour services and high-quality amenities, including electric vehicle charging stations and sustainability initiatives like groundwater reclamation systems. Overall demand for parking in downtown Boston remains strong, particularly in the financial districts and areas near major development projects. Future redevelopment efforts, environmental considerations, and transportation changes will continue to shape the garage business. In general, garages are expected to maintain their premium value.

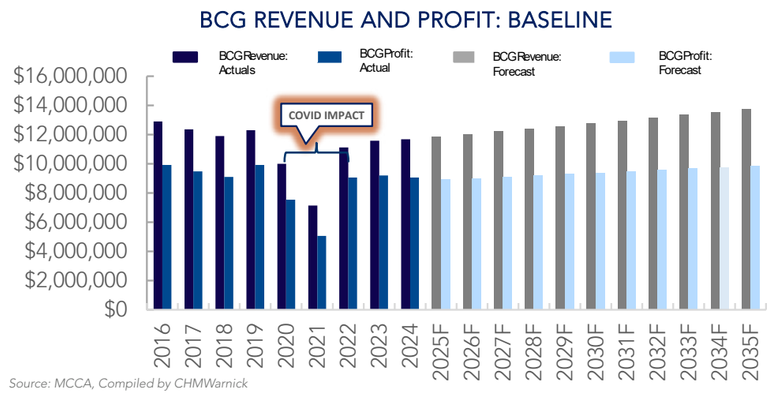
Boston Common Garage

The Boston Common Garage ("BCG") is an underground parking facility located beneath Boston Common, the oldest public park in the United States. The BCG serves as a key amenity for both visitors to the park and those accessing downtown Boston's numerous attractions, businesses and government buildings. The BCG is easily accessible from major roadways and is well-connected to public transportation, with nearby MBTA subway stations (Green Line and Red Line) providing easy access to other parts of the city. The garage is open 24 hours a day, seven days a week, providing flexible parking options with 1,350 spaces accommodating a variety of users, whether attending an event, visiting local attractions, commuting to work, or serving as a home base for local Boston residents purchasing monthly parking passes. The Boston Common Garage (BCG) is managed by Propark Mobility under a third-party contract that expires in August 2026.

Overall BCG Revenue/Profit Trend 2016 - 2035

The BCG is managed on a third-party basis by Propark Mobility under a contract that expires in August 2026. The BCG is generating approximately $12 million in annual revenue (FY24) and is forecasted to increase to $13.8 million in 2035. Revenue from monthly parkers serves as a strong foundation for the BCG's overall performance, representing approximately 40% of sales, with the number of monthly parkers ranging between 950 and 1,000.

Profitability for the Boston Common Garage (BCG) peaked in 2019 at 81%, or $9.9 million. Between FY25 and FY35, profit margins are projected to decline slightly, ranging from 75% to 72% ($9 million to $9.9 million under baseline projections), as labor-related expenses are expected to increase.

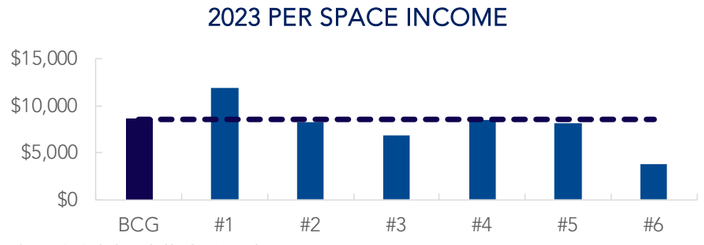


Source: MCCA, Compiled by CHMWarnick

BCG Performance Benchmarking

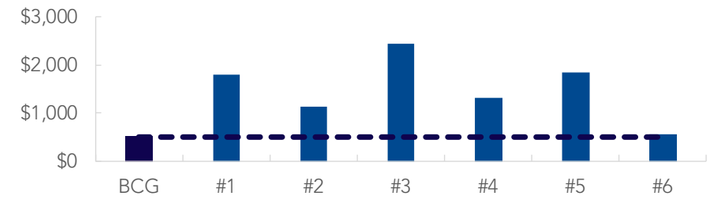
Performance Benchmarking Parking Operations – Revenue/Expense Per Space

Propark provided benchmarking data for comparable garage operations in the Boston market. The BCG's revenue per space exceeds the market average, largely due to a strong base of monthly parking revenue and its prime location for transient parkers. Costs are also favorable compared to similar operations, primarily because the current agreement with Propark is highly advantageous for the MCCA, as annual expense increases are capped and have not kept pace with inflation. This agreement expires in August 2026, when it is expected to be renegotiated to reflect a more balanced sharing of operating costs between the MCCA and Propark.



Source: ProPark, Compiled by CHMWarnick

Although the BCG has performed well, its pricing has consistently been 3% to 5% below market, indicating an opportunity to raise rates and offset future cost increases anticipated in upcoming contracts. These price increases are not currently reflected in the Baseline scenario and would provide incremental revenue to the forecast.



Source: ProPark, Compiled by CHMWarnick

		All Garages in the Survey are Boston Based					
Facility Name	**Boston Common**	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**
Spaces	**1350**	**550**	**800**	**900**	**1050**	**600**	**750**
Annual Income	**$11,610,000**	**$6,521,000**	**$6,576,000**	**$6,121,000**	**$8,866,000**	**$4,852,000**	**$2,826,000**
Per Space Income	**$8,600**	**$11,856**	**$8,220**	**$6,801**	**$8,444**	**$8,087**	**$3,768**
Annual Expense	**$695,599**	**$996,000**	**$914,000**	**$2,198,000**	**$1,391,166**	**$1,111,000**	**$421,000**
Per Space Expense	**$515**	**$1,811**	**$1,143**	**$2,442**	**$1,325**	**$1,852**	**$561**

Source: MCCA, Compiled by CHMWarnick

Capital Spend & Customer Sentiment

Capital Spend by Year

Capital expenditures for the BCG between FY25 and FY35 are projected to total just under $70 million. Ongoing or "routine" maintenance projects account for $12.2 million, with planned capital for "major" projects amount to $56.7 million. These major projects include the garage roof deck with waterproofing, a CO2 system, and parking controls, among others. Coordination with the Boston Common Parks & Recreation Team is required for the garage roof deck waterproofing, which was recently rescheduled from FY35 to FY30. Capital projects are managed by the parking operator in collaboration with MCCA resources.

Major Capital Projects	
Year	Amount
2025F	$300,000
2026F	$0
2027F	$1,500,000
2028F	$0
2029F	$1,200,000
2030F	$40,700,000
2031F	$0
2032F	$6,000,000
2033F	$1,800,000
2034F	$1,500,000
2035F	$3,700,000

Source: MCCA, Compiled by CHMWarnick

Boston Common Garage – Customer Sentiment

The BCG generally receives positive feedback, with users praising its convenience and location. Many users appreciate the cleanliness, well-lit spaces and ease of access. The BCG also offers a range of parking options, including affordable rates for evenings, weekends, and overnight parking, especially when booked online. However, there have been occasional complaints about the payment kiosks, particularly during hot weather when poor ventilation in the payment area caused issues. Additionally, the garage's low clearance can be problematic for larger vehicles, though staff are often helpful in these situations. Overall, the BCG is regarded as a preferred choice for parking in the heart of Boston, especially for those prioritizing proximity to the city's main attractions.

Parking Operator

Propark Mobility

Propark Mobility (Propark) is a national parking management company that operates and manages a diverse portfolio of parking facilities across the United States, including the BCG. Propark oversees all aspects of BCG's day-to-day operations, including customer service, maintenance, staffing, security, and the integration of advanced parking technologies to optimize the facility's efficiency.

Founded in 1984, Propark started with a modest 60-space parking lot in Hartford, Connecticut, and has since grown to manage over 1,000 locations across more than 140 cities nationwide. The company specializes in parking, mobility, and electrification services, staying at the forefront of technological innovation to deliver top-tier service and customer satisfaction. Propark's commitment to positive employee practices and social responsibility fosters a thriving company culture while supporting local communities across the country. From managing event parking at Boston's TD Garden to providing mobility and electrification services at Google's West Coast campuses, Propark continues to deliver exceptional results, blending its national reach with a personalized, customer-focused approach.

The current management contract for the BCG is set to expire in August 2026. MCCA is generally pleased with the performance and relationship with Propark.

Consolidated Findings

- Implement a 3% price increase starting in 2026, which would generate an additional $3.9 million in revenue from 2026 to 2035, contributing $2.8 million in incremental profit for the facility.
- Propark should provide MCCA Leadership with quarterly reports on key performance metrics. This would enable close monitoring of financial performance and identify opportunities for on-going optimization of revenue and expense management.
- Selling the garage at this time is not recommended due to its current value and financial contribution to the MCCA's portfolio.

Baseline Projection	2026F - 2035F
Projected Revenues	$128,772*
Incremental Revenue	**$3,863***
Projected Profit	$94,415*
Incremental Profit	**$2,832***

**Rounded to the nearest thousand*

05
Deferred Maintenance

Originally constructed around 1964 and renovated in 1995, the Boston Common Garage (BCG) interiors are managed by a third party vendor and are well maintained. A third party study performed by SGH in 2015, and again updated in 2020, included a summary of projected needs and costs for the facility. Additional deferred maintenance items and costs were identified within this study. Together, a list of key items are included with overall approximate deferred maintenance costs.

The MCCA previously obtained the services of Simpson, Gumpertz, & Heger (SGH) to develop "Facility Inspection & Fixed Asset Replacement Planning" documents for each facility, which were completed in 2015. SGH also assisted with a 10-year Capital Replacement plan in 2020 to provide an updated assessment of the deferred maintenance lists produced in 2015, with a preliminary forecast of when each system should be repaired or replaced.

Our design team evaluated these documents, along with a collection of other existing condition documents and on-site reviews, to provide an overall list of key deferred maintenance priorities. Recommendations for future repair/replacement require consistent on-site evaluation in order to meet continued operation requirements.

Since the garage is primarily underground, ongoing maintenance and repairs of the garage roof waterproofing system, as well as the mechanical fresh air/exhaust systems are critical to its ongoing operations. The command center, as the primary security room, is outdated and in need of upgrades. All are necessary to maintain reliable performance and building safety. The MCCA should continue to perform regular preventive maintenance, timely upgrades, and testing to support and ensure the full extent of the "useful life" cycle. Exterior envelope and interior materials review was based on SGH's report.

Aside from above, the deferred maintenance list shown on the next page represents a consolidated view of the key deferred maintenance items.

Key Findings:

Mechanical + Plumbing + Fire Protection

- Replace (1) air compressor pump that serves the sub-basement dry piping system.
- Replace all corroded sprinkler piping, fittings and couplings throughout.
- Replace garage ventilation system (supply & exhaust fans). Provide VFDs at new locations.
- Install a proper heat pump split system for the server rack room
- Provide new equipment to re-zone the office, security, server, and switchgear rooms.

Electrical + Fire Alarm

- Upgrade or replace emergency power paralleling switchgear and transfer switches.
- Install light density HID lighting fixtures.

Boston Common | Photo Credit: Google Earth

List of New Deferred Maintenance Projects

Item #	SGH Report CRP #	Cap Invest. List #	Asset Title	Location	Description	Total Project Cost (3)	Permit Cost (4)
DF-01	N/A	N/A	New Split System for Server Rack Room	Facility	Install a proper split system for the server rack room (verify this hasn't been completed since SHG report).	$107,890	$66,352
DF-02	N/A	N/A	Equipment Replacement	Facility	Provide new equipment to re-zone the office space, security space, server room, and switch-gear room. Demolish and remove existing AHU-1.	$205,972	$126,672
DF-03	N/A	N/A	Water Heater / Expansion Tank Replacement	Facility	Replace existing 30-gal water heater on the lower level in the southwest corner maintenance room with a new 30-gal water heater and new expansion tank.	$3,250	$1,998
DF-04	N/A	N/A	Expansion Tank	Facility	Provide expansion tank for existing 80-gal water to extend life expectancy of the water heater.	$3,900	$2,398
					Grand Total:	**$321,012**	**$197,422**

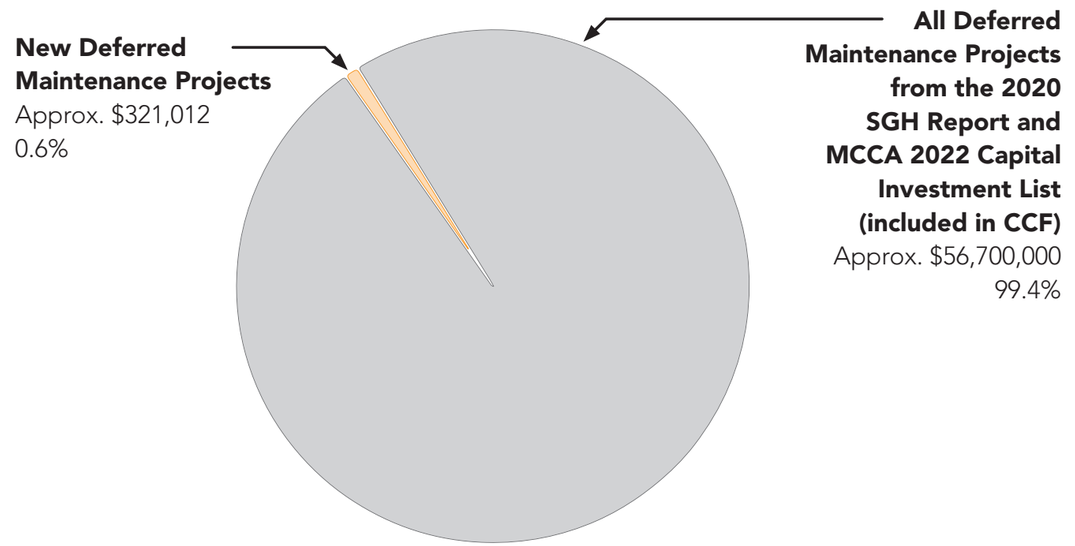
List of Current & Ongoing Deferred Maintenance Projects (see note #2)

Item #	SGH Report CRP #	Cap Invest. List #	Asset Title	Location	Description	Total Project Cost (3)	Permit Cost (4)
DF-05	6.6	N/A	Emergency Generator	Facility	Replace the existing emergency generator diesel fuel with either ultra0low sulfur (ULSD) diesel or HVO low carbon, low emissions, fossil free, renewable diesel as eco friendly alternatives. This potential fuel conversion should only be done in conjunction with the generator engine manu-facturer's recommendations and warranty.	See Note #1	See Note #1
DF-06	5.1 / 5.2	N/A	New Garage Supply and Exhaust Fans	Facility	Replace garage ventilation system (supply and exhaust fans). Provide VFDs for all new supply and exhaust fans.	See Note #1	See Note #1
DF-07	3.2	N/A	Waterproofing Repairs	Facility	Provide water-proofing repairs.	See Note #1	See Note #1
DF-08	6.4	N/A	HID Light Fixtures	Facility	Install light density HID lighting fixtures	See Note #1	See Note #1
DF-09	6.7	N/A	Emergency Power	Facility	Replace emergency power paralleling switchgear & transfer switches.	See Note #1	See Note #1
DF-10	N/A	N88	Upper Level/Park Roof Replacement	Facility	FY23 budget for design efforts needed for coordination with Boston Parks.	See Note #1	See Note #1
DF-11	N/A	R28	Public Safety Command Center Upgrade	Facility	Design only. Renovation of existing space to include carpet, workstation, equipment. Review HVAC.	See Note #1	See Note #1

Deferred Maintenance Costs

Total Project Costs

- Approx. **$321,012** of New Deferred Maintenance Projects. Escalated to FY 2026 (July 1, 2025).
- Approx. **$56,700,000** of All Deferred Maintenance Projects from the 2020 SGH Report and MCCA 2022 Capital Investment List. (See Notes)



Total Deferred Maintenance Costs:
Approx. $57,021,012

New Deferred Maintenance Projects

All Deferred Maintenance Projects from the 2020 SGH Report and MCCA 2022 Capital Investment List (included in CCF)

Entrance | Photo Credit: Wikimedia Commons

(1) SGH Report: Provided by the MCCA, a Capital Replacement Program outlining deferred maintencance projects scheduled through fiscal year 2029.

(2) MCCA FY2025 Capital Projects Budget: Provided by the MCCA, a running list of Capital Projects including facility improvements, technology upgrades, and equipment purchases for fiscal year 2025.

(3) Total Project Cost: Hard costs as determined by a cost estimator plus a 30% mark-up for soft costs.

(4) Permit Cost: inclusive to total costs, this is 61.5% of the Total Project Cost. This number should be used for determining MAAB upgrade requirements per the 30% threshold set fourth by the State of MA.

Note #1: Costs are to be identified from the 2020 SGH Report and/or the MCCA Capital Investment Report provided by the MCCA. Project costs have already been captured in the CCF as per CHMW coordination with MCCA and A&F.

Note #2: See the 2020 SGH Deferred Maintenance Project List for a full list of additional project costs. These costs have already been captured in the CCF as per CHMW coordination with the MCCA and A&F. List of Key Deferred Maintenance Projects is a snapshot of the SGH and Capital Projects reports provided by the MCCA. These are highlighted as the more important projects which should be undertaken.

Note #3: The 2020 SGH Costs have been escalated to July 1st 2025 (FY 2026).

06

Sustainability & Decarbonization

The MCCA can serve as a leader in the realm of sustainability while also fulfilling its economic mission. Holistic sustainability, energy efficiency, operational decarbonization, embodied carbon reduction, the creation of healthy, equitable spaces, and community stewardship are at the heart of MCCA's sustainability initiatives.

Sustainable design and operations of all facilities is a core goal of MCCA's mission. As the facility is currently not yet net carbon neutral operations, the MCCA staff is currently developing ongoing energy conservation measures, and opportunities to implement off-site renewable energy procurement (VPPA). Although a comprehensive plan is not yet fully coordinated, a comprehensive sustainability framework, path for operational decarbonization, and embodied carbon reduction strategy will help MCCA quantify and track the extensive sustainability and carbon neutral initiatives already underway at the BCG.

Establishing a well-developed sustainability framework is valuable for informing many aspects of the MCCA's buildings and operations – from policy and procurement decisions to facility design requirements. Identifying pathways for net carbon neutral operations is critical for any future renovation of MCCA facilities. Benchmarking of present-day energy usage and emissions provides a valuable metric by which to assess the strategies available to achieve operational carbon neutrality.

Lastly, with regard to embodied carbon, key considerations for both the existing systems and renovations have also been highlighted. For renovations and interior fit-outs, prioritizing embodied carbon reduction is of utmost importance. Minimizing embodied carbon should be a priority for new capital projects and vendors.

Key Findings:

- Develop holistic sustainability guidelines that are tailored to MCCA's requirements, priorities, and values to be applied across all facilities.
- Develop an investment-grade ASHRAE Level 3 Audit, before implementing the conservation measures. Ensure all measures implemented align with the long-term decarbonization goals of the MCCA.
- As the building is currently all electric, review and select the cost-optimal blend of off-site renewable electricity procurement options to eliminate the associated BCG Scope 2 emissions.
- Continue reporting energy usage and emissions trends to BERDO.
- Develop a tailored and formally adopted embodied carbon reduction strategy to deploy on future projects and ongoing operations.

Sustainability & Decarbonization

- Sustainability Framework
- Operational Carbon
- Embodied Carbon
- Energy Efficiency

Sustainability Framework

Sustainable design and operation of MCCA facilities is a core driver for this organization. A structured sustainability framework that provides guidelines and quantifiable metrics can enable MCCA to track progress, set goals and targets, and measure success.

Goals

Sustainability touches on every aspect of building, operations, and events at MCCA facilities. Currently, the MCCA does not have a comprehensive document to guide, track, and report sustainability progress. A holistic framework can provide sustainable guidance for built projects and vertical development, horizontal site and infrastructure projects, vendor services and operations, and event management. While numerous state and local regulations, policy drivers, codes, and priorities are in place, a consistent, comprehensive, and holistic framework to guide all four facilities does not exist. Further, there are many sustainability best practices that reach beyond minimum regulations and policies: energy efficiency, operational and embodied carbon, water conservation, waste management, health and wellbeing of building occupants, stormwater management, and biodiversity-- that enhance MCCA's investments and provide co-benefits in MCCA's role as a community steward.

Objectives

- Understand, align, and meet or exceed MCCA's sustainability goals and metrics with current energy codes, regulations, public agency requirements, reporting frameworks and local/regional goals.
- Develop holistic, streamlined processes and consistent metrics for tracking, quantifying, and implementing sustainability initiatives, measures, and data collection and tracking across all MCCA facilities.

Recommendations

- Continue to meet all requirements of the MA Energy Code and the MA Stretch Code.
- Elect to meet or exceed the requirements of Executive Order 594 for electric vehicles.
- Elect to establish formal sustainability guidelines and requirements for all MCCA facilities.
  a. Benchmark the MCCA's sustainability initiatives against peer institutions and organizations.
  b. Identify project-appropriate certification opportunities for building, site, and infrastructure projects.
  c. Establish flexible, but measurable "good, better, best" guidelines for vendors and events management that target sustainability goals that are meaningful and aligned with MCCA's mission.
- Elect to pursue project-appropriate certifications where appropriate, such as Parksmart for parking facilities or Envision for infrastructure projects.
- Elect to create a clear messaging platform/strategy for communicating MCCA's "good work" and community stewardship in the form of a comprehensive website, tracking tools, and/or yearly sustainability reports.

Focus Areas

A holistic sustainability framework should establish strategies, metrics, and set goals in the following areas:

Energy Efficiency and Operational Carbon: Increasing energy efficiency and reducing operational carbon with the goal of fully decarbonizing building systems is a primary goal for all MCCA facilities. An in-depth analysis of existing conditions and identification of high-level strategies is included in this report.

Embodied Carbon: Prioritizing tangible strategies for reducing embodied carbon in interior fit-outs, major renovations and vendor activities is also a goal for MCCA. While strategies will be unique to each condition and are often project specific, high-level strategies, metrics and targets are recommended.

Water Conservation and Rainwater Reuse: The conservation of potable water use (both inside and outside the facility) is also identified a priority for MCCA facilities. Reductions in potable water inside the building can be achieved via use of low-flow plumbing fixtures. Reductions in potable water consumption outside the building can be achieved with site design strategies that include the use of drought-resistant native vegetation. Rainwater reclamation, water sub-metering, and leak detection systems should also be considered with each project.

Waste Management: Construction waste reduction and waste diversion should be made a priority for any building and site related projects. From an operational waste perspective, the greatest source of waste at the convention centers and exposition halls is the waste generated by events. Targeting strategic opportunities for waste diversion and tracking of waste are ongoing measures at the BCG facility which can further be optimized and quantified.

Health and Wellbeing of Building Occupants: Enhancing the health and wellbeing of building occupants can be addressed in a variety of ways, focusing on providing access to daylight, provision of high-quality water and air, good acoustics, opportunities for socialization, access to healthy food, and the creation of outdoor spaces for recreation and enjoyment. Healthy material selections for building projects and vendors should be considered not only for embodied carbon considerations, but also with regard to the health and well-being of people who come into contact with these materials at all points and ethical sourcing considerations.

Landscape, Stormwater Management, Biodiversity, and Biophilia: The incorporation of landscape and low-impact development strategies can provide aesthetic enhancements and help mitigate stormwater management issues while also supporting biodiversity, providing recreational space, reducing the urban heat island effect, and elevating connections to nature and biophilia. Bringing biophilic elements into the building can enhance occupants' happiness levels, reduce anxiety, and contribute to wayfinding.

Boston Common | Photo Credit: Unknown

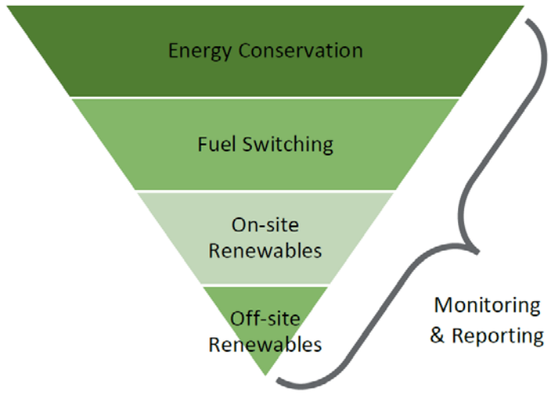
Operational Carbon

A top priority for the MCCA is to achieve Operational Carbon Neutrality by 2030 for all four facilities.

Goals

Set within a broader sustainability framework, a top priority for the MCCA is to achieve **carbon neutral operations**. Carbon neutral operations means all energy used on-site comes from carbon-free sources. This differs from Net Zero Energy operations (on-site energy demand equals on-site energy supply) in that it requires all purchased energy to come from carbon-free sources and does not require all energy to be generated on-site. Carbon neutral operations can be achieved by the following steps:

1. **Energy Conservation** to save money and reduce electricity and natural usage.
2. **Fuel Switching** to eliminate all remaining on-site natural gas usage (i.e., Scope 1 emissions).
3. **On-Site Renewable Energy Generation** to save money and reduce demand for purchased electricity.
4. **Off-Site Renewable Energy Procurement** to eliminate remaining energy-related GHG emissions.
5. **Monitor and Report** progress toward carbon neutral operations to maintain accountability and serve as a leader for the Commonwealth of Massachusetts and the events industry.



Four-Tiered Approach to Decarbonize Existing Buildings

Objectives

- Refine, develop, and implement cost-effective Energy Conservation Measures for each site.
- Upgrade or retrofit all appropriate systems from natural gas to electric alternatives.
- Upgrade or retrofit all heat pump equipment to use low global warming potential (GWP) refrigerants.
- Maximize the cost-effective installation of on-site renewable energy.
- Procure carbon-free energy sources for all remaining purchased energy.
- Monitor and report decarbonization process.

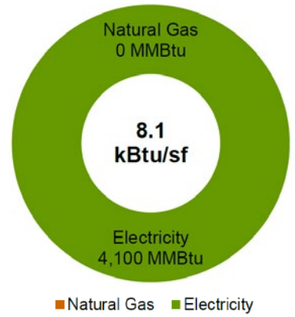
Existing Conditions

The existing assessment for operational carbon can be divided into **energy uses** and **energy supply**.

Energy Usage: Electricity is used for lighting, egress, electric vehicle charging, and ventilation throughout the parking area; and plug loads, heating, cooling, and DHW in the administrative area. Natural Gas is not used in the facility.

In 2023, the BCG consumed approximately 4,100 million British thermal units (MMBtu) or 1,200 Megawatt hours (MWh) of electricity. As a 510,000 square foot (sf) facility, 4,100 MMBtu translates to a site energy use intensity (EUI) of 8.1 thousand British thermal units per square foot (kBtu/sf).

Energy Usage Benchmark: Benchmarking this EUI performance against peer facilities against industry peers, Energy Star Portfolio Manager reports the typical parking structure with ventilation and no heating to be approximately 11.4 kBtu/sf. This places the EUI of the BCG at about 28% lower than the industry average.



Annual Energy Usage at BCG

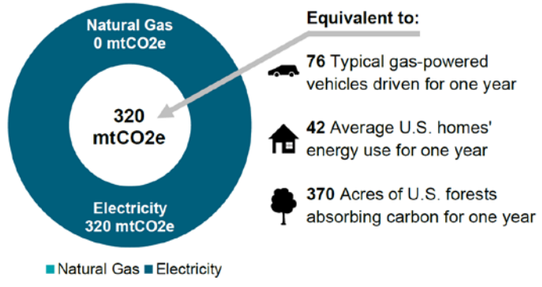
Exit Ramp | Credit: Google Earth

Operational Carbon (continued)

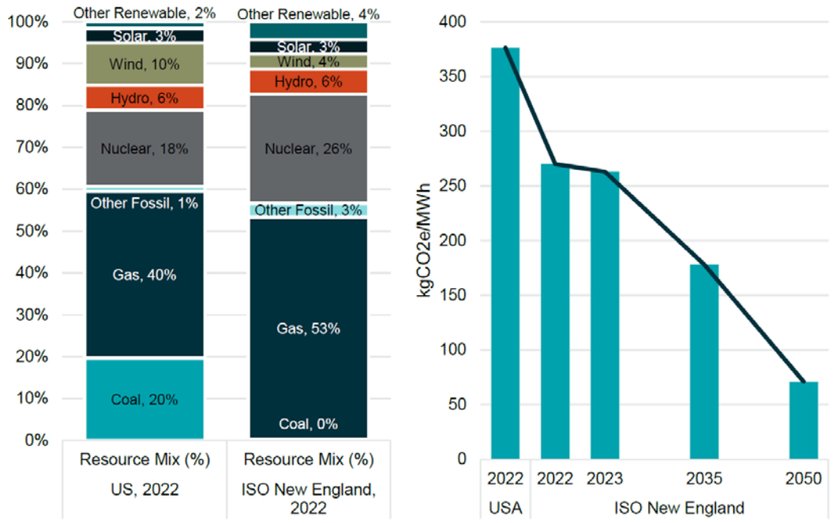
Existing Conditions (continued)

Energy Sources: Electricity is delivered to the site by Eversource. Based on the greenhouse gas (GHG) emissions factors of 263 kilograms of carbon dioxide equivalent (kgCO2e) per MWh for electricity (ISO New England 2023), current BCG energy usage equates to approximately 320 metric tons of CO2 equivalent (mtCO2e) per year.

Energy Sources Benchmark: Currently, the BCG does not procure any renewable electricity beyond what is served by the ISO New England grid on average. For context, the 2023 emissions factor for ISO New England is about 30% less than the national average emissions factor of 376 kgCO2e/MWh (eGRID, 2022). As more renewable energy is added to the grid, the ISO New England emissions factor is projected to drop to 178 kgCO2e/MWh by 2035 and 71 kgCO2e/MWh by 2050 (BERDO, 2024).



Annual Operational GHG Emissions at BCG



Comparison of ISO New England Energy Mix and Emissions Factor to US Average

Recent and Ongoing Efforts

To reduce energy usage and supply energy from lower carbon sources, the MCCA has been implementing many efforts at the BCG.

Lighting Upgrades: LED lighting conversion in the garage was completed about three years ago. This significant change included occupancy sensors with dimming to reduce the lighting without turning completely off (for safety).

Electric Vehicle Charging: Charging stations for up to 25 Electric Vehicles have been installed at the BCG. Significant issues with the ongoing maintenance of the charging stations have been identified, attributed to factors involving Eversource and beyond the control of the MCCA. There is a plan to install more charging stations at the BCG, but this is a slow process due to Eversource power requirements and the slow approval process for grants

Virtual Power Purchase Agreement (VPPA): A VPPA is a type of contract for off-site energy procurement. The MCCA has finalized a contract worth 19,500 MWh per year of renewable electricity for a period of fifteen years. Although primarily intended to mitigate Scope 2 emissions from the BCEC, the VPPA is expected to exceed BCEC demand with some remaining supply to potentially offset other MCCA facilities. Additionally, the MCCA Board has authorized a second VPPA worth 20,000 MWh per year for fifteen years which is expected to further reduce Scope 2 emissions across all MCCA facilities.

Recommendations

Energy Conservation Measures (ECMs) beyond recent and ongoing efforts at the BCG are identified in the recent ASHRAE Level 1 Audit Report (October 2024). Key ECMs include:

1. Recommission the ventilation and exhaust fans serving the parking area.
2. Install heat pumps to serve the administrative area, replacing the existing electric resistance and baseboard heating.

Combined, the identified ECMs have the potential to conserve approximately 110 MWh of electricity per year. Refer to the ASHRAE Level 1 Audit Report for more details.

Fuel Switching at the BCG has been determined unnecessary because there is currently no natural gas consumption at the site.

On-site Renewables at the BCG has been determined infeasible because it is located underground beneath a public park.

Assuming all recommendations for energy conservation are implemented, the BCG may experience up to a 10% reduction in demand for off-site purchased energy and associated GHG emissions.

Operational Carbon (continued)

Recommendations (continued)

Carbon-free Energy Procurement is necessary for carbon neutral operations. As illustrated above, energy conservation can have a meaningful impact on net energy demand, but there still is expected to be demand for approximately 3,800 MMBtu (1,100 MWh) of off-site purchased electricity. With the purchase of off-site electricity comes associated GHG emissions. Over time, some of these annual emissions will reduce as the electric grid and continues to get cleaner, but current projections show the electric grid will not be fully carbon-free within the time frame of the MCCA's carbon neutrality target. Therefore, supplemental clean energy procurement is required. To do this at the BCG, the MCCA may consider any of the three pathways established by BERDO (which the MCCA is not required to follow, but is recommended for consistent implementation of GHG reduction strategies):

1. Enrolling into the Boston Community Choice Electricity and choosing the "Standard" or "Green 100" service.

2. Buying and retiring Mass Class I Renewable Energy Certificates, either unbundled or bundled as part of a PPA inside ISO New England.

3. Signing additional VPPAs outside ISO New England.

The MCCA is in the final stages of establishing a virtual power purchase agreement (VPPA) to procure approximately 19,500 MWh of carbon-free electricity per year for fifteen years (pathway 3). Although primarily intended to serve the BCEC, when active, the VPPA is expected to exceed both the current and future (decarbonized) electricity demand at the BCEC with potentially enough spare capacity to meet the full electricity demand of the BCG as well.

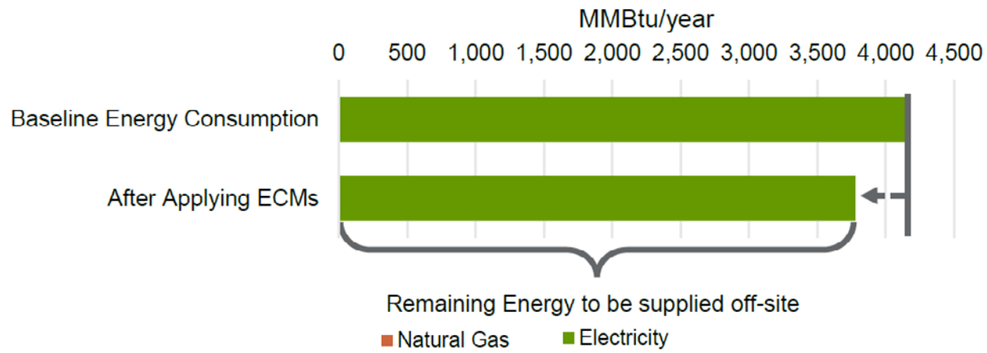
Procuring carbon-free energy in addition to implementing all site-level recommendations results in a clear pathway to carbon neutral operations at the BCG.

Underscoring all this effort, Monitoring and Reporting progress toward carbon neutral operations through established and transparent channels builds trust and accountability for the MCCA to follow through on its goals. As stated, the MCCA is not required to adhere to BERDO. However, the associated emissions disclosure platform is well established for Boston area facilities to report to; has a straightforward reporting process; and contributes to the BCG demonstrating local leadership. As such, it is recommended the MCCA continue reporting energy and emissions trend data to the BERDO platform moving forward.

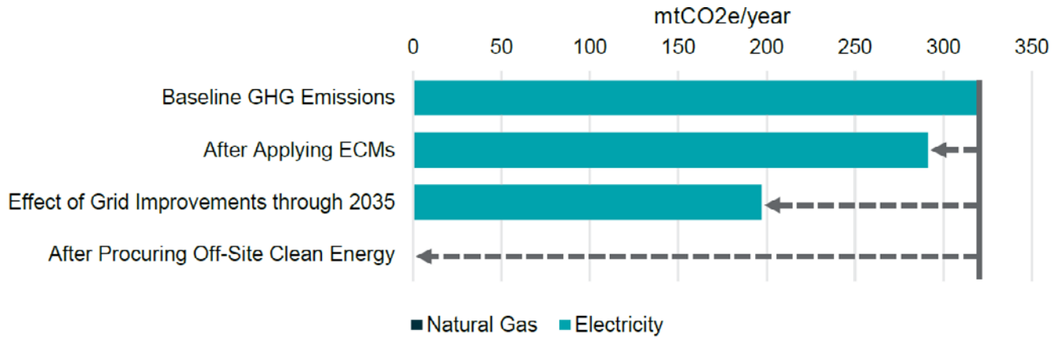
Beyond BERDO, there may be additional opportunities to explore more granular energy data monitoring and reporting, such as time series data and submetering, through other platforms which may benefit the MCCA through greater insight into energy usage trends.

Conclusion

In summary, the BCG has a viable pathway to achieve carbon neutral operations by implementing a combination of energy conservation, off-site renewable energy procurement, and ongoing monitoring and reporting.



Projected Impact of Recommended Strategies on Off-Site Energy Demand



Projected Reduction in GHG Emissions from Recommended Strategies

Embodied Carbon

Understanding, measuring and quantifying embodied carbon baselines will enable MCCA to establish reduction targets for all qualifying projects.

Goals

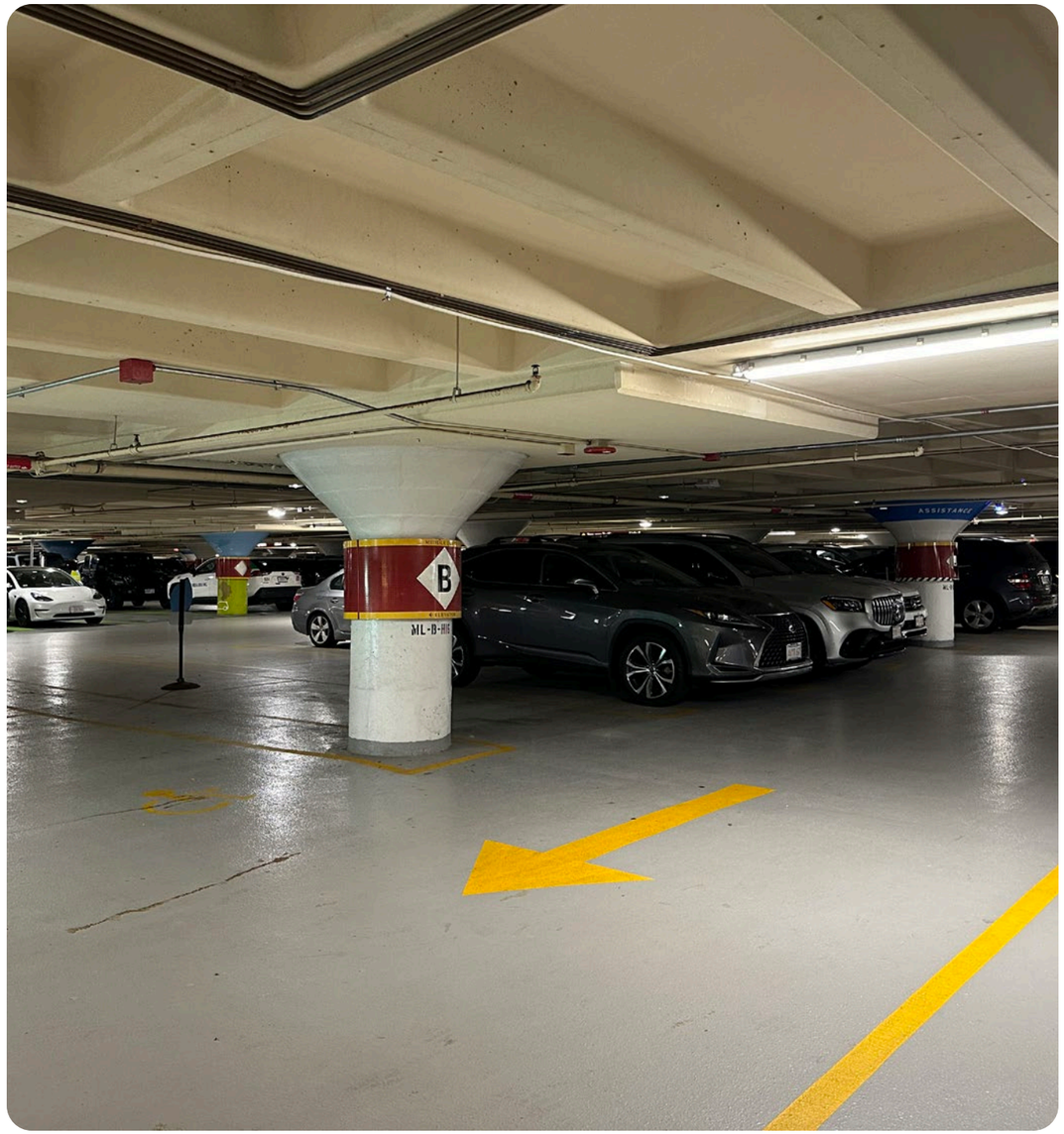
When considering full carbon neutrality, embodied carbon – the GHG emissions associated with the production, transportation and installation of materials – is an essential yet historically under-emphasized element however an increasing number of institutions and jurisdictions are starting to take embodied carbon measuring into account. There are many opportunities to effectively assess and reduce the embodied carbon of materials at all scales of facility design and operation. Prioritizing tangible strategies for reducing embodied carbon in interior fit-outs, renovations, new construction projects, and vendor activities is a goal for MCCA. While the specific strategies will be unique to each condition and project, establishing high-level strategies, metrics and targets for vertical development, horizontal development, and event management are recommended.

Objectives

- Require whole project LCAs for all significant capital projects.
- Quantify embodied carbon for key materials.
- Require all significant capital projects to demonstrate a 10% reduction in embodied carbon.
- Calculate embodied carbon for all MEP and interior fit-out projects.
- Reduce embodied carbon for key materials.
- Understand additional embodied carbon impacts.

Recommendations

- For major renovations, interior fit-out projects, new construction, or MEP upgrades more then $1M: require a baseline and proposed LCA to be run.
- Identify a target **Embodied Carbon Reduction** (potentially 10% from baseline) as project goals.
- For all projects requiring more than 10 yards of concrete, require EPDs for each mix.
- For all projects with key interior materials (ACT, carpet, or drywall), require EPDs for each product type.
- Require teams to evaluate the embodied carbon of at least three different structural systems and explore a variety of bay sizes prior to the completion of SD.
- Explore opportunities for key uses of alternate materials, such as mass timber, in projects.
- Consider providing pre-vetted standard products which comply with EC reduction targets.
- Require each project team to identify opportunities for end of life product reuse.
- Require construction teams to track onsite utility and fuel use related to construction.



Parking Garage | Photo Credit: Touloukian Touloukian

Energy Efficiency Summary Outline

DMI has completed an ASHRAE Level 1 energy audit for the Boston Common Garage (BCG) to help determine the building's current energy performance and to identify energy savings measures to reduce operating costs. The audit is based on:

- 1993 construction drawings
- A site visit to meet with facility operations staff and tour the facility to gain an understanding of how the building's HVAC systems operate and a follow-up phone call to discuss mechanical and electrical sequence of operations.

The BCG is ~510,000 ft² over three levels and is open 24/7. Lighting has been renovated within the past three years with LED's and according to the site is controlled to dim to 50% output during times when occupancy is not detected. During 'off-peak' hours (typically overnight), the site attempts to limit the areas where entering cars can park to make better use of the occupancy sensors. DMI recommends the site continue to operate the lighting in this fashion as it is an energy efficient method of control.

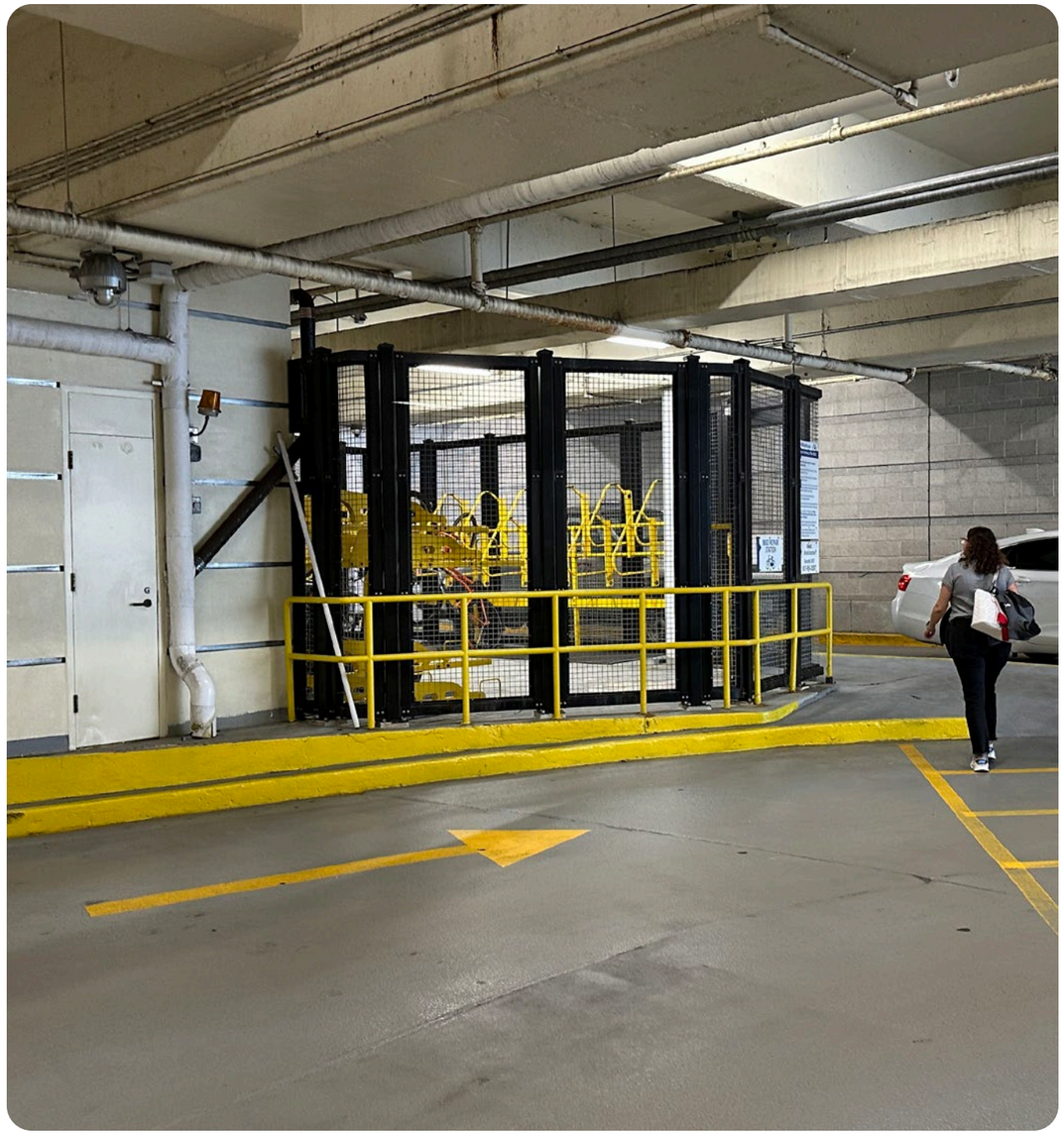
Each floor has supply and exhaust fans that operate for ventilation. BCG indicated that there are currently 11 exhaust fans and 8 supply fans. Of these fans, some have been retrofit with VFDs. BCG indicated that there are CO sensors throughout the garage and that the ventilation is controlled to a CO set point. It is unclear how the exact sequence of operations for these fans is set up and DMI has been unable to confirm the sequences with BCG. DMI recommends BCG consider a fan retro-commissioning effort to review and optimize the sequences (ECM #1). DMI recommends that the site consider retrofitting all of the fans with VFDs and modulating the fan speed based on the CO set point. When the CO set point is met, the fans should operate at minimum speed and ramp up when the set point is exceeded.

Billing Period	Area Ft²	Electric		Site EUI kBTU/ft²
		kWh	$	
6/2023 - 5/2024	510,000	1,190,707	$370,310	8.0

The mid-level, which cars enter and exit on, has various office and break room spaces that are ventilated by AHU-1. AHU-1 has an electric resistance coil which is assumed to temper the incoming ventilation air. Zone conditioning in the meeting/break rooms is typically done via mini-split heat pumps. However, the Propark office has electric baseboard heating. DMI recommends that the electric baseboard heating in the Propark office be replaced by a heat pump (ECM #2). The garage is not conditioned outside of the aforementioned office and break room spaces. The winter heating demand for the building appears to be ~35 kW based on the utility data.
The audit has focused on HVAC&R systems. A summary of utility consumption and costs for 2023 is below. The BCG uses only electricity and does not import natural gas.

This energy usage corresponds to an energy use intensity of 8.0 kBTU/ft²/year. This is significantly lower than the benchmarked 54 kBtu/ft2/year for parking garages in climate zone 5A according to the DOE's Building Performance Database. This difference is likely due to the BCG needing minimal conditioning since it is insulated underground.

The audit has identified two energy conservation measures. The identified measures include a retro-commissioning effort of the ventilation and exhaust fans as well as installing heat pumps to serve the propark office. The annual electric, gas, carbon and cost savings for each measure are estimated and shown in the appendix.



Bike Cage | Photo Credit: Touloukian Touloukian Inc.

Headhouse Entrance | Credit: Shiyang Hu, Wikimedia Commons

Energy Efficiency Recommendations

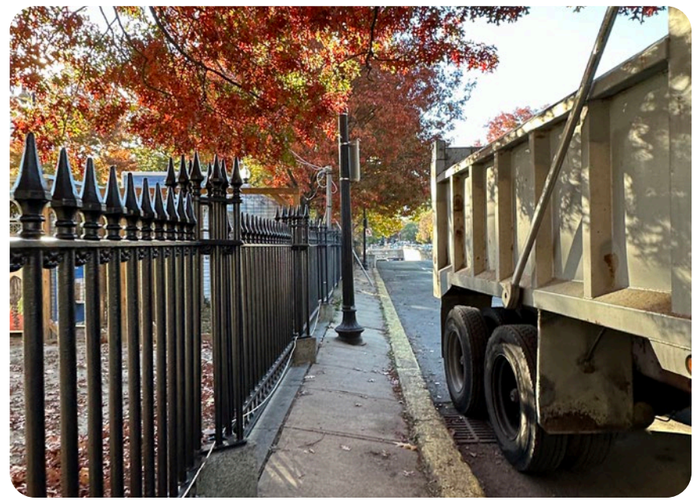
Building Location		Energy Efficiency Measure	Annual Savings Estimates			Cost Estimate ($)	Simple Payback (years)
			kWh	$	CO_2 (tons)		
Facility	**1**	Ventilation Fan Retrocommissioning	100,000	$16,697	10.70	$223,871†	13.4
Facility	**2**	Propark Office Heat Pump	8,000	$1,336	0.40	$17,381	13.0
		Total (w/5a & 25a)	**108,000**	**$18,033**	**11.10**	**$241,252**	**13.4**
					(3) Total Project Cost	**$313,628**	

Renewable Generation Recommendations

Item #	Title	Location	Description	Total Cost (3)	Permit Cost (4)
DC-01	VPPA	Facility	To be procured in 2028	Note #4	Note #4
			Grand Total:	N/A	N/A

Sidewalk close to BCG | Photo Credit: Touloukian Touloukian

Charles Street | Photo Credit: Touloukian Touloukian



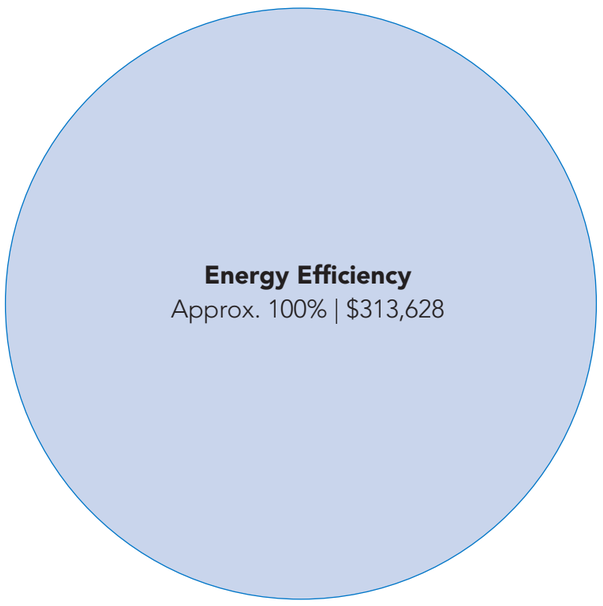
Sidewalk close to exit ramp | Photo Credit: Touloukian Touloukian

Sustainability & Decarbonization Captial Costs

Total Project Costs

- Approx. **$313,628** of Energy Efficiency Recommendations. From ASHRAE Level 1 Review. Escalated to FY 2026 (July 1, 2025).

- Off-site VPPA operation costs are not included.



Total Sustainability & Decarbonization Project Costs:
Approx. $313,628

Energy Efficiency Fuel Switching Renewables

BCG Exit Ramp | Photo Credit: Touloukian Touloukian

(1) SGH Report: Provided by the MCCA, a Capital Replacement Program outlining deferred maintencance projects scheduled through fiscal year 2029.

(2) MCCA FY2025 Capital Projects Budget: Provided by the MCCA, a running list of Capital Projects including facility improvements, technology upgrades, and equipment purchases for fiscal year 2025.

(3) Total Project Cost: Hard costs as determined by a cost estimator plus a 30% mark-up for soft costs.

(4) Permit Cost: inclusive to total costs, this is 61.5% of the Total Project Cost. This number should be used for determining MAAB upgrade requirements per the 30% threshold set fourth by the State of MA.

Note #1: Costs are to be identified from the 2020 SGH Report and/or the MCCA Capital Investment Report provided by the MCCA. Project costs have already been captured in the CCF as per CHMW coordination with MCCA and A&F.

Note #2: See the 2020 SGH Deferred Maintenance Project List for a full list of additional project costs. These costs have already been captured in the CCF as per CHMW coordination with the MCCA and A&F. List of Key Deferred Maintenance Projects is a snapshot of the SGH and Capital Projects reports provided by the MCCA. These are highlighted as the more important projects which should be undertaken.

Note #3: The 2020 SGH Costs have been escalated to July 1st 2025 (FY 2026).

Note #4: Operational budget adjustment.

07
Climate Resilience

Understanding and addressing the climate risks facing the Boston Common Garage (BCG) is essential for ensuring its long-term resilience and operational continuity. Our review of the BCG's exposure to climate risk and resilience allows us to evaluate current and future climate-related hazards and provide recommendations to enhance the long-term resilience of these facilities, integrating protective measures into the facility's design and operations.

A comprehensive analysis was conducted to evaluate the BCG's climate implications and how its operations intersect with broader environmental factors. The facility's contributions to climate change were examined, focusing on topics such as greenhouse gas emissions, urban heat island effects, and impacts on local biodiversity.

An in-depth assessment focused on identifying and analyzing various climate hazards, including riverine flooding, coastal and tidal flooding, stormwater flooding, groundwater flooding, extreme heat, and extreme winter weather. By understanding these risks and their implications, strategies were developed to mitigate vulnerabilities, minimize contributions to climate change, and ensure the facility's resilience in the face of evolving climate conditions.

The Boston Common Garage (BCG) faces risk from various types of flooding due to its underground location and proximity to water bodies. The primary flooding hazards, at risk of entering the garage's ramp entries, include stormwater flooding, coastal and tidal flooding, and groundwater flooding are projected to intensify by up to 20% by the 2070s according to the City of Boston's Climate Ready Boston report.

Key Findings:

- Regularly maintain and inspect all drainage systems to ensure they are clear of debris and functioning effectively during storm events. Install leak detection systems in critical areas to provide early warnings of water ingress.
- Evaluate opportunities to waterproof the garage entrances that prevent water ingress during intense rain events.
- Consider deployable flood barriers, flood berms, or installing backwater valves to protect against flooding.
- Upgrade drainage and pump systems to handle higher volumes of water anticipated due to climate change. Evaluate opportunities to increase the capacity of stormwater drainage systems by enlarging pipes and enhancing pump capabilities.
- Install or upgrade sump pumps in lower levels to promptly remove accumulated water, particularly from groundwater seepage.
- Develop a comprehensive emergency response plan outlining procedures for preparation, response, and recovery during flood events, including trigger conditions based on weather forecasts and flood warnings.

Climate Implications

The BCG's operations have several climate implications, including contributions to greenhouse gas emissions, urban heat island effects, and impacts on local biodiversity. Addressing these implications is essential for reducing the facility's environmental footprint and enhancing its resilience to climate change.

Biodiversity

The BCG is located within the Boston Common, a nearly 50-acre urban green space. While the facility itself is underground, its surface is part of the park, which provides habitats for local flora and fauna and contributes to the city's biodiversity.

Recommendations

- The MCCA does not control the park space above the BCG but in ongoing coordination with Boston Parks and Recreation the following concepts should be promoted. Maintain and enhance green spaces in Boston Common Park to support local biodiversity and provide ecological benefits. Plant native vegetation and trees to attract pollinators and provide habitats for birds, insects, and other wildlife.

Urban Heat Island Effect

The BCG, being underground and located beneath a park, does not significantly contribute to the urban heat island effect. The green space above helps to lower ambient temperatures and provides natural cooling benefits.

Recommendations

- The MCCA does not control the park space above the BCG but in ongoing coordination with Boston Parks and Recreation the following concepts should be promoted. Maintain and increase tree canopy and vegetation in Boston Common Park to continue mitigating urban heat island effects. Use reflective or light-colored materials for any above-ground structures or surfaces associated with the BCG to minimize heat absorption.

Greenhouse Gas Emissions

The BCG contributes to greenhouse gas emissions through energy consumption for lighting, ventilation, and other operational needs. Reducing these emissions is important for mitigating climate change impacts (see the Sustainability chapter for a detailed emissions and decarbonization discussion).

Climate Risk	BCG
Riverine Flooding	Low
Coastal and Tidal Flooding	Moderate
Stormwater Flooding	High
Groundwater Flooding	Moderate
Extreme Heat	High
Extreme Winter Weather	Low
Extreme Wind	Moderate
Seismic	Low
Hail	Low

Summary of Climate Risks at BCG
Source: Climate Resilience Design Standards Tool (Resilient MA Action Team), FEMA National Risk Index

Review of Hazards

An assessment of climate risks specific to the BCG was conducted, considering past events, current hazard levels, and future projections influenced by climate change. The highest risks identified are associated with stormwater flooding and extreme heat. Groundwater flooding and extreme wind pose moderate risks, while riverine flooding, seismic activity, and extreme winter weather present low risks. Coastal flooding poses a moderate risk. Given their high-risk levels, stormwater flooding and extreme heat are the priority hazards requiring immediate attention.

In addition to these, groundwater flooding presents a moderate risk due to the facility's underground location and potential rises in groundwater levels. Extreme wind poses a moderate risk, particularly to the above-ground pedestrian pavilions and entrances. Coastal and tidal flooding present a moderate risk in the future due to projected sea level rise and storm surge, potentially affecting the facility's lower levels through inundation or increased groundwater levels. By acknowledging and monitoring these additional hazards, the BCG can develop comprehensive strategies to enhance its overall resilience to a range of climate-related risks.

Priority Hazards

Flooding Hazards

The Boston Common Garage (BCG) faces significant risks from various types of flooding due to its underground location and proximity to water bodies. The primary flooding hazards include stormwater flooding, coastal and tidal flooding, and groundwater flooding. Climate change projections indicate that these risks will intensify over time, necessitating immediate and long-term mitigation strategies. The BCG is at high risk of stormwater flooding resulting from increasing precipitation levels, which are projected to intensify by up to 20% by the 2070s according to the City of Boston's Climate Ready Boston report. Intense rainfall events can overwhelm the city's drainage infrastructure, leading to surface runoff that may enter the facility through ramps, entrances, and other openings. The facility has previously experienced nuisance flooding at pedestrian entrances, particularly at the intersection of Charles Street / Beacon Street.

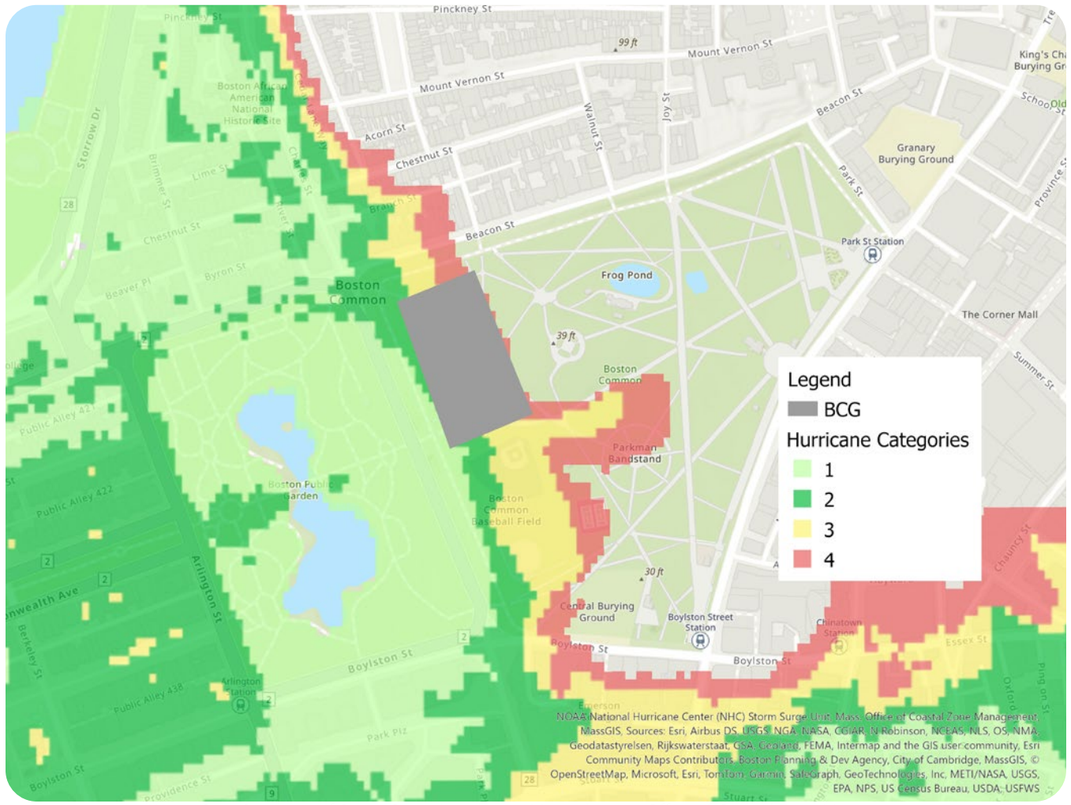
Location and Coastal Condition	Elevation (ft)	Notes, Source
Compliance		
The facility is not in FEMA SFHA.		
CFROD SLR – DFE is not triggered since no new construction and renovation (Zoning Article 25).		
Climate Change Considerations		
Sea Level Rise Inundation (MHHW+5ft)	16.2	NOAA
Sea Level Rise Inundation (MHHW+10ft)	21.2	NOAA
Storm Surge Flooding – Category 2 Hurricane	20.5	NWS SLOSH Model
Storm Surge Flooding – Category 3 Hurricane	23.5	NWS SLOSH Model
Storm Surge Flooding – Category 4 Hurricane	29.5	NWS SLOSH Model
Projected 100-Year Storm Coastal Flooding 2070 (SLR + Storm Surge)	19.5	Massachusetts Coast Flood Risk Model (MC-FRM)
Current Structural Conditions		
BCG Lower Level Slab	-2.9 to -12.9	As Built Drawings
BCG Entrance	-4.4	As Built Drawings
BCG Roof Level	17.4 to 31.5	As Built Drawings

Elevations Related to Flood Mitigation Design at BCG Source: Boston City Base Datum

Priority Hazards (continued)

Flooding Hazards (continued)

BCG is currently at a moderate risk for coastal flooding and is projected to face higher risks of coastal and tidal flooding in the future due to sea level rise and storm surge associated with climate change. The facility is located within the inundation zones for Category 2, 3, and 4 hurricanes based on the National Hurricane Center's SLOSH model. Projections indicate that by the 2070s, the BCG could experience flooding from a 100-year coastal storm event, with potential flood elevations reaching up to approximately 19.5 feet Boston City Base Datum (BCBD), which could inundate the lower levels of the garage. The underground nature of the BCG and potential rises in groundwater levels present a moderate risk of groundwater flooding. Increased precipitation and sea level rise can elevate the groundwater table, exerting hydrostatic pressure on the facility's foundations and potentially leading to water ingress into lower levels. This risk is compounded by the facility's proximity to areas with high groundwater levels and the challenges of balancing groundwater recharge with flood prevention.



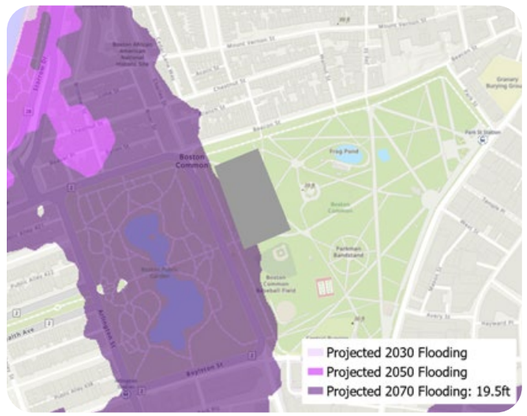
Worst-Case Scenarios of Storm Surge Inundation, Massachusetts Office of Coastal Zone Management Massachusetts Sea Level Rise and Coastal Flooding Viewer, Woods Hole Group, 2022

Challenges

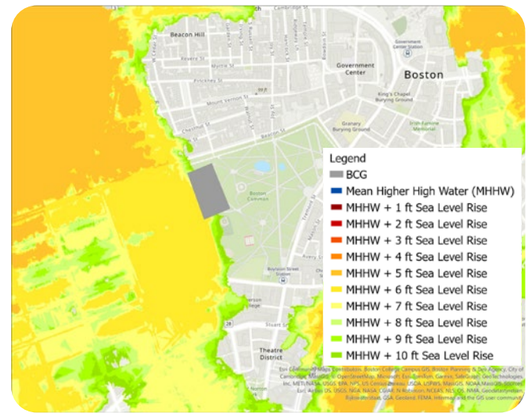
- Existing stormwater and drainage infrastructure may be insufficient to handle projected increases in water volume from intense precipitation, storm surge, and rising groundwater.
- The facility's entrances, ramps, and lower levels are susceptible to water ingress due to their below-grade positions and the potential for water to flow downward during flooding events.
- Essential building systems and equipment located in the lower levels are at risk of damage from flooding, which could disrupt operations and require costly repairs or replacements.
- Anticipated increases in extreme weather events, sea level rise, and groundwater levels amplify the facility's vulnerability to flooding, necessitating proactive adaptation measures.

Recommendations

- Regularly maintain and inspect all drainage systems to ensure they are clear of debris and functioning effectively during storm events. Install leak detection systems in critical areas to provide early warnings of water ingress.
- Enhance waterproofing measures by sealing garage entrances, pedestrian entryways, and low-lying openings to prevent water ingress during heavy rainfall or flooding events. Apply waterproof membranes or sealants to vulnerable walls, floors, and foundations, and seal utility penetrations, joints, and cracks to prevent pathways for water ingress.
- Implement floodproofing strategies by deploying temporary flood barriers at entrances and critical points of entry to guard against stormwater and coastal flooding. Elevate critical building systems and equipment where feasible, and create watertight compartments around essential equipment and areas to prevent water damage during flooding.



Projected Coastal Flooding Driven by Sea Level Rise and Storm Surge, Source: Massachusetts Office of Coastal Zone Management



Projected Sea Level Rise Inundation of Coastal Areas from Rise in Sea Level Above Current Mean Higher High Water (MHHW) Conditions, Source: NOAA

Priority Hazards (continued)

Flooding Hazards (continued)

Recommendations (continued)

- Upgrade drainage and pump systems to handle higher volumes of water anticipated due to climate change. Increase the capacity of stormwater drainage systems by enlarging pipes and enhancing pump capabilities. Install or upgrade sump pumps in lower levels to promptly remove accumulated water, particularly from groundwater seepage.

- Expand flood monitoring and early warning systems by installing flood and high-water sensors in strategic locations to provide real-time data. Integrate these monitoring systems with emergency alert protocols to ensure timely notifications and response during flooding.

- Develop a comprehensive emergency response plan outlining procedures for preparation, response, and recovery during flood events, including trigger conditions based on weather forecasts and flood warnings. Train staff on emergency procedures, ensure flood mitigation equipment is readily accessible, and that personnel know its location and how to use it.

- Review and establish appropriate flood elevations for the facility based on current and projected flood risks, including sea level rise and storm surge scenarios. Incorporate these design flood elevations into future renovations or expansions to ensure new work is designed to withstand projected flood levels.
- Coordinate with city initiatives by staying informed about city-led flood mitigation projects and policies, such as the Coastal Flood Resilience Overlay District guidelines, and collaborate with local agencies to align facility strategies with broader municipal efforts.

- Consider long-term adaptations such as structural modifications like raising entrances or constructing permanent flood barriers if feasible. Explore integrating green infrastructure solutions, such as permeable surfaces in adjacent areas, to enhance stormwater infiltration and reduce surface runoff.

- By implementing these recommendations, the BCG can significantly reduce its vulnerability to flooding hazards, protect critical infrastructure, and ensure the safety and comfort of its users. Proactive measures will also help mitigate potential operational disruptions and financial losses associated with flood events.

Boston Common | Photo Credit: Adobe Stock

08
Emergency Response

The Boston Common Garage (BCG) is a key facility in the Boston Common. This review identifies key opportunities to enhance the BCG's emergency response and highlights gaps that need to be addressed to ensure it can effectively support the community during critical times.

Despite its primary function as a parking facility with limited amenities, the BCG's underground structure, strategic location beneath Boston Common, and proximity to key city areas position it to play valuable roles in future emergency responses. For example, the BCG is usually available for “short-term” shelter during the 4th of July Celebration at the Hatch Shell. The BCG was used for this due to inclement weather in both 2017 and 2022.
The BCG is particularly well-suited for roles such as:

1. Shelter from Above Grade Hazards
The BCG's underground levels offer natural protection against high winds, tornadoes, hurricanes, and flying debris. This makes it a potential refuge during severe weather events when above-ground structures are at risk.

2. Staging and Storage for Emergency Resources and Vehicles
The garage's expansive parking areas can be repurposed to store emergency supplies and equipment, and house emergency response fleets. Situated in the heart of Boston, the BCG provides easy access for distribution to various parts of the city, enhancing logistical efficiency.

3. Evacuation Assembly Point
The BCG can serve as an initial assembly point for evacuees during building evacuations or localized emergencies. Being located beneath Boston Common, it is easily identifiable and accessible for the public.

Key Findings:

- To facilitate ongoing use of the facility as a local muster points and short-term shelter, continue fostering close working relationships with local and regional agencies such as MEMA, the Massachusetts Department of Public Health, and the Boston Office of Emergency Management.

- Regular participation in multi-agency drills, training, and emergency planning exercises will ensure the BCG’s emergency protocols are aligned with broader state and federal strategies.

BCG Emergency Response Context

While the Massachusetts Convention Center Authority (MCCA) operates the Boston Common Garage (BCG) and possesses significant infrastructure, it does not have a formal emergency response mandate. The designation of specific emergency response roles and responsibilities for the BCG would be determined by state agencies responsible for emergency management and planning, such as the Massachusetts Emergency Management Agency (MEMA). Moreover, in the Commonwealth, oversight of shelter operations would be governed by the city, State, or Federal government, and managing these activities would not be the responsibility of the MCCA. Emergency services would be provided by operational organizations like the American Red Cross or National Guard. This assessment focuses on the material and operational capacities of the BCG, recognizing that any expansion into emergency roles would require coordination with external authorities, and the need for external parties to establish the any formal emergency response designation and work closely with the MCCA to ensure organization alignment and preparedness. This study did not review current MCCA's operational emergency procedures. The MCCA is particularly well-equipped for logistical support and command center functions but faces challenges in roles that involve providing direct care and services to crisis-affected populations due to contractual and operational constraints.

Identified Gaps in Emergency Response Capacity

While the BCG has potential to serve in various emergency response roles, several critical gaps limit its ability to fully realize this potential are outlined below.

Emergency Response Gaps

- The facility is a parking garage, lacking critical services, such as restrooms, potable water, and seating. These are essential for occupant comfort during extended sheltering periods.
- Existing ventilation is designed for vehicle exhaust rather than human occupancy. Modifications may be necessary to ensure adequate air quality and temperature control.
- The underground condition makes the facility moist and experiencing significant changes in temperature. Measures may be needed to protect sensitive supplies or medical equipment.
- The garages low ceilings are a major barrier to accommodating ambulances, fire trucks, and utility vehicles. Additionally, it is important to ensure all exits are accessible and clearly marked to facilitate safe egress when necessary. Clear protocols are needed to manage crowd sizes and prevent overcrowding.

Recommendations for Enhancing Emergency Response

To ensure the BCG's emergency response capabilities are fully aligned with the facility's potential roles, several key actions are outlined below.

Recommended Actions

- The BCG is not well-suited for emergency response roles beyond short-term shelter from above-grade hazards, and we do not recommend it for further emergency designations. To prepare for the potential scenario of accommodating large groups, a detailed review of ventilation systems and safety sensors is necessary to ensure compliance with relevant codes and standards, as these uses deviate significantly from its typical function as a garage. This review is critical to maintain safety and regulatory adherence in such non-standard use cases.
- Continue fostering close working relationships with local and regional agencies such as MEMA, the Massachusetts Department of Public Health, and the Boston Office of Emergency Management. Regular participation in multi-agency drills, training, and emergency planning exercises will ensure the BCG's emergency protocols are aligned with broader state and federal strategies.

Limitations for Certain Emergency Roles

While the BCG can play an important role in many emergency response scenarios, it is not well-suited for use as a community storm shelter during events like hurricanes or severe flooding. Underground structure, lacking critical facilities, and vulnerability to flooding make it less ideal for such roles without significant infrastructure upgrade.

Conclusion

The BCG holds potential to serve as a critical asset in the Commonwealth's emergency response efforts, especially in areas such as short term shelter and evacuation assembly point. However, to fully realize this potential, the facility must address key infrastructure limitations, particularly in ventilation system and air quality monitoring.

Boston Common | Photo Credit: unknown

09
Transportation

The BCG's transportation infrastructure requires development to enhance accessibility, efficiency, and convenience. Key recommendations include ADA-compliant pedestrian ramps, upgraded bike infrastructure, better signage, transit improvements, safety measures, and collaboration with the City of Boston for safety enhancements.

The transportation infrastructure near and on-site of the BCG has several areas for future improvements aimed at enhancing accessibility, efficiency, and convenience for all users. Key recommendations for pedestrian infrastructure include collaborating with the City of Boston to upgrade nearby ramps and crosswalks to ensure ADA compliance and include detectable warning panels where necessary. The MCCA can work with the City of Boston to explore upgraded bike infrastructure surrounding the Site. The BCG should consider upgrading bicycle access, and current bike racks with compliant designs. Increasing their functionality, visibility and accessibility will boost utilization. Promoting cycling as a viable commuting option through increased awareness about available bike parking and integrating it with main entrances, as well as enhancing signage and developing better access routes for cyclists, will also improve safety and usability.

Evaluating feasibility of an MCCA-operated shuttle service to connect guests and employees to major transit hubs is recommended to encourage greater use of public transit and reduce vehicle congestion around the BCG. Collaboration with the MBTA to improve transit service frequency and reliability can improve site access for employees.

Key Findings:

- Improve internal parking circulation efficiency and wayfinding signage; ensure headhouse accessibility from the park through extended hours.
- Peak vehicle occupancy of 85% observed at 1:00 PM; monitor trends for expansion needs.
- Monitor and expand EV charging stations will support ongoing demands for electric vehicles.
- Coordinate Charles Street pedestrian infrastructure near entry/exit ramps to complement proposed landscape designs and Boston Common access paths.
- Upgrade internal garage wayfinding signs for better navigation.
- Replace bike racks with user-friendly models; improve cyclist awareness, visibility, and access.
- Consider conducting a feasibility study to explore the benefit of a consistent and active MCCA shuttle bus system that would connect to major hubs and MCCA facilities.
- Collaborate with the City of Boston to enhance nearby pedestrian access. Reconstruct ramps.
- Coordinate with the City of Boston to improve safety near BCG, addressing pedestrian-related HSIP cluster issues.
- Evaluate additional demand with a garage expansion under the ballfields as a possible additional phase.

1. Pedestrian Infrastructure

Summary

- The Boston Common Garage (BCG) provides vehicular access via an entrance ramp off Charles Street, supporting two travel lanes in a one-way operation. Within the parking decks, drive aisles are bidirectional offering access to upper and lower parking levels. Cars exit the garage from the middle level to Charles Street.
- The BCG offers a 1,350 parking spaces, 57 of which are dedicated to motorcycles. The BCG provides preferential parking spaces of hybrid vehicles and provides 25 EV charging stations.

Findings & Recommendations

- Opportunities include improving circulation efficiency within the parking levels, improved wayfinding signage and ensuring headhouse accessibility form the park.
- Peak occupancy in the lot occurred around 1:00 PM with a maximum occupancy of 89 percent (based on a limited sample size).
- MCCA should monitor the use of publicly available EV charging stations, and if warranted, should install additional stations where needed.

Headhouse | Photo Credit: VHB

Bike Sign and Pedestrian Access | Photo Credit: VHB

2. Bike Infrastructure

Summary

- The site offers secure, weather-protected bike parking with 38 long-term spaces in a cage on the Middle Level of the garage near the parking ramp
- The bike infrastructure around the BGC includes buffered bike lanes on Charles Street and occasionally on Beacon Street and Boylston Street
- Bluebikes stations are conveniently located nearby, including at Beacon Street at Charles Street.

Findings & Recommendations

- Observations found moderate utilization of these bike parking facilities, approx. 40 percent occupied on a weekday. Recommendations include replacing bike racks with compliant designs, and increasing awareness and visibility of bike parking areas, and improving signage and access routes to better accommodate cyclists.

Bicycle Cage | Photo Credit: VHB

3. Passenger Vehicle Access & Parking

Summary

- The Boston Common Garage (BCG) provides vehicular access via an entrance ramp off Charles Street, supporting two travel lanes in a one-way operation. Within the parking decks, drive aisles are bidirectional offering access to upper and lower parking levels. Cars exit the garage from the middle level to Charles Street. During events at the Common, the garage access points may get closed off from time to time. Ongoing coordination with events is needed.
- The BCG offers a 1,404 parking spaces, 57 of which are dedicated to motorcycles. The BCG provides preferential parking spaces of hybrid vehicles and provides 25 EV charging stations.
- MCCA should monitor the use of publicly available EV charging stations, and if warranted, should install additional stations where needed, with the understanding that it would require coordination with the power supplier on appropriate approvals.

Findings & Recommendations

- Opportunities include improving circulation efficiency within the parking levels, improved wayfinding signage and ensuring headhouse accessibility form the park.
- Peak occupancy in the lot occurred around 1:00 PM with a maximum occupancy of 85 percent (based on a limited sample size).

BCG Parking Supply	Staff Parking Spaces	Reserved (Other)	Public Parking Spaces	HP-Accessible Spaces	EV/Hybrid Spaces	OTHER	Totals
Upper Level	0	17	454	10	3		484
Middle Level	3	13	356	10	19	57 Motorcycle	458
Lower Level	1	0	443	11	3	4	462
Grand Total	4	30	1253	31	25	61	1,404

BCG Parking	Available Vehicle Parking Supply	Vehicle Occupancy at 1:00 PM Weekday		Vehicle Occupancy at 4:30 PM Weekday		Vehicle Occupancy at Average Weekday Occupancy	
Upper Level	484	435	90%	298	62%	367	76%
Middle Level	401 Cars / 57 Motorcycle	368	80%	279	61%	324	71%
Lower Level	462	388	84%	285	62%	337	73%
Average Demand	1,404 [1]	1191	85%	862	61%	1028	73%

[1] 1,404 includes motorcycle parking

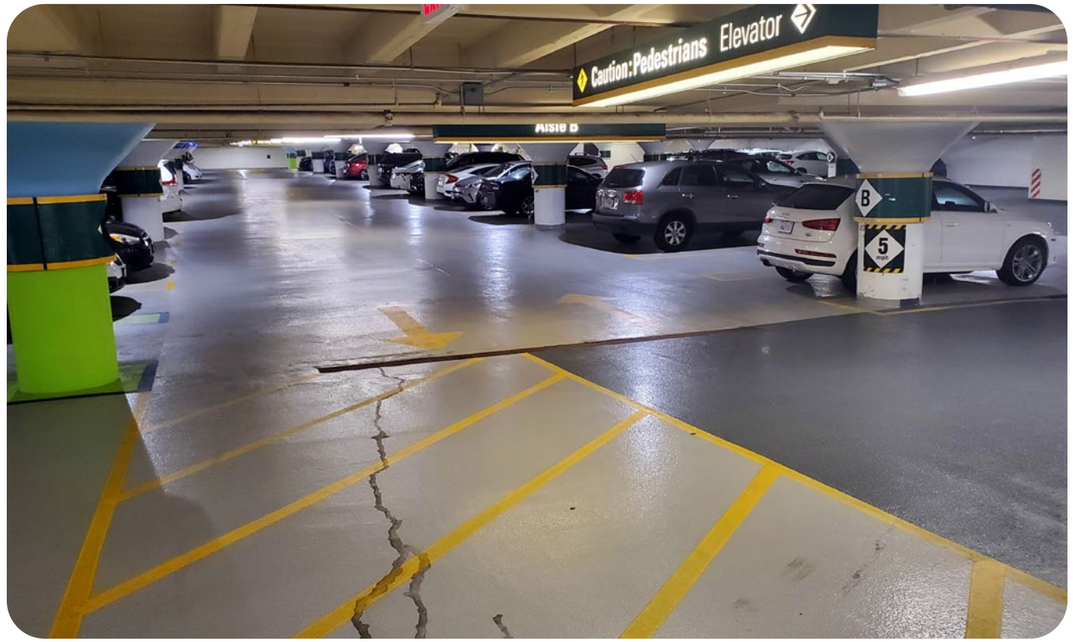
4. Transit and MCCA Shuttle

Summary

- The BCG is well-served by multiple MBTA public transportation options, including Green, red and Orange Lines as well as bus route 9, 43, and SL5 and Express bus lines 501 and 504.
- MCCA does not offer official shuttle services that connect BCG to other transportation hubs.

Findings & Recommendations

- MCCA shuttles are currently not provided for BCG. Consider conducting a feasibility study to explore the benefit of a consistent and active MCCA shuttle bus system that would connect to major hubs and MCCA facilities. Although BCG does have great access to public transit, an additional, or supplemental connection to some larger hubs may be considered a benefit to employees and visitors alike. The shuttle system could also be utilized for guest transfers between MCCA facilities (BCEC, HCC and BCG primarily) in case of event overflow spaces or parking overflow needs. A deeper review of transportation data points is needed to allow for detailed shuttle schedule and routing recommendations.



Parking Garage | Photo Credit: Unknown

Roadway Safety and Crash Analysis

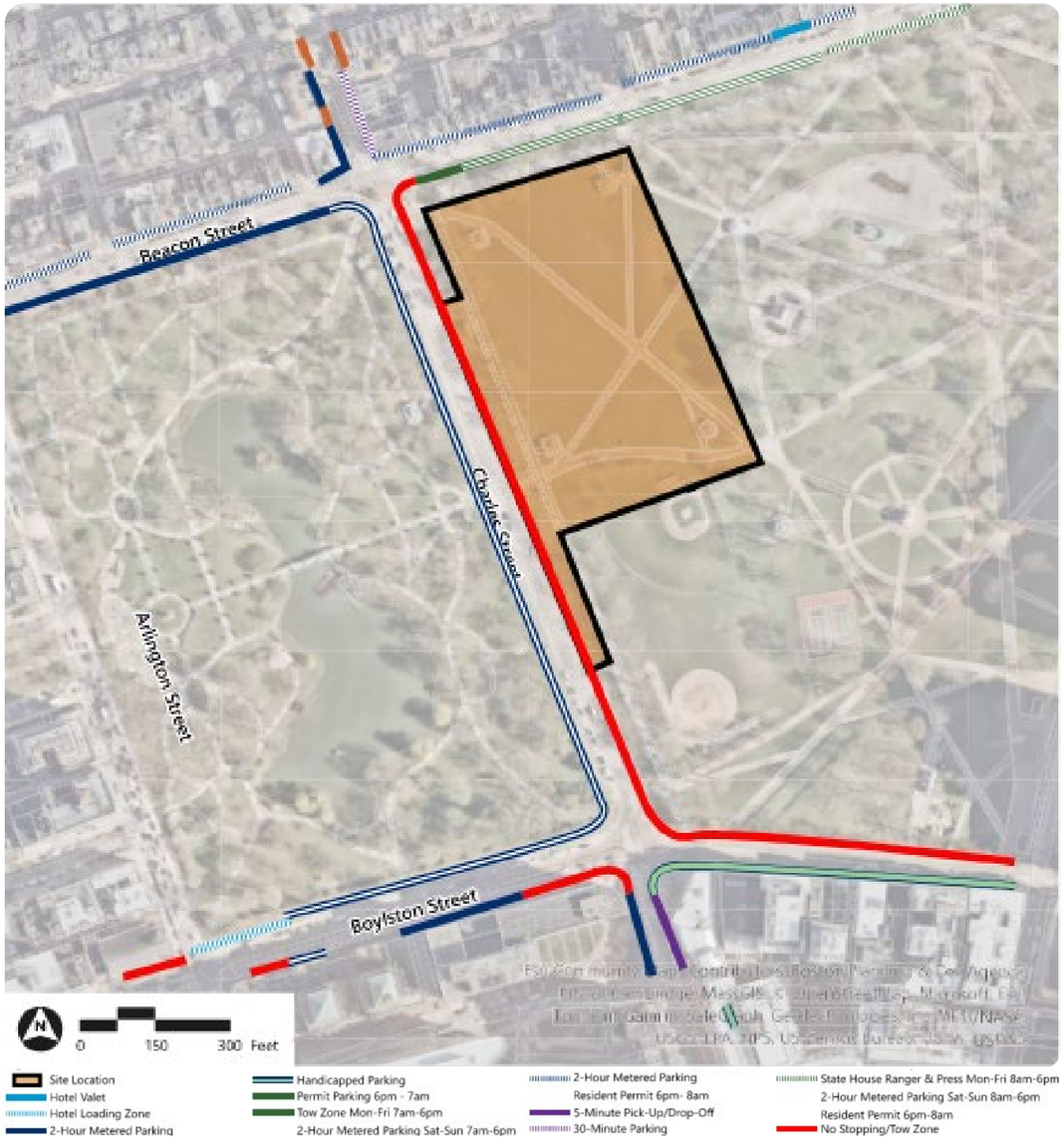
Summary

- Within the Study area, there were 73 crashes, 26 of which involved vulnerable roadway users.

Findings & Recommendations

- According to the MassDOT, there is one Highway Safety Improvement Program ("HSIP") cluster adjacent to the study area within the eastern edge or Boston Common, related to pedestrian crashes. MCCA should continue to coordinate with the City of Boston on initiatives to enhance safety near the BCG, especially for vulnerable roadway users. Any requests from the City for additional safety measures, such as sight line improvements, enhanced signage, elimination of conflict zones, etc. – should be evaluated and implementation should be coordinated.

Aerial View | Photo Credit: Adobe Stock



10
Capital Planning

Capital planning for the existing BCG seeks opportunities that enhance landscape and pedestrian experiences around its public facing exterior faces, modernize wayfinding and digital signage with ROI opportunities, and key operational improvements that advance safety for pedestrians and bicyclists as well as addressing the increasing need for EV chargers in the facility.

Bicyclist & Pedestrian Safety
Currently, the sidewalks leading to the BCG along Charles Street can be misleading. Pedestrians walking down the Charles Street sidewalks can often find themselves at unintended dead-ends that inadvertently lead one down the vehicular entrance and exit ramps into the garage. Landscape improvements aim to resolve this issue by creating plantings in lieu of un-useable sidewalks, preventing pedestrians from walking along these travel paths and directing them into the Boston Commons as intended. Bike lanes will also be added to the entrance and exit ramps with safer access leading down into the bike storage room.

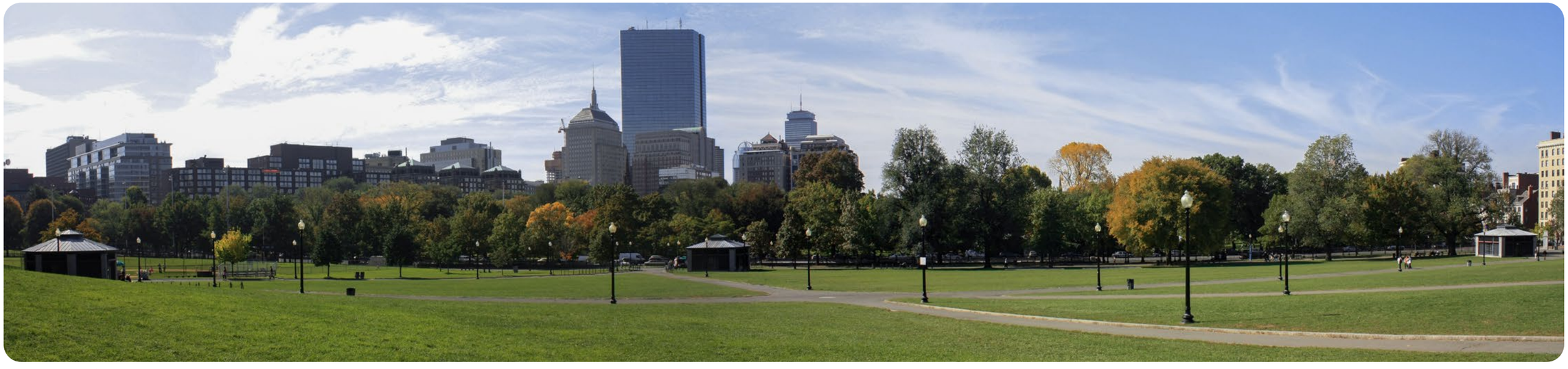
Key Findings:

- **EV Charging:** It is recommended that additional EV charges be installed in the facility to meet Boston guidelines outlined within the report. A new electric service will be required.
- **Digital Signage**: Key points for digital signage are noted to help increase ROI. Digital signage to be coordinated and reviewed with "Friends of the Public Garden."
- **Community Engagement:** Provide opportunities for artists to paint murals throughout the facility.

Boston Common | Photo Credit: Google Earth

List of Projects and Cost Estimates

Item #	Title	Location	Description	Investment (1)	Experience (2)	Complexity (3)	Impact (4)	Priority (5)	Total Project Cost (6)	Permit Cost (7)
Signage									**$541,816**	**$333,216**
P01	**Digital Signage**	Facility	Locate digital signage at key locations throughout the facility. See AV report for scope. See engineering narratives for Mechanical and Electrical scope.	$$	♡♡♡	^^	High	1	$541,816	$333,216
General Infrastructure									**$10,179,991**	**$6,260,694**
P02	**Bike Paths**	Entrance and Exit Ramps	Addition of bike lane	$	♡	^	High	1	$146,926	$90,359
P03	**Landscape Improvements**	Charles Street	Provide landscape improvements & wayfinding along entry & exit ramps into the garage. See Landscape report for scope.	$$$	♡	^^^	High	1	$2,378,740	$1,462,925
P04	**Additional EV Charging Stations**	Facility Wide	Install additional EV charging stations. See traffic report for scope. See engineering narratives for Electrical scope. This will require a new electrical service.	$$$	♡	^^^	High	1	$7,654,325	$4,707,409
							Grand Total:		**$10,721,807**	**$6,593,911**



Boston Common | Photo Credit: Adobe Stock

Project Priority & Total Cost

In order to help prioritize the list of capital projects, the Team created a series of categories which culminate in a priotization level of 1-3 where (1) is the highest priority and (3) is of a lower priority.

Priority is determined by cross referencing four categories:

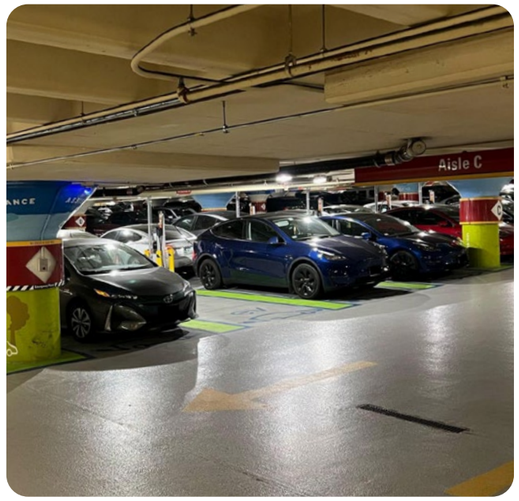
(1) Investment: how much the project will cost.
(2) Experience: level of improvement for user experience.
(3) Complexity: how disruptive the project would be to ongoing operations.
(4) Impact: how effective the project will be, derived by cross refencing ROI and User Experience.

(5) Priority: by cross referencing the above categories across the listed projects, a prioritization level is determined with the intent of framing future planning studies, schedules, and budgets.

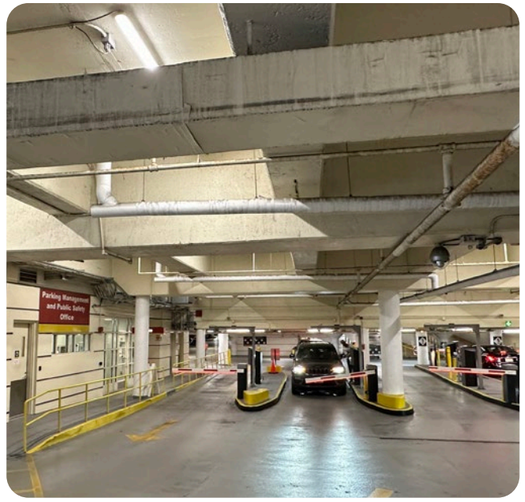
(6) Total Project Cost: Hard costs as determined by a cost estimator plus a 30% mark-up for soft costs.

(7) Permit Cost: inclusive to total costs, this is 61.5% of the Total Project Cost. This number should be used for determining MAAB upgrade requirements per the 30% threshold per the state of MA.

Existing Photos



EV Charging | Photo Credit: Touloukian Touloukian

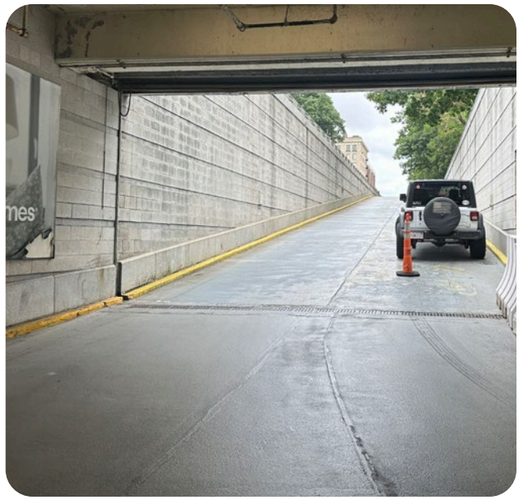


Security | Photo Credit: Touloukian Touloukian

Charles Street Facing East | Photo Credit: KMDG

Charles Street Boston Common Parking Garage Exit | Photo Credit: KMDG

Security | Photo Credit: Touloukian Touloukian



Exit Ramp | Photo Credit: Touloukian Touloukian

Capital Projects Overview

P01

Digital Signage
Currently, there are wallpaper advertisements. Replacing this with flat panel displays will reduce waste, labor costs, and provide more opportunity for digital advertisements. Mounting one (1) 85" wall-mounted, flat panel display behind a protective glass at this location can provide wayfinding information, digital advertisements that can be sold to convention sponsors, and other information pertaining to the on-going convention.

Advertising in Headhouse | Photo Credit: AVCT

P02

Bike Lane
Observations found moderate utilization of these bike parking facilities, at approximately 40 percent occupied on a weekday. Increasing awareness and visibility of bike parking areas, and improving signage and access routes to better accommodate cyclist will promote safety. A sharrow lane (a painted shared bike and vehicle lane) will be added to both the entrance and exit to the BCG parking garage, which will improve bicyclist visibility and access to the available BCG bike parking.

Bike Path | Photo Credit: unknown

P03

Pedestrian Access
Additional green space will be added to the site perimeter along Charles Street, and above the entrance and exit to the Boston Common Parking Garage. The current sidewalks along Charles St. near the entrance and exit to the BCG are inhospitable as the sidewalk width is not consistent and the path of travel ends at the entrance and exits. By removing these inhospitable sidewalks and replacing them with plant beds, pedestrian access will be greatly improved. The plant beds will eliminate perceived access down Charles St and instead direct site visitors into the Boston Common. This will align with one of the goals of the Boston Common Master Plan (City of Boston Parks and Recreation 2022), which is to restore and clarify park edges and entrances.

Entrance Ramp | Credit: KMDG

P04

EV Chargers
The Boston Common Garage provides preferential parking spaces of hybrid vehicles and provides 25 EV charging stations. MCCA should monitor the use of publicly available EV charging stations, and if warranted, should install additional stations where needed.

EV Chargers | Photo Credit: unknown


Digital Signage
Planters
Bike Lane
Planters
BOSTON COMMON
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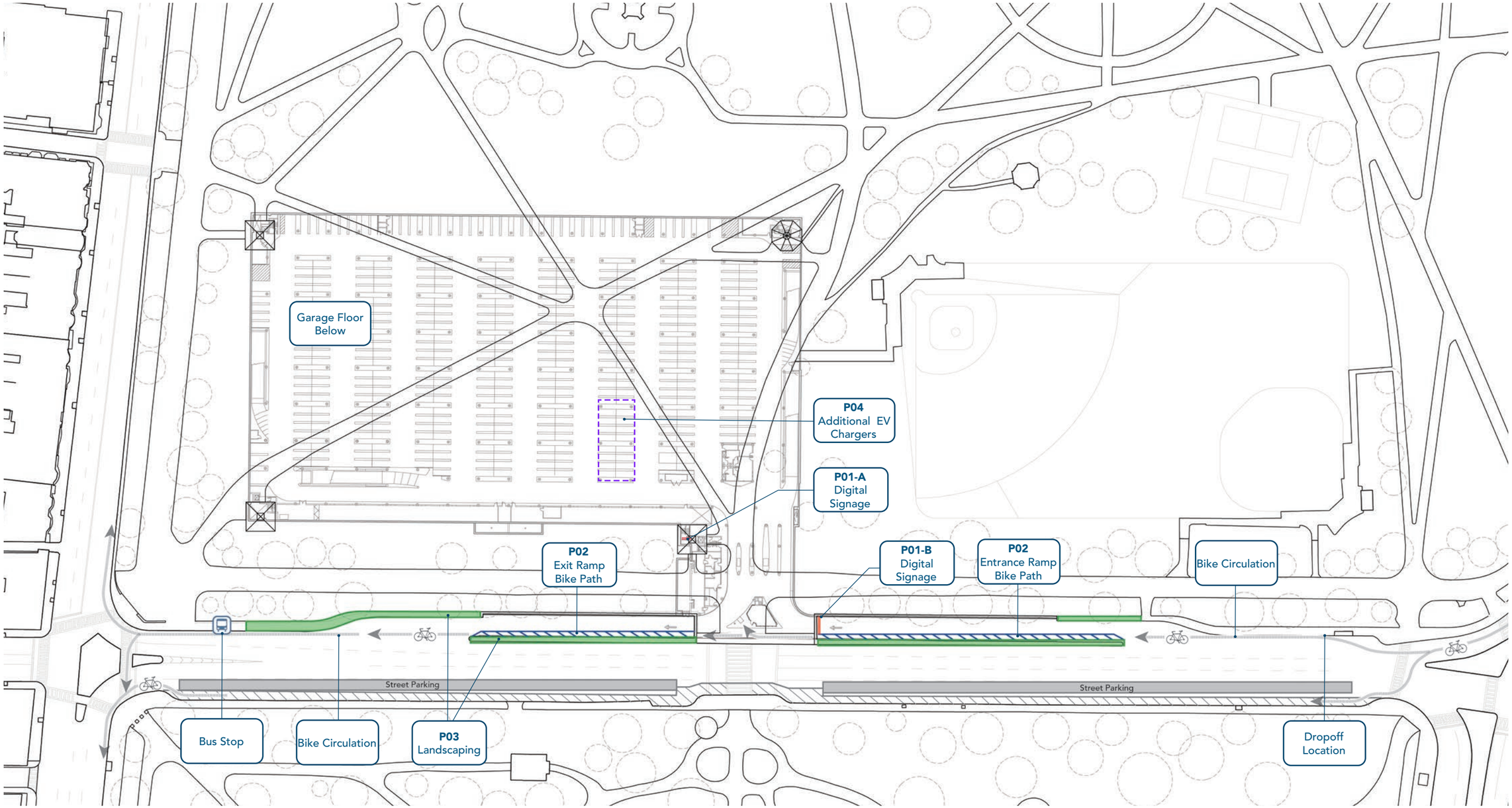
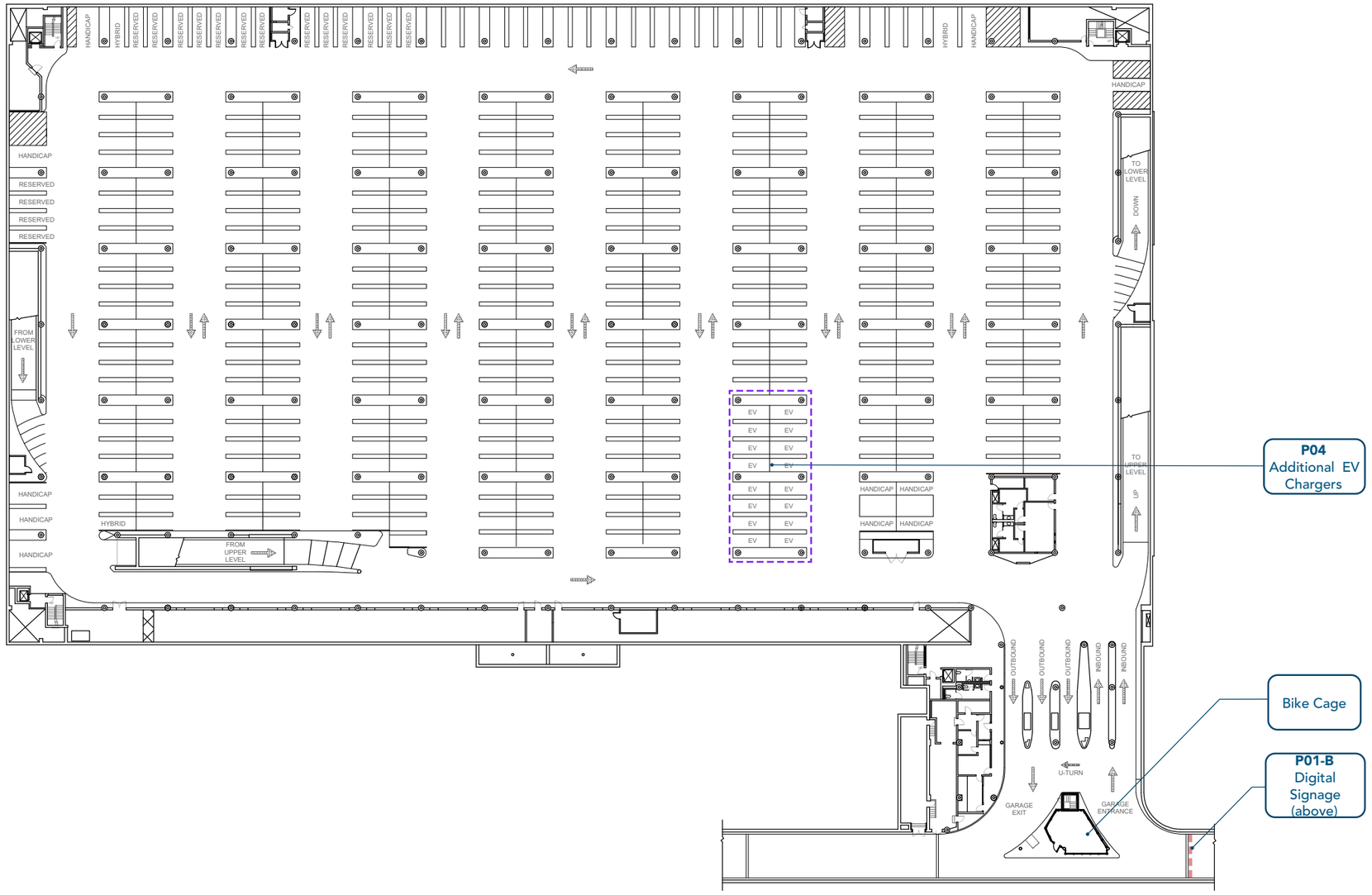


Proposed Ground Level Plan

Credit: Touloukian Touloukian Inc.



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Credit: Touloukian Touloukian Inc.

Proposed Middle Level Plan

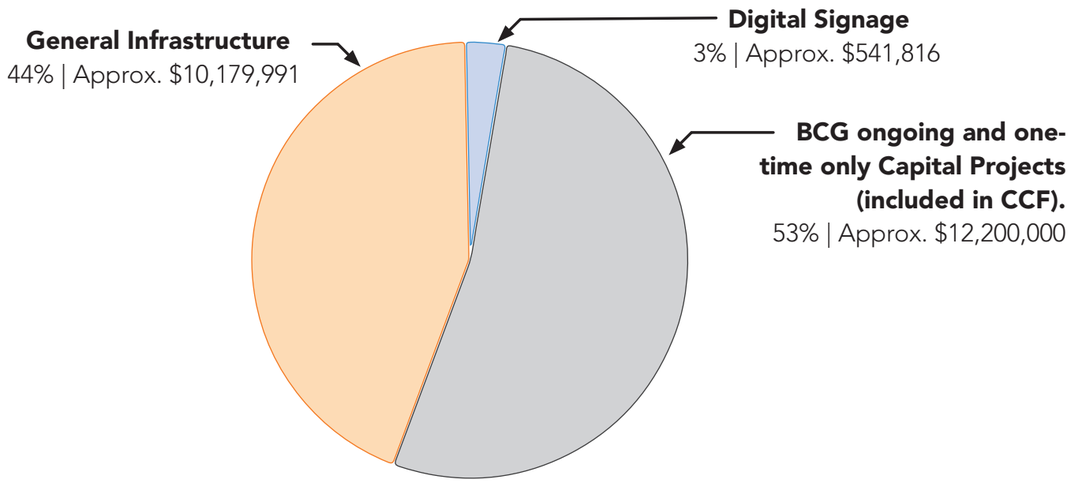
N

Headhouse Entrance | Photo Credit: Wikimedia Commons

Capital Project Costs

Total Project Costs

- Approx. **$541,816** of Digital Signage Recommendations. Escalated to FY 2026 (July 1, 2025).
- Approx. **$10,179,991** of General Infrastructure Recommendations. Escalated to FY 2026 (July 1, 2025).
- Approx. **$12,200,000** of BCG ongoing and one-time only Capital Projects (included in CCF).



Total Capital Project Costs:
Approx. $22,921,807

General Infrastructure
Digital Signage
BCG ongoing and one-time only Capital Projects (included in CCF)

Boston Common | Credit: unknown