

Summary of Findings

# Rose Kennedy Greenway State of Good Repair

## Summary of Findings

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# 1

## Executive Summary

In February 2020, the Greenway Conservancy engaged the VHB Team, consisting of VHB, ETM Associates, and Weston and Sampson, Engineering Inc., to provide technical assistance relating to the Greenway park system, located in Downtown Boston. The VHB Team prepared a new GIS-based asset inventory featuring the Greenway's carousel, park, fountain, and vehicle assets. Further, the VHB Team conducted a walk-through survey and physical conditions assessment.

The detailed findings of the condition assessment are stored within the GIS-based asset inventory. The Conservancy's staff can use the inventory to access the VHB Team's conditions assessments, and further, can use the inventory to prepare and store new assessments over time.

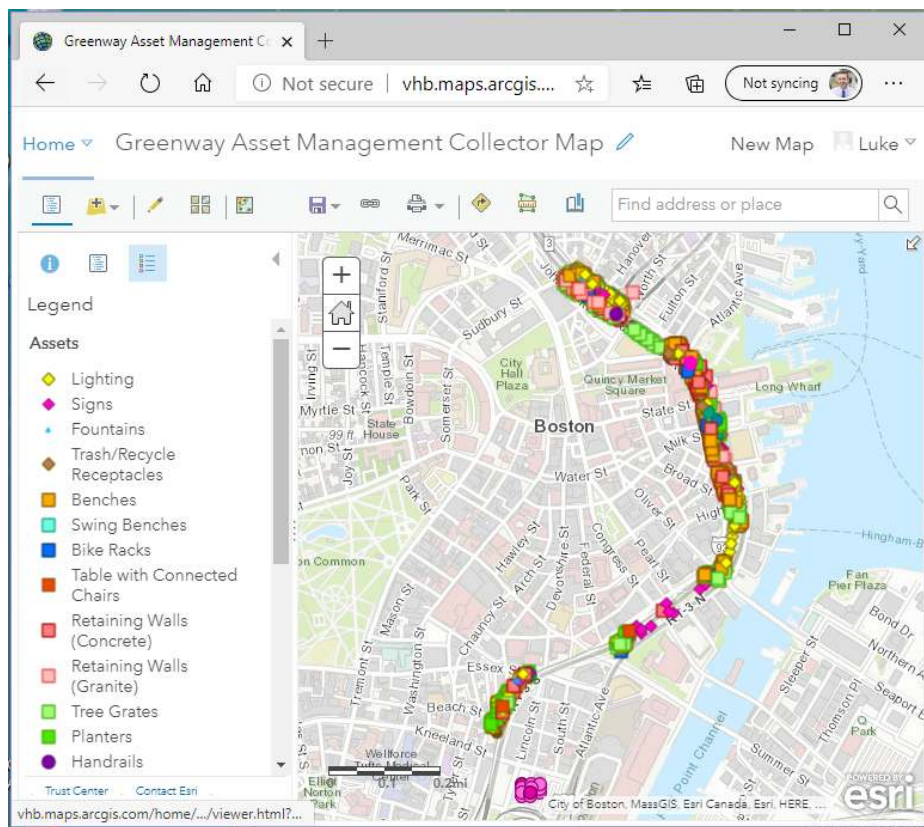
At a high level, we note the following observations:

1. Most of the assets in the Greenway were found to be in "excellent" or "good" condition (8% and 71%, respectively) (for a definition of the ranking systems, see chapter 2). Even for a relatively new park like the Greenway, the assets are well-kept, a testament to the Conservancy's stewardship.
2. The remainder of the assets were identified as either "fair" or "poor" condition (18% and 3%, respectively). The Conservancy should continue to monitor conditions closely, as those assets that are original to the park's construction are at this point twelve years old and getting closer to the end of their useful life expectancy.
3. The landscape is in very good condition and has a very mature feel for such a young space. Turf lawn areas appeared to be in very good condition with very few bare spots. Mixed shrub and perennial beds were obviously well tended with little to no weed cover or overgrown plant growth. Street trees in tree grates showed typical damage and loss due to vehicle impacts and limited irrigation.
4. Paving throughout the Greenway is in good condition with only a few notable issues. The chip and seal asphalt paving in parcel 21 could benefit from resurfacing soon and the steel edging along pathways in parcel 19 likely needs to be reset/repared. All seat walls, curbing, and granite veneer walls are in good condition and evidence of past repair work is evident.

## Rose Kennedy Greenway State of Good Repair

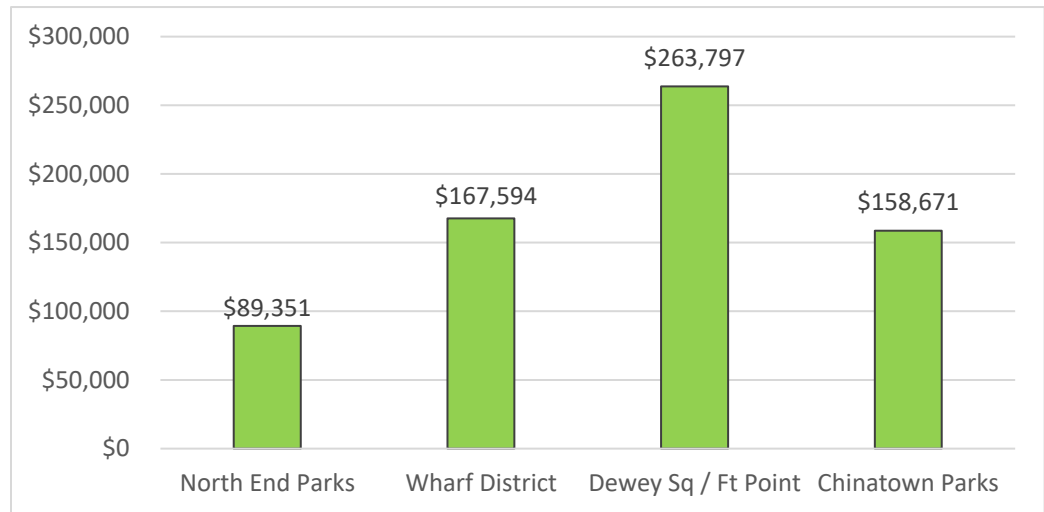
5. Site furniture throughout the Greenway is in relatively good condition. Fixed furniture issues are limited to aging bench slats and localized bench finish damage on bench undersides and areas of ground contact. Other fixed and moveable assets such as signage, trash recycling cans, and moveable planters show appropriate wear and tear for their age.
6. Lighting throughout the Greenway is in good condition. The finish is fading on pole lights in the north end of the Greenway and many of the tubular pole lights in parcels 16 and 17 have peeling finish at the base.
7. The Greenway's fountains are in good shape, but the various mechanical, electrical and plumbing components found within the fountain vaults require close maintenance. Chapter 3 details the conditions of this equipment.
8. We recommend performing a full conditions assessment every three to five years and compiling all assessments within the GIS asset inventory, as a means of tracking the life cycles of each asset type and anticipating maintenance needs as they arise.

*Figure 1: GIS-Based Asset Inventory (Screen Shot)*



9. The VHB Team’s cost estimate for all observed physical deficiencies is approximately \$679,000, including all park and fountain assets. The majority of this amount (approximately \$491,000) can be attributed to paver repair needs. The breakdown of this cost estimate by district can be seen in Figure 2. Specific cost estimates are provided within the GIS Asset Inventory tool.

*Figure 2: Total Cost to Repair (by district)*



# 2

## Conditions Assessment: Park Assets

This section provides a summary of the park assets within the Greenway park system (excluding fountain components which are covered in Chapter 3). The Greenway Conservancy owns, operates and maintains over 1,000 assets distributed across the Greenway. The VHB team evaluated these assets between June 9, 2020 and June 11, 2020. Each assessment was prepared using Survey123 software, which linked the assessment to an associated asset point within ArcGIS.

It should be noted that some assets throughout the Greenway, including select tree grates and pole lights, are not under the maintenance purview of the Greenway Conservancy. These assets are the responsibility of other agencies or organizations, and our team collaborated with RKG staff to identify and exclude these from the assessment. This may not be entirely clear to the casual observer but excluded assets have been noted where applicable within the GIS database. Conditions assessments were not conducted for these assets.

Each asset has been given a conditions assessment rating of Excellent, Good, Fair, or Poor. The rating scale is based up a visual inspection of the asset and reflects the observable condition of each asset. Any asset with no observable damage or finish degradation was given a rating of "Excellent". Ratings of "Good" were given to assets with only minor damage or finish degradation. Ratings of "Fair" were given to assets with clear observable damage or degradation. Ratings of "Poor" were given to assets with extensive damage or degradation.

Each asset is associated with an estimated lifespan (in years), and each asset was assigned a percentage of "estimated lifespan remaining". These designations generally reflect the condition ranking (e.g. A rating of "Good" typically falls between 50%-80%).

The VHB Team's findings in relation to park assets are summarized as follows:

### Paving

**Dry Set Paving.** Dry Set Paving types include the Mothers' Walk Engraved Concrete Pavers, Concrete Pavers, and Brick. All of these paving types are generally in good condition with no observed failing edges, differential settling, or major heaving from tree roots. Some minor heaving of the large concrete pavers was noted in parcel 14 near the carousel. Continue repairing localized issues caused by settling, vehicle damage, and tree root heaving.



**Ground Plane Granite.** Granite paving throughout the Greenway is in very good condition. Some grout joints have minor chips and loss that are typical of wet-laid paving. Continue monitoring and repairing localized grout issues or other cracked or damaged paver areas as needed.



**Raised Granite (Walls, Curbs, Veneer).** All of the raised granite masonry throughout the Greenway is in good condition. Isolated damage can be found at corners from impacts and abrasions, including some missing skateboard deterrents. Some of these areas show evidence of previous repairs. Curbing and large stone masonry seat walls have minor pointing loss or caulking gaps, but these issues are very limited. Granite veneer walls are also in good condition with minor pointing and caulking needs. Some corner damage was observed that requires repair work beyond pointing and caulking, but these issues were localized. Some efflorescence was observed on several wall areas in parcel 8, this area should be monitored for drainage/irrigation leak issues and any further surface damage.

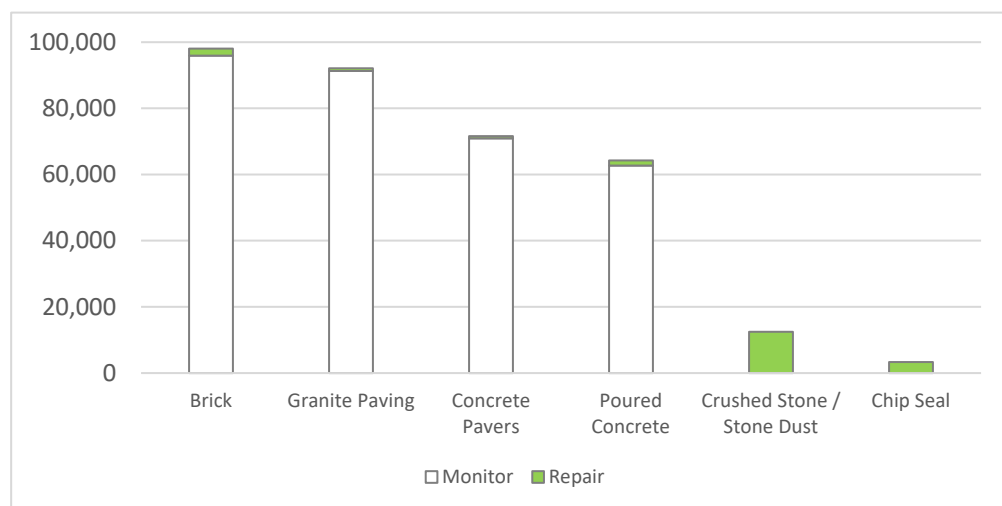
**Granite Stairs.** All stairways throughout the Greenway are in good condition with no major issues other than surface scratching and minor chipping.

**Aggregate pathway.** Aggregate pathways can be found in several parcels throughout the Greenway. Metal edging in parcel 19 shows evidence of heaving and leaning in some areas and should be adjusted as needed. Replacement of steel edging will likely be needed within the next decade.

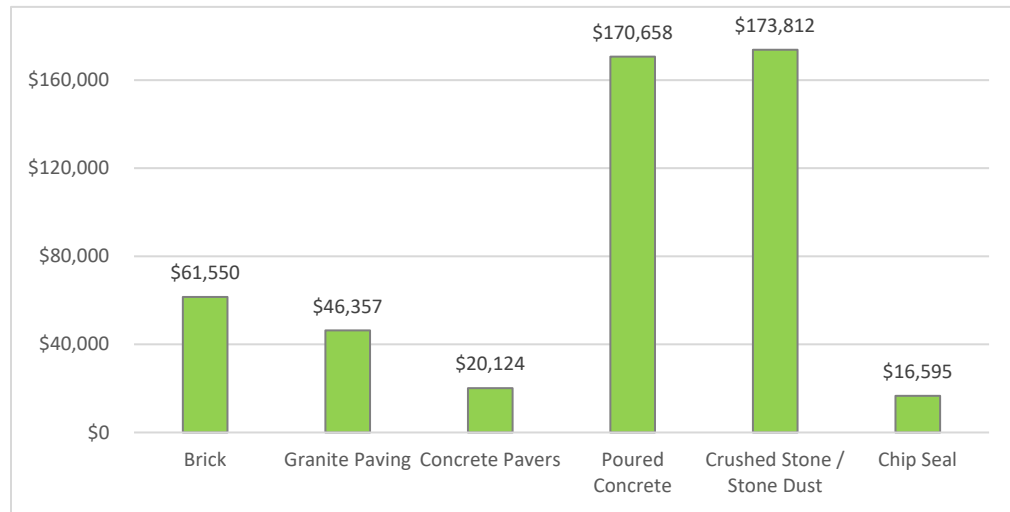
**Asphalt pathway.** The exposed aggregate asphalt path in parcel 21 shows significant degradation. It is understood that the initial aggregate topcoat was installed incorrectly and has prematurely worn. The aggregate top wearing surface has eroded in many areas and patches at transition areas are present. Resurfacing/repair should be considered.

**Concrete Paving.** Concrete paving throughout the Greenway is in good condition. There is no evidence of top surface sluffing or chipping. Damage is limited to localized cracks and chips with very little evidence of differential settling.

*Figure 3: Pavers – Recommended Repairs (SF)*



*Figure 4: Pavers – Cost to Repair*



## Fixed Furniture



**Benches (with and without wood).** Benches throughout the Greenway are mostly in good condition. The Primary concern regarding bench damage is localized powdercoat failures along bench undersides and points of ground contact. Monitoring and maintenance of these areas will prolong bench life. Utilize manufacturer provided touch-up kits or off-the-shelf repair paint materials as needed. Remove visible rust prior to applying finish repair coats. Consider shimming up bench feet in failure-prone areas to minimize ground water contact and limit premature failures. Most of the benches with wood slats are beginning to show aging. Bench slats appear to be in fair condition, however, slat replacement should be considered within the next several years. Continue to monitor slat condition and replace as needed.

**Swing Benches.** These benches are in very good condition with very few visible condition issues, limited to minor surface scratching. Past issues with swing braking mechanisms have required installation of upgraded mechanisms over the last several years. Issues appear to be resolved and swings are in good working order.

**Trash/Recycling Receptacles.** Receptacles in the Wharf District were replaced in 2019, and the remainder of older receptacles are being replaced this year (or have been replaced since the initial conditions assessment visit. Although our team's walk-through survey took place before the rollout of the new receptacles, the Asset Inventory has been updated to reflect replacements up to August 2020. Please note that a few conditions assessments may reflect conditions which have now been superseded.

**Tree Grates.** Tree grates are prevalent throughout the Greenway and most are in good condition. Many grates are showing some surface finish failures, but this is a common occurrence that should not greatly diminish service life. Several grates were noted as cracked, likely due to vehicle traffic (note: Greenway tree grates are not rated for vehicular

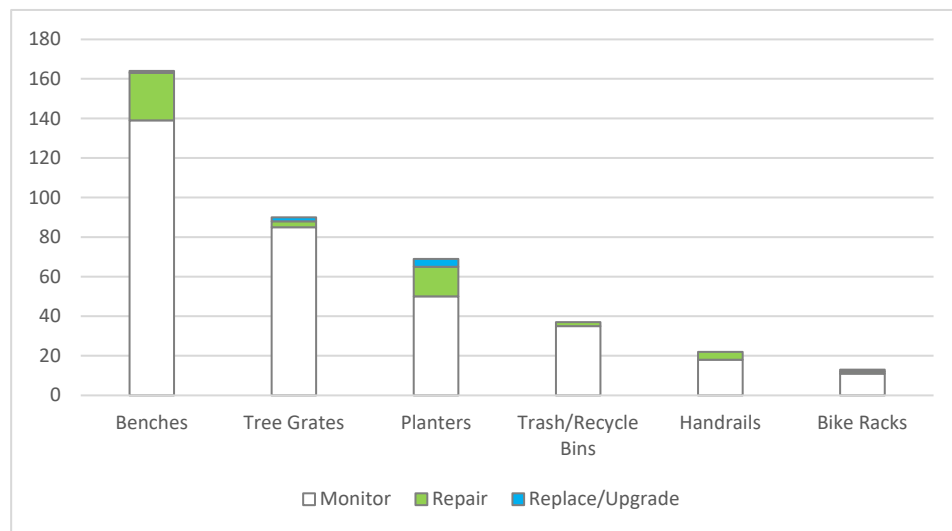
traffic). Crack repairs were noted on several grates throughout the Greenway. Center openings will need to be expanded on several grate sets as trees continue to mature.

**Tables and Chairs.** The Landscape Forms Parc Center table and chairs located in Mary Soo Hoo Park are in fair condition with significant surface damage on many of the table tops. These furnishings are structurally sound but should be considered for replacement (or refinishing) in the next several years due to the finish condition.

**Railing.** Generally in good condition, some chipped-up areas near base of support legs, but nothing major. Skateboard damage can be seen on many sections of railing, but this damage is limited to the finish and all railings are structurally sound.



*Figure 5: Fixed Furniture – Recommended Actions*



*Figure 6: Fixed Furniture – Cost to Repair*



## Lighting

*For the purposes of the assessment, lighting elements have been divided into five categories based on their assumed lifespan as follows: pole lights, bollard lights, in-ground lightings, wall/puck/down lights, and cafe lighting.*



**In-ground Uplights.** Most in-ground light fixtures are in fair to good condition. Many of the larger in-ground fixtures as the southern end of the Greenway show finish damage on the housings and many fixtures have evidence of moisture within the housing. Damaged finish on housings may be refinished with off-the-shelf repair paint and moisture within fixtures should be remedied by checking and replacing housing seals as needed. Stainless steel in-ground lights elements all appear to be in good condition with no visible issues.

**Pole Lights.** Several types of pole lights are present throughout the Greenway. Pole lights at the southern end of the Greenway are in good condition with no consistent finish issues aside from occasionally missing outlet covers and minor finish damage near pole bases. Pole lights located near the mid-point of the Greenway are generally in good condition. Peeling finish coating can be found at the base of many poles of this type. Touch-up painting should be considered at the base of all poles. Pole lights located at the northern end of the Greenway are generally in good/fair condition. The powdercoat finish on this particular light pole is beginning to fade and refinishing of these poles should be considered in the near future.

**Bollard Lights.** Bollard lights are generally in good condition. Fixtures located in paving areas tend to have more finish damage than others located in planting beds. The finish on many bollards is beginning to fade and show aging, but not regarded as an immediate issue.

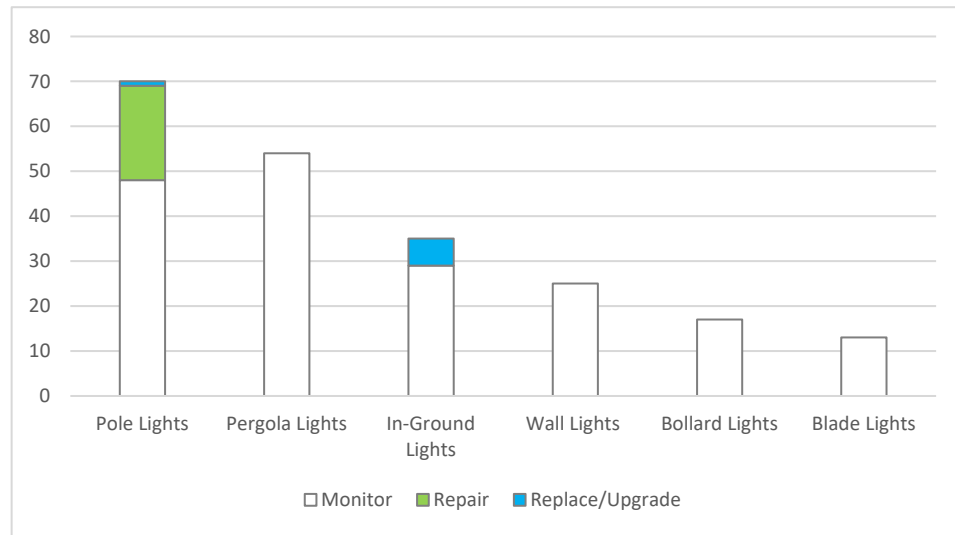
**Wall/Puck/Downlights.** A wide array of wall or structure-mounted lights can be found throughout the Greenway. All of these light types appear to be in good condition with very few notable issues.

**Cafe Lighting.** Cafe lighting located at Mary Soo Hoo Park is in fair condition. Cafe lighting systems typically have shorter lifespans than fixed lighting elements. Several missing bulbs were noted and the cafe lights do appear to be aging. Continue monitoring and replace bulbs as needed.

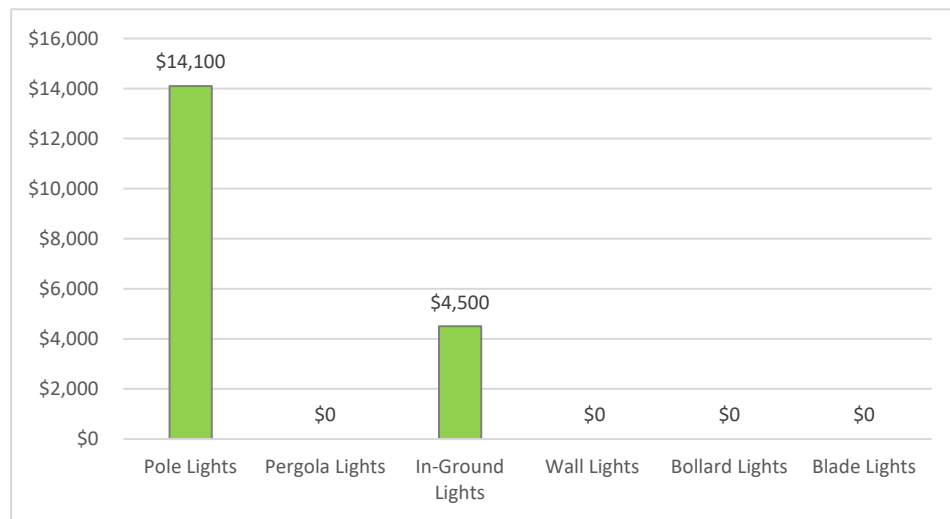
*GENERAL NOTE: All lighting elements should be upgraded to LED to reduce long term replacement costs. Most fixtures have been upgraded over the last several years and the operations staff has indicated that all lights will be updated in the next two to three years.*

**Outlets.** Outlets can be found throughout the Greenway either integrated into light pole bases or as standalone outlet pedestals. Some access panels on poles have been damaged or removed. Several outlets were tested and were in working order.

*Figure 7: Lighting – Recommended Actions*



*Figure 8: Lighting – Cost to Repair*



## Moveable Furniture

**Tables and chairs.** Several different moveable furnishing items are typically placed throughout the Greenway, although not currently due to Covid-19 restrictions. Items include the Parc Center chairs and ottomans, red lounges, red chairs, and brown heavy-duty tables. Although not observed, staff have indicated that furnishing items are generally in good condition.

**Tables with Connected Chairs.** The Landscape Forms Carousel Catena table and chair sets found in Mary Soo Hoo Park are in relatively good condition. This area of the Greenway sees quite a bit of daily usage and all furnishing should be regularly monitored for damage.

**Umbrellas.** The Ocean Master Hexagon Umbrella by Tuuci is a high quality cloth umbrella designed for commercial and park settings. It is assumed that these items will have a relatively short lifespan and should be replaced as needed following an annual inspection and evaluation. Continue following best practices and store indoors when not in use.

### Signage



**Signs.** Greenway signage consists of a family of powdercoated steel signs of varying sizes and shapes, many with printed panel graphics or silk screened letter print. All signage is generally in good condition with many years of service remaining. Common observed issues include finish damage at sign bases from string trimmers or incidental impacts, clouding Plexiglas panels on large directory signs, and fading/cracking graphic panels. Paint touch-ups should be considered for some of the signs with finish damage and plexiglass panels should be replaced.

### Special Features

**Light Blade Structure.** Twelve separate structures are located in parcels 15 and 16. All of these features are in good condition with no observed issues or damage to the finish, upper panels, masonry seating at ground plane, or associated lighting/outlets. Light blades appear to have been painted recently.

**Inscribed Granite Map and Katherine Nanny Nailer Site.** Both in ground engravings are in good condition with no visible damage. Both locations would benefit from a powerwashing/scrubbing.

**Leaning Rail Timeline.** The two railings located in parcels 10 and 8 are in good condition with no observed issues or damage with the top panels. The powdercoated support structure legs do have many surface chips. Repair localized chips as needed. Consider deep cleaning/restoration of the timeline plaques.

### Structures



**Pergolas.** The pergolas found in parcels 8 and 10 are in good condition, yet some paint finish peeling was observed on various areas near the ground plane and higher up in the structure in parcel #10. Pergolas should be considered for repainting/refinishing soon.

**Red Bamboo Cages + Red Gate and Sail.** These features appear to be in good condition. They were recently repainted and only 1 minor chip was observed.

**Play Cubes and Mat.** The play features in parcel 23 are in poor condition. The safety surface is badly damaged and needs to be replaced soon. The play structures are in better condition, but do have quite a bit of graffiti present, recommend additional graffiti removal efforts and eventual replacement as needed.

## Horticulture and Irrigation

**Rainbird ESP-MC and Baseline System 3200 Clock.** Electronic irrigation controllers are all operable and many of the older Rainbirds have been upgraded with Baseline System 3200 controllers. Replace as needed with original or upgraded equipment.

**Water Meter.** All in working condition and 1 replaced in parcel 14.

**Fault Finder.** Greenlee Pulse Fault Finder - In working order.

**Wire Tracer.** Tempo Irrigation Wire and Valve Locator – In working order.

**Backflow Preventers.** Watts or Febco (1-1/2" or 2") all in working order. Several past repairs or replacements have been completed.

**Booster Pump.** Goulds Model 3656, all in working order.

**Data Card.** Permanent Rain Bird Card, In working order

**Heater.** All in working order (many integrated with Hot Box)

## Plants and Containers

**Planting Containers.** Many fiberglass containers can be found throughout the Greenway and most are in in good condition with few minimal damage. A good percentage of the planters do have minor damage ranging from light surface scratching to deeper chips and gouges, especially along the top edge. Fiberglass is difficult to effectively patch and touch up, but this could be attempted on a test planter. Patching rough gouges and trying to color match a paint touchup (or full repaint) could prove effective and may be performed on all planters. Steel planters are in very good condition with no signs of damage or excessive wear. Pay close attention to lower areas for major deterioration where water collects.



## Carousel

**Carousel Components.** The carousel was installed in 2013. A/V updates were made as recently as March 2020. The carousel, which contains many electrical and mechanical components, is observed to be in good condition. The VHB Team created unique assets for each of these components in the Asset Inventory and arrayed them over the location of the carousel within the asset inventory.

## Vehicles

**Vehicles.** As of this writing, the Greenway owns and maintains 11 trucks and ride-on vehicles. These vehicles range in age from one to ten years old and are in various states of repair. The VHB Team created unique points for each of these vehicle assets within the Asset Inventory. The Conservancy is encouraged to update the inventory at these points, as maintenance is undertaken.

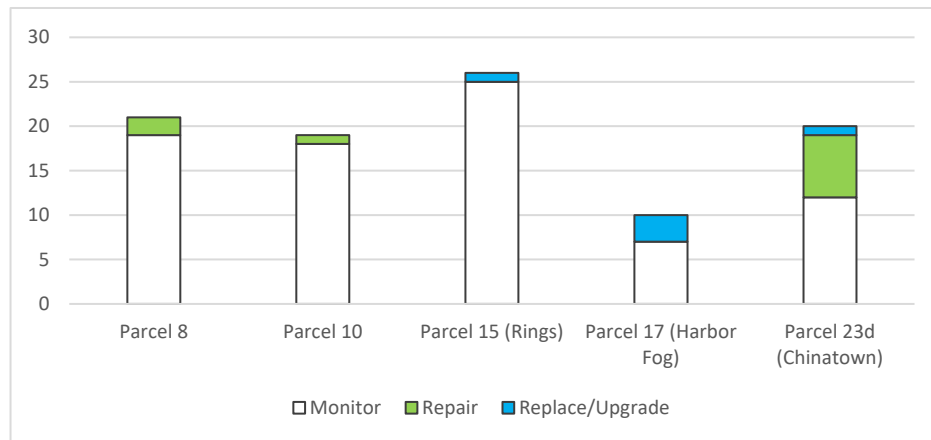
Unit costs for the park assets are featured in tabular format (see Appendix A).

# 3

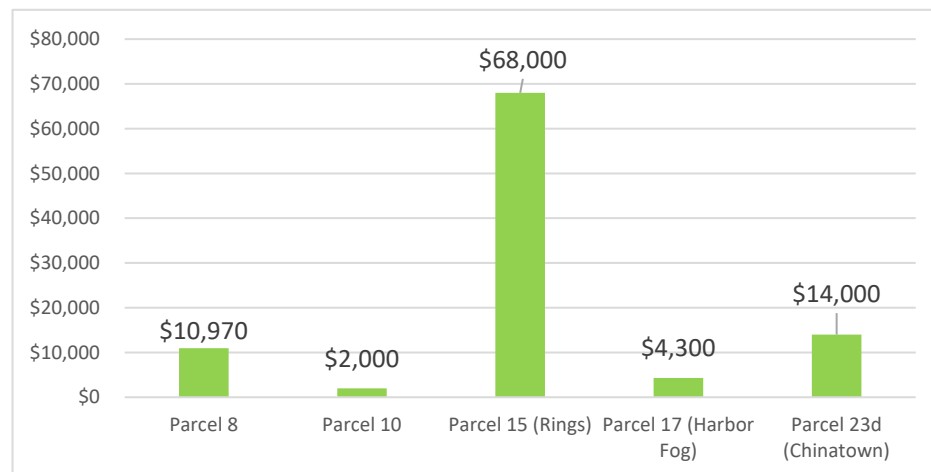
## Conditions Assessment: Fountain Assets

The Greenway Conservancy owns, operates, and maintains five fountains located along the Greenway in Boston, MA. Weston & Sampson Engineering, Inc. (WSE) evaluated assets associated with each of these fountains. Each condition assessment was entered into Survey123 which linked the assessment to the asset point within ArcGIS. The condition assessment was conducted on Tuesday, June 9, 2020. All fountains were operational during the site inspection except for the North Canal Fountain which was being repaired at the time. The following summarizes the findings from the assessment.

*Figure 9: Fountain Components – Recommended Actions (by Fountain)*



*Figure 10: Fountains – Cost to Repair (by Fountain)*







## North Canal Fountain

The North Canal fountain is located in Parcel 8 between John F Fitzgerald Surface Road and Cross Street in the North End. Fountain features include a shallow sheet of water that flows across the fountain deck with vertical ground sprays and LED lights scattered throughout. The mechanical equipment for the fountain is located in a vault northeast of the fountain. The vault includes the following components:

- Filter Pump
- Feature Pump (for the ground sprays)
- Display Pump (for the sheet flow)
- Sand Filter System
- Bromine Tablet Feeder System
- Water Quality Controller
- Fountain Controller
- HVAC Equipment
- Autofill Systems
- Sump Pumps
- Irrigation System Controller
- Electrical Panels

The fountain was installed in 2008, with some additional updates over the years including:

- Conversion from liquid chlorine water treatment to the Bromine Tablet Feeder System in 2015
- New automatic backwash valves in 2012
- New Water Quality Controller in 2019
- New display line check valves in 2020

During the time of the inspection the fountain wasn't turned on and therefore the evaluation for the North Canal Fountain does not include operability of the equipment other than what was conveyed to us by Greenway Personnel. The following observations were made during the assessment regarding asset condition:

- The sump pumps have surpassed their lifespan and should be monitored for replacement. Greenway personnel noted that they already monitor the sump pumps frequently for replacement as part of their regular maintenance efforts.
- The exhaust fan has surpassed its lifespan and should be monitored for replacement.
- The vault heater has surpassed its lifespan and should be monitored for replacement.
- Some of the ground sprays are not flush with the fountain decking and are missing escutcheon plates. These conditions can create a tripping and stubbing hazard to patrons - and therefore should be addressed immediately.
- There is a leak in the fountain trough that the Greenway Personnel had identified and have plans to caulk this year.

- The metal grating over the fountain trough needs to be repaired and/or replaced. Some pieces of the grating are exposed creating a hazard to users. Additionally, there are pieces that concave in, creating an uneven surface. Greenway Personnel noted that any hazards in grating are repaired as needed. The grating was designed with inadequate support. Ultimately, either the grates need to be replaced with stronger ones or stainless steel supports need to be welded to the trough.
- It is recommended that the sand for the filter be replaced every eight years instead of every three years.
- The wind sensor at the fountain serves both the North Canal Fountain and the South Canal Fountain. The wind sensor currently does not work. Further investigation is needed to determine what needs to be done to repair the sensor.
- Recommend installing additional water sensors to provide telemetry readout in the event of a failure to prevent vault flooding.



### South Canal Fountain

The South Canal Fountain is located in Parcel 10 between John F Fitzgerald Surface Road and Cross Street in the North End. The fountain is almost identical to the North Canal Fountain with a shallow sheet of water that flows across the fountain deck and vertical ground sprays and LED lights scattered throughout. The mechanical equipment for the fountain is located in a vault northeast of the fountain. The vault includes the following components:

- Filter Pump
- Feature Pump (for the ground sprays)
- Display Pump (for the sheet flow)
- Sand Filter System
- Bromine Tablet Feeder System
- Water Quality Controller
- Fountain Controller
- HVAC Equipment
- Auto fill Systems
- Sump Pumps
- Irrigation System Controller
- Electrical Panels

The fountain was installed in 2008, with significant upgrades in 2010 due to a leak in 2009. This involved rebuilding or replacing all electrical and mechanical equipment. Some additional upgrades over the years include:

- Conversion from liquid chlorine water treatment to the Bromine Tablet Feeder System in 2015
- New automatic backwash valves in 2012
- New Water Quality Controller in 2019
- New display line check valves in 2020

The overall fountain condition and mechanical equipment were in good condition. The following observations were made during the assessment regarding asset condition:

- The feature pump motor felt hot during operation and should be monitored for replacement over the next couple years.
- Greenway Personnel noted that sump pump #2 was having some issues that they were able to resolve. The sump pumps have surpassed their lifespan and may need to be replaced within the next year. Greenway personnel noted that they already monitor the sump pumps frequently for replacement as part of their regular maintenance efforts
- The exhaust fan has surpassed its lifespan and should be monitored for replacement.
- The vault heater has surpassed its lifespan and should be monitored for replacement.
- Some of the ground sprays are not flush with the fountain decking and are missing escutcheon plates. These conditions can create a tripping and stubbing hazard to patrons and therefore should be addressed immediately.
- The metal grating over the fountain trough needs to be repaired. Some pieces of the grating are exposed creating a hazard to users. Additionally, there are pieces that concave in, creating an uneven surface.
- Interior of the vault is showing signs of heavy corrosion on the conduit, hangers, and supports as a result of the 2009 flooding. These items are not housing or holding recirculation piping. Recommend providing a phased approach to replace rusted hangers and then conduit over the next 3-10 years.
- No wind sensor was identified for the fountain. It is recommended that one is installed since the fountain is located in an area with heavy foot traffic.
- Recommend installing additional water sensors to provide telemetry readout in the event of a failure to prevent vault flooding.



### Rings Fountain

The Rings Fountain is located in Parcel 15 between John F Fitzgerald Surface Road and Atlantic Avenue in the Wharf District. The fountain includes a series of vertical ground sprays that are laid out in two concentric rings and a third not concentric ring with LED lights and fog. The spray manifolds and lights are flush with the walkway and are located under pedestal pavers. The mechanical equipment for the fountain is located in a vault southwest of the fountain. The vault includes the following components:

- Jockey Pump & Strainer
- Compressor
- Micron Filter
- Air Dryer
- Fog Pump
- Fog Manifold / System

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- Water Softener (Not Used)
- Filter Pump
- Sand Filtration System
- UV System
- Bromine Tablet Feeder
- Fountain Controller
- Water Level Controls
- Water Chemistry Controller
- HVAC Exhaust Fan
- Electrical Panels

The overall fountain condition and mechanical equipment were in good condition. The following observations were made during the assessment regarding asset condition:

- The fountain controller is original to the fountain and is scheduled to be replaced next Spring (2021).
- It is recommended that the sand for the filter is replaced every 8 years instead of every 5 years. The sand was last replaced in 2017.
- It was noted by Greenway Personnel that the cartridges for the micron filter are replaced 1-3 times a year. The cartridges on the micron filter should only need to be replaced every 5 years. It is recommended that the existing micron filter is replaced with a larger one so to reduce to frequency of replacing the cartridges.
- It was noted by Greenway Personnel that the solenoid valve on the bromine tablet feeder is replaced frequently. We recommend upgrading to a Rain Bird solenoid valve for better durability.
- The bromine tablet feeder has surpassed its product lifespan and should be monitored for replacement.
- It was noted by Greenway Personnel that the ground sprays need to be replaced every 10 years. It is recommended that they are epoxy coated to help prolong their life.
- Components of the compressor and other forced air components are approaching a large maintenance threshold. It is likely there are individual components that can be replaced.



### Harbor Fog Sculpture

The Harbor Fog fountain is located in Parcel 17 between John F Fitzgerald Surface Road and Atlantic Avenue in the Wharf District. The fountain includes three sculptural beacons that represent navigational buoys. Each sculpture contains fog nozzles, color changing LED lights and sound systems. The fog mist and lights are triggered by motion sensors on top of the sculptures. Mechanical equipment for the fountain is located to the east in a vault. The vault includes the following components:

- Fog Pump

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- Fog Manifold
- Solenoid Control Panel
- Micron Filter

The fountain was constructed in 2008 with no major upgrades since then other than replacement of the motion sensors and speakers. Typical maintenance efforts surrounding the fountain include:

- Replacing O-rings for fog nozzles once or twice a year
- The overall fountain condition and mechanical equipment were in good condition. The following observations regarding asset condition were made during the assessment:
- The fog pump sounded like it had a loose belt. Although this noise has been standard throughout its use the pump should still be monitored and most likely will need replacement in the next 5 to 7 years.
- The solenoid valves are in good working condition but should be monitored for replacement in the next 1 to 5 years.
- The sump pump is replaced every year. A more reliable sump pump should be considered to reduce yearly maintenance efforts.
- It was noted by Greenway Personnel that the cartridges for the micron filter are replaced 1-2 times a year. The cartridges on the micron filter should only need to be replaced every 5 years. It is recommended that the existing micron filter is replaced with a larger one so to reduce to frequency of replacing the cartridges.



### Chinatown Stream

The Chinatown Stream fountain is located in Parcel 23 between John F Fitzgerald Surface Road and Kingston Street in the Chinatown neighborhood. The fountain consists of a series of stacked boulders that water overflows over into a stream to create a cascading waterfall effect. The water from the stream flows along a walkway into the fountain basin where water is then recirculated through the filtration system in the mechanical vault. The mechanical vault for the fountain is located at the southern end of the fountain, adjacent to the basin. The vault includes the following components:

- Filter Pump
- Feature Pump
- Sand Filtration System
- Bromine Tablet Feeder System
- Water Quality Controller
- Variable Frequency Drives
- AV Controllers
- Fountain Controller
- Water Level Probe

The fountain was constructed in 2008 with some equipment replaced in 2015. The overall fountain condition and mechanical equipment were in good condition. The following observations were made during the assessment regarding asset condition:

- The solenoid valve should be replaced on the bromine system within the next 3 to 5 years.
- The water level probe has surpassed its product lifespan and should be monitored for replacement.
- The sampling loop to the water quality controller is leaking and needs to be repaired.
- It is recommended that the sand in the filter system is replaced every 8 years versus every 3 years.
- The visibility through the site pipe for the backwash has become compromised. The pipe should be replaced.
- The exhaust fan vibrates excessively and has surpassed its product lifespan. It is recommended that it is replaced.
- The lower basin was retaining water when not in operation. This could be attributed to an issue with a check valve. The issue should be further investigated and repaired as needed.
- Pump #2 on the sump pump was not working properly during the site inspection but has since been operating sufficiently. This pump should be monitored.
- The main drain sump has some spalling around the grate that should be monitored.
- The vault hatch is missing a piston that should be replaced.
- The filter pump motor felt hot during operation and should be monitored for replacement over the next couple years.
- The stacked boulders had some rusting and infiltration. The boulders should be cleaned, and joints should be repointed at points of infiltration.
- The RPZ device found aboveground was leaking and should be repaired.

Unit costs for the fountain assets are featured in tabular format (see Appendix B).



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## Appendix A: Unit Costs (Park Assets)



## Rose Kennedy Greenway - Asset Maintenance Costs

Asset	Est. Life Span Yrs.	Unit	Average Repair \$	Replace Cost	Upgrade Cost	Comments
<b>Furniture (Fixed)</b>						
Benches	26	Each	\$240	\$2,800	N/A	Repair:Localized area paint touchup, average
Swing Benches	26	Each	\$1,000	\$8,300	N/A	Repair: braking mechanism repair, area paint touchup
Benches (with wood)	20	Each	\$420	\$3,200	N/A	Repair: Paint touchup, slat repair
Table and Chairs (Fixed)	14	Each	N/A	\$1,800	N/A	
Trash/Recycle Receptacles	16	Each	\$250	\$2,300	N/A	Repair:paint touchup
Fencing Red Steel	30	LF	\$20	\$180	N/A	Repair:Repaint/touchup
Planting Bed Guard	25	LF	\$15	\$72	N/A	Replace:Replace panel
Black tall fence	25	LF	\$22	\$72	N/A	Repair:Repaint/touchup
Bike Racks	16	Each	\$60	\$1,200	N/A	Replace:Replace panel
Tree Grates	30	Each	\$320	\$2,200	N/A	Repair:Repaint/touchup
						Replace:Replace panel
						Repair:Weld repair
						Replace:Replace grate
<b>Furniture (Moveable)</b>						
Table/Chair Set (moveable)	10	Set	\$120	\$2,200	N/A	Repair: Touchup/Finish Repair
Table (moveable)	8	Each	\$60	\$340	N/A	Repair: Touchup/Finish Repair
Chair (moveable)	8	Each	\$60	\$265	N/A	Repair: Touchup/Finish Repair
Chaise Lounge (Moveable)	7	Each	N/A	\$1,000	N/A	
Umbrella	4	Each	N/A	\$2,300	N/A	
<b>Infrastructure</b>						
Railing and Hand Rails	25	LF	\$18	\$105	N/A	Repair: repaint
Connex Boxes	50+	Each	\$1,800	N/A	N/A	Repair: Refinish/repaint
<b>Lighting and Electrical</b>						
Bollard Lights	22	Each	\$100	\$1,800	\$75	Repair: minor touchup (assume in house)
						Replace: Entire unit
						Upgrade:LED replacement
Pole Lights	30	Each	\$100	\$12,000	\$100	Repair: minor touchup (assume in house)
						Replace: Entire unit
						Upgrade:LED replacement
Wall/Puck/Down Lights	24	Each	N/A	\$750	\$75	Replace: Entire unit
						Upgrade:LED replacement
In-ground uplights	20	Each	N/A	\$750	\$75	Replace: Entire unit
						Upgrade:LED replacement
Cafe lighting	20	Each	N/A	\$2,500	\$50	Replace: Entire length
						Upgrade: LED Replacement
Rope lighting	20	Each	N/A	\$120	N/A	Replace: Entire length
Outlets	20	Each	N/A	\$50	N/A	Replace: Outlet
Outlet Bollards	20	Each	N/A	\$650	N/A	Replace: Bollard
<b>Paving</b>						
Concrete Pavers	50	SF	\$29	N/A	N/A	Repair: Remove and Reset
Brick	50	SF	\$29	N/A	N/A	Repair: Remove and Reset
Ground Plain Granite	50	SF	\$54	N/A	N/A	Repair: Remove and Reset
Stone Curbing/Wall	50	LF	\$24	\$2,200	N/A	Repair: Repointing/Caulking
Granite Stairs	50	Each	\$35	\$1,535	N/A	Repair: Repointing
						Replace: remove and reset step

Stone Seat Wall	50	LF	\$20	\$800	N/A	Repair: Repointing/Caulking Replace: remove and replace veneer/SF
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#### Signage

Signs - Large	20	Each	\$180	\$6,000	N/A	Repair: Paint touch up, Plexiglass replace
Park directory						
Signs - Medium	20	Each	\$120	\$2,650	N/A	Repair: Paint touch up
Interpretive panels						
Signs - Small	20	Each	\$120	\$2,200	N/A	Repair: Paint touch up
Information (knee high)						

#### Special Features

Mill Pond Wall Marker	50	Each	N/A	N/A	N/A	
Inscribed Granite Map	50	Each	N/A	N/A	N/A	
Leaning Rail Timeline	50	LF	\$18	\$115	N/A	Repair: Repaint posts/frame Replace: posts/frame
Katherine Nanny Naylor Site	50	Each	N/A	N/A	N/A	
Immigration Story Interpretive						
Engravings	50	Each	N/A	N/A	N/A	
Light Blade Structure	50	Each	\$1,200	N/A	N/A	Repair: Repaint structure

#### Structures

Pergolas	50	Each	\$15,000	N/A	N/A	Repair: Repaint structure
Red Bamboo Cages	50	Each	\$4,900	N/A	N/A	Repair: Repaint structure
Red Gate and Sail	50	Each	\$4,600	N/A	N/A	Repair: Repaint structure
Play Cubes	24	Each	N/A	\$32,000	N/A	Replace: similar play structure (Playworld)
Play Surface Mat	10	SF	N/A	\$18	\$22	Replace: similar mat surface Upgrade: Poured surface with stabilized edging

#### Horticulture Asset Inventory

##### Clocks

Rain Bird ESP-MC	10	Each	N/A	\$460	\$2,000	Can upgrade to Baseline as needed
Baseline System 3200 Clock	10	Each	N/A	\$6,000	N/A	

##### Irrigation Equipment

Fault Finder	15	Each	N/A	\$950	N/A	
Backflow	25	Each	\$250	\$1,350	N/A	
Wire Tracer	15	Each	N/A	\$600	N/A	
Booster Pump	14	Each	N/A	\$3,200	N/A	
Data Card	10	Each	N/A	\$1,300	N/A	
Heater	8	Each	N/A	\$200	N/A	

##### Infrastructure

Stainless Steel Enclosure for Clock	30	Each	N/A	\$360	N/A	
Hot Box	30	Each	N/A	\$3,200	N/A	
Above Ground Enclosure	30	Each	N/A	\$3,200	N/A	

##### Plants and Containers

Planting Containers (Fiberglass)	20	Each	\$120	\$1,220	N/A	Repair: Touchup/Finish Repair
Planting Containers (Cor Ten Steel)	30	Each	N/A	\$1,300	N/A	

## Rose Kennedy Greenway State of Good Repair

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## Appendix B: Units Costs (Fountain Assets)

## Fountain Unit Costs

Asset	Unit Cost <sup>1</sup>	Unit	Notes
<i>Basin Elements</i>			
Ground Sprays	\$2,500	EA	Includes deck removal and plumbing
8-in Trough Grates	\$120	LF	Based off Kaydee Industries, Inc. 2011 costs
18-in Trough Grates	\$270	LF	Based off Kaydee Industries, Inc. 2011 costs
Motion Sensor	\$1,500	EA	
Speakers	\$1,500	EA	
Masonry Repair (Chinatown Stream)	\$4,500	LS	Specific to Chinatown Stream repointing and replacing of various components.
Water Intake Basin (Chinatown Stream)	\$2,500	LS	Specific to Chinatown Stream - Recoating the Basin
<i>Sensors</i>			
Wind Sensor	\$1,500	EA	Includes new sensor and wiring to existing control panel
Water Level Sensor (Float Switches)	\$2,500	EA	
<i>Controllers &amp; Cabinets</i>			
Electrical Cabinet	\$10,000	EA	
Fountain Controller (Rings Fountain)	\$68,000	EA	Cost includes replacing entire controller.
Fountain Controller	\$30,000	EA	Cost includes replacing entire controller.
Irrigation Controller	\$3,000	EA	Includes removing, replacing and proraming.
Water Quality Controller	\$4,500	EA	
Wi-Fi Cabinet	\$2,500	EA	Cost includs cabinet, install, and start-up/configure
Water Meter & RPZ	\$6,000	EA	Includes replacement of RPZ (Add \$1,500 if RPZ is to be stored in a cabinet)
<i>Fans/HVAC</i>			
Air Intake Fan	\$1,500	EA	
Dehumidifier	\$1,000	EA	
Exhaust Fan	\$1,500	EA	
Heater	\$1,500 - \$2,500	EA	
Air Dryer	\$8,000	EA	
Air Conditioner	\$4,500	EA	
<i>Lighting</i>			
Fountain Lights	\$1,500 - \$2,500	EA	Replacement of existing light, niche, and wiring.
<i>Pumps/Compressors</i>			
Backflow Preventer	\$4,500	EA	
Compressor	\$25,000	EA	
Pump (5 HP)	\$5,500	EA	Includes pump and motor (Pump = \$3,000, Motor = \$2,500)
Pump (7.5 HP)	\$6,500	EA	Includes pump and motor (Pump = \$3,500, Motor = \$3,000)
Display Pump (North & South Canal)	\$12,500	EA	
Fog Pump	\$2,500	EA	
Jockey Pump	\$2,500	EA	
Jockey Strainer	\$2,000	EA	
Expansion Tank	\$6,500	EA	
Fog Manifolds	\$1,000	EA	
Main Drain Sump (Chinatown Stream)	\$2,500	EA	Replacement of main drain cover (specialty metal fabrication)
Sump Pump	\$400 - \$2,000	EA	
<i>Security &amp; Safety</i>			
Collector Tank Hatch	\$2,500	EA	Rebuilding of components - Do not recommend removal from slab
Eyewash Station	\$750 - \$1500	EA	Cost can vary based on whether the eyewash station is plumbed or not
Vault Hatch	\$2,500	EA	Rebuilding of components - Do not recommend removal from slab
Camera Recorder	\$1,500	EA	
Security Camera	\$1,000	EA	
<i>Water Purification System</i>			
Bromine System	\$1,000	EA	
Data Sticks	\$300	EA	
Sand Filtration System	\$3,000	EA	
Micron Filter	\$2,500	EA	
UV Light System	\$5,000	EA	Remove and replace the UV System. Bulbs replacement are approx. \$1,000/Year
Water Softener	\$2,000	EA	
Solenoid Valve	\$400	EA	
Solenoid Control Panel	\$5,000	EA	

1. All unit costs are based on removing and replacing asset unless noted otherwise and are 2020 cost values.

## Rose Kennedy Greenway State of Good Repair