CHAPTER EIGHT

INFRASTRUCTURE

Oakland Cemetery's infrastructure is made up of above and below ground utilities, supported by a roadway network. This chapter discusses stormwater infrastructure, supporting utilities, and watering systems. Recommendations concerning the roadway network and brick gutters can be found in Chapter 7.

Importance: Stormwater Infrastructure

Stormwater conveyance may be less visible, but is in greater need than other more cosmetic or programmatic changes at Oakland. From structures and landscape preservation to the integrity of restored hardscapes, stormwater affects every area of the grounds. Oakland is fortunate to have its iconic brick gutters and much of its original piping in place, but the importance of its repair and continued function cannot be overstated. Despite improvements to the drainage system in 2000, if not addressed, ongoing flooding will continue to threaten preservation efforts and historic structures.

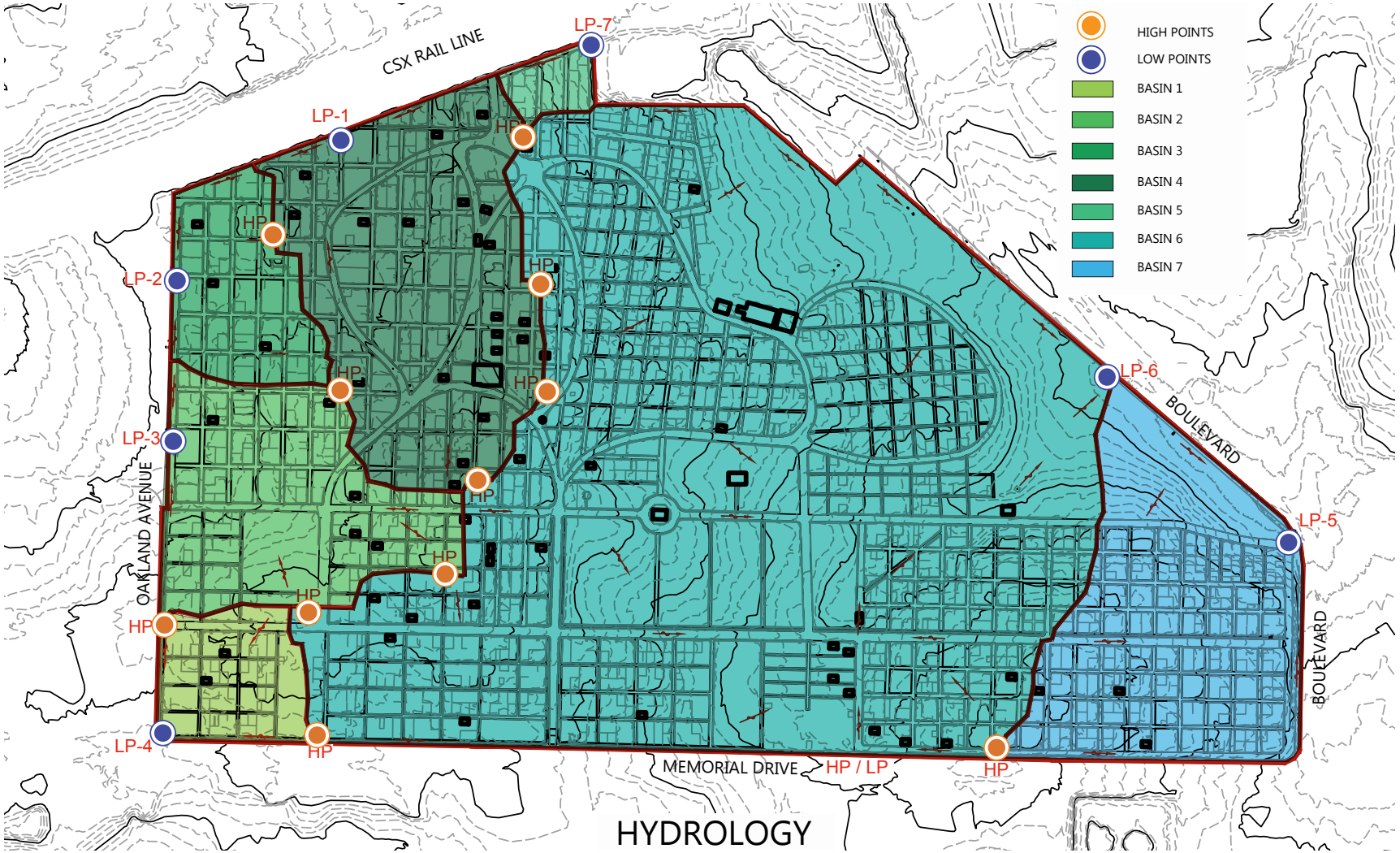
Existing Conditions: Stormwater

Standing water north of the Bell Tower. This area frequently sees heavy vehicular traffic and frequent roadside parking.

Infrastructure

Oakland sits on a site of varied topography that sees an elevation change of almost 70 feet. From its high point at the Austell mausoleum to the lower areas of Paupers Grounds, Oakland's landform is complex. The site is composed of seven distinct sub-watershed basins, each with its own high point and low points. The Hydrology map on the following pages illustrates these basins. The largest is Basin 6 which encompasses over two-thirds of the cemetery.

With this complex topography in mind, Oakland was developed with a brick gutter drainage network that funneled water to lower levels of the site. These brick drains only partially function because of their current poor condition. The majority of water on-site is surface flow into these gutters. There is also a historic sewer system (formerly part of the combined sewer system of Atlanta) that connects the comfort stations to a catch basin network along the east wall (at the low point of Basin 6). The condition of this converted storm pipe network is unknown, but flooding persists along the east wall. Flooding also occurs near the low points in Basins 2 and 3. Attempting to address these concerns, the city installed stormwater inlets at each low point. Today they do not work because they are largely clogged, full of sediment, leaves, and other debris. Other areas seeing flooding include the Boiler Room/Carriage


HIGH POINTS
LOW POINTS
BASIN 1
BASIN 2
BASIN 3
BASIN 4
BASIN 5
BASIN 6
BASIN 7
CSX RAIL LINE
LP-7
LP-1
LP-2
LP-3
LP-4
LP-5
LP-6
HP
HP / LP
OAKLAND AVENUE
MEMORIAL DRIVE
BOULEVARD
BOULEVARD

HYDROLOGY

House/Greenhouse complex where grates are covered and gutters are damaged.

Oakland is also experiencing increasing erosion. Areas of steep topography combined with a significant amount of impervious surfaces and lack of groundcover/turf on some lots, has increased siltation and runoff. This further exacerbates stormwater problems and flooding with a network that does not fully function.

Proposed Strategies: Stormwater

There are three strategies that will help address stormwater issues at Oakland:

- Hydraulic Modeling is needed to understand the hydrology of Oakland which will further identify solutions to Oakland's flooding. (See page 109.)
- Stormwater structures need to be upgraded, including its drop inlets, catch basins, and grates. Improvements to brick gutters are addressed in Chapter 7. (See page 110.)
- Another part of Oakland's infrastructure that needs replacement is the existing stormwater piping. (See page 111.)

Debris blocks inlets in heavy precipitation events. Low points such as this provide green infrastructure opportunities.

Standing water has allowed sediment to cover brick gutters, greatly reducing their functionality.

Strategy: Hydraulic Modeling and Survey

Description:

An updated structures and existing piping report, along with hydraulic modeling are necessary to understand stormwater patterns on site. Hydraulic modeling is also important in predicting the capacity of planned cisterns in capturing stormwater and contributing to watering needs. Prior to implementing any new infrastructure, a model and finalized survey are necessary to appropriately phase new infrastructure.

Steps Required for Implementation:

1. Hire surveyor to complete survey of project with site level accuracy.
2. Use survey results to help determine the location and size of cisterns.

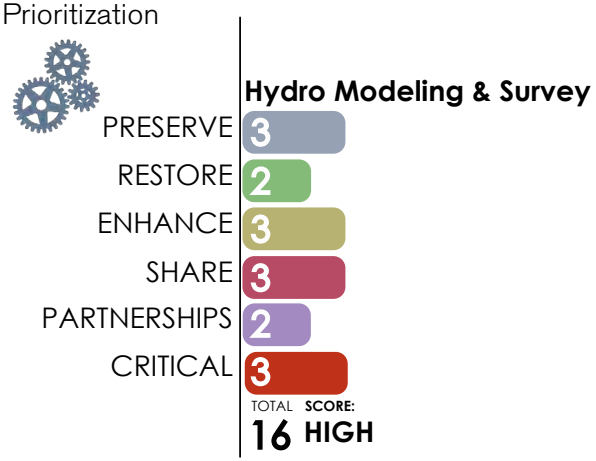
Cost Type:
Capital Improvement

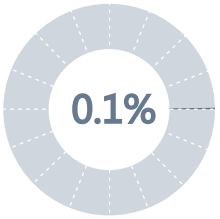
Partners:
Department of Parks and Recreation
Department of Watershed Management
Hydraulic Engineer
Site Contractors

Cost Range:
$50,000 - $75,000

Duration:
2018

Prioritization





Shown as a percent of the estimated $43.5M for all strategies

Strategy: Stormwater Structures

Description:

There is limited information available about the existing structures for capturing and moving water underground. Repairing existing structures is critical to continued upkeep of restored lots, hardscape, structures, and plantings. Stormwater structures are defined as the brick gutters; catch basins and inlets. This work can happen in coordination with upgrades to the roadways.

Steps Required for Implementation:

1. Complete hydraulic modeling of the site.
2. Work with a hydraulic engineer to establish a prioritization of improvements.
3. Begin upgrading stormwater structures. Some improvements may coincide with roadway replacement.

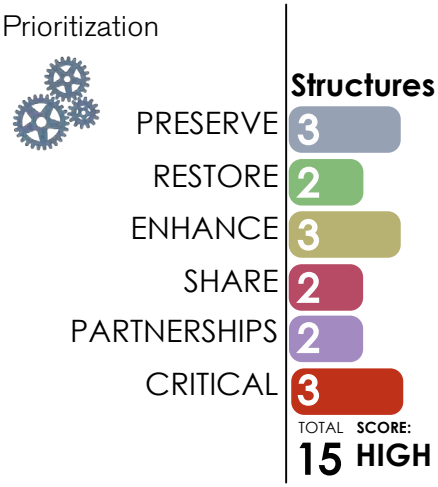
Cost Type:
Capital Improvement

Partners:
Department of Parks and Recreation
Department of Watershed Management
Southface
Hydraulic Engineer
Site Contractors

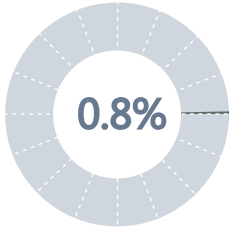
Cost Range:
$240,000-$360,000 (Excludes cost of repairing brick gutters)

Duration:
2019-2021

Prioritization



Storm Structures



of total

Shown as a percent of the estimated $43.5M for all strategies

Strategy: Stormwater Piping

Description:

Underground piping is outdated and in many cases obstructed. The piping system needs to be assessed and replaced to ensure the continued upkeep of restored lots, hardscape, structures, and plantings.

Steps Required for Implementation:

1. Assess routes and conditions as well as type of materials of existing stormwater piping with line inspection cameras as part of hydraulic modeling.
2. Coordinate repair efforts with utility or pavement repair and restoration.
3. Replace all out of date and inoperable stormwater piping.
4. Salvage portions of replaced piping for use in future exhibit space. Tag item with information such as location founds, material, age. Record the structure of the piping system before removal.

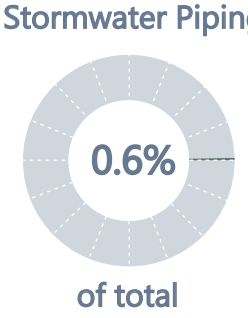
Cost Type:
Capital Improvement

Partners:
Department of Parks and Recreation
Department of Watershed Management
Hydraulic Engineer
Site Contractors

Cost Range:
$200,000-$300,000

Duration:
2019 - 2021

Prioritization



Importance: Power, Gas, Internet

As space programming plans develop and Historic Oakland Foundation pursues a visitor and staff office area outside of the gates, repurposing structures to meet future needs requires reliable electricity, gas, and telecommunications. Without meeting these needs, HOF's business efficiency, record keeping, and security are jeopardized.

Existing Conditions: Power, Gas, Internet

Utility upgrades (including relocating utilities underground) should be coordinated with roadway replacement, walkway repairs, and building improvements. Existing overhead power and buried gas lines enter Oakland from three main areas. Two power lines – from the Guardhouse and Bell Tower – connect west to a line on Oakland Avenue. A third line servicing the Greenhouse/Carriage House/Boiler Room complex runs northeast from the buildings to Boulevard. Communication and internet are also tied to these poles. The City of Atlanta is also planning to run a T1 line to the Carriage House from the west side of the cemetery. The gas line follows the same path as the power line that services the Bell Tower, only underground.

Proposed Strategy: Power, Gas, Internet

One strategy (see page 113), addresses the comprehensive utility updates needed to meet current and future electricity, gas, and telecommunication needs. Where possible, utility lines should be buried to maintain a park-like atmosphere and keep with Oakland's historic character and Victorian aesthetic. Meeting these needs while staying sensitive to historic structures and interpretive areas is costly, and should be phased. To distribute costs, expanding and updating utilities is a conversation closely associated with new facility planning.

As with stormwater and water piping, information utility upgrades should be carefully coordinated with surface repair and replacement to reduce installation costs.

Overhead power lines near the Bell Tower. These lines also obstruct views towards downtown Atlanta.

Strategy: Power / Gas / Internet Upgrades

Description:

Retrofit Oakland's historic structures to accommodate current Internet, gas and electricity needs. Where possible, utility lines should be buried to maintain a park-like atmosphere. In addition to retrofitting the historic structures for the reliable needs of today, HOF is exploring construction of a work shed and Visitors Center with staff offices outside of the gates. As with stormwater infrastructure and proposed water line upgrades, HOF should coordinate utility upgrades with other improvements to reduce installation costs.

Steps Required for Implementation:

1. With the assistance of a licensed electrical consultant, assess the needs to existing buildings, and location of future utilities.
2. Bury utility lines to existing structures where possible. Coordinate these installations with the replacement of pavers and full-depth asphalt.

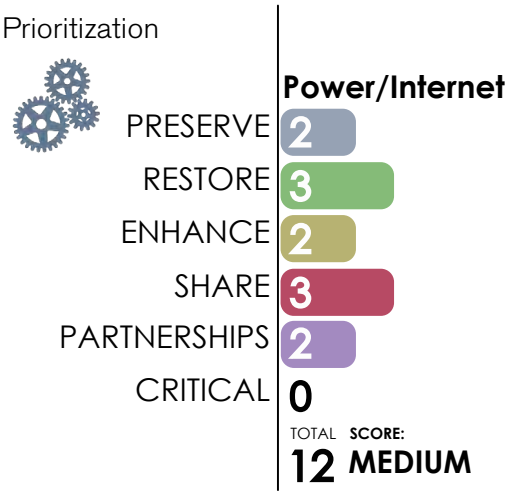
Cost Type:
Capital Improvement

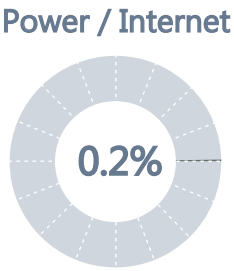
Partners:
Department of Parks and Recreation
Civil Engineer
Utility Providers

Cost Range:
$75,000 - $112,000

Duration:
2019 - 2029

Prioritization





Shown as a percent of the estimated $43.5M for all strategies

Importance: Watering

Oakland is a 48 acre city park that maintains a diverse, period-specific landscape. Without efficient, reliable access to water, landscape preservation efforts are greatly slowed and even futile. An improved watering system also allows Historic Oakland Foundation (HOF) staff to advance landscape enhancement efforts and expand maintenance capabilities.

Existing Conditions: Watering

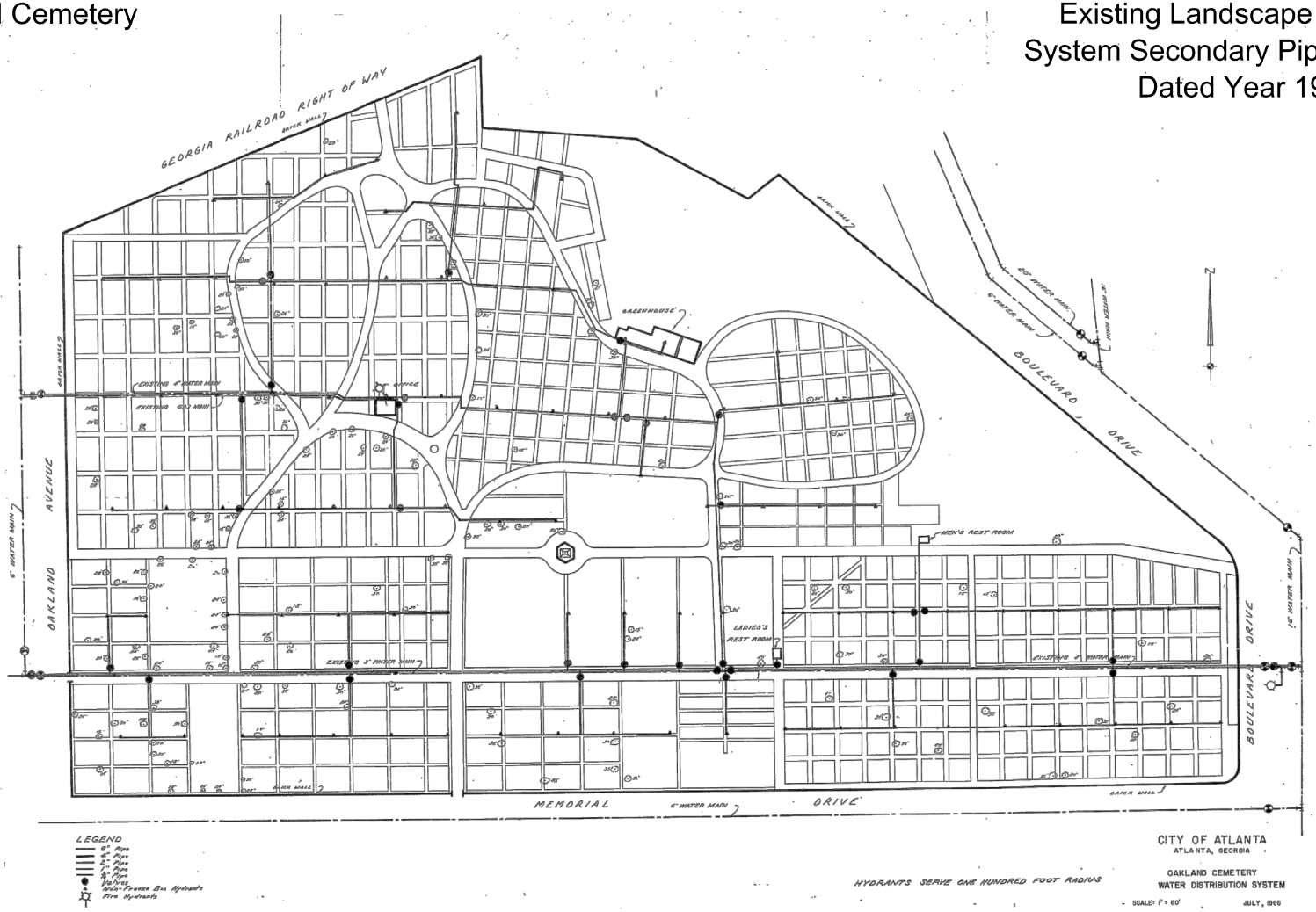
A Landscape Watering System Master Plan was completed Spring of 2017, reviewing the state of existing piping infrastructure and future needs. The plan, completed by Irrigation Consultant Services (ICS), recommended both cistern and well locations for watering throughout Oakland. The recommended plan acknowledges that Oakland does not regularly irrigate the entire cemetery. Instead, Oakland's watering system is intended to "water-in" new plantings for establishment, and supplement water needs for plantings during periods of drought.

Review of the existing water system infrastructure found supply piping and hose connections nearing the end of life expectancy for a pressurized landscape watering system. The existing system consists of secondary piping installed in 1966 and primary piping installed in the late 1990s and early 2000s. The new water system installed in 2000 also services a much smaller area than the older system. ICS's analysis found the secondary piping network of steel pipe largely corroded to the point of closure, and the existing primary system undersized at the meter. The assessment also revealed poor workmanship, with the primary lines dead-ending at opposite ends of the property and unable to maintain adequate pressure for extended periods of time. The assessment also found many of the old Murdock hose hydrants inoperable or in need of extensive costly repairs. In the past, HOF would restore these Murdocks, but high costs of replacement makes this a less desirable approach going forward. The inability to maintain adequate pressure throughout the cemetery and obstructed or broken pipes and hydrants would require nearly complete replacement and upgrades to piping and hose connections. Prior to the new system installation in 2000, there was at least one Murdock yard hydrant hookup in most sections of the cemetery. While the old, inoperable Murdocks will remain and not be replaced, the new water line has six new Murdock hydrants with back-flow prevention and nine sanitary drinking water fountains. Any water use outside these new hydrants or water fountains requires a long-distance connection to the new line. This limits the use of water and the distance it can be transported.

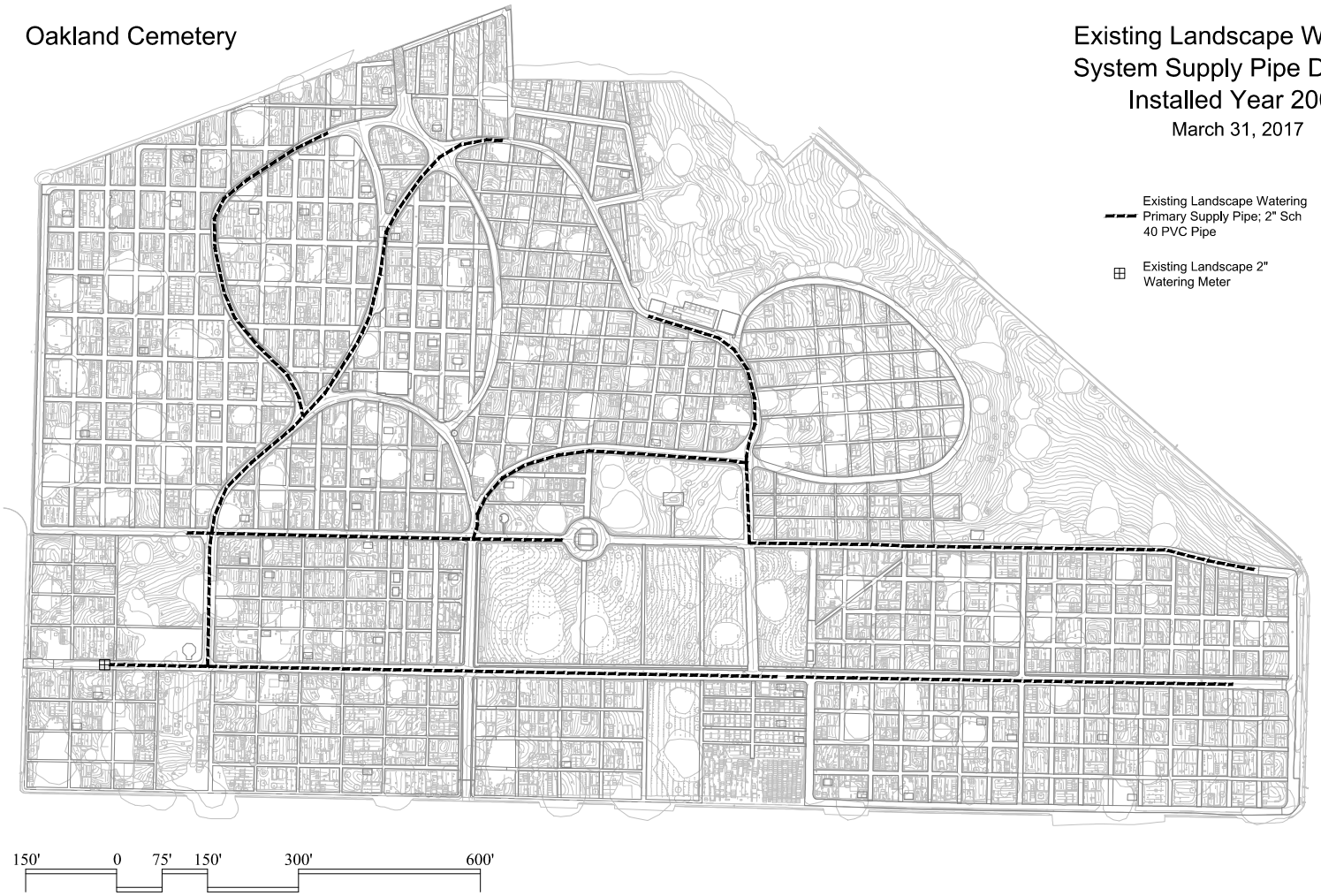
Old Murdock yard hydrants serviced most sections of the cemetery prior to new piping in the 1990s.

Oakland Cemetery

Existing Landscape Watering System Secondary Piping As Build Dated Year 1966



Oakland Cemetery



Existing Landscape Watering System Supply Pipe Diagram
Installed Year 2000
March 31, 2017

Pages 115 and 116 demonstrate the existing piping conditions resulting from updates in 1966 and 2000.

Proposed Strategies: Watering

Proposed strategies for watering were based on five key considerations outlined below:

1. **Collection:** Oakland's road and gutter system concentrates water in specific areas, allowing for logical collection points throughout the cemetery.

One of the nine sanitary drinking fountains installed in 2000.

2. **Topography:** By dividing Oakland into five geographical areas based on topography, localized watering needs are met and all character areas are served.

3. **Cistern locations:** One, 5,000 gallon underground cistern is proposed for each geographical area, placed in a low elevation collection point (under vehicular roads). Each of the five collection cisterns roughly corresponds to character areas and greatly reduces Oakland's reliance on the municipal water supply. The proposed water system improvements rely most on water supplied through rain, with well water added as an alternative back-up.

4. **Savings:** Currently, domestic water costs range from $13.00 to $34.00 per 1,000 gallons in the City of Atlanta. Following the initial investment, maintenance costs of the cistern and well system would be far less.


Watering system updates from 2000 with sinking asphalt patch.

5. **Efficiency:** A properly designed piping system, with air release valves, isolation valves, and no dead-ends will improve efficiency and reduce maintenance costs over the years ahead.

Three strategies address different components necessary to realize the proposed watering system.

- Install a piping system that greatly expands efficient service to all areas of the cemetery. (See page 122.)
- Install cistern wells that collect and store water, increasing Oakland's independence from the municipal water supply. (See page 123.)
- Install a pumping and filtration system to draw water from new cisterns. (See page 124.)

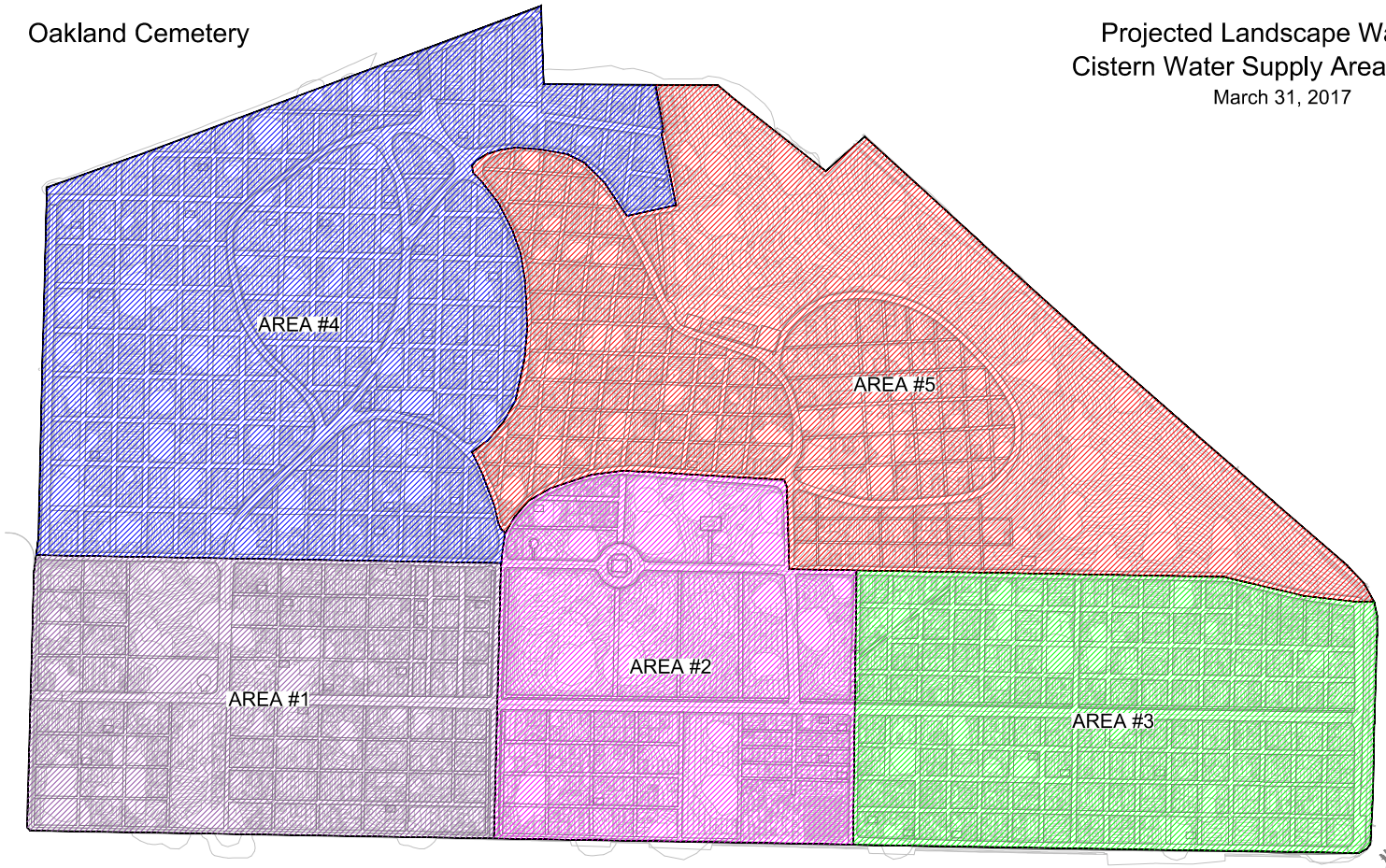
Pages 119-121 are from the Landscape Watering System Master Plan. Pages 119-120 show the proposed cistern locations and areas they will serve. Page 121 demonstrates the proposed piping supply plan, that greatly expands the system beyond the 2000 update.

Updates to the watering system in the 1990s are evident in the patched asphalt of Old Hunter Street Drive.

Shown as "LP-5" on the Stormwater map on page 109, this catchment structure was added in 2000 to reduce flooding in the southeastern edge of the Paupers Grounds. South of here is a proposed location for a cistern

Oakland Cemetery

Projected Landscape Watering
Cistern Water Supply Area Diagram
March 31, 2017



150' 0 75' 150' 300' 600'

Irrigation Consultant Services
2231 Weatherstone Circle
Conyers, GA 30094
(770) 929-0884, fax (770) 760-8025

Oakland Cemetery

Projected Landscape Watering
Cistern Locations Diagram
March 31, 2017

Indicates Projected Cistern Location

Irrigation Consultant Services
2231 Weatherstone Circle
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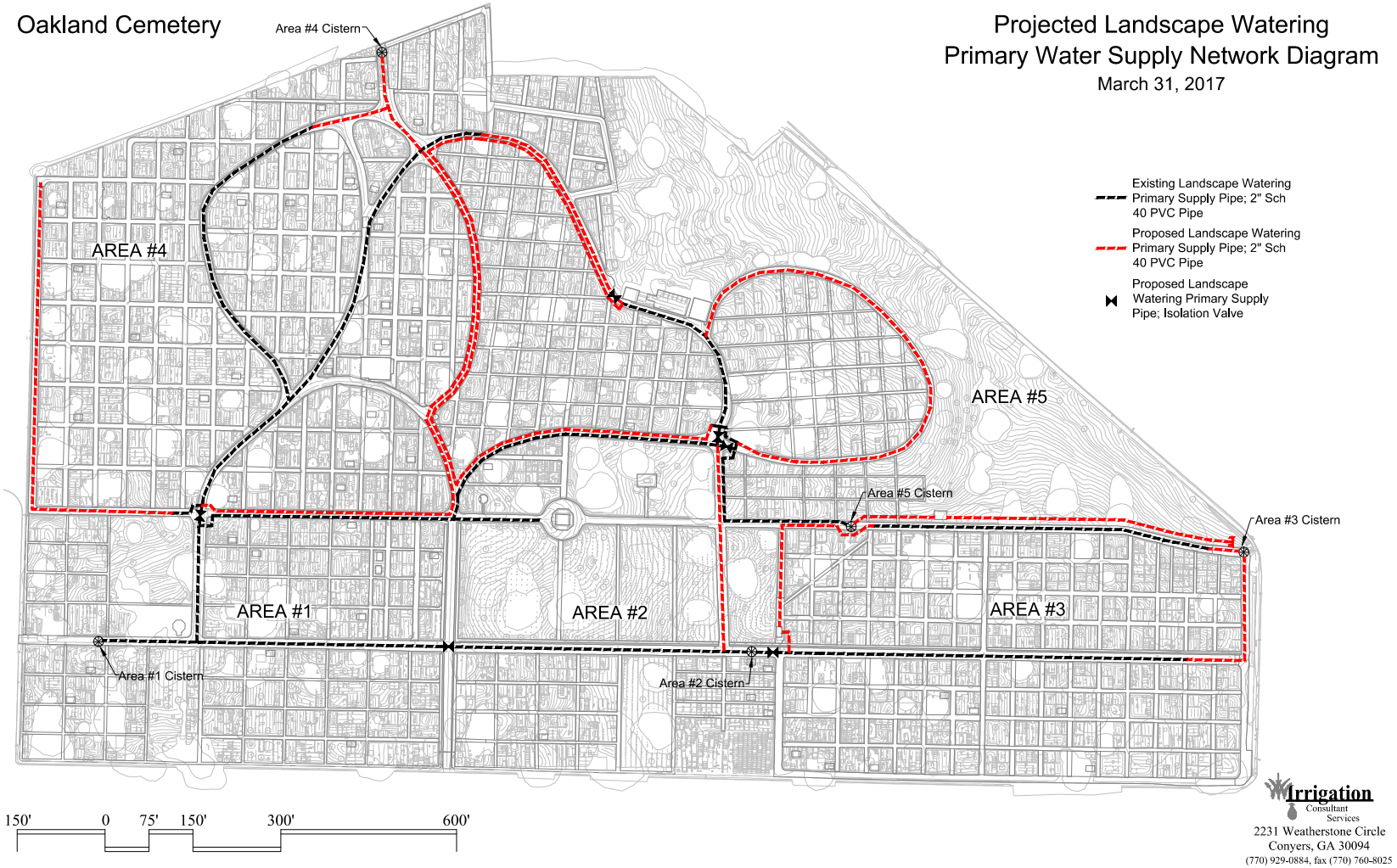
(770) 929-0884, fax (770) 760-8025


Oakland Cemetery
Area #4 Cistern
Projected Landscape Watering
Primary Water Supply Network Diagram
March 31, 2017
Existing Landscape Watering Primary Supply Pipe; 2" Sch 40 PVC Pipe
Proposed Landscape Watering Primary Supply Pipe; 2" Sch 40 PVC Pipe
Proposed Landscape Watering Primary Supply Pipe; Isolation Valve
AREA #4
AREA #5
AREA #1
AREA #2
AREA #3
Area #5 Cistern
Area #3 Cistern
Area #1 Cistern
Area #2 Cistern
150' 0 75' 150' 300' 600'
Irrigation Consultant Services
2231 Weatherstone Circle
Conyers, GA 30094
(770) 929-0884, fax (770) 760-8025

Strategy: Watering - Piping System

Description:

The watering-piping system updated in 2000 is undersized, serving only portions of the cemetery and lacks adequate water pressure. The Spring 2017 Landscape Watering System Plan specifies an expanded watering system that relies primarily on water collected in cisterns through precipitation. Collected water must be efficiently distributed, and an updated and expanded piping system is required to serve all areas of the cemetery. The nine sanitary drinking water drinking fountains installed in 2000, and additional fountains in the cemetery are currently functioning and do not require new piping at this time.

Steps Required for Implementation:

1. Install new piping in coordinated effort with road replacement and restoration efforts. If possible, focus first on Phase Four, Three D, and East Hill.

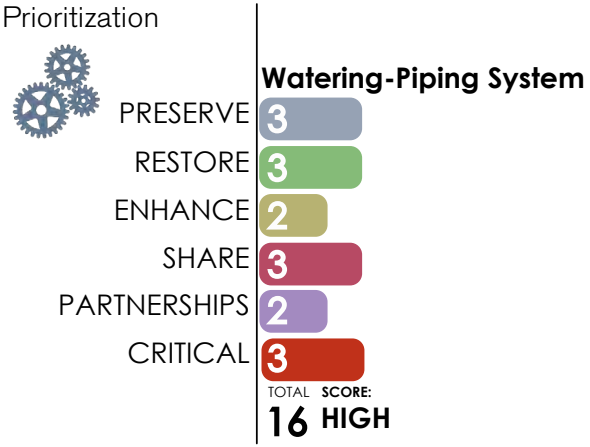
Cost Type:
Capital Improvement

Partners:
Southface
Irrigation Specialists
Site Contractors

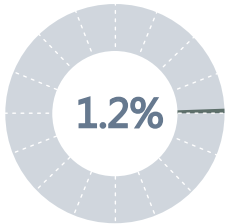
Cost Range:
$350,000-$525,000

Duration:
2018 - 2029

Prioritization



Watering - Piping



of total

Shown as a percent of the estimated $43.5M for all strategies

Strategy: Watering - Cistern/Wells

Description:

The Spring 2017 Landscape Watering System Plan specifies an expanded watering system that relies primarily on water collected in underground cisterns. Five 5,000 gallon cisterns and three new wells to feed cisterns are outlined in the 2017 Plan, and allow Oakland to reduce its dependence on municipal water supply. A test cistern in one of the five locations is strongly recommended. The complexity of capturing, filtering and pumping water from a cistern among sensitive surroundings should be proven in a test location.

Steps Required for Implementation:

1. Identify location for a cistern to be tested (See map on page 120).
2. Install and monitor cistern.
3. Plan and install additional cisterns. If located beneath roadways, coordinate with repaving efforts.

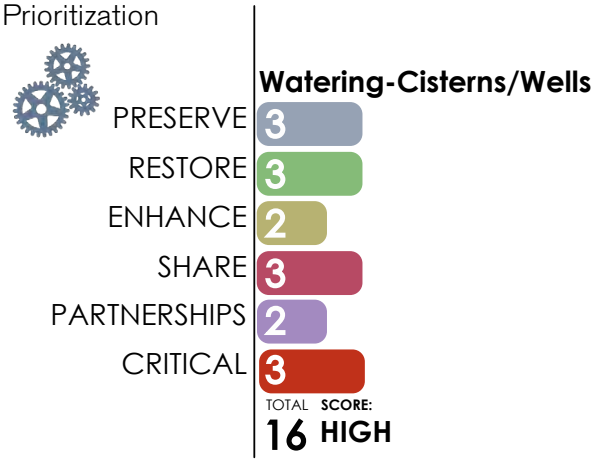
Cost Type:
Capital Improvement

Partners:
Southface
Irrigation Specialists
Site Contractors
Individual and Corporate Donors

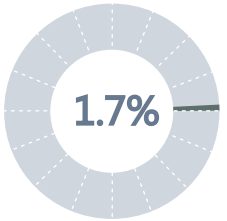
Cost Range:
$500,000-$750,000

Duration:
2020 (test); 2022-37

Prioritization



Watering - Cistern / Wells



of total

Shown as a percent of the estimated $43.5M for all strategies

Strategy: Water - Pumping and Filtration

Description:

Five new cisterns specified in the Landscape Watering System Plan will require water pumps and necessary filtration to operate as planned.

Steps Required for Implementation:

1. Coordinate with utility upgrades and assess electricity needs for pumps.
2. Implement during installation of new cisterns and wells.
3. Use the filtration and watering system as an educational tool by creating informational signage to explain the process to visitors.

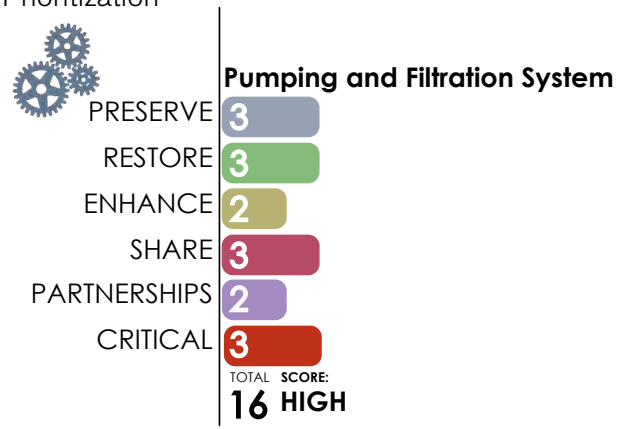
Cost Type:
Capital Improvement

Partners:
Southface
Irrigation Specialists
Site Contractors
Individual and Corporate Donors
Trees Atlanta

Cost Range:
$250,000 - $375,000

Duration:
2020 (test); 2022-2037

Prioritization



Pumping and Filtration

of total

Shown as a percent of the estimated $43.5M for all strategies