Fort Ward Park Master Drainage Plan

Prepared for the City of Alexandria

Presented by URS Corporation

May 7, 2014

Agenda

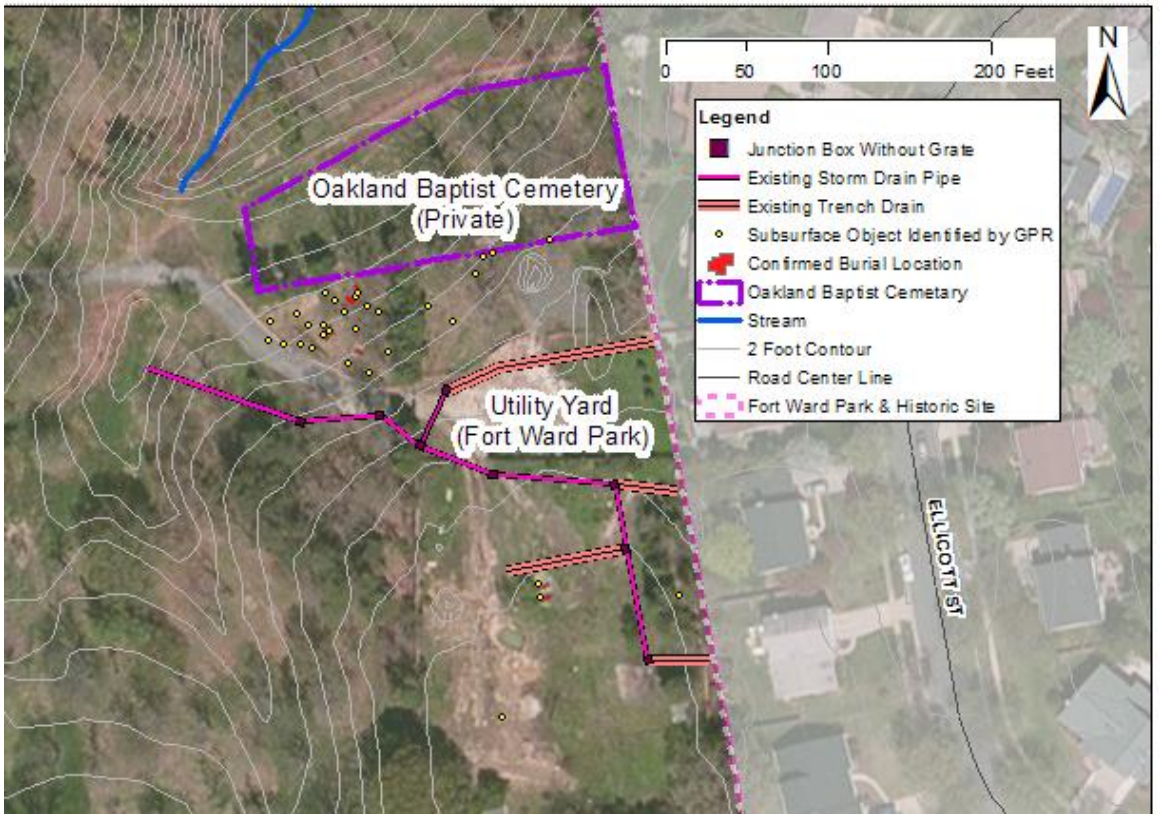
- Project Overview and Status
- Recommendations for Drainage Improvements
  - General (non-structural)
  - High Priority Structural Projects
  - Cemetery Area – Drainage Best Practices

Project Overview

- Concerns
  - Stormwater runoff
  - Erosion
  - Storm sewer system function

Project Overview

- Existing Measures (Interim Project)
  - Storm Drain Pipes
  - Infiltration Trenches
  - Perimeter Straw Wattles
  - Catch Basin



Project Overview

- Existing Measures (Interim Project)

Project Overview

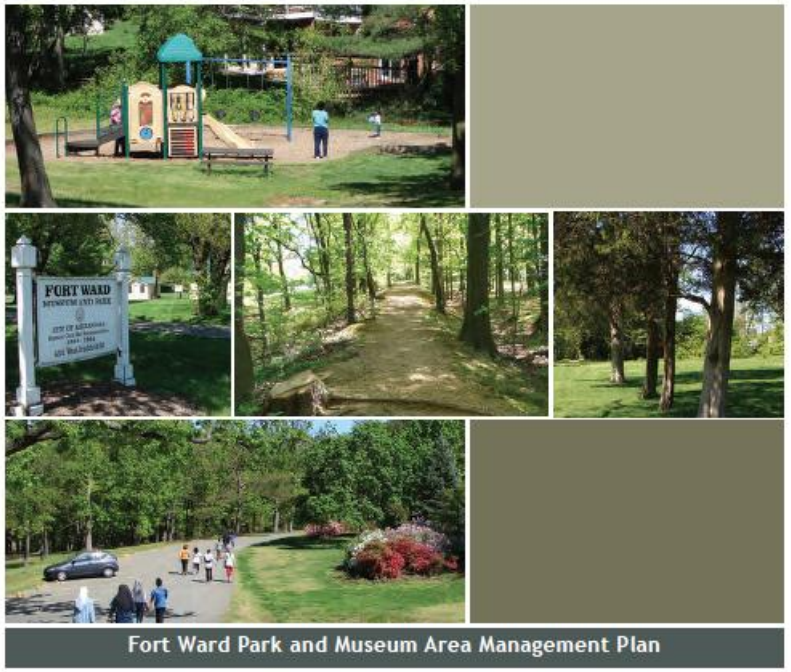
- Project Goals and Objectives
  - Identify potential drainage improvements
  - Develop effective solutions
  - Minimize impacts to the historic nature of the Park
  - Minimize runoff impacts from adjacent properties

Project Status

- Since August 2013:
  - Completed Hydrologic & Hydraulic Analysis and Report
  - Completed Draft Drainage Master Plan and Submitted to City
    - Recommended solutions for identified drainage deficiencies
    - Developed concept designs
      - Stormwater Filter (Site 3)
      - Diversion Berm around Cemetery (Site 6)
      - Stream Stabilization (Site 7)
    - Cemetery Areas Best Practices

Recommendations

- The recommendations are based on
  - Field observations
  - Engineering analysis
  - Advisory Group input
- The recommendations are consistent with the best practices presented in the Fort Ward Park and Museum Area Management Plan



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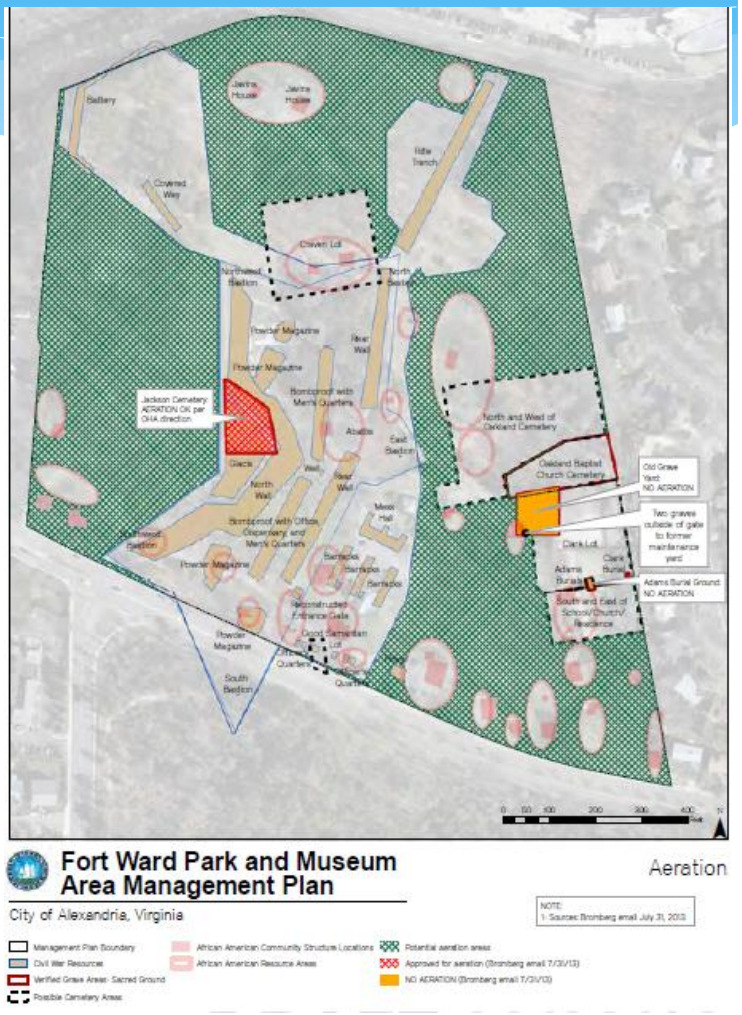
Recommendations

- Nonstructural Improvements
  - No design required
  - Lower cost
  - Can be integrated into existing Park Maintenance activities
- Structural Improvements
  - Design development
  - Higher cost
  - Archaeological investigation prior to any earthwork
  - May require permitting

Recommended Nonstructural Improvements

- Aeration and Turf Seeding
  - Increase infiltration capacity
  - Reduce erosion
  - Improve aesthetics

Note: Aeration and Turf Seeding began last Fall by RPCA in partnership with Office of Historic Alexandria. More is planned for this Spring



Recommended Nonstructural Improvements

- Conveyance Improvements
  - Remove sediment and debris
  - Increase flow conveyance
  - Improve inlet and outlet areas

Site 3: Near the Park entrance

Site 9: Near the playground

Recommended Nonstructural Improvements

- Mowing Maintenance Plan
  - Identify areas to be mowed and areas to avoid mowing

Site 4: Open Space

Recommended Nonstructural Improvements

- Storm drain outlet enhancements to diffuse flow
  - Convert high-velocity concentrated flow into sheet flow
  - Reduce erosion
- For Homeowners and Park Neighbors
  - Redirect drainage away from homes
    - Redirecting roof downspouts
    - Sump pumps away from the Park

Recommended Structural Improvements

- Increase Culvert Maintenance Activities
  - Increase the size of culverts to accommodate for up to the 25-year storm
  - Reduce runoff inundation
    - Site 2: Near the Entrance
    - Site 3: Near the Visitor Parking
    - Site 10: Near the Rifle Trench
    - Site 15: Near the Amphitheater

Site 2 Near the entrance

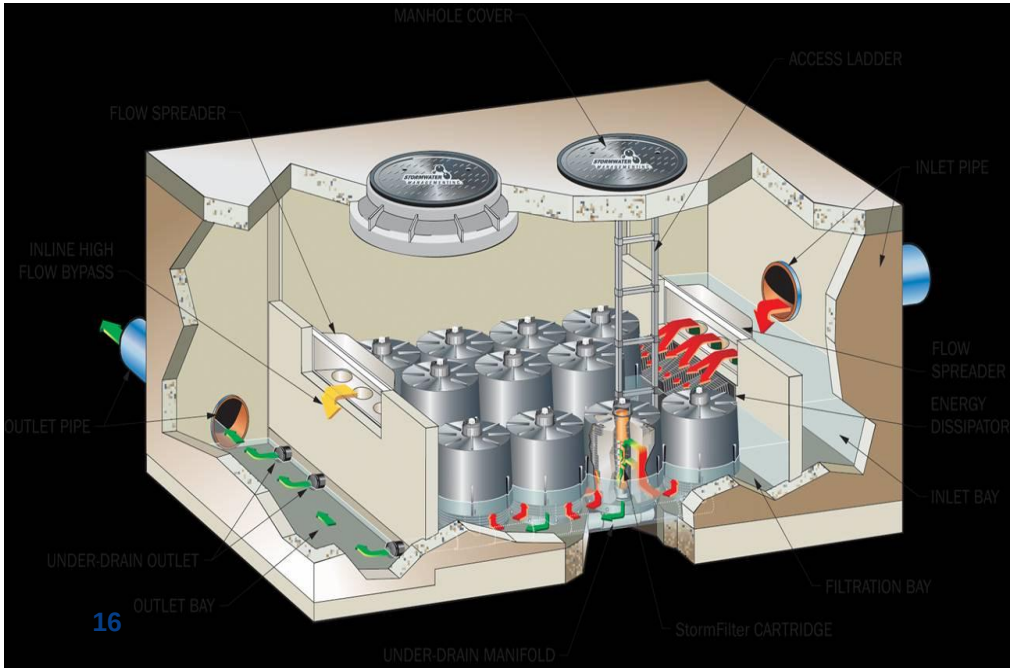
Site 10 Near Rifle Trench

Recommended High Priority Structural Improvements

- Install Underground Stormwater Filter in the visitor parking lot (Site 3)
- Redirect Surface Flow near Oakland Baptist Cemetery (Site 6)
- Stream Restoration/Stabilization on the intermittent stream northeast of the Oakland Baptist Cemetery (Site 7)

Recommended Structural Improvements

- Install Underground Stormwater Filter (Site 3)
  - Trap sediment, debris, and pollutants in a filter system
  - Reduce Improve the water quality



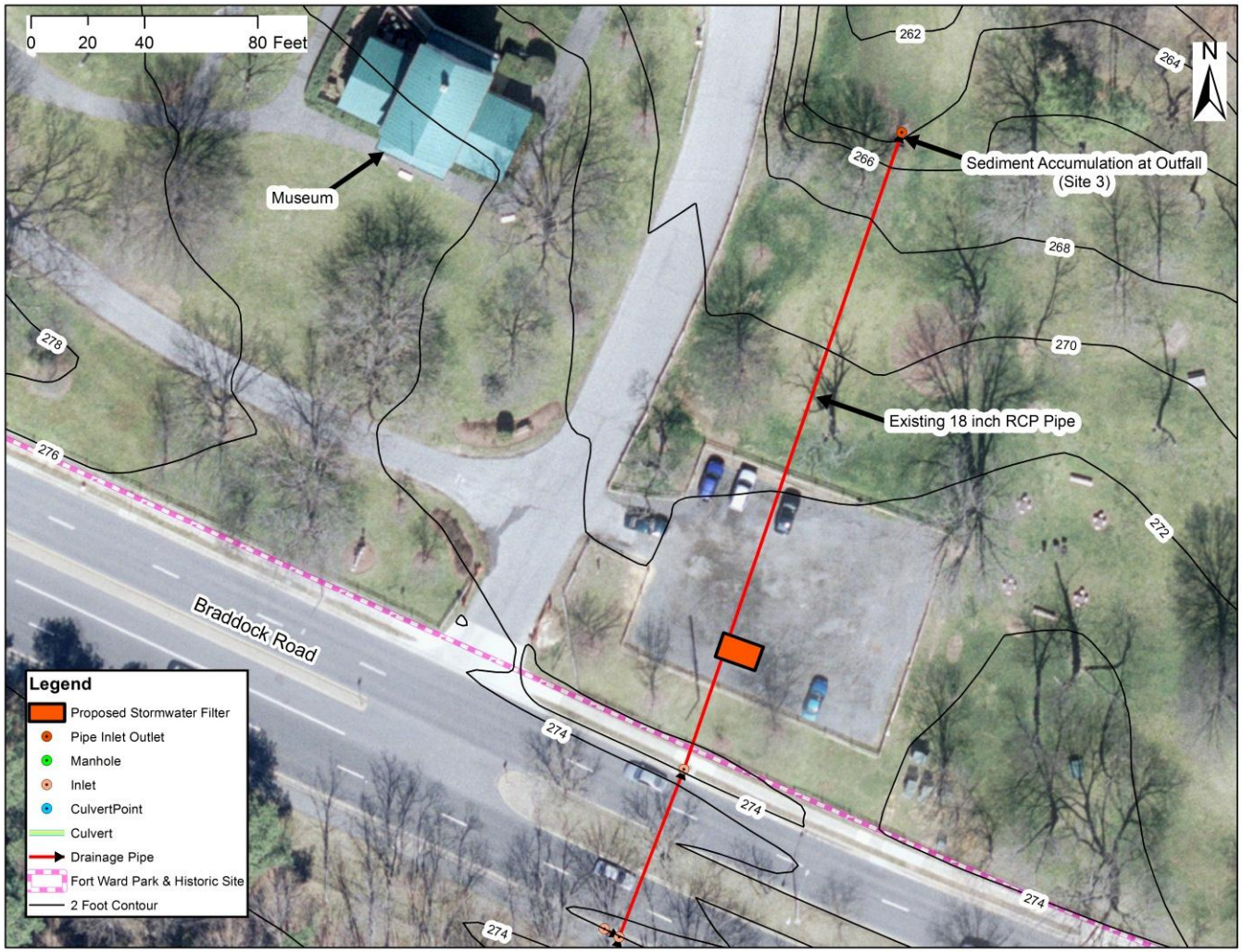
Site 3: Stormwater Filter

- Existing Conditions: Sediment and debris deposition was noted at the outlet of 18" pipe that collects runoff from Braddock Road. Engineering analysis shows that the pipe capacity is impaired by the sedimentation.

Downstream Outlet

Downstream of the Outlet

Site 3: Stormwater Filter



Site 3: Stormwater Filter

Pictures from http://www.conteches.com/

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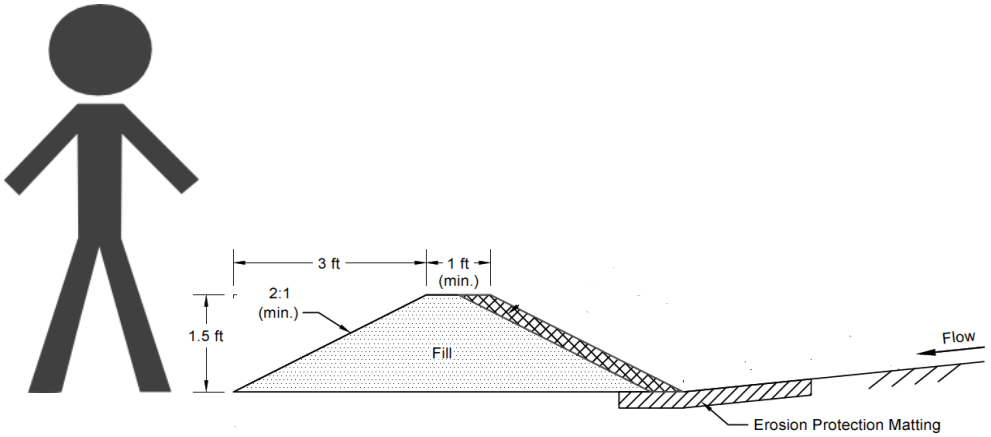
Recommended Structural Improvements

- Redirect Surface Flow around Oakland Baptist Cemetery (Site 6)
  - Diversion berm to redirect flow to avoid sensitive areas
  - Reduce inundation and erosion on the sensitive areas
  - Berm design avoids need for excavation adjacent to cemetery area
  - Protect cultural resources



Site 6: Diversion Berms

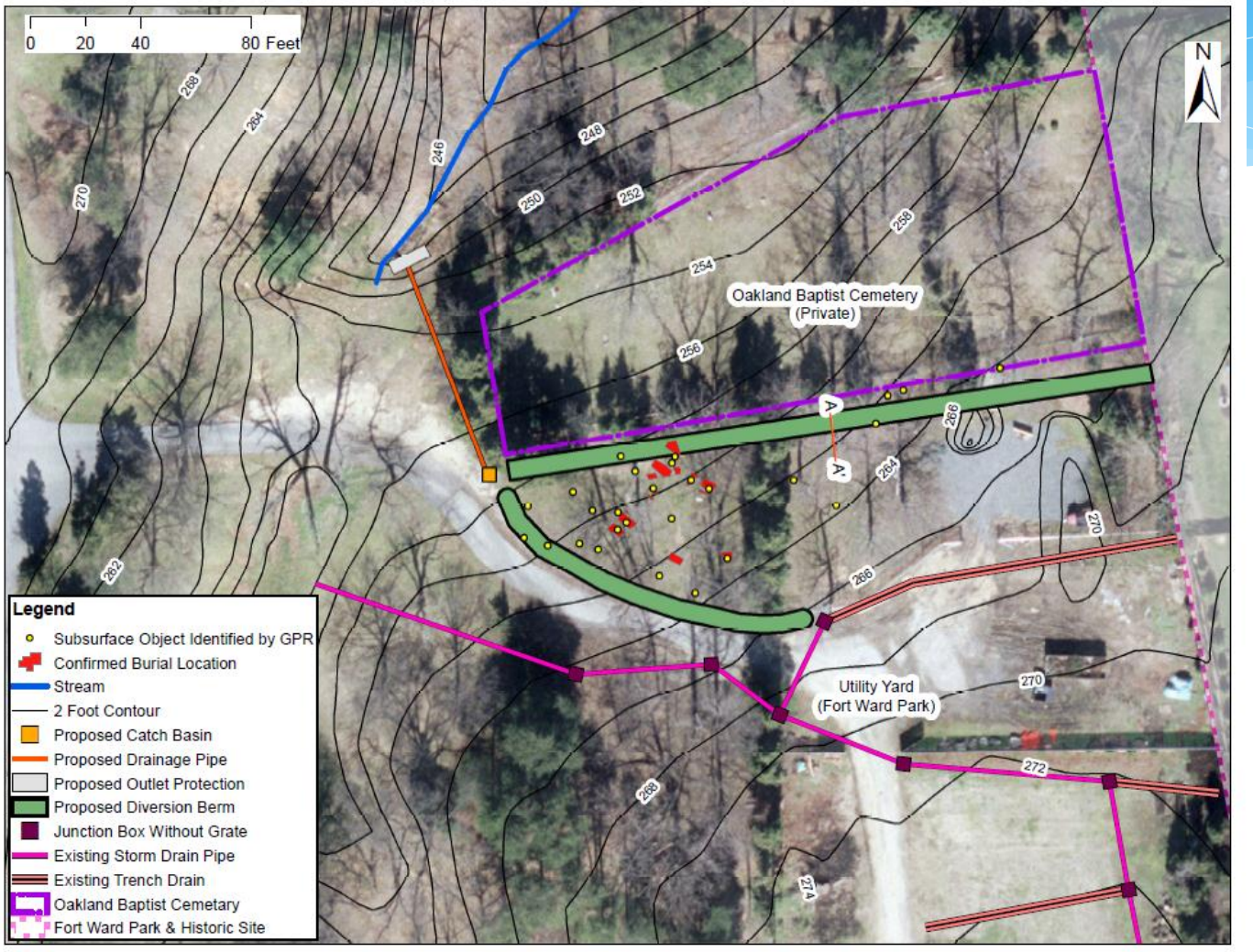
- Existing Conditions: Temporary solutions to address existing drainage issues in the area: infiltration trenches, a temporary catch basin, and temporary hay bales. A permanent solution is needed.

Infiltration Trenches

Straw Wattles

Catch Basin

Site 6: Diversion Berms



Site 6: Diversion Berms

Recommended Structural Improvements

- Stream Restoration/Stabilization on intermittent stream northeast of the Oakland Baptist Cemetery (Site 7)
  - Stabilize stream channel and banks
  - Reduce erosion and sedimentation along the stream
  - Improve potential habitat

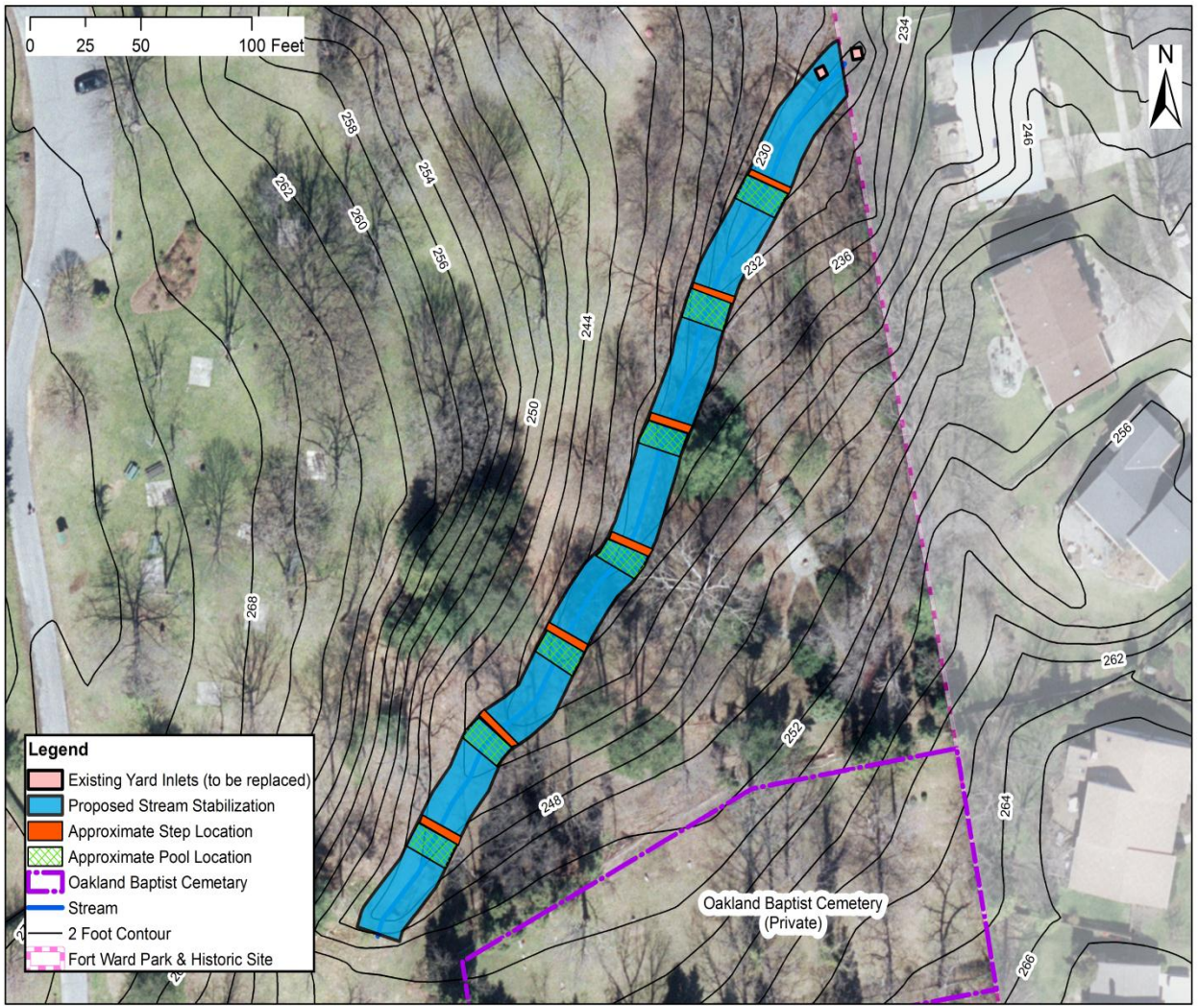
Site 7: Step Pools

- Existing Conditions: Main stream channel that runs through the park is eroded and there is concrete debris in the channel. In addition, there is a clogged inlet at the end of the natural stream channel.


Stream Bed


Downstream of the Foot Bridge

Site 7: Step Pools



Site 7: Step Pools

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Site 8: Cemetery Area

- Existing Conditions: The base areas are exposed on several gravestones in the cemetery. Depressions have formed in front of several graves from ponding during rain events. There are several areas of exposed, bare ground in the cemetery and channel is forming through the area.

Exposed Bare Ground

Exposed Gravestone

Exposed Bare Ground and Gravestone

Recommended Best Practices for Cemetery Area

- Turf Maintenance
- Water Diversion
- Conservation of Grave Depressions
- Conservation and Repair of Damaged Headstones

Summary of Project Purpose/Goals

- Identify opportunities to improve drainage conditions in the Fort Ward Park using a holistic approach
  - Conduct hydrologic analyses
  - Address drainage issues for
    - Park area
    - Cemetery
    - Offisite contributions
  - Development and prioritization of a wide range of solutions
    - Structural
    - Non structural

Comments from the Public

- Best Practices for Cemetery Area
- Runoff from the Park and Marlboro Estates into the Cemetery
- Increased runoff from compacted dumped gravel and fill in the maintenance yard
- Graves in the maintenance yard

Next Steps

- Coordination with OHA & Management Plan
- Standard Operating Procedures (SOPs) for Park Personnel
  - Practices and procedures

Next Steps

- Funding
  - Total funding = **$585,000** (Already approved funding)
  - Drainage Master Plan spent $80,000
  - Remaining Funding **$505,000** for 100% Design & Construction

Next Steps

- Cost Estimates for Recommended Improvements (Includes Engineering Design)
  - Diversion Berms at Site 6 = **$116,000**
  - Stormwater Filter at Site 3 = **$199,000**
  - Stream Stabilization at Site 7 = **$203,000**

  - Total Estimated Costs for all three:
    - **$518,000**

Next Steps

- Schedule
  - **FY2014** (Ends June 30, 2014)
    - Wrap up Final Drainage Master Plan
    - Deliver project list to DPI
  - **FY2015** (Starts July 1, 2014)
    - Design services for 100% design & construction drawings – 12mo
    - Perform Archaeology at designated site(s)
    - Advertise Construction for Fall/Winter 2015

Questions