City of Raleigh
Engineering Services Department

Stormwater Management

Dorothea Drive Culvert Replacement
Nov. 1, 2017
Introductions

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WK Dickson Staff
- Marc Horstman, PE, Project Manager
- Miranda Smalling, EI, Civil Designer
Overview

✓ Project Goals
✓ Recommended Drainage Improvements
✓ Permitting
✓ Construction Expectations and Challenges
✓ Proposed Schedule
✓ Easement Acquisition Process
✓ Questions & Answers
✓ Break Out Sessions
History of the culvert

- The age of the structure is unknown but estimated to be constructed in the early 1900’s.
- Water and Sewer mains have penetrated the culvert reducing its capacity and creating the opportunity for blockage during larger storms.
- Several sinkholes have developed over the years.
- Stream flow around the culvert instead of through the culvert observed as far back as 2011.
- Most recently repaired due to a sinkhole by City of Raleigh Public Utilities in 2015.
- New sink holes observed in the past year.
Project Goals

- Replace older failing culvert.
- Improve the flow capacity of the culvert to reduce flooding and road overtopping for at least the 10-year storm event.
- Ensure that the design incorporates the desired City roadway section and accommodates future development of upstream property including the possibility of a greenway trail or sidewalks.
- Provide for pedestrian and vehicular safety near headwalls.
- Stabilize eroding stream banks and ensure long term stability of the upstream and downstream channels.
- Minimize impacts to adjacent properties during and after construction.
- Minimize environmental impacts.
Intruding Utility Lines
Flow Around & Under Culvert
Recommended Improvements

- Upstream Custom Drop Headwall
- Double Catch Basin with RCP Connection
- Dual 6’ x 4’ RCBCs
- Stream
- Existing Sewer Line
- Existing Water Line
- Dorothea Drive
- Downstream Custom Headwall
Recommended Improvements

- Install wider box culverts under the existing utilities to improve flow.
- Extend the culvert ends to provide for future sidewalks.
- Construct an extended downstream headwall to protect the eroding bank on the southeast side.
- Make improvements to the street section to capture and convey runoff to the new culvert.
Recommended Improvements

Culvert Upsizing (6’X5’ Box Culvert to a dual 6’ X 4’ RCBC)
Construction Examples

Prior to Culvert Installation
Construction Examples

Culvert Installation
Construction Examples

Culvert Installation
Recommended Improvements

Double Catch Basins
Construction Examples

Road Closed
Dorothea Drive Road Closure
<table>
<thead>
<tr>
<th>Task</th>
<th>Date</th>
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<tbody>
<tr>
<td>Complete 70% Design Plans</td>
<td>November 2017</td>
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<tr>
<td>Acquire Easements</td>
<td>January – March 2018</td>
</tr>
<tr>
<td>Secure Environmental Permits</td>
<td>April 2018</td>
</tr>
<tr>
<td>Finalize Design Plans</td>
<td>May 2018</td>
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<tr>
<td>Relocate Private Utilities</td>
<td>January – April 2018</td>
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<tr>
<td>Prepare Project For Bid</td>
<td>July 2018</td>
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<tr>
<td>Council Approval of Bid</td>
<td>August 2018</td>
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<tr>
<td>Begin Construction</td>
<td>September 2018</td>
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Easement Acquisition Process

- **Easement Definition:**
  - Right granted from a property owner to another for a specific use of a portion of the owner’s land.
  - Utility operators (gas, electric, sewer, etc.) often have easements for the purpose of installing and maintaining the utility lines and structures.
  - As with most utility easements, storm drainage easements are permanent and run with the land (i.e. survive any sale of the property).
  - Generally requires the property owner to give up certain rights, such as building permanent structures within the easement to allow for proper function of the system and maintenance access.
Private Property Easements

- Construction and Permanent Easements will be required from 4 property owners.
- Raleigh’s Real Estate Office will work with owners to acquire the necessary easements for construction and future maintenance.
- Easement acquisition typically takes 3 to 4 months or longer depending on cooperation of property owners.
- The City anticipates owners granting easements.
Questions?

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Search: “Dorothea Drive Drainage Improvements”