

Norfolk Street Drainage Improvements

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**CDM
Smith**

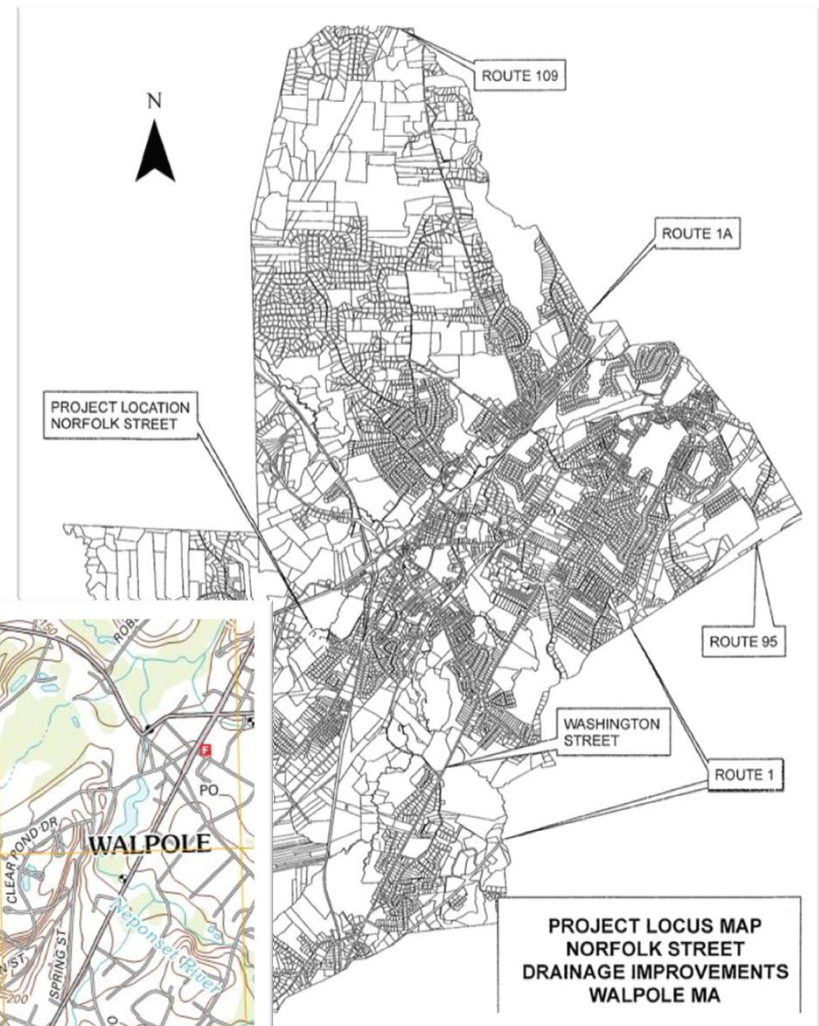
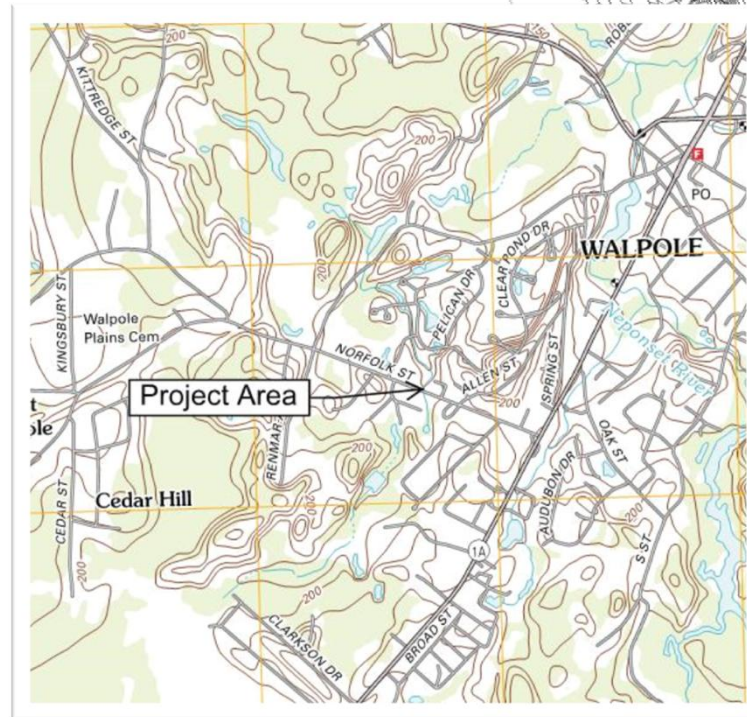
Objectives

- Site Description
- Discussion of Flooding Problems
- Hazard Mitigation Grant Application
- Design Process
- Construction Phase
- Lessons Learned
- Questions

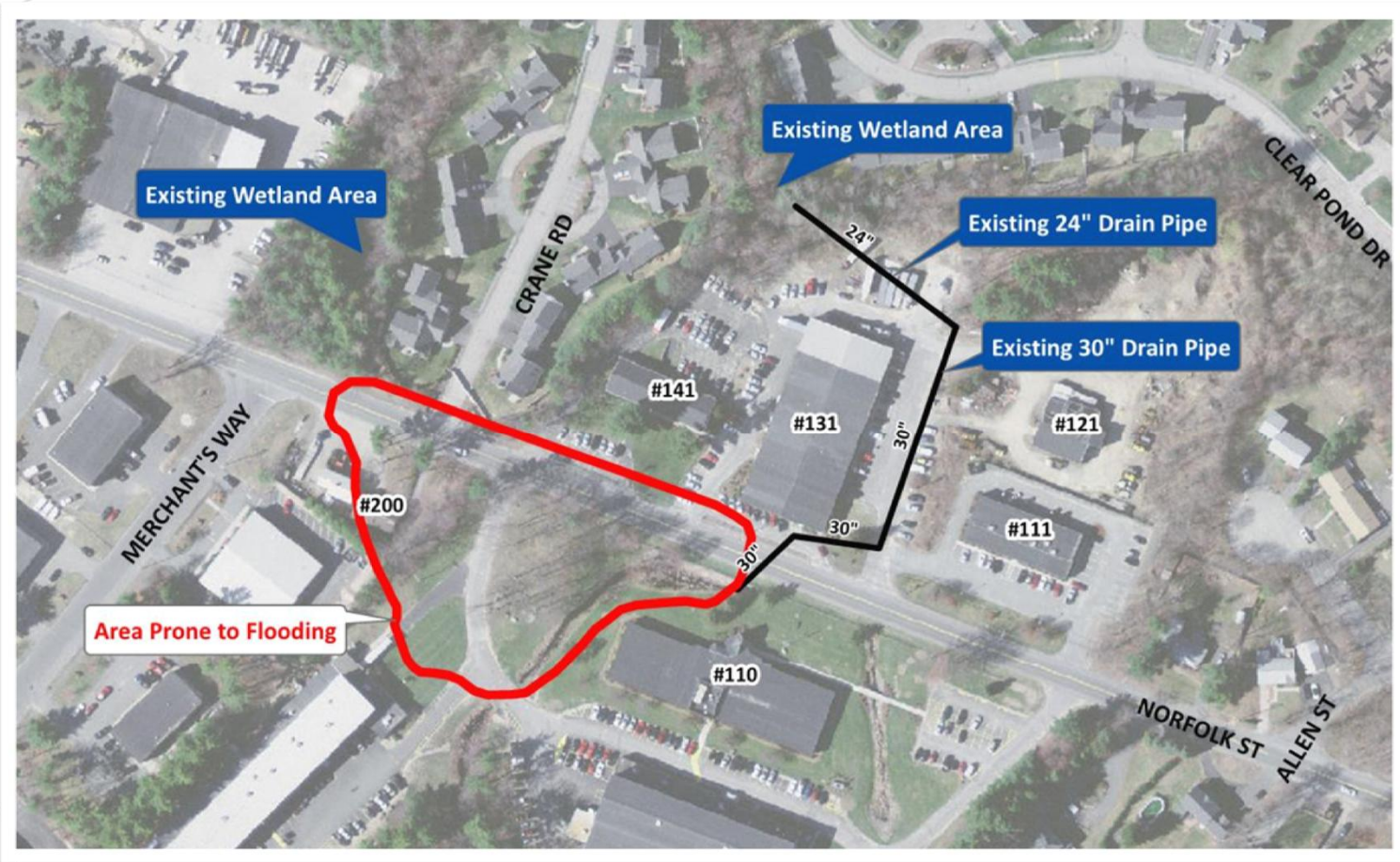


Site Description

- Project site at Norfolk Street, Walpole, MA
- Connects West Street with Main Street (Rte. 1A)
- Used to access Interstate 95 and Rtes. 1 and 1A

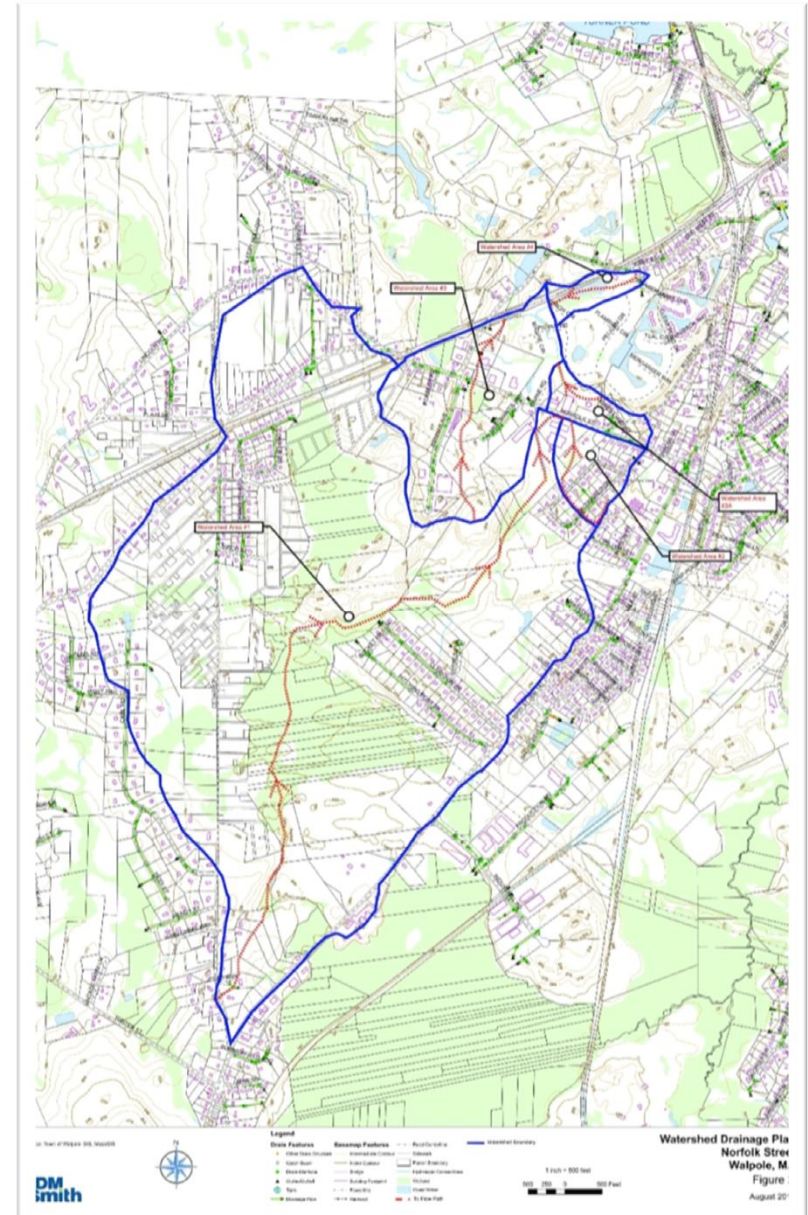


Site Description

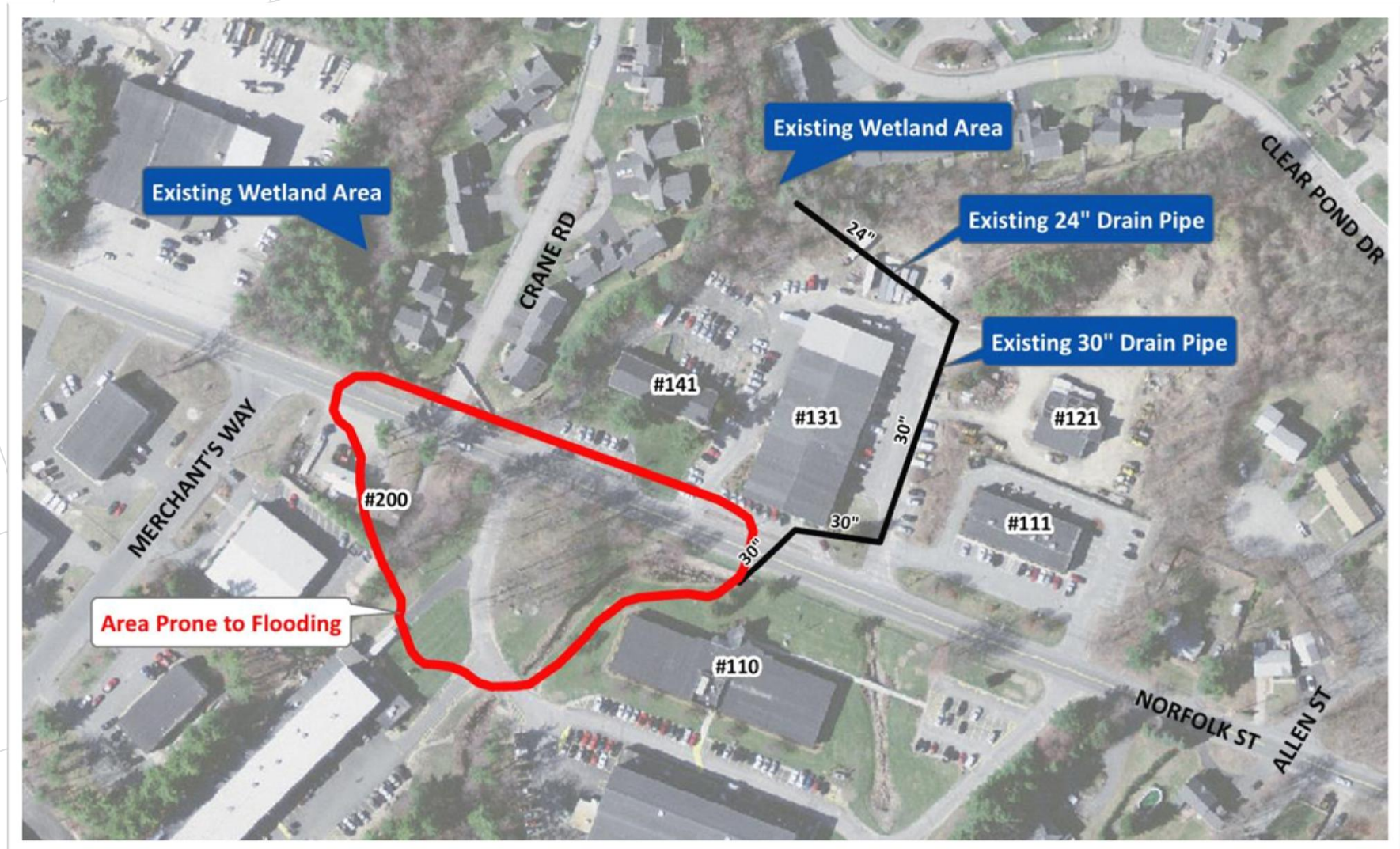


Site Description

- Watershed to culvert is 830 acres
- Largely undeveloped
- Cedar Swamp
- Some residential and commercial development
- Downstream MBTA 48-inch culvert



Existing Flooding Problems



Existing Flood Problems

- History of flooding
 - June 1998
 - December 2008
 - March 2010
- Most significant flooding event March 2010
- Flooding at Rolls Royce Naval Marine, Norfolk Street, Homes at Swan Pond
- March 2010 flooding declared a federal disaster

Existing Flooding Problems



Existing Flooding Problems

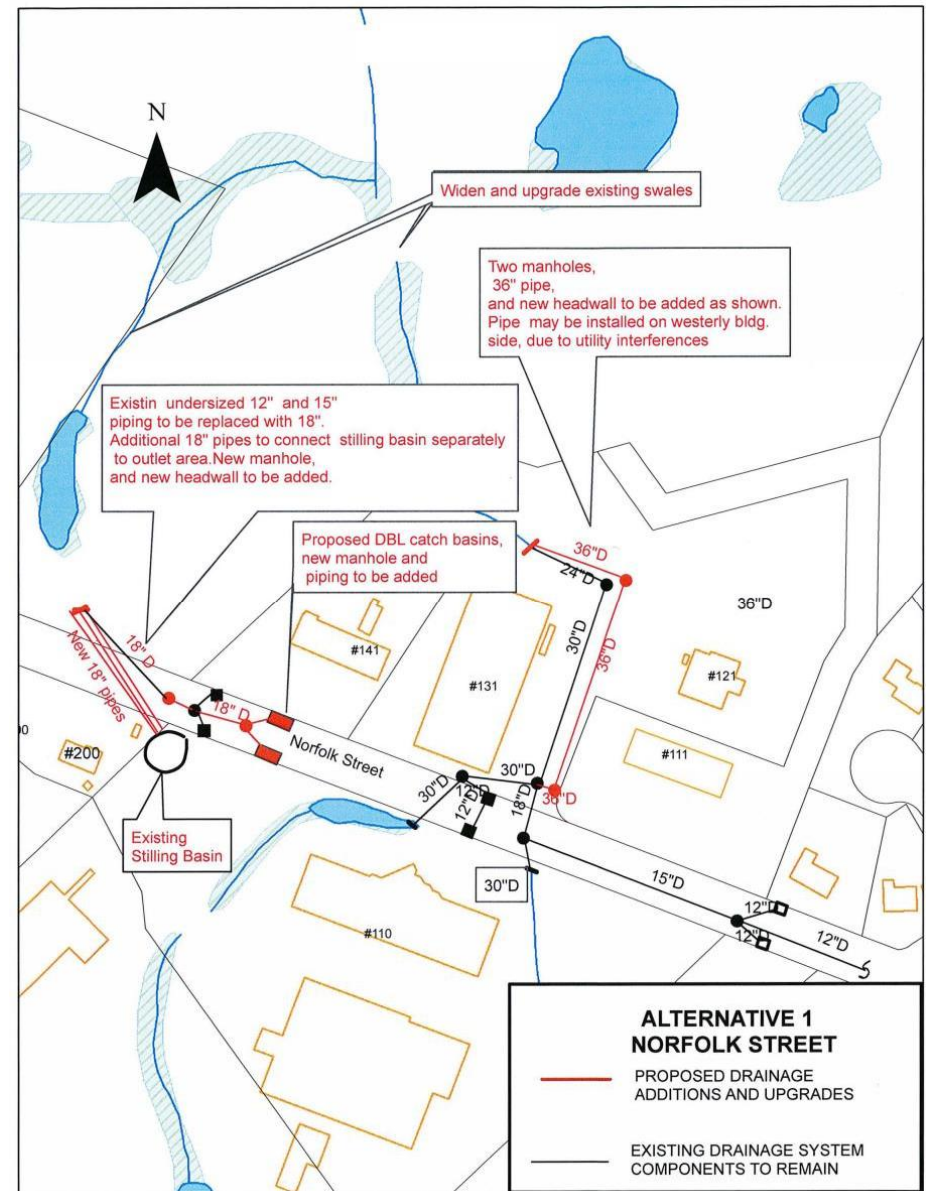


FEMA Hazard Mitigation Grant Program (HMGP)

- In October 2009, applied for FEMA Hazard Mitigation Grant to implement drainage improvements on Norfolk Street to alleviate flooding
 - Application *not approved* by FEMA
- In October 2010, re-applied for grant with supplemental information about March 2010 floods
 - Application *successful*
- Received grant in January 2012
- Total grant value \$394,000
 - \$98,000 Town share
 - \$295,000 FEMA share
- CDM Smith retained to provide design and construction assistance

FEMA Hazard Mitigation Grant Program

- Grant application provided a recommended alternative to alleviate flooding



Design Process

- Site visit to gain understanding of the project area in July 2012
- Detailed survey of project area
- Wetland resource areas were delineated



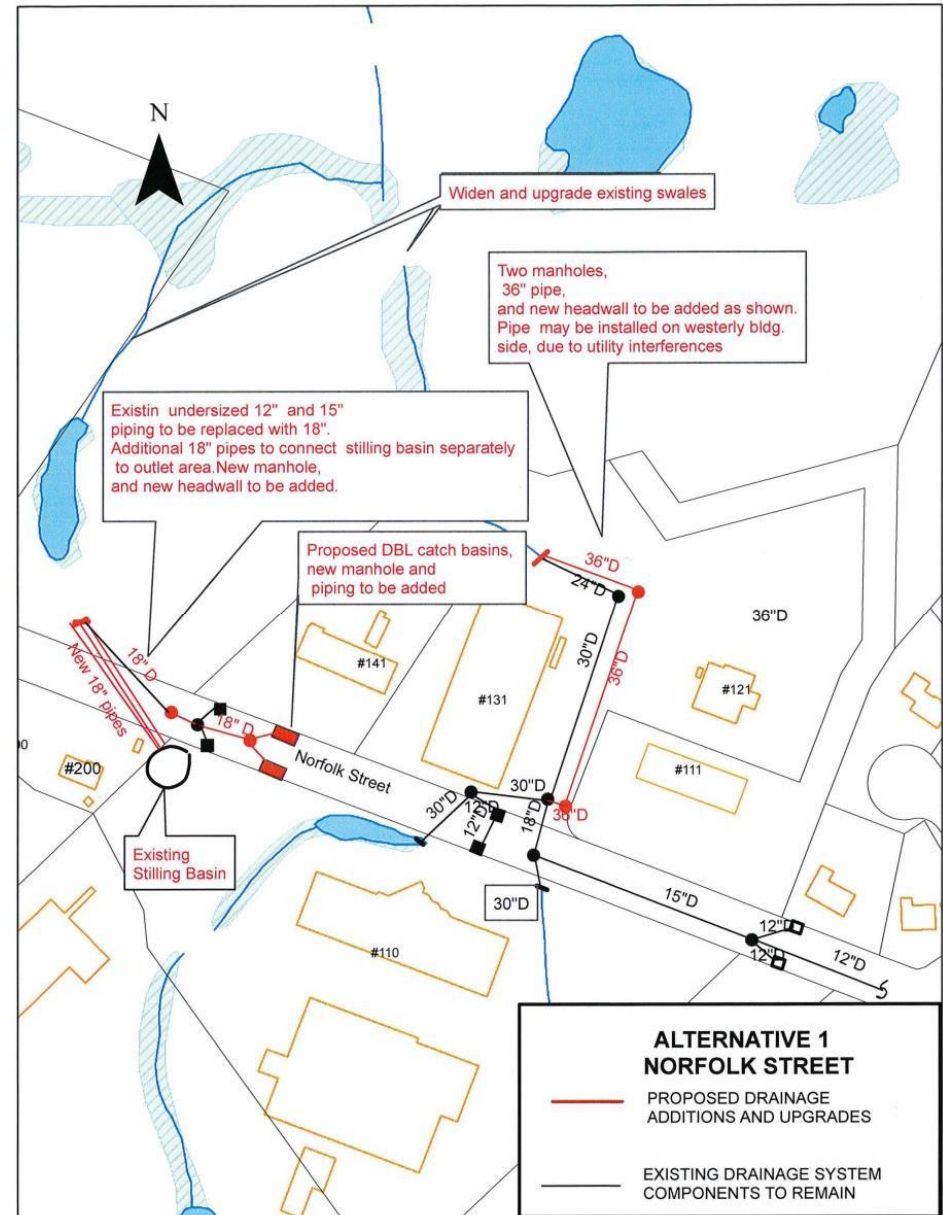
Design Process

- Existing Conditions Modeling
 - Constructed a model of existing conditions using HydroCAD
 - Results indicated 30-inch culvert can convey TP-40, 2-year storm (3.25 in/24 hr)
 - At a TP-40, 10-year storm (4.60 in/24 hr), peak flow is 58 cfs; culvert capacity is 40 cfs; and water begins to overtop road
 - Given site and funding constraints, implement a design to control up to 10-year storm



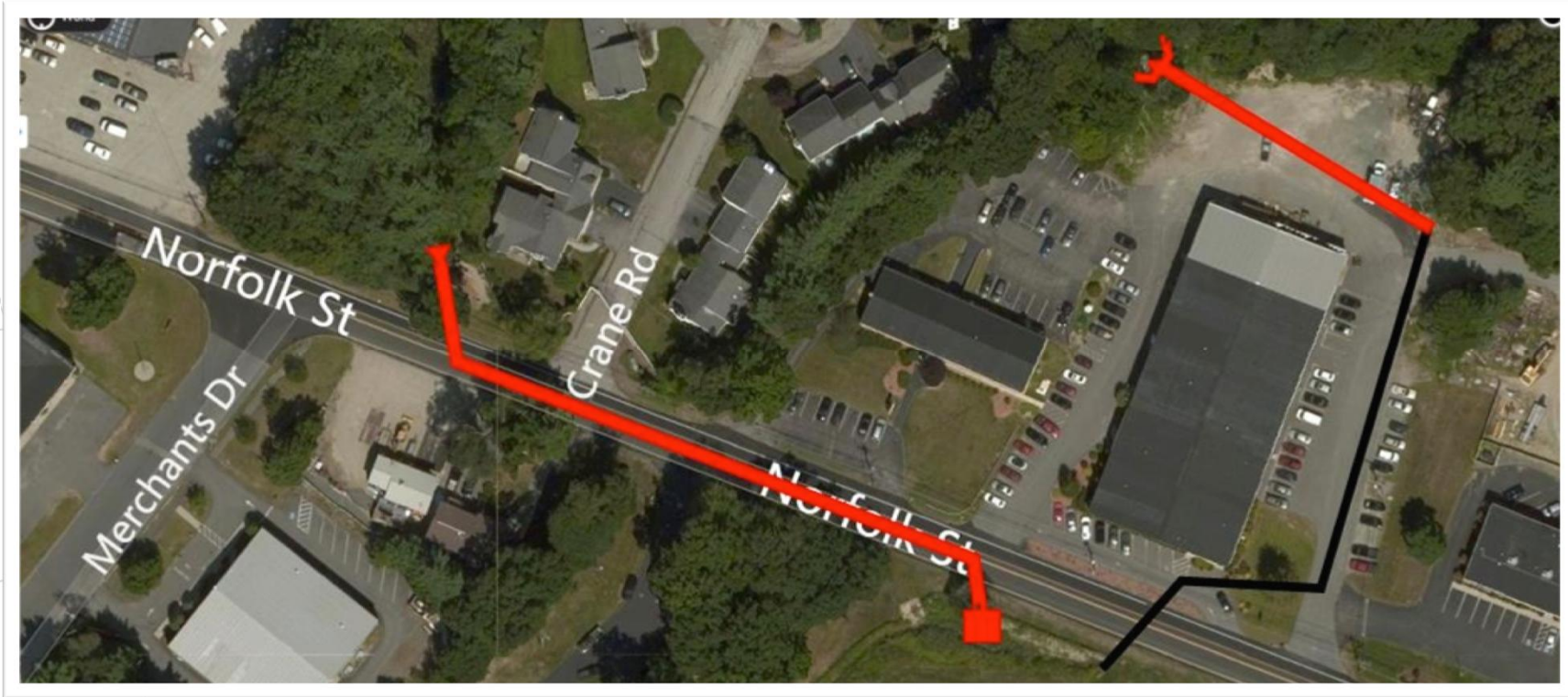
Design Process

- Alternatives Analysis
 - Performed an alternatives evaluation of possible solutions to alleviate the flooding
 - Alternative #1 – Hazard Mitigation Grant Alternative



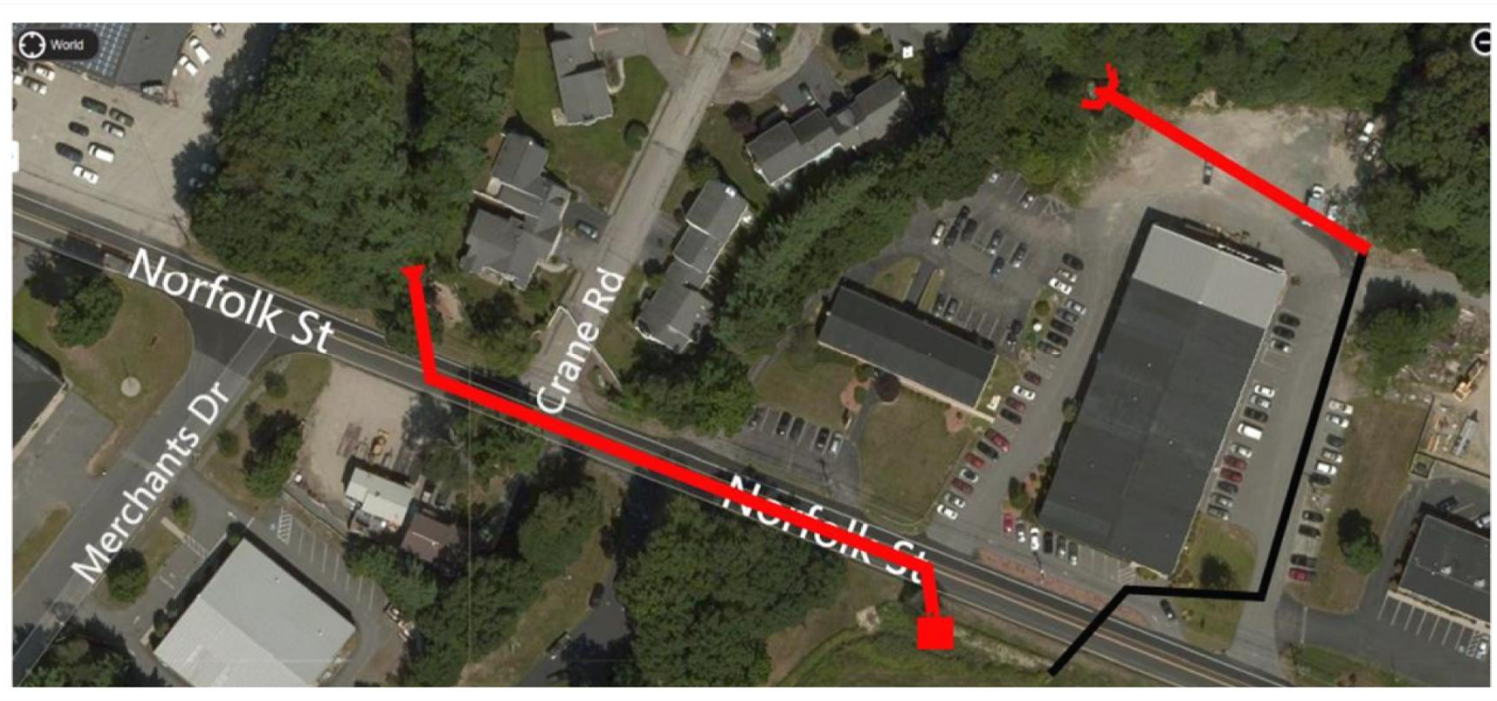
Design Process

- Alternatives Analysis
 - Alternative #2 – Inlet control structure at Rolls Royce Naval Marine, relief pipe in Norfolk Street discharging to wetlands, upsize pipe behind Island Oasis



Design Process

- Alternatives Analysis
 - Alternative #3 - Alternative #2, except pipe behind Island Oasis replaced with 65-inch by 40-inch arch pipe
 - Alternative #4 - Alternative #2 with the addition of underground flood storage in Island Oasis parking lot



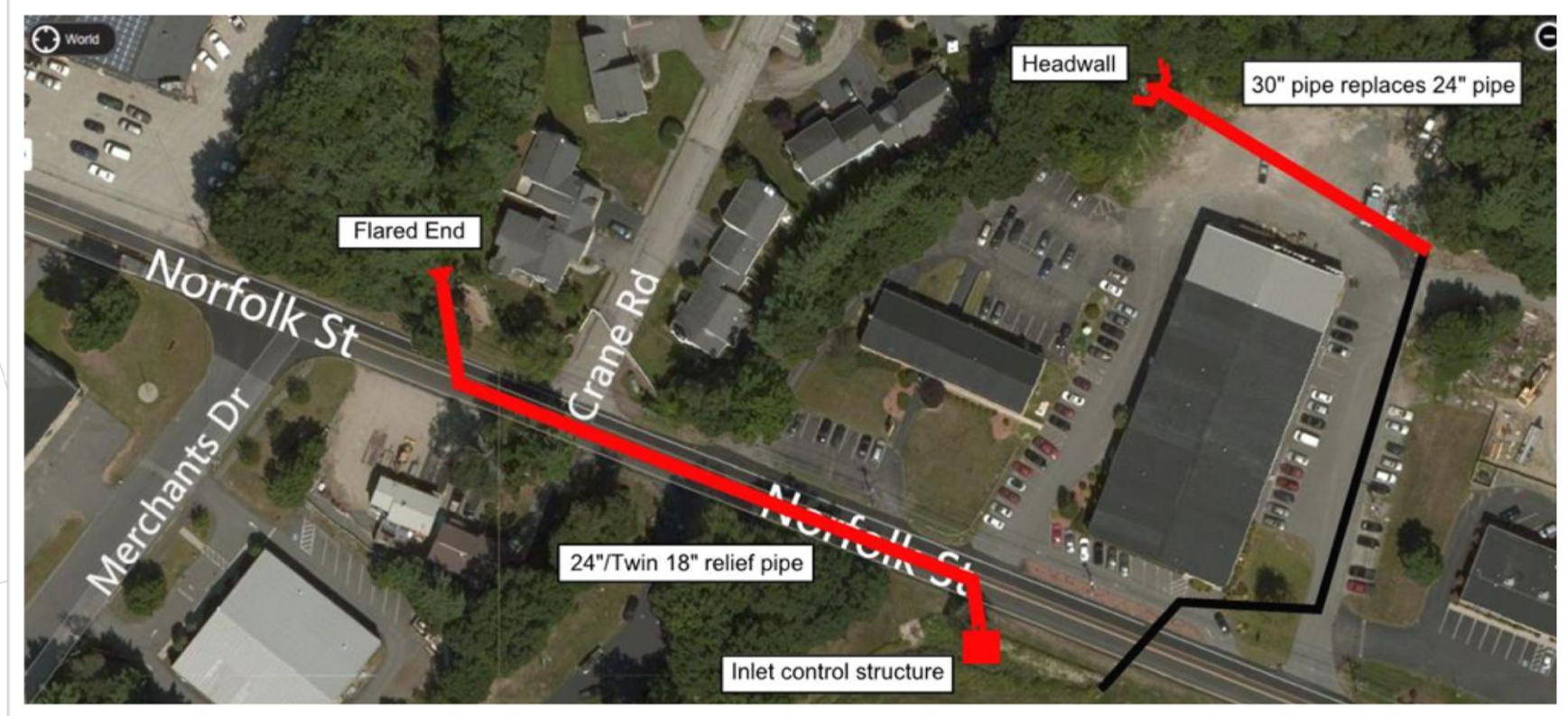
Design Process

- Alternatives Analysis
 - Alternative #5 - Create a flood storage area on Rolls Royce Naval Marine property



Design Process

- Alternative #2 is preferred alternative
 - Received approval from Conservation Agent
 - Received acceptance from abutters



Design Process

- FEMA Approval
 - Change in design required FEMA's approval of the revised alternative
 - Meeting with MEMA coordinator in Feb. 2013
 - Submission of a letter justifying alternative with revised plans in Feb. 2013
 - Suspended work on project pending approval from FEMA
 - Delayed project approximately 2 months awaiting approval



Design Process

- Final Design/Bidding
 - Submitted Notice of Intent to Conservation Commission in April 2013
 - Received Order of Conditions in May 2013
 - Bid documents in July 2013
 - Bid opening in August 2013
 - Eleven bidders for project
 - Lowest bidder P.J. Hayes, Inc. at \$193,000



Construction Phase

- Construction activities began October 2013
- Utility relocations
 - Water main
 - Existing drainage
 - Natural gas mains
- Realignment of relief pipe due to interference with sewer line
- Redesign of drainage system behind Island Oasis
 - Retain 24-inch pipe and add 30-inch pipe parallel to it



Construction Phase

- Sought approval for design change behind Island Oasis from Conservation Commission in late October 2013
- Also required FEMA approval for design change behind Island Oasis
- Completed a FEMA “Work Modification Request Justification Form” in December 2013
- Received approval within a month



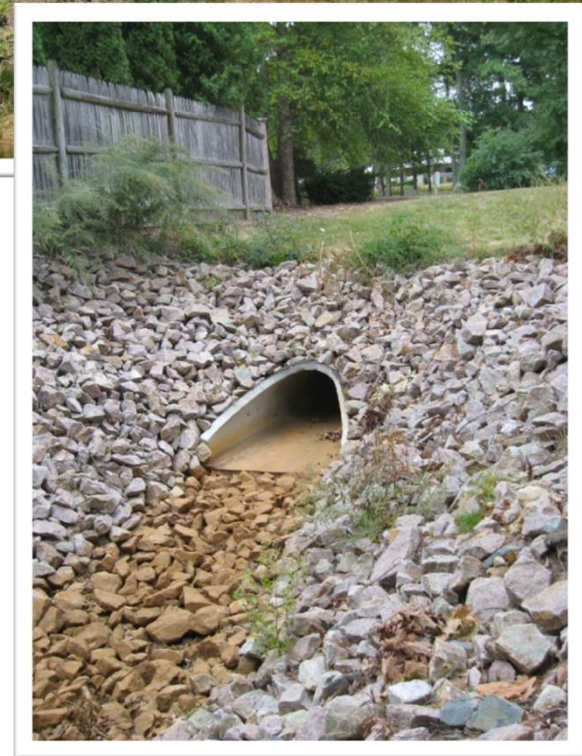
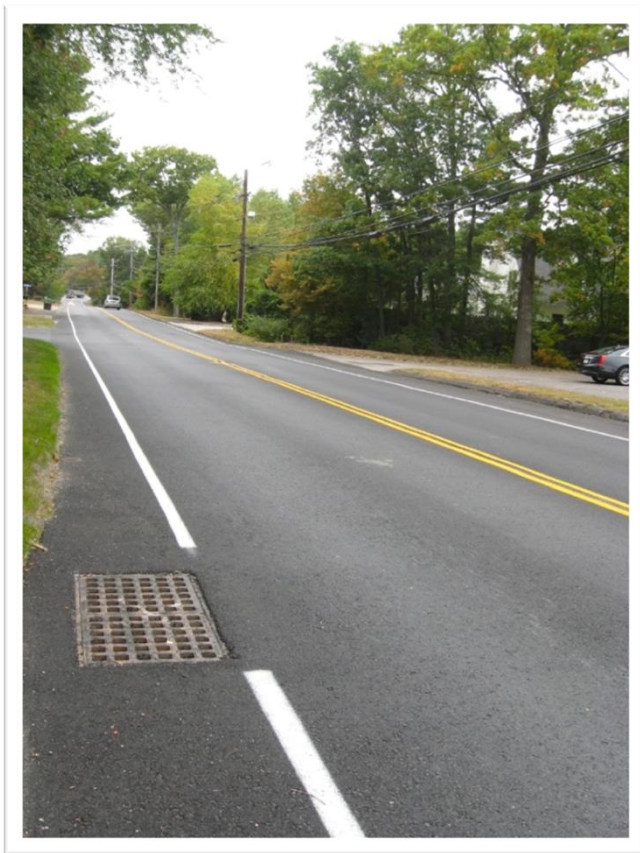
Construction Phase

- January 2014 work stopped due weather conditions
- Work resumed in late spring
- July 2014 work substantially completed
- Final walk-through with FEMA in September 2014
- Final Contractor cost \$215,000
- December 2014 received Conservation Commission Certificate of Compliance



Completed Project

- Total Cost = \$339,000



Completed Project



Lessons Learned

- FEMA expects the design proposed in Hazard Mitigation Grant application to match what will be constructed
 - Reduces delay in projects
 - Helps to ensure reimbursements
- Gaining acceptance by abutters facilitated design and construction process



Questions?

