

# Nancy Creek Stream and Water Quality Improvement Project

*Sandy Springs, GA*

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Wildlands Engineering | *Senior Water Resources Engineer*



**SANDY SPRINGS**  
GEORGIA

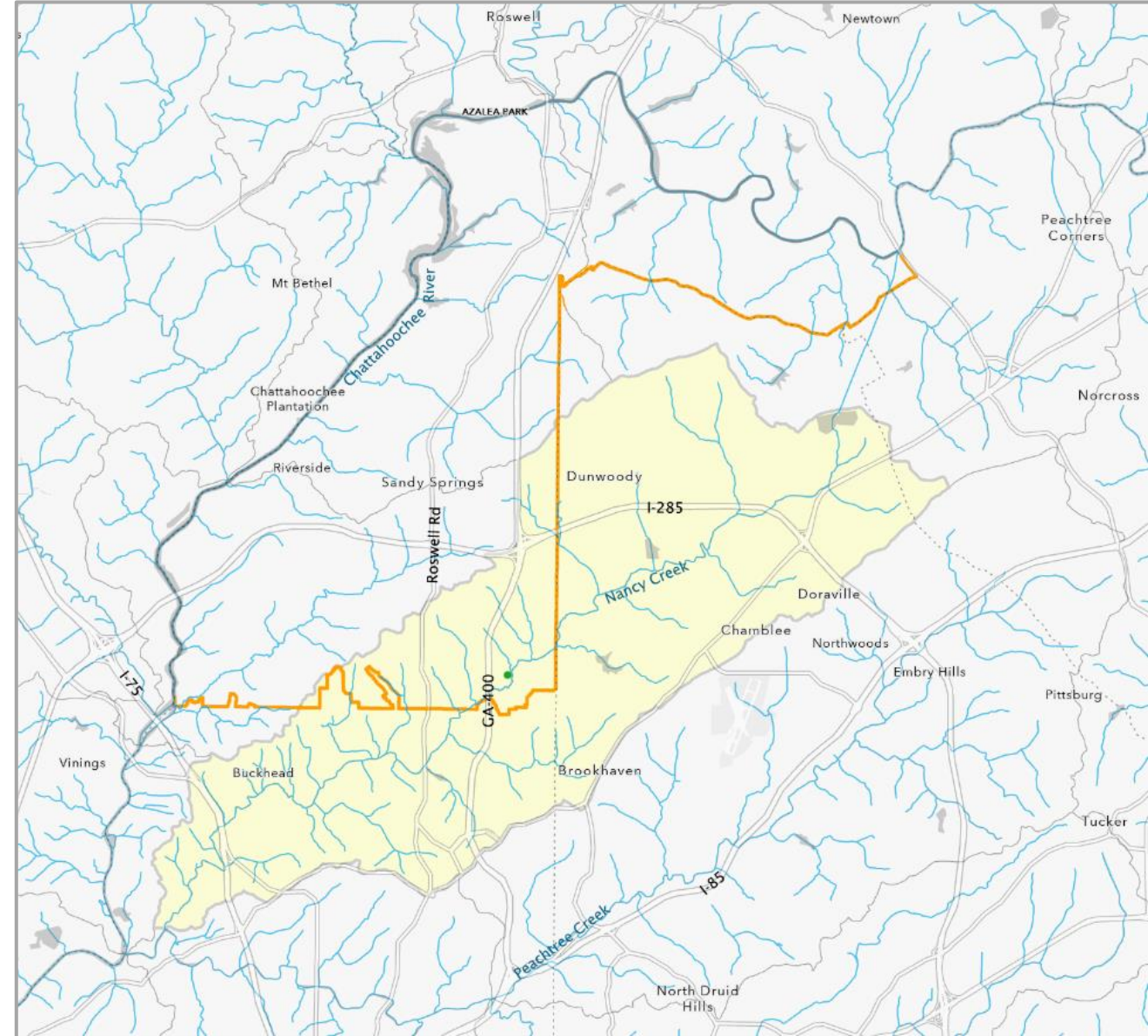


**WILDLANDS**  
ENGINEERING



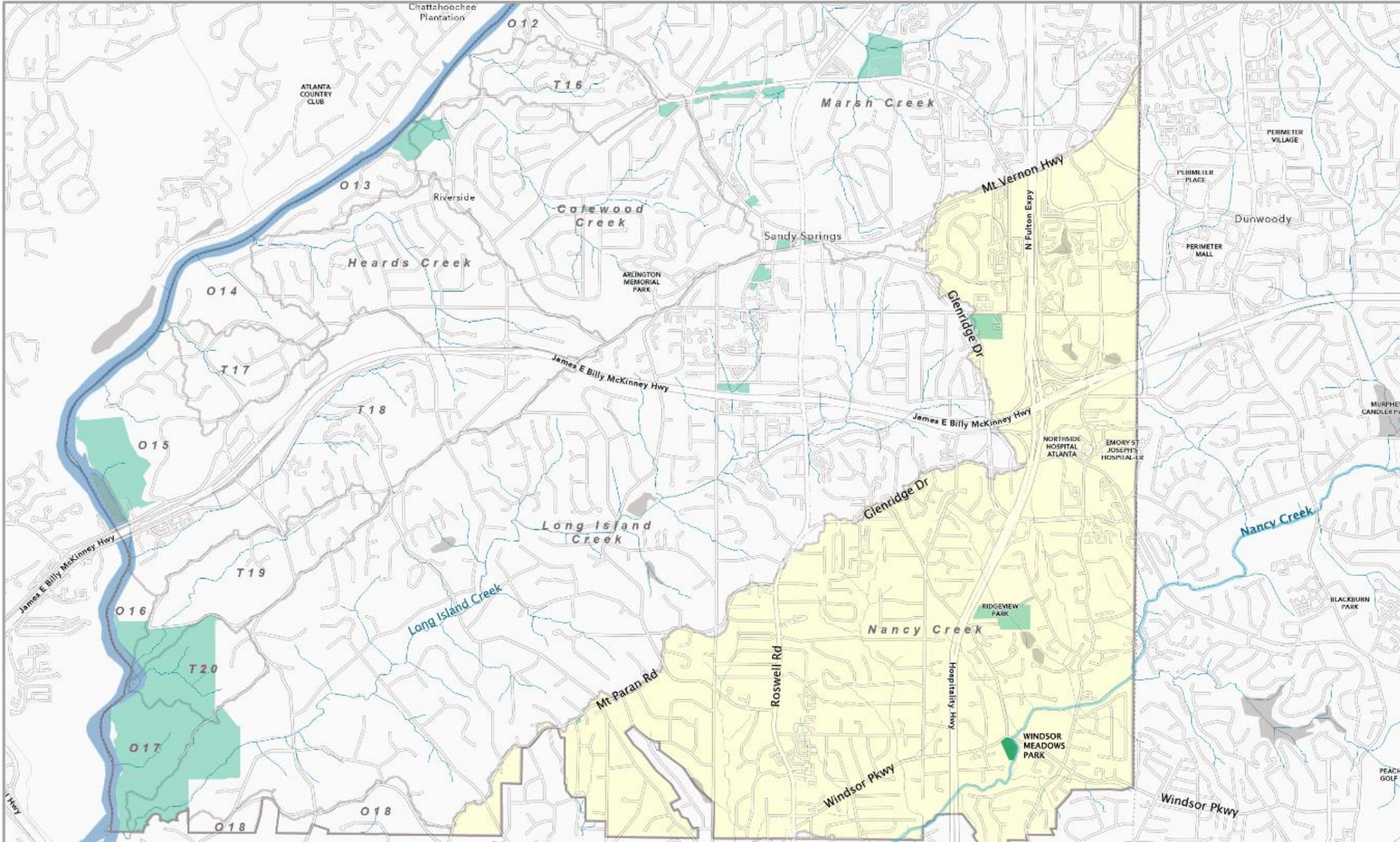
# Nancy Creek Watershed

- 24,200 acres (37.8 sq. miles)
- 3,800 acres (16%) in Sandy Springs
- 24 miles of main channel
- 7 different cities
- 7 named tributaries
- Confluence:
  - Peachtree Creek
  - Chattahoochee River





# Nancy Creek Watershed



OGLETHORPE  
Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, NOAA, USPS, US Census Bureau, USDA



# Windsor Meadows Park





# Nancy Creek

- Typical urban waterway: High peak flows, degraded
- Eroding the edge of the park
- Top of bank 12' above OHWM

## Impairment:

- Fecal coliform
- Fish biota impacted





# Project Objectives

- Assist in stabilizing the streambank
- Improve the health of the stream corridor
- Provide public education





# Planning & Funding

## Hazard Mitigation Grant Program

- Acquisition of 3 properties flooded in 2009

## Nancy Creek Consolidated Watershed Based Plan (2018)

- Nancy Creek Watershed Improvement Plan (2010)

## 319(h) Nonpoint Source Implementation Grant FY2020

- Brown & Caldwell: Concept and application
- Hawks Environmental: RFP preparation

*This project is made possible by a grant from the U.S. Environmental Protection Agency, under the Provisions of Section 319(h) of the Federal Water Pollution Control Act, and the Georgia Environmental Protection Division of the Department of Natural Resources.*





# Design-Build Approach

- Finite budget – Grant Funded
- Defined set of goals
- Stakeholder collaboration
  - Internal
  - External





# Design Considerations → How bad does it get?





# Design Considerations

→ After 4" of rain in 24-hrs  
(between 2-yr and 5-yr recurrence interval)





# Site Reconnaissance

## EVALUATE

- Upstream Conditions
- Park Infrastructure
- Stream Stability
- Invasive Species Concerns
- Hydraulic Impacts
- Recurrent Flooding Impact



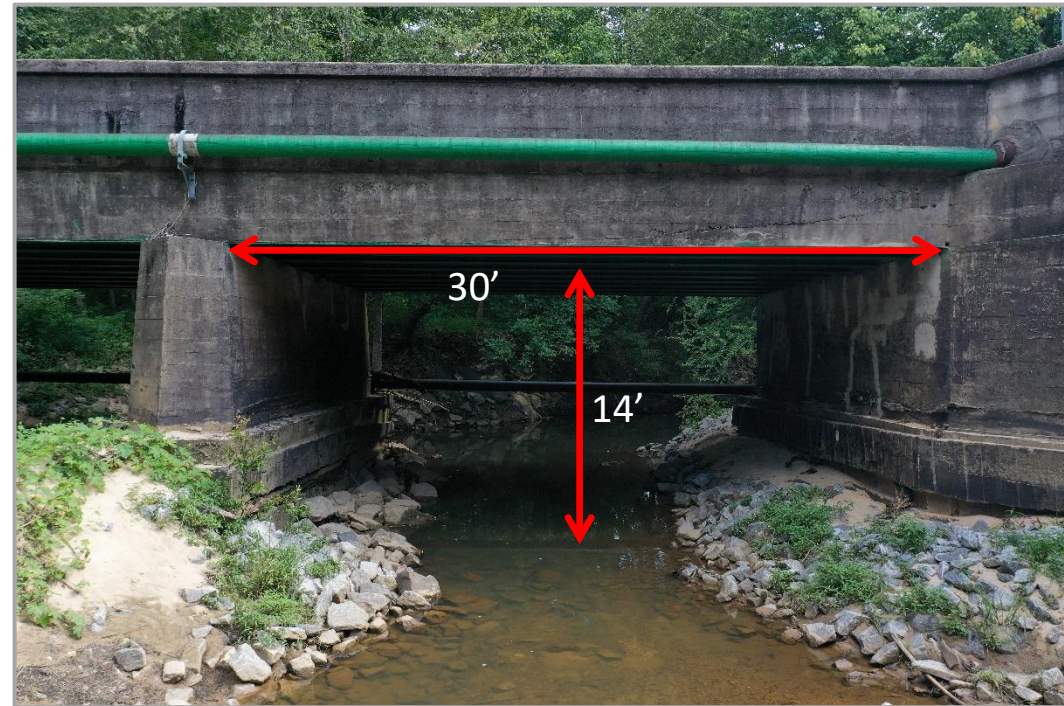


# Upstream Conditions

- Windsor Parkway Bridge
- Bridge skew ~ 30 degrees into Park
- Majority of base flow along right bank



Existing outfall from upstream stormwater pipe

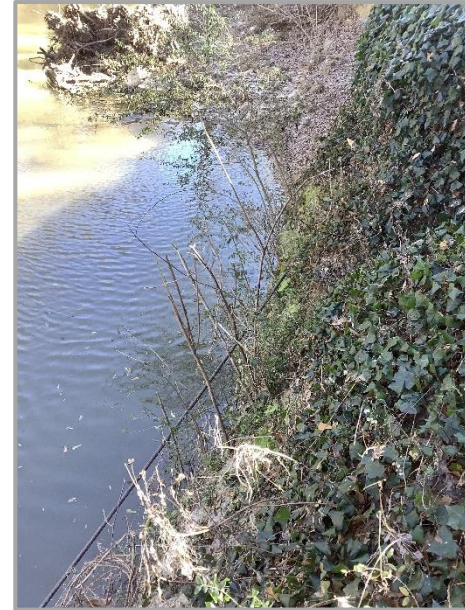




# Infrastructure Assessment

## EXISTING UTILITIES

- Water
- Electric
- Gas
- Stormwater





# Infrastructure Assessment

- Bridges
- Fencing
- Sidewalks



Bridge foundation scour



Bank erosion undermining fence (previously moved)



Historic scour issues and roadway runoff



# Stream Assessment

- Sand bed system
- Highly mobile bedload
- High velocity entering the park through right side of bridge abutment
- Downstream depositional bars
- Thalweg highly transient



Bedload movement shifted thalweg during course of the assessment and design process



# Streambank Assessment

- Vertical along right bank for approximately 200' (height ~ 12')
- High velocity and shear stress on upstream section along right bank in excess of 1.0 lb/sf from bridge to just past pedestrian overpass
- Vegetation rooting depth inadequate to maintain stable banks

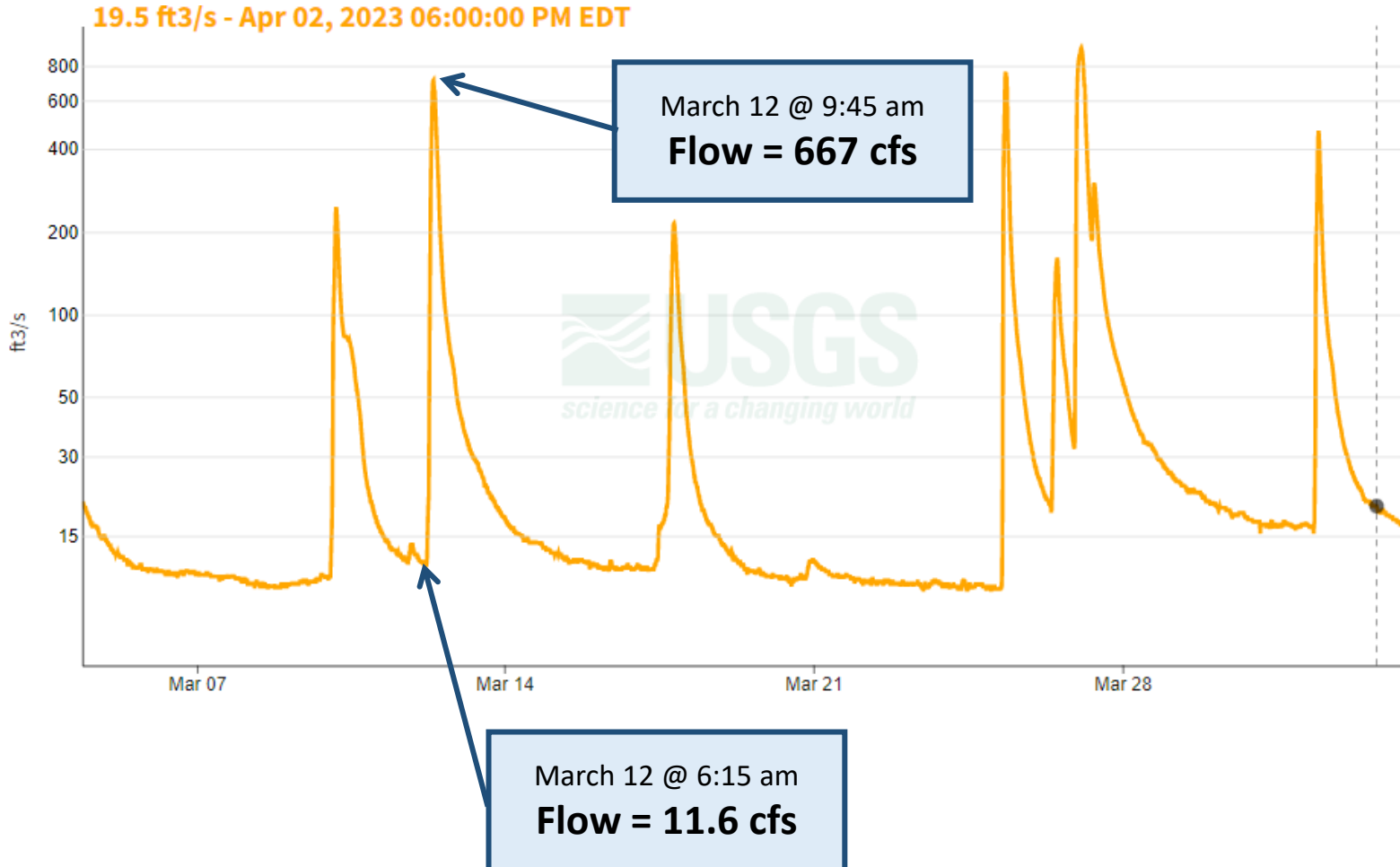




# Hydraulic Assessment – USGS Data

## USGS Gauge 02336240 @ Johnson Ferry Road (Brookhaven, Ga)

- 1.35 mi upstream of park
- Increase of 3.1 cfs /min (this was only a 1.2" storm event!)
- Extremely flashy system





# Water Quality Assessment

- Regenerative stormwater conveyance (RCS) required as part of the 319 Grant
- Location was conceptual
- Viability Assessment
- Constraints:
  - Existing path
  - Windsor Parkway
  - Existing vegetation





# Invasive Species Assessment

Several Invasive Species Identified along the stream bank through the park:

- Japanese Hops (*Humulus Japonicus*)
- Japanese Honeysuckle (*Lonicera japonica*)
- Mimosa (*Albizia julibrissin*)
- Tree of Heaven (*Ailanthus altissima*)
- Japanese Knotweed (*Reynoutria japonica*)
- Chinese Privet (*Ligustrum sinense*)

Developed Invasive control plan for the City to treat prior to construction

Contractor to implement treatment:

- Prior to construction
- Post-construction prior to planting







# Design Constraints

- Mobile stream bedload
- High velocity and shear stresses on bank
- Poor vegetative cover
- Extremely flashy and high flows
- Existing nature and utilization of the park





# Design Approach

Natural restoration design techniques

- Boulder toes
- Geolifts
- Rock vanes

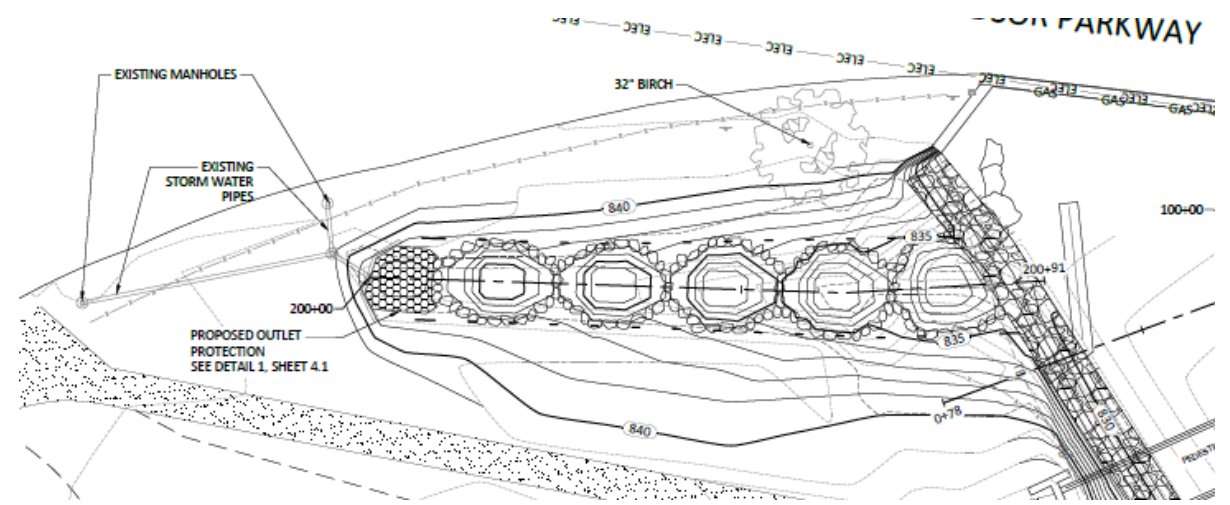
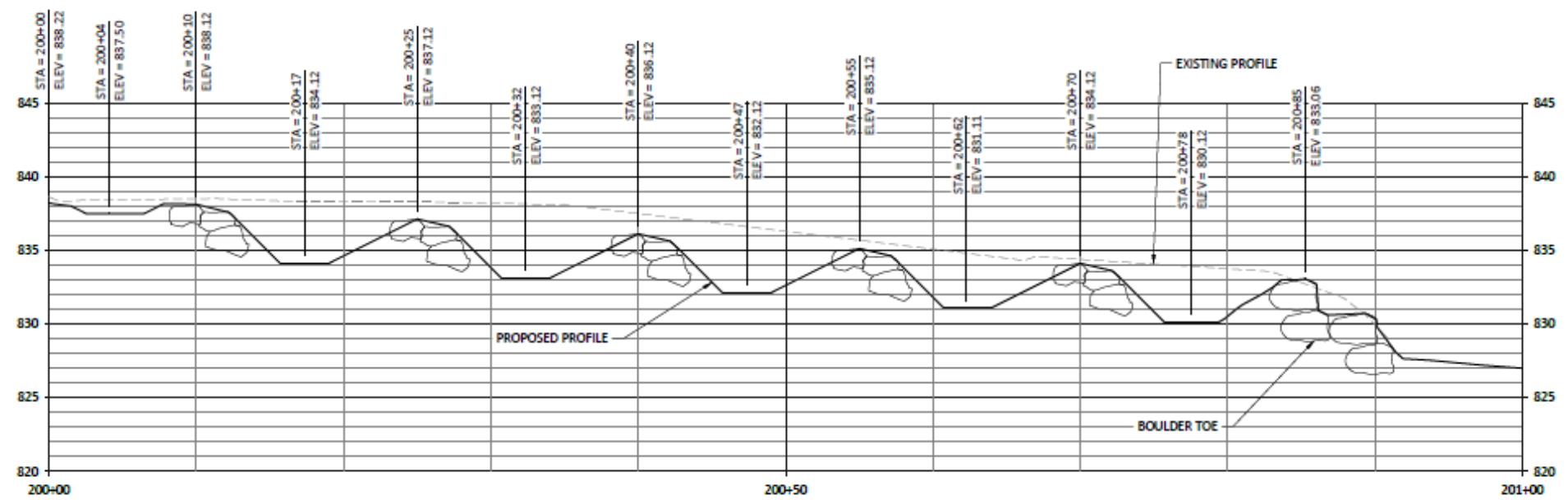
RSC (water quality treatment)

Native vegetation and pervious materials throughout the site





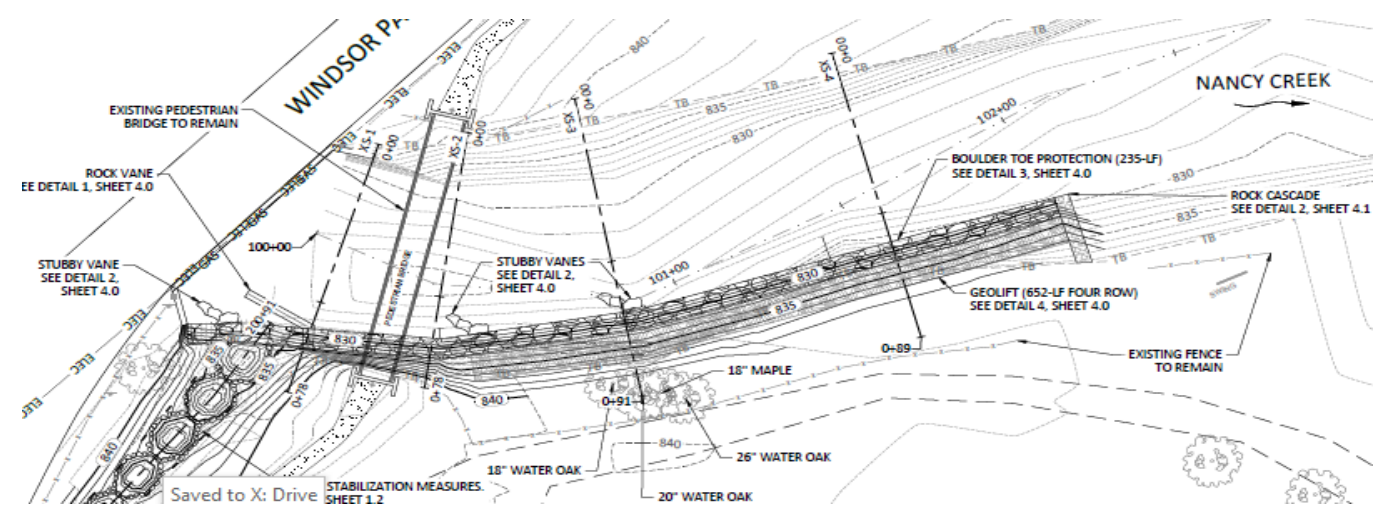
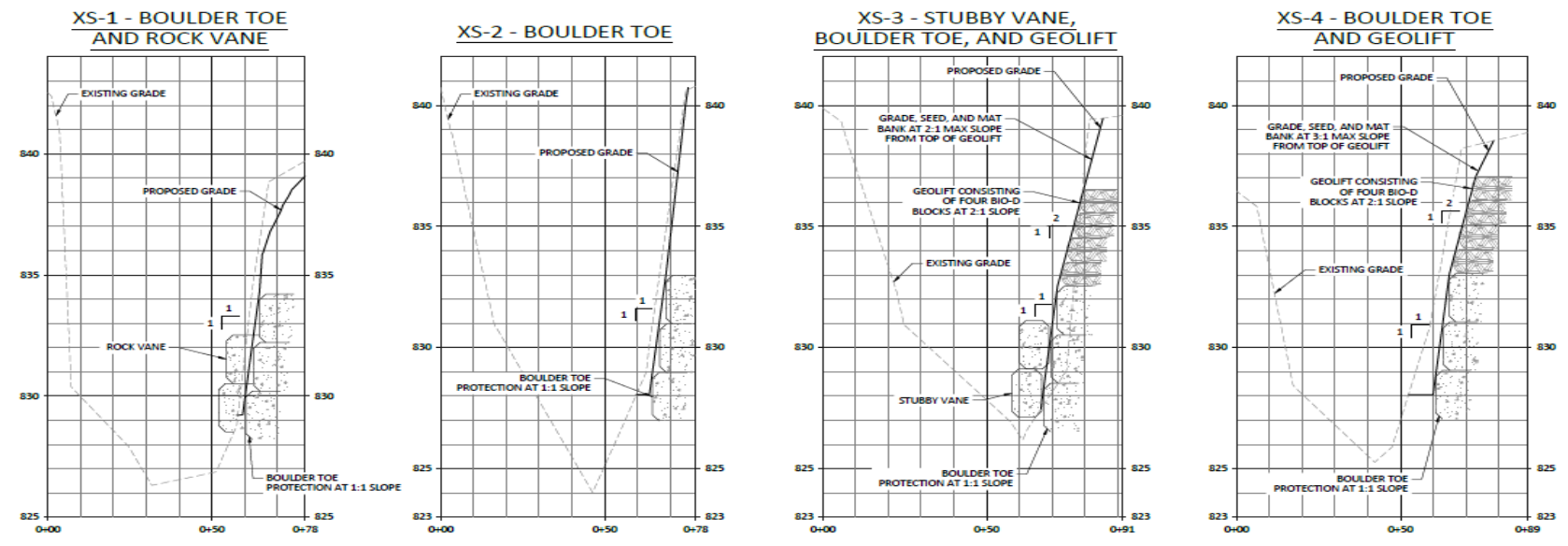
# Design Iteration: Initial 60% → RSC Design







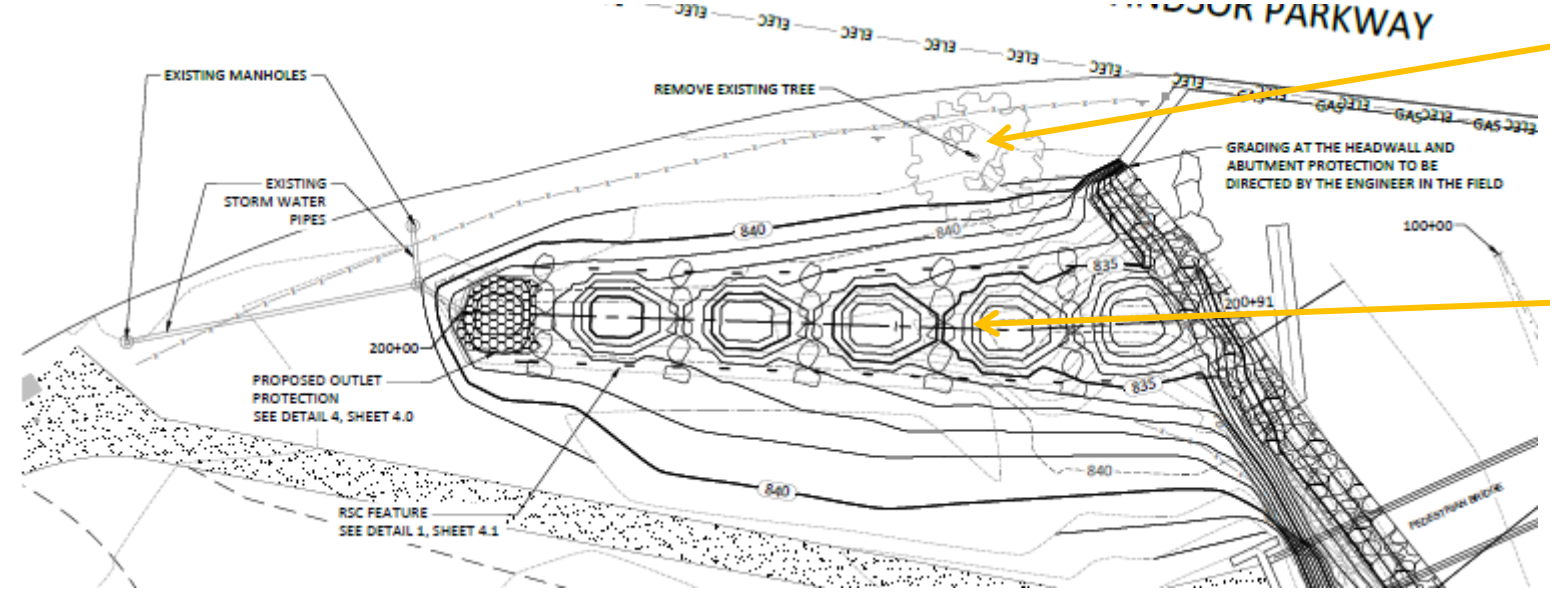
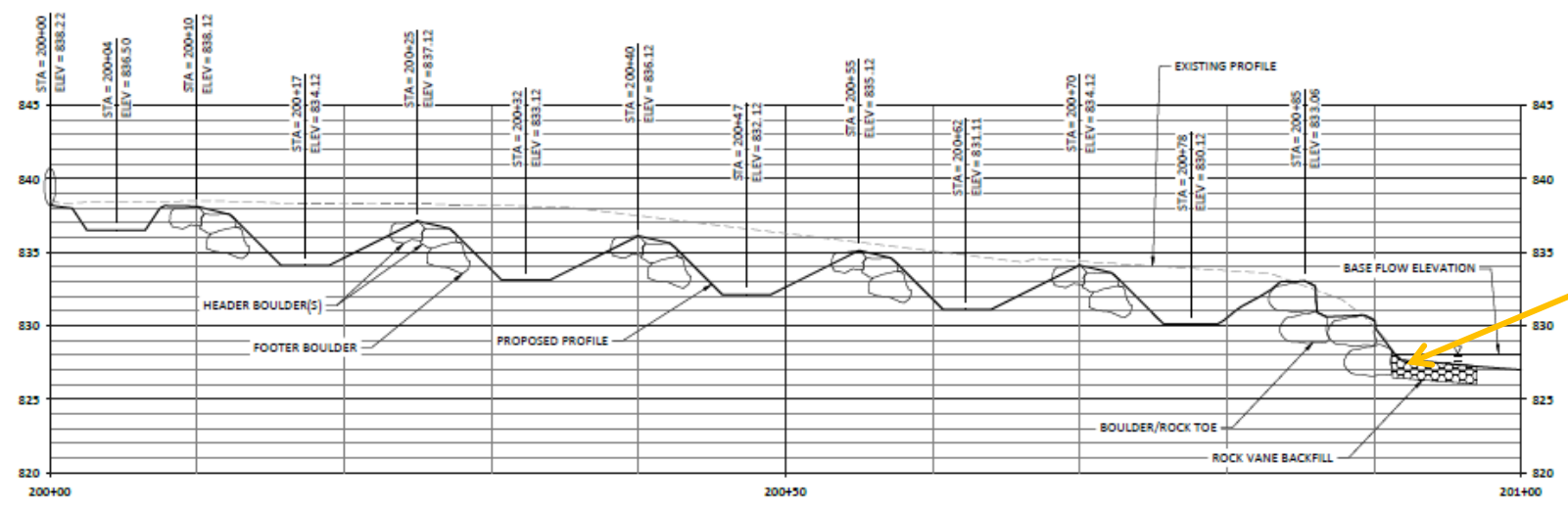
# Design Iteration: Initial 60% → Stream Bank Protection







# Design Iteration: Final 60% → RSC Design



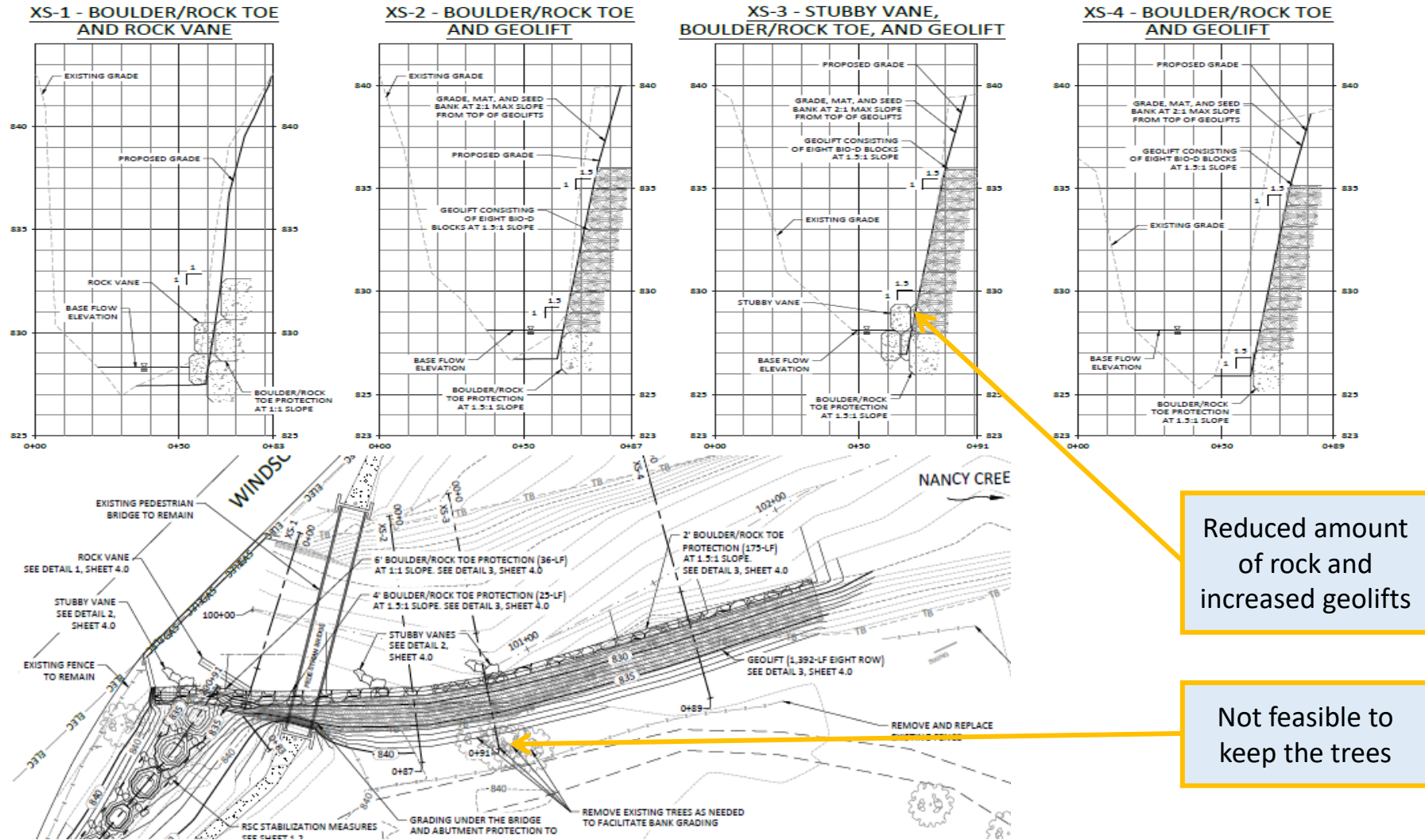
Create splash pad with rock vane backfill

Not feasible to keep the tree

Reduce the amount of rock in the RSC



# Design Iteration: Final 60% → Stream Bank Protection



Reduced amount of rock and increased geolifts

Not feasible to keep the trees



# Stakeholder Input



City held public meeting at the 60% review

- Held at the Park – it rained. **Eight people attended despite the weather!**



StoryMap developed for project:  
<https://storymaps.arcgis.com/stories/6f4897803dee407ca65d06e7eef00926>





# Regulatory Considerations

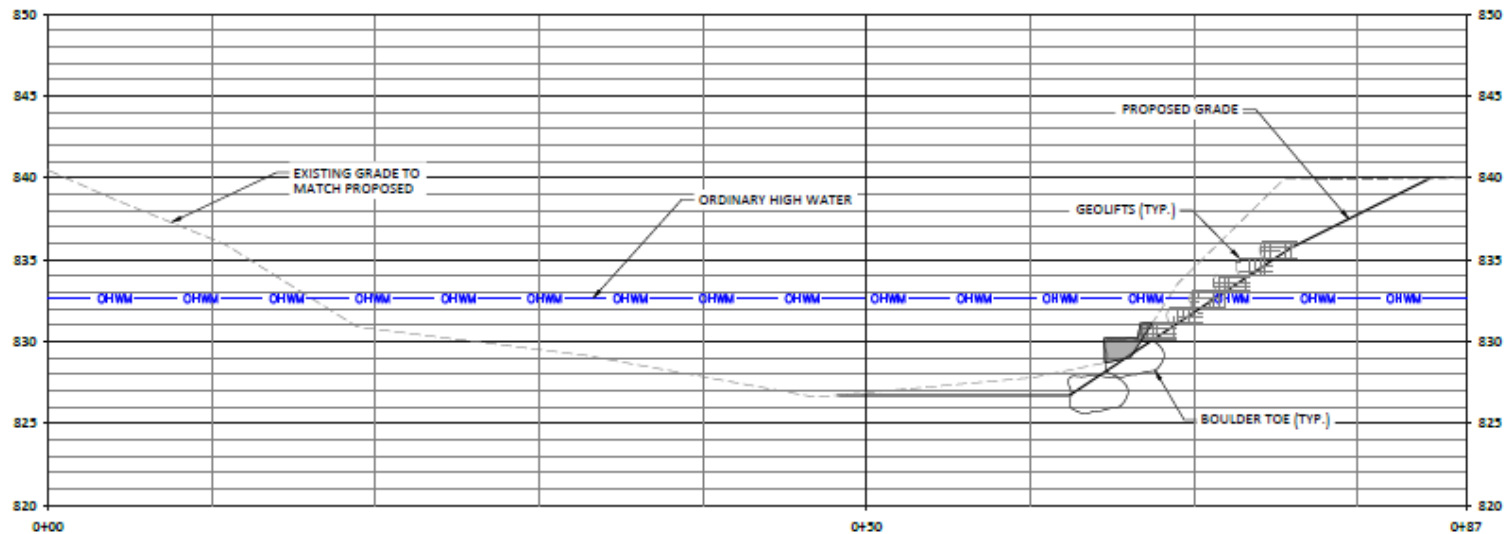
## USACE Nationwide 13 Permitting

- Based on existing conditions
- Limiting to construction approach

## GAEPD Buffer Variance

- Extensive evaluation of native vegetation, invasive species control and utilization of natural restoration techniques to meet buffer variance requirements

XS-2 - BOULDER TOE AND GEOLIFT





# Floodplain Analysis and Adjustments

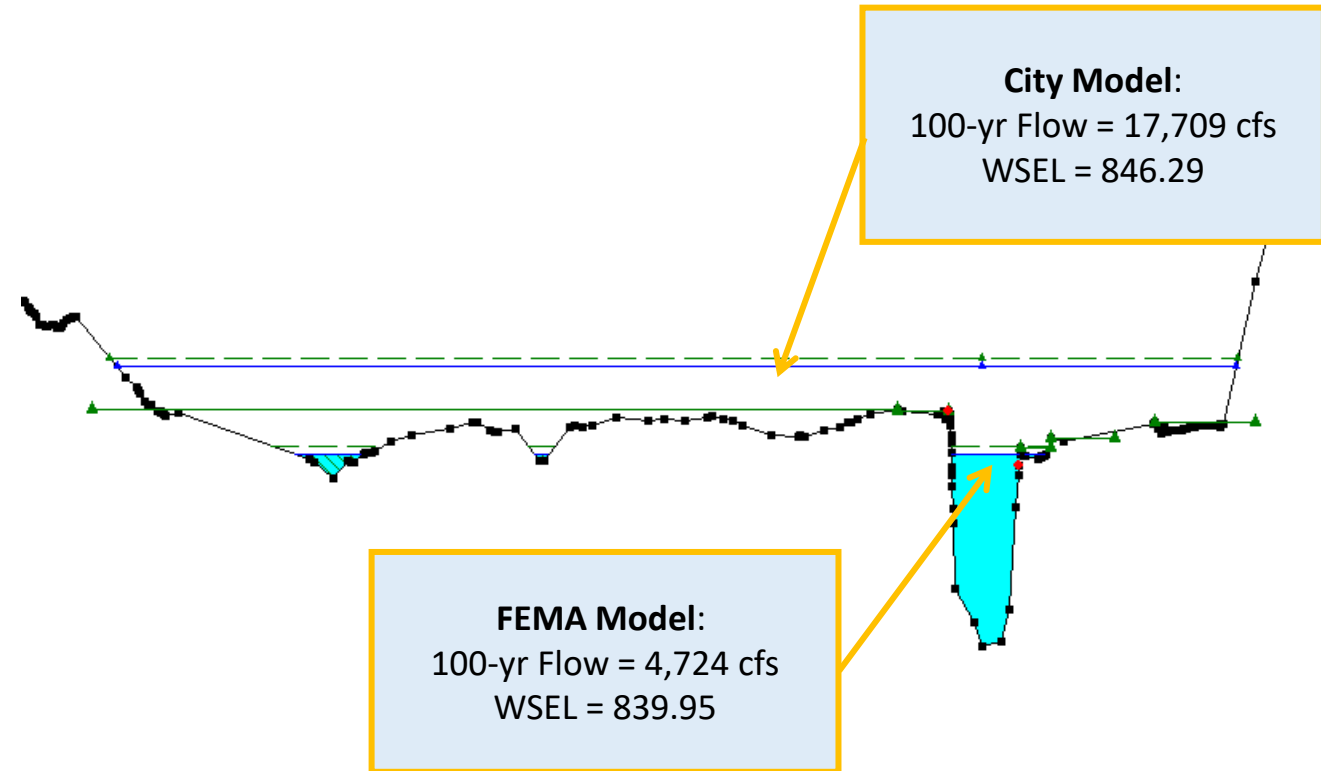
Two separate flood models for the site:

- FEMA FIS
- City Flood Study

Major Variability in discharge and elevations

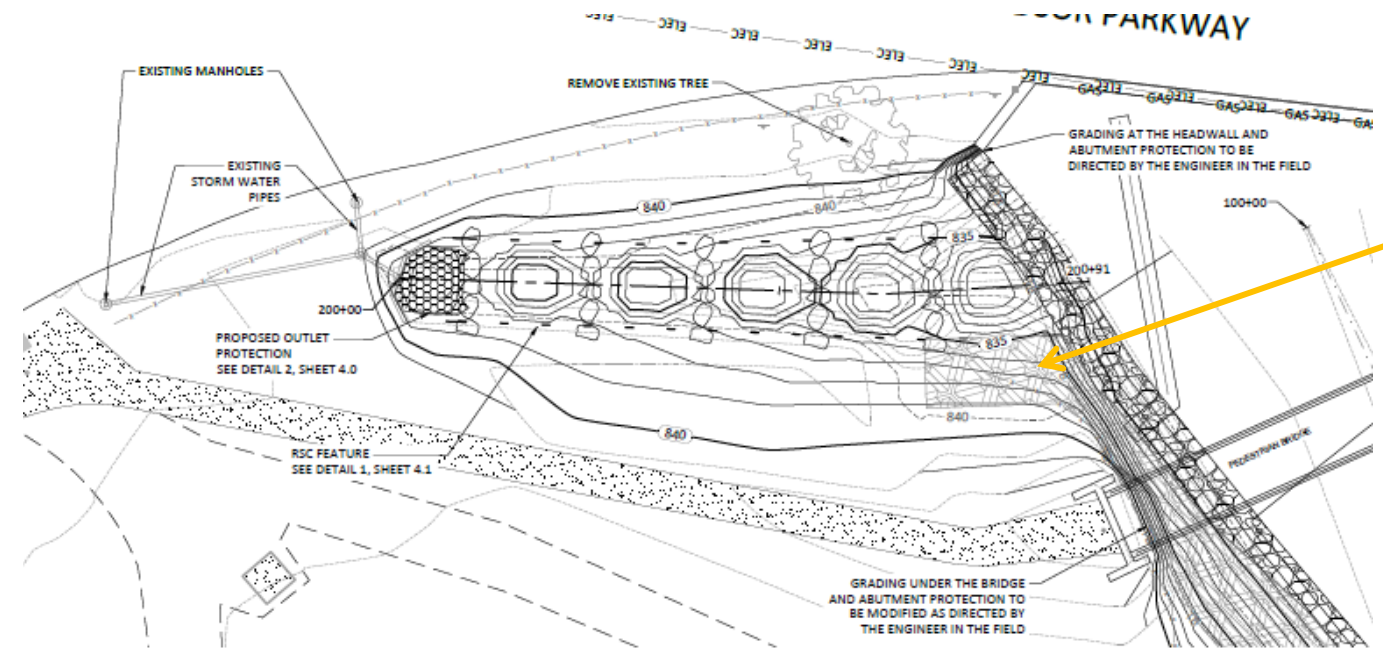
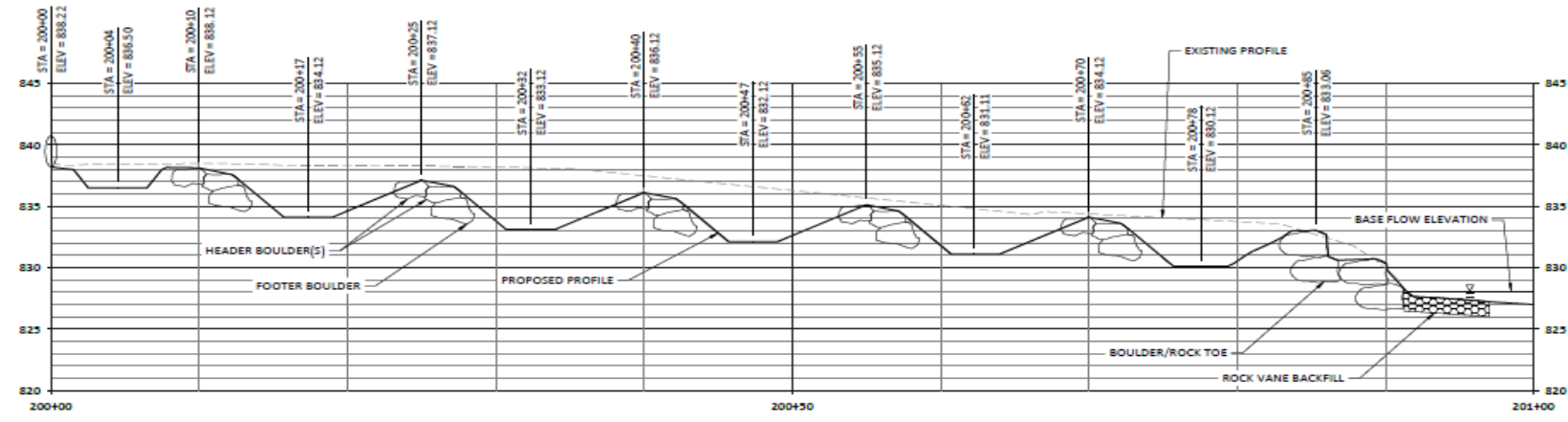
- (City more conservative)

Model required to meet both for no-rise conditions





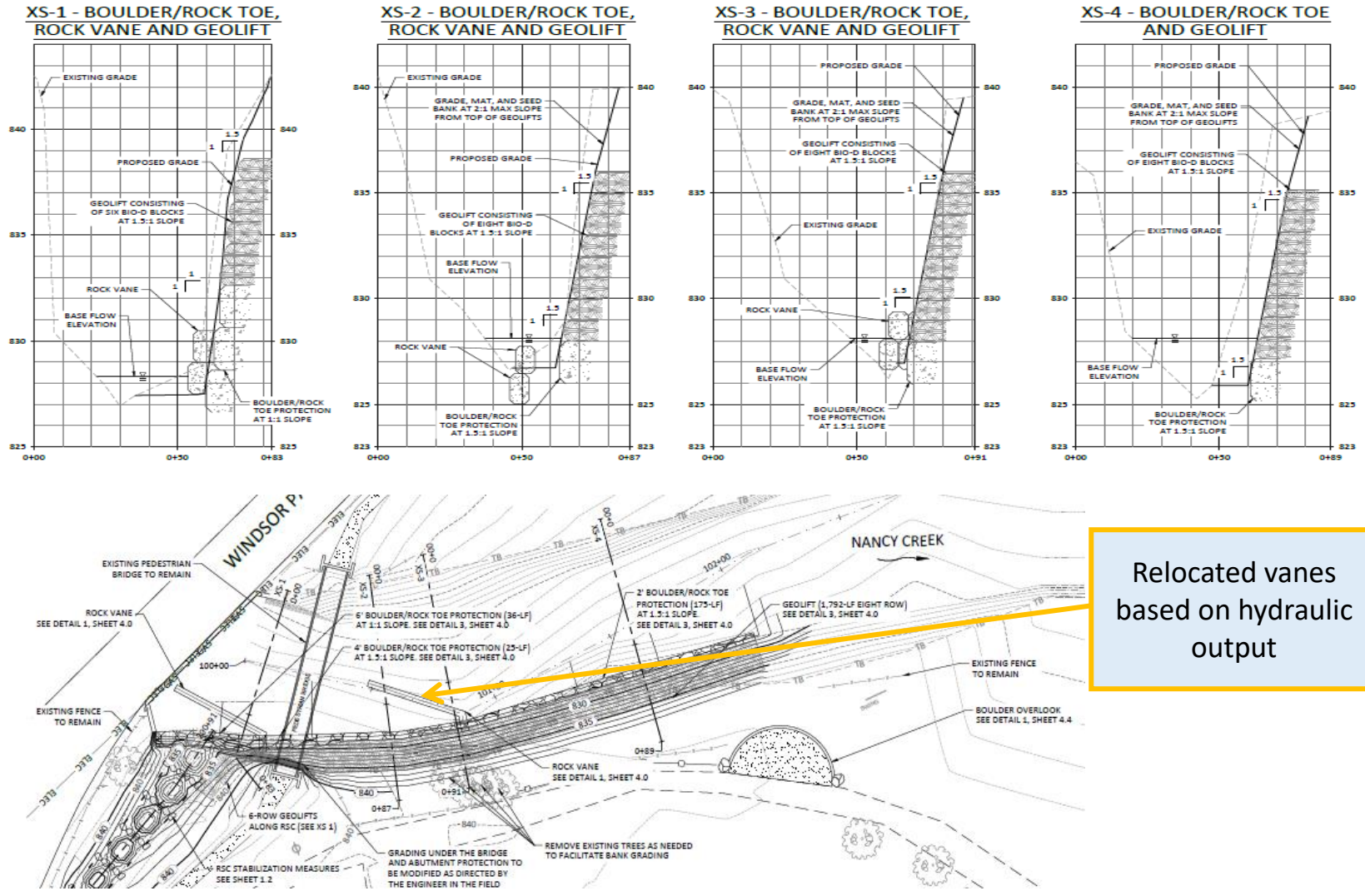
# Design Iteration: 90% → RSC Design



Hydraulic modeling to address bank shear



# Design Iteration: 90% → Stream Bank Protection

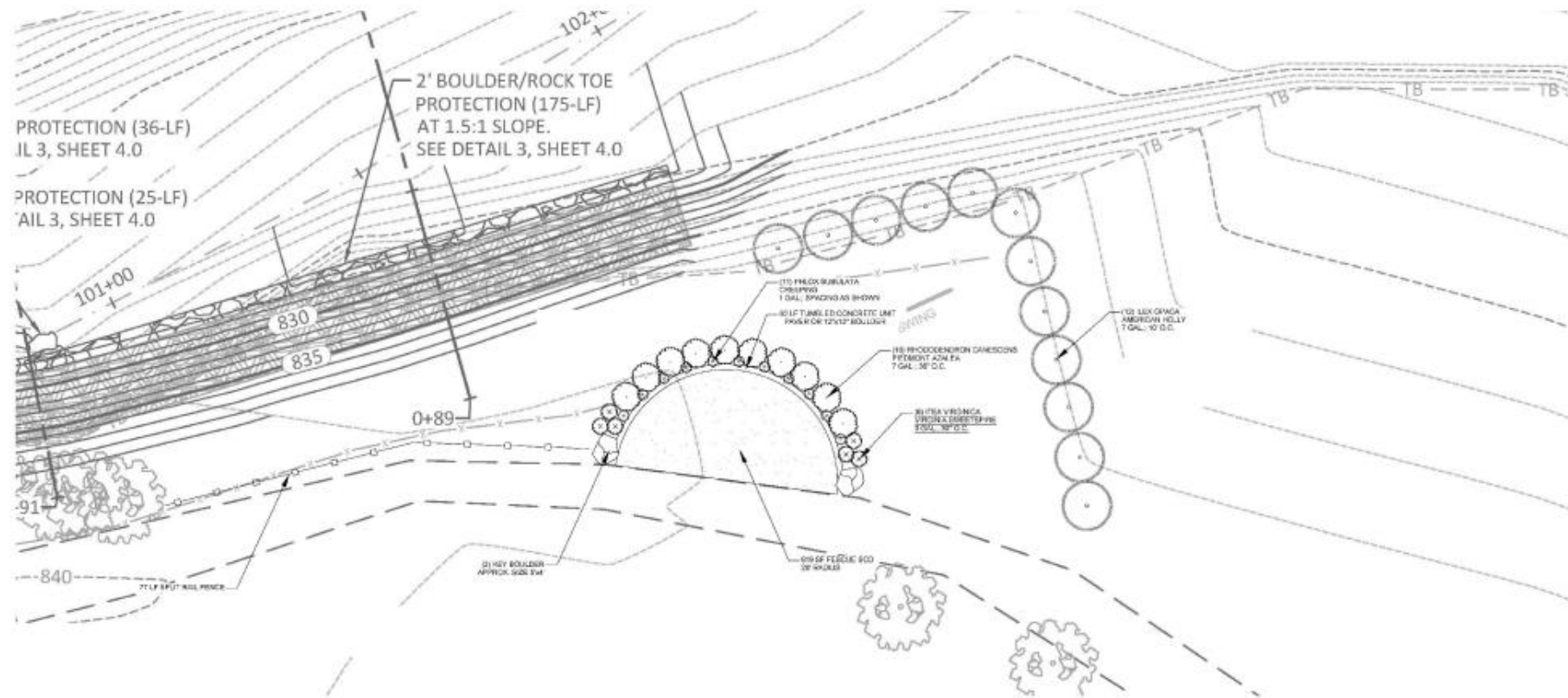


Relocated vanes based on hydraulic output



# Design Iteration: 90% → Overlook

- Several iterations to meet nature of park and to address goals provided by City and Stakeholders





# Implementation Schedule

- Permits in process
- Construction anticipated August 2023
- Planting completed fall 2023
- 1-year construction and planting warranty





# Resilient Design Impact

## Natural restoration design techniques

- Sustainable
- Cost-effective
- Maintainable

## Design-build approach

- Collaboration between all stakeholders
- Cost considerations before final design
  - Detailed analysis
  - Address issues before they become issues
  - Reduce potential for project creep

## Align project expectations







# Questions?

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