Webinar Training Series

SeSwA Southeast Stormwater Association

A Flood Mitigation Project Success Story

July 15, 2021 | 10:30 a.m. – 11:30 a.m. (Eastern)

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Today's Presenter

Adrian Ward, PE, CFM, CPESC
Vice President, Barge Design Solutions
adrian.ward@bargedesign.com

Flood Mitigation Design Success Stories

July 15, 2021

Adrian Ward, PE
Engineering Manager

BARGE DESIGN SOLUTIONS

Agenda

- Background
- Project Overviews
- Construction Photos
- Lessons Learned

Background

2014 U.S. Housing and Urban Development released $1 Billion in grant funding through a National Resiliency Competition.

Projects were required to

- Provide flood reduction
- Benefit low-to-moderate income population
- Support the economy and environment

Background

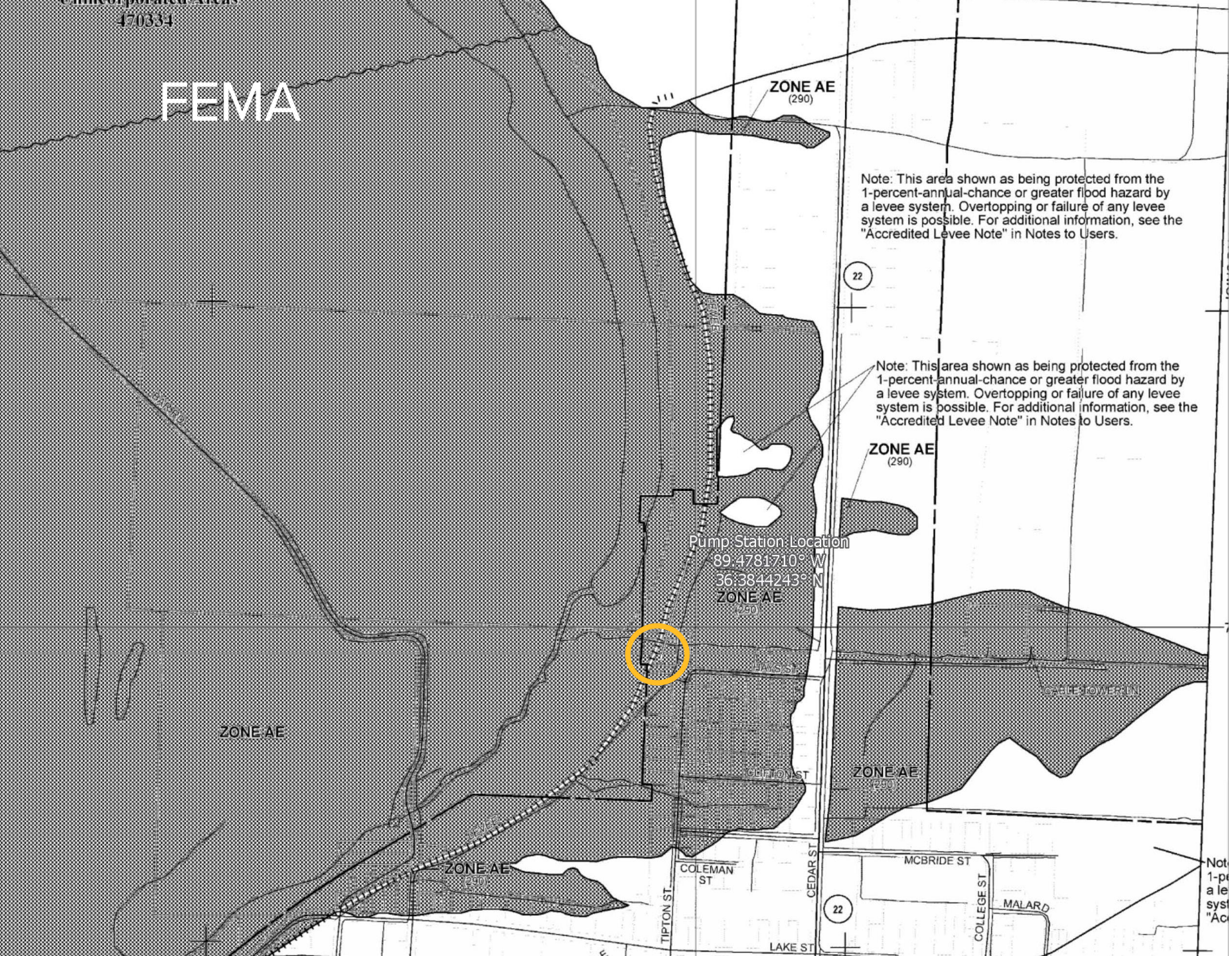
State of Tennessee was awarded $44 million for multiple projects

West TN River Basin Authority – Interagency Grantee

Barge was awarded three projects:

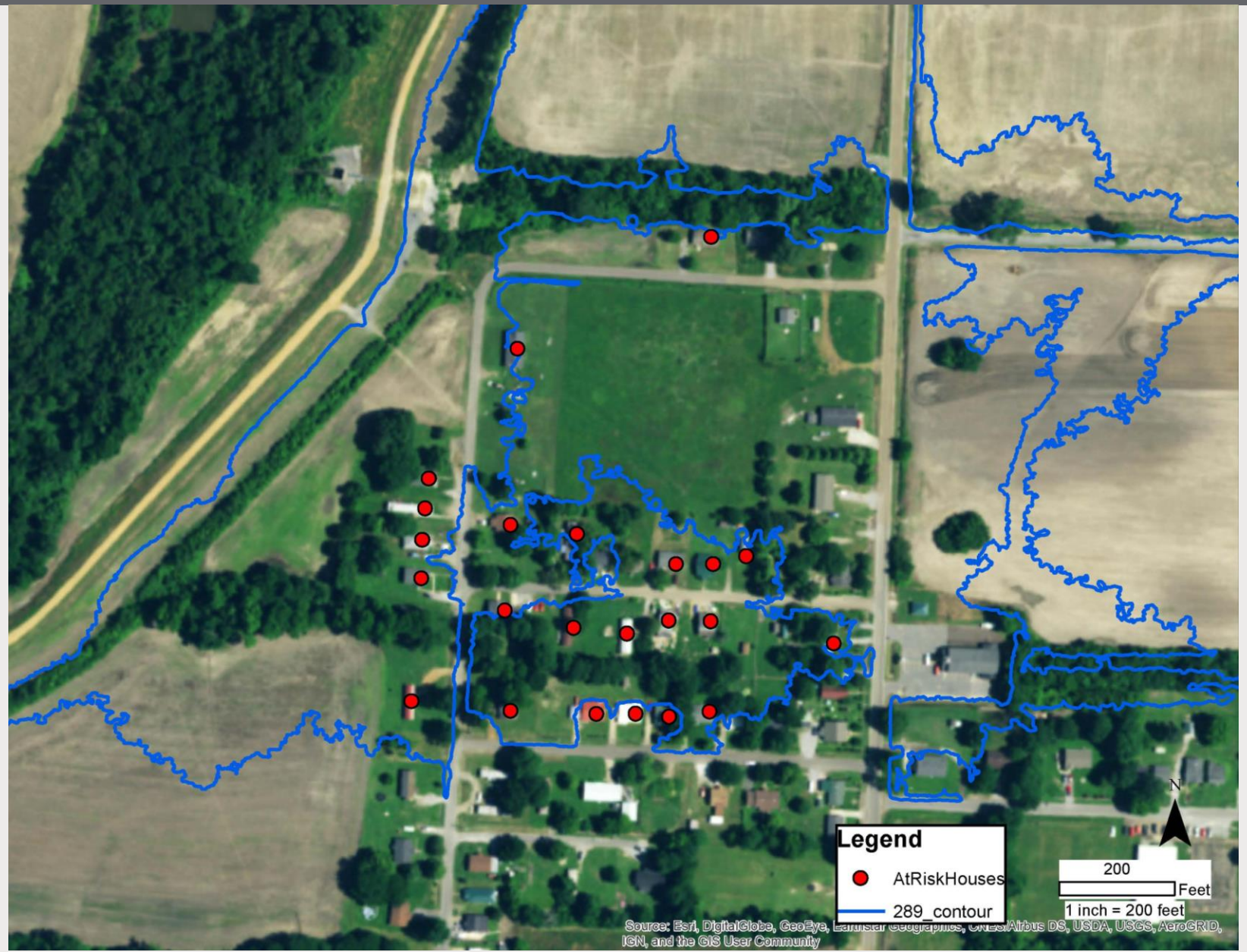
- Tiptonville Pump Station
- Jackson Flood Control
- Cold Creek Chute

Tiptonville Pump Station Project Location


Unincorporated Areas
470334
FEMA
ZONE AE
(290)
Note: This area shown as being protected from the 1-percent-annual-chance or greater flood hazard by a levee system. Overtopping or failure of any levee system is possible. For additional information, see the "Accredited Levee Note" in Notes to Users.
22
Note: This area shown as being protected from the 1-percent-annual-chance or greater flood hazard by a levee system. Overtopping or failure of any levee system is possible. For additional information, see the "Accredited Levee Note" in Notes to Users.
ZONE AE
(290)
Pump Station Location
89.4781710° W
36.3844243° N
ZONE AE
(290)
ZONE AE
ZONE AE
(290)
ZONE AE
(290)
CLIFTON ST
CABLE TOWER LN
COLEMAN ST
TIPTON ST
CEDAR ST
MCBRIDE ST
COLLEGE ST
MALARD
LAKE ST
22
22

Existing Structure

At-Risk Structures



Current Plan

Current Plan

Proposed Solution

Pump Size Design Criteria

DETERMINE INFLOWS FOR VARIOUS RETURN EVENTS

Combined Mississippi River frequency event
x
Land side frequency event
>=
100-year event

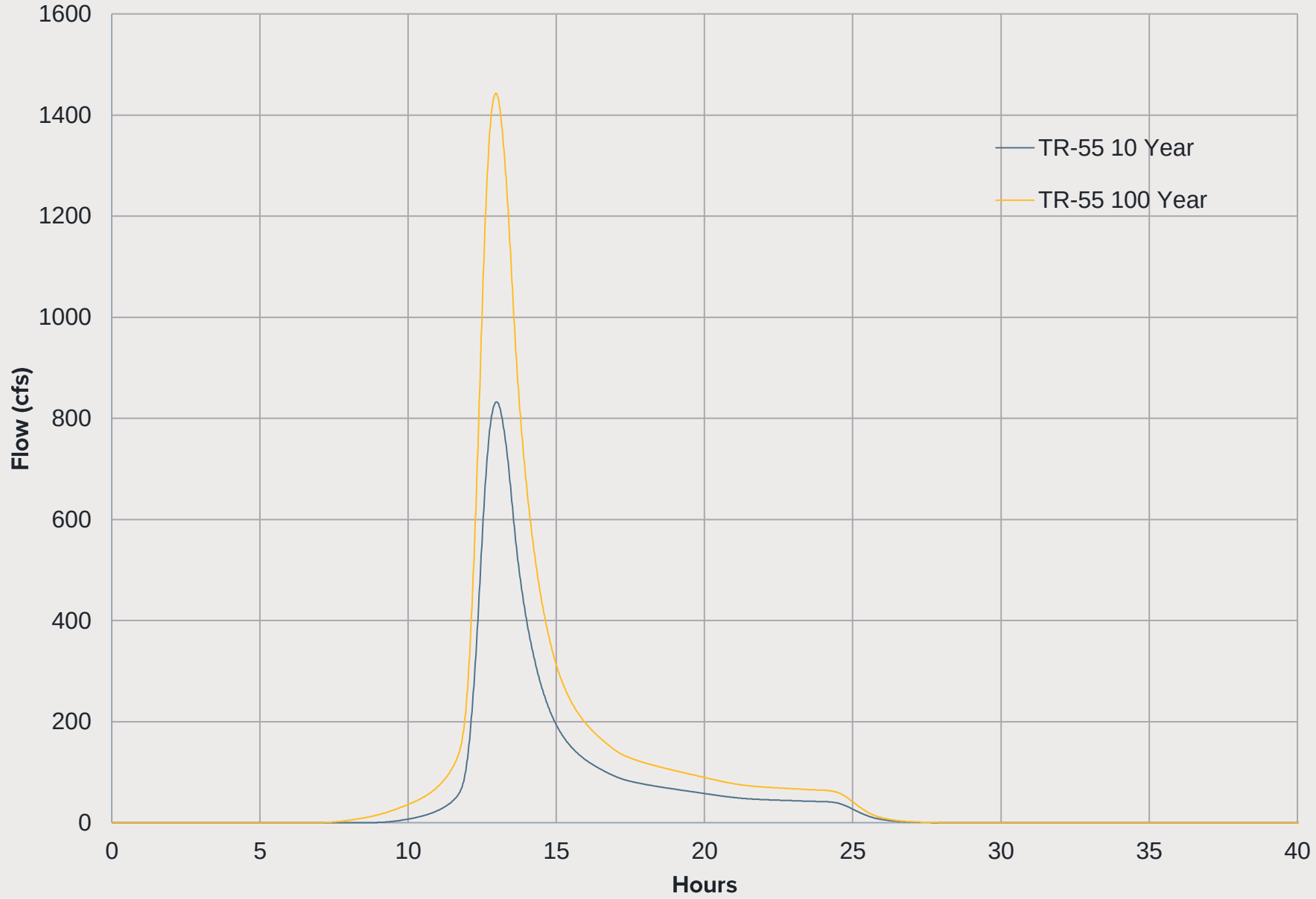
DESIGN

100-year Mississippi event

10-year Land Side Rainfall

Traditional Methodology

Traditional Methodology Inflow



USGS Rural Regression Equations

10 YEAR

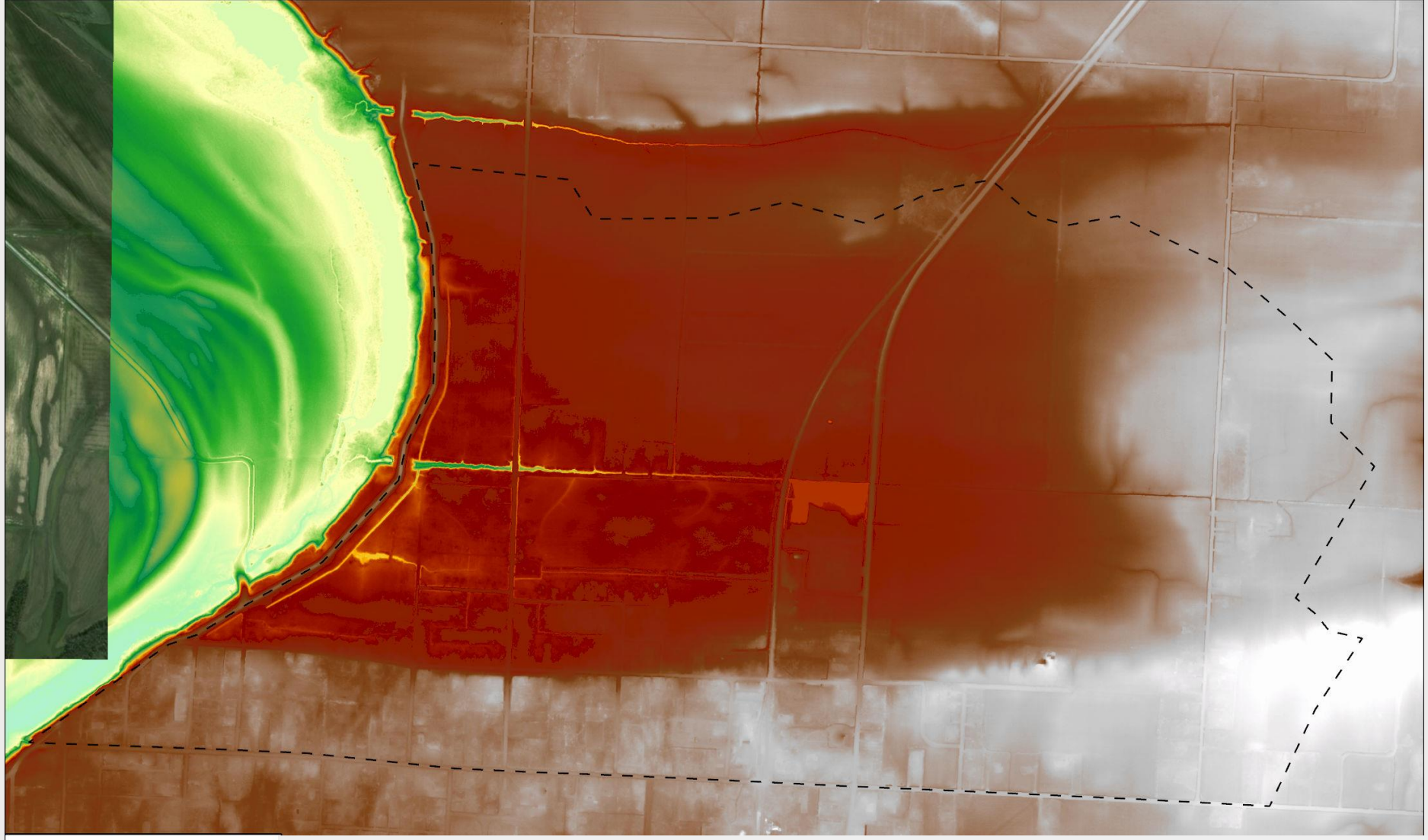
$Q_{10} = 735 \times (\text{Drainage Area})^{0.554}$

$Q_{10} = 828$ cfs ($\text{TR-55}_{10} = 820$ cfs)

100 YEAR

$Q_{100} = 1{,}080 \times (\text{Drainage Area})^{0.575}$

$Q_{100} = 1{,}220$ cfs ($\text{TR-55}_{100} = 1{,}420$ cfs)



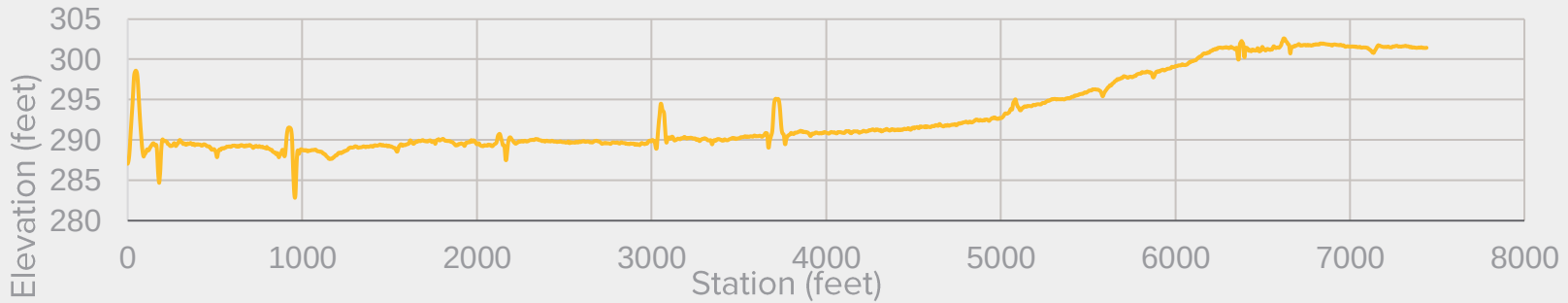
Elevation (ft)

311.15

263.46

N

0 500 1,000 Feet



HEC-RAS 2D

ONLY INPUTS INCLUDE

LiDAR

Excess Rainfall

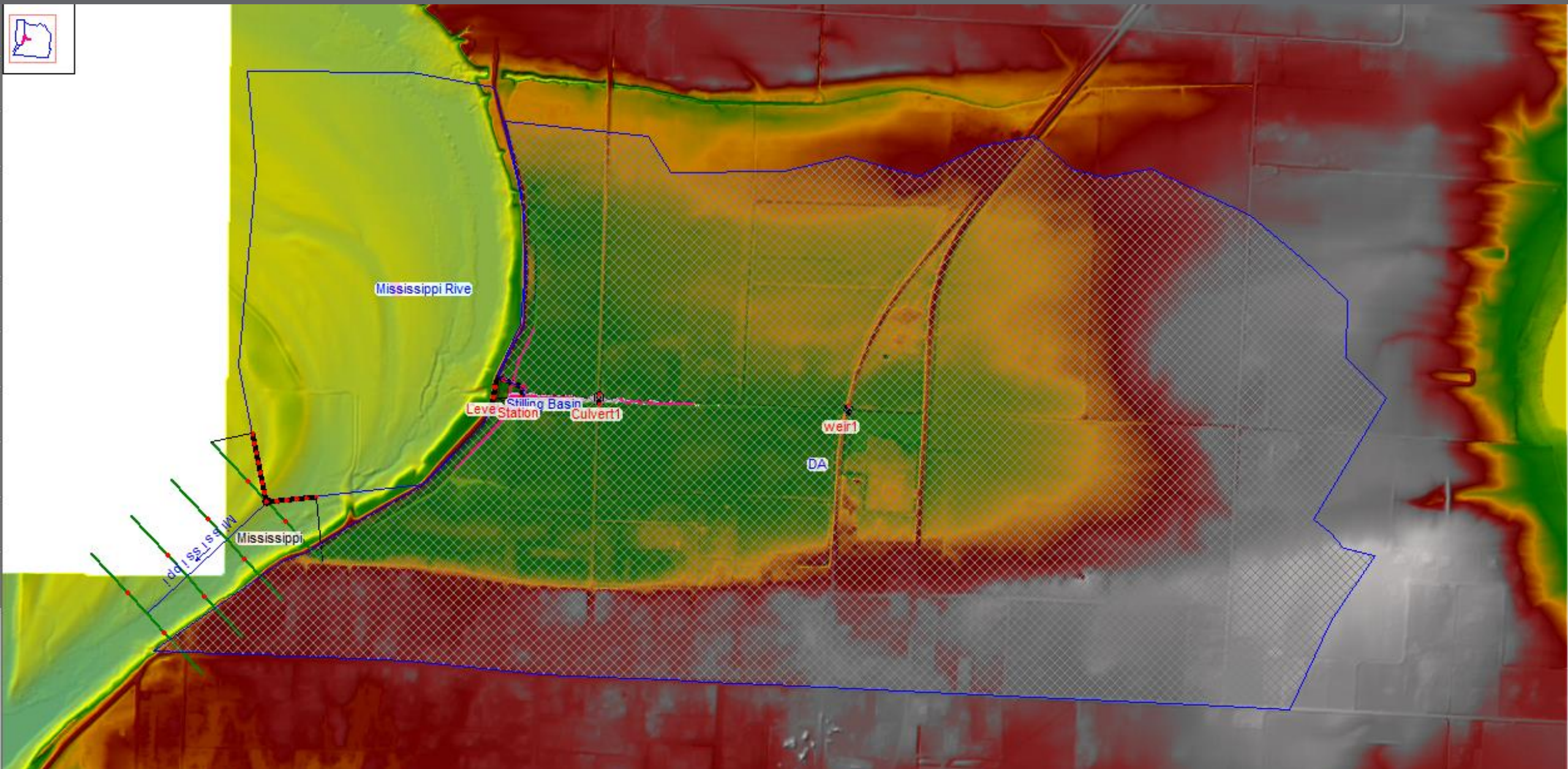
Land Use Data

Less subjective (deterministic)

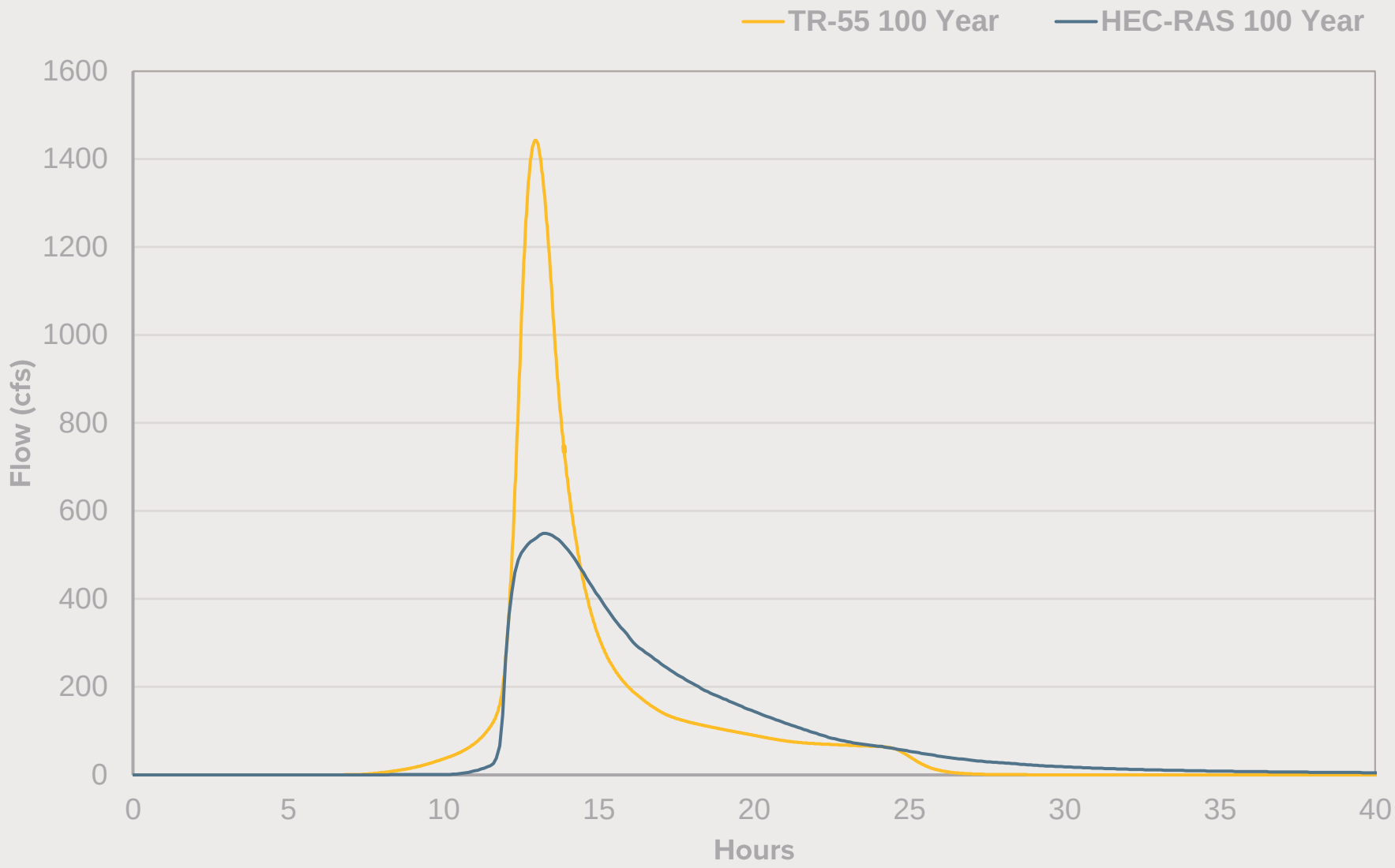
Combined hydrologic/ hydraulic model

Input pump curves

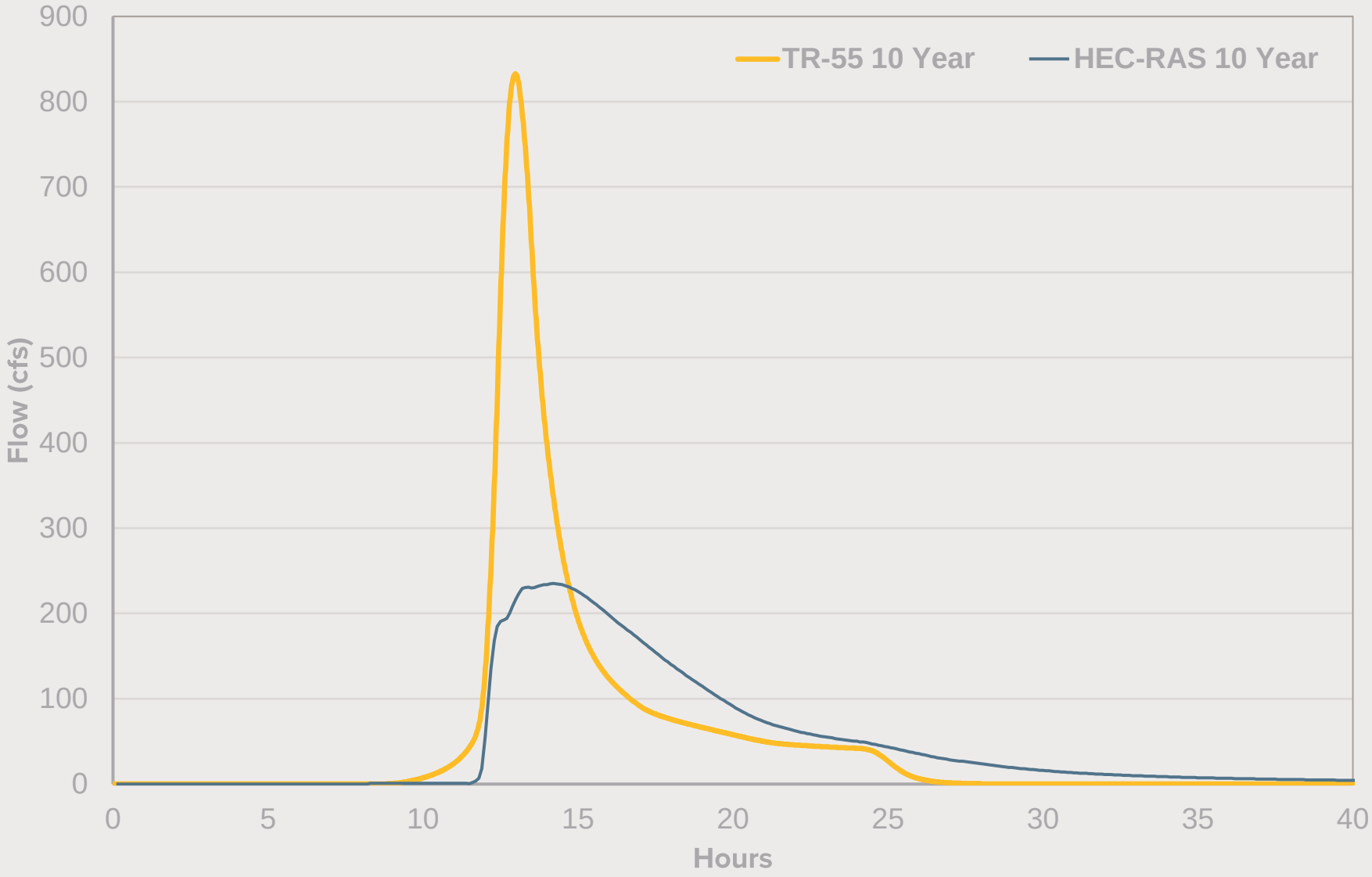
2D Model Domain



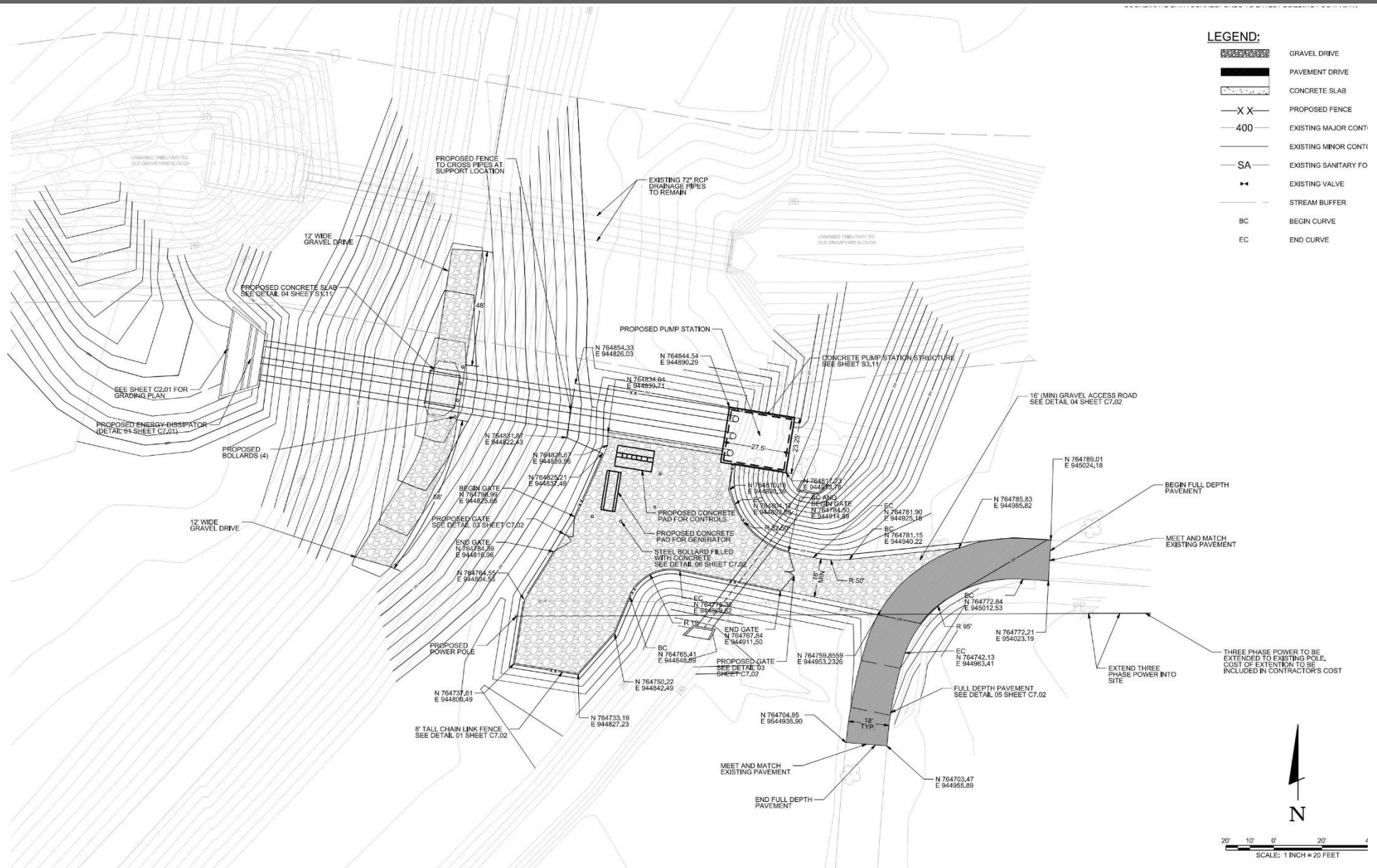
100 Year Inflow Comparison



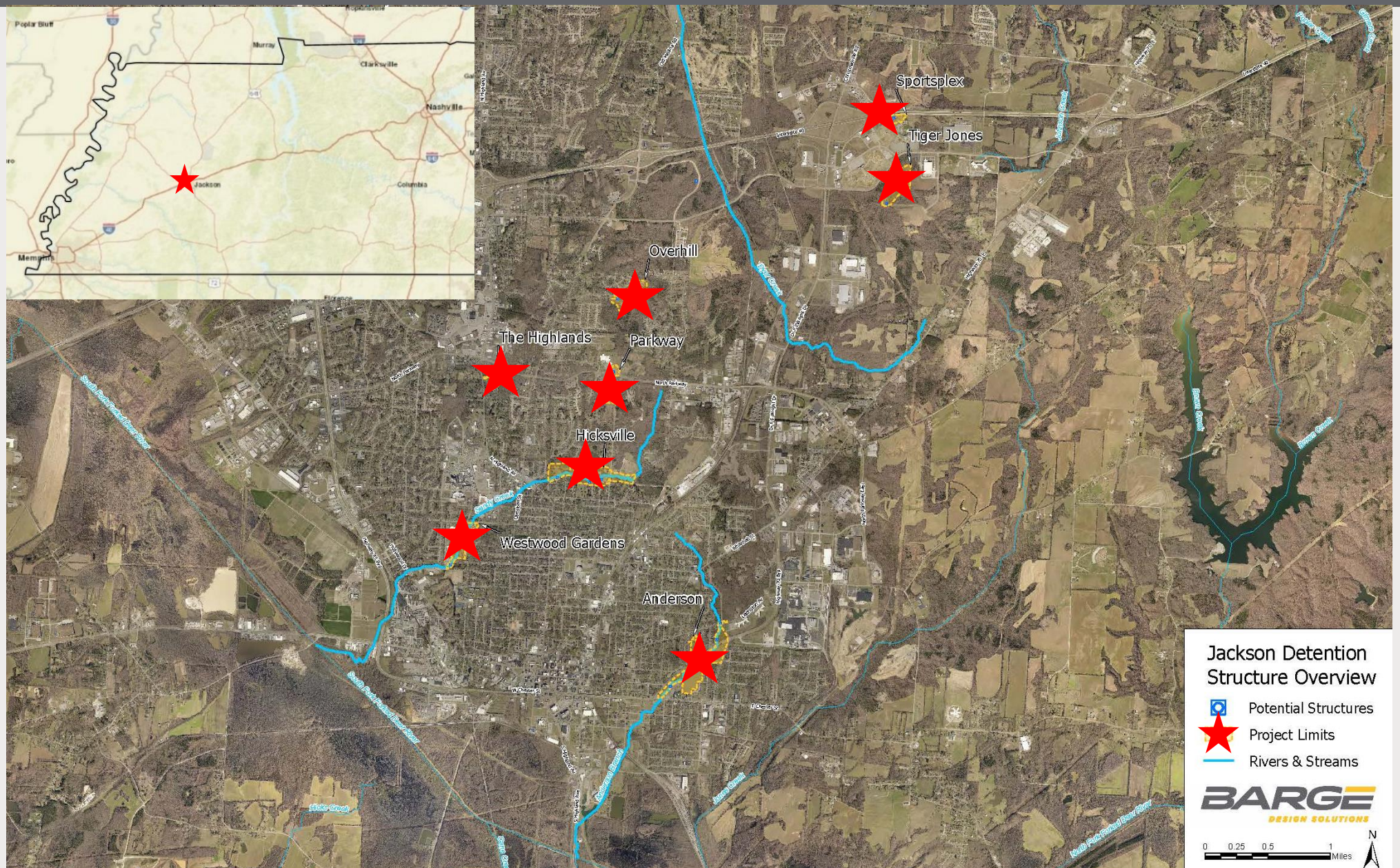
10 Year Inflow Comparison



Chosen Concept



Jackson Flood Control Project Location



HISTORIC FLOODING PROBLEMS | SANDY, EROSIVE SOILS

Exposed utilities

Exposed utilities

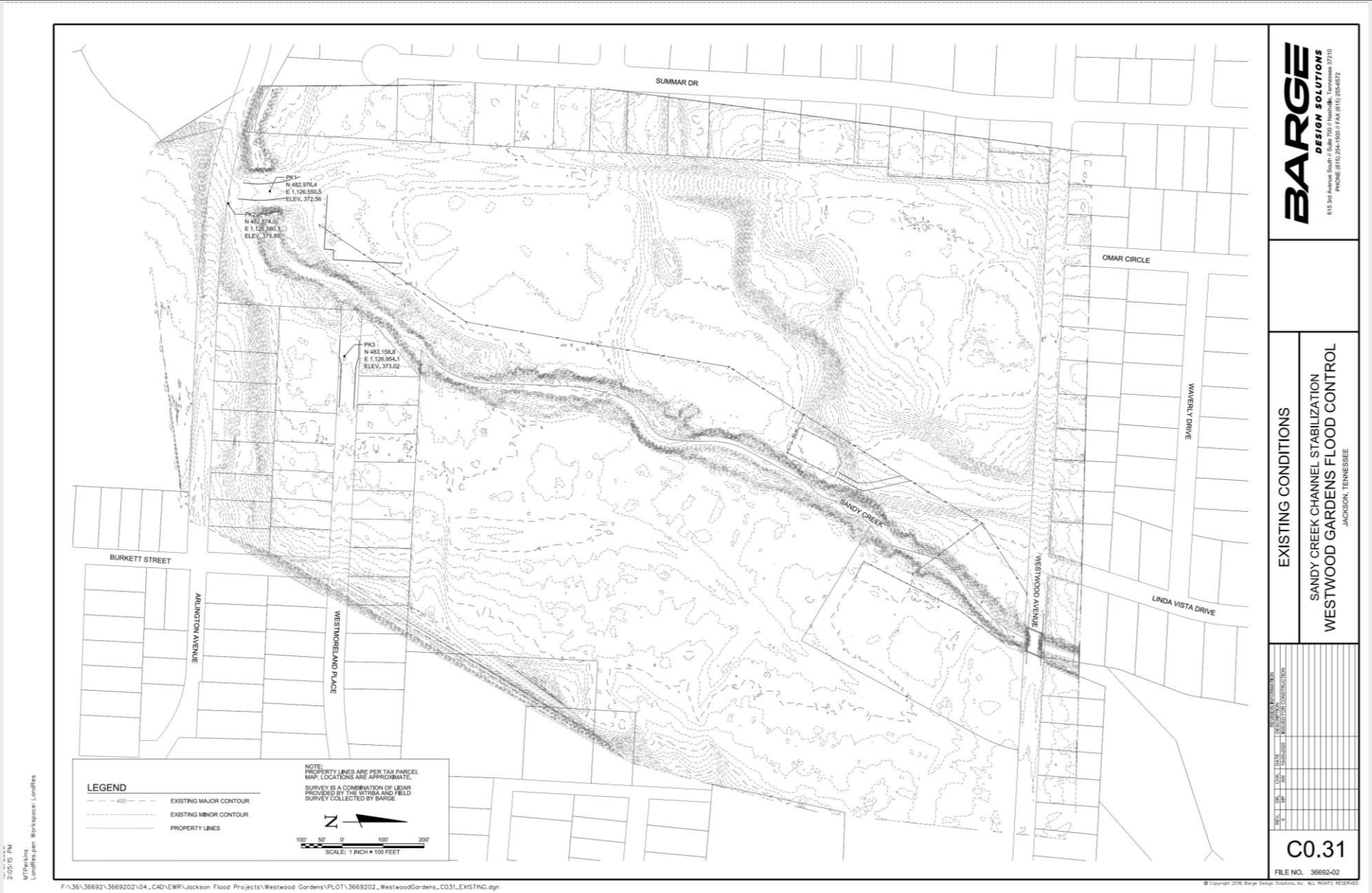
Vertical slopes/deposition of sediment

Project Inflows

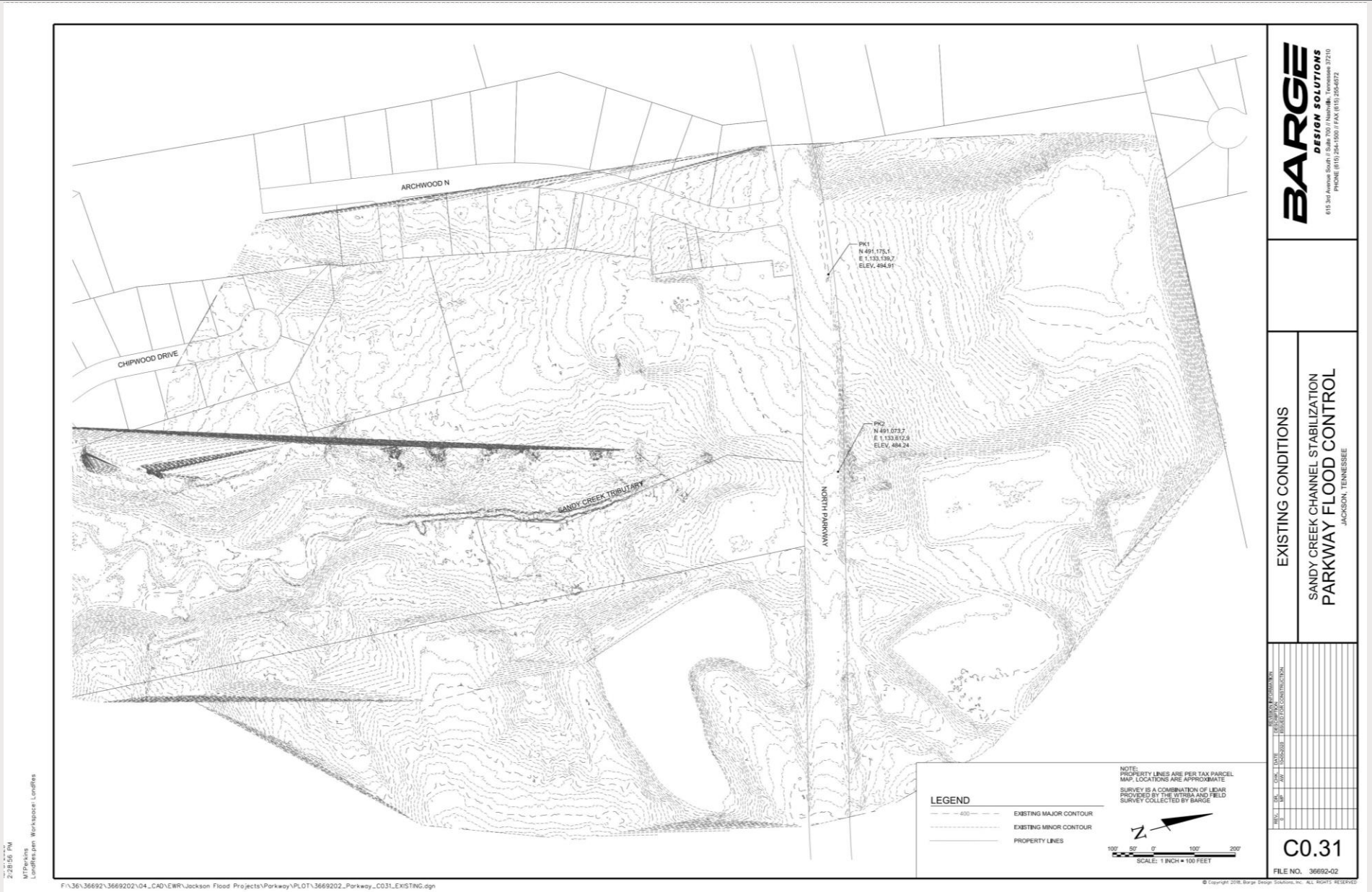
JACKSON

	2 year	100-year
Anderson	557.78	2074.63
Hicksville	369.72	1764.82
Overhill	34.76	214.21
★ Parkway	88.82	397.77
Sportsplex	165.34	533.27
★ Highlands	24.45	96.47
Tiger Jones	85.45	392.67
★ Westwood Gardens	625.66	2209.44

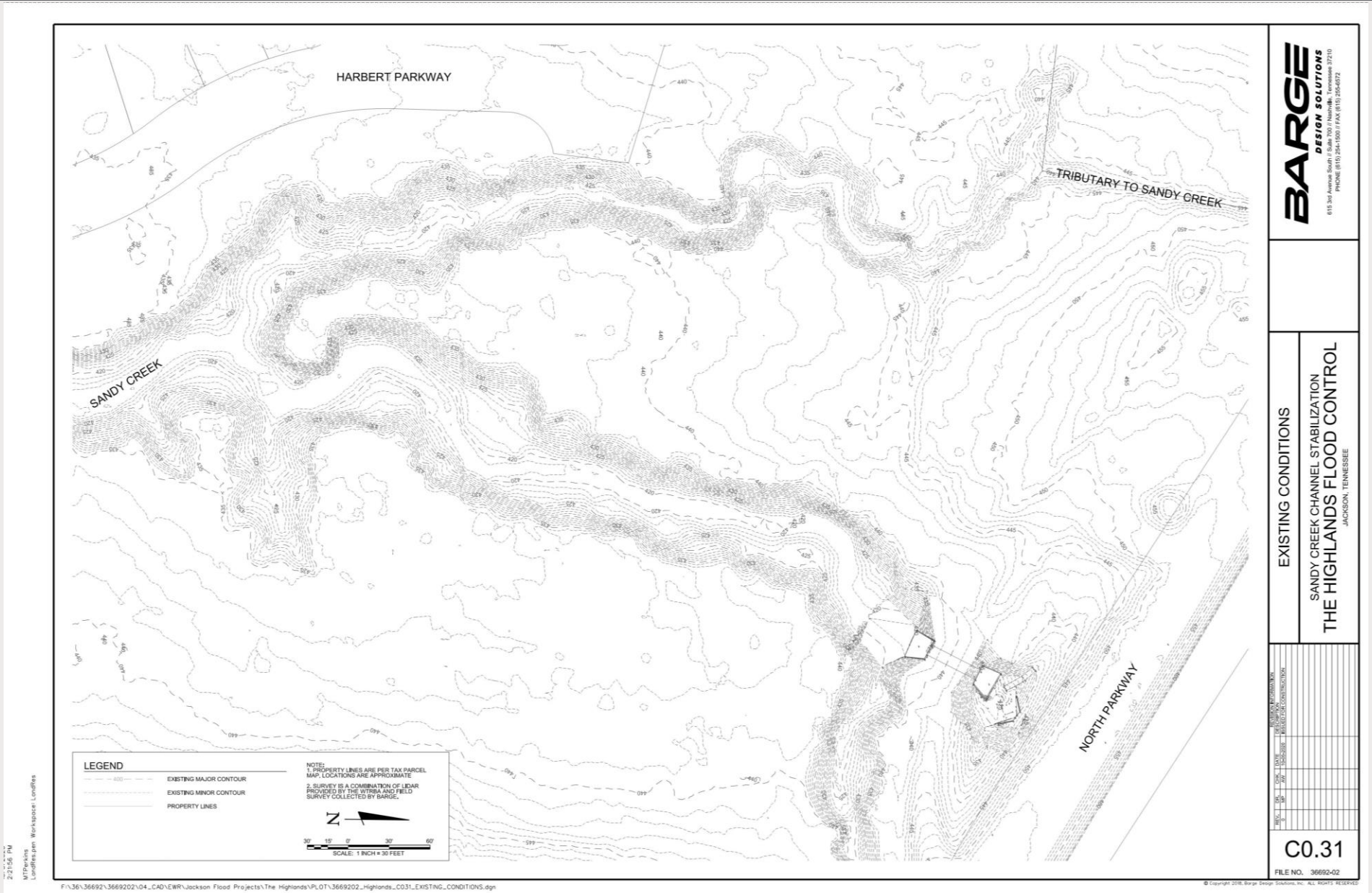
Existing Topography



Existing Topography



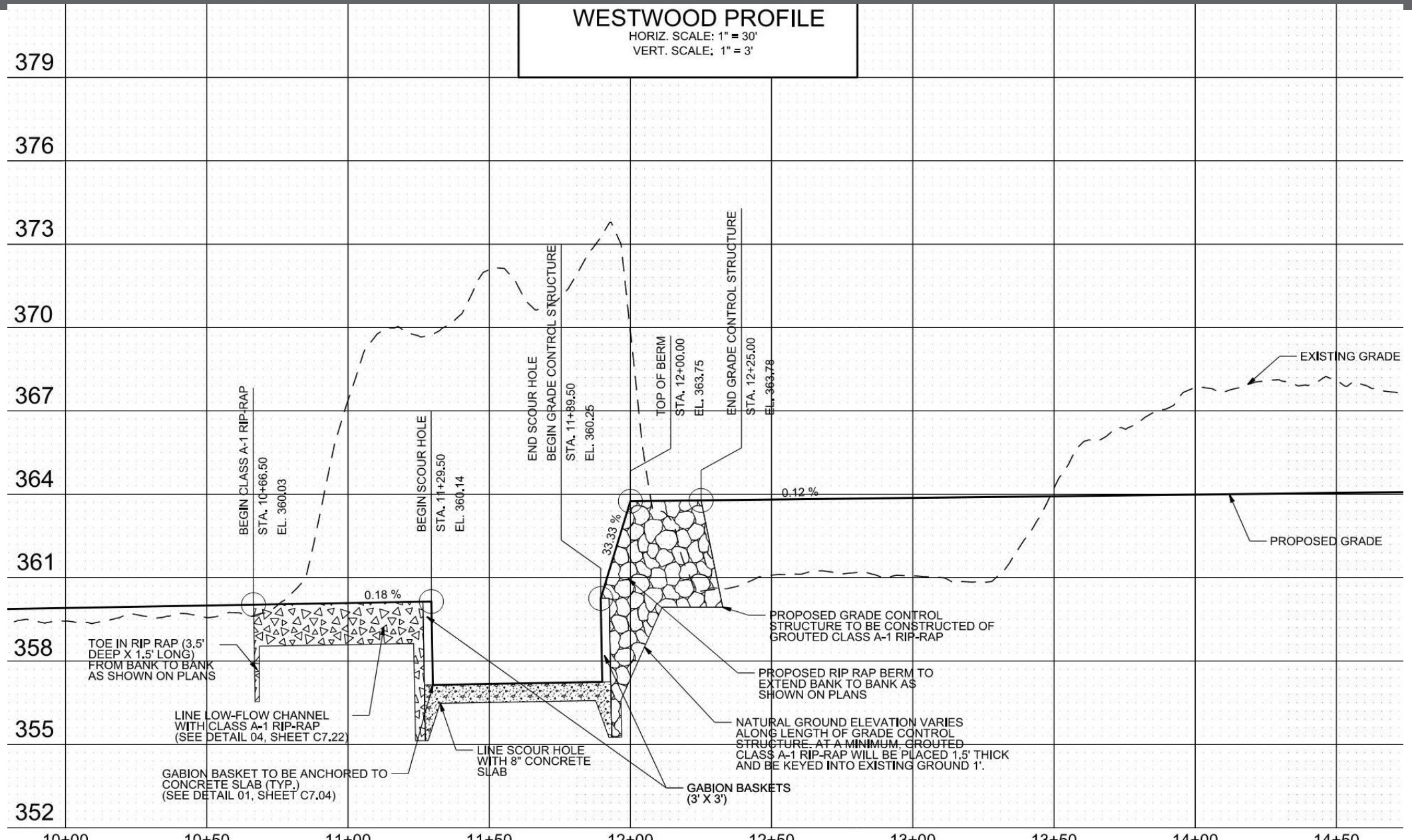
Existing Topography



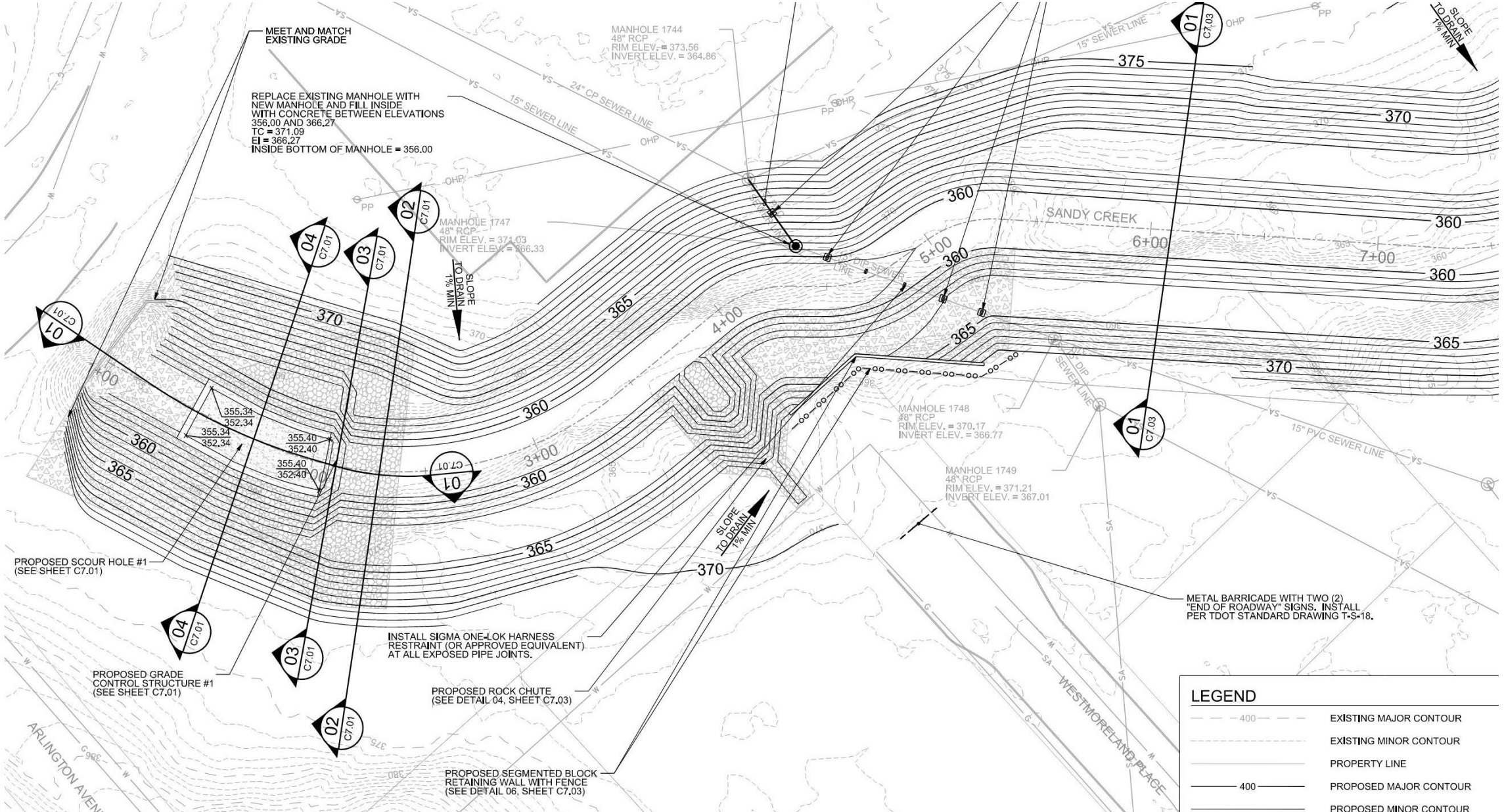
JACKSON FLOOD CONTROL PROJECTS

1. Lift existing channels
2. Provide low flow channels and floodplain
3. Stabilize utility crossings where possible
4. Remove kudzu

Grade Control



Grade Control



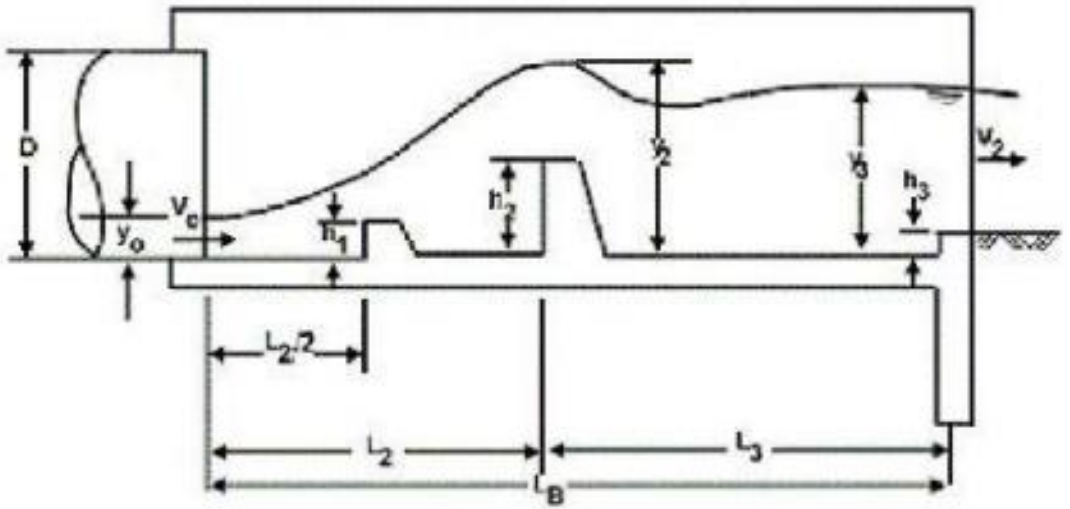
Construction Photos

Construction Photos

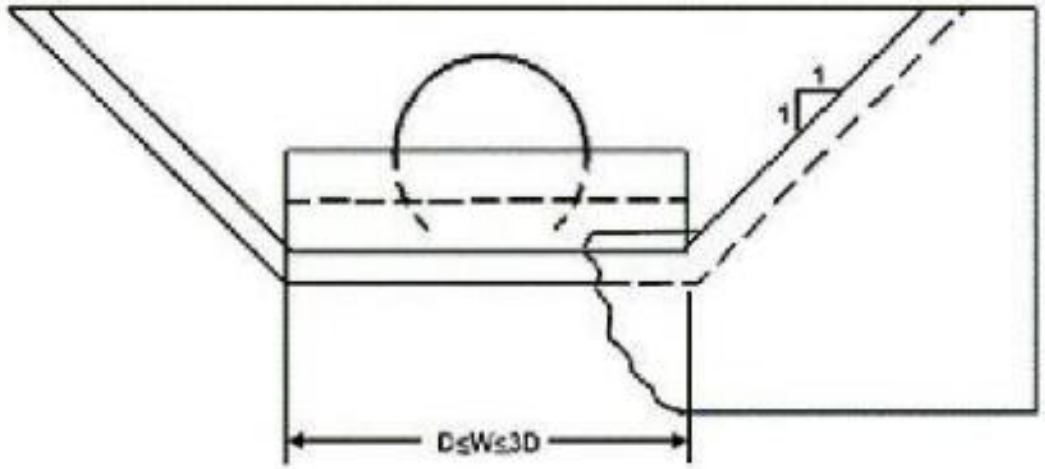
Construction Photos

Construction Photos

Construction Photos



Profile View



End View

Construction Photos

WESTWOOD GARDENS - GRADE CONTROL

Construction Photos

PARKWAY – GRADE CONTROL

HIGHLANDS – GRADE CONTROL

Estimate Costs Carefully

- Prepare as detailed as possible
- Use appropriate contingencies
- Involve subject matter specialists
- Account for construction conditions (wet, unsuitable soils, etc.)

Lessons Learned

Permitting

- Identify environmental constraints early
- Have a plan to mitigate/deal with impacts
- Get buy-in from regulators if possible

Experienced Leadership Team

- Capable project manager
- Multidisciplinary team to provide technical support
- Experienced grant administrator

Thank You!

July 15, 2021

Adrian Ward, PE
Engineering Manager

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