

# Engineering Services Proposal

Repair and Rehabilitation of County Road 626 in White Township, NJ



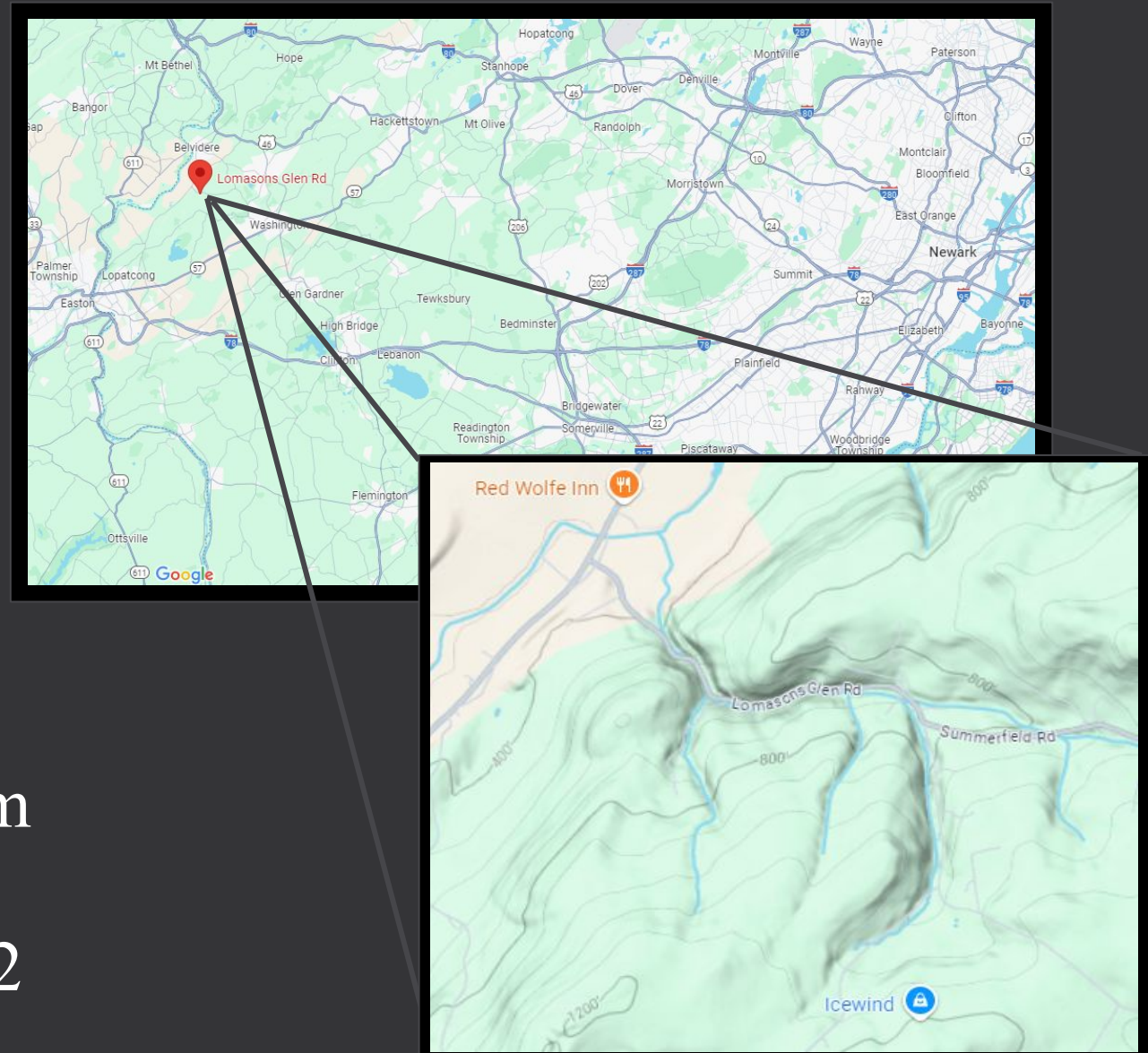
Team Members: Louis Turner (Team Leader), Michael Harrison, Daniel Geissler, and Tony Gonzalez

Advisors: Dr. Michael Horst and Dr. Thomas Brennan



# Problem Statement and Background

- County Road Route 626/ Lomasons Glen Road in White Township, NJ
- Bridge No. 23073, over Buckhorn Creek Tributary
- Original embankments upstream reinforced with concrete retaining walls
- Superstructure/substructure remained intact during storm event
- Roadway closure since 2022



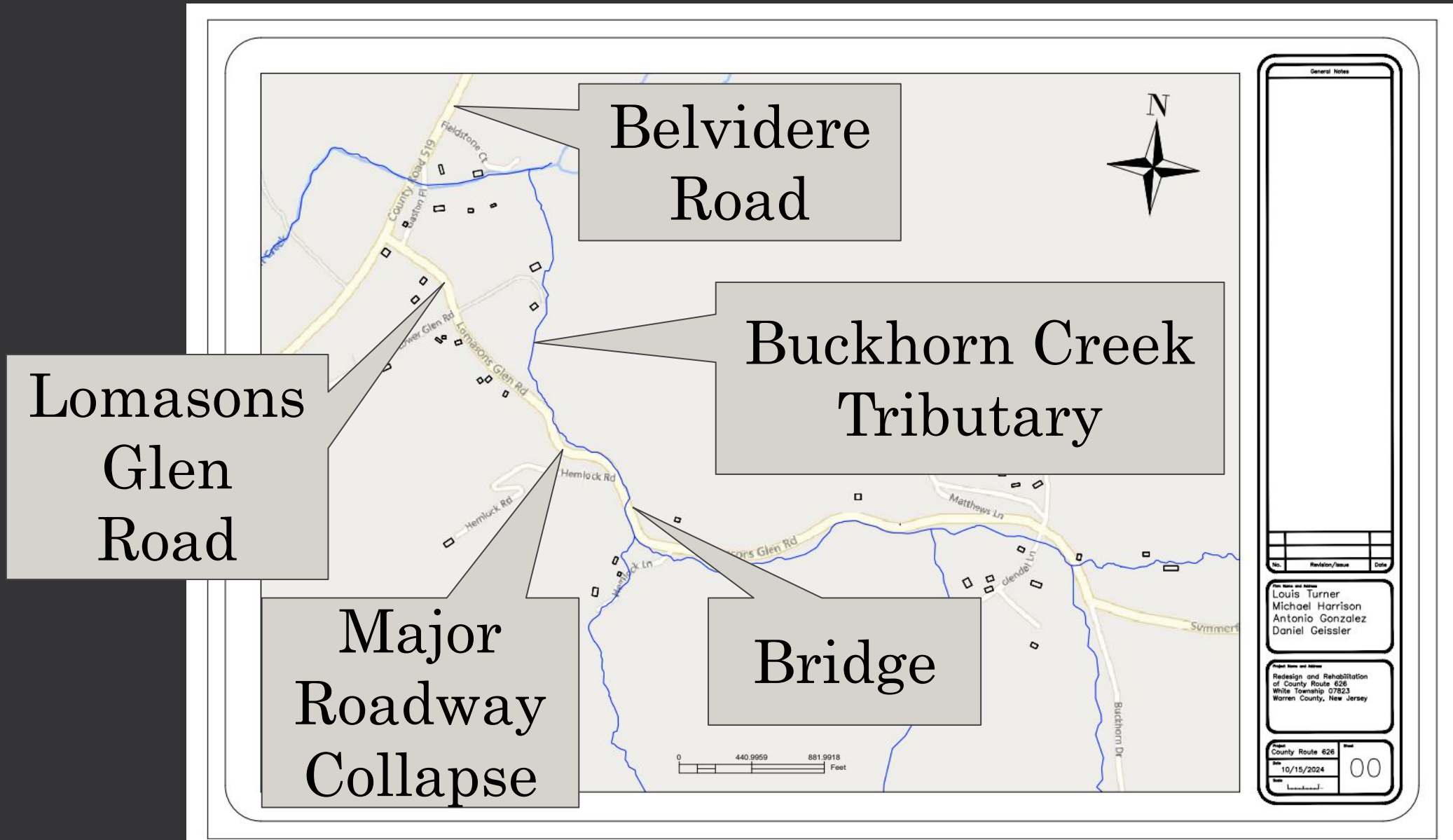


# Major Roadway Collapses





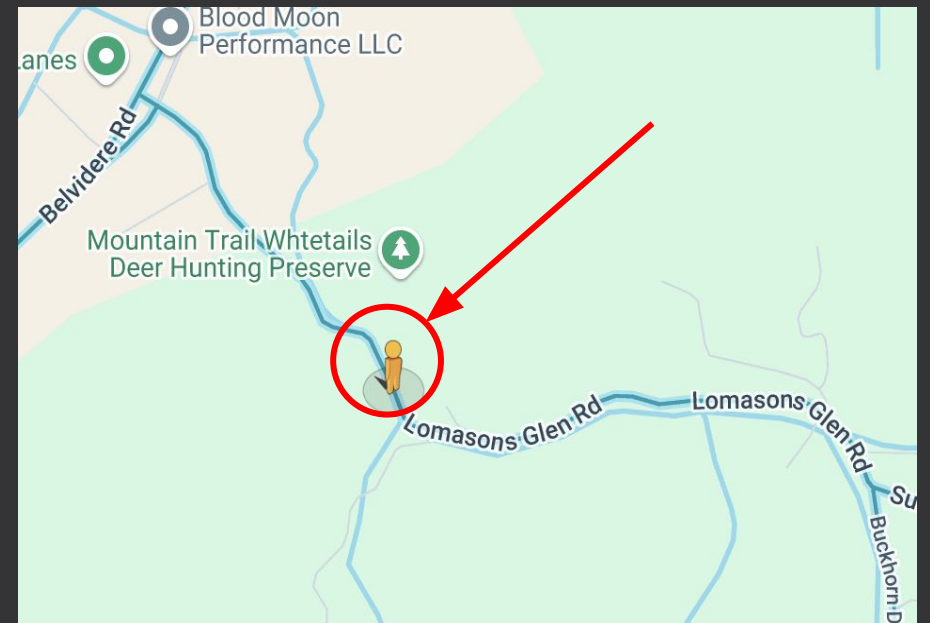
# Site Plan Overview





# Bridge Existing Conditions

- Steep sloped terrain and horizontal curves
- Substructure is in satisfactory condition





# Design Requirements

- Water Resources:
  - Typical Culvert Design
    - Rectangular Culvert, Arch Culvert
- Embankment Design
  - Assess possible sloped embankments
    - Levee wall system or gabion baskets
- Transportation:
  - Traffic Model





# Realistic Constraints

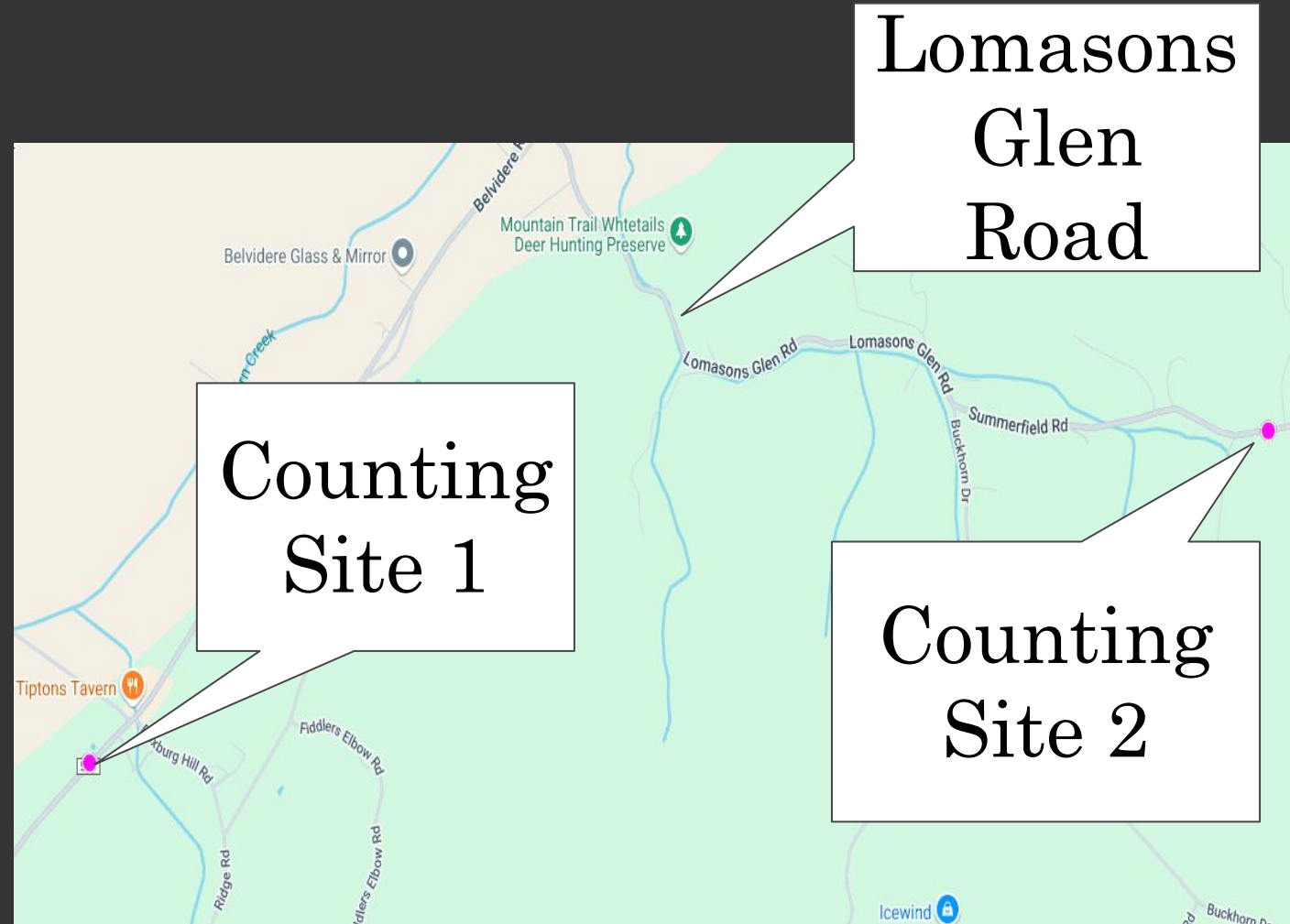
- Economic
- Environmental & Sustainability
  - Renewable Resources, Low Energy, and Maintenance
- Construction (QA/VE)
- Ethical & Legal
- Social & Political





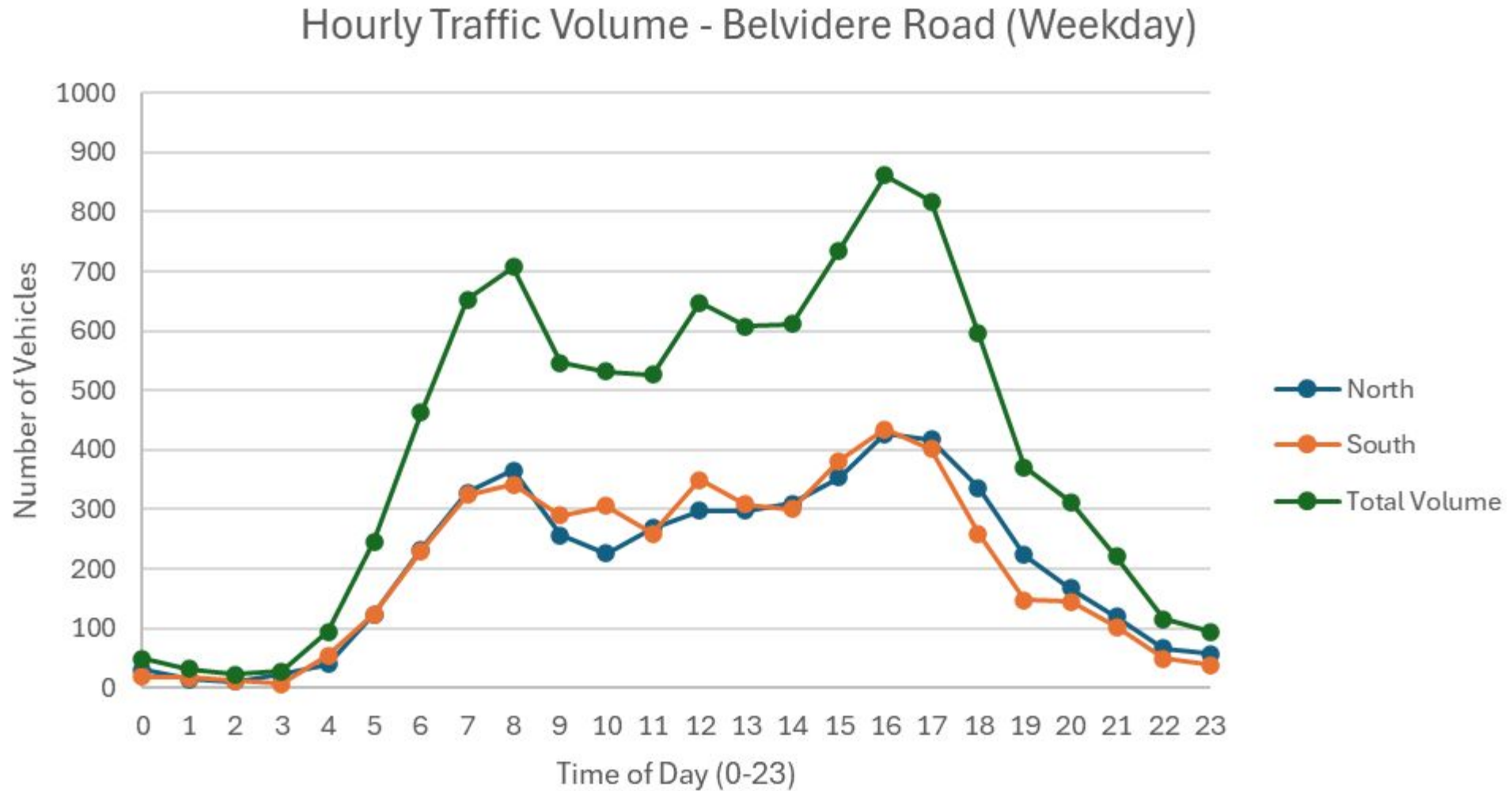
# Design Constraints (Transportation)

- NJDOT Traffic Counting Sites
- 862 Peak Traffic Hour Vehicles at Site 1
- 24 Peak Traffic Hour Vehicles at Site 2



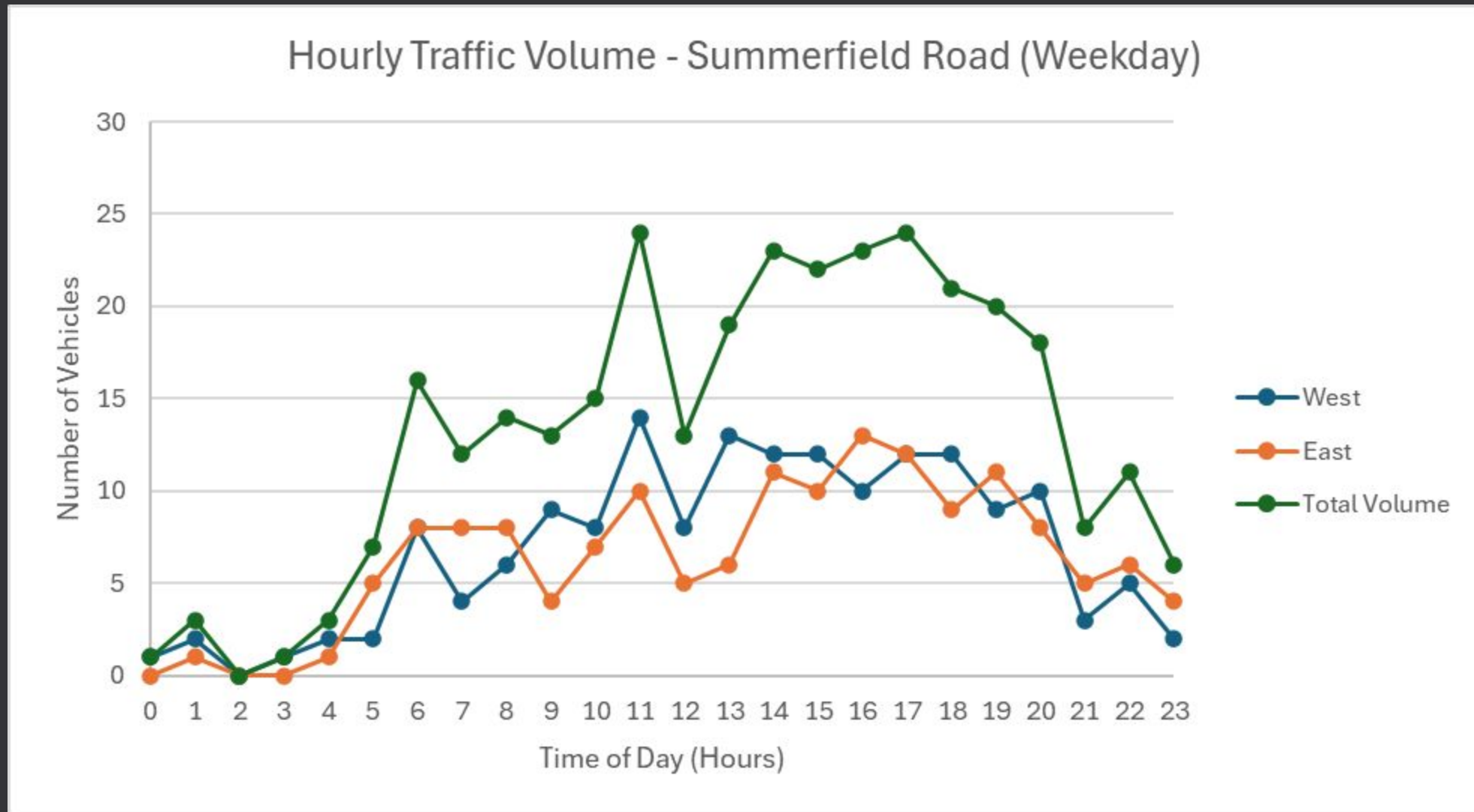


# Traffic Count Graph: Belvidere Road (Site 1)



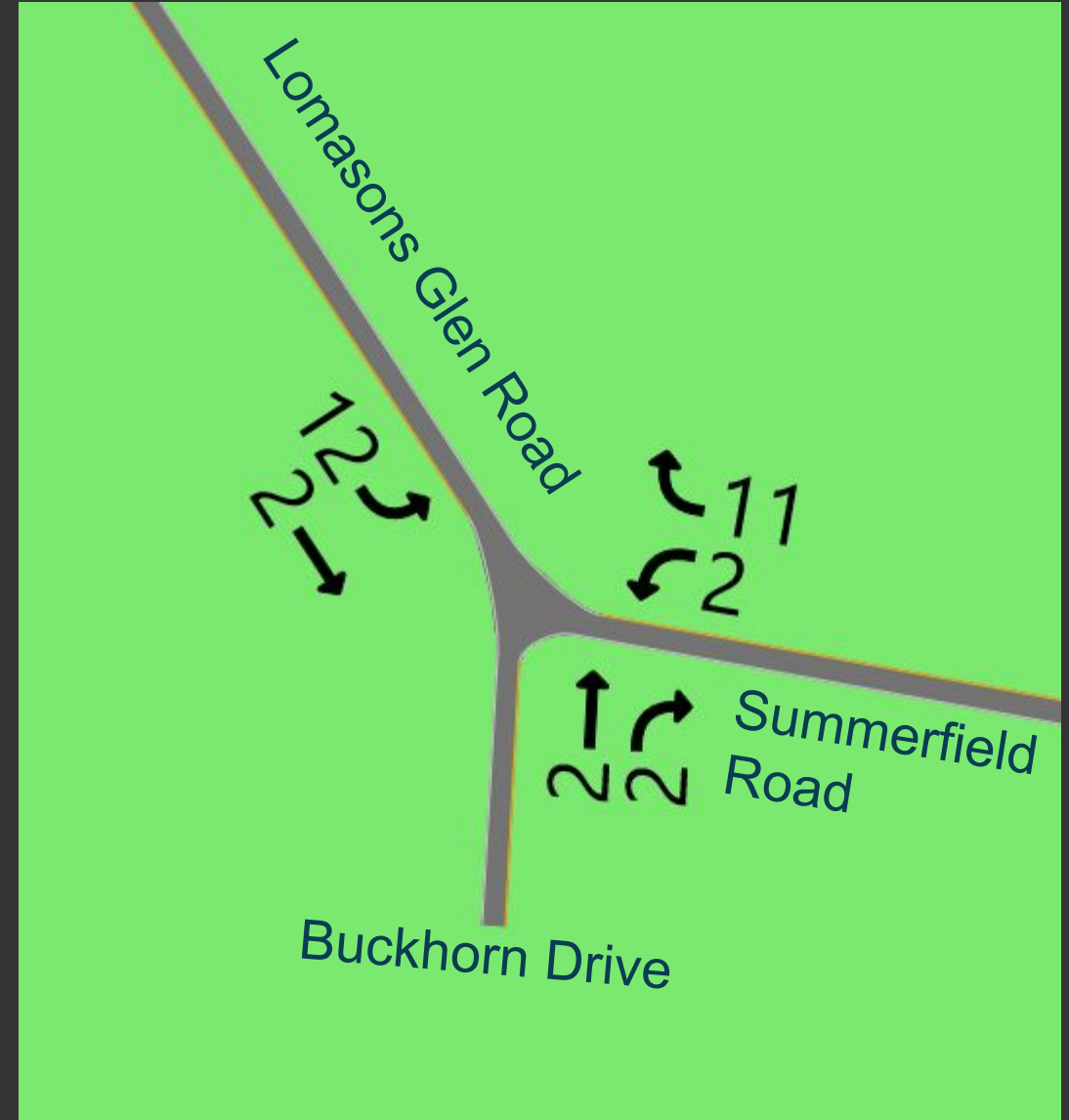
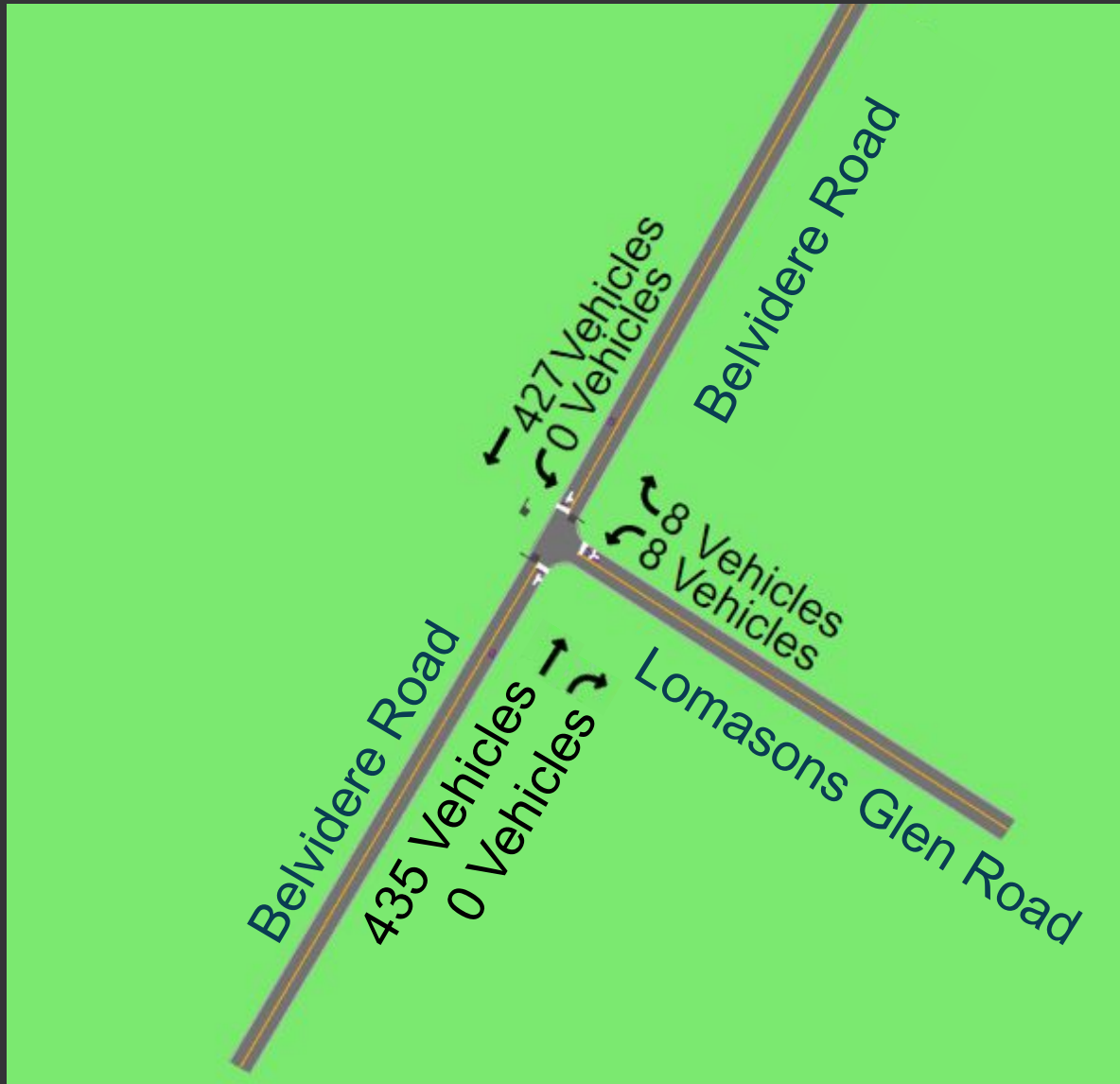


# Traffic Count Graph: Summerfield Road (Site 2)





# Synchro Model Existing Condition





# Geometric Design Constraint



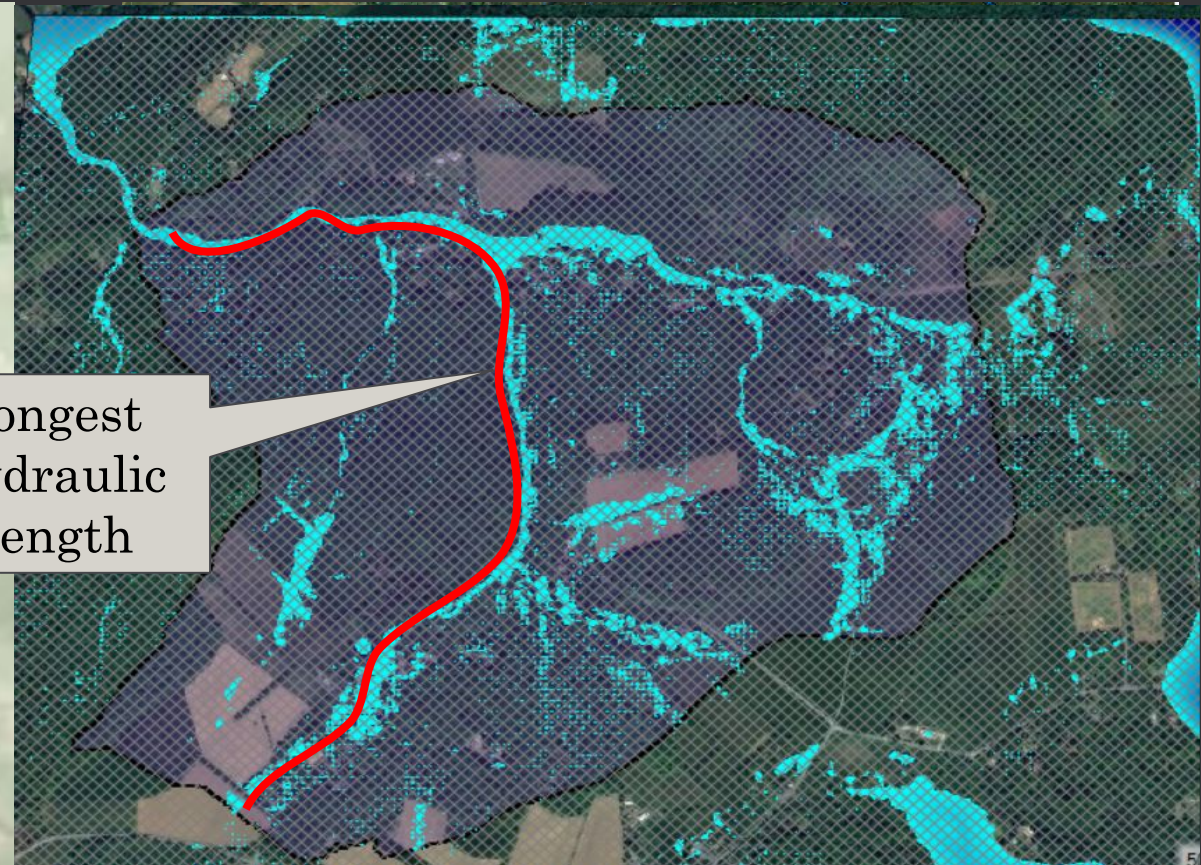
- Pedestrian and Bicyclist Signage



# Design Constraints (Water Resources)



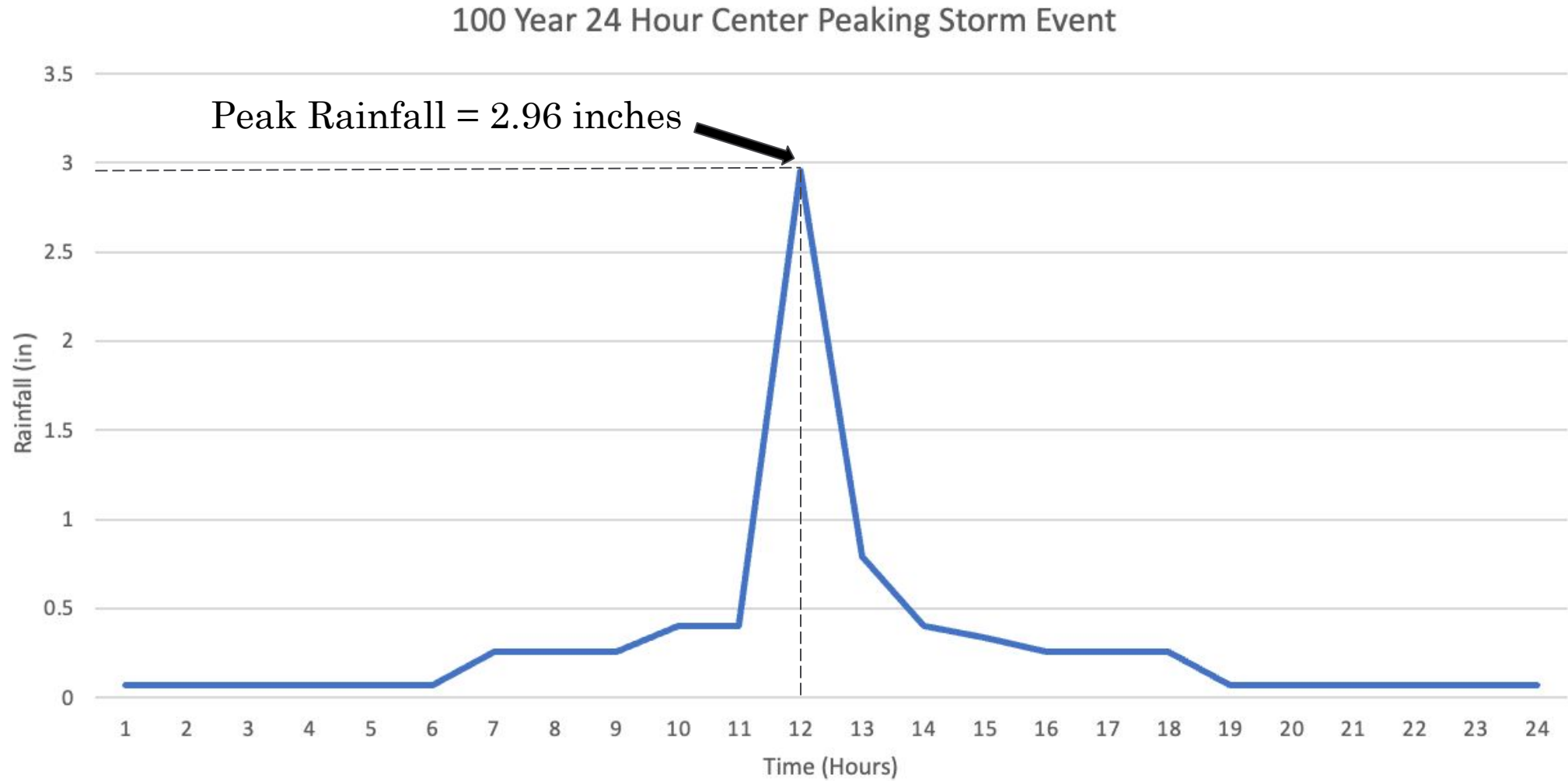
Lomasons  
Glen Road



Longest  
Hydraulic  
Length

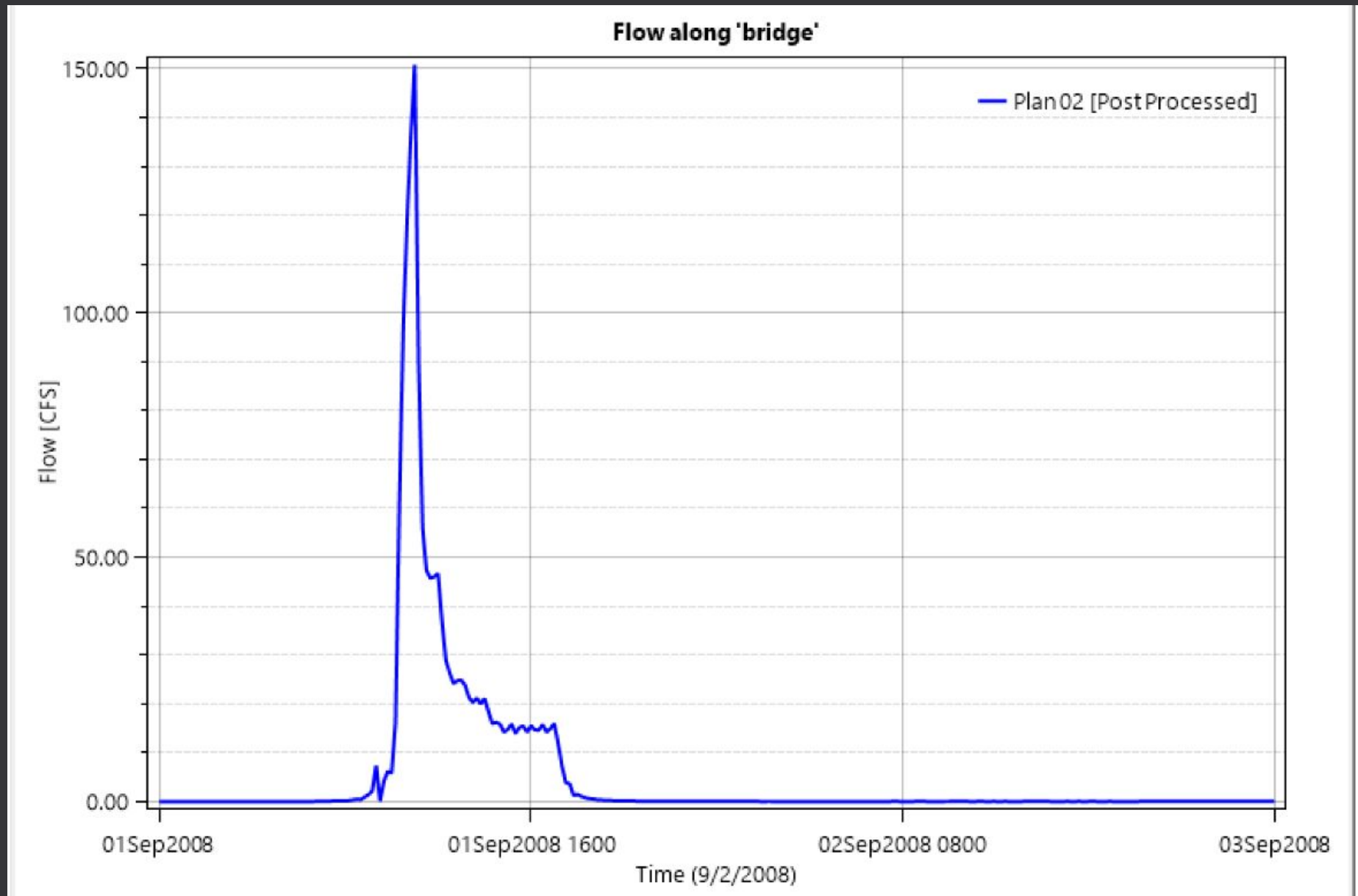
- Delineated Watershed Area = 1.32 sq. mi
- Longest Hydraulic Length = 9370 ft
- Average Land Slope = 21.52 %

# Rainfall Data





# Hydrograph



# Modern Engineering Tools

- Water Resources
  - Softwares: USGS Streamstats, NWS PFDS, HEC-RAS
    - Watershed Area, HEC-RAS river model
- Transportation
  - Softwares: Synchro, Microsoft Excel
- AutoCAD Civil 3D Imperial
  - Drafting Drawings and Design





# Applicable Standards, Specifications and Codes

- NJDOT Roadway Design Manual
- Manual on Uniform Traffic Control Devices Version 11 (MUTCD)
- ITE Trip Generation Manual
- Green Book (2018)



# Scour Protection Alternatives

## Option 1

- Concrete Levee Walls

## Option 2

- Rip Rap

## Option 3

- Gabion Baskets





# Alternative Culvert Designs

Option 1

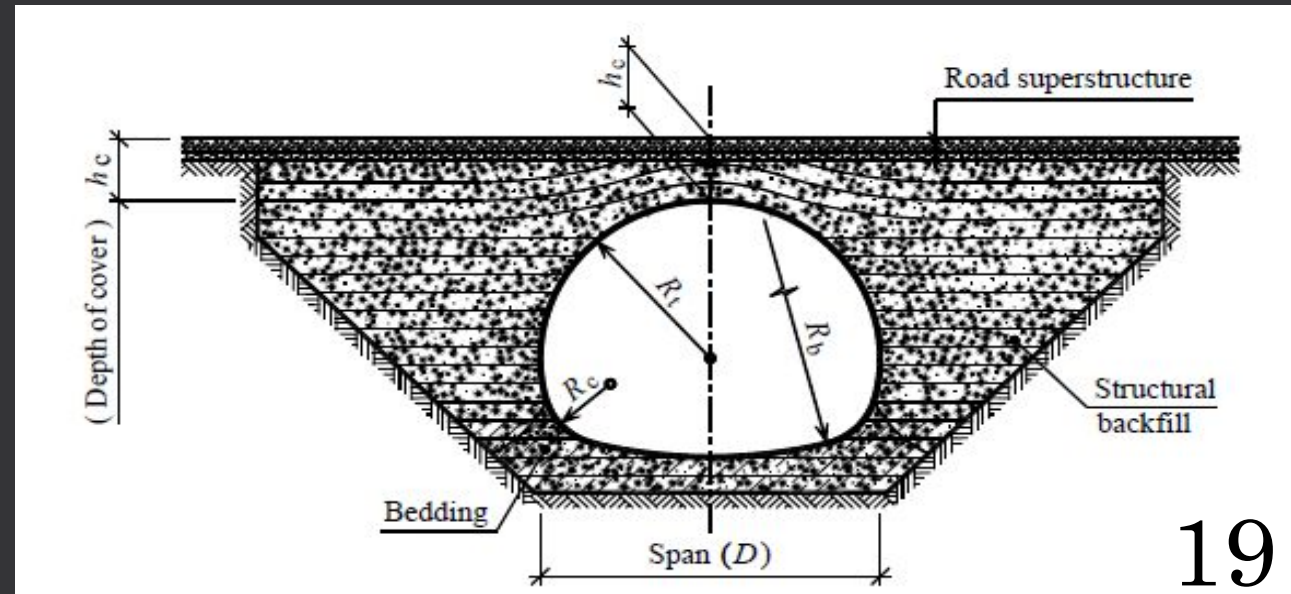
- Arch

Option 2

- Closed Bottom Rectangular

Option 3

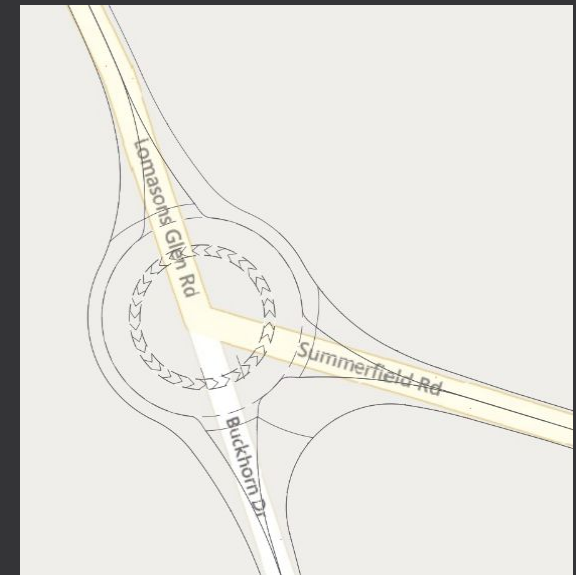
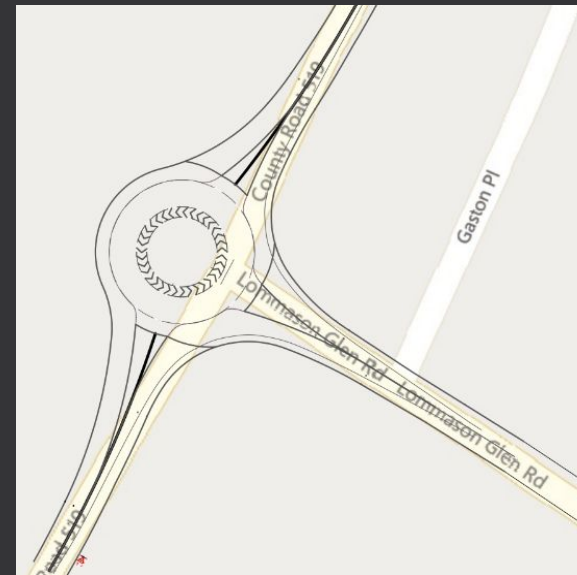
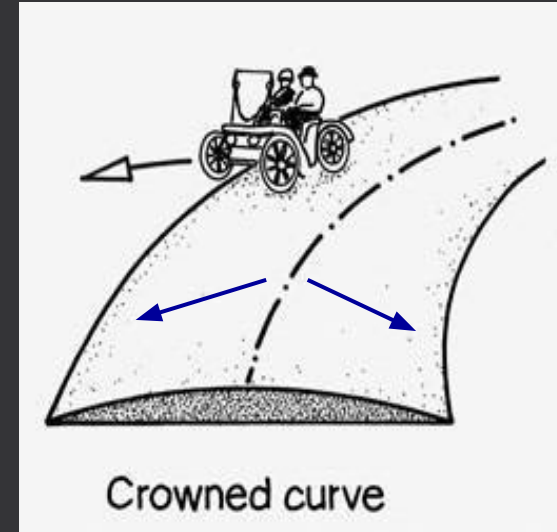
- Open Bottom Rectangular



# Alternative Transportation Designs

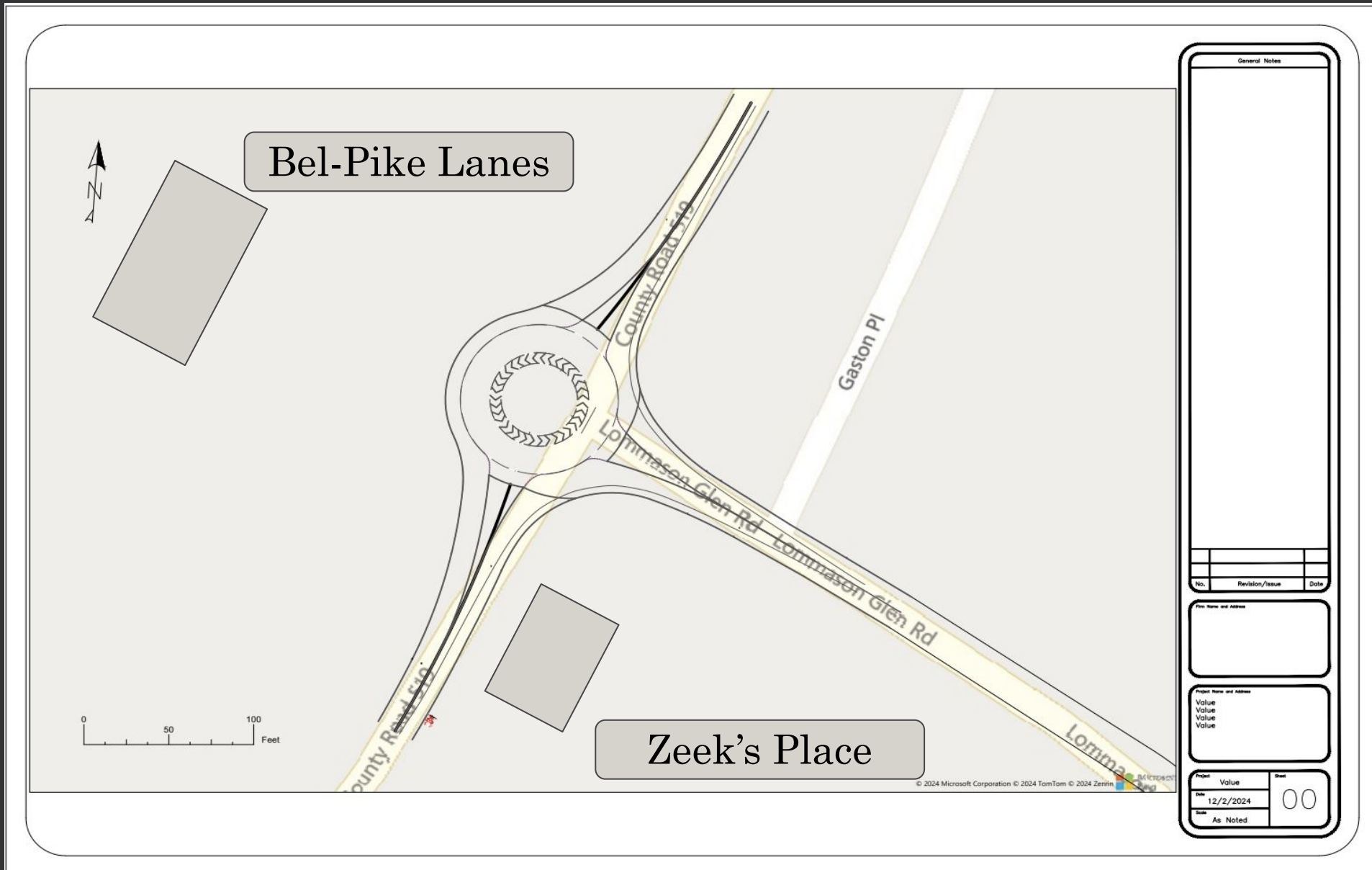
## Transportation

- Crowned Roadway
- Roundabouts:
  - Lomason's Glen Road and Belvidere Road
  - Buckhorn Drive, Summerfield Road, and Lomason's Glen Road





# Belvidere Road & Lomasons Glen Road



# Intersection of Lomasons Glen Road and Belvidere Road





# Lomasons Glen Road, Summerfield Road, & Buckhorn Drive



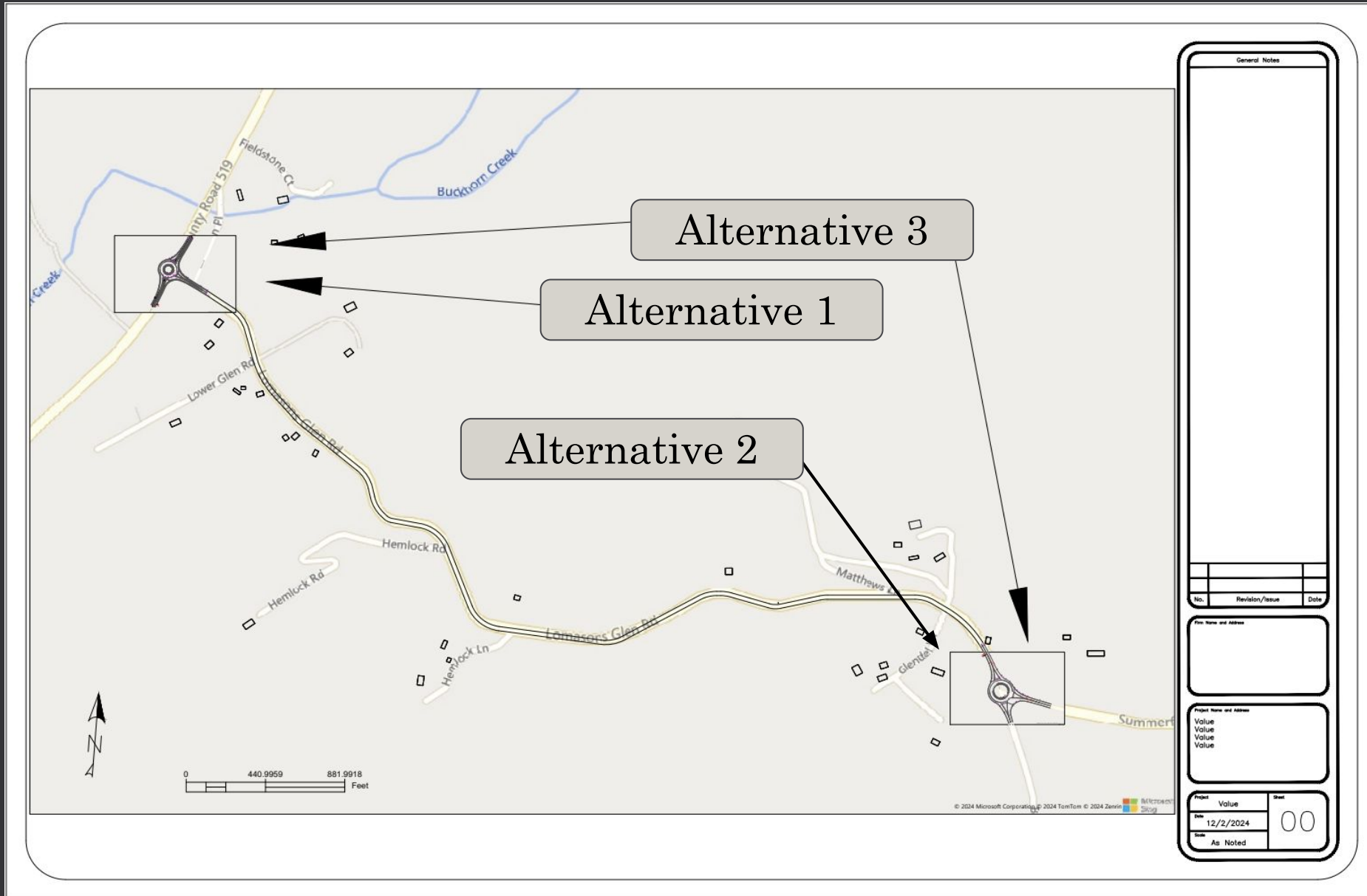


# Intersection of Summerfield Road, Lomasons Glen Road, and Buckhorn Drive





# Roundabout Locations



# Proposed Design Selection Matrices

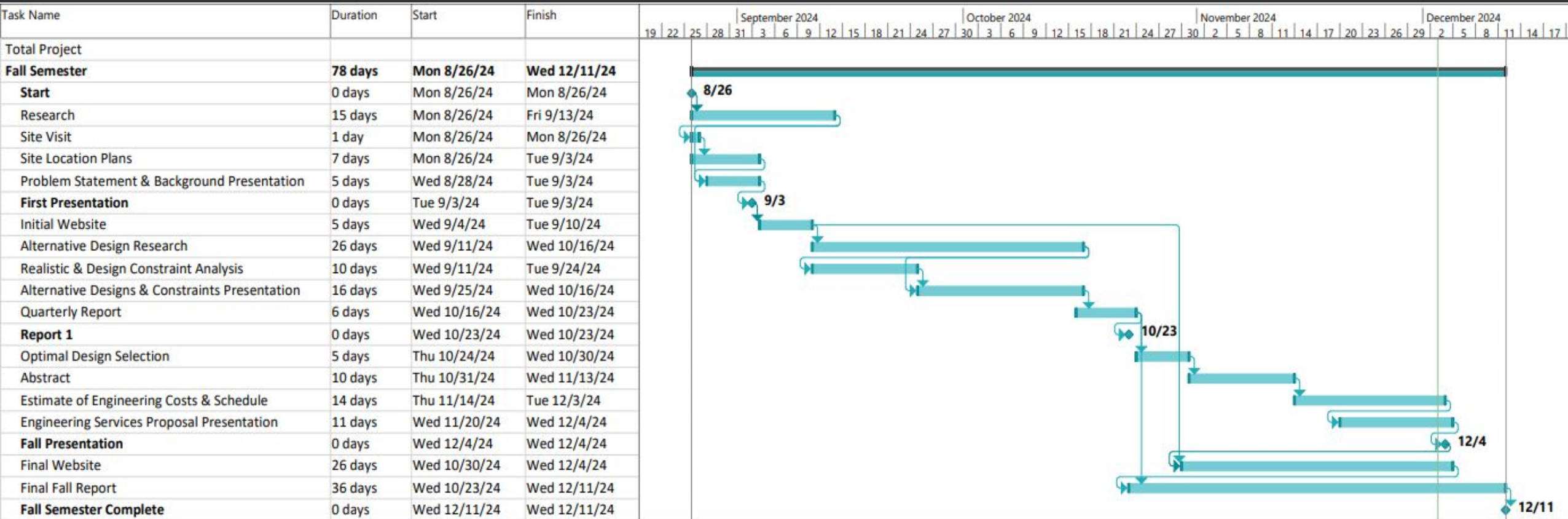
Scour Prevention					
Type	Constraints	Weight	Concrete Levee	Gabion	RipRap
Environmental	Floodplain Management	5	4	2	1
Economical	Cost	4	2	3	4
Sustainability	Recycling of Materials	3	1	2	2
Constructability	Ease of Construction	2	2	3	4
	Total		41	34	35
Culvert Design					
Type	Constraints	Weight	Natural Bottom Bridge	Rectangular Box Culvert	Pipe Arch
Water Resources Design	Stream Stability / Design Flood	5	4	3	3
Environmental	Water Quality/Ecological Safety	4	3	3	1
Economical	Cost	3	2	2	3
Construction	Land Use / Construction Practices	2	3	2	3
	Total		41	35	36
Traffic Design					
Type	Constraints	Weight	Belvidere Rd. & Lomasons Glen	Buckhorn Roundabout	Both Intersections
Ethical	Safety	5	1	1	3
Environmental	Resources	4	3	3	2
Economical	Cost	3	2	2	1
Sustainable	Construction	2	2	2	1
	Total		27	27	28



# Fall Budget

Fall						
Task	Dr. Horst	Dr. Brennan	Louis Turner	Michael Harrison	Antonio Gonzalez	Daniel Geissler
	Water Resources Director	Transportation Director	Project Engineer/Team Leader	Project Engineer	Project Engineer	Project Engineer
	Academic Advisor	Academic Advisor	Level II Engineer	Level I Engineer	Level I Engineer	Level I Engineer
Site Visit	0	0	2	0	0	0
Research	15	10	20	20	20	20
Proposal Presentation	1	1	5	5	5	5
Plan Drafting	0	1	1	1	2	3
Alt Design Research	0	0	4	4	4	4
Constraint Analysis	1	1	2	2	2	2
Quarterly Report	1	1	3	3	3	3
Engineering Services Presentation	1	1	2	3	2	2
Engineering Services Report	1	1	4	4	4	4
Total Hours	20	16	43	42	42	43
Hourly Rate	\$80.00	\$80.00	\$35.00	\$30.00	\$30.00	\$30.00
Salaries	\$1,600.00	\$1,280.00	\$1,505.00	\$1,260.00	\$1,260.00	\$1,290.00
				Wages Cost		\$8,195.00
				Overhead	150%	\$12,292.50
				Fixed Fee	10%	\$2,048.75
				Direct Cost		\$0.00
				Total		\$23,000

# Fall Semester Gantt Chart





Thank you.

Questions?