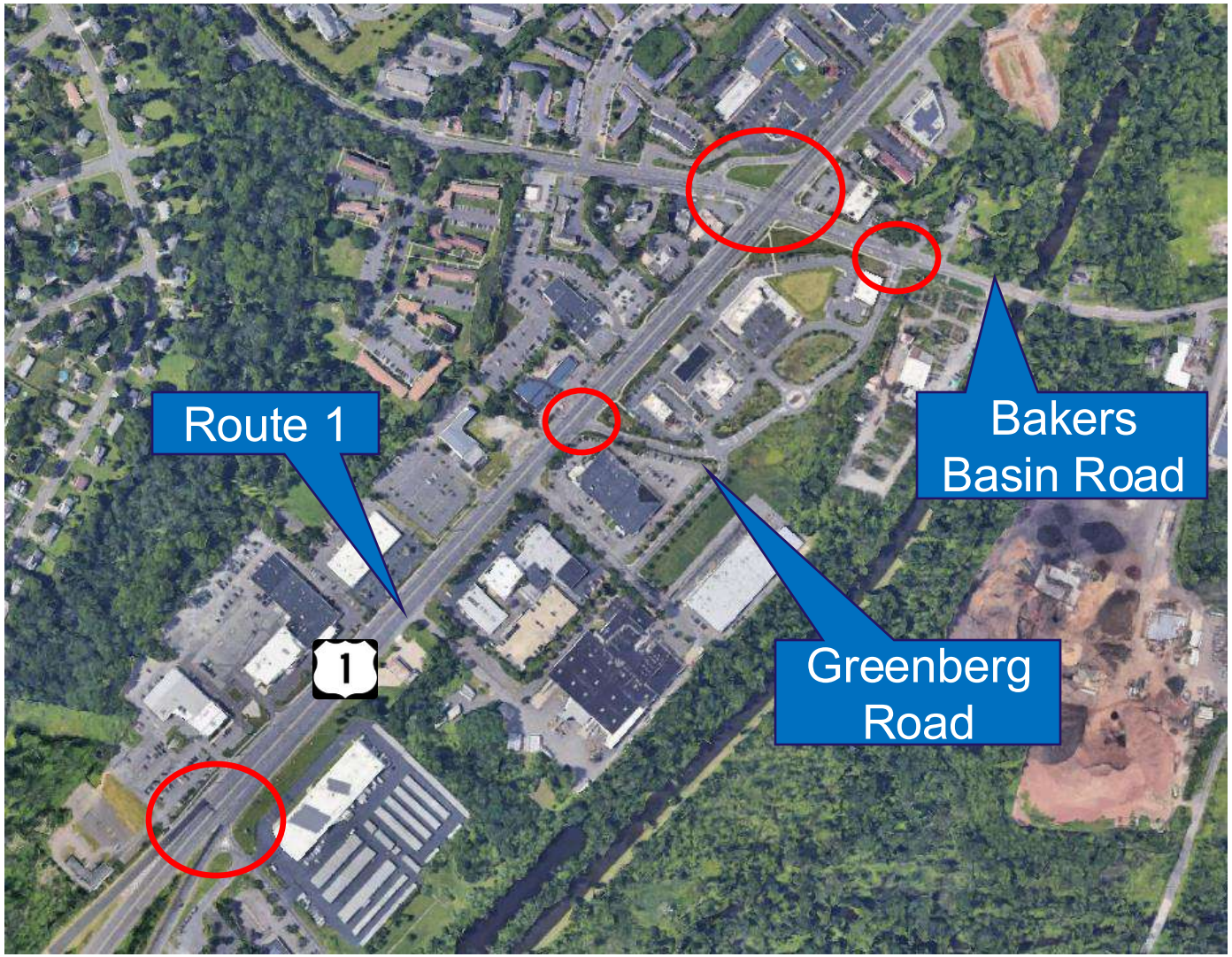
Redesign of US Route 1 Corridor at Bakers Basin Road

Design Team:

Patrick Frawley (Team Leader), Ryan Rosenthal, Nick Rocco, and Jayson Schmidt

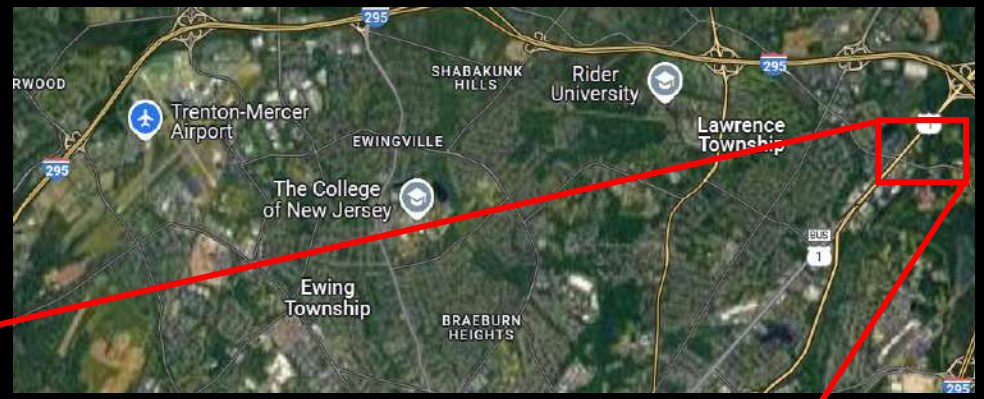
Advisor:

Dr. Thomas Brennan



Problem Statement and Background

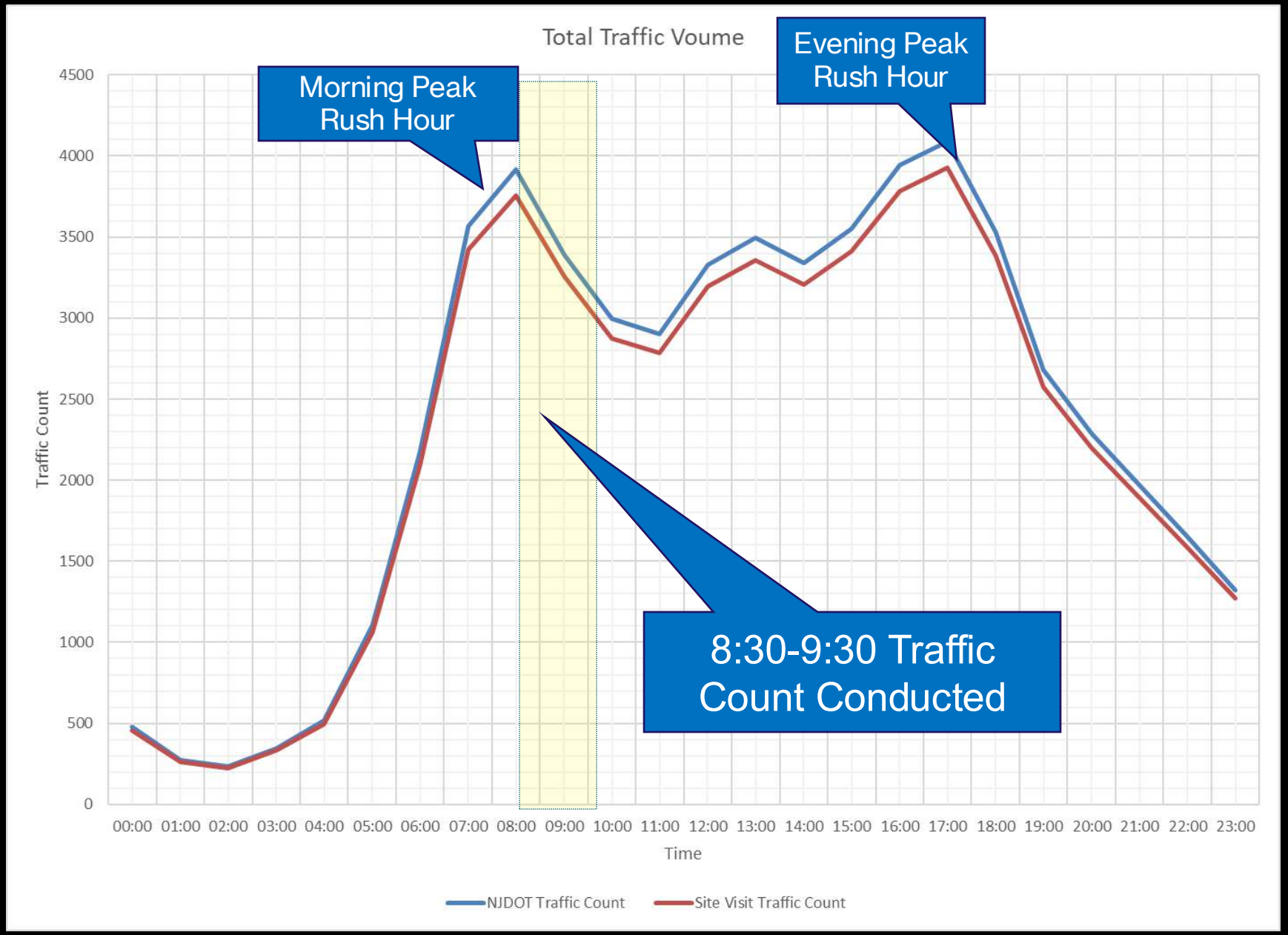
- US Route 1 Corridor at Bakers Basin Road, Lawrenceville NJ
- High Traffic Volume and Speed
- Pedestrian Safety Concerns
- History of Accidents
- Community Impact



Design Constraints

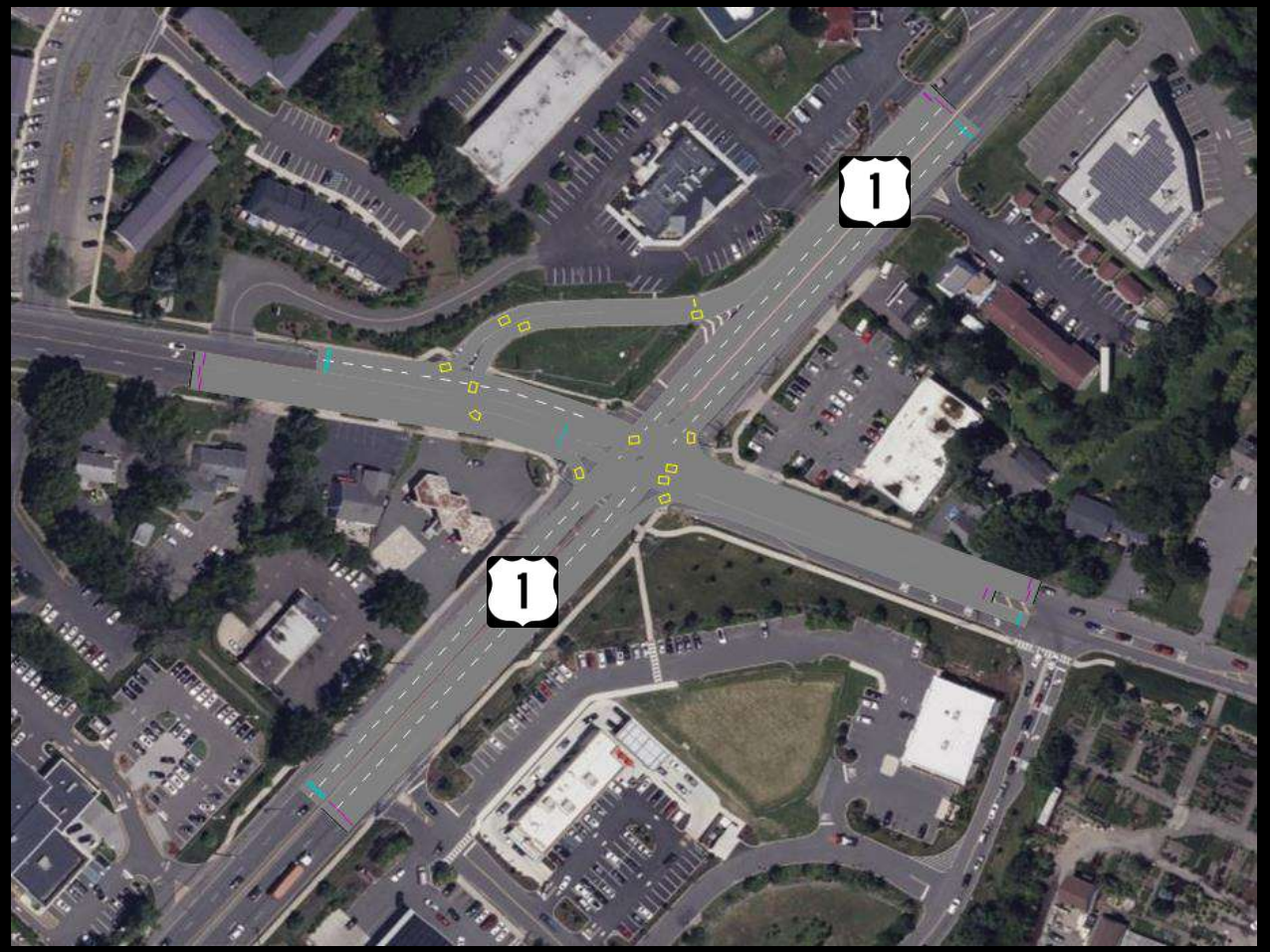
- Existing roadway geometry and right of way
- Traffic Flow and Capacity
- Pedestrian and Bicycle Accommodations
- Safety Regulations and Design Standards
  - American Association of State Highway and Transportation Officials (AASHTO)
  - Federal Highway Administration (FHWA)

Traffic Count Data



VISSIM Model of Existing Conditions

Count: 10	No	Name	Link	Volume(0-MAX)	VehComp(0-MAX)
1	1	Straight	1: Route 1 North	1500.0	1: Default
2	2	Right	2: Route 1 North	300.0	1: Default
3	3	Left	9: Bakers Basin West	100.0	1: Default
4	4	Straight	8: Bakers Basin West	150.0	1: Default
5	5	Right	16: Bakers Basin West	150.0	1: Default
6	6	Straight	3: Route 1 South	1300.0	1: Default
7	7	Right	7: Route 1 South	300.0	1: Default
8	8	Left	6: Bakers Basin East	200.0	1: Default
9	9	Straight	4: Bakers Basin East	100.0	1: Default
10	10	Right	5: Bakers Basin East	100.0	1: Default



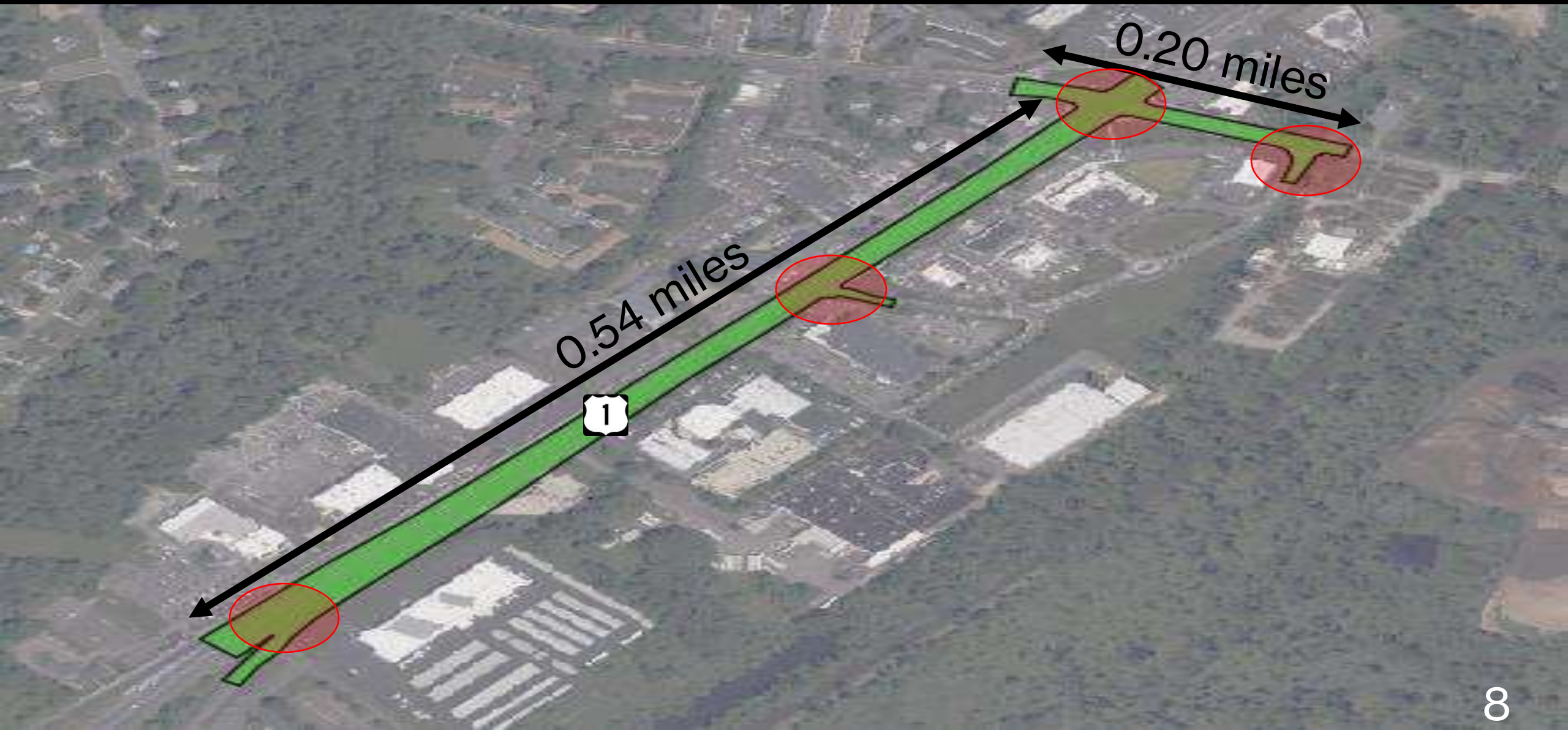
Realistic Constraints

- Economic: Budget limitations
- Political: State / County / Township Regulations
- Ethical: Safety vs. Convenience
- Health/Safety: Reducing Accident Rates
- Social: Reconnect Neighborhoods

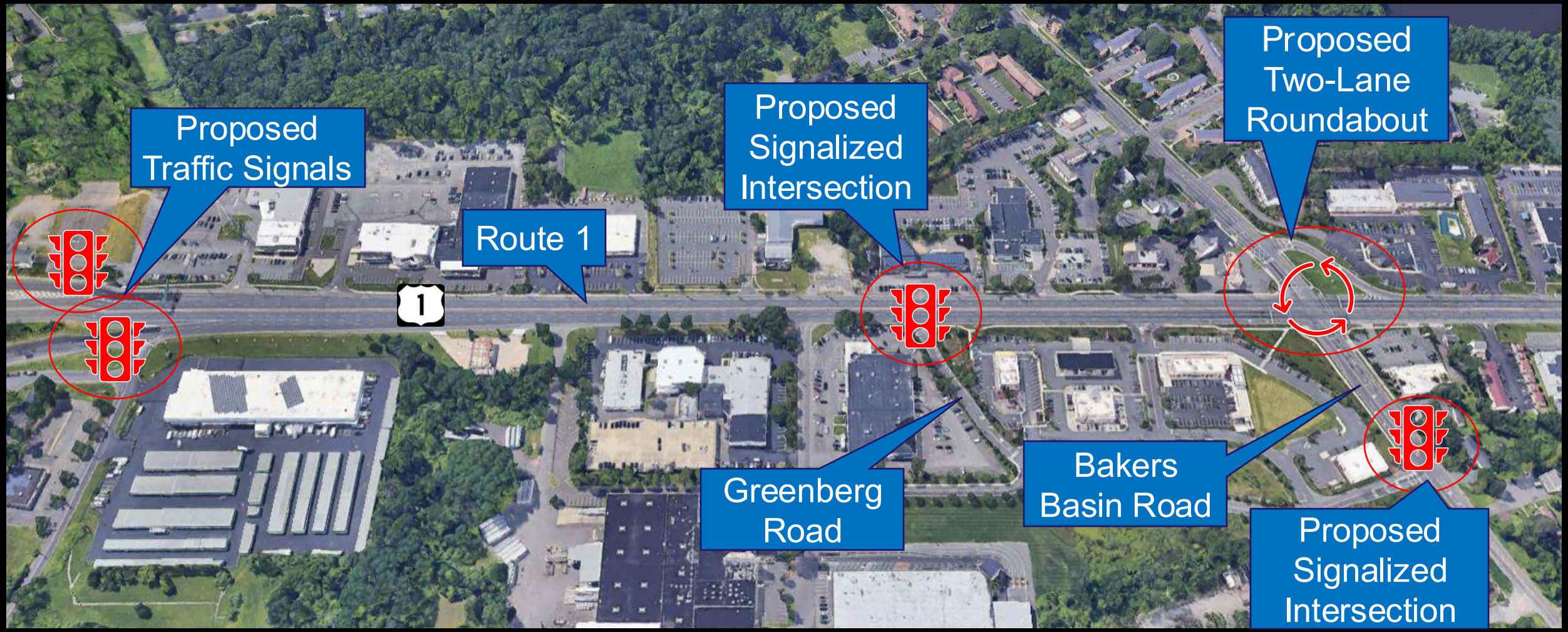
Applicable Standards

- ADA Standards for Accessible Design
- Lawrence Township Zoning Ordinances
- ITE Trip Generation Manual, 11th Edition
- Manual on Uniform Traffic Control Devices (MUTCD)
- NJDOT Roadway Design Manual

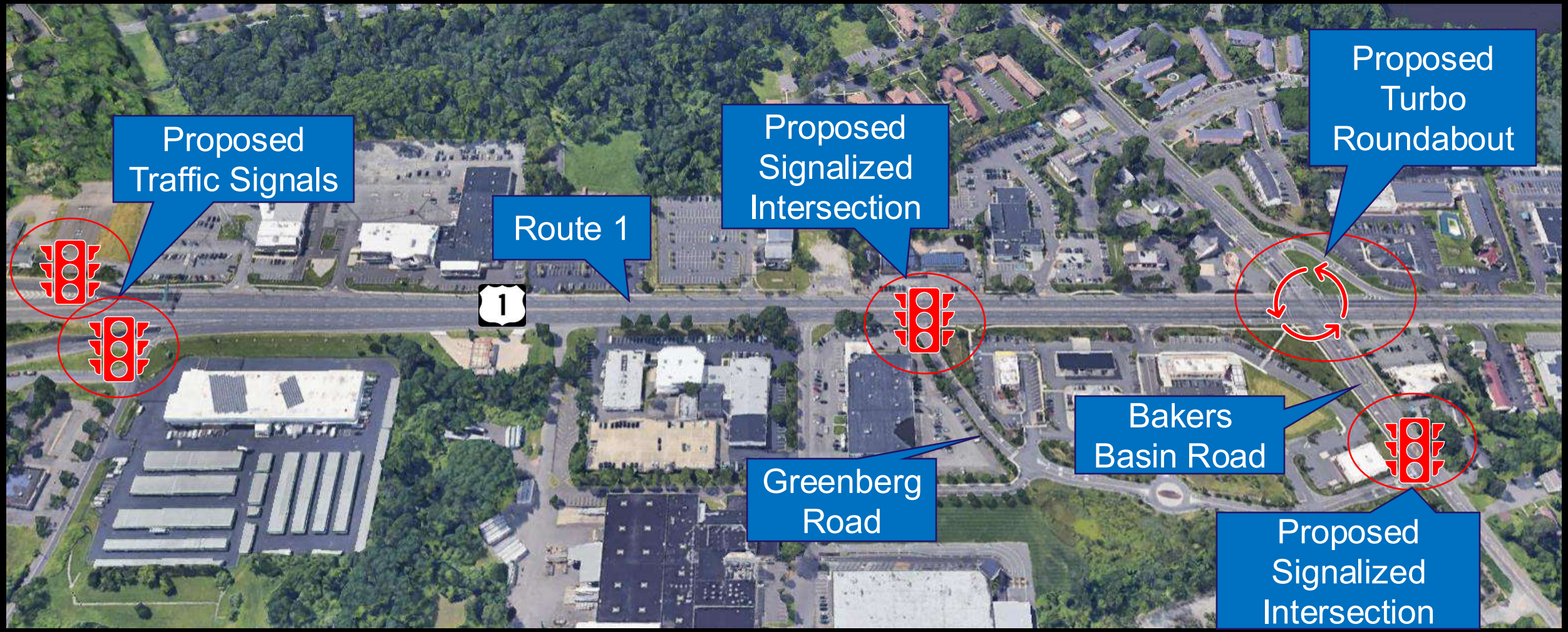
Site Layout Overview



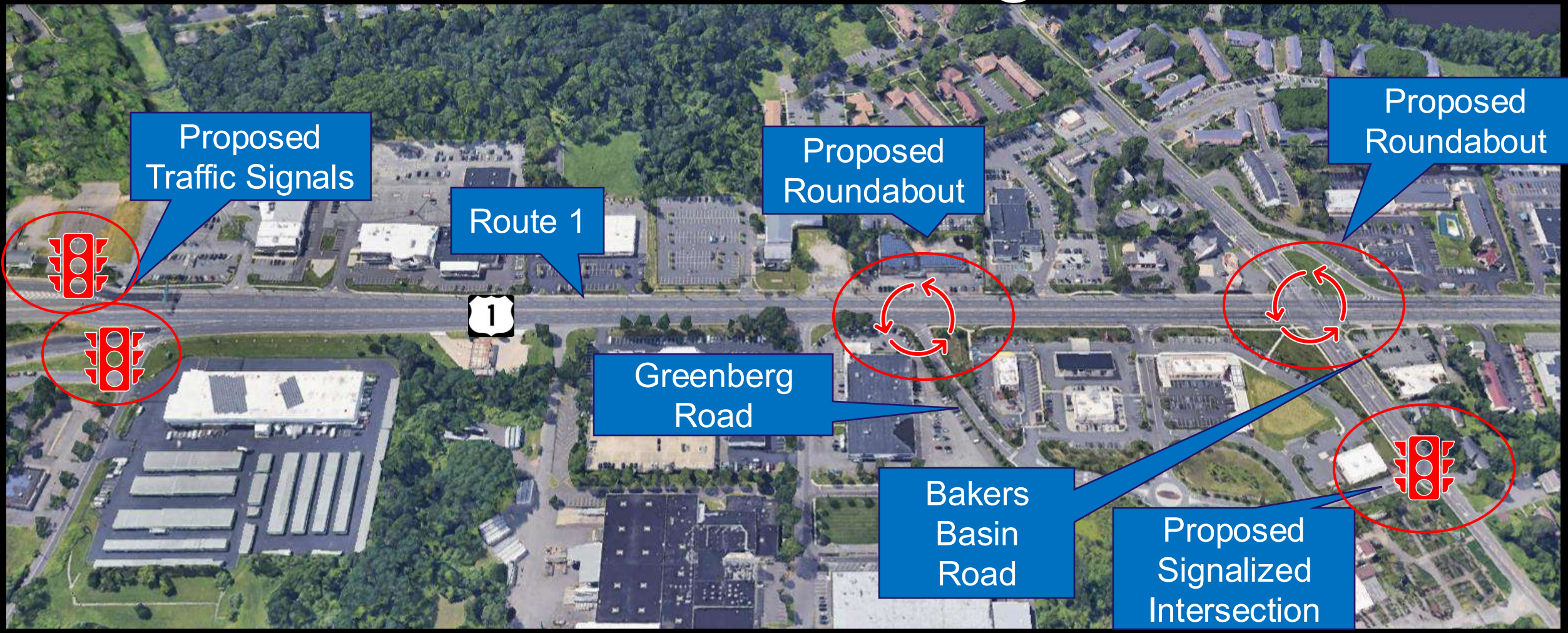
Alternative Design 1



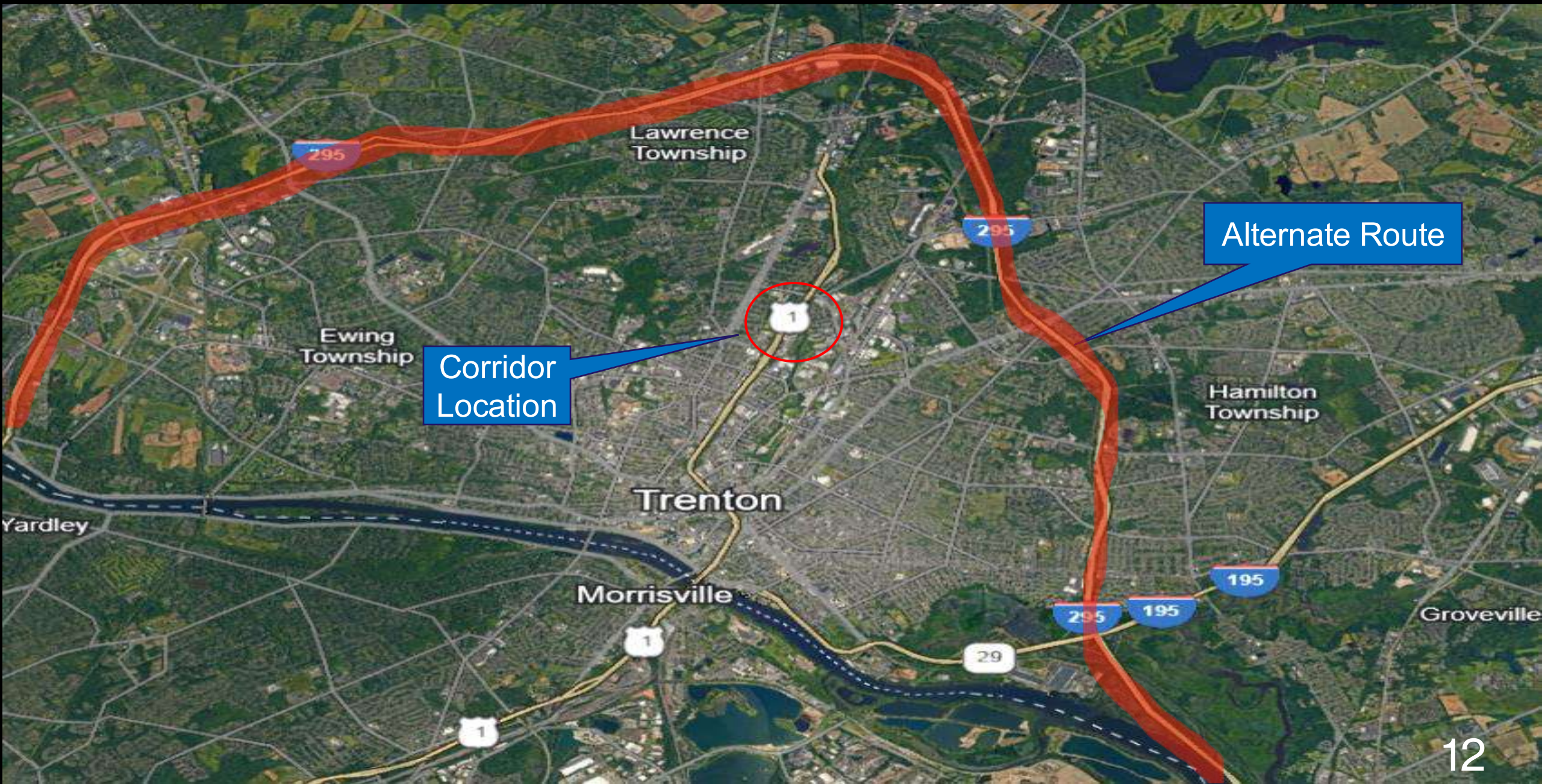
Alternative Design 2



Alternative Design 3



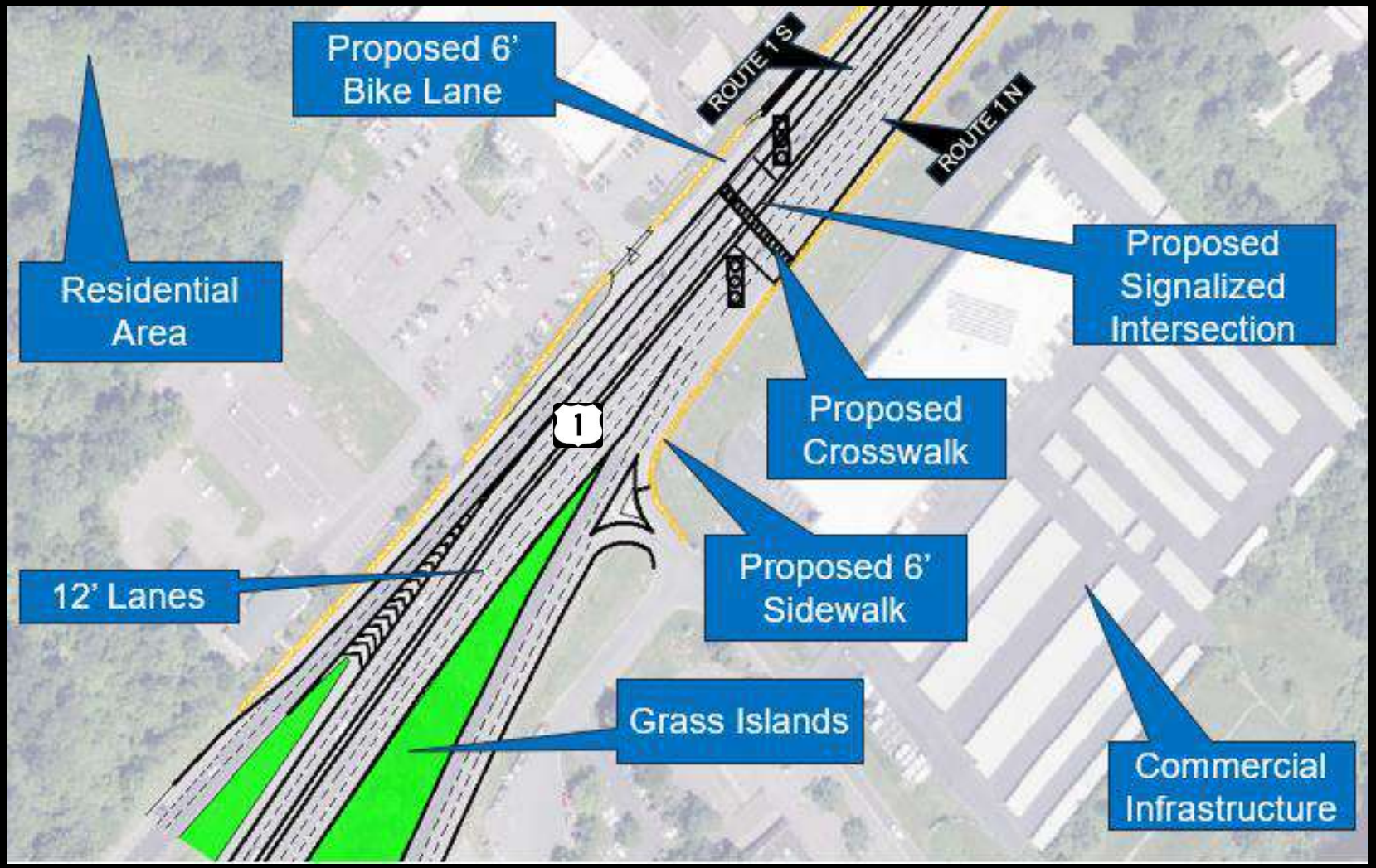
Alternate Route



Design Selection Matrix

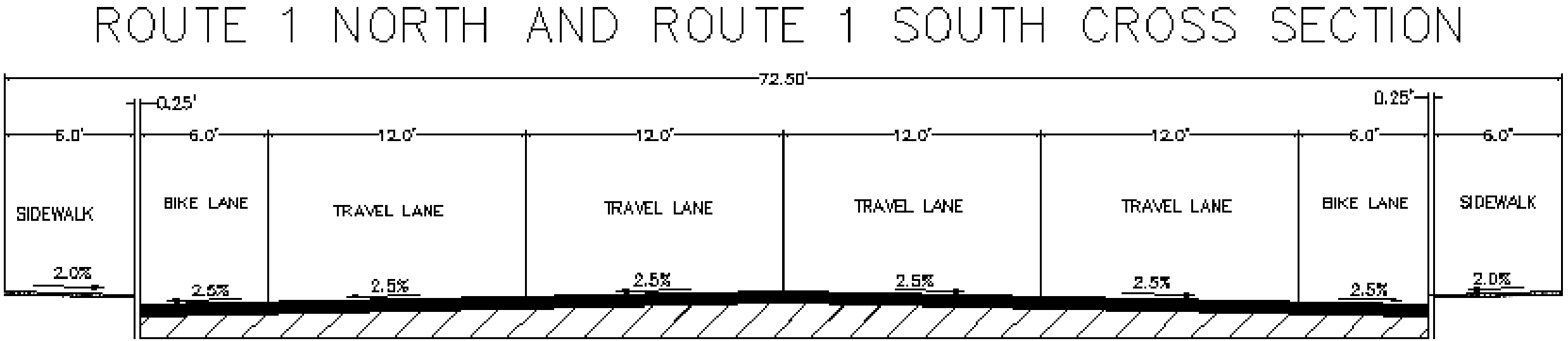
Criteria	Weight	Alternative 1	Alternative 2	Alternative 3
Safety	5	1	2	3
Pedestrian Accessibility	4	3	1	2
Improved Traffic Flow	3	1	2	3
Constructability	2	3	1	2
Cost	1	3	1	2
Total Score		29	23	38

Route 1 Branching Interchange



- Signalized intersection addition
- Prevents high speed merge
- Connects residential areas with commercial infrastructure

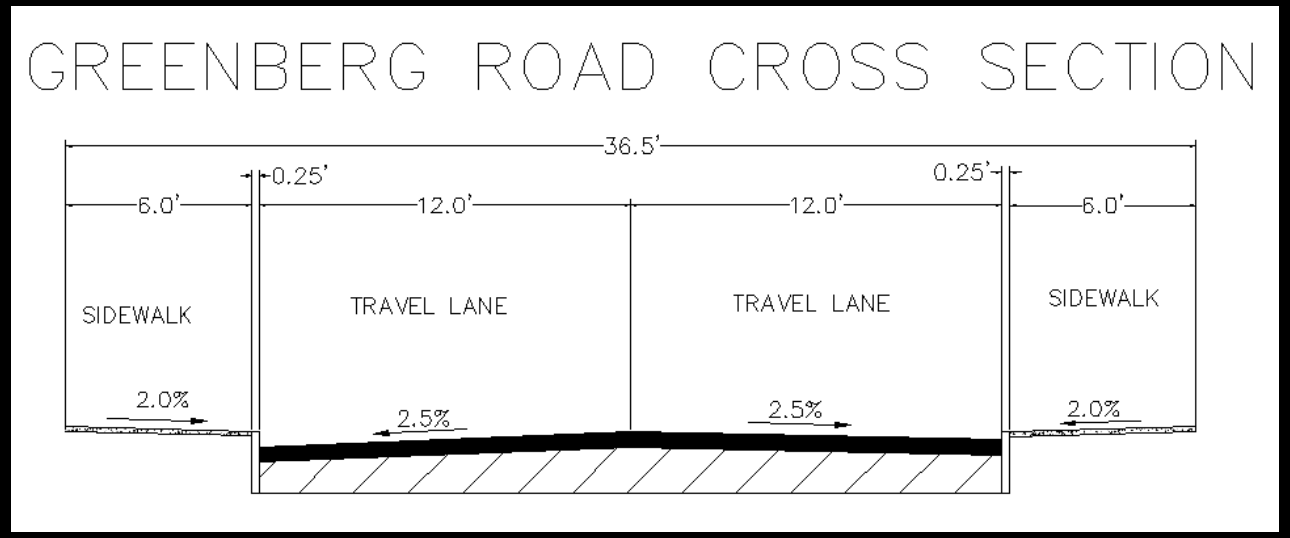
Route 1 Branching Interchange Cross Section

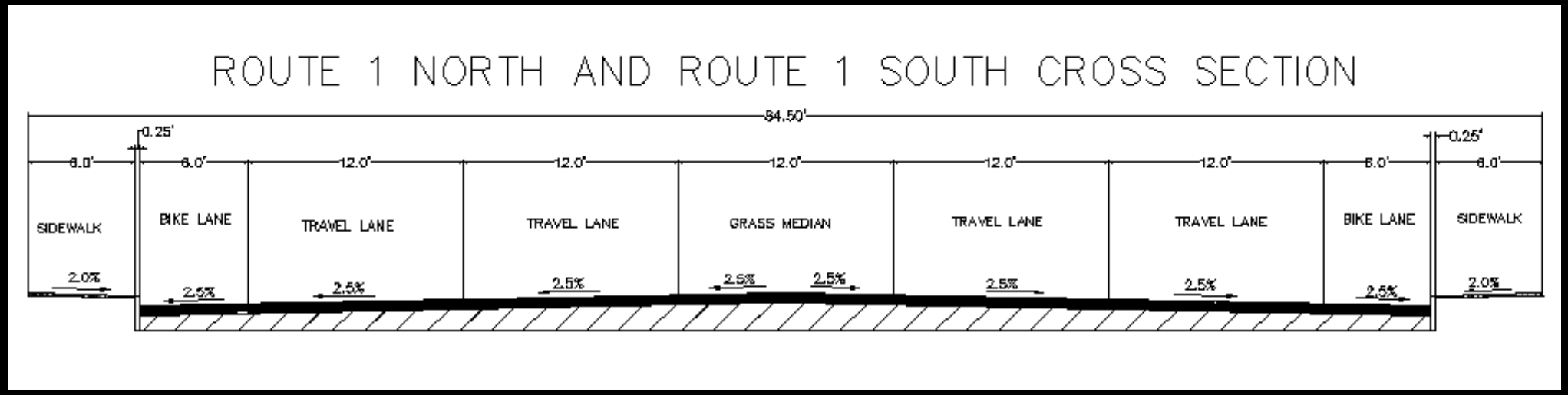


Route 1 and Greenberg Road Intersection

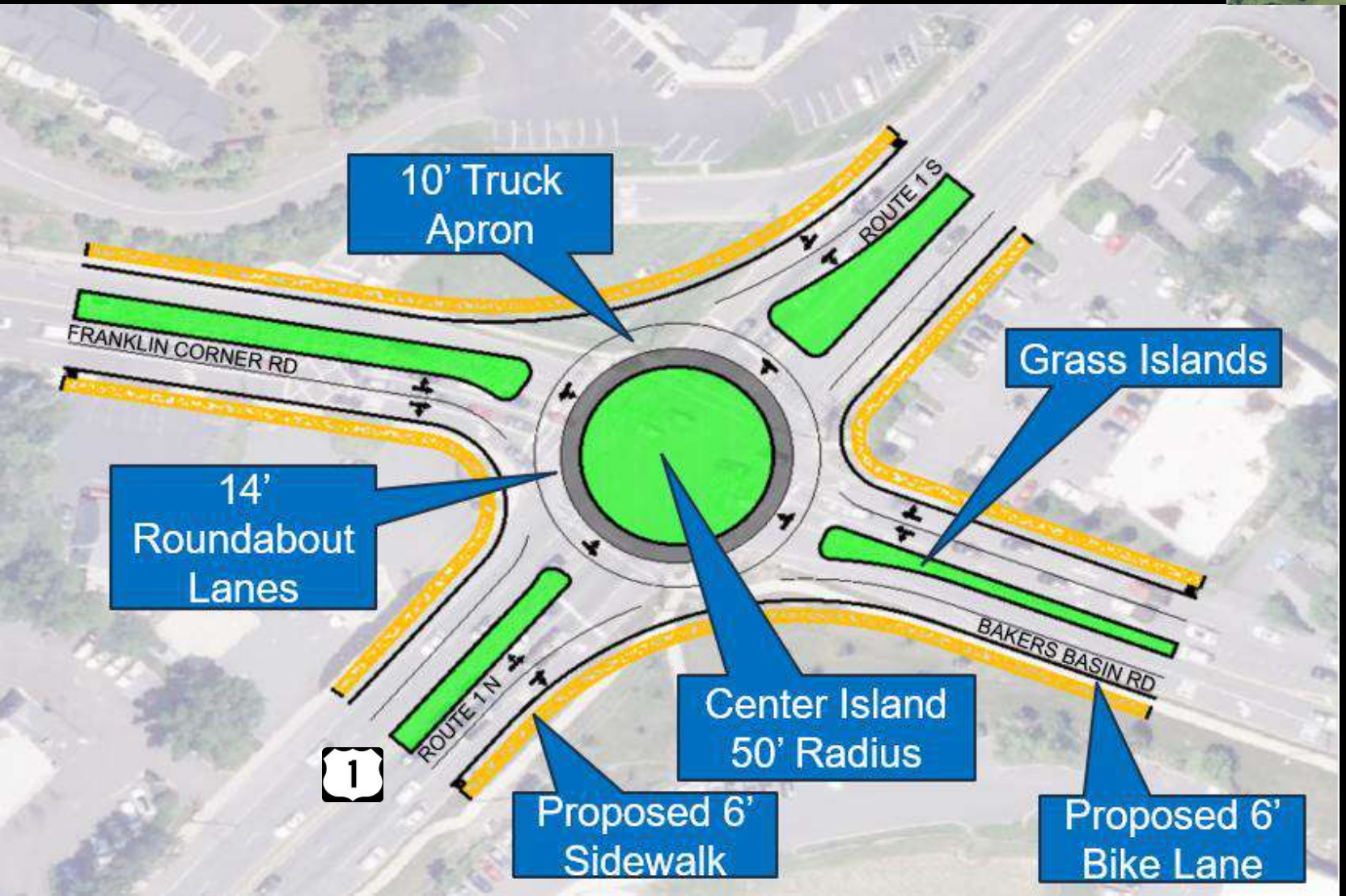
- 2 lane Roundabout Addition
- Pedestrian Accessibility Features
- Connectivity along Route 1

Route 1 and Greenberg Road Cross Section



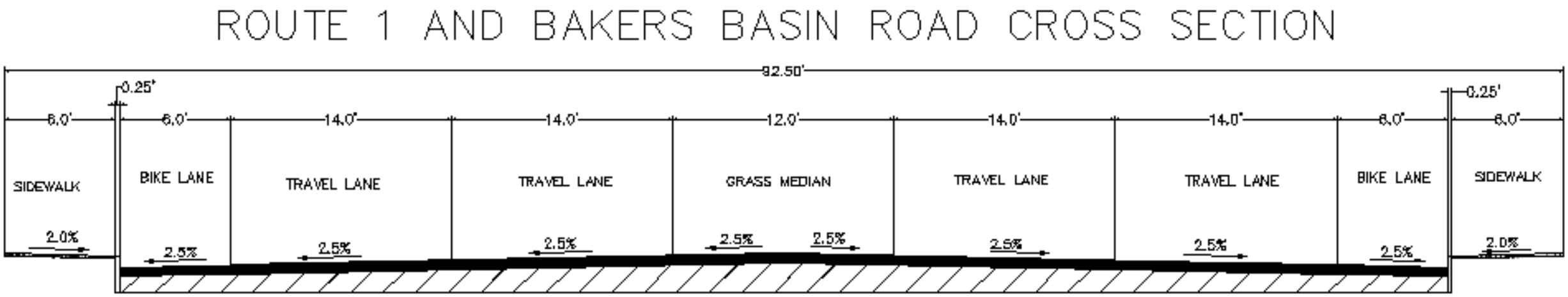


Route 1 and Bakers Basin Road Intersection

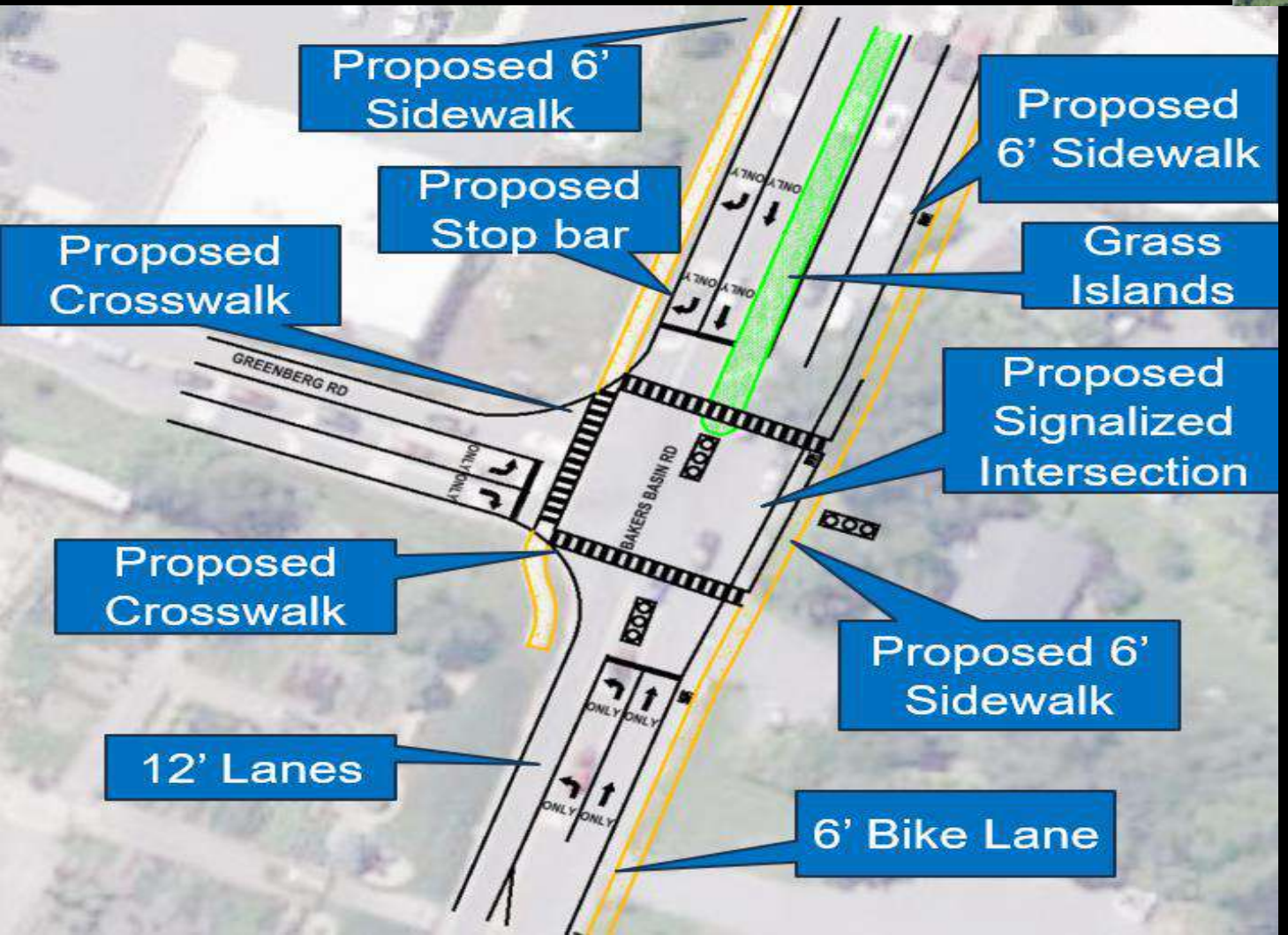


- Roundabout maintains consistent flow
- Pedestrian/biking features
- Trucking accessibility

Route 1 and Bakers Basin Road Cross Section

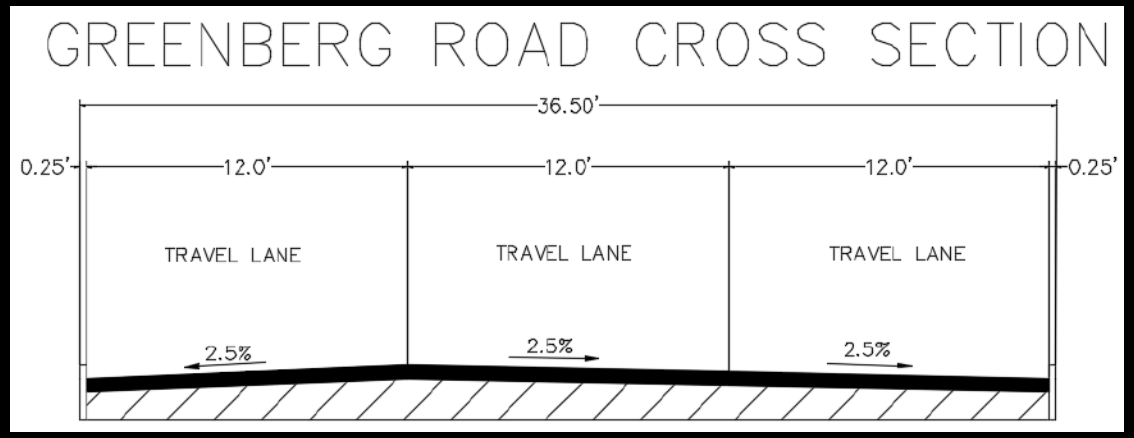


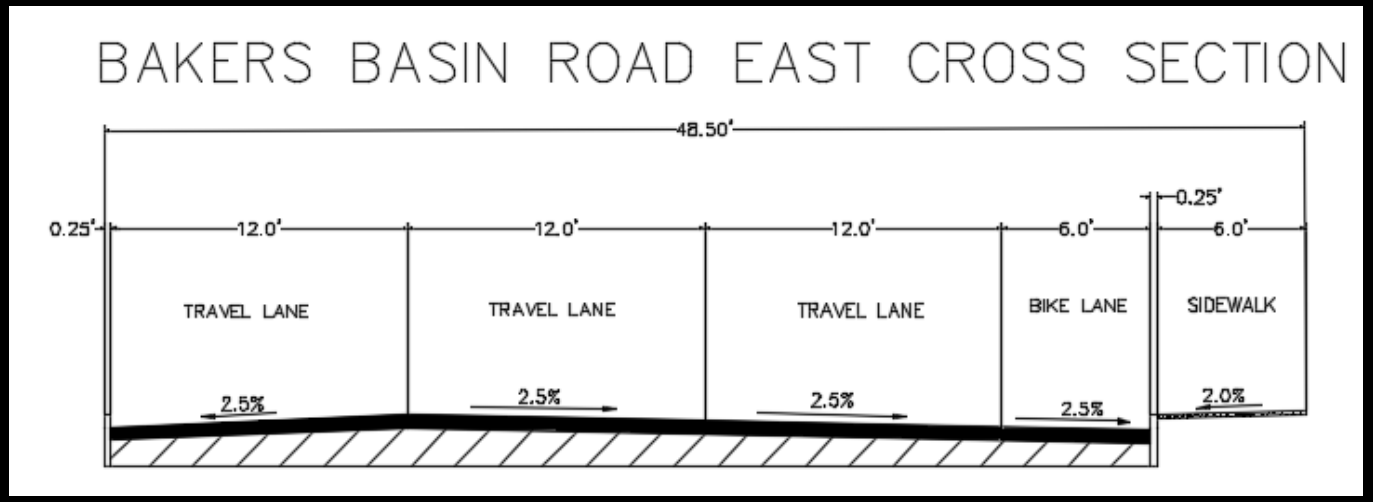
Greenberg Road and Bakers Basin Road Intersection

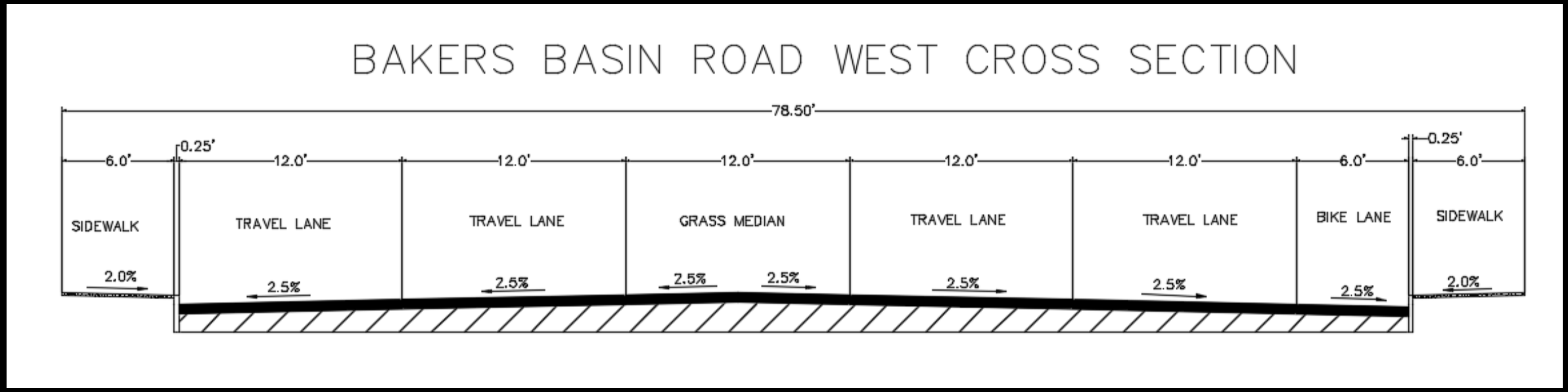


- Signalized intersection addition
- Pedestrian accessibility
- Overall improved safety

Greenberg Road and Bakers Basin Road Cross Sections



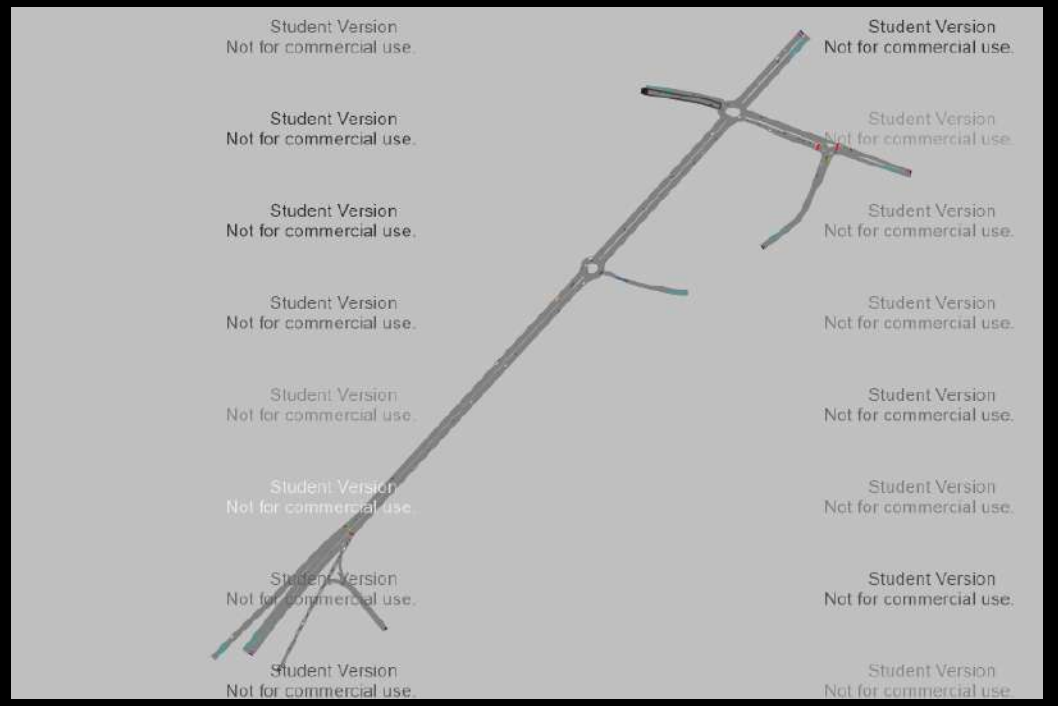




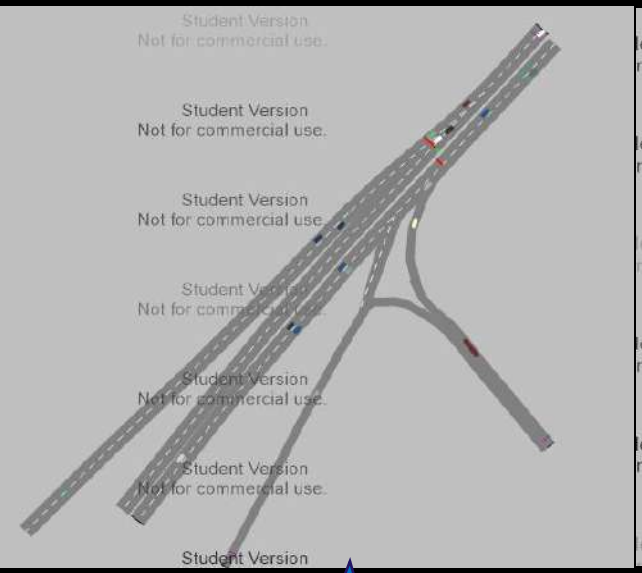
Proposed VISSIM Model

Number: 7	No	Name	Link	Volume(0-MAX)
1	1	Route 1 North	19	1211.0
2	5	Route 1 South	15	1402.0
3	6	Bakers Basin East Bound	17	522.0
4	7	Brunswick Pike	1	729.0
5	8	Carnegie Avenue West Bound	24	45.0
6	9	Bakers Basin West Bound	11	316.0
7	10	Greenburg Road North Bound	9	115.0

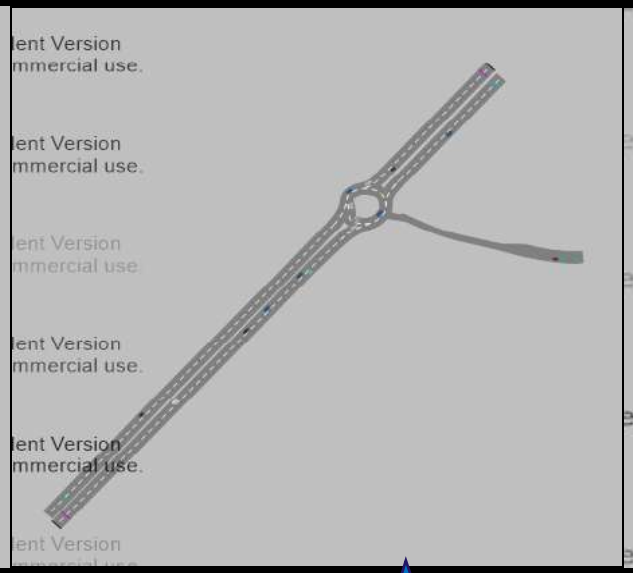
- Inputs based on peak hour counts
- Modeled all approach movements
- Signal timing adjusted at all nodes
- Reduced backups on Bakers Basin
- Simulation confirms effectiveness



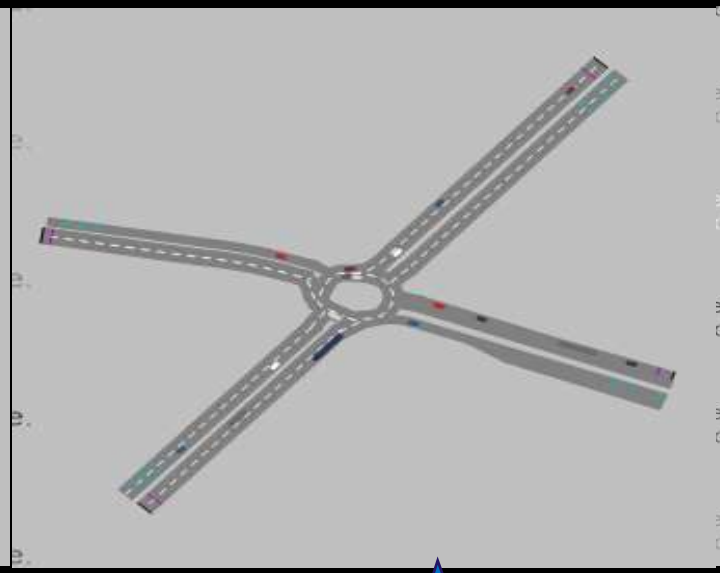
Proposed VISSIM Model



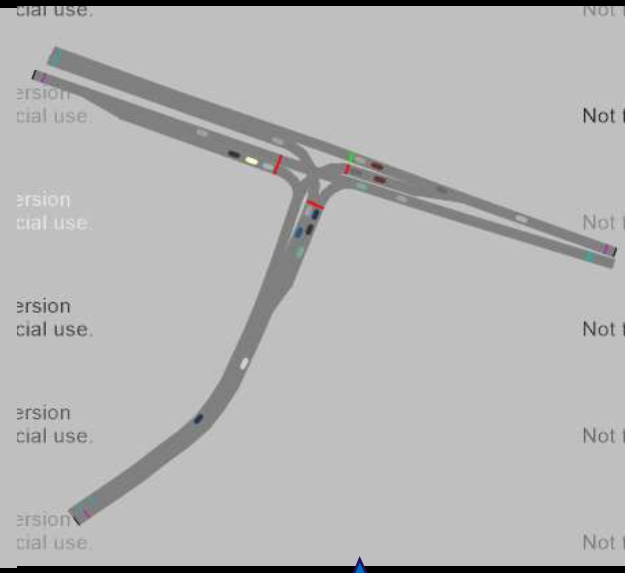
Route 1 Branching Interchange



Route 1 and Greenberg Road



Route 1 and Bakers Basin Road



Bakers Basin Road and Greenberg Road

Budget Breakdown

Task	Dr. Thomas Brennan	Patrick Frawley	Nicholas Rocco	Jayson Schmidt	Ryan Rosenthal
	Engineering Director	Project Engineer	Design Engineer	Design Engineer	Design Engineer
Fall 2024 Hours					
Site Visit	0	1	1	1	1
Research	1	9	8	8	8
Proposal Presentation	1	5	5	5	5
Traffic Analysis	0	4	5	5	6
Constraint Analysis	0	3	1	1	1
Alternative Design	1	1	2	2	2
Constraints and Alternatives Design Presentation	1	9	9	9	9
Design Selection	0	1	1	2	1
Quarterly Report	0	5	5	5	5
Estimate of Engineering Cost and Schedule	0	1	2	1	1
Engineering Services Proposal	2	8	8	8	8
Engineering Services Proposal Presentation	2	10	10	10	10
Spring 2025 Hours					
Intersection Designs	4	10	10	10	10
Corridor Design	3	10	10	10	10
Final Presentation	2	12	12	12	12
Final Report	2	8	8	8	8
Totals					
Hours	19	97	97	97	97
Hourly Rate	$95.00	$38.00	$34.00	$34.00	$34.00
Total Individual Cost	$1,805.00	$3,686.00	$3,298.00	$3,298.00	$3,298.00
Total cost	$15,385.00				
Overhead (150%)	$23,077.50				
Fixed Fee (10%)	$2,307.75				
Final Cost	$41,000.00				

Project Budget

Fall Total Cost	
Total Cost	$8,706.00
Overhead (150%)	$13,059.0
Fixed Fee (10%)	$1,305.90
Cost	$23,071
Final Cost	$23,000

Spring Total Cost	
Total Cost	$6,645.00
Overhead (150%)	$9,967.50
Fixed Fee (10%)	$996.75
Cost	$17,609
Final Cost	$18,000

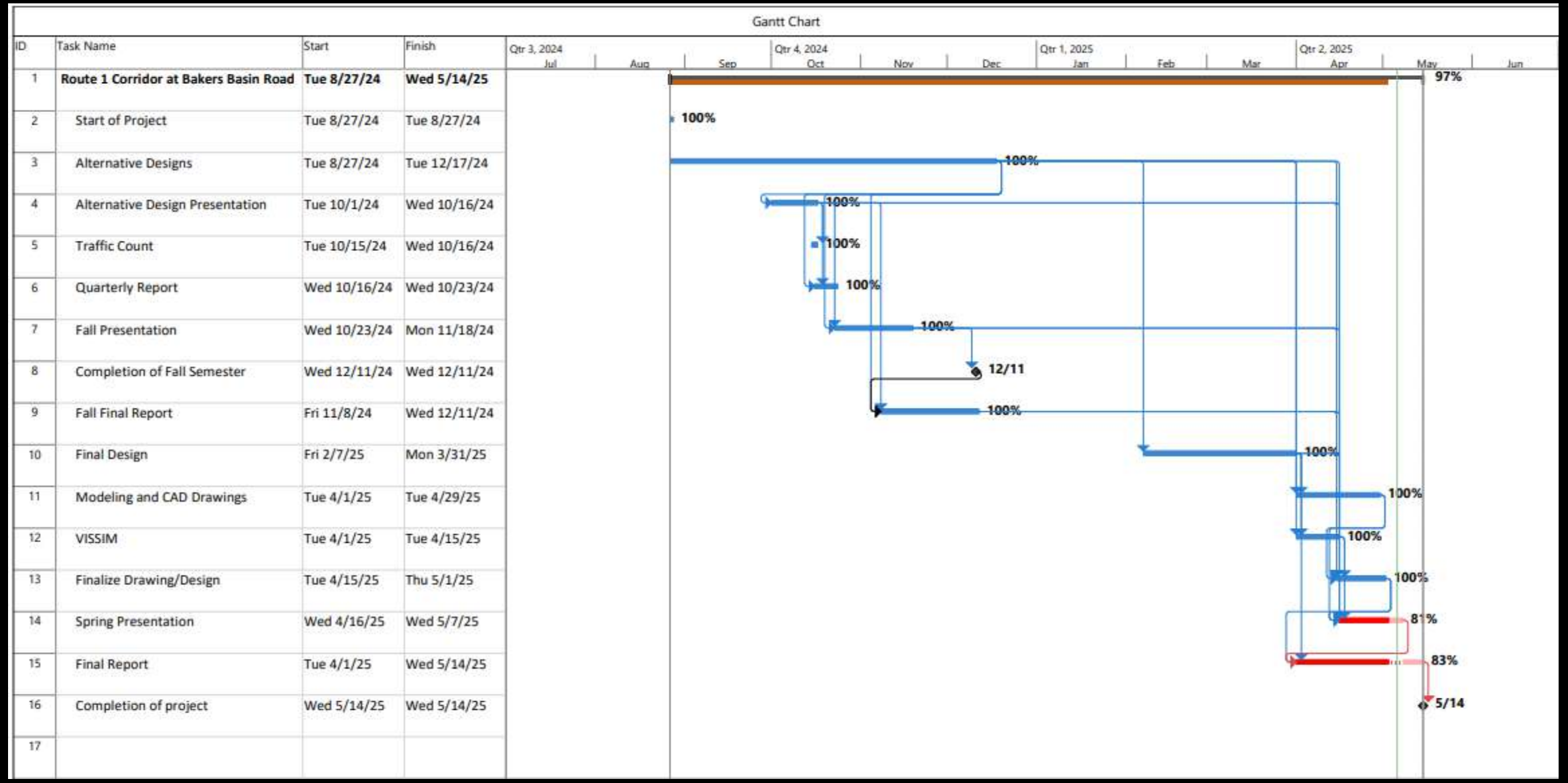
Construction Cost Estimate

Category	Estimated Cost
Mobilization, Traffic Control	$1,200,000
Demolition & Site Clearing	$600,000
Earthwork & Grading	$900,000
Stormwater & Drainage Improvements	$1,200,000
Utility Relocation/Adjustment	$900,000
Roadway Construction (Pavement, Base, Curbing)	$2,100,000
Intersection Signalization	$1,000,000
Roundabout Construction (2 roundabouts)	$2,200,000
Sidewalks, Bike Lanes, & ADA Features	$600,000
Landscaping & Aesthetics	$300,000
Contingency (10%)	$1,000,000
Total Cost	$12,000,000

Construction Breakdown

Phase	Duration	Timeframe
1. Design Finalization & Permits	3 months	Month 1–3
2. Mobilization & Traffic Setup	1 month	Month 4
3. Utility Relocation	3 months (staggered)	Month 4–6
4. Intersection 1 (Signal)	3 months	Month 5–7
5. Intersection 2 (Roundabout)	4 months	Month 7–10
6. Intersection 3 (Signal)	3 months	Month 9–11
7. Intersection 4 (Roundabout)	4 months	Month 11–14
8. Roadway, Sidewalks, Landscaping	3–4 months	Month 14–18
9. Testing, Punchlist, Closeout	1 month	Month 18–19

Project Schedule



Questions?