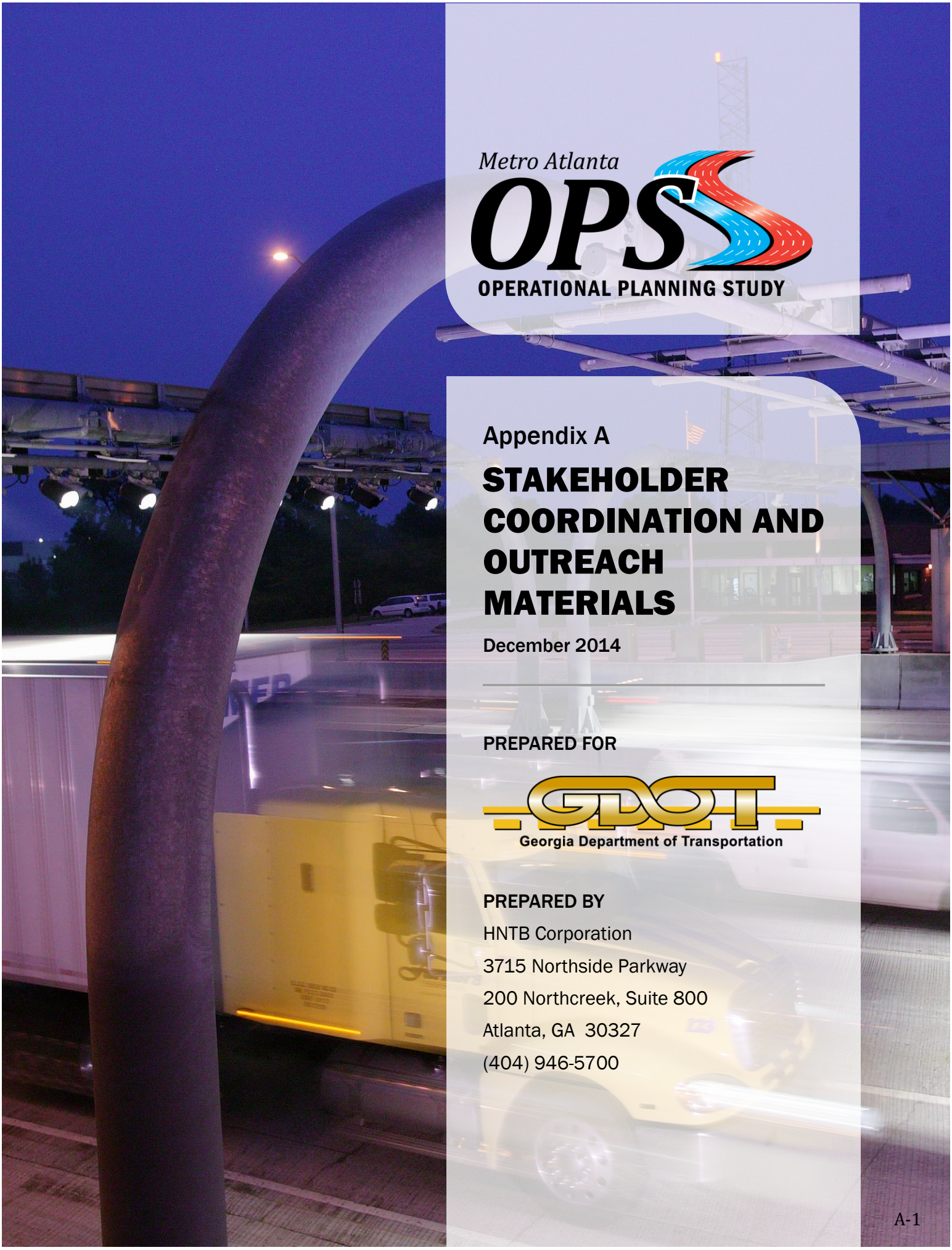

Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Appendix A

STAKEHOLDER COORDINATION AND OUTREACH MATERIALS

December 2014

PREPARED FOR

Georgia Department of Transportation

PREPARED BY

HNTB Corporation
3715 Northside Parkway
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PowerPoint presentations for each stakeholder meeting are provided below. They are also available online at: http://www.dot.ga.gov/Projects/studies/MetroAtlantaOperationalPlanningStudy/Pages/default.aspx.

1 STAKEHOLDER COMMITTEE MEETINGS

1.1 STAKEHOLDER COMMITTEE MEETING #1 (1/24/13)

1.2 ARC ROADWAY OPERATIONS MEETING (3/22/13)

1.3 STAKEHOLDER COMMITTEE MEETING #2 (3/25/13)

1.4 CID MEETING #1 (5/2/13)

1.5 OPERATIONAL STRATEGIES WORK SESSION (05/8/13)

1.6 STAKEHOLDER MEETING #4 – TECHNICAL COORDINATING COMMITTEE (06/21/13)

1.7 GEORGIA ITS MEETING (6/27/13)

1.8 GDOT/ARC COORDINATION MEETING (07/12/13)

1.9 STAKEHOLDER COMMITTEE MEETING #3 (9/9/13)

1.10 CID MEETING #2 (9/16/13)

1.11 GDOT/ARC RTP COORDINATION MEETING (9/26/13)

1.12 GPA FALL CONFERENCE TRANSPORTATION SOLUTIONS PRESENTATION (10/10/13)

Atlanta Regional
MANAGED LANES
Implementation Plan

Metro Atlanta
OPS
OPERATIONAL PLANNING STUDY

Stakeholder Meeting #1
January 24, 2013

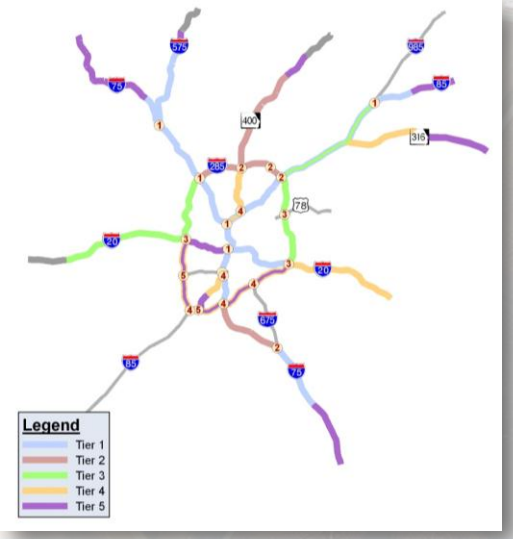
Georgia Department of Transportation

Agenda

- Overview
- Schedule
- Corridor Screening Process
- Parameters
- Potential Strategies
- Current Activities
- Next Steps

Overview – MLIP

- Previous Atlanta Regional Managed Lanes System Plan (MLSP) Goals:
  - Protect mobility
  - Maximize person/vehicle throughput
  - Minimize environmental impacts
  - Provide a financially feasible system
  - Design and maintain a flexible infrastructure for varying lane management



Overview – MLIP

- Update MLSP as part of Managed Lanes Implementation Plan (MLIP) to:
  - Build upon previous MLSP goals
  - Reflect current funding constraints
  - Identify feasible locations for managed lane projects
  - Redefine and reprioritize projects from the previous plan based on current and future needs
  - Prioritize list of managed lane projects and accompanying financing strategies (P3 and traditional funding sources)
- Incorporate preliminary recommendations into RTP and TIP update, as appropriate during 2013

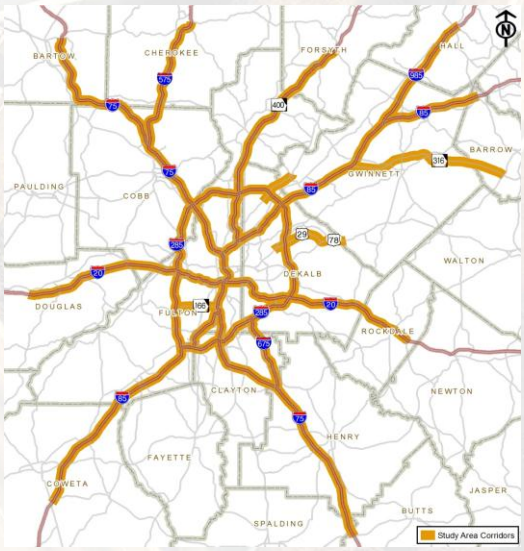
Atlanta Regional MANAGED LANES Implementation Plan
Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Overview – OPS

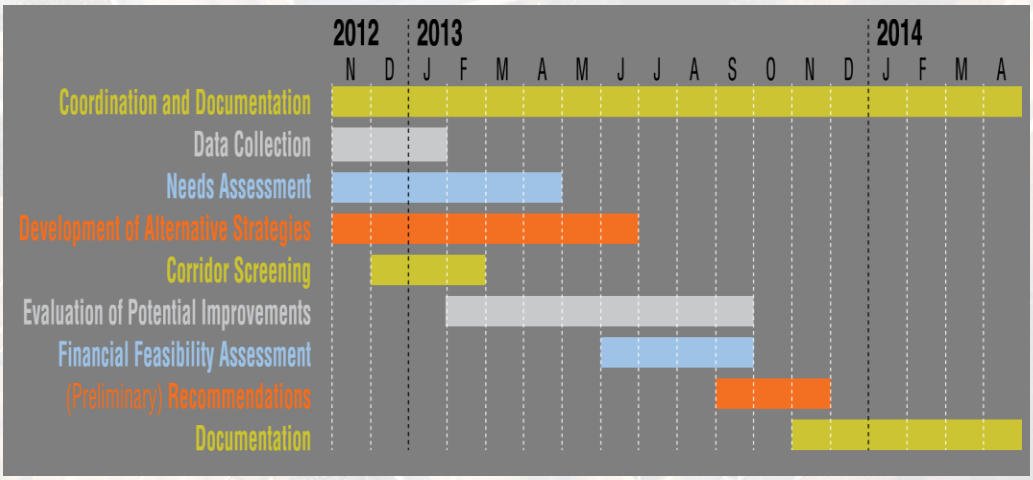
- Identify bottleneck areas
- Identify and evaluate potential low-cost improvements
- Document a prioritized list of operational projects

Study Area

- All limited access facilities in metro Atlanta
  - Interchanges
  - Up to 5 selected arterials within the interchange area of influence



Schedule



Corridor Screening Process

- Recurring vs. nonrecurring congestion locations
- Physical limitations in median and/or shoulder
- Estimated benefit
- New capacity (i.e. shoulder lanes or reversible lanes during the peaks) evaluated as part of MLIP
- Operational improvements evaluated as part of OPS

Planning Assumptions

- MLIP
  - All new capacity will likely be tolled
  - Remove HOV2+ to HOT3+ conversions from Atlanta MPO's Transportation Improvement Program (TIP)
  - Eliminate assumptions of long-term concession agreements
- OPS
  - Can be implemented within 6 months to 5 years
  - Low cost

Potential Strategies

- Added Corridor Capacity
- Improved Design Geometrics
- Intelligent Transportation Systems (ITS)
- Freight
- Demand Management & Policy Considerations

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Georgia Department of Transportation
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Potential Strategies

- Added Corridor Capacity
  - Bottleneck Mitigation
  - Managed Lanes
  - Reversible Lanes (e.g. moveable barriers)
  - Drivable / Hard Shoulder Running

Potential Strategies

- Roadway Geometrics
  - Roundabouts
  - Diverging Diamonds Interchanges
  - Loop Ramps
  - Ramp Configuration
  - Channelization
  - Innovative Intersections
  - Minimum Intersection / Interchange & Ramp Spacing
  - Improvements to Median
  - Crash Investigation Sites

Potential Strategies

- Intelligent Transportation Systems (ITS)
  - Traveler Information Systems
  - Quick Response Incident Clearance
  - Roadside & Motorist Assistance
  - ITS Support Infrastructure
  - CCTV Cameras / Traffic Flow Monitoring
  - Signal Operation & Management
  - Variable Speed Limits
  - Queue Warning
  - Dynamic Merge Control
  - Ramp Metering / Flow Control

Potential Strategies

- Freight
  - Commercial Vehicle Geometric Accommodations
  - Truck Lane Restrictions
- Demand Management & Policy Considerations
  - Demand Management Strategies
  - Variable / Dynamic Pricing
  - Variable / Dynamic Ramp Closures
  - Vehicle Eligibility / Occupancy

Non-Traditional Options

- Shoulder Lanes
- Moveable Barriers
- Variable Speed Limits

Shoulder Lanes – Considerations

- Shoulder depth
- Shoulder width
- Bridge spans and pillar locations
- Entrance / exit ramp locations and volumes
- Additional signage
- Refuge sites (incidents and emergency access)
- Segment length

SR 400 Shoulder Lane

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Shoulder Lanes – Case Studies

Sign in Washington

- Washington State - US 2
  - 1.5 miles during PM only
- Minneapolis
  - 3.0 miles during AM & PM
  - Use left shoulder
  - Region wide bus shoulders
- UK M42 Highway
  - 10 miles
  - Shoulders used in conjunction with variable speed limits
- Netherlands
  - Use left and right shoulder

Shoulder Lanes – Lessons Learned

- Capital costs vary dramatically based on existing infrastructure
- Develop overall active traffic management(ATM) system concept
- Pre-determine enforcement roles/processes, incident response, training, public outreach and education
- Regularly spaced video cameras to check for obstacles
- Regularly spaced emergency refuge areas with proper signing

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Georgia Department of Transportation
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Moveable Barriers – Considerations

- Directional split of traffic and number of lanes
- Median and/or shoulder widths
- Borrow inside lane or shoulder for reverse direction and/or widen to the median
- Bridge spans and pillar locations
- Additional signage
- Capital and Operating & Maintenance costs
- Logistics of reversible lanes
- Segment length
- Estimated benefit (travel time savings)

Moveable Barriers – Case Studies

- Honolulu H-1 Freeway
  - 12 mile HOV system during AM only
- Dallas Thornton Freeway/I-30
  - 5.2 mile managed lane during AM & PM
  - SOVs can use during incidents
- Colorado I-70
  - 13.5 mile EB Sundays

Source: Barrier Systems

Moveable Barriers – Lessons Learned

- Enforcement (if operated as a managed lane)
- Public education
- Dependable contractor
- Spare parts inventory
- Aggressive preventative maintenance
- Adequate staffing for enforcement, traffic incident management, and maintenance
- Consider multiple access points

Variable Speed Limits – Considerations

- Availability of ITS infrastructure
- Overhead signs vs. shoulder and median signs
- Enforcement
- Regulatory vs. advisory
- Coordination with existing signs

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Variable Speed Limits – Case Studies

- Washington State
  - I-5 & I-90
- Minneapolis
  - Smart Lanes initiative
- UK M42 Highway
  - 10 mile
  - Variable speed limits used in conjunction with shoulder lanes
- Netherlands
  - In operation since 1981

Variable Speed Limits – Lessons Learned

- Provides congestion relief if speeds are adjusted prior to delays occurring
- Capital costs vary dramatically (signage, technology, emergency refuge areas)
- Develop overall active traffic management (ATM) system
- Pre-determine enforcement roles and processes, incident response, personnel training, public outreach and driver education plan

Atlanta Regional MANAGED LANES Implementation Plan
Georgia Department of Transportation
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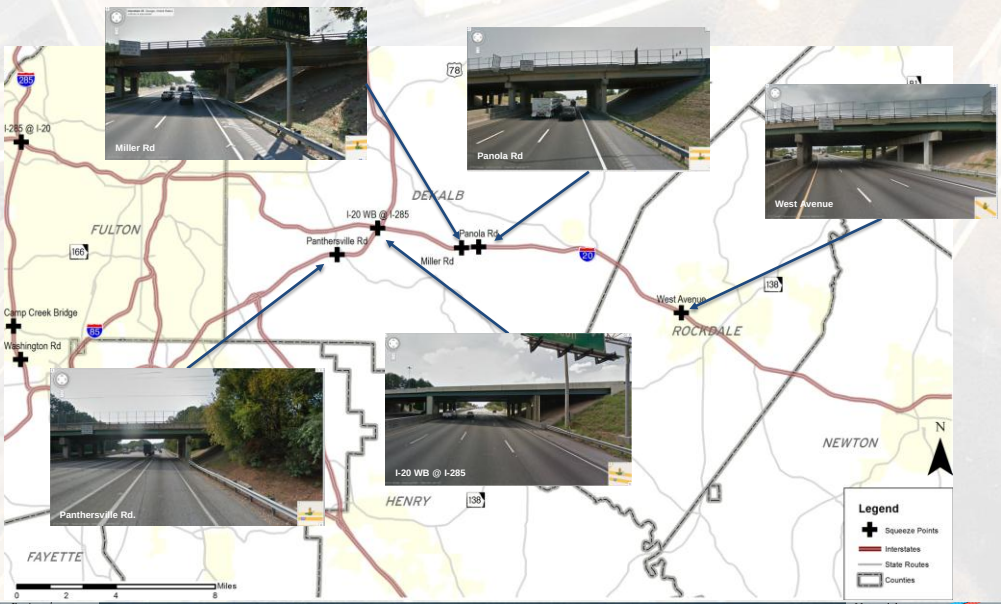
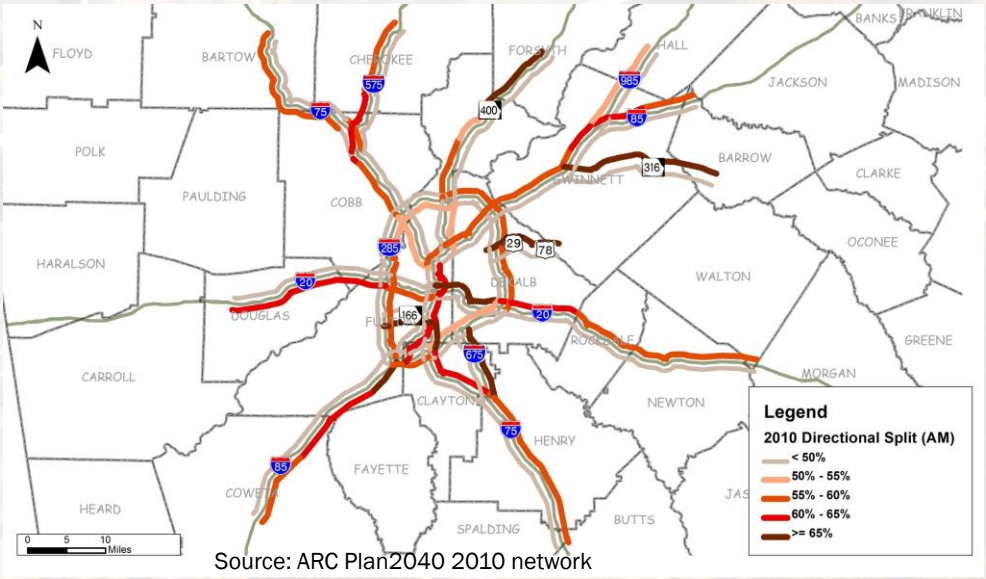
Current Activities

- Initial windshield survey to identify existing roadway characteristics
  - Shoulder width and pavement type
  - Horizontal clearances
  - Current lane widths
  - Median type and widths
- Analyzing directional splits and traffic volumes

Windshield Survey Sample Data



Directional Traffic Split – AM



Source: ARC Plan2040 2010 network

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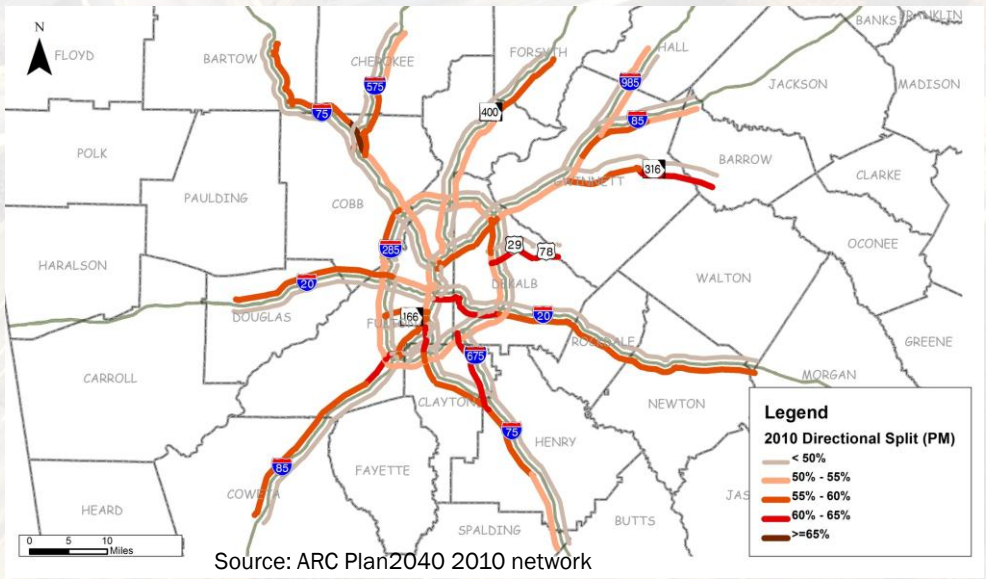
Directional Traffic Split – PM



Source: ARC Plan2040 2010 network

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Next Steps

- Complete windshield survey and directional split analysis
- Post-process speed and volume data
- Determine needs (identify bottleneck areas)
- Complete corridor screening process
- Evaluate projects
- Recommend list of projects
- Develop financial plan for managed lane projects
- Coordinate with ARC throughout the process

Atlanta Regional MANAGED LANES Implementation Plan

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www.dot.ga.gov\MLIP and www.dot.ga.gov\OPS

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ARC Roadway Operations

TCC Subcommittee Meeting

March 22, 2013

Georgia Department of Transportation

Agenda

- Overview of study
- Identified bottleneck locations
- Potential operational strategies
- Next steps

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

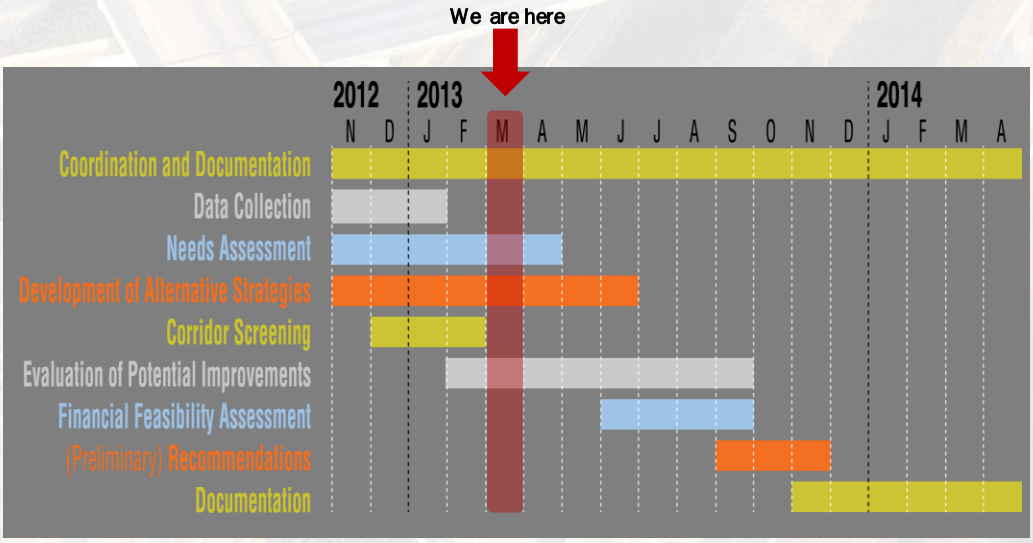
Overview

- Metro Atlanta Operational Planning Study (OPS)
  - Identify bottleneck areas
  - Identify and evaluate potential low-cost improvements
  - Document a prioritized list of operational projects

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Schedule



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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

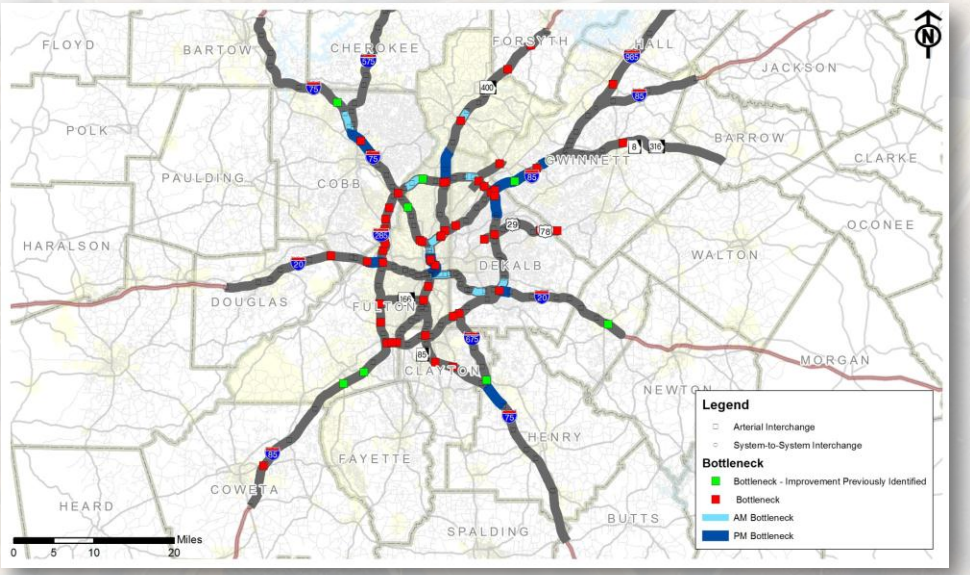
Identification of Bottleneck Locations

Data Inputs	User Inputs
TomTom GPS speeds & duration of congestion	GRTA bus drivers
TMC speeds & counts	HERO unit operators
SkyComp aerial congestion survey	TMC staff
	Stakeholders

Causes of Bottlenecks

- High volumes
- Weaving
- Lane drops/additions
- Last minute decision making
- Lack of storage space at ramp terminals and/or high turn volumes
- Tight turning radii and/or steep grade on ramps
- Frontage road access
- Limited access facility terminates at signalized intersection
- Suspected drainage issues

Existing Needs – Bottleneck Locations



Potential Strategies

- Added Corridor Capacity (Managed Lane Potential)
  - Bottleneck Mitigation
  - New Capacity Managed Lanes
  - Reversible Lanes (e.g. moveable barriers)
  - Drivable/Hard Shoulder Running

Potential Strategies

- Roadway Geometrics
  - Roundabouts
  - Diverging Diamonds Interchanges
  - Loop Ramps
  - Ramp Configuration
  - Channelization
  - Innovative Intersections
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  - Improvements to Median
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Potential Strategies

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  - Quick Response Incident Clearance
  - Roadside & Motorist Assistance
  - ITS Support Infrastructure
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- Freight
  - Commercial Vehicle Geometric Accommodations
  - Truck Lane Restrictions
  - Automated Truck Rollover Detection Systems
- Demand Management & Policy Considerations
  - Demand Management Strategies
  - Variable/Dynamic Pricing
  - Variable/Dynamic Ramp Closures
  - Vehicle Eligibility/Occupancy

Next Steps

- Complete development of operational strategies for evaluation
- Stakeholder Committee meeting
- Evaluate projects
- Recommend preliminary list of projects
- Coordinate with ARC throughout the process

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Questions?

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Atlanta Regional
MANAGED LANES
Implementation Plan

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OPERATIONAL PLANNING STUDY

Stakeholder Committee Meeting #2
March 25, 2013

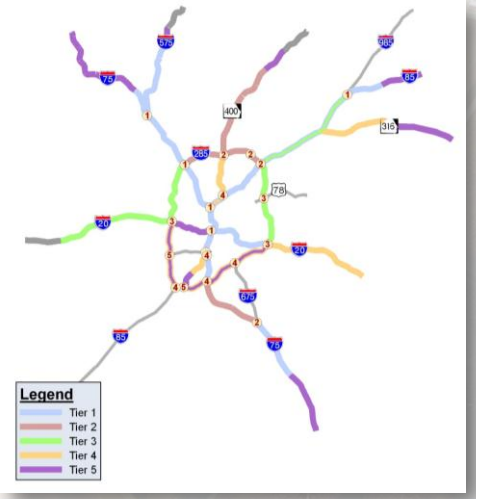
Georgia Department of Transportation

Agenda

- Opening Presentation
  - Overview of Studies
  - Status Update
  - Existing Needs
  - Corridor Screening Process
  - MLIP Projects for Evaluation
  - OPS Projects for Evaluation
- Break-out Groups
- Recap of Break-out Group Discussions
- Closing Presentation

Overview – MLIP

- Previous Atlanta Regional Managed Lanes System Plan (MLSP) Goals:
  - Protect mobility
  - Maximize person/vehicle throughput
  - Minimize environmental impacts
  - Provide a financially feasible system
  - Design and maintain a flexible infrastructure for varying lane management



Overview – MLIP

- Update MLSP as part of Managed Lanes Implementation Plan (MLIP) to:
  - Build upon previous MLSP goals
  - Reflect current funding constraints
  - Identify feasible locations for managed lane projects
  - Redefine and reprioritize projects from the previous plan based on current and future needs
  - Prioritize list of managed lane projects and accompanying financing strategies (P3 and traditional funding sources)
- Incorporate preliminary recommendations into RTP and TIP update, as appropriate during 2013-2014

Overview – OPS

- Identify bottleneck areas
- Identify and evaluate potential low-cost improvements
- Document a prioritized list of operational projects

Study Area

- All limited access facilities in metro Atlanta
  - Interchanges
  - Up to 5 selected arterials within the interchange area of influence

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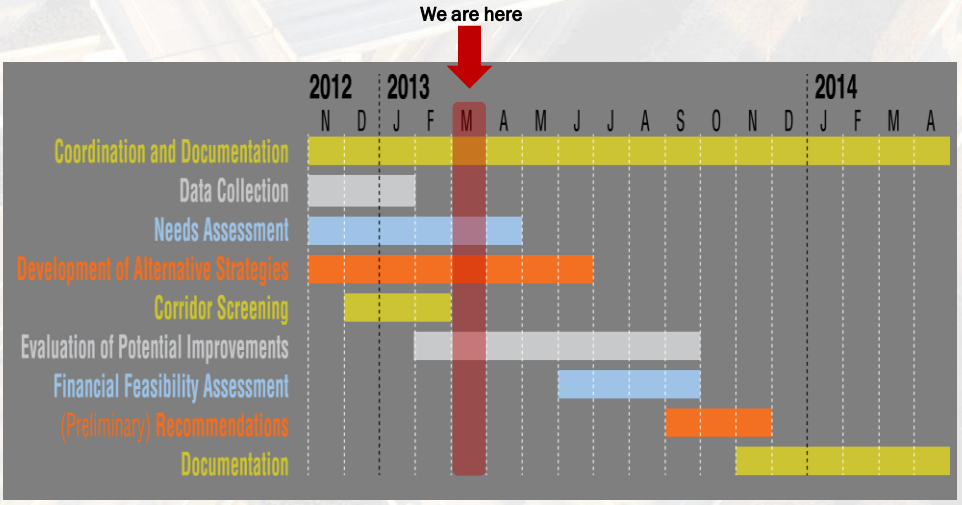
Schedule



Status Update

- Completed:
  - Completed initial windshield survey and directional split analysis
  - Post-processed speed and volume data
  - Determined capacity and bottleneck needs
  - Completed corridor screening process
  - Developed managed lane candidate strategies for evaluation
- Current Activities:
  - Developing operational strategies for evaluation

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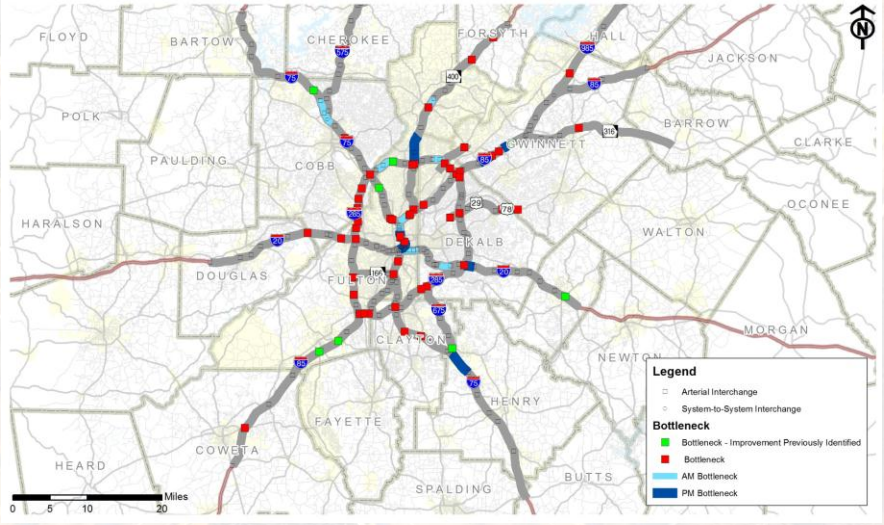
Existing Needs - Causes of Bottlenecks

- High volumes
- Weaving
- Lane drops/additions
- Last minute decision making
- Lack of storage space at ramp terminals and/or high turn volumes
- Tight turning radii and/or steep grade on ramps
- Frontage road access
- Limited access facility terminates at signalized intersection
- Suspected drainage issues

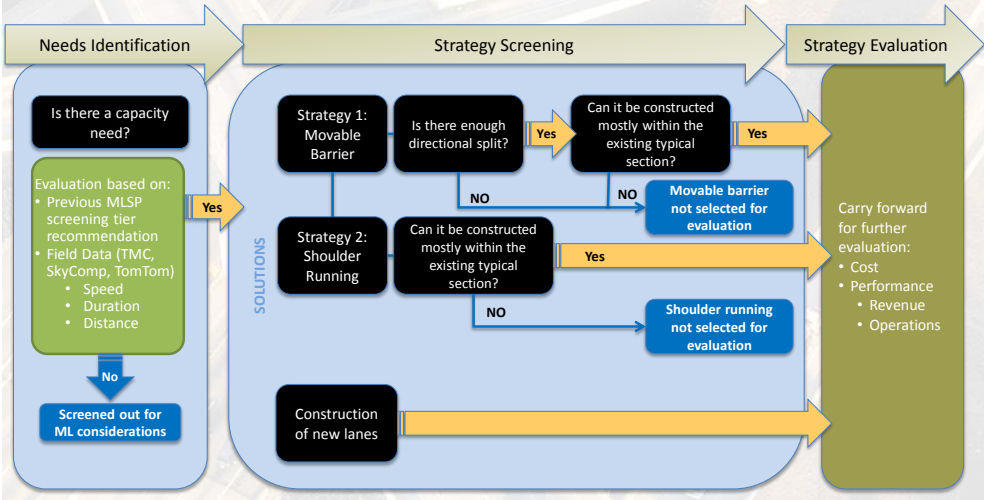
Existing Needs – Bottleneck Locations



Corridor Screening Process

- Recurring vs. nonrecurring congestion locations
- Physical limitations in median and/or shoulder
- Estimated benefit
- New capacity (i.e. shoulder lanes or reversible lanes during the peaks) evaluated as part of MLIP
- Operational improvements evaluated as part of OPS

Managed Lane Strategy Screening



Potential Managed Lane Corridors

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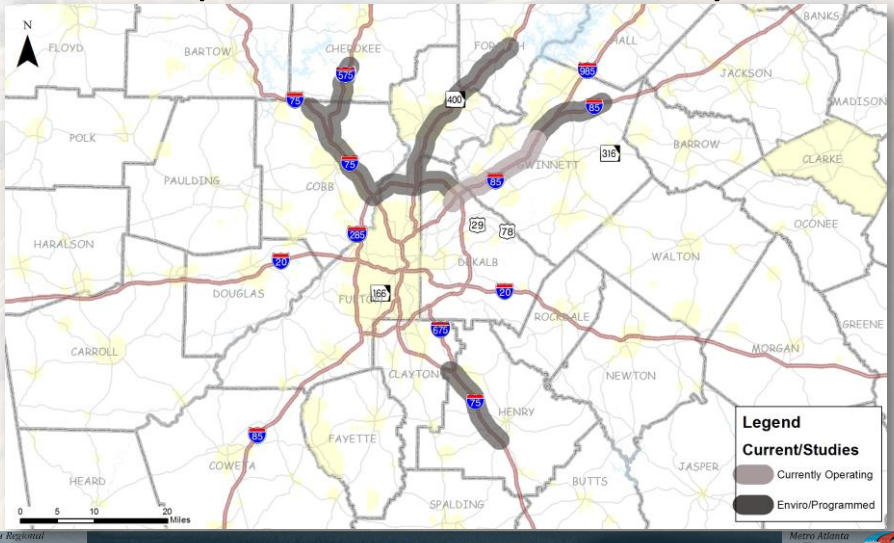
Corridors Currently in Operation or Under Study



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Corridors Selected for Shoulder/Moveable Barrier Evaluation

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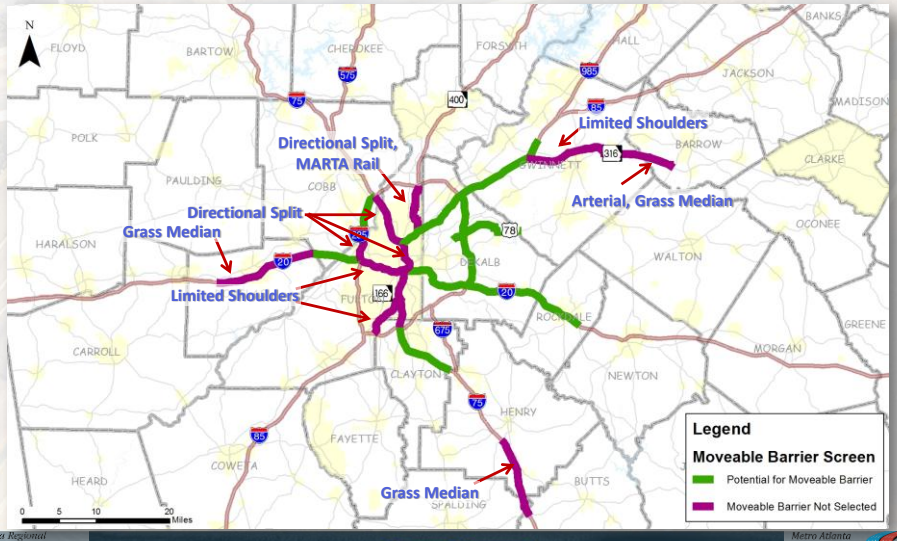
Corridors Selected for Moveable Barrier Evaluation



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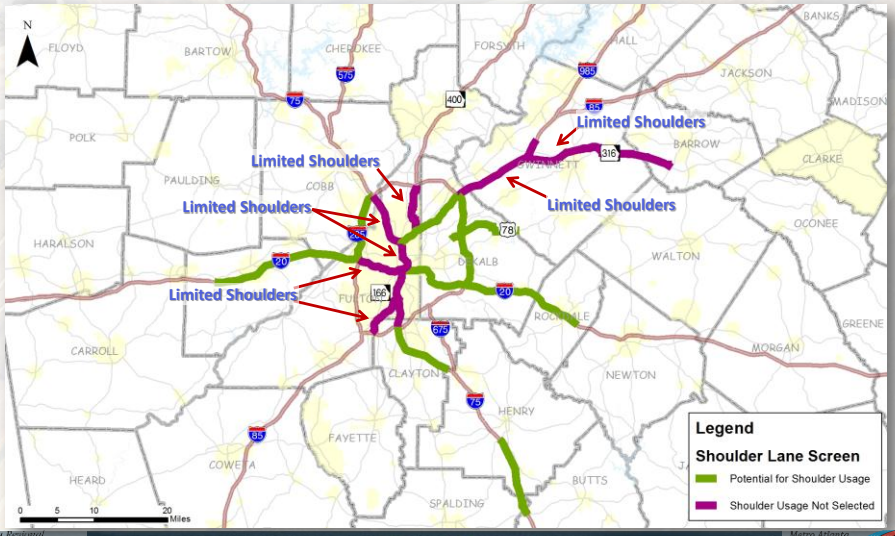
Corridors Selected for Shoulder Lane Evaluation



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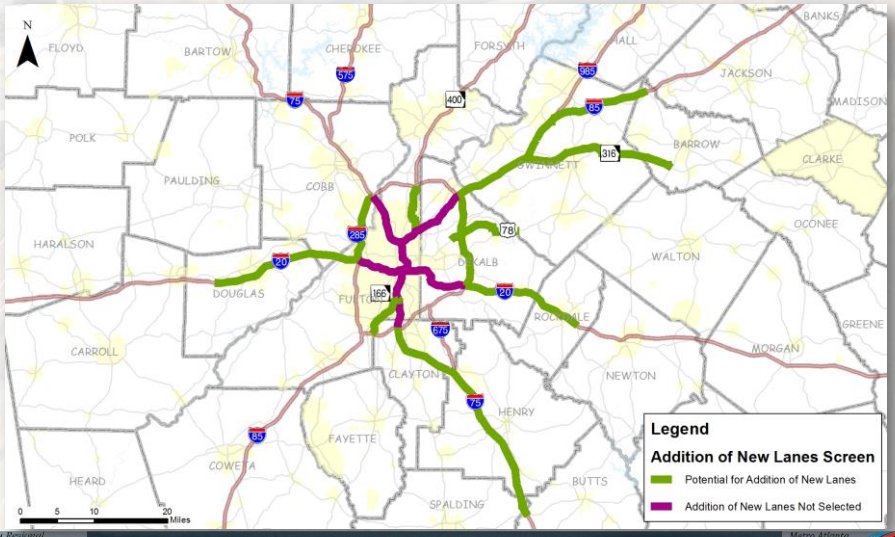
Corridors Selected for Additional Lanes Evaluation



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OPS Solutions

- System-wide solutions for consideration
- 75+ bottleneck locations indentified
- 12 types of location-specific solutions identified for evaluation
- Some locations include more than one solution for consideration

System-wide OPS Strategies for Evaluation

1) Expand ITS support infrastructure to include all limited access facilities
2) Advanced queue warning signs at shoulder/moveable barrier locations
3) Variable speed limits on limited access facilities with priority at shoulder/moveable barrier locations
4) Dynamically change shoulder usage times based on congestion

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System-wide OPS Strategies for Evaluation

5) Upgrade technology for CCTV cameras/traffic flow monitoring
6) Provide adequate crash investigation sites where shoulders are used
7) Modify ramp meters to permit 2 cars per green
8) Quick response incident clearance across the region
9) Expand number of HERO units if needed
10) Modify truck lane restrictions

Location-Specific OPS Strategies for Evaluation

1) Variable/dynamic ramp closures (closed to all vehicles v. closed to unauthorized vehicles)
2) Auxiliary lanes (new or using shoulders)
3) Collector/distributor roads
4) Modifications to frontage road access
5) Channelizations
6) Re-stripings

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Location-Specific OPS Strategies for Evaluation

7) Interchange reconfigurations (Diverging Diamond Interchanges, etc.)
8) Turning prohibitions
9) Additional ramp meters
10) Modify existing ramp meter operations
11) Modify ramp geometrics, with a focus to better accommodate trucks
12) Automated truck rollover warning systems

Break-Out Group Instructions

- Purpose of Break-Out Group
  - Share some of the operational strategies being considered for evaluation
  - Obtain feedback on strategies and bottleneck locations
- Instructions
  - Start out at your assigned station
  - Rotate to the next station
  - After you have participated at all 3 stations, each facilitator will report back discussion highlights

Atlanta Regional MANAGED LANES Implementation Plan
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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Next Steps

- Complete development of operational strategies for evaluation
- Evaluate projects
- Next Stakeholder Committee Meeting (#3)
  - Share impacts of projects evaluated
  - Summer 2013
- Recommend preliminary list of projects

Next Steps (Cont'd)

- Final Stakeholder Committee Meeting (#4)
  - Share preliminary recommendations
  - Late 2013
- Develop financial plan for managed lane projects
- Coordinate with Atlanta MPO on PLAN 2040 update throughout the process

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Questions?

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Community Improvement District (CID) Meeting
Kyle Mote
May 2, 2013

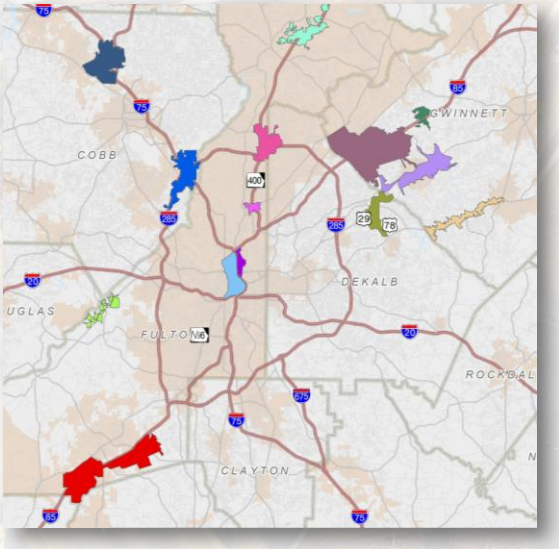
Georgia Department of Transportation

Agenda

- Purpose and Overview
- Corridor Screening Process
- Operational Overview
- Managed Lane Overview
- Breakout Group Discussions
- Recap of Input
- Next Steps

CID Involvement

- Local knowledge of operational issues
- Proven success implementing large and small transportation improvements



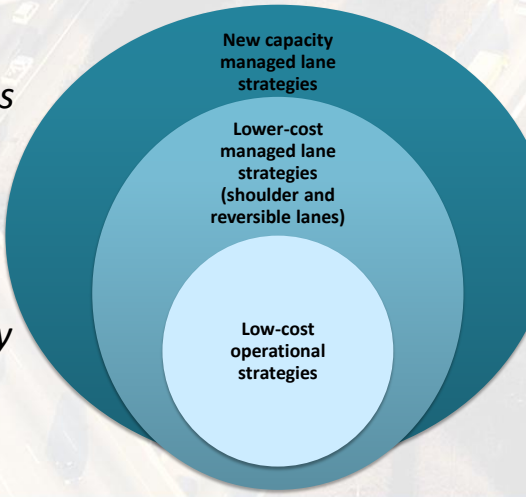
Vision for Transportation

- GDOT's Statewide Strategic Transportation Plan (SSTP) points to the importance of improving people mobility (via auto and transit) by utilizing "dual purpose" investments (such as managed lanes)
- A Strategic Goal of the Governor's for the State is to "improve the movement of people and goods across and within the state"

Atlanta Regional MANAGED LANES Implementation Plan
Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Study Purpose

Evaluate cost-effective projects that achieve goals for transit, freight and passenger vehicles; then consider more capital-intensive solutions as required by the complexity or intensity of the issue



Study Area

- All limited access facilities in metro Atlanta
  - Interchanges
  - Up to 5 selected arterials within the interchange area of influence

Schedule

Status

- Completed:
  - Completed initial windshield survey and directional split analysis
  - Post-processed speed and volume data
  - Determined capacity and bottleneck needs
  - Completed corridor screening process
  - Developed managed lane candidate strategies for evaluation
- Current Activities:
  - Developing operational strategies for evaluation

Atlanta Regional MANAGED LANES Implementation Plan
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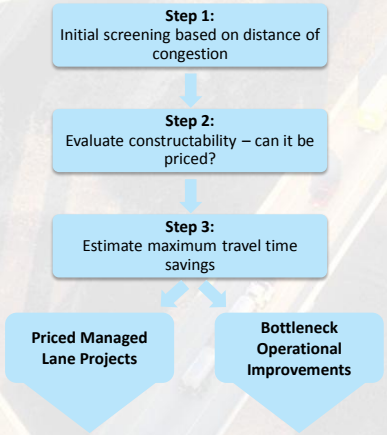
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Corridor Screening Process

- Recurring vs. nonrecurring congestion locations
- Physical limitations in median and/or shoulder
- Estimated benefit
- New capacity (i.e. shoulder lanes or reversible lanes during the peaks) evaluated as part of MLIP
- Operational improvements evaluated as part of OPS



Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Planning Assumptions - OPS

- Smaller scale operational improvements
- Focused on limited access highways in Metro Atlanta
- Can be implemented within 6 months to 5 years
- "Bang for your buck"/Return on your investment

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Overview – OPS

- Identify bottleneck areas along limited access highways
- Identify and evaluate potential low-cost improvements
- Document a prioritized list of operational projects
- Incorporate preliminary recommendations into RTP and TIP update, as appropriate during 2013-2014

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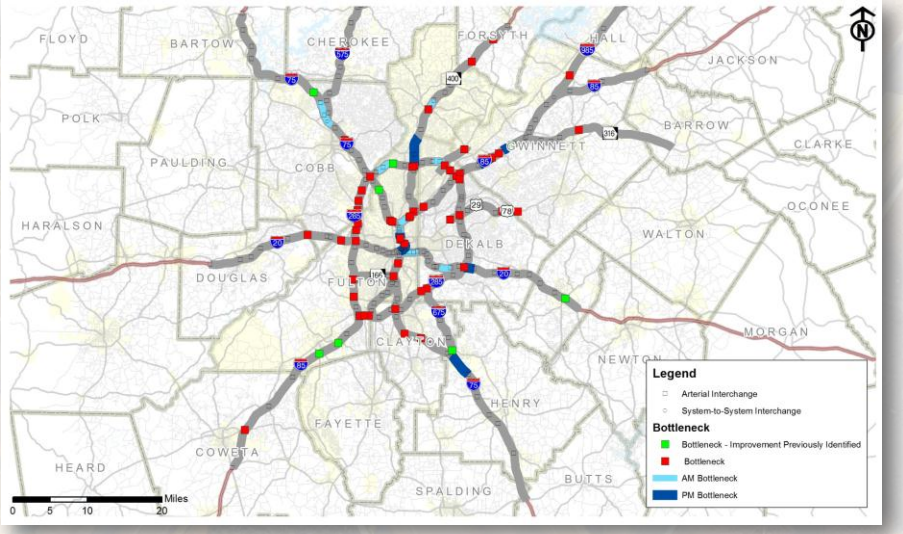
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Identified Bottleneck Locations - OPS



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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Causes of Bottlenecks - OPS

- High volumes
- Weaving
- Lane drops/additions
- Last minute decision making
- Lack of storage space at ramp terminals and/or high turn volumes
- Tight turning radii and/or steep grade on ramps
- Frontage road access
- Limited access facility terminates at signalized intersection
- Suspected drainage issues

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Potential Strategies - OPS

- Roadway Geometrics
- Intelligent Transportation Systems (ITS)
- Freight
- Demand Management & Policy Considerations

Potential Strategies - OPS

- Roadway Geometrics
  - Roundabouts
  - Diverging Diamonds Interchanges
  - Loop Ramps
  - Ramp Configuration
  - Channelization
  - Innovative Intersections
  - Minimum Intersection / Interchange & Ramp Spacing
  - Improvements to Median
  - Crash Investigation Sites

Potential Strategies - OPS

- Intelligent Transportation Systems (ITS)
  - Traveler Information Systems
  - Quick Response Incident Clearance
  - Roadside & Motorist Assistance
  - ITS Support Infrastructure
  - CCTV Cameras / Traffic Flow Monitoring
  - Signal Operation & Management
  - Variable Speed Limits
  - Queue Warning
  - Dynamic Merge Control
  - Ramp Metering / Flow Control

Potential Strategies - OPS

- Freight
  - Commercial Vehicle Geometric Accommodations
  - Truck Lane Restrictions
- Demand Management & Policy Considerations
  - Demand Management Strategies (i.e. reduction in single occupancy vehicle trips)
  - Variable / Dynamic Ramp Closures
  - Vehicle Eligibility / Occupancy

Atlanta Regional

MANAGED LANES
Implementation Plan

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Planning Assumptions - MLIP

- Update to 2009 Managed Lane System Plan
- All new capacity will likely be tolled
- Remove HOV2+ to HOT3+ conversions from TIP
- Eliminate assumptions of long-term concession agreements

Atlanta Regional MANAGED LANES Implementation Plan

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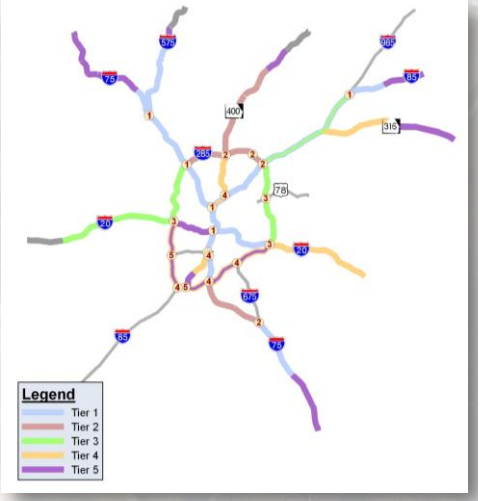
Overview – MLIP

- Previous Atlanta Regional Managed Lanes System Plan (MLSP) Goals:
  - Protect mobility
  - Maximize person/vehicle throughput
  - Minimize environmental impacts
  - Provide a financially feasible system
  - Design and maintain a flexible infrastructure for varying lane management



Overview – MLIP

- Update MLSP as part of Managed Lanes Implementation Plan (MLIP) to:
  - Build upon previous MLSP goals
  - Reflect current funding constraints
  - Identify feasible locations for managed lane projects
  - Redefine and reprioritize projects from the previous plan based on current and future needs
  - Prioritize list of managed lane projects and accompanying financing strategies (P3 and traditional funding sources)
- Incorporate preliminary recommendations into RTP and TIP update, as appropriate during 2013-2014

Potential Managed Lane Corridors

Atlanta Regional MANAGED LANES Implementation Plan

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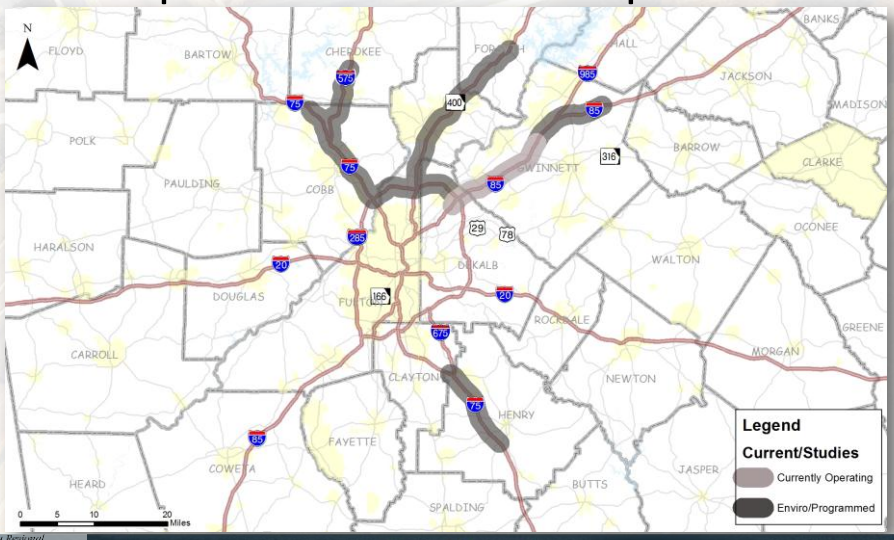
Managed Lane Corridors Currently in Operation or in Development



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Potential Strategies - MLIP

- Managed Lanes
  - New Capacity
  - Reversible Lanes (ex. moveable barriers)
  - Drivable / Hard Shoulder Running

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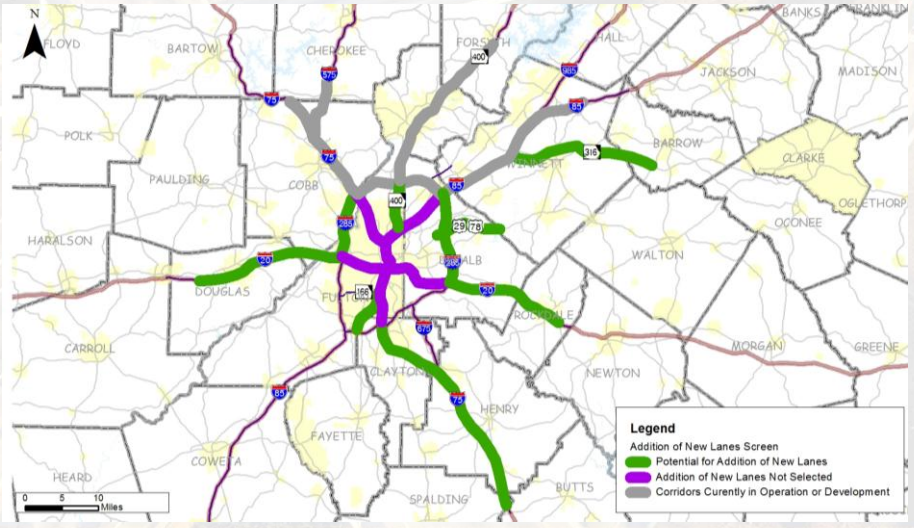
Corridors Selected for Managed Lanes Evaluation



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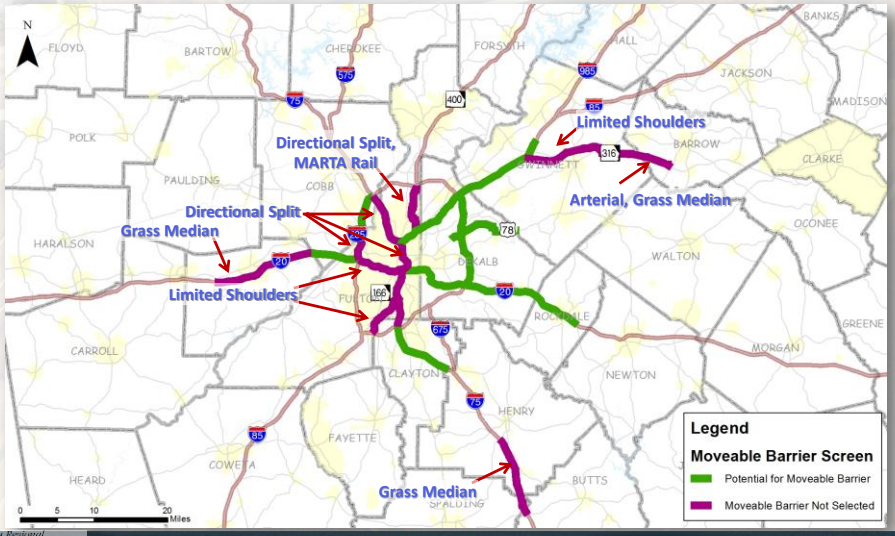
Corridors Selected for Moveable Barrier Evaluation



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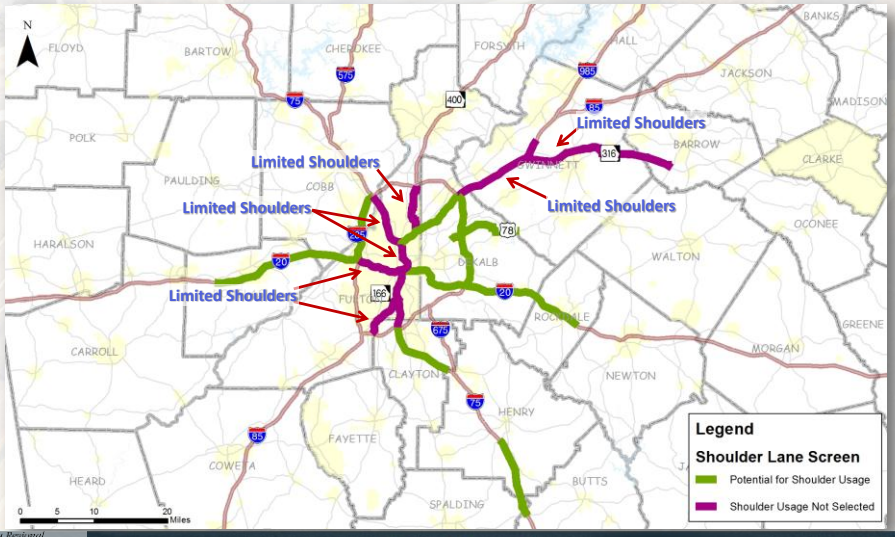
Corridors Selected for Shoulder Lane Evaluation



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BREAK-OUT GROUPS

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Break-Out Group Instructions

- Purpose of Break-Out Group
  - Share an example of an operational strategy being considered for evaluation
  - Discuss bottleneck locations
  - Discuss any other transportation improvements identified by CID
- Instructions
  - Move to your assigned station (based on geography of CIDs)
  - Upon conclusion each facilitator will report back discussion highlights

Atlanta Regional MANAGED LANES Implementation Plan

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Breakout Group Activities

GROUP	AGENCY
1	Atlanta Downtown Improvement District
	Buckhead CID
	Midtown Improvement District
	Boulevard CID
	South Fulton CID
2	Braselton Lifepath CID
	Gwinnett Place CID
	Gwinnett Village CID
	Evermore CID
	Lilburn CID
	Stone Mountain CID
3	Cumberland CID
	Town Center CID
	North Fulton CID
	Perimeter CIDs

Next Steps

MLIP

- Evaluation of potential improvements
  - Planning level traffic and toll revenue analysis
  - Detailed traffic assessment
- Financial feasibility assessment
  - Preliminary implementation and O&M cost estimates
  - Develop performance measures
- Final recommendations and documentation

OPS

- Evaluate potential improvements
  - VISSIM modeling
  - Performance measures
- Planning level costs estimates
- Benefit/cost analysis and prioritization
- Recommendations and documentation

2014 Atlanta MPO RTP/TIP Update

Atlanta Regional MANAGED LANES Implementation Plan
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Metro Atlanta OPS
OPERATIONAL PLANNING STUDY

Operational Strategies Work Session
GDOT Planning, Operations, & District 7
May 8, 2013

Georgia Department of Transportation

Agenda

- System-wide operational strategies
- Location-specific operational strategies
- Other planned or programmed projects
- Next Steps

System-wide Operational Strategies

1) Expand ITS support infrastructure to include all limited access facilities
2) Advanced queue warning signs at shoulder/zipper locations
3) Variable speed limits on all limited access facilities with priority at shoulder/zipper locations
4) Dynamically change shoulder usage times based on congestion

System-wide Operational Strategies (Cont'd)

5) Upgrade technology for CCTV cameras/traffic flow monitoring on limited access facilities and include with all managed lane and operational strategies utilizing the shoulder and zipper options
6) Provide adequate crash investigation sites where shoulders in use
7) Modify ramp meters to permit 2 cars per green
8) Quick response incident clearance
9) Expand number of HERO units if needed

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System-wide Operational Strategies (Cont'd)

10) Incorporate ARC Transportation Demand Management Plan
11) Modify truck lane restrictions

Potential Location-Specific Operational Strategies for Evaluation

1) Variable/dynamic ramp closures (closed to all vehicles v. closed to unauthorized vehicles)
2) Auxiliary lanes (new or using shoulder)
3) Collector/distributor roads
4) Modifications to frontage road access
5) Channelization
6) Re-striping

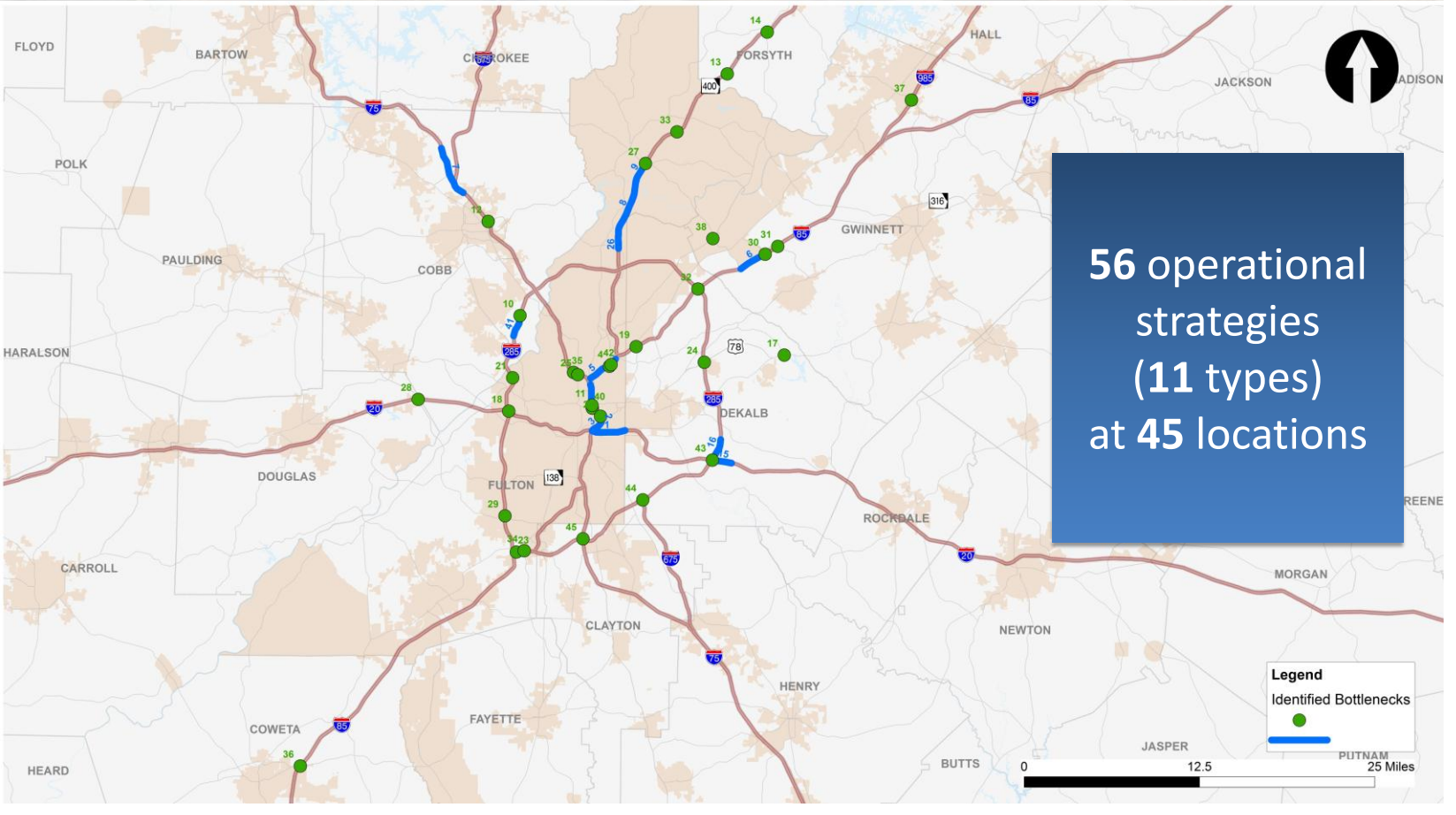
Potential Location-Specific Operational Strategies for Evaluation (Cont'd)

7) Interchange ramp terminal reconfigurations (Diverging Diamond Interchanges, etc.)
8) Turning prohibitions
9) Adjust signal timing at ramp terminal
10) New or modified ramp meters
11) Modify ramp geometrics to accommodate trucks and Automated truck rollover warning systems

Potential Location-Specific Operational Strategies for Evaluation - Summary

Strategy Category	No. of Locations
Variable/Dynamic Ramp Closures	4
Auxiliary Lanes (New or Using Shoulder)	15
Collector/Distributor Roads	2
Modifications to Frontage Road Access	1
Channelization	2
Re-Striping	9
Interchange Ramp Terminal Reconfiguration	14
Turning Prohibitions	1
Adjust Signal Timing at Ramp Terminal	1
New or Modified Ramp Meters	4
Modify Ramp Geometrics to Accommodate Trucks and Automated Truck Rollover Warning Systems	3

Location-Specific Operational Strategies – ID Map



56 operational strategies (**11** types) at **45** locations

Variable/Dynamic Ramp Closures
(closed to all vehicles or closed to unauthorized vehicles)

ID# 1: I-20 WB from Moreland Ave. to DT Connector

Location: I-20 WB from Moreland Ave. to Downtown Connector (2.2 miles)

Cause of Bottleneck: WB weave from 4 on-ramps and 4 off-ramps within 2.2 miles

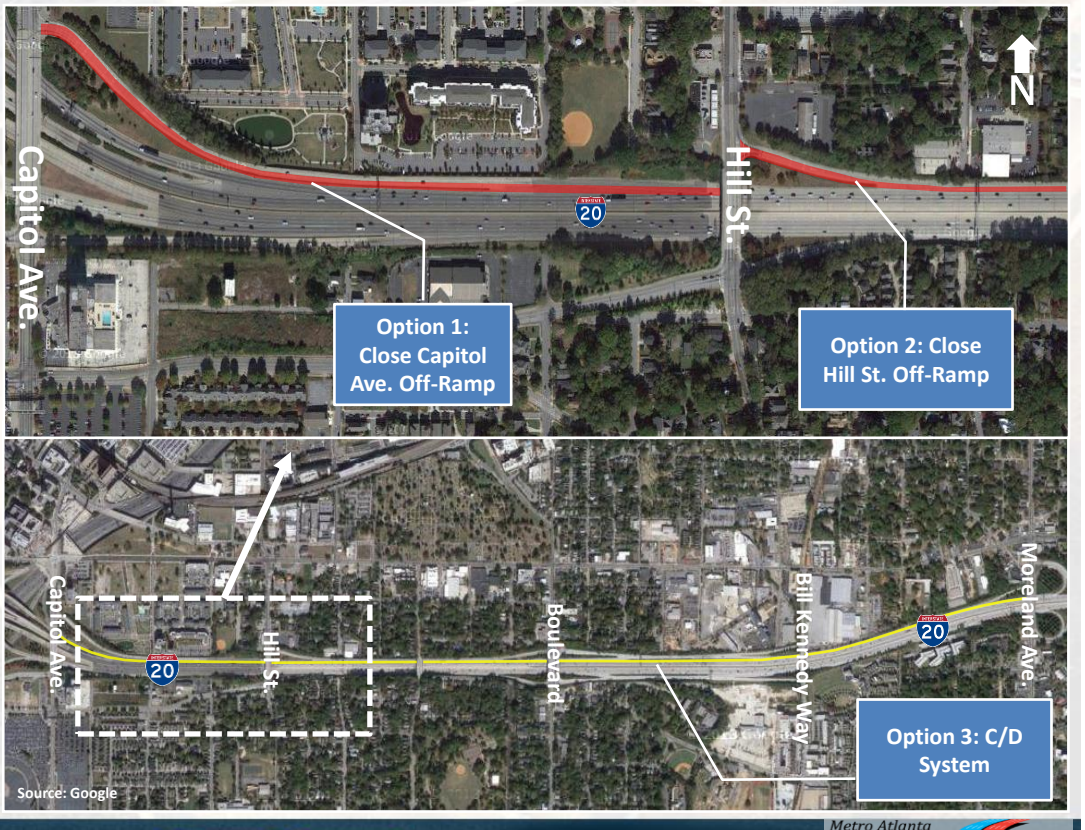
Potential Operational Strategies for Evaluation:

1) Dynamically close Capitol Ave. WB Off-Ramp by time of day

2) Dynamically close Hill St. WB Off-Ramp by time of day

3) WB C/D System from Moreland Ave. to Downtown Connector

Capitol Ave. WB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	700	200
Congested Speed (2010)	Not Available	Not Available
Hill St. WB Off-Ramp	**AM Peak**	**PM Peak**
Ramp Volume (2010)	1,000	300
Congested Speed (2010)	Not Available	Not Available
I-20 WB @ Boulevard	**AM Peak**	**PM Peak**
Volume (2010)	4,200	4,800
Congested Speed (2010)	> 45 mph	> 45 mph



ID# 2: Downtown Connector NB from I-20 to International Blvd.

Location: Downtown Connector NB from I-20 to International Blvd.

Cause of Bottleneck: I-20 merging traffic and traffic weaving between MLK Jr. Dr. and Edgewood Ave.

Potential Operational Strategies for Evaluation:

1) Close NB exit ramp at Edgewood Ave. to passenger vehicles (transit and emergency vehicles allowed)

2) Drop thru lane (dynamically) on Downtown Connector NB south of I-20 to provide I-20 users merging onto Downtown Connector another thru lane (bring all 3 I-20 lanes on to NB Downtown Connector)

I-75/I-85 NB @ Fulton St.	AM Peak	PM Peak
Volume (2010)	5,500	3,900
Congested Speed (2010)	> 45 mph	< 25 mph
I-20 to NB DT Connector On-Ramp	**AM Peak**	**PM Peak**
Ramp Volume (2010)	1,900	2,100
Congested Speed (2010)	Not Available	Not Available
Edgewood NB Off-Ramp	**AM Peak**	**PM Peak**
Ramp Volume (2010)	300	500
Congested Speed (2010)	Not Available	Not Available

ID# 3: Downtown Connector SB from Freedom Pkwy. to I-20

Location: Downtown Connector from Freedom Pkwy. to I-20

Cause of Bottleneck: Merging and diverging traffic (weave); 3 on-ramps and 2 off-ramps in ¾ mile

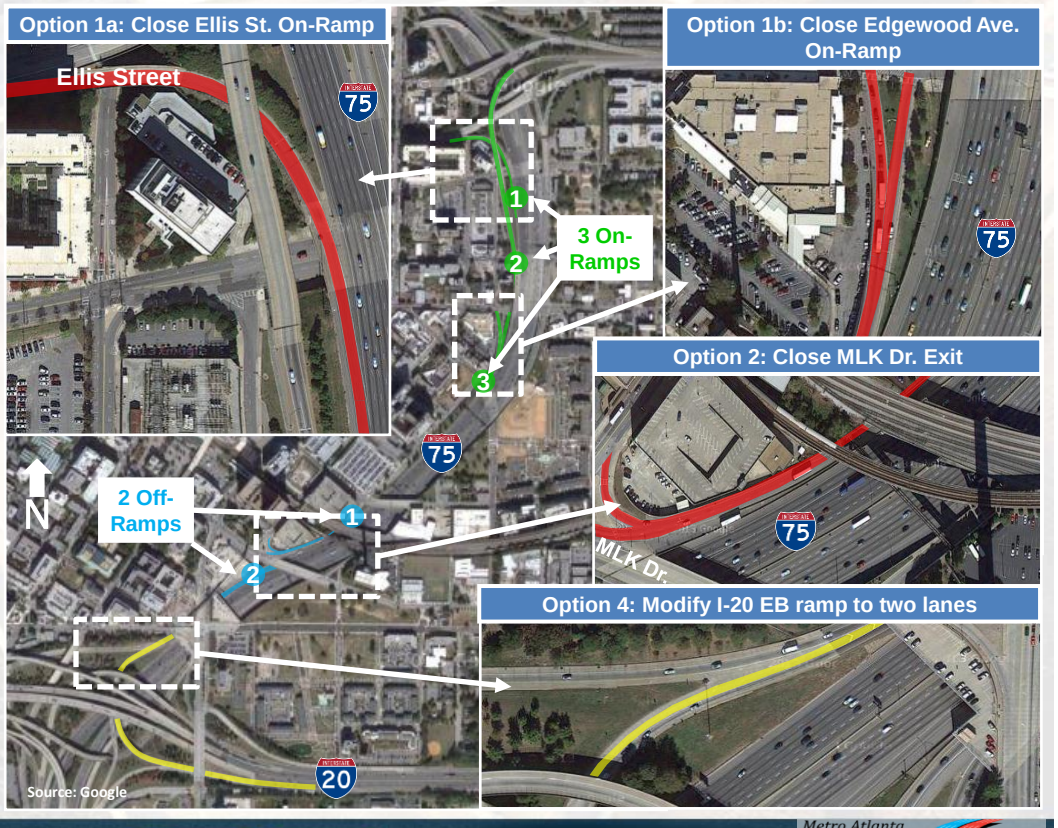
Potential Operational Strategies for Evaluation:

1) Close On-Ramp at either:
   a) Ellis St.; or
   b) Edgewood Ave.
2) Close MLK Off-Ramp
3) Modify DT Connector (to I-20) to 3 lane drop instead of 2
4) Re-stripe I-20 EB ramp to two lanes

Ellis St. SB On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	300	200
Congested Speed (2010)	Not Available	Not Available

Edgewood Ave. SB On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	400	900
Congested Speed (2010)	Not Available	Not Available

MLK Jr. Dr. SB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	900	100
Congested Speed (2010)	Not Available	Not Available



ID# 4: Monroe Dr. @ Buford Connector NB

Location: Monroe Dr. On-Ramp at NB Buford Connector

Cause of Bottleneck: Weaving (Multiple on/ off-ramps in a short distance)

Potential Operational Strategies for Evaluation:

1) Close on-ramp from Monroe Dr. onto NB Buford Connector
2) Add ramp meter on Monroe Dr. on-ramp to Buford Connector
3) Use approx. 1 mile of shoulder between Monroe Dr. and I-85 on-ramp

Additional Data Collection Underway

NB Buford Conn.	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Auxiliary Lanes
(new or using shoulder)

ID# 5: I-85 North from ½ Mile North of Peachtree St. to I-85/SR 400 Merge

Location: I-85 North from ½ mile north of Peachtree St. to I-85/SR 400 merge (1.3 miles)

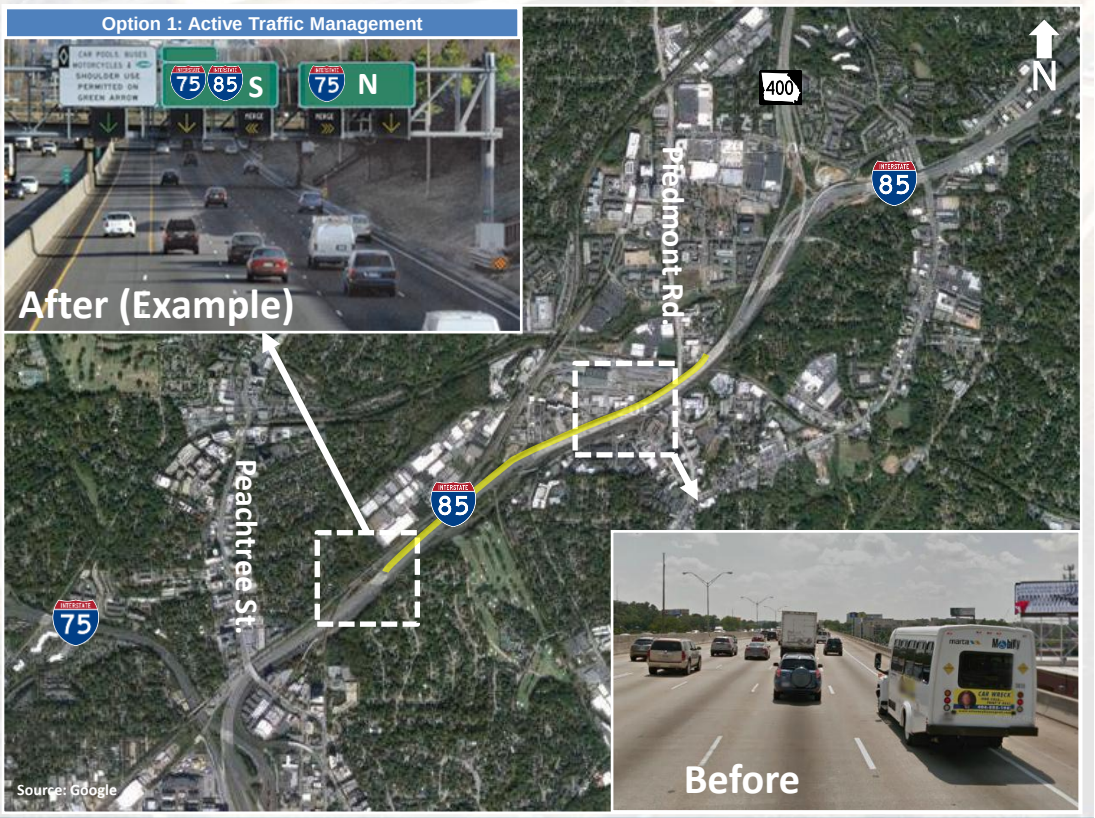
Cause of Bottleneck: Weaving

Potential Operational Strategies for Evaluation:

1) Active Traffic Management including using shoulder lanes, advance queue warning and variable speed limit strategies for I-85 (carry 2nd lane through at SR 400/I-85 merge SB and carry to I-75 with drop just before Buford Connector on-ramp)

I-85 NB @ Buford Hwy.	AM Peak	PM Peak
Volume (2010)	8,600	10,100
Congested Speed (2010)	> 45 mph	35 – 45 mph
I-85 SB @ Buford Hwy.	**AM Peak**	**PM Peak**
Volume (2010)	7,600	6,000
Congested Speed (2010)	> 45 mph	26 – 35 mph

Option 1: Active Traffic Management



ID# 6: I-85 NB from Jimmy Carter Blvd. to Indian Trail

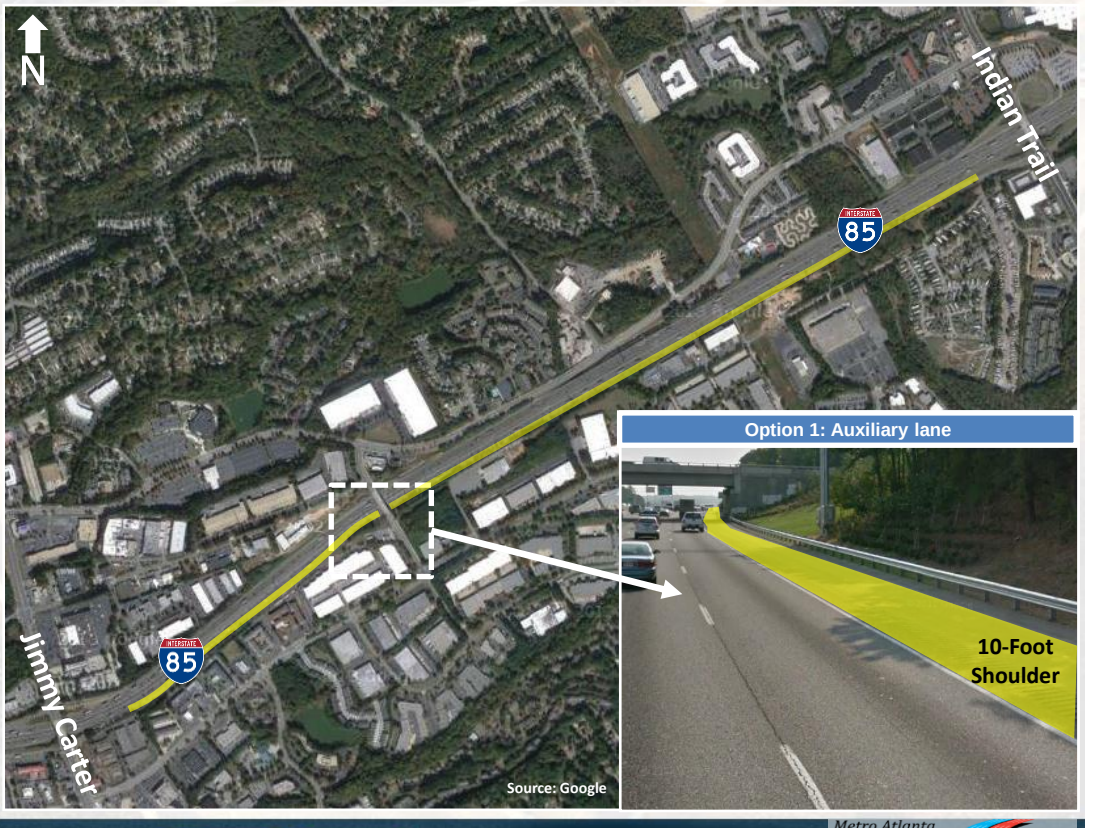
Location: I-85 NB from Jimmy Carter Blvd. to Indian Trail (1.9 miles)

Cause of Bottleneck: Weaving

Potential Operational Strategies for Evaluation:

1) **Use NB shoulder as an auxiliary lane during PM peak period**

I-85 NB	AM Peak	PM Peak
Volume (2010)	6,400	10,600
Congested Speed (2010)	> 45 mph	26 – 35 mph



ID# 7: I-75 N Between SR 5 to SR 120

Location: I-75 N SB between SR 5 to SR 120 (1.5 miles)

Cause of Bottleneck: High volume on-ramps accessing I-75

Potential Operational Strategies for Evaluation:

1) **Use SB shoulder as an auxiliary lane between SR 5 and SR 120 during AM peak period**

2) **Use NB shoulder as an auxiliary lane between SR 5 and SR 120 during PM peak period**

I-75 NB	AM Peak	PM Peak
Volume (2010)	5,400	9,600
Congested Speed (2010)	> 45 mph	< 25 mph

I-75 SB	AM Peak	PM Peak
Volume (2010)	8,400	7,600
Congested Speed (2010)	> 45 mph	> 45 mph

ID# 8: SR 400 from Abernathy Rd. to Holcomb Br. Rd.

Location: SR 400 from Abernathy Rd. to Holcomb Bridge Rd. (6.4 miles)

Cause of Bottleneck: Heavy peak period volumes

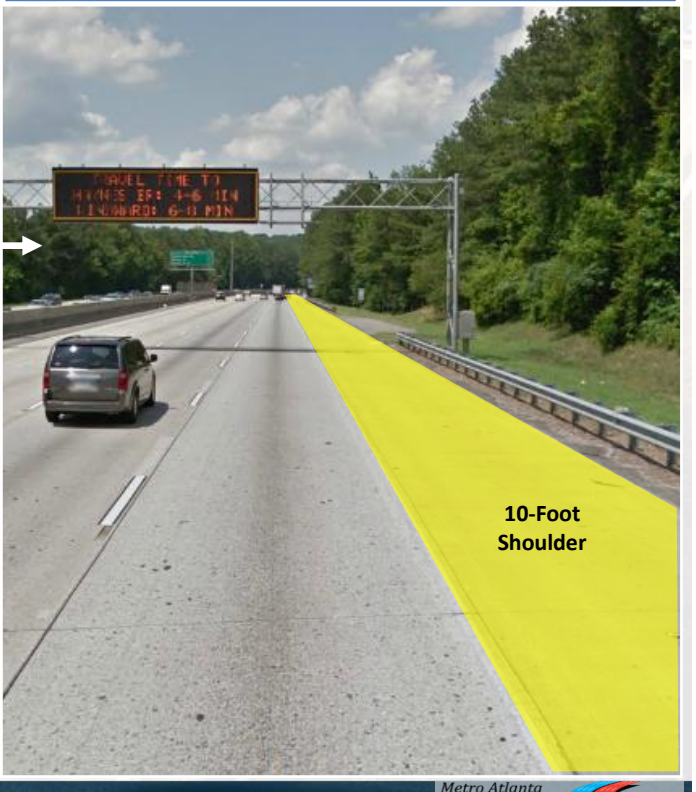
Potential Operational Strategies for Evaluation:

1) Use NB and SB shoulders as auxiliary lanes during the AM and PM peak periods

SR 400 NB @ Northridge Rd.	AM Peak	PM Peak
Volume (2010)	5,300	7,400
Congested Speed (2010)	> 45 mph	> 45 mph

SR 400 SB @ Northridge Rd.	AM Peak	PM Peak
Volume (2010)	5,400	5,500
Congested Speed (2010)	35 – 45 mph	35 – 45 mph

Option 1: Shoulder lane



ID# 9: SR 400 from Holcomb Bridge Rd. to Abernathy Rd.

Location: SR 400 from Holcomb Bridge Rd. to Abernathy Rd. (6.4 miles)

Cause of Bottleneck: High traffic volume

Potential Operational Strategies for Evaluation:

1) Upgrade current signage and technology to enhance existing shoulder lane performance

SR 400 NB @ Northridge Rd.	AM Peak	PM Peak
Volume (2010)	5,300	7,400
Congested Speed (2010)	> 45 mph	> 45 mph

SR 400 SB @ Northridge Rd.	AM Peak	PM Peak
Volume (2010)	5,400	5,500
Congested Speed (2010)	35 – 45 mph	35 – 45 mph

ID# 10: I-285 NW from S. Cobb Dr. to Paces Ferry Rd.

Location: I-285 NW from S. Cobb Dr. to Paces Ferry Rd. (2.5 miles)

Cause of Bottleneck: High traffic volume

Potential Operational Strategies for Evaluation:

1) Use shoulders as auxiliary lanes in both directions

I-285 NB @ Atlanta Rd.	AM Peak	PM Peak
Volume (2010)	6,500	5,100
Congested Speed (2010)	> 45 mph	> 45 mph

I-285 SB @ Atlanta Rd.	AM Peak	PM Peak
Volume (2010)	4,500	6,600
Congested Speed (2010)	> 45 mph	35 – 45 mph

Option 1: Shoulder lane

ID# 11: Downtown Connector NB from North Ave. to 10th St.

Location: Downtown Connector NB from North Ave. to 10th St. (.75 miles)

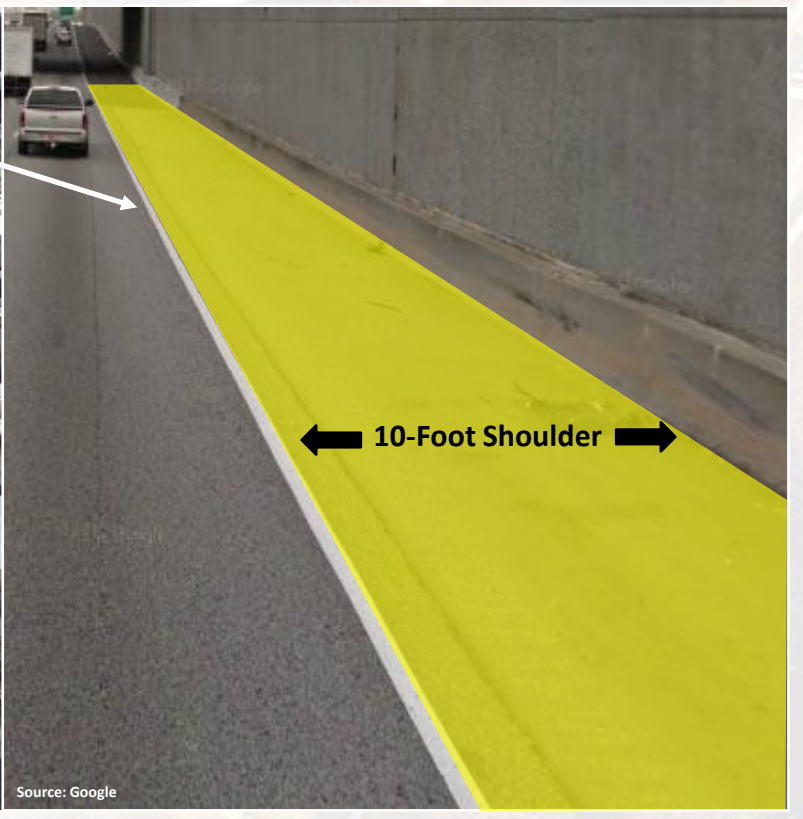
Cause of Bottleneck: Merging traffic from Williams St./Linden Ave.

Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane between North Ave. and 10th St. (NB)

2) Use shoulder lane to widen 10th St. off-ramp

I-75/I-85 NB @ 5th Street	AM Peak	PM Peak
Volume (2010)	8,000	10,200
Congested Speed (2010)	> 45 mph	25 - 35 mph



ID# 12: I-75 N @ North Loop

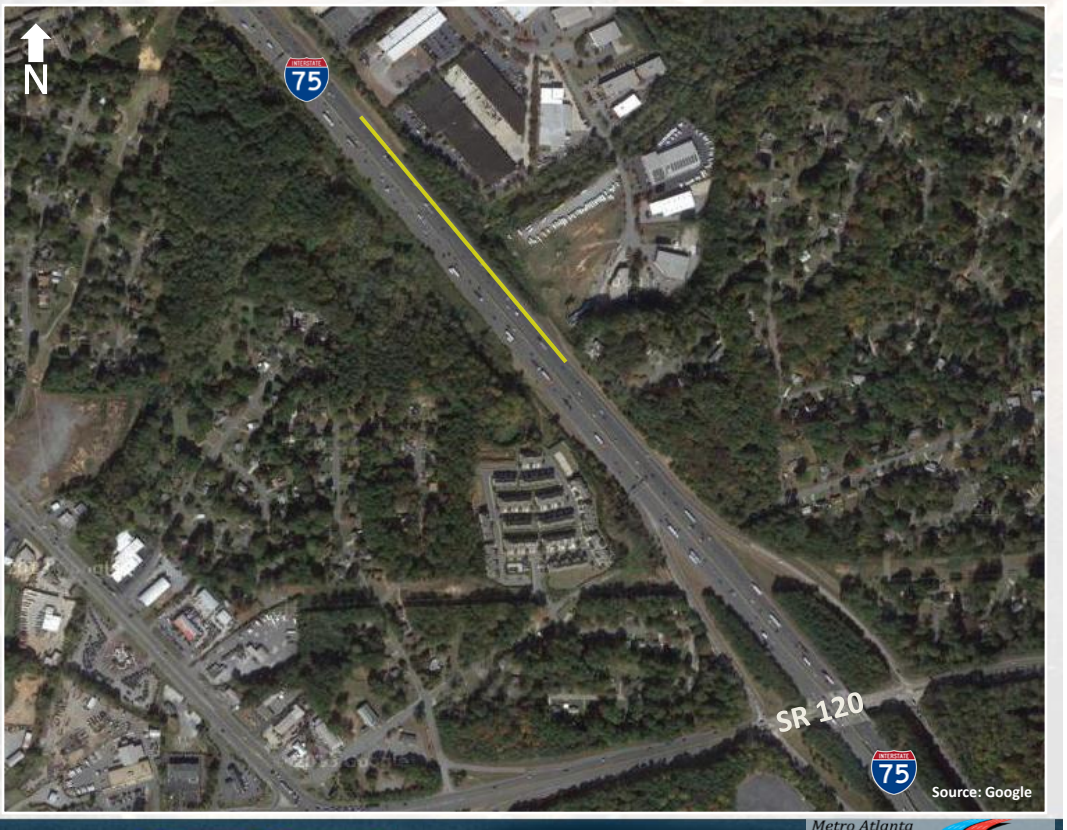
Location: I-75 N at North Loop (NB On-ramp grade)

Cause of Bottleneck: Lane drops/weaving

Potential Operational Strategies for Evaluation:

1) Use NB shoulder lane to extend on-ramp 1,000 feet

SR 120 NB On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	600	800
Congested Speed (2010)	Not Available	Not Available



ID # 13: SR 400 NB between McFarland Rd. and SR 141/Peachtree Pkwy.

Location: SR 400 between McFarland Rd. and SR 141/Peachtree Pkwy. (3.4 miles)

Cause of Bottleneck: Two NB general purpose (GP) lanes drop and merge at McFarland Rd. (Exit 12) on GA 400.

Recently completed GDOT project extending one NB GP lane north of McFarland Rd. interchange (now merges 4 to 3 to 2 lanes).

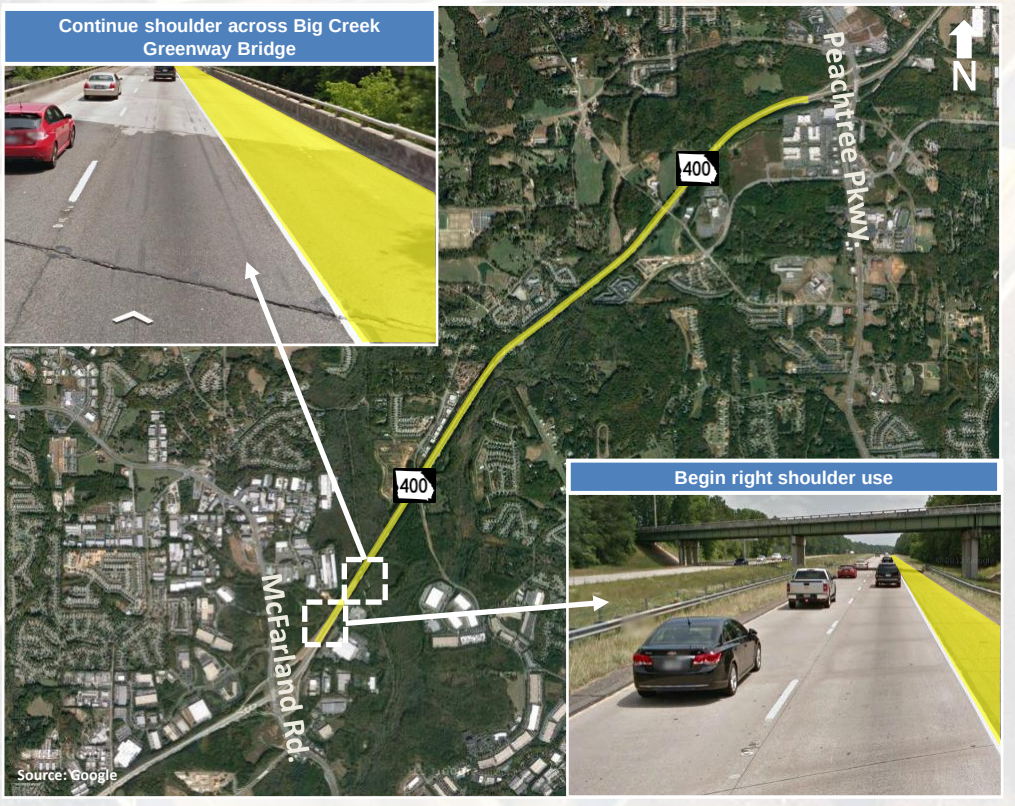
Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane between McFarland Rd. and Peachtree Pkwy.

Note: Consider bridge impacts on shoulder lane termini

Additional Data Collection Underway

GA 400 NB @ McFarland Rd.	AM Peak	PM Peak
Volume (2010)	1,200	1,900
Congested Speed (2010)	> 45 mph	35 – 45 mph



ID# 14: SR 400 SB between SR 141/Peachtree Pkwy. and McFarland Rd.

Location: SR 400 between SR 141/Peachtree Pkwy. and McFarland Rd. (3.4 miles)

Cause of Bottleneck: SB On-Ramp

Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane from Peachtree Parkway to McFarland Rd.

Additional Data Collection Underway

GA 400 SB @ McFarland Rd.	AM Peak	PM Peak
Volume (2010)	3,500	1,600
Congested Speed (2010)	35 - 45 mph	> 45 mph

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ID# 15: I-20 E WB From Wesley Chapel Rd. to I-285

Location: I-20 E WB from Wesley Chapel Rd. to I-285 (.9 miles)

Cause of Bottleneck: Weaving/Turning radius (especially for heavy trucks); High volume

Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane during AM peak period

I-20 WB West of Wesley Chapel Rd.	AM Peak	PM Peak
Volume (2010)	7,900	4,600
Congested Speed (2010)	35 – 45 mph	> 45 mph

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 16: I-285 E NB from I-20 to Glenwood Rd.

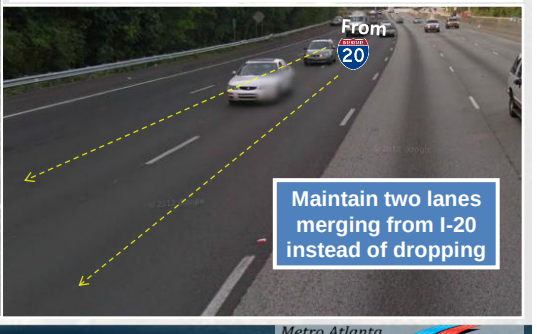
Location: I-285 E NB from I-20 to Glenwood Rd. (1.2 miles)

Cause of Bottleneck: Weaves

Potential Operational Strategies for Evaluation:

1) Use NB shoulder as an auxiliary lane to maintain an additional lane from I-20 onto I-285 NB

I-20 On-Ramp NB	AM Peak	PM Peak
Ramp Volume (2010)	1,300	2,200
Congested Speed (2010)	Not Available	Not Available



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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 17: US 78 @ Hugh Howell Rd.

Location: US 78 at Hugh Howell Rd.

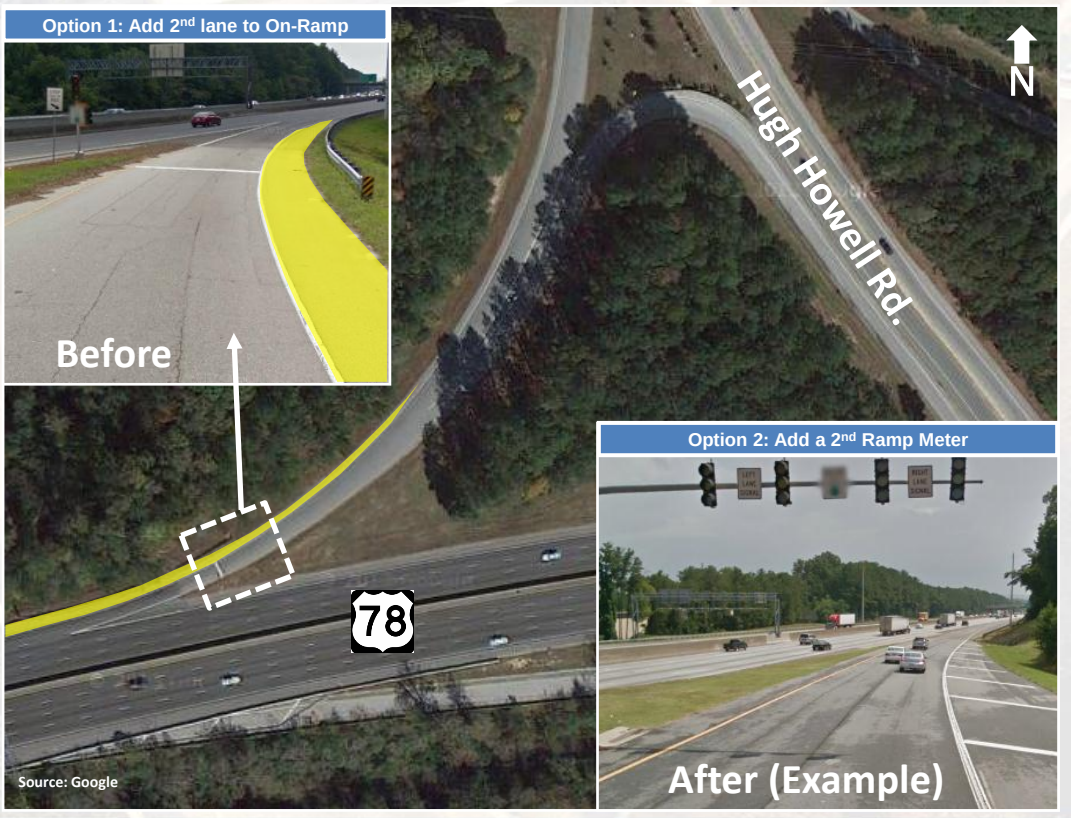
Cause of Bottleneck: High volume on single lane on-ramp

Potential Operational Strategies for Evaluation:

1) Add a second lane to WB on-ramp using shoulder

2) Add second ramp meter

Hugh Howell WB On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Collector/Distributor Roads

ID# 18: I-285 W/I-20 W

Location: I-285W/I-20W

Cause of Bottleneck: Tight turning radius/grade (NB to WB, SB to WB) especially for heavy trucks

Potential Operational Strategies for Evaluation:

1) SB I-285 to WB I-20: Drop a EB mainline lane at the exit to I-285 S so that we can add the lane back to the mainline when both WB ramps come on (adds 2 lanes on to the mainline instead of a merged lane – one of the lanes drops at Fulton Industrial Blvd.)

2) EB I-20 to NB I-285: Combine both ramps into 1 exit (2 lane exit and then splits to 1 lane North and 1 lane South) and introduce barrier to create a C/D road (reduce 3 thru lanes to 2 going over the bridge)

3) WB I-20 to SB I-285: Reconfigure as a lane drop

EB I-20 to SB I-285	AM Peak	PM Peak
Ramp Volume (2010)	400	1,000
Congested Speed (2010)	Not Available	Not Available

EB I-20 to SB I-285	AM Peak	PM Peak
Ramp Volume (2010)	400	1,000
Congested Speed (2010)	Not Available	Not Available

I-285 NB/SB On-Ramp to WB I-20	AM Peak	PM Peak
Ramp Volume (2010)	1,900	1,800
Congested Speed (2010)	Not Available	Not Available

WB I-20 to SB I-285	AM Peak	PM Peak
Ramp Volume (2010)	300	1,100
Congested Speed (2010)	Not Available	Not Available

Modifications to Frontage Road Access

ID# 19: I-85 SB @ N. Druid Hills Rd.

Location: I-85 SB at N. Druid Hills Rd. (Southbound Exit Ramp)

Cause of Bottleneck: Frontage road traffic access may create off-ramp bottleneck

Potential Operational Strategies for Evaluation:

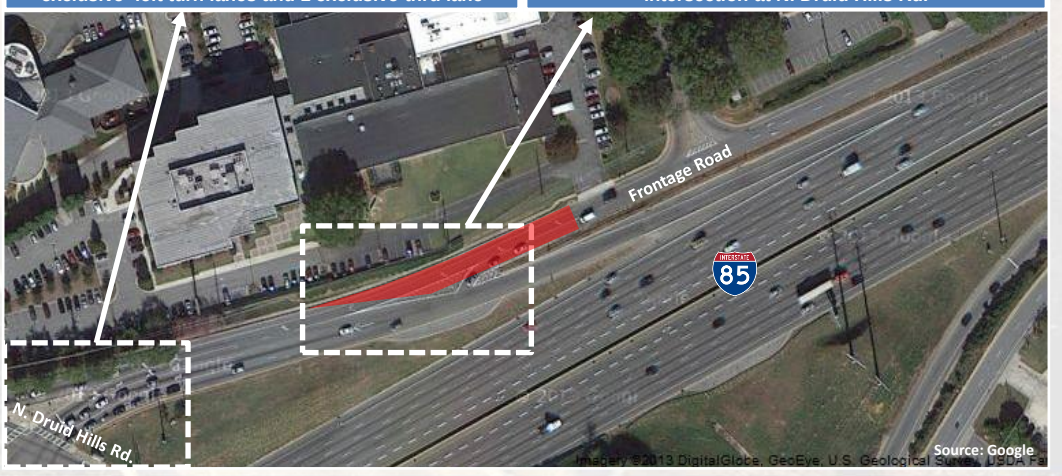
1) **Close access from frontage road to I-85 off-ramp**
2) **Re-stripe SB off-ramp to 1 exclusive thru lane and 2 exclusive left turn lanes**

Additional Data Collection Underway

Druid Hills SB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Option 2: Modify Intersection SB approach to 2 exclusive left turn lanes and 1 exclusive thru lane

Option 1: Close frontage road access to ramp intersection at N. Druid Hills Rd.



Channelization

ID# 20: Downtown Connector HOV Lanes

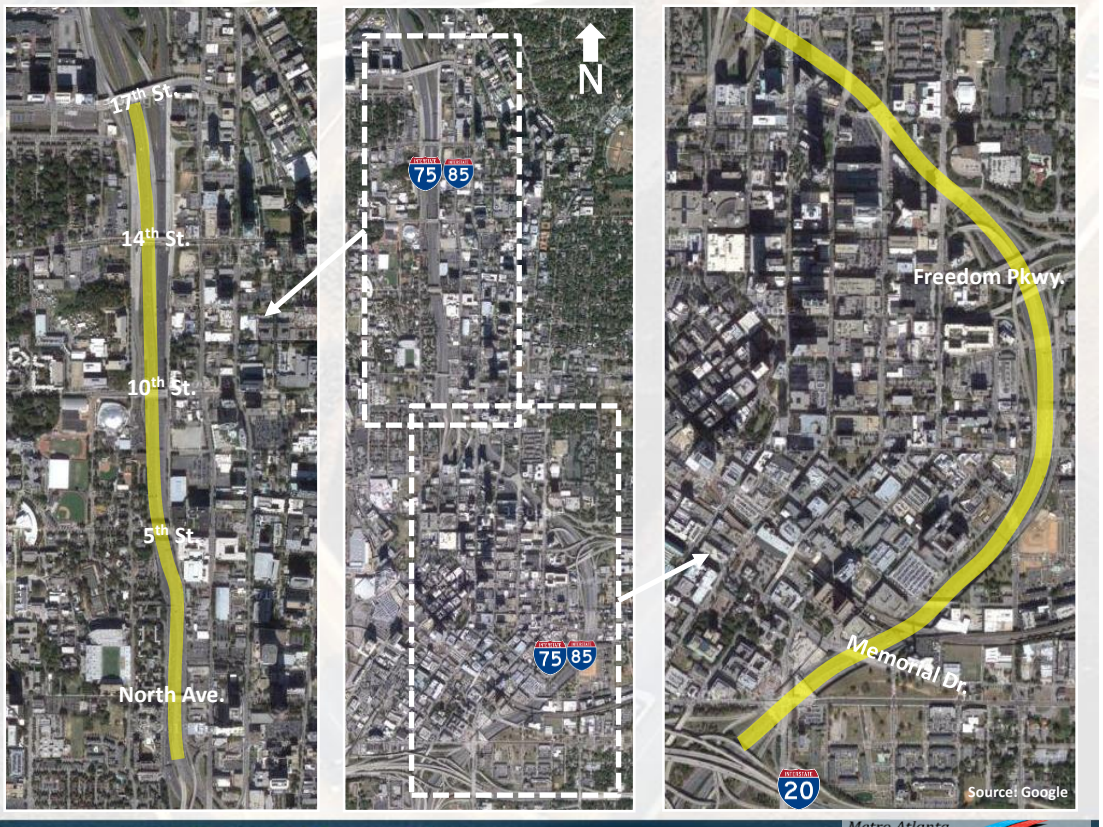
Location: Downtown Connector NB and SB HOV Lanes (3.5 miles)

Cause of Bottleneck: Weaving between HOV lanes and GP lanes

Potential Operational Strategies for Evaluation:

1) Remove HOV dashed line and channelize HOV lanes with delineators from 17th St. to I-20

SB DT Conn. @ 14th	AM Peak	PM Peak
Volume (2010)	8,900	5,000
Congested Speed (2010)	> 45	< 25
SB DT Conn. @ Memorial Dr.	**AM Peak**	**PM Peak**
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	> 45	25 - 35



ID# 21: I-285 NW @ Bolton Rd.

Location: I-285 NW at Bolton Rd.

Cause of Bottleneck: Skewed intersection and limited sight distance

Potential Operational Strategies for Evaluation:

1) Channelize NB traffic and add designated lane using new pavement for ramp traffic

Bolton Road	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Re-Striping

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 22: Downtown Connector NB from Freedom Pkwy. to Pine St.

Location: Downtown Connector NB from Freedom Pkwy. to Pine St. (NB Off-Ramp)

Cause of Bottleneck: Merge of two lanes from Freedom Pkwy. onto the Downtown Connector; Diverge of Peachtree St./Pine St. traffic exiting

Potential Operational Strategies for Evaluation:

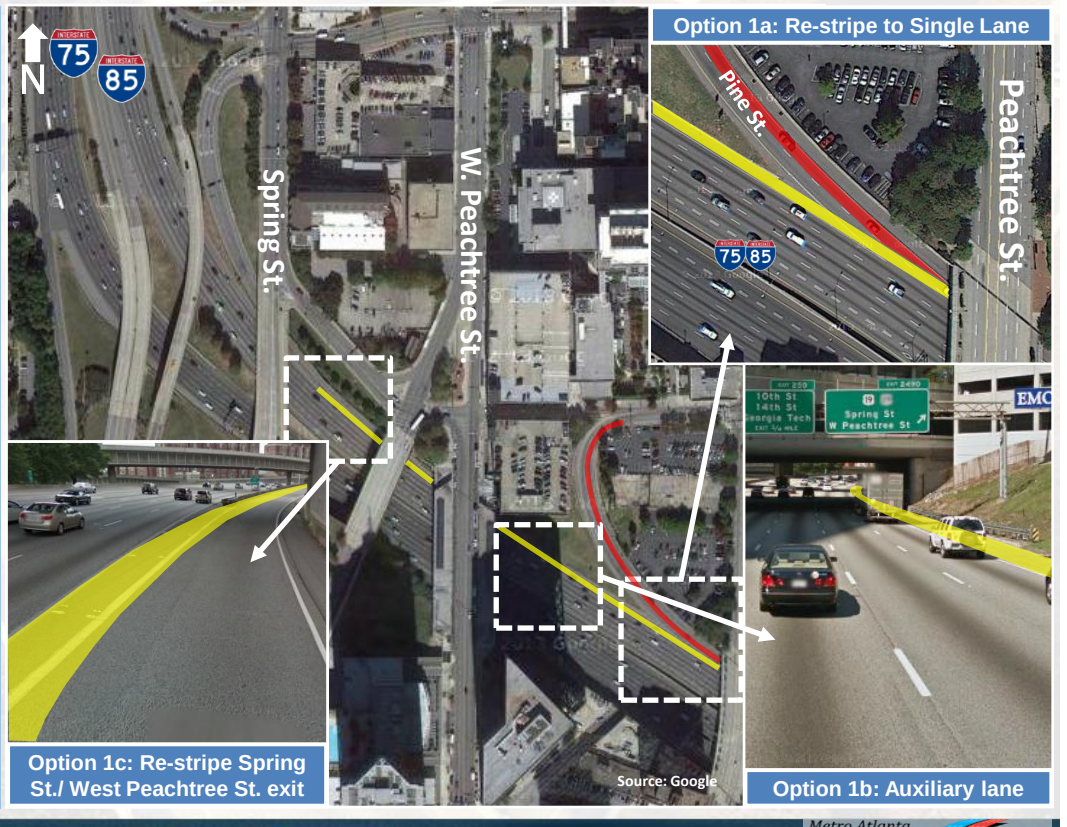
1a) Re-stripe Peachtree St./Pine St. exit from a 2-lane to a single lane exit

1b) Extend auxiliary lane via shoulder from Freedom Pkwy. to Spring St./ West Peachtree St. exit (.25 miles)

1c) Re-stripe Spring St./West Peachtree St. exit from 1 to 2 lanes (to accept shoulder lane traffic)

NB Pine/Peachtree Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	100	400
Congested Speed (2010)	Not Available	Not Available

NB DT Connector	AM Peak	PM Peak
Volume (2010)	8,800	8,000
Congested Speed (2010)	>45	26 - 35



Option 1a: Re-stripe to Single Lane

Option 1b: Auxiliary lane

Option 1c: Re-stripe Spring St./ West Peachtree St. exit

ID# 23: I-285 S @ I-85 S Interchange

Location: I-285 S at I-85 S Interchange

Cause of Bottleneck: I-85 NB to I-285 NB volume

Potential Operational Strategies for Evaluation:

1a) Re-stripe and widen (minimally) I-85 NB on-ramp to create two-lane on-ramp

1b) Re-stripe on-ramp from WB Old National Highway C/D road to merge traffic instead of adding a lane

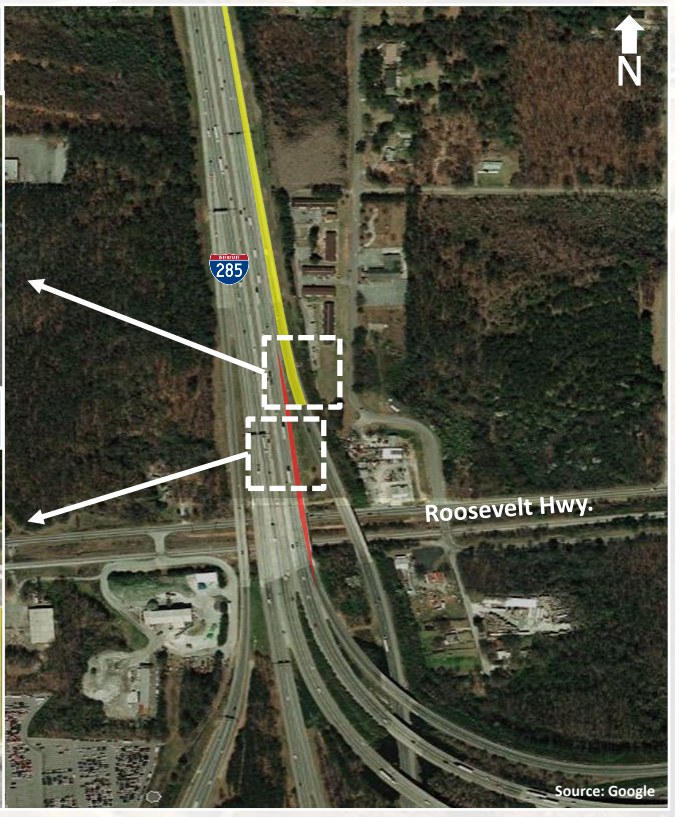
NB I-85 On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	2,700	1,800
Congested Speed (2010)	Not Available	Not Available

Additional Data Collection Underway

NB Old Natl. Hwy. On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Option 1a: Widen and restripe existing merge from I-85 NB to create two-lane on-ramp

Option 1b: Restripe Old National Hwy. On-ramp



ID# 24: US 78 WB @ I-285 NB

Location: US 78 WB at I-285 NB

Cause of Bottleneck: Signing/ Weaving/ Last minute decision making

Potential Operational Strategies for Evaluation:

1a) Re-signing for Lawrenceville exit (change from an exit only off-ramp to a decision off-ramp)

1b) Add new pavement in the gore area to extend two-lane ramp

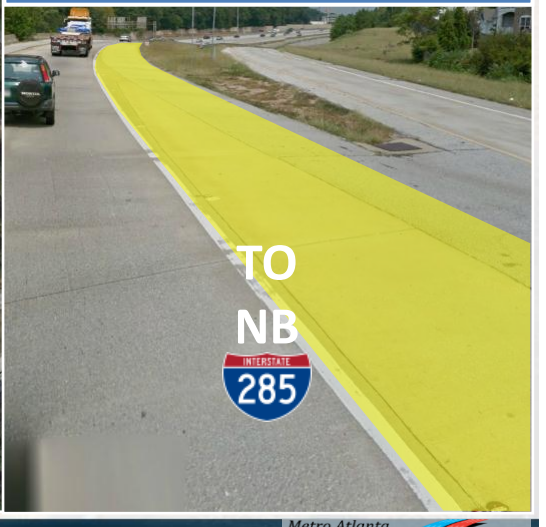
1c) Re-stripe two lanes from WB US 78 to NB I-285 so vehicles merge before I-285

NB I-285 @ US 78 On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	500	500
Congested Speed (2010)	Not Available	Not Available

Option 1c: Re-stripe US 78 to I-285 on-ramp

Option 1a: Signage Improvements

Option 1b: New Pavement and Re-striping of Lanes



ID# 25: I-75 @ Northside Dr.

Location: I-75 at Northside Dr.

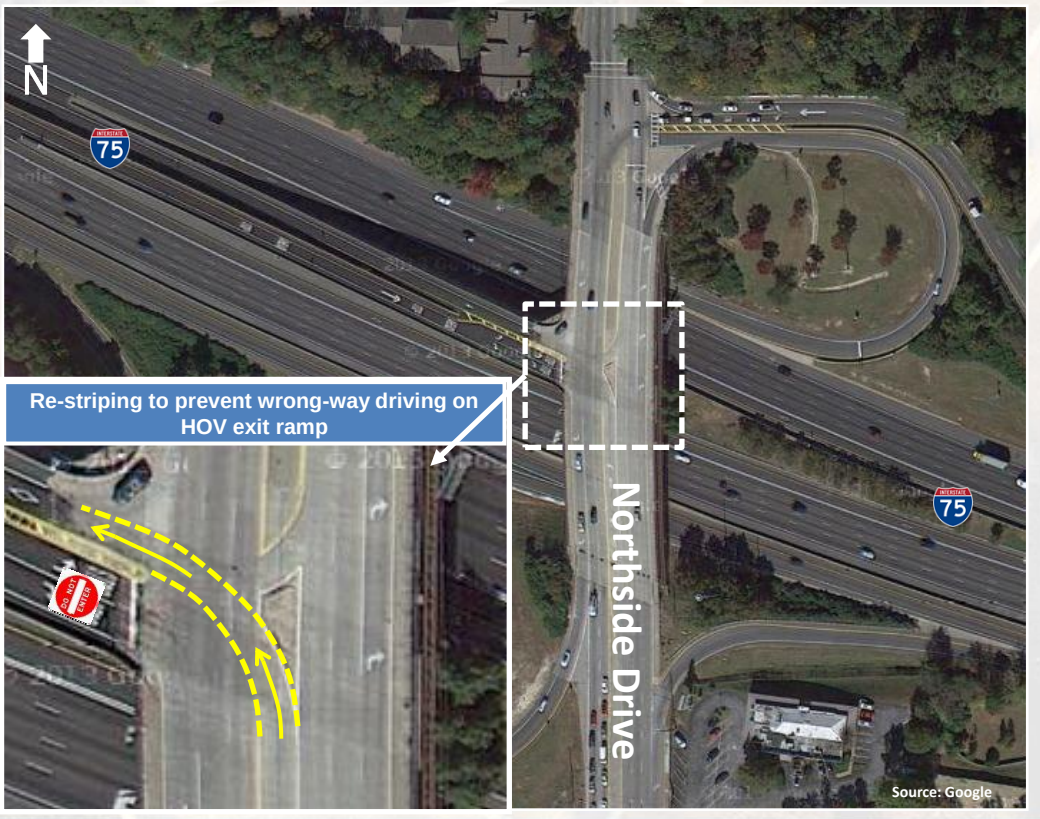
Cause of Safety Concern: HOV wrong way access

Potential Operational Strategies for Evaluation:

1) Re-striping; Add skip stripe on Northside Pkwy for WB to NB I-75 HOV entrance ramp so the drivers do not drive the wrong way on the HOV exit ramp.

Additional Data Collection Underway

Northside Drive	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 26: SR 400 @ Abernathy Rd.

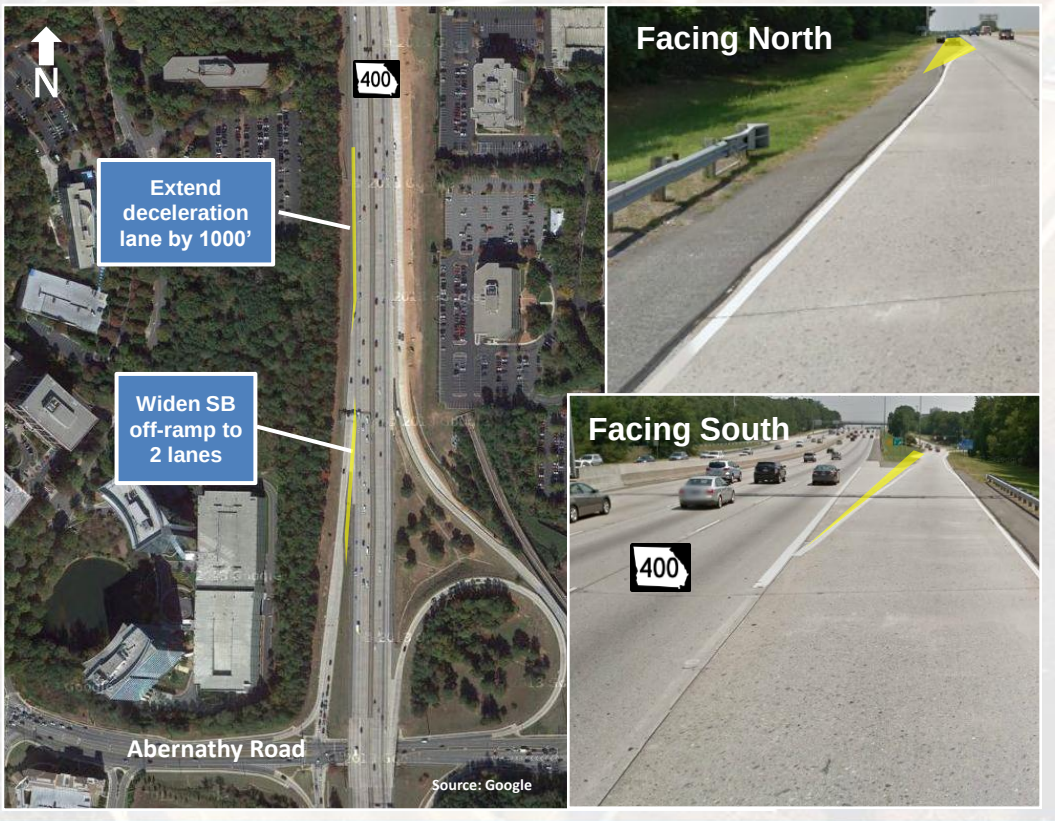
Location: SR 400 at Abernathy Rd.

Cause of Bottleneck: High SB off-ramp volume; short deceleration length

Potential Operational Strategies for Evaluation:

1) Widen SB Off-Ramp using the shoulder to 2 lanes and extend deceleration lane by 1000'

Abernathy Rd. SB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 27: SR 400 @ Holcomb Bridge Rd./SR 140

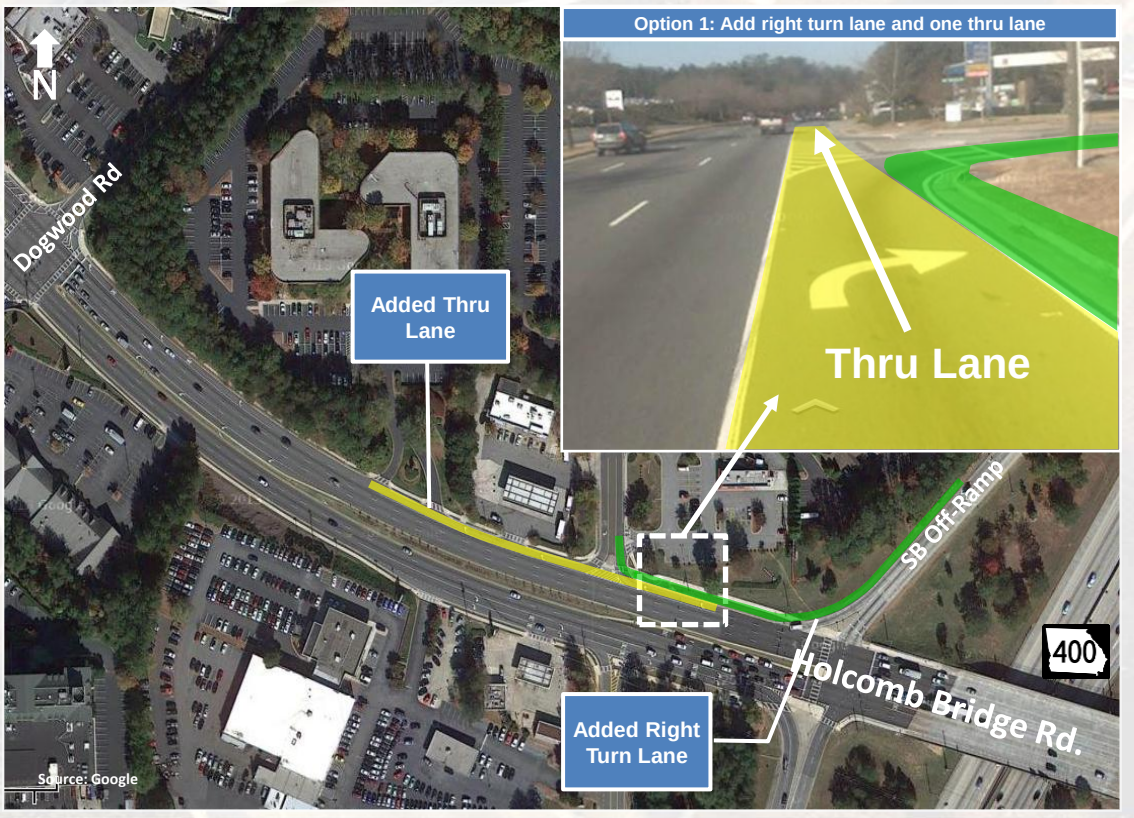
Location: SR 400 at Holcomb Bridge Rd./SR 140

Cause of Bottleneck: High volume on SB off-ramp

Potential Operational Strategies for Evaluation:

1) Add right turn lane to SB off-ramp and modify existing striping on Holcomb Bridge Rd. to add one through lane

SB Holcomb Bridge Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	300	1,000
Congested Speed (2010)	Not Available	Not Available



Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Interchange Ramp Terminal Reconfigurations
(Diverging Diamond Interchanges, etc.)

ID# 28: I-20 @ Thornton Rd.

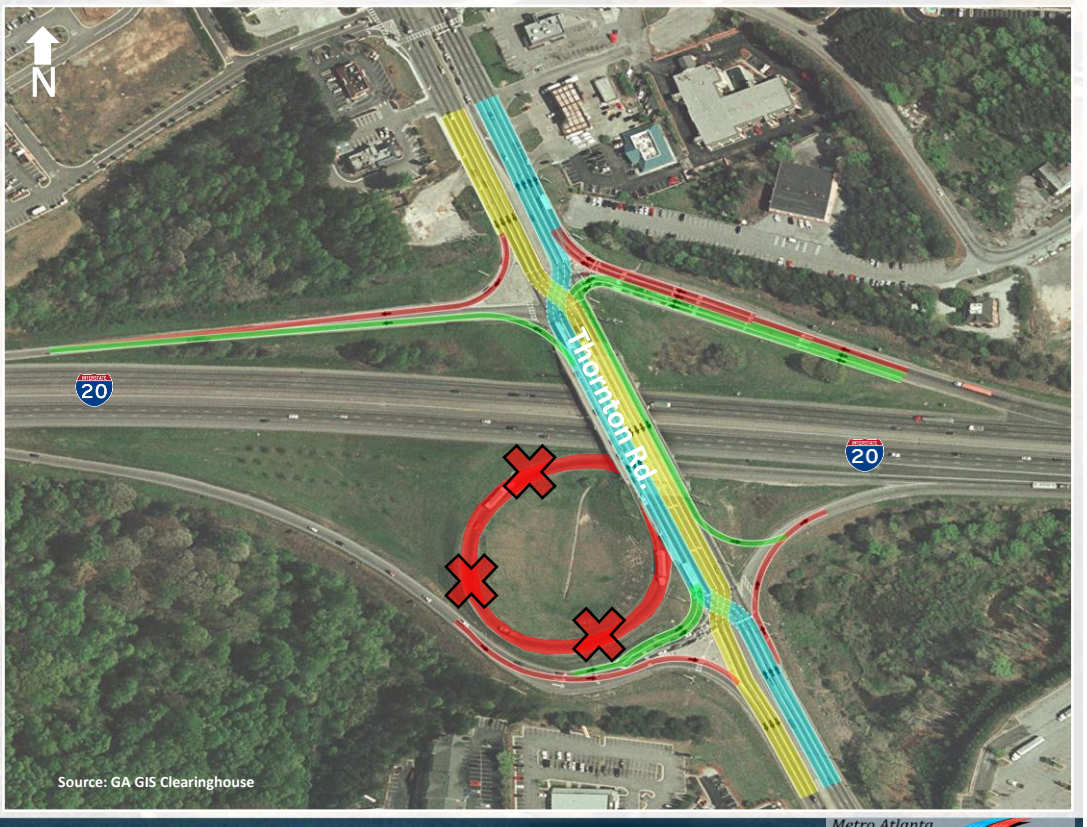
Location: I-20 at Thornton Rd.

Cause of Bottleneck: High left turn volumes/tight turning radii/steep grades

Potential Operational Strategies for Evaluation:

1) **Diverging Diamond Interchange (reduces the number of conflict points, enhances the operations of left turns from the arterial, and eliminates loop ramp (tight turning radii))**

Thornton Rd.	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 29: I-285 @ Camp Creek Pkwy.

Location: I-285 @ Camp Creek Pkwy.

Cause of Bottleneck: Both off-ramps back up onto I-285

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange (DDI) - (reduces the number of conflict points, enhances the operations of left turns from the arterial, and eliminates loop ramp (tight turning radii))

2) New configuration representing a hybrid of a DDI and a Displaced Left Turn Intersection

Additional Data Collection Underway

Camp Creek	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 30: I-85 N @ Indian Trail/Lilburn Rd.

Location: I-85 N at Indian Trail/Lilburn Rd.

Cause of Bottleneck: Not enough left/right turn lanes at ramp terminal

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange to reduce the number of conflicts

Indian Trail	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 31: I-85 N @ Beaver Ruin Rd.

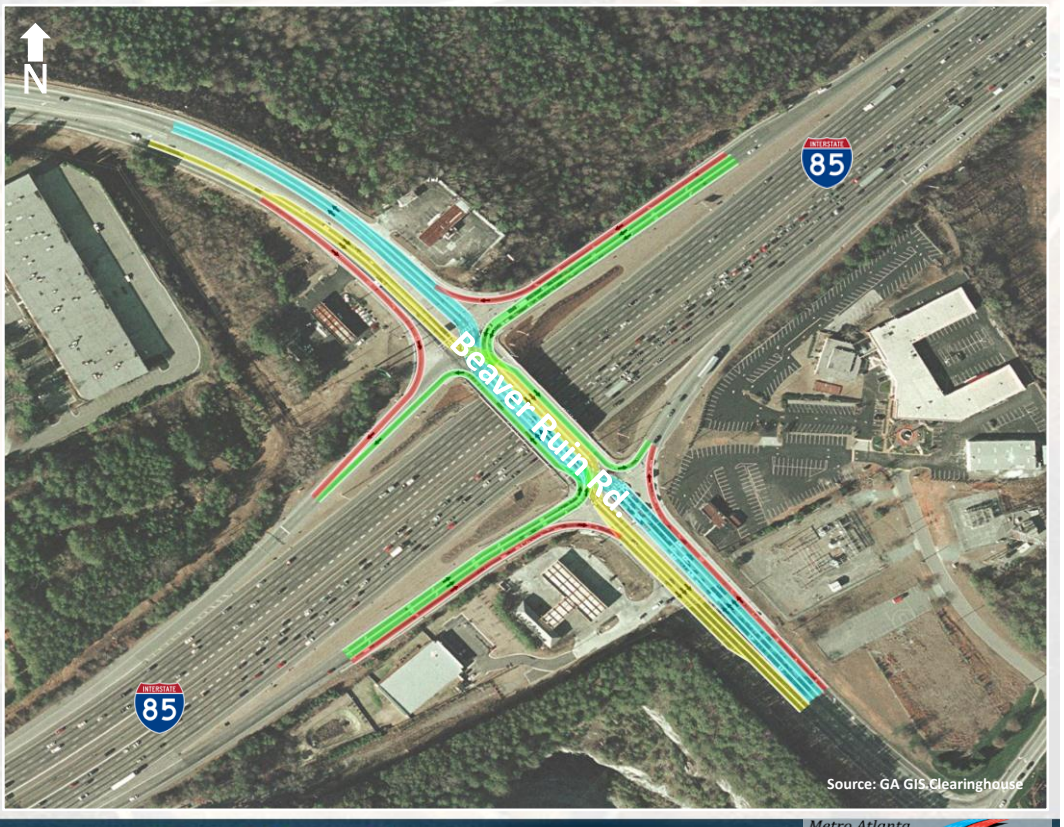
Location: I-85 N at Beaver Ruin Rd.

Cause of Bottleneck: High left turn volumes

Potential Operational Strategies for Evaluation:

1) **Diverging Diamond Interchange to reduce the number of conflicts**

Beaver Ruin Rd.	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 32: I-85 N @ I-285 Interchange

Location: I-85 N at I-285 Interchange

Cause of Bottleneck: High volumes - SB AM/NB PM

Potential Operational Strategies for Evaluation:

1) **Construct flyover for I-285 EB to I-85 NB that would provide access to Northcrest Rd. (eliminates the ability to exit on C/D and then get back on I-85 at Northcrest); and**

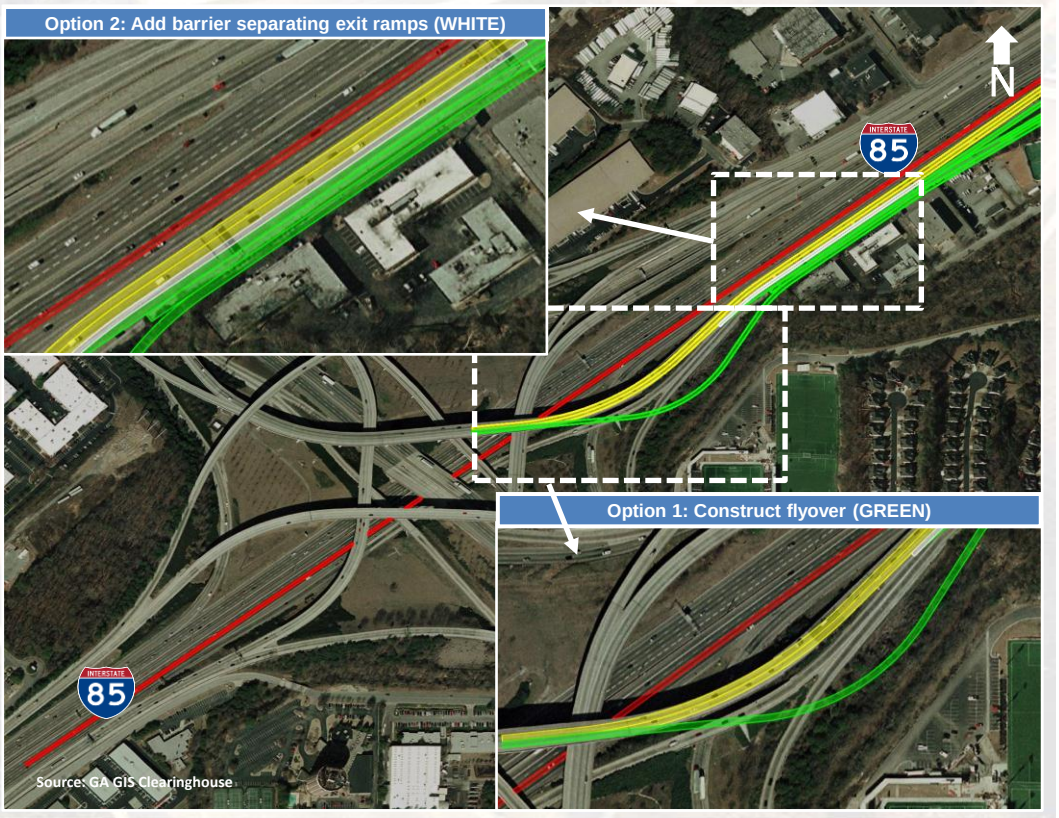
2) **Add barrier separating exit ramps from I-85 on-ramp**

Northcrest Rd. Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Additional Data Collection Underway

I-285 to I-85 NB On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

I-85 NB @ 285	AM Peak	PM Peak
Volume (2010)	3,400	8,600
Congested Speed (2010)	> 45	< 25



ID# 33: SR 400 @ Haynes Bridge Rd.

Location: SR 400 at Haynes Bridge Rd.

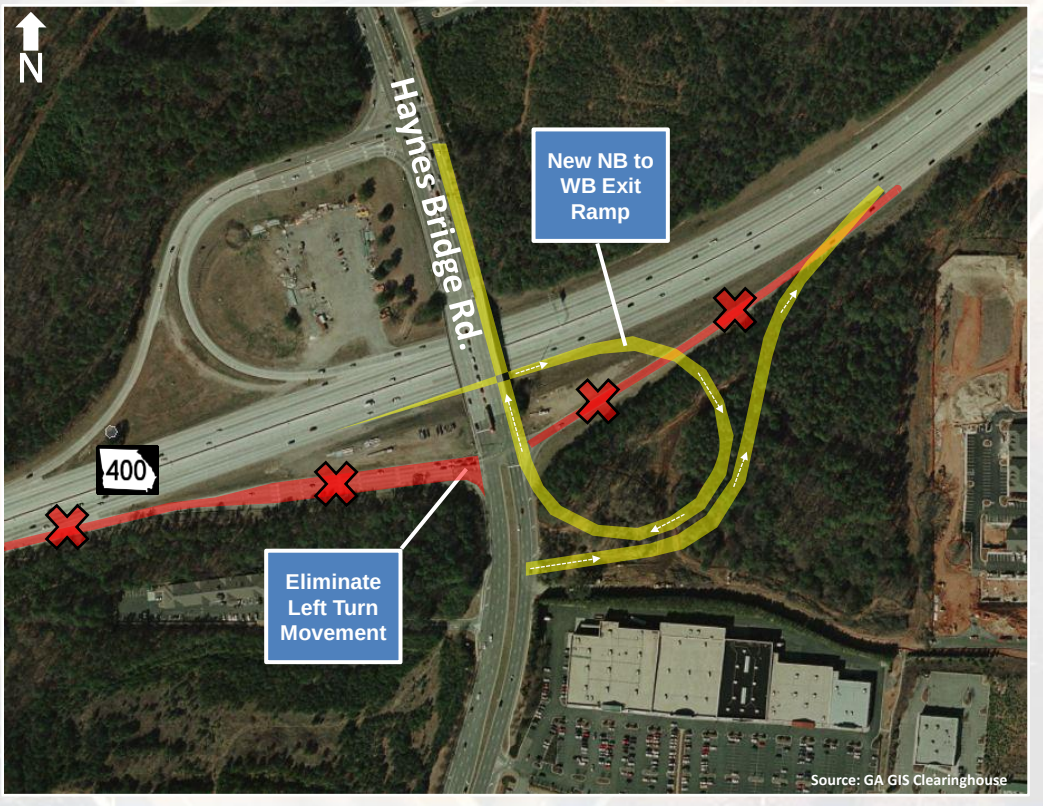
Cause of Bottleneck: Heavy NB to WB movement

Potential Operational Strategies for Evaluation:

1) Construct new NB to WB loop ramp and re-construct NB SR 400 on-ramp

Haynes Bridge Rd. NB On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	400	1,000
Congested Speed (2010)	Not Available	Not Available

Haynes Bridge Rd. NB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	900	1,100
Congested Speed (2010)	Not Available	Not Available



ID# 34: I-285/85 @ Old National Highway

Location: I-285/85 @ Old National Highway

Cause of Bottleneck: Arterial peak period volumes on Old National and Godby Rd.

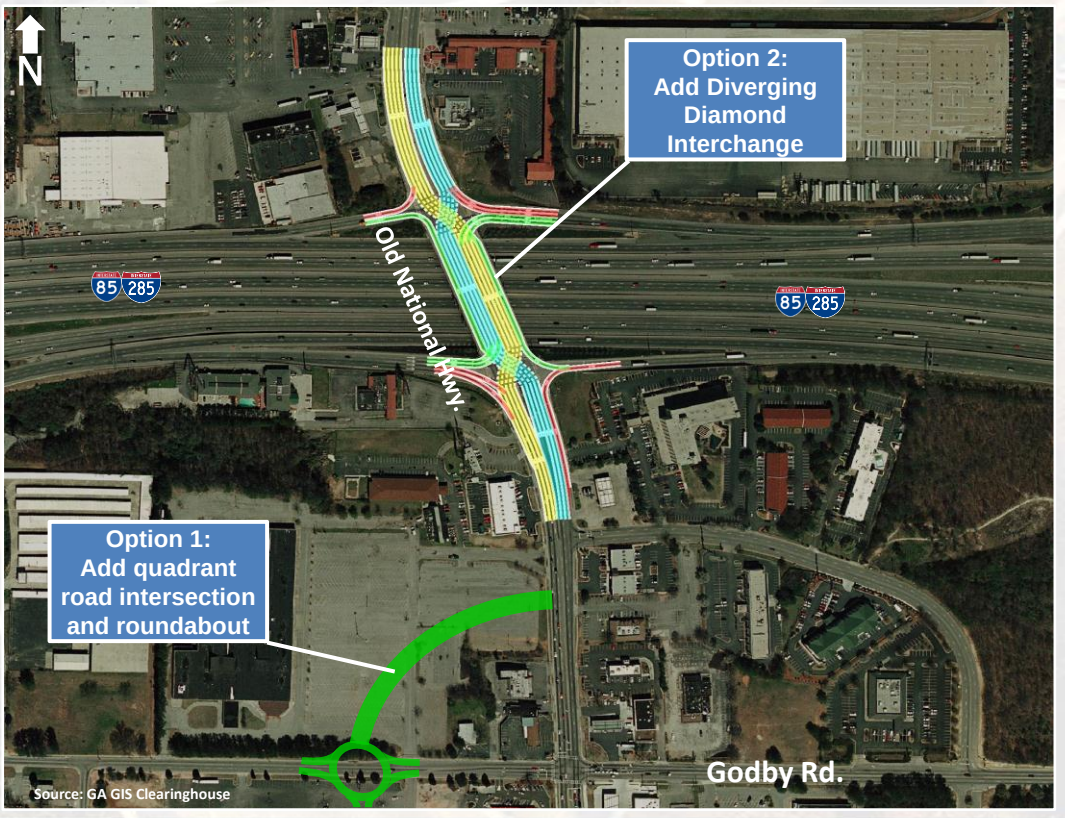
Potential Operational Strategies for Evaluation:

1) Add Quadrant road intersection and roundabout

2) Add Diverging Diamond (reduces the number of conflicts)

Additional Data Collection Underway

Old National Highway	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 35: I-75 @ Howell Mill Rd.

Location: I-75 at Howell Mill Rd.

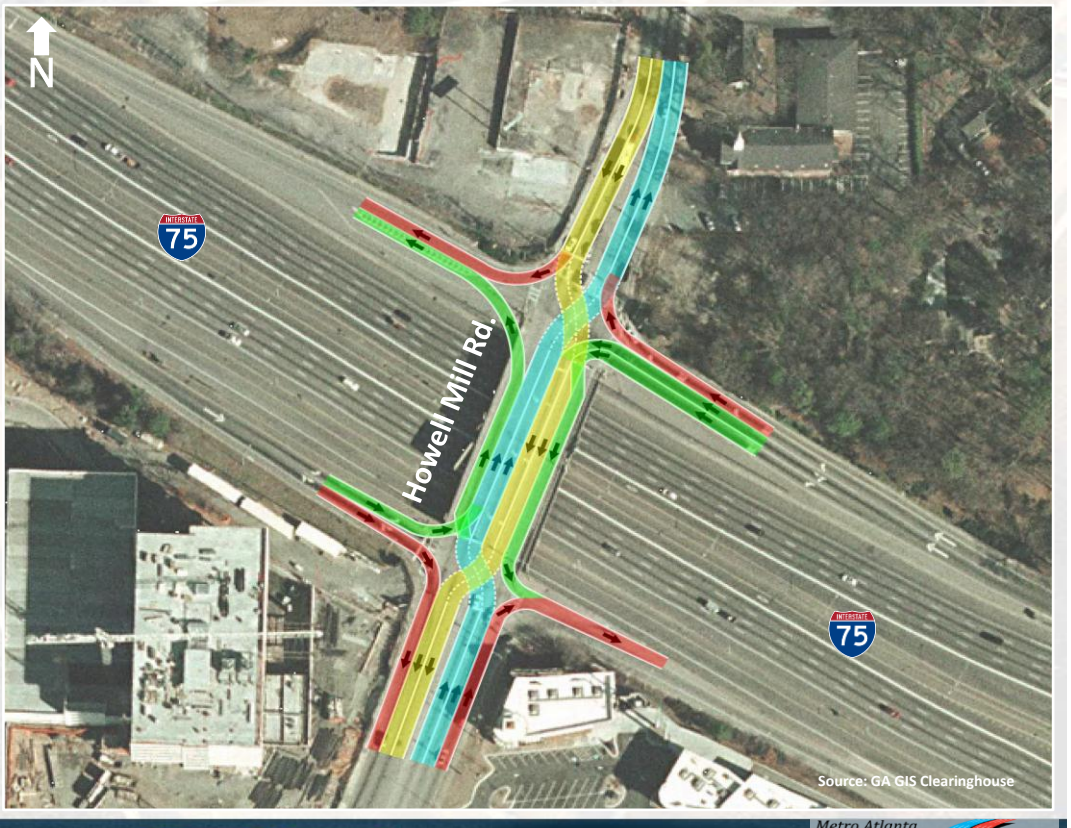
Cause of Bottleneck: Weaving/turn volumes at NB Off-Ramp

Potential Operational Strategies for Evaluation:

1) **Diverging Diamond Interchange (reduces the number of conflicts)**

Additional Data Collection Underway

Howell Mill Rd.	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 36: I-85 S @ SR 34

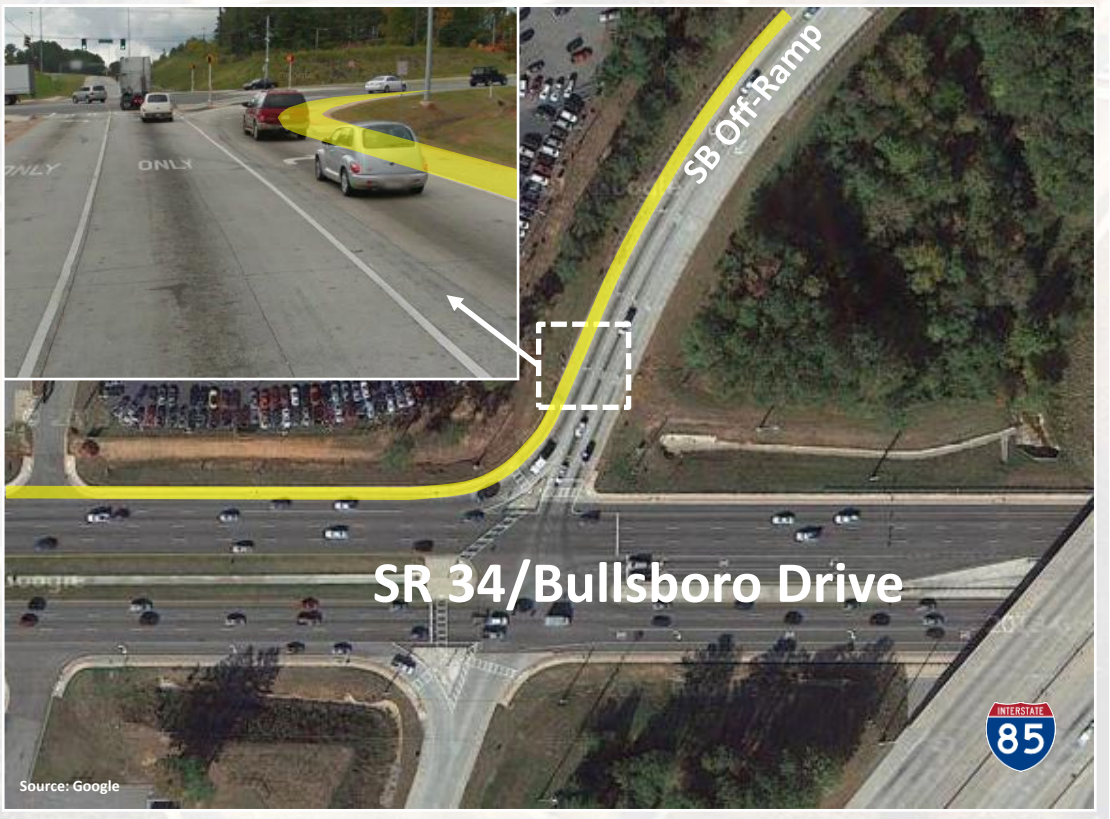
Location: I-85 S at SR 34 (Bullsboro Dr.)

Cause of Bottleneck: Right turn lane at SB Off-Ramp

Potential Operational Strategies for Evaluation:

1) **Construct 2nd right turn lane (additional pavement) and add right turn signal**

SR 34 SB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 37: I-985 @ SR 20

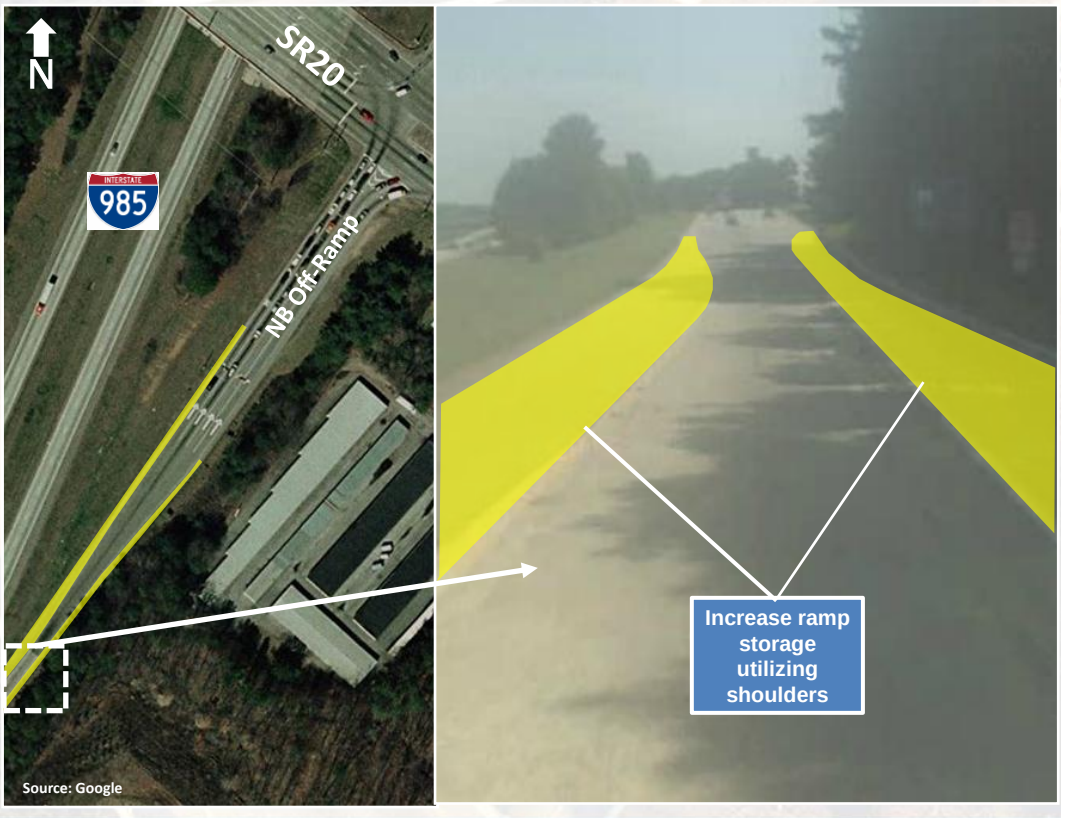
Location: I-985 at SR 20

Cause of Bottleneck: High volumes

Potential Operational Strategies for Evaluation:

1) **Increase NB exit ramp storage by widening ramp using shoulders (approx. .2 miles)**

SR 20 NB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 38: Peachtree Industrial Blvd. @ SR 140

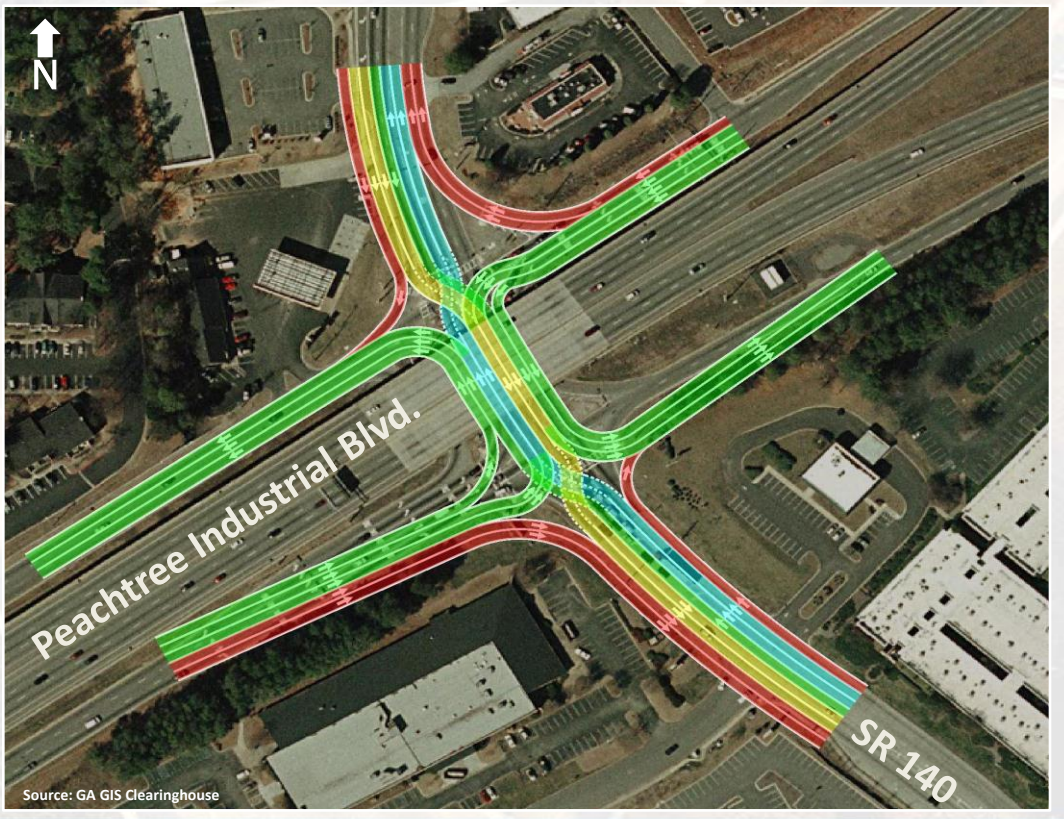
Location: Peachtree Industrial Blvd. at SR 140

Cause of Bottleneck: Left turn volumes

Potential Operational Strategies for Evaluation:

1) **Diverging Diamond Interchange (reduces the number of conflicts).**

SR 140	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



ID# 39: Downtown Connector @ North Ave.

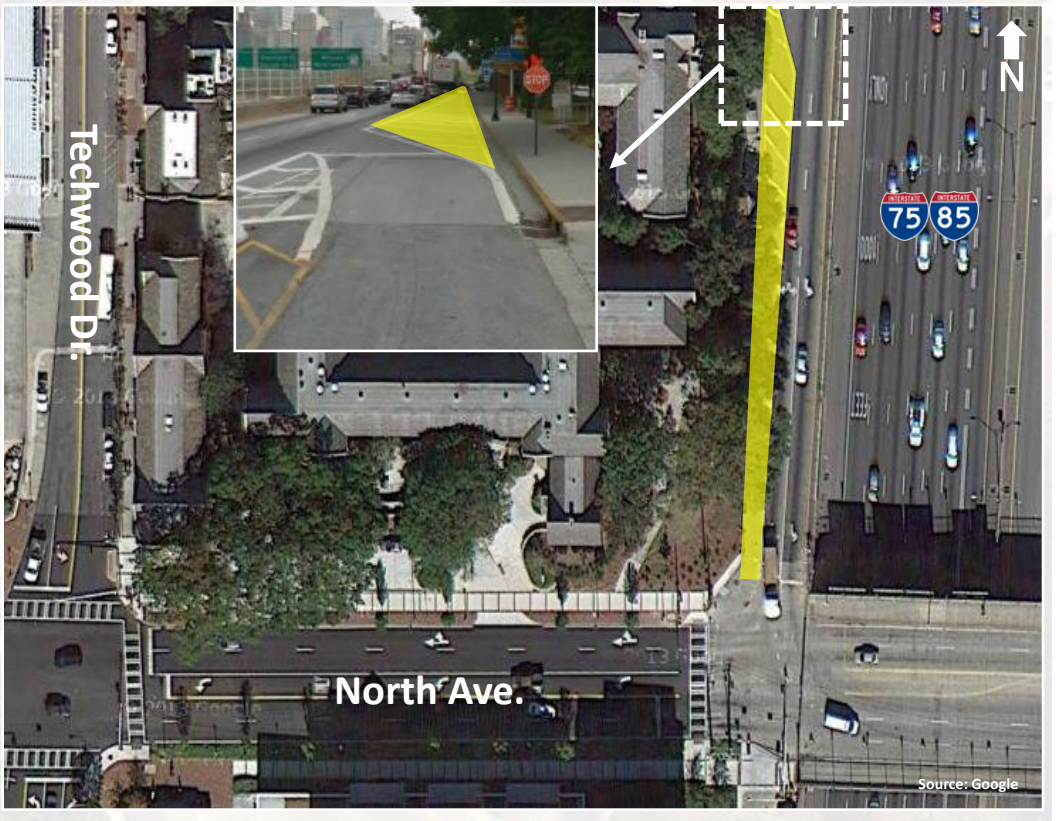
Location: Downtown Connector @ North Ave.

Cause of Bottleneck: High right turn volume

Potential Operational Strategies for Evaluation:

1) **Add right turn lane at North Ave. Off-Ramp**
2) **Close Williams St. Access to North Ave.**

SB North Ave. Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	1,300	400
Congested Speed (2010)	Not Available	Not Available



Turning Prohibitions

ID# 40: Downtown Connector SB @ Williams St.

Location: Downtown Connector at Williams St. (Southbound Off-Ramp, Northbound/ Southbound On-Ramp)

Cause of Bottleneck: Weave of SB exiting traffic approaching the intersection of Ivan Allen Jr. Blvd.

Potential Operational Strategies for Evaluation:

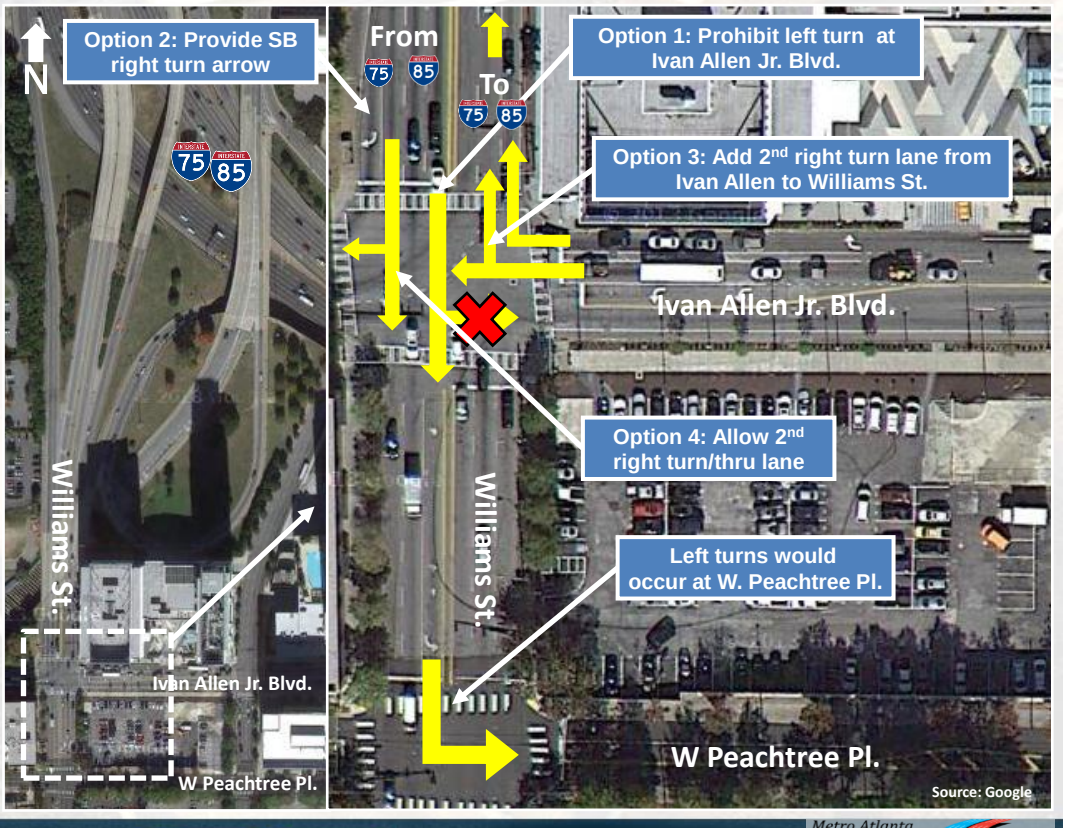
1) Prohibit left turn at Ivan Allen Jr. Blvd. SB approach (left turns will occur at W Peachtree Pl.)

2) Provide SB right turn arrow at Ivan Allen Jr. Blvd.

3) Add second right turn lane from Ivan Allen Jr. Blvd. to Williams St.

4) Williams St. Off-ramp striping (allow 2nd right turn/thru lane)

SB Williams St. Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	700	200
Congested Speed (2010)	Not Available	Not Available



Adjust Signal Timing at Ramp Terminal

Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 41: I-285 @ Paces Ferry Rd.

Location: I-285 at Paces Ferry Rd.

Cause of Bottleneck: High Ramp Volume

Potential Operational Strategies for Evaluation:

1) **Ramp meter signal timing improvements**
2) **Change ramp meter to allow two cars per green**

I-285 @ Paces Ferry SB	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	> 45	26 - 35
I-285 @ Paces Ferry NB	**AM Peak**	**PM Peak**
Ramp Volume (2010)	1,400	1,200
Congested Speed (2010)	> 45	35 - 45

Ramp Metering

ID# 42: Piedmont Rd. @ Buford Connector SB

Location: Piedmont Rd. at SB Buford Connector

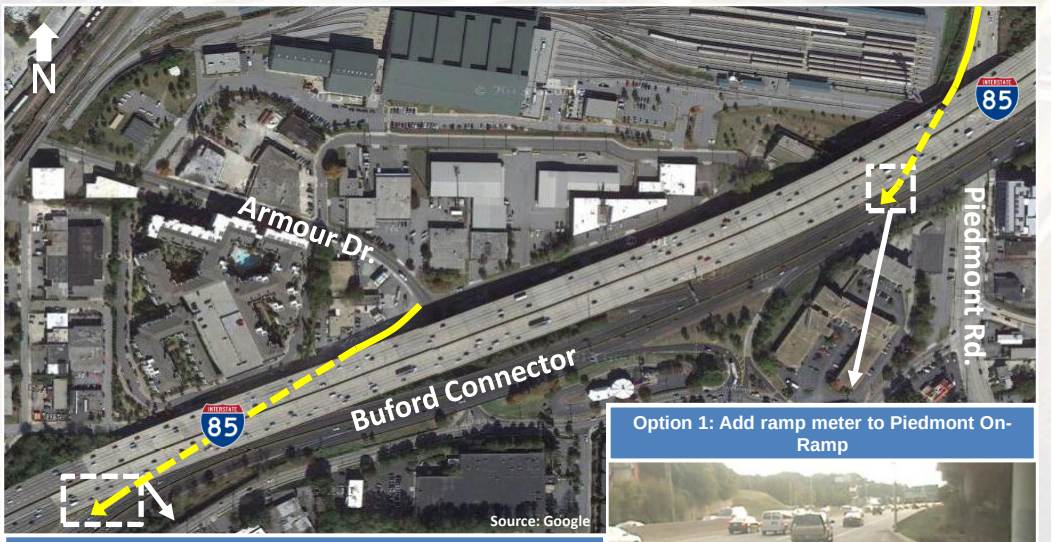
Cause of Bottleneck: High Volume and Weaving

Potential Operational Strategies for Evaluation:

1) Add ramp meter for southbound on-ramp from Piedmont Rd. to Buford Connector
2) Add ramp meter for southbound on-ramp from Armour Dr. to Buford Connector

Additional Data Collection Underway

SB Buford Conn.	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



Option 1: Add ramp meter to Piedmont On-Ramp

Option 2: Add ramp meter to Armour Dr. On-Ramp

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Modify Ramp Geometrics to Accommodate Trucks/ Automated Truck Rollover Warning Systems

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 43: I-285E/I-20E

Location: I-285/I-20 E

Cause of Safety Concern : Varying turning radii leading to difficulty for trucks navigating ramps

Potential Operational Strategies for Evaluation:

1) **Improve ramp geometrics to better accommodate trucks**
2) **Consider upgrade to existing automated truck rollover warning sign**

I-20 WB Off-Ramp	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

ID# 44: I-285 S @ I-675

Location: I-285 S at I-675

Cause of Safety Concern : Tight curves on ramps

Potential Operational Strategies for Evaluation:

1) **New automated truck rollover warning system for ramps**

I-675 NB On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	1,000	400
Congested Speed (2010)	Not Available	Not Available

I-675 SB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	200	1,500
Congested Speed (2010)	Not Available	Not Available

ID# 45: I-285 S @ I-75 S Interchange

Location: I-285 S at I-75 S Interchange

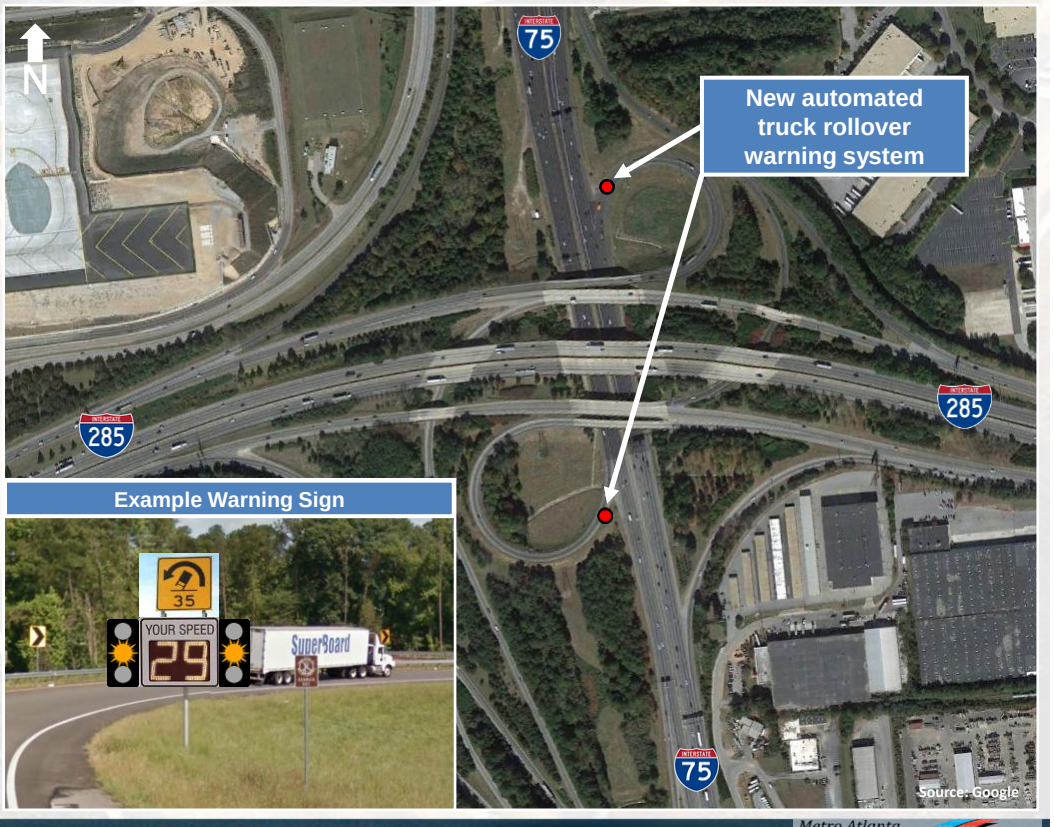
Cause of Safety Concern : Truck overturns (NB to WB)

Potential Operational Strategies for Evaluation:

1) **New automated truck rollover warning system**

I-75 NB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	500	800
Congested Speed (2010)	Not Available	Not Available

I-75 SB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	1,000	1,700
Congested Speed (2010)	Not Available	Not Available



Example Warning Sign

Other Planned or Programmed Projects FY '13

Status	PI#	County	Description
Scheduled for FY '13			
Auth. (CST)	0009678	Fulton	I-75 @ Mt. Paran Ramp
Auth. (CST)	0009957	DeKalb/Fulton	I-285 @ SR 8 & @ SR 10; SR 13 @ SR 247 & @ CS 519; Freeway Interchange/Meter
Auth. (CST)	0010782	Clayton, Cobb, DeKalb, Fulton	I-285 Variable Speed Limit Signs
Auth. (PE)	0010878	Fulton	I-285 @ SR 400; Add ramp lane/interchange reconfiguration
Auth. (PE)	0011657	Cobb	I-75 @ CR 4399/Wade Green Rd.; Diverging Diamond Interchange
Local Design/Let (PE)	0010858	Fulton	SR 400 SB @ SR 140; add ramp lane/interchange reconfiguration
Prog. (PE)	0012660	DeKalb	I-285 @ SR 141 interchange reconfiguration
Prog. (PE)	0012661	Multiple	I-85 from SR 74 to SR 316 except downtown; variable speed signs
Prog. (PE)	0012662	Multiple	I-20 from SR 6/Douglas to SR 124/DeKalb; variable speed signs
TO in progress (CST)	0009723	Clayton	I-75 NB @ SR 3/Old Dixie/Tara Blvd. freeway interchange

Other Planned or Programmed Projects FY '14

Status	PI#	County	Description
Scheduled for FY '14			
Prog. (CST)	0010878	Fulton	I-285 @ SR 400; add ramp lane/interchange reconfiguration
Local Design/ Let (ROW)	0010880	Fulton	SR 140 from SR 400 NB ramps to Old Alabama Rd.
Prog. (ROW)	0010881	Gwinnett	I-85 from Jimmy Carter Blvd. ramp to Indian Trail; add freeway auxiliary lane
TO in progress (CST)	0009724	Clayton	I-675 @ SR 138; additional lane on ramp
TO in progress (CST)	0010363	Cobb	SR 280 (Cobb Pkwy.) @ I-285; install turn lane

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Other Planned or Programmed Projects FY '15

Status	PI#	County	Description
Scheduled for FY '15			
Committee (CST)	0010858	Fulton	SR400 SB @ SR 140 – add ramp lane; interchange reconfiguration
Prog. (CST)	0010768	Fulton	SR 400 @ CR 9284/Windward Pkwy.; freeway interchange
Prog. (CST)	0010881	Gwinnett	I-85 from Jimmy Carter Blvd. ramp to Indian Trail; add freeway auxiliary lane
Prog. (CST)	0012660	DeKalb	I-285 @ SR 141; interchange reconfiguration
Under Design (CST)	0010760	Fulton	SR 10/Freedom Pkwy. @ Boulevard; intersection improvements
Prog. (CST)	0012661	Multiple	I-85 from SR 74 to SR 316, except downtown; variable speed signs
Prog. (CST)	0012662	Multiple	I-20 from SR 6/Douglas to SR 124/DeKalb; variable speed signs
TO in progress (CST)	0010218	Clayton, Cobb, DeKalb, Fulton	I-75 from Jodeco Rd. to Wade Green Rd.; variable speed signs

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Other Planned or Programmed Projects FY '16

Status	PI#	County	Description
Scheduled for FY '16			
Local Design/Let (CST)	0010880	Fulton	SR 140 from SR 400 NB ramps to Old Alabama Rd.; add ramp lane/interchange reconfiguration
Prog. (CST)	0010877	Gwinnett	SR 141 @ Peachtree Industrial Blvd.; add ramp lane/interchange reconfiguration
CST	0011657	Cobb	I-75 @ CR 4399/Wade Green Rd.; Diverging Diamond Interchange
Scheduling To Be Determined			
Committee (CST)	0010344	DeKalb	I-285 from I-20 to Glenwood Rd.; freeway interchange/auxiliary lane (FOS & IMR required)

Next Steps

- Finalize operational strategies to be evaluated
- Bundle operational strategies into 4 VISSIM models for those geographies included in VISSIM
- Identify appropriate tool for those areas outside of VISSIM (VISUM, HCS, Excel, etc.)
- Begin evaluating operational strategies with appropriate tools

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Atlanta Regional
MANAGED LANES
Implementation Plan

Metro Atlanta
OPS
OPERATIONAL PLANNING STUDY

Technical Coordinating Committee
Atlanta MPO

Kyle Mote
GDOT Office of Planning
June 21, 2013

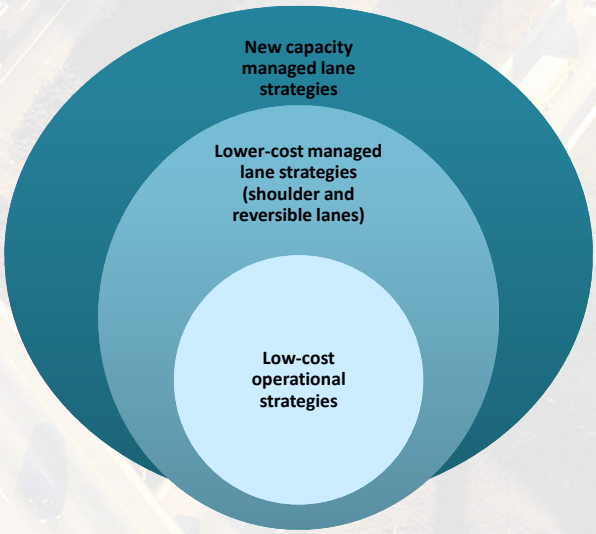
Georgia Department of Transportation

Vision for Transportation

- GDOT's Statewide Strategic Transportation Plan (SSTP) points to the importance of improving people mobility (via auto and transit) by utilizing "dual purpose" investments (such as managed lanes)
- A Strategic Goal of the Governor's for the State is to "improve the movement of people and goods across and within the state"

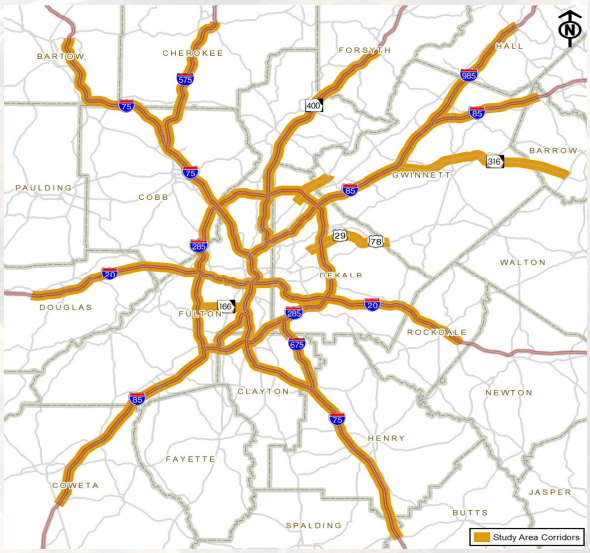
Study Purpose

Evaluate cost-effective projects that achieve goals for transit, freight and passenger vehicles; then consider more capital-intensive solutions as required by the complexity or intensity of the issue

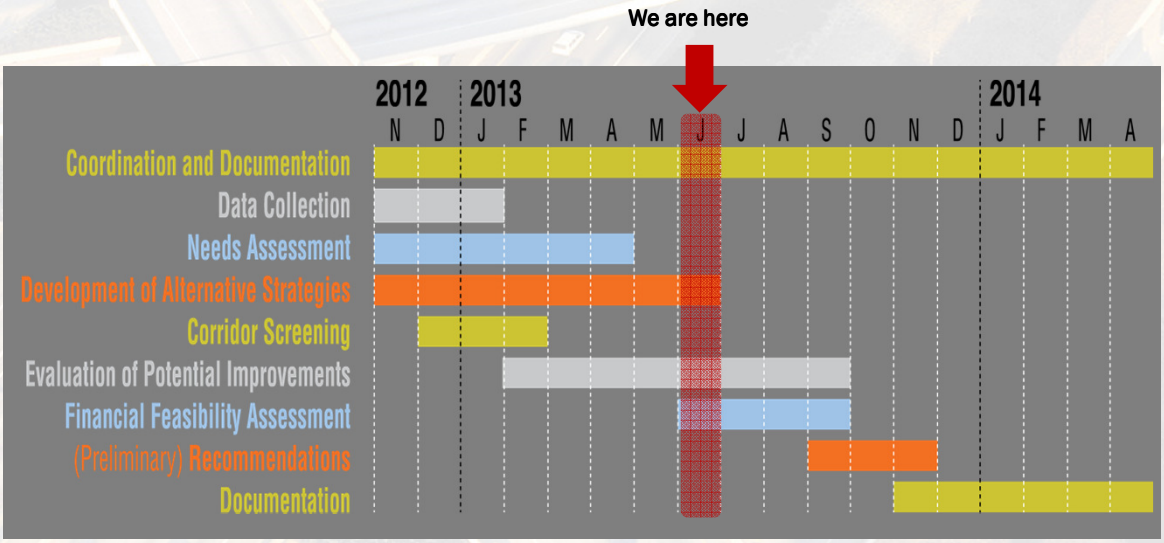


Study Area

- All limited access facilities in metro Atlanta
  - Interchanges
  - Up to 5 selected arterials within the interchange area of influence



Schedule



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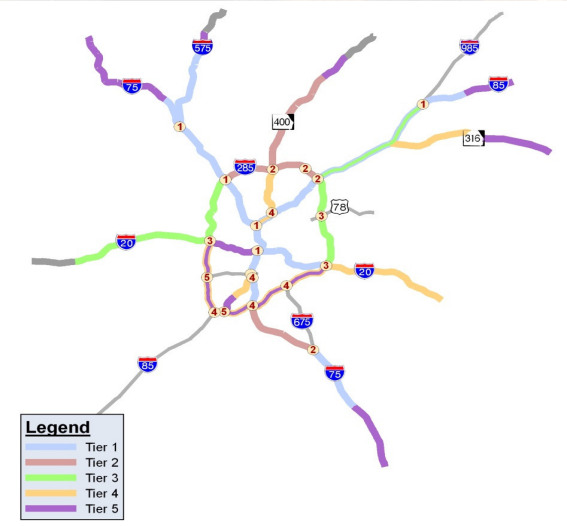
Planning Assumptions

- All limited access highway new capacity in Metro Atlanta will likely be tolled
- Remove HOV2+ to HOT3+ conversions from MPO TIP
- Eliminate assumptions of long-term concession agreements
- Evaluate lower-cost managed lane treatments

Overview – MLIP

- Previous Atlanta Regional Managed Lanes System Plan (MLSP) Goals:
  - Protect mobility
  - Maximize person/vehicle throughput
  - Minimize environmental impacts
  - Provide a financially feasible system
  - Design and maintain a flexible infrastructure for varying lane management



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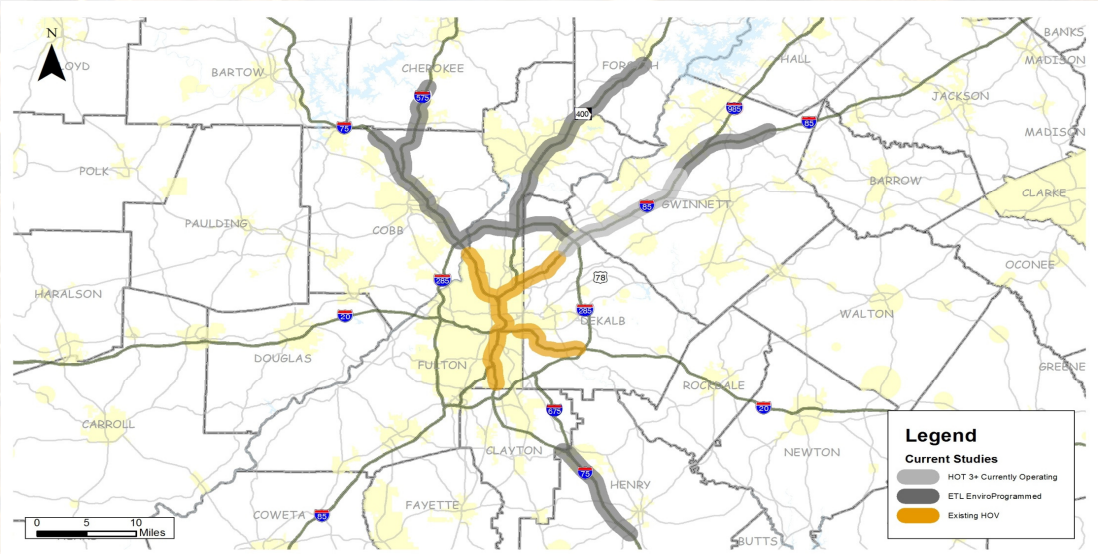
Managed Lane Implementation Plan (MLIP) Overview

- Updating MLSP as part of Managed Lanes Implementation Plan (MLIP) to:
  - Build upon previous MLSP goals
  - Reflect current funding constraints
  - Identify feasible locations for managed lane projects
  - Redefine and reprioritize projects from the previous plan based on current and future needs
  - Prioritize list of managed lane projects and accompanying financing strategies (P3 and traditional funding sources)
- Incorporate recommendations into RTP and TIP update, as appropriate during 2013-2014

Innovations and Emerging Findings-MLIP

- Considering non-traditional Managed Lane solutions
  - Reversible lanes
    - Moveable barrier (new option)
    - Fixed barrier (existing option)
  - Shoulder lanes
    - Consider managing inside lane in peak periods and off-setting the removed general purpose capacity with travel on shoulder
  - Option: use reversible barrier and shoulder lanes in conjunction with each other
- Intent is to not "reduce" current travel options for motorists

Managed Lane Corridors Currently in Operation or in Development (Priced & HOV)



Shoulder Lanes

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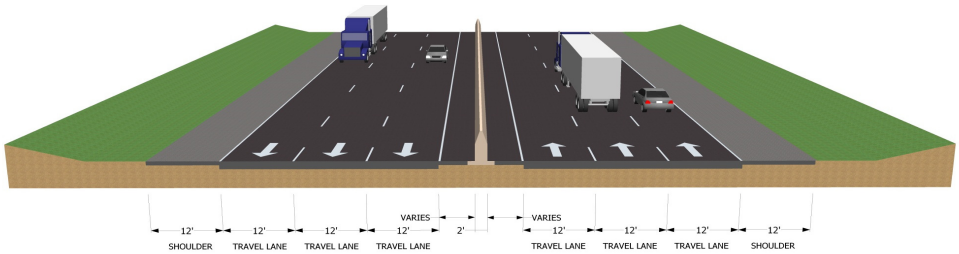
Shoulder Lanes – Typical Section BEFORE

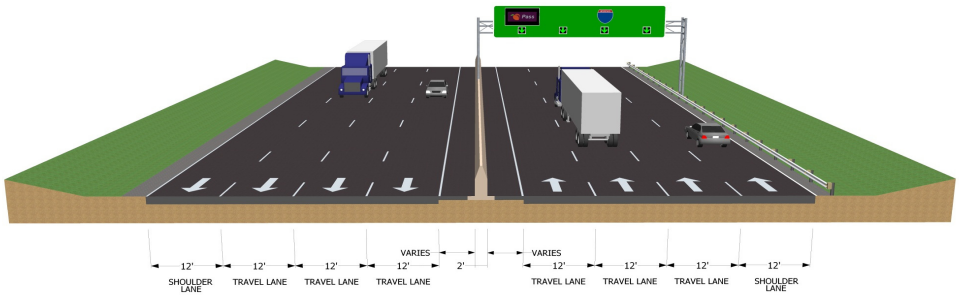
Existing Condition



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

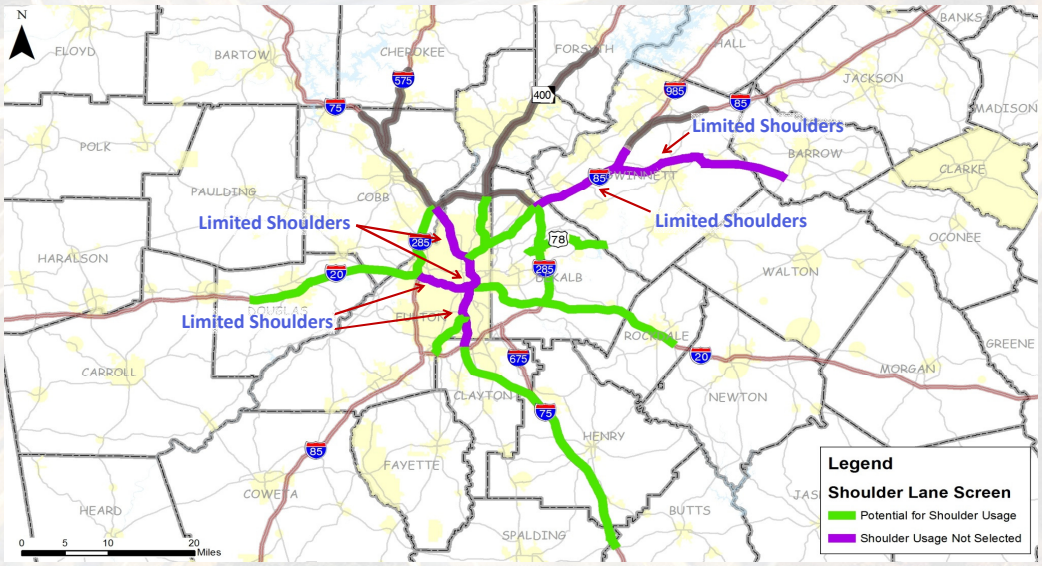
Shoulder Lanes – Typical Section AFTER

Shoulder Lane Open



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

Corridors Selected for Shoulder Lane Evaluation



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Moveable Barriers

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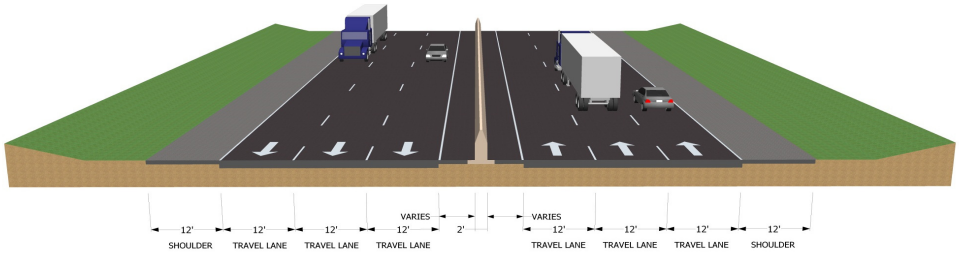
Moveable Barriers – Typical Section BEFORE

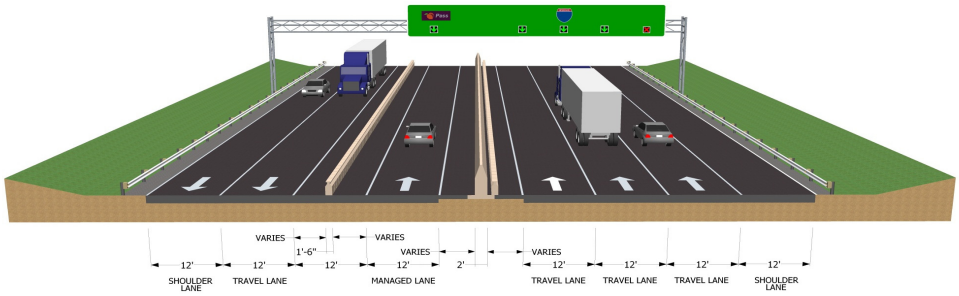
Existing Condition



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

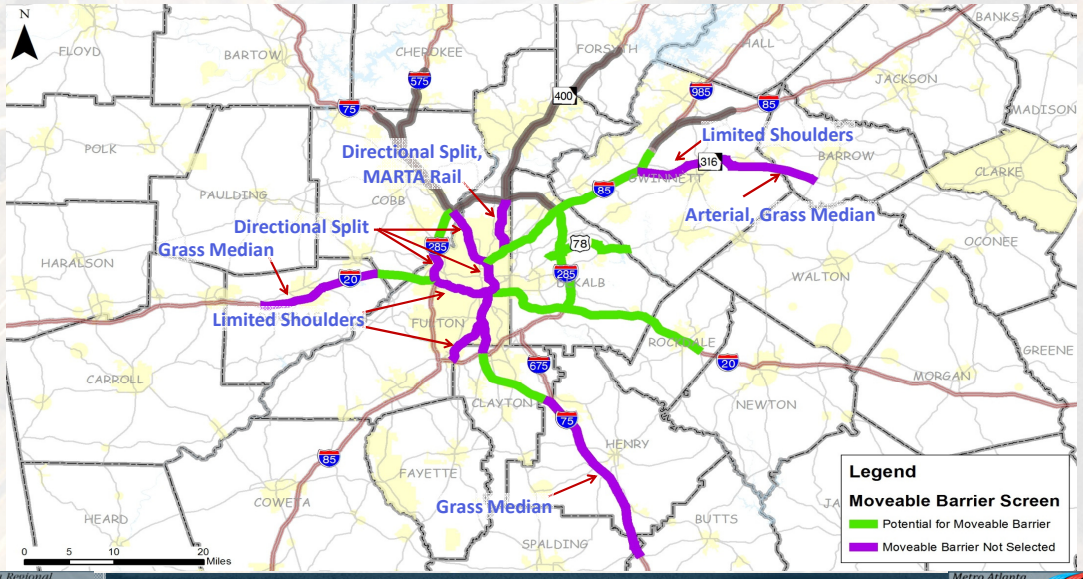
Moveable Barriers – Typical Section AFTER

Moveable Barrier (including shoulder usage)
Departing Vehicle Deployment



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

Corridors Selected for Moveable Barrier Evaluation



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Priced Managed Lanes

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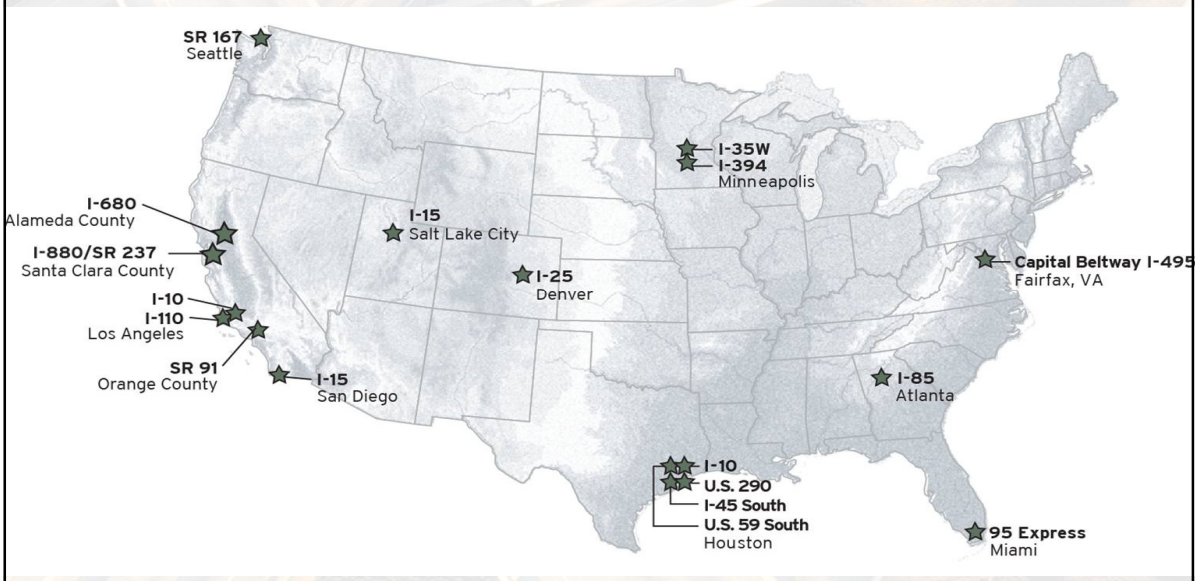
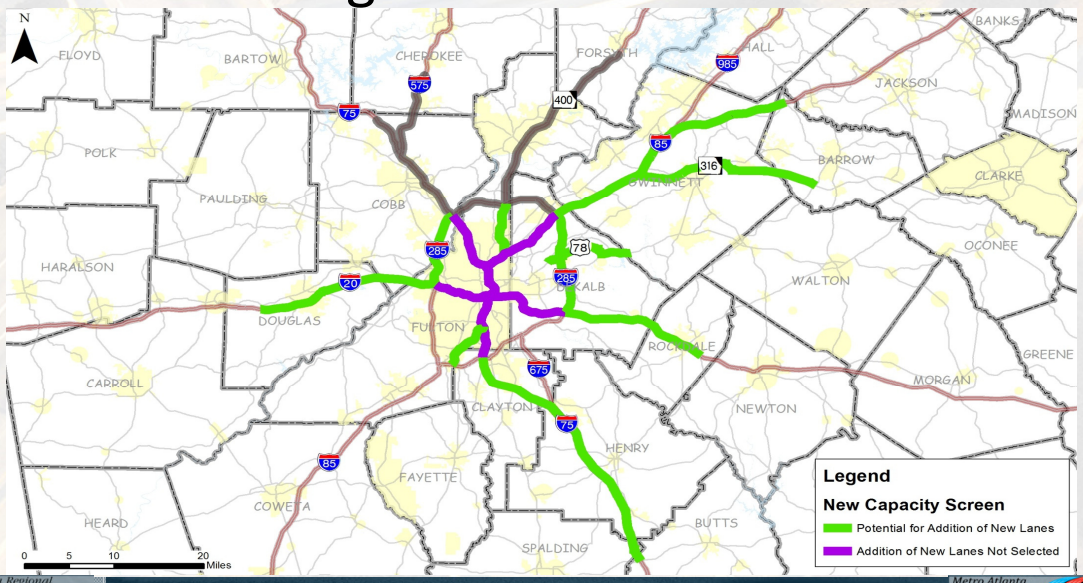
Georgia Priced Managed Lane Overview

- High Occupancy Toll (HOT)
  - Mixture of occupancy and tolling components
  - 17 currently in operation across US, including 1 in Georgia (I-85 North)
  - Relatively easy to convert HOV lanes to HOT (need public support)
  - Requires additional enforcement/back office operations
  - Transit buses have free access
- Express Toll Lanes (ETL)
  - All users pay (except transit buses)
  - 1 currently in operation in US (SR 91, CA), 2 planned in Georgia (I-75 South & I-75/I-575 North)
  - Easier to enforce/back office operations, when compared to HOT

Priced Managed Lanes



Corridors Selected for Managed Lanes Evaluation



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Managed Lane Implementation Plan Next Steps

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Next Steps

- Evaluate potential improvements in each corridor
  - Planning level traffic and toll revenue analysis
  - Detailed traffic assessment
- Financial feasibility assessment
  - Preliminary capital and O&M cost estimates
  - High level project financing plan
- Develop and apply project prioritization framework
- Final recommendations and documentation

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Planning Assumptions - OPS

- Smaller scale operational improvements
- Focused on limited access highways in Metro Atlanta
- Can be implemented within 6 months to 5 years
- "Bang for your buck"/Return on your investment

Overview – OPS

- Identify bottleneck areas along limited access highways
- Identify and evaluate potential low-cost improvements
- Document a prioritized list of operational projects
- Incorporate preliminary recommendations into RTP and TIP update, as appropriate during 2013-2014

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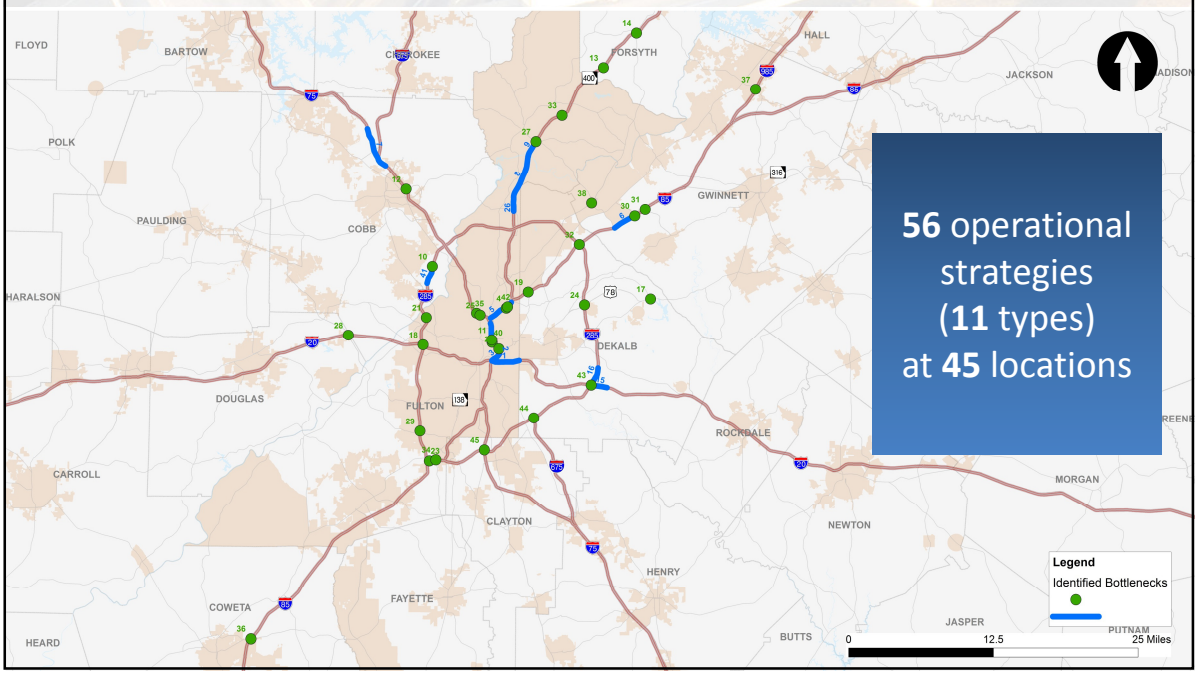
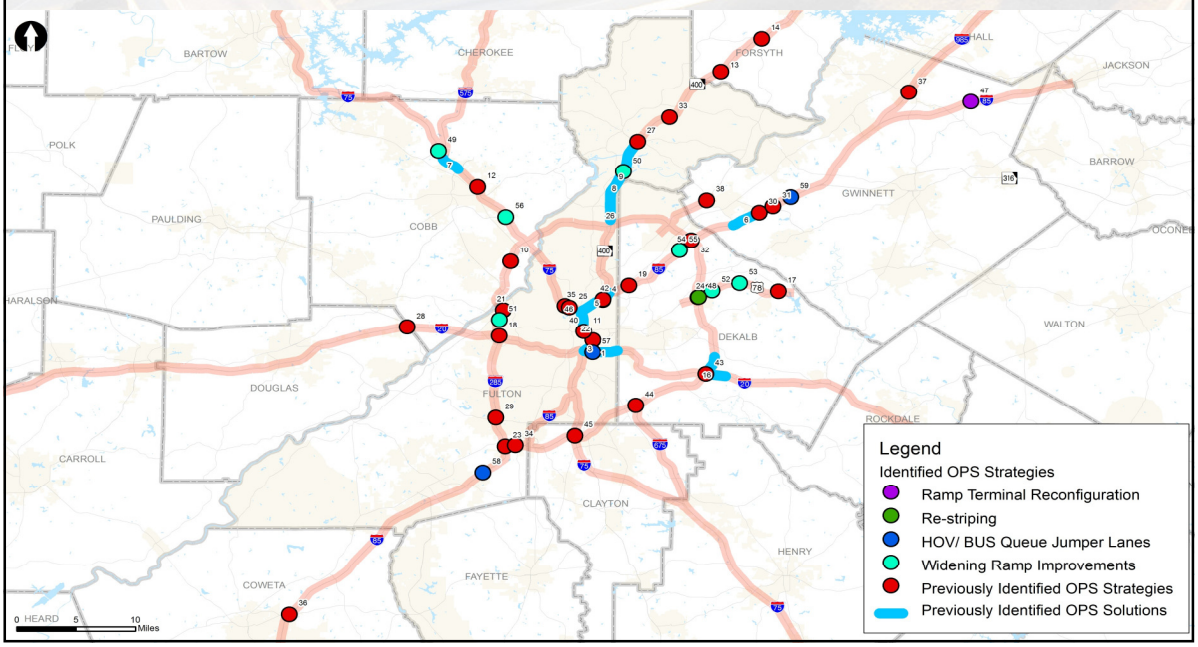
Location-Specific Operational Strategies – ID Map

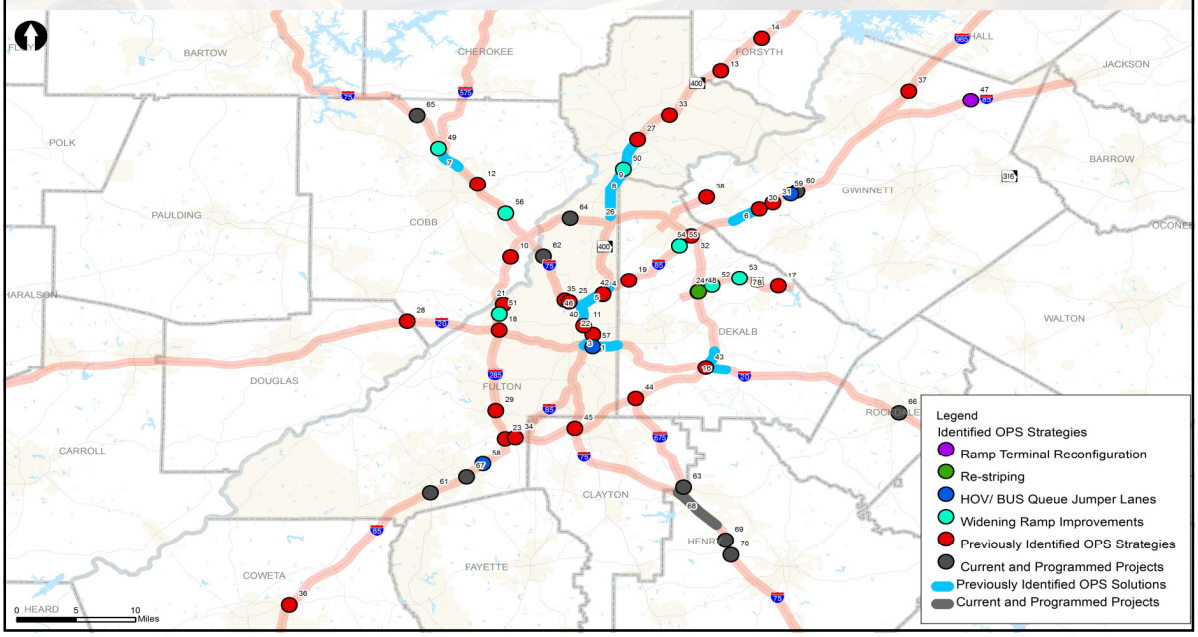


56 operational strategies (**11** types) at **45** locations

Ramp Specific Operational Strategies



GDOT + OPS Operational Strategies



Disclaimer

- *All projects/strategies are currently conceptual, the projects/strategies will be tested/analyzed further before being considered a "recommended project" in the final document.*

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I-285E/I-20E

Location: I-285/I-20 E

Cause of Safety Concern : Varying turning radii leading to difficulty for trucks navigating ramps

Potential Operational Strategies for Evaluation:

1) Improve ramp geometrics to better accommodate trucks
2) Consider upgrade to existing automated truck rollover warning sign

I-20 WB Off-Ramp	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

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Downtown Connector SB @ Williams St.

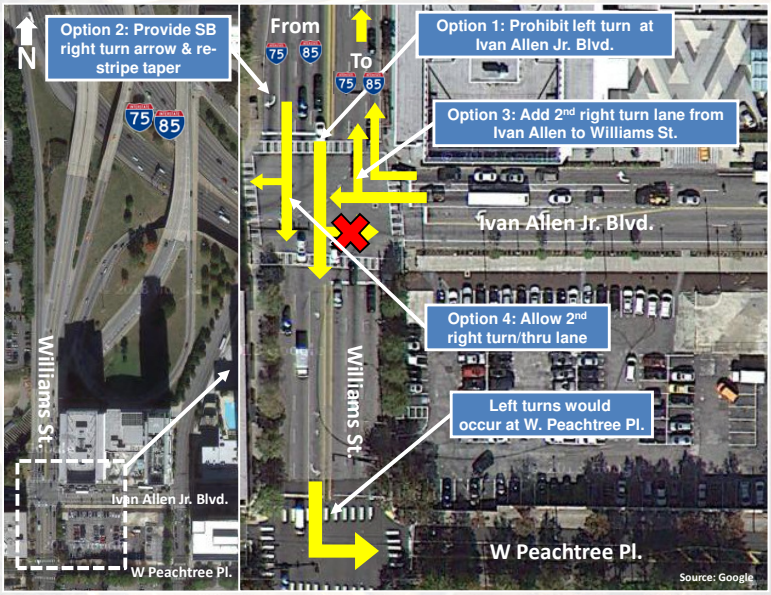
Location: Downtown Connector at Williams St. (Southbound Off-Ramp, Northbound/ Southbound On-Ramp)

Cause of Bottleneck: Weave of SB exiting traffic approaching the intersection of Ivan Allen Jr. Blvd.

Potential Operational Strategies for Evaluation:

1) Prohibit left turn at Ivan Allen Jr. Blvd. SB approach (left turns will occur at W Peachtree Pl.)
2) Provide SB right turn arrow at Ivan Allen Jr. Blvd. and re-stripe SB right turn taper
3) Add second right turn lane from Ivan Allen Jr. Blvd. to Williams St.
4) Williams St. Off-ramp striping (allow 2nd right turn/thru lane)

SB Williams St. Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	700	200
Congested Speed (2010)	Not Available	Not Available



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I-285 @ Camp Creek Pkwy.

Location: I-285 @ Camp Creek Pkwy.

Cause of Bottleneck: Both off-ramps back up onto I-285

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange (DDI) - (reduces the number of conflict points, enhances the operations of left turns from the arterial, and eliminates loop ramp (tight turning radii))

2) New configuration representing a hybrid of a DDI and a Displaced Left Turn Intersection

Additional Data Collection Underway

Camp Creek Pkwy.	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

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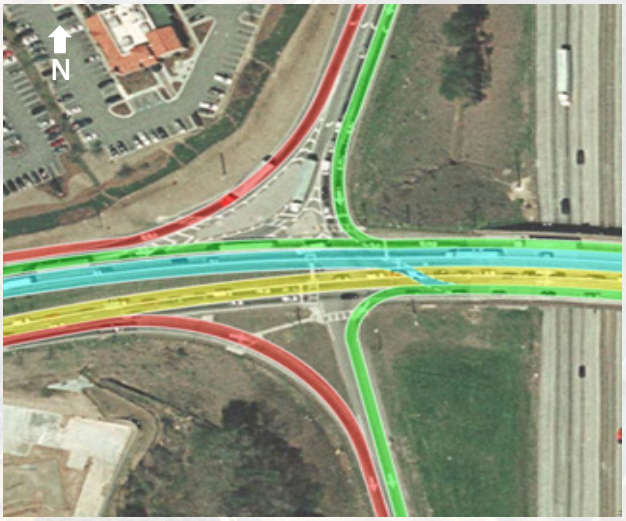
I-285 @ Camp Creek Pkwy Continued



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I-285 W/I-20 W

Location: I-285W/I-20W

Cause of Bottleneck: Tight turning radius/grade (NB to WB, SB to WB) especially for heavy trucks

Potential Operational Strategies for Evaluation:

1) SB I-285 to WB I-20: Drop a EB mainline lane at the exit to I-285 S so that we can add the lane back to the mainline when both WB ramps come on (adds 2 lanes on to the mainline instead of a merged lane – one of the lanes drops at Fulton Industrial Blvd.)

2) EB I-20 to NB I-285: Combine both ramps into 1 exit (2 lane exit and then splits to 1 lane North and 1 lane South) and introduce barrier to create a C/D road (reduce 3 thru lanes to 2 going over the bridge)

3) WB I-20 to SB I-285: Reconfigure as a lane drop

EB I-20 to SB I-285	AM Peak	PM Peak
Ramp Volume (2010)	400	1,000
Congested Speed (2010)	Not Available	Not Available
EB I-20 to SB I-285	AM Peak	PM Peak
Ramp Volume (2010)	400	1,000
Congested Speed (2010)	Not Available	Not Available
I-285 NB/SB On-Ramp to WB I-20	AM Peak	PM Peak
Ramp Volume (2010)	1,900	1,800
Congested Speed (2010)	Not Available	Not Available
Ramp Volume (2010)	300	1,100
Congested Speed (2010)	Not Available	Not Available

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US 78 WB @ I-285 NB

Location: US 78 WB at I-285 NB

Cause of Bottleneck: Signing/ Weaving/ Last minute decision making

Potential Operational Strategies for Evaluation:

1a) Re-signing for Lawrenceville exit (change from an exit only off-ramp to a decision off-ramp)

1b) Add new pavement in the gore area to extend two-lane ramp

1c) Re-stripe two lanes from WB US 78 to NB I-285 so vehicles merge before I-285

NB I-285 @ US 78 On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	500	500
Congested Speed (2010)	Not Available	Not Available

Option 1c: Re-stripe US 78 to I-285 on-ramp

Option 1a: Signage Improvements

Option 1b: New Pavement and Re-striping of Lanes

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SR 400 NB between McFarland Rd. and SR 141/Peachtree Pkwy.

Location: SR 400 between McFarland Rd. and SR 141/Peachtree Pkwy. (3.4 miles)

Cause of Bottleneck: Two NB general purpose (GP) lanes drop and merge at McFarland Rd. (Exit 12) on GA 400.

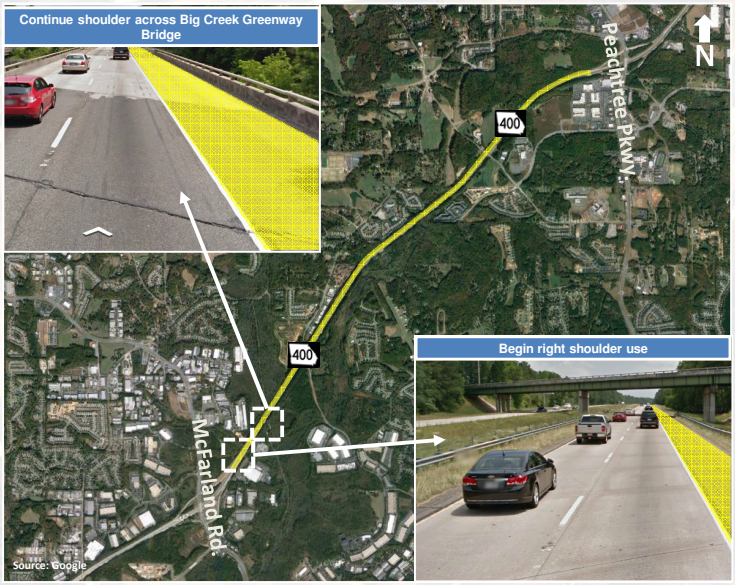
Recently completed GDOT project extending one NB GP lane north of McFarland Rd. interchange (now merges 4 to 3 to 2 lanes).

Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane between McFarland Rd. and Peachtree Pkwy.

Note: Consider bridge impacts on shoulder

GA 400 NB @ McFarland Rd.	AM Peak	PM Peak
Volume (2010)	1,200	1,900
Congested Speed (2010)	> 45 mph	35 – 45 mph



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I-85 SB @ N. Druid Hills Rd.

Location: I-85 SB at N. Druid Hills Rd. (Southbound Exit Ramp)

Cause of Bottleneck: Frontage road traffic access may create off-ramp bottleneck

Potential Operational Strategies for Evaluation:

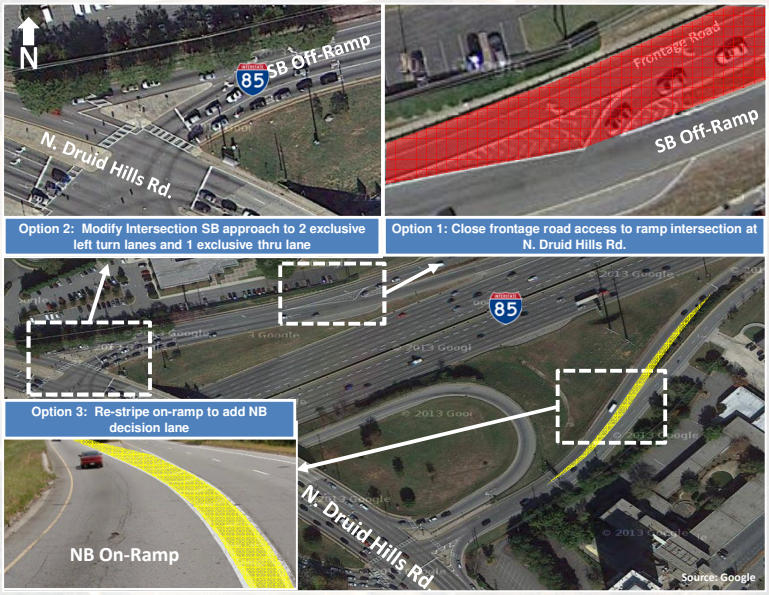
1) Close access from frontage road to I-85 off-ramp

2) Re-stripe SB off-ramp to 1 exclusive thru lane and 2 exclusive left turn lanes

3) Re-stripe NB on-ramp to add decision lane

Additional Data Collection Underway

Druid Hills SB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available
Druid Hills NB On-Ramp	**AM Peak**	**PM Peak**
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available



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Monroe Dr. @ Buford Connector NB

Location: Monroe Dr. On-Ramp at NB Buford Connector

Cause of Bottleneck: Weaving (Multiple on/ off-ramps in a short distance)

Potential Operational Strategies for Evaluation:

1) Close on-ramp from Monroe Dr. onto NB Buford Connector
2) Add ramp meter on Monroe Dr. on-ramp to Buford Connector (2 cars per green)
3) Use approx. 1 mile of shoulder between Monroe Dr. and I-85 on-ramp

Additional Data Collection Underway

NB Buford Conn.	AM Peak	PM Peak
Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

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Downtown Connector NB from I-20 to International Blvd.

Location: Downtown Connector NB from I-20 to International Blvd.

Cause of Bottleneck: I-20 merging traffic and traffic weaving between MLK Jr. Dr. and Edgewood Ave.

Potential Operational Strategies for Evaluation:

1) Close NB exit ramp at Edgewood Ave. to passenger vehicles (transit and emergency vehicles allowed)
2) Drop thru lane (dynamically) on Downtown Connector NB south of I-20 to provide I-20 users merging onto Downtown Connector another thru lane (bring all 3 I-20 lanes on to NB Downtown Connector)

I-75/I-85 NB @ Fulton St.	AM Peak	PM Peak
Volume (2010)	5,500	3,900
Congested Speed (2010)	> 45 mph	< 25 mph

I-20 to NB DT Connector On-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	1,900	2,100
Congested Speed (2010)	Not Available	Not Available

Edgewood NB Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	300	500
Congested Speed (2010)	Not Available	Not Available

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I-85 N @ I-285 Interchange

Location: I-85 N at I-285 Interchange

Cause of Bottleneck: High volumes - SB AM/NB PM

Potential Operational Strategies for Evaluation:

1) Construct flyover for I-285 EB to I-85 NB that would provide access to Northcrest Rd. (eliminates the ability to exit on C/D and then get back on I-85 at Northcrest); and

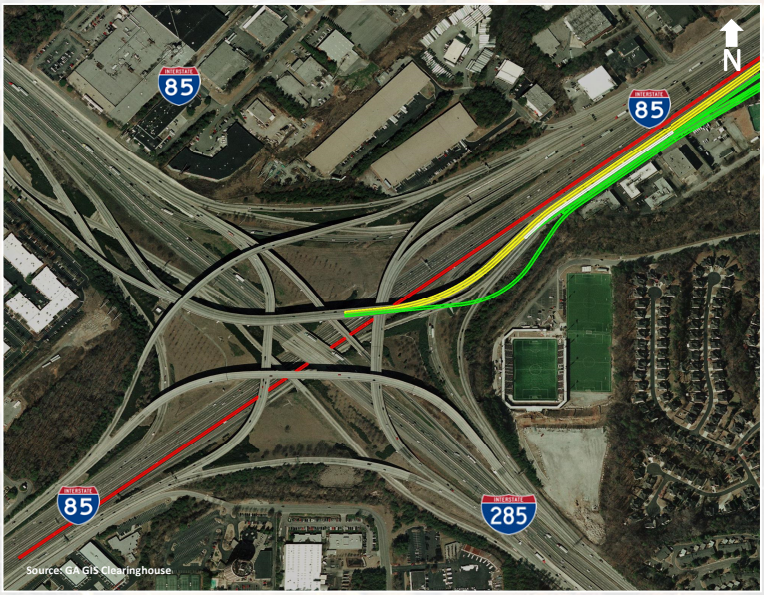
2) Add barrier separating exit ramps from I-85 on-ramp

Northcrest Rd. Off-Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Additional Data Collection Underway

Ramp	AM Peak	PM Peak
Ramp Volume (2010)	Not Available	Not Available
Congested Speed (2010)	Not Available	Not Available

Volume (2010)	3,400	8,600
Congested Speed (2010)	> 45	< 25



Atlanta Regional MANAGED LANES Implementation Plan

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Atlanta Regional
MANAGED LANES
Implementation Plan

Georgia ITS

Kyle Mote
GDOT Office of Planning
June 27, 2013

Georgia Department of Transportation

Agenda

- 2009 Managed Lane System Plan overview
- Current activities: Managed Lane *Implementation* Plan
- Lessons learned and emerging findings
- Next steps

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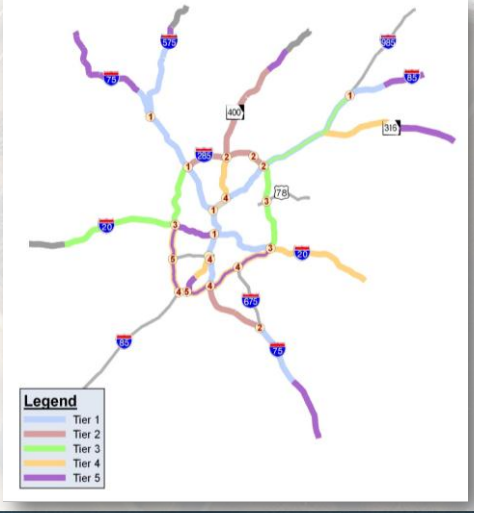
2009 Atlanta Regional Managed Lane System Plan (MLSP) - Overview

- First regional managed lanes plan in the country
- In 2009, there were no Priced Managed Lanes in the Atlanta region (only HOV lanes)
- Identified $16 Billion in MLs
- Assumed $9 Billion could be delivered via PPP
- $5.9 Billion programmed in current Atlanta MPO Plan



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2009 Managed Lane System Plan Goals

- Protect mobility with all new capacity
- Maximize person/vehicle throughput
- Minimize environmental impacts
- Provide a financially feasible system
- Design and maintain a flexible infrastructure network, for varying lane management

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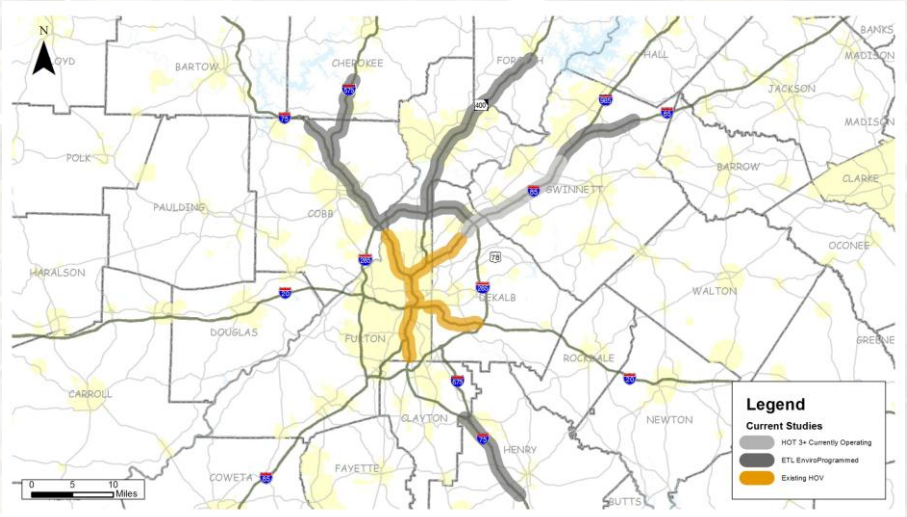
Managed Lane Corridors Currently in Operation or in Development (Priced & HOV)



Existing & Planned Priced Managed Lanes

- Open to traffic:
  - I-85 North Express Lanes (16 miles)
    - HOV2+ to HOT3+ conversion in 2011
    - 250,000 transponders issued
- Under Development:
  - Northwest Corridor (I-75/I-575 North) Express Lanes
    - ROD issued May 2013
  - I-75 South Express Lanes
    - Expect FONSI, summer 2013
  - I-85 North Extension
    - Construction currently planned for FY 15
- In the Alternative Evaluation Process:
  - I-285 Top End (revive285)
    - EIS under development
  - SR 400 North of I-285
    - Feasibility study underway

New Planning Assumptions Moving Forward

- All limited access highway new capacity in Metro Atlanta will likely be tolled
- Remove HOV2+ to HOT3+ conversions from MPO TIP
- Eliminate assumptions of long-term concession agreements
- Evaluate lower-cost managed lane treatments

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Managed Lane *Implementation* Plan (MLIP) Overview

- Updating MLSP as part of Managed Lanes Implementation Plan (MLIP) to:
  - Build upon previous MLSP goals
  - Reflect current funding constraints
  - Identify feasible locations for managed lane projects
  - Redefine and reprioritize projects from the previous plan based on current and future needs
  - Prioritize list of managed lane projects and accompanying financing strategies (P3 and traditional funding sources)
- Incorporate recommendations into RTP and TIP update, as appropriate during 2013-2014

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Innovations and Emerging Findings-MLIP

- Considering non-traditional Managed Lane solutions
  - Reversible lanes
    - Moveable barrier (new option)
    - Fixed barrier (existing option)
  - Shoulder lanes
    - Consider managing inside lane in peak periods and off-setting the removed general purpose capacity with travel on shoulder
  - Option: use reversible barrier and shoulder lanes in conjunction with each other
- Intent is to not "reduce" current travel options for motorists

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Shoulder Lanes

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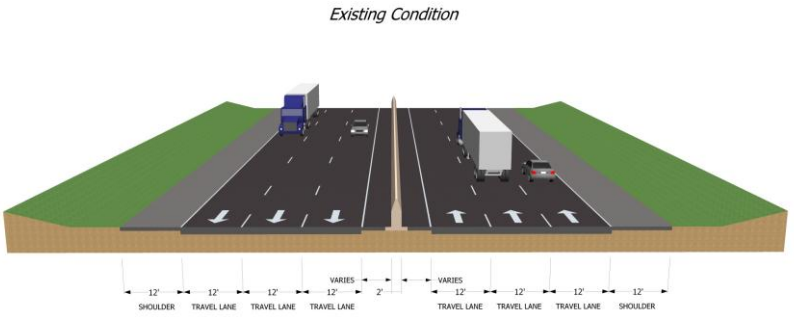
Shoulder Lanes – Typical Section BEFORE



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

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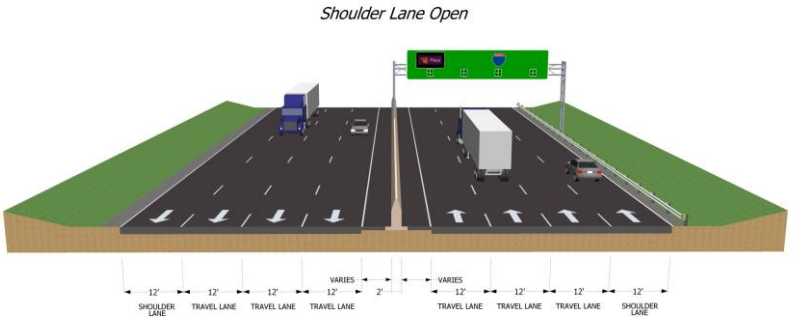
Shoulder Lanes – Typical Section AFTER



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

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Shoulder Lanes – Case Studies

Shoulder Sign in Washington State

- Washington State - US 2
  - 1.5 miles during PM only
- Minneapolis
  - 3.0 miles during AM & PM
  - Use left shoulder
  - Region wide bus shoulders
- UK M42 Highway
  - 10 miles
  - Shoulders used in conjunction with variable speed limits
- Netherlands
  - Use left and right shoulder

Shoulder Lanes – Considerations

- Shoulder pavement depth
- Shoulder width
- Bridge spans and pillar locations
- Entrance/exit ramp locations and volumes
- Additional signage
- Refuge sites (incidents and emergency access)
- Segment length

SR 400 Shoulder Lane (Atlanta, GA)

Source: www.itsinternational.com

Shoulder Lanes-Lessons Learned

- Manage expectations, not all shoulders lend themselves to travel
- Capital costs vary dramatically based on existing infrastructure
- Develop active traffic management system concept

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Shoulder Lanes-Lessons Learned

- Pre-determine enforcement roles/processes, incident response, training, public outreach and education
- Strategic placement of video cameras to monitor traffic
- Strategic placement of emergency refuge areas, with proper signing

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Moveable Barriers

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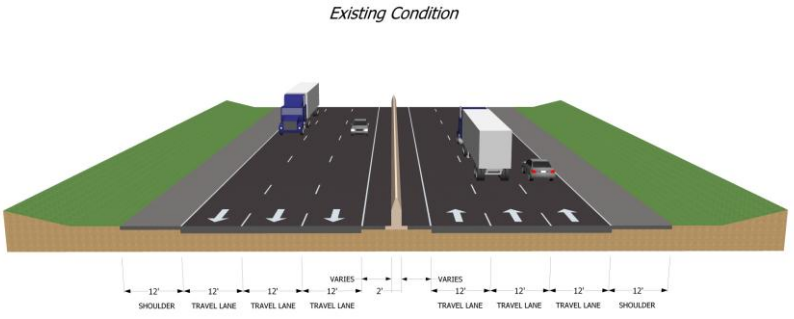
Moveable Barriers – Typical Section BEFORE



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

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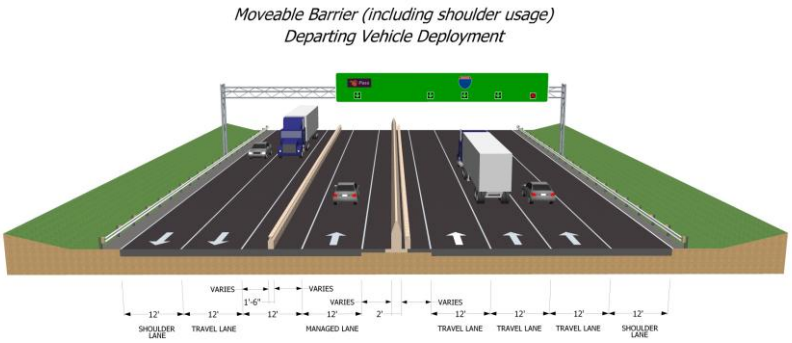
Moveable Barriers – Typical Section AFTER



Source: Atlanta Regional Managed Lanes Implementation Plan, GDOT.

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Moveable Barriers – Case Studies

- I-30/Thornton Freeway: Dallas, TX
  - 5.2 mile managed lane during AM & PM
  - Increased speeds from 22 to 41 mph
  - 1,200 – 1,400 vehicles per hour (vph)
- I-93: Boston, MA
  - 6.0 mile managed lane during AM & PM
  - Flows at posted speed (55 mph)
  - 1,500 - 1,800 vph
  - No increase in accidents
- I-70: West of Denver, CO
  - 13.5 mile EB Sundays
  - Significant decrease in EB travel times (79 to 41 min.) and increase in WB travel times (34 to 69 min.)
  - 2% annual increase in crashes (snow conditions)

I-93 Reversible Lanes in Boston

Source: Barrier Systems, Inc.

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Moveable Barriers – Considerations

- Directional split of traffic and number of lanes
- Estimated benefit (travel time savings)
- Capital and Operating & Maintenance costs
- Bridge spans and pillar locations
- Median and/or shoulder widths
- Borrow inside lane or shoulder for reverse direction and/or widen to the median
- Logistics of rev. lanes
- Additional signage
- Segment length

Source: Barrier Systems, Inc.

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Moveable Barriers-Lessons Learned

- Plan ahead (traffic impacts, physical limitations, storage, etc)
- Develop standard operating procedures
- Enforcement (if operated as managed lane)
- Public education
- Dependable contractor (if operation is privatized)

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Moveable Barriers-Lessons Learned

- Spare parts inventory
- Aggressive preventative maintenance
- Adequate staffing for enforcement, traffic incident management and maintenance
- Consider multiple access points

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Priced Managed Lanes

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Georgia Priced Managed Lane Overview

- High Occupancy Toll (HOT)
  - Mixture of occupancy and tolling components
  - 17 currently in operation across US, including 1 in Georgia (I-85 North)
  - Relatively easy to convert HOV lanes to HOT (need public support)
  - Requires additional enforcement/back office operations
  - Transit buses have free access
- Express Toll Lanes (ETL)
  - All users pay (except transit buses)
  - 1 currently in operation in US (SR 91, CA), 2 planned in Georgia (I-75 South & I-75/I-575 North)
  - Easier to enforce/back office operations, when compared to HOT
  - Higher revenue than HOT

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Priced Managed Lanes – Case Studies

- High Occupancy Toll (HOT) Lanes
  - I-95: Miami, FL
  - SR 167: Seattle, WA
  - I-15: Salt Lake City, UT
  - I-394: Minneapolis, MN
  - I-10 Katy Freeway: Houston, TX
- Express Toll Lanes (ETL)
  - SR 91: Orange County, CA

SR 91 Express Toll Lanes

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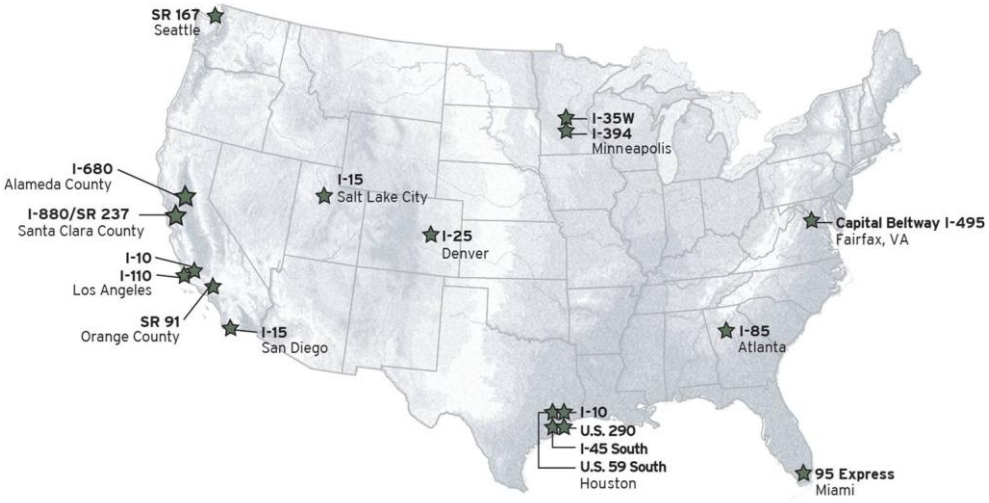
Priced Managed Lanes



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Priced Managed Lanes-Lessons Learned

- Tolling existing capacity (HOV and GP) can be challenging
- Likely not self-supporting, requiring funding source, particularly in early years for O&M
- Recognize ramp-up period for tolling, adjustment time for motorists
- Interface between differing managed lane types (HOV to HOT) has been less of an issue than anticipated in MLSP

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Priced Managed Lanes-Lessons Learned

- Ideally provide users with travel time estimates and speed limits in using dynamic signs
- Complete camera coverage aids in operations and enforcement
- Occupancy detection, declaration and enforcement impact revenues

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Priced Managed Lanes-Lessons Learned

- Access points may need modification after open to traffic
- Design and operation should be flexible enough to accommodate fluctuating traffic patterns
- Adequate signage is necessary to identify access points
- Evaluate potential funding resources early

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Priced Managed Lanes-Lessons Learned

- Effective outreach is essential and must continue throughout project planning, implementation, and operation:
  - Reliable/faster trips
  - Transit access
  - Increased network capacity
  - Limited ability to build additional general purpose lane capacity
  - HOV can be an ineffective way to regulate demand

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Priced Managed Lanes – Emerging Trends

- Multi-lane facilities
- Dual purpose investments (auto and transit)
- Regional network
- Develop performance measures (speeds, throughput-both car and transit)
- Moving from HOT based facilities to ETL facilities, with new construction

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Managed Lane Implementation Plan
Next Steps

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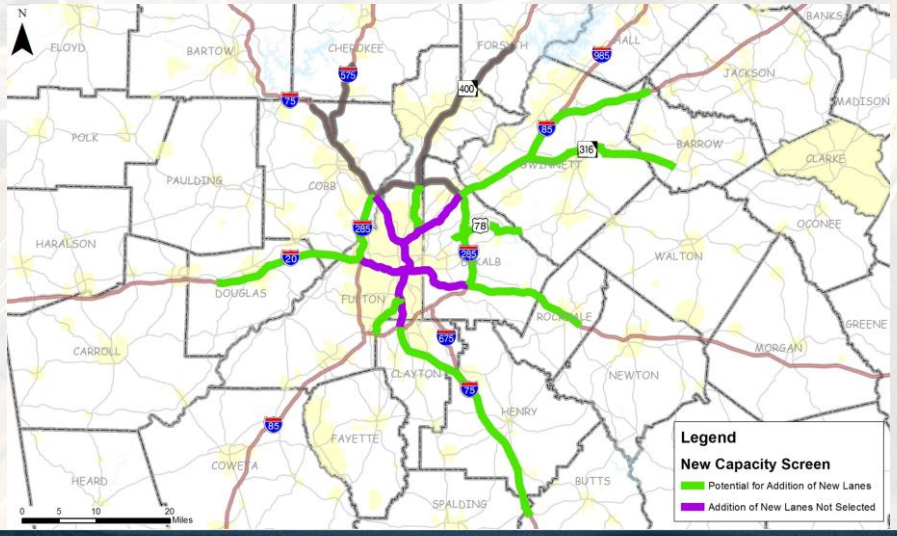
Corridors Selected for Managed Lanes Evaluation



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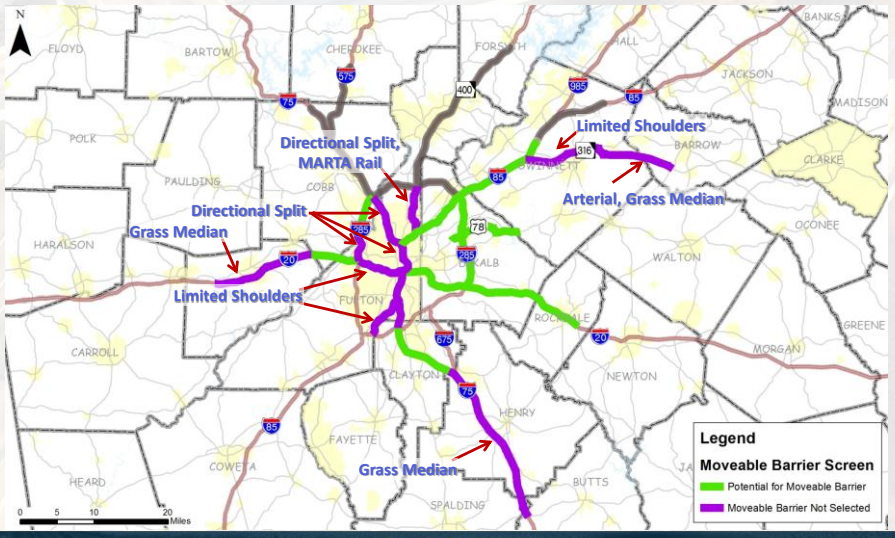
Corridors Selected for Moveable Barrier Evaluation



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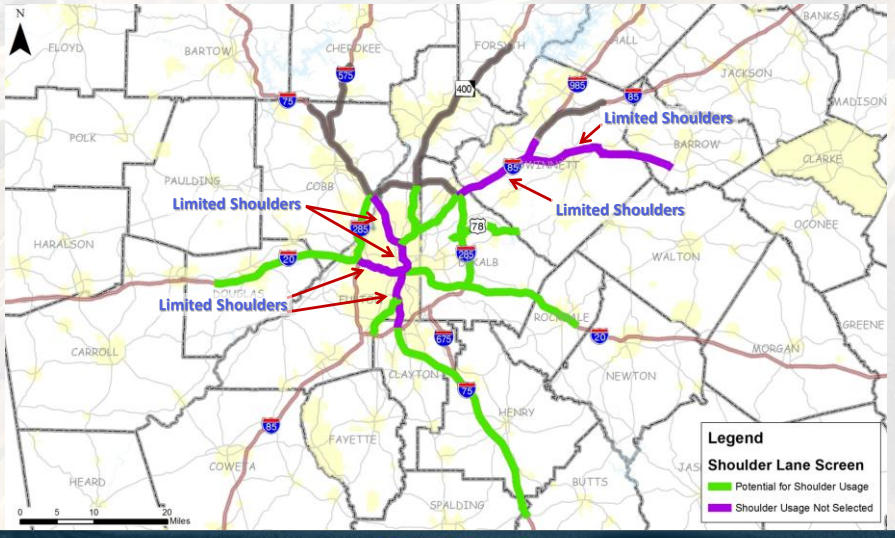
Corridors Selected for Shoulder Lane Evaluation



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Next Steps

- Evaluate potential improvements in each corridor
  - Planning level traffic and toll revenue analysis
  - Detailed traffic assessment
- Financial feasibility assessment
  - Preliminary capital and O&M cost estimates
  - High level project financing plan
- Develop and apply project prioritization framework
- Final recommendations and documentation

Georgia Department of Transportation

Atlanta Regional
MANAGED LANES
Implementation Plan

www.dot.ga.gov\MLIP

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Georgia Department of Transportation

Atlanta Regional
MANAGED LANES
Implementation Plan

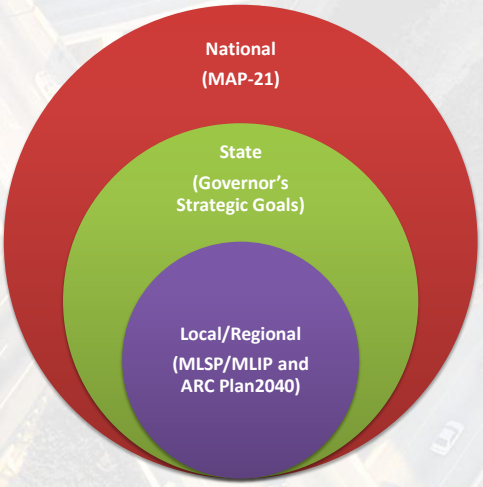
GDOT/ARC Coordination Meeting

MLIP Project Prioritization Framework

July 12, 2013

Georgia Department of Transportation

Overlapping Goals



Atlanta Regional MANAGED LANES Implementation Plan

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Overlapping Goals (Cont'd)

National – MAP-21

1. Safety
2. Infrastructure condition
3. Congestion reduction
4. System reliability
5. Freight movement and economic vitality
6. Environmental sustainability
7. Reduced project delivery delays

State – Governor's Strategic Goals

1. Mobile: Transporting people and products by improving the movement of people and goods across and within the state, expanding GA's role as a major logistics hub for global commerce, and leveraging public-private partnerships and improve intergovernmental cooperation for successful infrastructure development.
2. Growing: Creating jobs and growing businesses
3. Healthy: Accessible care and active lifestyles
4. Safe: Protecting the public's safety and security by reducing injury and loss of life on GA's roads

Overlapping Goals (Cont'd)

Local/Regional Goals MLSP/MLIP

1. Protect mobility
2. Maximize person/vehicle throughput
3. Minimize environmental impacts
4. Provide a financially feasible system
5. Design and maintain a flexible infrastructure for varying lane management

Local/Regional Goals ARC Plan2040 RTP

1. Lead as the global gateway to the South
2. Encourage healthy communities
3. Expand access to community resources

Preliminary MLIP Project Prioritization Framework

No.	Prioritization Theme	National	State	Local/Regional	
		MAP-21	Governor's Strategic Goals	MLSP/MLIP Goals	ARC Plan2040 RTP Goals
1	Transportation mobility	*Goals 3 & 4*	*Goal 1*	*Goals 1 & 2*	*Goal 3*
2	Financial feasibility			*Goal 4*	*Assumed**
3	System connectivity and economic growth	*Goals 3 & 5*	*Goal 2*	*Goal 1*	*Goal 1*
4	System preservation and environmental sustainability	*Goal 6*		*Goal 3*	*Goal 1*
5	Project support and readiness	*Goal 7*		*Goal 5*	*Assumed**

** Assumed or accounted for as part of the MPO TIP and RTP planning process.*

Preliminary MLIP Project Prioritization Framework (Cont'd)

No.	Themes	Performance Measures
1	Transportation mobility	Vehicle throughput and person throughput
		Changes in travel speeds and travel time savings
		Corridor reduction of vehicle delay
2	Financial feasibility	Revenue/mile
		Cost/mile
		Project financing index (PFI)
3	System connectivity and economic growth	System connectivity
		Connecting to major employment centers
		Jobs accessed within 45 minutes of travel
4	System preservation and environmental sustainability	System preservation
		Flexible lane management
		Level of environmental impacts
5	Project Support and Readiness	Project readiness
		General constructability and schedule
		Compatibility with regional plans

ARC RTP
System-wide Performance Measures

1. Annual fatalities on the transportation network
2. Percent of system adequately maintained
3. Percent of reliable peak period trips within 45 minutes by car
4. Percent of reliable peak period trips within 45 minutes by transit (rail and bus)
5. Recurring congestion costs in terms of wasted time and fuel
6. Incident response time in metro Atlanta
7. Truck delay measures

Next Steps

- Establish preliminary weighting
- Coordinate with:
  - GDOT upper management
  - ARC staff
  - Stakeholder Committee
  - TCC Subcommittees
- Develop methodologies and tools to calculate measures and rank projects by theme
- Calculate measures and rank projects
- Discuss preliminary findings

Atlanta Regional
MANAGED LANES
Implementation Plan

Metro Atlanta
OPS
OPERATIONAL PLANNING STUDY

Stakeholder Committee Meeting #3
September 9, 2013

Georgia Department of Transportation

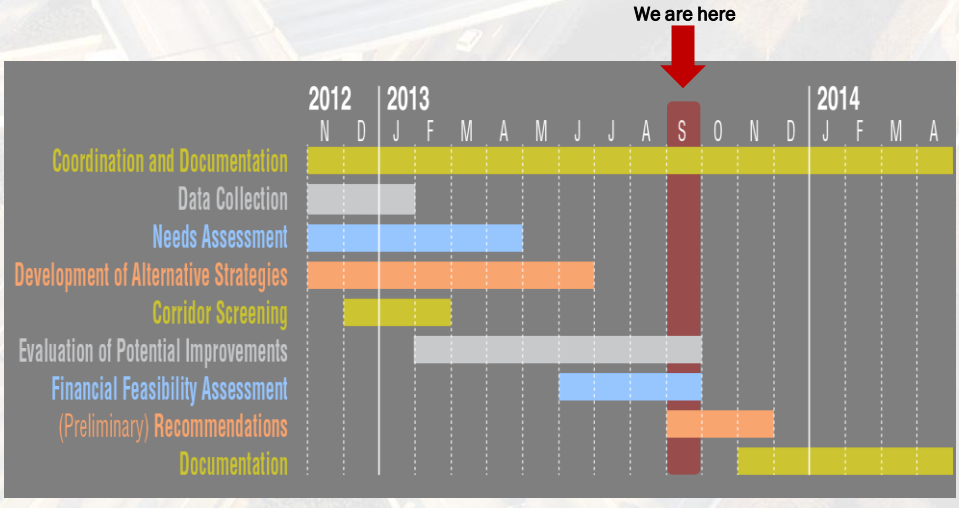
Agenda

- OPS
  - Recap
  - Stakeholder Feedback
  - OPS Project Prioritization Structure
  - OPS Break-Out Session #1
- MLIP
  - Recap
  - Managed Lane Strategies
  - MLIP Project Prioritization Structure
  - MLIP Break-Out Session #2
- Next Steps

Study Area

- All limited access facilities in metro Atlanta
- Emphasis on improving the Interstate mainline

Schedule



Atlanta Regional MANAGED LANES Implementation Plan
Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Georgia Department of Transportation

Objectives of OPS

- Identify bottleneck areas
- Identify and evaluate potential low-cost improvements that can be implemented within 6 months to 5 years
- Document a prioritized list of operational projects

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Incorporating Your Feedback

- Thank you for partnering with us and providing valuable input that has contributed to refining these strategy evaluations
- Actions we've taken based on your feedback:
  - ✓ Placed emphasis on ramp meters / transit vehicle preemption in the strategy evaluation
  - ✓ Incorporated bottleneck locations based on recommendations from GRTA bus drivers, HERO unit operators, GDOT's Traffic Management Center, CIDs and Atlanta MPO staff

System-wide OPS Strategies for Consideration

1) Expand ITS support infrastructure to include all limited access facilities
2) Advanced queue warning signs at shoulder / moveable barrier locations
3) Variable speed limits on limited access facilities with priority at shoulder / moveable barrier locations
4) Dynamically change shoulder usage times based on congestion

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

System-wide OPS Strategies for Consideration (Cont'd)

5) Upgrade technology for CCTV cameras / traffic flow monitoring
6) Provide adequate crash investigation sites where shoulders are used
7) Modify ramp meters to permit 2 cars per green
8) Quick response incident clearance across the region
9) Expand number of HERO units if needed
10) Modify truck lane restrictions

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Types of Location-Specific Strategies for Consideration

1) Variable / dynamic ramp closures (closed to all vehicles v. closed to unauthorized vehicles)
2) Auxiliary lanes (new or using shoulder)
3) Collector / distributor roads
4) Modifications to frontage road access
5) Channelization
6) Re-striping
7) Interchange reconfigurations (Diverging Diamond Interchanges, etc.)

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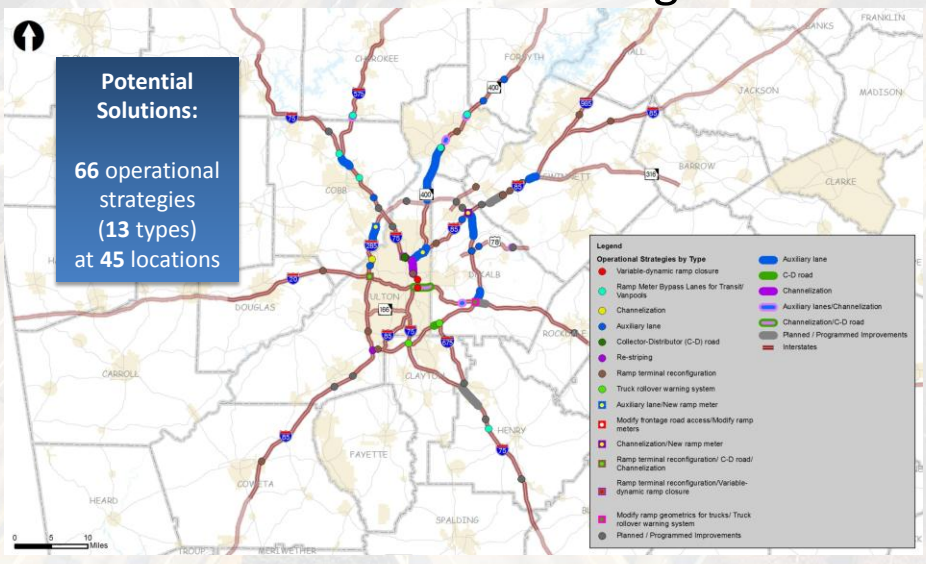
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Types of Location-Specific Strategies for Consideration (Cont'd)

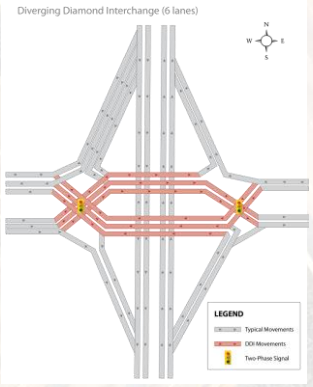
8) Turning prohibitions
9) Additional ramp meters
10) Modify existing ramp meter operations
11) Modify ramp geometrics, with a focus to better accommodate trucks
12) Automated truck rollover warning systems
13) Ramp meter bypass lanes for transit and vanpools

Potential OPS Strategies



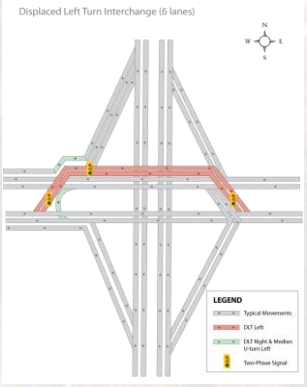
Innovative Interchange Reconfiguration Options

Diverging Diamond Interchange (DDI)



Partial DDI

Modified Displaced Left Turn



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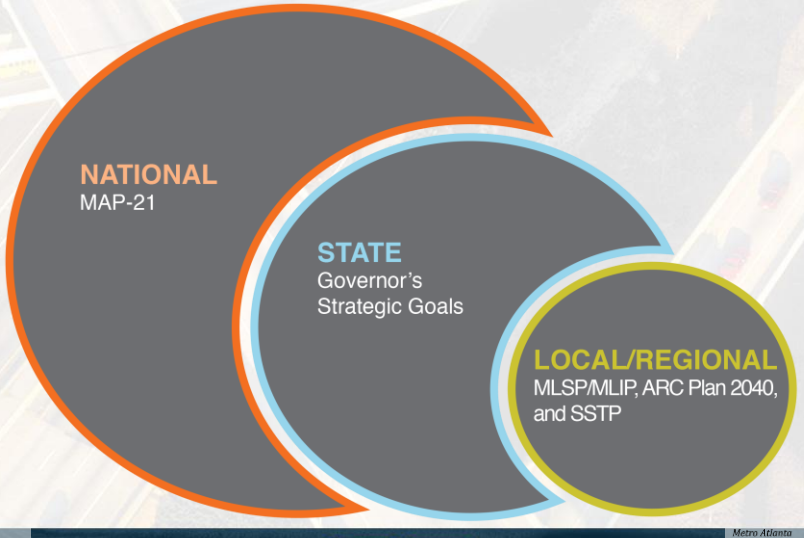
Project Prioritization Structure Goals



Atlanta Regional MANAGED LANES Implementation Plan

Georgia Department of Transportation

Metro Atlanta OPSS OPERATIONAL PLANNING STUDY

Goals (Cont'd)

NATIONAL
MAP-21

1. Safety
2. Infrastructure condition
3. Congestion reduction
4. System reliability
5. Freight movement and economic vitality
6. Environmental sustainability
7. Reduced project delivery delays

STATE
Governor's Strategic Goals

1. MOBILE: Transporting people and products by improving the movement of people and goods across and within the state, expanding GA's role as a major logistics hub for global commerce, and leveraging public-private partnerships and improve intergovernmental cooperation for successful infrastructure development.
2. GROWING: Creating jobs and growing businesses
3. HEALTHY: Accessible care and active lifestyles
4. SAFE: Protecting the public's safety and security by reducing injury and loss of life on GA's roads

Goals (Cont'd)

LOCAL/REGIONAL GOALS
MLSP/MLIP

1. Protect mobility
2. Maximize person/vehicle throughput
3. Minimize environmental impacts
4. Provide a financially feasible system
5. Design and maintain a flexible infrastructure for varying lane management

LOCAL/REGIONAL GOALS
ARC Plan2040 RTP

1. Lead as the global gateway to the South
2. Encourage healthy communities
3. Expand access to community resources

LOCAL/ REGIONAL GOALS
SSTP

People Mobility in Metro Atlanta

1. Increase number of people who can reach a major employment center within 45 minutes
2. Increase number of people taking reliable trips
3. Reduce financial burden of wasted hours & fuel caused by traffic congestion

Metro Atlanta and Statewide Freight and Logistics

4. Fix bottlenecks
5. Improve interregional and last-mile connectivity

OPS Project Prioritization Structure

		Transportation mobility	Financial feasibility	Safety	System connectivity & economic growth	System preservation & environmental sustainability	Project support and readiness
NATIONAL	MAP 21	Goals 3 & 4	-	Goal 1	Goals 3 & 5	Goal 6	Goal 7
STATE	Governor's Strategic Goals	Goal 1	Goal 1	Goal 4	Goal 2	-	-
LOCAL/REGIONAL	ARC Plan2040 RTP Goals	Goal 3	Assumed*	Goal 2	Goal 1	Goal 1	Assumed*
	SSTP**	Goals 1, 2, 3 & 4	-	Goal 7	Goals 3 & 8	-	-

** Assumed or accounted for as part of the MPO TIP and RTP planning process.*
***Statewide Strategic Transportation Plan (SSTP) in the Atlanta region.*

OPS Preliminary Project Prioritization Structure

No.	Themes	Performance Measures
1	Transportation mobility	Vehicle throughput
		Changes in travel speeds or travel time savings
		Reduction of vehicle delay
		Facilitation of transit options
2	Financial feasibility	Cost
		Benefit/cost ratio
3	Safety	Anticipated reduction of crashes
		Anticipated reduction of incident response time
4	Connectivity and economic growth	Facilitation of current major freight movement
		Connectivity to current major employment centers
5	System preservation and environmental sustainability	System preservation
		Level of environmental impacts
6	Project support and readiness	Project readiness
		General constructability and schedule

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Break-Out Group Instructions

- Purpose of Break-Out Group
  - Discuss and receive input on the project prioritization structure
  - Which themes and elements are most important to you in evaluating these strategies?
- Instructions
  - Two break-out sessions
  - Participants will stay at their tables for each session
  - Each facilitator will report back the group's discussion highlights

Break-Out Group #1
OPS Discussion

Atlanta Regional MANAGED LANES Implementation Plan
Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Objectives of MLIP

- Update MLSP as part of Managed Lanes Implementation Plan
- Evaluate new lanes, as well as lower cost priced managed lane solutions, such as shoulder lanes and movable barriers
- Incorporate preliminary recommendations, as appropriate and available, into RTP and TIP in the Fall of 2013; MLIP will wrap up in the Spring of 2014 with final recommendations

MLIP Status Update

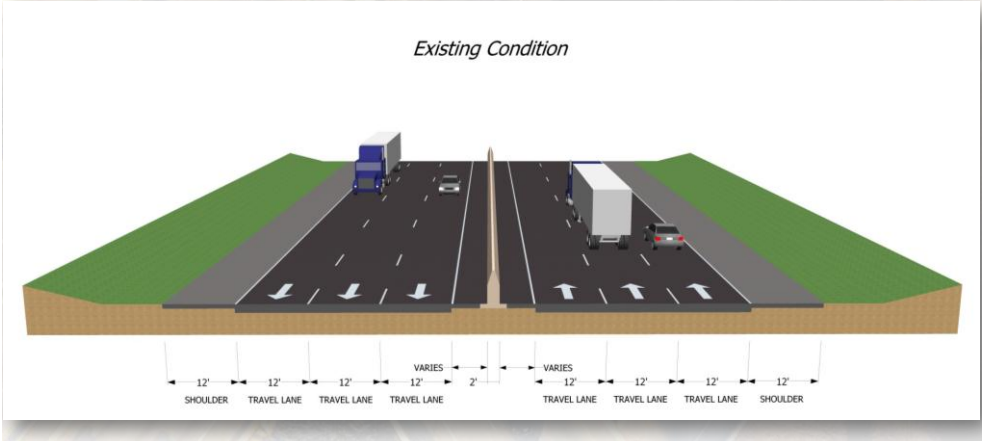
System-Level Model Traffic & Revenue Analysis

- New lane
- Priced shoulder lane
- Moveable barrier lane

Initiated cost estimates (roadway and tolling)

- Capital
- O&M

Existing Condition



Atlanta Regional MANAGED LANES Implementation Plan
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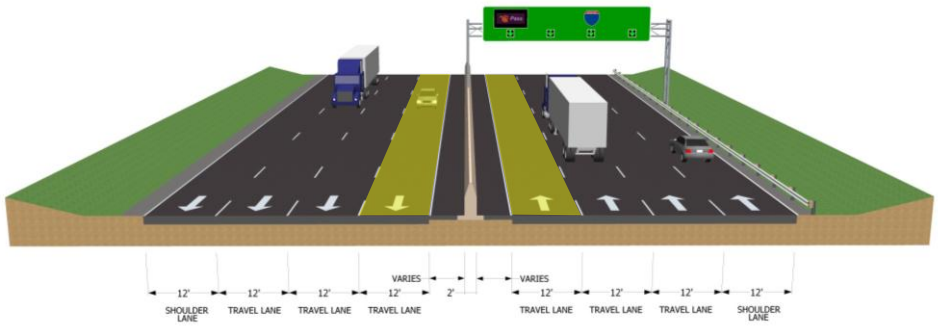
MLIP Strategies for Consideration
Priced Shoulder Lane

Shoulder Lane Open



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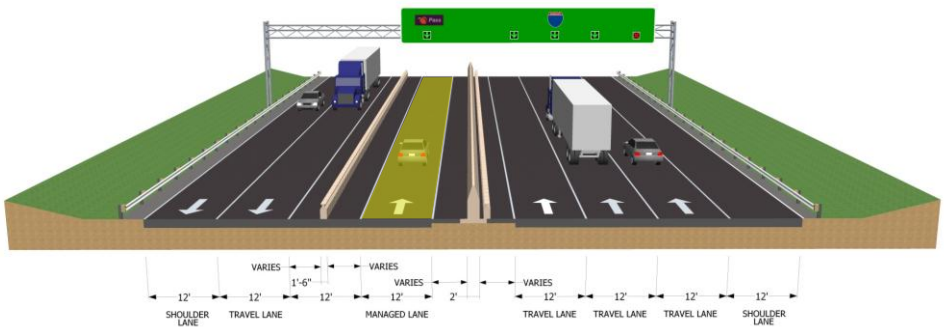
Georgia Department of Transportation

MLIP Strategies for Consideration
Moveable Barrier

Moveable Barrier (including shoulder usage)
Departing Vehicle Deployment



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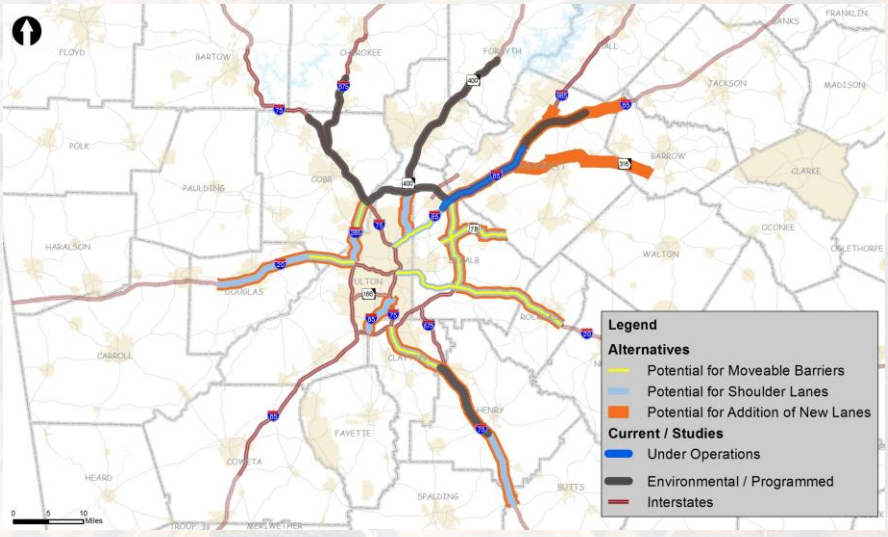
MLIP Strategies for Consideration (Cont'd)



Atlanta Regional MANAGED LANES Implementation Plan

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MLIP Project Prioritization Structure

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***Statewide Strategic Transportation Plan (SSTP) in the Atlanta region.*

MLIP Preliminary Project Prioritization Structure

No.	Themes	Performance Measures
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		Compatibility with regional plans

Break-Out Group #2 MLIP Discussion

Next Steps

- Complete evaluation of MLIP and OPS projects based on refined project prioritization structure
- Conduct Final Stakeholder Committee Meeting (#4)
  - Share preliminary recommendations
  - Winter 2013/2014
- Develop financial plan for managed lane projects
- Complete documentation and corridor profiles
- Continue coordinating with ARC on PLAN2040 RTP Update throughout the process

Questions?

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Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

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Atlanta Regional
MANAGED LANES
Implementation Plan

Metro Atlanta
OPS
OPERATIONAL PLANNING STUDY

Community Improvement District (CID)
Meeting #2
September 16, 2013

Georgia Department of Transportation

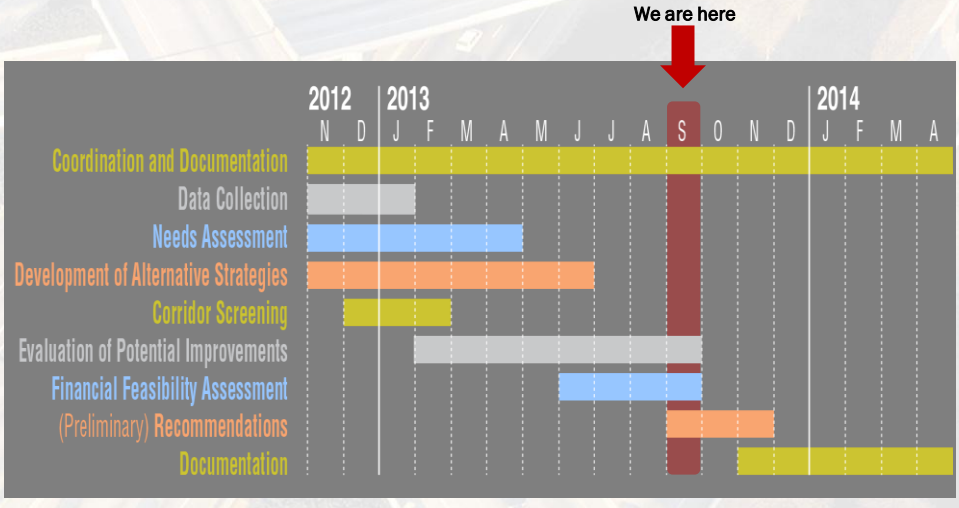
Agenda

- OPS
  - Recap
  - Participant Feedback
  - OPS Project Prioritization Structure
  - OPS Break-Out Session #1
- MLIP
  - Recap
  - Managed Lane Strategies
  - MLIP Project Prioritization Structure
  - MLIP Break-Out Session #2
- Next Steps and Q&A

Study Area

- All limited access facilities in metro Atlanta
- Emphasis on improving the Interstate mainline

Schedule



Atlanta Regional MANAGED LANES Implementation Plan
Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Georgia Department of Transportation

Objectives of OPS

- Identify bottleneck areas
- Identify and evaluate potential low-cost improvements that can be implemented within 6 months to 5 years
- Document a prioritized list of operational projects

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Incorporating Your Feedback

- Thank you for partnering with us and providing valuable input that has contributed to refining these strategy evaluations
- Actions we've taken based on your feedback:
  - ✓ Placed emphasis on ramp meters / transit vehicle preemption in the strategy evaluation
  - ✓ Incorporated bottleneck locations based on recommendations from GRTA bus drivers, HERO unit operators, GDOT's Traffic Management Center, CIDs and Atlanta MPO staff

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

System-wide OPS Strategies for Consideration

1) Expand ITS support infrastructure to include all limited access facilities
2) Advanced queue warning signs at shoulder / moveable barrier locations
3) Variable speed limits on limited access facilities with priority at shoulder / moveable barrier locations
4) Dynamically change shoulder usage times based on congestion

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

System-wide OPS Strategies for Consideration

5) Upgrade technology for CCTV cameras / traffic flow monitoring
6) Provide adequate crash investigation sites where shoulders are used
7) Modify ramp meters to permit 2 cars per green
8) Quick response incident clearance across the region
9) Expand number of HERO units if needed
10) Modify truck lane restrictions

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Types of *Location-Specific* Strategies for Consideration

1) Variable / dynamic ramp closures (closed to all vehicles v. closed to unauthorized vehicles)
2) Auxiliary lanes (new or using shoulder)
3) Collector / distributor roads
4) Modifications to frontage road access
5) Channelization
6) Re-striping
7) Interchange reconfigurations (Diverging Diamond Interchanges, etc.)

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Types of *Location-Specific* Strategies for Consideration

8) Turning prohibitions
9) Additional ramp meters
10) Modify existing ramp meter operations
11) Modify ramp geometrics, with a focus to better accommodate trucks
12) Automated truck rollover warning systems
13) Ramp meter bypass lanes for transit and vanpools

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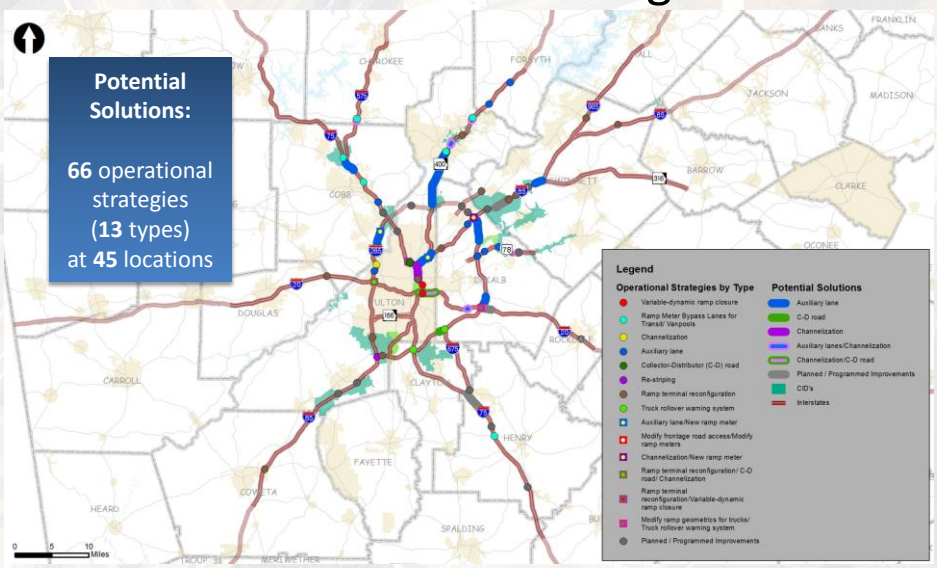
Potential OPS Strategies



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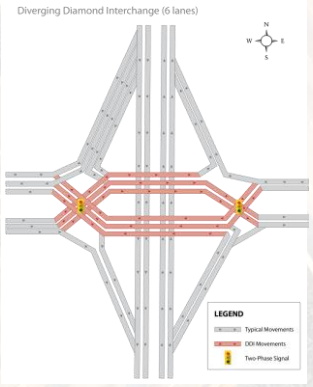
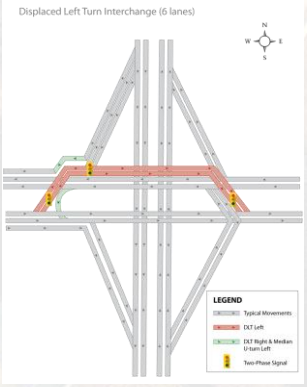
Innovative Interchange Reconfiguration Options

Diverging Diamond Interchange (DDI)



Partial DDI

Modified Displaced Left Turn



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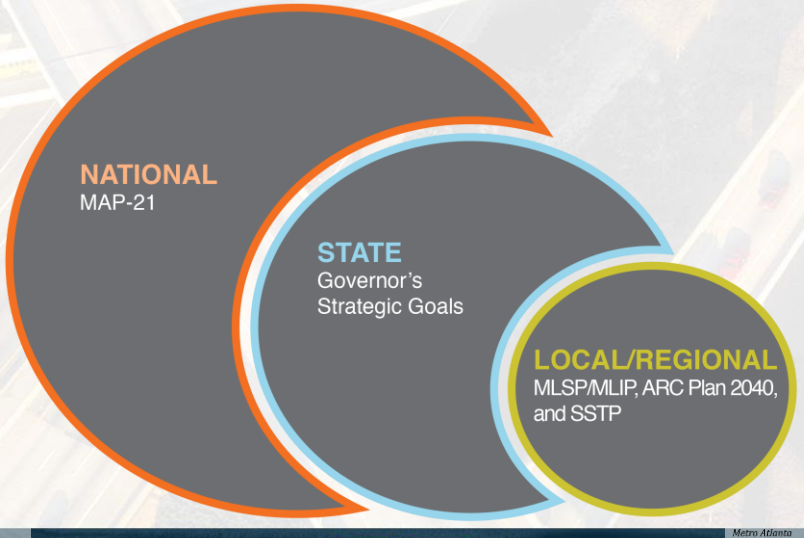
Project Prioritization Structure Goals



Atlanta Regional MANAGED LANES Implementation Plan

Georgia Department of Transportation

Metro Atlanta OPSS OPERATIONAL PLANNING STUDY

Goals

NATIONAL
MAP-21

1. Safety
2. Infrastructure condition
3. Congestion reduction
4. System reliability
5. Freight movement and economic vitality
6. Environmental sustainability
7. Reduced project delivery delays

STATE
Governor's Strategic Goals

1. MOBILE: Transporting people and products by improving the movement of people and goods across and within the state, expanding GA's role as a major logistics hub for global commerce, and leveraging public-private partnerships and improve intergovernmental cooperation for successful infrastructure development.
2. GROWING: Creating jobs and growing businesses
3. HEALTHY: Accessible care and active lifestyles
4. SAFE: Protecting the public's safety and security by reducing injury and loss of life on GA's roads

Goals

LOCAL/REGIONAL GOALS
ARC Plan2040 RTP

1. Lead as the global gateway to the South
2. Encourage healthy communities
3. Expand access to community resources

LOCAL/REGIONAL GOALS
MLSP/MLIP

1. Protect mobility
2. Maximize person/vehicle throughput
3. Minimize environmental impacts
4. Provide a financially feasible system
5. Design and maintain a flexible infrastructure for varying lane management

LOCAL/ REGIONAL GOALS
SSTP

People Mobility in Metro Atlanta

1. Increase number of people who can reach a major employment center within 45 minutes
2. Increase number of people taking reliable trips
3. Reduce financial burden of wasted hours & fuel caused by traffic congestion

Metro Atlanta and Statewide Freight and Logistics

4. Fix bottlenecks
5. Improve interregional and last-mile connectivity

OPS Project Prioritization Structure

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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Group Discussion Instructions

- Purpose of Group Discussion
  - Discuss and receive input on the project prioritization structure
  - Which themes are most important to you in evaluating these strategies?
- Instructions
  - One group discussion
  - Participants will be asked to weight the prioritization themes by placing dots on each table

Break-Out Group #1
OPS Discussion

Atlanta Regional MANAGED LANES Implementation Plan
Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Objectives of MLIP

- Update MLSP as part of Managed Lanes Implementation Plan
- Evaluate new lanes, as well as lower cost priced managed lane solutions, such as shoulder lanes and movable barriers
- Incorporate preliminary recommendations, as appropriate and available, into RTP and TIP in the Fall of 2013; MLIP will wrap up in the Spring of 2014 with final recommendations

MLIP Status Update

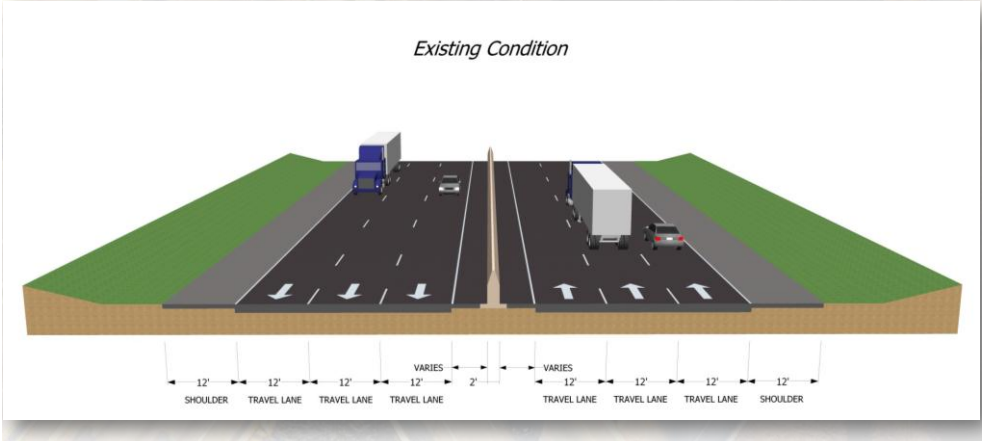
System-Level Model Traffic & Revenue Analysis

- New lane
- Priced shoulder lane
- Moveable barrier lane

Initiated cost estimates (roadway and tolling)

- Capital
- O&M

Existing Condition



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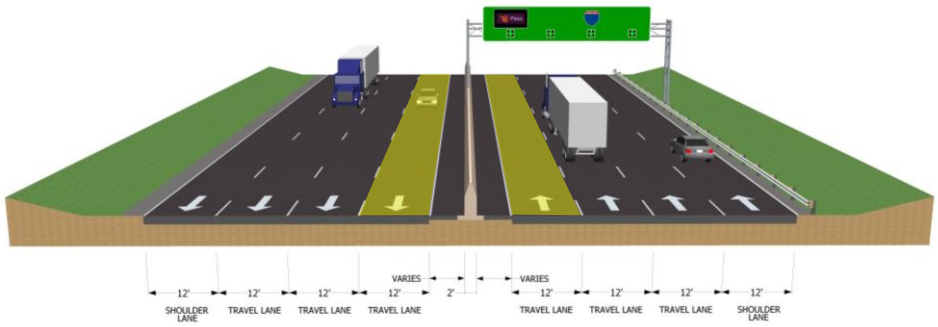
MLIP Strategies for Consideration
Priced Shoulder Lane

Shoulder Lane Open



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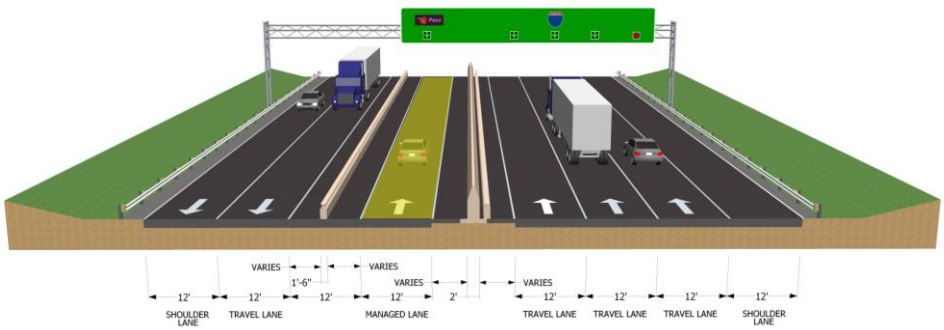

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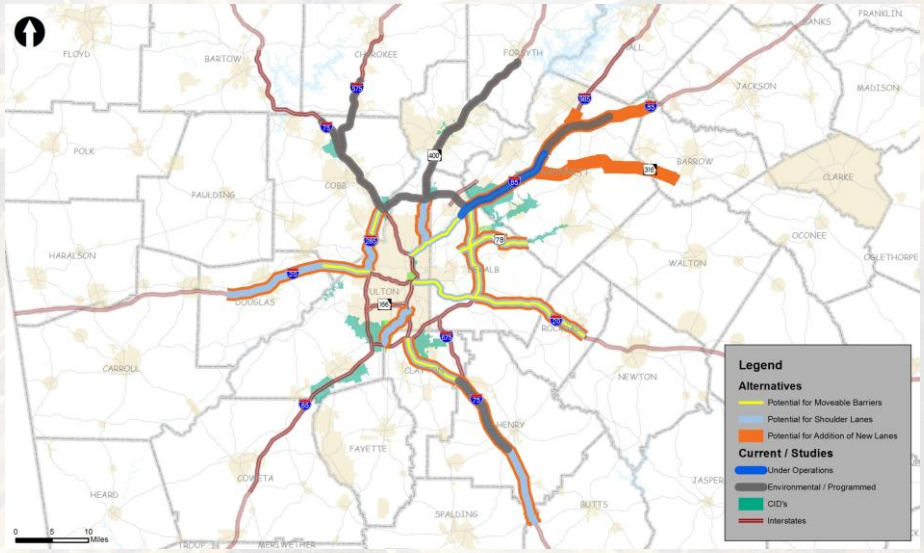
MLIP Strategies for Consideration



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Break-Out Group #2 MLIP Discussion

Next Steps

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- Conduct Final CID Meeting (#3)
  - Share preliminary recommendations
  - Winter 2013/2014
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Questions?

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Georgia Department of Transportation
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GDOT/ARC RTP Coordination Meeting

September 26, 2013

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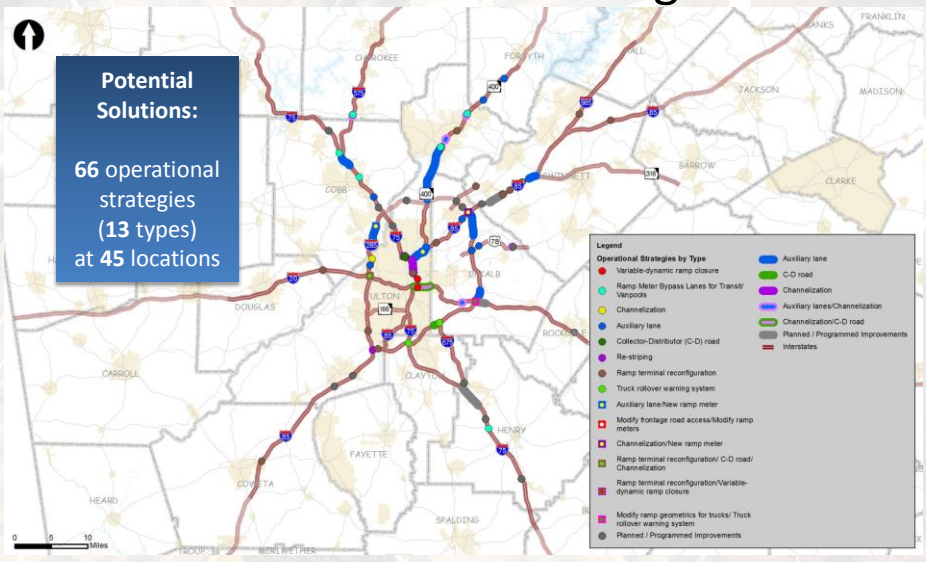
Potential OPS Strategies



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Project Prioritization Structure Goals

Atlanta Regional MANAGED LANES Implementation Plan

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Goals (Cont'd)

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MAP-21

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Goals (Cont'd)

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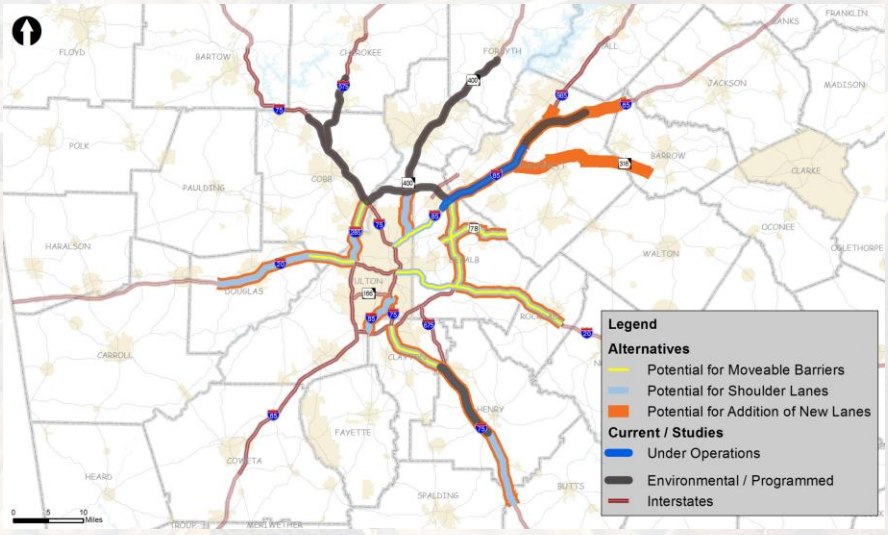
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

MLIP Strategies for Consideration (Cont'd)



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Atlanta Regional MANAGED LANES Implementation Plan

GDOT Georgia Department of Transportation

Metro Atlanta OPS
OPERATIONAL PLANNING STUDY

TRANSPORTATION SOLUTIONS: GETTING THE MOST BANG FOR YOUR BUCK!

GPA Fall Conference 2013

Garth Lynch, PE, AICP
HNTB Corporation
October 10, 2013

Georgia Department of Transportation

Agenda

- Overview of study
- Identification of bottlenecks
- Potential operational strategies
- Project prioritization
- Next steps

Georgia Department of Transportation
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Metro Atlanta OPS

OVERVIEW OF STUDY

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Study Area

- All limited access facilities in metro Atlanta
- Emphasis on improving the Interstate mainline

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Objectives

- Identify bottleneck areas
- Identify and evaluate potential low-cost improvements
- Quick implementation – 6 months to 5 years
- Document a prioritized list of operational projects

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Metro Atlanta OPS
OPERATIONAL PLANNING STUDY

Metro Atlanta OPS

IDENTIFICATION OF BOTTLENECKS

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OPERATIONAL PLANNING STUDY

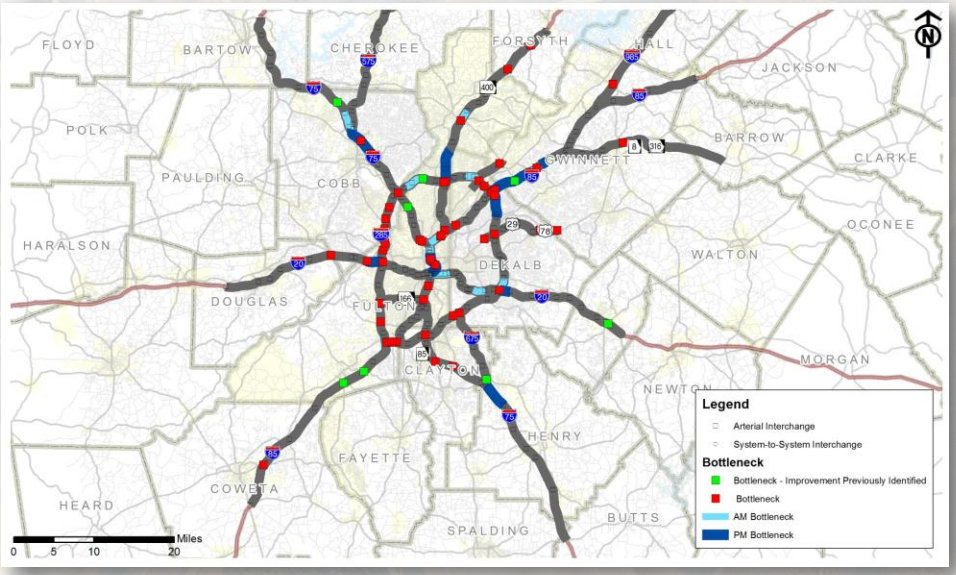
Identification of Bottleneck Locations

Data Inputs	User Inputs
NAVIGATOR Speeds & counts	GRTA Bus drivers
Skycomp Aerial congestion survey	GDOT Georgia Department of Transportation HERO Unit operators
TOMTOM GPS speeds & duration of congestion	GDOT TMC staff
	Stakeholders

Causes of Bottlenecks

- High volumes
- Weaving
- Lane drops/additions
- Last minute decision making
- Lack of storage on ramps and/or high turn volumes
- Tight turning radii and/or steep grade on ramps
- Frontage road access
- Limited access facility terminates at signalized intersection
- Suspected drainage issues

Identified Bottleneck Locations



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Metro Atlanta OPS

POTENTIAL STRATEGIES

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OPERATIONAL PLANNING STUDY

Potential Strategies

- Added Corridor Capacity (MLIP)
- Improved Design Geometrics
- Intelligent Transportation Systems
- Freight
- Demand Management & Policy Considerations

Category A — ADDED CORRIDOR CAPACITY

1 - Bottleneck mitigation
2 - Managed lanes
3 - Reversible/changeable lanes
4 - Driveable/hard shoulder running

Category B — IMPROVED DESIGN GEOMETRICS

1 - Roundabouts
2 - Diverging diamond interchanges
3 - Loop ramps reducing left turns
4 - Ramp configuration to increase queuing capacity
5 - Channelization
6 - Innovative intersections
7 - Minimum intersection/interchange and ramp spacing
8 - Improvements to median
9 - Crash investigation site
10 - Improved arterials/frontage roads
11 - Improvements to detour routes*

Category C — INTELLIGENT TRANSPORTATION SYSTEMS

1 - Traveler information systems
2 - Quick response incident clearance
3 - Roadside and motorist assistance
4 - ITS support infrastructure
5 - CCTV cameras/traffic flow monitoring
6 - Signal operation and management
7 - Variable speed limits
8 - Queue warning
9 - Dynamic merge control
10 - Ramp metering/flow control
11 - Connected vehicles*
12 - Express lanes*
13 - Queues jumpers*
14 - Traffic signal preemption/transit signal priority*

Category D — FREIGHT

1 - Commercial vehicle geometric accommodations
2 - Truck lane restrictions

Category E — DEMAND MANAGEMENT AND POLICY CONSIDERATIONS

1 - Demand management strategies
2 - Variable/dynamic pricing
3 - Variable/dynamic ramp closures
4 - Vehicle eligibility/occupancy
5 - Trip reduction ordinances*

** Added strategy for consideration as result of stakeholder input.*

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

System-wide Strategies for Consideration

1) Expand ITS
2) Advanced queue warning signs
3) Variable speed limits
4) Dynamically shoulder usage
5) Upgrade CCTV cameras / traffic flow monitoring
6) Increase crash investigation sites
7) Modify ramp meters to permit 2 cars per green
8) Expand quick response incident clearance
9) Expand HERO units
10) Modify truck lane restrictions

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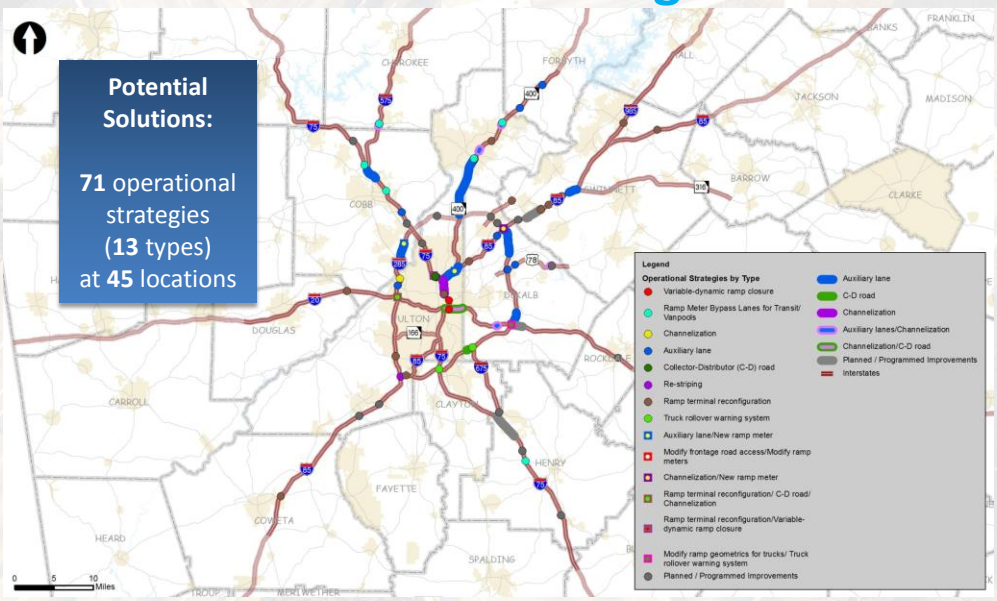
Types of Location-Specific Strategies for Consideration

1) Variable / dynamic ramp closures (closed to all vehicles v. closed to unauthorized vehicles)
2) Auxiliary lanes (new or using shoulder)
3) Collector / distributor roads
4) Modifications to frontage road access
5) Channelization
6) Re-striping
7) Interchange reconfigurations (Diverging Diamond Interchanges, etc.)

Types of Location-Specific Strategies for Consideration

8) Turning prohibitions
9) Additional ramp meters
10) Modify existing ramp meter operations
11) Modify ramp geometrics, with a focus to better accommodate trucks
12) Automated truck rollover warning systems
13) Ramp meter bypass lanes for transit and vanpools

Potential Strategies



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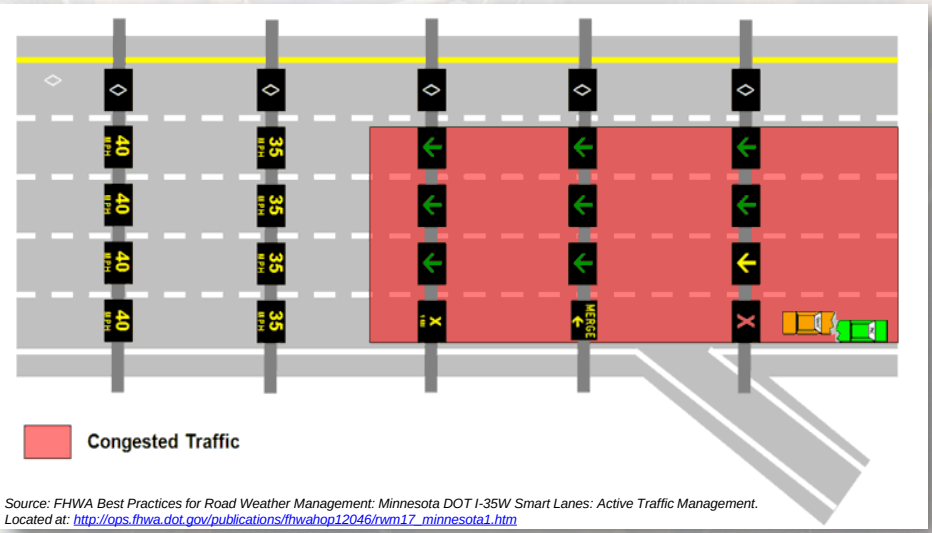
Active Traffic Management (ATM)

Lane Control Signals During an Incident



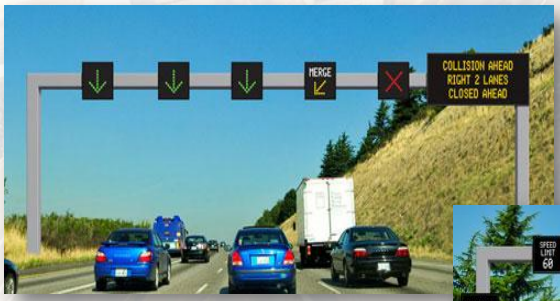
Source: FHWA Best Practices for Road Weather Management: Minnesota DOT I-35W Smart Lanes: Active Traffic Management. Located at: http://ops.fhwa.dot.gov/publications/fhwahop12046/rwm17_minnesota1.htm

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Active Traffic Management (ATM)

ATM Sign Example



Variable Speed Limit Sign Example

Source: Washington State Department of Transportation Smarter Highways: http://www.wsdot.wa.gov/smarterhighways/

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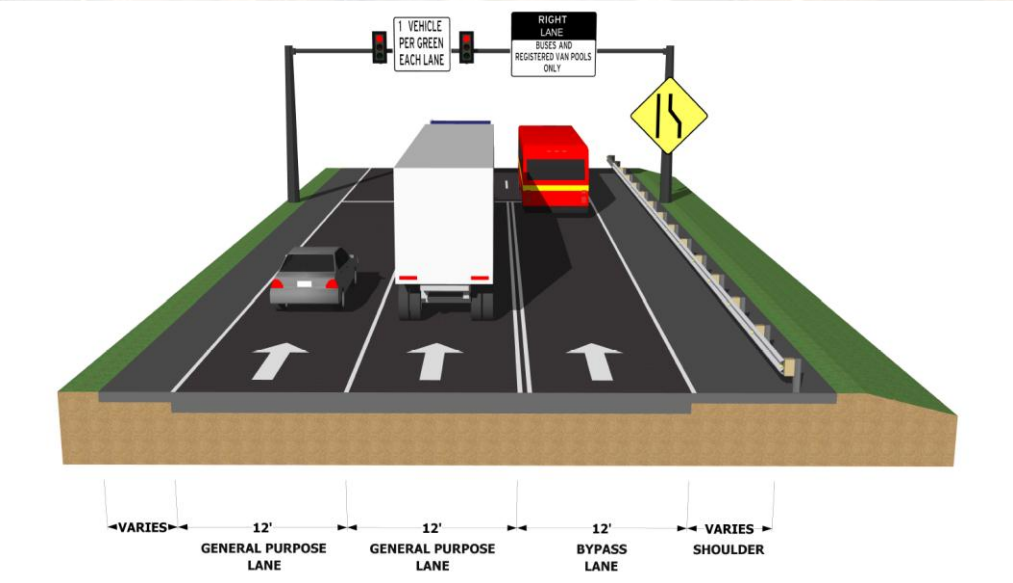
Ramp Meter Bypass Lane for Transit



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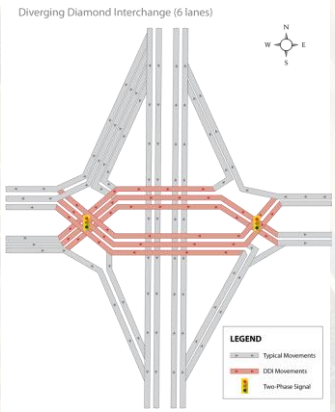
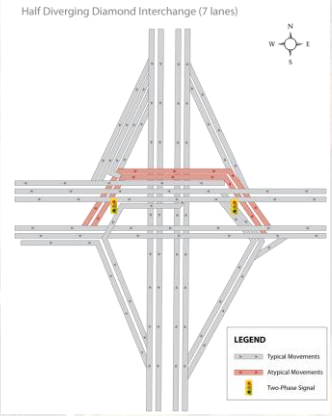
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Innovative Interchange Reconfiguration Options

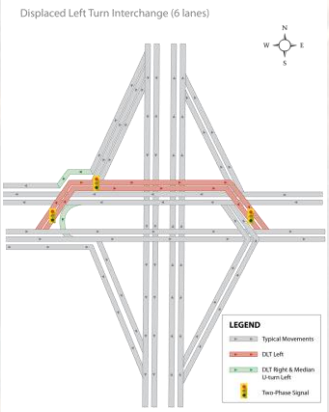
Diverging Diamond Interchange (DDI)



Partial DDI



Modified Displaced Left Turn



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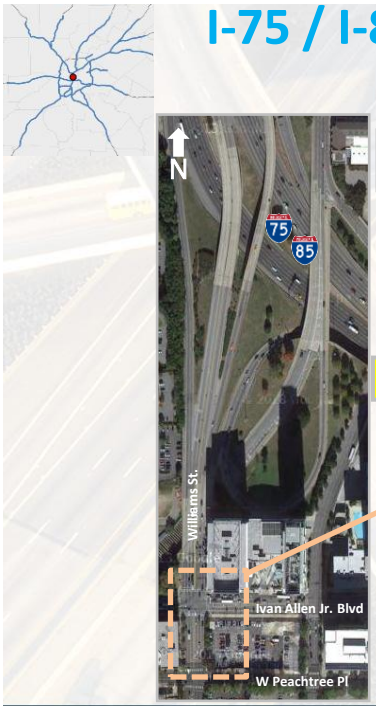
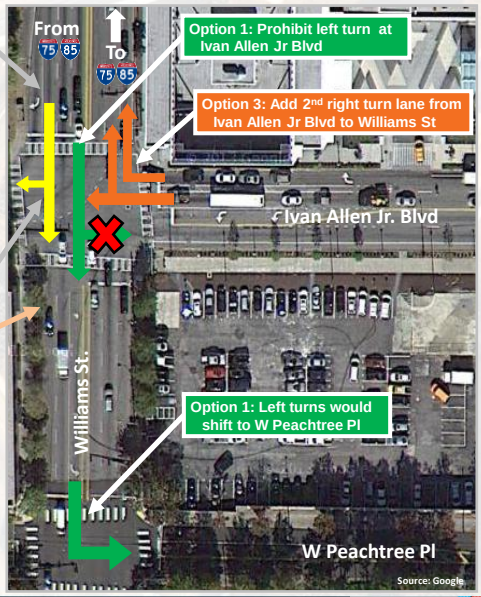
I-75 / I-85 (Downtown Connector) at Williams St



Option 2: Provide SB right turn arrow & re-stripe taper

Option 4: Allow 2nd right turn/thru lane



Option 1: Prohibit left turn at Ivan Allen Jr Blvd

Option 3: Add 2nd right turn lane from Ivan Allen Jr Blvd to Williams St

Option 1: Left turns would shift to W Peachtree Pl

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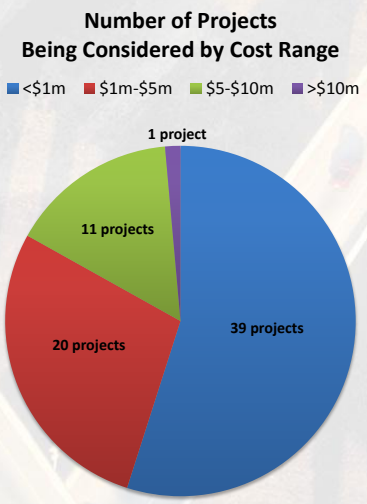
Strategies Being Considered by Cost Range

- OPS projects being input into project prioritization process
  - 71 projects totaling approximately $159 M



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Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Metro Atlanta OPS

PROJECT PRIORITIZATION

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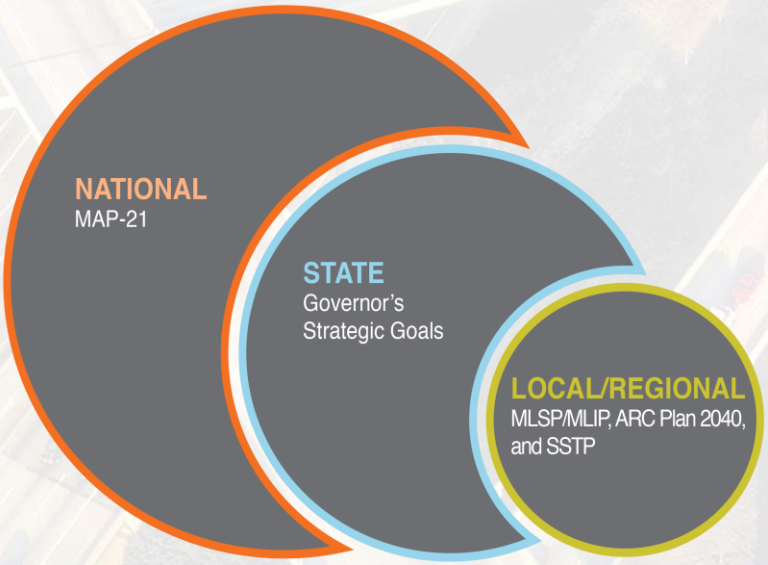
Project Prioritization Structure Goals



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National & State Goals

NATIONAL
MAP-21

1. Safety
2. Infrastructure condition
3. Congestion reduction
4. System reliability
5. Freight movement and economic vitality
6. Environmental sustainability
7. Reduced project delivery delays

STATE
Governor's Strategic Goals

1. MOBILE: Transporting people and products by improving the movement of people and goods across and within the state, expanding GA's role as a major logistics hub for global commerce, and leveraging public-private partnerships and improve intergovernmental cooperation for successful infrastructure development.
2. GROWING: Creating jobs and growing businesses
3. HEALTHY: Accessible care and active lifestyles
4. SAFE: Protecting the public's safety and security by reducing injury and loss of life on GA's roads

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Local Goals

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Project Prioritization Structure

		Transportation mobility	Financial feasibility	Safety	System connectivity & economic growth	System preservation & environmental sustainability	Project support and readiness
NATIONAL	MAP 21	Goals 3 & 4	-	Goal 1	Goals 3 & 5	Goal 6	Goal 7
STATE	Governor's Strategic Goals	Goal 1	Goal 1	Goal 4	Goal 2	-	-
LOCAL/REGIONAL	ARC Plan2040 RTP Goals	Goal 3	Assumed*	Goal 2	Goal 1	Goal 1	Assumed*
LOCAL/REGIONAL	SSTP**	Goals 1, 2, 3 & 4	-	Goal 7	Goals 3 & 8	-	-

** Assumed or accounted for as part of the MPO TIP and RTP planning process.*
***Statewide Strategic Transportation Plan (SSTP) in the Atlanta region.*

Preliminary Project Prioritization Structure

No.	Themes	Performance Measures
1	**Transportation mobility**	Vehicle throughput
		Changes in travel speeds or travel time savings
		Reduction of vehicle delay
		Facilitation of transit options
2	**Financial feasibility**	Cost
		Benefit/cost ratio
3	**Safety**	Anticipated reduction of crashes
		Anticipated reduction of incident response time
4	**Connectivity and economic growth**	Facilitation of current major freight movement
		Connectivity to current major employment centers
5	**System preservation and environmental sustainability**	System preservation
		Level of environmental impacts
6	**Project support and readiness**	Project readiness
		General constructability and schedule

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NEXT STEPS

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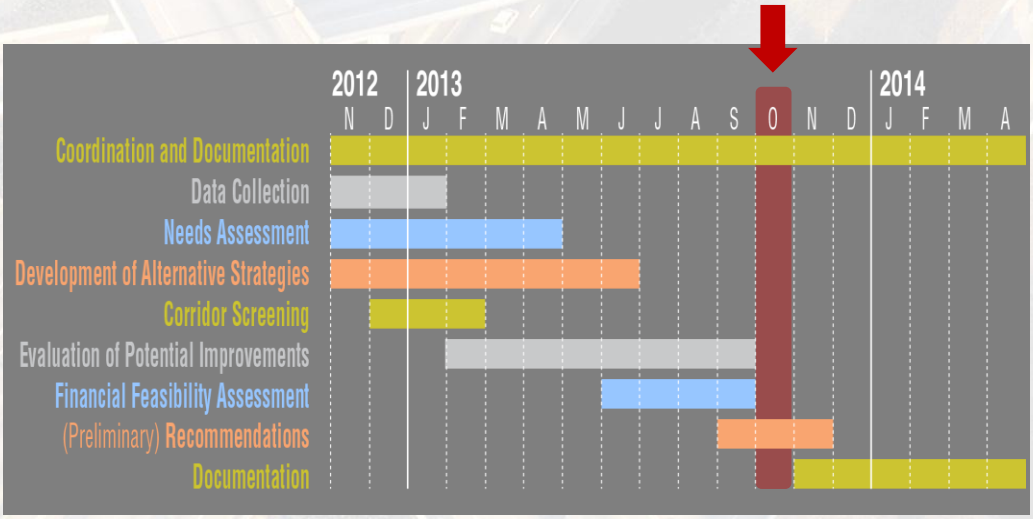
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

Next Steps



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www.dot.ga.gov\MLIP

Kyle Mote

GDOT Office of Planning

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kmote@dot.ga.gov

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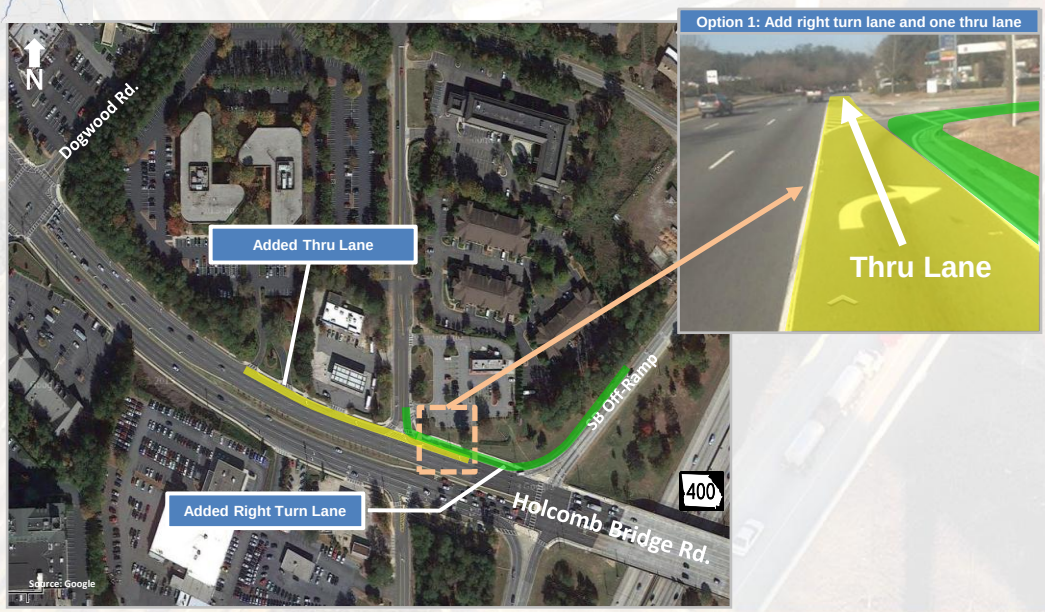
SR 400 at Holcomb Bridge Rd (SR 140)



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I-85 North at Hamilton Mill Rd

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

I-285 S at I-85 S Interchange

Option 1a: Widen and restripe existing merge from I-85 NB to create two-lane on-ramp

Option 1b: Restripe Old National Hwy. On-ramp

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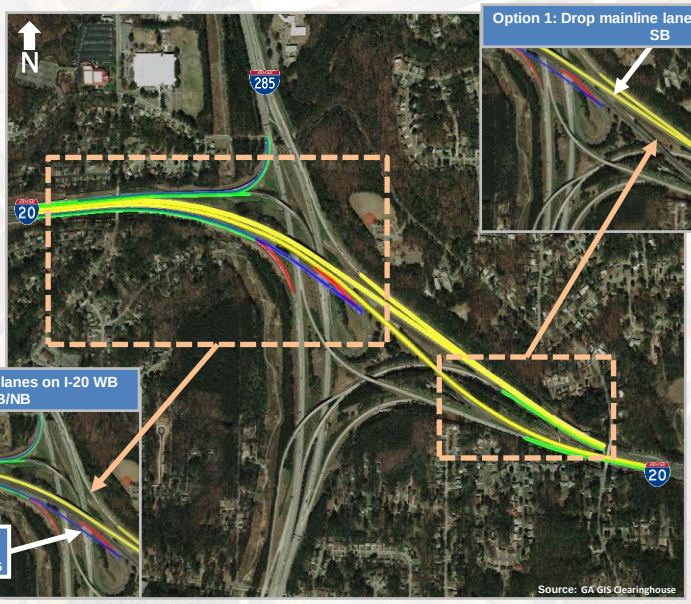
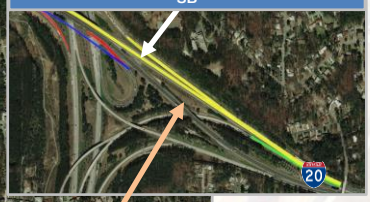
Metro Atlanta OPS OPERATIONAL PLANNING STUDY

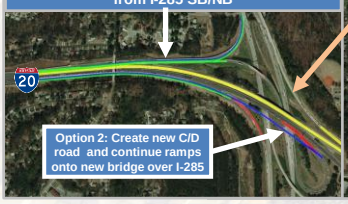
I-285 W / I-20 W



Option 1: Drop mainline lane on I-20 WB to I-285 SB



Option 1: Add 2 mainline lanes on I-20 WB from I-285 SB/NB



Option 2: Create new C/D road and continue ramps onto new bridge over I-285

Source: GA GIS Clearinghouse

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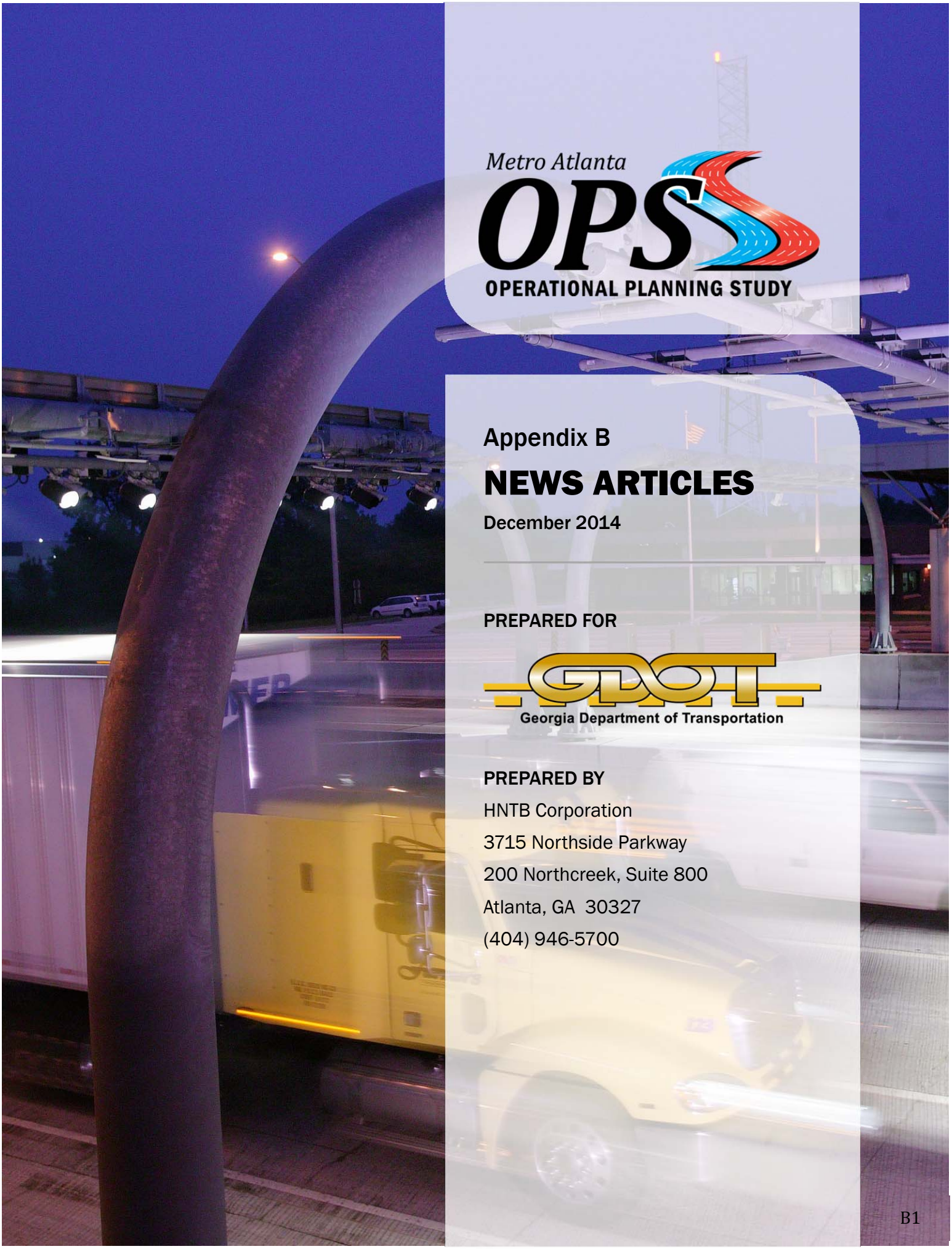

Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Appendix B

NEWS ARTICLES

December 2014

PREPARED FOR

Georgia Department of Transportation

PREPARED BY

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1 Atlanta Journal Constitution

1.1 A $59B PLAN TO EASE METRO ATLANTANS' TRANSPORTATION PAIN

Updated: 7:44 p.m., Jan. 11, 2014 | Posted: 12:00 a.m., Jan. 11, 2014

By Andria Simmons

Photo credit: Renee' Hannans Henry

I-20/Panola Road interchange: Turn lanes on and off the interstate will be extended and more lanes added to the off-ramps. Another left-turn lane will be added on the bridge. Cost is $28.1 million, with construction to begin in 2017.

The newest blueprint for helping to unsnarl metro Atlanta's traffic problems includes nearly $59 billion worth of transportation projects over the next 26 years, a sum so huge it could finance a new Falcon's stadium 49 times over.

Three-quarters of that money will go toward maintaining the existing roads, bridges and transit systems, but a fourth — about $15 billion — will bankroll projects aimed at relieving traffic congestion and providing alternatives to commuting by car. The public can go to www.atlantaregional.com/rtp update to weigh in on the plan.

Transportation planners acknowledge that a $15 billion investment won't be enough to keep pace with the expected increase in traffic congestion. The average commuter's time spent stuck in traffic is expected to worsen as the predicted 3 million people and 1.3 million jobs take root in metro Atlanta by 2040, according to the Atlanta Regional Commission.

"The best thing that happened to congestion in the past five years was the economic collapse," said David Haynes, a senior planner at the ARC.

"That's not a good way to solve it," he hastened to add.

The average yearly cost of congestion is $1,860 in wasted fuel and work hours. By 2040, that is expected to more than double to $3,900.

Without the planned investments, the cost would be significantly higher — more than $5,000 per person each year.

So regional leaders have prioritized transportation spending on projects that will unclog the major bottleneck points, ease congestion on heavily traveled arterial roads and add tolled express lanes to interstates for commuters who are willing to pay for a speedier trip. There is also a $1.4 billion list of pedestrian and bicycle improvements aimed at making it easier for people to get around without a car.

The region's long-term transportation plan is updated every few years in response to updated population and employment forecasts and changing local priorities that cause projects to be delayed or fast-tracked. It was last updated in 2011. And it will have to be updated again in 2016.

More money would have been available for transportation improvements if voters last year had approved a 10-year sales tax of one penny on every dollar. The tax would have brought in $7.2 billion ($8.5 billion with inflation factored in). About half of that would have gone toward transit. However, voters sent a resounding message that the government should make do with what it already had when they overwhelmingly rejected the plan in July 2012.

"All our communities in the state and the ARC has to deal with the economic realities," said Kerry Armstrong, the ARC's newly elected chairman. "There is never going to be enough (money) to do what we want to do. So it's going to take prudent management and good collective thinking to accomplish what we need to do."

More than 71 percent of people who responded to a recent public opinion survey by the ARC, "Metro Atlanta Speaks," about the major issues and opportunities facing the region, said improved public transportation was "very important" for the future. And 41 percent said improvements in public transportation would be the best way to fix traffic, as opposed to 30 percent who said better roads and highways were the solution.

But given the current funding environment, most of the major transit expansion projects in the long-range plan aren't slated to be built until between 2030 and 2040. Those projects include a bus-rapid transit system to connect Northwest Atlanta to Kennesaw, and MARTA expansion along the I-20 East, Ga. 400 North and the Clifton Corridor near Emory.

David Emory, president of Citizens for Progressive Transit, said one problem is that state law mandates that motor fuel taxes be spent on roads and bridges. Another is that the sales tax collected in DeKalb and Fulton to fund MARTA operations isn't enough to expand train and bus service.

Bringing in a private investor is one option to speed up some transit projects in the pipeline. A large federal grant could also put a project on the fast track.

But "I think we are going to need in some additional large-scale public investment if we want to see these projects move forward sooner," Emory said.

Baruch Feigenbaum, a Reason Foundation policy analyst and a Libertarian who tends to favor roads over transit, said he believes the $4.2 billion designated for express toll lanes in the plan will benefit transit riders because Xpress buses will travel in the lanes for free.

"I do think they need to spend a little more on managed lanes (express toll lanes), because those projects are so expensive and so large," Feigenbaum said.

Feigenbaum said it's appropriate that fuel taxes go toward road and bridge projects because drivers are the ones paying them.

The Atlanta Regional Commission is expected to vote on the updated long-range plan in March. Then it will go before the Georgia Regional Transportation Authority (GRTA) for final approval.

Following is a breakdown of some of the other big-impact projects. (As a rule of thumb, each project takes two to three years to complete.)

Unclogging bottlenecks

- Ga. 400: Four collector-distributor lanes will be constructed along the highway from the vicinity of Hammond Drive and Abernathy Road to north of Spalding Drive at a cost of $240.7 million. Construction should begin in 2017.

- I-20/ Panola Road interchange: Turn lanes on and off the interstate will be extended and more lanes added to the off-ramps. An additional left-turn lane will be constructed on the bridge. The cost is $28.1 million, with construction to begin in 2017.

- I-75 South: Two collector-distributor lanes will be constructed between I-285 and Forest Parkway (Ga. 331) at a cost of $89 million. Construction of northbound collector-distributor lanes is slated to start in 2017. The southbound side will be addressed sometime between 2020 and 2030.

- I-85 at Ga. 74 (Senoia Road) interchange: Additional turn lanes will be built on the bridge and the exit ramps. Price tag is $21.7 million, with construction to begin between 2020 and 2030.

Arterials

- Ga. 92: realignment and underpass at railroad crossing in Douglasville, $65.5 million. Construction begins sometime this year.

- Old Covington Highway: adding an underpass where it currently intersects with Ga. 138 from Green Street to Walnut Grove Road (Ga. 138/Ga. 20) in Conyers, $3 million. Construction begins sometime this year.

Express toll lanes

- I-75 South, from Charles W. Grant Parkway to 2.1 miles south of Ga. 155, $557.8 million. Construction on first phase begins sometime this year.

- I-75 North/ I-575 (also known as the Northwest Corridor), from Akers Mill Road to Hickory Grove Road on I-75 and from I-75 to Sixes Road on I-575, $935 million. Construction to begin sometime this year.

- I-85 North, one lane in each direction from Old Peachtree Road to Hamilton Mill Road, plus a southbound and northbound auxiliary lane, $112 million. Construction to begin in 2015.

- I-285 North between I-75 and I-85, $1.65 billion, to be built between 2020 and 2030.

Pedestrian/Bicycle access

- Juniper Street in Atlanta, bicycle and pedestrian facilities from Ponce De Leon Avenue to 14th Street, $4.2 million. Construction to begin in 2015.

- Ponce De Leon Avenue in Atlanta, retrofit with added bike lane and Atlanta Beltline connection, $4.5 million. Improvements already underway.

- Franklin Road in Cobb County, pedestrian improvements, $3.2 million. Construction to begin in 2015.

- Buford Highway (U.S. 23/Ga. 13) in Gwinnett County, medians from Jimmy Carter Boulevard to Beaver Ruin Road, $1.7 million, to be constructed in 2016. Additionally, bicycle and pedestrian access will be added from McGinnis Ferry Road to the entrance of George Pierce Park in Suwanee for $3.7 million in 2016. The following year, pedestrian and bicycle improvements will be added to the stretch from Simpson Circle to North Berkeley Lake Road.

Transit

- Atlanta Streetcar operation support provides $15.2 million for the first years of operation of the system, which is expected to begin gliding through downtown streets in May.

- MARTA rail frequency improvements, provides $11.4 million to reduce train headways from 15 to 10 minutes during peak travel periods beginning this year.

Economic competitiveness

- Ga. 6/Thornton Road in Douglas/Cobb counties to extend left-turn lanes at major intersections, improve the traffic signal system and add a truck rollover warning system at the intersection of Ga. 6 at Garrett Road for freight traffic departing the Whitaker Intermodal Terminal, the largest freight intermodal facility in the southeastern United States. Improve the freight network. $1.6 million, to begin in 2015.

Anticipated spending at a glance:

Pedestrian and bicycle programs: **$1.4 billion**

Transit expansion: **$4.1 billion**

Arterial highway improvements: **$4.6 billion**

Expressway and bottleneck relief programs: **$2.2 billion**

Express toll lanes: **$4.2 billion**

Maintaining existing roads and transit: **$41.5 billion**

Your two cents: The public can view details of the strategy, called Plan 2040, and weigh in on it from now until Feb. 21 at www.atlantaregional.com/rtpupdate. The Atlanta Regional Commission is expected to vote on the plan in March. Then it will go before the Georgia Regional Transportation Authority (GRTA) for final approval.

2 Saporta Report

2.1 METRO ATLANTA STILL LACKS 'PLAN B' AS OTHER CITIES INVEST IN TRANSPORTATION

Date: January 13, 2014, 5:33 pm

By Saba Long

Later this year, the metro Atlanta region will reach the end of the state mandated 24-month cooling off period before voters can reconsider another attempt at a regional transportation referendum.

With no known "Plan B" in the works, the Atlanta Regional Commission is in the process of revising the PLAN 2040 Regional Transportation Plan (RTP) to reflect current funding realities and updated MAP-21 requirements – ahead of a federally mandated 2016 RTP update.

Working with area transportation partners and local elected officials, a number of key changes are being presented to the public through late February.

Projects being dropped from the existing RTP include five separate conversions of existing HOV lanes to managed lanes on I-20 East, I-85 North, as well as I -75 North and South. Also, 24 projects are moving to the "aspirations" element of the plan – meaning, the funding feasibility is not clear.

It is important to note the Atlanta BeltLine and Atlanta Streetcar expansion projects fall in this category. However, the public-private partnership funding the entities are pursuing will move them from this category to a new yet-to-be determined line item.

Other removed projects include Georgia Regional Transportation Authority Park & Ride facilities in Rockdale and Cherokee counties.

Doug Hooker, ARC's executive director, noted: "Maintaining our economically competitive posture as a logistics hub is dependent on our willingness to invest in the region's roads and transit, as well as the investments the City [of Atlanta] makes in Hartsfield-Jackson."

Civic and elected leaders must view the region's transportation needs through a multimodal lens.

"Compared to some of our competitor regions, we continue to fall behind in transportation investment," Hooker said. "This plan means we have roughly $600 million per year for all new capacity, safety or operational improvements projects."

The Denver region is expected to spend more than $1 billion this year on its transportation infrastructure; and Dallas will invest more than $2 billion.

It is also important to note the local level property tax digest has fallen 18 percent from peak 2008 levels – a clear hit to local governments' general fund and the line items specific to their local transportation network. Henry County has seen the sharpest drop at 31.5 percent while Cobb experienced the lowest – well above the region's average – at 10.1 percent.

The same goes for state sales tax collections and the state motor fuel tax collections, down 10.3 percent from peak 2007 levels.

There are a number of notable PLAN 2040 projects that provide much needed congestion relief and have a clear regional impact, including interstate and arterial improvements and MARTA rail frequency improvements during peak hours.

Although we are entering the last few months of a mandated post-referendum waiting period, it is clear our region's competitors across the country are moving ahead while we are standing still.

With various cityhood initiatives and education likely to be at the forefront of this year's Georgia General Assembly, our region's waiting period to vote on significant new investments in transportation — especially transit — could last for years.

3 WAVE Radio

3.1 ARC PROPOSES $59B PLAN TO EASE METRO ATLANTA TRAFFIC

6:00 am Tues. January 14, 2014

By Michell Eloy

Photo credit: Federal Highway Administration

The Atlanta Regional Commission updated its long-term plan for relieving congestion in the metro area, and it includes about $59 billion worth of maintenance and expansion projects to be funded through 2040.

About $41.5 billion – or 71 percent of the funding – will go toward maintaining current infrastructure, like roads, bridges and tunnels, through the year 2040. Just over a quarter of that money – or about $15 billion – will go toward new projects to help alleviate congestion, like roadway widening, managed lanes and reconstructed interchanges, as well transit alternatives to cars. Another $1.4 billion is aimed at bicycling and pedestrian improvements.

"That sounds like an enormous number," said David Haynes, a senior planner with the Atlanta Regional Commission. "But when you average that out over a 25 year horizon, it's really not keeping pace where need to be."

The plan is updated at least every four years based on population growth and funding projections, and has to be constrained to known revenue sources.

Haynes says the update was needed after recent federal funding cuts and the 2012 failure of a transportation plan that would have provided $7 billion for transit projects over 10 years.

He says the nearly $59 billion price tag is still not enough to keep up with a metro area that's expected to add 3 million people and 1.3 million jobs by 2040.

"We still need to have this conversation about how do we bring additional money to the table so that we can keep pace with some of the other regions in the country," Haynes said.

The commission plans to vote on the plan in March.

4 ARC Spotlight

4.1 GDOT STUDY TO EXPLORE COST EFFECTIVE OPERATIONAL IMPROVEMENTS TO FREEWAY SYSTEM

Posted: Jan 25, 2013 9:16 AM EDT

Metro Atlanta has a well-established network of interstates and limited access facilities. However, many of these facilities experience traffic congestion during peak travel periods. In some instances, this congestion is due to recurring bottlenecks; other times, congestion is incident-related. Given limited federal funding availability, the Georgia Department of Transportation (GDOT) is looking to improve the existing transportation system.

The GDOT Office of Planning's Metro Atlanta Operational Planning Study (OPS) will provide an operational assessment of the interstate and limited access system in the metro Atlanta region.

Specifically, this study will:

- Identify bottleneck areas along the limited access facilities in the metro Atlanta region;
- Identify and evaluate potential low-cost improvements that can maximize capacity; and
- Document a prioritized list of operational projects.

This study is a coordinated effort with the Atlanta Regional Managed Lanes Implementation Plan (MLIP).The MLIP will focus on identifying, evaluating, and prioritizing new capacity projects where operational improvements are not sufficient to address congestion.

To learn more about GDOT's Interstate OPS, visit the project website.

5 Fox 5

5.1 COMMUNITY HOPES TO MAKE CAMP CREEK PARKWAY SAFER

Posted: Apr 23, 2013 9:10 PM EDT Updated: Apr 23, 2013 10:34 PM EDT

By Justin Gray

A community is banding together to try to fix one of Atlanta's most dangerous roads.

Camp Creek Parkway runs near Hartsfield-Jackson Atlanta International Airport. In just the past five years, there have been more than 5,000 traffic accidents along the road, with more than 1,800 injuries and 18 people killed.

Officials hope to fix it by becoming a Community Improvement District, which would allow the area to get millions in government grants that they would put towards redesigning intersections along Camp Creek to make them safer.

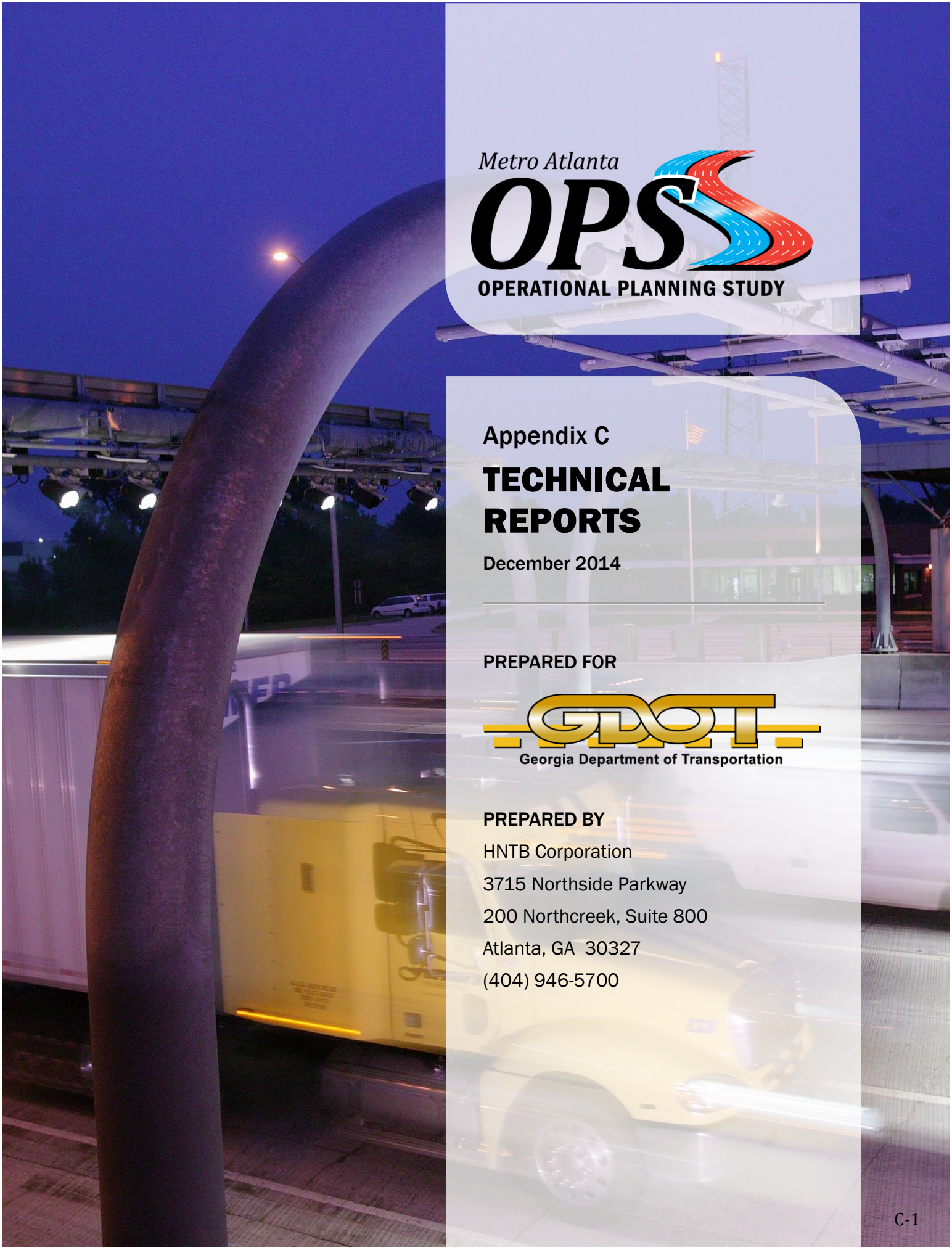
"The major project we are really excited about is doing a divergent diamond at Camp Creek Parkway and Perimeter Mall," said Natalie Martin of the Camp Creek Parkway Improvement Association. "Everyone who would take 285 to Camp Creek to head to the airport, they will automatically feel the benefit."

The Georgia Soccer Park draws hundreds of children and families every day and sits next to one of Camp Creek's deadliest intersections at Welcome All Road.

"As we grow and the area grows, it's going to become more of an issue, so we need good planning for the future," said one man.

There are 17 CIDs in metro Atlanta, but only one south of the city. In order to become a CID, businesses need to be signed on by April 30.

In mid-May, organizers will be going to local communities – including East Point, College Park, Fulton County and Atlanta – to vote on the CID. If it all goes through correctly, projects could begin as soon as July.



Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Appendix C

TECHNICAL REPORTS

December 2014

PREPARED FOR

Georgia Department of Transportation

PREPARED BY

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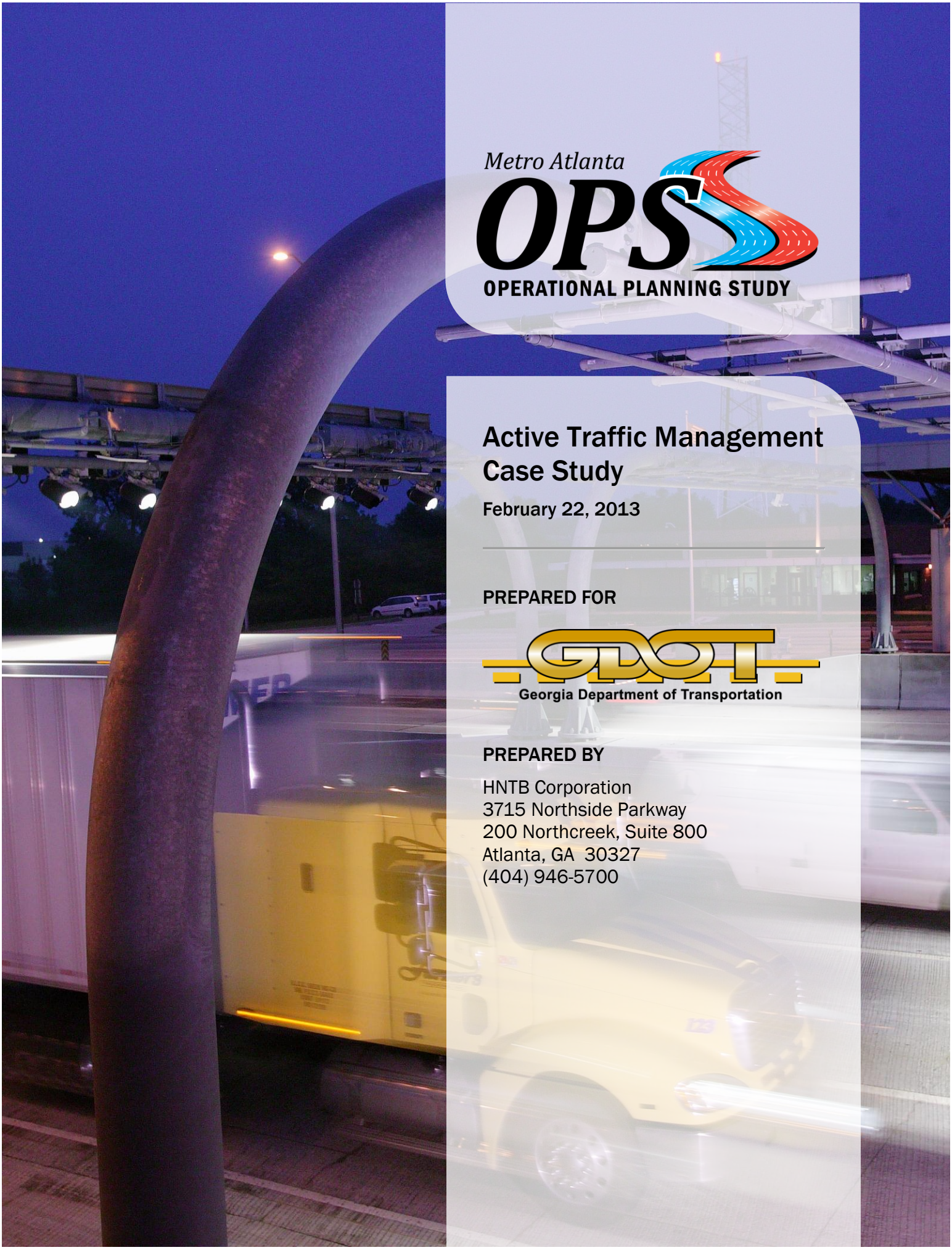

Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Active Traffic Management Case Study

February 22, 2013

PREPARED FOR

GDOT

Georgia Department of Transportation

PREPARED BY

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1 INTRODUCTION

Growing congestion, coupled with limited transportation funding, has highlighted the need for more innovative and cost effective transportation management approaches to mitigate congestion across the United States, such as Active Traffic Management (ATM). ATM strategies include technologies and operational approaches such as variable speed limits, ramp metering, managed lanes, traveler information, dynamic shoulder use, and pricing schemes. The most common ATM practices used on U.S. highways today are managed lane facilities, including High Occupancy Vehicle (HOV), High Occupancy Toll (HOT), express lanes and ramp metering signals. Three less common ATM approaches are dynamic shoulder use, variable speed limits, and queue warning systems.

ATM is a method of actively managing traffic to increase peak capacity and smooth traffic flows on urban freeways. ATM operational strategies help to maximize the efficiency of a roadway by making improvements to trip reliability, safety, and overall person throughput.

2 ATLANTA METRO OPERATIONAL PLANNING STUDY (OPS) ATM CASE STUDY APPROACH

Active traffic management strategies are utilized throughout the world. There are a wide array of trade-offs associated with ATM deployment that need to be considered before they are implemented in the Atlanta metropolitan area. The locations identified for review are assembled from U.S. and European applications. The following sections describe in greater detail how dynamic shoulder lanes, variable speed limits, and queue warning systems are being used throughout the world and the strategies that have led to their successful implementation. The findings from this case study will be used to inform project recommendations as part of the Atlanta Metro Operational Planning Study (OPS) and Atlanta Regional Managed Lanes Implementation Plan (MLIP).

2.1 DYNAMIC SHOULDER LANES (HARD SHOULDER RUNNING)

Dynamic shoulder lanes (also referred to as hard shoulder running or temporary shoulder use) is an ATM strategy currently used on several European and U.S. freeways to manage peak period capacity and reduce travel time. Dynamic shoulder lanes (DSL) allow vehicles to use either the right or left shoulder lanes under pre-determined traffic conditions or when conditions warrant and can be portrayed to users through fixed roadside signage or variable message signs located on gantries above travel lanes. Figure 1 illustrates a DSL in Virginia.

Figure 1: DSL Sign in Virginia

In a typical application, general purpose motorists are allowed to use right shoulders during peak periods. In other cases, such as Bus Only Shoulders (BOS) in Minneapolis, freeway shoulder lanes on the right shoulder are used exclusively by transit buses during the same periods. Emerging applications allow all motorists to use left shoulders (sometimes at a cost, such as in priced-dynamic shoulder lanes in Minneapolis) as an extra driving lane during the AM and PM peak travel periods or during incidents. In all cases, the use of shoulder lanes provides a capacity increase for congested freeways during peak periods. Currently, in the Atlanta metro area, BOS lanes are utilized on GA 400 (south of Holcomb Bridge Road) in the northbound direction and any vehicle may use shoulder lanes during the AM peak hour in the southbound direction.

2.2 VARIABLE SPEED LIMIT (SPEED HARMONIZATION)

Variable speed limit (VSL) strategies involve managing speed limits in areas of inclement weather, traffic incidents, or high congestion to improve traffic operations and reduce secondary traffic collisions. VSLs utilize variable message signs posted over freeway lanes or along the side of the road to encourage users to maintain better traffic flow through congested freeway locations by advising motorists to adjust their speed before encountering slower traffic or traffic incidents. The primary benefit of VSL or speed harmonization systems is congestion reduction by smoothing overall traffic flows. VSL systems are beneficial at eliminating dangerous speed differentials and increasing traffic safety through congested bottlenecks.

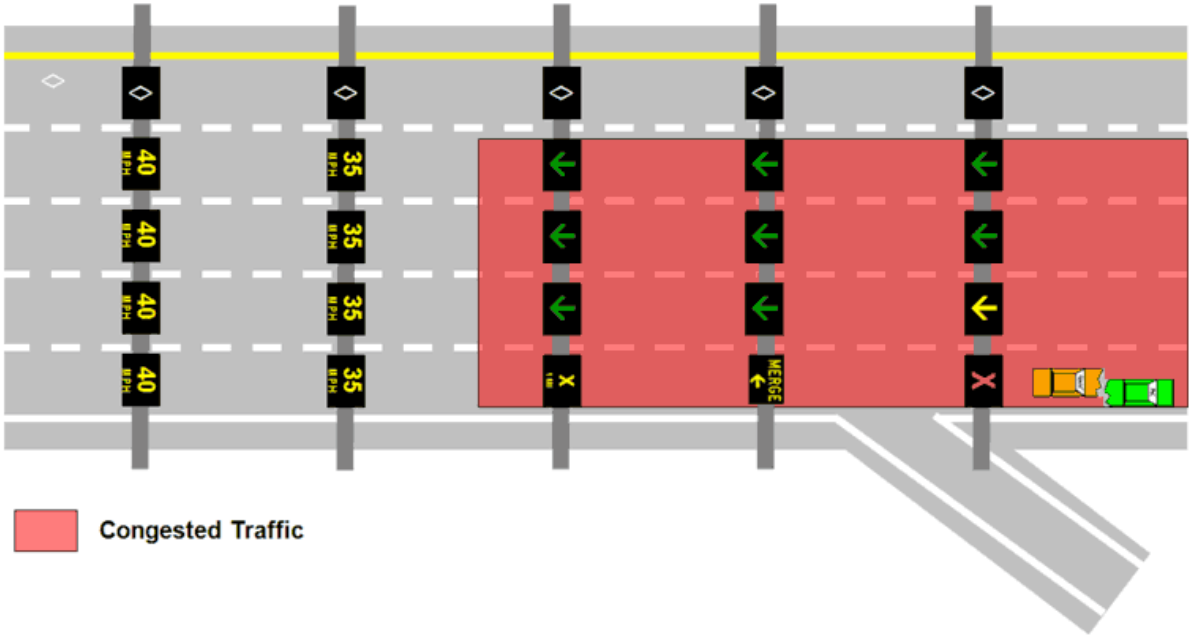
The primary benefit of variable speed limit systems is congestion reduction, but VSLs can also positively impact safety by smoothing traffic flows through congested bottlenecks.

Variable speed limit systems are most commonly used to manage traffic speeds during predictable periods, such as AM and PM peak travel times. VSLs are common in Europe, and becoming more widely used in the United States.

2.3 QUEUE WARNING SYSTEM

Queue warning systems (QWS) are an extension of VSLs that utilize real-time information and traffic data (not just during peak periods) to improve the overall safety and efficiency of freeway corridor operations. Queue warning systems notify motorists of downstream queues through overhead gantry signs and direct traffic to alternate (free flowing) lanes, thereby reducing the likelihood of speed differentials and collisions due to queuing. Figure 2 illustrates how corridors can utilize QWS to notify highway users of incidents ahead. This example uses overhead signs to notify drivers up to one mile upstream of an incident to give them ample time to slow down and/or change lanes to avoid congestion or incidents.

Figure 2: Active Traffic Management Lane Control Signals During an Incident



Source: FHWA Best Practices for Road Weather Management: Minnesota DOT I-35W Smart Lanes: Active Traffic Management. Located at: http://ops.fhwa.dot.gov/publications/fhwahop12046/rwm17_minnesota1.htm

Similar to variable speed limits, QWS are often implemented in conjunction with other ATM techniques. In these cases, the traffic sensors utilized for one technology are used to support both functions.

Similar to variable speed limits, QWS are often implemented in conjunction with other ATM techniques. In these cases, the traffic sensors utilized for one technology are used to support both functions.[1] Furthermore, there are very few examples of queue warning systems operating in the absence of other ATM strategies, which makes isolating the benefits and costs impractical.[2]

Queue warning systems have the potential to be an efficient traffic management technique as they allow traffic controllers the ability to constantly regulate freeway speeds based on prevailing traffic conditions. Speed limits can be reduced when freeway conditions are unsuitable for high speed operations, such as bad weather, congestion, or traffic incidents, thereby reducing the chances of secondary accidents and facilitating a smoother flow of traffic.

[1] *Fontaine, Michael. Planning for Active Traffic Management in Virginia: International Best Practices and Implementation Strategies, Virginia Center for Transportation Innovation and Research, 2012.*

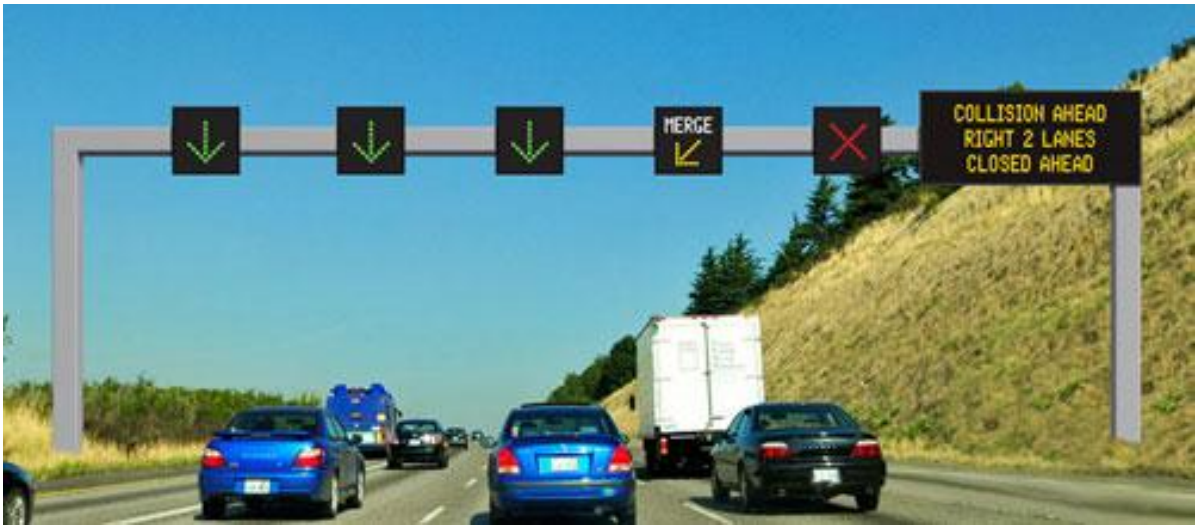
[2] *Fuhs, C. Synthesis of Active Traffic Management Experiences in Europe and the Unites States, FHWA, 2010.*

3 CASE STUDIES

3.1 WASHINGTON STATE

The Washington State Department of Transportation (WSDOT) was one of the first state transportation agencies in the United States to utilize active traffic management technologies. WSDOT uses ATM along portions of I-5 (5 lanes for 29 miles in each direction), I-90 (4 lanes for 9 miles in each direction), US 2 (3 lanes for 1.55 miles in each direction) and State Route (SR) 520 (3 lanes for 7.6 miles in each direction). The state's ATM strategies are part of its Smarter Highways Initiative, which uses integrated systems and coordinated response to improve roadway safety and traffic flows. WSDOT continues to study hard shoulder running, variable speed limits, and queue warning technologies in order to improve traffic flow and effectively manage traffic on the region's busiest routes. Figure 3 shows an example of an active traffic management sign in Washington.

Figure 3: WSDOT Active Traffic Management Sign



Source: Washington State Department of Transportation Smarter Highways: http://www.wsdot.wa.gov/smarterhighways/

WSDOT has been developing dynamic shoulder lanes (hard shoulder running) in the Seattle area since 2009, when it opened 1.55 miles of the right shoulder on US 2 near Everett to all traffic in the eastbound direction during the afternoon peak period. The objective of the project was to improve travel times, reduce the impacts of the bottleneck, and relieve the congestion at a critical interchange in the region. It cost WSDOT approximately $70,000 (used primarily to construct emergency refuge areas) to install the 1.5 mile shoulder segment on US 2.[3]

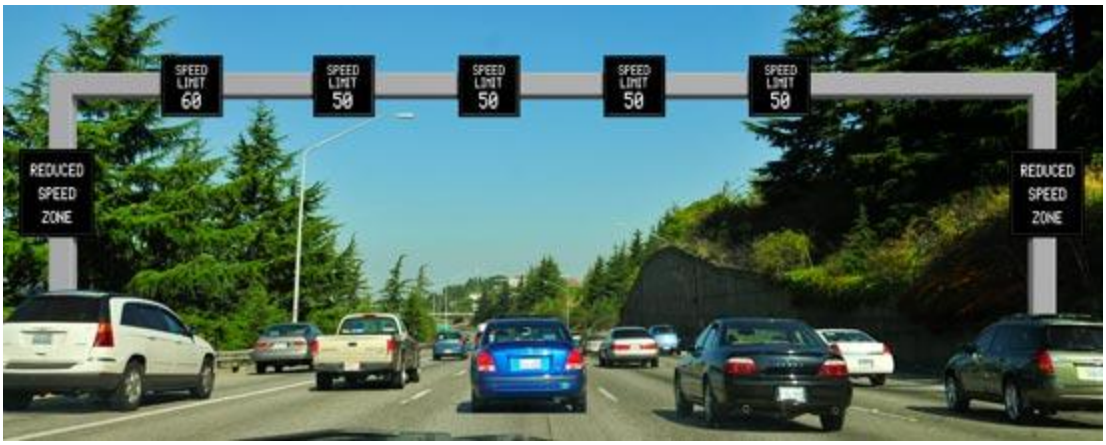
[3] *Kuhn, B. Efficient Use of Highway Capacity Summary, Texas Transportation Institute, 2010.*

Hard shoulder running in Washington State has reduced travel times by 8 minutes and average speeds have increased from 10 to 37 mph along the 1.5 mile segment of US 2.

Since its implementation in 2009, hard shoulder running on US 2 has reduced travel times from 8-10 minutes to 1-2 minutes along the 1.5 mile segment. In addition, the average speed has increased significantly from 10 to 37 mph.[4] To date, WSDOT has had difficulty quantifying the direct safety impacts of hard shoulder running because of the short time frame and because its deployment coincided with other traffic management strategies (ramp metering) on I-5; which feeds US 2. In general, the impacts of active traffic management strategies have been positive.

In Washington, variable speed limits are utilized on northbound I-5 in Seattle as well as I-90 and SR 520 between Seattle and Bellevue, WA. An example of a WSDOT installation is shown below. Average costs for implementing variable speed limits were $3.2 million per directional mile for three-lane sections and $4 million per directional mile for five-lane sections.[5]

Figure 4: WSDOT Variable Speed Limit Sign



Source: Washington State Department of Transportation Smarter Highways: http://www.wsdot.wa.gov/smarterhighways/

The Washington queue warning system is closely related to VSL. The main difference is that the QWS is automatically activated based on identified thresholds. The cost estimates for the WSDOT queue warning system are comparable to VSL systems; with QWS projected to range between $2.4 and $5.5 million per mile depending on the roadway segment.[6]

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[4] *Kuhn, B. Efficient Use of Highway Capacity Summary, Texas Transportation Institute, 2010.*

[5] *Fuhs, C. Synthesis of Active Traffic Management Experiences in Europe and the Unites States, FHWA, 2010.*

[6] *Active Traffic Management Conceptual Design and Cost Estimates, WSDOT, 2008.*

3.2 MINNEAPOLIS – ST. PAUL, MINNESOTA

MnPass allows customers to use the shoulder for a variable, congestion-based fee. The I-35 W shoulder lanes are unique in the U.S. because they utilize left-shoulder right-of-way.

The Minneapolis-St. Paul metro area employs several ATM strategies that make up a comprehensive network of freeway corridors and arterial roads totaling over 290 miles. The Minnesota Department of Transportation (Mn/DOT) has begun implementing new strategies to manage its transportation corridors through the use of dynamic shoulder lanes and variable speed limits.

A unique combination of strategies is in place on I-35W in Minneapolis where a 2.5 mile segment of the left shoulder is opened during the AM and PM peak periods. The State calls its newest shoulder strategy Priced Dynamic Shoulder Lanes (PDSL), and allows transit buses and carpools of two or more people to use the left shoulder for free while MnPASS (the state's automated toll program) customers can use the shoulder for a variable, congestion-based fee. The PDSL strategy is illustrated in Figure 5. The corridor also employs a bus on shoulders (BOS) strategy that utilizes the outside shoulder requiring buses to yield to any vehicle entering, merging, or exiting through the shoulder and are allowed to drive no more than 15 mph faster than mainline traffic with a 35 mph maximum speed. This BOS strategy is illustrated in Figure 6.

Figure 5: Minneapolis – St. Paul Priced Dynamic Shoulder Lane

Figure 6: Minneapolis - St. Paul Bus Only Shoulder Lane

The PDSL project cost $13 million, which included a new pavement surface for all lanes on the entire 2.5 mile facility including general purpose lanes, shoulder lanes and emergency pull-out

areas.[7] Costs can be significantly impacted depending on the amount of up-front capital investment required to construct new pavement and overhead infrastructure. Table 1 illustrates the per mile costs of PDSLs in Minneapolis-St. Paul, MN.

Table 1: Average Per-Mile Priced Dynamic Shoulder Lane Capital Costs in Minneapolis

Condition	Capital Cost Including Signaling & Striping
Shoulder width and bituminous depth[8] are adequate; Catch basins do not need adjustment; Signing and striping are only requirements.	$1,500 per mile - Freeway $2,500 per mile - Expressway
Shoulder width and bituminous depth are adequate; Minor shoulder repairs and catch basin[9] adjustments are needed.	$5,000 per mile - Freeway $5,000 per mile - Expressway
Shoulder width is adequate but bituminous depth requires a 2-inch overlay; This assumes shoulder and roadway can be overlaid at the same time.	$12,000 per mile - Freeway $12,000 per mile - Expressway
Same as above but adjacent roadway is not being overlaid; Shoulder must be removed, granular base[10] adjusted, and increased bituminous depth replaced.	$80,000-$100,000 per mile
Shoulder width and depth replacement are required.	$42,000-$66,000 per mile
Installing a 12-ft. shoulder rather than a 10-ft. shoulder in a new construction project.	$30,000 per mile

Source: Kuhn, B. Efficient Use of Highway Capacity Summary, Personal interview with Mn/DOT Staff, Mn/DOT Metro District, 2009.

Mn/DOT has identified implementation challenges to operating dynamic shoulder lanes. One of the potential challenges with using shoulders for travel lanes is the mediation of fixed objects in close proximity to roadway shoulders. In some cases, Mn/DOT has had to move guardrails to meet minimum pavement width requirements.[11] The safety of general purpose traffic is also a major concern as buses must yield to any vehicle entering, merging within, or exiting through the

[7] *Kuhn, B. Efficient Use of Highway Capacity Summary, Texas Transportation Institute, 2010.*

[8] *The depth of primary roadway materials such as tar, asphalt, and aggregate.*

[9] *A concrete, masonry, or cast iron box-like receptacle set into the pavement or road surface.*

[10] *The layer directly below the pavement surface that acts as the load bearing material.*

[11] *Kuhn, B. Efficient Use of Highway Capacity Summary, Texas Transportation Institute, 2010.*

shoulder. Emergency vehicle access and incident management concerns have been mitigated by developing emergency pull out bays along the length of the corridor.

Figure 7: Minneapolis – St. Paul Smart Lanes Signs

Minnesota also employs variable speed limit and queue warning ATM strategies as part of their Smart Lanes initiative that provides motorists with real-time traffic information (including advisory speeds, queue warnings, and incidents). The Smart Lanes signs were fully complete in the summer of 2012. Figure 7 illustrates the incident warning system where vehicles are pre-warned to merge ahead of a traffic queue.

3.3 BOSTON, MASSACHUSETTS

Figure 8: Massachusetts Breakdown Lane

Since 2002, the Massachusetts Department of Transportation (MassDOT) has developed 45 miles of temporary shoulder lanes along Massachusetts SR 3, I-93, and I-95 in the Boston metropolitan area to add roadway capacity as part of its Add-a-Lane project. All vehicles (with the exception of commercial motor vehicles) are permitted on the right shoulder, or breakdown lane, during the AM and PM peak periods.

MassDOT's main objective for opening the breakdown lanes to general purpose traffic during peak periods is to increase capacity and reduce congestion. The maximum allowed speed on the shoulder is 60 mph, which is also the posted speed for the general purpose lanes. A minimum of a 10-foot shoulder width is required for the breakdown use operations, with 12 feet being the desired shoulder width. MassDOT treated the deployment as a traditional widening project by moving drainage features and guardrails to the new edge of pavement wherever new construction was required. Emergency pull-off areas were installed approximately every ½ mile along the facilities to allow for incident management and response. Some of the region's shoulders were resurfaced as part of these projects as well.[12] MassDOT is still evaluating the benefits of its breakdown lanes across the state.

[12] *Kuhn, B. Efficient Use of Highway Capacity Summary, Texas Transportation Institute, 2010.*

3.4 UNITED KINGDOM (UK)

The Great Britain Highways Agency developed a system-wide ATM approach in 2006. The agency developed a pilot project combining the strategies of variable speed limits (speed harmonization) and temporary shoulder use to provide additional capacity during periods of recurring congestion and traffic incidents along a 16-km. (10-mi.) stretch of the M42 highway.[13]

Figure 9: UK ATM Strategy

Temporary shoulder use in Great Britain is deployed as a component of the region's overall ATM scheme. One unique element of the UK ATM strategy is that temporary shoulder use is only deployed when speeds are reduced to 50 mph or less. The shoulder strategy utilizes overhead VSL signs to notify drivers of current speed limits. The system is automated based on real-time data, and is initiated by an assessment algorithm which requires no intervention by an operator unless it becomes necessary to override the algorithm. It only operates during time periods of congestion or when incidents occur. Although it can be difficult to compare infrastructure costs between the U.S. and Great Britain, the M42 project (which includes hard shoulder running and speed harmonization) is estimated at approximately $18 million per mile.[14]

Even though Great Britain has only recently developed a combined ATM strategy, is has been using variable speed limits and queue warning signs for many years and there is significant data showing the encouraging safety, emissions, and travel time impacts. A study in 2005[15] examined the M25 and reported that the VSLs produced an estimated:

- 15 percent reduction in injury crashes;
- 2 to 8 percent reduction in emissions;
- 10 percent reduction in fuel consumption;
- 1.5 percent increase in throughput;
- 5 percent improvement in speed limit compliance; and a
- Neutral impact on travel time and travel time reliability.

One unique element of the UK ATM strategy is that temporary shoulder use is only deployed when speeds are reduced to 50 mph or less.

[13] *Berman, Wayne. Managing Travel Demand: Applying European Perspectives to U.S. Practice, American Trade Initiatives, 2006.*

[14] *Fuhs, C. Synthesis of Active Traffic Management Experiences in Europe and the Unites States, FHWA, 2010.*

[15] *Tucker, S. The Control of Traffic Using Variable Speed Limits: The UK Experience of Controlled Motorways, ITS America, 2005.*

3.5 NETHERLANDS

Figure 10: Netherlands ATM Strategy

The Netherlands was one of the first countries to develop variable speed limits, and has been utilizing ATM strategies since 1981 to manage traffic speeds and highway congestion. The country uses Dynamic Route Information Panels (DRIP) to notify traffic of congestion and incidents ahead. The Dutch road network has about 1,000 km (620 mi.) of VSL signing and has installed nearly 100 DRIPs since 1990.[16] The lane control and speed limit signs are placed approximately every 1,500 feet.

The Netherlands ATM system works through the Motor Control and Signaling System (MCSS); an advance queue warning system that utilizes variable speed signs to alert drivers of congestion and lane closures. Should the system detect a traffic queue within a certain area, it notifies other travelers one mile upstream from the queue and lowers the advisory speed limits for traffic approaching the congested area.

Figure 11: Netherlands Variable Speed Limits

Temporary shoulder use in The Netherlands is only deployed in conjunction with speed harmonization and queue warning systems. The Netherlands implemented temporary shoulder use on more than 620 miles of roads in 2003 as part of a larger program to improve use of the existing transportation infrastructure. Typically, a gantry with lane control signals indicates when the shoulder is available for use. In addition to allowing temporary use of the right shoulder, the Dutch also deploy the use of traveling on a dynamic lane on the median side of the roadway. This treatment, also known as the plus lane, is a narrowed extra lane provided by reconstructing the existing roadway while keeping the hard shoulder and is opened for travel use when traffic

[16] *Berman, Wayne. Managing Travel Demand: Applying European Perspectives to U.S. Practice, American Trade Initiatives, 2006.*

volumes reach levels that indicate congestion is growing. Deployment is automated based on field data and is initiated automatically based on an assessment algorithm, requiring no intervention by an operator. It only operates during periods of congestion or when incidents occur along instrumented roadways.[17]

Active Traffic Management strategies in the Netherlands have shown significant system-wide benefits.

Facilities under the MCSS system have seen significant network benefits between 1983 and 1996: [18] [19]

- Overall throughput increased between 4 and 5 percent;
- Capacity increased from 7 to 22 percent during congested periods;
- Travel times decreased up to 3 minutes per mile;
- Primary accidents decreased by 15 to 25 percent; and
- Secondary incidents decreased by 40 to 50 percent.

[17] *Kuhn, B. Efficient Use of Highway Capacity Summary, Texas Transportation Institute, 2010.*

[18] *Mirshahi, M. Active Traffic Management: The Next Step in Congestion Management. FHWA. 2007.*

[19] *Taale, H.* Regional Traffic Management Method and Tool. *AVV Transport Research Centre, Rotterdam, The Netherlands: Ministry of Transport, Public Works, and Water Management, Directorate–General of Public Works and Water Management, June 2006. Presentation to Planning for Congestion Management Scan Team.*

4 EMERGING TRENDS

New technologies, such as online mapping services, on-board GPS devices, and smartphones may be the future of providing real-time, personalized information on road pricing, travel time, and conditions.

While case studies of ATM strategies give an idea of how other locations across the country and the world have implemented ATM to positively influence system-wide traffic operations, it is important to stay abreast of emerging trends that may impact traveler information technologies in the future. It is likely that new technologies, such as online mapping services, on-board GPS devices, and smartphones may be the future of developing and distributing real-time, personalized ATM information.

These new devices are likely to provide more personalized information than existing ATM strategies, such as variable message signs.[20] By extrapolating the abilities of today's smartphone applications, we can envision future mobile devices that not only provide real-time travel information and travel patterns, but also queue warnings. These future devices will be able to do everything from finding the closest available parking space, to alerting drivers of traffic congestion, advisory speeds, or on-road debris ahead. New technologies could even make suggestions about time-saving routes or mode change suggestions; all with accurate, personalized, real-time information on pricing, travel time, and road conditions.[21]

In addition, smartphones provide a low-cost, free-market approach to providing and collecting travel data. Rather than requiring the government to spend limited dollars on new sensors or real-time information displays, third parties are developing applications that provide this information at a significantly lower cost to transportation providers.

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[20] *Vautin D. and Walker J., Transportation Impacts of Information Provision & Data Collection via Smartphones. 2011 Transportation Research Board Conference.*

[21] *Manasseh, C., Yaser. F., Sengupta, R., and J. Misener. Using Smartphones to Meaure the Effect of a Situational Awareness Application on Driver Behavior. 2011 Transportation Research Board Conference.*

5 CONCLUSIONS AND RECOMMENDATIONS

The overall intent of ATM is to improve person throughput along a corridor and smooth out driver performance to reduce the likelihood of traffic incidents.

Active Traffic Management is a holistic approach for maximizing system-wide transportation efficiency. There are many ATM strategies, and all are often called by many names, depending on where they are implemented. The overall intent of ATM is to improve person throughput along a corridor and smooth out driver performance to reduce the likelihood of traffic incidents. This research provides insights into future trends for active traffic management strategies and the delivery of traveler information that are already being successfully deployed in the U.S. and Europe. In general, traffic information is being delivered to transportation users with more of a focus on the impacts on individual vehicles and users. Traffic data is collected and disseminated dynamically and interactively, allowing for a much more efficient transportation network. The strategies discussed in these case studies will help to develop an effective and efficient ATM implementation strategy for the metropolitan Atlanta region as part of the Atlanta Metro Operational Planning Study and Atlanta Regional Managed Lanes Implementation Plan.

VSL and queue warning strategies do not operate well after heavy congestion forms, but do effectively provide preventative relief if notifications are given before delays occur.

Variable speed limit and queue warning strategies are growing in popularity across the US. Currently, they are used primarily to increase safety during adverse weather conditions (e.g., rain and fog), and as a traffic management strategy to create more uniform travel speeds. VSL and queue warning strategies typically do not operate well after heavy congestion forms, but do effectively provide preventative relief if notifications are given before delays occur.[22] In general, VSL and other dynamic highway sign technologies continue to be evaluated but are rarely implemented as a stand-alone ATM strategy. The most current research on VSLs shows the displays can work in harmony with travel time and queue length prediction, ramp metering, tolling schemes, and dynamic shoulders.[23]

There is a wide range of issues when determining whether dynamic shoulder lanes are appropriate for corridors throughout the Atlanta region. Experience both overseas and domestically, and summarized herein, provide a wealth of knowledge from which agencies can learn to make informed decisions. From the European perspective, dynamic shoulder lanes are only used during congested periods or traffic incidents when queues begin to build and are almost always deployed in conjunction with variable speed limits. In the U.S., many transportation agencies allow general purpose motorists to use shoulders

[22] *Mazzenda, N.J. Investigation of Solutions to Recurring Congestion on Freeways, Virginia Transportation Research Council, 2009.*

[23] *Berman, Wayne. Managing Travel Demand: Applying European Perspectives to U.S. Practice, American Trade Initiatives, 2006.*

Dynamic shoulder lanes are a unique solution that facilitates many system-wide benefits, while also providing the potential to produce revenue, if priced.

during peak periods when demand is highest or during an incident. However, dynamic shoulder lanes also provide the potential to produce revenue if priced.

Active traffic management challenges that should be considered include design, traffic control devices, safety benefits, maintenance, enforcement roles and processes, incident response, personnel training, capital and operating costs, and public outreach and education. Safety is a concern when implementing shoulder lane strategies; as emergency access can become complicated due to the loss of an emergency area for disabled vehicles during traffic incidents. Careful consideration of these issues can help ensure a shoulder use deployment is effective without having negative impacts on safety and operations. The most common mitigation strategy is to develop emergency pull-outs along the corridor to provide refuge areas.

While ATM deployments have been limited, the experience has been positive in U.S. applications.

Areas that need further analysis are the use of the left shoulder versus the right shoulder and which types of vehicles are allowed to use the shoulder lanes. Each application has a different subset of design and operational considerations to analyze.[24] Right shoulder lanes are a common way for transportation agencies to quickly add capacity at relatively low costs as they usually don't require any additional ROW acquisition costs. Many of the agencies utilizing right shoulder lanes across the U.S. initially installed the lanes as a stop-gap measure to add capacity because of the opening of the HOV lane on the left side of a highway facility. In these instances, the left lane is commonly changed from a general purpose lane into an HOV lane and general purpose traffic is negatively affected because roadway capacity decreases in general purpose lanes. Therefore, many shoulder lanes were initially implemented to maintain an existing baseline level of service. However, over time these lane additions often remain in operation and become a long-term traffic management strategy due to funding shortfalls and the high cost of constructing additional travel lanes.

Domestically, almost all applications of temporary shoulder use have occurred on the right side, while shoulder conversions to permanent lanes have tended to be more prominent on the left side.

[24] *Kuhn, B. Efficient Use of Highway Capacity Summary, Texas Transportation Institute, 2010.*

For dynamic shoulder lanes allowing all vehicle types, facilities should ideally meet these characteristics:[25]

- Considerable rush hour congestion (defined by speed and duration);
- A segment of significant length (approximately three miles or more);
- No regular bottleneck at the downstream end of the segment;
- Limited interference from ramp traffic entering and exiting the freeway facility;
- Available right-of-way for emergency areas and acceleration/deceleration tapers; and
- Sufficient pavement strength on the shoulder to bear the traffic.

For transit-only shoulder use, a facility should ideally have:

- Predictable congestion delays during the peak period;
- A minimum 10-ft shoulder width available;
- Sufficient pavement strength to sustain bus load; and
- A significant number of buses (or express buses) per hour.

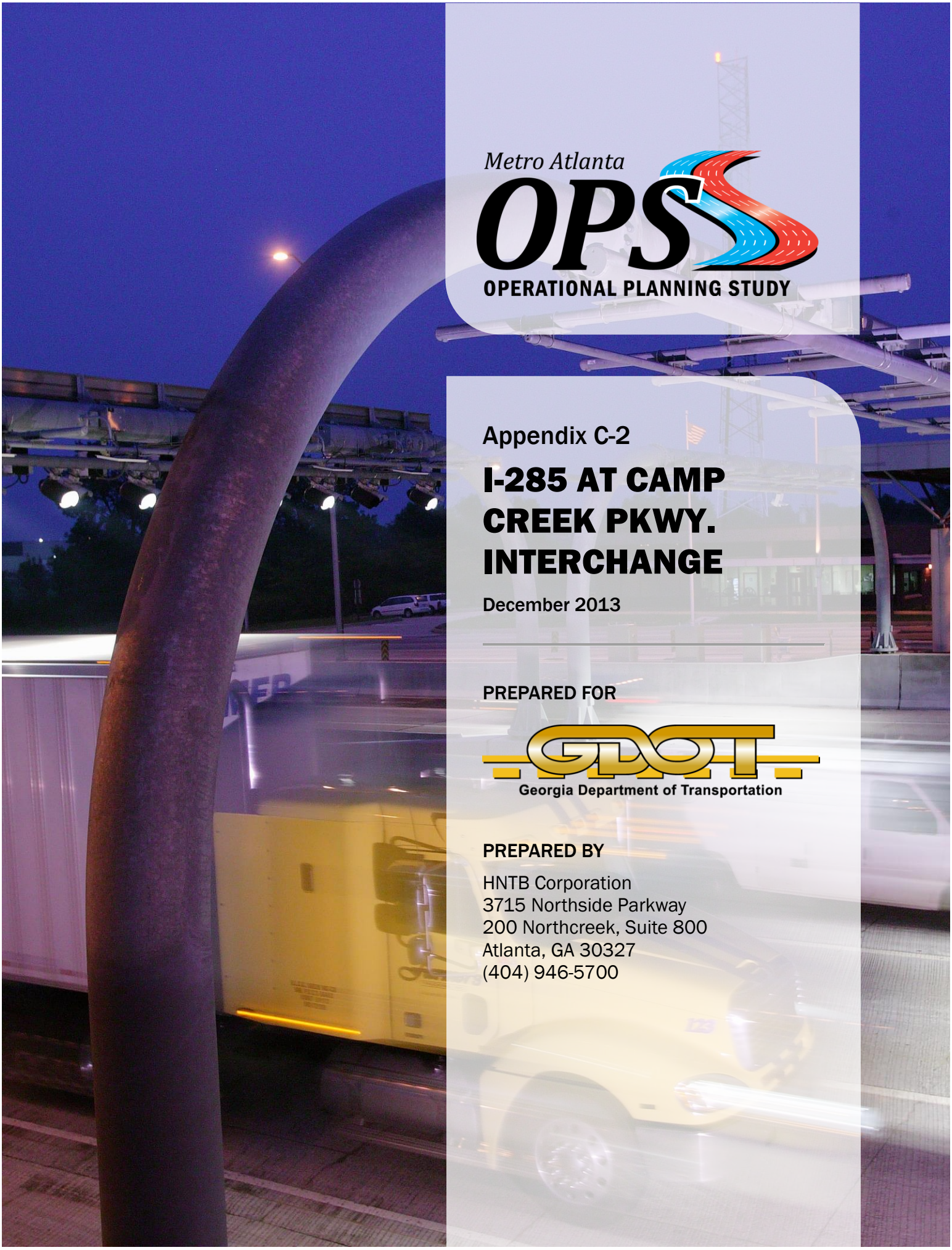
The following are key factors to consider that can help facilitate successful deployment of hard shoulder running:[26]

Dynamic shoulder lanes are more successfully deployed if they operate in harmony with traffic monitoring centers (to oversee incident management, existing sensors, and intelligent transportation systems) and other supportive ATM technologies, such as variable speed limits and queue warning systems.

- When implemented with variable speed limits, speed limit signs and lane control signals need to be visible to all vehicles; therefore, it is most effective if signs are placed on gantries over every lane of traffic. During normal operation (when the use of the shoulder is prohibited) all the signs, including the sign over the shoulder, are blank;
- Either the left or the right shoulder can be used for the application, depending on the facility conditions;
- Video cameras should be regularly spaced to allow operators to check for obstacles before opening the shoulder to traffic and to monitor operations while shoulder use is permitted;
- Emergency refuge areas should be located at regular intervals along the shoulder with proper signing to avoid having stranded vehicles on an open shoulder; and
- When the shoulder is open to traffic, guide signs should provide information to the shoulder lane as if it was a permanent travel lane. This can be accomplished with dynamic message signs.

[25] *Mobility Investment Priorities – Active Traffic Management Strategies, Texas Transportation Institute, 2012*

[26] *Levecq, C. General Guidelines for Active Traffic Management Deployment, Texas Transportation Institute, 2011.*



Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Appendix C-2

I-285 AT CAMP CREEK PKWY. INTERCHANGE

December 2013

PREPARED FOR

Georgia Department of Transportation

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Metro Atlanta Operational Planning Study (OPS) is an operational assessment of the Interstate and limited-access roadway system in metropolitan Atlanta. Specifically, this study will:

- Identify bottleneck areas along the limited-access facilities;
- Evaluate potential low-cost improvements that can maximize capacity; and
- Document a prioritized list of operational projects.

As part of this study, the interchange at I-285 and Camp Creek Parkway (CCP) was identified as one of the top five interchanges for detailed analysis based on traffic data and stakeholder input. As a result, several interchange modification concepts have been developed and evaluated based on a variety of criteria. The purpose of this technical report is to document existing conditions, examine the development of interchange modification concepts that have been evaluated to date and how they measured against one another, and provide recommendations and next steps for moving forward.

1.2 EXISTING CONDITIONS

The interchange of I-285 and SR 6 (CCP) is located in southwest Atlanta. I-285 is an eight-lane, north-south freeway at CCP, which is a four-lane, east-west divided highway east of I-285 and a six-lane divided highway west of I-285. The traffic count data indicates the heaviest movements at this interchange are to and from the west on CCP and in both directions of I-285. The reoccurring extended queues on the CCP and I-285 off-ramps result from traffic volumes that exceed the capacity of this interchange and the adjacent intersection of CCP and North Commerce Drive.

CORSIM traffic simulation software was used to evaluate traffic operations at the I-285/CCP interchange and the surrounding intersections. CORSIM estimated networkwide and intersection delay statistics for Existing, Opening Year (2016) and Design Year (2036) conditions that can be used to estimate user benefits and calculate approximate level of service (LOS).

The simulation modeling results predict that the North Commerce Drive intersection would impact the operations of the interchange for both Opening Year and Design Year, unless the capacity of this intersection is significantly increased or traffic on North Commerce Drive is allowed to back up. If the duration of green light time at North Commerce Drive was allocated to minimize overall intersection delay, the queues on CCP at North Commerce Drive would eventually radiate upstream to the I-285 mainline.

1.3 INTERCHANGE MODIFICATION CONCEPTS

The four interchange modification concepts described in this report are as follows:

1. **Diverging Diamond Interchange (DDI) Five Lanes:** This concept would have three westbound lanes and two eastbound lanes on the bridge over I-285. This concept could be constructed without widening the existing bridge. The critical capacity movement for this

interchange is the two-lane eastbound through movement at the southbound ramp terminal intersection.

2. **DDI Six Lanes:** This concept would have three westbound lanes and three eastbound lanes on the bridge over I-285. This concept would require widening the existing bridge to accommodate an additional lane. Because the actual latent demand at the CCP interchange has not been quantified, the useful lifespan of the DDI Five Lanes concept has not been determined; however, the DDI Six Lanes concept will accommodate more traffic than the Five Lanes concept, thereby extending its operational life. The critical capacity movement for this interchange is the two-lane southbound right-turn movement at the southbound ramp terminal intersection.
3. **Modified Displaced Left-Turn (DLT) Interchange Six Lanes:** This concept would have two westbound lanes and four eastbound lanes over I-285. Two of the eastbound lanes would remain at their current locations, and the other two lanes would be located on a new structure on the north side of the existing bridge. The two new eastbound lanes would carry the eastbound CCP-to-northbound I-285 movement, and the southbound I-285-to-eastbound CCP movement. The critical capacity movement for this interchange is the two-lane westbound through movement at the eastbound DLT intersection.
4. **Partial DDI Seven Lanes:** This concept is a variation of the Modified DLT Interchange Six Lanes. The eastbound DLT intersection would be shifted to the location of the southbound ramp terminal intersection. Similar to the Modified DLT Interchange Six Lanes concept, this concept includes a new two-lane bridge over I-285 for the same movements. Similar to the DDI Six Lanes concept, the critical capacity movement for this interchange is the two-lane southbound right-turn movement at the southbound ramp terminal intersection.

Schematic drawings of these four concepts are illustrated in **Section 4** of this report.

1.4 COMPARISON OF INTERCHANGE CONCEPTS

The selection of preferred concepts to study in the next level of evaluation should consider all of the factors from traffic operations to benefit-cost ratios. The following table summarizes the key selection criteria that will be used to make a final recommendation.

Table 1-1: Comparison of Interchange Concepts

	DDI Five Lanes	DDI Six Lanes	Modified DLT Interchange Six Lanes	Partial DDI Seven Lanes
Project Costs	$3.4M	$8.8M	$13.9M	$8.0M
Right-of-way* (SY)	0	1,200	3,800	1,800
Traffic Operations – Opening Year Delay AM+PM (hours)	331	282	265	241
Traffic Operations – Design Year Delay AM+PM (hours)	1,029	484	834	509
Interchange Reserve Capacity/ Increase of Lifespan	29%/0 yr.	58%/21 yrs.	33%/3 yrs.	62%/23 yrs.
Safety – # of Crossing Movement	8	8	6	6
Driver Expectancy – Differ from Typical Interchange	High	High	High	Medium
Constructability	Good	Poor	Fair	Good
Benefit/Cost Ratio	87.6	58.5	28.4	65.3

Note: No displacment required for any concept.

Source: HNTB Corporation

The DDI Six Lanes concept has the potential to add 22.5 percent more capacity than the DDI Five Lanes concept. The additional capacity from the DDI Six Lanes could extend the lifespan of the interchange by 13.6 years or 20.4 years beyond the DDI Five Lanes concept assuming annual average traffic growth rates of 1.5 percent and 1.0 percent, respectively. The Partial DDI Seven Lanes concept has the potential to add 25.6 percent more capacity than the DDI Five Lanes concept. The additional capacity from the Partial DDI Seven Lanes concept could extend the lifespan by 15.3 years or 22.9 years beyond the DDI Five Lanes concept, assuming annual average growth rates of 1.5 percent and 1.0 percent, respectively.

1.5 RECOMMENDATIONS

The order of preference of interchange concepts are prioritized as follows:

1. Partial DDI Seven Lanes
2. DDI Six Lanes
3. DDI Five Lanes

4. Modified DLT Interchange Six Lanes

The primary reasons why the Partial DDI Seven Lanes concept is preferred are as follows:

- It would provide the longest lifespan (up to 23 years beyond DDI Five Lanes);
- It would operate with the lowest Opening Year delay and the second lowest Design Year delay; and
- It has the second-lowest cost ($8 million), highest benefits ($522 million) and second-highest benefit/cost ratio (65).

Even though the Partial DDI Seven Lanes was given the highest preference, the DDI Six Lanes would have benefits similar to the Partial DDI Seven Lanes and would be an acceptable alternative to the Partial DDI Seven Lanes concept. The DDI Six Lanes concept would have the lowest Design Year delay (5 percent less than Partial DDI Seven Lanes). Its lifespan is almost as long as the Partial DDI Seven Lanes (21 years versus 23 years), and it would have the second-lowest right-of-way requirements (33 percent less than Partial DDI Seven Lanes).

1.6 NEXT STEPS

GDOT should decide on whether to select a single interchange concept or multiple interchange concepts to move forward with the next level of planning and design. The alternative(s) that are selected for further evaluation need to be analyzed by the Georgia Department of Transportation's (GDOT) Office of Program Delivery with design traffic volumes that consider the current and future latent demands at this interchange. The planned improvements at North Commerce Drive and CCP should be incorporated into the interchange project.

2 EXISTING CONDITIONS

2.1 DESCRIPTION OF EXISTING INTERCHANGE CONFIGURATION

The interchange of I-285 and SR 6 (CCP) is located in southwest Atlanta less than three miles west of the Hartsfield-Jackson Atlanta International Airport (HJAIA). I-285 is a loop freeway around the City of Atlanta that also serves as a truck bypass. CCP is a major arterial highway that provides the primary access to HJAIA from the west. Significant commercial and light industrial development is located along CCP to the west of I-285, and there are off-airport parking facilities and residential development to the east of I-285.

I-285 is an eight-lane, north-south freeway at CCP; CCP is a four-lane, east-west divided highway east of I-285, and a six-lane divided highway west of I-285. The interchange (Figure 3-1) is a typical urban diamond interchange with the ramp terminal intersections located immediately outside the bridge over the freeway.

Four through-lanes cross I-285 on CCP. The ramp terminal intersections consist primarily of single-lane turning movements except for the northbound-to-westbound left turns, the southbound-to-eastbound left turns, and the southbound-to-westbound right turns, which are all dual-turn lanes. The southbound-to-westbound dual right turn consists of one free-flow right-turn lane and one signal-controlled right-turn lane.

Figure 2-1: Existing Interchange Configuration

2.2 EXISTING CONGESTION

2.2.1 Traffic Counts

Peak-hour turning movement counts were taken at the two I-285/CCP ramp terminal intersections and the next signalized intersections to the east and west of I-285 (North Commerce Drive on the west side and North Desert Drive on the east side). Additional 24-hour tube counts were taken at several driveways and supplemental intersections on CCP between these two signalized intersections.

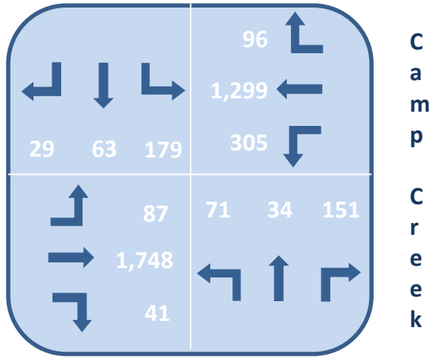
The count data indicated that the heaviest movements at this interchange are to and from the west on CCP and in both directions of I-285. The reoccurring extended queues on CCP and the I-285 off-ramps result in part from existing traffic volumes exceeding the capacity of this interchange. The traffic counts illustrated in Figure 2-2 represent the saturated capacity of this interchange and not the total demand, which is being stored in the long queues. There is also significant traffic entering and exiting CCP at North Commerce Drive during the PM peak hour. This intersection frequently queues the westbound CCP traffic back to the interchange during the PM peak hour, which also indicates that the traffic demand at this intersection is most likely greater than the traffic counts indicate.

Figure 2-2: Existing Turning-Movement Counts

AM Peak Hour

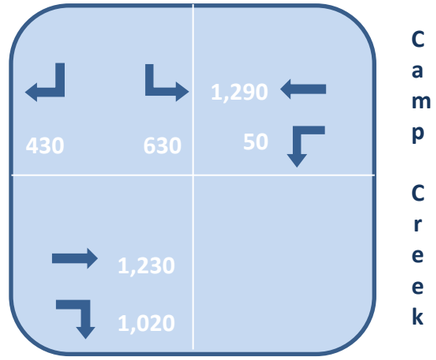
Camp Creek Pkwy. @ N. Commerce Dr.

North Commerce Drive



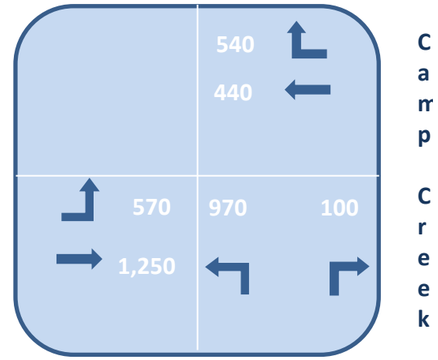
Camp Creek Pkwy. @ I-285 SB

I-285 SB Off-Ramp



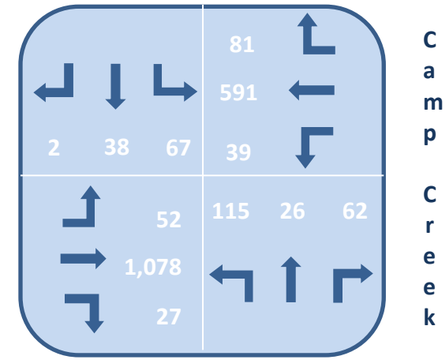
Camp Creek Pkwy. @ I-285 NB

I-285 NB Off-Ramp



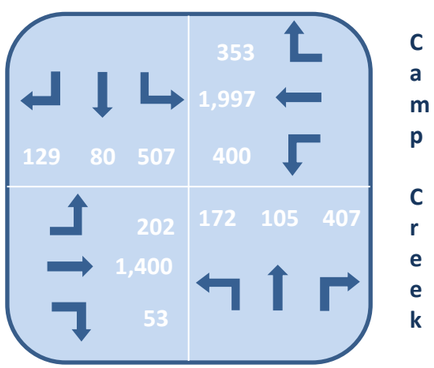
Camp Creek Pkwy. @ N. Desert Dr.

North Desert Drive

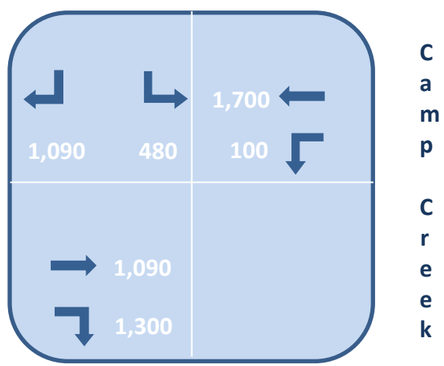


PM Peak Hour

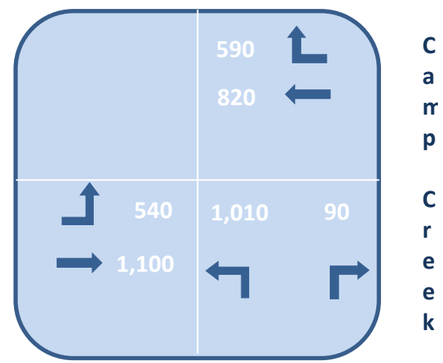
North Commerce Drive



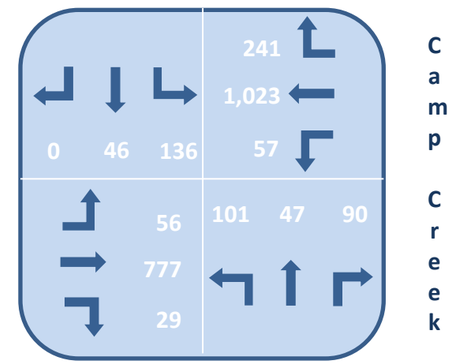
I-285 SB Off-Ramp



I-285 NB Off-Ramp



North Desert Drive



2.2.2 Traffic Analyses and Simulation Modeling

The traffic analysis tool used to evaluate the traffic operations of the I-285/CCP interchange and surrounding intersections is the traffic simulation software, CORSIM. CORSIM was used to estimate overall network performance measures plus individual roadway segment operations. CORSIM estimates networkwide and intersection delay statistics that can be used to estimate user benefits and calculate approximations of LOS. Even though the *2010 Highway Capacity Manual* defines intersection LOS in terms of overall intersection delay, there is not an exact correlation between CORSIM delay results and HCM delay. This document reports a pseudo-approach LOS for critical intersections based on the CORSIM segment delay results.

Three sets of CORSIM models for the AM and PM peak hours were developed representing the existing roadway geometry and the three following levels of traffic volumes:

- Existing – based on traffic count data but is probably less than the current demand;
- Opening Year – No Build (2016 volumes based on factoring traffic counts by 1.2); and
- Design Year – No Build (2036 volumes based on factoring traffic counts by 1.5).

The CORSIM networkwide traffic statistics and segment delays/LOS are summarized in the following tables. The network statistics indicate higher increases in delay in the PM peak hour than the AM peak hour. The PM peak hour would experience a more than 300 percent increase in delay from Existing to Design Year conditions. The average speed in the PM peak hour would decrease by approximately 30 percent from Existing to Design Year.

The intersection approach delays would also increase substantially from Existing to Design Year conditions. Seven of the 14 approaches would be LOS E or F during the PM peak hour in the Design Year. The delays would have been even greater if the North Commerce Drive intersection was not significantly metering traffic from the north side of CCP.

Table 2-1: Existing/Future No Build CORSIM Network Traffic Statistics

Peak Period	Alternative Concept	Delay Travel Total (hours)	Average Speed (mph)
AM	Existing	148	14
	No Build – Opening Year	162	19
	No Build – Design Year	507	13
PM	Existing	220	13
	No Build – Opening Year	486	11
	No Build – Design Year	951	9

Table 2-2: Existing/Future No Build Intersection Approach Delay

		Existing				Opening Year – No Build				Design Year – No Build			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
CCP Intersection	Approach	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS
North Commerce Drive	NB	35	D	40	D	16	C	43	D	37	D	**86**	**F**
	SB	50	D	54	D	45	D	**198**	**F**	**66**	**E**	**653**	**F**
	EB	39	D	36	D	14	C	**64**	**E**	37	D	**102**	**F**
	WB	25	C	27	C	16	C	21	C	24	C	21	C
I-285 SB Off-Ramp	SB	34	C	**62**	**E**	38	D	22	C	52	D	26	C
	EB	27	C	21	C	21	C	**80**	**F**	**66**	**E**	**85**	**F**
	WB	18	C	19	C	4	C	13	C	4	C	13	C
I-285 NB Off-Ramp	NB	50	D	**107**	**F**	**77**	**E**	**86**	**F**	**150**	**F**	**178**	**F**
	EB	37	D	36	D	26	C	44	D	40	D	38	D
	WB	33	C	43	D	37	D	**66**	**E**	**104**	**F**	**69**	**E**
North Desert Drive	NB	28	C	27	C	24	C	28	C	27	C	49	D
	SB	32	C	34	C	26	C	36	D	27	C	48	D
	EB	21	C	21	C	25	C	28	C	28	C	27	C
	WB	31	C	31	C	17	C	31	C	29	C	**225**	**F**

2.3 SUMMARY OF PROBLEM MOVEMENTS

The simulation modeling results for existing conditions indicate only two approaches in the interchange that are LOS E or F: (1) the southbound approach of the southbound off-ramp intersection (LOS E), and (2) the northbound approach of the northbound off-ramp intersection (LOS F). (Both are in the PM peak hour.) However, the results are not consistent with the observed queues in the PM peak hour, which are longer than the calculated delays would estimate. The most likely explanation of this phenomenon is that these intersections are oversaturated, and the existing traffic counts represent the maximum capacity of these intersections. The observed queues result from the actual traffic demand exceeding the intersection capacity, and the vehicles that are unable to pass through the various intersections during a single cycle develop these queues over multiple signal cycles.

Both sets of future models (Opening Year and Design Year) indicate that the North Commerce Drive intersection would experience the heaviest congestion. The higher delays at this intersection would occur, because this intersection would experience heavy increases in traffic volumes from the west on CCP and would continue to operate with a four-phase signal; this would not be as efficient as the interchange intersections, which are both three-phase signals. Both ramp terminal intersections operate as three-phase signals, because they only have three approaches.

The simulation modeling results predict that the North Commerce Drive intersection would impact the operations of the interchange during the PM peak hour for both Opening Year and Design Year, unless the traffic on North Commerce Drive is allowed to back up signficantly to provide the necessary green time for the higher priority CCP movements. If the green time at North Commerce Drive was allocated to minimize overall intersection delay, the queues on CCP at North Commerce Drive would eventually radiate upstream to the mainline of I-285.

3 INTERCHANGE MODIFICATION CONCEPTS

The objective of this study at I-285 and CCP was to recommend an interchange modification concept that would significantly improve traffic operations with minimal right-of-way acquisition and minimal construction cost. The constrained right-of-way of the existing interchange limited the potential interchange alternatives that could be considered. The two types of interchanges that met these constraints were different versions of diamond interchanges and displaced left-turn interchanges. The four interchange concepts described in this report are as follows:

1. DDI Five Lanes
2. DDI Six Lanes
3. Modified DLT Interchange Six Lanes
4. Partial DDI Seven Lanes

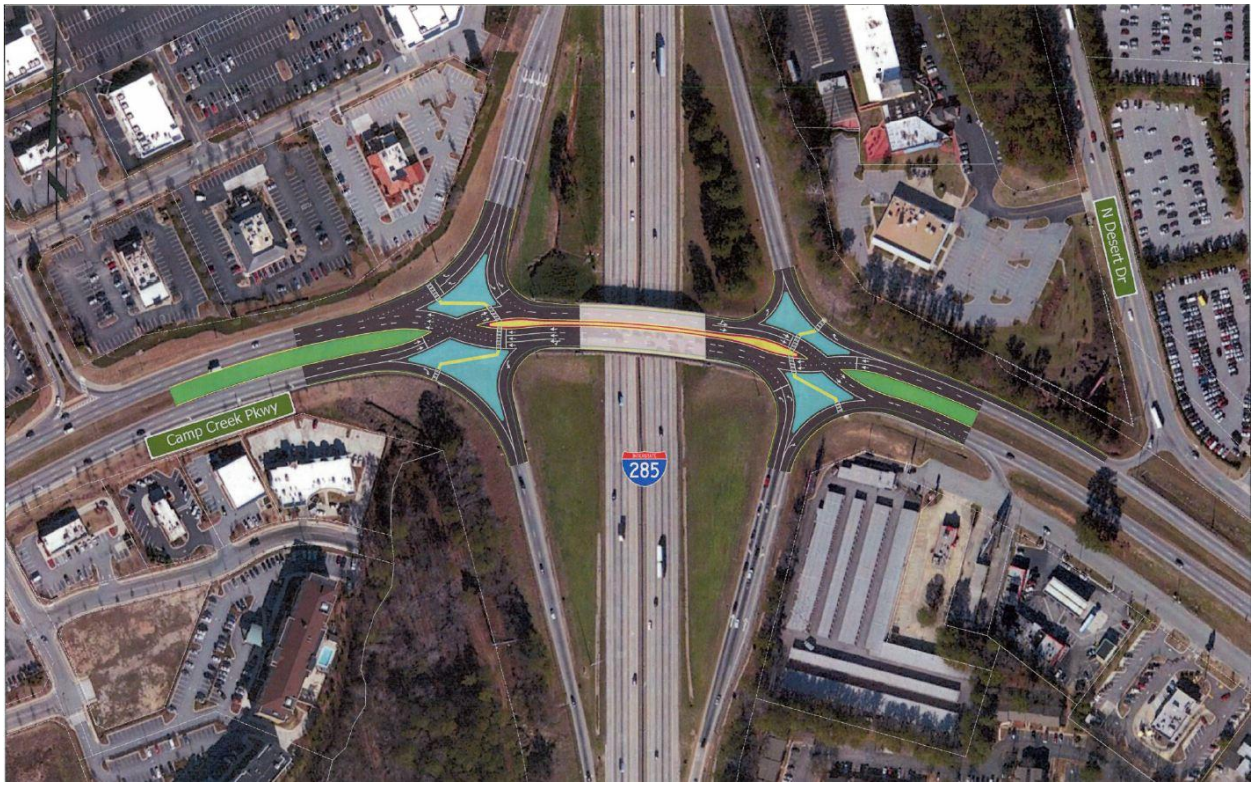
3.1 DIVERGING DIAMOND INTERCHANGE FIVE LANES

The DDI Five Lanes concept would have three westbound lanes and two eastbound lanes on the bridge over I-285. The remaining width on the existing bridge would be allocated to a median pedestrian corridor.

The DDI Five Lanes concept was selected as one of the final alternatives for this location because of its highly efficient traffic operations. This efficiency is achieved by converting the ramp terminal intersections from three-phase operations to two-phase operations and by routing the left turns from the freeway off-ramps along paths that do not cross each other.The primary negative aspect of this interchange concept is the requirement that all through traffic on the cross street must cross over each other two times (once at each ramp terminal intersection).

The DDI Five Lanes concept could be constructed without widening the existing bridge. The approach roadways on either side of the bridge would be reconfigured to shift traffic to the opposite sides of the bridge. The critical capacity movement for this interchange, assuming a future split of traffic similar to existing conditions, is the two-lane eastbound through-movement at the southbound ramp terminal intersection. A concept sketch for this alternative was developed by the Office of Traffic Operations (Figure 3-1).

Figure 3-1: Diverging Diamond Interchange Five Lanes

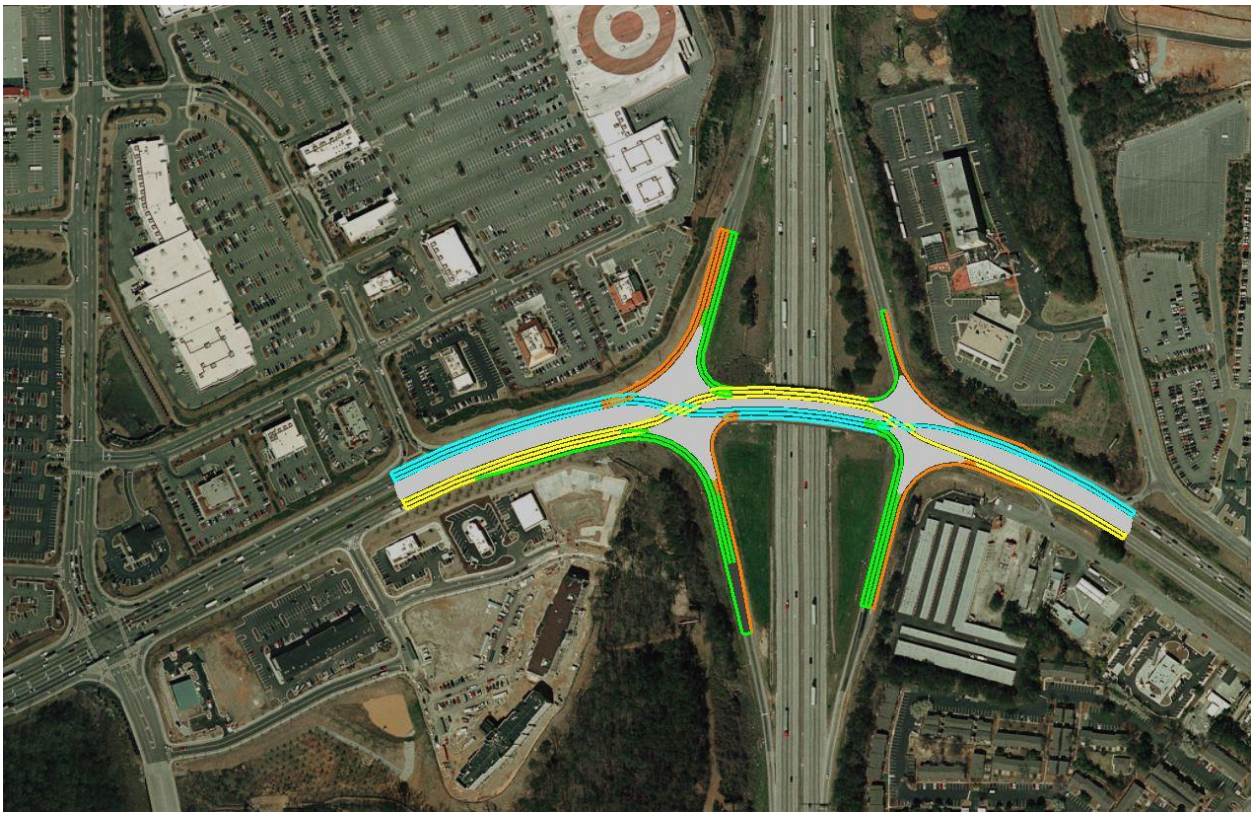


3.2 DIVERGING DIAMOND INTERCHANGE SIX LANES

The DDI Six Lanes concept would have three westbound lanes and three eastbound lanes on the bridge over I-285. This concept would be very similar to the DDI Five Lanes concept; however, this concept would have the same capacity heading eastbound as westbound. It would also give the eastbound CCP to northbound I-285 movement a dedicated lane over I-285, which would not be blocked as easily by the eastbound through traffic as the five-lane concept would. This second DDI concept was developed to better utilize the existing six-lane section of CCP west of I-285. This

concept would require the widening of the existing bridge to accommodate the additional lane. Because the actual latent demand at this interchange has not been quantified, the useful lifespan of the DDI Five Lanes concept has not been determined; however, the DDI Six Lanes concept would accommodate more traffic than the Five Lanes concept, thereby extending its operational life. The critical capacity movement for this interchange, assuming a future split of traffic similar to existing conditions, is the two-lane southbound right-turn movement at the southbound ramp terminal intersection. A concept sketch for this alternative was developed by the Study Team (Figure 3-2).

Figure 3-2: Diverging Diamond Interchange Six Lanes



3.3 MODIFIED DISPLACED LEFT-TURN INTERCHANGE SIX LANES

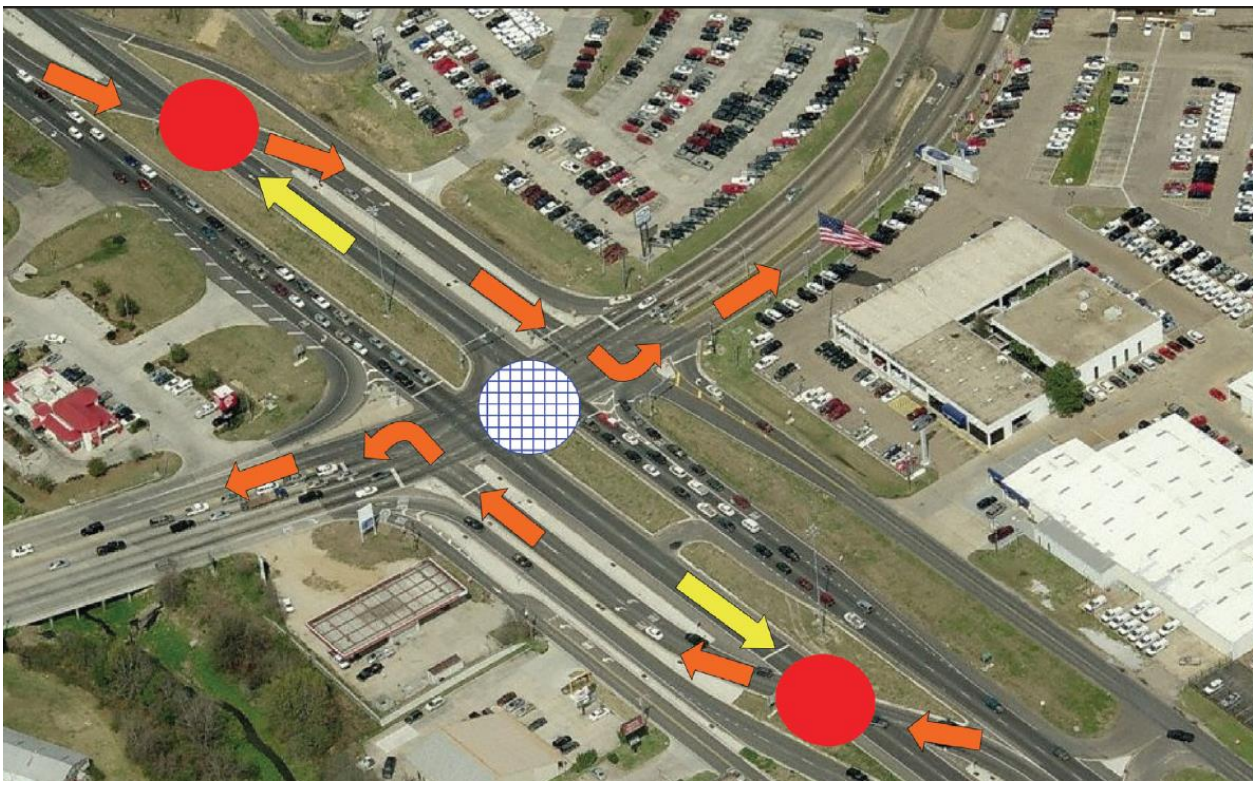
The Modified DLT Interchange Six Lanes concept would have two westbound lanes and four eastbound lanes over I-285.Two of the eastbound lanes would remain at their current locations on the existing bridge, and the other two lanes would be located on a new structure on the north side of the existing bridge. The two new eastbound lanes would carry the eastbound CCP to northbound I-285 movement and the southbound I-285 to eastbound CCP movement.

The development of this concept originated as a standard DLT interchange. This interchange concept has not been implemented in the United States; however, it is one of the innovative interchange concepts supported by the Federal Highway Administration (FHWA).[1] The DLT

[1] *FHWA Tech Brief,* Displaced Left-Turn Interchange, *FHWA Publication No.: FHWA-HRT-09-056*

interchange is the grade-separated version of a DLT intersection (also known as a continuous flow intersection or CFI). The DLT intersection concept consists of supplemental intersections in advance of the main intersection (DLT intersection) where left-turning vehicles cross over the opposing through vehicles then travel on the opposite side of the through traffic to the main intersection. Figure 3-3 is an aerial photo of an at-grade DLT intersection in Baton Rouge, La., from the FHWA Tech Brief on DLT Intersections.[2] This concept allows left-turning vehicles to turn simultaneously with the opposing through traffic. By separating these movements, this eliminates a signal phase at the main intersection and improves the efficiency of it.

Figure 3-3: Displaced Left-Turn Intersection (Two Legs Only), Baton Rouge, La.

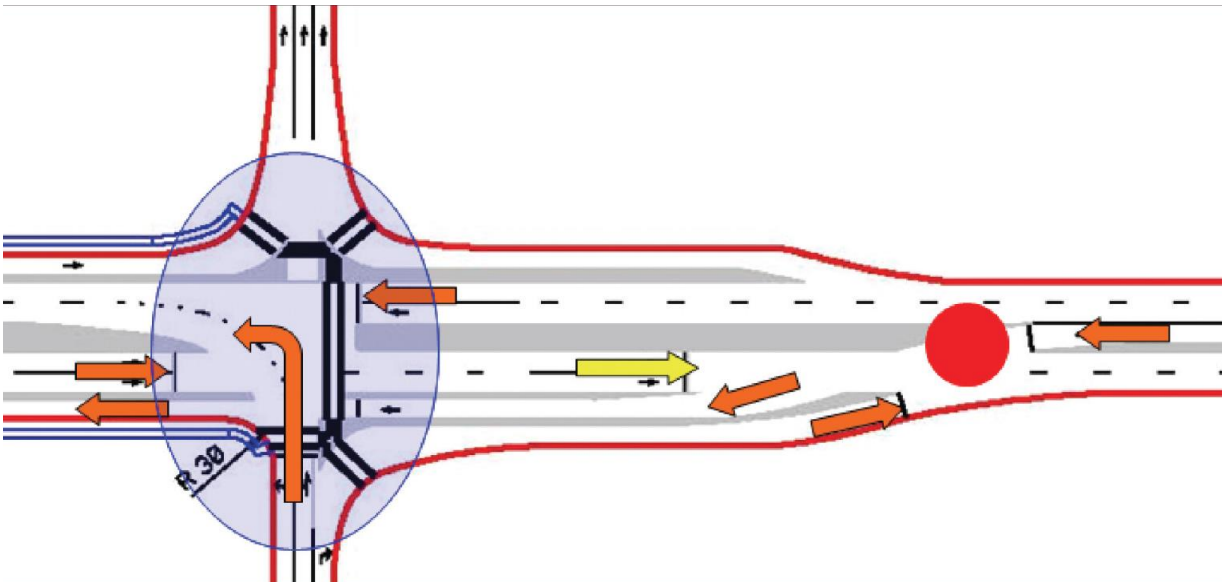


Source: FHWA Tech Brief, Displaced Left Turn Intersection

The Modified DLT Interchange Six Lanes concept uses the same DLT intersections to shift the left turns from the cross street to the opposite side of the cross-street through traffic. These contraflow lanes follow parallel to the other cross-street lanes until the contraflow lanes intersect the on-ramp on the opposite side of the freeway (Figure 4-4). Left turns from the off-ramps continue to turn onto the cross street in a manner similar to a typical diamond interchange. Shifting the cross-street left-turn movement to the opposite side of the opposing through traffic eliminates a signal phase for each direction. Therefore, the ramp terminal intersections operate as two-phase signals. However, the left-turning movements from the off ramps would continue to cross each other at both ramp terminal intersections, requiring additional green time for these conflicts.

[2] *FHWA Tech Brief,* Displaced Left Turn Intersection*, FHWA Publication No.: FHWA-HRT-09-055*

Figure 3-4: Typical Displaced Left-Turn Interchange Ramp Terminal Intersection



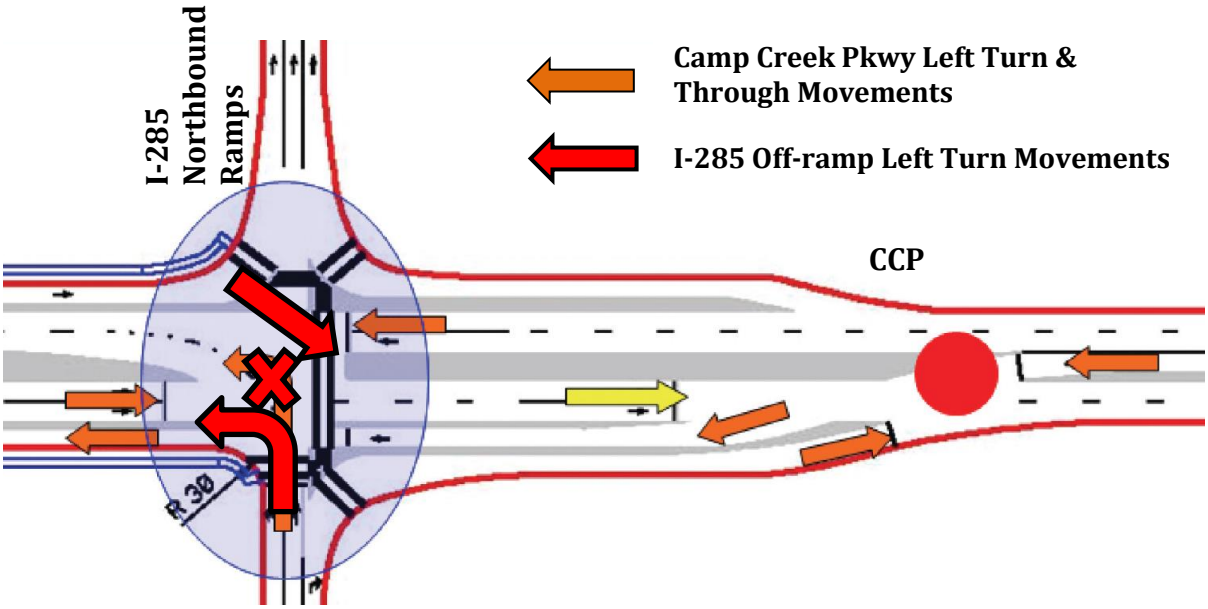
Source: FHWA Tech Brief, Displaced Left Turn Interchange

One way to improve the efficiency of the DLT interchange is to offset the off-ramp left turns to prevent them from crossing each other, similar to a DDI. This could be accomplished by shifting the off-ramp left-turn movements from the cross-street through-lanes at the near-side ramp terminal intersection to the contraflow lanes constructed for the cross-street DLTs. This off-ramp left-turn movement would then cross over both through-lanes at the ramp terminal intersection on the opposite side of the interchange. This crossover movement would require a two-phase signal to operate. The DLT intersection and ramp terminal intersection on the east side of I-285 for the Modified DLT Interchange Six Lanes concept are illustrated in the revised graphic from the FHWA Tech Brief in

Figure 3-5. This concept would require two sets of contraflow lanes (eastbound and westbound) to accommodate the left turns from each direction of the cross street.

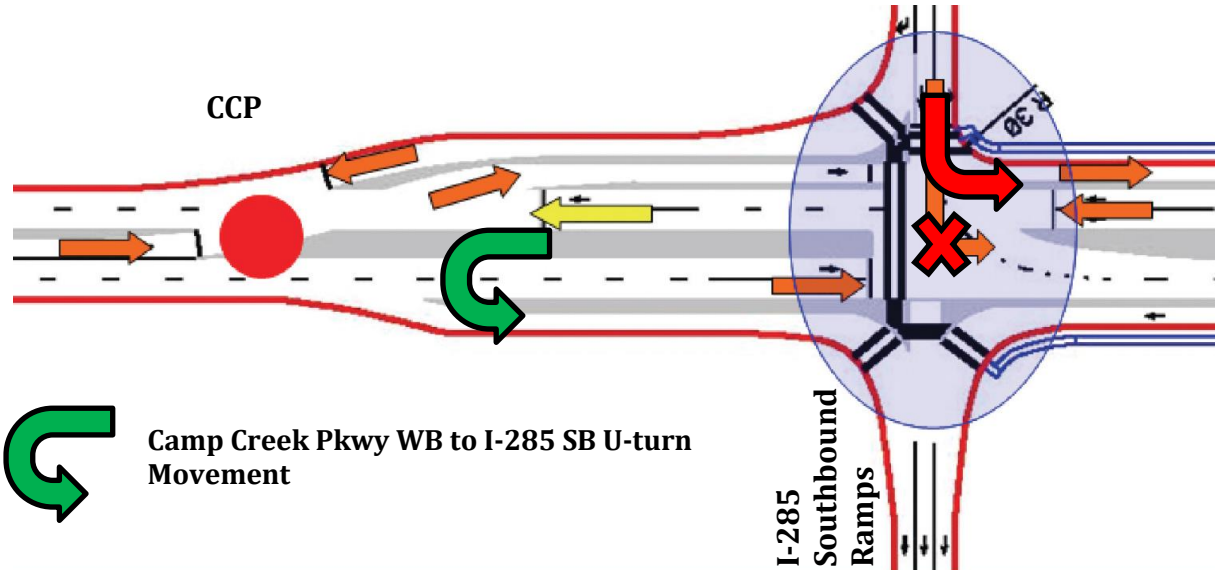
Because the CCP westbound-to-I-285 southbound left turn currently sustains approximately 100 vehicles per hour or less in the peak hour, the cost to construct contraflow lanes for these few vehicles would be cost prohibitive. Therefore, this movement was shifted to the west side of the interchange at the DLT intersection (see Figure 3-6) as a U-turn movement. This U-turn movement would operate simultaneously with the CCP eastbound to an I-285 northbound left-turn movement. The I-285 southbound-to-CCP westbound right turn sustains more than 1,000 vehicles per hour in the peak hour; therefore, a single right-turn lane could not accommodate this number of right turns unless it was a free-flow movement. This free-flow right turn would limit the number of westbound through-lanes at this intersection to a maximum of two lanes because the I-285 southbound-to-CCP westbound right turn would require one of the three existing westbound lanes on CCP.

Figure 3-5: Modified Displaced Left-Turn Interchange Northbound Off-Ramp Terminal Intersection and Westbound Displaced Left-Turn Intersection



Source: HNTB Corporation

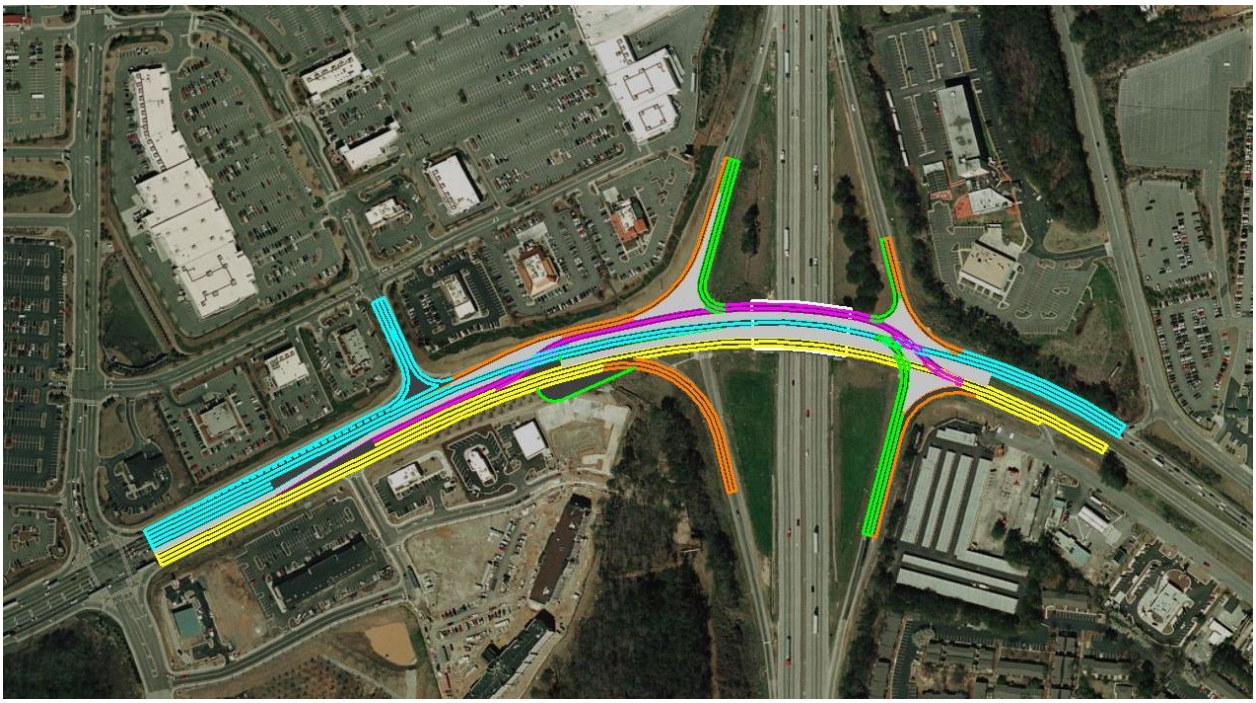
Figure 3-6: Modified Displaced Left-Turn Interchange Southbound Off-Ramp Terminal Intersection and Eastbound Displaced Left-Turn Intersection



Source: HNTB Corporation

The critical capacity movement for this interchange, assuming a future split of traffic similar to existing conditions, is the two-lane westbound through movement at the eastbound DLT intersection. The entire Modified DLT Interchange Six Lanes concept is illustrated in Figure 3-7.

Figure 3-7: Modified Displaced Left-Turn Interchange Six Lanes



3.4 PARTIAL DIVERGING DIAMOND INTERCHANGE SEVEN LANES

A fourth concept, Partial DDI Seven Lanes, was developed to address the critical capacity constraints of the Modified DLT Interchange Six Lanes concept. Even though this concept is called a Partial DDI, it is a version of the Modified DLT Interchange Six Lanes concept. In the Partial DDI Seven Lanes concept, the eastbound DLT intersection was shifted to the east to the location of the southbound ramp terminal intersection. This modification resulted in the following changes to the interchange concept:

- Conversion of the CCP westbound-to-I-285 southbound left turn from a U-turn movement to a typical diamond interchange left turn;
- Elimination of a separate intersection for I-285 southbound left turn and the CCP eastbound-to-I-285 northbound left-turn movement;
- Provision of space within the existing right-of-way to accommodate two right-turn lanes for the I-285 southbound-to-CCP westbound movement; and
- Establishment of an open lane on CCP to accommodate a third westbound through-lane at the southbound ramp terminal intersection.

Similar to the Modified DLT Interchange Six Lanes concept, this concept includes a new two-lane bridge over I-285 for the CCP eastbound left turn-to-I-285 northbound and the I-285 southbound left turn-to-CCP eastbound. However, because this concept allows three westbound lanes at the southbound ramp terminal intersection, it utilizes all seven lanes on the existing bridge without incurring any additional cost. Similar to the DDI Six Lanes concept, the critical capacity movement for this interchange, assuming a future split of traffic similar to existing conditions, is the two-lane southbound right-turn movement at the southbound ramp terminal intersection. A conceptual sketch of the Partial DDI Seven Lanes prepared by the Study Team is shown in Figure 3-8.

There are no known locations in the United States where the Partial DDI concept has been implemented. The only known reference that identified this concept is a website, *http://midimagic.sgc-hosting.com/diamseq.htm*, hosted by Larry Robinson of Bloomington, Ind. In this website, the concept is called "Half Diverging Diamond Interchange." The HNTB Team decided to call the concept "Partial Diverging Diamond Interchange." The existing interchange that most closely resembles this concept is a true half DDI on I-95 that services a one-way street, Thurbers Avenue, in Providence, R.I. A Google map image of this interchange and a street view of the eastbound approach at the crossover intersection are shown in Figure 3-9 and Figure 3-10, respectively.

The footprint for the Partial DDI Seven Lanes is similar to the DDI Six Lanes and would require minimal additional right-of-way.

Figure 3-8: Partial Diverging Diamond Interchange Seven Lanes

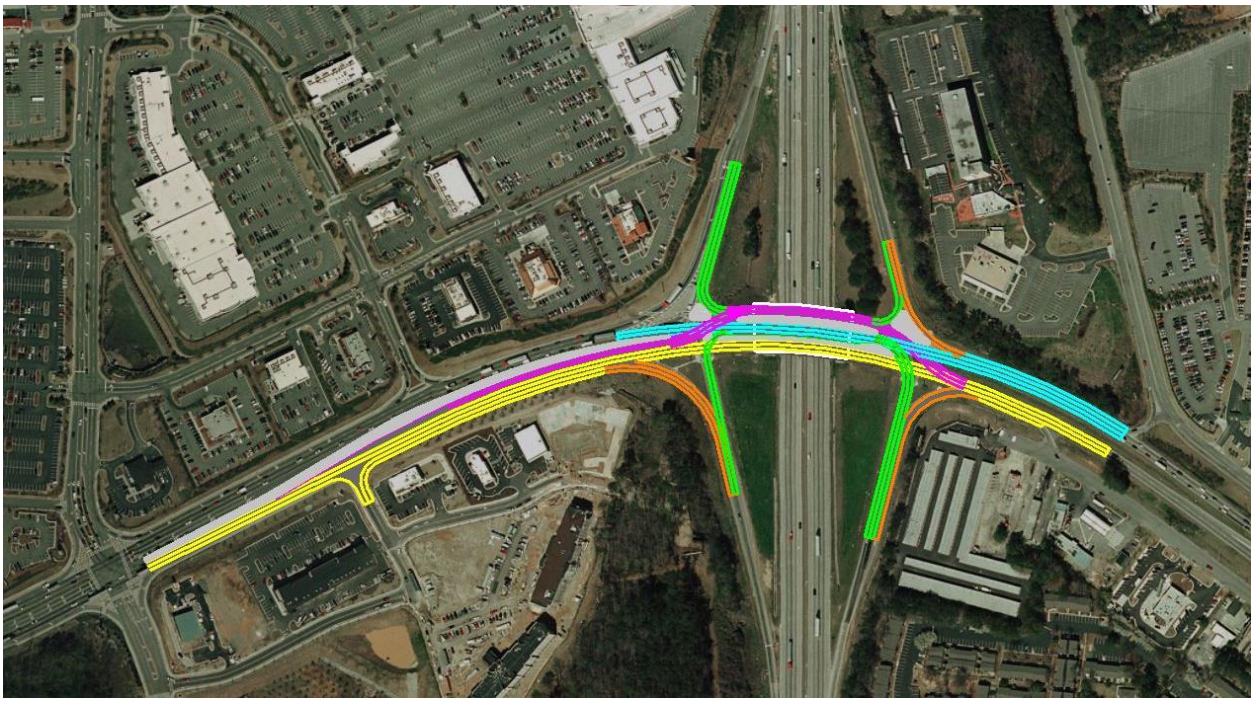
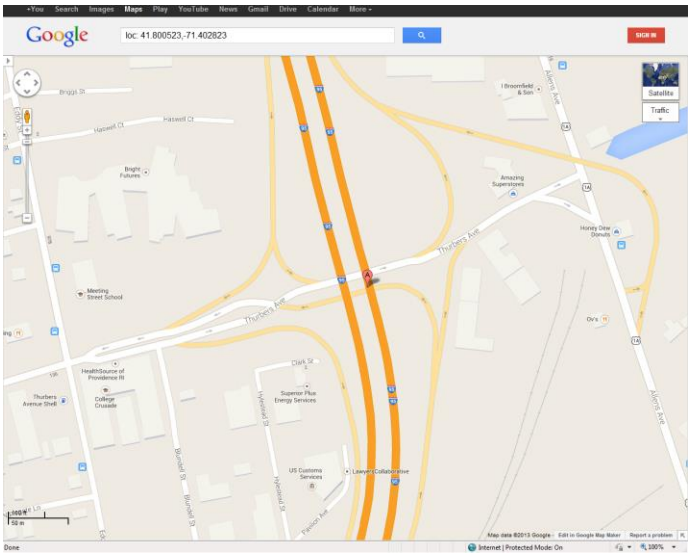


Figure 3-9: Existing I-95/Thurbers Avenue Half Diverging Diamond Interchange in Providence, Rhode Island



Source: Google Maps

Figure 3-10: Eastbound Approach to I-95/Thurbers Avenue Half Diverging Diamond Interchange

Source: Google Maps

4 COMPARISON OF INTERCHANGE CONCEPTS

The interchange concept evaluation process considered the following:

1. **Project cost:** included all the initial costs associated with implementing the project. This cost includes engineering, construction and right-of-way costs, but not the annual maintenance costs.
2. **Right-of-way impacts:** considered the size of the required right-of-way acquisitions and any necessary displacements.
3. **Traffic operations:** based primarily on future vehicular delays in the AM and PM peak hours for each concept; estimated using the FHWA traffic simulation modeling software, CORSIM.
4. **Desirable lifespan of project:** based on a quantitative estimate of interchange capacity. These estimates used the most congested intersection (based on either the AM or PM peak hours) in each of the concepts and calculated the sum of the critical lane volumes for these intersections. Intersection capacity was based on a total critical lane volume of 1,600 vehicles per lane per hour. Three different traffic growth rate scenarios were considered to assess the sensitivity to increases in traffic from the freeway and the cross street.
5. **Safety/driver expectations:** considered the extent concepts differed from typical interchange configurations, the number of out-of-direction turns that drivers are required to make, and the number of crossing movements at each of the intersections.
6. **Constructability:** considered the impacts to existing traffic during construction (detours and delays) and the complexity of the proposed construction.
7. **Benefit/cost:** based primarily on the calculated benefit/cost ratio. The user benefits included travel time savings related to the reduction in vehicular delay (autos and commercial vehicles) and operating costs/fuel savings. The cost component only considered the initial implementation costs.

4.1 PROJECT COST

Rough cost estimates that included preliminary engineering, right-of-way, construction, and a 30 percent contingency were developed for each concept to provide comparison reference points. Below are some of the basic assumptions used in developing these cost estimates:

- Project costs are based on the unit cost from the latest item mean summary published on the GDOT website.
- All concepts need to meet the new MS4 requirements.
- A contingency of 30 percent was added to each total for miscellaneous unaccounted for items.
- Asphalt widening was based on 12-inch asphalt concrete construction with a 12-inch graded aggregate base (GAB).
- The asphalt mill and overlay cost was based on 2-inch milling and 3-inch overlay.
- Pavement demolition was based on the unit cost for "Removal Asphalt Pavement including Base."

- The cost for signal reconfiguration was used for adjustments to traffic signals at each intersection.
- The unit cost for new signal/warning lights was for a single signal warning light.
- The unit cost for striping was for each lane of new striping per linear mile.
- The overhead sign unit cost was based on the cost for the structural support of a Type 1 overhead sign.
- The unit cost for "Roadside Signs" and "Changeable Warning Signs" assumed a 15 square foot sign as well as a sign post.
- The erosion control unit cost was based on one acre of disturbed acreage.
- The traffic control unit cost was based on the complexity of construction and maintenance of traffic.

Maintenance of traffic varied substantially between interchange concepts. The need for limited interruptions to traffic influenced many of the design requirements and thereby influenced the costs as well. Quantities increased or decreased depending on the construction limits required to allow traffic to operate at an acceptable LOS through the duration of construction. The assumed acceptable level of disruption to existing traffic is discussed further under the "Constructability" section of this document. Each design can be refined to further reduce the level and duration of disruption; however, construction costs will increase for the concept being modified. Detailed cost estimates for each concept are included in the Appendix.

Table 4-1: Cost Comparison of Interchange Concepts

Concept	Project Costs
DDI Five Lanes	$3.4M
DDI Six Lanes	$8.8M
Modified DLT Interchange Six Lanes	$13.9M
Partial DDI Seven Lanes	$8.0M

Source: HNTB Corporation

The costs summarized in the table above indicate that the DDI Five Lanes concept would be the least expensive concept to implement, primarily because it would not require any bridge widening or new bridge construction. The most expensive concept would be the Modified DLT Interchange Six Lanes, which has higher costs related to higher amounts of roadway/bridge construction and right-of-way acquistions. The other two concepts, DDI Six Lanes and Partial DDI Seven Lanes, have costs that are relatively similar: $8.8 million and $8.0 million, respectively. Both of these concepts would require some type of bridge work (widening or new construction).

Table 4-2: Cost Summary

Concept	Construction	Engineering	Right-of-way	Project Costs
DDI Five Lanes	$3.1M	$0.3M	–	$3.4M
DDI Six Lanes	$7.7M	$0.8M	$0.3M	$8.8M
Modified DLT Interchange Six Lanes	$11.7M	$1.2M	$1.0M	$13.9M
Partial DDI Seven Lanes	$6.8M	$0.7M	$0.6M	$8.0M

Source: HNTB Corporation

4.2 RIGHT-OF-WAY IMPACTS

No displacements are required by any of the concepts proposed. Some of the alternatives would require a small amount of adjacent ROW (strip takes) to accommodate the layouts presented. The areas in question are bare, with little or no desirable landscaping. Parking lots, curbs and builds would not be impacted in any way. The table below indicates roughly how much right-of-way would be required for each concept.

Table 4-3: Right-of-Way Comparison of Interchange Concepts

Concept	Right-of-way (SY)
DDI Five Lanes	0
DDI Six Lanes	1,200
Modified DLT Interchange Six Lanes	3,800
Partial DDI Seven Lanes	1,800

*Note: No Displacment required for any concept.

Source: HNTB Corporation

4.3 TRAFFIC OPERATIONS

The traffic operations criterion was based primarily on future vehicular delays in the AM and PM peak hours for each concept. These network-wide total delays and intersection approach delays were estimated using the FHWA traffic simulation modeling software, CORSIM. A simulation LOS was calculated for each intersection approach based on the total delay statistics. Even though these LOS values used the same ranges as the *2010 Highway Capacity Manual*, the LOS results are not equivalent to the HCM LOS values since the HCM calculations are based on different assumptions, such as passenger car equivalent volumes, etc.

The efficient operation of the intersection of CCP and North Commerce Drive is critical to the overall operation of the I-285/CCP interchange, because the westbound queues from this intersection can impact the operation of the interchange. Adding a southbound left turn and opening the eastbound right-turn lane to through traffic would help reduce congestion but may not be sufficient to accommodate the growth in traffic at this intersection. The CORSIM models for all the build alternatives used the same future configuration assumptions at this intersection. In addition to the improvements stated above, a separate signal phase for the northbound approach was eliminated, and all of the northbound left turns and through-traffic were removed from this intersection. These movements were shifted to the next intersection to the west of North Commerce Drive (Centre Parkway). The remaining northbound right-turn traffic would run at the same time as the westbound left turns.

The network-wide delay values shown in Table 4-4 and Figure 4-1 indicated that there is not a significant difference between the DDI Five Lanes, DDI Six Lanes and the Partial DDI Seven Lanes in the Opening Year. However, the DDI Six Lanes and Partial DDI Seven Lanes would operate significantly better in the Design Year. The critical choke points in the DDI Five Lanes and the Modified DLT Interchange Six Lanes created significantly more delays in the Design Year. The network-wide average speeds were consistent with the total delay results with slower speeds corresponding to higher delays.

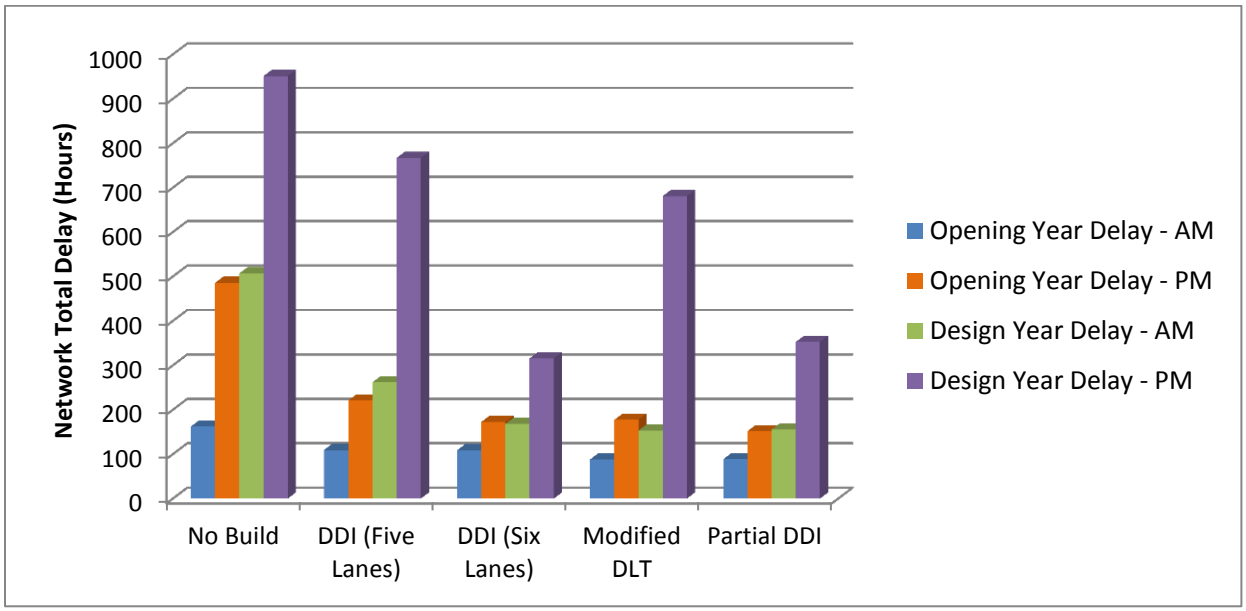
Table 4-4: Total Network Delay and Average Speed Comparison of Interchange Concepts

	AM Peak Hour		PM Peak Hour	
Alternative Concept	**Delay Travel Total (hours)**	**Average Speed (mph)**	**Delay Travel Total (hours)**	**Average Speed (mph)**
Existing	148	14	220	13
No Build Opening Year	162	19	486	11
No Build Design Year	507	13	951	9
DDI Five Lanes Opening Year	110	19	221	15
DDI Five Lanes Design Year	262	19	767	11
DDI Six Lanes Opening Year	109	23	173	17
DDI Six Lanes Design Year	168	24	316	20
Modified DLT Interchange Six Lanes Opening Year	88	24	177	22
Modified DLT Interchange Six Lanes Design Year	153	23	681	12

Alternative Concept	AM Peak Hour		PM Peak Hour	
	Delay Travel Total (hours)	Average Speed (mph)	Delay Travel Total (hours)	Average Speed (mph)
Partial DDI Seven Lanes Opening Year	89	24	152	22
Partial DDI Seven Lanes Design Year	156	24	353	19

Source: HNTB Corporation

Figure 4-1: Future Network Delay Comparison of Interchange Concepts



Source: HNTB Corporation

The intersection approach delay values indicated that there was not a significant difference in traffic operations between any of the four build alternatives in the Opening Year. The DDI Five Lanes and the Modified DLT Interchange Six Lanes concepts were the only alternatives that experienced significant congestion in the Design Year. Both the DDI Six Lanes and the Partial DDI Seven Lanes concepts would operate with minimal congestion in the Design Year. The majority of the approaches would be LOS D or better in the Design Year for both the DDI Six Lanes and the Partial DDI Seven Lanes concepts. The Partial DDI Seven Lanes concept would have three approaches that were LOS E, and the DDI Six Lanes concept would have two approaches that were LOS E in the Design Year.

Table 4-5: Intersection Approach Delay and Level of Service Comparison of Interchange Concepts

		DDI FIVE LANES								DDI SIX LANES							
		Opening Year				Design Year				Opening Year				Design Year			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
CCP Intersection	Approach	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS
North Commerce Drive	NB	13	C	44	D	35	D	1,032	F	12	C	41	D	25	C	53	D
	SB	45	D	57	E	59	E	320	F	48	D	64	E	61	E	77	E
	EB	11	C	19	C	12	C	52	D	10	C	31	C	11	C	20	C
	WB	16	C	24	C	17	C	34	C	15	C	25	C	19	C	26	C
I-285 SB Off-Ramp	SB	16	C	24	C	23	C	49	D	15	C	24	C	21	C	62	E
	EB	19	C	26	C	10	C	44	D	12	C	13	C	17	C	20	C
	WB	10	C	10	C	20	C	13	C	8	C	10	C	11	C	12	C
I-285 NB Off-Ramp	NB	20	C	19	C	73	E	82	F	16	C	19	C	22	C	29	C
	EB	12	C	8	C	4	C	8	C	13	C	10	C	8	C	10	C
	WB	7	C	22	C	16	C	31	C	6	C	22	C	10	C	28	C
North Desert Drive	NB	33	C	28	C	38	D	30	C	24	C	28	C	27	C	28	C
	SB	37	D	37	D	37	D	38	D	27	C	37	D	28	C	34	C
	EB	4	C	27	C	14	C	27	C	27	C	28	C	23	C	25	C
	WB	16	C	20	C	36	D	39	D	17	C	21	C	37	D	49	D

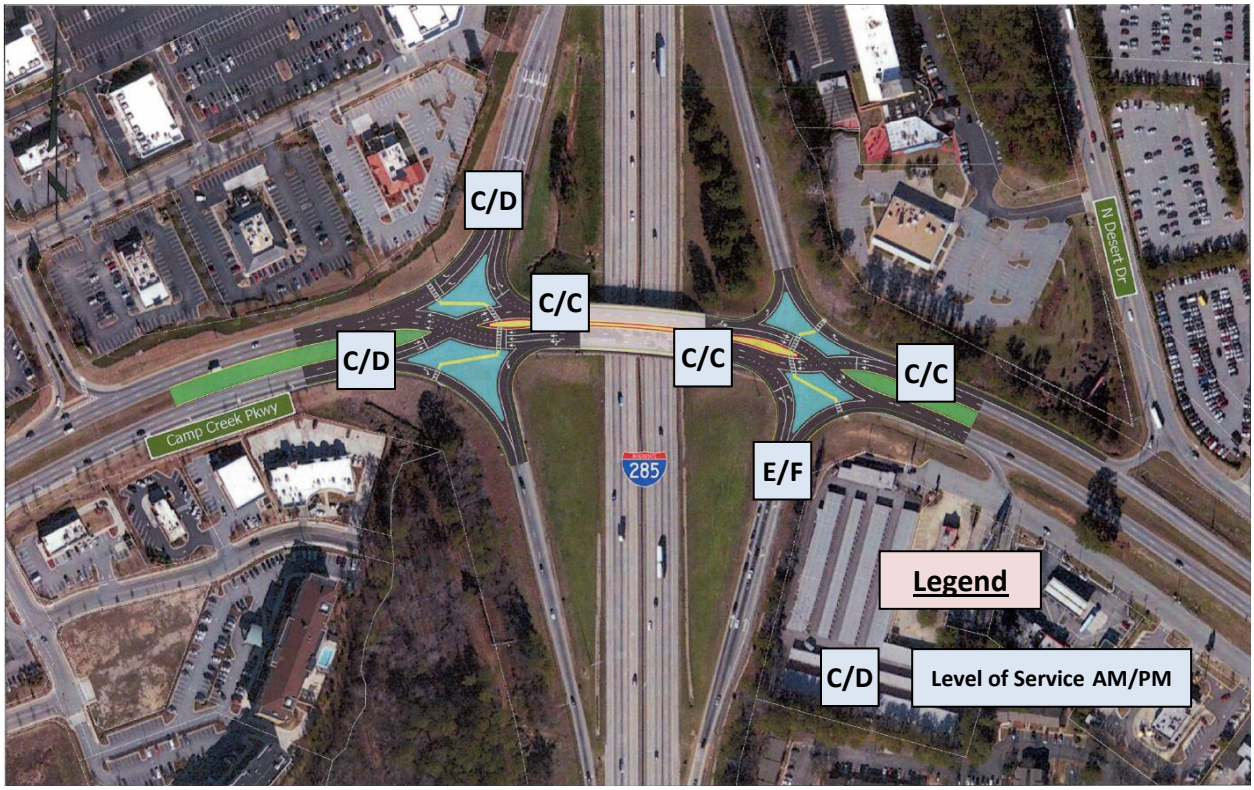
Source: HNTB Corporation

Table 5-5: Intersection Approach Delay and Level of Service Comparison of Interchange Concepts (continued)

		MODIFIED DLT INTERCHANGE SIX LANES								PARTIAL DDI SEVEN LANES							
		Opening Year				Design Year				Opening Year				Design Year			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
CCP Intersection	Approach	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS	Average Approach Delay (sec/veh)	LOS
North Commerce Drive	NB	10	C	35	D	26	C	67	E	11	C	18	C	30	C	45	D
	SB	46	D	67	E	60	E	73	E	48	D	53	D	64	E	69	E
	EB	10	C	18	C	11	C	22	C	9	C	17	C	10	C	19	C
	WB	13	C	27	C	15	C	38	D	15	C	23	C	18	C	32	C
I-285 SB Off-Ramp	SB	12	C	24	C	19	C	38	D	15	C	29	C	23	C	55	E
	EB	0	C	0	C	0	C	0	C	11	C	11	C	12	C	16	C
	WB	0	C	0	C	0	C	0	C	6	C	18	C	7	C	43	D
I-285 NB Off-Ramp	NB	16	C	21	C	24	C	69	E	19	C	18	C	30	C	64	E
	EB	14	C	19	C	16	C	21	C	6	C	6	C	7	C	22	C
	WB	6	C	7	C	7	C	105	F	7	C	12	C	9	C	31	C
North Desert Drive	NB	24	C	21	C	27	C	111	F	24	C	24	C	27	C	29	C
	SB	27	C	25	C	28	C	53	D	27	C	29	C	28	C	34	C
	EB	8	C	12	C	12	C	12	C	13	C	11	C	24	C	13	C
	WB	16	C	39	D	35	C	378	F	17	C	18	C	37	D	38	D

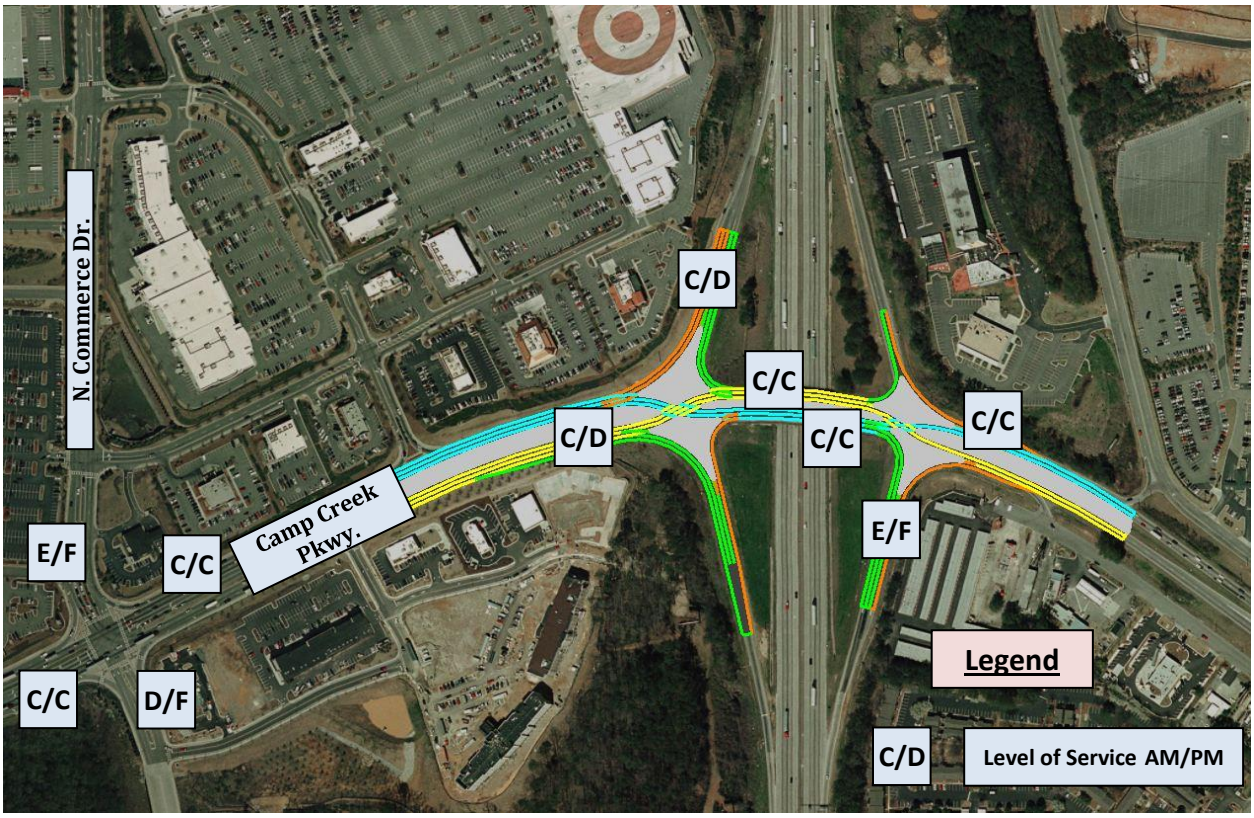
Source: HNTB Corporation

Figure 4-2: Diverging Diamond Interchange Five Lanes Approach Level of Service (Design Year)



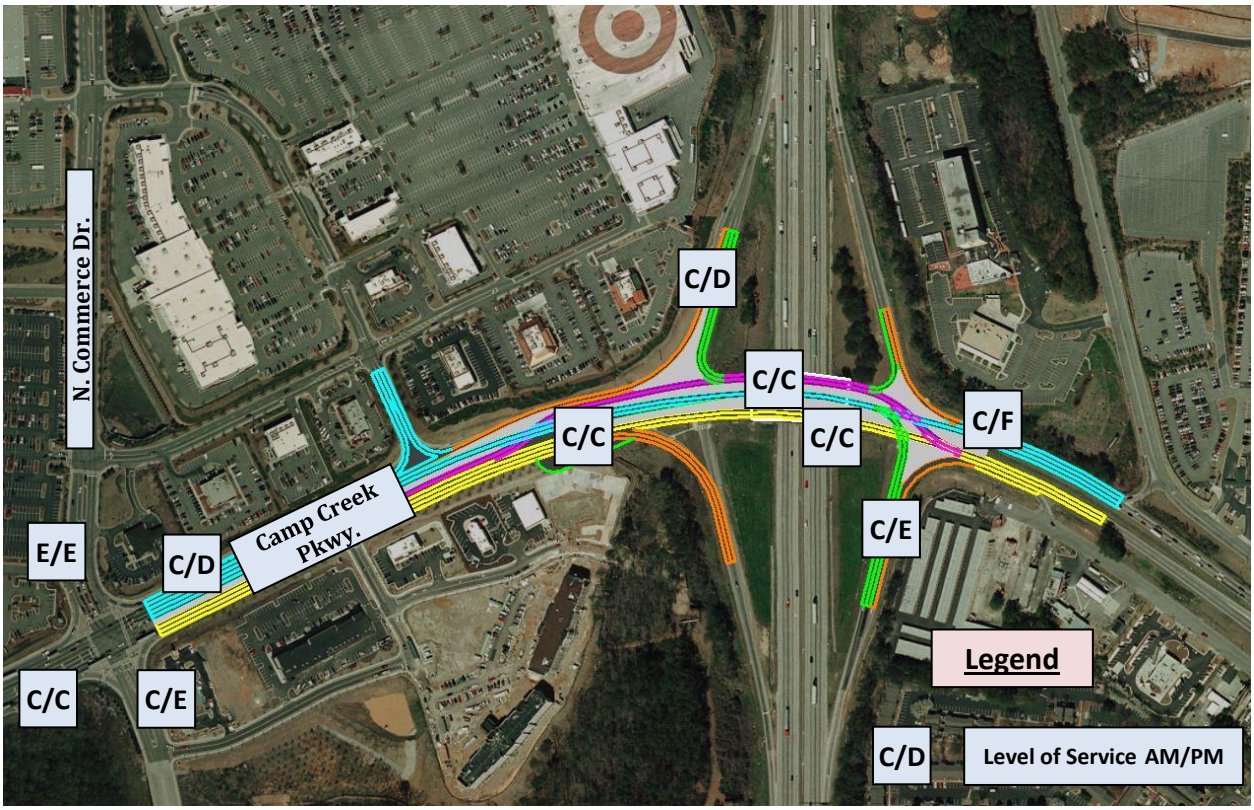
Source: HNTB Corporation

Figure 4-3: Diverging Diamond Interchange Six Lanes Approach Level of Service (Design Year)



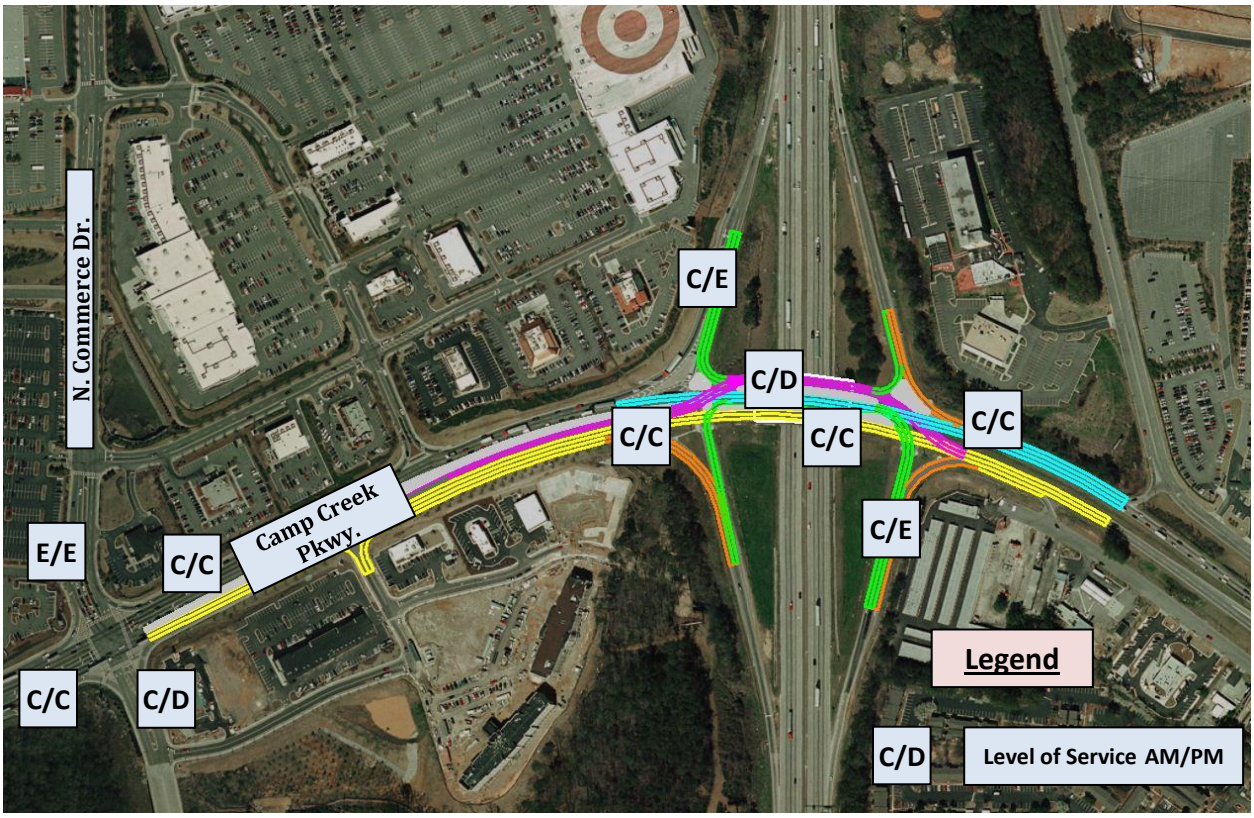
Source: HNTB Corporation

Figure 4-4: Modified Displaced Left-Turn Interchange Six Lanes Approach Level of Service (Design Year)



Source: HNTB Corporation

Figure 4-5: Partial Diverging Diamond Interchange Seven Lanes Approach Level of Service (Design Year)



Source: HNTB Corporation

4.4 DESIRABLE LIFESPAN OF PROJECT

The desirable lifespan of project criterion was related to traffic capacity and was based on a quantitative estimate of interchange throughput. These estimates used the most congested ramp terminal intersection (based on either the AM or PM peak hour traffic volumes) in each of the concepts and calculated the sum of the critical lane volumes for this intersection only. Intersection capacity was set at a value equal to a total critical lane volume of 1,600 vehicles per lane per hour. Using this maximum threshold value, the overall interchange traffic volumes were increased until the sum reached the maximum threshold. The percentage increase over current traffic levels was designated as the "Reserve Capacity" value for each interchange concept.

Because traffic may grow at different rates on I-285 and CCP, three different traffic growth-rate scenarios were considered to assess the sensitivity to varying increases in traffic from the freeway and the cross-street:

- The **Even Growth** scenario assumed that all traffic volumes from I-285 and CCP grew at the same rate;
- The **Heavy I-285 Growth** scenario assumed that the I-285 traffic grew at twice the rate as the CCP traffic; and

- The **Heavy CCP Growth** scenario assumed that the CCP traffic grew at twice the rate as the I-285 traffic.

The I-285 traffic was defined as any traffic volumes that entered and exited the interchange via the I-285 ramps. The CCP traffic was the through traffic only on CCP.

The results of this evaluation that are listed in the following table indicated that the interchange reserve capacity ranged from 15 percent (DDI Five Lanes/Heavy CCP Growth) to 82 percent (DDI Six Lanes/Heavy I-285 Growth). The DDI Five Lanes is comparable to the Modified DLT Interchange Six Lanes for all three growth scenarios. The DDI Six Lanes is comparable to the Partial DDI Seven Lanes for all three growth scenarios with the Partial DDI Seven Lanes slightly higher in the Even Growth and Heavy CCP Growth scenarios and the DDI Six Lanes slightly higher in the Heavy I-285 Growth scenario. These results are also displayed graphically in following Figure 4-6.

Using the Even Growth scenario, the DDI Six Lanes would add 22.5 percent more capacity than the DDI Five Lanes. This additional capacity would extend the lifespan of the interchange by 13.6 years or 20.4 years beyond the lifespan of the DDI Five Lanes, assuming annual average traffic growth rates of 1.5 percent and 1.0 percent, respectively. Using the Even Growth scenario, the Partial DDI Seven Lanes concept would add 25.6 percent more capacity than the DDI Five Lanes concept. The additional capacity from the Partial DDI Seven Lanes would extend the lifespan of the interchange by 15.3 years or 22.9 years assuming annual average growth rates of 1.5 percent and 1.0 percent, respectively.

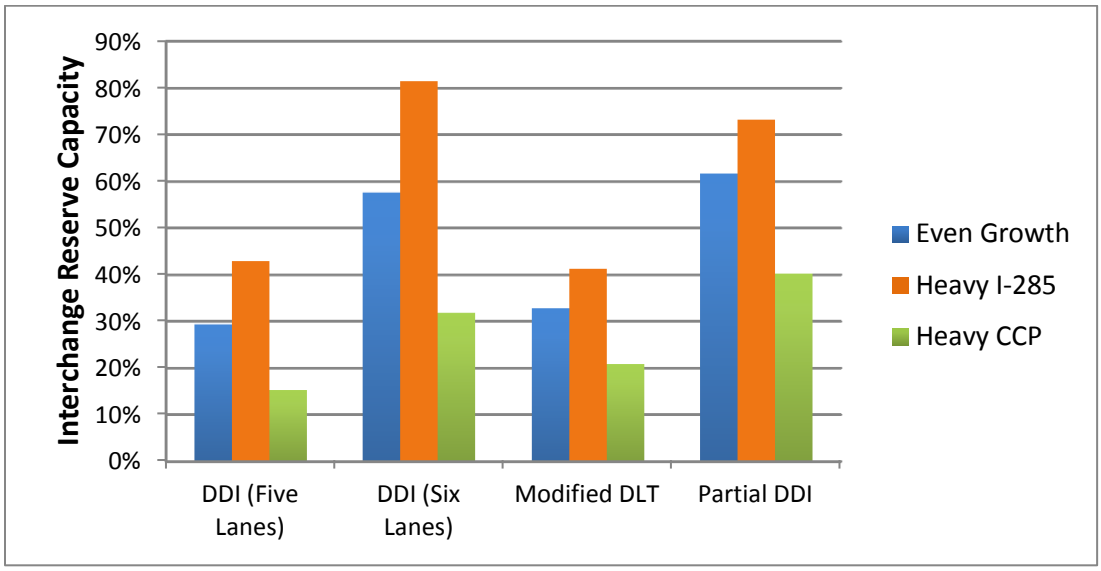
Table 4-6: Lifespan Comparison of Interchange Concepts

	Interchange Reserve Capacity			Increase in Lifespan beyond DDI Five Lanes for 1.0%/1.5% Annual Growth Rates (years)		
Interchange Concept	**Even Growth**	**Heavy I-285 Traffic**	**Heavy CCP Traffic**	**Even Growth**	**Heavy I-285 Traffic**	**Heavy CCP Traffic**
DDI Five Lanes	29%	43%	15%	0/0	0/0	0/0
DDI Six Lanes	58%	82%	32%	20.4/13.6	24.2/16.2	13.9/9.3
Modified DLT Interchange Six Lanes	33%	41%	21%	3.1/2.1	-1.4/-0.9	5.1/3.4
Partial DDI Seven Lanes	62%	73%	40%	22.9/15.3	19.1/12.8	19.8/13.2

Note: Negative increase in life span represented less reserved capacity than DDI Five Lanes.

Source: HNTB Corporation

Figure 4-6: Lifespan Comparison of Modification Concepts



Source: HNTB Corporation

4.5 SAFETY/DRIVER EXPECTATIONS

The safety/driver expectations criterion considered safety-related factors and driver expectancy factors. The safety related factors included:

- Number of crossing movements;
- Number of potential wrong-way maneuvers; and
- Potential for driver confusion.

The driver expectancy related factors included:

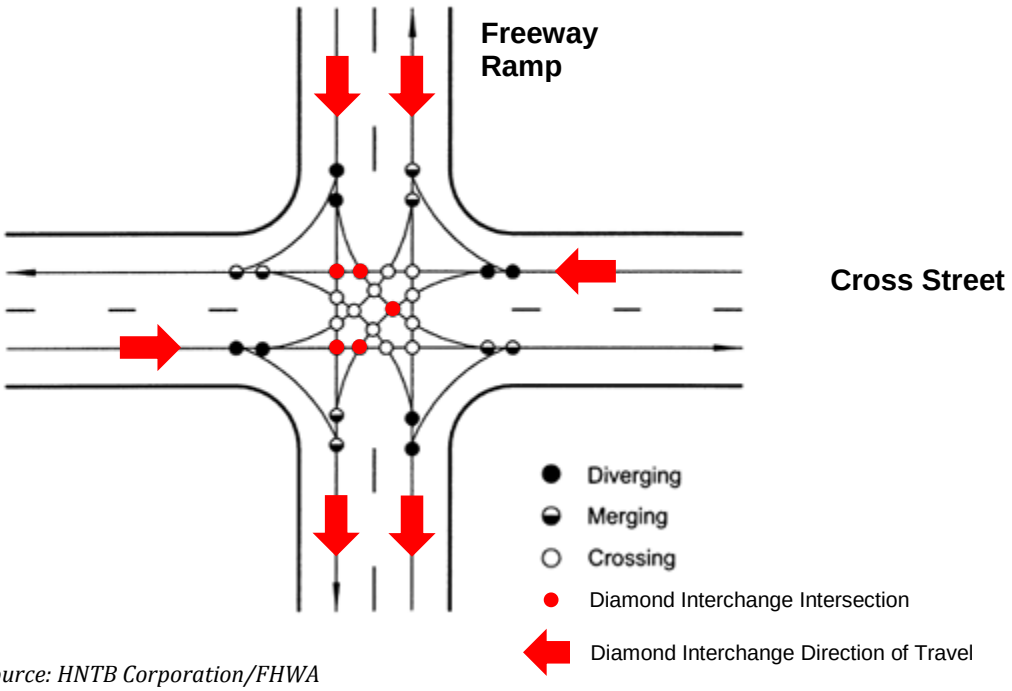
- The extent to which concepts differed from typical interchange configurations;
- Number of out-of-direction turns; and
- Driver familiarity with the interchange concept.

A typical at-grade intersection has 16 crossing points where individual movements cross each other and have the potential for right-angle accidents (Figure 4-7). Points where traffic movements are heading in the same direction and merging are not counted as crossing points because these types of side-swipe accidents are typically less severe (i.e., right-turn/through movement). A typical intersection of a two-way street and a one-way street (diamond interchange intersection) has five crossing points at each ramp terminal intersection. The crossing movements at a typical diamond interchange ramp terminal intersection with the freeway oriented in the north/south direction are:

1. Eastbound through/westbound left;
2. Eastbound through/southbound through;
3. Westbound through/southbound left;
4. Westbound through/southbound through; and

5. Westbound left/southbound left.

Figure 4-7: Typical Intersection Crossing Movements in a Diamond Interchange



Source: HNTB Corporation/FHWA

The DDI concepts have the least number of crossings (two) because these concepts merge all traffic into two streams that cross each other at the two ramp terminal intersections. The Modified DLT Interchange Six Lanes and the Partial DDI Seven Lanes concepts have the next lowest number of crossings (four) because both concepts eliminate the option for the ramp traffic to cross over the cross-street to re-enter the freeway in the same direction (Crossings #2 and #4) and eliminate the Crossing #5 at both ramp terminal intersections between the ramp left turns and the cross-street left turns.

The number of potential wrong-way maneuvers varies significantly among concepts. The standard diamond interchange has the following eight potential wrong-way maneuvers:

1. Eastbound left from cross-street onto southbound off-ramp;
2. Eastbound right from cross-street onto northbound off-ramp;
3. Westbound right from cross-street onto southbound off-ramp;
4. Westbound left from cross-street onto northbound off-ramp;
5. Southbound left from off-ramp to westbound lanes of cross-street;
6. Northbound left from off-ramp to eastbound lanes of cross-street;
7. Southbound right from off-ramp to eastbound lanes of cross-street; and
8. Northbound right from off-ramp to westbound lanes of cross -street.

All of the build alternatives have fewer number of potential wrong-way locations, because either the intersections have two one-way movements or the turning movements are offset to restrict the wrong-way maneuvers.

Potential for driver confusion is a function of requiring drivers to make out-of-direction maneuvers and not being able to see the path that will lead them to their ultimate destination. Two examples of out-of-direction maneuvers are the median U-turn in the Modified DLT Interchange Six Lanes concept and the two crossovers for through movements required by the DDI concepts. One example of obscured paths is the displaced left-turn movement in the Modified DLT Interchange Six Lanes concept. The standard diamond interchange has the lowest driver confusion potential, and the Modified DLT Interchange Six Lanes has the highest driver confusion potential.

The first driver expectancy factor is related to the extent a specific interchange differs from typical freeway arterial interchanges with the various versions of diamond interchanges being the most common and the cloverleaf interchange being the next most common. While all diamond interchanges require drivers to line up on the same side of the approach roadway that they plan to turn (inside for left-turning vehicles and outside for right-turning vehicles), some cloverleaf interchanges require left-turning vehicles to line up on the outside lanes, sometimes competing with the right-turning vehicles.

Figure 4-8,

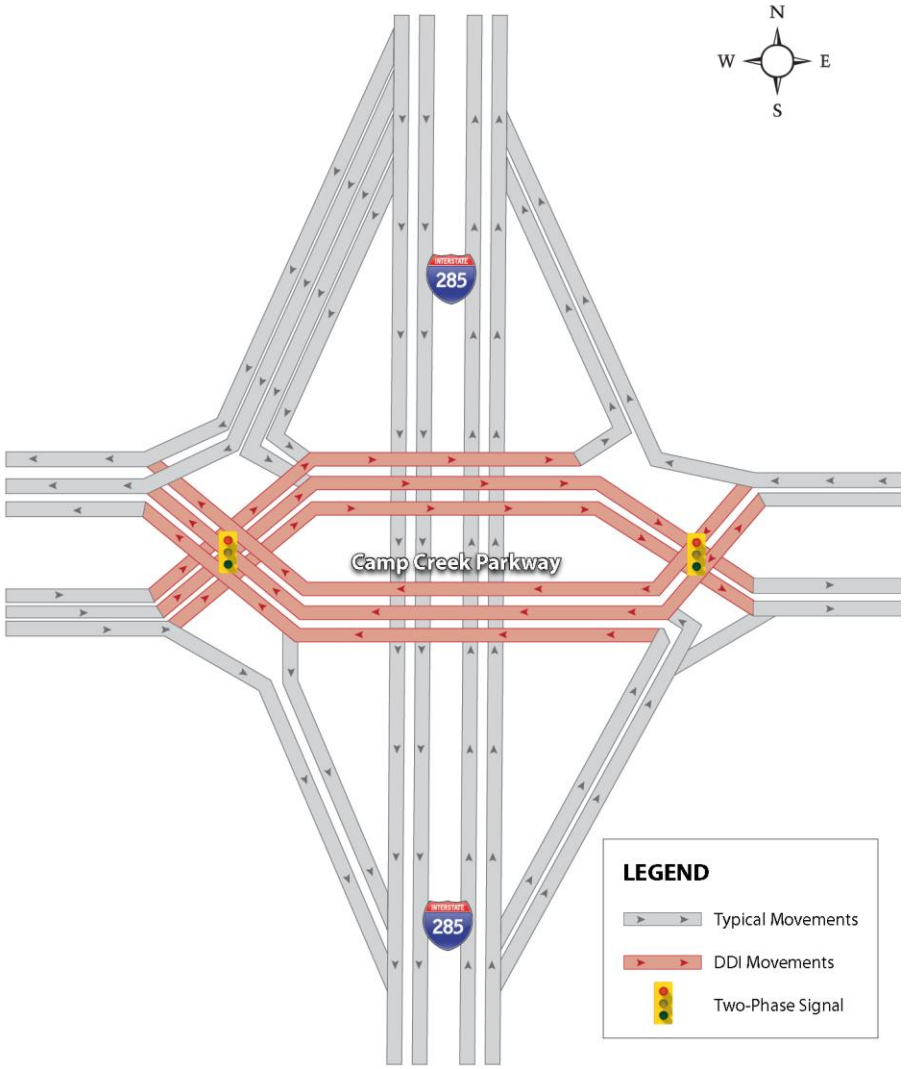
Figure 4-9 and Figure 4-10 illustrate the movements in the DDI, Partial DDI Seven Lanes and Modified DLT Interchange Six Lanes concepts that are different from a standard diamond interchange. The Partial DDI Seven Lanes exhibit illustrates how similar the concept is to a standard diamond interchange.

The only out-of-direction movements in the various build concepts are the median U-turn in the Modified DLT Interchange Six Lanes and the DDI crossovers. The DDI crossovers are not as much out of direction as the median U-turns.

Driver familiarity is related to how often local drivers encounter the types of interchanges being considered. With the introduction of the DDI concept at more new locations in the Atlanta area, more drivers are becoming familiar with their operations. Because neither the Partial DDI Seven Lanes nor the Modified DLT Interchange Six Lanes concepts have been implemented anywhere in the United States, their driver familiarity levels are low.

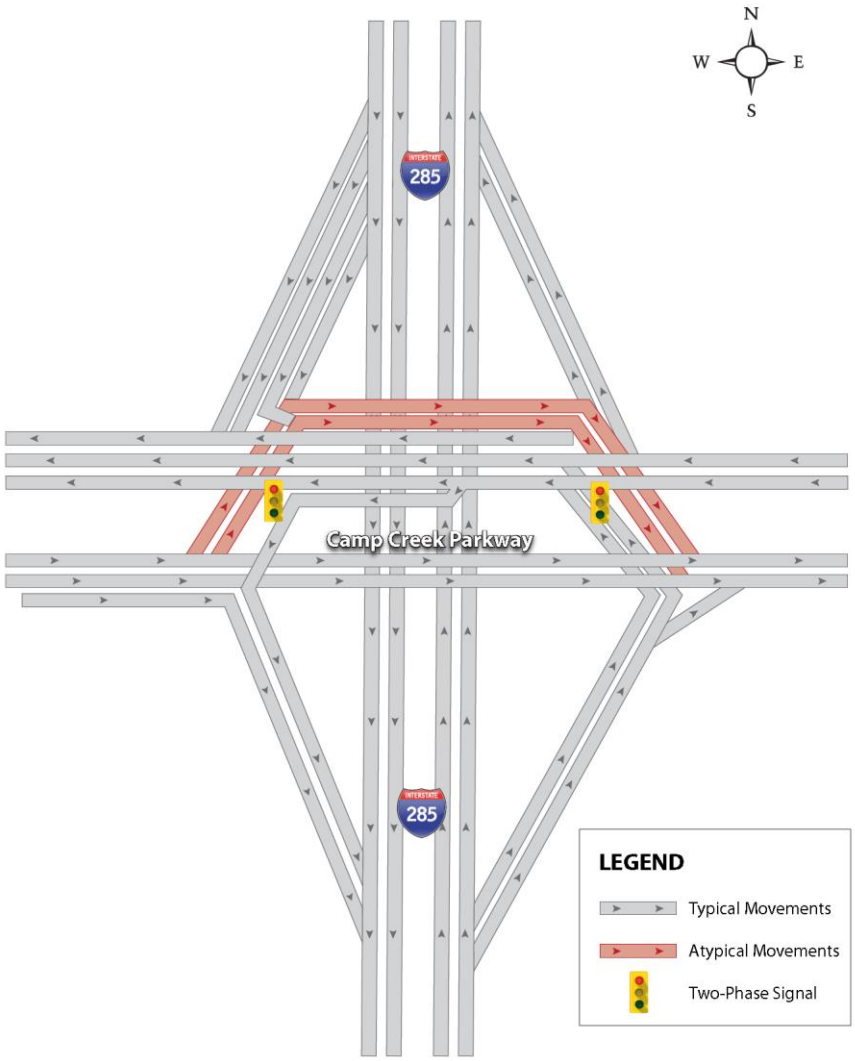
The results of the Safety and Driver Expectancy evaluation are summarized in Table 4-7.

Figure 4-8: Atypical Movements in a Diverging Diamond Interchange



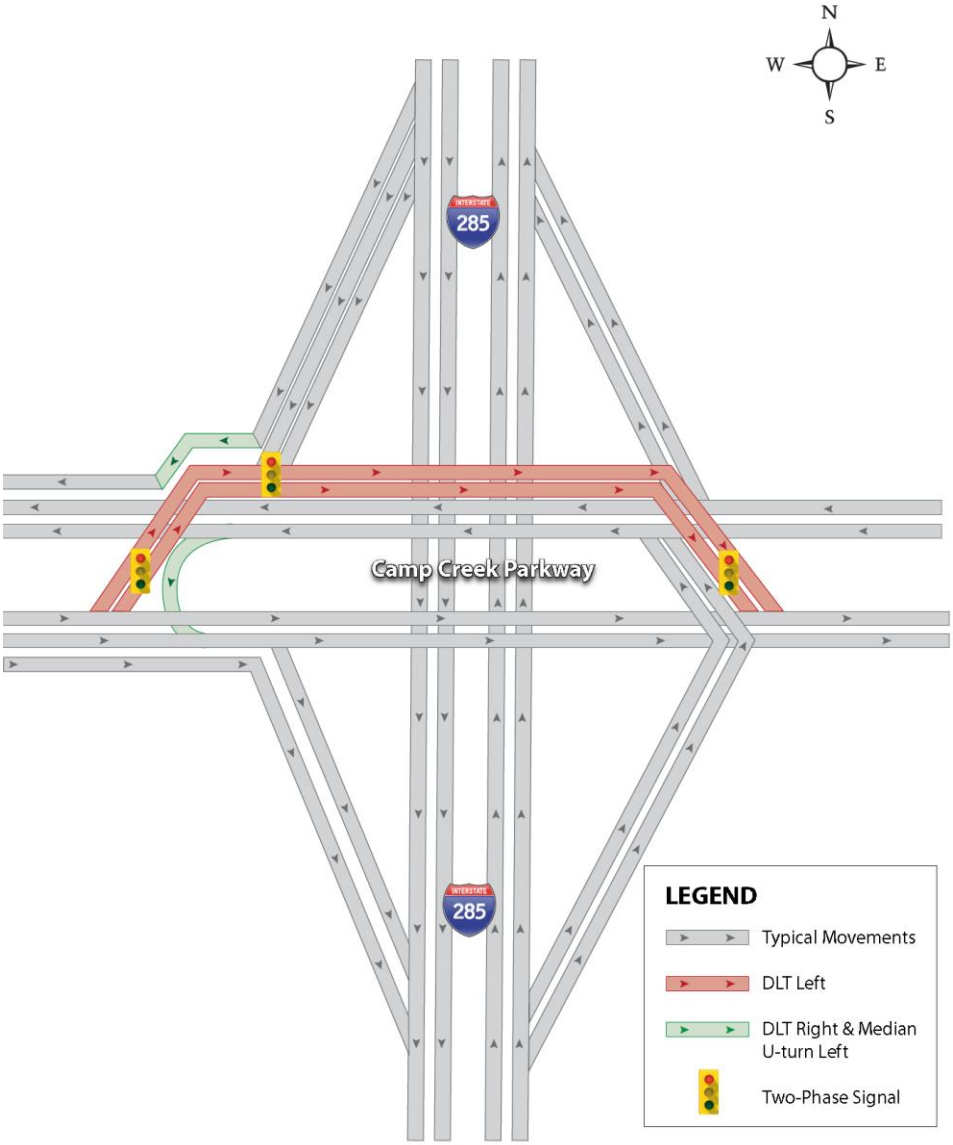
Source: HNTB Corporation

Figure 4-9: Atypical Movements in a Partial Diverging Diamond Interchange



Source: HNTB Corporation

Figure 4-10: Atypical Movements in a Modified Displaced Left-Turn Interchange



Source: HNTB Corporation

Table 4-7: Safety and Driver Expectations Comparison of Interchange Concepts

Interchange Concept	Safety			Driver Expectancy		
	# of Crossing Movement	# of Potential Wrong Way Maneuvers	Potential for Driver Confusion	Differ from Typical Interchanges	# of Out of Direction Turns	Driver Familiarity
Existing	10	8	Low	Low	0	High
DDI Five Lanes	2	6	Medium	High	2 (crossovers)	Medium
DDI Six Lanes	2	6	Medium	High	2 (crossovers)	Medium
Modified DLT Interchange Six Lanes	4	7	High	High	1 (U-turn)	Low
Partial DDI Seven Lanes	4	4	Medium	Medium	0	Low

Source: HNTB Corporation

4.6 CONSTRUCTABILITY

Maintenance of traffic would be the key issue related to constructability of these concepts. Even the costs are dictated by the design requirements to accommodate traffic needs. Two potential traffic maintenance scenarios are available to the designer. The first scenario is where an existing operational lane may be taken out of service for an extended period of time, and the second is where closing an operational lane in this manner would be unacceptable. As developed and presented in this technical report, both DDI concepts would require the closure of one existing lane during construction, while the Partial DDI Seven Lanes and Modified DLT Interchange Six Lanes concepts would not require lane closures for extended durations.

For this project, as traffic disruption increases, the cost to construct the concept decreases and vice versa. There are designs that would allow the DDI concepts to be constructed without closing an existing traffic lane; however, a parallel bridge would be required, thereby increasing the overall cost to construct the concept. Similarly, the Partial DDI Seven Lanes and Modified DLT Interchange Six Lanes concepts could be constructed more inexpensively by widening the existing bridge but would require a traffic lane to be taken out of service while doing so. Given the existing traffic volumes, taking any operational lanes out of service for an extended timeframe during construction does not seem viable.

Widening to the north of the existing roadway appeared to be the preferred option. Any widening to the south would require more substantial shifts to the existing lanes to ensure alignment continuity (more severe right-of-way impacts). It should be noted that the Modified DLT Interchange Six Lanes concept allows for a more simple future widening to the south of the existing

bridge if traffic patterns change. The constructability issues related to all of the alternatives are summarized in Table 5-8. Further detail on constructability issues for each concept are provided below.

4.6.1 Diverging Diamond Interchange Five Lanes

No bridge widening would be required; however, at some point the new median would need to be constructed to run down the middle of the bridge. While there are ways to minimize the duration of the impacts, an operational lane would need to be closed during construction of this median.

4.6.2 Diverging Diamond Interchange Six Lanes

With the DDI Six Lanes, the three lanes traveling in one direction must remain adjacent to each other. This could be accommodated in two ways: with a parallel bridge designed to carry all three lanes or with a widening and deck slab closure pour. The cost estimate provided assumes the latter, since the parallel bridge appeared cost prohibitive at the time. To do this, a portion of the existing deck slab must be removed and traffic could not be operational beyond the next adjacent longitudinal girder. For this specific bridge, the girder is located in the middle of the outside lane of traffic, and it would require that it be closed for the duration of bridge construction. Asphalt overlay work and the redesign of the two intersections would have the same level of impacts in all concepts. Such work could be completed during off-peak hours.

4.6.3 Modified Displaced Left-Turn Interchange Six Lanes and Partial Diverging Diamond Interchange Seven Lanes

Given the layout of these concepts, the two displaced left-turn lanes could be isolated on a separate bridge, leaving the existing bridge (with barrier) entirely intact. While a widening option is possible, at the time the design and cost estimate were developed, it was decided that the removal of one lane of existing operational traffic was unacceptable. Also, the parallel bridge would be limited in width and would allow for better isolation of the contraflow lanes. With the exception of the asphalt overlay work and the redesign of the two intersections, most of the construction for this concept would be outside the limits of the existing operational lanes. Any of the remaining work within the limits of the existing operational lanes could be completed during off-peak hours.

Table 4-8: Constructability Comparison of Interchange Concepts

Interchange Concept	Constructability			Construction Duration
	Long-Term Lane Closures	Short-Term Lane Closures	Bridge Construction Method	
DDI Five Lanes	No	Yes	N/A	18 months
DDI Six Lanes	Yes	Yes	Widen existing bridge on north side	24 months
Modified DLT Interchange Six Lanes	No	Yes	New bridge on north side	24 months
Partial DDI Seven Lanes	No	Yes	New bridge on north side	24 months

4.7 BENEFIT/COST RATIO

The benefit/cost criterion was based primarily on the calculated benefit/cost ratio. The user benefits included travel time savings related to reduction in vehicular delay (autos and commercial vehicles) and operating costs/fuel savings.

The B/C calculations used the travel time savings taken from the CORSIM simulation model results for network-wide total delay. CORSIM models were developed to estimate travel time savings for the AM and PM peak hours for the Opening Year (2016) and the Design Year (2036). The values for the AM and PM peak hours were summed together then multiplied by 3.5, because CCP is typically congested for seven hours per day. These numbers represented the average daily travel time savings in the Opening Year and the Design Year.

The travel time savings for the interim years between the Opening and Design Years were estimated based on a straight line interpolation between these two years.

The cost component only considered the initial implementation costs.

The following parameters were assumed in the B/C calculations:

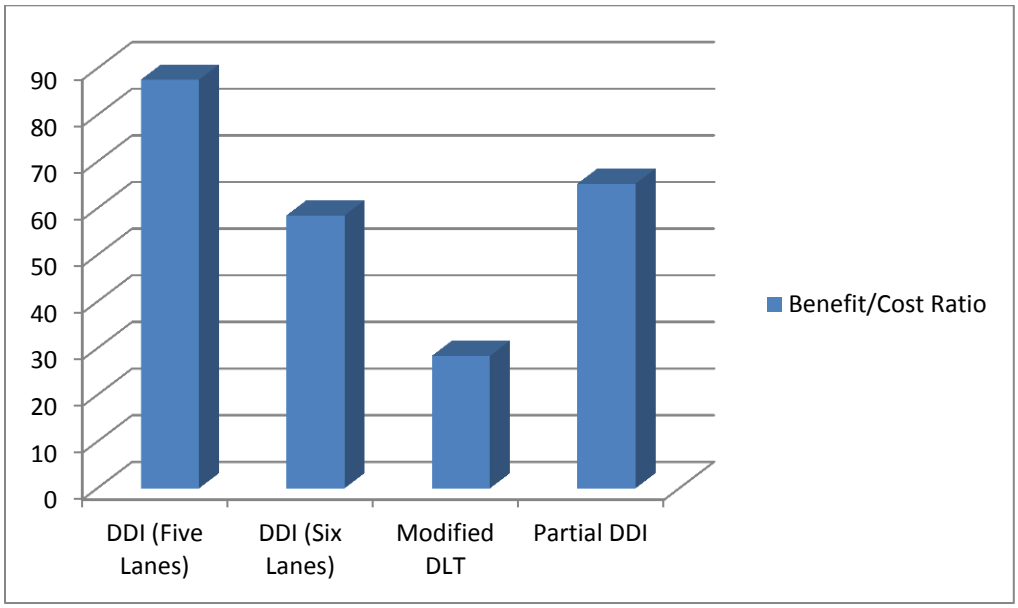
- Inflation = 2.5 percent
- Discount Rate = 5.5 percent
- Annual Growth Rate of Value of Time = 2.5 percent
- Project Life = 20 years
- Truck Percentage = 9 percent

Table 4-9: Benefit/Cost Ratio Comparison of Interchange Concepts

Interchange Concept	Present Value of Construction Cost	Annual Benefits in Opening Year	Present Value of User Benefits in Opening Year	Benefit/Cost Ratio
DDI Five Lanes	$3.4 M	$16.0 M	$295 M	87.6
DDI Six Lanes	$8.8 M	$18.4 M	$513 M	58.5
Modified DLT Interchange Six Lanes	$13.9 M	$19.3 M	$395 M	28.4
Partial DDI Seven Lanes	$8.0 M	$20.5 M	$522 M	65.3

Source: HNTB Corporation

Figure 4-11: Benefit/Cost Ratio Comparison of Interchange Concepts



Source: HNTB Corporation

The present value of construction cost, opening year benefits and the present value of benefits over the 20-year life of the project were included in the Benefit/Cost ratios for all the proposed interchange concepts. The DDI Five Lanes had the highest benefit/cost ratio at 87.6 primarily due to its low construction cost; however, it also had the lowest benefits at $295 Million. The Partial DDI Seven Lanes and DDI Six Lanes were in the next group of benefit/cost ratios at 65.3 and 58.5, respectively. These two alternatives also had similar benefits at $522 million and $513 million, respectively. These benefits are more than $218 million more than the DDI Five Lanes. The lowest benefit/cost ratio was 28.4 for the Modified DLT Interchange Six Lanes concept.

4.8 COMPARISON SUMMARY

The selection of the preferred concepts to carry into the next level of evaluation should consider all the factors from traffic operations to benefit/cost ratios. Table 5-10 summarizes the key selection criteria that will be used to make a final recommendation.

Table 4-10: Selection Criteria Summary

	DDI Five Lanes	DDI Six Lanes	Modified DLT Interchange Six Lanes	Partial DDI Seven Lanes
Project Costs	$3.4M	$8.8M	$13.9M	$8.0M
Right-of-way* (SY)	0	1.200	3,800	1,800
Traffic Operations – Opening Year Delay AM+PM (hours)	331	282	265	241
Traffic Operations – Design Year Delay AM+PM (hours)	1,029	484	834	509
Interchange Reserve Capacity/ Increase of Lifespan	29%/0 yr.	58%/21 yrs.	33%/3 yrs.	62%/23 yrs.
Safety – # of Crossing Movement	8	8	6	6
Driver Expectancy – Differ from Typical Interchange	High	High	High	Medium
Constructability	Good	Poor	Fair	Good
Benefit/Cost Ratio	87.6	58.5	28.4	65.3

*Note: No displacment required for any concept.

Source: HNTB Corporation

5 RECOMMENDATIONS AND NEXT STEPS

5.1 RECOMMENDATIONS

The order of HNTB's preference of interchange concepts are as follows:

1. Partial DDI Seven Lanes
2. DDI Six Lanes
3. DDI Five Lanes
4. Modified DLT Interchange Six Lanes

The primary reasons why the Partial DDI Seven Lanes is given the highest preference are:

- It would provide the longest lifespan (up to 23 years beyond DDI Five Lanes);
- It would operate with the lowest Opening Year delay and second lowest Design Year delay; and
- It has the second lowest cost ($8 million), highest benefits ($522 million) and second highest benefit/cost ratio (65).

Even though the Partial DDI Seven Lanes was given the highest preference, the DDI Six Lanes would have benefits similar to the Partial DDI Seven Lanes and would be an acceptable alternative to the Partial DDI Seven Lanes. The DDI Six Lanes concept would have the lowest Design Year delay (5 percent less than Partial DDI Seven Lanes concept). Its lifespan is almost as long as the Partial DDI Seven Lanes concept (21 years versus 23 years). The DDI Six Lanes concept would have the second lowest right-of-way requirements (33 percent less than Partial DDI Seven Lanes).

5.2 NEXT STEPS

GDOT should decide whether to select a single interchange concept or multiple interchange concepts to carry into the next level of planning and design. The alternative(s) that are selected for further evaluation need to be analyzed by GDOT's Office of Program Delivery with design traffic volumes that consider the current and future latent demands at this interchange. The planned improvements at North Commerce Drive and CCP should be incorporated into the interchange project.

Metro Atlanta OPS

OPERATIONAL PLANNING STUDY

Appendix C-3

WINDSHIELD SURVEYS

November 2014

PREPARED FOR

Georgia Department of Transportation

PREPARED BY

HNTB Corporation

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Roadway Geometry Field Inspection - Technical Memo for Metro Atlanta Operations Study

As part of the Metro Atlanta Operations Study, HNTB was tasked with exploring the interstates and limited access highways in the Metro Atlanta area to better understand the physical constraints of the current highway network. The goal was to determine how the existing pavement could be used even more efficiently without converting currently operating general purpose and managed (HOV) lanes in the peak direction into toll lanes. During the process the inspection team was required to keep in mind that each section where a change was proposed must contain logical termini. While there are short locations that could deploy any of the proposed options, without connecting to two points with major traffic drop-offs, the proposed solution would simply shift the problem.

The following corridors were inspected:

- SR 400 (to McFarland Pkwy.)
- I-20 (from Post Rd. to Salem Rd.)
- I-75 (from I-675 to Canton Rd.)
- I-85 (Sullivan Rd. to Hamilton Mill Rd.)
- I-285 (clockwise from I-85 N. to I-75 N.)
- I-675
- I-985 (to Buford Dr.)
- Langford Parkway
- Peachtree Industrial Boulevard
- SR 316 (to Loganville Hwy.)
- Stone Mountain Highway (to E. Park Place Blvd.)
- Downtown Connector

Using a camera mounted on top of a car, a wide angle shot was taken to cover the shoulder(s) as well as nearby lanes. When the roadway was wider than three lanes the area had to be driven twice to properly document both inside and outside shoulder widths. This video was then used to take screen captures at bridges or other potential narrow points and also confirm any field data collected. While driving the corridors a team member in the passenger seat would take notes on the following conditions, later to be compared with the video for accuracy:

- Number of general purpose lanes
- Number of managed/HOV lanes
- General purpose lane width
- Managed/HOV lane width
- Inside shoulder width
- Outside shoulder width
- Travel lane material
- Shoulder material
- Median width
- Auxiliary lane additions
- Light pole locations
- Miscellaneous unique items of interest

Inside shoulders were already minimized in most locations. The few areas that appeared wider were at tight horizontal curve locations where stopping sight distance around the barrier controlled the required width of the inside shoulder. Lane widths were found to have been minimized to 11 feet or less in most locations within the Metro Atlanta Area. At a few locations toward the outside limits of study (suburban Atlanta) lane widths of 12 feet still exist and can be reduced to 11 feet if warranted. Frequently, the outside shoulder was the only available location to expand without involving a major construction

project (increased expense and right-of-way needs). This made bridge spans and widths critical as discussed further below.

Bridges were the most common physical constraint along corridors and could both increase the cost and delay the immediate implementation of strategies along a specific corridor. In some cases the volume of traffic crossing the existing bridge may even prevent a simple, cost effective replacement. Bridges are also often surrounded by ramps with geometric complications at gores, elevations/grade differences requiring retaining walls, unique drainage patterns, etc. all of which would potentially need to be modified. The following specific information was collected at each bridge and interchange:

- Shoulder narrowing at the bridge
- Name of cross street
- Over or under pass
- Severe ramp/gore cross slope

The most common issue noted were narrow shoulders under older bridges. These vary in size and volume of traffic carried, requiring that each location be individually studied for a preferred solution. Where the problematic bridge crosses over the existing expressway the only apparent solution is full bridge replacement. Bridges supporting expressway traffic would simply require widening. In some locations, the bridge replacement could prove to be the fatal flaw since the road being carried is very congested with limited right-of-way at each abutment to allow an easy alignment shift for replacement.

Options to use off-peak lanes are also being studied as part of this task. Accomplishing this goal requires that traffic pass through the existing median barrier at ingress/egress points. It was assumed that overhead signs could be relocated and drainage inlets could be modified to carry cyclic traffic loading at these points. This leaves three items of importance to be noted during the field inspection:

- Bridge columns
- Street lighting
- Elevations differences between the two sides of the expressway

The final item of importance was pavement type and quality. While notes were taken concerning the existing traveled way, the focus was on the shoulders as this was the location that would be carrying non-typical loading with any of the options proposed. Asphalt shoulders were assumed to be partial depth and require full replacement. Concrete shoulders were assumed to be full depth pavement, requiring only restriping and/or widening as required.

Some miscellaneous items of noted importance were also documented. These included:

- Locations where ramps could be shortened to eliminate a narrowing of the shoulder under an existing bridge.
- Auxiliary lanes that could be changed to through lanes with merge ramps.
- Median widths were a center median of substantial width still exists.

<u>I-20 “West” from Post Road to Riverside Parkway:</u>

- **Recommendation – Widen to median**
- Pavement is mixture of asphalt and concrete
- Existing lanes are 12'
- Outside shoulder varies 8' to 10'
- Inside shoulder is 6'
- Shoulder use not recommend – money spent would be better spent widening to the median
- Squeeze points at Thornton OH (minor) and Factory Shoals OH (should be able to use additional spans to the outside of the bents) **(2)**

I-20 "West" from Riverside Parkway to I-285:

- **Recommendation - Use peak hour shoulder lane**
- Pavement is all asphalt
- Outside shoulder will likely need to be replaced to full depth
- Reduce lane widths to 11' (outside lane to remain at 12' for trucks)
- Outside shoulder varies 8 to 12'
- Inside shoulder varies 4' to 6'
- Custom sign and stripe shoulder for use during peak hours
- Squeeze point at Fairburn Rd (should be able to shift entrance ramp) **(1)**

I-20 "West" from I-285 to Connector:

- **Recommendation - None**
- Pavement is mixture of asphalt and concrete
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Existing lanes are 12'
- Outside shoulder is 8'
- Inside shoulder is 4'
- Squeeze points at I-285 OH bridges, Fairburn OH, Hamilton Holmes UP, Fairfield UP, Anderson UP, MLK Jr. UP, West Lake UP, Westview OH, Langhorn UP, Lawton UP, Lucile UP, Joseph Lowery UP, Lee OH, West Whitehall UP, Murphy UP and Northside UP **(14)**

I-20 "East" from Connector to I-285:

- **Recommendation - Use peak hour shoulder lane**
- Pavement is all concrete
- Lane widths to remain at 12'
- Reduce inside shoulder to 4' from 8' and shift all lane lines
- Custom sign and stripe shoulder for use during peak hours
- Squeeze point under I-285 OH bridges (likely not a concern since thru-traffic volumes under the bridge might be low enough that the peak hour lane is not required) **(2)**

I-20 "East" from I-285 to Salem Road:

- **Recommendation - Use peak hour shoulder lane**
- Pavement is all asphalt
- Outside shoulder will likely need to be replaced to full depth and widened 2' (adequate space exists to do so within the existing R/W)
- Reduce lane widths to 11' (outside lane to remain at 12' for trucks)
- Inside shoulder width to remain at 4' ±
- Custom sign and stripe shoulder for use during peak hours
- Squeeze points under Miller Road OH and West Avenue OH bridges (both are small two lane bridges that will need to be replaced to accommodate the width of roadway required) **(2)**

Langford Parkway from I-285 to Connector:

- **Recommendation - None**
- Existing lanes are already 11'
- Outside shoulder is 8' maximum
- Inside shoulder varies from 4' to 12', however, locations with 12' shoulder width are for sight distance related issues and cannot be reduced
- Multiple squeeze points at UP bridges

Stone Mountain Freeway from Lawrenceville Highway to East Park Place Boulevard:

- **Recommendation – Remove traffic signal at Lawrenceville Highway**
- Traffic constraint appears to be the traffic signal at Lawrenceville Highway, not the lane capacity. Suggest rerouting mall traffic through Druid Hills Road entrance and removing traffic signal at Lawrenceville Highway.
- Median reversible lane use not recommend – too short and the traffic has nowhere to go upon entering Lawrenceville Highway and the existing section becomes too narrow north of the Stone Mountain Park entrance
- Shoulder use not recommended – too many ramps interfere and the traffic has nowhere to go upon entering Lawrenceville Highway and the existing section becomes too narrow north of the Stone Mountain Park entrance
- Adequate median is available to install a reversible lane if desired but the existing section becomes too narrow north of the Stone Mountain Park entrance
- Shoulder use is available if desired but the existing section becomes too narrow north of the Stone Mountain Park entrance
- Outside shoulder will likely need to be replaced to full depth and widened 2' (adequate space exists to do so within the existing R/W)
- Maintain existing lane width (12') and inside shoulder width (varies 4' to 12')
- Squeeze point under I-285 OH bridge, South Fork Peachtree Creek, Silver Hill Rd, and Jefferson Davis Dr **(4)**

Peachtree Industrial Boulevard from I-285 to Peachtree Parkway:

- **Recommendation - None**
- There is not enough existing pavement to do anything
- Existing lanes are 12'
- Outside shoulder is 6'
- Inside shoulder is 4'
- Squeeze points – all UP bridges are too narrow

I-985 from I-85 to SR 20/Buford Drive:

- **Recommendation – Widen to median**
- Pavement is concrete lanes with asphalt shoulders
- Existing lanes are 12'
- Outside shoulder is 8'
- Inside shoulder is 4'
- Shoulder use not recommend – the cost to replace and widen the outside shoulder would be better spent widening to the median
- I-985 SB added lane logical termini problems – might need to extend to SR 317/Lawrenceville Highway along I-85 with limited R/W
- Squeeze point at Ivy Creek UP bridges **(1)**

I-675 from I-75 to I-285:

- **Recommendation – Widen to median**
- Pavement is all concrete
- Existing lanes are 12'
- Outside shoulder is 10'
- Inside shoulder is 8'
- Shoulder use not recommend – money spent would be better spent widening to the median
- There will be logical lane termini issues at the two ends – both I-285 and I-75 have limited space to add the traffic arriving in the additional travel lane(s) if proposed **(2)**

I-575 from Sixes Road to I-75:

- **Recommendation – See Northwest Corridor**

I-75 "North" from Wade Green to I-575:

- **Recommendation – See Northwest Corridor**

I-75 "North" from I-575 to I-285:

- **Recommendation – See Northwest Corridor**

I-75 "North" from I-285 to Connector:

- **Recommendation – No Change**
- Pavement is all asphalt
- Outside shoulder will likely need to be replaced to full depth
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Lane widths have already been minimized
- Squeeze points at RR Crossing UP, Northside Dr OH, and Howell Mill Rd OH **(3)**

I-75/I-85 Connector:

- **Recommendation – None**
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Lane widths have already been minimized

I-75 "South" from Connector to I-285:

- **Recommendation – No Change**
- Pavement is all asphalt
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Lane widths have already been minimized
- Squeeze points at N Central Ave OH, RR Crossing OH, Old Dixie Hwy OH, and Charles W Grant Pkwy OH **(4)**

I-75 "South" from I-285 to I-675:

- **Recommendation – No Change**
- Pavement is mixture of asphalt and concrete (with asphalt shoulders)
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Lane widths have already been minimized
- Squeeze points at Forest Pkwy OH, Forest Pkwy Ramp OH, Upper Riverdale Ramp OH, and Old Dixie Hwy OH **(4)**

I-285 "West" from I-75 to I-20 (Including Interchange):

- **Recommendation – Use peak hour shoulder lane**
- Pavement is mixture of asphalt and concrete (with asphalt shoulders)
- Outside shoulder will likely need to be replaced to full depth and widened 2' (adequate space exists to do so within the existing R/W)

- Lanes are already reduced to 11'
- Outside shoulder varies from 6' to 10'
- Inside shoulder varies from 2' to 4'
- Squeeze points at Church RD UP, the RR Crossing UP (North of Church Rd), and I-20 Interchange **(5)**

I-285 "West" from I-20 to I-85 (Including Interchange):

- **Recommendation – Use peak hour shoulder lane**
- Pavement is all concrete
- Lanes are already reduced to 11'
- Outside shoulder varies from 8' to 10'
- Inside shoulder varies from 2' to 4'
- Squeeze points at Camp Creek Bridge UP and Washington Rd OH
- The I-85 Ramps could have potential sight distance issues if a managed lane is added through interchange **(3)**

I-285 "South" from I-85 to I-75 (Including Interchange):

- **Recommendation – Use peak hour shoulder lane**
- Pavement is a mixture of asphalt and concrete (with mostly asphalt shoulders)
- Outside shoulder will likely need to be replaced to full depth and widened 2' (adequate space exists to do so within the existing R/W)
- Lanes are already reduced to 11'
- Outside shoulder varies from 8' to 20+'
- Inside shoulder varies from 2' to 6'
- No squeeze points in this location

I-285 "East" from I-75 to I-675 (Including Interchange):

- **Recommendation – Use peak hour shoulder lane**
- Pavement is all asphalt
- Outside shoulder will likely need to be replaced to full depth and widened 2' (adequate space exists to do so within the existing R/W)
- Lanes are already reduced to 11'
- Outside shoulder varies from 8' to 10'
- Inside shoulder varies from 2' to 6'
- No squeeze points at this location

I-285 "East" from I-675 to I-20 (Including Interchange):

- **Recommendation – Use peak hour shoulder lane**
- Pavement is all asphalt

- Outside shoulder will likely need to be replaced to full depth and widened 2' (adequate space exists to do so within the existing R/W)
- Lanes are already reduced to 11'
- Outside shoulder varies from 6' to 10'
- Inside shoulder varies from 2' to 6'
- Squeeze point at Panthersville Rd OH (shorten onramp to eliminate problem) **(1)**

I-285 "East" from I-20 to Stone Mountain Freeway:

- **Recommendation – Use peak hour shoulder lane**
- Pavement is all concrete
- Lanes already reduced to 11'
- Outside shoulder varies from 8' to 10'
- Inside shoulder varies from 2' to 6'
- Squeeze points at Redwing Cir and Covington Hwy **(2)**

I-285 "North" from Stone Mountain Freeway to I-75:

- **Recommendation – See Revive I-285**

I-85 "South" from Connector to I-285:

- **Recommendation – No Change**
- Pavement is all concrete with concrete shoulders
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Lane widths have already been minimized
- Squeeze points at Cofield Dr OH, Sylvan Rd OH, and NS Railroad OH **(3)**

I-85 "North" from Connector to I-285:

- **Recommendation – No Change**
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Lane widths have already been minimized

I-85 "North" from I-285 to I-985:

- **Recommendation – No Change**
- HOT lane already in operation

I-85 "North" from I-985 to Hamilton Mill Rd:

- **Recommendation – See I-85 Managed Lane Project**

SR 316 from I-85 to Collins Hill Rd:

- **Recommendation – No Change**
- There is not enough existing pavement to do anything and the existing shoulders are often up against steep slopes, retaining walls and concrete barriers
- Squeeze points at Herington Rd OH, Wolf Creek Bridge UP, Duluth Hwy 120, and Bridge UP **(4)**

SR 316 from Collins Hill Rd to Loganville Hwy:

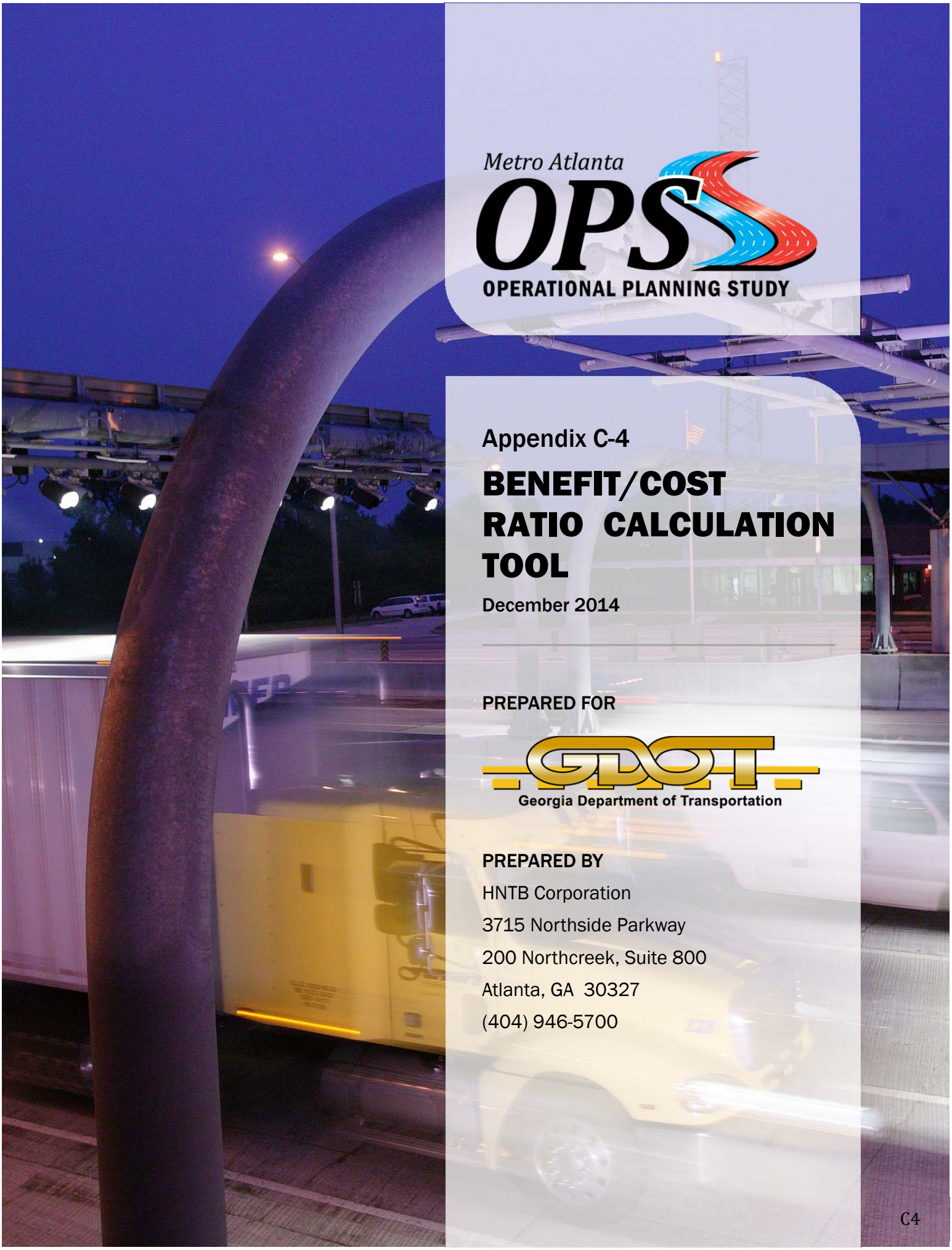
- **Recommendation – No Change**
- It would be best if all intersections were grade separated to create an expressway.
- A managed lane with traffic signals is not recommended since no matter where the lane is placed (outside edge or in the median) it will interfere with turn lanes at intersections.
- Squeeze points at Crossing UP, and Apalachee River Bridge UP **(2)**

GA 400 from I-85 to I-285

- **Recommendation – No Change**
- Pavement is all asphalt
- Outside shoulder will likely need to be replaced to full depth.
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers
- Lane widths have already been minimized
- Squeeze points at Peachtree Rd OH, Glenridge Conn OH, Johnson Ferry Rd OH, GA 400 Ramp UP, and I-285 UP **(5)**

GA 400 from I-285 to Mcfarland Rd:

- **Recommendation – No Change**
- There is not enough existing pavement to do anything and the existing shoulders are often up against retaining walls and concrete barriers



Metro Atlanta OPS

OPERATIONAL PLANNING STUDY

Appendix C-4

BENEFIT/COST RATIO CALCULATION TOOL

December 2014

PREPARED FOR

Georgia Department of Transportation

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1 INTRODUCTION

The purpose of this technical memorandum is to document the methodology and assumptions used to develop the benefit/cost (B/C) ratio calculation tool. This Excel-based tool was developed for the OPS in order to calculate B/C ratios for operational projects, as GDOT's standard B/C tool does not currently calculate B/C ratios for these types of projects. The B/C ratio for each project was then input into the project prioritization tool as one of the criteria used to prioritize projects. As anticipated, given the lower costs of these types of operational projects, the B/C ratios are typically much higher than typical major capacity projects.

2 BENEFIT/COST RATIO METHODOLOGY

This section describes the methodology used to estimate the Benefit/Cost (B/C) Ratio for the improvement projects. The benefits are assumed to accrue for a period of 20 years, which is typically used to represent the design life of a project. The monetized values of the benefits are estimated in each year of the project life and converted to the Net Present Value (NPV) in the opening year of the project. Given the nature of operational projects, the costs considered are capital costs only (excludes operations and maintenance) and are assumed to occur before the opening year. The B/C ratio was estimated using the following equation:

$$Benefit/Cost = \left(\frac{NPV\ of\ total\ benefits\ in\ the\ opening\ year}{NPV\ of\ total\ cost\ in\ the\ opening\ year}\right)$$

The section below discusses the step-by-step process used to estimate the user benefits from the available and collected data and to convert them into the Net Present Value in the opening year. The subsequent section focuses on the capital costs. However, the methodology for developing the capital costs are discussed in Chapter 6 and the individual cost estimation sheets can be found in Appendix F.

2.1 USER BENEFITS ESTIMATION

Two types of user benefits were considered, when comparing the benefits against the No-Build Scenario to the Build Scenario (project in place):

- Benefits from the travel time savings
- Benefits from the savings in the operating cost of the vehicle

The estimation for both the benefits is achieved through the following broad steps:

1. **AM and PM Travel Time Savings:** The travel time savings were estimated for the AM and the PM peak hours in the opening year of the project, and if possible in the design year
2. **Daily Travel Time Savings:** The time savings were converted to the daily savings and estimated for all years of the project life
3. **Daily Travel Time Benefits:** The daily time savings were monetized using the dollar value of time (VOT) of the respective vehicle types, such as cars and trucks

4. **Daily Operating Cost Savings:** Based on the daily savings in the travel time, the daily operating cost savings were estimated
5. **Total Annual Benefits:** The total benefits from the travel time savings and operating cost savings were converted to annual benefits in each year
6. **NPV of Benefits in the Opening Year:** The total benefits during the project duration were converted to NPV of benefits in the opening year

Details on how each of the steps above were accomplished, as well as the equations and parameters used, are described below.

2.1.1 AM and PM Travel Time Savings

The AM and the PM peak hour travel time savings were estimated for all the vehicles in the project influence area in the opening year and if possible, in the design year. This was done using software packages, such as Highway Capacity Software (HCS), Synchro, VISSIM and CORSIM, depending on which tool was best suited to a particular operational project.

2.1.2 Daily Travel Time Savings

The AM and PM travel time savings were converted to daily travel time savings. A conservative approach was used and it was assumed that the daily savings occur only in the hours of congestion. The following equation was used:

$$Daily\ savings\ =\ (Daily\ congestion\ hours/2)\ \times (AM\ savings\ +\ PM\ savings)$$

The daily hours of congestion were based on the TomTom GPS and NaviGAtor data for the project area. The daily travel time savings were estimated for both the opening year and the design year. For intermediate years, the benefits were linearly interpolated. In case the savings were not available for the design year, they were estimated for intermediate years by assuming a growth rate similar to the traffic growth, which was projected to be 1% per year for the study area. The total daily travel time savings were then estimated for the cars and trucks individually, using the observed truck percentage in the study area.

2.1.3 Daily Travel Time Benefits

The daily travel time savings were converted to daily travel time benefits for the cars and trucks, using their respective dollar value of time (VOT), as shown in the equation below:

$$B_{weekday} = Travel\ Time\ Saved(hr) \times VOT\left(\frac{\$}{hr}\right)$$

where:

B = Travel time benefits

The VOT for cars and trucks for the Year 2005 are shown in Table 1. For each year during the project life, the VOT was estimated by assuming a growth rate equivalent to inflation (shown in **Table 1**).

Table 1: Values of Parameters Used in Travel Time and Operating Cost Benefits

Variable	Value	Source
a	0.10	AASHTO
b	10	AASHTO
Annual Growth Rate of Traffic	1%	Observed
Annual Growth Rate of Value of Time	2.5%	Same as inflation
Inflation	2.5%	Bureau of Labor Statistics (BLS): 10 year average Consumer Price Index (CPI) (2003-2013)
Discount rate	5.5%	AASHTO
Fuel Cost/ gallon ($)	3.47	AAA Daily Fuel Gauge Report for Georgia: August 28, 2013
Year of value of time (VOT)	2005	Texas Transportation Institute's (TTI's) Urban Mobility Survey (for Atlanta in 2005)
Car		
Vehicle Passenger Car Equivalent (PCE)	1	AASHTO
Average Vehicle Occupancy	1.5	AASHTO
Value of time ($/hour)	14.6	TTI's Urban Mobility Survey (for Atlanta in 2005)
Trucks		
Vehicle PCE	2.5	AASHTO
Average Vehicle Occupancy	1.1	AASHTO
Value of time ($/hour)	77.1	TTI's Urban Mobility Survey (for Atlanta in 2005)

2.1.4 Daily Operating Cost Savings

The operating cost savings are the savings in fuel consumption as a result of reduced delays. The fuel consumption rate is different for each type of vehicle, such as cars and trucks, and varies by the free-flow speed in a corridor. The delay-related fuel consumption rate is provided in **Table 2**.

Table 2: Delay-Related Fuel Consumption (Gallons per min of delay)

Free Flow Speed (mph)	Car	Bus	Truck
20	0.0187	0.1980	0.1247
25	0.0220	0.2420	0.1573
30	0.0257	0.2840	0.1910
35	0.0300	0.3270	0.2263
40	0.0340	0.3690	0.2623
45	0.0390	0.4110	0.2990
50	0.0443	0.5430	0.3663
55	0.0503	0.4950	0.3743
60	0.0567	0.5370	0.4127
65	0.0637	0.5780	0.4510
70	0.0713	0.6200	0.4900
75	0.0793	0.6610	0.5290

Source: AASHTO

The following equation was used to estimate operating cost savings in each year of project life:

$$Operating\ Cost\ Benefits = \ Travel\ Time\ saved(hr)\ \times \\ Delay\ related\ fuel\ consumption\ (\frac{gal}{hr}) \times Fuel\ cost\ \left(\frac{gal}{hr}\right)$$

The fuel cost was estimated for each year during the project life by assuming a growth rate the same as inflation (shown in Table 1).

2.1.5 Total Annual Benefits

The total benefits from travel time and operating cost savings were converted to annual benefits using conversion factors and Bureau of Public Roads (BPR)-based equations, taken from the American Association of State Highway Transportation Officials (AASHTO) guide. These are represented below:

$$B_{weekly} = F_w \ \times \ B_{weekday}$$

$$B_{monthly} = F_m \times \ B_{weekday}$$

where:

B = Travel time benefits

F_w = Weekday to Week Factor =5.5

F_m = Week to Month Factor =4.345

$$B_{annual} = \left(\frac{1}{(0.076b + 0.206) * (Fac_{seas} - 1) + 1/12}\right) \times (B_{monthly})$$

where:

Fac_{seas} = Seasonality factor =1

b = BPR parameter = 10

The value of BPR parameter "b" depends on the type of facility and was taken from **Table 3**. The type of facility was based on the major facility in the area of improvement.

Table 3: Typical BPR Function Parameters in Volume-Delay Analysis

	Freeway	Expressway	Collector	Arterial
a	0.1	0.1	0.075	0.05
b	10	10	10	10

Source: AASHTO

2.1.6 Net Present Value of Benefits in the Opening Year

The final step was to convert the annual benefits to the net present value (NPV) of benefits in the opening year. This was done by using a discount rate of 5.5%, as per AASHTO.

2.2 CAPITAL COSTS

The capital costs for each of the operational projects included Preliminary Engineering, Right-of-Way, and Construction, as well as a 30 percent contingency. The methodologies and assumptions used to calculate the cost of each project are explained in more detail in **Chapter 6**. Individual cost sheets can be found in **Appendix E**. Like the benefits, the capital costs were also converted to the net present value (NPV) in the opening year for the calculation of B/C ratio.

2.2.1 Capital Cost Assumptions

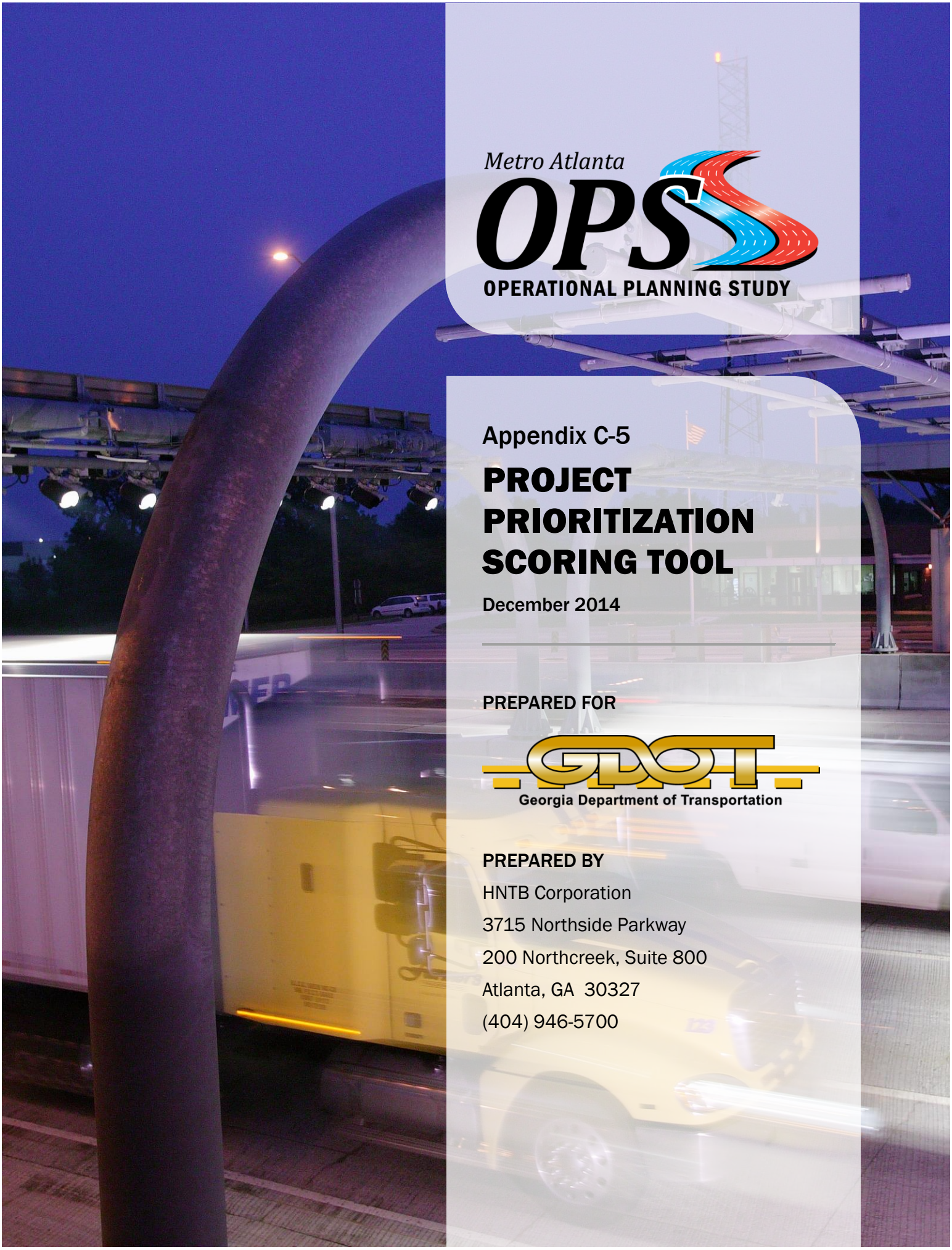
General Assumptions:

- All asphalt shoulders to be used are partial depth construction only and require full depth replacement
- All concrete shoulders to be used are full depth construction only and require no replacement
- Average shoulder removal width of 10' to be used if a location specific width could not be determined

Cost Estimate Assumptions:

- Unit cost for 'Grading Complete' is a lump sum cost based on the estimated required grading of the project.

- Cost estimates are based on the unit cost from the latest Item Mean Summary published on Georgia Department of Transportation website.
- Portland Cement Concrete (PCC) widening cost is based on 12" PCC Slab Construction with 12" Graded Aggregate Base (GAB).
- Asphalt Widening is based on 12" Asphalt Concrete Construction with 12" GAB.
- Asphalt Mill and Overlay cost is based on 2" milling and 3" overlay.
- Pavement Demolition is based on unit cost for 'Removal Asphalt Pavement including Base".
- Cost for Signal Reconfiguration is used for adjustments to signal timing at the end of off-ramp.
- Unit cost for New Signal/ Warning Lights is for single signal warning light.
- Unit cost for Striping is for each lane of new striping per linear mile.
- Overhead Signs' unit cost is based on the cost for Structural Support of Type 1 Overhead Signs.
- Unit cost for 'Remove Overhead Signs' include cost for Removal of Overhead Sign as well as the cost for removal of Structural Support for Signs.
- Unit cost for 'Retrofit Overhead Signs' include cost for reconstruction of overhead sign as well as the cost for reconstruction of structural support for signs.
- "Roadside Signs" and "Changeable Warning Signs" unit cost assumes 15 square feet sign as well as sign post.
- Unit cost for 'Remove Exist Solid Traffic Stripe' is based on the cost of removal of existing 8 inch solid thermoplastic stripes.
- Erosion control unit cost is based on per acre of disturbed acreage.
- Traffic control unit cost is assumed to be 10% of the construction cost excluding right-of-way.



Metro Atlanta

OPS

OPERATIONAL PLANNING STUDY

Appendix C-5

PROJECT PRIORITIZATION SCORING TOOL

December 2014

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1 INTRODUCTION

The purpose of this technical memorandum is to document the methodology and assumptions used to develop the project prioritization scoring tool. This Excel-based tool was developed for the OPS in order to prioritize projects.

2 PROJECT PRIORITIZATION TOOL METHODOLOGY

2.1 INPUTS AND OUTPUTS

The projects were evaluated based on a set of six themes that consisted of individual metrics (performance measures). These themes and metrics are mentioned below. More details on themes are provided in Chapter 6.

1. Transportation mobility
    a. Vehicle throughput
    b. Changes in travel speeds or travel time savings
    c. Reduction of vehicle delay
    d. Facilitation of transit options
2. Financial feasibility
    a. Cost
    b. Benefit/cost ratio
3. Safety
    a. Anticipated reduction of crashes
    b. Anticipated reduction of incident response time
4. System connectivity and economic growth
    a. Facilitation of current major freight movement
    b. Connectivity to current major employment centers
5. System preservation and environmental sustainability
    a. System preservation
    b. Level of environmental impacts
6. Project Support and Readiness
    a. Project readiness
    b. General constructability and schedule

The inputs required are the values of each individual performance measure in each theme for every project. Based on the ordinal rating scheme discussed in Chapter 6, a score was assigned for each performance measure for each project. The next step was to select a Scheme or Scenario, which contains different weighting factors for each theme. There were nine scenarios evaluated, and the weights of themes in each of these scenarios are shown in **Table 1**. The weights of the individual performance measure within the theme are shown in **Table 2**.

Table 1: Theme Weights by Scoring Scheme

	Scheme								
	1		2	3	4	5	6	7	8	9
Themes	**Stakeholder**	**CID**	**Average of Stakeholder/CID**	**Transportation mobility**	**Financial feasibility**	**Safety**	**System connectivity and economic growth**	**System preservation and environmental sustainability**	**Project Support and Readiness**
Transportation mobility	**35%**	**25%**	30%	**50%**	10%	10%	10%	10%	10%
Financial feasibility	**20%**	10%	15%	10%	**50%**	10%	10%	10%	10%
Safety	15%	15%	15%	10%	10%	**50%**	10%	10%	10%
System connectivity and economic growth	15%	**30%**	20%	10%	10%	10%	**50%**	10%	10%
System preservation and environmental sustainability	10%	10%	10%	10%	10%	10%	10%	**50%**	10%
Project Support and Readiness	5%	10%	10%	10%	10%	10%	10%	10%	**50%**
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 2: Weights of Performance Measures within Theme

Theme	Performance Measure	Weight
Transportation mobility	Vehicle throughput	25%
	Changes in travel speeds or travel time savings	25%
	Reduction of vehicle delay	25%
	Facilitation of transit options	25%
Financial feasibility	Cost	50%
	Benefit/cost ratio	50%
Safety	Anticipated reduction of crashes	50%
	Anticipated reduction of incident response time	50%

System connectivity and economic growth	Facilitation of current major freight movement	50%
	Connectivity to current major employment centers	50%
System preservation and environmental sustainability	System preservation	50%
	Level of environmental impacts	50%
Project Support and Readiness	Project readiness	50%
	General constructability and schedule	50%

For each project and a chosen scenario, the weighted score of the performance measure was estimated by multiplying the score with the weight of the theme and by weight of the measure within the theme. The weighted scores for all the performance measures were summed up to estimate the project points, which were eventually used to rank the projects.

$$Points_{measure} = Score \times Weight_{measure} \times Weight_{theme}$$

$$Points_{Project} = \sum Points_{measure}$$

2.2 PROJECT RANKING AND RESULTS

A total of 74 projects were prioritized. Rankings were obtained by selecting individual scenarios as well as multiple scenarios that provided aggregated results. **Table 3** provides the rankings based on the 9 scenarios discussed in Chapter 6. Final recommendation of rankings was based on Scenario 3, which was the aggregate scenario of stakeholder and CID inputs.

Table 3: Project Ranking by Scenario

			Rank By Scheme								
ID	**Option**	**Project**	1	2	3	4	5	6	7	8	9
2	3	DT Connector from I-20 to International Blvd (NB) - Close Fulton On-ramp	8	14	8	9	5	49	16	59	11
3	1a	DT Connector from Freedom Pkwy to I-20 (SB) - Close Ellis On-ramp	10	8	8	12	17	6	13	55	8
3	1b	DT Connector from Freedom Pkwy to I-20 (SB) - Close Edgewood On-ramp	7	10	7	6	4	47	15	58	10
3	2	DT Connector from Freedom Pkwy to I-20 (SB) - Close MLK Off-ramp	6	6	6	7	6	5	8	47	3
3	3	DT Connector from Freedom Pkwy to I-20 (SB) - Interchange reconfiguration	5	5	5	5	7	11	6	13	2
4	4	Buford Connector at Monroe Dr (NB) - Add left turn lane to off-ramp	33	29	30	40	48	12	32	63	38
4	5	Buford Connector from Piedmont Rd to I-85 (NB) - Auxiliary lane	48	45	49	57	83	20	60	71	77
5	1	I-85 N from I-85/SR 400 to Buford Connector (SB) - Auxiliary lane	11	13	11	10	19	17	18	60	12
6	1	I-75 N from SR 5 to SR 120 (SB) - Auxiliary lane	25	33	28	18	50	42	47	18	61
7	1	I-75 N from SR 120 to SR 5 (NB) - Auxiliary lane	21	24	23	13	34	38	40	14	58
8	1	I-85 N at SR 316 (SB) - Extend HOT lane merge	37	34	38	52	59	29	26	22	73
9	1	SR 400 from Holcomb Bridge Rd to Abernathy (SB) - Active Traffic Management (Full Gantry)	69	76	76	63	72	85	74	42	70

ID	Option	Project	Rank By Scheme 1	2	3	4	5	6	7	8	9
10	1	I-285 NW from S Cobb Dr to Paces Ferry Rd (NB) - Auxiliary lane	84	67	82	90	74	51	37	40	67
11	1	I-285 NW from Paces Ferry Rd to S Cobb Dr (SB) - Auxiliary lane	84	67	82	90	74	51	37	40	67
12	1	I-75 N at North Loop (NB) - Extend on-ramp	36	38	37	45	49	24	45	17	60
12	2	I-75 N at North Loop (NB) - On-ramp widening	51	55	55	64	67	48	61	32	65
13	1	SR 400 from McFarland Rd to Peachtree Pkwy (NB) - Auxiliary lane	90	89	88	78	85	61	92	63	72
14	1	SR 400 from Peachtree Pkwy to McFarland Rd (SB) - Auxiliary lane	67	82	80	48	80	57	89	62	71
15	1	I-20 E from Wesley Chapel Rd to I-285 E (WB) - Auxiliary lane	35	60	44	34	43	26	77	20	63
16	1	I-285 E from I-20 to Glenwood Rd (NB) - Auxiliary lane	30	37	32	26	40	43	48	19	62
17	1	I-285 E from Northlake Pkwy to I-85 N (NB) - Auxiliary lane	26	25	27	23	63	13	43	48	59
18	1	I-285 W at I-20 W (WB) - Add mainline lane	27	26	29	29	54	30	27	54	74
18	2	I-285 W at I-20 W (EB) - Drop mainline lane	34	41	44	34	81	35	51	72	88
19	2	I-85 Inside at N Druid Hills Rd (SB) - Off-ramp restriping	64	70	57	54	35	67	69	56	28
19	3	I-85 Inside at N Druid Hills Rd (NB) - On-ramp restriping	3	4	3	3	3	4	16	9	19
19	4	I-85 Inside at N Druid Hills Rd (Inter.) - Dual left turns restriping	1	1	1	1	1	1	10	6	1
20	1	I-285 E from I-85 to Northlake Pkwy (SB) - Auxiliary lane	38	42	41	39	64	32	55	57	64
21	1	I-285 NW at Bolton Rd (NB) - Add arterial thru lane	99	98	99	99	88	95	81	88	95
23	1	I-285 SW at I-85 S (NB) - Ramp reconfiguration	66	75	69	84	33	14	77	52	40
24	1	US 78 at I-285 NB (WB) - Ramp reconfiguration	38	42	39	34	43	45	51	52	40
25	1	I-75 Inside at Northside Dr (NB) - HOV On-ramp restriping	20	22	18	21	12	15	29	5	9
26	1	SR 400 at Abernathy Rd (SB) - Ramp upgrade	31	27	25	31	31	9	43	44	16
27	1	SR 400 at Holcomb Bridge Rd (SB) - Add off-ramp right turn lane arterial thru lane	75	79	72	49	61	82	85	61	31
28	2	I-20 W at Thornton Rd (EB) - Add on-ramp lane	51	48	51	67	73	17	66	77	53
29	3	I-285 SW at Camp Creek Pkwy (Inter.) - Partial DDI	18	16	20	17	42	16	22	84	75
30	2	I-85 N at Indian Trail/Lilburn Rd (NB) - On-ramp widening	19	18	19	27	16	7	25	39	32
31	2	I-85 N at Beaver Ruin Rd (Inter.) - Partial DDI	83	81	84	88	89	30	79	91	83
32	2	I-85 N at I-285 (WB) - Interchange restriping	15	19	15	14	15	17	33	35	12
33	1	SR 400 at Haynes Bridge Rd (NB) - Ramp reconfiguration	40	49	47	51	79	8	73	69	76
34	2	I-285/85 S at Old National Hwy (Inter.) - Quadrant road and roundabout	94	94	94	98	93	59	95	96	94
35	1	I-75 at Howell Mill Rd (Inter.) - DDI	82	86	85	86	92	33	90	94	91
36	1	I-85 S at SR 34 (SB) - Add right turn lane	14	23	17	11	27	43	48	74	39
37	1	I-985 at SR 20 (NB) - Ramp upgrade	41	35	34	32	38	36	33	10	20
39	1	DT Connector at North Ave (SB) - Add right turn lane	22	15	21	28	29	10	13	73	36
40	1	DT Connector at Williams St (SB) - Prohibit left turn	46	28	34	67	26	36	12	46	20

ID	Option	Project	Rank By Scheme 1	2	3	4	5	6	7	8	9
40	2	DT Connector at Williams St (SB) - Right turn restriping	28	21	24	25	23	56	11	45	18
40	3	DT Connector at Williams St (SB) - Add right turn lane	13	9	12	15	9	25	4	2	5
40	4	DT Connector at Williams St (SB) - Off-ramp restriping	22	17	21	22	14	55	9	42	15
42	2	Buford Connector at Armour Dr (SB) - Add ramp meter	42	53	42	42	20	62	64	48	24
43	1	I-20 E at I-285 E (WB) - Modify geometrics for trucks	47	38	46	67	45	50	24	67	66
43	2	I-20 E at I-285 E (WB) - Upgrade signage for trucks	16	11	13	19	10	27	2	3	6
44	1	I-285 S at I-675 (Inter.) - Upgrade signage for trucks	16	11	13	19	10	27	2	3	6
45	1	I-75 S at I-285 S (NB/SB) - Upgrade signage for trucks	12	7	10	16	8	23	1	1	4
47	4	I-85 N at Hamilton Mill Rd (Inter.) - Ramp relocation	4	2	4	4	25	2	5	78	56
48	1	I-285 E from US 78 to Ponce de Leon Ave (SB) - Auxiliary lane	81	91	87	77	77	66	95	75	82
49	1	I-75 N at Barrett Pkwy (SB) - Ramp widening	32	32	30	32	38	22	33	10	35
50	1	SR 400 at Northridge Dr (SB) - On-ramp widening	56	70	57	54	35	67	69	24	43
50	2	SR 400 at Northridge Dr (NB) - On-ramp widening	56	70	57	54	35	67	69	24	43
51	1	I-285 NW at Hollowell Pkwy (SB) - On-ramp widening	86	73	81	92	40	75	31	31	50
52	1	US 78 at Brockett Rd (WB) - On-ramp widening	70	83	77	67	45	79	83	35	53
53	1	US 78 at Mtn. Industrial Blvd (WB) - On-ramp widening	70	83	77	67	45	79	83	35	53
54	1	I-85 N at Chamblee Tucker Rd (NB) - On-ramp widening	56	58	54	52	59	46	67	22	42
55	1	I-285 E at Chamblee Tucker Rd (SB) - On-ramp widening	87	87	86	81	84	88	82	48	81
56	1	I-75 N at Delk Rd (NB) - On-ramp widening	60	61	57	58	55	70	56	26	45
57	1	I-75 S at Jonesboro Rd (NB) - Ramp meter bypass for transit	70	65	66	64	67	77	61	32	51
58	1	I-75 N at North Loop (SB) - Ramp meter bypass for transit	60	61	57	58	55	70	56	26	45
59	1	I-285 NW at Cobb Pkwy (Inter.) - Upgrade directional signage	76	51	57	87	24	60	20	15	23
60	1	I-75 N at Barrett Pkwy (SB) - Ramp meter bypass for transit	60	61	57	58	55	70	56	26	45
61	1	I-575 at SR 92 (SB) - Ramp meter bypass for transit	51	77	67	58	28	70	80	26	45
62	1	SR 400 at Holcomb Bridge Rd (SB) - Ramp meter bypass for transit	68	79	72	49	61	82	85	38	56
63	1	SR 400 at Windward Pkwy (SB) - Ramp meter bypass for transit	73	74	70	66	58	78	72	34	52
64	1	I-285 S at Moreland Ave (EB) - On-ramp restriping	42	31	36	38	53	39	20	15	37
65	1	I-985 at SR 20 (Inter.) - Partial DDI	9	20	16	8	66	20	68	86	87
65	2	I-985 at SR 20 (SB) - Add off-ramp right turn lane arterial thru lane	2	3	2	2	2	3	7	8	17

2.3 EXAMPLE OUTPUTS FROM EVALUATION TOOLS

Estimates of increasing traffic throughput and decreasing travel times were performed using a wide spectrum of evaluation tools – from a simple "Lane Volume over Capacity" tool to micro-simulation modeling tools. These tools assisted the study team in conducting much of the quantitative analyses. The type of evaluation tool used along specific corridors was determined by the availability of models previously developed for other projects/studies. The four primary evaluation tools used for the OPS are listed below and example outputs of each tool are presented in the following sections:

- Capacity Analysis for Planning of Junctions (CAP-X) (intersection/interchange evaluation spreadsheet);
- 2010 Highway Capacity Manual/Highway Capacity Software;
- CORSIM (FHWA developed micro-simulation model); and
- VISSIM (European micro-simulation model).

2.3.1 Capacity Analysis for Planning of Junctions (CAP-X)

Capacity Analysis for Planning of Junctions

Input Worksheet

		Critical Lane Volume Sum			
Project Name:	I-285 and Camp Creek Parkway - Existing PM	Acceptable Configurations			
Project Number:	"Enter the Project Number here (Input worksheet)"	< 1200	1200 - 1399	1400 - 1599	≥ 1600
Location	I-285 and Camp Creek Parkway	1	1	2	26
Date	May 13, 2013				

Results for Intersections

#	TYPE OF INTERSECTION	Sheet	Zone 1 (North) CLV	Zone 1 (North) V/C	Zone 2 (South) CLV	Zone 2 (South) V/C	Zone 3 (East) CLV	Zone 3 (East) V/C	Zone 4 (West) CLV	Zone 4 (West) V/C	Zone 5 (Center) CLV	Zone 5 (Center) V/C	Overall v/c Ratio	Ranking
1	Conventional	FULL									3403	2.13	2.13	8
2	Conventional Shared RT LN	CSRL									4406	2.75	2.75	14
3.1	Quadrant Roadway	S-W			1807	1.13			2489	1.56	2138	1.34	1.56	3
3.2		N-E	2640	1.65			1700	1.06			3066	1.92	1.92	6
3.3		S-E			2007	1.25	2007	1.25			3066	1.92	1.92	6
3.4		N-W	3872	2.42					3131	1.96	2235	1.40	2.42	12
4.1	Partial Displaced Left Turn	N-S	844	0.53	1228	0.77					1744	1.09	1.09	2
4.2		E-W					460	0.29	943	0.59	2755	1.72	1.72	5
5	Displaced Left Turn	FULL	844	0.53	1228	0.77	460	0.29	943	0.59	1678	1.05	1.05	1
6.1	Restricted Crossing U-Turn	N-S	1407	0.88	1404	0.88	1819	1.14	3895	2.43			2.43	13
6.2		E-W	2678	1.67	2391	1.49	1460	0.91	1677	1.05			1.67	4
7.1	Median U-Turn	N-S	1616	1.01	1302	0.81					5073	3.17	3.17	15
7.2		E-W					1830	1.14	1745	1.09	3808	2.38	2.38	11
8.1	Partial Median U-Turn	N-S	2243	1.40	1258	0.79					3458	2.16	2.16	9
8.2		E-W					1134	0.71	1420	0.89	3458	2.16	2.16	9

Capacity Analysis for Planning of Junctions

Input Worksheet

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North) Lane 1	Zone 1 (North) Lane 2	Zone 1 (North) Lane 3	Zone 3 (East) Lane 1	Zone 3 (East) Lane 2	Zone 3 (East) Lane 3	Zone 2 (South) Lane 1	Zone 2 (South) Lane 2	Zone 2 (South) Lane 3	Zone 4 (West) Lane 1	Zone 4 (West) Lane 2	Zone 4 (West) Lane 3	Overall v/c Ratio	Ranking
9.1	1 X 1	11.17			4.49			6.47			7.44			11.17	5
9.2	1 X 2	6.12			1.55	2.94		3.78			2.44	5.00		6.12	3
9.3	2 X 1	3.42	7.75		3.72			5.95	0.53		4.46			7.75	4
9.4	2 X 2	2.07	4.25		1.59	3.00		3.79	0.31		1.33	2.43		4.25	1
9.5	3 X 3	1.95	1.51	4.27	0.51	0.96	2.05	3.33	2.64	0.36	0.32	1.79	2.69	4.27	2

Results for Interchanges

#	TYPE OF INTERCHANGE	Sheet	Zone 1 (Rt Mrg) CLV	Zone 1 (Rt Mrg) V/C	Zone 2 (Lt Mrg) CLV	Zone 2 (Lt Mrg) V/C	Zone 3 (Ctr. 1) CLV	Zone 3 (Ctr. 1) V/C	Zone 4 (Ctr. 2) CLV	Zone 4 (Ctr. 2) V/C	Zone 5 (Lt Mrg) CLV	Zone 5 (Lt Mrg) V/C	Zone 6 (Rt Mrg) CLV	Zone 6 (Rt Mrg) V/C	Overall v/c Ratio	Ranking
10.1	Diamond	N-S					1486	0.93	1543	0.96					0.96	3
10.2		E-W					1812	1.13	1337	0.84					1.13	6
11.1	Partial Cloverleaf	N-S					1346	0.84	920	0.57					0.84	2
11.2		E-W					936	1.65	920	0.57					0.58	1
13.1	Displaced Left Turn	N-S	967	0.60			658	0.41	1765	1.10			1556	0.97	1.10	5
13.2		E-W	2189	1.37			1495	0.93	1189	0.74			718	0.45	1.37	9
14.1	Double Crossover Diamond	N-S	967	0.60	376	0.24	557	0.35	612	0.38	1180	0.74	1556	0.97	0.97	4
14.2		E-W	2335	1.46	1372	0.86	700	0.44	1031	0.64	847	0.53	518	0.32	1.46	10
15.1	Single Point	N-S	947	0.59			1974	1.23					1714	1.07	1.23	7
15.2		E-W	2020	1.26			1288	0.80					518	0.32	1.26	8

2.3.2 2010 Highway Capacity Manual/Highway Capacity Software

HCS 2010 Output Example

_____Merge Analysis_____

Analyst: WMB

Agency/Co.: GDOT/HNTB

Date performed: 5/22/2013

Analysis time period: AM

Freeway/Dir of Travel: I-285/NB

Junction: I-285 at Northlake Pkwy

Jurisdiction: Dekalb

Analysis Year: 2013

Description: Ops Fwy -Existing

_____Freeway Data_____

Type of analysis Merge

Number of lanes in freeway 4

Free-flow speed on freeway 55.0 mph

Volume on freeway 7839 vph

_____On Ramp Data_____

Side of freeway Right

Number of lanes in ramp 1

Free-flow speed on ramp 35.0 mph

Volume on ramp 593 vph

Length of first accel/decel lane 875 ft

Length of second accel/decel lane ft

_____Adjacent Ramp Data (if one exists)_____

Does adjacent ramp exist? No

Volume on adjacent Ramp vph

Position of adjacent Ramp

Type of adjacent Ramp

Distance to adjacent Ramp ft

_____Conversion to pc/h Under Base Conditions_____

Junction Components Freeway Ramp Adjacent

Ramp

Volume, V (vph) 7839 593 vph

Peak-hour factor, PHF 0.86 0.84

Peak 15-min volume, v15 2279 176 v

Trucks and buses 15 8 %

Recreational vehicles 0 0 %

Terrain type: Level Level

Grade % % %

Length mi mi mi

Trucks and buses PCE, ET 1.5 1.5

Recreational vehicle PCE, ER 1.2 1.2

Heavy vehicle adjustment, fHV 0.930 0.962

Driver population factor, fP 1.00 1.00

Flow rate, vp 9799 734 pcph

_____Estimation of V12 Merge Areas_____

L = (Equation 13-6 or 13-7)

EQ

P = 0.126 Using Equation 4

FM

v = v (P) = 1235 pc/h

12 F FM

_____Capacity Checks_____

Actual Maximum LOS F?

v 10533 9000 Yes

FO

v or v 4282 pc/h (Equation 13-14 or 13-17)

3 av34

Is v or v > 2700 pc/h? Yes

3 av34

Is v or v > 1.5 v /2 Yes

3 av34 12

If yes, v = 3919 (Equation 13-15, 13-16, 13-18, or 13-19)

12A

_____Flow Entering Merge Influence Area_____

Actual Max Desirable Violation?

v 10533 4600 Yes

12A

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 35.9 pc/mi/ln

R R 12 A

Level of service for ramp-freeway junction areas of influence F

_____Speed Estimation_____

Intermediate speed variable, M = 0.669

S

Space mean speed in ramp influence area, S = 46.3 mph

R

Space mean speed in outer lanes, S = 44.6 mph

0

Space mean speed for all vehicles, S = 45.4 mph

2.3.3 CORSIM (FHWA developed micro-simulation model)

```
RUN DATE        : 08/28/13
                                                TRAF SIMULATION MODEL

                                                   DEVELOPED FOR

                                         U. S. DEPARTMENT OF TRANSPORTATION
                                           FEDERAL HIGHWAY ADMINISTRATION
                                 FHWA OFFICE OF OPERATIONS RESEARCH, DEVELOPMENT AND TECHNOLOGY


                                           DATE =  3/ 6/2013
                                           USER = Keith Strickland
                                         AGENCY = HNTB Corporation

                                                RUN CONTROL DATA


            VALUE                        RUN PARAMETERS AND OPTIONS

                0     RUN IDENTIFICATION NUMBER
                1     RUN TYPE CODE = ( 1, 2, 3) TO RUN (SIMULATION, ASSIGNMENT, BOTH)
                                     (-1,-2,-3) TO CHECK (SIMULATION, ASSIGNMENT, BOTH) ONLY

                      NETSIM ENVIRONMENTAL OPTIONS
                      ----------------------------
                0     FUEL/EMISSION RATE TABLES ARE NOT PRINTED
                0     SIMULATION:  PERFORMED                              ENVIRONMENTAL MEASURES:  CALCULATED
                      RATE TABLES: EMBEDDED                               TRAJECTORY FILE:         NOT WRITTEN
                0     CODE   = (0,1,2) FOR UNIFORM DISTRIBUTION, NORMAL DISTRIBUTION, ERLANG DISTRIBUTION
                0     INITIALIZATION CODE (0,1) = (DO NOT, DO) FORCE FULL INITIALIZATION PERIOD
                0     INPUT  UNITS CODE = (0,1) IF INPUT IS IN (ENGLISH, METRIC) UNITS
                0     OUTPUT UNITS CODE = (0,1,2,3) IF OUTPUT IS IN (SAME AS INPUT, ENGLISH, METRIC, BOTH) UNITS
             1700     CLOCK TIME AT START OF SIMULATION (HHMM)
                0     SIGNAL TRANSITION CODE = (0,1,2,3) IF(NO, IMMEDIATE, 2-CYCLE, 3-CYCLE) TRANSITION WAS REQUESTED
            24556     RANDOM NUMBER SEED
            24556     RANDOM NUMBER SEED TO GENERATE TRAFFIC STREAM FOR NETSIM OR LEVEL I SIMULATION
            21804     RANDOM NUMBER SEED TO GENERATE EMISSION HEADWAYS FOR NETSIM SIMULATION
             3600     DURATION (SEC) OF TIME PERIOD NO.  1
              180     LENGTH OF A TIME INTERVAL, SECONDS
                7     MAXIMUM INITIALIZATION TIME, NUMBER OF TIME INTERVALS
                0     NUMBER OF TIME INTERVALS BETWEEN SUCCESSIVE STANDARD OUTPUTS
```

```
0     TIME INTERMEDIATE OUTPUT WILL BEGIN AT INTERVALS OF    0 SECS. FOR    0 SECS. FOR MICROSCOPIC MODELS
0     NETSIM MOVEMENT-SPECIFIC OUTPUT CODE = (0,1) (IF NOT, IF) REQUESTED FOR NETSIM SUBNETWORK

                    DEFAULT  LINK  GEOMETRIC  DATA

              WIDTH OF LANES                          12  FEET

              LONGITUDINAL DISTANCE FROM THE STOP      4 FEET
              LINE TO THE NEAR CURB

              FORWARD SIGHT DISTANCE AT STOP LINE   1000  FEET


                          LANE   CHANGE   DATA

             PARAMETERS                     VALUE                 UNITS
                                   ENGLISH / METRIC

DURATION OF LANE CHANGE MANEUVER                3*                  SECONDS

MEAN DRIVER REACTION TIME                      10*                  TENTHS OF A SECOND

TIME REQUIRED FOR SUCCESSIVE LANE CHANGES      20*                  TENTHS OF A SECOND

DECELERATION AT BEGINNING OF LANE CHANGE MANEUVER   5*   /      2   FEET [METERS] / SECOND**2

DIFFERENCE IN VEHICLE'S DECELERATION OVER THE DISTANCE
   BETWEEN ITS POSITION WHEN IT BEGINS TO RESPOND TO AN
   OBSTRUCTION AND THE POSITION OF THE OBSTRUCTION -

        FOR MANDATORY LANE CHANGE:             10*   /      3   FEET [METERS] / SECOND**2
        FOR DISCRETIONARY LANE CHANGE:          5*   /      2   FEET [METERS] / SECOND**2

PANIC DECELERATION RATE OF LEAD VEHICLE FOR
COMPUTATION OF CAR-FOLLOWING LAW               12*   /      4   FEET [METERS] / SECOND**2

PANIC DECELERATION RATE OF FOLLOWER VEHICLE FOR
COMPUTATION OF CAR-FOLLOWING LAW               12*   /      4   FEET [METERS] / SECOND**2

DRIVER TYPE FACTOR USED TO COMPUTE DRIVER AGGRESSIVENESS   25*

URGENCY THRESHOLD                               2*   /      1   10 * SECONDS**2 / FEET [METERS]

SAFETY FACTOR FOR COMPUTATION OF PERCEIVED RISK OF LANE
CHANGE                                          8*               FACTOR * 10

PERCENT OF DRIVERS WHO COOPERATE WITH A LANE CHANGER   50*       %
```

HEADWAY BELOW WHICH ALL DRIVERS WILL ATTEMPT TO CHANGE LANES 20* TENTHS OF A SECOND

HEADWAY ABOVE WHICH NO DRIVERS WILL ATTEMPT TO CHANGE LANES 50* TENTHS OF A SECOND

FORWARD DISTANCE SCANNED BY DRIVER FOR A TURN MOVEMENT / BUS STATION IN ORDER TO ASSESS NEED FOR A LANE CHANGE 300* / 91 FEET / [METERS]

* INDICATES DEFAULT VALUES WERE SPECIFIED

LINK	VEHICLE MILES	TRIPS	VEHICLE MINUTES MOVE TIME	DELAY TIME	TOTAL TIME	RATIO MOVE/ TOTAL	MINUTES/MILE TOTAL TIME	DELAY TIME	SECONDS / VEHICLE TOTAL TIME	DELAY TIME	CONTROL DELAY	QUEUE DELAY	STOP* TIME	AVERAGE VALUES STOPS (%)	VOL VPH	SPEED MPH
(6, 18)	48.15	797	96.3	16.5	112.8	0.85	2.34	0.34	8.5	1.2	0.0	0.0	0.0	0	797	25.6
(5, 17)	176.95	1832	353.9	39.7	393.6	0.90	2.22	0.22	12.9	1.3	0.0	0.0	0.0	0	1832	27.0
(3, 22)	47.42	730	94.8	12.0	106.8	0.89	2.25	0.25	8.8	1.0	0.0	0.0	0.0	0	730	26.6
(10, 25)	12.66	512	25.3	13.1	38.4	0.66	3.03	1.03	4.5	1.5	0.0	0.0	0.4	0	512	19.8
(10, 26)	5.79	207	11.6	6.9	18.5	0.63	3.19	1.19	5.4	2.0	0.0	0.0	0.4	0	207	18.8
(8, 18)	30.60	755	61.2	9.7	70.9	0.86	2.32	0.32	5.6	0.8	0.0	0.0	0.0	0	755	25.9
(2, 17)	12.03	145	24.1	2.6	26.7	0.90	2.22	0.22	11.0	1.1	0.0	0.0	0.0	0	145	27.0
(10, 27)	1140.46	1759	2280.9	418.2	2699.1	0.85	2.37	0.37	91.1	14.1	0.0	0.0	0.1	0	1759	25.4
(27, 10)	1235.08	1904	2470.2	1816.2	4286.4	0.58	3.47	1.47	134.5	58.4	68.9	33.4	27.0	79	1904	17.3
(3, 5)	416.46	3452	832.9	1254.6	2087.5	0.40	5.01	3.01	36.3	21.8	16.7	13.5	12.6	64	3452	12.0
(5, 3)	472.54	3968	945.1	332.3	1277.4	0.74	2.70	0.70	19.3	5.0	0.0	0.0	0.1	0	3968	22.2
(6, 2)	297.43	2703	396.6	2007.3	2403.9	0.16	8.08	6.75	53.0	44.3	0.0	0.0	24.4	85	2703	7.4
(5, 8)	248.85	2212	331.8	271.6	603.4	0.55	2.42	1.09	16.4	7.4	0.0	0.0	1.1	6	2212	24.7
(25, 10)	8.81	272	17.6	180.7	198.3	0.09	22.51	20.51	43.6	39.7	39.3	37.0	36.0	92	272	2.7
(26, 10)	10.95	357	21.9	186.6	208.5	0.11	19.03	17.03	35.0	31.3	30.7	29.1	28.4	92	357	3.2
(9, 6)	200.21	1987	400.4	1704.7	2105.1	0.19	10.51	8.51	63.1	51.1	37.5	35.4	31.9	77	1987	5.7
(16, 10)	126.61	1573	253.2	728.9	982.1	0.26	7.76	5.76	37.4	27.8	24.8	21.6	20.7	78	1573	7.7
(7, 9)	16.77	432	33.5	153.3	186.8	0.18	11.14	9.14	25.9	21.2	0.0	0.0	13.4	66	432	5.4
(2, 5)	69.31	2559	92.4	718.4	810.8	0.11	11.70	10.37	19.0	16.8	12.3	13.1	12.7	32	2559	5.1
(9, 16)	109.89	1581	219.8	37.5	257.2	0.85	2.34	0.34	9.8	1.4	0.0	0.0	0.0	0	1581	25.6
(16, 9)	109.54	1576	219.1	893.5	1112.6	0.20	10.16	8.16	42.3	34.1	0.0	0.0	18.1	65	1576	5.9
(23, 5)	855.44	2020	1140.6	2939.1	4079.7	0.28	4.77	3.44	119.4	85.8	61.7	37.7	35.2	84	2020	12.6
(24, 6)	937.04	1647	1249.4	1073.5	2322.9	0.54	2.48	1.15	83.7	38.6	31.4	17.1	16.6	72	1647	24.2
(10, 16)	128.79	1600	257.6	695.5	953.1	0.27	7.40	5.40	35.8	26.2	0.0	0.0	11.3	46	1600	8.1
(6, 9)	159.04	1581	318.1	57.1	375.1	0.85	2.36	0.36	14.2	2.2	0.0	0.0	0.1	0	1581	25.4
(22, 3)	24.54	366	32.7	34.9	67.6	0.48	2.76	1.42	11.1	5.7	0.0	0.0	0.3	15	366	21.8
(8, 6)	43.17	1452	57.6	284.9	342.5	0.17	7.93	6.60	14.2	11.8	9.4	9.0	8.7	37	1452	7.6
(12, 14)	514.23	2802	685.6	113.2	798.8	0.86	1.55	0.22	17.0	2.4	0.0	0.0	0.0	0	2802	38.6
(20, 1)	460.20	2482	920.4	1023.7	1944.1	0.47	4.22	2.22	46.8	24.7	20.8	18.3	17.5	57	2482	14.2
(19, 1)	622.08	1072	1244.2	1026.4	2270.6	0.55	3.65	1.65	125.2	56.2	74.2	45.8	45.2	90	1072	16.4

(1, 21)	458.58	744	917.2	117.6	1034.8	0.89	2.26	0.26	82.6	9.4	0.0	0.0	0.1	0	744	26.6
(1, 19)	451.32	790	902.6	83.8	986.4	0.92	2.19	0.19	74.6	6.3	0.0	0.0	0.2	0	790	27.5
(4, 1)	404.62	3621	809.2	1888.1	2697.3	0.30	6.67	4.67	44.5	31.1	25.4	23.1	21.6	62	3621	9.0
(1, 20)	516.90	2799	1033.8	184.2	1218.0	0.85	2.36	0.36	26.1	3.9	0.0	0.0	0.1	0	2799	25.5
(1, 4)	379.24	3455	654.4	150.1	804.4	0.81	2.12	0.40	14.0	2.6	0.0	0.0	0.1	0	3455	28.3
(21, 1)	377.48	611	755.0	363.8	1118.8	0.67	2.96	0.96	108.3	34.9	55.6	25.4	23.7	90	611	20.2

* AVERAGE QUEUE AND STOP TIME ARE COMPUTED AS TOTAL QUEUE TIME OR TOTAL STOP TIME DIVIDED BY
TOTAL NUMBER OF VEHICLES DISCHARGED FROM LINK PLUS NUMBER OF VEHICLES CURRENTLY ON THE LINK.

1 CUMULATIVE NETSIM STATISTICS AT TIME 18: 0: 0

ELAPSED TIME IS 1: 0: 0 (3600 SECONDS), TIME PERIOD 1 ELAPSED TIME IS 3600 SECONDS

LINK	VEHICLE MILES	VEHICLE TRIPS	VEHICLE MINUTES MOVE TIME	VEHICLE MINUTES DELAY TIME	VEHICLE MINUTES TOTAL TIME	RATIO MOVE/ TOTAL	MINUTES/MILE TOTAL TIME	MINUTES/MILE DELAY TIME	SECONDS / VEHICLE TOTAL TIME	SECONDS / VEHICLE DELAY TIME	SECONDS / VEHICLE CONTROL DELAY	SECONDS / VEHICLE QUEUE DELAY	SECONDS / VEHICLE STOP* TIME	AVERAGE VALUES STOPS (%)	AVERAGE VALUES VOL VPH	AVERAGE VALUES SPEED MPH
(14, 12)	455.14	2480	606.8	45.4	652.3	0.93	1.43	0.10	15.8	1.1	0.0	0.0	0.0	0	2480	41.9
(14, 28)	529.04	2813	705.4	107.8	813.2	0.87	1.54	0.20	17.3	2.3	0.0	0.0	0.0	0	2813	39.0
(28, 14)	466.79	2482	622.4	14.1	636.5	0.98	1.36	0.03	15.4	0.3	0.0	0.0	0.0	0	2482	44.0
(8013, 28)		2481													2481	
(12, 20)	396.11	2481	528.2	58.0	586.2	0.90	1.48	0.15	14.2	1.4	0.0	0.0	0.0	0	2481	40.5
(20, 12)	447.52	2803	596.7	136.4	733.1	0.81	1.64	0.30	15.7	2.9	0.0	0.0	0.0	0	2803	36.6
(4, 3)	243.49	3456	324.7	102.7	427.3	0.76	1.76	0.42	7.4	1.8	0.0	0.0	0.0	0	3456	34.2
(3, 4)	254.20	3608	338.9	159.9	498.8	0.68	1.96	0.63	8.3	2.7	0.0	0.0	0.1	0	3608	30.6
0SUBNETWORK=	13921.48	11084	398.07	357.74	755.81	0.53	3.26	1.54	3.86	1.83	1.15	0.83	0.94		191.9	18.4
			-- VEHICLE - HOURS --						--- MINUTES / VEHICLE-TRIP ---				PER TRIP			

1 CUMULATIVE NETSIM STATISTICS AT TIME 18: 0: 0

ELAPSED TIME IS 1: 0: 0 (3600 SECONDS), TIME PERIOD 1 ELAPSED TIME IS 3600 SECONDS

LINK	VEH-MINS * QUEUE TIME	VEH-MINS * STOP TIME	AVERAGE OCCUPANCY (VEHICLE)	CONGESTION STORAGE (%)	CONGESTION PHASE FAILURE	QUEUE LENGTH (VEHICLE) AVERAGE QUEUE BY LANE ** 1	2	3	4	5	6	7	8	9	MAXIMUM QUEUE BY LANE 1	2	3	4	5	6	7	8	9	NUMBER OF LANE CHANGES
(6, 18)	0.0	0.2	2.2	13.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(5, 17)	0.0	0.5	7.1	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181
(3, 22)	0.0	0.0	2.3	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(10, 25)	0.0	3.2	1.0	5.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LINK	VEH-MINS * QUEUE TIME	VEH-MINS * STOP TIME	AVERAGE OCCUPANCY (VEHICLE)	CONGESTION STORAGE (%)	CONGESTION PHASE FAILURE	AVERAGE QUEUE BY LANE ** 1	2	3	4	5	6	7	8	9	MAXIMUM QUEUE BY LANE 1	2	3	4	5	6	7	8	9	NUMBER OF LANE CHANGES
(10, 26)	0.0	1.4	0.5	2.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(8, 18)	0.0	0.0	1.4	13.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(2, 17)	0.0	0.0	0.6	2.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(10, 27)	0.0	2.5	45.5	13.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	746
(27, 10)	1136.9	918.3	76.1	20.5	29	13	14	0	0	0	1	1	0	0	63	57	0	0	0	8	7	0	0	1621
(3, 5)	787.7	735.0	35.3	29.4	12	6	5	7	0	0	0	1	0	0	18	18	21	0	0	0	11	0	0	1806
(5, 3)	0.0	6.2	21.8	23.9	0	0	0	0	0	0	0	0	0	0	5	4	2	0	0	0	0	0	0	1508
(6, 2)	0.0	1112.5	40.8	48.9	0	11	11	7	0	0	0	0	0	0	26	25	20	0	0	0	0	0	0	1649
(5, 8)	0.0	41.2	10.6	12.0	0	0	1	0	0	0	0	0	0	0	6	7	9	0	0	0	0	0	0	1072
(25, 10)	169.0	164.4	3.9	24.7	13	1	2	0	0	0	0	0	0	0	5	7	0	0	0	0	0	0	0	19
(26, 10)	174.4	170.4	4.2	24.6	9	1	2	0	0	0	0	0	0	0	6	8	0	0	0	0	0	0	0	16
(9, 6)	1193.8	1074.4	35.9	52.6	29	12	13	0	0	0	0	1	0	0	26	27	0	0	0	0	11	0	0	1157
(16, 10)	575.2	552.0	16.9	23.9	2	6	6	0	0	0	0	1	0	0	18	17	0	0	0	2	5	0	0	345
(7, 9)	0.0	96.8	3.8	41.7	0	2	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0
(2, 5)	563.0	546.5	14.0	68.3	0	3	3	3	0	0	0	0	0	0	7	7	7	0	0	0	0	0	0	197
(9, 16)	0.0	0.8	4.7	13.0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	82
(16, 9)	0.0	483.5	19.3	51.1	0	8	6	0	0	0	0	0	0	0	19	19	0	0	0	0	0	0	0	398
(23, 5)	1303.6	1218.3	68.2	38.4	47	16	0	0	0	13	1	1	0	0	45	0	0	0	21	8	8	0	0	271
(24, 6)	481.9	466.0	39.5	21.2	0	0	0	0	0	0	4	6	0	0	4	0	0	0	0	13	15	0	0	810
(10, 16)	0.0	307.2	16.7	38.2	0	5	5	0	0	0	0	0	0	0	19	18	0	0	0	0	0	0	0	244
(6, 9)	0.0	1.7	6.7	12.9	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	100
(22, 3)	0.0	1.6	2.0	10.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
(8, 6)	219.8	211.8	6.2	40.5	0	2	2	0	0	0	0	0	0	0	8	7	0	0	0	0	0	0	0	126
(12, 14)	0.0	0.1	13.8	9.7	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	389
(20, 1)	768.9	734.8	32.8	17.6	0	2	4	5	0	0	2	3	0	0	14	16	19	0	0	6	10	0	0	1727
(19, 1)	838.2	826.5	38.5	9.5	6	1	5	0	0	1	3	5	0	0	5	13	0	0	9	11	12	0	0	362
(1, 21)	0.0	1.0	17.7	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	280
(1, 19)	0.0	3.0	17.0	5.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	284
(4, 1)	1410.6	1320.5	45.2	28.7	11	6	7	6	0	0	4	6	0	0	22	22	24	0	7	16	17	0	0	1947
(1, 20)	0.0	2.5	20.9	14.6	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	439
(1, 4)	0.0	7.1	14.0	15.8	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	685
(21, 1)	266.3	248.5	19.2	11.2	0	3	0	0	0	0	0	2	0	0	8	0	0	0	0	0	7	0	0	0

1 CUMULATIVE NETSIM STATISTICS AT TIME 18: 0: 0

ELAPSED TIME IS 1: 0: 0 (3600 SECONDS), TIME PERIOD 1 ELAPSED TIME IS 3600 SECONDS

LINK	VEH-MINS * QUEUE TIME	VEH-MINS * STOP TIME	AVERAGE OCCUPANCY (VEHICLE)	CONGESTION STORAGE (%)	CONGESTION PHASE FAILURE	AVERAGE QUEUE BY LANE ** 1	2	3	4	5	6	7	8	9	MAXIMUM QUEUE BY LANE 1	2	3	4	5	6	7	8	9	NUMBER OF LANE CHANGES
(14, 12)	0.0	0.0	11.3	11.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	394
(14, 28)	0.0	0.0	13.9	9.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	379
(28, 14)	0.0	0.0	11.4	11.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1054
(12, 20)	0.0	0.0	10.2	12.1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	285

(20, 12)	0.0	0.4	12.6	10.3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	454
(4, 3)	0.0	0.1	7.6	13.6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	813
(3, 4)	0.0	3.8	8.6	16.0	0	0	0	0	0	0	0	0	0	0	5	5	7	0	0	0	0	0	835
0SUBNETWORK=	9889.3	11264.8	782.1	17.1	158																		22675

* THESE VALUES INCLUDE THE TIME FOR VEHICLES CURRENTLY ON THE LINK.
** AVERAGE QUEUE CALCULATED BASED ON TIME SINCE BEGINNING OF SIMULATION

1

CUMULATIVE NETSIM STATISTICS AT TIME 18: 0: 0

ELAPSED TIME IS 1: 0: 0 (3600 SECONDS), TIME PERIOD 1 ELAPSED TIME IS 3600 SECONDS

DISCHARGE BY LANE

LINK	LANE 1 VEH	LANE 1 VPH	LANE 2 VEH	LANE 2 VPH	LANE 3 VEH	LANE 3 VPH	LANE 4 VEH	LANE 4 VPH	LANE 5 VEH	LANE 5 VPH	LANE 6 VEH	LANE 6 VPH	LANE 7 VEH	LANE 7 VPH	LANE 8 VEH	LANE 8 VPH	LANE 9 VEH	LANE 9 VPH
(6, 18)	797	797	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(5, 17)	984	984	848	848	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(3, 22)	730	730	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(10, 25)	406	406	106	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(10, 26)	112	112	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(8, 18)	755	755	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(2, 17)	145	145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(10, 27)	879	879	880	880	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(27, 10)	741	741	721	721	0	0	0	0	0	0	351	351	91	91	0	0	0	0
(3, 5)	914	914	690	690	768	768	0	0	0	0	0	0	1080	1080	0	0	0	0
(5, 3)	1400	1400	1379	1379	1189	1189	0	0	0	0	0	0	0	0	0	0	0	0
(6, 2)	809	809	837	837	1057	1057	0	0	0	0	0	0	0	0	0	0	0	0
(5, 8)	651	651	806	806	755	755	0	0	0	0	0	0	0	0	0	0	0	0
(25, 10)	62	62	210	210	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(26, 10)	183	183	174	174	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(9, 6)	619	619	572	572	0	0	0	0	0	0	0	0	796	796	0	0	0	0
(16, 10)	754	754	677	677	0	0	0	0	0	0	50	50	92	92	0	0	0	0
(7, 9)	432	432	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(2, 5)	815	815	843	843	901	901	0	0	0	0	0	0	0	0	0	0	0	0
(9, 16)	846	846	735	735	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(16, 9)	455	455	1121	1121	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(23, 5)	705	705	0	0	0	0	0	0	713	713	271	271	331	331	0	0	0	0
(24, 6)	126	126	0	0	0	0	0	0	0	0	806	806	715	715	0	0	0	0
(10, 16)	765	765	835	835	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(6, 9)	846	846	735	735	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(22,	3)	366	366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(8,	6)	725	725	727	727	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(12,	14)	894	894	1018	1018	890	890	0	0	0	0	0	0	0	0	0	0	0	0
(20,	1)	557	557	722	722	866	866	0	0	0	0	163	163	174	174	0	0	0	0
(19,	1)	116	116	263	263	0	0	0	0	186	186	260	260	247	247	0	0	0	0
(1,	21)	389	389	355	355	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1,	19)	431	431	359	359	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(4,	1)	896	896	947	947	819	819	0	0	401	401	290	290	268	268	0	0	0	0
(1,	20)	954	954	996	996	849	849	0	0	0	0	0	0	0	0	0	0	0	0
(1,	4)	1018	1018	1114	1114	1323	1323	0	0	0	0	0	0	0	0	0	0	0	0
(21,	1)	219	219	0	0	0	0	0	0	0	0	0	0	392	392	0	0	0	0
(14,	12)	1180	1180	1300	1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(14,	28)	874	874	1053	1053	886	886	0	0	0	0	0	0	0	0	0	0	0	0
(28,	14)	1449	1449	1033	1033	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(12,	20)	1091	1091	1390	1390	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(20,	12)	915	915	1023	1023	865	865	0	0	0	0	0	0	0	0	0	0	0	0
(4,	3)	1177	1177	1050	1050	1229	1229	0	0	0	0	0	0	0	0	0	0	0	0
(3,	4)	1111	1111	1251	1251	1246	1246	0	0	0	0	0	0	0	0	0	0	0	0

```
 THE HIGHEST NUMBER OF VEHICLES ON THE NETWORK WAS   889 VEHICLES.
 THIS MAXIMUM OCCURRED AT  3451 SECONDS.

THE FRACTION OF VEHICLES THAT WERE UNABLE TO COMPLETE THEIR ASSIGNED TURN MOVEMENT WAS    0.00104

                                    -------------------------------
                                    NETWORK-WIDE AVERAGE STATISTICS
                                    -------------------------------

 TOTAL VEHICLE- MILE =   13921.48     VEHICLE-HOURS OF:  MOVE TIME =   398.07 , DELAY TIME =   357.74 , TOTAL TIME =   755.81

 AVERAGE SPEED ( MPH)=      18.42     MOVE/TOTAL = 0.53       MINUTES/MILE OF:  DELAY TIME =     1.54 , TOTAL TIME =     3.26

 NETWORK-WIDE STATISTICS FOR SCRIPT PROCESSING
   13921.48,   398.07,   357.74,   755.81,      18.42, 0.53,     1.54,     3.26

 TOTAL CPU TIME FOR SIMULATION =        9.06 SECONDS
 TOTAL CPU TIME FOR THIS RUN =        9.06 SECONDS
0***** THERE WERE   2 WARNING MESSAGES.
0LAST CASE PROCESSED
```

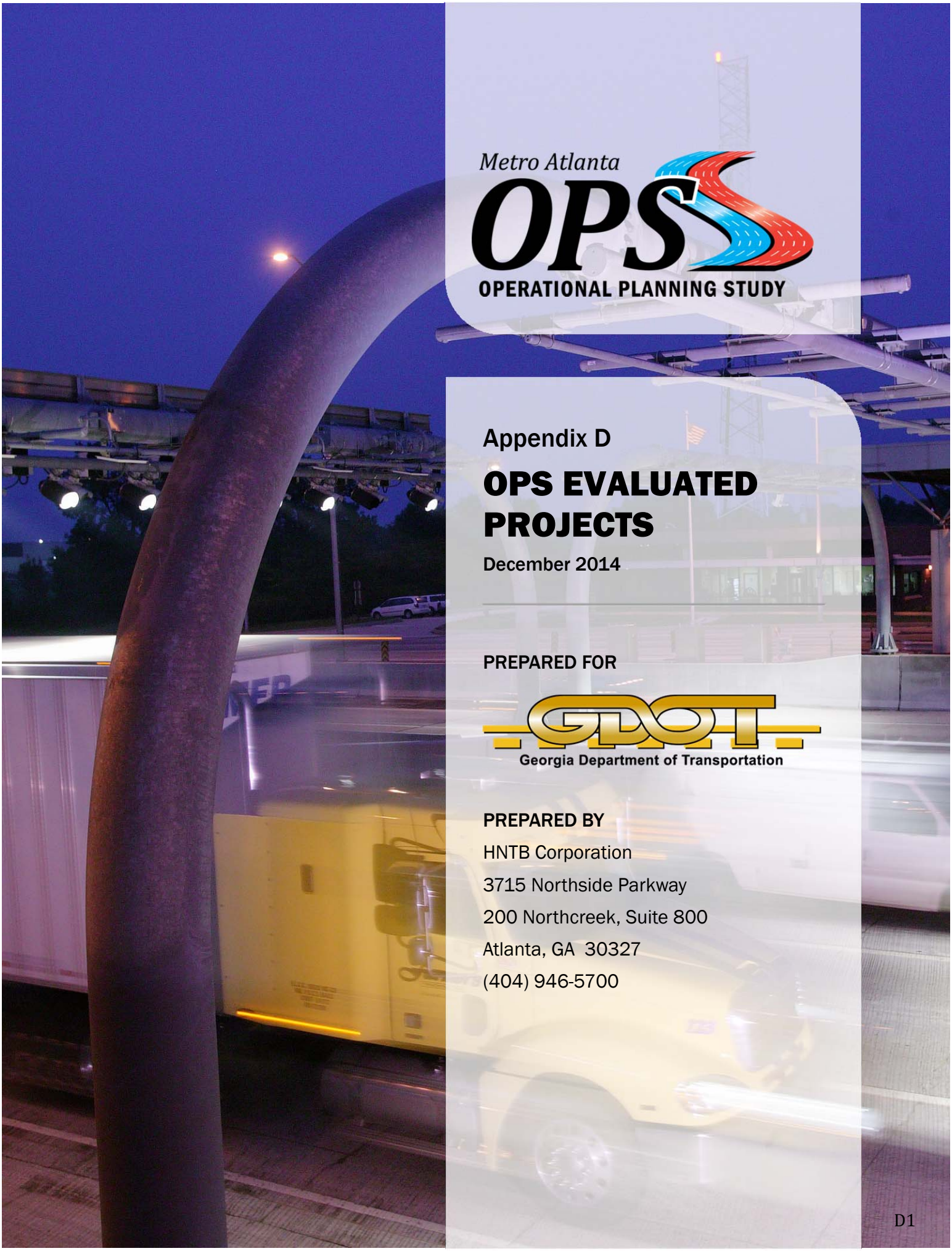
2.3.4 VISSIM (European micro-simulation model)

Downtown Connector AM Peak Hour VISSIM Results - OPS Improvements

Link #	Avg SegLen	Avg Volume	Avg Speed	Avg Density	Link Travel Time (sec)	VMT (veh.miles)	VHT	Travel Time (Sec)	VMT	VHT	Length (ft)
1039	1349	10460	63	165	14.52	2672	42	617	46660	1678	24901
11398	72	10490	63	168	0.79	144	2				
1	4519	10753	43	252	71.55	9203	214				
297	284	10442	30	351	6.48	562	19				
298	412	10533	30	358	9.48	822	28				
2	574	10593	29	362	13.30	1151	39				
10000	83	10482	28	380	2.04	165	6				
3	1514	10381	28	378	37.47	2977	108				
10291	143	9518	29	332	3.39	258	9				
4	796	9129	30	309	18.31	1376	46				
5	729	9182	31	300	16.20	1268	41				
7	376	8493	29	296	8.89	604	21				
10296	247	7842	27	287	6.16	367	13				
8	789	7614	26	296	20.85	1138	44				
9	2006	8237	25	334	55.42	3130	127				
10305	53	8197	23	363	1.59	82	4				
309	980	8671	21	411	31.65	1609	76				
10317	54	8564	23	374	1.60	87	4				
317	290	8323	24	354	8.42	458	19				
10320	44	8536	24	361	1.26	71	3				
10	864	10864	21	507	27.47	1777	83				
10322	50	11064	22	497	1.52	104	5				
11	1007	11538	23	501	29.76	2199	95				
10055	109	11291	22	508	3.34	233	10				
12	869	11059	22	509	27.23	1820	84				
10324	42	10569	21	512	1.39	84	4				
16	423	10320	21	501	13.98	826	40				
10330	143	8972	19	483	5.23	242	13				
17	1005	8818	18	487	37.77	1678	93				

18	241	9252	18	509	9.03	422	23				
21	287	9616	17	563	11.44	523	31				
19	896	9541	18	544	34.80	1619	92				
10010	35	9531	18	539	1.36	64	4				
23	247	9964	18	557	9.40	465	26				
24	761	10242	19	536	27.13	1476	77				
10013	58	10390	23	448	1.69	113	5				
25	771	10360	28	374	18.97	1514	55				
10140	92	10157	34	297	1.84	177	5				
26	1688	9935	47	211	24.45	3176	67				
250	8434	8244	63	132	91.90	13169	210				
1049	675	7666	63	122	7.30	981	16				
253	1332	7777	62	125	14.55	1962	31				
10245	55	7865	63	125	0.60	82	1				
256	384	7721	63	123	4.16	562	9				
10247	112	7899	63	125	1.22	168	3				
257	917	7830	63	125	9.97	1360	22				
259	386	6797	63	108	4.19	497	8				
10248	186	6861	63	110	2.02	241	4				
316	808	6736	63	107	8.75	1030	16				
10250	56	6852	63	109	0.60	72	1				
260	1376	7638	63	122	14.92	1990	32				
10252	48	7721	62	124	0.52	70	1	227	28623	486	19452
262	395	7932	61	131	4.43	593	10				
10254	23	8076	60	136	0.26	35	1				
264	245	7753	59	132	2.84	359	6				
10255	52	8063	58	140	0.62	80	1				
263	735	8013	55	146	9.09	1115	20				
10256	52	8035	53	152	0.67	79	2				
266	630	8464	50	171	8.65	1011	20				
10547	46	7114	49	148	0.65	63	1				
267	1291	7077	48	149	18.27	1731	36				
10281	62	6028	43	143	0.98	71	2				
269	902	5984	40	154	15.44	1022	26				
10258	68	5974	37	163	1.24	77	2				
272	181	5919	37	163	3.34	203	5				
10260	137	2942	28	109	3.37	76	3	31	596	24	1121
270	984	2788	24	117	27.79	520	22				
10311	91	1782	13	137	4.72	31	2				
312	829	1730	11	166	53.76	272	26	74	371	35	1142
10313	28	1728	10	181	1.99	9	1				

314	194	1620	10	166	13.46	59	6				
315	419	2577	14	186	20.59	204	15	59	565	42	1167
10316	73	2652	13	198	3.71	37	3				
313	635	2523	13	191	32.81	304	23				
10321	40	2617	14	186	1.92	20	1				
219	614	2437	59	41	7.05	284	5	108	1038	37	4060
10309	114	1196	63	19	1.23	26	0				
305	2769	1173	28	47	68.63	615	22				
10303	44	1110	13	88	2.27	9	1				
306	518	1060	12	89	29.13	104	9				
176	798	7966	53	150	10.22	1204	23	168	22127	432	12849
10163	54	8184	54	152	0.68	84	2				
175	333	7936	55	145	4.15	501	9				
10161	40	8185	56	146	0.49	62	1				
173	1292	8131	60	136	14.79	1990	33				
10159	23	7279	61	119	0.26	32	1				
172	109	7280	61	120	1.22	150	2				
166	68	7133	61	117	0.76	92	2				
165	440	7143	62	116	4.88	595	10				
10148	33	7199	62	117	0.36	45	1				
164	127	6175	62	100	1.41	148	2				
160	615	7053	62	114	6.81	822	13				
158	2058	7819	60	131	23.56	3048	51				
10143	59	8565	57	150	0.70	96	2				
159	117	8601	57	152	1.41	191	3				
10142	64	8998	56	162	0.78	109	2				
154	1273	9132	57	161	15.26	2201	39				
10137	40	9892	52	190	0.53	76	1				
152	892	9789	57	172	10.70	1654	29				
150	688	9474	51	184	9.12	1235	24				
149	78	10127	43	234	1.22	149	3				
10131	49	10685	38	282	0.87	98	3				
148	89	10270	30	342	2.02	174	6				
147	666	9744	35	284	13.09	1229	35				
143	1269	10566	39	281	22.22	2539	65				
142	1574	12089	52	244	20.77	3604	70				
Volume	**610**	**7805**	**40**	**240**							



Metro Atlanta OPS

OPERATIONAL PLANNING STUDY

Appendix D

OPS EVALUATED PROJECTS

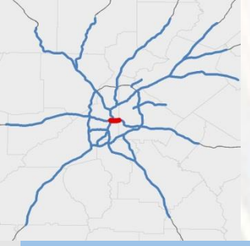
December 2014

PREPARED FOR

Georgia Department of Transportation

PREPARED BY

HNTB Corporation
3715 Northside Parkway
200 Northcreek, Suite 800
Atlanta, GA 30327
(404) 946-5700



ID# 1: I-20 East WB from Moreland Ave. to DT Connector

Location: I-20 WB from Moreland Ave. to Downtown Connector (2.2 miles)

Cause of Bottleneck: WB weave from 4 on-ramps and 4 off-ramps within 2.2 miles

Potential Operational Strategies for Evaluation:

1) Dynamically close Capitol Ave. WB Off-Ramp by time of day

2) Dynamically close Hill St. WB Off-Ramp by time of day

3) WB C/D System from Moreland Ave. to Downtown Connector

Capitol Ave. WB Off-Ramp	AM Peak	PM Peak
Ramp Volume	700	200

Hill St. WB Off-Ramp	AM Peak	PM Peak
Ramp Volume	1,000	300

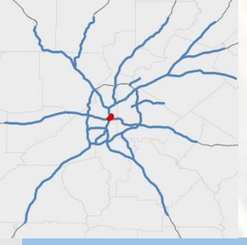
I-20 WB @ Boulevard	AM Peak	PM Peak
Mainline	4,200	4,800
Congested Speed	> 45 mph	> 45 mph

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Close Capitol off-ramp	$48,100	$0	$473,590	$521,690
Close Hill off-ramp	$45,500	$0	$448,045	$493,545
C/D System	$38,915,448	$7,098,000	$3,892,200	$49,905,648

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 2: Downtown Connector NB from I-20 to International Blvd.

Location: Downtown Connector NB from I-20 to International Blvd.

Cause of Bottleneck: I-20 merging traffic and traffic weaving between MLK Jr. Dr. and Edgewood Ave. on the Downtown Connector

Potential Operational Strategies for Evaluation:

1) Close NB exit ramp at Edgewood Ave. to passenger vehicles (transit and emergency vehicles allowed)
2) Drop thru lane (dynamically) on Downtown Connector NB south of I-20 to provide I-20 users merging onto Downtown Connector another thru lane (bring all 3 I-20 lanes on to NB Downtown Connector)
3) Dynamically close Fulton St. NB on-ramp

Fulton St. NB On-Ramp	AM Peak	PM Peak
Ramp Volume	600	400

I-75/I-85 NB @ Fulton St.	AM Peak	PM Peak
Mainline	5,500	3,900
Congested Speed	> 45 mph	< 25 mph

I-20 to NB DT Connector On-Ramp	AM Peak	PM Peak
Ramp Volume	1,900	2,100

Edgewood NB Off-Ramp	AM Peak	PM Peak
Ramp Volume	300	500

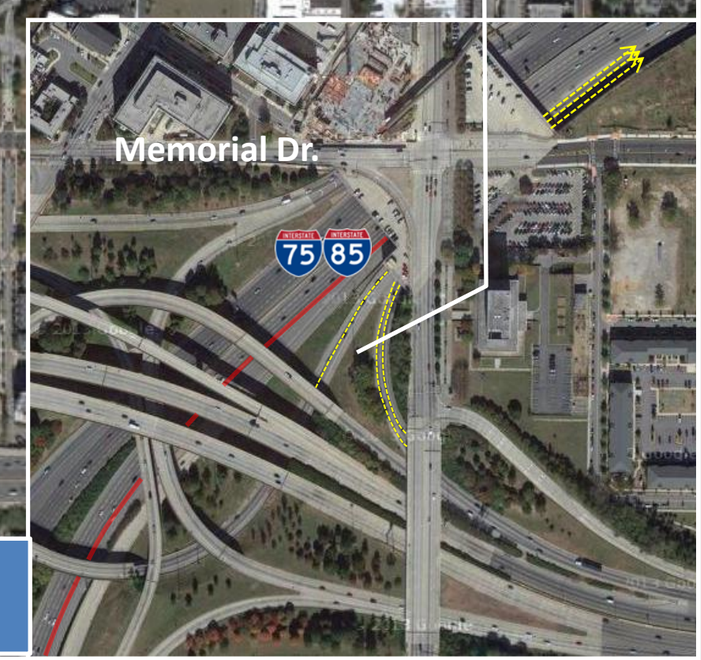
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Close Edgewood off-ramp	$45,500	$0	$448,045	$493,545
Drop thru lane	$91,000	$0	$897,195	$988,195
Close Fulton on-ramp	$44,200	$0	$438,750	$482,950

Option 1: Close Edgewood Ave. Off-Ramp to passenger vehicles

Option 2: Dynamically drop thru lane on Connector and bring 3 lanes from I-20 onto Connector

Source: Google

Option 3: Dynamically close Fulton St. On-Ramp



Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 3: Downtown Connector SB from Freedom Pkwy. to I-20

Location: Downtown Connector from Freedom Pkwy. to I-20

Cause of Bottleneck: Merging and diverging traffic (weave); 3 on-ramps and 2 off-ramps in ¾ mile

Potential Operational Strategies for Evaluation:

1) Close On-Ramp at either:
   a) Ellis St. ; or
   b) Edgewood Ave.
2) Close MLK Off-Ramp
3) Modify DT Connector (to I-20) to 3 lane drop instead of 2

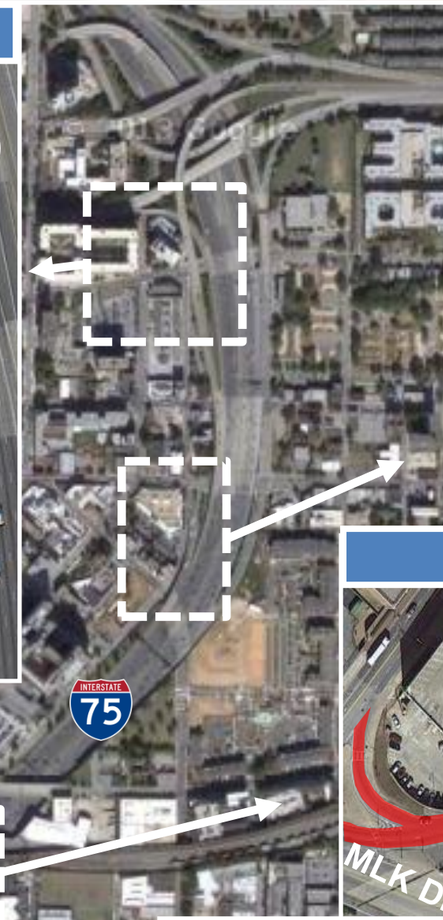
Ellis St. SB On-Ramp	AM Peak	PM Peak
Ramp Volume	300	200

Edgewood Ave. SB On-Ramp	AM Peak	PM Peak
Ramp Volume	400	900

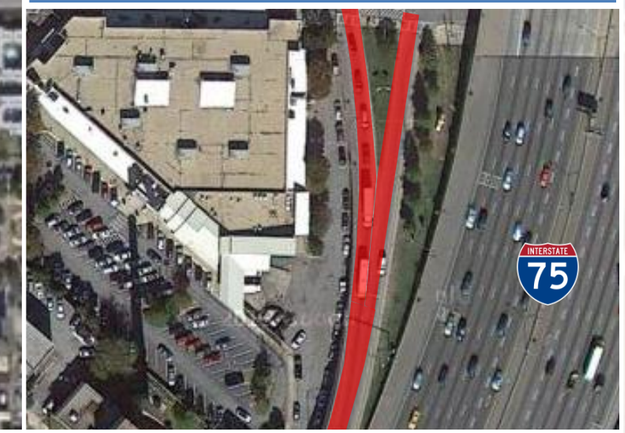
MLK Jr. Dr. SB Off-Ramp	AM Peak	PM Peak
Ramp Volume	900	100

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Close Ellis St.off-ramp	$23,400	$0	$232,895	$256,295
Close Edgewood Ave. off-ramp	$23,400	$0	$232,895	$256,295
Close Fulton on-ramp	$45,500	$0	$448,045	$493,545
Close Fulton on-ramp	$152,100	$0	$1,514,500	$1,666,600

1a: Close Ellis St. On-Ramp

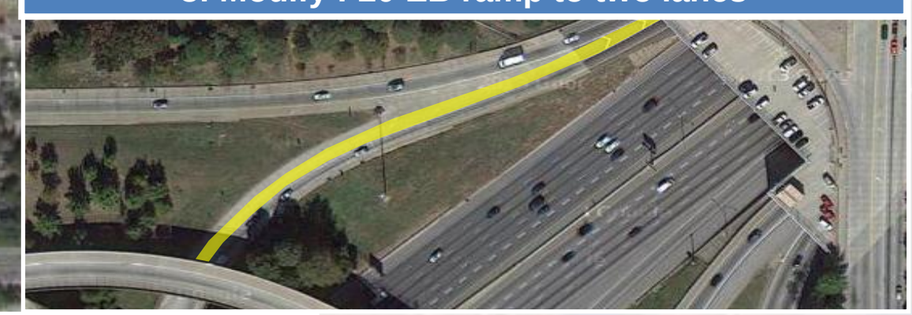


1b: Close Edgewood Ave. On-Ramp



2: Close MLK Dr. Off-Ramp

3: Modify I-20 EB ramp to two lanes

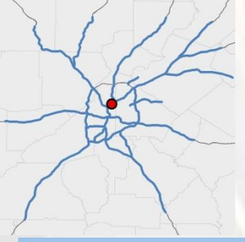


Source: Google

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 4: Buford Connector NB @ Monroe Dr.

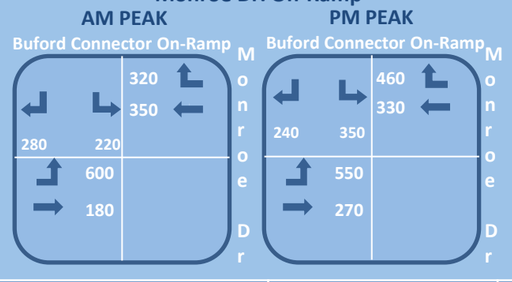
Location: Monroe Dr. On-Ramp at NB Buford Connector

Cause of Bottleneck: Weaving (Multiple on/ off-ramps in a short distance)

Potential Operational Strategies for Evaluation:

1) Close on-ramp from Monroe Dr. onto NB Buford Connector
2) Add ramp meter on Monroe Dr. on-ramp to Buford Connector (2 cars per green)
3) Use approx. 1 mile of shoulder between Monroe Dr. and I-85 on-ramp
4) Add second left turn lane at NB Off-ramp to Monroe Dr.
5) NB Auxiliary lane from Piedmont off-ramp to I-85 NB off-ramp

Monroe Dr. On-Ramp



Buford Connector	AM Peak	PM Peak
Mainline	1,710	1,660
NB On-ramp from Monroe Dr.	920	1,010
NB Off-ramp to Monroe Dr.	500	600
NB Off-ramp to I-85	1,250	2,230
NB Off-ramp to Piedmont Rd.	640	560

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Close Monroe Dr. on-ramp	$6,500	$0	$63,895	$70,395
Add ramp meter	$5,200	$0	$50,245	$55,445
Extend auxiliary lane	$614,900	$0	$6,141,447	$6,756,347
Add left turn lane to off-ramp	$88,400	$0	$879,190	$967,590
Extend auxiliary lane	$522,600	$0	$5,216,317	$5,738,917

Option 3: Add Shoulder Lane to I-85 Ramp

Option 2: Add Ramp Meter

Option 1: Close Monroe On-Ramp

Option 4: Add second left turn lane at NB Off-ramp to Monroe Dr.

Traffic Data Source: TMC Data/Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 5: I-85 North SB from SR 400 Merge to Buford Connector

Location: SB I-85 North from SR 400 merge to Buford Connector (1.3 miles)

Cause of Bottleneck: Weaving

Potential Operational Strategies for Evaluation:

1) Active Traffic Management (full gantry) including using auxiliary lanes, advance queue warning and variable speed limit strategies for I-85 (carry 2nd lane through at SR 400/I-85 merge SB and carry to I-75 with drop just before Buford Connector on-ramp)

I-85 SB @ Buford Connector	AM Peak	PM Peak
Mainline	7,600	6,000
Congested Speed	> 45 mph	26 – 35 mph

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$120,900	$0	$1,198,132	$1,319,032

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 6: I-75 N SB from SR 5 to SR 120

Location: I-75 N SB between SR 5 to SR 120 (1.5 miles)

Cause of Bottleneck: High volume on-ramps accessing I-75

Potential Operational Strategies for Evaluation:

1) Use SB shoulder as an auxiliary lane between SR 5 and SR 120 during AM peak period

I-75 SB	AM Peak	PM Peak
Mainline	8,840	7,410

I-75 SB Ramps	AM Peak	PM Peak
SB On-ramp from SR 5	820	730
SB Off-ramp to SR 120	700	750

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$395,200	$0	$3,945,825	$4,341,025

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 7: I-75 NB from SR 120 to SR 5

Location: I-75 NB between SR 120 to SR 5 (1.5 miles)

Cause of Bottleneck: High volume on-ramps accessing I-75, NB truck restrictions complicate traffic weaving

Potential Operational Strategies for Evaluation:

1) Use NB shoulder as an auxiliary lane between SR 5 and SR 120 during PM peak period

I-75 NB	AM Peak	PM Peak
Mainline	6,600	8,990

I-75 NB Ramps	AM Peak	PM Peak
NB On-ramp from SR 120	670	890
NB Off-ramp to SR 5	710	910

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$397,800	$0	$3,971,175	$4,368,975

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 8: I-85 @ SR 316

Location: I-85 @ SR 316

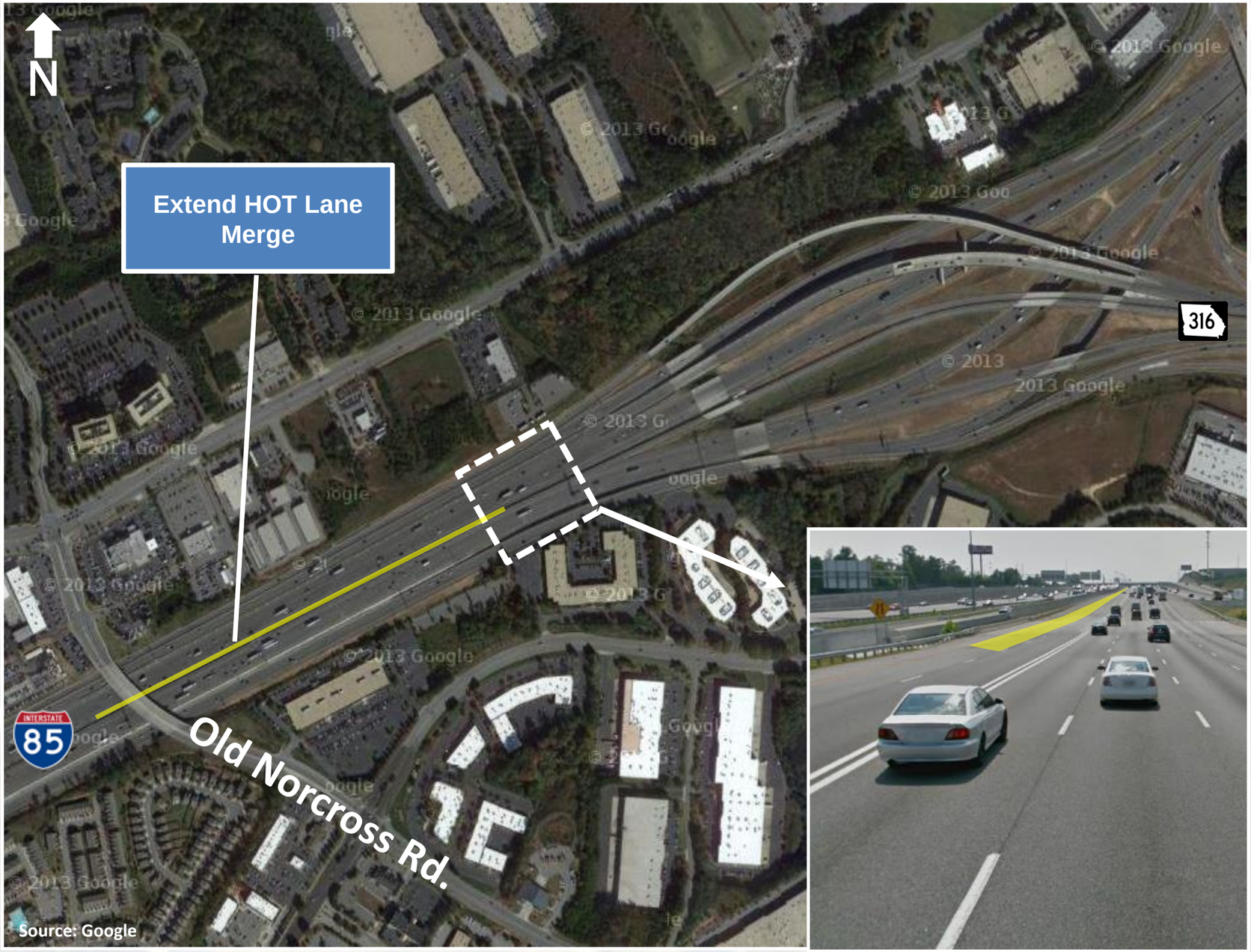
Cause of Bottleneck: Merge distance

Potential Operational Strategies for Evaluation:

1) Re-stripe SR 316 HOT lane on-ramp from 700' to 4000' to allow more merging space for vehicles merging from SR 316 to I-85 HOT lane

I-85 @ SR 316	AM Peak	PM Peak
Mainline	3,000	5,300

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Extend HOT lane merge	$153,400	$0	$1,530,035	$1,683,435



Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 9: SR 400 SB from Holcomb Bridge Rd. to Abernathy Rd.

Location: SR 400 SB from Holcomb Bridge Rd. to Abernathy Rd. (6.4 miles)

Cause of Bottleneck: High traffic volume

Potential Operational Strategies for Evaluation:

1) Upgrade current signage and technology to enhance existing shoulder lane performance (full gantry)

SR 400 SB @ Northridge Rd.	AM Peak	PM Peak
Mainline	5,400	5,500
Congested Speed	35 – 45 mph	35 – 45 mph

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Active Traffic Management	$179,400	$0	$1,794,000	$1,973,400

Traffic Data Source: TMC Data

ID# 10: I-285 NW NB from S. Cobb Dr. to Paces Ferry Rd.

Location: I-285 NW NB from S. Cobb Dr. to Paces Ferry Rd. (2.5 miles)

Cause of Bottleneck: High traffic volume

Potential Operational Strategies for Evaluation:

1) Use NB shoulder as an auxiliary lane during the peak periods

I-285 NB	AM Peak	PM Peak
Mainline	7,670	5,250

I-285 NB Ramps	AM Peak	PM Peak
NB On-ramp from S. Cobb Dr.	1,570	980
NB Off-ramp to Paces Ferry Rd.	810	630

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$629,200	$0	$6,283,030	$6,912,230

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 11: I-285 NW SB from Paces Ferry Rd. to S. Cobb Dr.

Location: I-285 NW SB from Paces Ferry Rd. to S. Cobb Dr. (2.5 miles)

Cause of Bottleneck: High traffic volume

Potential Operational Strategies for Evaluation:

1) Use SB shoulder as auxiliary lane during peak periods

I-285 SB	AM Peak	PM Peak
Mainline	4,750	7,590

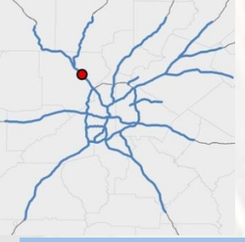
I-285 SB Ramps	AM Peak	PM Peak
SB On-ramp from Paces Ferry Rd.	460	810
SB Off-ramp to S. Cobb Dr.	820	1,230

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$629,200	$0	$6,283,030	$6,912,230

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 12: I-75 N @ North Loop/SR 120

Location: I-75 N at North Loop (NB On-ramp)

Cause of Bottleneck: Lane drops/weaving/grade

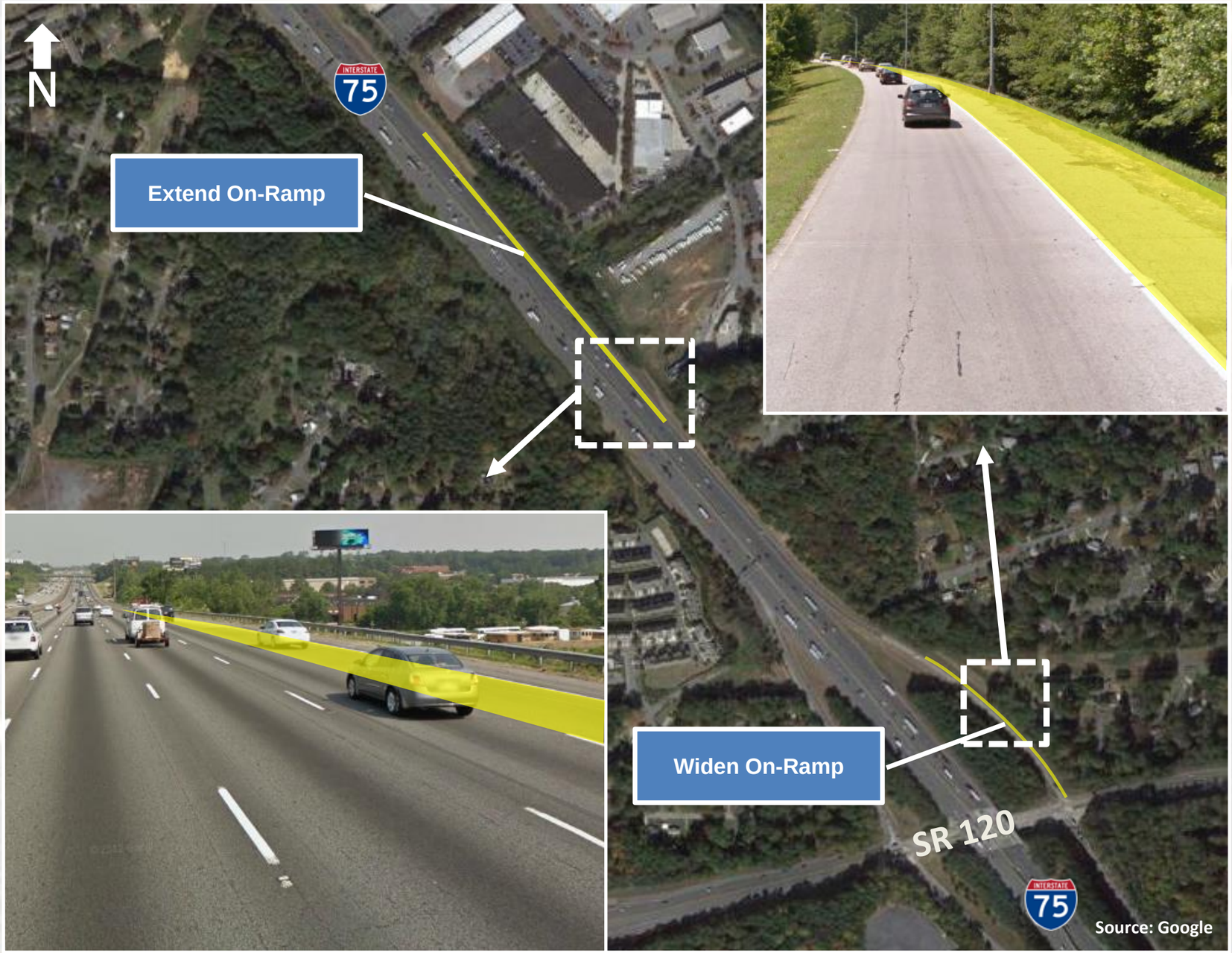
Potential Operational Strategies for Evaluation:

1) Use NB shoulder lane to extend on-ramp 1,000 feet

2) Widen SR 120 on-ramp to two lanes and merge to one lane before ramp meter

I-75 NB Ramps	AM Peak	PM Peak
NB On-ramp from SR 120	600	800

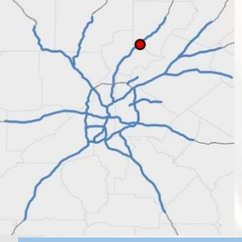
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Extend on-ramp	$80,600	$0	$803,595	$884,195
Widen on-ramp	$117,000	$0	$1,159,795	$1,276,795



Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 13: SR 400 NB b/w McFarland Rd. and SR 141/Peachtree Pkwy.

Location: SR 400 between McFarland Rd. and SR 141/Peachtree Pkwy. (3.4 miles)

Cause of Bottleneck: Two NB general purpose (GP) lanes drop and merge at McFarland Rd. (Exit 12) on SR 400.

Recently completed GDOT project extending one NB GP lane north of McFarland Rd. interchange (now merges 4 to 3 to 2 lanes in less than 1 mile).

Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane between McFarland Rd. and Peachtree Pkwy.

SR 400 @ McFarland	AM Peak	PM Peak
Mainline	1,620	3,590

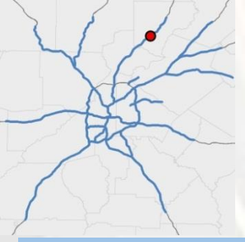
SR 400 Ramps	AM Peak	PM Peak
NB On-ramp from McFarland Rd.	380	1,180
NB Off-ramp to Peachtree Pkwy.	650	1,110

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$604,500	$0	$6,038,500	$6,643,000

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 14: SR 400 SB b/w SR 141/Peachtree Pkwy. and McFarland Rd.

Location: SR 400 between SR 141/Peachtree Pkwy. and McFarland Rd. (3.4 miles)

Cause of Bottleneck: SB On-Ramp

Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane from Peachtree Parkway to McFarland Rd.

SR 400 @ McFarland Pkwy.	AM Peak	PM Peak
Mainline	4,470	1,870

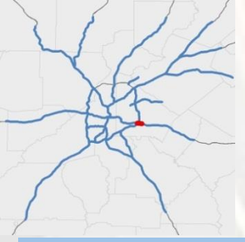
SR 400 Ramps	AM Peak	PM Peak
SB On-ramp from Peachtree Pkwy.	1,850	780
SB Off-ramp to McFarland Rd.	870	390

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$604,500	$0	$6,038,500	$6,643,000

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 15: I-20 East WB From Wesley Chapel Rd. to I-285

Location: I-20 E WB from Wesley Chapel Rd. to I-285 (0.9 miles)

Cause of Bottleneck: Weaving/Turning radius (especially for heavy trucks); High volume

Potential Operational Strategies for Evaluation:

1) Use shoulder as an auxiliary lane during AM peak period

I-20 WB	AM Peak	PM Peak
Mainline	7,750	4,830

I-20 WB Ramps	AM Peak	PM Peak
WB On-ramp from Wesley Chapel Rd.	2,530	1,260
WB Off-ramp to I-285 NB	2,780	1,780

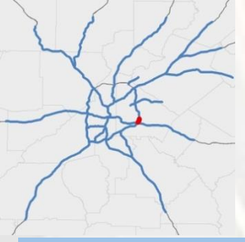
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$189,800	$0	$1,891,435	$2,081,235

Source: Google

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 16: I-285 East NB from I-20 to Glenwood Rd.

Location: I-285 E NB from I-20 to Glenwood Rd. (1.2 miles)

Cause of Bottleneck: Weaves

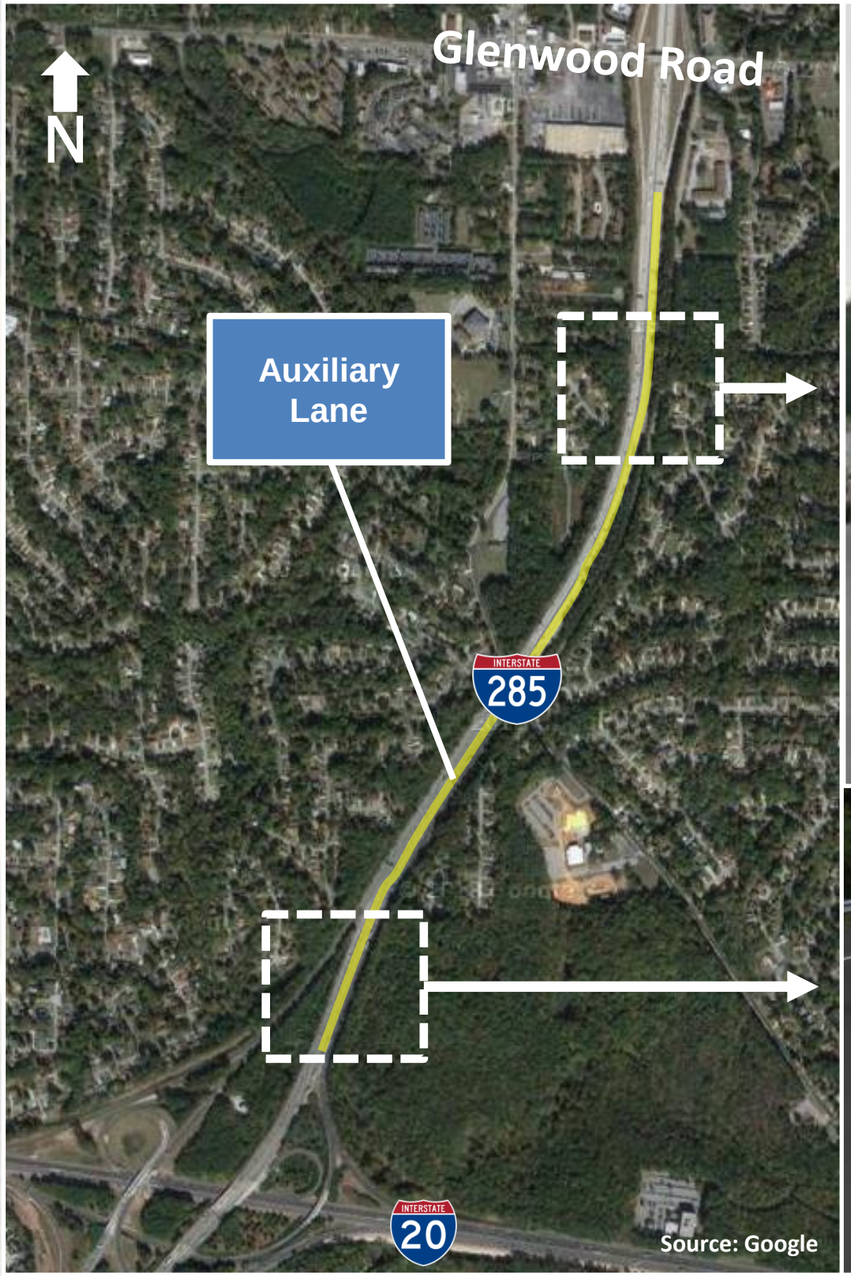
Potential Operational Strategies for Evaluation:

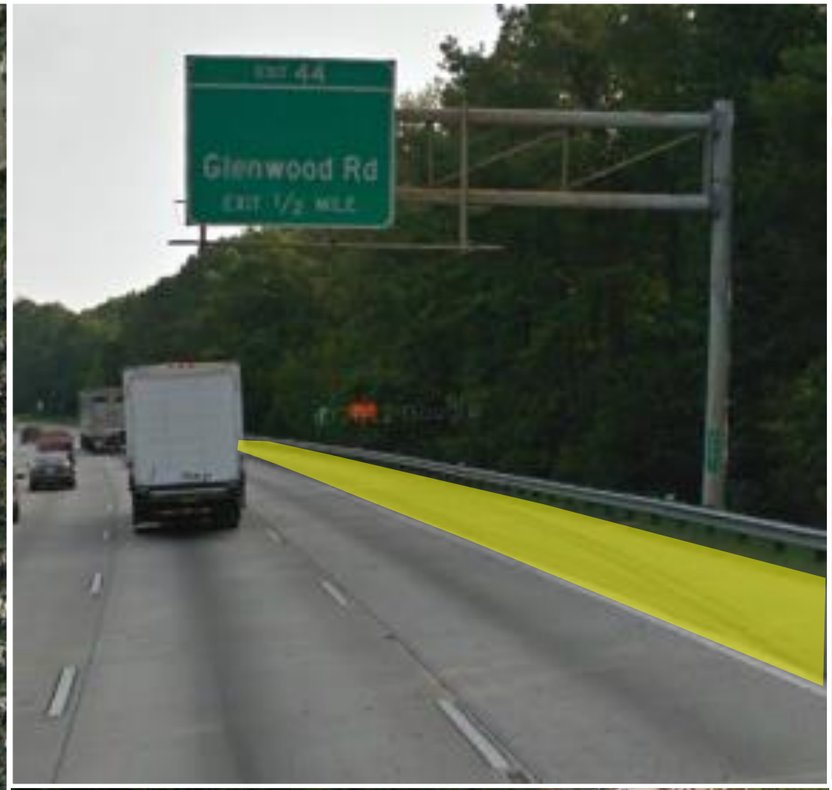
1) Use NB shoulder as an auxiliary lane to maintain an additional lane from I-20 onto I-285 NB

I-285 NB	AM Peak	PM Peak
Mainline	6,340	6,160

I-285 NB Ramps	AM Peak	PM Peak
NB On-ramp from I-20	1,280	2,230
NB Off-ramp to Glenwood Rd.	240	680

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$208,000	$0	$2,078,960	$2,286,960





Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 17: I-285 East NB from Northlake Pkwy. to I-85

Location: I-285 East NB from Northlake Pkwy. to I-85

Cause of Bottleneck: High traffic volume

Potential Operational Strategies for Evaluation:

1) Use NB shoulders as auxiliary lanes during the peak periods

I-285 NB @ Chamblee Tucker Rd.	AM Peak	PM Peak
Mainline	4,640	3,290

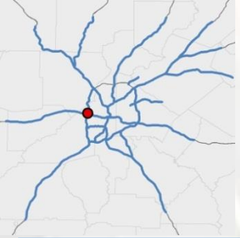
I-285 NB Ramps	AM Peak	PM Peak
NB On-ramp from Northlake Pkwy.	590	670
NB Off-ramp to I-85	2,750	2,800

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$544,700	$0	$5,436,275	$5,980,975

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 18: I-285 W/I-20 W

Location: I-285W/I-20W

Cause of Bottleneck: Tight turning radius/grade (EB to NB, SB to WB) especially for heavy trucks, combined with heavy volumes

Potential Operational Strategies for Evaluation:

1) **SB I-285 to WB I-20: Drop a WB mainline lane at the exit to I-285 S so that a lane can be added back to the mainline when both WB ramps come on (adds 2 lanes on to the mainline instead of a single lane – one of the lanes drops at Fulton Industrial Blvd.) Reconfigure (WB I-20 to SB I-285) as a lane drop.**

2) **EB I-20 to NB I-285: Drop an EB Mainline lane at the exit to I-285. Combine both ramps into a single 2-lane exit and a new two lane C/D road. The C/D road splits to 1 lane South and 1 lane North with ramp to North on a new bridge over I-285.**

Ramp Volumes	AM Peak	PM Peak
EB I-20 to SB I-285	400	1,000
I-285 NB/SB to WB I-20	1,900	1,800
WB I-20 to SB I-285	300	1,100

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Add mainline lane	$352,300	$0	$3,511,755	$3,864,055
Drop mainline lane	$702,000	$0	$7,009,470	$7,711,470

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 19-A: I-85 SB @ N. Druid Hills Rd.

Location: I-85 SB at N. Druid Hills Rd. (Southbound Exit Ramp)

Cause of Bottleneck: Frontage road traffic may create off-ramp bottleneck

Potential Operational Strategies for Evaluation:

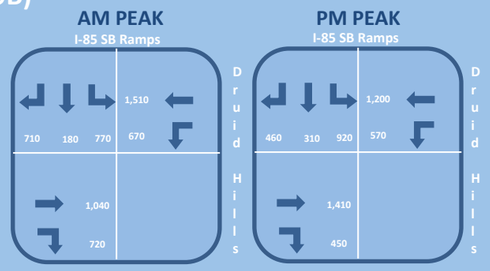
1) Close access from frontage road to I-85 SB off-ramp

2) Re-stripe SB off-ramp to 1 exclusive thru lane and 2 exclusive left turn lanes

3) Re-stripe NB on-ramp to add decision lane (see ID# 19B)

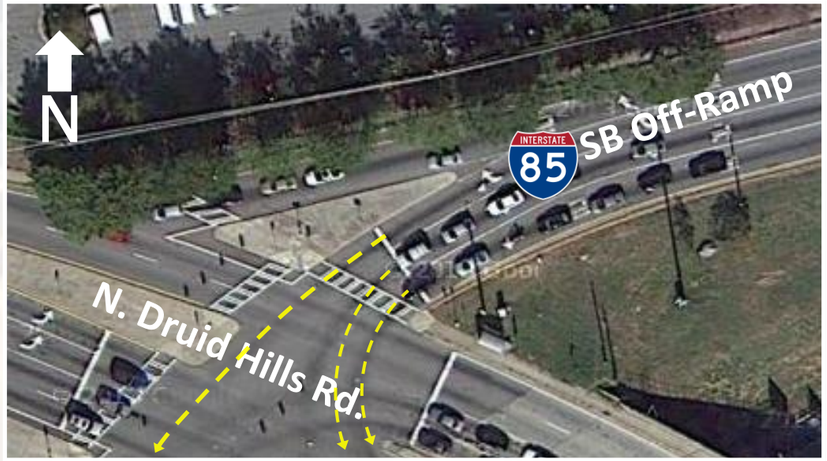
4) Re-stripe Druid Hills Rd. at Buford Hwy. adding dual left turn lanes (see ID# 19B)

N. Druid Hills Rd. @ I-85 SB

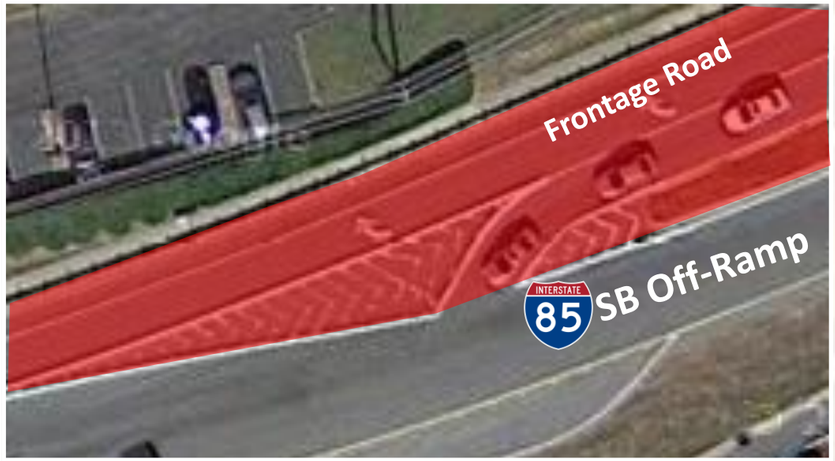


Frontage Rd.	AM Peak	PM Peak
SB Right Turn	200	90
SB Left Turn	410	720

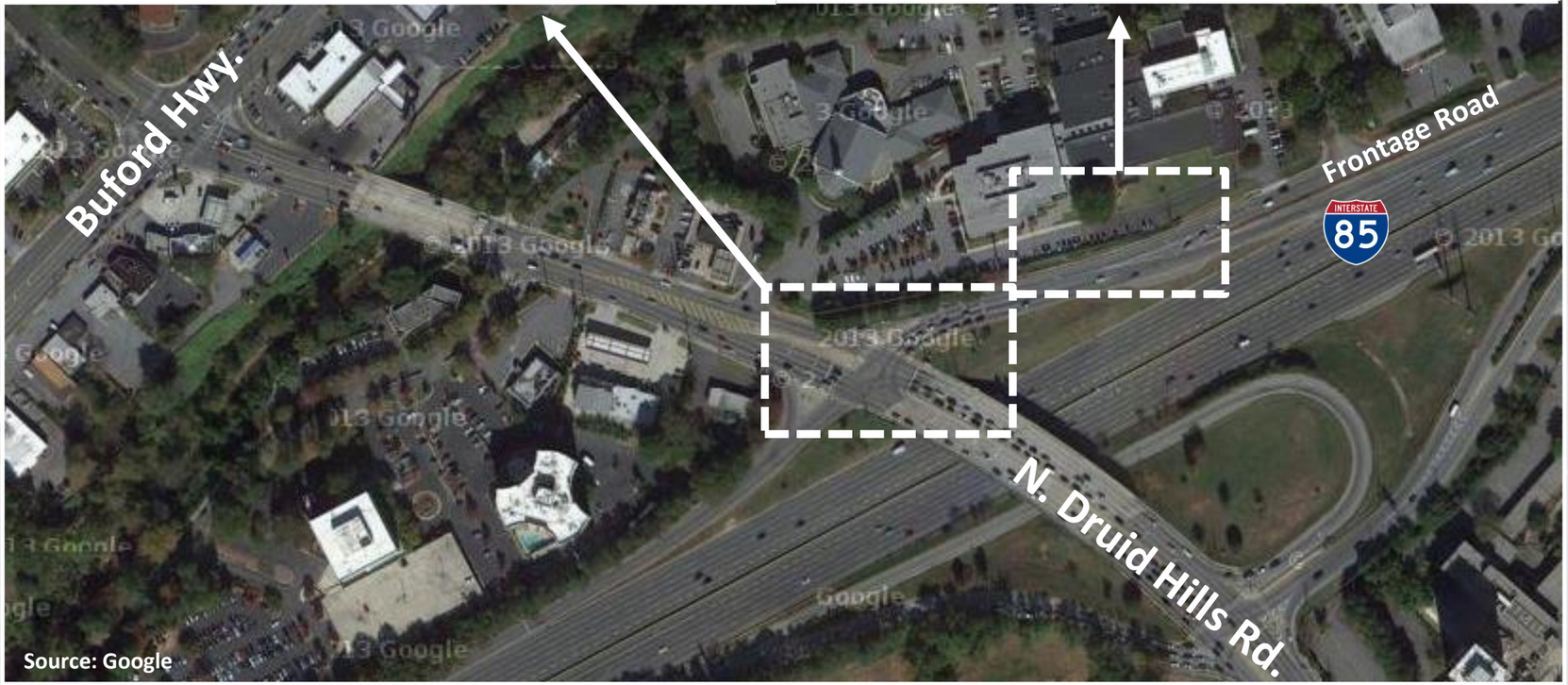
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Close Access	$22,100	$0	$220,610	$242,710
Restriping	$29,900	$0	$289,055	$318,955



Option 2: Re-stripe SB approach to 2 exclusive left turn lanes and 1 exclusive thru lane



Option 1: Close frontage road access to ramp intersection at N. Druid Hills Rd.



Source: Google

Traffic Data Source: Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 19-B: I-85 SB @ N. Druid Hills Rd.

Location: I-85 SB at N. Druid Hills Rd. (Southbound Exit Ramp)

Cause of Bottleneck: Frontage road traffic access may create off-ramp bottleneck

Potential Operational Strategies for Evaluation:

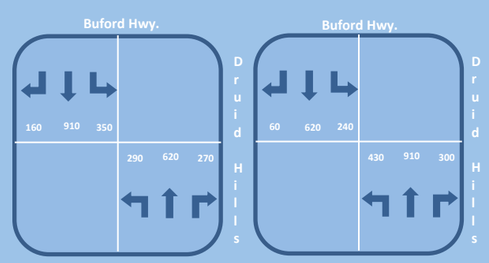
1) Close access from frontage road to I-85 off-ramp (see ID# 19A)

2) Re-stripe SB off-ramp to 1 exclusive thru lane and 2 exclusive left turn lanes (see ID# 19A)

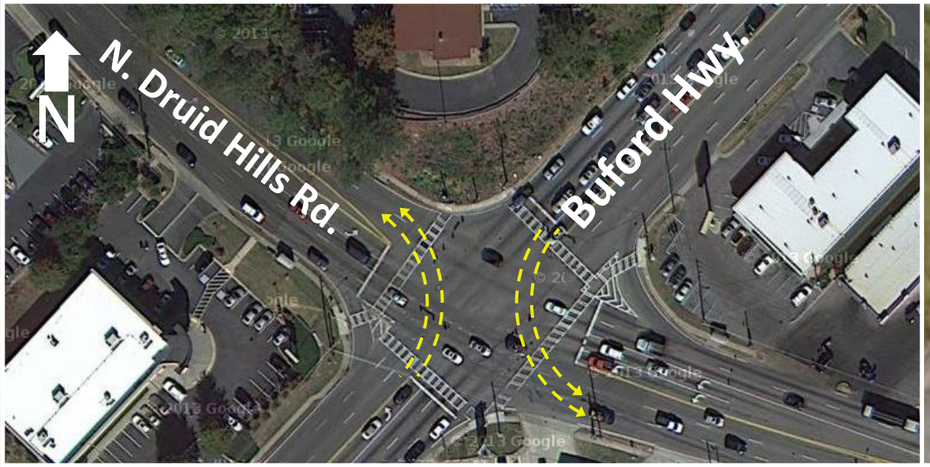
3) Re-stripe NB on-ramp to add decision lane

4) Re-stripe Druid Hills Rd. at Buford Hwy. adding dual left turn lanes and drop 1 southbound through lane on Buford Hwy.

Buford Hwy. @ N. Druid Hills Rd.



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Add decision lane	$91,000	$0	$906,425	$997,425
Dual left turn restriping	$53,300	$0	$524,290	$577,590



Option 4: Re-stripe Buford Hwy. adding NB and SB dual left turn lanes

Option 3: Re-stripe on-ramp to add NB decision lane

Source: Google

Traffic Data Source: Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 20: I-285 East SB from I-85 to Northlake Pkwy.

Location: I-285 East SB from I-85 to Northlake Pkwy.

Cause of Bottleneck: High traffic volume

Potential Operational Strategies for Evaluation:

1) Create auxiliary lane to eliminate lane drop from I-85 to I-285

I-285 SB	AM Peak	PM Peak
Mainline	5,480	6,070

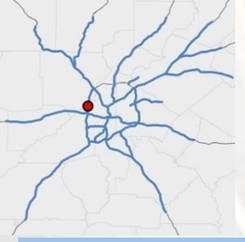
I-285 SB Ramps	AM Peak	PM Peak
SB On-ramp from I-85	500	680
SB Off-ramp to Northlake Pkwy.	650	390

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$455,000	$0	$4,538,430	$4,993,430

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



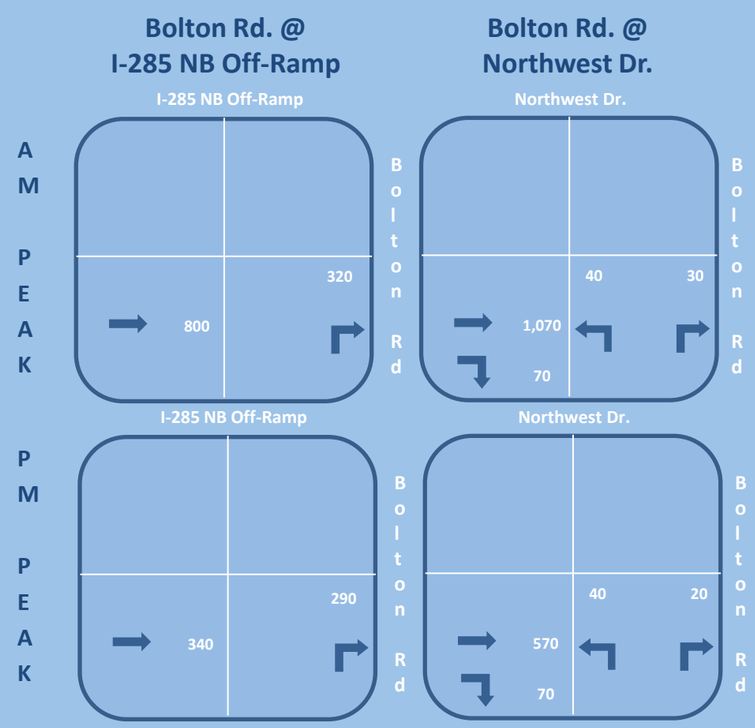
ID# 21: I-285 NW @ Bolton Rd.

Location: I-285 NW at Bolton Rd.

Cause of Bottleneck: Skewed intersection and limited sight distance

Potential Operational Strategies for Evaluation:

1) Channelize NB traffic and add designated lane using new pavement for ramp traffic

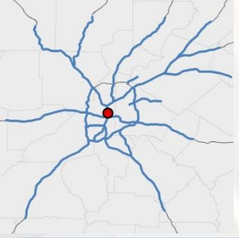


Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Add arterial thru lane	$105,300	$598,000	$1,043,614	$1,746,914

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 22: Downtown Connector NB from Freedom Pkwy. to Pine St.

Location: Downtown Connector NB from Freedom Pkwy. to Pine St.

Cause of Bottleneck: Merge of two lanes from Freedom Pkwy. onto the Downtown Connector; Diverge of Peachtree St./Pine St. traffic exiting

Potential Operational Strategies for Evaluation:

1a) Re-stripe Peachtree St./Pine St. exit from a 2-lane to a single lane exit

1b) Extend auxiliary lane via shoulder from Freedom Pkwy. to Spring St./ West Peachtree St. exit (.25 miles)

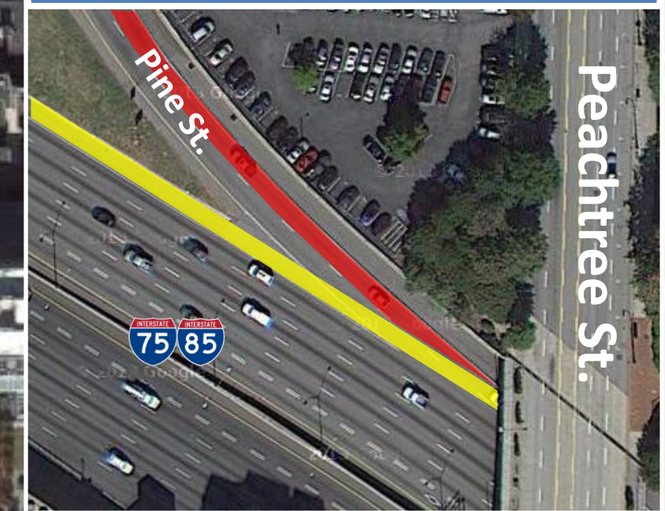
1c) Re-stripe Spring St./West Peachtree St. exit from 1 to 2 lanes (to accept shoulder lane traffic)

NB Pine/Peachtree Off-Ramp	AM Peak	PM Peak
Ramp Volume	100	400

NB DT Connector	AM Peak	PM Peak
Mainline	8,800	8,000
Congested Speed	>45	26 - 35

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Extend auxiliary lane	$105,300	$6,728,800	$67,278,185	$74,006,985

Option 1a: Re-stripe to Single Lane



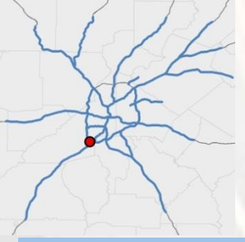
Option 1c: Re-stripe Spring St./ West Peachtree St. exit

Option 1b: Auxiliary lane

Traffic Data Source: TMC

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 23: I-285 S @ I-85 S Interchange

Location: I-285 S at I-85 S Interchange

Cause of Bottleneck: I-85 NB to I-285 NB volume

Potential Operational Strategies for Evaluation:

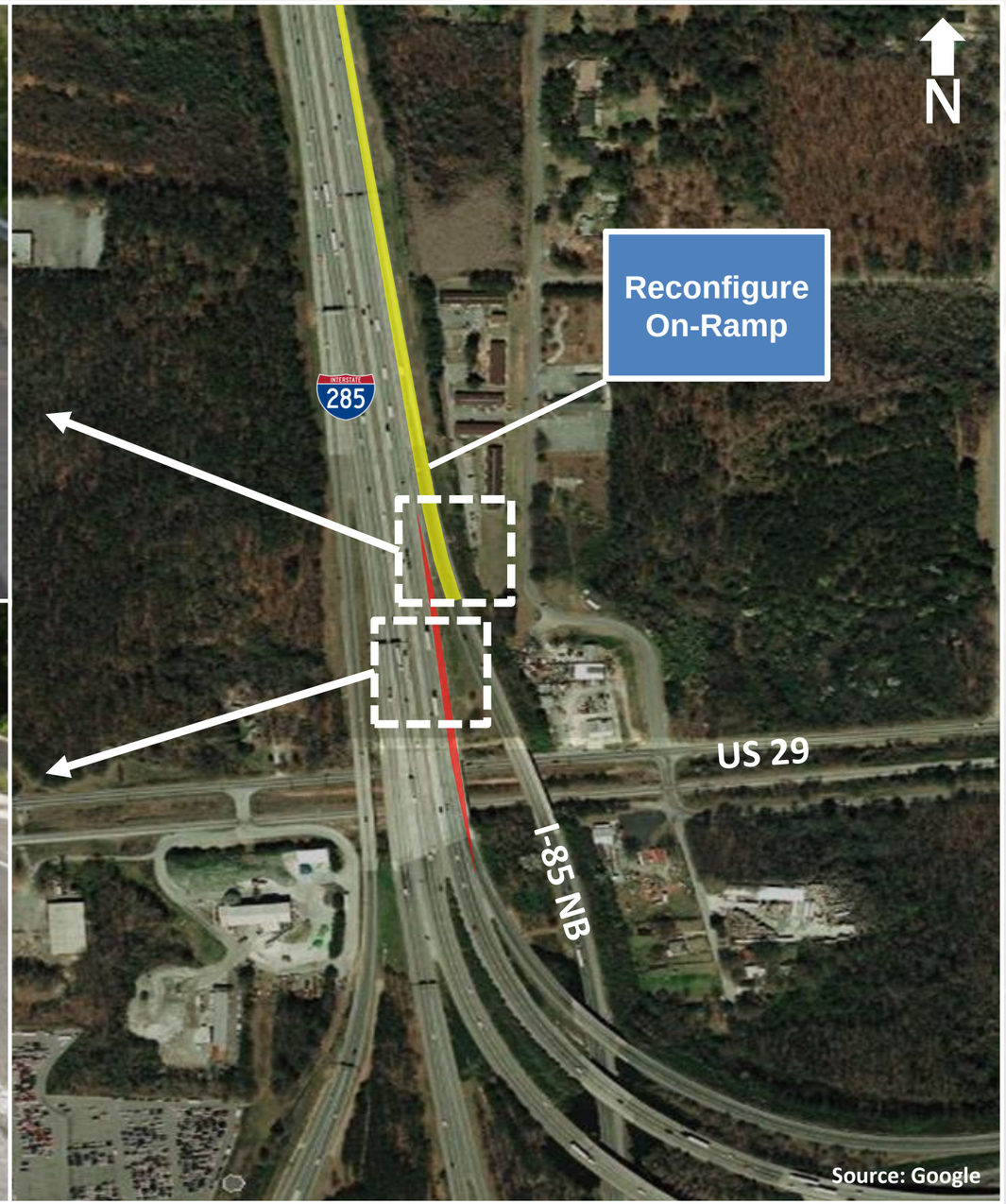
1a) Re-stripe and widen (minimally) I-85 NB on-ramp to create two-lane on-ramp

1b) Re-stripe on-ramp from WB Old National Highway C/D road to merge traffic instead of adding a lane

NB I-285	AM Peak	PM Peak
@ I-85 NB	2,530	2,440

I-285 NB Ramps	AM Peak	PM Peak
I-85 NB On-Ramp to I-285 NB	2,850	1,910
Old Natl. Hwy. NB On-Ramp to I-285 NB	690	650

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Reconfigure on-ramp	$85,800	$0	$851,279	$937,079



Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 24: US 78 WB @ I-285 NB

Location: US 78 WB at I-285 NB

Cause of Bottleneck: Signing/ Weaving/ Last minute decision making

Potential Operational Strategies for Evaluation:

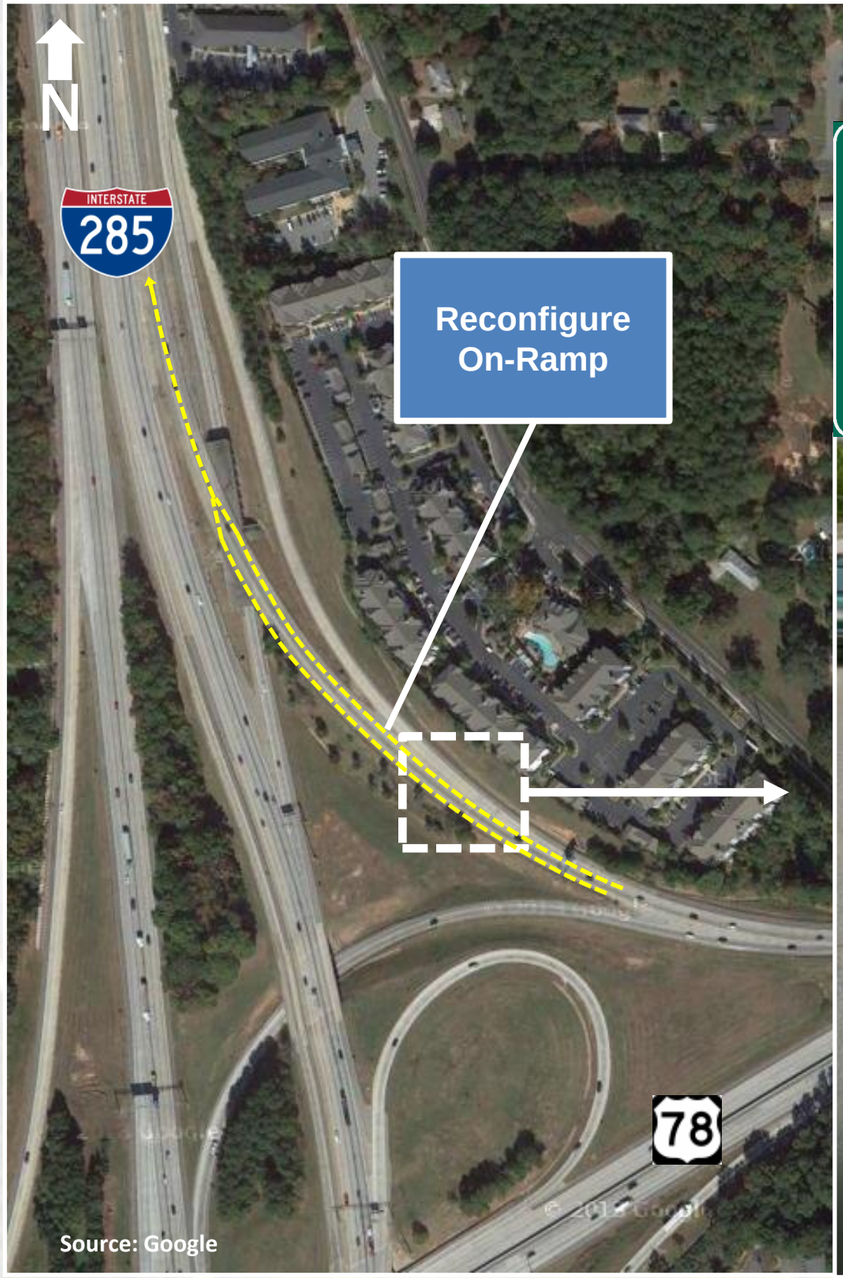
1a) Re-signing for Lawrenceville exit (change from an exit only off-ramp to a decision off-ramp)

1b) Add new pavement in the gore area to extend two-lane ramp

1c) Re-stripe two lanes from WB US 78 to NB I-285 so vehicles merge before I-285

US 78 Ramps	AM Peak	PM Peak
US 78 WB to I-285 NB	2,050	860
US 78 WB to I-285 SB	1,380	1,130

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Reconfigure on-ramp	$88,400	$0	$882,986	$971,386

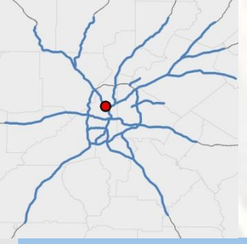


Source: Google

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 25: I-75 @ Northside Dr.

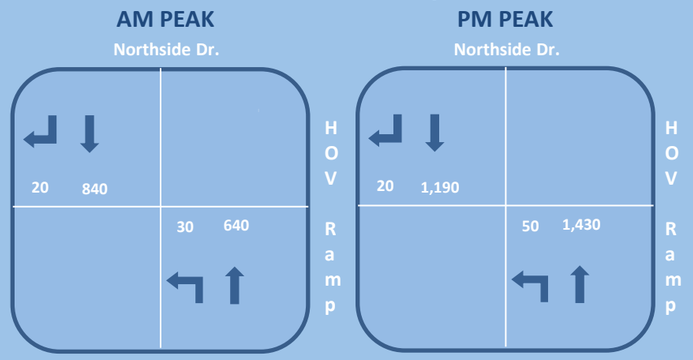
Location: I-75 at Northside Dr.

Cause of Safety Concern: HOV wrong way access

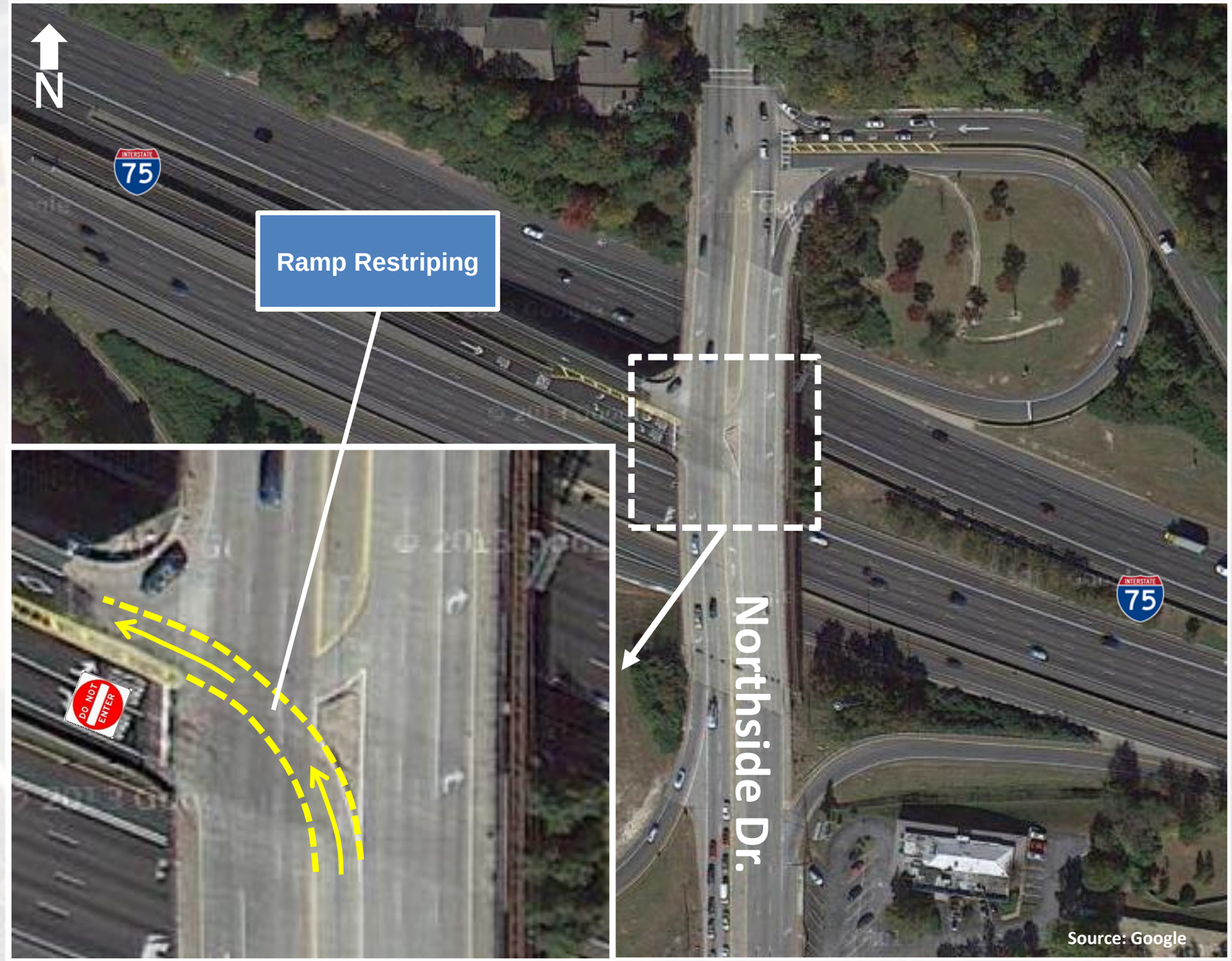
Potential Operational Strategies for Evaluation:

1) Re-striping; Add skip stripe on Northside Pkwy for WB to NB I-75 HOV entrance ramp so the drivers do not drive the wrong way on the HOV exit ramp.

Northside Dr. @
I-75 NB HOV Ramp



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Restriping	$1,300	$0	$8,645	$9,945



Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 26: SR 400 @ Abernathy Rd.

Location: SR 400 at Abernathy Rd.

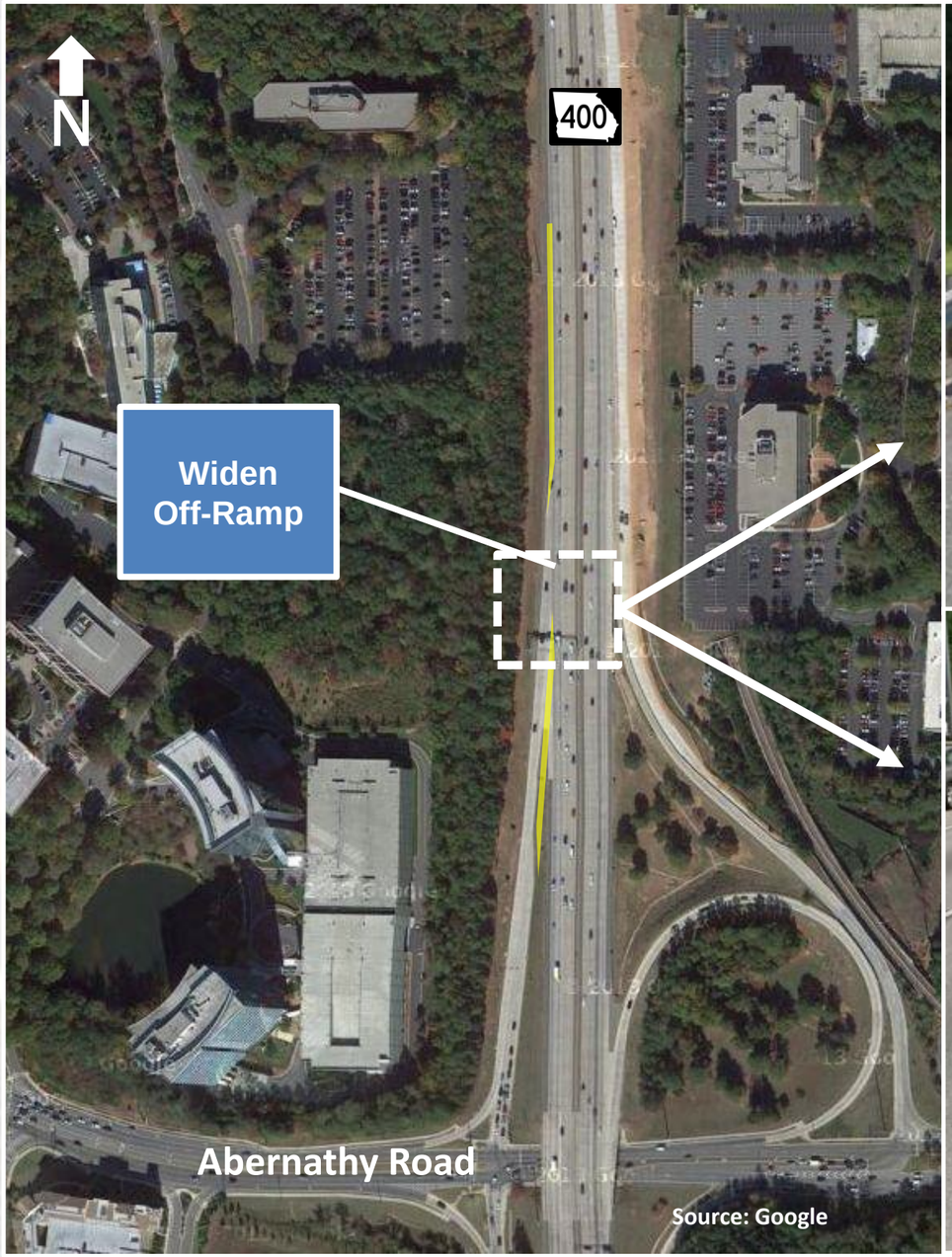
Cause of Bottleneck: High SB off-ramp volume; short deceleration length

Potential Operational Strategies for Evaluation:

1) Widen SB Off-Ramp using the shoulder to 2 lanes and extend deceleration lane by 1000'

SR 400 Ramp	AM Peak	PM Peak
Abernathy Rd. SB Off-Ramp	1,520	870

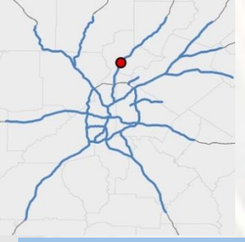
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen off-ramp	$87,100	$0	$863,983	$951,083



Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 27: SR 400 @ Holcomb Bridge Rd./SR 140

Location: SR 400 at Holcomb Bridge Rd./SR 140

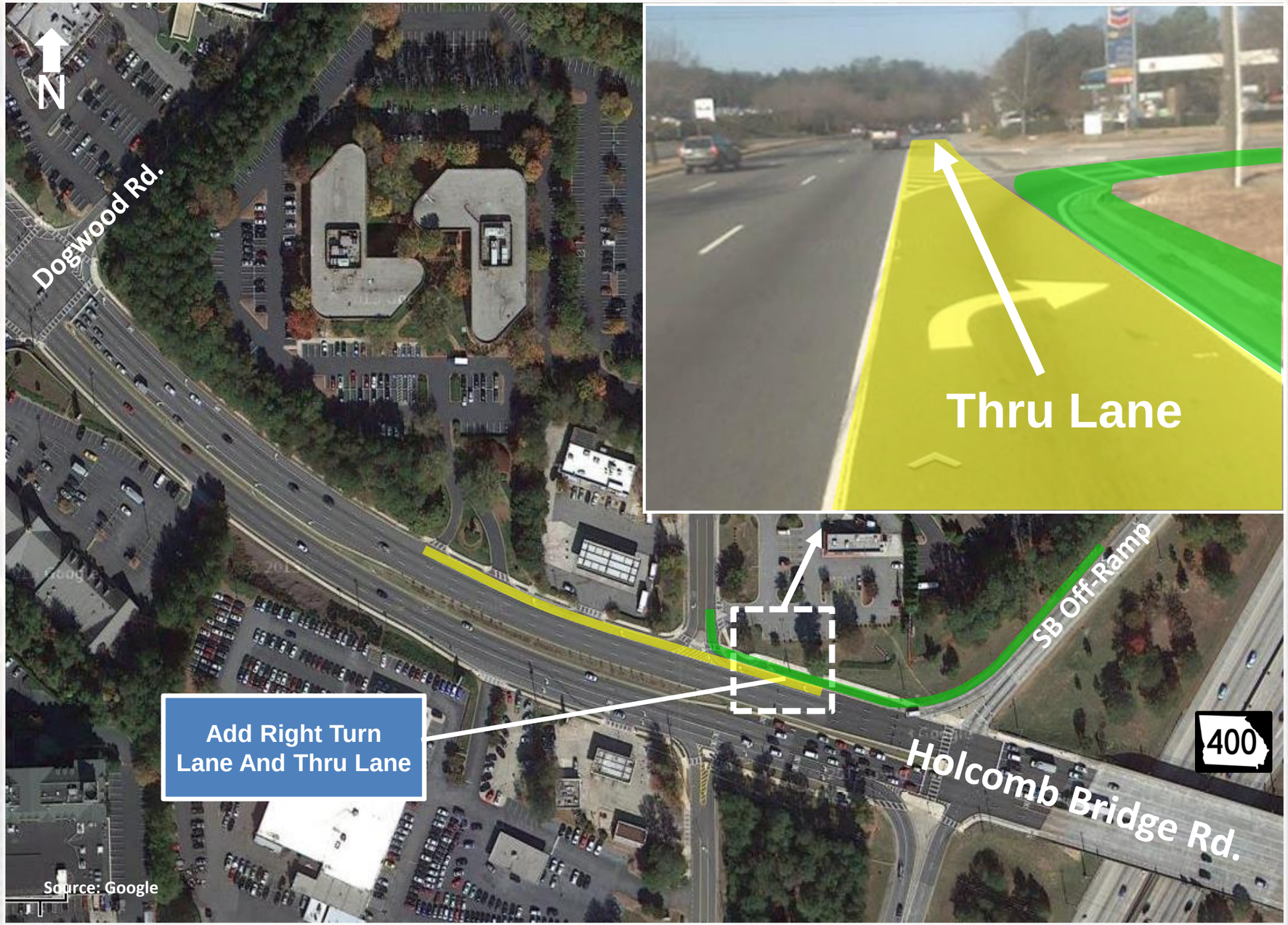
Cause of Bottleneck: High volume on SB off-ramp

Potential Operational Strategies for Evaluation:

1) Add right turn lane to SB off-ramp and modify existing striping on Holcomb Bridge Rd. to add one through lane

SR 400 Ramp	AM Peak	PM Peak
Holcomb Bridge SB Off-Ramp	300	1,000

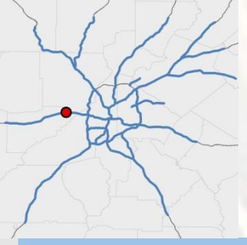
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Add turn lane	$76,700	$0	$760,370	$837,070



Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



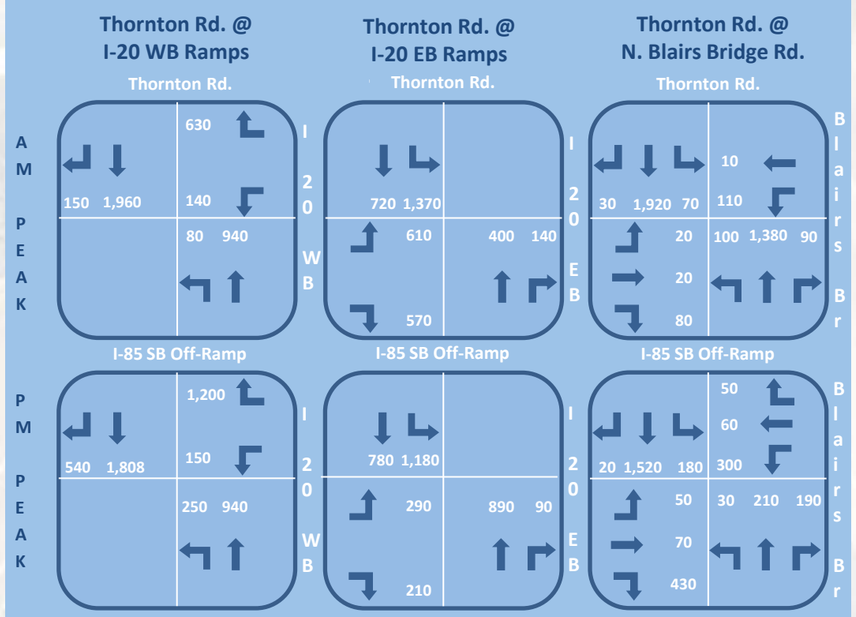
ID# 28A: I-20 @ Thornton Rd.

Location: I-20 at Thornton Rd.

Cause of Bottleneck: High left turn volumes/tight turning radii/steep grades

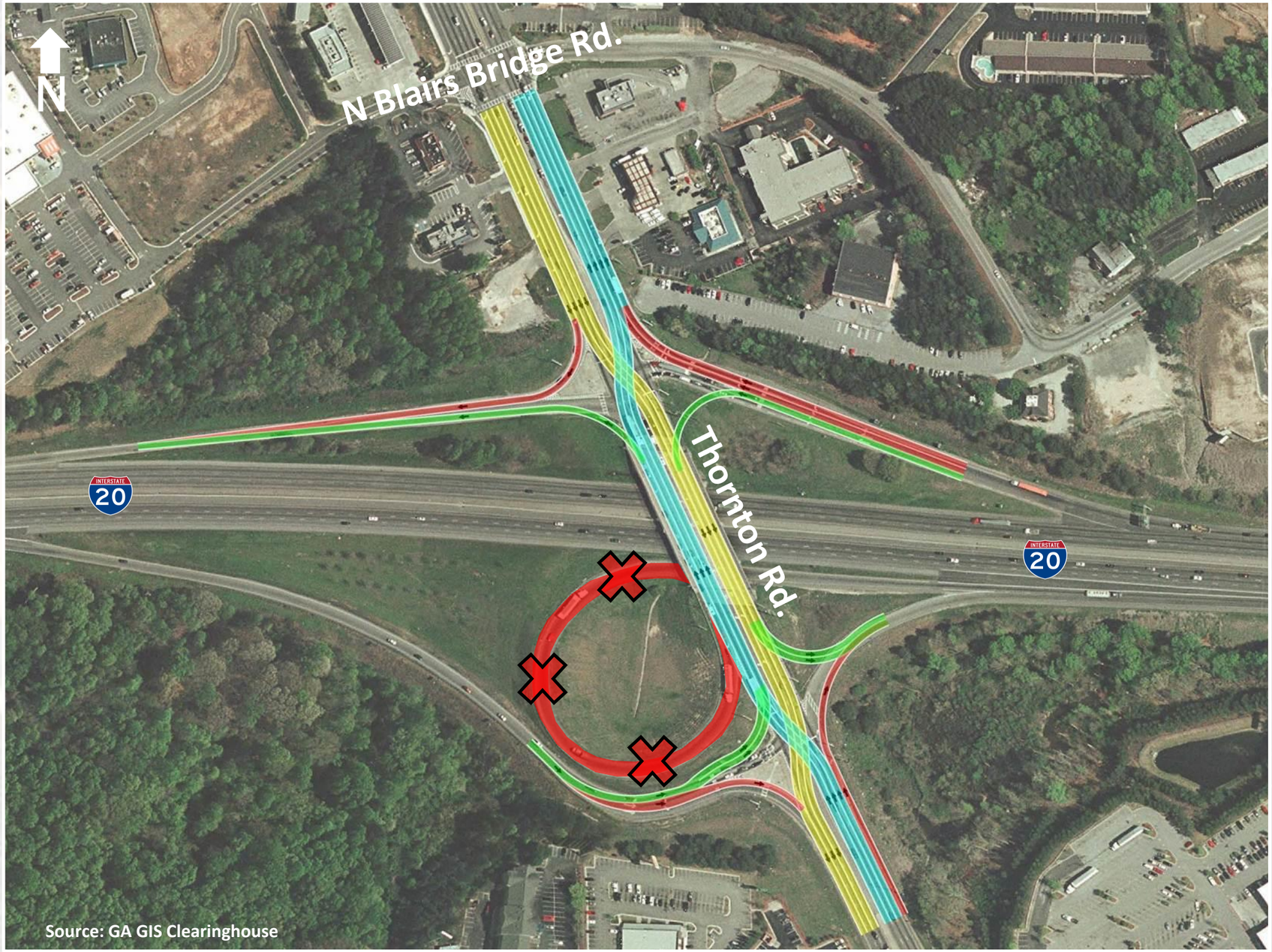
Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange and WB off-ramp re-striping (reduces the number of conflict points, enhances left turn operations, and eliminates loop ramp (tight turning radii))



I-20 @ Thornton Rd.	AM Peak	PM Peak
WB Mainline	2,970	6,103
EB Mainline	4,150	2,870

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Diverging Diamond	$327,600	$832,000	$3,268,590	$4,428,190

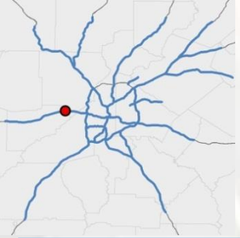


Source: GA GIS Clearinghouse

Traffic Data Source: GDOT Atlanta Radial Freeway Strategic Plan

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 28B: I-20 @ Thornton Rd.

Location: I-20 at Thornton Rd.

Cause of Bottleneck: High volumes

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange and WB off-ramp re-striping (reduces the number of conflict points, enhances left turn operations, and eliminates loop ramp (tight turning radii)) (See ID # 28A)

2) Re-stripe SB Thornton to WB Skyview Rd. right turn lane to accommodate additional SB through lane on Thornton Rd. Add two lane loop ramp on Thornton Rd. to I-20. Re-stripe WB off-ramp.

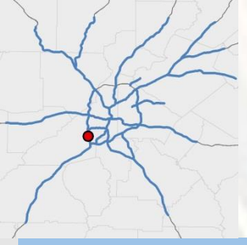
I-20 @ Thornton Rd.	AM Peak	PM Peak
WB Mainline	2,970	6,103
EB Mainline	4,150	2,870

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp upgrade and re-stripe, add thru lane	$273,000	$26,000	$2,723,500	$3,022,500

Traffic Data Source: GDOT Atlanta Radial Freeway Strategic Plan

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 29A: I-285 @ Camp Creek Pkwy.

Location: I-285 @ Camp Creek Pkwy.

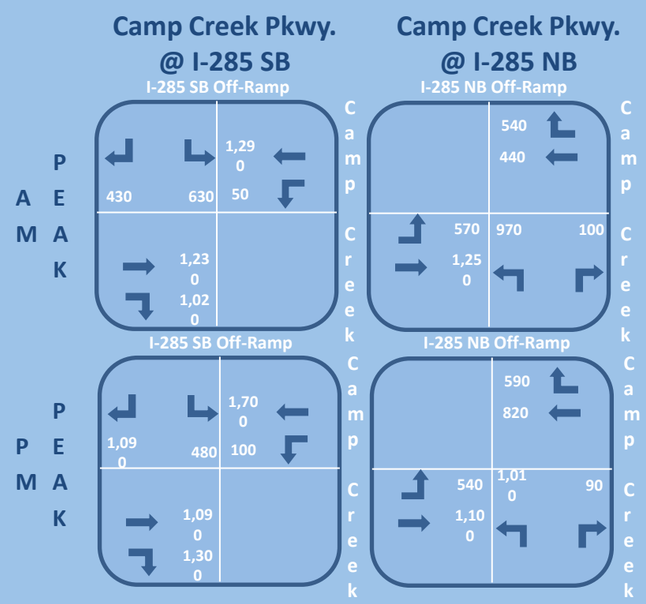
Cause of Bottleneck: Both off-ramps back up onto I-285

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange (DDI) - (reduces the number of conflict points, enhances the operations of left turns from the arterial

2) New configuration representing a hybrid of a DDI and a Displaced Left Turn Intersection (See ID# 29B)

3) New configuration hybrid of a DDI (See ID# 29C)



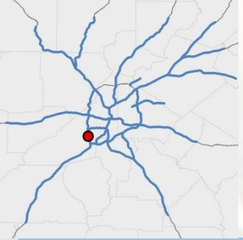
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp upgrade and re-stripe, add thru lane	$769,600	$312,000	$7,692,750	$8,774,350

Source: GA GIS Clearinghouse

Traffic Data Source: Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 29B: I-285 @ Camp Creek Pkwy.

Location: I-285 @ Camp Creek Pkwy.

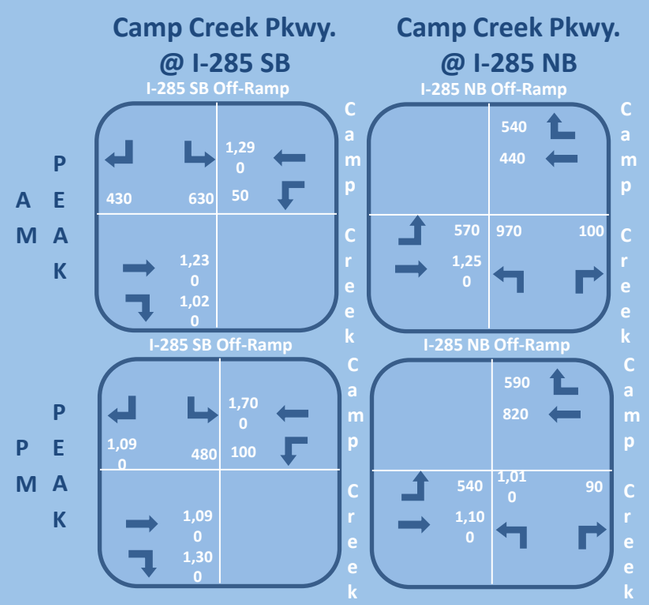
Cause of Bottleneck: Both off-ramps back up onto I-285

Potential Operational Strategies for Evaluation:

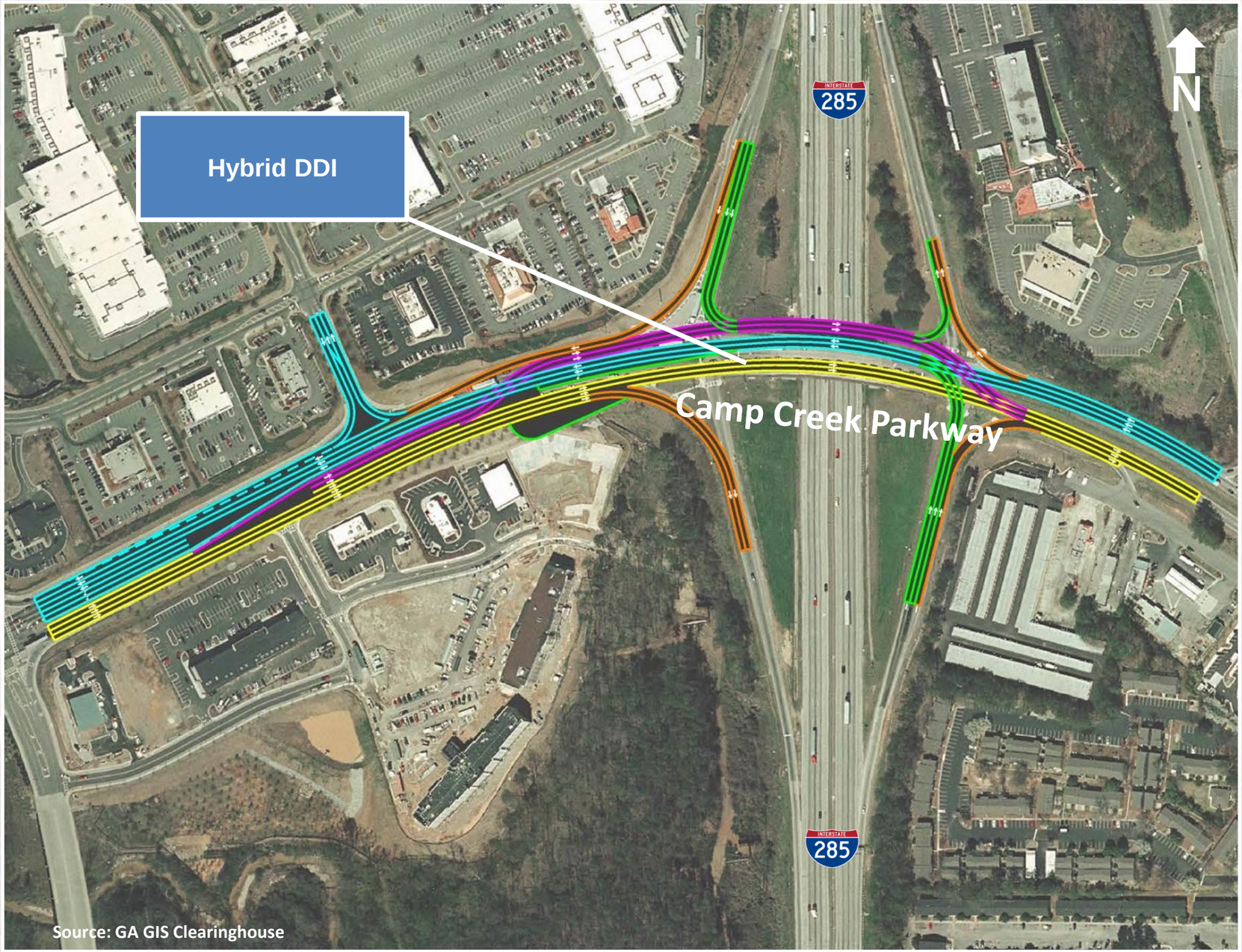
1) Diverging Diamond Interchange (DDI) (See ID# 29A)

2) New configuration representing a hybrid of a DDI and a Displaced Left Turn Intersection

3) New configuration hybrid of a DDI (See ID# 29C)



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp upgrade and re-stripe, add thru lane	$1,173,900	$988,000	$11,734,320	$13,896,220



Traffic Data Source: Traffic Counts

Georgia Department of Transportation

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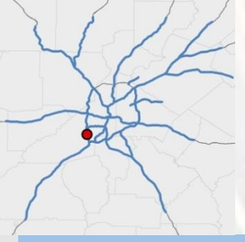


ID# 29C: I-285 @ Camp Creek Pkwy.

Location: I-285 @ Camp Creek Pkwy.

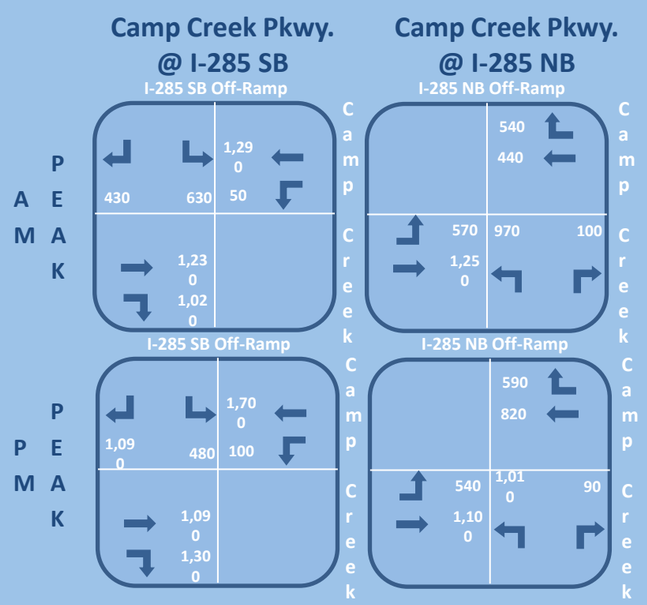
Cause of Bottleneck: Both off-ramps back up onto I-285

Potential Operational Strategies for Evaluation:

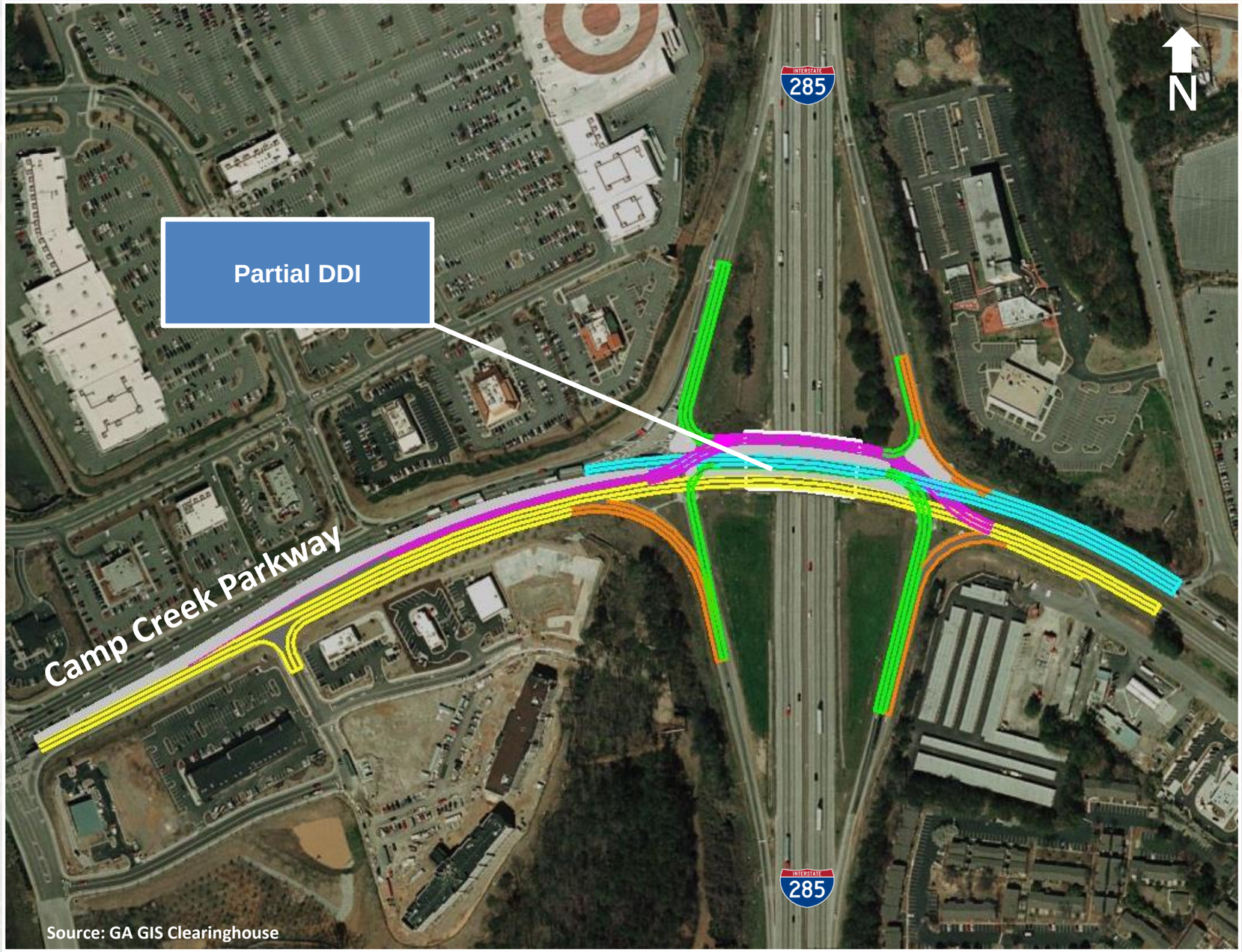
1) Diverging Diamond Interchange (DDI) (See ID# 29A)

2) New configuration representing a hybrid of a DDI and a Displaced Left Turn Intersection (See ID# 29B)

3) New configuration hybrid of a DDI



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Partial DDI	$685,100	$468,000	$6,846,645	$7,999,745



Source: GA GIS Clearinghouse

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

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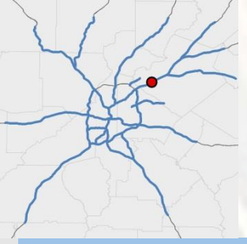


ID# 30: I-85 N @ Indian Trail/Lilburn Rd.

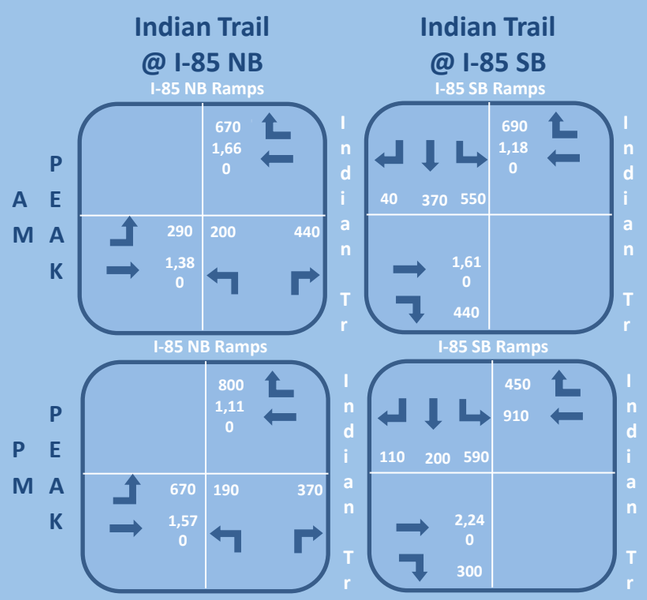
Location: I-85 N at Indian Trail/Lilburn Rd.

Cause of Bottleneck: Not enough left/right turn lanes at ramp terminal

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange to reduce the number of conflicts

2) I-85 NB on-ramp widening from 2 to 3 lanes



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
DDI	$373,100	$832,000	$3,724,305	$4,929,405
Ramp widening	$15,600	$0	$154,570	$170,170

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

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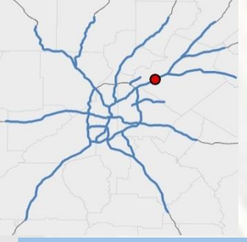


ID# 31A: I-85 N @ Beaver Ruin Rd.

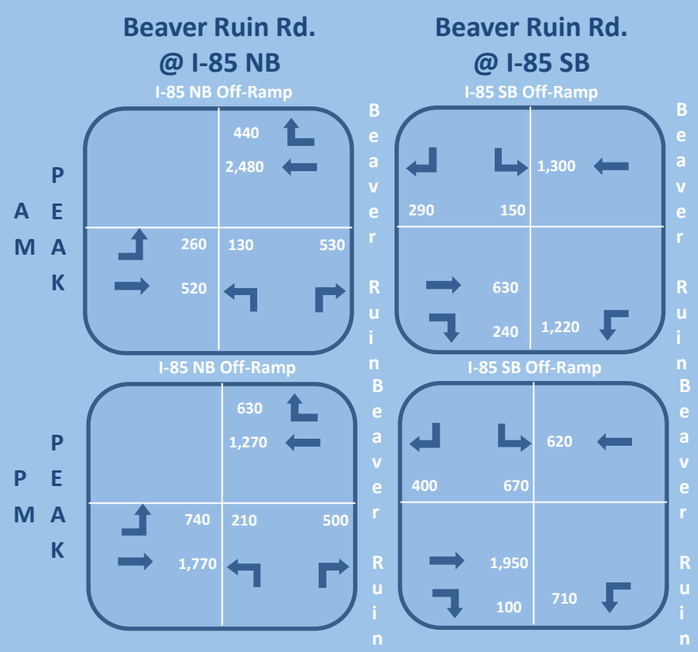
Location: I-85 N at Beaver Ruin Rd.

Cause of Bottleneck: High left turn volumes

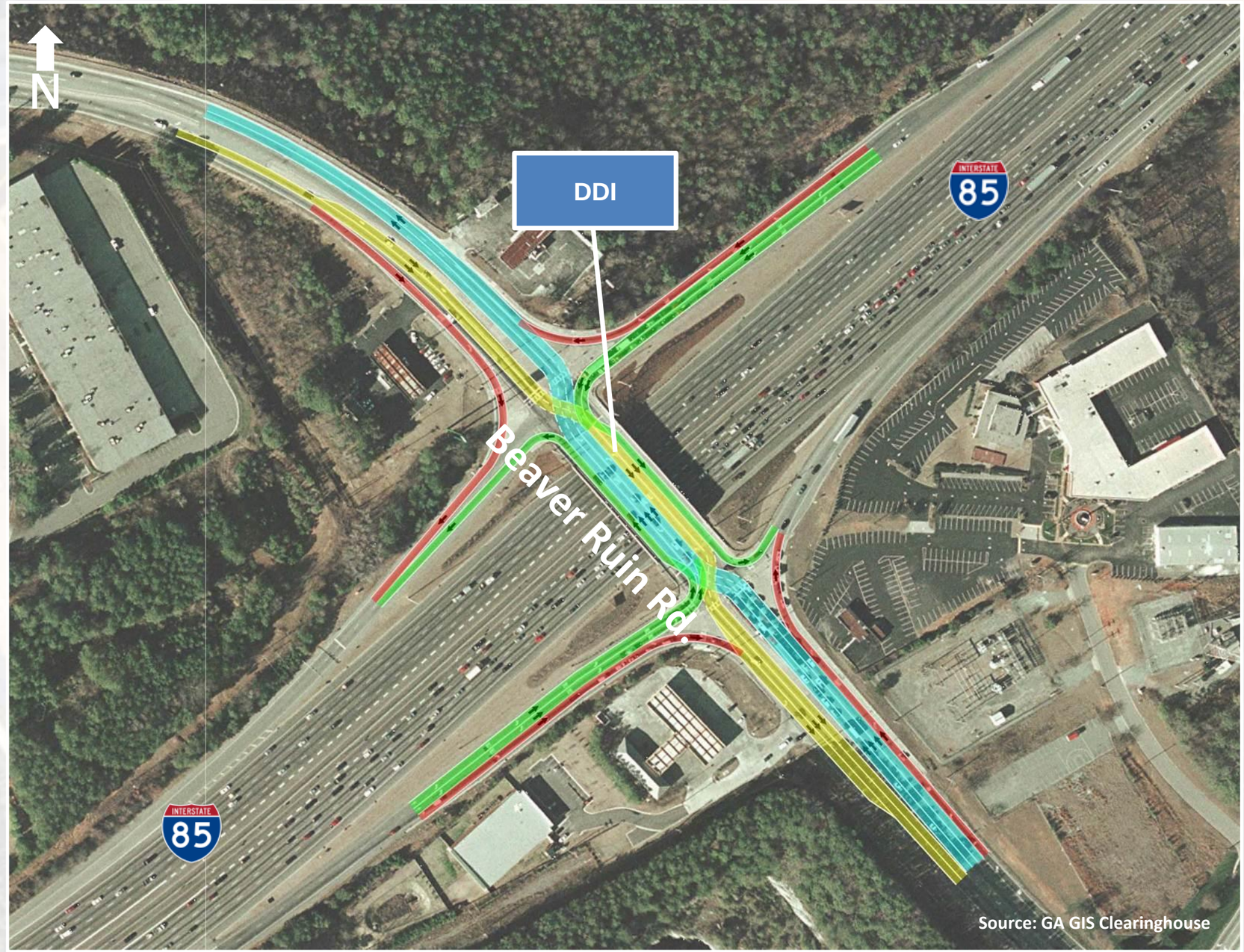
Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange to reduce the number of conflicts

2) Diverging Diamond Interchange to reduce the number of conflicts (See ID# 31B)



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
DDI	$328,900	$832,000	$3,285,750	$4,446,650

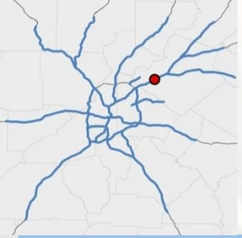


Source: GA GIS Clearinghouse

Traffic Data Source: TMC Data/Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 31B: I-85 N @ Beaver Ruin Rd.

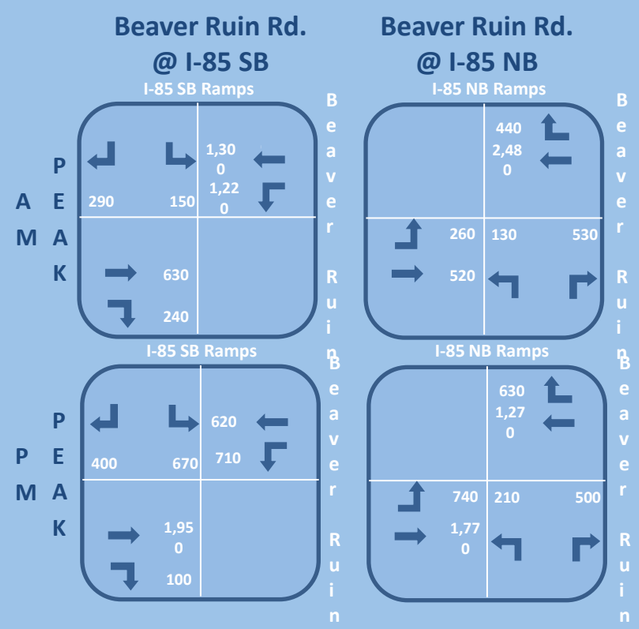
Location: I-85 N at Beaver Ruin Rd.

Cause of Bottleneck: High left turn volumes

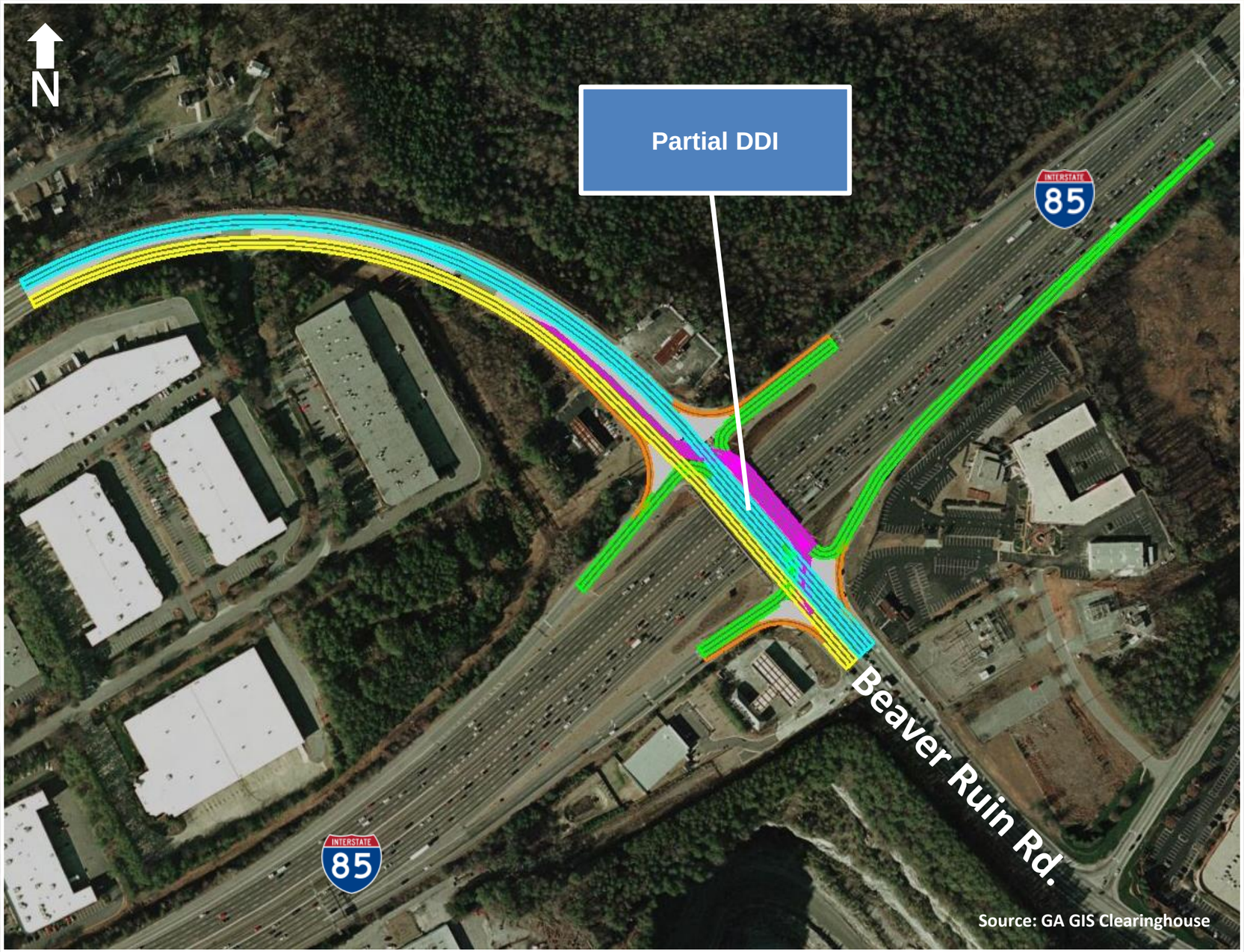
Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange to reduce the number of conflicts (See ID# 31A)

2) Diverging Diamond Interchange to reduce the number of conflicts



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Partial DDI	$663,000	$754,000	$6,619,470	$8,036,470



Source: GA GIS Clearinghouse

Traffic Data Source: TMC Data/OPS Traffic Counts

Georgia Department of Transportation

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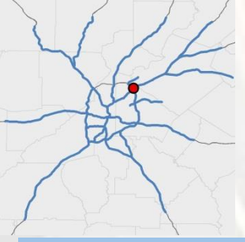


ID# 32A: I-85 N @ I-285 Interchange

Location: I-85 N at I-285 Interchange

Cause of Bottleneck: High volumes - SB AM/NB PM

Potential Operational Strategies for Evaluation:

1a) Construct flyover for I-285 EB to I-85 NB that would provide access to Northcrest Rd. (eliminates the ability to exit on C/D and then get back on I-85 at Northcrest)

1b) Add barrier separating exit ramps from I-85 on-ramp

1c) Re-stripe lane add to merge at I-285 WB to I-85 NB on-ramp

2a) Re-stripe I-285 EB to I-85 NB on-ramp to add 2 lanes

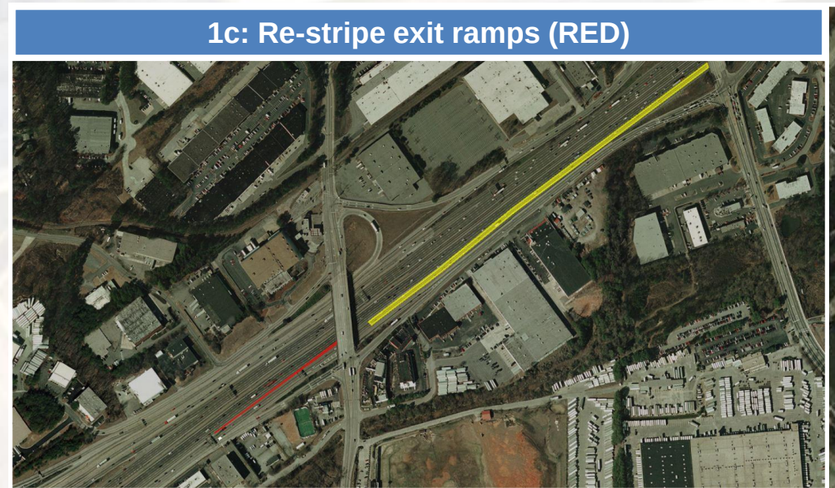
2b) Re-stripe lane add to merge at I-285 WB to I-85 NB on-ramp

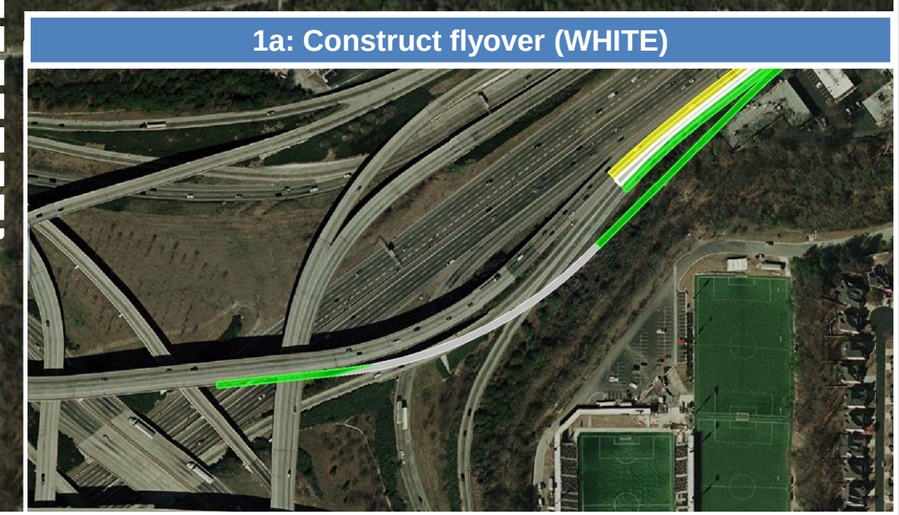
Northcrest Rd. Off-Ramp	AM Peak	PM Peak
Ramp Volume	790	480

I-285 to I-85 NB On-Ramp	AM Peak	PM Peak
Ramp Volume	Not Available	1,200

I-85 NB @ 285	AM Peak	PM Peak
Mainline	3,400	8,600
Congested Speed	> 45	< 25

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Restriping	$703,300	$4,303,000	$7,029,165	$12,035,465

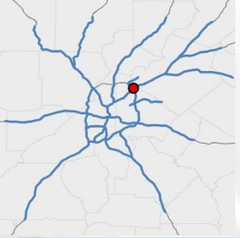




Traffic Data Source: TMC Data/Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 32B: I-85 N @ I-285 Interchange

Location: I-85 N at I-285 Interchange

Cause of Bottleneck: High volumes - SB AM/NB PM

Potential Operational Strategies for Evaluation:

1a) Construct flyover for I-285 EB to I-85 NB that would provide access to Northcrest Rd. (eliminates the ability to exit on C/D and then get back on I-85 at Northcrest)

1b) Add barrier separating exit ramps from I-85 on-ramp

1c) Re-stripe lane add to merge at I-285 WB to I-85 NB on-ramp

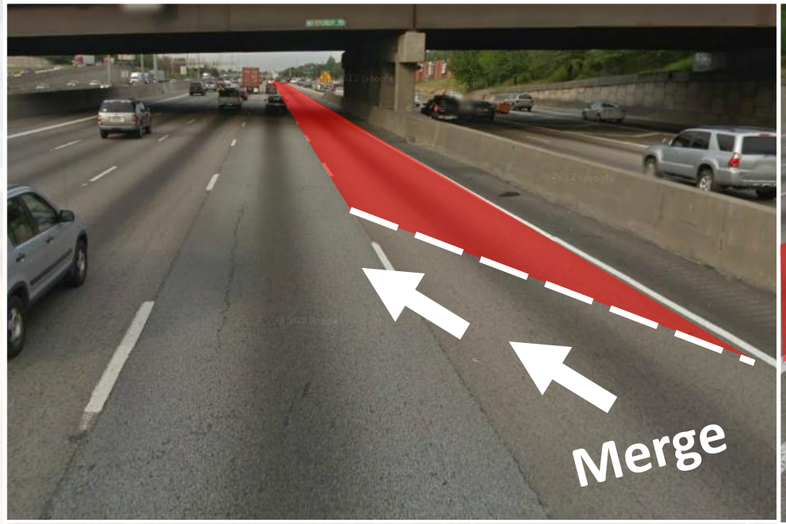
2a) Re-stripe I-285 EB to I-85 NB on-ramp (currently 1 lane) to add 1 lane; and

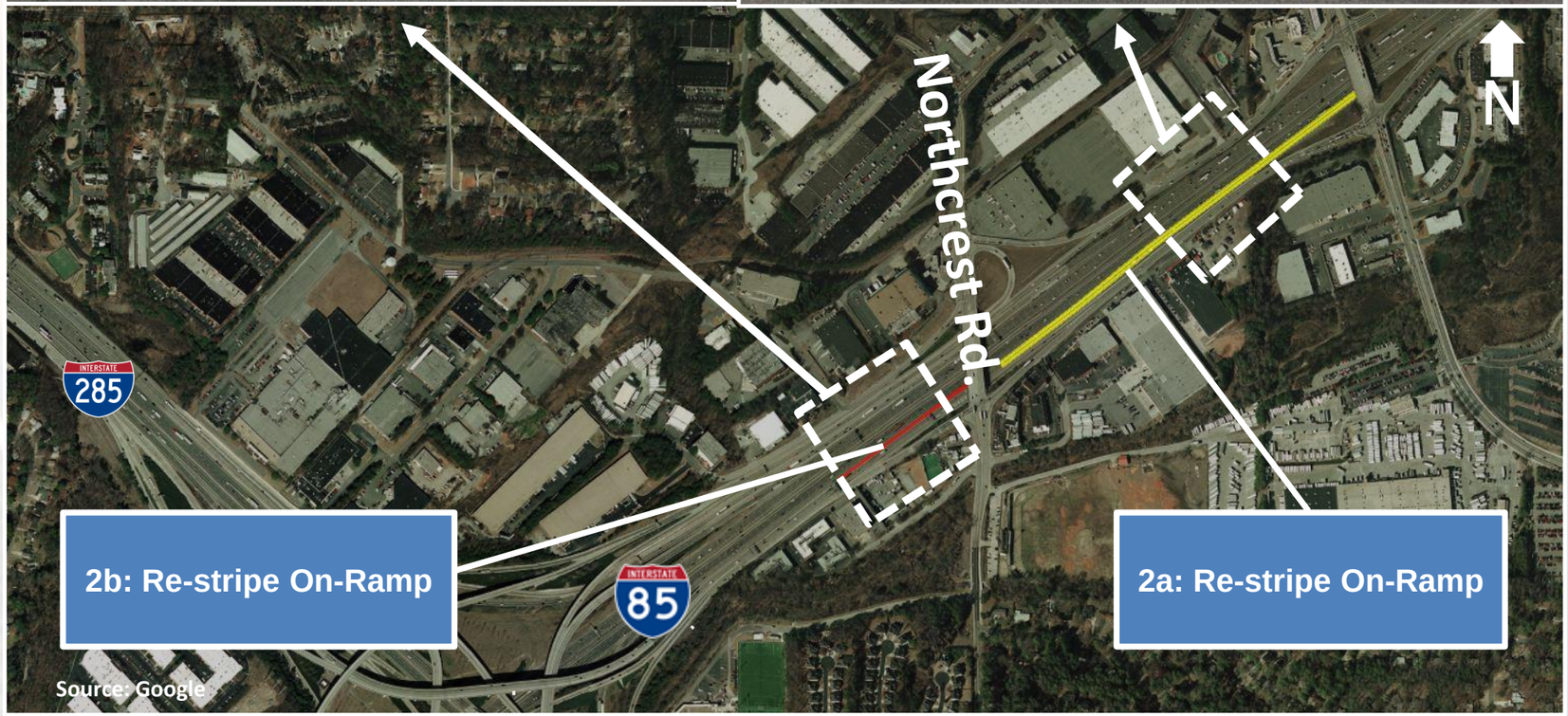
2b) Re-stripe I-285 WB to I-85 NB on-ramp (currently 2 lanes) to remove one lane

I-85 NB @ 285	AM Peak	PM Peak
Mainline	3,400	8,600
Congested Speed	> 45	< 25

I-85 NB Ramps	AM Peak	PM Peak
I-285 to I-85 NB On-Ramp	Not Available	1,200
Northcrest Rd. Off-Ramp	790	480

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Restriping	$42,900	$0	$416,260	$459,160





Traffic Data Source: TMC Data/OPS Traffic Counts

Georgia Department of Transportation

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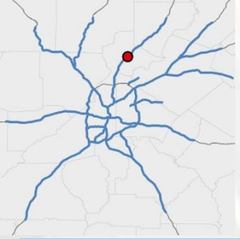


ID# 33: SR 400 @ Haynes Bridge Rd.

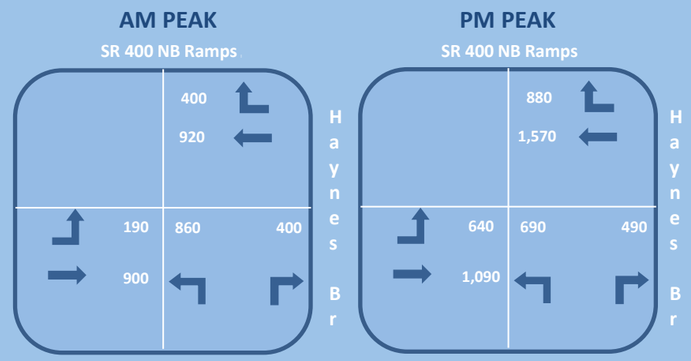
Location: SR 400 at Haynes Bridge Rd.

Cause of Bottleneck: Heavy NB to WB movement

Potential Operational Strategies for Evaluation:

1) Construct new NB to WB loop ramp and re-construct NB SR 400 on-ramp

Haynes Bridge Rd.
@ SR 400 NB



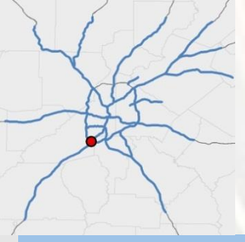
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Reconfigure Ramp	$205,400	$3,250,000	$2,047,262	$5,502,662

Source: Google

Traffic Data Source: TMC Data/OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 34: I-285/85 @ Old National Highway

Location: I-285/85 @ Old National Highway

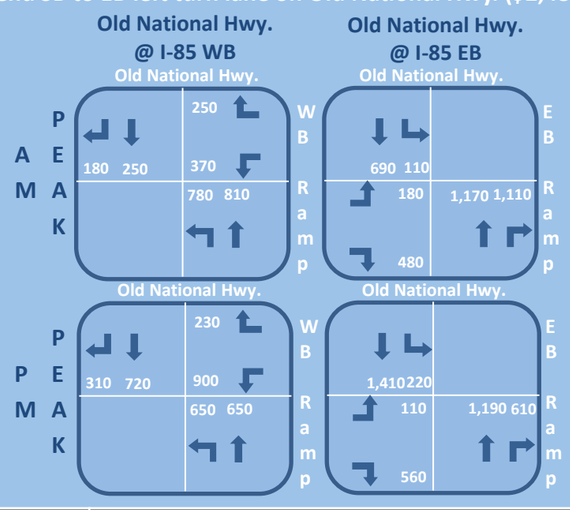
Cause of Bottleneck: Peak period volumes on Old National and Godby Rd.

Potential Operational Strategies for Evaluation:

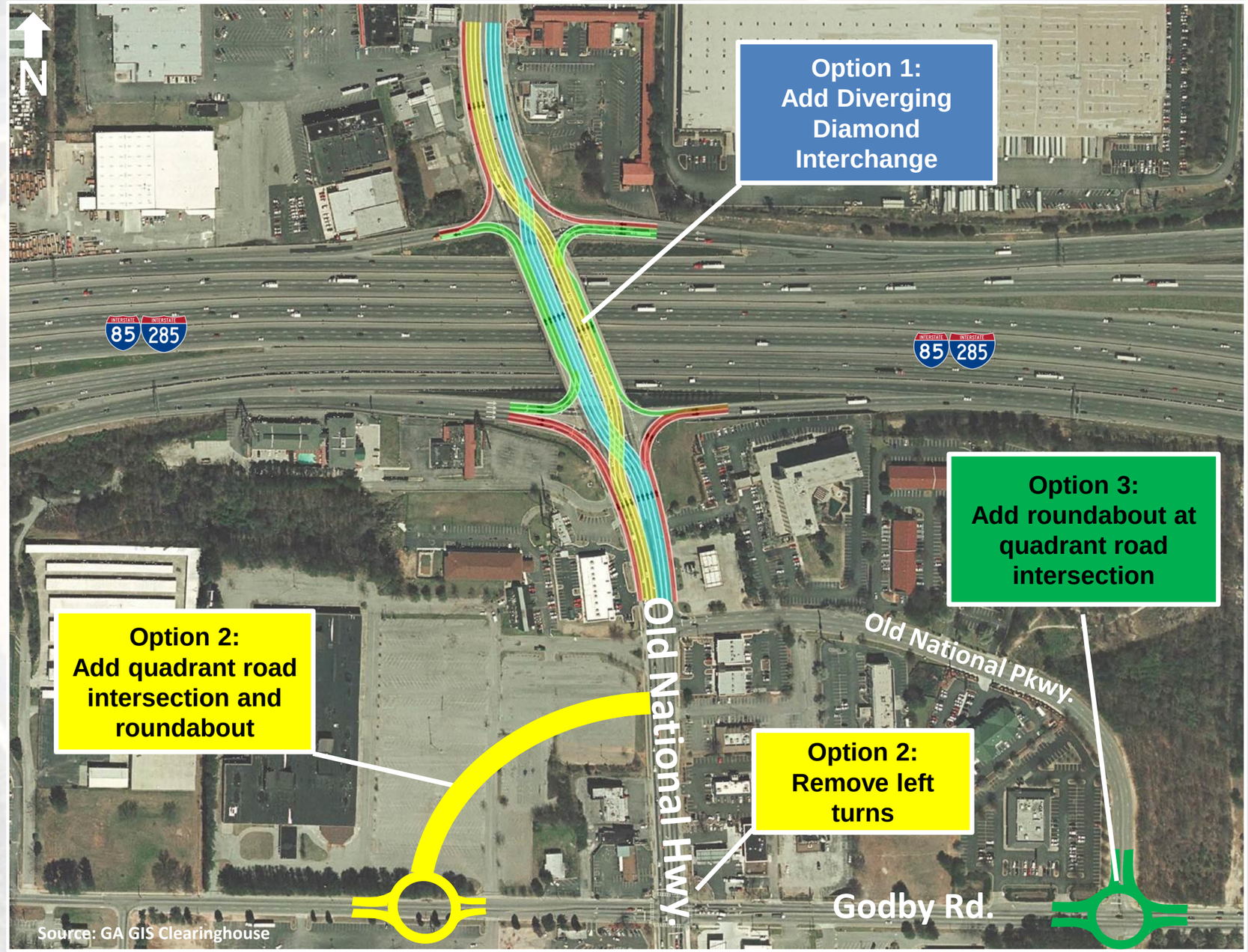
1) Add Diverging Diamond (reduces the number of conflicts) ($4,501,900)

2) Add quadrant road intersection and roundabout. Shift left turns from Old Nat. Hwy./Godby intersection to new quadrant intersection ($16,819,725)

3) Add roundabout at Godby Rd. and Old National Pkwy. intersection. Extend SB to EB left turn lane on Old National Hwy. ($2,489,890)



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
DDI	$334,100	$832,000	$3,335,800	$4,501,900
Quadrant road and roundabout	$373,100	$12,727,000	$3,719,625	$16,819,725
Roundabout	$221,000	$65,000	$2,203,890	$2,489,890



Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

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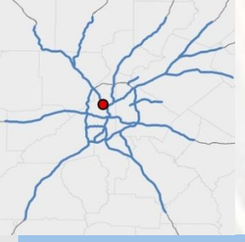


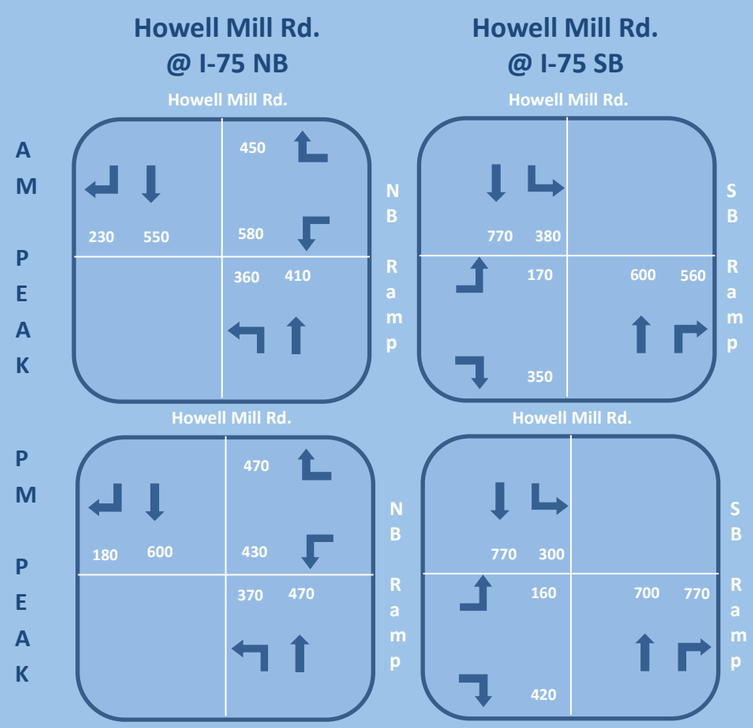
ID# 35: I-75 @ Howell Mill Rd.

Location: I-75 at Howell Mill Rd.

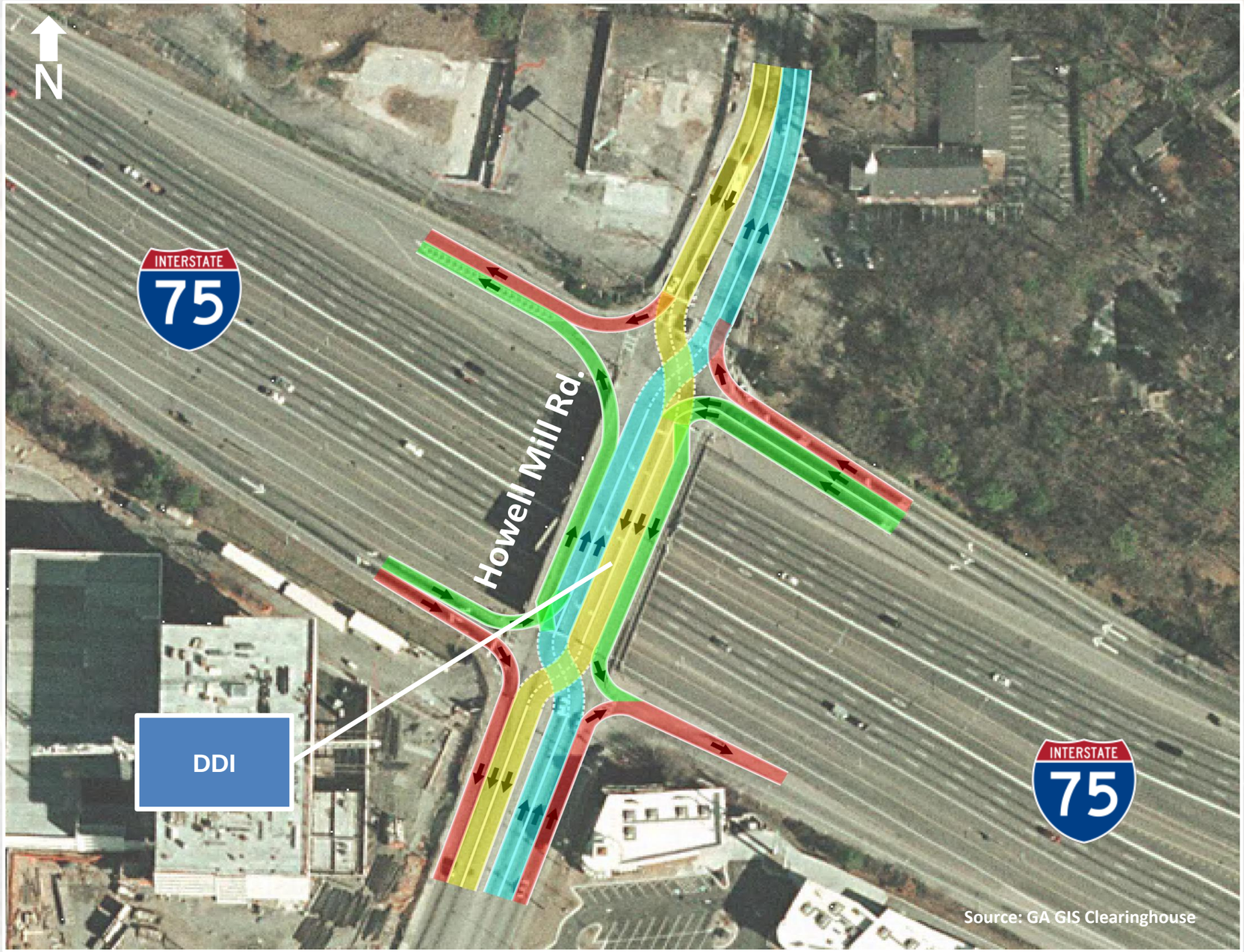
Cause of Bottleneck: Weaving/turn volumes at NB Off-Ramp

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange (reduces the number of conflicts)



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
DDI	$334,100	$3,640,000	$3,336,450	$7,310,550



Source: GA GIS Clearinghouse

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

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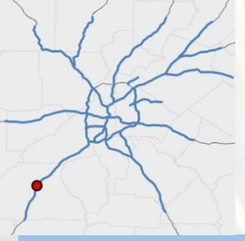


ID# 36: I-85 S @ SR 34

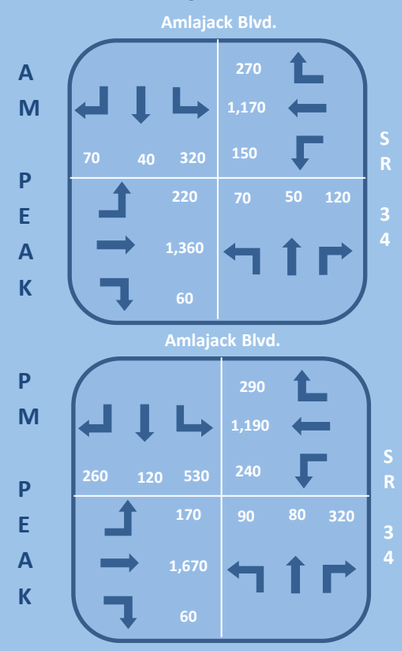
Location: I-85 S at SR 34 (Bullsboro Dr.)

Cause of Bottleneck: Right turn lane at SB Off-Ramp

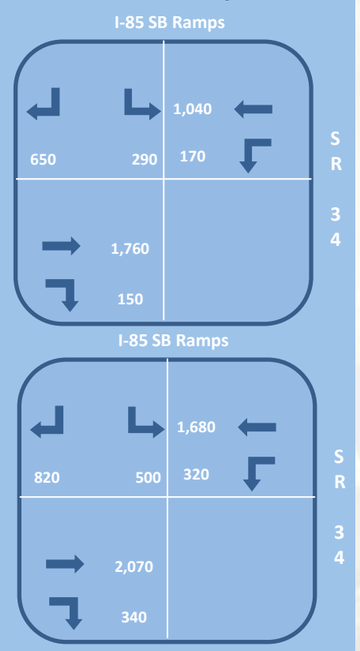
Potential Operational Strategies for Evaluation:

1) Construct 2nd right turn lane (additional pavement) and add right turn signal

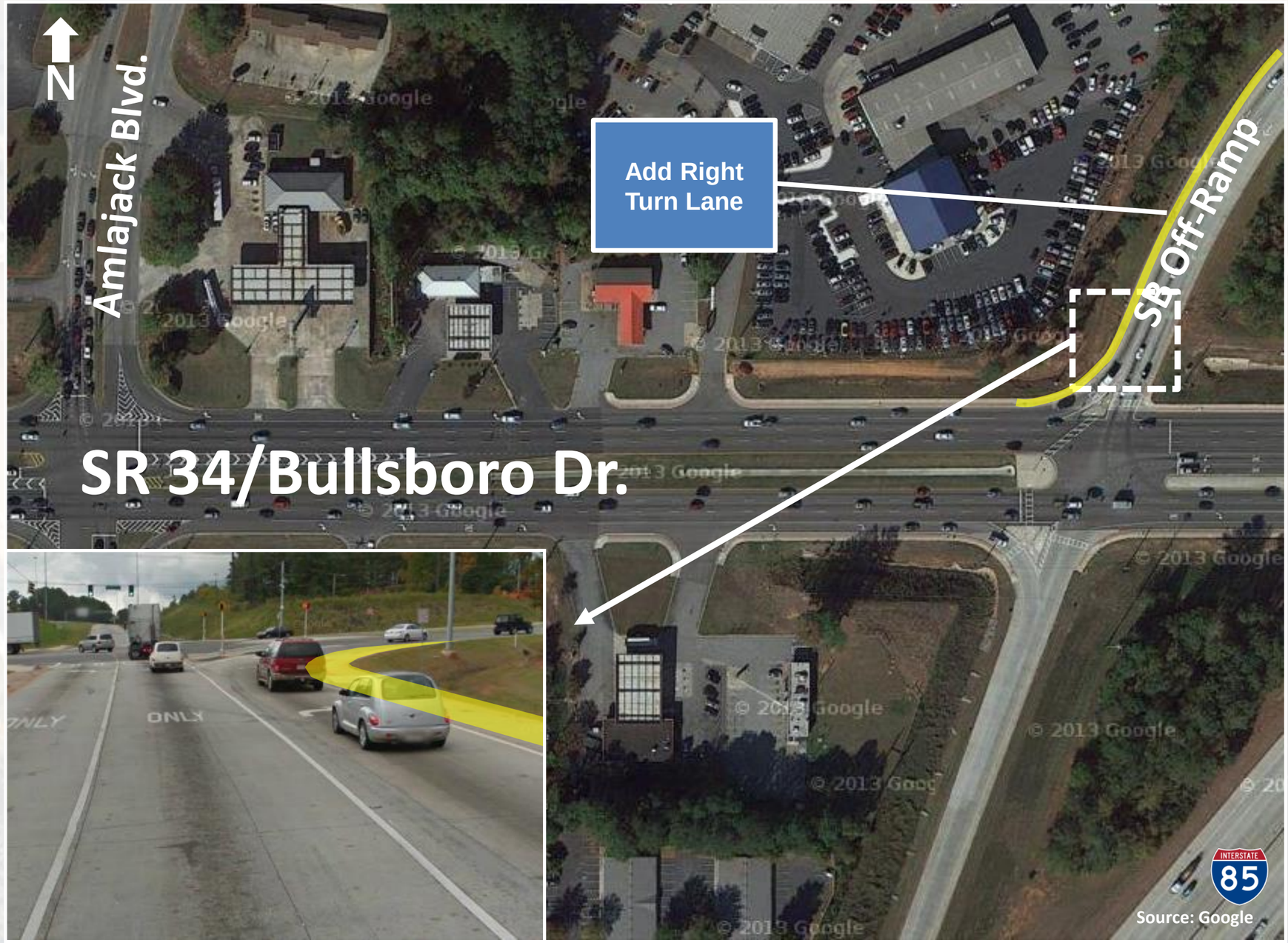
SR 34 @ Amlajack Blvd.



SR 34 @ I-85 SB Ramps



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Add right turn lane	$92,300	$312,000	$913,250	$1,317,550



Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

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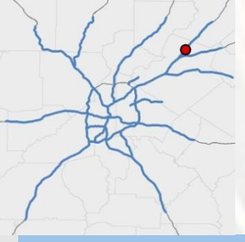


ID# 37: I-985 @ SR 20

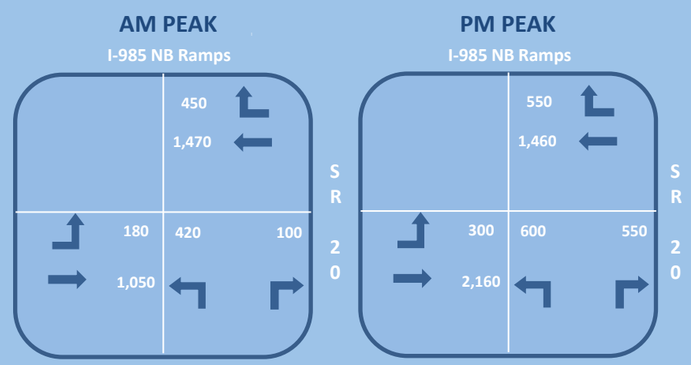
Location: I-985 at SR 20

Cause of Bottleneck: High volumes

Potential Operational Strategies for Evaluation:

1) Increase NB exit ramp storage by widening ramp using shoulders (approx. 0.2 miles)

SR 20
@ I-985 NB



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen off-ramp	$54,600	$0	$540,280	$594,880

Traffic Data Source: I-85 HOV Project

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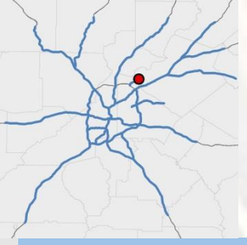


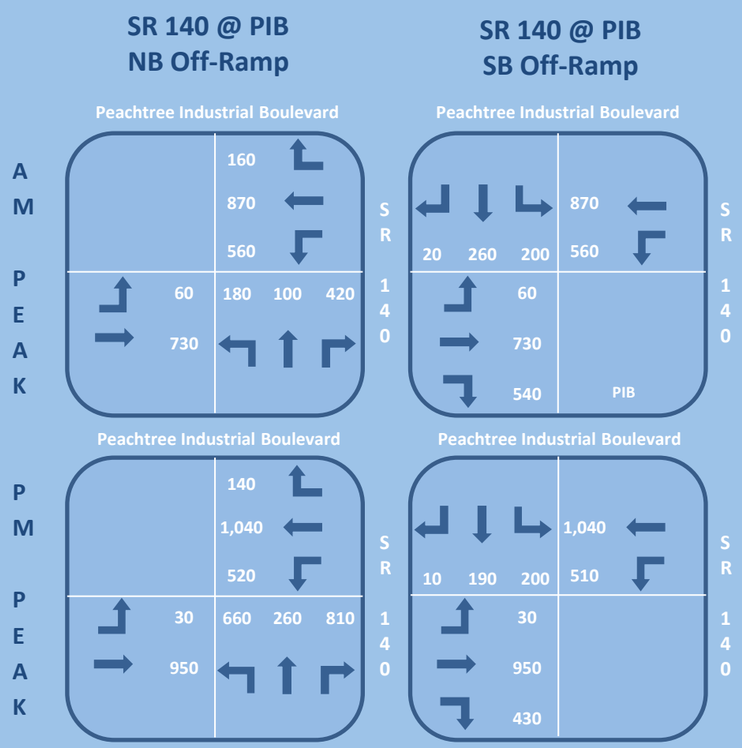
ID# 38: Peachtree Industrial Blvd. @ SR 140

Location: Peachtree Industrial Blvd. at SR 140

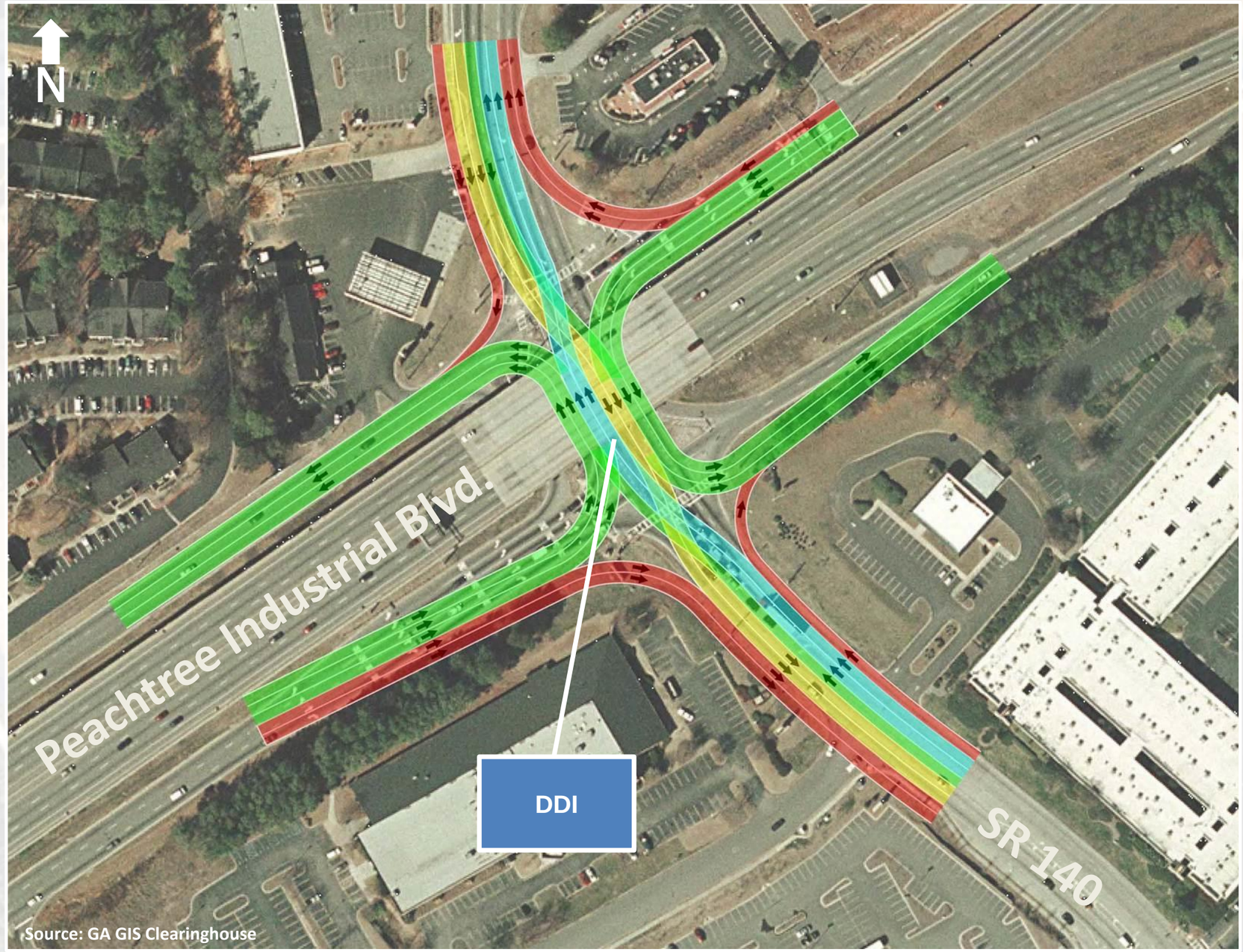
Cause of Bottleneck: Left turn volumes

Potential Operational Strategies for Evaluation:

1) Diverging Diamond Interchange (reduces the number of conflicts)



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
DDI	$276,900	$650,000	$2,761,720	$3,688,620



Source: GA GIS Clearinghouse

Traffic Data Source: Traffic Counts

Georgia Department of Transportation

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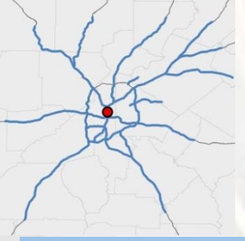


ID# 39: Downtown Connector @ North Ave.

Location: Downtown Connector @ North Ave.

Cause of Bottleneck: High right turn volume

Potential Operational Strategies for Evaluation:

1) Add right turn lane at North Ave. off-ramp

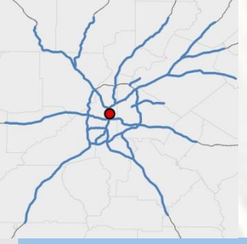
Downtown Connector Ramp	AM Peak	PM Peak
North Ave. SB Off-Ramp	1,300	400

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Add right turn lane	$72,800	$78,000	$723,060	$873,860

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 40: Downtown Connector SB @ Williams St.

Location: Downtown Connector at Williams St. (Southbound Off-Ramp, Northbound/ Southbound On-Ramp)

Cause of Bottleneck: Weave of SB exiting traffic approaching the intersection of Ivan Allen Jr. Blvd.

Potential Operational Strategies for Evaluation:

1) Prohibit left turn at Ivan Allen Jr. Blvd. SB approach (left turns would shift to W Peachtree Pl.

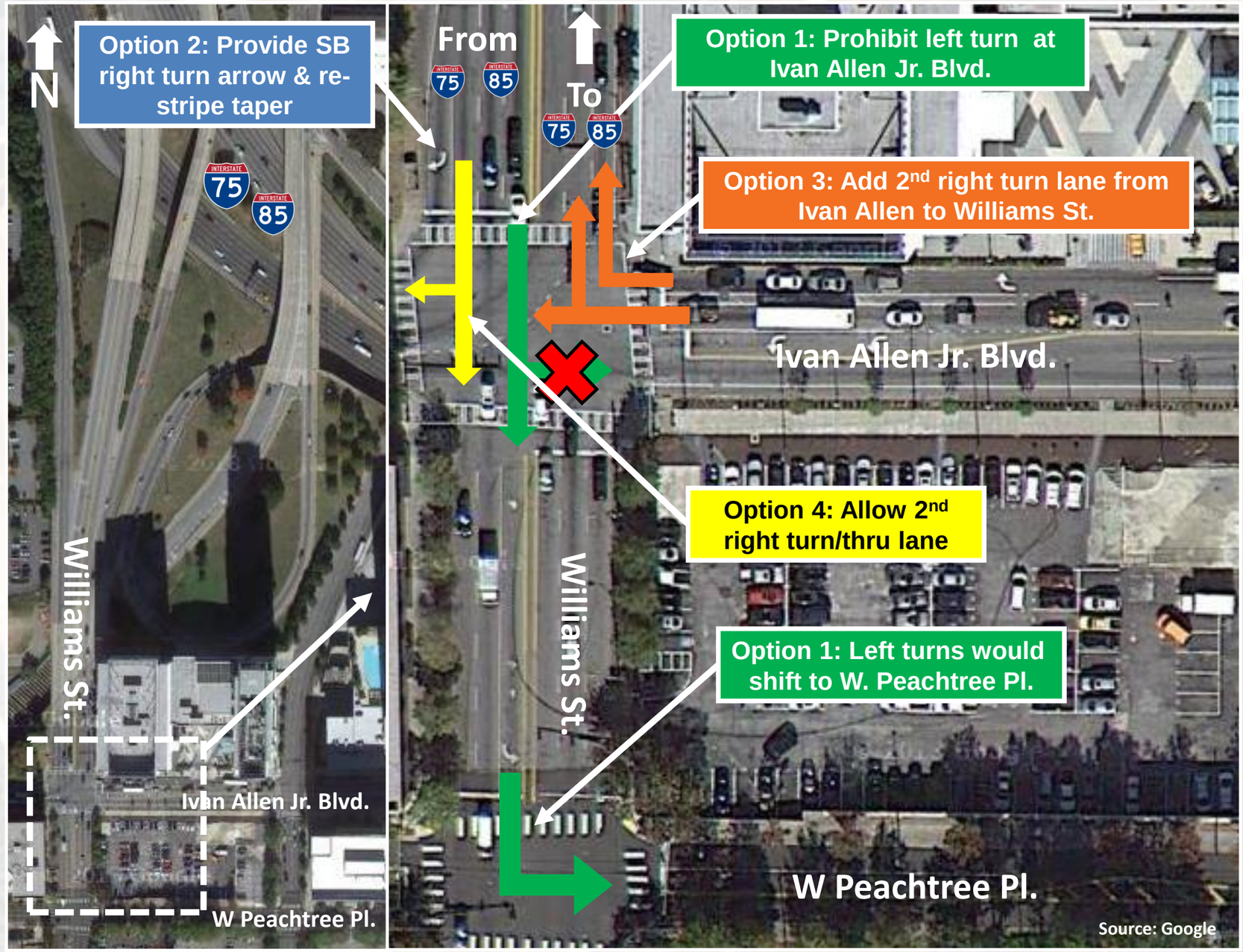
2) Provide SB right turn arrow at Ivan Allen Jr. Blvd. and re-stripe SB right turn taper

3) Add second right turn lane from Ivan Allen Jr. Blvd. to Williams St.

4) Re-stripe Williams St. (allow 2nd right turn/thru lane)

I-75 / I-85 Ramp	AM Peak	PM Peak
Williams St. SB Off-Ramp	700	200

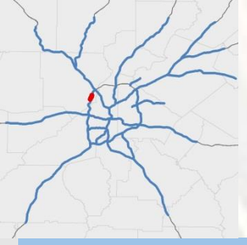
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Prohibit left turn	$11,700	$0	$109,687	$121,388
Re-stripe right turn	$41,600	$0	$390,943	$125,320
Add right turn lane	$9,100	$0	$83,817	$92,918
Re-stripe ramp	$9,100	$0	$83,817	$92,918



Traffic Data Source: TMC

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 41: I-285 @ Paces Ferry Rd.

Location: I-285 at Paces Ferry Rd.

Cause of Bottleneck: High Ramp Volume

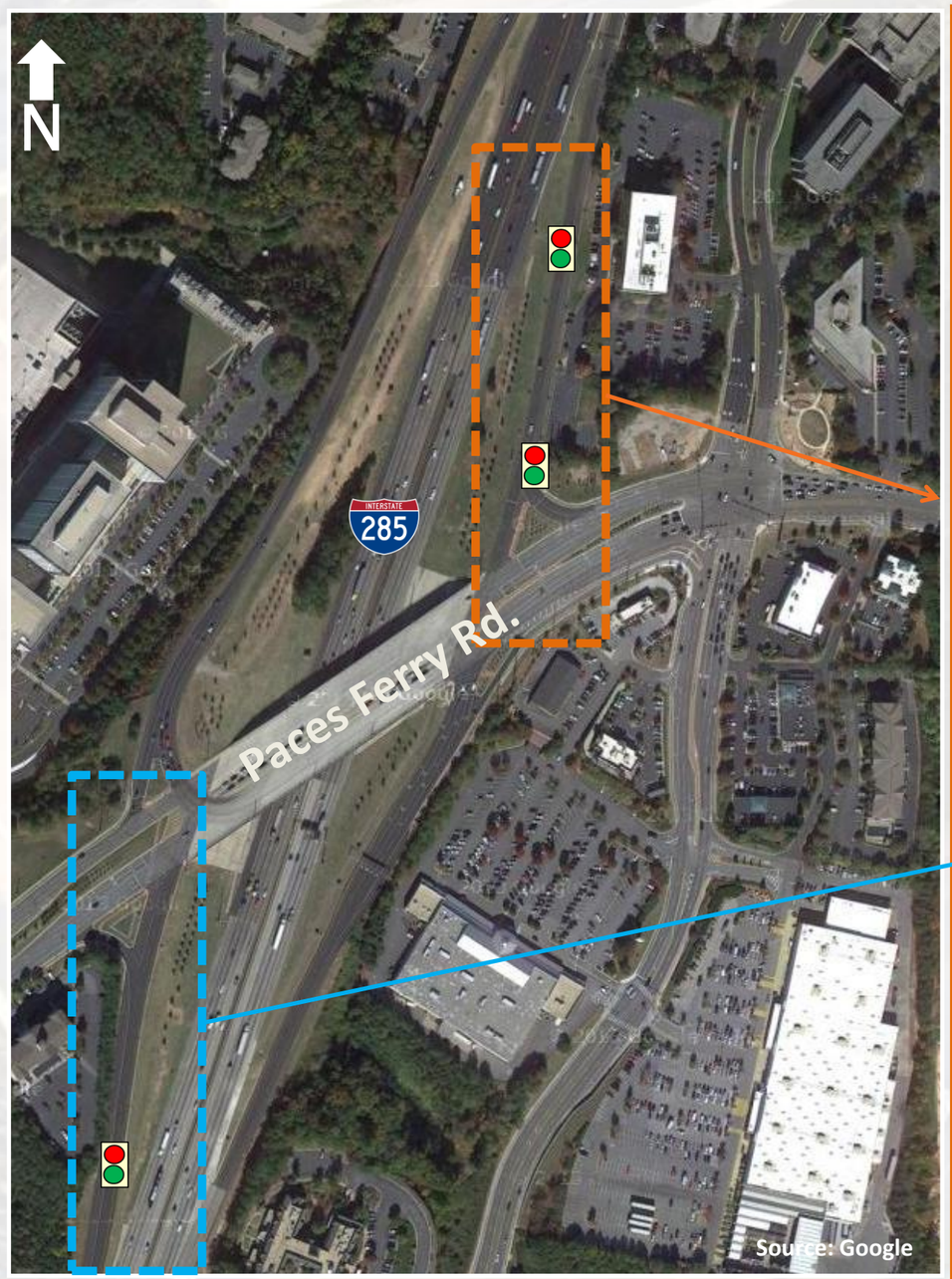
Potential Operational Strategies for Evaluation:

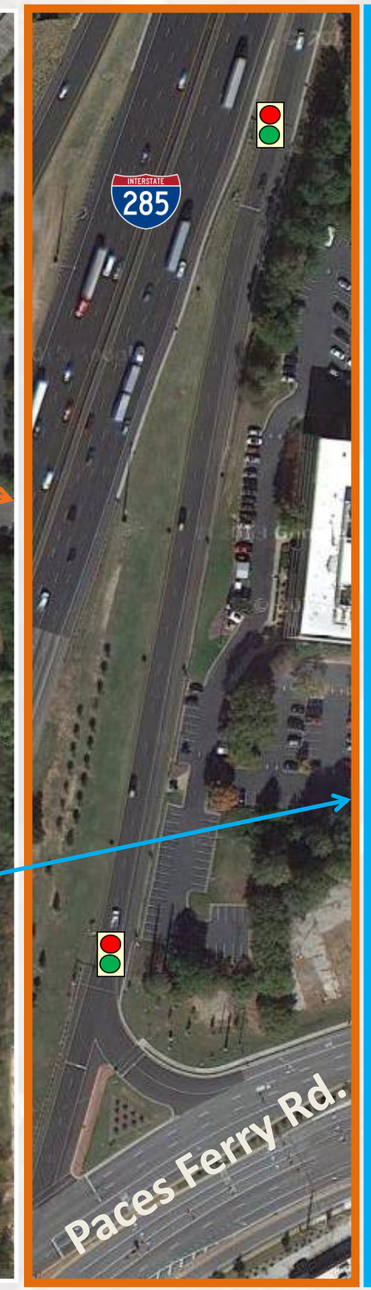
1) Ramp meter signal timing improvements

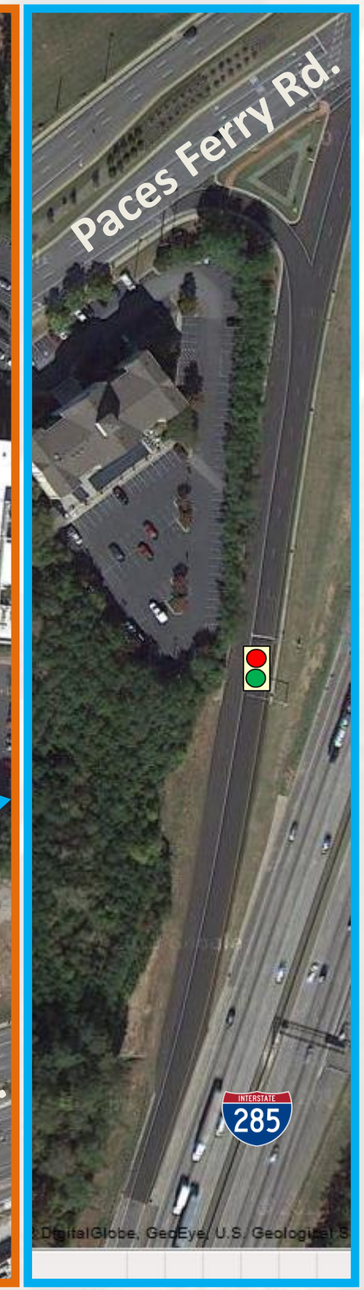
Paces Ferry NB On-Ramp	AM Peak	PM Peak
Ramp Volume	1,440	1,160

Paces Ferry SB On-Ramp	AM Peak	PM Peak
Ramp Volume	460	810

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp Signal Timing	$6,500	$0	$52,390	$58,890







Traffic Data Source: Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 42: Piedmont Rd. @ Buford Connector SB

Location: Piedmont Rd. at SB Buford Connector

Cause of Bottleneck: High Volume and Weaving

Potential Operational Strategies for Evaluation:

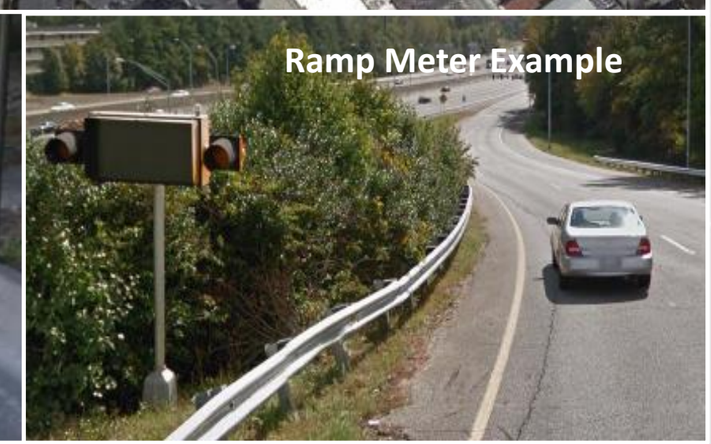
1) Add ramp meter for southbound on-ramp from Piedmont Rd. to Buford Connector

2) Add ramp meter for southbound on-ramp from Armour Dr. to Buford Connector

SB Buford Connector	AM Peak	PM Peak
Mainline	3,480	2,530

Buford Connector Ramps	AM Peak	PM Peak
Armour Dr. SB On-Ramp	Not available	Not available
Piedmont Rd. SB On-Ramp	920	920

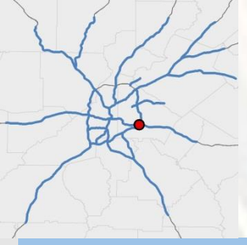
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp metering	$5,200	$0	$51,245	$55,445
Ramp metering	$5,200	$0	$51,245	$55,445



Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 43: I-285E/I-20E

Location: I-285E/I-20 E

Cause of Safety Concern : Varying turning radii leading to difficulty for trucks navigating ramps

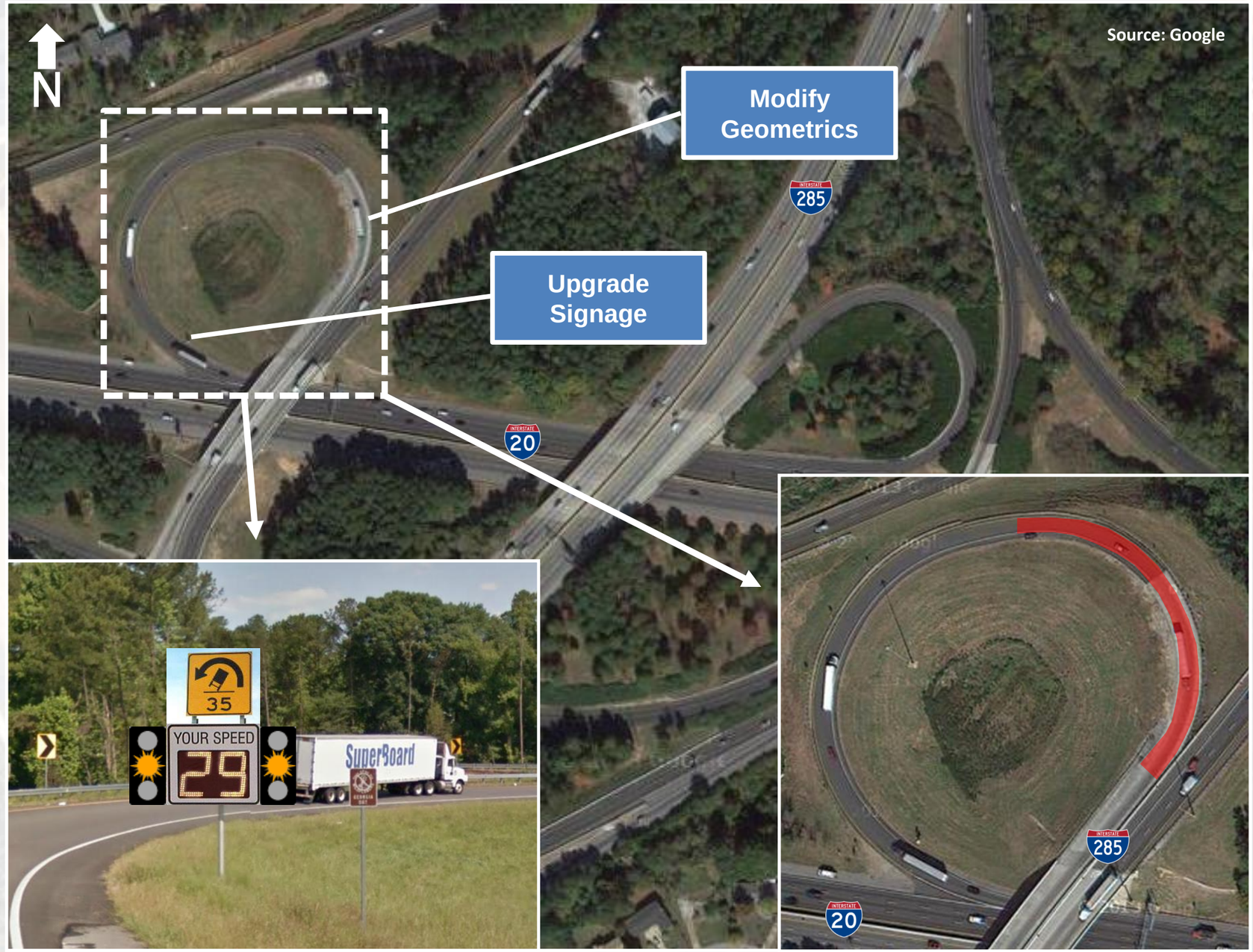
Potential Operational Strategies for Evaluation:

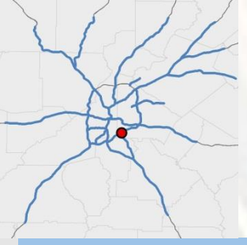
1a) Improve ramp geometrics to better accommodate trucks

1b) Consider upgrade to existing automated truck rollover warning sign

I-20 WB Ramps	AM Peak	PM Peak
I-20 WB to I-285 SB	Not Available	Not Available

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp geometrics / signage	$35,100	$0	$332,514	$367,614





ID# 44: I-285 South @ I-675

Location: I-285 S at I-675

Cause of Safety Concern : Tight curves on ramps

Potential Operational Strategies for Evaluation:

1) New automated truck rollover warning system for ramps

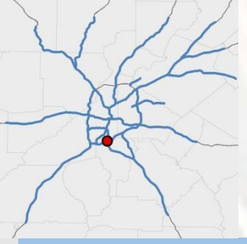
I-285 Ramps	AM Peak	PM Peak
I-675 NB to I-285 WB	1,000	400
I-285 WB to I-675 SB	200	1,500

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Signage	$2,600	$0	$14,950	$17,550

Traffic Data Source: TMC

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 45: I-285 South @ I-75 S Interchange

Location: I-285 S at I-75 S Interchange

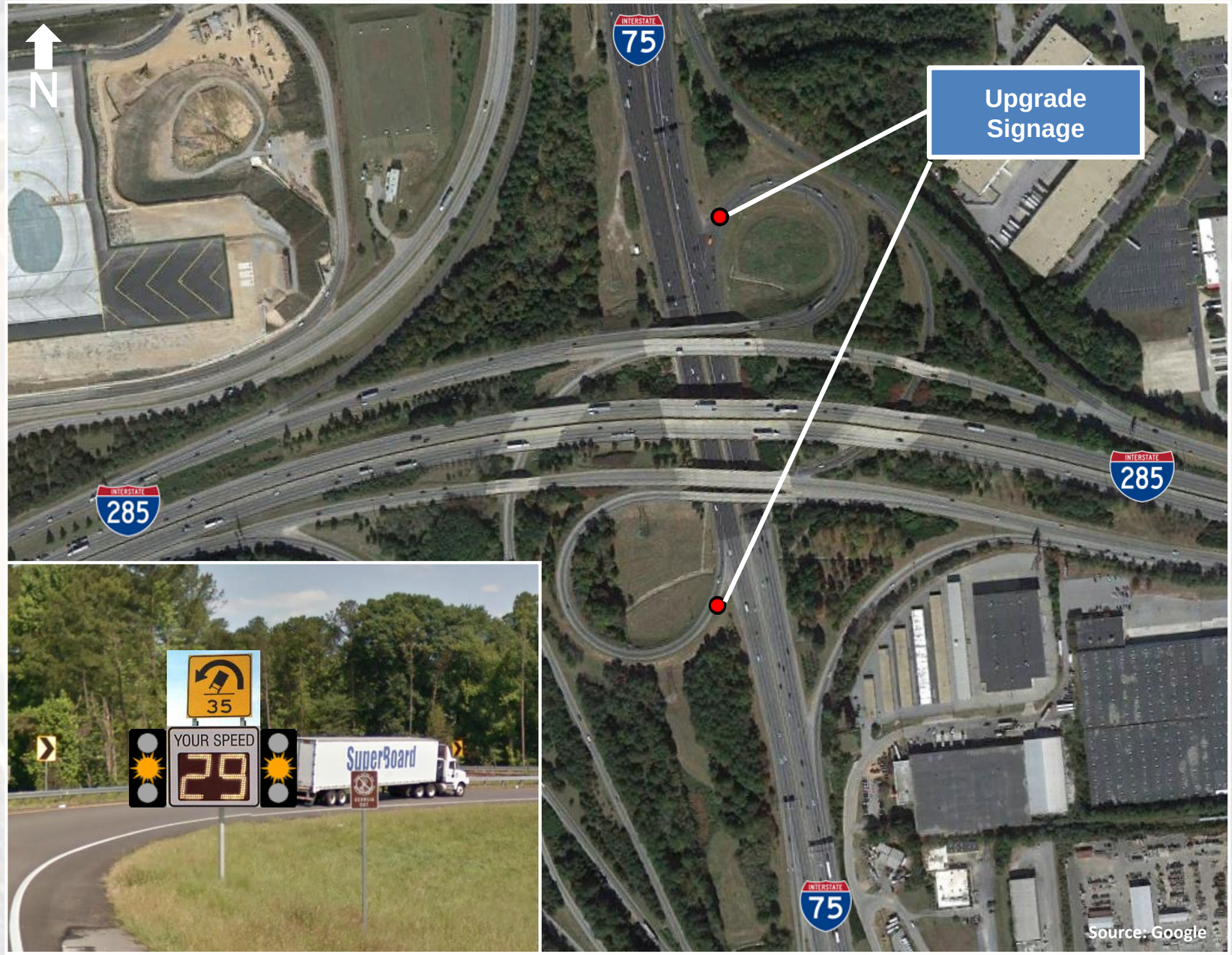
Cause of Safety Concern : Truck overturns (NB to WB)

Potential Operational Strategies for Evaluation:

1) New automated truck rollover warning system for ramps

I-75 NB Off-Ramp	AM Peak	PM Peak
I-75 NB to I-285 WB	500	800
I-75 SB to I-285 EB	1,000	1,700

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Signage	$2,600	$0	$14,950	$17,550



Traffic Data Source: TMC

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

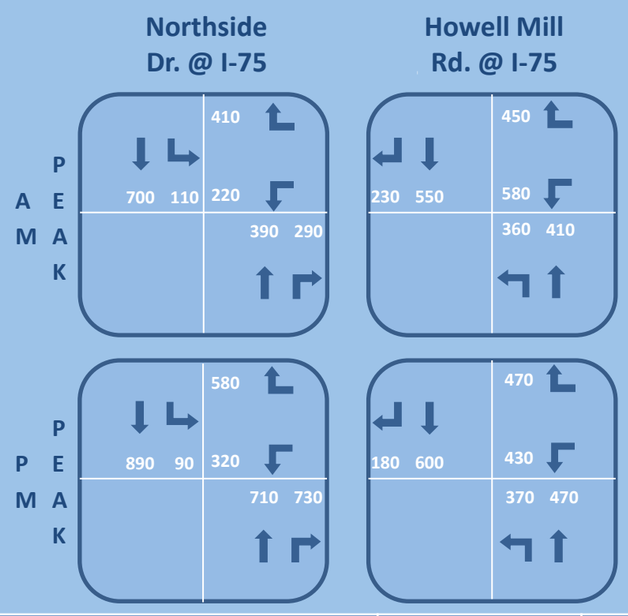
ID# 46: I-75 NB Between Northside Dr. and Howell Mill Rd.

Location: I-75 between Northside Dr. and Howell Mill Rd.

Cause of Bottleneck: Tight weaving distance for merging traffic

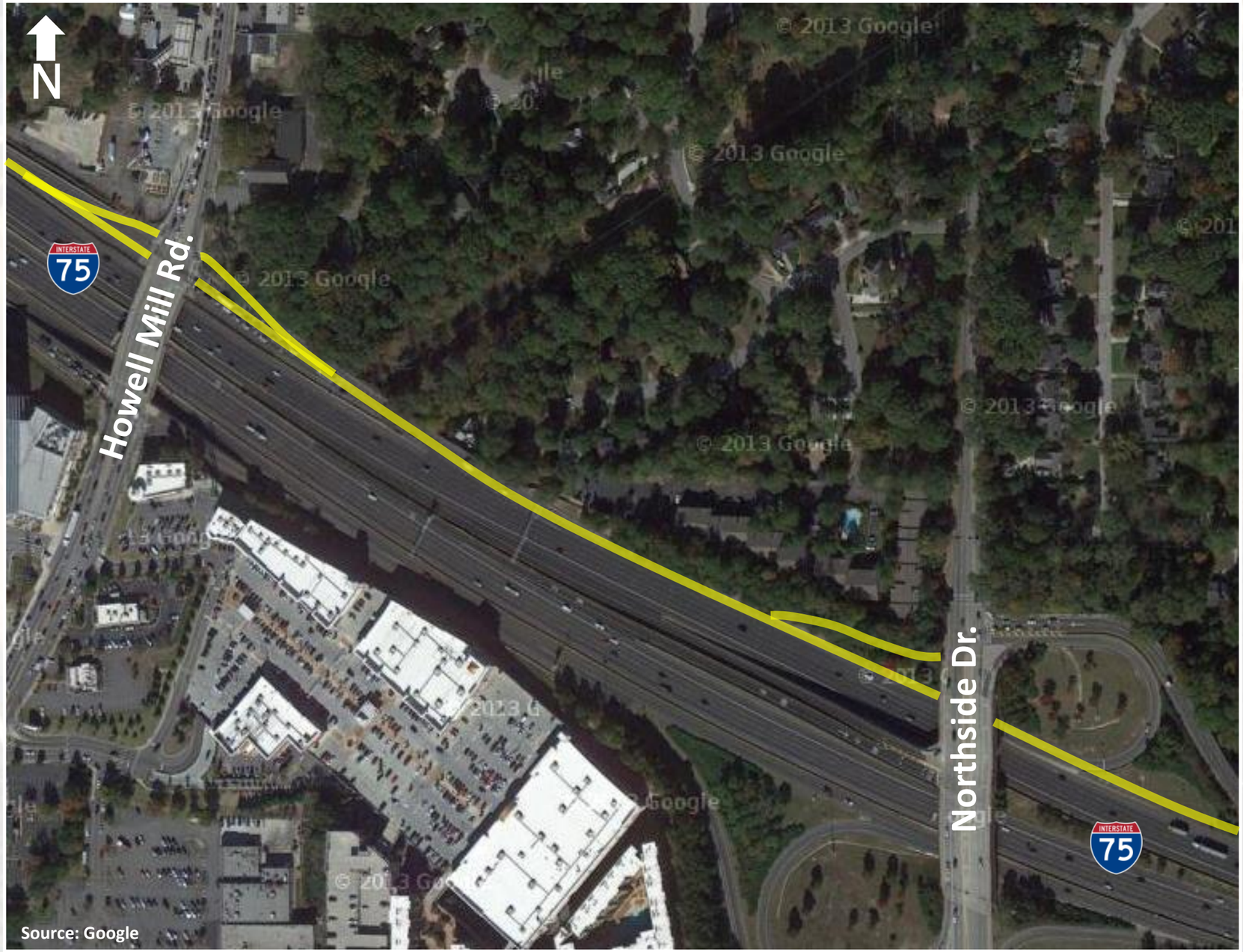
Potential Operational Strategies for Evaluation:

1) C/D road between Northside Dr. and Howell Mill Rd.



I-75 NB @ Howell Mill	AM Peak	PM Peak
Mainline	5,270	7,150

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
C/D Road	$908,700	$3,900,000	$9,076,990	$13,885,690



Source: Google

Traffic Data Source: Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 47A: I-85 North @ Hamilton Mill Rd.

Location: I-85 North @ Hamilton Mill

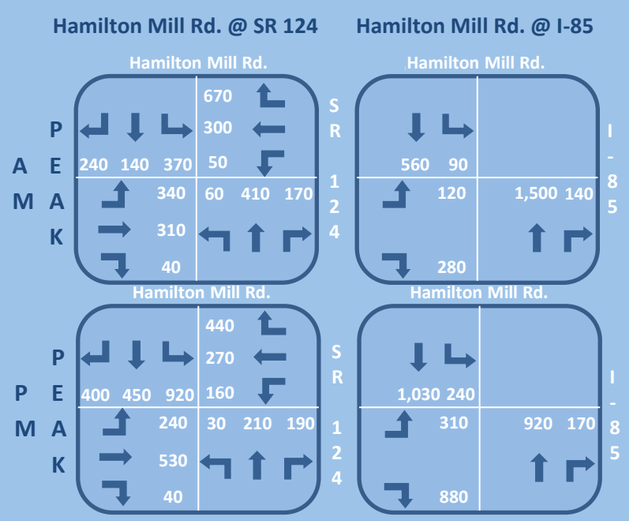
Cause of Bottleneck: Hamilton Mill Road and Braselton Highway Volume

Potential Operational Strategies for Evaluation:

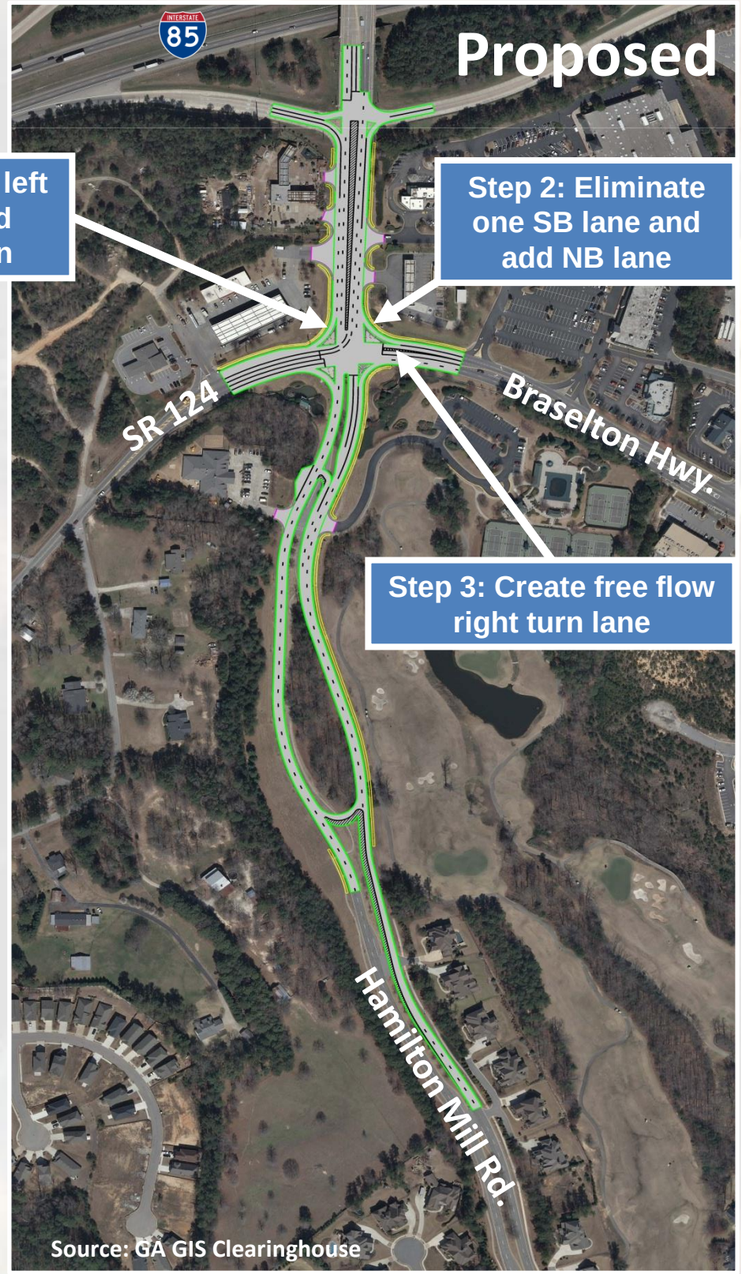
1a) Create indirect left turn intersection at Hamilton Mill Road and Braselton Highway/SR 124 and eliminate Hamilton Mill Road southbound left turn at SR 124

1b) Shift Hamilton Mill Rd. median between I-85 Northbound ramps and SR 124 to eliminate one southbound lane and add one northbound lane

1c) Create free flow right turn lane for SR 124 westbound to Hamilton Mill Road northbound movement



Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Indirect left turn	$200,200	$0	$1,991,470	$2,191,670



Traffic Data Source: Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

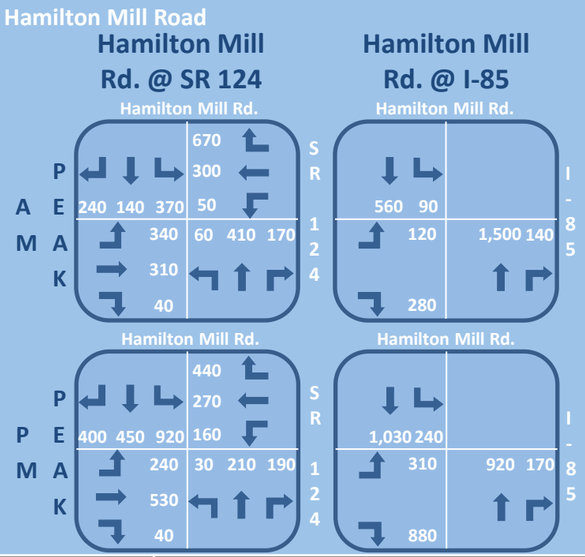
ID# 47B: I-85 North @ Hamilton Mill Rd.

Location: I-85 North @ Hamilton Mill Rd.

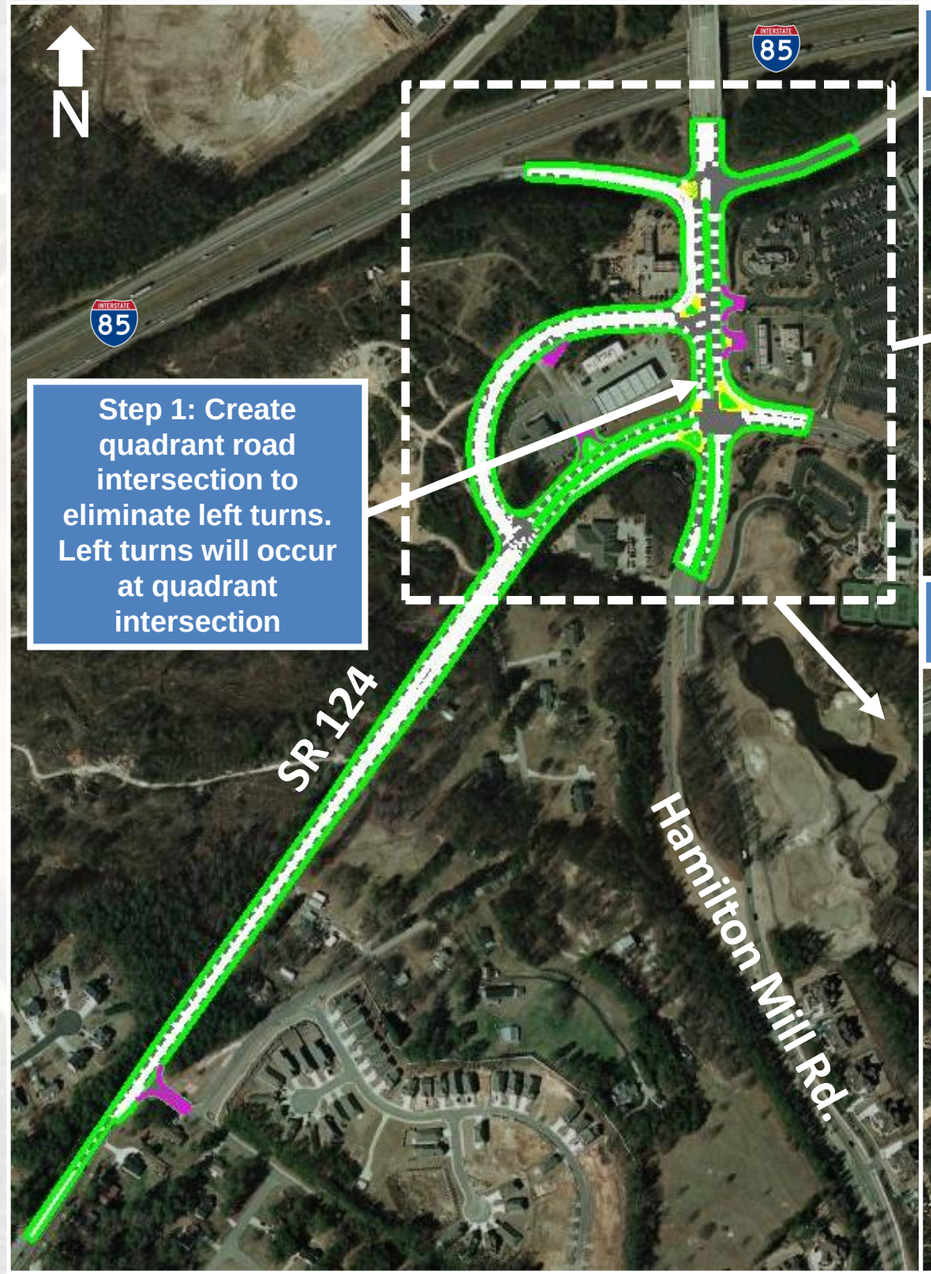
Cause of Bottleneck: Arterial peak period volumes at Hamilton Mill Road and Braselton Highway (SR 124)

Potential Operational Strategies for Evaluation:

1) Create quadrant road intersection to eliminate SB left turn onto SR 124 and all east/west left turns from SR 124 onto Hamilton Mill Road. These left turn movements will occur at quadrant road intersection. Channelize I-85 NB traffic at Hamilton Mill Road using pavement island
2) Create quadrant road intersection to eliminate SB left turn onto SR 124 and all east/west left turns from SR 124 onto Hamilton Mill Road. These left turn movements will occur at quadrant road intersection. Re-stripe SB Hamilton Mill Road

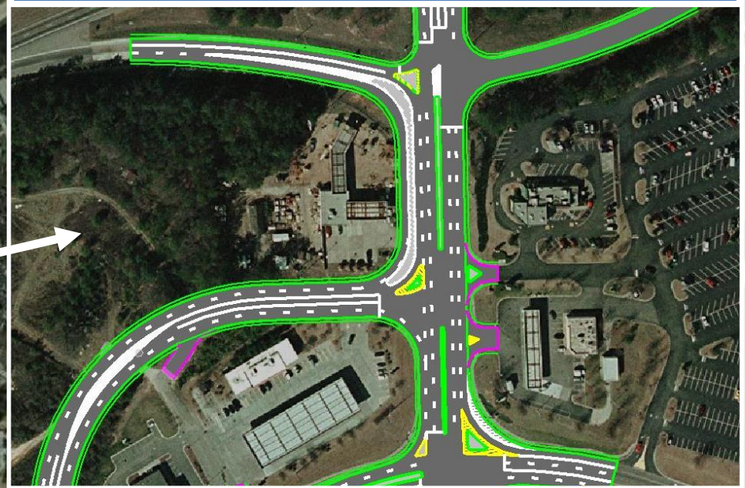


Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Quadrant road (barrier)	$483,600	$5,434,000	$4,827,680	$10,745,280
Quadrant road (no barrier)	$475,800	$5,434,000	$4,755,660	$10,665,460

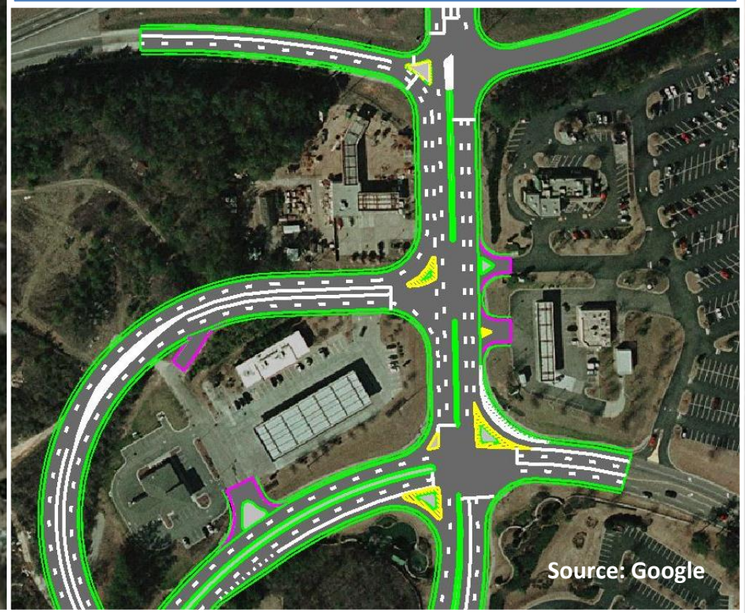


Step 1: Create quadrant road intersection to eliminate left turns. Left turns will occur at quadrant intersection

Option 1: Channelize I-85 ramp traffic onto quadrant road intersection (pavement island)



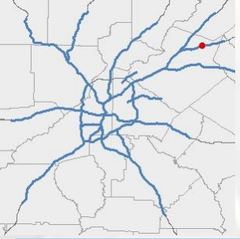
Option 2: Re-stripe SB Hamilton Mill Rd. traffic onto quadrant road intersection



Traffic Data Source: Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 47C: I-85 North @ Hamilton Mill Rd.

Location: I-85 North @ Hamilton Mill Rd.

Cause of Bottleneck: Arterial peak period volumes at Hamilton Mill Road and SR 124 (Braselton Hwy)

Potential Operational Strategies for Evaluation:

4) Relocate Hamilton Mill Rd. off-ramp

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Relocate off-ramp	$660,400	$3,003,000	$6,595,680	$10,259,080

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 48: I-285 East @ US 78

Location: I-285 East @ US 78

Cause of Bottleneck: Congestion

Potential Operational Strategies for Evaluation:

1a) Re-stripe I-285 SB off-ramp to US 78 EB to convert from one lane drop to two lanes drop to reduce I-285 SB from four lanes to three lanes

1b) Re-stripe US 78 EB on-ramp to I-285 SB to convert from merge to lane add

1c) Use SB shoulders on I-285 SB to accommodate auxiliary lane from US 78 to Ponce de Leon Ave (PM only)

I-285 SB	AM Peak	PM Peak
Mainline	4,220	7,700
US 78 WB/EB On-Ramp	340	790
US 78 EB Off-Ramp	600	1,740

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Aux. lane	$188,500	$0	$1,874,860	$2,063,360

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 49: I-75 North @ Barrett Pkwy.

Location: I-75 North @ Barrett Pkwy.

Cause of Safety Concern : Ramp Queue

Potential Operational Strategies for Evaluation:

1) Widen Barrett Parkway SB on-ramp to 3 lanes and extend merging distance

I-75 SB @ Barrett Pkwy.	AM Peak	PM Peak
Mainline	4,320	3,480

I-75 SB Ramp	AM Peak	PM Peak
Barrett Pkwy. SB On-Ramp	1,330	1,110

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp and extend merge distance	$81,900	$0	$814,320	$896,220

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 50: SR 400 @ Northridge Dr.

Location: SR 400 @ Northridge Dr.

Cause of Safety Concern : Ramp Queue

Potential Operational Strategies for Evaluation:

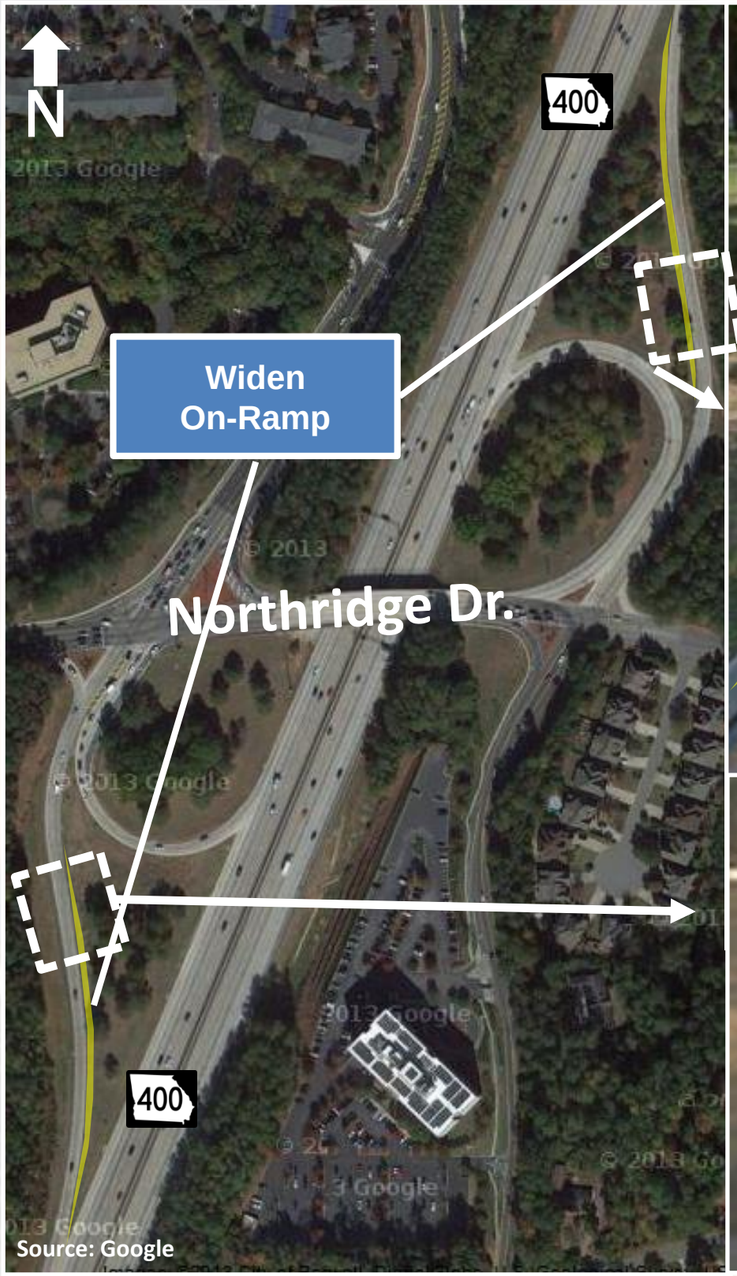
1) Widen Northridge Dr. SB on-ramp to 2 lanes

2) Widen Northridge Dr. NB on-ramp to 2 lanes

SR 400 @ Northridge	AM Peak	PM Peak
NB Mainline	5,130	7,240
SB Mainline	4,080	5,220

SR 400 Ramps	AM Peak	PM Peak
Northridge Dr. NB On-Ramp	1,040	1,070
Northridge Dr. SB On-Ramp	1,430	830

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp	$37,700	$0	$364,910	$402,610
Widen on-ramp	$37,700	$0	$374,270	$411,970



Source: Google

Traffic Data Source: TMC

Georgia Department of Transportation

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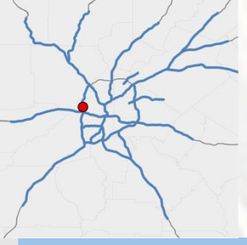


ID# 51: I-285 @ D.L. Hollowell Pkwy.

Location: I-285 @ D.L. Hollowell Pkwy.

Cause of Safety Concern : Ramp Queue

Potential Operational Strategies for Evaluation:

1) Widen Hollowell Pkwy. SB on-ramp to 2 lanes

I-285 SB @ Hollowell Pkwy.	AM Peak	PM Peak
Mainline	Not Available	Not Available

I-285 SB Ramp	AM Peak	PM Peak
Hallowell Pkwy. SB On-Ramp	Not Available	Not Available

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp	$29,900	$0	$297,671	$327,571

Source: Google

ID# 52: US 78 @ Brockett Rd.

Location: US 78 @ Brockett Rd.

Cause of Safety Concern : Ramp Queue

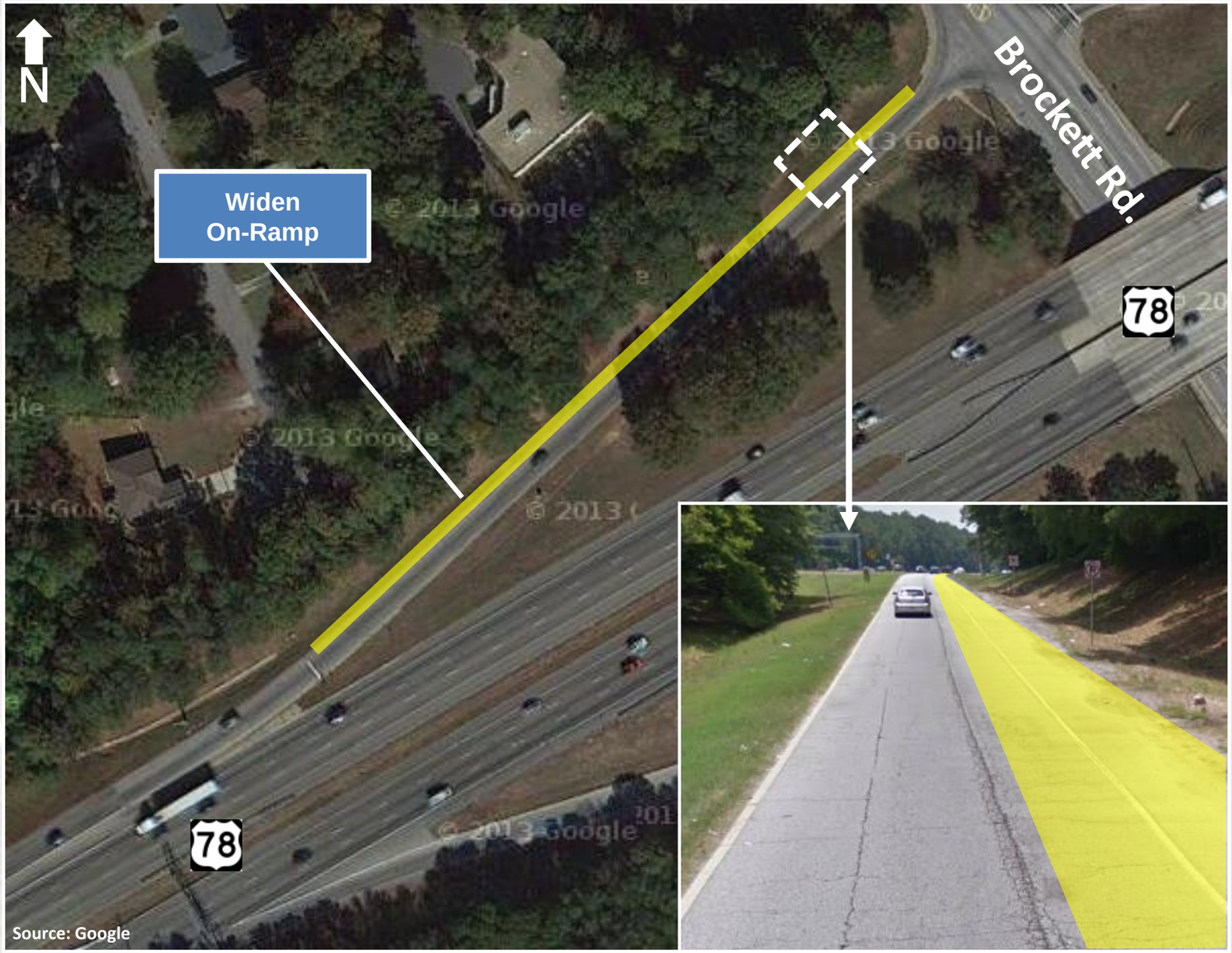
Potential Operational Strategies for Evaluation:

1) Widen Brockett Rd. WB on-ramp to 2 lanes

US 78 WB @ Brockett Rd.	AM Peak	PM Peak
Mainline	5,200	2,430

US 78 WB Ramp	AM Peak	PM Peak
Brockett Rd. WB On-Ramp	Not Available	Not Available

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp	$35,100	$0	$350,545	$385,645



Source: Google

Traffic Data Source: TMC

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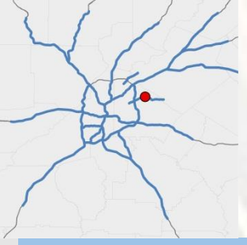


ID# 53: US 78 @ Mtn. Industrial Blvd.

Location: US 78 @ Mtn. Industrial Blvd.

Cause of Safety Concern : Ramp Queue

Potential Operational Strategies for Evaluation:

1) Widen Mtn. Industrial Blvd. WB on-ramp to 3 lanes

US 78 WB @ Mtn. Industrial Blvd.	AM Peak	PM Peak
Mainline	4,050	1,870

US 78 WB Ramp	AM Peak	PM Peak
Mtn. Industrial Blvd. WB On-Ramp	Not Available	Not Available

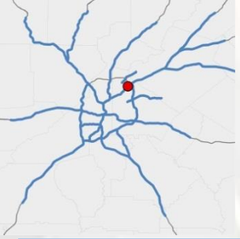
Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp	$35,100	$0	$348,530	$383,630

Source: Google

Traffic Data Source: TMC

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 54: I-85 North @ Chamblee Tucker Rd.

Location: I-85 North @ Chamblee Tucker Rd.

Cause of Safety Concern : Ramp Queue

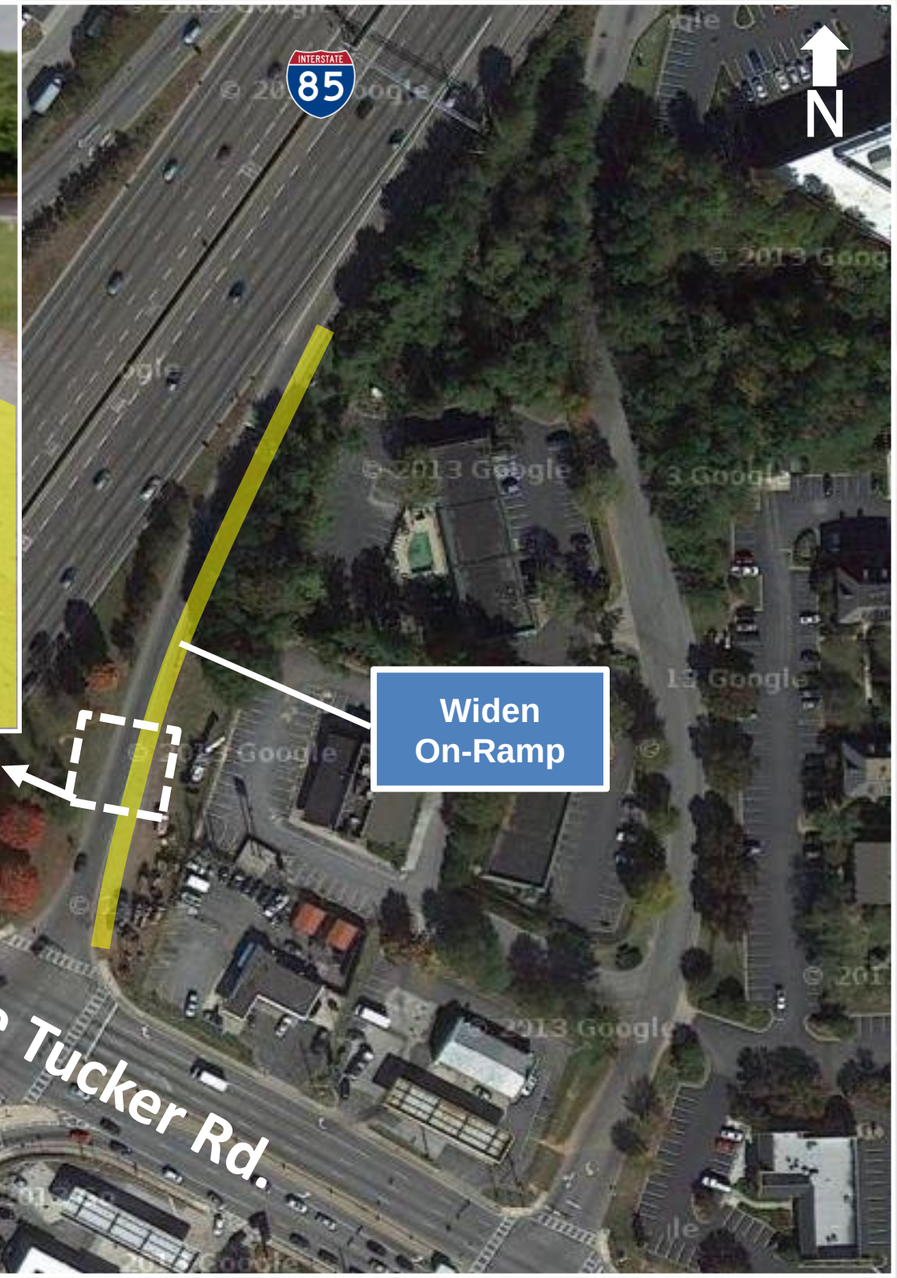
Potential Operational Strategies for Evaluation:

1) Widen Chamblee Tucker NB on-ramp to 2 lanes

I-85 NB Ramp	AM Peak	PM Peak
Chamblee Tucker NB On-Ramp	2,600	2,800

Chamblee Tucker	AM Peak	PM Peak
WB Right Turn	660	260
WB Through	990	490
EB Left Turn	90	160
EB Through	300	1,560

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp	$102,700	$0	$1,022,840	$1,125,540



Source: Google

Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 55: I-285 East @ Chamblee Tucker Rd.

Location: I-285 East SB from I-85 to Chamblee Tucker Rd.

Cause of Safety Concern : Ramp congestion

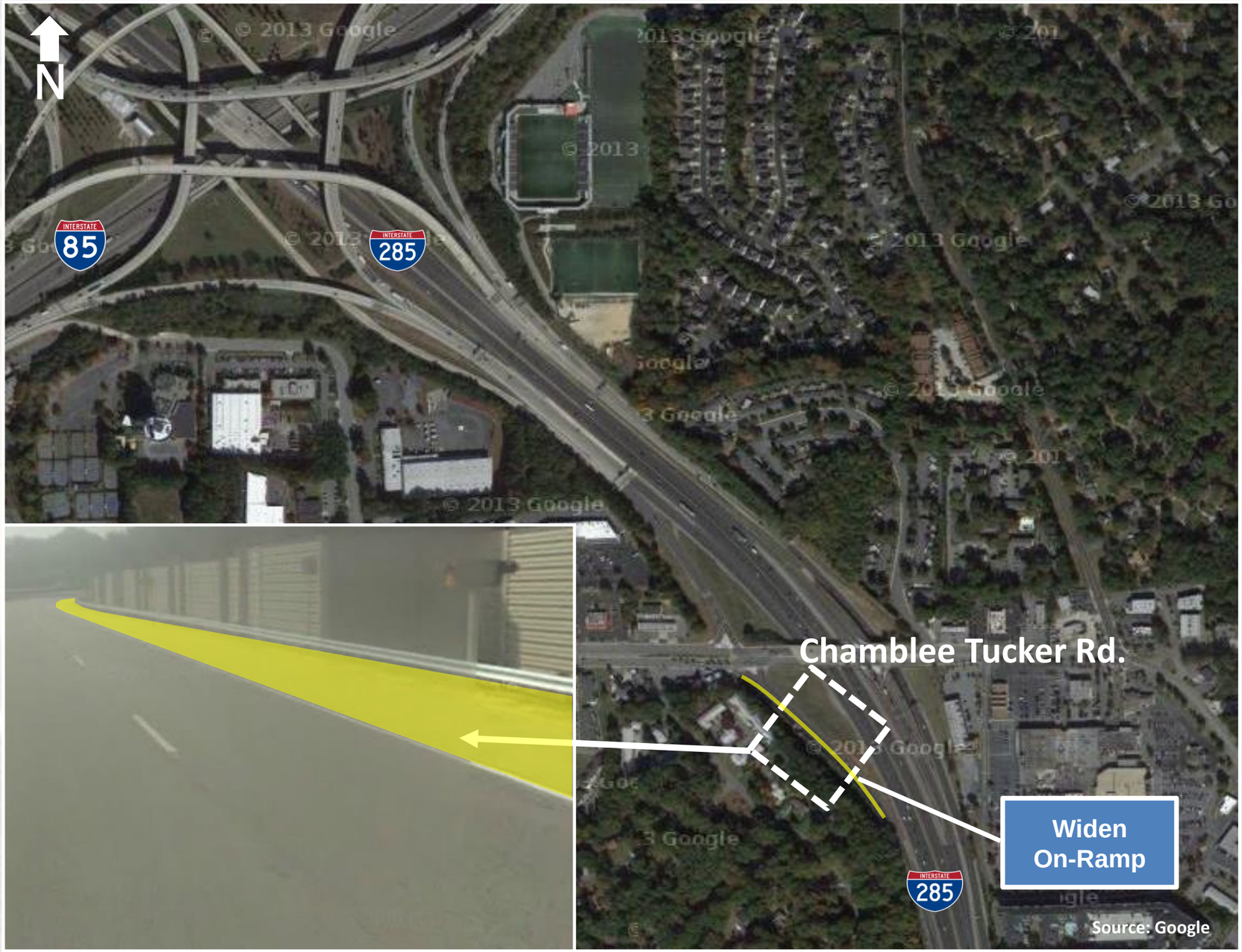
Potential Operational Strategies for Evaluation:

1) Widen Chamblee Tucker Rd. SB on-ramp

Chamblee Tucker @ 285 SB	AM Peak	PM Peak
WB Left Turn	310	130
WB Through	970	540
EB Right Turn	190	550
EB Through	250	960

SB I-285	AM Peak	PM Peak
Mainline	2,810	3,470
Chamblee Tucker On-Ramp	300	1,000

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp	$260,000	$0	$2,591,160	$2,581,160



Traffic Data Source: OPS Traffic Counts

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 56: I-75 North @ Delk Rd.

Location: I-75 North @ Delk Rd.

Cause of Safety Concern : Ramp Queue

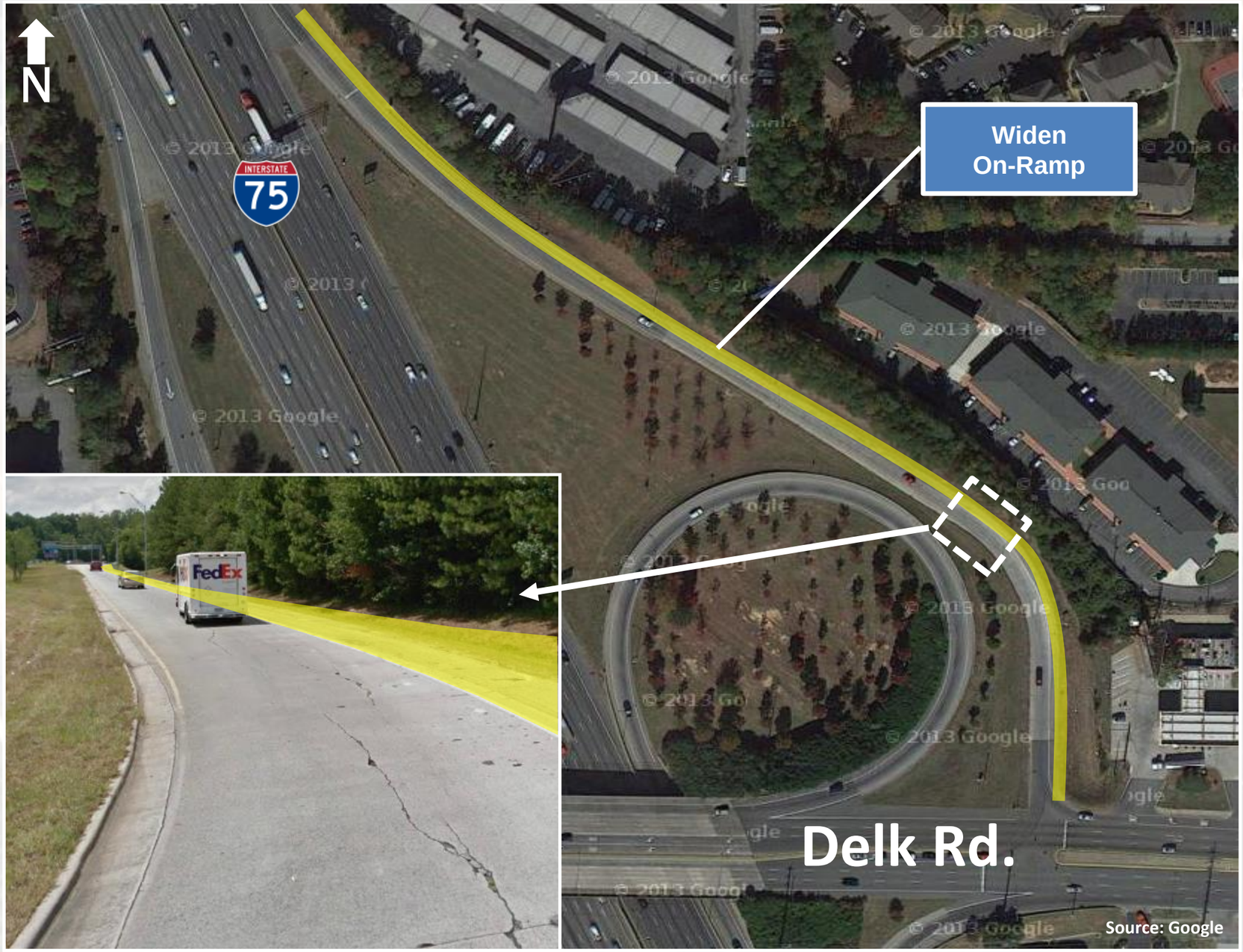
Potential Operational Strategies for Evaluation:

1) Widen Delk Rd. NB on-ramp to 2 lanes

I-75 NB @ Delk Rd.	AM Peak	PM Peak
Mainline	5,310	7,030

I-75 NB Ramp	AM Peak	PM Peak
Delk Rd. NB On-Ramp	560	730

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Widen on-ramp	$54,600	$0	$535,145	$589,745



Source: Google

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 57: I-75 South @ SR 54/Jonesboro Rd.

Location: I-75 South @ SR 54/Jonesboro Rd.

Cause of Bottleneck: Ramp queue

Potential Operational Strategies for Evaluation:

1) Add ramp meter bypass lane to on-ramp for buses/vanpools/HOVs to bypass ramp meter queues during peak period

Jonesboro Rd. On-Ramp	AM Departures
GRTA Route 440 Serving Hampton (Boothe's Crossing Shopping Plaza)	7
GRTA Route 440 Serving Jonesboro Station	8

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp meter bypass lane	$119,600	$0	$1,189,630	$1,309,230

Source: Google

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 58: I-75 North @ North Marietta Pkwy. (SR 120)

Location: I-75 North @ North Marietta Pkwy. (SR 20)

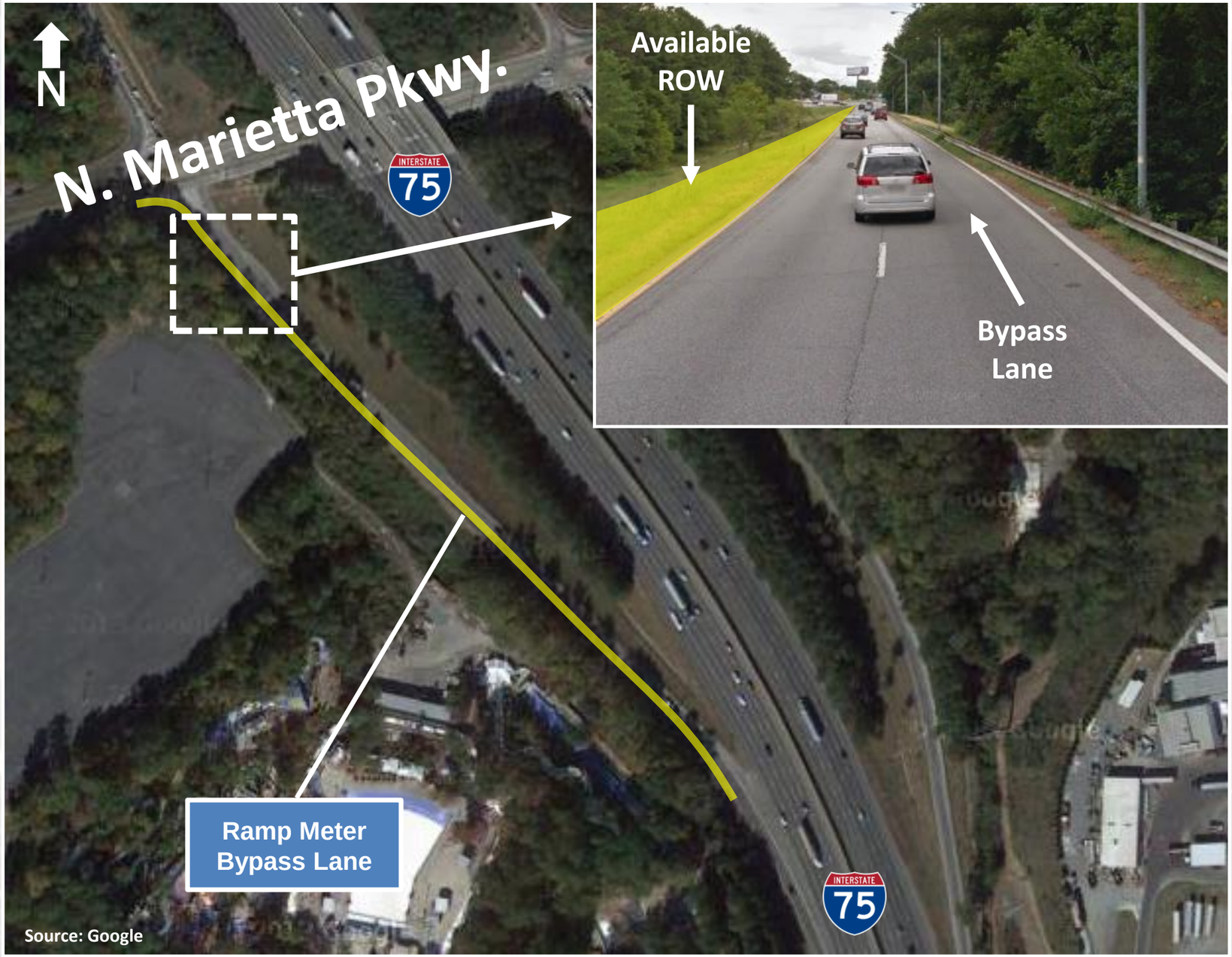
Cause of Bottleneck: Ramp queue

Potential Operational Strategies for Evaluation:

1) Add ramp meter bypass lane to on-ramp for buses/vanpools/HOVs to bypass ramp meter queues during peak period

Marietta Pkwy. On-Ramp	AM Departures
CCT Route 10-C Serving MTC Park & Ride	6

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp meter bypass lane	$58,500	$0	$581,360	$639,860



Source: Google

ID# 59: US 41/Cobb Parkway @ I-285

Location: Cobb Pkwy. @ I-285

Cause of Bottleneck: Congested intersection with upstream weaving issues.

Potential Operational Strategies for Evaluation:

1) Channelize Cobb Pkwy. SB traffic through signage

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Channelization	$22,100	$0	$220,220	$242,320

ID# 60: I-75 North @ Barrett Pkwy.

Location: I-75 North @ Barrett Pkwy.

Cause of Bottleneck: Ramp queue affecting transit bottleneck

Potential Operational Strategies for Evaluation:

1) Add ramp meter bypass lane to on-ramp for buses/vanpools/HOVs to bypass ramp meter queues during peak period

Barrett Pkwy. SB On-Ramp	AM Departures
CCT Route 10-C Serving Town Center	6
GRTA Route 480 Serving Acworth Park & Ride	6

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp meter bypass lane	$79,300	$0	$780,585	$859,885

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 61: I-575 @ SR 92

Location: I-575 @ SR 92

Cause of Bottleneck: Ramp queue affecting transit bottleneck

Potential Operational Strategies for Evaluation:

1) Add ramp meter bypass lane to on-ramp for buses/vanpools/HOVs to bypass ramp meter queues during peak period

SR 92 SB On-Ramp	AM Departures
GRTA Route 490 Serving Canton Park & Ride	4
GRTA Route 490 Serving Woodstock Park & Ride	4

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp meter bypass lane	$19,500	$0	$189,540	$209,040

ID# 62: SR 400 @ Holcomb Bridge Rd.

Location: SR 400 @ Holcomb Bridge Rd.

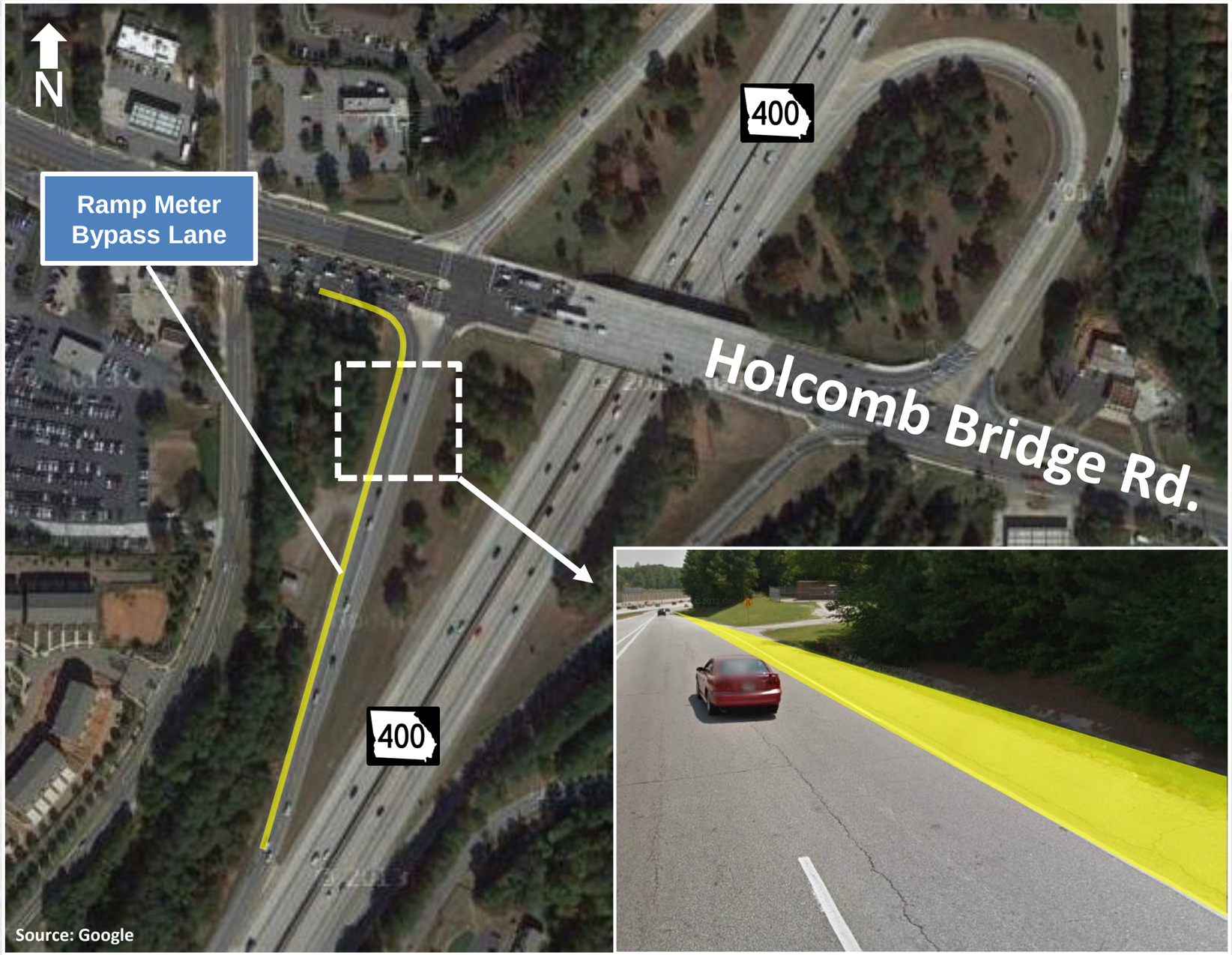
Cause of Bottleneck: Ramp queue affecting transit bottleneck

Potential Operational Strategies for Evaluation:

1) Add ramp meter bypass lane to on-ramp for buses/vanpools/HOVs to bypass ramp meter queues during peak period

Holcomb Bridge Rd. SB On-Ramp	AM Departures	PM Departures
MARTA Route 185 Serving Windward Pkwy. & Ride	13	25

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp meter bypass lane	$53,300	$0	$524,485	$577,785

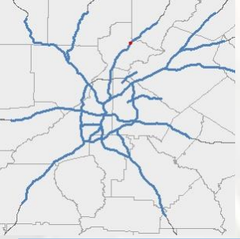


Source: Google

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY



ID# 63: SR 400 @ Windward Pkwy.

Location: SR 400 @ Windward Pkwy.

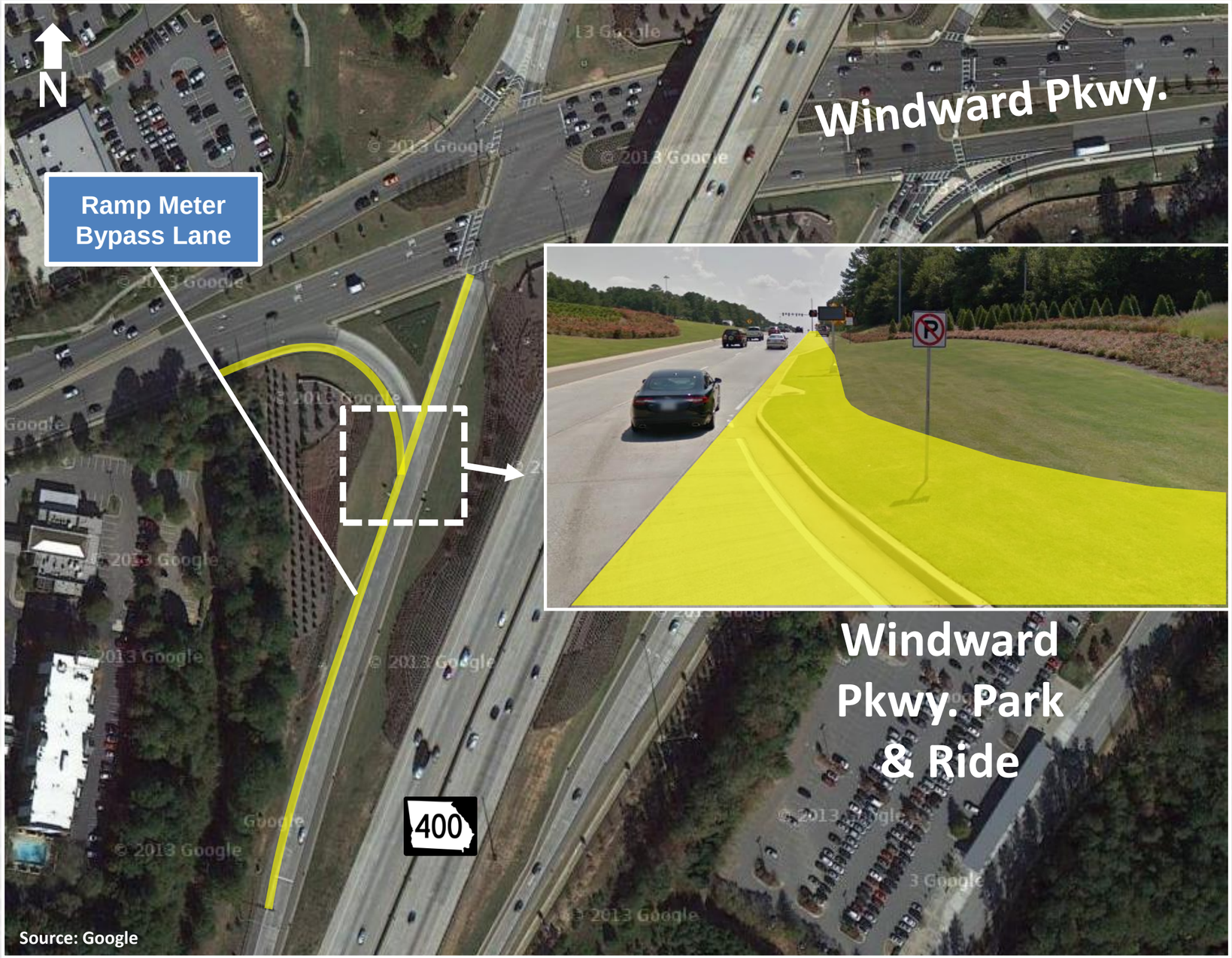
Cause of Bottleneck: Ramp queue affecting transit bottleneck

Potential Operational Strategies for Evaluation:

1) Add ramp meter bypass lane to on-ramp for buses/vanpools/HOVs to bypass ramp meter queues during peak period

Windward Pkwy. SB On-Ramp	AM Departures	PM Departures
MARTA Route 143 Serving Windward Pkwy. & Ride	13	15

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp meter bypass lane	$57,200	$0	$570,895	$628,095



Source: Google

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 64: I-285 S @ Moreland Ave.

Location: I-285 S @ Moreland Ave.

Cause of Bottleneck: Weaving distance on on-ramp

Potential Operational Strategies for Evaluation:

1) Re-stripe and re-align I-285 EB and I-675 SB on-ramps to increase weaving distance

I-285 @ Moreland Ave.	AM Peak	PM Peak
Mainline	2,120	3,900
Moreland Ave. On-Ramp	420	1,090

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Ramp realignment	$202,800	$0	$2,021,240	$2,224,040

Source: Google

Traffic Data Source: TMC Data

Georgia Department of Transportation

Metro Atlanta OPS OPERATIONAL PLANNING STUDY

ID# 65A: SR 20/Buford Dr. @ I-985

Location: Buford Dr. @ I-985

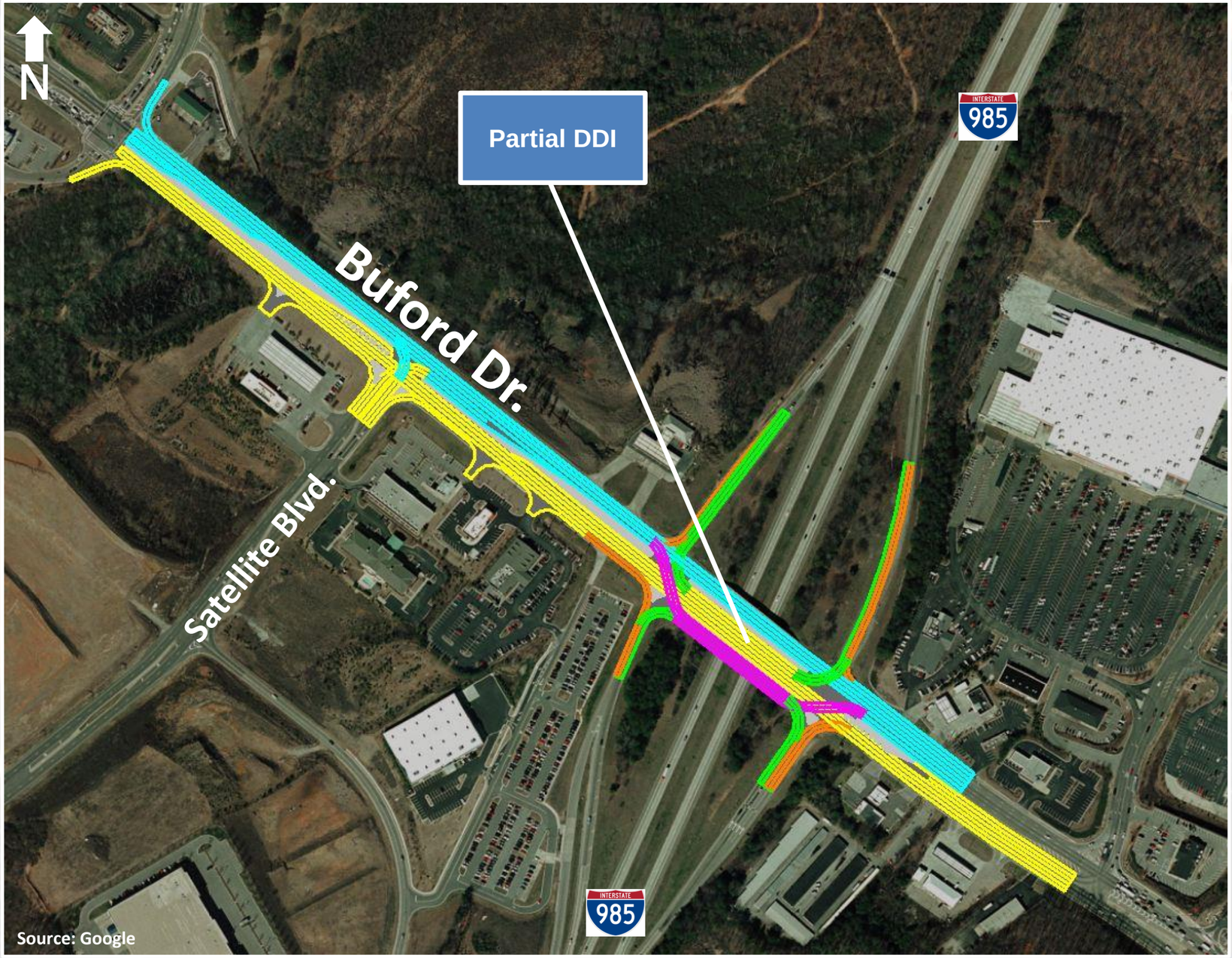
Cause of Bottleneck: Weaving

Potential Operational Strategies for Evaluation:

1) New configuration representing a partial DDI and a displaced left turn intersection

2) Re-stripe Buford Dr. between I-985 SB off-ramp and S. Lee St. (See ID# 66B) ($893,555)

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Partial DDI	$1,102,400	$1,820,000	$11,016,850	$13,939,250



Source: Google

ID# 65B: SR 20/Buford Dr. @ I-985

Location: Buford Dr. @ I-985

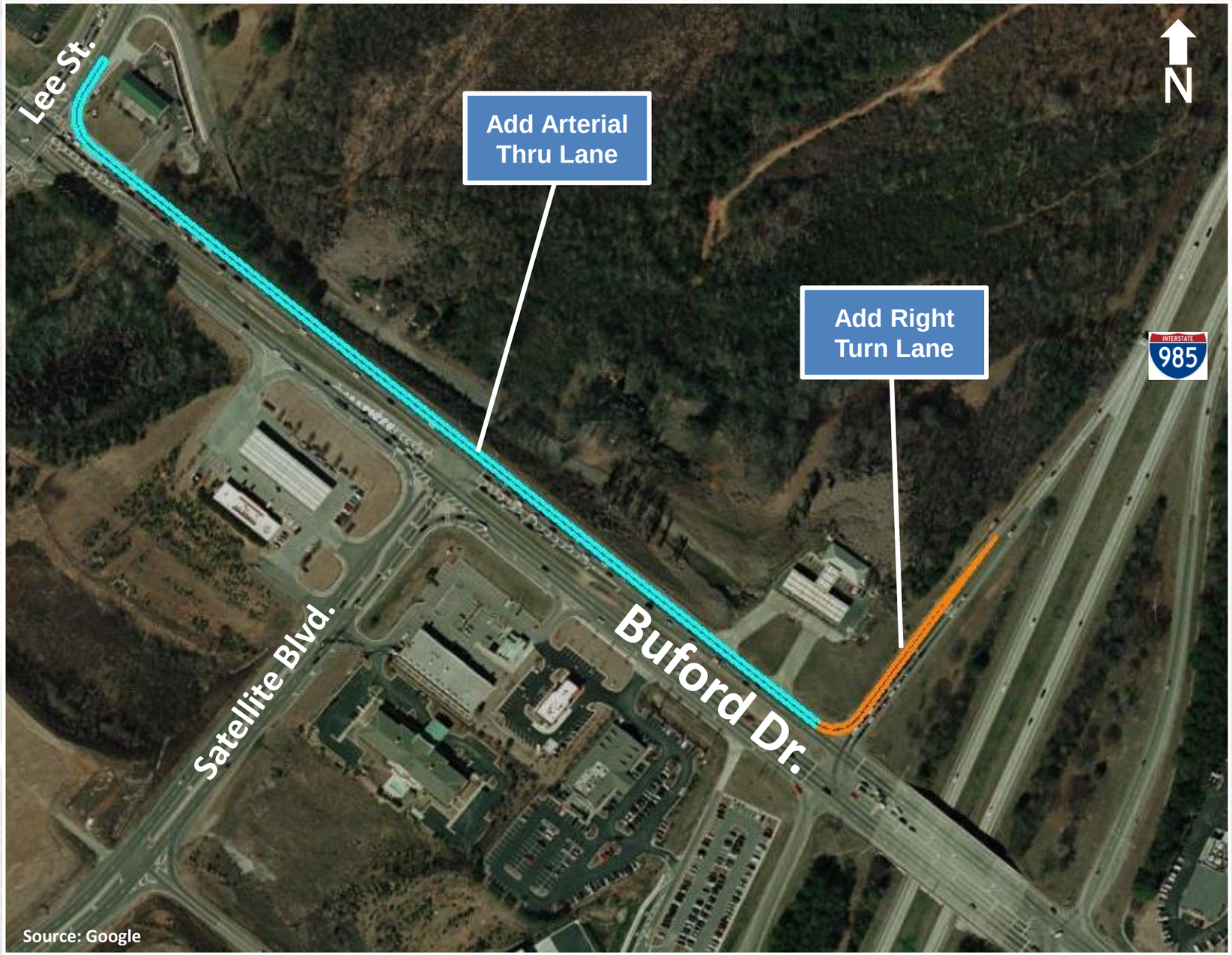
Cause of Bottleneck: Weaving

Potential Operational Strategies for Evaluation:

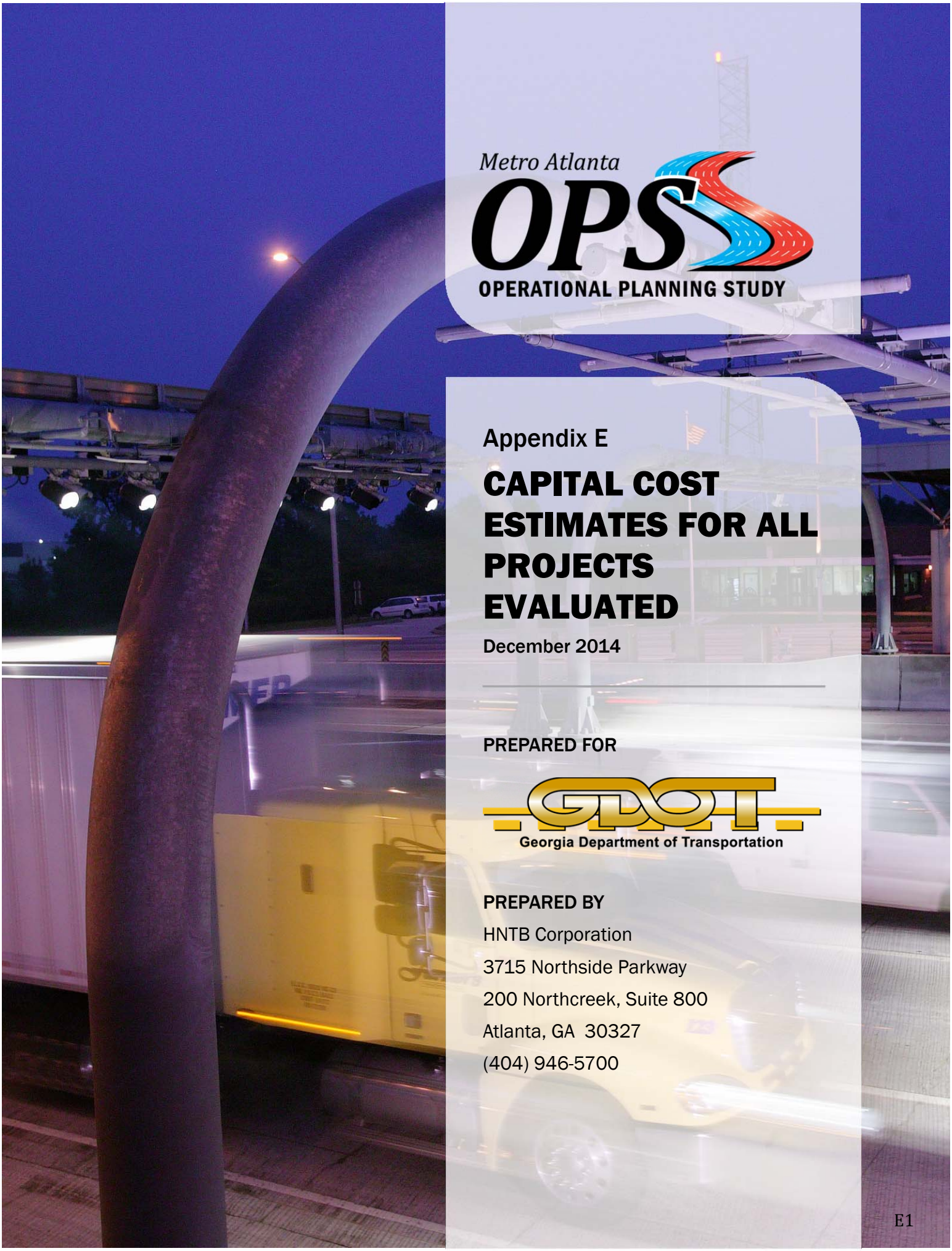
1) New configuration representing a partial DDI and a displaced left turn intersection (See ID# 66A) ($13,939,250)

2) Add right turn lane to I-985 SB Off-ramp and an arterial thru lane to Buford Dr.

Improvement Strategy	Cost (Includes 30% Contingency)			
	PE	ROW	CST	TOTAL
Add thru lane and right turn lane	$81,900	$0	$811,655	$893,555



Source: Google



Metro Atlanta OPS

OPERATIONAL PLANNING STUDY

Appendix E

CAPITAL COST ESTIMATES FOR ALL PROJECTS EVALUATED

December 2014

PREPARED FOR

Georgia Department of Transportation

PREPARED BY

HNTB Corporation
3715 Northside Parkway
200 Northcreek, Suite 800
Atlanta, GA 30327
(404) 946-5700

Variable Ramp Closures

ID Number: 1 (OP 1)

Location I-20 Inside from Moreland Ave to DT Connector (WB) - Close Capitol off-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights	1	EA	$50,000.00	$50,000.00
Lift Gates/Moveable Barrier		LS	$75,000.00	$0.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	12	EA	$10,000.00	$120,000.00
Roadside Signs	4	EA	$750.00	$3,000.00
Changeable Warning Signs		EA	$750.00	$0.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$34,000.00	$34,000.00
			SUBTOTAL (No ROW):	$364,300.00
			SUBTOTAL (No ROW) Contingency:	$109,290.00
			Engineering:	$37,000.00
			Engineering Contingency:	$11,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$521,690.00**

Variable Ramp Closures

ID Number: 1 (OP 2)

Location I-20 Inside from Moreland Ave to DT Connector (WB) - Close Hill off-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights	1	EA	$50,000.00	$50,000.00
Lift Gates/Moveable Barrier	1	LS	$75,000.00	$75,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Changeable Warning Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$32,000.00	$32,000.00
			SUBTOTAL (No ROW):	$344,650.00
			SUBTOTAL (No ROW) Contingency:	$103,395.00
			Engineering:	$35,000.00
			Engineering Contingency:	$10,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$493,545.00**

CD Roads

ID Number: 1 (OP 3)

Location I-20 Inside from Moreland Ave to DT Connector (WB) - C/D System

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbi	1	LS	$1,000,000.00	$1,000,000.00
PCC Widening	24500	SY	$65.00	$1,592,500.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	12300	SY	$35.00	$430,500.00
Concrete Barrier (Type 2)	8000	LF	$285.00	$2,280,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW	12300	SY	$200.00	$2,460,000.00
ROW Take	3	EA	$1,000,000.00	$3,000,000.00
Structural Items				
New Bridge	89920	SF	$150.00	$13,488,000.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	61500	SF	$90.00	$5,535,000.00
Soundwalls	30000	SF	$25.00	$750,000.00
Drainage Items				
Drainage Structures	70	EA	$2,500.00	$175,000.00
Drainage Pipe	21000	LF	$40.00	$840,000.00
Paved Ditched/Flume	1000	SY	$30.00	$30,000.00
Rip Rap	500	SY	$40.00	$20,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	24	LM	$1,650.00	$39,600.00
Overhead Signs	12	EA	$65,000.00	$780,000.00
Remove Overhead Signs	5	EA	$8,000.00	$40,000.00
Retrofit Overead Signs	4	EA	$10,000.00	$40,000.00
Roadside Signs	50	EA	$750.00	$37,500.00
Remove Exist Solid Traffic Stripe	21000	LF	$1.66	$34,860.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$2,722,000.00	$2,722,000.00
			SUBTOTAL (No ROW):	$29,934,960.00
			SUBTOTAL (No ROW) Contingency:	$8,980,488.00
			Engineering:	$2,994,000.00
			Engineering Contingency:	$898,200.00
			SUBTOTAL ROW:	$5,460,000.00
			SUBTOTAL ROW Contingency:	$1,638,000.00
			TOTAL COST:	**$49,905,648.00**

Variable Ramp Closures

ID Number: 2 (OP 1)

Location DT Connector from I-20 to International Blvd (NB) - Close Edgewood off-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights	1	EA	$50,000.00	$50,000.00
Lift Gates/Moveable Barrier	1	LS	$75,000.00	$75,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Changeable Warning Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$32,000.00	$32,000.00
			SUBTOTAL (No ROW):	$344,650.00
			SUBTOTAL (No ROW) Contingency:	$103,395.00
			Engineering:	$35,000.00
			Engineering Contingency:	$10,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$493,545.00**

Interchange Reconfiguration

ID Number: 2 (OP 2)

Location DT Connector from I-20 to International Blvd (NB) - Drop mainline lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing		LS	$25,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay	7300	SY	$23.00	$167,900.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs	6	EA	$65,000.00	$390,000.00
Remove Overhead Signs	4	EA	$8,000.00	$32,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$100,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$63,000.00	$63,000.00
			SUBTOTAL (No ROW):	$690,150.00
			SUBTOTAL (No ROW) Contingency:	$207,045.00
			Engineering:	$70,000.00
			Engineering Contingency:	$21,000.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$988,195.00**

Variable Ramp Closures

ID Number: 2 (OP 3)

Location DT Connector from I-20 to International Blvd (NB) - Close Fulton on-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights	1	EA	$50,000.00	$50,000.00
Lift Gates/Moveable Barrier	1	LS	$75,000.00	$75,000.00
Signing and Marking Items				
Striping		LM	$1,650.00	$0.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	10	EA	$750.00	$7,500.00
Changeable Warning Signs		EA	$750.00	$0.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$31,000.00	$31,000.00
			SUBTOTAL (No ROW):	$337,500.00
			SUBTOTAL (No ROW) Contingency:	$101,250.00
			Engineering:	$34,000.00
			Engineering Contingency:	$10,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$482,950.00**

Variable Ramp Closures

ID Number: 3 (OP 1)

Location DT Connector from Freedom Pkwy to I-20 - Close Ellis on-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights	1	EA	$50,000.00	$50,000.00
Lift Gates/Moveable Barrier	1	LS	$75,000.00	$75,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	6	EA	$750.00	$4,500.00
Changeable Warning Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$17,000.00	$17,000.00
			SUBTOTAL (No ROW):	$179,150.00
			SUBTOTAL (No ROW) Contingency:	$53,745.00
			Engineering:	$18,000.00
			Engineering Contingency:	$5,400.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$256,295.00**

Variable Ramp Closures

ID Number: 3 (OP 1)

Location DT Connector from Freedom Pkwy to I-20 - Close Edgewood on-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights	1	EA	$50,000.00	$50,000.00
Lift Gates/Moveable Barrier	1	LS	$75,000.00	$75,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	6	EA	$750.00	$4,500.00
Changeable Warning Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$17,000.00	$17,000.00
			SUBTOTAL (No ROW):	$179,150.00
			SUBTOTAL (No ROW) Contingency:	$53,745.00
			Engineering:	$18,000.00
			Engineering Contingency:	$5,400.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$256,295.00**

Variable Ramp Closures

ID Number: 3 (OP 2)

Location DT Connector from Freedom Pkwy to I-20 (SB) - Close MLK off-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights	1	EA	$50,000.00	$50,000.00
Lift Gates/Moveable Barrier	1	LS	$75,000.00	$75,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Changeable Warning Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$32,000.00	$32,000.00
			SUBTOTAL (No ROW):	$344,650.00
			SUBTOTAL (No ROW) Contingency:	$103,395.00
			Engineering:	$35,000.00
			Engineering Contingency:	$10,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$493,545.00**

Interchange Reconfiguration

ID Number: 3 (OP 3)

Location DT Connector from Freedom Pkwy to I-20 (SB) - Interchange reconfiguration

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing		LS	$25,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay	31400	SY	$23.00	$722,200.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	10	LM	$1,650.00	$16,500.00
Overhead Signs	3	EA	$65,000.00	$195,000.00
Remove Overhead Signs	6	EA	$8,000.00	$48,000.00
Retrofit Overhead Signs	6	EA	$10,000.00	$60,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe	5000	LF	$1.66	$8,300.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$100,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$106,000.00	$106,000.00
			SUBTOTAL (No ROW):	$1,165,000.00
			SUBTOTAL (No ROW) Contingency:	$349,500.00
			Engineering:	$117,000.00
			Engineering Contingency:	$35,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$1,666,600.00**

Variable Ramp Closures

ID Number: 4 (OP 1)

Location Buford Connector at Monroe Dr (NB) - Close Monroe on-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete		LS	$5,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)	100	LF	$285.00	$28,500.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Traffic Items				
Signal Reconfiguration	1	EA	$8,000.00	$8,000.00
New Signal/Warning Lights		EA	$50,000.00	$0.00
Lift Gates/Moveable Barrier		LS	$75,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	8	EA	$750.00	$6,000.00
Changeable Warning Signs		EA	$750.00	$0.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$5,000.00	$0.00
MOT Items				
Traffic Control	1	LS	$5,000.00	$5,000.00
			SUBTOTAL (No ROW):	$49,150.00
			SUBTOTAL (No ROW) Contingency:	$14,745.00
			Engineering:	$5,000.00
			Engineering Contingency:	$1,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$70,395.00**

Add Ramp Meters

ID Number: 4 (OP 2)

Location Buford Connector at Monroe Dr (NB) - Add ramp meter

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
New Signal/Warning Lights	1	EA	$30,000.00	$30,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$4,000.00	$4,000.00
			SUBTOTAL (No ROW):	$38,650.00
			SUBTOTAL (No ROW) Contingency:	$11,595.00
			Engineering:	$4,000.00
			Engineering Contingency:	$1,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$55,445.00**

Auxiliary Lanes
ID Number: 4 (OP 3)
Location Buford Connector from Monroe Dr to I-85 (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	5200	SY	$70.00	$364,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	3484	SY	$35.00	$121,940.00
Concrete Barrier (Type 2)	3000	LF	$285.00	$855,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	13200	SF	$150.00	$1,980,000.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	5000	LF	$40.00	$200,000.00
Paved Ditched/Flume	650	SY	$30.00	$19,500.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs	5	EA	$65,000.00	$325,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	4	EA	$10,000.00	$40,000.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$50,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$430,000.00	$430,000.00
			SUBTOTAL (No ROW):	$4,724,190.00
			SUBTOTAL (No ROW) Contingency:	$1,417,257.00
			Engineering:	$473,000.00
			Engineering Contingency:	$141,900.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$6,756,347.00**

Modify Ramp Geometrics

ID Number: 4 (OP 4)

Location Buford Connector at Monroe Dr (NB) - Add left turn lar

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1400	SY	$70.00	$98,000.00
Asphalt Mill/Overlay	1100	SY	$23.00	$25,300.00
Pavement Demo	700	SY	$35.00	$24,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	200	SY	$21.00	$4,200.00
Concrete Curb and Gutter	250	LF	$20.00	$5,000.00
ROW		SY	$200.00	$0.00
Guard Rail	500	LF	$30.00	$15,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	10	EA	$2,500.00	$25,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume	100	SY	$30.00	$3,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	6	EA	$10,000.00	$60,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$62,000.00	$62,000.00
			SUBTOTAL (No ROW):	$676,300.00
			SUBTOTAL (No ROW) Contingency:	$202,890.00
			Engineering:	$68,000.00
			Engineering Contingency:	$20,400.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$967,590.00**

Auxiliary Lanes
ID Number: 4 (OP 5)
Location Buford Connector from Piedmont Rd to I-85 (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	5522	SY	$70.00	$386,555.56
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	3700	SY	$35.00	$129,496.11
Concrete Barrier (Type 2)	3000	LF	$285.00	$855,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	9300	SF	$150.00	$1,395,000.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	18	EA	$2,500.00	$45,000.00
Drainage Pipe	4800	LF	$40.00	$192,000.00
Paved Ditched/Flume	650	SY	$30.00	$19,500.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs	4	EA	$65,000.00	$260,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	3	EA	$10,000.00	$30,000.00
Roadside Signs	25	EA	$750.00	$18,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$50,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$365,000.00	$365,000.00
			SUBTOTAL (No ROW):	$4,012,551.67
			SUBTOTAL (No ROW) Contingency:	$1,203,765.50
			Engineering:	$402,000.00
			Engineering Contingency:	$120,600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$5,738,917.17**

Auxiliary Lanes
ID Number: 5 (OP 2)
Location I-85 N from I-85/SR 400 to Buford Connector (SB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing		LS	$10,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay	10000	SY	$23.00	$230,000.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	30	LM	$1,650.00	$49,500.00
Overhead Signs	6	EA	$65,000.00	$390,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	4	EA	$10,000.00	$40,000.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe	54000	LF	$1.66	$89,640.00
Erosion Control Items				
Erosion Control (+ MS4)		AC	$50,000.00	$0.00
				$0.00
MOT Items				$0.00
Traffic Control	1	LS	$84,000.00	$84,000.00
			SUBTOTAL (No ROW):	$921,640.00
			SUBTOTAL (No ROW) Contingency:	$276,492.00
			Engineering:	$93,000.00
			Engineering Contingency:	$27,900.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$1,319,032.00**

Auxiliary Lanes
ID Number: 6
Location I-75 N from SR 5 to SR 120 (SB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	13300	SY	$70.00	$931,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	9500	SY	$35.00	$332,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	4250	LF	$30.00	$127,500.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	5000	SF	$90.00	$450,000.00
Drainage Items				
Drainage Structures	25	EA	$2,500.00	$62,500.00
Drainage Pipe	4500	LF	$40.00	$180,000.00
Paved Ditched/Flume	2500	SY	$30.00	$75,000.00
Rip Rap	1000	SY	$40.00	$40,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs	4	EA	$65,000.00	$260,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$276,000.00	$276,000.00
			SUBTOTAL (No ROW):	$3,035,250.00
			SUBTOTAL (No ROW) Contingency:	$910,575.00
			Engineering:	$304,000.00
			Engineering Contingency:	$91,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$4,341,025.00**

Auxiliary Lanes
ID Number: 7
Location I-75 N from SR 120 to SR 5 (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	13400	SY	$70.00	$938,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	9600	SY	$35.00	$336,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	4250	LF	$30.00	$127,500.00
				$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	5000	SF	$90.00	$450,000.00
Drainage Items				
Drainage Structures	25	EA	$2,500.00	$62,500.00
Drainage Pipe	4600	LF	$40.00	$184,000.00
Paved Ditched/Flume	2600	SY	$30.00	$78,000.00
Rip Rap	1000	SY	$40.00	$40,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs	4	EA	$65,000.00	$260,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$278,000.00	$278,000.00
			SUBTOTAL (No ROW):	$3,054,750.00
			SUBTOTAL (No ROW) Contingency:	$916,425.00
			Engineering:	$306,000.00
			Engineering Contingency:	$91,800.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$4,368,975.00**

Re-Striping
ID Number: 8
Location: I-85 N at SR 316 (SB) - Extend HOT lane merge

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay	38900	SY	$23.00	$894,700.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	10	LM	$1,650.00	$16,500.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	5	EA	$750.00	$3,750.00
Remove Traffic Markings		SY	$2.50	$0.00
Traffic Markings	20	EA	$250.00	$5,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$107,000.00	$107,000.00
			SUBTOTAL (No ROW):	$1,176,950.00
			SUBTOTAL (No ROW) Contingency:	$353,085.00
			Engineering:	$118,000.00
			Engineering Contingency:	$35,400.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$1,683,435.00

Interchange Reconfiguration
ID Number: 9 (OP 1)
Location SR 400 from Holcomb Bridge Rd to Abernathy (SB) - Active Traffic Management (Full Gantry)

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$25,000.00	$25,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2800	SY	$70.00	$196,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail	4200	LF	$30.00	$126,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping		LM	$1,650.00	$0.00
Overhead Signs	12	EA	$65,000.00	$780,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	36	EA	$750.00	$27,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$126,000.00	$126,000.00
			SUBTOTAL (No ROW):	$1,380,000.00
			SUBTOTAL (No ROW) Contingency:	$414,000.00
			Engineering:	$138,000.00
			Engineering Contingency:	$41,400.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$1,973,400.00**

Auxiliary Lanes
ID Number: 10
Location I-285 NW from S Cobb Dr to Paces Ferry Rd (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$500,000.00	$500,000.00
PCC Widening	21800	SY	$65.00	$1,417,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	15600	SY	$35.00	$546,000.00
Concrete Barrier (Type 2)	650	LF	$285.00	$185,250.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	7500	LF	$30.00	$225,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	3430	SF	$150.00	$514,500.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	5000	LF	$40.00	$200,000.00
Paved Ditched/Flume	3500	SY	$30.00	$105,000.00
Rip Rap	250	SY	$40.00	$10,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	5	EA	$65,000.00	$325,000.00
Remove Overhead Signs	5	EA	$8,000.00	$40,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	25	EA	$750.00	$18,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	5	AC	$50,000.00	$250,000.00
MOT Items				
Traffic Control	1	LS	$440,000.00	$440,000.00
			SUBTOTAL (No ROW):	$4,833,100.00
			SUBTOTAL (No ROW) Contingency:	$1,449,930.00
			Engineering:	$484,000.00
			Engineering Contingency:	$145,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$6,912,230.00**

Auxiliary Lanes
ID Number: 11
Location I-285 NW SB from Paces Ferry Rd to S Cobb Dr (SB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$500,000.00	$500,000.00
PCC Widening	21800	SY	$65.00	$1,417,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	15600	SY	$35.00	$546,000.00
Concrete Barrier (Type 2)	650	LF	$285.00	$185,250.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	7500	LF	$30.00	$225,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	3430	SF	$150.00	$514,500.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	5000	LF	$40.00	$200,000.00
Paved Ditched/Flume	3500	SY	$30.00	$105,000.00
Rip Rap	250	SY	$40.00	$10,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	5	EA	$65,000.00	$325,000.00
Remove Overhead Signs	5	EA	$8,000.00	$40,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	25	EA	$750.00	$18,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	5	AC	$50,000.00	$250,000.00
MOT Items				
Traffic Control	1	LS	$440,000.00	$440,000.00
			SUBTOTAL (No ROW):	$4,833,100.00
			SUBTOTAL (No ROW) Contingency:	$1,449,930.00
			Engineering:	$484,000.00
			Engineering Contingency:	$145,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$6,912,230.00**

Modify Ramp Geometrics

ID Number: 12 (OP 1)

Location I-75 N at North Loop (NB) - Extend on-ramp

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1700	SY	$70.00	$119,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1214	SY	$35.00	$42,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	650	LF	$30.00	$19,500.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	4	EA	$2,500.00	$10,000.00
Drainage Pipe	1000	LF	$40.00	$40,000.00
Paved Ditched/Flume	650	SY	$30.00	$19,500.00
Rip Rap	250	SY	$40.00	$10,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$57,000.00	$57,000.00
			SUBTOTAL (No ROW):	$618,150.00
			SUBTOTAL (No ROW) Contingency:	$185,445.00
			Engineering:	$62,000.00
			Engineering Contingency:	$18,600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$884,195.00**

Modify Ramp Geometrics

ID Number: 12 (OP 2)

Location I-75 N at North Loop (NB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1400	SY	$70.00	$98,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	900	SY	$35.00	$31,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	1000	LF	$30.00	$30,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	4	EA	$2,500.00	$10,000.00
Drainage Pipe	1000	LF	$40.00	$40,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$82,000.00	$82,000.00
			SUBTOTAL (No ROW):	$892,150.00
			SUBTOTAL (No ROW) Contingency:	$267,645.00
			Engineering:	$90,000.00
			Engineering Contingency:	$27,000.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$1,276,795.00**

Auxiliary Lanes
ID Number: 13
Location SR 400 from McFarland Rd to Peachtree Pkwy (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening	35800	SY	$65.00	$2,327,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	15400	SY	$35.00	$539,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	5000	LF	$30.00	$150,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	1250	SF	$150.00	$187,500.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	1200	SY	$30.00	$36,000.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	10	LM	$1,650.00	$16,500.00
Overhead Signs	6	EA	$65,000.00	$390,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	24	EA	$750.00	$18,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	7	AC	$50,000.00	$350,000.00
MOT Items				
Traffic Control	1	LS	$423,000.00	$423,000.00
			SUBTOTAL (No ROW):	$4,645,000.00
			SUBTOTAL (No ROW) Contingency:	$1,393,500.00
			Engineering:	$465,000.00
			Engineering Contingency:	$139,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$6,643,000.00**

Auxiliary Lanes
ID Number: 14
Location SR 400 from Peachtree Pkwy to McFarland Rd (SB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening	35800	SY	$65.00	$2,327,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	15400	SY	$35.00	$539,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	5000	LF	$30.00	$150,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	1250	SF	$150.00	$187,500.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	1200	SY	$30.00	$36,000.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	10	LM	$1,650.00	$16,500.00
Overhead Signs	6	EA	$65,000.00	$390,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	24	EA	$750.00	$18,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	7	AC	$50,000.00	$350,000.00
MOT Items				
Traffic Control	1	LS	$423,000.00	$423,000.00
			SUBTOTAL (No ROW):	$4,645,000.00
			SUBTOTAL (No ROW) Contingency:	$1,393,500.00
			Engineering:	$465,000.00
			Engineering Contingency:	$139,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$6,643,000.00**

Auxiliary Lanes
ID Number: 15
Location I-20 E from Wesley Chapel Rd to I-285 E (WB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	7800	SY	$70.00	$546,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	5600	SY	$35.00	$196,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	2500	LF	$30.00	$75,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	1200	SY	$30.00	$36,000.00
Rip Rap	300	SY	$40.00	$12,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	3	LM	$1,650.00	$4,950.00
Overhead Signs	4	EA	$65,000.00	$260,000.00
Remove Overhead Signs	3	EA	$8,000.00	$24,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	24	EA	$750.00	$18,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$133,000.00	$133,000.00
			SUBTOTAL (No ROW):	$1,454,950.00
			SUBTOTAL (No ROW) Contingency:	$436,485.00
			Engineering:	$146,000.00
			Engineering Contingency:	$43,800.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$2,081,235.00**

Auxiliary Lanes
ID Number: 16
Location I-285 E from I-20 to Glenwood Rd (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	7800	SY	$70.00	$546,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	5600	SY	$35.00	$196,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	2500	LF	$30.00	$75,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	875	SF	$150.00	$131,250.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	1200	SY	$30.00	$36,000.00
Rip Rap	300	SY	$40.00	$12,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	3	LM	$1,650.00	$4,950.00
Overhead Signs	4	EA	$65,000.00	$260,000.00
Remove Overhead Signs	3	EA	$8,000.00	$24,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	24	EA	$750.00	$18,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$146,000.00	$146,000.00
			SUBTOTAL (No ROW):	$1,599,200.00
			SUBTOTAL (No ROW) Contingency:	$479,760.00
			Engineering:	$160,000.00
			Engineering Contingency:	$48,000.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$2,286,960.00**

Auxiliary Lanes
ID Number: 17
Location I-285 E from Northlake Pkwy to I-85 N (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening	17000	SY	$65.00	$1,105,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	8500	SY	$35.00	$297,500.00
Concrete Barrier (Type 2)	2800	LF	$285.00	$798,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	1700	LF	$30.00	$51,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	6800	SF	$150.00	$1,020,000.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	10	EA	$2,500.00	$25,000.00
Drainage Pipe	2800	LF	$40.00	$112,000.00
Paved Ditched/Flume	1500	SY	$30.00	$45,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$50,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$381,000.00	$381,000.00
			SUBTOTAL (No ROW):	$4,181,750.00
			SUBTOTAL (No ROW) Contingency:	$1,254,525.00
			Engineering:	$419,000.00
			Engineering Contingency:	$125,700.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$5,980,975.00**

Interchange Reconfiguration

ID Number: 18 (OP 1)

Location I-285 W at I-20 W (WB) - Add mainline lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$250,000.00	$250,000.00
PCC Widening	150	SY	$65.00	$9,750.00
Asphalt Widening	2200	SY	$70.00	$154,000.00
Asphalt Mill/Overlay	34000	SY	$23.00	$782,000.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail	3200	LF	$30.00	$96,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	1260	SF	$150.00	$189,000.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls	13000	SF	$25.00	$325,000.00
Drainage Items				
Drainage Structures	8	EA	$2,500.00	$20,000.00
Drainage Pipe	1600	LF	$40.00	$64,000.00
Paved Ditched/Flume	800	SY	$30.00	$24,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	40	EA	$750.00	$30,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	4	AC	$100,000.00	$400,000.00
MOT Items				
Traffic Control	1	LS	$246,000.00	$246,000.00
			SUBTOTAL (No ROW):	$2,701,350.00
			SUBTOTAL (No ROW) Contingency:	$810,405.00
			Engineering:	$271,000.00
			Engineering Contingency:	$81,300.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$3,864,055.00**

Interchange Reconfiguration

ID Number: 18 (OP 2)

Location I-285 W at I-20 W (EB) - Drop mainline lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$250,000.00	$250,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	4000	SY	$70.00	$280,000.00
Asphalt Mill/Overlay	600	SY	$23.00	$13,800.00
Pavement Demo	2100	SY	$35.00	$73,500.00
Concrete Barrier (Type 2)	3200	LF	$285.00	$912,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail	3000	LF	$30.00	$90,000.00
Structural Items				
New Bridge	7200	SF	$150.00	$1,080,000.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	10000	SF	$90.00	$900,000.00
Soundwalls	30000	SF	$25.00	$750,000.00
Drainage Items				
Drainage Structures	10	EA	$2,500.00	$25,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume	400	SY	$30.00	$12,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	3	EA	$65,000.00	$195,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$100,000.00	$200,000.00
MOT Items				
Traffic Control	1	LS	$491,000.00	$491,000.00
			SUBTOTAL (No ROW):	$5,391,900.00
			SUBTOTAL (No ROW) Contingency:	$1,617,570.00
			Engineering:	$540,000.00
			Engineering Contingency:	$162,000.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$7,711,470.00**

Frontage Road Mods

ID Number: 19 (OP 1)

Location I-85 Inside at N Druid Hills Rd (SB) - Close access from frontage road

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1200	SY	$35.00	$42,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	1200	SY	$21.00	$25,200.00
Concrete Curb and Gutter	250	LF	$20.00	$5,000.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	3	EA	$8,000.00	$24,000.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping		LM	$1,650.00	$0.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$16,000.00	$16,000.00
			SUBTOTAL (No ROW):	$169,700.00
			SUBTOTAL (No ROW) Contingency:	$50,910.00
			Engineering:	$17,000.00
			Engineering Contingency:	$5,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$242,710.00**

Re-Striping
ID Number: 19 (OP 2)
Location I-85 Inside at N Druid Hills Rd (SB) - Off-ramp restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay	1400	SY	$23.00	$32,200.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	1	EA	$10,000.00	$10,000.00
Roadside Signs	6	EA	$750.00	$4,500.00
Remove Traffic Markings		SY	$2.50	$0.00
Traffic Markings	12	EA	$250.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$21,000.00	$21,000.00
			SUBTOTAL (No ROW):	$222,350.00
			SUBTOTAL (No ROW) Contingency:	$66,705.00
			Engineering:	$23,000.00
			Engineering Contingency:	$6,900.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$318,955.00

Modify Ramp Geometrics

ID Number: 19 (OP 3)

Location I-85 Inside at N Druid Hills Rd (NB) - On-ramp restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1400	SY	$70.00	$98,000.00
Asphalt Mill/Overlay	3700	SY	$23.00	$85,100.00
Pavement Demo	800	SY	$35.00	$28,000.00
Concrete Barrier (Type 2)	300	LF	$285.00	$85,500.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	1500	SF	$90.00	$135,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	6	EA	$2,500.00	$15,000.00
Drainage Pipe	500	LF	$40.00	$20,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs	1	EA	$8,000.00	$8,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$64,000.00	$64,000.00
			SUBTOTAL (No ROW):	$697,250.00
			SUBTOTAL (No ROW) Contingency:	$209,175.00
			Engineering:	$70,000.00
			Engineering Contingency:	$21,000.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$997,425.00**

Re-Striping
ID Number: 19 (OP 4)
Location I-85 Inside at N Druid Hills Rd (-) - Dual left turns restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay	8100	SY	$23.00	$186,300.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	24	EA	$750.00	$18,000.00
Remove Traffic Markings		SY	$2.50	$0.00
Traffic Markings	15	EA	$250.00	$3,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$37,000.00	$37,000.00
			SUBTOTAL (No ROW):	$403,300.00
			SUBTOTAL (No ROW) Contingency:	$120,990.00
			Engineering:	$41,000.00
			Engineering Contingency:	$12,300.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$577,590.00

Auxiliary Lanes
ID Number: 20
Location I-285 E from I-85 to Northlake Pkwy (SB) - Shoulder lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening	14500	SY	$65.00	$942,500.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	10000	SY	$35.00	$350,000.00
Concrete Barrier (Type 2)	2100	LF	$285.00	$598,500.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	700	LF	$30.00	$21,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	4200	SF	$150.00	$630,000.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	7	EA	$2,500.00	$17,500.00
Drainage Pipe	2100	LF	$40.00	$84,000.00
Paved Ditched/Flume	1000	SY	$30.00	$30,000.00
Rip Rap	75	SY	$40.00	$3,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	3	EA	$65,000.00	$195,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	3	EA	$10,000.00	$30,000.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$318,000.00	$318,000.00
			SUBTOTAL (No ROW):	$3,491,100.00
			SUBTOTAL (No ROW) Contingency:	$1,047,330.00
			Engineering:	$350,000.00
			Engineering Contingency:	$105,000.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$4,993,430.00**

Channelizations

ID Number: 21

Location I-285 NW at Bolton Rd (NB) - Add arterial thru lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2300	SY	$70.00	$161,000.00
Asphalt Mill/Overlay	5000	SY	$23.00	$115,000.00
Pavement Demo	1000	SY	$35.00	$35,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	30	SY	$21.00	$630.00
Concrete Curb and Gutter	500	LF	$20.00	$10,000.00
ROW	2300	SY	$200.00	$460,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	1000	SY	$30.00	$30,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Flexible Delineator, TP 2B		EA	$86.18	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$50,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$73,000.00	$73,000.00
			SUBTOTAL (No ROW):	$802,780.00
			SUBTOTAL (No ROW) Contingency:	$240,834.00
			Engineering:	$81,000.00
			Engineering Contingency:	$24,300.00
			SUBTOTAL ROW:	$460,000.00
			SUBTOTAL ROW Contingency:	$138,000.00
			TOTAL COST:	**$1,746,914.00**

Modify Ramp Geometrics
ID Number: 22
Location: DT Connector from Freedom Pkwy to Pine St (NB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing		LS	$10,000.00	$0.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1700	SY	$70.00	$119,000.00
Asphalt Mill/Overlay	2300	SY	$23.00	$52,900.00
Pavement Demo	1700	SY	$35.00	$59,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge	61875	SF	$150.00	$9,281,250.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	16000	SF	$90.00	$1,440,000.00
Soundwalls		SF	$25.00	$0.00
Special Bridge (West Peachtree St)	71250	SF	$500.00	$35,625,000.00
Drainage Items				
Drainage Structures	9	EA	$2,500.00	$22,500.00
Drainage Pipe	2650	LF	$40.00	$106,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs	4	EA	$65,000.00	$260,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$4,705,000.00	$4,705,000.00
			SUBTOTAL (No ROW):	$51,752,450.00
			SUBTOTAL (No ROW) Contingency:	$15,525,735.00
			Engineering:	$5,176,000.00
			Engineering Contingency:	$1,552,800.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$74,006,985.00**

Interchange Reconfiguration
ID Number: 23
Location I-285 SW at I-85 S (NB) - Ramp reconfiguration

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$25,000.00	$25,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2500	SY	$70.00	$175,000.00
Asphalt Mill/Overlay	3800	SY	$23.00	$87,400.00
Pavement Demo	2500	SY	$35.00	$87,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	6	EA	$2,500.00	$15,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	3	LM	$1,650.00	$4,950.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe	3000	LF	$1.66	$4,980.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$60,000.00	$60,000.00
			SUBTOTAL (No ROW):	$654,830.00
			SUBTOTAL (No ROW) Contingency:	$196,449.00
			Engineering:	$66,000.00
			Engineering Contingency:	$19,800.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$937,079.00**

Modify Ramp Geometrics
ID Number: 24
Location US 78 at I-285 NB (WB) - Ramp reconfiguration

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening	2500	SY	$65.00	$162,500.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1200	SY	$35.00	$42,000.00
Concrete Barrier (Type 2)	250	LF	$285.00	$71,250.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	150	LF	$30.00	$4,500.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	1800	SF	$90.00	$162,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	2	EA	$2,500.00	$5,000.00
Drainage Pipe	500	LF	$40.00	$20,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	3	EA	$10,000.00	$30,000.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe	2000	LF	$1.66	$3,320.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$62,000.00	$62,000.00
			SUBTOTAL (No ROW):	$679,220.00
			SUBTOTAL (No ROW) Contingency:	$203,766.00
			Engineering:	$68,000.00
			Engineering Contingency:	$20,400.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$971,386.00**

Re-Striping
ID Number: 25
Location I-75 Inside at Northside Dr (NB) - HOV on-ramp restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Traffic Markings		SY	$2.50	$0.00
Traffic Markings	4	EA	$250.00	$1,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$1,000.00	$1,000.00
			SUBTOTAL (No ROW):	$6,650.00
			SUBTOTAL (No ROW) Contingency:	$1,995.00
			Engineering:	$1,000.00
			Engineering Contingency:	$300.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$9,945.00

Auxiliary Lanes
ID Number: 26
Location SR 400 at Abernathy Rd (SB) - Ramp upgrade

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening	1800	SY	$65.00	$117,000.00
Asphalt Widening	1700	SY	$70.00	$119,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1500	SY	$35.00	$52,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	1000	LF	$30.00	$30,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	4	EA	$2,500.00	$10,000.00
Drainage Pipe	500	LF	$40.00	$20,000.00
Paved Ditched/Flume	800	SY	$30.00	$24,000.00
Rip Rap	250	SY	$40.00	$10,000.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,102.50
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs	1	EA	$8,000.00	$8,000.00
Retrofit Overhead Signs	3	EA	$10,000.00	$30,000.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$61,000.00	$61,000.00
			SUBTOTAL (No ROW):	$664,602.50
			SUBTOTAL (No ROW) Contingency:	$199,380.75
			Engineering:	$67,000.00
			Engineering Contingency:	$20,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$951,083.25**

Auxiliary Lanes
ID Number: 27
Location SR 400 at Holcomb Bridge Rd (SB) - Add off-ramp right turn lane arterial thru lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening	1000	SY	$65.00	$65,000.00
Asphalt Widening	1500	SY	$70.00	$105,000.00
Asphalt Mill/Overlay	1000	SY	$23.00	$23,000.00
Pavement Demo	1000	SY	$35.00	$35,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	250	SY	$21.00	$5,250.00
Concrete Curb and Gutter	400	LF	$20.00	$8,000.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	300	SY	$30.00	$9,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$54,000.00	$54,000.00
			SUBTOTAL (No ROW):	$584,900.00
			SUBTOTAL (No ROW) Contingency:	$175,470.00
			Engineering:	$59,000.00
			Engineering Contingency:	$17,700.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$837,070.00**

Interchange Reconfiguration

ID Number: 28 (OP 1)

Location I-20 W at Thornton Rd (-) - DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2000	SY	$70.00	$140,000.00
Asphalt Mill/Overlay	10000	SY	$23.00	$230,000.00
Pavement Demo	2000	SY	$35.00	$70,000.00
Concrete Barrier (Type 2)	400	LF	$285.00	$114,000.00
Concrete Median/Sidewalk	900	SY	$21.00	$18,900.00
Concrete Curb and Gutter	1600	LF	$20.00	$32,000.00
ROW	3200	SY	$200.00	$640,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	2400	SF	$150.00	$360,000.00
Retaining Walls	6000	SF	$90.00	$540,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	1500	LF	$40.00	$60,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	6	LM	$1,650.00	$9,900.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$229,000.00	$229,000.00
			SUBTOTAL (No ROW):	$2,514,300.00
			SUBTOTAL (No ROW) Contingency:	$754,290.00
			Engineering:	$252,000.00
			Engineering Contingency:	$75,600.00
			SUBTOTAL ROW:	$640,000.00
			SUBTOTAL ROW Contingency:	$192,000.00
			TOTAL COST:	**$4,428,190.00**

Auxiliary Lanes

ID Number: 28 (OP 2)

Location: I-20 W at Thornton Rd (EB) - Add on-ramp lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$150,000.00	$150,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	5600	SY	$70.00	$392,000.00
Asphalt Mill/Overlay	12900	SY	$23.00	$296,700.00
Pavement Demo	2500	SY	$35.00	$87,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	300	SY	$21.00	$6,300.00
Concrete Curb and Gutter	1000	LF	$20.00	$20,000.00
ROW	100	SY	$200.00	$20,000.00
Guard Rail	1200	LF	$30.00	$36,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	2000	SF	$90.00	$180,000.00
Drainage Items				
Drainage Structures	12	EA	$2,500.00	$30,000.00
Drainage Pipe	1500	LF	$40.00	$60,000.00
Paved Ditched/Flume	400	SY	$30.00	$12,000.00
Rip Rap	75	SY	$40.00	$3,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	35	EA	$750.00	$26,250.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$150,000.00	$150,000.00
MOT Items				
Traffic Control	1	LS	$191,000.00	$191,000.00
			SUBTOTAL (No ROW):	$2,095,000.00
			SUBTOTAL (No ROW) Contingency:	$628,500.00
			Engineering:	$210,000.00
			Engineering Contingency:	$63,000.00
			SUBTOTAL ROW:	$20,000.00
			SUBTOTAL ROW Contingency:	$6,000.00
			TOTAL COST:	**$3,022,500.00**

Interchange Reconfiguration

ID Number: 29 (OP 1)

Location I-285 SW at Camp Creek Pkwy (-) - DDI (6-Lane)

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	6000	SY	$70.00	$420,000.00
Asphalt Mill/Overlay	25000	SY	$23.00	$575,000.00
Pavement Demo	4500	SY	$35.00	$157,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	19500	SY	$21.00	$409,500.00
Concrete Curb and Gutter	1900	LF	$20.00	$38,000.00
ROW	1200	SY	$200.00	$240,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	10080	SF	$150.00	$1,512,000.00
Retaining Walls	6000	SF	$90.00	$540,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume	200	SY	$30.00	$6,000.00
Rip Rap	50	SY	$40.00	$2,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	10	LM	$1,650.00	$16,500.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	36	EA	$750.00	$27,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	10	AC	$100,000.00	$1,000,000.00
MOT Items				
Traffic Control	1	LS	$538,000.00	$538,000.00
			SUBTOTAL (No ROW):	$5,917,500.00
			SUBTOTAL (No ROW) Contingency:	$1,775,250.00
			Engineering:	$592,000.00
			Engineering Contingency:	$177,600.00
			SUBTOTAL ROW:	$240,000.00
			SUBTOTAL ROW Contingency:	$72,000.00
			TOTAL COST:	**$8,774,350.00**

Interchange Reconfiguration

ID Number: 29 (OP 2)

Location I-285 SW at Camp Creek Pkwy (-) -Modified displaced left tu

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$250,000.00	$250,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	35600	SY	$70.00	$2,492,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	35600	SY	$35.00	$1,246,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	7400	SY	$21.00	$155,400.00
Concrete Curb and Gutter	17450	LF	$20.00	$349,000.00
ROW	3800	SY	$200.00	$760,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge	11550	SF	$150.00	$1,732,500.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	70	EA	$2,500.00	$174,500.00
Drainage Pipe	17450	LF	$40.00	$698,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	4	EA	$150,000.00	$600,000.00
Signing and Marking Items				
Striping	10	LM	$1,650.00	$16,500.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	50	EA	$750.00	$37,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	3	AC	$100,000.00	$300,000.00
MOT Items				
Traffic Control	1	LS	$821,000.00	$821,000.00
			SUBTOTAL (No ROW):	$9,026,400.00
			SUBTOTAL (No ROW) Contingency:	$2,707,920.00
			Engineering:	$903,000.00
			Engineering Contingency:	$270,900.00
			SUBTOTAL ROW:	$760,000.00
			SUBTOTAL ROW Contingency:	$228,000.00
			TOTAL COST:	**$13,896,220.00**

Interchange Reconfiguration

ID Number: 29 (OP 3)

Location I-285 SW at Camp Creek Pkwy (-) - Partial DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$125,000.00	$125,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	11200	SY	$70.00	$784,000.00
Asphalt Mill/Overlay	13900	SY	$23.00	$319,700.00
Pavement Demo	11200	SY	$35.00	$392,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	4300	SY	$21.00	$90,300.00
Concrete Curb and Gutter	9135	LF	$20.00	$182,700.00
ROW	1800	SY	$200.00	$360,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge	11550	SF	$150.00	$1,732,500.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	37	EA	$2,500.00	$91,350.00
Drainage Pipe	9135	LF	$40.00	$365,400.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	8	LM	$1,650.00	$13,200.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	50	EA	$750.00	$37,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$100,000.00	$200,000.00
MOT Items				
Traffic Control	1	LS	$479,000.00	$479,000.00
			SUBTOTAL (No ROW):	$5,266,650.00
			SUBTOTAL (No ROW) Contingency:	$1,579,995.00
			Engineering:	$527,000.00
			Engineering Contingency:	$158,100.00
			SUBTOTAL ROW:	$360,000.00
			SUBTOTAL ROW Contingency:	$108,000.00
			TOTAL COST:	**$7,999,745.00**

Interchange Reconfiguration
ID Number: 30
Location I-85 N at Indian Trail/Lilburn Rd (-) - DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2000	SY	$70.00	$140,000.00
Asphalt Mill/Overlay	23000	SY	$23.00	$529,000.00
Pavement Demo	2000	SY	$35.00	$70,000.00
Concrete Barrier (Type 2)	500	LF	$285.00	$142,500.00
Concrete Median/Sidewalk	950	SY	$21.00	$19,950.00
Concrete Curb and Gutter	1100	LF	$20.00	$22,000.00
ROW	3200	SY	$200.00	$640,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	2400	SF	$150.00	$360,000.00
Retaining Walls	6000	SF	$90.00	$540,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	1500	LF	$40.00	$60,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	6	LM	$1,650.00	$9,900.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$261,000.00	$261,000.00
			SUBTOTAL (No ROW):	$2,864,850.00
			SUBTOTAL (No ROW) Contingency:	$859,455.00
			Engineering:	$287,000.00
			Engineering Contingency:	$86,100.00
			SUBTOTAL ROW:	$640,000.00
			SUBTOTAL ROW Contingency:	$192,000.00
			TOTAL COST:	**$4,929,405.00**

Modify Ramp Geometrics

ID Number: 30 (OP 2)

Location I-85 at Indian Trail/Lilburn Rd (NB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening	400	SY	$65.00	$26,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	200	SY	$35.00	$7,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	5	EA	$750.00	$3,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$10,000.00	$10,000.00
MOT Items				
Traffic Control	1	LS	$11,000.00	$11,000.00
			SUBTOTAL (No ROW):	$118,900.00
			SUBTOTAL (No ROW) Contingency:	$35,670.00
			Engineering:	$12,000.00
			Engineering Contingency:	$3,600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$170,170.00**

Interchange Reconfiguration

ID Number: 31 (OP 1)

Location I-85 N at Beaver Ruin Rd (-) - DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	3000	SY	$70.00	$210,000.00
Asphalt Mill/Overlay	8500	SY	$23.00	$195,500.00
Pavement Demo	1200	SY	$35.00	$42,000.00
Concrete Barrier (Type 2)	400	LF	$285.00	$114,000.00
Concrete Median/Sidewalk	900	SY	$21.00	$18,900.00
Concrete Curb and Gutter	1600	LF	$20.00	$32,000.00
ROW	3200	SY	$200.00	$640,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	2400	SF	$150.00	$360,000.00
Retaining Walls	6000	SF	$90.00	$540,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	1500	LF	$40.00	$60,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$230,000.00	$230,000.00
			SUBTOTAL (No ROW):	$2,527,500.00
			SUBTOTAL (No ROW) Contingency:	$758,250.00
			Engineering:	$253,000.00
			Engineering Contingency:	$75,900.00
			SUBTOTAL ROW:	$640,000.00
			SUBTOTAL ROW Contingency:	$192,000.00
			TOTAL COST:	**$4,446,650.00**

Interchange Reconfiguration
ID Number: 31 (OP 2)
Location I-85 N at Beaver Ruin Rd (-) - Partial DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$150,000.00	$150,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2900	SY	$70.00	$203,000.00
Asphalt Mill/Overlay	25600	SY	$23.00	$588,800.00
Pavement Demo	1500	SY	$35.00	$52,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	2500	SY	$21.00	$52,500.00
Concrete Curb and Gutter	8000	LF	$20.00	$160,000.00
ROW	2900	SY	$200.00	$580,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge	16800	SF	$150.00	$2,520,000.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	900	SF	$90.00	$81,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	3000	LF	$40.00	$120,000.00
Paved Ditched/Flume	2400	SY	$30.00	$72,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$463,000.00	$463,000.00
			SUBTOTAL (No ROW):	$5,091,900.00
			SUBTOTAL (No ROW) Contingency:	$1,527,570.00
			Engineering:	$510,000.00
			Engineering Contingency:	$153,000.00
			SUBTOTAL ROW:	$580,000.00
			SUBTOTAL ROW Contingency:	$174,000.00
			TOTAL COST:	**$8,036,470.00**

Interchange Reconfiguration

ID Number: 32 (OP 1)

Location I-85 N at I-285 (NB) - Interchange reconfiguration

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$250,000.00	$250,000.00
PCC Widening	14500	SY	$65.00	$942,500.00
Asphalt Widening	7500	SY	$70.00	$525,000.00
Asphalt Mill/Overlay	1500	SY	$23.00	$34,500.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)	1800	LF	$285.00	$513,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW	6550	SY	$200.00	$1,310,000.00
ROW Take	2	EA	$1,000,000.00	$2,000,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge	10400	SF	$150.00	$1,560,000.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	1500	SF	$90.00	$135,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	12	EA	$2,500.00	$30,000.00
Drainage Pipe	3000	LF	$40.00	$120,000.00
Paved Ditched/Flume	600	SY	$30.00	$18,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	3	LM	$1,650.00	$4,950.00
Overhead Signs	5	EA	$65,000.00	$325,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	4	EA	$10,000.00	$40,000.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe	10000	LF	$1.66	$16,600.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$100,000.00	$200,000.00
MOT Items				
Traffic Control	1	LS	$492,000.00	$492,000.00
			SUBTOTAL (No ROW):	$5,407,050.00
			SUBTOTAL (No ROW) Contingency:	$1,622,115.00
			Engineering:	$541,000.00
			Engineering Contingency:	$162,300.00
			SUBTOTAL ROW:	$3,310,000.00
			SUBTOTAL ROW Contingency:	$993,000.00
			TOTAL COST:	**$12,035,465.00**

Re-Striping
ID Number: 32 (OP 2)
Location I-85 N at I-285 (-) - Interchange restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay	8000	SY	$23.00	$184,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	8	LM	$1,650.00	$13,200.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	1	EA	$10,000.00	$10,000.00
Roadside Signs	24	EA	$750.00	$18,000.00
Remove Traffic Markings		SY	$2.50	$0.00
Traffic Markings		EA	$250.00	$0.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$30,000.00	$30,000.00
			SUBTOTAL (No ROW):	$320,200.00
			SUBTOTAL (No ROW) Contingency:	$96,060.00
			Engineering:	$33,000.00
			Engineering Contingency:	$9,900.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$459,160.00

Modify Ramp Geometrics
ID Number: 33
Location SR 400 at Haynes Bridge Rd (NB) - Ramp reconfigura

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$400,000.00	$400,000.00
PCC Widening	7333	SY	$65.00	$476,666.67
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	3200	SY	$35.00	$112,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter	600	LF	$20.00	$12,000.00
ROW	50000	SY	$50.00	$2,500,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	6	EA	$2,500.00	$15,000.00
Drainage Pipe	1500	LF	$40.00	$60,000.00
Paved Ditched/Flume	500	SY	$30.00	$15,000.00
Rip Rap	30	SY	$40.00	$1,200.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	3	LM	$1,650.00	$4,950.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs	1	EA	$8,000.00	$8,000.00
Retrofit Overhead Signs	3	EA	$10,000.00	$30,000.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$25,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$144,000.00	$144,000.00
			SUBTOTAL (No ROW):	$1,574,816.67
			SUBTOTAL (No ROW) Contingency:	$472,445.00
			Engineering:	$158,000.00
			Engineering Contingency:	$47,400.00
			SUBTOTAL ROW:	$2,500,000.00
			SUBTOTAL ROW Contingency:	$750,000.00
			TOTAL COST:	**$5,502,661.67**

Interchange Reconfiguration

ID Number: 34 (OP 1)

Location I-285/85 S at Old National Highway (-) - DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	3000	SY	$70.00	$210,000.00
Asphalt Mill/Overlay	10000	SY	$23.00	$230,000.00
Pavement Demo	1200	SY	$35.00	$42,000.00
Concrete Barrier (Type 2)	400	LF	$285.00	$114,000.00
Concrete Median/Sidewalk	900	SY	$21.00	$18,900.00
Concrete Curb and Gutter	1600	LF	$20.00	$32,000.00
ROW	3200	SY	$200.00	$640,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	2400	SF	$150.00	$360,000.00
Retaining Walls	6000	SF	$90.00	$540,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	1500	LF	$40.00	$60,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$234,000.00	$234,000.00
			SUBTOTAL (No ROW):	$2,566,000.00
			SUBTOTAL (No ROW) Contingency:	$769,800.00
			Engineering:	$257,000.00
			Engineering Contingency:	$77,100.00
			SUBTOTAL ROW:	$640,000.00
			SUBTOTAL ROW Contingency:	$192,000.00
			TOTAL COST:	**$4,501,900.00**

Interchange Reconfiguration

ID Number: 34 (OP 2)

Location I-285/85 S at Old National Highway (-) - Quadrant road and roundabout

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$750,000.00	$750,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	6000	SY	$70.00	$420,000.00
Asphalt Mill/Overlay	25000	SY	$23.00	$575,000.00
Pavement Demo	6000	SY	$35.00	$210,000.00
Concrete Barrier (Type 2)	400	LF	$285.00	$114,000.00
Concrete Median/Sidewalk	2000	SY	$21.00	$42,000.00
Concrete Curb and Gutter	2000	LF	$20.00	$40,000.00
ROW	87900	SY	$100.00	$8,790,000.00
ROW Take	1	EA	$1,000,000.00	$1,000,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	12	EA	$2,500.00	$30,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	5	LM	$1,650.00	$8,250.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	60	EA	$750.00	$45,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$261,000.00	$261,000.00
			SUBTOTAL (No ROW):	$2,861,250.00
			SUBTOTAL (No ROW) Contingency:	$858,375.00
			Engineering:	$287,000.00
			Engineering Contingency:	$86,100.00
			SUBTOTAL ROW:	$9,790,000.00
			SUBTOTAL ROW Contingency:	$2,937,000.00
			TOTAL COST:	**$16,819,725.00**

Interchange Reconfiguration

ID Number: 34 (OP 3)

Location I-285/85 S at Old National Highway - Roundabout

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$300,000.00	$300,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	6000	SY	$70.00	$420,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	6000	SY	$35.00	$210,000.00
Concrete Barrier (Type 2)	400	LF	$285.00	$114,000.00
Concrete Median/Sidewalk	2000	SY	$21.00	$42,000.00
Concrete Curb and Gutter	2000	LF	$20.00	$40,000.00
ROW	500	SY	$100.00	$50,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	12	EA	$2,500.00	$30,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$155,000.00	$155,000.00
			SUBTOTAL (No ROW):	$1,695,300.00
			SUBTOTAL (No ROW) Contingency:	$508,590.00
			Engineering:	$170,000.00
			Engineering Contingency:	$51,000.00
			SUBTOTAL ROW:	$50,000.00
			SUBTOTAL ROW Contingency:	$15,000.00
			TOTAL COST:	**$2,489,890.00**

Interchange Reconfiguration
ID Number: 35
Location I-75 at Howell Mill Rd (-) - DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay	8500	SY	$23.00	$195,500.00
Pavement Demo	800	SY	$35.00	$28,000.00
Concrete Barrier (Type 2)	250	LF	$285.00	$71,250.00
Concrete Median/Sidewalk	650	SY	$21.00	$13,650.00
Concrete Curb and Gutter	1200	LF	$20.00	$24,000.00
ROW	4000	SY	$200.00	$800,000.00
ROW Take	2	EA	$1,000,000.00	$2,000,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	4500	SF	$150.00	$675,000.00
Retaining Walls	6000	SF	$90.00	$540,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	20	EA	$2,500.00	$50,000.00
Drainage Pipe	1500	LF	$40.00	$60,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$234,000.00	$234,000.00
			SUBTOTAL (No ROW):	$2,566,500.00
			SUBTOTAL (No ROW) Contingency:	$769,950.00
			Engineering:	$257,000.00
			Engineering Contingency:	$77,100.00
			SUBTOTAL ROW:	$2,800,000.00
			SUBTOTAL ROW Contingency:	$840,000.00
			TOTAL COST:	**$7,310,550.00**

Auxiliary Lanes
ID Number: 36
Location I-85 S at SR 34 (SB) - Add right turn lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening	2200	SY	$65.00	$143,000.00
Asphalt Widening	1200	SY	$70.00	$84,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1700	SY	$35.00	$59,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	500	SY	$21.00	$10,500.00
Concrete Curb and Gutter	900	LF	$20.00	$18,000.00
ROW	1200	SY	$200.00	$240,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	5	EA	$2,500.00	$12,500.00
Drainage Pipe	1000	LF	$40.00	$40,000.00
Paved Ditched/Flume	10	SY	$30.00	$300.00
Rip Rap	10	SY	$40.00	$400.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$64,000.00	$64,000.00
			SUBTOTAL (No ROW):	$702,500.00
			SUBTOTAL (No ROW) Contingency:	$210,750.00
			Engineering:	$71,000.00
			Engineering Contingency:	$21,300.00
			SUBTOTAL ROW:	$240,000.00
			SUBTOTAL ROW Contingency:	$72,000.00
			TOTAL COST:	**$1,317,550.00**

Modify Ramp Geometrics
ID Number: 37
Location I-985 at SR 20 (NB) - Ramp upgrade

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$20,000.00	$20,000.00
PCC Widening	1800	SY	$65.00	$117,000.00
Asphalt Widening	1150	SY	$70.00	$80,500.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1000	SY	$35.00	$35,000.00
Concrete Barrier (Type 2)	300	LF	$285.00	$85,500.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe	5000	LF	$1.66	$8,300.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$38,000.00	$38,000.00
			SUBTOTAL (No ROW):	$415,600.00
			SUBTOTAL (No ROW) Contingency:	$124,680.00
			Engineering:	$42,000.00
			Engineering Contingency:	$12,600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$594,880.00**

Interchange Reconfiguration
ID Number: 38
Location Peachtree Industrial Blvd at SR 140 (-) - DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	5000	SY	$70.00	$350,000.00
Asphalt Mill/Overlay	16000	SY	$23.00	$368,000.00
Pavement Demo	3000	SY	$35.00	$105,000.00
Concrete Barrier (Type 2)	200	LF	$285.00	$57,000.00
Concrete Median/Sidewalk	1500	SY	$21.00	$31,500.00
Concrete Curb and Gutter	2700	LF	$20.00	$54,000.00
ROW	2500	SY	$200.00	$500,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	2500	SF	$90.00	$225,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	24	EA	$2,500.00	$60,000.00
Drainage Pipe	3000	LF	$40.00	$120,000.00
Paved Ditched/Flume	200	SY	$30.00	$6,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	6	LM	$1,650.00	$9,900.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	32	EA	$750.00	$24,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$194,000.00	$194,000.00
			SUBTOTAL (No ROW):	$2,124,400.00
			SUBTOTAL (No ROW) Contingency:	$637,320.00
			Engineering:	$213,000.00
			Engineering Contingency:	$63,900.00
			SUBTOTAL ROW:	$500,000.00
			SUBTOTAL ROW Contingency:	$150,000.00
			TOTAL COST:	**$3,688,620.00**

Auxiliary Lanes
ID Number: 6 39
Location DT Connector at North Ave (SB) - Add right turn lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	300	SY	$70.00	$21,000.00
Asphalt Mill/Overlay	1400	SY	$23.00	$32,200.00
Pavement Demo	200	SY	$35.00	$7,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	200	SY	$21.00	$4,200.00
Concrete Curb and Gutter	350	LF	$20.00	$7,000.00
ROW	300	SY	$200.00	$60,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	1500	SF	$90.00	$135,000.00
Drainage Items				
Drainage Structures	5	EA	$2,500.00	$12,500.00
Drainage Pipe	400	LF	$40.00	$16,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$51,000.00	$51,000.00
			SUBTOTAL (No ROW):	$556,200.00
			SUBTOTAL (No ROW) Contingency:	$166,860.00
			Engineering:	$56,000.00
			Engineering Contingency:	$16,800.00
			SUBTOTAL ROW:	$60,000.00
			SUBTOTAL ROW Contingency:	$18,000.00
			TOTAL COST:	**$873,860.00**

Re-Striping
ID Number: 40 (OP 1)
Location DT Connector at Williams St (SB) - Prohibit Left Turn

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
Signal Timing adjustments	3	EA	$8,000.00	$24,000.00
New Intersection Signal	0.3	EA	$150,000.00	$45,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Traffic Markings	30	SY	$2.50	$75.00
Traffic Markings	4	EA	$250.00	$1,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$8,000.00	$8,000.00
			SUBTOTAL (No ROW):	$84,375.00
			SUBTOTAL (No ROW) Contingency:	$25,312.50
			Engineering:	$9,000.00
			Engineering Contingency:	$2,700.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$121,387.50

Re-Striping
ID Number: 40 (OP 2)
Location DT Connector at Williams St (SB) - Right turn restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay	1000	SY	$23.00	$23,000.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	0.3	EA	$150,000.00	$45,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	2	EA	$750.00	$1,500.00
Remove Traffic Markings		SY	$2.50	$0.00
Traffic Markings	1	EA	$250.00	$250.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$8,000.00	$8,000.00
			SUBTOTAL (No ROW):	$87,400.00
			SUBTOTAL (No ROW) Contingency:	$26,220.00
			Engineering:	$9,000.00
			Engineering Contingency:	$2,700.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$125,320.00

Re-Striping
ID Number: 40 (OP 3)
Location DT Connector at Williams St (SB) - Add right turn lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	0.3	EA	$150,000.00	$45,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Traffic Markings	30	SY	$2.50	$75.00
Traffic Markings	3	EA	$250.00	$750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$6,000.00	$6,000.00
			SUBTOTAL (No ROW):	$64,475.00
			SUBTOTAL (No ROW) Contingency:	$19,342.50
			Engineering:	$7,000.00
			Engineering Contingency:	$2,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$92,917.50

Re-Striping
ID Number: 40 (OP 4)
Location DT Connector at Williams St (SB) - Off-ramp restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	0.3	EA	$150,000.00	$45,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Traffic Markings	30	SY	$2.50	$75.00
Traffic Markings	3	EA	$250.00	$750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$6,000.00	$6,000.00
			SUBTOTAL (No ROW):	$64,475.00
			SUBTOTAL (No ROW) Contingency:	$19,342.50
			Engineering:	$7,000.00
			Engineering Contingency:	$2,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$92,917.50

Modify Ramp Meter Ops

ID Number: 41

Location I-285 NW at Paces Ferry Rd (-) - Ramp meter upgrade

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
Signal Reconfiguration	3	EA	$8,000.00	$24,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$4,000.00	$4,000.00
			SUBTOTAL (No ROW):	$40,300.00
			SUBTOTAL (No ROW) Contingency:	$12,090.00
			Engineering:	$5,000.00
			Engineering Contingency:	$1,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$58,890.00**

Add Ramp Meters

ID Number: 42 (OP 1)

Location Buford Connector at Piedmont Rd (SB) - Add ramp meter

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
New Signal/Warning Lights	1	EA	$30,000.00	$30,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$4,000.00	$4,000.00
			SUBTOTAL (No ROW):	$38,650.00
			SUBTOTAL (No ROW) Contingency:	$11,595.00
			Engineering:	$4,000.00
			Engineering Contingency:	$1,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$55,445.00**

Add Ramp Meters

ID Number: 42 (OP 2)

Location Buford Connector at Armour Dr (SB) - Add ramp meter

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
New Signal/Warning Lights	1	EA	$30,000.00	$30,000.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$4,000.00	$4,000.00
			SUBTOTAL (No ROW):	$38,650.00
			SUBTOTAL (No ROW) Contingency:	$11,595.00
			Engineering:	$4,000.00
			Engineering Contingency:	$1,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$55,445.00**

Modify Ramp Geometrics

ID Number: 43 (OP 1)

Location I-20 E at I-285 E (WB) - Modify geometrics for trucks

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$20,000.00	$20,000.00
PCC Widening	350	SY	$65.00	$22,750.00
Asphalt Widening	350	SY	$70.00	$24,500.00
Asphalt Mill/Overlay	1200	SY	$69.00	$82,800.00
Pavement Demo	400	SY	$35.00	$14,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	500	LF	$30.00	$15,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	250	SY	$30.00	$7,500.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe	500	LF	$1.66	$830.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$23,000.00	$23,000.00
			SUBTOTAL (No ROW):	$250,030.00
			SUBTOTAL (No ROW) Contingency:	$75,009.00
			Engineering:	$26,000.00
			Engineering Contingency:	$7,800.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$358,839.00**

Automated Truck Rollover Warning

ID Number: 43 (OP 2)

Location I-20 E at I-285 E (WB) - Upgrade signage for trucks

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Signing and Marking Items				
Overhead Signs		EA	$65,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Custom Signs	1	EA	$5,000.00	$5,000.00
Roadside Signs	1	EA	$750.00	$750.00
			SUBTOTAL (No ROW):	$5,750.00
			SUBTOTAL (No ROW) Contingency:	$1,725.00
			Engineering:	$1,000.00
			Engineering Contingency:	$300.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$8,775.00**

Automated Truck Rollover Warning

ID Number: 44

Location I-285 S at I-675 (-) - Upgrade signage for trucks

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Signing and Marking Items				
Overhead Signs		EA	$65,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Custom Signs	2	EA	$5,000.00	$10,000.00
Roadside Signs	2	EA	$750.00	$1,500.00
			SUBTOTAL (No ROW):	$11,500.00
			SUBTOTAL (No ROW) Contingency:	$3,450.00
			Engineering:	$2,000.00
			Engineering Contingency:	$600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$17,550.00**

Automated Truck Rollover Warning

ID Number: 45

Location I-75 S at I-285 S (NB/SB) - Upgrade signage for trucks

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Signing and Marking Items				
Overhead Signs		EA	$65,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Custom Signs	2	EA	$5,000.00	$10,000.00
Roadside Signs	2	EA	$750.00	$1,500.00
			SUBTOTAL (No ROW):	$11,500.00
			SUBTOTAL (No ROW) Contingency:	$3,450.00
			Engineering:	$2,000.00
			Engineering Contingency:	$600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$17,550.00**

CD Roads
ID Number: 46
Location: I-75 N from Northside Dr to Howell Mill Rd (NB) - C/D System

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$1,000,000.00	$1,000,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	4700	SY	$70.00	$329,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	4700	SY	$35.00	$164,500.00
Concrete Barrier (Type 2)	4200	LF	$285.00	$1,197,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
ROW Take	3	EA	$1,000,000.00	$3,000,000.00
Structural Items				
New Bridge	21700	SF	$150.00	$3,255,000.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls	700	SF	$25.00	$17,500.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overead Signs		EA	$10,000.00	$0.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$100,000.00	$200,000.00
MOT Items				
Traffic Control	1	LS	$635,000.00	$635,000.00
			SUBTOTAL (No ROW):	$6,982,300.00
			SUBTOTAL (No ROW) Contingency:	$2,094,690.00
			Engineering:	$699,000.00
			Engineering Contingency:	$209,700.00
			SUBTOTAL ROW:	$3,000,000.00
			SUBTOTAL ROW Contingency:	$900,000.00
			TOTAL COST:	**$13,885,690.00**

Interchange Reconfiguration

ID Number: 47 (OP 1)

Location I-85 N at Hamilton Mill Rd (-) - Indirect left turn

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1200	SY	$70.00	$84,000.00
Asphalt Mill/Overlay	25300	SY	$23.00	$581,900.00
Pavement Demo	900	SY	$35.00	$31,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	2200	SY	$21.00	$46,200.00
Concrete Curb and Gutter	10300	LF	$20.00	$206,000.00
ROW		SY	$200.00	$0.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail		LF	$30.00	$0.00
				$0.00
Structural Items				$0.00
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	4	EA	$2,500.00	$10,000.00
Drainage Pipe	1000	LF	$40.00	$40,000.00
Paved Ditched/Flume	200	SY	$30.00	$6,000.00
Rip Rap	50	SY	$40.00	$2,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$140,000.00	$140,000.00
			SUBTOTAL (No ROW):	$1,531,900.00
			SUBTOTAL (No ROW) Contingency:	$459,570.00
			Engineering:	$154,000.00
			Engineering Contingency:	$46,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$2,191,670.00**

Interchange Reconfiguration
ID Number: 47 (OP 2)
I-85 N at Hamilton Mill Rd (-) - Quandrant road (no barrier)

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$500,000.00	$500,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	21900	SY	$70.00	$1,533,000.00
Asphalt Mill/Overlay	15600	SY	$23.00	$358,800.00
Pavement Demo	1400	SY	$35.00	$49,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	1000	SY	$21.00	$21,000.00
Concrete Curb and Gutter	1200	LF	$20.00	$24,000.00
ROW	31800	SY	$100.00	$3,180,000.00
ROW Take	1	EA	$1,000,000.00	$1,000,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls	3000	SF	$25.00	$75,000.00
Drainage Items				
Drainage Structures	8	EA	$2,500.00	$20,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume	400	SY	$30.00	$12,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	6	LM	$1,650.00	$9,900.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$300,000.00	$300,000.00
MOT Items				
Traffic Control	1	LS	$333,000.00	$333,000.00
			SUBTOTAL (No ROW):	$3,658,200.00
			SUBTOTAL (No ROW) Contingency:	$1,097,460.00
			Engineering:	$366,000.00
			Engineering Contingency:	$109,800.00
			SUBTOTAL ROW:	$4,180,000.00
			SUBTOTAL ROW Contingency:	$1,254,000.00
			TOTAL COST:	**$10,665,460.00**

Interchange Reconfiguration

ID Number: 47 (OP 3)

I-85 N at Hamilton Mill Rd (-) - Quandrant road (with barrier)

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$500,000.00	$500,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	22500	SY	$70.00	$1,575,000.00
Asphalt Mill/Overlay	15600	SY	$23.00	$358,800.00
Pavement Demo	1400	SY	$35.00	$49,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	1400	SY	$21.00	$29,400.00
Concrete Curb and Gutter	1200	LF	$20.00	$24,000.00
ROW	31800	SY	$100.00	$3,180,000.00
ROW Take	1	EA	$1,000,000.00	$1,000,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls	3000	SF	$25.00	$75,000.00
Drainage Items				
Drainage Structures	8	EA	$2,500.00	$20,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume	400	SY	$30.00	$12,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments	2	EA	$8,000.00	$16,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	6	LM	$1,650.00	$9,900.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$300,000.00	$300,000.00
MOT Items				
Traffic Control	1	LS	$338,000.00	$338,000.00
			SUBTOTAL (No ROW):	$3,713,600.00
			SUBTOTAL (No ROW) Contingency:	$1,114,080.00
			Engineering:	$372,000.00
			Engineering Contingency:	$111,600.00
			SUBTOTAL ROW:	$4,180,000.00
			SUBTOTAL ROW Contingency:	$1,254,000.00
			TOTAL COST:	**$10,745,280.00**

Interchange Reconfiguration
ID Number: 47 (OP 4)
I-85 N at Hamilton Mill Rd (-) - Ramp relocation

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$750,000.00	$750,000.00
PCC Widening	13000	SY	$65.00	$845,000.00
Asphalt Widening	12300	SY	$70.00	$861,000.00
Asphalt Mill/Overlay	17600	SY	$23.00	$404,800.00
Pavement Demo	14300	SY	$35.00	$500,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	900	SY	$21.00	$18,900.00
Concrete Curb and Gutter	2000	LF	$20.00	$40,000.00
ROW	11100	SY	$100.00	$1,110,000.00
ROW Take	1.2	EA	$1,000,000.00	$1,200,000.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls	3000	SF	$25.00	$75,000.00
Drainage Items				
Drainage Structures	12	EA	$2,500.00	$30,000.00
Drainage Pipe	3000	LF	$40.00	$120,000.00
Paved Ditched/Flume	3000	SY	$30.00	$90,000.00
Rip Rap	500	SY	$40.00	$20,000.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	6	LM	$1,650.00	$9,900.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs	2	EA	$8,000.00	$16,000.00
Retrofit Overhead Signs	2	EA	$10,000.00	$20,000.00
Roadside Signs	30	EA	$750.00	$22,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$500,000.00	$500,000.00
MOT Items				
Traffic Control	1	LS	$462,000.00	$462,000.00
			SUBTOTAL (No ROW):	$5,073,600.00
			SUBTOTAL (No ROW) Contingency:	$1,522,080.00
			Engineering:	$508,000.00
			Engineering Contingency:	$152,400.00
			SUBTOTAL ROW:	$2,310,000.00
			SUBTOTAL ROW Contingency:	$693,000.00
			TOTAL COST:	**$10,259,080.00**

Auxiliary Lanes
ID Number: 48
Location I-285 E from US 78 to Ponce de Leon Ave (SB) - Shoulder Lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening	4100	SY	$65.00	$266,500.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	2700	SY	$35.00	$94,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	1800	LF	$30.00	$54,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening	1600	SF	$150.00	$240,000.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	6	EA	$2,500.00	$15,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume	500	SY	$30.00	$15,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	4	LM	$1,650.00	$6,600.00
Overhead Signs	4	EA	$65,000.00	$260,000.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs	1	EA	$10,000.00	$10,000.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe	60000	LF	$1.66	$99,600.00
Erosion Control Items				
Erosion Control (+ MS4)	2	AC	$50,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$132,000.00	$132,000.00
			SUBTOTAL (No ROW):	$1,442,200.00
			SUBTOTAL (No ROW) Contingency:	$432,660.00
			Engineering:	$145,000.00
			Engineering Contingency:	$43,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$2,063,360.00**

Modify Ramp Geometrics
ID Number: 49
Location: I-75 N at Barrett Pkwy (SB) - Ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening	7000	SY	$65.00	$455,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	700	SY	$35.00	$24,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
				$0.00
Structural Items				$0.00
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	5	EA	$750.00	$3,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$57,000.00	$57,000.00
			SUBTOTAL (No ROW):	$626,400.00
			SUBTOTAL (No ROW) Contingency:	$187,920.00
			Engineering:	$63,000.00
			Engineering Contingency:	$18,900.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$896,220.00**

Modify Ramp Geometrics

ID Number: 50 (OP 1)

Location SR 400 at Northridge Dr (SB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening	1100	SY	$65.00	$71,500.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	300	SY	$35.00	$10,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	2	EA	$2,500.00	$5,000.00
Drainage Pipe	120	LF	$40.00	$4,800.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs	1	EA	$8,000.00	$8,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	5	EA	$750.00	$3,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$26,000.00	$26,000.00
			SUBTOTAL (No ROW):	$280,700.00
			SUBTOTAL (No ROW) Contingency:	$84,210.00
			Engineering:	$29,000.00
			Engineering Contingency:	$8,700.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$402,610.00**

Modify Ramp Geometrics

ID Number: 50 (OP 2)

Location SR 400 at Northridge Dr (NB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening	1100	SY	$65.00	$71,500.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	500	SY	$35.00	$17,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	2	EA	$2,500.00	$5,000.00
Drainage Pipe	100	LF	$40.00	$4,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	1	EA	$65,000.00	$65,000.00
Remove Overhead Signs	1	EA	$8,000.00	$8,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	5	EA	$750.00	$3,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$27,000.00	$27,000.00
			SUBTOTAL (No ROW):	$287,900.00
			SUBTOTAL (No ROW) Contingency:	$86,370.00
			Engineering:	$29,000.00
			Engineering Contingency:	$8,700.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$411,970.00**

Modify Ramp Geometrics
ID Number: 51
Location I-285 NW at Hollowell Pkwy (SB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening	1200	SY	$65.00	$78,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	500	SY	$35.00	$17,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	150	LF	$30.00	$4,500.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	1	EA	$2,500.00	$2,500.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	500	SY	$30.00	$15,000.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe	800	LF	$1.66	$1,328.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$21,000.00	$21,000.00
			SUBTOTAL (No ROW):	$228,978.00
			SUBTOTAL (No ROW) Contingency:	$68,693.40
			Engineering:	$23,000.00
			Engineering Contingency:	$6,900.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$327,571.40**

Modify Ramp Geometrics
ID Number: 52
Location: US 78 at Brockett Rd (WB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1200	SY	$70.00	$84,000.00
Asphalt Mill/Overlay	1000	SY	$23.00	$23,000.00
Pavement Demo	500	SY	$35.00	$17,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	150	LF	$30.00	$4,500.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	1	EA	$2,500.00	$2,500.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	800	SY	$30.00	$24,000.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	4	EA	$750.00	$3,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$25,000.00	$25,000.00
			SUBTOTAL (No ROW):	$269,650.00
			SUBTOTAL (No ROW) Contingency:	$80,895.00
			Engineering:	$27,000.00
			Engineering Contingency:	$8,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$385,645.00**

Modify Ramp Geometrics
ID Number: 53
Location US 78 at Mtn. Industrial Blvd (WB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	1100	SY	$70.00	$77,000.00
Asphalt Mill/Overlay	2400	SY	$23.00	$55,200.00
Pavement Demo	600	SY	$35.00	$21,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	5	EA	$750.00	$3,750.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$25,000.00	$25,000.00
			SUBTOTAL (No ROW):	$268,100.00
			SUBTOTAL (No ROW) Contingency:	$80,430.00
			Engineering:	$27,000.00
			Engineering Contingency:	$8,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$383,630.00**

Modify Ramp Geometrics
ID Number: 54
Location: I-85 N at Chamblee Tucker Rd (NB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2200	SY	$70.00	$154,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1600	SY	$35.00	$56,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	350	LF	$30.00	$10,500.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	2800	SF	$90.00	$252,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	6	EA	$2,500.00	$15,000.00
Drainage Pipe	1000	LF	$40.00	$40,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap	50	SY	$40.00	$2,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	10	EA	$750.00	$7,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$72,000.00	$72,000.00
			SUBTOTAL (No ROW):	$786,800.00
			SUBTOTAL (No ROW) Contingency:	$236,040.00
			Engineering:	$79,000.00
			Engineering Contingency:	$23,700.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$1,125,540.00**

Modify Ramp Geometrics
ID Number: 55
Location: I-285 E at Chamblee Tucker Rd (SB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	4400	SY	$70.00	$308,000.00
Asphalt Mill/Overlay	3800	SY	$23.00	$87,400.00
Pavement Demo	2700	SY	$35.00	$94,500.00
Concrete Barrier (Type 2)	3200	LF	$285.00	$912,000.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls	2200	SF	$25.00	$55,000.00
Drainage Items				
Drainage Structures	14	EA	$2,500.00	$35,000.00
Drainage Pipe	4500	LF	$40.00	$180,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	10	EA	$750.00	$7,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$182,000.00	$182,000.00
			SUBTOTAL (No ROW):	$1,993,200.00
			SUBTOTAL (No ROW) Contingency:	$597,960.00
			Engineering:	$200,000.00
			Engineering Contingency:	$60,000.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$2,851,160.00**

Modify Ramp Geometrics
ID Number: 56
Location: I-75 N at Delk Road (NB) - On-ramp widening

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening	2600	SY	$65.00	$169,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1500	SY	$35.00	$52,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	250	LF	$30.00	$7,500.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	300	SY	$30.00	$9,000.00
Rip Rap	50	SY	$40.00	$2,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	10	EA	$750.00	$7,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$38,000.00	$38,000.00
			SUBTOTAL (No ROW):	$411,650.00
			SUBTOTAL (No ROW) Contingency:	$123,495.00
			Engineering:	$42,000.00
			Engineering Contingency:	$12,600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$589,745.00**

Modify Ramp Geometrics
ID Number: 57
Location I-75 S at Jonesboro Rd (NB) - Ramp meter bypass for transit

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$20,000.00	$20,000.00
PCC Widening	8000	SY	$65.00	$520,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1200	SY	$35.00	$42,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	200	LF	$30.00	$6,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	4000	SY	$30.00	$120,000.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	4.00	LM	$1,650.00	$6,600.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	2.00	AC	$25,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$84,000.00	$84,000.00
			SUBTOTAL (No ROW):	$915,100.00
			SUBTOTAL (No ROW) Contingency:	$274,530.00
			Engineering:	$92,000.00
			Engineering Contingency:	$27,600.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$1,309,230.00**

Modify Ramp Geometrics
ID Number: 58
Location I-75 N at North Loop (SB) - Ramp meter bypass for transit

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	2500	SY	$70.00	$175,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	300	SY	$35.00	$10,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	1700	SY	$30.00	$51,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	3.00	LM	$1,650.00	$4,950.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	15	EA	$750.00	$11,250.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1.00	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$41,000.00	$41,000.00
			SUBTOTAL (No ROW):	$447,200.00
			SUBTOTAL (No ROW) Contingency:	$134,160.00
			Engineering:	$45,000.00
			Engineering Contingency:	$13,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$639,860.00**

Re-Striping
ID Number: 59
Location: I-285 NW at Cobb Pkwy (-) - Upgrade directional signage

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Asphalt Mill/Overlay		SY	$23.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs	1	EA	$140,000.00	$140,000.00
Remove Overhead Signs	1	EA	$8,000.00	$8,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs		EA	$750.00	$0.00
Remove Traffic Markings	500	SY	$2.50	$1,250.00
Traffic Markings	10	EA	$250.00	$2,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
MOT Items				
Traffic Control	1	LS	$16,000.00	$16,000.00
			SUBTOTAL (No ROW):	$169,400.00
			SUBTOTAL (No ROW) Contingency:	$50,820.00
			Engineering:	$17,000.00
			Engineering Contingency:	$5,100.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	$242,320.00

Modify Ramp Geometrics
ID Number: 60
Location: I-75 N at barrett Pkwy (SB) - Ramp meter bypass for transit

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$100,000.00	$100,000.00
PCC Widening	2800	SY	$65.00	$182,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1000	SY	$35.00	$35,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume	1900	SY	$30.00	$57,000.00
Rip Rap	200	SY	$40.00	$8,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	3	LM	$1,650.00	$4,950.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	12	EA	$750.00	$9,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$100,000.00	$100,000.00
MOT Items				
Traffic Control	1	LS	$55,000.00	$55,000.00
			SUBTOTAL (No ROW):	$600,450.00
			SUBTOTAL (No ROW) Contingency:	$180,135.00
			Engineering:	$61,000.00
			Engineering Contingency:	$18,300.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$859,885.00**

Modify Ramp Geometrics
ID Number: 61

I-575 at SR 92 (SB) - Ramp meter bypass for transit

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$10,000.00	$10,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	400	SY	$70.00	$28,000.00
Asphalt Mill/Overlay	1000	SY	$23.00	$23,000.00
Pavement Demo	400	SY	$35.00	$14,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	700	LF	$30.00	$21,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	10	EA	$750.00	$7,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$25,000.00	$25,000.00
MOT Items				
Traffic Control	1	LS	$14,000.00	$14,000.00
			SUBTOTAL (No ROW):	$145,800.00
			SUBTOTAL (No ROW) Contingency:	$43,740.00
			Engineering:	$15,000.00
			Engineering Contingency:	$4,500.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$209,040.00**

Modify Ramp Geometrics
ID Number: 62
Location: SR 400 at Holcomb Bridge Rd (SB) Ramp Meter bypass for transit

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay	4000	SY	$23.00	$92,000.00
Pavement Demo		SY	$35.00	$0.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	400	LF	$30.00	$12,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures		EA	$2,500.00	$0.00
Drainage Pipe		LF	$40.00	$0.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	1	EA	$150,000.00	$150,000.00
Signing and Marking Items				
Striping	3	LM	$1,650.00	$4,950.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	10	EA	$750.00	$7,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$37,000.00	$37,000.00
			SUBTOTAL (No ROW):	$403,450.00
			SUBTOTAL (No ROW) Contingency:	$121,035.00
			Engineering:	$41,000.00
			Engineering Contingency:	$12,300.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$577,785.00**

Modify Ramp Geometrics
ID Number: 63
Location: SR 400 at Windward Pkwy (SB) - Ramp meter bypass for transit

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening	1600	SY	$65.00	$104,000.00
Asphalt Widening		SY	$70.00	$0.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	900	SY	$35.00	$31,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail	400	LF	$30.00	$12,000.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	8	EA	$2,500.00	$20,000.00
Drainage Pipe	1200	LF	$40.00	$48,000.00
Paved Ditched/Flume	700	SY	$30.00	$21,000.00
Rip Rap	100	SY	$40.00	$4,000.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal	0.33	EA	$150,000.00	$49,500.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	10	EA	$750.00	$7,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$40,000.00	$40,000.00
			SUBTOTAL (No ROW):	$439,150.00
			SUBTOTAL (No ROW) Contingency:	$131,745.00
			Engineering:	$44,000.00
			Engineering Contingency:	$13,200.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$628,095.00**

Modify Ramp Geometrics
ID Number: 64
Location I-285 S at Moreland Ave (EB) - On-ramp restriping

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$300,000.00	$300,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	4000	SY	$70.00	$280,000.00
Asphalt Mill/Overlay	8200	SY	$23.00	$188,600.00
Pavement Demo	6500	SY	$35.00	$227,500.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk		SY	$21.00	$0.00
Concrete Curb and Gutter		LF	$20.00	$0.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	6	EA	$2,500.00	$15,000.00
Drainage Pipe	1000	LF	$40.00	$40,000.00
Paved Ditched/Flume	1500	SY	$30.00	$45,000.00
Rip Rap	10	SY	$40.00	$400.00
Traffic Items				
Signal Timing adjustments		EA	$8,000.00	$0.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	2	LM	$1,650.00	$3,300.00
Overhead Signs	2	EA	$65,000.00	$130,000.00
Remove Overhead Signs	1	EA	$8,000.00	$8,000.00
Retrofit Overhead Signs	1	EA	$10,000.00	$10,000.00
Roadside Signs	20	EA	$750.00	$15,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	3	AC	$50,000.00	$150,000.00
MOT Items				
Traffic Control	1	LS	$142,000.00	$142,000.00
			SUBTOTAL (No ROW):	$1,554,800.00
			SUBTOTAL (No ROW) Contingency:	$466,440.00
			Engineering:	$156,000.00
			Engineering Contingency:	$46,800.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$2,224,040.00**

Interchange Reconfiguration
ID Number: 65 OP 1
Location: I-985 at SR 20 (-) - Partial DDI

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$200,000.00	$200,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	4000	SY	$70.00	$280,000.00
Asphalt Mill/Overlay	53900	SY	$23.00	$1,239,700.00
Pavement Demo	2000	SY	$35.00	$70,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	9800	SY	$21.00	$205,800.00
Concrete Curb and Gutter	10200	LF	$20.00	$204,000.00
ROW	2800	SY	$500.00	$1,400,000.00
ROW Take		EA	$1,000,000.00	$0.00
Guard Rail	600	LF	$30.00	$18,000.00
Structural Items				
New Bridge	20000	SF	$150.00	$3,000,000.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls	9000	SF	$90.00	$810,000.00
Soundwalls		SF	$25.00	$0.00
Drainage Items				
Drainage Structures	35	EA	$2,500.00	$87,500.00
Drainage Pipe	7000	LF	$40.00	$280,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	4	EA	$8,000.00	$32,000.00
New Intersection Signal	2	EA	$150,000.00	$300,000.00
Signing and Marking Items				
Striping	10	LM	$1,650.00	$16,500.00
Overhead Signs	10	EA	$65,000.00	$650,000.00
Remove Overhead Signs	10	EA	$8,000.00	$80,000.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	40	EA	$750.00	$30,000.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$200,000.00	$200,000.00
MOT Items				
Traffic Control	1	LS	$771,000.00	$771,000.00
			SUBTOTAL (No ROW):	$8,474,500.00
			SUBTOTAL (No ROW) Contingency:	$2,542,350.00
			Engineering:	$848,000.00
			Engineering Contingency:	$254,400.00
			SUBTOTAL ROW:	$1,400,000.00
			SUBTOTAL ROW Contingency:	$420,000.00
			TOTAL COST:	**$13,939,250.00**

Auxiliary Lanes

ID Number: 65 OP 2

I-985 at SR 20 (SB) - Add off-ramp right turn lane arterial thru lane

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Roadway Items				
Grading Complete/Clearing&Grubbing	1	LS	$50,000.00	$50,000.00
PCC Widening		SY	$65.00	$0.00
Asphalt Widening	3200	SY	$70.00	$224,000.00
Asphalt Mill/Overlay		SY	$23.00	$0.00
Pavement Demo	1600	SY	$35.00	$56,000.00
Concrete Barrier (Type 2)		LF	$285.00	$0.00
Concrete Median/Sidewalk	1200	SY	$21.00	$25,200.00
Concrete Curb and Gutter	2000	LF	$20.00	$40,000.00
ROW		SY	$200.00	$0.00
Guard Rail		LF	$30.00	$0.00
Structural Items				
New Bridge		SF	$150.00	$0.00
Bridge Widening		SF	$150.00	$0.00
Retaining Walls		SF	$90.00	$0.00
Drainage Items				
Drainage Structures	10	EA	$2,500.00	$25,000.00
Drainage Pipe	2000	LF	$40.00	$80,000.00
Paved Ditched/Flume		SY	$30.00	$0.00
Rip Rap		SY	$40.00	$0.00
Traffic Items				
Signal Timing adjustments	1	EA	$8,000.00	$8,000.00
New Intersection Signal		EA	$150,000.00	$0.00
Signing and Marking Items				
Striping	1	LM	$1,650.00	$1,650.00
Overhead Signs		EA	$65,000.00	$0.00
Remove Overhead Signs		EA	$8,000.00	$0.00
Retrofit Overhead Signs		EA	$10,000.00	$0.00
Roadside Signs	10	EA	$750.00	$7,500.00
Remove Exist Solid Traffic Stripe		LF	$1.66	$0.00
Erosion Control Items				
Erosion Control (+ MS4)	1	AC	$50,000.00	$50,000.00
MOT Items				
Traffic Control	1	LS	$57,000.00	$57,000.00
			SUBTOTAL (No ROW):	$624,350.00
			SUBTOTAL (No ROW) Contingency:	$187,305.00
			Engineering:	$63,000.00
			Engineering Contingency:	$18,900.00
			SUBTOTAL ROW:	$0.00
			SUBTOTAL ROW Contingency:	$0.00
			TOTAL COST:	**$893,555.00**