

# Atlanta Congestion Reduction Demonstration

## National Evaluation: Travel Demand Management (TDM) Data Test Plan

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# **ATLANTA CONGESTION REDUCTION DEMONSTRATION**

## **NATIONAL EVALUATION: TRAVEL DEMAND MANAGEMENT (TDM) DATA TEST PLAN**

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## LIST OF ABBREVIATIONS

4Ts	Tolling, Transit, Telecommuting, and Technology
AFV	Alternative fuel vehicle
ALPR	Automatic license plate reader
ARC	Atlanta Regional Commission
CAC	Clean Air Campaign
CBA	Cost benefit analysis
CRD	Congestion Reduction Demonstration
CVO	Commercial vehicle operator
FHWA	Federal Highway Administration
GDOT	Georgia Department of Transportation
Georgia Tech	Georgia Institute of Technology
GRTA	Georgia Regional Transportation Authority
HOT	High occupancy toll
HOT3+	High occupancy toll lane allowing untolled travel by vehicles with three or more occupants
HOV	High occupancy vehicle
HOV2+	High occupancy vehicle with a minimum of two occupants
MARTA	Metropolitan Atlanta Rapid Transit Authority
RFID	Radio frequency identification
SOV	Single-occupant vehicle
SRTA	State Road and Tollway Authority
TDM	Travel demand management
UPA	Urban Partnership Agreement
U.S. DOT	United States Department of Transportation
VMT	Vehicle miles traveled

## 1.0 INTRODUCTION

This report presents the test plan for collecting and analyzing data associated with travel demand management (TDM) activities for the national evaluation of the Atlanta Congestion Reduction Demonstration (CRD) under the United States Department of Transportation (U.S. DOT) CRD program. The TDM data will be used in one or more of the evaluation analyses contained in the Atlanta CRD National Evaluation Plan. This plan is one of ten test plans identified in the Atlanta CRD National Evaluation Plan.

The Atlanta CRD is one of several large field deployments around the United States that are receiving U.S. DOT funding and which are intended to demonstrate congestion pricing and supporting strategies. The Atlanta CRD national evaluation will address the four primary U.S. DOT Urban Partnership Agreement (UPA) evaluation questions shown in Table 1-1.

**Table 1-1. U.S. DOT National Evaluation “Objective Questions”**

<b>Objective Question #1</b>	<p>How much was congestion reduced in the area impacted by the implementation of the tolling, transit, technology, and telecommuting strategies? It is anticipated that congestion reduction could be measured by one of the following measures, and will vary by site and implementation strategy:</p> <ul style="list-style-type: none"> <li>• reductions in vehicle trips made during peak/congested periods;</li> <li>• reductions in travel times during peak/congested periods;</li> <li>• reductions in congestion delay during peak/congested periods; and</li> <li>• reductions in the duration of congested periods.</li> </ul>
<b>Objective Question #2</b>	<p>What are the associated impacts of implementing the congestion reduction strategies? It is anticipated that impacts will vary by site and that the following measures may be used:</p> <ul style="list-style-type: none"> <li>• increases in facility throughput during peak/congested periods;</li> <li>• increases in transit ridership during peak/congested periods;</li> <li>• modal shifts to transit and carpools/vanpools;</li> <li>• traveler behavior change (e.g., shifts in time of travel, mode, route, destination, or forgoing trips);</li> <li>• operational impacts on parallel systems/routes;</li> <li>• equity impacts;</li> <li>• environmental impacts;</li> <li>• impacts on goods movement; and</li> <li>• effects on businesses.</li> </ul>
<b>Objective Question #3</b>	<p>What are the non-technical success factors with respect to the impacts of outreach, political and community support, and institutional arrangements implemented to manage and guide the implementation?</p>
<b>Objective Question #4</b>	<p>What are the overall costs and benefits of the deployed set of strategies?</p>

The questions shown in Table 1-1 will be addressed by carrying out the following 12 “evaluation analyses” described in the Atlanta CRD National Evaluation Plan: congestion, tolling, transit, TDM, technology, safety, equity, environmental, goods movement, business impacts, non-technical success factors, and cost benefit. Each of these 12 analyses relies upon various evaluation measures of effectiveness.

“Test plans” are the evaluation planning documents that describe how specific data will be collected and processed to yield the evaluation measures of effectiveness required for the various analyses. Whereas evaluation analyses are categorized according to related evaluation questions or types of impacts—for example all equity-related impacts are addressed in the equity analysis—test plans are categorized according to common data types or sources. For example, the “Traffic System Data Test Plan” collects and processes all of the traffic data required for the national evaluation. There are a total of ten test plans for the Atlanta CRD national evaluation. In addition to this TDM Data Test Plan, there are test plans focusing on the following types of data: traffic, tolling, transit, safety, surveys and interviews, environmental, content analysis, cost benefit analysis, and exogenous factors.

The relationship between test plans and evaluation analyses is discussed in Section 1.2. In short, analyses describe the evaluation questions and hypotheses to be investigated and the test plans describe how the data and measures of effectiveness needed to support the evaluation will be collected and processed. Most test plans collect data and provide measures of effectiveness that will be used in multiple analyses and most analyses rely upon data and measures developed through several different test plans.

The remainder of this introduction chapter describes the Atlanta CRD deployments and elaborates on the relationship between test plans and evaluation analyses. The remainder of the report is divided into three sections. Chapter 2 presents the data sources, data availability, and risks associated with the TDM data collected through this test plan. Chapter 3 discusses how all of the TDM data will be analyzed and used in the national evaluation. Chapter 4 presents the schedule and responsibilities for collecting and analyzing the TDM data.

## **1.1 The Atlanta CRD**

Atlanta was selected by the U.S. DOT to implement projects aimed at reducing congestion based on a combination of complementary strategies known as the 4Ts: Tolling, Transit, Telecommuting/TDM, and Technology. Under contract to the U.S. DOT, a national evaluation team led by Battelle is assessing the impacts of the projects in a comprehensive and systematic manner in Atlanta and other sites. The national evaluation will generate information and produce technology transfer materials to support deployment of the strategies in other metropolitan areas. The national evaluation will also generate findings for use in future Federal policy and program development related to mobility, congestion, and facility pricing.

The Atlanta CRD partnership is led by three public agencies—the Georgia Department of Transportation (GDOT), the Georgia Regional Transportation Authority (GRTA), and the State Road and Tollway Authority (SRTA). Other partners include Atlanta Regional Commission (ARC), Georgia Department of Public Safety, Metropolitan Atlanta Rapid Transit Authority

(MARTA), Gwinnett County Government, Clean Air Campaign (CAC), and Georgia Institute of Technology (Georgia Tech).

The Atlanta CRD partners have as a long-term regional goal an integrated system of congestion-priced lanes, enhanced transit service, and advanced technology on 49 miles of I-75, I-85, and I-20. The CRD will establish the first phase of that network on approximately 16 miles of I-85 from I-285 to Old Peachtree Road. The Atlanta CRD projects are described briefly below.

**High Occupancy Toll (HOT) Lanes on I-85.** As the first phase of a regional integrated system of congestion-priced lanes, the existing high occupancy vehicle (HOV) lanes will be converted to dynamically-priced HOT lanes, called Express Lanes, on approximately 16 miles of I-85 from Chamblee Tucker Road, just south of I-285, to just north of Old Peachtree Road in Gwinnett County. The Express Lanes are depicted in Figure 1-1. The occupancy requirement for using the Express Lanes toll-free will change from the two or more people on the current HOV lanes (HOV2+) to three or more people (HOT3+), and registration will also be required. Registered toll-exempt vehicles include vehicles with three or more people, motorcycles, alternative fuel vehicles (AFV) with GA AFV license plates (but not hybrids), transit, and emergency vehicles. Pre-registered vehicles with less than three occupants will be allowed on the Express Lanes by paying a toll. The lanes will operate with seven entry and exit points in the northbound direction and six in the southbound direction. Tolling will occur 24 hours a day and seven days a week in four southbound sections and five northbound sections. GDOT is responsible for the construction in the HOV to HOT conversion. SRTA will operate the tolling portion of the system.

**Transit Enhancements.** A total of 36 new buses will be added to the commuter bus fleet on the I-85 corridor, with 20 buses added in 2010 and 16 more in 2011. The expanded fleet will enable five new routes to operate on the corridor, the first of which began in August of 2010. GRTA will purchase the buses. GRTA is also responsible for the CRD-funded park-and-ride lot enhancements. These include three new lots—Mall of Georgia, Hamilton Mill, and Hebron Baptist Dacula—and one expanded lot at I-985/GA 20. The Mall of Georgia lot was the first to open in August of 2010 with 750 leased spaces until the permanent lot opens at that location. Opening in June 2011 are 400 new leased spaces at Hebron Baptist Dacula. Scheduled for July 2011 is the expansion of the I-985/GA 20 lot, which will add 384 spaces to the 347 that already exist today. The Hamilton Mill lot is scheduled to open in August 2011 with 918 spaces. In addition to the CRD-funded park and ride lots, the evaluation will include two other lots that are not funded by the CRD but could be impacted. These include the Discover Mills and Indian Trail Park and Ride Lots.

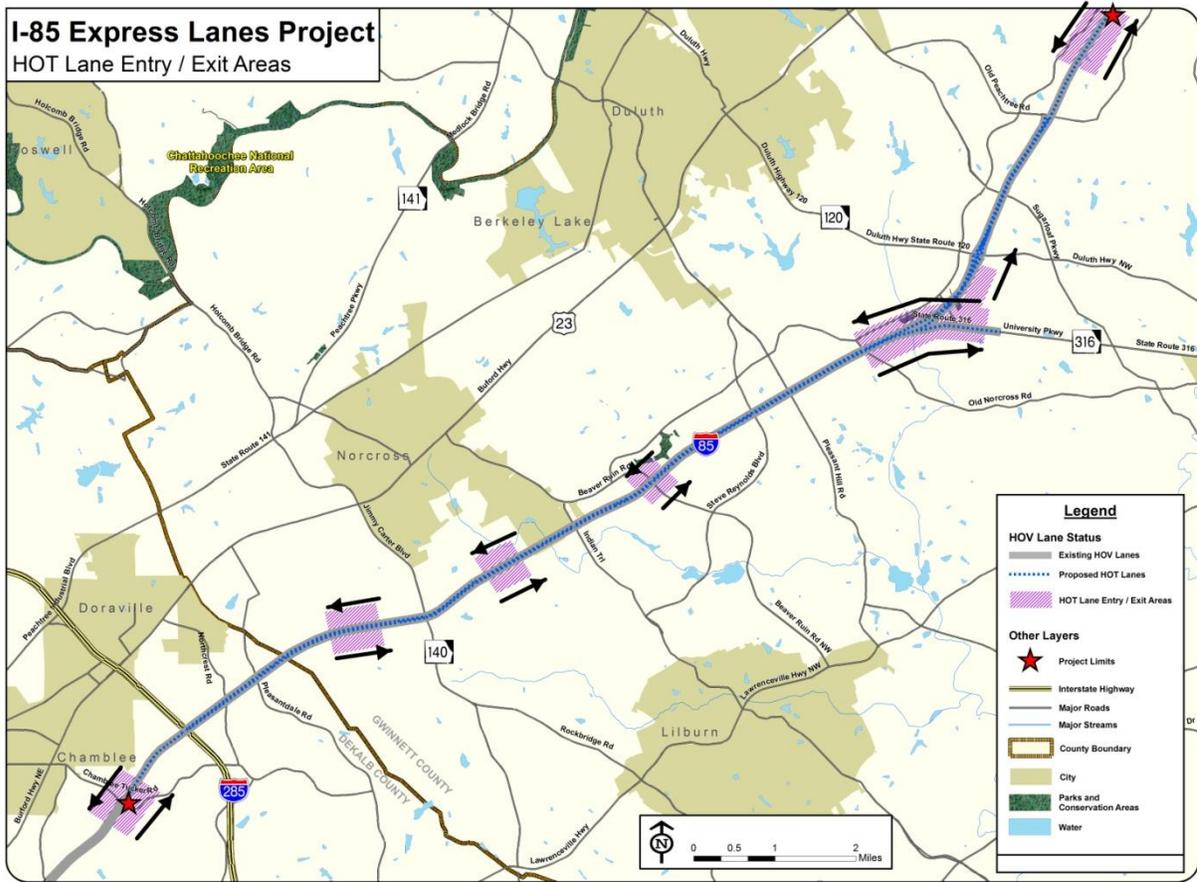


Figure 1-1. I-85 HOV to HOT Conversion Project

**Automated Enforcement Systems.** A gantry-controlled access system for the Express Lanes will consist of approximately 35 overhead gantries or existing structures placed in the median. Readers equipped with radio frequency identification (RFID) will read transponders, and cameras will collect images of vehicle license plates. This information will be used to identify toll violators. Mobile automatic license plate readers (ALPR) camera systems installed in enforcement vehicles will aid police officers with visual occupancy verification of vehicles using the Express Lane. Enforcement officials will be provided with an audible or visual alert if a license plate matches the database of registered HOT3+ users to prompt a visual inspection for vehicle occupancy compliance. Officers will upload a list of occupancy violations written during a shift to the Express Lanes back-office system.

**Carpooling Outreach.** To support the CRD projects, the Clean Air Campaign will undertake public outreach to increase the number of 3 person carpools in the I-85 Express Lanes corridor. Their efforts will focus on converting existing 2-person to 3-person carpools and on creating 3-person carpools from single-occupant vehicle (SOV) drivers. CAC will use existing carpooler databases to identify and contact 2-person carpoolers. In conjunction with SRTA, CAC will identify SOV commuters who travel in the I-85 Express Lanes and encourage carpool

formation. SOV drivers will also be targeted through outreach to employers in the I-85 corridor and to employers outside the corridor who may have employees who use the I-85 corridor.

**Schedule for the Atlanta CRD Projects.** The projects to be evaluated go into operation between August 2010 and July 2012. Table 1-2 presents the dates at which each of the Atlanta CRD projects are expected to be in operation.

**Table 1-2. CRD Project Schedules**

Projects	Operational Date
Express Lanes on I-85	September 2011
5 New Bus Routes	August 2010 – July 2012
Park-and-Ride Lots	August 2010 – August 2011
Automated Enforcement	September 2011
Carpooling Outreach	Spring 2011 – Winter 2012

## 1.2 Atlanta National Evaluation Plan and the Use of TDM Data

Table 1-3 shows which of the various Atlanta CRD test plans will contribute data to each of the evaluation analyses. The “flow” between test plans is “one way” in the sense that test plans feed data and measures to the analyses rather than the reverse. The solid circles show where data from a given test plan constitutes a major input to an analysis; the open circles show where data from a given test plan constitutes a supporting input to an analysis. As shown in Table 1-3, the TDM Data Test Plan provides major input to the TDM analysis and supporting input to the tolling, equity, environmental, business impacts, and cost benefit analyses.

Table 1-4 includes a summary of the TDM data elements, the measures of effectiveness and the hypotheses/questions the TDM data will be used to evaluate.

Table 1-3. Relationships Among Test Plans and Evaluation Analyses

Atlanta CRD Test Plans	Congestion Analysis	Tolling Analysis	Transit Analysis	TDM Analysis	Technology Analysis	Safety Analysis	Equity Analysis	Environmental Analysis	Goods Movement Analysis	Business Impact Analysis	Non-Technical Success Factors Analysis	Cost Benefit Analysis
Traffic System Data Test Plan	●	●		○	○	○		●	●			○
Tolling Data Test Plan		●					○		●			○
Transit System Data Test Plan			●				○	○				○
TDM Data Test Plan		○		●			○	○		○		○
Safety Data Test Plan					●	●						○
Surveys and Interviews Test Plan	○	○	●	●		○	●	○	○	○	●	○
Environmental Data Test Plan							○	●				○
Content Analysis Test Plan											●	
Cost Benefit Analysis Test Plan												●
Exogenous Factors Test Plan	○	○	○	○	○	○	○	○	○	○	○	○

● — Major Input      ○ — Supporting Input

**Table 1-4. TDM Data Test Plan Data Elements Use in Testing Evaluation Hypotheses/Questions**

Atlanta TDM Data Element	Atlanta UPA Measure of Effectiveness	Atlanta UPA Hypotheses/Questions*
1. Employer contacts	<ul style="list-style-type: none"> <li>Total number of employers targeted</li> </ul>	AtITDM-1 AtIBusins-1
2. Employees receiving information	<ul style="list-style-type: none"> <li>Total number of commuters targeted</li> </ul>	AtITDM-1
3. Marketing materials distributed	<ul style="list-style-type: none"> <li>Total number of materials distributed at targeted employers</li> </ul>	AtITDM-1
4. New "Carpool Rewards" recipients	<ul style="list-style-type: none"> <li>Formation of 3+ carpools</li> </ul>	AtITDM-2
5. New "Cash for Commuters" recipients	<ul style="list-style-type: none"> <li>New alternative mode users since deployment</li> </ul>	AtITDM-2
6. New "Commuter Prize" registrants	<ul style="list-style-type: none"> <li>New alternative mode users since deployment</li> </ul>	AtITDM-2
7. New vanpools and vanpoolers	<ul style="list-style-type: none"> <li>New vanpoolers since deployment</li> </ul>	AtITDM-2
8. Ride matching registrants	<ul style="list-style-type: none"> <li>New registrations and placements since deployment</li> </ul>	AtITDM-2
9. Calculated impact of mode shift for I-85 commuters from CAC incentive tracking software	<ul style="list-style-type: none"> <li>Mode shift</li> <li>New alternative mode users</li> <li>Vehicle trip reduction</li> <li>Vehicle miles traveled (VMT) reduction</li> </ul>	AtITDM-1 AtITDM-3 AtITolling-2 AtIEquity-1 AtIEnv-1 AtICBA-1

\*Listed are acronyms corresponding to hypotheses/questions to be addressed with data from this test plan. An explanation of these acronyms can be found in Appendix A, which contains a compilation of the hypotheses/questions for all the analysis areas from the Atlanta CRD National Evaluation Plan.

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## 2.0 DATA SOURCES, AVAILABILITY, AND RISKS

As noted previously GDOT plans to develop a targeted outreach campaign for employers in the I-85 corridor for implementation to be administered by CAC prior to the opening of the Express Lanes in September 2011. This outreach push might include new or enhanced incentives to those being used by CAC and TMAs. The targeted outreach will likely involve: a) identifying new and existing worksites with a large number of employees likely to commute on I-85, b) contacting employers to offer services, c) conducting cluster analysis of employee home locations to identify specific employees who commute on I-85, d) working through employer to market alternative modes to these employees, e) registering commuters for incentive programs, and f) tracking commute alternative utilization through an on-line system for administering incentives. One obvious focus of the outreach campaign will be to encourage and incentivize 2-person carpools to add one or more riders in order to travel in the Express Lanes for free.

Incentive programs include: a) cash incentives to switch from driving alone (Cash for Commuters), b) drawings for existing alternative mode users (Commuter Prizes) – for carpools, vanpoolers, transit riders, teleworkers, bicycle commuters and walkers, and c) incentives specifically for 3+ person carpools and vanpools (Carpool Rewards). Additional information on the Clean Air Campaign and its incentive programs can be found at <http://www.cleanaircampaign.org/Your-Commute/Earn-Cash.-Win-Prizes>. The objective of the targeted campaign will be to reinforce the benefits of 3+ person carpools and vanpools and to encourage use of all alternative modes in the I-85 corridor.

Commuters participating in these incentive programs register on and utilize CAC tracking software to log each day of eligible commute alternative usage. Outputs from this software allow for the derivation of program impacts, including trip and VMT reduction. Therefore, the data to be used in assessing the role of TDM outreach, information and incentives in the Atlanta CRD project will largely involve monitoring data already collected by CAC and GDOT as part of its outreach and incentives tracking system.

Table 2-1 summarizes the nine TDM data elements to be utilized from existing sources. Section 2.1 identifies the data sources for the required data, Section 2.2 discusses the availability of the data and transmittal to the evaluation team, and Section 2.3 addresses risks that might be encountered in assembling the required data and the means for overcoming them.

**Table 2-1. Summary of Data Needs for Atlanta TDM Data Test Plan**

<b>Data Element</b>	<b>Location</b>	<b>Data Granularity</b>	<b>Data Collection Frequency</b>	<b>Data Reporting Frequency</b>	<b>Responsible Agency (Data Source)</b>
1. Employer contacts	I-85 corridor*	# of employer worksites receiving services per month	Monthly statistics during pre-and post deployment	Quarterly	GDOT (CAC)
2. Employees receiving information	I-85 corridor	# of employees targeted to receive information	Monthly statistics during pre-and post deployment	Quarterly	GDOT (CAC)
3. Marketing materials distributed	I-85 corridor	# and type of materials distributed	Monthly statistics: pre-and post deployment	Quarterly	GDOT (CAC)
4. New Carpool Rewards (3+ carpools) recipients	I-85 corridor	# new recipients by occupancy	Monthly statistics: pre-and post deployment	Quarterly	GDOT (CAC)
5. New Cash for Commuters (mode shift incentive) recipients	I-85 corridor	# of new recipients by mode	Monthly statistics: pre-and post deployment	Quarterly	GDOT (CAC)
6. New Commuter Prizes (drawings for current alt. mode users) recipients	I-85 corridor	# new recipients by mode	Monthly statistics: pre-and post deployment	Quarterly	GDOT (CAC)
7. New vanpools and vanpoolers	I-85 corridor	# of new vanpoolers	Annual summary statics: pre-and post-deployment	Annual	GDOT (CAC) and vanpool vendors
8. New ride-matching registrants	I-85 corridor	# of new registrants and placements	Monthly statistics: pre-and post deployment	Quarterly	GDOT (CAC)
9. Calculated impact of mode shift for I-85 commuters from CAC incentive tracking software	I-85 corridor	Vehicle trip and VMT reduction by incentive program	Monthly statistics: pre-and post deployment	Quarterly	GDOT (CAC)

\* Includes I-85 commute shed with employee origins and destinations outside the corridor.

## 2.1 Data Sources

The primary data source for the evaluation of TDM outreach activities shown in Table 2-1 will be information collected by CAC to document outreach activities and their results. This data falls into two categories: descriptive and analytic.

The descriptive data (items 1-3 in Table 2-1) documents the amount of outreach and information provided by counting the number of employer worksites, targeted employees, and materials distributed. CAC will target employers whose employees may be impacted by the I-85 Express Lanes project, and these commuters will be targeted with information and incentives. GDOT and CAC will develop specialized marketing materials for I-85 commute alternatives and incentives available.

The analytic (items 4-7 in Table 2-1) data will include commuter registration data for the offered incentives (three types of incentives currently offered) and commuter use of the incentives. To be eligible for incentives, commuters must register and then use commuter tracking software to log their alternative modes. This tracking software ([www.logyourcommute.org](http://www.logyourcommute.org)) will be the source of utilization (how and how often registered commuters use alternatives) and travel impacts (calculated vehicle trip and VMT reduction).

GDOT is planning to develop a targeted outreach campaign, to be implemented by CAC prior to opening of the Express Lanes on I-85. In developing the campaign, and specifying contractual requirements of CAC, GDOT should incorporate national evaluation data collection and reporting activities in order to assure compilation of CRD-specific data.

## 2.2 Data Availability

The data required for the TDM evaluation should be readily available, since it should match ongoing reporting requirements by CAC to GDOT and come from the commute tracking software used to register alternative mode users and their travel behavior. It would be prudent for GDOT to establish the CRD-specific data items and reporting in their contract with CAC.

The date for launching any targeted outreach and incentives has not been finalized, but it will occur in the months prior to the Express Lanes opening in September of 2011.

Pre-Deployment Data (Spring 2011 – August 2011). CAC will report on the targeted outreach to GDOT by using specialized reporting forms (specific to the I-85 corridor) or by specially noting CRD-impacted worksites in regular reporting forms. Monthly reporting will include:

- The number of employer worksites contacted per month
- The number of employee targeted for information, based on cluster analyses
- The number of marketing materials, by type, distributed at all worksites that are part of targeted outreach
- The number of commuters in the I-85 corridor who register for one of three existing incentive programs or any new incentive program.
- The number of vanpools and vanpoolers in the I-85 corridor

GDOT will aggregate this information by quarter (i.e., one or two quarters in the pre-deployment time period) for transmittal to the national evaluation team.

Post-Deployment Data (September 2011 – August 2012). Presuming that targeted employer outreach will continue after the Express Lanes are opened, the post-deployment data reporting will include all items enumerated above for the before case, as well as the following:

- For those commuters registered to receive incentives, the commuter tracking software will be used to generate the following statistics:
  - Mode shift (pre- and post-deployment proportion of registrants in each mode)
  - Number of new carpoolers (by occupancy), vanpoolers, transit users and other alternative mode users
  - Calculated vehicle trip reduction
  - Calculated VMT reduction.

GDOT will aggregate this data by quarter for transmittal to the national evaluation team.

### **2.3 Potential Risks**

There are no significant risks foreseen to obtaining the data for this test plan. The TDM efforts to be implemented for the Atlanta CRD project are under the full control of GDOT and will be implemented by a single contractor. The targeted outreach effort will simply be an extension and targeting of existing outreach activities and incentive programs.

One potential risk involves contracting. GDOT is planning to develop the targeted outreach campaign for CAC after the start of 2011 in order to include it into a new contract cycle. If contracting issues cause a delay in finalizing a contract, the implementation of the outreach campaign might also be delayed. Any significant delays in contracting could be mitigated by extending the current contract to assure that planned employer outreach occurs in the I-85 corridor.

Another potential risk is that the contractor might not obtain sufficient and accurate data for all the seven data elements identified in Table 2-1. This risk is considered small, given that the data collection is part of an on-going program that has successfully collected the data in the past. However, the national evaluation team will be receiving the data quarterly and will inspect the data and bring any concerns about the data to the attention of GDOT for correction.

### 3.0 DATA ANALYSIS

The data analysis by the national evaluation team will begin upon receipt of the TDM data each quarter to check for anomalies or outliers. Any irregularities that are noted will be taken up with GDOT and CAC for resolution.

The TDM data analysis will primarily seek to address three key TDM hypotheses:

- AtlTDM-1: Promotion of commute alternatives removes vehicle trips and VMT from I-85
- AtlTDM-2: CAC incentives support formation of 3+ carpools and vanpools on I-85
- AtlTDM-3: What was the relative contribution of the Atlanta CRD TDM initiatives on I-85 vehicle trips and VMT?

As mentioned in Section 2.1, the analysis of the Atlanta TDM data will fall primarily into two categories: descriptive and analytic. The descriptive data will largely cover the *outputs* of the targeted employer outreach campaign. This includes the number of worksites reached, the number of I-85 commuters targeted, and type and amount of information provided to these commuters. The analysis of this data will, therefore, be largely descriptive in documenting the scope and reach of outreach activities. As such, it might be considered an assessment of the *output* of the targeted outreach campaign, e.g., how much outreach was accomplished and how many commuters were informed.

The analytic data will seek to establish the *outcomes* of the outreach campaign. In other words, what impact, on travel behavior, did this targeted outreach have? This will be accomplished by assessing the number of targeted commuters who register for one of the CAC incentives (and any special incentives added by GDOT) and their resulting travel behavior change. Registration and travel behavior statistics can be gleaned from the commuter tracking software used by CAC to dispense incentives. This software, in establishing prior mode and then tracking the use of alternative modes through a commuter calendar function, can also produce key program performance measures, such as: vehicle trip and VMT reduction. Therefore, CAC and GDOT will be asked to produce monthly reports that include the following outcome data items:

- Number of new registrants, by incentive program, who commute in I-85 corridor
- Number of new alternative mode users by mode in I-85 corridor
- Average daily mode split among registrants using I-85 corridor
- Vehicle trip reduction from mode shift (among new alternative mode users)
- VMT reduction from mode shift (among new alternative mode users)

Therefore, much of the analysis to be performed on the Atlanta TDM data will be generated directly from the commuter tracking software used by CAC to administer the incentive programs. Monthly descriptive and analytic data will be transmitted from CAC and GDOT to the national evaluation team on a quarterly basis. The tracking data will also be corroborated by vehicle occupancy counts being conducted as part of the Traffic Data Test Plan to assess the observed changes in high occupancy modes on I-85.

Survey data from the Surveys and Interviews Test Plan will shed further light on the effectiveness of outreach efforts and the use of alternate modes of travelers in the I-85 corridor. Data from the carpooler survey and Volpe household travel survey will be used as follows:

- The carpooler survey is intended to assess the impact of the Express Lanes on existing ridesharing arrangements, particularly 2-person carpools. This survey will query carpoolers that are currently in the CAC registrant database (same database noted above for distribution of incentives). The carpooler survey will provide a snapshot of carpooler behavior and attitudes before and after implementation of the Express Lanes. As such, it will be used in the TDM analysis to shed additional light on the nature and reasons for mode shift in reaction to the Express Lanes. In and of itself, however, the carpooler survey cannot be used to evaluate the impact of the targeted outreach campaign. Said a different way, the Carpooler Survey will seek to evaluate the impact of Express Lanes on mode choice and the TDM analysis will seek to evaluate the impact of outreach and incentives on mode choice in the Express Lanes corridor.
- The Volpe household travel survey will establish the travel behavior of all commuters and other travelers who use I-85. It is designed to better understand behavioral changes for all travelers in the corridor, including alternative mode users. However, since it is a general population survey, it will likely not generate enough respondents who have been exposed to the targeted outreach campaign at worksites in the corridor. As such, the household survey will serve as a point of comparison with the TDM data to assess the mode split among targeted worksites with mode split among the entire traveling public.
- The carpooler and Volpe household travel surveys will also generate individual demographics among commuters, whereas the TDM data generated by CAC will not. As such, these two surveys will be used to help understand who uses commute alternatives and what influenced them to use these modes.

The TDM data will also be used in the tolling, equity, environmental, business impacts and cost benefits analysis areas. TDM analysis will be used to assess the impact of the Express Lanes project on forming 3-person carpools, in this case utilizing incentives, for the tolling analysis. The impact of outreach to employees in the corridor will be used to inform the equity analysis. Finally, the outreach to employers, in educating employees about commute alternatives, will be considered with the business impacts analysis. The contribution of mode shift to VMT reduction will be reviewed (in a somewhat qualitative manner) to inform the environmental and cost-benefit analyses, both of which convert VMT reduction to emissions reduction.

Consideration will also be given to the potential impact of exogenous factors, such as economic conditions, influencing the observed before/after changes in the TDM data. Comparison of registration growth rates for the three incentive programs region-wide with the rates in the I-85 corridor will be used to assess whether factors external to the CRD outreach efforts may be at work.

Throughout the analysis of the TDM data standard statistical methods will be used to test for significance of differences before and after the CRD deployments and between different analytic groups.

## **4.0 SCHEDULE AND RESPONSIBILITY**

The schedule for the TDM evaluation will largely involve before and after data collection prior to analysis activities. The deployment of TDM outreach activities will be scheduled by GDOT in January 2011. Targeted employer outreach will occur in the months just before the opening of the Express Lanes and continue into the post-deployment period. The post-deployment period will be from September 2011 to August 2012.

GDOT, using monthly data provided by CAC, will transmit TDM data to the national evaluation team each quarter (likely two quarters before and four quarters after opening of the Express Lanes). The national evaluation team is responsible for interpretation and analysis of the data and reporting of results. Data quality checking will occur as the data are received, but most of the analysis will occur when all data are available in the fall of 2012.

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## APPENDIX A – COMPILATION OF HYPOTHESIS/QUESTIONS FROM ATLANTA CRD NATIONAL EVALUATION PLAN

Evaluation Analysis	Hypothesis/ Question Number	Hypothesis/Question
Congestion	AtlCong-1	Converting the I-85 HOV lanes to HOT operations will improve travel time and average travel speeds on both the general purpose and high occupancy lanes on I-85
	AtlCong-2	Converting the I-85 HOV lanes to HOT operations will improve travel time reliability and reduce variability on both the general purpose and high occupancy lanes on I-85
	AtlCong-3	Deploying the CRD improvements will result in more vehicles and persons being served on I-85
	AtlCong-4	Implementing the CRD improvements in the I-85 corridor will reduce the spatial and temporal extent of congestion
	AtlCong-5	As a result of the CRD improvements, the perception of travelers is that congestion has been reduced in the I-85 corridor
Pricing	AtlTolling-1	Tolling will increase vehicular throughput on I-85 Express Lanes and improve travel reliability
	AtlTolling-2	What changes in usage will occur as a result of the conversion of the HOV2+ lanes to HOT3+ lanes?
	AtlTolling-3	How much will travelers utilize the I-85 Express Lanes system?
	AtlTolling-4	Variable pricing on the I-85 Express Lanes will regulate vehicular access so as to improve the operation of the lanes
Transit	AtlTransit-1	Atlanta CRD project will enhance transit performance in the I-85 corridor
	AtlTransit-2	Atlanta CRD project will increase ridership and facilitate a mode shift to transit within the I-85 corridor
	AtlTransit-3	Increased ridership / mode shift to transit will contribute to congestion mitigation within the I-85 corridor
	AtlTransit-4	What was the relative contribution of each Atlanta CRD project element to increased ridership and/or mode shift to transit within the I-85 corridor?

Evaluation Analysis	Hypothesis/ Question Number	Hypothesis/Question
TDM	AtlTDM-1	Promotion of commute alternatives removes trips and vehicle miles traveled (VMT) from I-85
	AtlTDM-2	CAC incentives support formation of 3+ carpools and vanpools on I-85
	AtlTDM-3	What was the relative contribution of the Atlanta CRD TDM initiatives on reducing I-85 vehicle trips/VMT?
Technology	AtlTech-1	Using advanced technology to enhance enforcement will reduce the rate and type of violators in the corridor
Safety	AtlSafety-1	The collective impacts of CRD improvements will be safety neutral or safety positive
	AtlSafety-2	Gantry-controlled access technology will reduce incidents related to violations for crossing the double white line
	AtlSafety-3	Tolling strategies that entail unfamiliar signage will not adversely affect highway safety
Equity	AtlEquity-1	What are the direct social effects (travel times, tolls, and adaptation costs) for various transportation system user groups from tolling and other CRD strategies?
	AtlEquity-2	What is the spatial distribution of aggregate out-of-pocket and inconvenience costs, and travel-time and mobility benefits?
	AtlEquity-3	Are there any differential environmental impacts on certain socio-economic groups?
	AtlEquity-4	How does reinvestment of toll revenues impact various transportation system users?
Environmental	AtlEnv-1	What are the impacts of the Express Lanes project in the I-85 corridor on air quality?
	AtlEnv-2	What are the impacts on energy consumption?
Goods Movement	AtlGoods-1	Commercial vehicle operators (CVOs) will experience reduced travel time by reduced congestion on general purpose lanes
	AtlGoods-2	Operators with light-duty trucks will prefer to use Express Lanes to general purpose lanes for faster travel times
	AtlGoods-3	Operators delivering goods will perceive the net benefit of tolling strategies (e.g., benefits such as faster service and greater customer satisfaction outweigh higher operating costs due to tolls)
	AtlGoods-4	Operators report changing operational decisions due to use of Express Lanes (e.g., changing delivery times)

Evaluation Analysis	Hypothesis/ Question Number	Hypothesis/Question
Business	AtlBusiness-1	What is the impact of the strategies on employers? e.g., employee satisfaction with commute and increased employment-shed to downtown/mid-town Atlanta
	AtlBusiness-2	What is the impact of the strategies on businesses that rely on customers accessing their stores, such as retail and similar establishments?
	AtlBusiness-3	How are businesses that are particularly impacted by transportation costs affected (e.g., taxis, couriers, distributors, tradesmen)?
Non-Technical	AtlNonTech-1	What role did factors related to “people” play in the success of the deployment? People (sponsors, champions, policy entrepreneurs, neutral conveners)
	AtlNonTech-2	What role did factors related to “process” play in the success of the deployment? Process (forums including stakeholder outreach, meetings, alignment of policy ideas with favorable politics, and agreement on nature of the problem)
	AtlNonTech-3	What role did factors related to “structures” play in the success of the deployment? Structures (networks, connections and partnerships, concentration of power and decision-making authority, conflict-management mechanisms, communications strategies, supportive rules and procedures)
	AtlNonTech-4	What role did factors related to “media” play in the success of the deployment? Media (media coverage, public education)
	AtlNonTech-5	What role did factors related to “competencies” play in the success of the deployment? Competencies (cutting across the preceding areas: persuasion, getting grants, doing research, technical/technological competencies; ability to be policy entrepreneurs; knowing how to use markets)
	AtlNonTech-6	Does the public support the UPA/CRD strategies as effective and appropriate ways to reduce congestion?
Cost Benefit	AtlCBA-1	What is the net benefit (benefits minus costs) of the Atlanta CRD projects?

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