

Atlanta Regional Commission

December 2010



The Congestion Management Process (CMP) at the Atlanta Regional Commission (ARC), the area's metropolitan planning organization (MPO), is a broad and ongoing process that is embedded in most of the agency's work as well as in many of the studies and planning activities at member agencies. Although the CMP does not have specific, discrete steps, ARC staff recognize five primary elements: (1) monitor and evaluate performance, (2) identify causes, (3) identify and evaluate alternative strategies, (4) provide information supporting implementation, and (5) evaluate the effectiveness of implementation. The CMP is evolving as ARC seeks to continually improve its methods of identifying, monitoring, and addressing congestion. The activities directly associated with the CMP are primarily monitoring and evaluating system performance while most of the activities that comprise the other CMP elements are performed under other titles or programs.

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Source: ARC.

Background on ARC

ARC serves as the MPO for all or part of 18 Georgia counties—Barrow, Bartow, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Newton, Paulding, Rockdale, Spalding and Walton—as well as the city of Atlanta. There are 68 cities and 4.1 million people within the planning area. Greater Atlanta is the second fastest growing metropolitan region in the United States.¹

ARC has 39 Board members, including 23 local elected officials, 15 private citizens, and 1 representative from the Georgia Department of Community Affairs. ARC is currently developing a new regional plan, Plan 2040, that will include the *2040 Regional Transportation Plan*. As ARC develops the new plan, some of the prior methods used to support the CMP, such as project identification and prioritization, are likely to be revised.

¹ For more information, see a description of the Atlanta region at <http://www.atlantaregional.com/about-us/the-region>.

CMP Process Model

Prior to 2005, ARC used volume-to-capacity as its sole measure of congestion in the CMP. Since then, ARC has followed a three-dimensional approach towards measuring congestion that features the Travel Time Index (TTI), duration of congestion, and congestion extent. This methodology is explained more fully below. All three dimensions are weighted equally and the measures are applied by facility direction. This new approach was vetted with the regional planning partners and has been widely accepted among them. The three-dimensional methodology is now used to conduct the regional congestion ranking exercises, both in 2006 and in 2010. The local media has reported that these rankings and the results have been more acceptable to the public than rankings provided prior to 2005, which consisted only of the volume-to-capacity ratios and duration of congestion.

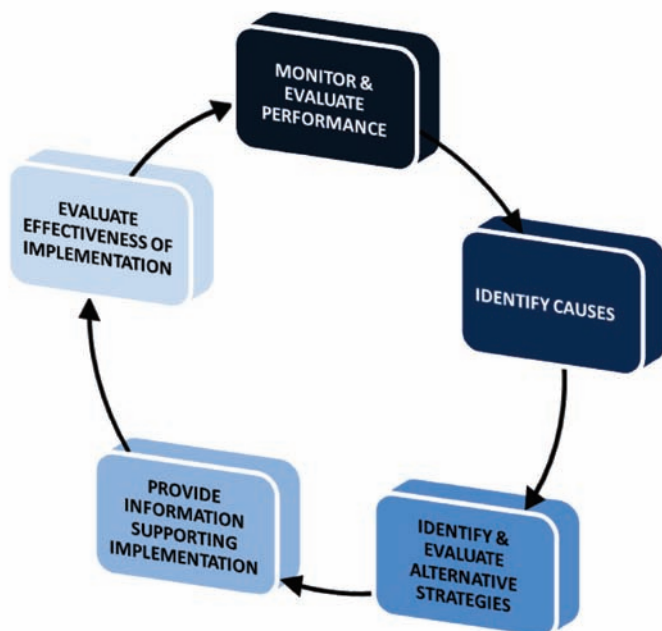
Even though all three dimensions are used to rank congestion, the TTI is used to provide an initial assessment of congested locations. By using the results of the regional travel demand model, ARC first identifies congested locations based on pre-defined TTI thresholds. Roads with TTIs of 1.0–1.35 are considered not congested; roads with TTIs of 1.35–1.8 are labeled moderately congested; and those with TTIs greater

than 1.8 are considered severely congested. Currently, ARC is conducting a Strategic Regional Thoroughfare Study (to be completed in 2011) that will identify the major thoroughfares of the region. ARC will evaluate congestion of the Regional Thoroughfare Network based on these same thresholds. In addition to solely relying on travel demand model results, ARC also has procured an annual travel time dataset from a private vendor, which provides actual measured travel times. Acquiring field data has been an emphasis area for improving the CMP in the metro Atlanta area, and this will be of great benefit. More information on the thoroughfare plan and the data used by ARC is available at <http://www.atlantaregional.com/srtp>.

The CMP is also motivated and shaped by the goals and objectives in the MTP (PLAN 2040) relevant to congestion and mobility. Objectives are not specifically developed for the CMP. For PLAN 2040, ARC has developed specific objectives and performance measures, and an evaluation methodology that includes the extent measure of congestion (vehicle hours of delay). The region has moved toward more specific objectives for its plan to provide more accountability and transparency. In addition, ARC desires a more rigorous basis for comparing cost effectiveness among strategies to be highly strategic about the use of its limited funds.

The ARC CMP is comprised of five primary elements, shown in figure 1. The following sections outline the elements.

Figure 1: Elements of ARC's CMP



Element 1 – Monitor and Evaluate Performance

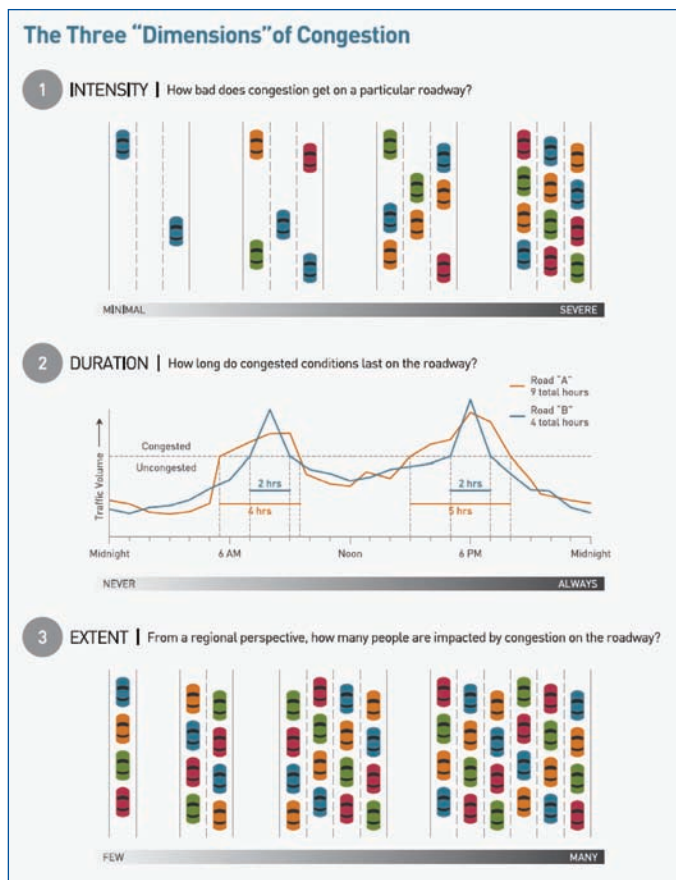
As a precursor to monitoring and evaluating performance in the region, ARC has defined the facilities and segments of the transportation system that it will monitor for congestion. As part of the 2005–2006 CMP update, ARC identified a CMP network using the following criteria:

1. All interstate highways and freeways
2. All high-occupancy vehicle (HOV) facilities
3. All major mobility corridors (besides interstates/freeways)
4. Roads that have already been identified as congested by public outreach or analysis, as well as roads that provide strategic connections

For the 2006–2007 CMP update, ARC unified the CMP network with the Regional Strategic Transportation System (RSTS), a system of the region’s most critical multimodal transportation facilities as defined by ARC and outreach with local jurisdictions. The system includes rail, premium transit routes, and freight corridors. In 2011, ARC will be updating the RSTS by adding the Regional Thoroughfare Network as a new component to the RSTS.

ARC measures congestion along three dimensions: intensity, duration, and extent. Intensity is represented by the TTI, which is the ratio between congested and free-flow travel time. Duration is the length of time the facility is experiencing congestion. Extent is defined as the percentage of lane-miles operating in congested conditions. In an annual state of the region publication, the Atlanta Regional Commission 2009 Transportation Fact Book, ARC illustrates for the public what is meant by the three dimensions of congestion (see figure 2).

Figure 2: ARC illustration to explain the three dimensions of congestion to the public



Source: ARC CMP, July 2006

ARC uses consultant services to measure and evaluate congestion in the region every 1–3 years depending on needs and available resources. Although ARC is quickly moving toward greater reliance on observed system performance data, currently the regional travel demand model is the primary tool for assessing congestion on the CMP network. The results of the travel demand model are supplemented with occasional floating car speed studies performed by ARC or a consultant.

ARC obtains high-quality traffic count data along all State routes from GDOT’s Office of Transportation Data. GDOT hires a private company to take aerial photographs of the region’s freeways for 2 or 3 days at the same time every other year. GDOT also collects and archives traffic volume, speed, and incident data through NAVIGATOR, GDOT’s Intelligent Transportation System. These data are used for real-time operations at the GDOT Transportation Management Center; however, significant manipulation is required to make it useful for planning purposes. For this reason, ARC has not used it for the CMP at this point. GRTA uses NAVIGATOR’s archived data each year to create its annual Transportation Metropolitan Atlanta Performance (MAP) Report showing average TTI for every hour of the day, average for the year, and averages for past years.

One of the new frontiers that ARC is exploring for its CMP is use of private sector system performance data. Collecting data on arterials has been a challenge given the high cost of floating car studies. While conducting a regional truck route master plan study in fall 2009, ARC purchased private sector data from an organization that had made agreements with private trucking companies to collect speed data via the global positioning system (GPS) and make them available for planning studies. This provided ARC with weekday speeds on about 2,000 miles of roadway for 1 year. The ARC staff report that the data have a detailed level of definition, with the ability to break out peak periods to observe high congestion levels on arterials and identify problematic intersections. ARC has procured 2010 travel time data from INRIX®, a private firm that collects travel data using cellular telephone and GPS system signals, in order to improve regional congestion measuring and monitoring over time.

ARC, with the support of consultants, is working on two major initiatives that will impact the way it monitors and evaluates system performance: the Strategic Regional Thoroughfare Plan and a regional data clearinghouse. The effort to develop the thoroughfare plan began in early 2010, with the purpose to identify the most strategic, unlimited-access facilities in the region and protect the mobility of those thoroughfares. The plan is being developed in coordination with the 2040 Plan and will establish a network of thoroughfares for performance monitoring and elevated attention at the regional level. This work will help redefine the RSTS that is currently being monitored for the CMP. The thoroughfares will be a subset of the RSTS facilities that also includes transit routes and interstate highways and freeways. Through the Strategic Regional Thoroughfare Plan, ARC seeks to develop guidelines, policies, and applicable congestion management strategies for common groups of thoroughfares identified as strategic. ARC views this effort as ultimately connecting to project prioritization.

A variety of descriptive and quantitative data will be collected on each thoroughfare. The proposed items include land use, bicycle and pedestrian, freight, roadway plans and studies, traffic modeling/socioeconomic, safety, environmental resources, transit, and community landmarks. ARC plans to develop a set of multimodal performance measures to be continuously monitored to observe how the thoroughfare system is performing over time. The measures will address mobility, accessibility, safety, and other factors that are relevant to all system users. ARC anticipates that it will develop performance targets for subclasses of the thoroughfare system that will help in project evaluation and selection.

In fall 2008, ARC began development of the regional data clearinghouse, the purpose of which is to facilitate use of data collected in the region for transportation planning, project prioritization, travel demand model development, and congestion management. The clearinghouse will bring together data from a variety of sources. ARC created an inventory of data collected in the region through interviews and surveys, and found that while many local agencies collected traffic count and even speed data, there was limited coverage across the region. ARC's member agencies did express significant interest in obtaining data from and contributing data to a regional clearinghouse. While a general framework and recommended collection policies

for the clearinghouse have been developed, there is still a need for more clarity on how it will work and whether local agencies are willing to agree on standards for data integrity.

Element 2 – Identify Causes

ARC identifies the causes of congestion by examining specific locations through special corridor studies or by analyzing collected data, including crash data. The data collected through the CMP are used to identify where specific corridor studies are needed. In addition, local agencies identify the causes of congestion through their own planning studies. ARC also conducts a Multimodal Corridor Study Program that funds comprehensive planning studies at various locations throughout the region. These studies provide more detail into the causes of congestion along specific corridors, as well as in-depth analysis for management and operations improvements.

In general, ARC finds that congestion is a result of too much demand for the capacity of the roadway network. Occasionally, signal timing is determined to be the cause. ARC has also looked at specific activity centers to determine the causes of congestion. ARC staff find that examining congestion along the three dimensions of intensity, duration, and extent is very helpful in understanding its causes.

Element 3 – Identify & Evaluate Alternative Strategies

Identifying congestion management strategies is performed on a subregional scale, often by local governments. ARC previously developed a CMP toolbox containing a checklist of congestion management strategies based on the type of facility or corridor. Over time, strategy identification became more decentralized as the region grew.

All counties in the ARC planning region have recently developed comprehensive transportation plans (CTPs) where specific congestion management strategies and projects are identified at the local level. These strategies and projects are then considered in the MTP. Congestion mitigation strategies are also proposed or developed through corridor studies. The Strategic Regional Thoroughfare Plan may help to bolster this activity by examining the specific needs and identifying solutions for individual thoroughfares or classes of thoroughfares.

In April, ARC hosted its first management and operations (M&O) subcommittee meeting to better link planning and operations. ARC staff feel there should be a way to elevate M&O strategies in the overall planning process and create an understanding of operations in the region. Although there are many different players involved in system operations, ARC would like to do a better job of centralizing M&O project selection and coordinating operations.

Evaluating the congestion management strategies occurs during development of the MTP. It is fully integrated into the prioritization process used to select projects and programs for the plan. During development of PLAN 2040, the ARC Board adopted a new project prioritization framework. ARC staff have revamped the prioritization process and no longer place a predominant weight on congestion relief. Instead, congestion relief (mobility) is weighted more equally with five other factors: connectivity, safety, freight supportiveness, economic growth, and environmental assessment. Roadway capacity and transit capacity projects are ranked separately because of the difficulties in comparing the two types of projects.

The weighting distribution for the PLAN 2040 prioritization process is:

- Delay (20 percent)
- Connectivity (20 percent)
- Safety (20 percent)
- Freight Friendly (10 percent)
- Economic Growth (10 percent)
- Environment (20 percent)

Element 4 – Provide Information Supporting Implementation

This element of the CMP occurs frequently. ARC modeling staff support local agencies during the congestion management project design process by providing them with information from their travel demand model. ARC staff report that they have requests for information almost every week.

Element 5 – Evaluate Effectiveness of Implementation

ARC has allocated funds to collect before-and-after data in the last couple of years due to a national push toward measuring the benefits of congestion mitigation strategies. As part of converting an HOV facility to a high-occupancy toll (HOT) facility, ARC will be conducting a before-and-after study. In addition, project sponsors, rather than ARC staff, often collect data on the effectiveness of the CMP strategy. For example, the Metro Atlanta Signal Timing Task Force prepared a cost-benefit analysis report focusing on improved travel time in the corridors the task force focused on.

Integration With Other Processes

The ARC CMP is thoroughly integrated into most of the planning activities at ARC as well as many of the activities of local agencies. Because addressing congestion is such a critical issue for the economic, environmental, and social health of the region, it is found throughout the metropolitan transportation planning process. As mentioned earlier, ARC identifies system performance and evaluation activities as part of the CMP, but the other elements are part of either development of the MTP, TIP, or local agency planning and implementation activities. The CMP at ARC is distributed across many organizations and activities, and is highly integrated with MTP development, especially within congestion strategy evaluation and project selection. The CMP is also integrated into local jurisdiction planning processes through project development. The data collected for the CMP are shared with agencies conducting the National Environmental Policy Act (NEPA) processes and is a primary input into corridor studies.

Although it is not identified as a CMP activity, ARC's goods movement study and development of a truck master plan for the region help fulfill the spirit of a multimodal CMP in systematically addressing congestion for goods movement. ARC also works to address congestion by partnering with local governments in its Livable Centers Initiative. ARC began the initiative in 2000 to provide funding to local governments to promote smart growth through improved mobility and livability in existing activity centers, town centers, and corridors. The centers help to improve access to alternative modes of transportation such as transit and walking.

Reporting and Visualization

Reporting of CMP Data and Analysis Results

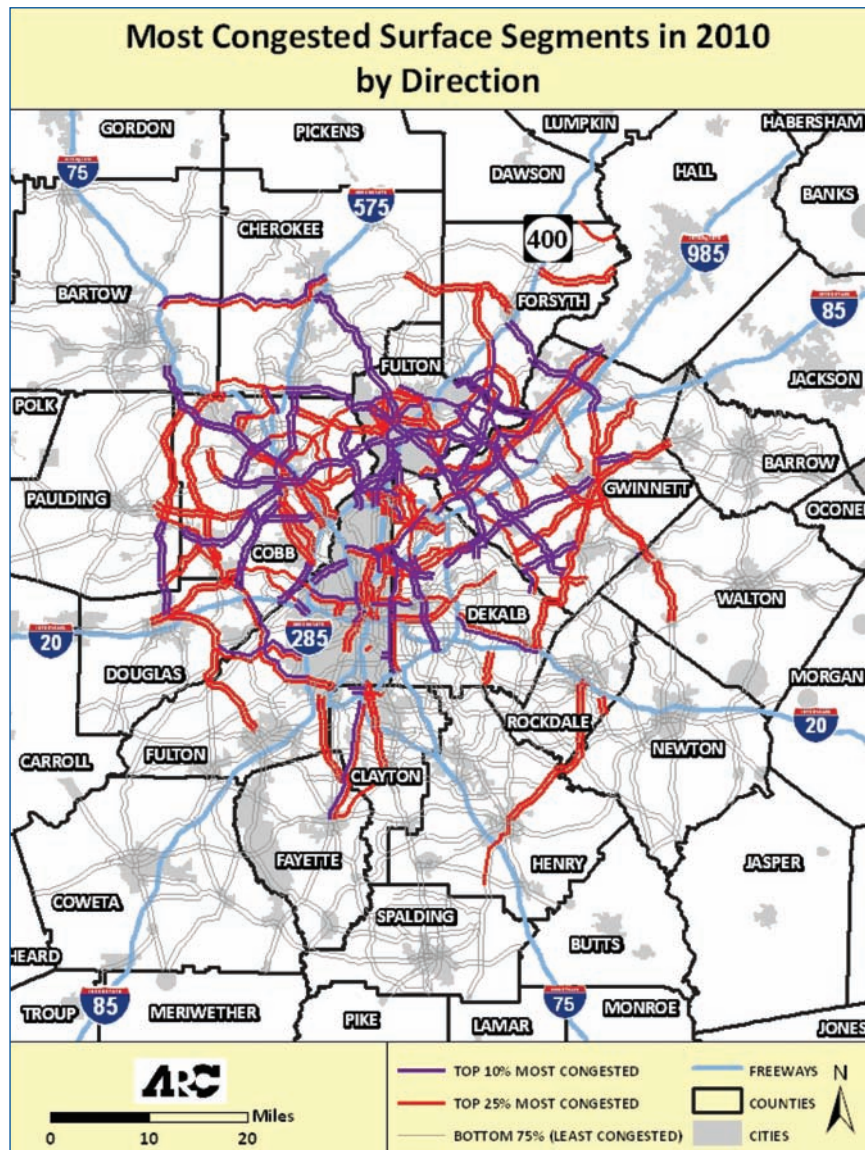
ARC develops a *Transportation Fact Book* every year that features travel patterns, population growth, land development, safety data, and congestion issues. The data collected through the CMP are reported through a map that shows congestion rankings of freeways and HOV lanes, and another map that shows the congestion rankings of arterials and State routes. The facilities are grouped according to

their rankings within the top 10 percent, top 25 percent, or bottom 75 percent of congestion scores within the region (see figure 3).

Visualization Practices

ARC uses several different types of graphics to better illustrate congestion and related issues. To illustrate the number of trips between activity centers, ARC uses color and line thickness. The map helps policymakers visualize the dominant origin-destination pairs.

Figure 3: Map showing congestion severity along arterials and State routes

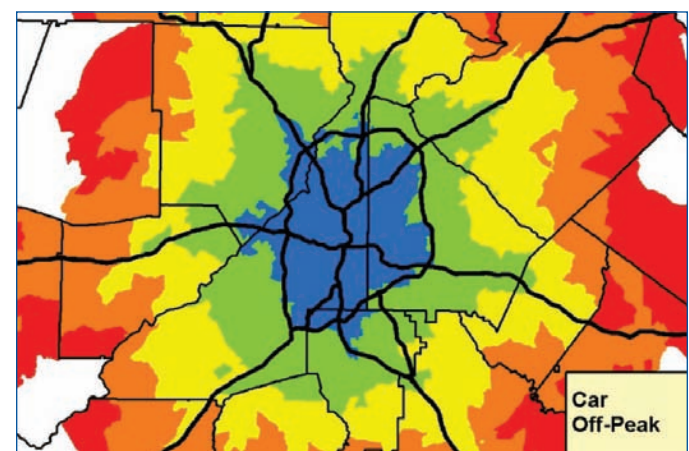
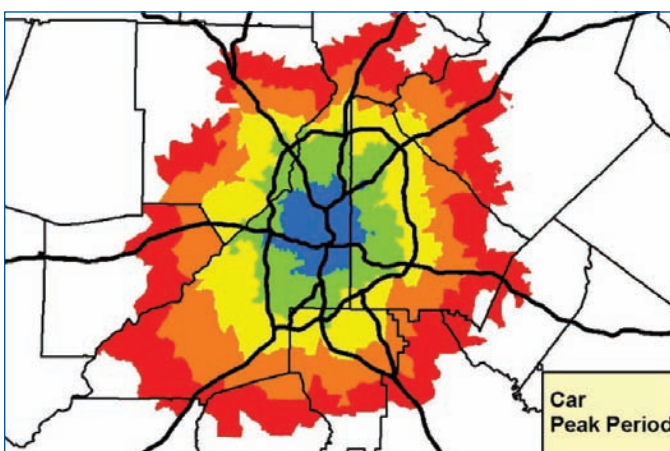
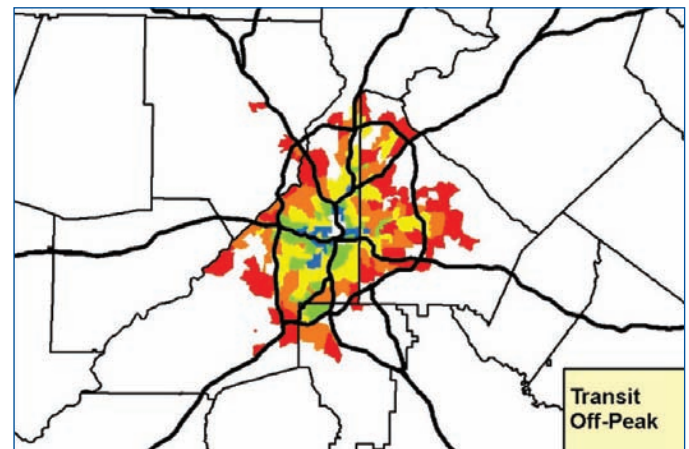
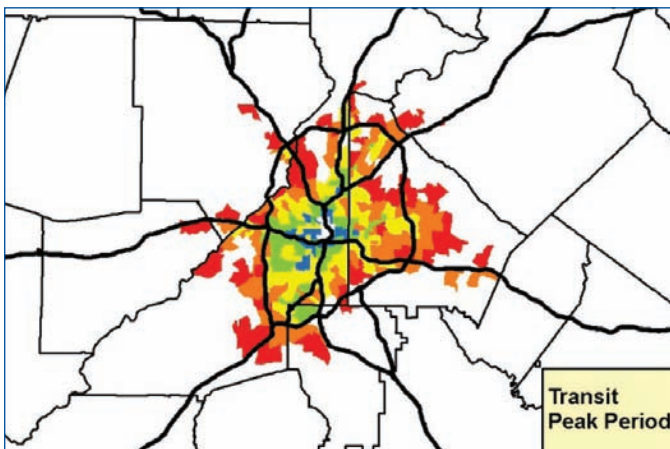


Source: ARC, 2010 *Transportation Fact Book*, July 2010.

In addition, ARC uses “travel-time shed” or contour maps to illustrate travel time generally from a central location for both transit and car trips (see figure 4). These maps are very popular, according to ARC staff, and are used to communicate congestion issues to policymakers, ARC committees, and the public. The contour maps are used in the Plan 2040 needs assessment report. ARC receives many requests for the maps from real estate developers.

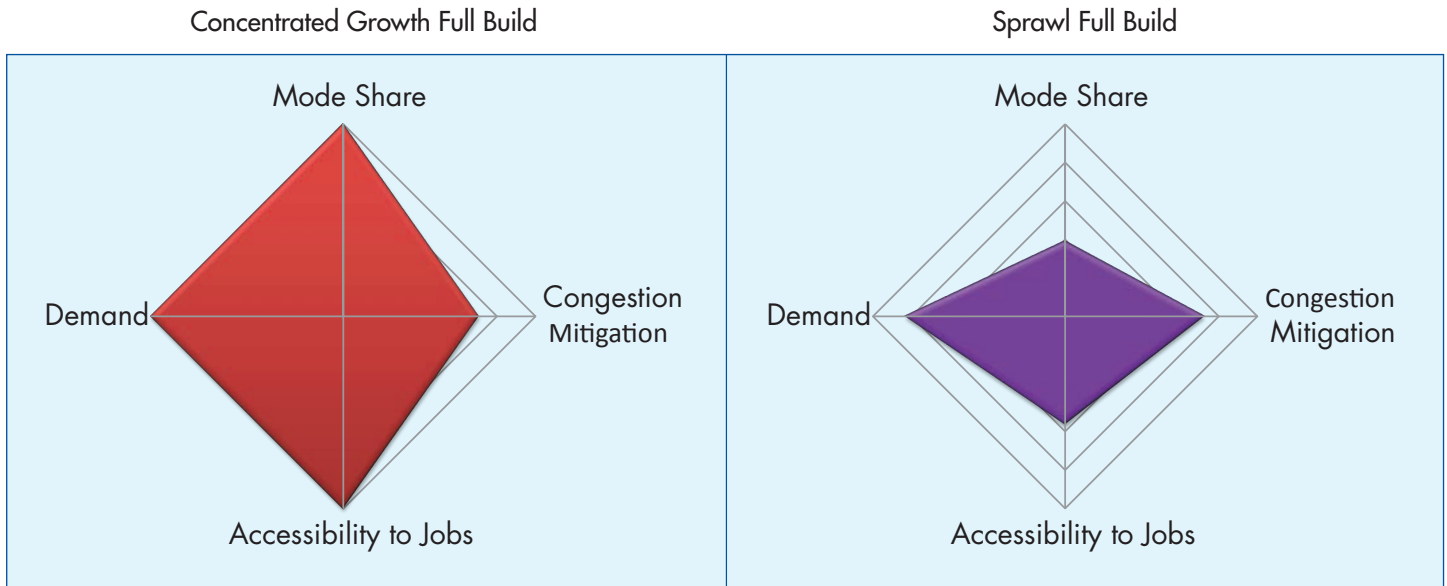
ARC also used video animation to simulate congestion issues for a small number of projects, including a downtown circulator study, but found it required a large amount of time and data. ARC recently developed quadrilateral diagrams (see figure 5) to illustrate the tradeoffs between scenarios in the plan. The purpose is for decisionmakers to use the diagrams to better understand the relative benefits of each plan scenario.

Figure 4: Contour maps showing travel time from a central location during peak and off-peak periods for transit and car



Source: ARC, *Plan 2040 Regional Assessment*, Appendix T1, Draft, January 2010.

Figure 5: Quadrilateral diagrams illustrating strengths and weaknesses of two plan scenarios



The bigger the polygon, the better the scenario performs

Source: Quadrilateral charts, ARC Plan 2040 Forecasts – Scenarios website

Lessons Learned and Challenges

ARC noted that its greatest challenge in implementing the CMP is conducting before-and-after studies to evaluate the effectiveness of implemented congestion management strategies. The project implementation rate in the region is fairly slow and the Atlanta region is still a very high growth area despite the recession. The changes in conditions over time make it difficult to isolate the impact of a CMP strategy. In addition, limited funds to collect data make the task more difficult. ARC recognizes the value of having this information on strategy effectiveness and has begun to set aside funding to collect before-and-after data to supplement the studies done by project sponsors.

Another challenge for the ARC has been in elevating the role of M&O strategies in managing congestion. M&O effectiveness in managing congestion is an open question for many in the region. M&O is generally handled by individual implementing agencies rather than part of a regional strategy for operating the system. To bring together all the M&O efforts in the region and develop a more strategic approach for use of these strategies, ARC recently convened an M&O committee of operators and planners from multiple modes across the region. Through this committee ARC aims to better coordinate M&O in the region using collaborative goals, policies, project selection, and funding practices. The committee is also intended to elevate the importance of M&O in addressing congestion issues in the region.