# Appendix T-3: Congestion Measurement in the Atlanta Region

## Understanding the Nature of Congestion

There is no doubt that congestion has been a culprit to hindered productivity, efficiency of accomplishing daily tasks, and loss of time and money. However, congestion can also be seen as an indicator of economic vitality. Every major city in the United States is faced with enduring rising levels of congestion, but they continue to also sustain healthy economies and social attractiveness. There is widespread recognition that congestion levels can and should be reduced in Metro Atlanta. There is also the emerging acknowledgement that not all congestion can be mitigated. Improving mobility while growing the region's economy should be a targeted effort that is balanced, versatile, and comprehensive.

Identifying and reducing congestion is only one of many regional transportation planning objectives. Similar to balancing the competing interests of relieving congestion and growing the economy, congestion relief should also be strategic and targeted. This is why the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: Legacy for Users (SAFETEA-LU) passed by Congress in 2005, requires ARC to oversee the Atlanta region's Congestion Management Process (CMP) for the 18-county MPO area. The CMP identifies congested locations and facilities within a metropolitan area, and is a key tool used in defining and implementing strategies for improving congested locations. The CMP must also monitor the effectiveness of these solutions.

Causes of congestion can be grouped into two different categories: **recurring** and **non-recurring**. Recurring congestion reflects the normal or routine commuting patterns that typically occur during the morning and afternoon rush hours. This type of congestion is often predictable because the travel routes follow a specific pattern in terms of time of day and route selection. Surprisingly, this type of congestion only accounts for roughly half of all the delay that motorists experience.

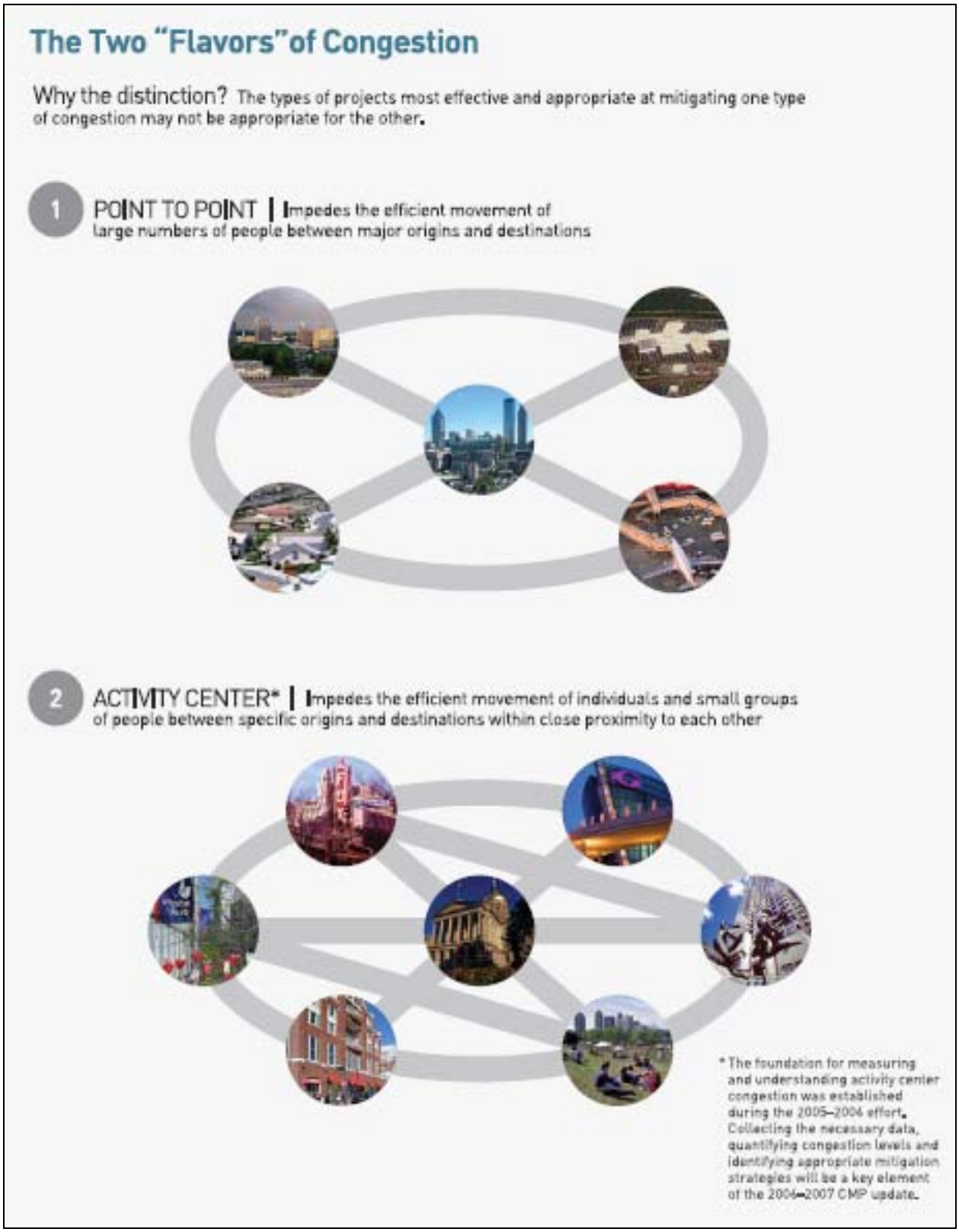
Non-recurring congestion results from dynamic factors, and is less predictable in nature. Non-recurring conditions are often a caused by poorly operated roadways, crashes and other roadway incidents, bad weather, special events, roadway construction, and other events that do not recur at the same location on a regular basis. It is very difficult, if not impossible, to forecast these events, and how they will contribute towards congestion delay. However, non-recurring congestion can be mitigated through intense operational management conducted by the Georgia Department of Transportation or other jurisdictions responsible for maintaining the facility (i.e., county or municipal transportation or public works department).

Typically, regional congestion evaluation has primarily focused on the causes and solutions to recurring congestion, because it is easier to measure and predict, and the analysis often boils down to determining whether a roadway contains enough capacity or not. Rarely is there a

regional analysis assesses if traffic signals are adequately timed, if there is a high occurrence of crashes, or if incident clearance times are too long. These operational conditions are not directly related to capacity. A road can be widened ten times over, but that improvement alone could never prevent the chances of an over-turned vehicle from completely stopping traffic in one direction for two hours, or overcome the bottleneck at an intersection where there are competing traffic flows. In order to be affirmative and diligent with incorporating operational factors into the regional planning process, ARC initiated the ***Strategic Regional Thoroughfare Plan*** in early-2010 to help incorporate all of these other factors in order to begin addressing the "other half" of congestion more effectively.

Figure 1 on the following page provides details on two types of congestion.

**Figure 1: Two Types of Congestion that Require Different Strategies**

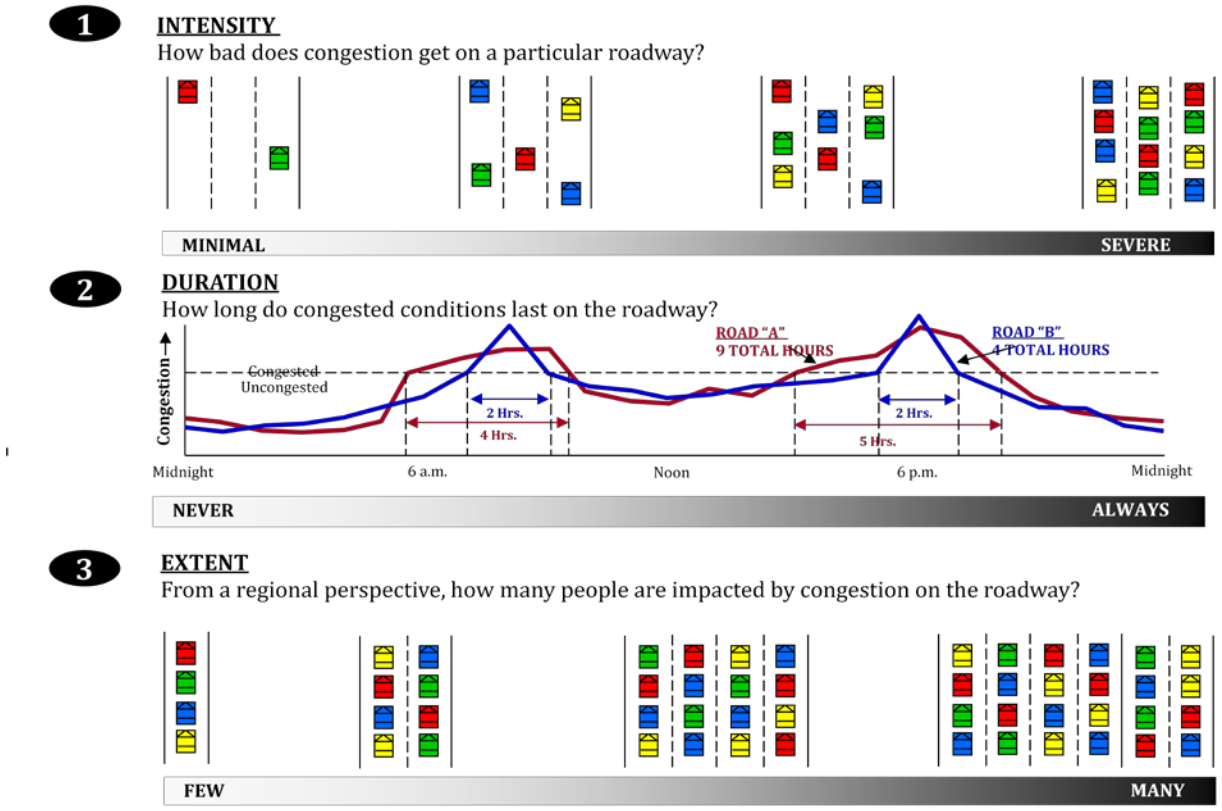


For purposes of identifying the general needs of the region, a congestion location analysis will help provide some initial answers as to where capacity deficiencies are located. The following graphics illustrate two primary ways to evaluate roadway capacity at the regional scale. Both of these approaches help the region become strategic in prioritizing where congestion relief should occur and be most effective.

ARC defines congestion as occurring when the actual demand or volume reaches or exceeds what a roadway or transit facility can handle. ARC uses three variables to quantify congestion. Figure 2 below displays graphic representations of these three variables.

- Intensity — assesses how much delay is experienced by the average commuter.
- Duration — Measures how many hours during the day a facility experiences congestion.
- Extent — identifies the number of people impacted by congestion.

**Figure 2: Three Congestion Variables**




Most people are unfamiliar with the aforementioned approaches for identifying and ranking roadway congestion. Nonetheless, motorists experience congestion in each of these three dimensions. Below is a **hypothetical example** to help explain these concepts.

*Motorist A's Experience*

1. **Intensity:** Motorist A might expect her weekday morning trip from Buckhead-Atlanta to Hartsfield-Jackson Atlanta International Airport to take twice as long as it should take during off-peak hours.
2. **Duration:** She might also expect that the conditions that are causing trips along this route to take twice as long as they would if they were taken during off-peak hours would last from 6:45 a.m. to 9:00 a.m.
3. **Extent:** The number of other vehicles also experiencing the same delay as Motorist A, while traveling the same route to the airport that morning is approximately 10,000.

*Motorist B's Experience*

1. **Intensity:** Motorist B's journey from Newnan to Hartsfield-Jackson Atlanta International Airport is *three times* longer than it would be if it had occurred during an off-peak setting like Saturday at 7:00 p.m.
2. **Duration:** Likewise, Motorist B's route only experiences that level of congestion from 7:30 a.m. to 8:30 a.m.
3. **Extent:** The number of vehicles traveling on Motorist B's route to the airport from 7:30-8:30 is 500.

A comparison between Motorist A and B's experiences shows that the **"Intensity"** that Motorist B endures is higher than Motorist A's. However, the route taken by Motorist A sustains a longer period of congestion **("Duration")** than Motorist B's. Furthermore, there are twenty times more vehicles delayed **("Extent")** from Buckhead to the Airport (10,000) as there are from Newnan (500). So the question is whose route should be considered more congested considering all three dimensions equally? This is the challenge in ranking the region's most congested roadways.