
APPENDIX C-2

Performance Measures Portfolio

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Introduction

This appendix serves as an overview of plan-level performance measures used to assess the performance of PLAN 2040. The results showcase PLAN 2040's expected impact on key regional indices such as mobility, safety, economic growth and environmental impact in the year 2040. Most of the impacts were derived from the ARC 20-county travel demand model by comparing the financially constrained PLAN 2040 scenario with one or more additional scenarios. Below is a list of all the scenarios studied:

- **2010 Base Scenario** – This scenario correlates to current conditions in the Atlanta region. Population, employment, and the transportation network are held at 2010 levels.
- **2040 No-Build Scenario** – This scenario assumes no capacity improvements are made to the region's transportation infrastructure out through the year 2040. Population and employment are set at forecasted 2040 levels.
- **PLAN 2040 Constrained Scenario/PLAN 2040 Build Scenario** – This scenario is the financially constrained portion of PLAN 2040. Funding for transportation infrastructure improvements is limited to what can reasonably assumed to be available based on expected federal, state and local sources. Population and employment are set at forecasted 2040 levels.
- **PLAN 2040 Aspirations Scenario** – Assumes funding is available to meet all currently recognized transportation infrastructure capacity needs. In this scenario the transportation network is maximized and population and employment are set at forecasted 2040 levels.

The No-Build, PLAN 2040 Aspirations and PLAN 2040 Constrained scenarios all assume an equal population and employment forecasted out to the year 2040. The only variable allowed to change is the transportation network, which ensures changes in plan-level performance measures are a result of changes in the modeled infrastructure and not population or employment altering trip destinations choice.

Table 1, below, contains plan-level performance measure scores evaluated for each scenario in the areas of mobility, connections/access, economic growth and safety. Values that are based on an index set 2010 levels at 1.0. A lower ratio indicates a decline in that variable, while a higher ratio indicates an increase.

In addition, the PLAN 2040 Constrained Scenario was evaluated for its impact on air quality/greenhouse gas emissions, supply and demand considerations, social equity and other variables. Information on performance related to these areas, and others, are included in the adjoined annotated performance portfolio PowerPoint presentation.

Table 1 – Plan Level Performance Measures

| Performance Emphasis Area | Measure Description | 2010Base | | 2040 No-Build | | 2040 Constrained | | 2040 Aspirations | |
|------------------------------------|---|---|----|---|----|---|----|---|----|
| Mobility | Average commute travel time by auto / transit (in minutes) | Walk to Transit | 58 | Walk to Transit | 62 | Walk to Transit | 59 | Walk to Transit | 59 |
| | | Drive to Transit | 58 | Drive to Transit | 75 | Drive to Transit | 73 | Drive to Transit | 66 |
| | | Automobile | 37 | Automobile | 59 | Automobile | 51 | Automobile | 43 |
| Connections / Accessibility | Worker access to employment centers within 45 minutes by car (index) | 1.0 | | 0.76 | | 1.03 | | 1.48 | |
| | Worker access to employment centers within 45 minutes by transit (index) | 1.0 | | 1.46 | | 1.66 | | 2.90 | |
| | Average number of jobs within 45 minutes of home for typical person | 464,029 | | 278,361 | | 373,646 | | 539,818 | |
| Economic Growth | Annual congestion cost per person | \$1,264 | | \$4,298 | | \$3,461 | | \$2,530 | |
| | Number of reliable trips in peak period | 49,100 | | 70,792 | | 126,896 | | 365,520 | |
| | Peak-hour highway VMT | 16,212,818 | | 21,576,185 | | 20,885,259 | | 22,064,577 | |
| | Peak-Hour highway speed (mph): | General Lanes : 35 Managed Lanes: 34 | | General Lanes : 16 Managed Lanes: 15 | | General Lanes : 18 Managed Lanes: 27 | | General Lanes : 22 Managed Lanes: 36 | |
| Safety | Percent of high crash locations with a project identified | - | | - | | 68 % | | - | |
| | Investments at high crash locations | - | | - | | \$10.5 Billion | | - | |

PLAN 2040

PLAN 2040 Performance Portfolio



ATLANTA REGIONAL COMMISSION

Base Data

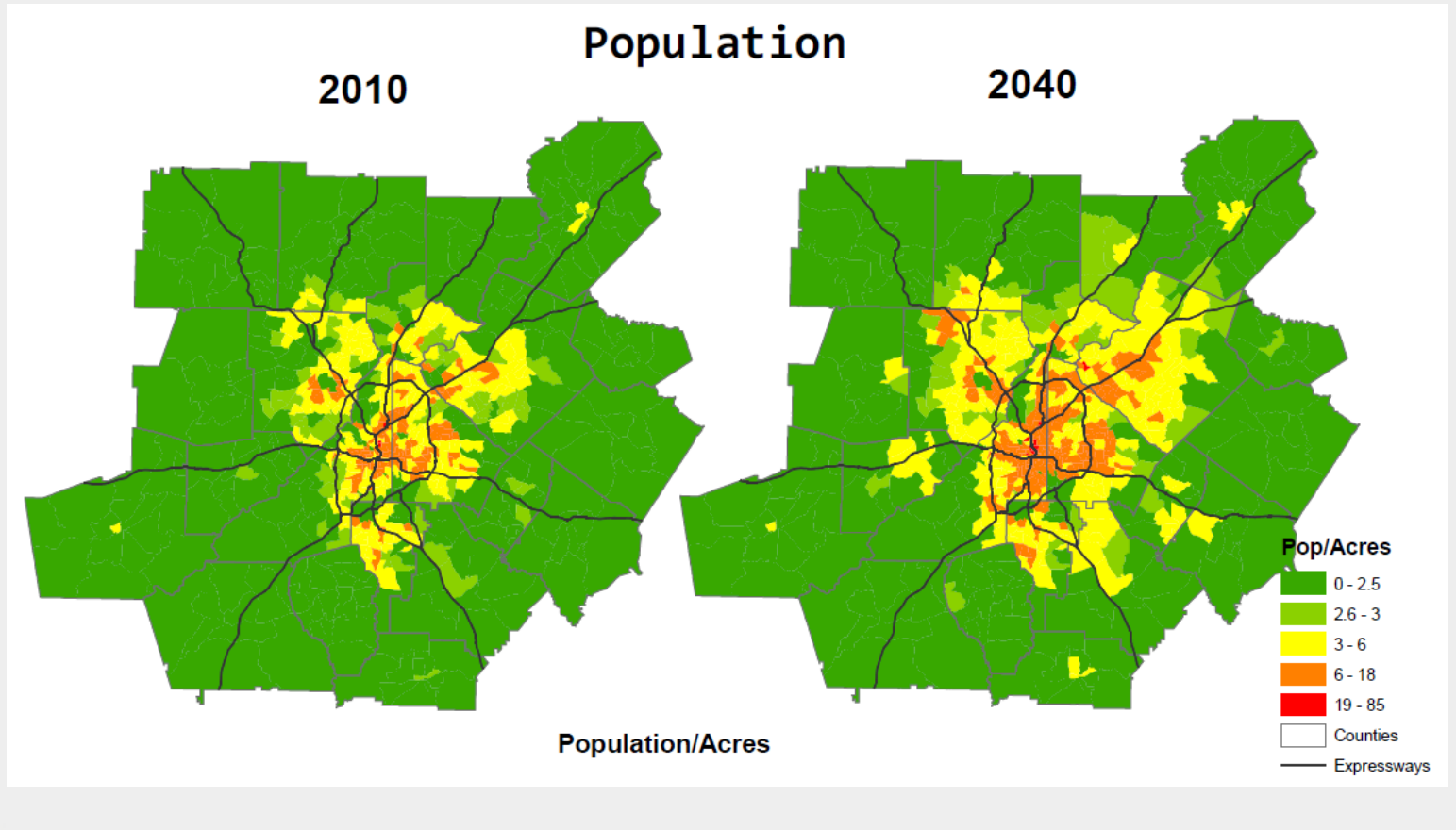
Change in Population by Census Tract – This slide illustrates the expected change in population in the 20-county region between the years 2010 and 2040. Population is projected to increase from around 5.4 million to 8.3 million people. The mean population density in the region is projected to rise from approximately 850 to 1300 people/acre.

Change in Major Employment Center Population – While most of the region’s housing remains low density, areas around major activity centers and transit nodes are expected to see further increases in density. Targeting multimodal investments in these areas will be key to ensuring future mobility.

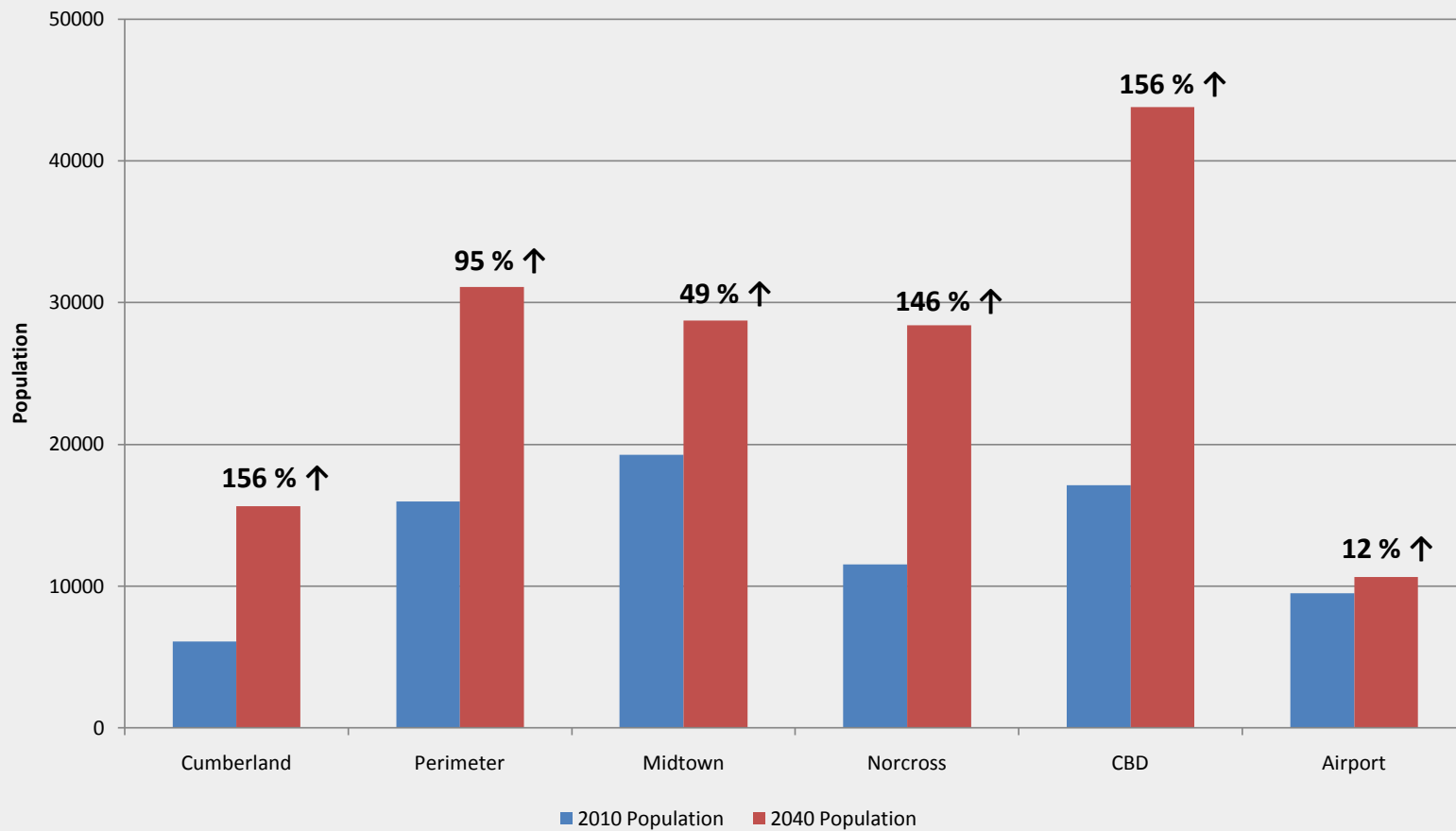
Change in Employment by Census Tract – The region is expected to see an increase in the total number of jobs between 2010 and 2040. Employment is projected to rise from approximately 2.7 million jobs to around 4.5 million jobs by 2040. An increased density of jobs is also expected in southern Gwinnett, northern Fulton, and central Henry counties.

Change in Major Employment Center Jobs – Jobs will continue to cluster primarily in locations where they have historically been located (the region’s core, airport, and major activity centers). Some of these employment centers are projected to see as much as a 70 percent increase in the number of jobs.

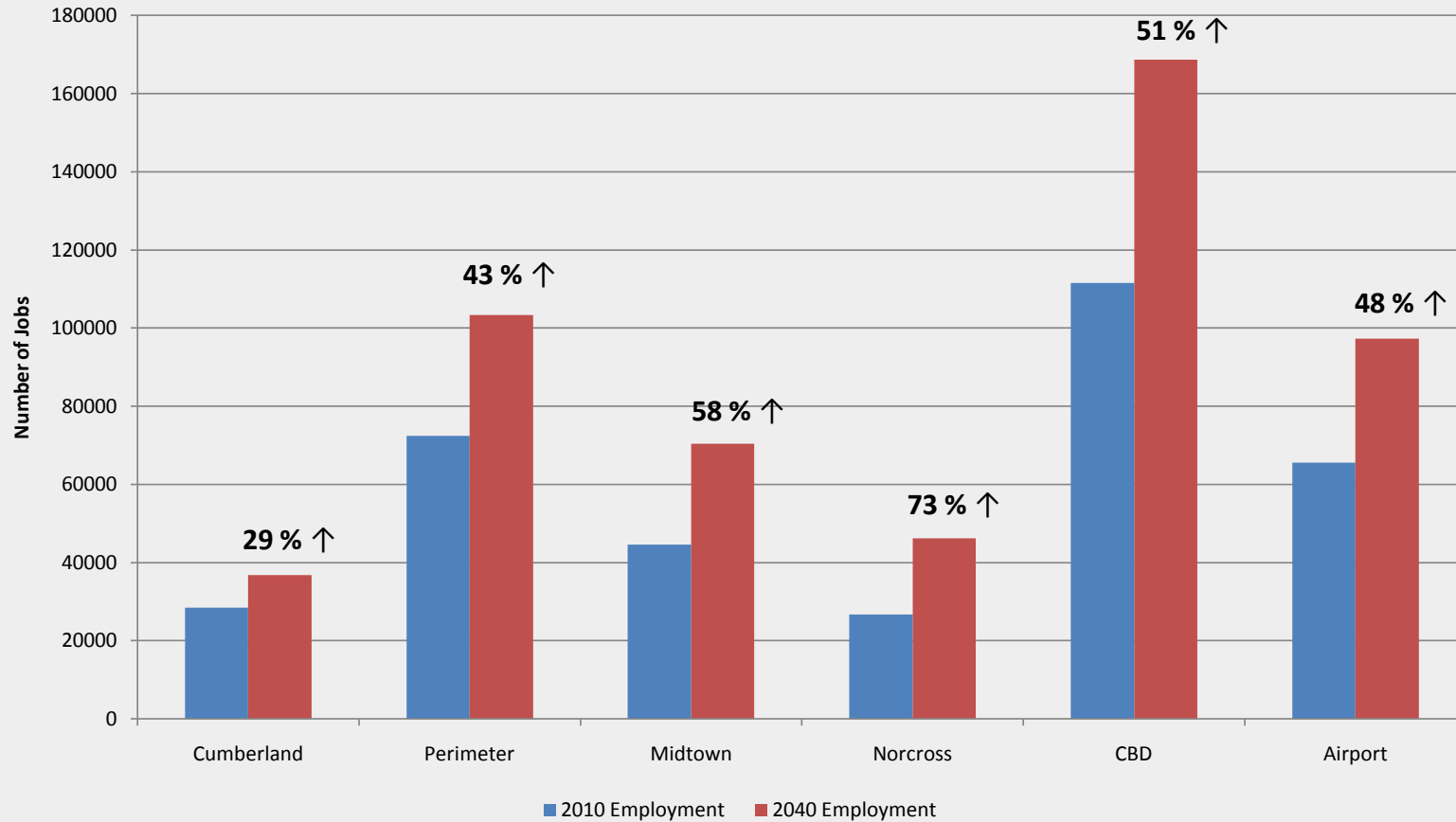
Base Data – Change in Population by Census Tract



Base Data – Change in Major Employment Center Population



Base Data – Change in Major Employment Center Jobs



Mobility

Daily Regional Travel Demand – This slide illustrates the change in expected travel patterns between 2010 and 2040 due to changes in population and employment. Travel demand is projected to maintain current patterns but increase in volume. Routes that connect Cobb, Fulton, DeKalb and Gwinnett counties will continue to see the greatest demand. In addition, some routes in the southern portion of the metropolitan area will see demand increase dramatically.

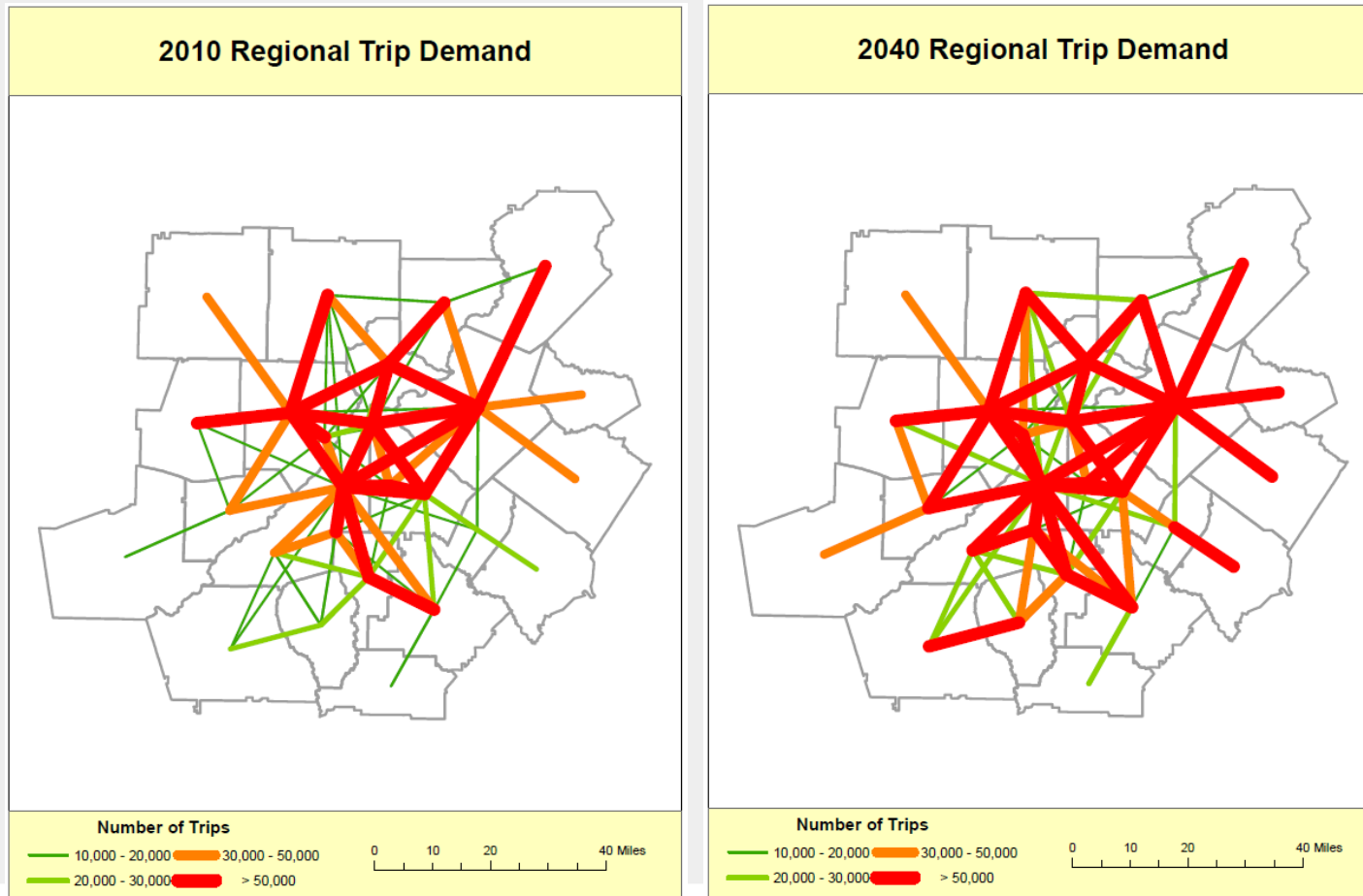
Congested Speed Differences – This graphic compares the PM peak period travel demand model expected speeds on regional roadways. The left-hand side of the graphic compares the PLAN 2040 Constrained scenario to 2010 Base conditions. The right-hand side of the graphic compares PLAN 2040 Aspirations to 2010 Base conditions. Due to the large increase in population and employment expected, it is impossible to maintain current travel speeds during the PM peak period in the region. As a result, both scenarios see a general degradation of speed on regional roadways. The PLAN 2040 Aspirations scenario is able to counter some of that degradation in the region's core and along interstate routes through investments in transit infrastructure and managed lanes.

Relative Congestion Cost – This measure assesses the region's total annual congestion cost per lane mile. Congestion cost is calculated based on hours of delay in traffic, and the wasted fuel associated with that delay, multiplied out by all the users of the system.

Total Work Transit Trips – This slide illustrates the change in total daily transit commuting trips in the region across all the scenarios. Since there are no improvements to the transit network between the 2010 Base and 2040 No Build scenarios, the increase in transit trips is purely a result of the increase in population and a shift in riders from personal automobile to transit due to increasing congestion. The PLAN 2040 Constrained and Aspirations networks see further increases in transit ridership due to increases in transportation infrastructure on top of the forecasted change in population.

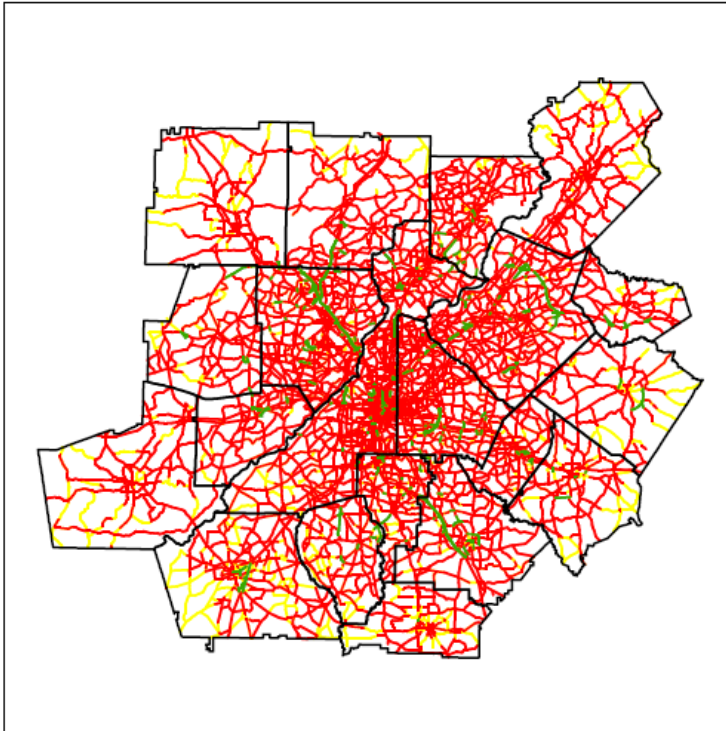
Reliability Network – As mobility is decreased due to the increase in population in the region in the future, it becomes increasingly important to provide the region with better options and more consistent travel times. PLAN 2040 seeks to meet that goal through the implementation of a reliable regional transportation network. The reliable transportation network is composed of trips made on premium transit (rail or express bus) or on a high occupancy toll (HOT) managed lane facility. The reliable network in the 2010 Base scenario consists only of trips made on MARTA heavy rail. The PLAN 2040 Constrained and Aspirations scenarios would see that increase due to the available funding to implement more premium transit and HOT lanes.

Mobility – Daily Regional Travel Demand

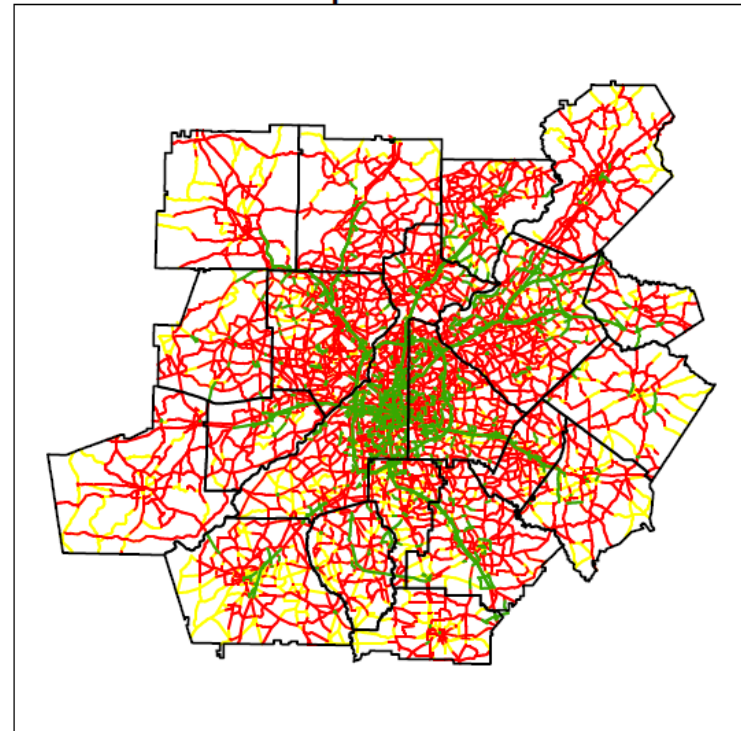


Mobility – Congested Speed Differences

2040 Build - 2010

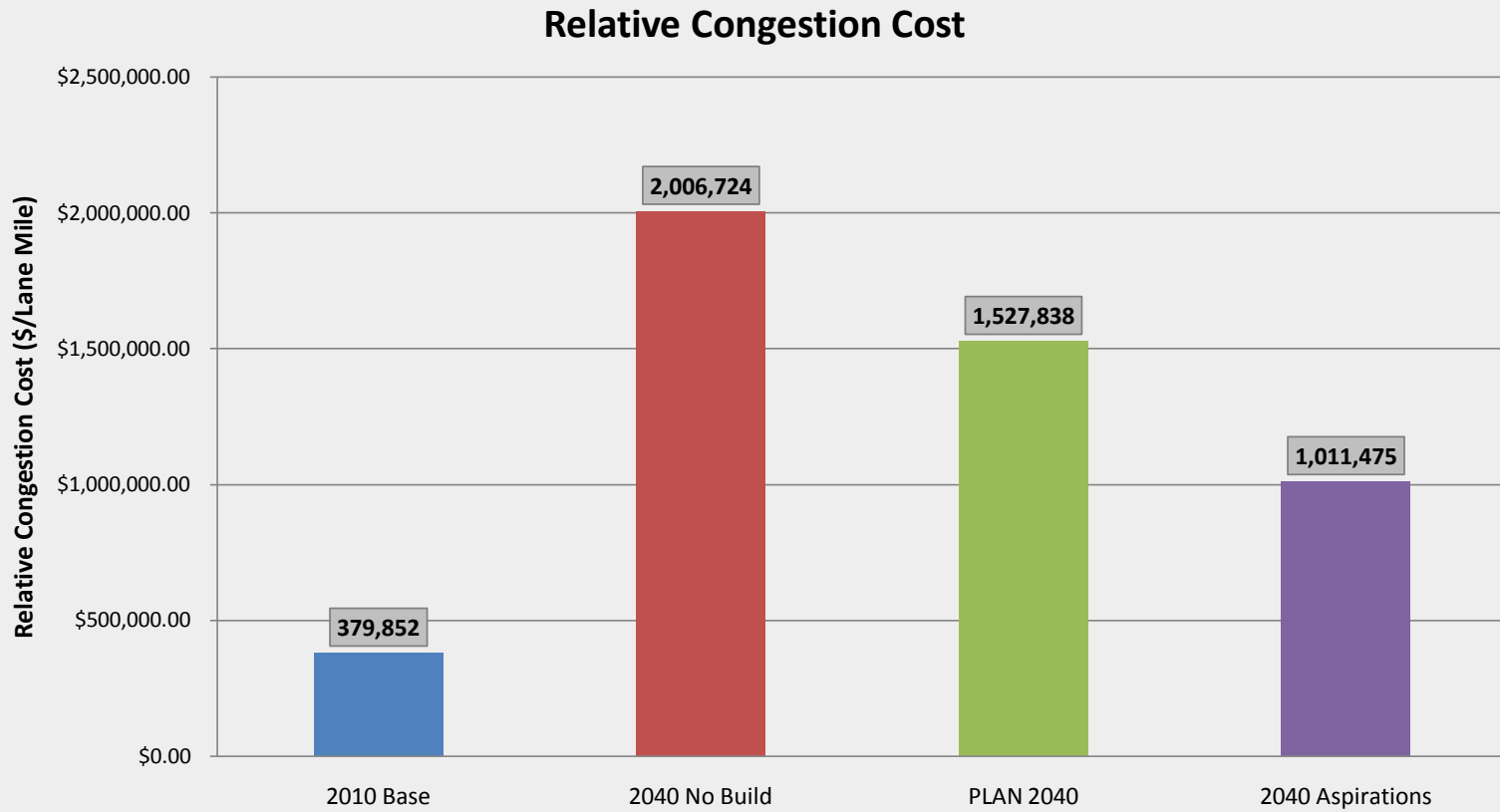


2040 Aspirations - 2010



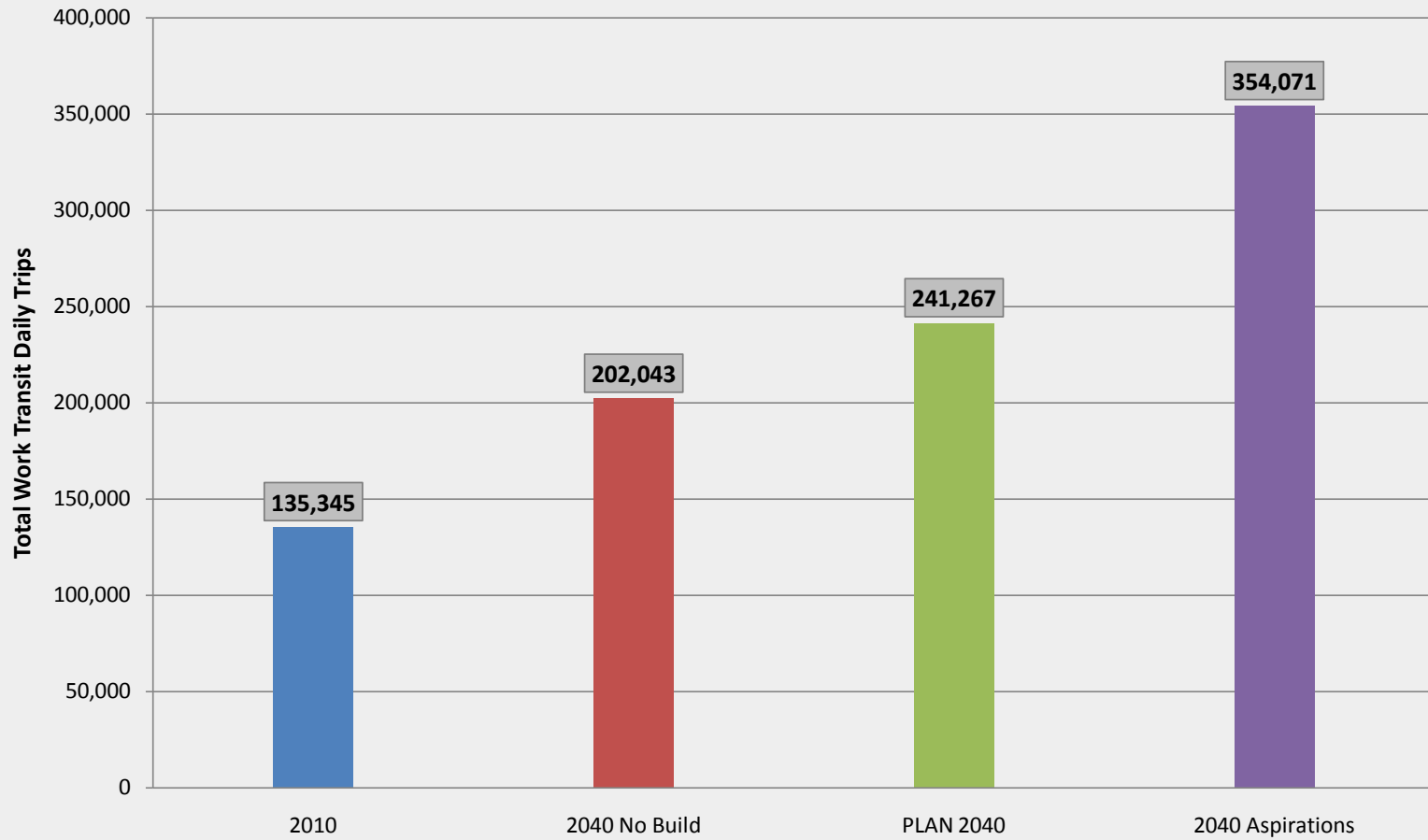
— Speed Improvement — No Change — Speed Worsening

Mobility – Relative Congestion Cost*

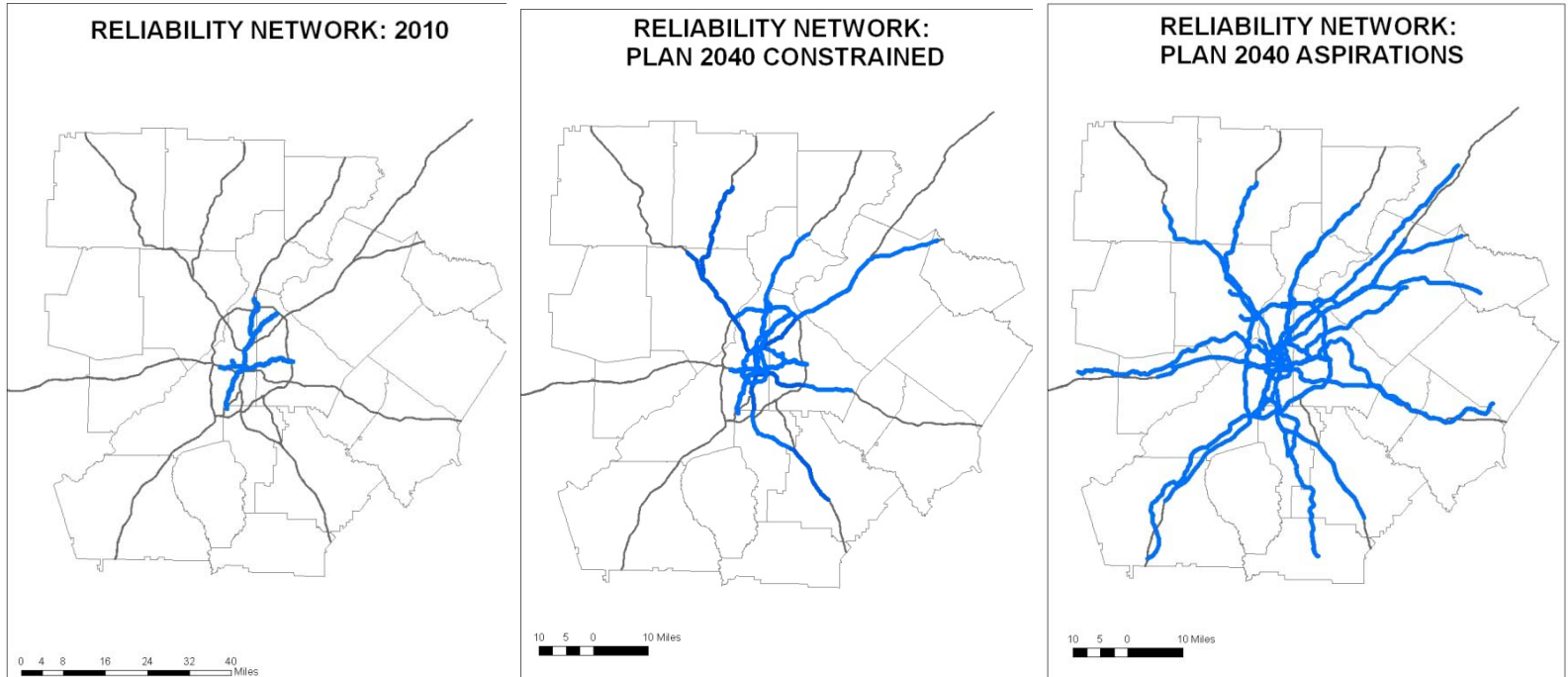


*Relative Congestion Cost= (Total Annual Congestion Cost)/(Total Lane Miles)

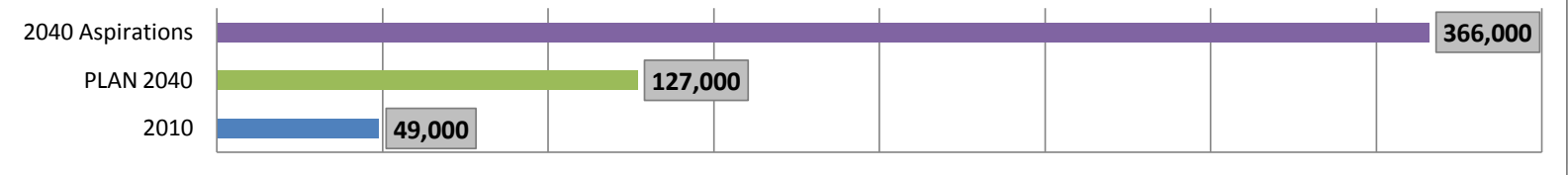
Mobility – Total Work Transit Trips



Mobility – Reliability Network



Number of Reliable Trips in Peak Period Travel



Connections / Accessibility

PM Peak Automobile Travel Sheds – This graphic illustrates the travel time one can expect departing from select locations in the region. Travel sheds in the 2040 Constrained and Aspirations scenarios are reduced from current conditions due to an increase in congestion in the region.

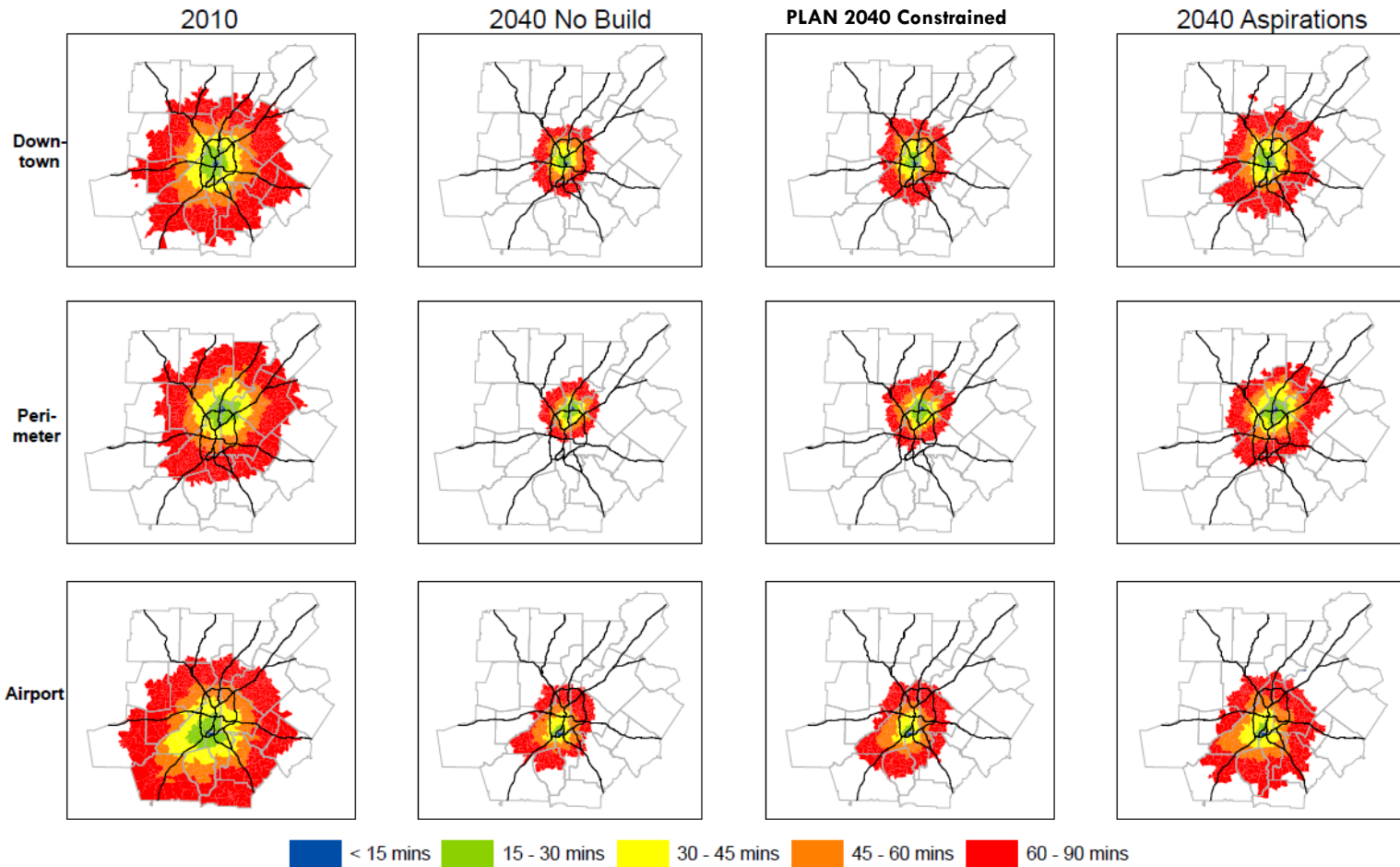
Peak Transit Travel Sheds – Similar to the automobile travel sheds, the transit travel sheds show how far/where someone could expect to travel around the region using transit within set time limits. Planned investments in the PLAN 2040 Constrained and Aspirations networks dramatically increase transit mobility and accessibility in the region, particularly in the northern suburbs.

Peak Period Automobile Travel Sheds – This series of three slides shows in more detail a 45-minute travel time contour from the PM Peak Automobile Travel Shed charts for the Perimeter Activity Center. Current conditions are contrasted against PLAN 2040 Constrained and Aspirations modeled conditions. Congestion shrinks the travel shed in the 2040 scenarios reducing the number of people that can access the activity center during peak periods.

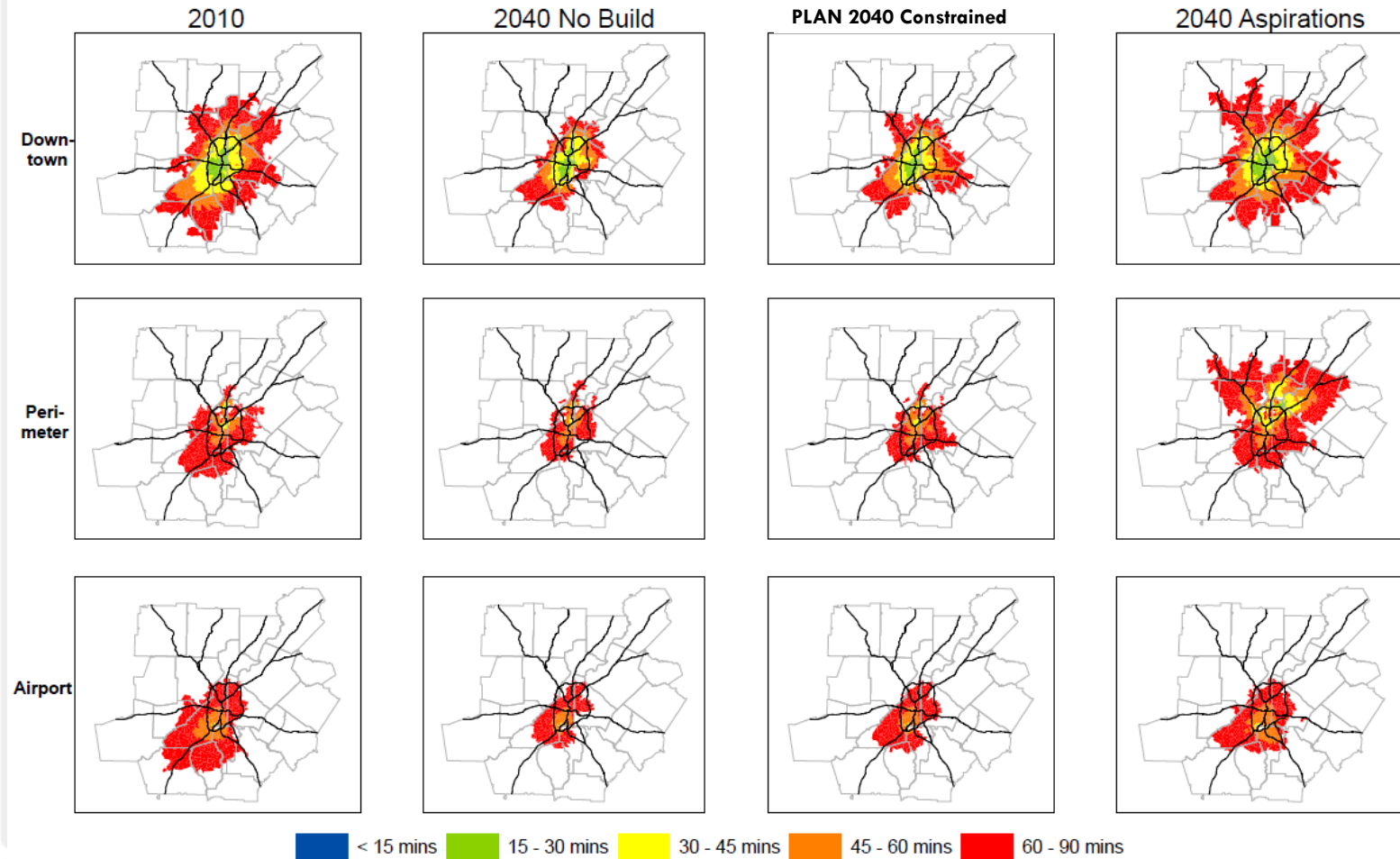
Potential Walking Demand – This graphic outlines the change in the ARC developed Potential Walking Demand Measure. This index measures the likelihood of walking trips occurring in an area of the region by looking at the number of households, the intersection grid and the number of service and retail jobs a person could walk to for work or to receive goods/services. Areas with high or medium-high scores should be priorities for the investment of funding for pedestrian infrastructure and include major employment centers, intown neighborhoods and regional town centers. Due to the predicted continuation of past growth patterns between 2010 and 2040 the overall index changes very little. Improvements are seen, however, due to the increased activity center and neighborhood densities in certain locations of the region.

Multimodal Accessibility Measure – The Multimodal Accessibility Measure assesses possible accessibility to employment by three travel modes: a 30-minute drive, a 15-minute walk and a 45-minute transit trip. Areas categorized as high or medium-high in the index offer all three options to reach employment opportunities. Areas in the low or very low categories generally only provide residents with the option to drive to their jobs. Between the 2010 Base and the 2040 No-Build scenario, the high scoring Multimodal Accessibility Measure areas decrease in area due to an increase in congestion. The PLAN 2040 Constrained/Aspirations scenarios help to maintain/expand modal accessibility in the region through the implementation of additional transit service and infrastructure.

Connections/Access – PM-Peak Automobile Travel Sheds



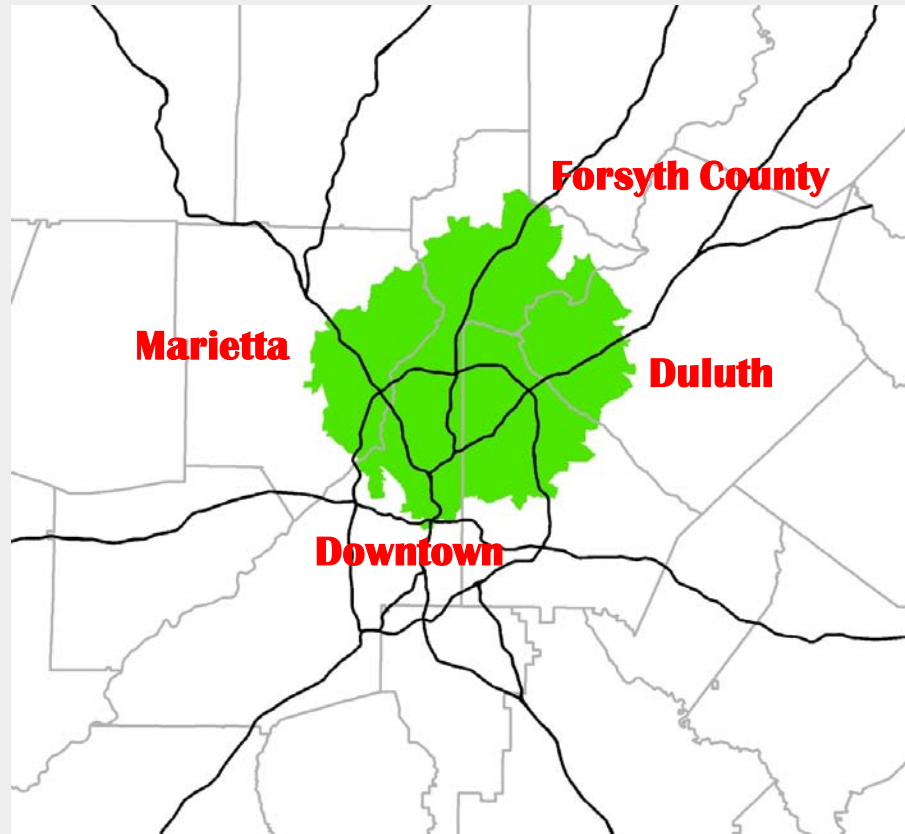
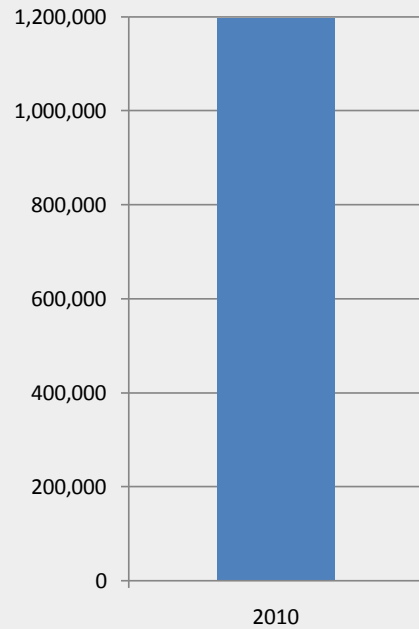
Connections/Access – Peak Period Transit Travel Sheds



Connections/Access – Peak Period Automobile Travel Sheds

2010

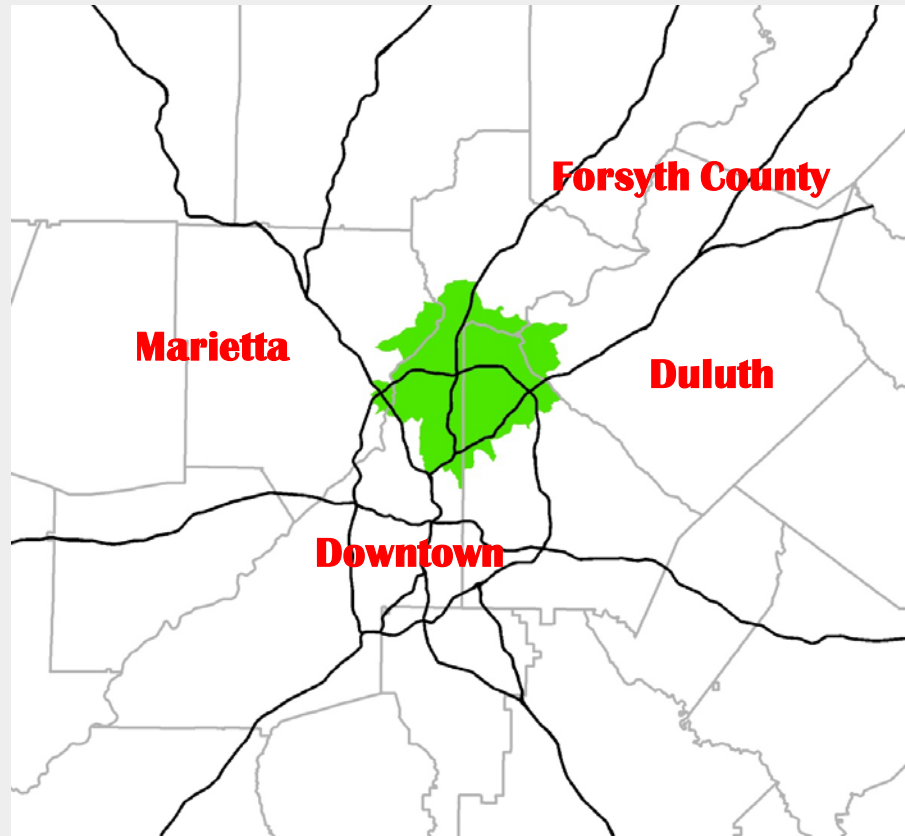
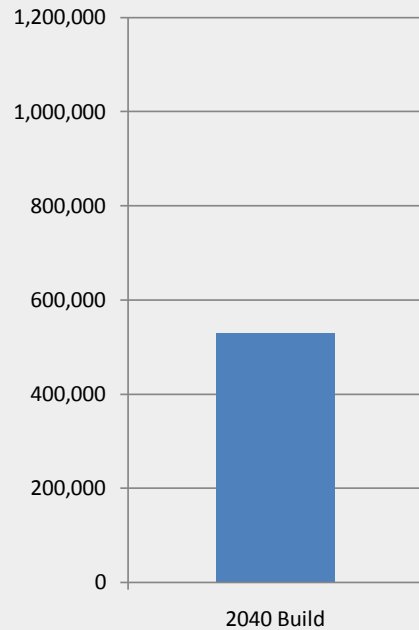
Population within 45 mins



Connections/Access – Peak Period Automobile Travel Sheds

PLAN 2040 Constrained

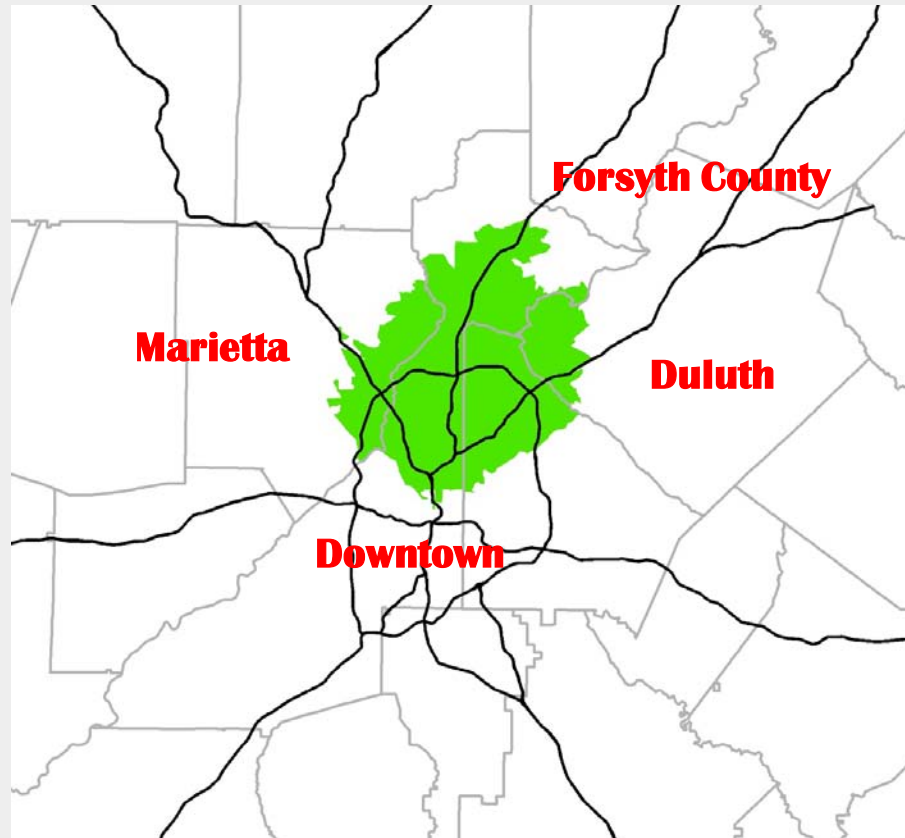
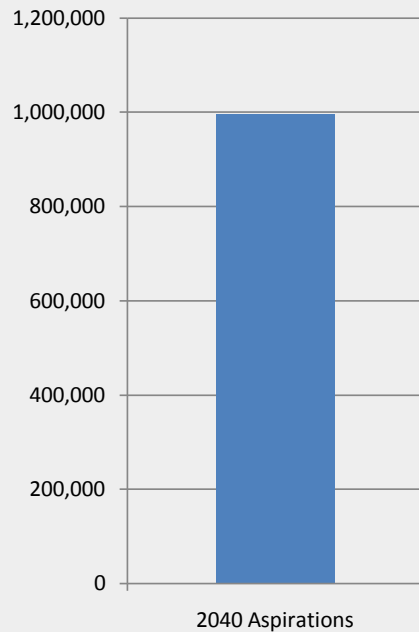
Population within 45 mins



Connections/Access – Peak Period Automobile Travel Sheds

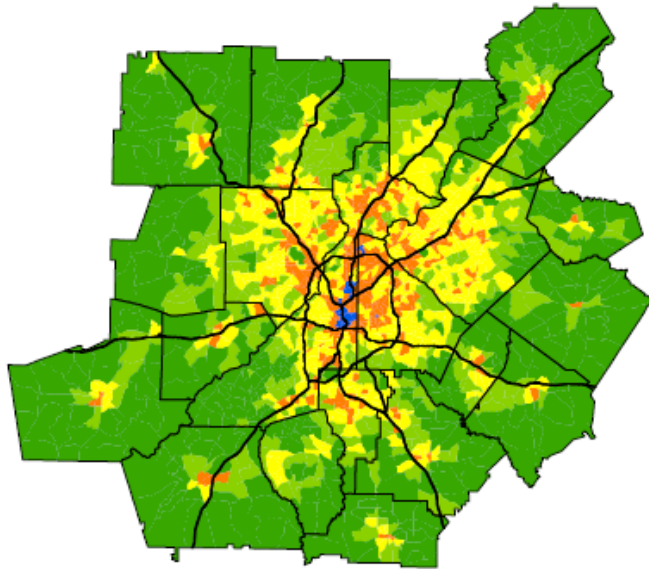
PLAN 2040 Aspirations

Population within 45 mins



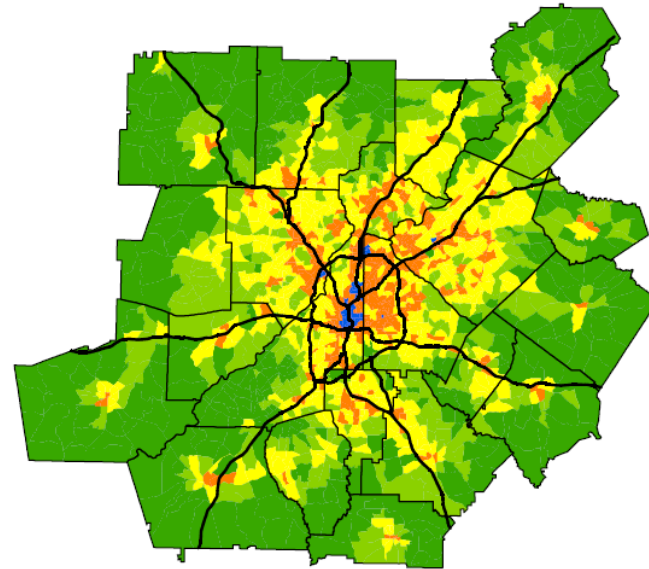
Connections/Access – Potential Walking Demand

2010 Potential Walking Demand



Very Low Low Medium Medium - High High

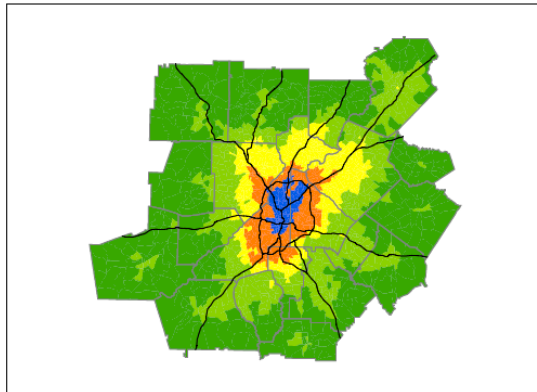
2040 Potential Walking Demand



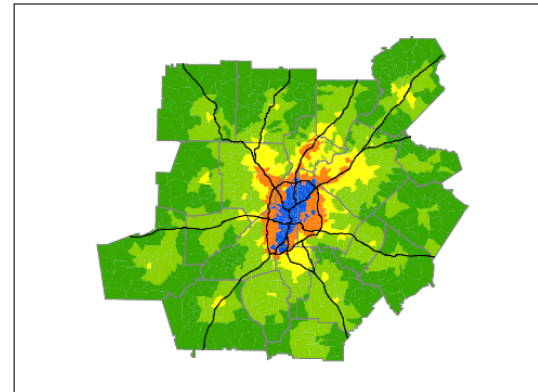
Very Low Low Medium Medium - High High

Connections/Access – Multimodal Accessibility Measure

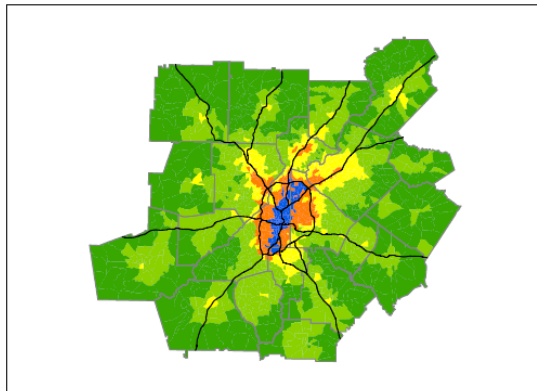
2010



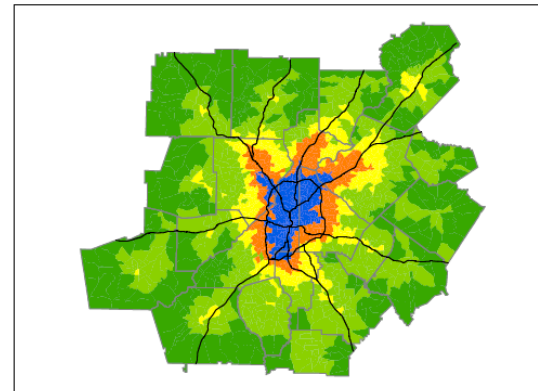
PLAN 2040 Constrained



2040 No Build



2040 Aspirations



Very Low Low Medium Medium-High High

Safety

Description Slide – Provides a brief summary of high crash corridors in the region and the corresponding predominant incident transportation mode.

Safety Measure 1 – This measure looks at the percent of high crash locations in the region with a PLAN 2040 Constrained scenario transportation project identified at that location. Projects at high crash locations are assumed to address the safety issues on the corridor. The PLAN 2040 Constrained scenario currently has projects allocated on 68 percent of the region’s high crash locations.

Safety Measure 2 – This measure assessed the total cost of the infrastructure investment at high crash locations in the region. The PLAN 2040 Constrained scenario allocated \$10.5 billion in improvements on high crash corridors.

Description

Quick Summary of High
Crash Locations:

of Locations by Travel Mode

Bicycle Injury: 16

Heavy Truck: 24

Pedestrian: 29

Vehicle Only: 13

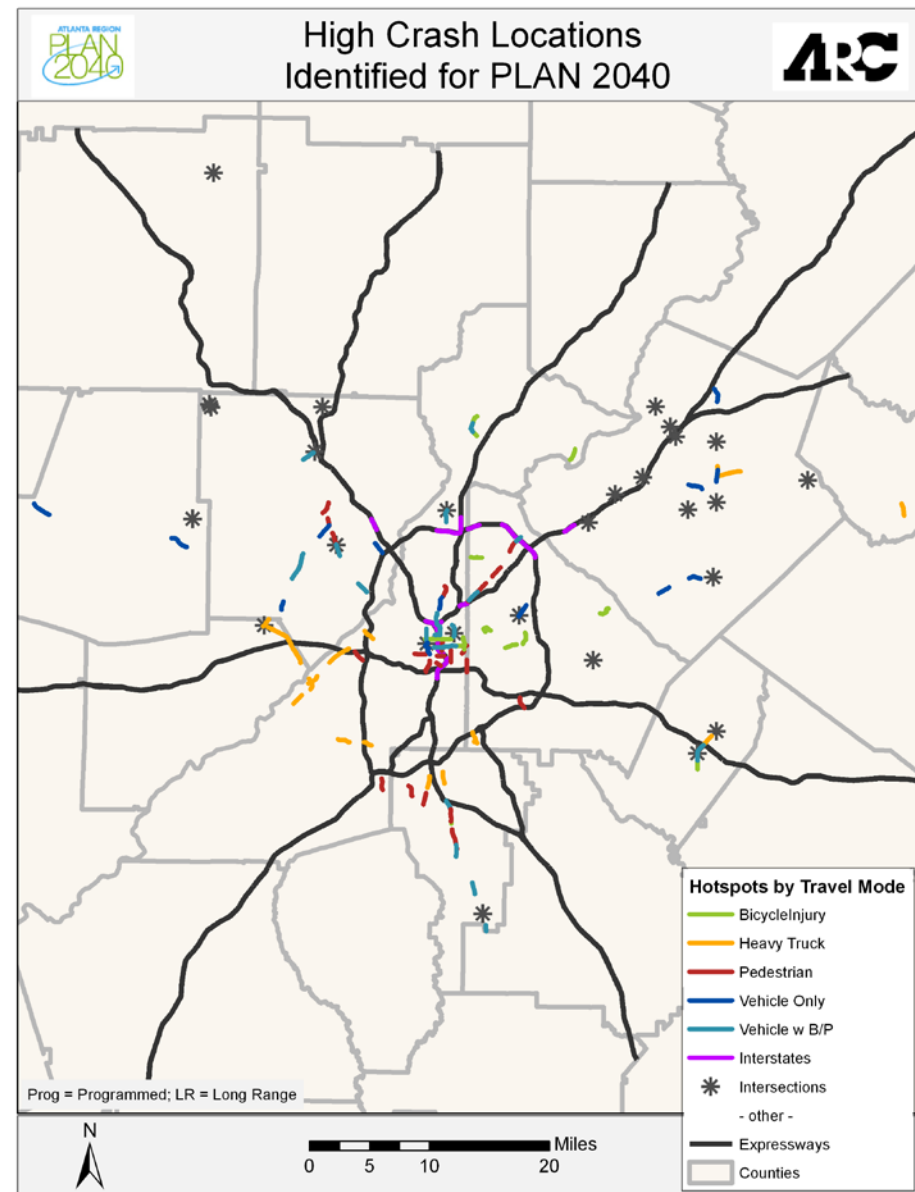
Vehicle w B/P: 19

Interstates: 19

TOTAL CORRIDORS: 120

TOTAL INTERSECTIONS: 26

TOTAL LOCATIONS: 146

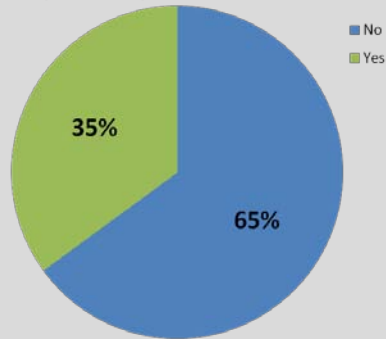


Safety Measure 1

No Build

35% of all High Crash Locations have a project Completed at that location

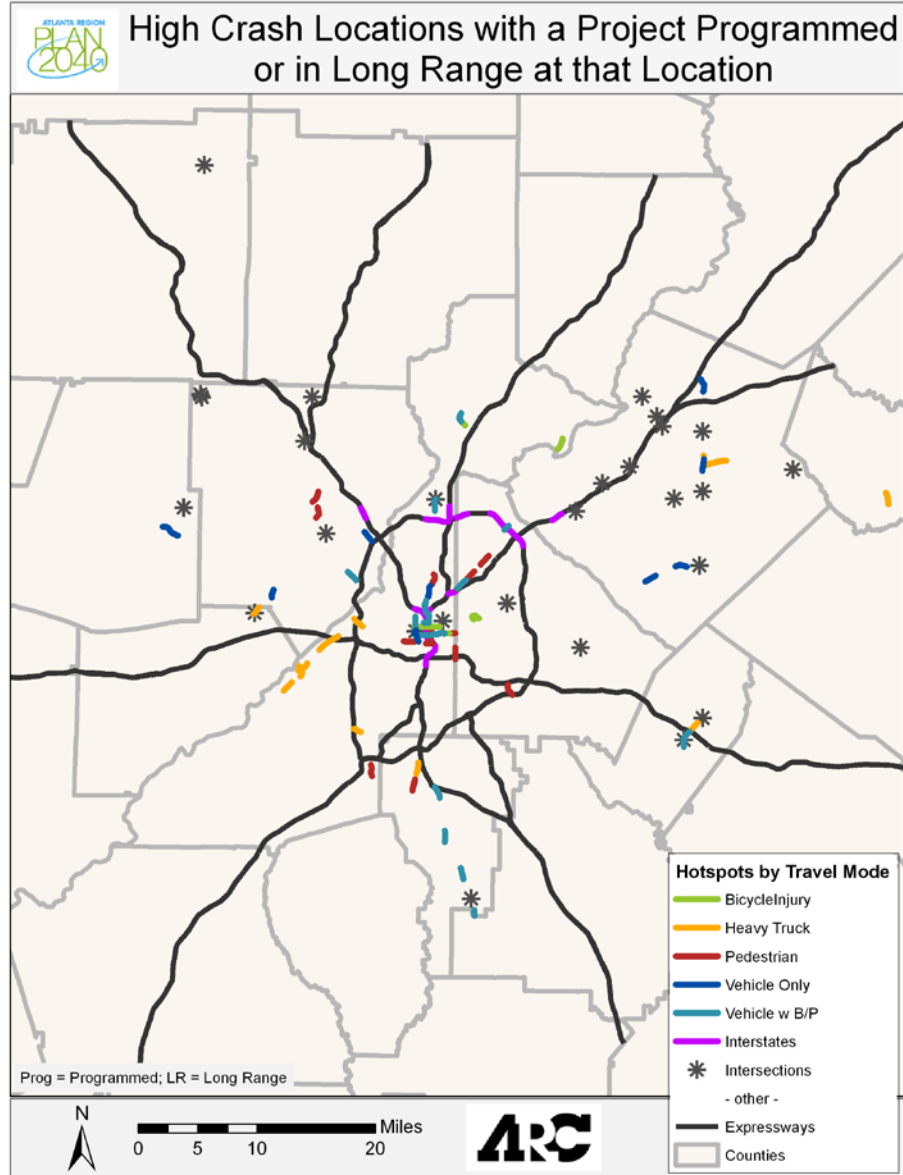
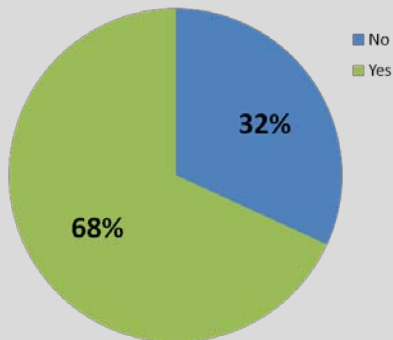
Percent of High Crash Locations with a Project Completed at that Location



Build

68% of all High Crash Locations have a project either Programmed or in Long Range at that location

Percent of High Crash Locations with a Project Programmed or in Long Range at that Location

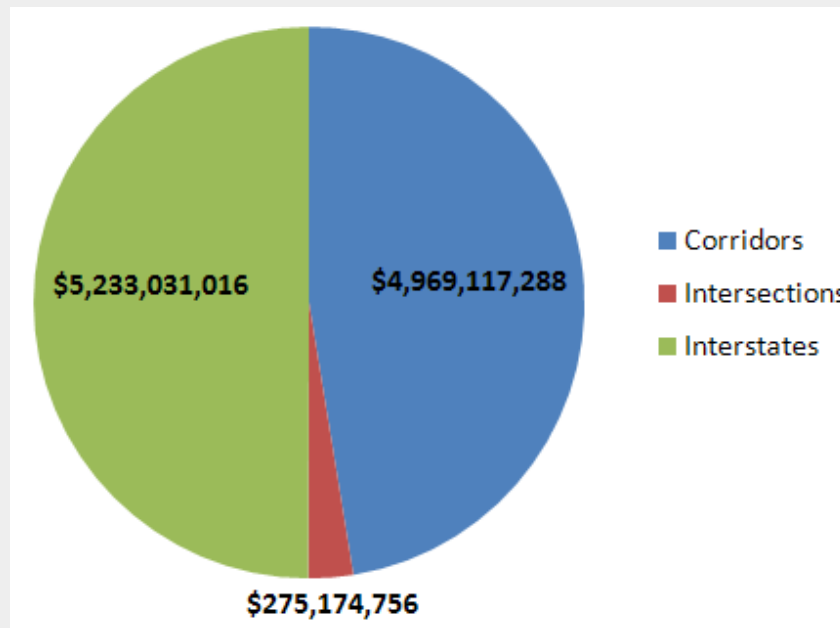


Safety Measure 2 – Monetary Investment at High Crash Locations

Total Investment at High Crash Locations: \$10.5 Billion

| | |
|----------------------|-------------------|
| <u>Corridors</u> | \$ 4,969,117,288 |
| <u>Intersections</u> | \$ 275,174,756 |
| <u>Interstates</u> | \$ 5,233,031,016 |
| <u>TOTAL</u> | \$ 10,477,323,060 |

| | |
|-------------------------------------|-------------------|
| <u>Draft PLAN 2040 Total Amount</u> | \$ 59,000,000,000 |
|-------------------------------------|-------------------|



- Note: Completed Projects do not have a cost amount associated with the projects, so cost total only includes the Constrained Plan2040 projects (i.e. programmed and long range)

Community & Environment

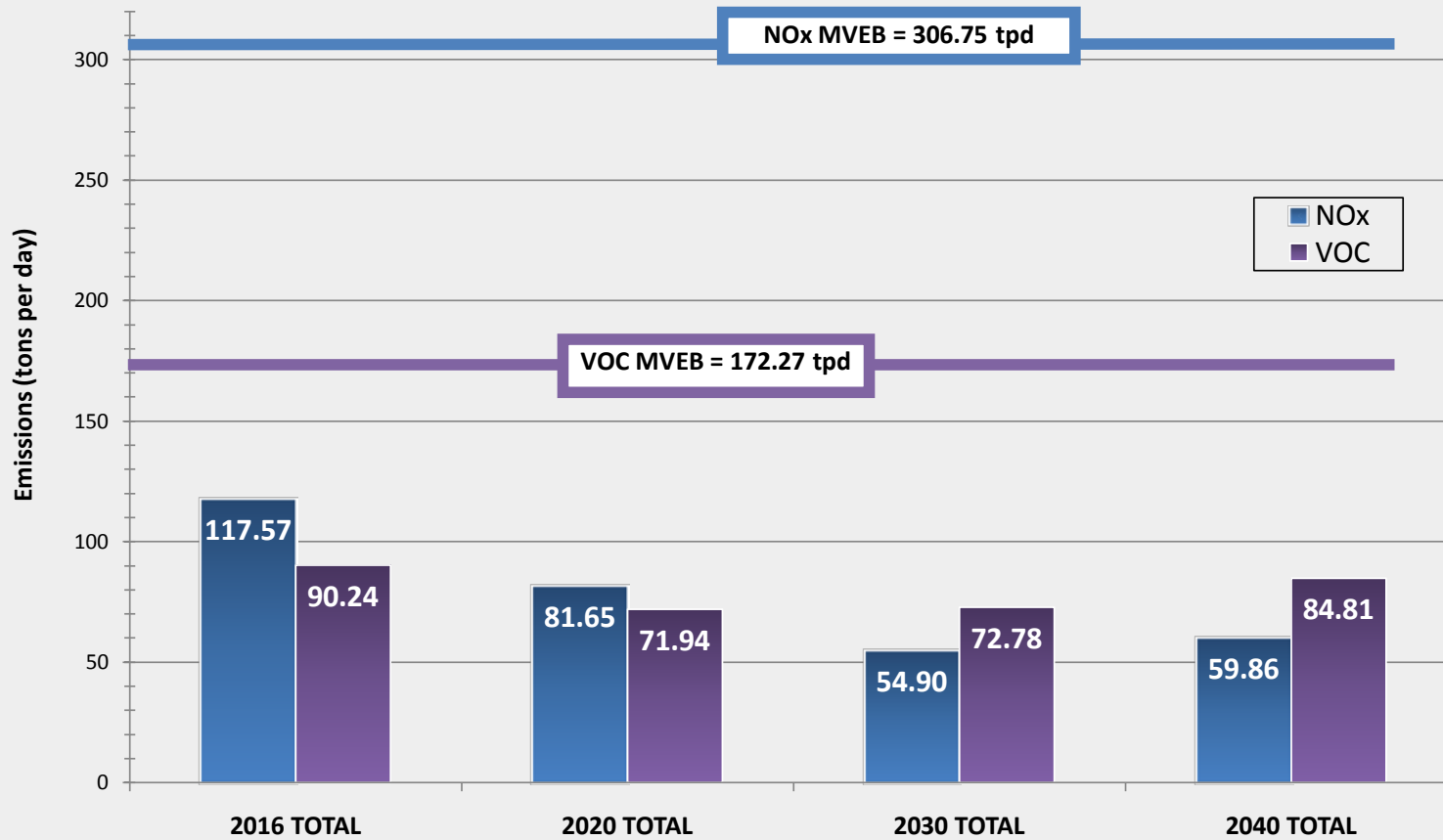
Ozone Precursors – The 20-county Atlanta area is in nonattainment for the eight-hour ozone standard. ARC performs emissions analysis to ensure compliance with the Clean Air Act's Transportation Conformity Rule. More information on transportation conformity is available in the Volume II: Conformity Determination Report. Currently, the PLAN 2040 Constrained scenario is well below the emissions budgets established in the 2007 Rate of Progress Ozone State Implementation Plan.

Direct PM_{2.5}/PM_{2.5} Precursor NO_x – In addition, the region (plus parts of two adjacent counties) are in nonattainment for the annual PM_{2.5} standard. The region is well below the established 2002 baseline emissions for PM_{2.5} and its precursor NO_x.

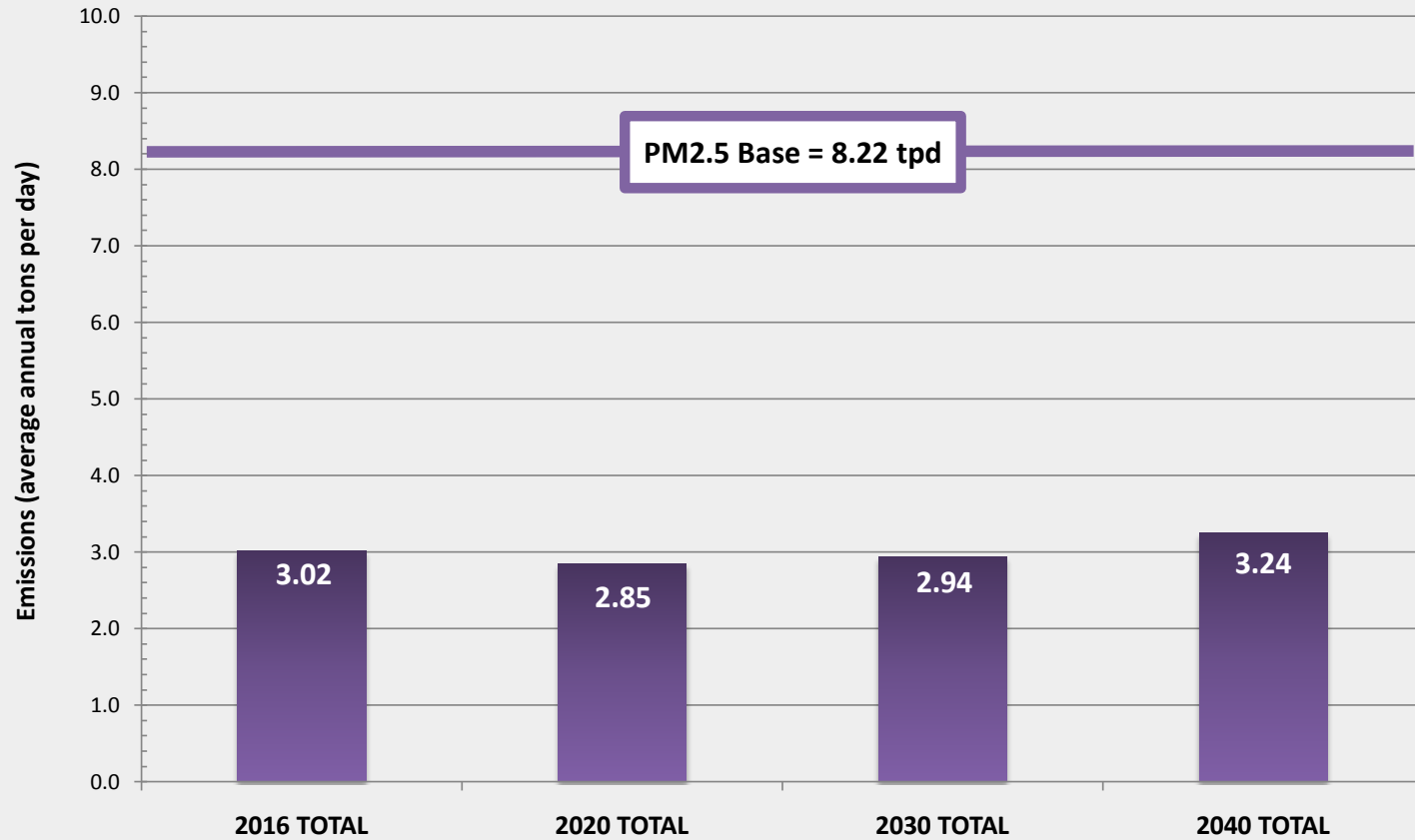
CO₂ Emissions – ARC looked at expected on-road CO₂ emissions resulting from the PLAN 2040 Constrained scenario. The graphic illustrates the upward trend in total regional emissions expected in the 20-county area. This increase is driven by the rapidly growing population. Per capita emissions are projected to decrease throughout the plan horizon. The per capita decrease is being driven primarily by projected improvements in fuel technology.

PLAN 2040 Constrained Scenario Transportation Investments in Equitable Target Areas (ETA) – The ETA index identifies areas in the Atlanta region with high concentrations of environmental justice communities. Appendix C-3 explains ETA areas in more detail. In evaluating the PLAN 2040 Constrained scenario's transportation investments in the region, it was found that investments in ETA communities exceed those in non-ETA areas by more than 34 percent.

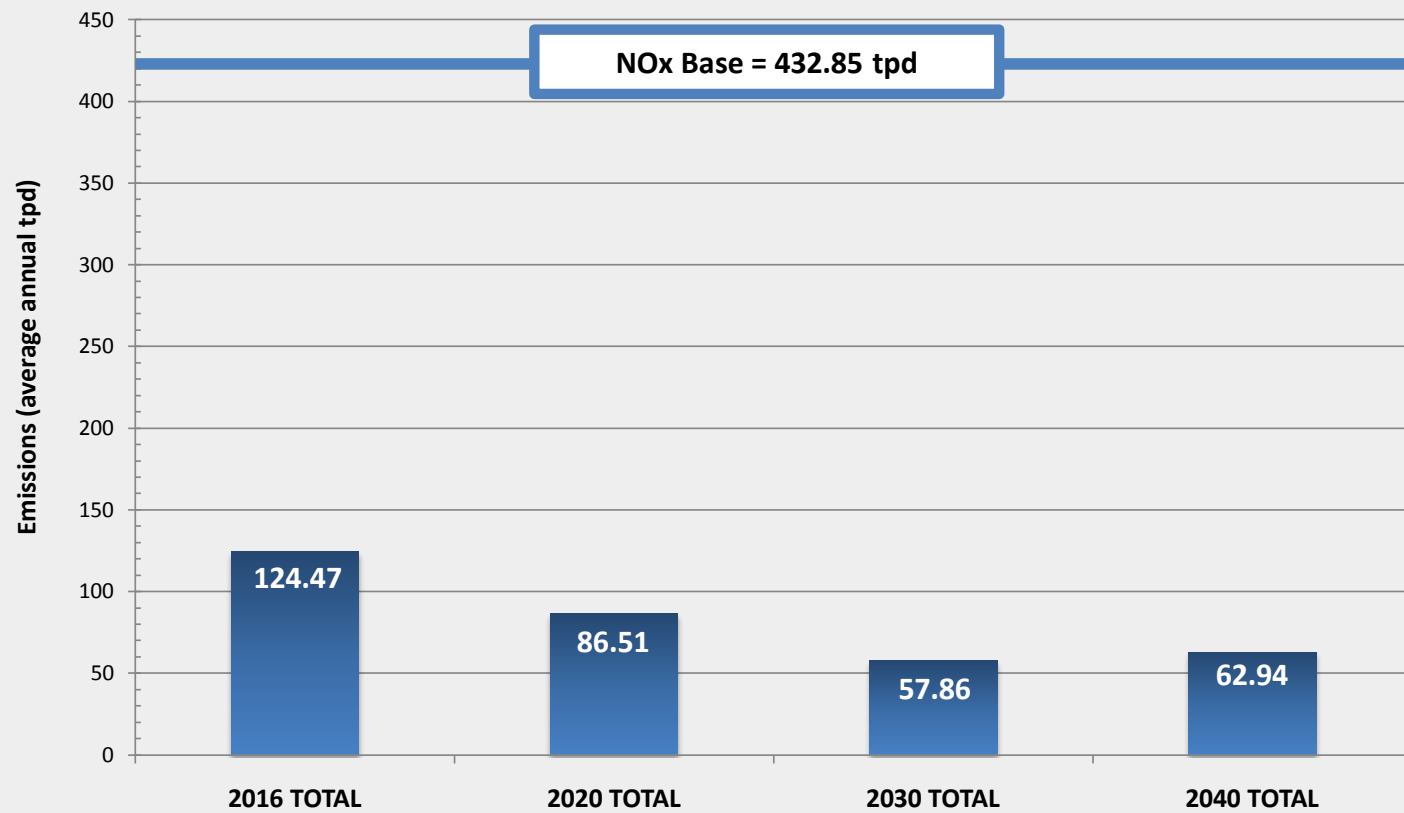
Community & Environment – Ozone Precursors



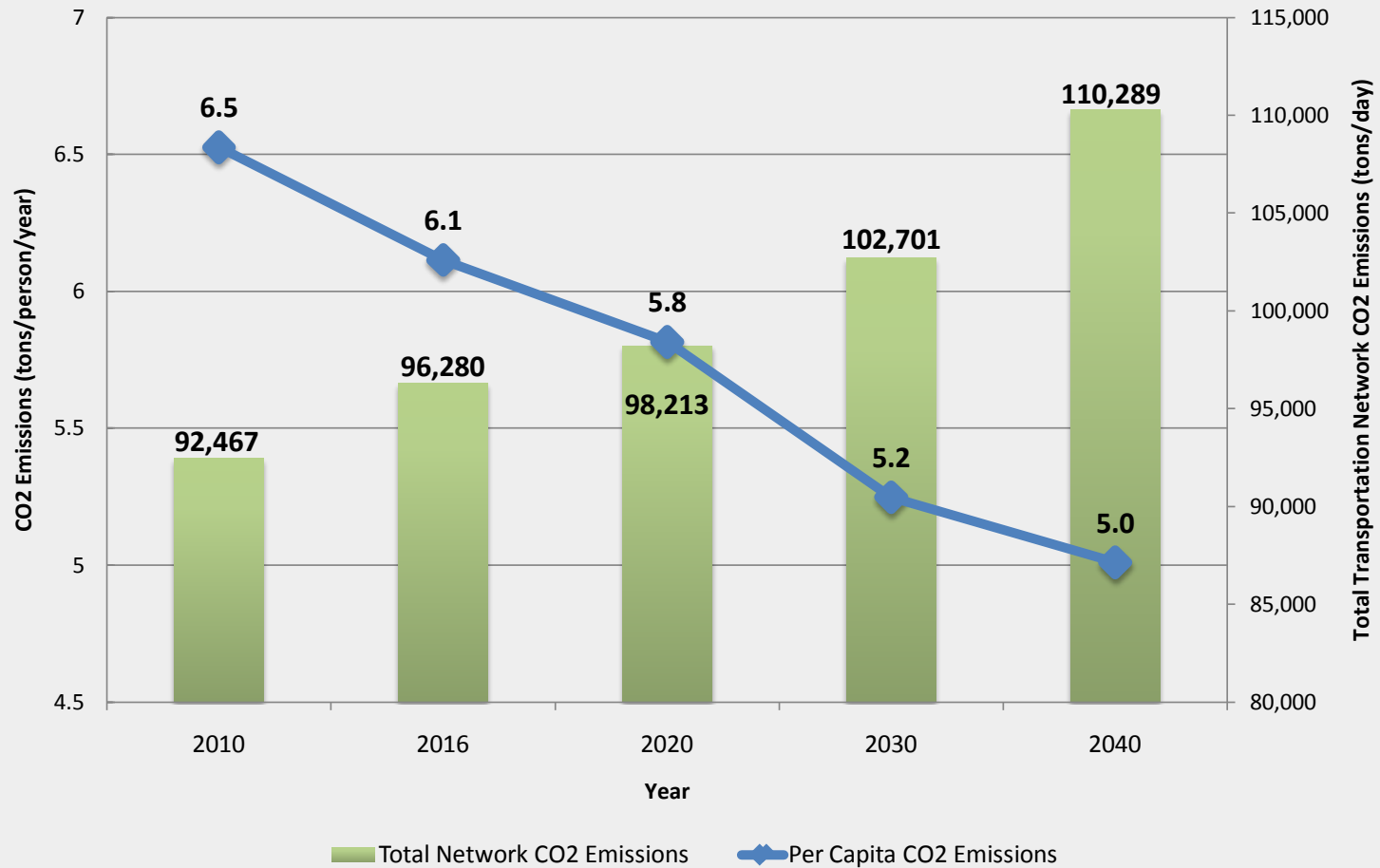
Community & Environment – Direct PM_{2.5}



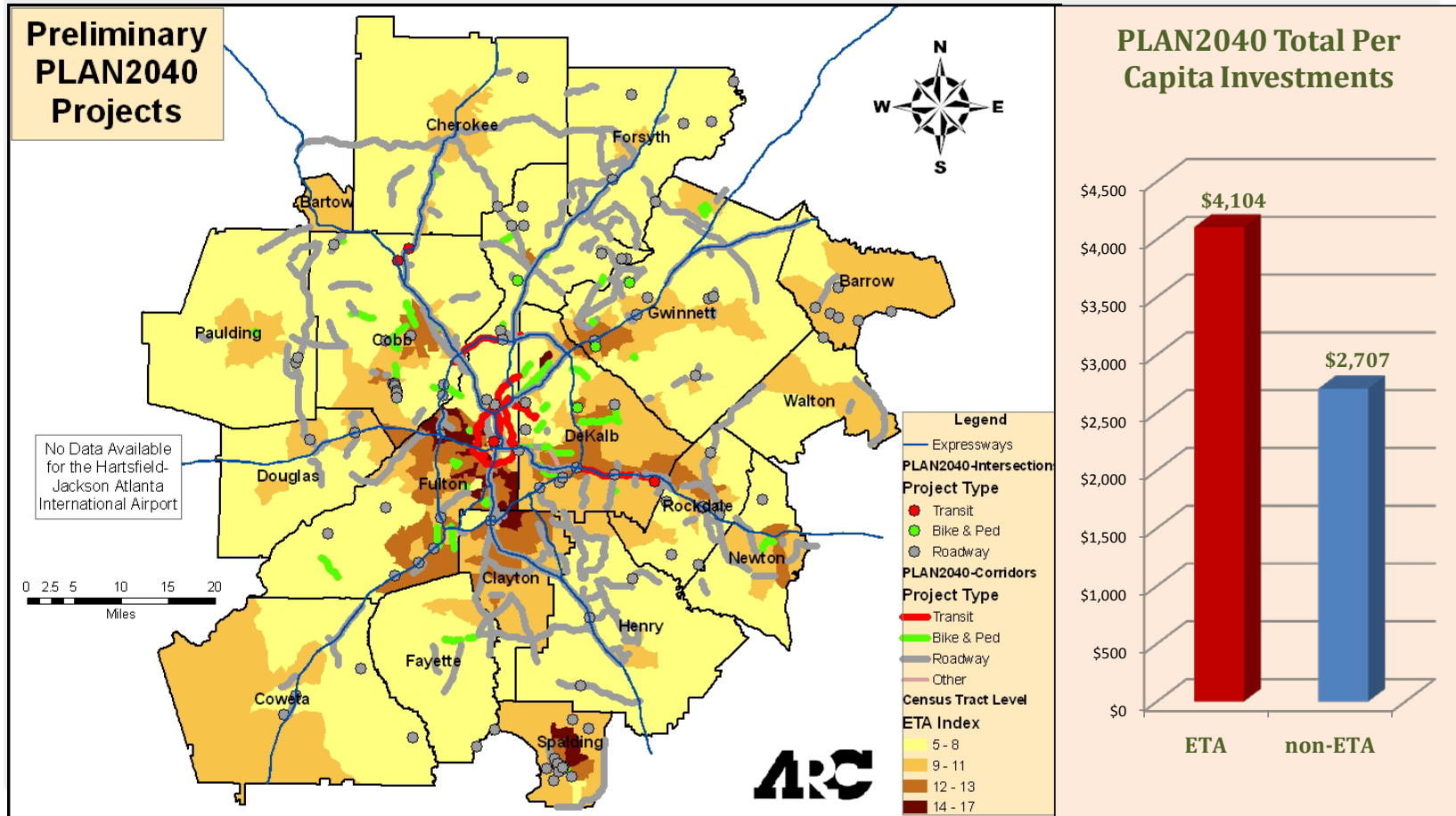
Community & Environment – PM_{2.5} Precursor NO_x



Community & Environment – CO₂ Emissions



Community & Environment – PLAN 2040 Constrained Scenario Transportation Investments in Equitable Target Areas (ETA)



Plan Level Summary Assessment

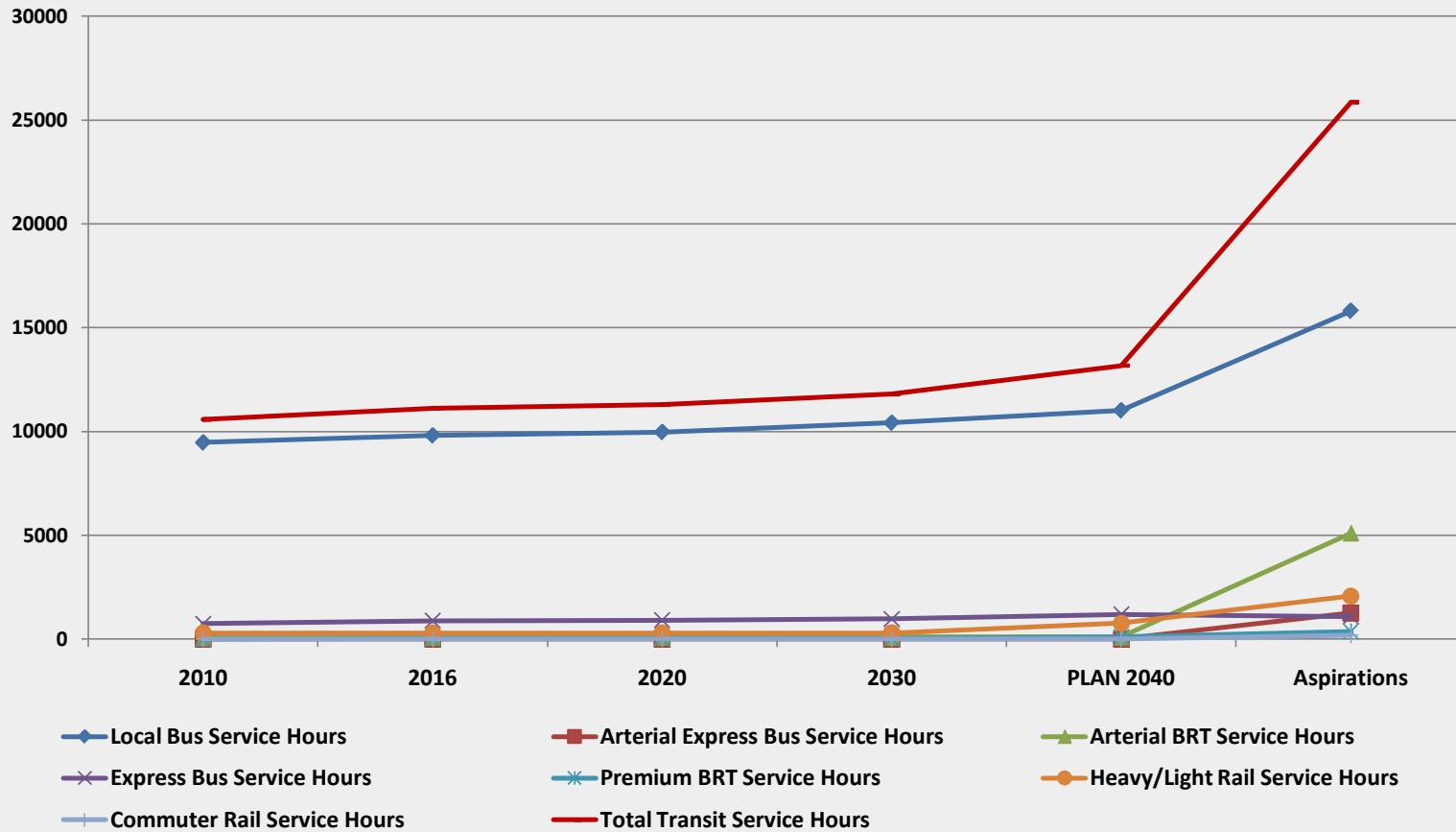
Change in Regional Transit Supply – This graphic illustrates the anticipated change in transit service hours. The scenario years correspond to modeled years in the PLAN 2040 Constrained scenario. The year 2040 result from the PLAN 2040 Aspirations scenario is also included as a benchmark. Total transit service creeps up over the years as investments are brought online, or demand dictates increased supply in the travel demand model. The PLAN 2040 Aspirations scenario sees a huge increase due to the sheer quantity of additional transit projects proposed in that scenario.

Change in Regional Roadway Supply – Similar to the increase in transit, this graphic represents the increase in roadway supply through increased lane miles. Facilities are broken out by category for comparison.

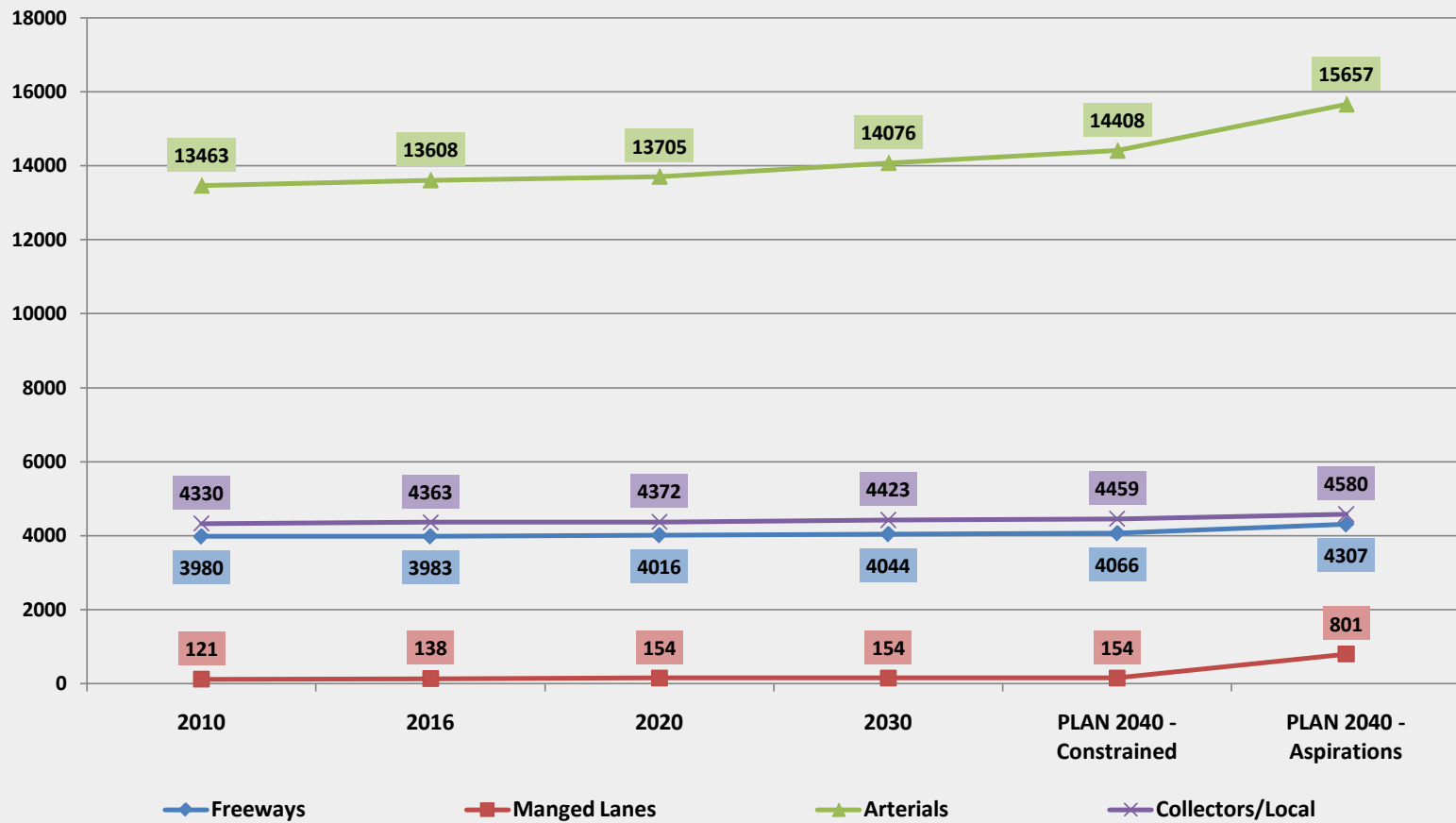
Forecasted Change in Performance – This graphic summarizes some key system level performance measures in the PLAN 2040 Constrained and Aspiration networks.

Scenario Comparison – This final slide illustrates a tool for comparing multiple scenarios visually at once. Each scenario is depicted on a diamond with a key plan level performance measure at each corner. Mobility (automobile travel time), the number of transit trips, the number of reliable trips (managed lane or premium transit trips), and the regional congestion cost are evaluated for each scenario and charted on the diamond so they can be visually compared against each other. Due to increasing population and congestion, 2010 mobility cannot be maintained in the year 2040. The PLAN 2040 Constrained and Aspiration networks seek to counter this loss in mobility by enhancing regional access to transit and reliable trips.

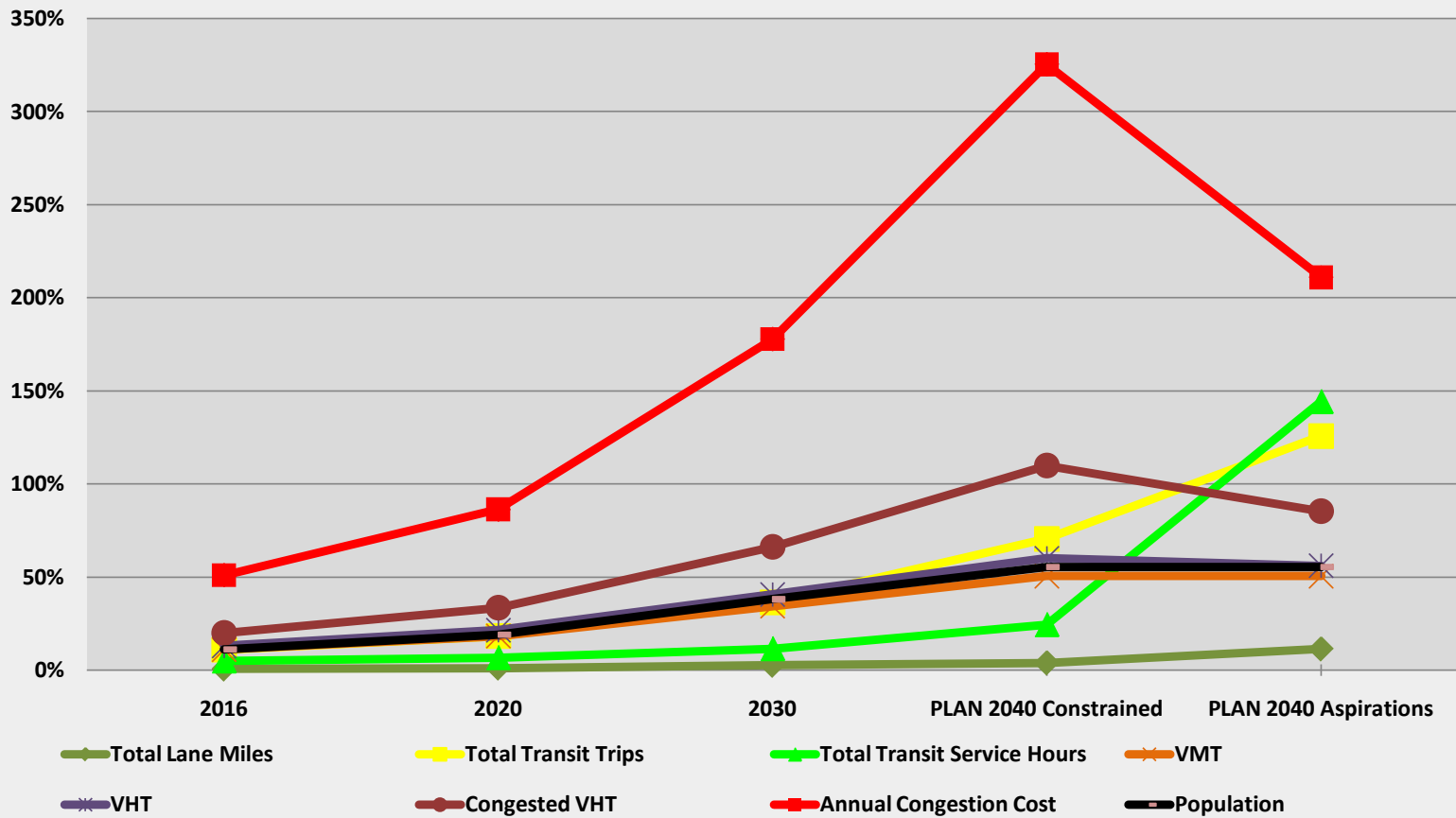
Assessment – Change in Regional Transit Supply (Service Hours)



Assessment – Change in Regional Roadway Supply (Lane-Miles)



Assessment – Forecasted Change in Performance (Region in Total)



Assessment – Scenario Comparison

