Appendix 3:
Environmental Justice Technical Analysis

Transportation Improvement Program

State Fiscal Years 2016 to 2019

morpc
Mid-Ohio Regional Planning Commission

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I. INTRODUCTION TO ENVIRONMENTAL JUSTICE

A. Definition of Environmental Justice

The U.S. EPA's Office of Environmental Justice defines environmental justice as follows:

"*The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people, including racial, ethnic, or socio-economic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies*."

B. Regulatory Framework for Environmental Justice

Recognizing that the impacts of federal programs and activities may raise questions of fairness to affected groups, President Clinton, on February 11, 1994, signed Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

Environmental justice, while not a new requirement, amplifies the provisions found in Title VI of the Civil Rights Act of 1964. Title VI of the Civil Rights Act of 1964 prohibits discriminatory practices in programs and activities receiving federal funds. The transportation planning regulations, issued in October 1993, require that metropolitan transportation planning processes be consistent with Title VI. MORPC complies with Title VI by preparing and submitting Title VI documentation reports, as directed by ODOT. MORPC also has a Title VI assurance resolution currently in force, which states that MORPC complies with Title VI and U.S. DOT-related requirements. Finally, MORPC operates a Disadvantaged Business Enterprise Program per U.S. DOT requirements and provides periodic reporting to ODOT.

The executive order also refocuses attention on the National Environmental Protection Act (NEPA), a 30-year-old law that set policy goals for the protection, maintenance, and enhancement of the environment.

Environmental justice strengthens Title VI by requiring federal agencies to make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The Ohio Department of Transportation developed DOT Order 5610.2 to address environmental justice and to respond to Executive Order 12898.

The Policy of DOT Order 5610.2 is to:

"*Promote the principles of environmental justice through the incorporation of those principles in all DOT programs, policies, and activities. This shall be done by fully considering environmental justice principles throughout planning and decision-making processes in the development of programs, policies, and activities, using the principles of the National Environmental Policy Act of 1969 (NEPA), Title VI of the Civil Rights Act of 1964, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and other DOT statutes, regulations, and guidance that address or affect infrastructure planning and decision-making; social, economic, or environmental matters; public health; and public involvement*."

C. MORPC's Approach to Environmental Justice

MORPC in its response to this very important challenge devised a process to assess the impacts of the transportation planning process, the regional transportation plan and the Transportation Improvement Program on the target populations. MORPC identified three principles to ensure environmental justice considerations were properly integrated into the transportation planning process.

- Adequate public involvement of low-income and minority populations in regional transportation decision making.
- Assess whether there were disproportionately high and adverse impacts on low-income and minority populations resulting from federal programs.
- Assure that the low-income and minority populations receive a proportionate share of benefits of federal transportation investments.

MORPC assembled an Advisory Task Force and completed an initial preliminary assessment in April 2000, which addressed each of the three principles. This initial assessment also established environmental justice (EJ) analysis as an ongoing aspect of MORPC's planning work program and that each Transportation Improvement Program (TIP) and Metropolitan Transportation Plan (MTP) update will include a quantitative environmental justice analysis. Besides the specific EJ populations (minority and low-income), MORPC has extended the quantitative analysis to Hispanic population, people with disabilities, elderly population and zero-car households, referred to as the target populations/groups altogether.

This appendix provides demographic information for the MORPC area and the results of applying the quantitative measures to the set of projects included the TIP SFY 2016-2019. The public involvement environmental justice issues are discussed in the public participation components of the TIP.

II. DEMOGRAPHICS

The population of Central Ohio is diverse. To protect people from being overlooked or taken advantage of in the course of regional transportation planning, target populations are identified to protect them from disproportional impact from transportation projects. This effort is part of the Environmental Justice process that MPO's use in preparing regional transportation plans. The target populations include minorities, Hispanics, elderly, disabled, people in poverty, and households without cars.

Demographic data were sought regarding characteristics of these target populations for the MORPC Transportation Study Area. The selected data were distributed into MORPC's Traffic Analysis Zones (TAZs). This was done so that the data could be further analyzed through the travel demand model. The analysis resulted in the identification of planning measurements that were used to identify a geographic target area of high densities of these target populations to test effects of changes to the transportation system on these populations.

A. Data Set Review

The 2009-2013 American Community Survey (ACS) from the U.S. Census contains comprehensive information detailed for pertinent data sets at low geographical levels. The 2009-2013 ACS was used to calculate Target Populations which include the Hispanic population, people in poverty, minority population, people over 65 years, disabled population, and zero-car households. These data are reported at the census tract level. An equivalency table was created between the census tracts and the MORPC Traffic Analysis Zone (TAZ) geography to transfer data from census tract to TAZ geographies. Characteristics of the Census Tract data available from the ACS were applied to 2014 estimated populations of the TAZ. Averages of regional totals for the various target populations were calculated to identify concentrations of these populations in the study area. Using the breakpoint at which areas fall above or below the average for the study area alerts planners to special areas of consideration when analyzing the effects of changes to the transportation system.

B. Target Populations

Demographic data for the target populations used in the Environmental Justice analysis were estimated for year 2014 using the methodology mentioned above. An equivalency between the census block group and MORPC Traffic Analysis Zone (TAZ) geographies was developed to report the data at TAZ level. The totals and averages for the demographic variables identified for measuring environmental justice are shown on Figures II-1 through II-6. The data are displayed in two ways on each map. They are density maps, where dots on the map represent people or households. These graphics show concentrations of the target populations. These dots are overlaid on a thematic display in which the traffic zones are

shaded based on how the characteristics of the traffic zone compare the threshold for that specific variable.

Details regarding the target populations that include minorities, Hispanics, people in poverty, the elderly, disabled and households without access to a car are described below. Table II-1 is a comparison between the percentages of these target populations in the MORPC MPO area and the entire state of Ohio.

Table II-1: Target Population Percentages in MOPRC MPO Area and State

Target Population	MORPC MPO Area	State of Ohio
Minority Population	20.7%	16.0%
Hispanic Population	3.5%	3.2%
Elderly Population	10.0%	13.8%
Population in Poverty	12.7%	15.8%
Disabled Population	10.2%	13.1%
Zero Car Households	6.9%	8.3%

Sources: 2009-2013 American Community Survey

Minority and Hispanic Populations

People considered minorities are identified in the census as people of African-American, Hispanic/Latino, Asian American, American Indian and Alaskan Native, Native Hawaiian and other Pacific Islander. People of Hispanic origin are technically an ethnic group and are themselves divided among various racial groups. The minority population in the MORPC MPO area was 20.7 percent of the total population in 2014, while the Hispanic population was 3.5 percent.

Most higher percentages of minority populations were located in the central parts of the city rather than in the outlying areas including neighborhoods in and around downtown Columbus, the Near East Side, Ohio State University, the Short North, the Linden area, Whitehall, and in the near northeast. In addition, neighborhoods around Eastland Shopping Center and in the south in the area of Groveport Road and SR 104 had much higher percentages of minority populations than the average for the study area. Neighborhoods around Polaris and Dublin have seen much growth in minority populations.

Low-Income Population

Low-income population was identified as people living below the level of poverty. The national poverty guidelines are issued annually by the Department of Health and Human Services. National poverty thresholds vary based on family size. About 12.7 percent of the population within the MORPC MPO area was living below the level of poverty in 2014. Approximately 50 percent of the people in poverty were concentrated in areas that exceeded the threshold. The highest concentration of people living in poverty was in the communities near the Columbus central business district, including the Ohio State University (OSU) area. Areas along Cleveland Avenue, West Broad Street, and East Main Street west of the City of Bexley also showed high concentrations of people living below the poverty level.

Elderly Population

The U.S. Census Bureau defines the elderly population as people 65 years and older. The distribution of seniors in our study area is evenly distributed. In 2014, the elderly population constituted 10.0 percent of the total population in the MORPC MPO area.

People with Disabilities

This analysis uses two types of disabilities recognized in the 2009-2013 American Community Survey. These include people who suffer from blindness, deafness, or a severe vision or hearing impairment (sensory disability) and/or people who suffer from a condition that substantially limits one or more basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying (physical disability). In 2014, disabled people represented approximately 10.2 percent of the population within the MORPC MPO area. People with disabilities are distributed throughout the region, although similar to minority and poverty target populations, higher concentrations occur within the I-270 outer belt and in the neighborhoods in and immediately adjacent to downtown Columbus.

Zero Car Households

Most households in the greater Columbus area have access to at least one vehicle. Approximately 6.9 percent of the households within MORPC transportation study area did not have a vehicle. Neighborhoods in the downtown and near the downtown showed higher concentrations of zero car households. The OSU campus area, as well as neighborhoods such as Linden and the Near South Side also showed high concentrations of zero car households.

C. Distribution of Target Populations

Figure II-1: Distribution of Minority Population by TAZ (2014)

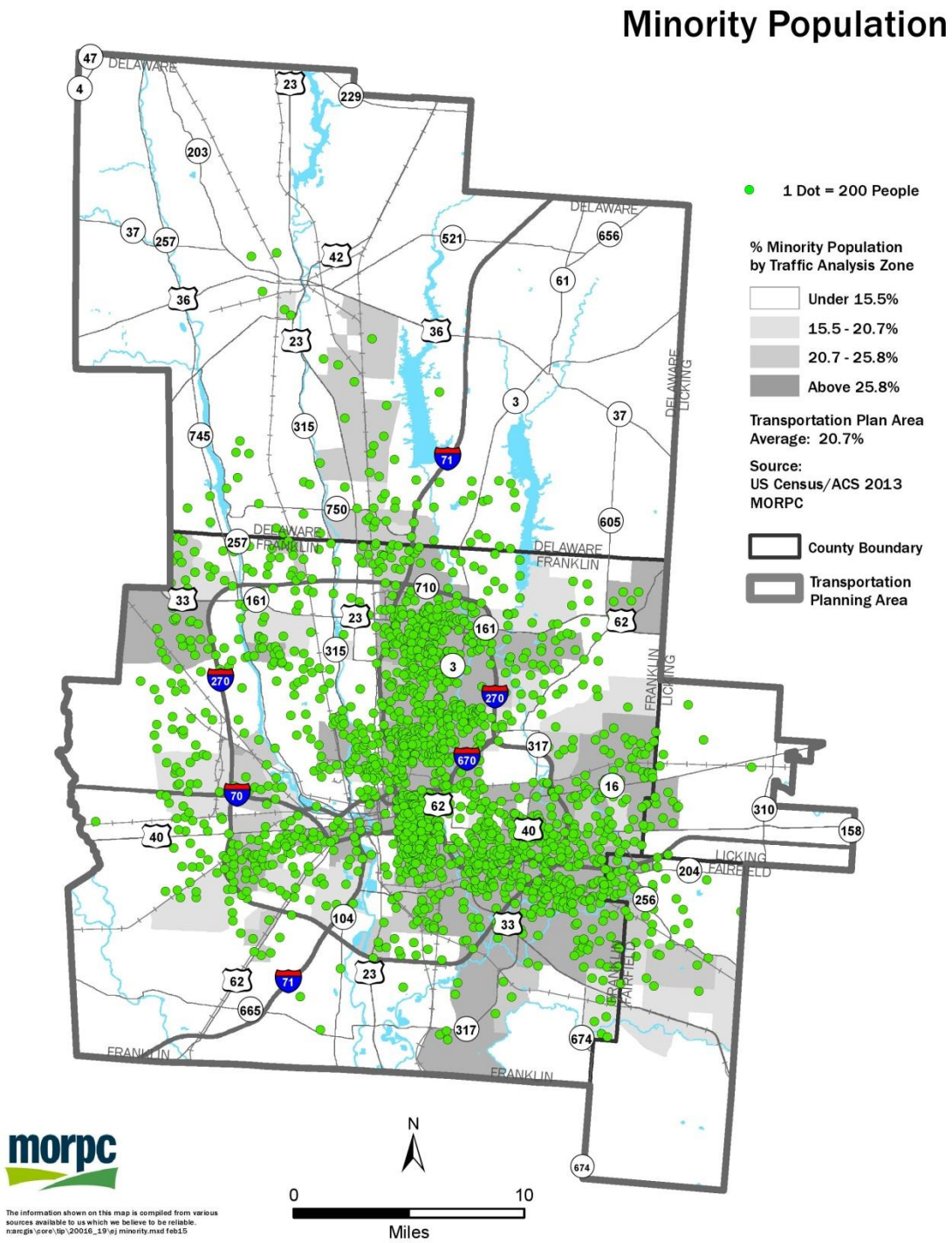


Figure II-2: Distribution of Hispanic Population by TAZ (2014)

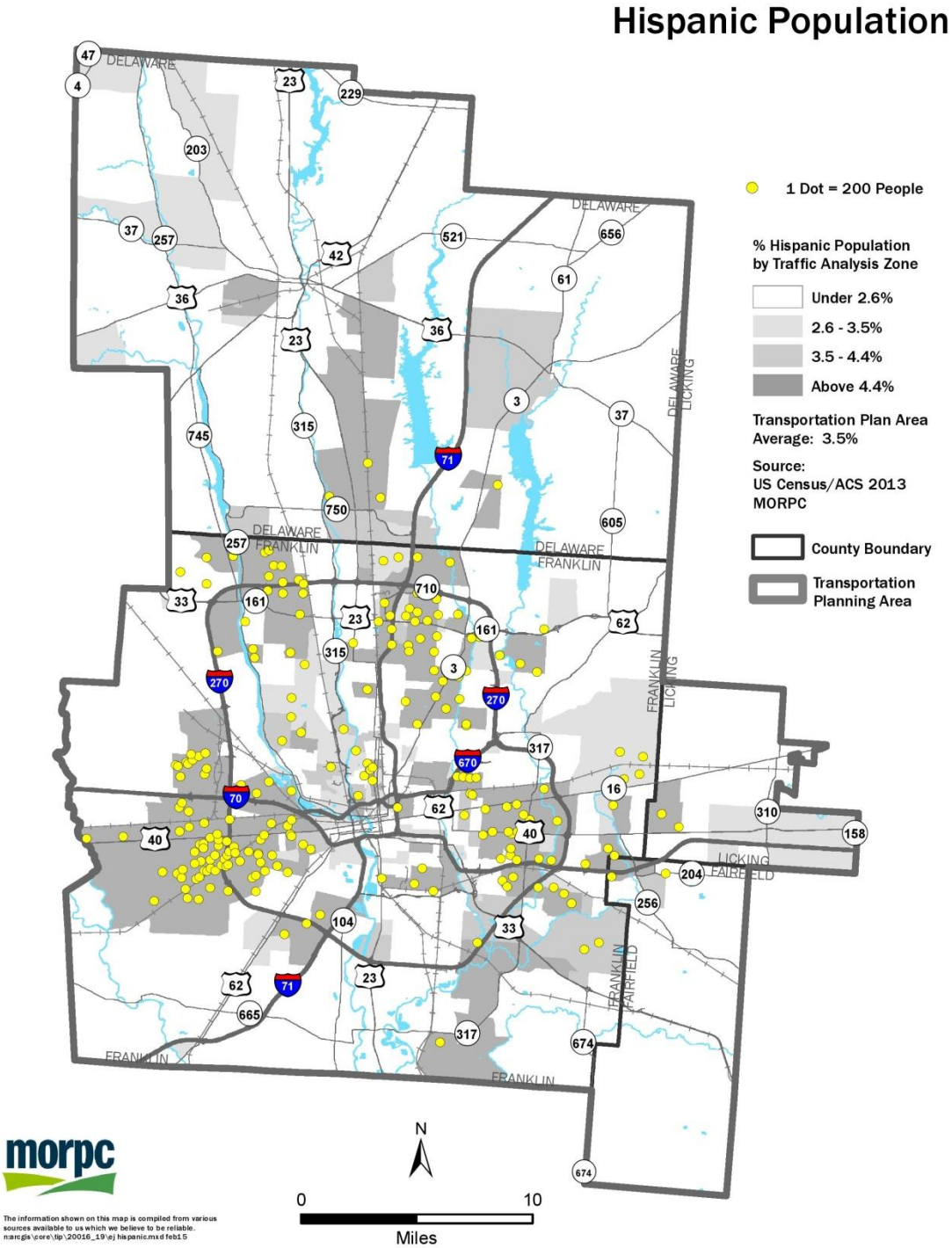


Figure II-3: Distribution of Population in Poverty by TAZ (2014)

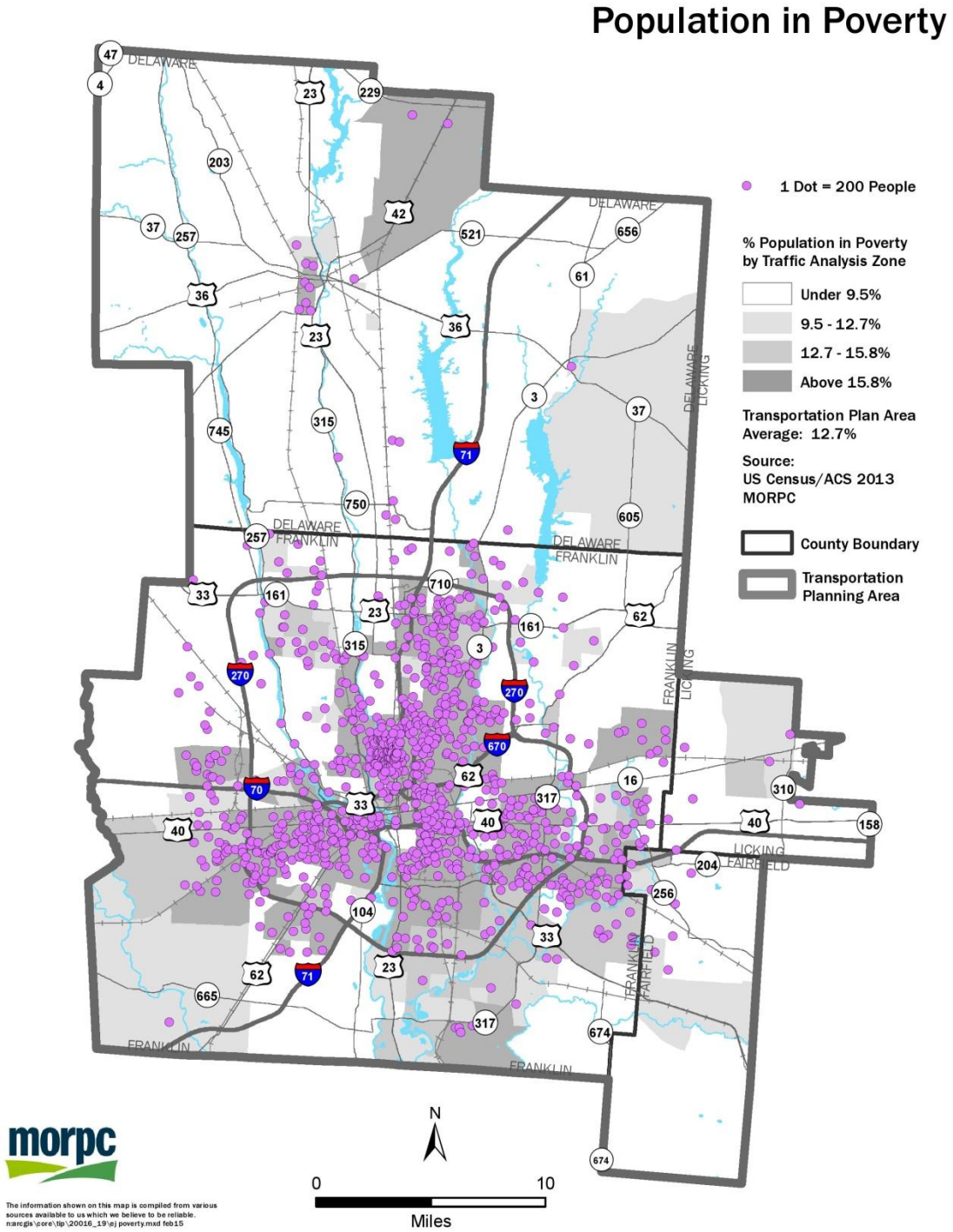


Figure II-4: Distribution of Population Older than 65 Years by TAZ (2014)

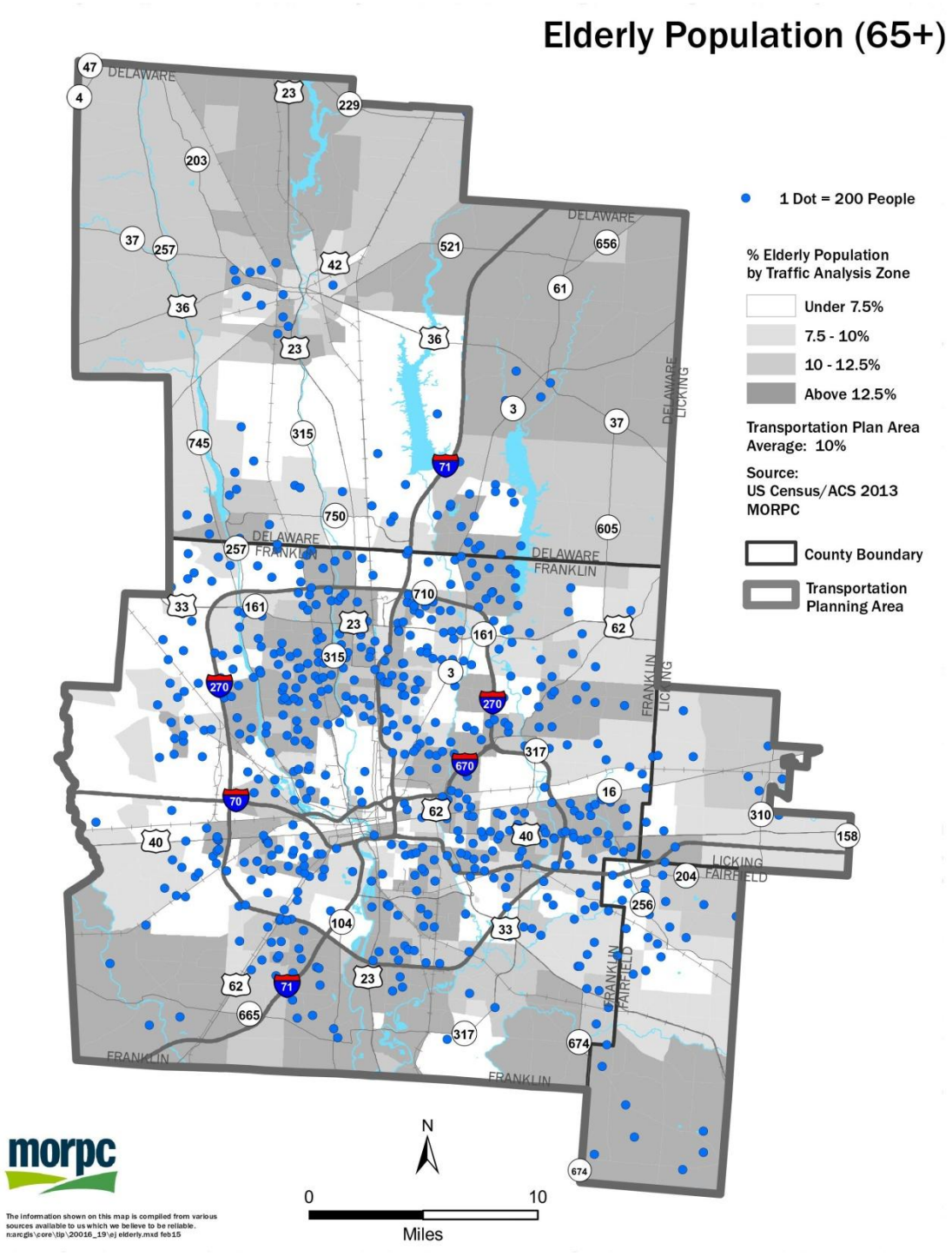


Figure II-5: Distribution of Population with Disabilities by TAZ (2014)

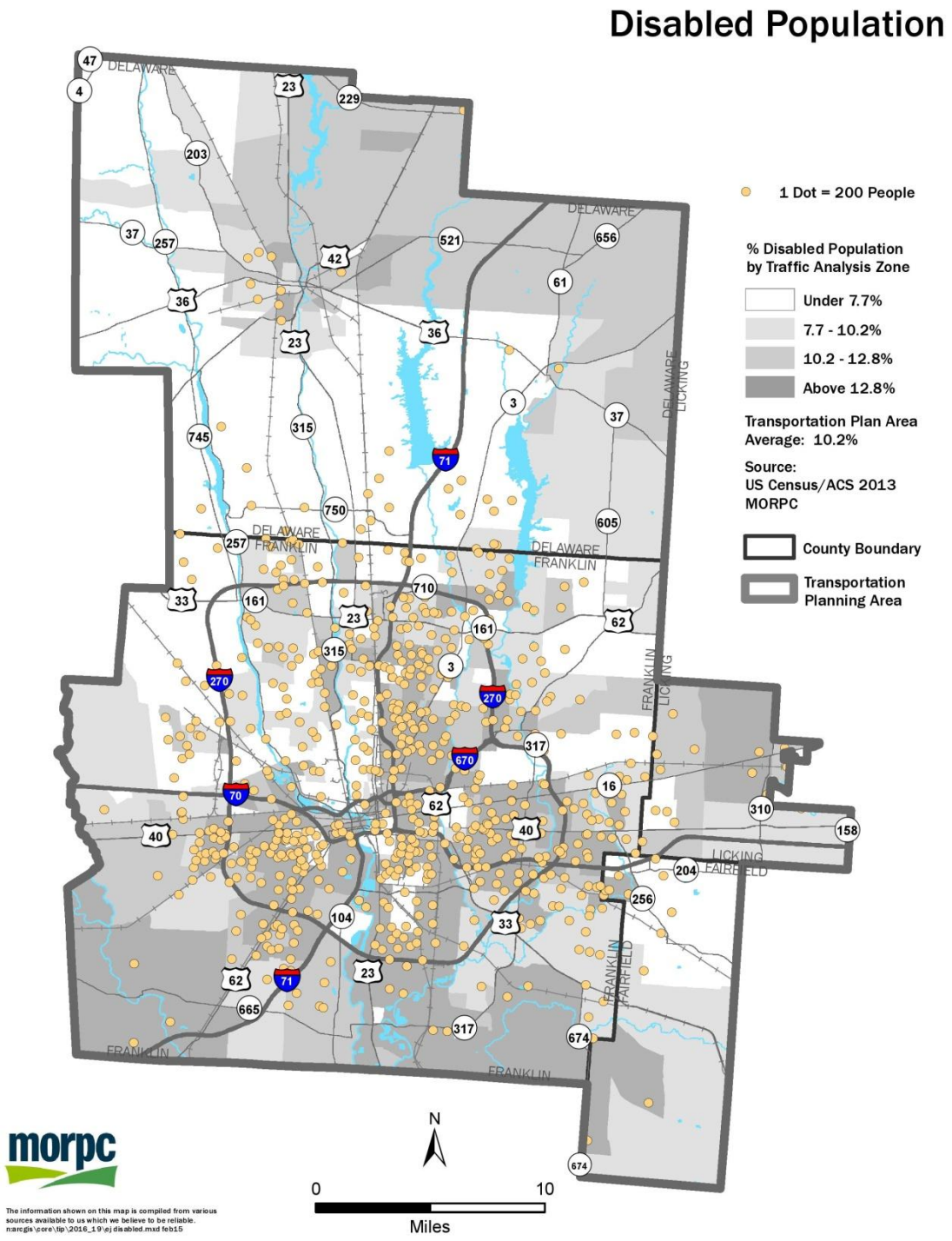
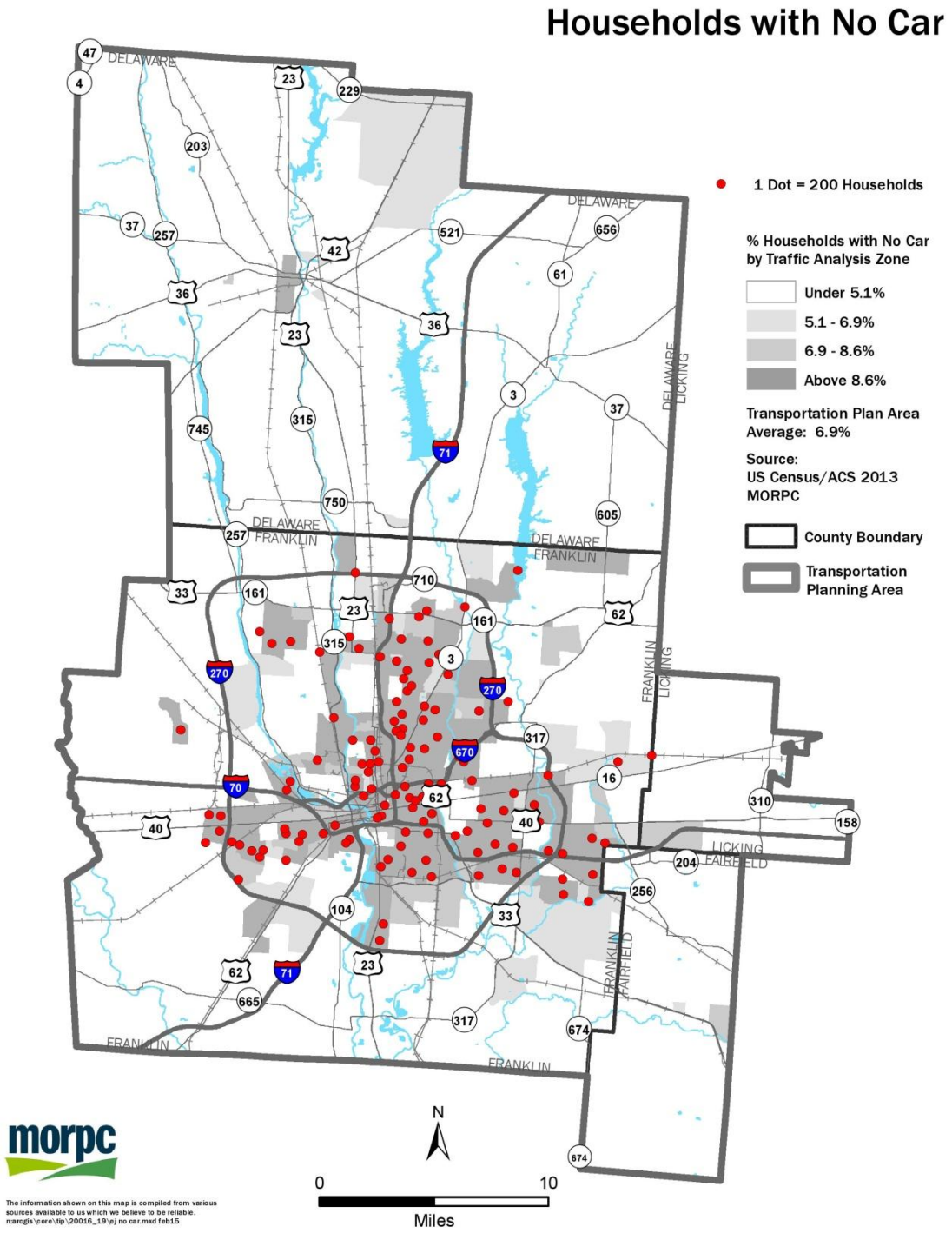


Figure II-6: Distribution of Households with No Cars by TAZ (2014)



III. QUANTITATIVE MEASURES METHODOLOGY

This section describes the environmental justice measures MORPC has identified and applied to the set of projects in the TIP. These measures should provide some information on whether or not the transportation investments being made in the region are having disproportionate adverse impacts on the target populations and if the benefits from these investments are equitably distributed.

A. Identification of Measures

In order to identify if there are any disproportionate negative impacts on the target populations, measures are needed. Measures compare the relative treatment of the target populations and non-target populations in the planning process and the TIP. They are not intended to measure how the implementers carry out the plan.

Characteristics of Measures:

- Should be meaningful
- Should be able to be applied or determined
- May be quantifiable or qualitative
- May be applied to compare targeted areas to other areas or to compare target populations to the other populations throughout the region
- Some may be mode specific (they are either unavailable for some modes or have little meaning)

B. Measures considered

While developing the list of possible measures it seemed that there were different types of measure data that could be developed. The types of measure data are:

- Population based
- Geographic based
- Visual

Population-based measures best address the environmental justice definition in that they provide information on the target population regardless of where they are located. Population-based measures take into consideration small pockets of target populations within non-target populations.

Geographic-based measures, on the other hand, provide information specific to a geographic area. Some information such as congested vehicle miles of travel can only be reported for an identified geographic area. The data reported within these areas are applicable to all of the populations that reside in the particular area. Thus, for an environmental justice analysis identification of the geographic area(s) of interest is very important. The geographic area(s) should have higher than average percentages of the target population and in total account for a large majority of the target population.

The goal of the population- and geographic-based measures is to be able to provide a series of numbers that can be compared to determine if there are environmental justice concerns. There are, however, some data that just can't be boiled down to a number for comparison. These can be classified as visual data. The visual data are usually in the form of maps.

It is not possible to identify one measure that will determine if there are environmental justice issues. However, it is necessary to look at a variety of measures that provide information on different issues. Likewise some measures may only be applicable for autos while others may be transit measures.

Some measures are accessibility measures while others reflect estimated travel. For example, the number of jobs within 20 minutes is a measure of accessibility to jobs. However, average work trip length is based on the estimated pattern of trip making. Estimates of congested vehicle miles of travel are another example of a travel measure.

Some measures could be either an accessibility measure or a travel measure depending on how they are calculated. For example, average travel time to CBD, if based on the estimated pattern of trip making, would be a travel measure. However, if it were calculated based on the average as if everyone made a trip to the downtown, it would be an accessibility measure.

C. Measurements Identified for Application

During the preliminary environmental justice completed in 2000, various measures were identified as appropriate environmental justice measures. Based on the data and methodologies available now, the measures were narrowed down for application in the EJ analysis, which will be described in more details in the next section. Over time additional measures may be developed depending on the available data and methodology.

D. Measurement Methodology

All of the measures described in this section were developed from MORPC's tour-based travel demand forecasting model process. The travel demand forecasting process takes basic land use and transportation system information and estimates travel patterns and volumes on the transportation system.

The tour based model needs land uses and socioeconomic data aggregated at traffic analysis zones (TAZs). There are 1,424 TAZs in MORPC's transportation planning area. From this information the number of trips generated by each TAZ is estimated. In the travel demand modeling chain, the model micro-simulates daily trips at the tour-level for each individual household. A tour is a closed chain of trips starting and ending at the same base location rather than elemental trips. Each tour has a primary destination and possible intermediate stops. These tours for each person are then aggregated into the trips by modes at the TAZ level. Then trips made in a vehicle are "assigned" to the highway network taking into account the characteristics of the highway network. Similarly, trips made by transit are assigned to the transit network. The results provide estimates of the daily number of vehicles or passengers on the network facilities.

MORPC currently compiles comprehensive land use sets every five years. The most current set is for 2014. In addition, MORPC reviews local land use plans, regional population

projections and other information to create future horizon year estimates of the data. Our horizon year is 2035.

For most measures, data for three different scenarios are presented. The first represents the 2014 conditions. The next two represent projected 2035 conditions under two transportation system assumptions. The first scenario is the No-Build condition that means no other projects are completed except for those currently in construction today. The other scenario assumes all of the projects in the TIP are constructed.

The following describes measures in more detail and the methodology used to develop the value of the various measures. Section IV presents the results of the measures.

Estimating 2035 Target and Non-Target Populations by Zone

In order to create the population-based measures, it is necessary to estimate the target and non-target population within each TAZ. However, in the land use variables for 2035 only total population by TAZ is developed. The most recent data are from the 2009-2013 American Community Survey. Thus, it was necessary to develop a procedure to estimate 2035 target populations by zone.

In estimating the target populations by traffic zone, it was assumed that the total regional percentage for each population would be the same percentage as the 2014 percentage. For example, the regional percentage in poverty in 2014 was 13.9 percent. Thus, for the forecasted 2035 populations, it was assumed that the regional poverty percentage would remain at 13.9 percent.

In the model, a complete population is synthesized by sampling from the PUMS (Public User Micro Sample) data for the horizon year. By linking the synthesized population to the PUMS data, the target population percentage in each zone can be derived for the current and horizon year. By using these percentages as a starting point, adjustments were made to zones throughout the region in order to achieve the same regional percentage as in 2014. The adjusted population was spread throughout the region based on this starting distribution of the particular target population. For example, assume 10,000 additional poverty population is needed for the horizon year 2035 to achieve the same 13.9 percent as in 2014. If, in the starting 2035 distribution, one TAZ had 1 percent of the total poverty population, an additional 100 (=10,000*.01) poverty persons were added to the zone. Likewise, a zone with 0.1 percent of the total poverty population received an additional 10 (=10,000*0.001) poverty persons. During this process, it was ensured that total target population did not exceed the total population of each zone.

Average Number of Job Opportunities Close

This measure estimates the average number of jobs there are within a specified travel time. The number of jobs by TAZ is one of MORPC's standard variables. First, the model was used to estimate peak period auto travel times and peak and off-peak transit travel times from each TAZ to every other TAZ. This is commonly referred to as a travel-time skim. Next, for each TAZ based on the skim, the total number of jobs within 20 minutes by auto and 40 minutes by transit were calculated. Finally, a weighted average of the number of jobs was calculated based on the number of each population group within each TAZ.

Average Number of Shopping Opportunities

This measure estimates the average number of shopping attractions there are within a specified travel time. Shopping attractions is an item that is estimated through the modeling process. As stated previously, in the new model, the base travel unit of modeling is tour that is a closed chain of trips starting and ending at the same base location rather than elemental trips. Each tour has a primary destination and possible intermediate stops. For a shopping tour, one attraction is added to the primary destination while one attraction would be added to any intermediate stop if there is an intermediate stop. Therefore, the shopping attractions are not a measure of the number of stores, but a measure of how many trips these stores attract on a typical day. This measure is developed in the same manner as job opportunities. Auto and transit travel-time skims were first developed, the total number of attractions within various travel times was calculated and a weighted average of the number of attractions was calculated based on the number of each population group within each TAZ. A 20-minute auto travel time and a 40-minute transit travel time were selected as the thresholds.

Average Number of Non-Shopping Opportunities

This measure estimates the average number of non-shopping attractions there are within a specified travel time. These attractions are for quality-of-life trips such as doctor's appointments, going to the bank and other non-shopping errands from home (namely, the purposes of the tours are other maintenance, discretionary and eating out in the model). Once again this is an item that is estimated through the modeling process and it is not a measure of the number of places, but a measure of how many trips these places attract on a typical day. This measure is developed in the same manner as shopping opportunities. Auto and transit travel-time skims were first developed, the total number of attractions within various travel times was calculated and a weighted average of the number of attractions was calculated based on the number of each population group within each TAZ. A 20-minute auto travel time and a 40-minute transit travel time were selected as the thresholds.

Percent of Population Close to a College

This measure estimates the percentage of population groups that are within a specified time to the closest college. A travel-time threshold of 20 minutes for auto and 40 minutes for transit was selected to match the thresholds used for job opportunities. The following colleges were used: Ohio State, Columbus State, Capital, Columbus College of Art & Design, Otterbein, DeVry Institute of Technology, Franklin, Mount Carmel College of Nursing, and Ohio Dominican. The measure was developed by using the travel-time skims to identify the travel time from every zone to each college. The minimum time was then determined and the population for each group was summed for all the zones that were less than 20 minutes for auto and 40 minutes for transit.

Percent of Population Close to a Hospital

This measure estimates the percentage of population groups that are within a specified time to the closest hospital. A travel-time threshold of 20 minutes for auto and 40 minutes for transit was selected to match the thresholds used for other home-based opportunities. The following hospitals were used in the analysis for all scenarios: Grady Memorial Hospital, Dublin Methodist Hospital, Mount Carmel St. Ann's Hospital, Mount Carmel New Albany

Surgical Hospital, Riverside Methodist Hospital, the Woods at Parkside Hospital, Ohio State University Hospital, Select Specialty Hospital - Columbus, Doctors Hospital, Mount Carmel West Hospital, Grant Medical Center, Ohio State University Hospital East, Nationwide Children's Hospital, Mount Carmel East Hospital, Regency Hospital, OhioHealth Westerville Medical Campus, Mount Carmel Grove City Medical Center (opened in 2014), and Ohio Health Medical Campus at Hill Road (opened in 2014). Hospitals were chosen not for the purposes of transport to emergency rooms, but because hospitals usually have complexes of medical offices in their vicinity. The original task force suggested using the various outpatient clinics and other small medical facilities, but these are too numerous and cannot be predicted into the future.

The measure was developed in the same manner as percent of population close to colleges. Travel-time skims were used to identify the travel time from every zone to each hospital. The minimum time was then determined and the population for each group was summed for all the zones that were less than 20 minutes for auto and 40 minutes for transit.

Percent of Population Close to a Major Retail Destination

This measure estimates the percentage of population groups that are within a specified time to the closest major retail destination. A travel-time threshold of 10 minutes for auto and 20 minutes for transit was selected to match the thresholds used for shopping opportunities. The following major retail destinations were used in the analysis: Polaris Fashion Place area, Tuttle Crossing Mall area, Easton Square area, Sawmill & SR 161 area, North Pointe Plaza area, Carriage Place area, Graceland area, Columbus Square area, Stone Ridge Plaza area, Westpointe Plaza area, Consumer Square west area, Lennox Town Center area, Eastland Mall area, Chantry Square area, and Taylor Square area.

The measure was developed in the same manner as percent of population close to colleges. Travel-time skims were done to identify the travel time from every zone to each major retail destination. The minimum time was then determined and the population for each group was summed for all the zones that were less than 20 minutes for auto and 40 minutes for transit.

Average Travel Time for Mandatory (Work, University and School) Purposes

Through the modeling process, different tour purposes are defined. One of these is mandatory tours, with purposes as Work, University and School. The previous measures discussed were accessibility measures. This measure, however, is a travel estimate measure. Average travel time is based on the model's estimated tour-making pattern for 2014 and 2035.

To compute this measure, first the different-period travel-time skims are matched up with each mandatory-tour record simulated in the model according to the starting and ending time of the tour. The travel time of the tour is calculated by summing up the travel time over all trips in the tour (the closed chain of trips). Because this time is total round trip time, it is divided by two to get the average time between one's home and their work, university or school destination. Then, the average travel time for mandatory purposes originating from each zone is computed. Finally, the weighted average mandatory-purpose travel time by population group was calculated.

It should be noted that when estimating the average travel time for each mode it is calculated as if all of the tours were to be made by the particular mode. This makes it a crossover between an accessibility measure and a travel measure. Although the actual origin and destinations are predicted, exact population groups using the different modes is unknown. Thus, when calculating the measure for a particular mode, the weighted average is based on the proportion to the target and non-target population in the origin zone and that of all the tours originating from the zone are made by the particular mode. However, not all the tours can be made by the transit, so the tours that cannot be made by the transit were ignored when calculating the measure for transit.

Average Travel Time for Shopping Purposes

As in the case for average mandatory-purpose travel time, average travel time for shopping purposes is based on the model estimation of tour-making patterns for 2014 and 2035 and is a travel estimate measure.

This measure is calculated in the same manner as is average travel time for mandatory purposes. First, the different-period travel-time skims are matched up with each shopping-tour record simulated in the model according to the starting and ending time of the tour. The travel time of the tour is calculated by summing up the travel time over all trips in the tour (the closed chain of trips). Because this time is total round trip time, it is divided by two to get the average time between one's home and their shopping destination. Then, the average travel time for shopping-purposes originating from each zone is computed. Finally, the weighted average shopping-purpose travel time by population group was calculated.

Average Travel Time for Other Purposes

There are still other tours that are not either shopping or work related. These include going to the doctor, bank, restaurant, recreation and other errands. They are grouped together and defined as other tours (namely, the purposes of the tours are other maintenance, discretionary and eating out in the model). As in the case for the previous travel time averages, average travel time for other purposes is based on the model estimation of tour-making patterns for 2014 and 2035 and is a travel estimate measure.

This measure is calculated in the same manner as is average travel time for mandatory purposes. First, the different-period travel-time skims are matched up with each other-tour record simulated in the model according to the starting and ending time of the tour. The travel time of the tour is calculated by summing up the travel time over all trips in the tour (the closed chain of trips). Because this time is total round trip time, it is divided by two to get the average time between one's home and their other destination. Then, the average travel time for other-purposes originating from each zone is computed. Finally, the weighted average other-purposes travel time by population group was calculated.

Average Travel Time for All Purposes

Another measure is the average travel time for all purposes. This measure estimates the average travel time for all purposes simulated in the model. The measure is calculated in the same manner as were the three previous measures.

Average Travel Time to Columbus CBD

The average travel time to the Columbus CBD is a measure of the accessibility to the downtown. It is determined by using the travel-time skims and determining the time from each zone to the statehouse in the downtown. A weighted average for each population group was then calculated based on the population in each zone. For transit average travel time to the CBD, only the zones that have walk access to transit are included in the average.

Transit Accessibility to Columbus CBD

This measure determines the percentage of each population group that has access to the CBD by transit because the entire region does not have transit service. This measure is determined by identifying zones that have walk access to transit service. Then the population within these zones for each group is summed and the percentage of the total population for the group calculated.

Congested Vehicle Miles of Travel during Peak Hours

This measure is a geographic measure. Before preparing this measure it is necessary to define a geographic target area. The geographic target area should constitute a large portion of the target population groups, have higher than average percentages of target population groups, and be defined in such a way that it is whole with smooth boundaries. The area defined will be discussed in the application section.

This measure estimates the percentage of travel in the target and non-target areas that are either moderately or highly congested during the peak hours that includes both AM and PM peak periods.

Transportation Investments

This is also a geographic measure. The location of projects that have been included in the TIP was compared to the geographic target areas and the total dollar amount of these highway investments calculated.

Displacements from Highway Projects

The projects on MORPC's TIP have been submitted for inclusion by ODOT, local agencies, or municipalities. In general, ODOT or the local community has reviewed a transportation project prior to the project's submission to MORPC. Therefore, it is somewhat unlikely that a project that has a high amount of displacement would be submitted for inclusion on the TIP without significant public involvement and analysis. As the projects proceed through the environmental process, the number of displacements will be determined and any environmental justice issues will be addressed at that time.

IV. ANALYSIS AND RESULTS

This section presents the results of applying the measures to the three scenarios, year 2014, year 2035 No-Build and year 2035 TIP. Much of the data are presented through charts with the data tables included in Attachment A.

A. Average Number of Job Opportunities Close

Figures IV-1 through IV-3 show the target populations on average have access to more jobs than do non-target populations by either auto or transit. Also, when compared to the 2035 No-Build, the TIP provides access to more jobs by auto and the gains appear to be relatively uniform across all of the population groups. When compared to the 2035 No-Build, the TIP provides access to more jobs by both peak and off-peak period transit travel and the gains appear to be relatively uniform across all of the population groups. This increase by transit travel is mainly due to the service changes proposed in the COTA 2014 Traffic System Review, and partially due to the highway improvements included in the TIP. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-1

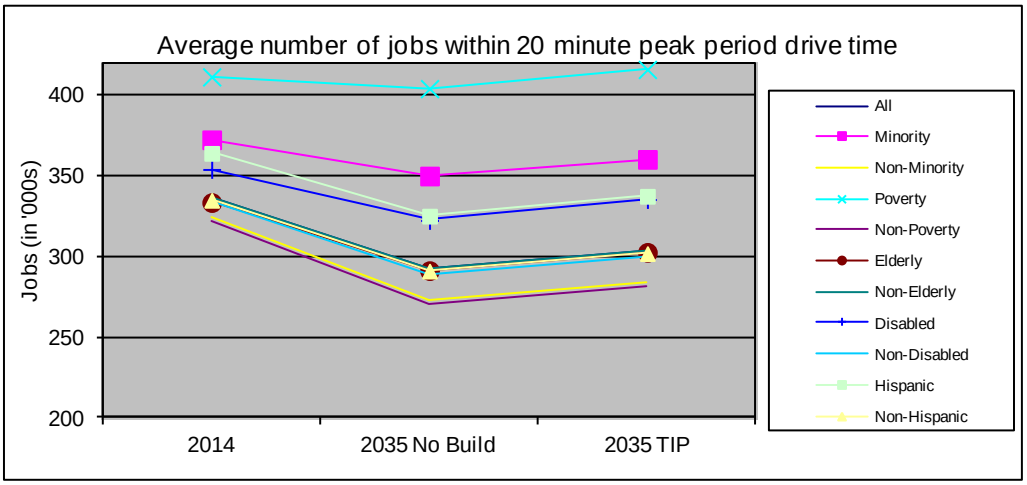


Figure IV-2

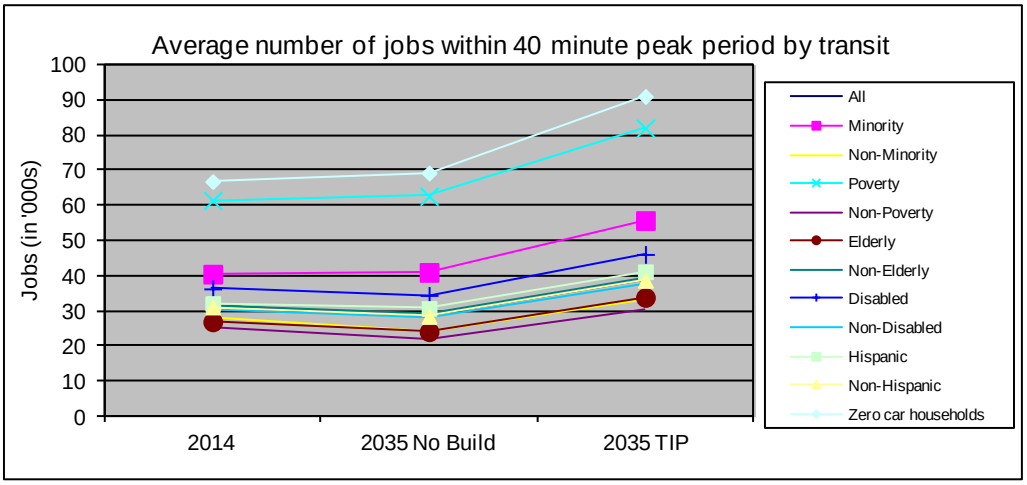
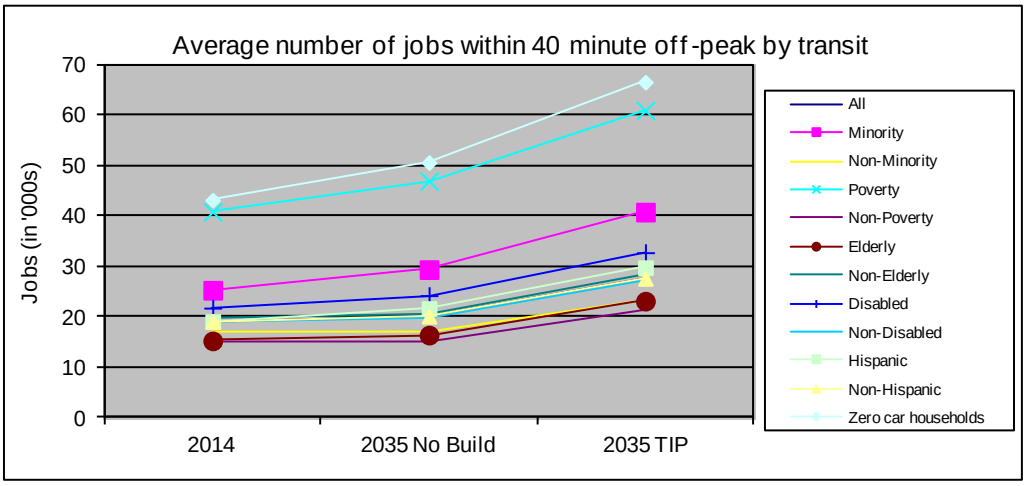


Figure IV-3



B. Average Number of Shopping Opportunities

Figures IV-4 through IV-6 show that the target populations on average have access to more shopping opportunities than do non-target populations by either auto or transit. Also, when compared to the 2035 No-Build, the TIP provides access to more shopping opportunities by auto and the gains appear to be relatively uniform across all of the population groups. When compared to the 2035 No-Build, the TIP provides access to more shopping opportunities by both peak and off-peak period transit travel and the gains appear to be relatively uniform across all of the groups. This increase by transit travel is mainly due to the service changes proposed in the COTA 2014 Traffic System Review, and partially due to the highway improvements included in the TIP. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-4

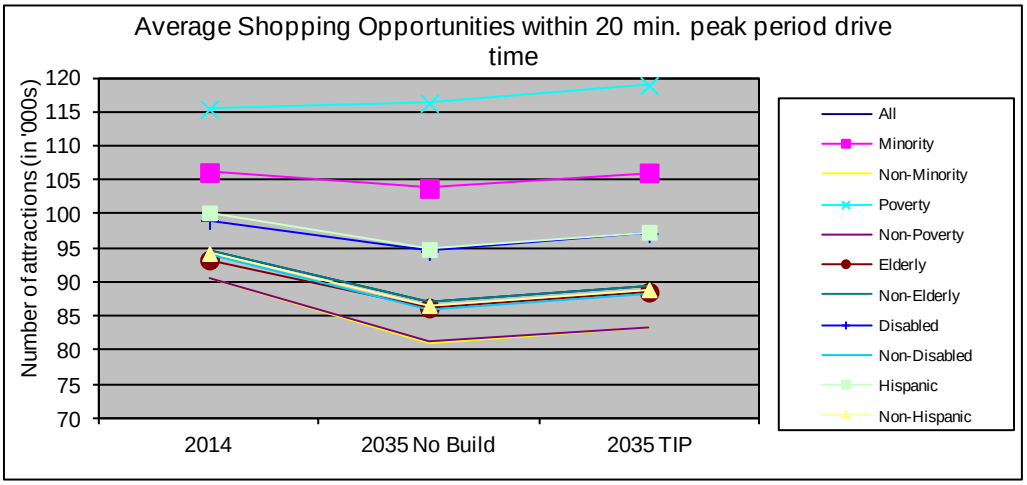


Figure IV-5

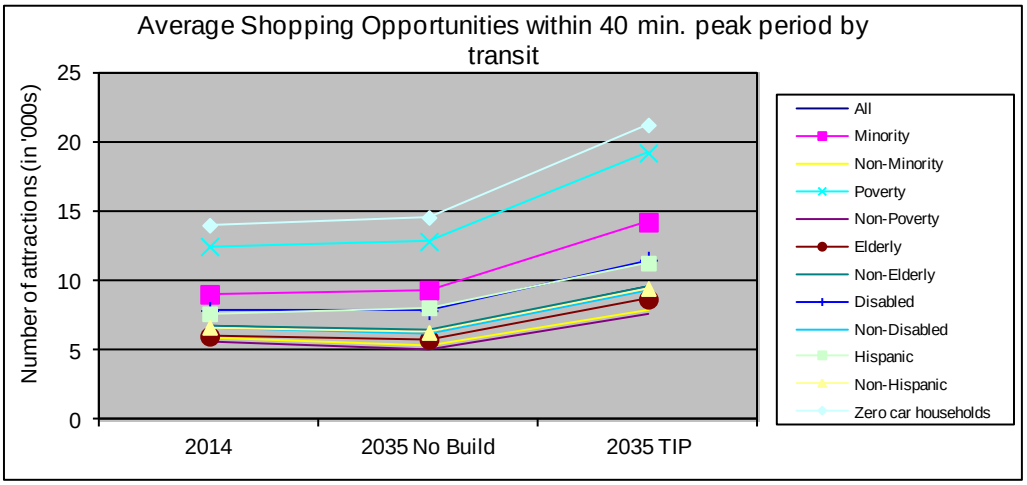
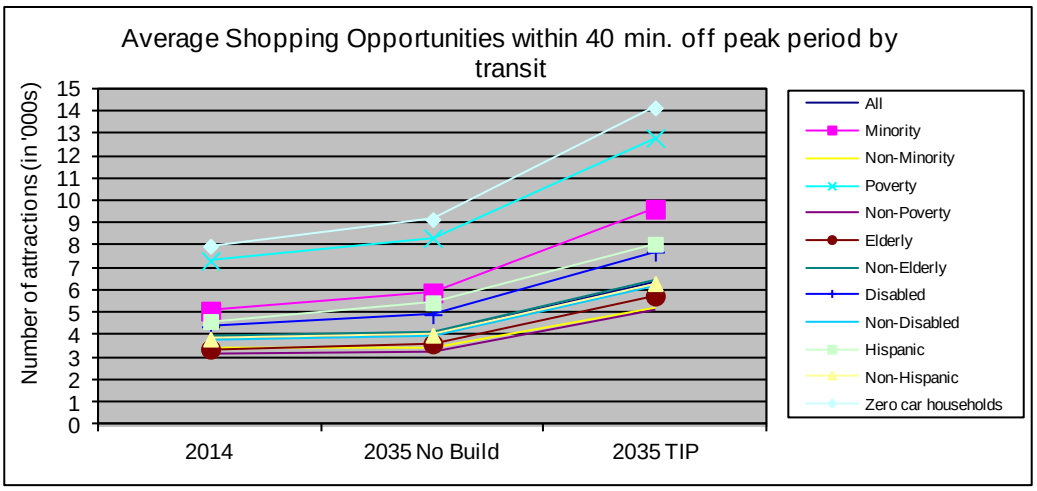


Figure IV-6



C. Average Number of Non-Shopping Opportunities

Figures IV-7 through IV-9 show that the target populations on average have access to more opportunities for non-shopping trips than the non-target populations. Also, when compared to the 2035 No-Build, the TIP provides access to more opportunities by auto and the gains appear to be relatively uniform across all of the population groups. When compared to the 2035 No-Build, the TIP provides access to more opportunities by both peak and off-peak period transit travel and the gains appear to be relatively uniform across all of the groups. This increase by transit travel is mainly due to the service changes proposed in the COTA 2014 Traffic System Review, and partially due to the highway improvements included in the TIP. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-7

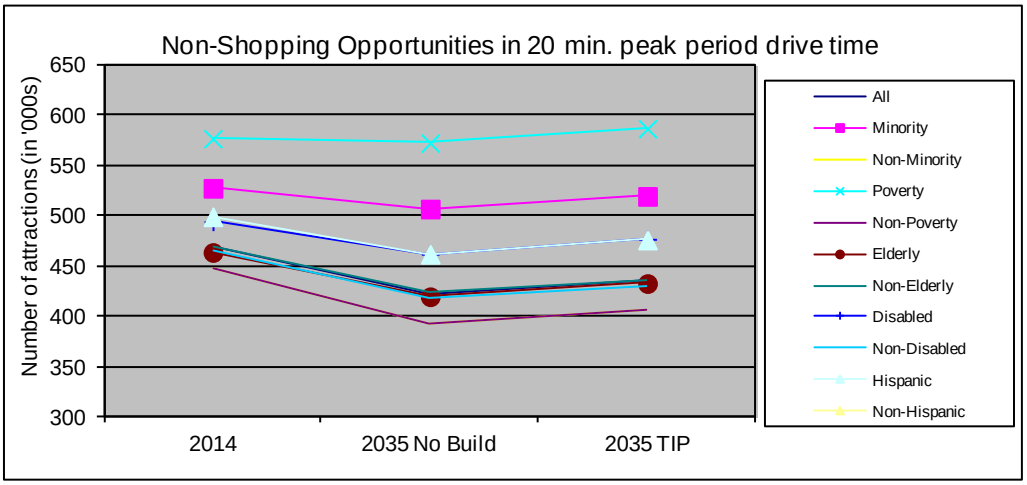


Figure IV-8

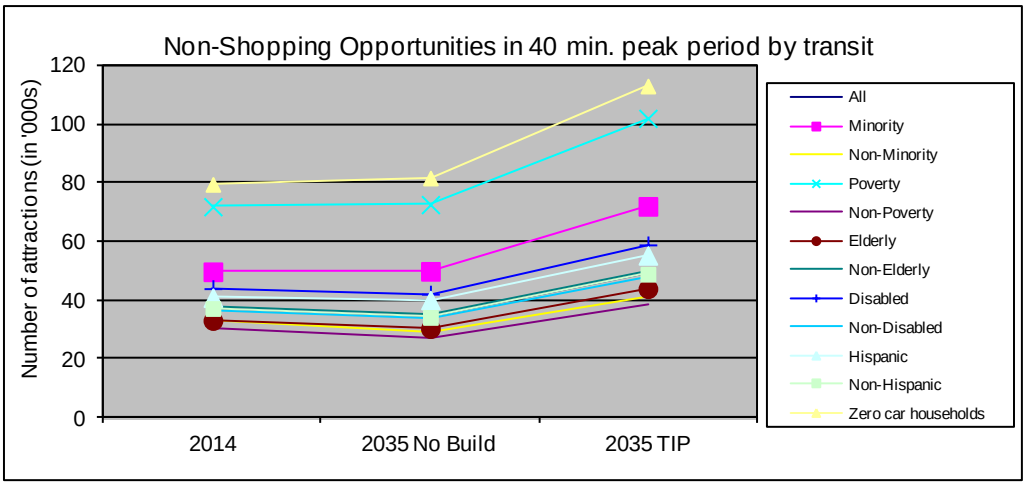
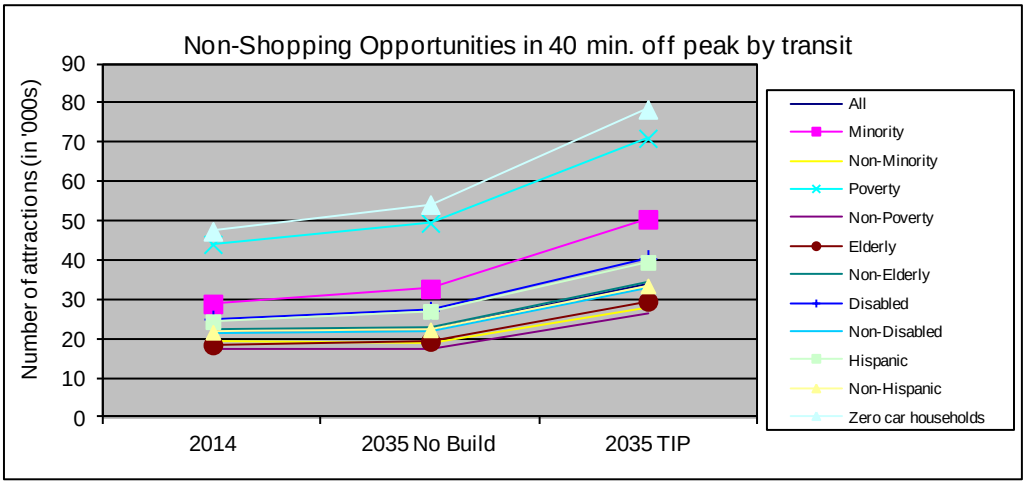


Figure IV-9



D. Percent of Population Close to a College

Figures IV-10 through IV-12 show higher percentages of target populations are within 20 minutes of auto drive time or 40 minutes of transit time to a college than are non-target populations. When compared to the 2035 No-Build, the TIP provides a same or higher percentage of populations within 20 minutes' auto drive time to a college and the gains appear to be relatively uniform across all the population groups. When compared to the 2035 No-Build, the TIP provides a same or higher percentage of populations within 40 minutes' both peak and off-peak transit travel time to a college and the gains appear to be relatively uniform across all of the population groups, except Minority population. This is because the COTA 2014 Traffic System Review is focusing on reducing low performing bus lines and discontinuing loops for better use of capital resource and certain riders may be sacrificed. With regard to this measure it still appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-10

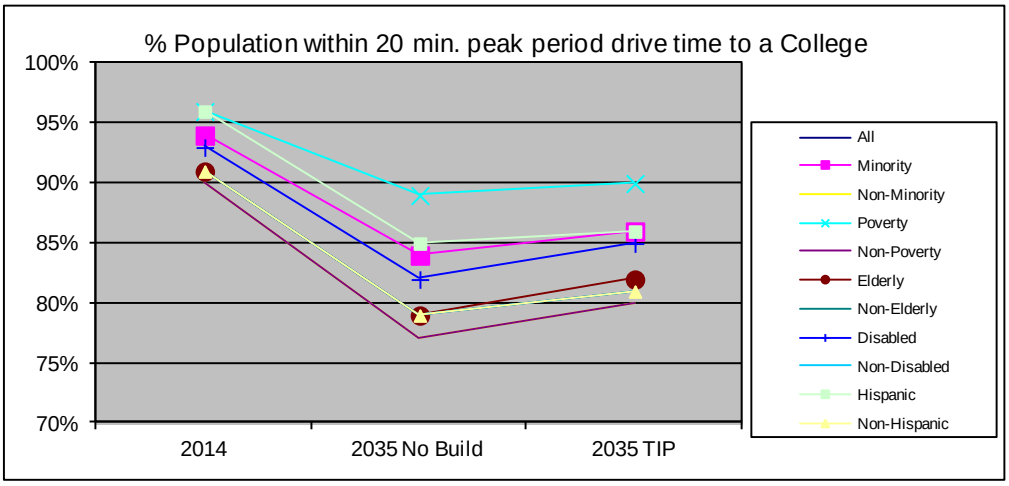


Figure IV-11

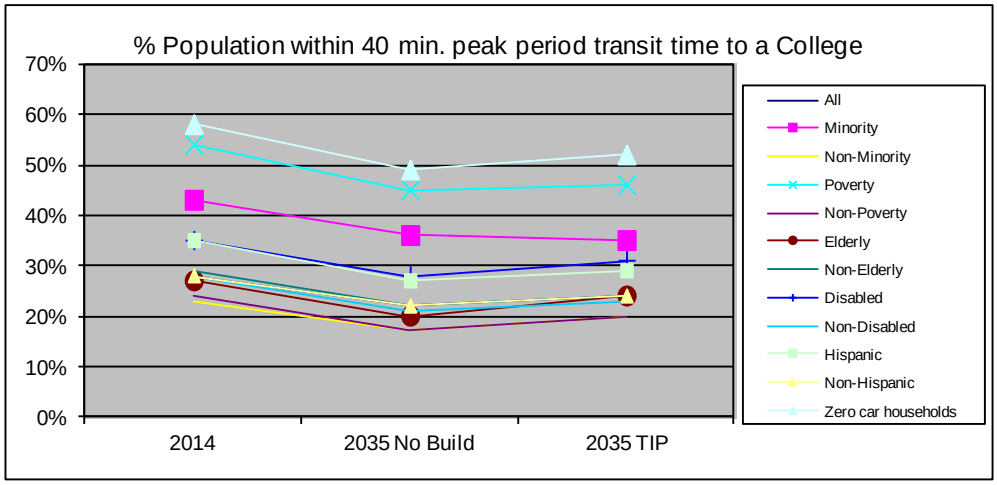
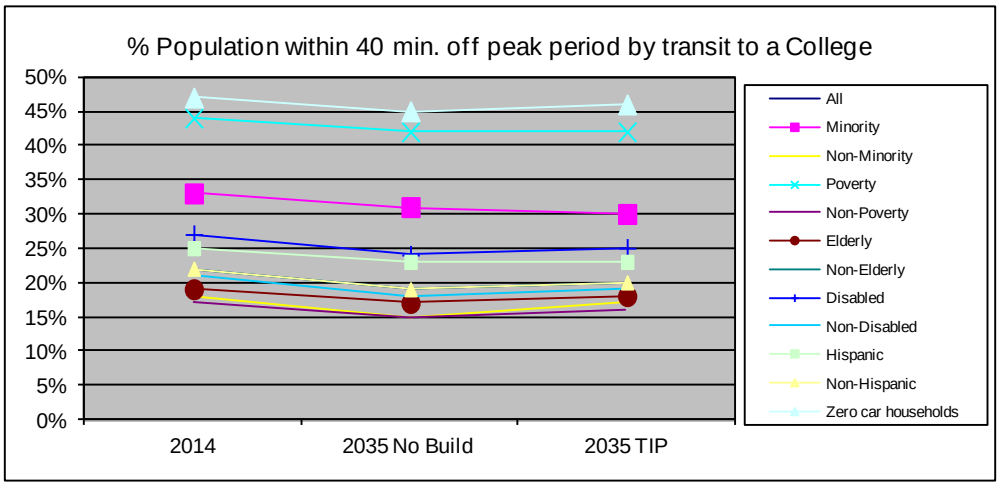


Figure IV-12



E. Percent of Population Close to a Hospital

Figures IV-13 through IV-15 show higher percentages of target populations are within 20 minutes of auto drive time or 40 minutes of transit time to a hospital than non-target populations. Also, when compared to the 2035 No-Build, the TIP provides a same or higher percentage of populations within 20 minutes to a hospital by auto and the gains appear to be relatively uniform across all of the population groups. When compared to the 2035 No-Build, the TIP provides a same or higher percentage of populations within 40 minutes' both peak and off-peak transit travel time to a hospital and the gains appear to be relatively uniform across all of the groups. This increase by transit travel is mainly due to the service changes proposed in the COTA 2014 Traffic System Review, and partially due to the highway improvements included in the TIP. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-13

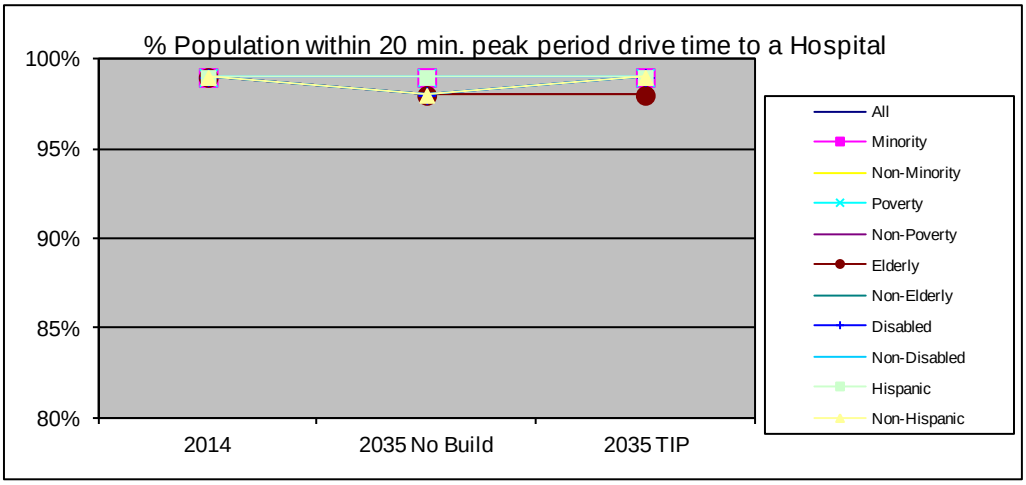


Figure IV-14

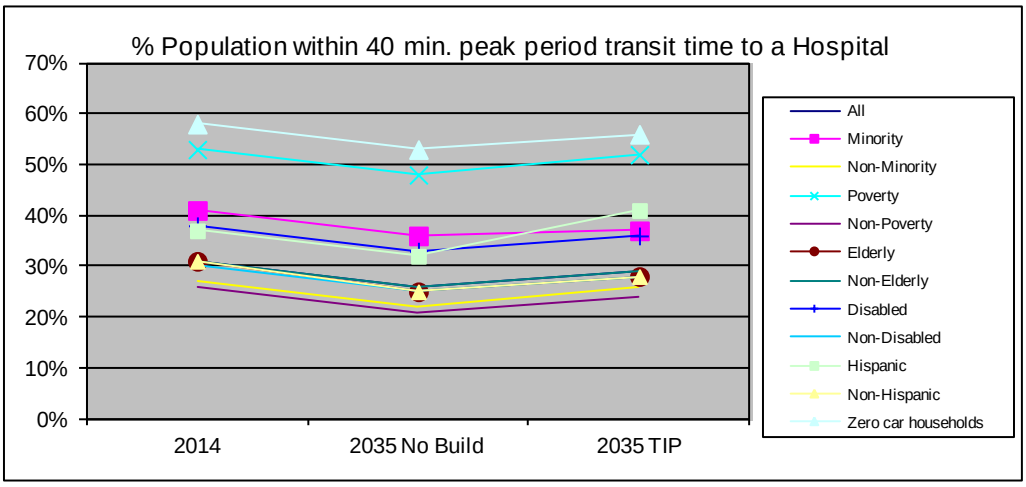
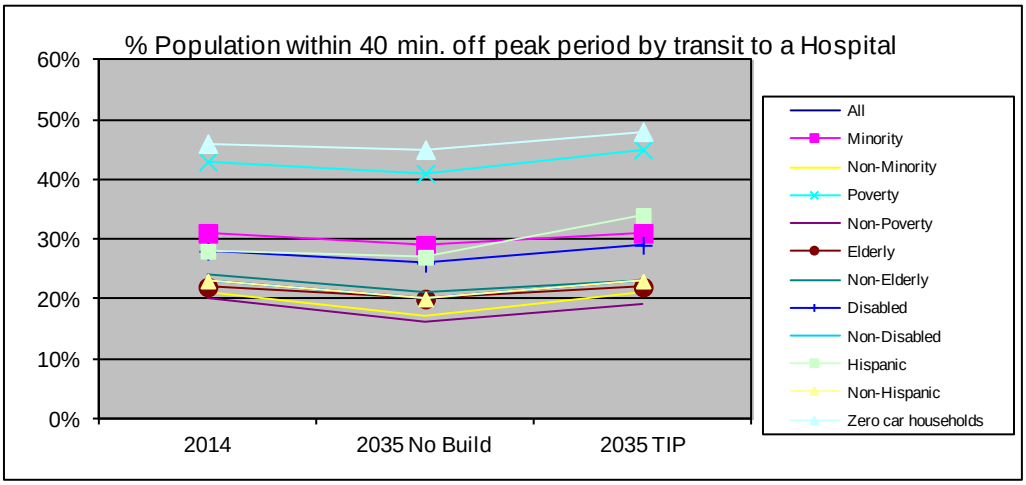


Figure IV-15



F. Percent of Population Close to a Major Retail Destination

Figures IV-16 through IV-18 show higher percentages of target populations are within 20 minutes of auto drive time or 40 minutes of transit time to a major retail destination than are non-target populations. Also, when compared to the 2035 No-Build, the TIP provides a slightly higher percentage of populations within 20 minutes to a major retail destination by auto and the gains appear to be relatively uniform across all of the population groups. When compared to the 2035 No-Build, the TIP provides a higher percentage of populations within 40 minutes' both peak and off-peak transit travel time to a major retail destination and the gains appear to be relatively uniform across all of the groups. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-16

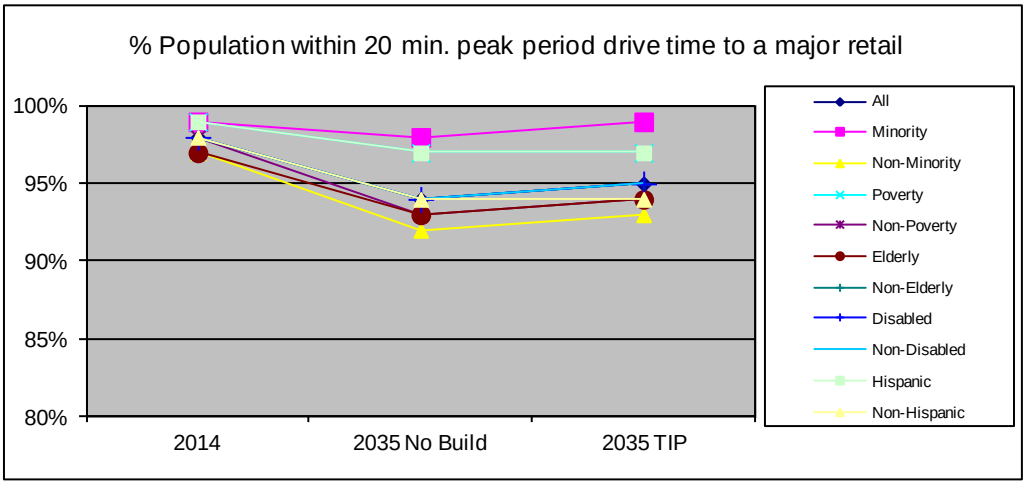


Figure IV-17

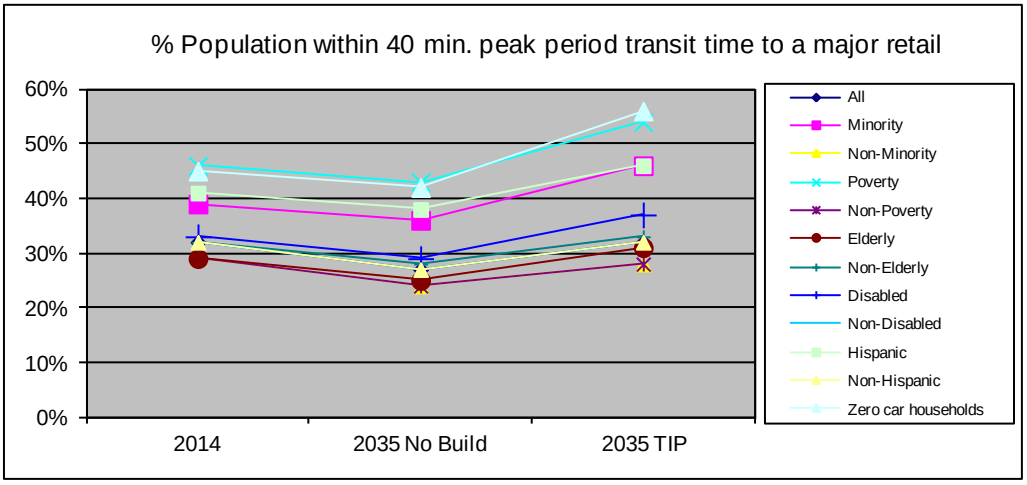
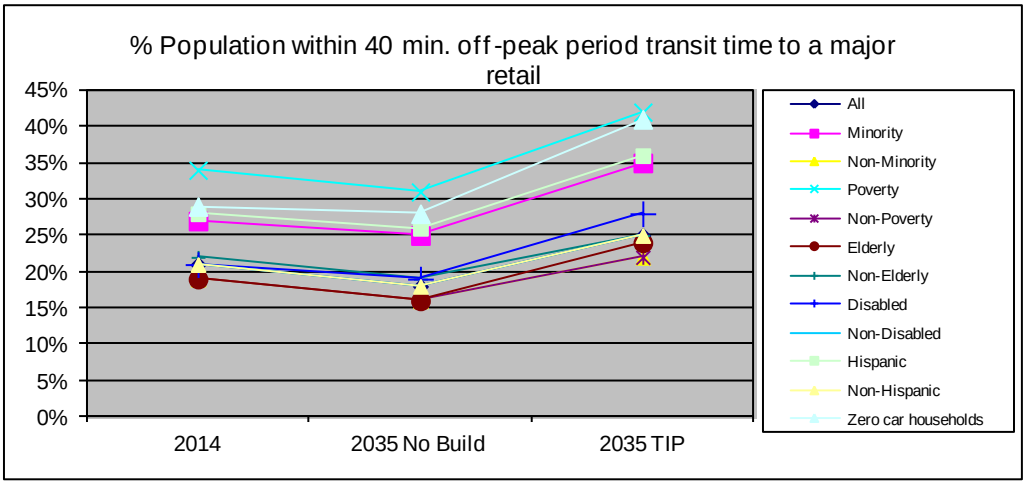


Figure IV-18



G. Average Travel Time for Work, University and School Purposes

Figures IV-19 through IV-20 show the average travel time between one's home and their work, university or school destination for target populations is less than or similar to that for non-target populations. Also, when compared to the 2035 No-Build, the TIP provides auto travel time decreases for the populations and the improvements appear to be relatively uniform across all of the population groups. When compared to 2035 No-Build, the TIP provides transit time decreases for the populations and the gains appear to be relatively uniform across all the groups. This is because that the COTA 2014 Traffic System Review was focusing on better all-day access to suburban job centers. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-19

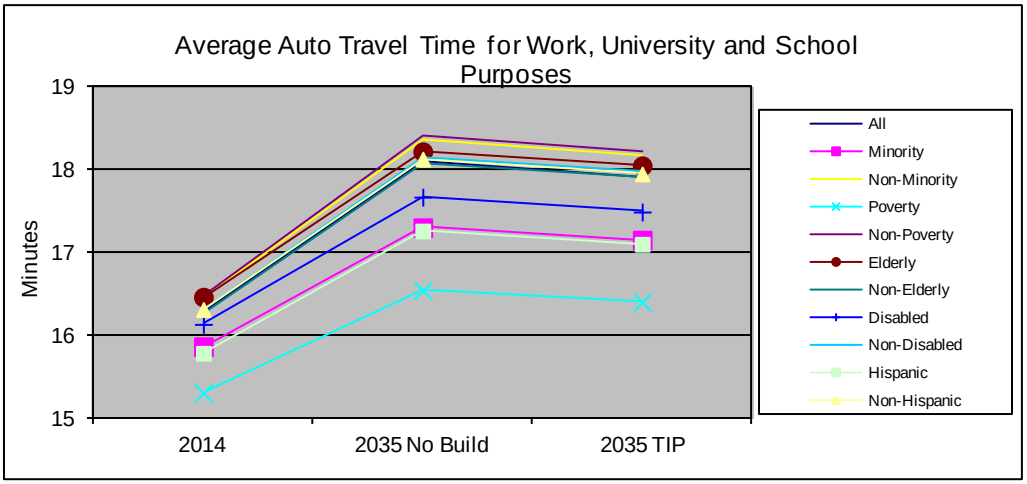
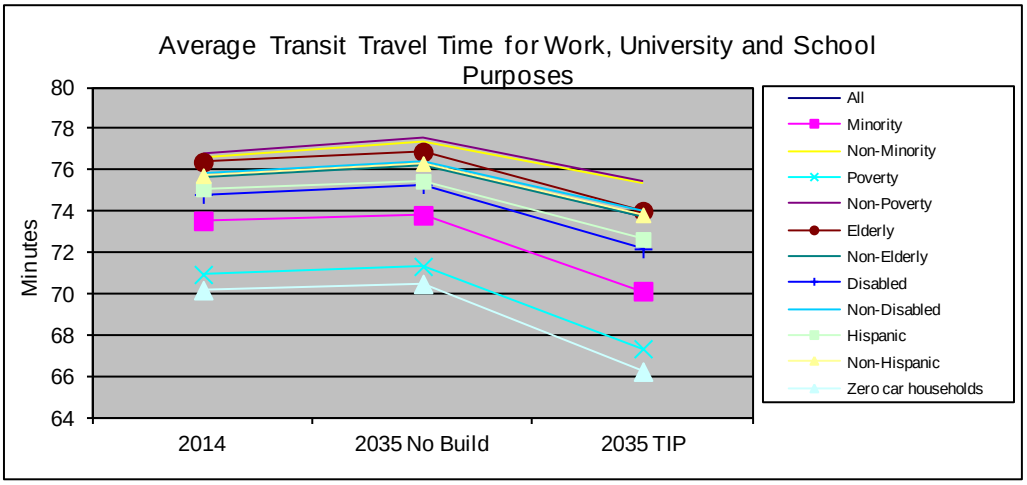


Figure IV- 20



H. Average Travel Time for Shopping Purposes

Figures IV-21 through IV-22 show the average travel time between one's home and their shopping destination for target populations is less than or similar to that for non-target populations. Also, when compared to the 2035 No-Build, the TIP provides auto travel time decreases for the populations and the improvements appear to be relatively uniform across all of the population groups. When compared to 2035 No-Build, the TIP provides transit travel time decreases for the populations and the improvements appear to be relatively uniform across all of the groups. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-21

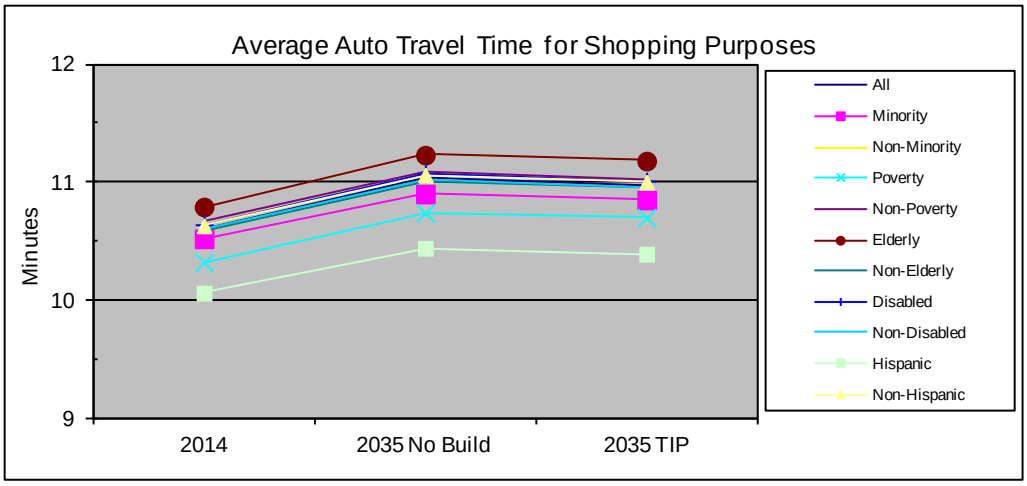
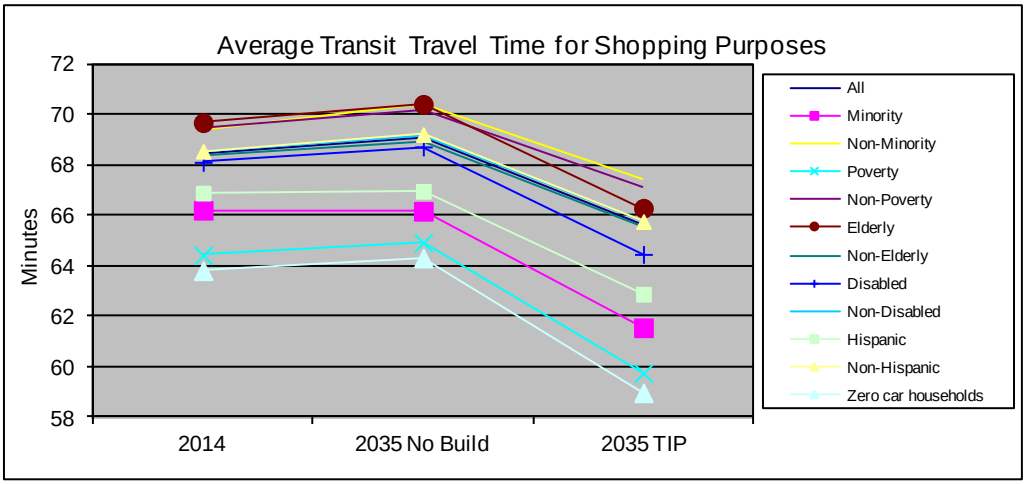


Figure IV- 22



I. Average Travel Time for Other Purposes

Figures IV-23 through IV-24 show the average travel time between one's home and their destination for other purposes for target populations is less than or similar to that for non-target populations. Also, when compared to the 2035 No-Build, the TIP provides auto travel time decreases for the populations and the improvements appear to be relatively uniform across all of the population groups. When compared to 2035 No-Build, the TIP provides transit travel time decreases for the populations and the improvements appear to be relatively uniform across all of the groups. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-23

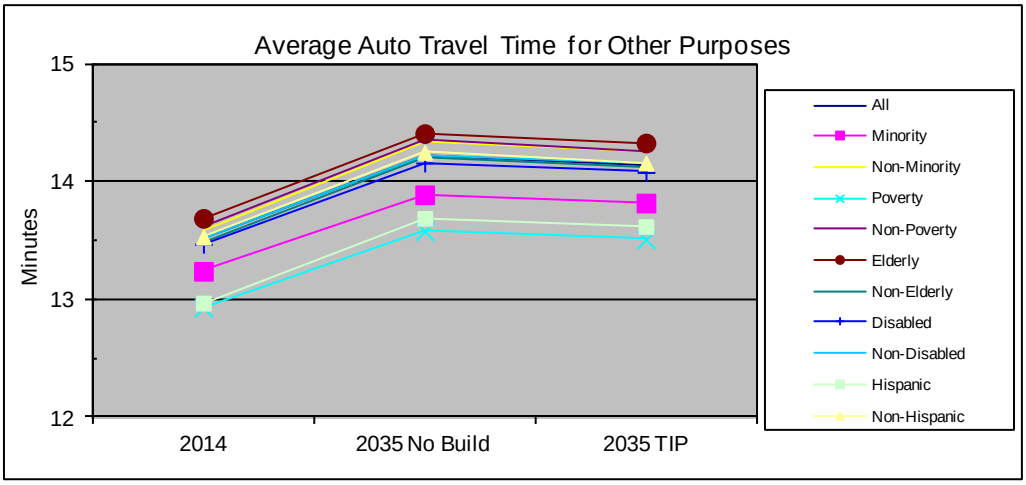
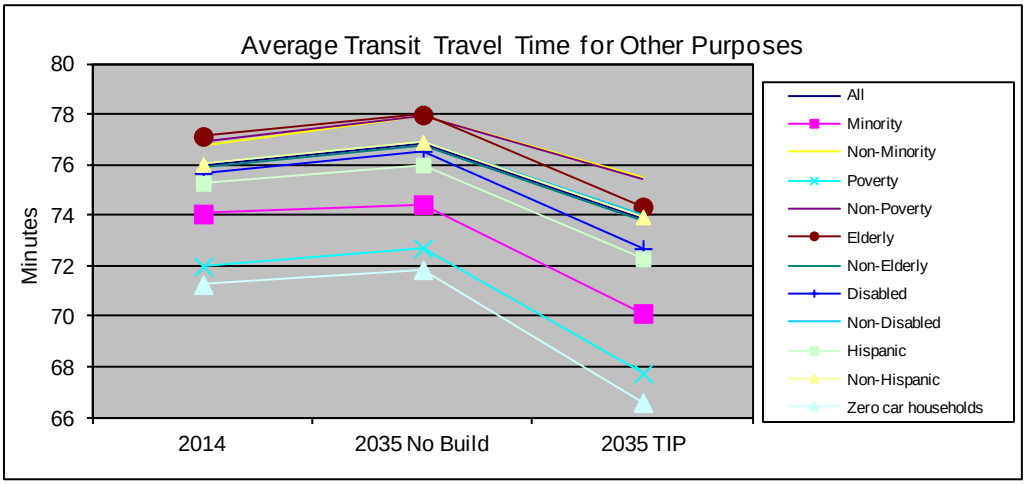


Figure IV-24



J. Average Auto Travel Time for All Purposes

Figures IV-25 through IV-26 show the average travel time for all purposes for target populations is less than or similar to that for non-target populations. Also, when compared to the 2035 No-Build, the TIP provides auto travel time decreases for the populations and the improvements appear to be relatively uniform across all of the population groups. When compared to 2035 No-Build, the TIP provides transit travel time decreases for the populations and the improvements appear to be relatively uniform across all of the groups. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-25

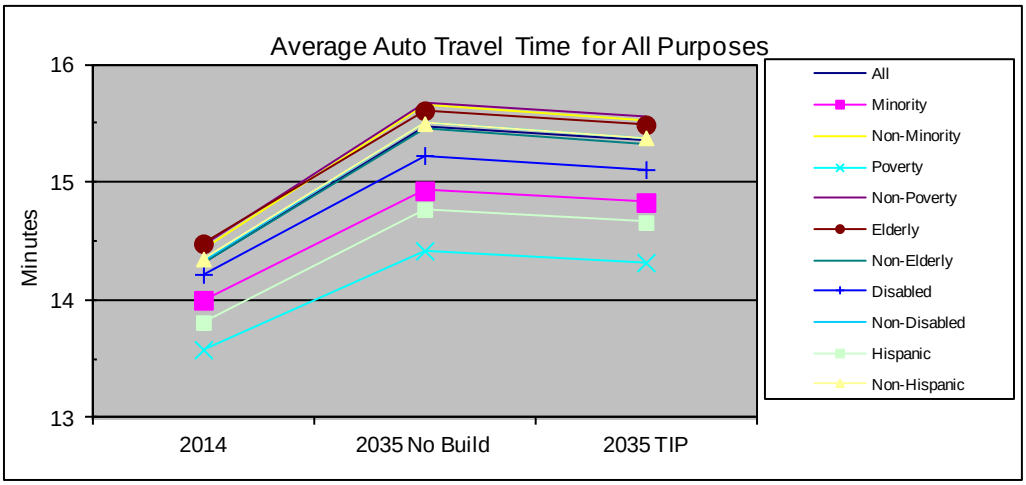
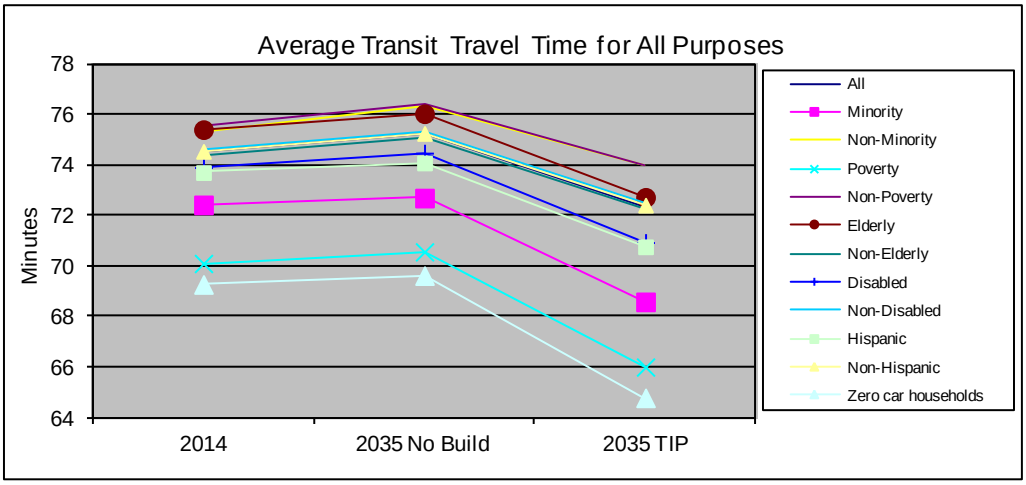


Figure IV-26



K. Average Travel Time to Columbus CBD

Figure IV-27 to IV-30 show that for each scenario the average travel time to the Columbus CBD is less for the target populations than that for non-target populations. Also, when compared to the 2035 No-Build, the TIP provides both peak and off-peak auto travel time to CBD decreases for the populations and the improvements appear to be relatively uniform across all of the population groups. When compared to 2035 No-Build, the TIP provides both peak and off-peak transit travel time decreases for the populations and the improvements appear to be relatively uniform across all of the population groups. With regard to this measure it appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-27

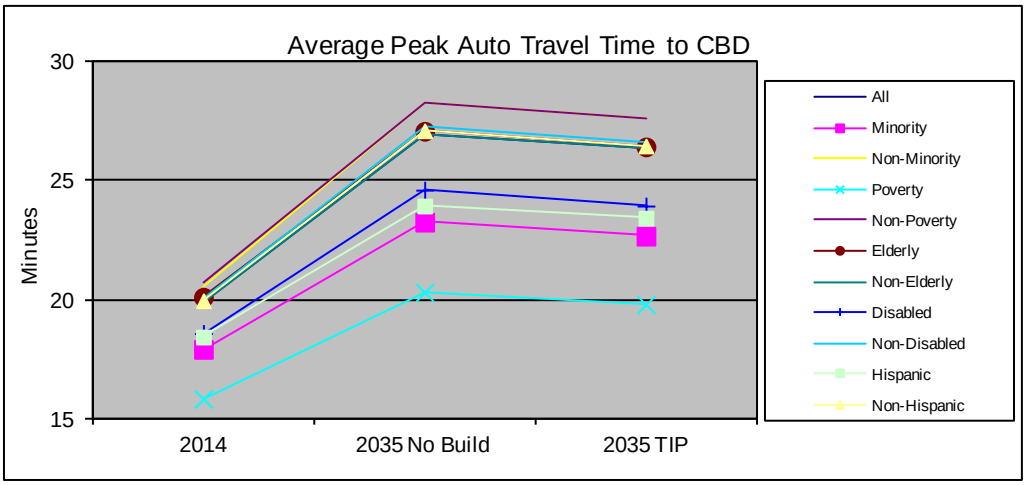


Figure IV-28

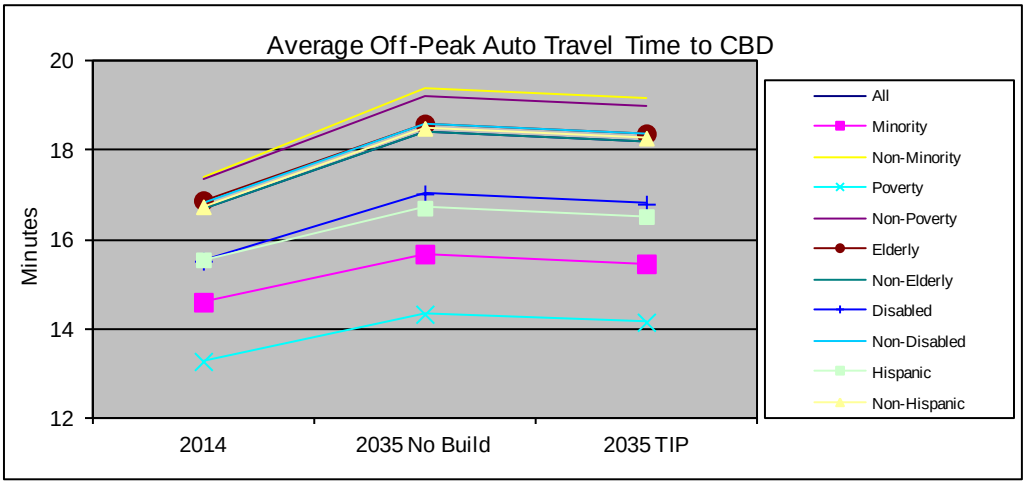


Figure IV-29

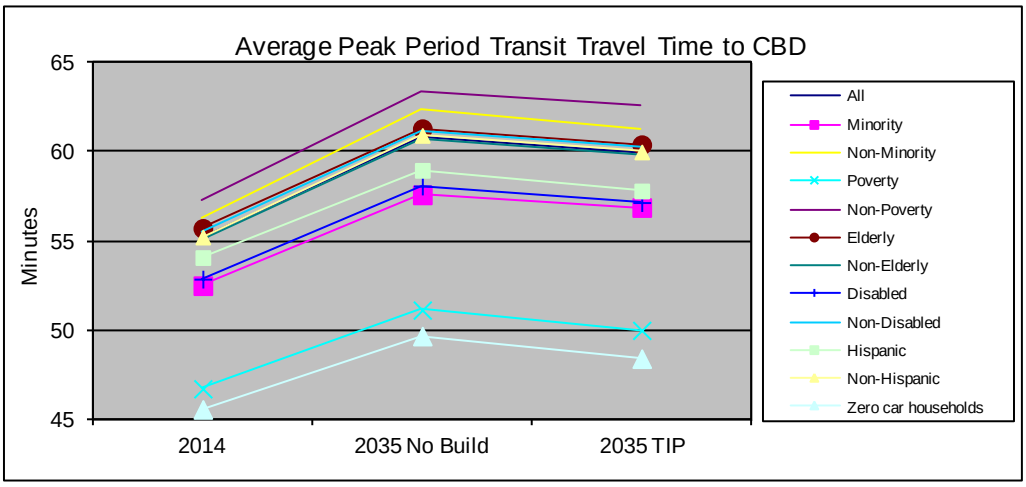
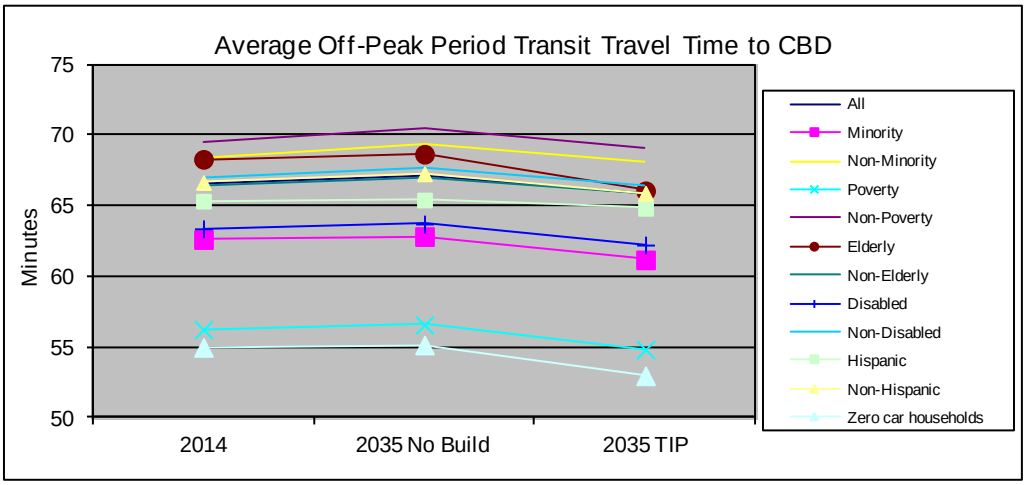


Figure IV-30



L. Transit Accessibility to Columbus CBD

Figures IV-31 and IV-32 show the percent of population that is accessible to the Columbus CBD by transit. This figure shows that for each scenario the percent of population accessible to the Columbus CBD is higher for the target populations than that for non-target populations. When compared to the 2035 No-Build, the TIP provides a lower percentage of the population with transit access to the CBD during peak hours and the decrease appears to be relatively uniform across all of the population groups. This is because the COTA 2014 Traffic System Review is focusing on reducing low performing bus lines and discontinuing loops for better use of capital resource which somehow sacrifices the coverage of transit services. With regard to this measure it still appears that there would be no disproportionate negative impacts on the target populations including specific EJ populations (minority and low income).

Figure IV-31

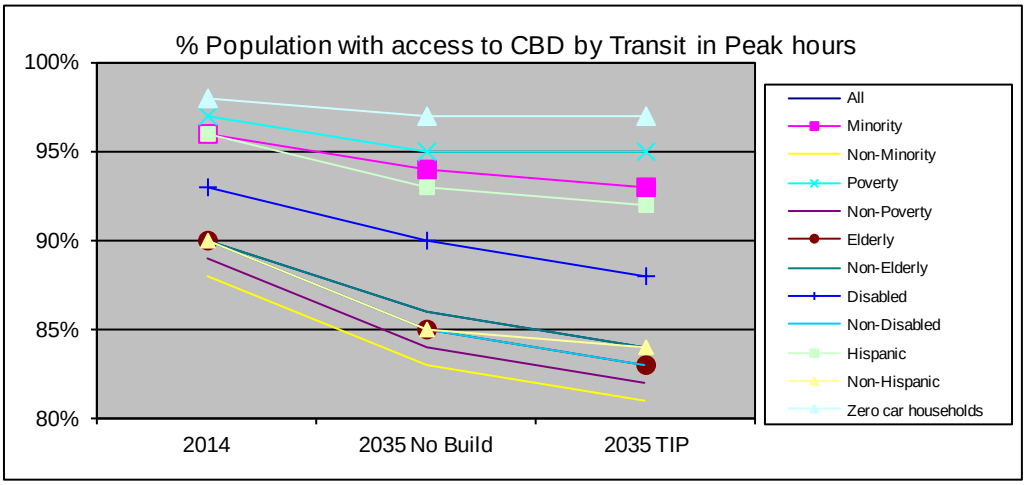
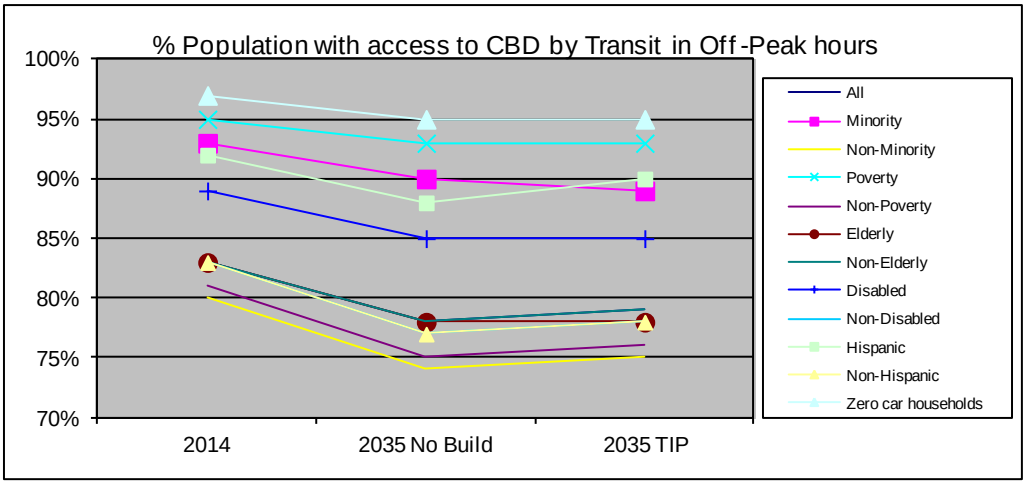


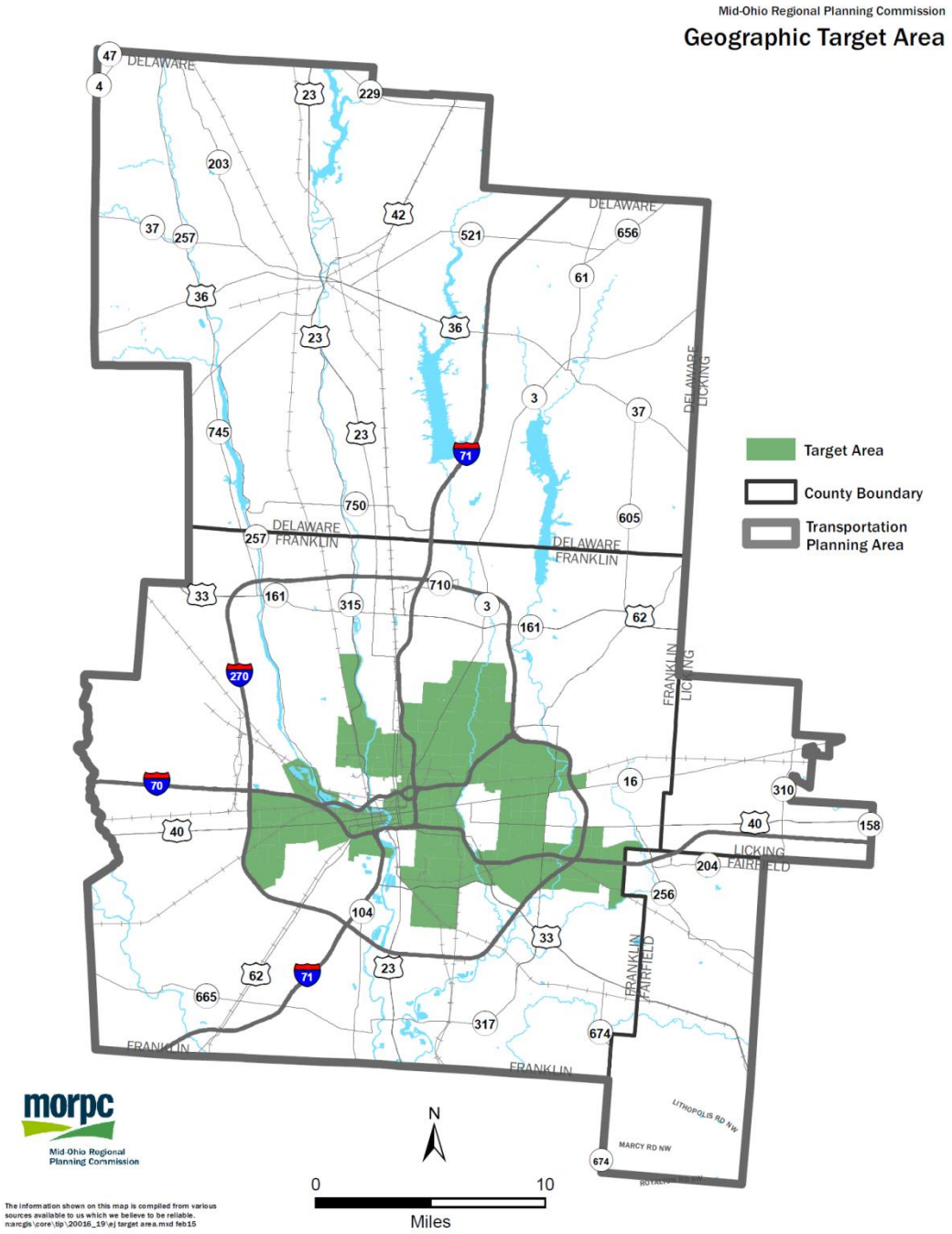
Figure IV-32



M. Congested Vehicle Miles of Travel during Peak Hours

Figure IV-33 shows the geographic target area that was identified. This target area generally includes areas that fall above twice the regional average for minority or poverty populations. The shape of the area is irregular, falling roughly between Morse Road and Bethel Road on the north and the southern boundary follows Refugee Road going down along Alum Creek Road and following Williams Road. The western and northern edges are roughly around I-270. Bexley and neighborhoods in the near south of Columbus are excluded. This area includes the majority of the target populations in 2014.

Figure IV-33 Geographic Target Area



Figures IV-34 and IV-35 show that for the year 2014, 2035 No-Build and 2035 TIP scenarios, the percent of congested vehicle miles during peak hours is higher for target populations than for non-target populations. When comparing all three scenarios together, percent of congested VMT and the respective scenario improvements appear to be relatively uniform for the Target and Non-target areas. Also, when compared to the 2035 No-Build, percent congested VMT traveled in 2035 TIP decreases for both Target and Non-target areas. With regard to this measure it appears that there would be no disproportionate negative impacts on the target area where EJ populations (minority and low income) are concentrated.

Figure IV-34

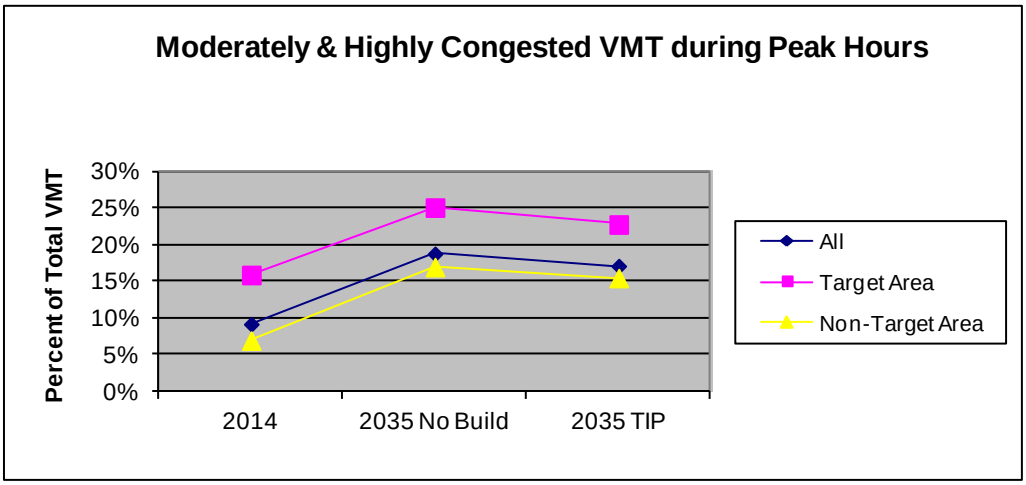
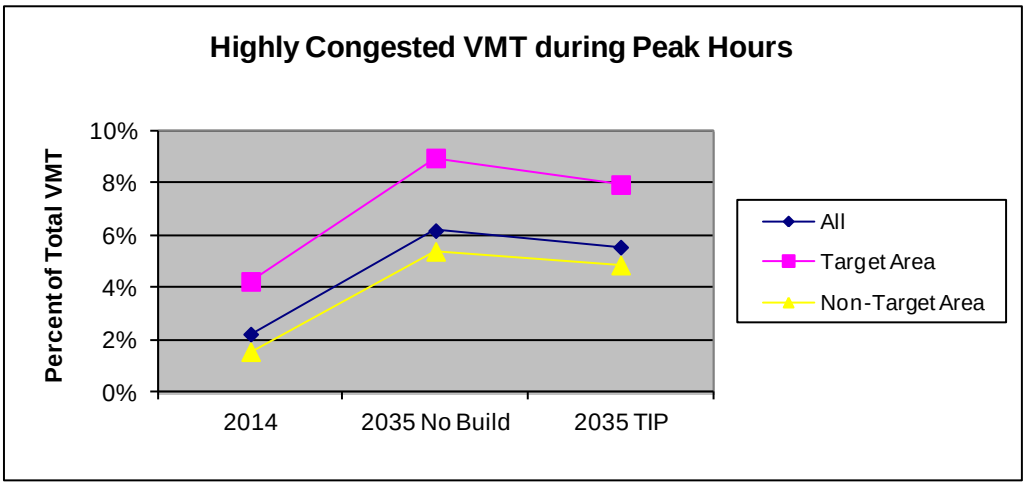


Figure IV-35



N. Transportation Expansion Investments

Millions of dollars are spent on transportation projects in the Central Ohio area. These include maintenance projects and projects that add capacity to the transportation system, such as those that include additional lanes or reconfigured interchanges.

Table IV-2 shows the amount of estimated transportation funding included in the TIP. The target area totals include only location-specific projects. This does not include the region-wide transit funds or studies. These funds are included in the total and thus, by default in the non-target area value. However, many of these activities do benefit the target area. Most of the population growth in the Columbus area is occurring outside the outer belt, especially in Delaware County. To accommodate the growth in the outer areas, more transportation projects are needed and expected in these growing areas.

Table IV-2

	TIP Funding (in Thousands)	Proportion
Target Area	$677,457	32%
Non-Target Area	$1,317,085	63%
Total	$2,091,025	100%

It is important to note that these cost estimates include only the large projects of the transportation system and do not include most local agencies' routine maintenance costs. Because a significant portion of the target area is heavily developed, there are fewer capacity expansion projects in the area. Furthermore, it is worth noting that transportation investments in a particular area may provide increased benefits beyond that area. Therefore, it may be more worthwhile to assess the benefits and the displacements and disruptions of a transportation project to a particular area than the amount of dollars spent.

O. Displacement from Projects

The projects on MORPC's TIP have been submitted for inclusion by ODOT, local agencies, or municipalities. In general, ODOT or the local community has reviewed a transportation project prior to the project's submission to MORPC. Therefore, it is somewhat unlikely that a project that has a high amount of displacement would be submitted for inclusion on the TIP without significant public involvement and analysis. As the projects proceed through the environmental process, the number of displacements will be determined and any environmental justice issues will be addressed at that time.

V. Summary

A variety of quantitative measures was presented in the previous section. Many measures are provided because one measure cannot capture all aspects of an environmental justice analysis. And in fact, these measures in total cannot take into account all things that can be considered with regard to environmental justice issues. These measures, however, are developed to provide some insight on whether significant environmental justice issues are present.

In general, the quantitative analysis did not indicate disproportionate impacts to environmental justice or other target populations. Furthermore, the benefits realized from the projects were proportionate with regard to both the environmental justice and other target populations and the non environmental justice and other non target populations. It is important to keep in mind that this was done at a systems level and additional refinement will be made as the various projects go through additional project development process steps.

Attachment A- Data Tables

Average Number of Jobs within 20 minute peak period drive time

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	335,993	44%	292,386	30%	303,307	31%	4%
Minority	372,249	49%	349,799	35%	360,114	36%	3%
Non-Minority	323,622	42%	272,273	28%	283,407	29%	4%
Poverty	411,223	54%	403,943	41%	415,829	42%	3%
Non-Poverty	321,477	42%	270,352	27%	281,082	28%	4%
Elderly	333,350	43%	291,182	29%	302,512	31%	4%
Non-Elderly	336,288	44%	292,523	30%	303,398	31%	4%
Disabled	353,876	46%	322,274	33%	335,244	34%	4%
Non-Disabled	333,818	44%	288,669	29%	299,336	30%	4%
Hispanic	363,859	47%	324,955	33%	337,249	34%	4%
Non-Hispanic	334,737	44%	290,887	29%	301,746	30%	4%

Average Number of Jobs within 40 minute peak period time by transit

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	31,186	4%	28,554	3%	38,818	4%	36%
Minority	40,501	5%	41,002	4%	55,744	6%	36%
Non-Minority	28,007	4%	24,194	2%	32,888	3%	36%
Poverty	61,440	8%	62,644	6%	82,051	8%	31%
Non-Poverty	25,348	3%	21,821	2%	30,278	3%	39%
Elderly	26,915	4%	24,108	2%	33,857	3%	40%
Non-Elderly	31,662	4%	29,060	3%	39,382	4%	36%
Disabled	36,310	5%	34,453	3%	46,110	5%	34%
Non-Disabled	30,563	4%	27,821	3%	37,911	4%	36%
Hispanic	32,138	4%	30,739	3%	41,166	4%	34%
Non-Hispanic	31,143	4%	28,454	3%	38,709	4%	36%
Zero car households	66,826	9%	69,261	7%	91,033	9%	31%

Average Number of Jobs within 40 minute off-peak period time by transit

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	19,124	2%	20,198	2%	27,732	3%	37%
Minority	25,289	3%	29,377	3%	40,780	4%	39%
Non-Minority	17,020	2%	16,983	2%	23,161	2%	36%
Poverty	40,829	5%	46,919	5%	60,923	6%	30%
Non-Poverty	14,936	2%	14,921	2%	21,176	2%	42%
Elderly	15,241	2%	16,391	2%	23,119	2%	41%
Non-Elderly	19,556	3%	20,632	2%	28,257	3%	37%
Disabled	21,745	3%	24,221	2%	32,737	3%	35%
Non-Disabled	18,805	2%	19,698	2%	27,109	3%	38%
Hispanic	19,086	2%	21,650	2%	29,751	3%	37%
Non-Hispanic	19,126	2%	20,132	2%	27,639	3%	37%
Zero car households	43,142	6%	50,591	5%	66,529	7%	32%

Total Jobs 2014 = 766,936 2035 = 989,342

Average Number of Shopping Attractions within 20 minute peak period drive time

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	94,478	42%	86,925	29%	89,268	30%	3%
Minority	106,126	47%	103,791	35%	106,082	35%	2%
Non-Minority	90,504	40%	81,017	27%	83,378	28%	3%
Poverty	115,437	51%	116,310	39%	118,896	40%	2%
Non-Poverty	90,434	40%	81,121	27%	83,416	28%	3%
Elderly	93,271	41%	86,220	29%	88,547	30%	3%
Non-Elderly	94,613	42%	87,005	29%	89,350	30%	3%
Disabled	99,083	44%	94,537	32%	97,147	32%	3%
Non-Disabled	93,918	42%	85,979	29%	88,288	29%	3%
Hispanic	100,205	44%	94,818	32%	97,359	33%	3%
Non-Hispanic	94,220	42%	86,562	29%	88,896	30%	3%

Average Number of Shopping Attractions within 40 minute peak period time by transit

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	6,713	3%	6,378	2%	9,553	3%	50%
Minority	9,055	4%	9,363	3%	14,258	5%	52%
Non-Minority	5,914	3%	5,333	2%	7,904	3%	48%
Poverty	12,506	6%	12,865	4%	19,255	6%	50%
Non-Poverty	5,595	2%	5,097	2%	7,636	3%	50%
Elderly	6,028	3%	5,788	2%	8,698	3%	50%
Non-Elderly	6,790	3%	6,446	2%	9,650	3%	50%
Disabled	7,886	3%	7,873	3%	11,519	4%	46%
Non-Disabled	6,571	3%	6,193	2%	9,308	3%	50%
Hispanic	7,646	3%	8,081	3%	11,306	4%	40%
Non-Hispanic	6,671	3%	6,300	2%	9,472	3%	50%
Zero car households	14,038	6%	14,598	5%	21,270	7%	46%

Average Number of Shopping Attractions within 40 minute off-peak period time by transit

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	3,855	2%	4,059	1%	6,376	2%	57%
Minority	5,071	2%	5,883	2%	9,622	3%	64%
Non-Minority	3,441	2%	3,420	1%	5,239	2%	53%
Poverty	7,312	3%	8,333	3%	12,801	4%	54%
Non-Poverty	3,188	1%	3,215	1%	5,107	2%	59%
Elderly	3,370	1%	3,607	1%	5,744	2%	59%
Non-Elderly	3,910	2%	4,110	1%	6,448	2%	57%
Disabled	4,373	2%	4,912	2%	7,708	3%	57%
Non-Disabled	3,792	2%	3,953	1%	6,210	2%	57%
Hispanic	4,609	2%	5,443	2%	8,057	3%	48%
Non-Hispanic	3,822	2%	3,995	1%	6,299	2%	58%
Zero car households	7,966	4%	9,159	3%	14,144	5%	54%

Shopping attractions 2014 = 225,643 2035 = 299,355

Average Number of Non-Shopping Attractions within 20 minute peak period drive time

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	468,544	42%	422,561	29%	435,584	30%	3%
Minority	527,570	48%	506,915	35%	519,508	36%	2%
Non-Minority	448,403	41%	393,011	27%	406,185	28%	3%
Poverty	576,947	52%	572,578	39%	586,889	40%	2%
Non-Poverty	447,627	40%	392,931	27%	405,700	28%	3%
Elderly	463,650	42%	419,585	29%	432,727	30%	3%
Non-Elderly	469,089	42%	422,900	29%	435,910	30%	3%
Disabled	494,269	45%	461,985	32%	476,811	33%	3%
Non-Disabled	465,414	42%	417,659	29%	430,458	30%	3%
Hispanic	499,196	45%	461,943	32%	476,043	33%	3%
Non-Hispanic	467,162	42%	420,750	29%	433,723	30%	3%

Average Number of Non-Shopping Attractions within 40 minute peak period time by transit

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	37,356	3%	34,418	2%	49,169	3%	43%
Minority	49,714	4%	49,873	3%	72,016	5%	44%
Non-Minority	33,139	3%	29,004	2%	41,166	3%	42%
Poverty	71,901	6%	72,609	5%	102,009	7%	40%
Non-Poverty	30,690	3%	26,875	2%	38,732	3%	44%
Elderly	33,090	3%	30,341	2%	43,933	3%	45%
Non-Elderly	37,831	3%	34,882	2%	49,765	3%	43%
Disabled	43,971	4%	42,105	3%	58,886	4%	40%
Non-Disabled	36,551	3%	33,462	2%	47,961	3%	43%
Hispanic	40,882	4%	40,067	3%	55,300	4%	38%
Non-Hispanic	37,197	3%	34,158	2%	48,887	3%	43%
Zero car households	79,507	7%	81,666	6%	113,014	8%	38%

Average Number of Non-Shopping Attractions within 40 minute off-peak period time by transit

	2014	% of Total	2035 No Build	% of Total	2035 TIP	% of Total	% Over No Build
All	21,790	2%	22,502	2%	33,744	2%	50%
Minority	28,889	3%	32,706	2%	50,467	3%	54%
Non-Minority	19,368	2%	18,928	1%	27,886	2%	47%
Poverty	44,080	4%	49,475	3%	71,113	5%	44%
Non-Poverty	17,490	2%	17,175	1%	26,363	2%	53%
Elderly	18,437	2%	19,322	1%	29,548	2%	53%
Non-Elderly	22,164	2%	22,864	2%	34,222	2%	50%
Disabled	25,039	2%	27,294	2%	40,464	3%	48%
Non-Disabled	21,395	2%	21,907	2%	32,908	2%	50%
Hispanic	24,359	2%	26,994	2%	39,478	3%	46%
Non-Hispanic	21,675	2%	22,296	2%	33,480	2%	50%
Zero car households	47,407	4%	54,226	4%	78,487	5%	45%

Total Non-Shopping Attractions 2014 = 1,106,490 2035 = 1,456,796

Percent of Population within 20 minute peak period drive time to a College

	2014	2035 No Build	2035 TIP
All	91%	79%	81%
Minority	94%	84%	86%
Non-Minority	90%	77%	80%
Poverty	96%	89%	90%
Non-Poverty	90%	77%	80%
Elderly	91%	79%	82%
Non-Elderly	91%	79%	81%
Disabled	93%	82%	85%
Non-Disabled	91%	79%	81%
Hispanic	96%	85%	86%
Non-Hispanic	91%	79%	81%

Percent of Population within 40 minute peak period time to a College by transit

	2014	2035 No Build	2035 TIP
All	28%	22%	24%
Minority	43%	36%	35%
Non-Minority	23%	17%	20%
Poverty	54%	45%	46%
Non-Poverty	24%	17%	20%
Elderly	27%	20%	24%
Non-Elderly	29%	22%	24%
Disabled	35%	28%	31%
Non-Disabled	28%	21%	23%
Hispanic	35%	27%	29%
Non-Hispanic	28%	22%	24%
Zero car households	58%	49%	52%

Percent of Population within 40 minute off-peak period time to a College by transit

	2014	2035 No Build	2035 TIP
All	22%	19%	20%
Minority	33%	31%	30%
Non-Minority	18%	15%	17%
Poverty	44%	42%	42%
Non-Poverty	17%	15%	16%
Elderly	19%	17%	18%
Non-Elderly	22%	19%	20%
Disabled	27%	24%	25%
Non-Disabled	21%	18%	19%
Hispanic	25%	23%	23%
Non-Hispanic	22%	19%	20%
Zero car households	47%	45%	46%

Colleges included are:

THE OHIO STATE UNIVERSITY
COLUMBUS STATE COMMUNITY COLLEGE
CAPITAL UNIVERSITY
COLUMBUS COLLEGE OF ART & DESIGN
OTTERBEIN COLLEGE
DEVRY INSTITUTE OF TECHNOLOGY
FRANKLIN UNIVERSITY
MOUNT CARMEL COLLEGE OF NURSING
OHIO DOMINICAN COLLEGE

Percent of Population within 20 minute peak period drive time to Hospital

	2014	2035 No Build	2035 TIP
All	99%	98%	99%
Minority	99%	99%	99%
Non-Minority	99%	98%	98%
Poverty	99%	99%	99%
Non-Poverty	99%	98%	98%
Elderly	99%	98%	98%
Non-Elderly	99%	98%	99%
Disabled	99%	98%	99%
Non-Disabled	99%	98%	99%
Hispanic	99%	99%	99%
Non-Hispanic	99%	98%	99%

Percent of Population within 40 minute peak period time to Hospital by transit

	2014	2035 No Build	2035 TIP
All	31%	26%	29%
Minority	41%	36%	37%
Non-Minority	27%	22%	26%
Poverty	53%	48%	52%
Non-Poverty	26%	21%	24%
Elderly	31%	25%	28%
Non-Elderly	31%	26%	29%
Disabled	38%	33%	36%
Non-Disabled	30%	25%	28%
Hispanic	37%	32%	41%
Non-Hispanic	31%	25%	28%
Zero car households	58%	53%	56%

Percent of Population within 40 minute off-peak period time to Hospital by transit

	2014	2035 No Build	2035 TIP
All	23%	20%	23%
Minority	31%	29%	31%
Non-Minority	21%	17%	21%
Poverty	43%	41%	45%
Non-Poverty	20%	16%	19%
Elderly	22%	20%	22%
Non-Elderly	24%	21%	23%
Disabled	28%	26%	29%
Non-Disabled	23%	20%	23%
Hispanic	28%	27%	34%
Non-Hispanic	23%	20%	23%
Zero car households	46%	45%	48%

Hospitals included in all scenarios are:

Grady Memorial, Dublin Methodist, Mount Carmel St. Ann's, Mount Carmel New Albany Surgical, Riverside Methodist, the Woods at Parkside, Ohio State University, Select Specialty - Columbus, Doctors, Mount Carmel West, Grant Medical Center, Ohio State University East, Nationwide Children's, Mount Carmel East, Regency, and OhioHealth Westerville Medical Campus, Mount Carmel Grove City Medical Center and Ohio Health Medical Campus at Hill Rd.

Percent of Population within 20 minute peak period drive time to Major Retail

	2014	2035 No Build	2035 TIP
All	98%	94%	95%
Minority	99%	98%	99%
Non-Minority	97%	92%	93%
Poverty	99%	97%	97%
Non-Poverty	98%	93%	94%
Elderly	97%	93%	94%
Non-Elderly	98%	94%	95%
Disabled	98%	94%	95%
Non-Disabled	98%	94%	95%
Hispanic	99%	97%	97%
Non-Hispanic	98%	94%	94%

Percent of Population within 40 minute peak period time to Major Retail by Transit

	2014	2035 No Build	2035 TIP
All	32%	27%	32%
Minority	39%	36%	46%
Non-Minority	29%	24%	28%
Poverty	46%	43%	54%
Non-Poverty	29%	24%	28%
Elderly	29%	25%	31%
Non-Elderly	32%	28%	33%
Disabled	33%	29%	37%
Non-Disabled	32%	27%	32%
Hispanic	41%	38%	46%
Non-Hispanic	32%	27%	32%
Zero car households	45%	42%	56%

Percent of Population within 40 minute off-peak period time to Major Retail by Transit

	2014	2035 No Build	2035 TIP
All	21%	18%	25%
Minority	27%	25%	35%
Non-Minority	19%	16%	22%
Poverty	34%	31%	42%
Non-Poverty	19%	16%	22%
Elderly	19%	16%	24%
Non-Elderly	22%	19%	25%
Disabled	21%	19%	28%
Non-Disabled	21%	18%	25%
Hispanic	28%	26%	36%
Non-Hispanic	21%	18%	25%
Zero car households	29%	28%	41%

Major Retail Locations included are:

Polaris Fashion Place area, Tuttle Crossing Mall area, Easton Square area, Saw mill & SR 161 area, North Pointe Plaza area, Carriage Place area, Stone Ridge Plaza area, Westpointe Plaza area, Graceland area, Columbus Square area, Consumer Square w est area, Lennox Tow n Center area, Eastland Mall area, Chantry Square area, and Taylor Square area.

Average Auto Travel Time for Work, University and School Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	16.3	18.1	11%	17.9	10%	0.2	1%
Minority	15.9	17.3	9%	17.2	8%	0.2	1%
Non-Minority	16.4	18.4	12%	18.2	11%	0.2	1%
Poverty	15.3	16.5	8%	16.4	7%	0.1	1%
Non-Poverty	16.5	18.4	12%	18.2	10%	0.2	1%
Elderly	16.5	18.2	11%	18.1	10%	0.2	1%
Non-Elderly	16.3	18.1	11%	17.9	10%	0.2	1%
Disabled	16.1	17.7	10%	17.5	8%	0.2	1%
Non-Disabled	16.3	18.1	11%	18.0	10%	0.2	1%
Hispanic	15.8	17.3	9%	17.1	8%	0.2	1%
Non-Hispanic	16.3	18.1	11%	18.0	10%	0.2	1%

Average Transit Travel Time for Work, University and School Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	75.7	76.3	1%	73.8	-3%	2.5	3%
Minority	73.5	73.8	0%	70.1	-5%	3.7	5%
Non-Minority	76.6	77.4	1%	75.4	-2%	2.0	3%
Poverty	70.9	71.3	1%	67.3	-5%	4.0	6%
Non-Poverty	76.8	77.5	1%	75.4	-2%	2.1	3%
Elderly	76.4	76.9	1%	74.0	-3%	2.9	4%
Non-Elderly	75.6	76.2	1%	73.7	-2%	2.5	3%
Disabled	74.8	75.3	1%	72.2	-4%	3.1	4%
Non-Disabled	75.8	76.4	1%	74.0	-2%	2.4	3%
Hispanic	75.1	75.5	0%	72.6	-3%	2.8	4%
Non-Hispanic	75.7	76.3	1%	73.8	-3%	2.5	3%
Zero car households	70.2	70.5	0%	66.2	-6%	4.3	6%

Average Auto Travel Time for Shopping Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	10.6	11.0	4%	11.0	3%	0.1	1%
Minority	10.5	10.9	4%	10.9	3%	0.1	0%
Non-Minority	10.6	11.1	4%	11.0	4%	0.1	1%
Poverty	10.3	10.7	4%	10.7	4%	0.0	0%
Non-Poverty	10.7	11.1	4%	11.0	3%	0.1	1%
Elderly	10.8	11.2	4%	11.2	4%	0.1	0%
Non-Elderly	10.6	11.0	4%	11.0	3%	0.1	1%
Disabled	10.6	11.1	4%	11.0	3%	0.1	1%
Non-Disabled	10.6	11.0	4%	11.0	3%	0.1	1%
Hispanic	10.1	10.4	4%	10.4	3%	0.0	0%
Non-Hispanic	10.6	11.1	4%	11.0	3%	0.1	1%

Average Transit Travel Time for Shopping Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	68.5	69.1	1%	65.6	-4%	3.5	5%
Minority	66.2	66.2	0%	61.6	-7%	4.6	7%
Non-Minority	69.4	70.4	1%	67.4	-3%	3.0	4%
Poverty	64.4	64.9	1%	59.8	-7%	5.2	8%
Non-Poverty	69.4	70.2	1%	67.1	-3%	3.1	4%
Elderly	69.7	70.4	1%	66.3	-5%	4.1	6%
Non-Elderly	68.3	69.0	1%	65.5	-4%	3.4	5%
Disabled	68.1	68.7	1%	64.5	-5%	4.3	6%
Non-Disabled	68.5	69.2	1%	65.8	-4%	3.4	5%
Hispanic	66.9	67.0	0%	62.9	-6%	4.1	6%
Non-Hispanic	68.6	69.2	1%	65.8	-4%	3.4	5%
Zero car households	63.8	64.3	1%	59.0	-8%	5.3	8%

Average Auto Travel Time for Other Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	13.5	14.2	5%	14.1	5%	0.1	1%
Minority	13.2	13.9	5%	13.8	4%	0.1	1%
Non-Minority	13.6	14.3	6%	14.3	5%	0.1	1%
Poverty	12.9	13.6	5%	13.5	4%	0.1	1%
Non-Poverty	13.6	14.4	5%	14.3	5%	0.1	1%
Elderly	13.7	14.4	5%	14.3	5%	0.1	1%
Non-Elderly	13.5	14.2	5%	14.1	5%	0.1	1%
Disabled	13.5	14.2	5%	14.1	5%	0.1	1%
Non-Disabled	13.5	14.2	5%	14.2	5%	0.1	1%
Hispanic	13.0	13.7	6%	13.6	5%	0.1	1%
Non-Hispanic	13.5	14.3	5%	14.2	5%	0.1	1%

Average Peak Transit Travel Time for Other Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	76.0	76.9	1%	73.9	-3%	3.0	4%
Minority	74.1	74.4	0%	70.1	-5%	4.3	6%
Non-Minority	76.8	77.9	1%	75.5	-2%	2.4	3%
Poverty	72.0	72.7	1%	67.7	-6%	5.0	7%
Non-Poverty	76.9	77.9	1%	75.4	-2%	2.5	3%
Elderly	77.1	78.0	1%	74.3	-4%	3.6	5%
Non-Elderly	75.9	76.7	1%	73.8	-3%	2.9	4%
Disabled	75.7	76.5	1%	72.7	-4%	3.9	5%
Non-Disabled	76.0	76.9	1%	74.0	-3%	2.9	4%
Hispanic	75.3	76.0	1%	72.3	-4%	3.7	5%
Non-Hispanic	76.0	76.9	1%	73.9	-3%	3.0	4%
Zero car households	71.3	71.9	1%	66.6	-7%	5.3	7%

Average Auto Travel Time for All Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	14.3	15.5	8%	15.4	7%	0.1	1%
Minority	14.0	14.9	7%	14.8	6%	0.1	1%
Non-Minority	14.4	15.7	9%	15.5	8%	0.1	1%
Poverty	13.6	14.4	6%	14.3	5%	0.1	1%
Non-Poverty	14.5	15.7	8%	15.6	8%	0.1	1%
Elderly	14.5	15.6	8%	15.5	7%	0.1	1%
Non-Elderly	14.3	15.5	8%	15.3	7%	0.1	1%
Disabled	14.2	15.2	7%	15.1	6%	0.1	1%
Non-Disabled	14.3	15.5	8%	15.4	7%	0.1	1%
Hispanic	13.8	14.8	7%	14.7	6%	0.1	1%
Non-Hispanic	14.4	15.5	8%	15.4	7%	0.1	1%

Average Transit Travel Time for All Purposes (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	v.s. 2035 No-Build %Saved
All	74.5	75.2	1%	72.3	-3%	2.9	4%
Minority	72.4	72.7	0%	68.6	-5%	4.1	6%
Non-Minority	75.3	76.3	1%	74.0	-2%	2.3	3%
Poverty	70.1	70.6	1%	66.0	-6%	4.6	6%
Non-Poverty	75.5	76.4	1%	74.0	-2%	2.4	3%
Elderly	75.4	76.0	1%	72.7	-4%	3.3	4%
Non-Elderly	74.4	75.1	1%	72.3	-3%	2.8	4%
Disabled	73.9	74.5	1%	70.9	-4%	3.5	5%
Non-Disabled	74.6	75.3	1%	72.5	-3%	2.8	4%
Hispanic	73.7	74.1	1%	70.8	-4%	3.3	4%
Non-Hispanic	74.5	75.3	1%	72.4	-3%	2.8	4%
Zero car households	69.3	69.6	1%	64.8	-6%	4.8	7%

Average Peak Auto Travel Time to CBD (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	%Saved
All	19.9	27.0	36%	26.4	32%	0.6	2%
Minority	17.9	23.3	30%	22.7	27%	0.6	3%
Non-Minority	20.6	28.3	37%	27.6	34%	0.6	2%
Poverty	15.8	20.3	28%	19.8	25%	0.5	3%
Non-Poverty	20.7	28.3	37%	27.6	34%	0.6	2%
Elderly	20.1	27.1	35%	26.4	31%	0.7	2%
Non-Elderly	19.9	27.0	36%	26.3	33%	0.6	2%
Disabled	18.6	24.6	33%	24.0	29%	0.7	3%
Non-Disabled	20.1	27.3	36%	26.7	33%	0.6	2%
Hispanic	18.4	24.0	30%	23.4	27%	0.5	2%
Non-Hispanic	20.0	27.1	36%	26.5	33%	0.6	2%

Average Off-Peak Auto Travel Time to CBD (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	%Saved
All	16.7	18.4	10%	18.2	9%	0.2	1%
Minority	14.6	15.7	7%	15.5	6%	0.2	1%
Non-Minority	17.4	19.4	11%	19.2	10%	0.2	1%
Poverty	13.3	14.3	8%	14.2	7%	0.2	1%
Non-Poverty	17.4	19.2	11%	19.0	10%	0.2	1%
Elderly	16.9	18.6	10%	18.4	9%	0.2	1%
Non-Elderly	16.7	18.4	10%	18.2	9%	0.2	1%
Disabled	15.5	17.0	10%	16.8	8%	0.2	1%
Non-Disabled	16.8	18.6	11%	18.4	9%	0.2	1%
Hispanic	15.6	16.7	7%	16.5	6%	0.2	1%
Non-Hispanic	16.7	18.5	11%	18.3	9%	0.2	1%

Average Peak Transit Travel Time to CBD (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	%Saved
All	55.2	60.8	10%	59.9	9%	0.9	2%
Minority	52.5	57.6	10%	56.9	8%	0.7	1%
Non-Minority	56.3	62.3	11%	61.3	9%	1.0	2%
Poverty	46.7	51.1	9%	50.0	7%	1.1	2%
Non-Poverty	57.2	63.4	11%	62.6	9%	0.8	1%
Elderly	55.7	61.3	10%	60.4	8%	0.9	1%
Non-Elderly	55.1	60.8	10%	59.8	9%	0.9	2%
Disabled	52.9	58.1	10%	57.2	8%	0.9	2%
Non-Disabled	55.5	61.2	10%	60.3	9%	0.9	2%
Hispanic	54.1	59.0	9%	57.8	7%	1.2	2%
Non-Hispanic	55.2	60.9	10%	60.0	9%	0.9	2%
Zero car households	45.5	49.7	9%	48.4	6%	1.3	3%

Average Off-Peak Transit Travel Time to CBD (minutes)

	2014	2035 No Build	% Inc Over 2014	2035 TIP	% Inc Over 2014	v.s. 2035 No-Build Min Saved	%Saved
All	66.6	67.2	1%	65.8	-1%	1.3	2%
Minority	62.6	62.8	0%	61.2	-2%	1.7	3%
Non-Minority	68.4	69.4	1%	68.1	0%	1.3	2%
Poverty	56.2	56.6	1%	54.8	-3%	1.7	3%
Non-Poverty	69.5	70.5	1%	69.1	-1%	1.4	2%
Elderly	68.3	68.7	1%	66.1	-3%	2.6	4%
Non-Elderly	66.4	67.0	1%	65.8	-1%	1.2	2%
Disabled	63.4	63.7	1%	62.2	-2%	1.5	2%
Non-Disabled	67.0	67.7	1%	66.4	-1%	1.3	2%
Hispanic	65.3	65.4	0%	64.8	-1%	0.6	1%
Non-Hispanic	66.7	67.3	1%	65.9	-1%	1.4	2%
Zero car households	55.0	55.2	0%	53.0	-4%	2.2	4%

Percent of Population with Access to CBD by Transit in the Peak Hours

	2014	2035 No Build	2035 TIP
All	90%	86%	84%
Minority	96%	94%	93%
Non-Minority	88%	83%	81%
Poverty	97%	95%	95%
Non-Poverty	89%	84%	82%
Elderly	90%	85%	83%
Non-Elderly	90%	86%	84%
Disabled	93%	90%	88%
Non-Disabled	90%	85%	83%
Hispanic	96%	93%	92%
Non-Hispanic	90%	85%	84%
Zero car households	98%	97%	97%

Percent of Population with Access to CBD by Transit in the Off Peak Hours

	2014	2035 No Build	2035 TIP
All	83%	78%	79%
Minority	93%	90%	89%
Non-Minority	80%	74%	75%
Poverty	95%	93%	93%
Non-Poverty	81%	75%	76%
Elderly	83%	78%	78%
Non-Elderly	83%	78%	79%
Disabled	89%	85%	85%
Non-Disabled	83%	77%	78%
Hispanic	92%	88%	90%
Non-Hispanic	83%	77%	78%
Zero car households	97%	95%	95%

Percent of Vehicle Miles Traveled by Level of Congestion during Peak Hours

	Level of Congestion	**2014**	**2035 No Build**	**2035 TIP**
All	Moderate + High	9.2%	18.7%	17.1%
	High	2.2%	6.2%	5.6%
Target Area	Moderate + High	15.9%	25.1%	22.7%
	High	4.2%	9.0%	8.0%
Non-Target Area	Moderate + High	6.9%	16.9%	15.5%
	High	1.6%	5.4%	4.9%