

FROM NO-BUILD TO ALL-BUILD

Analyzing a Continuum of Transportation Scenarios for the National Capital Region

Report on Phase I of the Long-Range Plan Task Force

November 2016

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National Capital Region
Transportation Planning Board

FROM NO-BUILD TO ALL-BUILD: ANALYZING A CONTINUUM OF TRANSPORTATION SCENARIOS FOR THE NATIONAL CAPITAL REGION

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The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 22 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

CREDITS

Report Authors: John Swanson and Lori Zeller

Technical Analysis and Project Development: Dusan Vuksan, Feng Xie, Andrew Austin, Charlene Howard, Jane Posey, Lori Zeller, John Swanson

Senior Advisors: Kanti Srikanth, Robert Griffiths, Ronald Milone, Lyn Erickson

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BACKGROUND

Twenty-five years ago, federal legislation fundamentally changed the way that planning bodies like the TPB do business. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 required Metropolitan Planning Organizations (MPOs) to develop financially constrained long-range transportation plans that would only include projects for which funding is “reasonably anticipated to be available.” The TPB’s Constrained Long-Range Plan (CLRP) is a legacy of that federal mandate.

The TPB developed its first CLRP under the new rules of ISTEA in 1994. Since that time, updates of the plan have only included projects that are expected to be funded. That means the CLRP truly is a reflection of the priorities of the TPB’s member jurisdictions. But it also means the plan does not offer a picture of what the region has collectively determined it wants the future to look like; rather it is a forecast of what can be expected, given anticipated revenues. Increasingly, those revenues are expected to be tight and the CLRP’s anticipated performance has been less than inspiring. Over the years, TPB members have frequently expressed concerns with the forecast performance of the CLRP, mainly with respect to worsening roadway congestion.

Federal law requires MPOs to develop financially constrained plans, but it does not prohibit regions from also developing larger regional plans that include unfunded or “aspirational” components. Indeed, most large MPOs in the United States currently develop long-range plans that comprise both funded and unfunded elements. Since the passage of ISTEA, however, the TPB’s long-range plan has only included “funded” projects.¹

That pattern is now set to change. Through the work of its Long-Range Plan Task Force, the TPB has embarked upon a set of planning activities that will culminate in the approval in 2018 of a long-range transportation plan that for the first time will highlight unfunded priority projects that the region will jointly agree are important to our future—and worth pushing for. This report, from Phase I of the task force’s work, represents a first step in that new planning process.

Looking beyond the CLRP

The year 2014 saw the development of a CLRP update that again received mixed reviews from many TPB members. As in previous years, analysis of the plan predicted that road congestion and transit crowding would increase significantly in the coming decades. At the same time, the plan did better in some measures, including growth in the share of transit and non-motorized trips, and declines in levels of criteria pollutants. Nonetheless, board members noted that of the approximately \$250 billion in investment included in the 2014 CLRP, about 83 percent was to be spent on system maintenance and only 17 percent for system expansion. Relative to the forecast growth in demand for mobility and accessibility, the proposed capital investment was noted to be inadequate, leading to system performance that could be less than desirable for some key measures.

Concerns about the CLRP contrasted with the aspirations of the Regional Transportation Priorities Plan, a new policy guide that the TPB approved in January of 2014. The Priorities Plan called upon the region to implement common-sense strategies to improve mobility and accessibility over the

¹ The documentation for the CLRP includes a database with projects classified as “studies” that do not currently have anticipated funding. However, these studies are not coded and modeled for performance analysis or air quality conformity.

coming decades. Some TPB members argued that was time to use the new Priorities Plan to promote the implementation of projects that could make a positive difference in transportation system performance.

In September 2014, the TPB asked staff to compile an unfunded capital needs inventory that would encompass transportation projects that have been included in the plans of TPB member jurisdictions but have not been submitted for the CLRP due to lack of anticipated funding. At that time, TPB members asked staff to analyze this master list in order to better understand the opportunities for improved system performance. In October, the TPB's Citizens Advisory Committee passed a resolution supporting the TPB's request to develop an inventory of unfunded projects. The CAC also asked that the list be made available for use in public outreach and other regional planning activities.

The TPB staff issued a solicitation in February 2015 for project inputs for the inventory. This solicitation specified that submitted projects should: 1) affect regional travel and 2) be in state, local, and regionally approved plans, but 3) they should not currently be in the CLRP due to lack of anticipated funding.

The list of unfunded transportation network improvement projects in the final inventory comprise more than a thousand projects including a large number small-scale bicycle and pedestrian facility improvement projects as well as over 550 highway and transit projects.

Task force work plan

As the inventory was being assembled, TPB leaders discussed how it might be used. In July of 2015, TPB Chairman Phil Mendelson established an Unfunded Capital Needs Working Group to 1) oversee the completion of the draft inventory and 2) develop a scope of work for regional planning activities that will use the inventory as the basis for analysis and outreach.

In the fall of 2015, the working group, led by TPB members Bridget Newton and Jonathan Way, oversaw the completion of the inventory and approved a work plan in November that was presented to the TPB in January 2016. Deciding that they did not want their work to "sit on a shelf," the group determined that, for the first time, unfunded capital needs would be incorporated into the next major update of the region's long-range transportation plan, scheduled for approval in 2018. Reflecting this new emphasis, the working group was renamed the Long-Range Plan Task Force in April 2016. The group also decided that after a full analysis of the inventory was conducted, the next phase of their work would focus on the development of a smaller set of unfunded projects with the greatest potential to improve mobility, accessibility and equity.

The work plan for the task force comprises the following three phases, which were to be conducted over three years, between FY 2016 and FY 2018:

- **PHASE I: DEVELOP A BASELINE REPORT**

To provide a context for future priority setting, Phase I would examine three scenarios of the region's long-term (2040) transportation system performance. All three scenarios would use the same land-use forecasts of population and job growth for 2040 (Round 8.4 Cooperative Forecasts), but would provide very different transportation inputs:

- *No-Build* – Includes only those projects that were on the ground in 2015. It includes none of the capital improvements in the current CLRP (as of 2015).
- *Planned-Build* – Includes projects planned to be built and implemented between 2015 and 2040 that are included in the current CLRP (as of 2015).
- *All-Build* – Includes all of the unfunded capital improvements inventoried by the TPB, in addition to projects included in the Planned-Build Scenario.

- **PHASE II: DEVELOP A PLAN OF UNFUNDED REGIONAL PRIORITY PROJECTS**

In FY 2017, the task force will oversee planning activities that will identify a limited set of priority projects that will address deficiencies in the CLRP and will help the region meet the goals and objectives of the TPB's Regional Transportation Priorities Plan.

- **PHASE III: INCORPORATE UNFUNDED PRIORITY PROJECTS INTO THE REGION'S LONG-RANGE TRANSPORTATION PLAN AND PROMOTE IMPLEMENTATION**

The three-year process will culminate in a new long-range transportation plan, which will be approved in 2018. This plan will be designed to reflect the region's aspirations for the future. Compared to the current CLRP, the new long-range plan will be redefined to include unfunded priorities as well as a constrained element.

This report represents the conclusion of Phase I of the work plan described above. It comprises analysis of the No-Build Scenario, which was presented to the Long-Range Plan Task Force in April 2016, and the All-Build Scenario, which was presented in September 2016. The Planned-Build Scenario, which is equivalent to the 2015 CLRP, was approved by the TPB in November 2015.

SCENARIOS: PURPOSE AND DESCRIPTION

The scenarios in this study comprise the outer bounds for understanding what new transportation capacity could potentially achieve over the next 25 years. The No-Build Scenario essentially asks: “What if we built nothing between now and 2040 – not even the projects in the CLRP?” And, in sharp contrast, the All-Build alternative asks: “What if we built all the major transportation projects included in the approved plans of the region’s local, state and sub-regional governments?”

Clearly, neither of these scenarios is likely to come true. Although funding is tight, a No-Build future would be highly unlikely. And the All-Build Scenario, with its massive price tag, is equally far-fetched. So why bother to analyze these extreme visions of 2040?

The purpose of looking at these two “bookend scenarios” is to provide context for future decision making and to establish parameters to aid in the identification of a smaller list of priority projects. On one extreme, the All-Build scenario serves as a fully unconstrained list of transportation projects that represents jurisdictions’ “wish lists” of projects that would expand capacity along with the forecasted growth in population and employment. On the other extreme, the No-Build scenario serves as a baseline case where no new investments would be made, but our region’s population and employment would still grow. By comparing these two scenarios to the performance of our present-day transportation system as well as in comparison to our regional commitment to the Planned-Build scenario to which the region is currently committed in the form of the 2015 CLRP, we can see how the different levels of investment produce some vast differences in system performance. These results are meant to help shape the task force’s aim of selecting a smaller, targeted set of projects to improve regional performance. These scenarios will be folded directly into the TPB’s 2018 long-range transportation plan, providing context for the new planning activities to come.

Land-use and transportation inputs

The scenarios were framed around the following inputs:

- Land Use – In order to isolate the impacts of transportation system capacity, the study used the same land-use forecasts for No-Build, Planned-Build, and All-Build scenarios. These forecasts are updated on a regular basis through the Cooperative Land-Use Forecasting Program at COG which combines regional data (based upon national economic trends and regional demographics) with local projections of population, households and employment.

The study used the Round 8.4 Cooperative Forecasts, which were available in early 2016 at the time of the analysis. These forecasts assume population growth of 24% and employment growth of 36% by 2040.

- Transportation – Different packages of transportation projects were identified for each of the three scenarios.
 - No-Build – This scenario includes the facilities that were in place as of 2015. It does not include the new capital improvements in the CLRP (based on the 2015 CLRP amendment) that would be built between today and 2040. For example, the No-Build

package includes the Metrorail Silver Line Phase I extension to Wiehle Avenue, which opened in 2014, but it does not include the Silver Line Phase II extension to Dulles Airport and into Loudoun County.

- Planned-Build – This scenario is synonymous with the version of the CLRP that was approved in 2015, which at the time of the analysis for this study was the TPB’s most recently approved long-range plan.² The scenario includes all unbuilt projects in the CLRP. Again, these projects have been included in the CLRP because project sponsors anticipate they can be funded. Continuing the example from above, the Planned-Build Scenario would include Phase II of the Silver Line.
- All-Build – This all-encompassing scenario includes a comprehensive inventory of unfunded capital needs, which was compiled by TPB staff. It was designed to include all the major transportation projects in the plans of the TPB’s member jurisdictions, even if those projects are not currently anticipated to be funded. More information about the process for compiling this inventory is provided below.

Compiling the All-Build inventory

TPB staff issued a solicitation for project inputs for the All-Build Scenario in February 2015. The solicitation was distributed through the TPB Technical Committee. Throughout 2015, staff worked to refine the inventory. The threshold requirements for submissions stipulated that projects should 1) affect regional travel and 2) be in state, local, and regionally approved plans, but 3) are not currently in the CLRP.

The identification of unfunded projects was not a clear-cut task. Projects that are included in local and state plans are often conceptual, particularly when their proposed construction is long-term and full agreement about necessary implementation steps is still in the distant future. Such long-term aspirational projects often do not have identified geographic alignments or details regarding mode.

Further, the various jurisdictions of our region have different planning mechanisms for identifying unfunded capital needs. In developing the inventory, staff worked to ensure consistency among the states and jurisdictions in the types of projects included in the inventory. Earlier versions of the draft list showed far fewer projects in Maryland in comparison to the District of Columbia and Virginia because of the different ways that member jurisdictions approached this exercise. The District and members in Virginia essentially submitted all the projects in their respective plans, while jurisdictions in Maryland largely submitted only those projects from their plans that had been designated as priorities in their annual “priority letters” submitted to the Maryland Department of Transportation (MDOT). Thus, initially there were fundamental differences in the source documents and the types of unfunded projects that were submitted by the Maryland and Virginia jurisdictions creating an imbalance in the number of projects and the potential cost of the unfunded needs. To address this imbalance, TPB staff and MDOT staff decided to include all the long-term unfunded projects in the Highway Needs Inventory of the State Highway Administration (SHA). The inclusion of these projects

² New road and transit projects that will be added in the 2016 CLRP Amendment were not included in the Planned-Build Scenario for this study, but they were included in the All-Build Scenario. The 2016 CLRP Amendment was scheduled for approval in November of 2016.

provided an unfunded project listing for Maryland jurisdictions more similar to those lists provided by the District of Columbia and Northern Virginia jurisdictions.

Developing cost information for projects was another challenge. MDOT noted that the unfunded projects in the Maryland SHA Highway Needs Inventory did not have cost estimates attached to them. In addition, many of the unfunded project submissions received from other jurisdictions did not have cost estimates attached to them. Staff suggested that rather than attach specific cost estimates to individual projects, the projects could be put into groups of similar size and scale, and cost ranges could be established for those types of projects. More detail about cost estimation can be found below.

Finally, TPB staff grappled with the way in which bicycle and pedestrian projects would be included in the list. As an expression of regional priorities, the projects in the TPB's Bicycle and Pedestrian Plan were added to the list. Additional submissions of bike/ped projects by individual submissions were also included in the inventory.³

Specifying project details

After the preliminary inventory was compiled, staff noted gaps in project details that required further attention. In many cases, projects were derived from plans with long-term time horizons and thus, individual projects were often conceptual and insufficiently specified. Staff needed to elaborate project details for inclusion in the travel demand analysis that formed the basis for the study's findings.

In the spring of 2016, project submitters were asked to fill in some of the missing project details such as number of lane miles, roadway facility type, and transit service characteristics (e.g., headway, run time). In situations in which submitting agencies did not provide the information requested, TPB staff used "default criteria and rules" to develop the missing project specifications. Default specifications included number of lanes, and transit route headways and run times, and other features.

Cost estimates for the study were developed as planning-level calculations based on concept-level details only. As previously noted, project cost estimates were provided by implementing agencies for some projects, but not for others. Where available, the number and length of lane-miles added was used with a unit cost estimate to calculate a planning level cost for projects where that data was not available. For projects where cost or length data were not available, projects were matched with similar projects that did have cost estimates to develop a planning level order of magnitude cost estimate. To account for these variations in project cost estimates, all projects were assigned to a cost range, rather than a specific cost.

In finalizing the project details, TPB staff reviewed dozens of local, state and sub-regional plans and held individual meetings with the TPB's partners. Throughout this process, staff worked to refine the list of unfunded projects in order to achieve the highest possible level of accuracy and consistency across jurisdictions in the representation of projects. However, it should be recognized that the inventory used for the All-Build Scenario is essentially in a permanent draft state. Therefore, it should not be viewed as a final product, but as a resource for regional discussion and analysis.

³ As noted later in this report, bicycle and pedestrian projects for the most part are not modeled for regional travel demand forecasts.

Tools and measures for analysis

For many years, TPB staff has used a series of standard transportation evaluation measures—such as mode choice, vehicle miles of travel, levels of congestion, and access to jobs— to evaluate the forecast impacts of the CLRP. For this analysis, these measures were applied to groups of strategies from the Regional Transportation Priorities Plan, which are described in the next section.

TPB staff used its travel demand forecasting models to analyze both the No-Build and All-Build scenarios. Forecast for the Planned-Build Scenario were done in 2015 as part of that year’s CLRP Amendment. In addition, staff used GIS and other means for this study to analyze All-Build inventory inputs. For example, such analysis included as identifying changes in the number of jobs or households that will be in proximity to transit.

All-Build overview

The final list used for the All-Build Scenario comprised more than 550 new projects. In comparison, the Planned-Build Scenario (based upon all the projects included in the 2015 CLRP Amendment) included 372 new projects.

Figure 1: Overview of Planned-Build and All-Build Scenario Inputs

2015 to 2040	Planned Build (PB)	All-Build (AB)
Population Growth	24%	24%
Employment Growth	36%	36%
New transportation projects	372	550 <i>additional</i>
Capital funding for new projects	\$42 billion - \$27 billion - highway - \$15 billion - transit	\$70-100 billion <i>additional</i> - \$25-55 billion - highway - \$45 billion - transit

The All-Build inputs were drawn from 33 plans and other sources from jurisdictions throughout the region.⁴ Some of the key sources include the Northern Virginia Transportation Authority’s “TransAction 2040” plan, WMATA’s “Momentum” and “Connect Greater Washington” plans, the District of Columbia’s “moveDC” plan, the Joint Transportation Priorities Letters from Charles, Frederick, Montgomery, and Prince George’s counties in Maryland, and the Highway Needs Inventory

⁴ The full inventory and a list of source documents can be found at: https://www.mwcog.org/assets/1/28/09212016_-_AB_Project_List.pdf

A GIS map of the projects can be found at: <https://gis.mwcog.org/webmaps/tpb/lrptf/allbuild/>

of the Maryland State Highway Administration (SHA). Jurisdictions also submitted projects derived from various other adopted comprehensive or master plans from the individual counties and cities.

The cost estimates for the new capacity in the All-Build Scenario range from \$70 billion to \$100 billion. Approximately \$45 billion would be needed for new transit, while the cost estimates for the new All-Build highway projects ranged from \$25 to \$55 billion. In comparison, new capacity in the Planned-Build Scenario was estimated at a total of \$42 billion – \$27 billion for roads and \$15 billion for transit.

SCENARIO ANALYSIS

The Regional Transportation Priorities Plan (RTPP), approved in January 2014, is the policy framework that guides the analysis in this report. The Priorities Plan was designed to assist local, state and regional leaders in “thinking regionally and acting locally” – that is, in considering regional needs when identifying transportation improvements to advance to implementation. The RTPP lists the multi-modal goals that were derived from the TPB Vision, which serves as the policy document for the TPB’s transportation plans.

Recognizing that the region’s economy and quality of life depend on our transportation system, the Priorities Plan identified a host of practical strategies to alleviate congestion and crowding and accommodate future growth. The analysis in this study utilizes those strategies as a way to examine different packages of potential transportation improvements.

FRAMEWORK FOR ANALYSIS

The Priorities Plan identified 19 specific strategies with the greatest potential to advance our regional transportation goals. Some of these strategies call for transportation capacity expansion projects (e.g., Express Toll Lanes), which the All-Build and Planned-Build scenarios provide. Other strategies are oriented toward policy or program changes (e.g., support and promote electric vehicles), which are not typically addressed by the scenarios in this report.

To better understand the impacts of the All-Build and No-Build scenarios, TPB staff developed a framework for analysis using the RTPP strategies. The development of this framework included two preliminary tasks to streamline the categories for analysis: 1) those strategies that would be addressed through transportation capacity increases were culled from the full list of 19 strategies, and 2) similar strategies were grouped into categories that could be analyzed in a unified manner.

Five packages of RTPP strategies, listed below, have been given succinct titles (in italics below) that reflect thematic objectives. They form the basis for the analysis in this report.⁵

Transit Improvements

- Provide additional capacity on the existing transit system
- Implement bus rapid transit (BRT) and other cost-effective transit alternatives
- Apply priority bus treatments

Targeted Congestion Relief

- Build/Implement Express Toll Lanes
- Alleviate roadway bottlenecks

Pedestrian and Bicycle Capacity

- Expand pedestrian infrastructure
- Expand bicycle infrastructure

⁵ The following RTPP strategies are not directly addressed by scenario capacity increases, and therefore, they generally were not used in this report’s analysis: ensure maintenance of the transit system; ensure maintenance of roads and bridges; promote system efficiency through management and operations, and the appropriate use of technology; Increase roadway efficiency; concentrate growth in Activity Centers; update and enforce traffic laws; support and promote electric vehicles; promote commute alternatives; and engage and communicate with the public.

Circulation in Activity Centers & Access to Transit

- Improve access to transit stops and stations
- Enhance circulation within Activity Centers

Environmental Justice Communities

- Ensure accessibility for persons with disabilities, low incomes, and limited English proficiency

Transit Improvements

The Priorities Plan called for the development of a wide variety of public transit options— diverse systems that will serve diverse needs throughout our region. The transit strategies in the plan included implementing cost effective transit expansions such as bus rapid transit, providing additional capacity on the existing system, and applying priority bus treatments.

WHAT'S IN THE SCENARIOS?

The Planned-Build Scenario (the 2015 CLRP) is expected to expand the region's high-capacity transit⁶ miles by 22% between 2015 and 2040.

Projects in the CLRP, totaling 64 new transit miles, include Phase II of the Silver Line and the Purple Line between Bethesda and New Carrollton.

The All-Build Scenario would expand high-capacity transit miles (Figure 2) by an additional 150% beyond the projects already in the Planned-Build Scenario. With a total of 368 new transit miles, the scenario includes 33 additional miles of Metrorail, 66 additional miles of light rail, 259 additional miles of bus rapid transit (BRT) and streetcar, and 10 additional miles of commuter rail. It also would widely add priority bus treatments to roads across the region, including the facilities identified in WMATA's Priority Corridor Network. The scenario includes many bold, high-profile projects, such as a Metrorail extension to Centreville, light rail to Charles County, and build-out of Montgomery County's currently planned BRT network.

More fundamentally, the All-Build package of improvements would make sure the existing transit system has the capacity to handle new riders. The scenario would add all the projects featured in WMATA's Momentum Plan for 2025, including all eight-car trains during rush hour, core station improvements, and a new station at Rosslyn. To expand capacity on the existing commuter rail system, the All-Build package would implement a host of other improvements, including major upgrades to Union Station and replacement of the Long Bridge.

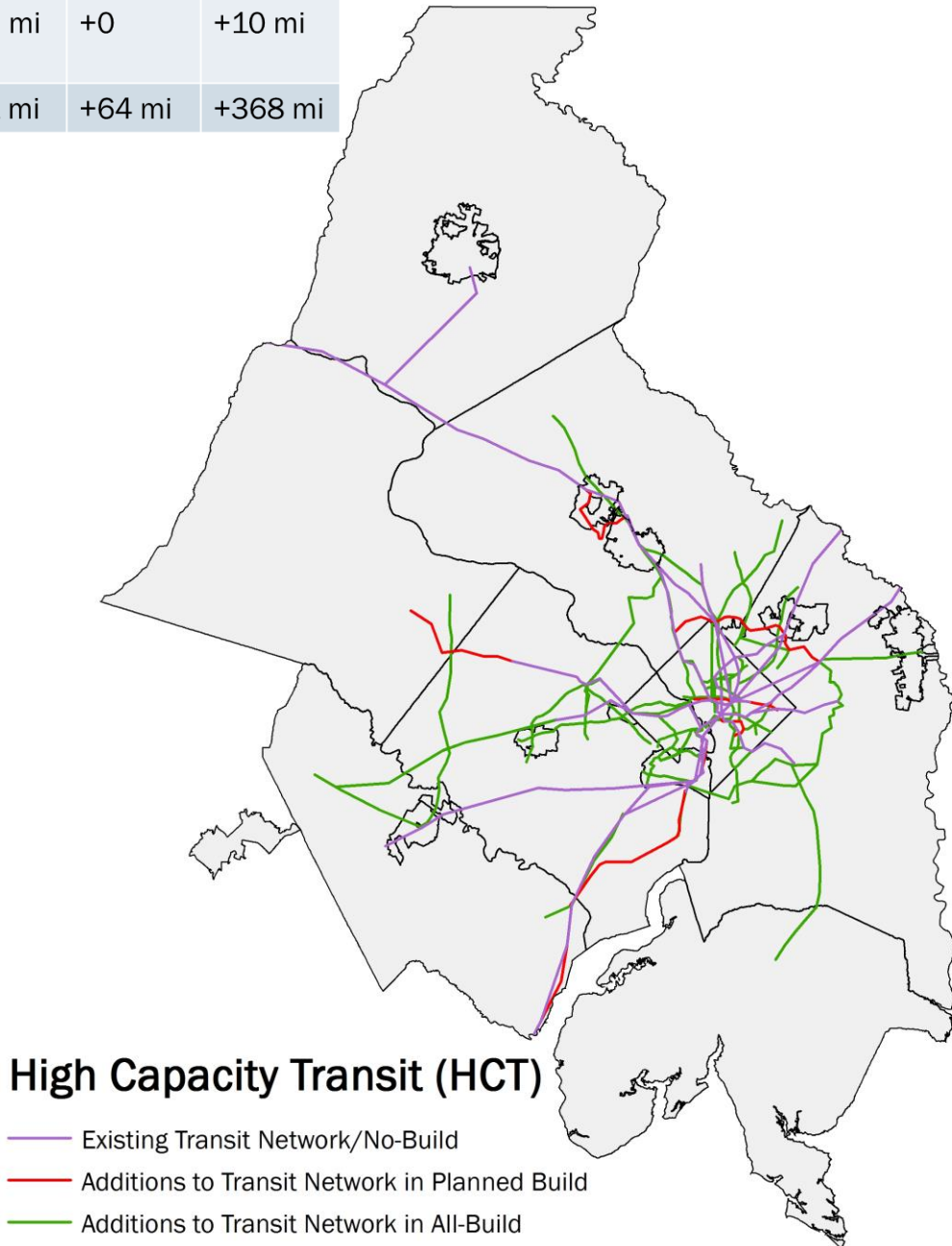
RTTP STRATEGIES:

- **Implement bus rapid transit and other cost-effective transit alternatives.**
- **Provide additional capacity on the existing transit system.**
- **Apply priority bus treatments.**

⁶ "High-capacity transit" was defined to include Metrorail, commuter rail, light rail, streetcar and bus rapid transit.

Figure 2: New Transit in Planned-Build and All-Build

System	Existing	Planned Build	All Build (additional)
Metro Rail	119 mi	+12 mi	+33 mi
Light Rail	0	+16 mi	+66 mi
BRT / Street Cars	5 mi	+36 mi	+259 mi
Commuter Rail	167 mi	+0	+10 mi
TOTAL	291 mi	+64 mi	+368 mi

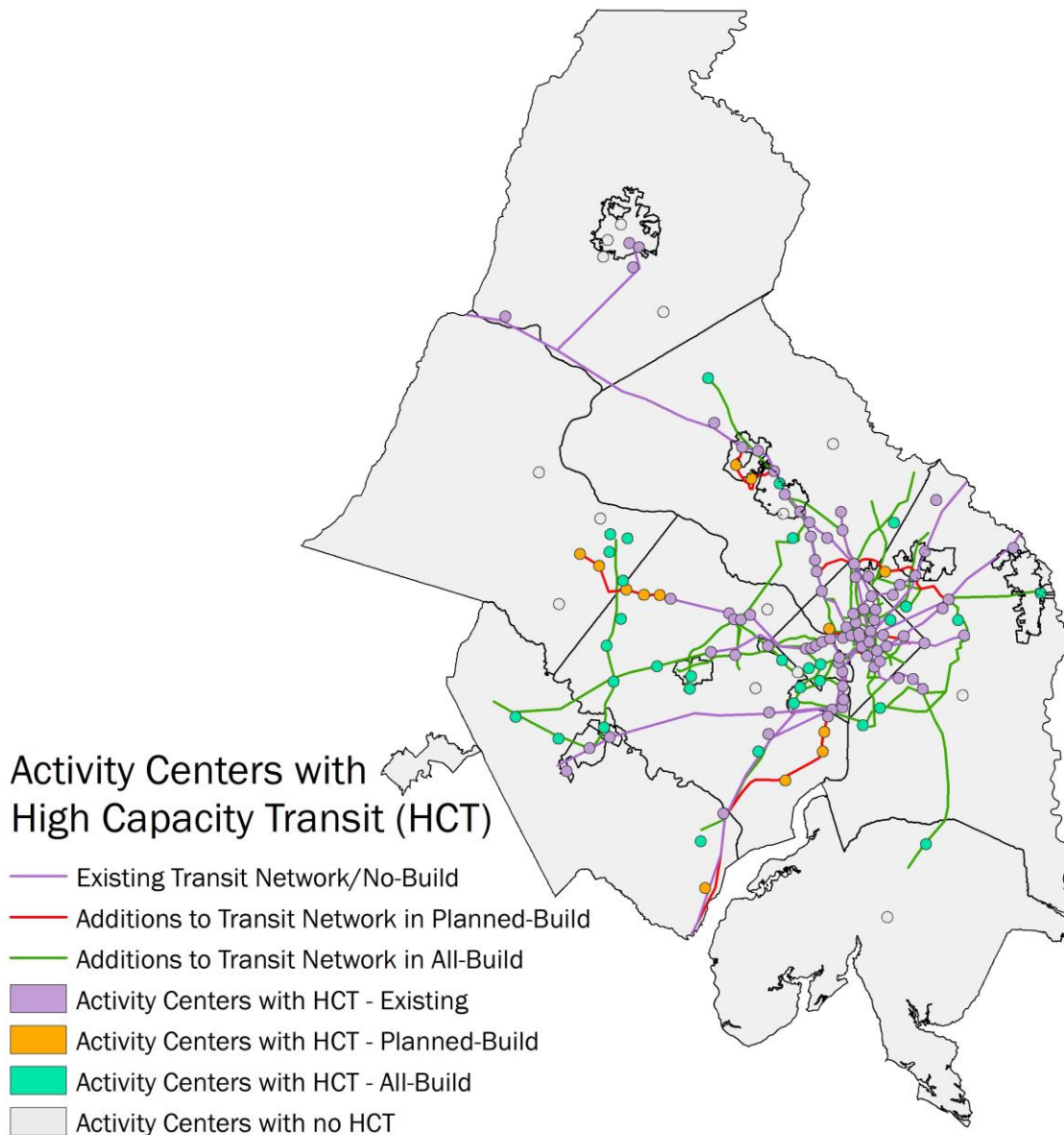


HOW WOULD THE SCENARIOS AFFECT TRANSIT?

Proximity to transit

Under the All-Build Scenario, many more people would live close to high-quality transit (Figure 4). With significant new transit capacity in this scenario, 48% of the region's population in 2040 would live within walking distance of quality transit.⁷ In contrast, the Planned-Build Scenario would provide transit access for 36% of the population, while the No-Build Scenario would provide access to high-quality transit to 31% of the region's people.

Figure 3: Activity Centers with High-Capacity Transit

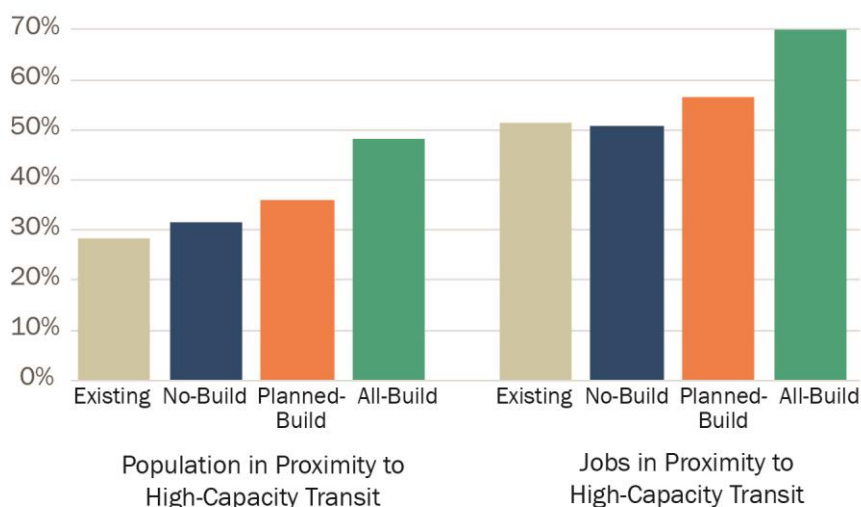


⁷ For this analysis, reasonable proximity was defined as within a mile of rail or within a ½ mile of BRT. This is considered a reasonable walking distance.

Improvements in proximity to jobs are even more dramatic under All-Build. Seven out of ten jobs (70%) would be within walking distance of transit under All-Build, compared to 57% under the Planned-Build Scenario and 51% with No-Build.

As shown in Figure 3, the All-Build Scenario would also significantly increase transit connections to Regional Activity Centers, the region’s economic growth centers. Under All-Build, 91% of Activity Centers will be connected by quality transit. In comparison, 68% of Activity Centers would be served by quality transit under the 2015 CLRP, and 59% would be connected by transit under the No-Build Scenario.

Figure 4: Population and Jobs in Proximity to High-Capacity Transit



Transit ridership

Compared to the other options, the All-Build Scenario would dramatically increase the use of transit over the next 25 years.⁸ In 2040 under the All-Build Scenario (Figure 5), the number of transit trips taken in the region is forecast to be 62% higher than in 2015. This increase in transit use far exceeds the growth in population, which is forecast to increase by 24% over the same period. In comparison, the 2015 CLRP would see an increase of 34% in transit trips, while the No-Build would increase transit trips by 28%.

Single-occupant vehicle (SOV) trips are forecast to experience a reverse trend when comparing the three scenarios. Under All-Build, SOV trips in 2040 will be 11% higher than today, but they would be 15% greater under the CLRP and 16% more under No-Build.

⁸ It is important to note that forecast changes in transit use would not result solely from the transit capacity increases in the various scenarios. Rather, the forecast performance of the 2040 scenarios is the result of systems that synergistically combine land-use and transportation inputs, including road improvements. The discrete effects of transit capacity inputs have not been disaggregated for this analysis.

Figure 5: All Trips - Changes in Solo Driving and Transit

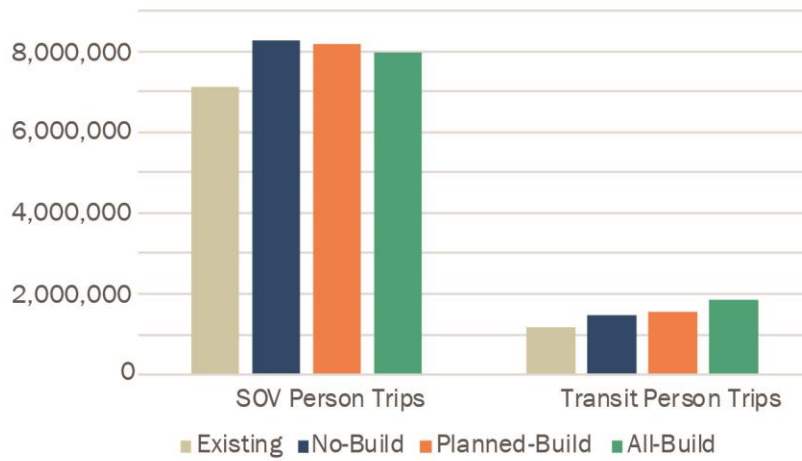


Figure 6: All Trips - Mode Share

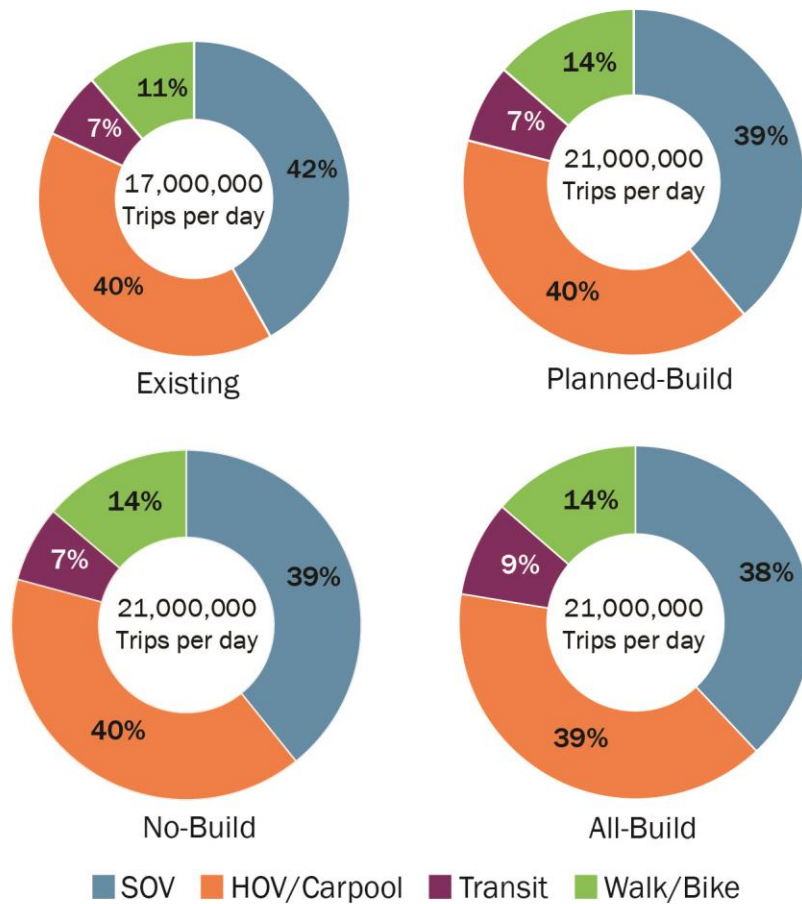


Figure 7: Work Trips - Changes in Solo Driving and Transit

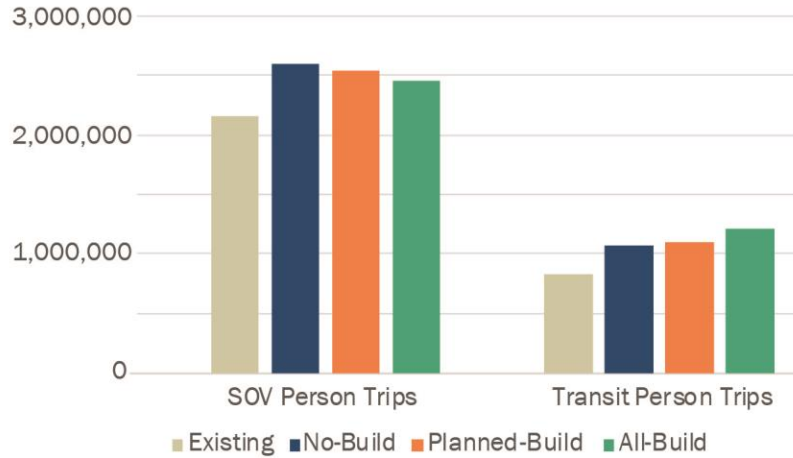
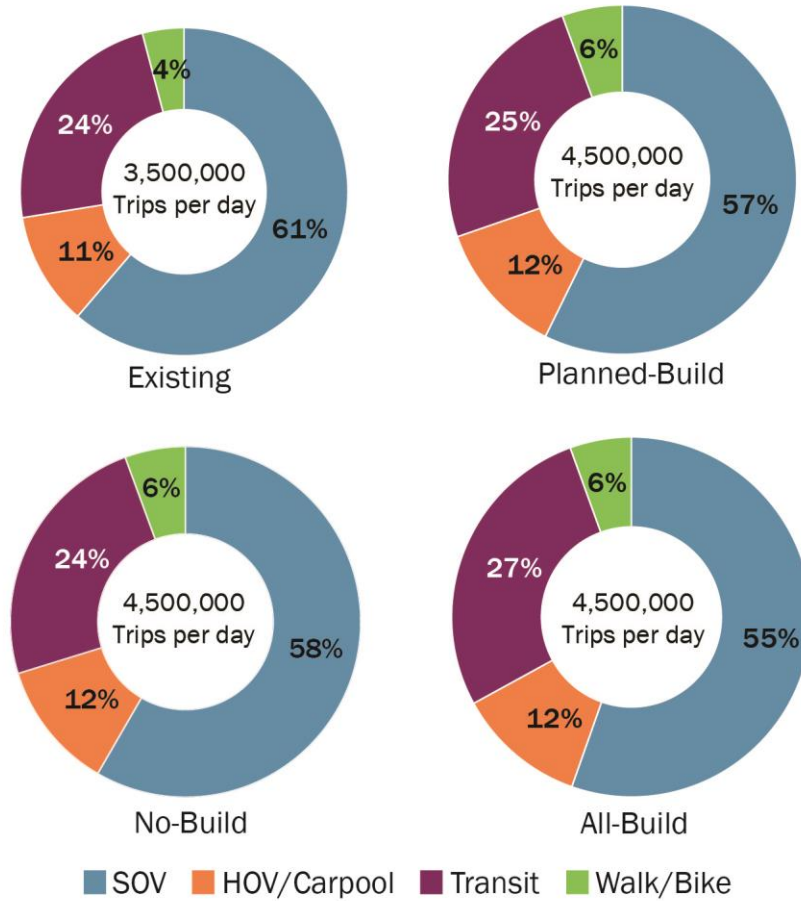


Figure 8: Work Trips - Mode Share



For work trips (Figure 7), transit trips will increase by 47% under All-Build and 33% under Planned-Build. Again, SOV trips would follow a reverse pattern for work trips, increasing 18% under the Planned Build and 14% under All-Build.

Today, the people of the region take an average of 17 million trips every day. In 2040, that number is expected to grow to 21 million. As shown in Figure 6, under the All-Build Scenario, the percentage of all trips (“mode share”) on transit would increase at a small, but significant, rate. Under All-Build, the share of trips on transit will be 9%, compared to a 7.4% mode share for transit under the 2015 CLRP and 7% under No-Build. Transit mode share in 2015 was 7%.

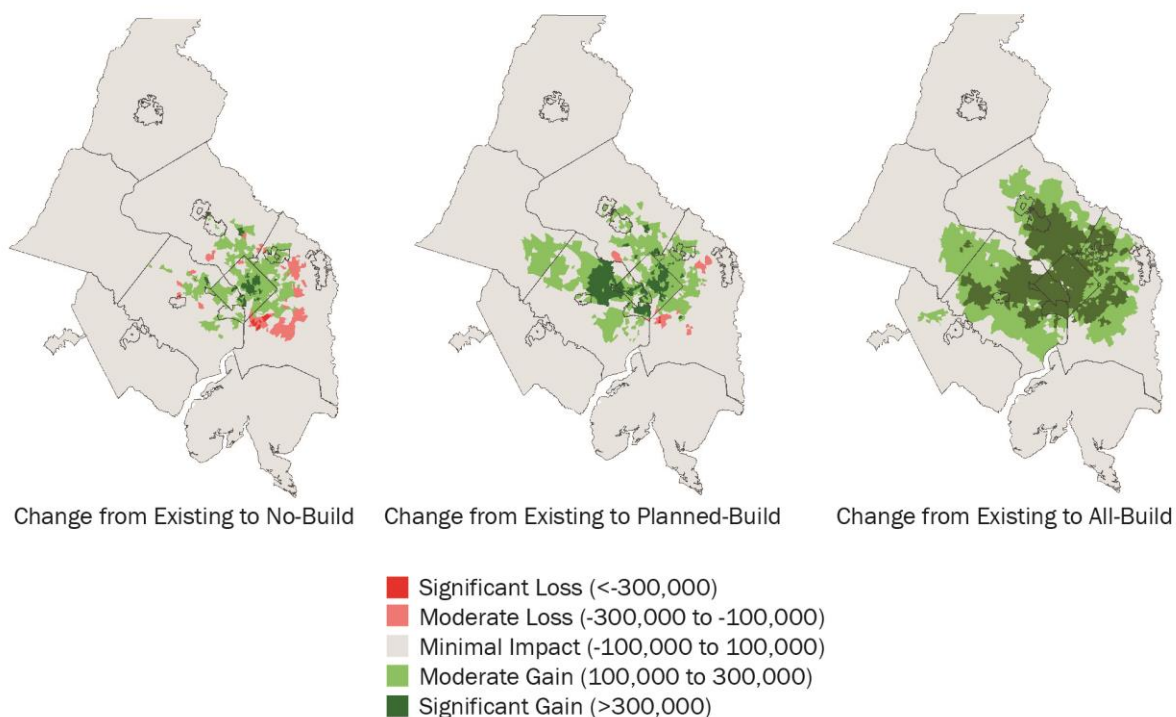
The same trends are found for trips to and from work – and it should be noted that transit ridership already constitutes 24% of commuting trips, a much larger base than for all trips. Figure 8 shows that under the All-Build Scenario, commuting on transit will represent 27% of work trips, compared to 25% under the 2015 CLRP and 24% under No-Build.

Nonetheless, driving will continue to be the dominant mode of travel in 2040. Driving, either alone or in carpools, under all scenarios will continue to constitute the largest share of all trips taken in the region. However, the share of driving trips is smaller under All-Build – by one to three percentage points – than under the CLRP and No-Build scenarios.

Access to jobs by transit

Compared to today, more jobs will be located near transit in 2040, and therefore all three scenarios show some increases in access to jobs by transit within 45 minutes (Figure 9). With the added transit capacity in the Planned-Build Scenario, however, that access will increase significantly, and the gains will be particularly dramatic under the All-Build Scenario.

Figure 9: Access to Jobs by Transit within 45 Minutes



Targeted Congestion Relief

The RTPP focused attention on targeted roadway improvements that provide congestion relief for drivers and support economic productivity. The plan called for expanded use of toll lanes to manage congestion and raise much-needed revenue. It also said the region should strategically target bottlenecks in determining whether to build new road capacity.

WHAT'S IN THE SCENARIOS?

The Planned-Build Scenario (the 2015 CLRP) is expected to expand the region's road network by 1,130 lane miles—a 7% increase between 2015 and 2040. Road projects include express lanes on I-395 and I-66 (inside and outside the Beltway), and widening/HOV construction on I-270.

RTPP STRATEGIES:

- **Build/implement express toll lanes**
- **Alleviate roadway bottlenecks**

The All-Build Scenario would more than double the amount of new lane miles in the Planned-Build—an increase of 14% over today's road network. This package includes 1,175 more lane miles, and out of this additional road capacity, 419 lane miles (36%) would be tolled. The projects include new capacity on the American Legion Bridge, I-270, and the Capital Beltway between Springfield and the Wilson Bridge, as well as county parkways in Loudoun, Prince William, and Fairfax.

The additional road capacity in the All-Build or Planned-Build scenarios have been derived from local and state planning processes that seek to prioritize efforts to reduce congestion and provide relief to bottlenecks. For example, under Virginia's Smart Scale project selection system, congestion mitigation is weighted highest among the factors in the prioritization process.

HOW DO THE SCENARIOS AFFECT CONGESTION AND DRIVING?

Lane miles of congestion

Under the All-Build Scenario, system-wide congestion would still increase, but at a much slower rate than under the other scenarios.⁹ In 2015, during the peak hour of morning congestion, 10% of lane miles in the region were congested. In 2040, under the All-Build Scenario, 12% of lane miles will be congested during the a.m. peak hour. That represents an increase of 32% in congested lane miles during the morning peak.

⁹ As was noted earlier for transit, the changes in congestion and road use that are forecast for different scenarios would not result solely from changes in the region's road network. Rather, the forecast impacts of the 2040 scenarios are derived from synergistic combinations of land-use and transportation inputs, including both road and transit improvements. The discrete effects of road capacity inputs have not been disaggregated for this analysis.

Figure 10: New Roadways and Tolled Roadways in Planned-Build and All-Build

System	Existing (lane miles)	Planned Build (additional lane miles)	All Build (additional lane miles)
Freeways / Expressways	3,549 mi	+444 mi	+453 mi
Arterials	13,396 mi	+686 mi	+722 mi
TOTAL	16,945 mi	+1,130 mi	+1,175 mi

System	Existing (lane miles)	Planned Build (additional lane miles)	All Build (additional lane miles)
Tolled Lane Miles	394 mi	+194 mi	+419 mi
Cordon Charge *	\$0	\$0	\$6

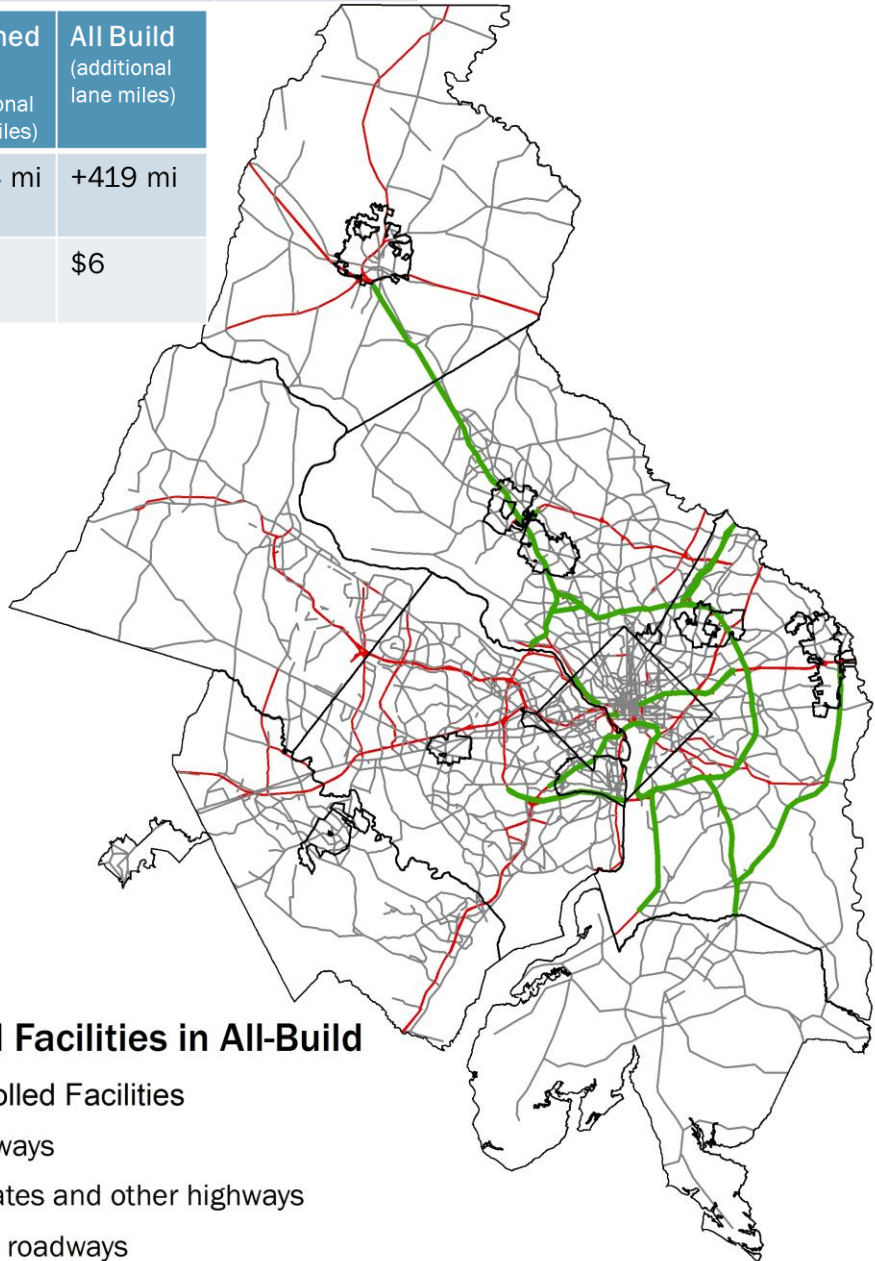


Figure 11: Lane Miles of Congestion (A.M. Peak Hour)

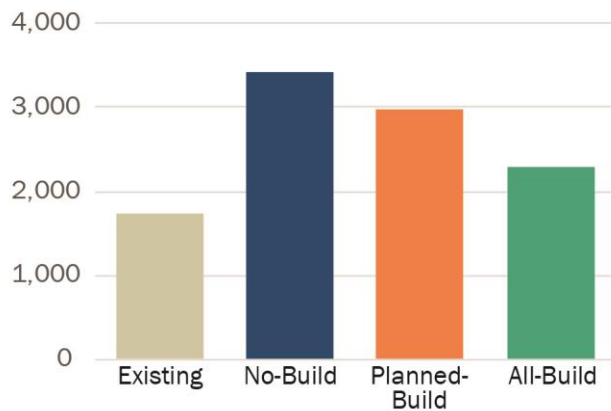
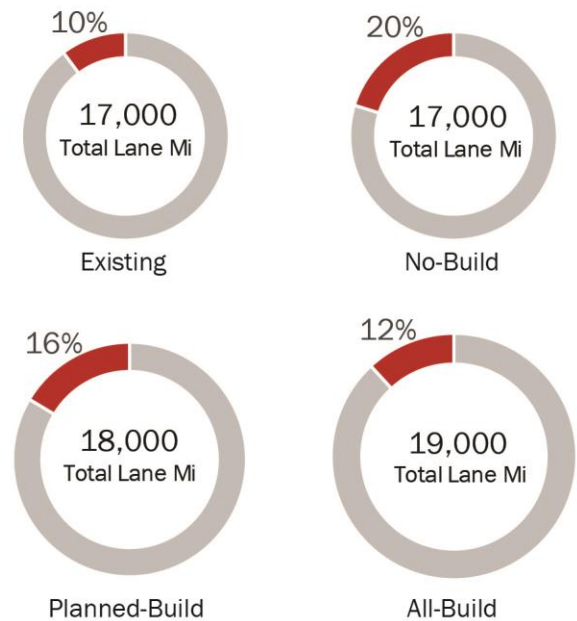


Figure 12: Lane Miles of Congestion (A.M. Peak Hour)

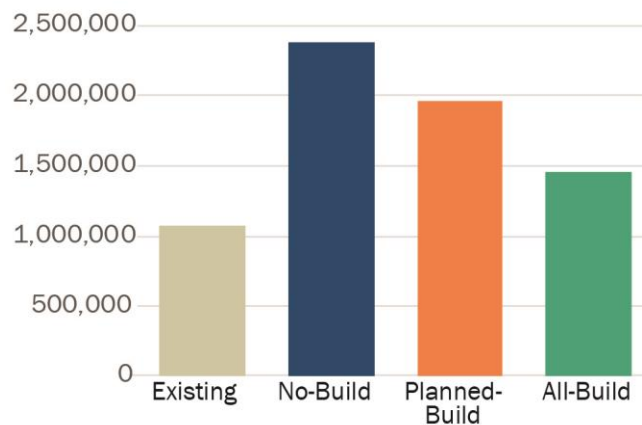


In contrast, the Planned-Build Scenario would increase congestion during the morning peak hour by 72%. More than 16% of lane miles would congested during the morning peak hour under Planned-Build. And if no highway capacity projects were constructed, congested lane miles would nearly double. With the No-Build Scenario, congested lane miles would represent 20% of all lane miles in the region during the morning peak hour, representing a 98% increase between 2015 and today.

Vehicle hours of delay

The trends for time wasted in traffic are similar to the forecasts for lane miles of congestion (Figure 13). Essentially, delay would still get worse under All-Build, but the increase would be dampened.

Figure 13: Total Daily Vehicle Hours of Delay



Under the Planned-Build Scenario, total vehicle hours of delay would increase by 82%. In contrast, under the All-Build Scenario, total daily vehicle hours of delay would increase by 35%.

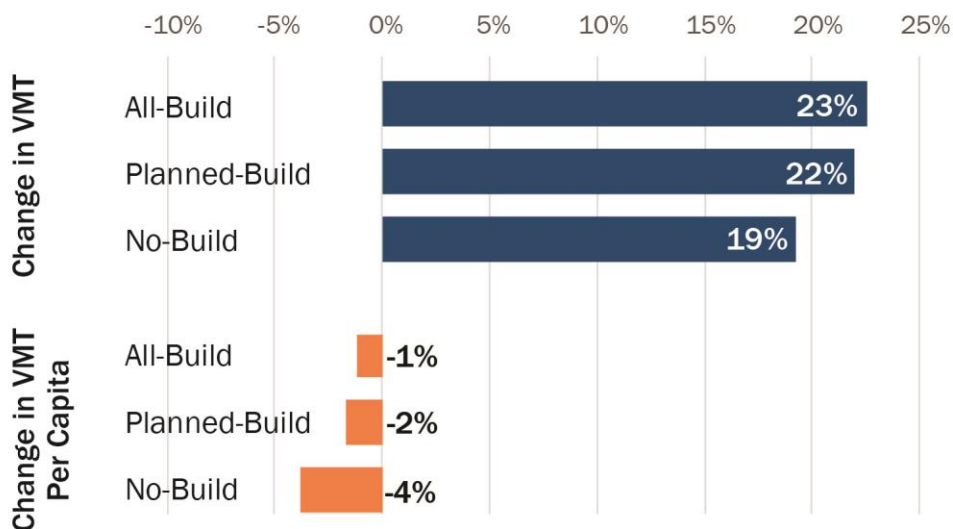
Bottlenecks, a major concern of the Priorities Plan, would be effectively targeted by the All-Build Scenario. In 2015, time wasted in the region’s Top 10 Bottlenecks during peak periods accounted for 25% of total vehicle hours of delay in the entire region. Under the All-Build Scenario, peak-hour delay would be 28% less in bottleneck locations, compared to the Planned-Build Scenario. This comparative reduction (between the Planned-Build and All-Build scenarios) is the same for the bottlenecks as for the system as a whole.

Vehicle miles of travel

The amount of driving in the region, measured as vehicle hours of travel or VMT, would not be significantly affected by any of the scenarios (Figure 14). Under the All-Build and Planned-Build scenarios, VMT would increase slightly slower than population growth. Therefore, VMT per capita will decrease slightly.

With more forecast congestion, the No-Build Scenario would see the smallest increase in VMT—19% between now and 2040, representing a 4% reduction in VMT per capita.

Figure 14: Vehicle Miles of Travel: Total and Per Capita

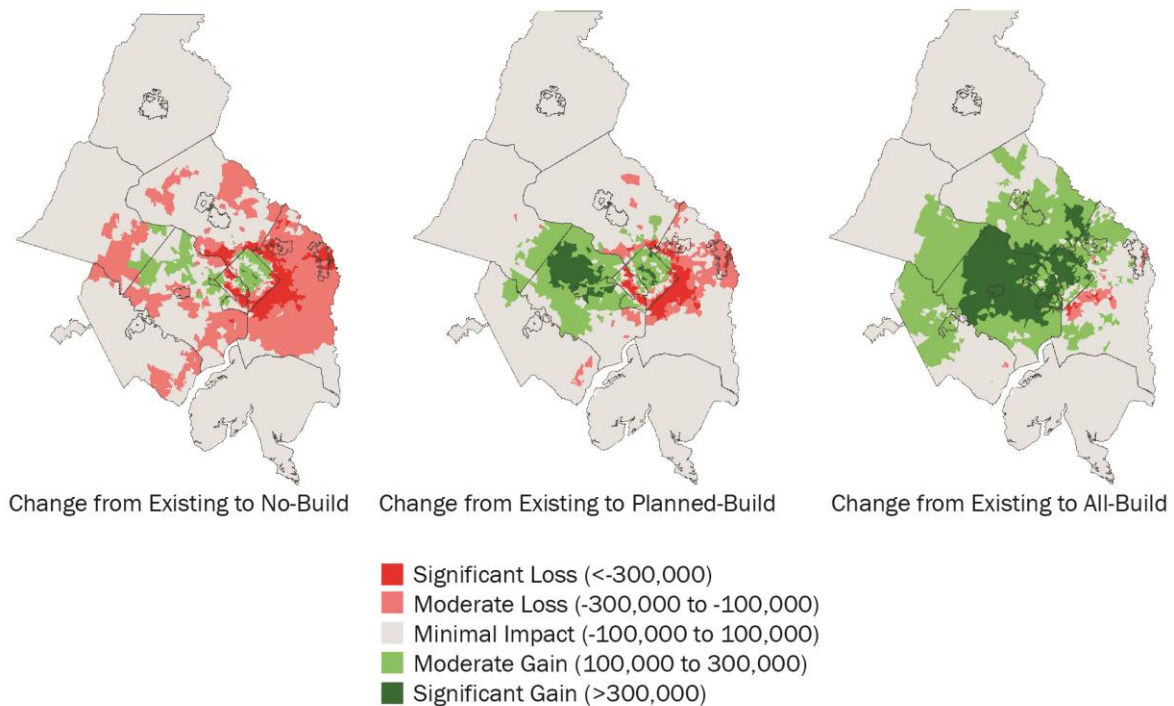


Access to jobs by automobile

Under the Planned-Build Scenario, many parts of metropolitan Washington, mainly on the eastern side of the region and the inner suburbs, will see declines in access to jobs by auto within a 45-minute commute (Figure 15). These declines are likely the result of anticipated increases in roadway congestion and the fact that more of the new jobs anticipated between now and 2040 are forecast to be located on the western side of the region, more than 45 minutes from many locations on the eastern side.

By significantly expanding roadway capacity, the All-Build Scenario would largely mollify losses in job access by auto that were forecast under the Planned-Build Scenario. It is important to note that these access increases are not a result of land-use factors since the same land-use forecasts were used for both future scenarios. Conversely, if we build no new transportation capacity, as shown in the No-Build Scenario, the region could expect an acute decrease in access to jobs by auto.

Figure 15: Access to Jobs by Auto Within 45 Minutes



Pedestrian and Bicycle Capacity

The Priorities Plan called for the region to make walking and biking more viable for more people. Accordingly, the plan called for the expansion of non-motorized transportation facilities.

WHAT'S IN THE SCENARIOS?

The No-Build scenario includes the region's existing 645 miles of non-motorized bike trails and off-road/separated paths. Bike lanes and shared roadways were excluded from this inventory in order to identify the specific infrastructure which provides opportunities for biking and walking which provide the most access to the most people regardless of age or ability. In addition, the analysis in this section focuses on bike and pedestrian projects that can be quantified region-wide. Unfortunately, throughout the region, there is a lack of data about the presence and condition of sidewalks and other small-scale pedestrian amenities, like crosswalks and curb-cuts. For this reason, off-street trails and paths comprise the All-Build inventory of bicycle and pedestrian projects because data for those is more readily available.

RTTP STRATEGIES:

- Expand pedestrian infrastructure
- Expand bicycle infrastructure

The All-Build Scenario includes unfunded trails and paths from the TPB's Bicycle and Pedestrian Plan,¹⁰ which identifies major bicycle and pedestrian projects the region wishes to carry out by 2040, as well as the projects jurisdictions submitted during the call for unfunded projects. Under the All-Build scenario, there would be 1,340 additional miles of pedestrian and bicycle infrastructure in the region. Those additional miles would add to the existing network of paths and trails, representing an increase of 307%. Some highlighted projects include the New York Avenue Trail in the District of Columbia, the Macarthur Boulevard Bikeway Improvement Segment 3 in Maryland, and the Route 234 Trail from Country Club Drive to Route 1 in Virginia.

There is no Planned-Build scenario for bicycle and pedestrian capacity expansion because the CLRP, which is the basis for the Planned-Build scenario analyzed in other sections of this report, only includes road and transit projects. The CLRP does not typically include a package of funded bicycle and pedestrian projects. Under federal requirements, the CLRP must include projects that may impact regional air quality, as measured through the TPB's travel demand models. Discrete pedestrian and bicycle projects, such as trails, typically do not have such impacts, and thus they are not included in the transportation network that is coded for the CLRP. Therefore, the modeled analysis for the CLRP (Planned-Build Scenario) did not include a package of pedestrian and bicycle, and similarly, the All-Build Scenario travel demand modeling did not include bicycle and pedestrian projects either

HOW WOULD THE SCENARIOS AFFECT PEOPLE WHO WALK OR BIKE?

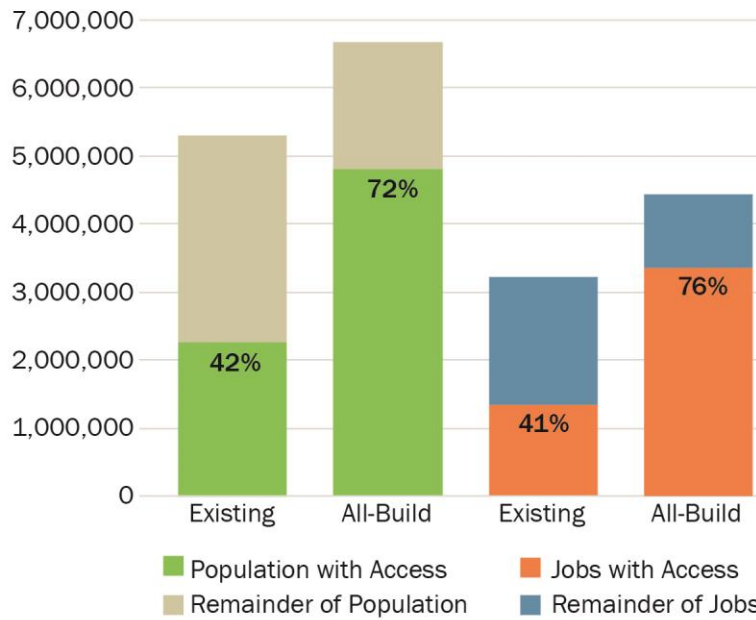
If we build all the Bike-Ped projects in the All-Build Scenario (Figure 16), 72% of people and 76% of jobs will be connected to paths in 2040.¹¹ In comparison, under existing conditions, 42% of people and 41% of jobs are connected to paths. By 2040 our region's population is expected to increase by

¹⁰ The TPB's Bike-Ped Plan can be found at http://www.mwcog.org/store/item.asp?PUBLICATION_ID=503

¹¹ Population and employment numbers come from TAZs which intersected with bicycle and pedestrian paths as described above.

24% but the population’s access to bike and pedestrian paths would increase at a higher rate of 112% under the All-Build scenario. Similarly, by 2040 our regional supply of jobs is expected to increase by 36% but job access to bike and pedestrian paths would increase at a higher rate of 155% under the All-Build scenario.

Figure 16: Population and Jobs with Access to Ped/Bike Paths



Access to Transit & Circulation in Activity Centers

The Priorities Plan called for small capital improvements to promote circulation within Activity Centers and to provide first-mile and last-mile connections to transit. Such improvements typically emphasize walking and bicycling.

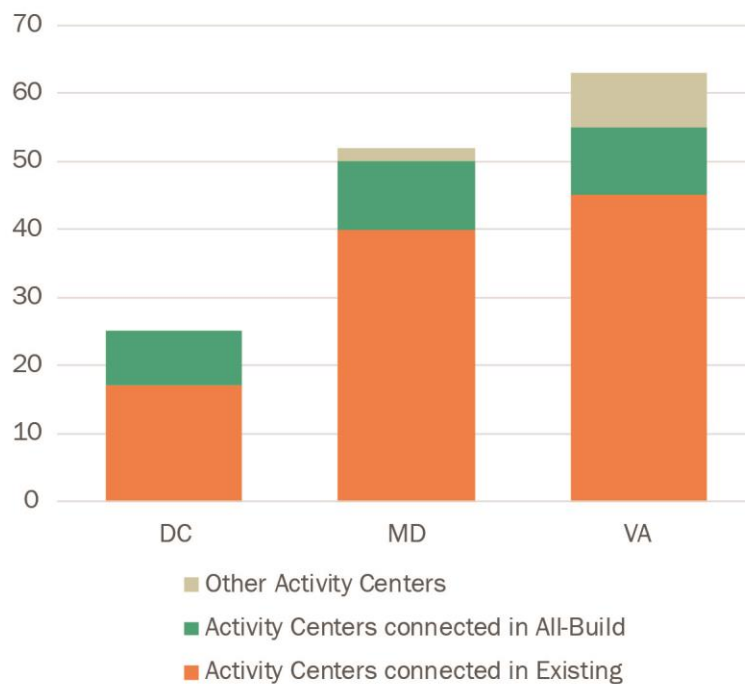
WHAT'S IN THE SCENARIOS?

Bicycle and pedestrian projects in the All-Build scenario will provide additional access to transit in Activity Centers and will also enhance circulation within Activity Centers. Additionally, WMATA provided a dataset from their Metrorail Station Investment Strategy project which contains pedestrian and bicycle projects near Metrorail stations. That dataset contains over 900 miles of pedestrian and bicycle projects and many spot projects or improvements which were gathered from local plans throughout the region. These projects would improve access to Metrorail stations by adding or improving sidewalks, crosswalks, bicycle facilities and other bicycle and pedestrian infrastructure. WMATA's inventory of projects is added to the bicycle and pedestrian paths in the All-Build scenario for the purposes of this section. Similar to the previous section, the No-Build scenario consists of what is on the ground today, and there is no Planned-Build scenario.

RTPP STRATEGIES:

- Improve access to transit stops and stations
- Enhance circulation within Activity Centers

Figure 17: Activity Centers Connected to Ped/Bike Paths & Trails



HOW WOULD THE SCENARIOS AFFECT ACCESS TO TRANSIT?

Under the All-Build scenario, there would be a dramatic increase in Activity Centers connected to high quality paths. Transit stations are frequently located in Activity Centers, where population and jobs are concentrated - new bicycle and pedestrian connections to Activity Centers would connect more people to transit. Under the All-Build scenario 92% of the region's Activity Centers will be connected to regionally significant bike-pedestrian paths, compared to 72% today.

The inventory of bicycle and pedestrian projects near Metrorail stations consists of many projects that would improve the surrounding communities' access to Metro. There are many places throughout the region where homes and destinations are cut off from nearby transit due to a lack of local connectivity or a lack of safe routes to walk or bike. WMATA created an index to identify groups of projects that would have the greatest impact on potential ridership based on factors like safety, and hopes to champion those projects for implementation. One of WMATA's measures looks at projects that are within a half mile of a Metro station, but outside of the station's current half-mile walkshed, meaning that they are located in places that people cannot currently walk due to a lack of connectivity. If all these projects were built, there would be 122 additional miles of sidewalks and paths that are within a half mile of a Metro station in places that were previously unwalkable. This could greatly improve local access to Metro stations and therefore provide greater regionwide access to jobs and other services. The jurisdictions with the greatest length of projects to expand walksheds are Prince George's County (45 miles), Washington, DC (24 miles) and Fairfax County (22 miles).

HOW WOULD THE SCENARIOS AFFECT CIRCULATION WITHIN ACTIVITY CENTERS?

Because most of the bike and pedestrian projects in the All-Build scenario are longer range paths, it is difficult to draw conclusions about how circulation within Activity Centers would be improved. However, WMATA's project inventory of projects to improve access to Metrorail can be used as a proxy for how the All-Build could affect circulation within Activity Centers. The projects in that inventory are meant to improve access to Metrorail stations, many of which are within Activity Centers. If all the projects in WMATA's inventory were built, circulation within many Activity Centers throughout the region could be greatly improved.

Environmental Justice Considerations

The Priorities Plan called upon the region to enhance transportation options for traditionally disadvantaged populations. Such communities are found throughout Metropolitan Washington, although these populations are located in higher concentrations on the eastern side of the region.

FORTHCOMING ANALYSIS

Environmental justice is a theme of the Priorities Plan and will be featured in future scenario analysis. TPB staff is currently developing a revised methodology to conduct an Environmental Justice analysis of the CLRP, which will be released in early 2017. This analysis will identify the impacts of the CLRP – essentially the Planned-Build Scenario – on low-income and minority populations. The new methodology will identify “Communities of Concern” throughout the region. These are locations with high concentrations of low-income and minority populations relative to regional averages. After the “Communities of Concern” map has been approved, staff will analyze the impacts of CLRP transportation investments on these communities compared to the rest of the region. In addition, this methodology will be used to examine the impacts of the All-Build Scenario on traditionally disadvantaged communities.

RTPP STRATEGY:

- **Ensure accessibility for persons with disabilities, low incomes, and limited English proficiency.**

SUMMARY OF FINDINGS

The results of this study raise numerous fascinating questions: What projects were included? What caused certain results? While it is tempting, we must be careful not to directly link our understanding of outcomes to specific projects or types of inputs. The scenarios were analyzed as complete packages and the results are derived from many complex, symbiotic factors.

But on the regional systems level, what do these extreme visions of the future— ranging from “do-nothing” to “do everything”— tell us about the opportunities we face over the coming decades? A few broad observations can be made:

MAJOR CAPITAL INVESTMENTS WOULD MAKE A DIFFERENCE IN MOBILITY

The scenarios show that dramatically increasing the supply of transportation options would significantly change the way people get around in 2040. Under the All-Build Scenario, the number of miles of high-capacity transit would expand by 432 miles— an increase of 150% compared to today. Road capacity would also increase under the scenario— by 14% with the addition of 2,305 new lane miles.

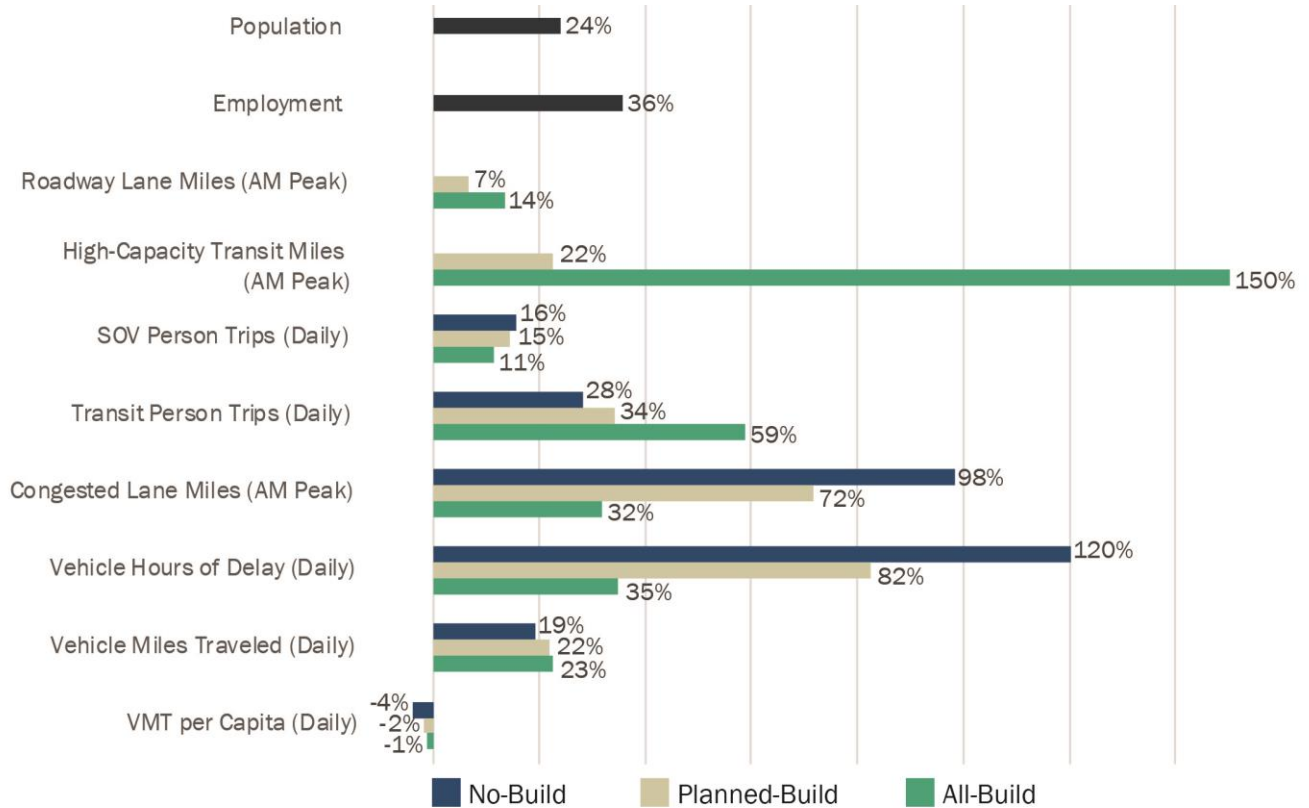
These capacity increases would be felt in a variety of ways. In some cases, they would accelerate positive trends that we already are anticipating. For example, transit ridership is expected to increase relative to today by 34% under the Planned-Build Scenario, but it would grow 59% under All-Build. In other cases, we might see a reversal of negative trends. Access to jobs by auto is forecast to decline for much of the region under the Planned-Build Scenario, but under the All-Build Scenario, more jobs would be accessible by auto in 2040 than today. And in some cases, negative trends might not be reversed, although they would be dampened by the additional capacity in the scenarios. Under the No-Build Scenario, for example, the number of congested lane miles during the morning rush hour would nearly double (98% increase). Under the Planned-Build option, congested lane miles would increase by 72%, while they would increase only 32% under All-Build.

These changes are impressive, especially when considering that the scenarios were based solely on variations in transportation capacity. The analysis did not consider different forecasts for land use, which is a major factor in determining transportation demand.

BUT NEW CAPACITY ALONE WON'T SOLVE OUR PROBLEMS

While it can make a difference, new transportation capacity is not likely to be enough. “We cannot build our way out of congestion” is an oft-repeated phrase that seems to be validated by the analysis in this study. As noted above, the All-Build Scenario would reduce the rate of growth in congestion, but reversing it will be very difficult through new capacity alone.

Figure 18: Changes in System Performance, 2015-2040



Clearly if we want to “solve” our transportation problems we will need to manage transportation demand as well as provide new supply. Making changes in land-use patterns can have a profound impact on demand. As noted earlier, this study did not vary land-use inputs for different scenarios, but it is important to note that the job and population forecasts that were used for all three scenarios show that the region is moving away from the dispersed land-use patterns of the past. Those forecasts indicate that the majority of new growth—76% of new jobs and 59% of new households—will occur in Regional Activity Centers.

Pricing mechanisms, including tolls, could also curtail demand. The All-Build Scenario did feature some major road pricing projects— most notably a cordon charge in downtown D.C. and 419 miles of managed lanes throughout the region. These would be bold changes, although pricing advocates would likely argue that much deeper reductions in driving would be achieved if tolls were established even more pervasively.

One lesson of this analysis might be that we need to temper our expectations when we examine new capacity, and perhaps we need to find new ways to measure success. For example, some participants in the TPB process have suggested certain levels of congestion are acceptable or

perhaps even good as a byproduct of economic vitality. The more useful question for planners could be how to ensure that congestion is not debilitating.

NEXT STEP: IDENTIFYING PRIORITY PROJECTS

This study was framed to include projects that have some level of viability. The All-Build inventory only included capital improvements that were already featured in the approved plans of the TPB's member jurisdictions. Yet even though local and state governments have officially approved the projects in the All-Build Scenario, the likelihood that they will all be constructed in the next 25 years is extremely low. The cost of the scenario— perhaps \$100 billion—is simply too enormous.

The next phase of this planning process will bring together regional leaders, stakeholders, and residents to determine which of the All-Build projects are most urgent and most compelling. The All-Build inventory represents a master list—a source for further planning and discussion. The challenge now is for the region to identify a limited number of projects that we can jointly get behind, demonstrating to ourselves and to each other that we can pro-actively take charge of our future.