

SCENARIO PLANNING REPORT

REGIONAL TRANSPORTATION PLAN: MOMENTUM 2050

April 26, 2021

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EXECUTIVE SUMMARY

Scenario Planning

Scenario planning is a decision-support tool that helps us plan for an uncertain and rapidly changing future. Metropolitan Planning Organizations (MPOs) across the country, like the Maricopa Association of Governments (MAG), use scenario planning to develop regional transportation plans (RTPs) that are flexible and adaptable.

As part of our RTP development process, MAG has developed two scenarios, each at two different funding levels, for a total of four combinations. The two overarching scenario philosophies are New Capacity and System Optimization.

The New Capacity scenarios seek to improve or maintain the region’s mobility through the addition of new capacity, including strategic investments in new roadway and rail-based transit projects.

The System Optimization scenarios prioritize investments in infrastructure, technology, and programs that improve or maintain the region’s mobility with lower levels of investment in new capacity.

The scenario philosophies were also explored at two different funding levels - one assuming a continuation of the regional half-cent sales tax, and another assuming an increase in the tax rate to one cent. The set of four scenarios includes:

- **New Capacity - Half Cent**
- **System Optimization - Half Cent**
- **New Capacity - One Cent**
- **System Optimization - One Cent**

These colors are used throughout the document to represent the four scenarios.

Analyzing the Scenarios

Each scenario – or package of projects and programs – has been evaluated to see how well it performs under a range of future conditions. The scenarios have been evaluated using both quantitative and qualitative measures to present a complete picture of their performance and contribution towards the RTP goals.

MAG’s activity-based travel demand model is the primary tool used to quantitatively evaluate the scenarios. It provides sophisticated information about mobility-related measures such as level of service, congestion, and delay on our transportation network. We can also use the model to help determine residents’ accessibility to jobs, services, and high capacity transit.

However, it is important to note that not all the impacts of our transportation investments can be modeled or even quantitatively evaluated. Investments can be divided into three categories: 1) those that can be modeled, 2) those that cannot be modeled but can be quantitatively assessed, and 3) those that can only be qualitatively assessed.

The impacts of the New Capacity scenarios are more easily modeled due to the composition of projects and program investments, such as new freeway lane miles and rail-based transit extensions. The System Optimization scenarios invest more heavily in bus-based transit and program areas, including intelligent transportation systems, emerging technology, and active transportation, which are less easily reflected in model results. Overall, about half of all scenario investments can be modeled, while the remainder must be accounted for using other tools and metrics.

The Results

The six RTP goals developed at the beginning of the planning process help set the tone of the plan, indicating priorities and areas for investment, and guiding the identification of projects to best meet regional needs. A performance-based planning process necessitates that we measure the extent to which the packages of projects and programs in each scenario help us meet our goals, as summarized below.



Safety

The safety goal was evaluated in terms of relative level of investment. The System Optimization scenarios (at both funding levels) included higher levels of investment in MAG’s safety program, yielding a higher safety benefit:

- New Capacity - Half Cent: \$180M
- System Optimization - Half Cent: \$240M
- New Capacity - One Cent: \$200M
- System Optimization - One Cent: \$240M



Mobility

As expected, the one-cent scenarios performed better than the half-cent scenarios in terms of preserving the region’s mobility. Greater investment in the system allows us to better plan for and accommodate growth. However, at both funding levels, the New Capacity and System Optimization scenarios performed similarly. New Capacity, primarily by adding new miles to the system. System Optimization, through investments in new technology and bus-based transit.



Responsiveness

Responsiveness speaks to the region’s ability to accommodate future growth and adapt to future uncertainty. Although all four scenarios were able to accommodate growth, the System Optimization scenarios present a more adaptable approach. These scenarios feature investment in a more diverse set of projects and programs, and reduce sunk costs through a focus on more flexible modes like bus rapid transit.



Livability

The focus of the livability goal is improving the health and well-being of our residents, and improving environmental sustainability. The System Optimization scenarios outperform the New Capacity scenarios in this goal area due to greater investments in active transportation, bus-based transit, and transportation demand management.



Preservation

Preservation speaks to our ability to maintain and operate the system we have already built, as well as future expansion. The System Optimization scenario performs better under this goal area due to greater investment in the Arterial Rehabilitation program (an additional \$500M over the New Capacity scenario) and a lower projected operations and maintenance cost in the future. The additional lane miles of roadways and rail-based transit built under the New Capacity scenario create a significant additional maintenance burden by 2050.



Prosperity

The role of the prosperity goal is to support our region’s economic competitiveness and growth. Although all four scenarios were able to ensure adequate levels of freight mobility across the region, the one-cent scenarios outperformed the half-cent scenarios in terms of economic benefit and job creation. Building, maintaining, and operating transportation facilities creates jobs in the short- and long-term, and these investments create a positive ripple effect through our regional economy.

SCENARIO PLANNING

What is Scenario Planning?

Scenario planning is a decision-support tool that helps us plan for an uncertain and rapidly changing future. It acts as an insurance policy, helping to identify resilient transportation investments that accommodate a range of possible futures.

What is a Scenario?

A scenario is a philosophy or set of guiding principles that helps us decide how to best spend our regional transportation dollars. As part of our RTP development process, MAG has developed two potential scenarios, each at two different funding levels, for a total of four combinations. Each scenario is expressed as a fiscally-constrained list of projects and program area investments. The list of projects and programs cannot exceed the revenue the region is expected to receive, primarily through federal funds and the regional transportation sales tax (e.g., Proposition 400).

How are Scenarios Evaluated?

Each scenario – or package of projects and programs – has been evaluated to see how well it performs under a range of future conditions. Using state-of-the-practice modeling tools, including a socioeconomic land use model and an activity-based travel demand model, we were able to simulate the impacts of investments being made under each scenario. Key Performance Indicators, or KPIs, were used to determine how well each scenario performs against regional goals. KPIs allow us to compare the costs, benefits, and tradeoffs of the scenarios in a fair and consistent manner. We are also able to compare the scenarios to a no-build (or no-extension) scenario, where we explore what could happen if no additional transportation investments were made.

This analysis will help our region identify tradeoffs associated with different types of investments and assess which investment packages move us closer to achieving the vision and goals for our region’s transportation future.

How Will We Use These Scenarios?

The result of this process will be a list of projects and programs that falls somewhere between the four scenarios. The scenarios act as a decision-support tool, helping us identify the opportunities and tradeoffs associated with different types and levels of investment. Policymakers can then use this information to inform final project and program selection.

MAG GOAL AREAS

Developing regional goals is an important early step in the development of the RTP. The goals help set the tone of the plan, indicating priorities and areas for investment, and guiding the selection of projects to best meet regional needs. Later in the process, these goals also serve as a measuring stick against which we can gauge the success of the package of projects selected to move forward in the RTP.

To develop the goal areas below, MAG embarked on a multi-year effort that began with a values mapping exercise. Values mapping was an interactive survey experience developed to help us understand residents’ core beliefs about transportation in our region and how it impacts their quality of life. The results of this exercise were backed up by additional outreach efforts, peer agency interviews and research, and discussions with regional policymakers. The collaborative process of developing the goals below culminated with endorsement by MAG policymakers.



THE COST OF DOING NOTHING (NO EXTENSION)

What happens if the sales tax is not extended?

The no extension scenario, often called a ‘no-build scenario’, is commonly used in transportation planning to demonstrate what would happen to our transportation system if we cannot continue to invest in the system at our current rate.

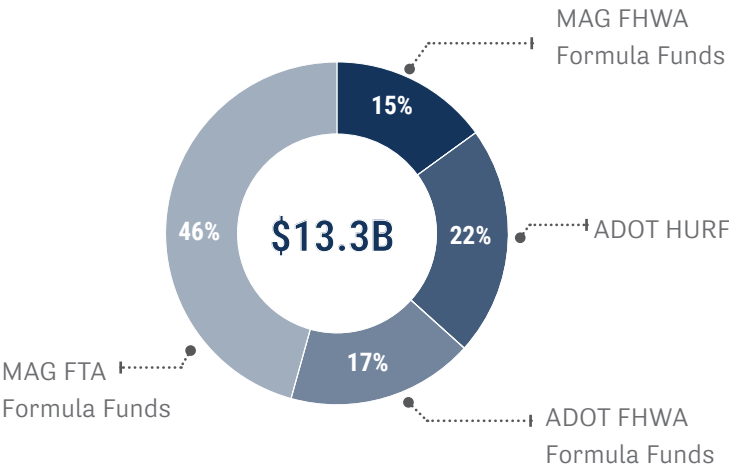
In the RTP scenario planning process, the no extension scenario assumes our current regional sales tax (Proposition 400) expires in 2025 and is not renewed. The only transportation dollars left to spend are limited federal funds and declining gas tax revenues, which would be used for ongoing operations and limited improvements to the system we have today. Under this scenario, we would not be able to build new facilities, expand our transit system, or engage in region-wide activities designed to help optimize the existing network.

KEY TAKEAWAYS

LOST MOBILITY: Results in a significant loss of mobility across the region.

STANDING STILL: Limited ability to optimize, diversify, or modernize our transportation system.

Figure 01 : Revenue Breakdown



Regional Trends



Our region makes up nearly 2/3 of the state’s population



6.8 million people are projected to live in our region by 2050

33%

Increase in our region’s population between 2025 and 2050

40%

Increase in our region’s employment between 2025 and 2050

Implications

76h

Amount of time each commuter in our region will spend in traffic congestion per year under the no-extension scenario

12%

Increase in the region’s congested lane miles

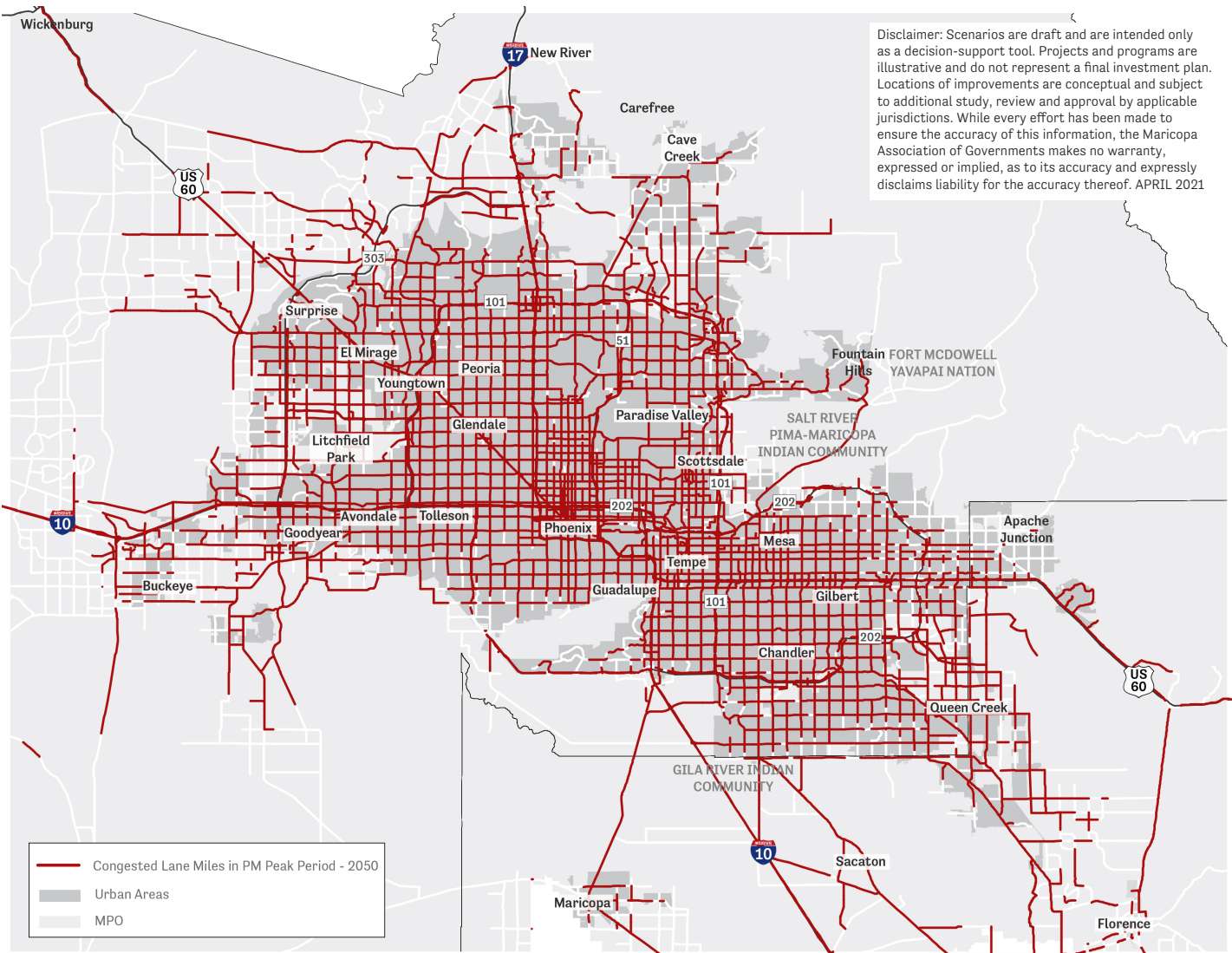
2.5x

The amount congestion will increase on our designated freight corridors

17%

Increase in the number of roadway segments with a failing level of service in the PM peak (2pm - 6pm)

Figure 01 : 2050 Congestion



THE SCENARIOS

New Capacity

The New Capacity scenarios seek to improve or maintain the region’s mobility through the addition of new capacity, including strategic investments in new roadway and rail-based transit projects. These scenarios emphasize large projects that bring significant benefits and a large price tag. The focus on large investments creates a less diverse portfolio with lower levels of investment in several program areas, including bus-based transit.

System Optimization

The System Optimization scenarios prioritize investments in infrastructure, technology, and programs that improve or maintain the region’s mobility with lower levels of investment in new capacity. These scenarios include a relatively diverse and resilient investment portfolio, including a range of programmatic investments and a focus on bus-based transit.

Funding

The amount of funding our region has available to invest in transportation projects has a real impact on how our region’s transportation system looks, feels, and functions over the next few decades. Although the amount of federal funding MAG receives is formula-based, and therefore relatively consistent, the other half of our transportation dollars come from a regional sales tax set to expire in 2025. With uncertainty about future funding levels, it was important to explore in our scenario planning process what we could deliver under two potential tax rates.

Under two scenarios, we have assumed a continuation of our regional half-cent sales tax (Proposition 400). Revenue from the half-cent sales tax combined with federal funds results in a total revenue of \$28.2 billion over 20 years. The other two scenarios assume an increase of the sales tax to one cent. Combined with federal funds, this results in a total revenue of \$43.2 billion over the same planning horizon.

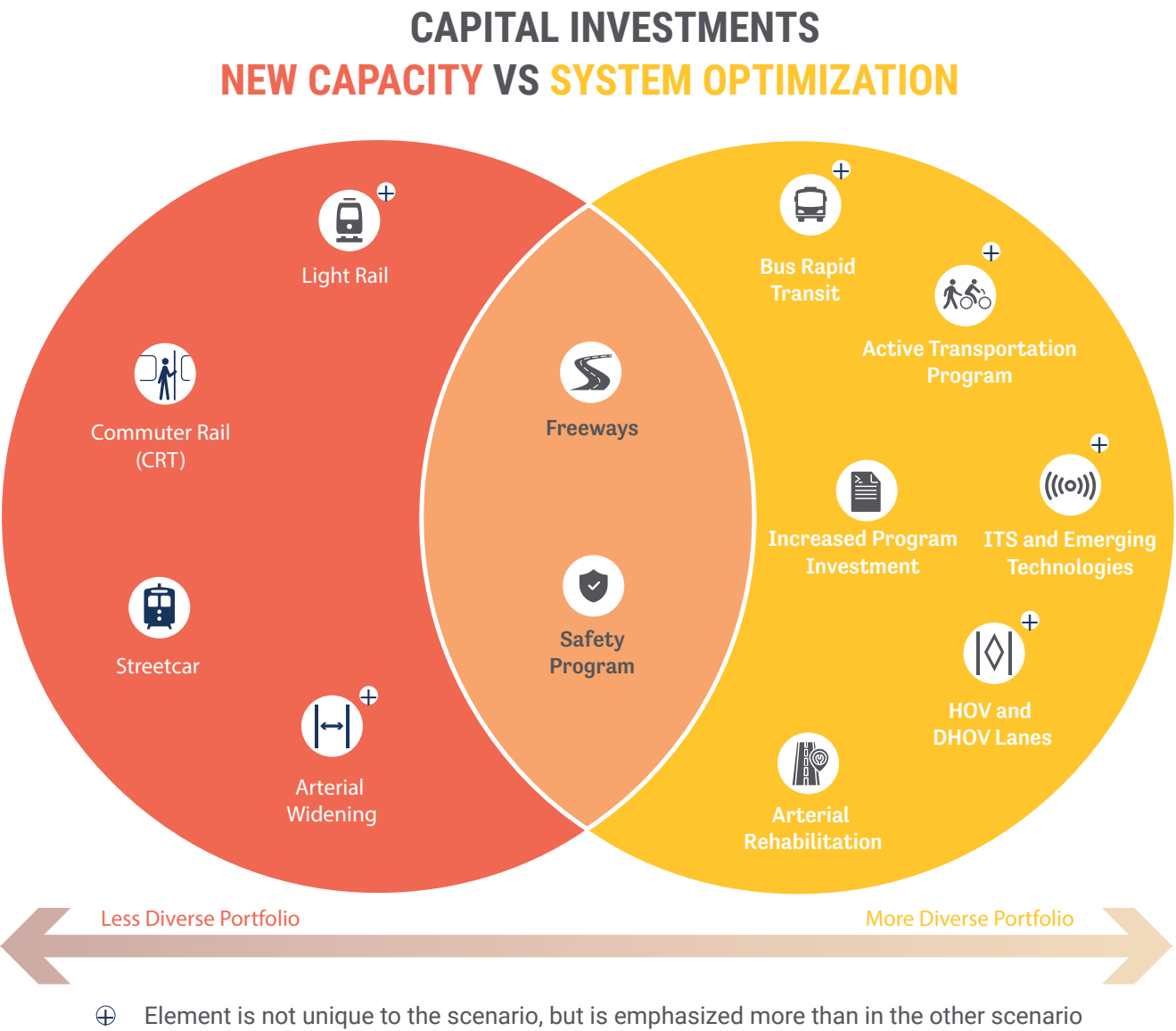
With significantly more money to spend in the one-cent scenarios, we are able to include more freeway, arterial, and transit projects, as well as allocating more money to various program areas. Under the half-cent scenarios, our choices are extremely constrained, forcing difficult tradeoffs both between and within modes.

Projects and Programs

Each of the scenarios we have developed include investments in a variety of project types and program areas. Projects are typically more targeted and discrete than program areas, and come in response to specific needs identified in the RTP Needs Catalog. Projects span a range of modes and facility types, including freeways, arterials, light rail, bus rapid transit, streetcar, and commuter rail. Programs set aside funding to address specific kinds of needs or priorities related to safety, active transportation, intelligent transportation systems, and transportation demand management, among others.

A complete list of the Project Types and Program Areas included in the scenarios can be found on the following pages.

Figure 02 : Scenario Comparison Venn Diagram



PROJECT CATEGORIES

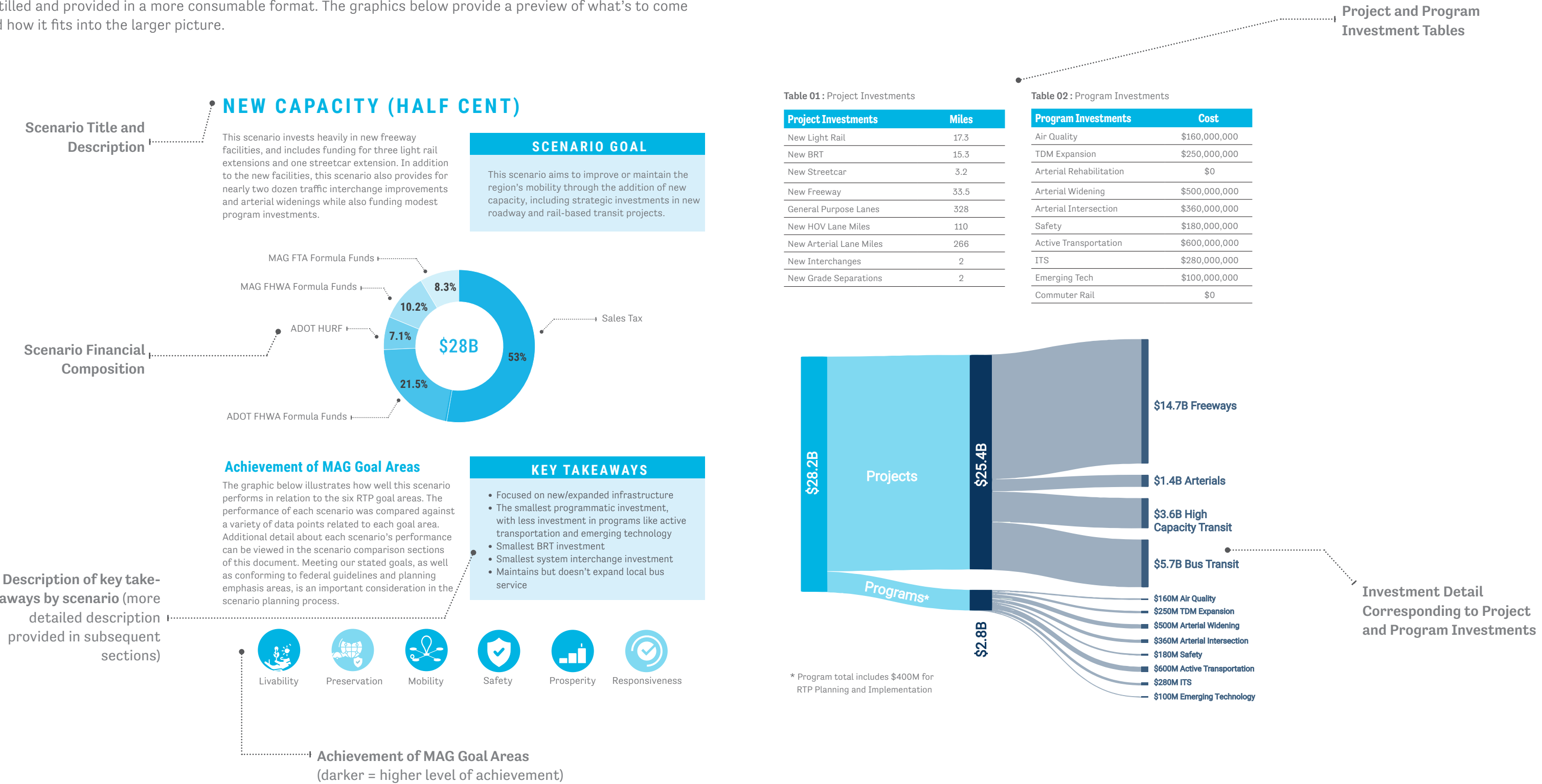
New Roadway Construction	New construction on land that has not been previously developed or improved.
Roadway Widening	The addition of capacity to an existing facility in the form of new lanes.
Reconfigured Roadway	Changes to a facility including but not limited to roadway geometry, changes to turn lanes, or road diets.
Reconstructed Roadway	The complete reconstruction of a facility.
Traffic Interchange Improvements	Reconstruction of existing interchanges to improve traffic operations and enhance regional mobility and safety.
System Interchange	Facilities that carry traffic from one freeway to another, typically via a series of ramps or flyovers.
Direct High-Occupancy Vehicle Connection	Facilities that provide direct access from arterial streets to freeway HOV lanes or connecting HOV lanes between freeways. These connections reduce weaving and improve safety for users of the region’s HOV network.
Commuter Rail Transit (CRT)	Fast service over long distances to connect suburban areas to dense employment centers.
Light Rail Transit (LRT)	Passenger urban rail transit that operates in an exclusive lane through urban corridors with frequent stops.
Bus Rapid Transit (BRT)	High-capacity, bus-based transit system that delivers fast, comfortable, and reliable service, similar in quality to light rail.
Streetcar	Small transit vehicles that operate over short distances in dense urban areas.
Bus Transit	In the context of this document, bus transit refers to fixed route local bus service (supergrid).
Grade Separation	Alignment of transportation modes to different heights, or grades, to improve safety, increase efficiency, and reduce modal conflicts.

PROGRAM AREAS

Active Transportation	Expansion of MAG’s current bicycle and pedestrian program investments including implementation of MAG’s Active Transportation Plan.
Air Quality	Continuation of currently funded programs that address air quality and required federal non-attainment mitigation measures.
Arterial Intersection	A new program to fund improvements at major arterial intersections through a periodic, regionally competitive call for projects. The program will be focused on enhancing accessibility, safety, and travel within the region.
Arterial Rehabilitation	A new program featuring projects that involve reconfiguring or otherwise altering existing arterial streets to improve their efficiency, safety, comfort, or address other operational considerations.
Arterial Widening	A new program focused on widening existing arterial streets.
Commuter Rail	Contains projects for construction, operations, and support infrastructure for the potential implementation of regional commuter rail.
Emerging Technology	A new program to fund future transportation technologies and to enable the region to respond and adapt to transportation innovations.
ITS	This program continues currently funded Intelligent Transportation System initiatives including the Regional Community Network/fiber and implementation of the System Management and Operations Plan, and includes programmatic expansion to a range of traffic signal management, infrastructure, and system investments.
Safety	Expansion of MAG’s current safety initiatives to include a wide range of education programs, safety countermeasure improvements, serious crash response, and traffic calming projects.
TDM Expansion	Expansion of currently funded transportation demand management programs.

HOW TO READ THIS DOCUMENT

This document provides an analysis of two different scenarios at two potential funding levels. The creation of scenarios and the analysis of those scenarios is a complex task. In the following pages, the results have been distilled and provided in a more consumable format. The graphics below provide a preview of what’s to come and how it fits into the larger picture.



Project and Program Investment Tables

Table 01 : Project Investments

Project Investments	Miles
New Light Rail	17.3
New BRT	15.3
New Streetcar	3.2
New Freeway	33.5
General Purpose Lanes	328
New HOV Lane Miles	110
New Arterial Lane Miles	266
New Interchanges	2
New Grade Separations	2

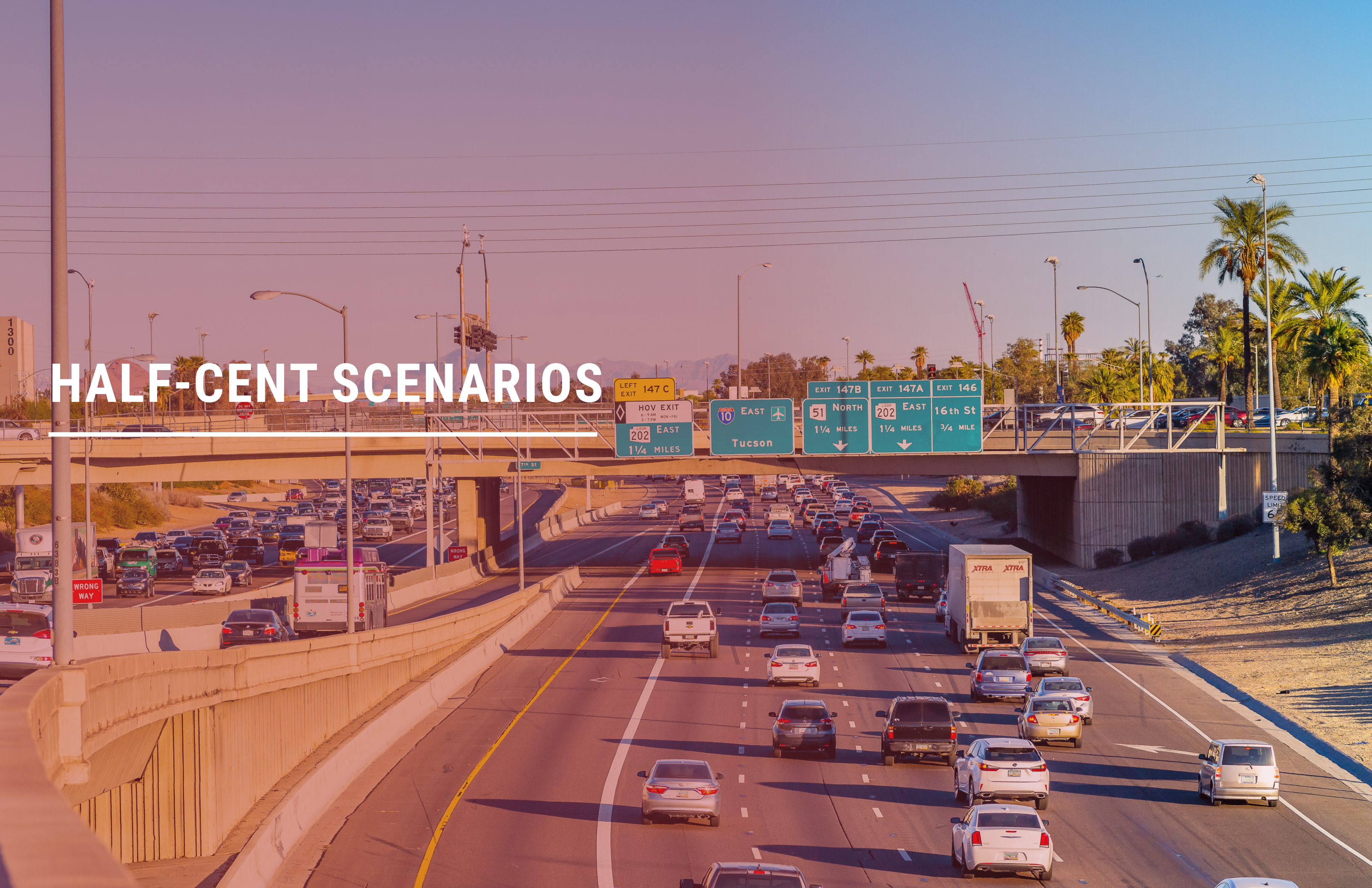
Table 02 : Program Investments

Program Investments	Cost
Air Quality	\$160,000,000
TDM Expansion	\$250,000,000
Arterial Rehabilitation	\$0
Arterial Widening	\$500,000,000
Arterial Intersection	\$360,000,000
Safety	\$180,000,000
Active Transportation	\$600,000,000
ITS	\$280,000,000
Emerging Tech	\$100,000,000
Commuter Rail	\$0

* Program total includes \$400M for RTP Planning and Implementation

Investment Detail Corresponding to Project and Program Investments

HALF-CENT SCENARIOS

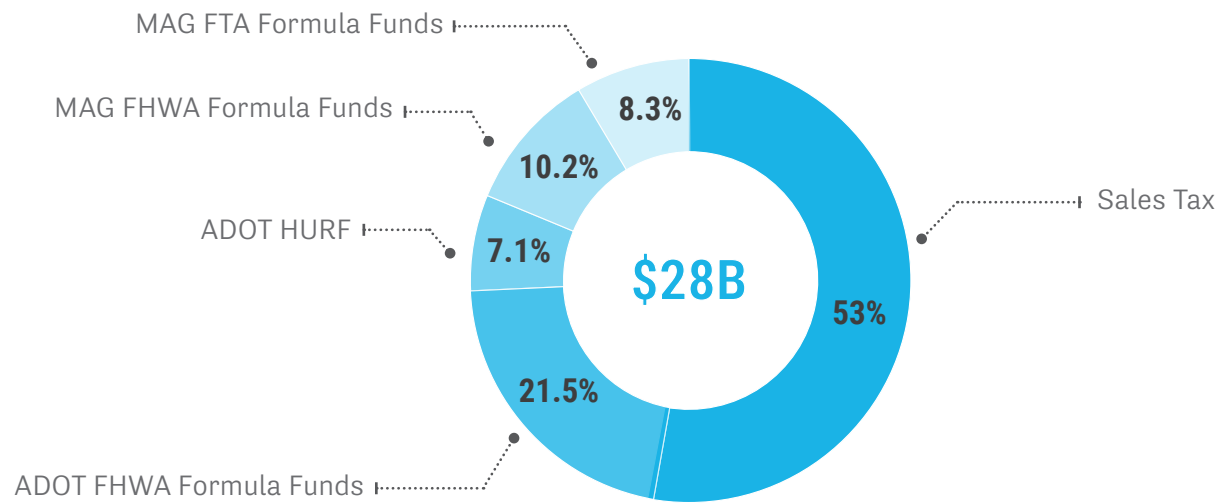


NEW CAPACITY (HALF CENT)

This scenario invests heavily in new freeway facilities, and includes funding for three light rail extensions and one streetcar extension. In addition to the new facilities, this scenario also provides for nearly two dozen traffic interchange improvements and arterial widenings while also funding modest program investments.

SCENARIO GOAL

This scenario aims to improve or maintain the region’s mobility through the addition of new capacity, including strategic investments in new roadway and rail-based transit projects.



Achievement of MAG Goal Areas

The graphic below illustrates how well this scenario performs in relation to the six RTP goal areas. The performance of each scenario was compared against a variety of data points related to each goal area. Additional detail about each scenario’s performance can be viewed in the scenario comparison sections of this document. Meeting our stated goals, as well as conforming to federal guidelines and planning emphasis areas, is an important consideration in the scenario planning process.

KEY TAKEAWAYS

- Focused on new/expanded infrastructure
- The smallest programmatic investment, with less investment in programs like active transportation and emerging technology
- Smallest BRT investment
- Smallest system interchange investment
- Maintains but doesn’t expand local bus service



Livability



Preservation



Mobility



Safety



Prosperity



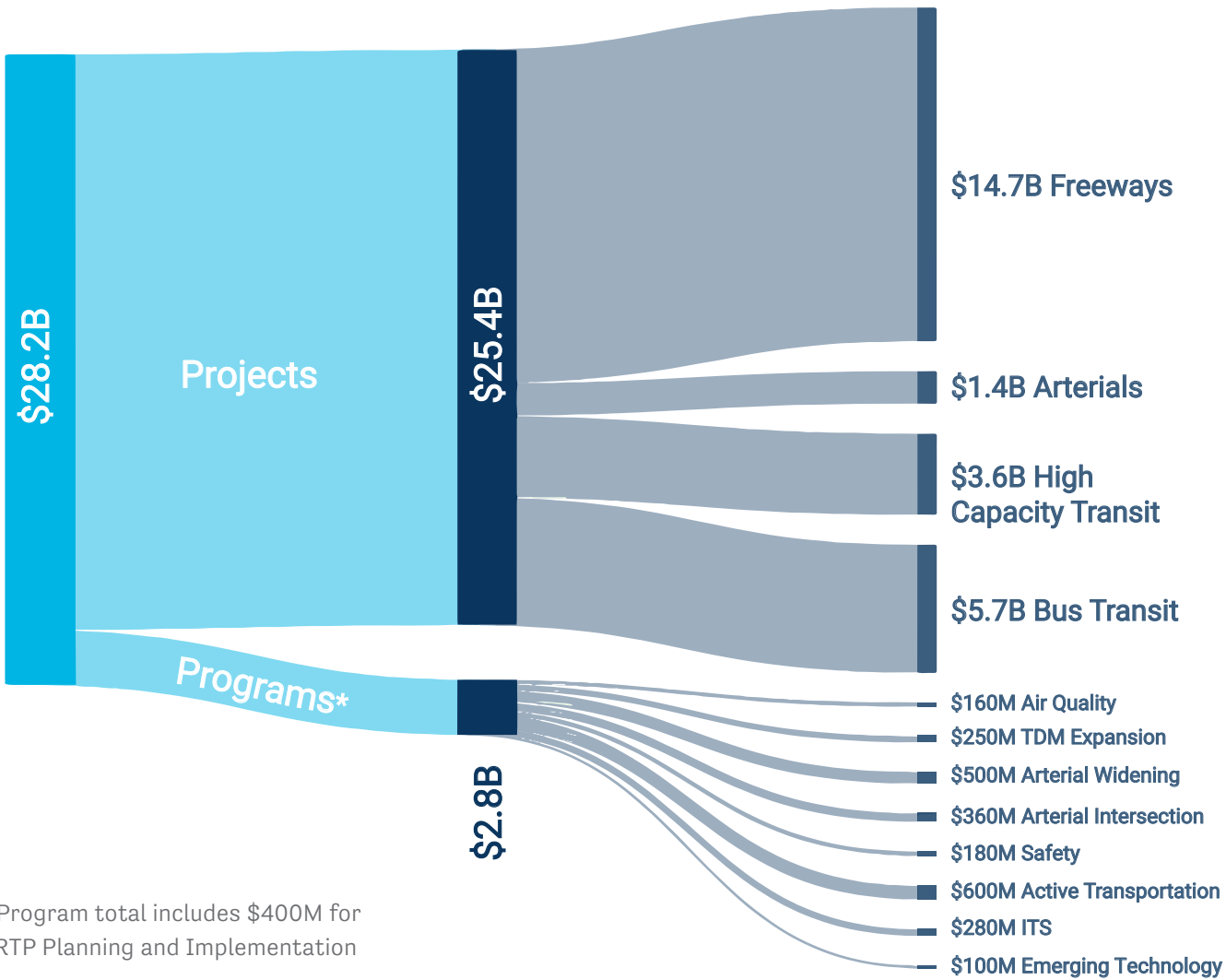
Responsiveness

Table 01 : Project Investments

Project Investments	Miles
New Light Rail	17.3
New BRT	15.3
New Streetcar	3.2
New Freeway	33.5
General Purpose Lanes	328
New HOV Lane Miles	110
New Arterial Lane Miles	266
New Interchanges	2
New Grade Separations	2

Table 02 : Program Investments

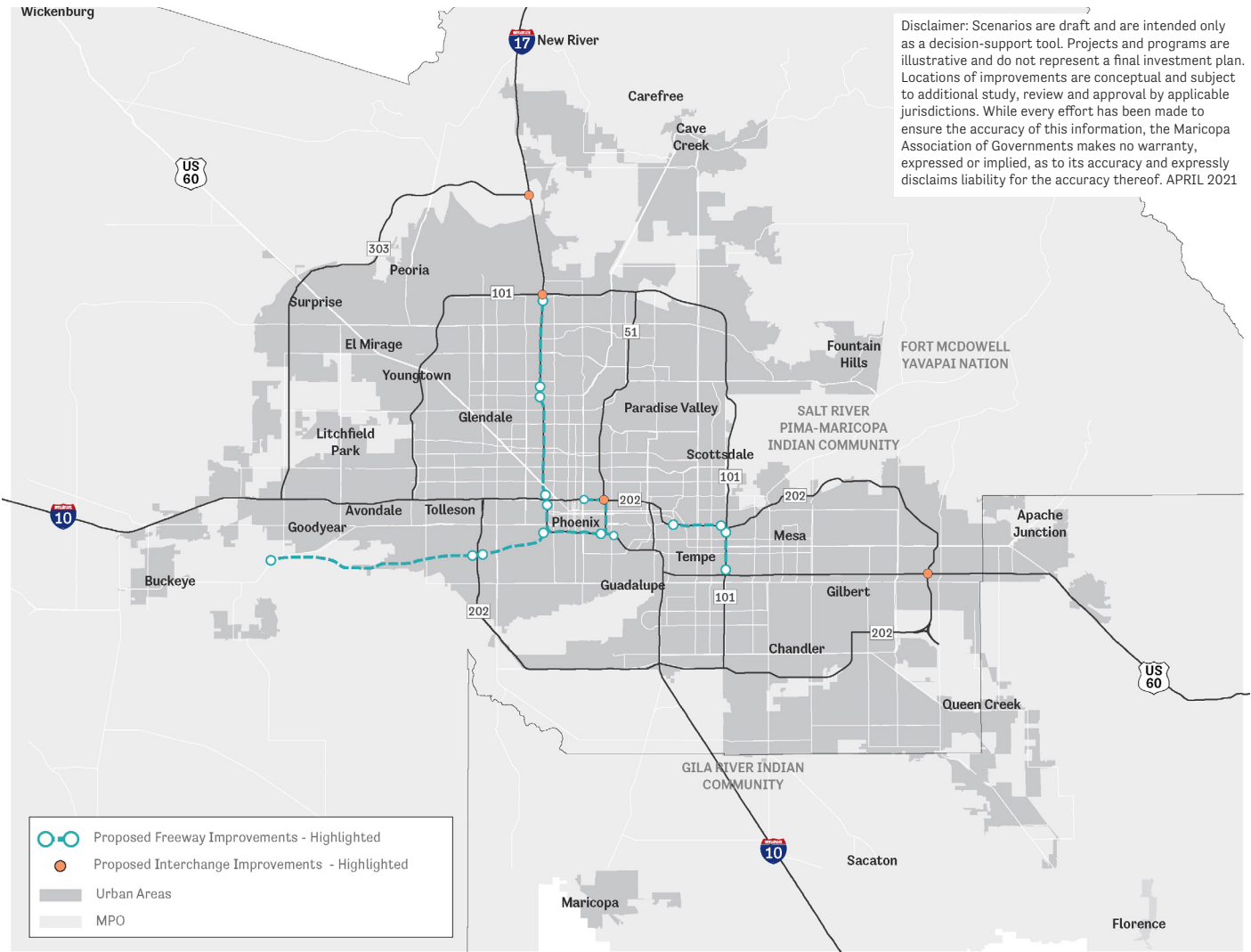
Program Investments	Cost
Air Quality	\$160,000,000
TDM Expansion	\$250,000,000
Arterial Rehabilitation	\$0
Arterial Widening	\$500,000,000
Arterial Intersection	\$360,000,000
Safety	\$180,000,000
Active Transportation	\$600,000,000
ITS	\$280,000,000
Emerging Tech	\$100,000,000
Commuter Rail	\$0



* Program total includes \$400M for RTP Planning and Implementation

NEW CAPACITY (HALF CENT)

Figure 03 : Notable Highway/Freeway Projects

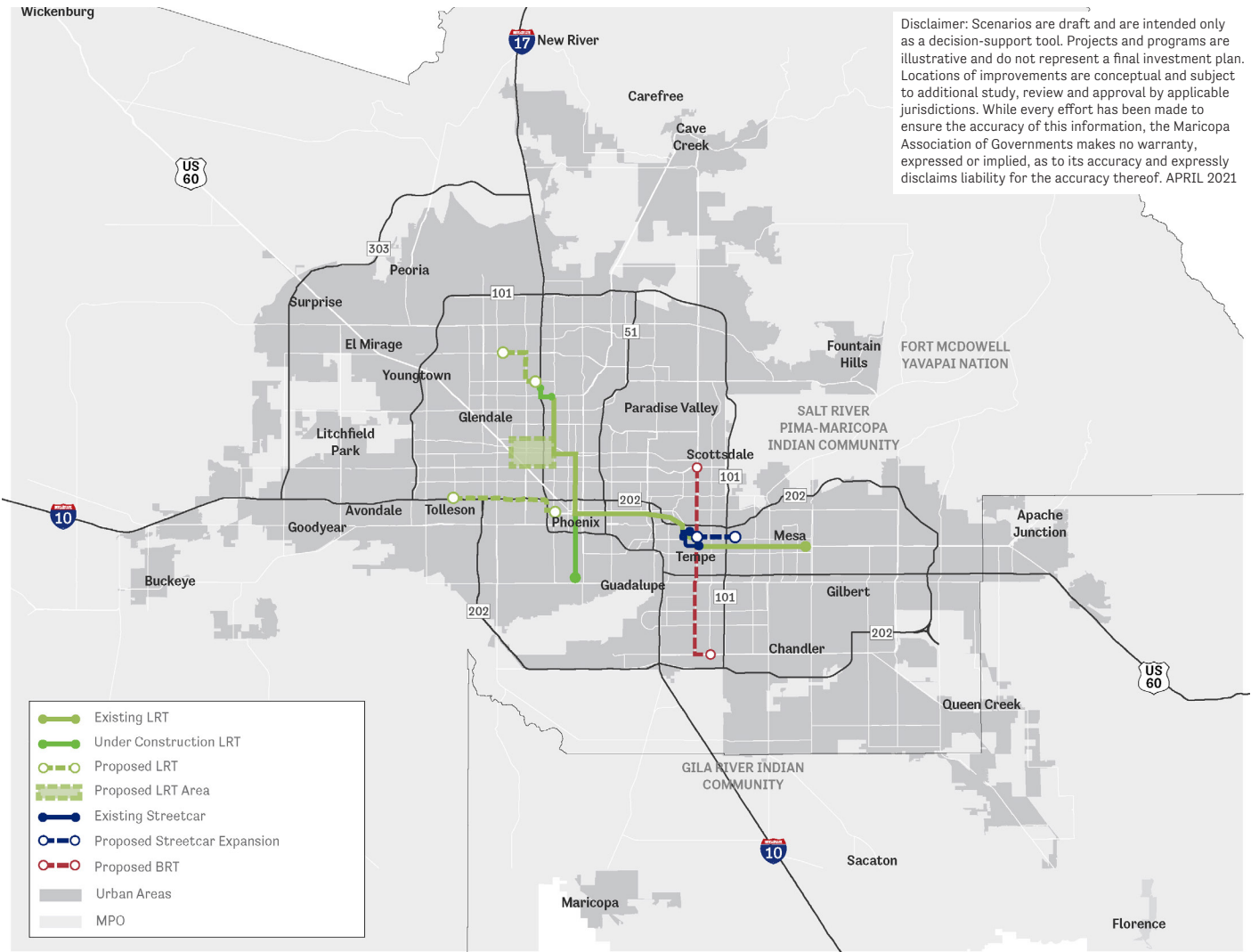


Notable Highway/Freeway Projects

- SR 30: Loop 303 to Loop 202
- SR 30: Loop 202 to I-17
- I-17: 19th Avenue to Dunlap Freeway Reconstruction
- I-17: Dunlap to Loop 101 Freeway Reconstruction
- I-17: I-10 (Papago) Split to 19th Ave HOV Lane
- Loop 202 (Red Mountain): Priest to Loop 101 System Improvements
- I-10/Loop 202/SR 51 Mini Stack System Interchange Improvements
- Loop 101 (Price): Loop 202 (Red Mountain) to US 60 (Superstition) Bottleneck Improvements
- Loop 303 at I-17 System Interchange
- Loop 101 (Agua Fria) at I-17 DHOV
- US 60 (Superstition) at Loop 202 (Santan) DHOV
- I-10 (Papago): Tunnel to Split Improvements

NEW CAPACITY (HALF CENT)

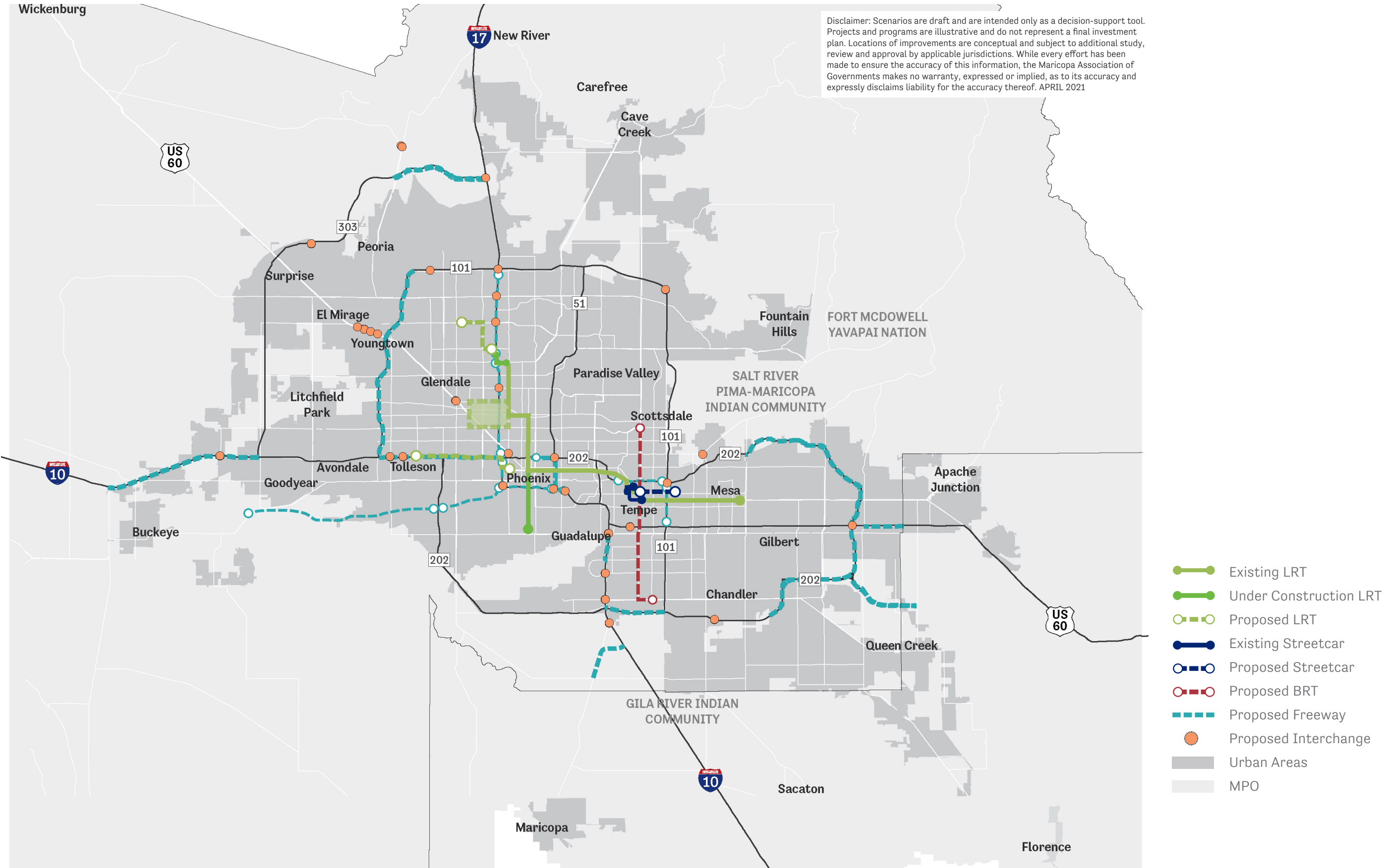
Figure 04 : Notable High Capacity Transit Projects



Notable High Capacity Transit Projects

- ASU West Light Rail Extension
- West Phoenix Light Rail Extension
- I-10 West Light Rail Extension
- Rio Salado East Streetcar
- Scottsdale Road/Rural Road BRT

Figure 05 : Capital Investment Projects

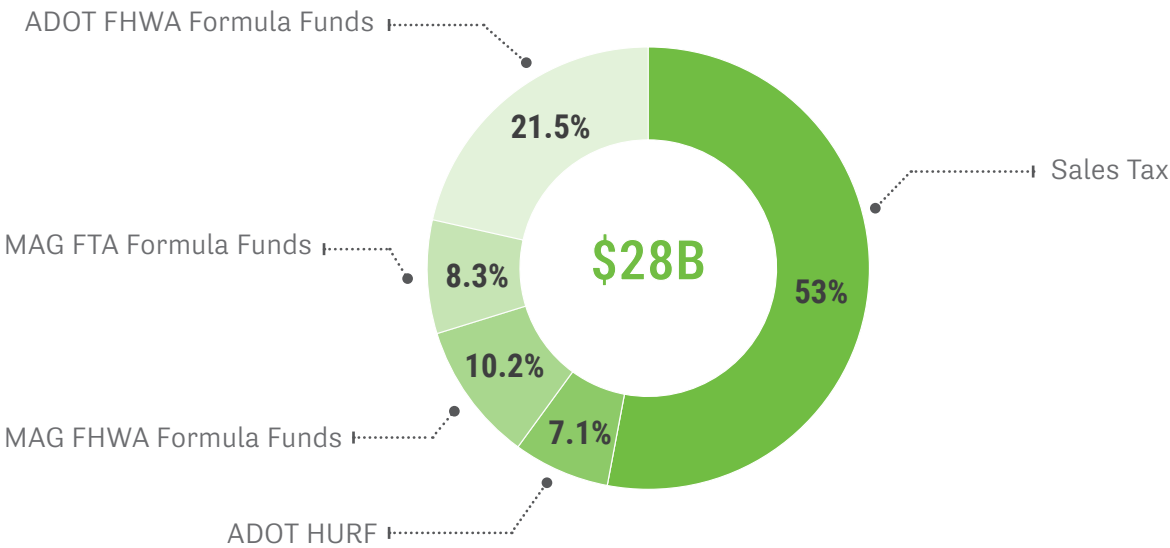


SYSTEM OPTIMIZATION (HALF CENT)

This scenario emphasizes flexible programmatic investments, continued growth of our high-occupancy vehicle network, and development of four regional bus rapid transit lines.

SCENARIO GOALS

This scenario prioritizes investments in infrastructure, technology, and programs that improve or maintain the region’s mobility without significant investments in new capacity.



Achievement of MAG Goal Areas

The graphic below illustrates how well this scenario performs in relation to the six RTP goal areas. The performance of each scenario was compared against a variety of data points related to each goal area. Additional detail about each scenario’s performance can be viewed in the scenario comparison sections of this document. Meeting our stated goals, as well as conforming to federal guidelines and planning emphasis areas, is an important consideration in the scenario planning process.



Livability



Preservation



Mobility



Safety



Prosperity



Responsiveness

KEY TAKEAWAYS

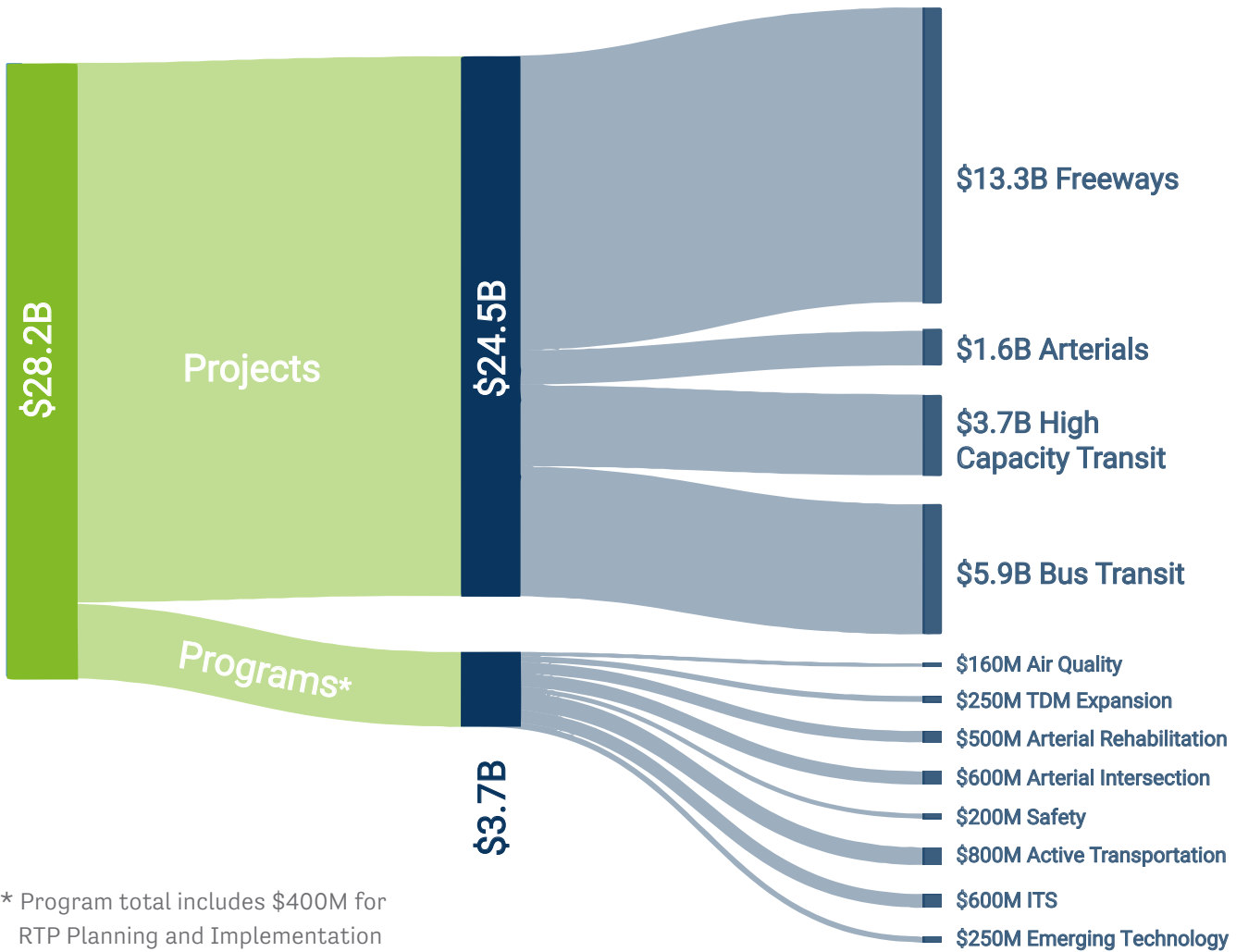
- The most investment in new HOV facilities
- Smaller investment in new freeways/ highways
- Increased investment in system interchanges (often sources of congestion)
- No streetcar extensions
- Larger investment in programs, including active transportation and ITS

Table 03 : Project Investments

Project Investments	Miles
New Light Rail	8.2
New BRT	58.3
New Streetcar	0
New Freeway	28.1
General Purpose Lanes	291
New HOV Lane Miles	135
New Arterial Lane Miles	299
New Interchanges	4
New Grade Separations	2

Table 04 : Program Investments

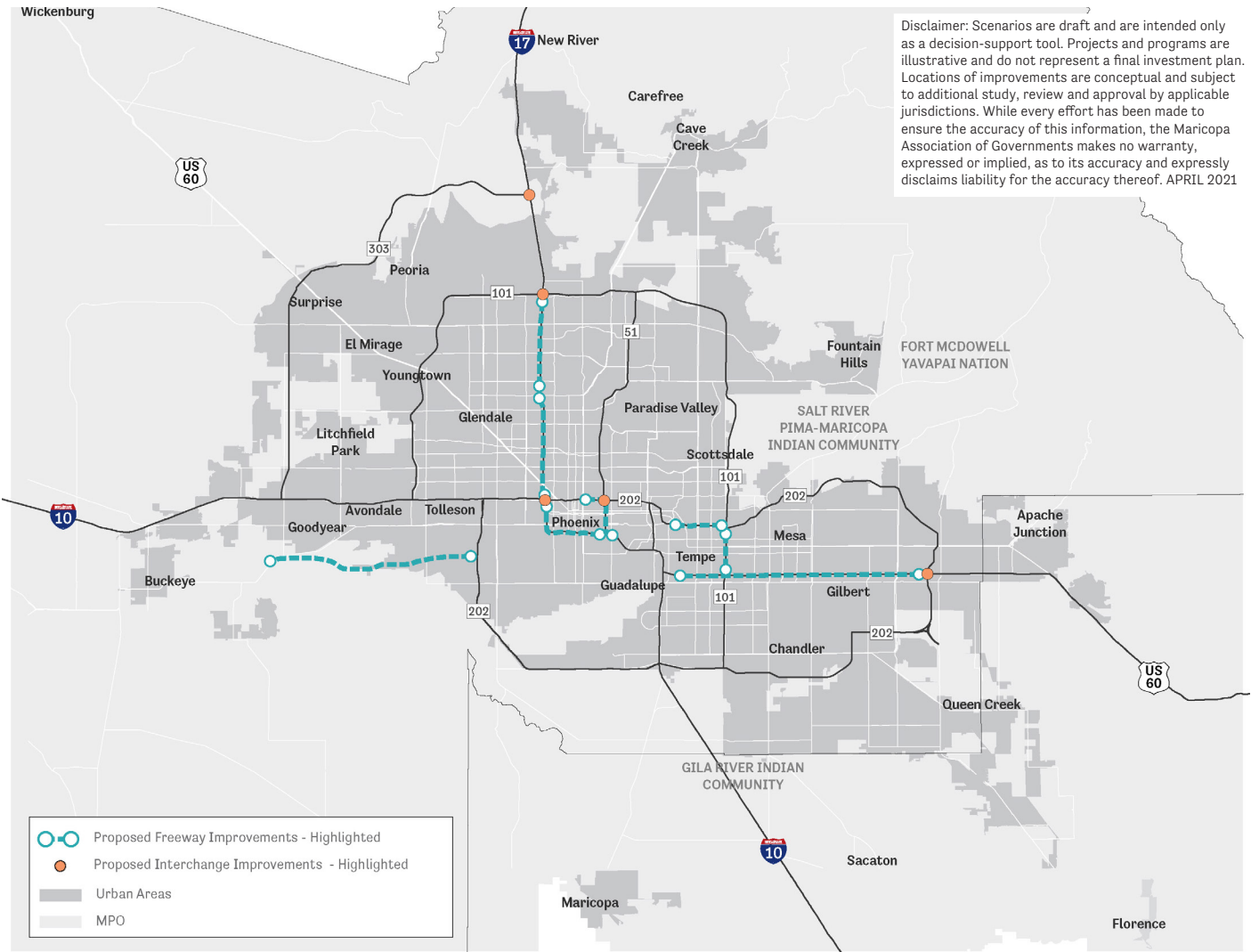
Program Investments	Cost
Air Quality	\$160,000,000
TDM Expansion	\$250,000,000
Arterial Rehabilitation	\$500,000,000
Arterial Widening	\$0
Arterial Intersection	\$600,000,000
Safety	\$200,000,000
Active Transportation	\$800,000,000
ITS	\$600,000,000
Emerging Tech	\$250,000,000
Commuter Rail	\$0



* Program total includes \$400M for RTP Planning and Implementation

SYSTEM OPTIMIZATION (HALF CENT)

Figure 06 : Notable Highway/Freeway Projects

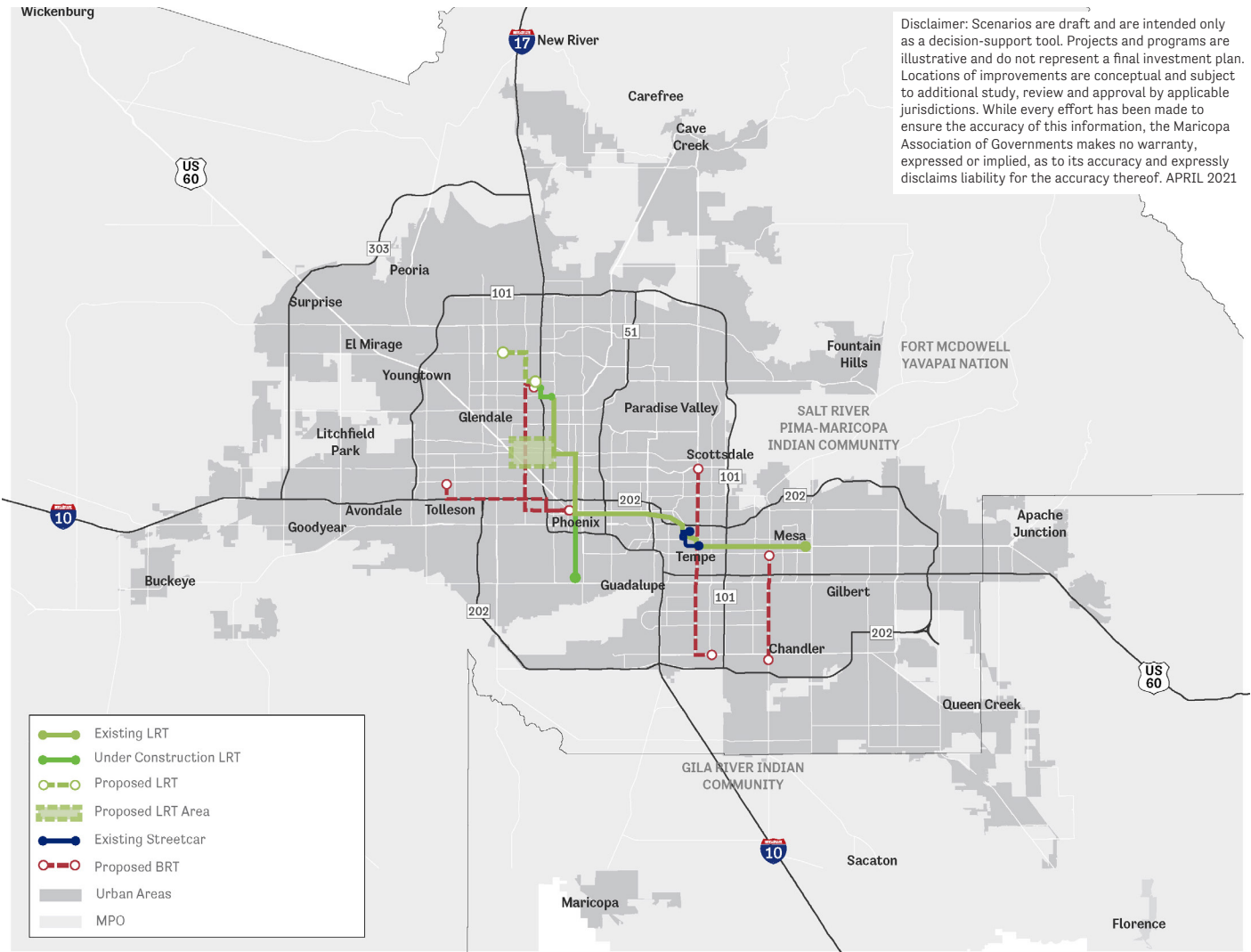


Notable Highway/Freeway Projects

- SR 30: Loop 303 to Loop 202
- I-17: 19th Avenue to Dunlap Freeway Reconstruction
- I-17: Dunlap to Loop 101 Freeway Reconstruction
- I-17: I-10 (Papago) Split to 19th Ave HOV Lane
- I-10/Loop 202/SR 51 Mini Stack System Interchange Improvements
- I-10/I-17 Stack System Interchange Improvements
- US 60 (Superstition): Corridor Multimodal Optimization
- Loop 101 (Price): Loop 202 (Red Mountain) to US 60 (Superstition) Bottleneck Improvements
- Loop 303 at I-17 System Interchange
- Loop 101 (Agua Fria) at I-17 DHOV
- Loop 202 (Red Mountain): Priest to Loop 101 Bottleneck Improvements
- US 60 (Superstition) at Loop 202 (Santan) DHOV
- I-10 (Papago): Tunnel to Split Improvements

SYSTEM OPTIMIZATION (HALF CENT)

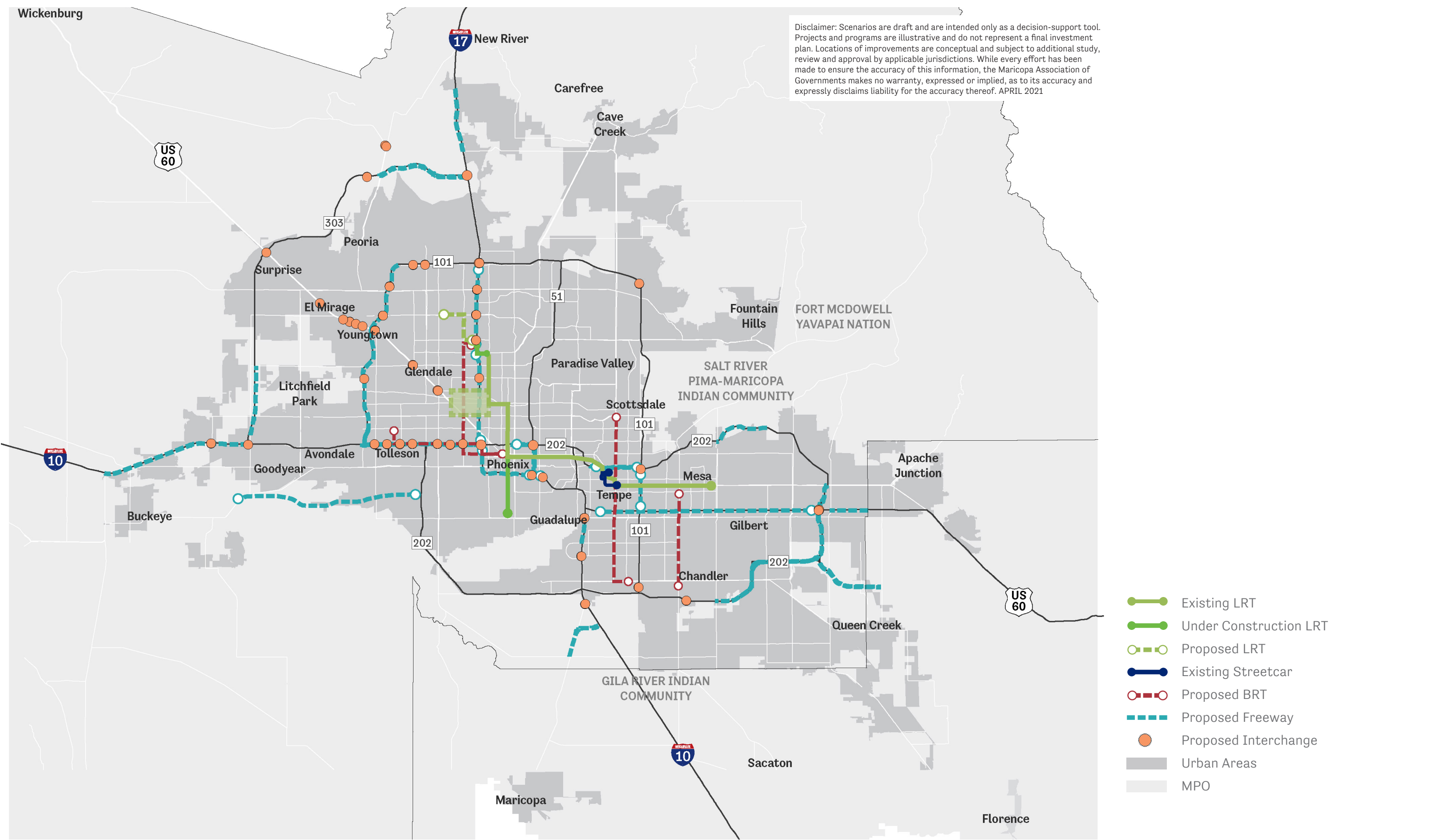
Figure 07 : Notable High Capacity Transit Projects



Notable High Capacity Transit Projects

- ASU West Light Rail Extension
- West Phoenix Light Rail Extension
- Capitol/I-10 West BRT
- 35th Avenue/Van Buren Street BRT
- Scottsdale Road/Rural Road BRT
- Arizona Avenue BRT

Figure 08: Capital Investment Projects





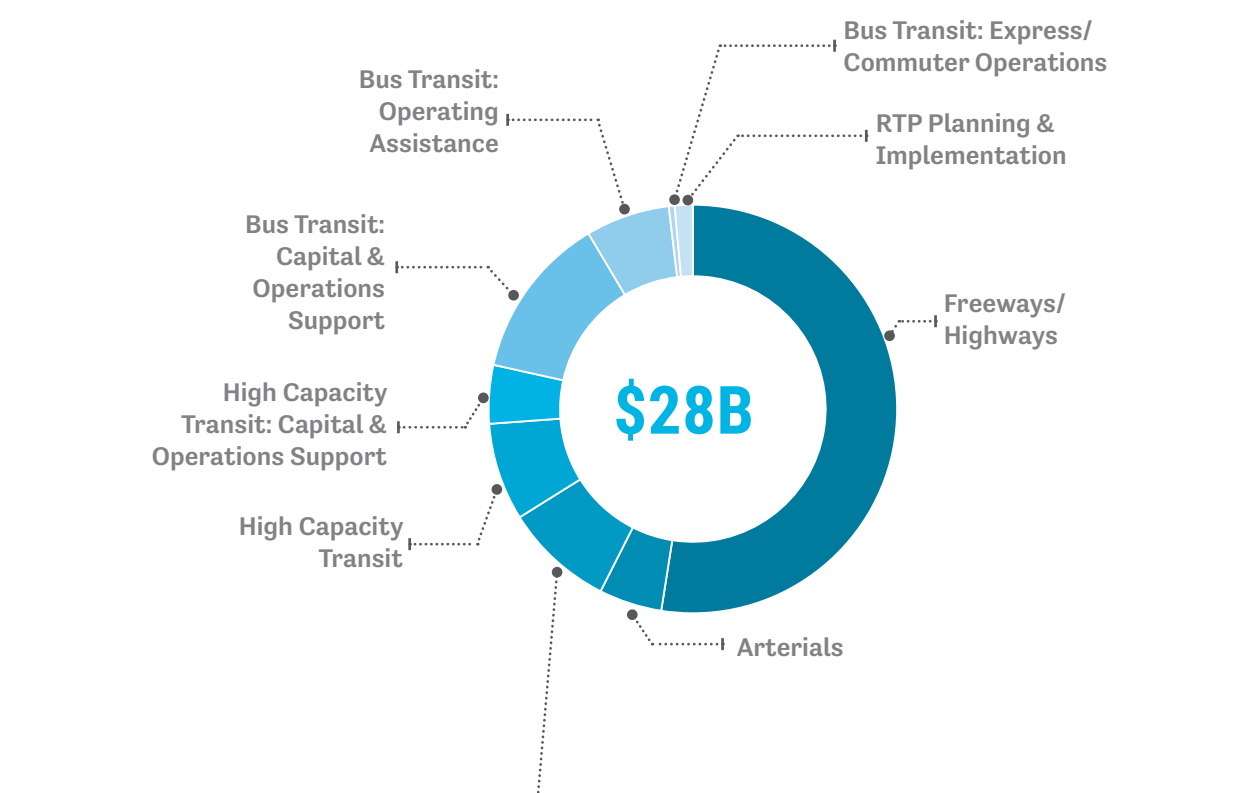
COMPARISON OF HALF-CENT SCENARIOS

COMPARISON OF HALF-CENT SCENARIOS

SCENARIOS	 Vehicle Miles Traveled	 % of Congested Lane Miles for AM & PM Peaks	 Total Vehicle Hours of Delay for AM & PM Peaks (average)	 % of the Network with Failing LOS During PM Peak	 Population within 1/4 mi of High-Capacity Transit Stops	 Vehicle Hours of Delay on Designated/Critical Freight Corridors in AM & PM Peaks	 Annual Delay per Commuter	 Number of Jobs Reachable within 30 minutes by TAZ Population
TODAY	139.9k Miles	34%	445k Hours	10%	210k	134k Hours	45 Hours	513k Jobs
NEW CAPACITY	209.4k Miles	+7%	818k Hours	+6%	325k	277k Hours	67 Hours	423k Jobs
SYSTEM OPTIMIZATION	209.4k Miles	+4%	763k Hours	+3%	351k	285k Hours	69 Hours	414k Jobs
NO EXTENSION	208.3k Miles	+12%	953k Hours	+9%	210k	322k Hours	76 Hours	387k Jobs

WHAT GOES INTO EACH SCENARIO?

NEW CAPACITY - HALF CENT

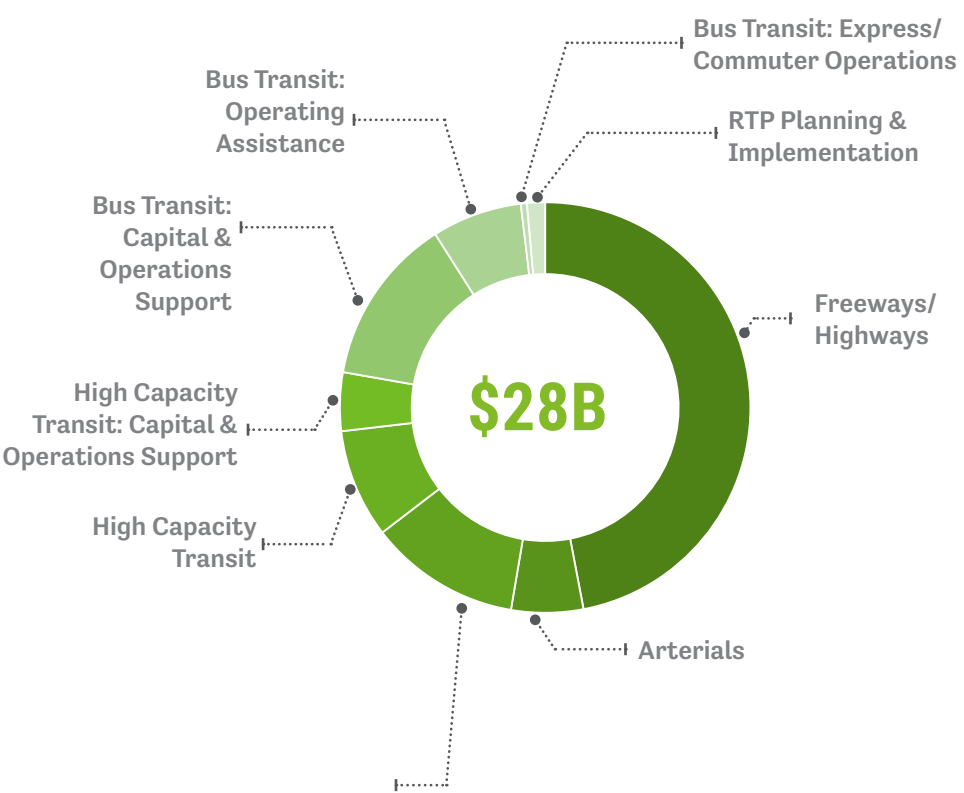


Programmatic Investments

Programs	Cost
Air Quality	\$160,000,000
TDM Expansion	\$250,000,000
Arterial Rehabilitation	\$0
Arterial Widening	\$500,000,000
Arterial Intersection	\$360,000,000
Safety	\$180,000,000
Active Transportation	\$600,000,000
ITS	\$280,000,000
Emerging Tech	\$100,000,000
TOTAL	\$2,430,100,000

More investment allocated to Arterial Widening

SYSTEM OPTIMIZATION - HALF CENT



Programmatic Investments

Programs	Cost
Air Quality	\$160,000,000
TDM Expansion	\$250,000,000
Arterial Rehabilitation	\$500,000,000
Arterial Widening	\$0
Arterial Intersection	\$600,000,000
Safety	\$200,000,000
Active Transportation	\$800,000,000
ITS	\$600,000,000
Emerging Tech	\$250,000,000
TOTAL	\$3,360,000,000

More investment allocated to Arterial Rehabilitation

Significant additional investment in ITS and Emerging Tech

Bus Transit

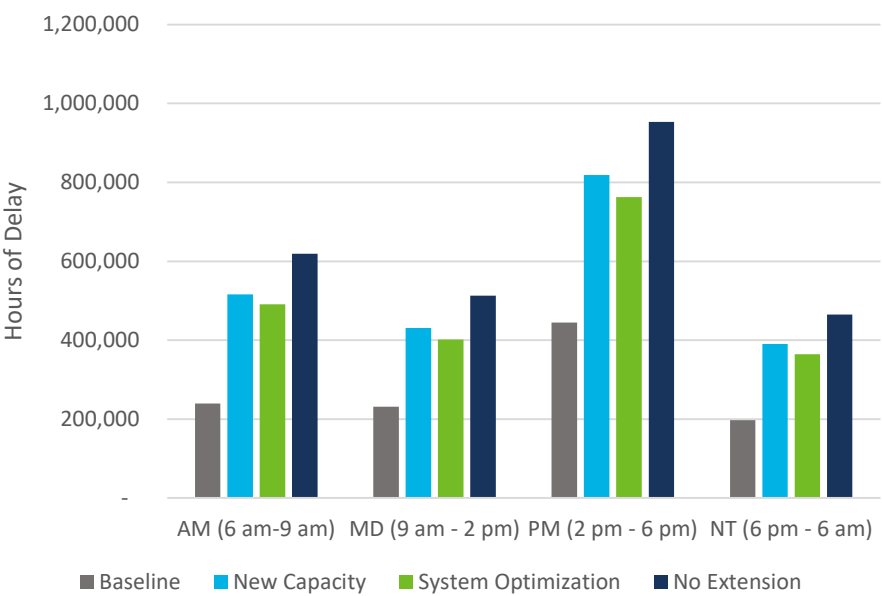
Bus transit refers to bus services including local bus, express routes, and paratransit. It also includes state of good repair considerations including preventative maintenance, bus purchases, and support for existing infrastructure such as park and rides and operation and maintenance facilities.

The funding amounts allocated in the half-cent scenarios represent the minimum amount of investment needed to maintain our existing service with minimal to no expansion.

HALF-CENT SCENARIO COMPARISON

Vehicle Hours of Delay

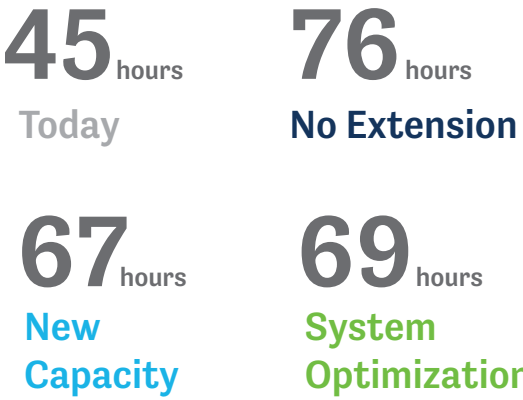
Delay is defined as additional travel time due to any speed lower than uncongested, or free flow, speed. To provide a more complete picture of congestion in our region, vehicle hours of delay is provided for the AM peak (6 am – 9 am), the PM peak (2 pm – 6 pm) and for the entire day. Congestion is often what drivers feel most when using our transportation system. Managing congestion through project selection and mitigation efforts is a federal mandate.



Annual Delay per Commuter

For drivers, the afternoon commute is often arduous and time-consuming. By looking at the annual delay per commuter we can we can make the impact of the important decisions ahead more relatable.

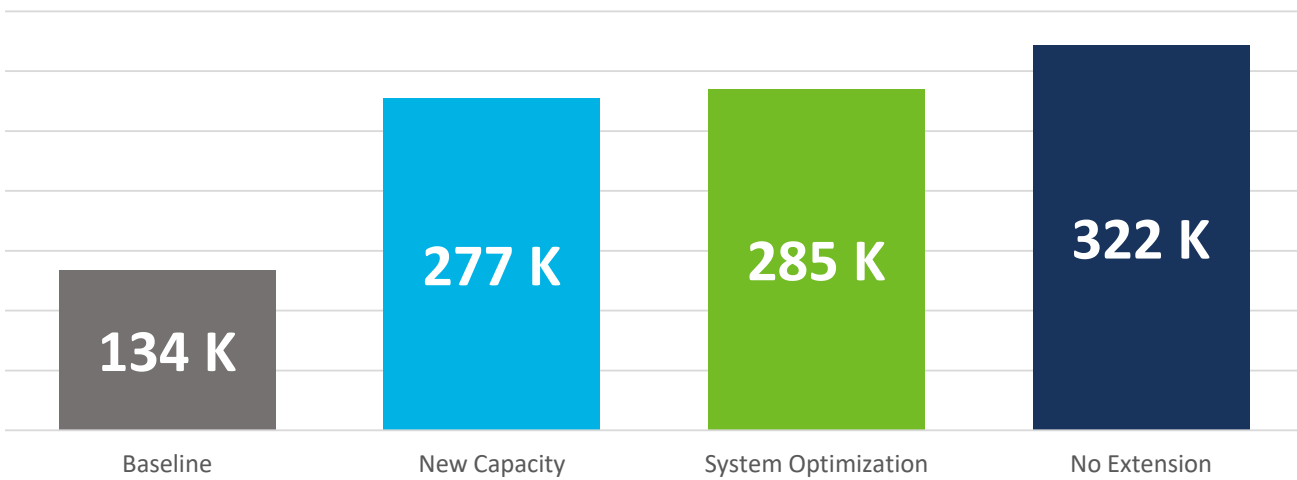
To help contextualize this information we’ve provided what our annual delay per commuter looks like in each of these two scenarios and what it could potentially be if no extension is passed.



Congestion on Freight Corridors

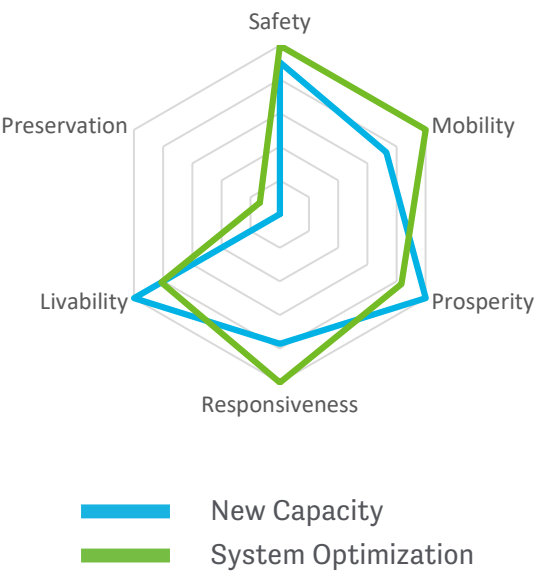
The movement of goods is critical to the economic health of the region. Delay on freight corridors is used to analyze the overall impact on freight movement. This analysis was conducted for the AM and PM peaks.

Hours of Delay on Critical Freight Corridors



MAG Goal Areas

The radar chart on the right provides at-a-glance insights into how each scenario addresses Momentums goals. This chart combines key performance indicators with financial information to summarize the scenario impacts. It summarizes only quantitative information, with an emphasis on outputs from MAG’s travel demand model.



HALF-CENT SCENARIO COMPARISON

Accessibility and equity are important elements in the evaluation of projects and packages of projects. MAG continues to refine its methodology for calculating accessibility. This assessment is intended only to illustrate the potential accessibility impact investments can extend to our community. Each scenario was analyzed through a variety of lenses, as described in the following sections.

Points of Interest

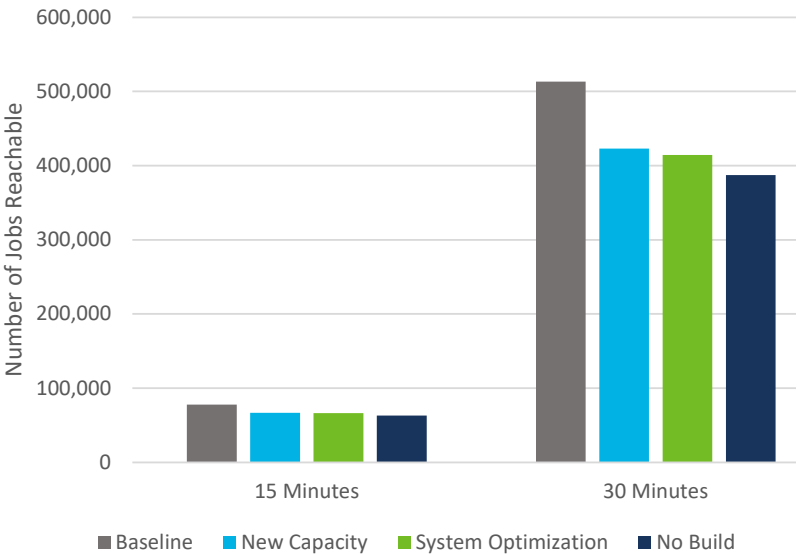
The ability to move freely around our region and access important destinations is a high priority for our residents. Convenient access to amenities like parks, libraries, grocery stores, and medical facilities has a real impact on residents’ quality of life. An analysis was conducted to help illustrate how each scenario impacted access to these destinations for our residents. The figures in the table on the right represent the number of each type of amenity **accessible for the average Valley resident within a 30 minute drive**. Both scenarios represent an improvement in accessibility over the no-extension scenario.

Programs	New Capacity	System Optimization
Culture	17.2	16.9
Entertainment	3.4	3.3
Parks and Recreation	118.3	116.8
Groceries	38.9	38.3
Hospitals	6.1	6.0

Number of Jobs Reachable

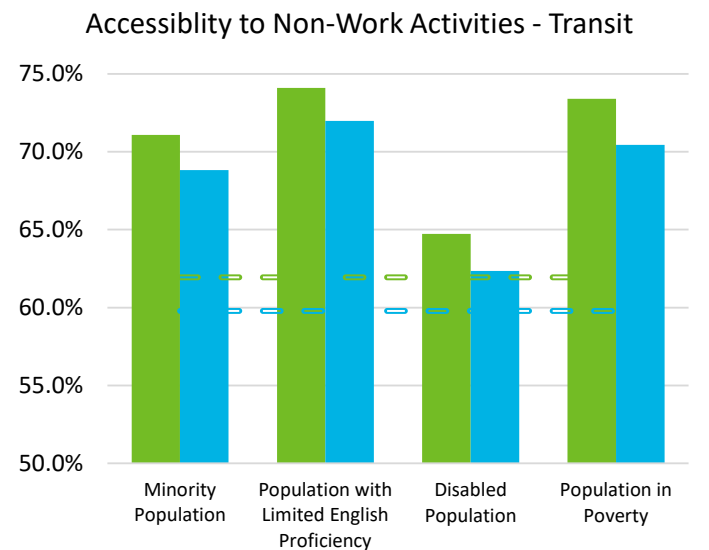
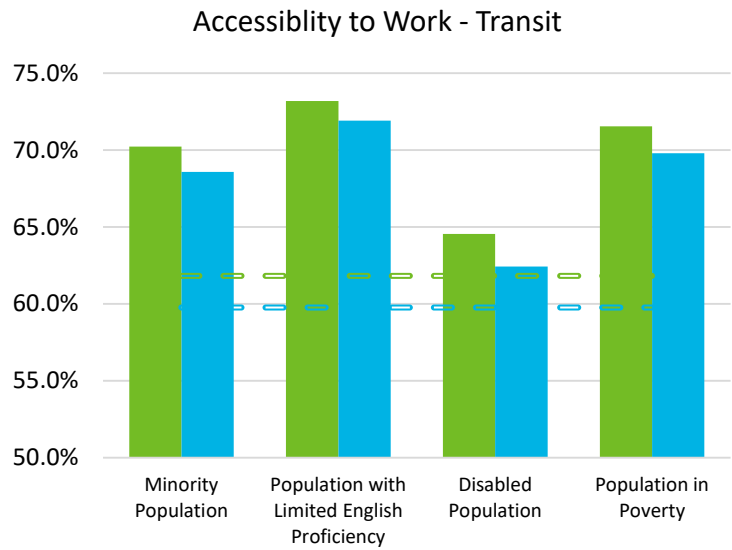
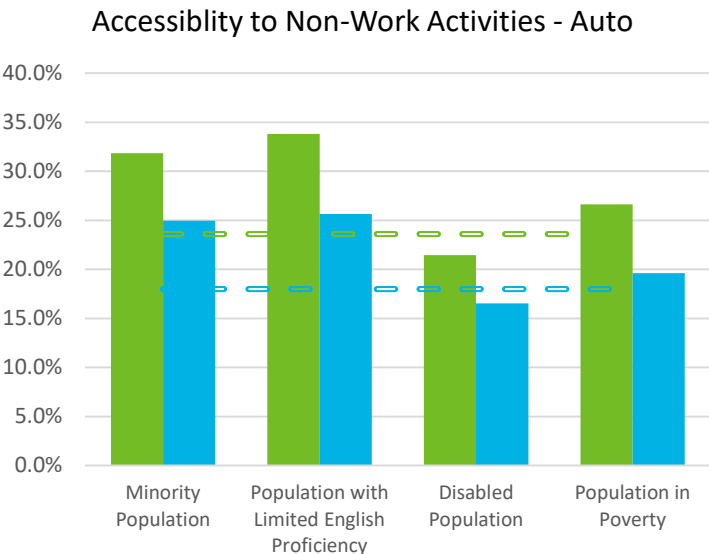
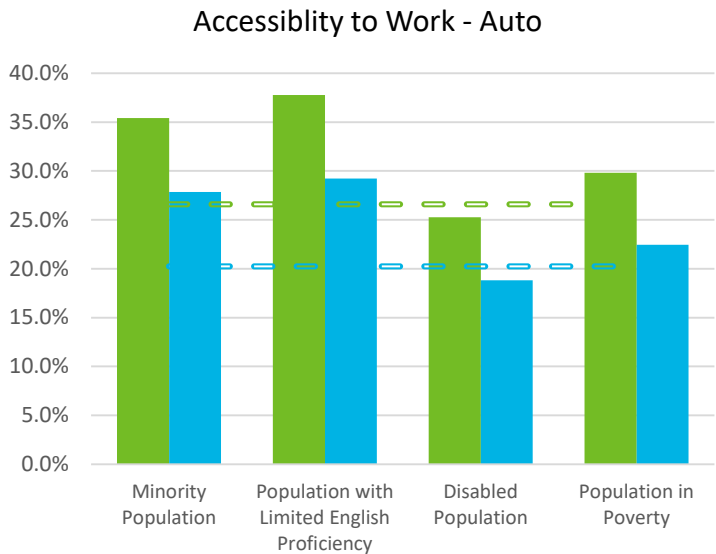
By combining model outputs with socioeconomic forecasts, an analysis of the number of jobs reachable in a given timeframe was conducted.

Without intervention, by 2050 the number of jobs in our region reachable within 30 minutes declines by 25 percent. Under either of the half-cent scenarios, the number of jobs reachable within 30 minutes still declines by almost 18 percent compared to the baseline.



Equity

Ensuring our scenarios don’t leave anyone behind is paramount to a successful RTP. Similar to the methodology used for the number of jobs reachable, an accessibility analysis was completed. Our analysis showed that accessibility improved for nearly everyone in both of our scenarios when compared to No Extension. The tables below reflect how accessibility is changing for each population (i.e., minority populations will see about a 30-35 percent improvement in accessibility to work via automobile). While accessibility is improving for all, it is improving at a higher rate for some populations.



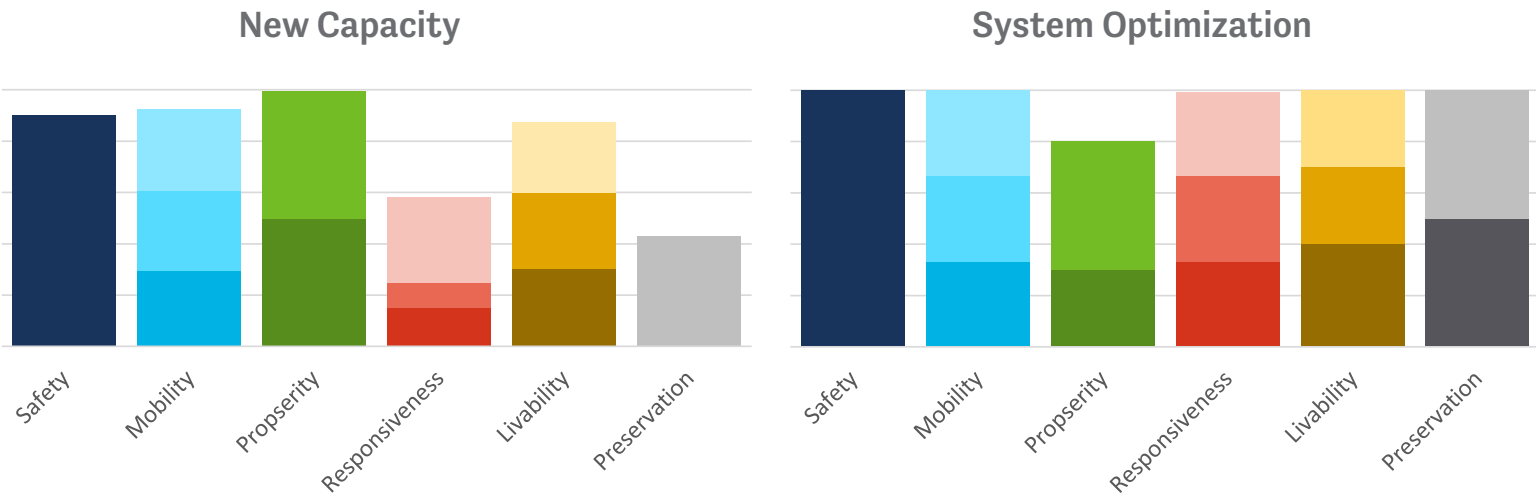
New Capacity
System Optimization

HALF-CENT SCENARIO COMPARISON

Qualitative Scenario Comparison

Not all elements of the scenarios can be captured through travel demand modeling or other quantitative data sources. The charts below show how the scenarios perform in each of the RTP goal areas, highlighting some of the key components within each.

Although both scenarios performed well under the Safety and Mobility goals, the System Optimization scenario clearly outperformed the New Capacity scenario in the areas of Responsiveness, Livability, and Preservation. The System Optimization scenario’s edge in these categories was due to the more flexible nature of its investment portfolio, including emphasis on a range of program areas, as well as lower operations and maintenance costs due to a reduced emphasis on upfront capital investments. The New Capacity scenario performed better under the Prosperity goal due to its greater emphasis on improving or expanding freeways and highways, which often serve as primary freight corridors in our region.

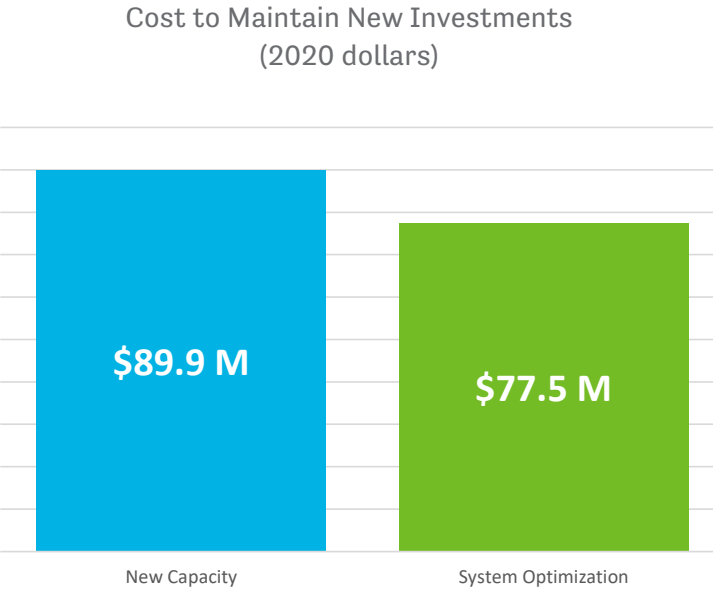


- Safety:
Relative level of investment
- Mobility:
Failing level of service (LOS)
Congested lane miles
Delay
- Prosperity:
Freight congestion
Input/Output Economics Multiplier

- Responsiveness:
Sunk cost
Investment diversity
Access to jobs
- Livability:
Active Transportation (relative level of investment)
Vehicle miles traveled (VMT)
Accessibility to high capacity transit (HCT)
- Preservation:
Operations and maintenance cost burden in 2050
Arterial rehabilitation vs. widening

Operations and Maintenance Costs

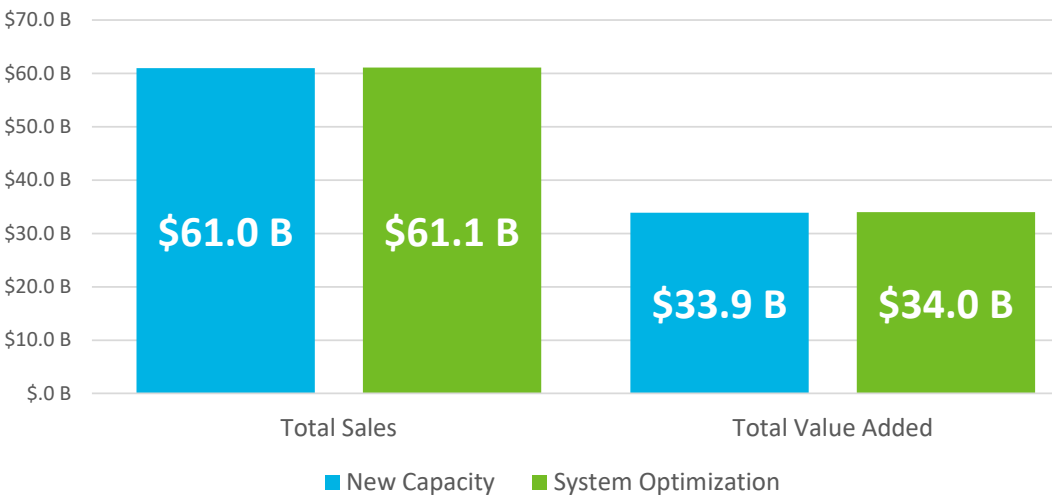
In addition to budgeting for the cost of operating and maintaining our existing transportation assets, the region must also plan ahead to ensure that we are able to take care of any new facilities we build as part of this plan. The chart on the right shows the additional cost (which comes in addition to the cost of existing assets) of operating and maintaining the facilities proposed under each of the scenarios. Because more new facilities are built under the New Capacity scenario, it leads to significantly higher future operations and maintenance costs.



14% Additional cost to operate and maintain the new facilities built under the New Capacity scenario vs. the System Optimization scenario

Economic Impact Analysis

Economic impact analysis evaluates how an investment spurs economic activity and job creation in a specific region. As investments are made, their spending ripples through the economy and contributes to value and employment. A high-level analysis of the two half-cent scenarios produced the results below which show similar economic benefits between the two scenarios.



354k jobs
New Capacity

357k jobs
System Optimization

ONE-CENT SCENARIOS

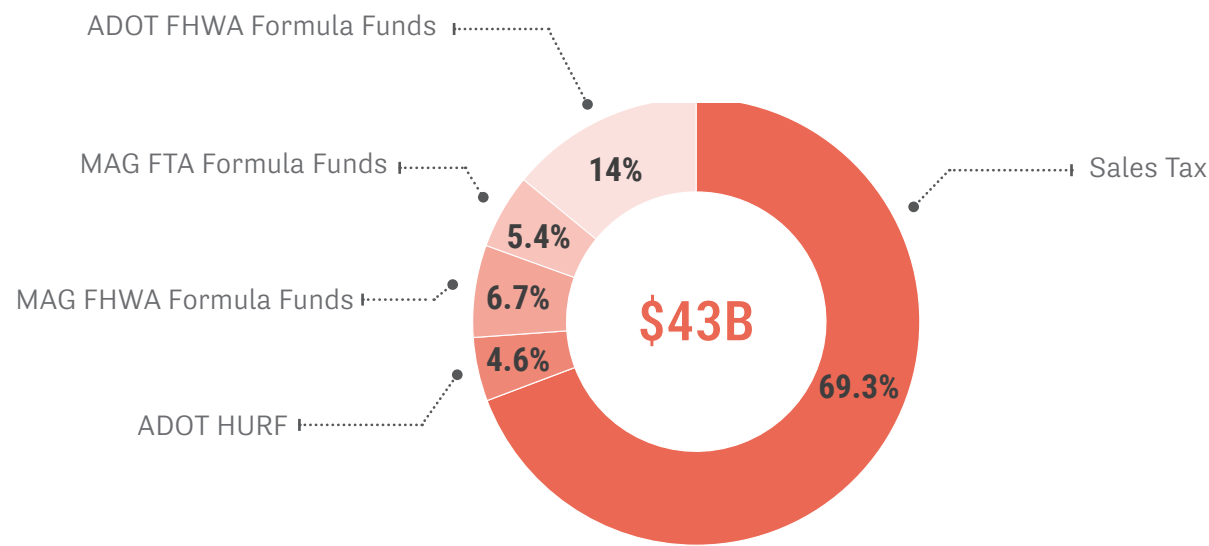


NEW CAPACITY (ONE CENT)

With the additional revenue generated by a one-cent regional sales tax, this scenario further increases the investment into fixed assets by allocating increased funding to freeways, interchanges, and grade separations. This scenario also increases the funding for both bus rapid transit and light rail extensions, and includes partial funding for the potential implementation of commuter rail.

SCENARIO GOALS

This scenario aims to improve or maintain the region’s mobility through the addition of new capacity, including strategic investments in new roadway and rail-based transit projects.



Achievement of MAG Goal Areas

The graphic below illustrates how well this scenario performs in relation to the six RTP goal areas. The performance of each scenario was compared against a variety of data points related to each goal area. Additional detail about each scenario’s performance can be viewed in the scenario comparison sections of this document. Meeting our stated goals, as well as conforming to federal guidelines and planning emphasis areas, is an important consideration in the scenario planning process.

KEY TAKEAWAYS

- Focuses investments on arterial widening rather than arterial rehabilitation
- Highest arterial investment with a comparatively small BRT investment
- Provides for the most new miles/lane miles of freeway
- Only scenario with partial funding for the potential implementation of commuter rail - a new mode for the region



Livability



Preservation



Mobility



Safety



Prosperity



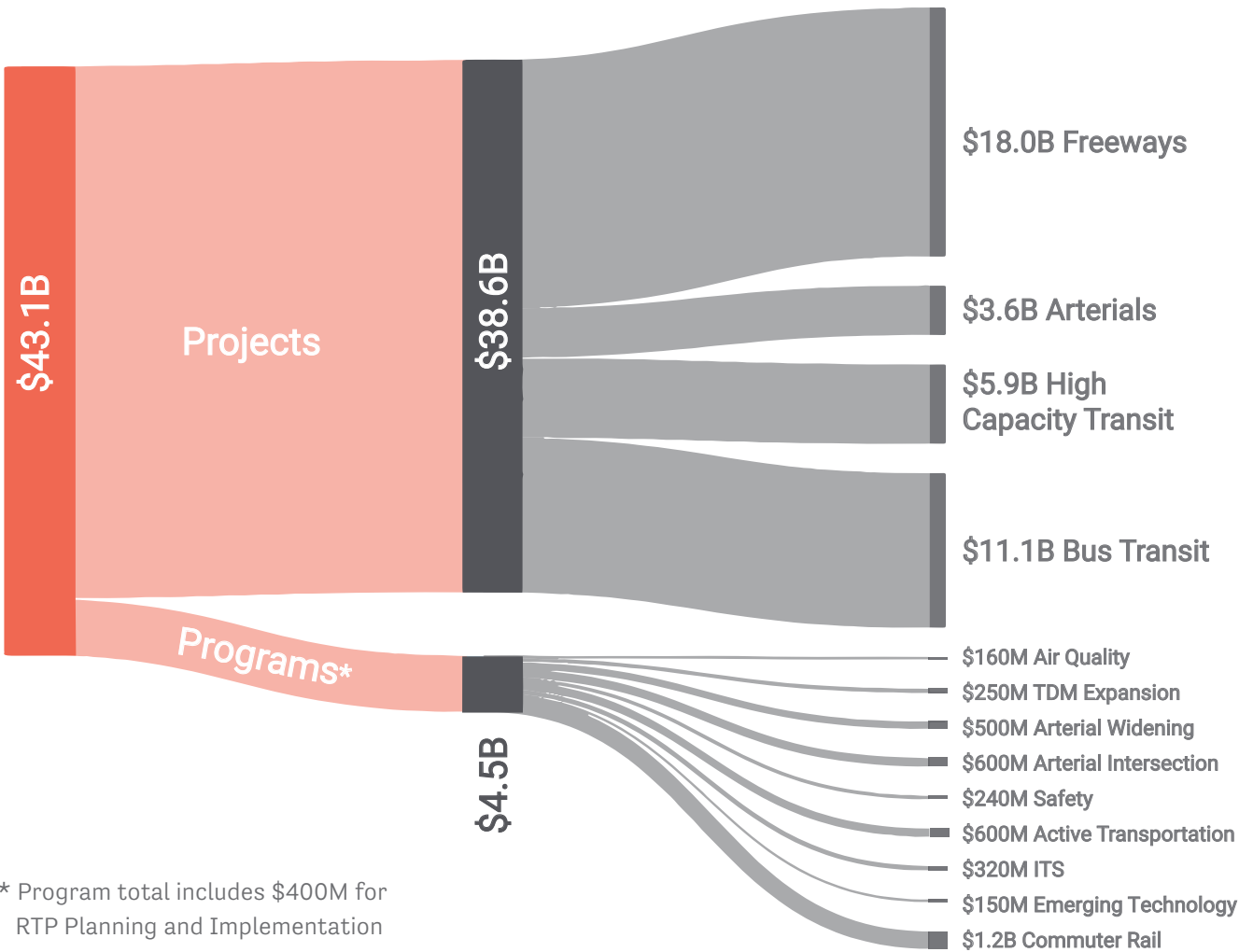
Responsiveness

Table 05 : Project Investments

Project Investments	Miles
New Light Rail	17.3
New BRT	53
New Streetcar	3.2
New Freeway	44.8
General Purpose Lanes	386
New HOV Lane Miles	231
New Arterial Lane Miles	494
New Interchanges	4
New Grade Separations	11

Table 06 : Program Investments

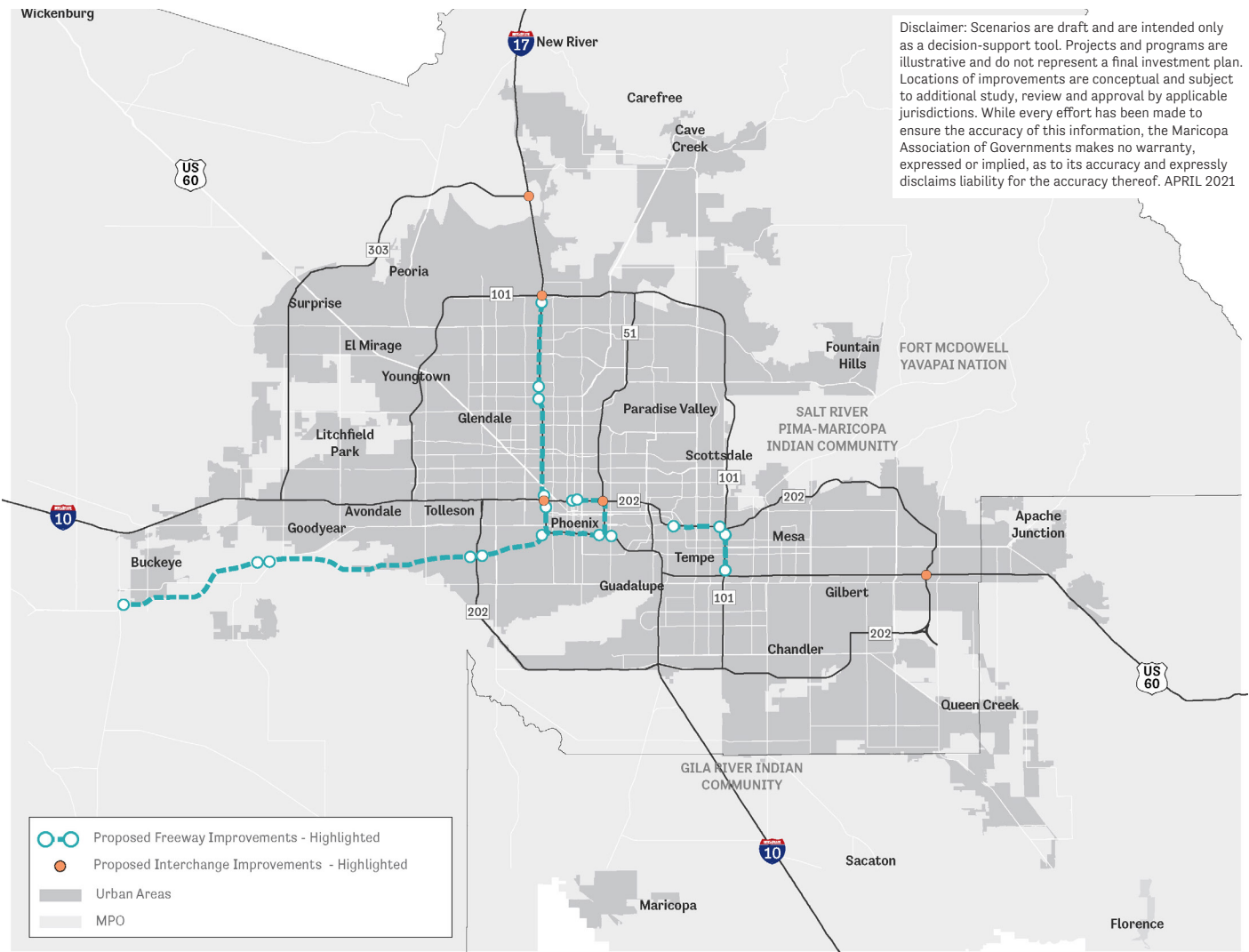
Program Investments	Cost
Air Quality	\$160,000,000
TDM Expansion	\$250,000,000
Arterial Rehabilitation	\$0
Arterial Widening	\$500,000,000
Arterial Intersection	\$600,000,000
Safety	\$240,000,000
Active Transportation	\$600,000,000
ITS	\$320,000,000
Emerging Tech	\$150,000,000
Commuter Rail	\$1,250,000,000



* Program total includes \$400M for RTP Planning and Implementation

NEW CAPACITY (ONE CENT)

Figure 09: Notable Highway/Freeway Projects

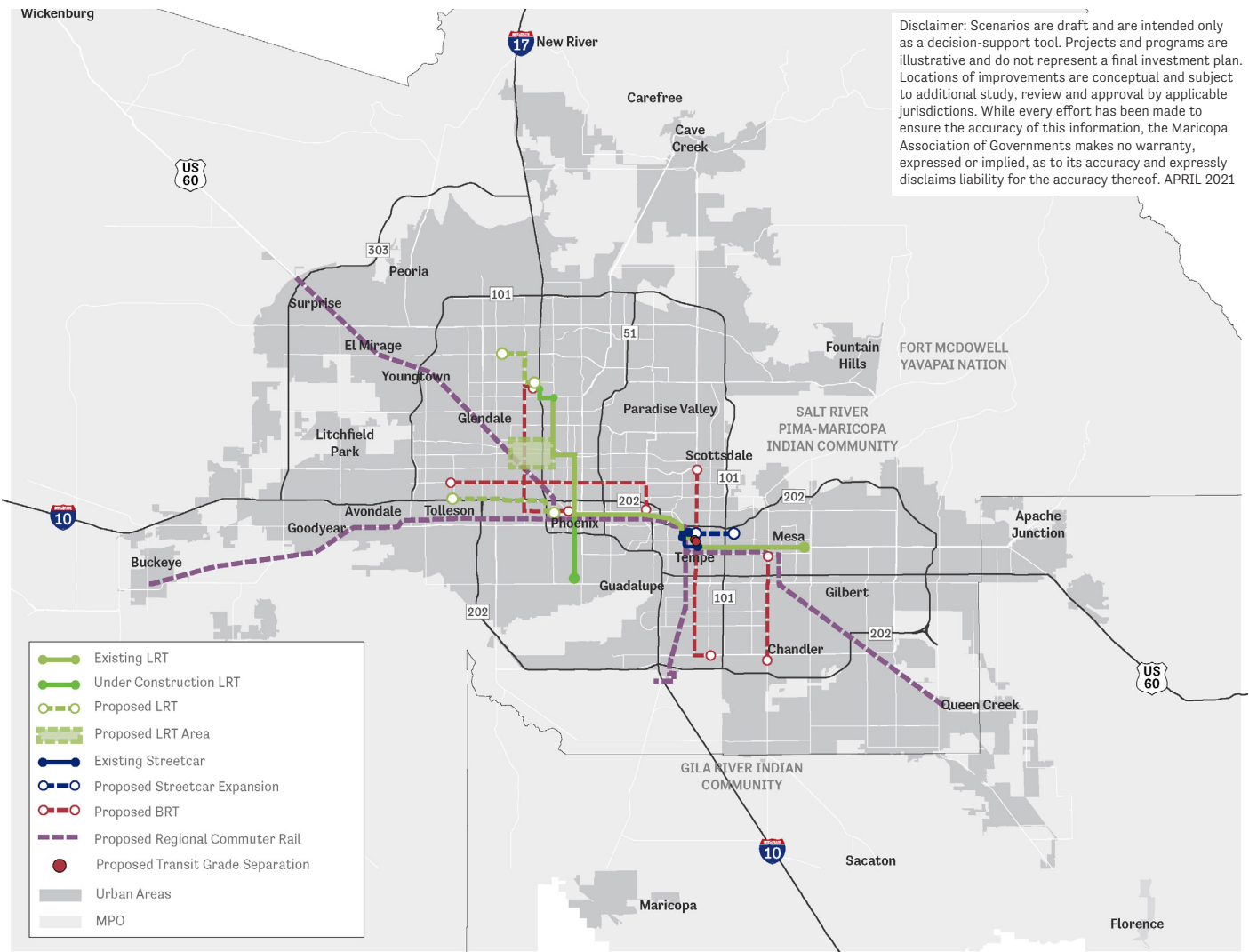


Notable Highway/Freeway Projects

- SR 30: Loop 303 to Loop 202
- SR 30: Loop 202 to I-17
- SR 30: SR 85 to Loop 303 Interim Facility
- I-17: 19th Avenue to Dunlap Freeway Reconstruction
- I-17: Dunlap to Loop 101 Freeway Reconstruction
- I-17: I-10 (Papago) Split to 19th Ave HOV Lane
- Loop 202 (Red Mountain): Priest to Loop 101 System Improvements
- I-10/Loop 202/SR 51 Mini Stack System Interchange Improvements
- Loop 101 (Price): Loop 202 (Red Mountain) to US 60 (Superstition) Bottleneck Improvements
- Loop 303 at I-17 System Interchange
- Loop 101 (Agua Fria) at I-17 DHOV
- US 60 (Superstition) at Loop 202 (Santan) DHOV
- I-10 (Papago): Tunnel to Split Improvements
- I-10/I-17 Stack System Interchange Improvements
- I-10 (Papago) Hance Park Tunnel Reconstruction

NEW CAPACITY (ONE CENT)

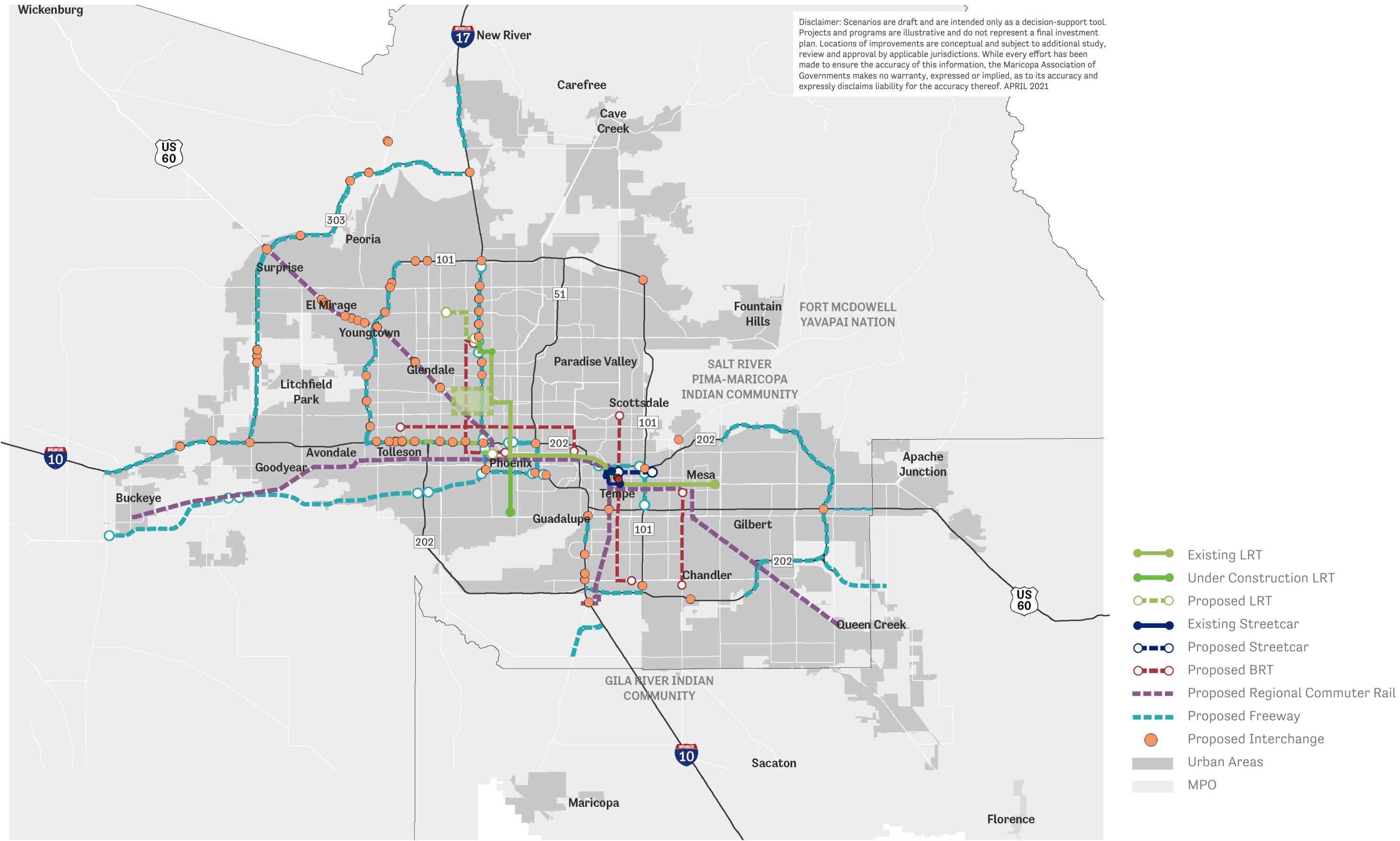
Figure 10: Notable High Capacity Transit Projects



Notable High Capacity Transit Projects

- ASU West Light Rail Extension
- West Phoenix Light Rail Extension
- I-10 West Light Rail Extension
- University Drive at Rural Road Light Rail Grade Separation
- Rio Salado East Streetcar Extension
- Thomas Road/44th Street BRT
- Scottsdale Road/Rural Road BRT
- 35th Avenue/Van Buren Street BRT
- Arizona Avenue BRT
- Regional Commuter Rail

Figure 11: Capital Investment Projects

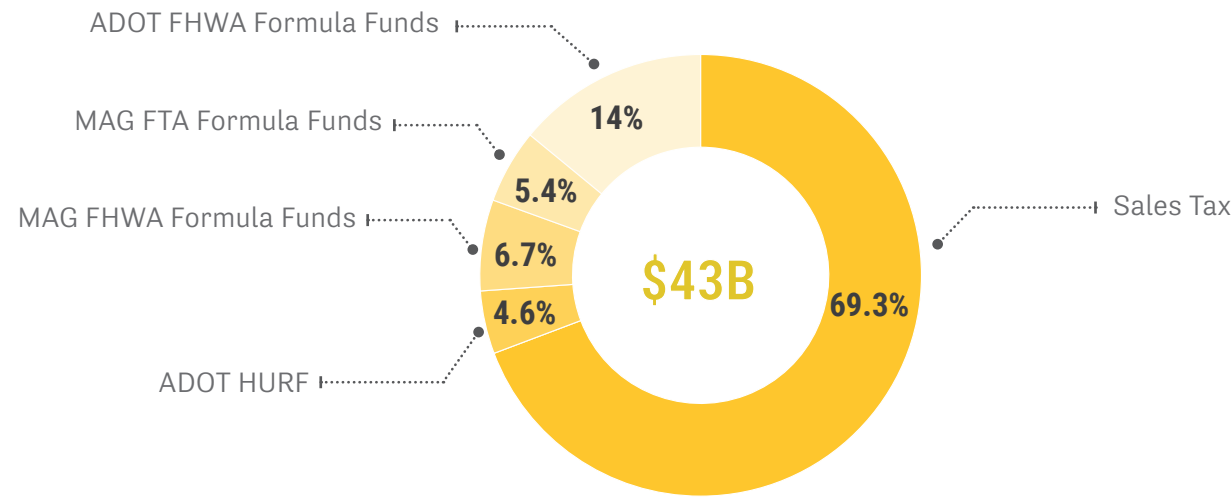


SYSTEM OPTIMIZATION (ONE CENT)

With the additional revenue generated by a one-cent regional sales tax, this scenario further increases the investment into solutions that maximize our existing facilities. These include additional programmatic investments in ITS and emerging technologies, widening our existing freeways, and arterial intersection improvements. This scenario also features the most robust bus rapid transit network that, when paired with HOV and DHOV investments, will most emphasize alternative travel modes and expand travel choices.

SCENARIO GOALS

This scenario prioritizes investments in infrastructure, technology, and programs that improve or maintain the region’s mobility without significant investments in new capacity.



Achievement of MAG Goal Areas

The graphic below illustrates how well this scenario performs in relation to the six RTP goal areas. The performance of each scenario was compared against a variety of data points related to each goal area. Additional detail about each scenario’s performance can be viewed in the scenario comparison sections of this document. Meeting our stated goals, as well as conforming to federal guidelines and planning emphasis areas, is an important consideration in the scenario planning process.

KEY TAKEAWAYS

- Largest transit investment, including the largest investment in bus transit expansion across the region
- Includes nearly \$5B for new freeways
- Adds nearly 500 lane-miles to our current freeway system



Livability



Preservation



Mobility



Safety



Prosperity



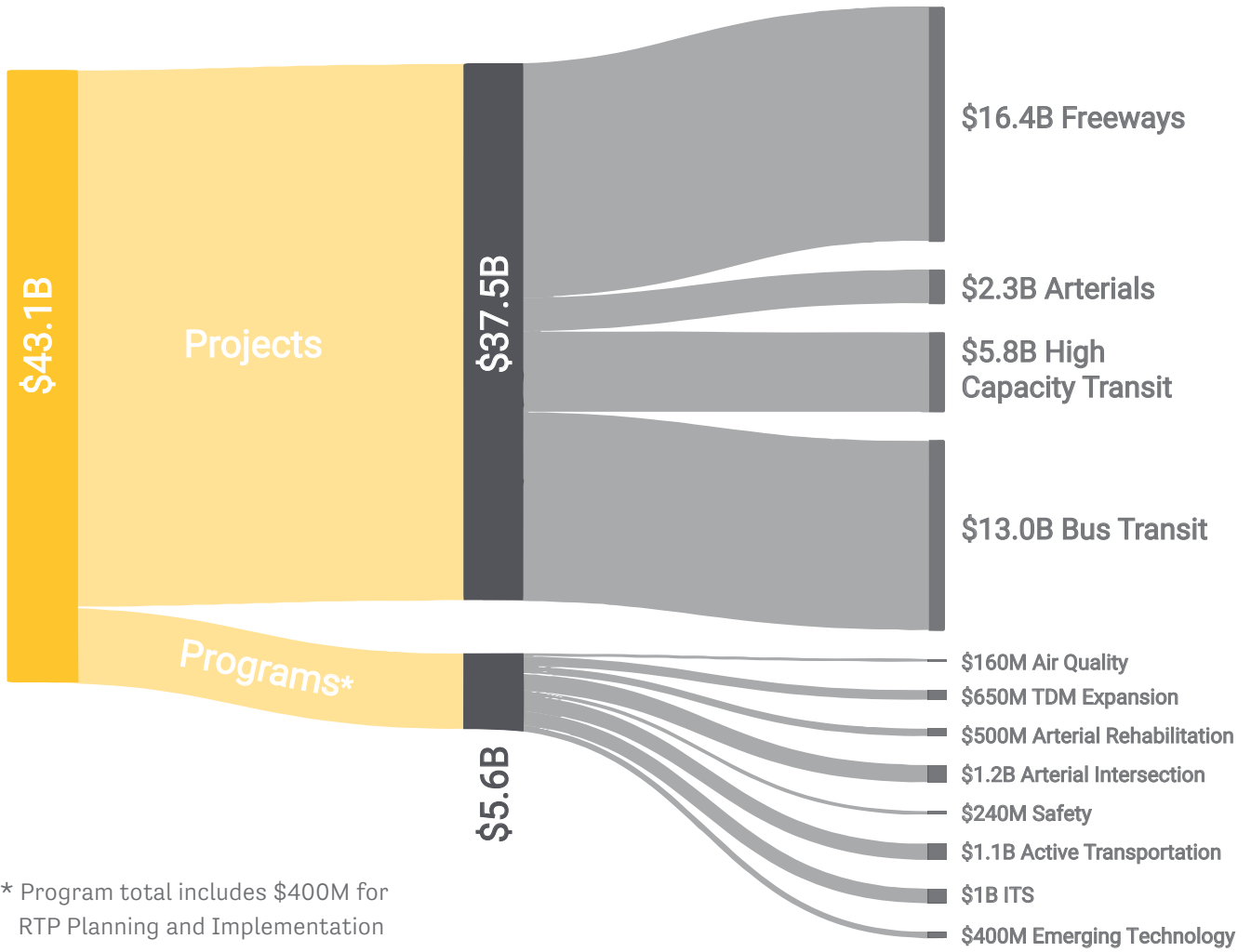
Responsiveness

Table 07 : Project Investments

Project Investments	Miles
New Light Rail	17.3
New BRT	66.8
New Streetcar	0
New Freeway	33.5
General Purpose Lanes	353
New HOV Lane Miles	135
New Arterial Lane Miles	415
New Interchanges	4
New Grade Separations	3

Table 08 : Program Investments

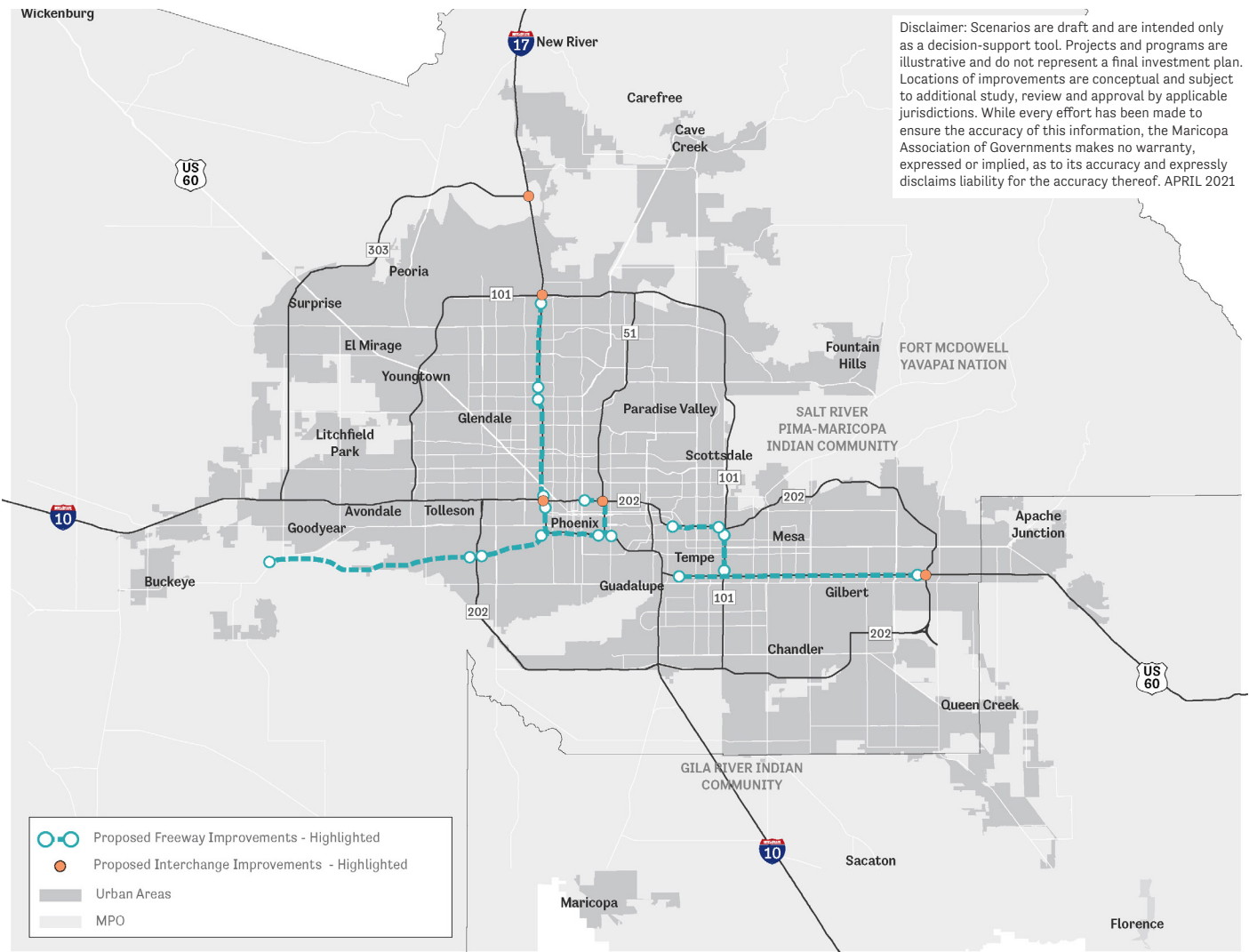
Program Investments	Cost
Air Quality	\$160,000,000
TDM Expansion	\$650,000,000
Arterial Rehabilitation	\$500,000,000
Arterial Widening	\$0
Arterial Intersection	\$1,200,000,000
Safety	\$240,000,000
Active Transportation	\$1,000,000,000
ITS	\$1,000,000,000
Emerging Tech	\$400,000,000
Commuter Rail	\$0



* Program total includes \$400M for RTP Planning and Implementation

SYSTEM OPTIMIZATION (ONE CENT)

Figure 12: Notable Highway/Freeway Projects

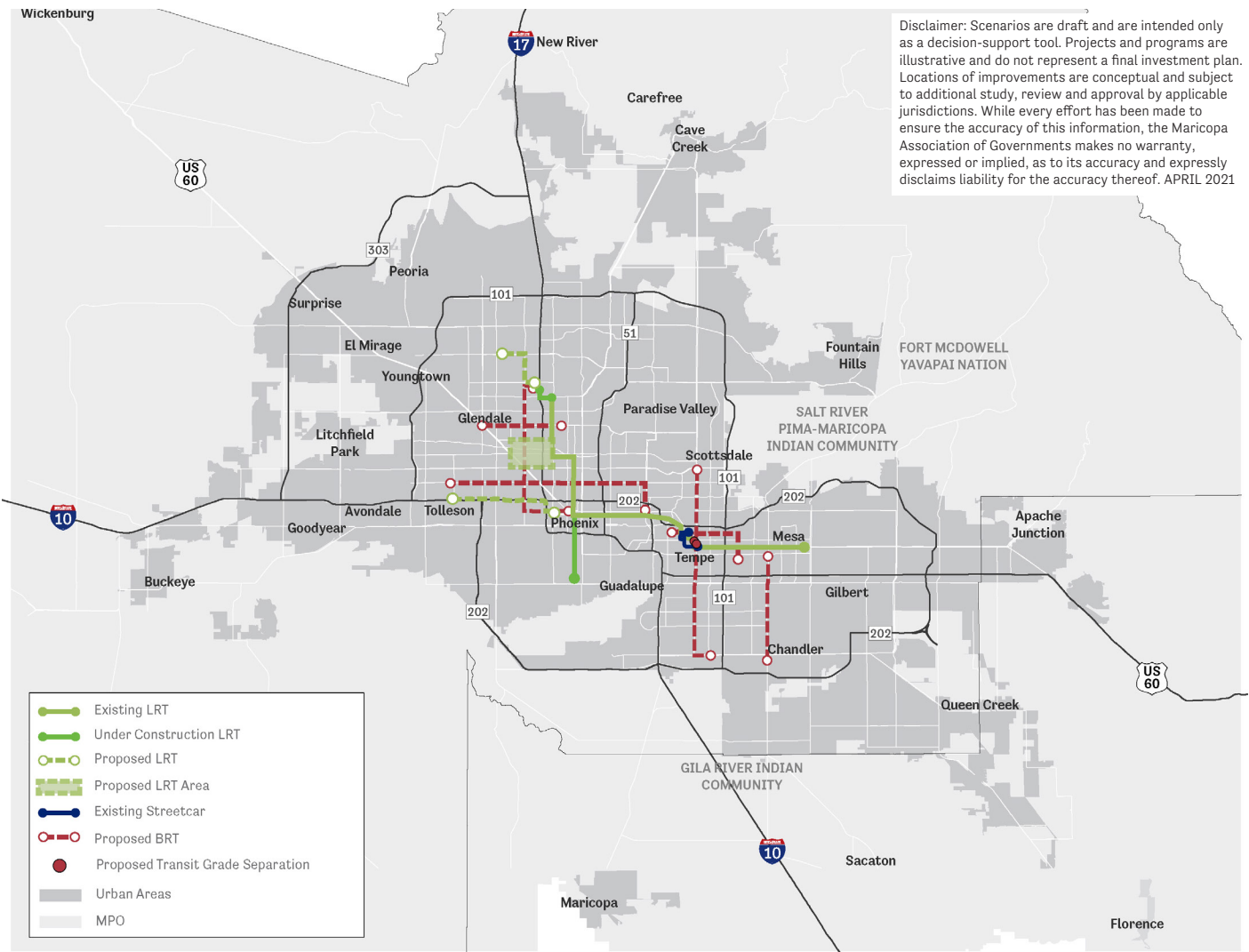


Notable Highway/Freeway Projects

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- I-17: I-10 (Papago) Split to 19th Ave HOV Lane
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- I-10/I-17 Stack System Interchange Improvements
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SYSTEM OPTIMIZATION (ONE CENT)

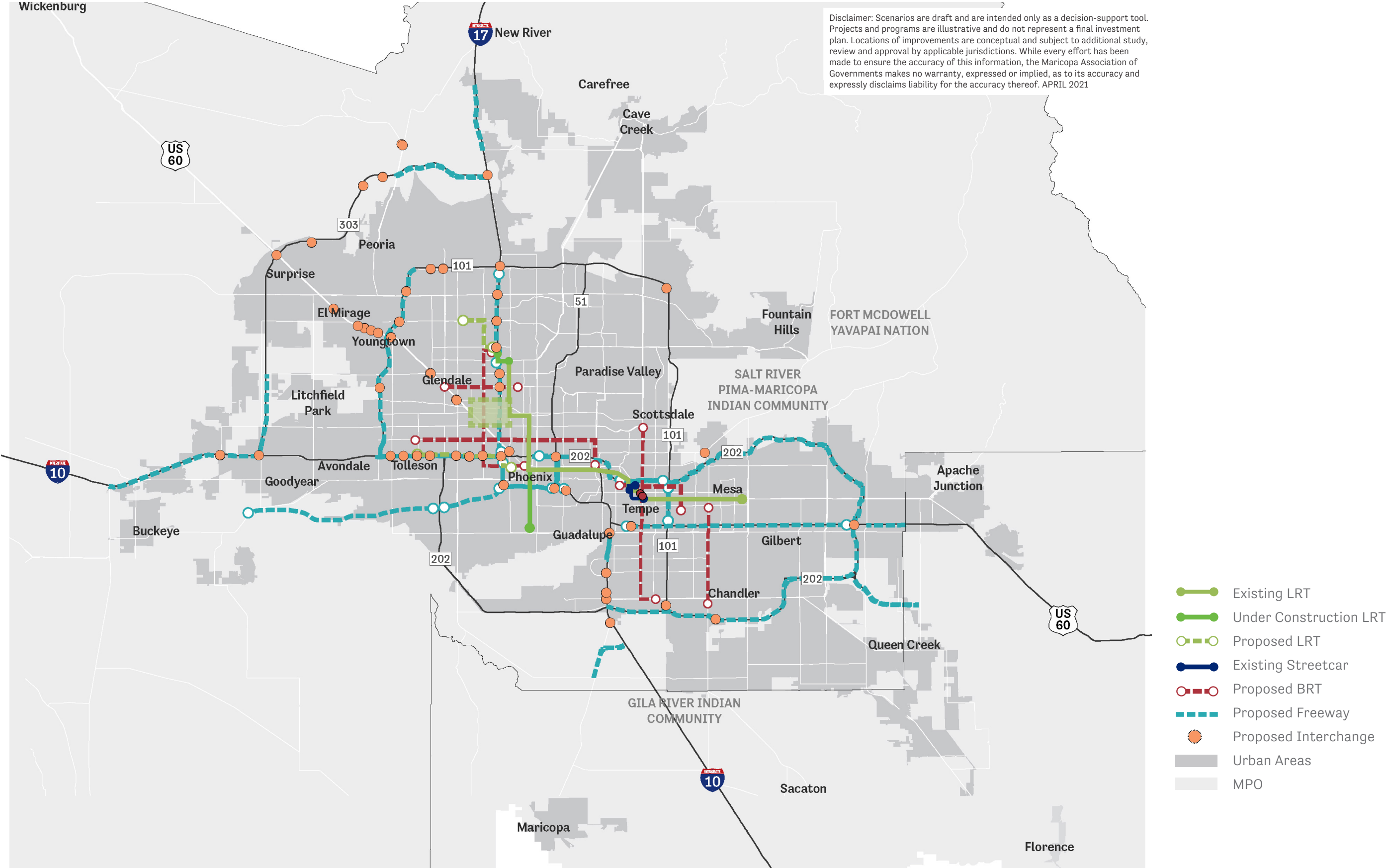
Figure 13: Notable High Capacity Transit Projects



Notable High Capacity Transit Projects

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- I-10 West Light Rail Extension
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- University Drive at Rural Road Light Rail Grade Separation
- Thomas Road/44th Street BRT
- Scottsdale Road/Rural Road BRT
- 35th Avenue/Van Buren Street BRT
- Arizona Avenue BRT
- Rio Salado/Dobson BRT
- Glendale Avenue BRT

Figure 14: Capital Investment Projects





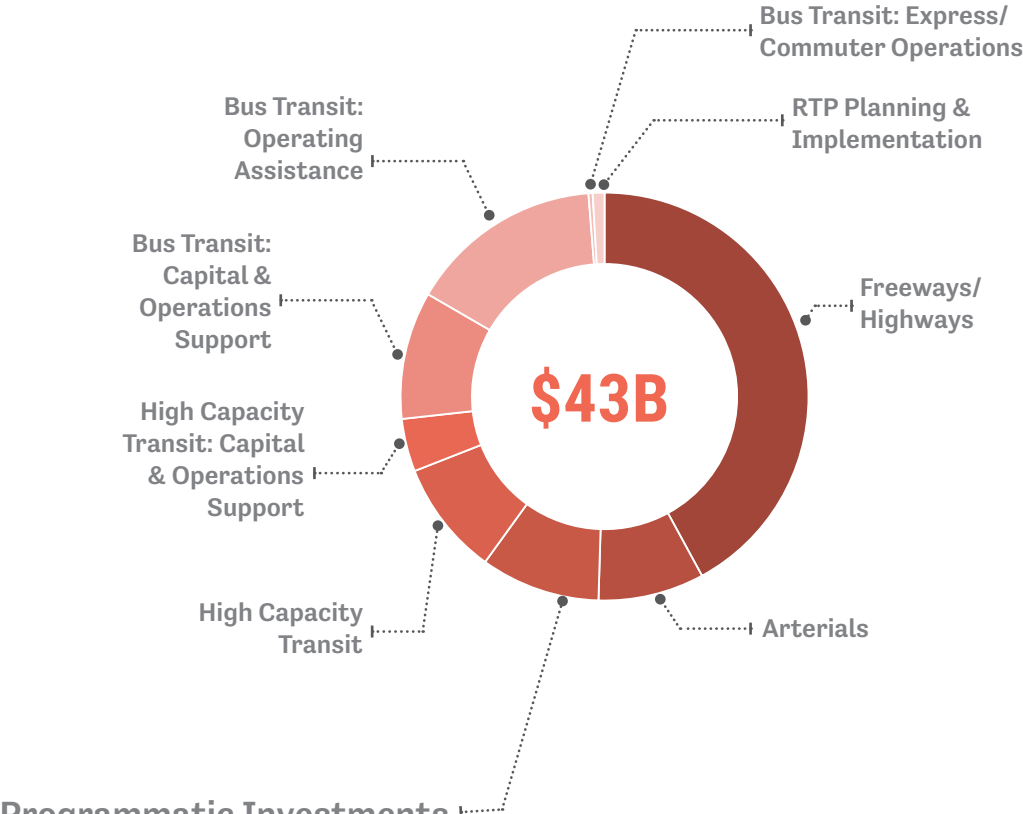
COMPARISON OF ONE-CENT SCENARIOS

COMPARISON OF ONE-CENT SCENARIOS

SCENARIOS	 Vehicle Miles Traveled	 % of Congested Lane Miles for AM & PM Peaks	 Total Vehicle Hours of Delay for AM & PM Peaks (average)	 % of the Network with Failing LOS During PM Peak	 Population within 1/4 mi of High-Capacity Transit Stops	 Vehicle Hours of Delay on Designated/ Critical Freight Corridors in AM & PM Peaks	 Annual Delay per Commuter	 Number of Jobs Reachable within 30 minutes by TAZ Population
TODAY	139.9M Miles	34%	445k Hours	10%	210k	134k Hours	45 Hours	513k Jobs
NEW CAPACITY	209.5M Miles	+6%	488k Hours	+5%	402k	269k Hours	64 Hours	430k Jobs
SYSTEM OPTIMIZATION	209.5M Miles	+3%	456k Hours	+3%	420k	275k Hours	67 Hours	427k Jobs
NO EXTENSION	208.3M Miles	+12%	619k Hours	+9%	210k	322k Hours	76 Hours	387k Jobs

WHAT GOES INTO EACH SCENARIO?

NEW CAPACITY - ONE CENT



Programmatic Investments

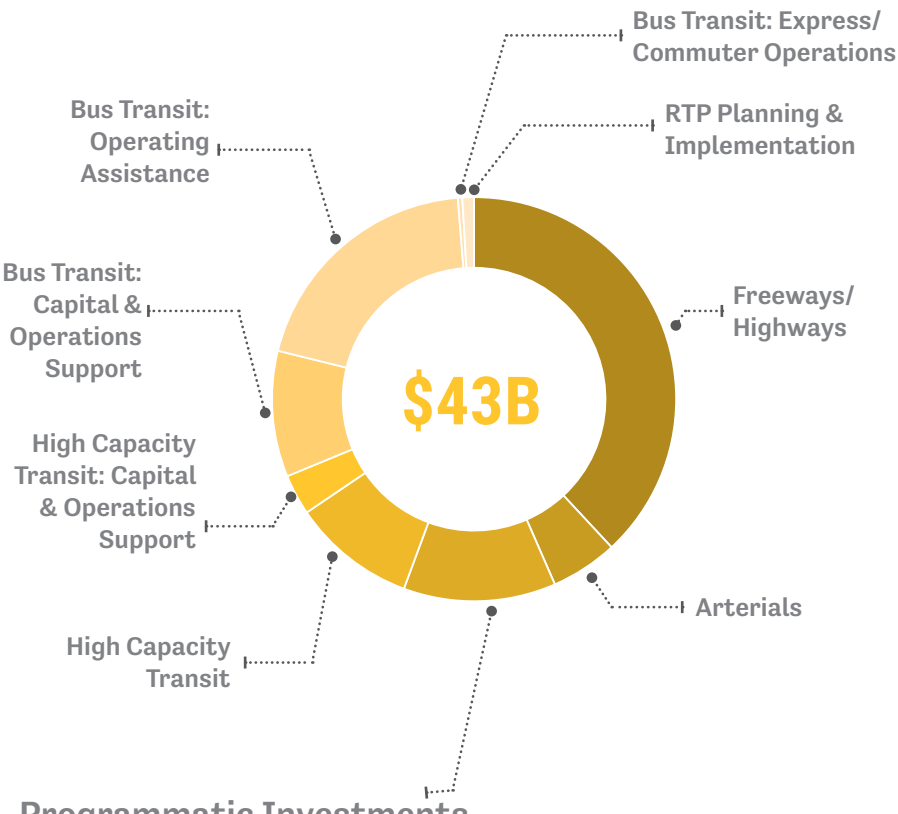
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Safety	\$240,000,000
Active Transportation	\$600,000,000
ITS	\$320,000,000
Emerging Tech	\$150,000,000
Commuter Rail	\$1,250,000,000
TOTAL	\$4,070,100,000

More investment allocated to Arterial Widening

Commuter Rail

This is the only scenario that includes partial funding for the potential implementation of Regional Commuter Rail. Implementation is further dependent on successfully securing required agreements with railroad partners, establishing a governing authority, and achieving needed statutory authority.

SYSTEM OPTIMIZATION - ONE CENT



Programmatic Investments

Programs	Cost
Air Quality	\$160,000,000
TDM Expansion	\$650,000,000
Arterial Rehabilitation	\$500,000,000
Arterial Widening	\$0
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Safety	\$240,000,000
Active Transportation	\$1,100,000,000
ITS	\$1,000,000,000
Emerging Tech	\$400,000,000
Commuter Rail	\$0
TOTAL	\$5,250,000,000

More investment allocated to Arterial Rehabilitation

Significant additional investment in ITS and Emerging Tech

Bus Transit

Bus transit refers to bus services including local bus, express routes, and paratransit. It also includes state of good repair considerations including preventative maintenance, bus purchases, and support for existing infrastructure such as park and rides and operation and maintenance facilities.

The additional funding available under the one-cent scenarios would allow for the expansion of, or improvements to, existing bus transit service.

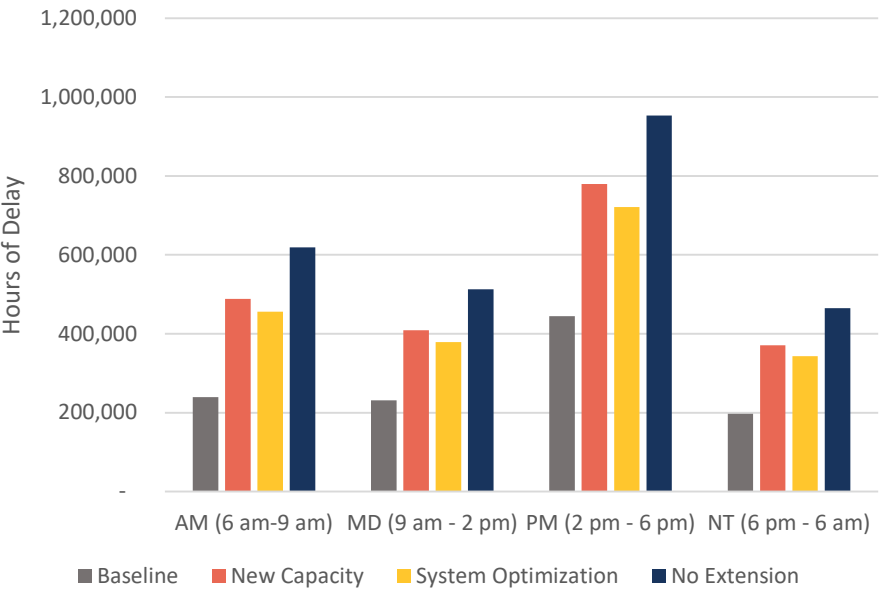
ONE-CENT SCENARIO COMPARISON



Vehicle Hours of Delay

Delay is defined as additional travel time due to any speed lower than uncongested, or free flow speed. To provide a more complete picture of congestion in our region, vehicle hours of delay is provided for the AM peak (6 am – 9 am), the PM peak (2 pm – 6 pm) and for the entire day.

Congestion is often what drivers feel most when using our transportation system. Managing congestion through project selection and mitigation efforts is a federal mandate.



Annual Delay per Commuter

For drivers, the afternoon commute is often arduous and time-consuming. By looking at the annual delay per commuter we can we can make the impact of the important decisions ahead more relatable.

To help contextualize this information we’ve provided what our annual delay per commuter looks like in each of these two scenarios and what it could potentially be if no extension is passed.

45 hours
Today

64 hours
New Capacity

76 hours
No Extension

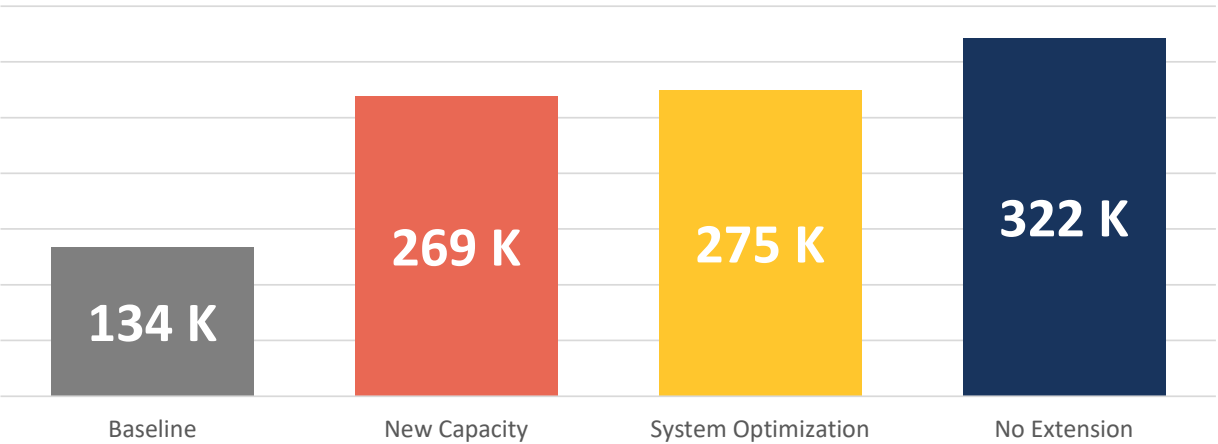
67 hours
System Optimization



Congestion on Freight Corridors

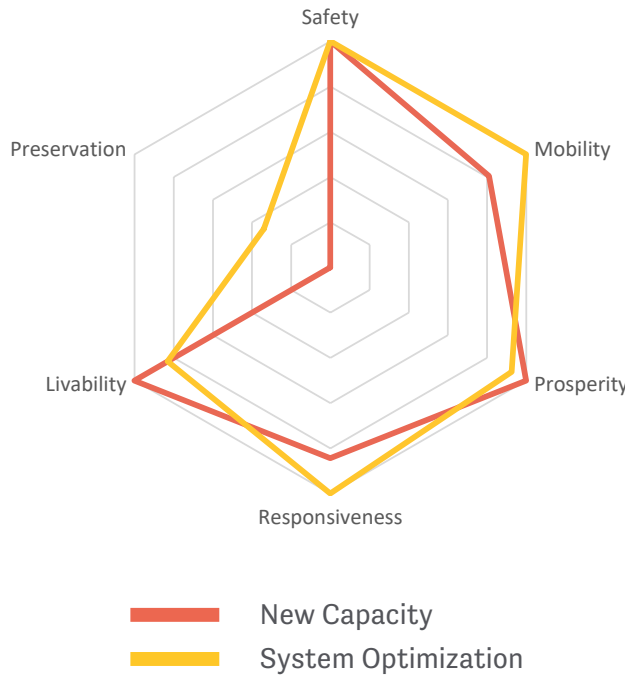
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Hours of Delay on Critical Freight Corridors



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The radar chart on the right provides at-a-glance insights into how each scenario addresses Momentums goals. This chart combines key performance indicators with financial information to summarize the scenario impacts. It summarizes only quantitative information, with an emphasis on outputs from MAG’s travel demand model.



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Points of Interest

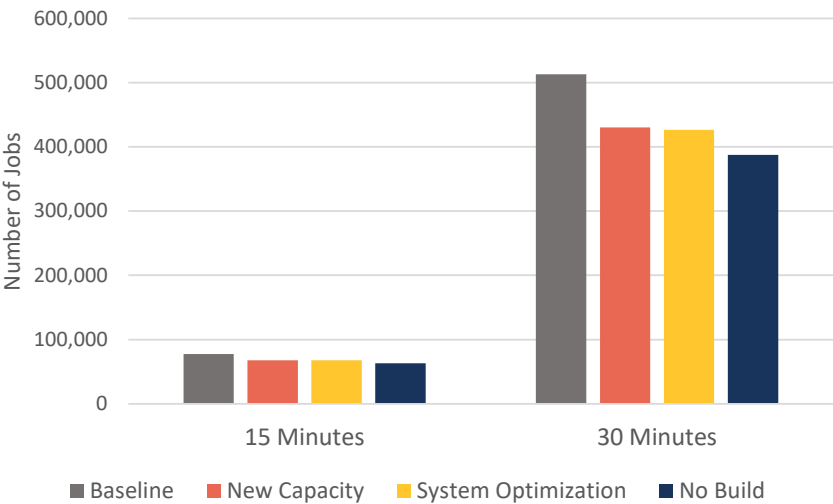
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Number of Jobs Reachable

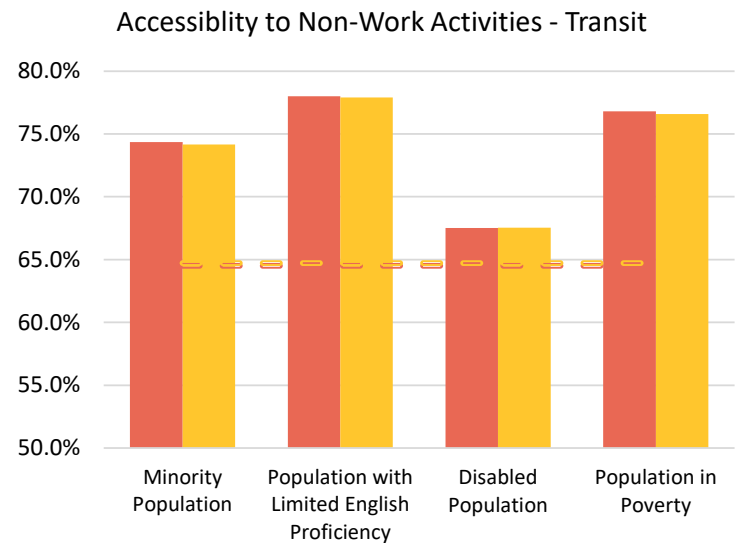
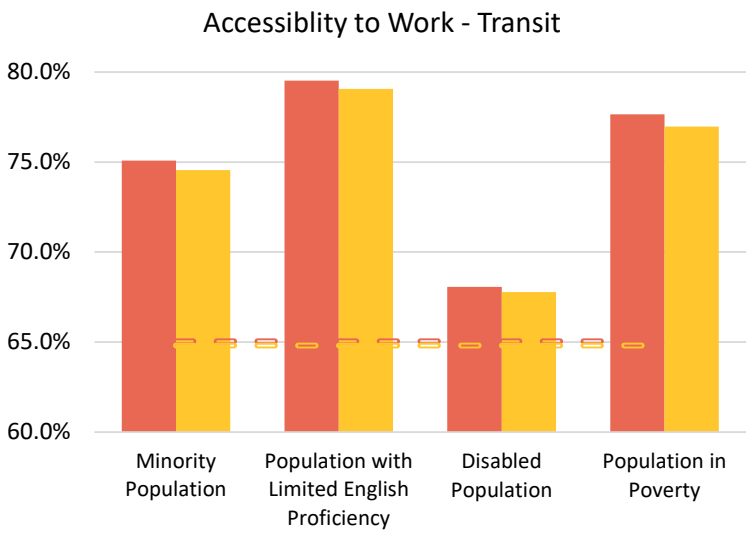
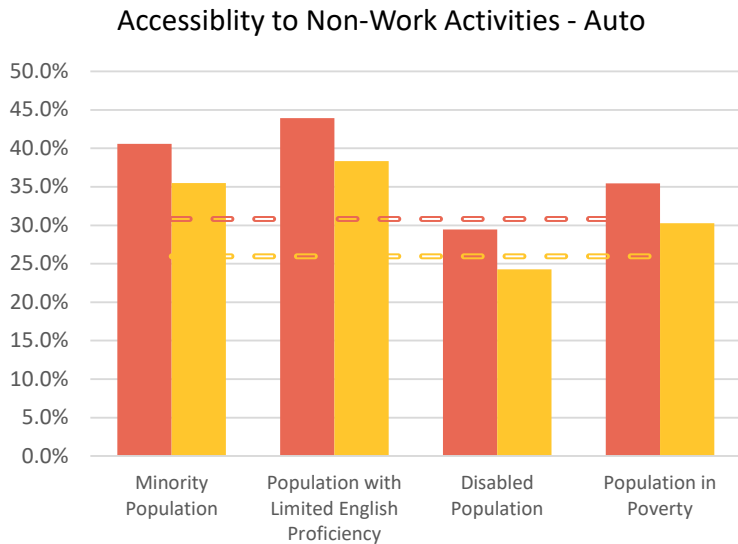
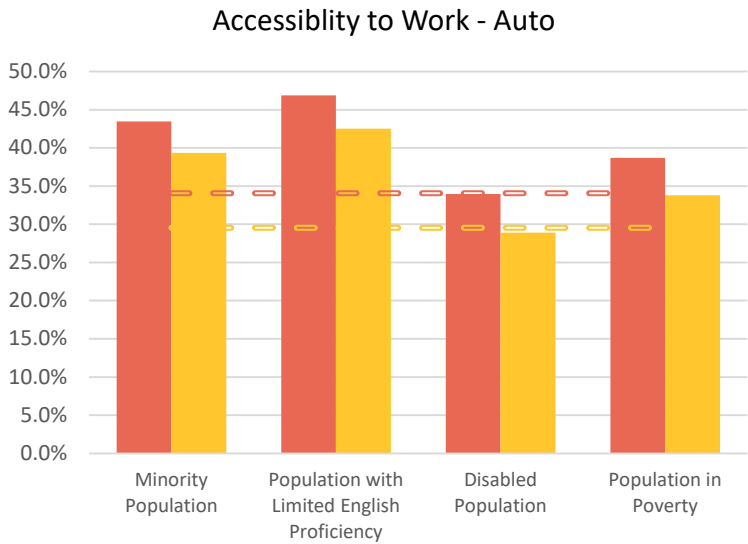
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Without intervention, by 2050 the number of jobs in our region reachable within 30 minutes declines by 25 percent. Under either of the one-cent scenarios, the number of jobs reachable within 30 minutes still declines by 16% compared to the baseline.



Equity

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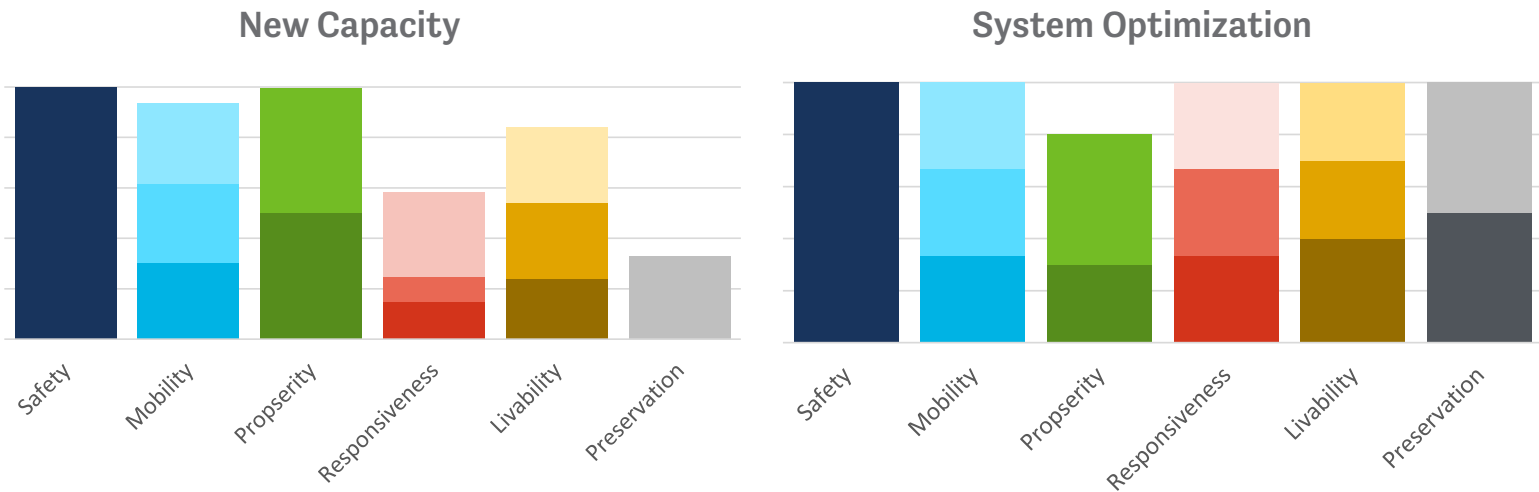
New Capacity
System Optimization

ONE-CENT SCENARIO COMPARISON

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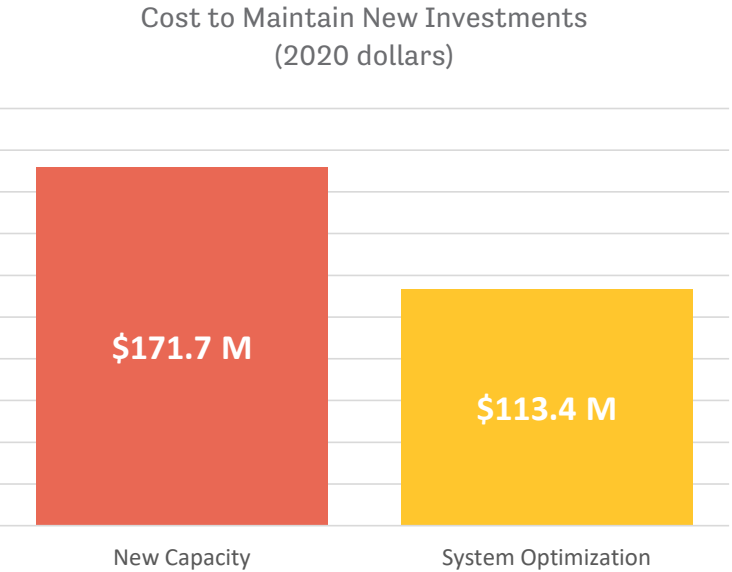


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Operations and maintenance cost burden in 2050
Arterial rehabilitation vs. widening

Operations and Maintenance Costs

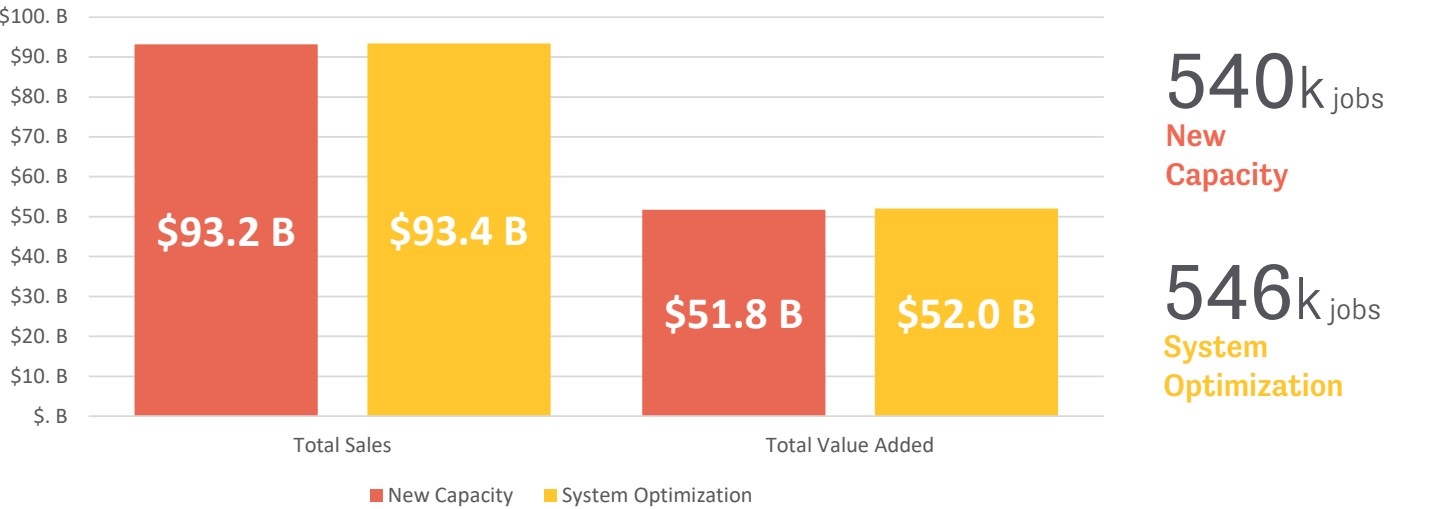
In addition to budgeting for the cost of operating and maintaining our existing transportation assets, the region must also plan ahead to ensure that we are able to take care of any new facilities we build as part of this plan. The chart on the right shows the additional cost (which comes in addition to the cost of existing assets) of operating and maintaining the facilities proposed under each of the scenarios. Because more new facilities are built under the New Capacity scenario, it leads to significantly higher future operations and maintenance costs.



34% Additional cost to operate and maintain the new facilities built under the New Capacity scenario vs. the System Optimization scenario

Economic Impact Analysis

Economic impact analysis evaluates how an investment spurs economic activity and job creation in a specific region. As investments are made, their spending ripples through the economy and contributes to value and employment. A high-level analysis of the two half cent scenarios produced the results below which show similar economic benefits between the two scenarios.



COMPARISON OF ALL SCENARIOS

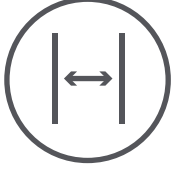
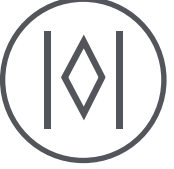


PROJECTS MATRIX

PROJECT TYPE	NEW CAPACITY HALF CENT	SYSTEM OPTIMIZATION HALF CENT	NEW CAPACITY ONE CENT	SYSTEM OPTIMIZATION ONE CENT
FREEWAY IMPROVEMENTS				
RAIL EXPANSION				
BUS RAPID TRANSIT				
ARTERIAL INVESTMENTS				

Disclaimer: Scenarios are draft and are intended only as a decision-support tool. Projects and programs are illustrative and do not represent a final investment plan. Locations of improvements are conceptual and subject to additional study, review and approval by applicable jurisdictions. While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof. APRIL 2021

WHAT GOES INTO EACH SCENARIO?

SCENARIO ATTRIBUTES	 Miles of New Freeway	 Freeway Lane Miles Widened	 New HOV Lane Miles	 Streetcar Miles	 Light Rail Extension Miles	 Miles of BRT	 Bus Transit Expenditure	 New or Improved Bus Transit Service (Route Miles)
NEW CAPACITY HALF CENT	33.5 miles	328 miles	110 miles	3.2 miles	17.3 miles	15.3 miles	\$5.6 billion	63 miles
SYSTEM OPTIMIZATION HALF CENT	28.1 miles	291 miles	135 miles	0 miles	8.2 miles	58.3 miles	\$5.8 billion	72 miles
NEW CAPACITY ONE CENT	44.8 miles	386 miles	231 miles	3.2 miles	17.3 miles	53.0 miles	\$11.2 billion	483 miles
SYSTEM OPTIMIZATION ONE CENT	33.5 miles	353 miles	135 miles	0 miles	17.3 miles	66.8 miles	\$13.1 billion	877 miles

PROGRAM FUNDING AND PROJECT TYPES

Programs (\$)	New Capacity - Half Cent	System Optimization - Half Cent	New Capacity - One Cent	System Optimization - One Cent
Air Quality	\$160,000,000	\$160,000,000	\$160,000,000	\$160,000,000
TDM Expansion	\$250,000,000	\$250,000,000	\$250,000,000	\$650,000,000
Arterial Rehabilitation	-	\$500,000,000	-	\$500,000,000
Arterial Widening	\$500,000,000	-	\$500,000,000	-
Arterial Intersection	\$360,000,000	\$600,000,000	\$600,000,000	\$1,200,000,000
Safety	\$180,000,000	\$200,000,000	\$240,000,000	\$240,000,000
Active Transportation	\$600,000,000	\$800,000,000	\$600,000,000	\$1,100,000,000
ITS	\$280,000,000	\$600,000,000	\$320,000,000	\$1,000,000,000
Emerging Tech	\$100,000,000	\$250,000,000	\$150,000,000	\$400,000,000
Commuter Rail	-	-	\$1,250,000,000	-
TOTAL	\$2,430,100,000	\$3,360,000,000	\$4,070,100,000	\$5,250,000,000

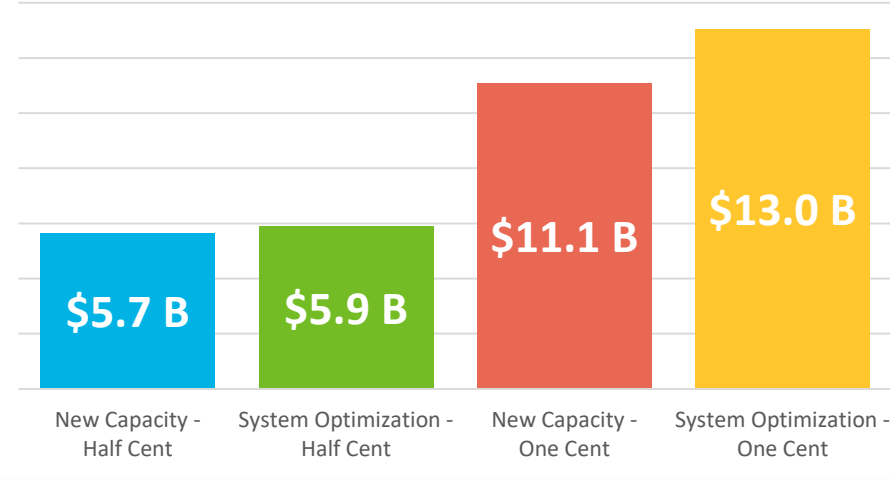
Projects (#)	New Capacity - Half Cent	System Optimization - Half Cent	New Capacity - One Cent	System Optimization - One Cent
Freeway: GPL (widen)	10	8	10	10
Freeway: HOV (new lanes)	4	6	9	6
Freeway: New	4	3	5	4
Freeway: Other	3	4	5	6
Freeway: Other Grade Separation	1	2	2	2
Freeway: Reconstruction	2	2	2	2
Freeway: System Interchange	2	4	4	4
Freeway: TI (DHOV)	5	7	12	9
Freeway: TI (improve)	21	33	44	35
Freeway: TI (new)	3	2	6	5
Freeway: Reconstruction	8	8	8	8
Transit: BRT	1	4	4	6
Transit: LRT	3	2	3	3
Transit: Streetcar	1	0	1	0
TOTAL	166	187	277	238



Bus Transit Investment

The level of investment in bus transit varies considerably between the four scenarios, from a high of \$13 billion under the System Optimization - One Cent scenario, to a low of \$5.7 billion under the New Capacity - Half Cent scenario.

Because bus transit could not be fully captured and quantified in our modeling efforts, it is especially important to point out the benefits this investment brings under nearly all the RTP goal areas. The greater level of investment would significantly change the face of transit in our region, improving mobility, prosperity, responsiveness, and livability in a variety of ways.



CONCLUSION

The four scenarios presented in this document represent four potential ways we could invest in our transportation system over the next 20+ years. Framed by two investment philosophies and two funding streams, the scenarios are intended to start a conversation and help inform the decision-making process as we move from hypothetical to reality, from the planning process to a fiscally-constrained plan.

We have discussed the implications of focusing our efforts on building new capacity versus optimizing our existing system, and we have seen the additional project and program-area investments that could be made with a larger revenue stream. These implications have been presented within the context of the goals developed early in the RTP process – goals developed with input from stakeholders, community members, committee representatives, and elected officials. These goals, and our progress towards achieving them, is the hallmark of a performance-based regional transportation plan.





LEFT EXIT 147 C
HOV EXIT
6-9 AM MON-FRI
3-7 PM
LOOP 202 EAST
1 1/4 MILES

10 EAST
Tucson

EXIT 147B
51 NORTH
1 1/4 MILES

EXIT 147A
LOOP 202 EAST
1 1/4 MILES

EXIT 146
16th St
3/4 MILE



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April 2021