DIRECTIONS 2045

LONG RANGE TRANSPORTATION PLAN

Sustainable, Equitable, and Innovative Transportation Solutions

OCTA

January 2023

DRAFT

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Through the years, Orange County has evolved from a suburb of Los Angeles to one of the most densely populated counties in the nation. Challenges arise as our population and employment continue to grow and our transportation system is required to adapt to meet future mobility needs. The challenges are compounded by the 2041 sunset of OC Go (also known as Measure M2), Orange County's one-half-cent sales tax for transportation improvements, which will be the end of a significant funding source for essential transportation projects and programs. Orange County will travel differently in 2045 than we did in 2006, when voters approved Measure M2. Our actions and investments now will benefit residents and employees in the future and ensure the continued success of Orange County. This Long-Range Transportation Plan (LRTP), Directions 2045, aims to understand these challenges and identify strategies necessary to meet our changing mobility needs.

LRTP Purpose

Directions 2045 is designed to provide answers to key questions about the future: What will Orange County look like in 2045? How will our population change and how will this affect commuting patterns and choices? Where will jobs and homes be concentrated and how will this affect congestion? What transportation services will be needed, and what is the most cost-effective way to meet them? Directions 2045 charts a course and establishes milestones to measure progress and refine strategies along the way as we move toward improving mobility, protecting Orange County transportation resources, and enhancing our quality of life.

The Orange County Transportation Authority (OCTA) is the state-designated County Transportation Commission. In this role, OCTA prepares an LRTP every 4 years to provide a system-level vision for Orange County. The LRTP is also used to provide Orange County's input into the State and federally required Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) prepared by the Southern California Association of Governments (SCAG). Similar to the LRTP, SCAG's RTP/SCS provides a system-level vision but at a larger scale, covering the counties of Orange, Los Angeles, Riverside, San Bernardino, Ventura, and Imperial. Projects must be included in an approved RTP/SCS to be eligible for State and federal funding and project-level approvals. Figure 1.1 shows the continuous planning process and general relationship between the LRTP, RTP/SCS, and the Federal Transportation Improvement Program (FTIP), which is used to program State and federal funding for project-level planning, design, and implementation.

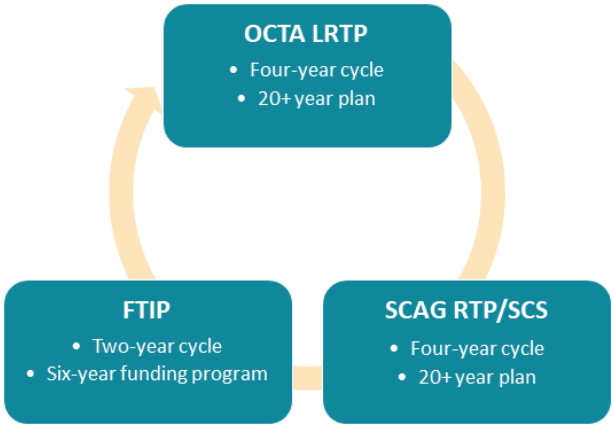

Figure 1-1: Continuous Planning Process

The OCTA planning process is continuous process. While the LRTP provides a long-term countywide vision and goals, it is generally reflecting many other OCTA studies, plans, and policies that are continuously being developed and/or revised. Some of these studies, plans, and policies make minor course corrections from the previous LRTP to reflect the changing conditions and needs of Orange County. The typical planning process begins with the development of multimodal system-level studies that identify the long-term mobility needs of a defined area within Orange County and recommend multimodal strategies. The recommended strategies are then further studied to locate and prioritize appropriate applications, recognizing that different communities within Orange County have different needs. With the locations and priorities established, project-level planning, design, and implementation can proceed. It is important to note that stakeholder and public engagement, along with equity considerations, are essential throughout each step of the planning process.

Using this Document

This LRTP is presented in the following chapters:

- **Chapter 2: Planning for 2045** describes the methods for projecting future travel demand and key factors influencing transportation in Orange County.
- **Chapter 3: Paths to Success** outlines the long-term goals for Orange County transportation and strategies for achieving those goals, referred to as the Paths to Success.
- **Chapter 4: 2045 Preferred Plan** identifies specific capital programs and strategies that constitute the transportation plan to deliver on OC Go and address the LRTP goals. The effects of taking no action as well as the preferred plan are described for multiple modes of transportation. An equity analysis is also included to ensure the plan does not result in an inequitable distribution of transportation burdens and benefits.
- **Chapter 5: Short-Term Action Plan** is a list of planning efforts and activities that aim to advance the Paths to Success and address any short-term planning needs that will inform the next iteration of the LRTP.

Chapter 2: Planning for 2045

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Many factors affect how people travel and how to plan for reliable and accessible mobility. Several of these factors were identified as being particularly influential for the development of the LRTP. The discussions in this chapter dive into five key factors to look at why they matter and the influences they may have on travel behavior and the transportation system.

Key Factor 1: Growing Travel Demand and Built-Out Roadways

Where people want to travel from and where they are traveling are often related to the location of housing and employment. To understand how population, housing, and employment will change by 2045, the Center for Demographic Research at California State University, Fullerton coordinates with Orange County's local jurisdictions to develop forecasts for Orange County. These forecasts are then approved by the Orange County Council of Governments (OCCOG). This LRTP uses the Orange County Projections-2018 (OCP-2018) dataset.

Based on OCP-2018, Orange County's population is projected to surpass 3.5 million residents by 2045, slightly fewer than the state of Connecticut. This is over a quarter million more residents than in 2019, a 9% increase. Housing is also projected to increase by 9%; however, this does not yet reflect increases in planned housing that are required by the State through the Regional Housing Needs Assessment. Figures 2-1 through 2-6 show population and housing density within Orange County for 2019 and 2045, and highlight those areas where growth is concentrated.

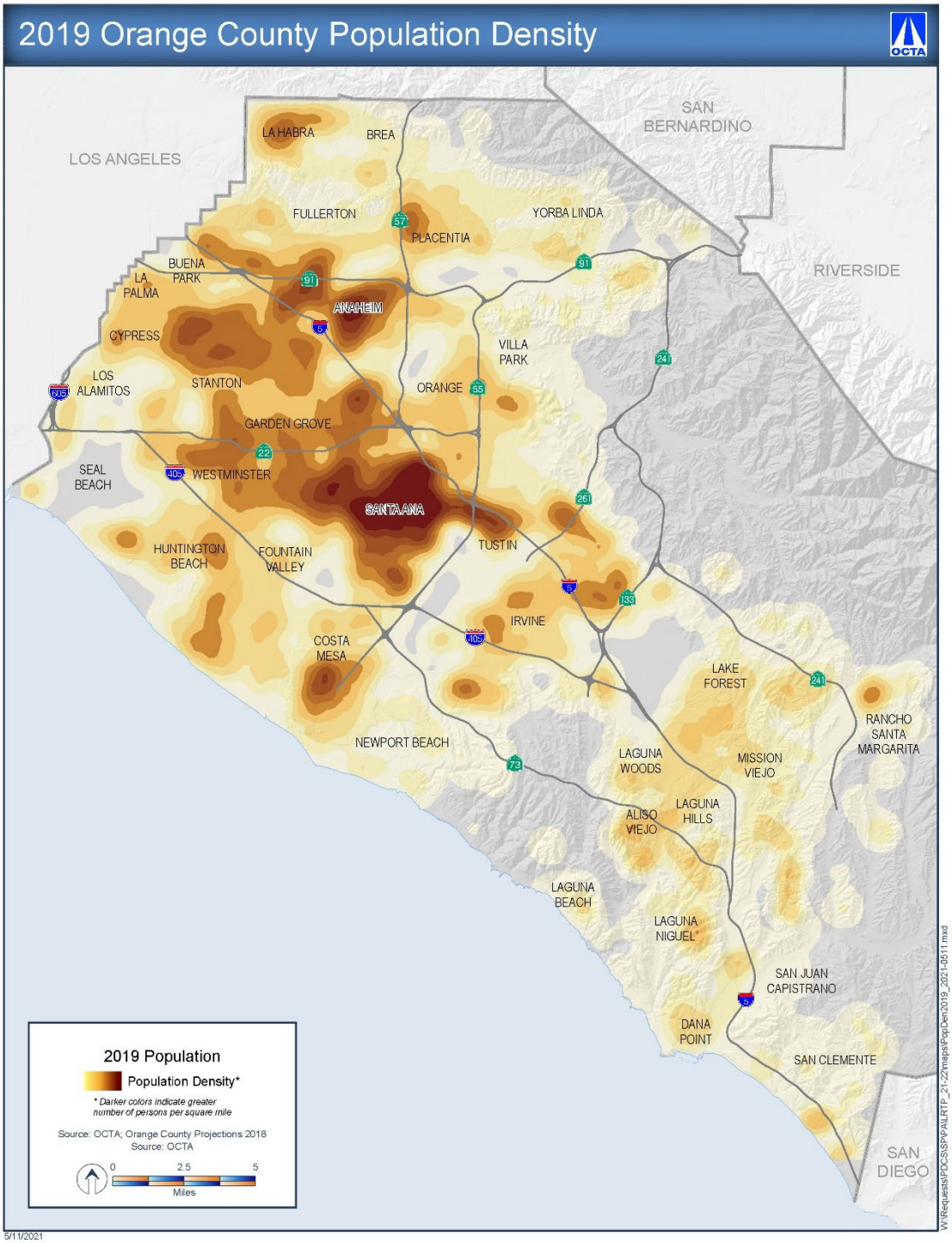


Figure 2-1: 2019 Orange County Population Density

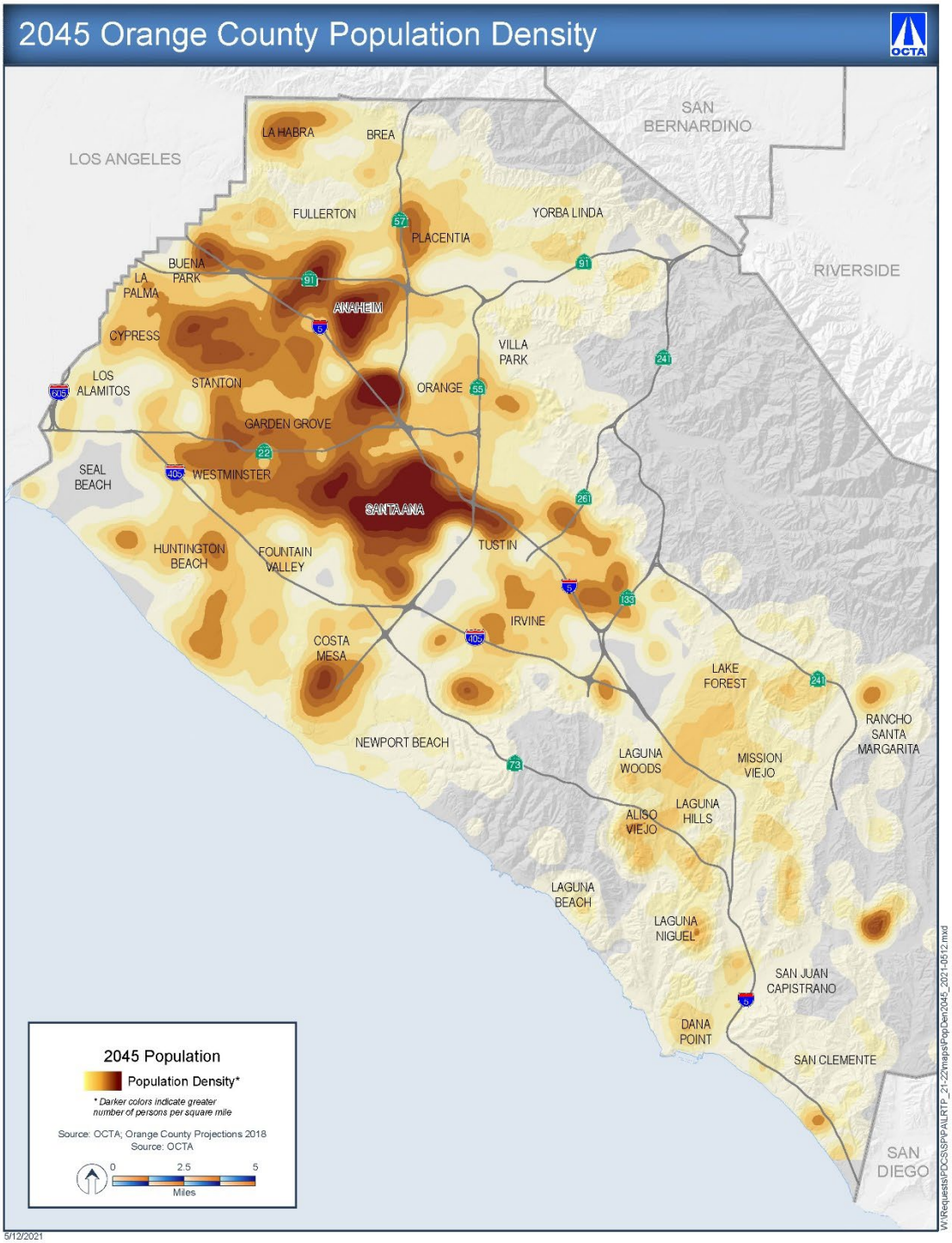


Figure 2-2: 2045 Orange County Population Density

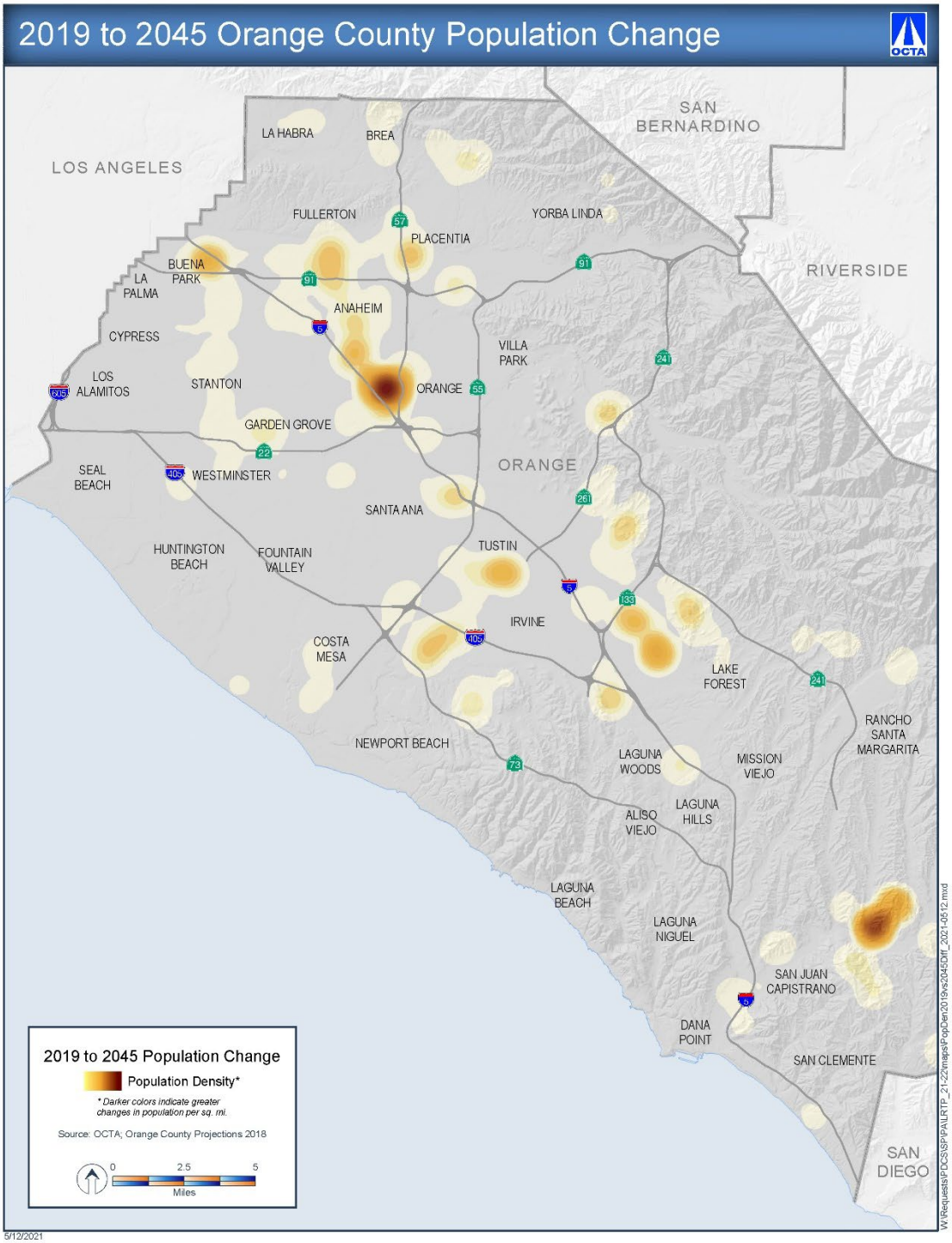


Figure 2-3: 2019 to 2045 Orange County Population Change

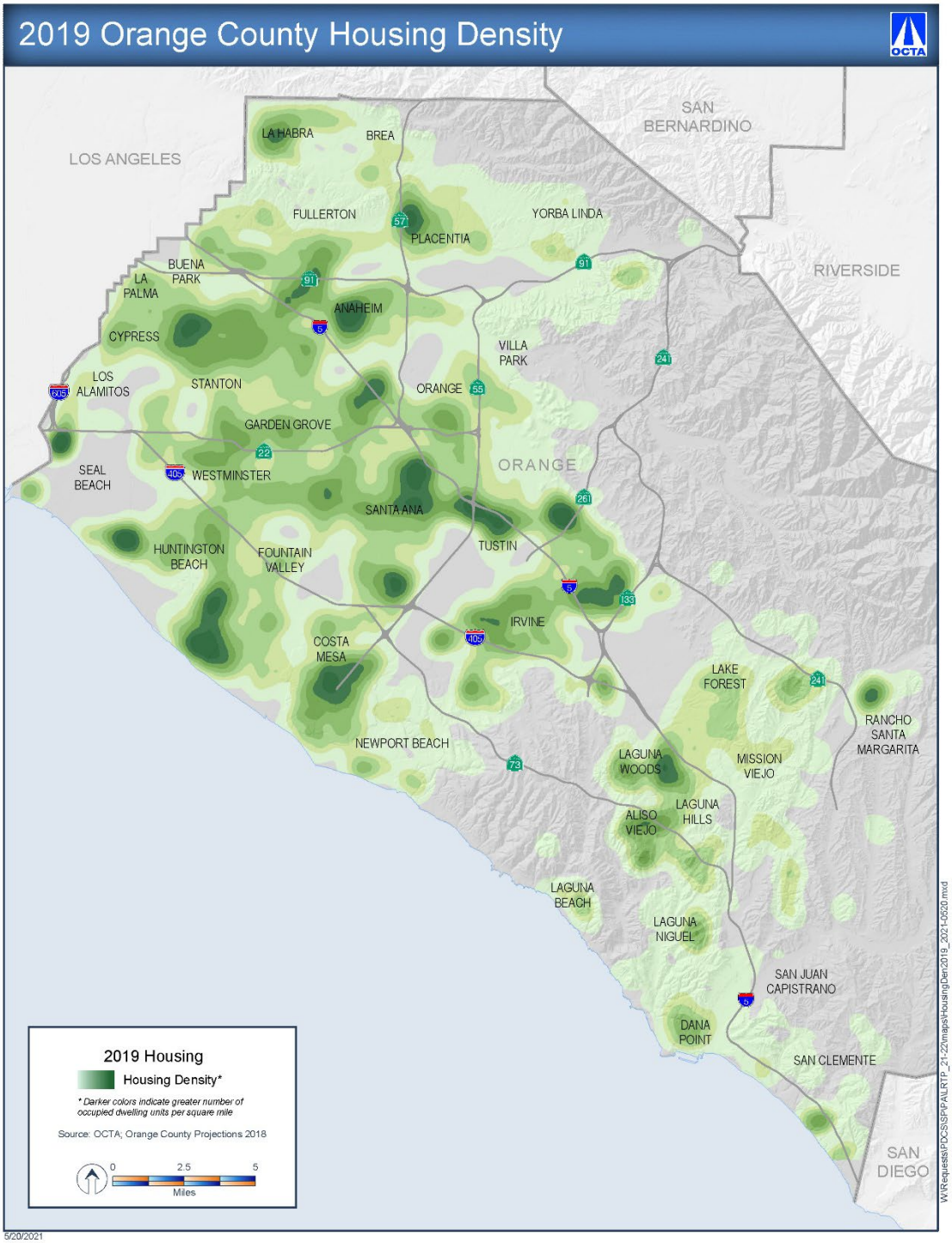


Figure 2-4: 2019 Orange County Housing Density

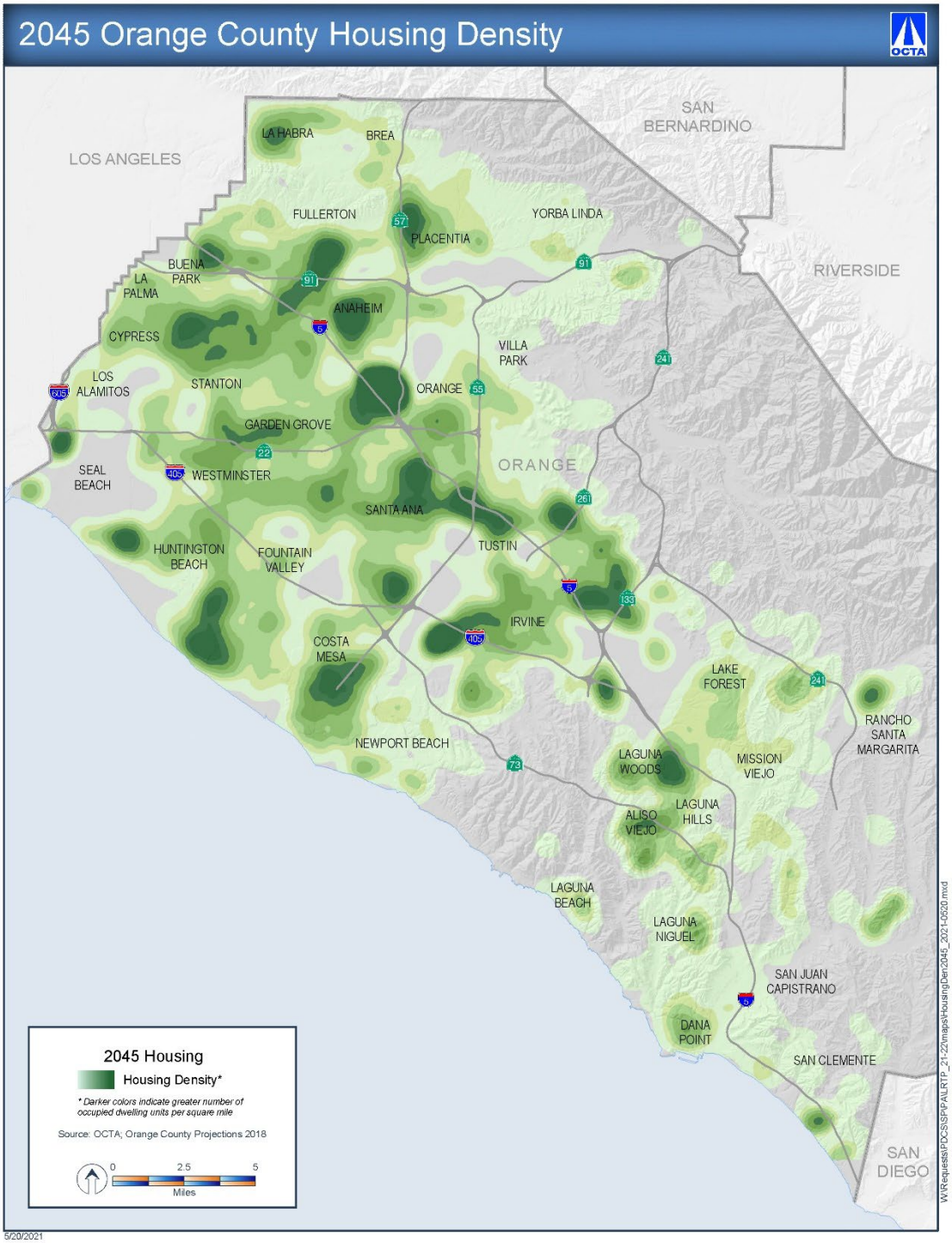


Figure 2-5: 2045 Orange County Housing Density

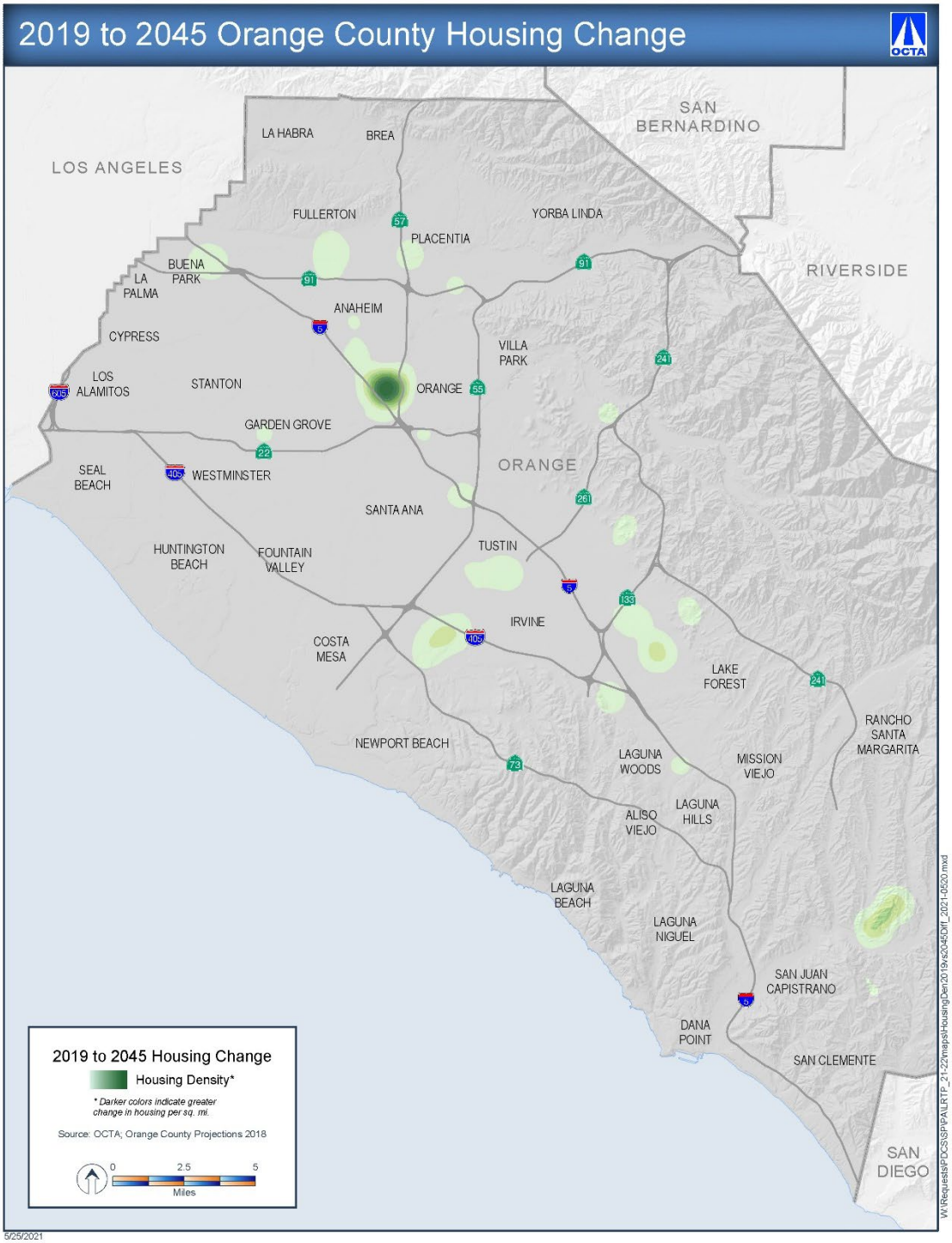


Figure 2-6: 2019 to 2045 Orange County Housing Change

While population and housing are anticipated to grow by 9%, employment is projected to increase by 12%. In 2019, Orange County had 1 job for every 1.8 residents. This is higher than the Southern California Association of Governments (SCAG) region as a whole, which had approximately 1 job per 2.2 residents. However, many of Orange County's employees commute from neighboring counties like Los Angeles and Riverside. Figure 2-7 illustrates this commute trend and shows that more workers travel into Orange County than out. Between 2019 and 2045, Orange County will add 1 job for every 1.3 new residents (including non-workers). Again, this is higher than the SCAG region as a whole (which is expected to add 1 job for every 2.2 residents). This means that the trend seen today of more workers commuting into Orange County than out is expected to grow. Figures 2-8 through 2-10 show employment density within Orange County for 2019 and 2045, and highlight areas where growth is concentrated.

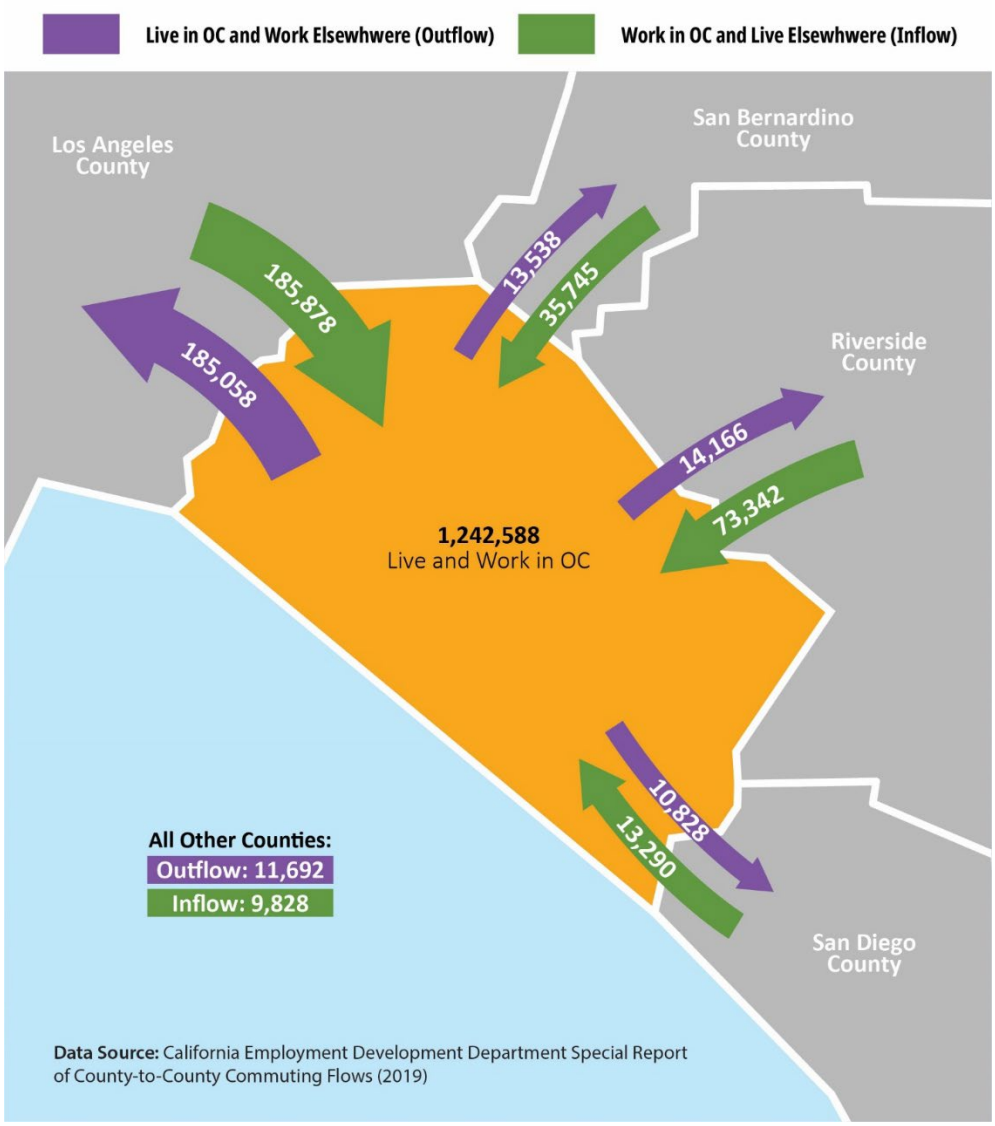


Figure 2-7: Intercounty Commuting Patterns

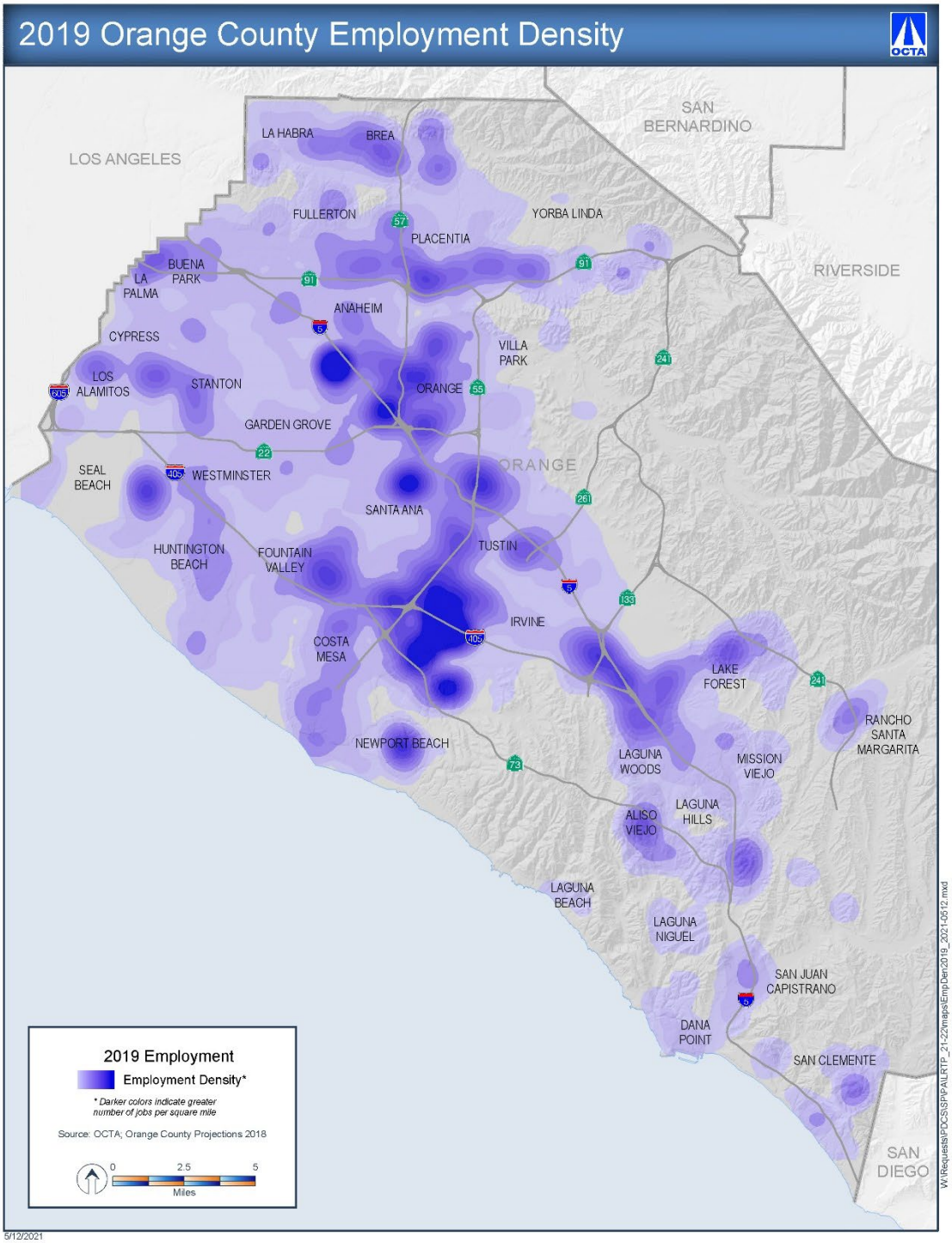


Figure 2-8: 2019 Orange County Employment Density

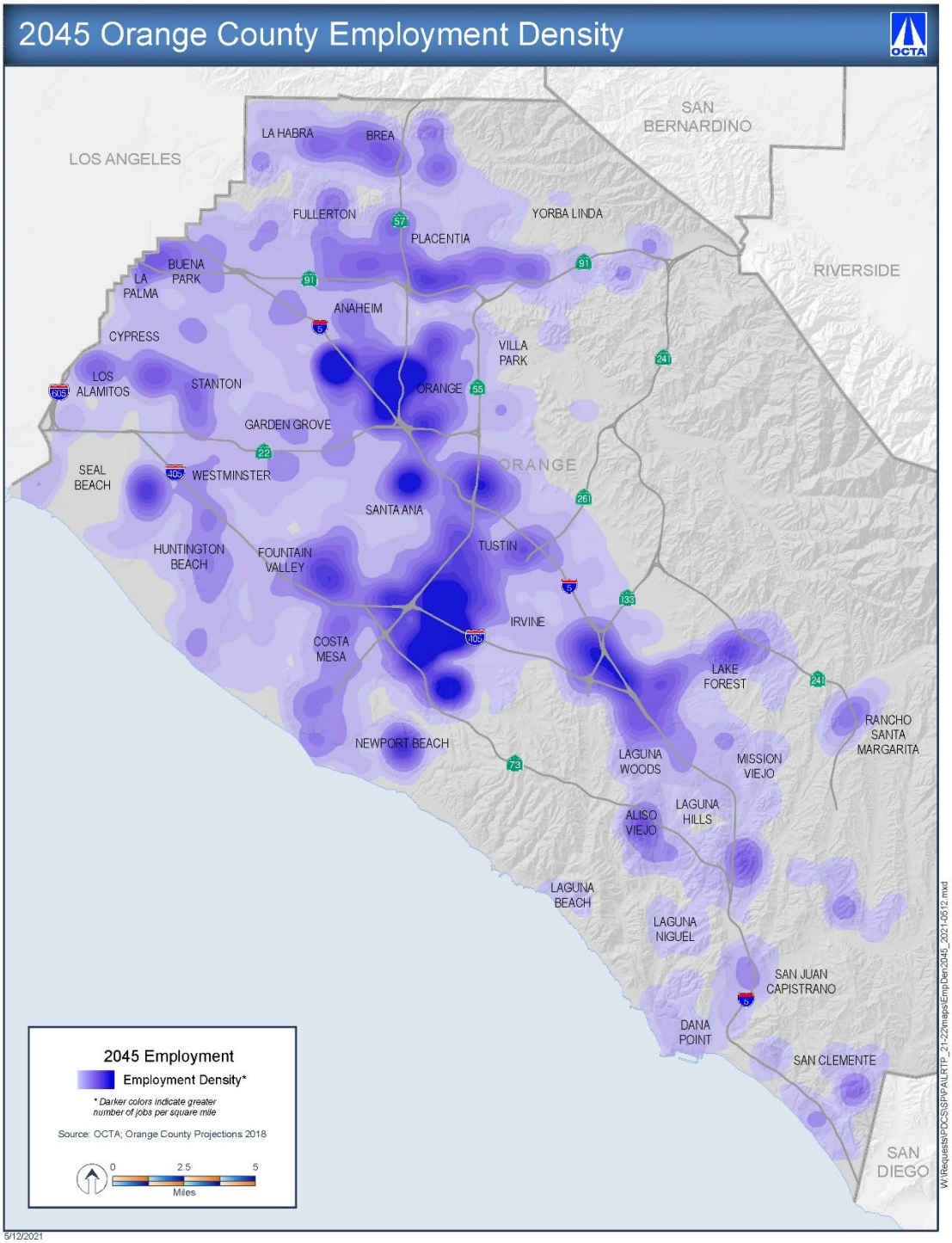


Figure 2-9: 2045 Orange County Employment Density

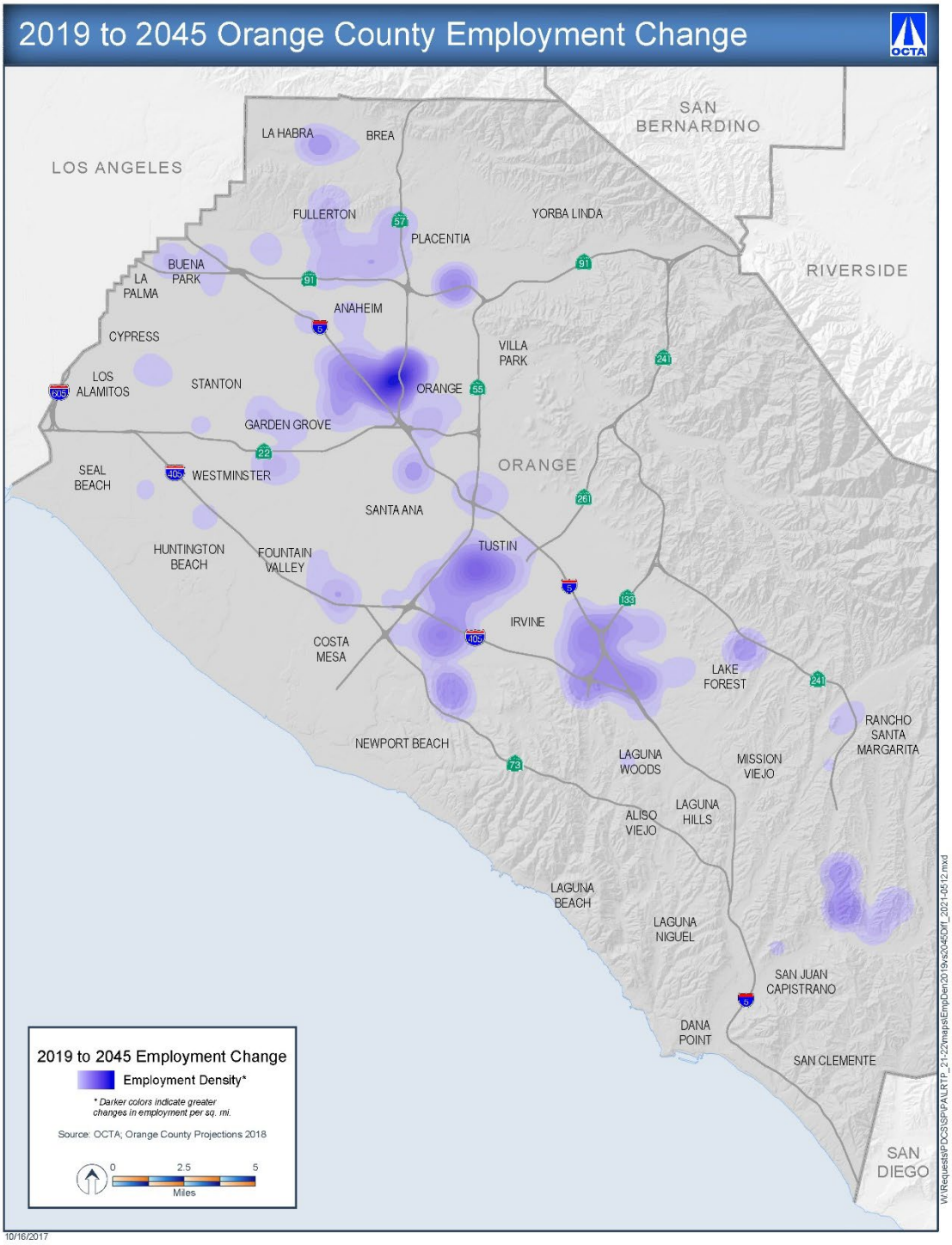


Figure 2-10: 2019 to 2045 Orange County Employment Change

2045 No Build Scenario

The future demographic trends summarized in Table 2.1 are used as input in the Orange County Transportation Analysis Model (OCTAM) to forecast travel patterns on Orange County's transportation network. OCTAM was used to analyze a scenario referred to as the 2045 No Build, which accounts for the socioeconomic changes noted above, but assumes no changes to the transportation network. This scenario is used to understand how the transportation network that we are familiar with, as of 2019, would be impacted by the forecasted 2045 socioeconomic changes alone.

Table 2.1: Demographic Growth

	Population	Households	Employment
2019	3,250,357	1,057,355	1,760,986
2045	3,534,620	1,154,416	1,980,433
Total Change	+284,263	+97,061	+219,447

A summary of the OCTAM travel data results for the 2045 No Build scenario is shown in Table 2.2, and Figures 2-11 through 2-18 illustrate the characteristics of the 2045 No Build transportation network. The results in Table 2.2 show that the travel impacts from the 9% population growth and 12% employment growth on the 2019 transportation network would result in a 7% increase in vehicle miles traveled (VMT) in 2045. This increase in VMT increases the time people spend in traffic congestion, which translates into an increase in the total vehicle hours of delay (VHD) and delay as a percent of travel time. With more congestion, average travel speeds on freeways and arterials are reduced. Meanwhile, there is a 6% increase in transit ridership that is a result of both the simple increase in population and employment as well as more people choosing to use transit to avoid congestion on the roadways and freeways.

Table 2.2: Summary of OCTAM Results for the 2045 No Build Scenario

	2019 Base Year	2045 No Build
Daily Vehicle Miles Traveled (VMT)	76,400,000	81,900,000 (7% increase vs 2019)
Total Vehicle Hours of Delay (VHD)	341,000	454,000
Delay as a Percent of Travel Time	15%	18%
Average Speed – Freeways – Peak Period	41	30
Daily Transit Trips	131,000	138,000 (6% increase vs 2019)

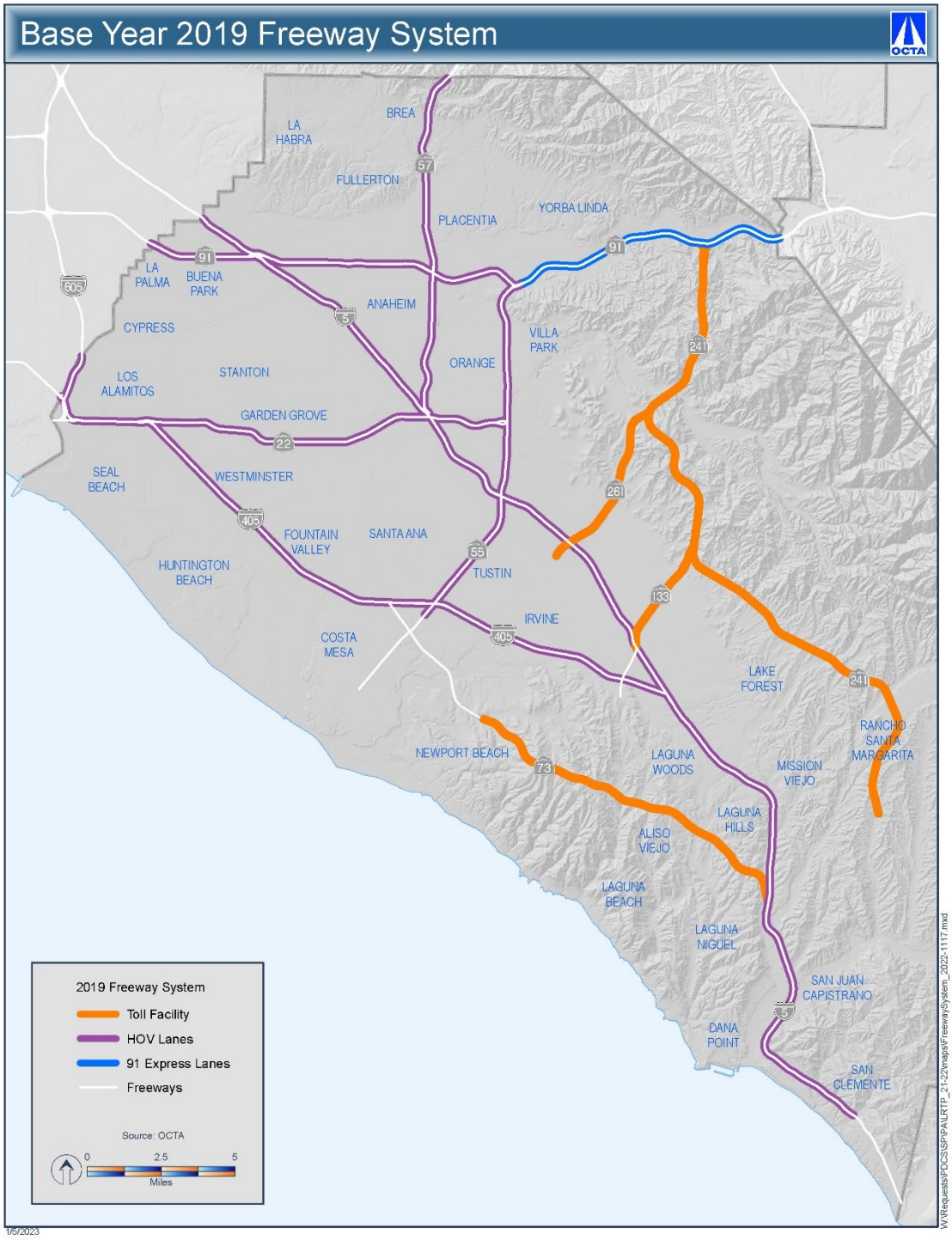


Figure 2-11: Base Year 2019 Freeway System

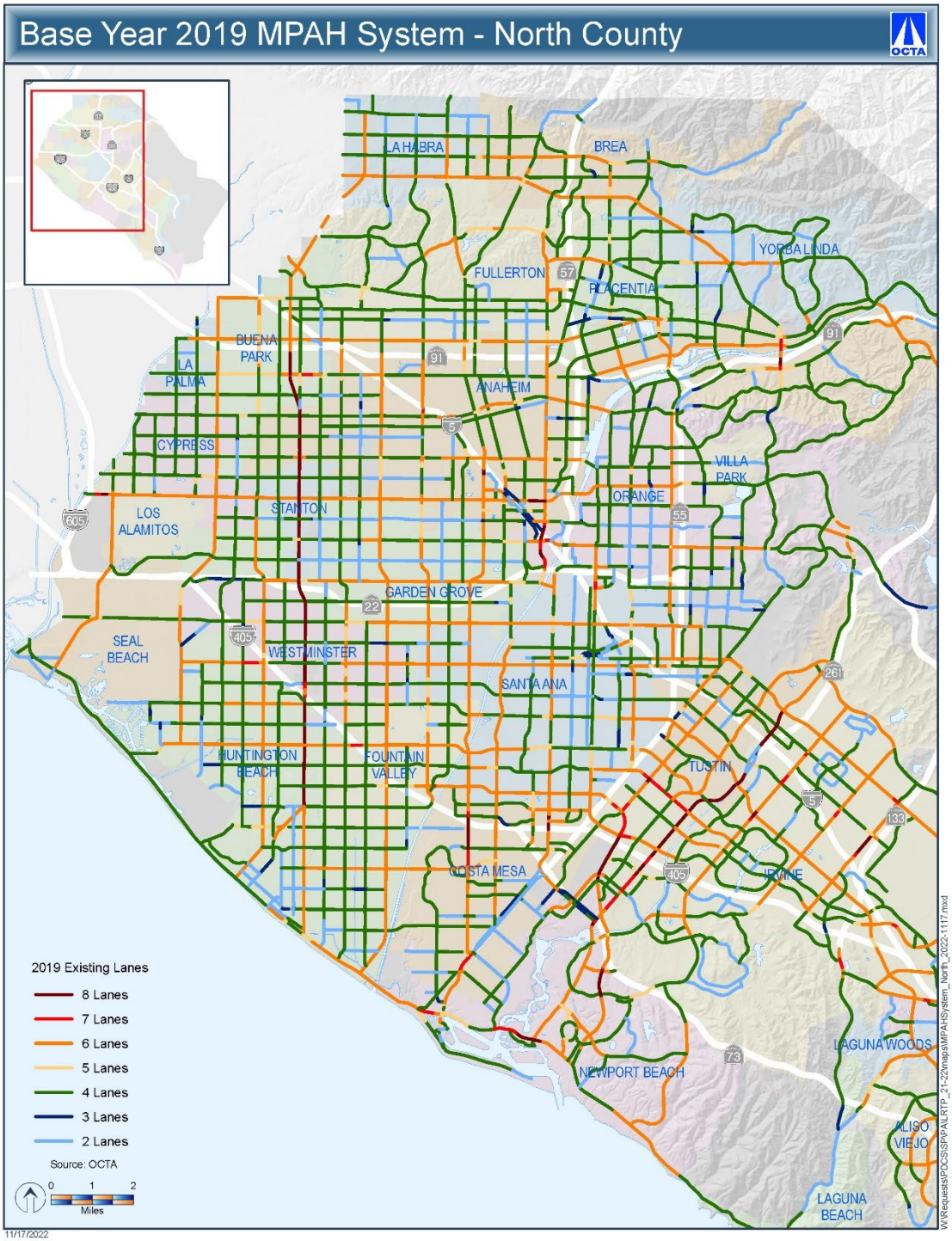


Figure 2-12: Base Year 2019 MPAH System – North County

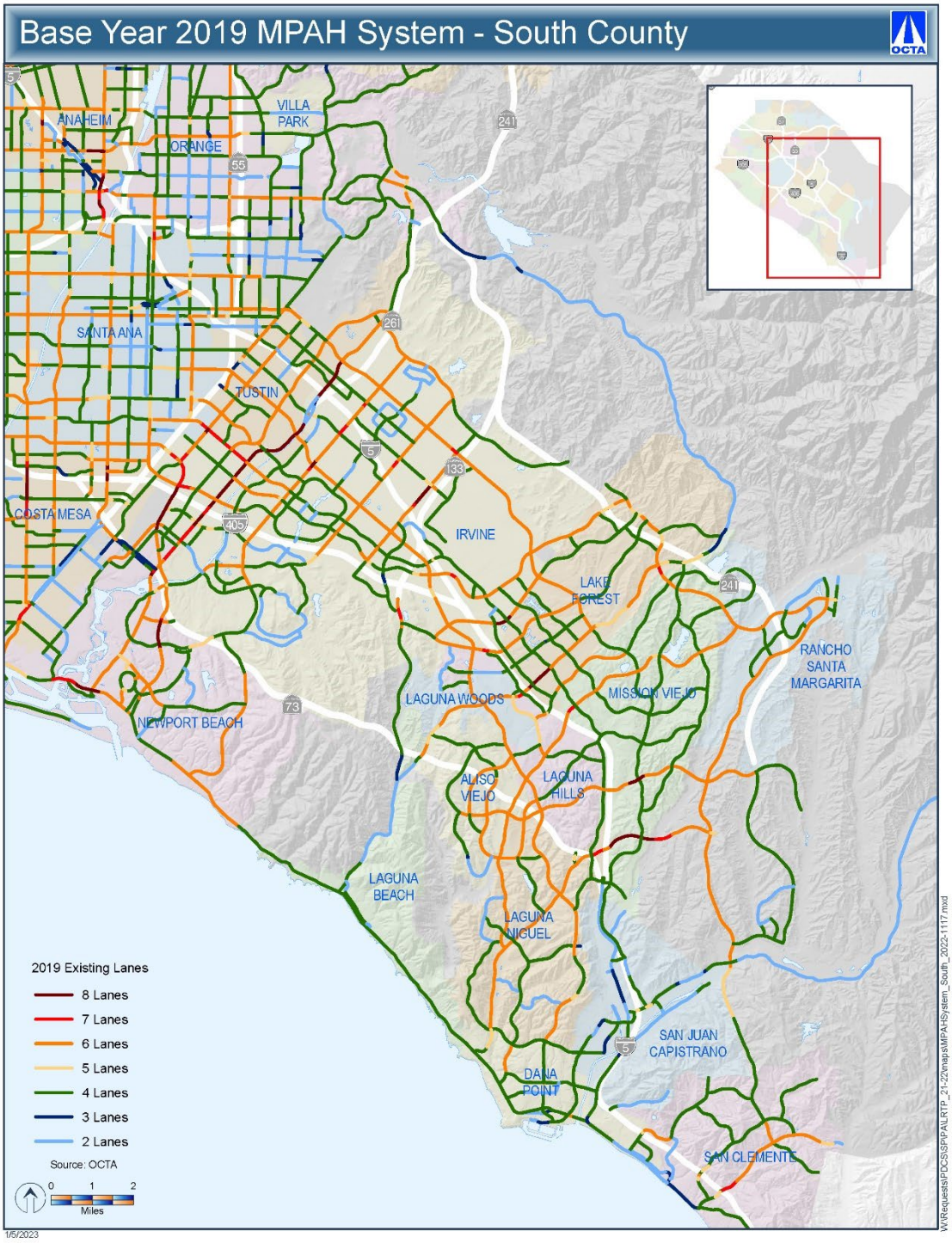


Figure 2-13: Base Year 2019 MPAH System – South County

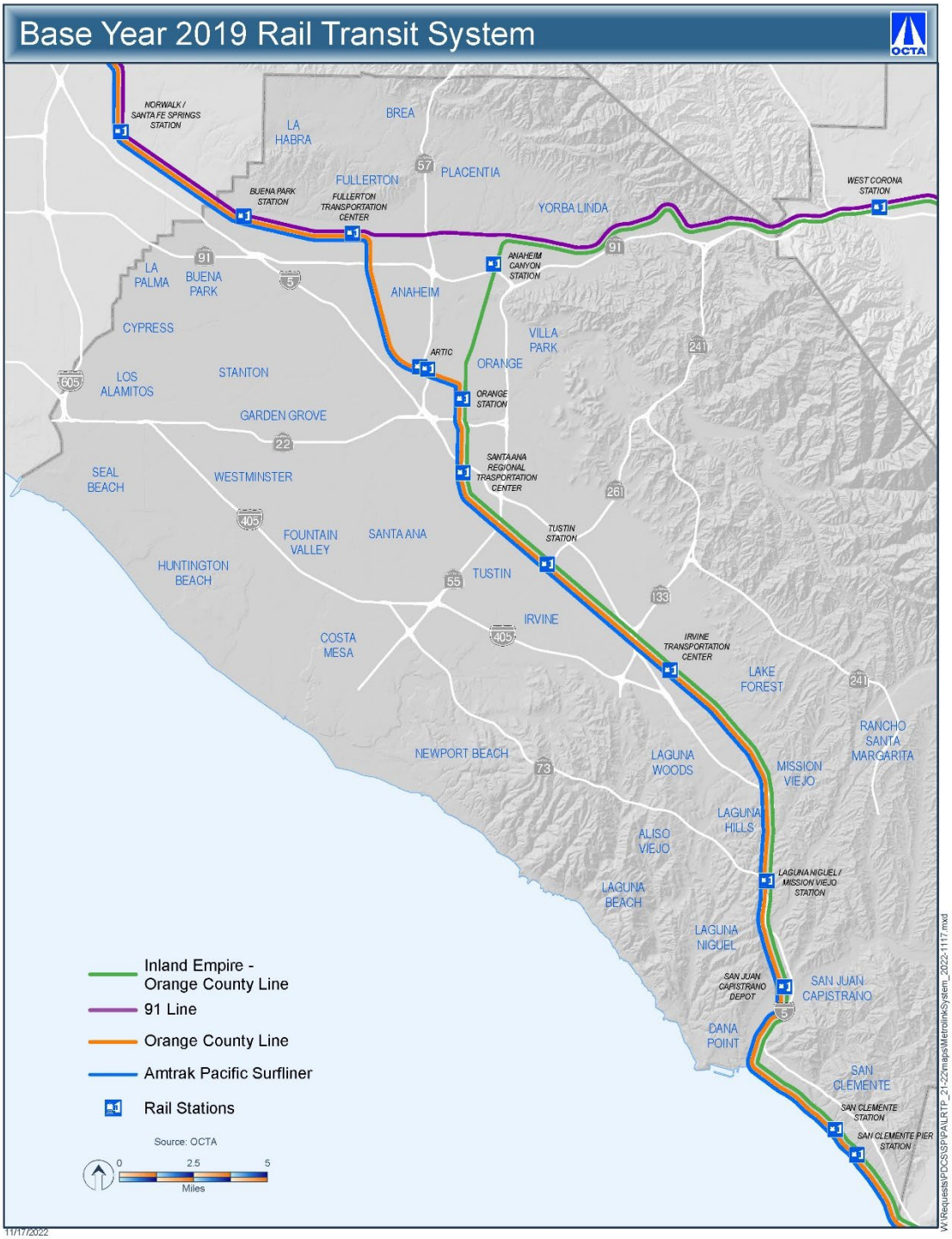


Figure 2-14: Base Year 2019 Rail Transit System

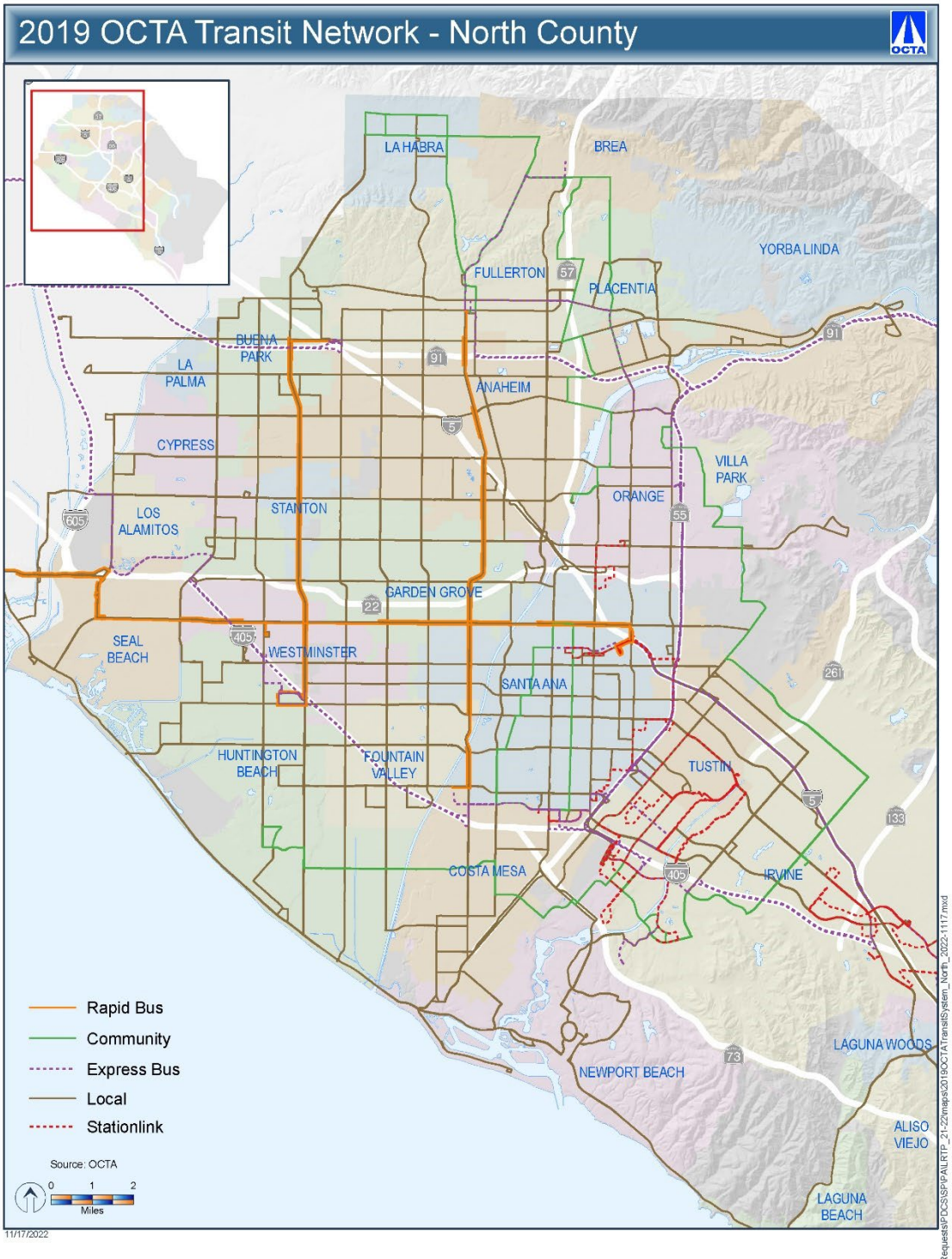


Figure 2-15: 2019 OCTA Transit Network – North County

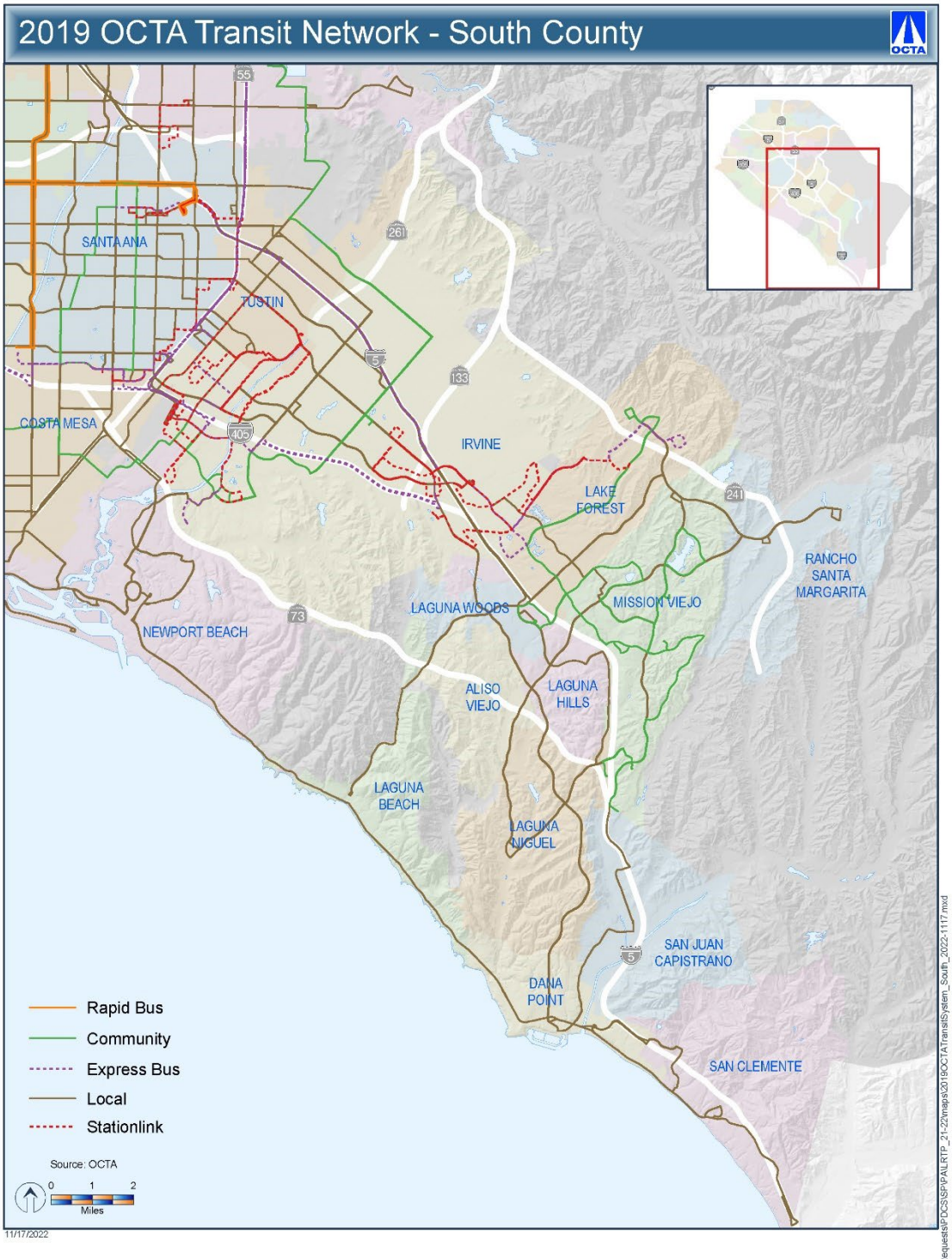


Figure 2-16: 2019 OCTA Transit Network – South County

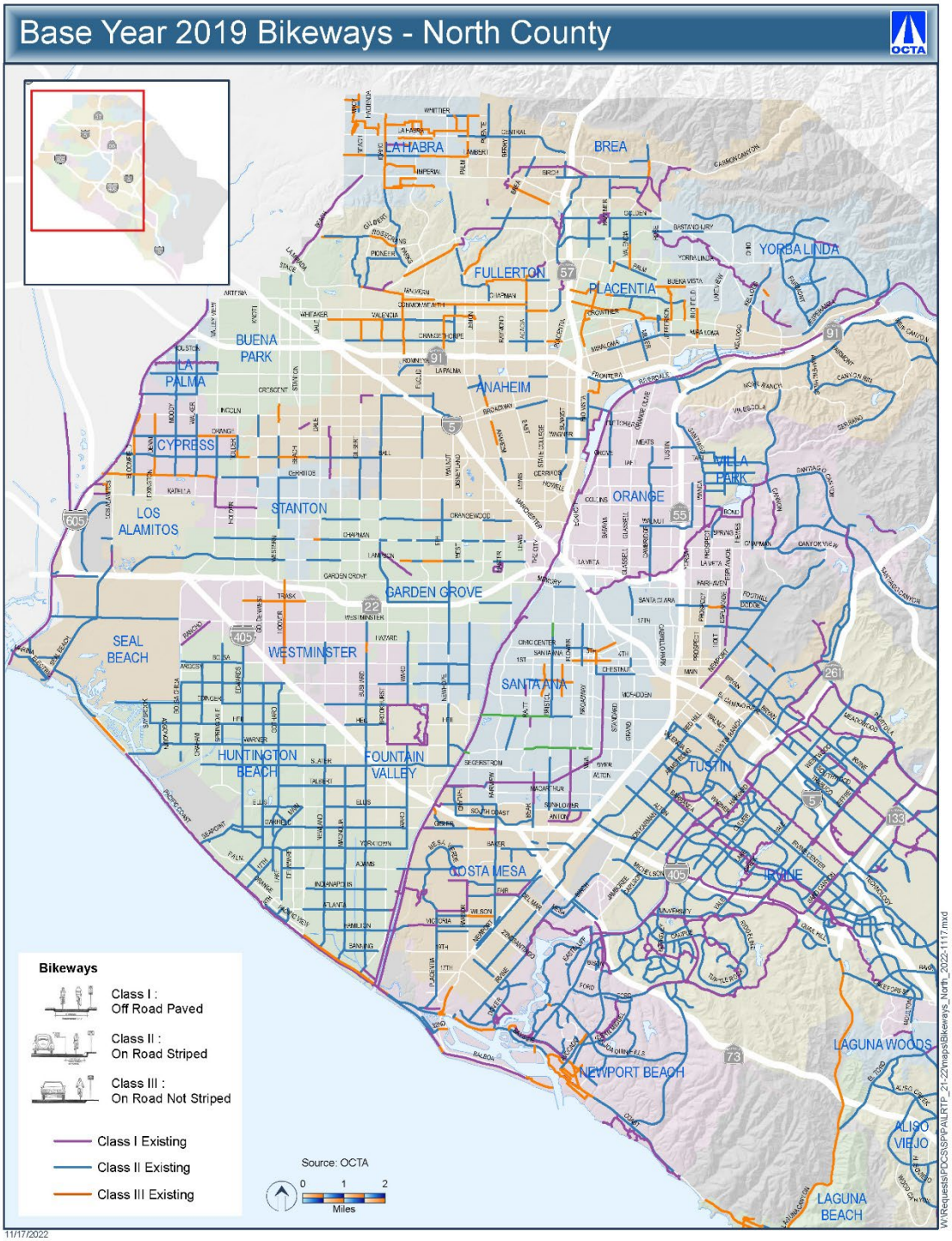


Figure 2-17: Base Year 2019 Bikeways – North County

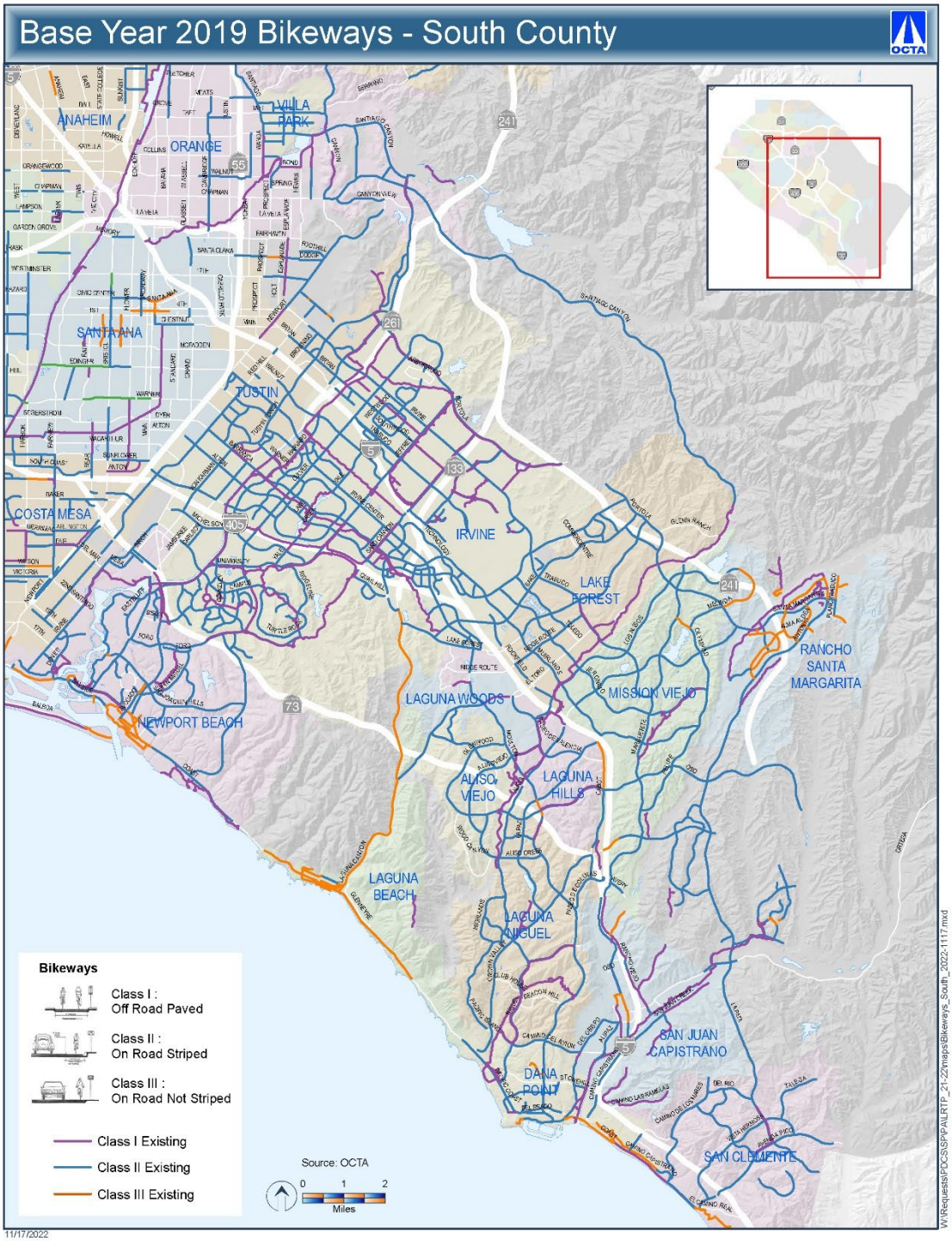


Figure 2-18: Base Year 2019 Bikeways – South County

Built Out Roadways

Keep in mind that the 2045 No Build scenario is a hypothetical scenario that assumes that the transportation system does not change between 2019 and 2045. This is used to set a bar for future travel conditions that can be used to understand the benefits of the projects and programs that are included in this LRTP. In reality, there is a whole series of improvements that are already either under construction or are in development that will help to address the projected increase in travel demand. Most of these are supported through Orange County's Measure M2 local sales tax. However, once these improvements are implemented, there will be very few, if any, opportunities to significantly expand roadways or freeways.

Additional expansion would, in most cases, require the acquisition of land to accommodate new lanes on roads and freeways. This would likely result in displacement of households and businesses, which would be undesirable and costly. Additionally, policies are being implemented at the State level that generally discourage adding new lanes. These policies will be discussed in further detail later in this chapter (see the Key Factor 3: Increasing Climate-Related Risks and Key Factor 4: Changing Funding Outlook sections).

The limited opportunities to add freeway and roadway capacity presents a paradigm shift in how transportation planning should be approached. The age of addressing congestion through lane additions is coming to an end, and the focus is turning to strategies that help manage the number of trips taken each day, how those trips are made, and how transportation facilities are operated to get the most out of them. Therefore, there is a need to begin developing solutions that improve the efficiency of the transportation system and provide travel options that help to reduce the overall travel demand.

Key Factor 2: Evolving Travel Trends

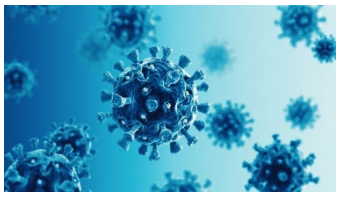
Changes in travel demand and travel behavior over the recent past have been influenced by trends that we can identify in retrospect but would have been difficult to predict. Think back to 2002 and consider whether it could have been predicted that nearly everybody would carry a combination phone/computer with them everywhere from which they could hail a ride, rent a bicycle or scooter, or find the fastest driving route, including how to avoid congestion from accidents. Some of these influential technologies and other recent trends are discussed below, including the nationwide downturn in transit ridership, the more recent impact of the COVID-19 pandemic, as well as the rise of smartphones and transportation network companies. Later in this section, discussions turn to future technologies, services, and trends that will almost certainly have unpredictable influences on transportation behavior.

Transit Ridership

Public transit providers across the nation experienced a steady nationwide decline in transit ridership over several years, beginning in 2008. This corresponded with an increase in automobile ownership. Between 2009 and 2015, the number of registered vehicles in Orange County grew more than three times faster than the population. A combination of rising employment and plummeting gas prices during this time period, along with the introduction of a new State law that allows undocumented immigrants to obtain driver's licenses, made driving a more affordable and accessible option. During this time, OC Bus ridership fell approximately 37% and prompted the implementation of a restructured bus system, referred to as the OC Bus 360 program. This focused bus service on the highest demand corridors in Orange County to improve the efficiency of the service in operation. This produced positive results, and ridership was on the rise after the OC Bus 360 program was implemented, but another unpredictable hurdle was approaching with the start of the pandemic.

COVID-19 Lasting Impacts

Previously predictable travel patterns suddenly changed during the COVID-19 crisis. In a September 2020 report, OCTA found that the pandemic lockdown resulted in significant declines in travel demand (e.g., 42% less at workplaces, 42% less at transit stations, and 27% less at retail/recreation). Rail ridership declined 88% while bus ridership declined 72%. At the same time, online grocery purchases more than doubled, and delivery or pick-up of food from restaurants both increased by 40%. VMT on Orange County freeways was down 10% between January 2020 and July 2020, and the remaining travel demand was more spread out throughout the day, which reduced traffic congestion delays by 62%.



In the short time since the peak travel disruptions of the lockdown, freeway congestion during peak morning and afternoon commute hours has returned. On freeways and arterials, off-peak traffic volume is often higher than pre-pandemic conditions. Use of the SR-91 Express Lanes has almost returned to normal and so has bus ridership, but Metrolink ridership is still far below pre-COVID levels. Additional discussion of the effects of technological changes facilitating work at home is presented later in this section. A promising development during the pandemic has been the rapid uptake in electric bicycles (e-bikes). E-bikes have the ability to reduce terrain and distance constraints, thereby encouraging further growth in bicycle ridership and potentially reducing single-occupant vehicle trips. Additionally, delivery services for food and household goods that rapidly expanded during the pandemic remain in demand and may also contribute to reductions in single-occupant vehicle trips.

The long-term impacts to travel behavior from the pandemic will take years to fully understand. Adaptations due to the pandemic caused major changes for years and some of those adaptations linger, but the trend has been toward pre-pandemic conditions. While this LRTP acknowledges that COVID-19 has had a profound impact over the past few years, the analysis of 2045 conditions is primarily based on pre-pandemic travel trends. As more data become available, future iterations of the LRTP and other mobility studies will continue to consider and account for the long-term influence of the pandemic on travel behavior.

Technology Adaptation

Some of the biggest changes to transportation have occurred because of smartphones and the technology and policy reactions to them. Wayfinding applications help to divert traffic volume away from areas where accidents have reduced capacity, but they also can exacerbate problems with traffic bypassing normal peak-hour congestion, thereby increasing congestion on local roads and residential streets. Transportation Network Companies can supplement public transit service by providing first-mile/last-mile solutions, but the trips added between drop-offs and pick-ups can potentially increase vehicle miles traveled. Micromobility options such as short-term bicycle and scooter rentals can fill a service gap for short-distance trips, but some providers have placed a burden on limited pedestrian rights-of-way. Public policy has often struggled to keep up with the rapid pace of changing technology.

Emerging Technology

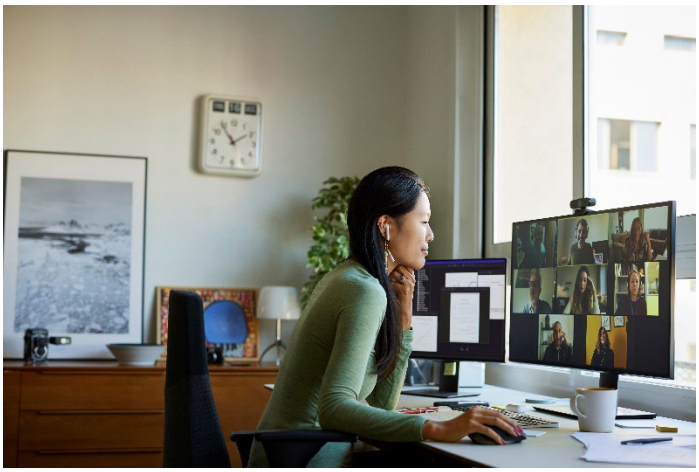
The examples above highlight how technology and services have influenced transportation in the past, and they present some opportunities that can benefit this LRTP. However, the ability to predict future technologies and how they could affect transportation choices is very limited. This LRTP forecasts trends into the future, but these are largely based on historical trends. As noted in the pandemic discussion above, it takes time for new trends to be established that can then be included in the analysis of future scenarios. This approach ensures that long-term planning decisions are not overly influenced by speculation. That

said, it is recognized that constant monitoring of emerging technologies and services is necessary to make timely and informed decisions that can benefit mobility in Orange County.

Monitoring of technological developments and capabilities is the first level of engagement necessary to make informed decisions related to whether it is appropriate to continue monitoring, influence development, test the technology, or pursue full-scale implementation. This approach provides for a state of readiness that can help to maximize the public benefit from new technologies.

Future Travel Influences

Looking forward, there are certain technologies we know are taking root or are developing into potential game changers. These include remote work and teleservices, charging infrastructure for electric vehicles, electric bicycles and scooters, neighborhood electric vehicles, and connected vehicles. While there is some certainty that these will influence travel behavior, more study and analysis is needed to understand the extent of the impact each may have on mobility.



Remote Work. Part-time and full-time remote work policies have become broadly accepted policies by employers, potentially altering long-distance commute demand. In July 2020, during the pandemic, OCTA conducted an employment and travel survey that included over 2,500 interviews of Orange County households. The survey found that while 11.5% of residents worked from home in February 2020, 46.5% worked from home at the height of the pandemic. Similarly, the number of commuters driving alone to work dropped from 77% to 48%. When workers were asked their preference post-pandemic, only 35% responded that they wanted to decrease working from home. This may not continue to reflect workers' preference after an extended period of working from home, but it gives an indication that it is likely to persist for some time.

Teleservices. Additionally, the convenience of teleservices, such as video or phone doctor visits, have been widely embraced. Teleservices have the potential to eliminate some trips altogether by allowing people to use a phone or computer to interact with professionals from a variety of fields. As more service providers begin to offer teleservice options, more trips can be reduced. Delivery services also have the potential to

affect travel demand. At a large enough scale, these could replace many individual trips from households to stores with fewer trips that are more efficient and reduce overall travel demand.

Micromobility. The short-term rental of bicycles, or bikeshare, is an example of micromobility that has been in development for a number of years. More recently, micromobility services have been shifting to focus more on renting electric scooters (e-scooters) and e-bikes. The evolution of micromobility will likely be augmented to include other devices in the future. Whatever the device is, micromobility services often help to address the first-mile/last-mile gap to and from more regional transit services. As micromobility matures, partnerships between local jurisdictions and private service providers are becoming more common, which helps to address some of the early concerns regarding where the devices are accessed and stored by the users. As such concerns are resolved, and standards are defined, micromobility will likely become a more common and accessible choice for many shorter trips. However, there are still challenges with implementing sustainable business models.

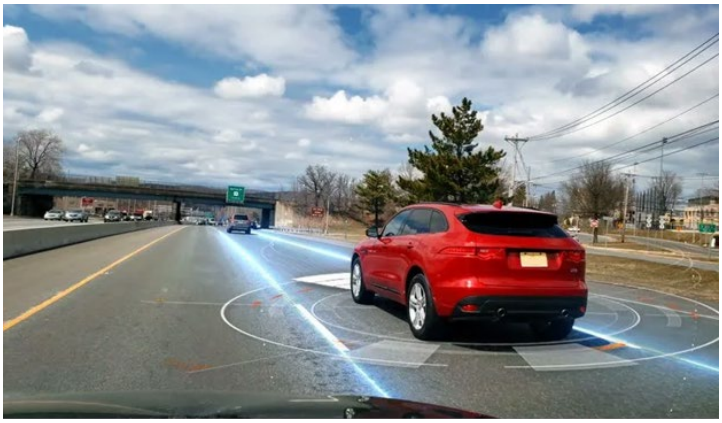
Connected Vehicles. New vehicles are increasingly equipped with safety features that semi-autonomously control the vehicle. These features include automatic braking, lane-keeping assistance, and adaptive cruise control. Some vehicles are also capable of parking with minimal input from the driver. Some of these features rely on sensors identifying the location of nearby vehicles. As these features mature, it is anticipated that location, speed, and travel route data could be transferred between vehicles to enhance overall travel safety. With appropriate public investments, these vehicles could also communicate with public infrastructure. Communication between vehicles and public infrastructure has the potential to allow dynamic signal timing and traffic management to improve roadway efficiencies within existing lanes as well as provide real-time feedback on roadway maintenance issues.

Electric Vehicles. According to the California Energy Commission, Orange County has the second highest number of zero-emission vehicles in the State. According to the latest data, 4.3% of vehicles in Orange County are battery electric, plug-in hybrid, or fuel cell vehicles. These vehicles have different needs for fueling infrastructure than is currently provided. The potential benefits of these vehicles are, however, worth the necessary investment. The California Air Resources Board Emission Factor model (EMFAC) for the 2045 No Build scenario shows a 21% decline in carbon dioxide equivalent (CO_2e) emissions despite a 9% increase in population and 7% increase in VMT. This emission reduction is largely due to the shifting fleet mix. Public policy changes also have an impact on the future of transportation. State rules eliminating sales of gasoline-fueled vehicles after 2035 is one example. This could increase the electric vehicle fleet rapidly, to the point that private investment in electrical charging infrastructure alone

may not be enough to satisfy future demand. Coordination will be needed between public and private entities, such as OCTA, local jurisdictions, developers, and utility companies.

Summary

In summary, some of the more certain influences to travel trends due to technology changes include remote work and other remote services, micromobility, connected vehicles, and zero-emissions vehicles. Taking advantage of the transportation benefits offered by these technologies requires additional planning and investment in public infrastructure.



Technologies that are early in development or are just emerging as concepts present less certain but potentially significant influences on travel behavior. Whether these technologies are ultimately implemented consistently with the current concepts is difficult to say. However, by regularly updating the LRTP, OCTA can account for future technologies and incorporate them into the transportation planning process when appropriate. Examples of such emerging technologies include fully autonomous vehicles, air taxis, and hyperloop systems.

Optimistic predictions of autonomous vehicle availability in the near future and the rapid uptake of technology have been more muted recently. The ability for computers to predict or react to human drivers or people walking or bicycling on or near roadways must improve before fully autonomous vehicles can become part of everyday life. While development and testing continue by some companies, other companies have reduced or shut down development because of the challenges with improving this technology.

Another example is air taxis and vertiports, the concepts of which were announced with much fanfare but have been slow to develop. The air taxi concept is a vertical take-off and landing vehicle that is relatively quiet compared to helicopters, so they can operate more discreetly in urban settings. They are designed to transport passengers up to 200 miles, providing point-to-point service, and operate out of vertiports. Vertiports are compact terminals used by air taxis to load and unload passengers that would be located within high travel demand areas.

Hyperloop is a high-speed transport system that moves magnetic levitation pods through a vacuum tube and could be used for transport of people and/or goods. Conceptual applications for hyperloop include long-distance overland routes and subterranean routes within urban areas. The high-speed nature of hyperloop increases the cost-effectiveness with distance, so long as travel demand along the corridor is high enough. It is possible, however, that connection between an urban center and a suburban/exurban area could contribute to urban sprawl. Hyperloop transportation corridors are in development in multiple locations around the world and the commercial viability of them may be better known soon.

These types of conceptual technologies (i.e., fully autonomous vehicles, air taxis, and hyperloop) and innovations that have not yet been revealed could have profound effects on travel behavior. It is difficult to predict how widespread these types of technology will be used in 2045 without additional data. Monitoring their development and examining data as it becomes available will assist policymakers to incorporate the benefits while minimizing the negative outcomes.

Key Factor 3: Increasing Climate-Related Risks

Climate-related risks to Orange County's transportation infrastructure and travelers are expected to continue and will likely increase through 2045 and beyond. These include sea level rise, flooding during storm surges, extreme heat days, and wildfires. To protect past and future infrastructure investments and to ensure the safety of travelers, these types of risks must be monitored and managed.

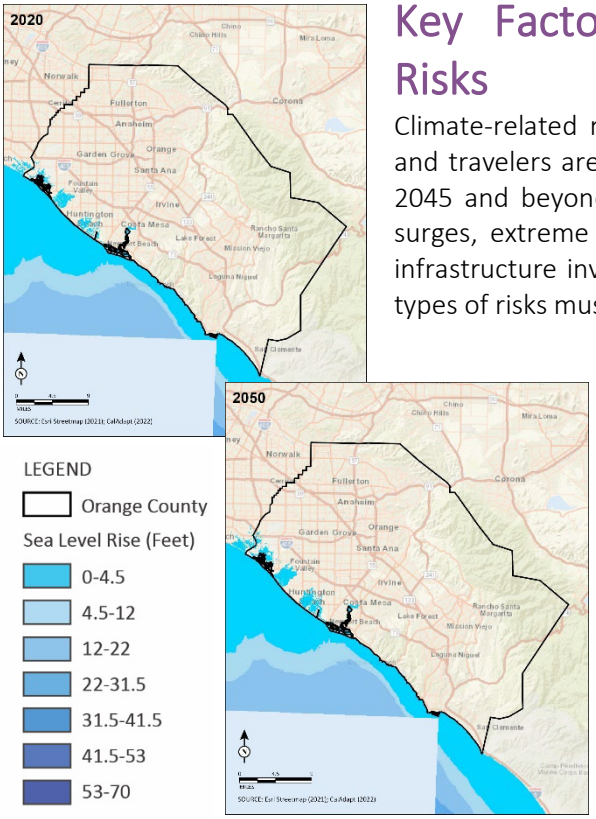


Figure 2-19: Flooding Due to Sea Level Rise, 2020 vs 2050

As sea levels rise by an estimated 1 to 2 feet during the planning horizon, the rail line and some roadways are at risk of flooding during storm surges. Pacific Coast Highway in Huntington Beach and Coast Highway in Dana Point have been subjected to flooding during storms. Additionally, rail service between Orange County and San Diego was interrupted in 2022 when movement of the ground under the rail line was detected. In areas where there had been 100 feet of beach 20 years ago, storm waves now come right up to the rail line. Riprap in the form of large boulders is used to prevent erosion, along with other measures to keep the rail line secure, but a long-term solution will be needed. Figure 2-19 illustrates sea level rise and flood risk through 2050.

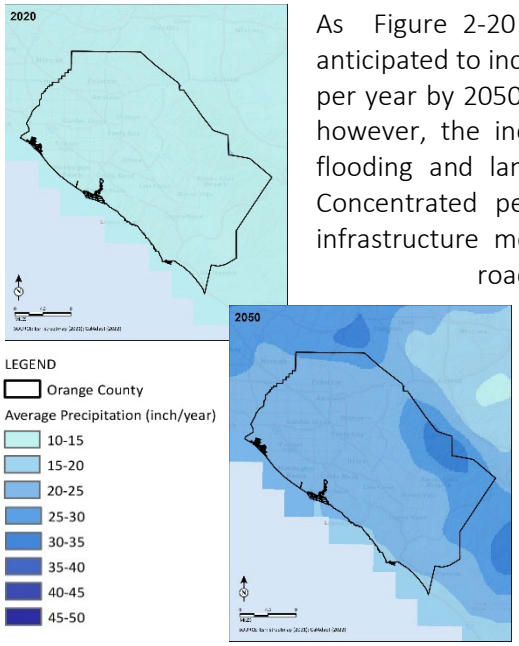


Figure 2-20: Average Precipitation, 2020 vs 2050

As Figure 2-20 shows, average precipitation for much of the County is anticipated to increase from 10 to 15 inches per year today to 20 to 25 inches per year by 2050. If it is spread out, increased rainfall could be beneficial. If, however, the increased rainfall occurs during brief, concentrated periods, flooding and landslides could endanger the transportation infrastructure. Concentrated periods of rainfall also make use of active transportation infrastructure more challenging and increase the number of incidents on roadways that can temporarily reduce capacity.

Climate modeling predicts increases in the average maximum and minimum temperatures for much of Orange County. This increase in the averages would be caused by an increase in the number of extreme heat days, when daytime and nighttime temperatures are far higher than average. Extreme heat days have the potential to cause the buckling of rails and introduce stress at bridge joints. Transit riders waiting at bus stops and train stations are impacted, along with pedestrians and bicyclists, all of whom may not have access to alternatives that could help them avoid exposure. Heat also lowers vehicle fuel economy, reduces the range of battery-operated vehicles, makes bicycling more difficult, and can accelerate wear and tear on asphalt surfaces. Figures 2-21 and 2-22, respectively, provide comparisons between the average maximum and minimum temperatures in 2020 and those forecast for 2050.

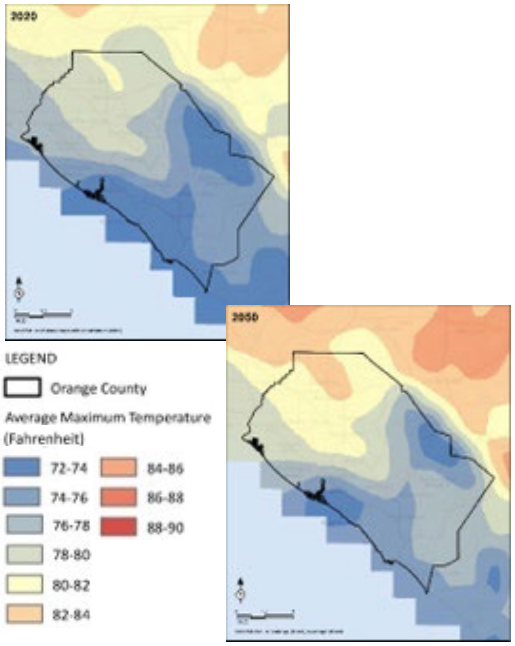


Figure 2-21: Average Maximum Temperature, 2020 vs 2050

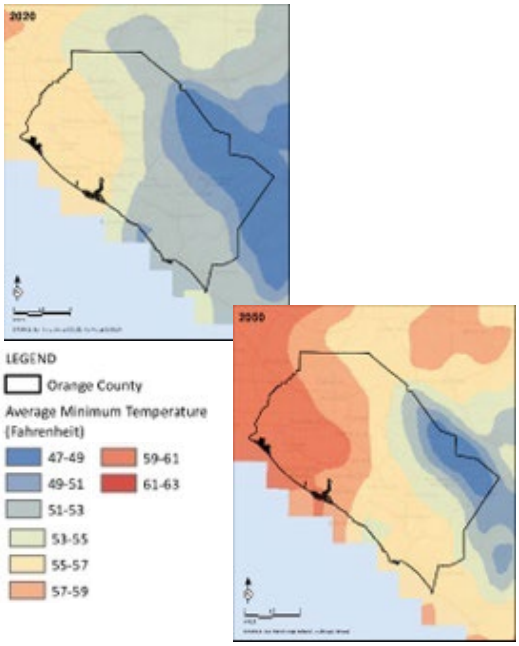


Figure 2-22: Average Minimum Temperature, 2020 vs 2050

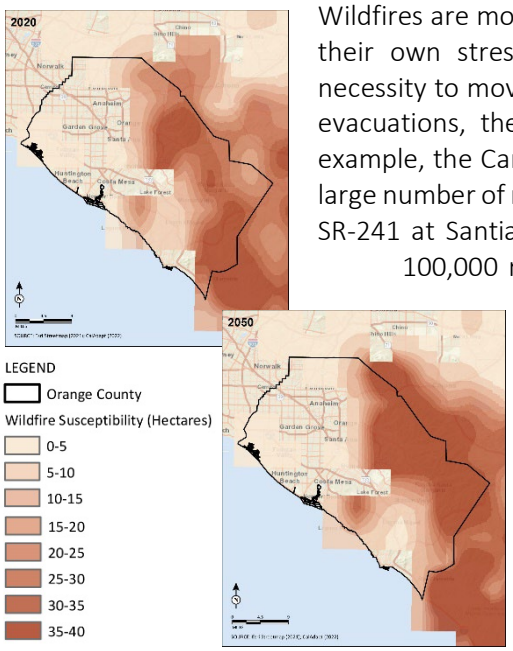


Figure 2-23: Wildfire Susceptibility, 2020 vs 2050

Wildfires are more likely to occur during extreme heat events, and these have their own stresses on transportation systems. Such stresses include the necessity to move large quantities of people in a short amount of time during evacuations, the displacement of residents, and closure of roadways. For example, the Canyon 2 Fire in Anaheim Hills in 2017 required evacuation of a large number of residents with limited roadway options and closed northbound SR-241 at Santiago Canyon Road. The Silverado Fire in 2020 displaced over 100,000 residents and again closed SR-241. The Coastal Fire in 2022 required evacuations and closed local roadways. Figure 2-23 provides a comparison between wildfire susceptibility in 2020 and that forecast for 2050.

As much as changes in the environment can increase sea level, extreme heat days, increase wildfire risk, and exacerbate drought, rainstorms are also becoming more intense and, at times, overwhelming the storm water management systems. As construction of new facilities and maintenance of existing facilities occur, steps should be taken to address these changes and increase the resiliency of the infrastructure.

To combat climate change, the State has set ambitious goals for reducing greenhouse gas (GHG) emissions. The State has achieved the 2020 GHG emissions reductions target and is now working toward the goal of further reducing GHG emissions by 40% below 1990 levels by 2030 and carbon neutrality by 2045. The transportation sector (primarily on-road travel) was the single largest contributor to GHG emissions in 2019 with 40% of total GHG emissions in the State. Therefore, much of the necessary reductions to achieve the State's 2030 and 2045 targets will come from the transportation sector.

Technology advancements, particularly in electric vehicles, can help to reduce GHG emissions. The 2022 Scoping Plan for Achieving Carbon Neutrality (CARB, November 2022), Executive Order N-79-20, and CARB's Advanced Clean Cars II rule lay out a path toward 100 percent of in-State passenger vehicle sales being zero emission vehicles by 2035. While this rule will increase the number of zero-emission vehicles, many internal combustion engine vehicles will remain on the road. By 2045, internal combustion engine vehicles could still make up more than 50 percent of the vehicle fleet and continue to emit a significant level of GHG emissions. Therefore, it will continue to be necessary to reduce single occupant vehicle travel.

One of the State's regulations aligning with climate action goals has been the implementation of Senate Bill 743. Senate Bill 743 resulted in revisions to the California Environmental Quality Act (CEQA) that focus analysis of transportation impacts on VMT, rather than traffic congestion. This means that capacity enhancement projects, like roadway and freeway lane additions, would likely increase VMT and result in transportation impacts that must be reported and potentially mitigated. This introduces another challenge for future widening projects in addition to those discussed earlier under Growing Travel Demand & Built-Out Roadways.

Key Factor 4: Changing Funding Outlook

In alignment with Senate Bill 743, revised CEQA Guidelines, and the State's climate action priorities, the State's infrastructure funding priorities have changed. Similarly, federal programs for the interstate highway system are focusing on repair, replacement, and rehabilitation of existing infrastructure. In addition, Orange County's local transportation sales tax, OC Go (Measure M2), is set to expire in 2041, which will sunset the freeway program begun in 1991 with Measure M1. These realities affect the planning process because funding sources for new roadway capacity will be limited.

Climate Action Plan for Transportation Infrastructure

The State's Climate Action Plan for Transportation Infrastructure (CAPTI) program acknowledges that the transportation sector is the largest contributor of California's GHG emissions. It establishes an action plan that aligns approximately $5 billion in annual funding for transportation investments with the State's climate goals. CAPTI also commits to a "fix it first" approach that prioritizes maintenance of the transportation system. Other funding programs effected by CAPTI focus on improving active transportation, goods movement, multimodal options, system efficiency and deployment of zero-emission vehicles. However, this creates challenges for funding any needed roadway capacity projects and greenhouse gas reduction projects are generally prioritized for funding over other local needs. Another catch is that while transit capital costs are prioritized, funding for transit operations is not eligible under these state programs.

Infrastructure Investment and Jobs Act

The federal Infrastructure Investment and Jobs Act was signed in November 2021 and programmed $1.2 trillion in transportation spending, including $550 billion for upgrading aging transportation infrastructure across the country. Orange County has experienced aging transportation infrastructure, including bridges that require maintenance to ensure stability. The spending program contains a few earmarked projects for existing Orange County infrastructure. The Infrastructure Investment and Jobs Act provides large investments for passenger rail service, transit capital investment and operations support, electric vehicle infrastructure, and funding for electric buses. In order to secure federal funding proportionate to Orange County's population or tax input, planning should align with these funding priorities.

Sunset of Measure M2

Orange County has a source of self-help revenue. Measure M was approved by Orange County voters in 1990 and provided $4 billion for improvements to the transportation infrastructure between 1991 and 2011. Measure M2, or OC Go, was approved by voters in 2006 to extend the program from 2011 to 2041. OC Go is currently anticipated to generate over $15 billion in revenue for transportation improvements in Orange County and it is worth noting that OC Go recently exceeded $1 billion in local roadway investments. These investments are part of the reason that Orange County roads are consistently ranked among the best in the State. It is not just drivers who benefit from well-maintained roadways; a well-maintained roadway surface benefits bicyclists, improves bus operations, and enhances safety for all users.

A total of 2% of the overall OC Go Program funds is allocated to the Environmental Cleanup Program.

A total of 5% of OC Go Freeway Program funds is allocated to the Freeway Environmental Mitigation Program.

OC Go-funded projects include freeway capacity enhancements, streets and roads improvements, grade separations, funding to local agencies for street maintenance, Metrolink station improvements, transit extensions to Metrolink, and local shuttle and Metrolink operations support. In addition, OC Go funds bus fare stabilization, community-based transit, expanded Metrolink service within Orange County, freeway service patrols that quickly clear obstructions from freeways, traffic signal synchronization, and more. The OC Go transportation sales tax will, however, sunset in 2041 within the horizon of this LRTP. OC Go revenue represents approximately 25% annually of all available transportation revenue in Orange County. If OC Go sunsets without a funding strategy that looks beyond 2041, many of the ongoing transportation programs noted above would be affected.

To better understand the implications of the sunset of OC Go, the 2045 M2 Sunset scenario was developed. This scenario assumes that the committed capital projects included in OC Go are completed. Figures 2-24, 2-25, and 2-26, respectively, illustrate the changes to arterials, freeways, and managed lanes as a result of OC Go programs. However, many of the OC Go programs would end after 2041. For example, Metrolink service would decline from 55 trains in 2019 to approximately 20 daily trains, and without the signal synchronization program arterial speeds would decline by approximately 10%. These impacts were analyzed, and the results are reflected in the performance metrics shown in Table 2.3.

Table 2.3: Performance Metrics

	2019 Base Year	2045 No Build	2045 M2 Sunset
Daily Vehicle Miles Traveled	76,400,000	81,900,000 (7% increase vs. 2019)	85,700,000 (12% increase vs. 2019)
Total Vehicle Hours of Delay	341,000	454,000	408,000
Delay as Percent of Travel Time	15%	18%	16%
Average Speed – Freeways – Peak Period	41	30	41
Average Speed – Arterials – Peak Period	26	25	24
Daily Transit Trips	131,000	138,000 (6% increase vs. 2019)	129,000 (2% decrease vs. 2019)

As previously noted, the OC Go Freeway Program is anticipated to be completed by 2041, which will help to improve freeway speeds and reduce time lost in congestion compared to the 2045 No Build scenario. However, the elimination of traffic signal synchronization slows arterial speeds, and there is a decline in transit ridership due to reductions in Metrolink service. This results in more driving trips and a 12% increase in VMT over 2019 levels. Retaining the travel benefits of OC Go will require identifying alternative funding sources after 2041.

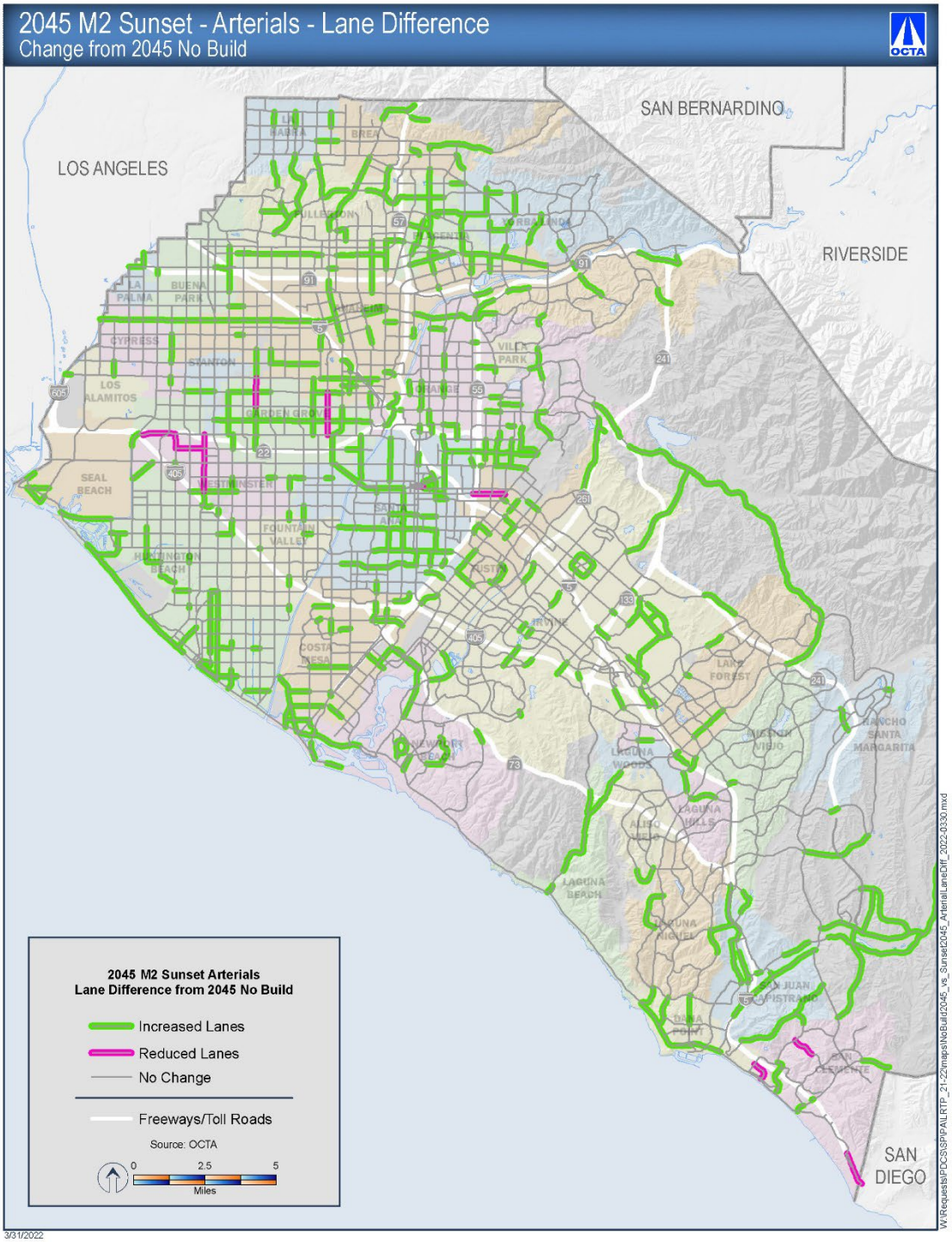


Figure 2-24: 2045 M2 Sunset – Arterials – Lane Difference, Change from 2045 No Build

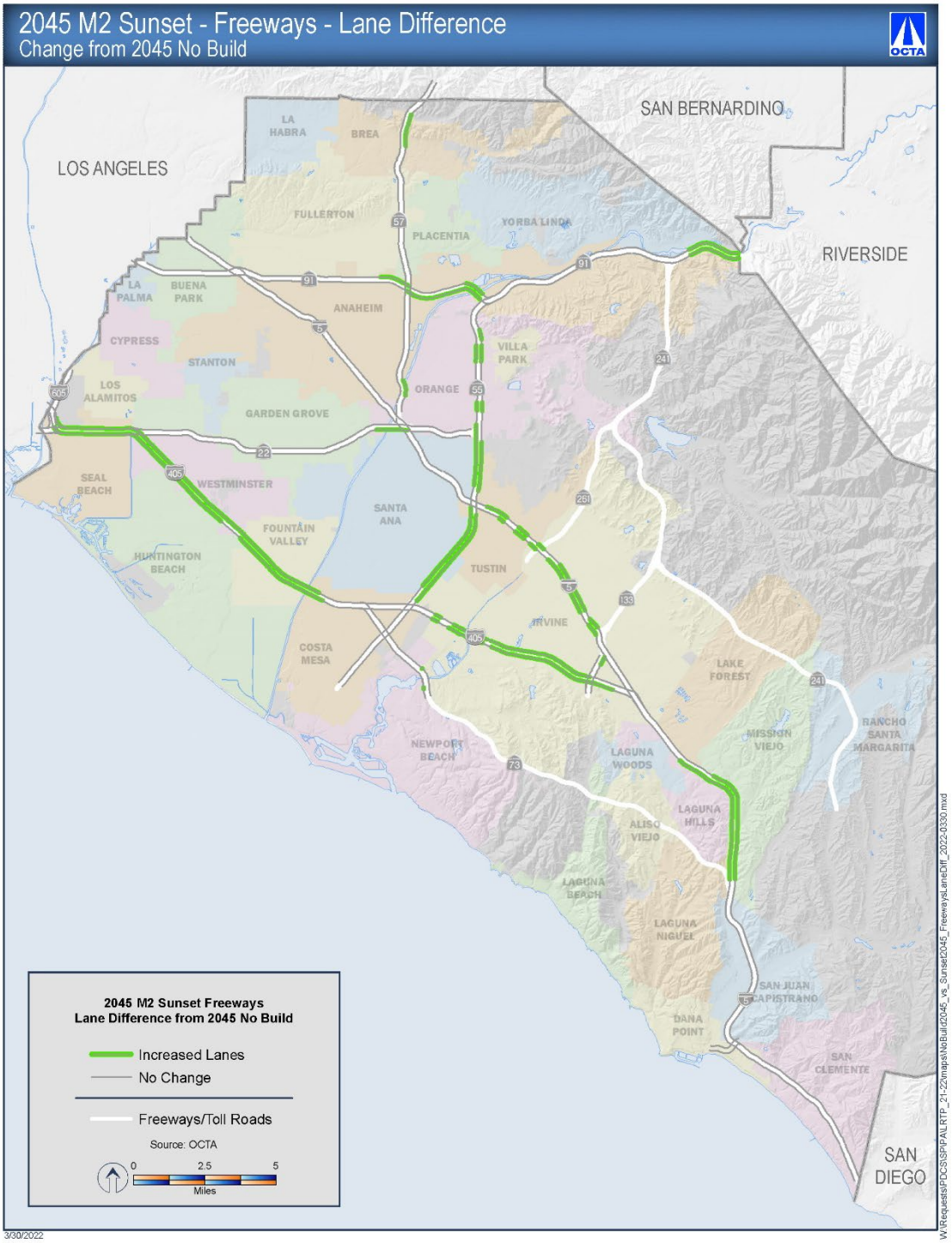


Figure 2-25: 2045 M2 Sunset – Freeways – Lane Difference, Change from 2045 No Build

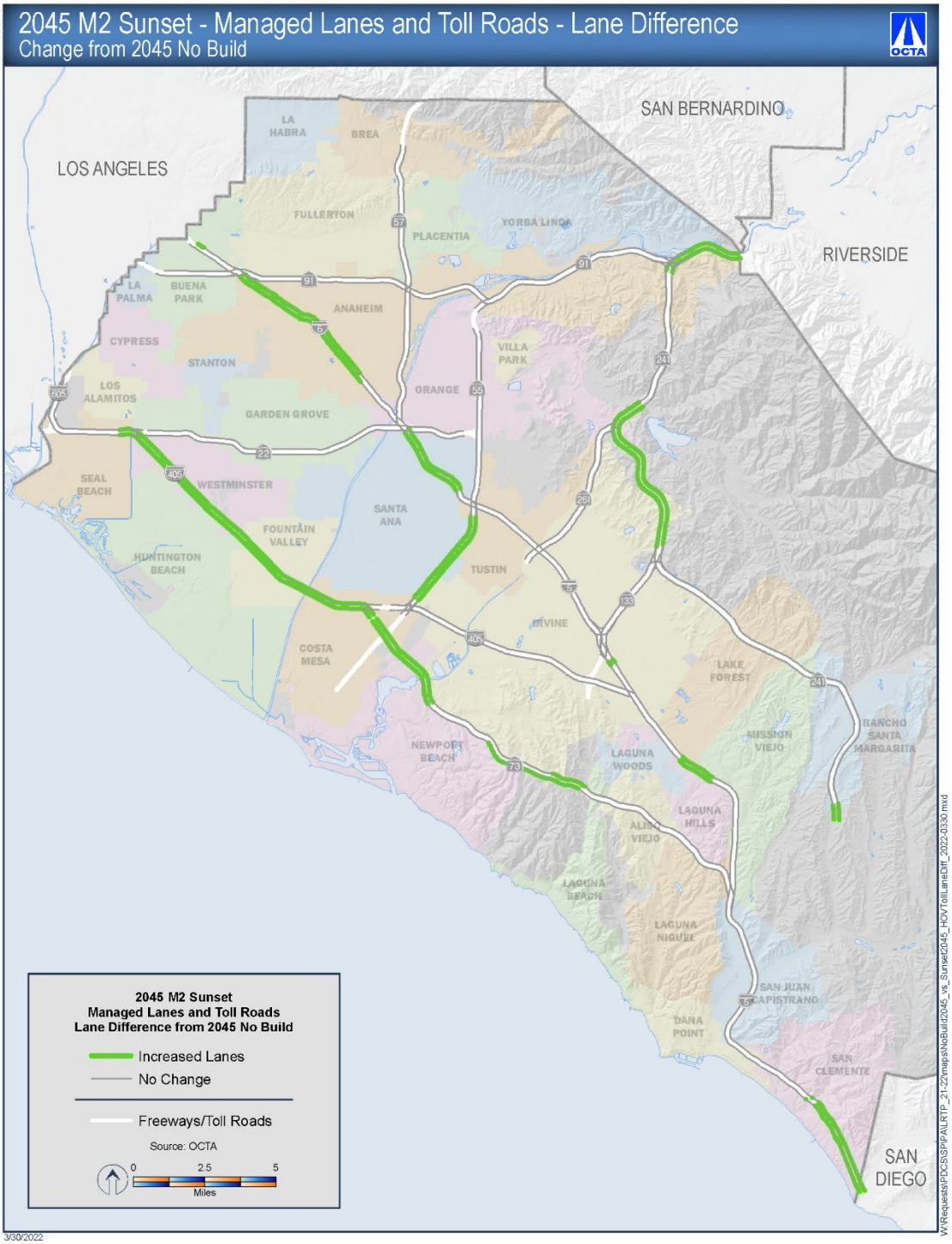


Figure 2-26: 2045 M2 Sunset – Managed Lanes and Toll Roads – Lane Difference, Change from 2045 No Build

In summary, the changing funding outlook reveals that roadway widening projects are unlikely to be funded by State programs, and Caltrans is becoming increasingly reluctant to consider any improvements on State facilities that could increase VMT. Regardless, in the future, Orange County's transportation system will need to move more people. This will need to be accomplished through more efficient use of facilities and enhancing alternatives to driving alone. The loss of OC Go programs after 2041 only makes this challenge more difficult, as transit ridership and roadway efficiencies would likely diminish. Therefore, options must be considered that look to continue the OC Go programs beyond 2041, along with additional strategies to address Orange County's mobility, accessibility, and sustainability needs through 2045 and beyond.

Key Factor 5: Diversity, Equity, and Inclusion

Historically, many disadvantaged populations throughout the nation have been disproportionately burdened by transportation inequities that limit access to opportunities. Recently, there has been a renewed call for transparency regarding diversity, equity, and inclusion, especially in public sector activities, to ensure that the voices of those most in need are heard and meaningfully addressed. There are opportunities for Orange County improvements that may provide for more balanced public transportation options and solutions and better ways to engage with diverse and disadvantaged communities.

OCTA operates all of its services, programs, and activities without regard to race, color, or national origin in accordance with Title VI federal regulations. Beyond these regulations, additional consideration of diversity, equity, and inclusion in the planning and operating of transportation for Orange County maximizes community benefits and the long-term economic viability of the County. Therefore, it is prudent to incorporate diversity, equity, and inclusion in OCTA's planning processes, beginning with public engagement that comes early and often.

Public Engagement

An outreach strategy to engage with people who live, work, and travel through Orange County was developed and implemented to inform this LRTP in Fall 2021. Due to the ongoing COVID-19 pandemic, the outreach approach used a variety of digital tools such as e-blasts, social media messaging, and announcements on OCTA's website promoting surveys, virtual community meetings, and other outreach opportunities. Staff also attended community events, collecting feedback from cities with the greatest need for additional engagement. Input was also received from standing OCTA committees, including the Citizen's Advisory Committee, Diverse Community Leaders Group, and Accessible Transit Advisory Committee. In addition, two Community Leader Roundtables were also held to extend the reach of project engagement.

Outreach methods were created and implemented with a diverse audience in mind to engage hard-to-reach segments of the community and ensure all voices had the opportunity to be heard, regardless of ethnicity, language preference, or socioeconomic background. The survey and materials were available in English, Spanish, and Vietnamese. A number of social media and radio advertisements were placed to connect with the Spanish and Vietnamese language communities. A bilingual project telephone helpline was also established.

A total of 1,825 survey responses were collected with approximately two-thirds of the responses from Orange County residents. The top responses for strategies to reduce how much people need to drive and decrease congestion were (1) encourage work-from-home policies at least one day per week, and (2) improve and expand commuter rail service. The biggest challenges to increase public transit usage were (1) lack of service close to their desired destination, and (2) long travel times. When asked about technology to improve transportation, survey respondents selected smart/connected roadways and intersections, real-time transit information, and synchronized traffic signals. When considering what services would make a mobility hub useful, respondents selected flexible services such as OC Flex and rideshare services. Other common themes for making mobility hubs useful were accessibility, safety, connection to buses, location within the community, safety features, and restrooms.

Summary

As discussed in this chapter, the population and employment in Orange County are projected to increase by 9% and 12%, respectively, through 2045. If this growth were to occur with the existing infrastructure, VMT would increase by 7% while total vehicle hours of delay would increase by 33%. With completion of the OC Go Freeway Program in 2041 and the sunset of the other programs funded by Measure M2, VMT would increase by 12% while total vehicle hours of delay would increase by 20%. However, limited opportunities are available to widen roadways, and the changing funding outlook shows similar limited opportunities for State or federal funding of roadway widening projects. To overcome this, public engagement results suggest that Orange County should embrace changing travel trends and technology to make more efficient use of facilities and enhance alternatives to driving alone. These public outreach results influenced development of strategies for improving the future of mobility in Orange County and informed the performance measures used to determine progress towards the goals of the LRTP. These goals and strategies are discussed in detail in the following chapter.

Chapter 3:
Paths to Success

Chapter 3: Paths to Success

While new challenges have emerged over the years, the goals of the LRTP remain steady, thereby allowing plans, programs, and projects to stay on course. The cornerstone of the LRTP is the delivery of the voter-approved OC Go programs and fulfilling OCTA's responsibility for delivering safe and reliable transit service. The second long-term goal is improving system performance. This goal is related to all travel modes and often requires consideration of innovative solutions that respond to Orange County's growing travel demand. The third goal of expanding system choices aims to provide travelers with convenient and equitable travel options. Residents and employees in Orange County should have options available to fulfill their travel needs and provide equitable access to jobs and other essential destinations. The final long-term goal is supporting sustainability. This goal highlights the need for strategies that reduce climate-related risks to Orange County's transportation infrastructure and travelers. This goal also considers the need for a transportation plan that is financially achievable and that maintains Orange County's existing infrastructure. These goals, along with feedback received from public and stakeholder engagement, were considered in developing the performance measures used to evaluate this LRTP. They were also key in developing the Paths to Success, which identify categories of strategies needed to adapt to the challenges outlined in Chapter 2 and address the LRTP goals. The Paths to Success will be discussed in more detail later in this chapter.

Defining Success

The LRTP determines progress toward achieving OCTA's goals by identifying measurable outcomes that are consistent with those goals and then comparing the performance of the planning scenarios with the outcomes, referred to as performance measures. This LRTP considers a wider array of performance measures than the system performance metrics used in past LRTPs. The first goal, *Deliver on Commitments*, can be measured by confirming that the voter-approved Measure M2 projects and safe and reliable transit service are prioritized in this LRTP. The other goals are more broad and require a more detailed analysis to understand how the LRTP performs.

Improve System Performance

Previous LRTPs have reported roadway performance measures for vehicles, including total vehicle hours of delay, delay as a percent of travel time, and average travel speed on freeways, arterials, and managed lanes. This LRTP keeps those performance measures for vehicles, which are currently used by the majority of Orange County's commuters. A new performance measure (i.e., average travel time) evaluates both vehicle and transit performance. Tracking average travel time will allow comparisons between vehicle and transit travel modes. Monitoring average travel time will also show whether the gap between vehicle and non-vehicle modes is closing over time.

Expand System Choices

Previous LRTPs have reported total transit trips as a measure of non-vehicle choice in the Orange County transportation system. This measure is being retained, but measures of transit system choice are being expanded by reporting revenue service hours (RSH) of all transit service, RSH of frequent transit service (i.e., routes with service every 15 minutes or less during morning and afternoon commute periods), average bus headways, and the number of households with access to high-capacity transit stops. This last

performance measure can be reported for Orange County as a whole and also within the Communities of Concern. Microtransit represents another system choice, and the microtransit service area is reported as a performance measure. The number of multimodal facilities (i.e., areas where travelers can conveniently transfer between travel modes) and miles of bikeways are more measures of system choice.

As an overall measure of the extent to which improvements to the transportation system permit residents and employees to choose alternatives to vehicle travel is measured by non-single occupant vehicle (non-SOV) trips. In other words, the number of trips made by any means other than driving alone. This is compared to the total number of trips to determine the share of non-SOV trips being made on a daily basis. The goal is to enhance choices while also enabling the public to continue their economic activity, recreational trips, and social activity.

The transportation system affects the lives of residents, employees, and visitors. By providing a system with travel options that provide access to jobs and other key destinations, it can reduce burdens related to travel costs and time. Figures 2-9 and 2-10 showed where Orange County's employment is expected to be concentrated in 2045. The ability to access these areas via the transportation system impacts job opportunities for Orange County residents. This LRTP measured the number of jobs accessible by vehicle and by transit within three different time limits (15, 30, and 45 minutes). For this performance measure, the countywide average can be compared to the average for the Communities of Concern to identify how well the transportation system serves these communities.

In addition to employment, this LRTP considered access to key destinations such as educational institutions, medical services, grocery stores, and open space. Figure 3-1 illustrates the density of these types of key destinations within Orange County. The number of key destinations accessible by vehicle and by transit (within 15, 30, and 45 minutes) was measured for the County as a whole and within the Communities of Concern. As a further measure of the outcome of transportation, average household spending on transportation was calculated for 2019 for the County and within the Communities of Concern. Future projections estimate how household spending will change as a result of the improvements made to the transportation system.

Support Sustainability

To support sustainability, this LRTP aims to reduce smog-forming emissions and GHGs. Performance metrics are included that measure the levels of emissions based VMT. VMT is analyzed to understand the number of miles driven at different speed ranges that correlate with levels of emissions produced at those speeds. The total emission level estimated takes into consideration the types of vehicles expected to be operating in 2045. Therefore, while technological improvements will contribute to lower emissions, additional strategies included in the LRTP are intended to help reduce emissions even further. The overall objective is to improve the health and quality of life in Orange County's communities.

As discussed in Chapter 2, GHG emissions and resulting climate-related risks have potential impacts in Orange County. Orange County infrastructure and population are at risk from sea level rise, flooding, heat, and wildfires. Efforts to reduce VMT by providing viable alternatives to single-occupant vehicle travel reduce these risk factors and support sustainability.

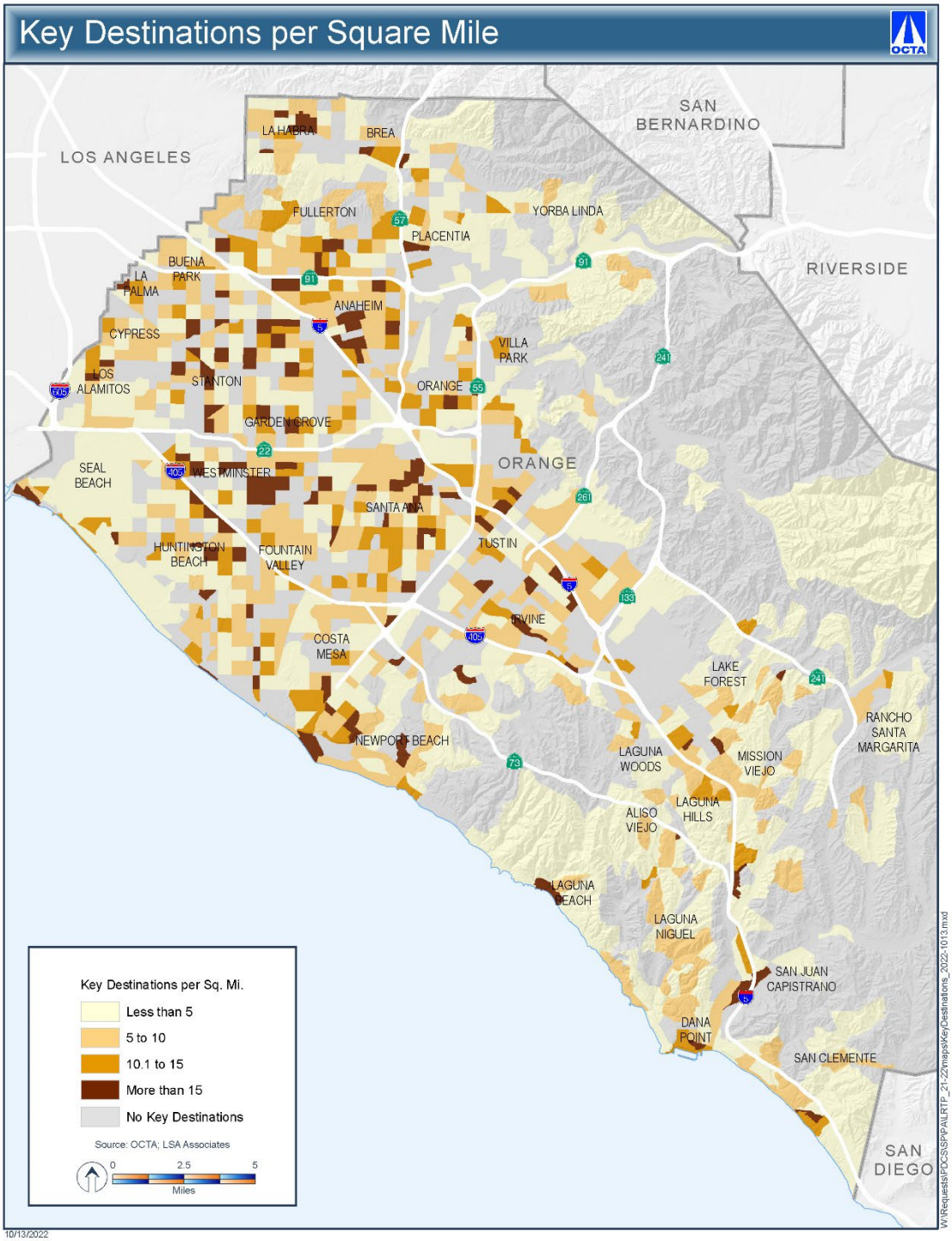


Figure 3-1: Key Destinations per Square Mile

Average arterial pavement conditions and jobs created or supported by transportation investments are also included as measures of sustainability. Maintenance of the transportation system is a priority of OCTA and is reflected in the pavement quality on Orange County streets. This is also an indicator of OCTA's understanding of the need to plan and implement adaptation and resiliency strategies. These strategies are being developed to strengthen the transportation system and protect travelers and the supply chain. These investments, along with others planned for in the LRTP, will also contribute to the economic sustainability of Orange County by creating jobs. It is important to remember that funding invested in the transportation system by OCTA contributes to wages earned by employees working on the projects or services. These wages can then be reinvested into the local economy.

Equity Analysis

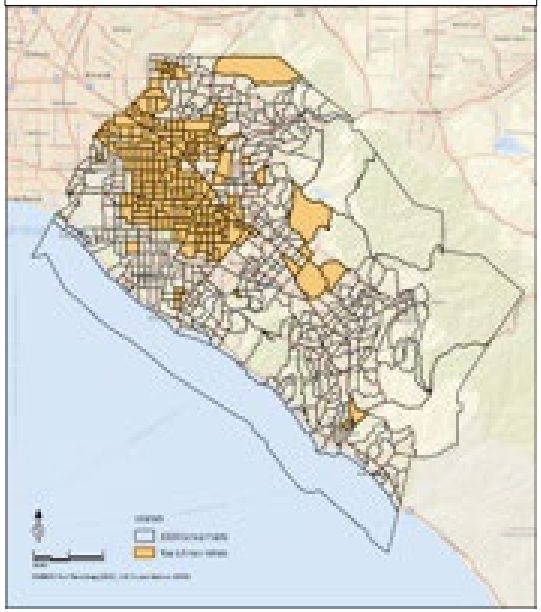
To consider the equitable distribution of transportation benefits, this LRTP incorporated the Equity Analysis in Regional Transportation Planning Processes report from the Transit Cooperative Research Program. This process included identifying populations for analysis, identifying needs and concerns, measuring impacts of proposed agency activity, and determining whether impacts are disparate or have disproportionately high and adverse effects.

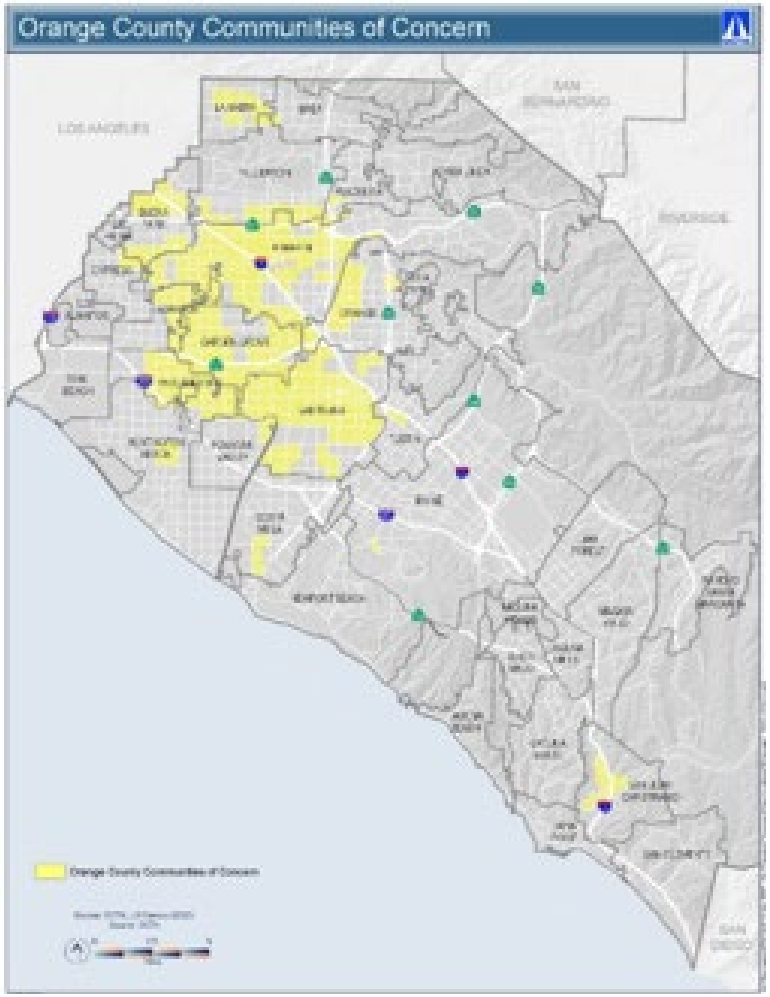
For the first step, identifying populations for analysis, the LRTP follows an adapted approach used in the SCAG 2020 RTP/SCS. The RTP identified three census-designated places within Orange County as Communities of Concern, which are defined as communities that fall in the upper one-third of all communities in the SCAG region with the highest concentration of non-white population and families in poverty. OCTA adapted the Communities of Concern approach for Orange County and applied it at the census tract level. Census tracts are geographic areas smaller than cities that permit analysis at a finer granularity.

Orange County is a majority non-white county. Census tracts with at least a 74.4% non-white population (and ranging up to 98.9% non-white) fall within the top one-third of Orange County census tracts. Figure 3-2 displays these tracts. For the percentage of families living in poverty, the top one-third of census tracts range from 8.0% to 34.6% of families, which is also displayed on Figure 3-2. The intersection of these two metrics leads to the proposed Communities of Concern within Orange County (Figure 3-2). The total population of the Orange County Communities of Concern is approximately 29% of Orange County's population.

Some additional data were collected and examined. Median annual household income in Orange County is approximately $81,000. The bottom one-third of Orange County Census tracts ranked by median household income range from $26,500 to $78,500, which comes close to Orange County's median household income. These areas are shown on Figure 3-3. Also provided are areas with the highest concentration of limited English-speaking households and areas with the highest concentration of zero-vehicle households. Many characteristic overlaps exist between these areas and the Orange County Communities of Concern.

Top One-Third Non-White





Top One-Third Families in Poverty

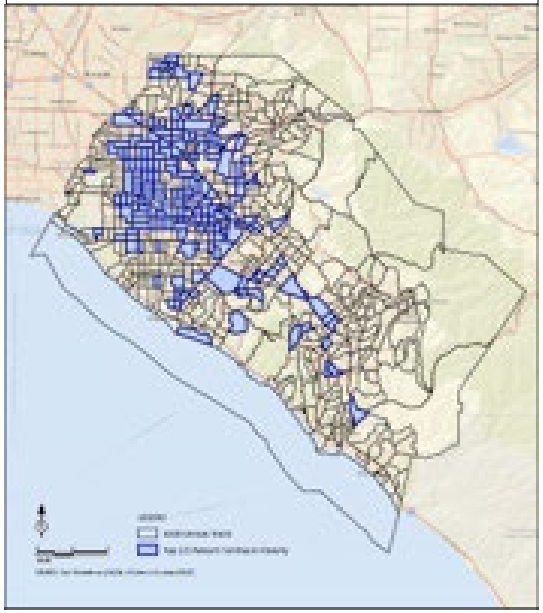


Figure 3-2: Communities of Concern Development

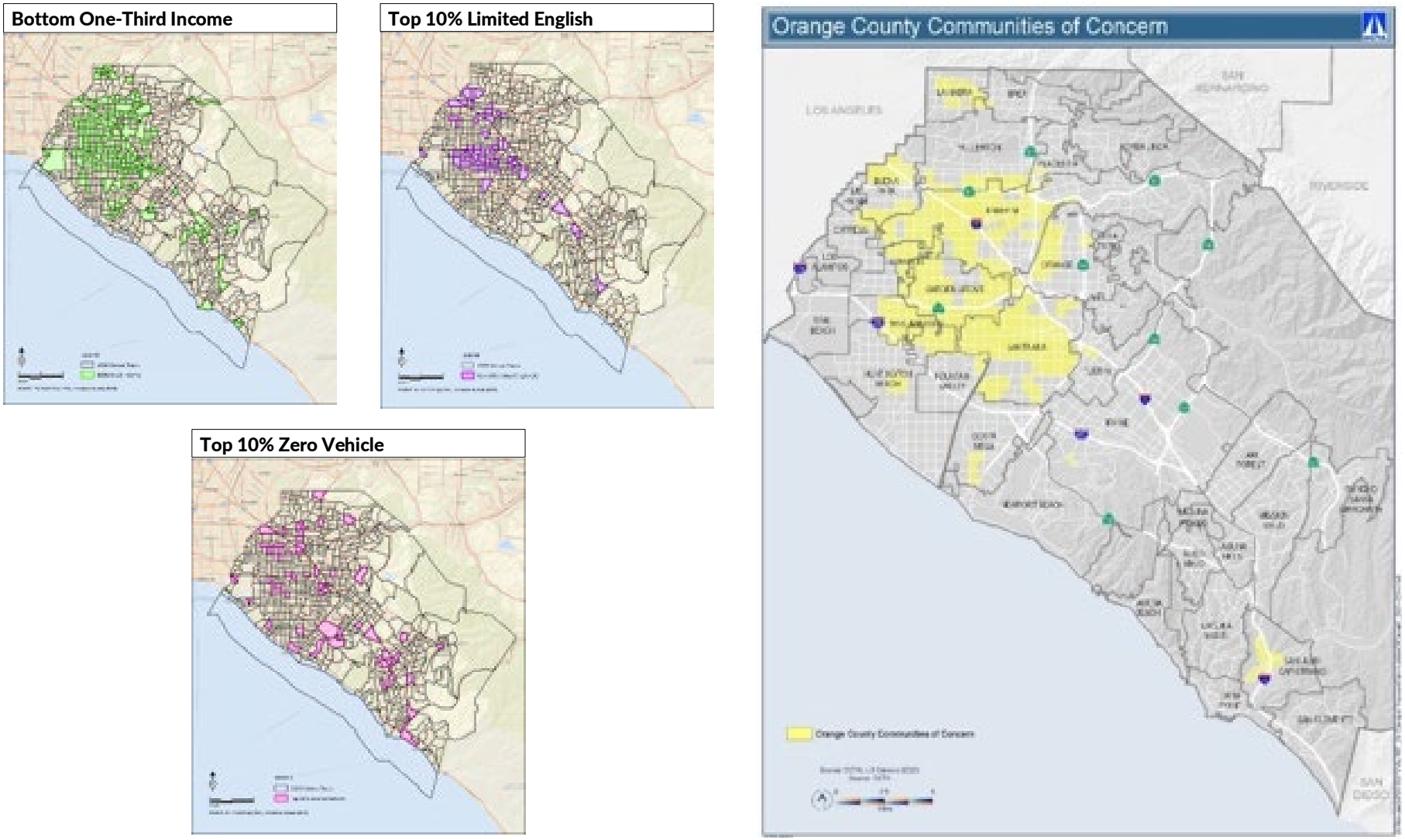


Figure 3-3: Comparison of Similar Measures to Communities of Concern

Once the Communities of Concern were identified, OCTA compared the areas to the most impacted census tracts in the California Healthy Places Index. The California Healthy Places Index was created by the Public Health Alliance of Southern California and examines different community characteristics that affect life expectancy. Access to clean air and water, education, job opportunities, health care, etc. vary by neighborhood. When these neighborhoods are also tied to race, the health outcomes can be inequitable. Figure 3-4 shows the percentile ranking of Orange County census tracts on the California Healthy Places Index as well as the Communities of Concern. As shown on Figure 3-4, all of the Orange County areas ranking lowest on the California Healthy Places Index are within or immediately adjacent to the LRTP's Communities of Concern.

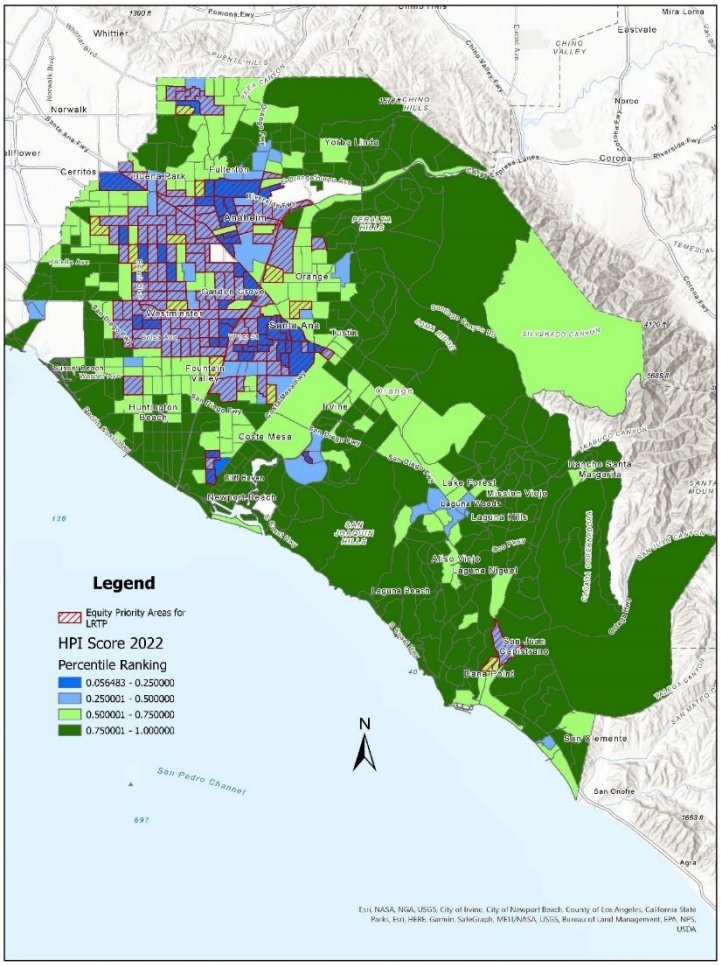


Figure 3-4: California Healthy Place Index Comparison

For the second step, identifying needs and concerns, this began with the public engagement strategy. The LRTP also considered the measurements of the California Healthy Places Index (e.g., access to education, job opportunities, health care, and open space) and incorporated these into measures of transportation performance. After incorporating feedback from public engagement and identifying needs and concerns, impacts of the LRTP were measured and compared to determine whether impacts are disparate or adverse within the Communities of Concern.

The Paths to Success

The Paths to Success are seven broad strategies that respond to the Planning Challenges and to feedback received through the initial public engagement phase. They build on OCTA's current commitments and look beyond the sunset of Measure M2 and the OC Go programs to achieve the long-term goals. This section is intended to provide an overview of the Paths to Success, while more specific assumptions associated with each will be discussed in Chapter 4.

- Extend or modify programs funded by M2
- Expand transit services
- Enhance active transportation
- Explore mobility integration
- Eliminate freeway chokepoints
- Embrace technology
- Elevate maintenance and resilience priorities

Path 1: Extend or Modify Programs Funded by M2

OC Go-funded services that Orange County travelers currently rely on should either be continued or adapted to future conditions. This includes programs like signal synchronization, freeway service patrol, community circulators, and support for Metrolink service, all of which help to increase transit ridership, reduce delay, and reduce congestion. This results in more reliable travel times, improved access to employment and key destinations, and reduced emissions and vehicle miles traveled. Additionally, arterial roadway improvement programs help to maintain Orange County's high pavement quality, which provides for safer travel conditions and less wear on vehicles and bicycles.

As noted above, some modifications to these programs may be needed to ensure they are flexible enough to adapt to new technologies and evolving travel conditions. Examples include modifying the signal synchronization program to incorporate new technology that allows for more dynamic responses to traffic patterns and communication with connected vehicles and other devices. Also, roadway improvement programs could be modified to help implement complete street projects that improve the mobility of all travel modes, encouraging more active transportation trips and reduce travel costs, emissions, and VMT.

The process to determine which OC Go programs to retain or revamp, and to develop a long-term funding strategy, is identified in Chapter 5, as part of the Short-Term Action Plan. This is envisioned as a comprehensive effort that would require a significant level of engagement by the OCTA Board of Directors, members of the public, and stakeholders. For the purposes of this LRTP, it is assumed that most programs would continue at the current scale.

Path 2: Expand Transit Services

This Path to Success looks to go beyond the near-term improvements proposed in OCTA's Making Better Connections effort by further enhancing bus service and expanding the types of service available to the public to meet local needs. These enhancements reflect plans developed as part of the 2018 OC Transit Vision, which

primarily includes expanding the number of corridors served by OCTA's Bravo! rapid bus service in the core of Orange County, as well as providing new freeway bus rapid transit services. The OC Transit Vision also recommends considering high-capacity transit services (such as bus rapid transit or streetcars) along higher density corridors with high transit demand. Expansion of high-capacity transit and rapid bus services can help improve travel times for transit riders and improve the quality of the service.

In addition, expansion of on-demand microtransit service in low-density areas of Orange County is proposed in this Path to Success. This could be in the form of additional OC Flex service or partnerships with transportation network companies to provide service charge subsidies for users within a defined area. Microtransit can be a cost-effective way to expand the service area providing additional access to transit, employment, and key destinations.

Some strategies that are gaining momentum at the state level and in other parts of the country are related to removing cost burdens for transit riders and reducing barriers to use transit. A concept is proposed in this Path to Success is to evaluate significantly reducing or removing transit fares for OC Bus services. This is dependent on increased operational revenues from state and federal sources, and would require plans and procedures to preserve or enhance the quality of the transit experience. Increased service combined with affordable transit fares will help to reduce single-occupant vehicle trips, emissions, VMT, and household spending on travel.

Path 3: Enhance Active Transportation

OCTA looks to continue coordination with local partners to develop and implement bicycle and pedestrian routes both regionally (e.g., OC Loops) and locally (e.g., safe routes to schools) and improve overall connectivity of active transportation facilities. This includes implementation of the additional planned bikeways identified in OCTA's countywide active transportation strategy, OC Active.

These planned facilities will help make active transportation a safer and more attractive choice for Orange County travelers. Relationships with local jurisdictions are critical for advancing the planning and implementation of these regional and local active transportation facilities. Expanding the active transportation network gives travelers better access to safe facilities, thereby making walking and rolling more viable and attractive for trips of moderate length. This helps to reduce vehicle trips, VMT, emissions, and travel cost.

Additionally, new opportunities may be identified to expand active transportation facilities on strategic segments of the Master Plan of Arterial Highways (MPAH). An initial analysis identified approximately 60 miles of the MPAH where there appeared to be opportunities to repurpose a vehicle lane for a bikeway. To further explore this potential, the Short-term Action Plan (included in Chapter 5) recommends additional analysis with local jurisdictions to identify areas of excess capacity that may provide valuable active transportation connections.

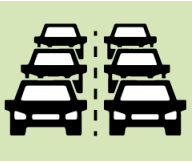
Path 4: Explore Mobility Integration

Improving integration of mobility options could increase accessibility and reduce the first- and last-mile barriers that typically discourage alternatives to single-occupant vehicle trips. This integration can be achieved through a combination of technological changes and capital investments.

OCTA is currently analyzing the potential benefits of a network of mobility hubs at key transit stations and destinations (such as employment and activity centers) and how to implement and operate mobility hubs. Mobility hubs provide an array of services that support the travel needs within that community or neighborhood. These services usually include connections to regional rail or bus transit, wayfinding information, rideshare services, and micromobility options. Micromobility includes first/last mile connections such as bicycle or e-scooter sharing services. By bringing these services together at key locations throughout Orange County, travelers will have increased accessibility to wider selection of alternatives to driving alone and will be able to transfer between travel modes more easily.

Mobility as a Service (MaaS) is another strategy that can also be used to support mobility integration and streamline the trip planning and payment experience for travelers. MaaS is a single interface that could be accessed through a smart phone application or at a kiosk to plan trips, receive real-time travel information, and pay for any transportation services such as transit, micromobility, and rideshare.

Mobility hubs and MaaS are intended to work together to provide easier and more equitable mobility alternatives to solo driving options for Orange County travelers. Providing mobility hubs and streamlining transitions and payments between modes improves the efficiency of the system, resulting in more reliable travel times, better access to and from jobs and key destinations, fewer single-occupant vehicle trips, and reduced VMT, emissions, and travel costs.



Path 5: Eliminate Freeway Chokepoints

Even with the OC Go freeway program fully implemented, chokepoints on freeways may still exist. It is essential to continue identifying strategies to eliminate those chokepoints. The strategies would emphasize lower cost spot treatments that would produce measurable benefits with minimal right-of-way needs. They are intended to enhance safety and reduce delays rather than full general-purpose lane additions. Examples include reducing weaving and merging operations by providing new auxiliary lanes and braided ramps, eliminating lane drops, and implementing system management techniques that improve operations.

Chokepoint improvements provide benefits that go well beyond improving the performance of the freeways. By enhancing safety and reducing delays on the freeway system, these treatments would help improve access to jobs and key destinations. Chokepoint improvements also include consideration of active transportation safety enhancements where freeway interchanges intersect with arterial roadways. Additionally, bus routes that operate on the freeway system would benefit from more reliable travel times. Finally, communities that experience unhealthy levels of ozone and fine particulate matter would benefit from reductions of these smog-forming emissions that tend to build where traffic is congested.

Path 6: Embrace Technology

Technology has advanced the way people travel, from trip planning applications with real-time traffic information, to transportation network companies and electric bicycles (E-bikes), to cloud-based networks making remote work a possibility for many. Based on these experiences, the ability to forecast the impacts of technology is limited. However, planning for flexibility and monitoring developing technologies can allow opportunities to be leveraged when they come along.

There are several technologies being monitored or studied that may provide opportunities to enhance Orange County's transportation system. Some are being considered as part of current projects, such as upgrading traffic signal controllers in the ongoing signal synchronization program. These controllers can be utilized to support elements of connected vehicle technology as they enter the market. Additional trends and technologies that are being tracked include, but are not limited to: remote work trends, E-bikes, E-scooters, neighborhood electric vehicles, and electric vehicle charging infrastructure needs.

There are also emerging technologies being studied and developed by others, including concepts like fully autonomous vehicles, hyperloop concepts, and urban air taxi services that could develop into new travel options or could lead to other transportation breakthroughs that have not yet been imagined. Planning for, investing in, and influencing the development of new technologies and services offers potential for cleaner and more efficient transportation options or to eliminate some trips altogether. With constraints on expanding the space used by the transportation system, new technologies and services may provide some of the best opportunities to reduce congestion and provide more reliable travel times, better access to and from jobs and key destinations, fewer single-occupant vehicle trips, and reduced VMT and emissions.

Path 7: Elevate Maintenance and Resilience Priorities

Regular maintenance of the transportation system can be challenging and costly. Fortunately, OC Go currently provides funding to local jurisdictions to help offset the cost and makes protecting roadway investments a top priority. As a result, Orange County has the best pavement quality in the State. Additionally, the M2 Freeway Program helps maintain freeway infrastructure when and where projects are implemented. However, a funding strategy is needed to continue these investments following the sunset of OC Go in 2041.

Additional challenges are presented with the increasing occurrences of wildfires, flooding, coastal erosion, extreme heat days, and other climate-related risks that threaten transportation infrastructure and the traveling public. Regular transportation system assessments will be conducted in response to these threats to identify proactive steps necessary for adapting to the changing environment and protecting the traveling public, infrastructure investments, and quality of life. One action that is being implemented is the conversion of the OCTA bus fleet to fully electric vehicles. Currently, 10 battery electric buses and 10 hydrogen electric buses are operating to test the different technologies and chart a path to a fully electric bus fleet by 2040. In addition, OCTA is preparing a study to develop and evaluate long-term strategies to address the rail corridor along the San Clemente coast.

By investing in clean energy technologies and adapting the transportation system to the changing environment, this path aims to reduce emissions and the risk level from climate-related events. At the same time, the path emphasizes the need to maintain past and future investments in the transportation system to provide a safe and reliable system while protecting public assets.

Summary

As discussed above, OCTA's long-term goals of delivering on commitments, improving system performance, expanding system choices, and supporting sustainability remain for this LRTP. The long-term goals and public and stakeholder feedback were key in developing the Paths to Success. These seven objectives build on the current commitments of OCTA and look beyond the sunset of Measure M2 to achieve OCTA's long-term goals. Performance measures used in previous LRTPs were expanded to evaluate more aspects of the goals and the Paths to Success. Techniques were also developed to measure equity consistent with OCTA's commitment to diversity, equity, and inclusion. These performance measures were used to evaluate the 2045 Preferred Plan for the LRTP, as detailed in the following chapter.

Chapter 4:
2045 Preferred Plan

Chapter 4: 2045 Preferred Plan

OCTA is committed to delivering OC Go as approved by voters in Measure M2 while continuing to provide safe and reliable public transit for Orange County. The projects and programs in OC Go reflect the expectations of the Orange County public and are the bedrock of the 2045 Preferred Plan. The 2045 Preferred Plan also includes a number of creative strategies to deliver mobility choices in an equitable and efficient manner. Transit, commuter rail, highway, local roadway, active and innovative strategies are all addressed in the Plan. The first part of the chapter discusses the 2045 Preferred Plan strategies identified for five travel modes: transit, commuter rail, local roadway, active transportation, and freeway. An evaluation of the 2045 Preferred Plan performance is then provided, which includes an equity analysis to recognize any uneven distributions of transportation resources and burden.

Transit Strategy

The Orange County transit system has been reassessed against emerging travel trends in the Making Better Connections Study Final Service Plan (Making Better Connections) approved in October 2022. Making Better Connections recommends improvements to the OCTA transit network to better serve transit customers and improve system efficiency. Transit performance, ridership, countywide multimodal travel trends, and customer input were evaluated to form the basis for the recommendations. As OCTA restores service levels to pre-COVID-19 levels, the recommendations will align transit operations with the changing travel patterns. With more travel options than ever before, public transit must work harder to attract riders by delivering high-quality, reliable service, evolving to meet changing mobility needs.

Making Better Connections is the outcome of months of analysis of travel patterns and ridership trends, engagement with community stakeholders, and thoughtful redesign of routes to provide better outcomes for riders by expanding access to destinations, increasing frequency, reducing transfer wait time, and extending hours of service. The Making Better Connections Plan concentrates resources on where transit demand is highest, thereby maximizing the opportunity where transit demand is unmet by lower service levels. The recommended improvements include:

- Service on the top 10 corridors will operate every 10-15 minutes from 6:00 a.m. to 6:00 p.m., benefiting over 58% of all riders.
- All routes operate on a maximum headway of 60 minutes, every day of the week.
- New timed transfer hubs at Brea Mall and Laguna Hills Transportation Center.
- A new limited stop Bravo! Route 553 on Main Street (implemented as part of Oct ’22 Service Change).
- An increase in the total number of bus trips offered, adding over 114,000 annual trips. The final plan adds 390 trips on weekdays and 275 trips on weekends.
- Approximately 89% of OC Bus riders will experience more frequent service, better connections, or more hours of service.
- Approximately 10% of bus riders will experience no changes.
- More than 99% of riders will be within ½ mile from a bus stop.

By implementing the Making Better Connections Plan, revenue service hours of fixed route bus service will increase from 1.65 million hours annually to 1.9 million hours annually (Figure 4-1).

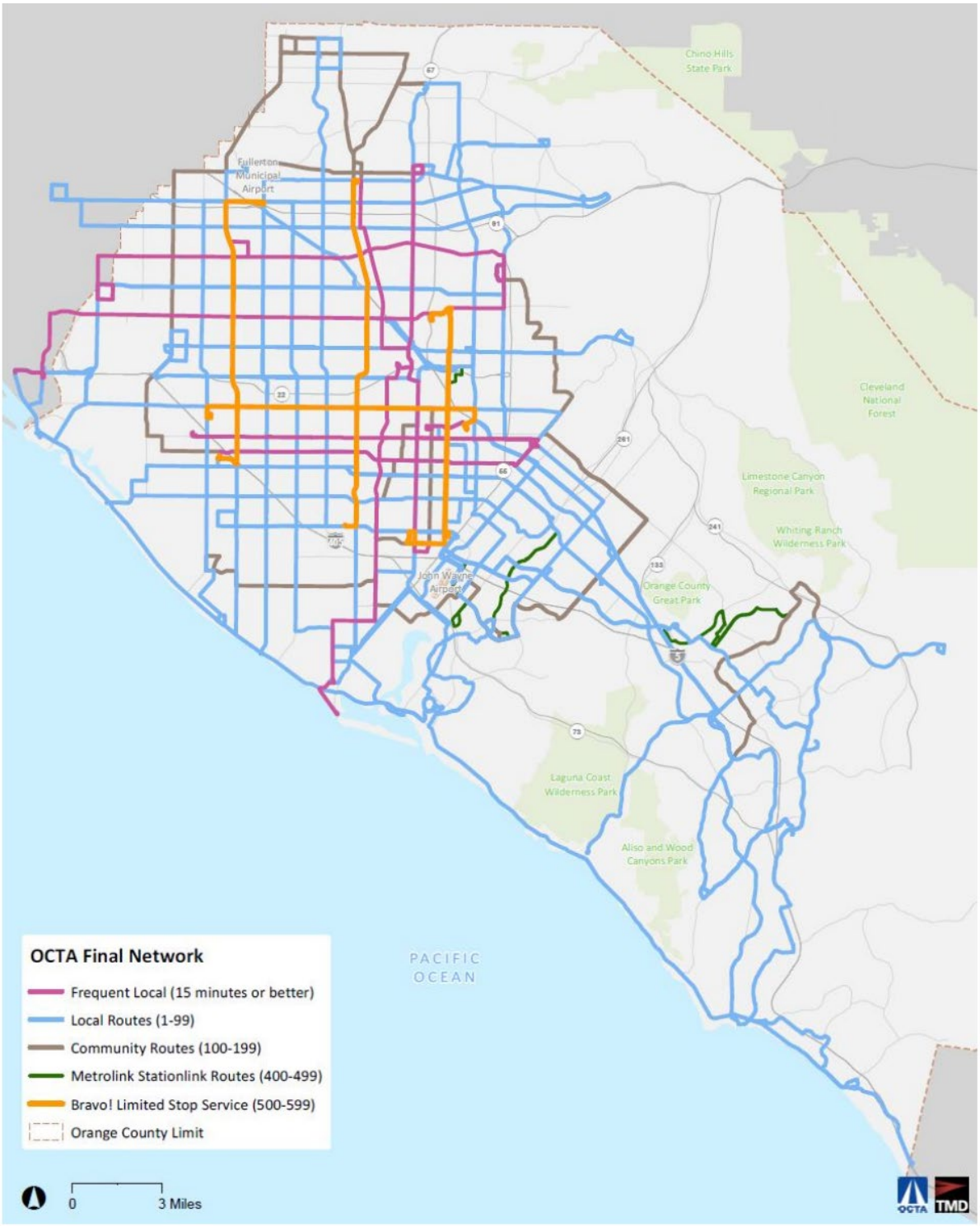


Figure 4-1: 2045 Preferred Plan Transit Network

In addition to improvements planned through Making Better Connections, OCTA is working to deliver the OC Streetcar, which is funded in part through OC Go. When the 4-mile OC Streetcar makes its debut in 2024, a new mobility horizon will be realized in Orange County. This 10 stop modern streetcar will provide frequent, high-capacity transit service to destinations between Santa Ana and Garden Grove, including the Santa Ana Metrolink station and the many businesses along the corridor. When it debuts, OC Streetcar is anticipated to operate for 30,496 revenue service hours annually. The 2045 Preferred Plan anticipates approximately 161,000 revenue service hours by 2045, increasing total revenue service hours for fixed route service to 2.1 million hours annually.

Paths to Success

Programs currently funded by OC Go are assumed to be extended through 2045 and modified, as appropriate, to provide connecting transit service at Metrolink stations, senior mobility services, support for locally operated community circulators, and other transit supportive programs. One modification assumed by 2045 is an expansion of the fare stabilization program to reduce or even eliminate transit fares. This assumption is largely dependent on modifications to federal and State rules related to fare box recovery ratios and sufficient transit operating funds.

In addition, the OC Transit Vision (January 2018) is assumed to be implemented to provide enhanced transit service on the corridors depicted in Figure 4-2. This vision includes the expansion of high-capacity service through much of the county. This would primarily be implemented as Bravo! service but could also include future Bus Rapid Transit service or possibly an extension of OC Streetcar.

As OCTA's bus fleet ages, new vehicle purchases will prioritize zero-emission vehicles. OCTA anticipates the entire bus fleet will be zero-emission by 2040. Past efforts by OCTA to modernize the bus fleet have greatly reduced criteria pollutants. This additional modernization will further reduce greenhouse gas emissions.

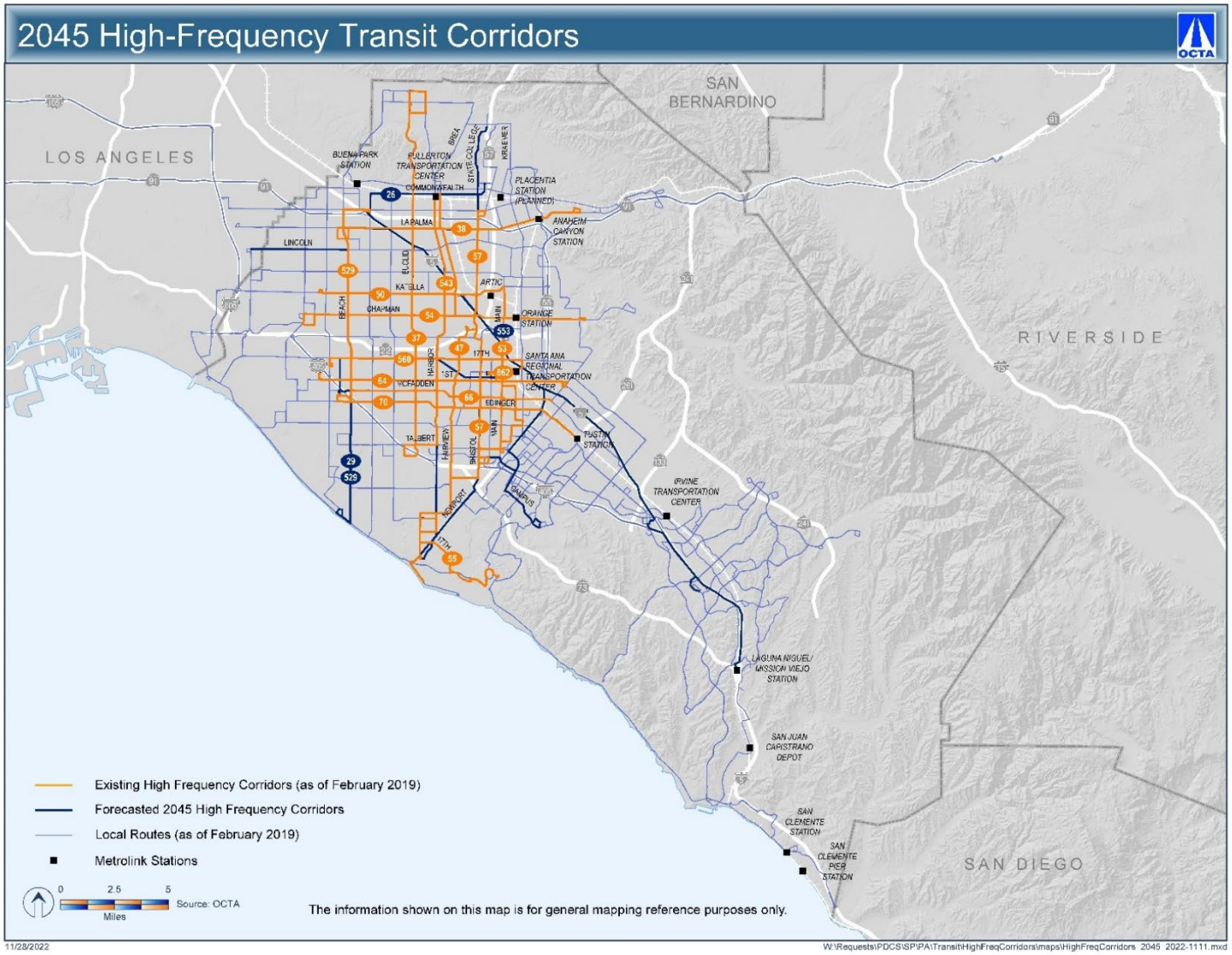


Figure 4-2: 2045 High-Frequency Transit Corridors

Microtransit services, such as OC Flex, provides on-demand transportation options within a specified service area. Microtransit can supplement OC Bus service in areas with lower demand for fixed-route services or where service on a single corridor may be inefficient. Figure 4-3 illustrates opportunity areas for expanding microtransit services in Orange County. These opportunity areas require further study to ensure there is demand for microtransit services. If they were to be fully implemented, the total area served by microtransit in Orange County would expand from 7 square miles in 2019 to up to 112 square miles.

Transit Project List

- OC Bus and OC Access – Increase to 1.926 million revenue vehicle hours
- Project S: OC Streetcar
- Project U: Expand Mobility Choices for Seniors and Persons with Disabilities
- Project V: Community Based Circulators
- Project W: Safe Transit Stops
- Reduced or Fare-Free Transit Service
- Transit Security and Operations Center
- Microtransit System Expansion

Commuter Rail Strategy

The OC Go Program will support Metrolink service in Orange County through 2041. Metrolink provides a regional commuter rail connection and intra-county rail service between major population and employment centers in the county. Metrolink operates within Ventura, Los Angeles, San Bernardino, Riverside, and Orange counties with a further connection to Oceanside in San Diego County. Three lines operate within Orange County with 55 daily weekday trains (as of 2019) serving Orange County's 12 Metrolink stations.

Paths to Success

Figure 4-4 illustrates the train lines serving Orange County, the distribution of the 55 daily weekday trains in 2019, and the assumed increase to 86 daily weekday trains under the 2045 Preferred Plan. In addition, a new Metrolink station is assumed in Placentia by 2045. The assumed continuation and expansion of Metrolink operations is dependent on funding availability beyond the 2041 sunset of OC Go. Additionally, capital and operational improvements would need to be funded through the Southern California Optimized Rail Expansion program and implemented to accommodate the expanded service level.

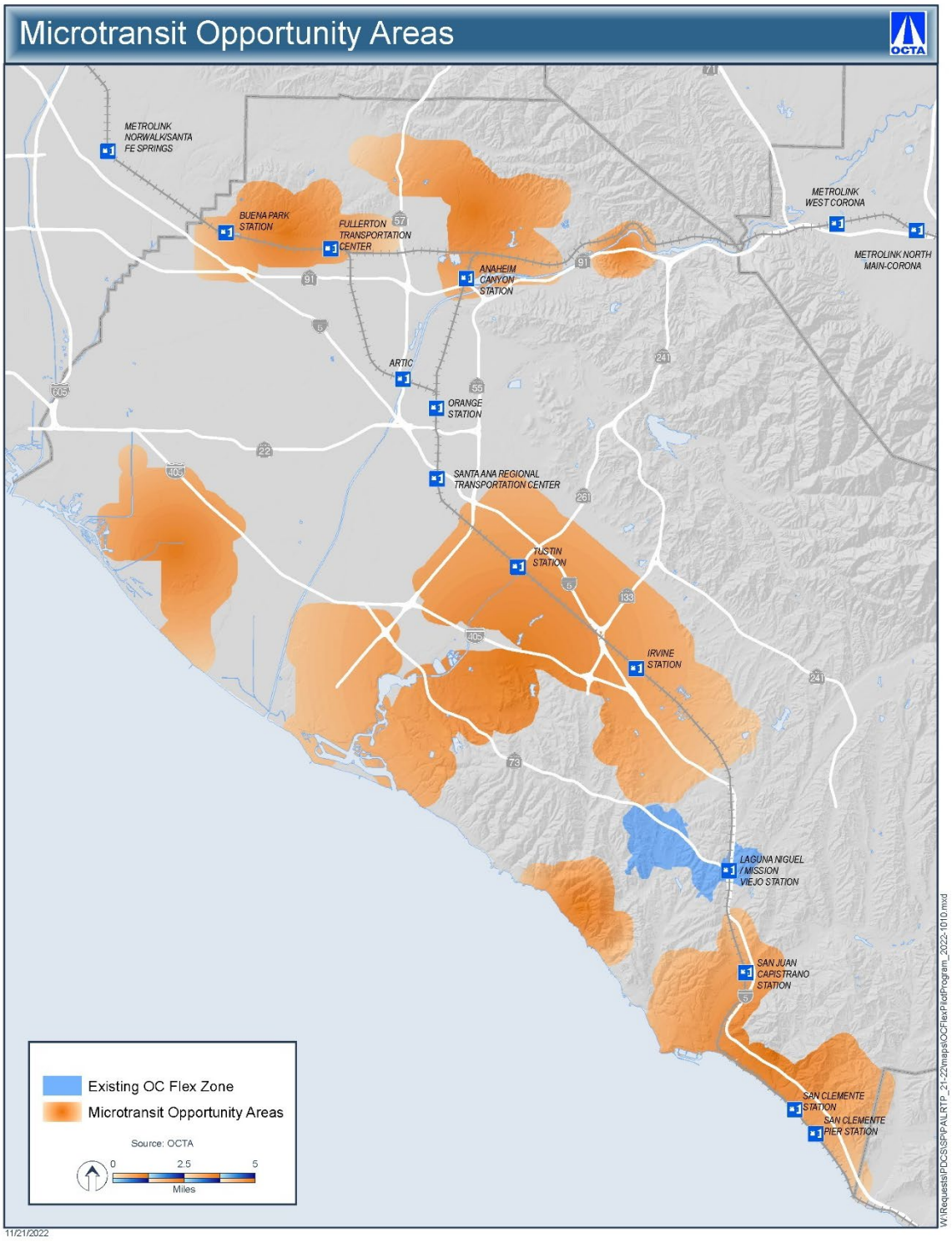


Figure 4-3: Microtransit Opportunity Areas

Figure 4-4: 2019-2045 Metrolink Service Expansion

Work is currently underway to repair the rail line along the San Clemente coast to ensure safe operations. However, a longer-term solution will likely be needed. The Short-Term Action Plan, presented in Chapter 5, recommends a study for this purpose, along with consideration for an additional Metrolink station as part of the Conceptual Project List (also in Chapter 5). While OCTA plans to follow up on these efforts, it is anticipated that Metrolink will also be looking to test and implement, as appropriate, technologies that can further reduce or potentially eliminate emissions from locomotives.

Commuter Rail Project List

- Metrolink Service – Increase to 86 weekday trains
- Project R: Anaheim Canyon Station Improvements
- Project R: Placentia Metrolink Station
- Project R: OC Maintenance Facility
- LOSSAN Corridor Grade Separations

Local Roadway Strategy

Local roads will continue to see improvements with the planned buildout of the Master Plan of Arterial Highways (MPAH), funded through the OC Go Regional Capacity Program. MPAH buildout would construct an additional 698 lane miles, increasing the total local roadway lane miles from 6,253 to 6,951 lane miles at buildout. Figures 4-5 and 4-6 illustrate the remaining sections for buildout of the MPAH. OC Go also continues to support the Signal Synchronization Program through 2041. Orange County's signal synchronization program provides coordination between local agencies to ensure that traffic flow along arterials does not end at city limits. The program interconnects traffic signals so that groups of vehicles traveling along the arterial at the speed limit pass through multiple green lights rather than starting and stopping at each signal. Free flowing traffic benefits travelers but also reduces fuel consumption and subsequent emissions of greenhouse gases and smog forming pollutants. Figure 4-7 shows the 2,000+ traffic signals along over 750 miles of roadway supported by this program. These programs help to ensure that local roadways have adequate capacity and are able to operate efficiently, which support the movement of goods and services around the county and benefit both transit operations and drivers.

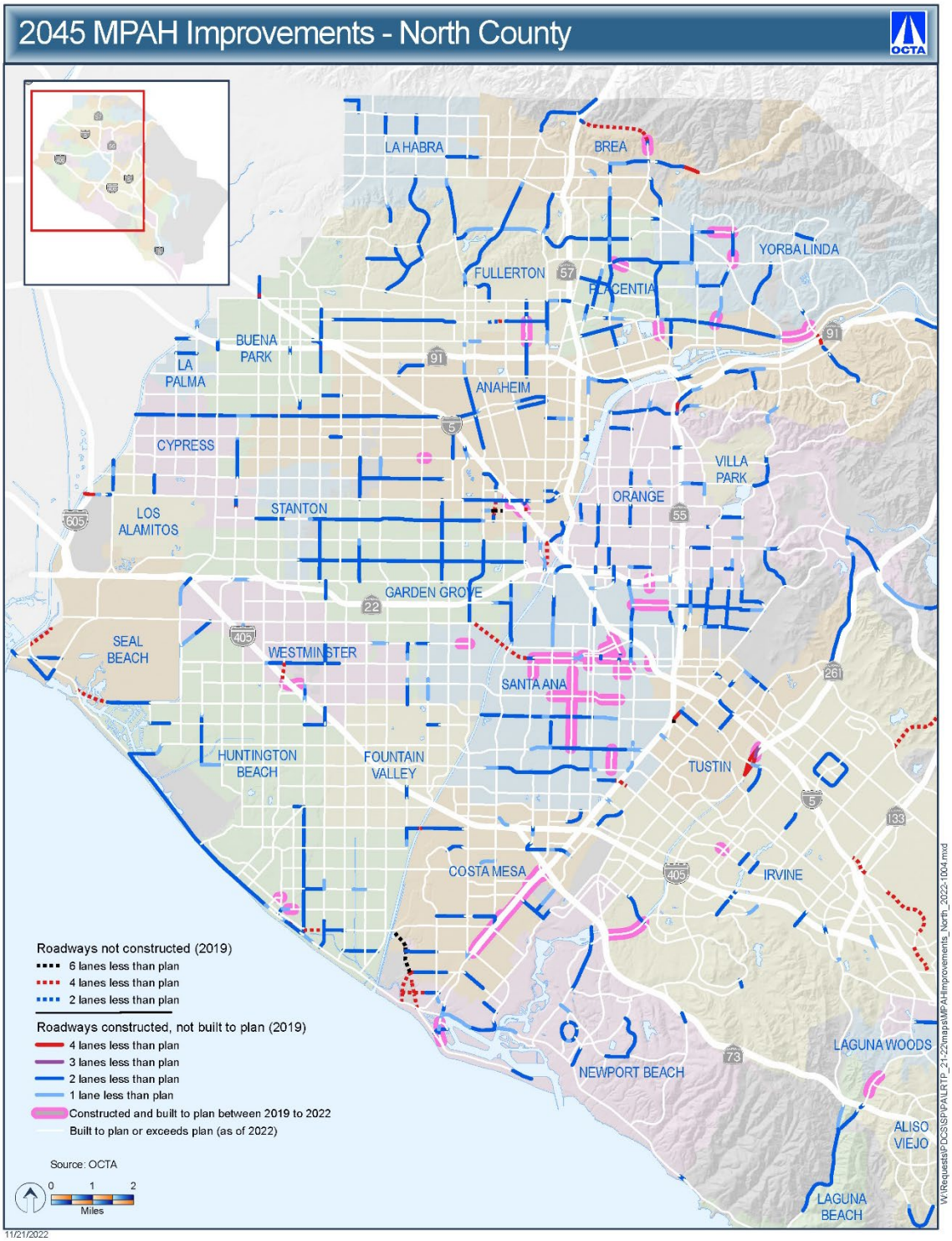


Figure 4-5: 2045 MPAH Improvements – North County

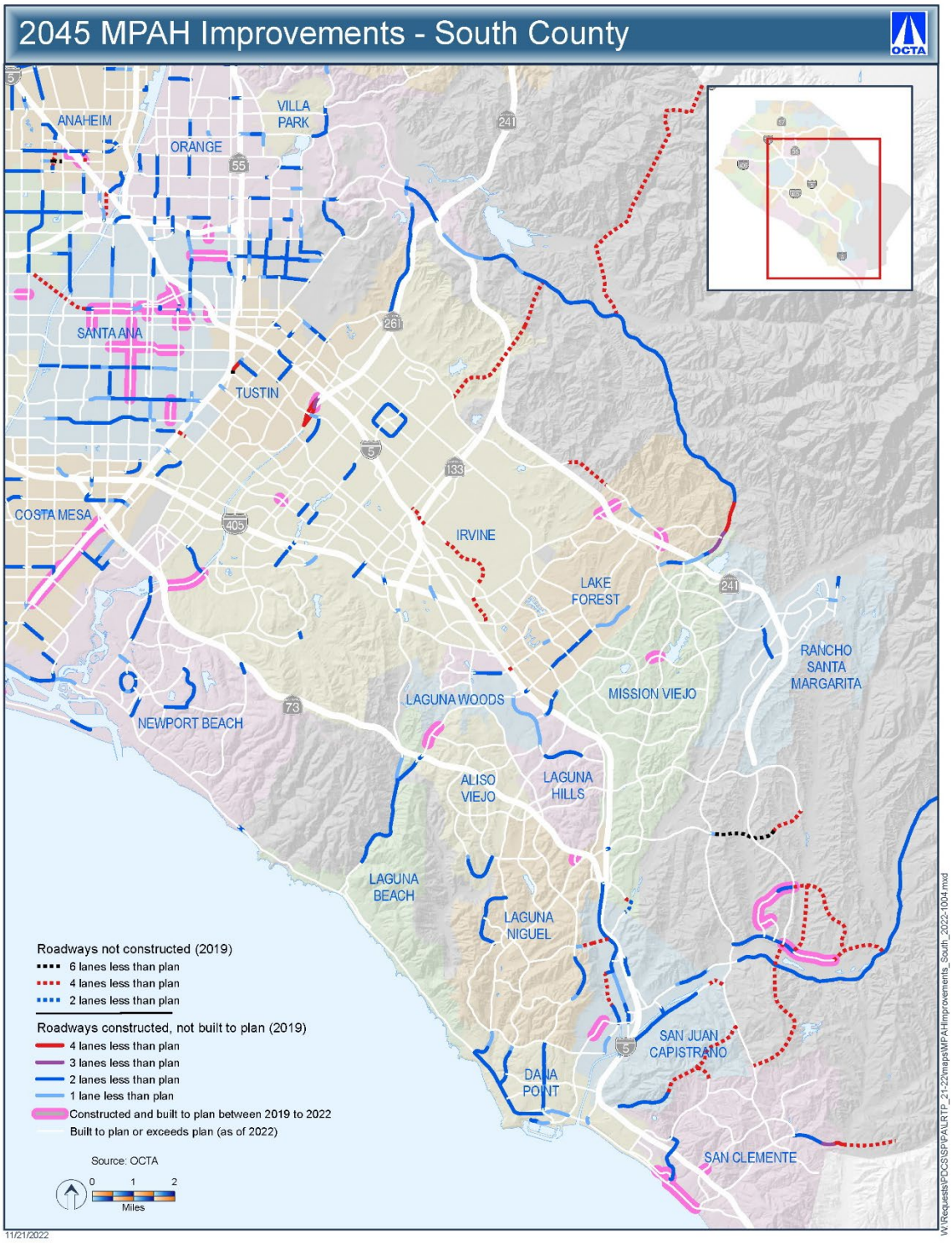


Figure 4-6: 2045 MPAH Improvements – South County

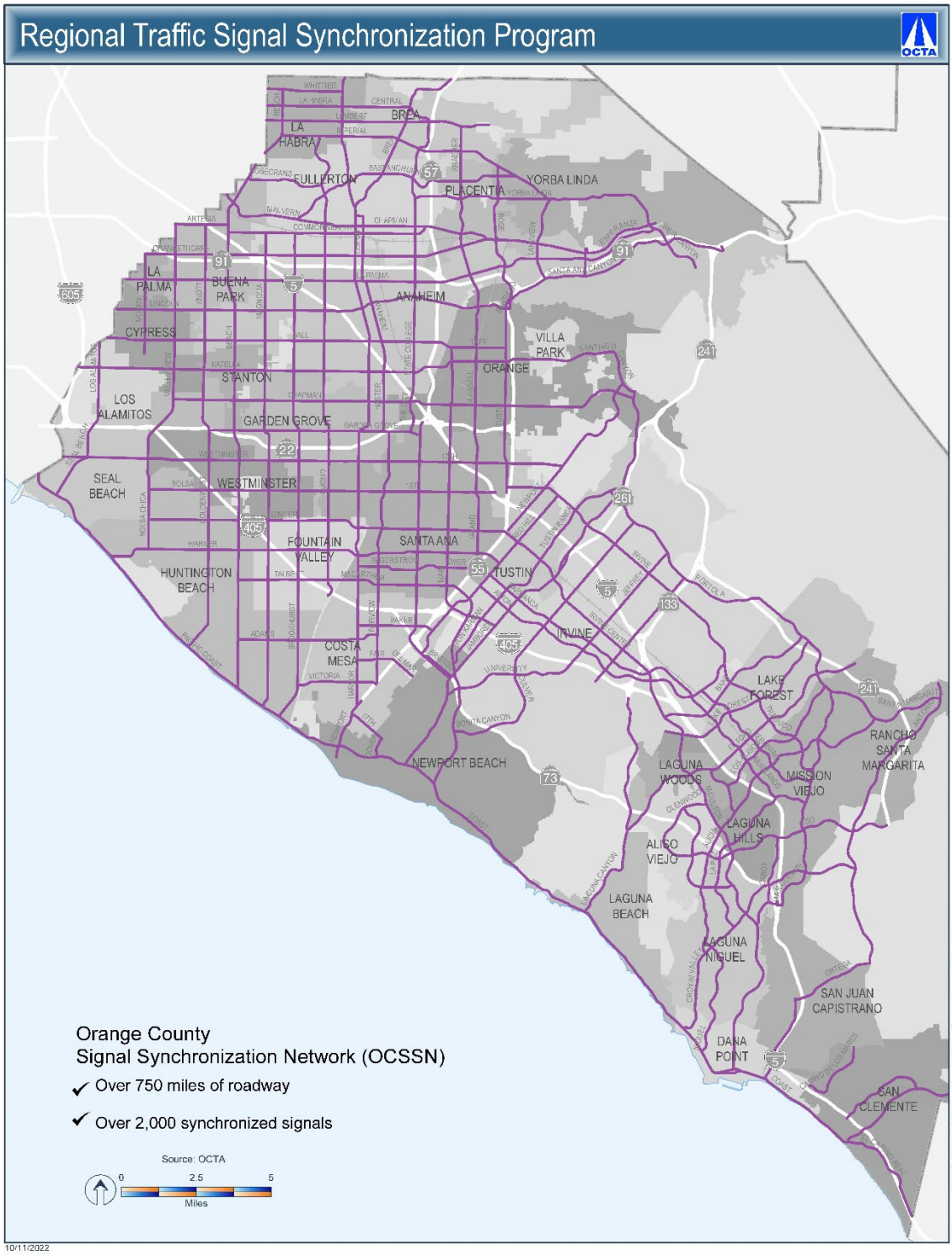


Figure 4-7: Regional Traffic Signal Synchronization Program

Transit operations, drivers, and bicycles are also benefited by Orange County's best in the State pavement quality. Smooth pavement with minimal cracking or potholes reduces bus and vehicle maintenance, reduces traffic collisions and subsequent delay, and improves bicycle safety. Continuous preventative maintenance is also less expensive and less disruptive to traffic flow than more extensive emergency repairs. OC Go includes revenue that is turned back to local jurisdictions for the purpose of roadway maintenance and incentives that encourage regular maintenance of MPAH roadways. The 2045 Preferred Plan extends these maintenance priorities that benefit multiple travel modes and protest previous infrastructure investments.

Paths to Success

Extending the OC Go local roadway programs through 2045 ensures that Orange County's roadways will continue to be maintained and operate efficiently. The Regional Capacity Program would be extended and modified to support roadway improvements that benefit active transportation and transit. Additional rail/arterial grade separation projects are proposed that enhance safety and reduce delays. The Regional Traffic Signal Synchronization Program would be extended and modified to include upgrades for compatibility with connected vehicles and for the integration of local and regional traffic management centers. This enhanced signal synchronization program could provide roadway efficiency improvements that exceed the benefits of the current signal synchronization program noted above.

Local Roadway Project List

- Master Plan of Arterial Highways Buildout
- Regional Traffic Signal Synchronization Program
- Local Fair Share Program
- Pavement Maintenance

Active and Innovative Transportation Strategy

The 2045 Preferred Plan includes strategies for active transportation and allows for the implementation of new and innovative technology beyond the OC Go program, consistent with the Paths to Success. The Paths to Success support the implementation of, OC Active – Orange County's Bike + Ped Plan (OC Active), which has seven goals:

- Reduce pedestrian and bicyclist collisions.
- Advance strategic walking and biking network.
- Enhance walking and biking access to transit.
- Improve high-need pedestrian areas.
- Strengthen stakeholder partnerships.
- Incorporate diverse community perspectives.
- Leverage funding opportunities.

OC Active will continue to be advanced through coordination between OCTA and local jurisdictions. Implementation of Orange County's planned bikeways is expected to increase bikeway lane miles from 1,238 in 2019 to 2,045 miles with the plan. Figures 4-8 and 4-9 illustrate the planned bikeways for North and South Orange County, respectively.

Paths to Success

As previously noted, extending and modifying the Regional Capacity Program allows it to facilitate the buildout of bicycle and active transportation routes and non-motorized connections to Metrolink. The Regional Capacity Program could also consider opportunities to reallocate roadway space for bikeways where there is excess capacity. Community circulators currently supported by Measure M2, such as the iShuttle in Irvine and trolleys in Dana Point and San Clemente, could be modified to include bicycle, scooter, or other active transportation sharing programs if extended.

Active transportation can also become a more attractive option with expansion of supportive multimodal facilities. Metrolink stations are multimodal facilities served by fixed route bus service and providing bicycle parking. These stations provide a location for travelers to transfer from one travel mode to another. With better connections to improved active transportation networks, multimodal facilities could expand the number of travelers able to use them and the non-single occupant travel modes connecting at the multimodal facilities. The Orange County Mobility Hubs Strategy looks at potential benefits of additional multimodal facilities that can provide enhanced access to flexible travel options and connectivity with transit services. Mobility hubs are identifiable places that facilitate more seamless, sustainable, and inclusive travel experiences by co-locating regional and local travel modes and amenities at a facility designed for the local context.

Mobility hubs can help to connect transit, active transportation, and on-demand services, while creating a sense of place that is attractive and helps to reduce automobile dependency. Amenities at each hub would vary based on the size and needs of the community being served but could include secure bicycle storage, wi-fi, parcel lockers, retail services, and mobility as a service (MaaS). MaaS is the use of technology to integrate travel information and fare payment platforms. With an identifiable location to access multiple travel modes, readily available information and real time updates on available travel mode options and a fluid transition between modes, the learning curve for use of alternatives would be reduced and more travelers could make their trip without an automobile. However, mobility hub locations and MaaS require further study before implementing .

The 2045 Preferred Plan integrates personal electric transport such as electric bicycles, scooters, and neighborhood electric vehicles. MPAH standards and active transportation planning may consider the opportunities and constraints of these travel options in future planning efforts. The 2045 Preferred Plan also makes room for supporting local jurisdictions as they expand electric vehicle charging infrastructure. OCTA may also consider strategies for incentivizing remote work as a VMT reduction or mitigation strategy.

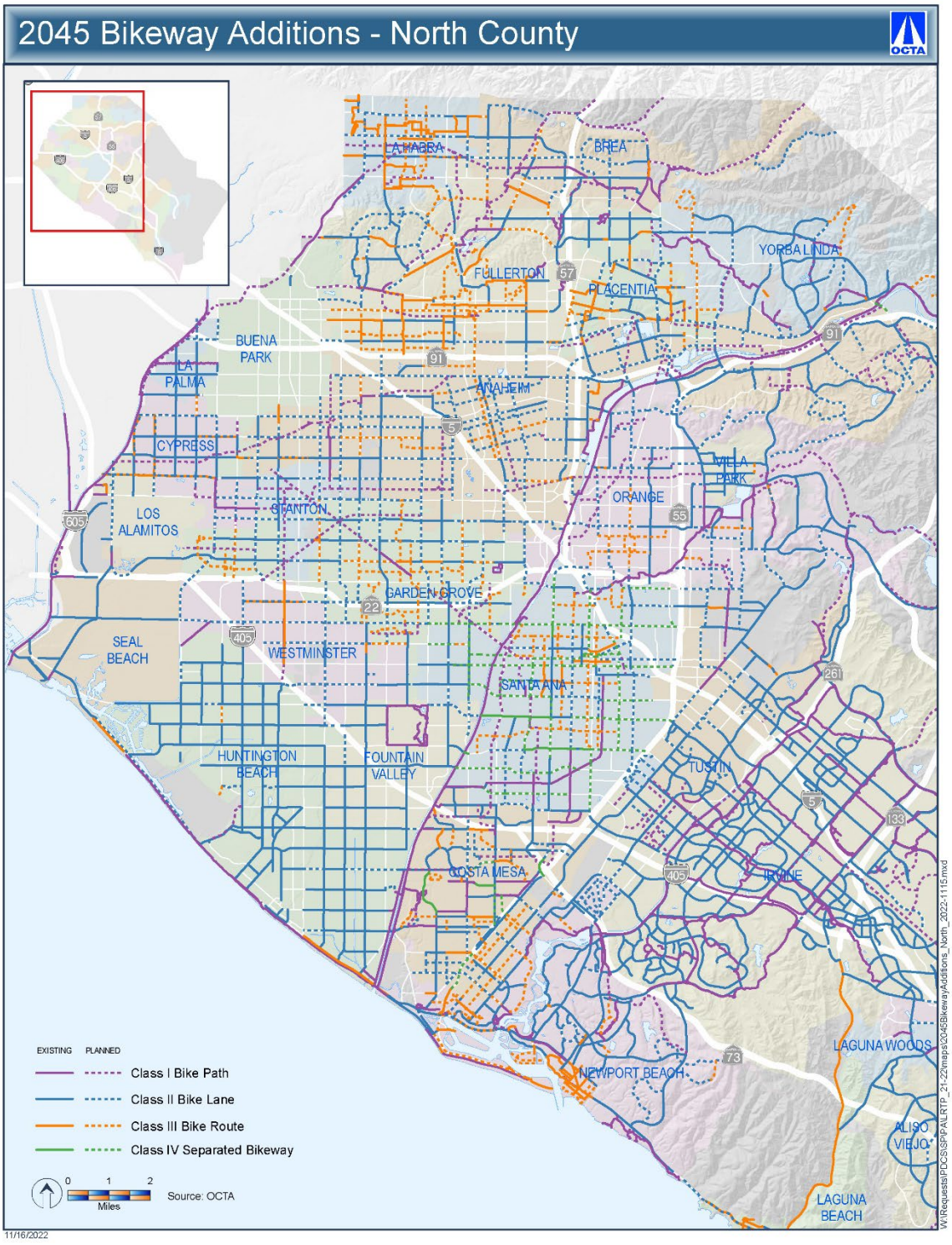


Figure 4-8: 2045 Bikeway Additions – North County

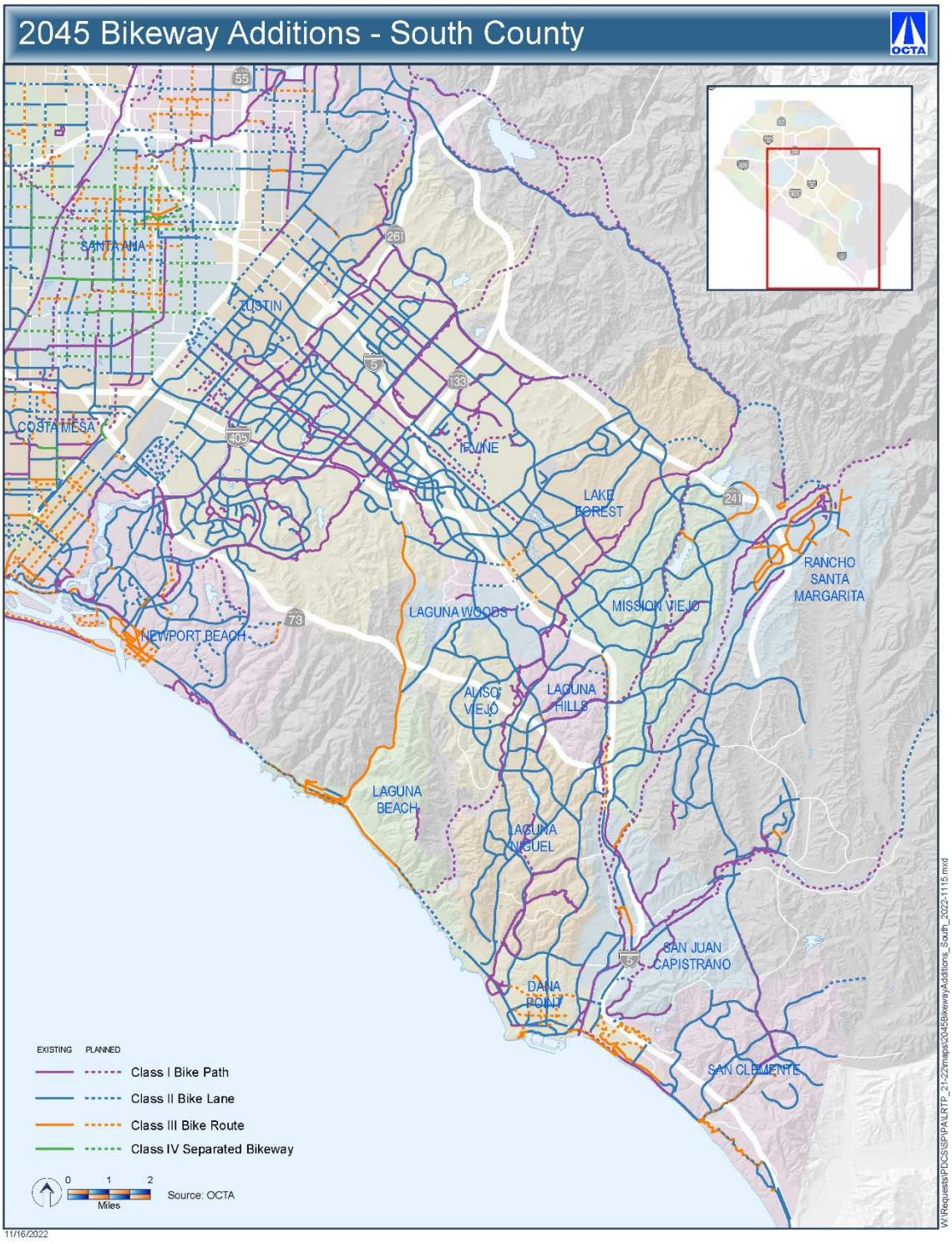


Figure 4-9: 2045 Bikeway Additions – South County

Active and Innovative Project List

- Active Transportation Network
- Enhanced Signal Synchronization – Integration with connected vehicles
- Mobility Hubs Network
- Electric Vehicle Charging Infrastructure
- Transportation Demand Management Strategies

Freeway Strategy

The 2045 Preferred Plan will complete the OC Go Freeway Program as approved by voters. The remaining projects to be completed are illustrated on Figure 4-10 which include improvements to general purpose lanes, managed lanes, and interchanges. Managed lanes are any lanes with controlled access, such as occupancy restrictions or pricing. The OC Go Freeway Program will add 110 general purpose lane miles, 22 HOV lane miles, and 27 priced lane miles, which will increase the number of lane miles from 1,712 in 2019 to 1,935 lane miles. Additional capacity improvements, beyond the OC Go Freeway Program are also proposed, which focus on improvements to the managed lane network. This includes, among other improvements, the extension of the I-5 managed lanes south of Avenida Pico to the San Diego County Line. These projects are proposed to add another 6 lane miles, increasing the freeway network to approximately 1,941 lane miles.

The original Measure M and current OC Go program funded by Measure M2 have been and continue to build out Orange County's network of high occupancy vehicle (HOV) lanes. These lanes have been operated to allow use by vehicles with minimum two passengers to provide an incentive for carpooling. However, as traffic volumes increased, including the number of HOVs, traffic volumes in the HOV lanes often exceeded the capacity of those lanes leading to congestion and reduced speeds and degrading the purpose of the dedicated lanes. Caltrans is responsible for ensuring the performance of these lanes uphold Federal standards of degradation of HOV lanes statewide. To do so, Caltrans may convert Orange County's HOV lanes to high occupancy tolling (HOT) lanes, which require three passengers per vehicle to access for free and other vehicles can pay a fee for access. This system of HOT lanes is anticipated to be implemented over several years, and it is assumed in this LRTP that Orange County's HOV network will be fully converted to HOT lanes by 2045.

The 2018 LRTP recommended an Express Lanes Network Study in its Short-Term Action Plan to study and make recommendations for incorporating State and regional planning of Express Lanes within Orange County. The recommendations, illustrated on Figure 4-10, suggest implementing HOT lanes on SR-57, northern portions of I-5, and an extension of the 91 Express Lanes to the west.

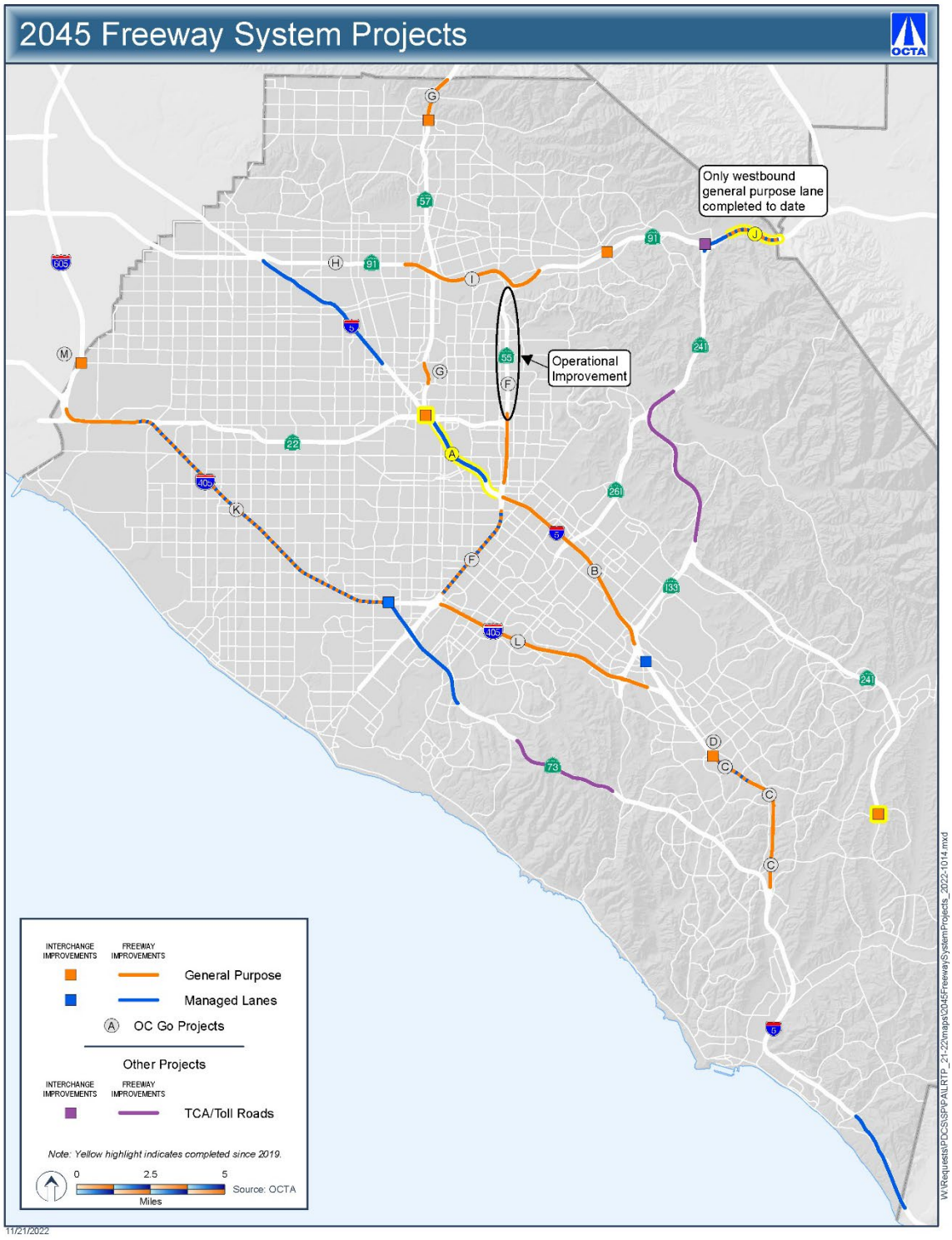


Figure 4-10: 2045 Freeway System Projects

Paths to Success



Under the 2045 Preferred Plan, programs such as the freeway service patrol, freeway environmental mitigation program, and water quality improvement projects would be extended past the 2041 M2 sunset. Other operational improvements such as eliminating congestion chokepoints and bottlenecks would be identified and implemented along the freeway network to enhance safety, goods movement, and to reduce concentrations of smog-forming emissions. These operational improvements are intended to be implemented within the existing right-of-way or require additional right-of-way with minimal impact to adjacent land uses. OCTA would seek partnership with Caltrans and other facility owners/operators to incorporate new transportation system management technologies that may become available in the future with the potential to improve traffic flow within existing right-of-way.

Freeway Project List

- Project A: Add 1 Managed Lane each direction on I-5 from SR-55 to SR-57 (Complete)
- Project B: Add 1 General-Purpose Lane each direction on I-5 from I-405 to SR-55
- Project C: Add 1 Managed Lane each direction on I-5 from Alicia Parkway to El Toro Road
- Project C and D: Add 1 General-Purpose Lane each direction on I-5 from SR-73 to Oso Parkway plus auxiliary lanes as needed to improve Avery Parkway interchange
- Projects C and D: Add 1 General-Purpose Lane each direction on I-5 from Alicia Parkway to Oso Parkway plus auxiliary lanes as needed to improve La Paz Road interchange
- Project D: Improve access and merging on I-5 in the vicinity of El Toro Road
- Add 1 Managed Lane each direction on I-5 from Avenida Pico to San Diego County line
- Add 1 Managed Lane each direction on I-5 between SR-57 and SR-91
- Barranca Parkway Managed Lane Interchange Improvement with I-5
- Improve operations and merging on SR-22 in the vicinity of I-5/SR-57 interchange (complete)
- Project F: Add 1 General-Purpose Lane and 1 Managed Lane each direction and fix chokepoints on SR-55 from I-405 to I-5
- Project F: Add 1 General-Purpose Lane each direction and fix chokepoints on SR-55 from I-5 to SR-91
- Project G: Add 1 northbound General-Purpose Lane on SR-57 between Orangewood Avenue and Katella Avenue
- Improve SR-57/Lambert Road interchange
- Project G: Add 1 Northbound truck climbing lane on SR-57 from Lambert Road to Los Angeles County line
- Add 1 Managed Lane each direction on SR-73 from MacArthur Boulevard to I-405
- Add 1 Managed Lane each direction on SR-73 from SR-133 to Newport Coast Drive
- Project I: On SR-91, add 1 eastbound General-Purpose Lane from La Palma Avenue to SR-55 and 1 westbound General-Purpose Lane from La Palma Avenue to Acacia Street; improve operations from Lakeview Avenue to Raymond Avenue
- Project J: Add 1 eastbound General-Purpose Lane on SR-91 from SR-241 to SR-71 and 1 westbound General-Purpose Lane from Green River Road to SR-241 (westbound lane complete)
- Add SR-91/Fairmont Boulevard interchange and overcrossing to the north

- Add Express Lane Connector at SR-91/SR-241
- SR-91 Express Lanes operations and maintenance
- Add overcrossing and SR-241/Oso Parkway/Los Patrones Parkway interchange (Complete)
- Add 1 lane each direction on SR-241 from SR-133 to SR-261
- Add 1 Express Lane each direction on I-405 from SR-605 to SR-55
- Project K: Add 1 General-Purpose Lane each direction on I-405 from SR-605 to SR-55 and improve operations
- Project L: Add 1 General-Purpose Lane each direction on I-405 from I-5 to SR-55 and add southbound auxiliary lane from SR-133 to Irvine Center Drive
- Add auxiliary lanes on I-405 from University Drive to Sand Canyon Avenue (Complete)
- I-405 Express Lanes operations and maintenance
- Project M: Improve I-605/Katella Avenue interchange
- Project N: Motorist Services (Freeway Service Patrol)
- Freeway Chokepoint Safety Projects

System Performance

A high-level summary of the 2045 Preferred Plan performance is shown in Table 4.1. These results demonstrate the travel impacts from implementing the transit, commuter rail, local roadway, active transportation, technology, and freeway strategies discussed above. Implementing these strategies leads to reductions in total vehicle hours of delay and delay as a percentage of travel time. Average speeds on freeways and arterials during the peak commute periods would also improve. VMT, however, only increases slightly compared to the 2045 No Build scenario, despite the improved driving conditions. This is due to the proposed investments in alternatives to single-occupant vehicle (SOV) travel that contribute to increases in daily transit trips. More detailed discussions of the LRTP performance measures are presented below. This will focus on how the performance metrics relate to the LRTP goals to Improve System Performance, Expand System Choices, and Support Sustainability. As previously noted, the goal to Deliver on Commitments is fulfilled by ensuring the inclusion of the OC Go program within the 2045 Preferred Plan.

Table 4.1: Summary Performance Metrics

	2019 Base Year	2045 No Build	2045 Preferred Plan
Daily Vehicle Miles Traveled	76,400,000	81,900,000 (↑7% vs. 2019)	82,100,000 (<1% increase vs. No Build)
Total Vehicle Hours of Delay	341,000	454,000	319,000
Delay as Percent of Travel Time	15%	18%	14%
Average Speed – Freeways – Peak Period	41	40	42
Average Speed – Arterials – Peak Period	26	25	27
Daily Transit Trips	131,000	138,000 (↑6% vs. 2019)	185,000 (↑34% vs. No Build)

Improve System Performance

Table 4.2 reports metrics associated with system performance. The 2045 No Build scenario demonstrates that increases in population and employment would result in increased delay and lower average speeds on Orange County roadways if the 2019 network were maintained as is. Implementation of the 2045 Preferred Plan would sustain or slightly improve on 2019 travel conditions. The 2045 Preferred Plan improvements have the biggest impact during the peak commute periods but do not have a perceptible effect on the average travel time for all automobile trips. Increases to the number of high frequency transit routes would result in a 4 percent reduction in the average travel time for people using transit.

Table 4.2: Performance Metrics – Improve System Performance

Performance Measure	Unit	2019 Base Year	2045 No Build	2045 Preferred Plan
Daily Vehicle Hours of Delay	Vehicle-Hours	341,000	454,000	319,000
Delay as Percent of Travel Time	Percent	15%	18%	14%
Average Speed – Freeways	Miles/Hour			
Peak Period		41	40	42
AM Peak		40	38	40
PM Peak		43	41	43
Average Speed – Arterials	Miles/Hour			
Peak Period		26	25	27
AM Peak		25	25	26
PM Peak		27	26	27
Average Speed – Managed Lanes				
Peak Period	Miles/Hour	51	49	61
Average Travel Time	Minutes	--	--	--
Transit		63	63	60
Automobile		14	14	14

Expand System Choices

Table 4.3 reports metrics associated with system choices. The total number of trips projected for 2045 No Build scenario increases with population and employment growth. However, there would likely be more trips made if there was less congestion. This is evidenced by the increase in trips reported in the 2045 Preferred Plan results, which reflect additional improvements that reduce congestion. These trips are indicative of growth in economic activities and improved access to open space, recreation centers, medical facilities, and other key destinations that support the quality of life for Orange County residents. Importantly, more of these daily trips are accomplished without SOVs due to the expansion of system choices in the 2045 Preferred Plan compared to the 2045 No Build scenario. Non-SOV mode share increases from 52 percent in 2019 to 57 percent under the 2045 Preferred Plan.

Table 4.3: Performance Metrics – Expand System Choices					
Performance Measure	Units	2019 Base Year	2045 No Build	2045 Preferred Plan	% Change (2045 Preferred - 2045 No Build)
Total Number of Trips	Person-Trips	16,200,000	17,600,000	17,700,000	0%
Transit Trips	Person-Trip	131,000	138,000	185,000	34%
Non-Single Occupant Vehicle Mode Share	Percent	52%	51%	57%	--
Average Bus Headways	Minutes	36.8	36.8	35.2	--
Revenue Service Hours (All Transit)	Hours	1,651,000	1,651,000	2,061,000	25%
Revenue Service Hours (Frequent Transit Service[1])	Hours	74,000	74,000	688,000	828%
Households with Access to High-Capacity Transit Stops	Households	64,000	73,000	259,000	254%
Microtransit Service Area	Square Miles	7	7	112	1,437%
Multimodal/Rideshare Facilities	Facilities	28	28	67	--
Bikeways (Class, I, II, III, IV)	Miles	1,238	1,238	2,045	65%
Jobs Accessible:	Jobs				
By Transit within 15 minutes		7,000	8,000	9,000	11%
By Transit within 30 minutes		65,000	71,000	79,000	11%
By Transit within 45 minutes		150,000	166,000	185,000	11%
By Automobile within 15 minutes		304,000	314,000	380,000	21%
By Automobile within 30 minutes		1,307,000	1,366,000	1,640,000	20%
By Automobile within 45 minutes		2,594,000	2,743,000	2,987,000	9%
Key Destinations Accessible:	Destinations				
By Transit within 15 minutes		10	10	10	0%
By Transit within 30 minutes		70	70	80	8%
By Transit within 45 minutes		160	160	170	10%
By Automobile within 15 minutes		350	330	380	14%
By Automobile within 30 minutes		1,270	1,200	1,420	19%
By Automobile within 45 minutes		1,900	1,810	2,010	11%
Average Household Spending on Transportation as a Percent of Income	Percent	22.5%	--[2]	↓2% vs. No Build[2]	--

Notes:
[1] Including OC Streetcar
[2] Future household income information unavailable; assumed to be constant for 2045 No Build and 2045 Preferred.

Transit service increases in the 2045 Preferred Plan with a significant increase in revenue service hours of frequent transit service (including the OC Streetcar) accompanied by a reduction in average bus headway. In addition, the number of households with access to high-capacity transit stops more than doubles. The revenue service hours for all transit service would increase by 25 percent in the 2045 Preferred Plan. This 25 percent increase in service is projected to grow the number of transit trips by 34 percent, resulting in more efficient use of transit resources.

In addition to fixed-route transit service, the 2045 Preferred Plan proposes expansion of microtransit service to fill gaps where fixed-route services may struggle to operate efficiently. The 2045 Preferred Plan also proposes expansion of multimodal facilities that provide locations for travelers to conveniently transfer between travel modes. Multimodal facilities include Metrolink stations, bus depots, park-and-ride lots, and mobility hubs. Both microtransit services and multimodal facilities allow people to make connections to their final destinations, providing alternatives to SOV trips. Currently, Orange County has approximately 7 square miles of microtransit service in operation and 28 multimodal facilities. The proposed improvements would increase these to 112 square miles of microtransit service and 67 multimodal facilities. Additionally, with the 2045 Preferred Plan, over 800 miles of bikeways are proposed to be added in Orange County that improve connectivity and make active transportation a more attractive alternative to automobile travel.

The available mode choices and efficiency of the transportation networks under the 2045 Preferred Plan results in improved accessibility. The number of jobs accessible by transit increases by 11 percent compared to the 2045 No Build scenario. The number of key destinations accessible within 30 minutes by transit increases by 8 percent and within 45 minutes increases by 10 percent. However, cars are still expected to provide access to the greatest number of jobs and key destinations with locations accessible within 30 minutes increasing approximately 20 percent over the 2045 No Build network.

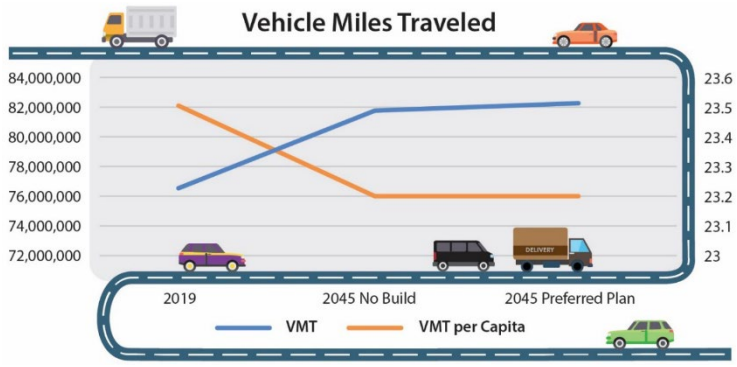
Transportation costs typically are a large part of a household budget second only to housing. In 2019, the average household spending on transportation accounted for 22.5 percent of household income. While estimates of future household income (and therefore future transportation costs as a percentage of income) were not analyzed, an estimate was developed based on 2019 incomes that found that the expanded choices in the 2045 Preferred Plan transportation system would reduce the average household spending on transportation by 2 percent.

Support Sustainability

Table 4.4 reports metrics associated with sustainability.

Table 4.4: Performance Metrics – Support Sustainability

Performance Measure	2019 Base Year	2045 No Build	2045 Preferred Plan	% Change (2045 Preferred - 2045 No Build)
Vehicle Miles Traveled per Capita	23.5	23.2	23.2	--
Greenhouse Gas Emissions (CO_2e lbs/day) from vehicles	52,600,000	41,500,000	40,400,000	-3%
Criteria Pollutant Emissions (lbs/day) from vehicles				
Reactive Organic Gases (ROG)	4,200	1,200	1,100	-8%
Nitrogen Oxides (NO_X)	19,300	4,200	4,000	-3%
Carbon Monoxide (CO)	215,500	98,100	94,900	-3%
Sulfur Oxides (SO_X)	500	400	400	0%
Particulate Matter – 10 micrometers (PM_{10})	3,900	3,810	3,870	2%
Particulate Matter – 2.5 micrometers ($PM_{2.5}$)	1,400	1,240	1,260	1%
Average Arterial Pavement Condition (PCI)	79.9	77.9	86.0	--
Jobs Created or Supported by Transportation Investment	--	--	745,000	--



As previously reported in Table 4.1, total daily VMT is expected to increase by approximately 7 percent by 2045 for the 2045 Preferred Plan. However, VMT per capita is anticipated to decline in future scenarios, since the projected VMT growth is less than the projected 9 percent population growth in Orange County. Nevertheless, absolute VMT will likely continue to be the recommended governing metrics for evaluating transportation projects under the California Environmental Quality Act (CEQA) and a VMT mitigation program to reduce VMT may be necessary.

As the State moves forward with eliminating sales of new gasoline powered vehicles by 2035, the share of zero emission vehicles in operation is expected to grow. Therefore, 2045 Preferred Plan traffic data was analyzed in the California Air Resources Board's Emission Factors (EMFAC) model which accounts for the anticipated increase in zero-emission vehicles. The EMFAC results showed a decline in greenhouse gas emissions and smog-forming pollutants by 2045, as shown in Table 4.4. While the increased number of zero-emission vehicles was a significant factor in these results, the 2045 Preferred Plan strategies also help to increase the non-SOV mode share and provide for more efficient transportation system. Note that the 2045 Preferred Plan is anticipated to slightly increase particulate matter emissions compared to the 2045 No Build scenario, but the future levels would be below 2019 levels.

Pavement condition can serve as an indicator of the sustainability of the transportation system. Routine preventative maintenance is more economical and less disruptive than deferring maintenance until major repairs or reconstruction is necessary. Poor pavement conditions result in vehicle wear and tear, and present increased safety hazard to roadway users, including bicyclists, and a liability risk for local jurisdictions. Orange County maintains high pavement quality on roadways, in part, through OC Go funding used for roadway maintenance and improvements. Measurements of the Pavement Condition Index (PCI) have found current Orange County roadways to be good on average (PCI range of 75-85 indicates "good" condition and PCI of 86 or higher indicates "very good" condition). Investments proposed in the 2045 Preferred Plan are expected to achieve OCTA's target threshold for "very good" pavement conditions. The capital, operations, and maintenance investments in the 2045 Preferred Plan are expected to provide 745,000 jobs which support the economic sustainability of Orange County.

Mobility Equity

Table 4.5 reports metrics associated with mobility equity. Each of these metrics was calculated for both the entire County and within the Communities of Concern to evaluate if implementation of the 2045 Preferred Plan would provide equitable results. For example, the daily trips metrics, the percentage changes for both automobile trips and transit trips are similar for the County and the Communities of Concern.

Table 4.5: Performance Metrics – Diversity, Equity, and Inclusion				
Performance Measure	2019 Base Year	2045 No Build	2045 Preferred Plan	2045 Preferred – 2045 No Build % Change
Daily Auto Trips				
Countywide	14,300,000	15,500,000	13,900,000	-11%
Communities of Concern	4,700,000	5,000,000	4,500,000	-11%
Daily Transit Trips				
Countywide	131,000	138,000	185,000	40%
Communities of Concern	72,000	75,000	105,000	39%
Households with Access to High-Capacity Transit Stops				
Countywide	64,000 (2%)	73,000 (2%)	259,000 (7%)	254%
Communities of Concern	57,000 (6%)	65,000 (6%)	167,000 (16%)	158%
Jobs Accessible within 30 minutes by Transit				
County Average	65,000	71,000	79,000	11%
Communities of Concern Average	102,000	113,000	131,000	16%
Jobs Accessible within 30 minutes by Auto				
County Average	1,300,000	1,400,000	1,600,000	20%
Communities of Concern Average	1,700,000	1,800,000	2,100,000	17%
Key Destinations Accessible within 30 minutes by Transit				
County Average	72	71	77	8%
Communities of Concern Average	132	129	143	11%
Key Destinations Accessible within 30 minutes by Auto				
County Average	1,273	1,199	1,421	19%
Communities of Concern Average	1,492	1,442	1,673	16%
Transit Travel Time (Minutes)				
County Average	63	63	60	-2%
Communities of Concern Average	58	58	55	-3%
Average Household Spending on Transportation as a Percent of Income[1]				
County Average	22.5%	--	↓2% vs. No Build	--
Communities of Concern	32.6%	--	↓3% vs. No Build	--

Notes:
[1] Future household income information unavailable; assumed to be constant for 2045 No Build and 2045 Preferred.

Households with access to high-capacity transit stops increases 158 percent within the Communities of Concern, but a larger increase (254 percent) countywide. The 2045 Preferred Plan improves the percent of Communities of Concern households with access to high-capacity transit from 6 percent in 2019 to 16 percent with the plan. Looking into this metric deeper reveals that 89 percent of households with access to high-capacity transit stops were within the Communities of Concern in 2019. The 2045 Preferred Plan expands high-capacity transit countywide. Households outside of the Communities of Concern with access to high-capacity transit stops increases from 11 percent in 2019 to 36 percent with the 2045 Preferred Plan. This means that households within the Communities of Concern are currently only able to access other areas within Communities of Concern today but would be able to use high-capacity transit to travel outside of the Communities of Concern in the future.

That ability to travel outside of the Communities of Concern is reflected in the average jobs accessible withing 30 minutes by transit. Countywide the number of jobs increases by 11 percent, but the Communities of Concern have a 16 percent increase compared to the 2045 No Build scenario. The average travel time also declines more for the Communities of Concern than the average for the County, due in part to the expansion of high-capacity transit.

Average jobs accessible by transit increase more for the Communities of Concern than the County average (11 percent for the County and 16 percent for Communities of Concern). Key destinations accessible by transit increase more for the Communities of Concern than the County average (8 percent for the County and 11 percent for Communities of Concern). Average jobs accessible by automobile increase for the Communities of Concern under the 2045 Preferred Plan, but less than the County average (20 percent for the County and 17 percent for Communities of Concern). Key destinations accessible by automobile also increase more for the Communities of Concern under the 2045 Preferred Plan, but less than the County average (19 percent for the County and 16 percent for Communities of Concern).

In the current condition, Orange County transit service (and especially high-capacity transit service) benefits residents in the Communities of Concern. The analysis shows that the transit investments of the 2045 Preferred Plan also benefit the Communities of Concern at a rate greater than the County average. However, while the 2045 Preferred Plan roadway investments do benefit the Communities of Concern, the rate of benefit is lower than average for the County.

Private automobile ownership can make job opportunities and key destinations accessible, but private automobile ownership is expensive. A transportation system dependent on private automobile ownership costs more for its users and can exclude more people from the benefits of mobility than a transportation system with greater travel options. As OCTA expands system choices, the dependency on private automobile ownership and the cost of using the transportation system will decline. In 2019, transportation costs account for an average of 22.5 percent of income for Orange County residents. For residents within the Communities of Concern, transportation costs account for 32.6 percent of income. Since this LRTP does not estimate future household income, transportation costs as a percentage of income are unavailable for future scenarios. Alternatively, by holding future income constant, it was calculated that 2045 Preferred Plan would reduce the Countywide average transportation cost as a percentage of income by 2 percent compared to the 2045 No Build scenario. The Communities of Concern would have a higher reduction at 3 percent.

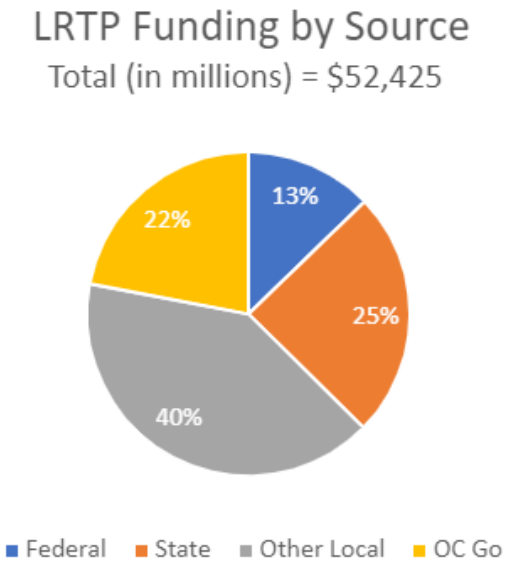
System Performance Summary

The 2045 Preferred Plan delivers on OCTA's commitments while continuing to support many of the annual OC Go programs benefiting Orange County residents and employees. If not for the proposed 2045 Preferred Plan investments, the system performance would be degraded due to the anticipated population and employment growth through 2045. The 2045 Preferred Plan would expand system choices resulting in decreased average household spending on transportation (as a percentage of income). The 2045 Preferred Plan would not result in an increase in VMT per capita and would decrease greenhouse gas and smog forming emissions. The performance metrics show that the 2045 Preferred Plan makes progress toward OCTA's long term goals. In relation to OCTA's diversity, equity, and inclusion policies, the 2045 Preferred Plan shown to be effective at distributing the benefits of transportation investments. The 2045 Preferred

Plan also helps to decrease average household spending on transportation for the county as a whole and even more so for Communities of Concern currently spend more on transportation as a percentage of income than the County average.

Financial Forecast

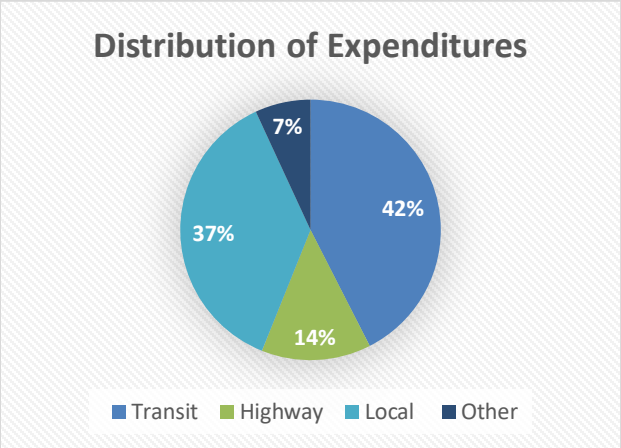
A forecast for transportation revenues between 2023 and 2045 was developed, which totals approximately $52.4 billion. Federal programs (including roadway and transit capital investment and transit operations assistance) make up 13 percent of the anticipated funding through 2045. This is higher than previous estimates of 9-10 percent due to the passage of the Infrastructure Investment and Jobs Act in 2021 that increased federal transportation funding.



State funding is anticipated to account for 25 percent of future revenue. This includes local turnback funding from the Senate Bill 1 (SB 1) gasoline taxes. Estimates for revenue from SB 1 are based on recent levels of funding and account for declining revenue as the State transitions away from new sales of gasoline powered vehicles.

The OC Go half-cent transportation sales tax is anticipated to generate $11.5 billion in revenue between 2023 and 2045. Other local funds include Transportation Development Act funds, local general fund expenditures for maintenance, developer fees, express lane revenues, and local transit fare revenues. These local funds account for 40 percent of total future funding.

These transportation funds are not always interchangeable. For example, the Federal New Starts transit funding cannot be used for roadway projects or transit operations. Most federal and State funding is allocated through programs for specific types of uses. The Measure M and OC Go sales taxes were approved by Orange County voters to provide investments in transportation projects consistent with Orange County priorities. However, the sunset of OC Go in 2041 will result in the loss of this local funding source.



Total expenditures for the 2045 Preferred Plan are projected to be $57.3 billion between 2023 and 2045, the majority of which is used to fund transit services and improvements to local facilities, as shown in the chart to the left. However, revenues are projected at $52.4 billion. This results in a shortfall of approximately $4.9 billion. However, there are potential opportunities to address this shortfall that can be explored through the development of a long-term funding strategy. This funding strategy would consider all potential new

funding sources including, but not limited to, revenues generated from the assumed conversion of HOV lanes to express lanes, a possible state-implemented mileage-based user fee, a potential future local transportation sales tax, or a combination of potential new sources. Some transportation programs could also be funded through a VMT mitigation program that agencies, developers, and others could fund to implement VMT reduction strategies that offset transportation impacts identified in CEQA for transportation and/or development projects.

2045 Preferred Plan Project List

The sections above identified and described the projects included in the 2045 Preferred Plan by transportation mode. Table 4.6 compiles the 2045 Preferred Plan project list for inclusion in the SCAG RTP/SCS.

Table 4.6: 2045 Preferred Plan

Number	Type	Project Description
1	Local Facilities	Master Plan of Arterial Highways
2	Local Facilities	Signal Synchronization
3	Local Facilities	Enhanced signal synchronization and integration with connected vehicles
4	Local Facilities	Pavement Maintenance
5	Local Facilities	Local Fair Share Program
6	Local Facilities	Active Transportation Network
7	State Facilities	I-5: SR-55 to SR-57 – Add one managed lane in each direction (Project A, Complete)
8	State Facilities	I-5: I-405 to SR-55 – Add one general purpose lane in each direction from I-405 to Yale Avenue; add one general purpose lane in each direction from Yale Avenue to SR-55; improve merging (Project B)
9	State Facilities	I-5: Alicia Parkway to El Toro Road – Add one managed lane in each direction; add auxiliary lanes as needed (Project C)
10	State Facilities	I-5: SR-73 to Oso Parkway – Add one general purpose lane in each direction, plus auxiliary lanes as needed and improve Avery Parkway interchange (Projects C and D)
11	State Facilities	I-5: Oso Parkway to Alicia Parkway – Add one general purpose in each direction, plus auxiliary lanes as needed and improve La Paz Road interchange (Projects C and D)
12	State Facilities	I-5: El Toro Road – Improve access and merging in the vicinity of El Toro Road (Project D)
13	State Facilities	I-5: Avenida Pico to San Diego County Line – Add one managed lane in each direction
14	State Facilities	I-5: Barranca Parkway – Add southbound managed lane on-ramp and northbound managed lane off-ramp
15	State Facilities	I-5: SR-57 to SR-91 – Add one managed lane in each direction
16	State Facilities	SR-22: at I-5/SR-57 – Improve operations and merging in vicinity of I-5/SR-57 interchange (Complete)
17	State Facilities	SR-55: I-405 to I-5 – Add one general purpose lane and one managed lane in each direction and fix chokepoints; add auxiliary lanes between select on/off ramps and other operational improvements through project limits (Project F)
18	State Facilities	SR-55: I-5 to SR-91 – Add one general purpose lane in each direction and fix chokepoints from I-5 to SR-22; and other operational improvements throughout project limits (Project F)
19	State Facilities	SR-57: Orangewood Avenue to Katella Avenue – Add one northbound general-purpose lane (Project G)
20	State Facilities	SR-57: Lambert Road – Improve SR-57/Lambert Road interchange
21	State Facilities	SR-57: Lambert Road to Los Angeles County Line – Add one northbound truck climbing lane (Project G)
22	State Facilities	SR-73: I-405 to MacArthur Boulevard – Add one managed lane in each direction
23	State Facilities	SR-73: SR-133 to Newport Coast Drive – Add one toll lane in each direction

Table 4.6: 2045 Preferred Plan		
Number	Type	Project Description
24	State Facilities	SR-91: Raymond Avenue to Lakeview Avenue – Add one eastbound general-purpose lane from La Palma Avenue to SR-55; add one westbound general-purpose lane from La Palma Avenue to Acacia Street; improve operations from Lakeview Avenue to Raymond Avenue (Project I)
25	State Facilities	SR-91: SR-241 to SR-71 – Add one eastbound general-purpose lane; Add one westbound general-purpose lane from Green River Road to SR-241 (Project J, Westbound Lane Complete)
26	State Facilities	SR-91: Fairmont Boulevard – Add SR-91/Fairmont Boulevard interchange and overcrossing to the north
27	State Facilities	SR-91: at SR-241 – Add Express Lane Connector at SR-91/SR-241
28	State Facilities	SR-91 Express Lanes operations & maintenance
29	State Facilities	SR-241: Oso Parkway to Los Patrones Parkway – Add overcrossing and SR-241/Oso Parkway/Los Patrones Parkway interchange (Complete)
30	State Facilities	SR-241: SR-133 to north of SR-261 – Add one toll lane in each direction
31	State Facilities	I-405: I-605 to SR-55 – Add one express lane in each direction and convert the existing managed lane to an express lane; Add one general purpose lane in each direction and improve operations (Project K)
32	State Facilities	I-405 Express Lanes operations & maintenance
33	State Facilities	I-405: I-5 to SR-55 – Add one general-purpose lane in each direction and add one southbound auxiliary lane from SR-133 to Irvine Center Drive (Project L)
34	State Facilities	I-405: University Drive to SR-133 – Add auxiliary lanes – University Drive to Sand Canyon Avenue and Sand Canyon Avenue to SR-133 (Complete)
35	State Facilities	I-605: Katella Avenue – Improve I-605/Katella Avenue interchange (Project M)
36	State Facilities	Freeway Chokepoint Safety Projects
37	State Facilities	Conversion of carpool lanes to tolled Express Lanes by 2045 (Caltrans initiative) - tolled access to lanes except for vehicles with three or more persons
38	State Facilities	Freeway Program Economic Uncertainties
39	State Facilities	Motorist Services (Project N)
40	Transit	OC Streetcar from Santa Ana Regional Transportation Center to Harbor Boulevard/Westminster Avenue (Project S)
41	Transit	OC Bus and OC ACCESS – increase to 1.926 million revenue vehicle hours – includes: • Making Better Connections • Main Street BRAVO! • Expanded Main Street BRAVO! • Expanded Beach Boulevard BRAVO! • Lincoln Avenue/La Palma Avenue BRAVO! • Chapman Avenue BRAVO! • McFadden Boulevard/Bolsa Avenue BRAVO! • Westminster Avenue/17th Street/Bristol Street high-capacity transit • Bristol Street/State College Boulevard high-capacity transit • South Harbor Boulevard high-capacity transit • North Harbor Boulevard high-capacity transit • I-5 BRT • SR-55 BRT
42	Transit	Expand Mobility Choices for Seniors and Persons with Disabilities (Project U)
43	Transit	Community-Based Circulators (Project V)
44	Transit	Safe Transit Stops (Project W)
45	Transit	Reduced or fare-free transit service
46	Transit	Transit Security & Operations Center
47	Transit	Microtransit service (e.g., OC Flex) – expand service areas
48	Transit	Metrolink Service – increase to 86 weekday trains

Table 4.6: 2045 Preferred Plan		
Number	Type	Project Description
49	Transit	Anaheim Canyon station improvements (Project R)
50	Transit	Placentia Metrolink Station (Project R)
51	Transit	OC Rail Maintenance Facility (Project R)
52	Transit	LOSSAN corridor – grade separations
53	TDM	Vanpool & Rideshare Programs
54	TDM	Mobility Hubs Network
55	TDM	Remote Work Incentive Program
56	TDM	Additional TDM Initiatives
57	Other	Environmental Cleanup Program – Transportation-related water quality program (Project X)
58	Other	Adaptation & Resiliency Initiatives
59	Other	Electric Vehicle Charging Infrastructure
60	Other	Debt Service

Notes:

BRT = Bus Rapid Transit
I-405 = Interstate 405
I-5 = Interstate 5
ITS = Intelligent Transportation System
SR-22 = State Route 22
SR-55 = State Route 55
SR-57 = State Route 57
SR-71 = State Route 71
SR-73 = State Route 73
SR-91 = State Route 91
SR-133 = State Route 133
SR-241 = State Route 241
SR-261 = State Route 261
TDM = Transportation Demand Management

Chapter 5:
A Living Document

Chapter 5: A Living Document

Orange County's LRTP is updated every 4 years to adapt to the needs of Orange County travelers, new technologies, and other changing conditions that influence travel and transportation infrastructure. OCTA responds to these changing factors that influence transportation by not only updating the LRTP on a regular basis, but also by including a Short-Term Action Plan that advances the LRTP Preferred Plan strategies. Additionally, OCTA maintains a Conceptual Projects listing that identifies projects that are not yet ready for inclusion in the Preferred Plan, but that may be further developed to support the goals of future LRTPs.

Short-Term Action Plan

OCTA has identified several short-term activities that build on the foundation of the LRTP (see Table 5.1). These activities are grouped into the categories of local and regional planning, emerging issues, and transportation outreach and education, and include all modes of transportation. They further the goals outlined in the LRTP, keeping OCTA moving forward by continuing to plan and dream, working with partners, considering all segments of Orange County's community, and making room for new technologies, regulations, and partnerships.

Table 5.1: Short-Term Action Plan

Activity	Description
Orange County Planning Activities	
Coordination with Local Partner Agencies	Continue dialogue with local jurisdictions – the California Department of Transportation (Caltrans) District 12, Transportation Corridor Agencies (TCA), local transit operators, and other local agencies as needed to further intra-county connectivity.
Diversity, Equity, and Inclusion	Explore opportunities to improve equity-related analyses in Orange County Transportation Authority (OCTA) planning processes.
Long-Term Transportation Funding Strategy	Develop and recommend strategies for securing funds for addressing transportation needs beyond the sunset of Measure M2.
Corridor Studies and Improvements	Conduct studies evaluating the feasibility of multimodal corridor enhancements.
OC Transit Vision Update	Update the long-term transit vision for Orange County.
Transit Support Services	Establish a long-term plan for Orange County transit supportive services, such as OC Flex, vanpools, and park-and-rides.
OC Metrolink Vision	Develop a long-term Metrolink operations vision for Orange County.
Coastal Infrastructure Study	Study sustainable solutions for infrastructure along the San Clemente coast.
Managed Lane Studies	Coordinate with Caltrans District 12 on the I-5 Managed Lanes Project and explore operational enhancements to the high-occupancy vehicle network and potential expansion of priced managed lanes on SR-91 and SR-57.
Future of the Toll Roads	Coordinate with Caltrans District 12 and TCA to plan for toll road improvements and operational approaches on the Toll Road corridors related to the State assuming full control of the facilities.
Freeway Chokepoints	Study and develop projects to improve freeway safety and system efficiency.
Signal Synchronization	Support local initiatives to maintain signal synchronization corridors countywide and study opportunities for advanced technologies.
Transportation Demand Management (TDM)	Study opportunities for new or expanded TDM projects.
Mobility Hubs	Develop a concept of operations for a future demonstration project.

Table 5.1: Short-Term Action Plan	
Activity	Description
Active Transportation Investments	Continue evaluating Orange County's Active Transportation needs, develop long-term plans, and implement programs that address data collection, data management, and safety education.
Complete Streets	Analyze the Master Plan of Arterial Highways (MPAH) for opportunities to reallocate excess capacity in support of active transportation and transit.
Sustainable Transportation Strategies	Study potential for a mitigation program designed to offset vehicle miles traveled (VMT) induced by transportation and land-use projects within Orange County.
Electric Vehicle Charging Infrastructure	Develop a strategy for Orange County's electric vehicle charging infrastructure to ensure equitable and affordable access as the electric vehicle fleet rapidly grows.
Joint Development Studies	Evaluate opportunities for joint developments at OCTA transit terminals to improve transit facilities and connectivity with employment/housing.
Asset Management	Monitor maintenance needs for existing and new facilities and equipment. Update fleet plans to address zero-emission bus requirements.
Adaptation Planning	Study infrastructure needs and develop recommendations.
Traffic Model Update	Update the Orange County Traffic Analysis Model (OCTAM) to incorporate latest socioeconomic data.
Regional Planning Activities	
Coordination with Regional Partner Agencies	Continue dialogue with Southern California Association of Governments (SCAG), San Diego Association of Governments, County Transportation Commissions, South Coast Air Quality Management District, Caltrans, and other regional agencies as needed to further inter-county connectivity.
Trade Corridors/Goods Movement	Coordinate with partner agencies to plan for projected growth in regional goods movement.
2024 Regional Transportation Plan/ Sustainable Communities Strategy (RTP/SCS)	Participate in the development of the 2024 RTP/SCS and initiate dialogue with SCAG and local jurisdictions.
2028 Olympics	Coordinate with Los Angeles County Metropolitan Transportation Authority (Metro) on preparations for the 2028 Olympics.
Metro Countywide Express Lanes Strategic Plan	Continue dialogue with Metro and appropriate agencies to identify impacts to, and opportunities for, connectivity with Orange County's transportation network.
San Diego's I-5 High Occupancy Toll Lane Project	Continue dialogue with SANDAG and appropriate agencies to identify impacts to, and opportunities for, connectivity with Orange County's transportation network.
West Santa Ana Branch/ Pacific Electric Right-of-Way	Continue dialogue with Metro and appropriate agencies to identify impacts to, and opportunities for, connectivity with Orange County's transportation network.
Gold Line Eastern Extension – Phase 2	Continue dialogue with Metro and appropriate agencies to identify impacts to, and opportunities for, connectivity with Orange County's transportation network.
Emerging Issues	
Monitor Technology	Monitor developing technologies and their potential impacts on transportation (e.g., autonomous and connected vehicles, remote work trends, vertiports and air taxis).
Connected Infrastructure Needs Assessment	Study infrastructure needs and identify opportunities to implement and/or complement emerging transportation technologies.

Table 5.1: Short-Term Action Plan	
Activity	Description
State and Federal Regulation	Monitor State and federal legislation/regulations/policies.
State and Federal Funding	Identify strategies and opportunities to access and leverage State and federal funding.
Transportation Outreach and Education	
Diversity, Equity, and Inclusion	Provide all members of the public equal opportunities to provide input into OCTA planning efforts.
Active Transportation Safety	Seek opportunities to enhance public outreach and education related to active transportation safety.
Transit Use and Trip Planning	Explore new approaches to increase the use of modes other than single occupant vehicles, including enhanced transit and active transportation facilities, public education, and incentives.

Conceptual Transportation Projects

Several transportation concepts and projects have been identified that go beyond the Preferred Plan but also support the LRTP goals. They have typically been vetted through high-level planning efforts, such as major investment studies, but require more research, development, funding, and/or public input. As these concepts become defined and refined through stakeholder input and further analysis, they may be considered for inclusion within the preferred project list in future LRTPs (see Table 5.2).

Table 5.2: Conceptual Plan		
Number	Type	Project Description
1	Local Arterial	Crown Valley Parkway – I-5 to Greenfield Drive Lane Additions Beyond MPAH
2	Local Arterial	Cabot Road – Paseo De Colinas to Camino Capistrano Lane Additions Beyond MPAH
3	Local Arterial	Harbor Boulevard/Ball Road Grade-Separated Intersection
4	Local Arterial	Harbor Boulevard – Warner Avenue to 17th Street Lane Additions Beyond MPAH
5	Local Arterial	Laguna Canyon Road – El Toro Road to Canyon Acres Drive
6	Local Arterial	MPAH Complete Streets Assessment – Reuse of Excess Capacity
7	Highway	Ortega Highway – Operational Improvements
8	Highway	I-5 – Avenida Pico to Avenida Vaquero Truck Lane
9	Highway	Additional Freeway Chokepoints (TBD)
10	Highway	Direct access ramps (TBD) – Managed Lane and High-Capacity Transit Support
11	Highway	SR-73, SR-261, SR-241 North – Buildout to Planned Capacity – TCA Project
12	Highway	SR-73/Glenwood Intersection Improvement – TCA Project
13	Highway	SR-241/Crown Valley Parkway Interchange – TCA Project
14	Highway	SR-133/Trabuco Interchange – City of Irvine Project
15	Highway	SR-55 – Extend Managed Lanes to Southern Terminus
16	Other	Goods Movement – Supply Chain Resiliency
17	Transit	California High-Speed Rail
18	Transit	New Southern OC Metrolink Station
19	Transit	Metrolink Expansion (SCRRA vision to increase above 86-weekday trains)

Notes:

HOV = high-occupancy vehicle
I-405 = Interstate 405
I-5 = Interstate 5
ITS = Intelligent Transportation System
MPAH = Master Plan of Arterial Highways
OC = Orange County
SR-55 = State Route 55
SR-73 = State Route 73
SR-133 = State Route 133
SR-241 = State Route 241
TBD = To Be Determined
TCA = Transportation Corridor Agencies