

Attachment A:
**List of Projects Proposed for Measure R – Mobility Improvement
Project (MIP) Funding in lieu of the Metro L Line California
Boulevard Grade Separation Project**

MULTI-MODAL MOBILITY IMPROVEMENTS

A number of complete streets projects are proposed to: improve safety for pedestrians and bicyclists by reducing auto speeds; enhance efficiency to accommodate regional and local travel demands; reduce the impacts of regional traffic diverted to local residential streets from adjacent freeways; and work toward encouraging non-auto travel throughout the City and the northern segment of the State Route (SR) 710 North corridor.

Pasadena Avenue and St John Avenue Roadway Network (Walnut Street to Columbia St)

Pasadena Avenue and St John Avenue are the primary access routes to the SR 710 northern stub in the City of Pasadena. They connect to three sets of Interstate 210 (I-210) and SR 134 on- and off-ramps north of California Boulevard. The purpose of this project is to provide near-term multimodal improvements to enhance safety along this 1.8-mile corridor, while maintaining the number of vehicular travel lanes. This project includes the cross-street connections that create the roadway network.

On June 29, 2022, the California Transportation Commission approved the relinquishment of the SR 710 transportation corridor from Union Street to Columbia Street to the City of Pasadena. The City of Pasadena officially took ownership of this transportation facility of August 15, 2022. While the long term vision for this area requires a significant multi-year planning process to determine land use, transportation network and utility infrastructure, this relinquishment allows the City to implement near term multi-modal mobility improvements along the corridor. Consistent with the documented purpose of the Measure R Mobility Improvement Project (MIP) funding parameters, this project creates a much-needed protected bicycle network along St John Avenue and Pasadena Avenue without reducing the number to travel lanes, and with only a very limited reduction of on-street parking along this 1.8-mile corridor.

A key premise in developing the project enhancements for this corridor is that near-term projects shall not preclude future changes to land-use, roadway networks, or other community development concepts that could be considered as part of the larger scale future long-term planning effort for this area.

This comprehensive multi-modal project provides for the installation of Class II bike lanes, Class IV protected bike lanes, sidewalk construction (with appropriate street trees and lighting), traffic signal modifications and other related construction for the following streets and the intersections connecting this street network:

- Pasadena Avenue from Walnut Street to Columbia Street
- St John Avenue from Walnut Street to Del Mar Boulevard and from California Street to the Pasadena Avenue wishbone/fork
- Union Street, Colorado Boulevard, Green Street, Del Mar Boulevard, California Boulevard and Bellefontaine Street, as they connect to Pasadena Avenue and St John Avenue

The preliminary cost estimate for this project is approximately \$75.1 million.

Columbia St (from Orange Grove Boulevard to Fair Oaks Avenue)

As a corollary to the St John Avenue/Pasadena Avenue project, the City is also requesting funding for multimodal improvement of Columbia Street from Orange Grove Boulevard to Fair Oaks Avenue. The purpose of this project is to enhance safety of the corridor for all modes of travel while maintaining the existing roadway capacity for motorists. This project consists of the following elements:

- Modifications to the intersection of Orange Grove Boulevard and Columbia Street to reduce the radius of the sweeping right turns, modify the traffic signal to provide vehicle and bicycle detection, add accessible pedestrian push buttons and modify the signal operations to enhance safety.
- Enhance the safety of the split (dog-legged) intersections of Columbia Street/Pasadena Avenue and Columbia Street/Fremont Avenue through roadway striping and traffic signal modifications.
- Installation of fiber optic communication infrastructure between Pasadena Avenue and Orange Grove Boulevard to support the signal modifications at the intersection of Orange Grove Boulevard and Columbia Street
- Implement a bike lane along Columbia Street to compliment the proposed Pasadena Avenue bike network to the north.

Since this project is adjacent to the City of South Pasadena, the City will continue to coordinate any potential improvements with the City of South Pasadena.

The preliminary cost estimate for this project is approximately \$9.9 million.

Orange Grove Mobility Improvement Program

Immediately to the west of the Pasadena Ave/St John Ave corridor, Orange Grove Boulevard carries a significant amount of traffic between, Colorado Boulevard and Columbia Street, along this SR 710 parallel route. The purpose of this project is to provide multimodal safety enhancements and mobility enhancements to intersections along the Orange Grove Boulevard. These include upgrades to traffic signals, installation of fiber optic communication and associated hardware along the corridor to allow for signal coordination to address motorist speed, and the replacement of a free right run slip lane with a standard right turn pocket at Orange Grove Boulevard and California Boulevard.

This project does not include improvements to the intersections of Orange Grove Boulevard/Colorado Blvd or Orange Grove Boulevard/Columbia Street. Those intersections are listed as separate projects.

The preliminary cost estimate for this project is approximately \$5.4 million.

San Rafael Avenue (between Linda Vista Avenue and Colorado Boulevard)

The SR-134 on- and off-ramps at San Rafael Ave are immediately west of the SR 710 connector ramps, and create three closely spaced signalized intersections. This project provides for modifications to the traffic signals at the three signalized intersections on San Rafael Ave between Linda Vista Avenue and Colorado Boulevard. Mobility improvements include the

upgrade of traffic signal controllers, installation of vehicle detection, installation of a CCTV camera and the installation of fiber optic communication and associated infrastructure from Colorado Boulevard to Linda Vista Ave. A component of the work is the relocation of the traffic signal cabinet, and the communications cabinets from the south side of Colorado Blvd to the north side of Colorado Blvd at San Rafael Ave, and the widening of that south sidewalk to provide an ADA compliant pedestrian path. Since these three intersections include freeway off-ramp facilities, the City will continue to coordinate any potential improvements with Caltrans.

The preliminary cost estimate for this project is approximately \$4.8 million.

Avenue 64 Complete Street Program

Improvements to Avenue 64 have been identified based on feedback obtained through a community process. While a portion of the speed reduction and pedestrian safety enhancements along the south end of this corridor are underway through the installation of a traffic circle at the intersection of Avenue 64 and Burleigh Drive, current economic conditions and supply chain constraints have significantly increased the cost of materials for construction. Also, an additional intersection to the north end of this corridor has been identified for pedestrian safety enhancements. This project would provide supplemental funding to allow for the construction of the Avenue 64 traffic circle at Burleigh Drive and would provide for the installation of curb extensions at the intersection of Avenue 64 and Glenullen Drive.

The preliminary cost estimate for this project is approximately \$1.5 million.

Continental Crosswalk Implementation

In order to enhance pedestrian safety at crosswalks throughout Pasadena, the City has identified the continental crosswalk layout as the standard for new installations. In addition, the City has developed an implementation plan to replace existing marked crosswalks with continental crosswalks citywide. The City is requesting funds to replace all existing marked crosswalks within the SR 710 northern stub corridor to continental crosswalks. This project area includes approximately 140 intersections with marked crosswalks, west of Lake Avenue and south of the I-210 freeway.

The preliminary cost estimate for this project is approximately \$6.8 million.

TRAFFIC SIGNAL AND INTELLIGENT TRANSPORTATION SYSTEMS PROJECTS

The City has implemented Adaptive Traffic Control System (ATCS) signal technology on several major corridors that parallel the SR 710 to reduce delay and enhance safety. As a complement to this, the City is requesting funding for Traffic Signal and Intelligent Transportation System (ITS) projects traffic signal upgrades and fiber communication, data collection and data analytics capability for motorists, bicyclists and pedestrians, and controller upgrades to provide high-resolution data.

Orange Grove Boulevard at Colorado Boulevard and Orange Grove Boulevard at Holly St

The SR 134 on- and off-ramps at the Orange Grove Boulevard/Colorado Boulevard intersection and Orange Grove Boulevard/Holly St intersection carry a significant amount of traffic within the SR 710 northern stub area. The City has been working closely with Caltrans to identify potential

safety concerns at these two adjacent intersections and potential safety and mobility enhancements. This project will address those concerns through upgrades to the traffic signal operations and associated roadway channelization and signage to separate vehicular movements in an effort to reduce collisions involving weaving and turning movements. A potential implementation includes separating the eastbound SR 134 off-ramp traffic from the eastbound Colorado Boulevard traffic as they approach Orange Grove Boulevard. This would require additional traffic signal hardware and upgraded traffic signal controllers, cabinets, vehicle detection and communication infrastructure to manage the split approach operation. In addition, the intersection of Orange Grove Boulevard and Holly Street could be equipped with protected permissive left turn green arrows for north/south traffic. Since these two intersections include freeway off-ramp facilities, the City will continue to coordinate any potential improvements with Caltrans.

The preliminary cost estimate for this project is approximately \$4.5 million.

Metro L Line At-grade Crossing Enhancements

This project would provide for enhanced performance monitoring, data collection and analytics at intersections adjacent to the at-grade Metro L Line crossings of Glenarm Street, California Boulevard and Del Mar Boulevard to monitor and reduce intersection delay. Currently, the L Line operates at six-minute headways in peak periods, resulting in a train crossing these intersections every three minutes during the time of day with the highest vehicular and pedestrian volumes. The City of Pasadena has been actively working on enhancements to reduce delay, including the implementation of Adaptive Traffic Control System (ATCS) along the corridors crossing and adjacent to the Metro L Line alignment.

This project would allow for greater reduction in delay through the implementation of a performance monitoring system that collects vehicular, bicyclist and pedestrian data and uses advanced analytics to report on performance measures and provide an analysis tool for making informed decisions. In addition, this project provides for the implementation of advanced video analytics to identify inherent risk based on near-miss occurrences. The project would provide for the installation of hardware at up to 15 signalized intersections, associated communication infrastructure and central system hardware and software to implement a performance monitoring system.

This project has preliminary been estimated to have a cost of \$2.5 million.

Holly Street, from Fair Oaks Avenue to Marengo Avenue

This project would provide for traffic signal upgrades and needed fiber optic communication and associated hardware at four intersections on Holly Street, between Fair Oaks Avenue and Marengo Ave. These upgrades would allow for the development of improved coordination plans, improved traffic flow, reducing delay for roadway users while simultaneously providing the ability to manage traffic speeds. This corridor provides a vital link between the central business district, the civic center and multifamily residential housing to the SR 710 northern stub, as well as the SR 134 and I-210 on-ramps in this area.

This project has preliminary been estimated to have a cost of \$1.4 million.

Pedestrian and Bicyclist Automated Data Collection

As the City of Pasadena continues to pursue the complete streets policies identified in the Mobility Element of its General Plan, the ability to collect, analyze and process pedestrian and bicyclist data takes on a more important role. This project provides for the installation of multimodal count stations that would collect motorist, pedestrian and bicyclist counts at 36 locations within a half-mile of the six L Line stations in Pasadena. The project would create an extensive database of multimodal traveler information, and would provide the analysis tools to report out on performance measures and make informed decisions based on advanced analytics.

This project has preliminary been estimated to have a cost of \$2.5 million.

High-Resolution Traffic Signal Data

While the City is currently updating some corridors to ATCS, the vast majority of the signalized intersections in the City continue to be controlled by hardware and software unable to collect high-resolution vehicle arrival data. This project would allow the City to upgrade traffic signal controllers citywide to collect such high-resolution data. The ability to collect and analyze high-resolution data would allow for the development of improved coordination plans, reducing delay for roadway users while simultaneously providing the ability to manage traffic speeds. In addition, high-resolution data would provide a foundation for arterial performance monitoring and reporting.

This project would provide for traffic signal controller upgrades at up to 280 intersections, the upgrade of up to 110 traffic signal cabinets. In addition, this project provides for the use of cost-effective network communication hardware to allow for IP communication over existing copper infrastructure where the cost to install fiber optic communication cable would be prohibitive.

This project has preliminary been estimated to have a capital cost of \$12.5 million.

I-210 Connected Corridors Expansion

A pilot for the California Department of Transportation's Connected Corridors program of integrated corridor management (ICM) measures is already underway in the I-210 corridor east of SR-134. This program includes measures such as:

- Integration of freeway ramp meters and arterial signal systems
- Arterial signal coordination
- Traffic re-routings due to incidents or events
- Traveler communication (via changeable message signs, 511, radio, social networks, mobile app) of traffic conditions, transit services, parking, alternate route/trip/mode options
- System coordination/communication between Caltrans (freeway operator) and local jurisdictions (arterial operators)

The I-210/SR 134 interchange has experienced a number of long-term closures resulting from collisions on the connector ramps. Additional funding would allow this innovative program to be expanded to the I-210 segment north of SR 134, facilitating the management of traffic resulting from the closure of the connector ramps at this interchange. Since the Connected Corridors project involves multiple jurisdictions, this project expansion would require continued coordination with Caltrans and Metro.

The estimated cost of providing these improvements is approximately \$5 million.

PASADENA TRANSIT SYSTEM EXPANSION FOR SR 710 CORRIDOR

A primary component of increasing multimodal access and mobility is the implementation of transit services. The City has evaluated the SR 710 corridor and identified potential route options that would serve north/south travel along the SR 710 northern stub project area and into northwest Pasadena. These route options are proposed based on a variety of demographic factors and potential transit ridership considerations. While funding for operations of the transit system is not being requested through Measure R MIP funds, three capital projects are required to implement a service expansion. The three capital projects are described below.

Transit Operations and Maintenance Facility

An expansion of transit service in Pasadena will require the construction of a new Transit Operations and Maintenance Facility. Not only is the City's current operations and maintenance facility already at capacity, but the facility is leased, and that lease will expire in three years. The City has already initiated the design and environmental clearance of a new Transit Operations and Maintenance Facility. However, funding for the facility has not been secured. Without a new facility, the City would not be able to provide an expanded transit service option for the SR 710 area. This new facility will have the ability to fuel/charge a future fleet of zero emission buses.

Construction of a new facility on City-owned property to accommodate these needs would cost an estimated \$62.4 million.

Zero Emission Buses (11) and Charging Infrastructure

Eleven new zero emission buses would be required to provide system expansion to serve the SR 710 Northern Stub project area. In order to comply with the State's mandate and the City's goals of reducing emissions, the vehicles are required to be zero emission buses. This requires charging infrastructure to serve this additional fleet.

The estimated cost of purchasing 11 zero emission buses and the necessary charging infrastructure for those 11 buses is \$12 million.

Bus Stop Enhancements

The transit system expansion for the SR 710 Northern Stub area would provide up to 24 new bus stops serving this area. All new bus stops along this corridor will require improvements to bus to provide accessibility for all users, and amenities to provide a space for passengers to wait for the bus. In addition, a number of existing bus stops within the SR 710 corridor area would be improved through this project. This includes items such as bus benches, bus shelters, ADA compliant landings, lighting, security features and shade structures as appropriate.

The estimated cost of the bus stop enhancements is \$3.6 million.

BICYCLE TRANSPORTATION ACTION PLAN PROJECTS

The City completed an updated Bicycle Transportation Action Plan in 2015. While some of its recommended projects are underway, others remain unfunded. These projects allow for the implementation of a comprehensive bike network, to provide residents and visitors an alternate mode to travel throughout the City. Two projects with regional significance due to their proximity to Metro L Line stations and ability to provide bicycle network connectivity are included below.

Greenways (Bike Boulevards)

Through the 2015 Bicycle Transportation Action Plan, the City identified various potential Greenways, also referred to as Bike Boulevards. The plan proposed Greenways as an enhanced set of calm, low traffic corridors with targeted traffic calming and gap crossing improvements such as narrower curbs and traffic signals. The four north/south Greenways selected included Wilson Avenue, El Molino Avenue, Sierra Bonita Avenue, and Craig Avenue. These four north/south corridors serve similar functions in that they provide ideal bicycle friendly connections across the 210 freeway. Three of the four Greenways are within ¼-mile of a Metro L Line station, and all four connect to the stations through an existing bicycle network. These Greenways provide a bicycle network connection to Lake Station and Hill Station, and they will also provide future connectivity to the Memorial Park Station and the Del Mar Station, once the construction of the Union Street Protected Bike Lane and the Cordova Street Roadway Configuration projects is completed.

A robust community outreach phase targeting the residents and businesses along the Greenway alignment has been initiated for two greenways; however, other Greenways within the plan will still require additional community discussion and project refinement.

The estimated cost to implement the four north-south greenways is \$12 million.

The Arroyo Link

One project that continues to garner attention due to the historic nature of prior trails leading from Arroyo Boulevard into the central business district is the Arroyo Link. The Arroyo Link would be a combination of Class III and Class I paths connecting the bike facilities currently in construction on Union Street (a protected cycle track) to the existing Arroyo Seco Path. With the completion of the Arroyo Seco Path to the Los Angeles River path, the Arroyo Link could provide a key connection in the regional bicycle network to Old Pasadena, Pasadena Civic Center and Pasadena City College.

This project has not yet been designed, and detailed cost estimates have not yet been developed. This project includes a new sidewalk from the intersection of Arroyo Blvd at Arroyo Drive to the intersection of Arroyo Blvd at Seco Street (a distance of approximately 0.8-miles), providing a much needed pedestrian connection from Arroyo Boulevard south of the SR 134 freeway to the Rose Bowl, Brookside Park, the Kidspace Museum and the Rose Bowl Aquatic Center. While most of the project would utilize city streets, a 1000-ft section of new, off-street path would be required for a zig-zag path between Orange Grove Boulevard and the Arroyo Seco Path. This project presents significant design challenges including topography and existing infrastructural constraints (primarily access across Colorado Boulevard at the Colorado Street Bridge and existing shoulder slope and geometry along Arroyo Boulevard, north of Arroyo Drive). New bridges and/or under-crossings would likely be required as well as a significant

length of retaining walls. The City anticipates the initial outreach, feasibility study and concept design to cost \$250,000. Once a concept is developed, the project costs could range between \$45 million and \$65 million depending on the path selected and the type and number bridges affected.

SR 710/SR 134/I-210 RAMP MODIFICATIONS

The relinquishment of the SR 710 northern stub from Caltrans to the City of Pasadena provides an opportunity to re-envision the land use, transportation network and utility infrastructure for this area. This community led planning effort to define the future use of the SR 710 northern stub will take a significant multi-year planning process. It is anticipated that this planning effort and environmental clearance would cost up to \$5-million to complete.

Any modifications to the freeway on- and off-ramps, as well as any modifications to the freeway-to-freeway connector ramps would require close coordination with Caltrans. An initial technical feasibility analysis and a subsequent supplemental traffic analysis confirmed that removing and/or relocating ramps is technically feasible and would not impact the safety or operations of the freeway system.

The I-210 stub between Union Street and California Boulevard, while less than one mile long, currently features two pairs of on- and off-ramps: north of California, and just north of Del Mar. The northbound on-ramps at Del Mar and north of California (between Bellevue and Waverly Drives) are less than 800 feet apart. In addition, the I-210 and SR 134 both have freeway connector ramps into the SR 710 ditch that would need to be removed or relocated to allow for the re-envisioning of the SR 710 stub.

Removal and/or relocation of the ramps would effectively shift north-south regional traffic (particularly southbound traffic) away from St. John and Pasadena avenues, relatively narrow residential streets, to Walnut Street, Del Mar Boulevard, Fair Oaks Avenue and Arroyo Parkway, broad commercial arteries that are designed to accommodate such traffic. This would be consistent with the City of South Pasadena's accompanying effort to shift regional traffic from Fremont Avenue to Fair Oaks Ave, and would enable multimodal improvements to Pasadena Avenue and St John Avenue.

Cost estimates have not been developed for this project, but costs for removal or relocation of four freeway on/off ramps and up to five freeway-to-freeway connector ramps within an active interchange, along with associated changes to roadway striping, signals and signage, could reasonably be expected to exceed \$150 million.

MOBILITY HUBS

Consistent with recommendations of the SR 710 Working Group (recommendations that were based on previous concepts developed by the City of Pasadena), the City is requesting funding for "mobility hub" first/last mile access improvements at L Line stations and the future Metro North Hollywood to Pasadena Bus Rapid Transit Line. Mobility hubs are activity centers that bring together transit, micro-transit and shared mobility to maximize first mile last mile connectivity through place-making strategies. Because Metro Rail station sites in Pasadena are generally constrained, and the future North Hollywood to Pasadena BRT line is still in

preliminary design, further analysis would need to be conducted of space requirements for different potential elements, as well as other factors including costs and benefits.

At this time, the anticipated cost for mobility hub implementation is estimated to be \$24 million.

SR 710 MEASURE R MOBILITY IMPROVEMENT PROJECT FUNDING ESTIMATES

Project	Preliminary Cost Estimate
Multi Modal Mobility Improvements	
Pasadena Ave and St John Ave Roadway Network (Walnut St to Columbia St)	\$75.1M
Columbia St (from Orange Grove Blvd to Fair Oaks Ave)	\$9.9M
Orange Grove Mobility Improvement Program	\$5.4M
San Rafael Ave (between Linda Vista Ave and Colorado Blvd)	\$4.8M
Avenue 64 Complete Street Program	\$1.5M
Continental Crosswalks	\$6.8M
Traffic Signals and Intelligent Transportation System Projects	
Orange Grove Blvd at Colorado Blvd and Orange Grove Blvd at Holly St	\$4.5M
Metro L Line At-Grade Crossing Enhancements	\$2.5M
Holly St, from Fair Oaks Ave to Marengo Ave	\$1.4M
Pedestrian and Bicyclist Automated Data Collection	\$2.5M
High-Resolution Traffic Signal Data	\$12.5M
I-210 Connected Corridors Expansion	\$5M
Pasadena Transit System Expansion for the SR 710 Corridor	
Transit Operations and Maintenance Facility	\$62.4M
Zero Emission Buses (11) and Charging Infrastructure	\$12M
Bus Stop Enhancements	\$3.6M
Bicycle Transportation Action Plan Projects	
Greenways (Bike Boulevards)	\$12M
Arroyo Link	\$45-65M
SR 710/SR 134/I-210 Ramp Modifications	\$150M +
Mobility Hubs	\$24M