Transportation Authority of Marin

HIGHWAY 101 INTERCHANGE & APPROACHING ROADWAY STUDY

North San Pedro Road/ Merrydale Road

EXISTING CONDITIONS, CONSTRAINTS, & OPPORTUNITIES REPORT

HNTB

Parisi
TRANSPORTATION CONSULTING

JULY 2022

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INTRODUCTION

This report on the North San Pedro Road/Merrydale Road Interchange forms one of a series of reports being prepared under the Transportation Authority of Marin's (TAM) Highway 101 Interchange and Approaching Roadway Study that examines the existing conditions, deficiencies, and constraints of 12 selected interchanges on Highway 101 in Marin County. The reports also identify opportunities for improvement under a program of near- and long-term projects that aim to improve operations and safety for all users.

The planning study is funded through Measure AA – the reauthorized ½-cent transportation sales tax that was approved by Marin voters in 2018. The overarching goal of the Transportation Sales Tax Renewal Expenditure Plan is to "reduce congestion and reduce greenhouse gas emissions, maintain and improve local transportation infrastructure, and provide high quality transportation options for people of all ages who live, work, and travel in Marin County."

Each interchange was evaluated to determine the existing conditions of the roadway, such as nonstandard features or outmoded design and flooding, traffic conditions, pedestrian/bicyclist circulation and intermodal connectivity, and environmental conditions, including vulnerability to sea level rise (SLR). The study looked at previous planning studies for these interchanges as well as any recent or proposed nearby development, including the new Sonoma–Marin Area Rail Transit (SMART) passenger rail line which aligns closely with Highway 101.

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EXISTING CONDITIONS

There are a number of existing physical and operational deficiencies associated with the interchange including short weaving lengths at the northbound (NB) off- and southbound (SB) on-ramps, short acceleration and merge lengths for the NB on-ramp, less than standard shoulder widths at the NB and SB ramp, and non-Americans with Disabilities Act (ADA) compliant paths of travel for pedestrians. Pavement conditions on North San Pedro west of Highway 101 is rated at risk and rated fair/good east of Highway 101.

In the five-year period from 2014 to 2018, the interchange reported 57 total collisions, 16, or 28%, resulted in injuries with one recorded to be severe. Approximately one-third of collisions were the result of a driver hitting a fixed object, with an additional 23% of collision types the result of rear ends. Another 32% of collisions were caused by sideswipes and broadsides.

The North San Pedro AM level of service is rated C at the intersection of North San Pedro/Civic Center Drive/San Pablo Ave and Merrydale Road/Highway 101 Southbound Ramps. All other intersections receive a level of service of B or better within the project study area. The PM level of service at the Westbound North San Pedro Road/Highway 101 Northbound off-ramp is D. All other intersection receive a PM level of service of C or better within the project study area.

Executive Summary

IMPROVEMENT CONCEPTS

Proposed improvements seek to address deficiencies and to upgrade the conditions for vehicular traffic, transit users, pedestrians, and bicyclists. The improvements vary from readily implementable solutions, such as new crosswalks, curb ramp replacements, restriping, new bike facilities, upgrading sidewalk and existing transit stops, improved multimodal connectivity, and widened bridges. Many of the improvements recommended by this study will strengthen the interchange's relationship with the surrounding area and new developments, and they will improve the operation and safety of these interchanges for all users, allowing smoother travel to, from, and across Highway 101 and local roads.

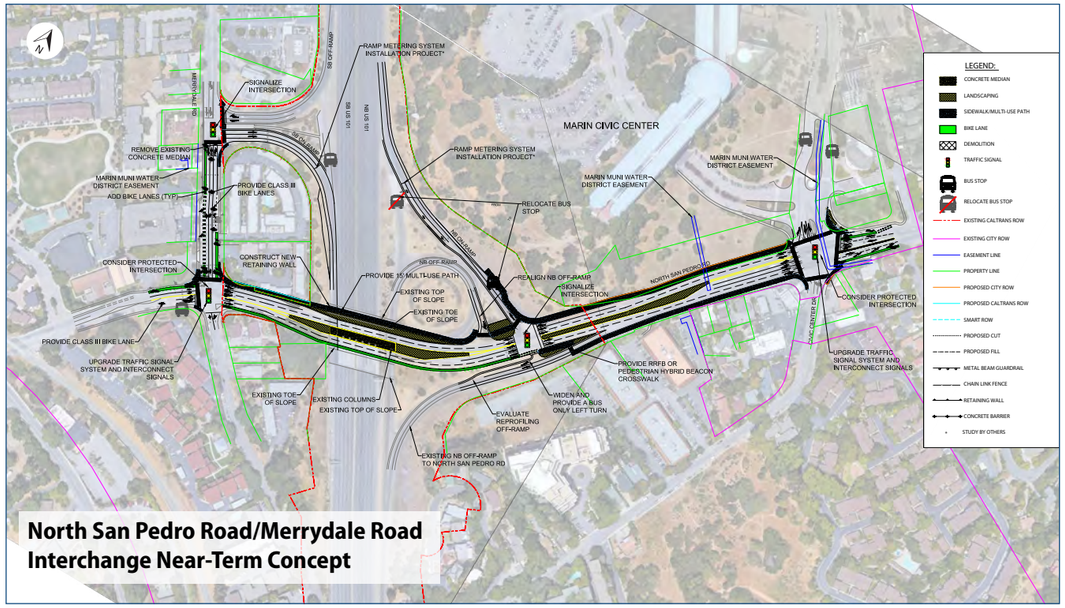
Concepts are presented as near- and long-term improvements based on the ease of implementation.

The near-term concept proposes to realign and widen North San Pedro Road to two thru lanes in each direction between Merrydale Road to Civic Center Drive. The North San Pedro undercrossing will be modified to allow for the travel lanes. The Northbound ramp intersection will be reconfigured with a signalized intersection. The NB diagonal off-ramp will provide a bus only lane to connect back onto the NB on-ramp at the signalized intersection.

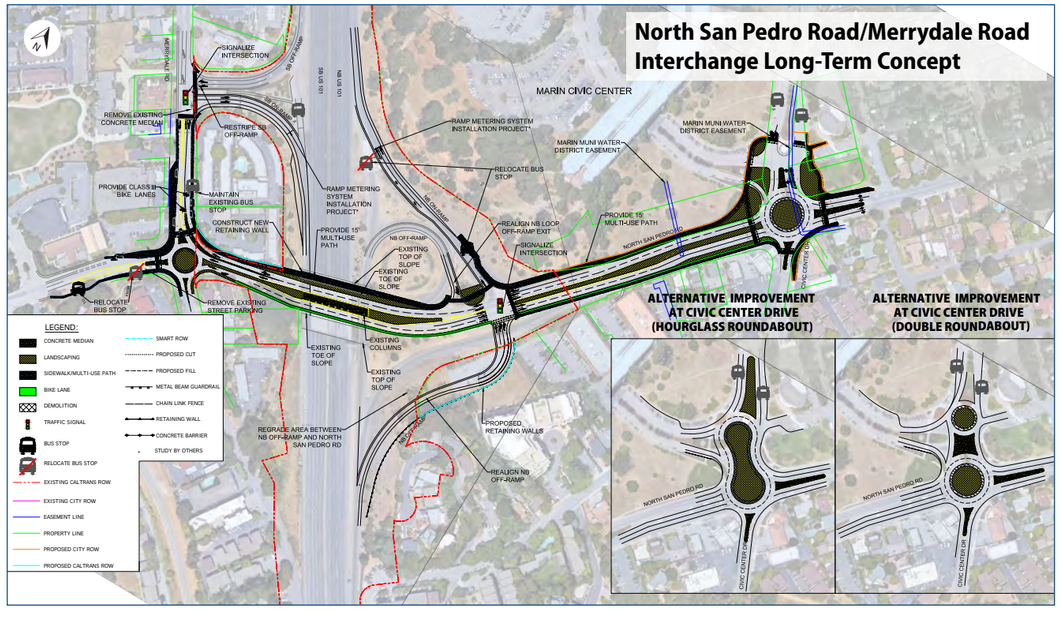
The long-term concept will carry many features mentioned in the near-term concept with the exceptions noted. The NB diagonal off-ramp will be realigned to connect to a proposed signalized intersection with the NB on-ramp. Roundabouts will be proposed at the intersection of North San Pedro Road/Merrydale Road and North San Pedro Road/Civic Center Drive.

The improvement concepts have been shared with the local jurisdictions and transit agency representatives, who have had an opportunity to review and comment on the concepts presented.

Refer to Attachment I for the exhibit associated with the near- and long-term concepts.



North San Pedro Road/Merrydale Road Interchange Near-Term Concept



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IMPLEMENTATION

As part of this study, each of the 12 interchanges will undergo evaluation and prioritization with the goal of identifying the most appropriate projects to move forward into project development.

It is anticipated that the improvements proposed under both the near- and long-term concepts would follow the typical three-phase California Department of Transportation (Caltrans) project development process for approval of work within the state's right of way.

- Project Initiation Document (PID) (Project Study Report-Project Development Support)
- Project Approval/Environmental Document (PA&ED)
- Plans, Specifications, and Estimates (PS&E)

Elements of the project could be implemented in a phased manner by either TAM or the City of San Rafael to meet funding opportunities.

Additionally, elements of the project could be incorporated into projects sponsored by Caltrans, such as a long-range ramp-squaring project identified by the System Planning Group.

NEXT STEPS

1. TAM Board to select projects(s) to move forward into project development in consultation with agency stakeholders.
2. TAM and the local jurisdiction will coordinate with the Metropolitan Transportation Commission (MTC) to have the project included in the current Regional Transportation Plan (RTP).
3. TAM and the local jurisdiction will secure funding for the PID and enter into a cooperative agreement with Caltrans for project development.
4. TAM will work with the local jurisdiction and a Project Development Team to prepare the PID for Caltrans approval to proceed to the PA&ED Phase for a locally funded project. Alternatively, the local jurisdiction can identify elements that can be implemented via a Caltrans encroachment permit process or on the approaching roadway outside Caltrans right of way.
5. TAM and the local jurisdiction will seek funding for subsequent phases of the project. If there is insufficient funding available, it may be possible to phase the improvements.

Introduction

This report on the North San Pedro Road/Merrydale Road Interchange forms one of a series of reports being prepared under TAM's Highway 101 Interchange and Approaching Roadway Study that examines the existing conditions, deficiencies, and constraints of 12 selected interchanges on Highway 101 in Marin County. The reports also identify opportunities for improvement under a program of near- and long-term projects that aim to improve operations and safety for all users.

The reports provide the basis for establishing performance measures against which improvement concepts can be evaluated and prioritized in a subsequent phase of the study.

The planning study is funded through Measure AA – the reauthorized ½-cent transportation sales tax that was approved by Marin voters in 2018. The overarching goal of the Transportation Sales Tax Renewal Expenditure Plan is to "reduce congestion and reduce greenhouse gas emissions, maintain and improve local transportation infrastructure, and provide high quality transportation options for people of all ages who live, work, and travel in Marin County." The Plan allocates 3% of the revenue for a 30-year program of improvements to interchanges and freeway access routes on Highway 101 to reduce congestion, improve local traffic flow, and address flooding impacts within the county. These funds will serve to leverage larger regional, state, and federal funds.

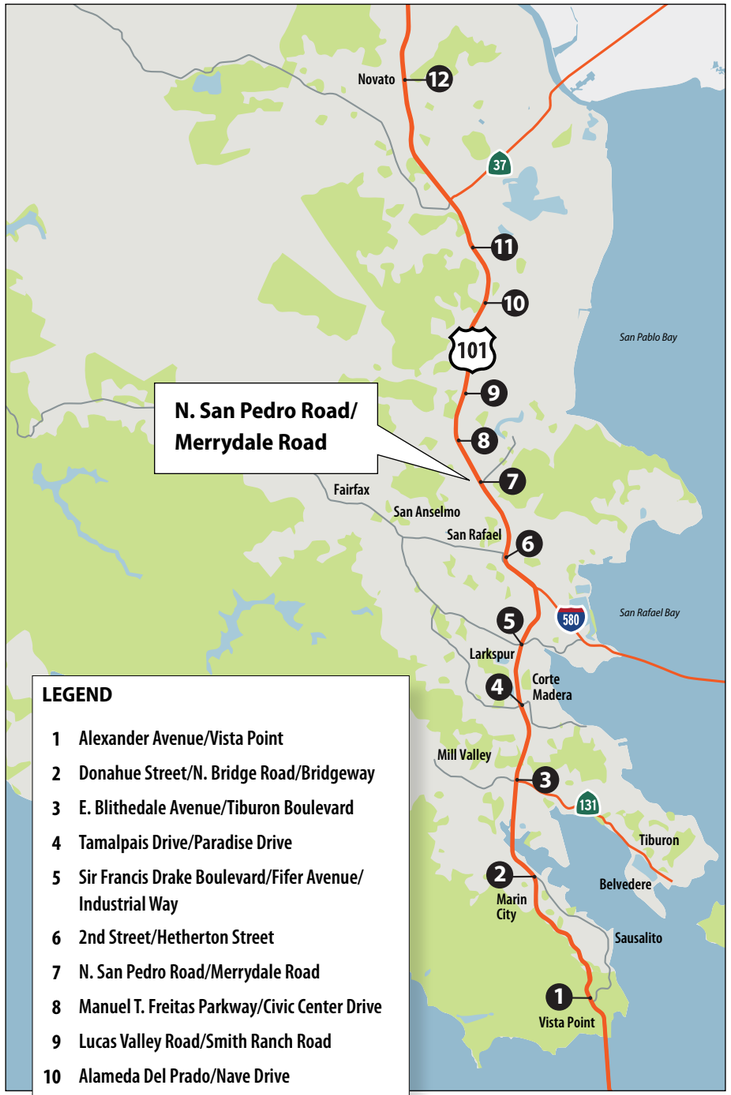
Throughout Marin County, Highway 101 serves as the primary north-south roadway and is a key link between communities. Accessing Highway 101 in Marin is a major source of congestion on local roads, which reduces the connectivity of communities across Marin. Interchanges vary in age and in needs for improvements. As communities around Marin have grown over the last 30-40 years, interchanges built in the 1950s and 1960s have not been altered to meet demands of vehicles, transit, bicyclists, and pedestrians. Many do not meet current design or operational standards.

In addition to the vehicular traffic these interchanges serve, many also provide bus stops for Marin Transit and Golden Gate Transit, which offer local and regional bus services but have poor connectivity with local land uses or for transfer between transit providers. Provisions for bike and pedestrian access are also typically poor, with missing, discontinuous, or generally unsafe paths of travel and a general lack of connectivity with the local pedestrian and bike networks.

The 12 interchanges identified for improvement within this study span the cities of Sausalito, Larkspur, San Rafael, and Novato; town of Corte Madera; and unincorporated areas of Marin County. The southernmost interchange is located just north of the Golden Gate Bridge at Alexander Avenue, and the northernmost interchange is located in Novato at Atherton Avenue.

Each interchange was evaluated to determine the existing conditions of the roadway, such as nonstandard features or outmoded design and flooding, traffic conditions, pedestrian/bicyclist circulation and intermodal connectivity, and environmental conditions, including vulnerability to SLR. The study looked at previous planning studies for these interchanges as well as any recent or proposed nearby development, including the new SMART passenger rail line which aligns closely with Highway 101.

This study addresses alleviating these nonstandard features and upgrading the conditions for vehicular traffic, transit users, pedestrians, and bicyclists. Proposed improvements vary from readily implementable solutions, such as new crosswalks, curb ramp replacements and restriping to new bike facilities, improved multimodal connectivity, and widened bridges. Many of the improvements recommended by this study will strengthen the interchange's relationship with the surrounding area and new developments, and they will improve the operation and safety of these interchanges for all users, allowing smoother travel to, from, and across Highway 101 and local roads.



Project Location and Background

The interchange at North San Pedro Road/Merrydale Road is located at Highway 101 postmile 12.69 in the City of San Rafael in Marin County accessing Civic Center, China Camp State Park, and neighborhoods in Los Ranchitos and Santa Venetia. It is situated in an urban environment characterized by mostly residential with some commercial and office spaces within the project study area. The Marin County Civic Center, a building designed by Frank Lloyd Wright, and other public works are located in the northeast corner of the interchange.

North San Pedro Road is located to the east of U.S. 101 and connects to Merrydale Road going under U.S. 101. There is a northbound diagonal on-ramp with two unsigned ramp entrances requiring motorists from eastbound and westbound North San Pedro Road to merge prior to the entering U.S. 101. A northbound loop off-ramp merges motorists to westbound North San Pedro Road. The northbound diagonal on-ramp merges with motorists heading eastbound on North San Pedro Road. The southbound hook off-ramp connects motorists to Merrydale Road at a stop controlled intersection. The southbound hook on-ramp merges motorists from northbound and southbound Merrydale Road to southbound U.S. 101.

The North San Pedro Road Undercrossing (Bridge No. 27-0014) was constructed in 1970. There are two westbound travel lanes and one eastbound travel lane passing underneath the structure. A sidewalk is located on the north side providing sidewalk connectivity. A paved path is located on the south side connecting to the shoulders.

The paved path on the side of the underpass serves bicyclists coming and going to the Class I bike path connected to the end of Merrydale Road. This Class I bike path runs along Highway 101.

Bus stops serving Golden Gate Transit and Marin Transit are located on short travel lanes between the U.S. 101 on- and off-ramps allowing the bus to re-enter the freeway. Riders accessing the bus stops are required to traverse on paved paths located along the ramps and having to cross traffic traveling at high speeds.

Previous Studies

The *Caltrans US 101 North Comprehensive Multimodal Corridor Plan* (2020) observed a bottleneck in the southbound AM peak to the north of this interchange due to the lane drop at the Lincoln off-ramp. It also observed a northbound PM peak bottleneck north of the northbound on-ramp due to a lane drop. The corridor plan proposed a range of project improvements for the U.S. 101 corridor.

- A short-term project currently under development by Caltrans is to install ramp metering for all remaining locations on Highway 101 in Marin County. This project has been environmentally cleared.
- A medium-term project listed in the RTP proposes to modernize the North San Pedro and Merrydale Road interchange with signalized intersections to the highway, provide separated turn lanes in both directions of Merrydale, add bike and pedestrian facilities, and improve pavement conditions.
- A long-term project proposes interchange reconstruction of ramps to eliminate free flow vehicular movements onto the U.S. 101 ramps and providing Class II bike lanes.

The Marin County Travel Safety Plan (2018) recommends safety improvements including the following:

- Roadway improvements, including the installation of a two-way left turn lane, where applicable.
- Pedestrian crossing improvements, including high visibility crosswalks, rectangular rapid flashing beacons, advanced stop bars, bulb-outs, tightened curb radius, and directional curb ramps.
- Bicycle facility improvements, including the installation of "Bikes may use full lane" signs clarifying where bicyclists are expected to ride and reminding motorists to expect bicyclists on the road.

Potential solutions for the interchange were identified in TAM's Highway 101 Interchange Fact Sheet (2017), including:

- Adding a traffic lane to North San Pedro Road, including under U.S. 101.
- Increasing the capacity of the southbound off-ramp at Merrydale Road, (e.g., signalizing the intersection and/or adding a second left-turn lane).
- Providing multimodal enhancements at the North San Pedro Road/ Merrydale Road intersection.
- Reconfiguring the northbound off-ramp and its connection with eastbound North San Pedro Road to improve access to the Civic Center.
- Providing an accessible path of travel along North San Pedro Road.
- Installing on-ramp meters to improve overall operational efficiency of Highway 101.
- Improving intersection signal coordination.

Future Development

There are no known planned improvements for this interchange.

Existing Conditions and Constraints

OVERVIEW

The following pages present an overview of the interchange study area's existing infrastructure, transportation, and environmental conditions and constraints. Data are from field observations as well as a number of national, state, and local sources, and they provide an important understanding of the interchange area.

Photo Exhibit

Photographs were taken during visits to the interchange area in early 2021. These capture existing conditions at various locations throughout the interchange area.

Infrastructure

A review of current infrastructure was undertaken to describe structures, utilities, drainage, right of way, and pavement conditions. Data considered for this section came from Caltrans, MarinMap, and MTC.

Nonstandard Design Features

Existing features within the interchange area were evaluated against the current Caltrans Highway Design Manual as well as local and ADA standards. Four types of nonstandard features were highlighted: nonstandard features on the highway, nonstandard features on the local roadway, ADA compliance, and nonstandard bike/pedestrian features.

Multimodal Infrastructure

Multimodal infrastructure was assessed through in-field reviews of facilities throughout the interchange area. The review noted the interchange configuration and the number of roadway lanes, and it included the location and condition of bike and pedestrian facilities, including sidewalks, Class I shared-use paths, Class II bike lanes, and any informal paths (e.g., dirt walking routes). The location of public transit stops and any connectivity gaps for people traveling to or from the stops were also noted for the purpose of the assessment.

Transit Routes

Marin Transit and Golden Gate Transit routes serving the interchange area as of early 2019 (pre-COVID) were identified. Distinction was made between local and freeway-only service routes. This section includes a brief discussion of transit stop amenities and accessibility issues.

Transit Ridership

Onboardings and alightings for each public transit stop within the interchange area were analyzed using Marin Transit (2017) and Golden Gate Transit (2020) ridership data provided by the respective transit agencies. For Golden Gate Transit routes, a growth factor was used to estimate pre-COVID ridership numbers based on the data provided. The resulting map shows onboardings, alightings, and total estimated daily passengers for each transit stop.

Weekday Peak Hour Traffic Volumes

Weekday AM and PM peak hour traffic volume turning movements are displayed for each intersection within the intersection area. These data are mostly from pre-COVID conditions (2017 to early 2019), but some counts were taken in Fall 2019 and adjusted to reflect a pre-COVID scenario.

Weekday AM & PM Peak Period Congestion

Year 2019 congestion data from INRIX was displayed for hourly periods during the AM and PM weekday peak periods. These data were assessed to determine which parts of the interchange area typically experience notably high or low vehicle congestion.

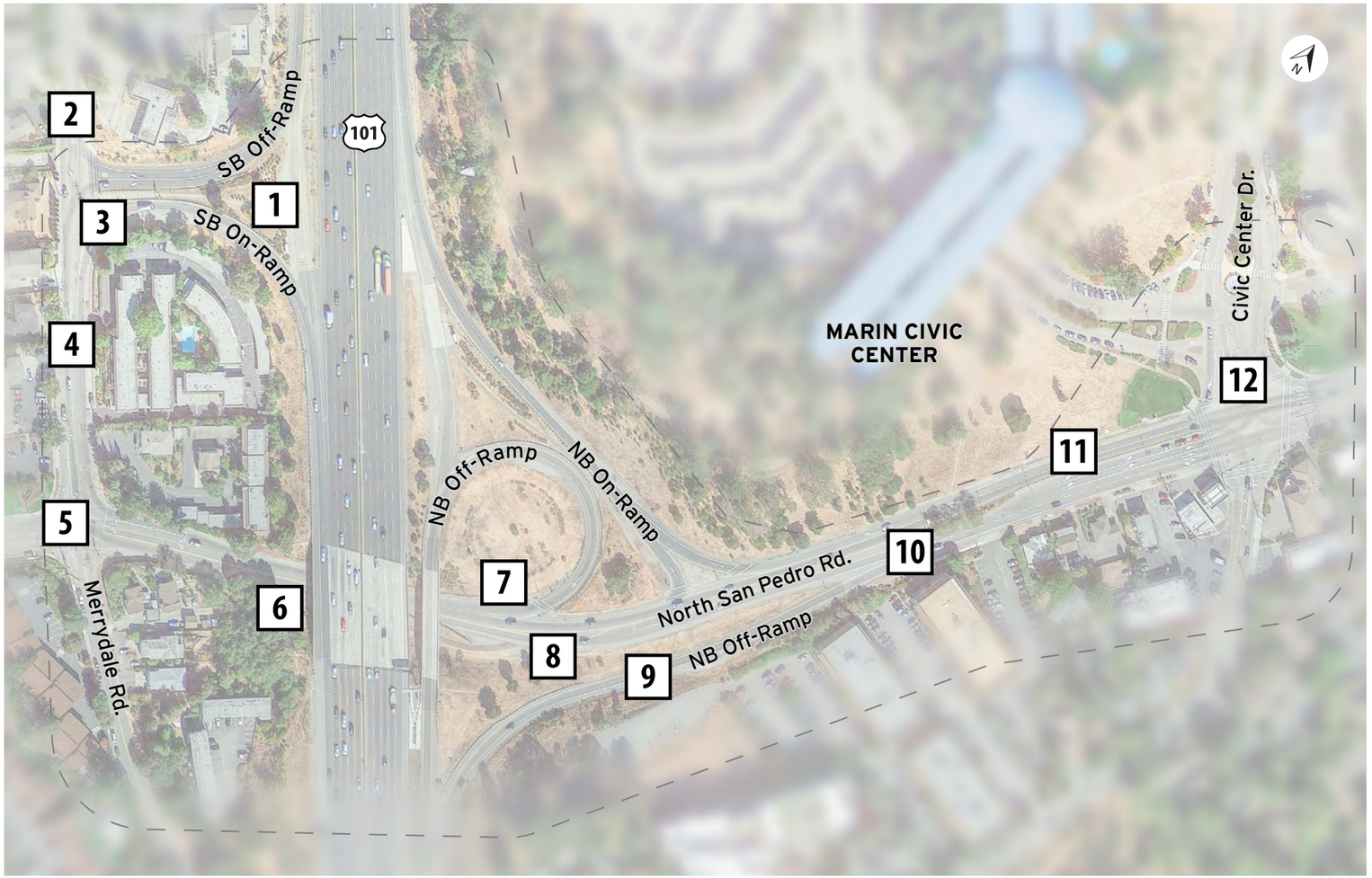
Crash Type & Severity

Five years of crash data (2014-2018) from SWITRS were analyzed within the project study area local roads and ramps. Particular note was taken of crashes involving pedestrians or bicyclists. The Crash Type exhibit notes the locations of crashes by type (i.e., head-on, sideswipe, etc.). The Crash Severity map displays the location of fatal crashes, crashes resulting in severe injury, and crashes resulting in minor injury. The exhibits include a brief discussion of primary collision factor trends.

Environmental Constraints

A desktop review considered environmental conditions and constraints within the interchange area. This review noted cultural resources, hazardous waste/materials, biological resources including water quality, susceptibility to sea-level rise, and land use/growth. The data reviewed was from a number of sources, including the Golden Gate National Parks Conservancy, MarinMap, and GeoTracker. The environmental disciplines also reviewed the following databases: Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS), National Wetlands Inventory (NWI), California Natural Diversity Database (CNDDB), and the San Francisco Bay Area Conservation and Development Commission (BCDC) mapping tool Adapting to Rising Tides (ART) Bay Shoreline Flood Explorer.

PHOTO EXHIBIT



Source: Parisi Transportation Consulting 2021

View of uncontrolled crosswalk across Civic Center Drive at Peter Behr Drive; photo taken during field review.

Looking east under the Highway 101 overcrossing; view of bikeway bypass; photo taken during field review.

LEGEND

Study Boundary

[#] Photo Number; see next two pages

PHOTO EXHIBIT

Bus stop along Highway 101 northbound; platform and sidewalk grade exceed ADA standards.

Looking south along Merrydale Avenue, south of the Highway 101 southbound ramps terminal; note pedestrian J-walking across the roadway.

"Pork chop" island at southeast corner of Merrydale Avenue and Highway 101 southbound ramps terminal, walkway leads into utility pole and sign posts.

Heavily-used bus stop on northbound Merrydale Avenue between North San Pedro Road and the Highway 101 southbound ramps terminal.

Southbound traffic queued along Merrydale Avenue's approach to North San Pedro Road; note pedestrian crosswalk and non-ADA-compliant curb ramp.

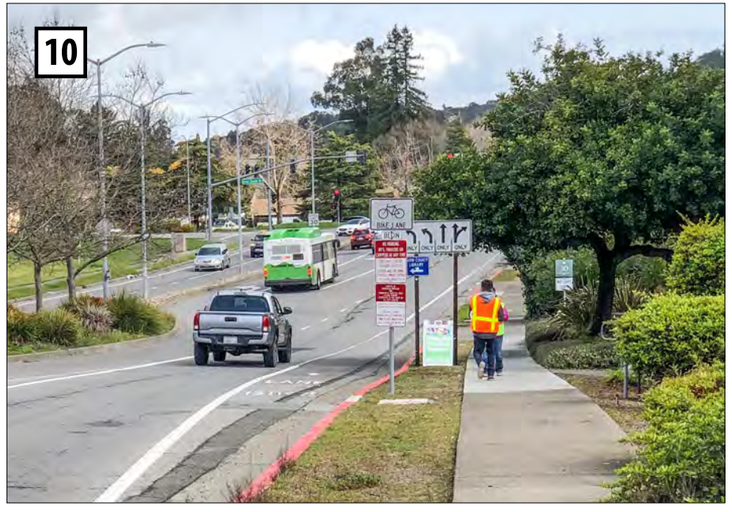
View looking east at bikeway under the Highway 101 overcrossing.

PHOTO EXHIBIT

Looking east on the north side of North San Pedro Road at entry to Highway 101 northbound on-ramp; walkway and sidewalk are not in compliance with ADA standards.

North San Pedro Road looking west towards the Highway 101 overcrossing; the roadway is located on the north side of the overcrossing.

Bus traveling along the northbound off-ramp from Highway 101 to eastbound North San Pedro Road.



Eastbound North San Pedro Road at the merging junction with the Highway 101 northbound off-ramp; the eastbound bike lane starts at this location.

Westbound North San Pedro Road adjacent to the Marin County Civic Center; the westbound bike lane ends before the on-ramp to northbound Highway 101.

Long crosswalk – 150 feet – across Civic Center Drive at North San Pedro Road.

INFRASTRUCTURE

Geometric Conditions and Nonstandard Features

The existing geometric conditions and features were evaluated for the North San Pedro Road/Merrydale Road interchange within the project study area. The project objective was to assess the existing condition for the ramps and the local roadways leading to and from the ramps within the project study area. The Highway 101 mainline was not evaluated as part of this study. The existing conditions were evaluated against the current Caltrans Highway Design Manual, Marin County, ADA criteria, Marin Transit standards, and San Rafael Design and Construction standards.

Within the project study area, it was observed in the field that existing sidewalks and pedestrian paths of travel for this interchange do not meet current ADA criteria. The existing condition of the sidewalks were either in poor conditions or grades exceeded the standard (5% running slope, 2% cross slope). The pedestrian crosswalks did not meet current ADA criteria (e.g., path of travel was not straight).

Refer to the Nonstandard Design Features exhibit and the Deficiency Matrix (Attachment J) for additional details on the less than standard roadway features identified at this interchange.

Structures Conditions

The North San Pedro Bridge (Caltrans Bridge No. 27-0014S) was constructed in 1970. The structure type is a continuous reinforced concrete box girder and all supports are on spread footings with the exception of abutment 3. The bridge deck was treated with methacrylate in 2016. This bridge has a sufficiency rating of 93.7. This bridge has a vertical clearance of 21.65 feet, which meets current standards of 15 feet over a local roadway per the Caltrans Highway Design Manual.

A bridge requiring replacement is not judged solely on the age of the bridge and it's sufficiency rating. There are other factors to consider, such as the bridge's ability to meet standards with further improvement, (e.g., bridge widening or the benefit to cost of repairing the bridge versus a full bridge replacement). Consideration for bridge replacement will need to be reviewed on a bridge-by-bridge basis.

Refer to the Nonstandard Design Features exhibit for the detailed locations where these less than standard structural features exist.

Identified Maintenance Needs

The project completed a review of the current Caltrans Bridge Inspection Report and recommends the following work:

- Seismic retrofit of existing columns with steel casing
- Retrofit of bent 2 spread footing

Refer to the Nonstandard Design Features exhibit for the detailed locations where these less than standard structural features exist.

Pavement Condition Index

The North San Pedro Road/Merrydale Road Interchange pavement conditions were collected via the MTC Vital Signs website for street pavement condition. MTC provides a pavement condition index (PCI) for local streets within the Bay Area, dated 2018.

The existing pavement conditions were given a PCI range as categorized:

- Failed/Poor (0-49)
- At Risk (50-59)
- Fair/Good (60-79)
- Very Good/Excellent (80-100)

For locations where information was not provided, a visual check was performed on Google Earth and validated in the field. This was also completed to corroborate data against more current conditions. The PCIs for the interchange study area are rated as follows:

- North San Pedro Road, west of Highway 101 – at risk (50-59)
- North San Pedro Road, east of Highway 101 – fair/good (60-79)[1]

MTC Vital Signs, "Street Pavement Conditions", did not have data for the west side of Highway 101 at North San Pedro Road/Merrydale Road.

On-ramp to southbound Highway 101 from Merrydale Avenue; several collisions have been reported along this ramp.

Pavement conditions rated fair/good and above do not require improvements at this time. Pavement condition rated "at risk" can be considered for rehabilitation under future improvement projects to return existing roadways to good condition. Existing pavement conditions rated "failed/poor" can be considered for reconstruction under future improvement projects to restore structural integrity to the roadway.

[1] MTC Vital Signs, "Street Pavement Conditions", 9 Nov 2020: https://www.vitalsigns.mtc.ca.gov/street-pavement-condition

Utilities

The project team researched existing utilities and identified all known utilities within the project study area. Utility data was gathered from local utility owners, Caltrans, and MarinMap.

The project team collected data on major utilities that are defined by Caltrans as high priority. These major utilities included electric or gas transmission lines, sanitary sewer lines larger than 24 inches in diameter, and water lines greater than 12 inches in diameter.

Refer to the Project Base Map (Attachment A) for the Existing Utility Mapping (location and type).

Drainage

The existing drainage conditions were assessed for the North San Pedro Road/Merrydale Road Interchange. Watersheds are located within the city boundaries of San Rafael. On-site drainage areas consist of highway, interchange ramps, surface streets, commercial areas with parking lots, unpaved roadside areas, and landscaped areas. Topographic relief throughout the project varies, with fill slopes up to an approximate steepness of 2:1, pervious areas of approximately 5-10% near the interchange ramps, and cut slopes as steep as approximately 1.5:1. Runoff occurring along U.S. 101 is collected by roadside curbs and inlets and conveyed to local drainage systems that ultimately outfall at South Fork Gallinas Creek.

The majority of the study area is in Federal Emergency Management Agency (FEMA) designated Flood Zone X (unshaded), with a small portion falling within Zone X (shaded) (see **Attachment L**). FEMA defines shaded zone X as "area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods."

FEMA defines unshaded Zone X as "areas of minimal flood hazard, usually depicted on Flood Insurance Rate Maps as above the 500-year flood level" (FEMA, n.d.).

Design of new drainage located within Caltrans' right of way should adhere to the Caltrans Highway Design Manual published 2020 and the standard drawings of the Caltrans Standard Plans published in 2018. Design of new drainage within local right of way should comply with standard drawings in the Marin County Uniform Construction Standards published in 2018.

All proposed stormwater treatment facilities within Caltrans' right of way will adhere to the Caltrans National Pollutant Discharge Elimination System (NPDES) permit. Treatment facilities outside Caltrans' right of way will adhere to the Marin County Phase 1 Municipal Separate Storm Sewer System (MS4) permit for Marin County.

Refer to the Project Base Map (Attachment A) and FEMA Flood Map (Attachment L) for the existing drainage mapping.

Right of Way

The North San Pedro Road/Merrydale Road Interchange is located within Caltrans' right of way. The Caltrans right of way extends about 340 feet to the west on North San Pedro Road stopping just before the Merrydale Road/North San Pedro Road intersection. The Caltrans right of way extends about 600 feet to the east along North San Pedro Road ending just after the northbound diagonal on-ramp.

Refer to the Project Base Map (Attachment A) for the existing right of way mapping.

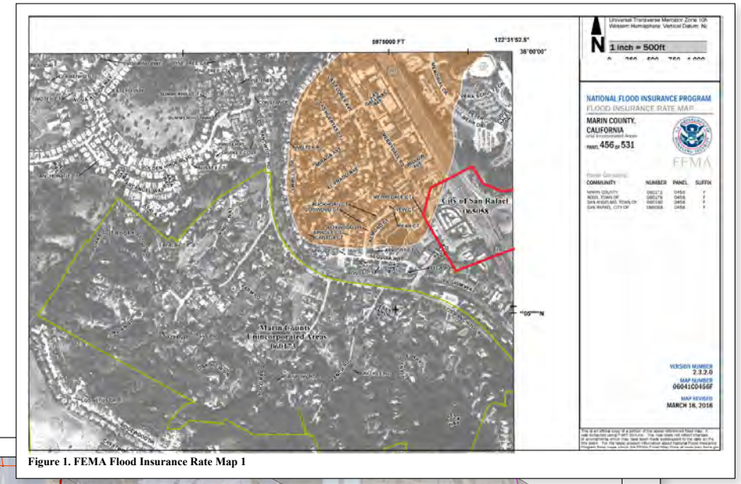
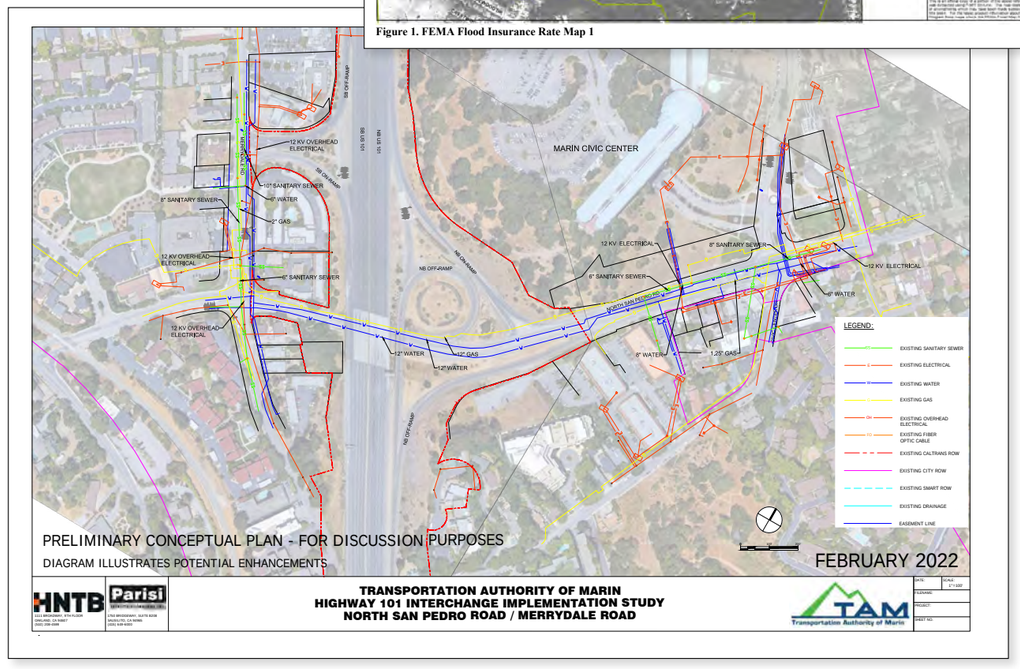


Figure 1. FEMA Flood Insurance Rate Map 1



NONSTANDARD DESIGN FEATURES

Source: HNTB 2022

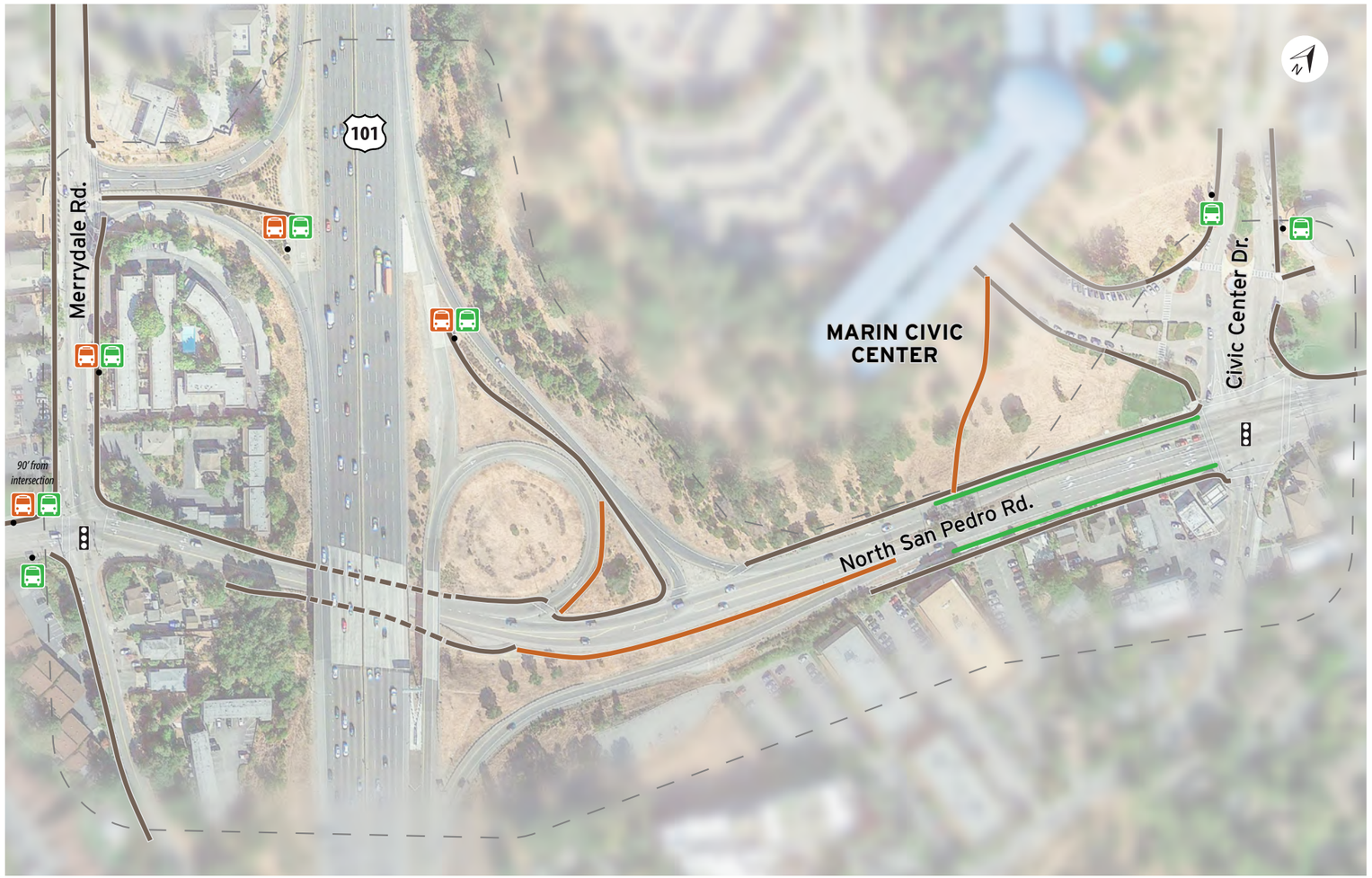
- There are less than standard shoulder widths at southbound and northbound on- and off-ramps.
- There are less than standard lane widths at the southbound and northbound ramps.
- There are less than standard truck lane widths at the southbound on-ramp and the northbound loop off-ramp.
- There is less than standard acceleration and merge length at the northbound on-ramps from North San Pedro Road to Highway 101.
- There is less than standard separation between ramp entrance-to-ramp exit creating less than standard weaving lengths at the following locations:
  - Northbound on-ramp from Villa Avenue to northbound off-ramp
  - Southbound hook on-ramp to Lincoln Avenue off-ramp
- There is an existing path that measures approximately 6 feet wide located on the south side of the underpass. This path connects to the shoulder of eastbound North San Pedro Rd. This path is used by cyclists to connect to the eastbound Class II bike lane that starts at the end of the northbound diagonal off-ramp where vehicles are merging onto North San Pedro Road from the northbound off-ramp.
- There are less than standard lane widths on North San Pedro Road.
- Within the project study area, there are pedestrian pathways (e.g., sidewalks and crosswalks) that do not meet current ADA standards. Existing curb ramps that do not meet current standards are also identified.

Refer to the Deficiency Matrix (Attachment J) for more information.

LEGEND

- Study Boundary
- Nonstandard Features on Highway
- Nonstandard Features on Local Roadway
- ADA Non-Compliance
- Nonstandard Bike/Pedestrian Features

MULTIMODAL INFRASTRUCTURE



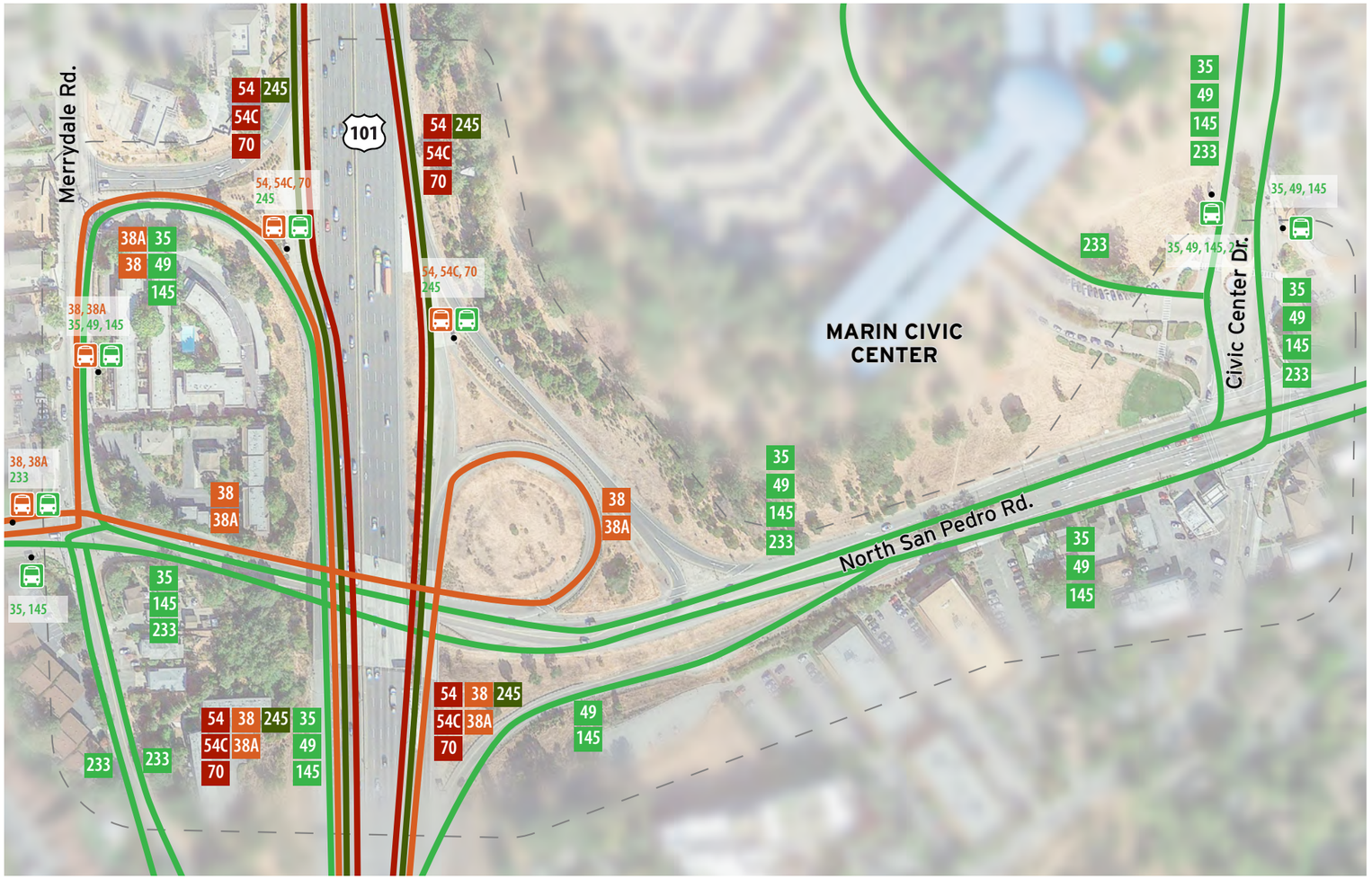
Source: Parisi Transportation Consulting 2021

LEGEND

- Study Boundary
- Traffic Signal
- Golden Gate Transit Bus Stop
- Marin Transit Bus Stop
- Class II Bike Path
- Sidewalk
- Sidewalk Under Freeway
- Unpaved Path

- The North San Pedro Road Interchange provides access to northeast San Rafael via North San Pedro Road and Merrydale Road, in addition to the destinations in the Civic Center area.
- The interchange is a 'trumpet' design with a crossroad terminating at a freeway. It contains one on- and off-ramp for each north and southbound Highway 101. The off ramp to westbound North San Pedro Road is a loop ramp. Southbound vehicle access to and from North San Pedro Road is provided via ramps located on Merrydale Road.
- The structure over Highway 101 was constructed in 1970 with a 2016 retrofit.
- North San Pedro Road contains one lane in each direction without shoulders at the Highway 101 undercrossing, expanding to two through lanes with 2-foot-wide to 7-foot -wide shoulders in each direction east of the highway. West of the undercrossing North San Pedro Road is more residential in nature, but still contains two westbound lanes which expands to three lanes at the Merrydale Road intersection. Six-foot-wide shoulders in this location are provided only on the south side of North San Pedro Road.
- The on-ramp to northbound Highway 101 extends approximately 270 feet along North San Pedro Road and permits a free-right turn onto the ramp. Short on- and off-ramps to and from southbound Highway 101 end at Merrydale Road.
- At the interchange, 6-foot-wide sidewalks are provided on both sides of North San Pedro Road, but the sidewalk on the south side does not connect to any other facility beyond the undercrossing. To walk along the roadway, pedestrians must cross the northbound ramps which are uncontrolled. Access to/from the northbound Highway 101 bus pads are provided with narrow pathways that are not ADA-accessible. Access to the southbound bus pad is accessed via a paved, narrow Class I bike path in between the southbound ramps. Sidewalks are present throughout the remainder of the study area, but the roadway network is auto-oriented and generally unfriendly to pedestrians given the wide crossings, speeds of vehicles, and lack of buffers between vehicular traffic and people on foot and on bicycles.
- Class II bike lanes are provided for a short segment of North San Pedro Road east of the interchange. The 2018 update to the San Rafael Bicycle and Pedestrian Master Plan has identified this study area as an "area of concern" for bicyclists given the lack of infrastructure and auto-oriented roadway design.
- There are a total of seven bus stops throughout the interchange study area, including the two stops located on the Highway 101 bus pads. Each bus stop serves at least three different bus routes.

TRANSIT ROUTES



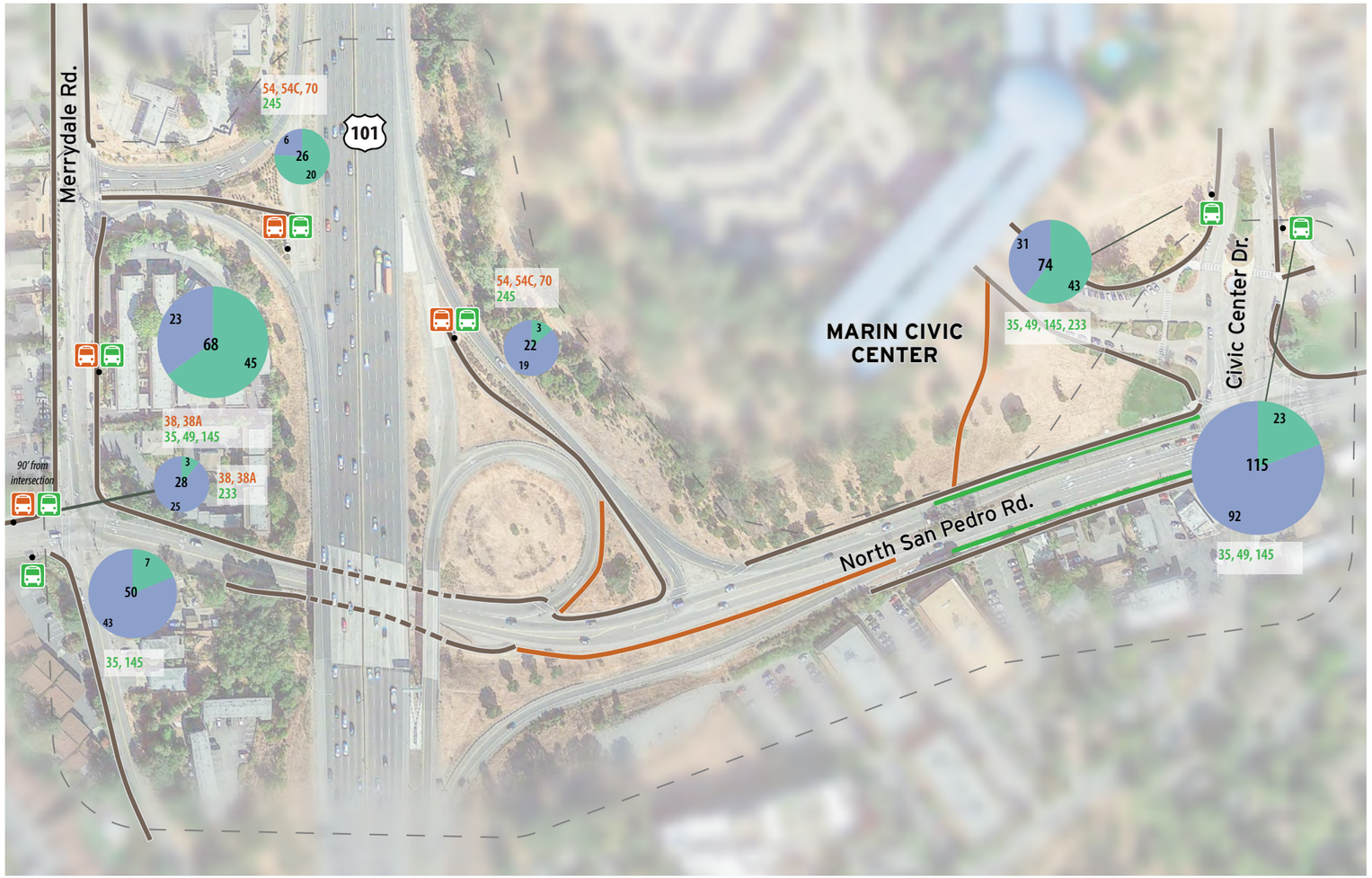
Source: Marin Transit 2020 & Golden Gate Transit 2020

- The interchange study area is served by nine separate Golden Gate Transit and Marin Transit bus routes. Five of the routes run along Highway 101 with stops at the bus pads, with the other four providing service to the Civic Center area.
- Sidewalks provide access to the study area bus stops, though there are gaps in the pedestrian facilities at the Highway 101 undercrossing. The northbound Highway 101 bus pad stop requires pedestrians to walk approximately 530 feet from North San Pedro Road along a narrow pathway adjacent to the northbound ramps. Once on North San Pedro Road pedestrians must cross uncontrolled ramps to reach the neighborhoods surrounding the interchange. The popular bus stops on Civic Center Drive are equipped with bus shelters and seating, and pedestrian access via 5-foot-wide sidewalks provide good access to Civic Center destinations.
- The bus stops on the east side of Merrydale Drive does include a bus shelter, though the design of the roadway network in this area can be considered hostile to pedestrians given the nonstandard pedestrian infrastructure in this area, the frequent curb cuts, and the adjacency to highway-bound traffic.

LEGEND

Study Boundary
Golden Gate Transit Bus Stop
Marin Transit Bus Stop
Golden Gate Transit Route
Marin Transit Route
Golden Gate Transit Route (101 Only)
Marin Transit Route (101 Only)

TRANSIT RIDERSHIP



- There are a total of seven bus stops throughout the interchange study area, including the two stops located on the Highway 101 bus pads. Each bus stop serves at least three different bus routes.
- A total of approximately 380 passengers on- and off-board buses per day in the study area. The largest bus stop by passenger volume is located on northbound Civic Center Drive at Peter Behr Drive. This stop serves approximately 115 passengers per day. The southbound Civic Center Drive bus stop serves 80 passengers per day. The northbound Merrydale Road bus stop serves 80 passengers per day that access buses that enter southbound Highway 101 immediately after departing this stop.

Source: Marin Transit 2020 & Golden Gate Transit 2020

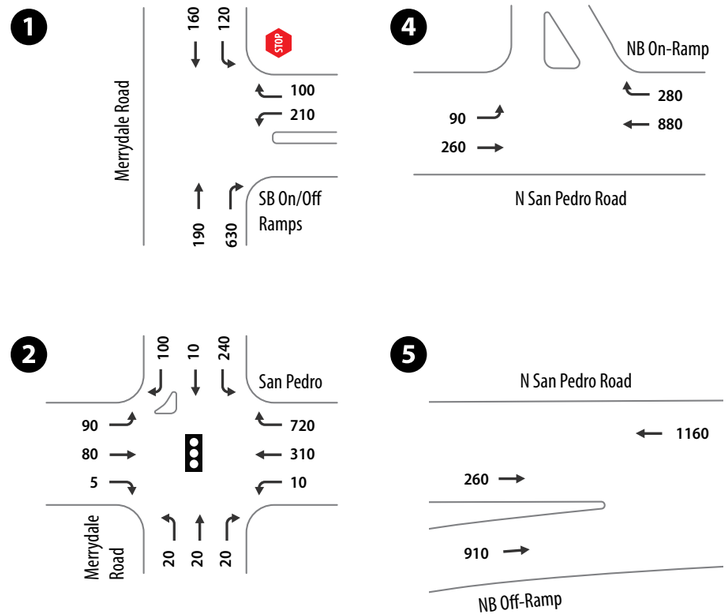
LEGEND

Study Boundary
Traffic Signal
Golden Gate Transit Bus Stop
Marin Transit Bus Stop
Class II Bike Path
Sidewalk
Sidewalk Under Freeway
Unpaved Path
Onboardings
Offboardings

WEEKDAY AM PEAK HOUR TRAFFIC VOLUMES

Source: Parisi Transportation Consulting 2021

AM Peak Hour

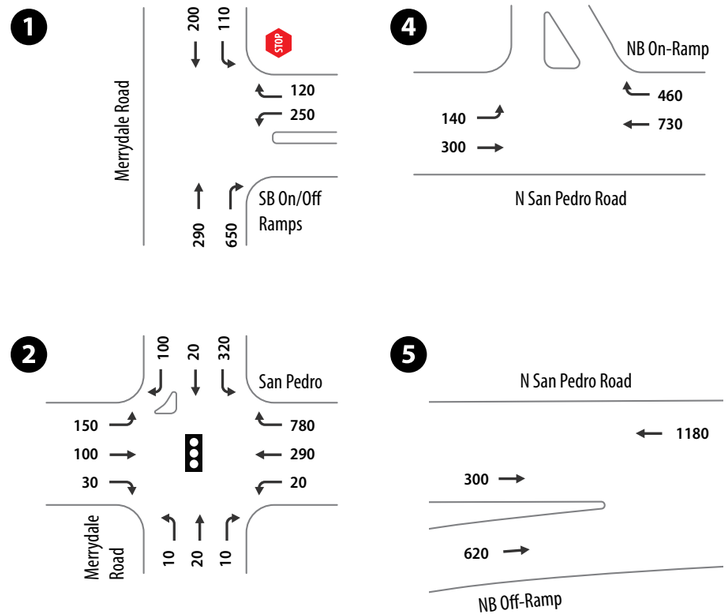


LEGEND

Study Boundary

WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

PM Peak Hour



Source: Parisi Transportation Consulting 2021

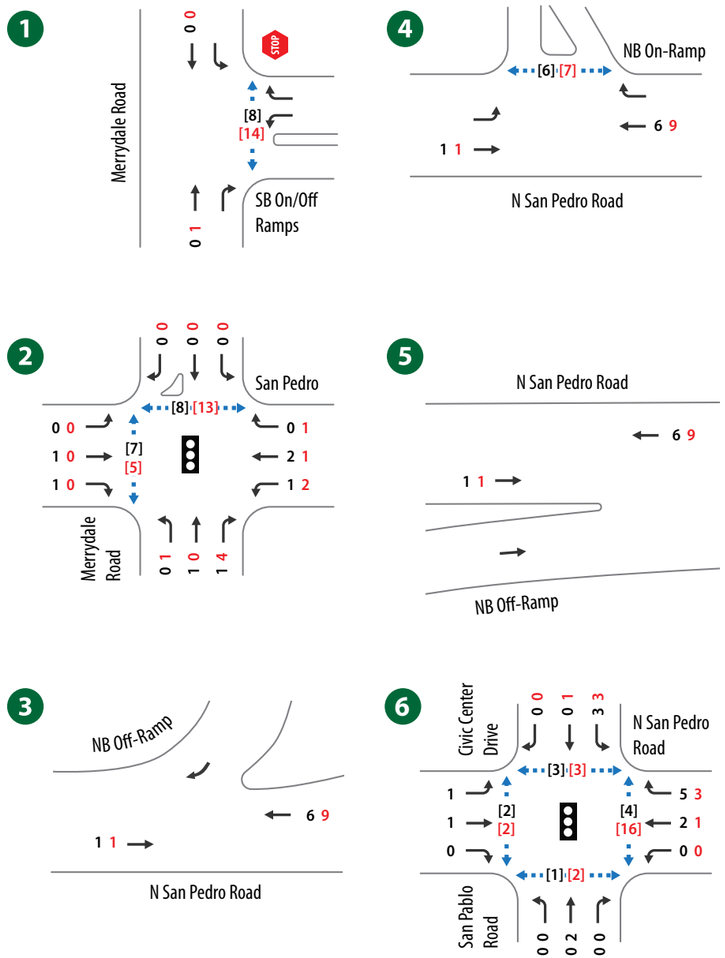
LEGEND

Study Boundary

WEEKDAY PEAK HOUR PEDESTRIAN & BICYCLE TRAFFIC VOLUMES

Source: Parisi Transportation Consulting 2021

AM and PM Peak Hours

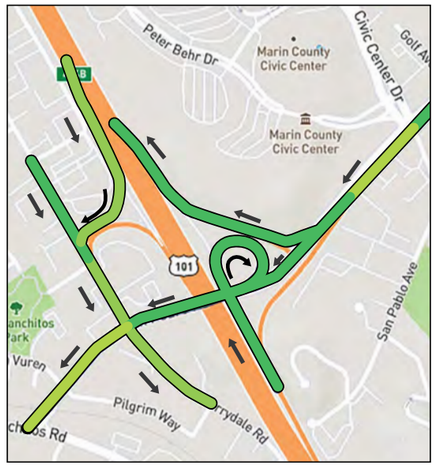


LEGEND

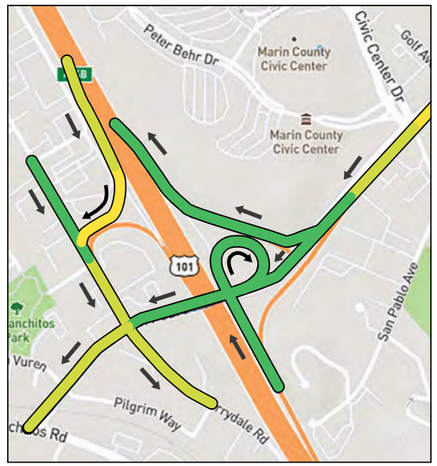
Study Boundary [xx] – Pedestrian xx - Bike [xx] – Pedestrian PM xx - Bike PM

WEEKDAY AM PEAK PERIOD CONGESTION

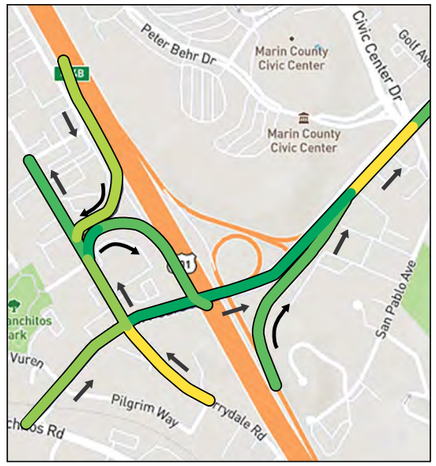
7–8 AM - Westbound & Southbound



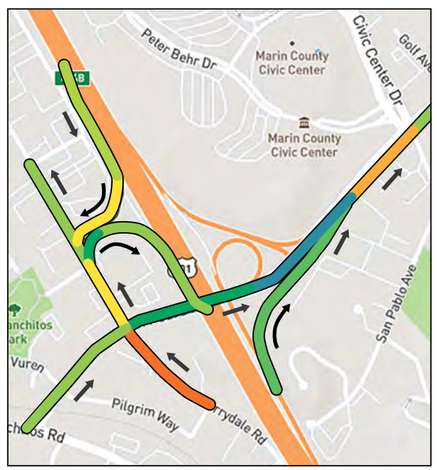
8–9 AM - Westbound & Southbound



7–8 AM - Eastbound & Northbound



8–9 AM - Eastbound & Northbound



Source: INRIX 2019

LEGEND

Study Boundary Most congested Least congested

- North San Pedro carries approximately 15,000 vehicles per day at the undercrossing.
- In the morning, peak period traffic congestion is most pronounced in the eastbound and westbound directions along North San Pedro Road from the northbound ramps. The location of the two schools on North San Pedro Road east of the interchange may be a contributing factor to this traffic congestion. Additional congestion can be found on both eastbound and westbound Merrydale Road from the adjacent residential neighborhoods to the approach to the southbound ramps.

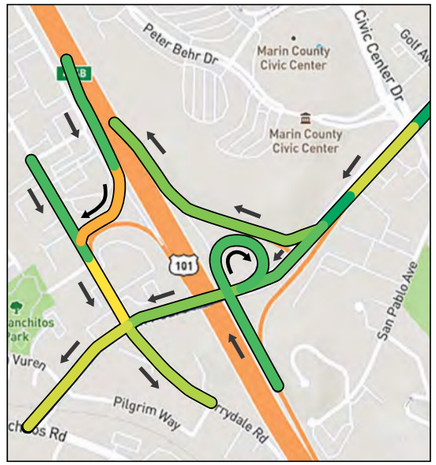
Highway 101 North San Pedro Road/Merrydale Road Interchange – AM Level of Service (LOS) Summary

No.	Intersection	LOS	Delay (s)
1	Merrydale Rd./ Hwy. 101 Southbound Ramps	C	7.1
2	Merrydale Rd./N. San Pedro Rd.	B	21.7
3	Westbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	A	5.7
4	N. San Pedro Rd./Hwy. 101 Northbound On-Ramp	A	0.7
5	Eastbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	n/a*	n/a*
6	N. San Pedro Rd./ Civic Center Dr./San Pablo Ave	C	23

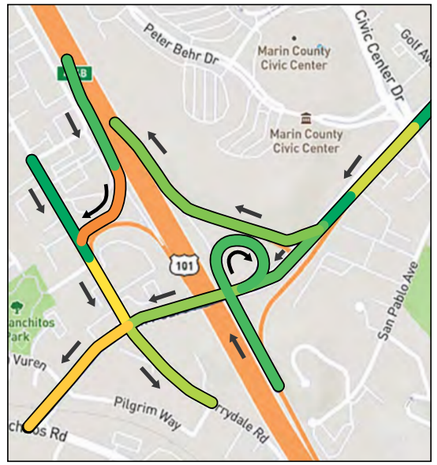
**Unable to determine LOS due to intersection's free-flow/yield-controlled configuration*

WEEKDAY PM PEAK PERIOD CONGESTION

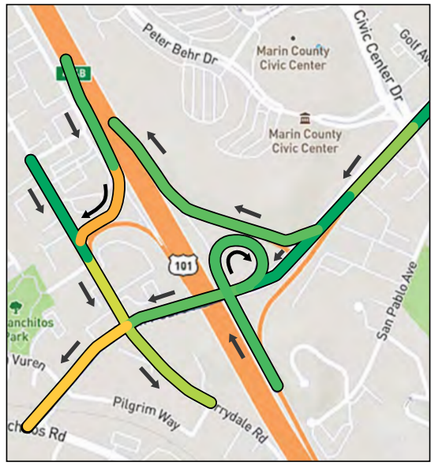
4–5 PM - Westbound & Southbound



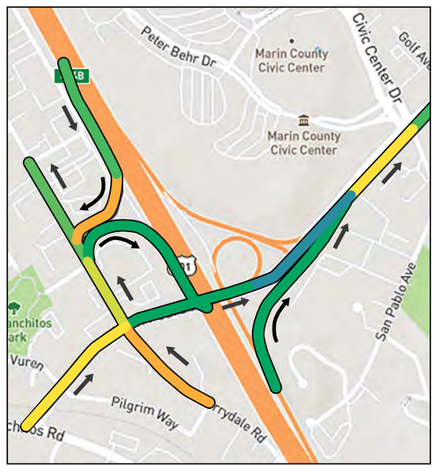
5–6 PM - Westbound & Southbound



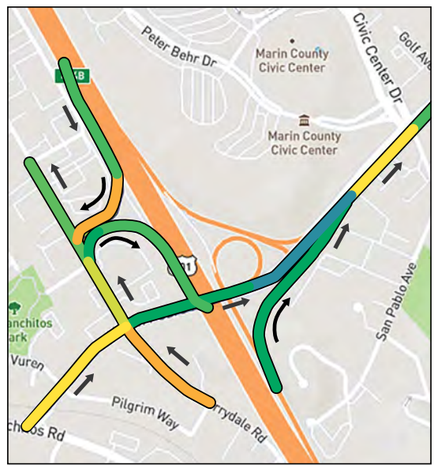
6–7 PM - Westbound & Southbound



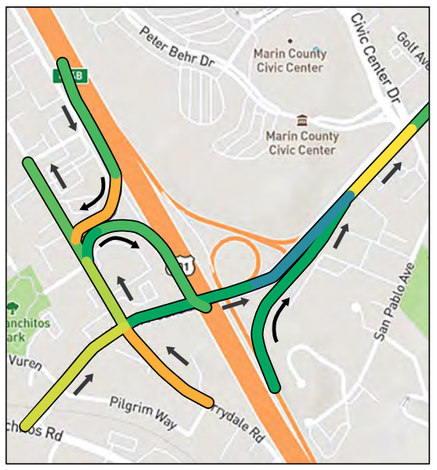
4–5 PM - Eastbound & Northbound



5–6 PM - Eastbound & Northbound



6–7 PM - Eastbound & Northbound



Source: INRIX 2019

LEGEND

Study Boundary Most congested Least congested

- Afternoon traffic congestion tends to be more focused around the southbound ramps, Merrydale Road, and Civic Center Drive west of Highway 101. Afternoon congestion is also prevalent eastbound from the interchange to the residential neighborhoods in east San Rafael.
- Inrix congestion scans correlates with the crash exhibits showing higher concentrated collisions at or near the Merrydale Road/North San Pedro Road intersection and the North San Pedro Road/ Civic Center Drive intersection. Collisions at these locations include broadsides, rear ends, and a collision involving a pedestrian.

Highway 101 North San Pedro Road/Merrydale Road Interchange – PM LOS Summary

No.	Intersection	LOS	Delay (s)
1	Merrydale Rd./ Hwy. 101 Southbound Ramps	C	16.7
2	Merrydale Rd./N. San Pedro Rd.	C	26.7
3	Westbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	D	28.5
4	N. San Pedro Rd./Hwy. 101 Northbound On-Ramp	A	0.9
5	Eastbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	n/a*	n/a*
6	N. San Pedro Rd./ Civic Center Dr./San Pablo Ave	B	15.2

**Unable to determine LOS due to intersection's free-flow/yield-controlled configuration*

CRASH TYPE

Source: SWITRS 2014-2018

- In the five-year period from 2014 – 2018, the interchange study area experienced a total of 57 reported collisions.
- Of the 57 total reported collisions, 16, or 28%, resulted in injury. This includes one collision that involved a severe injury.
- Approximately one-third of collisions were the result of a driver hitting a fixed object, with an additional 23% of collision types the result of rear ends. Another 32% of collisions were caused by sideswipes and broadsides.
- Thirty-seven percent of all collisions were the result of unsafe speeds. An additional 33% of collisions were the result of improper turning and violation of auto right of way. The collisions resulting in severe injury was due to an overturned vehicle. Unsafe speed was the primary factor in this collision.
- None of the 57 collisions involved pedestrians, and three involved bicyclists. All of the bicycle collisions resulted in minor injuries.
- Collisions took place throughout the interchange study area with some clustering of collisions at or near the North San Pedro Road intersection with Civic Center Drive and the North San Pedro Road intersection with Merrydale Road.

LEGEND

Study Boundary

TYPE OF CRASH

Head-On
Rear End
Hit Object
Side Swipe
Broadside
Other

PEDESTRIAN & BICYCLE INVOLVEMENT

Involving Bicycle

CRASH SEVERITY

- Of the 57 total reported collisions, 16, or 28% resulted in injury. This includes one collision resulting in severe injury.
- None of the 57 collisions involved pedestrians, and three involved bicyclists. The three bicycle collisions resulted in minor injuries.
- The locations of the collisions resulting in severe injury occurred at Highway 101 northbound at Civic Center Drive. The three bicycle collisions took places at three separate locations in the study area, including: Civic Center Drive at Peter Behr Drive, North San Pedro Road at Merrydale Road, and North San Pedro Road west of San Pablo Avenue.
- Of all 16 collisions resulting in injury, 31% were due to unsafe speeds with another 25% due to driving under the influence.

Source: SWITRS 2014-2018

LEGEND

Study Boundary

TYPE OF CRASH
- Minor Injury
- Severe Injury
- Fatality

PEDESTRIAN & BICYCLE INVOLVEMENT
- Involving Bicycle

ENVIRONMENTAL CONSTRAINTS

Cultural Resources

Soil types within the interchange and its surroundings are highly sensitive for buried cultural resources, which is supported by documented resources within a quarter-mile radius of the interchange study area. Ground disturbing activities could adversely impact previously documented and/or undiscovered prehistoric and historic period archaeological resources.

Changes to visual elements within the interchange may impact built environment resources, such as the Marin County Civic Center located northeast of the interchange.

Technical studies will be required to comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Native American consultation is also recommended early in project planning to gather further information on the nature and location of tribal cultural resources.

Hazardous Waste/Materials

Despite the presence of four historical releases in and near the study area, there is a low risk for encountering hazardous waste within the interchange. However, aerially-deposited lead originating from past vehicle emissions could be a source of contamination within the interchange. Proper disposal of any contaminated soil could add to the overall project cost and potentially delay construction.

An Initial Site Assessment is recommended to further evaluate potential sources of hazardous contamination.

Biological Resources/Water Quality

Habitat for special-status animal species potentially occurs within the interchange. Habitat for special-status species is known to occur near the study area. Field surveys would be needed to confirm the presence of any special-status species. If present, agency coordination would be required to identify any impacts and permitting may be required.

Sea Level Rise Susceptibility

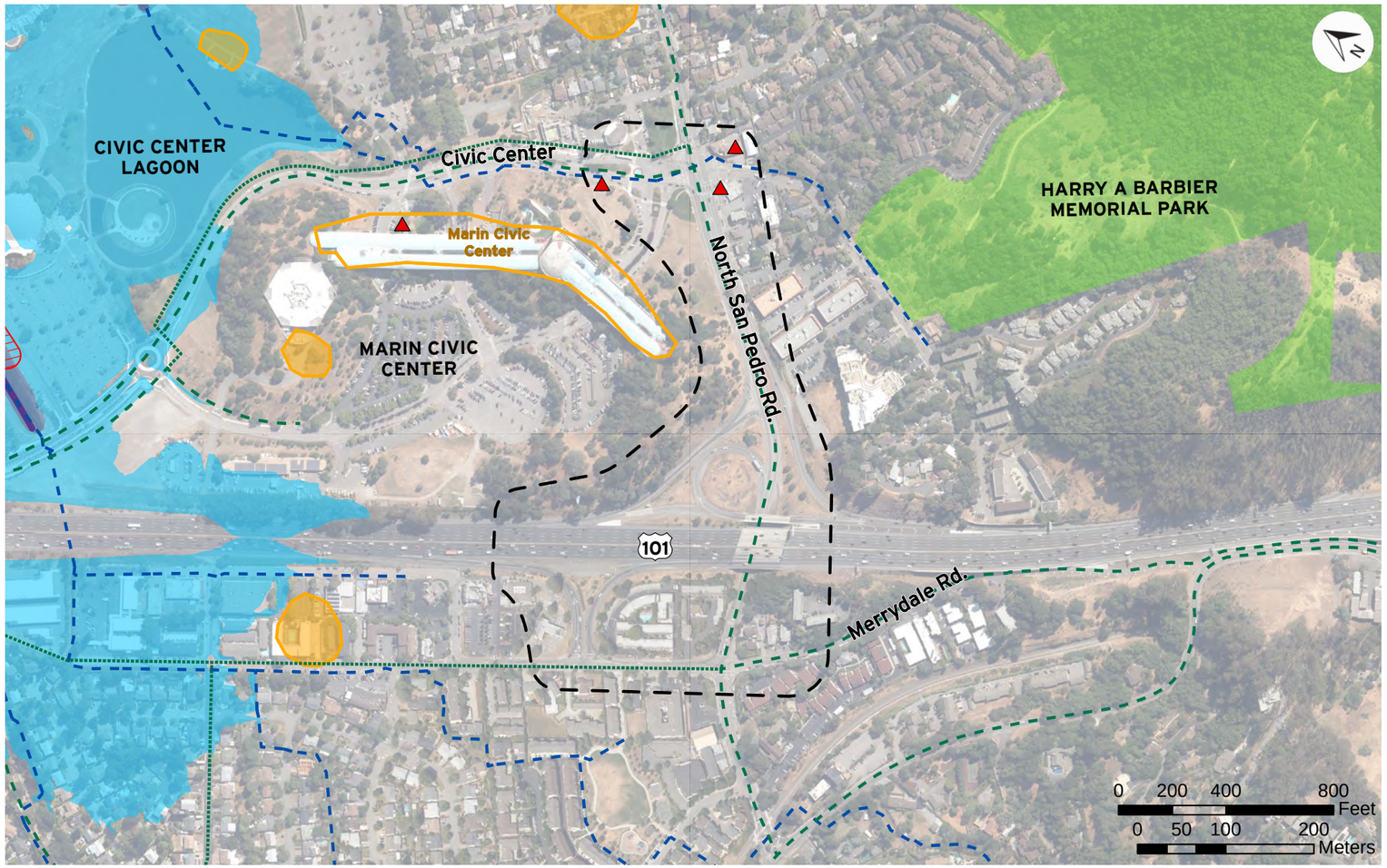
The interchange is not susceptible to SLR inundation by 2050 (1 in 200 high emissions scenario equating to two feet of SLR).

Land Use/Growth

The Marin Farmer's Market is held at the Marin Civic Center northeast of the interchange. Coordination would be required to ensure no disruptions occur to this bi-weekly event during project construction.

Based on review of applicable city general plans, there is a low likelihood that interchange improvements would induce growth.

ENVIRONMENTAL CONSTRAINTS



Sources: Golden Gate National Parks Conservancy, MarinMap, CNDDB, ART, NRHP, NHD, GeoTracker, DTSC.

- High sensitivity for buried cultural resources.
- Low-risk of encountering hazardous waste contamination.
- Potential for special-status animal species could occur within the interchange and its immediate surroundings.
- Interchange is not susceptible to SLR.

LEGEND

- Study Boundary
- Hazardous Waste
- Trail
- Park
- Proposed Bike Facility
- Existing Bike Facility
- Built Historical Resources
- Census Tract
- Environmentally Sensitive Area
- Fish Barrier
- Special-Status Plant
- Special-Status Animal
- Perennial Stream
- Intermittent Stream/Culvert
- Critical Habitat
- 36" Sea Level Rise (2052 H++)
- 108" Sea Level Rise (2092 H++)

STAKEHOLDER AGENCY AND PUBLIC OUTREACH

Stakeholder Outreach

At the onset of the project, TAM contacted representatives from the Public Works and Planning departments of the jurisdictions along the project corridor; Marin Transit; Golden Gate Bridge, Highway, and Transportation District; and Caltrans to advise them of the project and solicit a point of contact from each agency. Follow-up meetings were scheduled to seek input on issues of concern, to inform the team of planned projects within the vicinity, and to obtain project information relevant to the study. Jurisdictional stakeholders were also apprised of the evaluation process to select a 12th interchange for study and to gain their concurrence.

TAM Executive Committee and Board Briefings

Briefings were also made to the TAM Administration, Projects & Planning Executive Committee, and the TAM Board for selection of the 12th interchange and to establish the project goals and objectives for evaluation purposes.

Online Survey

An online survey was conducted between March 17 and April 16, 2021, to solicit input from Marin County residents and travelers on the project study interchange locations.

The survey was launched to support the development and refinement of the program's goals and objectives and to gather thoughts and priorities on transportation modes and deficiencies related to interchange improvements and access.

The online survey was distributed widely throughout Marin County through the following mechanisms:

- TAM social media feeds via Facebook and Twitter
- TAM project website
- TAM Traveler Newsletter
- TAM electronic mailer/e-blast
- Partner Agencies and Jurisdictions electronic mailer/e-blast – Organizations/Jurisdictions included in the distribution of the survey included California Walk & Bicycle Technical Advisory Committee, (Caltrans), Marin Transit, Golden Gate Transit, SMART Transit, and cities and towns in Marin County
- Community Groups electronic mailer/e-blast – Organizations included in the distribution of the survey were Marin Bicycle Coalition, San Rafael Canal Alliance, and others
- Paid Facebook advertisement targeting Spanish-speaking audiences
- TAM press release

A total of 2,758 participants were engaged with the survey, which was conducted in Spanish and English.

The online survey asked a series of questions mostly in multiple choice format with the last question allowing participants to provide additional input. These questions were:

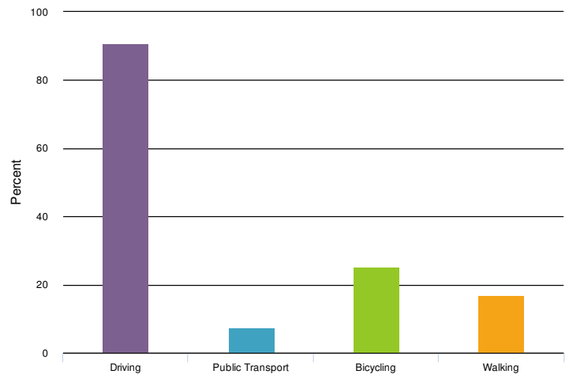
1. How do you normally travel through this interchange? Select up to 2.
    a. Driving
    b. Public Transport
    c. Bicycling
    d. Walking
2. What are the main purposes you use this interchange for? Select up to 2.
    a. Commuting to/from work
    b. School
    c. Shopping
    d. Recreation
    e. Other (please specify)
3. Please rank the following priorities (listed below) for this interchange based on their importance to you. (Priorities were ranked not important, lower importance, no opinion, somewhat important, most important.)
    a. Reduce traffic congestion
    b. Make it easier to drive to and ride from this interchange
    c. Improve the quality and access to bus stops near this interchange
    d. Increase Park and ride capacity
    e. Make it safer to walk around this interchange
    f. Make it safer to bike around this interchange
    g. Improve lighting and security
    h. Improve environmental sustainability (e.g. protection from flooding and sea level rise)
4. Is there anything else you'd like to let us know about traveling on or around this interchange?

Refer to the Online Survey Comments (Attachment K) for a summary of the comments received for the North San Pedro Road/Merrydale Road Interchange.

	Not Important	Lower Importance	No Opinion	Somewhat Important	Most Important
Reduce traffic congestion	10.5%	18.9%	11.6%	31.6%	27.4%
Make it easier to drive to and from this interchange	12.8%	9.6%	14.9%	20.2%	42.6%
Improve the quality and access to bus stops near this interchange	13.7%	13.7%	33.7%	24.2%	14.7%
Increase Park and Ride capacity	26.3%	14.7%	38.9%	10.5%	9.5%
Make it safer to walk around this interchange	7.4%	6.3%	17.9%	28.4%	40.0%
Make it safer to bike around this interchange	10.5%	7.4%	18.9%	18.9%	44.2%
Improve lighting and security	8.5%	8.5%	31.9%	28.7%	22.3%
Improve environmental sustainability and resiliency (e.g., protection from flooding and sea level rise)	12.6%	13.7%	43.2%	16.8%	13.7%

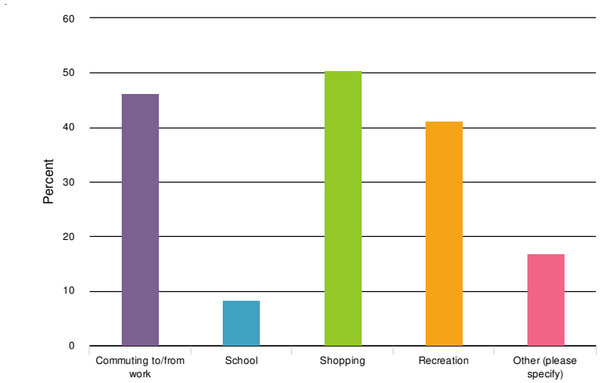
NORTH SAN PEDRO ROAD/MERRYDALE ROAD

How do you normally travel through this interchange? Select up to two



Value	Percent
Driving	90.5%
Public Transport	7.4%
Bicycling	25.3%
Walking	16.8%

What are the main purposes you use this interchange for? Select up to two



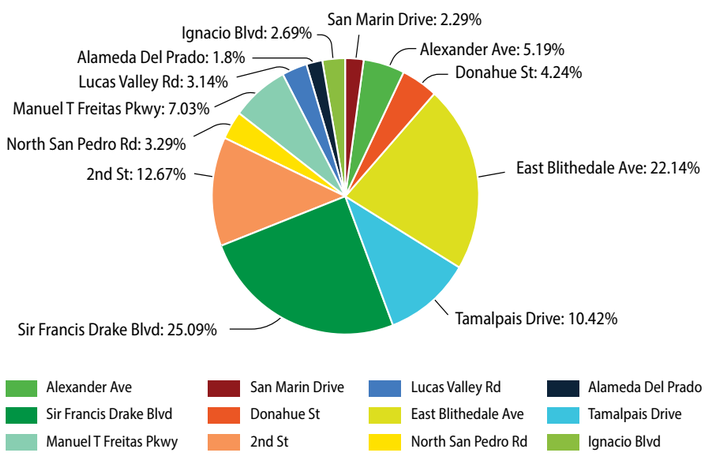
Value	Percent
Commuting to/from work	46.3%
School	8.4%
Shopping	50.5%
Recreation	41.1%
Other (please specify)	16.8%

A total of 58 participants provided additional input for the North San Pedro Road/Merrydale Road interchange. Responses from those surveyed are summarized below:

- Traffic operations (i.e., improve congestion, signage, ramp entrance/exit safety/proximity, and merging safety)
- Provide a safe bike and pedestrian facility
- Improve pedestrian lighting
- Increase park and ride capacity
- Improve access to bus stops
- Improve ADA compliance
- Increase public transit options
- Ramp configuration at Merrydale Ave
- Northbound on-ramp merge to mainline
- Northbound off-ramp merge with local traffic to Civic Center
- Consideration for roundabout application in general
- Short merge to southbound 101 mainline

Corridor Summary

The chart below describes the breakdown by interchange for the 2,758 surveyed. The interchange receiving the most input was Sir Francis Drake Blvd with 25.09%, followed by East Blithedale Ave with 22.14%. The third and fourth ranked interchanges in terms of input received were Second Street with 12.67% and Tamalpais Drive with 10.42%. The remaining interchanges received less than 10% of the total input received.



meta-chart.com

Opportunities and Concept Development

PRELIMINARY INTERCHANGE AREA CONCEPTS

This section describes the improvement opportunities identified for the North San Pedro Road/Merrydale Road Interchange to address operational deficiencies and safety for all users of the interchange and approaching roadways. These improvements will alleviate existing nonstandard conditions by upgrading existing facilities for vehicular traffic, transit users, pedestrians, and bicyclists.

Concepts aim to address safety for all modes and will provide the following upgrades within the project study area:

- Curb ramps upgraded to meet current ADA requirements.
- Existing traffic signals upgraded and interconnected, where beneficial.
- High visibility crosswalks installed at pedestrian crossings.
- Class II and IV bike lanes painted green.
- Existing sidewalks widened to a 6-foot-wide minimum.
- Minimum 11-foot-wide travel lanes provided.

These features may not necessarily be identified on the concept plans, but they have been accounted for in the project's conceptual cost. The concepts developed take into consideration the deficiencies noted in the preceding sections, data collected from field observations, and an understanding of the interchange from discussions with the local jurisdictions and transit agency representatives.

In addition, the concepts take into consideration planned developments and project improvements in the vicinity of the interchange and projected traffic conditions to the year 2040.

For this interchange, the study has assessed the following projects that have been studied or are currently under consideration:

- Caltrans' Ramp Metering System project that proposes to install ramp metering at all remaining locations on Highway 101 in Marin County.
- San Rafael Bicycle Pedestrian Master Plan 2018 Update

Concepts have been developed as near- and long-term concepts, which are based primarily on ease of implementation using the following guidelines:

- Near-term projects generally include improvements that may not necessarily be complicated in design, are lower cost, and require a less rigorous project approval process. For example, these improvements can be squaring off curb returns or lane reassignment within the current right of way to provide for a Class II bike lane and sidewalk widening.
- Long-term projects generally include improvements that are more complicated in design, entail significant capital investment, have right of way requirements, and require a more involved project development and approval process. For example, long-term improvements could be a proposal for a bridge widening/replacement or modification to freeway entry and exit points that will require Caltrans and Federal Highway Administration (FHWA) review and approval.

Note that the near-term design features are generally included in the long-term project, allowing for phased implementation to meet funding availability.

The improvement concepts have been shared with the local jurisdictions and transit agency representatives, who have had an opportunity to review and comment on the concepts presented.

Each concept has been assessed for utility impacts, right of way requirements, and potential for environmental impacts. Conceptual cost estimates have been prepared for the near- and long-term concepts.

Examples of Potential Near-Term and Long-Term Improvements

Near-Term	Long-Term
Lane reconfiguration and reassignments	Separated bike/pedestrian paths
Resolve discontinuities in bike lanes	Separate bike/pedestrian overcrossings
Resolve paths of travel and ADA	Structure widening
Signalization and crossing protections	Roundabouts
Tighten curb returns/shorten sidewalks	New interchange configuration
Ramp metering	Significant right of way acquisitions
Access to transit and interconnectivity	Significant environmental impacts

Near-Term Concept

The NB ramp entrance at North San Pedro Road is proposed to be reconfigured. The NB diagonal off-ramp is reconfigured to allow for a bus only left turn at the new signalized intersection which allows en route NB buses to re-enter the mainline via the NB diagonal on-ramp. Vehicles exiting on the NB diagonal off-ramp will continue to the east to merge with EB North San Pedro Road. The NB loop off-ramp that conforms to North San Pedro Road is realigned to enter at a more perpendicular angle and comes to a controlled stop before turning right to merge with local traffic. The NB on-ramp is also reconfigured with a tighter curb radius, reducing the width of the entrance to the ramp.

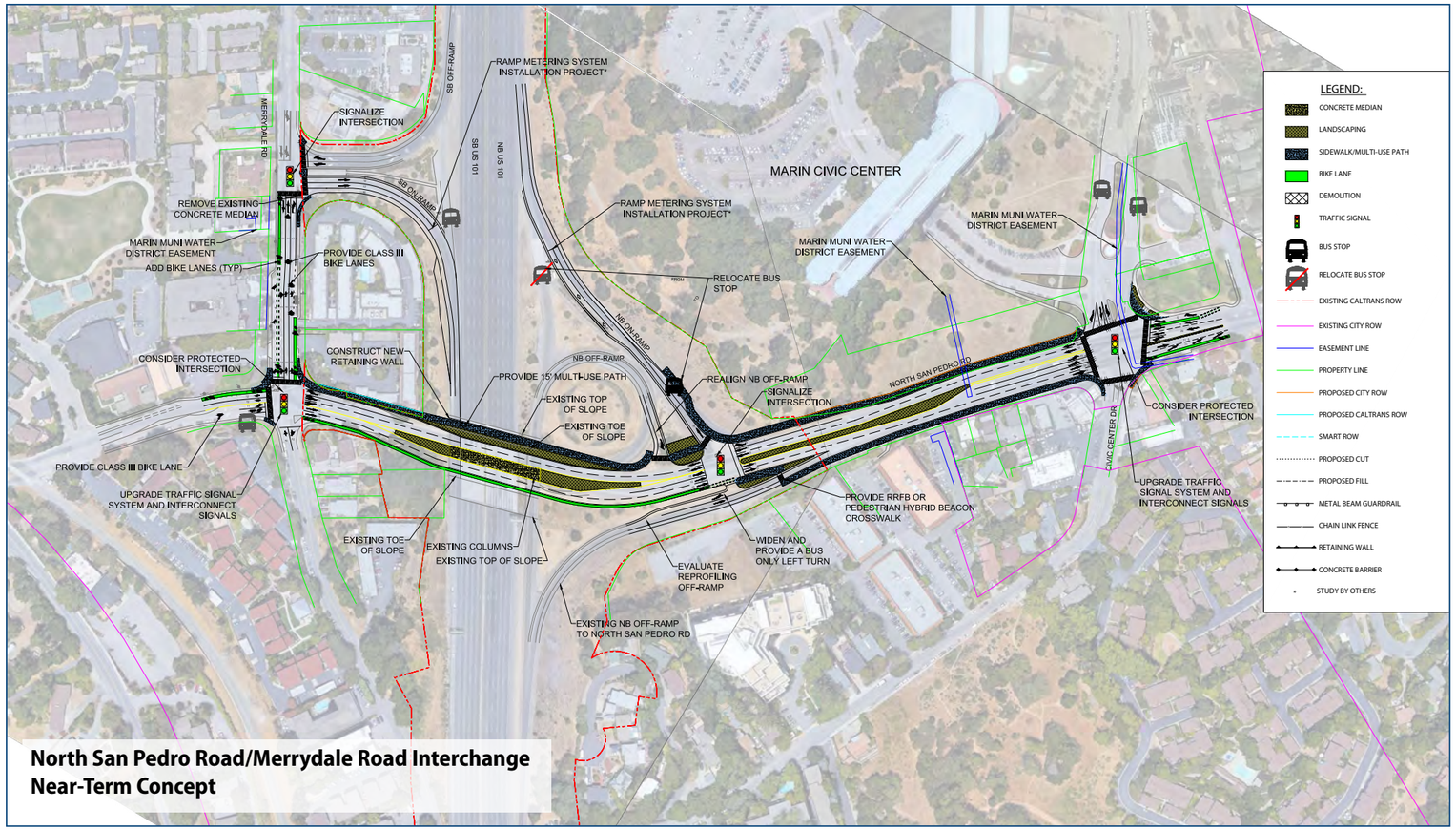
At the local street level, EB North San Pedro Road is realigned to the south to provide two thru lanes between Merrydale Road to Civic Center Drive. The North San Pedro undercrossing will be modified to allow for the EB North San Pedro Road travel lanes to fit south of the existing columns. EB North San Pedro will merge to one thru lane after the Civic Center Drive intersection to conform. WB North San Pedro is widened to provide for two thru lanes, a 15-foot-wide sidewalk and a landscaped median is provided between Civic Center Drive and Merrydale Road. The widening for WB North San Pedro at the North San Pedro undercrossing will remove the existing slope paving and install a retaining wall to accommodate the wider roadway width.

Merrydale Road is proposed to be restriped to provide two-NB lanes with the thru lane striped as a Class III. A dedicated right-turn lane is provided at the new signalized intersection at Merrydale Road at the SB on-ramp. SB Merrydale Road is restriped to provide one thru lane and opens up at the North San Pedro Road intersection to provide a dedicated right-turn, a share left-turn lanes at the signalized intersection of North San Pedro Road.

The existing porkchop islands located at the intersection of Merrydale Road and North San Pedro Road will be removed and curb radii will be tightened up with high visibility pedestrian crossings.

On EB North San Pedro Road, a Class III bike lane is provided just before the Merrydale Road intersection and will connect bicyclists to a Class II bike lane east of the intersection. This Class II bike lane will be provided for bicyclists headed eastbound on North San Pedro Avenue to a new multi-use path located on south side of North San Pedro Road extending to Civic Center Drive. The crosswalk at the NB diagonal off-ramp will provide users with a pedestrian hybrid beacon to navigate across the off-ramp safely. The multi-use path will continue past Civic Center Drive and conform to a Class II bike lane past the intersection.

On WB North San Pedro Road, a Class II bike lane is provided before the Civic Center Drive intersection and will connect bicyclists to a multi-use path on the north side of the roadway. This multi-use path extends from Civic Center Drive to Merrydale Road and conforms to a Class II bike lane west of the Merrydale Road intersection.



North San Pedro Road/Merrydale Road Interchange Near-Term Concept

Transit improvements include relocating the existing NB bus stop off of the NB loop off-ramp to the entrance of the NB diagonal on-ramp. The new proposed multi-use path on the north side of North San Pedro Road will be connect transit users. A new pedestrian crossing is provided at the new NB ramp signalized intersection to allow transit users to cross from the south side of North San Pedro Road, improving overall accessibility to this bus stop. All other bus stop locations within the project study area will remain in their current location.

Refer to Attachment I for the exhibit associated with the near-term concept.

Long-Term Concept

The long-term concept will carry many features mentioned in the near-term concept with the exceptions below.

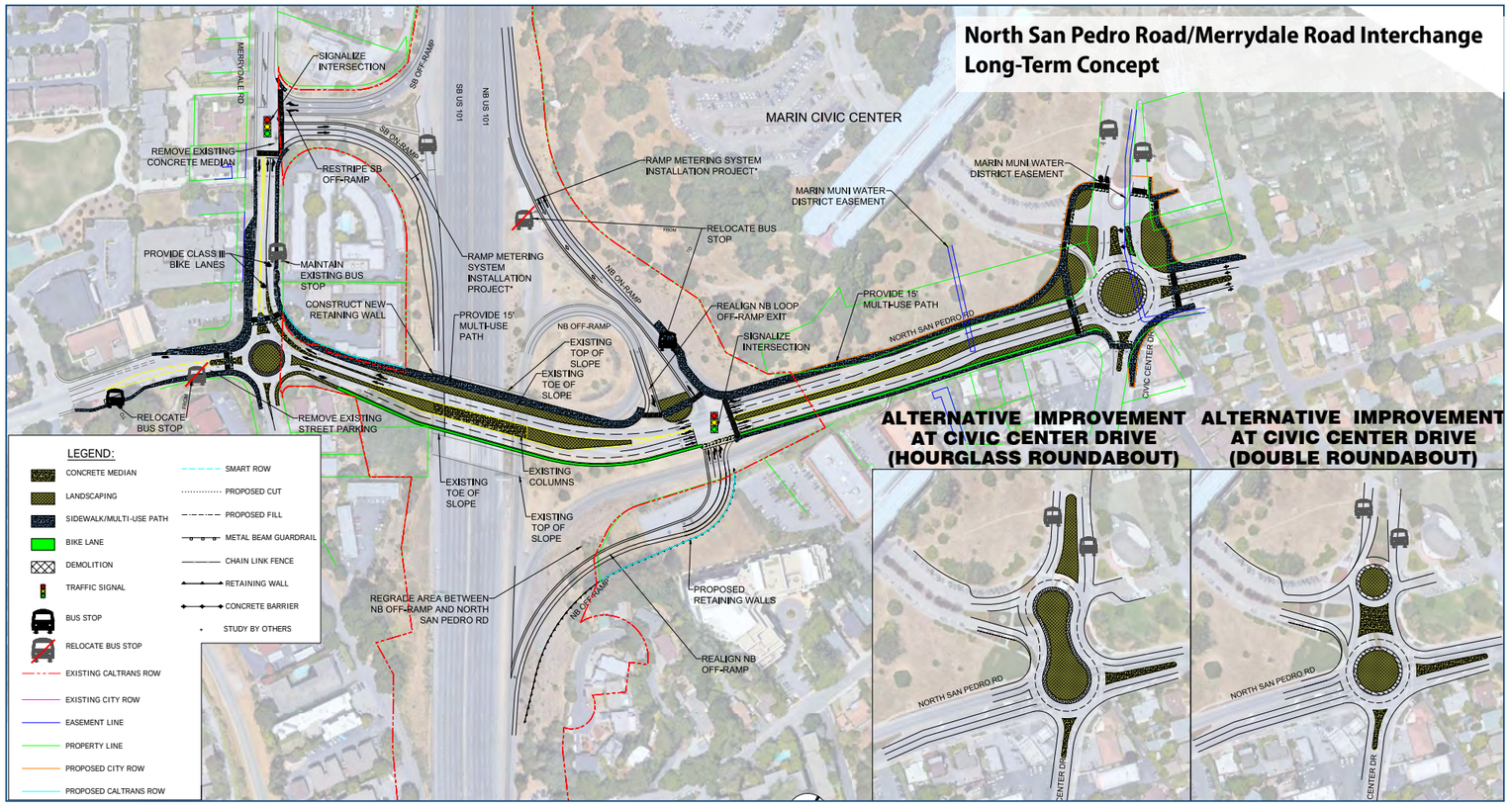
The NB diagonal off-ramp that conforms to North San Pedro Road is proposed to be realigned with the NB on-ramp entrance at a signalized intersection. The NB off-ramp will exit the mainline on a single lane and open up to three lanes at the intersection. The three lanes will consist of one thru and two right-turn-only lanes. The thru movement on the NB off-ramp allows for en route NB buses to exit and re-enter the NB on-ramp to pick up transit riders before merging back onto NB U.S. 101.

At the North San Pedro Road and Merrydale Road intersection, a roundabout will be proposed to improve vehicular traffic flow and bike/pedestrian connectivity in lieu of a signalized intersection. The roundabout will provide a single lane vehicular movement. WB drivers accessing the SB on-ramp on Merrydale Road are provided with a dedicated right-turn lane at the Merrydale Road roundabout and runs north to enter the SB on-ramp. High visibility crosswalks for pedestrians and green painted crossings for bicyclists are provided on the north and west side of the roundabout. To accommodate the roundabout at the Merrydale Road and North San Pedro Road intersection, an existing bus stop located west of the intersection is proposed to relocate approximately 100 feet to the west with a new bus pull out provided.

A roundabout is also considered at the North San Pedro and Civic Center Drive intersection in lieu of a signalized intersection. The roundabout will provide two lanes for vehicular movements. High visibility crosswalks for pedestrians and green painted crossings for bicyclists are proposed at the roundabout providing users with connectivity in all directions. Alternate roundabout options also considered at Civic Center Drive include an hour-glass roundabout and a double roundabout.

On the south side of North San Pedro Road between the realigned NB off-ramp and Civic Center Drive, a standard sidewalk is provided. Pedestrians are able to utilize the high visibility crossing at Civic Center Drive or at the NB ramps to connect to the multi-use path on the north side of the roadway.

A continuous Class II bike lane is provided on the south side of North San Pedro Road between the intersection of Merrydale Road and Civic Center Drive.



Refer to Attachment I for the exhibit associated with the long-term concept.

Utility Requirements

Attachment C provides the utility conflict matrix summarizing the impacts for the near-term and long-term concepts. A recommended disposition is provided for each utility for this phase of work. It is recommended that these utilities be further evaluated in subsequent design phases as the design is further refined.

A summary of the major utilities identified and affected by the concepts are noted below.

Utility impacts identified for only the near-term concept are:

- In the vicinity of North San Pedro and Civic Center Drive, there are water lines (2", 8") identified to be protected in place.
- In the vicinity of the Civic Center Drive, there are gas and 12 kilovolt (kV) electrical lines identified to be protected in place.

Utility impacts common to near- and long-term concepts are:

- In the vicinity of Merrydale Road, there are gas sized 12" and 16", 12" water lines identified to be protected in place.
- In the vicinity of North San Pedro and Civic Center, there is a gas and 12 kV electric line identified to be protected in place.

Utility impacts identified for only the long-term concepts are:

- In the vicinity of the intersection at Merrydale Road and North San Pedro Road, a water and sanitary sewer line proposed to be relocated due to conflict with proposed improvements.
- Along North San Pedro Road near the Civic Center Drive intersection, there is a sanitary sewer line identified to be relocated due to conflict with proposed improvements.

Right of Way Requirements

The project collected GIS right of way information from MarinMap, Caltrans and right of way record maps, and assessor's map to assess the right of way requirements for the alternatives developed. The findings are summarized in **Attachment D** listing the right of way requirements for the near- and long-term concepts. The right of way requirements will be further refined in subsequent design phases as the design is further refined.

No additional right of way takes were identified for the near- and long-term concepts developed under this study.

There are no private properties identified to be impacted by the proposed project improvements.

Environmental Considerations

Benefit to Environmental Justice Communities

Although Census data indicates there are no federally defined minority or low-income Environmental Justice communities within the project area, MTC has defined an Equity Priority Community (EPC) west of Highway 101. This EPC includes low-income, senior, and disabled persons. The multi-modal improvements (pedestrian, bicycle, and transit) under both the near and long-term improvements would offer a similar level of benefit to this community, promoting alternatives modes of transportation and reducing the barrier effect caused by Highway 101.

Ability to Gain Project Approvals

Soil types within the project area are highly sensitive for buried cultural resources. Ground disturbing activities could adversely impact undiscovered prehistoric and historic period archaeological resources. Long-term improvements, in particular, would have an elevated risk of encountering buried cultural resources. If resources are encountered, regulatory approvals may be required.

Changes to visual elements within project area could impact the Marin County Civic Center, which is listed on the National Register of Historic Places (NRHP). Near-term improvements involve minor work at the intersection of North San Pedro Road/Civic Center Drive, but could result in indirect impacts to this resource. Long-term improvements would construct one (or more) roundabouts at the entrance to the Civic Center. Both direct and indirect impacts to this resource could occur. Agency coordination and potentially mitigation would be required.

Habitat for special-status animal species occurs within the project area. Near-term improvements would have limited risk of impacting these species. However, long-term improvements would involve work outside of Caltrans' right of way and within vegetated areas. This disturbance elevates the risk of impacting biological resources, and could require agency coordination, permitting, and/or mitigation.

Cost Estimate

The project cost for the near-term and long-term improvements are summarized below:

		Escalated Total Project Cost
1	North San Pedro / Merrydale Road near-term	$27,700,000
2	North San Pedro / Merrydale Road long-term	$48,700,000

The long-term concept included alternative roundabout options at the intersection of Civic Center Drive and North San Pedro Road. The cost for the roundabout alternatives were determined to be similar in cost and a separate cost estimate was determined not needed.

The escalated project cost assumes the project for near-term and long-term will start construction in 5 years with estimated start to be April 2026 at an annual escalation rate of 3.5%. The project cost is conceptual and will be further refined in subsequent phases.

Refer to Attachment B for backup support for the conceptual cost.

Funding

The Highway 101 Interchange and Approaching Roadway Study is funded through Measure AA – the re-authorization of the 1/2-Cent Transportation Sales Tax, approved by voters in 2018. The funding will be used to leverage regional, state and federal funds for a program of improvements that will be determined through the TAM Board in coordination with Caltrans and the local jurisdictional stakeholders.

Regional and state transportation funding opportunities increased with passage of the Bay Area's Regional Measure 3 in June 2018, and California's Senate Bill 1 (SB1) in 2017. Federal funding is anticipated to play a larger role with recent passage of the Infrastructure Investment and Jobs Act (IIJA) in 2021. In addition, the Highway 101 interchange improvement projects are anticipated to be competitive to a number of grant programs that promote regional and state goals for sustainability and equity, access and mobility, congestion management, clean air, and climate action, such as the Active Transportation Program (ATP), the Transportation Fund for Clean Air (TFCA), and the Climate Action Plan for Transportation Infrastructure (CAPTI).

PROJECT IMPLEMENTATION

As part of this study, each of the 12 interchanges will undergo evaluation and prioritization with the goal of identifying the most appropriate projects to move forward into project development.

It is anticipated that the improvements proposed under both the near- and long-term concepts would follow the typical three-phase Caltrans project development process for approval of work within the state's right of way.

- PID (Project Study Report-Project Development Support)
- PA&ED
- PS&E

Project Initiation

The first step in the process is for funding to be obtained for preparation of the PID for the selected project(s). This would likely be sponsored by TAM under Measure AA – the reauthorized ½-cent transportation sales tax that was approved by Marin voters in 2018 – or with assistance from other local and regional funding sources.

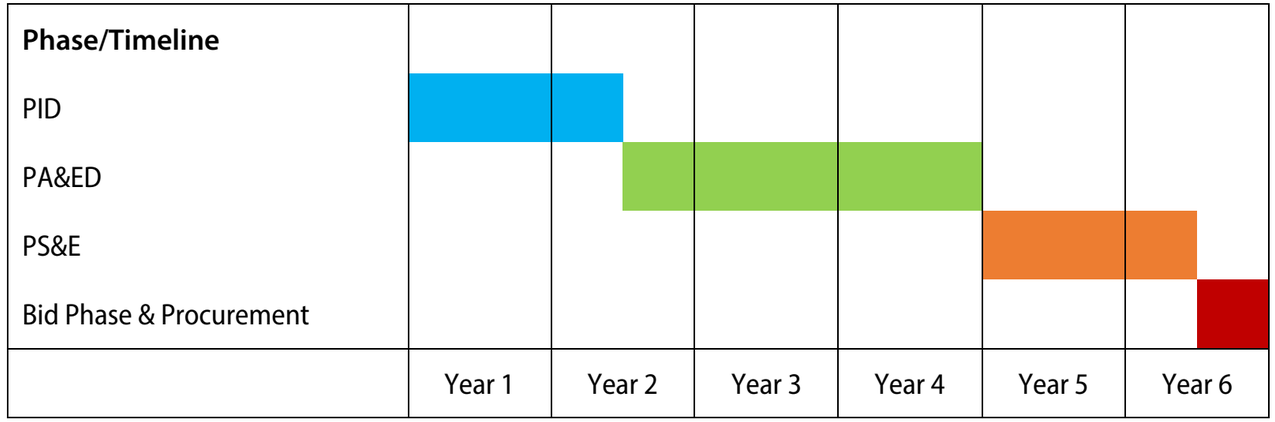
The document would refine and scope the project, or project alternatives, and define the level of effort needed for the environmental phase, including the level of environmental document anticipated and what supporting technical studies would be required. Coordination is required with MTC to ensure the project is entered into the current RTP (Plan Bay Area 2050) and with Caltrans to ensure they have appropriate resources scheduled to support the project.

Phased Implementation

Elements of the project could be implemented in a phased manner by either TAM or the City of San Rafael to meet funding opportunities. For example, improvements outside of Caltrans' right of way could be implemented without entailing the Caltrans project development process, or smaller scale improvements could progress through the Caltrans encroachment permit process once environmental clearance was obtained. Additionally, elements of the project could be incorporated into projects sponsored by Caltrans, such as the long-range ramp-squaring project identified by the System Planning Group.

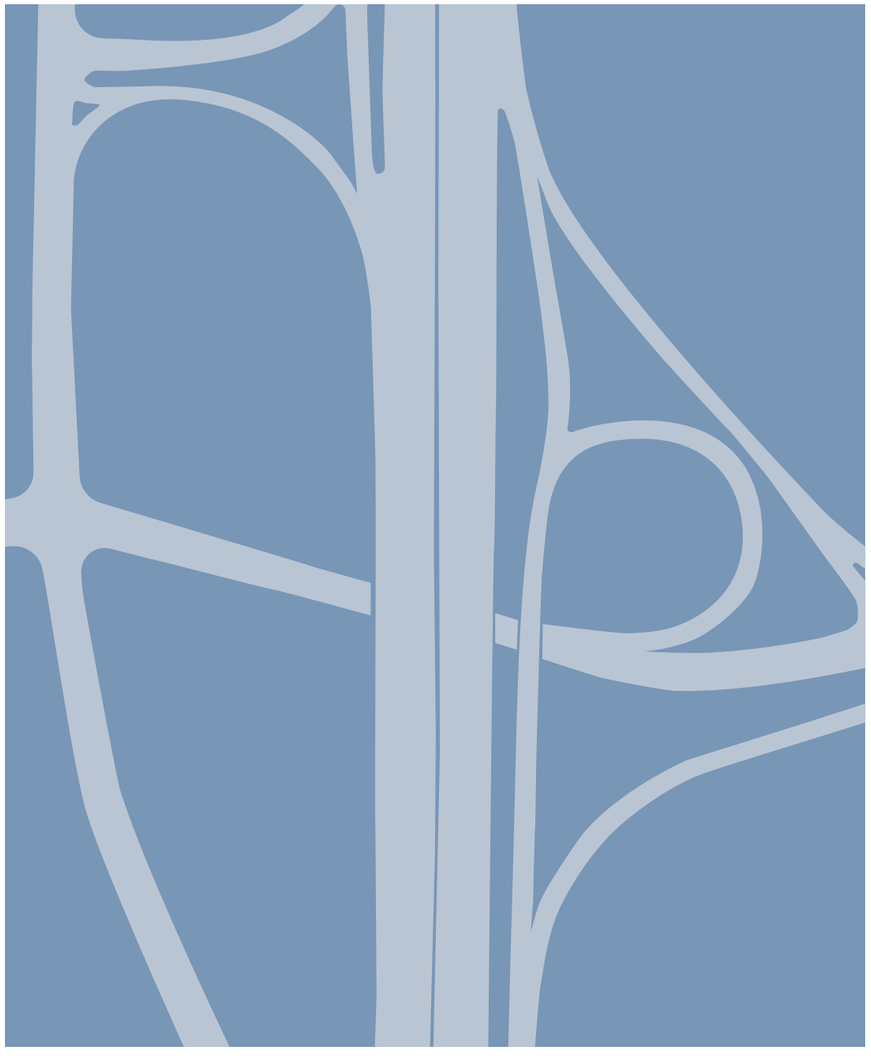
Timeline

The following chart provides a representative timeline for project development.



Next Steps

1. TAM Board to select a projects(s) to move forward into project development in consultation with agency stakeholders.
2. TAM and the local jurisdiction will coordinate with MTC to have the project included in the current RTP.
3. TAM and the local jurisdiction will secure funding for the PID and will enter into a cooperative agreement with Caltrans for project development.
4. TAM will work with the local jurisdiction and a Project Development Team to prepare the PID for Caltrans approval to proceed to the PA&ED Phase for a locally funded project. Alternatively, TAM can work with the local jurisdiction and a Project Development Team to identify design features that can be implemented through the Caltrans encroachment permit process or on the approaching roadways outside of Caltrans' right of way.
5. TAM and the local jurisdiction will seek funding for subsequent phases of the project. If there is insufficient funding available, it may be possible to phase the improvements.



NORTH SAN PEDRO ROAD/ MERRYDALE ROAD

ATTACHMENTS

A. Project Base Map

B. Cost Estimates (Near-Term and Long-Term)

C. Utility Impact Matrix

D. Right of Way Requirement Matrix

E. Existing and 2040 Traffic Volumes

F. Collision Data

G. Transit Ridership Data

H. Synchro Output

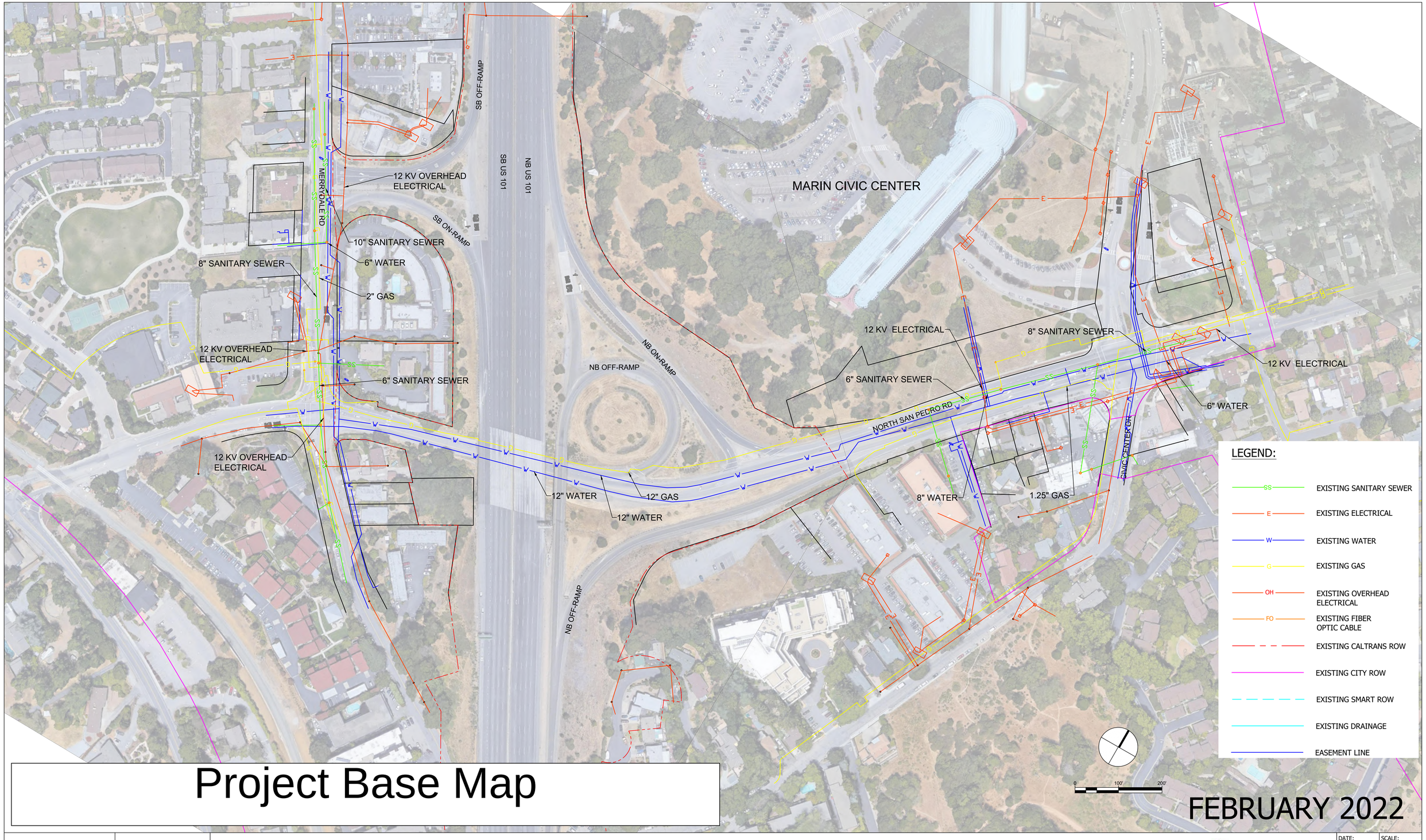
I. Preliminary Conceptual Plans

J. Deficiency Matrix

K. Online Survey Comments

L. Existing FEMA Map

A. Project Base Map



LEGEND:

- SS — EXISTING SANITARY SEWER
- E — EXISTING ELECTRICAL
- W — EXISTING WATER
- G — EXISTING GAS
- OH — EXISTING OVERHEAD ELECTRICAL
- FO — EXISTING FIBER OPTIC CABLE
- EXISTING CALTRANS ROW
- EXISTING CITY ROW
- EXISTING SMART ROW
- EXISTING DRAINAGE
- EASEMENT LINE

Project Base Map

FEBRUARY 2022

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TRANSPORTATION AUTHORITY OF MARIN
HIGHWAY 101 INTERCHANGE IMPLEMENTATION STUDY
NORTH SAN PEDRO ROAD / MERRYDALE ROAD

Transportation Authority of Marin

DATE:	SCALE: 1"=100'
FILENAME:	
PROJECT:	
SHEET NO.	

B. Cost Estimates (Near-Term and Long-Term)

Project Cost Estimate

Project Owner:	Transportation Authority of Marin
Project Description:	Hwy 101 Interchange and Approach Roadway Improvement Program
Location:	North San Pedro / Merrydale Road - Near Term Improvements
Type of Estimate:	Conceptual Level Cost Estimate
Prepared by:	HNTB

SUMMARY OF PROJECT OUTLAY COSTS

		Current Year Cost	Escalated Cost
I	ROADWAY	$ 15,249,053	$ 17,802,232
II	STRUCTURES	$ -	$ -
III	RIGHT OF WAY	$ 1,883,194	$ 2,198,501
	TOTAL CAPITAL OUTLAY COST	**$ 17,132,248**	**$ 20,000,733**
IV	PRELIMINARY ENGINEERING/ENVIRONMENTAL	$ 1,219,924	$ 1,306,813
V	DESIGN ENGINEERING	$ 1,524,905	$ 1,578,277
VI	DESIGN SERVICES DURING CONSTRUCTION	$ 457,472	$ 457,472
VII	CONSTRUCTION MANAGEMENT	$ 2,287,358	$ 2,450,275
	TOTAL SUPPORT COST	**$ 5,489,659**	**$ 5,792,837**
	DIRECT PROJECT COST	**$ 22,621,907**	**$ 25,793,571**
VIII	AGENCY MANAGEMENT	$ 2,287,358	$ 3,012,014
	TOTAL PROJECT COST	**$ 24,909,265**	**$ 28,805,584**

Project Cost Estimate

Project Owner: Transporation Authority of Marin
Project Description: Hwy 101 Interchange and Approach Roadway Improvement Program
Location: North San Pedro / Merrydale Road - Near Term Improvements

Item code	Description	Unit	Quantity	Unit Price ($)	Cost	
I. Roadway						
01 Earthwork						
1.1	Clearing & Grubbing	LS	1	30,000.00	$ 30,000	
1.2	Roadway Excavation	CY	0	65.00	$ -	
				Subtotal for Item 01 Earthwork	**$ 30,000**	
02 Pavement Structural Section						
2.1	Remove Curb and Gutter	LF	2,900	25.00	$ 72,500	
2.2	Remove Concrete Sidewalk	SF	14,500	5.00	$ 72,500	
2.3	Remove Asphalt Concrete Pavement	SF	85,000	5.00	$ 425,000	
2.4	Remove Concrete Island	SF	3,000	10.00	$ 30,000	
2.5	Remove Concrete Slope Paving	SF	0	50.00	$ -	
2.6	Pavement Section	SF	99,100	11.00	$ 1,090,100	
2.7	Microsurfacing	SF	150,000	1.00	$ 150,000	
2.8	Curb and Gutter	LF	6,200	65.00	$ 403,000	
2.9	Sidewalk / Multi-Use Path	SF	44,000	5.00	$ 220,000	
2.10	Concrete Island/Median	SF	6,200	25.00	$ 155,000	
				Subtotal for Item 02 Pavement Structural Section	**$ 2,618,100**	
03 Drainage						
3.1	Drainage (assume % of Roadway Cost Items 1 through 2)	1%			$ 26,481.00	
				Subtotal of Item 03 Drainage	**$ 26,481**	
04 Specialty Items						
4.1	Metal Beam Guard Railing	LF	0	65.00	$ -	
4.2	ADA Curb Ramps	EA	23	4,700.00	$ 108,100	
4.3	Concrete Barrier	LF	0	300.00	$ -	
4.4	Retaining Wall (Caltrans Type 1) (H=4'-10')	SQFT	0	160.00	$ -	
4.5	Retaining Wall (Caltrans Type 1) (H=10'-20')	SQFT	2,400	190.00	$ 456,000	
4.6	Remove Metal Beam Guard Railing	LF	0	20.00	$ -	
4.7	Remove Concrete Barrier	LF	0	50.00	$ -	
				Subtotal for Items 04 Specialty Items	**$ 564,100**	
05 Environmental						
5.1	Landscape and Irrigation	SF	24,100	35.00	$ 843,500	
5.2	Environmental Mitigation (assume % of Total Cost of Items 1 through 5.1)	20%			$ 816,436	
				Subtotal for Item 05 Environmental	**$ 1,659,936**	
06 Traffic						
06a Traffic Items						
6a.1	Traffic Signal Upgrade	EA	2	350,000.00	$ 700,000	
6a.2	Pedestrian Hybrid Beacon (PHB)	EA	1	175,000.00	$ 175,000	
6a.3	Rapid Reflective Flashing Beacons (one pair)	EA	0	25,000.00	$ -	
6a.4	Traffic Signal Priority	EA	1	150,000.00	$ 150,000	
6a.5	Traffic Operations Systems (Ramp Metering)	EA	0	350,000.00	$ -	
6a.6	Traffic Signal (New)	EA	2	500,000.00	$ 1,000,000	
				Subtotal for Item 06a Traffic Items	**$ 2,025,000**	
					Subtotal Sections 1 through 6a	**$ 6,923,617**
06b Additional Traffic Items						
6b.1	High Visibility Crosswalk (cost by width of roadway)	LF	1,000	36.00	$ 36,000	
6b.2	Highway Signage Structure	EA	0	1,000,000.00	$ -	
6b.3	Signing and Striping	LS	1	200,000.00	$ 200,000	
6b.4	Remove Signing and Striping	1%			$ 69,236	
6b.5	Roadway Lighting	5%			$ 346,181	
6b.6	Stage Construction and Traffic Handling	LS	1	200,000.00	$ 200,000	
6b.7	Protected Intersection	EA	2	1,000,000.00	$ 2,000,000	
				Subtotal for Item 06b Traffic Items	**$ 2,851,417**	
					Subtotal Sections 1 through 6	**$ 9,775,034**
07 Minor Items						
7.1	American with Disabilities Act Items	1%			$ 97,750.34	
7.2	Bike Path Items	1%			$ 97,750	
7.3	Other Minor Items	8%			$ 782,003	
				Subtotal of Item 07 Minor Items	**$ 977,503**	
08 Roadway Mobilization						
8.1	Roadway Mobilization	10%			$ 977,503	
				Subtotal for Item 08 Roadway Mobilization	**$ 977,503**	
09 Roadway Contingency						
9.1	Roadway Contingency (assume % of total cost of Section Items 01-08)	30%			$ 3,519,012	
				Subtotal for Item 09 Roadway Contingency	**$ 3,519,012**	
					Subtotal for Items 1-9 (Roadway)	**$ 15,249,053**

Project Cost Estimate

Project Owner: Transporation Authority of Marin
Project Description: Hwy 101 Interchange and Approach Roadway Improvement Program
Location: North San Pedro / Merrydale Road - Near Term Improvements

Item code	Description	Unit	Quantity	Unit Price ($)	Cost	
II. Structures						
10 Structures						
10.1	Bridge Demolition	SF	0	60.00	$ -	
10.2	New Bridge Structure	SF	0	500.00	$ -	
10.3	Bridge Widening	SF	0	600.00	$ -	
10.4	Pedstrian Overcrossing (including ramp)	SF	0	550.00	$ -	
10.5	Pedestrian Undercrossing (including ramp)	SF	0	600.00	$ -	
10.6	Tunnel	SF	0	1,200.00	$ -	
10.7	Structure modification	SF	0	700.00	$ -	
			Subtotal for Item 10 Structures		**$** -	
10.8	Structure Contingency	30%			$ -	
					Subtotal for Structures	**$** -
	TOTAL CONSTRUCTION COST (TCC) - SUM OF ITEMS 1-10 (ROADWAY AND STRUCTURES)					**$ 15,249,053**
III. Right of Way						
III.1	Right of Way Acquisition	SF	11,502	65.00	$ 747,630	
III.2	TCE	SF	26,400	15.00	$ 396,000	
III.3	Utility Relocation (assume % of total cost of Section 01-10)	2%			$ 304,981	
			Subtotal for Item 11 Right of Way		**$ 1,448,611**	
III.4	Right of Way Contingency	30%			$ 434,583.32	
					Subtotal for Right of Way	**$ 1,883,194**
Engineering and Management Costs						
			TCC	**Duration (Year)**	**Unescalatd Risk Loaded**	**Escalated (per year of TCC)**
						(escalation rate = 3.5%)
IV	**Preliminary Engineering/Environmental**	8%	***$ 15,249,053***	*2*	$ 1,219,924.27	$ 1,306,813.38
V	**Design Engineering**	10%	***$ 15,249,053***	*1*	$ 1,524,905.34	$ 1,578,277.03
VI	**Design Services During Construction**	3%	***$ 15,249,053***	*2*	$ 457,471.60	$ 457,471.60
VII	**Construction Management**	15%	***$ 15,249,053***	*2*	$ 2,287,358.01	$ 2,450,275.08
VIII	**Agency Management**	15%	***$ 15,249,053***	*8*	$ 2,287,358.01	$ 3,012,013.70
Escalation						
		Value				
	Date of Estimate (Month/Year)	11/4/2021				
	Anticipated Project Initiation Document Start (1-year duration)	April 2022				
	Anticipated year to begin construction (Month Year)	April 2026				
	Estimated construction duration (in years)	2				
	Years of Escalation (to start of construction)	4.5				
	Annual Escalation Rate, percentage	3.5%				
	Total Escalation	117%				
					Current Year Cost	**Escalated**
			Escalated Roadway Cost		**$ 15,249,053**	**$ 17,802,232**
			Escalated Structure Cost		**$ -**	**$ -**
			Escalated Right of Way Cost		**$ 1,883,194**	**$ 2,198,501**

Project Cost Estimate

Project Owner:	Transportation Authority of Marin
Project Description:	Hwy 101 Interchange and Approach Roadway Improvement Program
Location:	North San Pedro / Merrydale Road - Long Term Improvements
Type of Estimate:	Conceptual Level Cost Estimate
Prepared by:	HNTB

SUMMARY OF PROJECT OUTLAY COSTS

		Current Year Cost	Escalated Cost
I	ROADWAY	$ 26,689,495	$ 31,158,169
II	STRUCTURES	$ -	$ -
III	RIGHT OF WAY	$ 1,484,977	$ 1,733,609
	TOTAL CAPITAL OUTLAY COST	**$ 28,174,471**	**$ 32,891,778**
IV	PRELIMINARY ENGINEERING/ENVIRONMENTAL	$ 2,135,160	$ 2,287,236
V	DESIGN ENGINEERING	$ 2,668,949	$ 2,762,363
VI	DESIGN SERVICES DURING CONSTRUCTION	$ 800,685	$ 800,685
VII	CONSTRUCTION MANAGEMENT	$ 4,003,424	$ 4,288,568
	TOTAL SUPPORT COST	**$ 9,608,218**	**$ 10,138,852**
	DIRECT PROJECT COST	**$ 37,782,689**	**$ 43,030,630**
VIII	AGENCY MANAGEMENT	$ 4,003,424	$ 5,271,745
	TOTAL PROJECT COST	**$ 41,786,114**	**$ 48,302,375**

Project Cost Estimate

Project Owner: Transporation Authority of Marin
Project Description: Hwy 101 Interchange and Approach Roadway Improvement Program
Location: North San Pedro / Merrydale Road - Long Term Improvements

Item code	Description	Unit	Quantity	Unit Price ($)	Cost	
I. Roadway						
01 Earthwork						
1.1	Clearing & Grubbing	LS	1	50,000.00	$ 50,000	
1.2	Roadway Excavation	CY	20,000	65.00	$ 1,300,000	
				Subtotal for Item 01 Earthwork	**$ 1,350,000**	
02 Pavement Structural Section						
2.1	Remove Curb and Gutter	LF	4,200	25.00	$ 105,000	
2.2	Remove Concrete Sidewalk	SF	24,000	5.00	$ 120,000	
2.3	Remove Asphalt Concrete Pavement	SF	155,500	5.00	$ 777,500	
2.4	Remove Concrete Island	SF	3,000	10.00	$ 30,000	
2.5	Remove Concrete Slope Paving	SF	0	50.00	$ -	
2.6	Pavement Section	SF	160,100	11.00	$ 1,761,100	
2.7	Microsurfacing	SF	100,000	1.00	$ 100,000	
2.8	Curb and Gutter	LF	11,000	65.00	$ 715,000	
2.9	Sidewalk / Multi-Use Path	SF	62,100	5.00	$ 310,500	
2.10	Concrete Island/Median	SF	13,500	25.00	$ 337,500	
				Subtotal for Item 02 Pavement Structural Section	**$ 4,256,600**	
03 Drainage						
3.1	Drainage (assume % of Roadway Cost Items 1 through 2)		1%		$ 56,066.00	
				Subtotal of Item 03 Drainage	**$ 56,066**	
04 Specialty Items						
4.1	Metal Beam Guard Railing	LF	0	65.00	$ -	
4.2	ADA Curb Ramps	EA	41	4,700.00	$ 192,700	
4.3	Concrete Barrier	LF	0	300.00	$ -	
4.4	Retaining Wall (Caltrans Type 1) (H=4'-10')	SQFT	0	160.00	$ -	
4.5	Retaining Wall (Caltrans Type 1) (H=10'-20')	SQFT	20,000	190.00	$ 3,800,000	
4.6	Remove Metal Beam Guard Railing	LF	0	20.00	$ -	
4.7	Remove Concrete Barrier	LF	0	50.00	$ -	
				Subtotal for Items 04 Specialty Items	**$ 3,992,700**	
05 Environmental						
5.1	Landscape and Irrigation	SF	59,300	35.00	$ 2,075,500	
5.2	Additional Environmental Needs	LS	1	800,000.00	$ 800,000	
5.3	Environmental Mitigation (assume % of Total Cost of Items 1 through 5.2)		20%		$ 2,506,173	
				Subtotal for Item 05 Environmental	**$ 5,381,673**	
06 Traffic						
06a Traffic Items						
6a.1	Traffic Signal Upgrade	EA	0	350,000.00	$ -	
6a.2	Pedestrian Hybrid Beacon (PHB)	EA	0	175,000.00	$ -	
6a.3	Rapid Reflective Flashing Beacons (one pair)	EA	0	25,000.00	$ -	
6a.4	Traffic Signal Priority	EA	1	150,000.00	$ 150,000	
6a.5	Traffic Operations Systems (Ramp Metering)	EA	0	350,000.00	$ -	
6a.6	Traffic Signal (New)	EA	2	500,000.00	$ 1,000,000	
				Subtotal for Item 06a Traffic Items	**$ 1,150,000**	
					Subtotal Sections 1 through 6a	**$ 16,187,039**
06b Additional Traffic Items						
6b.1	High Visibility Crosswalk (cost by width of roadway)	LF	1,000	36.00	$ 36,000	
6b.2	Highway Signage Structure	EA	0	1,000,000.00	$ -	
6b.3	Signing and Striping	LS	1	200,000.00	$ 200,000	
6b.4	Remove Signing and Striping		1%		$ 161,870	
6b.5	Roadway Lighting		2%		$ 323,741	
6b.6	Stage Construction and Traffic Handling	LS	1	200,000.00	$ 200,000	
				Subtotal for Item 06b Traffic Items	**$ 921,611**	
					Subtotal Sections 1 through 6	**$ 17,108,650**
07 Minor Items						
7.1	American with Disabilities Act Items		1%		$ 171,086.50	
7.2	Bike Path Items		1%		$ 171,087	
7.3	Other Minor Items		8%		$ 1,368,692	
				Subtotal of Item 07 Minor Items	**$ 1,710,865**	
08 Roadway Mobilization						
8.1	Roadway Mobilization		10%		$ 1,710,865	
				Subtotal for Item 08 Roadway Mobilization	**$ 1,710,865**	
09 Roadway Contingency						
9.1	Roadway Contingency (assume % of total cost of Section Items 01-08)		30%		$ 6,159,114	
				Subtotal for Item 09 Roadway Contingency	**$ 6,159,114**	
					Subtotal for Items 1-9 (Roadway)	**$ 26,689,495**

Project Cost Estimate

Project Owner: Transporation Authority of Marin
Project Description: Hwy 101 Interchange and Approach Roadway Improvement Program
Location: North San Pedro / Merrydale Road - Long Term Improvements

Item code	Description	Unit	Quantity	Unit Price ($)	Cost	
II. Structures						
10 Structures						
10.1	Bridge Demolition	SF	0	60.00	$ -	
10.2	New Bridge Structure	SF	0	500.00	$ -	
10.3	Bridge Widening	SF	0	600.00	$ -	
10.4	Pedstrian Overcrossing (including ramp)	SF	0	550.00	$ -	
10.5	Pedestrian Undercrossing (including ramp)	SF	0	600.00	$ -	
10.6	Tunnel	SF	0	1,200.00	$ -	
10.7	Structure modification	SF	0	700.00	$ -	
				Subtotal for Item 10 Structures	**$ -**	
10.8	Structure Contingency		30%		$ -	
					Subtotal for Structures	**$ -**
	TOTAL CONSTRUCTION COST (TCC) - SUM OF ITEMS 1-10 (ROADWAY AND STRUCTURES)					**$ 26,689,495**
III. Right of Way						
III.1	Right of Way Acquisition	SF	5,000	65.00	$ 325,000	
III.2	TCE	SF	18,900	15.00	$ 283,500	
III.3	Utility Relocation (assume % of total cost of Section 01-10)		2%		$ 533,790	
				Subtotal for Item 11 Right of Way	**$ 1,142,290**	
III.4	Right of Way Contingency		30%		$ 342,686.97	
					Subtotal for Right of Way	**$ 1,484,977**

Engineering and Management Costs						
			TCC	**Duration (Year)**	**Unescalatd Risk Loaded**	**Escalated (per year of TCC)**
						(escalation rate = 3.5%)
IV	**Preliminary Engineering/Environmental**	8%	***$ 26,689,495***	*2*	$ 2,135,159.57	$ 2,287,236.31
V	**Design Engineering**	10%	***$ 26,689,495***	*1*	$ 2,668,949.46	$ 2,762,362.69
VI	**Design Services During Construction**	3%	***$ 26,689,495***	*2*	$ 800,684.84	$ 800,684.84
VII	**Construction Management**	15%	***$ 26,689,495***	*2*	$ 4,003,424.19	$ 4,288,568.08
VIII	**Agency Management**	15%	***$ 26,689,495***	*8*	$ 4,003,424.19	$ 5,271,745.15

Escalation					
		Value			
	Date of Estimate (Month/Year)	11/4/2021			
	Anticipated Project Initiation Document Start (1-year duration)	April 2022			
	Anticipated year to begin construction (Month Year)	April 2026			
	Estimated construction duration (in years)	2			
	Years of Escalation (to start of construction)	4.5			
	Annual Escalation Rate, percentage	3.5%			
	Total Escalation	117%			
				Current Year Cost	**Escalated**
			Escalated Roadway Cost	**$ 26,689,495**	**$ 31,158,169**
			Escalated Structure Cost	**$ -**	**$ -**
			Escalated Right of Way Cost	**$ 1,484,977**	**$ 1,733,609**

C. Utility Impact Matrix

Utility Conflict Matrix

Project Owner: Transportation Authority of Marin
Project No. : P20062
Project Description: Utility Conflict Assessment
Highway or Route: US 101- Marin County

Utility Conflict Matrix Developed/Revised By: WRECO
Date: 10/27/2021
Reviewed By:
Date:

Note: refer to subsheet for utility conflict cost analysis.

Utility Owner and/or Contact Name	Conflict ID	Location	Utility Type	Size and/or Material	Utility Conflict Description	Recommended Disposition
PG&E	34	North San Pedro Rd LT & NT (5975607.84, 2190743.25) 419 LF	Gas	16"	sidewalk improvement by Merrydale Rd	Confirm depth. Protect in place
MMWD	37	North San Pedro Rd LT & NT (5976413.19, 2190918.22) 2086 LF	Water	12"	from Merrydale Rd to Civic Center Dr sidewalks/median islands	Confirm depth. Protect in place
MMWD	38	North San Pedro Rd LT & NT (5975607.93, 2190879.49) 533 LF	Water	N/A	walkway by Merrydale Rd from North to South	Confirm depth. Protect in place
PG&E	42	North San Pedro Rd LT & NT (5975667.77, 2190761.50) 159 LF	Gas	N/A	sidewalk improvement by Merrydale Rd	Confirm depth. Protect in place
PG&E	44	North San Pedro Rd LT & NT (5976533.79, 2191099.78) 2454 LF	Gas	12"	from Merrydale Rd to Civic Center Dr sidewalks/median islands	Confirm depth. Protect in place
PG&E	50	North San Pedro Rd LT & NT (5976970.64, 2191466.82) 724 LF	Gas	N/A	North San Pedro between Civi and NB ramp Median improvements	Confirm depth. Protect in place
PG&E	51	North San Pedro Rd LT & NT (5976960.87, 2191499.15) 266 LF	Electric	12kV	North San Pedro between Civi and NB ramp sidewalk imrpovements	Confirm depth. Protect in place
MMWD	52	North San Pedro Rd LT & NT (5976941.40, 2191525.76) 111 LF	Water	8"	North San Pedro between Civi and NB ramp sidewalk imrpovements	Confirm depth. Protect in place
MMWD	53	North San Pedro Rd LT & NT (5977093.43, 2191530.18) 149 LF	Water	2"	North San Pedro between Civi and NB ramp sidewalk imrpovements	Confirm depth. Protect in place
Las Gallinas Valley S.D.	54	North San Pedro Rd LT & NT (5977171.46, 2191638.36) 113 LF	Sanitary Sewer	6"	North San Pedro between Civic and NB ramp Median improvements and sidewalk imrpovements	Relocate sewer North or South from proposed roundabout.
PG&E	56	North San Pedro Rd LT & NT 5977266.44, 2191839.89) 684 LF	Gas	N/A	Civic Median improvements	Relocate gas South from proposed roundabout.
PG&E	58	North San Pedro Rd LT & NT (5977231.76, 2191663.83) 266 LF	Electric	12kV	Civic Median/sidewalk improvements	Confirm depth. Protect in place
PG&E	60	North San Pedro Rd LT & NT (5977293.36, 2191770.11) 289 LF	Electric	12kV	Civic Median/sidewalk improvements	Confirm depth. Protect in place
PG&E	61	North San Pedro Rd LT & NT (5977299.80, 2191788.05) 178 LF	Electric	12kV	Civic Median/sidewalk improvements	Confirm depth. Protect in place

Key:
[List of acronyms used in the utility conflict matrix]

Utility Conflict Matrix

Project Owner: Transportation Authority of Marin
Project No. : P20062
Project Description: Utility Conflict Assessment
Highway or Route: US 101- Marin County

Utility Conflict Matrix Developed/Revised By: WRECO
Date: 10/27/2021
Reviewed By:
Date:

Note: refer to subsheet for utility conflict cost analysis.

Utility Owner and/or Contact Name	Conflict ID	Location	Utility Type	Size and/or Material	Utility Conflict Description	Recommended Disposition
PG&E	34	North San Pedro Rd LT & NT (5975607.84, 2190743.25) 419 LF	Gas	16"	sidewalk improvement by Merrydale Rd	Confirm depth. Protect in place
Las Gallinas Valley S.D.	35	North San Pedro Rd LT (5975665.82, 2190689.83) 237 LF	Sanitary Sewer	6"	sidewalk improvement by Merrydale Rd	Relocate sewer and MH outside of proposed roundabout
Las Gallinas Valley S.D.	36	North San Pedro Rd LT (5975618.21, 2190662.01) 106 LF	Sanitary Sewer	6"	sidewalk improvement by Merrydale Rd	Relocate sewer and MH outside of proposed roundabout
MMWD	37	North San Pedro Rd LT & NT (5976413.19, 2190918.22) 2086 LF	Water	12"	from Merrydale Rd to Civic Center Dr sidewalks/median islands	Confirm depth. Protect in place
MMWD	38	North San Pedro Rd LT & NT (5975607.93, 2190879.49) 533 LF	Water	N/A	walkway by Merrydale Rd from North to South	Confirm depth. Protect in place
MMWD	39	North San Pedro Rd LT (5975616.21, 2190837.90) 313 LF	Water	N/A	walkway by Merrydale Rd from North to South	Relocate outside (East) of proposed roundabout
MMWD	40	North San Pedro Rd LT (5975435.16, 2191035.43) 313 LF	Water	N/A	walkway by Merrydale Rd on North	Confirm depth. Protect in place
Las Gallinas Valley S.D.	41	North San Pedro Rd LT (5975422.36, 2191030.57) 111 LF	Sanitary Sewer	N/A	walkway by Merrydale Rd on North	Confirm depth. Protect in place
PG&E	42	North San Pedro Rd LT & NT (5975667.77, 2190761.50) 159 LF	Gas	N/A	sidewalk improvement by Merrydale Rd	Confirm depth. Protect in place
MMWD	43	North San Pedro Rd LT (5976539.70, 2191047.35) 2171 LF	Water	12"	from Merrydale Rd to Civic Center Dr sidewalks/median islands	Relocate outside (North) of proposed roundabout
PG&E	44	North San Pedro Rd LT & NT (5976533.79, 2191099.78) 2454 LF	Gas	12"	from Merrydale Rd to Civic Center Dr sidewalks/median islands	Confirm depth. Protect in place
PG&E	45	North San Pedro Rd LT (5975556.45, 2190791.92) 88 LF	Gas	N/A	walkway on Merrydale Rd on North	Confirm depth. Protect in place
Las Gallinas Valley S.D.	46	North San Pedro Rd LT (5975659.43, 2190846.28) 148 LF	Sanitary Sewer	6"	walkway on Merrydale Rd on North	Confirm depth. Protect in place
PG&E	47	North San Pedro Rd LT (5975473.15, 2190913.11) 266 LF	Electric	12kV	walkway on Merrydale Rd on North	Confirm depth. Protect in place
PG&E	48	North San Pedro Rd LT (5975648.62, 2190739.41) 214 LF	Gas	16"	Merrydale Rd along intersection	Relocate outside (East) of proposed roundabout
Las Gallinas Valley S.D.	49	North San Pedro Rd LT (5977108.63, 2191652.95) 734 LF	Sanitary Sewer	8"	North San Pedro between Civi and NB rampMedian improvements	Relocate sewer and MH (North) of Median Improvement.
PG&E	50	North San Pedro Rd LT & NT (5976970.64, 2191466.82) 724 LF	Gas	N/A	North San Pedro between Civi and NB ramp Median improvements	Confirm depth. Protect in place
PG&E	51	North San Pedro Rd LT & NT (5976960.87, 2191499.15) 266 LF	Electric	12kV	North San Pedro between Civi and NB ramp sidewalk imrpovements	Confirm depth. Protect in place

Utility Owner and/or Contact Name	Conflict ID	Location	Utility Type	Size and/or Material	Utility Conflict Description	Recommended Disposition
MMWD	52	North San Pedro Rd LT & NT (5976941.40, 2191525.76) 111 LF	Water	8"	North San Pedro between Civi and NB ramp sidewalk imrpovements	Confirm depth. Protect in place
MMWD	53	North San Pedro Rd LT & NT (5977093.43, 2191530.18) 149 LF	Water	2"	North San Pedro between Civi and NB ramp sidewalk imrpovements	Confirm depth. Protect in place
Las Gallinas Valley S.D.	54	North San Pedro Rd LT & NT (5977171.46, 2191638.36) 113 LF	Sanitary Sewer	6"	North San Pedro between Civic and NB ramp Median improvements and sidewalk imrpovements	Relocate sewer North or South from proposed roundabout.
MMWD	55	North San Pedro Rd LT (5977252.25, 2191660.87) 305 LF	Water	12"	Civic Median improvements	Relocate water South from proposed roundabout.
PG&E	56	North San Pedro Rd LT & NT 5977266.44, 2191839.89) 684 LF	Gas	N/A	Civic Median improvements	Relocate gas South from proposed roundabout.
MMWD	57	North San Pedro Rd LT (5977204.52, 2191791.04) 445 LF	Water	4"-5"	Civic Median/sidewalk improvements	Relocate water East from proposed roundabout.
PG&E	58	North San Pedro Rd LT & NT (5977231.76, 2191663.83) 266 LF	Electric	12kV	Civic Median/sidewalk improvements	Confirm depth. Protect in place
PG&E	59	North San Pedro Rd LT (5977258.99, 2191621.95) 95 LF	Electric	12kV	Civic Median/sidewalk improvements	Confirm depth. Protect in place
PG&E	60	North San Pedro Rd LT & NT (5977293.36, 2191770.11) 289 LF	Electric	12kV	Civic Median/sidewalk improvements	Confirm depth. Protect in place
PG&E	61	North San Pedro Rd LT & NT (5977299.80, 2191788.05) 178 LF	Electric	12kV	Civic Median/sidewalk improvements	Confirm depth. Protect in place

Key:
[List of acronyms used in the utility conflict matrix]

D. Right of Way Requirement Matrix

Right of Way Requirement Matrix

Project Owner: Transportation Authority of Marin
Project No. : P20062
Project Description: Right of Way Requirement Investigation
Highway or Route: US 101 - Marin County

ROW Requirement Matrix Developed/Revised By: WRECO
Date: 2/8/2022
Reviewed By:
Date:

Note: Refer to attachment for ROW requirement mapping

APN	Address	Location	Owner	Property Type	Partial ROW Acquisition (SF)	Full ROW Acquisition	TCE (SF)
179-141-06	100 Merrydale Road, San Rafael, CA	7- North San Pedro Road - NT	N/A	Multiple Residencial	2183		
179-270-22	N/A	7- North San Pedro Road - NT	County of Marin	Public District	9319		

Key:
[List of acronyms used in the utility conflict matrix]

Right of Way Requirement Matrix

Project Owner: Transportation Authority of Marin
Project No. : P20062
Project Description: Right of Way Requirement Investigation
Highway or Route: US 101 - Marin County

ROW Requirement Matrix Developed/Revised By: WRECO
Date: 12/6/2021
Reviewed By:
Date:

Note: Refer to attachment for ROW requirement mapping

APN	Address	Location	Owner	Property Type	Partial ROW Acquisition (SF)	Full ROW Acquisition	TCE (SF)
179-141-06	100 Merrydale Road, San Rafael, CA	7- North San Pedro Road - LT	N/A	Multiple Residencial	1448		
179-141-06	100 Merrydale Road, San Rafael, CA	7- North San Pedro Road - LT	N/A	Multiple Residencial	1363		
179-291-51	N/A	7- North San Pedro Road - LT	County of Marin	Parks/Open Space	31759		
179-311-20	76 San Pablo Ave, San Rafael, CA	7- North San Pedro Road - LT	N/A	Retail Business	1851		
179-270-22	N/A	7- North San Pedro Road	County of Marin	Public District	17745		
179-270-19	2 Civic Center Dr, San Rafael, CA	7- North San Pedro Road- LT	County of Marin	Public District	1760		
179-270-11	3501 Civic Center Dr, San Rafael, CA	7- North San Pedro Road- LT	Coiunty of Marin	Public District	6625		
179-270-21	N/A	7- North San Pedro Road- LT	County of Marin	Public District	7908		

Key:
[List of acronyms used in the utility conflict matrix]

E. Existing and 2040 Traffic Volumes

Highway 101 - San Pedro Interchange - Traffic Volumes Summary

7. Hwy 101 San Pedro Interchange - AM Traffic Volumes Summary - Existing

No.	Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	Merrydale Rd./ Hwy. 101 Southbound Ramps	-	190	630	120	160	-	-	-	-	210	-	100
2	Merrydale Rd./N. San Pedro Rd.	20	20	20	240	10	100	90	80	5	10	310	720
3	Westbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	-	-	-	170	-	350	-	-	880	-
4	N. San Pedro Rd./Hwy. 101 Northbound On-Ramp	-	-	-	-	-	-	90	260	-	-	880	280
5	Eastbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	910	-	-	-	-	260	-	-	1160	-
6	N. San Pedro Rd./ Civic Center Dr./San Pablo Ave	120	40	40	190	60	330	630	470	100	40	710	180

7. Hwy 101 San Pedro Interchange - PM Traffic Volumes Summary - Existing

No.	Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	Merrydale Rd./ Hwy. 101 Southbound Ramps	-	290	350	110	200	-	-	-	-	250	-	120
2	Merrydale Rd./N. San Pedro Rd.	10	20	10	320	20	100	150	100	30	20	290	780
3	Westbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	-	-	-	360	-	440	-	-	730	-
4	N. San Pedro Rd./Hwy. 101 Northbound On-Ramp	-	-	-	-	-	-	140	300	-	-	730	460
5	Eastbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	620	-	-	-	-	300	-	-	1180	-
6	N. San Pedro Rd./ Civic Center Dr./San Pablo Ave	170	50	90	190	60	440	220	560	100	40	570	130

Highway 101 - San Pedro Interchange - Traffic Volumes Summary (Cont.)

7. Hwy 101 San Pedro Interchange - AM Traffic Volumes Summary - 2040

No.	Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	Merrydale Rd./ Hwy. 101 Southbound Ramps	-	200	662	126	168	-	-	-	-	221	-	105
2	Merrydale Rd./N. San Pedro Rd.	21	21	21	252	11	105	95	84	5	11	326	756
3	Westbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	-	-	-	179	-	368	-	-	924	-
4	N. San Pedro Rd./Hwy. 101 Northbound On-Ramp	-	-	-	-	-	-	95	273	-	-	924	294
5	Eastbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	956	-	-	-	-	273	-	-	1218	-
6	N. San Pedro Rd./ Civic Center Dr./San Pablo Ave	126	42	42	200	63	347	662	494	105	42	746	189

7. Hwy 101 San Pedro Interchange - PM Traffic Volumes Summary - 2040

No.	Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	Merrydale Rd./ Hwy. 101 Southbound Ramps	-	305	368	116	210	-	-	-	-	263	-	126
2	Merrydale Rd./N. San Pedro Rd.	11	21	11	336	21	105	158	105	32	21	305	819
3	Westbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	-	-	-	378	-	462	-	-	767	-
4	N. San Pedro Rd./Hwy. 101 Northbound On-Ramp	-	-	-	-	-	-	147	315	-	-	767	483
5	Eastbound N. San Pedro Rd./Hwy. 101 Northbound Off-Ramp	-	-	651	-	-	-	-	315	-	-	1239	-
6	N. San Pedro Rd./ Civic Center Dr./San Pablo Ave	179	53	95	200	63	462	231	588	105	42	599	137

F. Collision Data

SWITRS Collision Raw Data Export Layout

ITEM NAME	DESCRIPTION	POSSIBLE VALUES
CASE_ID	The unique identifier of the collision report (barcode beginning 2002; 19 digit code prior to 2002)	
ACCIDENT_YEAR	The year when the collision occurred	
COLLISION_DATE	The date when the collision occurred (YYYYMMDD)	
COLLISION_TIME	The time when the collision occurred (24 hour time)	
PRIMARY_RD		
SECONDARY_RD		
DISTANCE		Distance converted to feet
DIRECTION		N - North E - East S - South W - West Blank - Not Stated, In Intersection
INTERSECTION		Y - Intersection N - Not Intersection Blank - Not Stated
COLLISION_SEVERITY	The injury level severity of the collision (highest level of injury in collision)	1 - Fatal 2 - Injury (Severe) 3 - Injury (Other Visible) 4 - Injury (Complaint of Pain) 0 - PDO
NUMBER_KILLED	Counts victims in the collision with collision severity of 1	0 to N for each collision
NUMBER_INJURED	Counts victims in the collision with collision severity of 2, 3, or 4	0 to N for each collision

SWITRS Collision Raw Data Export Layout

ITEM NAME	DESCRIPTION	POSSIBLE VALUES
PCF_VIOL_CATEGORY		01 - Driving or Bicycling Under the Influence 02 - Impeding Traffic 03 - Unsafe Speed 04 - Following Too Closely 05 - Wrong Side of Road 06 - Improper Passing 07 - Unsafe Lane Change 08 - Improper Turning 09 - Automobile Right of Way 10 - Pedestrian Right of Way 11 - Pedestrian Violation 12 - Traffic Signals and Signs 13 - Hazardous Parking 14 - Lights 15 - Brakes 16 - Other Equipment 17 - Other Hazardous Violation 18 - Other Than Driver (or Pedestrian 19 - 20 - 21 - Unsafe Starting or Backing 22 - Other Improper Driving 23 - Pedestrian or "Other" Under the Influence of Alcohol or Drug 24 - Fell Asleep 00 - Unknown Blank - Not Stated

SWITRS Collision Raw Data Export Layout

ITEM NAME	DESCRIPTION	POSSIBLE VALUES
TYPE_OF_COLLISION		A - Head-On B - Sideswipe C - Rear End D - Broadside E - Hit Object F - Overturned G - Vehicle/Pedestrian H - Other Blank - Not Stated
MVIW		A - Non-Collision B - Pedestrian C - Other Motor Vehicle D - Motor Vehicle on Other Roadway E - Parked Motor Vehicle F - Train G - Bicycle H - Animal I - Fixed Object J - Other Object Blank - Not Stated
PED_ACTION		A - No Pedestrian Involved B - Crossing in Crosswalk at Intersection C - Crossing in Crosswalk Not at Intersection D - Crossing Not in Crosswalk E - In Road, Including Shoulder F - Not in Road G - Approaching/Leaving School Bus Blank - Not Stated
PEDESTRIAN_ACCIDENT	Indicates whether the collision involved a pedestrian	Y or blank

SWITRS Collision Raw Data Export Layout

ITEM NAME	DESCRIPTION	POSSIBLE VALUES
BICYCLE_ACCIDENT	Indicates whether the collision involved a bicycle	Y or blank
COUNT_PED_KILLED	Counts the victims in the collision with Party Type 2 and Collision Severity 1	0 to N for each collision
COUNT_PED_INJURED	Counts the victims in the collision with Party Type 2 and Collision Severity 2. 3. or 4	0 to N for each collision
COUNT_BICYCLIST_KILLED	Counts the victims in the collision with Party Type 4 and Collision Severity 1	0 to N for each collision
COUNT_BICYCLIST_INJURED	Counts the victims in the collision with Party Type 4 and Collision Severity 2. 3. or 4	0 to N for each collision
LATITUDE		
LONGITUDE		

SWITRS Collision Raw Data Export

CASE_ID	ACCIDENT_ YEAR	COLLISION_ DATE	COLLISION_ TIME	PRIMARY_RD	SECONDARY_RD	DISTANCE	DIRECTION
6578562	2014	20140723	1630	NORTH SAN PEDRO RD	CIVIC CENTER DR	75	E
6565656	2014	20140710	1130	NORTH SAN PEDRO RD	SAN PABLO AV	200	W
6431913	2014	20140325	956	N SAN PEDRO	RT 101	200	N
7038444	2015	20150814	1817	CIVIC CENTER DR	PETER BEHR	600	E
7130307	2015	20151118	1515	NORTH SAN PEDRO RD	SAN PABLO RD	332	W
7024078	2015	20150703	2159	NORTH SAN PEDRO RD	RT 101	0	
6788020	2015	20150112	1640	NORTH SAN PEDRO RD	SAN PABLO AV	140	W
8151278	2016	20161011	1020	NORTH SAN PEDRO RD	MERRYDALE RD	0	
8152662	2016	20161014	952	NORTH SAN PEDRO RD	SAN PABLO AV	572	W
8189416	2016	20161209	815	NORTH SAN PEDRO RD	MERRYDALE RD	0	
8041989	2016	20160515	1238	CIVIC CENTER DR	PETER BEHR RD	0	
8189412	2016	20161210	2110	NORTH SAN PEDRO RD	MERRYDALE RD	0	
8068737	2016	20160604	1827	CIVIC CENTER DR	PETER BEHR DR	0	
8189319	2016	20161110	1324	NORTH SAN PEDRO RD	CIVIC CENTER DR	40	W
8151066	2016	20161012	816	CIVIC CENTER DR	PETER BEHR DR	30	N
8370969	2016	20160429	1303	NORTH SAN PEDRO RD	MERRYDALE RD	0	
8372253	2017	20170512	1338	NORTH SAN PEDRO RD	SAN PABLO AV	381	W
90504209	2017	20170712	1635	N. SAN PEDRO RD.	US 101 O/C	528	E
8372245	2017	20170516	1350	NORTH SAN PEDRO RD	CIVIC CENTER DR	36	E
8372257	2017	20170512	1422	CIVIC CENTER DR	NORTH SAN PEDRO RD	0	
8357913	2017	20170411	1607	NORTH SAN PEDRO RD	CIVIC CENTER DR	0	
8480118	2017	20171017	1204	CIVIC CENTER DR	SAN PEDRO RD	200	N
8737241	2018	20181026	1203	CIVIC CENTER DR	PETER BEHR DR	309	N
8543668	2018	20180111	1530	NORTH SAN PEDRO RD	CIVIC CENTER DR	0	
8644094	2018	20180604	1124	NORTH SAN PEDRO RD	CIVIC CENTER DR	60	E
8579723	2018	20180307	914	NORTH SAN PEDRO RD	SAN PABLO AV	75	W

CASE_ID	INTERSECTION	COLLISION_ SEVERITY	NUMBER_ KILLED	NUMBER_ INJURED	PCF_VIOL_ CATEGORY	TYPE_OF_ COLLISION	MVIW	PED_ACTION	PEDESTRIAN _ACCIDENT	BICYCLE_ ACCIDENT
6578562	N	0	0	0	0	B	C	A		
6565656	N	0	0	0	8	B	C	A		
6431913	N	0	0	0	3	C	C	A		
7038444	N	0	0	0	9	B	C	A		
7130307	N	0	0	0	3	C	C	A		
7024078	Y	0	0	0	3	D	C	A		
6788020	N	3	0	1	22	H	G	A		Y
8151278	Y	0	0	0	9	A	C	A		
8152662	N	0	0	0	8	D	C	A		
8189416	Y	0	0	0	9	D	C	A		
8041989	Y	0	0	0	9	D	C	A		
8189412	Y	3	0	1	1	A	C	A		
8068737	Y	4	0	1	9	D	C	A		
8189319	N	4	0	1	21	C	C	A		
8151066	N	3	0	1	9	C	G	A		Y
8370969	Y	3	0	1	9	D	G	A		Y
8372253	N	0	0	0	8	B	C	A		
90504209	N	0	0	0	3	C	C	A		
8372245	N	0	0	0	3	C	C	A		
8372257	N	0	0	0	3	C	C	A		
8357913	Y	0	0	0	17	C	C	A		
8480118	N	0	0	0	21	C	C	A		
8737241	N	0	0	0	8	B	C	A		
8543668	Y	0	0	0	8	B	C	A		
8644094	N	0	0	0	21	B	C	A		
8579723	N	0	0	0	15	D	C	A		

CASE_ID	COUNT_PED_KILLED	COUNT_PED_INJURED	COUNT_BICYCLIST_KILLED	COUNT_BICYCLIST_INJURED	LATITUDE	LONGITUDE
6578562	0	0	0	0	37.99701	-122.52887
6565656	0	0	0	0	37.99637	-122.5287
6431913	0	0	0	0	37.99563	-122.53277
7038444	0	0	0	0	37.99682	-122.52868
7130307	0	0	0	0	37.99531	-122.52908
7024078	0	0	0	0	37.99385	-122.53373
6788020	0	0	0	1	37.99625	-122.5288
8151278	0	0	0	0	37.99385	-122.53373
8152662	0	0	0	0	37.99385	-122.53373
8189416	0	0	0	0	37.99385	-122.53373
8041989	0	0	0	0	37.99682	-122.52868
8189412	0	0	0	0	37.99385	-122.53373
8068737	0	0	0	0	37.99682	-122.52868
8189319	0	0	0	0	37.9967	-122.52856
8151066	0	0	0	1	37.99768	-122.52861
8370969	0	0	0	1	37.99385	-122.53373
8372253	0	0	0	0	37.99531	-122.52908
90504209	0	0	0	0	37.99494	-122.53062
8372245	0	0	0	0	37.99768	-122.52861
8372257	0	0	0	0	37.9967	-122.52856
8357913	0	0	0	0	37.9967	-122.52856
8480118	0	0	0	0	37.9967	-122.52856
8737241	0	0	0	0	37.99768	-122.52861
8543668	0	0	0	0	37.9967	-122.52856
8644094	0	0	0	0	37.9967	-122.52856
8579723	0	0	0	0	37.9967	-122.52856

G. Transit Ridership Data

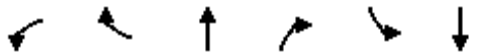
Highway 101 North San Pedro Rd Interchange - Transit Ridership

	Marin Transit Routes			Golden Gate Transit Routes			Total	
Stop ID	Route Numbers	Board	Exit	Route Numbers	Board*	Exit*	Board	Exit
40581	245	2	1	54, 70, 54C	17	5	19	6
40580	35, 49, 145	26	23	38, 38A	18	0	44	23
40578	35, 145	7	43				7	43
40579	223	3	1	38, 38A	0	23	3	24
40582	245	0	0	54, 70, 54C	3	19	3	19
40586	35, 49, 145, 233	44	31				44	31
40585	35, 49, 145	23	92				23	92

Data Sources: Marin Transit 2017, Golden Gate Transit 2020

*2020 Golden Gate Transit data were multiplied by a factor of 1.04 per transit agency recommendation to adjust for pandemic ridership

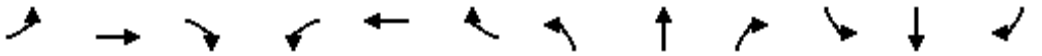
H. Synchro Output



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	205	99	188	625	121	160
Future Volume (Veh/h)	205	99	188	625	121	160
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	228	110	209	694	134	178
Pedestrians	23		4			23
Lane Width (ft)	14.0		11.0			12.0
Walking Speed (ft/s)	3.5		3.5			3.5
Percent Blockage	3		0			2
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			513			
pX, platoon unblocked						
vC, conflicting volume	682	255			926	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	682	255			926	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	31	85			81	
cM capacity (veh/h)	328	747			719	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	228	110	209	694	134	178
Volume Left	228	0	0	0	134	0
Volume Right	0	110	0	694	0	0
cSH	328	747	1700	1700	719	1700
Volume to Capacity	0.69	0.15	0.12	0.41	0.19	0.10
Queue Length 95th (ft)	123	13	0	0	17	0
Control Delay (s)	37.5	10.7	0.0	0.0	11.1	0.0
Lane LOS	E	B			B	
Approach Delay (s)	28.8		0.0		4.8	
Approach LOS	D					

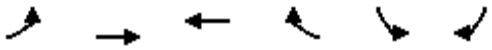
Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	75	4	9	310	722	15	20	18	235	8	96
Future Volume (vph)	85	75	4	9	310	722	15	20	18	235	8	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	12	12	12	12	10	12	11	12	12	12	12
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Util. Factor	1.00	1.00			0.91	0.91		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00			0.99	1.00		0.97			1.00	0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00			1.00	1.00
Frt	1.00	0.99			0.95	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1565	1558			3012	1274		1562			1683	1473
Flt Permitted	0.95	1.00			0.95	1.00		0.99			0.95	1.00
Satd. Flow (perm)	1565	1558			2869	1274		1562			1683	1473
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	94	83	4	10	344	802	17	22	20	261	9	107
RTOR Reduction (vph)	0	1	0	0	50	393	0	14	0	0	0	54
Lane Group Flow (vph)	94	86	0	0	505	208	0	45	0	0	270	53
Confl. Peds. (#/hr)			6	6		5			5			3
Confl. Bikes (#/hr)			7			5			9			3
Parking (#/hr)		2	2									
Turn Type	Prot	NA		Perm	NA	Prot	Split	NA		Split	NA	Perm
Protected Phases	5	2			6	6	8	8		4	4	
Permitted Phases				6								4
Actuated Green, G (s)	8.6	38.1			25.5	25.5		6.4			19.9	19.9
Effective Green, g (s)	9.6	39.1			26.5	26.5		7.4			20.9	20.9
Actuated g/C Ratio	0.13	0.51			0.35	0.35		0.10			0.27	0.27
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	196	797			995	441		151			460	402
v/s Ratio Prot	c0.06	0.05				0.16		c0.03			c0.16	
v/s Ratio Perm					c0.18							0.04
v/c Ratio	0.48	0.11			0.51	0.47		0.30			0.59	0.13
Uniform Delay, d1	31.1	9.6			19.8	19.5		32.1			24.0	20.9
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	1.8	0.1			0.4	0.8		1.1			1.9	0.2
Delay (s)	32.9	9.7			20.2	20.3		33.2			25.9	21.1
Level of Service	C	A			C	C		C			C	C
Approach Delay (s)		21.8			20.2			33.2			24.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

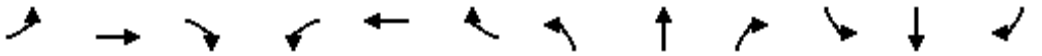
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	85	258	875	280	0	0
Future Volume (Veh/h)	85	258	875	280	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	94	287	972	311	0	0
Pedestrians		27	4		12	
Lane Width (ft)		12.5	14.0		0.0	
Walking Speed (ft/s)		3.5	3.5		3.5	
Percent Blockage		3	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1088	867			
pX, platoon unblocked	0.74				0.74	0.74
vC, conflicting volume	984				1463	1011
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	807				1450	843
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				100	100
cM capacity (veh/h)	609				90	263

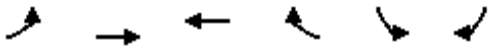
Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	94	287	972	311
Volume Left	94	0	0	0
Volume Right	0	0	0	311
cSH	609	1700	1700	1700
Volume to Capacity	0.15	0.17	0.57	0.18
Queue Length 95th (ft)	14	0	0	0
Control Delay (s)	12.0	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	3.0		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	626	466	98	38	708	181	122	38	38	189	58	325
Future Volume (vph)	626	466	98	38	708	181	122	38	38	189	58	325
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	12	12	11	12	13	12	14	12	12	14	14
Total Lost time (s)	1.0	1.0		1.0	1.0	3.0	1.0	1.0		1.0	1.0	3.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.98	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3144	3232		1621	3353	1523	1650	1717		1671	1882	1565
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.67	1.00		0.64	1.00	1.00
Satd. Flow (perm)	3144	3232		1621	3353	1523	1169	1717		1126	1882	1565
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	696	518	109	42	787	201	136	42	42	210	64	361
RTOR Reduction (vph)	0	10	0	0	0	0	0	23	0	0	0	0
Lane Group Flow (vph)	696	617	0	42	787	201	136	61	0	210	64	361
Confl. Peds. (#/hr)			29			12	22		12	5		29
Confl. Bikes (#/hr)			8			9			8			6
Turn Type	Prot	NA		Prot	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases	5	2		1	6			8			4	
Permitted Phases						Free	8			4		Free
Actuated Green, G (s)	30.5	58.2		8.5	36.2	109.4	27.7	27.7		27.7	27.7	109.4
Effective Green, g (s)	34.5	62.2		12.5	40.2	109.4	31.7	31.7		31.7	31.7	109.4
Actuated g/C Ratio	0.32	0.57		0.11	0.37	1.00	0.29	0.29		0.29	0.29	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	1.0	1.0		1.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	991	1837		185	1232	1523	338	497		326	545	1565
v/s Ratio Prot	c0.22	0.19		0.03	c0.23			0.04			0.03	
v/s Ratio Perm						0.13	0.12			c0.19		0.23
v/c Ratio	0.70	0.34		0.23	0.64	0.13	0.40	0.12		0.64	0.12	0.23
Uniform Delay, d1	32.9	12.6		44.1	28.6	0.0	31.2	28.6		33.9	28.6	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.9	0.0		0.2	1.1	0.2	0.3	0.0		3.3	0.0	0.3
Delay (s)	34.8	12.6		44.3	29.7	0.2	31.5	28.7		37.2	28.6	0.3
Level of Service	C	B		D	C	A	C	C		D	C	A
Approach Delay (s)		24.3			24.5			30.4			15.4	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	109.4	Sum of lost time (s)	3.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Traffic Volume (veh/h)	0	338	885	0	0	170
Future Volume (Veh/h)	0	338	885	0	0	170
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	376	983	0	0	189
Pedestrians		27				
Lane Width (ft)		12.0				
Walking Speed (ft/s)		3.5				
Percent Blockage		3				
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		739	1216			
pX, platoon unblocked	0.73				0.73	0.73
vC, conflicting volume	983				1359	1010
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	792				1307	829
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	28
cM capacity (veh/h)	605				129	264

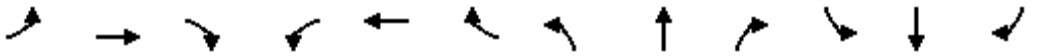
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	376	983	189
Volume Left	0	0	0
Volume Right	0	0	189
cSH	1700	1700	264
Volume to Capacity	0.22	0.58	0.72
Queue Length 95th (ft)	0	0	124
Control Delay (s)	0.0	0.0	47.0
Lane LOS			E
Approach Delay (s)	0.0	0.0	47.0
Approach LOS			E

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	246	122	292	653	112	196
Future Volume (Veh/h)	246	122	292	653	112	196
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	273	136	324	726	124	218
Pedestrians	23		4			23
Lane Width (ft)	14.0		11.0			12.0
Walking Speed (ft/s)	3.5		3.5			3.5
Percent Blockage	3		0			2
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			513			
pX, platoon unblocked						
vC, conflicting volume	817	370			1073	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	817	370			1073	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	79			80	
cM capacity (veh/h)	270	644			633	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	273	136	324	726	124	218
Volume Left	273	0	0	0	124	0
Volume Right	0	136	0	726	0	0
cSH	270	644	1700	1700	633	1700
Volume to Capacity	1.01	0.21	0.19	0.43	0.20	0.13
Queue Length 95th (ft)	257	20	0	0	18	0
Control Delay (s)	98.5	12.1	0.0	0.0	12.1	0.0
Lane LOS	F	B			B	
Approach Delay (s)	69.8		0.0		4.4	
Approach LOS	F					

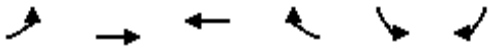
Intersection Summary			
Average Delay	16.7		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	102	27	24	285	780	10	20	12	321	16	110
Future Volume (vph)	150	102	27	24	285	780	10	20	12	321	16	110
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	12	12	12	12	10	12	11	12	12	12	12
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Util. Factor	1.00	1.00			0.91	0.91		1.00			1.00	1.00
Frpb, ped/bikes	1.00	0.99			0.99	1.00		0.96			1.00	0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00			1.00	1.00
Frt	1.00	0.97			0.94	0.85		0.96			1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1565	1508			2992	1274		1556			1685	1473
Flt Permitted	0.95	1.00			0.94	1.00		0.99			0.95	1.00
Satd. Flow (perm)	1565	1508			2812	1274		1556			1685	1473
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	113	30	27	317	867	11	22	13	357	18	122
RTOR Reduction (vph)	0	7	0	0	67	445	0	11	0	0	0	51
Lane Group Flow (vph)	167	136	0	0	494	205	0	35	0	0	375	71
Confl. Peds. (#/hr)			6	6		5			5			3
Confl. Bikes (#/hr)			7			5			9			3
Parking (#/hr)		2	2									
Turn Type	Prot	NA		Perm	NA	Prot	Split	NA		Split	NA	Perm
Protected Phases	5	2			6	6	8	8		4	4	
Permitted Phases				6								4
Actuated Green, G (s)	15.5	46.3			26.8	26.8		3.0			27.0	27.0
Effective Green, g (s)	16.5	47.3			27.8	27.8		4.0			28.0	28.0
Actuated g/C Ratio	0.19	0.54			0.31	0.31		0.05			0.32	0.32
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	292	807			885	401		70			534	467
v/s Ratio Prot	c0.11	0.09				0.16		c0.02			c0.22	
v/s Ratio Perm					c0.18							0.05
v/c Ratio	0.57	0.17			0.56	0.51		0.51			0.70	0.15
Uniform Delay, d1	32.7	10.5			25.1	24.7		41.2			26.5	21.6
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	2.7	0.1			0.8	1.1		5.7			4.2	0.2
Delay (s)	35.4	10.6			25.9	25.8		46.9			30.7	21.8
Level of Service	D	B			C	C		D			C	C
Approach Delay (s)		23.9			25.8			46.9			28.5	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

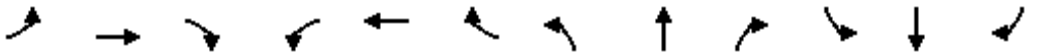
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	135	300	725	455	0	0
Future Volume (Veh/h)	135	300	725	455	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	150	333	806	506	0	0
Pedestrians		27	4		12	
Lane Width (ft)		12.5	14.0		0.0	
Walking Speed (ft/s)		3.5	3.5		3.5	
Percent Blockage		3	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1088	868			
pX, platoon unblocked	0.86				0.86	0.86
vC, conflicting volume	818				1455	845
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	704				1447	735
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	80				100	100
cM capacity (veh/h)	766				99	350

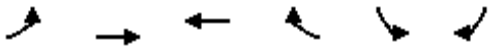
Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	150	333	806	506
Volume Left	150	0	0	0
Volume Right	0	0	0	506
cSH	766	1700	1700	1700
Volume to Capacity	0.20	0.20	0.47	0.30
Queue Length 95th (ft)	18	0	0	0
Control Delay (s)	10.8	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	3.4		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	224	564	98	36	572	133	166	45	86	194	64	440
Future Volume (vph)	224	564	98	36	572	133	166	45	86	194	64	440
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	12	12	11	12	13	12	14	12	12	14	14
Total Lost time (s)	2.0	2.0		2.0	2.0	3.0	2.0	2.0		2.0	2.0	3.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3144	3253		1621	3353	1523	1657	1670		1673	1882	1565
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.70	1.00		0.59	1.00	1.00
Satd. Flow (perm)	3144	3253		1621	3353	1523	1229	1670		1046	1882	1565
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	249	627	109	40	636	148	184	50	96	216	71	489
RTOR Reduction (vph)	0	9	0	0	0	0	0	41	0	0	0	0
Lane Group Flow (vph)	249	727	0	40	636	148	184	105	0	216	71	489
Confl. Peds. (#/hr)			29			12	22		12	5		29
Confl. Bikes (#/hr)			8			9			8			6
Turn Type	Prot	NA		Prot	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases	5	2		1	6			8			4	
Permitted Phases						Free	8			4		Free
Actuated Green, G (s)	14.0	36.4		5.9	28.3	80.8	23.5	23.5		23.5	23.5	80.8
Effective Green, g (s)	17.0	39.4		8.9	31.3	80.8	26.5	26.5		26.5	26.5	80.8
Actuated g/C Ratio	0.21	0.49		0.11	0.39	1.00	0.33	0.33		0.33	0.33	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	1.0	1.0		1.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	661	1586		178	1298	1523	403	547		343	617	1565
v/s Ratio Prot	c0.08	c0.22		0.02	0.19			0.06			0.04	
v/s Ratio Perm						0.10	0.15			c0.21		c0.31
v/c Ratio	0.38	0.46		0.22	0.49	0.10	0.46	0.19		0.63	0.12	0.31
Uniform Delay, d1	27.4	13.7		32.8	18.7	0.0	21.5	19.5		23.0	19.0	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1		0.2	0.3	0.1	0.3	0.1		2.6	0.0	0.5
Delay (s)	27.5	13.7		33.0	19.0	0.1	21.8	19.5		25.6	19.0	0.5
Level of Service	C	B		C	B	A	C	B		C	B	A
Approach Delay (s)		17.2			16.3			20.8			9.2	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.8	Sum of lost time (s)	6.0
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

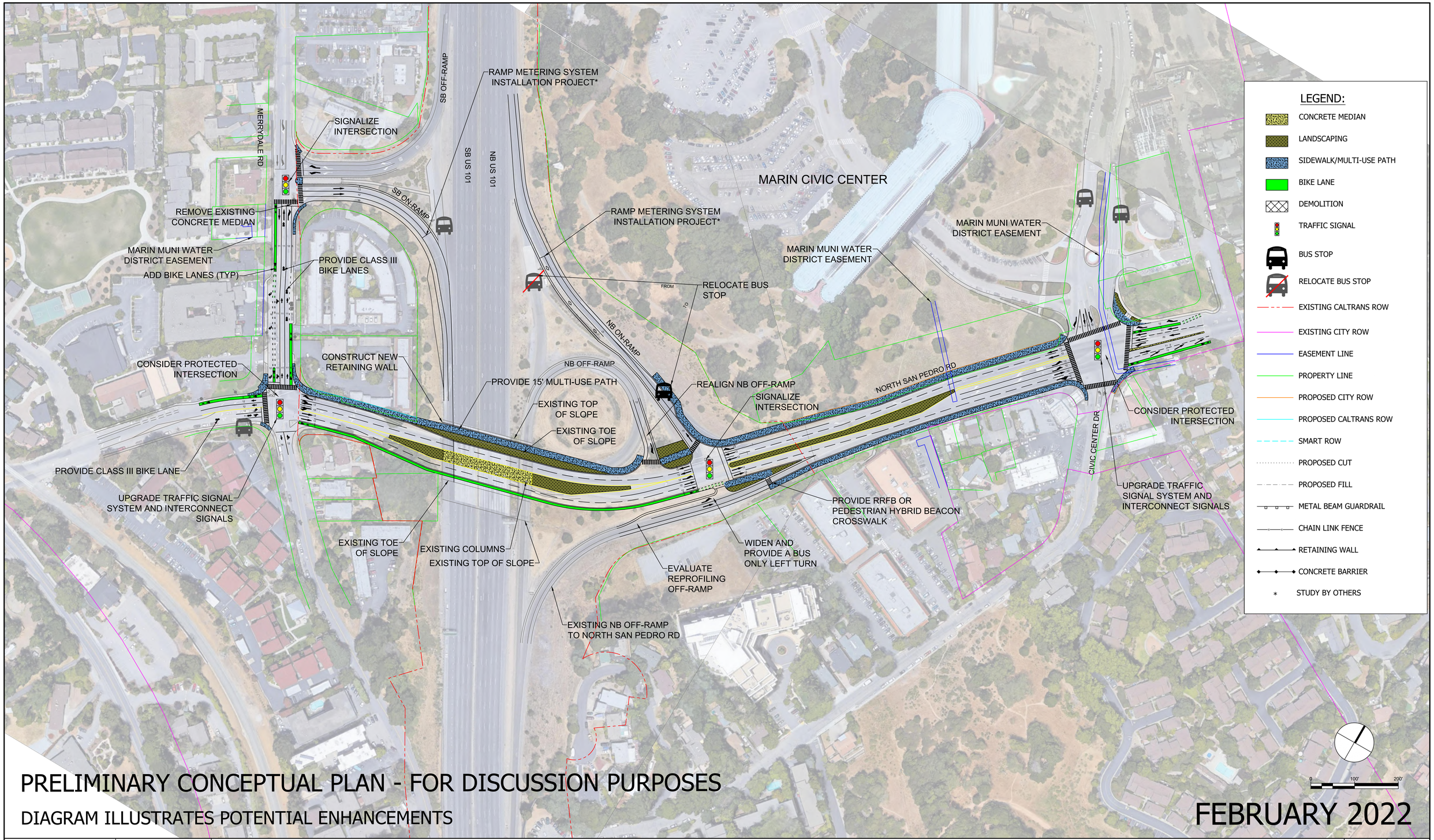


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Traffic Volume (veh/h)	0	435	725	0	0	361
Future Volume (Veh/h)	0	435	725	0	0	361
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	483	806	0	0	401
Pedestrians		27				
Lane Width (ft)		12.0				
Walking Speed (ft/s)		3.5				
Percent Blockage		3				
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		739	1217			
pX, platoon unblocked	0.88				0.88	0.88
vC, conflicting volume	806				1289	833
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	712				1260	743
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	782				166	356

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	483	806	401
Volume Left	0	0	0
Volume Right	0	0	401
cSH	1700	1700	356
Volume to Capacity	0.28	0.47	1.13
Queue Length 95th (ft)	0	0	384
Control Delay (s)	0.0	0.0	120.2
Lane LOS			F
Approach Delay (s)	0.0	0.0	120.2
Approach LOS			F

Intersection Summary			
Average Delay	28.5		
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		

I. Preliminary Conceptual Plans



PRELIMINARY CONCEPTUAL PLAN - FOR DISCUSSION PURPOSES

DIAGRAM ILLUSTRATES POTENTIAL ENHANCEMENTS

FEBRUARY 2022

HNTB
1111 BROADWAY, 9TH FLOOR
OAKLAND, CA 94607
(510) 208-4599

Parisi TRANSPORTATION CONSULTING
1750 BRIDGEWAY, SUITE B208
SAUSILITO, CA 94965
(415) 649-6000

HIGHWAY 101 INTERCHANGE AND APPROACH ROADWAY IMPROVEMENT PROGRAM
NORTH SAN PEDRO ROAD / MERRYDALE ROAD
NEAR-TERM IMPROVEMENTS

Transportation Authority of Marin

DATE:	SCALE: 1"=100'
FILENAME:	
PROJECT:	
SHEET NO.	

MARIN CIVIC CENTER

MERRYDALE RD

SIGNALIZE INTERSECTION

SB OFF-RAMP

SB US 101

NB US 101

SB ON-RAMP

REMOVE EXISTING CONCRETE MEDIAN

RESTRIPE SB OFF-RAMP

RAMP METERING SYSTEM INSTALLATION PROJECT*

MARIN MUNI WATER DISTRICT EASEMENT

MARIN MUNI WATER DISTRICT EASEMENT

RELOCATE BUS STOP

PROVIDE CLASS III BIKE LANES

MAINTAIN EXISTING BUS STOP

RAMP METERING SYSTEM INSTALLATION PROJECT*

NB ON-RAMP

CONSTRUCT NEW RETAINING WALL

PROVIDE 15' MULTI-USE PATH

NB OFF-RAMP

EXISTING TOP OF SLOPE

EXISTING TOE OF SLOPE

REALIGN NB LOOP OFF-RAMP EXIT

PROVIDE 15' MULTI-USE PATH

SIGNALIZE INTERSECTION

NORTH SAN PEDRO RD

CIVIC CENTER DR

RELOCATE BUS STOP

REMOVE EXISTING STREET PARKING

EXISTING TOE OF SLOPE

EXISTING COLUMNS

EXISTING TOP OF SLOPE

REGRADE AREA BETWEEN NB OFF-RAMP AND NORTH SAN PEDRO RD

NB OFF-RAMP

PROPOSED RETAINING WALLS

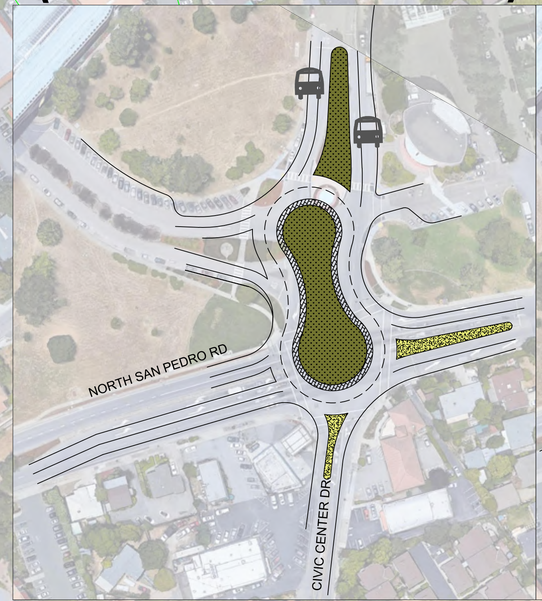
REALIGN NB OFF-RAMP

LEGEND:

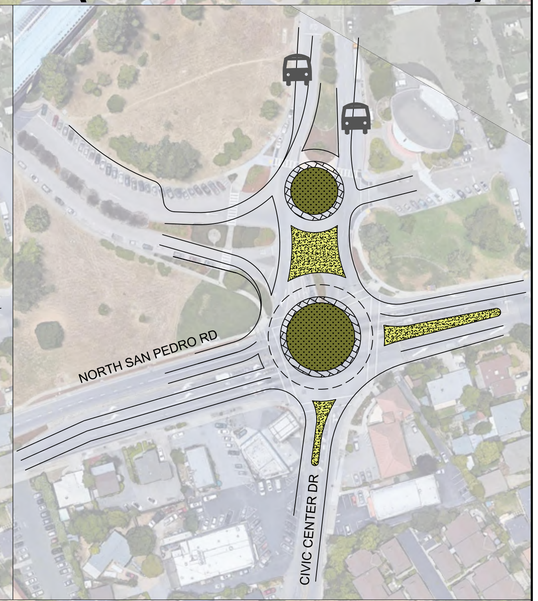
- CONCRETE MEDIAN
- LANDSCAPING
- SIDEWALK/MULTI-USE PATH
- BIKE LANE
- DEMOLITION
- TRAFFIC SIGNAL
- BUS STOP
- RELOCATE BUS STOP
- EXISTING CALTRANS ROW
- EXISTING CITY ROW
- EASEMENT LINE
- PROPERTY LINE
- PROPOSED CITY ROW
- PROPOSED CALTRANS ROW
- SMART ROW
- PROPOSED CUT
- PROPOSED FILL
- METAL BEAM GUARDRAIL
- CHAIN LINK FENCE
- RETAINING WALL
- CONCRETE BARRIER
- * STUDY BY OTHERS

0 100' 200'

ALTERNATIVE IMPROVEMENT AT CIVIC CENTER DRIVE (HOURGLASS ROUNDABOUT)



ALTERNATIVE IMPROVEMENT AT CIVIC CENTER DRIVE (DOUBLE ROUNDABOUT)



PRELIMINARY CONCEPTUAL PLAN - FOR DISCUSSION PURPOSES

DIAGRAM ILLUSTRATES POTENTIAL ENHANCEMENTS

FEBRUARY 2022

HNTB
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HIGHWAY 101 INTERCHANGE AND APPROACH ROADWAY IMPROVEMENT PROGRAM
NORTH SAN PEDRO ROAD / MERRYDALE ROAD
LONG-TERM IMPROVEMENTS

TAM Transportation Authority of Marin

DATE:	SCALE: 1"=100'
FILENAME:	
PROJECT:	
SHEET NO.	

J. Deficiency Matrix

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
1	101.1(2)(c)(2) Local Streets or Roads	**Where the local facility connects to a freeway or expressway (such as ramp terminal intersections), the design speed of the local facility shall be a minimum of 35 miles per hour.** However, the design speed should be 45 miles per hour when feasible.	45 mph standard / 35 mph minimum	•Speed Limit:25mph
2	Sidewalk	The minimum width of a sidewalk should be 8 feet between a curb and a building when in urban and rural main street place types. For all other locations the minimum width of sidewalk should be 6 feet when contiguous to a curb or 5 feet when separated by a planting strip.	8 feet for urban/rural main street to face of building 6 feet contiguous sidewalk 5 feet with separated planting	•5' sidewalk on north side of underpass
3	201.6 Stopping Sight Distance on Horizontal Curve	Figure 201.6		•Doesn't appear to have issues to be concern with
4	206.3 Pavement Reductions	Through Lane Drops. When a lane is to be dropped, it should be done by tapering over a distance equal to WV, where W=Width of lane to be dropped and V=Design Speed.		•See 504.3(5)
5	208.4 Bridge Sidewalks	**The minimum width of a bridge sidewalk shall be 6 feet.**	6 feet	•N/A
6	208.6 Bicycle and Pedestrian Overcrossing and Undercrossings	The minimum width of walkway for pedestrian overcrossing should be 8 feet. The minimum vertical clearance of the pedestrian undercrossing should be 10 feet.	8 feet	•N/A
7	208.6 Bicycle and Pedestrian Overcrossing and Undercrossing	Class I bikeways are designed for the exclusive use of bicyclists and pedestrians; equestrian access is prohibited.		•Noted - N/A
8	208.10(2) Bridge Barriers and Railings Policies	To reduce the risk of objects being dropped or thrown upon vehicles, protective screening in the form of fence-type railings should be installed along new overcrossing structure sidewalks in urban areas (Sec 92.6 California Streets and Highway Code).		•N/A
9	208.10(2) Bridge Barriers and Railings Policies	**Any use of railings and barriers with sidewalks on structures with posted speeds greater than 45 miles per hour shall have a barrier separation between the roadway and the sidewalk.**		•N/A - Speed Limit:25mph

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
10	208.10(6) Bicycle Railing	As a general policy, bicycle railings should be installed at the following locations: (a) On a Class I bikeway, except that a lower rail may be used if a curbed sidewalk, not signed for bicycle use, separates the bikeway from the rail or a shoulder at least 8 feet wide exists on the other side of the rail. (b) On the outside of a Class II or III bikeway, unless a curbed sidewalk, not signed for bicycle use, separates the bikeways from the rail.		▪N/A
11	208.10(7) Bridge Approach Railings	**Approach railings shall be installed at the ends of bridge railings exposed to approach traffic.**		▪Yes, end protection for bridge columns
12	301.1 Width	**Table 302.1**	Single-lane ramps shoulder width: 4' LT, 8' RT Multilane ramps shoulder width: 4' LT, 8' RT	▪NB single lane on-ramp:2.9 (LT), 7.0 (RT). ▪SB single lane loop on-ramp:2.0(LT), >8'(RT). ▪NB single lane off-ramp to East San Pedro Rd: 4.1'(LT), 7.1' (RT). ▪NB single lane off-ramp to West San Pedro Rd: 3.2(LT),7.9(RT). ▪SB single lane off-ramp:2.1'(LT),8.1'(RT)
13	301.1 Lane Width (travel lane width on overpass/underpass)	**The minimum lane width on two-lane and multilane highways, ramps, collector-distributor roads, and other appurtenant roadways shall be 12 feet, except as follows:** **▪ For conventional State highways and posted speeds less than or equal to 40 miles per hour and AADTT (truck volume) less than 250 per lane that are in urban, city or town centers (rural main streets), the minimum lane width shall be 11 feet.** **▪Where a 2-lane conventional State highway connects to a freeway within an interchange, the lane width shall be 12 feet.** **▪Where a multilane State highway connects to a freeway within an interchange, the outer most lane of the highway in each direction of travel shall be 12 feet.**	12 feet	Underpass lane widths: ▪WB Left:10' ▪WB right:10' ▪EB lane:10'
14	301.1 Lane Width	**The minimum lane width on two-lane and multilane highways, ramps, collector-distributor roads, and other appurtenant roadways shall be 12 feet, except as follows:** **▪For conventional State highways and posted speeds less than or equal to 40 miles per hour and AADTT (truck volume) less than 250 per lane that are in urban, city or town centers (rural main streets), the minimum lane width shall be 11 feet.** **▪Where a 2-lane conventional State highway connects to a freeway within an interchange, the lane width shall be 12 feet.** **▪Where a multilane State highway connects to a freeway within an interchange, the outer most lane of the highway in each direction of travel shall be 12 feet.**	12 feet *(unless otherwise noted for truck lane width)*	▪NB diagonal on-ramp: single 11' lane ▪NB loop on-ramp (R=143.27'): 12' single lane (20' standard for truck lane width) ▪NB diagonal off-ramp: single 12' lane ▪SB hook on-ramp (R-242'):single 12' lane (15' standard for truck lane width) ▪SB hook off-ramp (R=244'):single 12' lane (15' standard for truck lane width)

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
15	301.2(1) Class II Bikeway (Bike Lane) Lane Width	**Class II bikeways (bike lanes), for the preferential use of bicycles, may be established within the roadbed and shall be located immediately adjacent to a traffic lane as allowed in this manual.**		▪Class I at underpass -Shoulder connecting to it and not defined, Unsafe bike lane.
16	308.1 City Streets and County Roads	**Where local facility, not on the NHS, within the State right of way crosses over or under a freeway or expressway but has no connection to the State facility, the minium design standards for the cross section of the local facility within the State's right of way shall be the local agency adopted standards.**		▪Noted
17	308.1 City Streets and County Roads	**Where a local facility crosses over or under a freeway or expressway and connects to the State facility (such as ramp terminal intersections), the minimum design standards for the cross section of the local facility shall be at least equal to those for a conventional highway with the exception that the outside shoulder width shall match the approach roadway, but not less than 4 feet, and as shown below.**		▪Noted
18	308.1 City Streets and County Roads	**Where a 2-lane facility connects to a freeway within an interchange, the lane width of the local facility shall be 12 feet.**	12 feet	▪Noted - N/A (within Caltrans ROW)
19	308.1 City Streets and County Roads	**Where a multilane local facility connects to a freeway within an interchange, the outer most lane in each direction of the local facility shall be 12 feet.**	Outer lane width = 12'	▪Noted - N/A (within Caltrans ROW)
20	308.1 City Streets and County Roads	**Shoulder width shall not be less than 5 feet when railings or other lateral obstructions are adjacent to the right edge of shoulder.**	5' shoulder from lateral obstruction	▪Noted - N/A (within Caltrans ROW)
21	308.1 City Streets and County Roads	**If gutter pans are used, then the minimum shoulder width shall be 3 feet wider than the width of the gutter pan being used.**	3' wide shoulder plus gutter pan width	▪Noted - N/A (within Caltrans ROW)

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
22	308.1 City Streets and County Roads	**The minimum width for two-lane overcrossing structures at interchanges shall be 40 feet curb-to-curb.**	40 feet curb to curb	▪N/A
23	301.2(1) Class II Bikeway (Bike Lane) Lane Width	**The minimum Class II bike lane width shall be 4 feet, except where:** -Adjacent to on-street parking, the minimum bike lane should be 5 feet -Posted speeds are greater than 40 miles per hour, the minimum bike lane should be 6 feet	Min Class II bike lane width = 4' Class II adjacent to street parking = 5' >40 mph, Class II bike lane width = 6'	▪N San Pedro Rd WB: Discontinued bike lane on N San Pedro Rd West before North ON ramp (Bike lane end sign). bike lane<4' excluding gutter ▪N San Pedro Rd EB: Class I bike path undercrossing?- Unmarked bike lanes
24	309.1 (3) Horizontal Clearances for Highways - Minimum Clearances	**The following minimum horizontal clearances shall apply to all objects that are closer to the edge of traveled way than the clear recovery zone distances listed below:** **(a) The minimum horizontal clearance to all objects, such as bridge rails and safety-shaped concrete barriers, as well as sand-filled barrels, guardrail, etc., on all freeway and expressway facilities, including auxiliary lanes, ramps and collector-distributor roads, shall be equal to the standard shoulder width of the highway facility as stated in Table 302.1. A minimum clearance of 4 feet shall be provided where the standard shoulder width is less than 4 feet. Approach rail connections to bridge rail may require special treatment to maintain the standard shoulder width.**	Standard shoulder width from Table 302.1. 4' minimum for shoulder width < 4'.	▪Sidewalk on WB, EB <4' shoulder to rail
25	309.1 (3) Horizontal Clearances for Highways - Minimum Clearances	**The following minimum horizontal clearances shall apply to all objects that are closer to the edge of traveled way than the clear recovery zone distances listed below:** **(b) The minimum horizontal clearance to walls, such as abutment walls, retaining walls in cut locations, and noise barriers on all facilities, including auxiliary lanes, ramps and collector-distributor roads, shall not be less than 10 feet per Table 302.1.**	10 feet to abutment walls, retaining wall in cut locations, and noise barriers	▪N/A
26	309.1 (3) Horizontal Clearances for Highways - Minimum Clearances	**The following minimum horizontal clearances shall apply to all objects that are closer to the edge of traveled way than the clear recovery zone distances listed below:** **(c) On conventional highways, frontage roads, city streets and county roads within the State right of way (all without curbs), the minimum horizontal clearance shall be the standard shoulder width as listed in Table 302.1 and 307.2, except that a minimum clearance of 4 feet shall be provided where the standard shoulder width is less than 4 feet.**	Conventional highway, frontage roads, city streets within State ROW, minimum horizontal clearance is standard shoulder width and/or 4 feet	▪(City Street) Sidewalk on WB, EB <4' shoulder to rail
27	309.1 (3) Horizontal Clearances for Highways - Minimum Clearances	In areas without curbs, the face of Type 60 concrete barrier should be constructed integrally at the base of any retaining, pier, or abutment wall which faces traffic and is 15 feet or less from the edge of traveled way (right or left of traffic and measures from the face of wall).		▪N/A - columns w/MBGR

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
28	309.2(1)(a) Vertical Clearances - Major Structures - Freeways and Expressways	**16 feet 6 inches shall be the minimum vertical clearance over the roadbed of the State facility (e.g. main lanes, shoulders, ramps, collector-distributor roads, speed change lanes, etc.)**	16.5'	▪21.65'
29	309.2(1)(c) Vertical Clearances - Major Structures - Conventional Highways, Parkways, and Local Facilities, All Projects	**15 feet shall be the minimum vertical clearance over the traveled way and 14 feet 6 inches shall be the minimum vertical clearance over the shoulders of all portions of the roadbed.**	15' traveled way 14' 6" shoulders	▪N/A
30	309.2(2)Vertical Clearances - Minor Structures	**Pedestrian over-crossings shall have a minimum vertical clearance 2 feet greater than the standard for major structures for the State facility in question. Sign structures shall have a vertical clearance of 18 feet over roadbed of the State facility.**	18.5' over freeways	▪N/A
31	403.6(1) Turning Traffic: Treatment of Intersections with Right-Turn Only Lanes	Optional right-turn lanes should not be used in combination with right-turn-only lanes on roads where bicycle travel is permitted.		▪N/A
32	403.6(1) Turning Traffic: Treatment of Intersections with Right-Turn Only Lanes	Locations of right-turn-only lanes should provide a minimum of 4-foot width for bicycle use between the right-turn and through lane when bikes are permitted, except where posted speed is greater than 40 miles per hour, the minimum width should be 6 feet.		▪N/A
33	405.1(2)(b) Public Road Intersection	The minimum value for corner sight distance at signalized intersections should be equal to the stopping sight distance as given in Table 201.1 measured as previously described.		▪No Obstructions
34	405.1(3) Decision Sight Distance	At intersections where the State route turns or crosses another State route, the decision sight distance values given in Table 201.7 should be used.		▪N/A
35	405.2(2)(a) Left-turn Channelization: Lane Widths	**The lane width for both single and double left-turn lanes on State highways shall be 12 feet.**	12 feet	▪N/A
36	405.2(4) Two-way Left-turn Lane (TWLTL)	**The minimum width for a TWLTL (Two-way Left-turn Lane) shall be 12 feet (see Index 301.1)**	12 feet	▪N/A

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
37	405.3(2)(a) Right-Turn Channelization: Lane and Shoulder Width	**Index 301.1 shall be used for right-turn lane width requirements. Shoulder width shall be a minimum of 4 feet. Lane width is 12'.**	12 feet	▪N/A
38	405.3(2)(b) Right-Turn Channelization: Curve Radius	Where pedestrians are allowed to cross a free right-turning roadway, the curve radius should be such that the operating speed of vehicular traffic is no more than 20 miles per hour at the pedestrian crossing. See Index 504.3(3) for additional information.		▪NB loop off-ramp ▪Right turn from N San Pedro Rd to Merrydale Rd ▪NB on-ramp
39	501.3 Spacing	**The minimum interchange spacing shall be one mile in urban areas, two miles outside of urban areas, and two miles between freeway-to-freeway interchanges and other interchanges. The minimum interchange spacing on interchanges outside of urban areas shall be three miles.**	1 mile (urban)	Existing Condition - ▪Manuel T Freitas Parkway - 1 mi ▪2nd Street - 1.6 mi
40	504.2(2) Freeway Entrances and Exits	Design of freeway entrances and exits should conform to the standard designs illustrated in Figure 504.2A-B (single lane), and Figure 504.3K (two-lane entrances and exits) and/or Figure 504.4 (diverging brand connections), as appropriate. *Deceleration Length: See HDM 504.2B* *Acceleration Length: See HDM 504.2A*	Single lane on-ramp entrance Acceleration Length = 467.11' (measure from curve to gore point) Merge length = 600' (measure from gore point to 12' lane drop)	▪NB diagonal ramp Accel:445'<467.11' Merge: 472'<600' ▪SB hook on-ramp Accel: Auxiliary lane provided Merge: Auxiliary lane provided
41	504.2(2) Freeway Entrances and Exits	**The minimum deceleration length shown on Figure 504.2B shall be provided prior to the first curve beyond the exit nose to assure adequate distance for vehicles to decelerate before entering the curve.**	R<300', DL=570' R=300'-499', DL=470' R=500'-999', DL =420' R=1,000 or greater, DL=270'	▪Noted
42	504.3(1)(a) Ramps: Design Speed	When ramps terminate at an intersection at which all traffic is expected to make a turning movement, the minimum design speed along the ramp should be 25 miles per hour. When a "through" movement is provided at the ramp terminus, the minimum ramp design speed should meet or exceed the design speed of the highway facility for which the through movement is provided.		▪Noted
43	504.3(1)(b) Ramps: Lane Width (Trucks)	**Ramp Lanes shall be a minimum of 12 feet in width. Where ramps have curve radii of 350 feet or less, measured along the outside edge of traveled way for single lane ramps or along the outside lane line for multilane ramps, with a central angle greater than 60 degrees, the single ramp, or the lane furthest to the right if the ramp is multilane, shall be widened in accordance with Table 504.3 in order to accommodate large truck wheel paths.**	(Inside lane for multilane ramps) R<150', Lane width = 20' R=150-179', Lane width = 17' R=180-209', Lane width = 16' R=210-249', Lane width = 15' R=250-299', Lane width = 14' R=300-350', Lane width = 13' R>35', Lane width = 12'	▪NB off-ramp: single 12' lane ▪NB loop off-ramp (R=143.27'): 12' single lane (20' standard) ▪NB on-ramp:11' single lane ▪SB on-ramp (R-242'):12' Single lane (15' standard) ▪SB off-ramp (R=244'):12' single lane, widened at the curve part transitioning to two lanes

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
44	504.3(1)(c) shoulder width	**Shoulder widths for ramps shall be as indicated in Table 302.1**		▪Shoulder widths indicated above in Section 301.1
45	504.3(3) Location and Design of Ramp Intersections on the Crossroads	**For left-turn maneuvers from an off-ramp at an unsignalized intersection, the length of crossroads open to view should be according to the corner sight distance criteria in Index 405.1**		▪N/A - signalized
46	504.3(3) Location and Design of Ramp Intersections on the Crossroads	**The minimum distance (curb return to curb return) between ramp intersections and local road intersections shall be 400 feet.** The preferred minimum distance should be 500 feet.		▪605' from NB loop off-ramp to Merrydale Rd
47	504.3(5) Single-lane Ramps	When additional lanes are provided near an entrance ramp intersection, the lane drop should be accomplished over a distance equal to WV. The lane to be dropped should be on the right so the traffic merges left.	WV for ramp entering or exiting the freeway	▪NB diagonal on-ramp: L=110' (standard L=360' for 30 mph,12' lane) ▪SB hook on-ramp: L=85' (standard L=300' for 25 mph,12' lane)
48	504.3(5) Single-lane Ramps	If the length of the single lane ramp exceeds 1,000 feet, an additional lane should be provided on the ramp to permit passing maneuvers.	exit ramps with lengths greater than 1000' require additional lane	▪NB off-ramps >1000'
49	504.3(9) Distance Between Successive On-ramps	This distance should be about 1,000 feet unless the upstream ramp adds an auxiliary lane in which case the downstream ramp should merge with the auxiliary lane in a standard 50:1 (longitudinal to lateral) convergence.	1000' feet	▪Not an issue
50	504.3(10) Distance Between Successive Exits	The minimum distance between successive exit ramps for guide signs should be 1,000 feet on the freeway and 600 feet on collector-distributor roads.	1000' feet	▪Meets standard
51	504.7 Weaving Sections	**Between interchanges, the minimum entrance ramp-to-exit ramp spacing, measured as shown on Figure 504.2A and 504.2B shall be 2,000 feet in urban areas, 5,000 feet outside urban areas, and 5,000 feet between freeway-to-freeway interchanges and other interchanges.**	2000 feet for urban (entrance ramp-to-exist ramp spacing)	SB hook on-ramp to Lincoln Ave off-ramp: Distance = 1921' < 2000' NB on-ramp from Villa Ave to NB off-ramp: Distance = 682' < 2000'
52	1003.1(1)(a) Class I Bikeways (Bike Paths): Traveled Way	**The minimum paved width of a traveled way for a two-way bike path shall be 8 feet, 10 feet preferred. The minimum paved width for a one-way bike path shall be 5 feet.**	Two-way Class I =8' (10' preferred) (5' minimum)	▪5' (assumed one-way)

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Caltrans HDM)

Note: Existing conditions evaluated against Caltrans HDM(July 2020).

No.	HDM Section	HDM Boldface/Underline Criteria	Standard Applied	North San Pedro Road / Merrydale Road
53	1003.1(1)(b) Class I Bikeways (Bike Paths): Shoulder	**A minimum 2-foot wide shoulder, composed of the same pavement materials as the bike path or all weather surface material that is free of vegetation, shall be provided adjacent to the traveled way of the bike path when not on a structure.**	2' clear	▪Non-standard
54	1003.1(3) Class I Bikeways (Bike Paths): Clearance to Obstructions	**A minimum 2-foot horizontal clearance from the paved edge of a bike path to obstruction shall be provided.**	2' clear to obstruction	▪Ok
55	1003.1(3) Class I Bikeways (Bike Paths): Clearance to Obstructions	**The clear width of a bicycle path on structures between railings shall be not less than 10 feet.**	10' clear from structures	▪N/A - Not on structure
56	1003.1(3) Class I Bikeways (Bike Paths): Clearance to Obstructions	**The vertical clearance to obstruction across the width of a bike path shall be a minimum of 8 feet and 7 feet over shoulder.**	Class I vertical clearance = 8' over roadway and 7' over shoulder	▪Ok
57	1003.1(7) Class I Bikeways (Bike Paths): Clearance to Obstructions	**The minimum separation between the edge of traveled way of a one-way or two-way bicycle path and edge of traveled way of a parallel road or street shall be 5 feet plus the standard shoulder width. Bike paths within the clear recovery zone of freeways shall include a physical barrier separation.**	Class I - 5' clear + shoulder width to one-way or two-way bicycle path. Can be less with barrier.	▪Metal beam guard rail present

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Local Standards)

Note: Existing conditions evaluated against the Marin County Uniform Construction Standards(July 2008), the City of Novato's Uniform Standards(May 2013), and Marin Transit(August 2013).

No.	Jurisdiction	Criteria	Standard	North San Pedro Road / Merrydale Road
1	Uniform Construction Standards for Marin County dated July 2018		•Arterial road means road specified in the countywide plan or the Marin county annual road list, and other major roads with an actual or projected ADT over two thousand •Industrial commercial road means providing access to, or through, an industrial or commercial zone or an area of high truck and/or other large vehicle traffic •Collector road means a road with an actual or projected ADT from one though to two thousand •Residential road means a road providing access to a generally residential area and which serves or may serve twenty or more dwelling units, and a maximum potential ADT of one thousand •Minor residential road means a road providing access to a generally residential area and which serve seven to nineteen dwelling units, and a maximum potential ADT of five hundred •Limited residential road means a road which serves two to six dwelling units, and a maximum potential ADT of one hundred fifty	•Arterial/Collector
2	Uniform Construction Standards for Marin County dated July 2019	Design Speed	All roads except residential roads will have a minimum design speed of 25 mph	•Speed Limit:25mph
3	Uniform Construction Standards for Marin County dated July 2020	Centerline Radii	Follow Caltrans Highway Design Manual	•Noted
4	Uniform Construction Standards for Marin County dated July 2021	Intersections	Roads shall intersect each other as near to a right angle as is practical. Where several streets converge at one point, special approach treatment shall be provided to optimize driver sight distance and pedestrian safety. Provisions may include, but are not limited to, setback lines, special rounding, slope grading and/or vegetation removal. Block corners shall be rounded at the property line by a radius of not less than twenty feet and curb or pavement returns shall have a minimum radius of twenty-five feet.	•Noted
5	Uniform Construction Standards for Marin County dated July 2022	Roadway Width - lane widths	The following table sets forth the minimum widths for the improved section measured from face of curb to face of curb. Where no curb or berm is proposed the paved width shall be one foot greater than that listed to allow for edge striping and pavement edge raveling. •limited residential road: 20' with shoulders and 24' with curbs •minor residential road: 28' •residential road: 36' •collector road: 40' •arterial and industrial/commercial: as required	N San Pedro Rd and Merrydale Rd intersection (west of underpass) •N San Pedro Rd: 56' •S. Merrydale Rd 32' (40' std) •N. Merrydale Rd: >40 in the narrowest section N San Pedro Rd and San Pablo Ave (east of underpass) •N San Pedro Rd:82' •San Pablo Ave: 37' (40' std)
6	Uniform Construction Standards for Marin County dated July 2023	Roadway With - shoulder width	Shoulders shall be provided on each side of all roads. Shoulders shall normally be four feet although wider shoulders may be required as deemed appropriate by the agency.	•No shoulders
7	Uniform Construction Standards for Marin County dated July 2024	Curbs	Curbs and gutters or berms shall be required adjacent to all parking lanes and where physical separation, delineation, or stormwater control is necessary. PCC curbs and gutters shall normally be required in order to minimize long-term maintenance. AC berms may be allowed where appropriate at the discretion of the agency.	**West of Underpass:** •N San Pedro Rd: Yes curb and gutter for both direction. Parking lane on EB •Merrydale Rd: Yes curb and gutter. Parking lane on SB side **East of Underpass** •N San Pedro Rd: Yes curb and gutter for both directions. No parking lanes •San Pablo Ave: yes curb yes gutter. Parking lane for SB direction on the North side of San Pablo Ave

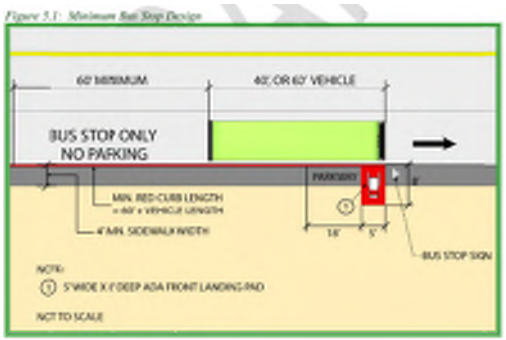
Hwy 101 Interchange Implementation Study - Deficiency Matrix (Local Standards)

Note: Existing conditions evaluated against the Marin County Uniform Construction Standards(July 2008), the City of Novato's Uniform Standards(May 2013), and Marin Transit(August 2013).

No.	Jurisdiction	Criteria	Standard	North San Pedro Road / Merrydale Road
8	Uniform Construction Standards for Marin County dated July 2025	Sidewalks required	Sidewalks shall be provided in conformance with any applicable general, specific, or community plan which has been adopted by the county. In addition, the following general standards shall apply: (a) Sidewalks shall be required on both side of all roads within residential areas where densities will be equal to or ultimately exceed four units per acre (b) Sidewalks shall be required on only one side of each road within a residential area where densities will be less than four units per acre (c) Pedestrian paths of an acceptable width may also be required through the center of long blocks; to provide access to schools, parks, playgrounds, open space, and other public areas; to river, lake, bay and ocean frontage; to connect cul -de-sac streets and where otherwise necessary as determined by the agency and/or the community development agency. If location outside of the right of way of a county maintained road, provisions must be made for their maintenance. (d) Sidewalks may be eliminated on one or both sides of streets where it is found that topography, density or other circumstances make them impractical as determined by the agency (e) Sidewalks shall be required on both sides of all roads in industrial, commercial and business districts (f) Safe and reasonable direct pedestrian access shall be provided between residential subdivisions and transit stops where feasible	
9	Uniform Construction Standards for Marin County dated July 2026	Sidewalks within city-centered corridor	4' in width adjacent to a curb or 4.5' when separated by a curb. Additional width may be required for potential high pedestrian volumes such as near schools, places of public assembly, commercial areas and in vicinity of senior citizen housing or convalescent hospital.	•Sidewalk east of underpass: 4' and 5' •Sidewalk west of underpass: 5'
10	Uniform Construction Standards for Marin County dated July 2027	Sidewalk obstructions	(a) No poles, grates, covers, fire hydrants or other obstructions are allowed within a sidewalk. Utility boxes and other flush facility may be allowed within a sidewalk if their location and nature are deemed safe by the agency. (b) If the postal service requires that mailboxes be located adjacent to the curb then the sidewalk shall be either separated from the curb or wide enough to provide a four-foot obstructed width	•No sidewalk obstructions
11	Uniform Construction Standards for Marin County dated July 2028	Transit facilities - passenger shelters	Bus passenger shelters shall be designed to shelter at least eight persons, shall not obstruct a sidewalk and shall be subject to approval of the Marin County Transit District and the agency.	•Bus Shelter outside of sidewalk
12	Uniform Standards (City of Novato) dated May 2013	Bus Turnout	Refer to drawing no. 195N	
13	Marin Transit (Golden Gate Transit) dated August 2013		The bus stop has ADA landing pads, 4 - feet accessible sidewalk, a clear wheelchair's space inside the shelter, and barrier and obstacle-free zone.	•Yes
14	Marin Transit (Golden Gate Transit) dated August 2014		No parking in front of bus stop	•Yes
15	Marin Transit (Golden Gate Transit) dated August 2015		60' clear from parking to bus stop (near side stops)	•N/A
16	Marin Transit (Golden Gate Transit) dated August 2016		50' clear from parking to bus stop (far side stops)	•Yes
17	Marin Transit (Golden Gate Transit) dated August 2017		60' clear from back and 60' clear from front of bus (mid block stops)	•Yes

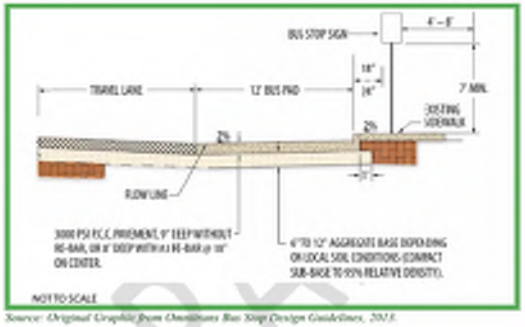
Hwy 101 Interchange Implementation Study - Deficiency Matrix (Local Standards)

Note: Existing conditions evaluated against the Marin County Uniform Construction Standards(July 2008), the City of Novato's Uniform Standards(May 2013), and Marin Transit(August 2013).

No.	Jurisdiction	Criteria	Standard	North San Pedro Road / Merrydale Road
18	Marin Transit (Golden Gate Transit) dated August 2018		Bus turn-out should be consider: •Traffic in the curb lane exceeds 250 vehicles during the peak hour •Traffic speed is greater than 40 mph •Bus volumes are 10 or more per peak hour on the roadway •Passenger volumes exceed 20 boardings per hour •Average peak-period dwell time exceed 30 second per bus •History of repeated traffic and/or pedestrian accidents at stop location •A right turn lane is used by buses as a queue jumper lane, •Improvements, such as widening, are planned for major roadway. This provides the opportunity to include the bus bay as part of the reconstruction, resulting in better-designed and less-costly bus turnout.	
19	Marin Transit (Golden Gate Transit) dated August 2019		When traffic volumes exceed 1000 veh/hr per lane, placement of a bus turnout on a high-volume road is guided by the following: •Far side intersection placement is desirable. Bus bays should be placed at signal-controlled intersection so that the signal can create gaps in traffic. •Near side bays should be avoided because of conflicts with right-turning vehicles, delays to transit service as buses attempt to re-enter the travel lane, and obstruction of traffic control devices and pedestrian activity unless associated with key sites or key pedestrian access to major transit-oriented activities centers. •Midblock bus bays locations are not desirable unless associated with key pedestrian access to major transit-oriented activities centers.	
20	Marin Transit (Golden Gate Transit) dated August 2020		Bus pad : 8" thick reinforced concrete pad with #3 rebar at 18" OC. Width of pad =11' and varies in length (40'-60') (depends on bus length)+3' buffer at beg/end	•Adjacent to SB 101 (Stop ID 40581): No bus pad •Adjacent to NB 101 (Stop ID 40582): Standard Bus pad •West of Underpass- N San Pedro Rd & Merrydale Rd (Stop Id 40578): No bus pad •West of Underpass- N San Pedro Rd & Merrydale Rd (Stop Id 40580: Yes bus pad, but width<11'
21	Marin Transit (Golden Gate Transit) dated August 2021		ADA Landing Pad : front landing pad are 5 feet parallel to street and 8 feet deep and rear landing pad are 5 feet parallel to street and 8 feet deep (ADAAG 10.2.1)	•Yes
22	Marin Transit (Golden Gate Transit) dated August 2022		Minimum Bus Stop Design 	

Hwy 101 Interchange Implementation Study - Deficiency Matrix (Local Standards)

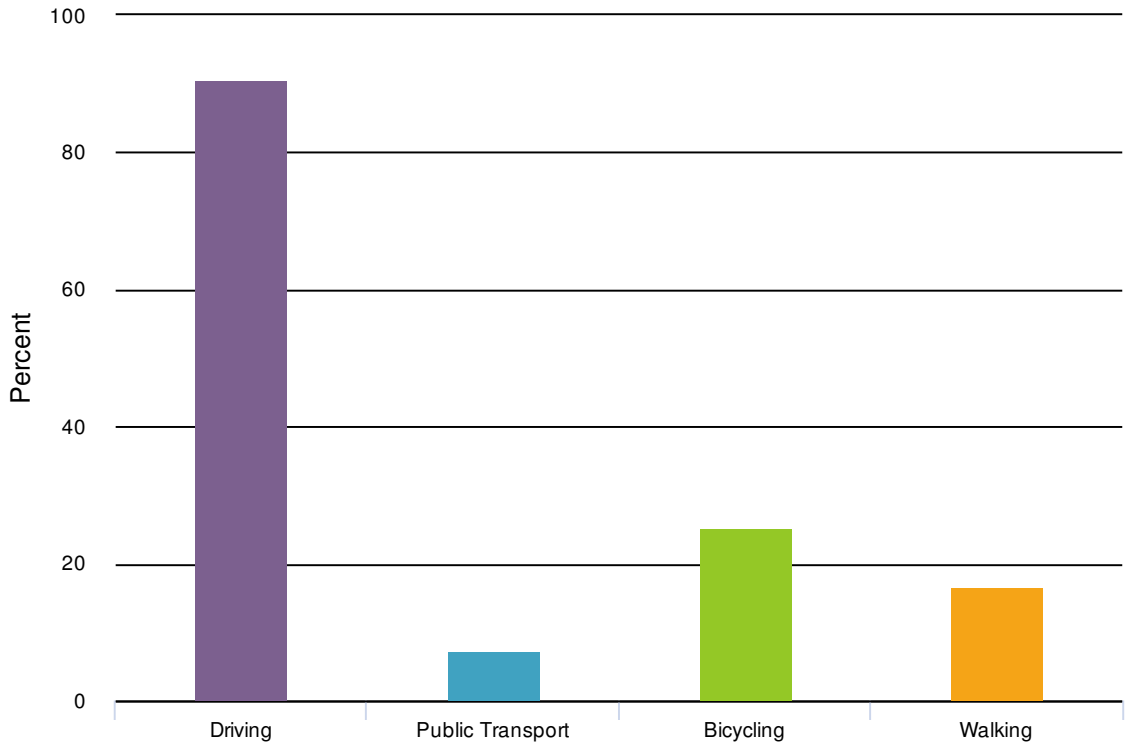
Note: Existing conditions evaluated against the Marin County Uniform Construction Standards(July 2008), the City of Novato's Uniform Standards(May 2013), and Marin Transit(August 2013).

No.	Jurisdiction	Criteria	Standard	North San Pedro Road / Merrydale Road
23	Marin Transit (Golden Gate Transit) dated August 2023		Bus Pad Design - Cross Section  Source: Original Graphic from Omnitrans Bus Stop Design Guidelines, 2015.	

K. Online Survey Comments

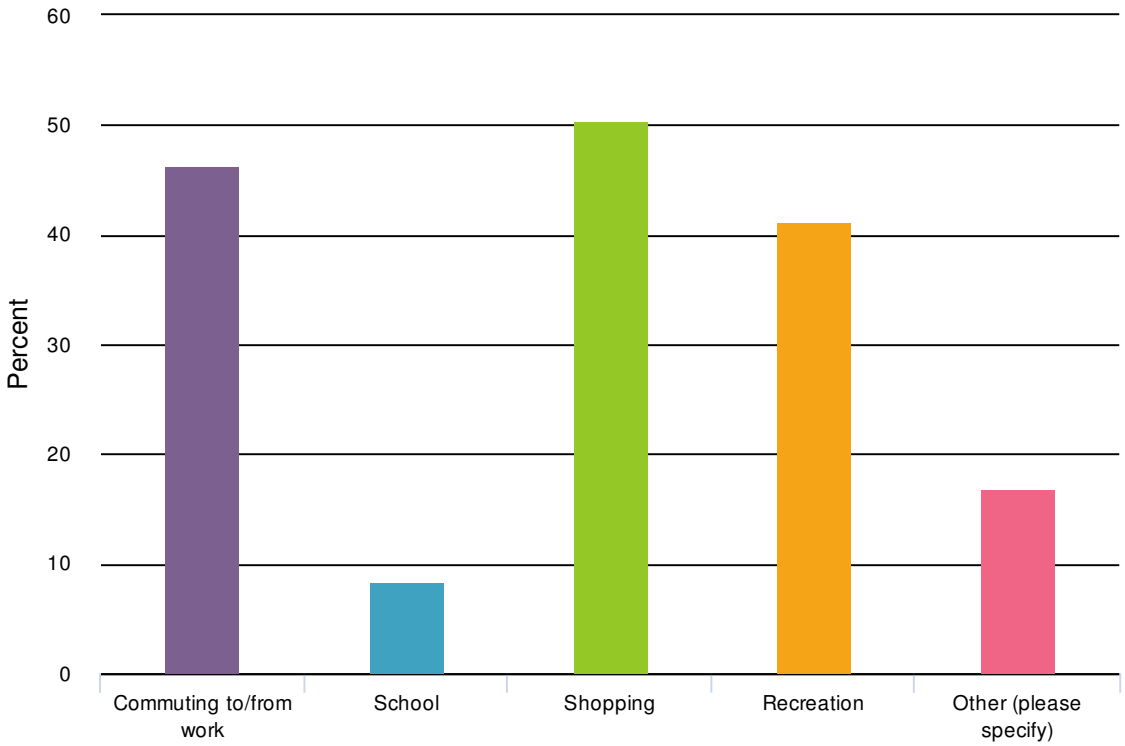
N. San Pedro Road / Merrydale Road

25. How do you normally travel through this interchange? Select up to 2



Value	Percent
Driving	90.5%
Public Transport	7.4%
Bicycling	25.3%
Walking	16.8%

26. What are the main purposes you use this interchange for? Select up to 2



Value	Percent
Commuting to/from work	46.3%
School	8.4%
Shopping	50.5%
Recreation	41.1%
Other (please specify)	16.8%

Other (please specify)
Anytime I leave home
Appointments etc
Civic Center business
Civic Center offices
Connect to North South Greenway
Driving while working
Errands for work and school
Everything else
Family in SF
Government business
Relatives. Visiting
Synagogue, jury duty
Taking the bus to San Francisco
To friends' homes
Visiting my Father
general driving to/from various destinations

27. Please rank the following priorities for this interchange based on their importance to you:

	Not Important	Lower Importance	No Opinion	Somewhat Important	Most Important	Responses
Reduce traffic congestion Row %	10.5%	18.9%	11.6%	31.6%	27.4%	95
Make it easier to drive to and from this interchange Row %	12.8%	9.6%	14.9%	20.2%	42.6%	94
Improve the quality and access to bus stops near this interchange Row %	13.7%	13.7%	33.7%	24.2%	14.7%	95
Increase Park and Ride capacity Row %	26.3%	14.7%	38.9%	10.5%	9.5%	95
Make it safer to walk around this interchange Row %	7.4%	6.3%	17.9%	28.4%	40.0%	95
Make it safer to bike around this interchange Row %	10.5%	7.4%	18.9%	18.9%	44.2%	95
Improve lighting and security Row %	8.5%	8.5%	31.9%	28.7%	22.3%	94

	Not Important	Lower Importance	No Opinion	Somewhat Important	Most Important	Responses
Improve environmental sustainability and resiliency (e.g. protection from flooding and sea level rise) Row %	12.6%	13.7%	43.2%	16.8%	13.7%	95
Totals Total Responses						95

28. Is there anything else you'd like to let us know about traveling on or around this interchange? Please be as specific as possible.

ResponseID	Response
284	Biking westbound on North San Pedro Rd across the 101 intersection is very dangerous. Safety could be greatly improved by clearly painting bike lanes in green on the pavement, and adding signs.
376	The cross-walks and bike lanes crossing the on and off-ramps on North San Pedro are completely insane. We literally have bikers and pedestrians mixing it up with 50MPH traffic in uncontrolled crossings.
417	I ride my bicycle to the Farmers' Market at the Civic Center. Here again there is a small side path for eastbound bicyclists on N San Pedro to go under the overcrossing. It is easily missed and there is no accommodation for bicyclists to deal with speedy merging eastbound traffic merging from northbound 101. An alternative route using the N-S Greenway along the SMART ROW is quite a long detour.
479	This is a super scary interchange for a cyclist. The road often has loose gravel that is dangerous for a cyclist, but the most scary part is trying to cross the interchange on-ramp as cars are speeding up to get on 101 and also crossing the off-ramp where cars are still going fast getting off 101. I always worry that I can't be seen, especially by the cars coming onto San Pedro off the highway. Then crossing under the overpass is dark and visibility is sketchy.
525	Northbound on ramp is extremely short and has resulted in several recent near misses with traffic exiting at the intersection and which is often in the drivers blind spot. The on ramp and off ramp need more separation.

ResponseID	Response
625	Merging onto 101 North from N. San Pedro Road is dangerous. The merge area is very short. Cars traveling in the right-hand lane of 101 are moving downhill at high speed and are often preparing to exit at Freitas Parkway. Cars entering from the N. San Pedro Road ramp either have to slow/stop on the ramp or use the 101 shoulder to avoid being hit.
651	Please address the south bound 101 on-ramp from Miller Creek in Marinwood. This on-ramp is seriously dangerous.
722	When heading north, entering this exchange is dangerous from both the freeway (while exiting) and while entering to join freeway traffic. Visibility is limited, and simultaneously, within a very SHORT, SHARED distance, cars must merge onto freeway and exit off of freeway. There are many accidents because of this bad design.
806	The roadway is awful on the exit going north and has been for forever. Shameful!
862	This is a very important interchange for me and I use it all the time, both day and night, even late at night. If you are thinking of taking it away, DON'T!!
883	traffic entering 101 and that exiting 101 is a hazardous crossover (northbound)
901	Public transit opportunities at this interchange have been greatly reduced over the years. I would like to see those opportunities increased in the future. Demand will not go up until there are better options. There is no commute service into Santa Venetia and the Terra Linda commute choices have been cut. It's no wonder more people were driving even before the pandemic. Once the high density housing starts appearing we will be in trouble with lack of space on the current buses. Just the idea of 1300 apartments being built at North Gate without additional transit options is horrible.
904	Actually this comment is about exit 451 from 101 north (Richmond Bridge/Francisco Blvd). This needs to be replaced with a direct interchange to 580 East. The traffic backs up onto 101 north due to the intersection of Francisco Blvd and Bellam Blvd, where there are about multiple stoplights in rapid succession that cause immense congestion. This creates a dangerous condition on the freeway, with cars stopped in the exit lane, while cars continue at freeway speeds in the next lane. Critical to fix this!
934	have a bike lane eastbound under the underpass

ResponseID	Response
1035	This interchange is so unsafe. AS a bicyclist - there's merging traffic and no bike lane so you're just stuck riding in the middle of traffic. Cars exiting the highway often don't stop to let people cross the offramp - and often because they don't see people standing there/don't expect them to be standing there. A pedestrian and bicycle bridge that takes people over the offramp would be the safest. And a bicycle lane is desperately needed there. Also sidewalks are NOT wide enough for strollers, wheelchairs, etc. leading both East and West from the intersection on North San Pedro.
1074	Trying to merge from NBound 101 exit to the Farmers Market/Civic Center is trying to cross 3 lanes with eastbound traffic on San Pedro which is dangerous.
1129	The pedestrian access around this interchange could be improved.
1134	Very dangerous in north direction from 12-8 pm, traffic pikes up as cars slow and pile up to wait for parking at vista point. Always dangerous in south direction as 3 lanes converge on right side. Tourists are often freaked out and I expect an accident almost every time I approach this exchange at a very tight turn. You must slow traffic from the Waldo Tunnel down to here, please. This could be a deadly exchange for people on the trip of a lifetime.
1178	The width of the road was fixed The San Rafael narrows. But but the 101 freeway extends uphill on an upward slope which causes most cars to decelerate and slow down. Because of the slope of the freeway leading to the top of the San Rafael narrows, it causes cars to slow down and creates large congestion. Once you get through the San Rafael straight traffic opens up.
1255	On the Merrydale side I get the addition of the stop sign. However, it has made traffic congestion in area a problem. As this is a confined area, there is not much room for the longer lines of cars which increases the danger for anyone walking or riding a bicycle. That this intersection and the next one Frietas/Civic Center are both awkward and dangerous with the current amount of traffic, I am truly terrified at what they would be like if the Northgate Mall area is developed and this increases the traffic even a tiny bit.
1362	The walking experience to the bus pad - especially waking from the Northern bus pad to Merrydale Rd - is terrible. It is dark, the street crossing are all dangerous. Merrydale is scary to bike on, despite being part of a signed bike route! Traffic flow on the on/off ramp going southbound could be improved by a roundabout. It is currently a 3 way stop.
1369	I think that these should be a high priority placed on improving access from the northbound side of the highway to the southbound side without having to walk under the underpass.

ResponseID	Response
1379	The northbound offramp/onramp is getting more congested. It's harder to get on and off the freeway here as more people are using it to avoid freitas parkway. Would be good to have another offramp halfway between NSan Pedro and Freitas where the overpass is, when apartments go into Northgate mall. I'd like to be able to walk safely from the Dominican neighborhood (southeast of exit) to the civic center/postoffice (northeast of exit) without going another half mile around the other side of the freeway. The path over the hill is steep and homeless addicts were lighting fires there.
1453	Pedestrian experience on Merrydale and N San Pedro could be so much better. Cross walks by on/off ramps are dangerous. There are merging issues for people coming off the N off ramp and people moving to the right lane on N San Pedro. The three way stop near the S on ramp is inefficient. Given that further down Merrydale there is a small commercial hub, plus new housing being built, the area should be better for walking and transit access.
1698	If you're heading North on 101 and want to go to the Civic Center, trying to navigate from the freeway exit to the left turn lane can be a harrowing experience. I'm glad I don't have to do this often. Thank you so much for adding the stop signs around the area when you come off of 101 South onto Merrydale. Those are a huge help!
1722	The overpass where North San Pedro goes under 101 is a very perilous walk. The sidewalk is narrow and rough, there are no traffic lights to control traffic turning onto the Northbound on ramp while pedestrians are crossing, or to control the traffic merging from the clover leaf off of Northbound 101 onto Westbound San Pedro. Left lane traffic here is merging to turn right onto Merrydale to then merge South on 101, and they have to cross paths with the 101 traffic from the clover leaf that is merging left to got straight West. It's a mess.
1731	A bike connection from the Canal to Venetia Valley school via the North-South Greenway is critical. Walking and biking to school is most important. Safety for children and parent access to all the schools on this corridor. Merrydale also needs to add on and off-ramps. Several large housing projects are going in such as Northgate Walk and Northgate Mall and the revitalized mall require better traffic handling. NO ONE IS GETTING OUT OF THEIR CARS TO LIVE THERE. Stop social; engineering which has conclusively been shown not to work.

ResponseID	Response
1734	The southbound on-ramp entrance on Merrydale is still scary, even after the stop signs were added a couple of years ago. Drivers coming from the south and turning onto the southbound on-ramp are supposed to yield to cars coming from the north (who have a stop sign) but they rarely do. When it's busy, drivers just pour through, one after another, while drivers who already proceeded past the stop sign get caught in their part of the intersection. I always expect to hear a crash after I get away from there. Pedestrians are hard to see and are in danger.
1825	It would be safer to make Merrydale a through road instead of deadend.
1867	Whenever I approach this going north from the street below, I always fear the cars exiting 101 in the exact same space where I am merging left. Why must we use the same short space? Also, whenever I approach this going north on 101 itself, I fear other cars merging from below and using the same space I am using to bear right.
1920	Stop signs were added that just made the congestion situation worse. Anytime there is an accident or heavy traffic on the highway people use this off ramp as a detour. I live in a nearby neighborhood and this is the only exit in and out. When I took the bus to work I complained about the led lighting when it was still dark in the am and I walked up to the bus top and did not feel safe. This intersection is extremely for pedestrians.
1936	The drivers are usually pretty good about giving cyclists the right of way in the class 2 bike lane.
2019	A dedicated northbound lane for the on ramp would help with the merge for cars taking the Manual Freitas exit.
2025	The bike lane on westbound San Pedro is a terrible segment - invites you to merge through a lane of traffic speeding up to get on the freeway with no separation. Would be much better to have a bidirectional physically separated lane in the center of the roadway with safe entry/exit far enough from the on-ramps and off-ramps.
2048	The on ramp to 101 North is one of the most dangerous merges in Marin Cty.
2068	Would be great to have Park and Ride at this interchange for direct bus service into SF. The current issue is that the underpass is not aligned with the bus-pads, so if I park my car on the street near the southbound bus-pad, it is a long walk from the northbound bus pad where I would get dropped off - this adds about 10 minutes onto my commute. See Montlake Terrace Transit Center along I-5 north of Seattle for a great example of better infrastructure. Adding something like this between N San Pedro and Freitas would be amazing!

ResponseID	Response
2125	I would like to see more speed bumps near each intersection near schools, churches, MJJ, and dividers such as recently installed on S.Eliseo Dr. On vendola drive, Adrian Drive & Rosal at each cross section to slow down opposite traffic from cutting into the wrong lane. I reside at a corner and have witnessed this so often. So thankful that besides my 15 lbs dachshund & neighbor's cat getting run over, no human has yet. I wish was able to upload pics. I appreciate the opportunity to contribute my experiences and sad meomires of last 40 yrs. SS
2139	I exit N101 onto N. San Pedro several times a day. This exit has a big problem with trash and rock and mud slides. There have been piles of rocks on the shoulder for years that are big hazards. There are tire tracks over the piles that indicate they are being hit. In the last year there has been more attention (trash clean-up, repaving, drainage, guardrail) given to this exit but, as the entrance to our Civic Center, it is still a mess. I would like to see the hillside above this exit shored up and more regular trash pick-up.
2154	Signage needed heading west on San Pedro before turning to enter freeway heading north. Sometimes I miss this turn to enter the freeway. The other direction stopping at Merrydale to head south is sometimes confusing - do you need to stop before turning right? Also, exiting at Merrydale, traffic is very fast and the need to slow can be jarring...
2182	The stop sign where the southbound exit intersects Merrydale has reduced congestion on the exit by controlling right-of-way.
2188	Given that RoundAbouts are known to 1. cost less overall and overtime, 2. improve traffic flow, 3. reduce fatal pedestrian accidents, 4. reduce carbon emissions from idling cars that sit uselessly at lights, 5. save the public money because they aren't wasting gas sitting idly at traffic lights and in traffic... WHY! isn't Marin County beginning the transition to RoundAbouts for all these areas you have listed in your survey. WHY! are we spending a ridiculous amount of money on traffic lights? https://freakonomics.com/podcast/roundabouts/
2225	the way the interchange is designed is to keep cars moving fast and does not take pedestrian or bike safety in to account at all. This could likely redesigned in a way that wouldn't cost a ton of money but make the experience much safer for other road users. Would encourage alternate transport options rather than driving solo.
2240	The entrance ramp to get on to 101 South is too short, and combined with the uphill grade there, can often make merging hazardous as incoming cars struggle to attain highway speed.

ResponseID	Response
2285	Cycling westbound on North San Pedro from the Civic Center (as for doing jury service or shopping at the farmers market), it is very dangerous crossing the on-ramps to 101 north and then the cloverleaf off ramp from 101 to head west, especially as cars have been traveling at highway speeds before exiting 101.
2320	Dangerous when trying to bike heading north and going from West side of 101 to East side, such as traveling from downtown San Raf to Civic Center. Bicyclists have to cross the off-ramp from 101 North onto N San Pedro with cars coming off the highway at high speeds.
2331	There is a need for improved bike access under the overcrossing. While there is a sidewalk on the north side, bicyclists have had to create an unofficial bike path on the south side to feel safe riding in this area.
2413	It would be nice to have more bike and pedestrian access around this interchange. Traffic congestion has not be a real issue lately.
2420	The southbound on ramp combines too many bad design elements. The short on ramp combined with a sharp radius curve and a steep uphill incline create a hazard for motorists to accelerate onto the freeway. There are frequent hits on the guardrail as motorists accelerate through the curve primarily in wet conditions. There is a grade break in the N/B lanes approx. 5,000 feet south of the North San Pedro Bridge that causes hydroplaning during rain events. It causes frequent spin outs. The marks on the sound wall are evidence of the hazard.
2430	I would like to bike to work, but I don't feel safe navigating this interchange
2434	It's really hard to understand who's turn it is with all the different lanes. Even driving here for a while I get confused.
2435	Lighting needs to be improved from the bus pad to N. San Pedro and biking/walking made safer at each exit Eand W bound on N San Pedro.
2446	A big issue for me is lighting is TOO bright: using bright white LED lights or allowing buildings shining lights on to the road makes driving more difficult.I have used this interchange for over 35 years. We need better ways for people to get to Civic Center, walk and public transit. And as I mentioned before there is no way for anyone to park in the area and easily get to the SMART train especially for seniors like me. Please make access to transportation more user friendly. And by the way, the street signs are old and not very visible.
2529	Approach from north is confusing. Leaving it to go to San Francisco also confusing, almost hidden.

ResponseID	Response
2606	Make a class 1 pathway on south side of N San Pedro road from Merrydale to Civic Center. Also connect with NS Greenway at Merrydale and at Ranchitos. No safe for at for school kids to use N San Pedro road under 101 and NB off ramp. Intersection of Merrydale and N San Pedro needs to be reconfirmed for safe biking and walking all legs.
2653	Westbound traffic from N San Pedro Rd before the pandemic backed up towards Meadow Dr. Problem is caused by low utilization of right lane on-ramp. Needs to have two through westbound lanes at interchange. This is a known problem backed by traffic reports that has not been addressed.
2705	I live in Santa Venetia so I use this interchange almost every time I leave the house. The main difficulty on the northbound exit is the extremely short two-lane merge for cars making the left onto Civic Center Drive (this is not usually me, but I see crazy stuff every day around this issue!). The creation of a three-way stop at the southbound exit has been a huge improvement in safety and calming at that exit -- bravo.
2847	Bike routes and sidewalks along North San Pedro need protection from motorists exiting or entering the highway.
2849	Riding on a bike through this interchange is pretty hairy for a seasoned cyclist, I could see how it could totally put off more normal people. Would really appreciate a dedicated bike lane with perhaps some plastic bollards going eastbound and some protection in a similar way when trying to navigate across the northbound on-ramp, going westbound.

L. Existing FEMA Map

1000 Broadway, Suite 475
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www.wreco.com

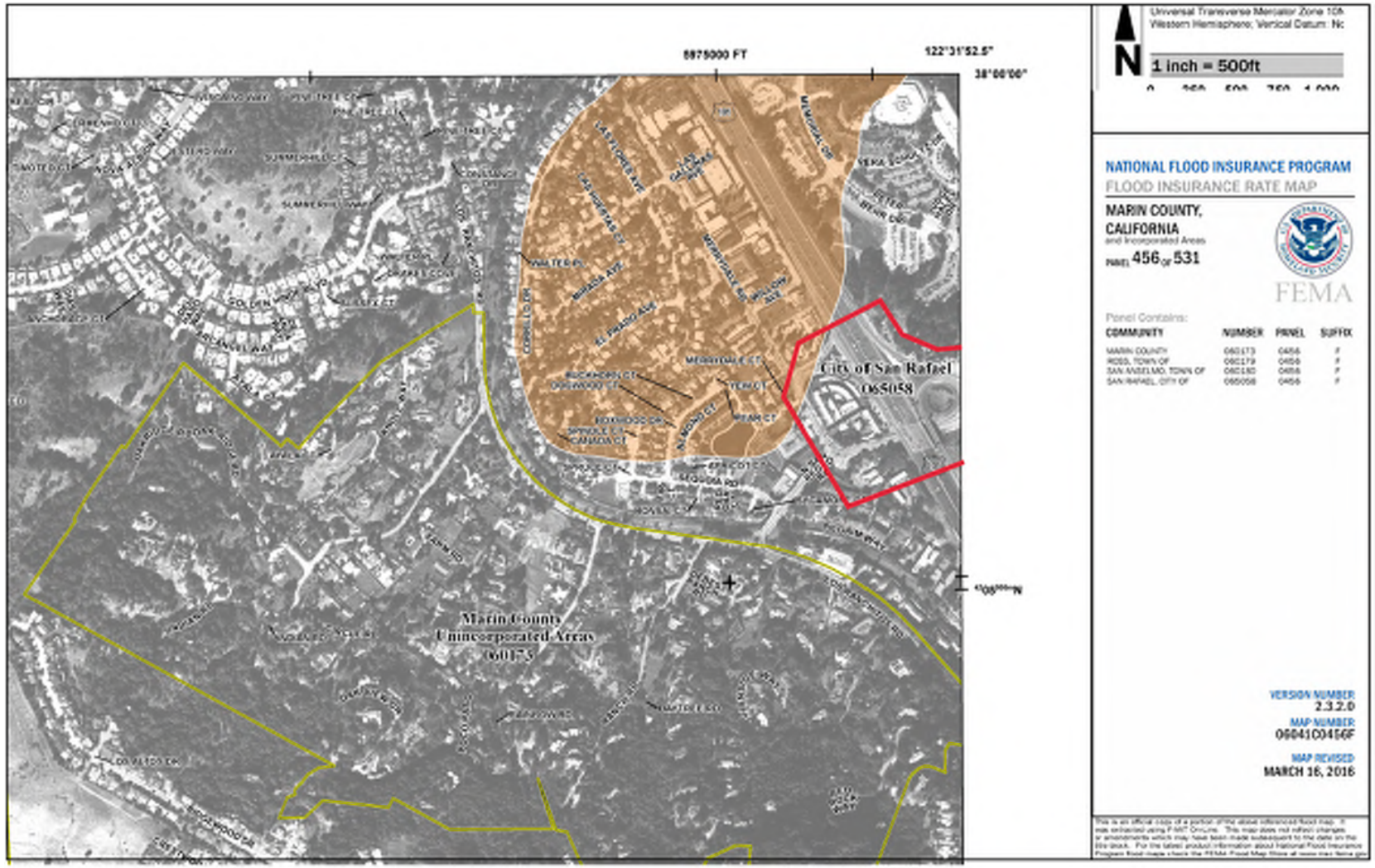

Figure 1. FEMA Flood Insurance Rate Map 1

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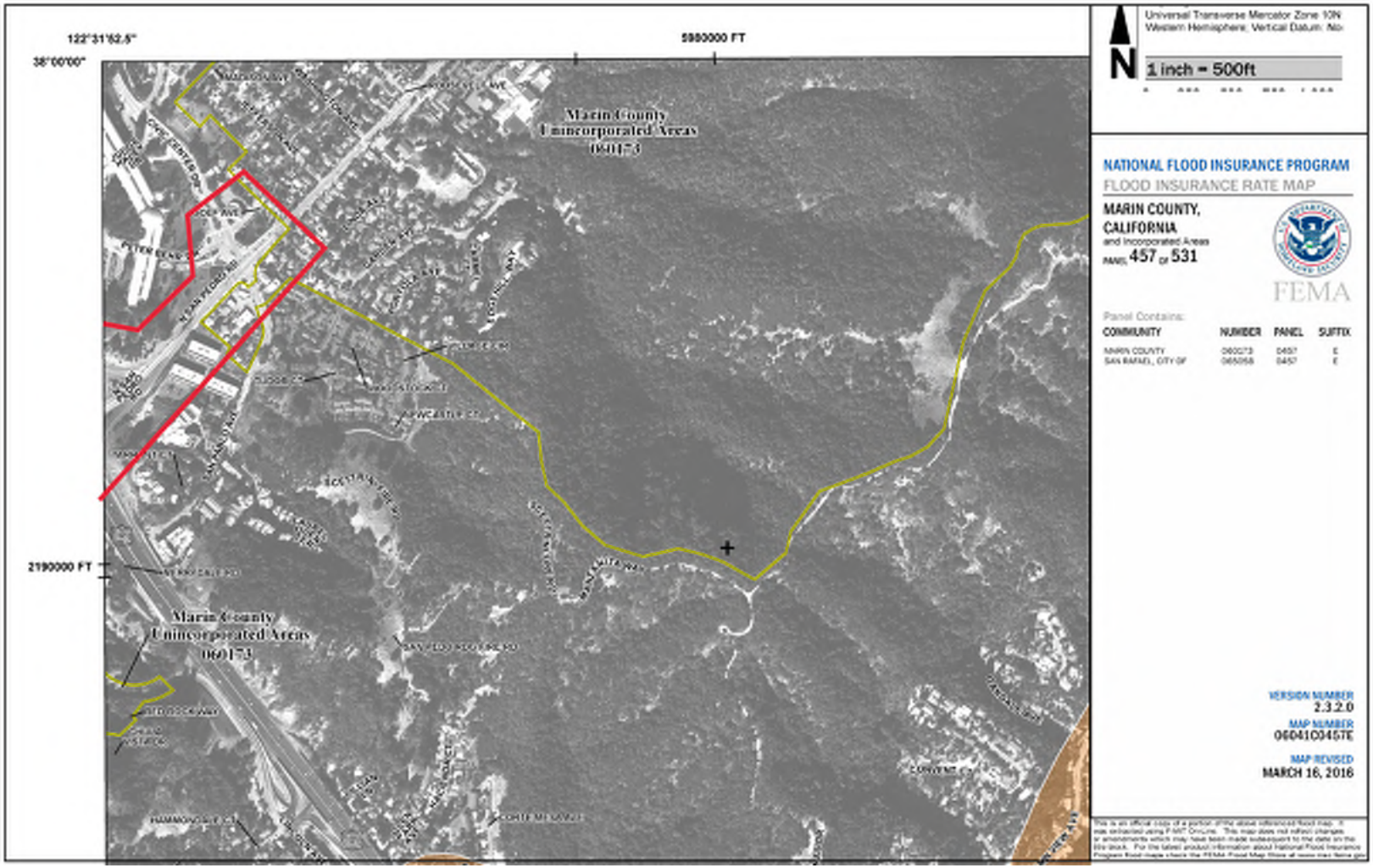

Figure 2. FEMA Flood Insurance Rate Map 2