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# MEMORANDUM

TO:	Tracy Bettencourt, City of Chico						
COPY TO:	Claire Bromund, ICF Intern	national					
FROM:	Kenneth D. Anderson, P.E., KD Anderson & Associates						
SUBJECT:	Esplanade Corridor Project	Traffic Techn	ical Memorandum				
DATE:	February 18, 2020	PROJECT:	Chico Esplanade 3910-06				

The purpose of this technical memorandum is to present a traffic analysis and assessment of the Esplanade Corridor Safety and Accessibility Improvement Project. This project is City of Chico Capital Improvement Project No. 50355, and Federal Project No. ATPCML-5037(037).

Enclosed are a **Project Vicinity Map** showing the location of the project, and a **Project Aerial** showing the study area. The following is:

- information describing the project,
- existing traffic conditions in the project study area,
- methods used in the traffic analysis and assessment, and
- results of the analysis and assessment.

The description of existing traffic conditions and the traffic analysis and assessment are largely from the *Esplanade Corridor Safety and Accessibility Study* (W-Trans 2016), and the *Updated Traffic Analysis of Esplanade Corridor with Class I Path* (Alta Planning + Design 2019).

# **PROJECT INFORMATION**

The following is information describing the Esplanade Corridor Safety and Accessibility Improvement Project.

### **Project Location**

The proposed project site is located along an approximate 1.25-mile segment of the Esplanade within the City of Chico between Memorial Way and East 11<sup>th</sup> Avenue, along Oleander Avenue between Memorial Way and East 10<sup>th</sup> Avenue, along East 10<sup>th</sup> Avenue between Esplanade and Oleander Avenue, and along Memorial Way between Esplanade and approximately 0.06 miles (335 feet) east of the intersection of Memorial Way & Oleander Avenue. Roadways and intersections within the proposed project site are operated and maintained by the City of Chico.

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## **Project Objectives/Purpose and Need**

The purpose of the project is to enhance mobility, connectivity, safety, and accessibility for roadway users of all ages and abilities, including automobiles, trucks, buses, and other large vehicles, bicyclists, and pedestrians, on the Esplanade from Memorial Way to 11<sup>th</sup> Avenue in Chico. The City's primary goal is to incorporate "complete streets" features and provide safer connectivity for all users between the downtown and destinations along the corridor.

The project is needed due to multi-modal operational deficiencies and lack of sufficient facilities for pedestrian and bicycle travel modes on the Esplanade, and the parallel roadway, Oleander Avenue. Currently, no facilities, signage, or pavement markings are provided for bicycle riders on the complex Esplanade boulevard or frontage roads. Car/bicycle collision rates are extremely high. Pedestrians have no pedestrian signal crossings indicators, compounded by a signal system which does not provide the minimum crossing time needed. Curb ramps are installed at marked crosswalk locations with sidewalks, but the ramp designs do not meet current Americans with Disabilities Act (ADA) design requirements. There are substantial gaps in the sidewalk on the east side frontage road of the Esplanade between 8<sup>th</sup> and 11<sup>th</sup> Avenues, and in various locations on Oleander Avenue, as well as East 10<sup>th</sup> Avenue.

### **Project Description**

The City of Chico proposes to create a separated and paved Class I multi-use bicycle/pedestrian path along the Esplanade, connecting downtown; California State University, Chico; Chico Junior and Senior High Schools; a regional hospital; and neighborhoods adjacent to the existing Airport Class I multi-use path at 11<sup>th</sup> Avenue. The parallel street to the east of the Esplanade, Oleander Avenue, would also receive signage, sidewalk, signal, and stop control improvements between 10<sup>th</sup> Avenue & Memorial Way. A roundabout would be installed at the intersection of Oleander Avenue and Memorial Way adjacent to Chico Junior High School. Two traffic signals are proposed to be installed at the intersections of Oleander Avenue & 1<sup>st</sup> Avenue and West Sacramento Avenue & Esplanade.

Existing traffic signals would be outfitted with pedestrian signal crossing equipment (now absent), updated detection equipment, an associated traffic signal timing plan to accommodate the added pedestrian phases, and pedestrian refuge islands where applicable. Appropriate ADA ramps and sidewalks would be added.

The proposed non-motorized "complete streets" improvements along the Esplanade corridor and on Oleander Avenue are listed in more detail in the sections below and are shown on the enclosed set of eight **Project Footprint Maps**.



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#### Pedestrian Improvements

- Install new pedestrian countdown crossing signal heads and pedestrian push button activation at all existing traffic signals on the Esplanade with sufficient crossing timing that meets Federal guidelines.
- Add vehicle detection as necessary, replacing timed signalization with an ondemand detection system.
- Provide adequate pedestrian crossing refuge islands at unsignalized intersections on the Esplanade.
- Consistently mark pedestrian crosswalks at all crossing locations.
- Prepare an enhanced signal timing plan to respond to vehicles, bikes and pedestrian needs.
- Maintain signal progression on the Esplanade during off-peak hours.

### ADA Improvements

- Improve connection to the 11<sup>th</sup> Avenue Airport Class I multi-use path with adequate walkway and ramps, on the southwest, southeast and northeast corners of the intersection.
- Install ADA accessible curb ramps at all crosswalk locations.
- Install missing sidewalks at identified gap closure locations (see project footprint map).

# **Bicycle Facility Improvements**

- Install paved Class I multi-use bicycle/pedestrian path on old rail right-of-way (east side) with appropriate safety crossing measures.
- Discourage wrong-way riders on the west side frontage road by adding a shared space pavement design to slow vehicle and bicycle traffic through conflict zones. Enclosed is a figure, Esplanade Corridor Safety and Accessibility Study Frontage Road Options, from W-Trans 2016. This figure conceptually shows various intersection treatments, including shared space pavement design.



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- Add marked bicycle route on Oleander Avenue which favors minimal stopping except at 1<sup>st</sup> Avenue and 5<sup>th</sup> Avenue.
- Install traffic signals at West Sacramento Avenue & Esplanade and Oleander Avenue & 1<sup>st</sup> Avenue with bike crossing emphasis.

### Junior High School Area Improvements

 Change intersection design at Memorial Way & Oleander Avenue (near Chico Junior High School) to a single-lane roundabout.

#### General Vehicle Guidance Improvements

- Provide clear and consistent pavement markings at frontage road intersection areas.
- Create the shared space area at crossings of the east-west streets and frontage roads.
- Install "Keep Clear" pavement legends guiding cross traffic to stop "outside" of the frontage road where appropriate.

#### 11<sup>th</sup> Avenue Connection Improvements

• Enhance connections between the 11<sup>th</sup> Avenue and the Airport Class I Multi-use path.

#### Other Amenities

- Install pedestrian-scale lighting in the form of full cutoff, energy-efficient LED fixtures restricted to illuminate pathways in order to minimize light "spill over" to adjacent properties.
- Install replacement landscaping within the project footprint.

### Typical Signalized Intersection

- Provide a Class I multi-use path in the eastern median.
- Provide textured "mixing zone" at the intersection of southbound frontage and east-west cross streets. Enclosed is a figure, *Esplanade Corridor Safety and Accessibility Study – Frontage Road Options*, from W-Trans 2016. This figure



conceptually shows various intersection treatments, including textured "mixing zone".

- Eliminate northbound right-turn pocket, where applicable.
- Provide pedestrian refuge islands on medians.
- Update signal timing with adequate crossing time in the east-west directions.
- Refresh striping and add crosswalks, where applicable.

## Typical Unsignalized Intersection

- Provide a Class I multi-use path in the eastern median.
- Provide textured "mixing zone" at the intersection of southbound frontage and east-west cross streets.
- Provide pedestrian refuge islands on medians.
- Refresh striping and add crosswalks, where applicable.

# **Construction and Schedule**

The project would be constructed in one phase. It is currently anticipated that the proposed improvements would be constructed over an approximate nine-month period starting in early Spring of 2022.

### **Traffic Management**

A traffic management plan would be developed and implemented during construction in accordance with Caltrans' 2018 Standard Specifications and in compliance with the California Manual on Uniform Traffic Control Devices, Part 6, Temporary Traffic Control. The Esplanade and Oleander Avenue would remain open during construction; however, the project would temporarily impact traffic patterns with on-site traffic controls (e.g., flagging, pilot car) and episodic, temporary single-lane traffic closures. The proposed project would not permanently close roadways or block access to private or commercial properties.



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# **EXISTING CONDITIONS**

The following is a description of existing conditions in the Esplanade Corridor Safety and Accessibility Improvement Project study area.

## **Study Area**

The study area consists of the Esplanade from 11<sup>th</sup> Avenue at the northern end to the Big Chico Creek bridge and the entrance to downtown at the southern end, and includes Oleander Avenue between Memorial Avenue and 10<sup>th</sup> Street. Both the Esplanade and Oleander Avenue are under the jurisdiction of the City of Chico. Some frontage improvements, such as sidewalks, exist where there are developed parcels along the corridor but generally not along undeveloped parcels.

## **Esplanade Corridor Characteristics**

The posted speed limit on the Esplanade is 30 miles per hour (mph) and the side streets have speed limits varying from 25 mph (most east-west streets) to 35 mph (1<sup>st</sup> Avenue). The traffic signals are timed so that most traffic travels the corridor at 28 mph without having to stop, although there are exceptions during peak periods. Every other intersection on the corridor is signalized without north-south left-turn access. These signalized intersections have northbound right-turn pockets. The uncontrolled, or unsignalized, intersections have north-south left-turn access. The corridor also includes a wider median on the east side which was once the right-of-way for a streetcar which ran to the airport. Following is a description of the two typical intersection cross-sections for the corridor.

**Signalized Intersections.** Signalized intersections on the Esplanade typically have two 12-foot southbound lanes, two 12-foot northbound lanes, one 10-foot northbound right-turn pocket cut into the location of the old streetcar right-of-way, and 19-foot one-way frontage roads on either side, which include a 12-foot travel lane and a 7-foot parking lane. The center medians are typically 13 feet wide.

**Unsignalized Intersections.** Unsignalized intersections on the Esplanade typically have two 12-foot through lanes and one 10-foot left-turn lane both northbound and southbound, and one-way frontage roads on either side, with 12-foot travel lanes and 7-foot parking lanes. The median on the east side, separating the northbound major travel lanes from the minor frontage road, is wider because of the old streetcar right-of-way. The center medians are typically 3 feet wide at these intersections.



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### **Esplanade Study Intersections**

The following is a description of the eight study intersections for this technical memorandum.

**Esplanade & Memorial Way** is a four-way signalized intersection with the west leg being the driveway to a parking lot for the Bidwell Mansion a State Historic Park and the Gateway Science Museum. There are pedestrian crosswalks along the east, north, and south legs of the intersection. Left turns are not allowed from the Esplanade.

**Esplanade & Lincoln Avenue** is an offset four-legged signalized intersection. There is a rightturn pocket northbound, and left turns are not allowed northbound, southbound or westbound. Yellow school crosswalks are located across the south and west legs of the intersection.

**Esplanade & 1^{st} Avenue** is a signalized intersection with permitted left turns on eastbound and westbound  $1^{st}$  Avenue; left turns are prohibited on northbound and southbound Esplanade. There is a right-turn pocket on northbound Esplanade. There are marked crosswalks across every leg of the intersection.

**Esplanade & 3^{rd} Avenue** is a signalized intersection with permitted left turns on the eastbound and westbound  $3^{rd}$  Avenue approaches. Left-turns are prohibited from Esplanade, which has a right-turn pocket on the northbound approach. There are uncontrolled crosswalks across the north and south legs of the intersection.

**Esplanade & 5<sup>th</sup> Avenue** is a signalized intersection with permitted left turns on the eastbound and westbound 5<sup>th</sup> Avenue approaches. Esplanade has a right-turn pocket on the northbound approach, while left-turns are prohibited. There are uncontrolled marked crosswalks across the north and south legs of the intersection.

**Esplanade & 7<sup>th</sup> Avenue** is a signalized intersection with permitted left-turns on the eastbound and westbound 7<sup>th</sup> Avenue approaches. As with the other signalized intersection, left-turns are prohibited from Esplanade, and there is a right-turn pocket on northbound Esplanade. There is an uncontrolled marked crosswalk across the south leg of the intersection.

**Esplanade & 9<sup>th</sup> Avenue** is a signalized intersection with permitted left-turns on the eastbound and westbound 9<sup>th</sup> Avenue approaches. As is typical for the corridor, left-turns are prohibited from Esplanade, and it has a right-turn pocket on the northbound approach. There is an uncontrolled marked crosswalk across the north leg of the intersection.

**Esplanade & 11<sup>th</sup> Avenue** is a signalized intersection with permitted left-turns on the eastbound and westbound 11<sup>th</sup> Avenue approaches, and protected left-turn phasing on the northbound approach. There are signalized crosswalks across the south and east legs of the intersection.



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## **Esplanade Cross Streets**

Following are descriptions of the cross streets along the Esplanade study corridor in geographical order from south to north:

**Memorial Way** is a two-lane road with marked and unmarked on-street parallel parking on both sides of the street to the east of Esplanade, and a parking lot for Bidwell Mansion and a State historic park to the west of Esplanade. Chico Junior High School is located on the northeast corner with Oleander Avenue.

Lincoln Avenue is a local residential street with parallel parking on either side of the street.

 $1^{st}$  Avenue has one lane in each direction, provides access to State Route (SR) 99, and has a posted 35-mph speed limit. Parallel parking is available on both sides of the street.

 $3^{rd}$  Avenue is a local residential street with parallel parking on either side of the street. There is some angled parking at businesses on  $3^{rd}$  Avenue.

5<sup>th</sup> Avenue is a two-lane road with a double yellow centerline and parallel parking. East of Esplanade there are Class II bike lanes and a posted 30-mph speed limit.

7<sup>th</sup> Avenue is a two-lane road with parallel parking on either side of the street.

9<sup>th</sup> Avenue is a two-lane road with parallel parking on either side of the street.

11<sup>th</sup> Avenue is a two-lane road with parallel parking on either side of the street, a double yellow center line and a posted 35-mph speed limit sign to the west of Esplanade. The airport trail starts immediately northeast of the intersection with the Esplanade.

### **Oleander Avenue**

Oleander Avenue is a local street with a posted speed limit of 25 mph. The south end of the corridor connects to Memorial Avenue near Chico Junior High School. The north end of Oleander Avenue terminates at  $10^{\text{th}}$  Avenue near Chico Nut Company. The intersections on the corridor are all controlled with stop signs with some oriented to stop north-south traffic and others to stop east-west traffic. The intersection at  $3^{\text{rd}}$  Avenue is controlled with an all-way stop control. The road width varies from 44 feet at the south end to 36 feet in the central area to 20 feet of pavement at the north end.



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## **Bicycle Facilities**

The Caltrans *Highway Design Manual*  $6^{th}$  *Edition* (California Department of Transportation 2018) classifies bikeways into four categories:

- Class I Multi-Use Path a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- Class II Bike Lane a striped and signed lane for one-way bike travel on a street or highway.
- Class III Bike Route signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- Class IV Bikeway also known as a separated bikeway, is a bikeway for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation (or, "buffer") may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

The *Chico Bicycle Plan 2019 Update* (City of Chico 2019) lays out the City's comprehensive bicycling system. Despite the City's many natural and man-made barriers complicating bicycle circulation throughout the city and inhibiting the ability of bicyclists to make direct, convenient connections between origins and destinations, Chico continues to seek ways to overcome the barriers. In 2016, Chico was awarded the "Gold Level Bicycle Friendly Communities" distinction by the League of American Bicyclists.

Implementation of the Bicycle Plan would provide a network of connected bicycle facilities for use by the City's residents, including school-aged students and seniors, with links to activity centers within the City as well as neighboring communities. Additionally, the Bicycle Plan seeks to provide enhanced recreational cycling opportunities and attract bicycle tourism. The Bicycle Plan currently identifies a Class IV facility on Esplanade between Memorial Avenue and 11<sup>th</sup> Avenue and a Class III bikeway on Oleander Avenue. After conducting additional in-depth traffic analysis, the City's Public Works – Engineering Department, with the approval of the California Transportation Commission, determined that a separated Class I multi-use facility along the old-street car right-of-way of the Esplanade is a safer and more appropriate alternative for both bicyclists and pedestrians. The Bicycle Plan provides built-in flexibility to adapt/modify proposed projects in response to new information. Thus, a Class I multi-use path would be constructed instead of the Class IV bikes-only facility. The Bicycle Plan also proposes bike facilities along cross-streets of the Esplanade corridor, including the following in the vicinity of the study area:



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- West 11<sup>th</sup> Avenue Class II bike lanes from Esplanade to Nord Ave via W Lindo Ave.
- East 10<sup>th</sup> Avenue Class III bike route from Esplanade to Oleander Avenue
- 9<sup>th</sup> Avenue Class III bike route from Magnolia Avenue to Sheridan Avenue
- 3<sup>rd</sup> Avenue Class III bike route from Arcadian Avenue to Sherman Avenue
- 1<sup>st</sup> Avenue Class II bike lanes from Warner Street to east of SR 99
- West Sacramento Avenue Class II bike lanes from Warner Street to Esplanade
- West Lincoln Avenue Class III bike route from Arcadian Avenue to Esplanade
- East Lincoln Avenue Class III bike route from Esplanade to Oleander Avenue
- Memorial Way Class III bike route from Esplanade to Vallombrosa Avenue
- Sol-Wil-Le-No Avenue Class III bike route from Arcadian Avenue to Esplanade

## **Collision History and Safety Conditions**

The following description of collision history and safety conditions in the study area is from the *Esplanade Corridor Safety and Accessibility Study* (W-Trans 2016).

All Collisions. The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision records for the study intersections were obtained from the Caltrans Highway Patrol as published in their *Statewide Integrated Traffic Records System* (SWITRS) reports. The five-year period from January 2010 through December 2014 was used. As presented in the enclosed **Table 1**, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in the 2012 Caltrans document *Collision Data on California State Highways* (California Department of Transportation 2012).

The calculated collision rates are higher than the statewide average collision rate for similar facilities at the intersections of Esplanade & 4<sup>th</sup> Avenue, Esplanade & 8<sup>th</sup> Avenue, and Esplanade & 9<sup>th</sup> Avenue. Nearly all of the intersections had calculated injury rates higher than statewide averages, with the exception of the intersections of Esplanade & 6<sup>th</sup> Avenue and Esplanade & 10<sup>th</sup> Avenue.



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Overall, one-third of the reported collisions at the intersections along the Esplanade were identified in SWITRS as having a primary collision factor of "Traffic Signals and Signs" which could imply confusion or conflicts with traffic signals or signage. Another one-sixth of the reported collisions had a primary collision factor of automobile right-of-way violations. DUIs were listed as the primary collision factor for 13 percent of the reported collisions and unsafe speeding occurred in 8 percent of the collisions. The percentage breakdown of the collisions is shown in the following graph showing the primary collision factor.





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The collision types included 60 percent listed as broadside, 16 percent listed at rear-end, and 6 percent listed as vehicle-pedestrian. The percentage breakdown of the collision types is shown in the following graph.



**Pedestrian and Bicycle Collisions.** Collisions involving just pedestrian and bicycles were also reviewed. Because these types of collisions are less common than vehicle collisions, the analysis period was extended to 10 years including January 2004 to December 2013. Over a 10-year period, there were 36 collisions involving either a bicyclist or pedestrian. The intersection with the largest number of pedestrian and bicycle collisions was Esplanade & 1<sup>st</sup> Avenue.



It should be noted that there is not a published methodology for evaluating the significance of pedestrian and bicycle collisions at intersections. Therefore, one was developed for the *Esplanade Corridor Safety and Accessibility Study*. Pedestrian and bicycle collision rates were calculated for each of the intersections based on the corresponding pedestrian and bike volumes at those intersections. These rates were then compared to average collision rates for similar facilities statewide, as indicated in the Caltrans document *Collision Data on California State Highways*.

For example, the Caltrans data indicates that a four-way signalized intersection experiences 0.27 collisions per million <u>vehicles</u> entering the intersection. The intersection of Esplanade & 1<sup>st</sup> Avenue was determined to have a bicycle collision rate of 1.27 bicycle collisions per million bicycles entering the intersection. This rate was 4.7 times the 0.27 average rate which was considered "Extremely High" in the rating scale developed as part of this process.

Maps of the pedestrian and bicycle collisions along the corridor reported in the 10-year period are included in the Technical Appendix in a separate electronic file. Based on these data, the following high collision rates were identified:

- The pedestrian collision rate is 9.4 times the statewide average at the intersection of Esplanade & Sacramento Avenue.
- The pedestrian collision rate is 6.1 times the statewide average at the intersection of Esplanade & 8<sup>th</sup> Avenue.
- The pedestrian collision rate is 6.1 times the statewide average at the intersection of Esplanade & 1<sup>st</sup> Avenue.
- The bicycle collision rate is extremely high at more than 3 times the statewide average at the Esplanade intersections with Sacramento Avenue, 1<sup>st</sup> Avenue, 3<sup>rd</sup> Avenue, 4<sup>th</sup> Avenue, 7<sup>th</sup> Avenue, 8<sup>th</sup> Avenue, and 9<sup>th</sup> Avenue.
- The bicycle collision rates are substantially above average (1.5 to 3 times the statewide average) at the Esplanade intersections with Memorial Way, Lincoln Avenue, 5<sup>th</sup> Avenue, and 11<sup>th</sup> Avenue.

# **Traffic Operations**

The following is a description of traffic operations in the Esplanade Corridor Safety and Accessibility Improvement Project study area.

**Methodology.** Level of service (LOS) analysis provides a basis for describing existing traffic conditions and for evaluating future and project-related traffic operations. Level of service



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measures the quality of traffic flow and is represented by letter designations from A to F, with a grade of A referring to the best conditions, and F representing the worst conditions. The characteristics associated with the various LOS for intersections are presented in the enclosed **Table 2**.

Level of service at intersections was analyzed using methods presented in the *Highway Capacity Manual*. Methods described in the *Highway Capacity Manual* were used to provide a basis for describing traffic operating conditions.

*Highway Capacity Manual* methods (Transportation Research Board 2000) as implemented in the Synchro software package (Trafficware 2019) were used for this technical memorandum.

**Level of Service Standards.** For this technical memorandum, traffic operations were analyzed under existing conditions and future scenarios to determine whether resulting LOS is considered acceptable. The *Chico 2030 General Plan* (City of Chico 2017) Policy CIRC-1.4 (Level of Service Standards) states,

"Maintain LOS D or better for roadways and intersections at the peak PM period, except as specified below:

- "LOS E is acceptable for City streets and intersections under the following circumstances:
  - "Downtown streets within the boundaries identified in Figure DT-1 of the Downtown Element.
  - "Arterials served by scheduled transit.
  - "Arterials not served by scheduled transit, if bicycle and pedestrian facilities are provided within or adjacent to the roadway.
- "Utilize Caltrans LOS standards for Caltrans' facilities.
- "There are no LOS standards for private roads."

Because the Esplanade corridor is served by scheduled transit, LOS E or better conditions are considered acceptable.

**Traffic Volumes.** Traffic volume count data were collected for the *Esplanade Corridor Safety and Accessibility Study* (W-Trans 2016) on Thursday May 14, 2015. Updating the traffic volume count data were considered by the City of Chico and Alta Planning + Design for the preparation of



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the *Updated Traffic Analysis of Esplanade Corridor with Class I Path* (Alta Planning + Design 2019). However, because of extraordinary citywide traffic congestion due to the Camp Fire and the relocation of the former residents of the City of Paradise, updated traffic volume count data were determined to be not representative.

Traffic volume data for the years 2019, 2022, and 2030 were needed for the *Updated Traffic Analysis of Esplanade Corridor with Class I Path.* 2019 conditions would represent existing conditions. 2022 conditions would represent opening year for the Esplanade Corridor Safety and Accessibility Improvement Project. 2030 conditions would be consistent with the *Chico 2030 General Plan* (City of Chico 2017) and represent long-term future conditions.

California State University, Chico and the City of Chico have collected traffic volume count data in the Esplanade corridor. Based on these data (Ottoboni pers. comm.), the City and Alta Planning + Design concluded the following approach should be used to develop 2019, 2022, and 2030 traffic volume data.

- 2019 traffic volume data in the Esplanade corridor were calculated by increasing the 2015 count data from the *Esplanade Corridor Safety and Accessibility Study* by 13 percent for the northbound and southbound though movements at all study intersections, and for the eastbound and westbound through movements at the intersection of 1<sup>st</sup> Avenue. All left-turn and right-turn volumes were increased by 1.5 percent.
- 2022 traffic volume count data were developed by increasing 2019 volumes by 0.75 percent per year for the three-year period from 2019 to 2022.
- 2030 traffic volume count data were developed by increasing 2019 volumes by 0.75 percent per year for the 11-year period from 2019 to 2030.

Levels of Service. Existing LOS during the a.m. peak hour and p.m. peak hour at the study intersections is shown in the enclosed **Table 3**. During the a.m. peak hour, all study intersections operate at acceptable LOS D or better. During the p.m. peak hour, all study intersections operate at acceptable LOS C or better. LOS D and C are considered acceptable by the City of Chico.

LOS calculation worksheets are included in the Technical Appendix in a separate electronic file.

# **RESULTS OF THE ANALYSIS**

The following is a description of the results of the traffic analysis of the Esplanade Corridor Safety and Accessibility Improvement Project.



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## **Effects of the Project on Safety**

As noted above in the Project Objectives/Purpose and Need section of this report,

"Currently, no facilities, signage, or pavement markings are provided for bicycle riders on the complex Esplanade boulevard or frontage roads. Car/bicycle collision rates are extremely high. Pedestrians have no pedestrian signal crossings indicators, compounded by a signal system which does not provide the minimum crossing time needed. Curb ramps are installed at marked crosswalk locations with sidewalks, but the ramp designs do not meet current Americans with Disabilities Act (ADA) design requirements. There are substantial gaps in the sidewalk on the east side frontage road of the Esplanade between 8<sup>th</sup> and 11<sup>th</sup> Avenues, and in various locations on Oleander Avenue, as well as East 10<sup>th</sup> Avenue."

As noted above in the Project Description section of this report,

"The City of Chico proposes to create a separated and paved Class I multi-use bicycle/pedestrian path along the Esplanade, connecting downtown; California State University, Chico; Chico Junior and Senior High Schools; a regional hospital; and neighborhoods adjacent to the existing Airport Class I multi-use path at 11<sup>th</sup> Avenue. The parallel street to the east of the Esplanade, Oleander Avenue, would also receive signage, sidewalk, signal, and stop control improvements between 10<sup>th</sup> Avenue and Memorial Way. A roundabout would be installed at the intersection of Oleander Avenue and Memorial Way adjacent to Chico Junior High School. Two traffic signals are proposed to be installed at the intersections of Oleander Avenue & 1<sup>st</sup> Avenue and West Sacramento Avenue & Esplanade.

"Existing traffic signals would be outfitted with pedestrian signal crossing equipment (now absent), updated detection equipment, an associated traffic signal timing plan to accommodate the added pedestrian phases, and pedestrian refuge islands where applicable. Appropriate ADA ramps and sidewalks would be added."

The components of the Esplanade Corridor Safety and Accessibility Improvement Project described above from the *Project Description* section of this report would improve pedestrian and bicycle safety by directly addressing the deficiencies described above from the *Project Objectives/Purpose and Need* section of this report.

Specific features of the Esplanade Corridor Safety and Accessibility Improvement Project improve safety for both bicycle and pedestrian users in the corridor. As noted in the *Collision* 



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*History and Safety Conditions* section of this report, both pedestrian and bicycle collision rates at several locations in the Esplanade corridor are higher than the statewide average collision rate. In the proposed project, the City of Chico proposes to install a Class I shared use path in the Esplanade Corridor. During the process of defining the project, the City considered both a Class IV two-way cycle track and a Class I shared use path. A Class IV two-way cycle track would strongly favor bicycle traffic through the specific use of bike signals which might not provide enough clearance time to cross lower-speed pedestrian users, whereas the Class I shared use path would favor all users while using the pedestrian signals. The City has made a conscious decision to propose a Class I shared use path, rather than a Class IV two-way cycle track.

The decision by the City to propose a Class I shared use path was made in consideration of the expected users. With students from the California State University, Chico campus; Chico Senior High School; Chico Junior High School; and potentially Citrus Avenue Elementary School using the path, the City chose to not limit the users to just bicycles. With use of pedestrian signals in a Class I shared use path, rather than the bicycle signals in a Class IV two-way cycle track, a leading pedestrian interval in the north-south direction is proposed to allow an additional seven seconds of pedestrian walk time before the vehicular movement is initiated. This would increase the safety of all users by allowing Class I users to have the additional time to be in front of turning vehicles.

Because the proposed project would address existing safety deficiencies, the project is considered to have a beneficial effect on safety.

### Effects of the Project on Level of Service

The effects of the Esplanade Corridor Safety and Accessibility Improvement Project on traffic operations was assess by analyzing the effects of the project on LOS under opening year 2022 conditions, and under long-term future 2030 conditions consistent with the *Chico 2030 General Plan* (City of Chico 2017).

The acceptability of traffic operations under 2022 and 2030 future scenarios was determined by applying LOS standards presented in the *Chico 2030 General Plan* Policy CIRC-1.4 (Level of Service Standards). Consistent with this policy, LOS E is considered acceptable in the Esplanade corridor.

**Table 3** presents LOS during the a.m. peak hour and p.m. peak hour under the 2022 Plus Project scenario and the 2030 Plus Project scenario.

**2022 Plus Project Scenario.** Under the 2022 Plus Project scenario, all study intersections would operate at LOS D or better during both the a.m. peak hour and p.m. peak hour. Because LOS D is considered acceptable, the proposed project is considered to operate acceptably under opening year conditions.



**2030 Plus Project Scenario.** Under the 2030 Plus Project scenario, all study intersections would operate at LOS E or better during both the a.m. peak hour. All study intersections would operate at LOS D or better during the p.m. peak hour. Because LOS E and D are considered acceptable, the proposed project is considered to operate acceptably under long-term 2030 conditions.

LOS calculation worksheets are included in the Technical Appendix in a separate electronic file.

## **California Environmental Quality Act Impacts**

For purposes of California Environmental Quality Act (CEQA) analysis, the impacts of the Esplanade Corridor Safety and Accessibility Improvement Project are described below.

**Safety.** As described in more detail above in the *Effects of the Project on Safety* section of this report, the proposed project would improve safety conditions in the Esplanade corridor, in particular for pedestrians and bicycles. As a result, the project is considered to have a less than significant impact on safety, and no mitigation measures are required.

**Traffic Operations.** As described in more detail above in the *Effects of the Project on Level of Service* section of this report, LOS with implementation of the proposed project would result in acceptable LOS at intersections in the Esplanade corridor. As a result, the project is considered to have a less than significant impact on traffic operations, and no mitigation measures are required.

**Vehicle Miles Traveled.** Senate Bill (SB) 743 (Steinberg, 2013), which was codified in Public Resources Code section 21099, required changes to the guidelines implementing CEQA (CEQA Guidelines) regarding the analysis of transportation impacts. SB 743 required changes to the CEQA Guidelines that identify vehicle miles traveled (VMT) as the most appropriate metric to evaluate a project's transportation impacts. The State of California Governors Office of Planning and Research (OPR) document *Technical Advisory on Evaluating Transportation Impacts in CEQA* presents recommendations on the implementation of SB 743 (State of California Governors Office of Planning and Research 2018). The *Transit and Active Transportation Projects* section of the Technical Advisory states,

"Transit and active transportation projects generally reduce VMT and therefore are presumed to cause a less-than-significant impact on transportation. This presumption may apply to all passenger rail projects, bus and bus rapid transit projects, and bicycle and pedestrian infrastructure projects. Streamlining transit and active transportation projects aligns with each of the three statutory goals contained in SB 743 by reducing GHG emissions, increasing multimodal transportation networks, and facilitating mixed use development."



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The Esplanade Corridor Safety and Accessibility Improvement Project is a "bicycle and pedestrian infrastructure project". As such, consistent with the Technical Advisory, the proposed project is "presumed to cause a less-than-significant impact on transportation" related to VMT. No mitigation measures are required.

# **CLOSING**

Thank you for this opportunity to provide traffic analysis services on the Esplanade Corridor Safety and Accessibility Improvement Project. If you have any questions about this report, please contact me via E-mail message at kanderson@kdanderson.com, or call me at 916/660-1555.

enclosures



# **CITATIONS**

#### **Publications Cited**

Alta Planning + Design. 2019. September 10, 2019 Memorandum from Joe Gilpin and Matt Fralick, P.E. to City of Chico. Re: Updated Traffic Analysis of Esplanade Corridor with Class I Path.

California Department of Transportation. 2012. Collision Data on California State Highways. Sacramento. CA.

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Trafficware. 2019. Trafficware Internet Website. http://www.trafficware.com/

Transportation Research Board. 2000. Highway Capacity Manual 2000. Washington, D.C.

W-Trans. 2016. Esplanade Corridor Safety and Accessibility Study. Santa Rosa, CA.

#### **Personal Communications**

Ottoboni, Brendan. City of Chico Department of Public Works – Engineering. January 11, 2019 and May 16, 2019 Memorandum to Mark Orme, City of Chico City Manager. Subject: Camp Fire Traffic Impacts.

Intersection	Number of Collisions (2010 - 2014)	Collision Rate (c/mve)	Statewide Average Rate (c/mve)	Injury Rate	Fatality Rate				
Esplanade & Memorial Way	6	0.17	0.27	83.3%	0.0%				
Esplanade & Frances Willard Avenue	1	0.03	0.15	100.0%	0.0%				
Esplanade & Lincoln Avenue	4	4 0.11 0.27		50.0%	0.0%				
Esplanade & Sacramento Avenue	6	0.15	0.15	83.3%	0.0%				
Esplanade & 1st Avenue	14	0.27	0.27	71.4%	0.0%				
Esplanade & 2nd Avenue	1	0.03	0.15	100.0%	0.0%				
Esplanade & 3rd Avenue	7	7 0.19		85.7%	0.0%				
Esplanade & 4th Avenue	6	0.16	0.15	83.3%	0.0%				
Esplanade & 5th Avenue	5	0.12	0.27	80.0%	0.0%				
Esplanade & 6th Avenue	0	0	0.15	0.0%	0.0%				
Esplanade & 7th Avenue	8	0.21	0.27	100.0%	0.0%				
Esplanade & 8th Avenue	7	0.17	0.15	85.7%	0.0%				
Esplanade & 9th Avenue	11	0.28	0.27	72.7%	0.0%				
Esplanade & 10th Avenue	1	0.03	0.15	0.0%	0.0%				
Esplanade & 11th Avenue	4	0.1	0.27	75.0%	0.0%				
Note: c/mve = collisions per million vehicles entering. Bold = actual rate greater than the statewide average rate. Source: W-Trans 2016.									

Level of Service	Description	Delay			
A	Uncongested operations, all queues clear in a single-signal cycle.	Delay $\leq 10.0$ seconds/vehicle			
В	Uncongested operations, all queues clear in a single cycle.	Delay > 10 seconds/vehicle and < 20 seconds/vehicle			
С	Light congestion, occasional backups on critical approaches.	Delay > 20 seconds/vehicle and < 35 seconds/vehicle			
D	Significant congestions of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed.	Delay > 35 seconds/vehicle and < 55 seconds/vehicle			
Е	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es).	Delay > 55 seconds/vehicle and < 80 seconds/vehicle			
F	Total breakdown, stop-and-go operation.	Delay > 80 seconds/vehicle			
Source: Tran	sportation Research Board 2000.				

# Table 2. Level of Service Definitions - Signalized Intersections

Existing Conditions				2022 Plus Project Scenario			2030 Plus Project Scenario					
AM	Peak	PM	Peak	AM Peak		PM	PM Peak		AM Peak		PM Peak	
LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	
B	12.5	B	12.4	В	14.6	B	12.2	В	18.5	B	12.6	
В	17.5	С	27.4	В	18.3	С	20.9	В	18.2	С	26.5	
D	37.3	В	15.5	D	46.7	D	35.9	E	63.7	D	38.4	
C	21.0	В	19.0	С	27.9	С	20.1	С	31.4	С	20.6	
В	10.7	В	16.3	В	18.6	В	16.6	С	20.9	В	17.5	
С	23.3	В	11.7	С	31.0	В	18.5	D	43.3	С	24.9	
В	15.3	B	11.9	В	11.5	A	9.9	В	12.5	В	11.2	
D	39.8	В	17.4	D	39.4	В	15.1	D	52.9	В	15.9	
-	AM LOS B D C B C B D	Existing C       AM     Peak       LOS     Delay       B     12.5       B     17.5       D     37.3       C     21.0       B     10.7       C     23.3       B     15.3       D     39.8	Existing Condition         AM       Peak       PM         LOS       Delay       LOS         B       12.5       B         B       17.5       C         D       37.3       B         C       21.0       B         B       10.7       B         C       23.3       B         B       15.3       B         D       39.8       B	Existing Conditions         Peak         AM       Peak       PM       Peak         LOS       Delay       LOS       Delay         B       12.5       B       12.4         B       17.5       C       27.4         D       37.3       B       15.5         C       21.0       B       19.0         B       10.7       B       16.3         C       23.3       B       11.7         B       15.3       B       11.9         D       39.8       B       17.4	Existing Conditions         2022           AM         Peak         PM         AM           LOS         Delay         LOS         Delay         LOS           B         12.5         B         12.4         B           B         17.5         C         27.4         B           D         37.3         B         15.5         D           C         21.0         B         19.0         C           B         10.7         B         16.3         B           C         23.3         B         11.7         C           B         15.3         B         11.9         B           D         39.8         B         17.4         D	Existing Conditions         2022 Plus Product           AM         Peak         PM         Peak         AM         Peak         IOS         Delay         IOS         DIS         IOS         IOS	Existing Conditions         2022 Plus Project Scent           AM         Peak         PM         AM         Peak         AM         Peak         PP         AM         Peak         PM         IOS         AM         Peak         PM         IOS         Peak         PE         AM         Peak         PM         IOS         Peak         PM         IOS         Peak         PM         IOS         Peak         PM         IOS         Peak         PE         AM         Peak         PM         IOS         PA         IOS         PE         AM         PE         AM         PE         AM         PE         IOS         PE         IOS         IOS	2022 Puts Project ScenarioAMPakPMPakAMPakPMPakLOSDelayLOSDelayLOSDelayLOSDelayB12.5B12.4B14.6B12.2B17.5C27.4B18.3C20.9D37.3B15.5D46.7D35.9C21.0B19.0C27.9C20.1B10.7B16.3B18.6B16.6C23.3B11.7C31.0B18.5D39.8B17.4D39.4B15.1	Existing Conditions         2022 Plus Project Scenario         2030           AM         Peak         PM         Peak         AM         Pak         PM         Pak         AM           LOS         Delay         LOS         Delay         Delay         Delay         Delay         Poilay         Delay         Delay	Existing Conditions         2022 Plus Project Scenario         2030 Plus Project Scenario           AM         Peak         AM         Peak         PM         Peak         AM         Peak         AB         Peak </td <td>Z022 Plus Project Scenario         2030 Plus Project Scenario           AM         Peak         AM         Peak         PM         PEak         P</td>	Z022 Plus Project Scenario         2030 Plus Project Scenario           AM         Peak         AM         Peak         PM         PEak         P	

 Table 3 - Intersection Level of Service

Source: Alta Planning + Design 2019. Notes: LOS = Level of Service. Delay is measured in seconds per vehicle.



















