



Final

**Traffic Impact Study
for Proposed Balloon
Track Mixed-Use
Development**

In the City of Eureka

March 31, 2008



Vision That Moves Your Community

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Introduction and Summary

Introduction

This report presents the results of the traffic impact study of the proposed Balloon Track mixed-use development, to be named Marina Center. The project site is to be located north of Washington Street and west of Broadway (US Route 101) in the City of Eureka. Waterfront Drive is the north and west boundary of the project site, which is adjacent to Humboldt Bay. Figure 1 illustrates the project location and its vicinity.

The project sponsor (CUE VI, LLC) proposes to construct approximately 511,200 square feet of commercial/retail mixed use plus 54 dwelling units. A Home Depot anchor of about 152,700 square feet is included within the 511,200 square feet. Figure 2 shows the proposed site development.

The purpose of this traffic study is to evaluate the potential traffic impacts resulting from the development of the proposed project, identify potential roadway and circulation needs and determine potential mitigation measures to offset significant traffic impacts due to the project. The study focused on evaluating conditions at twenty-seven existing intersections and one future study intersection that may potentially be impacted by the proposed project. The following study intersections were selected for analysis in coordination with City and Caltrans staff:

1. Broadway and Fourth Street
2. Broadway and Fifth Street
3. Broadway and Sixth Street
4. Waterfront Drive and Fourth Street (project access, does not exist now)
5. Broadway and Washington
6. Broadway and 14th Street
7. Broadway and Wabash-Fairfield
8. Broadway and Del Norte
9. Broadway and Hawthorne
10. Broadway and Henderson
11. Washington and Waterfront
12. Washington and Koster
13. Waterfront and Commercial
14. Koster and 14th Street
15. Wabash and Koster
16. Broadway and Bayshore Mall (north) - Harris
17. Commercial and Fourth Street
18. Fourth Street and 'C' Street
19. Fourth Street and 'E' Street
20. Fourth Street and 'F' Street
21. Fourth Street and 'H' Street
22. Fourth Street and 'I' Street
23. Fifth Street and 'C' Street
24. Fifth Street and 'E' Street
25. Fifth Street and 'F' Street
26. Fifth Street and 'H' Street
27. Fifth Street and 'I' Street
28. Broadway and Seventh Street

With commercial development, Saturday trip generation is normally higher than it is during the week. Studies referenced in *Trip Generation, 7th Edition* published by the Institute of Transportation Engineers show that Saturday trip generation rates for retail centers greater than 300,000 square feet of gross leasable area are 28 percent higher than weekday trip generation rates during the commuter p.m. peak hour. TJKM evaluated the potential that Saturday volumes would be higher than weekday volumes. We determined that total volumes on Saturday with the project will be less than the p.m. weekday commuter peak volumes with the project based upon week long counts on Broadway south of Wabash Avenue as conducted by Caltrans. All count data are provided in Appendix A. All appendices to this report are bound in a separate document because they constitute hundreds of pages.

The intersection operating conditions were evaluated under the following four scenarios:

1. Existing Conditions in 2006
2. Baseline 2010 (Existing volumes factored by 1.06 traffic growth)
3. Baseline 2010 + Project
4. Cumulative + Project 2025 Conditions

Level of Service Analysis Methodology

The level of service measurement is a qualitative description of traffic operating conditions, including expected traffic conflicts and delay. Levels of service describe these conditions in terms of such factors as speed, travel time, delays, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. Levels of service are given letter designations ranging from A to F. Level of Service (LOS) A indicates free-flow conditions with little or no delay, and LOS F indicates congested conditions with excessive delays and long backups. Various methodologies are used to determine levels of service on specific roadway facilities, including signalized and unsignalized intersections, rural two-lane and multi-lane highways, urban arterials, freeway ramps and weaving sections, and freeway segments and systems.

Signalized and unsignalized intersections were evaluated using the corresponding methodology contained in the *2000 Highway Capacity Manual*, as implemented in Synchro 6.0 software. This methodology reports peak hour operating conditions as the average control delay for all vehicles entering the intersection for signalized intersections, and for the worst approach for unsignalized intersections. "Control Delay" is an estimate of the extra time spent at an intersection considering the time stopped plus the added time spent in decelerating and accelerating before and after stopping. Appendix B contains detailed descriptions of the level of service methodologies used in this study.

In addition, all scenarios were simulated using SimTraffic 6.0 to better assess the potential adverse interaction of traffic queues between closely spaced signalized intersections. Therefore, average speeds, queues, and use of special lane storage lengths are also addressed. While there are no minimum performance criteria for these additional factors, the output of the simulation models allows a good comparison of no project with project conditions scenarios.

Summary

The Balloon Track mixed-use development project, to be named Marina Center, offers several benefits for traffic circulation and conditions along with the potential for negative traffic impacts. Three new signals will be provided which will be at Fourth Street and Broadway, Fourth Street and Commercial, and Broadway at Hawthorne. The new signal at Fourth and Broadway will provide protected pedestrian crossings of the heavy Fourth Street to Broadway traffic. Project traffic is divided between three main access points: Broadway at Fourth Street and at Sixth Street and Waterfront Drive at Fourth Street (new street extended through the project) near the marina. The access drive west from Sixth and Broadway will be offset approximately 75 feet to the south of the westbound Sixth Street approach east of Broadway. A more detailed concept plan is shown in Figure 12 and in Appendix K. Other project access is proposed at Broadway and Third Street, Broadway and Second Street, and Waterfront Drive and Commercial Street.

The extension of existing streets of the downtown street grid through the Balloon Track also reduces the site as a barrier between downtown and the waterfront and marina. Both Second and Fourth Streets will be extended west of Broadway as private streets, and will provide for pedestrian and bicycle access and circulation along with vehicular access and circulation. Fourth Street will also be extended to intersect with Waterfront Drive across from the marina and just north of the Wharfinger Building. Thus, the project provides direct access to the waterfront. The project includes construction of the planned Class I bike trail along the east side of Waterfront Drive.

Bicyclists will also be able to move through the project via Fourth Street, which will serve as a Class III bike route. Bicyclists using the Class II bike lanes on Sixth and Seventh Streets will be able to access the project via the signal at Sixth and Broadway. Westbound bicyclists on Sixth Street can cross Broadway using the Sixth Street signal. No separate bicycle lanes are proposed through the project site from the Sixth Street access drive. Bicyclists desiring to travel east in the bike lanes on Seventh Street east of Broadway will need to cross Broadway at Sixth, then travel south on the sidewalk to the Class II bike lane on Seventh Street.

The trip generation analysis for the proposed development of the Balloon Track estimates that for an entire weekday, the project is expected to result in an additional 15,669 vehicle trips beyond the project boundaries. Additional vehicular, walking and bicycle trips within the site will also be made between the various uses such as office, residential and retail. A "trip" is defined as having an origin and a destination, and is not a round trip. Therefore, the project will generate an estimated 7,834 round trips daily on weekdays. Trip generation for the weekend will be lower at most of the uses, and higher at Home Depot and additional retail uses. Because traffic volumes at the study intersections are lower on weekends, this traffic impact analysis concerns itself only with project impacts on normal, weekday commuter traffic peaks in the morning and evening. The project is estimated to generate 792 new trips in the a.m. peak hour (534 inbound and 257 outbound), and 1,370 trips in the p.m. peak hour (575 inbound and 795 outbound). The actual number of trips in and out of project driveways will be higher as noted later in this report, but these are not all "new trips." Deductions to the total trip generation are made to account for the pass-by trips that are already on the public street system, and for trips made entirely within the site that do not use the public street system.

The Humboldt County countywide travel model was made available for use in estimating project traffic distribution and assignment to study intersections. An origin-destination study was made of Costco customers prior to the availability of the model, so that estimates of project trip

distribution could be made for impact analysis. TJKM calibrated the countywide model so that it closely estimates the existing turning volumes at the 27 existing study intersections in this study, and it also fairly estimates the trip distribution for customers leaving Costco. The adjustments to enhance and refine the model for the traffic impact analysis in this report resulted in a powerful tool for analyzing project impacts. The model was only used for project trips in 2010, because there was no general agreement on the land uses in the model for cumulative conditions in 2025.

Details regarding estimation of 2025 volumes are provided in subsequent chapters of this report and in Appendix L. Estimates of Baseline 2010 volumes in this study are based upon historical trends of traffic volume growth on U.S. 101 near the project site from raw count data by Caltrans for 1992 through 2004. An analysis was also made using published traffic count data by Caltrans for all regional highways in the Eureka metropolitan area from 1985 through 2005 as well as for population and employment data and forecasts for 1985 to 2020. The annual average growth is 1.5 percent per year for traffic counts, so a four-year growth is 6 percent. Baseline 2010 volumes without the project were estimated simply by multiplying existing counts by 1.06. Compounded over the 19 years for traffic volumes used for this traffic report (2006 extrapolated to 2025), we would expect a 33 percent increase in traffic by 2025 including the project. The consideration of potential development projects as described in the next paragraph coupled with Marina Center traffic volumes almost exactly increases traffic volumes by 33 percent between 2006 and 2025.

The City of Eureka provided a list of projects in various stages of the entitlement process. TJKM used all projects that had reasonably-defined uses and sizes, and estimated trip generation for these projects in the same manner as for the proposed project. Trips in the a.m. and p.m. peak hours were assigned to study intersections using TRAFFIX software. This process was used for estimating Cumulative 2025 Conditions by also adding traffic from Marina Center.

Mitigation appears feasible for all signalized intersections for Baseline 2010 + Project Conditions. Mitigation strategies include signal coordination, encouragement of alternative routes to and from the south via Waterfront Drive, extension of the Henderson/Harris one-way couplet to Broadway, and elimination of the northbound Fairfield approach at Broadway/Wabash Avenue with signalization of Broadway and Hawthorne to accommodate redirected traffic from the prohibited northbound movement on Fairfield.

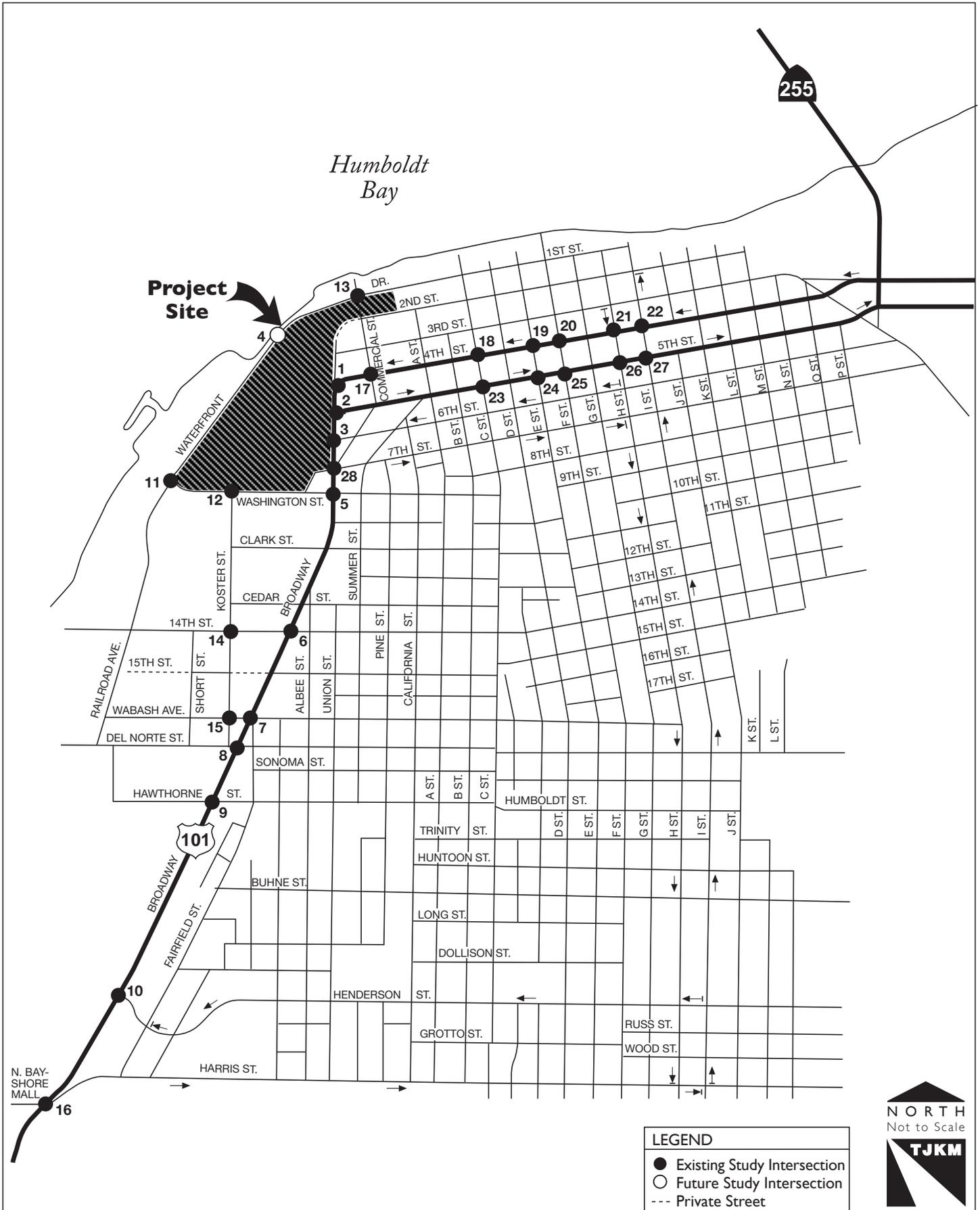
The project proposes off site mitigation of traffic impacts at several intersections for 2010. These improvements plus additional congestion management strategies are assumed for the 2025 analysis. Under Cumulative + Project 2025 Conditions with the additional mitigation of striping three lanes southbound on Broadway from Vigo through the north Bayshore Mall driveway plus the forced diversion of exiting Marina Center traffic to Waterfront Drive results in acceptable conditions throughout the system excepting Koster and Wabash.

In 2010 without the project, one signalized intersection, Broadway and Henderson, is expected to operate at an unacceptable level of service (LOS E) in the a.m. peak hour. Five unsignalized intersections will operate at LOS E or F in the p.m. peak (Fourth and Broadway, Fourth and 'C' Street, Fifth and 'C' Street, Broadway and Hawthorne, and Fourth and Commercial) and two will operate at LOS F in the a.m. peak hour (Broadway and Fourth, and Broadway and Hawthorne). With the project and project mitigations in 2010, three unsignalized intersections are expected to operate at LOS E or F in the p.m. peak (Fourth and 'C', Fifth and 'C', and Koster and Wabash) with only Fourth and 'C' Street as LOS E in the a.m. peak. Mitigation for Fourth and 'C' Street, and for Fifth and 'C' Street is to signalize the intersections. However, signals are not

warranted at either Fourth and 'C' or Fifth and 'C' Streets in any scenario. Signals could be installed under and "Systems Warrant." Otherwise, there is no other type of mitigation for LOS F at these unsignalized intersections. There is no apparent feasible mitigation for the LOS E at Koster and Wabash. Here, the intersection is too close to the complex intersection of Broadway and Wabash-Fairfield for signalization, and the traffic volumes on Wabash are high enough to result in LOS E for southbound left turns from Koster to eastbound Wabash. Without the project, between 2010 and 2025, this intersection would reach LOS E and then F regardless. It is likely that southbound drivers will use 14th Street to get to Broadway and to eastbound Wabash rather than wait at Koster and Wabash. Although it is a private street, TJKM traffic engineers observed many vehicles exiting Costco and other nearby uses and using 15th Street between Koster and Broadway as a means of going north on Broadway or south, then left turning to the east on Wabash rather than waiting for traffic to clear on southbound Koster at Wabash.

Significance Criteria for Impacts

The City of Eureka strives to maintain LOS C or better on all roadways, while Caltrans District I requires LOS D or better operation. These criteria are used in this report to define significant adverse impacts.



Existing Conditions

Introduction

Currently, the Balloon Track is an abandoned rail yard near the historic Eureka waterfront. It is an approximately thirty two-acre site that has been cleared of almost all rails, the roundhouse, and other facilities. The remaining rails of the dormant Eureka Southern Railroad traverse the northern and western portions of the site. Just beyond the rail alignment, Waterfront Drive parallels the shoreline of Humboldt Bay and bounds the site on the north and west. On the south, Washington Street intersects Waterfront Drive and extends east to Broadway and beyond. Broadway bounds the site on the east from Washington Street to Second Street, and Second Street then completes the closure of the site boundaries between Broadway to about 400 feet east of Commercial Street. Commercial Street crosses the site between Second Street and Waterfront Drive, the only street crossing of the dormant rail lines within the site.

The reason for the name, Balloon Track, is that the curvature of the main rail alignment within the site outlines the shape of a hot air balloon when seen in aerial view. There are several parcels within the general boundaries named above that are not a part of the site. These parcels lie along both Broadway and Washington Street, although portions of the site intersect both these streets. The intersections of Second, Third, Fourth and Sixth Streets at Broadway and Waterfront Drive near the Marina will become access locations for the development of the site.

CUE VI, LLC of Eureka has acquired the rail yard and several of the additional parcels for the proposed mixed-use development of the entire site. The proposed project will consist of approximately 511,200 square feet of mixed commercial, industrial, retail uses plus 54 multi-family dwelling units. A Home Depot anchor of about 152,700 square feet (includes outdoor garden center) is included in the above, with several other anchor tenants ranging from 10,000 to 30,000 square feet of retail floor area. Additional development in smaller buildings included in the project is proposed for the remainder of the site, and could be either retail or a mix of retail and office uses. Figure 1 in the preceding section shows the project vicinity along with the study intersections for traffic impact assessments. Figure 2 on page 7 shows the proposed site development.

Existing Transportation System

Existing Roadways

Regional and local road access to the site is primarily provided by US 101 (Broadway). Broadway extends to the south from the western edge of downtown Eureka. US 101 turns 90° to the east through downtown Eureka as a one-way couplet on Fourth and Fifth Streets. Local and regional transit routes pass near the site, and bike lanes and sidewalks are provided in the vicinity. The layout of the street grid in the vicinity is shown in Figure 1. Details regarding signal operation, the proportion of trucks in the total volume of traffic, pedestrian and bicycle volumes, lane widths and lengths of left and right turn lanes are contained in Appendices A and C.

Broadway (US 101 south of Fourth Street) is a four-lane, north-south major arterial south of Fifth Street, and extends through Eureka roughly following Humboldt Bay. North of Fourth Street, Broadway is a local street with badly deteriorated pavement. There is a sidewalk only on the east side. Broadway terminates 110 feet south of Second Street and beyond this point the street is an unimproved private street. There are no marked lanes north of Fourth Street. Between Fourth and Fifth Streets, Broadway is a one-way, two-lane southbound street plus a left turn lane for turns to eastbound Fifth Street. The one-way couplet of US 101 through downtown Eureka begins at

Broadway and Fifth Street. Near the city limits of Eureka three miles south of the Balloon Track site, US 101 (Broadway) transitions to a grade-separated freeway at the Herrick Avenue overpass. The speed limit on Broadway north of Wabash to Fourth Street is 30 mph, while south of Wabash to the freeway it is 40 mph. Westbound Fourth Street turns, without a stop sign, onto southbound Broadway with an advisory speed of 15 mph. Southbound Broadway at Fourth Street is controlled by a stop sign. Broadway is two-way between Fourth Street and Second Street with a prima facie speed limit of 25 mph.

Land use along Broadway in the vicinity of the project site is a mixture of industrial, retail and commercial. A historic feed store remains on the west side of Broadway from Fourth Street to south of Fifth Street separates the site from Broadway. Parking is prohibited on both sides from Fifth Street to just south of Wabash (on-street parking is allowed on the east side of Broadway between Fourth and Fifth Streets). The section from Fourth Street to Wabash Avenue is approximately 0.7 mile. From Wabash Avenue to Fourth Street, Broadway is 55 feet from curb to curb within a 70-foot right of way.

South of Wabash Avenue, the right of way along Broadway widens to 100 feet with a curb-to-curb width of 73 feet. Broadway remains a four-lane highway with a two-way left turn lane all the way to the freeway (there are directional left turn lanes at signalized intersections). On-street parking is allowed south of Wabash Avenue on the west side, and south of Del Norte Street on the east side. There is an edge stripe providing a 7- to 12-foot shoulder on both sides along this section of Broadway. From Wabash, Broadway extends another 2.4 miles before becoming a freeway at the Herrick Avenue overpass.

Washington Street is a 44-foot wide, two-lane street extending east and west. It begins at Waterfront Drive on the west and extends east to 'C' Street. There is a signal at Broadway and Washington Street. Parking is generally allowed on both sides along the entire length.

Fourth and Fifth Street One-Way Couplet (US 101) extends east from Broadway through downtown Eureka. Both Fourth and Fifth Streets are 51-foot wide, three lane, one-way streets with parking on both sides east of Broadway. Fourth Street is one-way westbound and Fifth Street is one-way eastbound. Parking on Fourth Street east of V Street and on Fifth Street east of Myrtle Avenue is prohibited on both sides of each street where they both narrow to 42.5 feet in width. Through downtown Eureka there are signals at most of the cross streets, with pedestrian crossings on all approaches. Neither Fourth nor Fifth Street intersections with Broadway are signalized. The closest signals to the east on both Fourth and Fifth Streets are at 'E' Street, approximately 2,000 feet east of Broadway.

Sixth Street is a 42-foot wide, one-way, westbound, two-lane street through downtown Eureka ending at Broadway. It is a designated bike route and emergency route for fire equipment. The intersection of Sixth Street and Broadway is signalized. The westbound Class II bike lane ends at Commercial Street approximately 250 feet east of Broadway. Parking is allowed on both sides.

Seventh Street is a 42-foot wide, one way, eastbound, two-lane street through downtown Eureka starting at Broadway. Parking is allowed on both sides. It is a designated bike route with an eastbound Class II bike lane starting at Broadway. There is no signal at Seventh Street and Broadway.

Second Street is a 44-foot wide, east-west, two-lane street east of Commercial Street. West of Commercial Street Second Street is a private unimproved street. The street terminates at 'M' Street to the east and the intersections are not signalized. The side streets are stop controlled and parking is allowed on both sides.

14th Street is a 38-foot wide, east-west, two-lane street east of Broadway and 40 feet wide west of Broadway. The westbound approach widens to 46 feet at Broadway with a through lane and a left turn lane. The eastbound approach widens to 52 feet at Broadway with one right, one through, and one left turn lane. Generally, parking is allowed on both sides of the street.

Fairfield Street is a 36-foot wide, north-south, two-lane street ending at the intersection of Broadway and Wabash Avenue on the north end. Parking is allowed on both sides of the street.

Waterfront Drive is a 48-foot wide two-lane street that parallels the shoreline of Humboldt Bay and serves the marina. It currently extends from Washington Street to join and become First Street just east of 'C' Street. First Street then continues east to 'H' Street. Waterfront Drive begins again at 'J' Street and continues easterly to T Street. Parking is generally allowed, but few, if any vehicles are found parked along Waterfront Drive in the vicinity of the Balloon Track property because off-street lots at buildings along Humboldt Bay accommodate most of the observed parking demand. However, Railroad Avenue from Del Norte to 14th Street has a high on-street parking demand. Waterfront Drive becomes Railroad Avenue just north of 14th Street.

Wabash Avenue is a 51-foot wide, two-lane street extending from Railroad Avenue on the west (near the shoreline of Humboldt Bay) through Broadway to 'H' Street. At Broadway eastbound Wabash has a sharp-right turn lane (to southbound Broadway), a through-right lane (to Fairfield and eastbound Wabash) and a left turn lane. Westbound Wabash at Broadway has a left turn lane and a through-right lane. Parking is allowed on both sides of Wabash west of Koster Street and east of Spring Street.

Koster Street is a 44-foot wide, two-lane street extending as a two-way street from Washington Street (near the project site) on the north to Wabash Avenue on the south. The short segment to the south between Wabash Avenue and Broadway at Del Norte is a one-way northbound, two-lane street. Southbound traffic on Koster Street must turn right or left at Wabash Avenue. Parking is allowed on both sides of Koster Street.

Henderson Street is a 44-foot wide two-lane two-way traffic street between Broadway and Fairfield. It extends uphill from Broadway to Fairfield where all eastbound traffic must turn left or right onto Fairfield. East of Fairfield, Henderson is one-way westbound and part of a couplet with Harris as the eastbound street. The Henderson/Harris couplet serves the Henderson Center shopping area that includes a Safeway and other shops. At Broadway, Henderson widens to two westbound approach lanes and one eastbound lane, with one westbound lane only for left turns, with the adjacent westbound lane as a shared left, through and right turn lane. The eastbound approach is from a private parking lot. The signal operation is approach phasing for Henderson and the private eastbound approach. Parking is not allowed on Henderson Street between Fairfield and Broadway.

Transit Systems

The Humboldt Transit Authority operates local transit service seven days a week within Eureka. There are four routes: Red, Green, Gold and Purple. The Red, Gold, and Purple routes are within the vicinity of the project and shown in Figure 3. The Red line operates along Fourth and Fifth

Streets and along Broadway to Washington Street. It then turns on Washington over to Koster Street for southbound service. Northbound service is along Summer Street for (parallel to Broadway approximately 500 feet east). The service operates from 6:15 a.m. until 7:00 p.m. with one-hour headways. Fares are normally \$1.20 with reduced single fares of \$0.90 per ride. Reduced fares are available for seniors above the age of 62, children 3-17 years of age, and persons with disabilities. A book of ten tickets costs \$9.00 for regular fares, and \$6.50 for reduced fares. Passes are also available for either a day or a month. If use is regular, the passes offer transit patrons significant discounts over the book of tickets, and the cash fares.

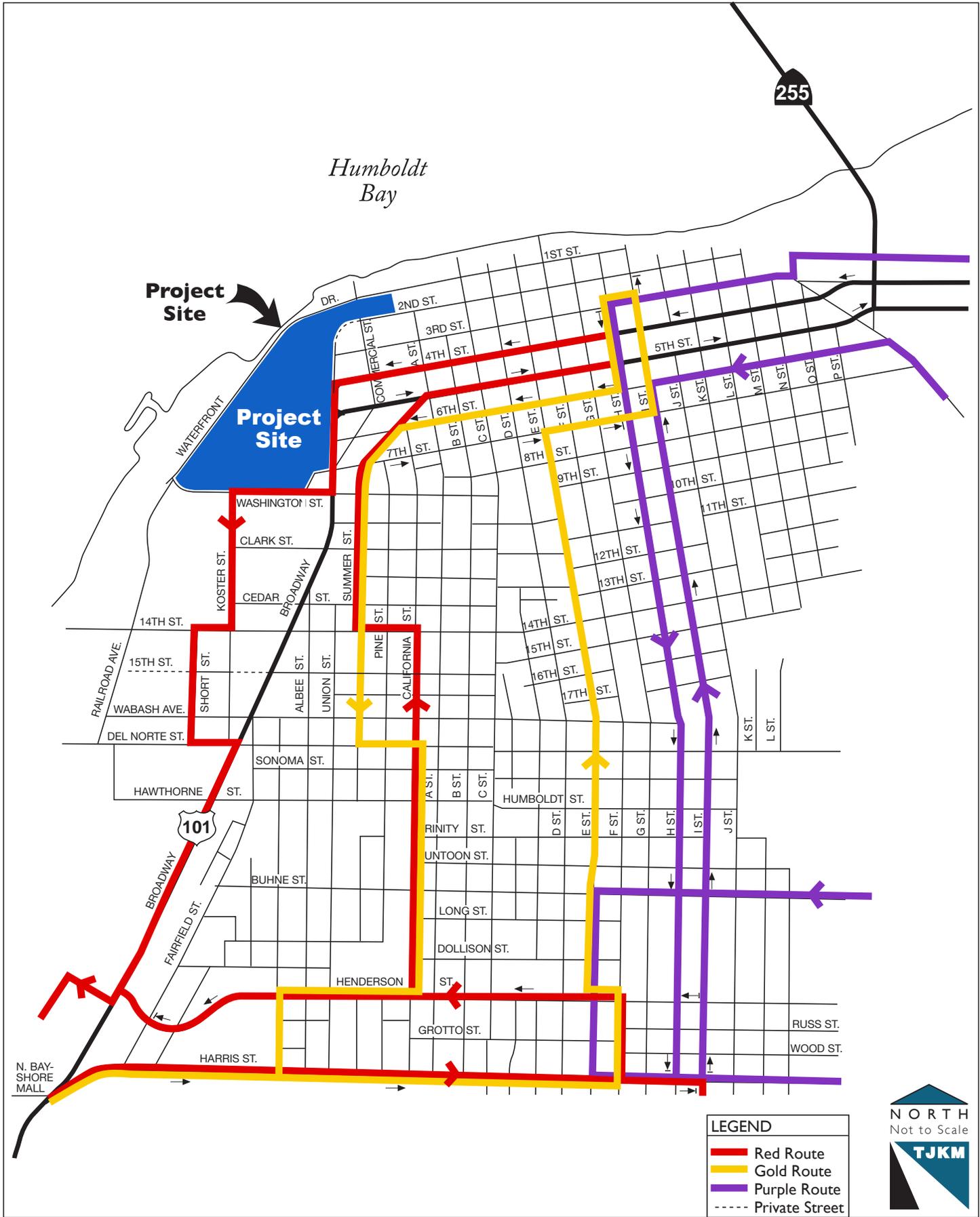
There is also intercity transit service provided by the Redwood Transit System between Trinidad and Scotia through Eureka. The service operates on three-hour headways for the entire route, and offers more frequent, approximately one-hour headways between the Arcata Transit Center (about nine miles north) and the Bayshore Mall (2 miles south of Balloon Track). In the vicinity of the Balloon Track, southbound service starts around 9:40 a.m. and ends at 6:15 p.m., and northbound service starts around 9:45 a.m. and ends at 5:55 p.m. Fares for one-way service range from \$1.95 to \$2.20 depending upon the length of the ride (reduced is \$1.70 to \$1.95). Again, day and month passes are available at significant discounts for the regular transit patron.

Pedestrian Network

Generally, sidewalks exist along both sides of most of the roadways at and between the study intersections. Sidewalk widths vary from 6 feet to 12 feet. Marked crosswalks are provided at all signalized intersections and at many two-way stop intersections. All crosswalks at signalized intersections have pedestrian signals and pushbuttons. However, the complex turning lanes and one-way pattern of US 101 on Broadway at Fourth and Fifth Streets creates difficulties for pedestrians trying to cross the heavy traffic flows. Pedestrians are prohibited from crossing the south leg of Broadway at Sixth and at Fourth, and sight distance for crossing Fifth Street in the turn from Broadway to eastbound Fifth Street is less than ideal. A pedestrian crosswalk is provided across Broadway on the north leg of Broadway from the island separating southbound left turns (to Fifth) and southbound through traffic. There is a six-foot wide sidewalk on the east side of Waterfront Drive from Washington Street to the north. Sidewalks are generally available on both sides of Broadway with a missing section on the east side from just north of Henderson to about 850 feet north.

The downtown grid of streets with sidewalks east of the Balloon Track site offers convenient and safe pedestrian circulation. In downtown the flow of traffic along the one-way couplets of Fourth/Fifth Streets and Sixth/Seventh Streets is periodic, with heavy platoons of traffic for 30 to 40 seconds and then a relative absence of traffic for about 20 to 30 seconds. These gaps in traffic flow allow relatively safe pedestrian crossings of even heavily trafficked streets. At Broadway, the downtown grid of streets is interrupted by the existing Balloon Track site between Washington and Commercial/Waterfront. The barrier represented by the present Balloon Track prevents pedestrian access between downtown and the waterfront in the vicinity of the marina for almost one-half mile between Washington/Waterfront and Waterfront/Commercial.

Pedestrian travel along Broadway south of Washington Street is not pleasant because of the high volume of traffic as well as high driveway volumes. Crossings of Broadway are difficult except at signalized intersections, and even here, the volume of left and right turns at the major intersections conflicts with pedestrians trying to cross. Curb ramps are generally available at the study intersections. The angled intersections of Broadway at Wabash and Fairfield result in very long crosswalks.



Bicycle Network

The definitions of the three classes of bikeways are in Chapter 1000 of the Caltrans Highway Design Manual.

- Class I bikeway (bike path) – Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with cross flow minimized.
- Class II bikeway (bike lane) – Provides a striped lane for one-way bike travel on a street or highway.
- Class III bikeway (bike route) – Provides for shared use with pedestrian or motor vehicle traffic.

The City of Eureka has classified bicycle facilities throughout the city, both existing and proposed. Figure 4 shows these facilities.

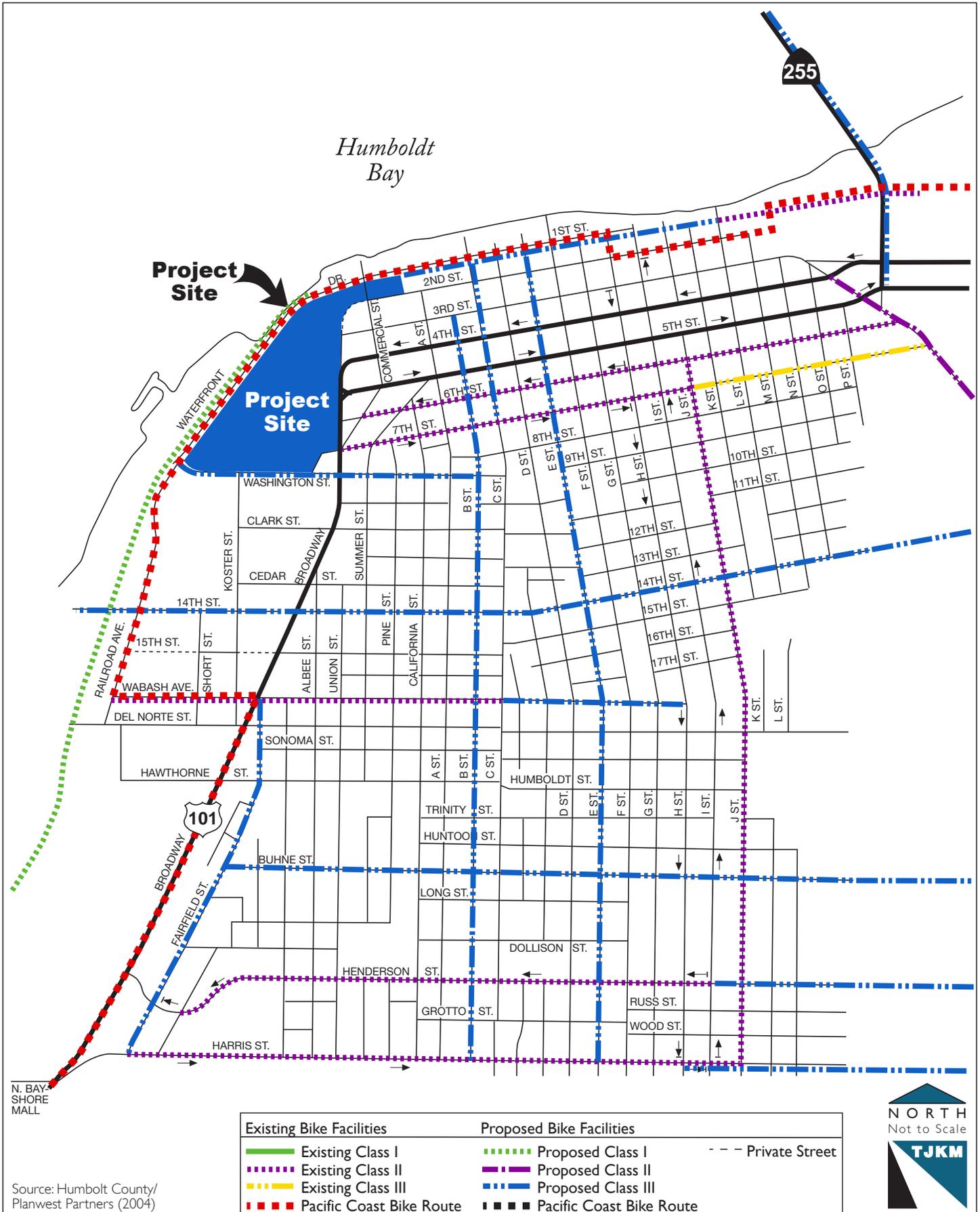
Existing Bicycle Circulation

There are Class II bike lanes on both Sixth Street and Seventh Street from Broadway through downtown to Myrtle Avenue. The Class II bike lane on Sixth Street ends at Commercial Street east of Broadway. Class II bike lanes are also provided on Wabash Avenue between 'C' Street on the east and Railroad Avenue on the west, accepting the section between Spring Street and Koster Street one block either side of Broadway. The Pacific Coast Bike Route comes into Eureka from the south along US 101 and Broadway to Wabash Avenue. It then goes west on Wabash Avenue to Railroad Avenue, along Railroad Avenue/Waterfront Drive/First Street to 'H' Street, south to Second Street, east to 'L' Street in the downtown vicinity, north to Waterfront Drive, east to 'T' Street, south to First Street, east to 'V' Street, and south to Fourth/Fifth Streets. The Pacific Coast Bike Route avoids the narrow section of Broadway north of Wabash Avenue.

A Class III bike route along Washington Street is proposed between Waterfront Drive and 'B' Street. 'B' Street is also a designated Class III bike route proposed between Henderson Street in the south to Fourth Street in downtown. Fairfield from Wabash Avenue to Harris and south is also proposed as a Class III bike route. Waterfront Drive is signed as a Class III bikeway. The existence of vehicle parking has precluded establishment of formal bike lanes.

A Class I bike trail is proposed along Railroad Avenue and Waterfront Drive including the western and northern perimeter of the Balloon Track site. The planned Class I trail would extend east along Waterfront Drive to meet up with the soon-to-be-constructed Class I trail along the Old Town Boardwalk east of 'C' Street. East of the Old Town Boardwalk there are existing Class II bike lanes all the way to the State Route 255 bridge to Indian Island and the Samoa Peninsula.

Bicycle travel along Broadway is problematic and difficult because of the relatively narrow curb lanes north of Wabash Avenue as well as high driveway volumes. South of Del Norte, the striped shoulder coupled with the almost complete lack of on-street parking affords some convenience to bicycle travel, but the high volumes of traffic along Broadway along with the relatively high speeds of 40 mph and more contribute to a relatively low level of comfort and increased hazard for most bicyclists



Source: Humboldt County/
Planwest Partners (2004)



On-Street Parking

On-street parking is generally permitted on the street segments between study intersections, excepting Broadway on both sides, from Fifth Street to Wabash Avenue. Between Fourth Street and Fifth Street on the east side of Broadway, parking is permitted. On Wabash Avenue between Koster Street on the west to Spring Street on the east, parking is also prohibited. Finally, parking is prohibited on both sides of Henderson Street between Broadway and Fairfield. Otherwise, parking is generally allowed on all other streets described in the Roadway Network section above. Parking is prohibited on Fourth Street east of V Street and on Fifth Street east of Myrtle Avenue.

Very little parking was observed on Broadway south of Wabash Avenue on Tuesday, February 28th and Wednesday, March 1, 2006. Between Henderson Street and Wabash Avenue, only six cars were parked along the east side, and three cars were parked along the west side just after noon. The same held true at 3:00 p.m. with minor changes in the numbers. During the noon hour, the east side of Broadway between Fourth Street and Fifth Street was 70 percent parked, but by 3:00 p.m. there were only two cars parked at the curb. The parking is in relation to the restaurant at Broadway and Fifth Street, which has off street parking. Use is made of on street parking because it is more convenient to some. The Best Western motel at this same location allows restaurant customers to park in their spaces as well. Table I shows parked cars and percentage parking occupancy by street segment on Broadway by time of day. Overall there is little demand for on-street parking, because all uses along Broadway have off-street parking available.

Table I: Parking Occupancy on Broadway

Broadway Section	9:00 A.M.		Noon / 1:00 P.M.		3:00 P.M.		5:00 P.M.	
	East side	West side	East side	West side	East side	West side	East side	West side
Wabash to Henderson	7(10%)	0	6(8%)	3(5%)	6 (8%)	2 (5%)	6(8%)	1(2%)
Fourth to Fifth Street	4(60%)	prohibited	5 (70%)	prohibited	2(30%)	prohibited	2(30%)	prohibited
Second to Fourth Street	4(30%)	2(15%)	2(15%)	0	2(15%)	0	0	0

Note: Percentage parking occupancy is shown in parentheses

Traffic Volumes, Intersection Lane Configurations, and Traffic and Field Data

Traffic counts for all study intersections were taken by BayMetrics in March 2006 and April 2006. The counts were made manually to record left, through and right turns on each intersection approach for the a.m. peak period (7:00 to 9:00 a.m.) and the evening peak period (4:00 to 6:00 p.m.). No counts were taken on a Monday or Friday to ensure that weekend effects would not distort normal traffic patterns. At the same time counts were made of pedestrian and bicycle volumes by direction at each intersection. Extensive information from Caltrans count records back to 1990 was also used, plus detailed volume information from recent traffic studies for other development and capital improvements projects in Eureka. Figure 5 shows the a.m. and p.m. peak hour volumes at each of the study intersections, and Figures 6 and 7 provide pedestrian and bicycle volumes respectively at these same intersections. The source data for existing volumes are in Appendix A. Because the counts were taken on several days, there is normal variation from day to day, and this variation sometimes results in more or less vehicles arriving at an intersection than were sent from an upstream intersection. In all cases, no adjustments were made to the raw counts. Other reasons for imbalances of volumes between study intersections include driveways and intervening streets where vehicles can turn off and onto routes between study intersections.

Traffic engineers from TJKM (see “Study Participants,” page 55) surveyed intersection geometry at each of the study intersections. The engineers also made sampling counts of truck volumes, saturation flow rates (for capacity and level of service analysis), whether traffic was distributed generally evenly across multiple approach lanes, influences from driveways, on-street parking, bus stops, and other observations. These observations were used directly in the capacity and level of service analysis. Aerial photographs were also used to supplement the field observations. Aerial photos from both the City of Eureka GIS system as well as Google Earth were used to fill in data and information for later analysis.

The TJKM traffic engineers also directly observed the operation of both signalized and unsignalized study intersections. They observed the existence of pedestrian push buttons, and sampled the average splits and cycle lengths for each signal. It was noted that the signals are not coordinated along Broadway as there is no common cycle length north of Henderson Street. The signal timing sheets from Caltrans show coordination along US 101 from Sixth and Broadway east into downtown to ‘E’ Street, and again from Henderson Street south. There is no coordination between Henderson and Washington on Broadway. Coordination of these signals is not desirable, as Caltrans has explained, because the complex five-approach intersection of Broadway, Wabash and Fairfield requires such a long cycle length that it is impractical to require the remaining signals between Washington and Henderson to operate at a common cycle length. Figure 8 shows the existing lane configurations and traffic control for each of the study intersections. The volumes plus lane geometry and traffic control plus the more detailed information in Appendix A were all used for the analysis of existing conditions.

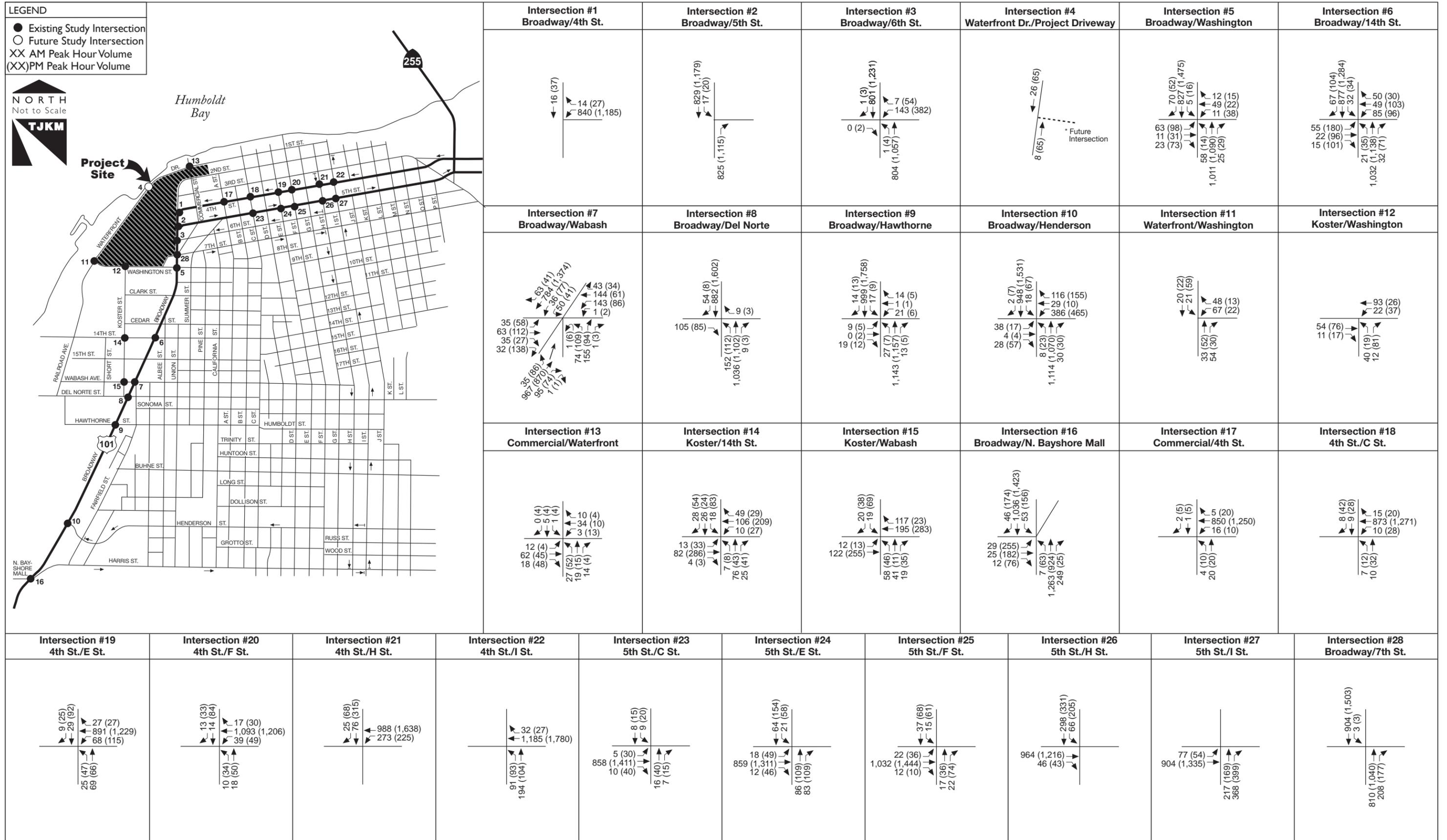
Accident Analysis

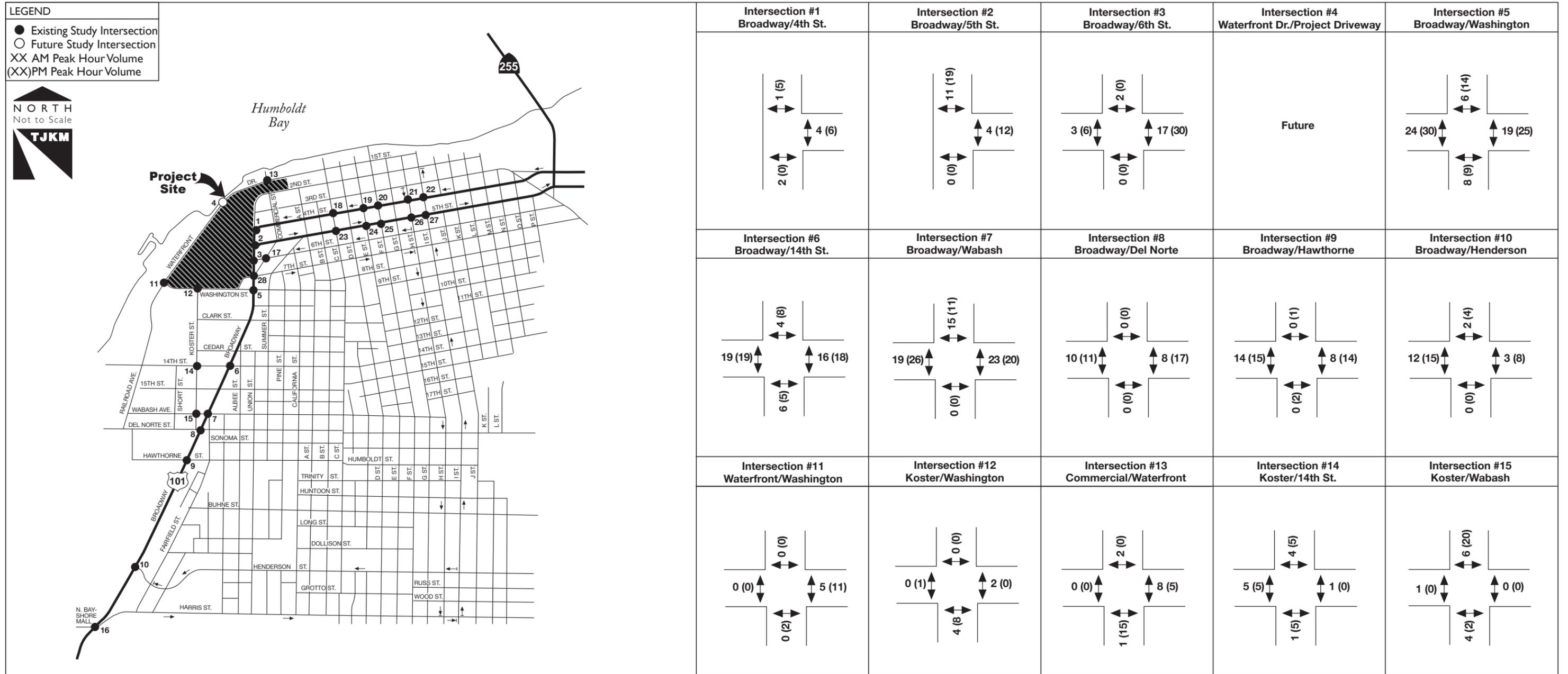
The Statewide Integrated (SWITRS) collision data from January 2000 to September 2005 were obtained from the California Highway Patrol. Appendix I shows the summary of collision analysis at study intersections in the City of Eureka. For each of the study intersections a collision diagram, type of collision pie chart and type of violation pie chart are also included.

From the collision diagrams, the signalized intersections of Broadway at 14th Street, Wabash and Henderson show a high incidence of rear end collisions on the northbound and southbound approaches. The determination of the cause and effect relationships of traffic controls and street design on accident patterns is a complex and inexact science.

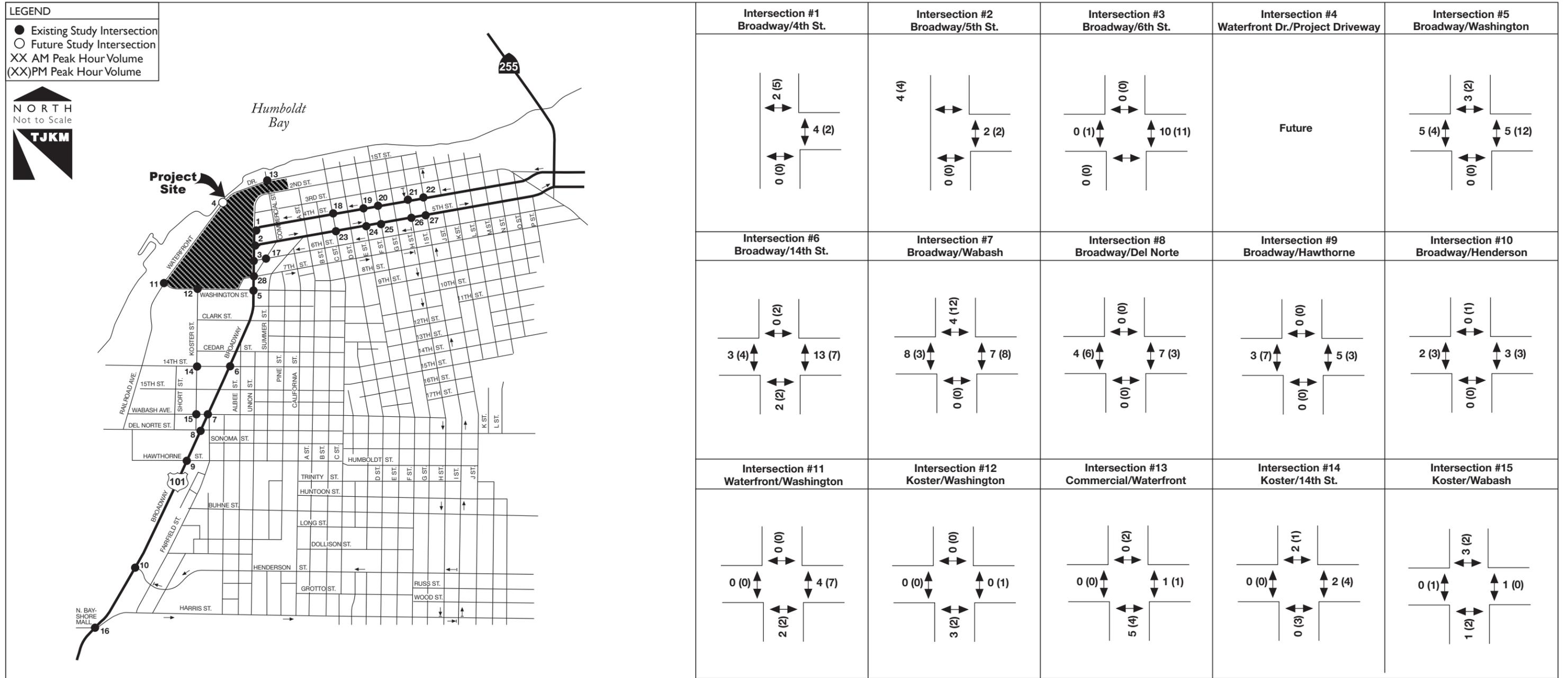
Caltrans has developed a procedure within the HISP Program for estimating reductions in accidents as a result of a wide range of highway improvements. For the types of improvements represented by the mitigating measures for the Balloon Track (new signals, upgraded signals, interconnect and signal coordination), the expected reduction in accidents overall is 15 percent. The study intersections that will likely experience reductions in accidents were analyzed using Caltrans worksheets. It is estimated that there will be 16.6 fewer accidents per year at the study intersections on the basis of the traffic mitigation proposed when Marina Center is fully developed. The related average economic savings from reductions in property damage, injury and fatal accidents at the study intersections is worth \$180,000 annually over a 15-year period, or a total of \$2,700,000 in savings from 2010 through 2025.

City of Eureka – Balloon Track Development
Existing Turning Movement Volumes

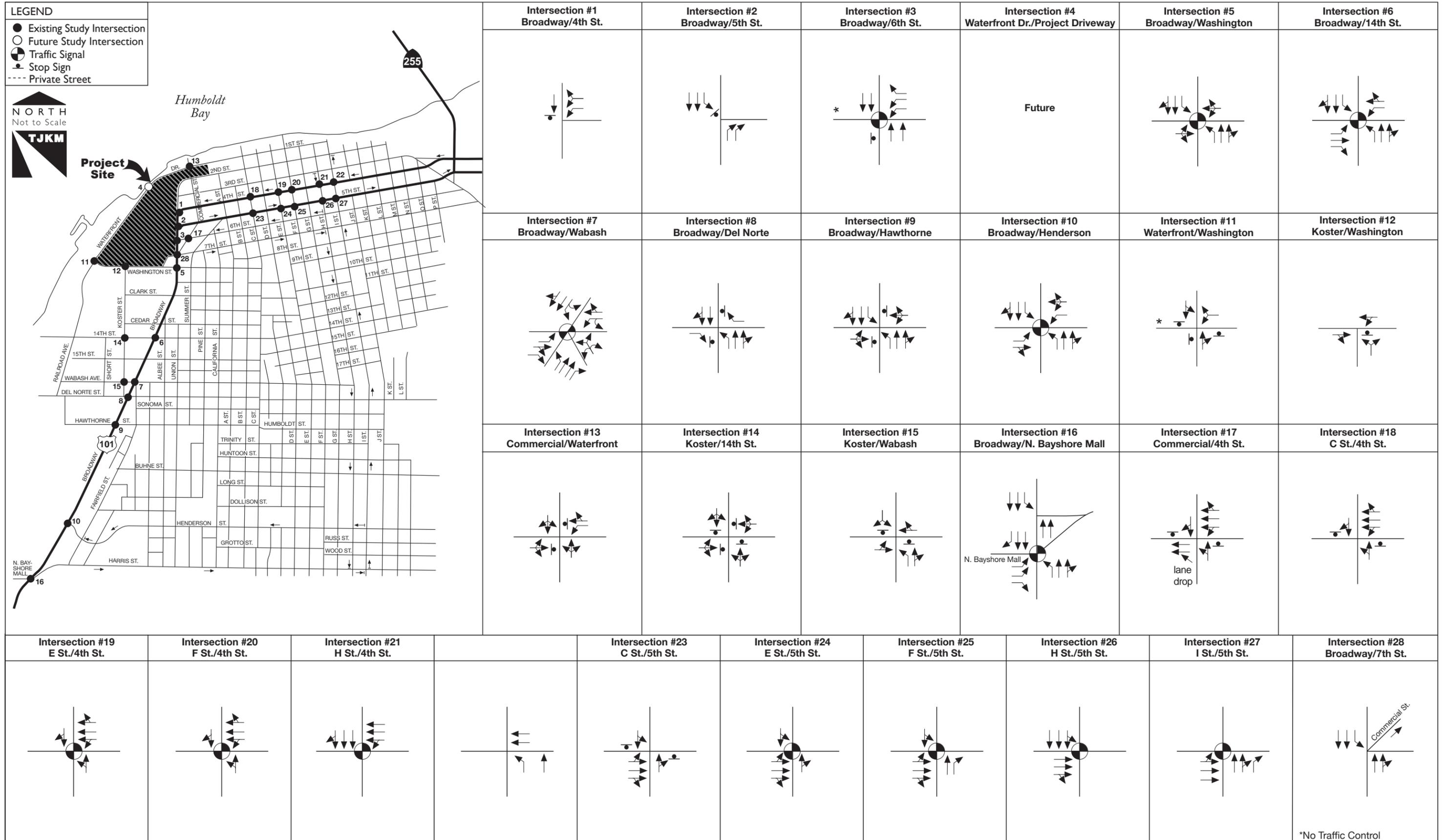




City of Eureka – Balloon Track Development
Existing Peak Hour Weekday Bicycle Volumes



City of Eureka – Balloon Track Development
Existing Lane Configurations and Traffic Controls



Results of Level of Service Analysis

The following table presents a summary of existing peak hour levels of service at the study intersections. Field-observed input values (such as saturation flows, lane utilization, truck percentages, etc.) were entered into the intersection analysis software so that the level of service analysis more closely represents actual conditions. Observed input values were determined as discussed in the “Existing Conditions” chapter, “Traffic Volumes, Intersection Lane Configurations, Traffic and Field Data” section of this report. Level of service worksheets are in Appendix C and level of service results are in Table II. TJKM received signal timing sheets as well as as-built signal plans from Caltrans District I offices in Eureka.

Table II: Levels of Service Summary – Existing 2006 Conditions

<i>Signalized Intersections</i>					
<i>ID</i>	<i>Intersection</i>	<i>A.M. Peak Hour</i>		<i>P.M. Peak Hour</i>	
		<i>Delay (sec)</i>	<i>LOS</i>	<i>Delay (sec)</i>	<i>LOS</i>
3	Broadway and Sixth Street	7.6	A	12.6	B
5	Broadway and Washington	12.7	B	16.7	B
6	Broadway and 14th Street	12.1	B	21.3	C
7	Broadway and Wabash-Fairfield	49.4	D	43.9	D
10	Broadway and Henderson	63.0	E	33.6	C
16	Broadway and Bayshore Mall (north)-Harris	4.4	A	19.1	B
19	Fourth Street and 'E' Street	4.9	A	7.4	A
20	Fourth Street and 'F' Street	5.1	A	5.4	A
21	Fourth Street and 'H' Street	4.5	A	7.3	A
22	Fourth Street and 'I' Street	11.8	B	10.4	B
24	Fifth Street and 'E' Street	10.6	B	17.8	B
25	Fifth Street and 'F' Street	6.2	A	7.8	A
26	Fifth Street and 'H' Street	10.6	B	8.3	A
27	Fifth Street and 'I' Street	9.9	A	16.3	B

Table continued next page.

Table II (Continued): Levels of Service Summary – Existing 2006 Conditions

<i>Unsignalized Intersections</i>					
<i>ID</i>	<i>Intersection</i>	<i>A.M. Peak Hour</i>		<i>P.M. Peak Hour</i>	
		<i>Delay (sec)</i>	<i>LOS</i>	<i>Delay (sec)</i>	<i>LOS</i>
1	Broadway and Fourth Street	>120.0	F	>120.0	F
2	Broadway and Fifth Street	11.9	B	14.0	B
4	Waterfront Drive/Fourth Street (project)	-	-	-	-
8	Broadway and Del Norte	14.0	B	13.3	B
9	Broadway and Hawthorne	>120.0	F	> 120.0	F
11	Washington and Waterfront	11.6	B	10.8	B
12	Washington and Koster	3.2	A	9.8	A
13	Waterfront and Commercial	10.3	B	10.8	B
14	Koster and 14th Street	9.4	A	14.8	B
15	Wabash and Koster	14.7	B	19.9	C
17	Commercial and Fourth Street	19.9	C	31.4	D
18	Fourth Street and 'C' Street	>120.0	F	88.5	F
23	Fifth Street and 'C' Street	24.6	D	98.7	F

Notes: Delay = Control Delay in Seconds/Vehicle, LOS = Level of Service
 X.X (X.X) = Average Intersection Delay in seconds per vehicle (signalized)
 Average Delay in seconds per vehicle for the worst minor approach (unsignalized)

All the signalized intersections operate acceptably excepting Broadway and Henderson in the a.m. peak hour. Most unsignalized intersections also operate acceptably at LOS D or better except Broadway and Fourth, Broadway/Hawthorne, Fourth and 'C' Street, and Fifth and 'C' Street. Only the worst level of service on the minor leg of a two-way stop is reported. Traffic on the street not stopping operates with little or no delay. At Fourth and Broadway, for example, just the southbound approach operates at a poor level of service due to the large westbound to southbound non-stopping flows from Fourth Street to Broadway. Southbound Broadway traffic volumes subjected to LOS F are 16 vehicles and 37 vehicles in the a.m. and p.m. peak hours respectively. The through flows on the one-way couplet of 860 and 1,250 vehicles in the a.m. and p.m. peak hours respectively are LOS A.

In micro-simulation model runs for Broadway, average travel speeds along Broadway in the a.m. peak hour are 26 mph northbound and 25 mph southbound, and in the p.m. peak, 22 mph northbound and 19 mph southbound. In terms of travel time, the trip from Fourth and I Street to Bayshore Mall (Harris) runs between 5 minutes 54 seconds (25 mph) to 7 minutes 26 seconds (19 mph), while coming north over the same distance, the trip takes between 5 minutes 26 seconds (26 mph) to 6 minutes 15 seconds (22 mph). The micro-simulation model very closely estimates average travel speeds and time along the entire route.

No mitigation measures are suggested for the Existing Conditions scenario. The Baseline 2010 + Project Conditions scenario describes the required mitigation for the signalized and unsignalized intersections with poor levels of service.

Baseline 2010 Conditions

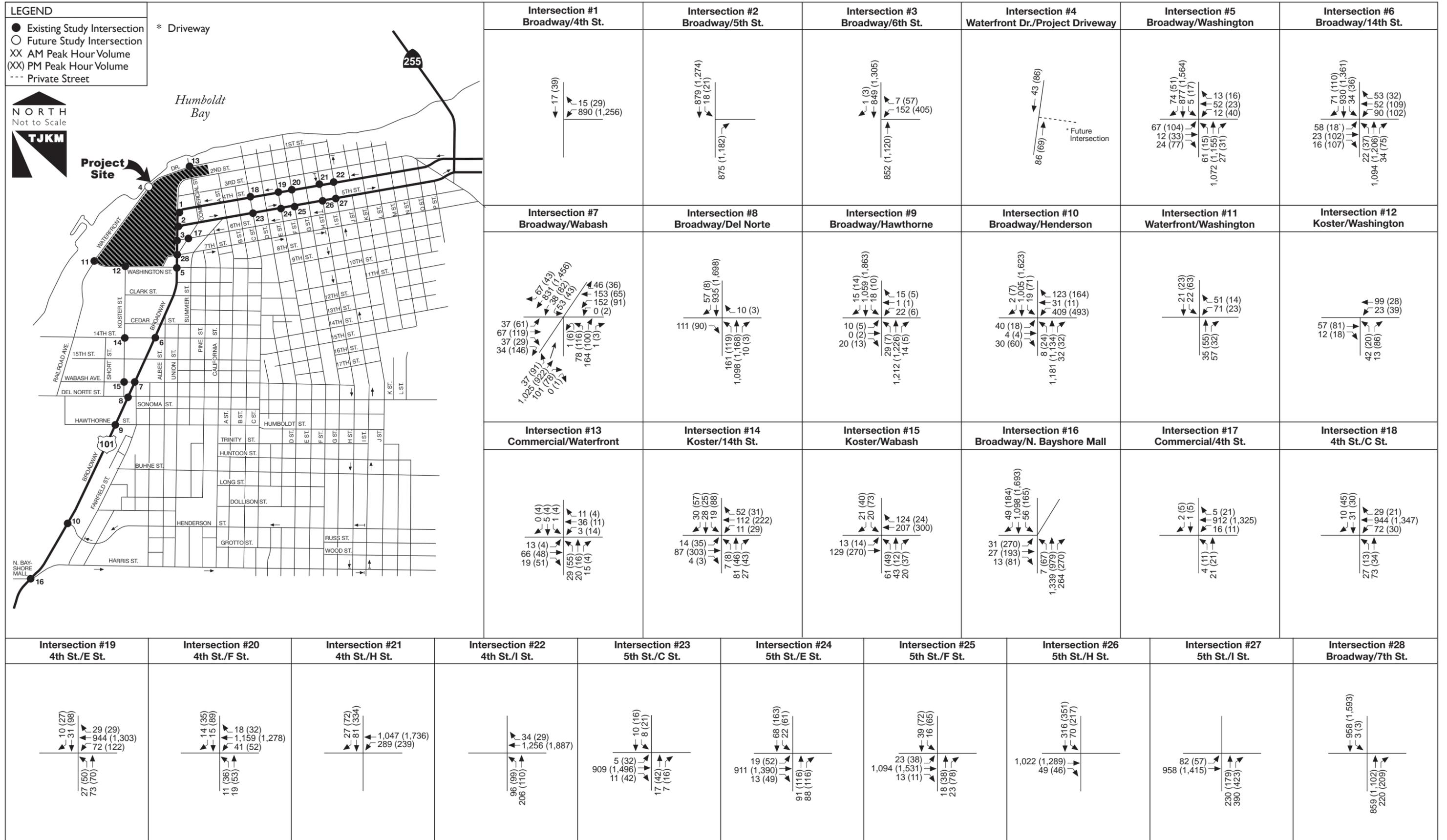
Traffic counts at the study intersections were extrapolated to the expected opening in 2010 because the project will not be open in 2007. Between now and 2010, traffic growth without Marina Center is expected to be six percent over existing volumes. The Baseline 2010 Conditions street network remains the same as the Existing Conditions. Figure 9 shows the resulting traffic volumes for Baseline 2010 Conditions.

Results of the Level of Service Analysis

Without the project, one signalized study intersection is expected to operate at unacceptable service levels, Broadway and Henderson. Without the project four unsignalized study intersections are also expected to operate at LOS F (Fourth and Broadway, Broadway and Hawthorne, and Fourth and Fifth Streets at 'C' Street). The results of the LOS analysis with and without the project are summarized in Table IV in the next chapter. The Baseline 2010 + Project Conditions scenario describes the required mitigations.

Detailed LOS calculations for Baseline 2010 Conditions are provided in Appendix D.

City of Eureka – Balloon Track Development
 Baseline 2010 Turning Movement Volumes



Baseline 2010 + Project Conditions

The Balloon Track mixed-use development project, to be named Marina Center, offers several benefits for traffic circulation and conditions along with the potential for negative traffic impacts. The project includes a revision of circulation and access for Broadway between Washington Street and Second Street. Project traffic is divided between three main access points: Broadway at Fourth Street and at Sixth Street and Waterfront Drive at Fourth Street (new street extended through the project) near the marina. The access drive west from Sixth and Broadway will be offset approximately 75 feet to the south of the westbound Sixth Street approach east of Broadway. A more detailed concept plan for Broadway at Sixth Street is shown in Appendix K. Other project access is proposed at Broadway and Third Street, Broadway and Second Street, and Waterfront Drive and Commercial Street.

The new Broadway and Fourth Street signal will provide for protected pedestrian crossings of the heavy Fourth Street to Broadway traffic. All these access drives provide for pedestrian and bicycle access into and through the Marina Center site to Waterfront Drive at the Fourth Street Extension. The offsite mitigation of project impacts also results in several intersections operating better with the project than without the project.

Northbound traffic on Broadway wishing to enter at Third Street or Fourth Street, or at Commercial and Second Street will turn east onto Fifth Street from Broadway, then left onto Commercial to the new signal at Fourth Street, then left on Fourth Street westbound to the new signal at Broadway and Fourth Street or right onto Broadway again to Third Street. Traffic entering the project at Second Street can simply stay on Commercial. Fourth Street continues as a private street through the Marina Center project to intersect Waterfront Drive. Figure 12 shows changes to Broadway between Washington Street and Second Street with the project. Appendix K provides conceptual plans on aerial photos showing these changes as well as details for the recommended offsite mitigation measures to be implemented by the time the project opens. Offsite mitigation is described in later chapters of this report. Signal warrant analysis is contained in Appendix N for the proposed signals on Broadway and for Fourth Street and Commercial.

The extension of existing streets of the downtown street grid through the Balloon Track also reduces the site as a barrier between downtown and the waterfront and marina. Both Second and Fourth Streets will be extended west of Broadway as private streets, and will provide for both pedestrian and bicycle access and circulation along with vehicular access and circulation. The extension of Fourth Street to intersect Waterfront Drive across from the marina just north of the Wharfinger Building provides direct access to the waterfront. The project includes construction of the planned Class I bike trail along the east side of Waterfront Drive.

Project Trip Generation

The trip generation analysis for this project is more complex than for single-use development proposals. The retail components will attract some traffic already passing by the site along Broadway. Likewise, the combination of industrial, commercial, residential and retail on site will also result in a limited proportion of trips generated by the uses to begin and end entirely within the site. These are “captured trips” in that they will not be using public streets nor contribute to traffic impacts at the study intersections. Detailed calculations for captured trips are in Appendix G.

Table III shows the trip generation analysis for the proposed development of the Balloon Track. For an entire weekday the project is expected to result in an additional 15,669 vehicle trips. A “trip” is defined as having an origin and a destination, and is not a round trip. Therefore, the project will generate an estimated 7,834 round trips daily on weekdays. Trip generation for the weekend will be lower at most of the uses, and higher at Home Depot and additional retail uses. Because traffic volumes at the study intersections are lower on weekends (includes project trips), the analysis concerns itself only with project impacts on normal, weekday commuter traffic peaks in the morning and evening. The project is estimated to generate 792 new trips in the a.m. peak hour (534 inbound and 257 outbound), and 1,370 trips in the p.m. peak hour (575 inbound and 795 outbound). The actual number of trips in and out of project driveways will be higher, but these are not all “new trips.” Deductions to the total trip generation are made to account for the pass-by trips that are already on the public street system, and for trips made entirely within the site that do not use the public street system. Home Depot supplied the planned truck operations and is noted in the references at the end of the report. The planned truck operations would be 20 to 24 truck trips per week.

All trip generation calculations are made consistent with the Institute of Transportation Engineers standard reference, *Trip Generation, 7th Edition* along with the *Trip Generation Handbook* used for the calculation of pass-by and captured trips. The standard pass-by percentage of 48 percent for Home Depot in the p.m. peak hour (*Trip Generation Handbook, 2nd Edition*) was reduced to 25 percent to estimate a “worst case” analysis.

Table III: Project Trip Generation

Land Use	ITE Code	Size	Daily		A.M. Peak Hour			P.M. Peak Hour				
			Rate	Trips	Rate	In	Out	Total	Rate	In	Out	Total
Industrial (Industrial Park)	130	70 ksf	25.73	1,801	1.3	75	16	91	1.94	29	107	136
Anchor I (Home Improvement Superstore) + Nurseries (Garden Center)	862	152.7 ksf	28.26	4,315	1.2	99	84	183	2.45	176	198	374
Additional truck trips in Passenger Car Equivalents (PCE) ¹						5	5	10		5	5	10
Discount for Pass By trips (-5% for A.M., -25% for P.M. and -10% for daily trips) ²				-432		-5	-4	-9		-44	-50	-94
Discount for Captured trips (-5% for daily trips and -15% for P.M. trips) ³				-216						-26	-30	-56
Retail/Service (shopping center)	820	160 ksf	57.95	9,272	1.31	128	82	210	5.37	412	447	859
Discount for Pass By trips (-10% for daily and P.M. trips) ²				-927						-41	-45	-86
Discount for Captured trips (-15% for daily and P.M. trips) ³				-1391						-62	-67	-129
Office (Westside Office Park)	750	80 ksf	14.35	1,148	2.15	153	19	172	2.23	25	153	178
Discount for Captured trips (-15% for P.M. only) ³										-4	-23	-27
Office (Northside Office Park)	750	24 ksf	14.35	344	2.15	46	6	52	2.23	7	46	54
Discount for Captured trips (-15% for P.M. only) ³										-1	-7	-8
Restaurant (Quality Restaurant)	931	12.5 ksf	89.95	1,124	0.81	8	2	10	7.49	63	31	94
Discount for Captured trips (-15% for daily and P.M. trips) ³				-169						-9	-5	-14
Museum ⁴	N/A	12 ksf	N/A	400	N/A	20	20	40	N/A	20	20	40
Multi Family Residential (Condominiums / Townhouses)	230	54 du	7.36	397	0.62	6	28	33	0.71	26	13	38
Total		511.2 ksf*		15,669⁵		534	257	792		575	795	1370

Notes: DU – Dwelling Unit; KSF – 1,000 square feet; N/A – Not Available *Total developed area not including dwelling units

¹ For Home Improvement Superstore, 20 – 24 truck trips/week are expected. Thus, during a weekday peak hour a maximum of 2 inbound and 2 outbound truck trips are expected.

¹ A Passenger Car Equivalent (PCE) of 2.5 passenger cars per truck is assumed. 2 trucks/peak hour = 2 X 2.5 passenger cars = 5 passenger cars/hour

² Discount for Pass-By Trips (AM Peak): Home Improvement Superstore (5 percent)

² Discount for Pass-By Trips (PM Peak): Home Improvement Superstore (25 percent) and Retail (10 percent)

³ Discount for Captured Trips (PM Peak): Home Improvement Superstore (15 percent), Quality Restaurant (15 percent) and Retail (15 percent), Office Park (15 percent)

⁴ There are no museum trip generation rate estimates in the ITE Trip Generation or other reliable sources. Trips are estimated using parking spaces. The trip rates shown on the table are conservatively estimated on the basis of parking requirements provision (i.e. 20 spaces).

⁵Rounding causes actual total of 15,669 to only add to 15,666 in the table.

Project Trip Distribution

The Humboldt County countywide travel model was made available for use in estimating project traffic distribution and assignment to study intersections. However, from August 2005 through April 2007, the travel model was not available, so earlier analyses in working versions of this report were based upon a surrogate origin-destination study of the Costco store west of Broadway on Wabash. A comparison of the two traffic-estimating methods is included in Appendix H.

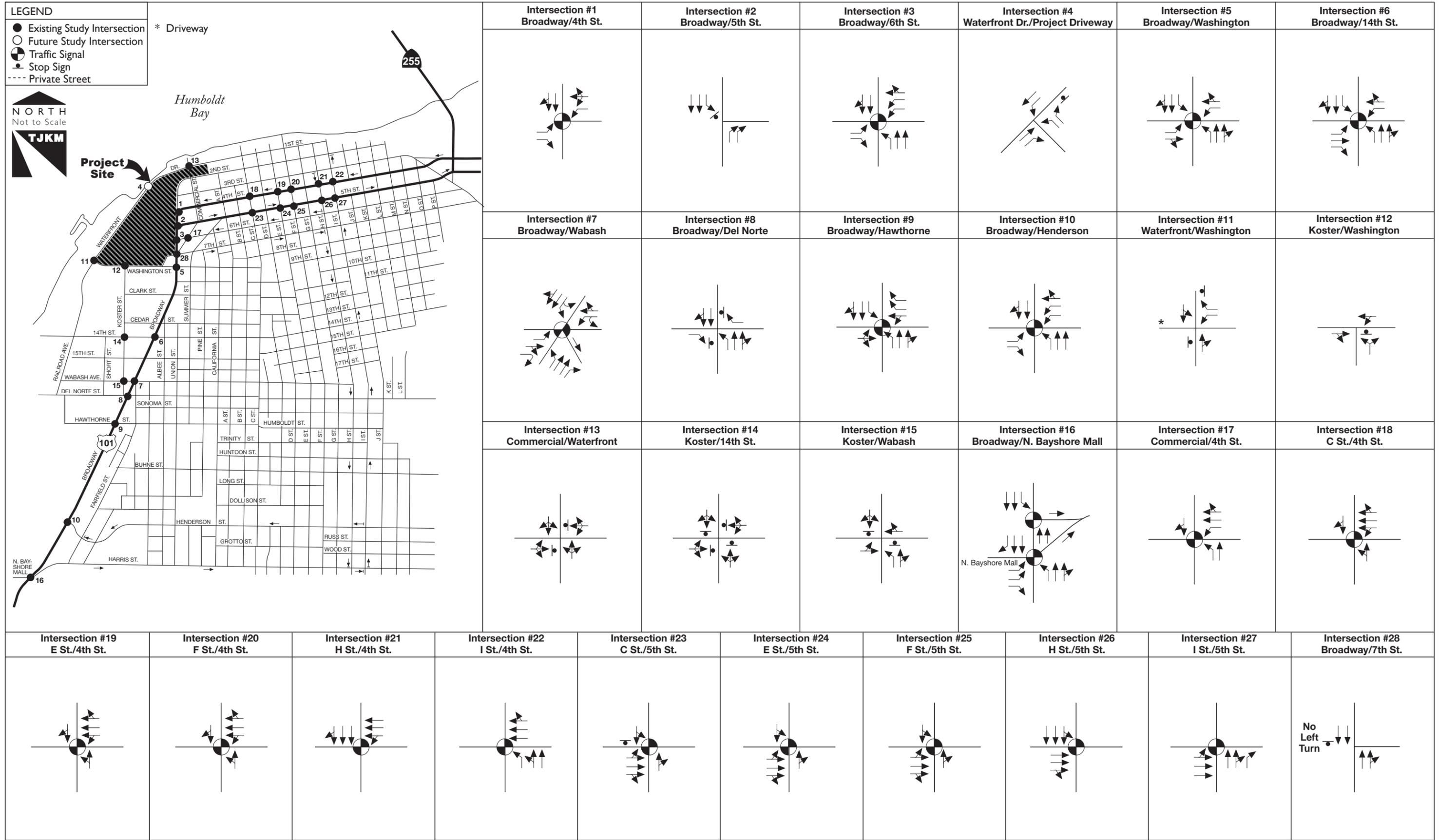
The 2005 “Existing Conditions” version of the model was used in this analysis. Prior to use, the model was calibrated to the manual turn counts at the 27 existing study intersections of this traffic impact study. That is, the model origins and destinations were adjusted so that model volume estimates of turns and link volumes closely replicates the 2006 traffic volumes in this study. Details of this procedure are included in Appendix H, “Trip Distribution Methodology.” Appendix H also contains the comparison of the Costco origin-destination study with the model estimates of project trip distribution. Additional adjustments of the model parameters were made, primarily speeds on minor downtown streets such as Second and Third Streets, so that the origin-destination survey results were comparable with the model estimates of trips leaving Costco. In this traffic report, the model trip distribution and assignment was used for the Baseline 2010 + Project scenario, and not the Costco survey.

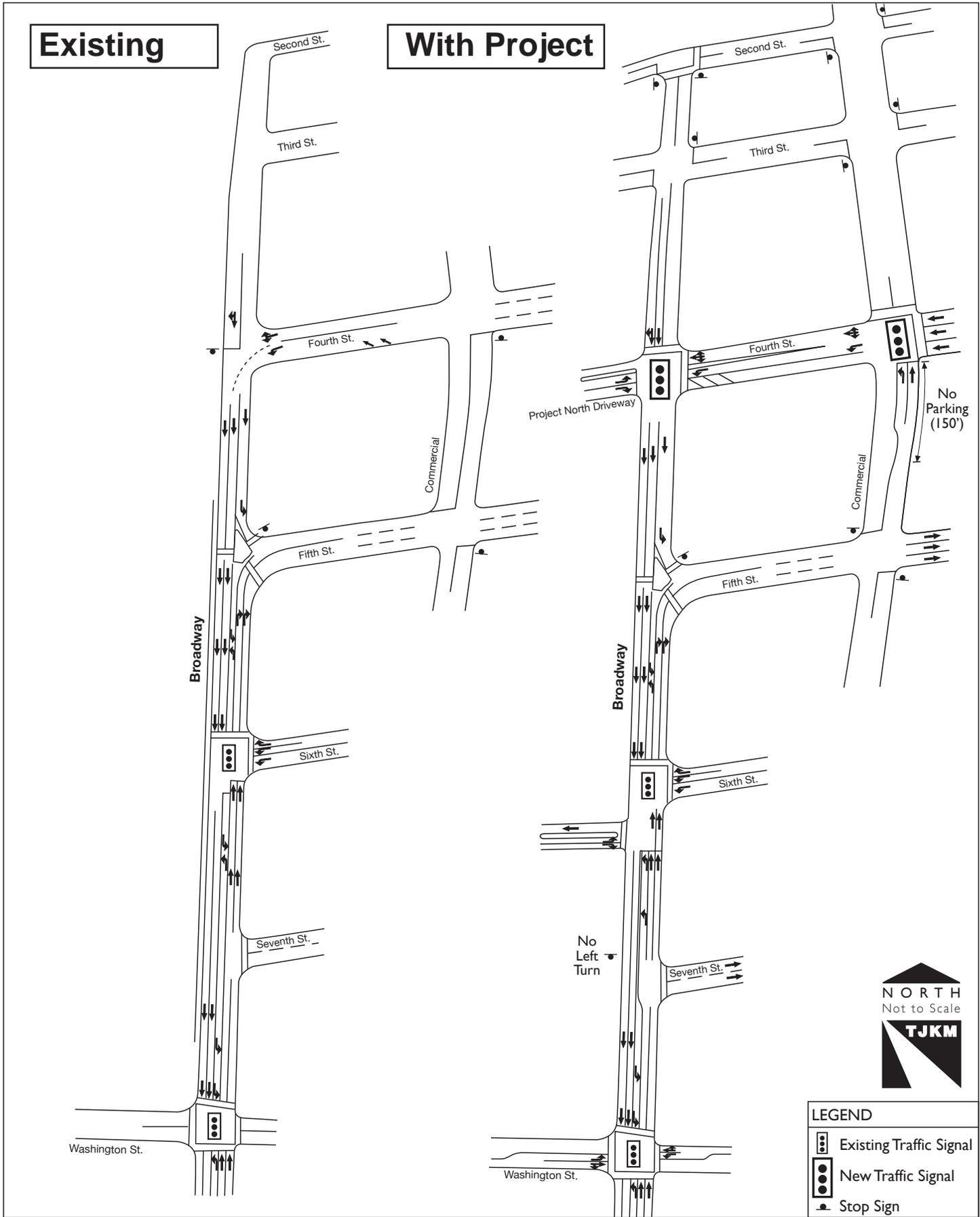
The trip generation for the project in Table III was converted to trip generation parameters used in the model for direct modeling use. The standard four-step demand modeling process was used to generate, distribute and assign project trips to the study intersections. Generally, the model fairly estimates the distribution of Costco trips except that the model assigns fewer outbound trips to Fifth Street and more to Seventh Street (but the total trips for the two streets are almost identical), and fewer trips to Fairfield and more to Wabash than in the survey. Project trip assignments to study intersections are also shown in Appendix H. Figure 10 represents the resulting Baseline 2010 + Project volumes.

The project trips were assigned to a “mitigated network.” That is, the project contributes enough trips to some study intersections to the extent that the total trips exceed the capacity of the intersection. Because the project would not be approved without mitigation, certain changes were made in the network, so that a direct addition of project trips to 2010 Baseline volumes is not always correct. For example, northbound Fairfield traffic (not just project traffic) is restricted north of Del Norte, and rather, is diverted west on Hawthorne to Broadway, and then north to Wabash. Appendix E has information regarding the assignment of project trips to an unmitigated network for both the a.m. and p.m. peak hours.

Beyond traffic at the study intersections, there was also an analysis of which access points would be used by drivers coming to and leaving Marina Center. The basis for this was the trip generation for the individual uses and their location, parking supply, and the geographic distribution of trips. These calculations allowed detailed estimates of project traffic at each access point. Figure 11 shows the assumptions for the revisions to the roadway network for level of service analysis for offsite mitigation. Because the revisions to Broadway between Washington Street and Second Street are extensive, Figures 12 and 13 describe the detailed lane geometry and traffic controls from Fourth Street and Commercial to Broadway, and then south to Harris and the north Bayshore Mall driveway on Broadway.

City of Eureka – Balloon Track Development
 Baseline 2010 + Project Lane Configurations and Traffic Controls



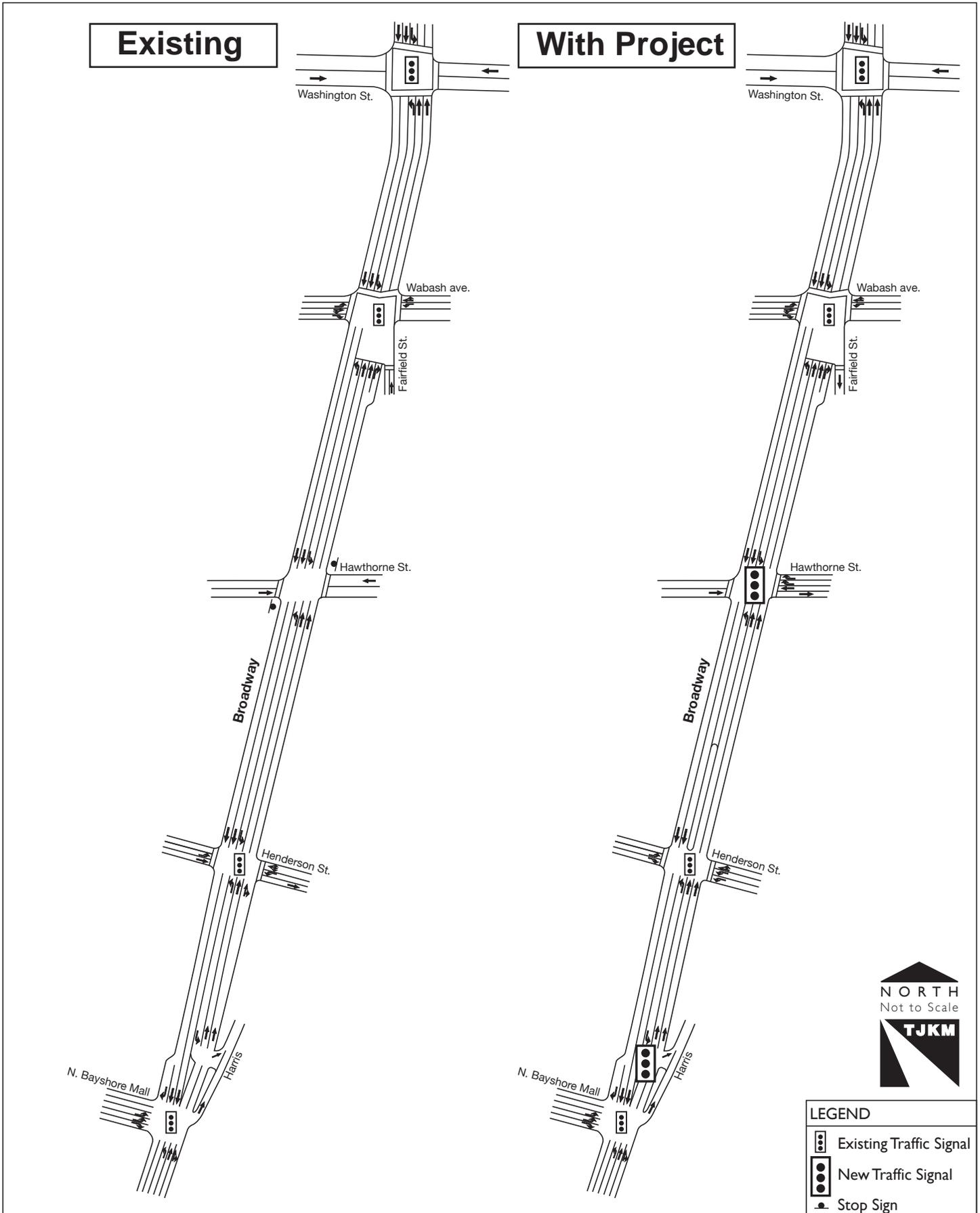


Existing

With Project



LEGEND	
	Existing Traffic Signal
	New Traffic Signal
	Stop Sign



Results of the Level of Service Analysis

With the project, two additional intersections along Broadway will be signalized: Broadway at Fourth Street and Broadway at Hawthorne. Another signalized intersection is created at Fourth Street and Commercial. Project access from northbound Broadway will be via a right turn to eastbound Fifth Street, a left turn to northbound Commercial to the signal at Fourth Street, then left onto westbound Fourth Street to Marina Center. The existing signal at Broadway and Sixth Street will be modified to include access to the west into Marina Center. This will result in an offset intersection with the west and east legs not lining up, but the detailed analysis of traffic operations indicates that the modified intersection will perform acceptably at LOS D. One new intersection is also created at Waterfront Drive and the extension of Fourth Street. As a private road within the project, Fourth Street will stop at Waterfront Drive. The results of the LOS analysis with and without the project are summarized in Table IV. The LOS worksheets for Baseline 2010 + Project Conditions are in Appendix E.

The analysis of project traffic added to the non-mitigated network is also contained in Appendix E. One signalized intersection is already at an unacceptable level of service (Broadway and Henderson), and another four unsignalized intersections are at LOS F. Clearly, project traffic cannot be added to these intersections without mitigation. LOS worksheets for the unmitigated scenario are contained in Appendix E. Because this is an entirely unrealistic scenario, it is not included in the body of this report. With the project and no mitigation, two signalized intersections would operate at LOS E (Broadway and Wabash-Fairfield, and Broadway and Henderson, both in the p.m. peak), and six unsignalized intersections would also operate at LOS E or F (Broadway and Fourth, Broadway and the southern driveway to Marina Center, Broadway and Hawthorne, Wabash and Koster, Fourth and 'C' and Fifth and 'C'). Warranted signals mitigate all but three of these intersections, Fourth and Fifth at C Street and Wabash and Koster where no feasible mitigation has been determined. Warranted signals due to the project are at Broadway and Fourth, Broadway and Sixth, and Broadway and Hawthorne. Signals are not warranted at Fourth and 'C' Street, and at Fifth and 'C' Street. However, a systems warrant could be considered for the installation of signals at the 'C' Street intersections because of the poor LOS.

A more detailed analysis of growth in traffic is contained in Appendix L. With the project plus offsite mitigation, none of the signalized study intersections is expected to operate with unacceptable levels of service. There appears to be no feasible mitigation for the LOS E for southbound left turns at Koster and Wabash. Striping a left turn lane results in continued LOS E for these turns but does reduce delay for drivers turning right. A signal is not warranted, and in any case would be too close to the complex intersection of Broadway and Wabash-Fairfield to operate acceptably. Another unsignalized intersection would operate at unacceptable levels of service: Broadway and Seventh Street, but the project mitigation includes prohibition of southbound left turns because of the need to provide for a northbound left turn into the project at Sixth Street. There is insufficient room to accommodate both of these turning lanes, and in any case, the LOS of F for southbound left turns at Seventh is unacceptable even without the project. There are only a few turns made in either the a.m. or p.m. peak hours.

The redirection of these left turns to the signalized left turns for southbound Broadway at Washington Street is feasible, but a raised median will be needed to ensure there are no southbound left turns at Seventh Street. Project traffic greatly increases the demand for these left turns, so mitigation is required. The left turns diverted to Washington Street may turn left, and then left again onto Summer one block east, then right onto eastbound Seventh to continue their trip. The shift of 21 a.m. and 67 p.m. southbound left turns from the project to Washington from

Seventh Street changes the p.m. peak hour volumes at Washington, but the mitigation for Washington Street easily accommodates the change with p.m. peak LOS remaining at B. With no conflicts at Seventh Street, that intersection will operate at LOS A with no delay.

Because the project will result in several study intersections with closely-spaced signals, micro-simulation modeling was also employed to further evaluate operations without and with the project. Table V summarizes the results of micro-simulation modeling for the a.m. and p.m. peak hours without and with the project. It shows that average traffic speeds in the a.m. peak hour are not significantly impacted. Overall, in the a.m. peak with the project in 2010, the average speed on US 101 from 'I' Street in downtown through Bayshore Mall will drop from the current 26.3 mph to 21.6 mph with the project. The increased travel time for either direction is approximately one minute 19 seconds. In the a.m. peak hour without the project, the increased travel time over the same distance is about 59 seconds.

In the p.m. peak hour, the project traffic along with the recommended mitigation results in slightly worse operations with the project than without in 2010. The project results in an increase of about eight percent additional traffic over 2010 without the project on Broadway. Along the frontage of the project on Broadway, in 2010 there is a reduction in average speeds from 13 mph to about 10 mph from Fourth to Washington in the p.m. peak. However, the mitigation results in the ability to maintain 2010 operations overall on Broadway over Baseline 2010 Conditions. Overall, for both directions on US 101 (Broadway, Fourth and Fifth Streets) with the project, average speeds will be reduced from today's 21.2 mph to 18.5 mph. Without the project in 2010, the six percent growth in traffic will result in a drop from 21.2 mph today to 20.1 mph. The mitigation is capable of maintaining acceptable operations on US 101 through Eureka, though with the project, speeds will be lower than without the project.

With the project in the p.m. peak hour, travel time southbound will increase from the current 7 minutes 55 seconds to 8 minutes 48 seconds between Fourth and I Street to Broadway at Bayshore, a 53 second increase, and from 6 minutes 46 seconds today to 8 minutes 11 seconds northbound over the same distance, an increase of one minute 25 seconds. Without the project southbound travel times would increase to 8 minutes 34 seconds (an increase of about 40 seconds), and northbound times would be the same as today (this is the lighter direction of traffic volumes in the p.m. peak).

The key improvements contributing to maintaining acceptable operations include eliminating the major bottlenecks on Broadway at Wabash-Fairfield and at Henderson.

There are additional aspects of improvements to traffic completed as part of the project. On Broadway from Fourth Street to Washington Street, signals are spaced at approximately 600-foot intervals. Likewise, the mitigation of Broadway at Wabash-Fairfield involves the installation of a new signal at Broadway and Hawthorne, only 1,000 feet south of Wabash. The obvious question is how well the entire system of signalized intersections will operate so that traffic from one intersection does not back up through upstream intersections.

The analysis of system operations in this study includes the overall coordination and synchronization of traffic signals along US 101 in Eureka from 'I' Street to Bayshore Mall. The micro-simulation model closely estimates existing traffic performance in terms of average speeds through a series of signals, the number of stops in each direction through these same signals, and other performance measures. Appendix B provides additional details regarding the micro-

simulation model used for the operations analysis of Highway 101. Detailed results from the micro-simulation model are in Table V. Table V clearly illustrates the effects of both Baseline 2010 and Baseline 2010 + Project traffic over existing conditions. There are several specialized performance measures in Table V that are explained below.

The first performance measure is “vehicle miles of travel,” usually abbreviated as VMT. This is an excellent comparative measure of the magnitude of traffic demand. One vehicle traveling for one mile is one vehicle mile of travel. From Existing Conditions, Baseline 2010 Conditions show an increase in traffic of 9 percent in the a.m. peak, and 5 percent in the p.m. peak on US 101 through Eureka. Adding the Marina Center project increases Baseline 2010 traffic again by 6 percent in the a.m. peak and by 14 percent in the p.m. peak. The overall increase in traffic on US 101 with Baseline 2010 + Project Conditions is 15 percent in the a.m. peak and 20 percent in the p.m. peak.

Another primary measure of system performance in Table V is vehicle hours of travel (VHT). For example, if it takes ten minutes for one car to travel from ‘I’ Street downtown to Bayshore Mall, it would take six cars traveling this distance to constitute one vehicle hour of travel. The faster the trip can be made, the faster the speed. In some instances, with traffic improvements it is possible to reduce vehicle hours of travel even as total traffic (VMT) climbs. Dividing VMT by VHT results in a direct estimate of speed in terms of miles per hour. These performance measures are provided in Table V.

Full project access to Broadway is generally accommodated within acceptable level of service criteria established by Caltrans for US 101 both in terms of intersection LOS as well as urban arterial LOS. With urban arterial LOS, the criterion is speed. With 30 mph speed limits, the minimum average speed on Broadway is 9 mph or above using this criterion. Table V shows that all segments of Broadway will operate at speeds greater than 9 mph excepting southbound Broadway from Fourth through Washington in the p.m. peak. Overall, US 101 through all study intersections will have an average speed of 21.6 mph in the a.m. peak and 18.5 mph in the p.m. peak compared with 22.6 mph (a.m. peak) and 20.1 mph (p.m. peak) on Broadway without the project in 2010. In short, the offsite mitigation improvements work to maintain adequate average speeds on US 101 and offset the impacts of the project.

Table IV: Levels of Service Summary – Baseline 2010 without and with Project Conditions

ID	Signalized Intersection	Baseline 2010 Without Project				Baseline 2010 With Project			
		A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Broadway and Fourth Street	<120.0	F	>120.0	F	6	A	16.1	B
3	Broadway and Sixth Street	7.8	A	13.4	B	15.6	B	38.4	D
5	Broadway and Washington	13.7	B	18.9	B	5.5	A	12.6	B
6	Broadway and 14 th Street	12.7	B	23.3	C	10.9	B	18.7	B
7	Broadway and Wabash-Fairfield	48.6	D	51.2	D	22	C	25.8	C
10	Broadway and Henderson	72.8	E	36.5	D	13.5	B	16	B
16	Broadway and Harris/Bayshore	4.6	A	20.1	C	3.9	A	22.4	C
19	Fourth Street and 'E' Street	5	A	8.1	A	5	A	8.4	A
20	Fourth Street and 'F' Street	5.2	A	5.6	A	2.7	A	9.6	A
21	Fourth Street and 'H' Street	4.9	A	7.7	A	4.5	A	12.7	B
22	Fourth Street and 'I' Street	12.2	B	10.9	B	9.5	A	11.9	B
24	Fifth Street and 'E' Street	11	B	19.2	B	9.1	A	16.9	B
25	Fifth Street and 'F' Street	6.5	A	8	A	4.9	A	9.9	A
26	Fifth Street and 'H' Street	10.9	B	8.9	A	9.4	A	10.6	B
27	Fifth Street and 'I' Street	10.7	B	16.8	B	22.4	C	25.4	C

Table continued next page

Table IV (Continued): Levels of Service Summary - Baseline 2010 without and with Project Conditions

ID	Unsignalized Intersection	Baseline 2010 Without Project				Baseline 2010 With Project			
		A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
2	Broadway and Fifth Street	12.2	B	14.6	B	11.7	B	22.1	C
4	Waterfront Drive/Fourth Street (Project)	-	-	-	-	11.6	B	17.3	C
8	Broadway and Del Norte	14.6	B	13.8	B	13.2	B	16.4	C
9	Broadway and Hawthorne	>120.0	F	>120.0	F	-	-	-	-
	Mitigation: Traffic Signal	-	-	-	-	9.4	A	7.8	A
11	Washington and Waterfront	11.8	B	11	B	11.7	B	17.7	C
12	Washington and Koster	10.1	B	9.9	A	10.7	B	11.6	B
13	Waterfront and Commercial	10.4	B	11	B	9.1	A	9.6	A
14	Koster and 14th Street	9.7	A	16.5	C	10	A	20.6	C
15	Wabash and Koster	14.4	B	22.3	C	15.6	C	45.3	E
17	Commercial and Fourth Street*	21.3	C	35.3	E	5.3	A	15.2	B
18	Fourth Street and 'C' Street	32.6	D	73	F	42.5	E	>120.0	F
	Mitigation: Traffic signal	-	-	-	-	3.8	A	5.5	A
23	Fifth Street and 'C' Street	28.2	D	87.5	F	33.3	D	>120.0	F

Notes: X.X = Average Intersection Delay in seconds per vehicle (Signalized)
Average Delay in seconds per vehicle for the worst approach (Unsignalized) *Commercial/Fourth unsignalized in Baseline

Table V: A.M. & P.M. Peak Hour Micro-Simulation Results

Section	Street	Dir	Intrscn	Existing a.m. peak			Baseline a.m. Peak			Mitigated			Exist/	Baseline/
				VMT	VHT	Stops/Veh	VMT	VHT	Stops/Veh	VMT	VHT	Stops/Veh	Baseline	Project
Downtown	4th	WB	H	65.6	3.2	0.08	71.3	3.6	0.1	84.9	4	0.1		
			F	112.6	4.5	0.06	123	4.9	0.06	146.1	5.4	0.04		
			E	53.7	2.1	0.01	58.9	2.4	0.02	70.8	2.7	0.03		
	5th	EB	C	96.7	3.4	0.05	106.7	3.7	0.05	132.4	5.9	0.26		
			Broadway	126.5	4.8	0.03	140.2	5.4	0.04	299.8	13.1	0.5		
			C	205	7.3	0.03	217.7	0.07	0.1	310.5	12.6	0.29		
			E	92.8	4.6	0.12	100	5.1	0.39	112.6	6	0.33		
			F	59	2.9	0.11	62.7	3.1	0.11	70.4	3.6	0.15		
			H	106	4	0.03	111.5	4.2	0.02	120.2	4.8	0.05		
			I	60.9	2.6	0.05	63.8	2.7	0.06	70.3	3.4	0.12		
totals				978.8	39.4	0.57	1055.8	35.17	0.95	1418	61.5	1.87	107.9%	134.3%
Avg Spd														
		WB	4th										98.9%	94.4%
		EB	5th										149.7%	61.4%
Balloon	Broadway	SB	5th	52.1	2.2	0	56.7	2.4	0	61.6	3.5	0.13		
			6th	27.4	1.7	0.23	30.6	2.1	0.25	77.3	4.7	0.17		
			7th	48.9	1.9	0	54.5	2.2	0	46.7	2.3	0.05		
		NB	Wshgtn	46.8	3.5	0.37	52.2	4.2	0.39	51.1	2.9	0.16		
			7th	41.4	1.9	0.01	44.2	2.1	0.01	47.8	2.8	0.15		
			6th	47.1	2.6	0.26	50.6	3	0.29	53.1	5.7	0.4		
			5th	15.6	1.2	0.03	16.8	1.3	0.04	14.7	1.4	0.1		
totals			279.3	15	0.9	305.6	17.3	0.98	352.3	23.3	1.16	109.4%	115.3%	
Avg Spd														
		SB											94.5%	99.2%
		NB											95.5%	67.0%
Wsh-Wbsh	Broadway	SB	14th	260.7	11	0.42	270.2	12	0.39	257.6	7.21	0.31		
			Wabash	167.5	12.5	0.62	177.1	14.7	0.72	181	10.5	0.43		
		NB	14th	210.1	8.8	0.37	230.8	12	0.35	232	12.4	0.31		
			Wshgtn	330.3	10	0.37	344.2	15	0.34	365.3	15.3	0.2		
totals			968.6	42.3	1.78	1022.3	53.7	1.8	1035.9	45.41	1.25	105.5%	101.3%	
Avg Spd														
		SB											91.9%	147.8%
		NB											74.1%	61.9%
s/o Wabash	Broadway	SB	Del Norte	51	2.1	0	60.4	2.7	0	66.4	2.7	0		
			Hawthorne	103.6	2.7	0	119.6	4	0	127.3	6.1	0.23		
			Hndrson	370.9	11.2	0.29	428.5	17.4	0.39	478.0	15.2	0.29		
		NB	Byshore	368.6	10.5	0.09	412.4	15.2	0.17	464.3	18.6	0.35		
			Hndrson	421.9	12.9	0.33	454.7	20.7	0.44	481	18.3	0.16		
			Hawthorne	522	14.3	0	566.3	20.1	0	478.9	21.7	0.4		
			Del Norte	126.9	4.6	0.09	135.9	6.9	0.23	152.5	6.6	0.06		
			Wabash	51.5	6.4	0.62	55.1	10.8	0.61	64	7.3	0.5		
totals			2016.4	64.7	0.38	2232.9	97.8	0.56	2312.4	96.5	1.99	110.7%	103.6%	
Avg Spd														
		SB											77.0%	102.7%
		NB											70.5%	105.3%
Grand Totals	Hwy 101	SB		Existing a.m. peak			Baseline a.m. Peak			Baseline + Project a.m. peak			Exist/	Baseline/
				VMT	VHT	Stops	VMT	VHT	Stops	VMT	VHT	Stops	Baseline	Project
				1952.6	77.3	2.25	2162.3	96.9	2.58	2545.3	104.81	3.05	110.7%	117.7%
	NB		2290.5	84.1	2.42	2454.3	107.07	2.99	2341.3	121.9	3.22	107.2%	95.4%	
	Both		4243.1	161.4	4.67	4616.6	203.97	5.57	4886.6	226.71	6.27	108.8%	105.8%	
	Avg Spd													
		SB											88%	109%
		NB											84%	84%
		Both											86%	95%

Table continued next page

Table V: A.M. & P.M. Peak Hour Micro-Simulation Results (Continued)

Section	Street	Dir	Intrscn	Existing p.m. peak			Baseline p.m. Peak			Mitigated Baseline + Project p.m. peak			Exist/ Baseline VMT	Baseline/ Project VMT			
				VMT	VHT	Stops/Veh	VMT	VHT	Stops/Veh	VMT	VHT	Stops/Veh					
Downtown	4th	WB	H	113.9	5.5	0.07	117.5	5.8	0.07	132.4	7.1	0.12					
			F	167.4	6.2	0.02	173	6.4	0.02	197.7	8	0.1					
			E	68.3	3	0.07	70.3	3.1	0.07	84.4	3.7	0.07					
			C	146.9	5.4	0.07	150.1	5.4	0.06	182.4	8.8	0.3					
	5th	EB	Broadway	195.9	8.1	0.09	200	8.2	0.07	413.6	42.2	1.38					
			C	337.7	12.5	0.08	357.9	13.4	0.08	469.2	21	0.41					
			E	148.2	7.6	0.34	156.8	8.3	0.36	201.4	9.4	0.13					
			F	87.2	3.9	0.07	92.5	4.1	0.07	117.4	5.5	0.07					
			H	146.6	6	0.09	156.6	6.4	0.09	186.2	9	0.14					
	totals	Avg Spd	WB EB	4th	1499.6	62.1	1	1568.9	65.5	1	2096.7	122	2.95	104.6%	133.6%		
				5th		24.6		24.6		14.5		100.2%	58.9%				
					23.8		23.4		20.8		98.5%	88.8%					
Balloon	Broadway	SB	5th	79.2	3.6	0	38.5	1.4	0	90.8	12.2	0.46					
			6th	42.3	3.7	0.28	43.7	4.2	0.31	76.6	18.3	0.45					
			7th	78.7	3.4	0.03	81.3	3.8	0.05	80.7	5.3	0.09					
		NB	Wshgtn	67.9	8.8	0.3	70.5	13	0.3	93.3	5.7	0.14					
			7th	50	2.3	0.01	53	2.5	0.01	61.8	4.6	0.24					
			6th	61	3.9	0.27	64.8	4.2	0.26	68.8	7.1	0.34					
			5th	18.8	1.6	0.04	20.2	1.7	0.05	21.1	2.1	0.1					
totals	Avg Spd	SB NB		397.9	27.3	0.93	372	30.8	0.98	493.1	55.3	1.82	93.5%	132.6%			
					13.7		10.4		8.2		76.0%	78.7%					
					16.6		16.4		11.0		98.7%	66.9%					
Wsh-Wbsh	Broadway	SB	14th	447.9	24.6	0.52	461.6	26.3	0.51	488.6	24.7	0.37					
			Wabash	262.4	32.9	0.94	270.8	39.4	1.01	296.6	19	0.4					
		NB	14th	206.8	11.9	0.41	220.6	13.5	0.44	231.9	10.8	0.17					
			Wshgtn	357.4	15.3	0.26	385	17.2	0.3	417.5	20.3	0.46					
				1274.5	84.7	2.13	1338	96.4	2.26	1434.6	74.8	1.4	105.0%	107.2%			
totals	Avg Spd	SB NB			12.4		11.1		18.0		90.2%	161.2%					
					20.7		19.7		20.9		95.1%	105.9%					
s/o Wabash	Broadway	SB	Del Norte	107	4.6	0	111.9	4.9	0	118	5.2	0.01					
			Hawthorne	213.4	6.3	0	223.2	6.6	0	226.5	11.2	0.19					
			Hndrson	731.9	27.5	0.44	769	30.8	0.5	811.0	23.2	0.37					
			Byshore	620.5	24.7	0.45	656.8	27.1	0.48	725.7	29.8	0.41					
		NB	Hndrson	378.1	15.5	0.52	417	16.9	0.53	465.1	15.3	0.24					
			Hawthorne	518.9	14.3	0	571.1	16.1	0	492.2	25.7	0.46					
			Del Norte	129.3	4.5	0.07	140.1	6.2	0.15	159.5	11.5	0.21					
			Wabash	53.6	7.6	0.54	58.7	8.6	0.5	61.1	9.5	0.42					
			totals	Avg Spd	SB NB		2752.7	105	2.02	2947.8	117.2	2.16	3059.1	131.4	2.31	107.1%	103.8%
								26.5		25.4		27.1		95.7%	106.8%		
								25.8		24.8		19.0		96.3%	76.5%		
Grand Totals	Hwy 101	SB NB Both		Existing p.m. peak			Baseline p.m. Peak			Baseline + Project p.m. peak			Exist/ Baseline VMT	Baseline/ Project VMT			
				VMT	VHT	Stops	VMT	VHT	Stops	VMT	VHT	Stops					
				3343.6	168.3	3.3	3438.2	186.4	3.5	4018.3	224.4	4.86	102.8%	116.9%			
				2581.1	110.8	2.8	2788.5	123.5	3.0	3065.2	159.1	3.62	108.0%	109.9%			
				5924.7	279.1	6.1	6226.7	309.9	6.4	7083.5	383.5	8.48	105.1%	113.8%			
Avg Spd	SB NB Both			19.9		18.4		17.9		93%	97%						
				23.3		22.6		19.3		97%	85%						
				21.2		20.1		18.5		95%	92%						

Project Access and Circulation

The site plan shows adequate design for parking aisles, driveways, traffic circulation, sidewalks, and truck loading and maneuvering areas. An AutoTurn analysis is included in Appendix K. AutoTurn is software that shows the precise paths of various types of vehicles including large trucks.

The site plan provides 1,585 parking spaces, which includes a four level parking structure as well as on-street angle parking along the north side of Second Street from Broadway to 'A' Street. The angle parking on Second Street uses an indented curb so that on-street parking on the south side of Second Street is not affected. The City of Eureka Municipal Code Section 155.117 requires 1,580 spaces for the planned uses. A shared parking analysis for the land uses is included in Appendix J. The conceptual plan provides sufficient parking to serve the project site except for the peak month of December, which would require 1,630 parking spaces. Only parking on private property is included in this count. The on-street parking mentioned above is only on private streets. The deficit in December can be accommodated by adjacent on-street parking around the site. In many retail centers employees are asked to park off site during peak December parking demand. This is not a significant impact, because adequate spaces exist at nearby on street parking.

Landscaping and other obstructions should not exceed three feet in height at the ends of the parking rows. The three feet maximum limitation will help minimize line of sight problems for traffic circulation through the parking lot.

Based on the conceptual site plan, the Second Street vehicle access and also the Fourth Street vehicle access would provide good ingress and egress towards downtown, with landscaped pedestrian paths that create a pedestrian-friendly environment. The Second Street access also provides a landscaped pedestrian access to the waterfront. The signalized access at Sixth Street provides good access to the site with landscaped pedestrian access.

The project site parking lot is designed to provide good circulation. The orientation of the parking stalls enables pedestrians to walk along the parking rows instead of having to cross the parking rows, at least for access to and from the major retail stores. This feature reduces the potential for pedestrian-vehicle conflicts. Adequate sidewalks with wheelchair ramps should be provided for pedestrian access when more detailed plans are prepared for the site, consistent with ADA requirements. The conceptual plan shows landscaped pedestrian paths from store to store across the parking lot creating an attractive pedestrian-friendly appearance.

Based on the site plan, the throat length of vehicle accesses to get in and out of the parking lot appears to have the necessary storage for ingress and egress. At Fourth Street, 180 feet of storage is provided, and at both Waterfront Drive and Sixth Street, 140 feet is provided.

Adequate corner radii and aisle widths are provided within the parking lot so that trucks as large as STAA can access the loading docks from any project access point to public streets. Truck access to Home Depot is via the aisle along the east side of the garden center to the loading dock just south of the garden center. Trucks will back into the loading docks. The site plan shows that there is sufficient maneuvering room for trucks to make these movements, and then pull forward to leave along the south side of Home Depot, turning right along the west side to any of the access drives, but most commonly Broadway and Sixth Street or Waterfront Drive and the Fourth Street extension. Truck access throughout the site is provided with a minimum 50-foot radius at intersections along main circulation aisles.

Bicyclists will be attracted to the proposed project for employment, shopping, dining and to take advantage of other opportunities. Adequate, safe and secure bike parking should be provided according to the Humboldt County 2004 Regional Transportation Plan. To be secure, parking facilities should be in front of the store and visible to customers entering and exiting the store to minimize the potential for theft and vandalism. Bike parking for employees should be provided as an incentive for employees to ride bikes to work. Bike lockers or a fenced in, covered enclosure with bike racks within can be located behind businesses or at the parking structure.

Cumulative + Project 2025 Conditions

Although the Humboldt County countywide travel model was made available for use in estimating project traffic distribution and assignment to study intersections, future land uses have not been finalized to reflect the most likely growth and development in the Arcata-Eureka-Fortuna area.

To forecast traffic volumes for Cumulative + Project 2025 Conditions, the historical trends of traffic volume growth on Broadway at Wabash were analyzed from 1985 through 2005 based upon published Caltrans traffic volume data. Additional analysis and details regarding estimation of future volumes are provided in Appendix L. Actual traffic count data from 1994 to 2004 on Broadway were also checked, and there was little real growth over these years. From year to year the growth is uneven. The annual average growth is 1.5 percent per year. Compounded over the 19 years in this traffic report (2006 to 2025), we would expect a 33 percent increase in traffic by 2025.

Between now and 2025, substantial other project development is anticipated. Cumulative conditions were estimated by adding trips from other known development projects to the study intersections. Known projects were defined as currently identified projects in various stages of the entitlement process as provided by the City of Eureka. Table VI and Figure 14 show the type, size, trip generation and location of these projects. Project number 12, the 26,000 square-foot Co-Op Grocery Store, is now in operation, but was under construction at the time the 2006 Existing Conditions counts were made. Trip generation estimates are based on *Trip Generation*, 7th Edition published by the Institute of Transportation Engineers (ITE). In some cases the exact type and size of a project was incompletely defined, and assumptions are provided as notes to entries in Table VI. Trips from these projects were assigned to study intersections in similar manner to that for the Marina Center Project. The assignment of potential project trips to the study intersections is shown in Appendix H. These volumes were added to existing volumes as one of two steps in forecasting Cumulative 2025 volumes. Marina Center trips were also added to the existing volumes as a second step in estimating 2025 volumes. When both potential project trips and Marina Center trips are added to existing volumes, the increased traffic is just over 35 percent greater than existing 2006 volumes.

Table VI: Potential Projects Trip Generation

No.	Name of Development – Land Use	ITE Code	Size		Daily		A.M. Peak Hour				P.M. Peak Hour			
					Rate	Trips	Rate	In	Out	Total	Rate	In	Out	Total
1	Figas Development – Light Industrial	110	30	KSF	6.97	209	0.92	24	3	28	0.98	4	26	29
2a	Southgate Industrial Park – Warehouse	150	60	KSF	4.96	298	0.45	22	5	27	0.47	7	21	28
2b	Southgate Industrial Park – Office	710	32.5	KSF	14.35	466	2.15	62	8	70	2.23	10	62	72
3a	Ocean View Commercial Development - Retail/Services	820	18.2	KSF	57.95	1,055	1.31	15	9	24	5.37	47	51	98
3b	Ocean View Commercial Development - Office	710	9.8	KSF	14.35	141	2.15	19	2	21	2.23	3	19	22
4	Peterson Tractor - New Automobile Sale	841	47.9	KSF	33.34	1,597	2.05	73	26	98	2.64	49	77	126
5a	Bayshore Inn – Motel	320	51	Rooms	5.63	287	0.45	8	14	23	0.47	13	11	24
5b	Bayshore Inn – Restaurant	931	6.4	KSF	89.95	576	0.81	4	1	5	7.49	32	16	48
6	Fredrickson Lease - Retail/Services	820	6	KSF	57.95	348	1.31	5	3	8	5.37	15	17	32
7a	Eureka Pacific - Retail/Services	820	26	KSF	57.95	1,507	1.31	21	13	34	5.37	67	73	140
7b	Eureka Pacific – Restaurant	931	14	KSF	89.95	1,259	0.81	9	2	11	7.49	70	35	105
8	Eureka Health Foods – Supermarket	850	18	KSF	102.24	1,840	3.25	36	23	59	10.45	96	92	188
9	Redwood Marine Boats – New Automobile Sale	841	33.5	KSF	33.34	1,117	2.05	51	18	69	2.64	34	54	88
10	Hampton Inn – Motel	320	100	Rooms	5.63	563	0.45	17	28	45	0.47	25	22	47
11	Balloon Track Mixed-Development - Mixed Land Use	Proposed Project												
12	Co-Op Grocery Store – Supermarket	850	26	KSF	102.24	2,658	3.25	52	33	85	10.45	139	133	272
13	NCVRC – Office	710	9.1	KSF	14.35	131	2.15	17	2	20	2.23	3	17	20
14a	FB's Fish Processing Plant – Light Industrial	110	12	KSF	6.97	84	0.92	10	1	11	0.98	1	10	12
14b	Fisherman's Building Café – High Turnover Restaurant	932	3	KSF	127.15	381	11.52	18	17	35	10.86	20	13	33
15a	Seaport Village – Retail	820	22.5	KSF	57.95	1,304	1.31	18	11	29	5.37	58	63	121
15b	Seaport Village – Office	710	5.6	KSF	14.35	80	2.15	11	1	12	2.23	2	11	12
15c	Seaport Village - Residential Condo / Townhouse	230	9.4	KSF	5.86	55	0.44	1	3	4	0.52	3	2	5

Table continued next page

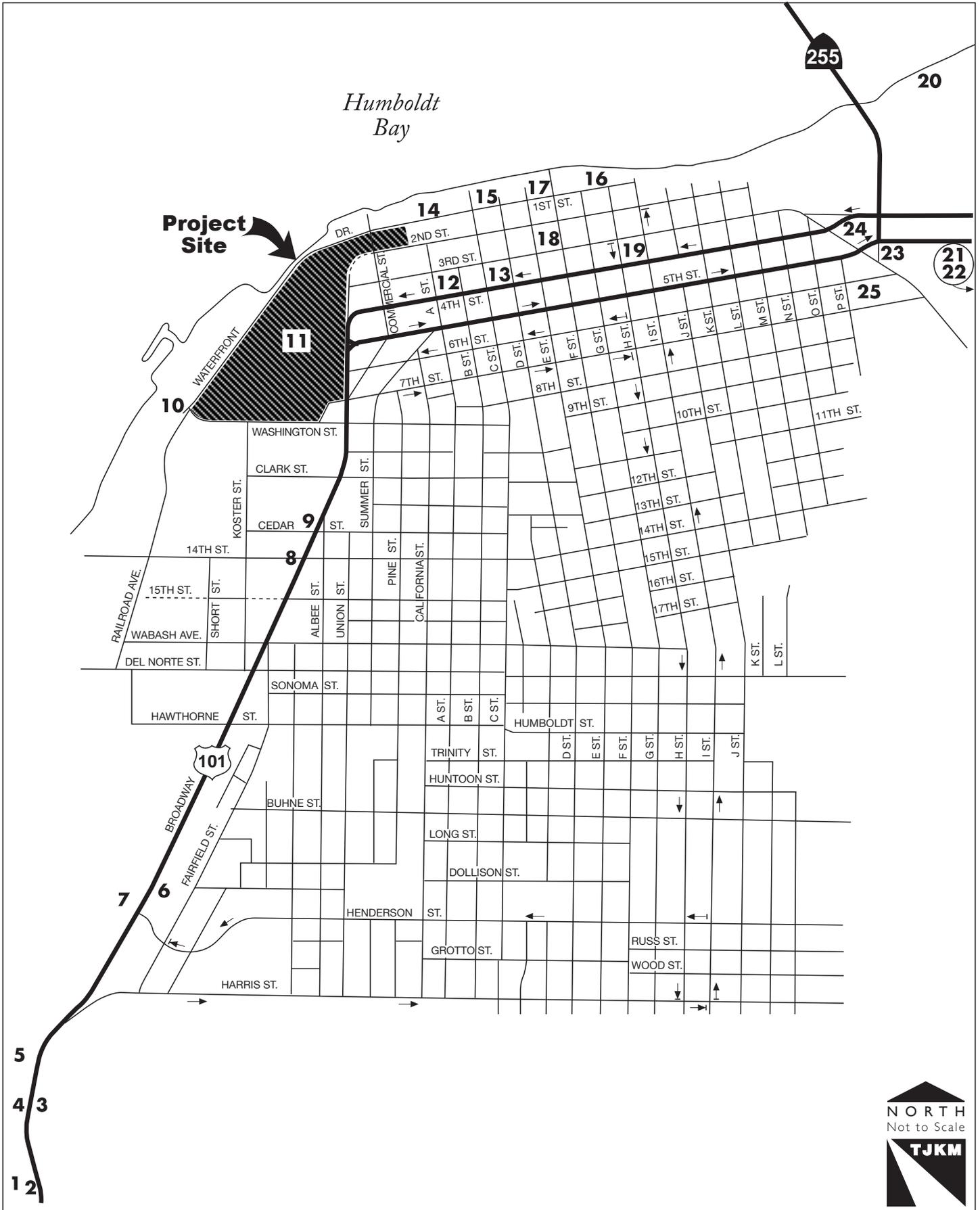
Table VI: Potential Projects Trip Generation (Continued)

No.	Name of Development – Land Use	ITE Code	Size		Daily		A.M. Peak Hour				P.M. Peak Hour			
					Rate	Trips	Rate	In	Out	Total	Rate	In	Out	Total
16a	Bayfront One – Retail	820	24	KSF	57.95	1,391	1.31	19	12	31	5.37	62	67	129
16b	Bayfront One – Office	710	4	KSF	14.35	57	2.15	8	1	9	2.23	1	8	9
16c	Bayfront One - Residential Condo./Townhouse	230	12	DU	5.86	70	0.44	1	4	5	0.52	4	2	6
17a	Bayfront Two – Retail	820	24	KSF	57.95	1,391	1.31	19	12	31	5.37	62	67	129
17b	Bayfront Two – Office	710	4	KSF	14.35	57	2.15	8	1	9	2.23	1	8	9
17c	Bayfront Two - Residential Condo./Townhouse	230	12	DU	5.86	70	0.44	1	4	5	0.52	4	2	6
18	Coastal Business Systems – Office	710	3	KSF	14.35	43	2.15	6	1	6	2.23	1	6	7
21	Shoreline RV Park - RV Park	416	100	OCS	-	-	0.2	8	12	20	0.37	26	11	37
22	Hidden View - Residential Condo./Townhouse	230	38	DU	5.86	223	0.44	3	14	17	0.52	13	7	20
23	HCOE School - Elementary School	520	75	Students	1.29	97	0.42	17	14	32	0.28	9	12	21
25	Seventh Street Villa's - Residential Condo./Townhouse	230	6	DU	5.86	35	0.44	0	2	3	0.52	2	1	3
Total					10,699		582	303	884		885	1013	1,898	

Notes and Assumptions:

DU – Dwelling Unit, KSF = 1,000 Square feet, OCS – Occupied Camp Sites

- | | |
|--|---|
| 2a – assumed 65% warehouse, 35% office | 14a – assumed light industrial |
| 3b – assumed FAR of 0.4 acres, 65% retail/service and 35% office | 15a – assumed 60% retail, 15% office, 25% res |
| 4 – assumed new car sales (841 ITE Code) for tractor sales | 16a – assumed 60% retail, 15% office, 25% res |
| 7a – assumed 65% retail/service and 35% office | 17a – assumed same as 15a, 16a |
| 8 – assumed net increase of 18 ksf expansion of new facility | 21 – assumed increase of 100 OCS expand |
| 9 – assumed .35 FAR per acre for a 2.2 acre lot expansion | |
| 10 – assumed 100 rooms | |
| 13 – assumed office land use | |



The Cumulative + Project 2025 Conditions street network uses the fully mitigated scenario of Baseline 2010 + Project, because the Marina Center project and its mitigating measures are considered part of 2025 Cumulative Conditions. Additional mitigation is also used. Additional mitigation includes:

- Closing off outbound access to Broadway at both the Fourth and Sixth Street exits by diverting all outbound traffic to Waterfront Drive, then south to Hawthorne at Broadway, or to Second and Third Streets at Broadway.
- Striping three southbound lanes on Broadway from Vigo through the north Bayshore driveway at Harris. The existing right turn lane into the north driveway of Bayshore Mall just south of Harris would be converted from an exclusive right turn lane to a shared through and right turn lane.

There are other types of mitigation than that listed above, but the level of service calculations for Cumulative + Project 2025 Conditions were based on these additional improvements. There is no current means of determining exactly what improvements are needed for 2025 because there is no long-term transportation plan for Eureka, nor is there a traffic mitigation fee program in place. Alternative mitigation strategies include:

- Widening Broadway to six through lanes in both directions from Fourth Street through to the freeway near Herrick;
- Establishing an alternate US 101 bypass route on other surface streets; and
- Extending Waterfront Drive from Del Norte to Hilfiker.

Other alternatives are also possible. The basic premise is to control the growth of traffic on Broadway, if it is kept to four through lanes, or to accommodate the increased travel through adding capacity through widening to six through lanes.

The analysis of Cumulative + Project 2025 Conditions shows that Marina Center traffic can be accommodated in addition to traffic increases due to other development through 2025. Figure 15 shows the resulting traffic volumes for Cumulative + Project 2025 Conditions.

Results of Level of Service Analysis

Table VII summarizes the level of service analysis for Cumulative + Project 2025 Conditions. The detailed LOS calculations are contained in Appendix F.

Under Cumulative + Project 2025 Conditions, assuming that all Marina Center project mitigation is in place, only one study intersection operates at an unacceptable level of service, Koster and Wabash (unsignalized), and no mitigation appears feasible. What is more likely is that southbound drivers will divert onto other routes to the extent this shortens travel times.

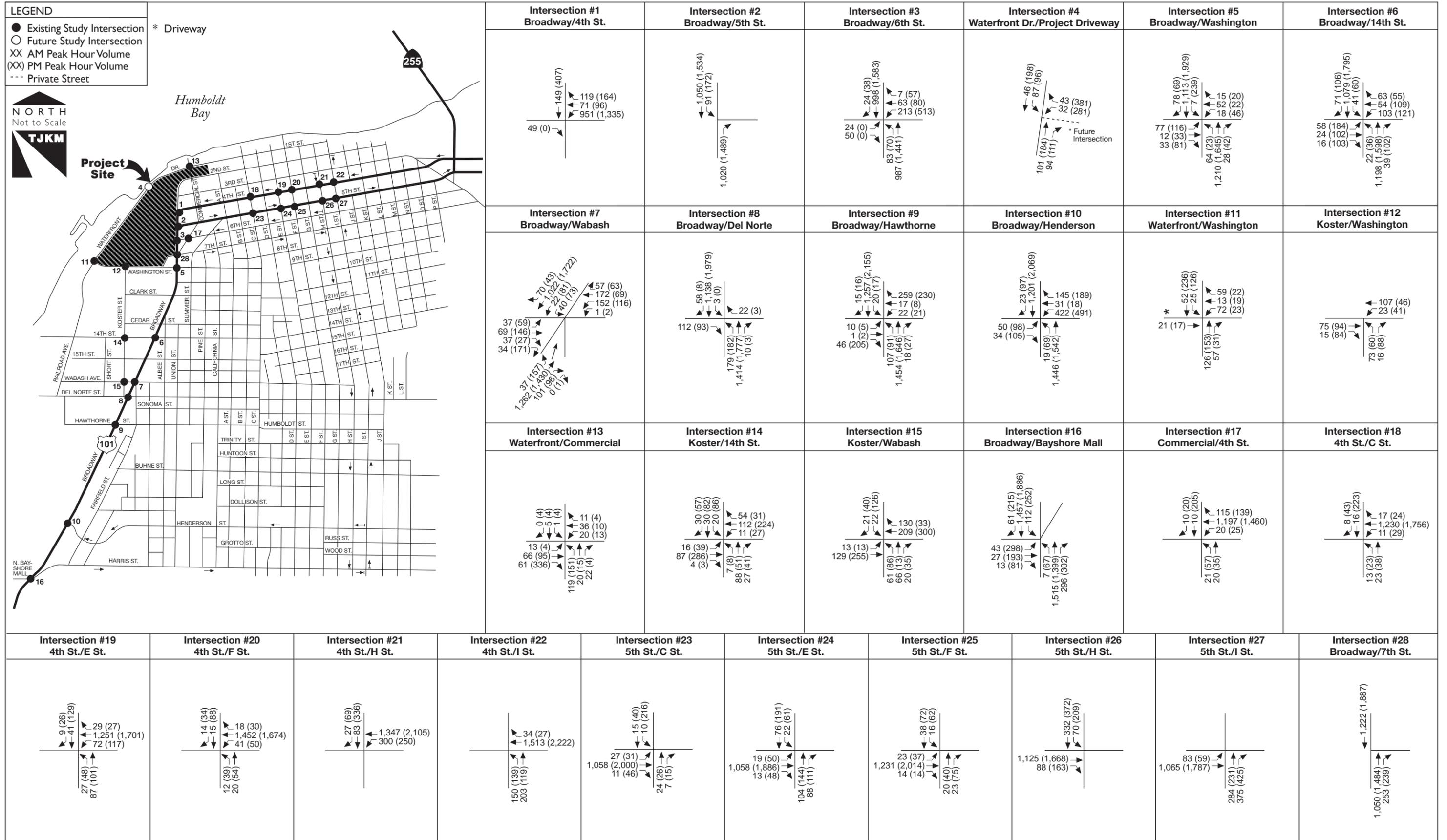
Table VII: Levels of Service Summary - 2025 Cumulative Conditions

Signalized Intersections					
ID	Intersection	A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
1	Broadway and Fourth Street	9.1	A	32.7	C
3	Broadway and Sixth Street	18.4	B	23.8	C
5	Broadway and Washington	6.7	A	29.7	C
6	Broadway and 14th Street	8.3	A	29.9	C
7	Broadway and Wabash-Fairfield	24.5	C	28.2	C
9	Broadway and Hawthorne	10.4	B	17.4	B
10	Broadway and Henderson	11.5	B	19.0	C
16	Broadway and Bayshore Mall	5.6	A	17.4	B
17	Commercial and Fourth Street	8.6	A	14.8	B
18	Fourth Street and 'C' Street	4.2	A	12.7	B
19	Fourth Street and 'E' Street	5.8	A	8.7	A
20	Fourth Street and 'F' Street	2.2	A	8.0	A
21	Fourth Street and 'H' Street	3.8	A	11.9	B
22	Fourth Street and 'I' Street	10.9	B	10.1	B
23	Fifth Street and 'C' Street	3.8	A	19.3	C
24	Fifth Street and 'E' Street	9.2	A	12.5	B
25	Fifth Street and 'F' Street	3.8	A	8.5	A
26	Fifth Street and 'H' Street	9.4	A	15.1	B
27	Fifth Street and 'I' Street	21.7	C	22.6	C
Unsignalized Intersections					
ID	Intersection	A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
2	Broadway and Fifth Street	12.1	B	19.2	C
4	Waterfront Drive/Fourth Street (project)	10.3	B	16.9	C
8	Broadway and Del Norte	14.8	B	15.5	C
11	Washington and Waterfront	12.7	B	17.2	C
12	Washington and Koster	10.1	B	10.1	B
13	Waterfront and Commercial	8.8	A	11.5	B
14	Koster and 14th Street	9.0	A	15.0	C
15	Wabash and Koster	15.0	C	43.0	E
28	Broadway and Seventh	0.0	A	0.0	A

Notes: Delay = Control Delay in Seconds/Vehicle, LOS = Level of Service
 X.X (X.X) = Average Intersection Delay in seconds per vehicle (Average Delay in seconds per vehicle for the minor approach or Average Delay in second per vehicle for the worst approach)

City of Eureka – Balloon Track Development
 Cumulative 2025 + Project Turning Movement Volumes

Figure
 15



Project Mitigation

The project as proposed includes implementation of extensive off site mitigation measures. The project does not cause a new need for traffic signals at Fourth Street and 'C' Street nor Fifth Street and 'C' Street, but a fair share contribution is in order, because project traffic is added to these already-impacted intersections. The conceptual designs developed for this analysis indicate that there may be no need for right of way acquisition for any mitigation measure, but final design will confirm this general understanding. The widening of Hawthorne Street may be found to need right of way to ensure the least cost physical improvements.

Many mitigation measures and/or general system improvements were considered for the project, but for reasons discussed in the body of the traffic study, were ultimately rejected. The rejected mitigation measures and/or general system improvements include the following:

- Making Broadway and Koster a one-way couplet from Fourth Street to Del Norte with southbound US 101 directly through the Balloon Track site to Koster and Washington Street,
- Widening Broadway north of Wabash in the northbound direction to provide three northbound through lanes at Wabash, then merging back to two northbound lanes by 15th Street,
- Widening Broadway physically within the 100 foot available right of way south of Wabash,
- Making Broadway two-way from Fourth to Fifth Streets,
- Providing a new signalized intersection at Broadway and Seventh for project access (instead of the offset intersection at Sixth Street and Broadway), but prohibiting eastbound left turns from Marina Center to northbound Broadway,
- Creating a project access drive on Washington Street to reduce project traffic on Broadway,
- Extending Waterfront Drive south of Del Norte to Hilfiker and Broadway (dropped as mitigation because this may not be feasible in the short term),
- Widening Broadway to six through lanes (three in each direction) from Fifth Street to the freeway at Herrick,
- Restricting left turns in the p.m. peak hour and redirecting traffic to other routes at both Broadway at 14th Street, and Broadway at Washington Street, and
- Redirecting traffic from the project at Fourth Street and Broadway north to Third Street, then east to 'C' Street, and then south to Fifth Street and 'C' Street for all vehicles headed east and north on US 101.

While many of these ideas and strategies had advantages, they were discarded after careful analysis and consultation with both the City of Eureka and Caltrans District I staff. The mitigation measures below are considered to be the most feasible program of improvements to accommodate traffic generated by Marina Center. Concept plans for geometric changes are provided in Appendix K. The Marina Center project and mitigating improvements are assumed to be in place in 2025. The thirty mitigation measures listed below will not all be needed in 2010 if project development is phased over several years after 2010. All thirty mitigation measures are needed only if the entire project were developed and open to the public in 2010. There is no

specific development scenario or phases defined at this time. Since the project developer wishes to obtain entitlements for the entire project, this report assumes that the project is 100 percent complete and the traffic mitigation measures are in place in 2010. Subsequently, it is anticipated that the developer and the City of Eureka will create a development agreement listing which improvements are needed under specific conditions relating to the phased construction of the project. The additional items mentioned on page 46, paragraph I will be implemented by the developer as required by the City of Eureka and Caltrans prior to 2025, again as defined within the anticipated development agreement.

Project Access Drive at Fourth and Broadway

A project access drive will be constructed as the west leg of the Broadway and Fourth Street intersection. The access drive will have 50-foot corner radii to accommodate STAA trucks entering and leaving the site. A signal will be installed to accommodate the new traffic patterns at the intersection. The eastbound lanes will have one right turn lane and one left turn lane with protected eastbound left turns. Southbound Broadway will be restriped to provide two southbound lanes, one southbound through and one southbound through/right. Westbound Fourth Street will remain as it is with one left turn lane and one shared left-through-right turn lane. There will be a four-foot raised median on the access drive separating the inbound and outbound lanes. The new signal is fully warranted.

This mitigation is 100 percent the responsibility of the developer.

New Signal at Fourth Street and Commercial

Northbound traffic on Broadway to the northern portions of the project will need to turn right to eastbound Fifth Street, then left to northbound Commercial to a new signal at Fourth and Commercial Street. Commercial Street will be restriped to provide one northbound left turn lane and one through lane. Southbound Commercial Street will have just one shared through-right lane at the signal. Parking will need to be eliminated along the east side of Commercial from Fourth Street to 150 feet south. Land uses on both sides of Commercial between Fourth and Fifth Streets have off street parking. Nevertheless, with parking occupancy at less than 50 percent on Commercial, the loss of on street parking along the east curb will not result in a material loss of parking for those using on-street parking here. There may be a need to provide guide signs to orient northbound drivers going to Marina Center. The signal is fully warranted.

This mitigation is 100 percent the responsibility of the developer.

Broadway and Wabash with Fairfield Northbound Closure

The basic problem with this intersection is the fifth leg, Fairfield Street. TJKM recommends eliminating the northbound Fairfield approach to the intersection (southbound traffic could still enter at this location), thereby eliminating an entire critical movement and significantly increasing the capacity of Broadway. The northbound Fairfield traffic will be redirected to Broadway via westbound Hawthorne, about 1,000 feet south of Wabash. This requires widening Hawthorne by starting a transition at Fairfield to a full new width of 58 feet, 175 feet east of Broadway. This widening will provide two westbound right-turn lanes plus a shared through/left lane. The maximum queue in the right turn lanes is expected to be up to four cars, or 100 feet. Signal operation here would have southbound left turns to Hawthorne overlap westbound right turns for

further efficiency. The 60-foot right of way on Hawthorne is sufficient for the widened cross section. The recommended cross section is:

- 6-foot sidewalk on north side
- 14-foot westbound right turn lane at curb
- 12-foot westbound right turn lane
- 12-foot westbound through plus left turn lane
- 14-foot eastbound lane
- TOTAL = 58 feet

This widening will mitigate traffic congestion at Broadway and Wabash-Fairfield by allowing more green time for Broadway with a lower cycle length, so that the signals along US 101 (both on Broadway and the Fourth Street/Fifth Street couplet) can all share a common cycle length. This means that all signals on US 101 from Myrtle to south of Bayshore Mall can be coordinated to improve average speeds, lower delays and reduce stops. It is assumed that signal coordination on US 101 will extend from Myrtle at Fourth and Fifth Streets to the McCullen signal on Broadway.

The developer will be responsible for a fair and equitable share of this mitigation. This responsibility will be handled within a development agreement between the developer, the City of Eureka and Caltrans. All 30 mitigation items listed below will need to be in place prior to project opening.

Broadway and Hawthorne Street

With a signal, this intersection will operate at excellent levels of service for all approaches in both a.m. and p.m. peak hours. With the diversion, the signal is fully warranted.

The developer will be responsible for a fair and equitable share of this mitigation. This responsibility will be handled within a development agreement between the developer, the City of Eureka and Caltrans. All 30 mitigation items listed below will need to be in place prior to project opening.

US 101 - Signal Coordination

Along US 101 (Broadway and on the Fourth/Fifth Street one-way couplet in downtown), the project will increase the need for coordinated signal timing, and timing plans should be updated every five years (assumes continuation of the 1.5 percent annual traffic growth). The signals should be coordinated most hours of the day because of the close signal spacing along with heavy traffic flows, otherwise, queues may back up from one intersection through another. Signals along US 101 are not completely interconnected; so this mitigation measure will include an inventory of the signal communication along US 101. According to Caltrans District I, the gaps in interconnect conduit and cable are along the following segments of US 101: 1) Broadway from Henderson to Wabash, 2) Broadway/Fifth Street from Broadway and Sixth Street to Fifth Street and 'E' Street, and 3) Broadway/Fourth Street from Broadway and Sixth Street to Fourth Street and 'E' Street.

We recommend that the coordination system use Caltrans CTNet software. The master control system would be located in the Caltrans District I offices on Union at Wabash, but it would be appropriate for the City of Eureka to also have read-only access to the Highway 101 system. It is possible to collect traffic counts at several locations along US 101 using signal detectors, so that

monitoring of traffic volumes can be automated. For signals that are modified as project mitigation prior to opening, all will have emergency vehicle preemption included as part of the signal system upgrade.

The developer will be responsible for a fair and equitable share of the costs of coordination, because coordination improves the performance of the entire system including existing deficiencies. This responsibility will be handled within a development agreement between the developer, the City of Eureka and Caltrans. All 30 mitigation items listed below will need to be in place prior to project opening.

Henderson/Harris One-Way Couplet Extension to Broadway

The intersection of Broadway and Henderson is expected to operate at LOS E in 2010 and LOS F before 2025. The difficulty with this intersection is that the westbound left turns onto southbound Broadway exceed the capacity of the single left turn lane plus the shared left-through-right lane. In addition the full signalization of the commercial driveway (the west leg of the intersection) plus the protected northbound left turn phase all contribute to the poor level of service without mitigation. Project volumes are added to the critical movements (southbound through in the p.m. peak).

The recommended mitigation is to extend the existing one-way couplet of Henderson and Harris east of Fairfield Street all the way to Broadway. Harris Street is currently one-way eastbound from Broadway (south of Henderson). This measure would relocate southbound left turns at Henderson to the existing unsignalized left turn to eastbound Harris Street just 200 feet north of the signalized north entrance to the Bayshore Mall. Because of the increase in southbound left turns onto eastbound Harris Street, these left turns would need a protected left turn signal at this location. The need for a protected left turn is increased by the less than ideal sight distance from the southbound left turn lane for traffic turning out of the mall to go north on Broadway. This left turn movement can be made at the same time as northbound left turns are made into the signalized north driveway for the Bayshore Mall parking area. Because northbound through movements are not a critical movement at this location in the p.m. peak hour (when the mitigation is needed), the addition of the southbound left turn signal at Harris will not significantly increase delay to traffic nor lower the LOS at the Bayshore Mall signal. At Henderson and Broadway, the eastbound left turns will be made at the same time westbound left turns are made, so the split phase operation for east-west traffic is no longer needed. Removal of split phase operation is made possible by eliminating the shared left-through-right lane under current conditions. Elimination of split phase operation also increases the efficiency of the intersection beyond just the simple addition of a third westbound lane.

A motel directly above the Broadway/Henderson intersection on the northeast corner may be impacted with this mitigation. Currently, drivers in either direction on Broadway can easily see the motel, and they now turn east up Henderson to Fairfield to reach it (or use the direct access driveway parallel and directly to the north of Henderson). This direct access driveway allows drivers to go east up to the motel. However, southbound drivers may not be able to easily access this driveway because there will no longer be a protected left turn for them to turn left onto Henderson. If the mitigation were in place, southbound drivers would most likely need to use Harris and Fairfield to reach the motel, and they could be redirected with appropriate, private signs.

STAA trucks cannot presently make the southbound left turn from Broadway to eastbound Harris. Consequently, the southbound through lanes and left turn lane need to be shifted at least six feet

to the west to provide the necessary turning radius for truck left turns. The queuing in the now-signalized southbound left turn lane is not expected to reach more than 300 feet 95 percent of the time. That means that a 300 foot southbound left turn lane at the new left turn signal onto eastbound Harris will not normally result in left turn traffic backing into the southbound through lanes, nor will there be a need to shorten the northbound left turn lane into Victoria Place (private shopping center drive just north of Harris). No impacts are foreseen for Victoria Place ingress and egress traffic other than a reduction in available gaps for left turns out of the parking lot due to the normal growth in traffic volumes over the years.

Finally, southbound traffic on Broadway is the critical movement at Henderson. With over 2,100 vehicles/hour southbound at Henderson and over 2,200 per hour southbound at Bayshore Mall in Cumulative + Project 2025 Conditions, two lanes will not be sufficient to accommodate the traffic demand. Broadway will ultimately need to be widened to provide three southbound through lanes plus the southbound left turn lane. With extension of the one-way couplet to Broadway plus three lanes southbound through these two major intersections, the levels of service will improve dramatically from LOS F to LOS C even with the project in 2025. In the a.m. peak, while traffic is also quite high, two lanes can reasonably accommodate the traffic, so there is no apparent need for three northbound lanes through 2025.

Extension of the one-way Henderson/Harris couplet is needed when the project opens in 2010 and is 100 percent the responsibility of the developer.

Diversion to Alternative Routes

Traffic in the parking lots for Marina Center will be voluntarily encouraged through signing to use Waterfront Drive, Second Street and Third Street to exit the project rather than using either the Fourth or Sixth Street at Broadway access drives. Signing within the Marina Center parking areas to these routes is a mitigation measure.

When traffic volumes approach the Cumulative + Project 2025 volumes on Broadway, a more direct mitigation is required for drivers going south on Broadway. The least expensive mitigation is a closure of Marina Center driveways to outbound traffic at both Fourth Street and Broadway and at Sixth Street and Broadway.

Closure of access drives is not needed by the time the project opens in 2010. Closure of outbound drives is only needed when traffic on Broadway reaches 1,700 vehicles per hour in the southbound through movement at 14th Street during the p.m. peak hour. Beyond this level of traffic, the level of service may reach LOS E with further growth in traffic volumes. However, while this strategy is the least expensive, there are other strategies to consider for long term traffic improvements including widening Broadway to six lanes, diverting US 101 through traffic to other surface routes elsewhere in the city, extending Waterfront Drive south of Del Norte to Hilfiker, or eliminating Marina Center outbound traffic access to Broadway and Fourth and Sixth Streets at all times.

Closure of the Fourth and Sixth Street exit drives is long-term mitigation and is not required of the developer for the 2010 opening of Marina Center. It is described in this study because the analysis shows that the strategy can successfully accommodate 2025 volumes including all trips from Marina Center. The decision to close off exiting traffic from Marina Center to Broadway at all times will be based on engineering judgment, at the sole discretion of Caltrans, in coordination with the City of Eureka.

Summary of Project Mitigation

The following list summarizes the discussion of mitigation in the preceding section. Should only portions of Marina Center be developed and opened to the public in 2010, not all of the following mitigation measures would be needed at the opening of a phased implementation of the project beginning in 2010.

Mitigation Needed at Project Opening (Assuming Full Development of All Uses)

1. Install new signal at Broadway and Fourth Street
2. Restripe southbound Broadway at Fourth Street for one southbound through and one southbound through/right lane
3. Install new signal at Fourth Street and Commercial Street
4. Restripe northbound Commercial Street to one left turn lane northbound and one through lane northbound, and prohibit parking along east curb for 150 feet south of the intersection. Convert one of the three westbound lanes approaching Commercial on Fourth Street to a left turn only lane. This slightly modifies the present conditions where the third westbound lane is dropped just west of Commercial Street. The need to prohibit parking may impact other businesses and will need to be reviewed by the Parking Place Commission.
5. Provide guide signing for Marina Center access facing eastbound traffic on Fifth Street west of Commercial Street ("TO MARINA CENTER" with a left arrow)
6. Modify the existing traffic signal at Broadway and Sixth, to provide for a Marina Center access drive intersecting Broadway approximately 75 feet south of Sixth Street. Both offset intersections will be operated by one traffic signal controller. The corner radii for the drive will not exceed 30 feet to minimize the offset. As such, trucks over 30 feet in length will not be able to enter this driveway from the north. Signs restricting large truck access at Sixth Street will need to be posted east of Broadway on Fourth Street, on Broadway just south of Fifth Street, and at the driveway itself. The signs will indicate that trucks may continue south to Washington, turn right, and then right again to enter the project from Waterfront Drive.
7. Relocate the southern driveway at Crivello's Used Car lot at Sixth and Broadway outside of the new offset intersection by moving it north to within 75 feet of the northerly driveway. The existing driveway is within the signalized intersection, and with the new western leg into Marina Center, this correction needs to be made. This will require approval by the owner of Crivello's Used Car business.
8. Stripe one 350-foot northbound left turn lane on Broadway at the new Sixth Street Marina Center access drive. Include a raised median along the northbound left turn lane to physically prevent southbound left turns from Broadway to Seventh Street.
9. Prohibit southbound left turns from Broadway to eastbound Seventh Street, and instead, shift these turns to the southbound left turn lane at Washington. Provide guide signing for motorists so they can then return to eastbound Seventh Street by turning left onto Summer, then east at Seventh Street. The restriction of southbound left turns may have an impact on existing businesses on Seventh Street east of Broadway.
10. Install east and westbound left turn lanes on Washington at Broadway.

11. Modify the traffic signals at both Broadway and Washington and at Broadway and 14th Street to operate with protected-permissive phasing for the left turn movements on Broadway.
12. Provide a southbound left turn lane and northbound right turn lane on Waterfront Drive at the project access drive (Fourth Street Extension).
13. Close the northbound Fairfield access to Wabash and Broadway approximately 40 feet south of that intersection, post signs on northbound Fairfield at Del Norte advising motorists that traffic is "LOCAL ACCESS ONLY – NO ACCESS TO BROADWAY OR WABASH." Closure should be accomplished by extending the east curb of Fairfield to the street centerline, and posting a "DO NOT ENTER" sign at the closure.
14. Modify the Broadway and Wabash signal to account for the elimination of northbound Fairfield access.
15. Install a new signal at Broadway and Hawthorne, and provide for a southbound left turn and westbound right turn overlap (no southbound U-turns allowed).
16. Widen Hawthorne to provide two westbound right turn lanes and one westbound through/left lane. On the eastbound approach, provide one eastbound right turn and one eastbound through-left lane, and one westbound lane leaving the intersection. Cross-section to be fully 58 feet wide (including 6-foot sidewalk) from 175 east of Broadway to Broadway. Transition to the widened section should start at Fairfield, and the six-foot sidewalk should also extend from Broadway to Fairfield.
17. Post an advisory sign to northbound motorists on Fairfield south of Hawthorne saying "NO ACCESS TO WABASH OR BROADWAY AHEAD – USE HAWTHORNE TO BROADWAY" with a left arrow.
18. Install an all-way stop at Fairfield and Hawthorne.
19. Convert Henderson to one-way westbound traffic from Fairfield to Broadway and provide for one westbound through/right lane and two westbound left turn lanes to southbound Broadway from Henderson. Remove southbound left turns to eastbound Henderson by closing the southbound left turn lane and modifying the signal indications. Retain the all-way stop at Fairfield and Henderson.
20. Convert the Henderson and Broadway signal to allow simultaneous eastbound left turns with westbound left turns.
21. Post a "NO LEFT TURN" sign for southbound Broadway and a "NO RIGHT TURN" sign for northbound Broadway at Henderson and post "ONE-WAY" signs on Henderson.
22. Provide appropriate guide signs to advise southbound Broadway motorists to turn left at Harris Street to go east up the hill.
23. Install a signal at Harris and Broadway to provide protected southbound left turns from Broadway to eastbound Harris. This signal needs to be interconnected to the north Bayshore Mall driveway signal and coordinated at all times excepting evening and early morning hours to be determined by timing plans to coordinate signals along US 101.

24. Shift the two southbound through lanes and southbound left turn lane at least six feet to the west for an appropriate distance to provide for adequate left turning radius for STAA trucks making a southbound left turn to eastbound Harris. Final design will determine exactly how this is accomplished. If the lanes are shifted, the resulting lane widths may require a design exception for the reduced lane and shoulder widths. However, it may also be possible to relocate the southbound left turn stop line to the north so as to provide more lateral room between the southbound left turn lane and the east curb of Harris heading uphill.
25. Lengthen the southbound left turn lane to 300 feet in length. This does not shorten the existing northbound left turn lane into Victoria Place (private drive).
26. Provide funds for private signage to the Bayview Motel at Fairfield and Henderson for both northbound and southbound motorists.
27. Provide guide signs within the Marina Center parking lot directing all exiting motorists to Waterfront Drive for destinations south on US 101 or to the east and north in downtown and along US 101, via project access drives on Second Street and Third Street.
28. Install signal interconnect on US 101 so that all signals along US 101 are in one system, from V Street at Fourth and Fifth Streets to the K-Mart signal and Broadway signal near Bayshore Mall. According to Caltrans, this can be accomplished by installing conduit and cable from Broadway and Henderson to Broadway and Wabash, Fourth Street/Broadway from Broadway and Sixth to 'E' Street, and Fifth Street/Broadway from Broadway and Sixth to 'E' Street.
29. Develop and implement optimized signal coordination timing on US 101 from Fourth and Fifth Streets at Myrtle to Broadway, and on Broadway from Fourth Street to the K-Mart driveway signal near Bayshore Mall. A monitoring system for US 101 must be set up to the satisfaction of Caltrans District I and City of Eureka traffic signal operations personnel.
30. Provide, for the entire Marina Center project site, adequate, safe and secure bike parking.

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