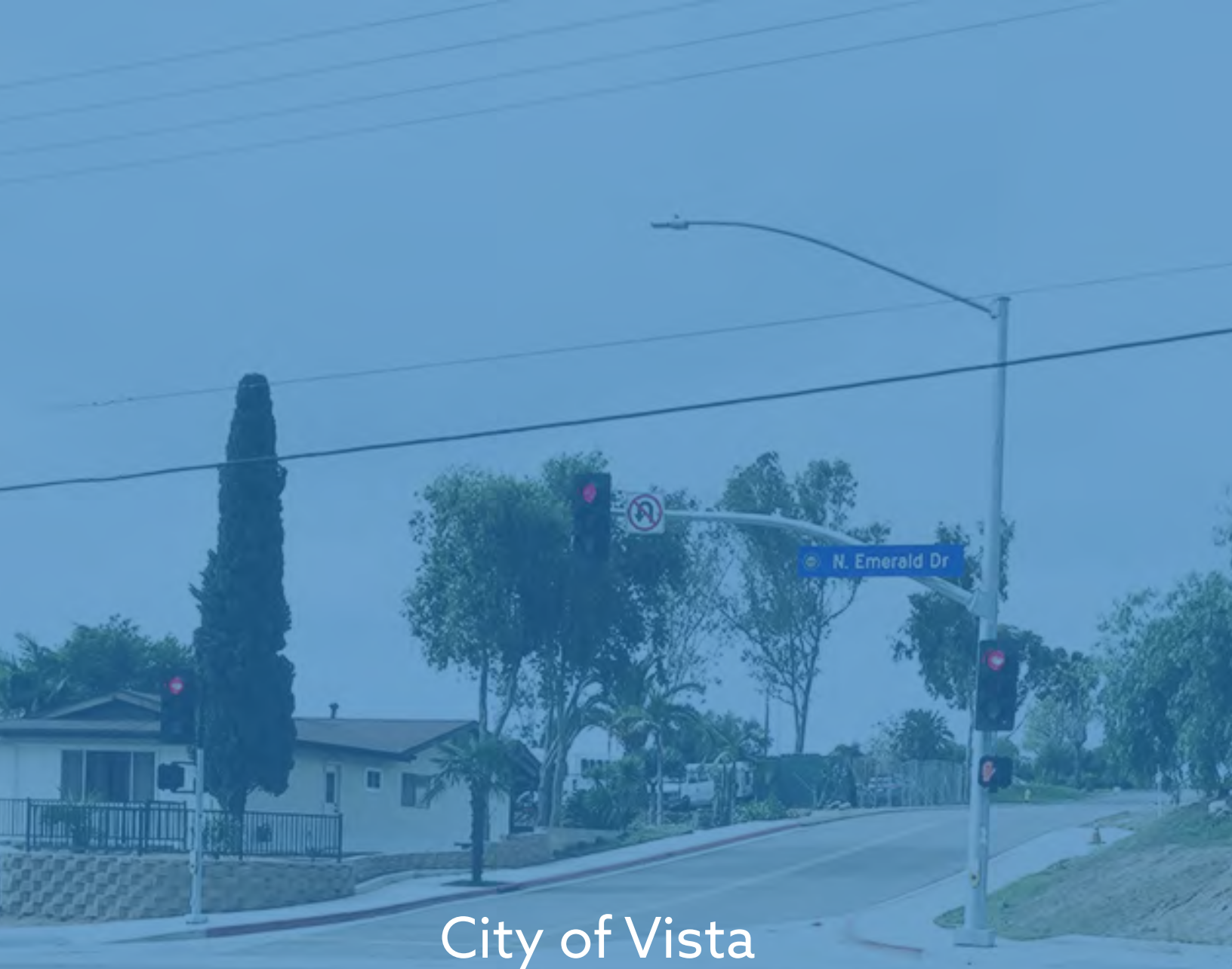

City of Vista

Emerald Drive Corridor Study

Final Report
July 2018

Acknowledgments

City of Vista

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A. Traffic Analysis

B. Collision Summary

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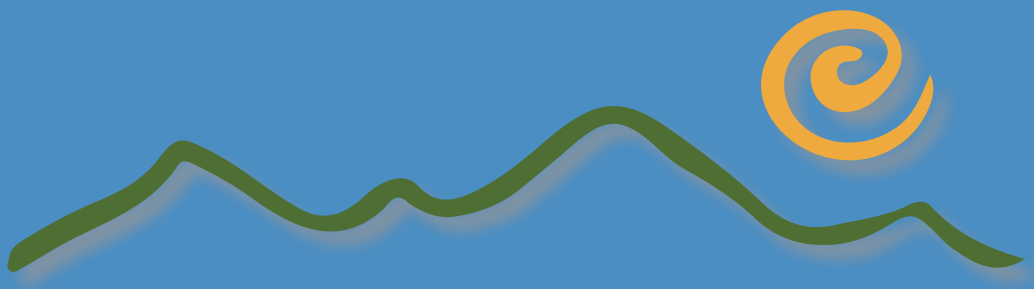
D. Counts

1 Introduction



Study Area

Emerald Drive is located at the west end of the city. It divides Vista and the City of Oceanside north of Date Street. Please see Figure 1-1 for a map of the location of Emerald Drive in relation to the City of Vista and the neighboring cities.

Because of its strategic location, Emerald Drive serves as a significant connection between the SR-78 and parts of Vista, Oceanside and beyond. As is shown in Figure 1-2, large employment clusters, shopping and recreation destinations are located near both ends of the corridor. A Sprinter light rail station is less than a mile away from the north end of Emerald Drive. It is also an important school route, with Tri-City Christian School, Bella Mente Montessori Academy, both located on Emerald Drive, Grapevine Elementary a block to the east and Casita Elementary west of Emerald Drive.

However, the segment of Emerald Drive between West Drive and Olive Avenue is primarily abutted by residential land uses and experiences issues such as speeding and collisions. Emerald Drive has become an alternative to College Boulevard in Oceanside to access SR-78. There have been two fatal crashes, in addition to many other injury and property damage crashes, and the residents have long complained about traffic safety and access along this segment. The lack of bike facilities and complete sidewalk also create a gap in the local active transportation network.

Project Purpose

This study aims to develop a conceptual design for the segment of Emerald Drive between Date Street and Olive Avenue (Corridor) that:

1. Improves traffic safety
2. Reduces vehicular speed
3. Provides pedestrian and bicycle facilities
4. Improves access to schools and transit
5. Determines the function the corridor will serve and the improvements to implement

The study analyzes various alternatives with varying number of lanes, intersection controls and pedestrian and bicycle facilities. Out of the various alternatives, one preferred alternative is determined that best addresses the traffic safety, pedestrian and bicycling connectivity, and resident issues while balancing motor vehicle mobility and accounting for future needs.

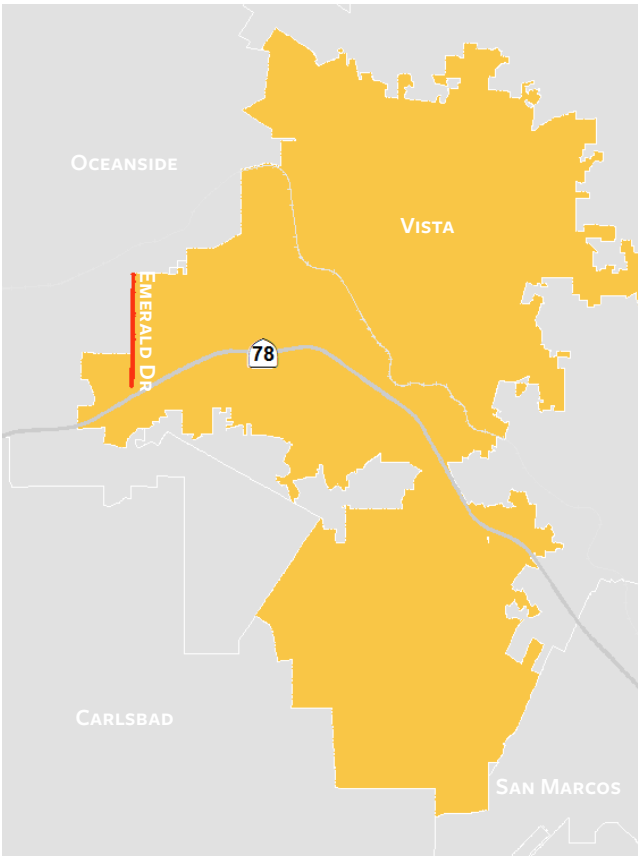


Figure 1-1: The Location of Emerald Drive

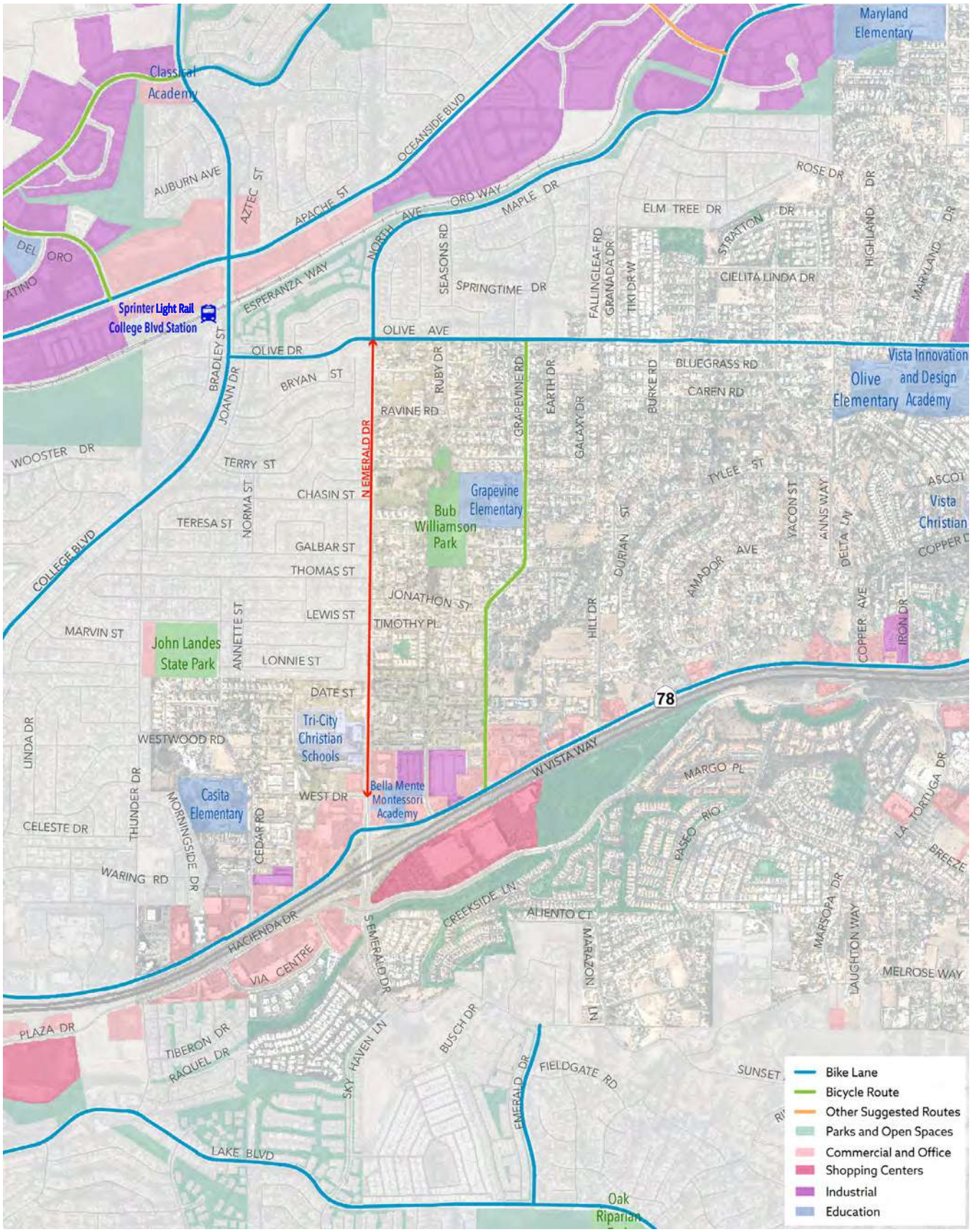


Figure 1-2: Project Location and Surrounding Area

Planning Context

The study takes into consideration the City's previous planning efforts related to Emerald Drive and its vicinity. The following reports provide useful planning context for this study's efforts.

General Plan Circulation Element, 2011

The Circulation Element of the City of Vista General Plan establishes the policy foundation to guide future circulation and transportation related decision making to achieve the community's Vision 2030. The City seeks to enhance the safety, access, convenience and comfort of all users of all ages and abilities. The circulation element classifies Emerald Drive as a four-lane collector with shoulders for bike lanes. The following goal and policies are closely related to this study:

Circulation Element Goal 6:

Develop an efficient bicycle and pedestrian circulation system that improves access and linkages in a manner that is human- scaled, bicycle- and pedestrian- oriented, and transit accessible, encourages use of these facilities for recreation, and provides alternatives to the personal automobile.

CE Policy 6. 3.: Implement the bicycle plan and pedestrian plan improvements identified in this Circulation Element according to their identified priorities.

CE Policy 6. 6: Construct sidewalks and retrofit traffic signal light standards to include pedestrian crossing buttons, when feasible, on all primary and major roadways.

CE Policy 6. 8: Design and retrofit bicycle facilities in accordance with the design standards identified in the City' s Bicycle Master Plan.

CE Policy 6. 9: Retrofit light standards to include bicycle crossing buttons and, where feasible, use bicycle- sensitive traffic signal loop activation systems.

CE Policy 6. 10: Prohibit motorcycles and other motorized vehicles from using the bicycle and trail system.

CE Policy 6. 14: Maintain and expand, where possible and appropriate, the system of non-motorized connections that link neighborhoods to larger roadways, activity centers and nodes, businesses, community services, parks and recreational facilities, and transit stops and stations.

CE Policy 6. 3.5: Coordinate with surrounding jurisdictions to ensure that trails, sidewalks, bikeways, and other non - motorized facilities connect to like facilities within those jurisdictions. Adjustments to alignment, width, designation, or design may be made to create appropriate regional connections.

CE Policy 6. 3.8: Complete breaks in sidewalks and non - motorized paths where they are missing, especially along commercial corridors and routes to schools. Prioritization shall be given to such connections in development of the Capital Improvement Program (CIP).

CE Policy 6. 20: Provide safe and adequate crossing facilities that minimize pedestrian exposure to vehicular traffic, such as curb extensions or refuge islands, wherever feasible.

Bicycle Master Plan, 2015

In 2015, the City of Vista completed a Bicycle Master Plan to guide the development and implementation of bicycle-related infrastructure, policies, and supporting programs within the City over the next 20 years. This plan recommends bike lanes along Emerald Drive.

BMP Goal 1:

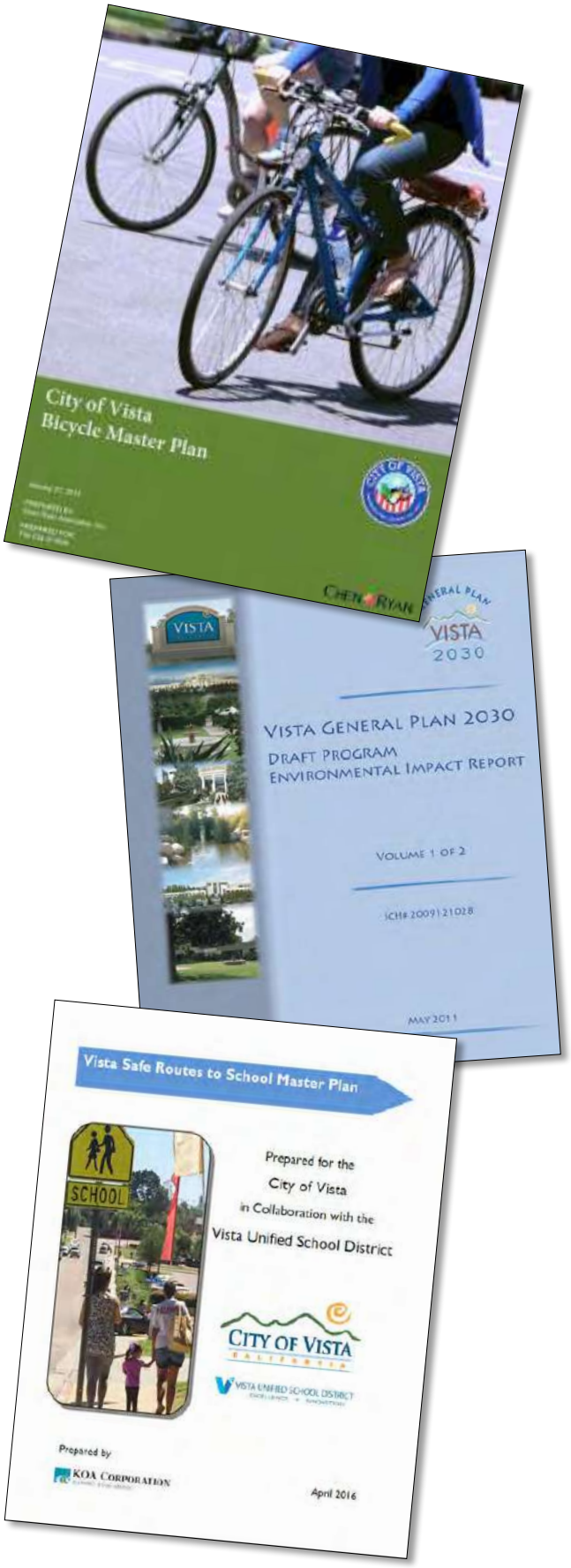
A complete bicycle network that provides connections between transit stops, residential neighborhoods, schools, recreational resources, employment centers, and activity nodes.

BMP Goal 2:

Safe and efficient bicycle facilities that are accessible to all users, with appropriate and necessary amenities.

BMP Goal 3:

Increased use of bicycle facilities for utilitarian and recreational trips.



Vista Safe Routes to School Master Plan, 2016

The Safe Routes to School (SRTS) program is intended to improve the health of students through increased exercise and reduce greenhouse gas and emissions by reducing the number of vehicle miles traveled through accommodating an increase in the number of students walking and cycling to school. The program promotes safe walking and cycling through the five E's:

Education – instruction in the benefits and opportunities of SRTS

Encouragement – incentives for walking and biking to school

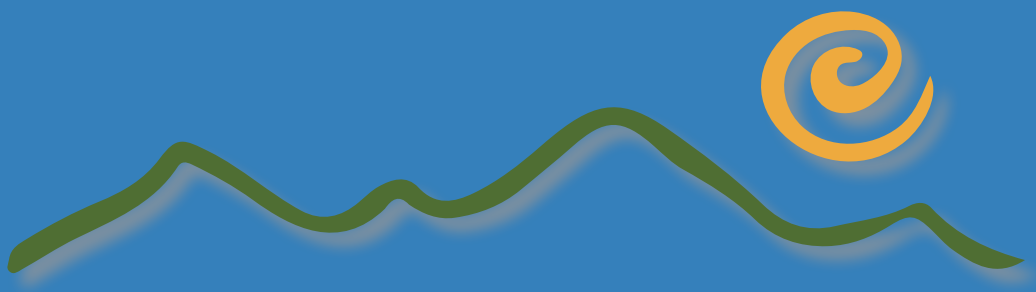
Enforcement – methods for ensuring compliance with regulations and ordinances

Engineering – improvement of infrastructure to accommodate safe walking and biking

Evaluation – comparison of pre-SRTS and post-plan implementation.

The Vista SRTS Master Plan specifically analyzed conditions at ten schools in the City and developed conceptual improvement projects through an interactive community engagement process that included school staff and parents. Traffic safety and pedestrian access on Emerald Drive were major concerns for the Grapevine Elementary community.

2 Existing Conditions



Overview

Emerald Drive between Olive Avenue and Date Street is one lane in each direction with a center turn lane on the north and south ends of this segment totaling about half the length of this segment. This segment has numerous cross streets and single family home driveways.

The segment between Date Street and West Drive is two lanes in each direction with a center turn lane. Tri City Christian School is located on the west side of this segment with Bella Mente Charter School on the east side. Both schools cater to grades K-12.

Both segments are posted with a 35 mile per hour speed limit.

Emerald Drive has become an alternative to College Boulevard in neighboring Oceanside to access State Route 78. Residents and local school staff have reported that speeding, access to and from Emerald Drive from side streets and safety are major concerns along the corridor. The varying right-of-way widths have also become a concern which currently limits bicycle and pedestrian connectivity throughout the corridor.

Access to Grapevine Elementary by foot or bicycle has been an ongoing problem raised by the residents to who participated in the workshops and input from the city's Safe Route to School Plan. The need for lighting, crosswalks, sidewalks and traffic calming were consistent between the Safe Routes to School plan and the community workshops conducted for this corridor. The neighborhood just west of Emerald Drive is part of the school's attendance boundary and falls below the State's identified disadvantaged community with a median income of $50,652. Implementing multiple safe crossings across Emerald Drive will provide access to Grapevine Elementary for the children who must walk or bike to school. Please see Figure 2-1 for a map of the study segment and its surrounding area.

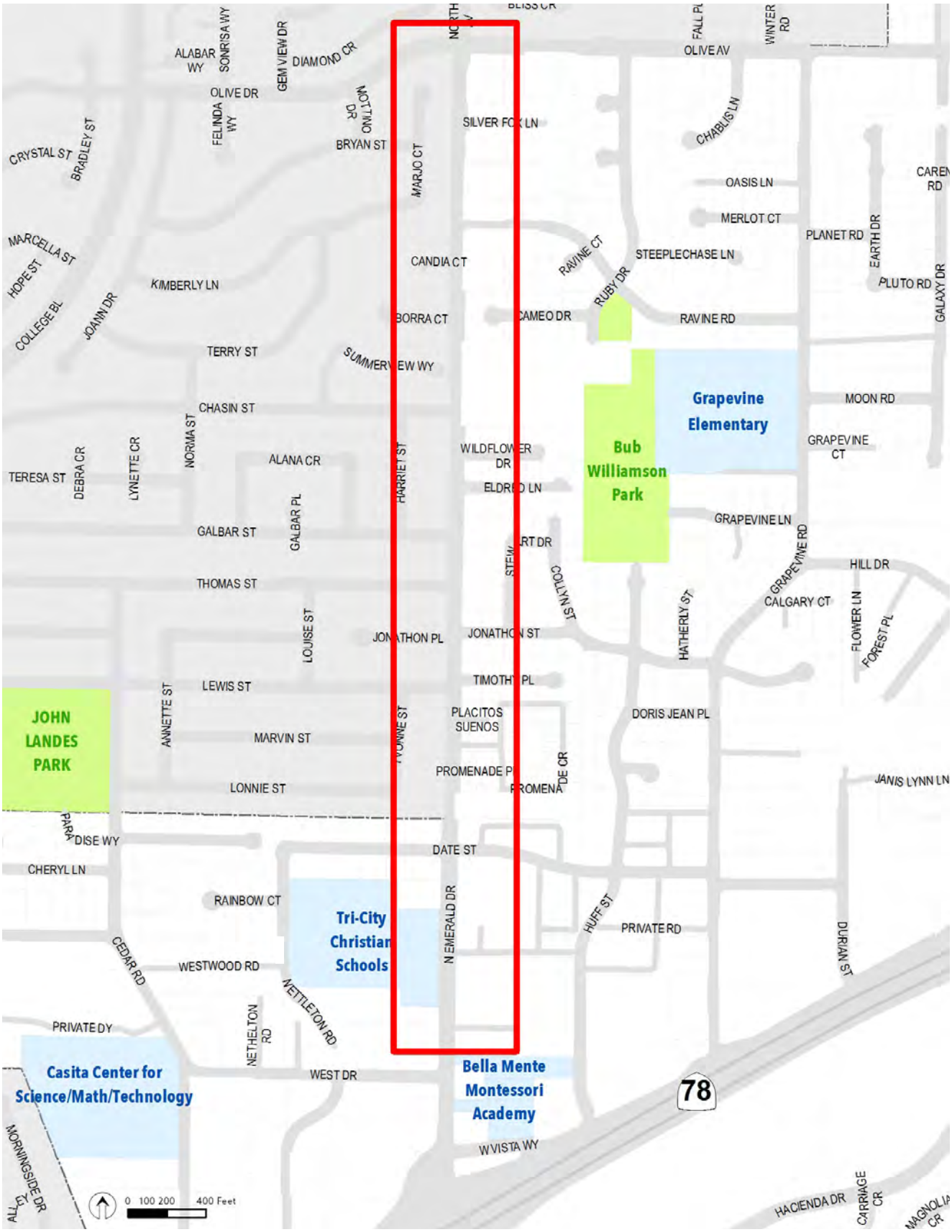


Figure 2-1: Project Location

Field Observations of Existing Deficiencies

Emerald Drive's issues are a barrier to access schools, parks and retail for the residents who have limited transportation options. While sidewalks are continuous on the west side, they are almost non-existent on the east side for most of the northern end of the corridor. The west side has a more consistent right-of-way, while the east side varies from block to block, leaving a disconnected sidewalk network. In addition, the lack of any traffic control discourages crossing Emerald Drive without pedestrians taking risks. Existing signalized crossings are also ¾-mile apart.

The corridor also lacks bicycle facilities to connect to adjacent bike lanes to access Grapevine Elementary and nearby parks, retail and employment centers. It serves as a connection between Oceanside and various parts of Vista.

Emerald Drive is also a bus route with limited amenities at the bus stops. Figure 2-2 is an exhibit and photos showing the existing conditions along Emerald Drive between Olive Avenue and West Drive.

The following items were observed:

- Sidewalk connectivity (including ADA accessibility)
- Lack of pedestrian crossing locations
- Varying right-of-ways
- Motor vehicle speed
- Bus stop conditions
- Topography
- User visibility
- Lack of bicycle facilities

Figure 2-2: Existing Condition Map and Photos

Signage directing pedestrians to Olive Avenue, the nearest traffic controlled intersection

Existing sidewalks on the west side

Rolling topography at Silver Fox Lanes and Ravine Road

Limited visibility for motor vehicles accessing Emerald Drive, lack of ADA access and sidewalks

Pedestrians walking into the street due to lack of sidewalks

Disconnected sidewalk network on east side

Lack of sidewalk connectivity on the east side

Lack of bus stop amenities

Varying right-of-way widths

Figure 2-2: Existing Condition Map and Photos (Cont.)

Lack of marked crosswalks on side streets

Lack of safe crossing locations and long crossing distances

Sidewalks with parkways on some sections of the east side

Merging from four lanes to two at Promenade Place

Signalized intersection at Date Street

Varying degrees of separation between pedestrians and motor vehicles on various segments

Figure 2-2: Existing Condition Map and Photos (Cont.)

Pedestrian Facilities

Sidewalks

Sidewalks are present the entire length of the west side of Emerald Drive, which falls within the City of Oceanside's boundary. As is shown on Figure 2-3, on the east side, sidewalks are intermittent and where they are present, are the result of installation by new development. Sidewalks are continuous between West Drive and Eldred Lane then disappear, only to be present one block north between Wildflower Court and Chasin Street. A short segment exists across Borra Court then disappears again to Silver Fox Lane, where sidewalks continue to Olive Avenue.

Crosswalks

There are no pedestrian crossings between Date Street and Olive Drive. At Silver Fox Lane, pedestrians are directed to cross at the Olive Avenue intersection. Bicycle and pedestrian counts were conducted at the intersections of Olive Avenue, Ravine Road, Wildflower Court, Jonathon Place/Jonathon Street, Lewis Street/Timothy Place, and Date Street. The differences in pedestrian volume activity between the west and east sides of the corridor reflect the need for connected sidewalks. At the locations where counts were conducted, pedestrian volumes on the west side, where sidewalks exist, were much higher than the east side. Pedestrians crossing Emerald Drive at uncontrolled intersections were also counted with most crossing at the Jonathon Place/Jonathon Street and Lewis Street/Timothy Place intersections. Figure 2-4 summarizes the pedestrian and bicycle counts. Within each count block, pedestrian represent the first number and bicyclist the second. Pedestrian and bicycle counts were conducted at 15-minute intervals for two 2-hour peak periods, which are 7 to 9 A.M. and 2 to 4 P.M. on February 20th, 2018.

Bicycle Facilities

Currently, there are no existing bicycle facilities along Emerald Drive. Bike lanes do exist on North Drive which connects to Emerald Drive at Olive Avenue. The highest volumes of bicycle use is at Olive Avenue where bike lanes exist along both Olive Avenue and North Drive.

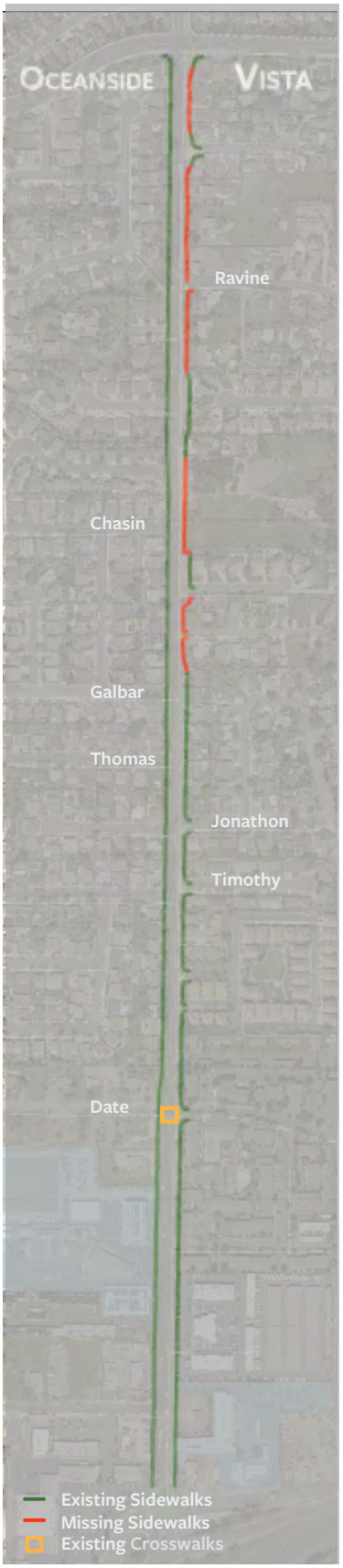


Figure 2-3: Existing Pedestrian Facilities

Figure 2-4: Bicycle and Pedestrian Counts

Transit

Route 323 travels along Emerald Drive with stops at West Drive, Promenade Place, Lewis Street, Chasin Street, Candia Court/Borra Court and at Silver Fox Lane, as is shown in Figure 2-5 . None of the stops along Emerald Drive have shelters or benches and those on the northbound lanes have limited sidewalk connectivity between them. In addition, crosswalks are non-existent for those that need to access the northbound line between the east side and west side. The only crossings that are designated are at Date Street and at Olive Drive, which are almost a mile apart.

Motor Vehicles

Existing vehicular movement was analyzed by conducting counts and a Level of Service (LOS) analysis at the major intersections. Figure 2-66 shows the existing LOS at five intersections with three resulting in poor LOS based on motor vehicle capacity. These three intersections do not have any traffic controls . This coincides with the input received that side street access to and from Emerald Drive is an ongoing challenge for residents. The other two intersections are signalized and the LOS is moderate to good.

Traffic volumes are fairly consistent throughout the corridor between Olive Avenue and West Drive and range between 23,800 and 25,200 average daily trips, with traffic predominantly accessing SR 78. A speed survey was also conducted with the 85th percentile varying between 34-38 MPH throughout the corridor with speeds slightly higher in the southbound lanes towards SR 78, which also has a downhill grade. The speed limit on Emerald Drive is 35 MPH. Please see Figure 2-6 for a summary of speed survey and traffic volumes.

Caltrans signal warrants were analyzed for all major intersections with only Lewis Street/Timothy Place and Jonathon Place/Johnathon Street meeting warrants. For more detail on traffic analysis, please see appendix.

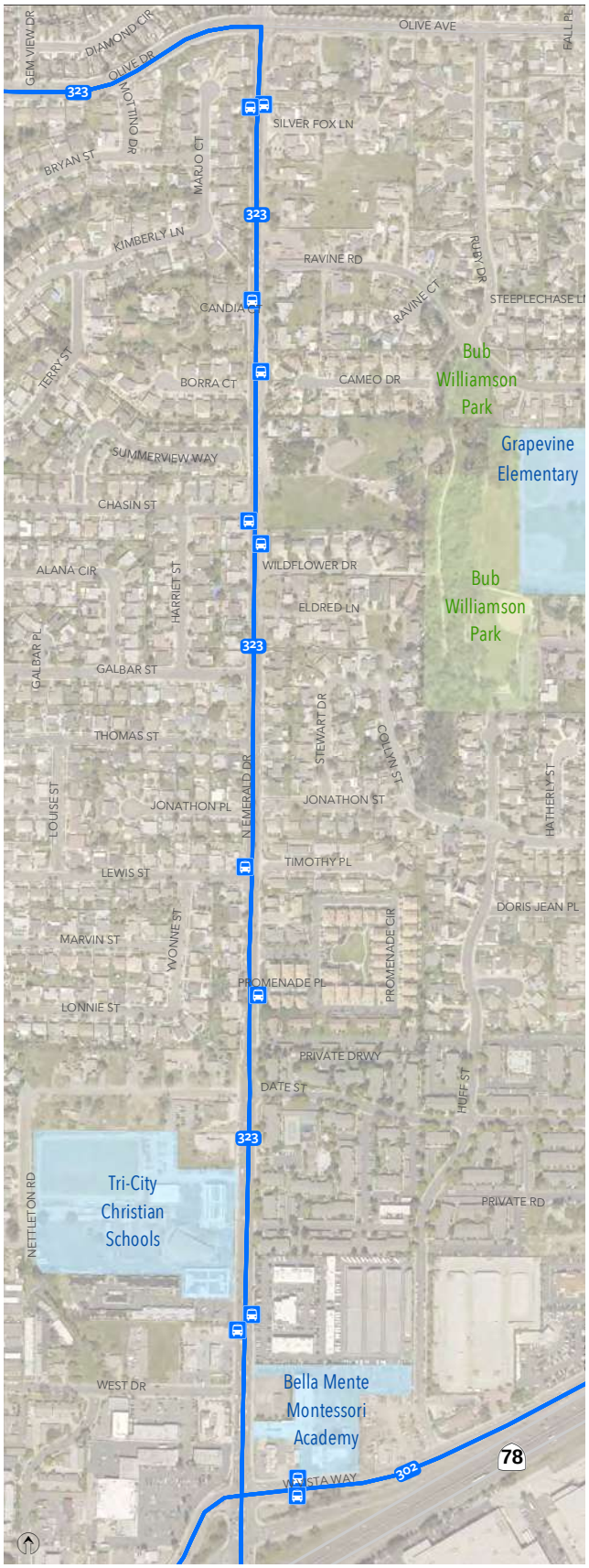


Figure 2-5: Transit Lines and Stops

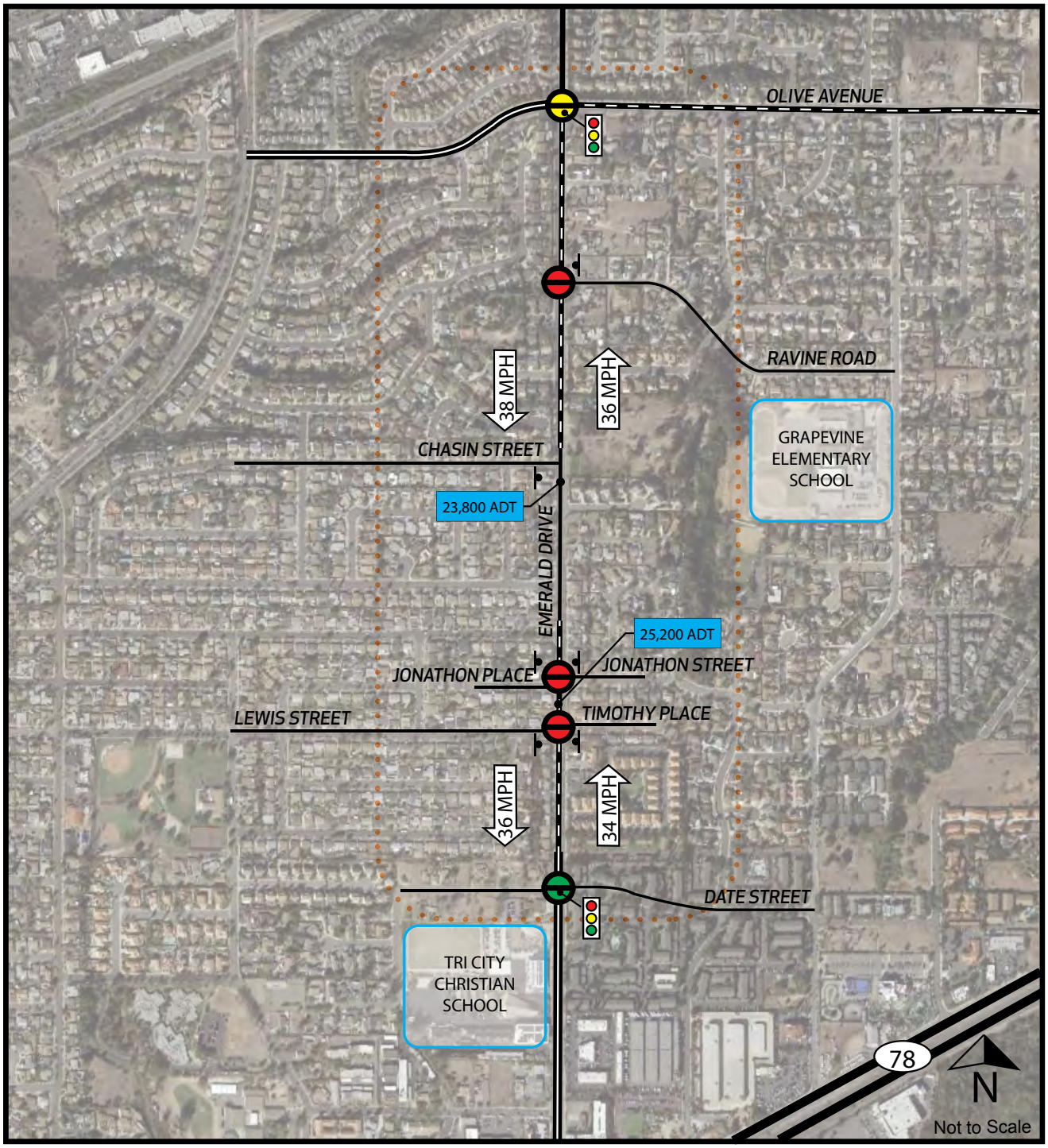


Figure 2-6: Existing Level of Service (LOS)

Land Use

Land use along Emerald Drive is primarily single family residential with several blocks of homes fronting the street. Multi-family residential exists south of Promenade Circle, in addition to two schools, Tri-City Christian School and Bella Mente Montessori Academy. Commercial land use is also present on the southern end of Emerald Drive. Within a few blocks from Emerald Drive are two parks, John Landes Park in Oceanside and Bub Williamson Park in Vista. A new single-family housing development is planned to be built across from Chasin Street. Grapevine Elementary is east of Emerald Drive and can be accessed from Ravine Road and Jonathon Street. Please see Figure 2-77.

Current Land Use (SANDAG)

Planned Land Use (SANDAG)

Figure 2-7: Existing and Future Land Use

Collision Analysis

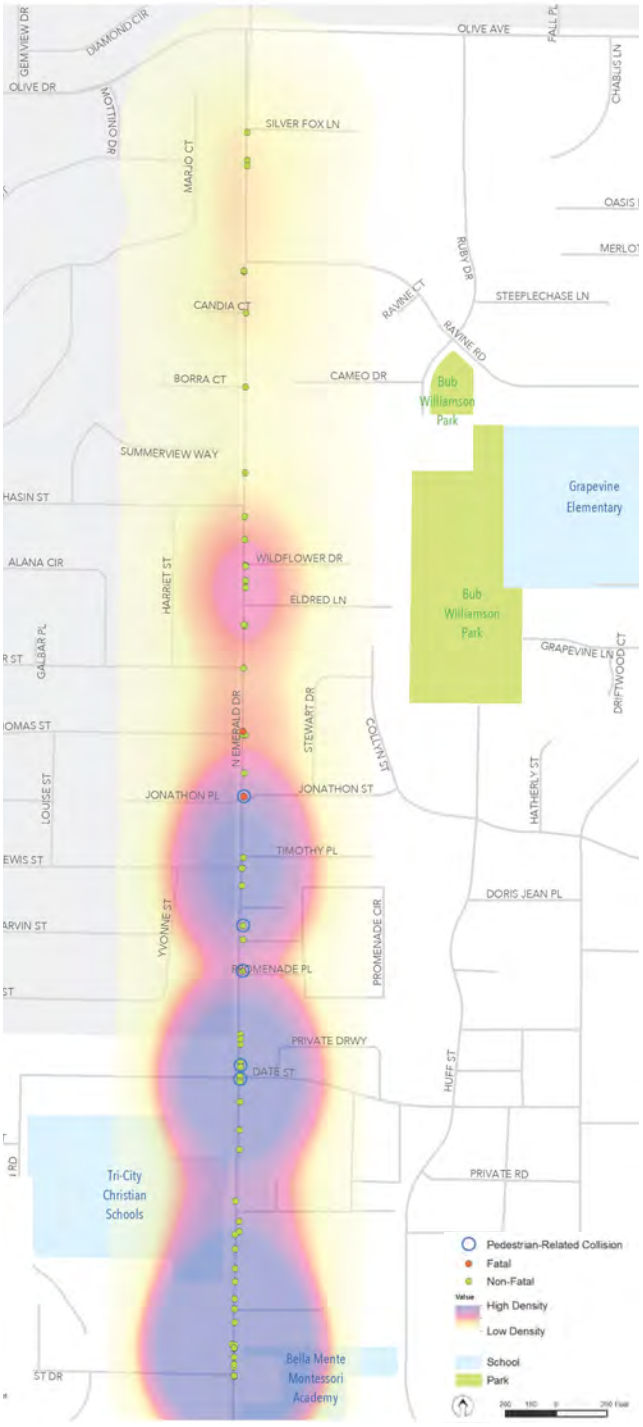
Data was collected through the City's Crossroads database to analyze the collision trends between 2012-2016. There have a been total of 79 collisions reported with two fatalities and 44 injuries in the five-year span. As is shown in Figure 2-8 , one fatality occurred at the intersection of Thomas Street which was classified as a DUI and one at Jonathon Place where a pedestrian was killed crossing Emerald Drive.

Most of the collisions have occurred on the southern end of the corridor primarily between Promenade Place and SR 78. Fifty-three percent of all collisions and three of the five pedestrian collisions have occurred between Promenade Place and West Drive.

The top causes of collisions involve speeding, improper turning and violating other vehicle's right of way. These cases coincide with the input received during the public outreach process. There is no traffic control between Olive Avenue and Date Street allowing vehicles to keep a constant speed throughout and preventing bicyclists and pedestrians the ability to cross Emerald Drive safely. These types of collisions coincide with the causes with broadside and rear- end collisions being by far the most prevalent type of collision.

Property damage and hitting parked cars is also common along Emerald Drive. During the community workshops, residents spoke about vehicles crashing into their properties. There have been 18 occurrences of collisions with property or a fixed object such as a telephone pole, parked car or a home.

Figure 2-9 and Figure 2-1010 summarize the various collision characteristics provided by the Crossroads data for all collision types and Pedestrian-related collisions.



78 Total Collisions, 2012-2016

Figure 2-8: Emerald Drive Collision Heat Map

All Collisions (78 total)

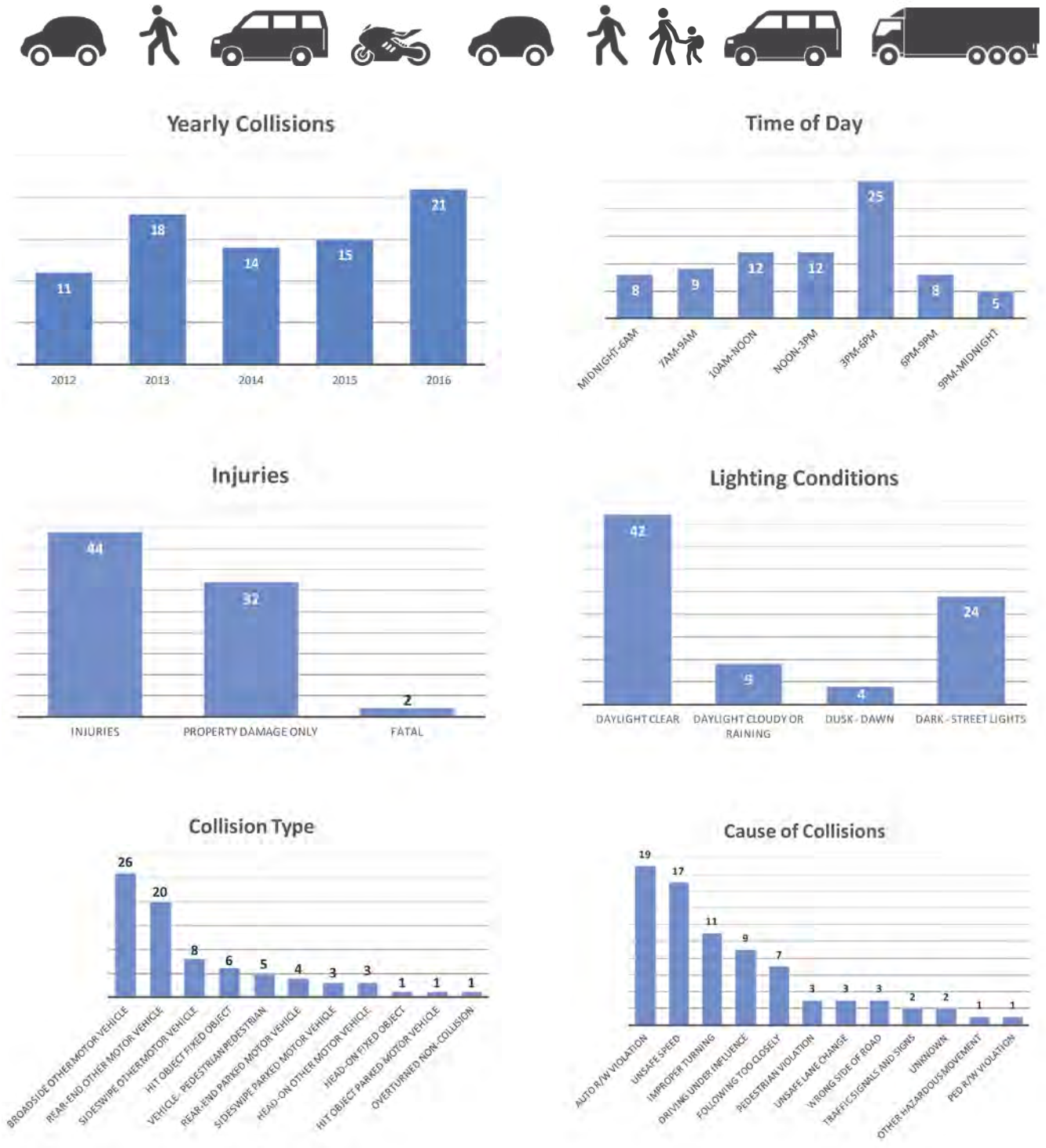
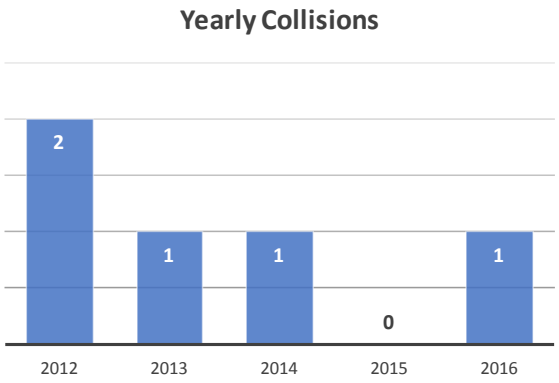
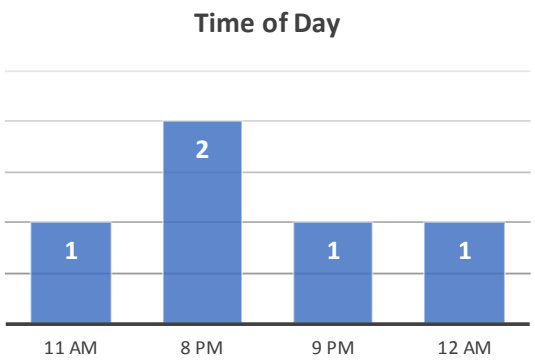
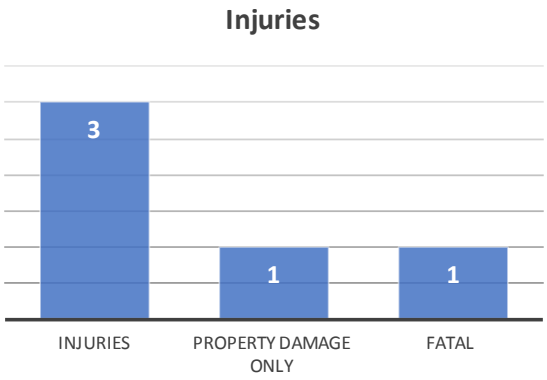


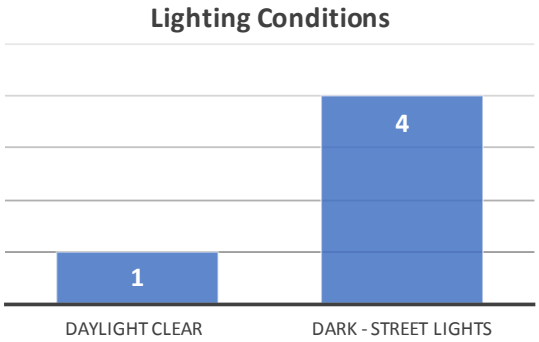
Figure 2-9: Diagrams of All Types of Collisions

Pedestrian-related Collisions (5 total)









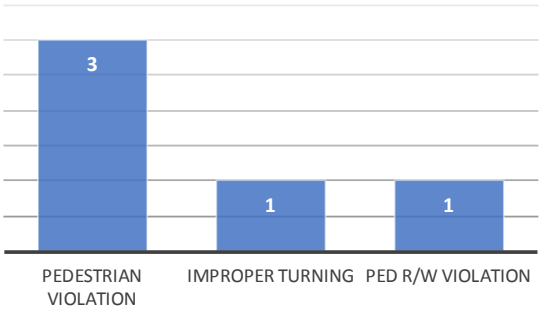
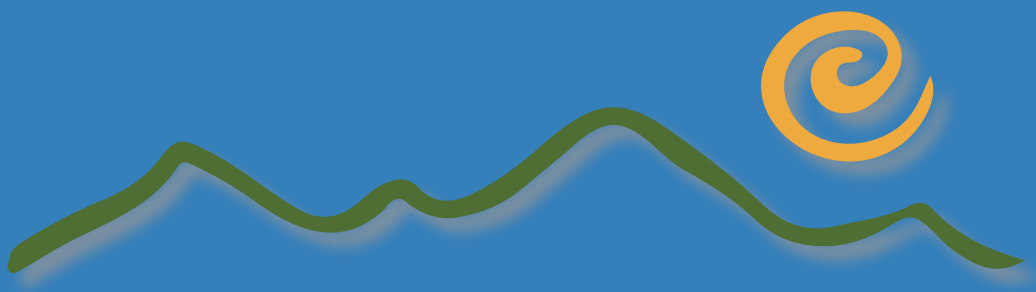


Figure 2-10: Diagrams of Pedestrian Collisions Only

3 Alternative Analysis



Alternatives

The concerns of residents along Emerald Drive and adjoining neighborhoods have been brought to the City on a recurring basis over the years, which has led to this corridor study. Prior to conducting community engagement, a series of alternative ideas had already been discussed leading up to this project to be included as part of a screen check exercise to expedite the alternative design process and to present ideas at the community workshops. Alternatives included recommendations from the city's General Plan, Bicycle Master Plan and input from concerned residents about safety, speed, pedestrian and bicycle connectivity and congestion. The following concepts were discussed to analyze as possible solutions.

Alternative 1: 2-lane road with roundabouts, parking, sidewalks and buffered bike lanes (R/W = 66')

Alternative 2: 2-lane road with traffic signals, parking, sidewalks and buffered bike lanes (R/W = 66')

Alternative 3: 2-lane road with center turn lane, roundabouts, half street parking, sidewalks and bike lanes (R/W = 56')

Alternative 4: 2-lane road with center turn lane, traffic signals, half street parking, sidewalks and bike lanes (R/W = 56')

Alternative 5: 4-lane road with traffic signals, sidewalks, and bike lanes (R/W = 66')
(*Proposed in the Vista General Plan 2030 Circulation Element*)

Alternative 6: 4-lane road with center turn lane, sidewalks and traffic signals (R/W = 64')

Screen Check

The alternative screening process consists of a series of criteria and weighting factors to analyze the alternatives that best meet the goals of the project. Criteria includes:

a. Constrained Right-of-Way: Criteria based on the encroachment into adjacent private properties to implement the alternative. A higher score is given to alternatives with little or no impact.

b. Pedestrian Comfort: Criteria that addresses installing continuous sidewalks, number of travel lanes (crossing opportunities), signal control and additional separation from the travel lanes, such as on-street parking, planting buffers, and bike lanes.

c. Traffic Calming: Criteria addresses traffic control, edge friction such on-street parking and bike lanes, and number of lanes.

d. Side Street Access: Criteria that addresses traffic control for exiting and entering side streets, and two-way left turn lanes.

e. Bicycle Comfort: Recommends bicycle facilities with higher score for additional separation from travel lanes such as buffered bike lanes.

f. Vehicular Safety: Criteria address speed reduction based on lane configurations to reduce collisions.

g. Existing and Future Capacity: Criteria based on motor vehicle capacity and LOS.

A weighting factor of 1 or 2 provided a scale of importance based on public input to best balance the city's goals for the corridor with those of the residents. Once applied, the top two alternatives moved into design development with the third option being the option proposed in the General Plan. Please see Table 3-1 for more detail. The following sections describe the three alternatives in more detail.

Michael Baker INTERNATIONAL

CRITERIA	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
RIGHT OF WAY						
Additional R/W Needs (Not at Intersections)						
	High	Moderate	High	High	Moderate	Moderate
PEDESTRIAN COMFORT						
Alternative include a combination of sidewalks, bike lanes, buffered bike lanes, parking, number of lanes, traffic signal or roundabout						
	High	High	Moderate	Moderate	Low	Low
TRAFFIC CALMING EFFECT						
Alternative include a combination of bike lanes, buffered bike lanes, parking, number of lanes, traffic signal or roundabout						
	High	Moderate	High	Moderate	Moderate	Low
SIDE STREET ACCESS						
Existing Side Street Access is provided by center left turn lanes for a majority of the corridor						
	High	Moderate	High	Moderate	Low	Moderate
BICYCLE COMFORT						
Alternative include Existing Bicycle Facilities						
	High	High	Moderate	Moderate	Moderate	Low
VEHICULAR SAFETY						
Various vehicualr safety countermeasures, includes reduction of lanes, incorporation of bike lanes and/or parking						
	High	High	Moderate	Moderate	Moderate	Low
EXISTING (2018) CAPACITY AND SERVICE						
Vehicle/Capacity Ratio and LOS						
	Low	Low	Low	Low	Low	High
FUTURE (2035) CAPACITY AND SERVICE						
Vehicle/Capacity Ratio and LOS						
	Low	Low	Low	Low	Low	High
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Results	**High**	**High**	**High**	**Moderate**	**Low**	**Low**

Table 3-1: Alternative Screening Results

Alternative No.1

Alternative No.1 consists of keeping two travel lanes, constructing raised medians and roundabouts at all the major intersections from Lewis Street/Timothy Place to Silver Fox Lane. The roundabouts provide access to side streets while also allowing U-turns for left turn driveway access that will be restricted by the raised medians. The lanes are narrowed for additional traffic calming. At all the roundabouts, high-visibility pedestrian crossings and curb extensions would provide an additional twelve crossing locations throughout the corridor. In addition, sidewalk gaps would be completed on the east side of Emerald Drive to provide a continuous north-south pedestrian facility within the City of Vista. Planting buffers and on-street parking are also added where space is available to provide additional pedestrian separation from the travel lanes.

Buffered bike lanes would be installed along the longer, uninterrupted stretches of Emerald Drive to help narrow the lanes and provide additional separation for bicyclists. The bike lanes would transition into Shared Lane Markings ("Sharrows") prior to entering the roundabouts to line up with vehicles single-file through the roundabout. Green transition striping would be installed where bike lanes travel past smaller side streets and larger commercial driveways.

Between Date Street and West Drive, on-street parking is removed to add bike lanes with intersections remaining the same as current conditions, except for high-visibility crosswalks, adjustment in signal timing for pedestrians and green bike lane intersection striping.

Between Olive Avenue and Silver Fox Lane, a bike lane is added to connect to the existing bike lanes north of Olive Avenue with green transition striping. High visibility crosswalks were also added.

The bus stop between Jonathon Place and Lewis Street is moved north almost equidistance between the two intersections to provide the additional space needed for the roundabout and curb extensions. With the new space provided by the curb extensions, bus boardings and alightings can be conducted without impeding traffic flow. Figure 3-1 shows Alternative No.1.

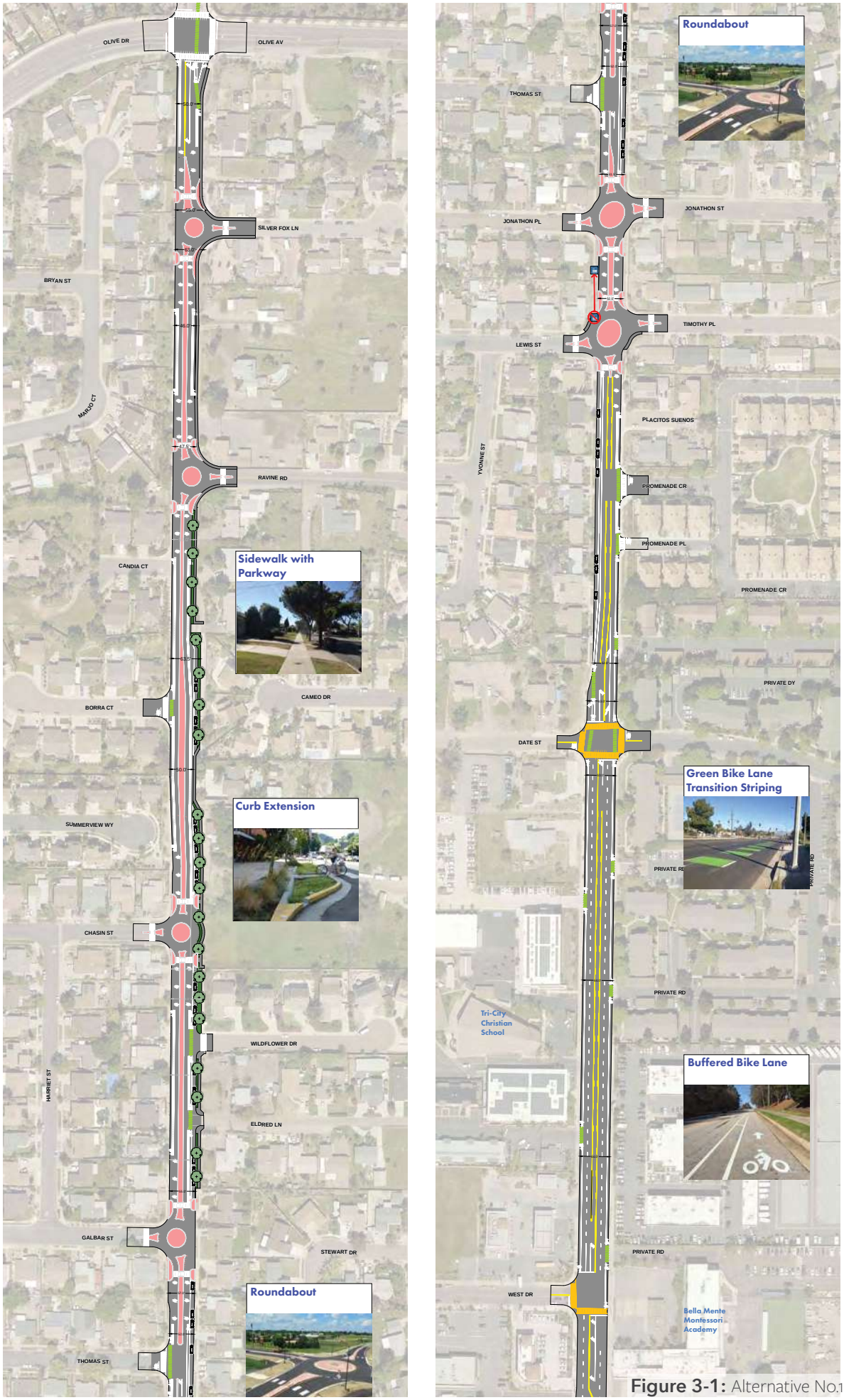


Figure 3-1: Alternative No.1

Alternative No.2

This alternative entails a minor modification from Alternative No.1. This alternative is a hybrid of roundabouts and traffic signals. Signal warrant analysis was conducted for all the intersections in the study area and only the Lewis Street/Timothy Place and Jonathon Place/Jonathon Street intersections met any warrants for a traffic signal. These intersections were also the locations that most participants wanted to see pedestrian crossings due to access to the John Landes Recreation Center in Oceanside and Grapevine Elementary in Vista. Traffic signals are recommended at these two intersections for this alternative, instead of roundabouts.

High visibility crosswalks and green bicycle transition lanes were also recommended. The bus stop between Jonathon Place and Lewis Street is also moved north almost equidistance between the two intersections. With the space provided by the buffered bike lanes, boardings and alightings can be conducted without impeding traffic flow. Figure 3-2 highlights the difference between Alternative No.1 and No.2.

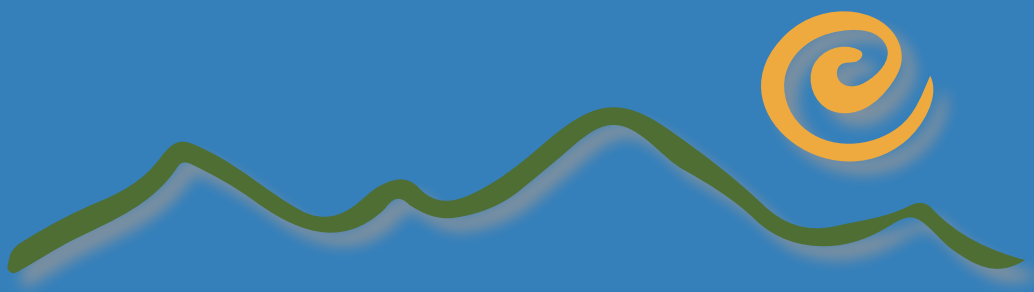
Figure 3-2: Alternative No.2

Alternative No.3

Alternative No.3 is a combination of the City's General Plan designation and Bicycle Master Plan's recommendation for bike lanes. This alternative keeps the 64' right-of-way from West Drive to Olive Avenue, with four travel lanes, a center-turn lane and 5' bike lanes. Figure 3-3 shows Alternative No.3.

Figure 3-3: Alternative No.3

4 Community Engagement



Community Engagement Overview

Community engagement consisted of two interactive workshops to listen to the residents, schools and local business and develop ideas for improvements along Emerald Drive. Both workshops were conducted at the City's Civic Center. The first workshop was held on March 21, 2018 and focused on introducing the project and gathering issues and concerns. The second workshop was held on April 11, 2018 and presented the three alternatives discussed above based on the feedback from the first workshop for participants to review and provide input.

A variety of outreach materials was designed to maximize community engagement. Because of Vista's multi-generational, Spanish-speaking population, all outreach materials were in English and Spanish. Materials that were developed included flyers and announcements that were published via appropriate City communication outlets. Figure 4-1 shows an example of the bilingual flyers created for the workshops. The City also sent notices to property owners and residents within 500 feet of Emerald Drive for each workshop.

Both workshops include a presentation in the beginning, some exhibit boards showing statistics and overall information about the corridor, and large table maps as well as exemplary practice sheet on ea ch table to encourage participation and invite people to share their thoughts during the workshop activities. Figure 4-2 illustrates how these engagement tools are used through a typical workshop scene. Other materials used at the workshops to engage the attendants and obtain input included flyers and comment cards.

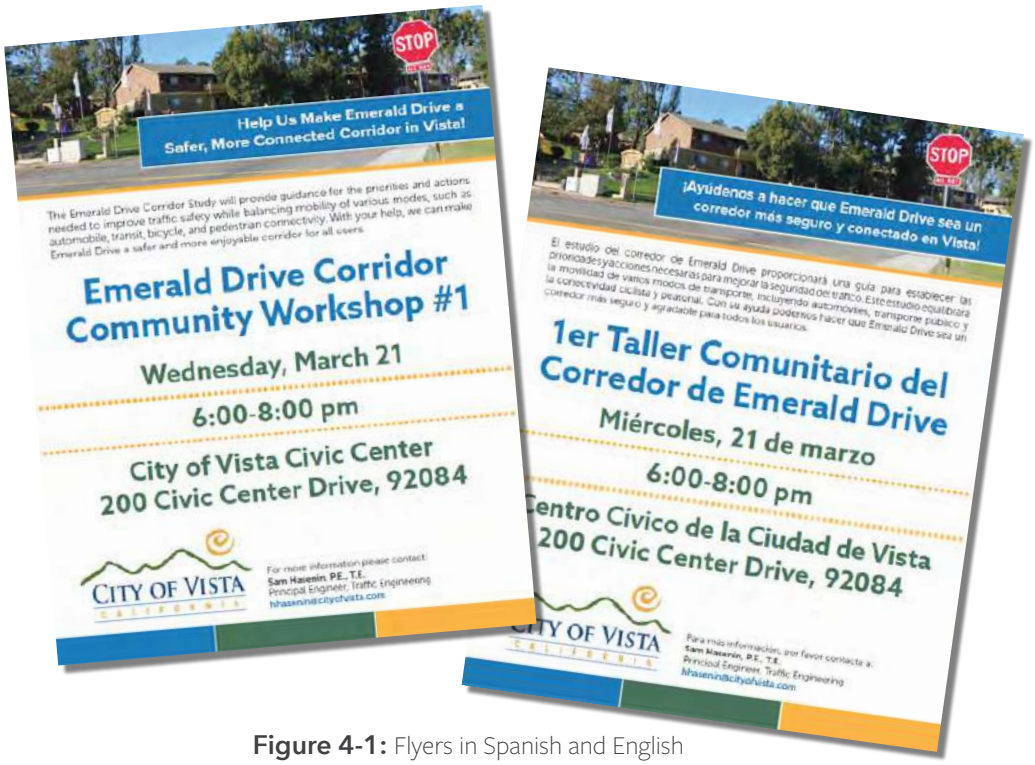


Figure 4-1: Flyers in Spanish and English

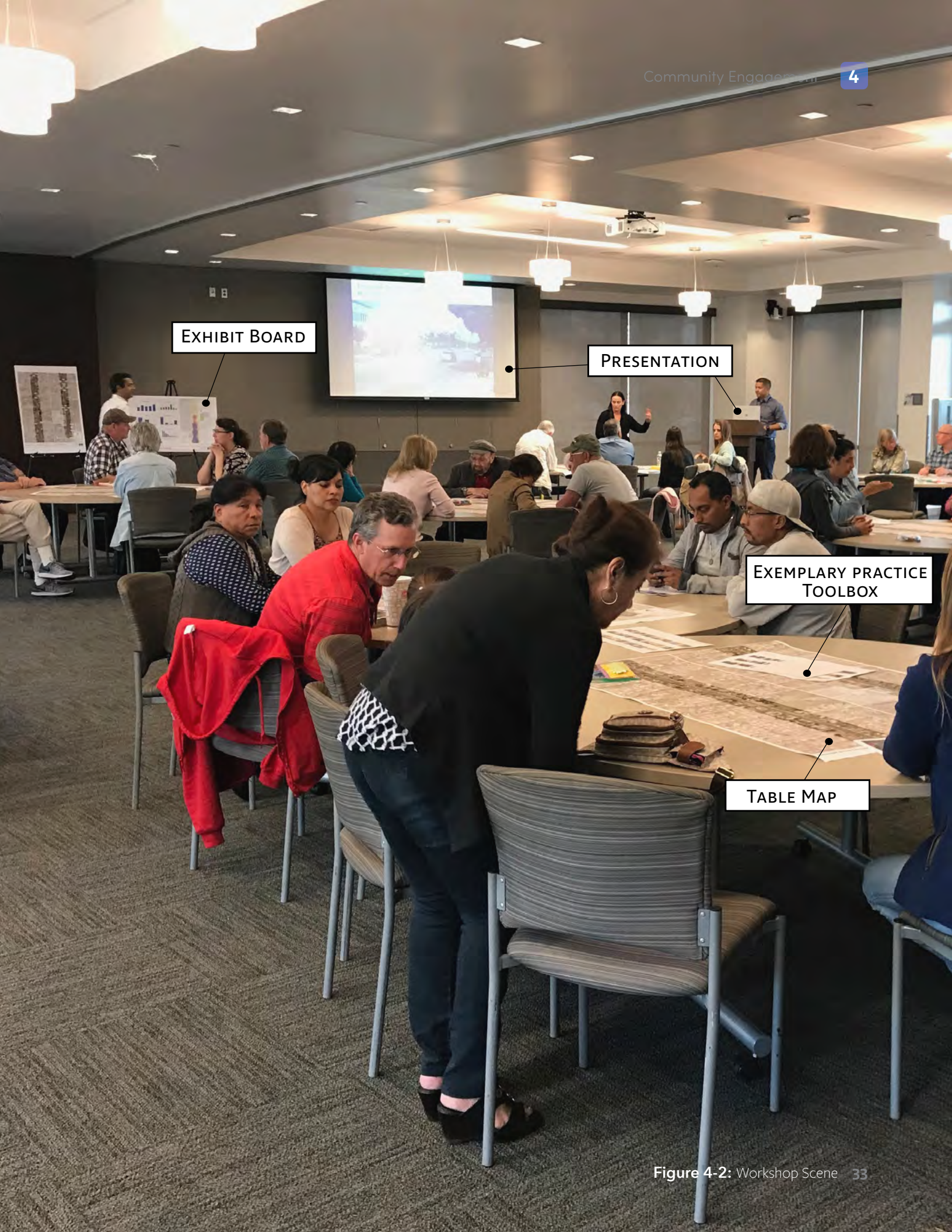


Figure 4-2: Workshop Scene

Community Workshop No.1

Date: March 21, 2018, 6:00-8:00 pm. Announced February 28, 2018.
Format: Round Table Discussion

The agenda for Workshop No.1 consisted of a brief presentation introducing the project and the project's goals, objectives, timeline and two exercises. The first exercise asked attendees to review existing conditions and discuss challenges they are experiencing throughout the corridor. Each table then collaborated to prioritize their highest concerns and reported their results to the rest of the group. The second exercise consisted of discussing possible solutions to the priority issues raised in the first exercise. Once each table came to a consensus on the various solutions, they again reported their results to the rest of the group.

Workshop attendance was very successful with over 40 attendees of all ages. Attendees were primarily residents along Emerald Drive and adjacent streets. Representatives from Tri-City Christian School and Grapevine Elementary were also present to discuss concerns around their campuses. In addition, Mayor Judy Ritter was present, participating in the table exercises and providing additional support for the project. As is shown in Figure 4-3, residents were active and speaking up at the event.

Figure 4-3: Photos from Workshop No.1

Figure 4-3: Photos from Workshop No.1 (Cont.)

Workshop No.1 Results

The workshop collected valuable inputs from local residents. Residents discussed and wrote about their location-specific comments on sticky notes and placed them on the table map, as is shown in Figure 4-5. Figure 4-4 shows the summarized results in charts, which highlights speeding as the No. 1 issue along the corridor, followed by the lack of pedestrian crossing and sidewalks. Residents are expecting more crosswalks and sidewalks, more traffic light and roundabouts to slow the traffic. Galbar Street is the cross street that received the most complaints and comments.

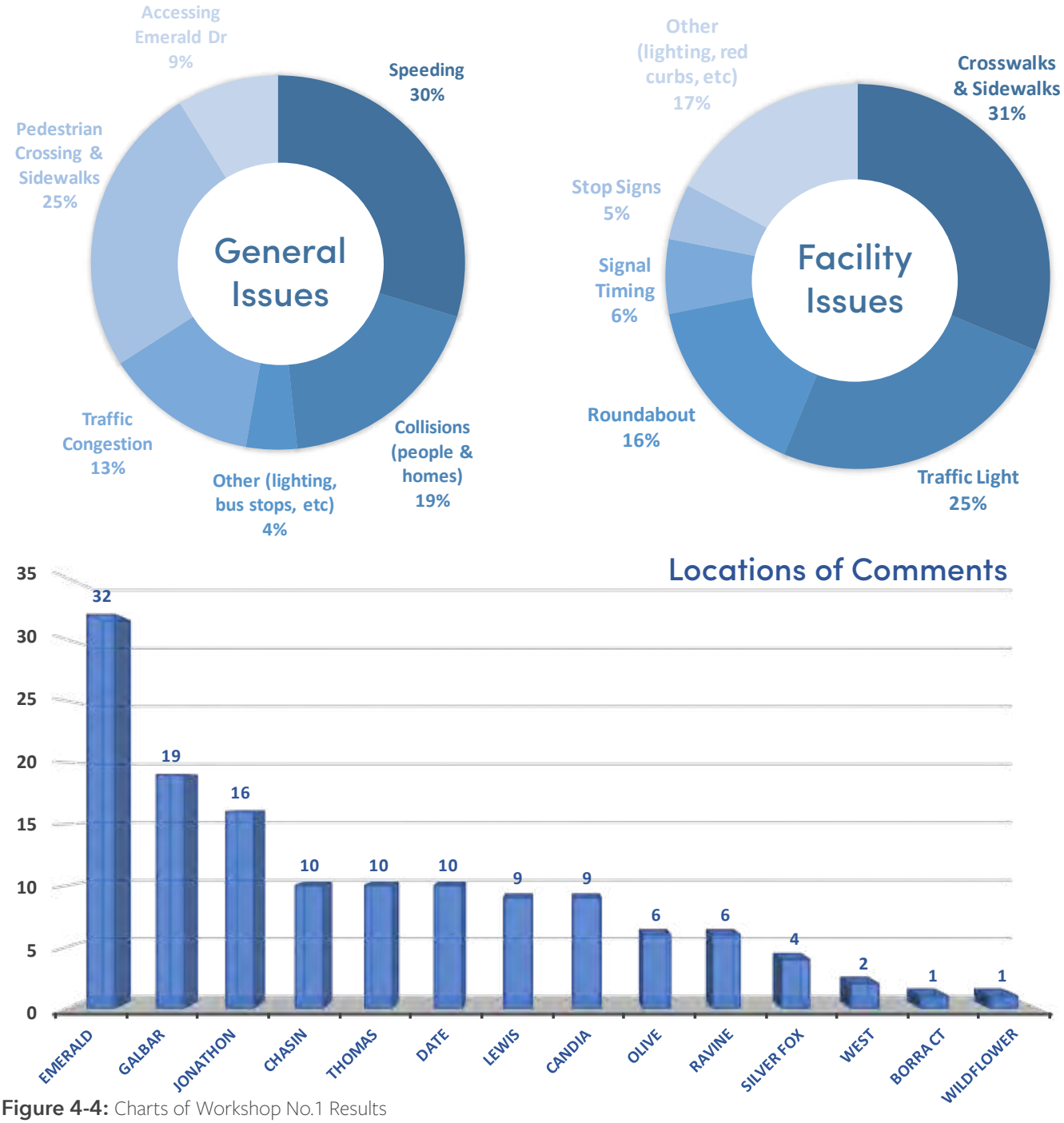


Figure 4-4: Charts of Workshop No.1 Results

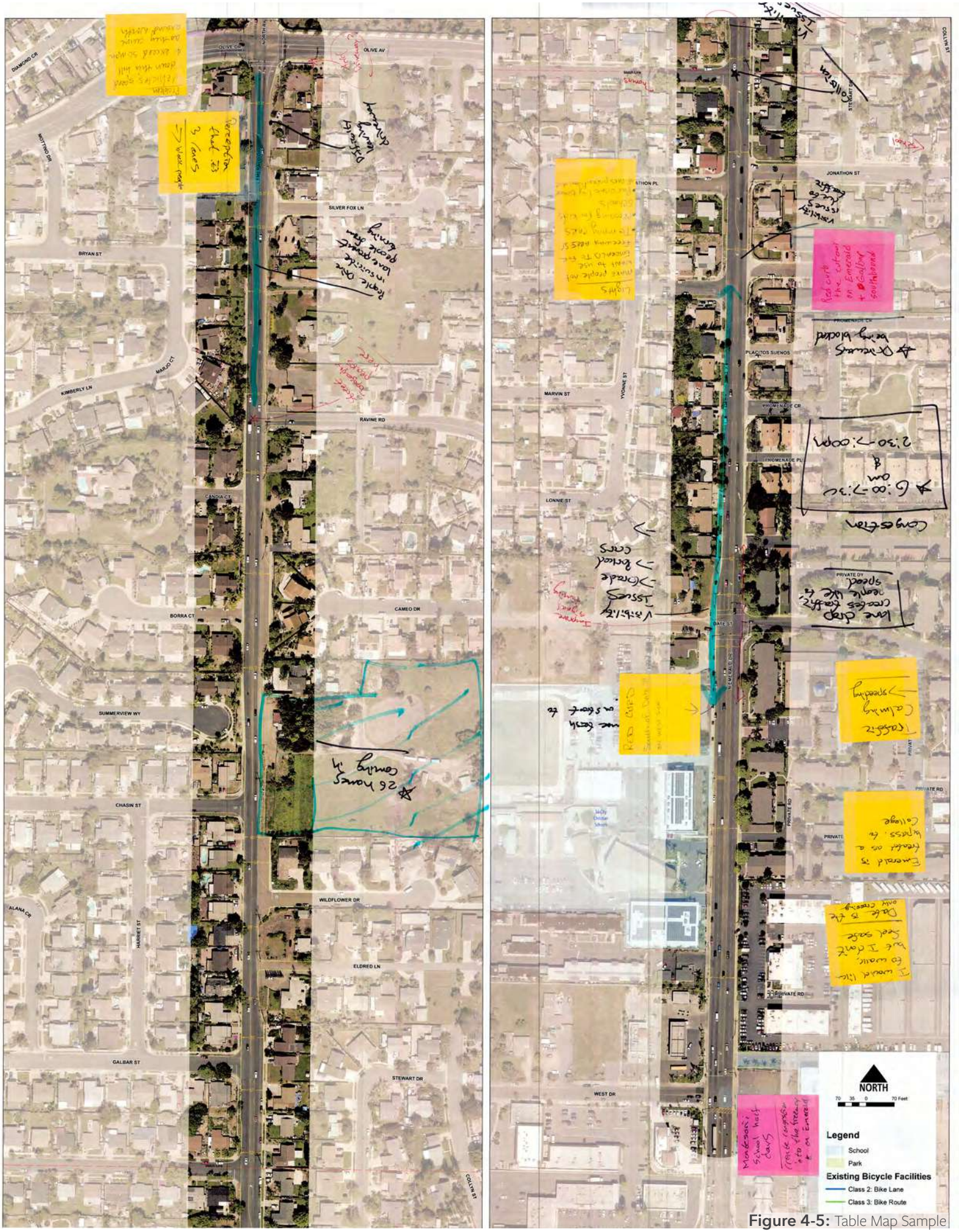


Figure 4-5: Table Map Sample

Community Workshop No.2

Date: April 11, 2018, 6:00-8:00 pm. Announced March 21, 2018.
Format: Open House Workshop

The second workshop was less formal and consisted of a brief presentation stating the project's goals, objectives, timeline and results of the first workshop. This open house format allowed participants to view the three alternatives developed for the corridor. Due to the expected attendance, two tables with the conceptual drawing of each alternative were set up to allow room to move about and discuss the improvements with other attendees and city and consultant staff. As is shown in Figure 4-6, participants were given a series of dots to vote on the individual treatments they liked and write down other things they would like to see.

Since the goal of this workshop was to come to a consensus on a preferred alternative, one star was given to each participant to vote on their preferred alternative. This exercise proved to be very enlightening as some participants moved their star from one alternative to another after learning the pros and cons of each and discussions with their neighbors and other participants. Over 50 participants attended this final workshop with Mayor Judy Ritter in attendance, as well as Council Members Joe Green and Amanda Young Rigby.

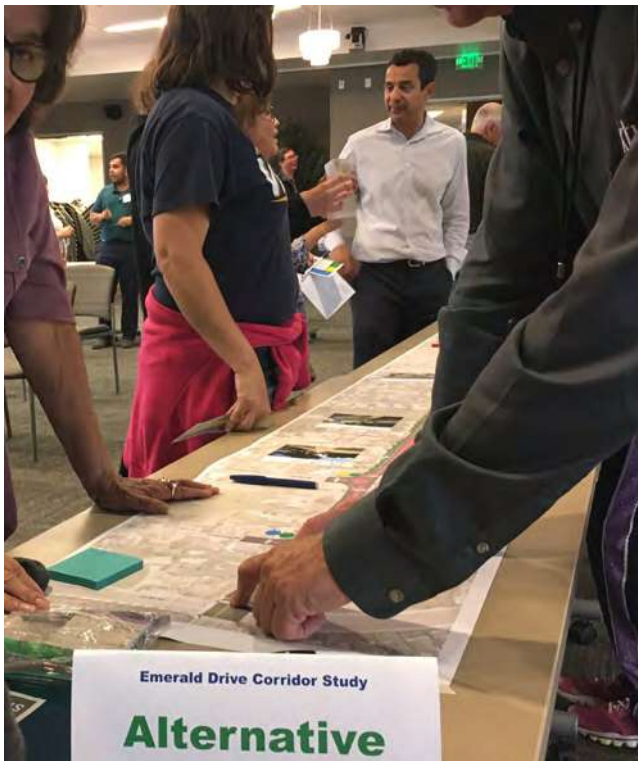


Figure 4-6: Photos from Workshop No.2

Figure 4-6: Photos from Workshop No.2 (Cont.)

Workshop No.2 Results

- Alternative No.1: Roundabouts and bike lanes - 28 stars
- Alternative No.2: Roundabouts, traffic signals and bike lanes - 22
- Alternative No.3: General Plan designation and bike lanes - 2

The workshop collected votes and comments from local residents, both for the overall alternative plans and specific treatments at various location. Figure 4-8 shows both ways of voting. Most residents first walked through the entire stretch of the corridor, placed dots and sticky notes to the treatments on the table map, and then came to the end of the map and voted for their favorite alternative.

As a result of the voting exercise for the overall alternatives, Alternative No.1 received the most votes and was selected as the overall concept to refine and move forward with. Alternative No.2 also got many votes, yet roundabouts turned out to be more favorable among residents comparing to traffic signals. In terms of location-specific comments, Galbar Street remains to be the intersection with the most attention and discussion. Participants voted to express their support for the proposed roundabout. Please see Figure 4-7 for the location specific voting results.

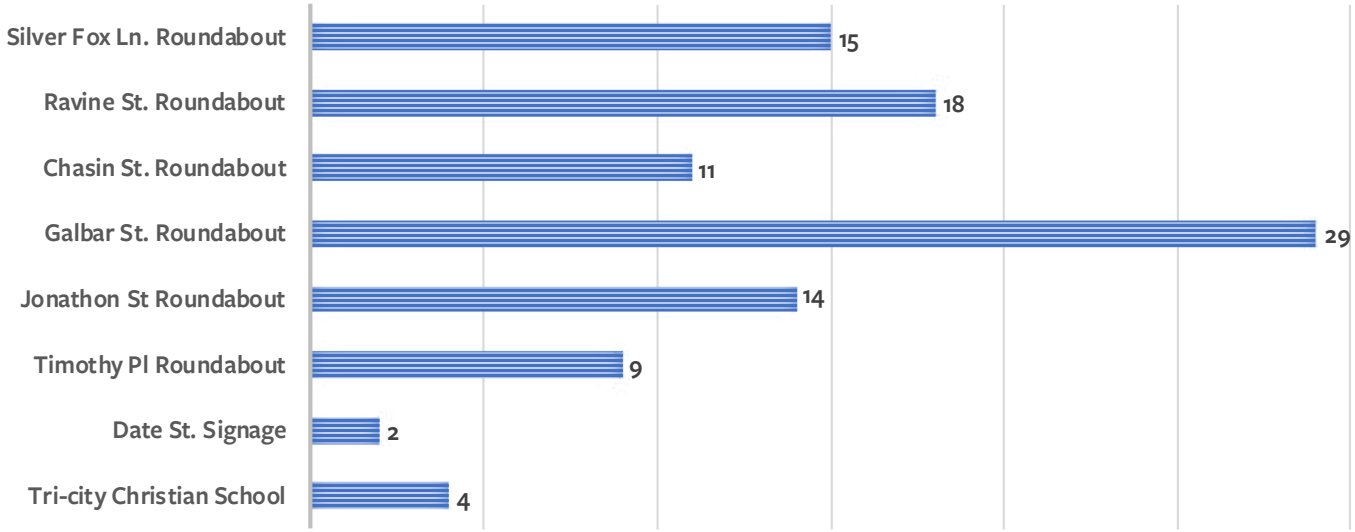


Figure 4-7: Workshop No.2 Results Chart

Figure 4-8: Workshop No.2 Voting Results

Consolidated General Comments

Figure 4-9 summarized all the comments to guide the refinement of the final alternative. The numbered blue dots indicates the amount of votes the location received from the workshop table map. Comments may apply to specific location or a stretch of the corridor.

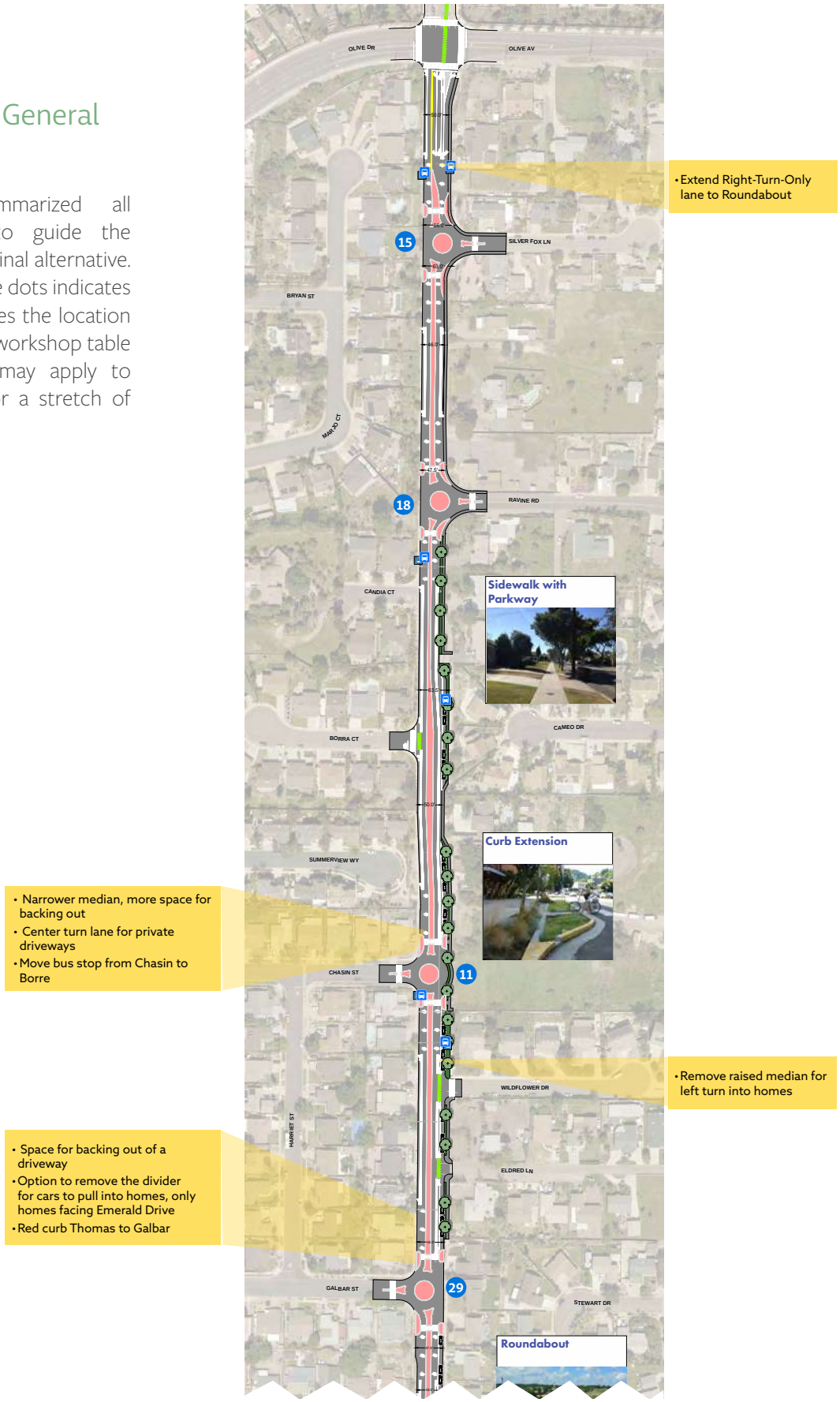


Figure 4-9: Alternative No.1 Consolidated Comments (Olive Dr to Galbar St)

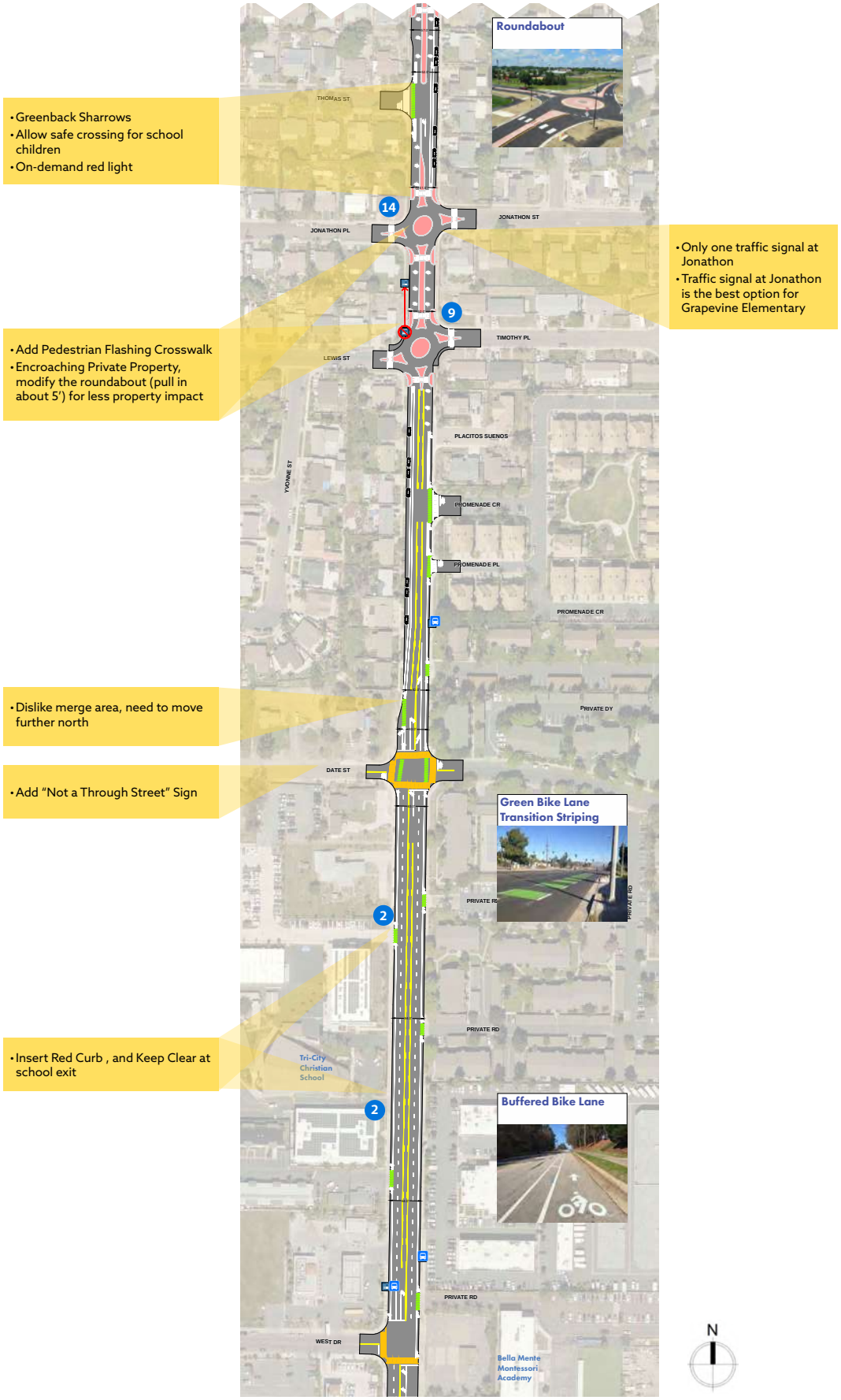
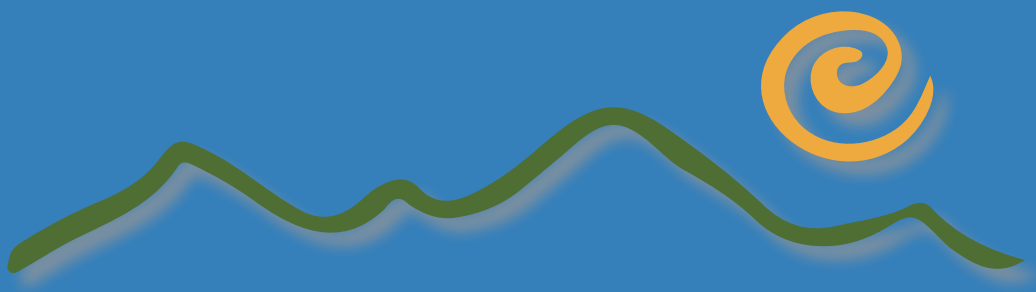


Figure 4-9: Alternative No.1 Consolidated Comments (Galbar St to West Dr)

5 Final Alternative



Final Alternative

Once Alternative No.1 was selected, refinement to the concept was conducted. This alternative consists of keeping two travel lanes, raised medians and roundabouts at all the major intersections from Lewis Street/Timothy Place to Silver Fox Lane. Intersections at Silver Fox Lane and Ravine Road are reconfigured to provide shorter pedestrian crossing distances and to accommodate the roundabouts. A right-turn-only lane has been added at Olive Avenue due to the excessive motor vehicle queuing at Silver Fox Lane for vehicles turning right. The bike lane continues from Silver Fox Lane to Olive Avenue with green transition lanes continuing to North Avenue. Green back sharrows have also been added leading into the roundabouts

This final alternative was further analyzed for level-of-service to see if existing and future conditions improve with roundabouts versus the existing configuration. Eight intersections and three roadway segments were analyzed along Emerald Drive under Existing and Horizon Year 2035 conditions with and without proposed improvements. The analysis shows six of the eight study intersections are currently operating at deficient levels of service (LOS E or F). The reason for the deficient levels of service at the one-way and two-way stop controlled intersection is due to the high delay motorists experience on the minor street approach. Because of the proposed improvements and roundabouts, all of the study intersections are expected to operate at acceptable levels of service except at Emerald Drive/Thomas Street which will remain a one-way stop controlled intersection. The roadway segment analysis under Existing and Existing with Proposed Improvements conditions show all study segments operate at acceptable levels of service.

Under Horizon Year 2035 Without Proposed Improvements condition, the analysis shows seven of the eight study intersection are forecast to operate at deficient levels of service (LOS E or F). However, with the proposed improvements and roundabouts, all of the study intersections are forecast to operate at acceptable levels of service except at Emerald Drive/Thomas Street which remains a one-way stop controlled intersection and Emerald Drive/Olive Avenue. The project is restriping the northbound approach at Emerald Drive/Olive Avenue to allow more vehicle storage for queuing which does not improve the delay and LOS during the AM peak hour. The roadway segment analysis under Horizon Year 2035 With and Without Proposed Improvements conditions show all study segments operate at acceptable levels of service.

Overall, the proposed improvements are anticipated to improve the operations and safety of Emerald Drive for all users including motorists, pedestrians, bicyclists and transit users.

Not only does through traffic travel at a more efficient rate along Emerald Drive, better access to and from the side streets is also more efficient and safer. For more detail on the traffic analysis, see Appendix A.

The following figures show the conceptual design, cross-sections and cost estimates.

Figure 5-4: Layout of the Final Alternative

Layout and Sections

Silver Fox Ln. to Galbar St.

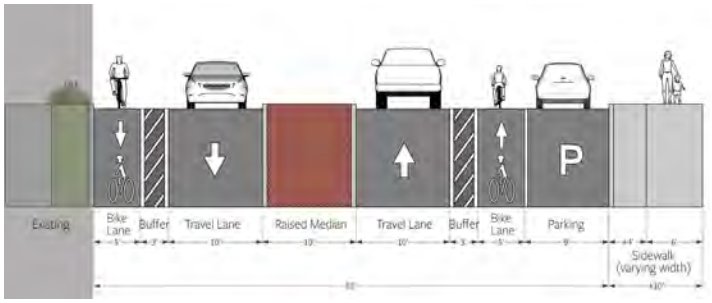


Figure 5-1: Sample Section of Buffered Bike Lane

South of Date St.

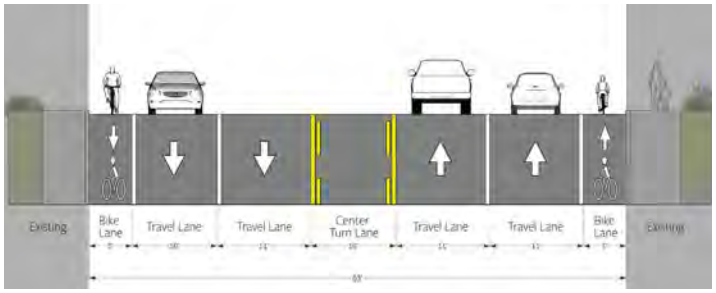


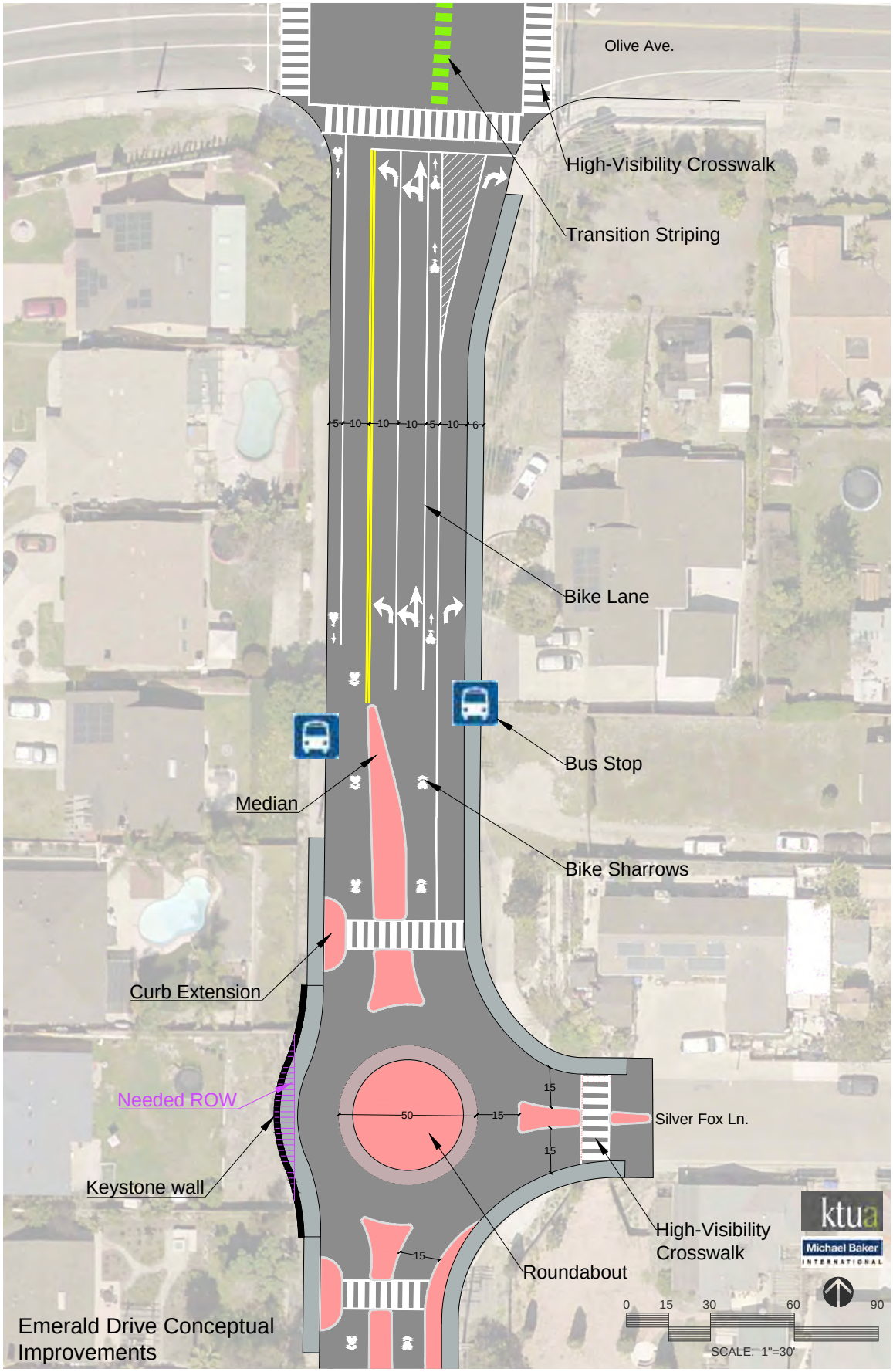
Figure 5-2: Sample Section of Bike Lane

3-Way Roundabout at Galbar St.

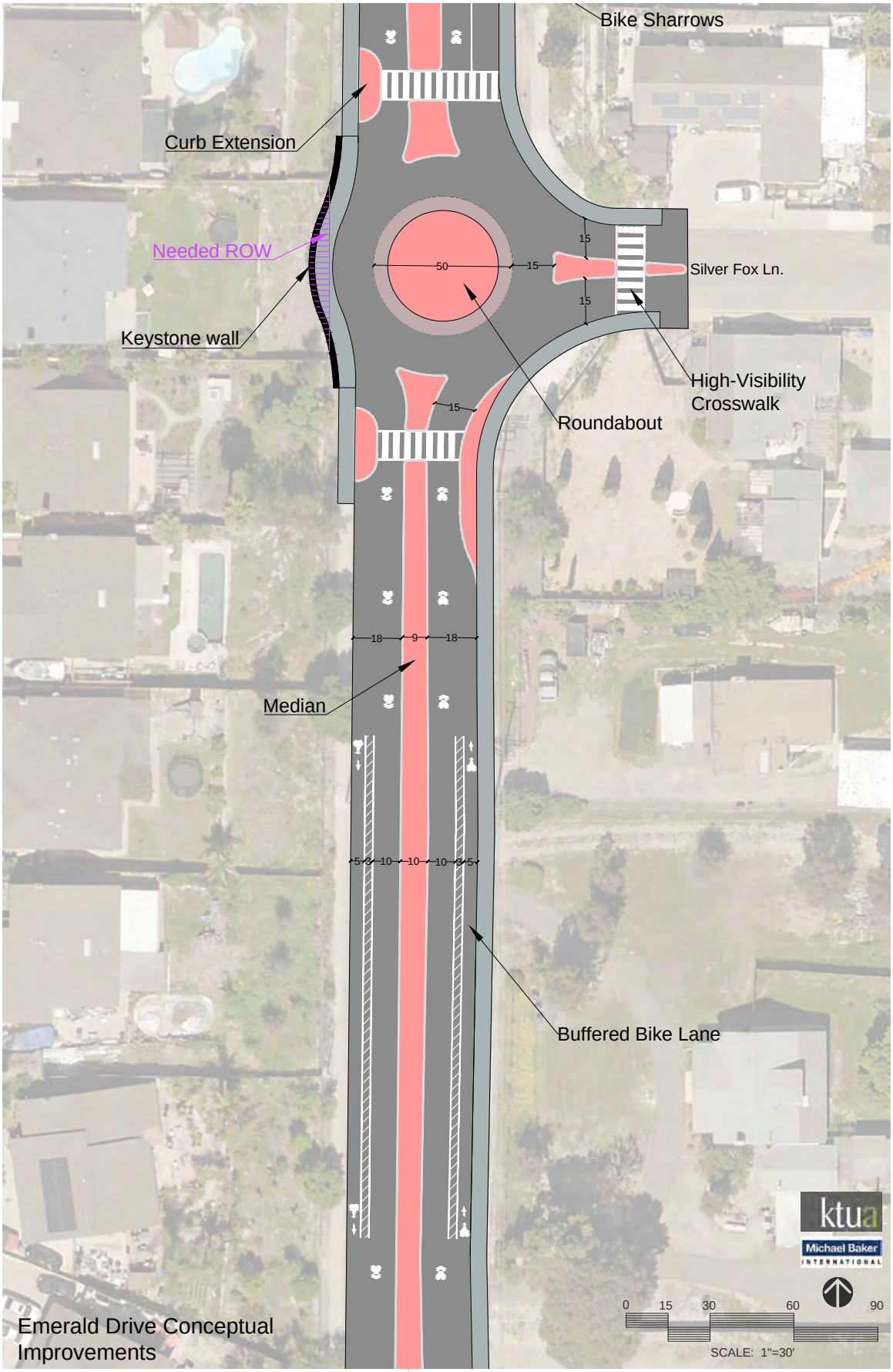
Figure 5-5: Sample 3-way Roundabout

Roundabout at Lewis St. & Timothy Pl.

Figure 5-6: Sample 4-way Roundabout


Olive Ave.
High-Visibility Crosswalk
Transition Striping
5
10
10
10
5
10
6
Bike Lane
Bus Stop
Median
Bike Sharrows
Curb Extension
Needed ROW
50
15
15
15
15
Silver Fox Ln.
Keystone wall
High-Visibility Crosswalk
Roundabout
15
Emerald Drive Conceptual Improvements
ktua
Michael Baker INTERNATIONAL
0
15
30
60
90
SCALE: 1"=30'
Existing Sidewalk
New Sidewalk
New Pavement

Map 1 of 12


Bike Sharrows
Curb Extension
Needed ROW
Keystone wall
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Silver Fox Ln.
High-Visibility
Crosswalk
Roundabout
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18
Median
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Buffered Bike Lane
ktua
Michael Baker
INTERNATIONAL
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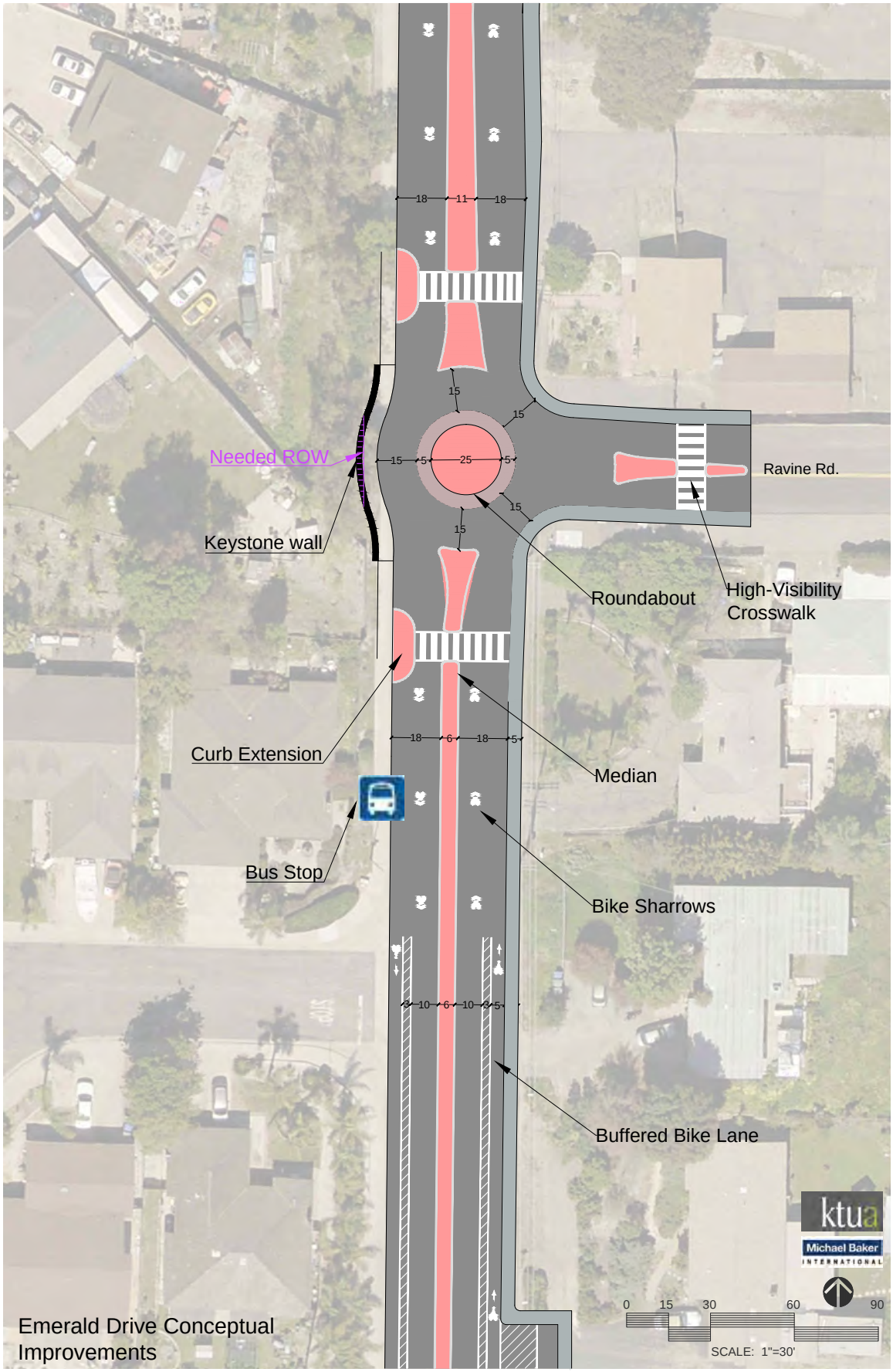
SCALE: 1"=30'
Emerald Drive Conceptual
Improvements
Existing Sidewalk
New Sidewalk
New Pavement

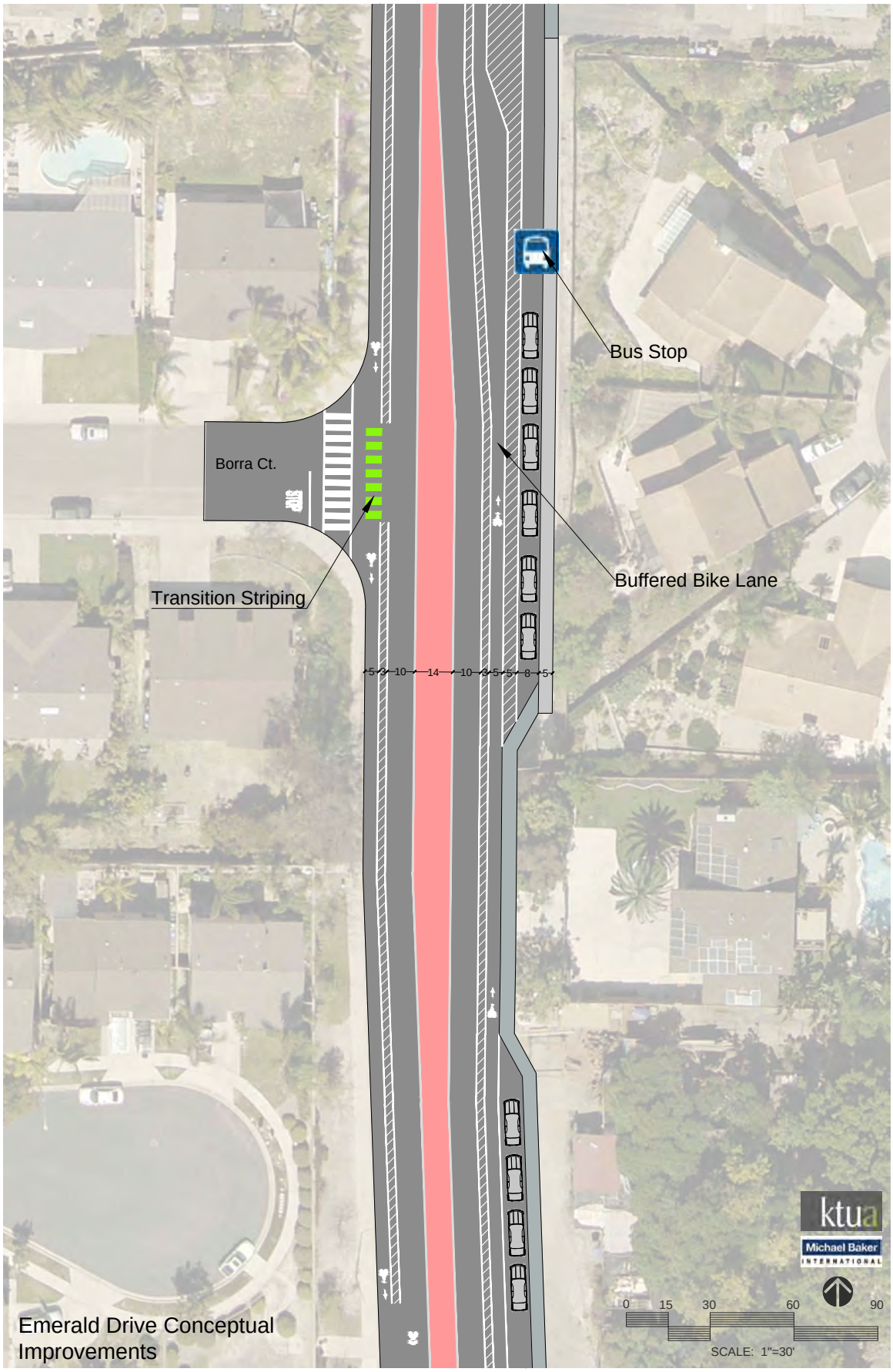
Map 2 of 12



Emerald Drive Conceptual Improvements

Existing Sidewalk | New Sidewalk | New Pavement

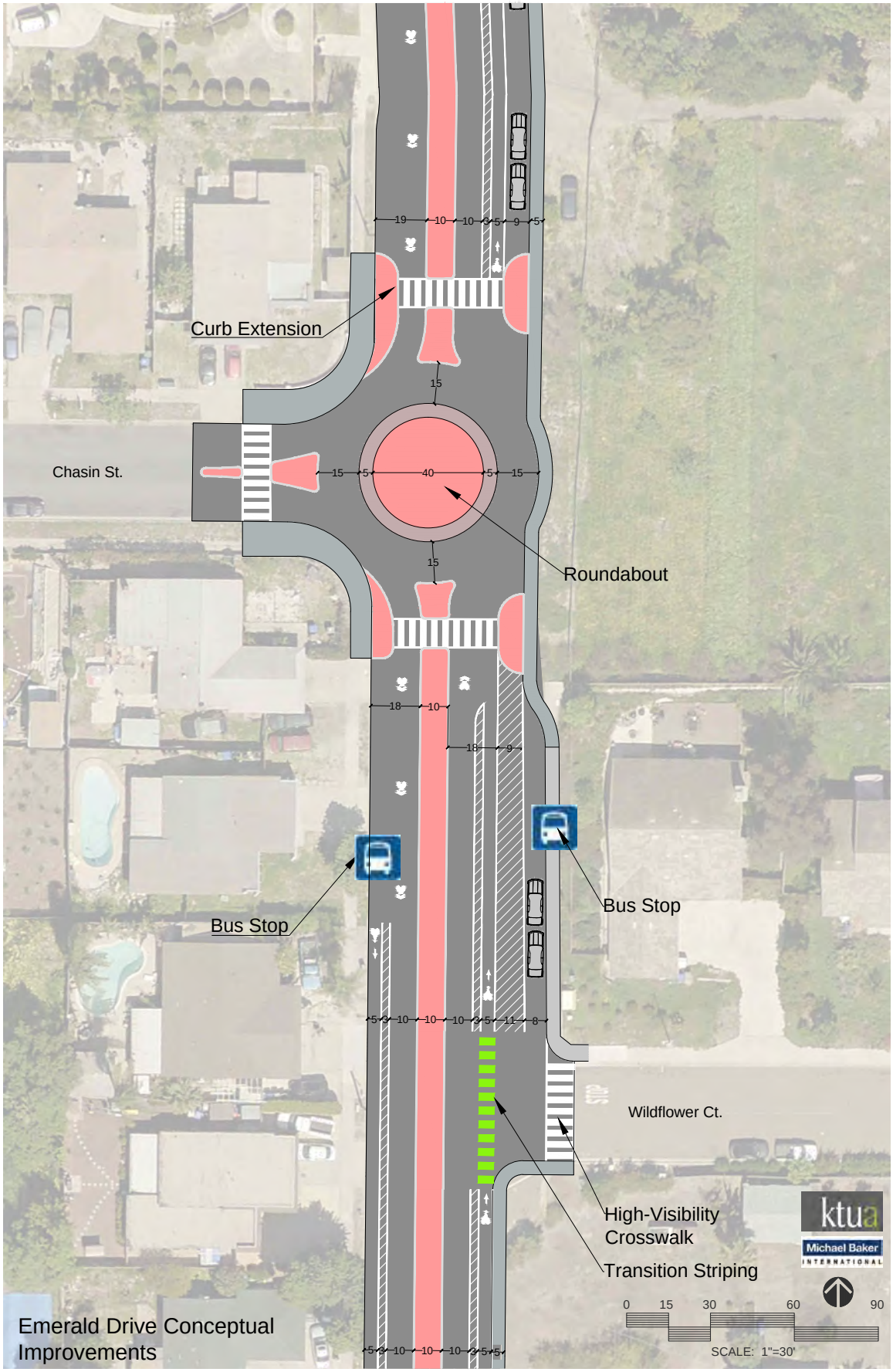
Map 3 of 12



Emerald Drive Conceptual Improvements

Existing Sidewalk | New Sidewalk | New Pavement

Map 4 of 12


Curb Extension
Chasin St.
Roundabout
Bus Stop
Bus Stop
Wildflower Ct.
High-Visibility Crosswalk
Transition Striping
Emerald Drive Conceptual Improvements
ktua
Michael Baker INTERNATIONAL
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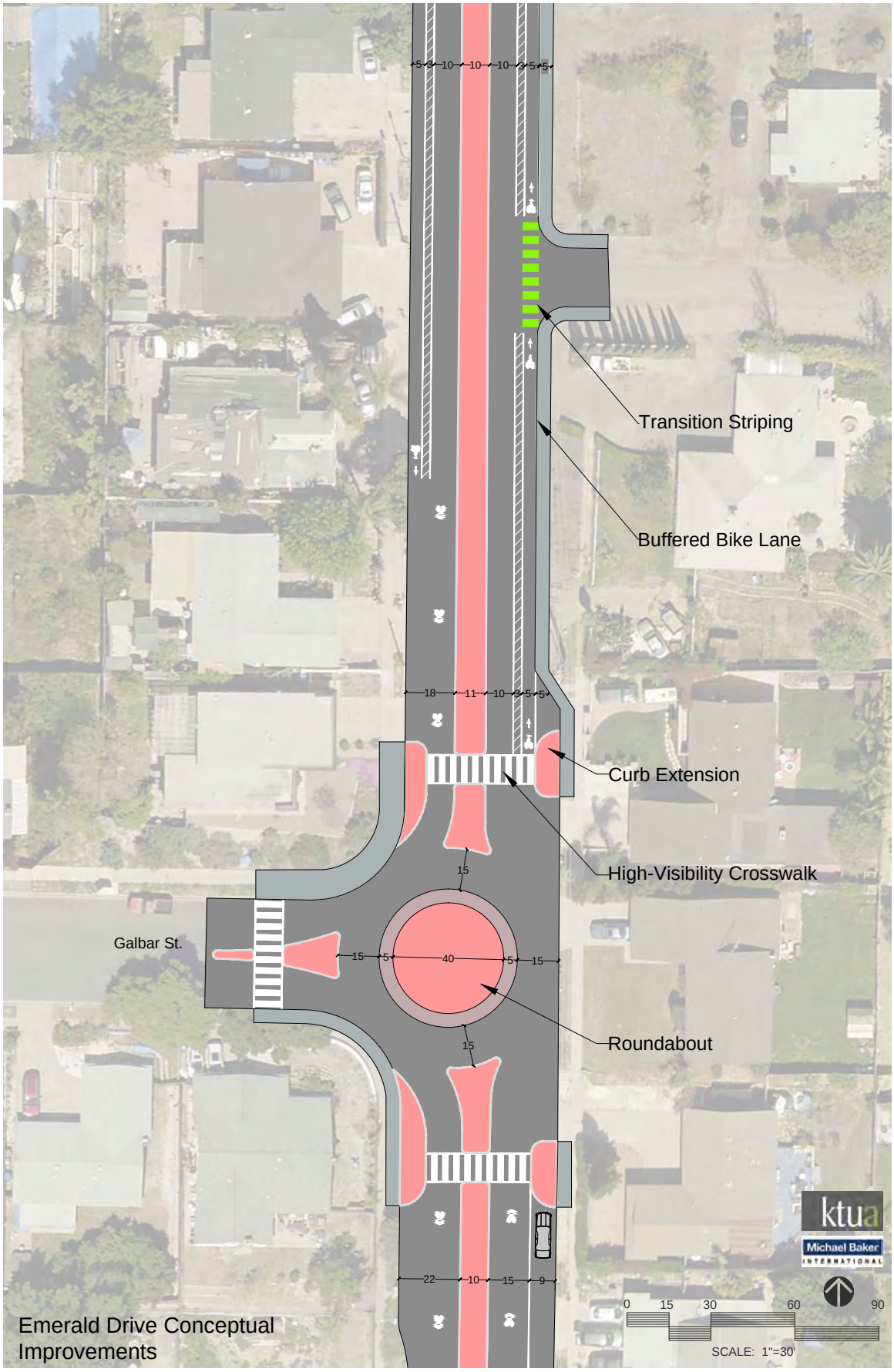
SCALE: 1"=30'
Existing Sidewalk
New Sidewalk
New Pavement

Map 5 of 12


5
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Transition Striping
Buffered Bike Lane
18
11
10
5
5
Curb Extension
High-Visibility Crosswalk
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Galbar St.
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5
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15
Roundabout
15
22
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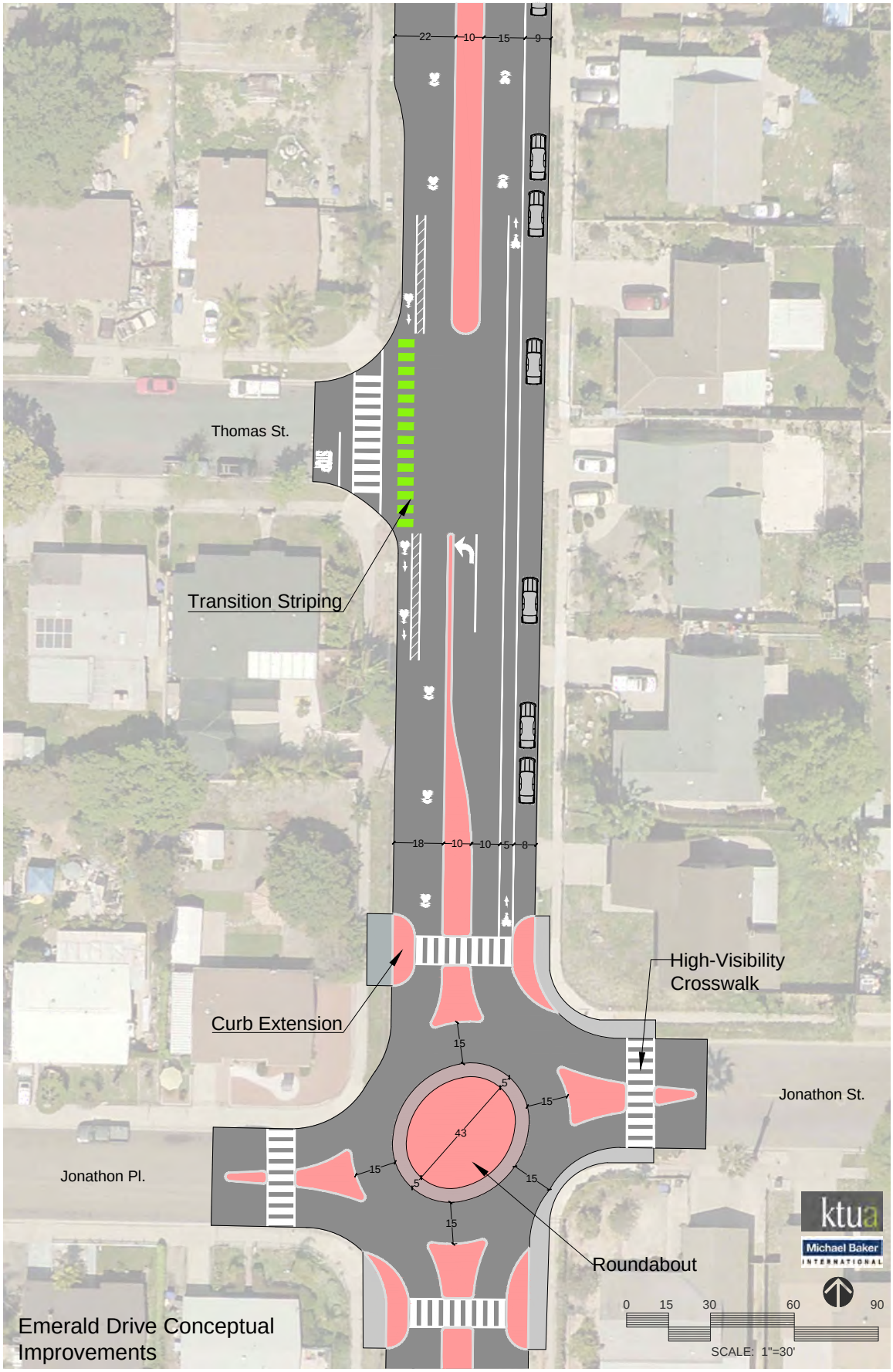
SCALE: 1"=30'
ktua
Michael Baker
INTERNATIONAL
Emerald Drive Conceptual Improvements
Existing Sidewalk
New Sidewalk
New Pavement

Map 6 of 12


Thomas St.
Transition Striping
Curb Extension
High-Visibility Crosswalk
Jonathon St.
Jonathon Pl.
Roundabout
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10
10
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8
15
5
43
15
15
5
15
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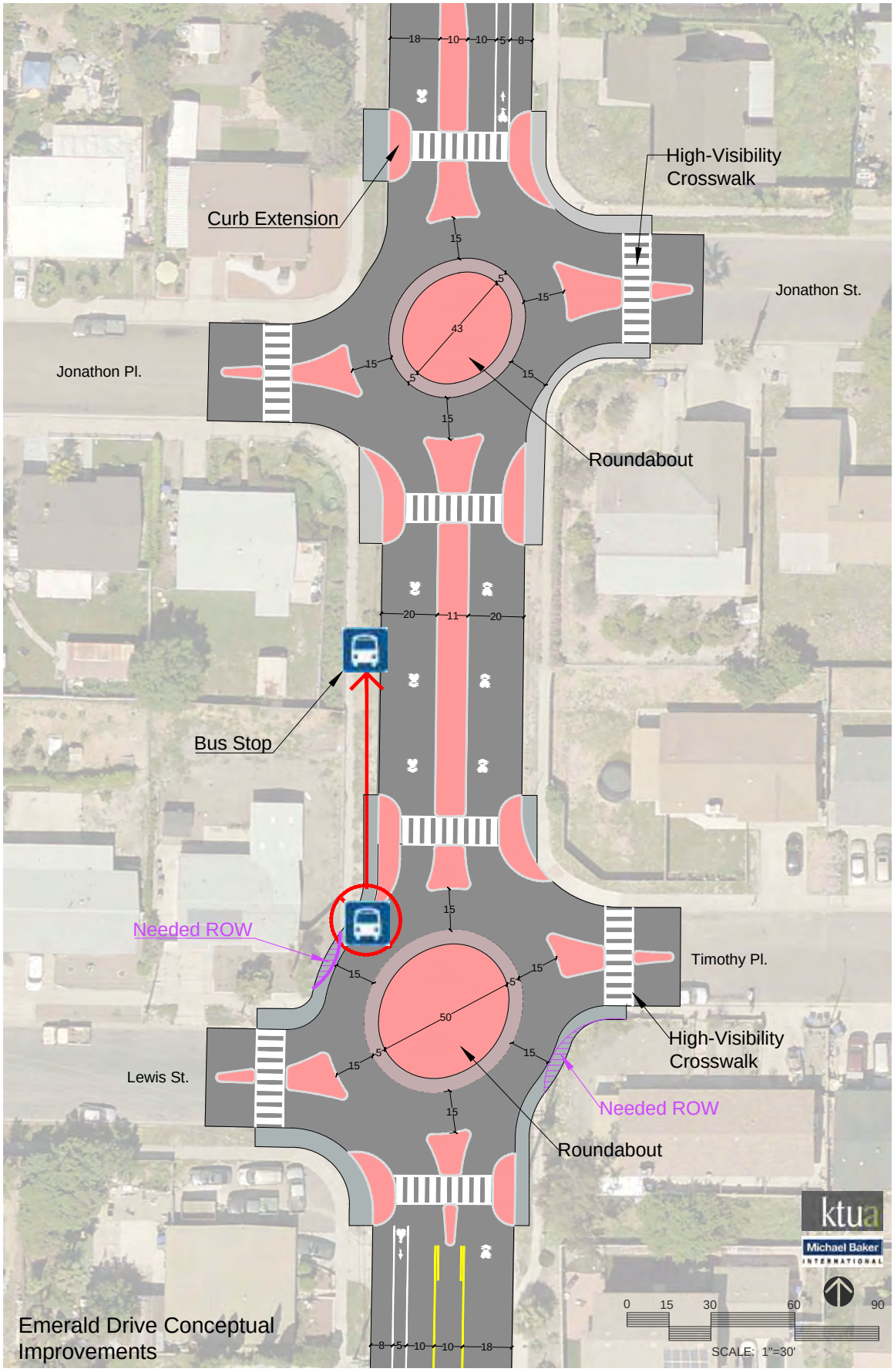
SCALE: 1"=30'
ktua
Michael Baker INTERNATIONAL
Emerald Drive Conceptual Improvements
Existing Sidewalk
New Sidewalk
New Pavement

Map 7 of 12


Curb Extension
High-Visibility Crosswalk
Jonathon St.
Jonathon Pl.
Roundabout
Bus Stop
Needed ROW
Timothy Pl.
High-Visibility Crosswalk
Lewis St.
Needed ROW
Roundabout
ktua
Michael Baker INTERNATIONAL
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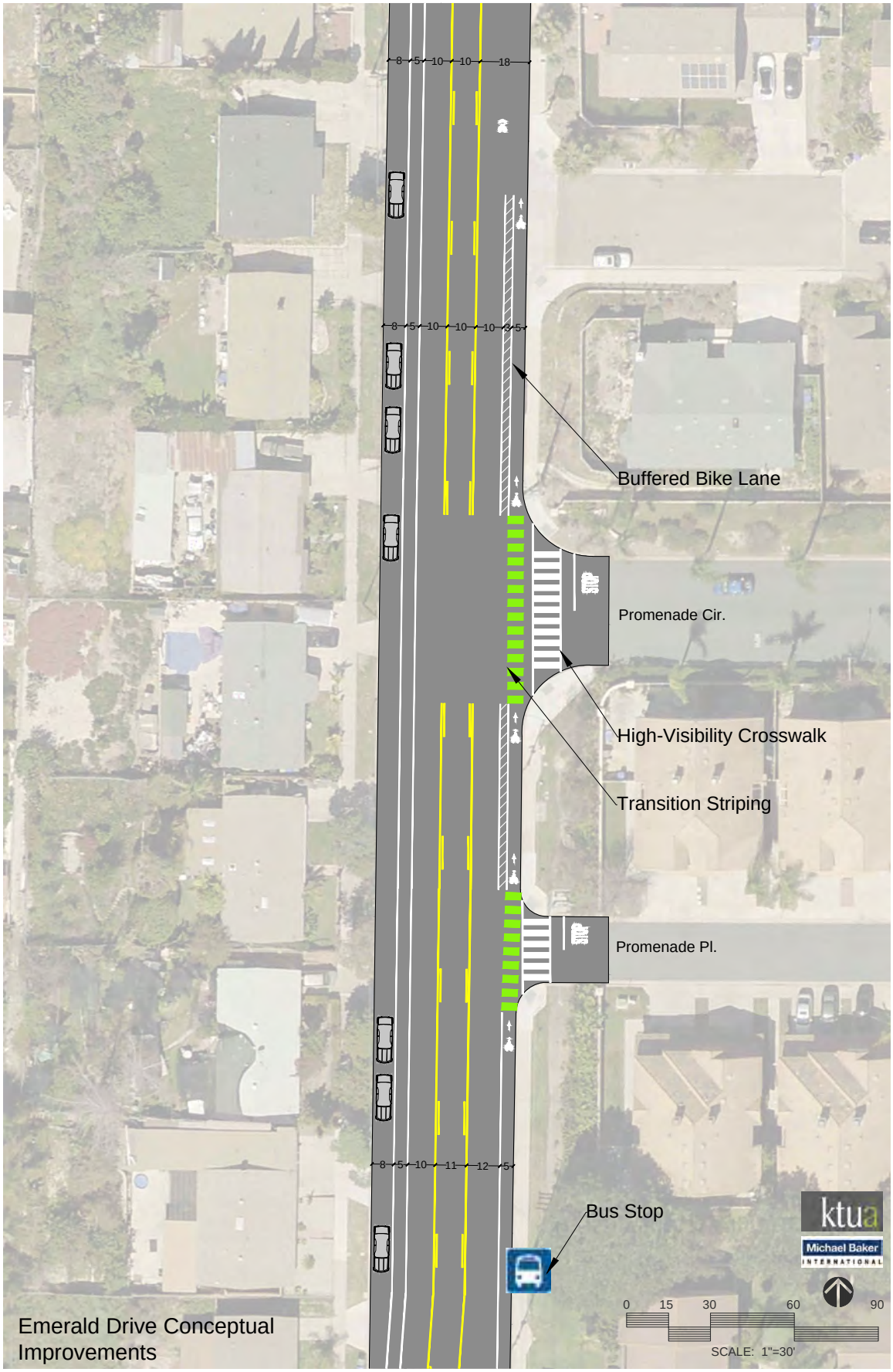
SCALE: 1"=30'
Emerald Drive Conceptual Improvements
Existing Sidewalk
New Sidewalk
New Pavement

Map 8 of 12


8 5 10 10 18
8 5 10 10 10 8 5
8 5 10 11 12 5
Buffered Bike Lane
Promenade Cir.
High-Visibility Crosswalk
Transition Striping
Promenade Pl.
Bus Stop
ktua
Michael Baker INTERNATIONAL
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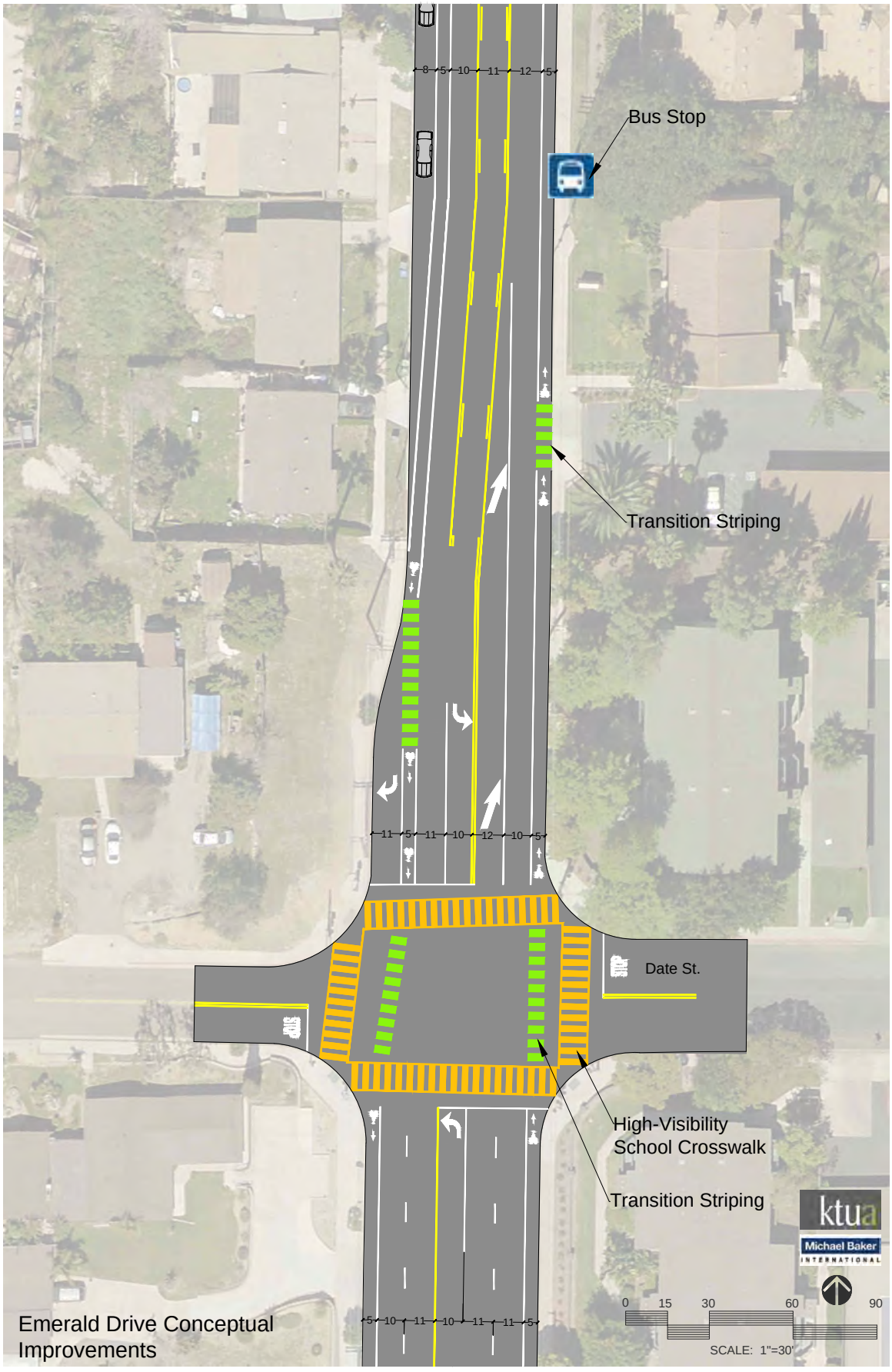
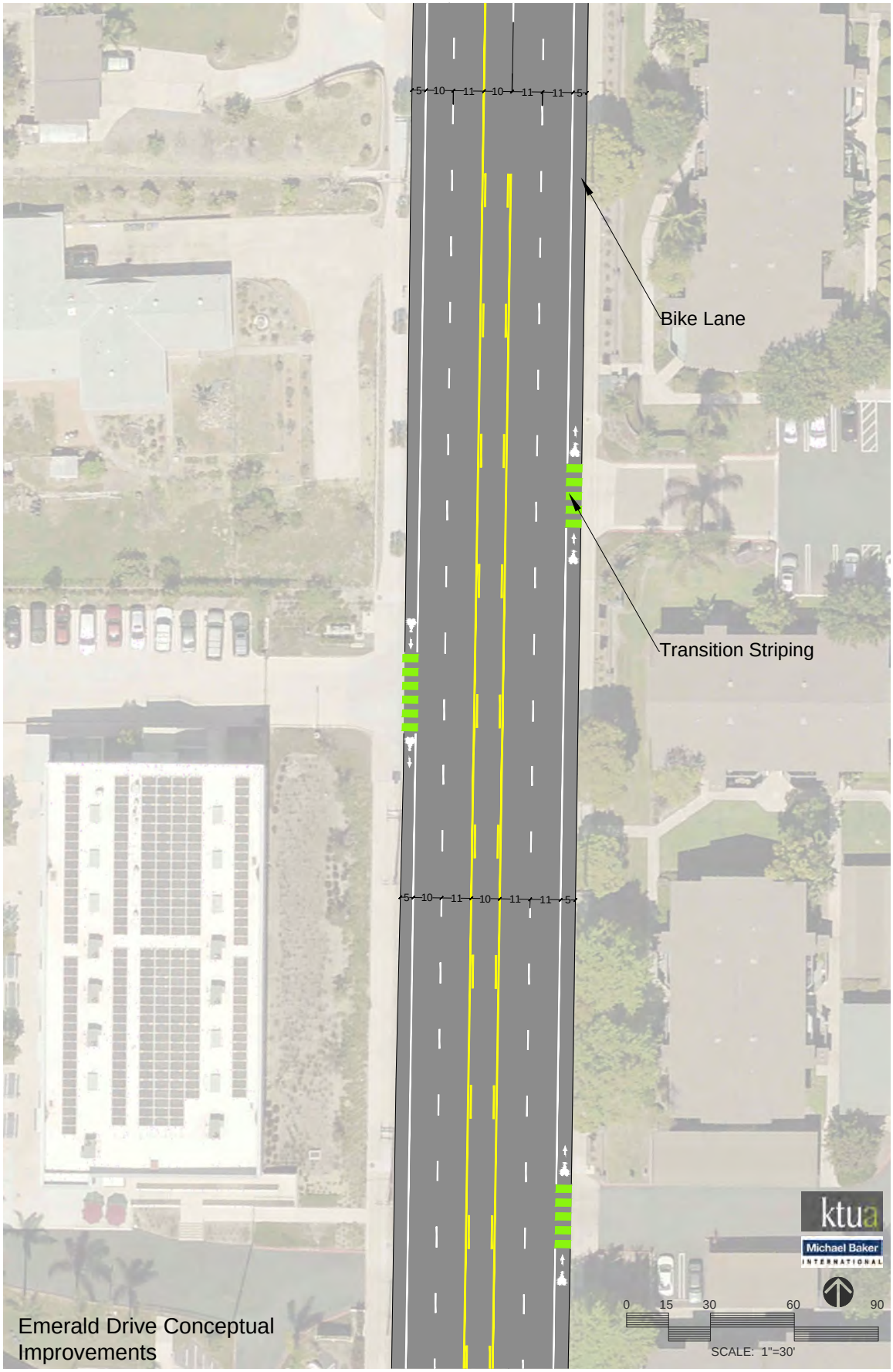
SCALE: 1"=30'
Emerald Drive Conceptual Improvements
Existing Sidewalk
New Sidewalk
New Pavement

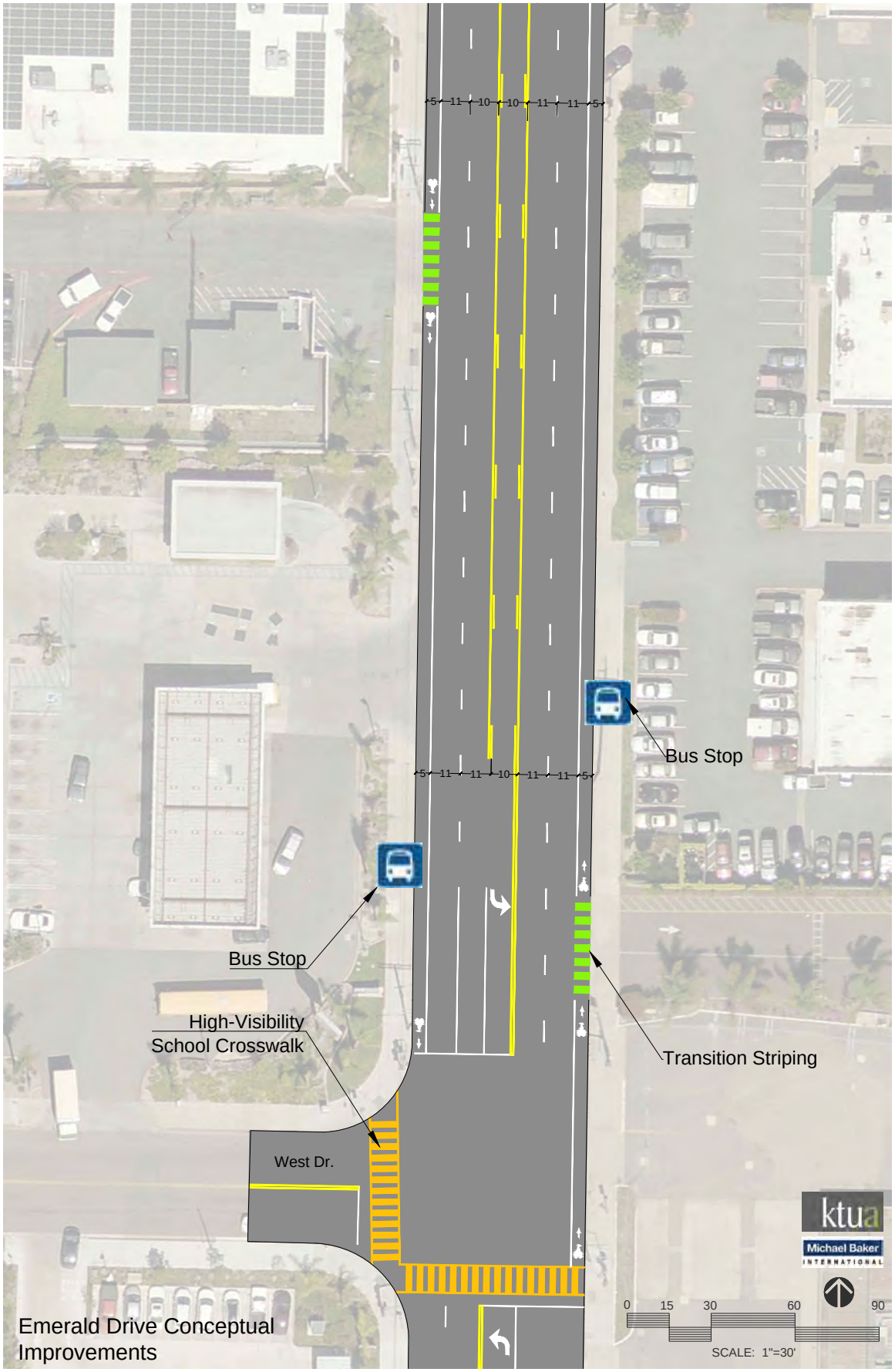
Map 9 of 12


Bus Stop
Transition Striping
Date St.
High-Visibility
School Crosswalk
Transition Striping
ktua
Michael Baker
INTERNATIONAL
0 15 30 60 90
SCALE: 1"=30'
Emerald Drive Conceptual
Improvements
Existing Sidewalk
New Sidewalk
New Pavement

Map 10 of 12


5 10 11 10 11 11 5
Bike Lane
Transition Striping
5 10 11 10 11 11 5
ktua
Michael Baker INTERNATIONAL
0 15 30 60 90
SCALE: 1"=30'
Emerald Drive Conceptual Improvements
Existing Sidewalk
New Sidewalk
New Pavement

Map 11 of 12


5 11 10 10 11 11 5
5 11 11 10 11 11 5
Bus Stop
Bus Stop
High-Visibility
School Crosswalk
Transition Striping
West Dr.
ktua
Michael Baker
INTERNATIONAL
0 15 30 60 90
SCALE: 1"=30'
Emerald Drive Conceptual
Improvements
Existing Sidewalk
New Sidewalk
New Pavement

Map 12 of 12

Cost Estimate

Detailed Engineer's Estimate and Total Project Costs- Cycle 4

Important: Read the Instructions in the first sheet (tab) before entering data. Do not enter data in shaded fields (with formulas).

Project Information:

Agency:	City of Vista	**Date:**	11-Jul-18
Project Description:	Closes sidewalk gaps to schools, parks, employment centers and retail, adds bike lanes and traffic calming elements.		
Project Location:	Emerald Drive from West Drive to Olive Ave		
Licensed Engineer in responsible charge of preparing or reviewing this PSR-Equivalent Cost Estimate:	Ryan Zellers	**License #:**	CA 69470

Engineer's Estimate and Cost Breakdown:

Engineer's Estimate (for Construction Items Only)						Cost Breakdown					
						ATP Eligible Costs/Items		ATP Ineligible Costs/Items		Corps/CCC to construct	
Item No.	Item	Quantity	Units	Unit Cost	Total Item Cost	%	$	%	$	%	$
General Overhead-Related Construction Items											
1	Mobilization	1	LS	$100,000.00	$100,000	100%	$100,000				
2	Traffic Control	1	LS	$80,000.00	$80,000	100%	$80,000				
3	Stormwater Protection Plan	1	LS	$30,000.00	$30,000	100%	$30,000				
4	Monument Preservation & Restoration	1	LS	$50,000.00	$50,000	100%	$50,000				
5	Utility Relocation Coordination	1	LS	$10,000.00	$10,000	100%	$10,000				
General Construction Items (non-decorative only)											
6	Full depth AC pavement removal	46100	SF	$3.00	$138,300	100%	$138,300				
7	Clear and grub	8000	SF	$4.00	$32,000	100%	$32,000				
8	Remove existing curb and gutter	1500	LF	$3.50	$5,250	100%	$5,250				
9	Remove and Replace PCC sidewalk	960	SF	$9.00	$8,640	100%	$8,640				
10	Install PCC median	35700	SF	$10.00	$357,000	100%	$357,000				
11	Install full depth AC pavement	15200	SF	$7.00	$106,400	100%	$106,400				
12	Install PCC sidewalk	19500	SF	$6.50	$126,750	100%	$126,750				
13	Install median curb	7100	LF	$28.00	$198,800	100%	$198,800				
14	Install 6" curb and gutter	4000	LF	$33.00	$132,000	100%	$132,000				
15	Install ADA ramp	46	EA	$3,000.00	$138,000	100%	$138,000				
16	Install new PCC driveway	1800	SF	$10.00	$18,000	100%	$18,000				
17	Remove and Replace PCC driveway	1400	SF	$13.00	$18,200	100%	$18,200				
18	Install retaining wall	660	SF	$60.00	$39,600	100%	$39,600				
19	Signing and striping (inlc. removal)	1	LS	$150,000.00	$150,000	100%	$150,000				
20	Traffic signal mod (Emerald/West)	1	LS	$20,000.00	$20,000	100%	$20,000				
21	Traffic signal mod (Emerald/Date)	1	LS	$20,000.00	$20,000	100%	$20,000				
22	Traffic signal mod (Emerald/Olive)	1	LS	$25,000.00	$25,000	100%	$25,000				
23	Street Lighting	1	LS	$75,000.00	$75,000	100%	$75,000				
24	Water Quality	1	LS	$200,000.00	$200,000	100%	$200,000				
25	Grind and Overlay (to match edge cond.)	1	LS	$100,000.00	$100,000	100%	$100,000				
26	Drainage	1	LS	$100,000.00	$100,000	100%	$100,000				
27								100%			
28								100%			
29								100%			
	Subtotal of Construction Items:				$2,278,940		$2,278,940				
	Construction Item Contingencies (% of Construction Items):			**25.00%**	$569,735		$569,735				
	Total (Construction Items & Contingencies) cost:				$2,848,675		$2,848,675				

Project Delivery Costs:

Type of Project Cost		Cost $	ATP Eligible Costs	Non-participating Costs	
Preliminary Engineering (PE)					
Environmental Studies and Permits(PA&ED):	$	100,000	$100,000		
Plans, Specifications and Estimates (PS&E):	$	350,000	$350,000		"PE" costs / "CON" costs
Total PE:	$	450,000	$450,000		16% — 25% Max
Right of Way (RW)					
Right of Way Engineering:	$	30,000	$30,000		
Acquisitions and Utilities:	$	175,000	$175,000		
Total RW:	$	205,000	$205,000		
Construction Engineering (CE)					"CE" costs / "CON" costs
Construction Engineering (CE):	$	350,000	$350,000		12% — 15% Max
Total Project Delivery:		$1,005,000	$1,005,000		
Total Construction Costs:		$3,198,675	$3,198,675		
			ATP Eligible Costs	Non-participating Costs	
Total Project Cost:		$3,853,675	$3,853,675		

Documentation of Ineligible (Non-Participating) Costs:

The Engineer's logic and/or calculations for splitting costs between ATP-Eligible and Non-participating costs must be documented in this section of the Estimate form.
Separate logic is required for each construction item listed above which is partly ineligible for ATP funding or is required for the construction of an ineligible item/element of the project.

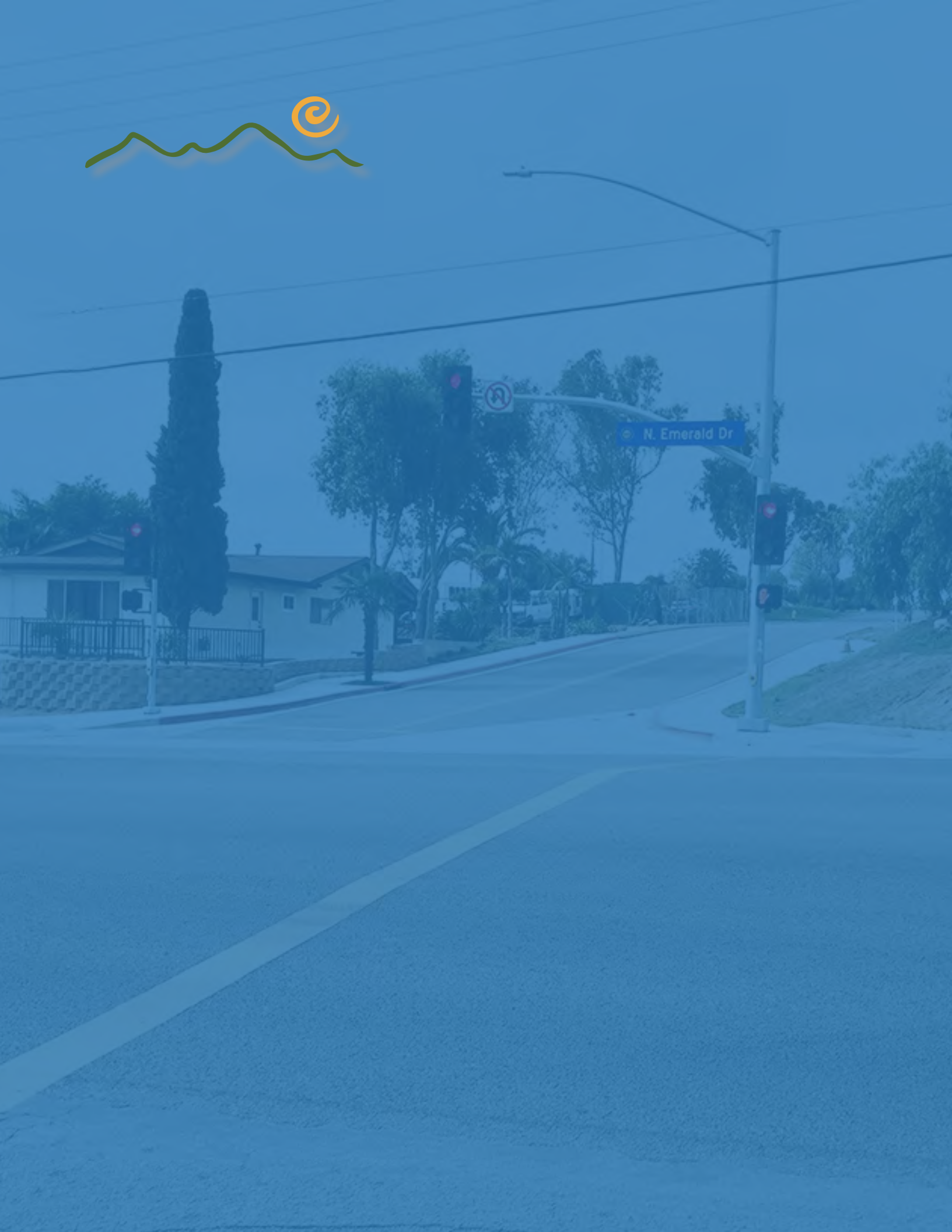
Detailed Engineer's Estimate and Total Project Costs- Cycle 4

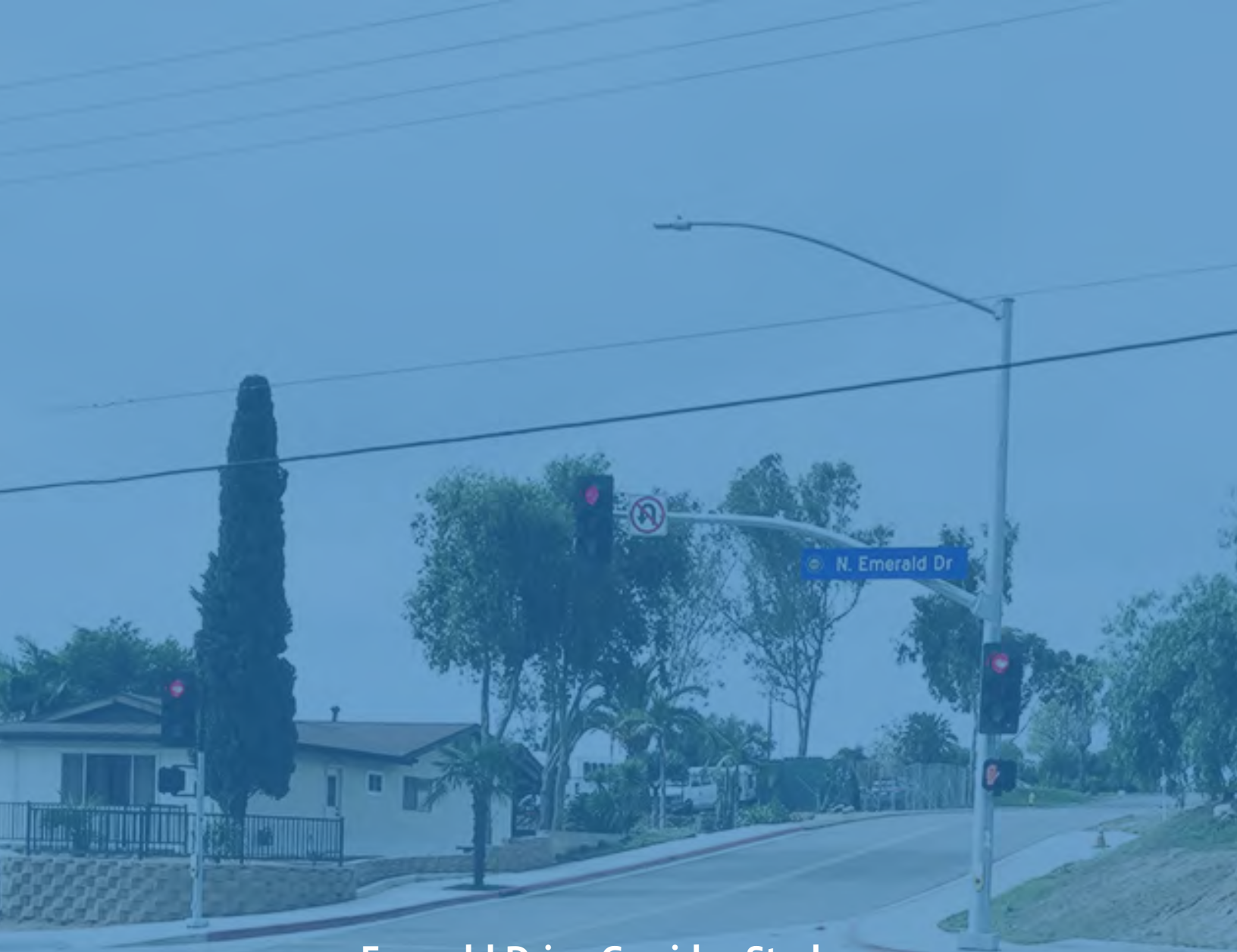
Important: Read the Instructions in the first sheet (tab) before entering data. Do not enter data in shaded fields (with formulas).

Project Information:

Agency:	City of Vista	**Date:**	11-Jul-18
Project Description:	Closes sidewalk gaps to schools, parks, employment centers and retail, adds bike lanes and traffic calming elements.		
Project Location:	Emerald Drive from West Drive to Olive Ave		
Licensed Engineer in responsible charge of preparing or reviewing this PSR-Equivalent Cost Estimate:	Ryan Zellers	**License #:**	CA 69470

Item Number(s):	Description of Engineer's Logic: (See examples shown in the Instructions)


N. Emerald Dr



Emerald Drive Corridor Study

Appendix A
Traffic Analysis

Michael Baker INTERNATIONAL

We Make a Difference

June 25, 2018

Subject: Emerald Drive Corridor Traffic Assessment

Michael Baker International (Michael Baker) has prepared a traffic assessment of the intersections and roadway segments along Emerald Drive to be included in the Active Transportation Program (ATP) Grant application. Existing and Horizon Year 2035 traffic conditions with and without the proposed improvements along Emerald Drive from Olive Avenue to West Drive in the City of Vista were evaluated in this analysis. The purpose of this memorandum is to summarize the analysis results of the proposed improvements selected by the community and City staff through a series of public workshops for inclusion in the ATP Grant application.

STUDY AREA

The proposed improvements along Emerald Drive are bounded by Olive Avenue to the north and West Drive to the south which is approximately one mile in length. Based on consultation with City of Vista staff, eight (8) intersections and three (3) roadway segments were evaluated in this analysis as shown in **Table 1** and **Table 2**, respectively.

TABLE 1 – STUDY INTERSECTIONS

ID	Study Intersection	Existing Traffic Control
1	North Avenue/Emerald Drive & Olive Avenue	Signal
2	Emerald Drive & Ravine Road	One-Way Stop Control
3	Emerald Drive & Chasin Street	One-Way Stop Control
4	Emerald Drive & Galbar Street	One-Way Stop Control
5	Emerald Drive & Thomas Street	One-Way Stop Control
6	Emerald Drive & Jonathon Place/Jonathon Street	Two-Way Stop Control
7	Emerald Drive & Lewis Street/Timothy Place	Two-Way Stop Control
8	Emerald Drive & Date Street	Signal

TABLE 2 – STUDY ROADWAY SEGMENTS

Roadway	Segment
Emerald Drive	Olive Drive to Chasin Street
	Chasin Street to Date Street
	Date Street to West Drive

These study locations were analyzed for the following study scenarios:

- Existing Conditions
- Existing with Proposed Improvements
- Forecast Year 2035 Without Proposed Improvements
- Forecast Year 2035 With Proposed Improvements

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Office: 760.476.9193 | Fax: 760.476.9198

ANALYSIS METHODOLOGY

This analysis has been prepared in accordance to the *SANTEC/ITE Guidelines for Traffic Impact Studies in the San Diego Region*, March 2, 2000. Methodologies for analyzing study intersections and roadway segments are described below.

Intersection Analysis Methodology

The City of Vista utilizes the 2010 Highway Capacity Manual (HCM) intersection analysis methodology to analyze the operation of signalized, un-signalized intersections and roundabouts. The 2010 HCM analysis methodology describes the operation of an intersection using a range of level of service (LOS) from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding stopped delay experienced per vehicle for study intersections shown in **Table 3**.

TABLE 3 – LEVEL OF SERVICE AND DELAY RANGES

Level of Service	Delay (seconds/vehicle)		
	Signalized Intersections	Unsignalized Intersections	Roundabouts
A	≤ 10.0	≤ 10.0	≤ 10.0
B	10.1 - 20.0	10.0 - 15.0	10.0 - 15.0
C	21.1 - 35.0	15.1 - 25.0	15.1 - 25.0
D	35.1 - 55.0	25.1 - 35.0	25.1 - 35.0
E	55-1 - 80.0	35.1 - 50.0	35.1 - 50.0
F	> 80.0	> 50.0	> 50.0

Source: 2010 Highway Capacity Manual

Level of service is based on the average stopped delay per vehicle for all movements of signalized intersections, all-way stop controlled intersections and roundabouts. For one-way or two-way stop controlled intersections, LOS is based on the worst stop-controlled approach.

A computer software program called *Synchro Vs. 9.0* was used to analyze the study intersections and *Sidra Vs. 7.0* was used to analyze the roundabouts. Both software programs are direct applications of HCM methodology.

Roadway Segment Analysis Methodology

Roadway segment level of service standards are generally used as long-range planning guidelines to determine the functional classification of roadways and are not always accurate indicators of roadway performance. Typically, the performance and level of service of a roadway segment is heavily influenced by the ability of intersections to accommodate peak hour traffic volumes. Therefore, the study roadway segments were analyzed under peak hour conditions to determine if there is adequate capacity during the critical peak hours. The base saturation flow rate of 1,900 vehicles per hour per lane (veh/hr/ln) is taken from the Urban Street Facility methodology in Chapter 16.0 of the 2010 Highway Capacity Manual (HCM) and used in this analysis. The peak hour directional volume of the segment was then divided by the capacity to determine the volume to capacity (v/c) ratio of the segment. This ratio was then compared to the LOS thresholds for segments defined in the SANTEC/ITE traffic study guideline to determine the LOS of the segment. The SANTEC/ITE LOS thresholds for segments is shown in **Table 4**.

TABLE 4 – ROADWAY SEGMENT LOS & DELAY RANGES

LOS	V/C Ratio
A	< 0.41
B	0.42 - 0.62
C	0.63 - 0.79
D	0.80 - 0.92
E	0.93 - 1.00
F	> 1.00

The City of Vista considers LOS D or better (LOS A, B, or C) to be acceptable operating conditions for intersections and roadway segments during peak traffic periods. Therefore, any intersection or roadway segment operating at LOS E or LOS F will be considered deficient.

EXISTING CONDITIONS

This section of the study evaluates the existing conditions within the study area. A detailed field review was conducted to determine the existing intersection geometry, traffic control devices, signal phasing, and other factors that may affect intersection or roadway segment capacity.

Emerald Drive is a two-lane to four-lane roadway oriented in a north-south direction from Olive Avenue to West Drive. Emerald Drive serves the residential community between Olive Avenue and Date Street and commercial/retail shops from Date Street to SR-78.

Between Olive Avenue and Borra Court, Emerald Drive functions as a two-lane roadway with a shared center left-turn lane. This three-lane section of roadway has a curb-to-curb width ranging from 45 to 65 feet. The posted speed limit is 35 mph and on-street parking is prohibited. Class II bike lanes are not provided on either side of the roadway.

Approximately 200 feet south of Borra Court to Galbar Street, Emerald Drive narrows down to a two-lane roadway with no shared center left-turn lane. This two-lane section of roadway has a curb-to-curb width ranging from 35 to 65 feet. The posted speed limit is 35 mph and on-street parking is prohibited on the west side and limited on the east side of the roadway. Class II bike lanes are not provided on either side of the roadway.

From Galbar Street to Date Street, Emerald Drive widens to a two-lane roadway with either a shared center left-turn lane or left-turn pockets. This three-lane section of roadway has a curb-to-curb width of 50 feet. The posted speed limit is 35 mph. On-street parking is permitted with restricted hours for parking posted on both sides of the roadway. Class II bike lanes are not provided on either side of the roadway.

From Date Street to West Drive, Emerald Drive widens to a four-lane roadway with a shared center left-turn lane and a curb-to-curb width of 65 feet. The posted speed limit is 35 mph and 25 mph when children are present from local schools such as Tri-City Christian School. On-street parking is prohibited on the east side of the roadway and permitted with restricted hours for parking on the west side of the roadway. Class II bike lanes are not provided on either side of the roadway.

According to the City of Vista's General Plan Circulation Element, the ultimate classification of Emerald Drive is a four-lane Collector from Olive Avenue to West Drive. The improvement project does not plan

on widening Emerald Drive to four-travel lanes, but rather proposes to maintain one travel lane in each direction from Olive Avenue to Date Street to provide Class II bike lanes with buffers on both sides of the roadway. Where sidewalks are deficient or non-existent on Emerald Drive, new sidewalks are proposed throughout the corridor to improve mobility for pedestrians. As such, the City of Vista is progressive in its approach to improve safety and promote active transportation in the City.

Intersection Analysis

To determine existing operating conditions of the study intersections, AM and PM peak hour intersections movement counts were collected on Tuesday, February 20, 2018 and Tuesday, April 3, 2018, while schools were in session. AM peak period intersection counts were collected from 7:00 to 9:00 AM and PM peak period counts were collected from 4:00 to 6:00 PM. The counts used in this analysis were taken from the hour with the highest volumes of traffic in the peak period counted.

Table 5 summarizes AM and PM peak hour level of service for all study intersections in the existing conditions.

TABLE 5 – EXISTING CONDITIONS AM/PM PEAK HOUR INTERSECTION LOS

	Study Intersection	Existing Traffic Control	Existing Conditions			
			AM		PM	
			Delay[1]	LOS	Delay[1]	LOS
1	North Avenue/Emerald Drive & Olive Avenue	Signal	45.2	D	36.7	D
2	Emerald Drive & Ravine Road	OWSC	**> 50.0**	**F**	**> 50.0**	**F**
3	Emerald Drive & Chasin Street	OWSC	**> 50.0**	**F**	**37.6**	**E**
4	Emerald Drive & Galbar Street	OWSC	**> 50.0**	**F**	**> 50.0**	**F**
5	Emerald Drive & Thomas Street	OWSC	**44.9**	**E**	28.7	D
6	Emerald Drive & Jonathon Place/Jonathon St	TWSC	**> 50.0**	**F**	**> 50.0**	**F**
7	Emerald Drive & Lewis Street/Timothy Place	TWSC	**> 50.0**	**F**	**> 50.0**	**F**
8	Emerald Drive / Date Street	Signal	8.7	A	10.3	B

*Note: Deficient intersection operation indicated in **bold.***
[1] Average seconds of delay per vehicle.
LOS = level of service; OWSC = One-Way Stop Control, minor street approach delay and LOS is reported; TWSC = Two-Way Stop Control, minor street approach delay and LOS is reported.

As shown in **Table 5**, six of the eight study intersections are currently operating at deficient levels of service (LOS E or F). The reason for the deficient levels of service at the one-way and two-way stop controlled intersection is due to the high delay motorists experience on the minor street approach. The two signalized intersections in the study area are currently operating at acceptable levels of service (LOS D or better).

Peak Hour Arterial Analysis

The performance and level of service of a roadway segment is heavily influenced by the ability of intersections to accommodate peak hour traffic volumes. Therefore, the study roadway segments were analyzed under peak hour conditions to determine if there is adequate capacity during the critical peak hours.

Table 6 presents the analysis results of the peak hour arterial analysis by direction along three segments of Emerald Drive. The analysis results show all three roadway segments operate at acceptable levels of service (LOS D or better) with the proposed improvements.

TABLE 6 – EXISTING CONDITIONS PEAK HOUR ARTERIAL ANALYSIS

Emerald Drive Roadway Segment	No. of Lanes by Direction		Roadway Segment Capacity (VPHPL)	Existing Conditions					
				Peak Hour Volume		V/C		LOS	
				AM	PM	AM	PM	AM	PM
Olive Dr to Chasin St	NB	1	1,900	968	1,044	0.51	0.55	B	B
	SB	1	1,900	1,093	773	0.58	0.41	B	A
Chasin St to Date St	NB	1	1,900	973	1,237	0.51	0.65	B	C
	SB	1	1,900	1,174	806	0.62	0.42	B	B
Date St to West Dr	NB	2	3,800	900	1,268	0.24	0.33	A	A
	SB	2	3,800	1,117	801	0.29	0.21	A	A

*Note: Deficient roadway segment operations shown in **bold**.*
VPHPL = Vehicles per hour per lane; LOS= Level of Service; V/C= Volume to Capacity Ratio

PROPOSED IMPROVEMENTS

The purpose of this project is consistent with the City's Circulation Element goal *"to improve the safety and efficiency of existing transportation facilities by providing complete and safe connections on roadways, sidewalks, and bikeways."* The City of Vista seeks to enhance the safety, access, convenience and comfort of all users, including motorists, pedestrians, bicyclists, and transit users. The proposed improvements along Emerald Drive include:

- Single-lane roundabouts at Silver Fox Lane, Ravine Road, Chasin Street, Galbar Street, Jonathon Place/Jonathon Street, and Lewis Street/Timothy Place.
- Replace the shared center left-turn lane with a raised median from Silver Fox Lane to Lewis Street/Timothy Place. A gap in the center median is proposed at Thomas Street.
- Provide 5-foot Class II bike lanes along both sides of Emerald Drive with 3-foot buffers where feasible.
- Add green skip markings on Emerald Drive for bicyclists crossing minor side streets and major commercial driveways.
- Add continental crosswalks at each approach to the proposed roundabouts and side-street approaches.
- Add new sidewalks along the east side of Emerald Drive between Olive Avenue and Galbar Street.
- Restripe pedestrian crossings at Emerald Drive/Date Street and Emerald Drive/West Drive to include yellow continental crosswalks.

Refer to **Chapter 5** for additional details and conceptual layouts of the proposed improvements along Emerald Drive.

EXISTING WITH PROPOSED IMPROVEMENTS

The proposed improvements are not anticipated to generate additional traffic volumes since no changes to land use are proposed. It should also be noted that vehicular traffic on Emerald Drive is not anticipated to divert from the corridor since the study intersections and roadway segments are forecast to operate at acceptable levels of service with the proposed improvements. Vehicular traffic restricted from turning left in/out of side streets such as Borra Court, Wildflower Court, and private residential driveways due to the proposed center raised median on Emerald Drive were considered in the Existing with Proposed Improvements analysis. For example, traffic that currently turns left out of Borra Court onto Emerald Drive heading northbound would need to turn right due to the proposed raised median, travel southbound on Emerald Drive and then make a legal U-turn at the proposed roundabout at Chasin Street to travel northbound. Therefore, the Existing with Proposed Improvement traffic volumes change slightly compared to Existing traffic volumes to account for the additional legal U-turns.

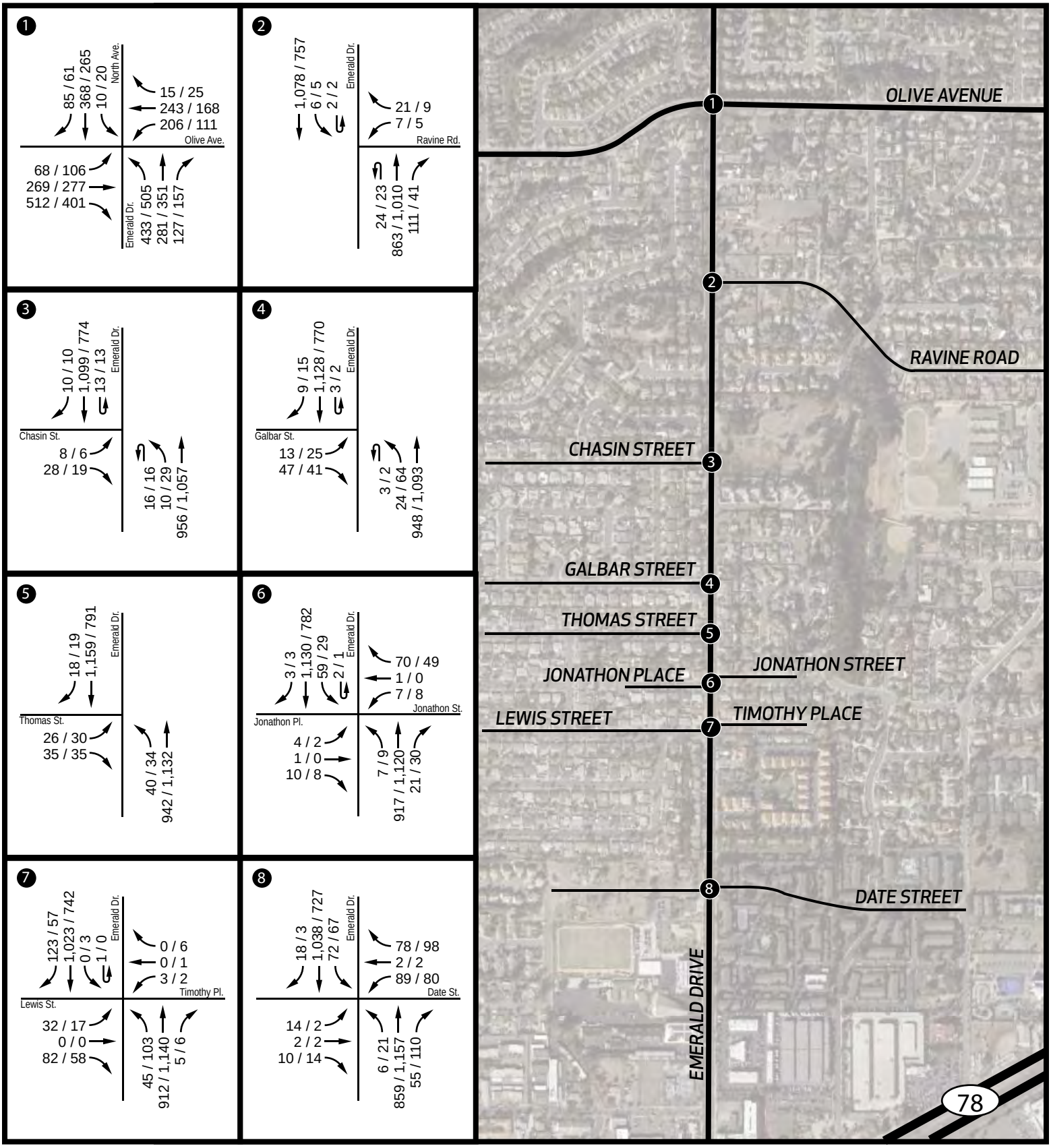
Intersection Analysis

Improvements to Emerald Drive include six roundabouts to improve side street access and calm vehicular traffic through the corridor. **Table 7** and **Figure 1** summarizes the intersection analysis results of the Existing with Proposed Improvements. As shown, all of the study intersections are forecast to operate at acceptable levels of service (LOS D or better) except for the intersection at Emerald Drive/Thomas Street. This intersection continues to operate deficiently (LOS E) in the AM peak hour with the proposed improvements due to the side street delay on Thomas Street. The proposed single-lane roundabouts on Emerald Drive are anticipated to improve access to and from the side streets, reduce travel speeds through the corridor, and improve pedestrian safety.

Peak Hour Arterial Analysis

Study roadway segments were analyzed under peak hour conditions to determine if there is adequate capacity during the critical peak hours with the proposed improvements.

Table 8 presents the analysis results of the peak hour arterial analysis by direction along three segments of Emerald Drive. The analysis results show all three roadway segments operate at acceptable levels of service (LOS D or better) with the proposed improvements.



N

Not to Scale

LEGEND

= Study Intersection

/ ## = AM / PM Peak Hour Volumes

Figure 1 - Existing With Proposed Improvements

AM/PM Peak Hour Turn Volumes

Michael Baker INTERNATIONAL

June 2018

TABLE 7 – EXISTING WITH PROPOSED IMPROVEMENTS INTERSECTION LOS

	Study Intersection	Proposed Traffic Control	Existing with Proposed Improvements			
			AM		PM	
			Delay[1]	LOS	Delay[1]	LOS
1	North Avenue/Emerald Drive & Olive Avenue	Signal	45.2	D	36.7	D
2	Emerald Drive & Ravine Road	Roundabout	29.6	C	15.1	B
3	Emerald Drive & Chasin Street	Roundabout	30.2	C	16.7	B
4	Emerald Drive & Galbar Street	Roundabout	25.3	C	22.1	C
5	Emerald Drive & Thomas Street	OWSC	47.1	E	29.8	D
6	Emerald Drive & Jonathon Place/Jonathon Street	Roundabout	33.1	C	21.7	C
7	Emerald Drive & Lewis Street/Timothy Place	Roundabout	26.2	C	31.3	C
8	Emerald Drive / Date Street	Signal	12.2	B	11.1	B

*Note: Deficient intersection operation indicated in **bold.***
1 Average seconds of delay per vehicle.
LOS = level of service; OWSC = One-Way Stop Control, minor street approach delay and LOS is reported.

TABLE 8 – EXISTING WITH PROPOSED IMPROVEMENTS PEAK HOUR ARTERIAL LOS

Emerald Drive Roadway Segment	No. of Lanes by Direction		Roadway Segment Capacity (VPHPL)	Existing With Proposed Improvements					
				Peak Hour Volume		V/C		LOS	
				AM	PM	AM	PM	AM	PM
Olive Dr to Chasin St	NB	1	1,900	998	1,120	0.53	0.59	B	B
	SB	1	1,900	1,143	809	0.60	0.43	B	B
Chasin St to Date St	NB	1	1,900	993	1,257	0.52	0.66	B	C
	SB	1	1,900	1,194	826	0.63	0.43	C	B
Date St to West Dr	NB	2	3,800	920	1,288	0.24	0.34	A	A
	SB	2	3,800	1,137	821	0.30	0.22	A	A

*Note: Deficient roadway segment operations shown in **bold**.*
VPHPL = Vehicles per hour per lane; LOS= Level of Service; V/C= Volume to Capacity Ratio

HORIZON YEAR 2035 WITHOUT PROPOSED IMPROVEMENTS

Future year conditions were forecast to Year 2035 to reflect the buildout conditions of Emerald Drive. SANDAG Series 12 regional traffic forecast models were utilized to derive the Year 2035 peak hour volumes. In the regional forecast model, Year 2035 daily traffic volumes along Emerald Drive were reviewed and compared to Year 2020 daily traffic volumes to verify the future volumes were higher than Year 2020 traffic and assumed a reasonable amount of growth. The average daily traffic growth along Emerald Drive was calculated to be 0.35% per year or a total of 5.25% (15 years x 0.35%). This growth was then applied to the existing (2018) turning movement counts at the study intersections to derive the future Year 2035 peak hour traffic volumes.

Intersection Analysis

Table 9 summarizes the intersection analysis results of the Horizon Year 2035 Without Proposed Improvements condition. As shown, seven of the eight study intersections are forecast to operate at deficient levels of service (LOS E or F).

TABLE 9 – HORIZON YEAR 2035 WITHOUT PROPOSED IMPROVEMENTS INTERSECTION LOS

	Study Intersection	Traffic Control	Horizon Year 2035 Without Proposed Improvements			
			AM		PM	
			Delay[1]	LOS	Delay[1]	LOS
1	North Avenue/Emerald Drive & Olive Avenue	Signal	**74.9**	**E**	46.6	D
2	Emerald Drive & Ravine Road	OWSC	**> 50.0**	**F**	**> 50.0**	**F**
3	Emerald Drive & Chasin Street	OWSC	**> 50.0**	**F**	**> 50.0**	**F**
4	Emerald Drive & Galbar Street	OWSC	**> 50.0**	**F**	**> 50.0**	**F**
5	Emerald Drive & Thomas Street	OWSC	**> 50.0**	**F**	30.8	D
6	Emerald Drive & Jonathon Place/Jonathon Street	TWSC	**> 50.0**	**F**	**> 50.0**	**F**
7	Emerald Drive & Lewis Street/Timothy Place	TWSC	**> 50.0**	**F**	**> 50.0**	**F**
8	Emerald Drive / Date Street	Signal	9.0	A	10.9	B

*Note: Deficient intersection operation indicated in **bold**.*
[1] Average seconds of delay per vehicle.
LOS = level of service; OWSC = One-Way Stop Control, minor street approach delay and LOS is reported; TWSC = Two-Way Stop Control, minor street approach delay and LOS is reported.

Peak Hour Arterial Analysis

Study roadway segments were analyzed under peak hour conditions to determine if there is adequate capacity during the critical peak hours under the Horizon Year 2035 condition without the proposed improvements.

Table 10 presents the analysis results of the peak hour arterial analysis by direction along three segments of Emerald Drive. The analysis results show all three roadway segments operate at acceptable levels of service (LOS D or better) under the Horizon Year 2035 condition without the proposed improvements.

TABLE 10 – HORIZON YEAR 2035 WITHOUT PROPOSED IMPROVEMENTS PEAK HOUR ARTERIAL LOS

Emerald Drive Roadway Segment	No. of Lanes by Direction		Roadway Segment Capacity (VPHPL)	Horizon Year 2035 Without Proposed Improvements					
				Peak Hour Volume		V/C		LOS	
				AM	PM	AM	PM	AM	PM
Olive Dr to Chasin St	NB	1	1,900	1,193	1,289	0.63	0.68	C	C
	SB	1	1,900	1,340	940	0.71	0.49	C	B
Chasin St to Date St	NB	1	1,900	1,035	1,283	0.54	0.68	B	C
	SB	1	1,900	1,230	850	0.65	0.45	C	B
Date St to West Dr	NB	2	3,800	951	1,257	0.25	0.33	A	A
	SB	2	3,800	1,137	821	0.30	0.22	A	A

*Note: Deficient roadway segment operations shown in **bold.***
VPHPL = Vehicles per hour per lane; LOS= Level of Service; V/C= Volume to Capacity Ratio

HORIZON YEAR 2035 WITH PROPOSED IMPROVEMENTS

As previously mentioned, the proposed improvements are not anticipated to generate additional traffic volumes since no changes to land use are proposed. However, vehicular traffic restricted from turning

left in/out of side streets such as Borra Court, Wildflower Court, and private residential driveways due to the proposed center raised median on Emerald Drive were considered in the Horizon Year 2035 With Proposed Improvements analysis. Therefore, the Horizon Year 2035 With Proposed Improvement traffic volumes change slightly compared to Horizon Year 2035 base traffic volumes to account for the additional legal U-turns.

Intersection Analysis

Table 11 summarizes the intersection analysis results of the Horizon Year 2035 With Proposed Improvements. As shown, all of the study intersections are forecast to operate at acceptable levels of service (LOS D or better) except for the following intersections:

- North Avenue/Emerald Drive & Olive Avenue (LOS E in the AM peak hour)
- Emerald Drive & Thomas Street (LOS F in the AM peak hour)

Emerald Drive/Thomas Street continues to operate deficiently (LOS E) in the AM peak hour with the proposed improvements due to the side street delay on Thomas Street. The proposed single-lane roundabouts on Emerald Drive are anticipated to improve access to and from the side streets, reduce travel speeds through the corridor, and improve pedestrian safety.

Peak Hour Arterial Analysis

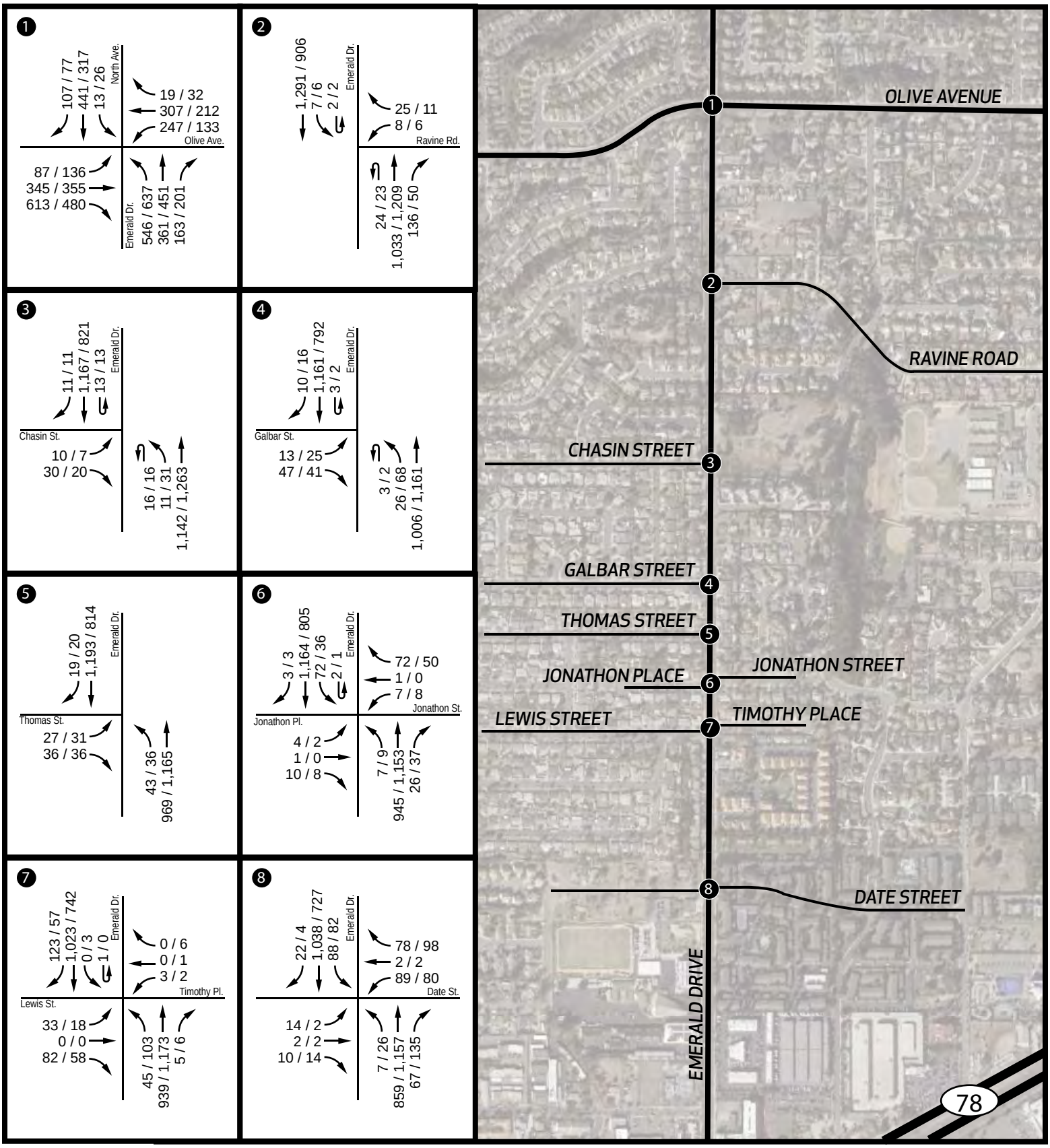
Study roadway segments were analyzed under peak hour conditions to determine if there is adequate capacity during the critical peak hours with the proposed improvements.

Table 12 shows the analysis results of the peak hour arterial analysis by direction along three segments of Emerald Drive. See **Figure 2** for the turning movement analysis. The analysis results show all three roadway segments operate at acceptable levels of service (LOS D or better) with the proposed improvements in the Horizon Year 2035 condition.

TABLE 11 – HORIZON YEAR 2035 WITH PROPOSED IMPROVEMENTS INTERSECTION LOS

Study Intersection		Proposed Traffic Control	Horizon Year 2035 With Proposed Improvements			
			AM		PM	
			Delay[1]	LOS	Delay[1]	LOS
1 -	North Avenue/Emerald Drive & Olive Avenue	Signal	**74.9**	**E**	46.6	D
2 -	Emerald Drive & Ravine Road	Roundabout	49.2	D	30.3	C
3 -	Emerald Drive & Chasin Street	Roundabout	44.4	D	34.8	C
4 -	Emerald Drive & Galbar Street	Roundabout	30.1	C	29.5	C
5 -	Emerald Drive & Thomas Street	OWSC	**> 50.0**	**F**	32.1	D
6 -	Emerald Drive & Jonathon Place/Jonathon Street	Roundabout	40.8	D	26.2	C
7 -	Emerald Drive & Lewis Street/Timothy Place	Roundabout	26.7	C	35.9	D
8 -	Emerald Drive / Date Street	Signal	12.5	B	11.6	B

*Note: Deficient intersection operation indicated in **bold.***
[1] Average seconds of delay per vehicle.
LOS = level of service; OWSC = One-Way Stop Control



N

Not to Scale

LEGEND

= Study Intersection

/ ## = AM / PM Peak Hour Volumes

Figure 2- Forecast Year 2035 With Proposed Improvements AM/PM Peak Hour Turn Volumes

Michael Baker INTERNATIONAL

June 2018

TABLE 12 – HORIZON YEAR 2035 WITH PROPOSED IMPROVEMENTS
PEAK HOUR ARTERIAL LOS

Emerald Drive Roadway Segment	No. of Lanes by Direction		Roadway Segment Capacity (VPHPL)	Horizon Year 2035 With Proposed Improvements					
				Peak Hour Volume		V/C		LOS	
				AM	PM	AM	PM	AM	PM
Olive Dr to Chasin St	NB	1	1,900	1,193	1,310	0.63	0.69	C	C
	SB	1	1,900	1,340	940	0.71	0.49	C	B
Chasin St to Date St	NB	1	1,900	1,035	1,318	0.54	0.69	B	C
	SB	1	1,900	1,241	850	0.65	0.45	C	B
Date St to West Dr	NB	2	3,800	951	1,257	0.25	0.33	A	A
	SB	2	3,800	1,137	821	0.30	0.22	A	A

*Note: Deficient roadway segment operations shown in **bold**.*
VPHPL = Vehicles per hour per lane
LOS= Level of Service
V/C= Volume to Capacity Ratio

CONCLUSIONS

The City of Vista seeks to enhance the safety, access, convenience and comfort of all users, including motorists, pedestrians, bicyclists, and transit users. As such, the proposed improvements along Emerald Drive includes six new roundabouts, Class II bike lanes, new continental crosswalks and sidewalks.

Eight intersections and three roadway segments were analyzed along Emerald Drive under Existing and Horizon Year 2035 conditions with and without proposed improvements. The analysis shows six of the eight study intersections are currently operating at deficient levels of service (LOS E or F). The reason for the deficient levels of service at the one-way and two-way stop controlled intersection is due to the high delay motorists experience on the minor street approach. As a result of the proposed improvements and roundabouts, all of the study intersections are expected to operate at acceptable levels of service except at Emerald Drive/Thomas Street which will remain a one-way stop-controlled intersection. The roadway segment analysis under Existing and Existing with Proposed Improvements conditions show all study segments operate at acceptable levels of service.

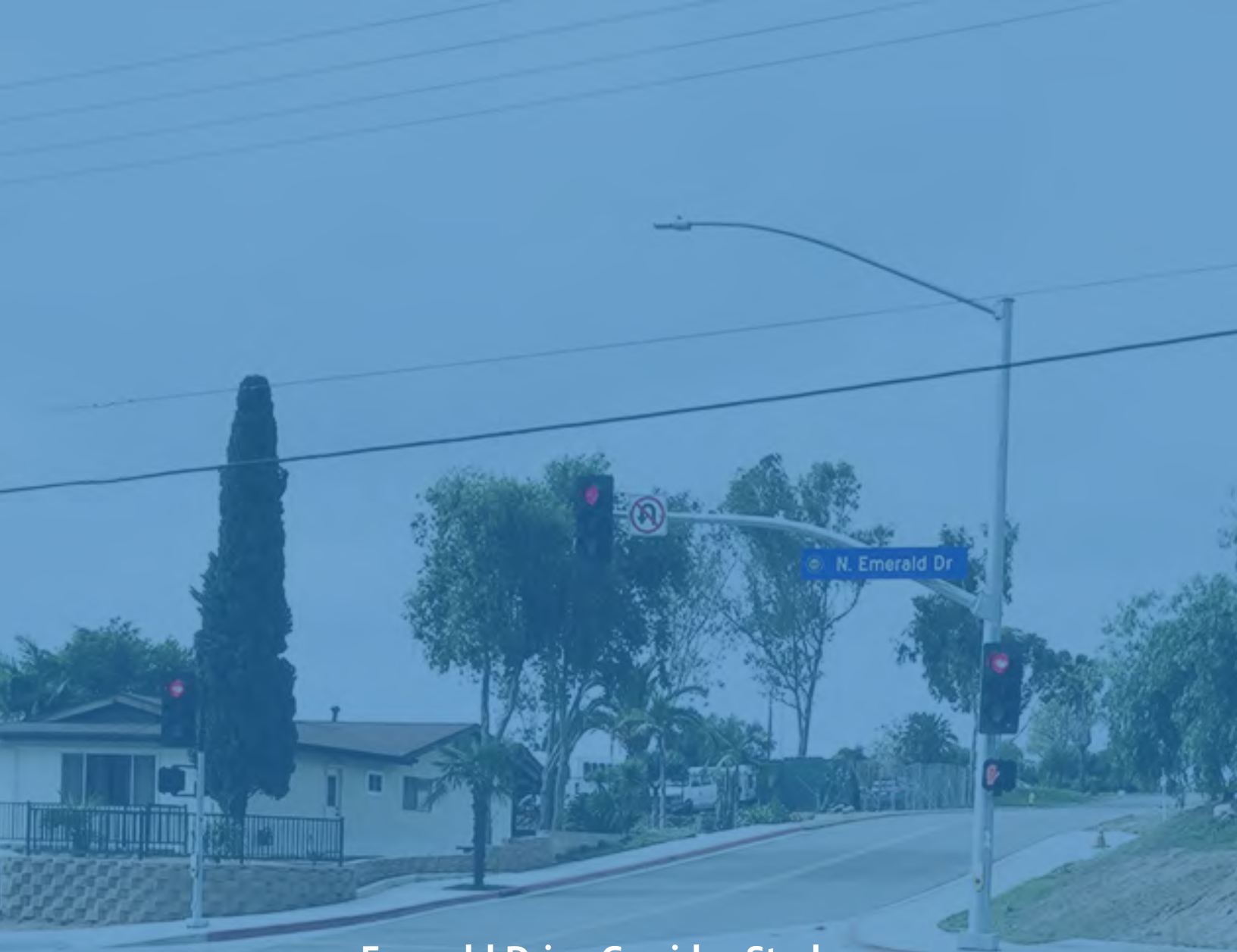
Under Horizon Year 2035 Without Proposed Improvements condition, the analysis shows seven of the eight study intersection are forecast to operate at deficient levels of service (LOS E or F). However, with the proposed improvements and roundabouts, all of the study intersections are forecast to operate at acceptable levels of service except at Emerald Drive/Thomas Street which remains a one-way stop-controlled intersection and Emerald Drive/Olive Avenue. The project is restriping the northbound approach at Emerald Drive/Olive Avenue to allow more vehicle storage for queuing which does not improve the delay and LOS during the AM peak hour. The roadway segment analysis under Horizon Year 2035 With and Without Proposed Improvements conditions show all study segments operate at acceptable levels of service.

Overall, the proposed improvements are anticipated to improve the operations and safety of Emerald Drive for all users including motorists, pedestrians, bicyclists and transit users.

If you have any questions pertaining to the analysis results summarized in this letter, please call me at (858) 810-1432.

Sincerely,

Ryan Zellers
Project Manager



Emerald Drive Corridor Study

Appendix B
Collision Summary

Collision Diagram

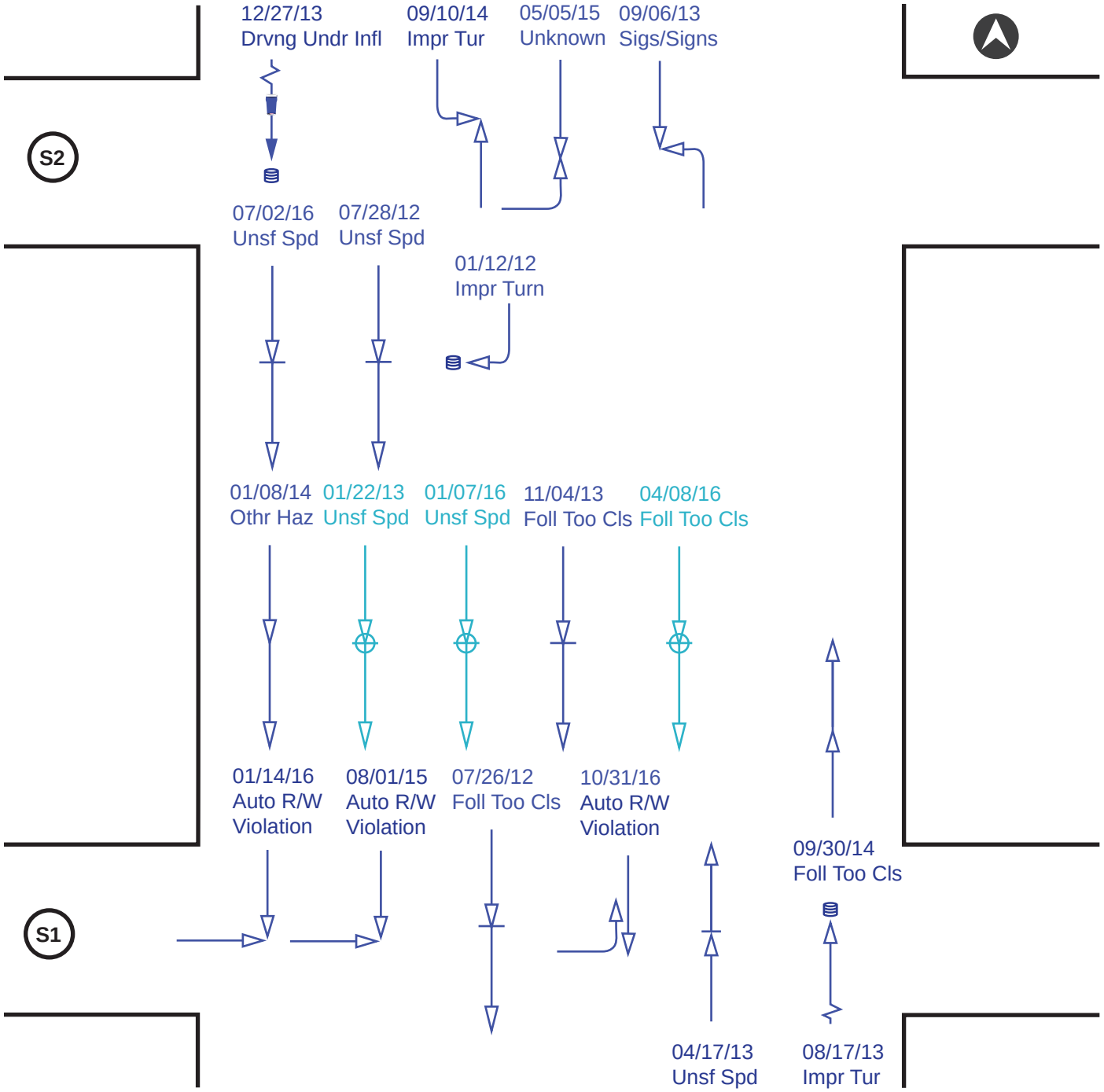
Horizontal Street 1: WEST DR

Horizontal Street 2: PRIVATE RD

Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016

Date Prepared: 3/1/2018



Number of Collisions

16	**Property Damage Only**
3	**Injury Collisions**
0	**Fatal Collisions**
19	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

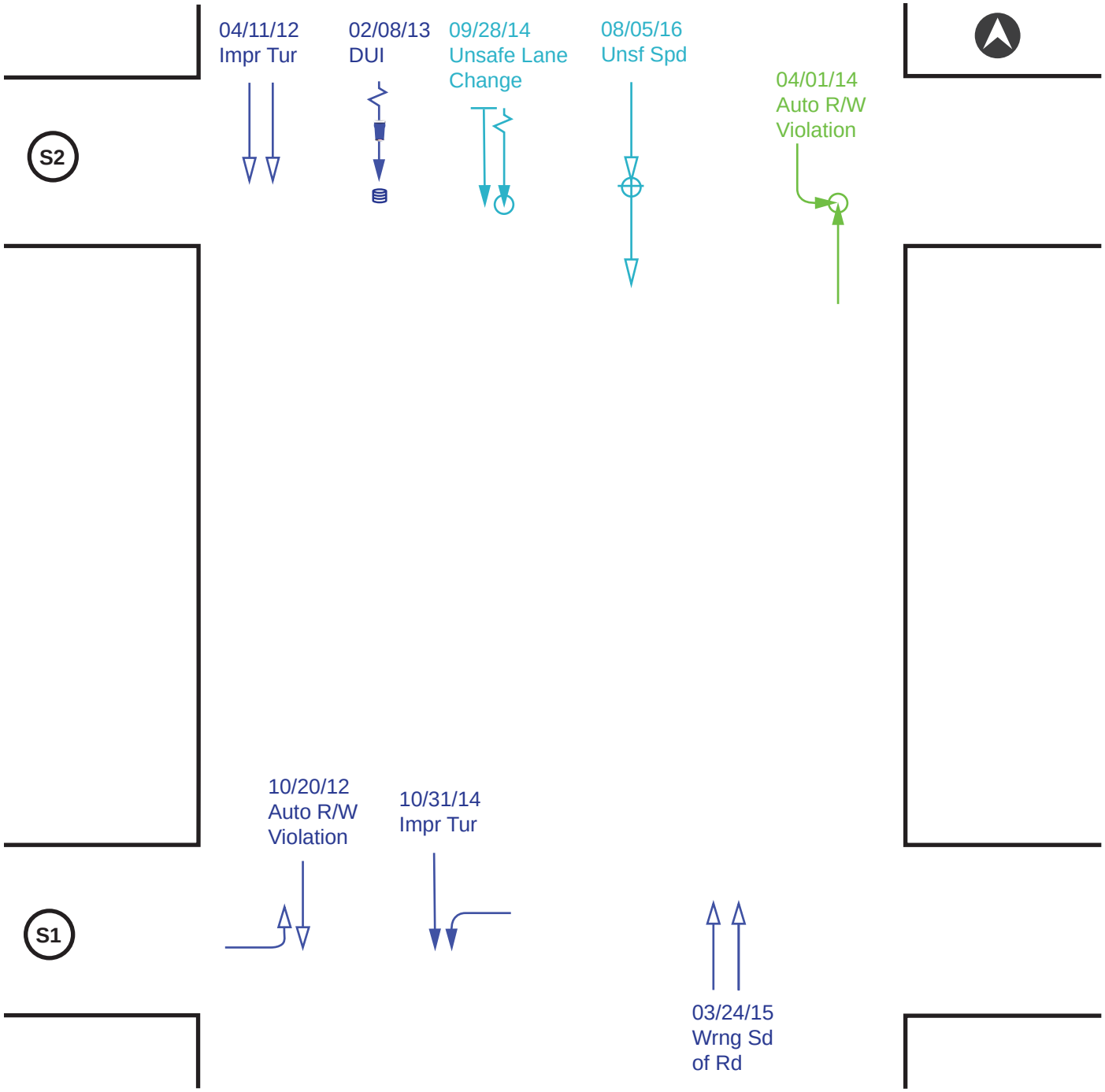
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: PRIVATE RD
Horizontal Street 2: PRIVATE RD
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

5	**Property Damage Only**
3	**Injury Collisions**
0	**Fatal Collisions**
8	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

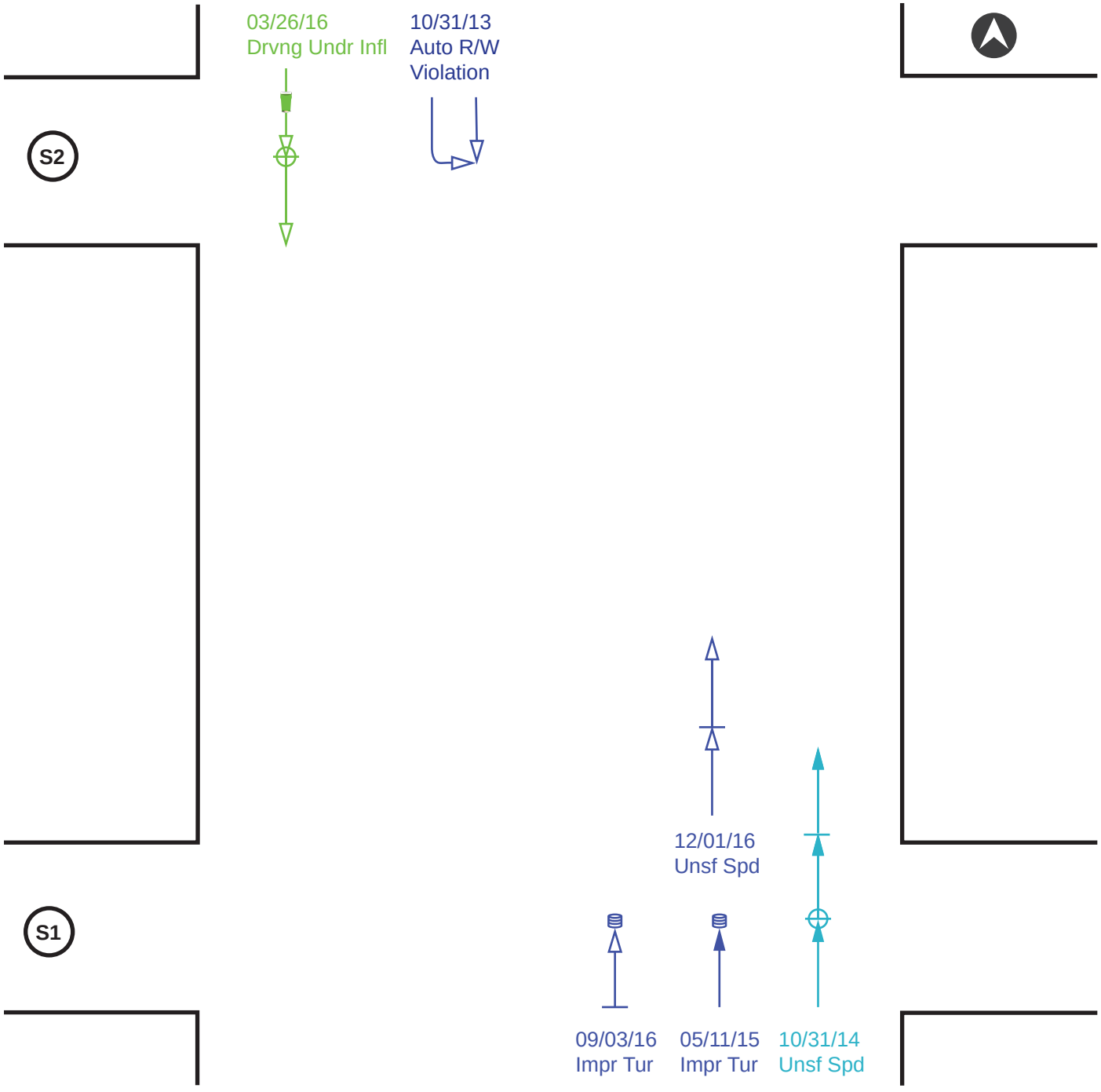
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: PRIVATE RD
Horizontal Street 2: DATE ST
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

4	**Property Damage Only**
2	**Injury Collisions**
0	**Fatal Collisions**
6	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

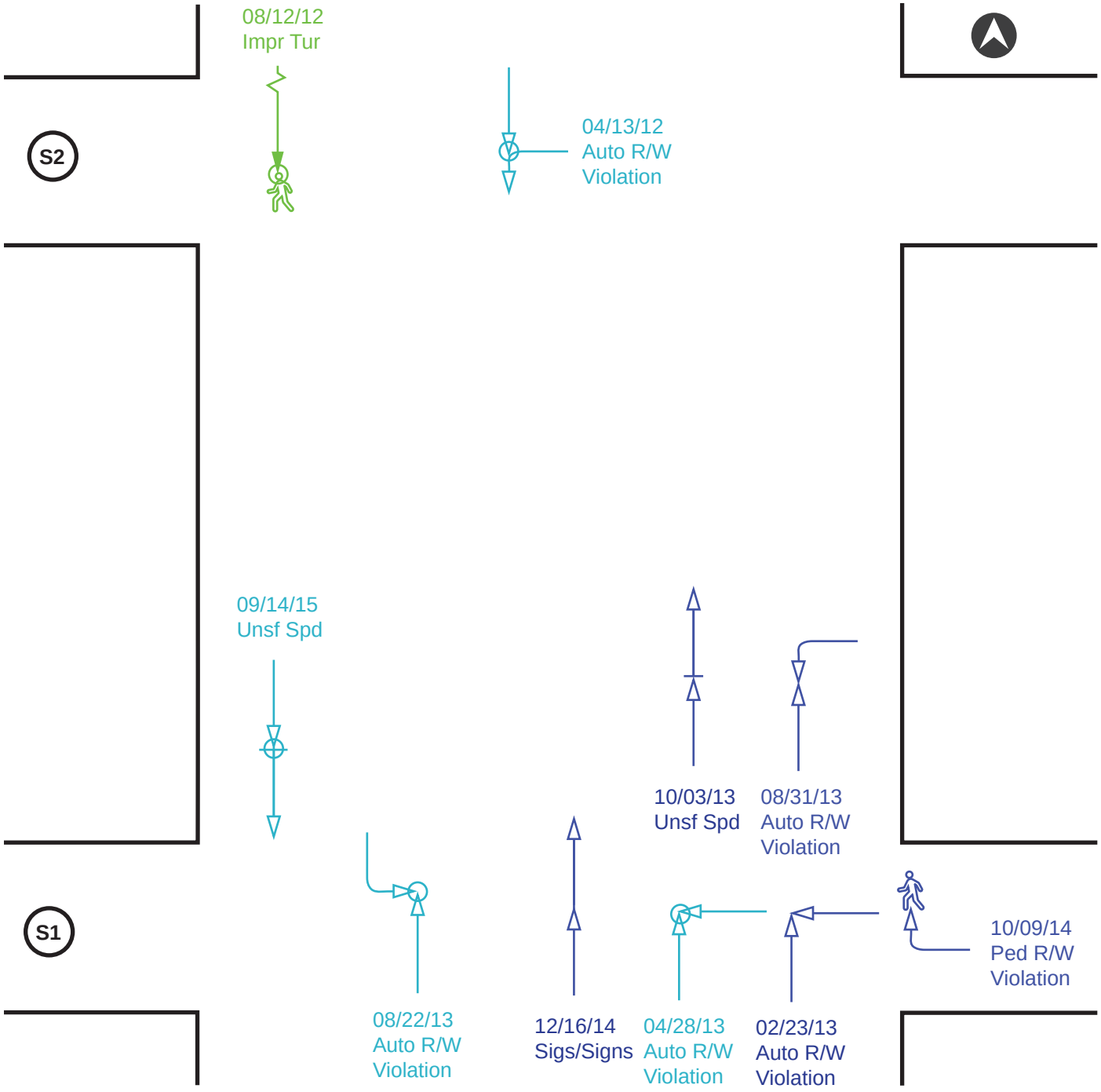
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: DATE ST
Horizontal Street 2: PROMENADE PL
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

5	**Property Damage Only**
5	**Injury Collisions**
0	**Fatal Collisions**
10	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

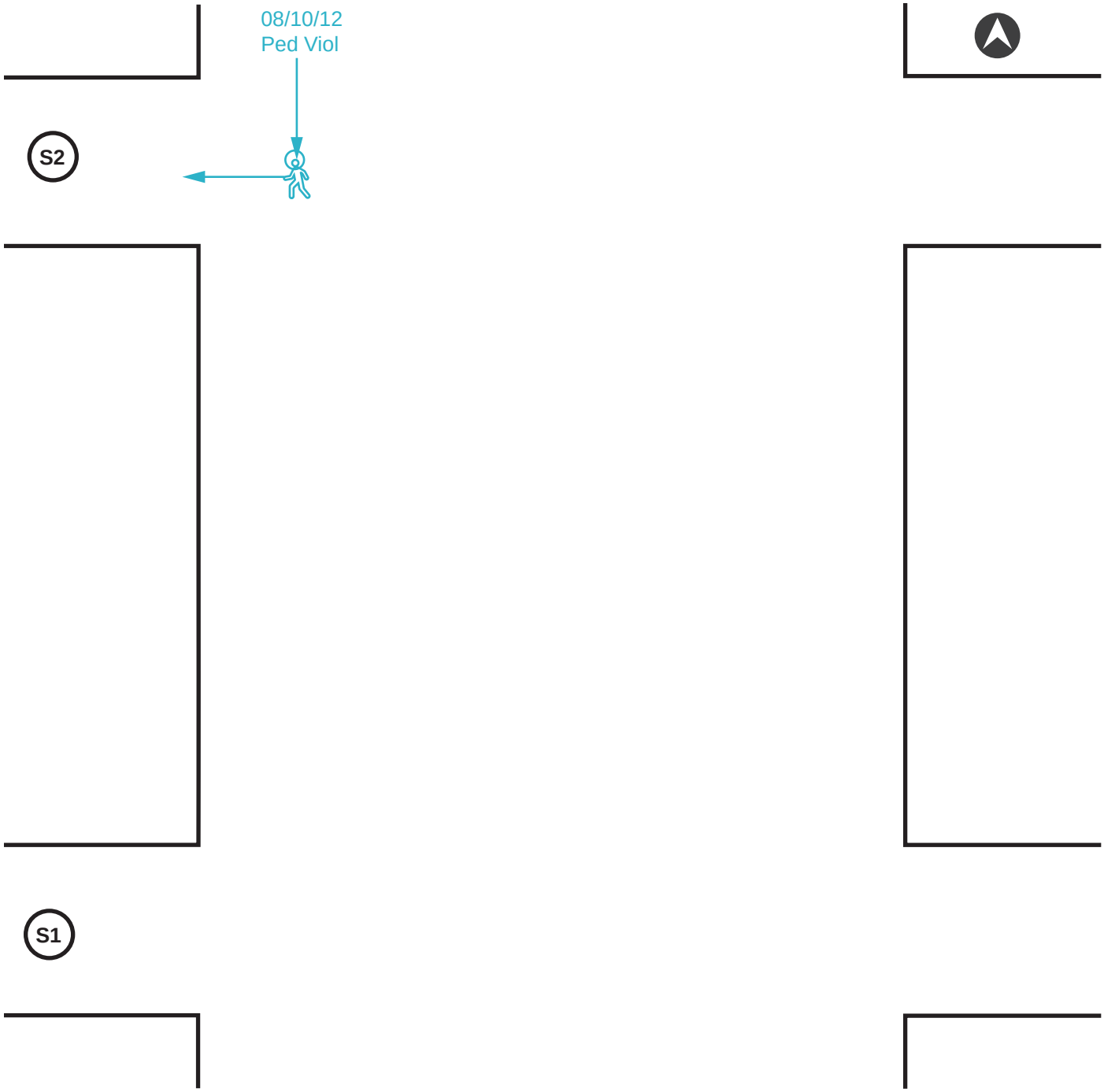
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: PROMENADE PL
Horizontal Street 2: PROMENADE CIR
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

0	**Property Damage Only**
1	**Injury Collisions**
0	**Fatal Collisions**
1	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

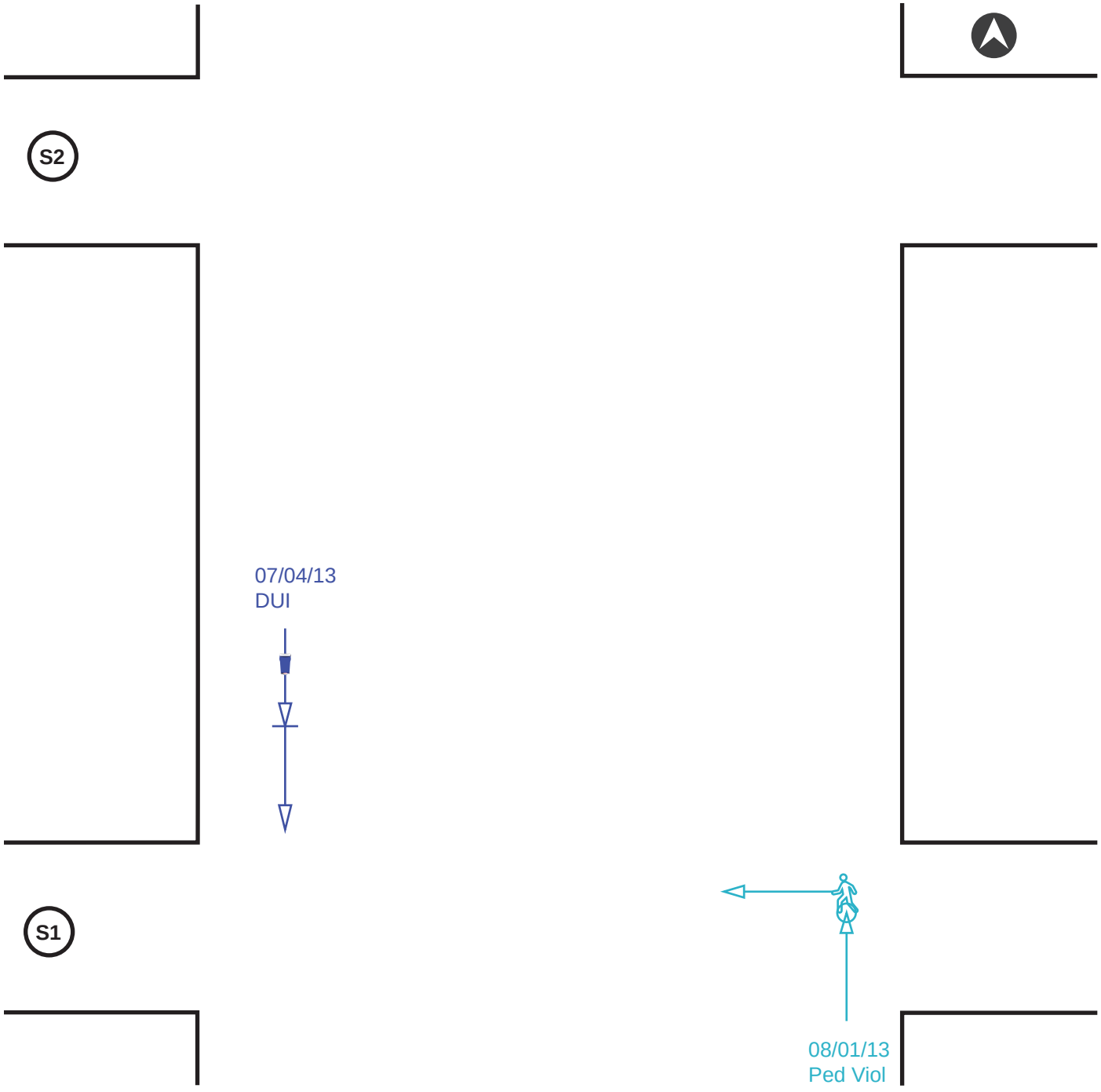
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: PROMENADE CIR
Horizontal Street 2: PLACITOS SUENOS
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

1	**Property Damage Only**
1	**Injury Collisions**
0	**Fatal Collisions**
2	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

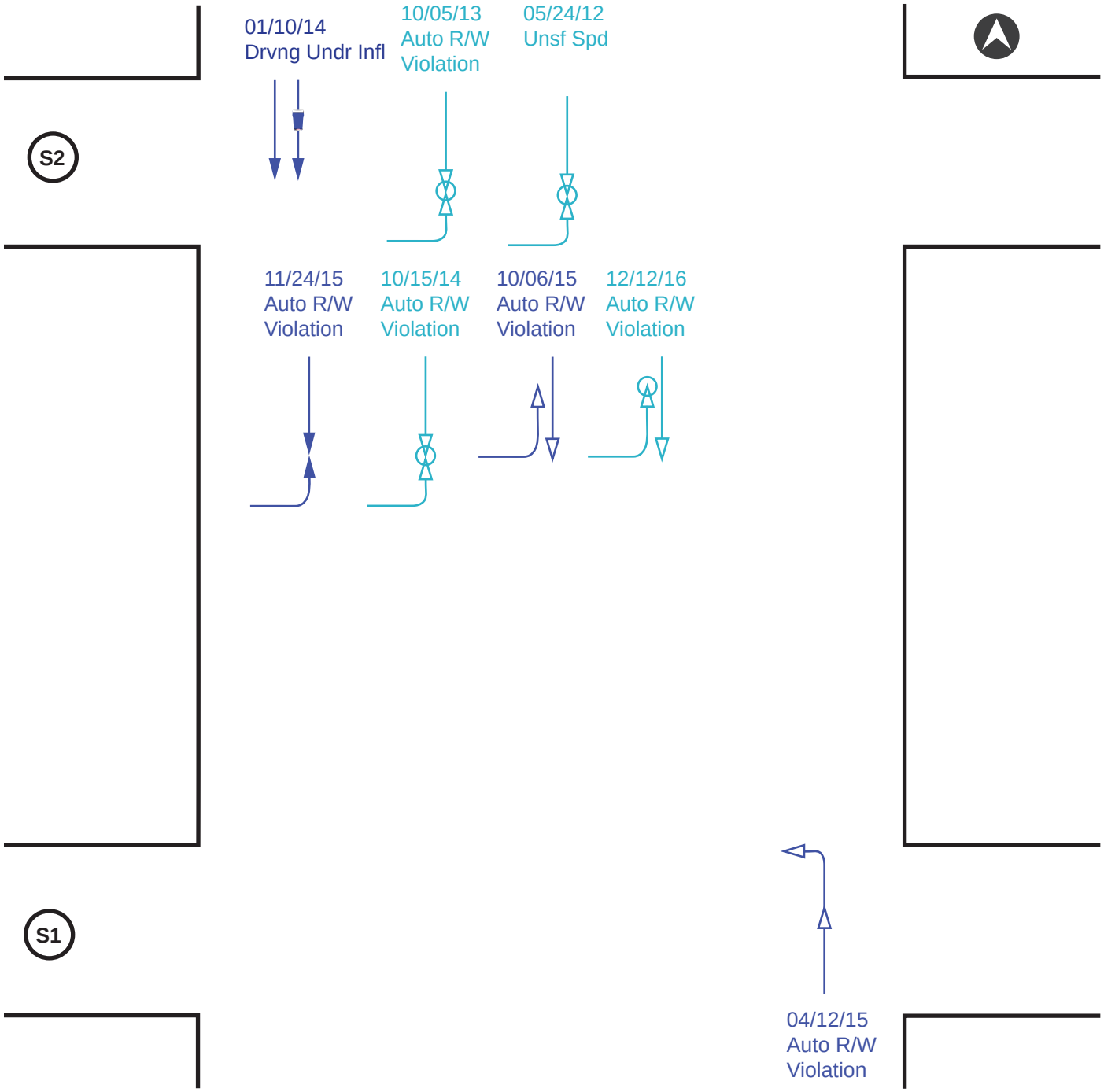
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: PLACITOS SUENOS
Horizontal Street 2: LEWIS ST
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

4	**Property Damage Only**
4	**Injury Collisions**
0	**Fatal Collisions**
8	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

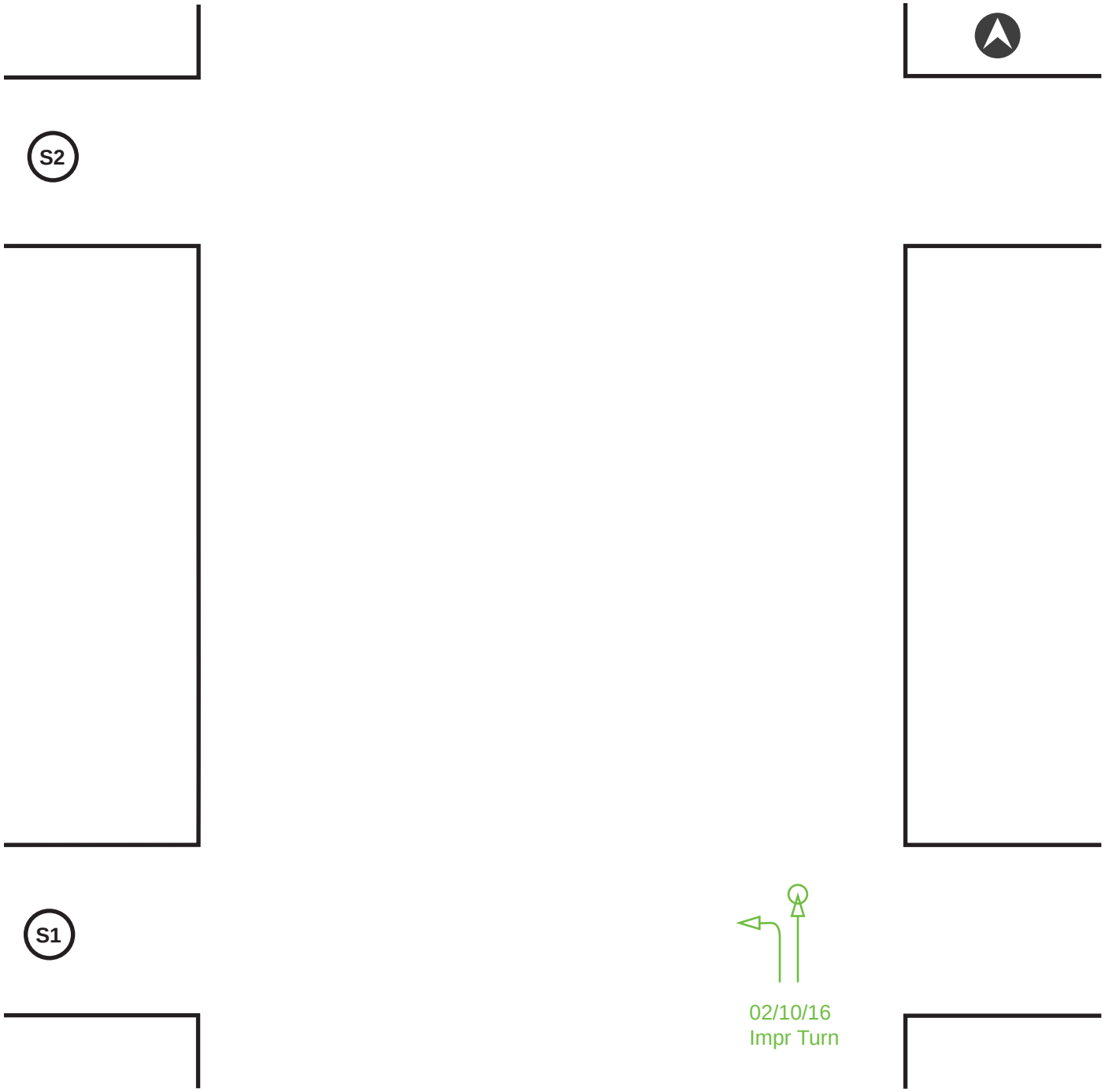
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: TIMOTHY PL
Horizontal Street 2: JONATHON PL
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

0	**Property Damage Only**
1	**Injury Collisions**
0	**Fatal Collisions**
1	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

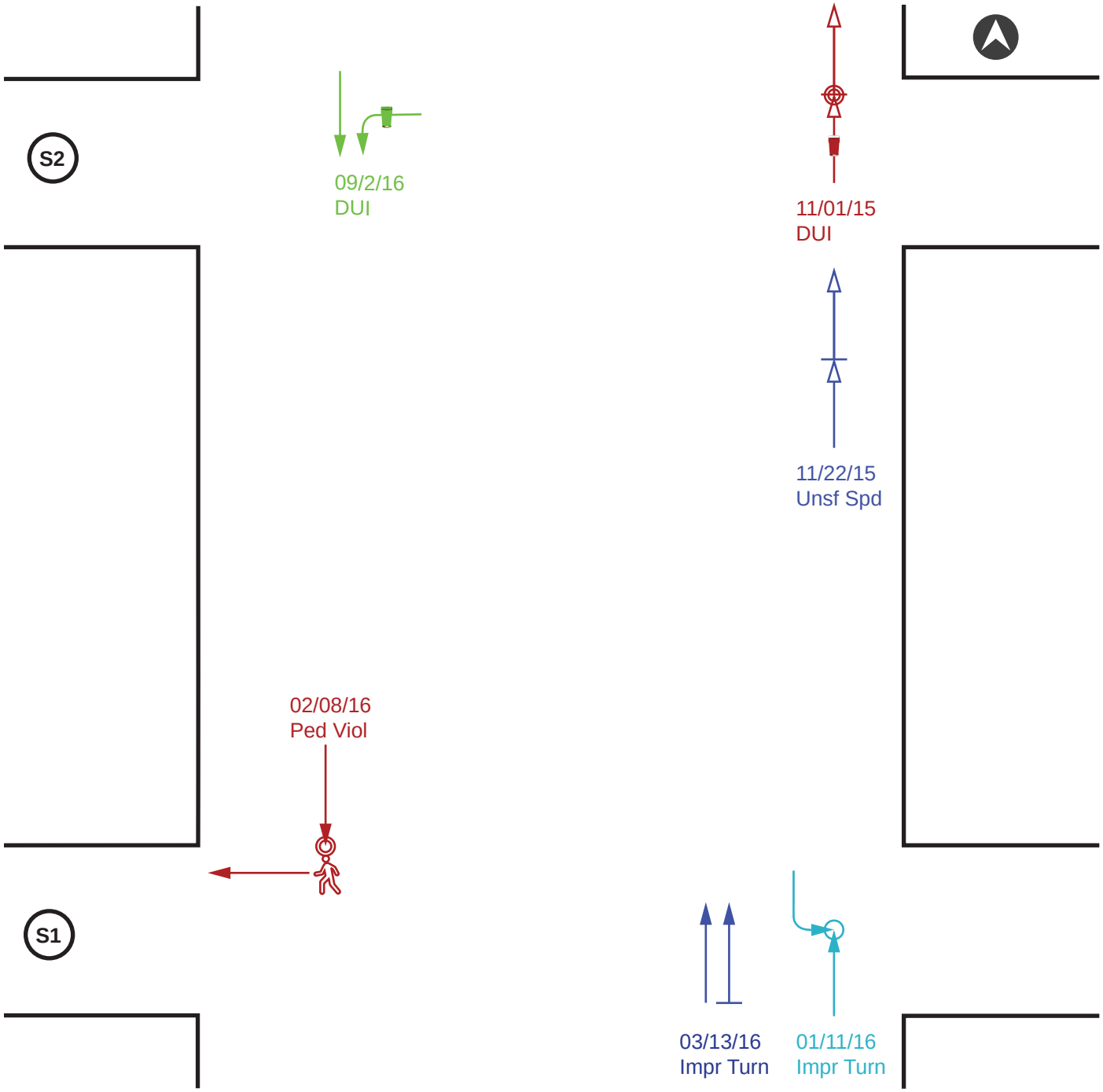
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: JONATHON PL
Horizontal Street 2: THOMAS ST
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

2	**Property Damage Only**
2	**Injury Collisions**
2	**Fatal Collisions**
6	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

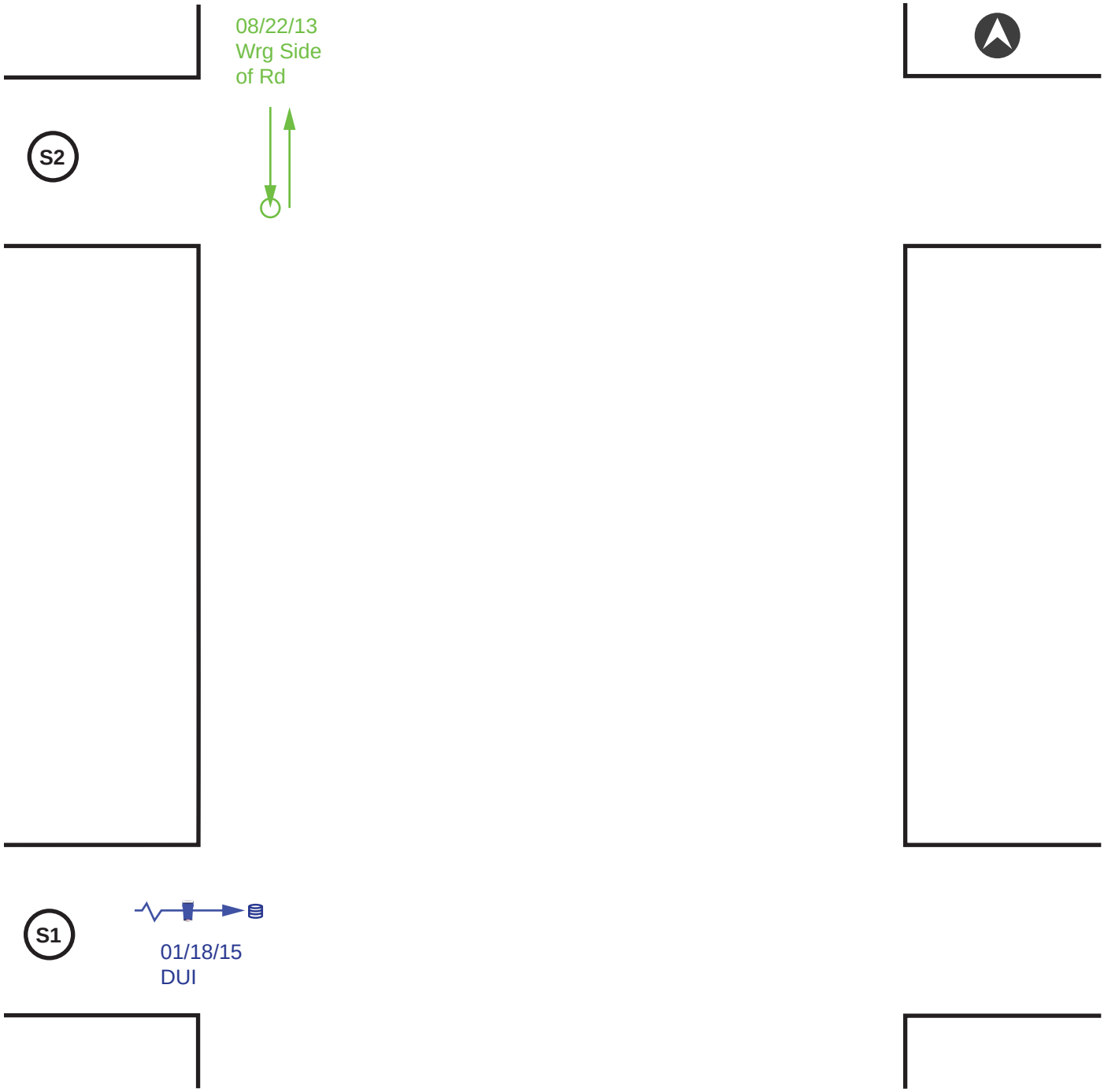
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: GALBAR ST
Horizontal Street 2: ELDRED LN
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

1	**Property Damage Only**
1	**Injury Collisions**
0	**Fatal Collisions**
2	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

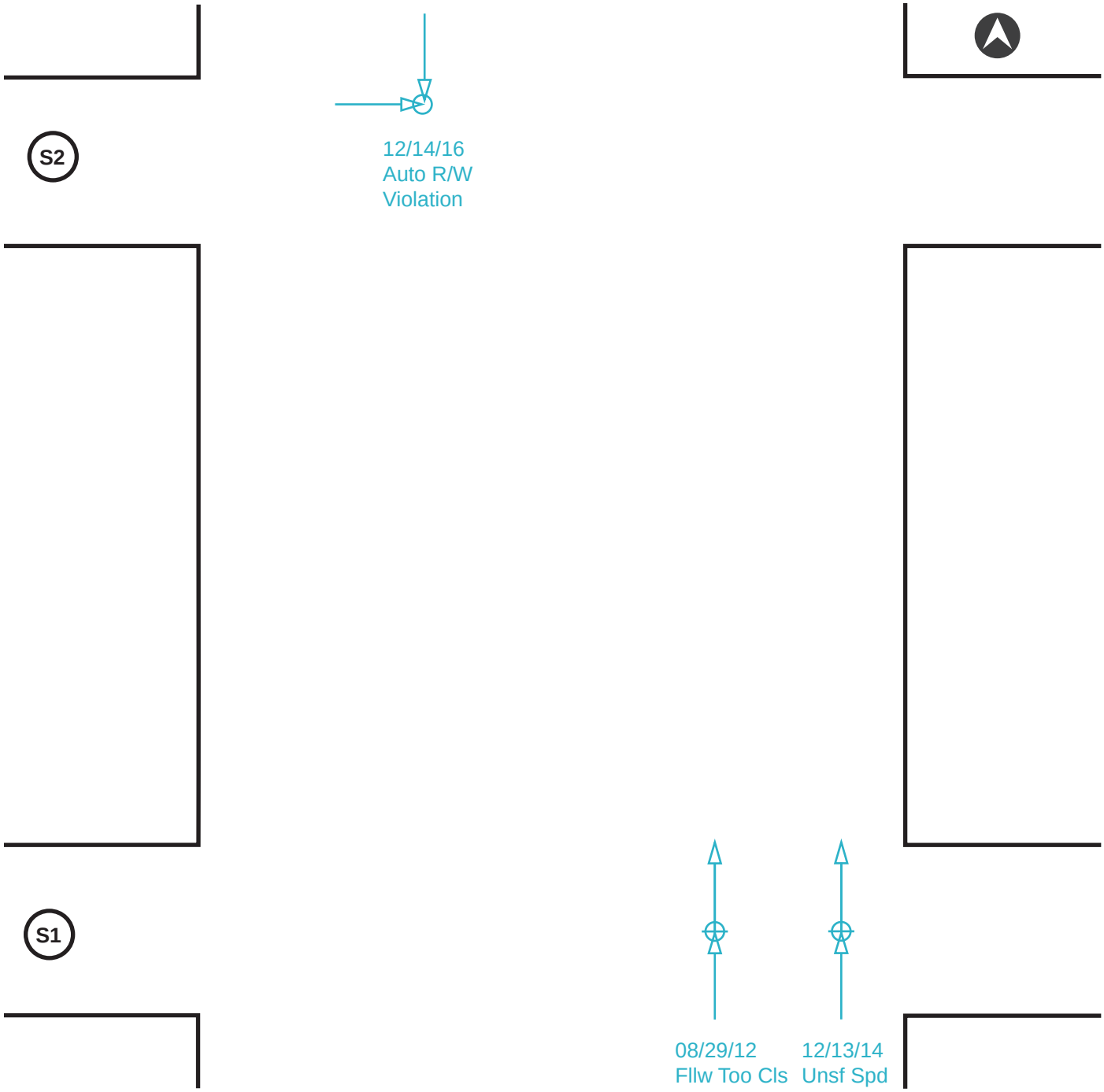
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: ELDRED LN
Horizontal Street 2: WILDFLOWER DR
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

0	**Property Damage Only**
3	**Injury Collisions**
0	**Fatal Collisions**
3	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

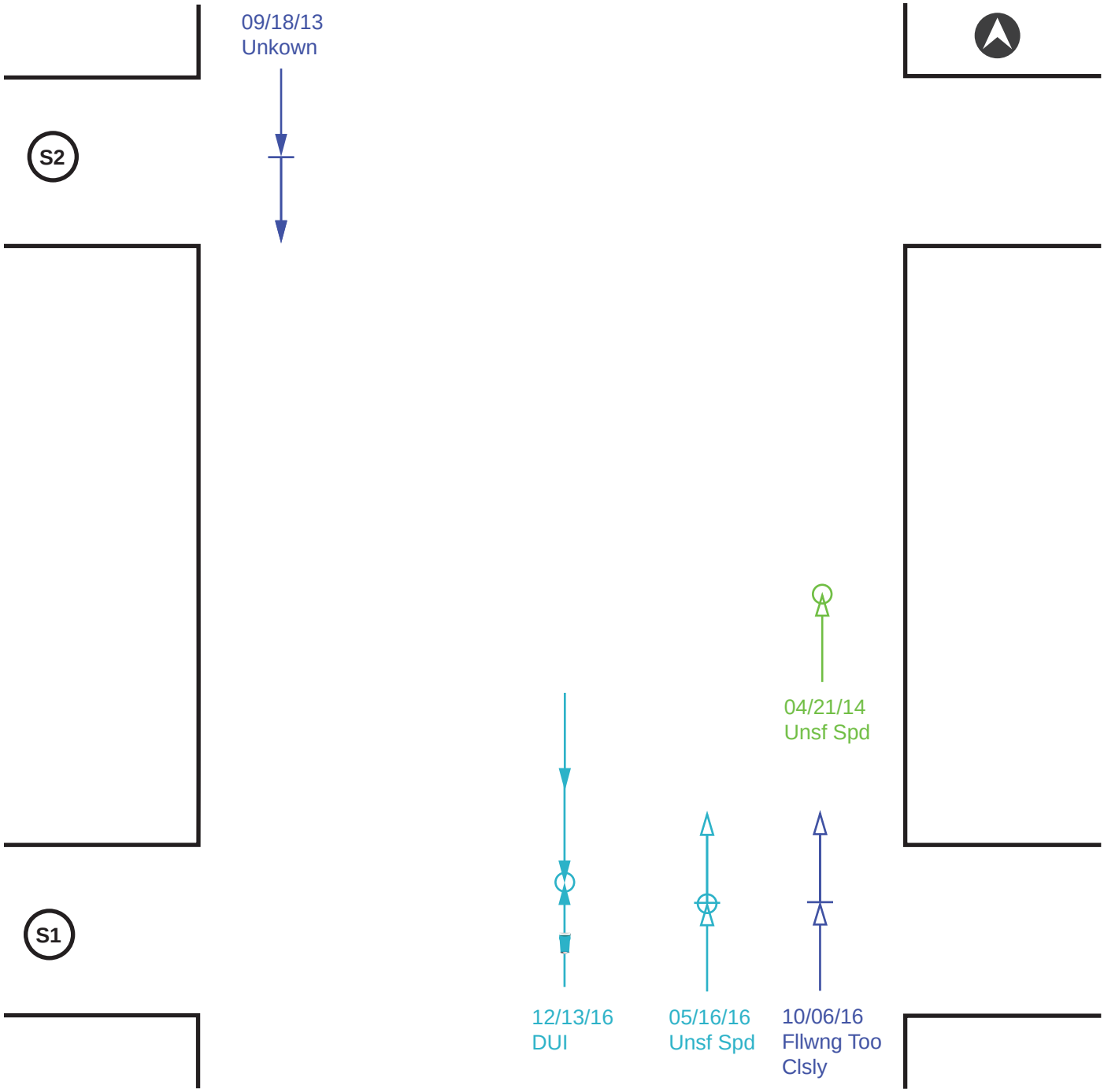
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: WILDFLOWER DR
Horizontal Street 2: CHASIN ST
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

2	**Property Damage Only**
3	**Injury Collisions**
0	**Fatal Collisions**
5	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

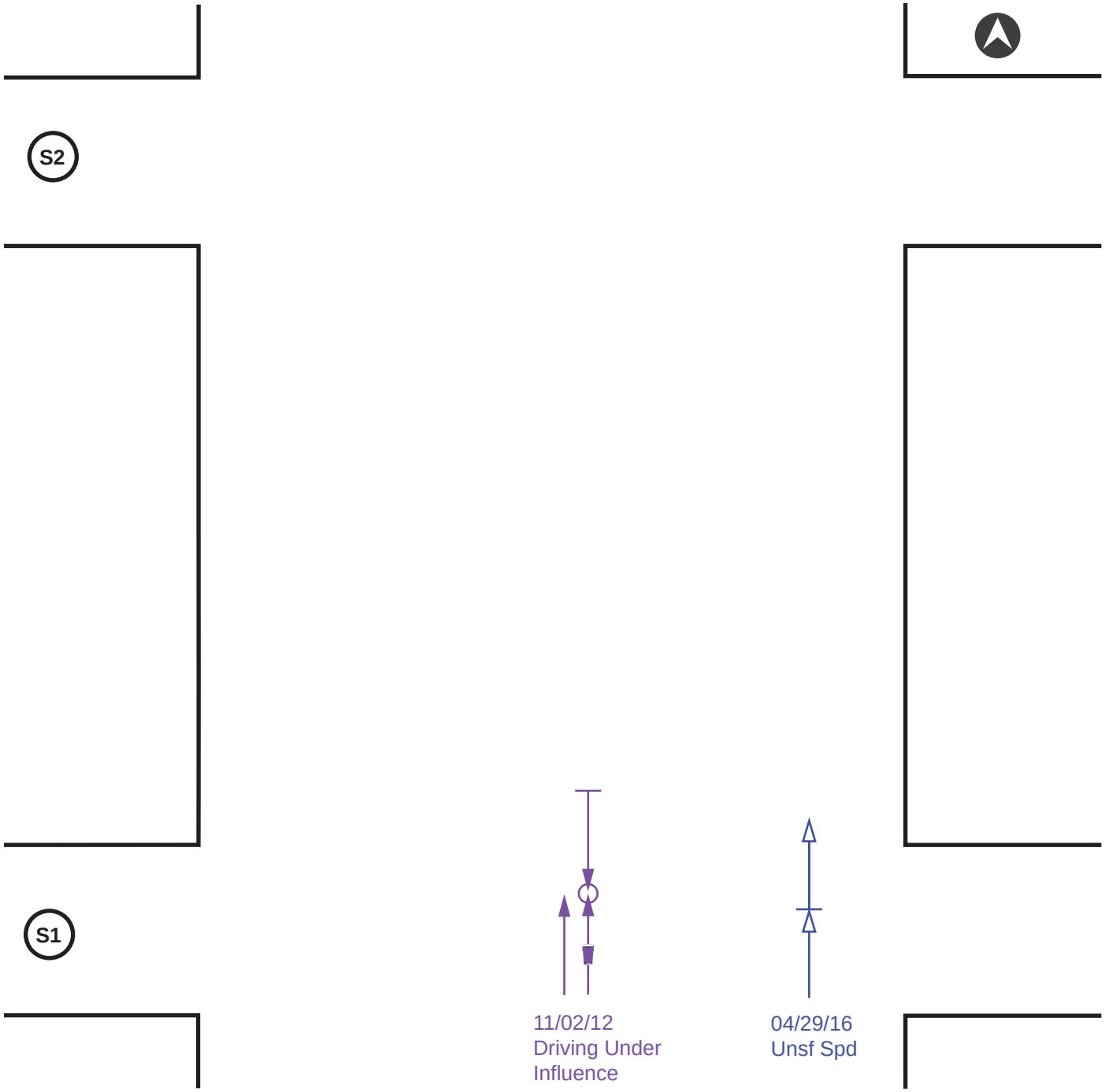
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: CHASIN ST
Horizontal Street 2: BORRA CT
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

1	**Property Damage Only**
1	**Injury Collisions**
0	**Fatal Collisions**
2	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

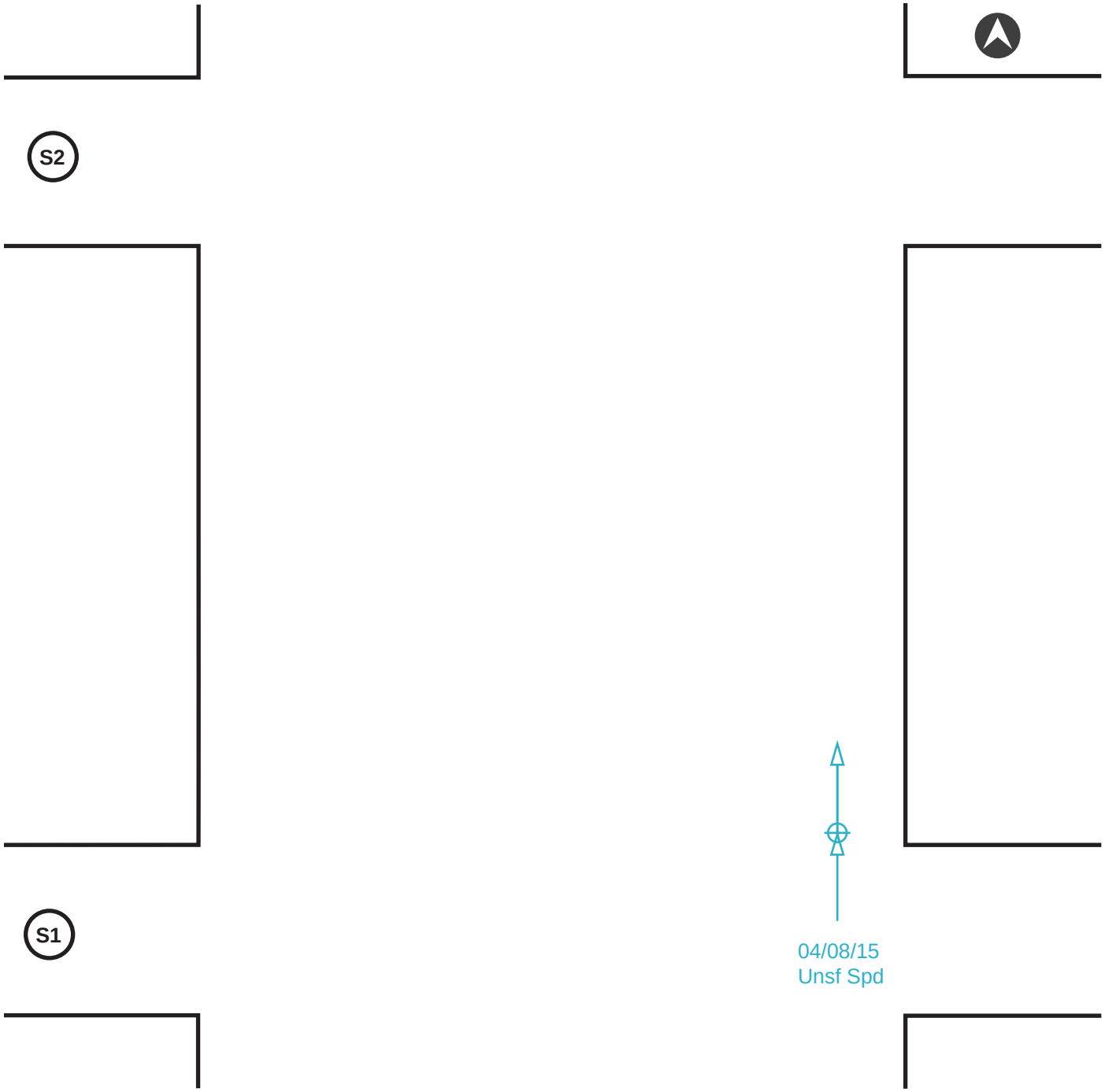
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: CANDIA CT
Horizontal Street 2: RAVINE RD
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

0	**Property Damage Only**
1	**Injury Collisions**
0	**Fatal Collisions**
1	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

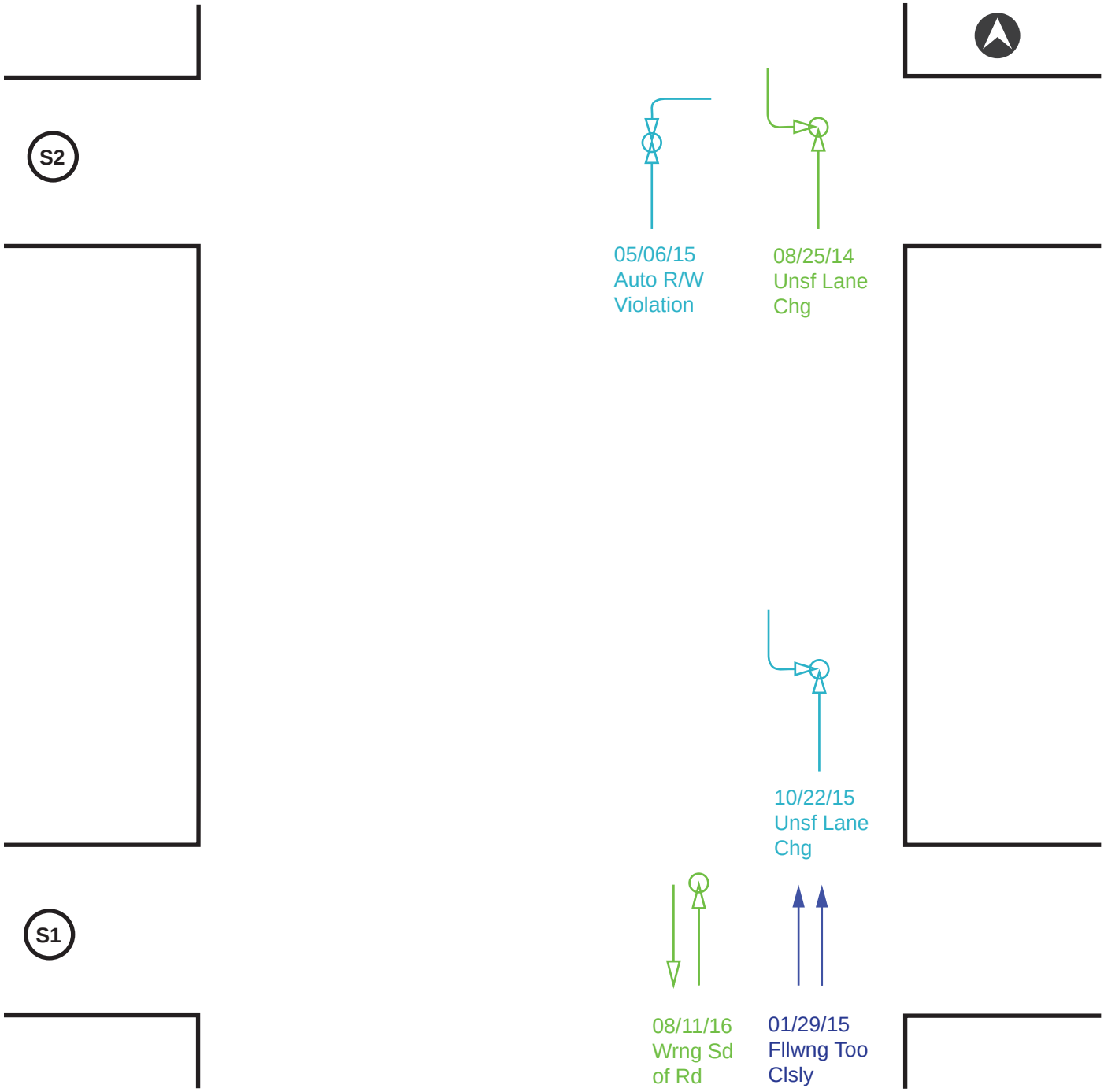
Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only

Collision Diagram

Horizontal Street 1: SILVER FOX LN
Horizontal Street 2: RAVINE RD
Vertical Street: N EMERALD DR

From: 1/1/2012 **To:** 12/31/2016
Date Prepared: 3/1/2018



Number of Collisions

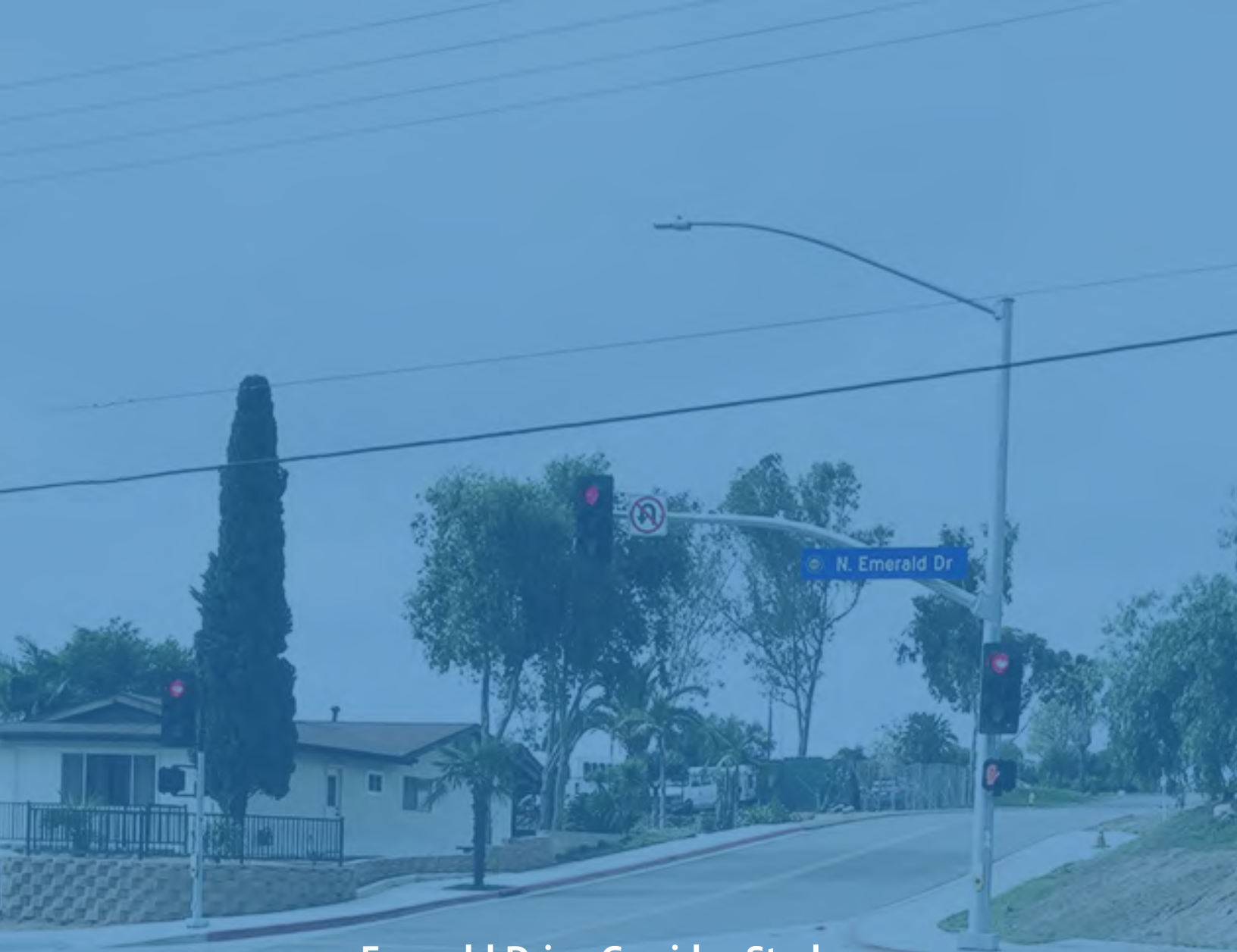
1	**Property Damage Only**
4	**Injury Collisions**
0	**Fatal Collisions**
5	**Total Collisions**

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal
Purple = Severe Injury
Green = Other Visible Injury
Teal = Complaint of Pain
Dark Blue = Property Damage Only



Emerald Drive Corridor Study

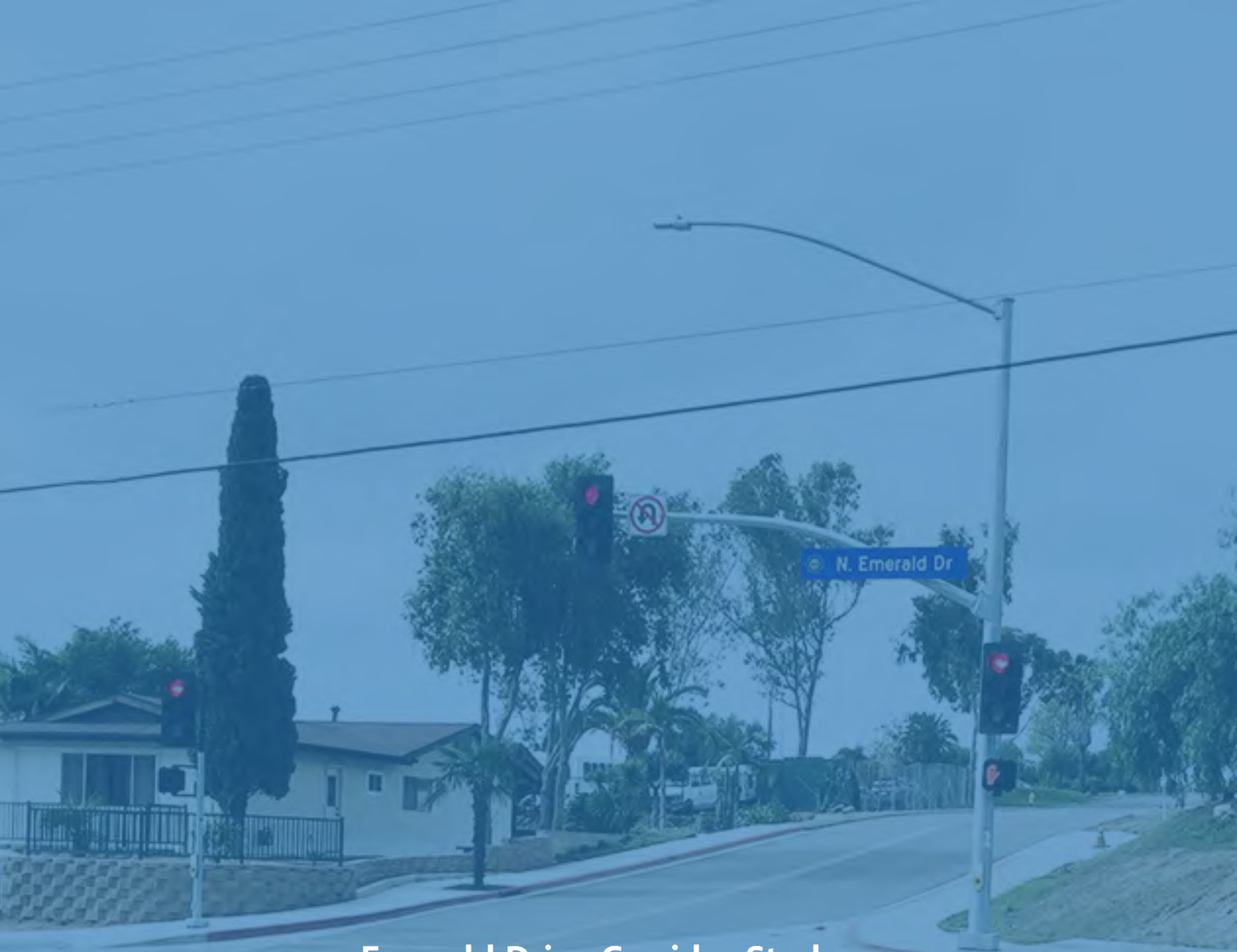
Appendix C
Screen Check Form

Alternative Screening
Emerald Drive between Olive Avenue and Date Street

Michael Baker INTERNATIONAL

Alternative 1: 2-lane road with roundabouts, parking, sidewalks and buffered bike lanes (R/W = 66')
Alternative 2: 2-lane road with traffic signals, parking, sidewalks and buffered bike lanes (R/W = 66')
Alternative 3: 2-lane road with center turn lane, roundabouts, half street parking, sidewalks and bike lanes (R/W = 56')
Alternative 4: 2-lane road with center turn lane, traffic signals, half street parking, sidewalks and bike lanes (R/W = 56')
Alternative 5: 4-lane road with traffic signals, sidewalks, and bike lanes (R/W = 66') - Proposed in the Vista General Plan 2030 Circulation Element
Alternative 6: 4-lane road with center turn lane, sidewalks and traffic signals (R/W = 64') - General Plan

CRITERIA	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
RIGHT OF WAY						
Additional R/W Needs (Not at Intersections)						
	High	Moderate	High	High	Moderate	Moderate
PEDESTRIAN COMFORT						
Alternative include a combination of sidewalks, bike lanes, buffered bike lanes, parking, number of lanes, traffic signal or roundabout						
	High	High	Moderate	Moderate	Low	Low
TRAFFIC CALMING EFFECT						
Alternative include a combination of bike lanes, buffered bike lanes, parking, number of lanes, traffic signal or roundabout						
	High	Moderate	High	Moderate	Moderate	Low
SIDE STREET ACCESS						
Existing Side Street Access is provided by center left turn lanes for a majority of the corridor						
	High	Moderate	High	Moderate	Low	Moderate
BICYCLE COMFORT						
Alternative include Existing Bicycle Facilities						
	High	High	Moderate	Moderate	Moderate	Low
VEHICULAR SAFETY						
Various vehicualr safety countermeasures, includes reduction of lanes, incorporation of bike lanes and/or parking						
	High	High	Moderate	Moderate	Moderate	Low
EXISTING (2018) CAPACITY AND SERVICE						
Vehicle/Capacity Ratio and LOS						
	Low	Low	Low	Low	Low	High
FUTURE (2035) CAPACITY AND SERVICE						
Vehicle/Capacity Ratio and LOS						
	Low	Low	Low	Low	Low	High
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Results	**High**	**High**	**High**	**Moderate**	**Low**	**Low**



Emerald Drive Corridor Study

Appendix D
Counts

Prepared by National Data & Surveying Services

Pedestrian

Location: Emerald Dr & S/O Wildflower Ct **Date:** 2/20/2018

City: Vista **Day:** Tuesday

TIME	Peds (Sidewalk)				
	East Leg		West Leg		
	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	0	2	***2***
7:15 AM	1	0	0	3	***4***
7:30 AM	0	1	0	0	***1***
7:45 AM	0	0	0	0	***0***
8:00 AM	1	0	0	2	***3***
8:15 AM	0	0	0	0	***0***
8:30 AM	0	0	0	0	***0***
8:45 AM	0	0	0	0	***0***
2:00 PM	0	0	0	1	***1***
2:15 PM	0	0	0	0	***0***
2:30 PM	0	0	1	0	***1***
2:45 PM	0	0	0	0	***0***
3:00 PM	0	0	1	0	***1***
3:15 PM	0	0	4	0	***4***
3:30 PM	1	0	2	1	***4***
3:45 PM	0	0	2	4	***6***
Totals	***3***	***1***	***10***	***13***	***27***

Prepared by National Data & Surveying Services

Bikes

Location: Emerald Dr & S/O Wildflower Ct
City: Vista
Date: 2/20/2018
Day: Tuesday

TIME	Bikes (Sidewalk)				
	East Leg		West Leg		
	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	0	0	***0***
7:15 AM	0	0	0	0	***0***
7:30 AM	0	0	0	0	***0***
7:45 AM	0	0	0	0	***0***
8:00 AM	0	0	0	0	***0***
8:15 AM	0	0	0	0	***0***
8:30 AM	0	0	0	0	***0***
8:45 AM	0	0	0	0	***0***
2:00 PM	0	0	0	0	***0***
2:15 PM	0	0	0	0	***0***
2:30 PM	0	0	0	0	***0***
2:45 PM	1	0	0	0	***1***
3:00 PM	0	0	0	0	***0***
3:15 PM	0	0	0	0	***0***
3:30 PM	0	0	0	0	***0***
3:45 PM	0	0	0	0	***0***
Totals	***1***	***0***	***0***	***0***	***1***

Prepared by National Data & Surveying Services

Emerald Dr & Ravine Rd

Peak Hour Turning Movement Count

ID: 18-04044-003
City: Vista

Day: Tuesday
Date: 02/20/2018

PEAK HOURS		COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	03:00 PM - 04:00 PM	02:00 PM - 04:00 PM

Emerald Dr – SOUTHBOUND

	Right	Through	Left	U-Turn	Northbound exit
AM	0	1071	6	0	863
NOON	0	0	0	0	0
PM	0	750	5	0	1008
(red)	0	1	0	0	

Ravine Rd – WESTBOUND

Movement	(red)	PM	NOON	AM
Right	0	5	0	7
Through	1	0	0	0
Left	0	9	0	21
U-Turn	0	0	0	0
Eastbound exit		46	0	117

Ravine Rd – EASTBOUND

Movement	AM	NOON	PM	(red)
Westbound exit	0	0	0	
U-Turn	0	0	0	0
Left	0	0	0	0
Through	0	0	0	0
Right	0	0	0	0

Emerald Dr – NORTHBOUND

	Southbound exit	U-Turn	Left	Through	Right
(red)		0	0	1	0
PM	759	0	0	1003	41
NOON	0	0	0	0	0
AM	1093	1	0	856	111

CONTROL

1-Way Stop(WB)

	AM	NOON	PM
TEV	2073	0	1813
PHF	0.88		0.97

Total Vehicles (AM)

Approach	U-Turn	Left	Through	Right
Southbound	0	6	1071	0
Westbound		21	0	7
Eastbound		0	0	0
Northbound	0		856	111

Total Vehicles (Noon)

All movements: N/A

Total Vehicles (PM)

Approach	U-Turn	Left	Through	Right
Southbound	0	5	750	0
Westbound		9	0	5
Eastbound		0	0	0
Northbound	0		100	41

Bikes (AM)

All movements: 0

Bikes (NOON)

All movements: N/A

Bikes (PM)

Approach	Values
Southbound	0, 0, 1
Westbound	0, 0, 0
Eastbound	0, 0, 0
Northbound	0, 0, 0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg (west side)	0	0	0
North leg (east side)	0	0	0
West leg (north side)	0	0	0
West leg (south side)	0	0	0
East leg (north side)	0	0	0
East leg (south side)	2	0	0
South leg (west side)	0	0	0
South leg (east side)	0	0	0
NW diagonal	0	0	0
NE diagonal	0	0	0
SW diagonal	0	0	0
SE diagonal	0	0	0

Prepared by National Data & Surveying Services

Emerald Dr & Jonathon Pl/Jonathan St

Peak Hour Turning Movement Count

ID: 18-04044-004
City: Vista

Day: Tuesday
Date: 02/20/2018

PEAK HOURS

AM	07:15 AM - 08:15 AM
NOON	NONE
PM	03:00 PM - 04:00 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	02:00 PM - 04:00 PM

Emerald Dr — SOUTHBOUND

AM	3	1111	59	1	973 AM
NOON	0	0	0	0	0 NOON
PM	3	762	29	0	1151 PM

Jonathon Pl/Jonathan St — EASTBOUND

AM	NOON	PM	
11	0	12	
0	0	0	0
4	0	2	0
1	0	0	1
10	0	8	0

Jonathon Pl/Jonathan St — WESTBOUND

PM	NOON	AM	
49	0	70	0
0	0	1	1
8	0	6	0
0	0	1	0
59	0	82	

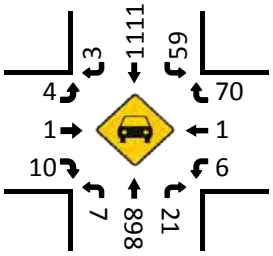
Emerald Dr — NORTHBOUND

PM	778	0	9	1100	30 PM
NOON	0	0	0	0	0 NOON
AM	1127	0	7	898	21 AM

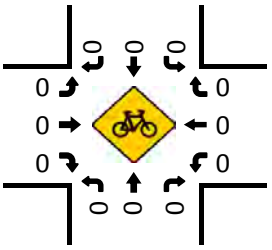
CONTROL: 2-Way Stop(EB/WB)

TEV	2193	0	2000
	AM	NOON	PM
PHF	0.90		0.96

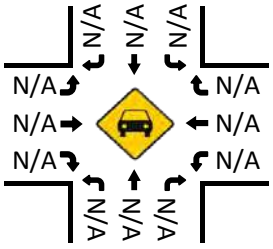
Total Vehicles (AM)



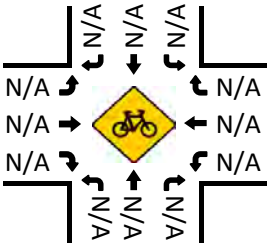
Bikes (AM)



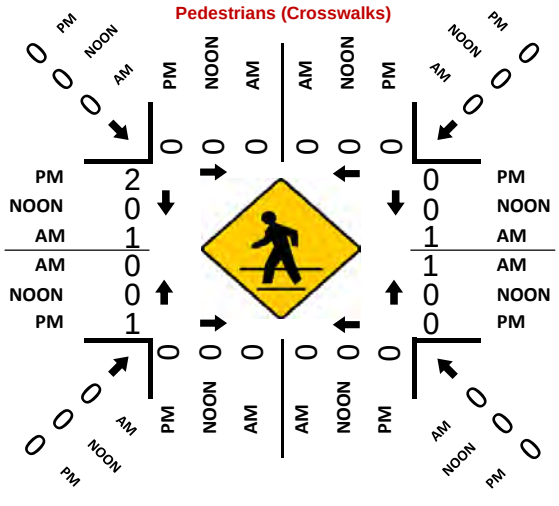
Total Vehicles (Noon)



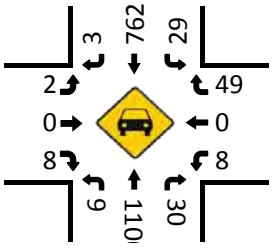
Bikes (NOON)



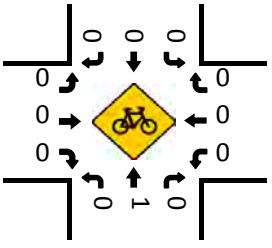
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Emerald Dr & Lewis St/Timothy Pl

Peak Hour Turning Movement Count

ID: 18-04044-005
City: Vista

Day: Tuesday
Date: 02/20/2018

PEAK HOURS		COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	03:00 PM - 04:00 PM	02:00 PM - 04:00 PM

Emerald Dr — SOUTHBOUND

	Right	Through	Left	U-Turn	Exiting (NB)
AM	123	1003	0	1	925
NOON	0	0	0	0	0
PM	57	722	3	0	1143
Lanes	0	1	1	0	

Lewis St/Timothy Pl — EASTBOUND

	AM	NOON	PM	Lanes
Exiting (WB)	168	0	161	
U-Turn	0	0	0	0
Left	32	0	17	0
Through	0	0	0	1
Right	82	0	58	0

Lewis St/Timothy Pl — WESTBOUND

	Lanes	PM	NOON	AM
Left	0	6	0	0
Through	1	1	0	0
Right	0	2	0	3
U-Turn	0	0	0	0
Exiting (EB)		9	0	5

Emerald Dr — NORTHBOUND

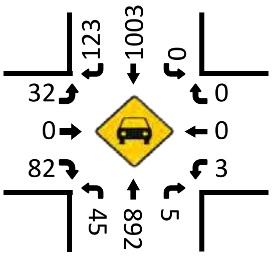
	Exiting (SB)	U-Turn	Left	Through	Right
Lanes		0	0	1	0
PM	782	0	103	1120	6
NOON	0	0	0	0	0
AM	1088	0	45	892	5

CONTROL

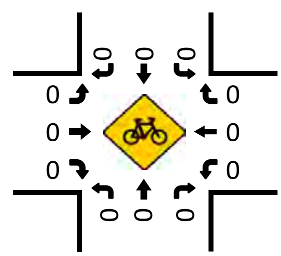
1-Way Stop(EB)

	AM	NOON	PM
TEV	2186	0	2095
PHF	0.94		0.95

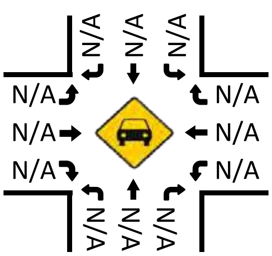
Total Vehicles (AM)



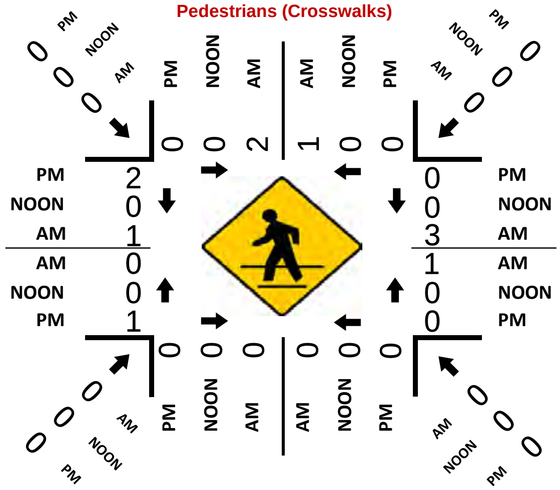
Bikes (AM)



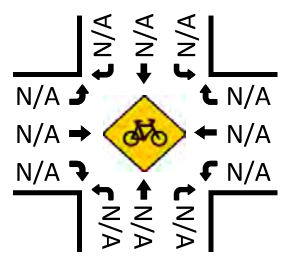
Total Vehicles (Noon)



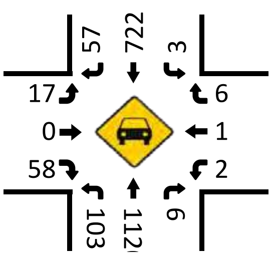
Pedestrians (Crosswalks)



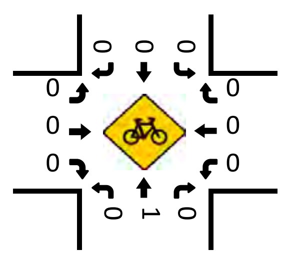
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Emerald Dr & Date St

Peak Hour Turning Movement Count

ID: 18-04044-006
City: Vista

Day: Tuesday
Date: 02/20/2018

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 03:00 PM - 04:00 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 02:00 PM - 04:00 PM

SOUTHBOUND — Emerald Dr

AM	18	1018	72	0	931	AM
NOON	0	0	0	0	0	NOON
PM	3	707	67	0	1237	PM

EASTBOUND — Date St

AM	NOON	PM	
26	0	26	
0	0	0	0
14	0	2	0
2	0	2	1
10	0	14	0
AM	NOON	PM	

WESTBOUND — Date St

PM	NOON	AM	
98	0	78	0
2	0	2	1
80	0	89	0
0	0	0	0
179	0	129	
PM	NOON	AM	

NORTHBOUND — Emerald Dr

PM	801	0	21	1137	110	PM
NOON	0	0	0	0	0	NOON
AM	1117	0	6	839	55	AM

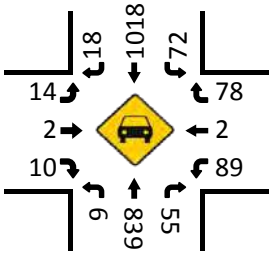
	1	2	1	0
	0	1	2	0

CONTROL

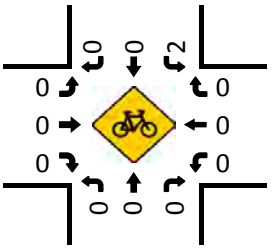
Signalized

TEV	2203 AM	0 NOON	2243 PM
PHF	0.95		0.97

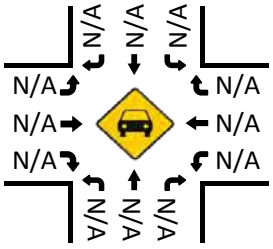
Total Vehicles (AM)



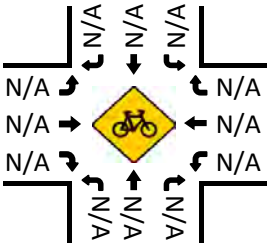
Bikes (AM)



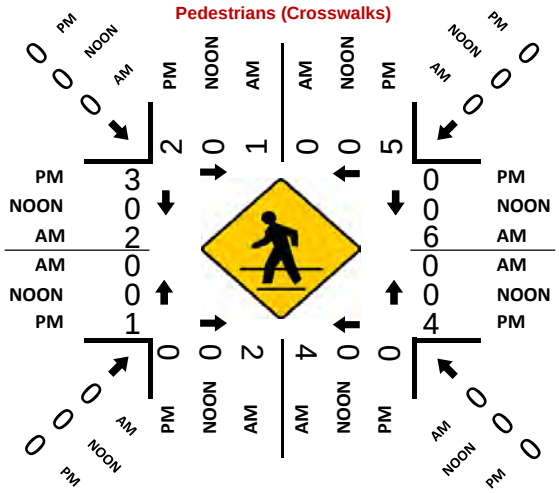
Total Vehicles (Noon)



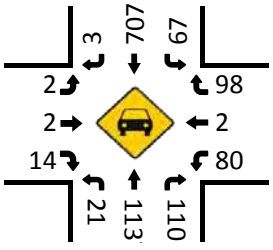
Bikes (NOON)



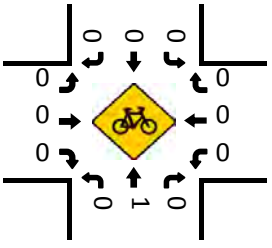
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Emerald Dr & Chasin St

Peak Hour Turning Movement Count

ID: 18-04106-001
City: Vista

Day: Tuesday
Date: 04/03/2018

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	03:00 PM - 04:00 PM	02:00 PM - 04:00 PM

Emerald Dr — SOUTHBOUND

	Right	Thru	Left	U-Turn	Out
AM	10	943	0	0	944
NOON	0	0	0	0	0
PM	10	754	0	0	1011
Bikes	0	1	0	0	

Chasin St — EASTBOUND

	AM	NOON	PM	Bikes
Out	20	0	39	
U-Turn	0	0	0	0
Left	8	0	6	0
Thru	0	0	0	1
Right	28	0	19	0

Chasin St — WESTBOUND

	PM	NOON	AM	Bikes
Right	0	0	0	0
Thru	0	0	0	0
Left	0	0	0	0
U-Turn	0	0	0	0
Out	0	0	0	

Emerald Dr — NORTHBOUND

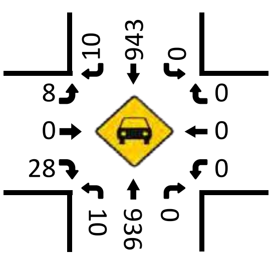
	Out	U-Turn	Left	Thru	Right
Bikes		0	0	1	0
PM	773	0	29	1005	0
NOON	0	0	0	0	0
AM	971	0	10	936	0

CONTROL

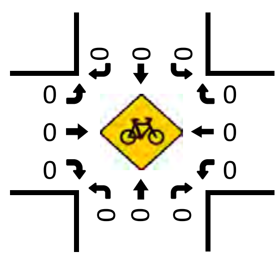
1-Way Stop(EB)

	AM	NOON	PM
TEV	1935	0	1823
PHF	0.88		0.97

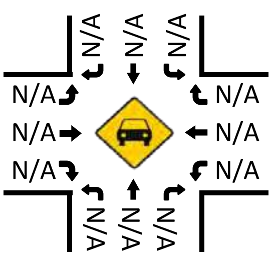
Total Vehicles (AM)



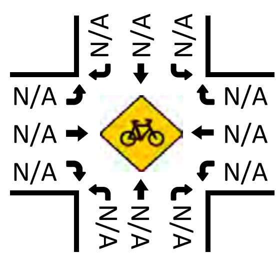
Bikes (AM)



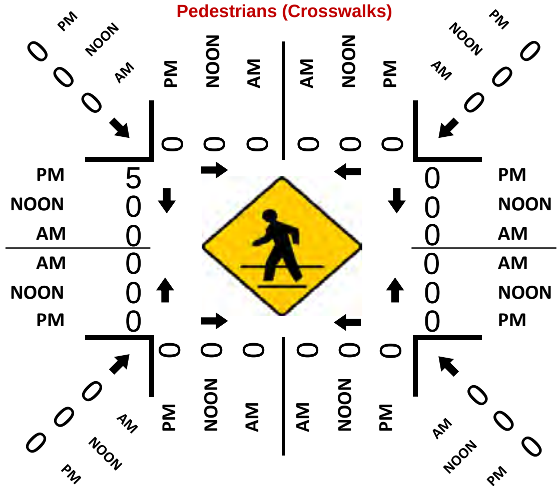
Total Vehicles (Noon)



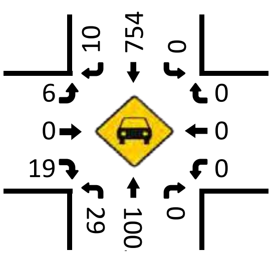
Bikes (NOON)



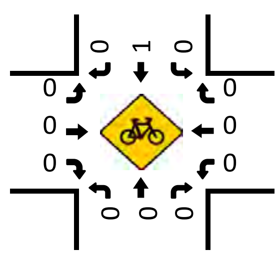
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Emerald Dr & Galbar St

Peak Hour Turning Movement Count

ID: 18-04106-002
City: Vista

Day: Tuesday
Date: 04/03/2018

PEAK HOURS		COUNT PERIODS
07:15 AM - 08:15 AM	AM	07:00 AM - 09:00 AM
NONE	NOON	NONE
03:00 PM - 04:00 PM	PM	02:00 PM - 04:00 PM

Emerald Dr – SOUTHBOUND

	Right	Through	Left	U-Turn	Departing
AM	9	972	0	1	943
NOON	0	0	0	0	0
PM	15	750	0	0	1048
Bikes	0	1	0	0	

Galbar St – EASTBOUND

	AM	NOON	PM	Bikes
Departing	33	0	79	
U-Turn	0	0	0	0
Left	13	0	25	0
Through	0	0	0	1
Right	47	0	41	0

Galbar St – WESTBOUND

	PM	NOON	AM	Bikes
Right	0	0	1	0
Through	0	0	0	0
Left	0	0	1	0
U-Turn	0	0	0	0
Departing	0	0	0	

Emerald Dr – NORTHBOUND

	Departing	U-Turn	Left	Through	Right
Bikes		0	0	1	0
PM	791	0	64	1023	0
NOON	0	0	0	0	0
AM	1021	1	24	928	0

CONTROL

1-Way Stop(EB)

	AM	NOON	PM
TEV	1997	0	1918
PHF	0.90		0.95

Total Vehicles (AM)

SB: 9, 972, 0 · EB: 13, 0, 47 · WB: 1, 0, 1 · NB: 24, 928, 0

Total Vehicles (Noon)

All movements: N/A

Total Vehicles (PM)

SB: 15, 750, 0 · EB: 25, 0, 41 · WB: 0, 0, 0 · NB: 64, 102, 0

Bikes (AM)

SB: 0, 0, 0 · EB: 0, 0, 0 · WB: 0, 0, 0 · NB: 0, 0, 0

Bikes (NOON)

All movements: N/A

Bikes (PM)

SB: 0, 1, 0 · EB: 0, 0, 0 · WB: 0, 0, 0 · NB: 0, 0, 0

Pedestrians (Crosswalks)

	West leg	East leg
PM	5	0
NOON	0	0
AM	1	0
AM	0	0
NOON	0	0
PM	3	0

North and south crosswalks (AM / NOON / PM): 0 / 0 / 0 on each side; diagonal crossings: 0 / 0 / 0.

Prepared by National Data & Surveying Services

Emerald Dr & Thomas St

Peak Hour Turning Movement Count

ID: 18-04106-003
City: Vista

Day: Tuesday
Date: 04/03/2018

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 03:00 PM - 04:00 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 02:00 PM - 04:00 PM

Emerald Dr — SOUTHBOUND

AM	18	1003	0	0	948	AM
NOON	0	0	0	0	0	NOON
PM	19	771	1	0	1083	PM

Thomas St — EASTBOUND

AM	NOON	PM	
58	0	53	
0	0	0	0
26	0	30	0
0	0	0	1
35	0	35	0

Thomas St — WESTBOUND

PM	NOON	AM	
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
1	0	0	

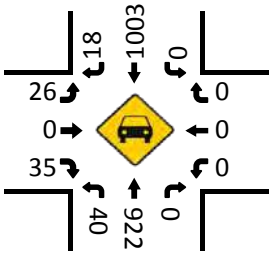
Emerald Dr — NORTHBOUND

PM	806	0	34	1053	0	PM
NOON	0	0	0	0	0	NOON
AM	1038	0	40	922	0	AM

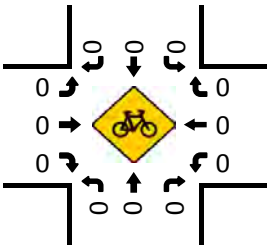
CONTROL: 1-Way Stop(EB)

TEV	2044 AM	0 NOON	1943 PM
PHF	0.88		0.95

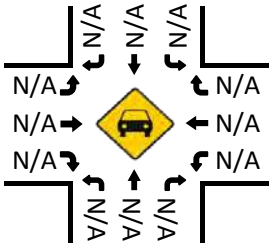
Total Vehicles (AM)



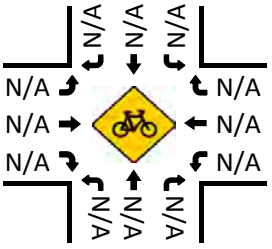
Bikes (AM)



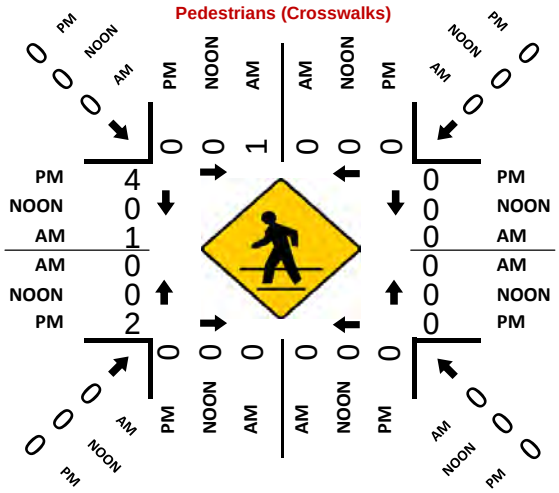
Total Vehicles (Noon)



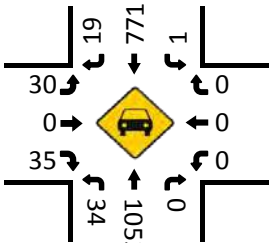
Bikes (NOON)



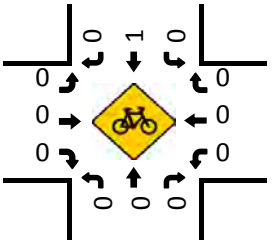
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by NDS/ATD

VOLUME

Emerald Dr Bet. SR 78 & Olive Ave

Day: Thursday
Date: 12/14/2017

City: Vista
Project #: CA17_4294_090

DAILY TOTALS	NB	SB	EB	WB	Total
	15,880	13,647	0	0	29,527

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	43		21				64		12:00	181		181				362	
00:15	38		15				53		12:15	188		193				381	
00:30	21		16				37		12:30	166		173				339	
00:45	21	123	13	65			34	188	12:45	205	740	188	735			393	1475
01:00	20		10				30		13:00	202		143				345	
01:15	21		8				29		13:15	228		214				442	
01:30	16		13				29		13:30	212		201				413	
01:45	10	67	11	42			21	109	13:45	288	930	175	733			463	1663
02:00	12		4				16		14:00	282		196				478	
02:15	9		15				24		14:15	259		207				466	
02:30	12		11				23		14:30	339		239				578	
02:45	18	51	14	44			32	95	14:45	337	1217	268	910			605	2127
03:00	11		12				23		15:00	328		252				580	
03:15	15		21				36		15:15	344		246				590	
03:30	15		13				28		15:30	346		250				596	
03:45	25	66	22	68			47	134	15:45	336	1354	209	957			545	2311
04:00	14		20				34		16:00	327		220				547	
04:15	17		39				56		16:15	344		216				560	
04:30	31		75				106		16:30	328		217				545	
04:45	41	103	83	217			124	320	16:45	343	1342	248	901			591	2243
05:00	43		81				124		17:00	328		243				571	
05:15	61		134				195		17:15	371		236				607	
05:30	91		201				292		17:30	319		223				542	
05:45	116	311	192	608			308	919	17:45	313	1331	226	928			539	2259
06:00	81		187				268		18:00	304		193				497	
06:15	142		207				349		18:15	295		187				482	
06:30	154		254				408		18:30	278		202				480	
06:45	180	557	284	932			464	1489	18:45	231	1108	174	756			405	1864
07:00	186		229				415		19:00	234		164				398	
07:15	239		252				491		19:15	224		134				358	
07:30	319		258				577		19:30	180		123				303	
07:45	358	1102	264	1003			622	2105	19:45	163	801	119	540			282	1341
08:00	355		257				612		20:00	168		116				284	
08:15	259		244				503		20:15	161		121				282	
08:30	176		201				377		20:30	143		107				250	
08:45	193	983	209	911			402	1894	20:45	133	605	130	474			263	1079
09:00	159		158				317		21:00	144		115				259	
09:15	155		194				349		21:15	138		86				224	
09:30	146		199				345		21:30	112		60				172	
09:45	169	629	205	756			374	1385	21:45	107	501	53	314			160	815
10:00	148		197				345		22:00	105		55				160	
10:15	154		180				334		22:15	102		43				145	
10:30	177		178				355		22:30	88		42				130	
10:45	190	669	163	718			353	1387	22:45	80	375	35	175			115	550
11:00	141		169				310		23:00	66		47				113	
11:15	185		198				383		23:15	56		30				86	
11:30	197		169				366		23:30	41		28				69	
11:45	191	714	197	733			388	1447	23:45	38	201	22	127			60	328
TOTALS		5375		6097				11472	TOTALS		10505		7550				18055
SPLIT %		46.9%		53.1%				38.9%	SPLIT %		58.2%		41.8%				61.1%

DAILY TOTALS	NB	SB	EB	WB	Total
	15,880	13,647	0	0	29,527

AM Peak Hour	07:30	07:15						07:30	PM Peak Hour	16:30	14:45							14:45
AM Pk Volume	1291	1031						2314	PM Pk Volume	1370	1016							2371
Pk Hr Factor	0.902	0.976						0.930	Pk Hr Factor	0.923	0.948							0.980
7 - 9 Volume	2085	1914	0	0				3999	4 - 6 Volume	2673	1829	0	0					4502
7 - 9 Peak Hour	07:30	07:15						07:30	4 - 6 Peak Hour	16:30	16:45							16:30
7 - 9 Pk Volume	1291	1031	0	0				2314	4 - 6 Pk Volume	1370	950	0	0					2314
Pk Hr Factor	0.902	0.976	0.000	0.000				0.930	Pk Hr Factor	0.923	0.958	0.000	0.000					0.953