Memorandum

Date: October 12, 2022

Project: SMX900-2

To: Vanessa Castro,
County of San Mateo; and
Hugh Louch, City of Menlo Park

From: Mark Spencer
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Subject: Coleman and Ringwood Avenues Transportation Study – Existing Conditions

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This memorandum serves to summarize the existing transportation conditions and previous planning efforts that will inform the development of potential design alternatives for Coleman and Ringwood Avenues moving forward. W-Trans has reviewed existing background and planning documentation relative to transportation conditions in the study area and compiled various data sources including traffic counts, vehicle speed data, roadway cross section measurements, and capacity results. In addition, the collision histories for both corridors were reviewed in detail and collision rate calculations have been prepared.

Study Area

The study area consists of Coleman Avenue between Ringwood Avenue on the west and Willow Road on the east and Ringwood Avenue between Middlefield Road on the south and Bay Road on the north. It is noted that while both roadways are aligned on a skewed orientation from true north-south or east-west, for the purposes of this study Coleman Avenue was assumed to be oriented east-west and Ringwood Avenue north-south. Both roadways are partly within the unincorporated community of Menlo Oaks and the City of Menlo Park. The County of San Mateo's jurisdiction on Coleman Avenue extends from Ringwood Avenue to approximately 150 feet west of Riordan Place at the beginning of the Coleman Arms Apartments frontage; the City of Menlo Park has jurisdiction from this point to the east. On Ringwood Avenue, the section at the southern end of the study area between Middlefield Road and Arlington Way is located within the City of Menlo Park, while the rest of the roadway up to Bay Road is located within the County of San Mateo; the properties fronting the west side of the corridor are located within the Town of Atherton. A map of the study area is shown in the attached Figure 1.

The land uses along Coleman Avenue are primarily residential with many single-family homes accessed directly from the roadway in the County's jurisdiction. Within the City of Menlo Park, Coleman Avenue is fronted by numerous apartment buildings on the north side of the street and single-family homes on the south side. Ringwood Avenue is also fronted by primarily residential uses, though two schools are located on the west side of the corridor. Menlo-Atherton High School (MAHS) fronts the southern approximately one-third of the study area and Laurel School Lower Campus (serving kindergarten through second grade) is positioned near the middle of the segment to the north of the intersection with Edge Road. There is a combination of homes that are accessed from side streets and those with their driveways directly on Ringwood Avenue. The attached Figure 2 shows the land use zoning for the study area, which is composed of residential, public facilities, and school districts. The existing uses are consistent with the zoning and the study area is mostly built out, though recent State legislation and County regulations such as the County's Accessory Dwelling Unit (ADU) Ordinance allow for additional housing units to be built in certain areas, including the Study Area. These regulations could impact future traffic volumes and patterns if owners in the area decide to build additional units on their properties. However, given the current zoning in this area, it is unlikely for large new development to occur; therefore, traffic volumes and

patterns are unlikely to substantially change in the future as a result of new development. Modifications to the schools located on the corridors and enrollment adjustments would have the greatest potential to impact future traffic volumes.

Roadway Characteristics

Coleman Avenue

Coleman Avenue spans approximately 0.7 miles between Ringwood Avenue and Willow Road and has a single travel lane in each direction. Within the County's jurisdiction, the roadway has two 11-foot travel lanes separated by a raised pavement marker centerline and a striped shoulder on the north side of the street that varies between two and four feet wide. The roadway shoulders are occupied by a combination of gravel, dirt, and vegetation with numerous large mature oak trees and utility poles located within the public right-of-way. It should also be noted that the intersections with Menlo Oaks Drive, Arlington Way, and Berkeley Avenue have traffic circles with oak trees in the center of the intersections. The right-of-way available on Coleman Avenue is approximately 63 feet wide between Ringwood Avenue and Menlo Oaks Drive, 55 feet wide between Menlo Oaks Drive and Arlington Way, and varies between 50 and 58 feet wide between Arlington Way and County/City Limits. A typical cross section for this section of Coleman Avenue west of Berkeley Avenue is shown in Plate 1.

Plate 1 Coleman Avenue West of Berkeley Avenue (County of San Mateo) Looking East

The section of Coleman Avenue in unincorporated San Mateo County has a posted speed limit of 25 miles per hour (mph) with an 85th percentile speed of 29 mph and an average travel speed of 24 mph based on speed data collected in March 2016. Both the measured 85th percentile and average travel speeds are consistent with expectations for the posted speed limit. This section of the roadway has an average daily traffic (ADT) volume of approximately 3,500 vehicles on weekdays, with a split of 1,900 vehicles eastbound and 1,600 vehicles westbound. The peak hours are generally aligned with the start and end times of local schools with the morning peak hour occurring between 7:45 and 8:45 a.m. which is the highest hour of the day and the afternoon peak hour occurring between 2:30 and 3:30 p.m.

Within the City of Menlo Park's jurisdiction, Coleman Avenue is classified as a Bike Boulevard according to the City's General Plan and has a curb-to-curb width of approximately 36 feet, which allows for a single travel lane in each direction and on-street parking on both sides of the street. Full sidewalk connectivity is provided except for a section about 120 feet long on the south side of the street to the west of Riordan Place. The public right-of-way available to the east of College Avenue is approximately 50 feet, which includes two feet of property behind the sidewalk on both sides of the street. A typical cross section for Coleman Avenue within the City of Menlo Park is shown in Plate 2.

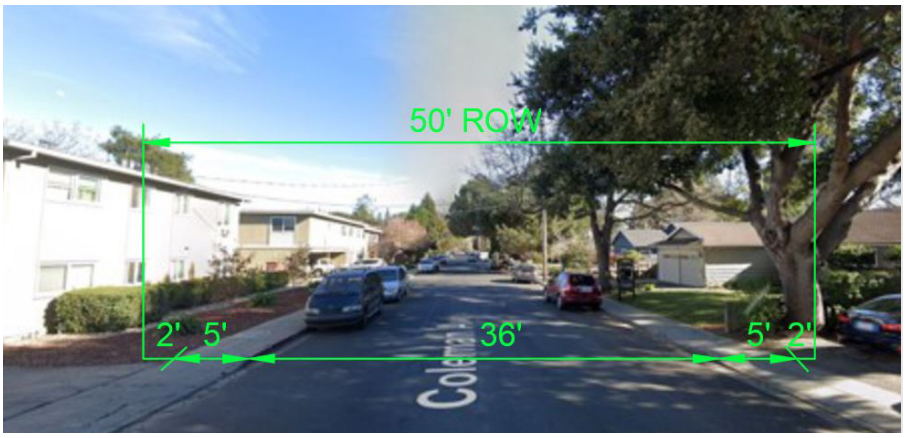

Plate 2 Coleman Avenue East of Santa Monica Avenue (City of Menlo Park) Looking East

Based on traffic count data collected in April 2017, this section of Coleman Avenue has an ADT of approximately 3,200 vehicles on weekdays, including 2,000 eastbound and 1,200 westbound. The directional split for any given street is generally relatively balanced over the course of a typical day so the fact that Coleman Avenue carries a traffic load that is approximately 40 percent higher eastbound than westbound may indicate that the street is being used as a "cut-through" by motorists that that would otherwise have used Middlefield Road and Willow Road. Given the documented congestion on these roadways during the afternoon and evening peak periods, many motorists wishing to travel eastbound on Middlefield Road and then northbound on Willow Road have likely found it to be quicker to use Ringwood and Coleman Avenues as a bypass or are directed to do so by mobile traffic apps such as Waze, Google, or Apple maps.

Streetlight Data from 2019 was used to estimate the percentage of trips on Coleman Avenue that pass through the entire study area without making a stop at a destination on either Coleman or Ringwood Avenue or turning onto a connecting minor street, thus indicating a cut-through trip. It is estimated that approximately 28 percent of the average daily weekday trips are of passing through the neighborhood. While Coleman Avenue may provide a shorter route from motorists traveling to the adjacent neighborhoods of Lindenwood or Belle Haven, it is more likely that the cut-through traffic is associated with avoiding congestion on Middlefield Road, Willow Road, or Bay Road.

Ringwood Avenue

The section of Ringwood Avenue between Middlefield Road and Bay Road is approximately 0.9 miles long with two 11-foot travel lanes to the north of Arlington Way and three travel lanes to the south. A southbound right-turn lane is provided at the MAHS driveway and continues to the intersection with Middlefield Road. Class II bicycle lanes are provided in both directions. Most of Ringwood Avenue is located within the County of San Mateo except for the southernmost approximately 550 feet which is within the City of Menlo Park and Town of Atherton. The public right-of-way available on Ringwood Avenue is 55 feet wide along most of the segment, though is slightly wider at 57 feet near the intersection with Middlefield Road. Private fences are generally set at the right-of-way boundaries, though there is private landscaping encroaching on the right-of-way near Laurel School Lower Campus. Similar to Coleman Avenue, the roadway shoulders are occupied by a combination of gravel, dirt, and vegetation with numerous trees and utility poles located within the public right-of-way. A typical cross section for the portion of Ringwood Avenue within the County is shown in Plate 3.

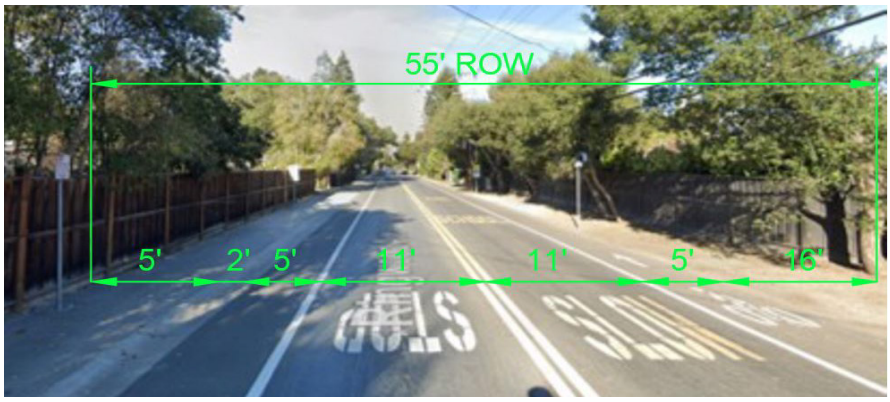

Plate 3 Ringwood Avenue North of Coleman Avenue (County of San Mateo) Looking North

The roadway has a posted speed limit of 30 mph with an 85th percentile speed of 33 mph and an average travel speed of 28 mph based on speed data collected in March 2016. Traffic volumes are relatively consistent across the study segment, though taper off slightly from south to north with a weekday ADT of about 7,100 vehicles along the MAHS frontage, 6,900 vehicles near the middle of the segment north of Coleman Avenue, and 6,800 vehicles at the northern end of the segment near Bay Road. The morning peak hour on Ringwood Avenue aligns with the school drop-off period from 7:30 a.m. to 8:30 a.m. and the highest volumes of the day occur during the evening peak hour between 4:30 and 5:30 p.m., though volumes are consistently elevated between approximately 3:00 and 6:00 p.m. due to a combination of school and commute traffic.

Streetlight Data from 2019 indicates that approximately 38 percent of the average daily weekday trips on Ringwood Avenue originate outside of the study area and pass through the study area without stopping at a designation or turning onto a connecting minor street. Compared to Coleman Avenue, this percentage is approximately ten percent higher, which is consistent with expectations given that Ringwood Avenue is a primary connection between Middlefield Road and Bay Road.

Potential COVID-19 Impacts on Data

While the government mandates and restrictions associated with the COVID-19 public health pandemic have eased in 2022, the pandemic is still ongoing to some degree, so the decision was made to rely upon pre-pandemic traffic volume and speed data for this study rather than collect new data or use data that was collected during the height of the pandemic in 2020 and 2021. The lasting effects of COVID-19 on our transportation system remain to be seen and will certainly vary from one facility and location to another based on many factors, though given the shift to permanent or part-time remote work in many industries both full- and part-time, many jurisdictions in the Bay Area have observed a decrease in traffic volumes as fewer people are commuting to work five days a week compared to before the pandemic. Data collected in May 2021 indicates that traffic volumes have decreased approximately seven percent on Coleman Avenue since 2017 and nearly 25 percent on Ringwood Avenue since 2016, though given the uncertainty surrounding to what degree traffic volumes will rebound to pre-pandemic levels, the higher pre-pandemic volume data was retained to provide a conservative assessment of existing transportation conditions.

Existing Pedestrian Facilities

Pedestrian facilities include sidewalks, pathways, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a connected network of sidewalks is provided on the sections of Coleman and Ringwood Avenues within the City of Menlo Park, while pedestrian facilities are limited within the County of San Mateo. Neither the County of San Mateo nor the City of Menlo Park have any adopted standards for evaluating the operation of pedestrian facilities such as Pedestrian

Quality of Service (QOS) or Level of Traffic Stress (LTS). The attached Figure 3 presents a map of the existing pedestrian, bicycle, and transit facilities in the study area.

Coleman Avenue

A dedicated pedestrian facility is lacking on the section within the County of San Mateo, though there is a striped shoulder on the north side of the street that varies between one and four feet wide that many pedestrians use in conjunction with the adjacent soft shoulder composed of mostly dirt and gravel. The paved shoulder is four feet wide on average, though the usable pavement area is less along some parts of the corridor as portions of the pavement have eroded away or are covered with dirt or gravel. Within the City of Menlo Park, full sidewalk coverage is provided on both sides of the street except for a short section on the south side of the street to the west of Riordan Place. The only crosswalks across Coleman Avenue are provided at the side-street stop-controlled intersection with Santa Monica Avenue and the signalized intersection with Willow Road. The uncontrolled crossing at Santa Monica Avenue is a yellow ladder-style crosswalk on the west leg of the intersection with curb ramps and pedestrian crossing signage on both sides of the street. Additionally, a curb extension is provided on the southeast corner of the intersection. The intersection of Coleman Avenue/Willow Road has yellow continental style crosswalk markings with pedestrian phasing on all four legs of the intersection; curb ramps are provided on all four corners.

Ringwood Avenue

Sidewalks are present on both sides of the street at the southern end of the study segment within the City of Menlo Park, then transition to a paved shoulder with a valley gutter on only the west side of the street within unincorporated Menlo Oaks. The paved shoulder with valley gutter extends all the way to Bay Road, though the section along the Laurel School frontage includes an asphalt concrete (AC) dike for additional separation, which is essentially a six-inch raised curb between the pathway and the bike lane. A valley gutter is used primarily for drainage purposes and as such does not provide much protection to pedestrians, while an AC dike offers more protection and has a better chance of redirecting an errant vehicle away from the walking path. The AC dike is show in Plate 5 and the paved shoulder with valley gutter is shown in Plate 4.

Plate 5 Asphalt concrete (AC) dike

Plate 4 Valley gutter

Crosswalks across Ringwood Avenue are provided at the following locations.

- Ringwood Avenue/Middlefield Road: Yellow "basic" style crosswalk markings are provided on all four legs of the intersection with pedestrian signal phasing and curb ramps on all four corners, though three of the four curb ramps do not have truncated domes.
- Ringwood Avenue/Coleman Avenue: Yellow continental-style crosswalk markings are provided on the north leg of the all-way stop-controlled intersection.
- Ringwood Avenue/Edge Road: Yellow ladder-style crosswalks are striped on the north and west legs of the side-street stop-controlled intersection. The uncontrolled crossing on Ringwood Avenue has advance yield markings and pedestrian-activated flashing crossing signage.
- Ringwood Avenue/Colby Avenue: A yellow ladder-style crosswalk is marked on the north leg of the intersection with advance yield markings and pedestrian-activated flashing crossing signage.

Pedestrian count data collected in April 2017 indicates that approximately 70 pedestrians cross Ringwood Avenue near Coleman Avenue during the morning peak hour and 114 pedestrians cross during the afternoon peak hour when school lets out.

Existing Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into four categories:

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

Generally, the comfort level and safety for cyclists tends to progressively increase beginning with Class III then moving to Class II to Class IV and ending with Class I, though there are many factors to consider when selecting the preferred type of bicycle facility for a specific location such as roadway context, vehicle speeds, and traffic volumes. Neither the County of San Mateo nor the City of Menlo Park have any adopted standards for evaluating the operation of bicycle facilities such as Level of Traffic Stress (LTS).

Ringwood Avenue has existing five-foot wide Class II bike lanes in both directions between Middlefield Road and Bay Road. These are the only existing dedicated facilities for cyclists in the study area. Count data collected in 2016 indicates a volume of approximately 137 cyclists on Ringwood Avenue near Coleman Avenue during the morning peak hour and 77 cyclists during the afternoon peak hour. While Coleman Avenue is classified as a Bicycle Boulevard in the City's General Plan, no signage or striping is provided to warn motorists to the presence of potential cyclists. Count data collected in February 2017 indicates a volume of approximately 100 cyclists on Coleman Avenue near Santa Monica Avenue during the morning peak hour and 81 cyclists during the afternoon peak hour.

While bicycle lanes are provided on Ringwood Avenue, parked vehicles can be an obstacle for cyclists as parking is permitted at several locations north of Coleman Avenue. The west side of the street is signed for "No Stopping" between 7:30 – 8:30 a.m. and 1:30 – 3:30 p.m. near Laurel Lower School, though motorists waiting in the loading zone queue block the bicycle lane during pick-up and drop-off periods at the school. Coleman Avenue is signed for "No Parking" between 7:30 – 9:30 a.m. and 2:00 – 4:00 p.m. within the Menlo Oaks area, though again parked

vehicles can be an obstacle for pedestrian and cyclists during times when parking is allowed. The type and locations of the various parking and stopping restrictions on the corridors is shown in the attached Figure 4.

Existing Transit Facilities

The San Mateo County Transit District (SamTrans) provides fixed route bus service in the study area and has transit stops on Coleman Avenue at Menlo Oaks Drive and Santa Monica Avenue and on Ringwood Avenue adjacent to MAHS, Coleman Avenue, Laurel School, Colby Avenue, and Fredrick Court. These stops are served by Routes 82, 86, and 88. SamTrans Routes 82 and 88 provide school bus service within Atherton and Menlo Park and Route 86 provides service between MAHS and Alpine Road south of I-280. It should be noted that transit services can change over time, though this information is accurate for the planned route changes effective as of August 7, 2022. The transit stop locations on the corridors are shown in Figure 3.

Collision History

5-Year Total Collisions

The collision history for both corridors was reviewed to determine any trends or patterns that may indicate a safety issue for motorists, pedestrians, or cyclists in the study area. Segment collision rates were calculated based on records available from the California Highway Patrol (CHP) as published in their Statewide Integrated Traffic Records System (SWITRS) reports as well as information within the Transportation Injury Mapping System (TIMS) database. The most current five-year period available is January 1, 2016, through December 31, 2020.

As presented in Table 1, the calculated collision rates for Coleman and Ringwood Avenues were compared to average collision rates for similar facilities statewide, as indicated in *2018 Collision Data on California State Highways*, California Department of Transportation (Caltrans). These average rates statewide are for roadways in the same environment (urban, suburban, or rural), with the same number of lanes and access restrictions, and similar travel speeds (less than or greater than 45 mph). The study roadways were compared to other two-lane conventional facilities in a suburban environment with travel speeds less than 45 mph.

Table 1 – Collision Rates for the Study Roadways

Study Roadway	Number of Collisions (2016–2020)	Calculated Collision Rate (c/mvm)	Statewide Average Collision Rate (c/mvm)
Coleman Ave – Ringwood Ave to Willow Rd	12	2.68	1.60
Ringwood Ave – Middlefield Rd to Bay Rd	8	0.71	1.60

Note: c/mvm = collisions per million vehicle miles

During the five-year study period, a total of 12 collisions were reported on Coleman Avenue, six of which resulted in injuries, translating to a calculated collision rate higher than the statewide average for similar facilities. A total of eight collisions were reported on Ringwood Avenue resulting in five injuries and a calculated collision rate below the statewide average. Even though average speeds on Coleman Avenue are approximately four mph less than Ringwood Avenue and volumes are about half of those on Ringwood Avenue, four more collisions occurred on Coleman Avenue compared to Ringwood Avenue. The collision rate calculations are attached along with Figures 5 and 6, which map the total collisions that were reported on each segment by type and primary collision factor (PCF).

Of the 12 total collisions that occurred on Coleman Avenue, five were attributed to improper turning or driving including two collisions with parked vehicles and one with a fixed object, four were attributed to unsafe speed,

two were intersection automobile right-of-way violations, and the details for one collision are unknown. In terms of location, three collisions occurred near the intersection of Coleman Avenue/Menlo Oaks Drive (a rear-end, broadside, and a hit-object) and three collisions occurred near the intersection of Coleman Avenue/Willow Road (all rear-ends). Two collisions occurred near the intersection of Coleman Avenue/Coleman Place (a broadside and a rear-end) and four collisions occurred along an approximately 500-foot segment of Coleman Avenue between the Coleman Arms Apartments and Santa Monica Avenue (two sideswipes, a hit-object, and a collision with a cyclist).

Five of the eight collisions that occurred on Ringwood Avenue were attributed to unsafe speed, while two were intersection automobile right-of-way violations, and one was due to improper turning. Three of the collisions occurred near the intersection with Middlefield Road all of which were rear-ends, two collisions occurred near the intersection with Toyon Road both of which were broadsides, two collisions occurred on the north leg of the intersection with Coleman Avenue both of which were rear-ends, and a single rear-end collision was recorded at the intersection of Ringwood Avenue/Quail Court. The breakdown of crashes on each facility by PCF is summarized in Plate 6 and the individual collision details are summarized in Table 2.

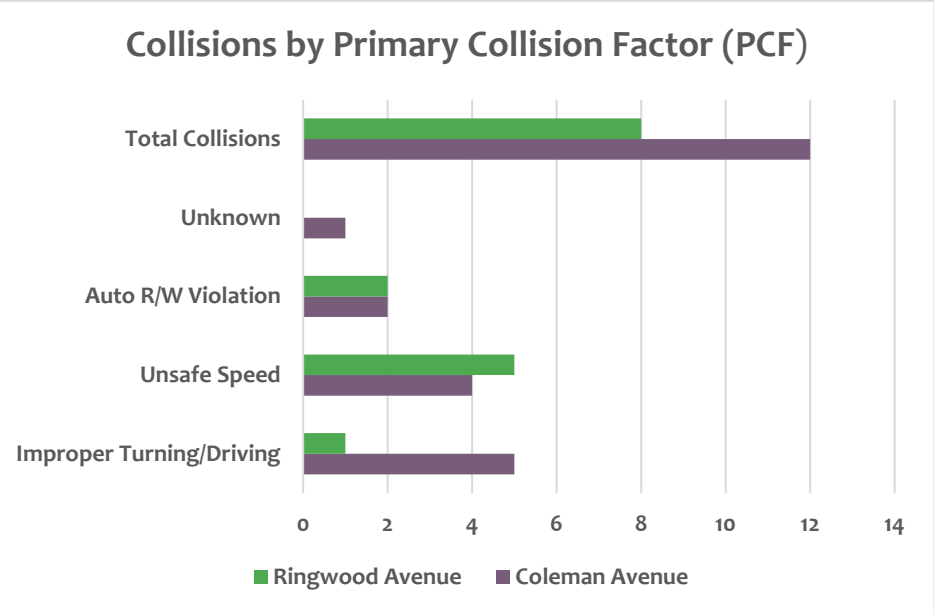

Plate 6 5-Year Total Collisions by Primary Collision Factor

Table 2 – 5-Year Individual Collision Details

Study Roadway Nearest Intersection	Date	Type	PCF	Injury (Severity)
Coleman Ave				
Coleman Pl	2/15/2016	Broadside	Improper Turning	No
Menlo Oaks Dr	2/22/2016	Rear-end	Unsafe Speed	No
Santa Monica Ave	6/15/2016	Bicycle	Auto R/W Violation	Yes (Other Visible)
Menlo Oaks Dr	9/8/2016	Broadside (Bicycle)	Auto R/W Violation	Yes (Other Visible)
Riordan Pl (72' East)	9/16/2016	Hit Object	Unknown	Yes (Other Visible)
Willow Rd	10/30/2016	Rear-end	Unsafe Speed	No
Menlo Oaks Dr	12/14/2016	Hit Object	Improper Turning	Yes (Other Visible)
Willow Rd	1/20/2017	Rear-end	Unsafe Speed	No
862 Coleman Ave	1/7/2018	Sideswipe	Improper Turning	No
Willow Rd	1/29/2018	Rear-end	Unsafe Speed	No
Santa Monica Ave (220' West)	2/12/2019	Sideswipe	Improper Turning	Yes (Other Visible)
Coleman Pl	5/19/2019	Rear-end	Improper Turning	Yes (Complaint of Pain)
Ringwood Ave				
Coleman Ave (56' North)	7/11/2016	Rear-end	Unsafe Speed	Yes (Other Visible)
Middlefield Rd	8/1/2016	Rear-end	Unsafe Speed	Yes (Unknown)
Toyon Rd	10/16/2016	Broadside	Auto R/W Violation	No
Middlefield Rd	10/27/2016	Rear-end	Unsafe Speed	Yes (Complaint of Pain)
Quail Ct	8/13/2017	Rear-end	Unsafe Speed	No
Middlefield Rd	12/4/2017	Rear-end	Improper Turning	No
Coleman Ave (46' North)	6/7/2019	Rear-end	Unsafe Speed	Yes (Other Visible)
Toyon Rd	10/1/2019	Broadside	Auto R/W Violation	Yes (Complaint of Pain)

Note: R/W = Right-of-way

10-Year Pedestrian and Bicyclist Collisions

In addition to total collisions for the most recent complete five years, crashes that involved pedestrians and bicyclists were reviewed for the last ten years. During the study period between January 1, 2011, and December 31, 2020, there were two collisions reported with pedestrians on Coleman Avenue, including one near the intersection with Ringwood Avenue and another at the intersection with Arlington Way. There were also four collisions reported with cyclists, including one each at the intersections with Menlo Oaks Drive, Arlington Way, Berkeley Avenue, and Santa Monica Avenue. All six collisions resulted in an injury to the pedestrian or cyclist. During the ten-year study period, three collisions involving bicyclists were reported on Ringwood Avenue, including one each near Coleman Avenue, Colby Avenue, and approximately 200 feet north of Parkwood Drive; the collision near Colby Avenue was the only incident not to result in an injury. Of the nine pedestrian or bicycle-involved crashes in the study area, seven occurred in 2015 or prior, two occurred in 2016, and none have been

reported since 2016. Figure 7 attached shows the pedestrian and cyclist-involved crashes in the study area and the individual collision details are summarized in Table 3.

Table 3 – 10-Year Individual Pedestrian and Bicycle Collision Details

Study Roadway Nearest Intersection	Date	Type	PCF	Injury (Severity)
Coleman Ave				
Arlington Wy	1/8/2014	Bicycle	Auto R/W Violation	Yes (Other Visible)
Ringwood Ave	3/5/2014	Pedestrian	Improper Turning	Yes (Other Visible)
Arlington Wy	9/20/2014	Pedestrian	Unsafe Starting/ Backing	Yes (Other Visible)
Berkeley Ave	3/18/2015	Bicycle	Wrong Side of Road	Yes (Other Visible)
Santa Monica Ave	6/15/2016	Bicycle	Auto R/W Violation	Yes (Other Visible)
Menlo Oaks Dr	9/8/2016	Bicycle	Auto R/W Violation	Yes (Other Visible)
Ringwood Ave				
Colby Ave	5/9/2013	Bicycle	Wrong Side of Road	No
Parkwood Dr (200' North)	2/22/2015	Bicycle	Improper Turing	Yes (Complaint of Pain)
Coleman Ave	6/16/2015	Bicycle	Unsafe Speed	Yes (Other Visible)

Note: R/W = Right-of-way

Vehicle Capacity

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. Operating conditions at key intersections in the study area, as analyzed for other recent planning efforts, were reviewed; no new capacity analysis was prepared for this project. Operating conditions at the intersection of Ringwood Avenue/Bay Road were most recently analyzed in the *Final EIR Traffic Impact Study for the Flood County Park Landscape Plan*, 2018 while the intersections of Ringwood Avenue/Middlefield Road and Coleman Avenue/Willow Road were most recently analyzed for the *City of Menlo Park Transportation Impact Fee Nexus Study*, 2020.

As shown in Table 4, the intersection of Ringwood Avenue/Bay Road operates at LOS C during the p.m. peak hour. While the a.m. peak hour was not evaluated in the traffic analysis prepared for the Flood County Park project, the evening peak hour is the critical peak hour in the study area with the highest volumes of the day so operations would be expected to be LOS C or better during the a.m. peak hour. The intersections of Ringwood Avenue/Middlefield Road and Coleman Avenue/Willow Road both operate at LOS C during the morning peak hour and at LOS F during the evening peak hour with delays that are well above what is considered the reasonable upper limit of the Highway Capacity Manual (HCM) methodologies.

Table 4 – Existing Peak Hour Intersection Levels of Service

Intersection	Weekday AM Peak		Weekday PM Peak	
	Delay	LOS	Delay	LOS
Ringwood Ave/Bay Rd	-	-	21.2	C
Ringwood Ave/Middlefield Rd	33.7	C	**>80**	**F**
Coleman Ave/Willow Rd	21.1	C	**>80**	**F**

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; **Bold** text denotes unacceptable operation per appliable jurisdiction standard

Planning Context

This effort is not the first time that these corridors have been studied for potential circulation improvements and in fact, there have been multiple previous planning efforts as residents and stakeholders have highlighted concerns about safety, accessibility, and need for improvements for more than two decades. Most recently, pedestrian and bicycle improvements to Coleman and Ringwood Avenues have been identified as priority projects in the *Unincorporated San Mateo County Active Transportation Plan* (ATP), 2021. Below is a summary of the notable previous studies and planning efforts conducted for the corridors.

2003 - San Mateo County Coleman Avenue Improvement Options Evaluation

The County evaluated six different alternatives for potential improvements to Coleman Avenue to improve mobility for all modes of transportation, and specifically walking and bicycling. Alternatives considered included the following:

- Option 1 – Class I multi-use pathway on one side of the street.
- Option 2 – Paved shoulder on both sides of the street.
- Option 3 – Sidewalk on a single side of the street.
- Option 4 – Sidewalk on both sides of the street.
- Option 5 – Graded shoulder area on one side of the street.
- Option 6 – Limit parking with minimal clearance.

Options 5 and 6 were supported by the community and ultimately implemented so are now part of the existing conditions.

2007 - Menlo Park Laurel School Safe Routes to School Study

Various improvements were evaluated, recommended, and ultimately installed on Ringwood Avenue to improve connectivity to Laurel School for active transportation modes. Improvements implemented as a result of the Safe Routes to School study included installation of:

- All-way stop controls at the intersection of Ringwood Avenue/Coleman Avenue along with a marked crosswalk on the north leg of the intersection,
- Crosswalks on Ringwood Avenue at Colby Avenue and Edge Road, and
- An asphalt concrete (AC) dike on the west side of Ringwood Avenue next to Laurel School.

As part of the study, improvements were also considered for Coleman Avenue, including closing the roadway at the County/City line, implementing a one-way eastbound path of travel for motorists, installing Class II bike lanes, and a multi-use pathway on one side of the street; however, no improvements were implemented.

2016 – Menlo-Atherton High School Transportation Demand Management Report

Prepared for an increase in school enrollment, this document established a Transportation Demand Management (TDM) Plan for MAHS and includes detailed travel mode statistics along with maps outlining the available options for sustainable modes of transportation in the vicinity of the school including bicycle facilities, pedestrian facilities, transit routes, and availability on-street parking. The goal of the TDM Plan is to achieve a combined 45 percent travel mode split for transit, walking, biking, and carpooling meaning that 45 percent of all trips to and from the school would be made by these modes of transportation. The Plan recommended the following TDM measures:

- Provide full and reduced sale transit passes to students.*
- Provide bike racks located in convenient spaces around campus.*
- Require a permit for students to park on campus.*
- Provide carpool incentives and coordination assistance.
- Organize school-wide walk and bike to school events.*
- Work with SamTrans to improve transit operations, specifically to relocate the southbound transit stop near Middlefield Road to improve pedestrian access for students and to improve vehicle access out of the southernmost MAHS driveway.*

Note: * = indicates measure has been implemented.

Annual monitoring was completed for five years following implementation of the TDM measures. Between 2015 and 2019, the percentage of students commuting to and from school via sustainable transportation modes such as walking, biking, and transit increased from 30 to 40 percent during the a.m. peak period and from 43 to 51 percent during the p.m. peak period.

2019 – City of Menlo Park Safe Routes to School Strategy

As part of a Citywide effort to support families walking, biking, and carpooling to school, "Walk and Roll to School" maps that identify preferred walking and biking routes to school were developed for Laurel School and MAHS. The maps include identification of intersection control types, crosswalks, bike parking, loading zones, bus routes and other facilities for active transportation modes on Coleman and Ringwood Avenues.

Links to online maps: *Laurel School Lower Campus*, *Menlo Atherton High School*

2020 – City of Menlo Park Transportation Master Plan

As a comprehensive evaluation of multimodal circulation within the City of Menlo Park, the Transportation Master Plan (TMP) includes numerous data sources and recommendations relative to the current effort for Coleman and Ringwood Avenues. The TMP recommends installation of Class II bike lanes on Coleman Avenue between Willow Road and Menlo Park City Limits as a Tier 1 Project, which would require removal of parking on one side of the street. The TMP also recommends coordination with the County of San Mateo for the roadway segment between the Menlo Park City Limits and Ringwood Avenue. Other recommended intersection improvements relative to the corridors are summarized below concept design plans are attached for reference.

- **Coleman Avenue/Willow Road**
  - Install right-turn lane on the eastbound Coleman Avenue approach with bike detection.
  - Refresh decorative crosswalk.
  - Evaluate the feasibility of protected-permitted left-turn phasing on Willow Road.
- **Ringwood Avenue/Bay Road**
  - Install a traffic signal.
  - Convert the northern Sonoma Avenue and Ringwood Avenue legs to one-way couplets.

  - Install left-turn lanes, as deemed necessary during design, on the northbound Ringwood Avenue and westbound Bay Road approaches.
- **Ringwood Avenue/Arlington Way**
  - Install a Rectangular Rapid Flashing Beacon (RRFB) system and a new high visibility crosswalk on Ringwood Avenue with ADA-compliant curb ramps.
- **Ringwood Avenue/Middlefield Road**
  - Remove eastbound Middlefield Road channelized right-turn lane and reconstruct curb ramp with reduced radius.
  - Replace crosswalks on the west and south legs.
  - Install two-stage left-turn queue boxes for cyclists traveling form Middlefield Road to Ringwood Avenue.

Link to online document: *City of Menlo Park Transportation Master Plan*

2021- Unincorporated San Mateo County Active Transportation Plan

The County's Active Transportation Plan (ATP) establishes the framework to improve active transportation conditions for people walking and biking throughout unincorporated San Mateo County and identifies specific improvements for both Ringwood Avenue and Coleman Avenue with supporting conceptual improvement graphics. The ATP identifies the provision of traffic calming elements and a Class III Bicycle Boulevard on Coleman Avenue between Ringwood Avenue and County/City Limits and the provision of a shared-use path on Ringwood Avenue between Arlington Way and Bay Road. The Plan also identifies Laurel School and MAHS as a priority focus area that needs pedestrian enhancements and recommends provision of a pedestrian pathway along the north side of Coleman Avenue with vertical separation from the travel way.

Link to online document: *Unincorporated San Mateo County Active Transportation Plan*

Thank you for giving W-Trans the opportunity to provide these services. Please call if you have any questions.

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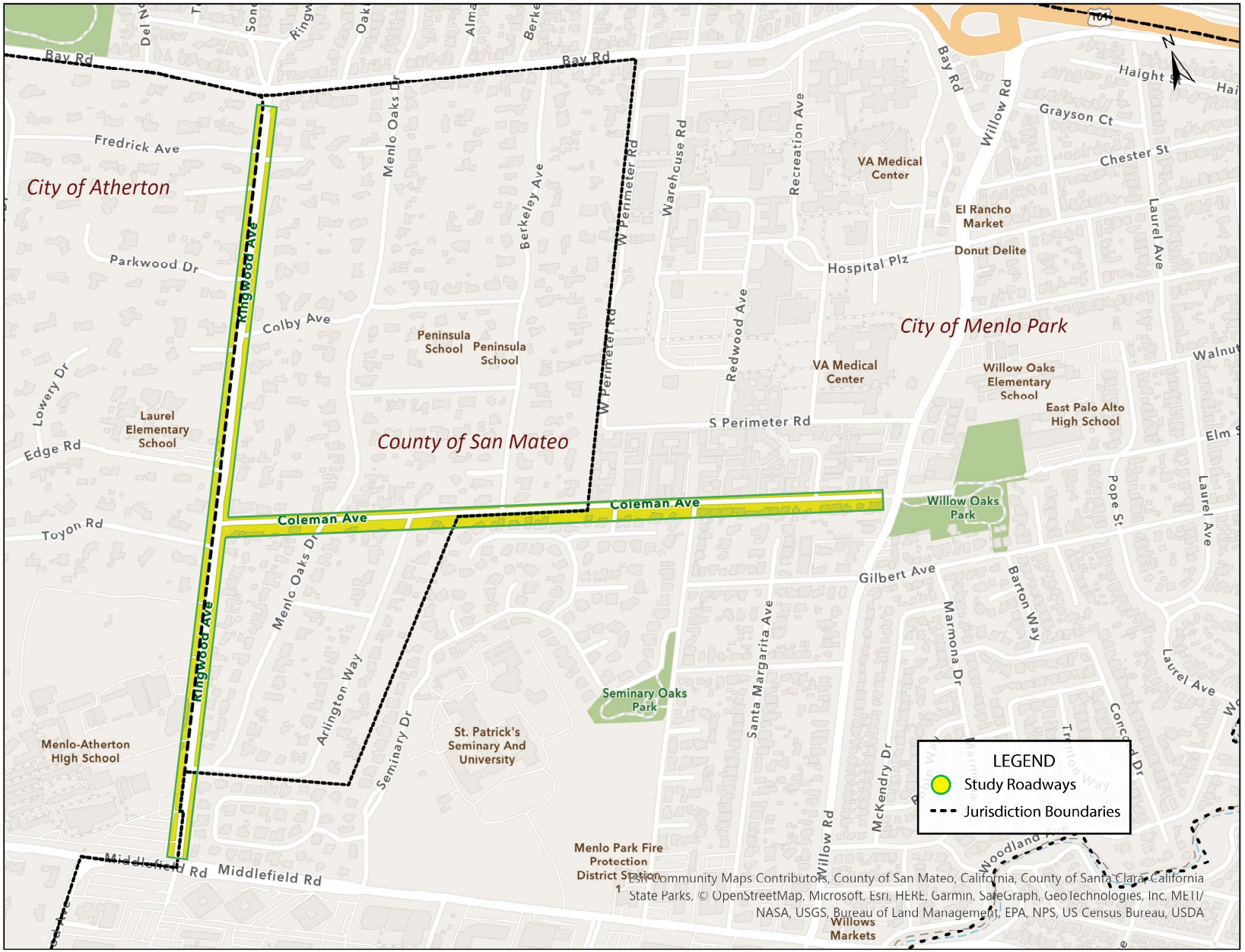
Attachments: Figure 1 (Study Area)
Figure 2 (Land Use Zoning)
Figure 3 (Intersection Controls and Existing Pedestrian, Bicycle, and Transit Facilities)
Figure 4 (Parking Restrictions)
Collision Rate Calculations
Figure 5 (5-Year Total Collisions by Type)
Figure 6 (5-Year Total Collisions by Primary Collision Factor)
Figure 7 (10-Year Pedestrian and Bicycle Collisions)
Menlo Park TMP Conceptual Improvement Plans



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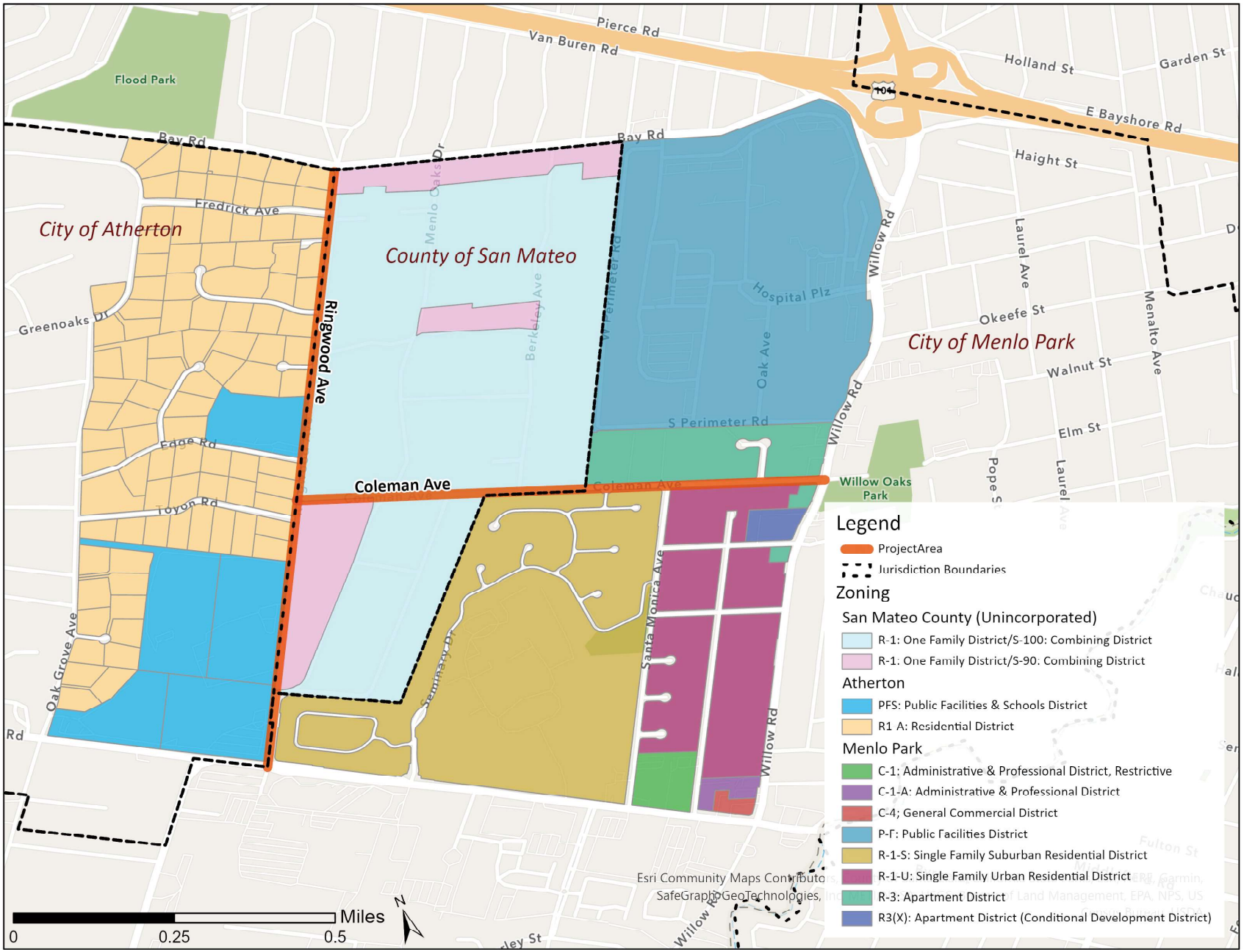
Coleman and Ringwood Avenues Transportation Study - Existing Conditions

Figure 1 – Study Area



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Coleman and Ringwood Avenues Transportation Study - Existing Conditions

Figure 2 – Zoning Map

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Coleman and Ringwood Avenues Transportation Study - Existing Conditions

Figure 3 – Intersection Controls and Existing Pedestrian, Bicycle, and Transit Facilities

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Coleman and Ringwood Avenues Transportation Study - Existing Conditions

Figure 4 – On-Street Parking Restrictions

Roadway Segment Collision Rate Worksheet

Coleman and Ringwood Avenues Transportation Study

Location: Ringwood - Middlefield to Bay

Date of Count: Friday, April 1, 2022
Average Daily Traffic (ADT): 6,900

Number of Collisions: 8
Number of Injuries: 5
Number of Fatalities: 0
Start Date: January 1, 2016
End Date: December 31, 2020
Number of Years: 5

Highway Type: Conventional 2 lanes or less
Area: Suburban
Design Speed: ≤45

Segment Length: 0.9 miles
Direction: North/South

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Segment Length} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{8 \times 1{,}000{,}000}{6{,}900 \times 365 \times 0.9 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Segment	**0.71 c/mvm**	**0.0%**	**62.5%**
Statewide Average*	**1.60 c/mvm**	**1.0%**	**38.3%**

Notes
ADT = average daily traffic volume
c/mvm = collisions per million vehicle miles
* 2018 Collision Data on California State Highways, Caltrans

Location: Coleman - Ringwood to Willow

Date of Count: Friday, April 1, 2022
Average Daily Traffic (ADT): 3,500

Number of Collisions: 12
Number of Injuries: 6
Number of Fatalities: 0
Start Date: January 1, 2016
End Date: December 31, 2020
Number of Years: 5

Highway Type: Conventional 2 lanes or less
Area: Suburban
Design Speed: ≤45

Segment Length: 0.7 miles
Direction: East/West

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Segment Length} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{12 \times 1{,}000{,}000}{3{,}500 \times 365 \times 0.7 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Segment	**2.68 c/mvm**	**0.0%**	**50.0%**
Statewide Average*	**1.60 c/mvm**	**1.0%**	**38.3%**

Notes
ADT = average daily traffic volume
c/mvm = collisions per million vehicle miles
* 2018 Collision Data on California State Highways, Caltrans

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Coleman and Ringwood Avenues Transportation Study - Existing Conditions

Figure 5 – 5-Year Total Collisions by Type

smx900-2.ai 5/22

Coleman and Ringwood Avenues Transportation Study - Existing Conditions

Figure 6 – 5-Year Total Collisions by Primary Collision Factor

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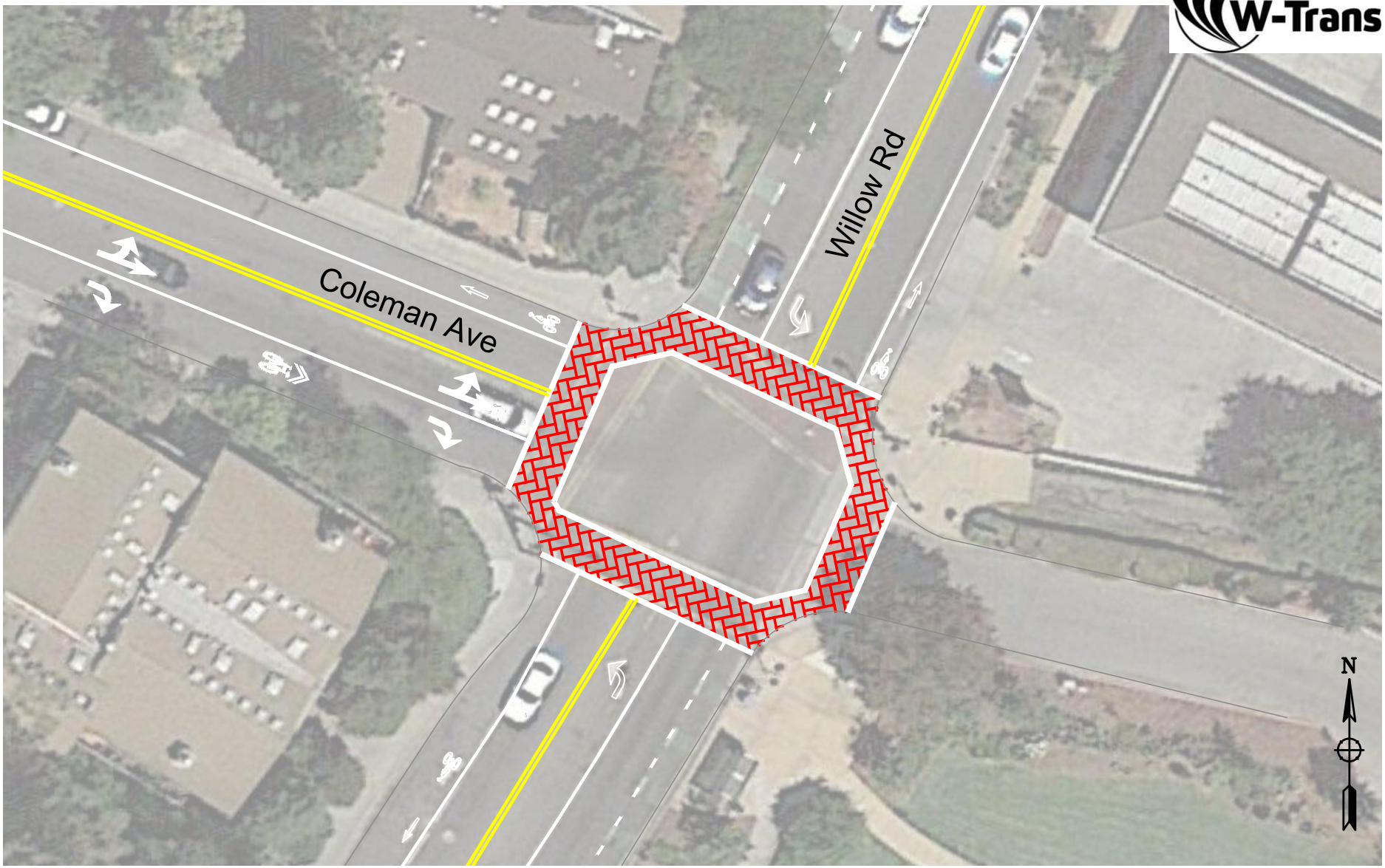
Coleman and Ringwood Avenues Transportation Study - Existing Conditions

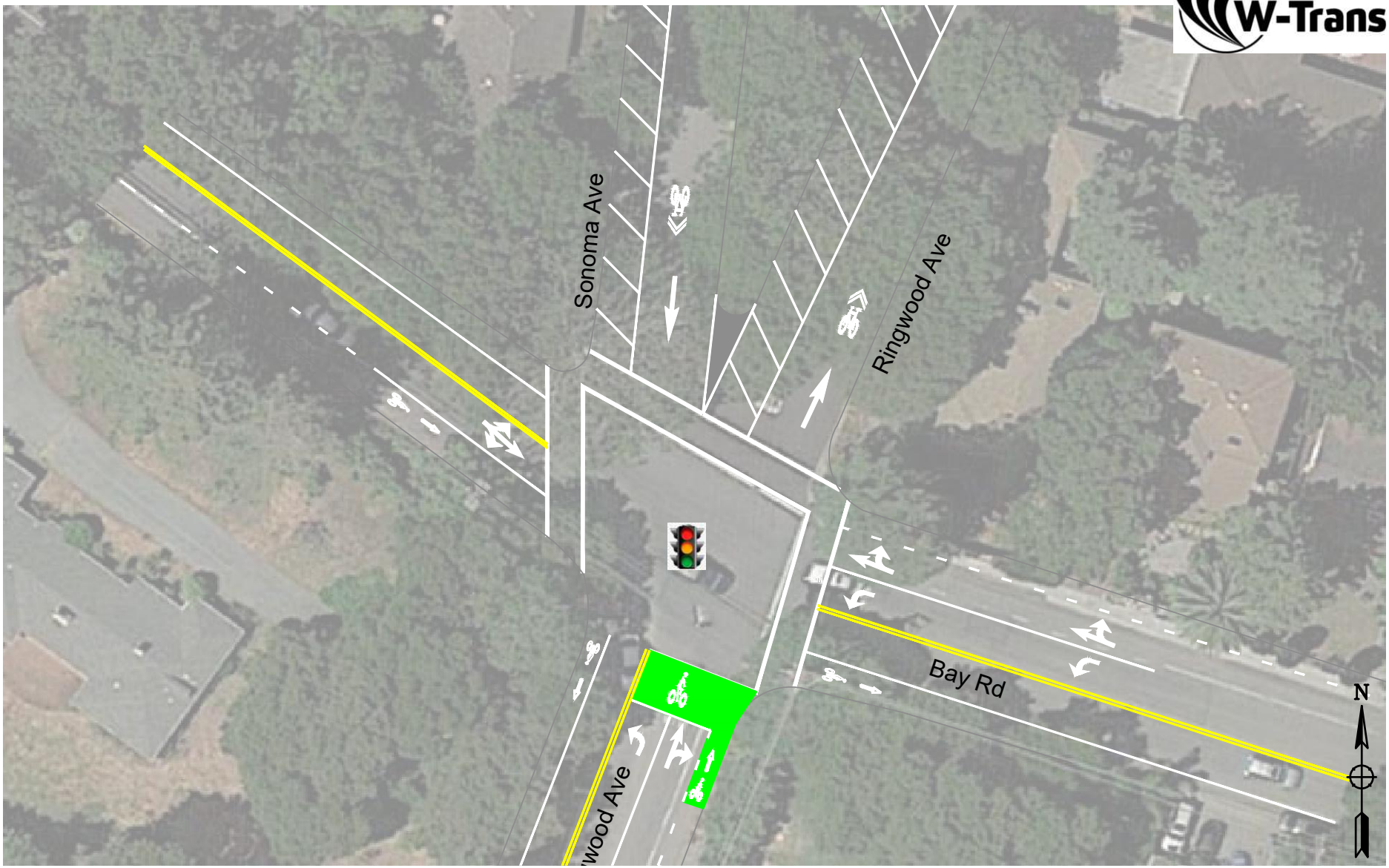
Figure 7 – 10-Year Pedestrian and Bicycle Collisions



Recommendation #45: Install right turn lane on north leg of Coleman Ave, install bike lanes on Coleman Ave north of Willow Road.

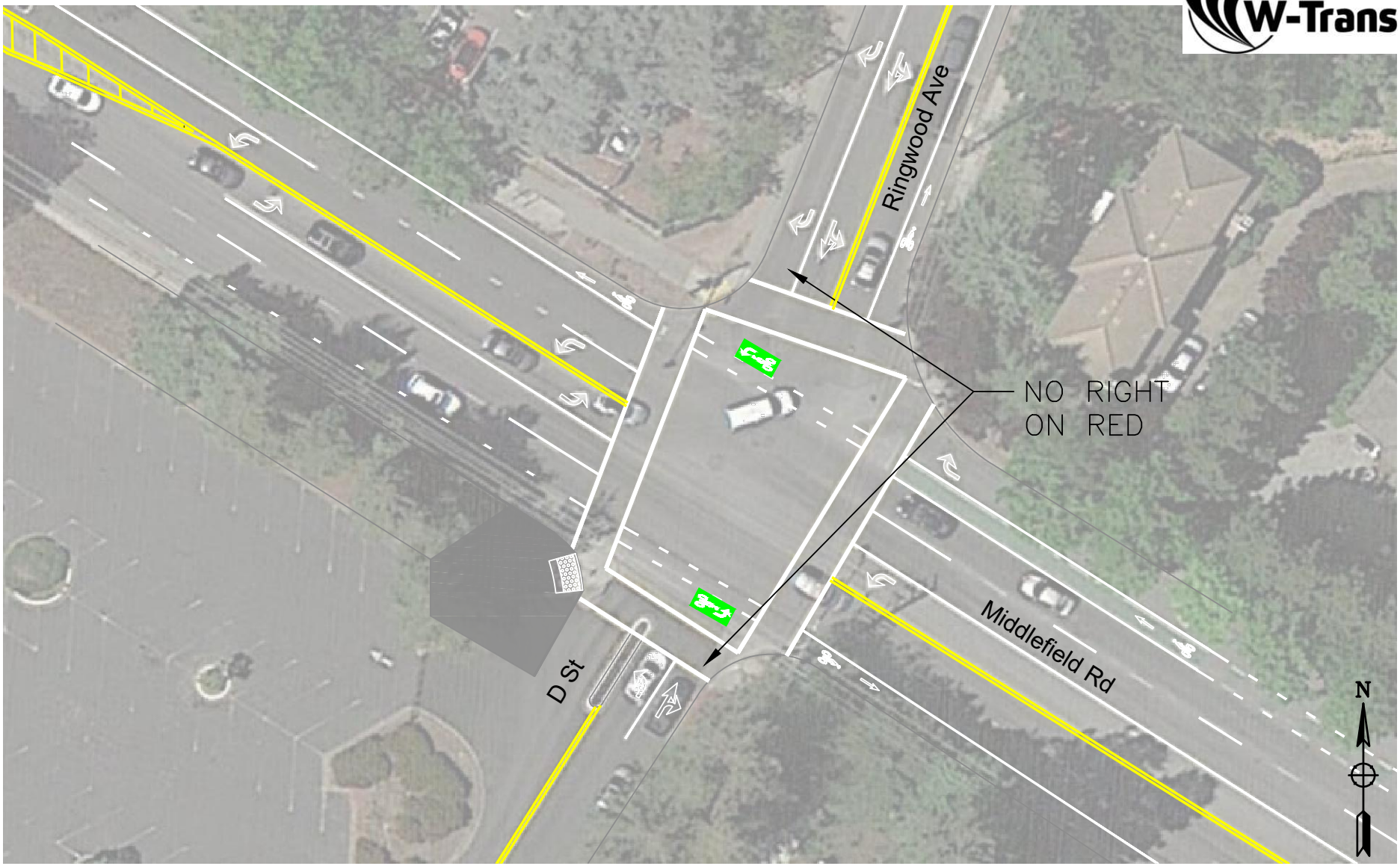
Advantages: improve overall intersection flow, provide dedicated bike lanes

Disadvantages: require on-street parking removal



Recommendation #53: Install signal and convert east legs to one-way couplets. Install left-turn lanes as necessary.

Advantages: Improved traffic flow. Average delays during the a.m. peak period are expected to be reduced by 23 seconds. Average delays during the p.m. peak period are expected to be reduced b
Disadvantages: removal of landscaping on Bay Road and Ringwood Avenue



Recommendation #64: Install two-stage left-turn boxes, crosswalks, conflict detection markings, and reconstruct northwest curb ramp

Advantages: improved pedestrian and bicycle crossings, reduced vehicle speeds

Disadvantages: right-turns are restricted when bicycles are present