Application of Criteria for a Project of Air Quality Concern

Project Title: Marin County - Civic Center Drive Improvements Project

Project Summary for Air Quality Conformity Task Force Meeting: (March 26, 2015)

Description

- The project consists of constructing improvements to Civic Center Drive that would provide:
  (1) A safe path of travel for pedestrians and bicyclists connecting the SMART Civic Center Station and the Civic Center Campus between the SMART railway crossing and Armory Drive/Judge Haley Drive;
  (2) Buffered bike lanes[1]; and
  (3) A two-way bicycle path from the future SMART station location to Peter Behr Drive.

Background

- CEQA Mitigated Negative Declaration approved on February 10, 2015 by Marin Co. Board of Supervisors (public comment period 12/12/14 – 01/12/15)
- NEPA process almost complete / Air Quality Tech. Memo. – Submitted to Caltrans 11/18/14
- No comments received on air quality to date
- Seeking Air Quality Conformity determination on 03/26/15

Not a Project of Air Quality Concern (40 CFR 93.123(b)(1))

(i) New or expanded highway projects with significant number/increase in diesel vehicles?

- The proposed project would add a roundabout; thus, it is not considered a POAQC per Section 93.123(b)(1)i and ii. According to this rule, the following project types are not considered to be POAQCs.

  - Intersection channelization projects, traffic circles or roundabouts, intersection signalization projects at individual intersections, and interchange reconfiguration projects that are designed to improve traffic flow and vehicle speeds, and do not involve any increases in idling. Thus, they would be expected to have a neutral or positive influence on PM2.5 or PM10 emissions.

(ii) Affects intersections at LOS D, E, or F with a significant number of diesel vehicles?

- The proposed project would not be a POAQC, per Section 93.123(b)(1)i and ii, because it would add a roundabout that is designed to improve traffic flow.

(iii) New bus and rail terminals and transfer points?

- The project will place a new northbound bus stop on Civic Center Dr., but the project does not include new bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location.

(iv) Expanded bus and rail terminals and transfer points?

- The project will relocate and expand the existing southbound bus stop on Civic Center Dr., but the project does not include expanded bus or rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.

(v) Affects areas identified in PM_{10} or $PM_{2.5}$ implementation plan as site of violation?

- No state implementation plan for $PM_{2.5}$

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[1] Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Accessed: October 2, 2014. http://nacto.org/cities-for-cycling/design-guide/bike-lanes/buffered-bike-lanes/.

Project Assessment Form for $PM_{2.5}$ Interagency Consultation

RTIP ID# *(required)* Resolution No. 4128
TIP ID# *(required)* MRN130007
Air Quality Conformity Task Force Consideration Date March 26, 2015
Project Description *(clearly describe project)* The project consists of constructing improvements to Civic Center Drive that would provide: 1) A safe path of travel for pedestrians and bicyclists connecting the SMART Civic Center Station and the Civic Center Campus between the SMART railway crossing and Armory Drive/Judge Haley Drive; 2) buffered bike lanes, and 3) a two-way bicycle path from the future SMART station location to Peter Behr Drive. Intersection improvements (i.e. the construction of a roundabout) would be installed to provide safe pedestrian access to the Civic Center Campus and surrounding employment centers. Additional improvements consist of new up to eight (8)-foot wide sidewalks; five (5)-foot wide landscape buffers between the new roadway and the sidewalks; drainage; curb and gutter; buffered bike lanes; 12-foot wide traffic lanes; a 10-foot wide, two-way bicycle path; landscaping; new signage; traffic signal relocations at McInnis Parkway; new pedestrian and roadway lighting; and, new driving surfaces. The roadway will be re-striped and new striped crosswalks are proposed at all intersections. The project also includes bus stop improvements, such as relocating and expanding the existing southbound bus stop and placing a new northbound bus stop (Marin Transit stops periodically within the project area on an as-needed basis); and, streetscape features, such as pedestrian plaza areas. The project limits on Civic Center Drive are between Merrydale Road and Armory Drive/Judge Haley Drive. The project would also install sidewalks and bicycle improvements along Peter Behr, from Civic Center Drive to 600 feet south of Civic Center Drive. Some slight modifications to the roadway alignment are proposed. To accommodate the new landscaping, sidewalk, and bus stop on the north side of the roadway within the existing ROW, the roadway centerline will be shifted by up to 10-feet to the southwest between the SMART tracks and the roundabout. The modifications to the alignment and the associated grading are to be designed in accordance with the geometric design standards in the Caltrans Highway Design Manual and the AASHTO Greenbook. To provide proper roadway slopes, sidewalk slopes, and superelevations, minor re-grading of the existing roadway would take place, as well as grading of the widened roadway and new sidewalks. Where feasible, curb cuts are being placed to allow drainage into stormwater treatment areas (bio-swales) within the proposed planters. In most areas of the project, grades are being modified by no more than one (1)-foot, and are being raised in most, but not all, locations. Cut and fill slopes at the edge of the roadway are being designed for a maximum 2:1 (H:V) slope. Erosion control would be placed on all finalized slopes.

$PM_{2.5}$ Project Assessment Form for Interagency Consultation

Type of Project: Intersection Channelization
Pick one project type: New State highway, Change to existing State highway, New regionally significant street, Change to existing regionally significant street, New interchange, Reconfigure existing interchange, Intersection Channelization, Intersection signalization, Roadway realignment, Bus, rail or intermodal facility/terminal/transfer point, Truck weight/inspection station

County	**Narrative Location/Route & Postmiles :** In San Rafael: On Civic Center Drive from Merrydale Overcrossing/Scettrini Drive to Judge Haley Drive 04-MRN-0-CR **Caltrans Projects – EA#** STPL – 5927 (103)
Marin County	

Lead Agency: Caltrans

Contact Person	**Phone#**	**Email**
Chien Wu	510-286-5227	chien_wu@dot.ca.gov

Federal Action for which Project-Level PM Conformity is Needed *(check appropriate box)*

X	Categorical Exclusion (NEPA)	EA or Draft EIS	FONSI or Final EIS	PS&E or Construction	Other

Scheduled Date of Federal Action: TBD

NEPA Delegation – Project Type *(check appropriate box)*

Exempt	Section 6004 – Categorical Exemption	X	Section 6005 – Non-Categorical Exemption

Current Programming Dates *(as appropriate)*

	PE/Environmental	ENG	ROW	CON
Start	N/A	N/A	N/A	8/15
End	N/A	N/A	N/A	12/16

Project Purpose and Need (Summary): *(please be brief)*

The purpose of the project is to provide a safe, accessible, and welcoming experience for all users entering the Marin County Civic Center campus from the north, and to increase multi-modal access to the Civic Center and surrounding employment centers.

Civic Center Drive currently serves as the northern gateway to the Marin County Civic Center Campus, and with the advent of SMART rail service scheduled for 2016, intermodal connections to the Civic Center campus and surrounding employment centers will need to be in place. Currently, however, there is little to no intermodal access within the project limits. There are significant sidewalk gaps, a lack of bicycle facilities, and little in the way of pedestrian safety components.

Project Assessment Form for $PM_{2.5}$ Interagency Consultation

Surrounding Land Use/Traffic Generators *(especially effect on diesel traffic)*
Land uses surrounding the project area are mostly Marin County municipal government buildings, recreational areas, and commercial uses. Office and commercial structures border the project area to the north, with single family and multi-family residential sues found further north and northeast. The Marin Center, consisting of the Veteran's Memorial Auditorium (VMA) (and parking lot) and Exhibition Hall border the project area to the east and south seat. The facilities are considered part of the larger Marin County Civic Center Campus. The Children's Lagoon Park and Marin County fairgrounds are found further to the east and southeast. The Lagoon Park actually forms a portion of the southeast project boundary.

U.S. Highway 101 forms the majority of the project border to the west, across from which are mixed-use (commercial/multi-family residential) neighborhoods are located. The Marin County, General Services Agency (i.e., County Garage & Maintenance Facility) is found at the southwest boundary of the project, fronting Peter Behr Drive. The Marin County Civic Center (MCCC) property, including the Hall of Justice, Superior Courts, and the Administration Wing forms the remaining portion of the south and west project boundaries.

The MCCC Campus hosts two regional Farmer's Markets (Thursday & Sunday), the Marin County Fair (1st week in July), and approximately 50 events and conference yearly at the VMA and Exhibition Hall. The Civic Center facility contains approximately 1000+ employees and is the site of the Superior Court for the County. Civic Center Drive also serves as a connection point between residential areas located to the south of the MCCC Campus and the commercial areas to the north and northeast. Peak hour traffic analysis showed between 2% - 4% truck traffic through the Civic Center Drive corridor, which would indicate little diesel related traffic within the project area.

$PM_{2.5}$ Project Assessment Form for Interagency Consultation

Brief summary of assumptions and methodology used for conducting analysis *(please keep this concise – specifics may include date of when traffic counts were conducted, studies where truck percentages were derived)*

AADT, LOS, Delay, and Intersection Volume data were collected in 2013 & 2014 by Fehr and Peers. The AADT data is provided below (existing and cumulative).

Roadway	Location	Existing Year	Existing	Cumulative (2035)	Existing PM Peak Hour Truck Data (% of trucks along corridor)
Civic Center Drive	between Avenue of the Flags & Peter Behr	2014	7,700	8,400	3%
	s/o Armory	2014	7,700	8,400	3%
	s/o McInnis Parkway	2014	8,700	9,500	3%
McInnis Parkway	e/o Civic Center Drive	2013	3,800	4,200	<1%
San Pedro Road	e/o Civic Center Drive	2013	15,200	16,800	2%

Opening Year: If facility is an interchange(s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT

AADT data is noted above, including peak hour Truck AADT data. Intersection volumes and Level of Service Data are available for the existing and cumulative year scenarios. Please refer to Tables 1-4 below for the LOS and intersection volume data for the existing year scenario.

RTP Horizon Year / Design Year: If facility is an interchange (s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT

AADT data is noted above, including peak hour Truck AADT data. Please refer to Tables 1-4 below for the LOS and intersection volume data for the cumulative year scenario.

Describe potential traffic redistribution effects of congestion relief *(impact on other facilities)*

The LOS data for the project scenarios (see Tables 1-4 below.) show that implementation of the project would reduce delay at a minimum of 4 out of the 6 major intersections in the project area for all of the project alternatives. Delay would be reduced substantially at the intersection of Marin Civic Center Drive and Peter Behr Drive (delay reduction of between 49-86% for the project Alternatives), which is the intersection where the roundabout would be constructed. Because intersection delay would improve at nearly all of the major intersections in the project area due to the project, the proposed improvements would therefore improve system wide travel efficiency and speeds, which would result in overall PM reductions in the project area.

TABLE 1: EXISTING PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKDAY EVENING (PM PEAK HOUR)

	Intersection	Control	Existing		Existing Plus Project A		Existing Plus Project B		Existing Plus Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	21.9	C	22	C	22	C	21.8	C
2	Civic Center Drive/McInnis Parkway	Signal	7.3	A	7	A	7.3	A	7.2	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	7.8	A	7.2	A	1.1	A	8	A
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	9.4	A	1.3	A	1.4	A	4.8	A
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	12.2	B	10.7	B	12	B	12.1	B
6	Civic Center Drive/N San Pedro Road	Signal	25.9	C	25.9	C	25.5	C	25.5	C

Notes:

1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under Existing, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under Existing; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations

Source: Fehr & Peers, April 2013

TABLE 2: EXISTING PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKEND MIDDAY (SUNDAY PEAK HOUR)

	Intersection	Control	Existing		Existing Plus Project A		Existing Plus Project B		Existing Plus Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	13.4	B	12.9	B	13.2	B	13.6	B
2	Civic Center Drive/McInnis Parkway	Signal	3.9	A	3.9	A	4	A	4	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	8.9	A	10.2	B	1.3	A	8	A
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	14.1	B	1.9	A	1.8	A	9.7	A
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	23.8	C	12	B	12.3	B	11.9	B
6	Civic Center Drive/N San Pedro Road	Signal	32.6	C	25.9	C	25.5	C	35.3	D

Notes:

1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under Existing, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under Existing; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations.

Source: Fehr & Peers, April 2013

TABLE 3: CUMULATIVE PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKDAY EVENING (PM PEAK HOUR)

	Intersection	Control	Cumulative (2035) No Project		Cumulative Plus Project A		Cumulative Plus Project B		Cumulative Plu Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	25.7	C	26.4	C	26.2	C	25.6	C
2	Civic Center Drive/McInnis Parkway	Signal	8	A	8	A	8.3	A	8	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	7.7	A	8.5	A	1.3	A	8.5	A
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	11.3	B	1.7	A	1.8	A	6.1	A
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	12.8	B	12.6	B	12.7	B	12.9	B
6	Civic Center Drive/N San Pedro Road	Signal	33.8	C	32.9	C	32.2	C	31.9	C

Notes:
1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under No Project, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under No Project; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations

Source: Fehr & Peers, April 2013

TABLE 4: CUMULATIVE PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKEND MIDDAY (SUNDAY PEAK HOUR)

	Intersection	Control	Cumulative (2035) No Project		Cumulative Plus Project A		Cumulative Plus Project B		Cumulative Plus Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	15.9	B	15.1	B	14.9	B	15.1	B
2	Civic Center Drive/McInnis Parkway	Signal	7.7	A	8.2	A	8.7	A	7.6	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	21.7	C	28.4	D	6.8	A	21.9	C
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	16.2	C	6.7	A	7.1	A	16.8	B
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	**35.3**	**E**	33.9	D	33.2	D	34	D
6	Civic Center Drive/N San Pedro Road	Signal	40.4	D	52.1	D	49.4	D	45	D

Notes:
1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under No Project, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under No Project; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations

Source: Fehr & Peers, April 2013

Comments/Explanation/Details *(please be brief)*

EPA's 2006 final transportation conformity rule (40 CFR 51.390 and Part 93) that addresses local air quality impacts in PM10 and PM2.5 nonattainment and maintenance areas specifies in 40 CFR 93.123(b)(1) that only "projects of air quality concern" are required to undergo a PM2.5 or PM10 hot-spot analysis. EPA defines projects of air quality concern as certain highway and transit projects that involve significant levels of diesel vehicle traffic, or any other project that is identified by the PM10/PM2.5 SIP as a localized concern. A list of projects of air quality concern, as defined by 40 CFR 93.123(b)(1), is provided below

(i) New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles.

(ii) Projects affecting intersections that are at level–of–service (LOS) D, E, or F with a significant number of diesel vehicles or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project.

(iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location.

(iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.

(v) Projects in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$- or PM_{10}-applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

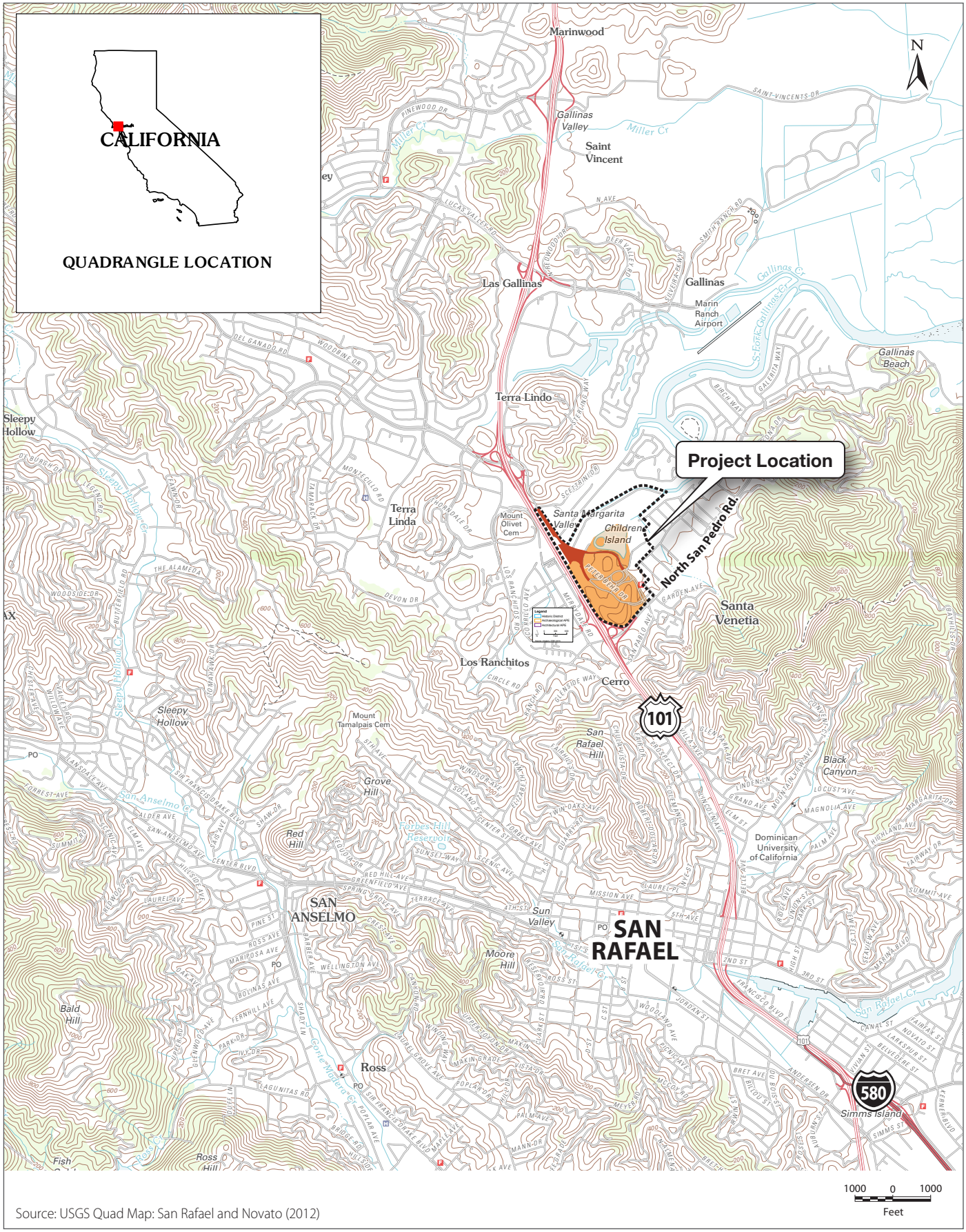
The EPA's 2006 final transportation conformity rule also lists examples of projects that would <u>not</u> be considered projects of local air quality concern under 40 CFR 93.123(b)(1)(i) and (ii). Among these examples are:

> "Intersection channelization projects, traffic circles or roundabouts, intersection signalization projects at individual intersections, and interchange reconfiguration projects that are designed to improve traffic flow and vehicle speeds, and do not involve any increases in idling. Thus, they would be expected to have a neutral or positive influence on PM2.5 or PM10 emissions (71 FR 12491)."

Based on the EPA 2006 Conformity Rules noted above, and by that same rule indicating that the Civic Center Drive Improvement project design (i.e., traffic circles or roundabout) is <u>not</u> considered a project of local air quality concern, the proposed project would <u>not</u> be considered a Project of Air Quality Concern, as defined by 40 CFR 93.123(b)(1). Therefore, a PM2.5 hot-spot evaluation is not required.

00075.13 Marin County DPW (09-14) SS

Figure 1
Project Vicinity



Source: USGS Quad Map: San Rafael and Novato (2012)

00075.13 (09-14) SS

Figure 2
Project Location

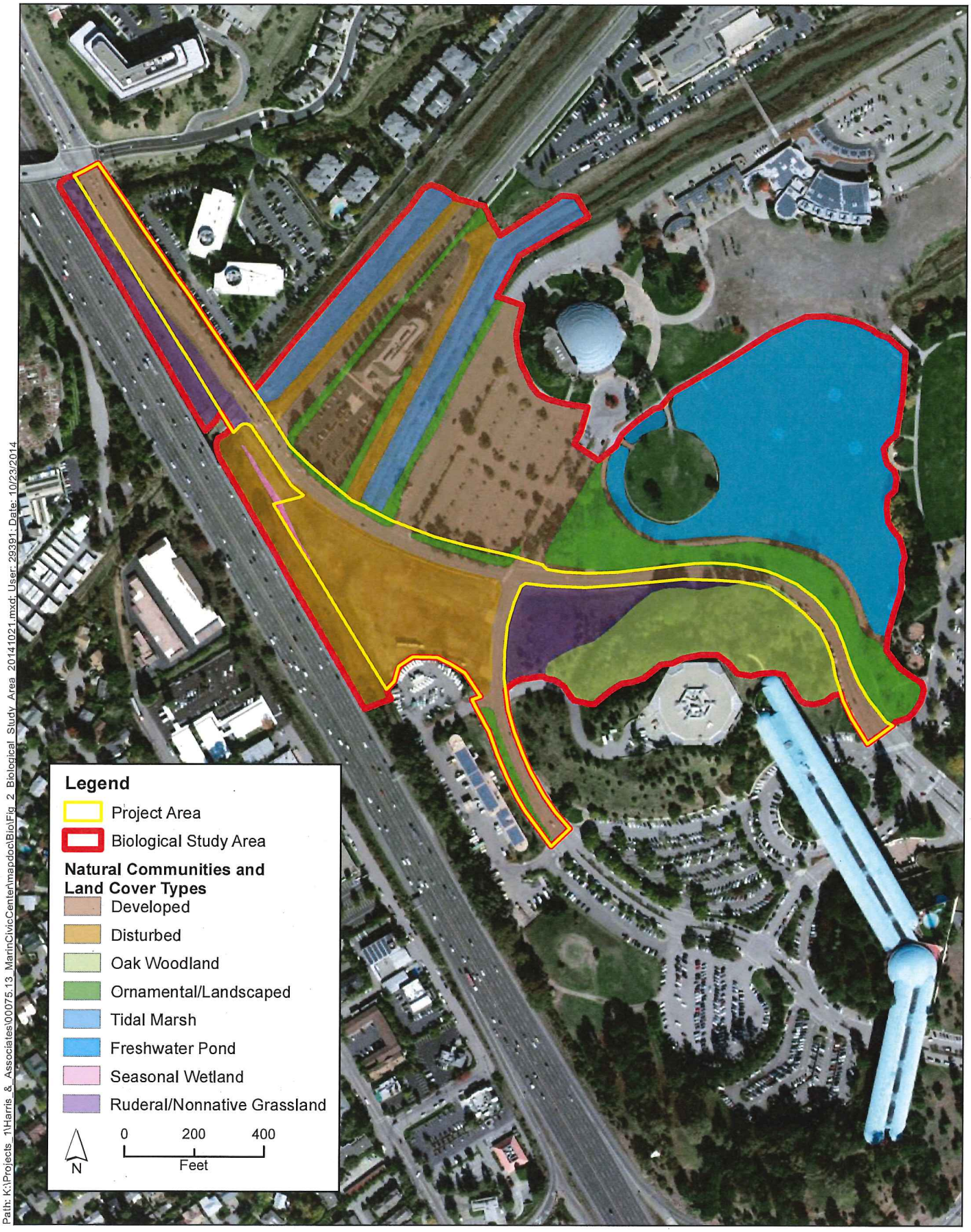


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Figure 2
Biological Study Area and Land Cover Types
Marin Civic Center Drive Improvements Project

FEHR PEERS

MEMORANDUM

Date: May 3, 2013

To: Dave Bernardi and Pat Echols, County of Marin

From: Fehr & Peers

Subject: Marin Civic Center Drive Traffic Operations

SF13-0665

This memorandum presents the findings of a transportation operations analysis for proposed roadway improvements along Civic Center Drive (Project) adjacent to the Veterans' Memorial Auditorium and Christmas Tree Lot on the Marin Civic Center Campus. Traffic operations for three design scenarios were evaluated at six intersections along Civic Center Drive between Merrydale Road-Scettrini Drive and North San Pedro Road. The intersection peak hour operational analysis was conducted using VISSIM software. VISSIM provides a microsimulation of vehicular traffic, capturing the variations in the nature of driver behavior and modeling the interaction between vehicles, pedestrians, bicyclists, transit and trucks within the roadway network.

The microsimulation analysis found that all three project alternatives would result in minimal delay and congestion along Civic Center Drive, and that traffic would generally operate at acceptable levels based on the City of San Rafael's standards, under both existing and future conditions. As such, the merits of each alternative may be evaluated by other criteria such as safety, cost, aesthetics, and feasibility.

APPROACH

This section describes the methods and performance criteria used to evaluate the Civic Center Drive corridor operations.

Study Area and Analysis Scenarios

The following intersections, as shown on **Figure 1**, were selected as study locations in consultation with the County of Marin:

1. Civic Center Drive/Merrydale Road-Scettrini Drive (signalized)
2. Civic Center Drive/McInnis Parkway (signalized)
3. Civic Center Drive/Avenue of the Flags (side-street stop)
4. Civic Center Drive/Peter Behr Drive (side-street stop)
5. Civic Center Drive/Judge Haley-Armory Drive (side-street stop)
6. Civic Center Drive/N San Pedro Road (signalized)

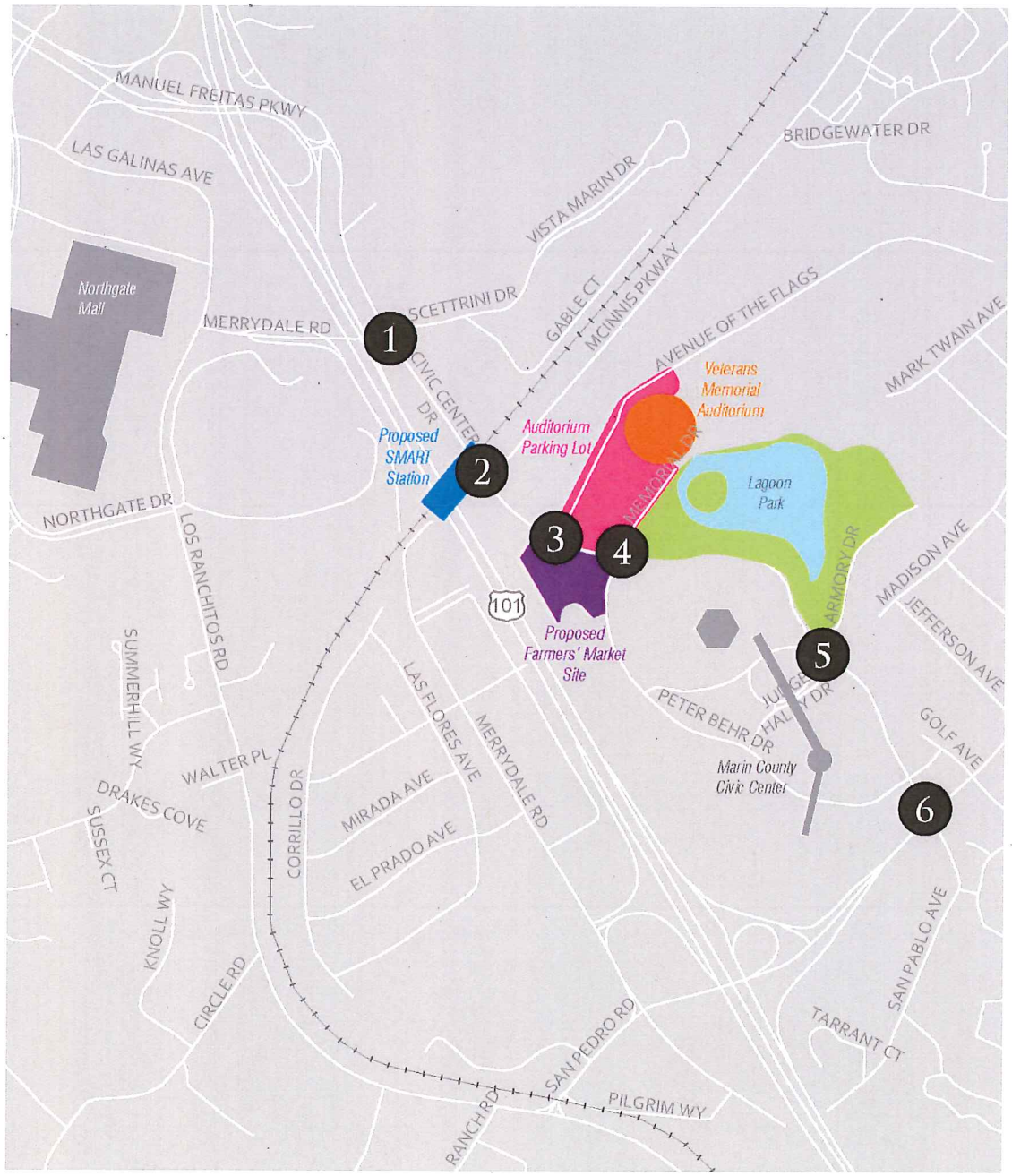
The study intersections were evaluated during two time periods: during the midweek evening peak-hour (4:00 PM and 6:00 PM), and the Sunday midday peak-hour occurring during the Marin Civic Center Farmers Market (11:00 AM and 1:00 PM). Existing and cumulative conditions were analyzed for the following Project alternatives:

Project Alternative A: Installation of a roundabout at the intersection of Civic Center Drive/Peter Behr Drive (replacing the existing side-street stop traffic control)

Project Alternative B: Installation of a roundabout at both the Civic Center Drive/Peter Behr Drive intersection and the Civic Center Drive/Avenue of the Flags intersection (replacing the existing side-street stop traffic controls)

Project Alternative C: Installation of an actuated signal at the Civic Center Drive/Peter Behr Drive intersection (replacing the existing side-street stop control)

Existing volumes were obtained from new traffic counts conducted in March, 2013. Cumulative (2035) volumes were calculated using an annual growth rate of 0.41 percent, or 9.1% total growth over 22 years. The growth rate was determined using the Association of Bay Area Governments' (ABAG) projection of job and population growth by 2035 for the County of Marin. The cumulative analysis also accounts for the planned relocation of the Agricultural Institute of Marin Farmers Market to the Christmas Tree lot.



Not to Scale

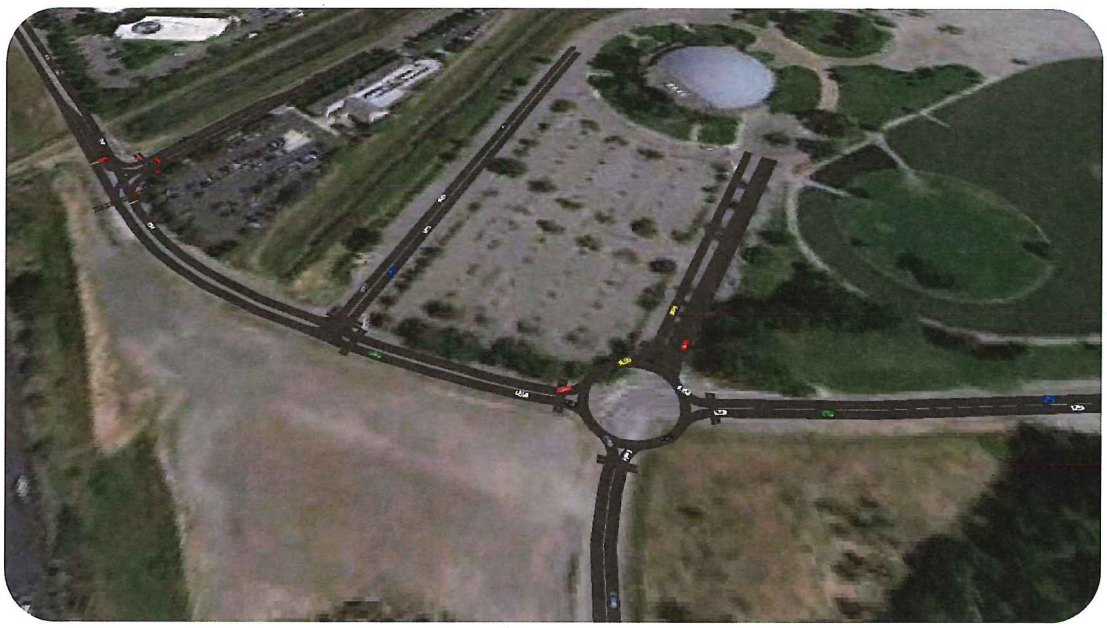
FEHR & PEERS

MARIN CIVIC CENTER DRIVE IMPROVEMENTS
STUDY INTERSECTIONS

FIGURE 1

Analysis Method

The intersection analysis was conducted using methodologies consistent with the *Highway Capacity Manual 2010* (Transportation Research Board, 2011), applied using the VISSIM traffic analysis software.



A snapshot from the VISSIM traffic analysis shows vehicle operations with a roundabout at Peter Behr Drive (Alternative A).

The following procedures and assumptions were used to develop the existing conditions traffic operations analysis model:

- Traffic volumes were based on new intersection counts and balanced between study intersections
- Roadway geometry was based on field observations of the study area
- Signal Timing information was provided by City/County Staff and confirmed during field observations
- Speeds for the model network were set based on the posted speed limits

The existing conditions traffic analysis model was calibrated and validated to observed traffic counts and observed vehicle queues. The procedures used are consistent with *Traffic Analysis*

Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software (FHWA, 2004).

Level of Service Criteria

Traffic operations at intersections are typically described in terms of "Level of Service" (LOS). LOS is a qualitative measure of the effect of several factors on traffic operating conditions, including speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort, and convenience. It is generally measured quantitatively in terms of vehicular delay and described using a scale that ranges from LOS A to F, with LOS A representing essentially free-flow conditions and LOS F indicating over-capacity conditions with substantial congestion and delay.

All study intersections are under the jurisdiction of The City of San Rafael. The City has a set of intersection operation criteria to determine if operations are acceptable. The City's standard for all study intersections evaluated as part of this exercise is LOS D or better, except for Merrydale Road / Civic Center Drive, where the standard is LOS E or better.

EXISTING CONDITIONS

Traffic operations were evaluated at each of the six study intersections for the weekday evening and weekend midday peak period using the validated VISSIM models.

Operations Analysis

The existing peak hour delay and LOS are presented for the weekday evening and weekend midday in **Table 1** and **Table 2,** respectively. Under existing conditions, there is minimal congestion along the Civic Center Drive corridor during the PM and Weekend peak hours. All of the study intersections operate at LOS D or better during both peak hours under all Project scenarios. The VISSIM model matched observations in the field of minimal queuing at all intersections during the peak hours.

Although there are more conflicts between traffic and pedestrians during the weekend peak hour during the Farmers Market, those conflicts are accounted for in the analysis. Observations suggest that while drivers may drive more slowly during the Farmers Market, traffic is able to reasonably circulate through the network.

TABLE 1: EXISTING PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKDAY EVENING (PM PEAK HOUR)

	Intersection	Control	Existing		Existing Plus Project A		Existing Plus Project B		Existing Plus Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	21.9	C	22	C	22	C	21.8	C
2	Civic Center Drive/McInnis Parkway	Signal	7.3	A	7	A	7.3	A	7.2	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	7.8	A	7.2	A	1.1	A	8	A
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	9.4	A	1.3	A	1.4	A	4.8	A
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	12.2	B	10.7	B	12	B	12.1	B
6	Civic Center Drive/N San Pedro Road	Signal	25.9	C	25.9	C	25.5	C	25.5	C

Notes:
1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under Existing, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under Existing; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations
Source: Fehr & Peers, April 2013

TABLE 2: EXISTING PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKEND MIDDAY (SUNDAY PEAK HOUR)

	Intersection	Control	Existing		Existing Plus Project A		Existing Plus Project B		Existing Plus Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	13.4	B	12.9	B	13.2	B	13.6	B
2	Civic Center Drive/McInnis Parkway	Signal	3.9	A	3.9	A	4	A	4	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	8.9	A	10.2	B	1.3	A	8	A
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	14.1	B	1.9	A	1.8	A	9.7	A
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	23.8	C	12	B	12.3	B	11.9	B
6	Civic Center Drive/N San Pedro Road	Signal	32.6	C	25.9	C	25.5	C	35.3	D

Notes:
1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under Existing, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under Existing; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations

Source: Fehr & Peers, April 2013

CUMULATIVE (2035) PLUS PROPOSED PROJECT SCENARIOS

Operations Analysis

The Cumulative (2035) peak hour delay and LOS are presented for the weekday evening and weekend midday in **Table 3** and **Table 4,** respectively. As noted earlier, this analysis accounts for regional traffic growth as well as the proposed relocation of the Agricultural Institute of Marin Farmer's Market to the Christmas Tree lot, just north of Peter Behr Drive and west of Civic Center Drive. Under future conditions, there is minimal congestion along the Civic Center Drive corridor during the weekday PM peak hour and all of the study intersections operate at LOS C or better.

During the weekend midday peak hour, during the Farmers Market, there will be minor congestion at the side-street stop sign-controlled approach to the intersection of Civic Center Drive/Judge Haley-Armory Drive. However, the delay and correlating LOS shown in **Table 4** are representative of the worst movement, and not the overall intersection operation. In this case, the worst movement is the westbound left turn which has a demand of only 30 vehicles (less than 3% of total intersection demand). The delay for this movement is mostly due to time associated with vehicles waiting for an acceptable gap in free-flowing traffic along Civic Center Drive. All other intersections operate at an acceptable LOS of D or better during the weekend midday peak hour.

TABLE 3: CUMULATIVE PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKDAY EVENING (PM PEAK HOUR)

	Intersection	Control	Cumulative (2035) No Project		Cumulative Plus Project A		Cumulative Plus Project B		Cumulative Plus Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	25.7	C	26.4	C	26.2	C	25.6	C
2	Civic Center Drive/McInnis Parkway	Signal	8	A	8	A	8.3	A	8	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	7.7	A	8.5	A	1.3	A	8.5	A
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	11.3	B	1.7	A	1.8	A	6.1	A
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	12.8	B	12.6	B	12.7	B	12.9	B
6	Civic Center Drive/N San Pedro Road	Signal	33.8	C	32.9	C	32.2	C	31.9	C

Notes:
1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under No Project, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under No Project; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations
Source: Fehr & Peers, April 2013

TABLE 4: CUMULATIVE PLUS PROJECT INTERSECTIONS LEVEL OF SERVICE FOR THE WEEKEND MIDDAY (SUNDAY PEAK HOUR)

	Intersection	Control	Cumulative (2035) No Project		Cumulative Plus Project A		Cumulative Plus Project B		Cumulative Plus Project C	
			Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1	Civic Center Drive/Merrydale Road-Scettrini Drive	Signal	15.9	B	15.1	B	14.9	B	15.1	B
2	Civic Center Drive/McInnis Parkway	Signal	7.7	A	8.2	A	8.7	A	7.6	A
3	Civic Center Drive/Avenue of the Flags	Side-street Stop / Roundabout[3]	21.7	C	28.4	D	6.8	A	21.9	C
4	Civic Center Drive/Peter Behr Drive	Side-street Stop / Roundabout / Signal[4]	16.2	C	6.7	A	7.1	A	16.8	B
5	Civic Center Drive/Judge Haley-Armory Drive	Side-street Stop	**35.3**	**E**	33.9	D	33.2	D	34	D
6	Civic Center Drive/N San Pedro Road	Signal	40.4	D	52.1	D	49.4	D	45	D

Notes:
1. Signalized intersection level of service based on weighted average control delay per vehicle; Stop controlled delay based on average delay per vehicle for the worst movement
2. LOS = Level of Service
3. Intersection is SSS control under No Project, Project A, and Project C; Roundabout under Project B
4. Intersection is SSS control under No Project; Roundabout under Project A and Project B; Signal under Project C

Bold text indicates deficient intersection operations
Source: Fehr & Peers, April 2013

RECOMMENDED INTERSECTION MODIFICATIONS

While traffic operations for the three scenarios are not expected to cause substantial additional delay or congestion, there are several minor design considerations that could further improve intersection operations along the corridor, as described below.

Civic Center Drive at Peter Behr Drive

Signal Alternative

Previous studies of Civic Center Drive recommended the consideration of left-turn pockets with the signal alternative at Peter Behr Drive. Left-turn pockets would provide a place for turning vehicles to queues while waiting for an acceptable gap in opposing traffic, and would reduce the number of through vehicles encroaching on the bike lane when trying to maneuver around queued turning vehicles. If installed, left-turn pockets would also provide enough space for the construction of a center median to run along the rest of the roadway segment. However, the installation of turn pockets at Peter Behr Drive would require moving the existing curbline to accommodate the road widening, which would have sizable cost implications. This analysis found that it will not be necessary to install left-turn pockets at Peter Behr Drive from a traffic operations standpoint under existing or future traffic conditions on typical days, although they may prove beneficial on an infrequent basis prior to special events at the auditorium when a large number of vehicles are attempting to enter the parking lot within a short amount of time.

Roundabout Alternative

The proposed roundabout alternative would be a single lane roundabout, which would require single travel lanes on all approaches. As Memorial Drive currently has two lanes in each direction, the lane geometry at the entrance and exit of the roundabout would be reconfigured to single lanes. The southbound lanes exiting the Auditorium parking lot would merge in advance of the roundabout, and the northbound entry lane would expand to two lanes on the far side of the marked crosswalk across Memorial Drive. Although this reconfiguration would slightly reduce the queuing capacity exiting Memorial Drive, a roundabout would still improve vehicle operations after events compared to the current side stop control. Reducing Memorial Drive to a single lane in each direction would also benefit pedestrians by minimizing the crossing distance across Memorial Drive. It would also compliment the proposal to remove the on-street parallel parking

spaces along the west side of Memorial Drive in order to accommodate a wider pedestrian promenade.

Civic Center Drive at McInnis Parkway

Fehr & Peers also tested intersection operations at McInnis Parkway with and without a southbound left-turn pocket on Civic Center Drive. If the existing left-turn pocket were removed, it could provide additional right of way to install a median or sidewalk. This analysis found that traffic operations at this intersection would not degrade after the removal of the existing southbound left-turn lane on Civic Center Drive. This configuration was only tested for weekday PM traffic conditions, and further analysis of the weekday AM conditions and/or conditions prior to a special event at the auditorium may be required before making final design decisions.

Farmers Market Site Plan Review

With the relocation of the Farmers Market to the Christmas Tree Lot, traffic and parking patterns around the Civic Center Campus will change; however, there will be no significant increase to the level of traffic. The new site will have vehicular access from Peter Behr Drive just south of Civic Center Drive.

A new driveway is also proposed on Civic Center Drive opposite Avenue of the Flags. Although we do not recommend installing a second parking lot driveway at this location as it would introduce additional conflict points, constructing it with removable bollards would provide AIM or Marin County with the flexibility to provide access under limited circumstances. We recommend that during the Farmers Market and during typical daily operations, this driveway be closed off to vehicular traffic with bollards (or similar) and be used only for pedestrian access. This would reduce potential conflicts and improve pedestrian and bicycle conditions at the Avenue of the Flags intersection. The single driveway on Peter Behr Drive will likely be adequate during typical times; however, during peak parking times, such as before and after events at the Auditorium, where many cars are entering or exiting the lot in a very short amount of time, the secondary driveway on Civic Center Drive may be useful to facilitate efficient access to or exit from the lot. We recommend that if the bollards were to be removed, and access unrestricted to the second driveway, that a parking lot assistant be present to help facilitate safe and efficient movements.

RECOMMENDATIONS & NEXT STEPS

The microsimulation analysis found that "No Project" alternative and all three Project Alternatives would result in minimal delay and congestion along Civic Center Drive, and that traffic would operate at acceptable levels based on the City of San Rafael's standards, under both existing and future conditions. As such, the merits of each alternative may be evaluated by other criteria such as safety, cost and feasibility. Such criteria was identified and evaluated in the first phase of this study, and should be further refined as the design work moves forward.

In addition, the draft *Roundabout Safety Analysis Memo* (April 8, 2013) provided an evaluation of pedestrian and bicycle safety issues associated with the installation of a roundabout as compared to a traffic signal at the Civic Center Drive and Peter Behr intersection. **Table 7** presents the primary considerations for selecting the preferred alternative.

TABLE 7: PRELIMINARY ALTERNATIVES EVALUATION

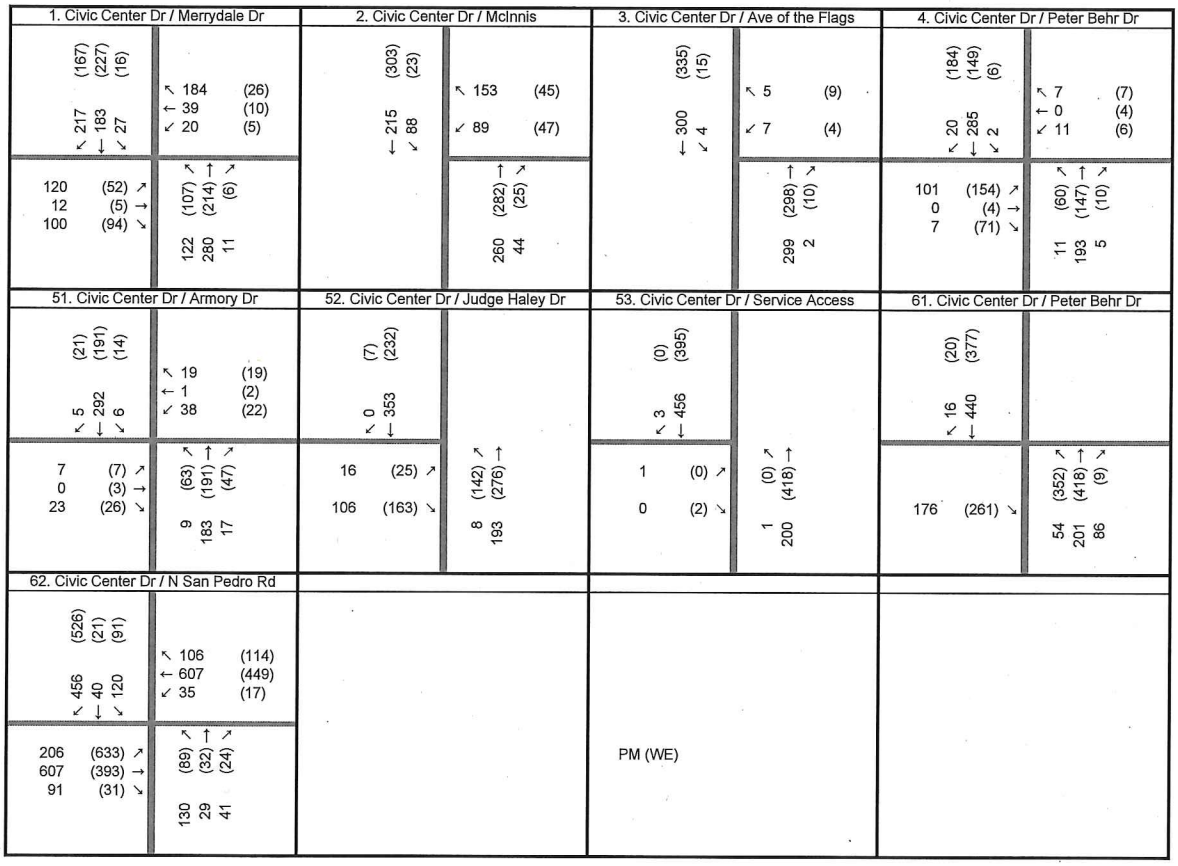
	Project Alternative A Single roundabout	Project Alternative B Double roundabout	Project Alternative C Signal
Transportation considerations			
Acceptable vehicle operations	Yes	Yes	Yes
Improves pedestrian & bicycle access & safety	Yes	Yes	Yes
Calms traffic	Yes	Yes	**No**
Additional considerations			
Gateway feature	Yes	Yes	**No**
Right of way considerations	Parking loss (2 stalls), Southwest corner of intersection would require a retaining wall	All of Alt. A considerations, plus encroaches on Farmers Market site, shifts/shortens proposed NB bus stop	Potential centerline offset road alignment issues
Estimated cost[1]	$470,000 (roundabout)	$850,000 (two roundabouts)	$475,000 (signal)
Environmental considerations	TBD	Potential work near wetlands	TBD

[1]Source: Marin Veterans' Memorial Auditorium *Parking Lot Circulation Design Study*, Fehr & Peers (2012)

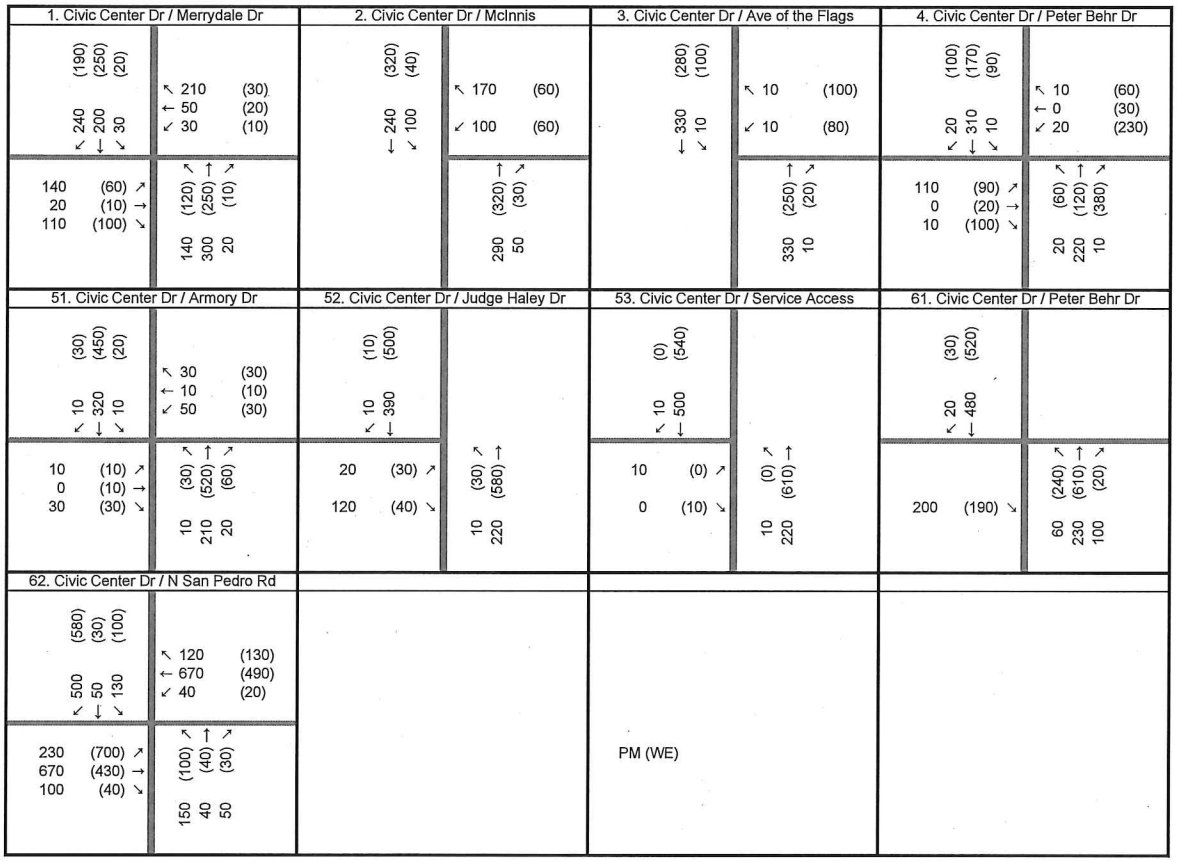
Attachments:

Appendix A – Traffic Operations

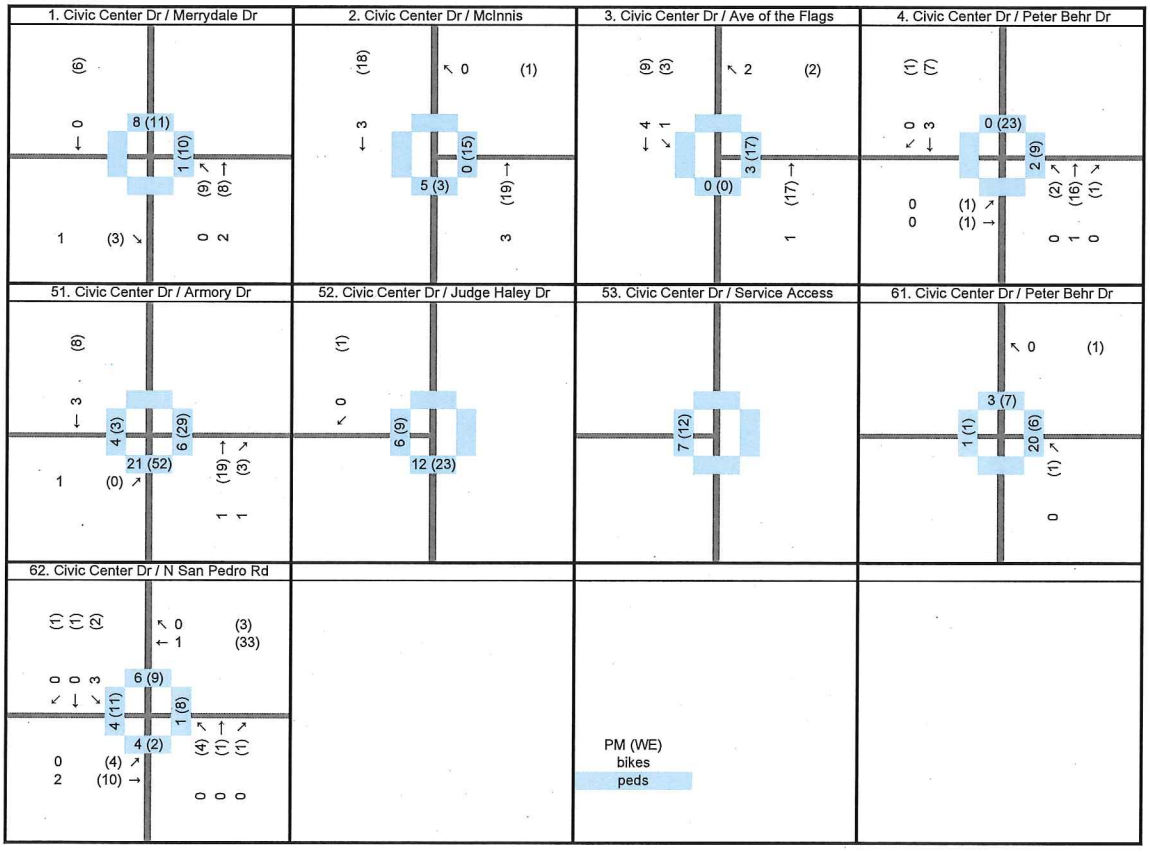
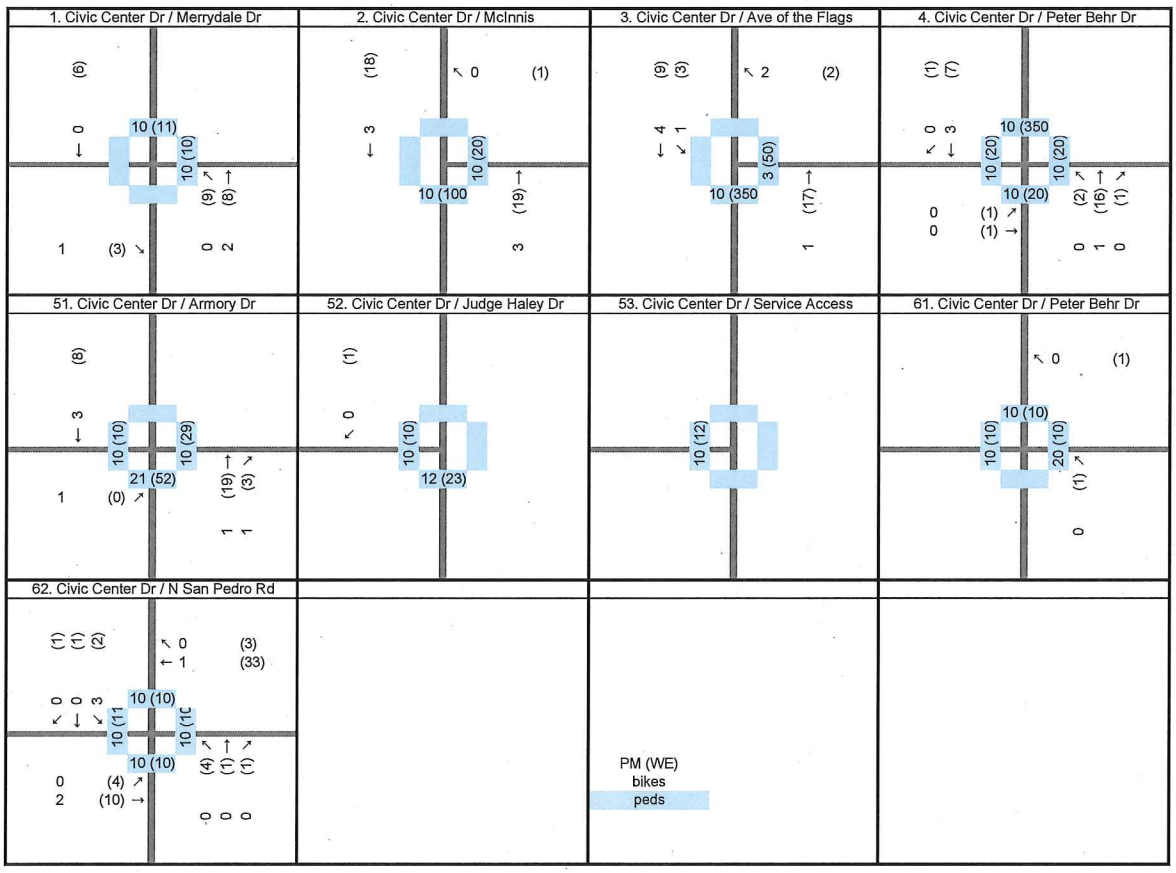
Marin Civic Center Drive **Existing Vehicle Volumes**



Marin Civic Center Drive **Cumulative Vehicle Volumes**



Marin Civic Center Drive **Existing Pedestrian and Bicycle Volumes**



Marin Civic Center Drive **Cumulative Pedestrian and Bicycle Volumes**