

## MEMORANDUM

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**To:** Brian Froelich, AICP, Senior Planner, City of Capitola  
Jessica Kahn, Public Works Director, City of Capitola

**From:** Dennis Pascua, Transportation Services Manager

**Subject:** 4401 Capitola Road: 45<sup>th</sup> Avenue/Capitola Road Traffic Analysis

**Date:** November 17, 2022

**cc:** Stephanie Strelow, Principal

**Attachment(s):** Project site plan  
Traffic counts  
LOS worksheets  
Traffic signal warrant

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The following traffic analysis of the intersection of 45<sup>th</sup> Avenue/Capitola Road has been prepared to determine the level of service (LOS) and queuing operations of the intersection without (existing conditions) and with the proposed affordable housing project at 4401 Capitola Road (proposed project). The traffic analysis has been prepared consistent with the requirements of the City of Capitola (City) Public Works Department and the City's General Plan Mobility Element (adopted June 2014).

Goal MO-3 of the Mobility Element is “*Provide a roadway system that enhances mobility and protects residential neighborhoods.*” The following policies are pertinent to this analysis:

**Policy MO-3.3 Level of Service Standard.** *Continue to maintain the established level of service C or better at intersections throughout Capitola, with the exception of the Village area, Bay Avenue, and 41<sup>st</sup> Avenue.*

**Policy MO-3.4 Reduced Standards.** *Accept a lower level of service and higher congestion at major regional intersections if necessary improvements are considered infeasible, as determined by the Public Works Director, or result in significant, unacceptable environmental impacts.*

## 1 Project Description

The proposed project would develop 36 affordable multifamily dwelling units (DU) on the property at 4401 Capitola Road, on the northwest corner of the intersection of 45<sup>th</sup> Avenue/Capitola Road. Currently there are four standalone office buildings on the site ranging between 924 and 925 square feet (SF) each, for a total office square footage of 3,697 SF. These office buildings will be demolished in order to construct the proposed project. There will be two parking lots on the project site. A 15-space lot will be provided on the northwest portion of the site, with driveway access on 44<sup>th</sup> Avenue, and a 21-space lot will be provided on the east side of the site, with driveway access on the

north leg of the 45<sup>th</sup> Avenue/Capitola Road intersection. This driveway will be constructed next to an existing residential driveway of a single-family home. In order to properly place the new driveway on the north leg of the intersection, the existing continental crosswalk will be relocated slightly to the west. The crosswalk relocation will require modification of the existing median on Capitola Road. The project site plan is attached.

## 2 Project Trip Generation

The following discussion provides an overview of the trip generation, distribution and assignment of traffic associated with the proposed project.

### 2.1 Trip Generation

Trip generation estimates for the project are based on daily and AM and PM peak hour trip generation rates obtained from the Institute of Transportation Engineers (ITE) *Trip Generation, 11<sup>th</sup> Edition* (ITE 2021), using the Affordable Housing (ITE Code 223) and Small Office Building (ITE Code 712) rates. The proposed project trip generation estimates are tabulated in Table 1 below.

**Table 1. Project Trip Generation Estimates**

Land Use	ITE Code	Size/Units	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
<b>TRIP RATES<sup>1</sup></b>									
Affordable Housing	223	per DU	4.81	0.10	0.26	0.36	0.27	0.19	0.46
Small Office Building	712	per TSF	14.39	1.37	0.30	1.67	0.73	1.43	2.16
<b>TRIP GENERATION</b>									
Affordable Housing (project)	223	36 DUs	173	4	9	13	10	7	17
Small Office Buildings (to be removed)	712	-3.697 TSF	-53	-5	-1	-6	-3	-5	-8
<b>Total NET Trip Generation</b>			<b>120</b>	<b>-1</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>1</b>	<b>8</b>

**Notes:** DU = dwelling unit; TSF = thousand square feet

<sup>1</sup> Trip rates from Trip Generation, 11th Edition, Institute of Transportation Engineers, 2021.

As detailed above, the proposed project would generate 173 daily trips, 13 AM peak hour trips (4 inbound and 9 outbound), and 17 PM peak hour trips (10 inbound and 7 outbound). The existing office buildings generate 53 daily trips, 6 AM peak hour trips (5 inbound and 1 outbound), and 8 PM peak hour trips (3 inbound and 5 outbound). With the removal of the existing office buildings, the net trips generated by the project are 120 daily trips, 7 AM peak hour trips (-1 inbound and 8 outbound), and 8 PM peak hour trips (7 inbound and 1 outbound).

## 2.2 Trip Distribution and Assignment

Project trip distribution assumptions are based on logical travel paths to and from the project site and consideration of the traffic distribution patterns in the area. For the purposes of this analysis, the following distribution has been assumed:

- 80% to the west, towards 41<sup>st</sup> Avenue
- 20% to the east, towards Wharf Road

## 3 Traffic Analysis

The following details the peak hour traffic counts collected at 45<sup>th</sup> Avenue/Capitola Road, and the LOS and queuing analysis at the intersection.

### 3.1 Traffic Counts

Weekday AM (7:00 a.m. to 9:00 a.m.) and PM (4:00 p.m. to 6:00 p.m.) peak period traffic counts at the 45<sup>th</sup> Avenue/Capitola Road intersection were collected on Thursday, November 3, 2022, during a typical weekday while area schools were in session. Additionally, pedestrians and bicyclists that crossed the intersection were also counted. The raw traffic counts are attached.

Based on the traffic counts, the AM peak hour was from 8:00 a.m. to 9:00 a.m. and a total of 650 vehicles, 5 bicyclists, and 5 pedestrians passed through the intersection. The PM peak hour was from 4:30 p.m. to 5:30 p.m. and a total of 1,148 vehicles, 15 bicyclists, and 29 pedestrians passed through the intersection.

### 3.2 Levels of Service

Level of service (LOS) is commonly used as a qualitative description of intersection operations based on the design capacity of the intersection configuration, compared to the volume of traffic using the facility. The City's intersection evaluation methodology to assess transportation impacts and traffic operating conditions is based on the *Highway Capacity Manual* (HCM). The HCM analysis methodology describes the operation of an intersection using a range of LOS from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding control delay experienced per vehicle based on the worst turning movement for unsignalized intersections.

The Synchro 11 software package was used to determine intersection LOS, consistent with the HCM 6 methodologies. Table 2 shows the LOS values by delay ranges for unsignalized and signalized intersections under the HCM methodology. It should be noted that the intersection of 45<sup>th</sup> Avenue/Capitola Road is unsignalized with stop-control on all approaches (i.e., all-way stop-control – AWSC).

**Table 2. Levels of Service for Signalized and Unsignalized Intersections**

Level of Service	Unsignalized Intersections Control Delay (in seconds per vehicle)	Signalized Intersections Control Delay (in seconds per vehicle)
A	< 10.0	< 10.0
B	> 10.0 and < 15.0	> 10.0 and < 20.0
C	> 15.0 and < 25.0	> 20.0 and < 35.0
D	> 25.0 and < 35.0	> 35.0 and < 55.0
E	> 35.0 and < 50.0	> 55.0 and < 80.0
F	> 50.0	> 80.0

Source: HCM 6 (Transportation Research Board 2016).

An intersection LOS analysis was prepared for the Existing (2022) and Existing plus Project conditions using HCM 6 methodology via the Synchro software. Table 3 shows the results of the Existing plus Project LOS analysis.

**Table 3. Existing plus Project Peak Hour Intersection Levels of Service**

Intersection	Control	Existing				Existing plus Project			
		AM Peak		PM Peak		AM Peak		PM Peak	
		Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>
45 <sup>th</sup> Ave/Capitola Rd	AWSC <sup>3</sup>	11.1	B	34.6	D	11.2	B	36.4	E

**Notes:**

- <sup>1</sup> Delay in seconds per vehicle
- <sup>2</sup> Level of service (LOS)
- <sup>3</sup> All-Way Stop-Control

As shown in the table, in the AM peak hour the intersection currently operates with satisfactory LOS (LOS B). With addition of project traffic, the intersection would continue to operate with satisfactory conditions at LOS B. The project would add 0.1 seconds of delay in the AM peak hour. However, in the PM peak hour, the intersection is currently operating with unsatisfactory conditions (i.e., worse than LOS C as noted in the City’s General Plan) at LOS D. With addition of project traffic, the intersection would worsen to LOS E in the PM peak hour. The project would add 1.8 seconds of delay. Detailed LOS calculation sheets are attached.

**Traffic Signal Warrants**

Typically, when unsignalized intersections are operating at unsatisfactory LOS conditions, a traffic signal warrant analysis is conducted based on the peak hour traffic volumes delayed at the intersection. The peak hour traffic signal warrant is based on the California Manual of Uniform Traffic Control Devices (MUTCD), Figure 4C-3. Warrant 3, Peak Hour. Based on the peak hour traffic signal warrant run for the existing (without project) condition, a traffic signal would be warranted. However, it should be noted that signal warrants are not the sole determinant of whether a traffic signal should be installed. Area context and engineering judgement should also be considered.

### 3.3 Queues

A queuing analysis was conducted based on the HCM methodology utilized for the LOS analysis. The analysis calculated the 95<sup>th</sup> percentile (design) queues for each intersection approach lane. Table 4 presents the results of the queuing analysis in terms of the length of queue (in feet) and the number of vehicles in the queue based on a length of 25 feet per car (used in the HCM). The queuing results are contained in the LOS worksheets which are attached.

**Table 4. Peak-Hour Queuing Summary for Existing plus Project Condition**

Inter-section	Mvmnt	Available Stacking Distance in Feet (in # of vehicles) <sup>1 2</sup>	Existing		Existing plus Project	
			95 <sup>th</sup> Percentile Queue in Feet (in # of vehicles) <sup>2</sup>			
			AM Peak	PM Peak	AM Peak	PM Peak
45 <sup>th</sup> Ave/ Capitola Rd	NB LTR	--	18' (0.7 veh)	43' (1.7 veh)	18' (0.7 veh)	43' (1.7 veh)
	SB LTR	45' (1.8 veh)	<i>does not exist</i>		0' (0.0 veh)	0' (0.0 veh)
	EB LT	765' (30.6 veh)	30' (1.2 veh)	<b>373' (14.9 veh)</b>	30' (1.2 veh)	<b>385' (15.4 veh)</b>
	EB R	765' (30.6 veh)	3' (0.1 veh)	10' (0.4 veh)	3' (0.1 veh)	10' (0.4 veh)
	WB LTR	890' (35.6 veh)	73' (2.9 veh)	68' (2.7 veh)	73' (2.9 veh)	70' (2.8 veh)

**Notes:** NB = northbound; SB = southbound; EB = eastbound; WB = westbound; L = left; T = through; R = right. **Bold:** Highest queue.

<sup>1</sup> Estimated/assumed for the purposes of this analysis

<sup>2</sup> One vehicle length is estimated to be 25 feet per HCM

Based on the table, the 95<sup>th</sup> percentile queues on all approaches are currently contained within their existing stacking areas, and do not impact downstream major intersections. Some minor intersections on Capitola Road are blocked by the queues on the eastbound approach (left/through lane) during the PM peak hour. Approximately 15 vehicles (or 373 feet) have a peak 95<sup>th</sup> percentile queue (one-time in the hour) on the eastbound approach. With the addition of project traffic, that queue would increase by 0.5 vehicles (or 12 feet).

## 4 Findings and Recommendations

Based on the traffic analysis of the proposed 36 DU affordable housing project on the intersection of 45<sup>th</sup> Avenue/Capitola Road, the following findings and recommendations are made:

- The proposed project would generate 173 daily trips, 13 AM peak hour trips (4 inbound and 9 outbound), and 17 PM peak hour trips (10 inbound and 7 outbound). The existing office buildings generate 53 daily trips, 6 AM peak hour trips (5 inbound and 1 outbound), and 8 PM peak hour trips (3 inbound and 5 outbound). With the removal of the existing office buildings, the net trips generated by the project are 120 daily trips, 7 AM peak hour trips (-1 inbound and 8 outbound), and 8 PM peak hour trips (7 inbound and 1 outbound).
- Based on the traffic counts, the AM peak hour was from 8:00 a.m. to 9:00 a.m. and a total of 650 vehicles, 5 bicyclists, and 5 pedestrians passed through the intersection. The PM peak hour was from 4:30 p.m. to 5:30 p.m. and a total of 1,148 vehicles, 15 bicyclists, and 29 pedestrians passed through the intersection.

- In the PM peak hour, the intersection of 45<sup>th</sup> Avenue/Capitola Road is currently operating with unsatisfactory conditions (i.e., worse than LOS C as noted in the City's General Plan) at LOS D. With addition of project traffic, the intersection would worsen to LOS E in the PM peak hour. The project would add 1.8 seconds of delay. As noted above, the General Plan allows for a reduced (LOS) standard as determined by the Public Works Director.
- Based on the peak hour traffic signal warrant run for the existing (without project) condition, a traffic signal would be warranted. However, it should be noted that signal warrants are not the sole determinant of whether a traffic signal should be installed. Area context and engineering judgement should also be considered.
- Some minor intersections on Capitola Road are blocked by the queues on the eastbound approach (left/through lane) during the PM peak hour. Approximately 15 vehicles (or 373 feet) have a peak 95<sup>th</sup> percentile queue (one-time in the hour) on the eastbound approach. With the addition of project traffic, that queue would increase by 0.5 vehicles (or 12 feet).
- Based on review of the site plan, the following design considerations are recommended:
  - The relocated continental crosswalk on the west leg of the intersection shall be placed at a 90-degree angle with the roadway. This may require modification of the existing raised median on Capitola Road. The crosswalk shall be designed per City and ADA standards.
  - A hammer head turnaround shall be placed at the north end of the east parking lot so that vehicles can turn around on site instead of backing into the intersection. The City may waive certain landscaping requirements in the parking lot to achieve this design.



**STUDIO  
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**4401 CAPITOLA DR**  
 CAPITOLA, CA 95010

Sheet Title:  
**SITE PLAN**

Job No. 21041  
 Date: 09/02/2022  
 Scale:  
 Drawn By:

Sheet No:

# National Data & Surveying Services Intersection Turning Movement Count

**Location:** 45th Ave & Capitola Rd  
**City:** Capitola  
**Control:** 3-Way Stop(NB/EB/WB)

**Project ID:** 22-080320-001  
**Date:** 11/3/2022

## Data - Totals

NS/EW Streets:	45th Ave				45th Ave				Capitola Rd				Capitola Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
7:00 AM	8	0	5	0	0	0	0	0	0	12	3	0	1	23	0	0	52
7:15 AM	5	0	1	0	0	0	0	0	0	17	1	0	7	40	0	0	71
7:30 AM	5	0	9	0	0	0	0	0	0	17	4	0	4	32	0	0	71
7:45 AM	10	0	10	0	0	0	0	0	0	29	0	0	14	46	0	0	109
8:00 AM	9	0	20	0	0	0	0	0	0	37	4	0	9	48	1	0	128
8:15 AM	12	0	17	0	0	0	0	0	0	45	3	0	9	75	0	0	161
8:30 AM	11	0	24	0	0	0	0	0	0	46	6	0	24	78	0	0	189
8:45 AM	12	0	13	0	0	0	0	0	0	46	8	0	19	74	0	0	172
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
<b>APPROACH %'s :</b>	72	0	99	0	0	0	0	0	0	249	29	0	87	416	1	0	953
	42.11%	0.00%	57.89%	0.00%					0.00%	89.57%	10.43%	0.00%	17.26%	82.54%	0.20%	0.00%	
<b>PEAK HR :</b>	<b>08:00 AM - 09:00 AM</b>																TOTAL
<b>PEAK HR VOL :</b>	44	0	74	0	0	0	0	0	0	174	21	0	61	275	1	0	650
<b>PEAK HR FACTOR :</b>	0.917	0.000	0.771	0.000	0.000	0.000	0.000	0.000	0.000	0.946	0.656	0.000	0.635	0.881	0.250	0.000	0.860
	0.843								0.903				0.826				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
4:00 PM	15	0	30	0	0	0	0	0	0	137	11	0	11	70	0	0	274
4:15 PM	8	0	37	0	0	0	0	0	0	125	7	0	17	54	0	0	248
4:30 PM	9	0	46	0	0	0	0	0	0	145	21	0	13	67	0	0	301
4:45 PM	13	0	49	0	0	0	0	0	0	132	25	0	17	61	0	0	297
5:00 PM	6	0	41	0	0	0	0	0	0	147	17	0	8	52	0	0	271
5:15 PM	11	0	39	0	0	1	0	0	0	135	16	0	9	68	0	0	279
5:30 PM	10	0	34	0	0	0	0	0	0	125	21	0	13	49	0	0	252
5:45 PM	13	0	22	0	0	0	0	0	0	129	9	0	17	47	0	0	237
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
<b>APPROACH %'s :</b>	85	0	298	0	0	1	0	0	0	1075	127	0	105	468	0	0	2159
	22.19%	0.00%	77.81%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	89.43%	10.57%	0.00%	18.32%	81.68%	0.00%	0.00%	
<b>PEAK HR :</b>	<b>04:30 PM - 05:30 PM</b>																TOTAL
<b>PEAK HR VOL :</b>	39	0	175	0	0	1	0	0	0	559	79	0	47	248	0	0	1148
<b>PEAK HR FACTOR :</b>	0.750	0.000	0.893	0.000	0.000	0.250	0.000	0.000	0.000	0.951	0.790	0.000	0.691	0.912	0.000	0.000	0.953
	0.863				0.250				0.961				0.922				



# National Data & Surveying Services Intersection Turning Movement Count

**Location:** 45th Ave & Capitola Rd  
**City:** Capitola  
**Control:** 3-Way Stop(NB/EB/WB)

**Project ID:** 22-080320-001  
**Date:** 11/3/2022

## Data - Bikes

NS/EW Streets:	45th Ave				45th Ave				Capitola Rd				Capitola Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
7:00 AM	0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	5
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
7:30 AM	0	0	1	0	0	1	0	0	0	0	0	0	1	2	0	0	5
7:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:00 AM	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	3
8:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
<b>APPROACH %'s :</b>	0	0	3	0	0	1	0	0	0	3	1	0	5	4	0	0	17
	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	75.00%	25.00%	0.00%	55.56%	44.44%	0.00%	0.00%	
<b>PEAK HR :</b>	08:00 AM - 09:00 AM																<b>TOTAL</b>
<b>PEAK HR VOL :</b>	0	0	2	0	0	0	0	0	0	1	0	0	1	1	0	0	5
<b>PEAK HR FACTOR :</b>	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.250	0.000	0.000	0.417
	0.500								0.250				0.500				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
4:00 PM	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3
4:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	6
4:30 PM	2	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	5
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
5:15 PM	1	0	1	0	0	0	0	0	0	3	0	0	0	1	0	0	6
5:30 PM	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	3
5:45 PM	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	4
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
<b>APPROACH %'s :</b>	7	0	2	0	0	0	0	0	1	6	2	0	3	10	0	0	31
	77.78%	0.00%	22.22%	0.00%					11.11%	66.67%	22.22%	0.00%	23.08%	76.92%	0.00%	0.00%	
<b>PEAK HR :</b>	04:30 PM - 05:30 PM																<b>TOTAL</b>
<b>PEAK HR VOL :</b>	3	0	1	0	0	0	0	0	0	5	1	0	0	5	0	0	15
<b>PEAK HR FACTOR :</b>	0.375	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.417	0.250	0.000	0.000	0.625	0.000	0.000	0.625
	0.500								0.500				0.625				

# National Data & Surveying Services Intersection Turning

## Movement Count

Location: 45th Ave & Capitola Rd  
City: Capitola

Project ID: 22-080320-001  
Date: 11/3/2022

### Data - Pedestrians (Crosswalks)

NS/EW Streets:	45th Ave		45th Ave		Capitola Rd		Capitola Rd		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		TOTAL
	EB	WB	EB	WB	NB	SB	NB	SB	
7:00 AM	0	0	0	0	0	0	0	1	1
7:15 AM	0	0	1	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	1	0	1
7:45 AM	0	0	0	0	0	0	0	1	1
8:00 AM	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	1	0	1
8:30 AM	0	0	0	0	0	1	1	0	2
8:45 AM	0	0	0	1	0	0	1	0	2
<b>TOTAL VOLUMES :</b>	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
<b>APPROACH %'s :</b>	0	0	1	1	0	1	4	2	9
			50.00%	50.00%	0.00%	100.00%	66.67%	33.33%	
<b>PEAK HR :</b>	<b>08:00 AM - 09:00 AM</b>								TOTAL
<b>PEAK HR VOL :</b>	0	0	0	1	0	1	3	0	5
<b>PEAK HR FACTOR :</b>				0.250		0.250	0.750	0.750	0.625

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		TOTAL
	EB	WB	EB	WB	NB	SB	NB	SB	
4:00 PM	0	0	0	1	0	3	2	0	6
4:15 PM	0	0	0	0	0	0	1	3	4
4:30 PM	0	0	0	1	0	1	2	3	7
4:45 PM	0	0	4	1	2	2	0	1	10
5:00 PM	0	0	0	1	0	0	0	0	1
5:15 PM	0	0	0	0	2	0	2	7	11
5:30 PM	0	0	4	0	2	0	1	3	10
5:45 PM	0	0	0	0	0	0	0	1	1
<b>TOTAL VOLUMES :</b>	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
<b>APPROACH %'s :</b>	0	0	8	4	6	6	8	18	50
			66.67%	33.33%	50.00%	50.00%	30.77%	69.23%	
<b>PEAK HR :</b>	<b>04:30 PM - 05:30 PM</b>								TOTAL
<b>PEAK HR VOL :</b>	0	0	4	3	4	3	4	11	29
<b>PEAK HR FACTOR :</b>			0.250	0.750	0.500	0.375	0.500	0.393	0.659
			0.350		0.438		0.417		

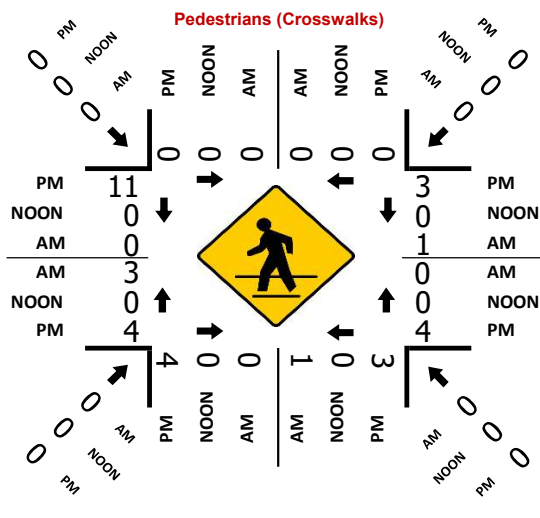
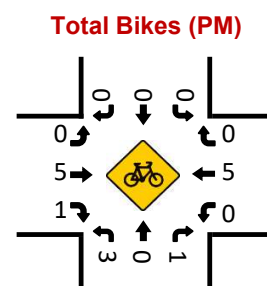
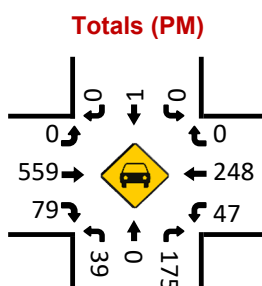
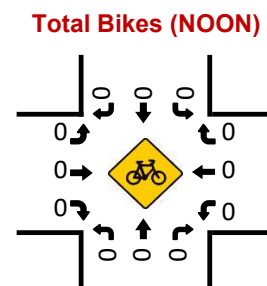
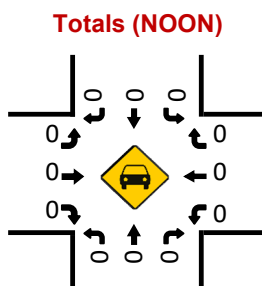
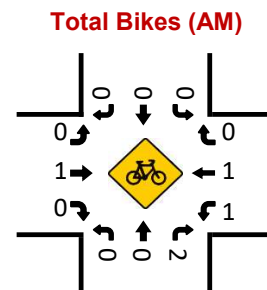
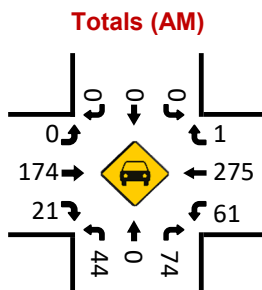
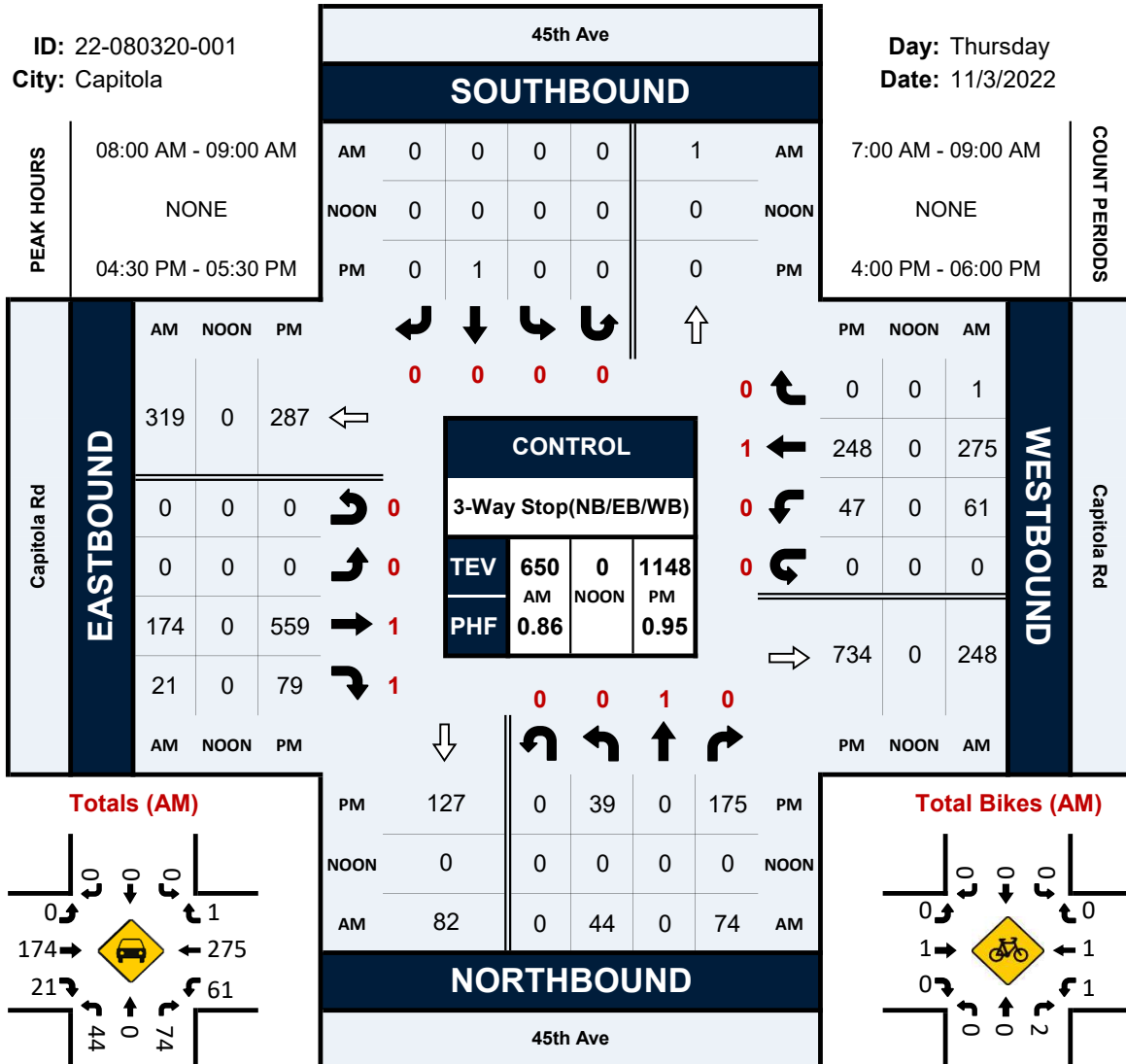
# National Data & Surveying Services Intersection

## 45th Ave & Capitola Rd

### Turning Movement Count

ID: 22-080320-001  
City: Capitola

Day: Thursday  
Date: 11/3/2022



Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	
Traffic Vol, veh/h	174	21	61	275	44	74
Future Vol, veh/h	174	21	61	275	44	74
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	202	24	71	320	51	86
Number of Lanes	1	1	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.8	12.5	9.3
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1
Vol Left, %	37%	0%	0%	18%
Vol Thru, %	0%	100%	0%	82%
Vol Right, %	63%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	118	174	21	336
LT Vol	44	0	0	61
Through Vol	0	174	0	275
RT Vol	74	0	21	0
Lane Flow Rate	137	202	24	391
Geometry Grp	2	7	7	5
Degree of Util (X)	0.193	0.293	0.031	0.509
Departure Headway (Hd)	5.058	5.21	4.505	4.694
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	705	688	790	766
Service Time	3.117	2.963	2.257	2.74
HCM Lane V/C Ratio	0.194	0.294	0.03	0.51
HCM Control Delay	9.3	10.1	7.4	12.5
HCM Lane LOS	A	B	A	B
HCM 95th-tile Q	0.7	1.2	0.1	2.9

Intersection	
Intersection Delay, s/veh	34.6
Intersection LOS	D

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	
Traffic Vol, veh/h	599	79	47	248	39	175
Future Vol, veh/h	599	79	47	248	39	175
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	631	83	49	261	41	184
Number of Lanes	1	1	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	50.4	14.3	12.6
HCM LOS	F	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1
Vol Left, %	18%	0%	0%	16%
Vol Thru, %	0%	100%	0%	84%
Vol Right, %	82%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	214	599	79	295
LT Vol	39	0	0	47
Through Vol	0	599	0	248
RT Vol	175	0	79	0
Lane Flow Rate	225	631	83	311
Geometry Grp	2	7	7	5
Degree of Util (X)	0.373	0.988	0.114	0.495
Departure Headway (Hd)	5.967	5.64	4.931	5.738
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	601	643	726	627
Service Time	4.024	3.375	2.666	3.785
HCM Lane V/C Ratio	0.374	0.981	0.114	0.496
HCM Control Delay	12.6	56	8.3	14.3
HCM Lane LOS	B	F	A	B
HCM 95th-tile Q	1.7	14.9	0.4	2.7

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔			↔			↔	
Traffic Vol, veh/h	2	174	21	61	275	0	44	0	74	1	0	4
Future Vol, veh/h	2	174	21	61	275	0	44	0	74	1	0	4
Peak Hour Factor	0.92	0.86	0.86	0.86	0.86	0.92	0.86	0.92	0.86	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	202	24	71	320	0	51	0	86	1	0	4
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	9.9	12.6	9.4	8.3
HCM LOS	A	B	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	37%	1%	0%	18%	20%
Vol Thru, %	0%	99%	0%	82%	0%
Vol Right, %	63%	0%	100%	0%	80%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	118	176	21	336	5
LT Vol	44	2	0	61	1
Through Vol	0	174	0	275	0
RT Vol	74	0	21	0	4
Lane Flow Rate	137	204	24	391	5
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.194	0.297	0.031	0.511	0.008
Departure Headway (Hd)	5.079	5.231	4.519	4.71	5.165
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	703	683	787	762	685
Service Time	3.141	2.988	2.277	2.76	3.254
HCM Lane V/C Ratio	0.195	0.299	0.03	0.513	0.007
HCM Control Delay	9.4	10.2	7.4	12.6	8.3
HCM Lane LOS	A	B	A	B	A
HCM 95th-tile Q	0.7	1.2	0.1	2.9	0

Intersection	
Intersection Delay, s/veh	36.4
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔			↔			↔	
Traffic Vol, veh/h	5	599	79	47	248	1	39	0	175	1	0	3
Future Vol, veh/h	5	599	79	47	248	1	39	0	175	1	0	3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	631	83	49	261	1	41	0	184	1	0	3
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0

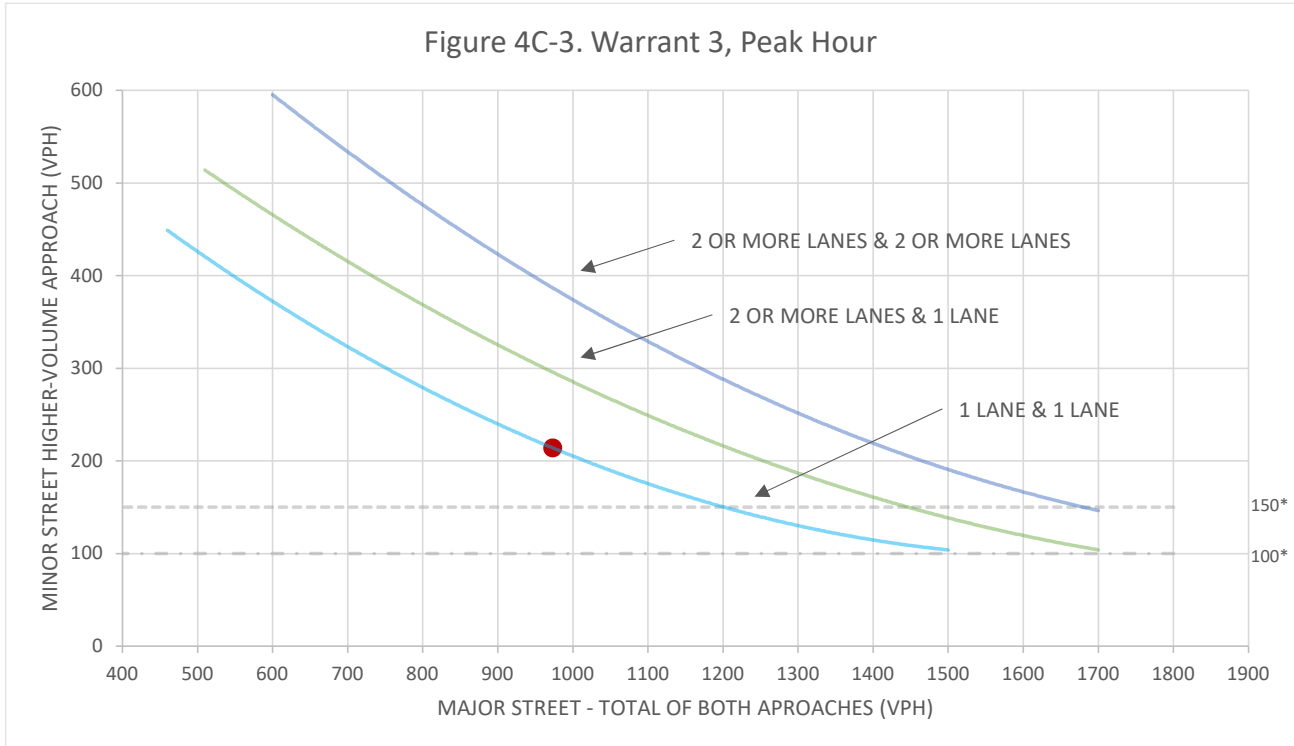
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	53.4	14.5	12.7	9.9
HCM LOS	F	B	B	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	18%	1%	0%	16%	25%
Vol Thru, %	0%	99%	0%	84%	0%
Vol Right, %	82%	0%	100%	0%	75%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	214	604	79	296	4
LT Vol	39	5	0	47	1
Through Vol	0	599	0	248	0
RT Vol	175	0	79	1	3
Lane Flow Rate	225	636	83	312	4
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.376	1.001	0.114	0.499	0.008
Departure Headway (Hd)	6.007	5.666	4.953	5.768	6.753
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	597	642	723	623	526
Service Time	4.067	3.404	2.691	3.819	4.85
HCM Lane V/C Ratio	0.377	0.991	0.115	0.501	0.008
HCM Control Delay	12.7	59.3	8.3	14.5	9.9
HCM Lane LOS	B	F	A	B	A
HCM 95th-tile Q	1.7	15.4	0.4	2.8	0

<b>Project</b>	4401 Capitola Road
<b>Scenario</b>	Existing Conditions
<b>Peak Hour</b>	PM

<b>Intersection #</b>	1
<b>Major Street</b>	Capitola Avenue
<b>Minor Street</b>	45th Avenue

<b>N-S</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>E-W</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

\*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	Capitola Avenue	45th Avenue	
<b>Number of Approach Lanes</b>	1	1	<b>Yes</b>
<b>Traffic Volume (VPH)*</b>	973	214	
<p>*Note:                      Traffic volume for the Major Street approach is the total volume of both approaches.                      Traffic volume for the Minor Street is the highest volume approach.</p>			