Monterey Avenue Skatepark
Capitola, CA

TRAFFIC IMPACT STUDY
FINAL REPORT

AUGUST 28, 2015

Prepared For:

City of Capitola
420 Capitola Avenue
Capitola, CA 95010

Prepared By:

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Capitola, CA 95010

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INTRODUCTION

This traffic study presents the findings of the traffic analysis for the proposed skatepark which will be located within Monterey Park on Monterey Avenue in Capitola, CA. The skatepark will be approximately 6,000 square feet in size and the facilities in the park will cater to skateboard activities for middle school/pre-teen aged children.

The site currently has 26 striped parking spaces and on-street parking is available along Monterey Avenue. The skateboard facility would require 6 parking spaces during the peak use periods and these could overlap with baseball field activities. The skatepark would be used primarily by children later in the afternoon (after school, but before sunset) and on weekends during the day, peaking around noon-time through the early afternoon. The analysis periods for determining potential impacts to the road network is thus the weekday PM peak period and Saturday midday peak period. The skatepark will be located immediately adjacent to the residential neighborhood and the existing New Brighton Middle School. The majority of user trips are anticipated to originate from the surrounding neighborhoods. Observation from similar sites indicate typical peak occupancy of between 10-15 children. Several sites were surveyed, and ultimately the data from the Live Oak Skatepark in Santa Cruz were deemed comparable to the proposed Project site and used to develop trip generation data. **Figure 1** illustrates the location of the project site. **Figures 2a and 2b** display the site plan and skatepark layout.

STUDY METHODOLOGY

DEVELOPMENT CONDITIONS

This traffic impact study was based on the following development conditions:

- Existing Conditions
- Existing Plus Project Conditions
- Cumulative (2035) Conditions
- Cumulative (2035) Plus Project Conditions

OPERATING CONDITIONS AND CRITERIA FOR INTERSECTIONS

Analysis of potential environmental impacts at intersections is based on the concept of Level of Service (LOS). The LOS of an intersection is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. Levels of Service for this study were determined using methods defined in the *Highway Capacity Manual, 2010* (HCM) and Synchro 8 traffic analysis software. Synchro 8 uses HCM 2010 methodologies.

The HCM 2010 methodologies included procedures for analyzing side-street stop-controlled (SSSC), all-way stop-controlled (AWSC), and signalized intersections. The SSSC procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection as a whole. **Table 1** relates the operational characteristics associated with each LOS category for signalized and unsignalized intersections.

Table 1 – Intersection Level of Service Definitions

Level of Service	Description	Signalized (Avg. control delay per vehicle sec/veh.)	Unsignalized (Avg. control delay per vehicle sec/veh.)
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	< 10	≤ 10
B	Stable traffic. Traffic flows smoothly with few delays.	> 10 – 20	> 10 – 15
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	> 20 – 35	> 15 – 25
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	> 35 – 55	> 25 – 35
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	> 55 – 80	> 35 – 50
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	> 80	> 50

Sources: Transportation Research Board, *Highway Capacity Manual 2010*, National Research Council,

Project impacts are determined by comparing conditions without the proposed project to those with the proposed project. Significant impacts for intersections are created when traffic from the proposed project causes the LOS to fall below the City LOS threshold and causes any impacted intersections to deteriorate further per the criteria indicated below.

Consistent with the significant impact criteria documented in the City of Capitola General Plan, the City considers LOS C as the standard, but accepts a lower standard as the minimum acceptable at signalized and unsignalized intersections within the Village Area, along Bay Avenue, and along 41st Avenue where LOS D is the minimum acceptable standard.

STUDY INTERSECTIONS INCLUDED IN ANALYSIS

The proposed project will generate new vehicular trips that will increase traffic volumes on the nearby street network. To assess changes in traffic conditions associated with the proposed project, the following intersections, listed with the applicable jurisdiction, were selected by the City of Capitola for evaluation in this traffic study:

1. Kennedy Drive / Park Avenue (All-Way Stop Controlled)
2. Monterey Avenue / Bay Avenue (All-Way Stop Controlled)

These study intersections are illustrated in **Figure 3**.

EXISTING CONDITIONS

EXISTING ROADWAY NETWORK

Below is a description of the principal roadways included in this study:

Monterey Avenue

Monterey Avenue is a two-lane residential minor arterial with on-street parking that becomes Kennedy Drive before intercepting with Park Avenue. It serves as a connector for the neighborhood and provides access to New Brighton Middle School and the Monterey Park baseball field. The posted speed limit in the project vicinity is 25 miles per hour. Monterey Avenue accommodates approximately 4,000 vehicles daily.

EXISTING PEAK-HOUR TURNING MOVEMENT VOLUMES

Weekday PM intersection turning movement volumes for the two study intersections were taken directly from the City of Capitola General Plan EIR published in 2013. Additional Saturday midday intersection turning movement volumes were collected in May 2015. Volumes for intersections were collected during the midday and PM peak periods between 12:00-2:00PM on a Saturday and between 4:00-6:00 PM on a weekday, respectively. No growth has occurred in the City since 2013; thus the traffic counts were deemed applicable for use in the weekday PM analysis. These traffic counts were taken in the weekday when local schools were in session and the weather was fair. Existing Conditions turning movements are shown in **Figure 3.** Intersection volume data sheets for all traffic counts are provided in **Appendix A**.

EXISTING TRANSIT FACILITIES

The vicinity of the proposed project lies within the Capitola service region, which provides two bus routes (Routes 54 and 55) along Park Avenue and along Bay Avenue. There are three bus stops within walking distance of the proposed skatepark. One bus stop is located 0.4 miles from the proposed skatepark on Bay Avenue, just northwest of its intersection with Monterey Avenue. Two bus stops are located less than 0.5 miles from the skatepark on Park Avenue, at the intersections of Monterey Avenue and Park Avenue and Monterey Avenue and McCormick Avenue.

EXISTING PEDESTRIAN AND BICYCLE FACILITIES

Pedestrians: In the immediate project vicinity, there are currently sidewalks located on both sides of Monterey Avenue. ADA ramps at the driveways are non-compliant.

Bicycles: Class 3 bicycle facilities (shared vehicular-bicycle travel lanes marked with “sharrows”) are currently provided on Monterey Avenue in both directions within the project vicinity.

EXISTING LEVEL OF SERVICE AT STUDY INTERSECTIONS

Traffic operations were evaluated at the study intersections under existing traffic conditions. Results of the analysis are presented in **Table 2**. Locations operating unacceptably are bolded.

As shown in **Table 2**, Intersection #1 - Kennedy Drive / Park Avenue currently operates at an acceptable LOS C in the Saturday midday peak, but operate at an unacceptable LOS E in the weekday PM peak. Intersection #2 - Monterey Avenue / Bay Avenue currently operates at acceptable LOS B or better during the time periods of analysis. Analysis sheets are provided in **Appendix B**.

Table 2 – Existing Intersection Level of Service Analysis

#	Intersection	Control Type	LOS Standard	Peak Hour	Existing (2015)	
					Delay	LOS
1	Kennedy Drive / Park Avenue	AWSC	C	Weekday PM	**38.4**	**E**
				Weekend Midday	21.1	C
2	Monterey Avenue / Bay Avenue	AWSC	E	Weekday PM	10.6	B
				Weekend Midday	9.2	A

Notes:

1. Analysis performed using HCM 2010 methodologies
2. Delay indicated in seconds/vehicle
3. Intersections that fall below City standard are shown in **bold**.

PROPOSED PROJECT

PROPOSED SITE USE

The proposed project will comprise a skatepark intended for middle school/pre-teen aged children which will be located at the existing Monterey Park on Monterey Avenue in Capitola, CA. The site is immediately adjacent to New Brighton Middle School. The skatepark will be approximately 6,000 square feet in size.

The site currently has 26 striped parking spaces, and on-street parking is available along Monterey Avenue. The proposed skatepark would require 6 parking spaces during the peak use periods, which is based on the maximum number of trips generated of the two peak hours studied as presented in **Table 3** in the following section. Assuming 20 baseball team members would play at peak use, 20 vehicles would be parked at the site – this presents a worst case analysis, since some parents may park on the street or carpool. With skatepark use overlapping with baseball field activities, a total of 26 vehicles would be parked during peak use at the skatepark. The project therefore would not need to provide additional spaces. The skatepark would be used primarily by children later in the afternoon (after school, but before sunset) and on weekends during the day, peaking around lunchtime or just thereafter. Outdoor activity use will also be dictated by weather conditions. The park will be located immediately adjacent to the residential neighborhood in the area. The majority of visitors are anticipated to originate from the surrounding neighborhoods and would travel to the park by skateboard/bicycle. The project site plan and proposed skatepark layout are presented in **Figures 2a and 2b.**

PROJECT TRIP GENERATION

A trip is defined in *Trip Generation* as a single or one-directional vehicle movement with either the origin or destination at the project site. In other words, a trip can be either “to” or “from” the site. In addition, a single customer visit to a site is counted as two trips (i.e., one to and one from the site).

Trip generation for the project was calculated based on available information at similar sites and engineering judgement. For purposes of determining the worst-case impacts of traffic on the surrounding street network, the trips generated by a proposed skatepark are typically estimated between the hours of 4PM to 6PM on a weekday and between 12PM and 2PM (midday) on a Saturday.

Information from similar studies was used to estimate the trip generation, including a survey at the Live Oak neighborhood (Jose Avenue) skatepark. The Jose Avenue Skatepark is similar in size to the Project and contains skatepark features with a level of difficulty intended for beginners and young children, unlike Santa Cruz’s San Lorenzo Skatepark, which contains more advanced skatepark facilities tailored to teenagers. Jose Avenue Park also contains a playground and open spaces and is located well within a residential neighborhood, unlike San Lorenzo Skatepark, which is solely a skatepark and is located adjacent to main arterial road San Lorenzo Boulevard.

The trip rate for the proposed park was also compared to the Center Avenue Skatepark in Huntington Beach, which has rates of 1.36 trips per KSF in the weekday PM peak hour and 1.86 trips per KSF in the Saturday midday peak hour. This park, though larger in size, uses trip generation rates that account for its size and is therefore an appropriate comparison.

Factoring in trip generation rates of these skateparks, a similar trip generation rate was therefore used for the Project, taking into account the smaller footprint of the facility; thus the Project trips generated would be less. In addition, many neighborhood children will either bike, walk or skate to the facility and would not contribute additional vehicular trips to the Project. Non-vehicular access to the McGregor Skatepark is more difficult compared to the Monterey Skatepark and this vehicular trip generation rate to the Monterey Skatepark would be lower.

The highest trip generation will occur on a Saturday. The location of the Project does not lean itself to attract regional traffic and it is expected that this skatepark will remain a local attraction, mainly due to its secluded location among residential properties. The project will generate 8 trips (4 in, 4 out) during the weekday PM peak hour and 11 trips (6 in, 5 out) over the Saturday Peak hour. **Table 3** indicates these trip generation calculations.

Table 3 - Project Trip Generation

Land Uses	Project Size		WEEKDAY PM PEAK HOUR[4]				WEEKEND MIDDAY PEAK HOUR[3]			
			Total Peak Hour	IN	/	OUT	Total Peak Hour	IN	/	OUT
Trip Generation Rates[1]										
Center Avenue Skatepark - Huntington Beach, CA[2]	45.5	KSF	1.36	50%	/	50%	1.86	53%	/	47%
Jose Avenue Skatepark - Santa Cruz, CA	5.0	KSF	0.80				1.20			
Weighted Average Rates used for Monterey Ave. Skatepark			1.30	50%	/	50%	1.79	53%	/	47%
Trips Generated										
Monterey Avenue Skatepark - Capitola, CA	6	KSF	8	4	/	4	11	6	/	5
Net Project Trip Generation			**8**	**4**	**/**	**4**	**11**	**6**	**/**	**5**
Parking Requirement (maximum of inbound vehicles during either peak hour)			**6 spaces**							

Notes:

1. Trip generation rates were calculated from observations made at comparable skateboard parks observed on June 6-7, 2015 and from TIAs of comparable skateparks.
2. Trip generation rates from Center Avenue Skatepark found in the City of Huntington Beach Center Avenue Skatepark TIA, published December 2011.
3. Weekend Midday Peak Hour is from 2PM-3PM, based on observations at skateparks listed in the table. In/Out rates taken from City of Huntington TIA.
4. Weekday PM Peak Hour is from 4PM-5PM, based on findings in City of Huntington Beach Center Avenue Skatepark TIA, published December 2011.

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Because the Project will be located well within the local neighborhood and will not be located adjacent to a main arterial road, most trips will be to and from the surrounding residences. Most of these trips will also likely be non-motorized trips as the Project has nearby existing pedestrian facilities as well as the New Brighton Middle School. However some trips will also be from further out. 30% of trips will distribute to the north towards Park Avenue leading to Highway 1, and 70% will distribute south towards Bay Avenue.

EXISTING PLUS PROJECT LEVEL OF SERVICE AT STUDY INTERSECTIONS

Traffic operations were evaluated at the study intersections under existing conditions plus traffic generated by the project as seen on **Figure 3**. Results of the analysis are presented in **Table 3**. Locations operating unacceptably are bolded.

As shown in **Table 3**, Intersection #1 – Park Avenue / Kennedy Drive will continue to operate at unacceptable LOS E, and the delay at the intersection remains unchanged with the addition of Project trips due to the small increases in volumes to non-critical movements. During the Saturday Midday, the delay would only increases slightly, but the LOS will remain acceptable at C. Intersection #2, Monterey Avenue / Bay Avenue, would continue to operate at LOS B in the PM peak hour and LOS A during the Saturday peak hour. The delay at the intersection during these analysis periods also remains unchanged with the addition of project trips. Analysis sheets from Synchro are provided in **Appendix C.**

Table 4 – Existing Plus Project Intersection Level of Service Analysis

#	Intersection	Control Type	LOS Standard	Peak Hour	Existing (2015)		Existing Plus Project	
					Delay	LOS	Delay	LOS
1	Kennedy Drive / Park Avenue	AWSC	C	Weekday PM	**38.4**	**E**	**38.4**	**E**
				Weekend Midday	21.1	C	21.3	C
2	Monterey Avenue / Bay Avenue	AWSC	E	Weekday PM	10.6	B	10.6	B
				Weekend Midday	9.2	A	9.2	A

Notes:

1. Analysis performed using HCM 2010 methodologies
2. Delay indicated in seconds/vehicle
3. Intersections that fall below City standard are shown in **bold**.

CUMULATIVE (2035) CONDITIONS

CUMULATIVE LANE CONFIGURATIONS AND TRAFFIC CONTROL

Per the City's General Plan, the only future roadway improvements or other programmed network improvements in the immediate project area and study intersections have been identified that are expected to be completed by 2035. This includes the extension of Class 2 bike lanes along Monterey Avenue and the installation of a traffic signal at the intersection of Kennedy Drive and Park Avenue. **Figure 3** illustrates the intersection geometry and traffic control assumed in the Cumulative (2035) analysis.

Future projects within the vicinity of the Project include the McGregor Skatepark, located approximately ¾-mile from the Project at the intersection of McGregor Drive and Park Avenue, and the provision of Class 2 bicycle lanes along Monterey Avenue. McGregor Skatepark will be a combined skatepark and dog park and would attract different visitors than those that would use Monterey Avenue Skatepark. Because McGregor Skatepark has no pedestrian facilities within the vicinity, its visitors will also more likely travel by car. With the extension of Class 2 bicycle lanes along Monterey Avenue, on-street parking may be lost. However, these bicycle facilities would increase access to the surrounding neighborhood, New Brighton Middle School, and Monterey Avenue Skatepark.

YEAR 2035 FORECAST MODEL VOLUMES AND CUMULATIVE NO PROJECT LEVEL OF SERVICE AT STUDY INTERSECTIONS

General Plan volumes for the PM peak hour were obtained from the City General Plan EIR and utilized for the analysis. Cumulative volumes are shown in **Figure 3** and analysis sheets from Synchro are provided in **Appendix D.** Volumes for the midday peak hour were calculated by finding the average annual percent growth between existing and cumulative PM peak hour volumes provided in the City General Plan EIR. These calculations are provided in **Appendix F**.

CUMULATIVE PLUS PROJECT LEVEL OF SERVICE AT STUDY INTERSECTIONS

Traffic operations were evaluated at the study intersections under cumulative conditions plus traffic generated by the project as seen on **Figure 3**. Results of the Cumulative No Project and Cumulative Plus Project analyses are presented in **Table 5**.

As shown in **Table 5**, Intersection #1 – Park Avenue / Kennedy Drive will operate acceptably as an signalized intersection at LOS C in both weekday PM and Saturday midday peak hours, with and without project trips. Intersection #2, Monterey Avenue / Bay Avenue, will operate at LOS B in the PM peak hour and during the Saturday midday peak hour. Analysis sheets from Synchro are provided in **Appendix E.**

Table 5 – Cumulative No Project and Cumulative Plus Project Intersection Level of Service Analysis

#	Intersection	Control Type	LOS Standard	Peak Hour	Cumul. (2035)		Cumul. (2035) + Project	
					Delay	LOS	Delay	LOS
1	Kennedy Drive / Park Avenue	Signal	C	Weekday PM	33.7	C	33.8	C
				Saturday Midday	22.6	B	22.8	C
2	Monterey Avenue / Bay Avenue	AWSC	E	Weekday PM	13.2	B	13.3	B
				Saturday Midday	10.2	B	10.2	B

Notes:
1. Analysis performed using HCM 2010 methodologies
2. Delay indicated in seconds/vehicle
3. Intersections that fall below City standard are shown in **bold**.

SUMMARY OF IMPACTS

Based on the results of the traffic analysis and evaluation of the proposed site plan, Intersection #1 – Kennedy Drive / Park Avenue is the only intersection that operates at an unacceptable level of service in existing conditions, with and without the Project. The project traffic does *not* cause the intersection to fall below City standards in either peak hour and therefore does not cause a significant impact that should be mitigated. The intersection will be signalized in cumulative conditions and will operate acceptably at LOS C in both peak hours studied, with and without the Project trips.

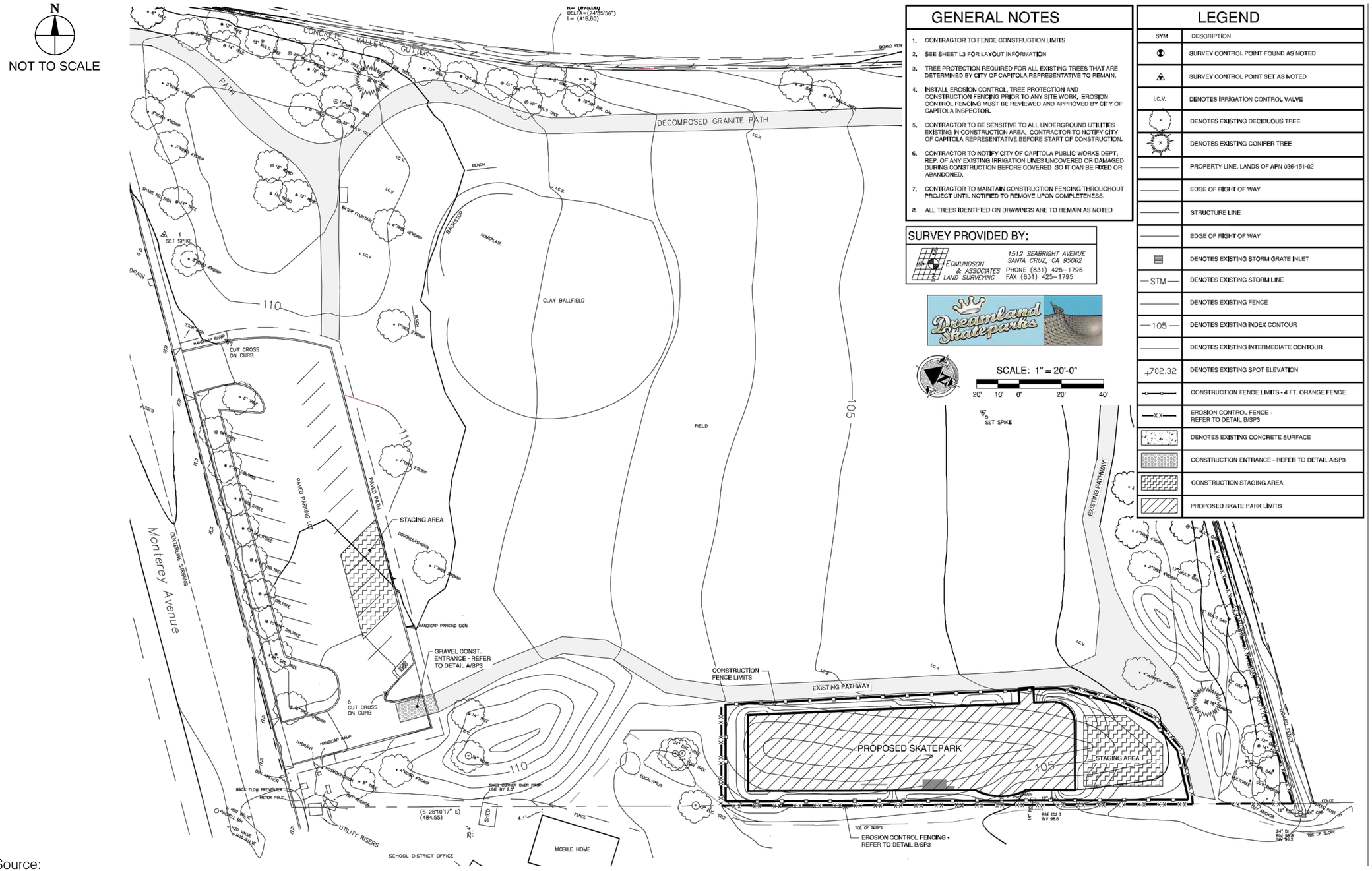
N

NOT TO SCALE

Source:
Google Earth

Kimley»Horn

FIGURE 1
VICINITY MAP



GENERAL NOTES

1. CONTRACTOR TO FENCE CONSTRUCTION LIMITS
2. SEE SHEET L3 FOR LAYOUT INFORMATION
3. TREE PROTECTION REQUIRED FOR ALL EXISTING TREES THAT ARE DETERMINED BY CITY OF CAPITOLA REPRESENTATIVE TO REMAIN.
4. INSTALL EROSION CONTROL, TREE PROTECTION AND CONSTRUCTION FENCING PRIOR TO ANY SITE WORK. EROSION CONTROL FENCING MUST BE REVIEWED AND APPROVED BY CITY OF CAPITOLA INSPECTOR.
5. CONTRACTOR TO BE SENSITIVE TO ALL UNDERGROUND UTILITIES EXISTING IN CONSTRUCTION AREA. CONTRACTOR TO NOTIFY CITY OF CAPITOLA REPRESENTATIVE BEFORE START OF CONSTRUCTION.
6. CONTRACTOR TO NOTIFY CITY OF CAPITOLA PUBLIC WORKS DEPT. REP. OF ANY EXISTING IRRIGATION LINES UNCOVERED OR DAMAGED DURING CONSTRUCTION BEFORE COVERED SO IT CAN BE FIXED OR ABANDONED.
7. CONTRACTOR TO MAINTAIN CONSTRUCTION FENCING THROUGHOUT PROJECT UNTIL NOTIFIED TO REMOVE UPON COMPLETENESS.
8. ALL TREES IDENTIFIED ON DRAWINGS ARE TO REMAIN AS NOTED

SURVEY PROVIDED BY:

EDMUNDSON & ASSOCIATES LAND SURVEYING
1512 SEABRIGHT AVENUE
SANTA CRUZ, CA 95062
PHONE (831) 425-1796
FAX (831) 425-1795

LEGEND

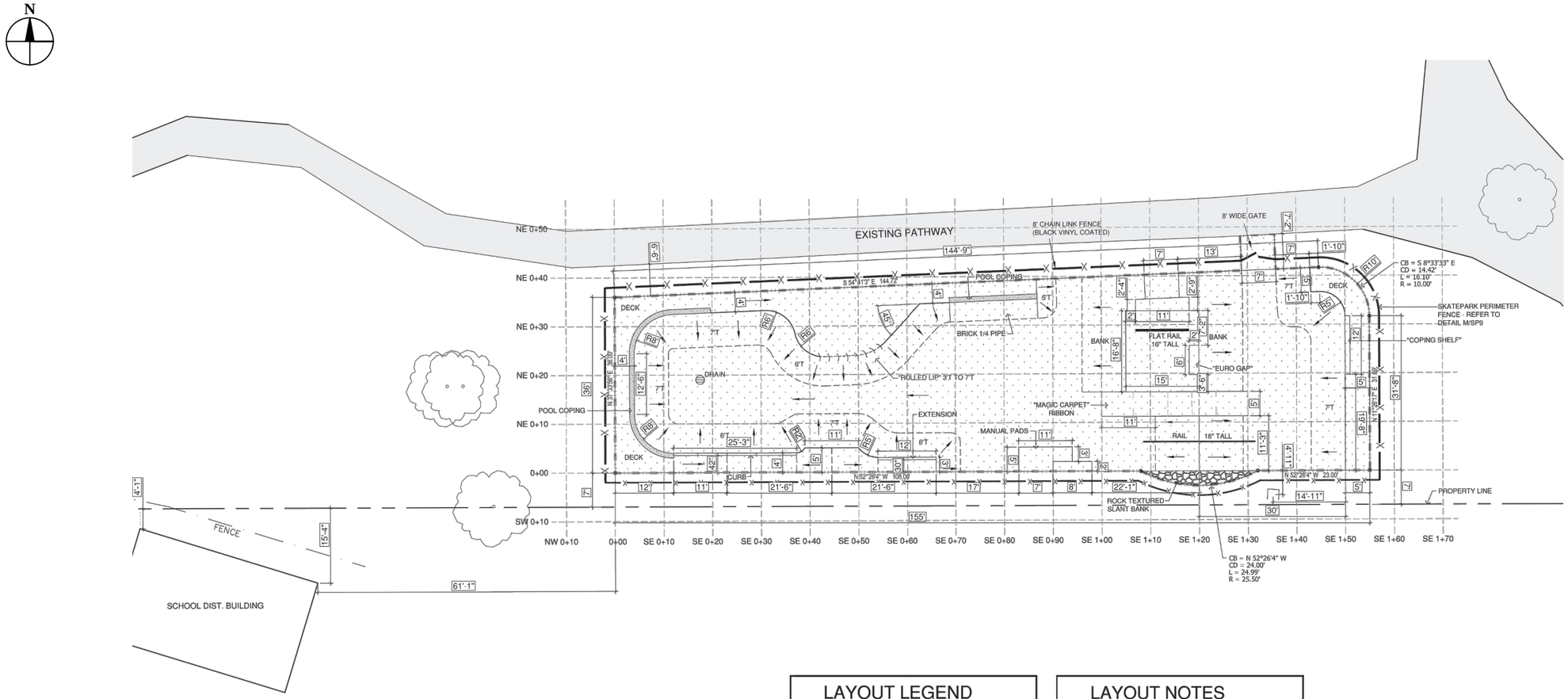
SYM	DESCRIPTION
	SURVEY CONTROL POINT FOUND AS NOTED
	SURVEY CONTROL POINT SET AS NOTED
I.C.V.	DENOTES IRRIGATION CONTROL VALVE
	DENOTES EXISTING DECIDUOUS TREE
	DENOTES EXISTING CONIFER TREE
	PROPERTY LINE, LANDS OF APN 036-151-02
	EDGE OF RIGHT OF WAY
	STRUCTURE LINE
	EDGE OF RIGHT OF WAY
	DENOTES EXISTING STORM GRATE INLET
—STM—	DENOTES EXISTING STORM LINE
	DENOTES EXISTING FENCE
—105—	DENOTES EXISTING INDEX CONTOUR
	DENOTES EXISTING INTERMEDIATE CONTOUR
+702.32	DENOTES EXISTING SPOT ELEVATION
	CONSTRUCTION FENCE LIMITS - 4 FT. ORANGE FENCE
—XX—	EROSION CONTROL FENCE - REFER TO DETAIL B/SP3
	DENOTES EXISTING CONCRETE SURFACE
	CONSTRUCTION ENTRANCE - REFER TO DETAIL A/SP3
	CONSTRUCTION STAGING AREA
	PROPOSED SKATE PARK LIMITS

Source:
MEARS Design Group

Kimley»Horn

FV-097005001 JUNE 2015

FIGURE 2a
PROPOSED SITE PLAN
MONTEREY AVENUE SKATEPARK TRAFFIC IMPACT STUDY



LAYOUT LEGEND

SYM	DESCRIPTION
	SKATEPARK LIMITS OF CONSTRUCTION
R	RADIUS AS INDICATED
T	TRANSITION AS INDICATED
L	LENGTH AS INDICATED
CB	CHORD BEARING AS INDICATED
CD	CHORD DISTANCE AS INDICATED
	STEEL FLAT RAIL / RAILING AS INDICATED
	PROPOSED FLOOR DRAIN
	BOTTOM OF TRANSITION RAMP
	STEEL COPING
	8 FT. BLACK VINYL COATED CHAIN LINK FENCE - REFER TO DETAIL M/SP9

LAYOUT NOTES

1. ALL TRANSITIONS OF WALKS AND CURBS SHALL BE CONSTRUCTED TO A SMOOTH CURVE. ALL ADJUSTMENTS OF THE "LAYOUT" SHALL BE APPROVED BY CITY OF CAPITOLA PRIOR TO CONSTRUCTION.
2. SKATEPARK CONTRACTOR RESPONSIBLE FOR SKATEPARK LAYOUT. FINAL APPROVAL REQUIRED BY CITY OF CAPITOLA REPRESENTATIVE.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFICATION OF THE LOCATIONS OF ALL UTILITIES IN THE FIELD. LOCATIONS SHOWN ON THE PLAN ARE APPROXIMATE AND FOR GENERAL INFORMATION ONLY.
4. ALL "LAYOUT" WORK SHALL BE APPROVED BY CITY OF CAPITOLA PRIOR TO THE START OF ANY EXCAVATION.
5. DIMENSIONS FOR WALKS, CURB WALLS AND CURBS ARE AT CENTER LINE OR ON THE SIDE SHOWN ON THE PLAN.
6. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONSTRUCT ALL CONCRETE WORK USING FORM LUMBER AND STAKES STRONG ENOUGH AND AT INTERVALS FREQUENT ENOUGH TO ASSURE ACCURATE ANGLES & SMOOTH CONTINUOUS RADII.
7. CONTRACTOR IS REQUIRED TO RE-SEED ALL SCARRED AREAS DUE TO CONSTRUCTION WITH CITY APPROVED SEED MIX.
8. CONTRACTOR TO REPAIR AND ADJUST ALL EXISTING IRRIGATION DAMAGED OR REMOVED DUE TO SKATEPARK CONSTRUCTION. FINISHED IRRIGATION PRODUCT IS TO BE INSTALLED TO COVER ALL EXISTING AND NEWLY PLANTED/SEEDED AREAS WITH MINIMAL THROUGH ON HARD SURFACES. FINAL PRODUCT IS TO BE APPROVED BY OWNER'S REPRESENTATIVE. CONTRACTOR TO ABIDE BY CITY OF CAPITOLA STANDARDS.
9. NO LIGHTING IS PROPOSED.

Dreamland Skateparks

SCALE: 1" = 10'-0"

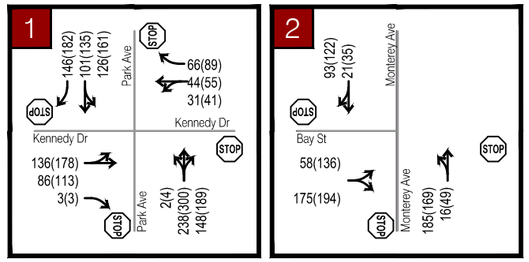
10' 5' 0' 10' 20'

Source:
MEARS Design Group

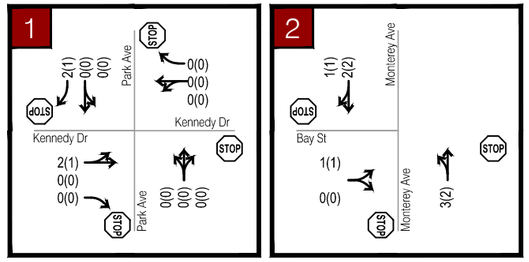
Kimley»Horn

FIGURE 2b
PROPOSED SKATEPARK LAYOUT
MONTEREY AVENUE SKATEPARK TRAFFIC IMPACT STUDY

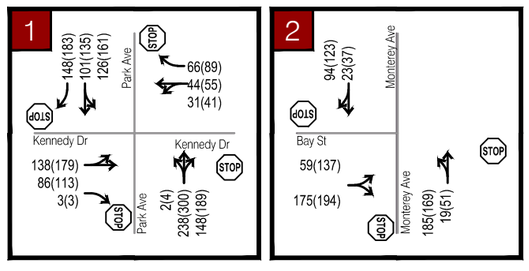
Existing Volumes



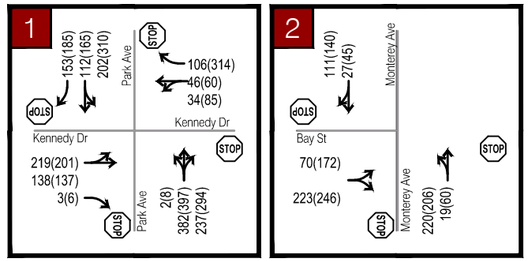
Project Volumes



Existing Plus Project Volumes



Cumulative Volumes



Cumulative Plus Project Volumes

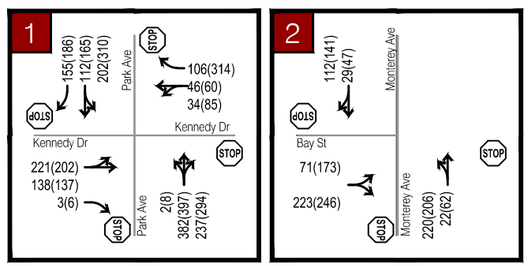


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FIGURE 3
EXISTING, PROJECT, AND CUMULATIVE CONDITIONS
PEAK HOUR TURNING MOVEMENT VOLUMES
MONTEREY AVENUE SKATEPARK TRAFFIC IMPACT STUDY

APPENDICES

A: INTERSECTION TURNING MOVEMENT VOLUMES – NDS/ATD TRAFFIC

B: EXISTING TRAFFIC CONDITIONS ANALYSIS SHEETS

C: EXISTING PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS SHEETS

D: CUMULATIVE (2035) TRAFFIC CONDITIONS ANALYSIS SHEETS

E: CUMULATIVE (2035) PLUS PROPOSED PROJECT TRAFFIC CONDITIONS ANALYSIS SHEETS

F: CALCULATION OF CUMULATIVE CONDITION MIDDAY PEAK HOUR VOLUMES

APPENDIX A
Intersection Turning Movement Volumes
NDS/ATD Traffic

ALL TRAFFIC DATA

APPENDIX D

City of Capitola
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-7510-001 Monterey Avenue-Bay Avenue.ppd
Date : 5/30/2015

Unshifted Count = All Vehicles

	Monterey Avenue Southbound					Westbound					Monterey Avenue Northbound					Bay Avenue Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
12:00	0	4	25	0	29	0	0	0	0	0	40	2	0	0	42	23	0	38	0	61	132	0
12:15	0	7	27	0	34	0	0	0	0	0	42	10	0	0	52	16	0	35	0	51	137	0
12:30	0	4	15	0	19	0	0	0	0	0	42	4	0	0	46	15	0	43	0	58	123	0
12:45	0	2	20	0	22	0	0	0	0	0	55	6	0	0	61	12	0	45	0	57	140	0
Total	0	17	87	0	104	0	0	0	0	0	179	22	0	0	201	66	0	161	0	227	532	0
13:00	0	7	27	0	34	0	0	0	0	0	46	5	0	0	51	15	0	46	0	61	146	0
13:15	0	7	25	0	32	0	0	0	0	0	42	3	0	0	45	13	0	39	0	52	129	0
13:30	0	5	21	0	26	0	0	0	0	0	42	2	0	0	44	18	0	45	0	63	133	0
13:45	0	5	18	0	23	0	0	0	0	0	46	8	0	0	54	17	0	39	0	56	133	0
Total	0	24	91	0	115	0	0	0	0	0	176	18	0	0	194	63	0	169	0	232	541	0
Grand Total	0	41	178	0	219	0	0	0	0	0	355	40	0	0	395	129	0	330	0	459	1073	0
Apprch %	0.0%	18.7%	81.3%	0.0%		0.0%	0.0%	0.0%	0.0%		89.9%	10.1%	0.0%	0.0%		28.1%	0.0%	71.9%	0.0%			
Total %	0.0%	3.8%	16.6%	0.0%	20.4%	0.0%	0.0%	0.0%	0.0%	0.0%	33.1%	3.7%	0.0%	0.0%	36.8%	12.0%	0.0%	30.8%	0.0%	42.8%	100.0%	

ALL TRAFFIC DATA

APPENDIX D

City of Capitola
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-7510-001 Monterey Avenue-Bay Avenue.ppd
Date : 5/30/2015

Unshifted Count = All Vehicles

NOON PEAK	Monterey Avenue Southbound					Westbound					Monterey Avenue Northbound					Bay Avenue Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 12:45 to 13:45																					
Peak Hour For Entire Intersection Begins at 12:45																					
12:45	0	2	20	0	22	0	0	0	0	0	55	6	0	0	61	12	0	45	0	57	140
13:00	0	7	27	0	34	0	0	0	0	0	46	5	0	0	51	15	0	46	0	61	146
13:15	0	7	25	0	32	0	0	0	0	0	42	3	0	0	45	13	0	39	0	52	129
13:30	0	5	21	0	26	0	0	0	0	0	42	2	0	0	44	18	0	45	0	63	133
Total Volume	0	21	93	0	114	0	0	0	0	0	185	16	0	0	201	58	0	175	0	233	548
% App Total	0.0%	18.4%	81.6%	0.0%		0.0%	0.0%	0.0%	0.0%		92.0%	8.0%	0.0%	0.0%		24.9%	0.0%	75.1%	0.0%		
PHF	.000	.750	.861	.000	.838	.000	.000	.000	.000	.000	.841	.667	.000	.000	.824	.806	.000	.951	.000	.925	.938

ALL TRAFFIC DATA

APPENDIX D

City of Capitola
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-7510-001 Kennedy Drive-Park Avenue.ppd
Date : 5/30/2015

Unshifted Count = All Vehicles

	Monterey Avenue Southbound					Park Avenue Westbound					Monterey Avenue Northbound					Park Avenue Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
12:00	13	28	1	0	42	46	4	11	0	61	6	33	60	1	100	0	0	1	0	1	204	1
12:15	11	29	1	0	41	43	3	14	0	60	6	34	58	0	98	2	0	1	0	3	202	0
12:30	15	32	1	0	48	41	2	12	0	55	2	34	63	0	99	1	1	0	0	2	204	0
12:45	12	33	2	0	47	51	3	15	0	69	14	44	75	0	133	3	1	0	0	4	253	0
Total	51	122	5	0	178	181	12	52	0	245	28	145	256	1	430	6	2	2	0	10	863	1
13:00	18	33	1	0	52	47	2	12	0	61	11	34	63	0	108	4	1	4	0	9	230	0
13:15	16	30	1	0	47	49	1	8	0	58	8	35	56	0	99	2	4	1	0	7	211	0
13:30	16	31	2	0	49	52	1	20	0	73	3	20	66	0	89	3	0	4	0	7	218	0
13:45	8	35	1	0	44	36	1	13	0	50	6	37	79	0	122	5	5	3	0	13	229	0
Total	58	129	5	0	192	184	5	53	0	242	28	126	264	0	418	14	10	12	0	36	888	0
Grand Total	109	251	10	0	370	365	17	105	0	487	56	271	520	1	848	20	12	14	0	46	1751	1
Apprch %	29.5%	67.8%	2.7%	0.0%		74.9%	3.5%	21.6%	0.0%		6.6%	32.0%	61.3%	0.1%		43.5%	26.1%	30.4%	0.0%			
Total %	6.2%	14.3%	0.6%	0.0%	21.1%	20.8%	1.0%	6.0%	0.0%	27.8%	3.2%	15.5%	29.7%	0.1%	48.4%	1.1%	0.7%	0.8%	0.0%	2.6%	100.0%	

ALL TRAFFIC DATA

APPENDIX D

City of Capitola
(916) 771-8700
orders@atdtraffic.com

All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

File Name : 15-7510-001 Kennedy Drive-Park Avenue.ppd
Date : 5/30/2015

Unshifted Count = All Vehicles

NOON PEAK	Monterey Avenue Southbound					Park Avenue Westbound					Monterey Avenue Northbound					Park Avenue Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 12:45 to 13:45																					
Peak Hour For Entire Intersection Begins at 12:45																					
12:45	23	26	49	0	98	8	19	18	0	45	1	78	42	0	121	34	15	1	0	50	314
13:00	37	26	24	0	87	7	13	14	0	34	1	61	36	0	98	45	14	1	0	60	279
13:15	33	24	24	0	81	8	6	10	0	24	0	63	32	0	95	23	57	0	0	80	280
13:30	33	25	49	0	107	8	6	24	0	38	0	36	38	0	74	34	0	1	0	35	254
Total Volume	126	101	146	0	373	31	44	66	0	141	2	238	148	0	388	136	86	3	0	225	1127
% App Total	33.8%	27.1%	39.1%	0.0%		22.0%	31.2%	46.8%	0.0%		0.5%	61.3%	38.1%	0.0%		60.4%	38.2%	1.3%	0.0%		
PHF	.851	.971	.745	.000	.871	.969	.579	.688	.000	.783	.500	.763	.881	.000	.802	.756	.377	.750	.000	.703	.897

APPENDIX B
Synchro Analysis Worksheets
Existing Midday, PM

Intersection	
Intersection Delay, s/veh	21.1
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	136	86	3	0	31	44	66	0	2	238	148
Future Vol, veh/h	0	136	86	3	0	31	44	66	0	2	238	148
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	151	96	3	0	34	49	73	0	2	264	164
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	2	2
HCM Control Delay	19.3	12.1	31.3
HCM LOS	C	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	1%	61%	0%	41%	0%	56%	0%
Vol Thru, %	61%	39%	0%	59%	0%	44%	0%
Vol Right, %	38%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	388	222	3	75	66	227	146
LT Vol	2	136	0	31	0	126	0
Through Vol	238	86	0	44	0	101	0
RT Vol	148	0	3	0	66	0	146
Lane Flow Rate	431	247	3	83	73	252	162
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.799	0.538	0.006	0.188	0.146	0.509	0.282
Departure Headway (Hd)	6.672	7.847	6.81	8.119	7.181	7.26	6.26
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	543	459	524	441	497	497	573
Service Time	4.725	5.606	4.568	5.891	4.953	5.019	4.018
HCM Lane V/C Ratio	0.794	0.538	0.006	0.188	0.147	0.507	0.283
HCM Control Delay	31.3	19.4	9.6	12.8	11.2	17.4	11.5
HCM Lane LOS	D	C	A	B	B	C	B
HCM 95th-tile Q	7.6	3.1	0	0.7	0.5	2.8	1.2

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	126	101	146
Future Vol, veh/h	0	126	101	146
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	140	112	162
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	15.1
HCM LOS	C

Lane

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	58	175	0	185	16	0	21	93
Future Vol, veh/h	0	58	175	0	185	16	0	21	93
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	62	186	0	197	17	0	22	99
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.2	9.8	8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	92%	25%	0%
Vol Thru, %	8%	0%	18%
Vol Right, %	0%	75%	82%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	201	233	114
LT Vol	185	58	0
Through Vol	16	0	21
RT Vol	0	175	93
Lane Flow Rate	214	248	121
Geometry Grp	1	1	1
Degree of Util (X)	0.285	0.297	0.144
Departure Headway (Hd)	4.806	4.312	4.26
Convergence, Y/N	Yes	Yes	Yes
Cap	746	833	839
Service Time	2.844	2.341	2.3
HCM Lane V/C Ratio	0.287	0.298	0.144
HCM Control Delay	9.8	9.2	8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	1.2	1.2	0.5

Intersection	
Intersection Delay, s/veh	38.4
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	178	113	3	0	41	55	89	0	4	300	189
Future Vol, veh/h	0	178	113	3	0	41	55	89	0	4	300	189
Peak Hour Factor	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	185	118	3	0	43	57	93	0	4	313	197
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	2	2
HCM Control Delay	29.6	13.8	69
HCM LOS	D	B	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	1%	61%	0%	43%	0%	54%	0%
Vol Thru, %	61%	39%	0%	57%	0%	46%	0%
Vol Right, %	38%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	493	291	3	96	89	296	182
LT Vol	4	178	0	41	0	161	0
Through Vol	300	113	0	55	0	135	0
RT Vol	189	0	3	0	89	0	182
Lane Flow Rate	514	303	3	100	93	308	190
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	1	0.715	0.006	0.249	0.206	0.684	0.374
Departure Headway (Hd)	7.578	8.497	7.453	8.959	8.006	7.984	7.102
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	483	427	480	402	447	450	510
Service Time	5.582	6.201	5.196	6.689	5.776	5.774	4.802
HCM Lane V/C Ratio	1.064	0.71	0.006	0.249	0.208	0.684	0.373
HCM Control Delay	69	29.8	10.2	14.6	12.9	26.5	14
HCM Lane LOS	F	D	B	B	B	D	B
HCM 95th-tile Q	13.3	5.5	0	1	0.8	5	1.7

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	161	135	182
Future Vol, veh/h	0	161	135	182
Peak Hour Factor	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	168	141	190
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	21.7
HCM LOS	C

Lane

Intersection	
Intersection Delay, s/veh	10.6
Intersection LOS	B

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	136	194	0	169	49	0	35	122
Future Vol, veh/h	0	136	194	0	169	49	0	35	122
Peak Hour Factor	0.92	0.95	0.95	0.92	0.95	0.95	0.92	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	143	204	0	178	52	0	37	128
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	11.3	10.7	8.9
HCM LOS	B	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	78%	41%	0%
Vol Thru, %	22%	0%	22%
Vol Right, %	0%	59%	78%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	218	330	157
LT Vol	169	136	0
Through Vol	49	0	35
RT Vol	0	194	122
Lane Flow Rate	229	347	165
Geometry Grp	1	1	1
Degree of Util (X)	0.326	0.445	0.211
Departure Headway (Hd)	5.114	4.607	4.6
Convergence, Y/N	Yes	Yes	Yes
Cap	698	778	773
Service Time	3.184	2.664	2.673
HCM Lane V/C Ratio	0.328	0.446	0.213
HCM Control Delay	10.7	11.3	8.9
HCM Lane LOS	B	B	A
HCM 95th-tile Q	1.4	2.3	0.8

APPENDIX C
Synchro Analysis Worksheets
Existing+Project Midday, PM

Intersection	
Intersection Delay, s/veh	21.3
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	138	86	3	0	31	44	66	0	2	238	148
Future Vol, veh/h	0	138	86	3	0	31	44	66	0	2	238	148
Peak Hour Factor	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	153	96	3	0	34	49	73	0	2	264	164
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	2	2
HCM Control Delay	19.5	12.1	31.6
HCM LOS	C	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	1%	62%	0%	41%	0%	56%	0%
Vol Thru, %	61%	38%	0%	59%	0%	44%	0%
Vol Right, %	38%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	388	224	3	75	66	227	148
LT Vol	2	138	0	31	0	126	0
Through Vol	238	86	0	44	0	101	0
RT Vol	148	0	3	0	66	0	148
Lane Flow Rate	431	249	3	83	73	252	164
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.801	0.543	0.006	0.188	0.147	0.51	0.287
Departure Headway (Hd)	6.69	7.858	6.82	8.139	7.201	7.277	6.276
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	539	458	523	440	496	494	571
Service Time	4.742	5.618	4.579	5.91	4.971	5.035	4.034
HCM Lane V/C Ratio	0.8	0.544	0.006	0.189	0.147	0.51	0.287
HCM Control Delay	31.6	19.6	9.6	12.8	11.2	17.4	11.6
HCM Lane LOS	D	C	A	B	B	C	B
HCM 95th-tile Q	7.7	3.2	0	0.7	0.5	2.9	1.2

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	126	101	148
Future Vol, veh/h	0	126	101	148
Peak Hour Factor	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	140	112	164
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	15.1
HCM LOS	C

Lane

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	59	175	0	185	19	0	23	94
Future Vol, veh/h	0	59	175	0	185	19	0	23	94
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	63	186	0	197	20	0	24	100
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.2	9.8	8.1
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	91%	25%	0%
Vol Thru, %	9%	0%	20%
Vol Right, %	0%	75%	80%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	204	234	117
LT Vol	185	59	0
Through Vol	19	0	23
RT Vol	0	175	94
Lane Flow Rate	217	249	124
Geometry Grp	1	1	1
Degree of Util (X)	0.29	0.299	0.148
Departure Headway (Hd)	4.811	4.33	4.276
Convergence, Y/N	Yes	Yes	Yes
Cap	747	829	836
Service Time	2.849	2.359	2.316
HCM Lane V/C Ratio	0.29	0.3	0.148
HCM Control Delay	9.8	9.2	8.1
HCM Lane LOS	A	A	A
HCM 95th-tile Q	1.2	1.3	0.5

Intersection	
Intersection Delay, s/veh	38.4
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	179	113	3	0	41	55	89	0	4	300	189
Future Vol, veh/h	0	179	113	3	0	41	55	89	0	4	300	189
Peak Hour Factor	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	186	118	3	0	43	57	93	0	4	313	197
Number of Lanes	0	0	1	1	0	0	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	2	2
HCM Control Delay	29.8	13.8	69
HCM LOS	D	B	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	1%	61%	0%	43%	0%	54%	0%
Vol Thru, %	61%	39%	0%	57%	0%	46%	0%
Vol Right, %	38%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	493	292	3	96	89	296	183
LT Vol	4	179	0	41	0	161	0
Through Vol	300	113	0	55	0	135	0
RT Vol	189	0	3	0	89	0	183
Lane Flow Rate	514	304	3	100	93	308	191
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	1	0.718	0.006	0.249	0.206	0.684	0.376
Departure Headway (Hd)	7.586	8.501	7.456	8.966	8.013	7.99	7.109
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	483	429	480	402	447	450	509
Service Time	5.59	6.202	5.197	6.696	5.783	5.781	4.809
HCM Lane V/C Ratio	1.064	0.709	0.006	0.249	0.208	0.684	0.375
HCM Control Delay	69	30	10.2	14.7	12.9	26.5	14
HCM Lane LOS	F	D	B	B	B	D	B
HCM 95th-tile Q	13.3	5.6	0	1	0.8	5	1.7

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	161	135	183
Future Vol, veh/h	0	161	135	183
Peak Hour Factor	0.92	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	168	141	191
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	21.7
HCM LOS	C

Lane

Intersection	
Intersection Delay, s/veh	10.6
Intersection LOS	B

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	137	194	0	169	51	0	37	123
Future Vol, veh/h	0	137	194	0	169	51	0	37	123
Peak Hour Factor	0.92	0.95	0.95	0.92	0.95	0.95	0.92	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	144	204	0	178	54	0	39	129
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	11.4	10.7	9
HCM LOS	B	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	77%	41%	0%
Vol Thru, %	23%	0%	23%
Vol Right, %	0%	59%	77%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	220	331	160
LT Vol	169	137	0
Through Vol	51	0	37
RT Vol	0	194	123
Lane Flow Rate	232	348	168
Geometry Grp	1	1	1
Degree of Util (X)	0.329	0.447	0.216
Departure Headway (Hd)	5.12	4.621	4.612
Convergence, Y/N	Yes	Yes	Yes
Cap	697	773	771
Service Time	3.192	2.679	2.686
HCM Lane V/C Ratio	0.333	0.45	0.218
HCM Control Delay	10.7	11.4	9
HCM Lane LOS	B	B	A
HCM 95th-tile Q	1.4	2.3	0.8

APPENDIX D
Synchro Analysis Worksheets
Cumulative No Project Midday, PM

HCM 2010 Signalized Intersection Summary
1: PARK AVE & KENNEDY DR

8/23/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	219	138	3	34	46	106	2	382	237	202	112	153
Future Volume (veh/h)	219	138	3	34	46	106	2	382	237	202	112	153
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	243	153	3	38	51	118	2	424	263	224	124	170
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	287	180	4	85	114	294	70	462	566	292	286	392
Arrive On Green	0.26	0.26	0.26	0.11	0.11	0.11	0.25	0.25	0.25	0.08	0.40	0.40
Sat Flow, veh/h	1100	692	14	779	1045	1583	2	1859	1583	1774	713	977
Grp Volume(v), veh/h	399	0	0	89	0	118	426	0	263	224	0	294
Grp Sat Flow(s),veh/h/ln	1805	0	0	1824	0	1583	1861	0	1583	1774	0	1690
Q Serve(g_s), s	11.0	0.0	0.0	2.4	0.0	3.4	1.6	0.0	6.7	4.0	0.0	6.6
Cycle Q Clear(g_c), s	11.0	0.0	0.0	2.4	0.0	3.4	11.7	0.0	6.7	4.0	0.0	6.6
Prop In Lane	0.61		0.01	0.43		1.00	0.00		1.00	1.00		0.58
Lane Grp Cap(c), veh/h	471	0	0	199	0	294	531	0	566	292	0	678
V/C Ratio(X)	0.85	0.00	0.00	0.45	0.00	0.40	0.80	0.00	0.46	0.77	0.00	0.43
Avail Cap(c_a), veh/h	552	0	0	557	0	605	531	0	566	292	0	678
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.4	0.0	0.0	21.8	0.0	18.8	19.2	0.0	13.0	15.8	0.0	11.4
Incr Delay (d2), s/veh	10.5	0.0	0.0	1.6	0.0	0.9	8.6	0.0	0.6	11.6	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	0.0	0.0	1.3	0.0	1.6	7.2	0.0	3.5	2.2	0.0	3.1
LnGrp Delay(d),s/veh	28.8	0.0	0.0	23.4	0.0	19.7	27.8	0.0	13.6	27.5	0.0	11.8
LnGrp LOS	C			C		B	C		B	C		B
Approach Vol, veh/h		399			207			689			518	
Approach Delay, s/veh		28.8			21.3			22.4			18.6	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	8.0	17.0		17.7		25.0		9.7
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	4.0	13.0		16.0		21.0		16.0
Max Q Clear Time (g_c+I1), s	6.0	13.7		13.0		8.6		5.4
Green Ext Time (p_c), s	0.0	0.0		0.7		4.5		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.6
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	70	223	0	220	19	0	27	111
Future Vol, veh/h	0	70	223	0	220	19	0	27	111
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	74	237	0	234	20	0	29	118
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.4	10.8	8.6
HCM LOS	B	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	92%	24%	0%
Vol Thru, %	8%	0%	20%
Vol Right, %	0%	76%	80%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	239	293	138
LT Vol	220	70	0
Through Vol	19	0	27
RT Vol	0	223	111
Lane Flow Rate	254	312	147
Geometry Grp	1	1	1
Degree of Util (X)	0.354	0.388	0.183
Departure Headway (Hd)	5.006	4.478	4.496
Convergence, Y/N	Yes	Yes	Yes
Cap	714	801	791
Service Time	3.068	2.527	2.565
HCM Lane V/C Ratio	0.356	0.39	0.186
HCM Control Delay	10.8	10.4	8.6
HCM Lane LOS	B	B	A
HCM 95th-tile Q	1.6	1.8	0.7

HCM 2010 Signalized Intersection Summary
1: PARK AVE & KENNEDY DR

8/23/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	201	137	6	85	60	314	8	397	294	310	165	185
Future Volume (veh/h)	201	137	6	85	60	314	8	397	294	310	165	185
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	212	144	6	89	63	331	8	418	309	326	174	195
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	180	8	113	80	339	68	460	565	337	344	385
Arrive On Green	0.25	0.25	0.25	0.11	0.11	0.11	0.25	0.25	0.25	0.11	0.43	0.43
Sat Flow, veh/h	1057	718	30	1060	750	1583	11	1842	1583	1774	803	900
Grp Volume(v), veh/h	362	0	0	152	0	331	426	0	309	326	0	369
Grp Sat Flow(s),veh/h/ln	1805	0	0	1810	0	1583	1853	0	1583	1774	0	1704
Q Serve(g_s), s	10.5	0.0	0.0	4.6	0.0	6.0	3.1	0.0	8.7	6.0	0.0	8.9
Cycle Q Clear(g_c), s	10.5	0.0	0.0	4.6	0.0	6.0	12.5	0.0	8.7	6.0	0.0	8.9
Prop In Lane	0.59		0.02	0.59		1.00	0.02		1.00	1.00		0.53
Lane Grp Cap(c), veh/h	453	0	0	194	0	339	528	0	565	337	0	729
V/C Ratio(X)	0.80	0.00	0.00	0.79	0.00	0.98	0.81	0.00	0.55	0.97	0.00	0.51
Avail Cap(c_a), veh/h	740	0	0	194	0	339	528	0	565	337	0	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.7	0.0	0.0	24.4	0.0	21.9	20.5	0.0	14.4	16.9	0.0	11.7
Incr Delay (d2), s/veh	3.3	0.0	0.0	18.8	0.0	42.6	9.0	0.0	1.1	40.2	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.0	0.0	3.3	0.0	9.1	7.7	0.0	4.6	7.2	0.0	4.2
LnGrp Delay(d),s/veh	23.0	0.0	0.0	43.3	0.0	64.5	29.5	0.0	15.5	57.1	0.0	12.3
LnGrp LOS	C			D		E	C		B	E		B
Approach Vol, veh/h		362			483			735			695	
Approach Delay, s/veh		23.0			57.8			23.6			33.3	
Approach LOS		C			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	10.0	18.0		18.1		28.0		10.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.0	14.0		23.0		24.0		6.0
Max Q Clear Time (g_c+I1), s	8.0	14.5		12.5		10.9		8.0
Green Ext Time (p_c), s	0.0	0.0		1.6		5.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	33.7
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	13.2
Intersection LOS	B

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	172	246	0	206	60	0	45	140
Future Vol, veh/h	0	172	246	0	206	60	0	45	140
Peak Hour Factor	0.92	0.95	0.95	0.92	0.95	0.95	0.92	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	181	259	0	217	63	0	47	147
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	14.9	12.7	10
HCM LOS	B	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	77%	41%	0%
Vol Thru, %	23%	0%	24%
Vol Right, %	0%	59%	76%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	266	418	185
LT Vol	206	172	0
Through Vol	60	0	45
RT Vol	0	246	140
Lane Flow Rate	280	440	195
Geometry Grp	1	1	1
Degree of Util (X)	0.432	0.591	0.276
Departure Headway (Hd)	5.549	4.962	5.096
Convergence, Y/N	Yes	Yes	Yes
Cap	652	730	707
Service Time	3.557	2.962	3.107
HCM Lane V/C Ratio	0.429	0.603	0.276
HCM Control Delay	12.7	14.9	10
HCM Lane LOS	B	B	A
HCM 95th-tile Q	2.2	3.9	1.1

APPENDIX E
Synchro Analysis Worksheets
Cumulative+Project Midday, PM

HCM 2010 Signalized Intersection Summary
1: PARK AVE & KENNEDY DR

8/24/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	221	138	3	34	46	106	2	382	237	202	112	155
Future Volume (veh/h)	221	138	3	34	46	106	2	382	237	202	112	155
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	246	153	3	38	51	118	2	424	263	224	124	172
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	289	180	4	85	114	293	69	461	565	291	283	393
Arrive On Green	0.26	0.26	0.26	0.11	0.11	0.11	0.25	0.25	0.25	0.08	0.40	0.40
Sat Flow, veh/h	1105	687	13	779	1045	1583	2	1859	1583	1774	708	982
Grp Volume(v), veh/h	402	0	0	89	0	118	426	0	263	224	0	296
Grp Sat Flow(s),veh/h/ln	1805	0	0	1824	0	1583	1861	0	1583	1774	0	1689
Q Serve(g_s), s	11.1	0.0	0.0	2.4	0.0	3.4	1.6	0.0	6.7	4.0	0.0	6.7
Cycle Q Clear(g_c), s	11.1	0.0	0.0	2.4	0.0	3.4	11.7	0.0	6.7	4.0	0.0	6.7
Prop In Lane	0.61		0.01	0.43		1.00	0.00		1.00	1.00		0.58
Lane Grp Cap(c), veh/h	473	0	0	199	0	293	530	0	565	291	0	676
V/C Ratio(X)	0.85	0.00	0.00	0.45	0.00	0.40	0.80	0.00	0.47	0.77	0.00	0.44
Avail Cap(c_a), veh/h	550	0	0	556	0	603	530	0	565	291	0	676
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.4	0.0	0.0	21.9	0.0	18.8	19.3	0.0	13.0	15.9	0.0	11.4
Incr Delay (d2), s/veh	10.7	0.0	0.0	1.6	0.0	0.9	8.8	0.0	0.6	11.9	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	0.0	0.0	1.3	0.0	1.6	7.2	0.0	3.5	2.3	0.0	3.1
LnGrp Delay(d),s/veh	29.1	0.0	0.0	23.5	0.0	19.7	28.0	0.0	13.6	27.8	0.0	11.9
LnGrp LOS	C			C		B	C		B	C		B
Approach Vol, veh/h		402			207			689			520	
Approach Delay, s/veh		29.1			21.3			22.5			18.7	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	8.0	17.0		17.8		25.0		9.7
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	4.0	13.0		16.0		21.0		16.0
Max Q Clear Time (g_c+I1), s	6.0	13.7		13.1		8.7		5.4
Green Ext Time (p_c), s	0.0	0.0		0.7		4.5		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.8
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	71	223	0	220	22	0	29	112
Future Vol, veh/h	0	71	223	0	220	22	0	29	112
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	76	237	0	234	23	0	31	119
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.4	10.9	8.6
HCM LOS	B	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	91%	24%	0%
Vol Thru, %	9%	0%	21%
Vol Right, %	0%	76%	79%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	242	294	141
LT Vol	220	71	0
Through Vol	22	0	29
RT Vol	0	223	112
Lane Flow Rate	257	313	150
Geometry Grp	1	1	1
Degree of Util (X)	0.359	0.391	0.188
Departure Headway (Hd)	5.014	4.497	4.514
Convergence, Y/N	Yes	Yes	Yes
Cap	713	798	788
Service Time	3.077	2.546	2.582
HCM Lane V/C Ratio	0.36	0.392	0.19
HCM Control Delay	10.9	10.4	8.6
HCM Lane LOS	B	B	A
HCM 95th-tile Q	1.6	1.9	0.7

HCM 2010 Signalized Intersection Summary
1: PARK AVE & KENNEDY DR

8/24/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	137	6	85	60	314	8	397	294	310	165	186
Future Volume (veh/h)	202	137	6	85	60	314	8	397	294	310	165	186
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	213	144	6	89	63	331	8	418	309	326	174	196
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	266	180	8	113	80	339	68	460	564	337	343	386
Arrive On Green	0.25	0.25	0.25	0.11	0.11	0.11	0.25	0.25	0.25	0.11	0.43	0.43
Sat Flow, veh/h	1059	716	30	1060	750	1583	11	1842	1583	1774	801	902
Grp Volume(v), veh/h	363	0	0	152	0	331	426	0	309	326	0	370
Grp Sat Flow(s),veh/h/ln	1805	0	0	1810	0	1583	1853	0	1583	1774	0	1703
Q Serve(g_s), s	10.6	0.0	0.0	4.6	0.0	6.0	3.1	0.0	8.8	6.0	0.0	8.9
Cycle Q Clear(g_c), s	10.6	0.0	0.0	4.6	0.0	6.0	12.6	0.0	8.8	6.0	0.0	8.9
Prop In Lane	0.59		0.02	0.59		1.00	0.02		1.00	1.00		0.53
Lane Grp Cap(c), veh/h	454	0	0	193	0	339	528	0	564	337	0	728
V/C Ratio(X)	0.80	0.00	0.00	0.79	0.00	0.98	0.81	0.00	0.55	0.97	0.00	0.51
Avail Cap(c_a), veh/h	740	0	0	193	0	339	528	0	564	337	0	728
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.7	0.0	0.0	24.4	0.0	21.9	20.5	0.0	14.4	17.0	0.0	11.7
Incr Delay (d2), s/veh	3.3	0.0	0.0	18.9	0.0	42.8	9.0	0.0	1.1	40.5	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	0.0	3.3	0.0	9.1	7.7	0.0	4.6	5.9	0.0	4.2
LnGrp Delay(d),s/veh	23.0	0.0	0.0	43.4	0.0	64.7	29.5	0.0	15.6	57.5	0.0	12.3
LnGrp LOS	C			D		E	C		B	E		B
Approach Vol, veh/h		363			483			735			696	
Approach Delay, s/veh		23.0			58.0			23.7			33.5	
Approach LOS		C			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	10.0	18.0		18.1		28.0		10.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.0	14.0		23.0		24.0		6.0
Max Q Clear Time (g_c+I1), s	8.0	14.6		12.6		10.9		8.0
Green Ext Time (p_c), s	0.0	0.0		1.6		5.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	33.8
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

User approved changes to right turn type.

Intersection	
Intersection Delay, s/veh	13.3
Intersection LOS	B

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Traffic Vol, veh/h	0	173	246	0	206	62	0	47	141
Future Vol, veh/h	0	173	246	0	206	62	0	47	141
Peak Hour Factor	0.92	0.95	0.95	0.92	0.95	0.95	0.92	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	182	259	0	217	65	0	49	148
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	15	12.8	10.1
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	77%	41%	0%
Vol Thru, %	23%	0%	25%
Vol Right, %	0%	59%	75%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	268	419	188
LT Vol	206	173	0
Through Vol	62	0	47
RT Vol	0	246	141
Lane Flow Rate	282	441	198
Geometry Grp	1	1	1
Degree of Util (X)	0.436	0.594	0.281
Departure Headway (Hd)	5.56	4.978	5.111
Convergence, Y/N	Yes	Yes	Yes
Cap	652	728	706
Service Time	3.567	2.978	3.122
HCM Lane V/C Ratio	0.433	0.606	0.28
HCM Control Delay	12.8	15	10.1
HCM Lane LOS	B	B	B
HCM 95th-tile Q	2.2	4	1.2

APPENDIX F
Calculation of Cumulative Condition Midday Peak Hour Volumes

Calculation of annual % growth based on Existing & Cumulative PM peak hour volumes

Growth Rate	Annual % Growth	Avg Annual %	Direction, Road Segment
1.608465608	2.40%	0.96%	NB, north of Kennedy/Park
1.170068027	0.79%		EB, west of Kennedy/Park
1.254054054	1.14%		NB, north of Monterey/Bay
1.049792531	0.24%		WB, west of Kennedy/Park
1.189003436	0.87%		WB, west of Monterey/Bay
1.108225108	0.52%		SB, south of Park/Kennedy
1.600431965	2.38%		EB, east of Kennedy/Park
1.270742358	1.21%		SB, south of Bay/Monterey

Kimley-Horn, 2015.