Appendix A

Air Quality Modeling Results

Sheehy Court Bus Maintenance Facility

Napa County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	3.92	1000sqft	0.09	3,917.00	0
Parking Lot	162.49	1000sqft	3.73	162,493.00	0
Automobile Care Center	23.16	1000sqft	0.53	23,164.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.6	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - The automobile care center has been used for the bus maintenance facility and general office for the office building.

Construction Phase - The construction schedule is based on an 18 month construction time as provided by the applicant.

Grading -

Architectural Coating -

Vehicle Trips - Trip generation rates based on traffic study. Distance for the Auto Care Center based on distance to Napa Transit Center.

Vechicle Emission Factors - Fleet mix is based on the traffic study for the proposed project. Autos were split between LDA, LDT1 and 2, and MCY

Vechicle Emission Factors - Fleet mix was based on the traffic study completed for the project. Autos were split between LDA, LDT 1 and 2, and MCY

Vechicle Emission Factors - Fleet mix is based on the traffic study completed for the project. Autos split between LDA, LDT 1 and 2, and MCY.

Construction Off-road Equipment Mitigation -

Area Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	18.00	49.00
tblConstructionPhase	NumDays	230.00	300.00
tblConstructionPhase	NumDays	8.00	15.00
tblConstructionPhase	NumDays	18.00	50.00
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	PhaseEndDate	6/6/2019	6/7/2018
tblConstructionPhase	PhaseEndDate	8/16/2018	6/7/2019
tblConstructionPhase	PhaseStartDate	3/30/2019	4/2/2018
tblConstructionPhase	PhaseStartDate	2/3/2018	2/5/2018
tblConstructionPhase	PhaseStartDate	1/13/2018	1/15/2018
tblConstructionPhase	PhaseStartDate	6/8/2018	4/1/2019
tblLandUse	LandUseSquareFeet	3,920.00	3,917.00
tblLandUse	LandUseSquareFeet	162,490.00	162,493.00
tblLandUse	LandUseSquareFeet	23,160.00	23,164.00
tblProjectCharacteristics	OperationalYear	2014	2021

tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleTrips	CC_TL	7.30	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CW_TL	9.50	11.00
tblVehicleTrips	CW_TTP	33.00	100.00
tblVehicleTrips	DV_TP	51.00	0.00

tblVehicleTrips	PB_TP	28.00	0.00
tblVehicleTrips	PR_TP	21.00	100.00
tblVehicleTrips	ST_TR	62.00	4.27
tblVehicleTrips	SU_TR	62.00	4.27
tblVehicleTrips	WD_TR	62.00	4.27
tblVehicleTrips	WD_TR	11.01	37.63

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.6076	3.6031	3.4995	5.5200e-003	0.2504	0.2097	0.4600	0.1049	0.1967	0.3016	0.0000	470.9705	470.9705	0.0856	0.0000	472.7688
2019	0.1311	1.0734	1.1255	1.8700e-003	0.0332	0.0602	0.0934	8.9500e-003	0.0562	0.0652	0.0000	157.4470	157.4470	0.0322	0.0000	158.1239
Total	**0.7387**	**4.6765**	**4.6251**	**7.3900e-003**	**0.2836**	**0.2698**	**0.5534**	**0.1138**	**0.2530**	**0.3668**	**0.0000**	**628.4175**	**628.4175**	**0.1179**	**0.0000**	**630.8926**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.6076	3.6031	3.4995	5.5200e-003	0.1736	0.2097	0.3833	0.0637	0.1967	0.2604	0.0000	470.9701	470.9701	0.0856	0.0000	472.7684
2019	0.1311	1.0734	1.1255	1.8700e-003	0.0332	0.0602	0.0934	8.9500e-003	0.0562	0.0652	0.0000	157.4469	157.4469	0.0322	0.0000	158.1237
Total	**0.7387**	**4.6765**	**4.6251**	**7.3900e-003**	**0.2068**	**0.2698**	**0.4767**	**0.0726**	**0.2530**	**0.3256**	**0.0000**	**628.4169**	**628.4169**	**0.1179**	**0.0000**	**630.8921**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**27.05**	**0.00**	**13.86**	**36.20**	**0.00**	**11.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.7572	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.3900e-003	3.3900e-003	1.0000e-005	0.0000	3.5800e-003
Energy	3.7900e-003	0.0344	0.0289	2.1000e-004		2.6200e-003	2.6200e-003		2.6200e-003	2.6200e-003	0.0000	162.3898	162.3898	6.3700e-003	1.8600e-003	163.0987
Mobile	0.5460	3.4063	3.5956	7.0900e-003	0.3747	0.0491	0.4238	0.1217	0.0452	0.1669	0.0000	565.2822	565.2822	7.2100e-003	0.0000	565.4337
Waste						0.0000	0.0000		0.0000	0.0000	18.6995	0.0000	18.6995	1.1051	0.0000	41.9069
Water						0.0000	0.0000		0.0000	0.0000	0.9123	6.3212	7.2335	0.0940	2.2700e-003	9.9114
Total	**1.3070**	**3.4408**	**3.6262**	**7.3000e-003**	**0.3747**	**0.0517**	**0.4264**	**0.1217**	**0.0478**	**0.1695**	**19.6118**	**733.9965**	**753.6084**	**1.2127**	**4.1300e-003**	**780.3543**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.7572	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.3900e-003	3.3900e-003	1.0000e-005	0.0000	3.5800e-003
Energy	3.7900e-003	0.0344	0.0289	2.1000e-004		2.6200e-003	2.6200e-003		2.6200e-003	2.6200e-003	0.0000	162.3898	162.3898	6.3700e-003	1.8600e-003	163.0987
Mobile	0.5460	3.4063	3.5956	7.0900e-003	0.3747	0.0491	0.4238	0.1217	0.0452	0.1669	0.0000	565.2822	565.2822	7.2100e-003	0.0000	565.4337
Waste						0.0000	0.0000		0.0000	0.0000	18.6995	0.0000	18.6995	1.1051	0.0000	41.9069
Water						0.0000	0.0000		0.0000	0.0000	0.9123	6.3212	7.2335	0.0940	2.2700e-003	9.9100
Total	**1.3070**	**3.4408**	**3.6262**	**7.3000e-003**	**0.3747**	**0.0517**	**0.4264**	**0.1217**	**0.0478**	**0.1695**	**19.6118**	**733.9965**	**753.6084**	**1.2127**	**4.1300e-003**	**780.3529**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2018	1/12/2018	5	10	
2	Grading	Grading	1/15/2018	2/2/2018	5	15	
3	Building Construction	Building Construction	2/5/2018	3/29/2019	5	300	
4	Architectural Coating	Architectural Coating	4/2/2018	6/7/2018	5	49	
5	Paving	Paving	4/1/2019	6/7/2019	5	50	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 7.5

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 47,934; Non-Residential Outdoor: 15,978 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	6.00	130	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	77.00	31.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0215	0.2280	0.1812	2.0000e-004		0.0118	0.0118		0.0109	0.0109	0.0000	17.8705	17.8705	5.5600e-003	0.0000	17.9873
Total	**0.0215**	**0.2280**	**0.1812**	**2.0000e-004**	**0.0903**	**0.0118**	**0.1022**	**0.0497**	**0.0109**	**0.0605**	**0.0000**	**17.8705**	**17.8705**	**5.5600e-003**	**0.0000**	**17.9873**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	4.9000e-004	4.7300e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.2000e-004	2.2000e-004	1.0000e-005	2.2000e-004	0.0000	0.6729	0.6729	4.0000e-005	0.0000	0.6737
Total	**3.1000e-004**	**4.9000e-004**	**4.7300e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.2000e-004**	**2.2000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.6729**	**0.6729**	**4.0000e-005**	**0.0000**	**0.6737**

3.2 Site Preparation - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0407	0.0000	0.0407	0.0223	0.0000	0.0223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0215	0.2280	0.1812	2.0000e-004		0.0118	0.0118		0.0109	0.0109	0.0000	17.8705	17.8705	5.5600e-003	0.0000	17.9873
Total	**0.0215**	**0.2280**	**0.1812**	**2.0000e-004**	**0.0407**	**0.0118**	**0.0525**	**0.0223**	**0.0109**	**0.0332**	**0.0000**	**17.8705**	**17.8705**	**5.5600e-003**	**0.0000**	**17.9873**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	4.9000e-004	4.7300e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.2000e-004	2.2000e-004	1.0000e-005	2.2000e-004	0.0000	0.6729	0.6729	4.0000e-005	0.0000	0.6737
Total	**3.1000e-004**	**4.9000e-004**	**4.7300e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.2000e-004**	**2.2000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.6729**	**0.6729**	**4.0000e-005**	**0.0000**	**0.6737**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0491	0.0000	0.0491	0.0253	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0225	0.2330	0.1800	2.2000e-004		0.0129	0.0129		0.0119	0.0119	0.0000	20.3647	20.3647	6.3400e-003	0.0000	20.4979
Total	**0.0225**	**0.2330**	**0.1800**	**2.2000e-004**	**0.0491**	**0.0129**	**0.0620**	**0.0253**	**0.0119**	**0.0371**	**0.0000**	**20.3647**	**20.3647**	**6.3400e-003**	**0.0000**	**20.4979**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.8000e-004	6.1000e-004	5.9100e-003	1.0000e-005	1.0200e-003	1.0000e-005	1.0300e-003	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	0.8411	0.8411	5.0000e-005	0.0000	0.8421
Total	**3.8000e-004**	**6.1000e-004**	**5.9100e-003**	**1.0000e-005**	**1.0200e-003**	**1.0000e-005**	**1.0300e-003**	**2.7000e-004**	**1.0000e-005**	**2.8000e-004**	**0.0000**	**0.8411**	**0.8411**	**5.0000e-005**	**0.0000**	**0.8421**

3.3 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0221	0.0000	0.0221	0.0114	0.0000	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0225	0.2330	0.1800	2.2000e-004		0.0129	0.0129		0.0119	0.0119	0.0000	20.3647	20.3647	6.3400e-003	0.0000	20.4978
Total	**0.0225**	**0.2330**	**0.1800**	**2.2000e-004**	**0.0221**	**0.0129**	**0.0350**	**0.0114**	**0.0119**	**0.0232**	**0.0000**	**20.3647**	**20.3647**	**6.3400e-003**	**0.0000**	**20.4978**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.8000e-004	6.1000e-004	5.9100e-003	1.0000e-005	1.0200e-003	1.0000e-005	1.0300e-003	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	0.8411	0.8411	5.0000e-005	0.0000	0.8421
Total	**3.8000e-004**	**6.1000e-004**	**5.9100e-003**	**1.0000e-005**	**1.0200e-003**	**1.0000e-005**	**1.0300e-003**	**2.7000e-004**	**1.0000e-005**	**2.8000e-004**	**0.0000**	**0.8411**	**0.8411**	**5.0000e-005**	**0.0000**	**0.8421**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3149	2.7448	2.0689	3.1600e-003		0.1763	0.1763		0.1658	0.1658	0.0000	279.3882	279.3882	0.0684	0.0000	280.8240
Total	**0.3149**	**2.7448**	**2.0689**	**3.1600e-003**		**0.1763**	**0.1763**		**0.1658**	**0.1658**	**0.0000**	**279.3882**	**279.3882**	**0.0684**	**0.0000**	**280.8240**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0419	0.2954	0.5170	8.5000e-004	0.0233	4.1700e-003	0.0275	6.6500e-003	3.8300e-003	0.0105	0.0000	74.9018	74.9018	5.7000e-004	0.0000	74.9138
Worker	0.0309	0.0496	0.4771	9.5000e-004	0.0824	7.0000e-004	0.0831	0.0219	6.5000e-004	0.0226	0.0000	67.9283	67.9283	3.9500e-003	0.0000	68.0112
Total	**0.0729**	**0.3450**	**0.9942**	**1.8000e-003**	**0.1057**	**4.8700e-003**	**0.1106**	**0.0286**	**4.4800e-003**	**0.0331**	**0.0000**	**142.8301**	**142.8301**	**4.5200e-003**	**0.0000**	**142.9250**

3.4 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3149	2.7448	2.0689	3.1600e-003		0.1763	0.1763		0.1658	0.1658	0.0000	279.3879	279.3879	0.0684	0.0000	280.8237
Total	**0.3149**	**2.7448**	**2.0689**	**3.1600e-003**		**0.1763**	**0.1763**		**0.1658**	**0.1658**	**0.0000**	**279.3879**	**279.3879**	**0.0684**	**0.0000**	**280.8237**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0419	0.2954	0.5170	8.5000e-004	0.0233	4.1700e-003	0.0275	6.6500e-003	3.8300e-003	0.0105	0.0000	74.9018	74.9018	5.7000e-004	0.0000	74.9138
Worker	0.0309	0.0496	0.4771	9.5000e-004	0.0824	7.0000e-004	0.0831	0.0219	6.5000e-004	0.0226	0.0000	67.9283	67.9283	3.9500e-003	0.0000	68.0112
Total	**0.0729**	**0.3450**	**0.9942**	**1.8000e-003**	**0.1057**	**4.8700e-003**	**0.1106**	**0.0286**	**4.4800e-003**	**0.0331**	**0.0000**	**142.8301**	**142.8301**	**4.5200e-003**	**0.0000**	**142.9250**

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0753	0.6709	0.5479	8.6000e-004		0.0411	0.0411		0.0387	0.0387	0.0000	74.9193	74.9193	0.0182	0.0000	75.3021
Total	**0.0753**	**0.6709**	**0.5479**	**8.6000e-004**		**0.0411**	**0.0411**		**0.0387**	**0.0387**	**0.0000**	**74.9193**	**74.9193**	**0.0182**	**0.0000**	**75.3021**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0107	0.0733	0.1352	2.3000e-004	6.3100e-003	1.0500e-003	7.3700e-003	1.8000e-003	9.7000e-004	2.7700e-003	0.0000	19.9682	19.9682	1.5000e-004	0.0000	19.9714
Worker	7.4000e-003	0.0121	0.1154	2.6000e-004	0.0224	1.8000e-004	0.0225	5.9500e-003	1.7000e-004	6.1100e-003	0.0000	17.7631	17.7631	9.8000e-004	0.0000	17.7838
Total	**0.0181**	**0.0854**	**0.2507**	**4.9000e-004**	**0.0287**	**1.2300e-003**	**0.0299**	**7.7500e-003**	**1.1400e-003**	**8.8800e-003**	**0.0000**	**37.7314**	**37.7314**	**1.1300e-003**	**0.0000**	**37.7552**

3.4 Building Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0753	0.6709	0.5479	8.6000e-004		0.0411	0.0411		0.0387	0.0387	0.0000	74.9192	74.9192	0.0182	0.0000	75.3020
Total	**0.0753**	**0.6709**	**0.5479**	**8.6000e-004**		**0.0411**	**0.0411**		**0.0387**	**0.0387**	**0.0000**	**74.9192**	**74.9192**	**0.0182**	**0.0000**	**75.3020**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0107	0.0733	0.1352	2.3000e-004	6.3100e-003	1.0500e-003	7.3700e-003	1.8000e-003	9.7000e-004	2.7700e-003	0.0000	19.9682	19.9682	1.5000e-004	0.0000	19.9714
Worker	7.4000e-003	0.0121	0.1154	2.6000e-004	0.0224	1.8000e-004	0.0225	5.9500e-003	1.7000e-004	6.1100e-003	0.0000	17.7631	17.7631	9.8000e-004	0.0000	17.7838
Total	**0.0181**	**0.0854**	**0.2507**	**4.9000e-004**	**0.0287**	**1.2300e-003**	**0.0299**	**7.7500e-003**	**1.1400e-003**	**8.8800e-003**	**0.0000**	**37.7314**	**37.7314**	**1.1300e-003**	**0.0000**	**37.7552**

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1666					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3200e-003	0.0491	0.0454	7.0000e-005		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	6.2555	6.2555	5.9000e-004	0.0000	6.2680
Total	**0.1740**	**0.0491**	**0.0454**	**7.0000e-005**		**3.6900e-003**	**3.6900e-003**		**3.6900e-003**	**3.6900e-003**	**0.0000**	**6.2555**	**6.2555**	**5.9000e-004**	**0.0000**	**6.2680**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2500e-003	2.0000e-003	0.0193	4.0000e-005	3.3300e-003	3.0000e-005	3.3600e-003	8.9000e-004	3.0000e-005	9.1000e-004	0.0000	2.7475	2.7475	1.6000e-004	0.0000	2.7508
Total	**1.2500e-003**	**2.0000e-003**	**0.0193**	**4.0000e-005**	**3.3300e-003**	**3.0000e-005**	**3.3600e-003**	**8.9000e-004**	**3.0000e-005**	**9.1000e-004**	**0.0000**	**2.7475**	**2.7475**	**1.6000e-004**	**0.0000**	**2.7508**

3.5 Architectural Coating - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1666					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3200e-003	0.0491	0.0454	7.0000e-005		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	6.2555	6.2555	5.9000e-004	0.0000	6.2680
Total	**0.1740**	**0.0491**	**0.0454**	**7.0000e-005**		**3.6900e-003**	**3.6900e-003**		**3.6900e-003**	**3.6900e-003**	**0.0000**	**6.2555**	**6.2555**	**5.9000e-004**	**0.0000**	**6.2680**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2500e-003	2.0000e-003	0.0193	4.0000e-005	3.3300e-003	3.0000e-005	3.3600e-003	8.9000e-004	3.0000e-005	9.1000e-004	0.0000	2.7475	2.7475	1.6000e-004	0.0000	2.7508
Total	**1.2500e-003**	**2.0000e-003**	**0.0193**	**4.0000e-005**	**3.3300e-003**	**3.0000e-005**	**3.3600e-003**	**8.9000e-004**	**3.0000e-005**	**9.1000e-004**	**0.0000**	**2.7475**	**2.7475**	**1.6000e-004**	**0.0000**	**2.7508**

3.6 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0313	0.3147	0.3036	4.7000e-004		0.0178	0.0178		0.0164	0.0164	0.0000	41.1918	41.1918	0.0127	0.0000	41.4579
Paving	4.8900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0362**	**0.3147**	**0.3036**	**4.7000e-004**		**0.0178**	**0.0178**		**0.0164**	**0.0164**	**0.0000**	**41.1918**	**41.1918**	**0.0127**	**0.0000**	**41.4579**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-003	2.4600e-003	0.0234	5.0000e-005	4.5400e-003	4.0000e-005	4.5700e-003	1.2100e-003	3.0000e-005	1.2400e-003	0.0000	3.6045	3.6045	2.0000e-004	0.0000	3.6087
Total	**1.5000e-003**	**2.4600e-003**	**0.0234**	**5.0000e-005**	**4.5400e-003**	**4.0000e-005**	**4.5700e-003**	**1.2100e-003**	**3.0000e-005**	**1.2400e-003**	**0.0000**	**3.6045**	**3.6045**	**2.0000e-004**	**0.0000**	**3.6087**

3.6 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0313	0.3147	0.3036	4.7000e-004		0.0178	0.0178		0.0164	0.0164	0.0000	41.1918	41.1918	0.0127	0.0000	41.4578
Paving	4.8900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0362**	**0.3147**	**0.3036**	**4.7000e-004**		**0.0178**	**0.0178**		**0.0164**	**0.0164**	**0.0000**	**41.1918**	**41.1918**	**0.0127**	**0.0000**	**41.4578**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-003	2.4600e-003	0.0234	5.0000e-005	4.5400e-003	4.0000e-005	4.5700e-003	1.2100e-003	3.0000e-005	1.2400e-003	0.0000	3.6045	3.6045	2.0000e-004	0.0000	3.6087
Total	**1.5000e-003**	**2.4600e-003**	**0.0234**	**5.0000e-005**	**4.5400e-003**	**4.0000e-005**	**4.5700e-003**	**1.2100e-003**	**3.0000e-005**	**1.2400e-003**	**0.0000**	**3.6045**	**3.6045**	**2.0000e-004**	**0.0000**	**3.6087**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.5460	3.4063	3.5956	7.0900e-003	0.3747	0.0491	0.4238	0.1217	0.0452	0.1669	0.0000	565.2822	565.2822	7.2100e-003	0.0000	565.4337
Unmitigated	0.5460	3.4063	3.5956	7.0900e-003	0.3747	0.0491	0.4238	0.1217	0.0452	0.1669	0.0000	565.2822	565.2822	7.2100e-003	0.0000	565.4337

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Automobile Care Center	98.89	98.89	98.89	395,968	395,968
General Office Building	147.51	9.29	3.84	256,277	256,277
Parking Lot	0.00	0.00	0.00		
Total	246.40	108.18	102.73	652,245	652,245

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Automobile Care Center	11.00	0.00	0.00	100.00	0.00	0.00	100	0	0
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.285283	0.043889	0.105335	0.158225	0.057544	0.008255	0.015015	0.022833	0.002351	0.296882	0.004388	0.000000	0.000000

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	124.9083	124.9083	5.6500e-003	1.1700e-003	125.3892
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	124.9083	124.9083	5.6500e-003	1.1700e-003	125.3892
NaturalGas Mitigated	3.7900e-003	0.0344	0.0289	2.1000e-004		2.6200e-003	2.6200e-003		2.6200e-003	2.6200e-003	0.0000	37.4815	37.4815	7.2000e-004	6.9000e-004	37.7096
NaturalGas Unmitigated	3.7900e-003	0.0344	0.0289	2.1000e-004		2.6200e-003	2.6200e-003		2.6200e-003	2.6200e-003	0.0000	37.4815	37.4815	7.2000e-004	6.9000e-004	37.7096

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Automobile Care Center	634925	3.4200e-003	0.0311	0.0261	1.9000e-004		2.3700e-003	2.3700e-003		2.3700e-003	2.3700e-003	0.0000	33.8820	33.8820	6.5000e-004	6.2000e-004	34.0882
General Office Building	67450.7	3.6000e-004	3.3100e-003	2.7800e-003	2.0000e-005		2.5000e-004	2.5000e-004		2.5000e-004	2.5000e-004	0.0000	3.5994	3.5994	7.0000e-005	7.0000e-005	3.6213
Total		**3.7800e-003**	**0.0344**	**0.0289**	**2.1000e-004**		**2.6200e-003**	**2.6200e-003**		**2.6200e-003**	**2.6200e-003**	**0.0000**	**37.4815**	**37.4815**	**7.2000e-004**	**6.9000e-004**	**37.7096**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Automobile Care Center	634925	3.4200e-003	0.0311	0.0261	1.9000e-004		2.3700e-003	2.3700e-003		2.3700e-003	2.3700e-003	0.0000	33.8820	33.8820	6.5000e-004	6.2000e-004	34.0882
General Office Building	67450.7	3.6000e-004	3.3100e-003	2.7800e-003	2.0000e-005		2.5000e-004	2.5000e-004		2.5000e-004	2.5000e-004	0.0000	3.5994	3.5994	7.0000e-005	7.0000e-005	3.6213
Total		**3.7800e-003**	**0.0344**	**0.0289**	**2.1000e-004**		**2.6200e-003**	**2.6200e-003**		**2.6200e-003**	**2.6200e-003**	**0.0000**	**37.4815**	**37.4815**	**7.2000e-004**	**6.9000e-004**	**37.7096**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Automobile Care Center	209171	60.8502	2.7500e-003	5.7000e-004	61.0845
General Office Building	77204.1	22.4596	1.0200e-003	2.1000e-004	22.5460
Parking Lot	142994	41.5986	1.8800e-003	3.9000e-004	41.7587
Total		**124.9083**	**5.6500e-003**	**1.1700e-003**	**125.3892**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Automobile Care Center	209171	60.8502	2.7500e-003	5.7000e-004	61.0845
General Office Building	77204.1	22.4596	1.0200e-003	2.1000e-004	22.5460
Parking Lot	142994	41.5986	1.8800e-003	3.9000e-004	41.7587
Total		**124.9083**	**5.6500e-003**	**1.1700e-003**	**125.3892**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.7572	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.3900e-003	3.3900e-003	1.0000e-005	0.0000	3.5800e-003
Unmitigated	0.7572	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.3900e-003	3.3900e-003	1.0000e-005	0.0000	3.5800e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0167					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.7404					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.3900e-003	3.3900e-003	1.0000e-005	0.0000	3.5800e-003
Total	**0.7572**	**2.0000e-005**	**1.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.3900e-003**	**3.3900e-003**	**1.0000e-005**	**0.0000**	**3.5800e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0167					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.7404					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.3900e-003	3.3900e-003	1.0000e-005	0.0000	3.5800e-003
Total	**0.7572**	**2.0000e-005**	**1.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.3900e-003**	**3.3900e-003**	**1.0000e-005**	**0.0000**	**3.5800e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	7.2335	0.0940	2.2700e-003	9.9100
Unmitigated	7.2335	0.0940	2.2700e-003	9.9114

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Automobile Care Center	2.17892 / 1.33547	5.4809	0.0712	1.7200e-003	7.5101
General Office Building	0.696716 / 0.42702	1.7525	0.0228	5.5000e-004	2.4014
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**7.2335**	**0.0940**	**2.2700e-003**	**9.9114**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Automobile Care Center	2.17892 / 1.33547	5.4809	0.0712	1.7200e-003	7.5090
General Office Building	0.696716 / 0.42702	1.7525	0.0228	5.5000e-004	2.4010
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**7.2335**	**0.0940**	**2.2700e-003**	**9.9100**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	18.6995	1.1051	0.0000	41.9069
Unmitigated	18.6995	1.1051	0.0000	41.9069

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Automobile Care Center	88.47	17.9586	1.0613	0.0000	40.2464
General Office Building	3.65	0.7409	0.0438	0.0000	1.6604
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**18.6995**	**1.1051**	**0.0000**	**41.9068**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Automobile Care Center	88.47	17.9586	1.0613	0.0000	40.2464
General Office Building	3.65	0.7409	0.0438	0.0000	1.6604
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**18.6995**	**1.1051**	**0.0000**	**41.9068**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Sheehy Court Bus Maintenance Facility

Napa County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	3.92	1000sqft	0.09	3,917.00	0
Parking Lot	162.49	1000sqft	3.73	162,493.00	0
Automobile Care Center	23.16	1000sqft	0.53	23,164.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.6	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - The automobile care center has been used for the bus maintenance facility and general office for the office building.

Construction Phase - The construction schedule is based on an 18 month construction time as provided by the applicant.

Grading -

Architectural Coating -

Vehicle Trips - Trip generation rates based on traffic study. Distance for the Auto Care Center based on distance to Napa Transit Center.

Vechicle Emission Factors - Fleet mix is based on the traffic study for the proposed project. Autos were split between LDA, LDT1 and 2, and MCY

Vechicle Emission Factors - Fleet mix was based on the traffic study completed for the project. Autos were split between LDA, LDT 1 and 2, and MCY

Vechicle Emission Factors - Fleet mix is based on the traffic study completed for the project. Autos split between LDA, LDT 1 and 2, and MCY.

Construction Off-road Equipment Mitigation -

Area Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	18.00	49.00
tblConstructionPhase	NumDays	230.00	300.00
tblConstructionPhase	NumDays	8.00	15.00
tblConstructionPhase	NumDays	18.00	50.00
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	PhaseEndDate	6/6/2019	6/7/2018
tblConstructionPhase	PhaseEndDate	8/16/2018	6/7/2019
tblConstructionPhase	PhaseStartDate	3/30/2019	4/2/2018
tblConstructionPhase	PhaseStartDate	2/3/2018	2/5/2018
tblConstructionPhase	PhaseStartDate	1/13/2018	1/15/2018
tblConstructionPhase	PhaseStartDate	6/8/2018	4/1/2019
tblLandUse	LandUseSquareFeet	3,920.00	3,917.00
tblLandUse	LandUseSquareFeet	162,490.00	162,493.00
tblLandUse	LandUseSquareFeet	23,160.00	23,164.00
tblProjectCharacteristics	OperationalYear	2014	2021

tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleTrips	CC_TL	7.30	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CW_TL	9.50	11.00
tblVehicleTrips	CW_TTP	33.00	100.00
tblVehicleTrips	DV_TP	51.00	0.00

tblVehicleTrips	PB_TP	28.00	0.00
tblVehicleTrips	PR_TP	21.00	100.00
tblVehicleTrips	ST_TR	62.00	4.27
tblVehicleTrips	SU_TR	62.00	4.27
tblVehicleTrips	WD_TR	62.00	4.27
tblVehicleTrips	WD_TR	11.01	37.63

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	10.4216	45.6947	37.2402	0.0473	18.2360	2.3668	20.6028	9.9757	2.1775	12.1532	0.0000	4,403.5064	4,403.5064	1.2351	0.0000	4,429.4440
2019	2.9012	23.5052	24.2041	0.0427	0.9300	1.3235	2.2535	0.2505	1.2437	1.4942	0.0000	3,924.7667	3,924.7667	0.6670	0.0000	3,938.7726
Total	**13.3229**	**69.1999**	**61.4443**	**0.0900**	**19.1660**	**3.6903**	**22.8563**	**10.2262**	**3.4212**	**13.6474**	**0.0000**	**8,328.2731**	**8,328.2731**	**1.9021**	**0.0000**	**8,368.2166**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	10.4216	45.6947	37.2402	0.0473	8.2996	2.3668	10.6664	4.5138	2.1775	6.6913	0.0000	4,403.5064	4,403.5064	1.2351	0.0000	4,429.4440
2019	2.9012	23.5052	24.2041	0.0427	0.9300	1.3235	2.2535	0.2505	1.2437	1.4942	0.0000	3,924.7667	3,924.7667	0.6670	0.0000	3,938.7726
Total	**13.3229**	**69.1999**	**61.4443**	**0.0900**	**9.2296**	**3.6903**	**12.9199**	**4.7643**	**3.4212**	**8.1855**	**0.0000**	**8,328.2731**	**8,328.2731**	**1.9021**	**0.0000**	**8,368.2166**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**51.84**	**0.00**	**43.47**	**53.41**	**0.00**	**40.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Energy	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681
Mobile	3.5504	20.4064	21.9453	0.0456	2.4219	0.3100	2.7318	0.7819	0.2852	1.0672		3,994.2834	3,994.2834	0.0504		3,995.3413
Total	**7.7212**	**20.5953**	**22.1232**	**0.0467**	**2.4219**	**0.3244**	**2.7462**	**0.7819**	**0.2996**	**1.0816**		**4,220.7152**	**4,220.7152**	**0.0548**	**4.1500e-003**	**4,223.1532**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Energy	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681
Mobile	3.5504	20.4064	21.9453	0.0456	2.4219	0.3100	2.7318	0.7819	0.2852	1.0672		3,994.2834	3,994.2834	0.0504		3,995.3413
Total	**7.7212**	**20.5953**	**22.1232**	**0.0467**	**2.4219**	**0.3244**	**2.7462**	**0.7819**	**0.2996**	**1.0816**		**4,220.7152**	**4,220.7152**	**0.0548**	**4.1500e-003**	**4,223.1532**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2018	1/12/2018	5	10	
2	Grading	Grading	1/15/2018	2/2/2018	5	15	
3	Building Construction	Building Construction	2/5/2018	3/29/2019	5	300	
4	Architectural Coating	Architectural Coating	4/2/2018	6/7/2018	5	49	
5	Paving	Paving	4/1/2019	6/7/2019	5	50	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 7.5

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 47,934; Non-Residential Outdoor: 15,978 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	6.00	130	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	77.00	31.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762		3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**18.0663**	**2.3654**	**20.4317**	**9.9307**	**2.1762**	**12.1069**		**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0658	0.0859	1.0056	2.0200e-003	0.1698	1.3900e-003	0.1711	0.0450	1.2900e-003	0.0463		158.4981	158.4981	8.6200e-003		158.6790
Total	**0.0658**	**0.0859**	**1.0056**	**2.0200e-003**	**0.1698**	**1.3900e-003**	**0.1711**	**0.0450**	**1.2900e-003**	**0.0463**		**158.4981**	**158.4981**	**8.6200e-003**		**158.6790**

3.2 Site Preparation - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1298	0.0000	8.1298	4.4688	0.0000	4.4688			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762	0.0000	3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**8.1298**	**2.3654**	**10.4952**	**4.4688**	**2.1762**	**6.6450**	**0.0000**	**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0658	0.0859	1.0056	2.0200e-003	0.1698	1.3900e-003	0.1711	0.0450	1.2900e-003	0.0463		158.4981	158.4981	8.6200e-003		158.6790
Total	**0.0658**	**0.0859**	**1.0056**	**2.0200e-003**	**0.1698**	**1.3900e-003**	**0.1711**	**0.0450**	**1.2900e-003**	**0.0463**		**158.4981**	**158.4981**	**8.6200e-003**		**158.6790**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0028	31.0702	23.9988	0.0297		1.7201	1.7201		1.5825	1.5825		2,993.1005	2,993.1005	0.9318		3,012.6681
Total	**3.0028**	**31.0702**	**23.9988**	**0.0297**	**6.5523**	**1.7201**	**8.2724**	**3.3675**	**1.5825**	**4.9500**		**2,993.1005**	**2,993.1005**	**0.9318**		**3,012.6681**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0548	0.0716	0.8380	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		132.0817	132.0817	7.1800e-003		132.2325
Total	**0.0548**	**0.0716**	**0.8380**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**132.0817**	**132.0817**	**7.1800e-003**		**132.2325**

3.3 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	3.0028	31.0702	23.9988	0.0297		1.7201	1.7201		1.5825	1.5825	0.0000	2,993.1005	2,993.1005	0.9318		3,012.6681
Total	**3.0028**	**31.0702**	**23.9988**	**0.0297**	**2.9486**	**1.7201**	**4.6686**	**1.5154**	**1.5825**	**3.0979**	**0.0000**	**2,993.1005**	**2,993.1005**	**0.9318**		**3,012.6681**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0548	0.0716	0.8380	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		132.0817	132.0817	7.1800e-003		132.2325
Total	**0.0548**	**0.0716**	**0.8380**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**132.0817**	**132.0817**	**7.1800e-003**		**132.2325**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6687	23.2608	17.5327	0.0268		1.4943	1.4943		1.4048	1.4048		2,609.9390	2,609.9390	0.6387		2,623.3517
Total	**2.6687**	**23.2608**	**17.5327**	**0.0268**		**1.4943**	**1.4943**		**1.4048**	**1.4048**		**2,609.9390**	**2,609.9390**	**0.6387**		**2,623.3517**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3168	2.4148	3.3610	7.2300e-003	0.2039	0.0352	0.2391	0.0579	0.0323	0.0903		702.0178	702.0178	5.2700e-003		702.1284
Worker	0.2814	0.3675	4.3019	8.6500e-003	0.7261	5.9700e-003	0.7321	0.1926	5.5000e-003	0.1981		678.0194	678.0194	0.0369		678.7936
Total	**0.5983**	**2.7823**	**7.6629**	**0.0159**	**0.9300**	**0.0411**	**0.9712**	**0.2505**	**0.0378**	**0.2884**		**1,380.0372**	**1,380.0372**	**0.0421**		**1,380.9220**

3.4 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6687	23.2608	17.5327	0.0268		1.4943	1.4943		1.4048	1.4048	0.0000	2,609.9389	2,609.9389	0.6387		2,623.3517
Total	**2.6687**	**23.2608**	**17.5327**	**0.0268**		**1.4943**	**1.4943**		**1.4048**	**1.4048**	**0.0000**	**2,609.9389**	**2,609.9389**	**0.6387**		**2,623.3517**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3168	2.4148	3.3610	7.2300e-003	0.2039	0.0352	0.2391	0.0579	0.0323	0.0903		702.0178	702.0178	5.2700e-003		702.1284
Worker	0.2814	0.3675	4.3019	8.6500e-003	0.7261	5.9700e-003	0.7321	0.1926	5.5000e-003	0.1981		678.0194	678.0194	0.0369		678.7936
Total	**0.5983**	**2.7823**	**7.6629**	**0.0159**	**0.9300**	**0.0411**	**0.9712**	**0.2505**	**0.0378**	**0.2884**		**1,380.0372**	**1,380.0372**	**0.0421**		**1,380.9220**

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3516	20.9650	17.1204	0.0268		1.2850	1.2850		1.2083	1.2083		2,580.7618	2,580.7618	0.6279		2,593.9479
Total	**2.3516**	**20.9650**	**17.1204**	**0.0268**		**1.2850**	**1.2850**		**1.2083**	**1.2083**		**2,580.7618**	**2,580.7618**	**0.6279**		**2,593.9479**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.2992	2.2092	3.2235	7.2200e-003	0.2039	0.0328	0.2366	0.0579	0.0301	0.0880		690.1292	690.1292	5.1500e-003		690.2374
Worker	0.2504	0.3309	3.8603	8.6400e-003	0.7261	5.7200e-003	0.7319	0.1926	5.2900e-003	0.1979		653.8757	653.8757	0.0339		654.5873
Total	**0.5496**	**2.5401**	**7.0838**	**0.0159**	**0.9300**	**0.0385**	**0.9685**	**0.2505**	**0.0354**	**0.2859**		**1,344.0049**	**1,344.0049**	**0.0390**		**1,344.8247**

3.4 Building Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3516	20.9650	17.1204	0.0268		1.2850	1.2850		1.2083	1.2083	0.0000	2,580.7618	2,580.7618	0.6279		2,593.9479
Total	**2.3516**	**20.9650**	**17.1204**	**0.0268**		**1.2850**	**1.2850**		**1.2083**	**1.2083**	**0.0000**	**2,580.7618**	**2,580.7618**	**0.6279**		**2,593.9479**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.2992	2.2092	3.2235	7.2200e-003	0.2039	0.0328	0.2366	0.0579	0.0301	0.0880		690.1292	690.1292	5.1500e-003		690.2374
Worker	0.2504	0.3309	3.8603	8.6400e-003	0.7261	5.7200e-003	0.7319	0.1926	5.2900e-003	0.1979		653.8757	653.8757	0.0339		654.5873
Total	**0.5496**	**2.5401**	**7.0838**	**0.0159**	**0.9300**	**0.0385**	**0.9685**	**0.2505**	**0.0354**	**0.2859**		**1,344.0049**	**1,344.0049**	**0.0390**		**1,344.8247**

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.8013					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.0102
Total	**7.0999**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.0102**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0548	0.0716	0.8380	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		132.0817	132.0817	7.1800e-003		132.2325
Total	**0.0548**	**0.0716**	**0.8380**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**132.0817**	**132.0817**	**7.1800e-003**		**132.2325**

3.5 Architectural Coating - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.8013					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506	0.0000	281.4485	281.4485	0.0267		282.0102
Total	**7.0999**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**	**0.0000**	**281.4485**	**281.4485**	**0.0267**		**282.0102**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0548	0.0716	0.8380	1.6800e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		132.0817	132.0817	7.1800e-003		132.2325
Total	**0.0548**	**0.0716**	**0.8380**	**1.6800e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**132.0817**	**132.0817**	**7.1800e-003**		**132.2325**

3.6 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2520	12.5889	12.1441	0.0187		0.7111	0.7111		0.6560	0.6560		1,816.2490	1,816.2490	0.5585		1,827.9782
Paving	0.1955					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4475**	**12.5889**	**12.1441**	**0.0187**		**0.7111**	**0.7111**		**0.6560**	**0.6560**		**1,816.2490**	**1,816.2490**	**0.5585**		**1,827.9782**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0651	0.0860	1.0027	2.2400e-003	0.1886	1.4800e-003	0.1901	0.0500	1.3700e-003	0.0514		169.8378	169.8378	8.8000e-003		170.0227
Total	**0.0651**	**0.0860**	**1.0027**	**2.2400e-003**	**0.1886**	**1.4800e-003**	**0.1901**	**0.0500**	**1.3700e-003**	**0.0514**		**169.8378**	**169.8378**	**8.8000e-003**		**170.0227**

3.6 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2520	12.5889	12.1441	0.0187		0.7111	0.7111		0.6560	0.6560	0.0000	1,816.2490	1,816.2490	0.5585		1,827.9782
Paving	0.1955					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4475**	**12.5889**	**12.1441**	**0.0187**		**0.7111**	**0.7111**		**0.6560**	**0.6560**	**0.0000**	**1,816.2490**	**1,816.2490**	**0.5585**		**1,827.9782**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0651	0.0860	1.0027	2.2400e-003	0.1886	1.4800e-003	0.1901	0.0500	1.3700e-003	0.0514		169.8378	169.8378	8.8000e-003		170.0227
Total	**0.0651**	**0.0860**	**1.0027**	**2.2400e-003**	**0.1886**	**1.4800e-003**	**0.1901**	**0.0500**	**1.3700e-003**	**0.0514**		**169.8378**	**169.8378**	**8.8000e-003**		**170.0227**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.5504	20.4064	21.9453	0.0456	2.4219	0.3100	2.7318	0.7819	0.2852	1.0672		3,994.2834	3,994.2834	0.0504		3,995.3413
Unmitigated	3.5504	20.4064	21.9453	0.0456	2.4219	0.3100	2.7318	0.7819	0.2852	1.0672		3,994.2834	3,994.2834	0.0504		3,995.3413

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Automobile Care Center	98.89	98.89	98.89	395,968	395,968
General Office Building	147.51	9.29	3.84	256,277	256,277
Parking Lot	0.00	0.00	0.00		
Total	246.40	108.18	102.73	652,245	652,245

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Automobile Care Center	11.00	0.00	0.00	100.00	0.00	0.00	100	0	0
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.285283	0.043889	0.105335	0.158225	0.057544	0.008255	0.015015	0.022833	0.002351	0.296882	0.004388	0.000000	0.000000

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681
NaturalGas Unmitigated	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Automobile Care Center	1739.52	0.0188	0.1705	0.1433	1.0200e-003		0.0130	0.0130		0.0130	0.0130		204.6496	204.6496	3.9200e-003	3.7500e-003	205.8950
General Office Building	184.797	1.9900e-003	0.0181	0.0152	1.1000e-004		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		21.7408	21.7408	4.2000e-004	4.0000e-004	21.8731
Total		**0.0208**	**0.1887**	**0.1585**	**1.1300e-003**		**0.0143**	**0.0143**		**0.0143**	**0.0143**		**226.3903**	**226.3903**	**4.3400e-003**	**4.1500e-003**	**227.7681**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Automobile Care Center	1.73952	0.0188	0.1705	0.1433	1.0200e-003		0.0130	0.0130		0.0130	0.0130		204.6496	204.6496	3.9200e-003	3.7500e-003	205.8950
General Office Building	0.184797	1.9900e-003	0.0181	0.0152	1.1000e-004		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		21.7408	21.7408	4.2000e-004	4.0000e-004	21.8731
Total		**0.0208**	**0.1887**	**0.1585**	**1.1300e-003**		**0.0143**	**0.0143**		**0.0143**	**0.0143**		**226.3903**	**226.3903**	**4.3400e-003**	**4.1500e-003**	**227.7681**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Unmitigated	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0913					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.0569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8100e-003	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Total	**4.1500**	**1.8000e-004**	**0.0194**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0415**	**0.0415**	**1.1000e-004**		**0.0438**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0913					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.0569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8100e-003	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Total	**4.1500**	**1.8000e-004**	**0.0194**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0415**	**0.0415**	**1.1000e-004**		**0.0438**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Sheehy Court Bus Maintenance Facility

Napa County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	3.92	1000sqft	0.09	3,917.00	0
Parking Lot	162.49	1000sqft	3.73	162,493.00	0
Automobile Care Center	23.16	1000sqft	0.53	23,164.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.6	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - The automobile care center has been used for the bus maintenance facility and general office for the office building.

Construction Phase - The construction schedule is based on an 18 month construction time as provided by the applicant.

Grading -

Architectural Coating -

Vehicle Trips - Trip generation rates based on traffic study. Distance for the Auto Care Center based on distance to Napa Transit Center.

Vechicle Emission Factors - Fleet mix is based on the traffic study for the proposed project. Autos were split between LDA, LDT1 and 2, and MCY

Vechicle Emission Factors - Fleet mix was based on the traffic study completed for the project. Autos were split between LDA, LDT 1 and 2, and MCY

Vechicle Emission Factors - Fleet mix is based on the traffic study completed for the project. Autos split between LDA, LDT 1 and 2, and MCY.

Construction Off-road Equipment Mitigation -

Area Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	18.00	49.00
tblConstructionPhase	NumDays	230.00	300.00
tblConstructionPhase	NumDays	8.00	15.00
tblConstructionPhase	NumDays	18.00	50.00
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	PhaseEndDate	6/6/2019	6/7/2018
tblConstructionPhase	PhaseEndDate	8/16/2018	6/7/2019
tblConstructionPhase	PhaseStartDate	3/30/2019	4/2/2018
tblConstructionPhase	PhaseStartDate	2/3/2018	2/5/2018
tblConstructionPhase	PhaseStartDate	1/13/2018	1/15/2018
tblConstructionPhase	PhaseStartDate	6/8/2018	4/1/2019
tblLandUse	LandUseSquareFeet	3,920.00	3,917.00
tblLandUse	LandUseSquareFeet	162,490.00	162,493.00
tblLandUse	LandUseSquareFeet	23,160.00	23,164.00
tblProjectCharacteristics	OperationalYear	2014	2021

tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDA	0.48	0.29
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT1	0.07	0.04
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	LDT2	0.17	0.11
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MCY	6.9340e-003	4.3880e-003
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	MH	2.8670e-003	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	SBUS	6.9300e-004	0.00
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleEF	UBUS	1.2160e-003	0.30
tblVehicleTrips	CC_TL	7.30	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CW_TL	9.50	11.00
tblVehicleTrips	CW_TTP	33.00	100.00
tblVehicleTrips	DV_TP	51.00	0.00

tblVehicleTrips	PB_TP	28.00	0.00
tblVehicleTrips	PR_TP	21.00	100.00
tblVehicleTrips	ST_TR	62.00	4.27
tblVehicleTrips	SU_TR	62.00	4.27
tblVehicleTrips	WD_TR	62.00	4.27
tblVehicleTrips	WD_TR	11.01	37.63

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	10.5087	45.7181	37.2260	0.0466	18.2360	2.3668	20.6028	9.9757	2.1775	12.1532	0.0000	4,337.9651	4,337.9651	1.2351	0.0000	4,363.9027
2019	2.9784	23.7104	26.2930	0.0420	0.9300	1.3239	2.2539	0.2505	1.2440	1.4945	0.0000	3,870.7999	3,870.7999	0.6671	0.0000	3,884.8090
Total	**13.4871**	**69.4285**	**63.5190**	**0.0886**	**19.1660**	**3.6907**	**22.8567**	**10.2262**	**3.4215**	**13.6477**	**0.0000**	**8,208.7650**	**8,208.7650**	**1.9022**	**0.0000**	**8,248.7117**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	10.5087	45.7181	37.2260	0.0466	8.2996	2.3668	10.6664	4.5138	2.1775	6.6913	0.0000	4,337.9651	4,337.9651	1.2351	0.0000	4,363.9027
2019	2.9784	23.7104	26.2930	0.0420	0.9300	1.3239	2.2539	0.2505	1.2440	1.4945	0.0000	3,870.7999	3,870.7999	0.6671	0.0000	3,884.8090
Total	**13.4871**	**69.4285**	**63.5190**	**0.0886**	**9.2296**	**3.6907**	**12.9202**	**4.7643**	**3.4215**	**8.1858**	**0.0000**	**8,208.7650**	**8,208.7650**	**1.9022**	**0.0000**	**8,248.7117**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**51.84**	**0.00**	**43.47**	**53.41**	**0.00**	**40.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Energy	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681
Mobile	3.5319	22.0576	24.7779	0.0447	2.4219	0.3100	2.7319	0.7819	0.2853	1.0672		3,925.1300	3,925.1300	0.0504		3,926.1891
Total	**7.7027**	**22.2464**	**24.9558**	**0.0458**	**2.4219**	**0.3244**	**2.7463**	**0.7819**	**0.2997**	**1.0816**		**4,151.5618**	**4,151.5618**	**0.0549**	**4.1500e-003**	**4,154.0010**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Energy	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681
Mobile	3.5319	22.0576	24.7779	0.0447	2.4219	0.3100	2.7319	0.7819	0.2853	1.0672		3,925.1300	3,925.1300	0.0504		3,926.1891
Total	**7.7027**	**22.2464**	**24.9558**	**0.0458**	**2.4219**	**0.3244**	**2.7463**	**0.7819**	**0.2997**	**1.0816**		**4,151.5618**	**4,151.5618**	**0.0549**	**4.1500e-003**	**4,154.0010**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2018	1/12/2018	5	10	
2	Grading	Grading	1/15/2018	2/2/2018	5	15	
3	Building Construction	Building Construction	2/5/2018	3/29/2019	5	300	
4	Architectural Coating	Architectural Coating	4/2/2018	6/7/2018	5	49	
5	Paving	Paving	4/1/2019	6/7/2019	5	50	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 7.5

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 47,934; Non-Residential Outdoor: 15,978 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	6.00	130	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	77.00	31.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762		3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**18.0663**	**2.3654**	**20.4317**	**9.9307**	**2.1762**	**12.1069**		**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0654	0.1093	0.9914	1.8700e-003	0.1698	1.3900e-003	0.1711	0.0450	1.2900e-003	0.0463		146.7526	146.7526	8.6200e-003		146.9335
Total	**0.0654**	**0.1093**	**0.9914**	**1.8700e-003**	**0.1698**	**1.3900e-003**	**0.1711**	**0.0450**	**1.2900e-003**	**0.0463**		**146.7526**	**146.7526**	**8.6200e-003**		**146.9335**

3.2 Site Preparation - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1298	0.0000	8.1298	4.4688	0.0000	4.4688			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762	0.0000	3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**8.1298**	**2.3654**	**10.4952**	**4.4688**	**2.1762**	**6.6450**	**0.0000**	**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0654	0.1093	0.9914	1.8700e-003	0.1698	1.3900e-003	0.1711	0.0450	1.2900e-003	0.0463		146.7526	146.7526	8.6200e-003		146.9335
Total	**0.0654**	**0.1093**	**0.9914**	**1.8700e-003**	**0.1698**	**1.3900e-003**	**0.1711**	**0.0450**	**1.2900e-003**	**0.0463**		**146.7526**	**146.7526**	**8.6200e-003**		**146.9335**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0028	31.0702	23.9988	0.0297		1.7201	1.7201		1.5825	1.5825		2,993.1005	2,993.1005	0.9318		3,012.6681
Total	**3.0028**	**31.0702**	**23.9988**	**0.0297**	**6.5523**	**1.7201**	**8.2724**	**3.3675**	**1.5825**	**4.9500**		**2,993.1005**	**2,993.1005**	**0.9318**		**3,012.6681**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0545	0.0911	0.8262	1.5600e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		122.2938	122.2938	7.1800e-003		122.4446
Total	**0.0545**	**0.0911**	**0.8262**	**1.5600e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**122.2938**	**122.2938**	**7.1800e-003**		**122.4446**

3.3 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	3.0028	31.0702	23.9988	0.0297		1.7201	1.7201		1.5825	1.5825	0.0000	2,993.1005	2,993.1005	0.9318		3,012.6681
Total	**3.0028**	**31.0702**	**23.9988**	**0.0297**	**2.9486**	**1.7201**	**4.6686**	**1.5154**	**1.5825**	**3.0979**	**0.0000**	**2,993.1005**	**2,993.1005**	**0.9318**		**3,012.6681**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0545	0.0911	0.8262	1.5600e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		122.2938	122.2938	7.1800e-003		122.4446
Total	**0.0545**	**0.0911**	**0.8262**	**1.5600e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**122.2938**	**122.2938**	**7.1800e-003**		**122.4446**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6687	23.2608	17.5327	0.0268		1.4943	1.4943		1.4048	1.4048		2,609.9390	2,609.9390	0.6387		2,623.3517
Total	**2.6687**	**23.2608**	**17.5327**	**0.0268**		**1.4943**	**1.4943**		**1.4048**	**1.4048**		**2,609.9390**	**2,609.9390**	**0.6387**		**2,623.3517**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4057	2.5412	5.5921	7.2100e-003	0.2039	0.0355	0.2395	0.0579	0.0327	0.0906		696.5090	696.5090	5.4200e-003		696.6228
Worker	0.2799	0.4675	4.2411	8.0000e-003	0.7261	5.9700e-003	0.7321	0.1926	5.5000e-003	0.1981		627.7749	627.7749	0.0369		628.5490
Total	**0.6856**	**3.0087**	**9.8331**	**0.0152**	**0.9300**	**0.0415**	**0.9716**	**0.2505**	**0.0382**	**0.2887**		**1,324.2838**	**1,324.2838**	**0.0423**		**1,325.1718**

3.4 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6687	23.2608	17.5327	0.0268		1.4943	1.4943		1.4048	1.4048	0.0000	2,609.9389	2,609.9389	0.6387		2,623.3517
Total	**2.6687**	**23.2608**	**17.5327**	**0.0268**		**1.4943**	**1.4943**		**1.4048**	**1.4048**	**0.0000**	**2,609.9389**	**2,609.9389**	**0.6387**		**2,623.3517**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4057	2.5412	5.5921	7.2100e-003	0.2039	0.0355	0.2395	0.0579	0.0327	0.0906		696.5090	696.5090	5.4200e-003		696.6228
Worker	0.2799	0.4675	4.2411	8.0000e-003	0.7261	5.9700e-003	0.7321	0.1926	5.5000e-003	0.1981		627.7749	627.7749	0.0369		628.5490
Total	**0.6856**	**3.0087**	**9.8331**	**0.0152**	**0.9300**	**0.0415**	**0.9716**	**0.2505**	**0.0382**	**0.2887**		**1,324.2838**	**1,324.2838**	**0.0423**		**1,325.1718**

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3516	20.9650	17.1204	0.0268		1.2850	1.2850		1.2083	1.2083		2,580.7618	2,580.7618	0.6279		2,593.9479
Total	**2.3516**	**20.9650**	**17.1204**	**0.0268**		**1.2850**	**1.2850**		**1.2083**	**1.2083**		**2,580.7618**	**2,580.7618**	**0.6279**		**2,593.9479**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3808	2.3242	5.4100	7.2000e-003	0.2039	0.0331	0.2370	0.0579	0.0304	0.0884		684.7032	684.7032	5.3000e-003		684.8146
Worker	0.2460	0.4212	3.7626	8.0000e-003	0.7261	5.7200e-003	0.7319	0.1926	5.2900e-003	0.1979		605.3349	605.3349	0.0339		606.0466
Total	**0.6268**	**2.7454**	**9.1726**	**0.0152**	**0.9300**	**0.0388**	**0.9688**	**0.2505**	**0.0357**	**0.2862**		**1,290.0381**	**1,290.0381**	**0.0392**		**1,290.8611**

3.4 Building Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.3516	20.9650	17.1204	0.0268		1.2850	1.2850		1.2083	1.2083	0.0000	2,580.7618	2,580.7618	0.6279		2,593.9479
Total	**2.3516**	**20.9650**	**17.1204**	**0.0268**		**1.2850**	**1.2850**		**1.2083**	**1.2083**	**0.0000**	**2,580.7618**	**2,580.7618**	**0.6279**		**2,593.9479**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3808	2.3242	5.4100	7.2000e-003	0.2039	0.0331	0.2370	0.0579	0.0304	0.0884		684.7032	684.7032	5.3000e-003		684.8146
Worker	0.2460	0.4212	3.7626	8.0000e-003	0.7261	5.7200e-003	0.7319	0.1926	5.2900e-003	0.1979		605.3349	605.3349	0.0339		606.0466
Total	**0.6268**	**2.7454**	**9.1726**	**0.0152**	**0.9300**	**0.0388**	**0.9688**	**0.2505**	**0.0357**	**0.2862**		**1,290.0381**	**1,290.0381**	**0.0392**		**1,290.8611**

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.8013					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.0102
Total	**7.0999**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.0102**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0545	0.0911	0.8262	1.5600e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		122.2938	122.2938	7.1800e-003		122.4446
Total	**0.0545**	**0.0911**	**0.8262**	**1.5600e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**122.2938**	**122.2938**	**7.1800e-003**		**122.4446**

3.5 Architectural Coating - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.8013					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506	0.0000	281.4485	281.4485	0.0267		282.0102
Total	**7.0999**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**	**0.0000**	**281.4485**	**281.4485**	**0.0267**		**282.0102**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0545	0.0911	0.8262	1.5600e-003	0.1415	1.1600e-003	0.1426	0.0375	1.0700e-003	0.0386		122.2938	122.2938	7.1800e-003		122.4446
Total	**0.0545**	**0.0911**	**0.8262**	**1.5600e-003**	**0.1415**	**1.1600e-003**	**0.1426**	**0.0375**	**1.0700e-003**	**0.0386**		**122.2938**	**122.2938**	**7.1800e-003**		**122.4446**

3.6 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2520	12.5889	12.1441	0.0187		0.7111	0.7111		0.6560	0.6560		1,816.2490	1,816.2490	0.5585		1,827.9782
Paving	0.1955					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4475**	**12.5889**	**12.1441**	**0.0187**		**0.7111**	**0.7111**		**0.6560**	**0.6560**		**1,816.2490**	**1,816.2490**	**0.5585**		**1,827.9782**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0639	0.1094	0.9773	2.0800e-003	0.1886	1.4800e-003	0.1901	0.0500	1.3700e-003	0.0514		157.2299	157.2299	8.8000e-003		157.4147
Total	**0.0639**	**0.1094**	**0.9773**	**2.0800e-003**	**0.1886**	**1.4800e-003**	**0.1901**	**0.0500**	**1.3700e-003**	**0.0514**		**157.2299**	**157.2299**	**8.8000e-003**		**157.4147**

3.6 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2520	12.5889	12.1441	0.0187		0.7111	0.7111		0.6560	0.6560	0.0000	1,816.2490	1,816.2490	0.5585		1,827.9782
Paving	0.1955					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4475**	**12.5889**	**12.1441**	**0.0187**		**0.7111**	**0.7111**		**0.6560**	**0.6560**	**0.0000**	**1,816.2490**	**1,816.2490**	**0.5585**		**1,827.9782**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0639	0.1094	0.9773	2.0800e-003	0.1886	1.4800e-003	0.1901	0.0500	1.3700e-003	0.0514		157.2299	157.2299	8.8000e-003		157.4147
Total	**0.0639**	**0.1094**	**0.9773**	**2.0800e-003**	**0.1886**	**1.4800e-003**	**0.1901**	**0.0500**	**1.3700e-003**	**0.0514**		**157.2299**	**157.2299**	**8.8000e-003**		**157.4147**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.5319	22.0576	24.7779	0.0447	2.4219	0.3100	2.7319	0.7819	0.2853	1.0672		3,925.1300	3,925.1300	0.0504		3,926.1891
Unmitigated	3.5319	22.0576	24.7779	0.0447	2.4219	0.3100	2.7319	0.7819	0.2853	1.0672		3,925.1300	3,925.1300	0.0504		3,926.1891

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Automobile Care Center	98.89	98.89	98.89	395,968	395,968
General Office Building	147.51	9.29	3.84	256,277	256,277
Parking Lot	0.00	0.00	0.00		
Total	246.40	108.18	102.73	652,245	652,245

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Automobile Care Center	11.00	0.00	0.00	100.00	0.00	0.00	100	0	0
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.285283	0.043889	0.105335	0.158225	0.057544	0.008255	0.015015	0.022833	0.002351	0.296882	0.004388	0.000000	0.000000

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681
NaturalGas Unmitigated	0.0208	0.1887	0.1585	1.1300e-003		0.0143	0.0143		0.0143	0.0143		226.3903	226.3903	4.3400e-003	4.1500e-003	227.7681

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Automobile Care Center	1739.52	0.0188	0.1705	0.1433	1.0200e-003		0.0130	0.0130		0.0130	0.0130		204.6496	204.6496	3.9200e-003	3.7500e-003	205.8950
General Office Building	184.797	1.9900e-003	0.0181	0.0152	1.1000e-004		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		21.7408	21.7408	4.2000e-004	4.0000e-004	21.8731
Total		**0.0208**	**0.1887**	**0.1585**	**1.1300e-003**		**0.0143**	**0.0143**		**0.0143**	**0.0143**		**226.3903**	**226.3903**	**4.3400e-003**	**4.1500e-003**	**227.7681**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Automobile Care Center	1.73952	0.0188	0.1705	0.1433	1.0200e-003		0.0130	0.0130		0.0130	0.0130		204.6496	204.6496	3.9200e-003	3.7500e-003	205.8950
General Office Building	0.184797	1.9900e-003	0.0181	0.0152	1.1000e-004		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		21.7408	21.7408	4.2000e-004	4.0000e-004	21.8731
Total		**0.0208**	**0.1887**	**0.1585**	**1.1300e-003**		**0.0143**	**0.0143**		**0.0143**	**0.0143**		**226.3903**	**226.3903**	**4.3400e-003**	**4.1500e-003**	**227.7681**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Unmitigated	4.1500	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0913					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.0569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8100e-003	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Total	**4.1500**	**1.8000e-004**	**0.0194**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0415**	**0.0415**	**1.1000e-004**		**0.0438**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0913					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.0569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8100e-003	1.8000e-004	0.0194	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0415	0.0415	1.1000e-004		0.0438
Total	**4.1500**	**1.8000e-004**	**0.0194**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0415**	**0.0415**	**1.1000e-004**		**0.0438**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Appendix B

Natural Environmental Study

Sheehy Court Bus Maintenance Facility Project NES (MI)

Natural Environment Study

(Minimal Impacts)

Sheehy Court at Devlin Road
Napa Valley Transportation Authority
Napa County, CA
04-NAP-Sheehy Court
[Insert Federal Project Number when available]:
June 2016

STATE OF CALIFORNIA
Department of Transportation
Napa Valley Transportation Authority

Prepared By: _____ Date: _____

Kristiaan Stuart
Senior Ecologist
(916) 706-1374, Ext. 257
4825 J Street Suite 200, Sacramento, CA 95819
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Prepared By: _____ Date: _____

Antonio Onorato
Manager of Finance, Grants and Administration
(707) 259-8779
625 Burnell Street, Napa, CA 94559
Napa Valley Transportation Authority

Approved By: _____ Date: _____

Caltrans Peer Reviewer
Phone Number
Office Name
Cooperating Agency Name

Approved By: _____ Date: _____

Caltrans Management, Title
Phone Number
Office Name

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Summary

The Napa Valley Transportation Authority (NVTA) is proposing to construct a new maintenance facility (Project), which will include a 22,000-square-foot, two-story maintenance and administrative building, a bus wash facility, and a parking lot within two vacant parcels located in southern Napa County, approximately five miles south of the City of Napa. The Project area is north of and adjacent to Sheehy Creek, a perennial stream with direct connectivity to the Napa River. Project activities will remain outside and north of the riparian vegetation canopy dripline of Sheehy Creek and remain in the upland areas only. No sensitive habitats or plant species were identified or have the potential to occur in the upland areas. The upland areas do support marginal foraging habitat for Swainson's hawk but the conversion of this habitat area to an industrial use would not have an adverse effect due to the small area of suitable foraging habitat onsite and abundance of high quality foraging habitat areas adjacent to the site. Sheehy Creek offers suitable nesting habitat for several species of migratory and non-migratory birds but implementation of minor avoidance and minimization measures would reduce potential impacts to a less than significant level.

1. Introduction

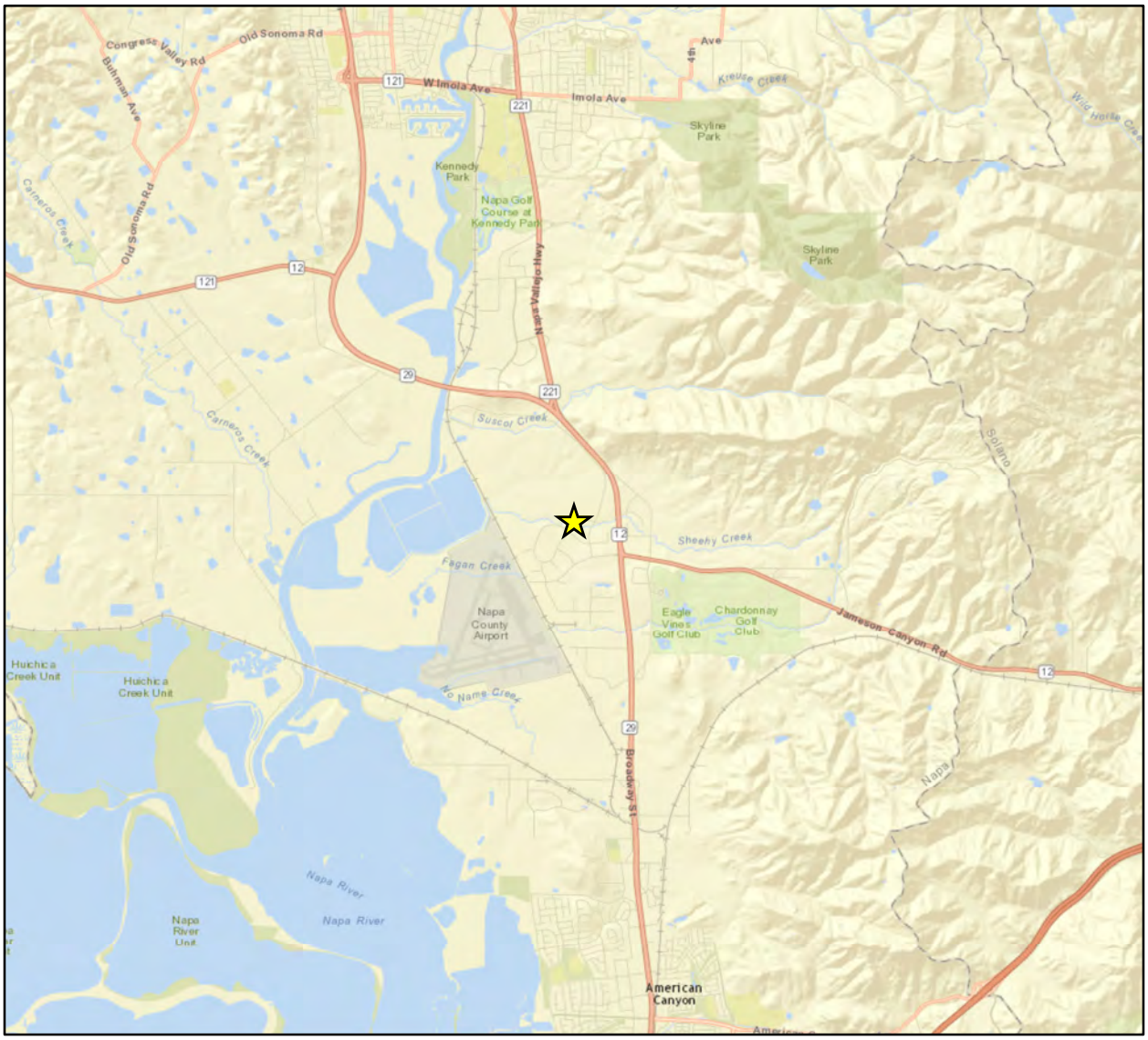
1.1 Project Description

The Project is located on approximately 9.11 acres in an unincorporated area of Napa County, California within Assessor's Parcel Numbers (APNs) 057-250-025 and 057-250-036, south and west of State Route (SR) 12, northeast of the Napa County Airport, and east of the Napa River near Bull Island. The Project is mapped within Township 4 North, Range 4 West, Sections 1 and 2 of the *Cuttings Wharf, California* United States Geological Survey (USGS) 7.5-minute topographic quadrangle (USGS 2014). The Project is specifically located west of Devlin Road at the end of Sheehy Court. The Project currently consists of a mostly undeveloped property that is bordered by commercial businesses to the northeast, Sheehy Creek to the south, and large areas of agricultural land to the north and northwest (Figure 2). The 9.11-acre Area of Potential Effect and Biological Study Area (BSA) are one-in-the-same for the purposes of this Natural Environment Study – Minimal Impacts (NES-MI).

The proposed Project consists of the construction of a 22,000-square-foot, two-story maintenance facility building including new administrative offices, a bus wash facility, and a parking lot for up to 100 public transit vehicles and parking for employees and visitors (Figure 3).

Construction of the proposed Project would require grading and excavation. Based on the design of the Project, no physical alteration of the existing roadway is proposed. Relocation of underground utilities (e.g. storm drain) would be required. The following is a list of the equipment that is anticipated to be used onsite during Project implementation:

- Backhoe / Loader / Excavator
- Chip Spreader
- Cold Planer
- Compactor
- Crane
- Curb Machine
- Dump Truck
- Oil Distributer
- Paver
- Redi-Mix Truck
- Roller
- Sweeper
- Water Tender



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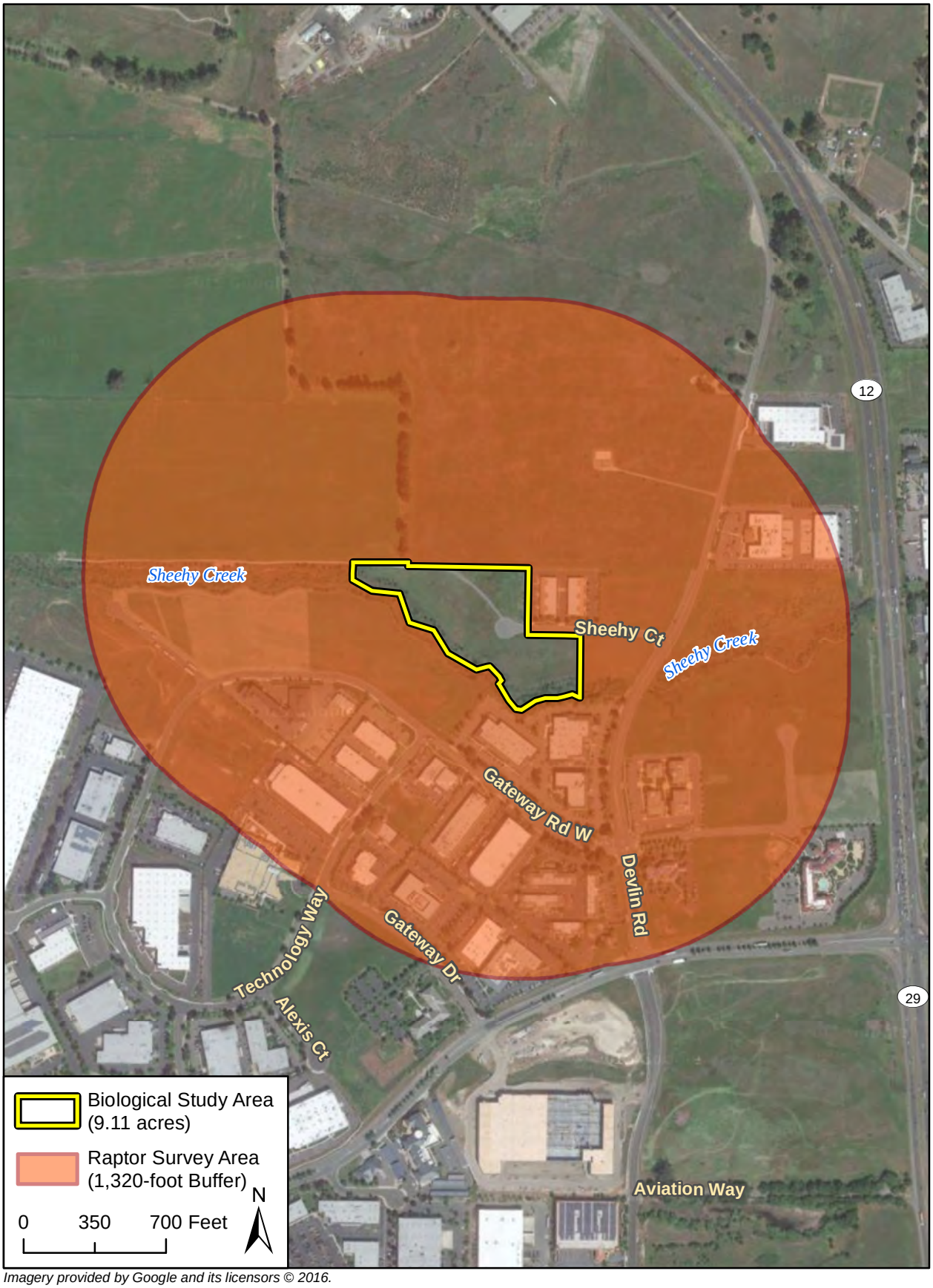
Project Location

0 0.75 1.5
Miles

N

Regional Location

Figure 1



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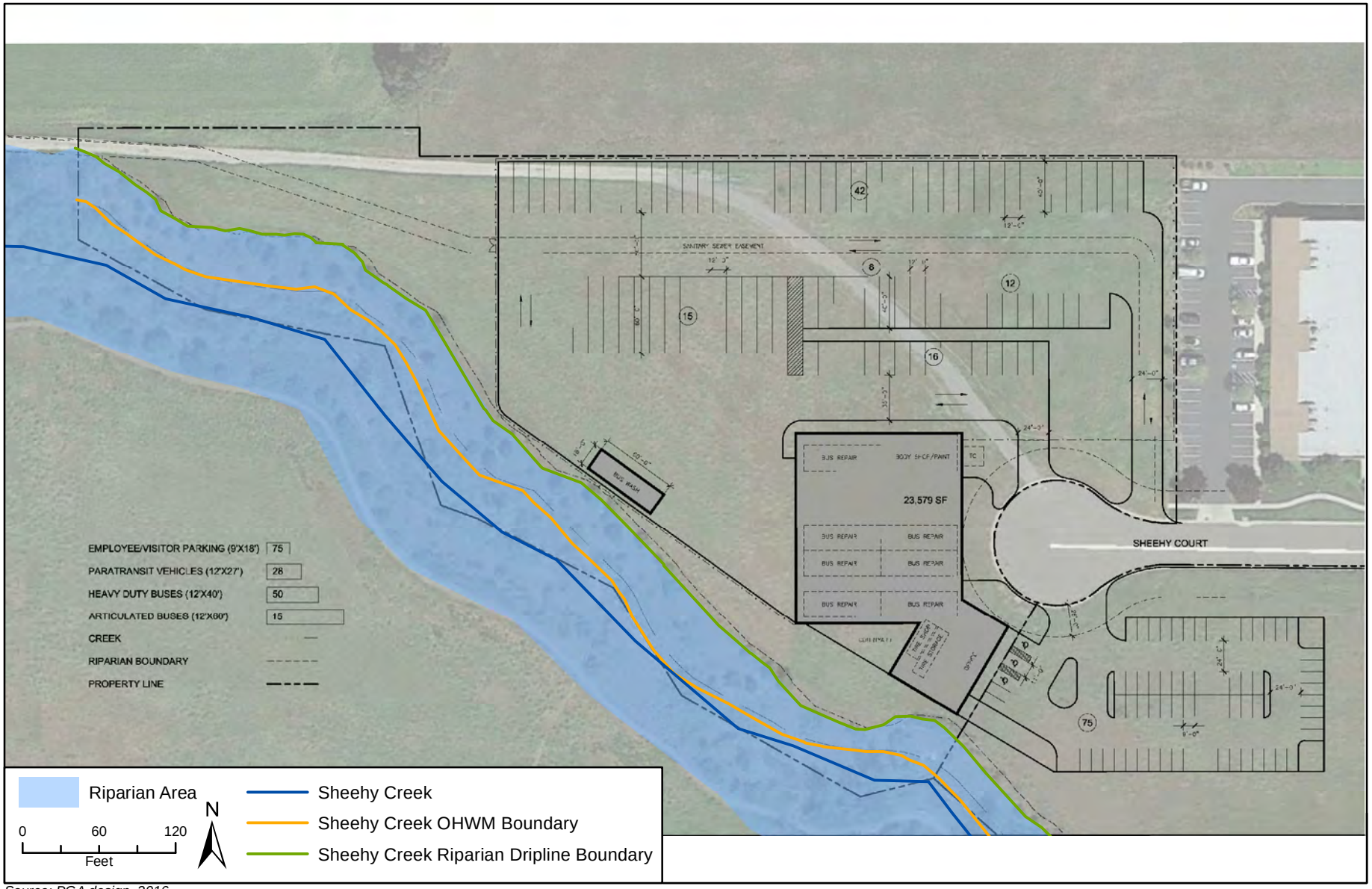
Biological Study Area

Figure 2



Source: PGA design, 2016.

Conceptual Site Plan

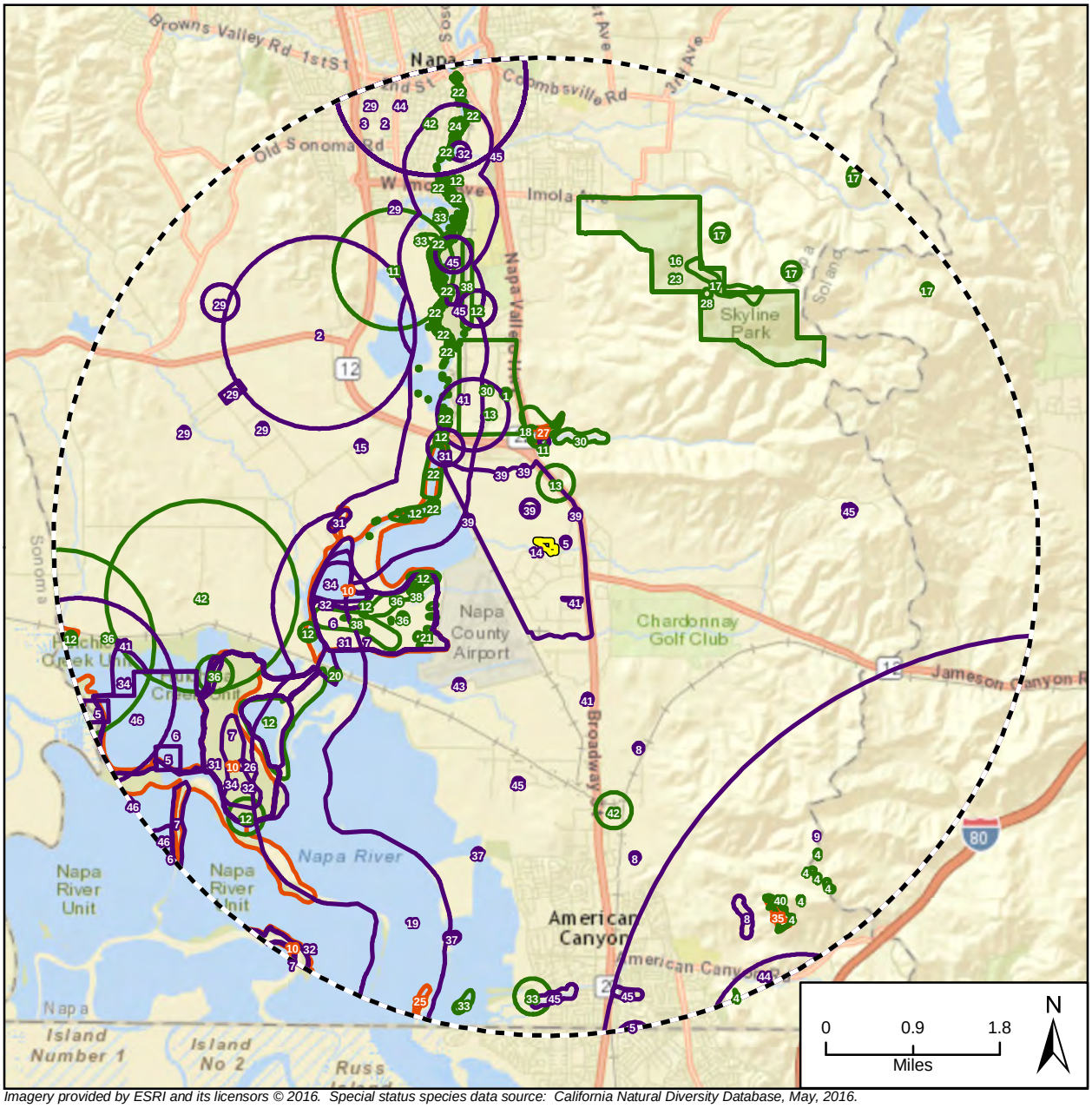
Figure 3

2. Study Methods

Prior to conducting biological field surveys, Rincon Consultants, Inc. (Rincon) Senior Ecologist, Kristiaan Stuart queried the California Department of Fish Wildlife (CDFW) California Natural Diversity Database (Figures 4 and 5, Appendix A), the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) (Figure 6, Appendix B) and the California Native Plant Society online Inventory of Rare and Endangered Plants of California (Appendix C) for known special status species, sensitive habitats and federally designated critical habitats. A literature review was also conducted on the population distributions of two special status song sparrows - the Suisun and Samuel's (*Melospiza melodia maxillaris* and *M. melodia samuelis*, respectively) - for their potential to be within the Project area. The List of Vegetation Alliances and Associations (CDFW 2010) was cross-referenced to vegetation communities identified and mapped in accordance with A Manual of California Vegetation, 2nd Edition (Sawyer et al. 2009) to asses if any sensitive natural terrestrial communities occur within the BSA.

On May 18, 2016 between the hours of 1340 and 1920, Mr. Stuart conducted biological field surveys including reconnaissance-level wildlife and aquatic resources inventories, and a full floristic botanical survey within the 9.1-acre BSA. Nesting raptor surveys were also conducted up to one-quarter mile (1,320 feet) outside of the Project area boundary. These surveys included pedestrian surveys along a gravel service road to the west and windshield surveys in the industrial park south of the Project area accessed through Gateway Road West. Binoculars (Nikon Monarch 8x42) were used to visually identify all visible avian species. Avian species were also detected acoustically and determined to species when possible. Botanical surveys were conducted on foot throughout the BSA. A list of all plant species encountered was generated at the time of the survey and specimens that could not be identified to species in the field were later identified using a stereo dissecting microscope. Survey data were collected on notebooks, 11x17 color aerial maps of the Project area, digital camera and a handheld Global Positioning System unit. All pertinent data was later transferred into a Geographic Information System and / or has been incorporated into this report.

Mr. Stuart has 25 years of experience in the biological sciences and has conducted botanical and wildlife surveys and aquatic resource inventories in nearly all counties in California. He has recently conducted three other biological surveys in the vicinity of the Project in the winter of 2015 and early spring of 2016 and was familiar with the flora and fauna and abiotic conditions of the Project area prior to conducting the biological field surveys. Mr. Stuart holds a Bachelor of Science degree in Biology with an Ecology Emphasis and conducted three years of graduate studies and research in plant ecology from California State University, Chico, and serves as Senior Ecologist/Project Manager in the Natural & Cultural Resources Group at Rincon.



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Project Location
5-Mile Buffer

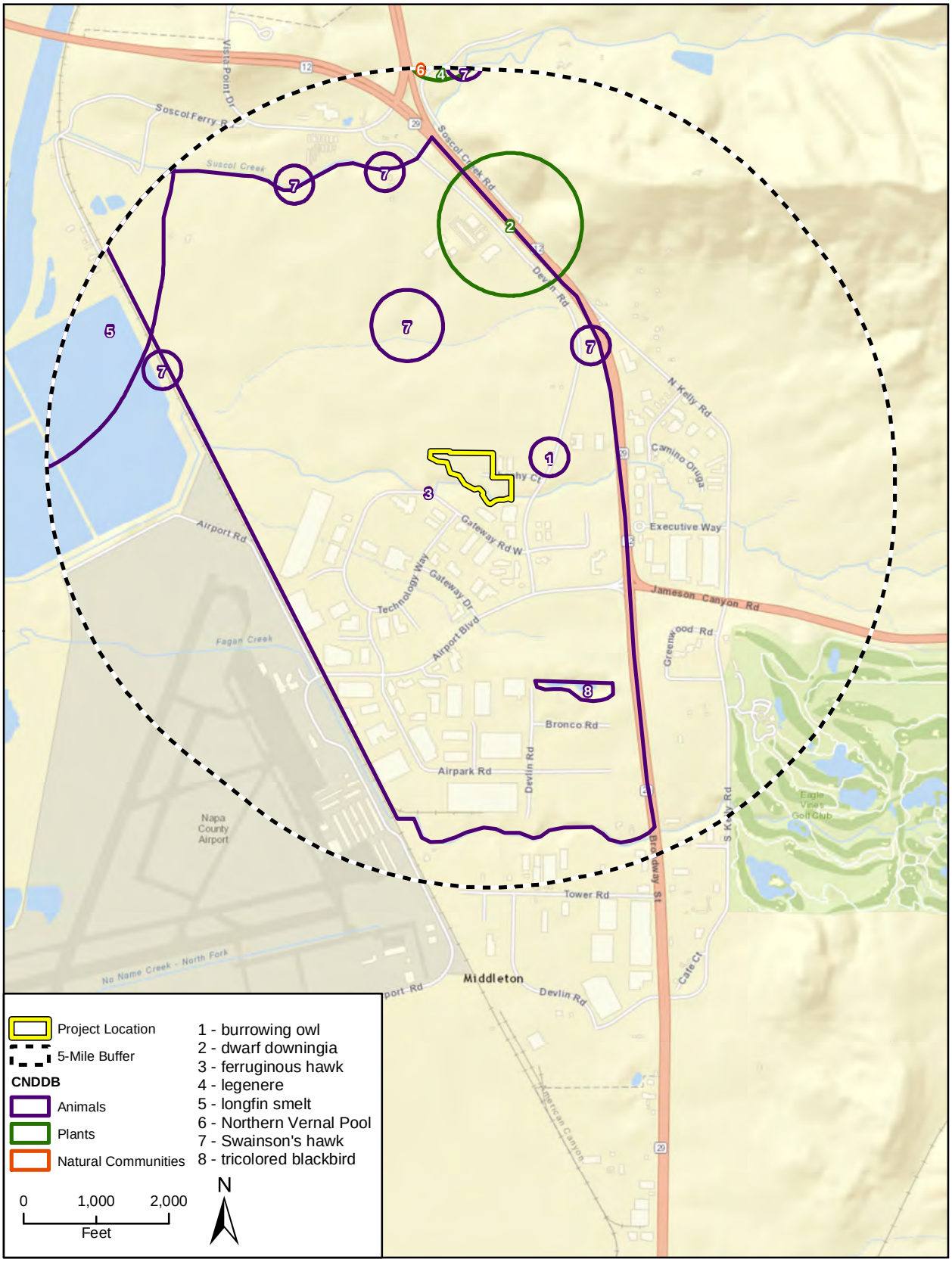
CNDDB

Animals
Plants
Natural Communities

1 - alkali milk-vetch
2 - American badger
3 - An isopod
4 - big-scale balsamroot
5 - burrowing owl
6 - California black rail
7 - California clapper rail
8 - California red-legged frog
9 - callippe silverspot butterfly
10 - Coastal Brackish Marsh
11 - Contra Costa goldfields
12 - Delta tule pea
13 - dwarf downingia
14 - ferruginous hawk
15 - golden eagle
16 - Greene's narrow-leaved daisy
17 - holly-leaved ceanothus
18 - legenere
19 - longfin smelt
20 - Lyngbye's sedge
21 - Marin knotweed
22 - Mason's lilaeopsis
23 - narrow-anthered brodiaea
24 - Northern California black walnut
25 - Northern Coastal Salt Marsh
26 - northern harrier
27 - Northern Vernal Pool
28 - oval-leaved viburnum
29 - pallid bat
30 - saline clover
31 - salt-marsh harvest mouse
32 - saltmarsh common yellowthroat
33 - San Joaquin spearscale
34 - San Pablo song sparrow
35 - Serpentine Bunchgrass
36 - soft salty bird's-beak
37 - steelhead - central California coast DPS
38 - Suisun Marsh aster
39 - Swainson's hawk
40 - Tiburon paintbrush
41 - tricolored blackbird
42 - two-fork clover
43 - vernal pool fairy shrimp
44 - western bumble bee
45 - western pond turtle
46 - western snowy plover

Sensitive Elements Reported in the California Natural Diversity Database Located within 5 miles

Figure 4



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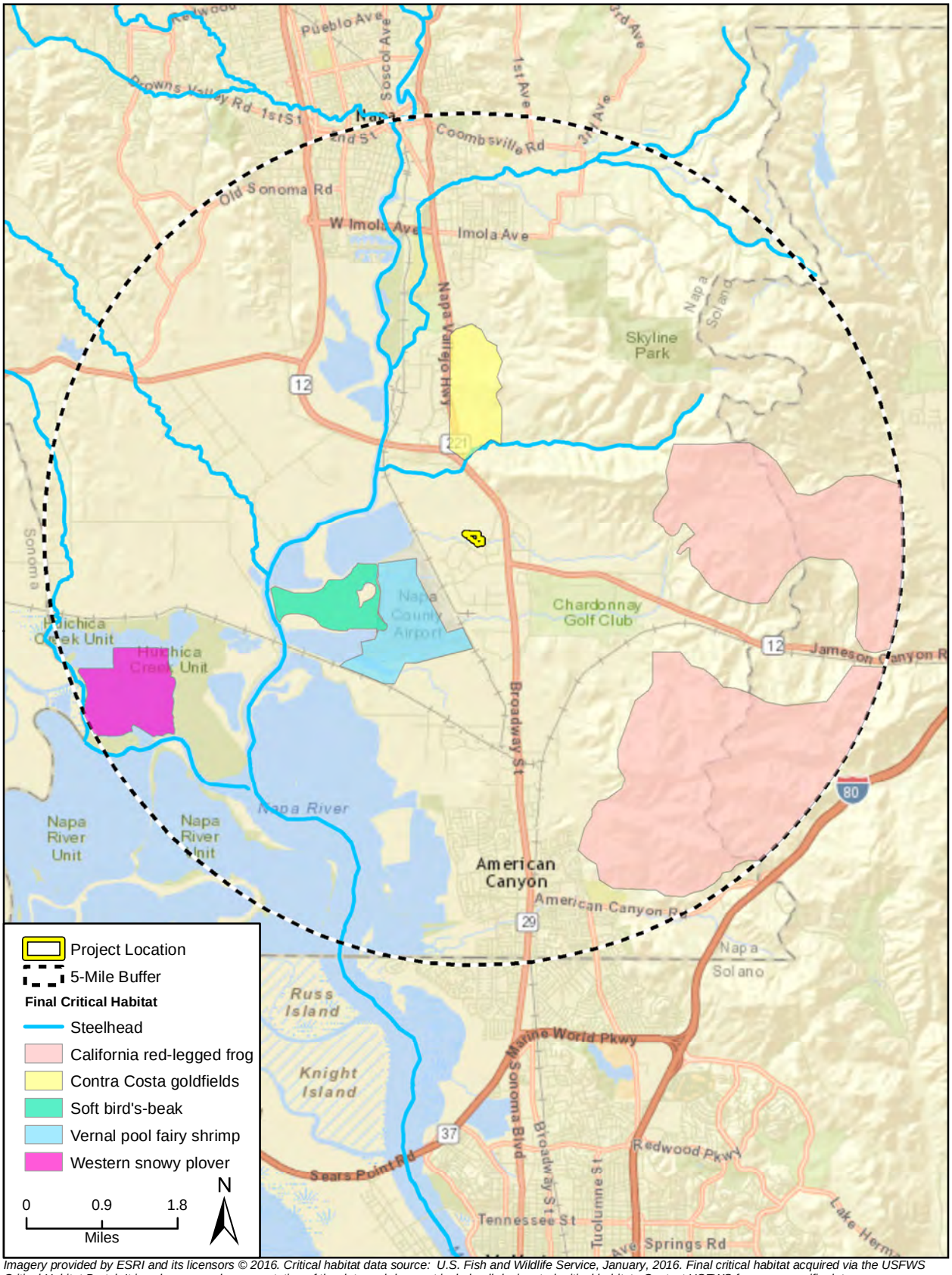
Sensitive Elements Reported in the California Natural Diversity Database Located within 1 mile

Figure 5



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Federally Designated Critical Habitats
Located within 5 miles

Figure 6

2.1 Regulatory Requirements

Clean Water Act Section 402

The Project impact area (approximately 6.82 acres) exceeds the minimum state threshold of one acre for compliance with Section 402 of the federal Clean Water Act (CWA) and will therefore be required to obtain a General Construction Permit under the National Pollutant Discharge Elimination System (NPDES). The NPDES permit will require the development of a Storm Water Pollution Prevention Plan (SWPPP) which requires the identification of Best Management Practices (BMPs) used to protect storm water runoff. The General Construction NPDES permit and associated SWPPP will need to be submitted to the San Francisco Bay Regional Water Quality Control Board (RWCQB) for review and approval.

Clean Water Act Section 404

The U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) regulate the discharge of dredged or fill material into waters of the U.S., including wetlands, under Section 404 of the CWA. Waters of the U.S. include wetlands, lakes, and rivers, streams, and their tributaries. Wetlands that fall under the jurisdiction of the USACE (referred to as jurisdictional wetlands) are defined as areas “inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Areas not considered jurisdictional waters include, for example, non-tidal drainage and irrigation ditches excavated on dry land; artificially irrigated or created bodies such as small ponds, lakes or swimming pools; and water-filled depressions (33 CFR 328.3; 40 CFR 230.3).

Project proponents must obtain a permit from the USACE for all discharges of dredged or fill material into waters of the U.S., including jurisdictional wetlands, before proceeding with a proposed action. If wetlands are jurisdictional and could be filled as part of the Project, the USACE may issue either an individual permit or a general permit. Individual permits are prepared on a Project-specific basis for Projects that are expected to have more than minimal adverse effects on the aquatic environment. General permits are pre-authorized permits issued to cover similar activities that are expected to cause only minimal individual and cumulative adverse environmental effects.

A Section 404 permit may not be required if the Project avoids the discharge of any fill material into waters of the U.S., including wetlands. If the Project cannot be designed to avoid the discharge of fill into waters of the U.S., including wetlands, a Section 404 permit must be obtained.

Federal Endangered Species Act of 1973, as amended

Federal agencies that fund, authorize, or carry out actions that "may affect" a listed species and its habitat, must consult with the U.S. Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) according to the provision in Section

7(a) of the Endangered Species Act (Act) for federal actions. Provisions of the 1982 amendments to the Act authorize the USFWS to permit the taking of listed species, if such taking is "incidental to, and not the purpose of carrying out otherwise lawful activities [16 U.S.C. 1539 and Section 10(a)(1)(B) of the Act] pursuant to Section 7 of Act for federal actions." As part of Caltrans National Environmental Policy Act assignment of federal responsibilities by the Federal Highway Administration effective October 1, 2012 and pursuant to 23 USC 327 as amended by Moving Ahead for Progress in the 21st Century Act (MAP-21), Caltrans assumed the role of lead federal agency for Section 7 of the Act. As part of the process of compliance with the Act (Section 7(c)), this NES-MI was prepared to provide Caltrans, the lead National Environmental Policy Act (NEPA) agency, with adequate information to determine the Project's impacts to federally listed and proposed species, and their habitat, including any federally designated Critical Habitat, and whether consultation is necessary with the USFWS and/or NMFS.

Executive Order 13112 – Invasive Species

Executive Order 13112 was issued in 1999 to enhance federal coordination and response to the complex and accelerating problem of invasive species. Invasive species on the U.S. Department of Agriculture Federal Noxious Weed List (2014), California Department of Food and Agriculture Noxious Weed List (2010), and California Invasive Plant Council (Cal-IPC) Inventory (2006) were reviewed and compared to those documented within the BSA.

Executive Order 11988 – Flood Plains Management

Executive Order 11988 directs federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

Executive Order 11990 – Protection of Wetlands

Executive Order 11990 requires agencies to minimize destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. Wetlands function to improve water quality, detain stormwater runoff, recharge groundwater, and provide wildlife habitats. A wetland is an area of land whose soil is saturated with moisture either permanently or seasonally. Such areas may also be covered partially or completely by shallow pools of water.

Migratory Bird Treaty Act

This treaty with Canada, Mexico, and Japan makes it unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, or kill migratory birds. The law applies to the removal of nests (such as swallow nests on bridges) occupied by migratory birds during the breeding season. The California Fish and Game Code (CFGC; Section 3500) also prohibits the destruction of any nest, egg, or nestling (see below).

California Fish and Game Code

Under the California Endangered Species Act (CESA), the CDFW has the responsibility for maintaining a list of endangered and threatened species (CFGC Section 2070). Sections 2050 through 2098 of the CFGC outline the protection provided to California's rare, endangered, and threatened species. Section 2080 of the CFGC prohibits the taking of plants and animals listed under the CESA. Section 2081 established an incidental take permit program for state-listed species. The CDFW maintains a list of "candidate species," which it formally notices as being under review for addition to the list of endangered or threatened species.

In addition, the Native Plant Protection Act of 1977 (CFGC Section 1900 et seq.) prohibits the taking, possessing, or sale within the State of any plants with a state designation of rare, threatened, or endangered (as defined by CDFW). An exception to this prohibition in the Native Plant Protection Act allows landowners, under specified circumstances, to take listed plant species, provided that the owners first notify CDFW and give that state agency at least 10 days to come and retrieve (and presumably replant) the plants before they are plowed under or otherwise destroyed. It should be noted that CFGC Section 1913 exempts from "take" prohibition "the removal of endangered or rare native plants from a canal, lateral ditch, building site, or road, or other right of way." Project impacts to these species are not considered significant unless the species are known to have a high potential to occur within the area of disturbance associated with construction of the proposed Project.

The CDFW also maintains lists of "Species of Special Concern" that serve as species "watch lists." The CDFW has identified many Species of Special Concern. Species with this status have limited distribution or the extent of their habitats has been reduced substantially, such that their populations may be threatened. Thus, their populations are monitored, and they may receive special attention during environmental review. While they do not have statutory protection, they may be considered rare under CEQA and thereby warrant specific protection measures.

Sensitive species that would qualify for listing but are not currently listed are afforded protection under CEQA. The CEQA Guidelines Section 15065 (Mandatory Findings of Significance) requires that a substantial reduction in numbers of a rare or endangered species be considered a significant effect. The CEQA Guidelines Section 15380 (Rare or Endangered Species) provides for assessment of unlisted species as rare or endangered under CEQA if the species can be shown to meet the criteria for listing. Unlisted plant species on the CNPS Lists 1A, 1B, and 2 would typically be considered under CEQA.

Sections 3500 to 5500 of the CFGC outline protection for fully protected species of mammals, birds, reptiles, amphibians, and fish. Species that are fully protected by these sections may not be taken or possessed at any time. The CDFW cannot issue permits or licenses that authorize the take of any fully protected species, except under certain

circumstances such as scientific research and live capture and relocation of such species pursuant to a permit for the protection of livestock.

Under Section 3503.5 of the CFGC, it is unlawful to take, possess, or destroy any birds in the orders of Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto. To comply with the requirements of the CESA, an agency reviewing a proposed Project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the Project study area and determine whether the proposed Project will have a potentially significant impact on such species. In addition, the CDFW encourages informal consultation on any proposed Project that may impact a candidate species.
Project-related impacts to species on the CESA endangered or threatened list would be considered significant. State-listed species are fully protected under the mandates of the CESA. “Take” of protected species incidental to otherwise lawful management activities may be authorized under CFGC Section 206.591. Authorization from the CDFW would be in the form of an Incidental Take Permit.

Section 1602 of the CFGC requires any entity to notify the CDFW before beginning any activity that “may substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake” or “deposit debris, waste, or other materials that could pass into any river, stream, or lake.” ”River, stream, or lake” includes waters that are episodic and perennial; and ephemeral streams, desert washes, and watercourses with a subsurface flow. A Lake or Streambed Alteration Agreement will be required if the CDFW determines that Project activities may substantially adversely affect fish or wildlife resources through alterations to a covered body of water.

California Porter-Cologne Water Quality Control Act and Clean Water Act Section 401

The Regional Water Quality Control Board (RWQCB) has regulatory authority over wetlands and waterways under both the CWA and the State of California’s Porter-Cologne Water Quality Control Act (California Water Code, Division 7). Under the CWA, the RWQCB has regulatory authority over actions in waters of the U.S., through the issuance of water quality certifications under Section 401 of the CWA in conjunction with permits issued by the USACE under Section 404 of the CWA. When the RWQCB issues Section 401 certifications, it simultaneously issues general Waste Discharge Requirements (WDRs) permit for the Project under the Porter-Cologne Water Quality Control Act. Activities in areas that are outside of the jurisdiction of the USACE (e.g., isolated wetlands, vernal pools, seasonal streams, intermittent streams, channels that lack a nexus to navigable waters, or stream banks above the ordinary high water mark) are regulated by the RWQCB under the authority of the Porter-Cologne Water Quality Control Act. Activities that lie outside of USACE jurisdiction may require the issuance of either individual or general WDRs permits.

Local Ordinances: Napa County

The County of Napa Municipal Code (Ord. 1307 § 1 (part), 2008) contains the following restrictions for all proposed activities within any riparian zone:

- The proposed activity will not, with regard to the riparian zones along a channel, remove more than the following:
    - A native tree eighteen inches diameter-at-breast-height (DBH) per one hundred linear feet of riparian zone on each side of the floodplain, or
    - Three native trees twelve inches DBH per one hundred linear feet of riparian zone on each side of the floodplain, or
    - Six native trees six inches DBH per one hundred linear feet of riparian zone on each side of the floodplain, or
    - Five hundred square feet of vegetation in riparian zones beyond ten feet from the top of the bank, or
    - The temporary removal of a portion of riparian vegetation not more than fifteen feet wide beyond ten feet from the top of the bank, where replanting of such strip is a part of the Project; and

- The proposed activity will not involve the locating of any facility or structure within ten feet from the top of the bank; and
- Will not result in a cut or fill slope that would remain unprotected by slope reseeding and bank stabilization replanting at the end of the Project, thereby making the slope susceptible to erosion.

Napa County Municipal Code Title 18, Chapter 18.40.170 - Watercourse protection.

A. Setbacks.

1. Unobstructed development setback corridors shall be established and maintained along the following watercourses to facilitate movement of wildlife, to reduce the impacts of localized flooding, to provide visual amenities, to improve water quality and associated habitat, and to contribute to a separation between the geographic portions of the industrial park.

   Unless specifically authorized by the applicable specific plan, no development or improvements, including storage of equipment or materials or construction of fences, shall be permitted in the setbacks established below:

   a. Suscol Creek: one hundred fifty feet;
   b. Fagan Creek: seventy-five feet;
   c. Sheehy Creek: thirty-five feet;
   d. "No Name" Creek south of the Napa County Airport: fifty feet.

2. Approved parking, loading or storage which existed on the south side of Fagan Creek, on the west side of Highway 29 as of October 20, 1998: thirty-five feet.

3. Setback may be required to be increased if a greater distance is set by the State Department of Fish and Game, the Napa County Water Conservation and Flood Control District, or the department if such increase is necessary to increase biological values, or is necessary to achieve integrated habitat retention or restoration.
4. Setbacks established in this section shall be measured from the top of the bank.

Napa County does not contain any other tree removal ordinances or constraints to biological features relevant to this Project.

2.2 Studies Required

To support preparation of this NES-MI and to provide the level of information necessary to analyze potential Project impacts to biological resources pursuant to NEPA for the proposed Project, a review of relevant biological literature and databases was performed and a field reconnaissance survey was conducted within the BSA.

2.3 Agency Coordination and Professional Contacts

Due to a CNDDB recorded occurrence of California red-legged frog (CRLF) approximately 2.18 miles south of the Project area, the USFWS was consulted for protocol-level survey requirements. On May 20, 2016, Kristiaan Stuart (Rincon) spoke with Leif Goude (Biologist, USFWS) regarding the need for protocol-level CRLF surveys in the Project area. Based on USFWS's data and expert knowledge, Mr. Goude determined that protocol-level surveys would not be required and based on the Project location and description a "May Affect but Not Likely to Adversely Affect" (NLAA) determination would be appropriate for informal Section 7 consultation under the Act. Mr. Goude was informed that the federal nexus for informal Section 7 consultation was based on Project financial assistance from the Federal Transportation Authority (FTA).

2.4 Limitations That May Influence Results

All plant species observed within the survey area were documented. The survey included a directed search for special status plants that would have been apparent during the time of the survey. Limitations to the compilation of a comprehensive floral checklist were imposed by seasonal factors, such as blooming period and emergence of some of the annual species. Floral nomenclature for native and non-native plants follows Baldwin et al. (2012) as updated by The Jepson Online Interchange (University of California, Berkeley 2016).

Wildlife species observed directly or detected from calls, tracks, scat, nests, or other sign were documented. The detection of wildlife species was limited by seasonal and temporal factors. The survey was conducted in the late spring; therefore, potentially occurring winter migrants may not have been observed. As the survey was performed during the day, identification of nocturnal animals was limited to sign if present onsite. Zoological nomenclature is based upon Stebbins and McGinnis (2012) for amphibians

and reptiles, the American Ornithologists Union (1998) for birds, and Kelt and Osborn (2014) for mammals.

3. Results: Environmental Setting

3.1 Description of the Existing Biological and Physical Conditions

Study Area
The study area or BSA includes the limits of the Project and extends approximately 1,320 feet in all directions to include a raptor survey area. The Project is proposed to partially occupy two APNs (057-250-025 and 057-250-036) at the end of Sheehy Court. This area is comprised of Sheehy Creek, a low gradient mostly perennial stream with a mid-developed riparian habitat restoration area (Napa Valley Gateway Business Park Wetland Mitigation Project) that was implemented in 2002 (Macmillan 2008), to the south and open disturbed annual grassland comprising the remainder of the Project area.

Physical Conditions
The BSA ranges in elevation from approximately 40 feet in the east to approximately 32 feet in the west with the lowest elevation at the western extent of the channel of Sheehy Creek at 25 feet. Soils are described as a Haire loam, 2 to 9 percent slopes (Natural Resources Conservation Service 2016) and based on observations may have a neutral to alkaline pH due relictual salt intrusion from San Francisco Bay. Soil textures range from loam to clay to sandy clay with increasing depth.

Biological Conditions in the Study Area
The BSA consists of two broad habitat areas: riparian and upland grasslands. The riparian area occurs along Sheehy Creek (Figure 7) and is in a post-restoration mid-development stage with open areas between trees and shrubs. Riparian species in this habitat are represented by hard stemmed bulrush (*Schoenoplectus acutus*), red willow (*Salix laevigata*), coast live oak (*Quercus agrifolia*), and blue elderberry (*Sambucus nigra* ssp. *caerulea*) and becoming denser to the east with arroyo willow (*Salix lasiolepis*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), sandbar willow (*Salix exigua*), California blackberry (*Rubus ursinus*) and more blue elderberry shrubs. Three specific vegetation communities occur within the riparian habitat area: 1) Red-willow thicket Alliance; 2) Hardstem bulrush marsh Alliance; and 3) Coast live oak woodland Alliance.

The Red-willow thicket Alliance (G3 S3): The Red-willow thicket Alliance is a sensitive plant community largely found within the ordinary high water mark of Sheehy Creek within the BSA. Most of the red-willow habitat is currently growing in inundated conditions (i.e. emergent) in the stream bed and along the stream bank. Subdominant species included Fremont's cottonwood, sandbar willow, Pacific willow and arroyo willow. Other co-occurring species included hardstem bulrush, cattails, river bulrush, and rabbits foot grass.

Hardstem bulrush marsh Alliance (G5 S4): The Hardstem bulrush marsh Alliance is found within the inundated stream channel of Sheehy Creek. Hardstem bulrush is a wetland obligate species and only grows in wetted conditions of prolonged saturation.

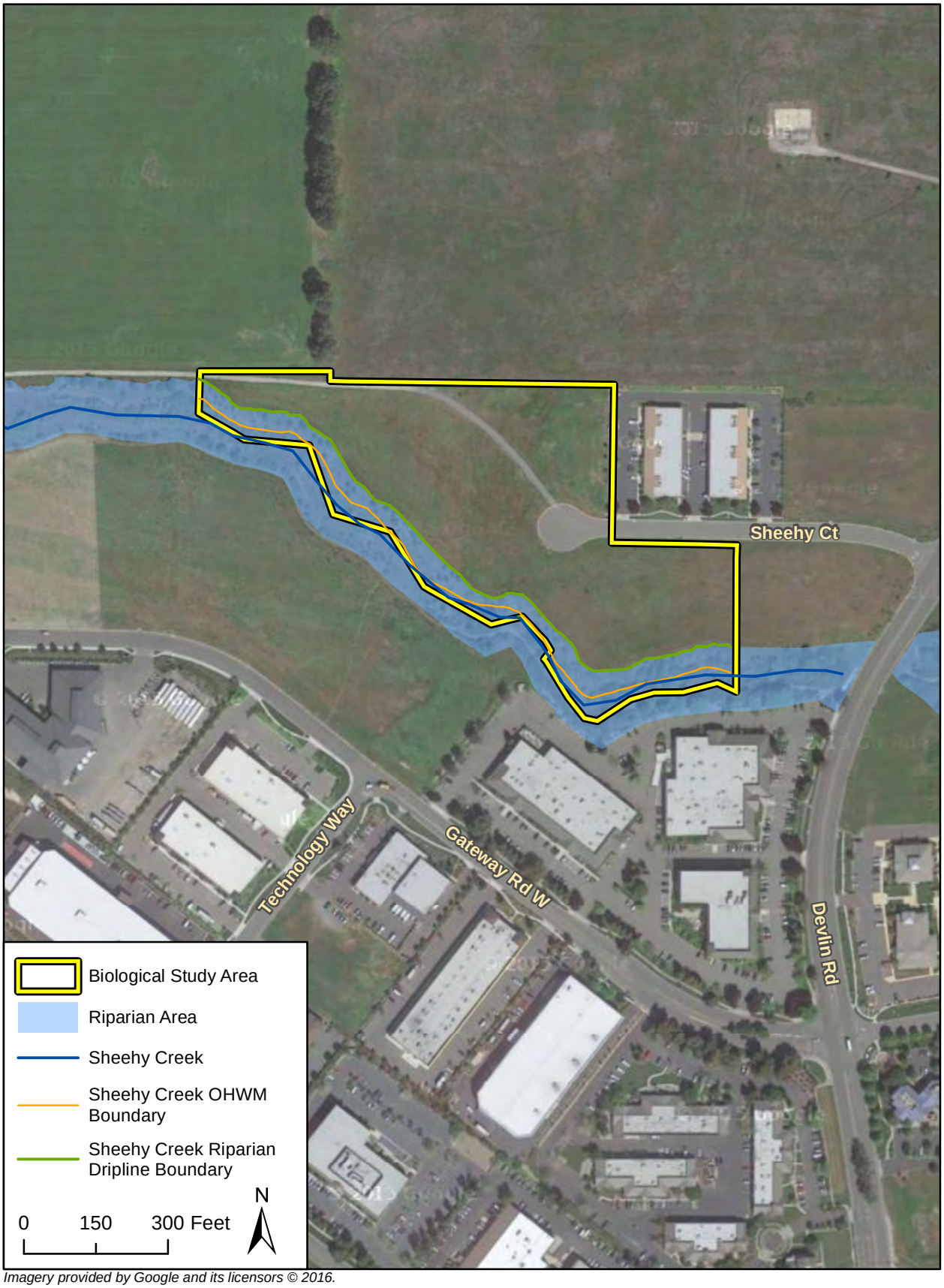
The aquatic habitat area created by the dense stand of hardstem bulrush is an obligate wetland, and as such is protected under state and federal law. Associate species included red-willow and sandbar willow.

Coast live oak woodland Alliance (G5 S4): The Coast live oak woodland Alliance dominates the riparian area of Sheehy Creek extending from the ordinary high water mark to the outer riparian drip line. The density of the coast live oak varies with woodland density decreasing from east to west along Sheehy Creek. Subdominant species included blue elderberry, California bay, California buckeye, coyote brush, California wild rose, California blackberry, Sweet fennel, Harding grass and salt grass.

The upland area is divided into monotypic areas of Harding grass (*Phalaris aquatica*) and areas of mostly non-native annual grasses such as slender oat (*Avena barbata),* Medusa head (*Elymus caput-medusae*), salt grass (*Distichlis spicata*), Italian rye grass (*Festuca perennis*) and foxtail barley (*Hordeum murinum*).

Harding grass swards Semi-natural Stands (No Rank): The Harding grass swards Semi-natural Stands plant community dominates the majority of the upland area north of the riparian drip line. Harding grass comprises the sole plant species of this community except where bordered by non-native annual grassland. Harding grass in this area forms thick, monotypic stands up to six feet tall. Harding grass is a non-native plant species listed by the California Invasive Plant Council (Cal-IPC) in the “Moderate” category for its “substantial and apparent” ecological impacts to plant and animal communities. Based on the review of 23 years of aerial imagery, the upland area north of the riparian drip line has been subjected to a consistent disturbance regime for over 20 years. Activities that were evident from aerial imagery included the use of this area as an agricultural site (1993), borrow area for fill material used in the site development of the business park north of Sheehy Court (2005), and regular mowing since 2007. This disturbance regime has likely exacerbated the spread of non-native invasive species in this area.

Non-native annual grassland (No Rank): The non-native annual grassland plant community is composed largely of non-native annual grass species including but not limited to: slender oats, Italian rye grass, foxtail barley, soft brome, Medusa head, rose clover, narrow leaved plantain and jointed charlock. This plant community occurs in the eastern upland areas of the Project area north of the riparian drip line. Slender oats are often the dominant species and grow to heights of approximately three and a half feet (approximately 42 inches). This plant community is not protected by state or federal law. Based on the review of 23 years of aerial imagery, the upland area north of the riparian drip line has been subjected to a consistent disturbance regime to date. Activities that were evident from aerial imagery included the use of this area as an agricultural site (1993), borrow area for fill material used in the site development of the business park north of Sheehy Court (2005), and nearly annual mowing since 2007. This disturbance regime has likely exacerbated the spread of non-native invasive species in this area.



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Biological Survey Results – Reconnaissance Level State and Federal Jurisdictional Aquatic Resource Boundaries

Figure 7

Habitat Connectivity
Sheehy Creek, as with other riparian habitat areas, supports wildlife movement from higher elevation uplands to low lying areas with various habitat types. Sheehy Creek is a relatively short stream extending only 2.75 miles to the east into the base of the foothills from the BSA. Sheehy Creek extends west from the BSA for another 2.8 miles before terminating at the Napa River.

3.2 Regional Species and Habitats and Natural Communities of Concern

For the purpose of this report, special status species are those plants and animals listed, proposed for listing, or candidates for listing as Threatened or Endangered by the USFWS or NMFS under the Act; those listed or proposed for listing as Rare, Threatened, or Endangered by the CDFW under CESA; those recognized as Species of Special Concern (SSC) by the CDFW; and plants occurring on lists 1 and 2 of the CDFW California Rare Plant Rank (CRPR) system (i.e., formerly known as the CNPS lists) in accordance with the following definitions:

- List 1A = Plants presumed extinct in California;
- List 1B.1 = Rare or endangered in California and elsewhere; seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- List 1B.2 = Rare or endangered in California and elsewhere; fairly endangered in California (20-80% occurrences threatened);
- List 1B.3 = Rare or endangered in California and elsewhere, not very endangered in California (<20% of occurrences threatened or no current threats known);
- List 2 = Rare, threatened or endangered in California, but more common elsewhere

Table 1 below lists 44 special status plant species that were identified in the database searches as having the potential to occur in the vicinity of the BSA; of these, 10 were identified as having the potential to occur based on existing site conditions and expert knowledge. Table 2 lists 36 special status animal species that were identified in the database searches as occurring or having the potential to occur within five miles of the BSA; of these, 14 have the potential to occur based on local conditions or are known to occur based on direct observations.

Table 1: Special Status Plant Species Potentially Occurring within the Project Area

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
alkali milk-vetch	*Astragalus tener* var. *tener*	—	—	1B.2	Dicot annual herb found in Alkali playa, valley and foothill grassland, vernal pools, and wetland. Prefers low ground, alkali flats, and flooded lands; in annual grassland or in playas or vernal pools. Bloom period: March–June 0–168 meters (m)	A	No suitable habitat present within the Project area. There are no recorded occurrences within 1 mile of the Project.
bent-flowered fiddleneck	*Amsinckia lunaris*	—	—	1B.2	Dicot annual herb found in valley grassland and foothill woodland. Bloom period: March–June 3–500 m	HP	Suitable habitat is present within the Project. No recorded occurrences are within 1 mile of the Project.
big tarplant	*Blepharizonia plumosa*	—	—	1B.1	Dicot annual herb found in valley and foothill grassland. Prefers dry hills and plains in annual grassland; clay to clay-loam soils; usually on slopes and often in burned areas. Bloom period: July–November 30–505 m	HP	Marginal habitat is present within the Project. No recorded occurrences are within 1 mile of the Project.
big-scale balsamroot	*Balsamorhiza macrolepis*	—	—	1B.2	Dicot perennial herb found in slopes of valley grassland and foothill woodland. Bloom period: March–June 90–1,555 m	A	Marginal habitat is present within the Project. However the site elevation is out of the range for this species. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
Bolander's water-hemlock	*Cicuta maculata* var. *bolanderi*	—	—	2B.1	Dicot perennial herb found in marshes and swamps, fresh or brackish water. Bloom period: July–September 0–200 m	HP	Suitable habitat present within the Project area. There are no recorded occurrences within 1 mile of the Project.
Carquinez goldenbush	*Isocoma arguta*	—	—	1B.1	Dicot shrub found in valley and foothill grassland. Alkaline soils, flats, lower hills. On low benches near drainages, on tops and sides of mounds in swale habitat. Bloom period: August–December 1–50 m	A	No suitable habitat present within the Project area. This species has a very limited distribution on Solano County only. No recorded occurrences are within 1 mile of the Project.
chaparral ragwort	*Senecio aphanactis*	—	—	2B.2	Dicot annual herb found in chaparral, cismontane, and coastal scrub. Prefers drying alkaline flats. Blooming period: March–June 15–800 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Cobb Mountain lupine	*Lupinus sericatus*	—	—	1B.2	Dicot perennial herb found in chaparral, cismontane woodland, lower montane coniferous forest, broadleafed upland forest. In stands of knobcone pine-oak woodland, on open wooded slopes in gravelly soils; sometimes on serpentine. Bloom period: March–June 275–1,525 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	—	—	1B.1	Dicot annual herb found in valley and foothill grassland. Prefers alkaline soils, sometimes described as heavy white clay. Bloom period: May–November 0–230 m	HP	Marginal habitat is present within the Project. No recorded occurrences are within 1 mile of the Project.
congested-headed hayfield tarplant	*Hemizonia congesta* ssp. *congesta*	—	—	1B.1	Dicot annual herb found in valley and foothill grassland. Grassy valleys and hills, often in fallow fields; sometimes along roadsides. Bloom period: April–November 20–560 m	HP	Suitable habitat is present within the Project. No recorded occurrences are within 1 mile of the Project.
Contra Costa goldfields	*Lasthenia conjugens*	FE	—	1B.1	Dicot annual herb found in alkali playa, cismontane woodland, valley and foothill grassland, vernal pools, and wetlands. Prefers vernal pools, swales, low depressions, and to be in open grassy areas. Bloom period: March–June 1–470 m	A	No suitable habitat present within the Project. One recorded occurrence 1 mile north of Project, dated 2005.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*	—	—	1B.1	Dicot perennial herb found in freshwater and brackish marshes. Often found with *Typha, Aster lentus, Rosa californica, Juncus* spp., *Scirpus*, etc. Usually on marsh and slough edges. Bloom period: May– July 0–5 m	HP	Suitable habitat capable of supporting this species is present within the Project. Three recorded occurrences 1 mile west of Project at Napa River; 2 undated, one dated 2000.
Diablo helianthella	*Helianthella castanea*	—	—	1B.2	Dicot perennial herb found in chaparral, foothill woodland, northern coastal scrub, and valley grassland; riparian. Occurs in wetlands in another region, but occurs almost always under natural conditions in non-wetlands in California. Bloom period: March–June. 60–1,300 m	A	Outside of known elevation range. Suitable habitat may be present within the Project. No recorded occurrences are within 1 mile of the Project.
dwarf downingia	*Downingia pusilla*	—	—	2B.2	Dicot annual herb found in valley and foothill grassland (mesic sites) and vernal pools. Prefers vernal lake and pool margins with a variety of associates in several vernal pools. Bloom period: March–May 1–445 m	A	No suitable habitat present within the Project. One recorded occurrence 0.2 mile northeast of Project, unknown date.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
fragrant fritillary	*Fritillaria liliacea*	—	—	1B.2	Monocot perennial herb (bulb) found in cismontane woodland, coastal prairie, and coastal scrub often on serpentine; various soils reported though usually clay, in grassland. Bloom period: February–April, 3–400m.	A	No suitable habitat present within the Project area. Project soils range from loams to heavy clays and are known to be alkaline in areas furthest away from Sheehy Creek alluvium. No recorded occurrences within 1 mile of the Project.
Franciscan onion	*Allium peninsulare* var. *franciscanum*	—	—	1B.2	Monocot perennial herb (bulb) found in cismontane woodland, valley and foothill grassland. Prefers clay soils; often on serpentine or dry hillsides. Bloom period: May–June 50–300 m	A	Outside of known elevation range. Otherwise suitable habitat may be present within the Project. No recorded occurrences are within 1 mile of the Project, and the majority of occurrences are in Sonoma region.
Greene's narrow-leaved daisy	*Erigeron greenei*	—	—	1B.2	Dicot perennial herb found in chaparral. Prefers serpentine and volcanic substrates, generally in shrubby vegetation. Bloom period: May–September 80–1,005 m	A	Outside of known elevation range. Suitable habitat may be present within the Project. No recorded occurrences are within 1 mile of the Project.
Jepson's leptosiphon	*Leptosiphon jepsonii*	—	—	1B.2	Dicot annual herb found in chaparral, cismontane woodland. Open to partially shaded grassy slopes. On volcanics or the periphery of serpentine substrates. Bloom period: March– May 55–855 m	A	Outside of known elevation range. Suitable habitat may be present within the Project. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
legenere	*Legenere limosa*	—	—	1B.1	Dicot annual herb found in in beds of vernal pools. Bloom period: April– June 1–880 m	A	No suitable habitat present within the Project. Recorded occurrences within 1 mile northeast of Project, dated 1990.
Lyngbye's sedge	*Carex lyngbyei*	—	—	2B.2	Monocot perennial grass-like herb found in coastal marshes and swamps (brackish or freshwater). Bloom period: April–August 0–200 m	A	No suitable habitat present within the Project. This species is closely associated with coastal and coastal bay habitat areas. No recorded occurrences are within 1 mile of the Project.
Marin dwarf-flax	*Hesperolinon congestum*	FT	—	1B.1	Dicot annual herb found in chaparral and valley grassland. Prefers serpentine soil. Bloom period: April–July 0–200 m	A	No suitable habitat is present within the Project. Soils in Project area are alkaline. No recorded occurrences are within 1 mile of the Project.
Marin knotweed	*Polygonum marinense*	—	—	3.1	Dicot annual herb found in marshes and swamps. Coastal salt marshes and brackish marshes. Bloom period: May–August 0–10 m	A	No suitable habitat found within the Project area. This species is closely associated with coastal and coastal bay and wetland habitat areas. No recorded occurrences are within 1 mile of the Project.
Mason's lilaeopsis	*Lilaeopsis masonii*	—	SR	1B.1	Dicot perennial herb found in tidal zones, in muddy or silty soil formed through river deposition or river bank erosion. Bloom period: April–November 0–10 m	A	No suitable habitat present within the Project. One recorded occurrence 1 mile north of Project at Napa River, dated 2011.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
Mt. Diablo fairy-lantern	*Calochortus pulchellus*	—	—	1B.2	Monocot perennial herb (bulb) found in chaparral, cismontane woodland, riparian woodland, valley and foothill grassland. On wooded and brushy slopes. Bloom period: April–June 30–915 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Mt. Tamalpais bristly jewelflower	*Streptanthus glandulosus* ssp. *pulchellus*	—	—	1B.2	Dicot annual herb found in chaparral, valley and foothill grassland. Serpentine slopes. Bloom period: May–July 150–800 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Mt. Tamalpais manzanita	*Arctostaphylos montana* ssp. *montana*	—	—	1B.3	Dicot shrub found in chaparral, valley and foothill grassland. Serpentine slopes in chaparral and grassland. Bloom period: February–April 160–760 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Napa bluecurls	*Trichostema ruygtii*	—	—	1B.2	Dicot annual herb found in cismontane woodland, chaparral, valley and foothill grassland, vernal pools, lower montane coniferous forest. Often in open, sunny areas. Also has been found in vernal pools. Bloom period: June–October 30–680 m	HP	Marginal habitat is present within the Project. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
Napa false indigo	*Amorpha californica* var. *napensis*	—	—	1B.2	Dicot shrub found in broadleafed upland forest, chaparral, cismontane woodland. Prefers openings in forest or woodland or in chaparral. Bloom period: April–July 120–2,000 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
narrow-anthered brodiaea	*Brodiaea leptandra*	—	—	1B.2	Monocot perennial herb found in broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland. Volcanic substrates. Bloom period: May–July 110–915 m	A	Outside of known elevation range. Suitable habitat may be present within the Project. No recorded occurrences are within 1 mile of the Project.
Northern California black walnut	*Juglans hindsii*	—	—	1B.1	Dicot tree found in riparian forest, riparian woodland. Few extant native stands remain; widely naturalized. Deep alluvial soil associated with a creek or stream. Bloom period: April– May 0–440 m	A	Marginal habitat is present within the Project. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
pappose tarplant	*Centromadia parryi* ssp. *parryi*	—	—	1B.2	Dicot annual herb found in chaparral, coastal prairie, meadows and seeps, coastal salt marsh, valley and foothill grassland. Vernally mesic, often alkaline sites. Bloom period: May–November 2–420 m	HP	Suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Point Reyes salty bird's-beak	*Chloropyron maritimum* ssp. *palustre*	—	—	1B.2	Dicot annual herb (hemiparasitic) found in marsh & swamp, salt marsh, and wetland. Prefers coastal salt marsh with *Salicornia*, *Distichlis*, *Jaumea*, *Spartina*, etc. Bloom period: May–June 0–10 m	A	Outside of known specific range. No recorded occurrences are within 1 mile of the Project.
Rincon Ridge ceanothus	*Ceanothus confusus*	—	—	1B.1	Dicot shrub found in closed-cone coniferous forest, chaparral, cismontane woodland. Known from volcanic or serpentine soils, dry shrubby slopes. Bloom period: February–June 75–1,065 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
saline clover	*Trifolium hydrophilum*	—	—	1B.2	Dicot annual herb found in marshes & swamps, valley and foothill grassland, vernal pools, and wetlands. Prefers mesic, alkaline sites. Bloom period: April–June 0–300 m	HP	Suitable habitat capable of supporting this species is present within the Project area. Two recorded occurrences within 1 mile of Project, most recent dated 1993.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
San Joaquin spearscale	*Extriplex joaquinana*	—	—	1B.2	Dicot annual or perennial herb found in alkali playa, chenopod scrub, meadow & seep, and valley and foothill grassland. Prefers to be in seasonal alkali wetlands or alkali sink scrub with *Distichlis spicata, Frankenia,* etc. Bloom period: April–October 1–835 m	A	No suitable alkali habitat capable of supporting this species is present within the Project area. There are no recorded occurrences within 1 mile of the Project.
soft salty bird's-beak	*Chloropyron molle* ssp. *molle*	FE	SR	1B.2	Dicot annual herb found in coastal salt marsh with *Distichlis*, *Salicornia*, *Frankenia*, etc. Bloom period: July–November 0–3 m	A	No suitable alkali habitat is present within the Project area. One recorded occurrence 1 mile southwest of Project dated 2010.
Sonoma ceanothus	*Ceanothus sonomensis*	—	—	1B.2	Dicot shrub found in chaparral. Prefers sandy, serpentine or volcanic soils. Bloom period: February–April 210–800 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Sonoma sunshine	*Blennosperma bakeri*	FE	SE	1B.1	Dicot annual herb found in vernal pools, valley and foothill grassland. Vernal pools and swales. Bloom period: March–May 10–110 m	A	No suitable habitat present within the Project area. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
Suisun Marsh aster	*Symphyotrichum lentum*	—	—	1B.2	Dicot perennial herb found in marshes and swamps (brackish and freshwater). Most often seen along sloughs with Phragmites, Scirpus, blackberry, Typha, etc. Bloom period: May–November 0–3 m	HP	Suitable habitat capable of supporting this species is present within the Project area adjacent to Sheehy Creek. There are no recorded occurrences within 1 mile of the Project.
Tamalpais lessingia	*Lessingia micradenia* var. *micradenia*	—	—	1B.2	Dicot annual herb found in chaparral, valley and foothill grassland. Usually on serpentine, in serpentine grassland or serpentine chaparral; often on roadsides. Bloom period: July–October 100–500 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
thin-lobed horkelia	*Horkelia tenuiloba*	—	—	1B.2	Dicot perennial herb found in broadleaved upland forest, chaparral, valley and foothill grassland. Sandy soils; mesic openings. Bloom period: May– July 50–500 m	A	Outside of known elevation range. Suitable habitat may be present within the Project. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
Tiburon buckwheat	*Eriogonum luteolum* var. *caninum*	—	—	1B.2	Dicot annual herb found in chaparral, valley and foothill grassland, cismontane woodland, coastal prairie. Serpentine soils; sandy to gravelly sites. Bloom period: May–September 0–700 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Tiburon paintbrush	*Castilleja affinis* var. *neglecta*	FE	ST	1B.2	Dicot perennial herb found in valley and foothill grassland. Rocky serpentine sites. Bloom period: April–June 75–400 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
two-fork clover	*Trifolium amoenum*	FE	—	1B.1	Dicot annual herb found in valley and foothill grassland, coastal bluff scrub. Sometimes on serpentine soil, open sunny sites, swales. Most recently cited on roadside and eroding cliff face. Bloom period: April–June 5–310 m	A	Due to sites disturbance regime there is no suitable habitat present within the Project. Species has a very limited extant distribution. No recorded occurrences are within 1 mile of the Project.

Common Name	*Scientific Name*	Regulatory Status			Habitat Description	Habitat Present/Absent	Rationale
		USFWS	CDFW	CNPS			
western leatherwood	*Dirca occidentalis*	—	—	1B.2	Dicot shrub found in chaparral, foothill woodland, mixed evergreen forest, closed-cone pine forest, north coastal coniferous forest, and wetland-riparian. Prefers riparian. Bloom period: January–March 35–425 m	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.

Code Designations

Federal Status: 2015 USFWS Listing	State Status: 2015 CDFW Listing	CNPS: 2015 CNPS-California Rare Plant Ranks (CRPR)	Habitat description
FE = Listed as endangered under the Endangered Species Act **FT** = Listed as threatened under the Endangered Species Act **FC** = Candidate for listing (threatened or endangered) under Endangered Species Act **FD** = Delisted in accordance with the Endangered Species Act — = Not federally listed	**SE** = Listed as endangered under the California Endangered Species Act **ST** = Listed as threatened under the California Endangered Species Act **SSC** = Species of Special Concern as identified by CDFW **CFP** = Listed as fully protected under FGC **CR** = Species identified as rare by CDFW — = Not state listed	**1A** = Plants species that presumed extinct in California. **1B** = Plant species that are rare, threatened, or endangered in California and elsewhere. **List 2** = Plant species that are rare, threatened, or endangered in California, but more common elsewhere. **Blooming period:** Months in parentheses are uncommon.	Habitat descriptions adapted from CNDDB (CDFW 2016) and CNPS online inventory (CNPS 2016)

Table 2: Special Status Wildlife Species Potentially Occurring within the Project

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
Invertebrates						
California freshwater shrimp	*Syncaris pacifica*	FE	SE	Endemic to Marin, Napa, & Sonoma counties. Found in low elevation, low gradient streams where riparian cover is moderate to heavy. Shallow pools away from main streamflow. Winter: undercut banks w/exposed roots. Summer: leafy branches touching water.	HP	Suitable habitat may be present within Sheehy Creek. No recorded occurrences within 1 mile of the Project.
Callippe silverspot butterfly	*Speyeria callippe callippe*	FE	—	Restricted to the northern coastal scrub of the San Francisco peninsula. Hostplant is *Viola pedunculata*. Most adults found on east-facing slopes; males congregate on hilltops in search of females.	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	—	Occurs in the Central Valley of California, in association with blue elderberry (*Sambucus mexicana*). Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for “stressed” elderberries.	A	Suitable habitat present within the Project however Project area is outside of known range. No recorded occurrences are within 1 mile of the Project.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
vernal pool fairy shrimp	*Branchinecta lynchi*	FT	—	Found in vernal pools in southern Oregon and parts of California.	A	No suitable habitat present within the Project study area. No seasonal wetlands including vernal pool and swale habitats located in the Project study area. Recorded occurrences are within 1.5 miles of the Project study area. Specifically two recent records are located in vernal pool habitat near the Napa Airport.
Fish						
Delta smelt	*Hypomesus transpacificus*	FT	SE	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait & San Pablo Bay. Seldom found at salinities > 10 ppt. Most often at salinities < 2ppt.	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
longfin smelt	*Spirinchus thaleichthys*	FC	ST SSC	Euryhaline, nektonic & anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15-30 ppt, but can be found in completely freshwater to almost pure seawater.	A	No suitable habitat within the Project, however, suitable habitat capable of supporting this species is present within the vicinity in the Napa River. One recorded occurrence 1 mile north of Project at Napa River, dated 2012.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
Sacramento splittail	*Pogonichthys macrolepidotus*	—	SSC	Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay & associated marshes. Slow moving river sections, dead end sloughs. Requires flooded vegetation for spawning & foraging for young.	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
steelhead - central California coast DPS	*Oncorhynchus mykiss irideus*	FT	—	From Russian River, south to Soquel Cr. but not including, Pajaro River. Also San Francisco & San Pablo Bay basins.	A	No suitable habitat present within Sheehy Creek.
tidewater goby	*Eucyclogobius newberryi*	FE	SSC	Brackish water habitats along the Calif coast from Agua Hedionda Lagoon, San Diego Co. to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water & high oxygen levels.	A	No suitable habitat present within the Project. Sheehy Creek lacks the suspended oxygen needs during summer months. No recorded occurrences are within 1 mile of the Project.
Amphibians						

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
California Red-legged frog	*Rana draytonii*	FT	SSC	Found mainly near ponds in humid forests, woodlands, grasslands, coastal scrub, and stream sides with plant cover. Most common in lowlands or foothills. Frequently found in woods adjacent to streams. Breeding habitat is in permanent or ephemeral water sources; lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps.	HP	Moderate Potential to Occur: Suitable habitat capable of supporting this species is present within the Project. There are no recorded occurrences within 1 mile of the Project.
foothill yellow-legged frog	*Rana boylii*	—	SSC	A medium-sized frog with a slim waist, long legs, grainy skin, and webbing on the hind feet. Frequents rocky streams and rivers with rocky substrate and open, sunny banks in forests, chaparral, and woodlands.	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
Reptiles						
Alameda whipsnake	*Masticophis lateralis euryxanthus*	FT	—	Found in chaparral, northern coastal sage scrub and coastal sage. Can be found in grassland, oak savanna, and occasionally oak-bay woodland.	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
western pond turtle	*Emys marmorata*	—	SSC	This species is a thoroughly aquatic turtle found in ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation below 6000 feet elevation. Requires basking sites and suitable upland habitat (sandy banks or grassy open fields) up to 0.5 km from water for egg-laying.	HP	Suitable habitat present within the BSA. Aquatic and upland basking sites are present in and adjacent to Sheehy Creek.
Birds						
American peregrine falcon	*Falco peregrinus anatum*	FD MBTA	SD FP FGC	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.	HP	Marginal foraging habitat for this species is present above the Sheehy Creek riparian corridor in the BSA.
bald eagle	*Haliaeetus leucocephalus*	BGEPA BCC MBTA	SE FP FGC	Found nesting in tall trees next to lakes and rivers, also found in areas where there is an abundance of waterfowl that can be utilized as prey.	A	No Suitable nesting or foraging habitat present within the Project area. Roosting habitat is present in the larger Eucalyptus trees north of the Project in the BSA.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
bank swallow	*Riparia riparia*	MBTA	ST	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig a nesting hole. Prefers riparian scrub and riparian woodland.	A	No suitable habitat present within the Project area. No recorded occurrences within 1 mile of the Project.
black rail	*Laterallus jamaicensis coturniculus*	MBTA	ST FP	Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays. Requires water depth of about 1 inch that does not fluctuate during the year, and dense vegetation for nesting.	A	No suitable habitat present within the Project. One recorded occurrence within 1 mile southwest of Project, dated 2010.
black swift	*Cypseloides niger*	MBTA	SSC	Coastal belt of Santa Cruz & Monterey Co; central & southern Sierra Nevada; San Bernardino & San Jacinto Mountains. Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above the surf; forages widely	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
burrowing owl	*Athene cunicularia*	MBTA	SSC FGC	Found in open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. A subterranean nester, dependent upon burrowing mammals, most notably the California ground squirrel.	HP	Suitable habitat capable of supporting this species is present within the Project area. One recorded occurrence 0.70 mile southeast of Project, dated 2006.
California clapper rail	*Rallus longirostris obsoletus*	FE MBTA	SE	Found in salt-water & brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	A	No suitable habitat present within the Project. One recorded occurrence 1 mile southwest of Project, dated 1989.
Cooper's hawk	*Accipiter cooperii*	MBTA	FGC	Found in woodlands, chiefly of the open, interrupted, or marginal types. Nest sites are mainly in riparian growths of deciduous trees, such as in canyon bottoms on river plains; also, in live oaks.	HP	Suitable habitat capable of supporting this species is present within the Project. No recorded occurrences within 1 mile of the Project.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
ferruginous hawk	*Buteo regalis*	MBTA	FGC	Found in open grasslands, sagebrush flats, desert scrub, low foothills and fringes of pinyon and juniper habitats. Eats mostly lagomorphs, ground squirrels, and mice. Population trends may follow lagomorph population cycles.	HP	Marginal foraging habitat capable of supporting this species is present within the Project. Large trees for perching habitat are present within the Project. One recorded occurrence 1 mile southwest of Project, dated 1988.
golden eagle	*Aquila chrysaetos*	BGEPA MBTA	FP FGC	Found in rolling foothills, mountain areas, sage-juniper flats, and desert. Prefers cliff-walled canyons to provide nesting habitat as well as large trees in open areas.	A	Suitable foraging and roosting habitat is present north of the BSA in the large Eucalyptus trees, but the site does not provide suitable nesting or foraging habitat.
northern harrier	*Circus cyaneus*	MBTA	SSC	Found in coastal salt & fresh-water marsh. Nest & forage in grasslands, from salt grass in desert sink to springs and marshes in mountain areas.	HP	Suitable foraging habitat capable of supporting this species is present within the Project. Annual grasslands in BSA offer marginal nesting habitat for this species.
salt-marsh yellowthroat	*Geothlypis trichas sinuosa*	—	SSC	Resident of the San Francisco Bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	A	No continuous suitable habitat capable of supporting this species is present within the Project. Riparian habitat adjacent to Sheehy Creek does not have the canopy or density requirements for this species. One recorded occurrence within 1 mile southwest of Project, dated 2004.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
Samuel's (San Pablo) song sparrow	*Melospiza melodia samuelis*	—	SSC	Resident of salt marshes along the north side of San Francisco and San Pablo bays. Inhabits tidal sloughs in the Salicornia marshes; nests in Grindelia bordering slough channels.	A	Suitable foraging habitat capable of supporting this species is not present within the Project. Specific nesting habitat is not present in the Project or BSA. No recorded occurrences within 1 mile of the Project.
Suisun song sparrow	*Melospiza melodia maxillaris*	—	SSC	Resident of brackish-water marshes surrounding Suisun Bay. Inhabits cattails, tules and other sedges, and *Salicornia*; also known to frequent tangles bordering sloughs.	A	Suitable habitat capable of supporting this species is present within the Project; however, the Project is located outside of this species range. No recorded occurrences within 1 mile of the Project.
Swainson's hawk	*Buteo swainsoni*	MBTA	ST	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	HP/P	Suitable foraging habitat capable of supporting this species is present within the Project. Large trees for nesting and roosting habitat are present within one-quarter mile north of the Project. Species was observed in Project study area during the field surveys. Three CNDDB recorded occurrences within 1 mile, most recent dated 2012.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
tricolored blackbird	*Agelaius tricolor*	MBTA	SSC	Found in freshwater marsh, marsh & swamp, swamp and wetland. Highly colonial species, most numerous in Central Valley & vicinity. Largely endemic to California. Requires open water, protected nesting substrate, & foraging area with insect prey within a few km of the colony.	HP	Suitable habitat capable of supporting this species is present within the BSA. CNDDB Occurrence located 1 mile north of Project, dated 1993.
western snowy plover	*Charadrius alexandrinus nivosus*	FT MBTA	SSC	Breeds above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries.	A	No suitable habitat present within the Project. No recorded occurrences are within 1 mile of the Project.
white-tailed kite	*Elanus leucurus*	MBTA	FP FGC	Found in rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Requires open grasslands, meadows, or marshes for foraging close to the isolated, dense-topped trees for nesting and perching.	HP/P	Suitable habitat capable of supporting this species is present within the Project. Large trees for nesting and roosting habitat present within the one-quarter mile of Project. Species was observed during a previous winter field survey in 2016..

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	MBTA	SSC	Nests in freshwater emergent wetlands with dense vegetation & deep water. Often along borders of lakes or ponds. Nests only where large insects such as Odonata are abundant, nesting timed with maximum emergence of aquatic insects.	HP	Marginal habitat capable of supporting this species is present within the Project area. No recorded occurrences within 1 mile of the Project.
Mammals						
American badger	*Taxidea taxus*	—	SSC	Found in drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Requires sufficient food sources (rodents), friable soils, and open, uncultivated ground. Digs large burrows.	HP	Suitable habitat present within the Project. Soils immediately adjacent to Sheehy Creek are friable but not sandy. Soils become heavy and clayey away from Sheehy Creek. No recorded occurrences are within 1 mile of the Project.
pallid bat	*Antrozous pallidus*	—	SSC	Found in deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting; however, also known to occupy large trees, large snags, buildings, barns and bridges. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	A	No suitable roosting habitat present within the Project area. No recorded occurrences within 1 mile of the Project.

Common Name	Scientific Name	Regulatory Status		Habitat Description[4]	Habitat Present/Absent	Rationale
		USFWS	CDFW			
salt marsh harvest mouse	*Reithrodontomys raviventris*	FE	—	Only in the saline emergent wetlands of San Francisco Bay and its tributaries. Pickleweed (*Salicornia virginica*) is primary habitat. Require higher areas for flood escape.	A	No suitable habitat present within the Project area. Two recorded occurrences within 1 mile, most recent dated 2010.
Suisun shrew	*Sorex ornatus sinuosus*	—	SSC	Tidal marshes of the northern shores of San Pablo and Suisun bays. Require dense low-lying cover and driftwood and other litter above the mean high-tide line for nesting and foraging.	A	No suitable habitat present within the Project. No recorded occurrences within 1 mile of the Project.

Federal Status: 2016 USFWS Listing
DPS = Distinct Population Segment
FE = Listed as endangered under the FESA.
FT = Listed as threatened under the FESA.
FC = Candidate for listing (threatened or endangered) under FESA.
FD = Delisted in accordance with the FESA.
FPD = Federally Proposed to be Delisted.
FSC = Federal Species of Concern
MBTA = Migratory Bird Treaty Act
BCC = Birds of Conservation Concern
BGEPA = Bald and Golden Eagle Protection Act
— = No federal status

State Status: 2016 CDFW Listing
SE = Listed as endangered under the CESA.
ST = Listed as threatened under the CESA.
SSC = Species of Special Concern as identified by the CDFW.
FP = Listed as fully protected under FGC.
SR = Rare in California.
FGC = FGC 3503.5
— = No state status

Habitat/Species Codes CH = Critical Habitat
A = Habitat Absent
HP = Habitat Present
P = Species Present

4. Results: Biological Resources, Discussion of Impacts & Mitigation

4.1 Habitats and Natural Communities of Special Concern

Federal, state, and local governments have passed laws protecting certain natural communities, particularly wetlands, streams and rivers and the riparian habitats associated with them and/or habitat areas that are known to contain special status plant or animal species. Federally designated critical habitat areas are considered areas of special concern and are defined as those areas essential to the conservation of a federally listed species. Not all federally listed species have designated critical habitat.

There are no critical habitat areas in the BSA. No special status plant species were detected during the field reconnaissance survey conducted at the site. Although elements of suitable habitat for some special status plant and animal species are present (e.g., bat species and pond turtle), each species is limited to specific biotypes or soil types (e.g., volcanic, alkaline, and/or clay soils; brackish habitat; etc.), which do not occur on site.

Special status wildlife species typically have very specific habitat requirements which may include, but are not limited to, vegetation communities, elevation levels and topography, and availability of primary constituent elements (i.e., space for individual and population growth, breeding, foraging, and shelter). Suitable habitat for special status wildlife species with occurrence records in the vicinity of the Project is present within BSA, predominantly within the riparian corridor along Sheehy Creek.

Sheehy Creek runs from east to west at the southern boundary of the Project area and does contain stream features that are interspersed with wetland habitats and is bordered by riparian habitat. The existing riparian habitat has largely been a result of the plantings of riparian species along Sheehy Creek as part of a restoration / mitigation effort established in August of 2002 (Macmillan 2008). Wetland habitats within the Sheehy Creek stream channel include emergent willow thickets, bulrush, cattail and knotweed. The following describes the natural communities that comprise the habitats of special concern as well as the other natural communities that are not of special concern.

4.2 Discussion of Natural Communities

The BSA was evaluated for the presence of sensitive natural communities, as recognized by the CDFW (2010). The BSA was also evaluated for the presence of potential jurisdictional waters subject to regulatory agency jurisdiction, including the USACE, CDFW and RWQCB. Any waters observed were assessed for the presence of Ordinary High Water Mark (OHWM) indicators and/or defined streambed, banks, or channel features; however, a formal jurisdictional delineation was not conducted, as the Project area is clearly outside of agency jurisdiction.

Plant communities are also considered sensitive biological resources if they have limited distributions, have high wildlife value, include sensitive species, or are

particularly susceptible to disturbance. The CDFW ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in CNDDB. CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2010) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive.

Survey Results

Biologists documented three sensitive vegetation communities within the BSA (see Section 3.1 above for discussions of these communities): 1) Red-willow thickets Alliance (G3 S3); 2) Hardstem bulrush marsh Alliance (G5 S4); and 3) Coast live oak woodland Alliance (G5 S4). All three of these vegetation communities are either obligate wetland communities, or located within the jurisdictional limits of the riparian corridor, and as such are considered sensitive communities.

Project Impacts

The proposed Project construction footprint has been designed to avoid impacts to Sheehy Creek with the construction activity to occur completely outside of the riparian drip line. Additional, all construction activity will be further constrained by a County code-specified 35-foot set-back from all Waters of the State and Waters of the U.S. jurisdictional limits. Because there is no proposed construction activity within this habitat, and minimum (35-foot) jurisdictional set-backs are required, there will be no impacts to the coast live oak woodland plant community.

Avoidance and Minimization Efforts/Compensatory Mitigation

The proposed Project construction footprint has been designed to avoid impacts to Sheehy Creek, and Napa County code (18.40.170 - Watercourse protection) requires a minimum 35-foot setback from top-of-bank for Sheehy Creek. A 100-foot setback buffer around the creek is recommended, as practicable, to ensure avoidance of impacts to CDFW jurisdictional areas above the top-of-bank (i.e. riparian habitat) along with the measures outlined below. The implementation of measures outlined below will avoid and/or minimize potential indirect impacts to natural communities along Sheehy Creek.

- Any material/spoils from Project activities shall be located away from potential jurisdictional areas or sensitive habitat and protected from storm water run-off using temporary perimeter sediment barriers such as berms, silt fences, fiber rolls, covers, sand/gravel bags, and straw bale barriers, as appropriate.
- Materials shall be stored on impervious surfaces or plastic ground covers to prevent any spills or leakage from contaminating the ground and generally at least 100 feet from potentially jurisdictional waters.
- Any spillage of material will be stopped if it can be done safely. The contaminated area will be cleaned and any contaminated materials properly disposed of. For all spills the Project foreman or other designated liaison will notify the Project’s biologist.

4.3 Special Status Plant Species

The 44 plants listed in Table 1 are considered based on (1) federal, state, or local laws regulating their development; (2) limited distributions; and/or (3) the presence of habitat required by the special-status plants occurring on site. Of the 44 special status plants listed in Table 1, 10 were determined to have the potential to exist within the BSA based on their biological requirements compared to existing site conditions and the range of each species. Full floristic surveys were completed over the entire BSA. Suitable habitat for the majority of special status plants spices with potential to occur in the BSA is limited to the riparian corridor outside of the proposed Project footprint. Based on results of field surveys, and as a result of over 20 years of ongoing disturbance within the non-native annual grassland, and the resulting invasive plant communities that dominate this upland area, the potential for occurrence of all special status plant species have been excluded from areas outside of the riparian corridor. No special status plants were found during the botanical survey within the BSA.

4.3.1 Discussion of Bent-flowered Fiddleneck

Bent-flowered fiddleneck (*Amsinckia lunaris*), CNPS 1B.2, is an annual plant species belonging to the Boraginaceae family of plants. Known biological requirements for this species indicate that growth variables are broad as is its distribution with records spanning 12 different counties in California. Known habitat types for this species include coastal bluff scrub, valley grassland and foothill woodland at elevations ranging from 3 to 500 meters (CNPS 2016).

Survey Results

Potentially suitable habitat for this species occurs within the riparian habitat in the BSA. The species was not observed during the biological reconnaissance survey; however based on the presence of suitable habitat, this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts

Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation

The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.2 Discussion of Big Tarplant

Big tarplant (*Blepharizonia plumosa*), CNPS 1B.2, is an annual plant species belonging to the Asteraceae family of plants. Its distribution spans 5 different counties in California from Solano to Modesto County. Known habitat types for this species include clayey

soils in valley and foothill grasslands at elevations ranging from 30 to 505 meters (CNPS 2016).

Survey Results
Potentially suitable habitat for this species occurs within the riparian habitat in the BSA. The species was not observed during the biological reconnaissance survey; however based on the presence of suitable habitat, this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts
Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation
The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.3 Discussion of Bolander's Water-hemlock
Bolander's water-hemlock (*Cicuta maculata var. bolanderi*), CNPS 2B.1, is a perennial plant species belonging to the Apiaceae family of plants. Its current distribution spans 4 different counties in California and other states including Arizona, New Mexico, and Washington. Known habitat types for this species include coastal fresh or brackish marshes and swamps at elevations ranging from 0 to 200 meters (CNPS 2016).

Survey Results
Potentially suitable habitat for this species occurs within the riverine habitat in the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts
Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation
The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.4 Discussion of Congdon's Tarplant
Congdon's tarplant (*Centromadia parryi ssp. congdonii*), CNPS 1B.1, is an annual plant species belonging to the Asteraceae family of plants. Its current distribution spans 6 different counties in California. Known habitat types for this species include alkali soils

in valley and foothill grasslands at elevations ranging from 0 to 230 meters (CNPS 2016).

Survey Results
Potentially suitable habitat for this species occurs within the open patches of grassland habitat in the riparian corridor of the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts
Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation
The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.5 Discussion of Congested-headed Hayfield Tarplant
Congdon's tarplant (*Centromadia parryi ssp. congdonii*), CNPS 1B.1, is an annual plant species belonging to the Asteraceae family of plants. Its current distribution spans 5 different counties in California. Known habitat types for this species include areas in valley and foothill grasslands occasionally in disturbed (roadside) sites at elevations ranging from 20 to 560 meters (CNPS 2016).

Survey Results
Suitable habitat for this species occurs within the open patches of grassland habitat in the riparian corridor of the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts
Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation
The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.6 Discussion of Delta Tule Pea

Delta tule pea (*Lathyrus jepsonii var. jepsonii*), CNPS 1B.1, is a perennial plant species belonging to the Fabaceae family of plants. Its current distribution spans 5 different counties in California. Known habitat types for this species include areas in valley and foothill grasslands occasionally in disturbed (roadside) sites at elevations ranging from 20 to 560 meters (CNPS 2016).

Survey Results

Suitable habitat for this species occurs within the riverine and wetland habitats in the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts

Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation

The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.7 Discussion of Napa Bluecurls

Napa bluecurls (*Trichostema ruygtii*), CNPS 1B.2, is an annual plant species belonging to the Lamiaceae family of plants. Its current distribution potentially spans 3 different counties in California. Known habitat types for this species include cismontane woodland, chaparral, valley and foothill grassland, vernal pools, lower montane coniferous forest in sandy loam soils and often in open, sunny areas. Elevations range from 30 to 680 meters (CNPS 2016).

Survey Results

Suitable habitat for this species occurs within the open patches of grassland habitat in the riparian corridor of the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts

Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation

The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the

U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.8 Discussion of Pappose Tarplant

Pappose tarplant (*Centromadia parryi ssp. parryi*), CNPS 1B.2, is an annual plant species belonging to the Asteraceae family of plants. Its current distribution spans 8 different counties in California. Known habitat types for this species include vernally mesic and often alkaline sites in chaparral, coastal prairie, valley and foothill grasslands, meadows and seeps, and coastal salt marsh. Elevations range from 0 to 420 meters (CNPS 2016).

Survey Results

Suitable habitat for this species occurs within the open patches of grassland habitat in the riparian corridor of the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts

Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation

The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.9 Discussion of Saline Clover

Saline clover (*Trifolium hydrophilum*), CNPS 1B.2, is an annual plant species belonging to the Fabaceae family of plants. Its current known distribution spans 14 different counties in California. Known habitat types for this species include marshes and swamps, vernal pools, and wetlands in valley and foothill grasslands. This species grows preferentially in mesic and alkaline sites. Elevations range from 0 to 300 meters (CNPS 2016).

Survey Results

Suitable habitat for this species occurs within the riverine and wetland habitats in the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts

Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation
The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.3.10 Discussion of Suisun Marsh Aster
Suisun Marsh aster (*Symphyotrichum lentum*), CNPS 1B.2, is a perennial plant species belonging to the Asteraceae family of plants. Its current known distribution spans 6 different counties in California. Known habitat types for this species include brackish and freshwater marshes, sloughs and swamps. Elevations range from 0 to 3 meters (CNPS 2016).

Survey Results
Suitable habitat for this species occurs within the riverine and wetland habitats in the BSA. The species was not observed during the biological reconnaissance survey; however, based on the existing habitat this species has the potential to occur within the riparian portions of the BSA, outside of the proposed Project footprint.

Project Impacts
Suitable habitat for this species is not present within areas proposed for development; therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation
The proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, additional avoidance and minimization efforts for this species will not be required.

4.4 Special Status Animal Species

Thirty-six species with known occurrences within five miles of the Project site were evaluated for the potential to occur within the BSA based on the presence of suitable habitat. Additionally, Swainson's hawk was observed during the biological reconnaissance survey. The reconnaissance-level biological survey was conducted during bird nesting season and suitable nesting habitat occurs within the BSA, and immediately adjacent to the proposed Project area. Of the thirty-six species evaluated for potential occur, 22 were determined to have no potential to occur at the project site because the site did not contain suitable habitat or microhabitat conditions and/or the site was outside of the known range of the species. The remaining fourteen species are evaluated in the following sections.

4.4.1 Discussion of the California Freshwater Shrimp
The California freshwater shrimp (*Syncaris pacifica*) *Federally Endangered*, is known to occur in large, slow moving streams at low elevations with undercut banks, overhanging woody vegetation and areas of overhanging roots. Moderate available habitat is found within Sheehy Creek. Because of the absence of recorded CNDDB observations in or

near the BSA, the moderate quality of the available habitat, the high density of likely predators, the California freshwater shrimp is assumed to not occur in Sheehy Creek. Therefore a No Affect determination is recommended for section 7 ESA consultation with USFWS.

Survey Results

The stream channel of Sheehy Creek was surveyed for aquatic resource habitat areas including flow, width, depth, bank morphology, aquatic and riparian vegetation and observable wildlife. Sheehy Creek is a slow moving, low gradient stream at a low elevation (31 to 25 feet ASL from the east end of the BSA to the west). Widths average from 15 feet to 35 feet wide in the BSA. In the narrower segments of Sheehy Creek, areas of embankment may have slightly undercut banks with overhanging roots. However, this micro-habitat area is not well defined in the study area as would be typical in a higher energy stream with similar bankside vegetation. Large schools of small minnow fish were observed in Sheehy Creek which may pose as a significant predator to the California freshwater shrimp. Another potential predator observed included a high density of American bullfrog (*Lithobates catesbeianus*) larvae (tadpoles) in the pool areas of Sheehy Creek. American bullfrogs, a non-native species to California, are known to be voracious predators that feed on aquatic animals including invertebrates, fish and tadpoles.

Project Impacts

Suitable habitat for this species is limited to the active channel of Sheehy Creek, and no suitable habitat is present within areas proposed for development. Although this species may be present within Sheehy Creek, the proposed Project is designed to avoid riparian areas (including a County code-specified minimum 35-foot avoidance buffer for all Waters of the state and Waters of the U.S.); therefore, there will be no Project related impacts to this species.

Avoidance and Minimization Efforts/Compensatory Mitigation

The Project will not have direct impacts on California freshwater shrimp habitat. The Napa County code specified minimum 35-foot setback from top of bank of Sheehy Creek, and measures outlined to protect natural communities (see measures to protect natural communities) will ensure no indirect impacts to potential California freshwater shrimp habitat from Project activity.

4.4.2 Discussion of the California Red-Legged Frog

The California red-legged frog (*Rana draytonii*), *Federally Threatened, CDFW Species of Special Concern*, occupies deep aquatic habitats with dense, shrubby and emergent vegetation in lowlands and foothills. The California red-legged frog (CRLF) requires aquatic habitats with 11 to 20 weeks of permanent water for larval development and requires access to aestivation habitat (CDFW 2016). Aestivation habitat may include small mammal burrows, incised stream channels, complexes of terrestrial cover including logs, boulders, and debris. Migration corridors from aquatic breeding sites to aestivation sites are requisite habitat components. CRLF is known to disperse conservatively up to 1 mile with accounts of up to two miles to aestivation sites from

breeding sites. Any non-urban habitat cover would be considered adequate migration habitat.

Survey Results
Sheehy Creek is suitable breeding habitat for the CRLF with perennial waters during non-drought years, ample emergent vegetation for egg dispersal and dense shrubby riparian vegetation on the east side of the BSA. CRLF were not detected in or near the BSA during the biological reconnaissance survey. A known predator of CRLF, the American bullfrog, was found in high densities though in Sheehy Creek which may preclude the successful reproduction and presence of CRLF. The upland area, non-native grassland habitat, north of Sheehy Creek is adequate migratory habitat for CRLF. The closest occurrence identified in the CNDDB search results is located approximately 2.18 miles south of the Project area; however, the USFWS considers it unlikely that Sheehy Creek is currently occupied by CRLF (L. Goude, pers. comm. May 23, 2016).

Project Impacts
No Project activity will occur within the limits of Sheehy Creek, therefore there would be no direct impacts to potential California red-legged frog breeding habitat. Although, the conversion of the upland non-native grasslands for industrial use has the potential impacts to CRLF if individuals were present at the time of construction activity, the species is not believed to occur within the Sheehy Creek, therefore the potential for Project activity to impact California red-legged frog is considered low.

Avoidance and Minimization Efforts/Compensatory Mitigation
To ensure no impacts to California red-legged frog, the following avoidance and minimization efforts are drawn from the Programmatic Biological Opinion for Issuance of Permits under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, including Authorizations Under 22 Nationwide Permits, for Projects that May Affect the Threatened California Red-Legged Frog in Nine San Francisco Bay Area Counties, California and are recommended:

- A Service-approved biologist(s) will be onsite during all activities that may result in take of the California red-legged frog. The qualifications of the biologist(s) will be submitted to the Service for review and written approval at least thirty (30) calendar days prior to the date earthmoving is initiated at the project site. The Service-approved biologist(s) will keep a copy of this programmatic biological opinion and the appendage in their possession when onsite.
- No more than twenty-four (24) hours prior to the date of initial ground disturbance, a preconstruction survey for the California red-legged frog will be conducted by a Service-approved biologist at the project site. The survey will consist of walking the project limits and within the project site to ascertain the possible presence of the species. The Service-approved biologist will investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, and other essential behaviors. This includes an adequate examination of mammal burrows, such as California ground squirrels or gophers. If any adults, subadults, juveniles, tadpoles, or eggs are found, the Service-approved biologist will contact the Service to determine if

moving any of the individuals is appropriate. In making this determination the Service will consider if an appropriate relocation site exists. If the Service approves moving animals, the Corps through the applicant will ensure the Service approved biologist is given sufficient time to move the animals from the work site before ground disturbance is initiated. Only Service-approved biologists will capture, handle, and monitor the California red-legged frog.

- The Service-approved biologist(s) will be given the authority to freely communicate verbally, by telephone, electronic mail, or in writing at any time with construction personnel, any other person(s) at the project site, otherwise associated with the project, the Service, the Department, or their designated agents. The Service-approved biologist will have oversight over implementation of all the conservation measures in this programmatic biological opinion, and, through the applicant, will have the authority and responsibility to stop project activities if they determine any of the associated requirements are not being fulfilled. If the Service approved biologist(s) exercises this authority, the Service will be notified by telephone and electronic mail within twenty-four (24) hours. The Service contact is the Coast Bay Foothills Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at telephone (916) 414-6600.
- The Service-approved biologist will conduct employee education training for employees working on earthmoving and/or construction activities. Personnel will be required to attend the presentation which will describe the California red-legged-frog, avoidance, minimization, and conservation measures, legal protection of the animal, and other related issues. All attendees will sign an attendance sheet along with their printed name, company or agency, email address, and telephone number. The original sign-in sheet will be sent to the Service within seven (7) calendar days of the completion of the training.
- The applicant will minimize adverse effects to the California red-legged frog by limiting, to the maximum extent possible, the number of access routes, construction areas, equipment staging, storage, parking, and stockpile areas. Prior to the date of initial ground disturbance at the project site, equipment staging areas, site access routes, construction equipment and personnel parking areas, debris storage areas, and any other areas that may be disturbed will be identified, surveyed by the Service-approved biologist, and clearly identified with 5-foot tall bright orange plastic fencing. The fencing will be inspected by the Service approved biologist and maintained daily by the applicant until the last day that construction equipment are at the project.
- To the extent practicable, initial ground-disturbing activities will be avoided between November 1 and March 31 because that is the time period when California red-legged frogs are most likely to be moving through upland areas. When ground-disturbing activities must take place between November 1 and March 31, the Corps through the applicant will ensure that daily monitoring by the Service-approved biologist is completed for the California red-legged frog.
- To minimize harassment, injury death, and harm in the form of temporary habitat disturbances, all project-related vehicle traffic will be restricted to established roads, construction areas, equipment staging, storage, parking, and stockpile

areas. These areas will be included in pre-construction surveys and, to the maximum extent possible, established in locations disturbed by previous activities to prevent further adverse effects. Project-related vehicles will observe a 20-mile per hour speed limit within construction areas, except on County roads, and State and Federal highways. Off-road traffic outside of designated and fenced project work areas will be prohibited.

- The Corps through the applicant will ensure bio-swales and bio-filtration are installed at the project site adjacent to roadways to avoid and minimize sediment loading and point source pollutants.
- Stormwater pollution prevention plans (SWPPPs) and erosion control BMPs will be developed and implemented to minimize any wind- or water-related erosion and will be in compliance with the requirements of the Corps. The applicant will include provisions in construction contracts for measures to protect sensitive areas and prevent and minimize stormwater and non-stormwater discharges. Protective measures will include, at a minimum, those listed below:
    a. No discharge of pollutants from vehicle or equipment cleaning will be allowed into any storm drains or water courses.
    b. Vehicle and equipment fueling and maintenance operations will be at least 50 feet away from water courses, except at established commercial gas stations or established vehicle maintenance facilities.
    c. Concrete waste and water from curing operations will be collected in washouts and will be disposed of and not allowed into water courses.
    d. Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.
    e. Dust control measures will include use of water trucks and organic tackifiers to control dust in excavation-and-fill areas, covering temporary access road entrances and exits with rock (rocking), and covering of temporary stockpiles when weather conditions require.
- The applicant will maintain all construction equipment to prevent leaks of fuels, lubricants, or other fluids.
- Each encounter with the California red-legged frog will be treated on a case-by-case basis in coordination with the Service, but the general procedure is as follows: (1) the animal will not be disturbed if it is not in danger; or (2) the animal will be moved to a secure location if it is in any danger. These procedures are further described below:
    a. When a California red-legged frog is encountered in the action area, all activities which have the potential to result in the harassment, injury, or death of the individual will be immediately halted. The Service-approved biologist will then assess the situation in order to select a course of action that will avoid or minimize adverse effects to the animal. To the maximum extent possible, contact with the frog will be avoided and the applicant will allow it to move out of the potentially hazardous situation to a secure location on its own volition. This procedure applies to situations where a California red-legged frog is encountered while it is moving to another location. It does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to

support the species should the individual move away from the hazardous location.

b. California red-legged frogs that are in danger will be relocated and released by the Service approved biologist outside the construction area within the same riparian area or watershed. If relocation of the frog outside the fence is not feasible (i.e., there are too many individuals observed per day), the biologist will relocate the animals to a Service preapproved location. Prior to the initial ground disturbance, the applicant will obtain approval of the relocation protocol from the Service in the event that a California red-legged frog is encountered and needs to be moved away from the project site. Under no circumstances will a California red-legged frog be released on a site unless the written permission of the landowner has been obtained by the applicant.

   The Service-approved biologist will limit the duration of the handling and captivity of the California red-legged frog to the minimum amount of time necessary to complete the task. If the animal must be held in captivity, it will be kept in a cool, dark, moist, aerated environment, such as a clean and disinfected bucket or plastic container with a damp sponge. The container used for holding or transporting the individual will not contain any standing water.

c. The applicant will immediately notify the Service once the California red-legged frog and the site is secure. The contact for this situation is the Coast Bay Foothills Division Chief of the Endangered Species Program by email and at telephone (916) 414-6600.

- Uneaten human food and trash attracts crows, ravens, coyotes, and other predators of the California red-legged frog. A litter control program will be instituted at each project site. All workers will ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash are deposited in covered or closed trash containers. The trash containers will be removed from the project site at the end of each working day.
- All grindings and asphaltic-concrete waste may be temporally stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert, pond, creek, stream crossing, or other waterbody. On or before the date of project completion, the waste will be transported to an approved disposal site.
- Loss of soil from run-off or erosion will be prevented with straw bales, straw wattles, or similar means provided they do not entangle, block escape or dispersal routes of the California red-legged frog.
- The applicant will not apply insecticides or herbicides at the project site during construction or long-term operational maintenance where there is the potential for these chemical agents to enter creeks, streams, waterbodies, or uplands that contain potential habitat for the California red-legged frog.
- No pets will be permitted at the project site, to avoid and minimize the potential for harassment, injury and death of the California red-legged frog.

- No firearms will be allowed at the project site except for those carried by authorized security personnel, or local, State, or Federal law enforcement officials to avoid and minimize the potential for harassment, injury and death of the California red-legged frog.
- For onsite storage of pipes, conduits and other materials that could provide shelter for California red-legged frogs, an open-top trailer will be used to elevate the materials above ground. This is intended to reduce the potential for animals to climb into the conduits and other materials.
- To the maximum extent practicable, no construction activities will occur during rain events or within 24-hours following a rain event. Prior to construction activities resuming, a Service-approved biologist will inspect the action area and all equipment/materials for the presence of California red-legged frogs. The animals will be allowed to move away from the project site of their own volition or moved by the Service-approved biologist.
- To the maximum extent practicable, night-time construction will be minimized or avoided by the applicant. Because dusk and dawn are often the times when the California red-legged frog is most actively moving and foraging, to the maximum extent practicable, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again prior to no less than 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project site will be prohibited during the hours of darkness.
- Dust control measures will be implemented during construction, or when necessary in the opinion of the Service-approved biologist, Service, California Department of Fish and Wildlife, or their authorized agent. These measures will consist of regular truck watering of construction access areas and disturbed soil areas with water or organic soil stabilizers to minimize airborne dust and soil particles generated from graded areas. Regular truck watering will be a requirement of the construction contract. Watering guidelines for truck watering will be established to avoid any excessive run-off that may flow into contiguous or adjacent areas containing potential habitat for the California red-legged frog.
- Trenches or pits one (1) foot or deeper that are going to be left unfilled for more than forty eight (48) hours will be securely covered with boards or other material to prevent the California red-legged frog from falling into them. If this is not possible, the applicant will ensure wooden ramps or other structures of suitable surface that provide adequate footing for the California red-legged frog are placed in the trench or pit to allow for their unaided escape. Auger holes or fence post holes that are greater than 0.10 inch in diameter will be immediately filled or securely covered so they do not become pitfall traps for the California red-legged frog. The Service-approved biologist will inspect the trenches, pits, or holes prior to their being filled to ensure there are no California red-legged frogs in them. The trench, pit, or hole also will be examined by the Service-approved biologist each workday morning at least one hour prior to initiation of work and in the late afternoon no more than one hour after work has ceased to ascertain whether any individuals have become trapped. If the escape ramps fail to allow the animal to

escape, the Service-approved biologist will remove and transport it to a safe location, or contact the Service for guidance.

4.4.3 Discussion of the Western Pond Turtle

The western pond turtle (*Emys amrmorata*), *CDFW Species of Special Concern*, is an aquatic species that occupies rivers, streams, ponds and agricultural canals typically with aquatic vegetation at elevations below 6,000 feet. The banks of Sheehy Creek are suitable for basking as well as nesting sites. Females may travel along a waterway as far as 1.2 miles (2 km) to distant nesting areas if suitable nesting habitat is not available locally (Rathbun et al., 1992). Nests are typically located on stream or pond margins with a southern aspect. The western pond turtle is known to nest as far as 318 feet in grassy slopes with a south exposure (Holland 1994).

Survey Results

Sheehy Creek and its surroundings offer suitable habitat for this species. Flattened emergent vegetation (hard stemmed bulrush) was found in the Sheehy Creek stream channel and is known to be preferred basking habitat with an easy escape. The north banks of Sheehy Creek are generally gradual and do offer several grassy open areas for basking and nesting. Soils in the riparian area of Sheehy Creek are generally a sandy loam and are therefore suitable for nest sites. American bullfrogs are a known predator of the western pond turtle. A high density of American bullfrog tadpoles were observed in Sheehy Creek, this predator would likely have a severe impact on western pond turtle recruitment. The Project's upland area is unlikely to be utilized by the western pond turtle due to its flat topography and often dense stands of Harding grass.

Project Impacts

The proposed Project has been designed to avoid Sheehy Creek and associated riparian areas; therefore, project activity will not encroach upon suitable riparian habitat or stream habitat for this species. Project-related impacts on western pond turtle are not expected.

Avoidance and Minimization Efforts/Compensatory Mitigation

No avoidance or minimization is required for western pond turtle.

4.4.4 Discussion of Burrowing Owl

The burrowing owl is primarily a grassland species, but also occurs in highly altered landscapes and often near human activity. Suitable habitat requirements include burrows for roosting and nesting and relatively short vegetation with only sparse shrubs and taller vegetation. Nest and roost burrows of the Burrowing Owl in California are most commonly dug by ground squirrels, typically California ground squirrel (*Spermophilus beecheyi*), but they can also use a range of other burrows including kit fox and coyote (Polite 1999). The CNDDB includes a Burrowing Owl occurrence record from approximately 0.7 mile southeast of the BSA.

Survey Results

No burrowing owls or sign (whitewash, pellets, feathers, etc.) of burrowing owl was observed during field surveys. The project site including marginally suitable habitat in

the non-native annual grassland in the upland portions of the project site, but no suitable burrows to support nesting or wintering burrowing owls were present within the BSA.

Project Impacts

Project activity could directly impact burrowing owls if present at the time of construction. Currently, burrowing owls are not present within the BSA; however, marginally suitable habitat is present within the non-native grassland habitat where project development is proposed. If present, impacts to burrowing owl could include mortality through destruction of occupied burrows or by being struck by construction equipment. Burrowing owls may also abandon active nest or winter burrows as a result of construction noise and activity.

Avoidance and Minimization Efforts/Compensatory Mitigation

- Burrowing Owl Pre-construction Surveys. Prior to the commencement of construction activities, adherence to the following measure is recommended:

  A qualified wildlife biologist (i.e., a wildlife biologist with previous burrowing owl survey experience) should conduct pre-construction surveys of the permanent and temporary impact areas to confirm the existing or new locations occupied breeding or wintering burrowing owl burrows no fewer than 14 days prior to ground-disturbing activities (i.e., vegetation clearance, grading, tilling). The survey methodology should be consistent with the methods outlined in the 2012 CDFW Staff Report on Burrowing Owl Mitigation and should consist of walking parallel transects 7 to 20 meters apart, adjusting for vegetation height and density as needed, and noting any potential burrows with fresh burrowing owl sign or presence of burrowing owls. Surveys may be combined with desert tortoise pre-construction surveys

- Burrowing Owl Mitigation. If burrowing owls are present at the time of preconstruction surveys, adherence to the following measures is recommended:

  If burrowing owls are detected on-site, no ground-disturbing activities, such as vegetation clearance or grading, should be permitted within a buffer of no fewer than 100 meters (330 feet) from an occupied burrow during the breeding season (February 1 to August 31), unless otherwise authorized by CDFW. During the non-breeding (winter) season (September 1 to January 31), ground-disturbing work can proceed as long as the work occurs no closer than 50 meters (165 feet) from the burrow. Depending on the level of disturbance, a smaller buffer may be established in consultation with CDFW.

  If burrow avoidance is infeasible during the non-breeding season or during the breeding season (February 1 through August 31), where resident owls have not yet begun egg laying or incubation, or where the juveniles are foraging independently and capable of independent survival, a qualified biologist should implement a passive relocation program in accordance

with Appendix E1 (i.e., Example Components for Burrowing Owl Artificial Burrow and Exclusion Plans) of the 2012 CDFW Staff Report on Burrowing Owl Mitigation.

If passive relocation is required, a qualified biologist should prepare a Burrowing Owl Exclusion and Mitigation Plan and Mitigation Land Management Plan in accordance with CDFWs 2012 Staff Report on Burrowing Owl Mitigation and for review by CDFW prior to passive relocation activities. The Burrowing Owl Exclusion and Mitigation Plan should include all necessary measures to minimize impacts to burrowing owls during passive relocation, including all necessary monitoring of owls and burrows during passive relocation efforts. The Mitigation Land Management Plan should include a requirement for the permanent conservation of off-site Burrowing Owl Passive Relocation Compensatory Mitigation.

If passive relocation is required, the project proponent should implement the Mitigation Land Management Plan and permanently conserve off-site habitat suitable for burrowing owl at ratio of 15 acres per passively relocated burrowing owl pair, not to exceed the size of the final project footprint. Land identified to mitigate for passive relocation of burrowing owl may be combined with other off-site mitigation requirements of the project if the compensatory habitat is deemed suitable to support the species. The Passive Relocation Compensatory Mitigation plan should be approved by CDFW. If the project is located within the service area of a CDFW-approved burrowing owl conservation bank, the project proponent may purchase available burrowing owl conservation bank credits in lieu of placing off-site habitat into a conservation easement, if acceptable to the CDFW.

The project proponent should mitigate for the loss of acres of burrowing owl foraging habitat by providing habitat management lands at a ratio of ten acres per burrow identified within the final project footprint. These lands must be on suitable habitat for burrowing owl prior to operations. Land identified to mitigate for foraging habitat mitigation may be combined with other offsite mitigation requirements of the proposed project if the compensatory habitat is deemed suitable. A Foraging Habitat Compensatory Mitigation Plan describing the proposed mitigation, including suitability for meeting the objectives of the mitigation, and methods for preserving the mitigation values of the habitat should be prepared.

4.4.5 Discussion of White-tailed Kite

The white-tailed kite is predominantly a grassland and savannah avian species. Its other habitat areas include: agricultural areas, wetlands, riparian areas adjacent to wetlands and oak woodlands. Habitat selection though is more dependent on prey availability

than plant community type. Un-grazed or lightly grazed fields generally sustain a higher prey base and are therefore are more suitable. The white-tailed kite's prey base includes small diurnal mammals such as voles and to a lesser extent birds, amphibians, reptiles and insects (Zeiner et al. 1988-1990). Nest sites are variable from shrubs and trees ranging from less than ten feet (3 meters) tall to trees greater than 164 feet (50 meters) in height. Nest trees are located near foraging areas and may be isolated in habitat areas with little available nesting habitat, or in large stands of trees. The white-tailed kite in North America is mostly a west coast species ranging from southern Washington to southern California and Baja Mexico. In California, this species occupies cismontane areas including the Sacramento and San Joaquin valleys, coastal ranges and coastal lowlands.

Survey Results

There are no CNDDB records of the white-tailed kite within 5 miles of the Project area. No white-tailed kites were observed in or near the BSA or the Raptor Survey Area during the May 18, 2016 surveys of the Project's BSA or Raptor Survey Area. No raptor nests were found within the Raptor Survey Area or the BSA during the May survey. White-tail kite is known to occur in the region and know occurrences within five miles of the project site are documented in eBrid (eBird 2012).

Project Impacts

Project activity could directly impact white-tailed kite if present at the time of construction. White-tailed kites were not observed within the BSA; however, marginally suitable foraging habitat is present within the non-native grassland habitat where project development is proposed and suitable nesting habitat is located in the riparian corridor of Sheehy Creek. If white-tailed kite are nesting within the riparian corridor adjacent to areas proposed for project development, impacts could include nest abandonment as a result of construction activity and noise.

Avoidance and Minimization Efforts/Compensatory Mitigation

Adherence to the avoidance and minimization measures for potential impacts to nesting birds outlined in *Section 4.4.10* (*Nesting Birds*) will ensure no impacts to white-tailed kite.

4.4.6 Discussion of Northern Harrier

The Northern Harrier is widespread throughout North and Middle America. In California, this species is a year round inhabitant of coastal, bay and central valley areas (Zeiner et al. 1989-1990). This conspicuously white-rumped, medium sized falcon is typically observed flying at low elevations over grasslands, shrub-steppe uplands, and fresh and salt water marshes while foraging for small to medium sized mammals (Slater and Rock 2005), small birds, reptiles and frogs. Diet selection is seasonal with prey base being comprised almost entirely of voles (*Microtus sp.*) during the winter (Preston 1990). Habitats with greater cover that have not been mowed or heavily grazed are preferentially selected for foraging areas (Herkert et al. 1999). The Northern Harrier is a ground nesting bird, with nest sites occurring in open, vegetated habitats including dry and saturated emergent wetlands and uplands. Nesting habitat plant assemblages in

upland grasslands have been documented as native and non-native, generally tall grass species including bromegrass and wheatgrass. Nesting habitat plant assemblages in freshwater wetlands include: tall grasses, reeds, sedges, bulrushes and cattails. Site selection for the northern harrier has been positively correlated with habitats with the highest prey biomass. The closest CNDDB record for northern harrier to the BSA is approximately 3.9 miles to the southwest and was located in ideal habitat.

Survey Results
No northern harriers were observed during the field surveys. The BSA has a low small mammal population based on the relative absence of observable small mammal burrows, active trails and seed caches. The non-native annual grassland habitat does provide marginal nesting habitat; however the regularity of disturbance and maintenance in these areas of the project site would discourage most raptor nesting behavior.

Project Impacts
Project activity could impact nesting norther harriers in the upland grassland area if they were present at the time of construction. However, northern harriers were not present within the BSA at the time of surveys conducted din May 2016, and the species is unlikely to breed on site. The availability of higher quality foraging and nesting habitat within the Project's vicinity makes it unlikely that this species would occur on the site, and as such, impacts to the northern harrier as a result of the Project's implementation are unlikely.

Avoidance and Minimization Efforts/Compensatory Mitigation
Although impacts to this species are not expected, adherence to the avoidance and minimization measures for potential impacts to nesting birds outlined in *Section 4.4.10* (*Nesting Birds*) will ensure no impacts to northern harrier.

4.4.7 Discussion of Tricolored Blackbird
The tricolored black bird is nearly endemic to California with only small populations in Oregon and Washington comprising only 1% of their population. Distribution in California extends throughout the greater Central Valley and the coastal areas from the central northern coast to coastal southern California (Zeiner et al. 1989-1990, Meese et al. 2014). The tricolored blackbird breeds near fresh water wetlands with nests located in tall cattails or tules but nests to a lesser extent can also be found willow thickets, blackberry, wild rose, and tall herbaceous plants. The tricolored blackbird is an obligate colonial nesting species with nesting colonies of no less than 50 breeding pairs (Meese et al. 2014). The tricolored blackbird feeds on insects, seeds and cultivated grains. Cover habitat is similar to nesting habitat. The closest CNDDB occurrence of tricolored blackbird to the BSA is approximately 0.47 mile south of the BSA

Survey Results
No tricolored blackbirds were observed during the field surveys in the BSA. The BSA has small areas of potentially suitable nesting habitat in the channel of Sheehy Creek where hardstem and river bulrush are the dominant emergent species; however, the

small size of potentially suitable habitat is unlikely to support breeding colonies of this species.

Project Impacts
Project impacts to tricolored blackbird are not anticipated due to the small amount of available nesting habitat in the emergent bulrush located in Sheehy Creek.

Avoidance and Minimization Efforts/Compensatory Mitigation
Although impacts to this species are not expected, adherence to the avoidance and minimization measures for potential impacts to nesting birds outlined in *Section 4.4.10* (*Nesting Birds*) will ensure no impacts to tricolored blackbird.

4.4.8 Discussion of Cooper's Hawk
The Cooper's Hawk is a year round resident in most of its range throughout the contiguous 48 states (Zeiner et al. 1989-1990). This crow sized hawk feeds primarily on small birds and some small mammals in fragmented woodland habitats. Breeding habitat includes forested areas of hardwood, mixed, evergreen forests, and deciduous stands of riparian forest. This species has become increasingly tolerant to human environments and habitat fragmentation (Curtis 2006).

Survey Results
No Cooper's hawks were observed during the field surveys in the BSA; however, suitable foraging and nesting habitat is present within the riparian corridor of Sheehy Creek.

Project Impacts
Project activity could directly impact Cooper's hawk if present at the time of construction. Cooper's hawk were not observed within the BSA at the time of the surveys in May, 2016; however, suitable foraging and nesting habitat is present the riparian corridor of Sheehy Creek. If Cooper's hawks were to be nesting within the riparian corridor adjacent to areas proposed for project development, impacts could include nest abandonment as a result of construction activity and noise.

Avoidance and Minimization Efforts/Compensatory Mitigation
Adherence to the avoidance and minimization measures for potential impacts to nesting birds outlined in *Section 4.4.10* (*Nesting Birds*) will ensure no impacts to Cooper's hawk.

4.4.9 Discussion of Yellow-headed Blackbird
The yellow-headed blackbird in California is distributed throughout the Central Valley, north eastern California and south central California in open wetland habitats. This species nests in similar habitats as red-winged and tricolored blackbirds but has a preference for deeper water palustrine habitats. The yellow-headed blackbird feeds primarily on large aquatic insects, seeds and agricultural grains. Nesting habitat and foraging habitat will be within the same are if the prey base, mostly dragon and damselflies, is dense enough (Zeiner et al. 1989-1990, Twedt and Crawford 1995).

Survey Results
No yellow-headed blackbirds were observed during the field surveys in the BSA. The BSA has small areas of potentially suitable nesting and foraging habitat in the channel of Sheehy Creek where hardstem and river bulrush are the dominant emergent species.

Project Impacts
Project impacts to yellow-headed blackbird are not anticipated due to the small amount of available nesting habitat in the emergent bulrush habitat located in Sheehy Creek.

Avoidance and Minimization Efforts/Compensatory Mitigation
Although impacts to this species are not expected, adherence to the avoidance and minimization measures for potential impacts to nesting birds outlined in *Section 4.4.10* (*Nesting Birds*) will ensure no impacts to yellow-headed blackbird.

4.4.10 Discussion of Swainson's Hawk
The Swainson's' hawk occurs variable throughout much of central and southern California with restricted breeding ranges. It occurs as an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen Co., and Mojave Desert, with very limited breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, and Antelope Valley. The species typically breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley. Swainson's hawk Forage in grasslands or suitable grain or alfalfa fields, or livestock pastures often adjacent to breeding habitat (Zeiner et al. 1989-1990).

Survey Results
There are several CNDDB records of the Swainson's hawk within 1 miles of the Project area (Figure 4). No Swainson's hawks were observed in the BSA; however, this species was observed in flight and foraging in the Raptor Survey Area during the May 18, 2016 surveys of the Project's BSA or Raptor Survey Area. No raptor nests were found within the Raptor Survey Area or the BSA during the May survey; however, Swainson's hawk is known to occur in the area, the project site is on the margin of the known breeding range for this species.

Project Impacts
Project activity could directly impact Swainson's hawk if present and nesting at the time of construction. Swainson's hawks were observed just outside of the BSA; however, only marginally suitable foraging habitat is present within the non-native grassland habitat where project development is proposed. Suitable nesting habitat is located in the riparian corridor of Sheehy Creek; however, the project site occurs at the limits of the known breeding range for this species, which more typically breeds in the central valley and not commonly within the Coast Range. If Swainson's hawks are nesting within the riparian corridor adjacent to areas proposed for project development, impacts could include nest abandonment as a result of construction activity and noise.

Avoidance and Minimization Efforts/Compensatory Mitigation
Adherence to the avoidance and minimization measures for potential impacts to nesting birds outlined in Section 4.4.10 (Nesting Birds) will ensure no impacts to white-tailed kite.

4.4.11 Discussion of Nesting Birds

Birds nest in a variety of habitats from ground burrows, upland grasslands, wetlands, shrubs and large trees of various species. A bird's tolerance to disturbance is typically correlated to the size of the bird in an inversely proportional manner – smaller birds are usually less tolerant to disturbance than larger birds. However, all birds differ in the disturbance tolerance based on how accustomed they become to a given disturbance or types of disturbances. Most birds for example will not flush if approached by a slow moving vehicle at a nominal distance; whereas, a human on foot will flush birds at a much greater distance. Once a bird has been flushed from its nest, the incubating eggs or fledglings are at increased risk of mortality from thermal stress, nest predation and starvation.

Survey Results
Suitable habitat for birds protected by the MBTA and other special status birds and raptors (as discussed above) occurs within and adjacent to the Project in the riparian grassland areas. No avian nests were detected during the reconnaissance surveys May, 2016.

Project Impacts
Potential impacts could occur to resident and migratory species during project construction. Construction activity could result in direct mortality if nests were to be destroyed, or individual birds injured or killed through impacts with construction equipment. Construction activity, noise and vibrations could result in nest abandonment, and displaced birds could suffer stress from displacement into adjacent territories belonging to other individuals.

Avoidance and Minimization Efforts/Compensatory Mitigation
Implementation of the following avoidance and minimization measures would reduce impacts to special status birds, raptors and other nesting birds protected under the MBTA:

- **Preconstruction Nesting Bird Surveys and Construction Timing.**
    - Ground disturbance Removal of trees should be limited to only those necessary to construct the proposed project, and should occur outside of the nesting season when feasible.
    - For all construction activity that occurs during the nesting season (generally February 15 to August 31) a qualified biologist should conduct preconstruction nesting bird surveys not more than 14 days prior to the start of construction activity. No avoidance or minimization measures are necessary for construction activities that occur outside of the nesting season (generally September 1 through February 14).

    - Surveys should be conducted by a qualified biologist and should include the entire project and a 250 foot buffer common and special status passerine species, and a 1/4 mile buffer for special status raptors (i.e. white-tailed kite and Swainson's hawk).
    - If an active nest of non-special status species is located during pre-construction surveys, the qualified biologist should establish appropriate avoidance buffers based on the location of the nest, distance from proposed construction activity, type and degree of disturbance expected from construction, the species of bird and observed behavior of the nesting bird. The avoidance buffer should be of sufficient size as to ensure no change in nesting behavior at the nest, and should not be encroached until the nest has become inactive (i.e. the chicks have successfully fledged or the nest has become otherwise inactive through natural processes such as depredation) as determined by the qualified biologist. The nest avoidance buffer should be demarcated with flagging in the field and identified on project plans as an exclusion zone, and no construction activity should be allowed within the active nest exclusion zone.
    - If an active nest of a federal or state listed species, other special status species, or any raptor, USFWS and/or CDFW (as appropriate) should be notified regarding the status of the nest, and the qualified biologist should establish an appropriate buffer as listed below. The avoidance buffer should not be encroached until the nest has become inactive (i.e. the chicks have successfully fledged or the nest has become otherwise inactive through natural processes such as depredation) as determined by the qualified biologist. The nest avoidance buffer should be clearly demarcated with flagging in the field and identified on project plans as an exclusion zone, and no construction activity should be allowed within the active nest exclusion zone.
- **Special Status Species Avoidance Buffers**
    - Special status passerines: 250 feet
    - Non-listed raptors: 250-500 feet
    - White-tailed kite: 500 feet
    - Swainson's hawk: 1/4 mile

4.4.11 Discussion of the American Badger

The American badger (*Taxidea taxus*) *CDFW Species of Special Concern*, is a transient, burrowing mustelid species that builds burrows typically in soft soils in open and often grassland habitats. Their burrows may only be used once and several burrows can be found in areas rich with prey species. Burrows are easily identified due to their large size, oblong opening and the large amount of throws or soil cast in front of the burrow. The American badger primarily preys on small mammal species including pocket gophers, moles and ground squirrels but is also an opportunistic omnivore.

Survey Results

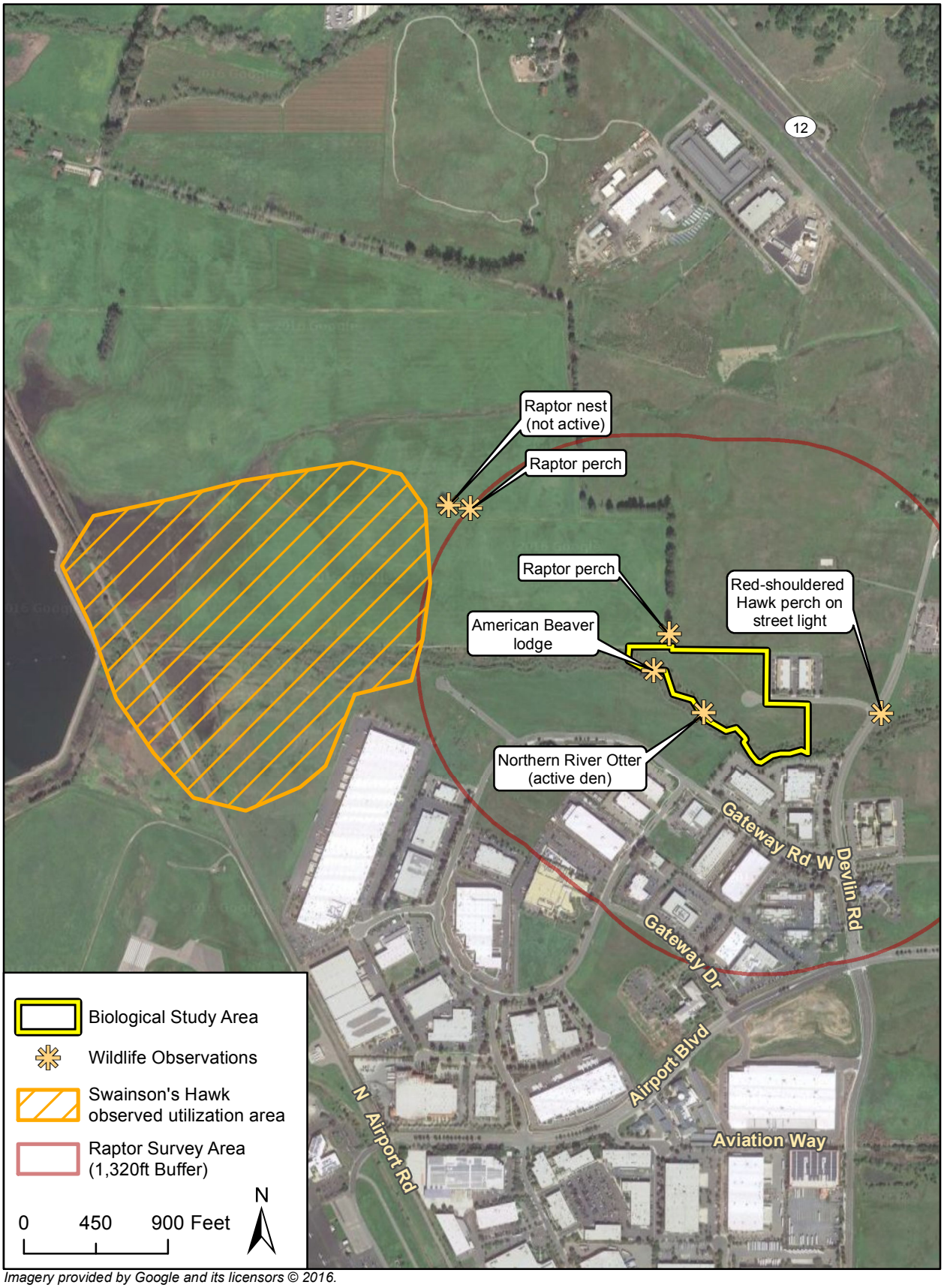
No American badgers and no sign of American badger (burrows, scat, prints, etc.) were observed during wildlife surveys of the BSA. The site lacks a significant prey population for this species, and small mammal (badger prey) burrows were present in very low density on the site. The regular ongoing disturbance of the annual grassland areas of site is likely to maintain prey populations at low abundances on the site, and as a result, the site provides only marginally suitable habitat for this species

Project Impacts

The Project site is not currently occupied by this species, and is unlikely to become occupied based on the marginal quality of the habitat and low abundance of prey at the Project site. Therefore, impacts to American badger are not expected as a result of Project activity.

Avoidance and Minimization Efforts/Compensatory Mitigation

The project is not expected to impact American badger: therfore, no avoidance and minimization measures are recommended.



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Biological Survey Results –
Sensitive Species and Other Protected Wildlife

Figure 8

5. Conclusions & Regulatory Determination

5.1 Federal Endangered Species Act Consultation Summary

As mentioned, due to a CNDDB recorded occurrence of CRLF approximately 2.18 miles south of the Project area, the USFWS was consulted for protocol-level survey requirements and for Section 7 determination guidance. On May 23, 2016, Kristiaan Stuart (Rincon) spoke with Leif Goude (Biologist, USFWS) regarding the need for protocol-level CRLF surveys in the Project area. Based on USFWS's data and expert knowledge, Mr. Goude determined that protocol-level surveys would not be required and based on the Project location and description a NLAA determination would be appropriate for informal Section 7 consultation under the Act. Mr. Goude was informed that the federal nexus for informal Section 7 consultation was based on Project financial assistance from the FTA.

5.2 Essential Fish Habitat Consultation Summary

There is no available information on the presence of federally or state listed fish species being present within Sheehy Creek, and based on anecdotal information, the creek has been completely dry on an annual basis over the previous several years; however, the presence of EFH within Sheehy Creek at the project site cannot be excluded. However, the project is designed to completely avoid the limits of Sheehy Creek (including a County code-specified 35-foot setback from top of bank) and the Project will not result in direct or indirect impacts to Essential Fish Habitat. Therefore, no EFH consultation is necessary for this project.

5.3 Wetlands and Other Waters Coordination Summary

The BSA includes a section of Sheehy Creek, including the active channel, bed, bank, ordinary high water mark (OHWM), top of bank and associated riparian habitat (Figure 3). These areas likely consist of both Waters of the U.S. and Waters of the State under the jurisdiction of the USACE, CDFW and RWQCB. The project has been designed to avoid direct impacts to USACE, CDFW and RWQCB jurisdictional areas, and Napa County code requires a minimum 35-foot setback from Sheehy Creek. The Project will also not result in the discharge of dredged or fill material below the ordinary high water mark of Sheehy Creek or any other wetlands. Therefore, the project will not directly impact any Waters of the U.S. or Waters of the state, and consultation with USACE, CDFW and RWQCB for wetland permitting is not required. As mentioned, due to the area of impact a General Construction Permit pursuant to Section 402 of the CWA (i.e., NPDES permit and SWPPP) will be required.

5.4 Invasive Species

Pursuant to Executive Order 13112, measures must be taken to prevent the spread or infestation of invasive species. There is potential for the proposed Project to result in the

spread of invasive plant species. With implementation of the following recommended avoidance and minimization measures invasive plant species will not be spread.

1. Prior to the start of each Project, the below measures would be reviewed by a qualified botanist/biologist to prevent invasion of native habitat by non-native plant species. A list of target species shall be included, along with measures for early detection and eradication.
2. Prior to construction, a qualified botanist/biologist shall provide invasive plant prevention training and an appropriate identification/instruction guide to staff and contractors.
3. Prior to construction, specific areas shall be designated for cleaning of tools, vehicles, equipment, clothing and footwear, and other gear.
4. Before entering and exiting the work site, any and all tools, equipment, vehicles, clothing and footwear, and other gear shall be cleaned to remove soil, seeds, and other plant parts.
5. If necessary, suitable receiving areas shall be designated for invasive plant waste disposal prior to their transport to a certified landfill and 100 percent containment of invasive plant materials during transport shall be achieved.
6. All disturbed areas should be hydroseeded with a mix of locally native species upon completion of work in those areas. In areas where construction is ongoing, hydroseeding shall occur where no construction activities have occurred within six (6) weeks since ground disturbing activities ceased. If exotic species invade these areas prior to hydroseeding, weed removal shall occur in consultation with a qualified botanist/ biologist.
7. No pets shall be allowed at the Project site.

Table 3 below lists the invasive plant species recorded during the reconnaissance survey.

Table 3. Invasive Exotic Plant Species Occurring in the Biological Study Area

Scientific name	**Common name**	**Native**	**Cal-IPC Status**
Elymus caput-medusae	Medusa head	No	High
Foeniculum vulgare	Sweet fennel	No	High
Lepidium latifolium	Perennial pepperweed	No	High
Brassica nigra	Black mustard	No	Moderate
Bromus diandrus	Ripgut brome	No	Moderate
Carduus pycnocephalus	Italian thistle	No	Moderate
Centaurea calcitrapa	Purple star thistle	No	Moderate
Cirsium vulgare	Bull thistle	No	Moderate
Festuca perennis	Italian rye grass	No	Moderate
Hordeum murinum	Foxtail barley	No	Moderate
Phalaris aquatica	Harding grass	No	Moderate
Trifolium hirtum	Rose clover	No	Moderate
Bellardia trixago	Mediterranean lineseed	No	Limited
Bromus hordeaceus	Soft brome	No	Limited
Erodium cicutarium	Red stemmed filaree	No	Limited
Medicago polymorpha	Bur clover	No	Limited
Plantago lanceolata	Narrow leaved plantain	No	Limited

Scientific name	Common name	Native	Cal-IPC Status
Polypogon monspeliensis	Rabbitsfoot grass	No	Limited
Rumex crispus	Curly dock	No	Limited
Silybum marianum	Blessed milkthistle	No	Limited

California Invasive Plant Council Inventory Categories (Cal-IPC 2016):	
High	These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
Moderate	These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
Limited	These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

5.5 Migratory Bird Treaty Act and California Fish and Game Code Protecting Avian Species

The MBTA and the CFGC protect migratory birds with special provisions under the CFGC for subsets of protected birds including raptors (CFGC 3503.5) and protection for fully protected species (CFGC Sections 3500 to 5500). California “species of special concern” serve as a watch list of species that are either of limited distribution or the extent of their habitats has been reduced substantially, such that threat to their populations may be imminent. Several species of birds protected under the MBTA and or state law have the potential to nest in or adjacent to the BSA. These species include but are not limited to: white-tailed kite, burrowing owl, Cooper’s hawk, northern harrier, tricolored blackbird, and yellow-headed blackbird. Numerous other passerines may also nest within the riparian habitat along Sheehy Creek, or in the upland non-native annual grassland at the site.

Because construction disturbance could result in the destruction of active nests, the incidental loss of fertile eggs or nestlings or the abandonment of nests of bird species protected under the MBTA, minimization and avoidance measures discussed in Chapter 4 will be implemented.

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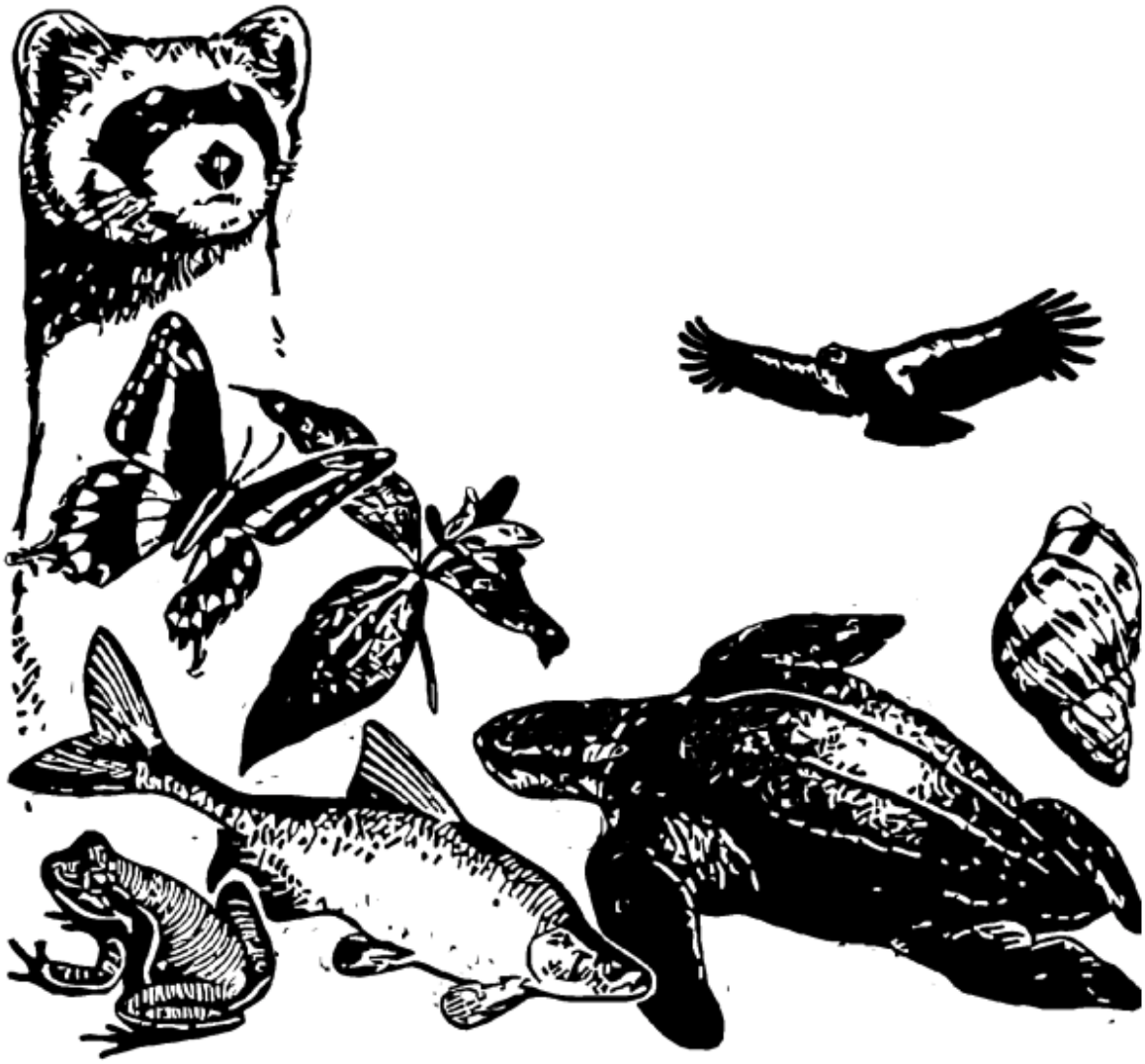
Appendix A. USFWS IPaC Report

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

Generated May 19, 2016 07:21 PM MDT, IPaC v3.0.7

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

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U.S. Fish & Wildlife Service

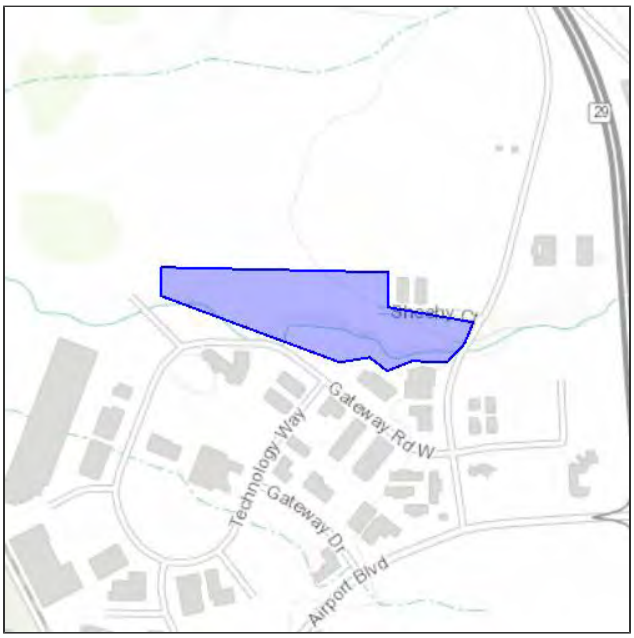
IPaC Trust Resources Report

LOCATION

Napa County, California

IPAC LINK

https://ecos.fws.gov/ipac/project/L26ME-HXIKR-A33ID-NO4JN-JLOP4U



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Amphibians

California Red-legged Frog Rana draytonii — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=D02D

Birds

California Clapper Rail Rallus longirostris obsoletus — Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B04A

California Least Tern Sterna antillarum browni — Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B03X

Northern Spotted Owl Strix occidentalis caurina — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08B

Western Snowy Plover Charadrius alexandrinus nivosus — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B07C

Crustaceans

California Freshwater Shrimp Syncaris pacifica — Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=K01W

Conservancy Fairy Shrimp Branchinecta conservatio — Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=K03D

Vernal Pool Fairy Shrimp Branchinecta lynchi — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=K03G

Fishes

Delta Smelt Hypomesus transpacificus — Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E070

Steelhead Oncorhynchus (=Salmo) mykiss — Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E08D

Tidewater Goby Eucyclogobius newberryi — Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E071

Flowering Plants

Contra Costa Goldfields Lasthenia conjugens — Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q122

Showy Indian Clover Trifolium amoenum — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q238

Soft Bird's-beak Cordylanthus mollis ssp. mollis — Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q0GT

Insects

Callippe Silverspot Butterfly Speyeria callippe callippe — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I019

San Bruno Elfin Butterfly Callophrys mossii bayensis — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I00Q

Mammals

Salt Marsh Harvest Mouse Reithrodontomys raviventris — Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A03Y

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

Allen's Hummingbird Selasphorus sasin — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0LI

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Bell's Sparrow Amphispiza belli — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HE

Black Oystercatcher Haematopus bachmani — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0KJ

Black Rail Laterallus jamaicensis — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09A

Black Skimmer Rynchops niger — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EO

Burrowing Owl Athene cunicularia — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0NC

Common Yellowthroat Geothlypis trichas sinuosa — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B080

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Lawrence's Goldfinch Carduelis lawrencei — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J8

Least Bittern Ixobrychus exilis
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092

Lesser Yellowlegs Tringa flavipes — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MD

Lewis's Woodpecker Melanerpes lewis — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HQ

Long-billed Curlew Numenius americanus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06S

Marbled Godwit Limosa fedoa — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JL

Mountain Plover Charadrius montanus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B078

Nuttall's Woodpecker Picoides nuttallii — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HT

Oak Titmouse Baeolophus inornatus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MJ

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Rufous-crowned Sparrow Aimophila ruficeps — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MX

Short-billed Dowitcher Limnodromus griseus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JK

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Snowy Plover Charadrius alexandrinus — Bird of conservation concern
Season: Breeding

Swainson's Hawk Buteo swainsoni — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B070

Tricolored Blackbird Agelaius tricolor — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06P

Western Grebe aechmophorus occidentalis — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EA

Whimbrel Numenius phaeopus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JN

Yellow Rail Coturnicops noveboracensis — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JG

Appendix B. Plants and Animals Identified in the Biological Study Area

Sheehy Court – Botanical Observations

Scientific name	**Common name**	**Native**	**Status**
Acmispon brachycarpus	Short podded lotus	Y	
Acmispon strigosus	Strigose lotus	Y	
Aesculus californica	California buckeye	Y	
Avena barbata	Slender oat	N	
Baccharis pilularis	Coyote brush	Y	
Bellardia trixago	Mediterranean lineseed	N	limited
Bolboschoenus fluviatilis	River bulrush	Y	
Brassica nigra	Black mustard	N	moderate
Briza minor	Little quaking grass	N	
Bromus carinatus	California brome grass	Y	
Bromus diandrus	Ripgut brome	N	moderate
Bromus hordeaceus	Soft brome	N	limited
Carduus pycnocephalus	Italian thistle	N	moderate
Centaurea calcitrapa	Purple star thistle	N	moderate
Cirsium occidentale var. candidissimum	Snowy thistle	Y	
Cirsium vulgare	Bull thistle	N	moderate
Convolvulus arvensis	Field bindweed	N	
Distichlis spicata	Salt grass	Y	
Elymus caput-medusae	Medusa head	N	high
Elymus triticoides	Beardless wild rye	Y	
Epilobium ciliatum	Slender willow herb	Y	
Erodium cicutarium	Red stemmed filaree	N	limited
Festuca perennis	Italian rye grass	Y	
Foeniculum vulgare	Sweet fennel	N	high
Geranium dissectum	Cranesbill	N	
Hordeum murinum	Foxtail barley	N	moderate
Juncus effusus	Bog rush	Y	
Juncus mexicanus	Mexican rush	Y	
Lactuca serriola	Prickly lettuce	N	
Lepidium latifolium	Perennial pepperweed	N	high
Lotus corniculatus	Bird's foot trefoil	N	
Lysimachia arvensis	Scarlet pimpernel	*N*	
Medicago polymorpha	Bur clover	N	limited
Nasturtium officinale	Watercress	Y	
Phalaris aquatica	Harding grass	N	moderate
Plantago lanceolata	Narrow leaved plantain	N	limited
Polypogon monspeliensis	Rabbitsfoot grass	N	limited
Populus fremontii ssp. fremontii	Fremont cottonwood	Y	
Quercus agrifolia	Coast live oak	Y	
Quercus durata	Leather oak	Y	
Raphanus raphanistrum	Jointed charlock	N	
Rosa californica	California wild rose	Y	
Rubus ursinus	California blackberry	Y	
Rumex acetosella	Common sheep sorrel	N	
Rumex crispus	Curly dock	N	limited
Salix exigua	Sandbar willow	Y	
Salix laevigata	Red willow	Y	

Salix lasiandra	Pacific willow	Y	
Salix lasiolepis	Arroyo willow	Y	
Sambucus nigra ssp. caerulea	Blue elderberry	Y	
Schoenoplectus acutus	Hardstem bulrush	Y	
Silybum marianum	Blessed milkthistle	N	limited
Sonchus asper	Spiny sowthistle	N	
Stipa pulchra	Purple needle grass	Y	
Tragopogon dubius	Yellow salsify	N	
Trifolium hirtum	Rose clover	N	moderate
Vicia americana	American vetch	Y	
Vicia benghalensis	Purple vetch	N	

Sheehy Court - Wildlife Survey Results

Name (Scientific)	**Status**	**Detection Method**
Fish		
Minnow *Unidentifiable to species*		Visual
Amphibians		
American Bullfrog (*Lithobates catesbeianus*)		Visual
Avian		
American Crow (*Corvus brachyrhynchos*)	MBTA / -	Acoustic / Visual
American White Pelican (*Pelecanus erythrorhynchos*)	MBTA / -	Visual
Barn Swallow *(Hirundo rustica*)	MBTA / -	Visual
Black Phoebe (*Sayornis nigricans*)	MBTA / -	Acoustic / Visual
Black-chinned Hummingbird (*Archilochus alexandri*)	MBTA / -	Acoustic / Visual
Brewer's Blackbird (*Euphagus cyanocephalus*)	MBTA / -	Acoustic / Visual
Brown-headed Cowbird (*Molothrus ater*)		Acoustic / Visual
European Starling (*Sturnus vulgaris*)		Acoustic / Visual
Fox Sparrow (*Passerella iliaca*)	MBTA / -	Visual
Great Blue Heron (*Ardea herodias*)		Acoustic / Visual
Great Egret (*Ardea alba*)		Visual
Green Heron (*Butorides virescens*)		Acoustic / Visual
House Finch (*Haemorhous mexicanus*)		Acoustic / Visual
Mourning Dove (*Zenaida macroura*)	MBTA / -	Acoustic / Visual
Northern Mockingbird (*Mimus polyglottos*)	MBTA / -	Acoustic / Visual
Red-shouldered Hawk (*Buteo lineatus*)	MBTA / CFGC 3503.5	Visual
Red-tailed Hawk (*Buteo jamaicensis)*	MBTA / CFGC 3503.5	Acoustic / Visual

Red-winged Blackbird (*Agelaius phoeniceus*)	MBTA / -	Acoustic / Visual
Swainson's Hawk (*Buteo swainsoni*)	MBTA / CFGC 3503.5, State Threatened	Acoustic / Visual
Tree Swallow (*Tachycineta bicolor*)	MBTA / -	Visual
Turkey Vulture (*Cathartes aura*)	MBTA / -	Visual
Western Scrub-Jay (*Aphelocoma californica*)	MBTA / -	Acoustic / Visual
Wild Turkey (*Meleagris gallopavo*)		Acoustic
Yellow Warbler (*Setophaga petechial*)	MBTA / -	Visual
Mammal		
American Beaver (*Castor canadensis*)		Lodge, Tree damage
Mule Deer (*Odocoileus hemionus*)		Beds, Tracks, Scat
Northern River Otter (*Lontra canadensis*)		Den, Slides

Appendix C

Historic Property Survey Report

Napa Valley Transportation Authority

Napa Valley Transportation Authority Sheehy Court Bus Maintenance Facility Project

Historic Property Survey Report

U.S.G.S. Cuttings Wharf, CA quadrangle

Prepared for:
Federal Transit Administration—District 9
90 7th Street, Suite 15-300
San Francisco, CA 94310

Prepared by:
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449 15th Street, Suite 303
Oakland, CA 94612

Author:
Kyle Brudvik, M.A., RPA

June 2016

Keywords: Cuttings Wharf, CA quadrangle; Napa County; negative survey; no historic properties affected

Environmental Scientists Planners Engineers

HISTORIC PROPERTY SURVEY REPORT

1. UNDERTAKING DESCRIPTION AND LOCATION

District	County	Route	Post Miles	Unit	E-FIS Project Number	Phase
District	***County***	***Federal Project. Number. (Prefix, Agency Code, Project No.)***		***Location***		
	NA			City of Napa		

Project Description:

The proposed project consists of the construction of a 22,000 square foot multi-story maintenance facility building, a bus washer, a parking lot for up to 100 public transit vehicles, and parking for employees and visitors.

2. AREA OF POTENTIAL EFFECTS

In accordance with Section 106 Programmatic Agreement Stipulation VIII.A, the Area of Potential Effects (APE) for the project was established in consultation with NVTA, on April 20, 2016. The APE maps are located in Appendix A of this HPSR (Figures 2 and 3in this Historic Property Survey Report. The APE was established as the approximately 8-acre total, adjacent Assessor's parcels numbered 057-250-025 and 057-250-036.

3. CONSULTING PARTIES / PUBLIC PARTICIPATION

✓ Local Government

- The Napa County Historical Society was contacted by mail on May 20, 2016 to inquire about possible historical information that could be used to inform the current project. NCHS responded on May 31, 2016 that "NCHS has no concerns regarding specific historic resources within the project area."
- The Napa Cultural Heritage Commission was contacted by mail on May 20, 2016 to inquire about possible historical information that could be used to inform the current project. A follow-up email and voicemail were left for the Napa Cultural Heritage Commission on May 31, 2016. Ken MacNab, Planning Manager, responded May 31, 2016 that he had forwarded request to Michael Allen, Associate Planner, who responded that since "the subject property is located outside the City of Napa City limits, the City's archeological database does not contain any information regarding 90 Sheehy Court (APN 057-250-036)."

✓ Native American Tribes, Groups and Individuals

The following Native American tribes, groups, and individuals were contacted (either provided by the Native American Heritage Commission (NAHC) on May 12, 2016 or identified by Rincon). More information about the Native American consultation for this project can be found in the Archaeological Survey Report (ASR) prepared for the project (Attachment B).

- Gene Buvelot of the Federated Indians of Graton Rancheria- letter mailed on May 12, 2016; Buffy McQuillen, the Tribal Heritage Preservation Officer (THPO) for the Federated Indians of Graton Rancheria responded on May 25, 2016 that the project "is not in our traditional ancestral territory" and therefore had no comments.
- Jose Simon III of the Middletown Rancheria of Pomo Indians- letter mailed on May 12, 2016;

called on May 31, 2016. No response was received.

- Marshall McKay of the Yocha Dehe Wintun Nation- letter mailed on May 12, 2016; called on May 31, 2016. No response was received.
- Ya-Ka-Ama- letter mailed on May 12, 2016; called on May 24, 2016. No response was received.
- Greg Sarris of the Federated Indians of Graton Rancheria- letter mailed on May 12, 2016; Buffy McQuillen, the Tribal Heritage Preservation Officer (THPO) for the Federated Indians of Graton Rancheria responded on May 25, 2016 that the project "is not in our traditional ancestral territory" and therefore had no comments.
- Charlie Toledo of the Suscol Intertribal Council- letter mailed on May 12, 2016; called on May 31, 2016. No response was received.
- Charlie Wright of the Cortina Rancheria Band of Wintun Indians- letter mailed on May 12, 2016; called on May 31, 2016. No response was received.
- Kesner Flores of the Cortina Rancheria Band of Wintun Indians - letter mailed on May 12, 2016; called on May 31, 2016. No response was received.
- Lelan Kinter of the Native Cultural Renewal Committee- letter mailed on May 12, 2016; called on May 31, 2016. No response was received.
- Cynthia Clarke of the Native Cultural Renewal Committee - letter mailed on May 12, 2016; called on May 31, 2016. No response was received.
- Scott Gabaldon of the Mishewal-Wappo Tribe of Alexander Valley- letter mailed on May 12, 2016; called on May 31, 2016. No response was received.

✓ Native American Heritage Commission (NAHC)

- A Sacred Lands File (SLF) search was requested on May 3, 2016. The NAHC emailed a response on May 10, 2016 and stated that "a search of the SLF was completed for the USGS quadrangle information provided with negative results."

4. SUMMARY OF IDENTIFICATION EFFORTS

✓ National Register of Historic Places
✓ California Register of Historical Resources
✓ California Points of Historical Interest
✓ California Historical Resources Information System (CHRIS)
✓ California Inventory of Historic Resources
✓ California Historical Landmarks
✓ **Results:** *(Provide a brief summary and research results, as well as inventory findings.)*

Rincon conducted a search of the California Historical Resources Information System (CHRIS) on May 16, 2016 at the Northwest Information Center (NWIC), located at Sonoma State University. The search was completed to identify previously conducted cultural resource studies as well as previously recorded cultural resources in the APE and within a 0.8 km (0.50-mile) radius of the APE. No structures previously evaluated for listing on the California Register of Historic Resources (CRHR) were identified within the APE. In addition, no archaeological resources were recorded within the APE.

5. PROPERTIES IDENTIFIED

✓ No cultural resources are present within the APE.

6. HPSR to SHPO

HISTORIC PROPERTY SURVEY REPORT

✓ Not applicable.

7. Findings for State-Owned Properties

✓ Not applicable; project does not involve FTA right-of-way or FTA-owned cultural resources within the APE.

8. CEQA Considerations

✓ Not applicable; FTA is not the lead agency under CEQA.

9. List of Attached Documentation

✓ Project Vicinity, Location, and APE Maps (Attachment A)

✓ Archaeological Survey Report (ASR; Attachment B)

- K. Brudvik
  2016 *Archaeological Survey Report for the Napa Valley Transportation Authority Sheehy Court Bus Maintenance Facility Project, Napa County, California*. Rincon Consultants Project No. 16-02601. Report on file at the Northwestern Information Center, Sonoma State University.

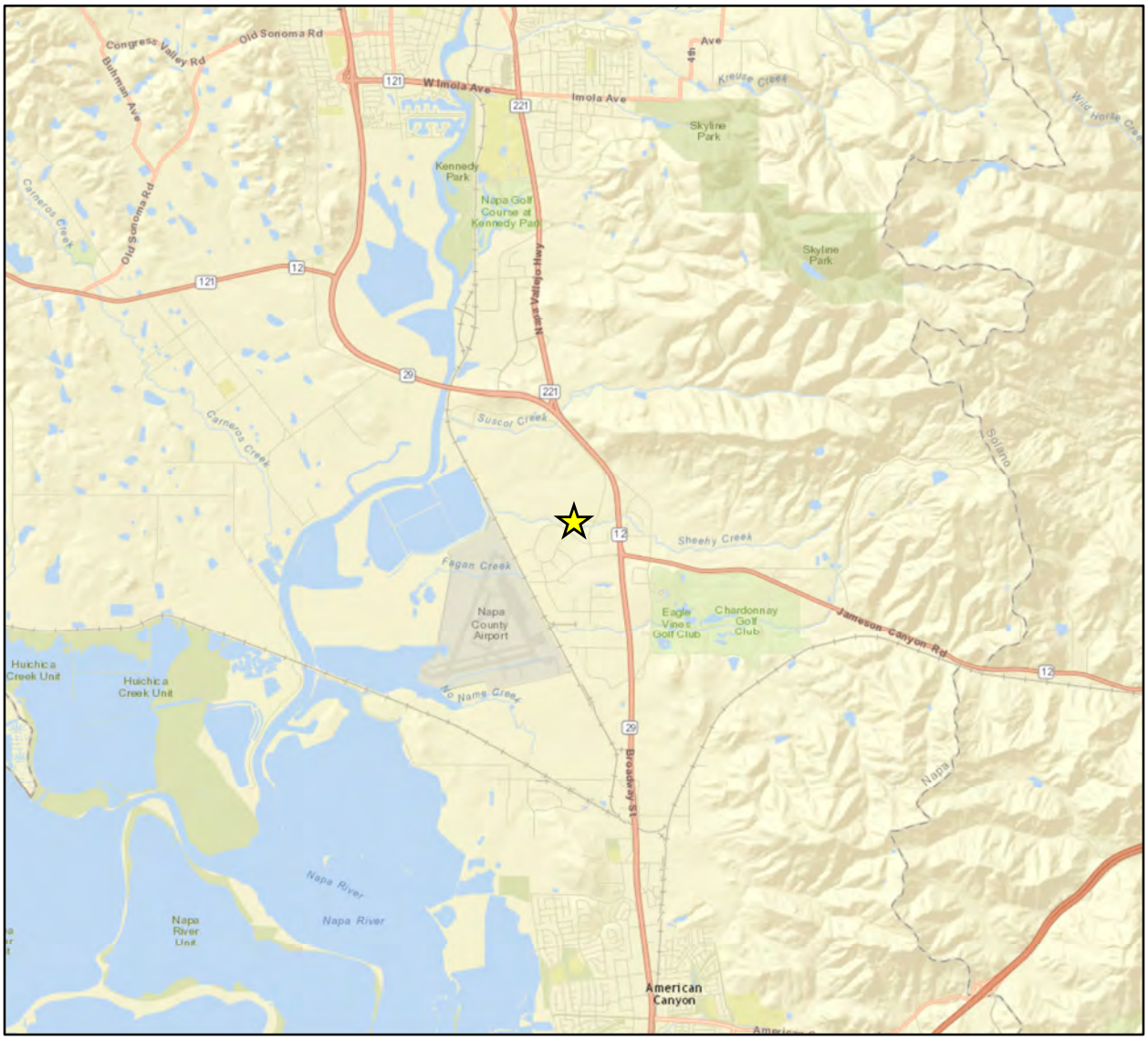
10. HPSR Preparation and FTA Approval

Prepared by:

		05/31/2016
Consultant / discipline:	*Kyle Brudvik, Principal Investigator*	Date
Affiliation	*Rincon Consultants* *449 15th Street, Suite 303* *Oakland, CA 94612*	

Reviewed for approval by: *(sign on line)*

District 9 FTA discipline/level:	*Regional Administrator* *FTA District 9*	Date



Imagery provided by ESRI and its licensors © 2016.

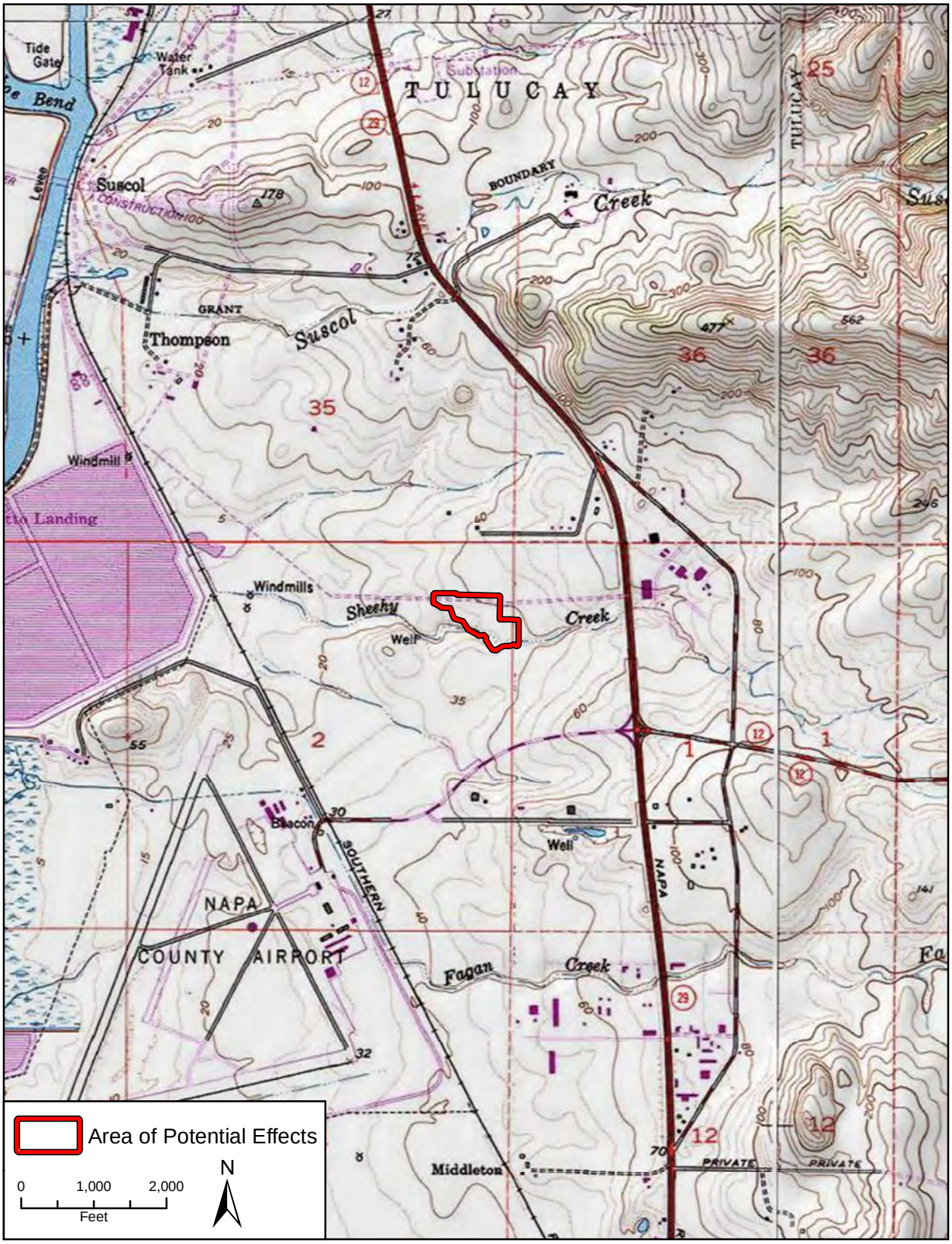
Project Location

0 0.75 1.5
Miles

N

Project Vicinity Map

Figure 1



Imagery provided by National Geographic Society, ESRI and its licensors © 2016. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Project Location Map

Figure 2

Figure 3
Area of Potential Effects

Napa Valley Transportation Authority

Appendix B

Archaeological Survey Report

Napa Valley Transportation Authority

Napa Valley Transportation Authority Sheehy Court Bus Maintenance Facility Project

Archaeological Survey Report

U.S.G.S. Cuttings Wharf, CA quadrangle

Prepared for:
Federal Transit Administration—District 9
90 7th Street, Suite 15-300
San Francisco, CA 94310

Prepared by:
Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, CA 94612

Author:
Kyle Brudvik, M.A., RPA

June 2016

Keywords: Cuttings Wharf, CA quadrangle; Napa County; negative survey; no historic properties affected

Environmental Scientists Planners Engineers

Archaeological Survey Report for the Napa Valley Transportation Authority Sheehy Court Bus Maintenance Facility Project, Napa County, California

Prepared for:
Federal Transit Administration— District 9
90 7th Street, Suite 15-300
San Francisco, CA 94310

Prepared by:

Kyle Brudvik, M.A., RPA and
Rincon Consultants
449 15th Street, Suite 303
Oakland, CA 94612

Reviewed for approval by:

_____ _____
Date

Regional Administrator
FTA District 9

U.S.G.S. *Cuttings Wharf, CA* quadrangle; City of Napa; negative survey; no historic properties affected

June 2016

CONFIDENTIAL DISTRIBUTION

The following document contains sensitive and confidential information concerning Native American site and component locations and this report is not for general distribution. Archaeological site locations are exempted from the California Public Records Act, as specified in Government Code 6254.10, and from the Freedom of Information Act (Exemption 3), under the legal authority of both the National Historic Preservation Act (PL 102-574, Section 304[a]) and the Archaeological Resources Protection Act (PL 96-95, Section 9[a]). Sections of this report contain maps and other sensitive information. Distribution should be restricted appropriately.

Note: the remainder of this document is omitted from the public draft environmental documents because it contains sensitive information, as discussed in the Confidential Distribution note above. It is on file at NVTA offices as part of the administrative record for the Sheehy Court Bus Maintenance Facility project.

K. Brudvik
2016 *Archaeological Survey Report for the Napa Valley Transportation Authority Sheehy Court Bus Maintenance Facility Project, Napa County, California*. Rincon Consultants Project No. 16-02601. Report on file at the Northwestern Information Center, Sonoma State University.

Appendix D

Noise Measurements

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 84.6 - 2016/08/12 13:54:37
- Level Range : 40-100
- SEL : 88.4
- Leq : 58.9
-

No.s	Date Time	(dB)
1	2016/08/12 13:39:43	56.9
2	2016/08/12 13:39:44	54.7
3	2016/08/12 13:39:45	54.2
4	2016/08/12 13:39:46	53.5
5	2016/08/12 13:39:47	52.8
6	2016/08/12 13:39:48	54.3
7	2016/08/12 13:39:49	54.6
8	2016/08/12 13:39:50	53.4
9	2016/08/12 13:39:51	51.7
10	2016/08/12 13:39:52	52.3
11	2016/08/12 13:39:53	53.6
12	2016/08/12 13:39:54	55.4
13	2016/08/12 13:39:55	56.4
14	2016/08/12 13:39:56	55.9
15	2016/08/12 13:39:57	56.7
16	2016/08/12 13:39:58	55.2
17	2016/08/12 13:39:59	57.3
18	2016/08/12 13:40:00	56.6
19	2016/08/12 13:40:01	56.0
20	2016/08/12 13:40:02	55.7
21	2016/08/12 13:40:03	55.5
22	2016/08/12 13:40:04	55.7
23	2016/08/12 13:40:05	54.1
24	2016/08/12 13:40:06	52.5
25	2016/08/12 13:40:07	53.2
26	2016/08/12 13:40:08	53.2
27	2016/08/12 13:40:09	52.8
28	2016/08/12 13:40:10	52.6
29	2016/08/12 13:40:11	52.3
30	2016/08/12 13:40:12	56.0
31	2016/08/12 13:40:13	55.5
32	2016/08/12 13:40:14	55.5
33	2016/08/12 13:40:15	55.7
34	2016/08/12 13:40:16	56.4
35	2016/08/12 13:40:17	56.6
36	2016/08/12 13:40:18	57.2
37	2016/08/12 13:40:19	56.3
38	2016/08/12 13:40:20	55.5
39	2016/08/12 13:40:21	55.2
40	2016/08/12 13:40:22	55.4
41	2016/08/12 13:40:23	55.3
42	2016/08/12 13:40:24	55.5
43	2016/08/12 13:40:25	54.7
44	2016/08/12 13:40:26	54.8
45	2016/08/12 13:40:27	54.3
46	2016/08/12 13:40:28	54.7
47	2016/08/12 13:40:29	54.7
48	2016/08/12 13:40:30	54.8
49	2016/08/12 13:40:31	54.9
50	2016/08/12 13:40:32	55.4
51	2016/08/12 13:40:33	55.8
52	2016/08/12 13:40:34	55.9
53	2016/08/12 13:40:35	56.2
54	2016/08/12 13:40:36	55.7
55	2016/08/12 13:40:37	54.7
56	2016/08/12 13:40:38	53.5
57	2016/08/12 13:40:39	53.4
58	2016/08/12 13:40:40	53.7
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60	2016/08/12 13:40:42	53.7
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81	2016/08/12 13:41:03	57.0
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89	2016/08/12 13:41:11	61.2
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852	2016/08/12 13:53:54	70.6
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- Time Weight : FAST
- Level Range : 40-100
- Max dB : 83.5 - 2016/08/12 18:26:16
- Level Range : 40-100
- SEL : 93.0
- Leq : 63.5
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- Time Weight : FAST
- Level Range : 40-100
- Max dB : 99.5 - 2016/08/12 18:42:00
- Level Range : 40-100
- SEL : 99.5
- Leq : 70.0
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- Time Weight : FAST
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- Max dB : 82.6 - 2016/08/12 14:13:19
- Level Range : 40-100
- SEL : 96.1
- Leq : 66.6
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- Time Weight : FAST
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- Max dB : 76.5 - 2016/08/12 15:29:55
- Level Range : 40-100
- SEL : 85.5
- Leq : 56.0
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- Time Weight : FAST
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- Max dB : 71.3 - 2016/08/12 15:42:13
- Level Range : 40-100
- SEL : 80.5
- Leq : 51.0
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741	2016/08/12 15:53:46	43.1
742	2016/08/12 15:53:47	43.3
743	2016/08/12 15:53:48	43.4
744	2016/08/12 15:53:49	44.0
745	2016/08/12 15:53:50	44.2
746	2016/08/12 15:53:51	43.9
747	2016/08/12 15:53:52	44.6
748	2016/08/12 15:53:53	43.4
749	2016/08/12 15:53:54	49.7
750	2016/08/12 15:53:55	44.6
751	2016/08/12 15:53:56	44.4
752	2016/08/12 15:53:57	43.8
753	2016/08/12 15:53:58	45.9
754	2016/08/12 15:53:59	44.4
755	2016/08/12 15:54:00	44.0
756	2016/08/12 15:54:01	44.1
757	2016/08/12 15:54:02	43.6
758	2016/08/12 15:54:03	44.9
759	2016/08/12 15:54:04	44.0
760	2016/08/12 15:54:05	45.5
761	2016/08/12 15:54:06	43.0
762	2016/08/12 15:54:07	44.1
763	2016/08/12 15:54:08	44.5
764	2016/08/12 15:54:09	43.3
765	2016/08/12 15:54:10	43.7
766	2016/08/12 15:54:11	43.5
767	2016/08/12 15:54:12	43.7
768	2016/08/12 15:54:13	43.1
769	2016/08/12 15:54:14	43.2
770	2016/08/12 15:54:15	43.2
771	2016/08/12 15:54:16	44.0
772	2016/08/12 15:54:17	44.6
773	2016/08/12 15:54:18	44.3
774	2016/08/12 15:54:19	43.8
775	2016/08/12 15:54:20	44.1
776	2016/08/12 15:54:21	43.8
777	2016/08/12 15:54:22	43.2
778	2016/08/12 15:54:23	44.4

779	2016/08/12 15:54:24	43.6
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785	2016/08/12 15:54:30	44.8
786	2016/08/12 15:54:31	44.8
787	2016/08/12 15:54:32	45.2
788	2016/08/12 15:54:33	45.2
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802	2016/08/12 15:54:47	44.5
803	2016/08/12 15:54:48	44.0
804	2016/08/12 15:54:49	43.8
805	2016/08/12 15:54:50	44.4
806	2016/08/12 15:54:51	43.4
807	2016/08/12 15:54:52	44.0
808	2016/08/12 15:54:53	43.3
809	2016/08/12 15:54:54	43.4
810	2016/08/12 15:54:55	43.3
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812	2016/08/12 15:54:57	46.3
813	2016/08/12 15:54:58	43.6
814	2016/08/12 15:54:59	43.9
815	2016/08/12 15:55:00	45.8
816	2016/08/12 15:55:01	50.3
817	2016/08/12 15:55:02	46.0
818	2016/08/12 15:55:03	43.9
819	2016/08/12 15:55:04	44.3
820	2016/08/12 15:55:05	44.4
821	2016/08/12 15:55:06	44.3
822	2016/08/12 15:55:07	43.7
823	2016/08/12 15:55:08	43.4
824	2016/08/12 15:55:09	43.8
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833	2016/08/12 15:55:18	44.7
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837	2016/08/12 15:55:22	46.0
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854	2016/08/12 15:55:39	46.0
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877	2016/08/12 15:56:02	46.2

878	2016/08/12 15:56:03	45.9
879	2016/08/12 15:56:04	46.7
880	2016/08/12 15:56:05	45.7
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883	2016/08/12 15:56:08	45.9
884	2016/08/12 15:56:09	47.1
885	2016/08/12 15:56:10	46.5
886	2016/08/12 15:56:11	46.3
887	2016/08/12 15:56:12	46.7
888	2016/08/12 15:56:13	47.7
889	2016/08/12 15:56:14	46.9
890	2016/08/12 15:56:15	47.3
891	2016/08/12 15:56:16	46.3
892	2016/08/12 15:56:17	47.1
893	2016/08/12 15:56:18	47.8
894	2016/08/12 15:56:19	47.9
895	2016/08/12 15:56:20	51.9
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898	2016/08/12 15:56:23	48.4
899	2016/08/12 15:56:24	46.5
900	2016/08/12 15:56:25	48.9

Appendix E

Traffic Impact Study

NVTA Bus Maintenance Facility

Traffic Impact Study

Final Report

By

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September 2, 2016

Document Description

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Project Name	NVTA Bus Maintenance Facility TIS
Related Task / WBS Number	N/A
Document Name	Traffic Impact Study Final Report
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1-1	08/11/2016	Revised Draft Report	KBJ/EKT
2-0	08/23/2016	Final Report	KBJ
2-1	09/02/2016	Final Report - Revised	KBJ

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Executive Summary

This report provides an evaluation of traffic and transportation issues related to the proposed Project. The Project consists of the construction of a new 23,164 square foot bus maintenance facility and 3,917 square foot office building. The site will provide parking to accommodate up to 93 buses of varying sizes and 75 passenger cars. The proposed Project site is located at the end of Sheehy Court in unincorporated Napa County. The proposed Project would generate 345 daily trips, including 41 net-new AM peak hour trips (16 inbound, 25 outbound) and 32 net-new PM peak hour trips (9 inbound, 23 outbound).

The study analyzed six intersections for the AM and PM peak hour of traffic. These intersections were evaluated for the following scenarios: Existing, Background, Project, Cumulative and Cumulative plus Project Conditions. The results of the intersection level of service analysis are summarized in Table 1 of this report.

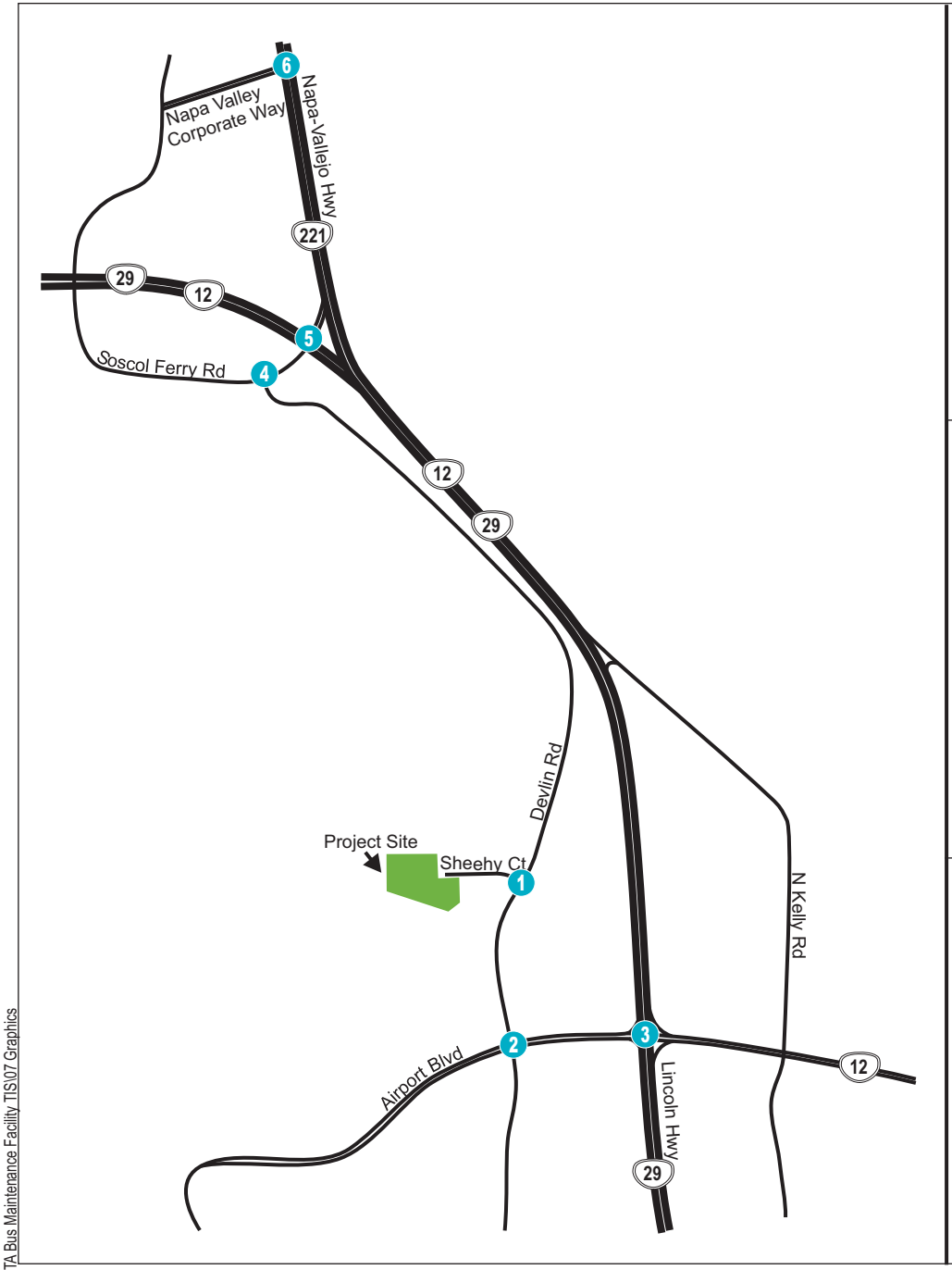
The intersection level of service analysis results show that the addition of project-generated traffic onto surrounding study intersections is not anticipated to result in significant impacts based on level of service thresholds discussed in Section 4.2.

An evaluation of the preliminary site layout plan did not reveal any operational or safety deficiencies. The internal circulation, on-site parking supply and layout, and site egress and ingress are all adequate and no mitigations are required.

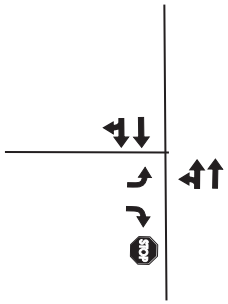
Although the project site would be located near existing and planned bike facilities, interaction between project-related vehicles and bicycle users is expected to be minimal because peak activity periods for the project would occur during very early morning or late evening hours when pedestrian and bicycle activity will be minimal.

This study evaluated the issues related to transportation, traffic and circulation for the proposed project and did not identify any significant impacts. Therefore, mitigation measures are not required.

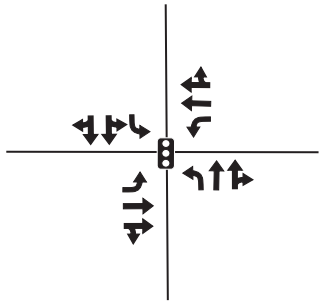
Figure 1 illustrates the Project site location, study area, surrounding roadway network and existing intersection geometry at each study intersection. **Figure 2** shows the Project site plan. **Table 1** summarizes the Level-of-Service operations for all study intersections under AM and PM peak hours.



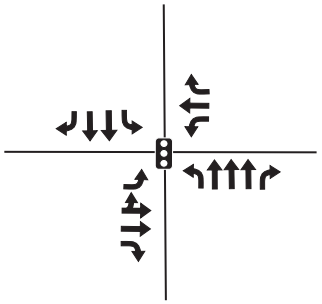
1. *Devlin Rd & Sheehy Ct*



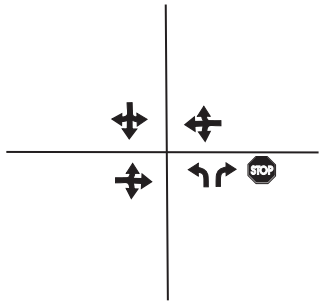
2. *Devlin Rd & Airport Blvd*



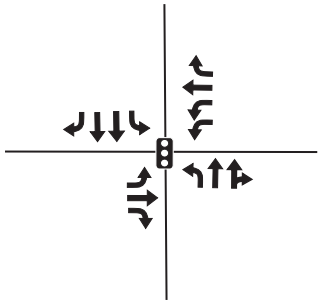
3. *Lincoln Hwy & Airport Blvd*



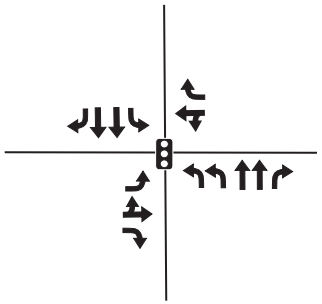
4. *Devlin Rd & Soscol Ferry Rd*



5. *SR 12/29 & SR 221*



6. *SR 221 & Napa Valley Corporate Wy*



LEGEND

- Study Intersection
- Project Site
- Traffic Signal
- Stop Control
- Existing Lane Geometry

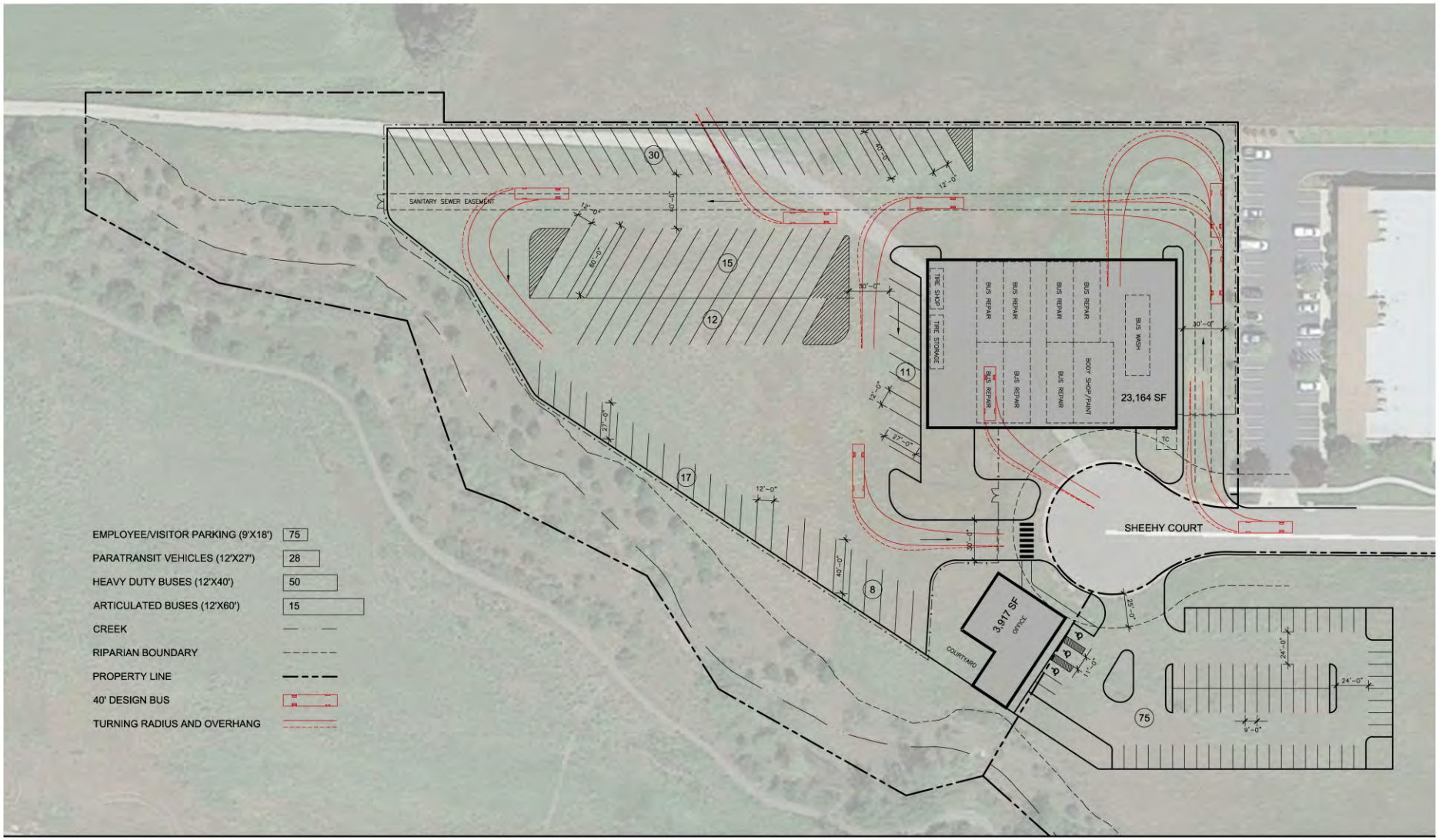
No Scale

DKS

Figure 1

NVTA Bus Maintenance Facility TIS
Study Area, Intersection Geometry, Traffic Control

P:\16\16067-000 NVTA Bus Maintenance Facility TIS\07 Graphics



PGA design INC
LANDSCAPE ARCHITECTS

July 14, 2016

STANDALONE OFFICE LAYOUT (PREFERRED)

SHEEHY COURT BUS MAINTENANCE FACILITY

NORTH

0' 30' 60' 120'
UNITS IN FEET

P:\16\16067-000 NVTA Bus Maintenance Facility TIS\07 Graphics

DKS

Figure 2

NVTA Bus Maintenance Facility TIS
Project Site Plan

Table 1: Study Intersection LOS Summary

Int. #	Intersection	Control Type	Peak Hour	Existing		Background		Project		Cumulative		Cumulative plus Project	
				Avg Delay	LOS	Avg Delay	LOS	Avg Delay	LOS	Avg Delay	LOS	Avg Delay	LOS
1	Devlin Rd & Sheehy Ct	Unsignalized[1]	AM	12.0	B	14.3	B	13.8	B	15.0	B	14.3	B
			PM	22.6	C	30.5	D	32.9	D	**52.2**	**F**	**63.6**	**F**
2	Devlin Rd & Airport Blvd	Signal	AM	12.6	B	15.1	B	15.2	B	15.0	B	15.2	B
			PM	23.3	C	34.7	C	35.6	D	**68.9**	**E**	**70.4**	**E**
3	Lincoln Hwy & Airport Blvd	Signal	AM	51.9	D	**70.0**	**E**	**70.7**	**E**	**> 80**	**F**	**> 80**	**F**
			PM	43.5	D	**55.9**	**E**	**56.6**	**E**	**> 80**	**F**	**> 80**	**F**
4	Devlin Rd & Soscol Ferry Rd	Unsignalized[1]	AM	**37.5**	**E**	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
			PM	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
5	SR 12/29 & SR 221	Signal	AM	44.8	D	50.3	D	51.2	D	**> 80**	**F**	**> 80**	**F**
			PM	**67.8**	**E**	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
6	SR 221 & Napa Valley Corporate Way	Signal	AM	13.2	B	13.7	B	13.8	B	46.8	D	47.3	D
			PM	17.9	B	18.7	B	18.7	B	37.7	D	38.0	D

Source: DKS Associates, 2016
Notes: **Bold** = LOS E or worse.
1. Unsignalized Intersections LOS are based on the worst approach.

1. Introduction

This report provides an evaluation of traffic and transportation issues related to the proposed Project. The Project consists of the construction of a new 23,164 square foot bus maintenance facility and 3,917 square foot office building. The site will have enough parking to accommodate up to 93 buses of varying sizes and 75 passenger cars. The proposed Project site is located at the end of Sheehy Court in unincorporated Napa County. The proposed Project would generate 345 daily trips, including 41 net-new AM peak hour trips (16 inbound, 25 outbound) and 32 net-new PM peak hour trips (9 inbound, 23 outbound). **Figure 1** illustrates the Project site location, study area, surrounding roadway network and existing intersection geometry at each study intersection. **Figure 2** shows the Project site plan.

The addition of project-generated traffic onto surrounding study intersections is not anticipated to result in significant impacts related to transportation, traffic or circulation. Therefore, mitigation measures are not required.

This report provides a general description of the transportation facilities in the Project vicinity and summarizes Existing Condition, Background Condition, Background plus Project Condition, Cumulative Condition, and Cumulative plus Project Conditions.

This report analyzes the traffic conditions during the weekday AM and PM peak hours for the Project land use. The impacts of the proposed Project were estimated using the current level-of-service methodologies set forth by the Napa County and Caltrans.

1.1 Intersection Analysis

Table 2 shows the list of intersections which were analyzed as part of the traffic impact analysis. These locations were chosen based on consultation with Napa Valley Transportation Authority (NVTA) staff.

Table 2: Study Intersections

Int. #	Intersection	Jurisdiction
1.	Devlin Rd & Sheehy Ct	County
2.	Devlin Rd & Airport Blvd	County
3.	Lincoln Hwy & Airport Blvd	Caltrans
4.	Devlin Rd & Soscol Ferry Rd	County
5.	SR 12/29 & SR 221	Caltrans
6.	SR 221 & Napa Valley Corporate Way	Caltrans

The list of study intersections was based on the size and nature of the Project and how travelers would be expected to use the roadways within the surrounding study area, and with consideration to those intersections that are most likely to be impacted by the proposed Project. The operation of these intersections was evaluated during the weekday AM (7:00 – 9:00 AM) and weekday PM (4:00 – 6:00 PM) peak periods for the following scenarios:

Scenario 1: Existing Condition. Existing peak-hour volumes, lane geometry, and traffic control (e.g., signal timing, signal phasing, STOP control, etc.).

Scenario 2: Background Condition. Existing peak-hour volumes plus growth from approved, but not yet constructed, developments in the vicinity of the proposed Project.

Scenario 3: Project Condition. Background Condition volumes plus Project-generated traffic estimated for proposed development Project. This scenario assumes full buildout of the proposed bus maintenance facility.

Scenario 4: Cumulative Condition. Existing peak-hour volumes plus anticipated forecasted growth for the year 2040 derived from the Napa-Solano Travel Demand Model.

Scenario 5: Cumulative plus Project Condition. Cumulative Year Condition volumes plus Project-generated traffic estimated for proposed development Project. This scenario assumes full buildout of the proposed bus maintenance facility.

2. Existing Transportation System

This section provides an evaluation of traffic and transportation issues related to the proposed Project. A description of the existing transportation system facilities in terms of the roadway network facilities, intersections, transit service, bicycle, pedestrian and parking is provided below.

2.1 Adjacent Street System

The roadway network within the study area is comprised of freeways, arterials, and local streets. **Figure 1** illustrates the roadway network. The major surrounding roadways are described below.

State Route 12 (SR 12) – This facility is a two- to four-lane roadway that runs in the east-west direction through Napa County, connecting to Sonoma County on the west side and to I-80 in Solano County on the east side. In the vicinity of the study area, it has two lanes in each direction and a posted speed limit of 55 mph. The portion of SR 12 that is east of SR 29 is also known as the Lincoln Highway.

State Route 29 (SR 29) – This facility is a two- to four-lane roadway that runs in the north-south direction through Napa County, connecting to City of Napa on the north side and to Vallejo County on the south side. It is a primary route for commuter and commercial truck traffic traveling between Napa County and the San Francisco-Oakland Bay Area. In the vicinity of the study area, it has two lanes in each direction and a posted speed limit of 60 mph. The portion of SR 29 south of Airport Boulevard (SR 12) is also known as the Lincoln Highway.

State Route 121 (SR 121) – This facility is a two- to four-lane roadway that runs in the north-south direction through Napa County. Moving southward through the City of Napa, it meets SR 221 at Imola Avenue, and then travels about 1.5 miles west to its terminus and junction with SR 29. It has a posted speed limit of 35 mph.

State Route 221 (SR 221) – This facility is also known as the Napa-Vallejo Highway and is a four-lane roadway that runs in the north-south direction through Napa County. It meets with SR 121 at Imola Avenue, and moving southward meets Soscol Ferry Road at the junction with SR 12. In the vicinity of the study area, it has two lanes in each direction and a posted speed limit of 55 mph.

Airport Boulevard – This four-lane roadway runs in the east-west direction and provides access between the Napa County Airport and State Routes 12 and 29. The posted speed limit of Airport Boulevard is 45 mph within the study area.

Devlin Road – This facility is a two-lane roadway that runs in the north-south direction within the study area. It extends from where SR 221 meets SR 12 at Soscol Ferry Road to 600 feet south of Airpark Road. In the vicinity of the study area, it has two lanes in each direction and a posted speed limit of 45 mph.

2.2 Existing Pedestrian and Bicycle Facilities

Pedestrian facilities within the vicinity of the project site were reviewed during a recent site visit. Amenities such as sidewalks, crosswalks, curb ramps and traffic signals with pedestrian crosswalks are

generally not provided along Sheehy Court, Devlin Road, Airport Boulevard, SR 12/29 and SR 221. Sidewalks are provided for short distances directly in front of newly developed areas such as warehouses and hotels. Pedestrians are prohibited along SR 29 and SR 12 within the study area. Pedestrian phases and painted crosswalks are not provided at any of the study intersections, except at the intersection of Devlin Road and Airport Boulevard where pedestrian phases are provided but painted crosswalks are non-existent. There is a recreational walking trail located along Sheehy Creek with a trailhead where it crosses Devlin Road located approximately 275 feet south of the Devlin Road and Sheehy Court intersection.

The Napa County General Plan defines the following three classifications of bicycle facilities:

- Class I Multi Use Path (bike path) – completely separated, with paved right-of-way (shared with pedestrians) which excludes general motor vehicle traffic.
- Class II Bikeway (bike lane) – provides a striped and stenciled lane for one-way bike travel on a street or highway.
- Class III Bikeway (bike route) – a shared use roadway with motor vehicle traffic and is only identified by signage.

~~Bicycles are prohibited along SR 12/29 between SR 221 Soscol Ferry Road and SR 12 Airport Boulevard.~~ Bicycle facilities are not provided along SR 221; however bicyclists will use the paved shoulder outside of the painted edge line striping as a bicycling path. Class II Bikeways are currently provided along SR 12 (east of SR 29 on Jameson Canyon Road), Napa Valley Corporate Drive between Kaiser Road and Anselmo Court, on Devlin Road between Soscol Ferry Road and Airport Boulevard and on Airport Boulevard between North Airport Road and Devlin Road.

The Napa Valley Vine Trail (Class I) has a proposed alignment along the east side of Devlin Road, Soscol Ferry Road and Napa Valley Corporate Way within the study area. According to the Napa County Bicycle Plan (January 2012) the following improvements are planned within the study area:

- Class I Multi Use Path along Devlin Road and Soscol Ferry Road.
- Class II Bikeway along SR 221 and SR 29 between the City of American Canyon to City of Napa
- Class II Bikeway along Airport Boulevard between Devlin Road and SR 29.

2.3 Available Transit Service

Vine Transit

Vine Transit provides a bus transit system in the Napa County. There are eight local routes in the City of Napa and five regional routes with three inter-county service routes with connections to Solano County, Bay Area Rapid Transit (BART), and the San Francisco Ferry in Vallejo. The eight local routes are located farther north from the project study area. Of the five regional routes, Routes 11, 21, and 29[1] currently operate in the vicinity of the project study area and are shown in **Figure 3.**

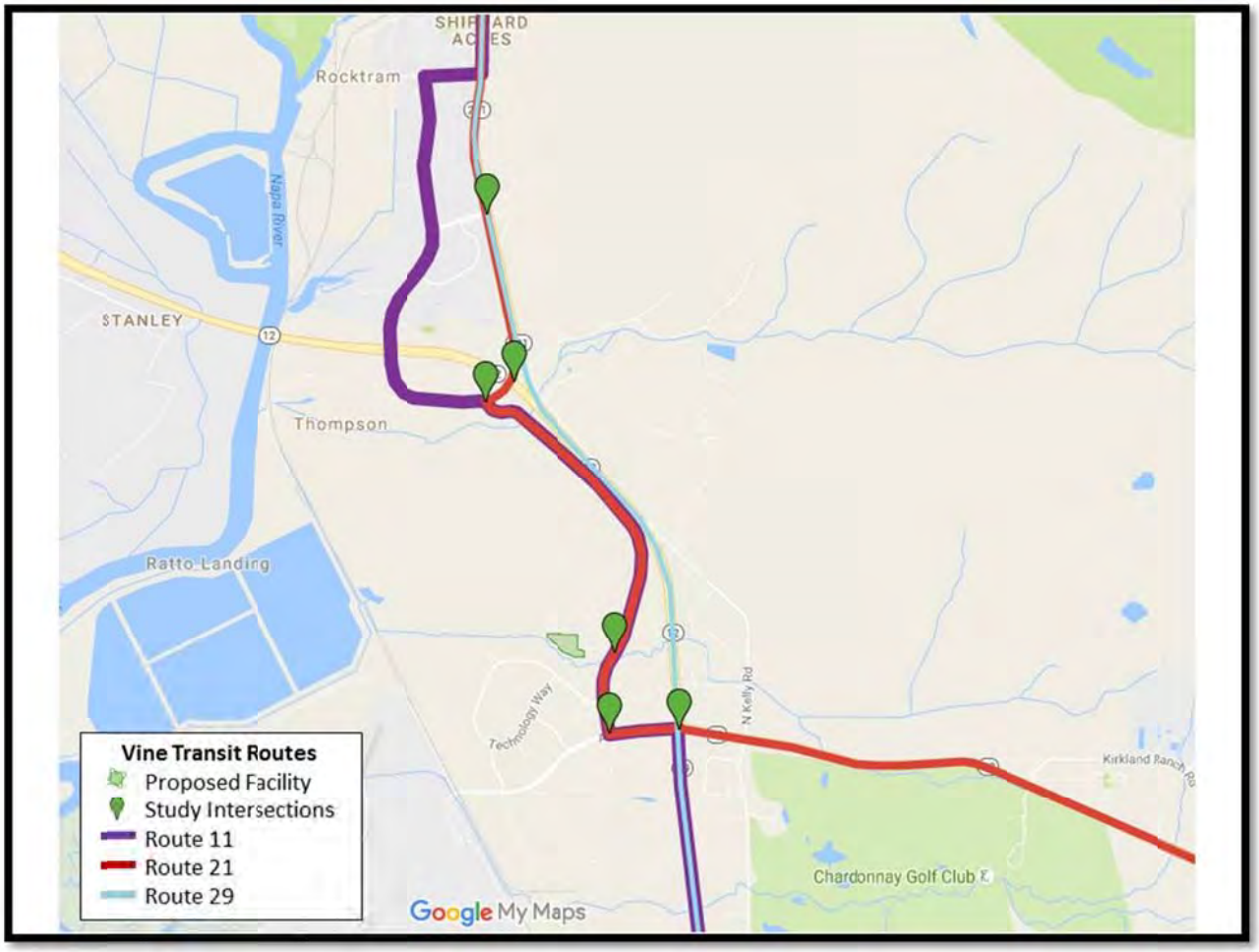
Route 11 begins at the Redwood Park & Ride in downtown Napa and ends at the Vallejo Ferry Terminal. In the vicinity of the project site, it travels along SR 221, Devlin Road, and SR 29. It operates on weekdays with headways anywhere from 20 minutes to 1 hour and 20 minutes, and service is provided between 5:15 AM and 8:52 PM in the northbound direction and 4:00 AM to 7:57 PM in the southbound direction. Weekend service is less frequent with headways of about 1 hour and operating time between 8:15 AM and 8:45 PM in the northbound direction and 6:45 AM to 7:02 PM in the southbound direction on Saturday and between 9:15 AM to 8:24 PM in the northbound direction and 8:45 AM to 7:02 PM in the southbound direction on Sunday.

Route 21 begins at the Soscol Transit Center in downtown Napa and ends at the Suisun City Train Depot. In the vicinity of the project site, it travels along SR 29, Devlin Road, and SR 12. It operates only on weekdays with headways anywhere from about 1 hour to 3.5 hours, and service is provided between 6:30 AM and 7:31 PM in the westbound direction and 5:33 AM to 6:14 PM in the eastbound direction.

Route 29 begins at Calistoga Lincoln Bridge and ends at El Cerrito del Norte BART Station. In the vicinity of the project site, it travels along SR 29. It operates only on weekdays with the first stop beginning at various bus stops and varying headways, and service is provided between 5:45 AM to 8:45 PM in the northbound direction and 4:33 AM and 7:30 PM in the southbound direction.

[1] Vine Transit bus routes and schedules based on information provided by NVTA staff.

Figure 3: Vine Transit Routes



3. Regulatory Setting

This study considered the standards and guidelines adopted by local and regional agencies. Relevant policy goals, guidelines and objectives adopted by each of these jurisdictions are summarized below.

3.1 State

The following study intersections are within State highway facilities; Lincoln Highway and Airport Boulevard, SR 12/29 and SR 221, and SR 221 and Napa Valley Corporate Way. Caltrans provides guidance on the evaluation of traffic impacts to State highway facilities in the Guide for the Preparation of Traffic Impact Studies (Caltrans 2002), including when a traffic impact study is required and what should be included in the scope of the study.

3.2 Local

Napa County

The Circulation Element of the *Napa County General Plan* (Napa County, 2008) shows maps of the existing and proposed transit network, vehicular circulation network, and bicycle/pedestrian circulation network. The three goals of the *Napa County General Plan* in addressing the County's transportation system are to 1) comply with the policies of the Agricultural preservation and Land Use Element and protect the County's rural character, 2) provide safe and efficient movement on well-maintained roads throughout the County and meet the needs of all users, and 3) incorporate use of private vehicles, transit, paratransit, walking, bicycling, air travel, rail, and water transport.

The County Board of Supervisors adopted a Complete Streets Policy (Napa County Board of Supervisors, 2013) on January 8, 2013. The principles of this policy include creating and maintaining Complete Streets serving all users and maintaining sensitivity to local conditions in both residential and business districts as well as urban, suburban, and rural areas.

Napa Valley Transportation Agency (NVTA)

The Napa Valley Transportation Agency (NVTA), formerly known as the Napa County Transportation and Planning Agency (NCTPA), is the countywide transportation planning agency for the incorporated and unincorporated areas of Napa County. The NVTA acts as the transportation program and funding administrator for all member jurisdictions and is the operator of the countywide transit system, "The Vine", the paratransit system "Vine-GO", and community shuttles/trolley in each of the Cities/Town.

4. Level-of-Service (LOS) Analysis Methodology

To evaluate traffic conditions as well as provide a basis for comparison of conditions before and after Project-generated traffic is added to the street system, intersection Level-of-Service (LOS) analysis was evaluated at all six study intersections. Heavy vehicle percentages where assumed to be two percent for every turning movement at each intersection. Peak hour factors observed during existing conditions (averaged for all movements at each intersection) were assumed to be unchanged for each study scenario. Signal timing sheets (signal timing plans for signalized intersections) were provided by Napa County and Caltrans staff and used in this analysis.

4.1 Level-of-Service (LOS) Definition

Traffic conditions for the study intersections were evaluated using the methodologies provided in the 2000 Highway Capacity Manual (HCM). For reference purposes, Level-of-Service as defined in the HCM is a quality measure describing operating conditions within a traffic stream. It is generally described in terms such as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Level-of-Service at study intersections was calculated using Synchro 8.0 software.

The LOS evaluation indicates the degree of congestion that occurs during peak travel periods and is the principal measure of roadway and intersection performance. Level-of-Service can range from "A" representing free-flow conditions, to "F" representing extremely long delays. LOS B and C signify stable conditions with acceptable delays. LOS D is typically considered acceptable for a peak hour in urban areas. LOS E is approaching capacity and LOS F represents conditions at or above capacity.

At signalized intersections, level-of-service is evaluated on the basis of average stopped delay for all vehicles at the intersection. **Table 3** defines the levels of service for signalized intersections based on HCM methodology.

At unsignalized intersections each approach to the intersection is evaluated separately and assigned a Level-of-Service. The level-of-service is based on the delay at the worst approach for two-way stop controlled intersections. Total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line. This time includes the time required for the vehicle to travel from the last-in-queue position to the first-in queue position. **Table 4** provides definitions of level-of-service for unsignalized intersections.

Table 3: Signalized Intersections— Level-of-Service Thresholds

Level-of-Service	Average Stopped Delay (seconds/vehicle)	Description
A	≤ 10.0	Free flow; minimal to no delay
B	10.0 < and ≤ 20.0	Stable flow, but speeds are beginning to be restricted by traffic condition; slight delays.
C	20.0 < and ≤ 35.0	Stable flow, but most drivers cannot select their own speeds and feel somewhat restricted; acceptable delays.
D	35.0 < and ≤ 55.0	Approaching unstable flow, and drivers have difficulty maneuvering; tolerable delays.
E	55.0 < and ≤ 80.0	Unstable flow with stop and go; delays
F	> 80.0	Forced flow; excessive delays

Source: Transportation Research Board, Special Report 209, Highway Capacity Manual, Chapter 16-Signalized Intersections, 2000.

Notes: Average Control Delay per Vehicle (in seconds per vehicle)

Table 4: Unsignalized Intersection — Level-of-Service Thresholds

Level-of-Service	Average Stopped Delay (seconds/vehicle)	Description
A	≤ 10.0	Little or no delay
B	> 10.0 and ≤ 15.0	Short traffic delay
C	> 15.0 and ≤ 25.0	Average traffic delays
D	> 25.0 and ≤ 35.0	Long traffic delays
E	> 35.0 and ≤ 50.0	Very long traffic delays
F	> 50.0	Extreme delays potentially affecting other traffic movements in the intersection

Source: Transportation Research Board, Special Report 209, Highway Capacity Manual, Chapter 17 Unsignalized Intersections, 2000.

Notes: Worst Approach Delay (in seconds per vehicle)

4.2 Significance Criteria and Project Impacts

The following significance criteria represent those that are applicable to this project.

According to the California Environmental Quality Act (CEQA) Guidelines, the standards of significance for traffic impacts for a project are:

- If the project traffic will cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).
- If the project traffic will exceed, either individually or cumulatively, a LOS standard established by the county congestion management agent for designated roads or highways.
- If the project will result in a change in traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.
- If the project will substantially increase hazards due to a design feature or incompatible uses.
- If the project would result in inadequate emergency access and parking capacity.
- If the project would conflict with adopted policies, plans or programs supporting alternative transportation.

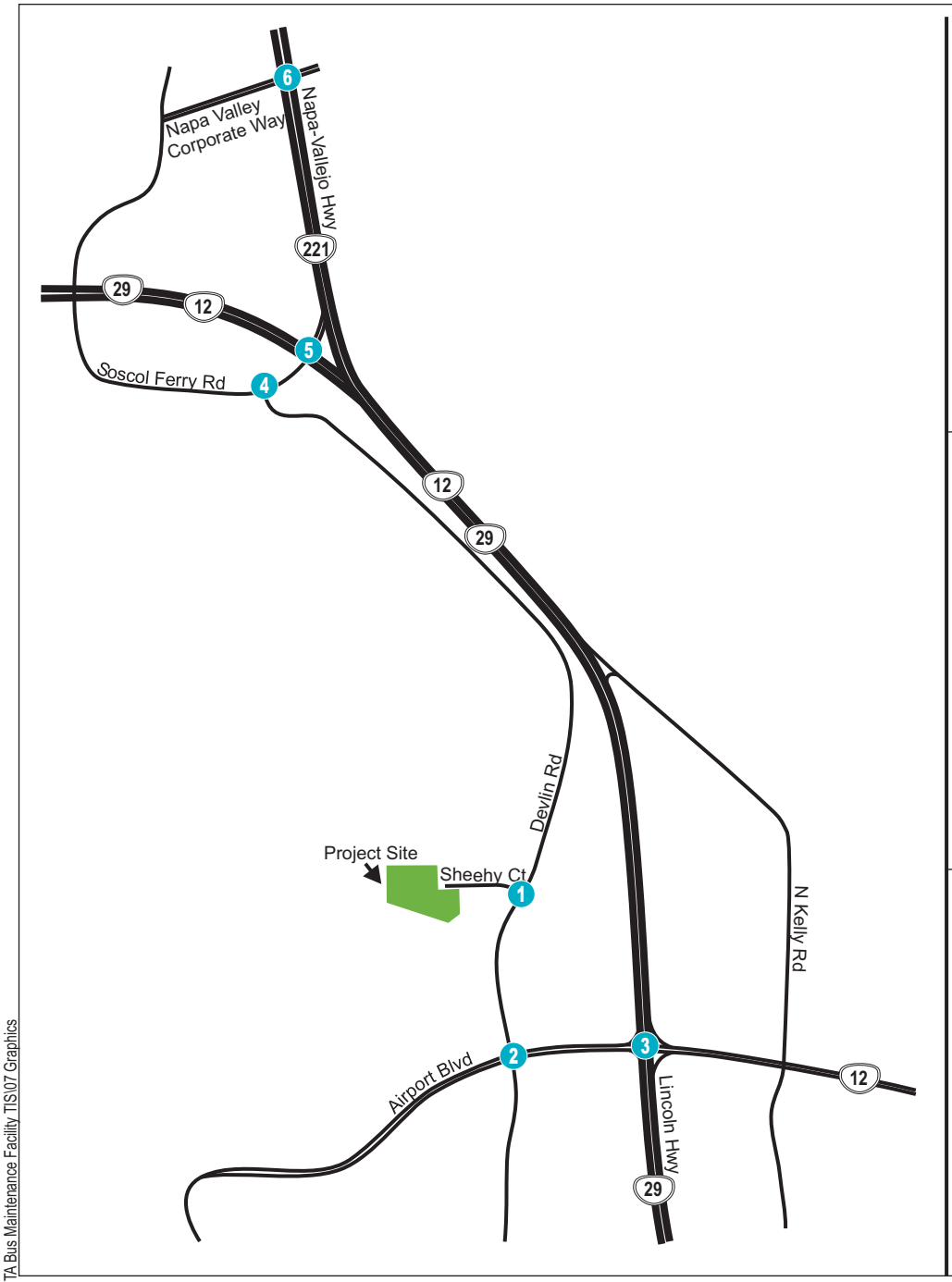
To avoid any confusion associated with using different significance criteria for each jurisdiction within the County, a set of guidelines was developed for projects located in unincorporated Napa County. These guidelines are documented in a memorandum to County staff dated December 1, 2015. A project would cause a significant impact requiring mitigation if:

- A signalized intersection operates at LOS A, B, C or D during the selected peak hours without Project trips, and LOS deteriorates to LOS E or F with the addition of Project trips; or
- A signalized intersection operates at LOS E or F during the selected peak hours without Project trips, and the addition of Project trips increases the total entering volume by one percent of more.
- An unsignalized intersection operates at LOS A, B, C or D during the selected peak hours without Project trips, and LOS deteriorates to LOS E or F with the addition of Project traffic; the peak hour traffic signal warrant criteria should also be evaluated and presented for informational purposes; or
- An unsignalized intersection operates at LOS E or F during the selected peak hours without Project trips, and the project contributes one percent or more of the total entering traffic for all-way stop-controlled intersections, or ten percent or more of the traffic on a side-street approach for side-street stop-controlled intersections the peak hour traffic signal warrant criteria should also be evaluated and presented for informational purposes.
- For horizon year analysis at signalized and unsignalized intersections, the projects contribution to a significant cumulative impact would be considerable if it is equal to or greater than five percent.

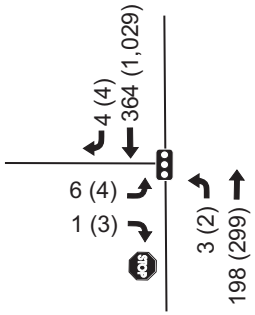
5. Existing Conditions

Turning movement counts at the six study intersections were conducted during a typical weekday AM and PM peak period in June 2016. An intersection turning movement count consisted of counting each vehicle at each study intersection location by turning movement.

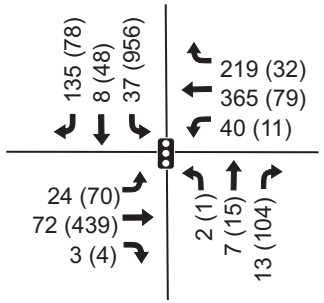
Signal timing plans were provided by Napa County and Caltrans. **Appendix A** includes the detailed intersection count sheets for the AM and PM peak periods. **Figure 4** illustrates the existing AM and PM peak hour traffic volumes at each study intersection. The intersections and their corresponding existing levels of service are presented in **Table 5**. **Appendix B** includes the detailed calculation LOS analysis sheets for each intersection, including the AM and PM peak hours.



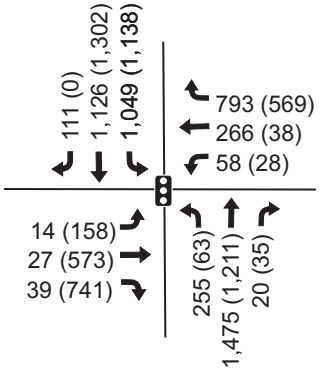
1. ***Devlin Rd & Sheehy Ct***



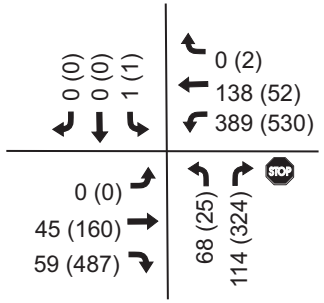
2. ***Devlin Rd & Airport Blvd***



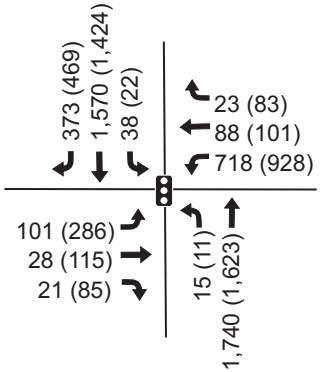
3. ***Lincoln Hwy & Airport Blvd***



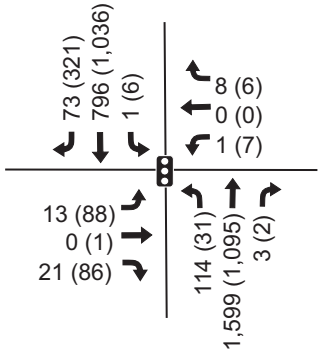
4. ***Devlin Rd & Soscol Ferry Rd***



5. ***SR 12/29 & SR 221***



6. ***SR 221 & Napa Valley Corporate Way***



LEGEND

- Study Intersection
- Project Site
- Stop Sign
- Traffic Signal
- AM(PM) - Peak Hour Trips

No Scale

DKS

Figure 4

NVTA Bus Maintenance Facility TIS
Existing Condition Intersection Peak Hour Volumes

P:\16\16067-000 NVTA Bus Maintenance Facility TIS\07 Graphics

Table 5 Existing Condition LOS Summary

Int. #	Intersection	Control Type	Peak Hour	Existing Condition	
				Avg Delay	LOS
1	Devlin Rd & Sheehy Ct	Unsignalized[1]	AM	12.0	B
			PM	22.6	C
2	Devlin Rd & Airport Blvd	Signal	AM	12.6	B
			PM	23.3	C
3	Lincoln Hwy & Airport Blvd	Signal	AM	51.9	D
			PM	43.5	D
4	Devlin Rd & Soscol Ferry Rd	Unsignalized[1]	AM	**37.5**	**E**
			PM	**> 80**	**F**
5	SR 12/29 & SR 221	Signal	AM	44.8	D
			PM	**67.8**	**E**
6	SR 221 & Napa Valley Corporate Way	Signal	AM	13.2	B
			PM	17.9	B

Source: DKS Associates, 2016
Notes: **Bold** = LOS E or worse.
1. Unsignalized Intersections LOS are based on the worst approach.

6. Background Conditions

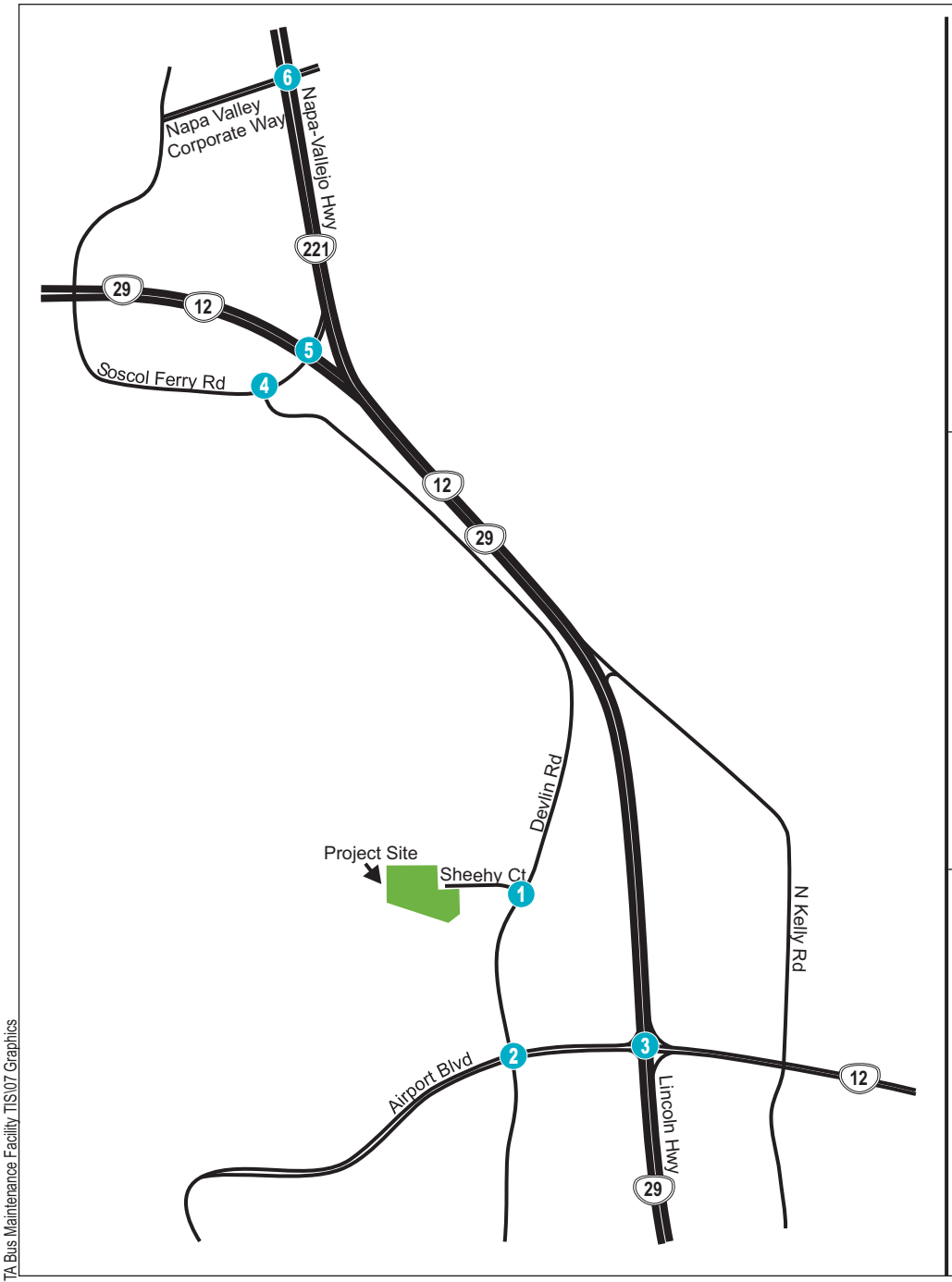
This section discusses the traffic operating conditions at the study intersections under the Background Condition. The Background Condition includes the traffic expected to be generated by nearby approved projects prior to the completion of the proposed Project. Project-generated trips from the following projects were added to the local street network and study intersections:

- Montalcino at Napa Resort Hotel;
- Montalcino at Napa Golf Course;
- Napa Gateway Plaza Phase 1;
- Napa Gateway Plaza Phase 2;
- Napa Bottling Center;
- Zapolski Rudd Winery;
- Gateway Winery;
- Napa Executive Management; and
- Turnkey Technologies

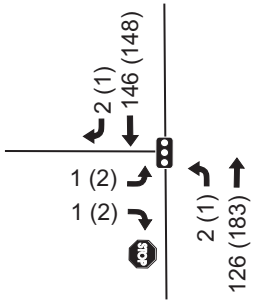
The proportion of these trips that would be expected to travel through the study area was added to each study intersection under the Background Condition LOS analysis. **Figures 5** and **6** illustrates the background trips and Background Condition weekday AM and PM peak hour intersection traffic volumes at each study intersection. The intersections and their corresponding existing levels of service are presented in **Table 6**. **Appendix A** includes the detailed calculation level-of-service analysis sheets for each intersection, including the weekday AM and PM peak hours.

6.1 Roadway Improvements

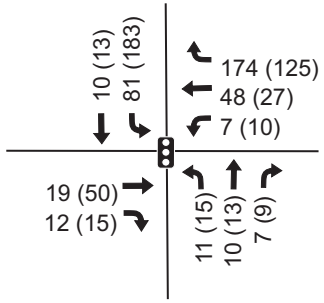
It was assumed in this study that the transportation network under existing conditions is the same as that used in each scenario for the LOS analysis.



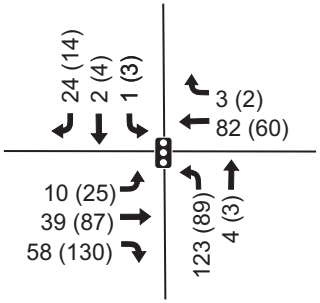
1. Devlin Rd & Sheehy Ct



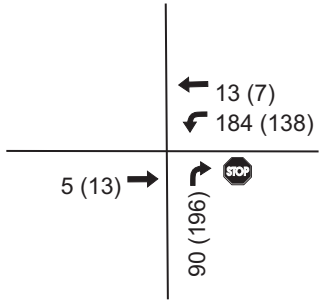
2. Devlin Rd & Airport Blvd



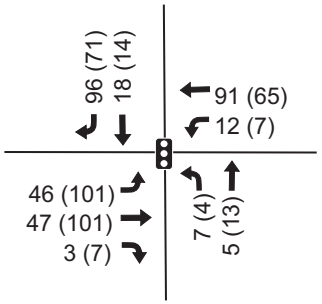
3. Lincoln Hwy & Airport Blvd



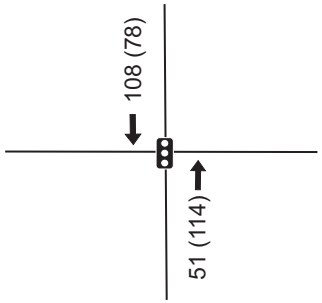
4. Devlin Rd & Soscol Ferry Rd



5. SR 12/29 & SR 221



6. SR 221 & Napa Valley Corporate Way



LEGEND

- Study Intersection
- Project Site
- Stop Sign
- Traffic Signal

AM(PM) - Peak Hour Trips

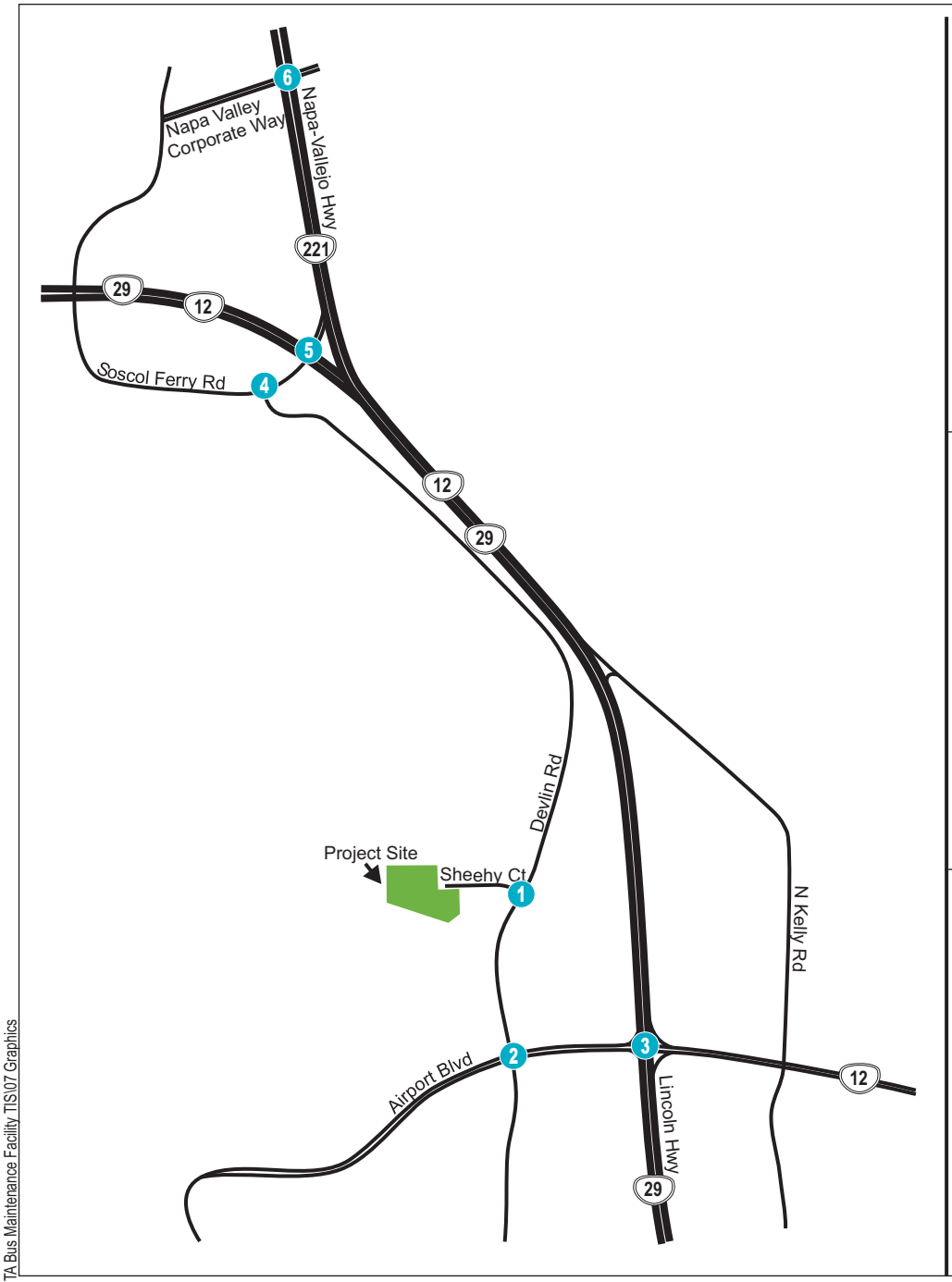
No Scale

DKS

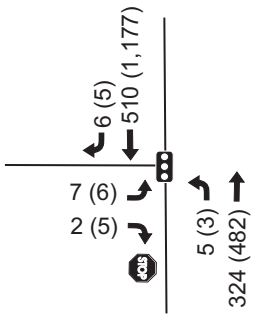
Figure 5

NVTA Bus Maintenance Facility TIS
Background Trips Intersection Peak Hour Volumes

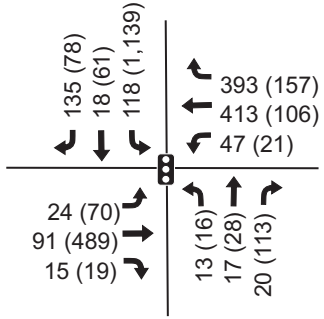
P:\16\16067-000 NVTA Bus Maintenance Facility TIS\07 Graphics



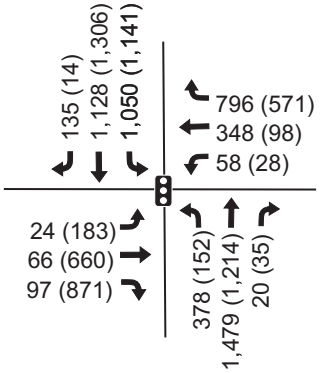
1. Devlin Rd & Sheehy Ct



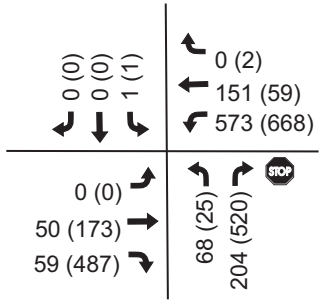
2. Devlin Rd & Airport Blvd



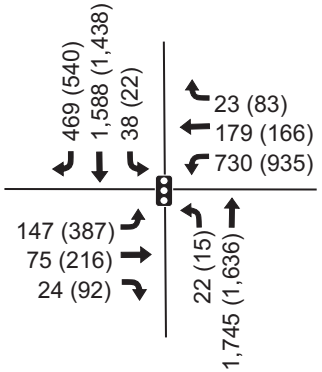
3. Lincoln Hwy & Airport Blvd



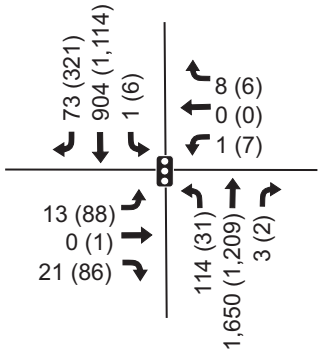
4. Devlin Rd & Soscol Ferry Rd



5. SR 12/29 & SR 221



6. SR 221 & Napa Valley Corporate Way



LEGEND

- Study Intersection
- Project Site
- Stop Sign
- Traffic Signal

AM(PM) - Peak Hour Trips

No Scale

DKS

Figure 6

NVTA Bus Maintenance Facility TIS
Background Condition Intersection Peak Hour Volumes

P:\16\16067-000 NVTA Bus Maintenance Facility TIS\07 Graphics

Table 6 Background Condition LOS Summary

Int. #	Intersection	Control Type	Peak Hour	Existing Condition		Background Condition	
				Avg Delay	LOS	Avg Delay	LOS
1	Devlin Rd & Sheehy Ct	Unsignalized[1]	AM	12.0	B	14.3	B
			PM	22.6	C	30.5	D
2	Devlin Rd & Airport Blvd	Signal	AM	12.6	B	15.1	B
			PM	23.3	C	34.7	C
3	Lincoln Hwy & Airport Blvd	Signal	AM	51.9	D	**70.0**	**E**
			PM	43.5	D	**55.9**	**E**
4	Devlin Rd & Soscol Ferry Rd	Unsignalized[1]	AM	**37.5**	**E**	**> 80**	**F**
			PM	**> 80**	**F**	**> 80**	**F**
5	SR 12/29 & SR 221	Signal	AM	44.8	D	50.3	D
			PM	**67.8**	**E**	**> 80**	**F**
6	SR 221 & Napa Valley Corporate Way	Signal	AM	13.2	B	13.7	B
			PM	17.9	B	18.7	B

Source: DKS Associates, 2016
Notes: **Bold** = LOS E or worse.
1. Unsignalized Intersections LOS are based on the worst approach.

6.2 Intersection Operations – Background Conditions

According to the intersection level-of-service standards discussed in Section 4 of this document, the following study intersections would not operate at acceptable levels of service under the Background Conditions;

- Lincoln Highway & Airport Boulevard (Both AM and PM peak hour); and
- Devlin Rd & Soscol Ferry Rd (Both AM and PM peak hour).

7. Project-Generated Traffic

This section evaluates Project-generated traffic estimated for the proposed Project. The amount of traffic associated with a Project is estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. Trip generation is the process of predicting the number of peak-hour trips a proposed development would contribute to the roadways, and whether these trips would be entering or exiting the site. After the number of trips is determined, the distribution process projects the direction these trips use to approach and depart the site, from a regional perspective. Trip

assignment involves determining which specific roadways a vehicle would use to travel between its origin and destination.

7.1 Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition (2012) does not have a standardized rate for bus maintenance facilities. Therefore, a site-specific trip generation estimate was prepared for the proposed project. The trip generation estimate was based on the following information:

- A review of daily staffing schedules, bus schedules and interviews with facility staff.
- Many of the bus operators and support staff would be anticipated to arrive/depart from the Project site during periods that are beyond the AM or PM peak hours.
- Although the proposed Project would be significantly larger than the current facility, the size of the proposed Project would not have a significant change on the bus operations and staffing.
- To account for the effect of buses on the study area traffic stream, a heavy vehicle adjustment factor was applied to convert bus trips to passenger vehicle trips. The effect of heavy vehicles on traffic flow is typically accounted for through the use of passenger car equivalency (PCE) factors. These factors are intended to approximate the effect of heavy vehicles and are expressed as multiplies of an average passenger car. As such, PCE factor of 2.0 was applied for every Project bus trip to approximate the relative impact to surrounding traffic streams as passenger car units.
- Also, to incorporate any possibility of future growth in operations, namely adding bus routes and support staff, an increase of 10% was added to the trip estimates to determine the final trip generation estimate.

The proposed trip generation is summarized in **Table 7**, for the AM and PM peak hours, respectively. The proposed Project would generate 345 daily trips, including 41 net-new AM peak hour trips (16 inbound, 25 outbound) and 32 net-new PM peak hour trips (9 inbound, 23 outbound).

7.2 Trip Distribution

The trip distribution was developed using the Napa-Solano Travel Demand Model as a starting point to establish relative travel patterns of the study area. These were then manually adjusted using our knowledge of the area and likely travel paths of expected users. The resulting trip distribution is presented in **Figure 7** with project trips entering and exiting the study area along these routes:

- 30% along SR29 to/from the south
- 20% along SR12 to/from the east
- 25% along SR221 to/from the north
- 25% along SR12 to/from the west

7.3 Trip Assignment

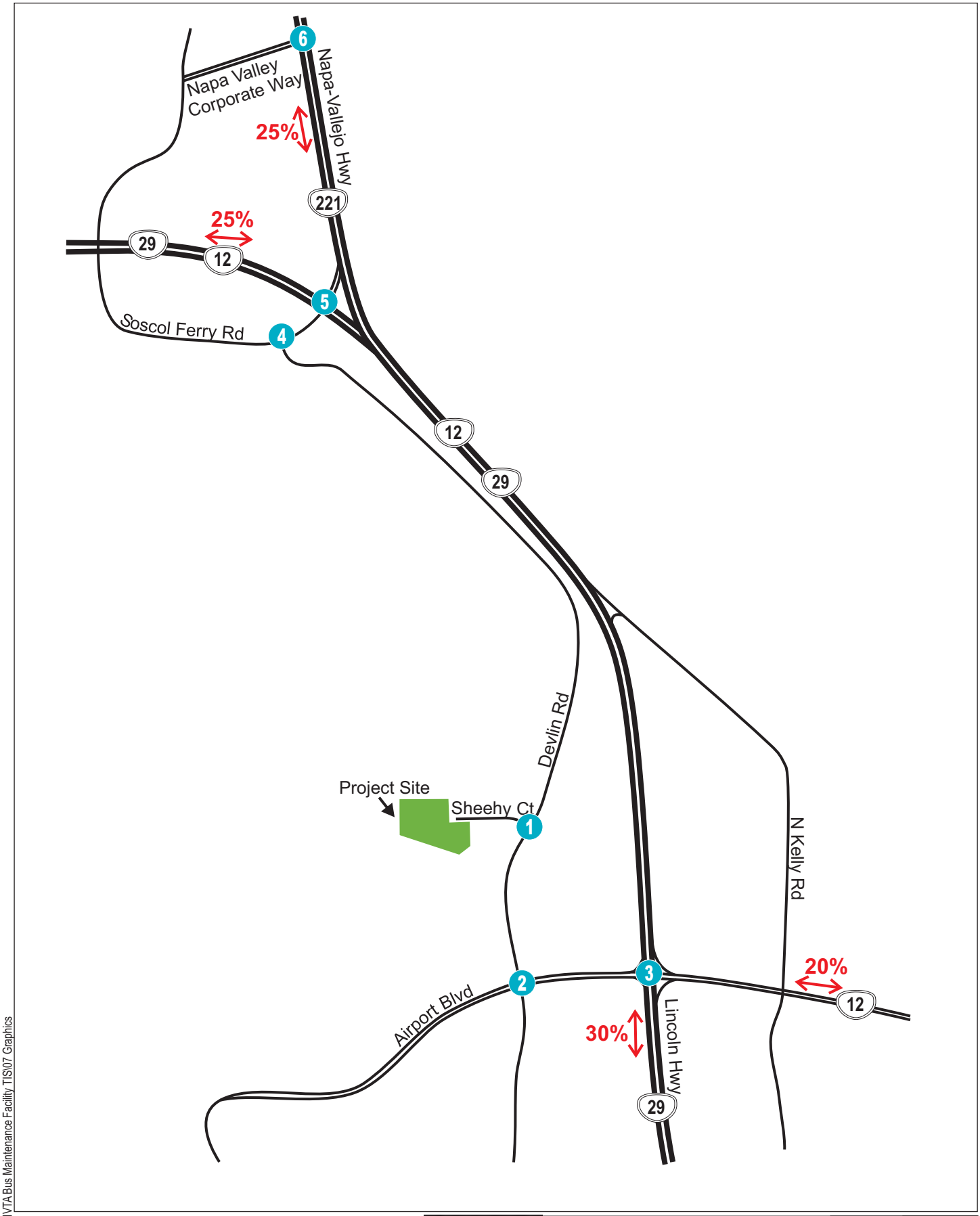
Project-generated trips were assigned to the roadway network based on access points, trip distribution assumptions and likely travel patterns. The proportion of these trips that would travel through the study intersections was used for the intersection LOS analysis under the Project Condition. **Figure 8** illustrates the Peak Hour Project Trips at each study intersection for the AM and PM peak hour.

Table 7: Project Trip Generation

Description	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
Estimated Number of Passenger Car Trips at Existing Facility	134	14	2	16	4	11	15
Estimated Number of Bus Trips at Existing Facility	*90*	*0*	*10*	*10*	*2*	*5*	*7*
Number of Bus Trips (as PCE)[1]	180	0	20	20	4	10	14
Total Number of Trips at Existing Facility (number of Passenger Car + bus trips as PCE)	314	14	22	36	8	21	29
Increase for Potential Future Operations (10% of Existing)	31	2	3	5	1	2	3
Total Net New Trips	**345**	**16**	**25**	**41**	**9**	**23**	**32**

Source: Review of work schedules from operators, bus schedules, and interviews with staff, 2016

1 Each bus equals two passenger cars. Passenger Car Equivalents (PCE).



LEGEND

0 - Study Intersection

- Project Site

XX% - Trip Distribution

No Scale

DKS

Figure 7

NVTA Bus Maintenance Facility TIS
Project Trip Distribution

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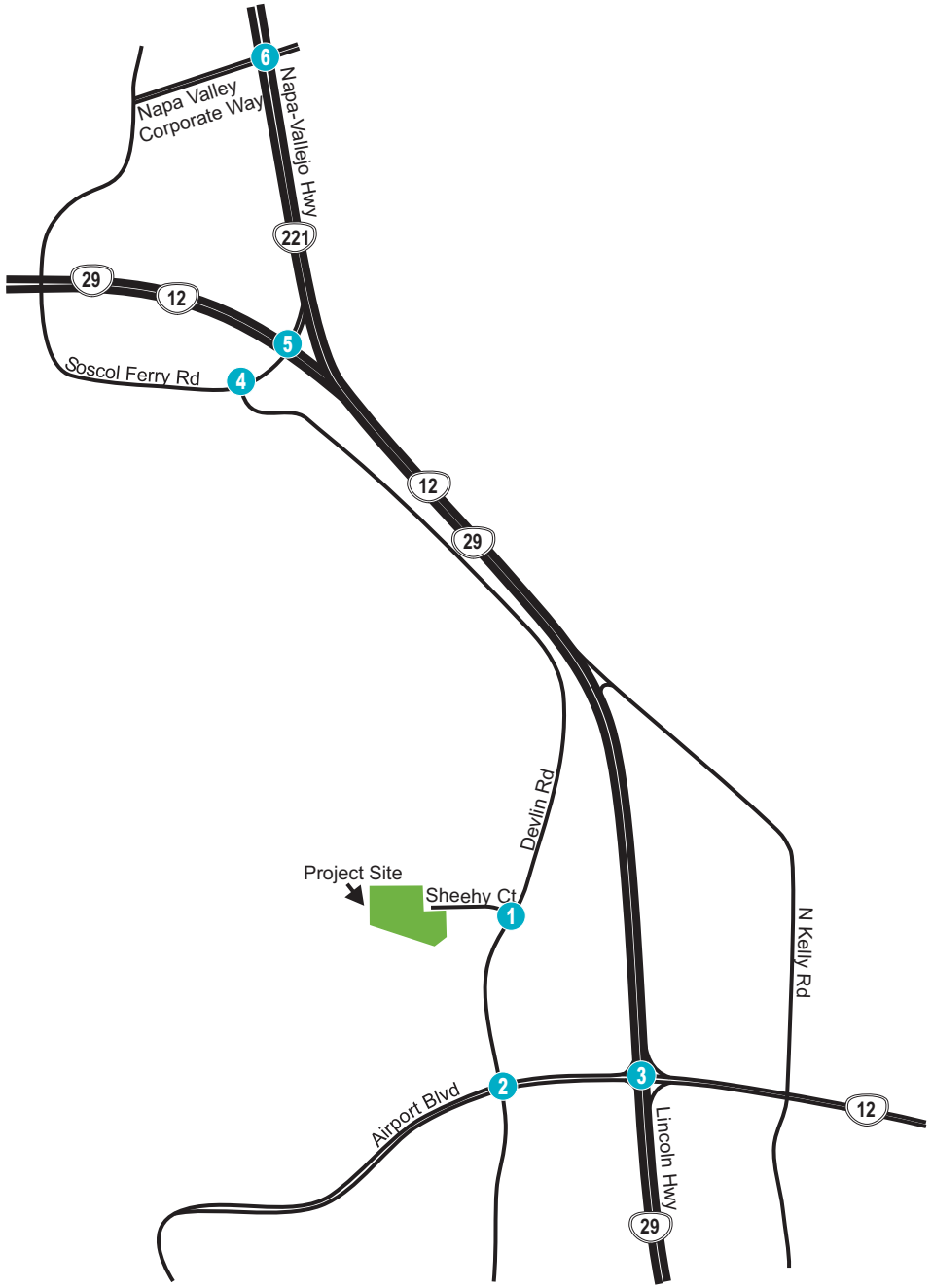
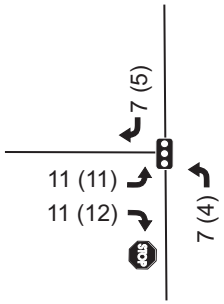
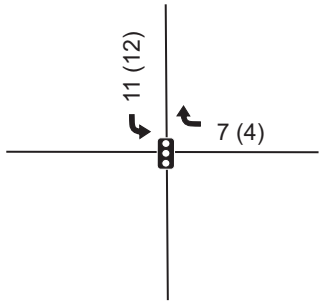


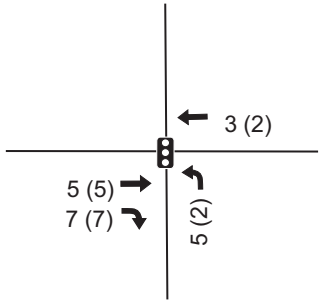
1. ***Devlin Rd & Sheehy Ct***



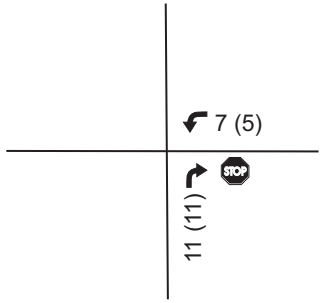
2. ***Devlin Rd & Airport Blvd***



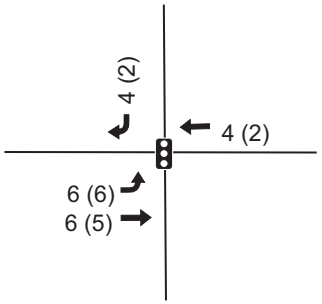
3. ***Lincoln Hwy & Airport Blvd***



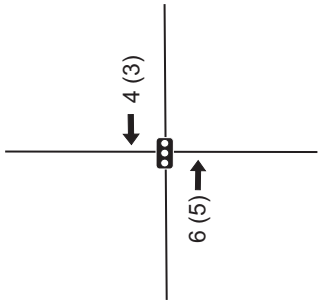
4. ***Devlin Rd & Soscol Ferry Rd***



5. ***SR 12/29 & SR 221***



6. ***SR 221 & Napa Valley Corporate Way***



LEGEND

- Study Intersection
- Project Site
- Stop Sign
- Traffic Signal

AM(PM) - Peak Hour Trips

No Scale

DKS

Figure 8

NVTA Bus Maintenance Facility TIS
Project Trips Intersection Peak Hour Volumes

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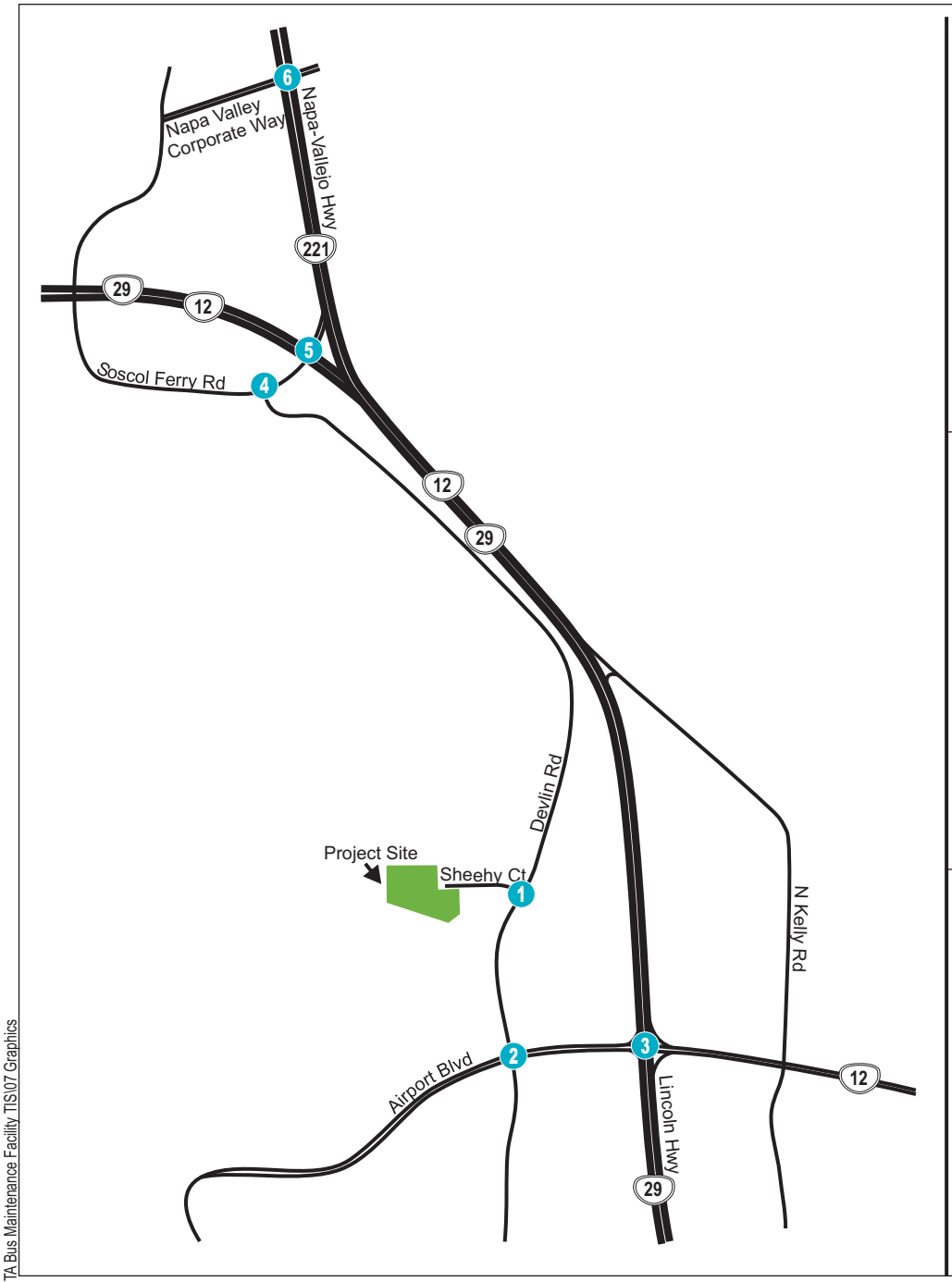
8. Project Condition

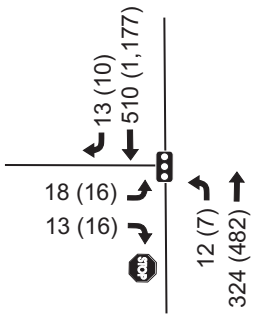
Project trips were added to Background Condition volumes to obtain the Project Condition turn movement volumes, which are shown in **Figure 9** for the AM and PM peak hours.

8.1 Intersection Operations – Project Conditions

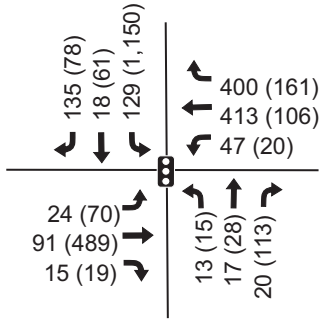
All intersections were evaluated for the Project Conditions under the significance criteria as outlined in Section 4.2 of this report. The intersections and their corresponding Project Condition LOS are presented in **Table 8**. **Appendix B** includes the AM and PM Peak hour detailed calculation level-of-service analysis sheets for all study intersections



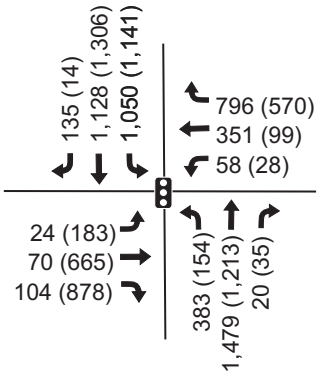
1. Devlin Rd & Sheehy Ct



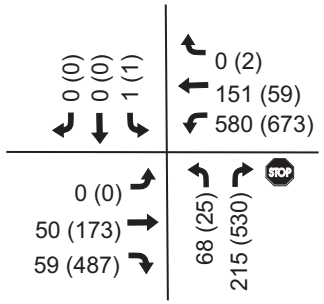
2. Devlin Rd & Airport Blvd



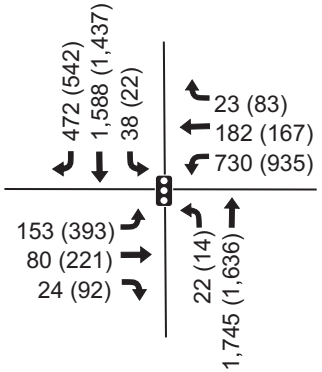
3. Lincoln Hwy & Airport Blvd



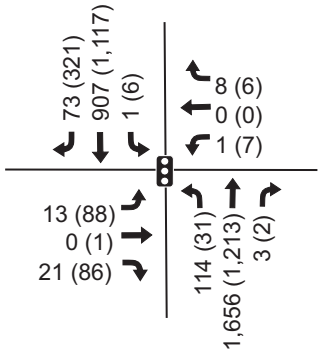
4. Devlin Rd & Soscol Ferry Rd



5. SR 12/29 & SR 221



6. SR 221 & Napa Valley Corporate Way



LEGEND

- Study Intersection
- Project Site
- Stop Sign
- Traffic Signal

AM(PM) - Peak Hour Trips

No Scale

DKS

Figure 9

NVTA Bus Maintenance Facility TIS
Project Condition Intersection Peak Hour Volumes

P:\16\16067-000 NVTA Bus Maintenance Facility TIS\07 Graphics

Table 8 Project LOS Summary

Int. #	Intersection	Control Type	Peak Hour	Background Condition		Project Condition		Significant Project Impact (Yes/No)
				Avg Delay	LOS	Avg Delay	LOS	
1	Devlin Rd & Sheehy Ct	Unsignalized[1]	AM	14.3	B	13.8	B	No
			PM	30.5	D	32.9	D	No
2	Devlin Rd & Airport Blvd	Signal	AM	15.1	B	15.2	B	No
			PM	34.4	C	35.6	D	No
3	Lincoln Hwy & Airport Blvd	Signal	AM	**70.0**	**E**	**70.7**	**E**	No
			PM	**55.9**	**E**	**56.6**	**E**	No
4	Devlin Rd & Soscol Ferry Rd	Unsignalized[1]	AM	**> 80**	**F**	**> 80**	**F**	No
			PM	**> 80**	**F**	**> 80**	**F**	No
5	SR 12/29 & SR 221	Signal	AM	50.3	D	51.2	D	No
			PM	**> 80**	**F**	**> 80**	**F**	No
6	SR 221 & Napa Valley Corporate Way	Signal	AM	13.7	B	13.8	B	No
			PM	18.7	B	18.7	B	No

Source: DKS Associates, 2016
Notes: **Bold** = LOS E or worse.
1. Unsignalized Intersections LOS are based on the worst approach.

According to intersection level-of-service standards, the following intersections are anticipated to operate at unacceptable levels of service for the project condition under AM, PM or both peak hours.

- Lincoln Highway and Airport Boulevard (Both AM and PM peak); and
- Devlin Road and Soscol Ferry Road (Both AM and PM peak).

Per the significance criteria described in Section 4.2, none of the study intersections would be considered a significant impact for the Project Condition. The unsignalized intersection of Devlin Road and Soscol Ferry Road was evaluated for a peak hour traffic signal warrant under the Project Condition since it operates at a LOS F. The warrant worksheets are provided in Appendix C and were prepared in accordance with the procedures described in the 2014 edition of the California Manual on Uniform Traffic Control Devices (CaMUTCD). This peak hour warrant is provided for informational purposes only.

8.2 Site Access Analysis

The proposed Project site is located at the west end of Sheehy Court. Vehicular access to the Project site is provided along four separate driveway locations, each located at different positions around the "ball" formed at the end of the street. A brief description of each access point is provided below:

1. "Right-in" entrance only for buses to parking lot and main building;
2. "Out only" exit from main building;
3. "Out only" exit for buses from parking lot; and
4. Driveway access for office building parking lot.

The proposed driveways were evaluated for safety and spacing issues. This evaluation included considerations for the characteristics of the surrounding land uses, the existing roadway geometry and the available sight distance. The evaluation determined there are no issues related to vehicular egress or ingress at any of the four access points.

According to Table 405.1A of the Caltrans Highway Design Manual, the required Corner Sight Distance for a 25 MPH roadway is 275 feet. An evaluation of the Project site plan, shown in **Figure 2**, shows that the Project driveways are located on roadways that are both straight and flat with satisfactory sight distance per the requirements of the Highway Design Manual.

8.3 Internal Site Circulation

The proposed site was evaluated for internal circulation. The layout of the bus parking, arrangement of the drive aisles and approaches to maintenance building entrance and exits are consistent with contemporary design principles of site with similar uses.

8.4 Pedestrian and Bicycle Facilities

Pedestrian and bicycle facilities within the study area (such as, bike lanes, sidewalks and pedestrian crosswalks) are generally not provided within the study area except for where noted in Section 2.2. The project should include a sidewalk along the circular end of Sheehy Court to provide a continuous sidewalk connection with neighboring properties.

Vehicles heading to/from the project site will primarily be traveling during early morning and late evening hours when surrounding bicycle and pedestrian activity is expected to be minimal. Thus interaction between project-related vehicles and other pedestrians or bicyclists should be infrequent and no safety hazards are identified. Similarly, the project-related traffic is not anticipated to interfere with the public access or use of the existing trail along the Sheehy Creek or the proposed Class I Napa Valley Vine Trail along Devlin Road.

Also, nearly all site visitors and employees will be traveling to/from the project via motor vehicle; the project is expected to generate a small number of pedestrians or bicyclists. Since the number of pedestrians and bicyclists will be minimal, no other adverse pedestrian impacts are anticipated.

8.5 Transit Accessibility

The anticipated mode share of transit patrons from the proposed project site is anticipated to be minimal (less than five percent). By assuming a mode share of five percent, approximately three or fewer peak-hour transit trips would be made in any direction. It is estimated that these additional patrons could be accommodated by the existing service, spread out over the various routes and frequency of service. Therefore, the proposed project will have a minimal impact on transit operations.

8.6 On-Site Parking

The project site plan provides adequate parking to support existing and anticipated future transit operations. The estimated number of daily auto trips to the project is less than the number of total parking spaces provided. Employees will also be arriving and departing in separate shifts, which increase the availability of parking spaces during any one time of the day. Since the project site will be able to accommodate parking demand for both autos and buses, no impacts are anticipated and no mitigation is required.

9. Cumulative and Cumulative plus Project Conditions

Recent forecasts from the travel forecast model were reviewed for several roadway segments within the vicinity of the Project. For the purpose of this analysis, the 2015 and 2040 growth forecasts (roadway segment link volumes) were used. The growth forecasts were derived from the Napa-Solano Travel Demand Model. **Figure 10** illustrates AM and PM peak hour intersection turning movement volumes for the Cumulative condition without the Project. **Figure 11** illustrates AM and PM peak hour intersection turn movement volumes under the 2040 Cumulative plus Project Condition.

9.1 Planned Roadway Improvements

The only planned future roadway improvement within the study area is a flyover serving southbound SR 221 to southbound SR 29. This project is needed to address existing congestion at the intersection of SR 29 at SR 221, which will continue to worsen as traffic volumes increase over time. Because funding has not been identified for the flyover project, this improvement was not included with the cumulative condition analysis.

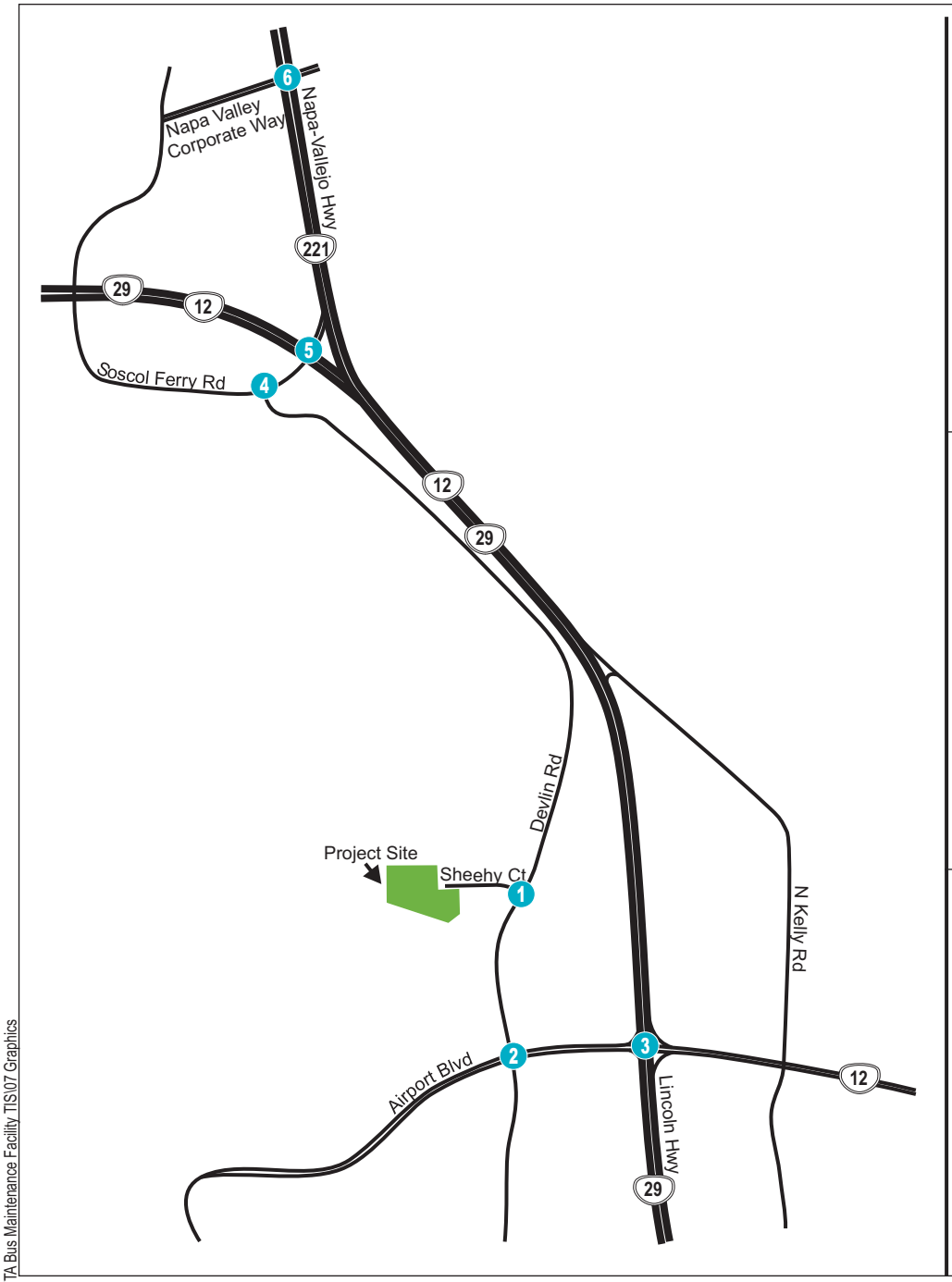
It was assumed in this study that the transportation network under cumulative conditions is the same as that used in the existing conditions.

9.2 Cumulative and Cumulative plus Project Forecast Methodology

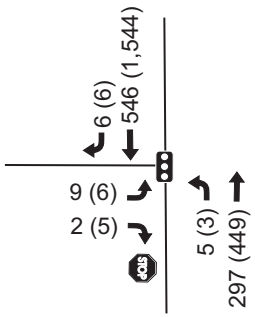
Cumulative year 2040 traffic forecasts were obtained by adding the model growth between 2016 and 2040 to existing counts. The model growth was estimated by comparing the link volumes at links adjacent to the project site from the 2015 and 2040 Napa-Solano Travel Demand Model forecast models. This growth was summarized into a uniform percent growth per year and then applied to existing counts to estimate the 2040 traffic demands.

9.3 Intersection Operations—Cumulative Conditions (Without Project)

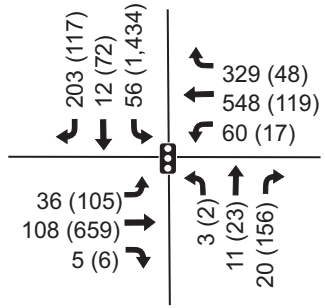
All intersections were evaluated under each of the significance criteria as outlined in Section 4.2 of this report. These intersections and their corresponding Cumulative Condition LOS are presented in **Table 9**. **Appendix B** includes the detailed calculation LOS analysis sheets for these signalized intersections, including the weekday AM and PM peak hours.



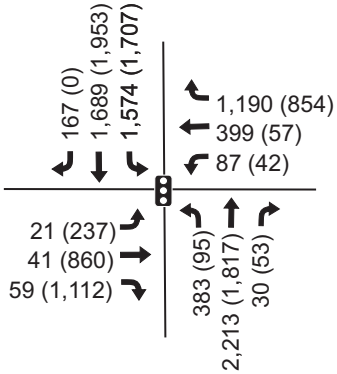
1. ***Devlin Rd & Sheehy Ct***



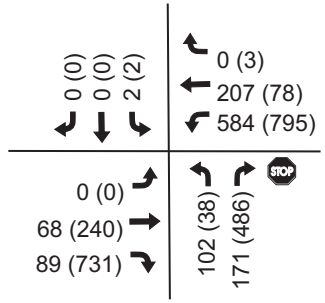
2. ***Devlin Rd & Airport Blvd***



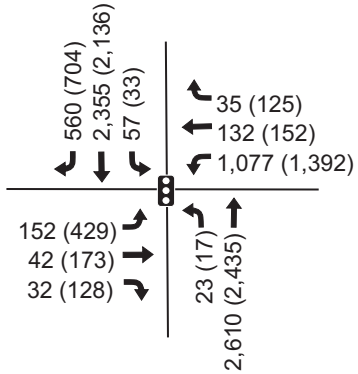
3. ***Lincoln Hwy & Airport Blvd***



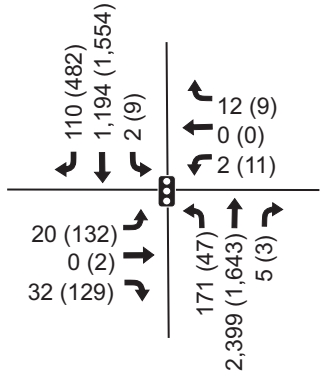
4. ***Devlin Rd & Soscol Ferry Rd***



5. ***SR 12/29 & SR 221***



6. ***SR 221 & Napa Valley Corporate Way***



LEGEND

- 0 - Study Intersection
- Project Site
- STOP - Stop Sign
- Traffic Signal
- AM(PM) - Peak Hour Trips

No Scale

DKS

Figure 10

NVTA Bus Maintenance Facility TIS
Cumulative Condition Intersection Peak Hour Volumes

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Table 9 Cumulative Condition LOS Summary

Int. #	Intersection	Control Type	Peak Hour	Cumulative Condition	
				Avg Delay	LOS
1	Devlin Rd & Sheehy Ct	Unsignalized[1]	AM	15.0	B
			PM	**52.2**	**F**
2	Devlin Rd & Airport Blvd	Signal	AM	15.0	B
			PM	**68.9**	**E**
3	Lincoln Hwy & Airport Blvd	Signal	AM	**> 80**	**F**
			PM	**> 80**	**F**
4	Devlin Rd & Soscol Ferry Rd	Unsignalized[1]	AM	**> 80**	**F**
			PM	**> 80**	**F**
5	SR 12/29 & SR 221	Signal	AM	**> 80**	**F**
			PM	**> 80**	**F**
6	SR 221 & Napa Valley Corporate Way	Signal	AM	46.8	D
			PM	37.7	D

Source: DKS Associates, 2016
Notes: **Bold** = LOS E or worse.
1. Unsignalized Intersections LOS are based on the worst approach.

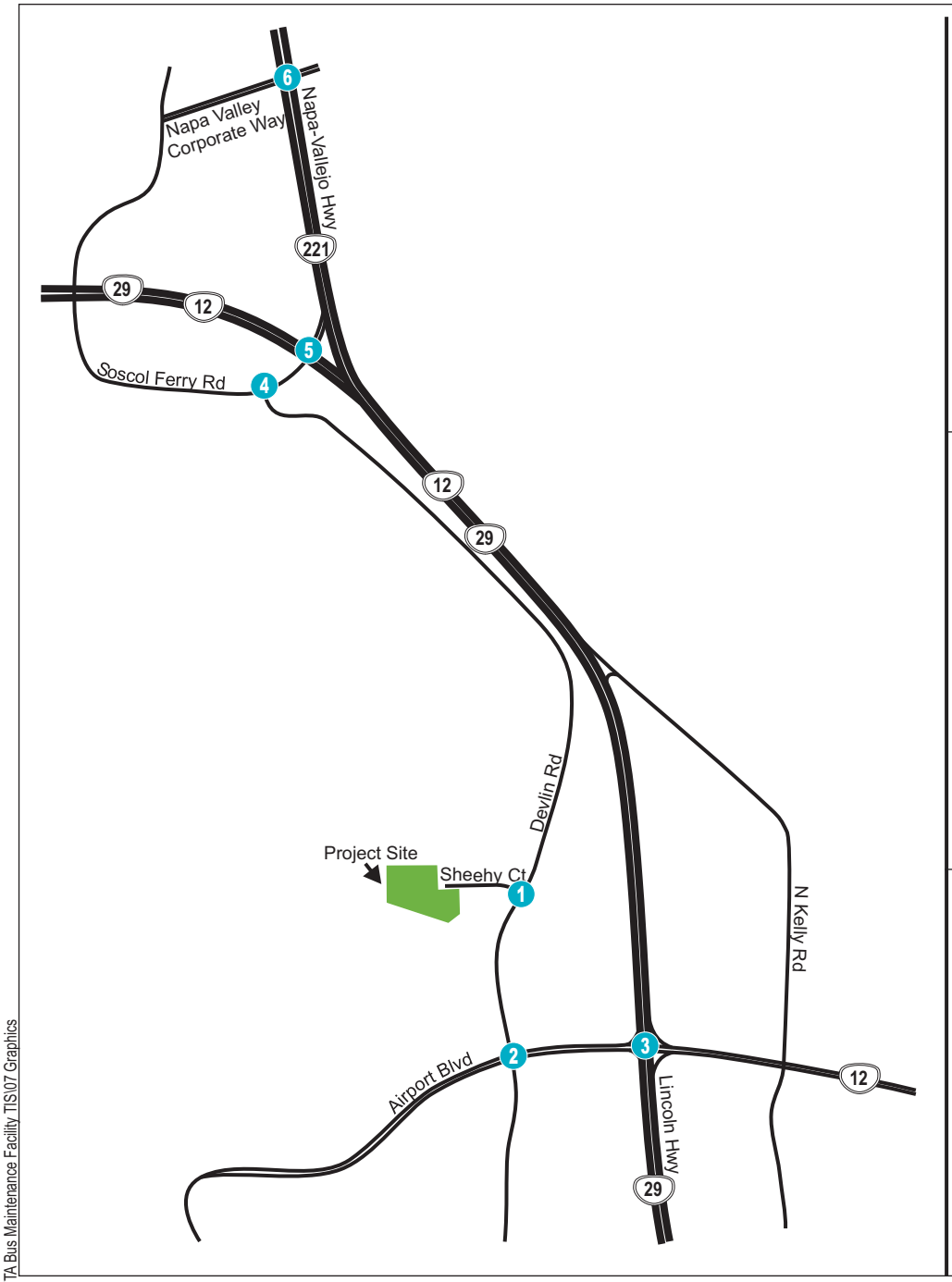
According to intersection level-of-service standards, the following intersections are anticipated to operate at unacceptable levels of service for the project condition under AM, PM or both peak hours.

- Devlin Road and Sheehy Court (PM peak);
- Devlin Road and Airport Boulevard (PM peak);
- Lincoln Highway and Airport Boulevard (Both AM and PM peak); and
- Devlin Road and Soscol Ferry Road (Both AM and PM peak).

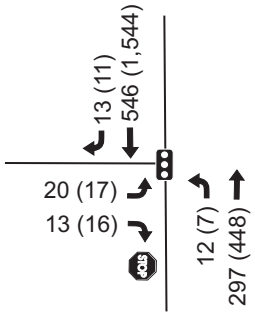
9.4 Intersection Operations—Cumulative plus Project Conditions

All intersections were evaluated for the Cumulative plus Project Conditions under the significance criteria as outlined in Section 4.2 of this report. The intersections and their corresponding Cumulative plus Project Condition levels of service are presented in **Table 10. Appendix B** includes the detailed calculation LOS analysis sheets for all intersections, including the weekday AM and PM peak hours.

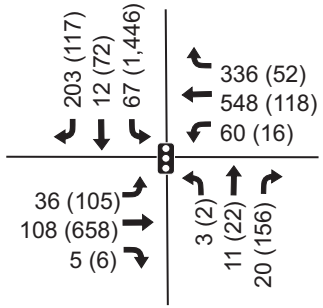
Figure 11: Cumulative plus Project Condition Intersection Peak Hour Volumes



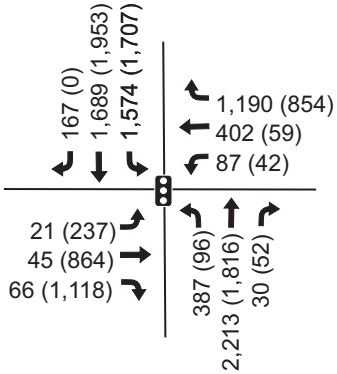
1. Devlin Rd & Sheehy Ct



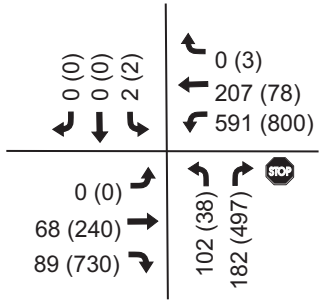
2. Devlin Rd & Airport Blvd



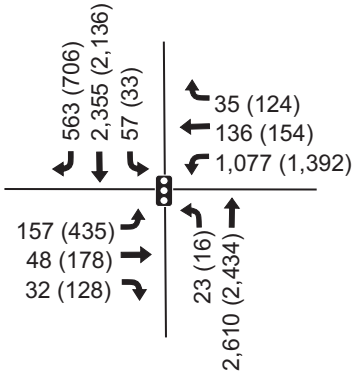
3. Lincoln Hwy & Airport Blvd



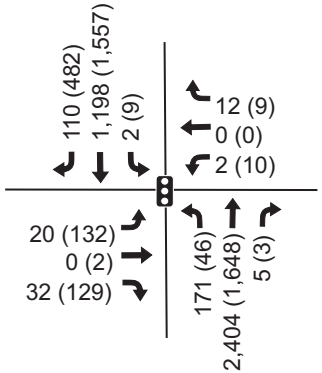
4. Devlin Rd & Soscol Ferry Rd



5. SR 12/29 & SR 221



6. SR 221 & Napa Valley Corporate Way



LEGEND

- 0 - Study Intersection
- Project Site
- STOP - Stop Sign
- Traffic Signal
- AM(PM) - Peak Hour Trips

No Scale

DKS

Figure 11

NVTA Bus Maintenance Facility TIS
Cumulative Plus Project Condition Intersection Peak Hour Volumes

P:\16\16067-000 NVTA Bus Maintenance Facility TIS\07 Graphics

Table 10 Cumulative plus Project LOS Summary

Int. #	Intersection	Control Type	Peak Hour	Cumulative Condition		Cumulative Project Condition		Significant Project Impact (Yes/No)
				Avg Delay	LOS	Avg Delay	LOS	
1	Devlin Rd & Sheehy Ct	Unsignalized[1]	AM	15.0	B	14.3	B	No
			PM	**52.2**	**F**	**63.6**	**F**	No
2	Devlin Rd & Airport Blvd	Signal	AM	15.0	B	15.2	B	No
			PM	**68.9**	**E**	**70.4**	**E**	No
3	Lincoln Hwy & Airport Blvd	Signal	AM	**> 80**	**F**	**> 80**	**F**	No
			PM	**> 80**	**F**	**> 80**	**F**	No
4	Devlin Rd & Soscol Ferry Rd	Unsignalized[1]	AM	**> 80**	**F**	**> 80**	**F**	No
			PM	**> 80**	**F**	**> 80**	**F**	No
5	SR 12/29 & SR 221	Signal	AM	**> 80**	**F**	**> 80**	**F**	No
			PM	**> 80**	**F**	**> 80**	**F**	No
6	SR 221 & Napa Valley Corporate Way	Signal	AM	46.8	D	47.3	D	No
			PM	37.7	D	38.0	D	No

Source: DKS Associates, 2016
Notes: **Bold** = LOS E or worse.
1. Unsignalized Intersections LOS are based on the worst approach.

According to intersection level-of-service standards, the following intersections are anticipated to operate at unacceptable levels of service for the cumulative plus project condition under AM, PM or both peak hours.

- Devlin Road and Sheehy Court (PM peak);
- Devlin Road and Airport Boulevard (PM peak);
- Lincoln Highway and Airport Boulevard (Both AM and PM peak); and
- Devlin Road and Soscol Ferry Road (Both AM and PM peak).

Per significance criteria described in Section 4.2, none of the study intersections would be considered a significant impact for the Cumulative plus Project Condition. The unsignalized intersections of Devlin Road and Soscol Ferry Road and Devlin Road and Sheehy Court were evaluated for a peak hour traffic signal warrant under the Cumulative plus Project Condition since it operates at a LOS F. The warrant worksheets are provided in Appendix C and were prepared in accordance with the procedures described in the 2014 edition of the California Manual on Uniform Traffic Control Devices (CaMUTCD). This peak hour warrant is provided for informational purposes only.

10. Conclusions

The study analyzed six intersections for the AM and PM peak hour of traffic. These intersections were evaluated for the following scenarios: Existing, Background, Project, Cumulative and Cumulative plus Project Conditions. The results of the intersection level of service analysis are summarized in Table 1 of this report.

The intersection level of service analysis results show that the addition of project-generated traffic onto surrounding study intersections is not anticipated to result in significant impacts based on level of service thresholds discussed in Section 4.2.

An evaluation of the preliminary site layout plan did not reveal any operational or safety deficiencies. The internal circulation, on-site parking supply and layout, and site egress and ingress are all adequate and no mitigations are required.

Although the project site would be located near existing and planned bike facilities, interaction between project-related vehicles and bicycle users is expected to be minimal because peak activity periods for the project would occur during very early morning or late evening hours when pedestrian and bicycle activity will be minimal.

This study evaluated the issues related to transportation, traffic and circulation for the proposed project and did not identify any significant impacts. Therefore, mitigation measures are not required.

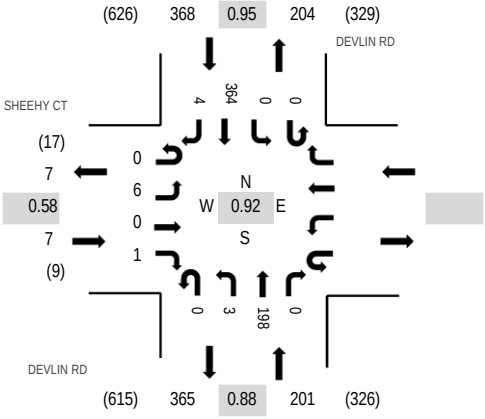
Appendix A

INTERSECTION TURNING MOVEMENT COUNTS

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

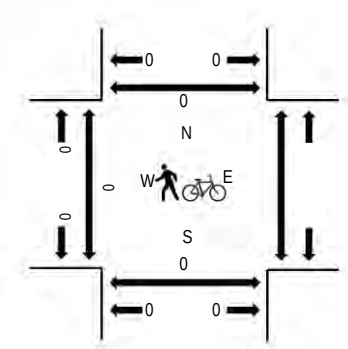
Location: 1 DEVLIN RD & SHEEHY CT AM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SHEEHY CT Eastbound U-Turn	Eastbound Left	Eastbound Thru	Eastbound Right	Westbound U-Turn	Westbound Left	Westbound Thru	Westbound Right	DEVLIN RD Northbound U-Turn	Northbound Left	Northbound Thru	Northbound Right	DEVLIN RD Southbound U-Turn	Southbound Left	Southbound Thru	Southbound Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	1	0	0					0	0	23	0	0	0	33	3	60	426	0		0	0
7:15 AM	0	0	0	0					0	1	38	0	0	0	52	1	92	520	0		0	0
7:30 AM	0	3	0	0					0	0	48	0	0	0	67	0	118	576	0		0	0
7:45 AM	0	0	0	0					0	1	56	0	0	0	97	2	156	575	0		0	0
8:00 AM	0	0	0	1					0	2	50	0	0	0	100	1	154	535	0		0	0
8:15 AM	0	3	0	0					0	0	44	0	0	0	100	1	148		0		0	0
8:30 AM	0	0	0	0					0	0	34	0	0	0	81	2	117		0		0	0
8:45 AM	0	1	0	0					0	1	28	0	0	0	84	2	116		0		0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound U-Turn	Eastbound Left	Eastbound Thru	Eastbound Right	Westbound U-Turn	Westbound Left	Westbound Thru	Westbound Right	Northbound U-Turn	Northbound Left	Northbound Thru	Northbound Right	Southbound U-Turn	Southbound Left	Southbound Thru	Southbound Right	Total
Articulated Trucks	0	1	0	0					0	1	7	0	0	0	1	0	10
Lights	0	5	0	1					0	2	182	0	0	0	358	4	552
Mediums	0	0	0	0					0	0	9	0	0	0	5	0	14
Total	0	6	0	1					0	3	198	0	0	0	364	4	576

All Traffic Data Services Inc.

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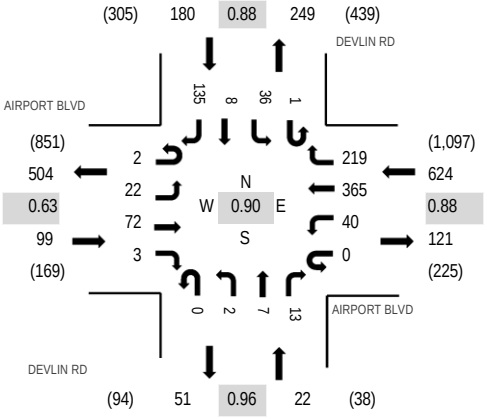
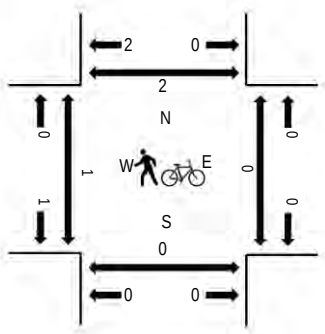
Location: 2 DEVLIN RD & AIRPORT BLVD AM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	AIRPORT BLVD Eastbound				AIRPORT BLVD Westbound				DEVLIN RD Northbound				DEVLIN RD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	8	15	0	0	6	58	30	0	1	1	1	0	6	2	13	141	765	0	0	0	0
7:15 AM	0	2	10	1	0	9	58	46	0	0	2	3	0	10	0	22	163	853	0	0	0	2
7:30 AM	0	5	10	0	0	18	82	56	0	0	1	2	0	11	1	19	205	904	0	0	0	0
7:45 AM	1	4	11	2	0	15	108	63	0	1	1	2	0	13	3	32	256	925	0	0	0	1
8:00 AM	0	4	14	0	0	9	87	72	0	1	2	3	0	5	2	30	229	844	1	0	0	0
8:15 AM	0	6	16	1	0	10	83	48	0	0	2	4	0	6	1	37	214		0	0	0	1
8:30 AM	1	8	31	0	0	6	87	36	0	0	2	4	1	12	2	36	226		0	0	0	0
8:45 AM	0	3	16	0	0	6	68	36	0	2	0	3	0	17	0	24	175		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	7	0	0	7	15	7	0	0	1	5	0	3	0	1	46
Lights	2	22	53	3	0	31	337	206	0	2	4	5	1	31	8	134	839
Mediums	0	0	12	0	0	2	13	6	0	0	2	3	0	2	0	0	40
Total	2	22	72	3	0	40	365	219	0	2	7	13	1	36	8	135	925

All Traffic Data Services Inc.

(303) 216-2439
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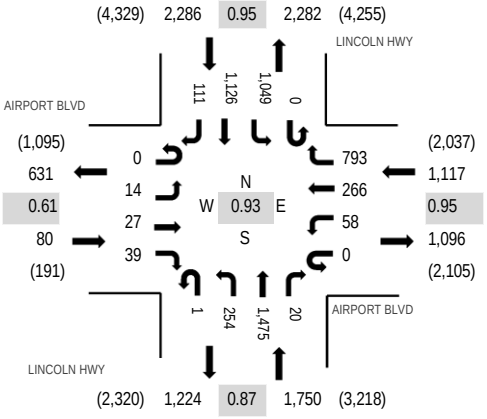
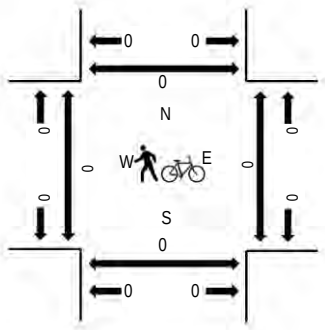
Location: 3 LINCOLN HWY & AIRPORT BLVD AM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 07:15 AM - 08:15 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	AIRPORT BLVD Eastbound				AIRPORT BLVD Westbound				LINCOLN HWY Northbound				LINCOLN HWY Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	7	11	9	0	17	36	179	0	35	387	7	0	228	286	17	1,219	5,207	0	0	0	0
7:15 AM	0	3	8	9	0	10	71	205	0	41	370	2	0	288	245	18	1,270	5,233	0	0	0	0
7:30 AM	0	5	4	13	0	18	53	188	1	76	438	5	0	253	319	29	1,402	5,036	0	0	0	0
7:45 AM	0	4	5	15	0	19	82	192	0	76	366	7	0	237	280	33	1,316	4,836	0	0	0	0
8:00 AM	0	2	10	2	0	11	60	208	0	61	301	6	0	271	282	31	1,245	4,568	0	0	0	0
8:15 AM	0	4	8	1	0	15	49	164	0	47	292	9	0	212	234	38	1,073		0	0	0	0
8:30 AM	0	12	13	15	0	21	70	178	1	38	283	5	0	278	256	32	1,202		0	0	0	0
8:45 AM	0	8	9	14	1	9	32	149	2	43	310	9	0	219	216	27	1,048		0	0	0	0

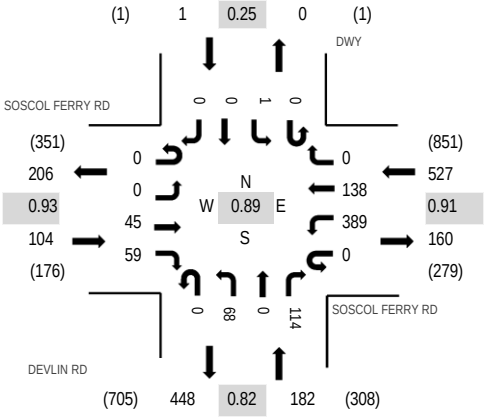
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	1	6	2	0	17	13	49	0	7	38	5	0	25	28	1	192
Lights	0	12	17	34	0	39	247	722	1	235	1,378	13	0	1,009	1,062	108	4,877
Mediums	0	1	4	3	0	2	6	22	0	12	59	2	0	15	36	2	164
Total	0	14	27	39	0	58	266	793	1	254	1,475	20	0	1,049	1,126	111	5,233

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

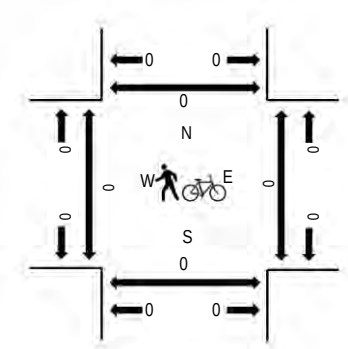
Location: 4 DEVLIN RD & SOSCOL FERRY RD AM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SOSCOL FERRY RD Eastbound				SOSCOL FERRY RD Westbound				DEVLIN RD Northbound				DWY Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	9	7	0	28	24	0	0	10	0	13	0	0	0	0	91	600	0	0	0	0
7:15 AM	0	0	8	3	0	60	26	0	0	12	0	20	0	0	0	0	129	712	0	0	0	0
7:30 AM	0	0	12	13	0	64	22	0	0	15	0	25	0	0	0	0	151	786	0	0	0	0
7:45 AM	0	0	9	19	0	108	37	0	0	25	0	31	0	0	0	0	229	814	0	0	0	0
8:00 AM	0	0	13	8	0	97	41	0	0	15	0	28	0	1	0	0	203	736	0	0	0	0
8:15 AM	0	0	9	18	0	98	34	0	0	16	0	28	0	0	0	0	203		0	0	0	0
8:30 AM	0	0	14	14	0	86	26	0	0	12	0	27	0	0	0	0	179		0	0	0	0
8:45 AM	0	1	7	12	0	70	30	0	0	6	0	25	0	0	0	0	151		0	0	0	1

Peak Rolling Hour Flow Rates

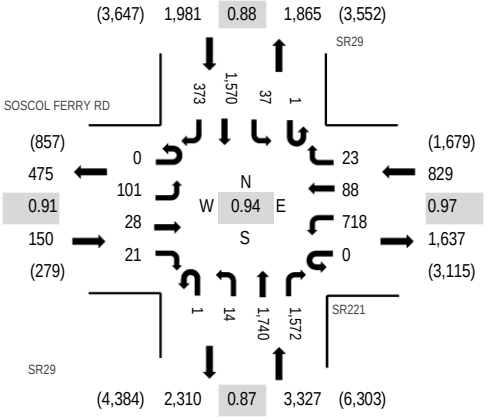
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	1	0	3	0	0	0	4	0	1	0	0	0	0	9
Lights	0	0	41	56	0	384	135	0	0	60	0	104	0	1	0	0	781
Mediums	0	0	4	2	0	2	3	0	0	4	0	9	0	0	0	0	24
Total	0	0	45	59	0	389	138	0	0	68	0	114	0	1	0	0	814

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

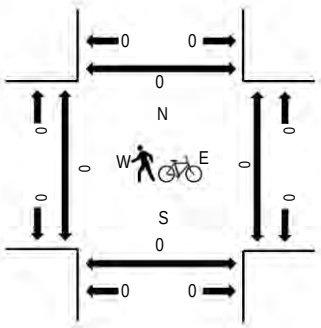
Location: 5 SR29 & SR221 AM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 07:15 AM - 08:15 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SOSCOL FERRY RD Eastbound				SR221 Westbound				SR29 Northbound				SR29 Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	11	2	7	0	200	12	6	0	5	396	412	0	7	382	31	1,471	6,282	0	0	0	0
7:15 AM	0	16	7	5	0	175	14	2	0	5	438	376	1	9	390	72	1,510	6,287	0	0	0	0
7:30 AM	0	27	6	6	0	161	24	4	0	3	515	459	0	6	389	77	1,677	6,210	0	0	0	0
7:45 AM	0	28	6	5	0	190	27	9	1	0	381	416	0	10	435	116	1,624	5,945	0	0	0	0
8:00 AM	0	30	9	5	0	192	23	8	0	6	406	321	0	12	356	108	1,476	5,626	0	0	0	0
8:15 AM	0	25	6	4	0	177	29	10	0	3	372	357	1	15	331	103	1,433		0	0	0	0
8:30 AM	0	29	6	8	0	179	24	11	1	2	400	329	0	13	333	77	1,412		0	0	0	0
8:45 AM	1	20	7	3	0	162	20	20	3	2	385	309	1	15	284	73	1,305		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	3	0	1	0	11	0	3	0	0	75	22	0	1	43	4	163
Lights	0	93	24	19	0	687	86	14	1	13	1,600	1,506	1	31	1,496	368	5,939
Mediums	0	5	4	1	0	20	2	6	0	1	65	44	0	5	31	1	185
Total	0	101	28	21	0	718	88	23	1	14	1,740	1,572	1	37	1,570	373	6,287

All Traffic Data Services Inc.

(303) 216-2439
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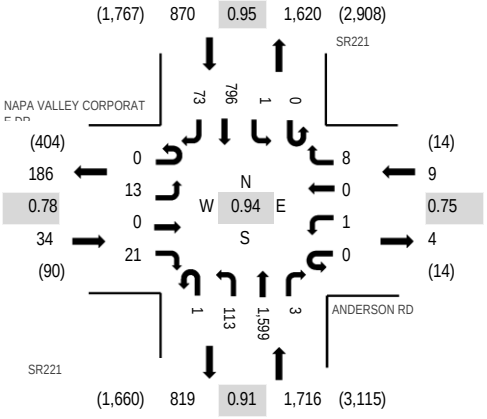
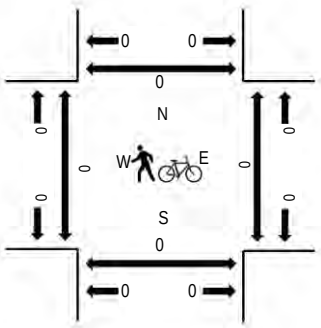
Location: 6 SR221 & ANDERSON RD AM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	NAPA VALLEY CORPORATE DR Eastbound				ANDERSON RD Westbound				SR221 Northbound				SR221 Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	3	0	3	0	0	0	2	0	22	398	1	0	0	209	9	647	2,629	0	0	0	0
7:15 AM	0	3	0	3	0	1	0	2	0	20	372	0	0	1	183	11	596	2,586	0	0	0	0
7:30 AM	0	1	0	7	0	0	0	3	0	35	436	0	0	0	183	25	690	2,628	0	0	0	0
7:45 AM	0	6	0	8	0	0	0	1	1	36	393	2	0	0	221	28	696	2,501	0	0	0	0
8:00 AM	0	3	0	10	0	1	0	1	0	30	311	1	0	1	220	26	604	2,357	0	0	0	0
8:15 AM	0	3	0	5	0	2	0	0	0	38	340	0	0	3	218	29	638		0	0	0	0
8:30 AM	0	8	0	9	0	0	0	0	0	22	324	2	0	0	184	14	563		0	0	0	0
8:45 AM	0	8	0	10	0	1	0	0	1	41	289	0	1	3	180	18	552		0	0	0	0

Peak Rolling Hour Flow Rates

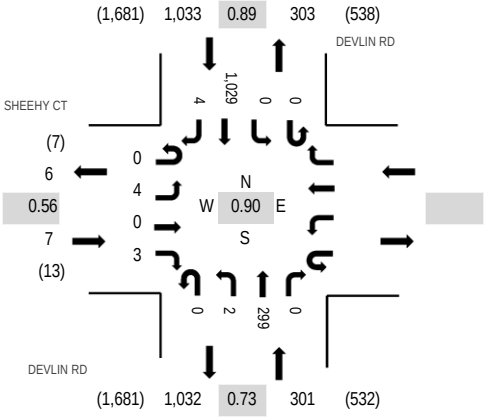
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	1	0	0	0	0	0	4	19	0	0	0	11	0	35
Lights	0	13	0	17	0	1	0	7	1	105	1,528	3	0	1	758	73	2,507
Mediums	0	0	0	3	0	0	0	1	0	4	52	0	0	0	27	0	87
Total	0	13	0	21	0	1	0	8	1	113	1,599	3	0	1	796	73	2,629

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

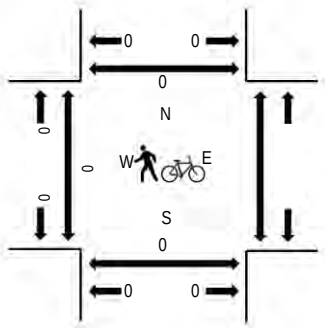
Location: 1 DEVLIN RD & SHEEHY CT PM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:00 PM - 04:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SHEEHY CT Eastbound U-Turn	Eastbound Left	Eastbound Thru	Eastbound Right	Westbound U-Turn	Westbound Left	Westbound Thru	Westbound Right	DEVLIN RD Northbound U-Turn	Northbound Left	Northbound Thru	Northbound Right	DEVLIN RD Southbound U-Turn	Southbound Left	Southbound Thru	Southbound Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
4:00 PM	0	0	0	2					0	0	78	0	0	0	289	2	371	1,341	0		0	0
4:15 PM	0	1	0	0					0	1	60	0	0	0	254	2	318	1,268	0		0	0
4:30 PM	0	2	0	0					0	1	102	0	0	0	263	0	368	1,197	0		0	0
4:45 PM	0	1	0	1					0	0	59	0	0	0	223	0	284	1,043	0		0	0
5:00 PM	0	3	0	1					0	0	75	0	0	0	219	0	298	885	0		0	0
5:15 PM	0	0	0	1					0	0	51	0	0	0	194	1	247		0		0	0
5:30 PM	0	1	0	0					0	0	56	0	0	0	157	0	214		0		0	0
5:45 PM	0	0	0	0					0	0	49	0	0	0	77	0	126		0		0	0

Peak Rolling Hour Flow Rates

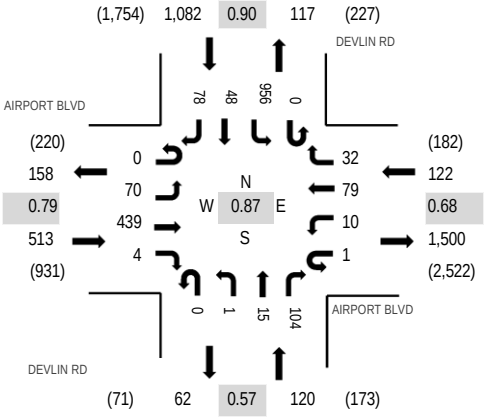
Vehicle Type	Eastbound U-Turn	Eastbound Left	Eastbound Thru	Eastbound Right	Westbound U-Turn	Westbound Left	Westbound Thru	Westbound Right	Northbound U-Turn	Northbound Left	Northbound Thru	Northbound Right	Southbound U-Turn	Southbound Left	Southbound Thru	Southbound Right	Total
Articulated Trucks	0	0	0	0					0	0	0	0	0	0	7	0	7
Lights	0	3	0	3					0	1	295	0	0	0	985	3	1,290
Mediums	0	1	0	0					0	1	4	0	0	0	37	1	44
Total	0	4	0	3					0	2	299	0	0	0	1,029	4	1,341

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

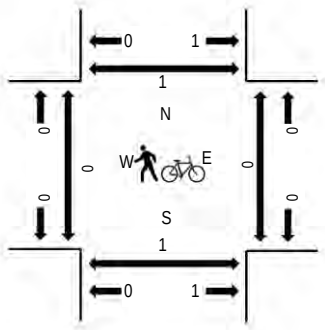
Location: 2 DEVLIN RD & AIRPORT BLVD PM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:00 PM - 04:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	AIRPORT BLVD Eastbound				AIRPORT BLVD Westbound				DEVLIN RD Northbound				DEVLIN RD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	23	128	3	0	1	29	8	0	0	2	33	0	247	19	35	528	1,837	0	0	0	0
4:15 PM	0	18	62	0	0	3	14	5	0	0	5	11	0	248	5	17	388	1,755	0	0	0	0
4:30 PM	0	15	151	0	0	5	30	10	0	0	7	46	0	213	19	19	515	1,692	0	0	0	1
4:45 PM	0	14	98	1	1	1	6	9	0	1	1	14	0	248	5	7	406	1,460	0	0	0	0
5:00 PM	0	25	148	1	0	1	7	10	0	1	2	20	0	219	1	11	446	1,203	0	0	0	0
5:15 PM	0	16	78	0	0	2	6	6	0	0	0	12	1	193	1	10	325		0	0	0	0
5:30 PM	0	23	69	0	0	2	9	6	0	0	0	14	0	152	1	7	283		0	0	0	0
5:45 PM	0	17	41	0	0	0	7	4	0	0	0	4	0	72	0	4	149		0	0	0	1

Peak Rolling Hour Flow Rates

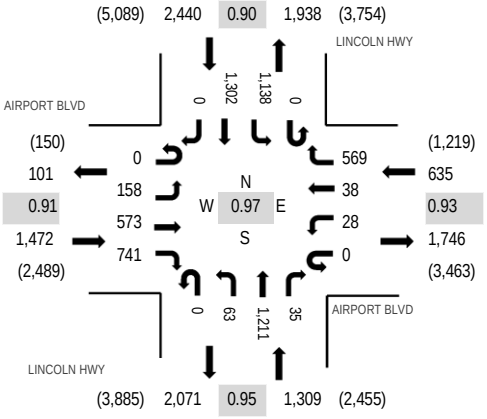
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	10	2	0	4	9	1	0	0	0	8	0	7	0	0	41
Lights	0	70	419	2	1	5	62	28	0	1	15	95	0	920	47	78	1,743
Mediums	0	0	10	0	0	1	8	3	0	0	0	1	0	29	1	0	53
Total	0	70	439	4	1	10	79	32	0	1	15	104	0	956	48	78	1,837

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

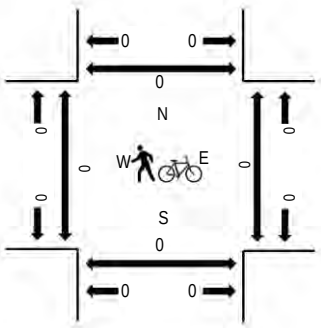
Location: 3 LINCOLN HWY & AIRPORT BLVD PM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	AIRPORT BLVD Eastbound				AIRPORT BLVD Westbound				LINCOLN HWY Northbound				LINCOLN HWY Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	30	146	174	0	12	14	144	0	20	305	12	0	267	335	0	1,459	5,856	0	0	0	0
4:15 PM	0	40	144	163	0	5	8	157	0	11	288	8	0	286	300	0	1,410	5,807	0	0	0	0
4:30 PM	0	44	153	210	0	6	12	129	0	25	289	5	0	300	306	0	1,479	5,763	0	0	0	0
4:45 PM	0	44	130	194	0	5	4	139	0	7	329	10	0	285	361	0	1,508	5,603	0	0	0	0
5:00 PM	0	77	118	172	0	7	1	134	0	7	250	7	0	294	339	4	1,410	5,396	0	0	0	0
5:15 PM	0	42	137	121	0	9	7	140	0	3	288	3	0	320	294	2	1,366		0	0	0	0
5:30 PM	0	38	108	96	0	6	3	120	0	11	267	12	0	323	335	0	1,319		0	0	0	0
5:45 PM	0	27	42	39	0	4	5	148	0	6	285	7	0	346	392	0	1,301		0	0	0	0

Peak Rolling Hour Flow Rates

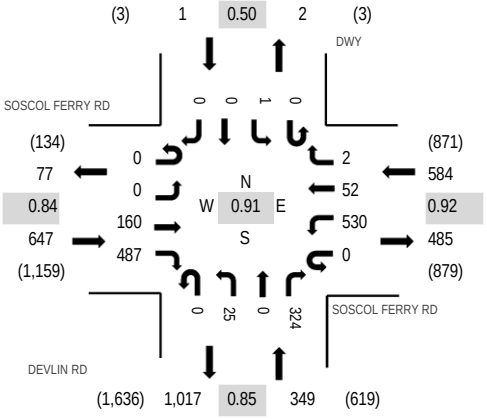
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	18	4	0	9	7	0	0	5	5	8	0	17	13	0	86
Lights	0	156	536	724	0	17	25	557	0	51	1,188	24	0	1,099	1,259	0	5,636
Mediums	0	2	19	13	0	2	6	12	0	7	18	3	0	22	30	0	134
Total	0	158	573	741	0	28	38	569	0	63	1,211	35	0	1,138	1,302	0	5,856

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

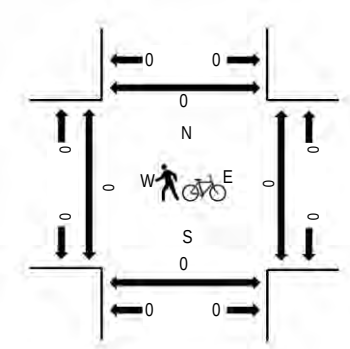
Location: 4 DEVLIN RD & SOSCOL FERRY RD PM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SOSCOL FERRY RD Eastbound				SOSCOL FERRY RD Westbound				DEVLIN RD Northbound				DWY Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	46	141	0	142	16	0	0	4	0	79	0	0	0	0	428	1,581	0	0	0	0
4:15 PM	0	0	31	109	0	146	11	0	0	7	0	65	0	0	0	0	369	1,524	0	0	0	0
4:30 PM	0	0	54	132	0	130	14	0	0	6	0	99	0	0	0	0	435	1,448	0	0	0	0
4:45 PM	0	0	29	105	0	112	11	2	0	8	0	81	0	1	0	0	349	1,267	0	0	0	0
5:00 PM	0	0	61	144	0	61	11	0	0	8	0	85	0	1	0	0	371	1,071	0	0	0	0
5:15 PM	0	0	40	121	0	62	8	0	1	5	0	56	0	0	0	0	293		0	0	0	0
5:30 PM	0	0	25	56	0	101	7	0	0	9	0	56	0	0	0	0	254		0	0	0	0
5:45 PM	0	0	22	43	0	30	6	1	0	3	0	47	0	1	0	0	153		0	0	0	0

Peak Rolling Hour Flow Rates

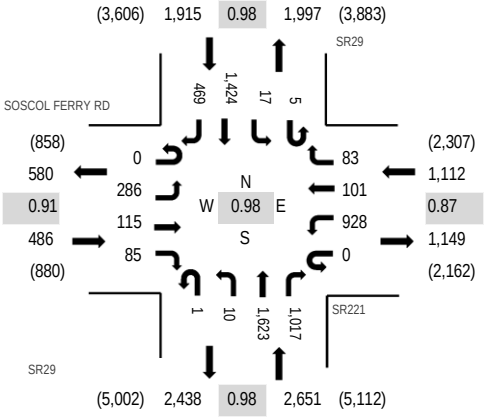
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	1	1	0	5	1	0	0	1	0	1	0	0	0	0	10
Lights	0	0	157	470	0	508	47	2	0	18	0	322	0	1	0	0	1,525
Mediums	0	0	2	16	0	17	4	0	0	6	0	1	0	0	0	0	46
Total	0	0	160	487	0	530	52	2	0	25	0	324	0	1	0	0	1,581

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

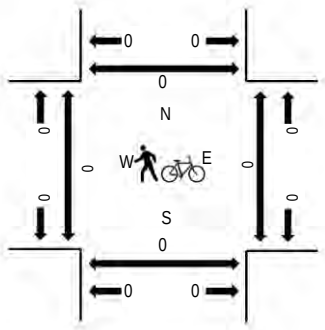
Location: 5 SR29 & SR221 PM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:00 PM - 04:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SOSCOL FERRY RD Eastbound				SR221 Westbound				SR29 Northbound				SR29 Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	77	33	23	0	268	33	20	0	2	380	242	1	7	346	133	1,565	6,164	0	0	0	0
4:15 PM	0	64	19	16	0	239	25	19	0	1	384	273	2	4	350	127	1,523	6,134	0	0	0	0
4:30 PM	0	69	38	30	0	203	20	22	1	4	410	275	2	3	347	107	1,531	6,063	0	0	0	0
4:45 PM	0	76	25	16	0	218	23	22	0	3	449	227	0	3	381	102	1,545	5,930	0	0	0	0
5:00 PM	0	84	22	32	0	255	15	48	0	4	425	239	0	2	366	43	1,535	5,741	0	0	0	0
5:15 PM	0	65	22	22	0	293	29	23	0	1	382	236	0	4	325	50	1,452		0	0	0	0
5:30 PM	0	59	18	7	0	235	22	16	0	3	345	225	1	4	393	70	1,398		0	0	0	0
5:45 PM	0	39	16	8	0	225	13	21	1	0	378	222	0	3	402	28	1,356		0	0	0	0

Peak Rolling Hour Flow Rates

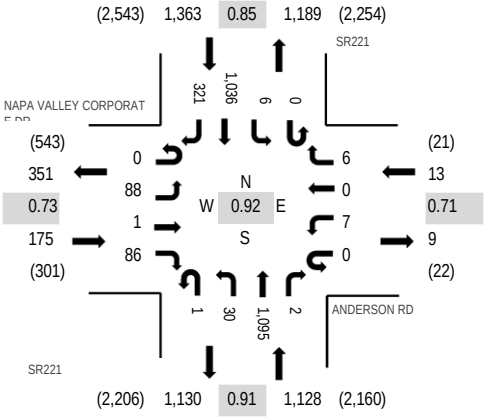
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	1	1	0	3	0	1	0	0	6	5	0	0	25	6	48
Lights	0	285	113	84	0	903	98	80	1	10	1,582	1,000	5	15	1,367	447	5,990
Mediums	0	1	1	0	0	22	3	2	0	0	35	12	0	2	32	16	126
Total	0	286	115	85	0	928	101	83	1	10	1,623	1,017	5	17	1,424	469	6,164

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

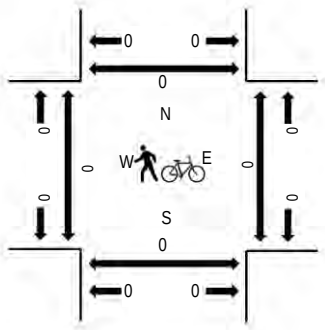
Location: 6 SR221 & ANDERSON RD PM
Date and Start Time: Tuesday, June 07, 2016
Peak Hour: 04:15 PM - 05:15 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	NAPA VALLEY CORPORATE DR Eastbound				ANDERSON RD Westbound				SR221 Northbound				SR221 Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	16	0	12	0	3	0	3	0	17	263	2	0	2	287	66	671	2,620	0	0	0	0
4:15 PM	0	12	0	7	0	3	0	3	1	13	281	0	0	0	255	81	656	2,679	0	0	0	0
4:30 PM	0	28	1	28	0	1	0	1	0	6	308	2	0	2	244	73	694	2,620	0	0	0	0
4:45 PM	0	18	0	15	0	2	0	1	0	8	246	0	0	2	248	59	599	2,454	0	0	0	0
5:00 PM	0	30	0	36	0	1	0	1	0	3	260	0	0	2	289	108	730	2,405	0	0	0	0
5:15 PM	0	26	0	11	0	0	0	0	0	5	255	2	0	4	244	50	597		0	0	0	0
5:30 PM	0	16	0	17	0	0	0	2	0	5	242	0	0	3	221	22	528		0	0	0	0
5:45 PM	0	5	0	23	0	0	0	0	0	5	236	0	1	0	258	22	550		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	2	0	0	0	0	0	0	6	0	0	0	4	0	12
Lights	0	86	1	82	0	7	0	6	1	27	1,075	2	0	6	1,015	313	2,621
Mediums	0	2	0	2	0	0	0	0	0	3	14	0	0	0	17	8	46
Total	0	88	1	86	0	7	0	6	1	30	1,095	2	0	6	1,036	321	2,679

Appendix B

INTERSECTION LEVEL OF SERVICE ANALYSIS

Existing Condition

A.M. Peak

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	1	3	198	364	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	1	3	215	396	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	512	200	400			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	512	200	400			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	490	808	1155			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	75	143	264	136
Volume Left	7	3	0	0	0
Volume Right	1	0	0	0	4
cSH	572	1155	1700	1700	1700
Volume to Capacity	0.01	0.00	0.08	0.16	0.08
Queue Length 95th (ft)	1	0	0	0	0
Control Delay (s)	12.0	0.4	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	12.0	0.1		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	72	3	40	365	219	2	7	13	37	8	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	0.99		1.00	0.94		1.00	0.90		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3520		1770	3340		1770	3201		1610	2919	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3520		1770	3340		1770	3201		1610	2919	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	80	3	44	406	243	2	8	14	41	9	150
RTOR Reduction (vph)	0	2	0	0	83	0	0	14	0	0	130	0
Lane Group Flow (vph)	27	81	0	44	566	0	2	8	0	37	33	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	0.8	12.0		2.1	13.3		0.6	0.6		4.9	4.9	
Effective Green, g (s)	0.8	12.0		2.1	13.3		0.6	0.6		4.9	4.9	
Actuated g/C Ratio	0.02	0.32		0.06	0.35		0.02	0.02		0.13	0.13	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	37	1123		98	1181		28	51		209	380	
v/s Ratio Prot	0.02	0.02		c0.02	c0.17		0.00	c0.00		c0.02	0.01	
v/s Ratio Perm												
v/c Ratio	0.73	0.07		0.45	0.48		0.07	0.16		0.18	0.09	
Uniform Delay, d1	18.3	8.9		17.2	9.5		18.2	18.3		14.6	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.3	0.0		1.9	0.2		0.6	0.8		0.3	0.1	
Delay (s)	65.6	8.9		19.1	9.6		18.8	19.0		14.9	14.5	
Level of Service	E	A		B	A		B	B		B	B	
Approach Delay (s)		22.9			10.2			19.0			14.5	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	37.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	27	39	58	266	793	255	1475	20	1049	1126	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	4.0
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	3379	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1610	3379	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	15	29	42	62	286	862	274	1586	22	1128	1211	119
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	15	0	0	0
Lane Group Flow (vph)	13	31	42	62	286	862	274	1586	7	1128	1211	119
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	7.8	7.8	147.8	23.0	23.0	147.8	25.4	47.1	47.1	49.3	71.0	147.8
Effective Green, g (s)	7.8	7.8	147.8	23.0	23.0	147.8	25.4	47.1	47.1	49.3	71.0	147.8
Actuated g/C Ratio	0.05	0.05	1.00	0.16	0.16	1.00	0.17	0.32	0.32	0.33	0.48	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	84	178	1583	275	289	1583	304	1620	504	1145	1700	1583
v/s Ratio Prot	0.01	0.01		0.04	c0.15		0.15	c0.31		c0.33	0.34	
v/s Ratio Perm			0.03			c0.54			0.00			0.08
v/c Ratio	0.15	0.17	0.03	0.23	0.99	0.54	0.90	0.98	0.01	0.99	0.71	0.08
Uniform Delay, d1	66.9	66.9	0.0	54.6	62.3	0.0	60.0	49.9	34.5	48.9	30.3	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.5	0.0	0.4	49.5	1.4	27.4	17.9	0.1	22.8	2.6	0.1
Delay (s)	67.7	67.4	0.0	55.0	111.8	1.4	87.4	67.8	34.5	71.7	32.9	0.1
Level of Service	E	E	A	E	F	A	F	E	C	E	C	A
Approach Delay (s)		34.5			30.2			70.2			49.1	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	147.8	Sum of lost time (s)	20.6
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	45	59	389	138	0	68	0	114	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	51	66	437	155	0	76	0	128	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.99						0.99	0.99		0.99	0.99	0.99
vC, conflicting volume	155			117			1113	1113	84	1177	1146	155
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	139			117			1108	1108	84	1173	1142	139
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			70			46	100	87	99	100	100
cM capacity (veh/h)	1427			1472			142	146	976	112	139	898

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	117	592	204	1
Volume Left	0	437	76	1
Volume Right	66	0	128	0
cSH	1427	1472	381	112
Volume to Capacity	0.00	0.30	0.54	0.01
Queue Length 95th (ft)	0	31	76	1
Control Delay (s)	0.0	7.0	26.8	37.5
Lane LOS		A	D	E
Approach Delay (s)	0.0	7.0	26.8	37.5
Approach LOS			D	E

Intersection Summary			
Average Delay	10.6		
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	28	21	718	88	23	15	1740	0	38	1570	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	107	30	22	764	94	24	16	1851	0	40	1670	397
RTOR Reduction (vph)	0	0	21	0	0	19	0	0	0	0	0	189
Lane Group Flow (vph)	107	30	1	764	94	5	16	1851	0	40	1670	208
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	6.5	6.5	6.5	22.0	22.0	22.0	1.9	50.4		2.6	51.6	51.6
Effective Green, g (s)	6.5	6.5	6.5	22.0	22.0	22.0	1.9	50.4		2.6	51.6	51.6
Actuated g/C Ratio	0.07	0.07	0.07	0.22	0.22	0.22	0.02	0.51		0.03	0.52	0.52
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	116	122	104	766	416	353	34	1810		46	1853	829
v/s Ratio Prot	c0.06	0.02		c0.22	0.05		0.01	c0.52		c0.02	0.47	
v/s Ratio Perm			0.00			0.00						0.13
v/c Ratio	0.92	0.25	0.01	1.00	0.23	0.02	0.47	1.02		0.87	0.90	0.25
Uniform Delay, d1	45.7	43.7	43.0	38.2	31.3	29.8	47.8	24.1		47.8	21.2	12.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	58.8	0.4	0.0	31.6	0.1	0.0	3.7	27.1		81.6	7.6	0.7
Delay (s)	104.6	44.1	43.0	69.8	31.4	29.8	51.5	51.1		129.4	28.7	13.6
Level of Service	F	D	D	E	C	C	D	D		F	C	B
Approach Delay (s)		84.6			64.6			51.1			27.8	
Approach LOS		F			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	44.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	98.5	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	21	1	0	8	114	1599	3	1	796	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	14	0	22	1	0	9	121	1701	3	1	847	78
RTOR Reduction (vph)	0	0	16	0	0	9	0	0	1	0	0	36
Lane Group Flow (vph)	7	7	6	0	1	0	121	1701	2	1	847	42
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	7.8	7.8	27.1		2.3	2.3	15.3	65.0	65.0	2.1	51.8	51.8
Effective Green, g (s)	7.8	7.8	27.1		2.3	2.3	15.3	65.0	65.0	2.1	51.8	51.8
Actuated g/C Ratio	0.08	0.08	0.28		0.02	0.02	0.16	0.68	0.68	0.02	0.54	0.54
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	137	137	450		42	38	551	2416	1080	39	1925	861
v/s Ratio Prot	c0.00	0.00	0.00		c0.00		c0.04	c0.48		0.00	0.24	
v/s Ratio Perm						0.00			0.00			0.03
v/c Ratio	0.05	0.05	0.01		0.02	0.01	0.22	0.70	0.00	0.03	0.44	0.05
Uniform Delay, d1	40.3	40.3	24.5		45.4	45.3	34.8	9.2	4.8	45.5	13.0	10.2
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.1	0.0	0.1	1.7	0.0	0.1	0.7	0.1
Delay (s)	40.3	40.3	24.5		45.4	45.4	34.8	11.0	4.8	45.6	13.7	10.3
Level of Service	D	D	C		D	D	C	B	A	D	B	B
Approach Delay (s)		30.6			45.4			12.5			13.5	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

P.M. PEAK

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	4	3	2	299	1029	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	3	2	332	1143	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1316	574	1148			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1316	574	1148			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	100			
cM capacity (veh/h)	149	462	604			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	113	221	762	386
Volume Left	4	2	0	0	0
Volume Right	3	0	0	0	4
cSH	260	604	1700	1700	1700
Volume to Capacity	0.03	0.00	0.13	0.45	0.23
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	22.6	0.3	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	22.6	0.1		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	439	4	11	79	32	1	15	104	956	48	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	1.00		1.00	0.96		1.00	0.87		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3534		1770	3386		1770	3074		1610	3198	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (perm)	1770	3534		1770	3386		1770	3074		1610	3198	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	80	505	5	13	91	37	1	17	120	1099	55	90
RTOR Reduction (vph)	0	1	0	0	31	0	0	110	0	0	10	0
Lane Group Flow (vph)	80	509	0	13	97	0	1	27	0	549	685	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	6.4	16.2		1.1	10.9		5.5	5.5		27.5	27.5	
Effective Green, g (s)	6.4	16.2		1.1	10.9		5.5	5.5		27.5	27.5	
Actuated g/C Ratio	0.09	0.24		0.02	0.16		0.08	0.08		0.40	0.40	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	165	838		28	540		142	247		648	1287	
v/s Ratio Prot	c0.05	c0.14		0.01	0.03		0.00	c0.01		c0.34	0.21	
v/s Ratio Perm												
v/c Ratio	0.48	0.61		0.46	0.18		0.01	0.11		0.85	0.53	
Uniform Delay, d1	29.4	23.2		33.3	24.8		28.9	29.1		18.5	15.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.3		6.9	0.1		0.0	0.1		9.9	0.4	
Delay (s)	30.5	24.5		40.2	24.9		28.9	29.2		28.4	15.9	
Level of Service	C	C		D	C		C	C		C	B	
Approach Delay (s)		25.3			26.3			29.2			21.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	68.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	158	573	741	28	38	569	63	1211	35	1138	1302	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	163	591	764	29	39	587	65	1248	36	1173	1342	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	27	0	0	0
Lane Group Flow (vph)	147	607	764	29	39	587	65	1248	9	1173	1342	0
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	23.1	23.1	129.1	7.8	7.8	129.1	7.4	33.1	33.1	44.5	70.2	
Effective Green, g (s)	23.1	23.1	129.1	7.8	7.8	129.1	7.4	33.1	33.1	44.5	70.2	
Actuated g/C Ratio	0.18	0.18	1.00	0.06	0.06	1.00	0.06	0.26	0.26	0.34	0.54	
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	288	605	1583	106	112	1583	101	1303	405	1183	1924	
v/s Ratio Prot	0.09	c0.18		0.02	0.02		0.04	c0.25		c0.34	0.38	
v/s Ratio Perm			c0.48			0.37			0.01			
v/c Ratio	0.51	1.00	0.48	0.27	0.35	0.37	0.64	0.96	0.02	0.99	0.70	
Uniform Delay, d1	47.9	53.0	0.0	57.9	58.2	0.0	59.6	47.3	35.9	42.1	21.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.5	37.4	1.1	1.4	1.9	0.7	10.1	16.7	0.1	24.0	2.1	
Delay (s)	49.4	90.4	1.1	59.3	60.1	0.7	69.6	64.0	36.0	66.1	23.8	
Level of Service	D	F	A	E	E	A	E	E	D	E	C	
Approach Delay (s)		41.5			6.8			63.5			43.5	
Approach LOS		D			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	43.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	129.1	Sum of lost time (s)	20.6
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	160	487	530	52	2	25	0	324	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	176	535	582	57	2	27	0	356	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.97						0.97	0.97		0.97	0.97	0.97
vC, conflicting volume	59			711			1666	1668	443	1845	1934	58
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	14			711			1672	1673	443	1855	1948	13
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			34			21	100	42	90	100	100
cM capacity (veh/h)	1555			888			35	32	614	11	22	1035

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	711	642	384	1
Volume Left	0	582	27	1
Volume Right	535	2	356	0
cSH	1555	888	419	11
Volume to Capacity	0.00	0.66	0.92	0.10
Queue Length 95th (ft)	0	126	250	7
Control Delay (s)	0.0	15.9	57.2	369.4
Lane LOS		C	F	F
Approach Delay (s)	0.0	15.9	57.2	369.4
Approach LOS			F	F

Intersection Summary			
Average Delay	18.7		
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	115	85	928	101	83	11	1623	0	22	1424	469
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	292	117	87	947	103	85	11	1656	0	22	1453	479
RTOR Reduction (vph)	0	0	69	0	0	61	0	0	0	0	0	259
Lane Group Flow (vph)	292	117	18	947	103	24	11	1656	0	22	1453	220
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	62.5		2.6	63.6	63.6
Effective Green, g (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	62.5		2.6	63.6	63.6
Actuated g/C Ratio	0.16	0.16	0.16	0.25	0.25	0.25	0.01	0.45		0.02	0.46	0.46
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	274	288	245	866	470	399	25	1595		33	1623	726
v/s Ratio Prot	c0.17	0.06		c0.28	0.06		0.01	c0.47		c0.01	0.41	
v/s Ratio Perm			0.01			0.02						0.14
v/c Ratio	1.07	0.41	0.07	1.09	0.22	0.06	0.44	1.04		0.67	0.90	0.30
Uniform Delay, d1	58.5	52.8	50.0	51.8	41.0	39.3	67.7	38.0		67.6	34.4	23.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	72.8	0.3	0.0	59.3	0.1	0.0	4.4	33.1		32.9	8.1	1.1
Delay (s)	131.4	53.1	50.1	111.1	41.1	39.4	72.2	71.2		100.5	42.5	24.6
Level of Service	F	D	D	F	D	D	E	E		F	D	C
Approach Delay (s)		98.7			99.4			71.2			38.8	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	67.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	138.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	1	86	7	0	6	31	1095	2	6	1036	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1687	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1687	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	1	93	8	0	7	34	1190	2	7	1126	349
RTOR Reduction (vph)	0	0	64	0	0	7	0	0	1	0	0	180
Lane Group Flow (vph)	48	49	29	0	8	0	34	1190	1	7	1126	169
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	14.2	14.2	30.0		5.0	5.0	11.8	55.7	55.7	2.3	46.2	46.2
Effective Green, g (s)	14.2	14.2	30.0		5.0	5.0	11.8	55.7	55.7	2.3	46.2	46.2
Actuated g/C Ratio	0.15	0.15	0.32		0.05	0.05	0.12	0.59	0.59	0.02	0.49	0.49
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	250	251	498		92	83	425	2070	926	42	1717	768
v/s Ratio Prot	0.03	c0.03	0.02		c0.00		0.01	c0.34		c0.00	c0.32	
v/s Ratio Perm						0.00			0.00			0.11
v/c Ratio	0.19	0.20	0.06		0.09	0.00	0.08	0.57	0.00	0.17	0.66	0.22
Uniform Delay, d1	35.5	35.5	22.7		42.9	42.7	36.9	12.3	8.2	45.5	18.5	14.1
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.1	0.0	0.0	1.2	0.0	0.7	2.0	0.7
Delay (s)	35.6	35.6	22.8		43.1	42.7	36.9	13.5	8.2	46.2	20.5	14.8
Level of Service	D	D	C		D	D	D	B	A	D	C	B
Approach Delay (s)		29.3			42.9			14.2			19.3	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Background Condition

A.M. Peak

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	2	5	324	510	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	5	352	554	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	745	280	561			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745	280	561			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	99			
cM capacity (veh/h)	348	717	1006			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	10	123	235	370	191
Volume Left	8	5	0	0	0
Volume Right	2	0	0	0	7
cSH	447	1006	1700	1700	1700
Volume to Capacity	0.02	0.01	0.14	0.22	0.11
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	14.3	0.4	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	14.3	0.1		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	91	14	47	413	393	12	16	20	118	18	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	0.98		1.00	0.93		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1770	3467		1770	3280		1770	3247		1610	2980	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (perm)	1770	3467		1770	3280		1770	3247		1610	2980	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	101	16	52	459	437	13	18	22	131	20	150
RTOR Reduction (vph)	0	10	0	0	156	0	0	21	0	0	123	0
Lane Group Flow (vph)	27	107	0	52	740	0	13	19	0	106	72	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	1.0	16.5		2.4	17.9		1.8	1.8		8.5	8.5	
Effective Green, g (s)	1.0	16.5		2.4	17.9		1.8	1.8		8.5	8.5	
Actuated g/C Ratio	0.02	0.35		0.05	0.38		0.04	0.04		0.18	0.18	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	37	1211		90	1243		67	123		289	536	
v/s Ratio Prot	0.02	0.03		c0.03	c0.23		c0.01	0.01		c0.07	0.02	
v/s Ratio Perm												
v/c Ratio	0.73	0.09		0.58	0.59		0.19	0.15		0.37	0.13	
Uniform Delay, d1	23.0	10.3		21.9	11.7		22.0	22.0		17.0	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.3	0.0		6.5	0.6		0.7	0.3		0.7	0.1	
Delay (s)	70.3	10.3		28.4	12.3		22.7	22.3		17.6	16.4	
Level of Service	E	B		C	B		C	C		B	B	
Approach Delay (s)		21.6			13.2			22.4			16.8	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	66	97	58	348	796	378	1479	20	1050	1128	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	4.0
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	3383	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1610	3383	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	26	71	104	62	374	865	406	1590	22	1129	1213	145
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	15	0	0	0
Lane Group Flow (vph)	23	74	104	62	374	865	406	1590	7	1129	1213	145
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	10.0	10.0	150.0	23.0	23.0	150.0	28.3	47.0	47.0	49.4	68.1	150.0
Effective Green, g (s)	10.0	10.0	150.0	23.0	23.0	150.0	28.3	47.0	47.0	49.4	68.1	150.0
Actuated g/C Ratio	0.07	0.07	1.00	0.15	0.15	1.00	0.19	0.31	0.31	0.33	0.45	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	107	225	1583	271	285	1583	333	1593	496	1130	1606	1583
v/s Ratio Prot	0.01	0.02		0.04	c0.20		c0.23	c0.31		c0.33	0.34	
v/s Ratio Perm			0.07			c0.55			0.00			0.09
v/c Ratio	0.21	0.33	0.07	0.23	1.31	0.55	1.22	1.00	0.01	1.00	0.76	0.09
Uniform Delay, d1	66.3	66.8	0.0	55.7	63.5	0.0	60.9	51.5	35.5	50.3	34.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.9	0.1	0.4	163.4	1.4	122.8	22.1	0.1	26.3	3.4	0.1
Delay (s)	67.3	67.7	0.1	56.2	226.9	1.4	183.6	73.6	35.6	76.6	37.4	0.1
Level of Service	E	E	A	E	F	A	F	E	D	E	D	A
Approach Delay (s)		32.7			68.8			95.3			53.0	
Approach LOS		C			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	70.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	50	59	573	151	0	68	0	204	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	56	66	644	170	0	76	0	229	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	170			122			1547	1547	89	1661	1580	170
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	58			122			1551	1551	89	1675	1586	58
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			56			0	100	76	97	100	100
cM capacity (veh/h)	1426			1465			56	59	969	35	56	930

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	122	813	306	1
Volume Left	0	644	76	1
Volume Right	66	0	229	0
cSH	1426	1465	198	35
Volume to Capacity	0.00	0.44	1.54	0.03
Queue Length 95th (ft)	0	58	484	2
Control Delay (s)	0.0	8.4	310.5	111.3
Lane LOS		A	F	F
Approach Delay (s)	0.0	8.4	310.5	111.3
Approach LOS			F	F

Intersection Summary			
Average Delay	82.0		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	74	24	730	178	23	22	1745	0	38	1587	468
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	156	79	26	777	189	24	23	1856	0	40	1688	498
RTOR Reduction (vph)	0	0	24	0	0	19	0	0	0	0	0	237
Lane Group Flow (vph)	156	79	2	777	189	5	23	1856	0	40	1688	261
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	6.5	6.5	6.5	22.0	22.0	22.0	1.9	50.4		2.6	51.6	51.6
Effective Green, g (s)	6.5	6.5	6.5	22.0	22.0	22.0	1.9	50.4		2.6	51.6	51.6
Actuated g/C Ratio	0.07	0.07	0.07	0.22	0.22	0.22	0.02	0.51		0.03	0.52	0.52
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	116	122	104	766	416	353	34	1810		46	1853	829
v/s Ratio Prot	c0.09	0.04		c0.23	0.10		0.01	c0.52		c0.02	0.48	
v/s Ratio Perm			0.00			0.00						0.16
v/c Ratio	1.34	0.65	0.02	1.01	0.45	0.02	0.68	1.03		0.87	0.91	0.31
Uniform Delay, d1	46.0	44.9	43.0	38.2	33.1	29.8	48.0	24.1		47.8	21.4	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	201.7	8.5	0.0	36.1	0.3	0.0	34.5	27.9		81.6	8.2	1.0
Delay (s)	247.7	53.4	43.0	74.4	33.3	29.8	82.5	51.9		129.4	29.6	14.4
Level of Service	F	D	D	E	C	C	F	D		F	C	B
Approach Delay (s)		168.5			65.5			52.3			28.0	
Approach LOS		F			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	50.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	98.5	Sum of lost time (s)	17.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	21	1	0	8	114	1650	3	1	903	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	14	0	22	1	0	9	121	1755	3	1	961	78
RTOR Reduction (vph)	0	0	16	0	0	9	0	0	1	0	0	36
Lane Group Flow (vph)	7	7	6	0	1	0	121	1755	2	1	961	42
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	7.8	7.8	27.1		2.3	2.3	15.3	65.0	65.0	2.1	51.8	51.8
Effective Green, g (s)	7.8	7.8	27.1		2.3	2.3	15.3	65.0	65.0	2.1	51.8	51.8
Actuated g/C Ratio	0.08	0.08	0.28		0.02	0.02	0.16	0.68	0.68	0.02	0.54	0.54
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	137	137	450		42	38	551	2416	1080	39	1925	861
v/s Ratio Prot	c0.00	0.00	0.00		c0.00		c0.04	c0.50		0.00	0.27	
v/s Ratio Perm						0.00			0.00			0.03
v/c Ratio	0.05	0.05	0.01		0.02	0.01	0.22	0.73	0.00	0.03	0.50	0.05
Uniform Delay, d1	40.3	40.3	24.5		45.4	45.3	34.8	9.5	4.8	45.5	13.6	10.2
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.1	0.0	0.1	1.9	0.0	0.1	0.9	0.1
Delay (s)	40.3	40.3	24.5		45.4	45.4	34.8	11.5	4.8	45.6	14.5	10.3
Level of Service	D	D	C		D	D	C	B	A	D	B	B
Approach Delay (s)		30.6			45.4			12.9			14.2	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

P.M. PEAK

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	5	3	482	1177	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	6	3	536	1308	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1585	657	1313			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1585	657	1313			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	99	99			
cM capacity (veh/h)	98	408	522			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	182	357	872	441
Volume Left	7	3	0	0	0
Volume Right	6	0	0	0	6
cSH	180	522	1700	1700	1700
Volume to Capacity	0.07	0.01	0.21	0.51	0.26
Queue Length 95th (ft)	5	0	0	0	0
Control Delay (s)	30.5	0.3	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	30.5	0.1		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	489	19	20	106	157	15	28	113	1139	61	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	0.99		1.00	0.91		1.00	0.88		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3519		1770	3223		1770	3113		1610	3205	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (perm)	1770	3519		1770	3223		1770	3113		1610	3205	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	80	562	22	23	122	180	17	32	130	1309	70	90
RTOR Reduction (vph)	0	3	0	0	148	0	0	119	0	0	8	0
Lane Group Flow (vph)	80	581	0	23	154	0	17	43	0	654	807	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	6.6	16.6		2.5	12.5		5.8	5.8		27.6	27.6	
Effective Green, g (s)	6.6	16.6		2.5	12.5		5.8	5.8		27.6	27.6	
Actuated g/C Ratio	0.09	0.24		0.04	0.18		0.08	0.08		0.39	0.39	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	165	828		62	571		145	256		630	1254	
v/s Ratio Prot	c0.05	c0.17		0.01	0.05		0.01	c0.01		c0.41	0.25	
v/s Ratio Perm												
v/c Ratio	0.48	0.70		0.37	0.27		0.12	0.17		1.04	0.95dl	
Uniform Delay, d1	30.3	24.7		33.2	25.1		30.0	30.1		21.4	17.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	2.7		2.2	0.1		0.2	0.2		46.1	1.1	
Delay (s)	31.5	27.4		35.4	25.2		30.2	30.3		67.5	18.5	
Level of Service	C	C		D	C		C	C		E	B	
Approach Delay (s)		27.9			25.9			30.2			40.3	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	660	871	28	97	570	152	1213	35	1141	1306	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	4.0
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	189	680	898	29	100	588	157	1251	36	1176	1346	14
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	27	0	0	0
Lane Group Flow (vph)	170	699	898	29	100	588	157	1251	9	1176	1346	14
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	23.0	23.0	130.0	10.0	10.0	130.0	10.3	33.0	33.0	43.4	66.1	130.0
Effective Green, g (s)	23.0	23.0	130.0	10.0	10.0	130.0	10.3	33.0	33.0	43.4	66.1	130.0
Actuated g/C Ratio	0.18	0.18	1.00	0.08	0.08	1.00	0.08	0.25	0.25	0.33	0.51	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	284	599	1583	136	143	1583	140	1290	401	1146	1799	1583
v/s Ratio Prot	0.11	c0.21		0.02	0.05		0.09	c0.25		c0.34	0.38	
v/s Ratio Perm			c0.57			0.37			0.01			0.01
v/c Ratio	0.60	1.17	0.57	0.21	0.70	0.37	1.12	0.97	0.02	1.03	0.75	0.01
Uniform Delay, d1	49.3	53.5	0.0	56.3	58.5	0.0	59.9	48.0	36.4	43.3	25.3	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.4	92.2	1.5	0.8	13.9	0.7	112.4	18.8	0.1	33.5	2.9	0.0
Delay (s)	52.6	145.7	1.5	57.1	72.4	0.7	172.2	66.8	36.5	76.8	28.2	0.0
Level of Service	D	F	A	E	E	A	F	E	D	E	C	A
Approach Delay (s)		63.5			13.0			77.5			50.6	
Approach LOS		E			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	55.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	173	487	668	59	2	25	0	519	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	190	535	734	65	2	27	0	570	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	67			725			1992	1993	458	2277	2259	66
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			725			2028	2029	458	2334	2315	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			16			0	100	5	0	100	100
cM capacity (veh/h)	1512			878			12	9	603	0	6	1011

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	725	801	598	1
Volume Left	0	734	27	1
Volume Right	535	2	570	0
cSH	1512	878	196	0
Volume to Capacity	0.00	0.84	3.05	2.84
Queue Length 95th (ft)	0	247	Err	17
Control Delay (s)	0.0	25.9	Err	Err
Lane LOS		D	F	F
Approach Delay (s)	0.0	25.9	Err	Err
Approach LOS			F	F

Intersection Summary			
Average Delay	2827.5		
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	387	216	92	935	165	83	15	1636	0	22	1437	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	395	220	94	954	168	85	15	1669	0	22	1466	551
RTOR Reduction (vph)	0	0	69	0	0	58	0	0	0	0	0	298
Lane Group Flow (vph)	395	220	25	954	168	27	15	1669	0	22	1466	253
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	62.5		2.6	63.6	63.6
Effective Green, g (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	62.5		2.6	63.6	63.6
Actuated g/C Ratio	0.16	0.16	0.16	0.25	0.25	0.25	0.01	0.45		0.02	0.46	0.46
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	274	288	245	866	470	399	25	1595		33	1623	726
v/s Ratio Prot	c0.22	0.12		c0.28	0.09		0.01	c0.47		c0.01	0.41	
v/s Ratio Perm			0.02			0.02						0.16
v/c Ratio	1.44	0.76	0.10	1.10	0.36	0.07	0.60	1.05		0.67	0.90	0.35
Uniform Delay, d1	58.5	56.1	50.3	51.8	42.6	39.4	67.9	38.0		67.6	34.7	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	218.2	10.3	0.1	62.3	0.2	0.0	23.2	35.7		32.9	8.6	1.3
Delay (s)	276.8	66.4	50.3	114.1	42.7	39.4	91.1	73.8		100.5	43.3	25.5
Level of Service	F	E	D	F	D	D	F	E		F	D	C
Approach Delay (s)		181.5			98.9			73.9			39.1	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	80.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	138.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	1	86	7	0	6	31	1208	2	6	1114	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1687	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1687	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	1	93	8	0	7	34	1313	2	7	1211	349
RTOR Reduction (vph)	0	0	64	0	0	7	0	0	1	0	0	169
Lane Group Flow (vph)	48	49	29	0	8	0	34	1313	1	7	1211	180
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	14.2	14.2	30.0		5.0	5.0	11.8	55.7	55.7	2.3	46.2	46.2
Effective Green, g (s)	14.2	14.2	30.0		5.0	5.0	11.8	55.7	55.7	2.3	46.2	46.2
Actuated g/C Ratio	0.15	0.15	0.32		0.05	0.05	0.12	0.59	0.59	0.02	0.49	0.49
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	250	251	498		92	83	425	2070	926	42	1717	768
v/s Ratio Prot	0.03	c0.03	0.02		c0.00		0.01	c0.37		c0.00	c0.34	
v/s Ratio Perm						0.00			0.00			0.11
v/c Ratio	0.19	0.20	0.06		0.09	0.00	0.08	0.63	0.00	0.17	0.71	0.23
Uniform Delay, d1	35.5	35.5	22.7		42.9	42.7	36.9	13.0	8.2	45.5	19.2	14.2
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.1	0.0	0.0	1.5	0.0	0.7	2.5	0.7
Delay (s)	35.6	35.6	22.8		43.1	42.7	36.9	14.5	8.2	46.2	21.6	14.9
Level of Service	D	D	C		D	D	D	B	A	D	C	B
Approach Delay (s)		29.3			42.9			15.1			20.3	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Project Condition

A.M. Peak

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	13	12	324	510	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	14	13	352	554	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	764	284	568			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	764	284	568			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	98	99			
cM capacity (veh/h)	336	713	1000			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	34	130	235	370	199
Volume Left	20	13	0	0	0
Volume Right	14	0	0	0	14
cSH	578	1000	1700	1700	1700
Volume to Capacity	0.06	0.01	0.14	0.22	0.12
Queue Length 95th (ft)	5	1	0	0	0
Control Delay (s)	13.8	1.0	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.8	0.3		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	91	14	47	413	400	12	16	20	129	18	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	0.98		1.00	0.93		1.00	0.92		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1770	3467		1770	3278		1770	3247		1610	2990	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (perm)	1770	3467		1770	3278		1770	3247		1610	2990	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	101	16	52	459	444	13	18	22	143	20	150
RTOR Reduction (vph)	0	10	0	0	159	0	0	21	0	0	123	0
Lane Group Flow (vph)	27	107	0	52	744	0	13	19	0	110	80	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	1.0	16.5		2.4	17.9		1.8	1.8		8.6	8.6	
Effective Green, g (s)	1.0	16.5		2.4	17.9		1.8	1.8		8.6	8.6	
Actuated g/C Ratio	0.02	0.35		0.05	0.38		0.04	0.04		0.18	0.18	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	37	1209		89	1240		67	123		292	543	
v/s Ratio Prot	0.02	0.03		c0.03	c0.23		c0.01	0.01		c0.07	0.03	
v/s Ratio Perm												
v/c Ratio	0.73	0.09		0.58	0.60		0.19	0.15		0.38	0.15	
Uniform Delay, d1	23.0	10.3		22.0	11.8		22.0	22.0		17.0	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.3	0.0		7.2	0.6		0.7	0.3		0.7	0.1	
Delay (s)	70.4	10.4		29.1	12.4		22.8	22.3		17.7	16.4	
Level of Service	E	B		C	B		C	C		B	B	
Approach Delay (s)		21.6			13.3			22.4			16.8	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	47.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	70	104	58	351	796	382	1479	20	1050	1128	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	4.0
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	3384	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1610	3384	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	26	75	112	62	377	865	411	1590	22	1129	1213	145
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	15	0	0	0
Lane Group Flow (vph)	23	78	112	62	377	865	411	1590	7	1129	1213	145
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	10.0	10.0	150.0	23.0	23.0	150.0	28.3	47.0	47.0	49.4	68.1	150.0
Effective Green, g (s)	10.0	10.0	150.0	23.0	23.0	150.0	28.3	47.0	47.0	49.4	68.1	150.0
Actuated g/C Ratio	0.07	0.07	1.00	0.15	0.15	1.00	0.19	0.31	0.31	0.33	0.45	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	107	225	1583	271	285	1583	333	1593	496	1130	1606	1583
v/s Ratio Prot	0.01	0.02		0.04	c0.20		c0.23	c0.31		c0.33	0.34	
v/s Ratio Perm			0.07			c0.55			0.00			0.09
v/c Ratio	0.21	0.35	0.07	0.23	1.32	0.55	1.23	1.00	0.01	1.00	0.76	0.09
Uniform Delay, d1	66.3	66.9	0.0	55.7	63.5	0.0	60.9	51.5	35.5	50.3	34.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.9	0.1	0.4	167.7	1.4	128.7	22.1	0.1	26.3	3.4	0.1
Delay (s)	67.3	67.8	0.1	56.2	231.2	1.4	189.6	73.6	35.6	76.6	37.4	0.1
Level of Service	E	E	A	E	F	A	F	E	D	E	D	A
Approach Delay (s)		32.1			70.4			96.7			53.0	
Approach LOS		C			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	70.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	50	59	580	151	0	68	0	215	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	56	66	652	170	0	76	0	242	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	170			122			1562	1562	89	1683	1596	170
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	53			122			1568	1568	89	1699	1604	53
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			56			0	100	75	97	100	100
cM capacity (veh/h)	1428			1465			54	57	969	33	54	933

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	122	821	318	1
Volume Left	0	652	76	1
Volume Right	66	0	242	0
cSH	1428	1465	198	33
Volume to Capacity	0.00	0.44	1.60	0.03
Queue Length 95th (ft)	0	59	518	3
Control Delay (s)	0.0	8.4	336.5	118.8
Lane LOS		A	F	F
Approach Delay (s)	0.0	8.4	336.5	118.8
Approach LOS			F	F

Intersection Summary			
Average Delay	90.3		
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	80	24	730	182	23	22	1745	0	38	1587	472
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	85	26	777	194	24	23	1856	0	40	1688	502
RTOR Reduction (vph)	0	0	24	0	0	19	0	0	0	0	0	239
Lane Group Flow (vph)	162	85	2	777	194	5	23	1856	0	40	1688	263
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	6.5	6.5	6.5	22.0	22.0	22.0	1.9	50.4		2.6	51.6	51.6
Effective Green, g (s)	6.5	6.5	6.5	22.0	22.0	22.0	1.9	50.4		2.6	51.6	51.6
Actuated g/C Ratio	0.07	0.07	0.07	0.22	0.22	0.22	0.02	0.51		0.03	0.52	0.52
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	116	122	104	766	416	353	34	1810		46	1853	829
v/s Ratio Prot	c0.09	0.05		c0.23	0.10		0.01	c0.52		c0.02	0.48	
v/s Ratio Perm			0.00			0.00						0.17
v/c Ratio	1.40	0.70	0.02	1.01	0.47	0.02	0.68	1.03		0.87	0.91	0.32
Uniform Delay, d1	46.0	45.0	43.0	38.2	33.2	29.8	48.0	24.1		47.8	21.4	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	222.3	13.1	0.0	36.1	0.3	0.0	34.5	27.9		81.6	8.2	1.0
Delay (s)	268.3	58.1	43.0	74.4	33.5	29.8	82.5	51.9		129.4	29.6	14.4
Level of Service	F	E	D	E	C	C	F	D		F	C	B
Approach Delay (s)		181.4			65.3			52.3			28.0	
Approach LOS		F			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	51.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	98.5	Sum of lost time (s)	17.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	21	1	0	8	114	1655	3	1	907	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	14	0	22	1	0	9	121	1761	3	1	965	78
RTOR Reduction (vph)	0	0	16	0	0	9	0	0	1	0	0	36
Lane Group Flow (vph)	7	7	6	0	1	0	121	1761	2	1	965	42
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	7.8	7.8	27.1		2.3	2.3	15.3	65.0	65.0	2.1	51.8	51.8
Effective Green, g (s)	7.8	7.8	27.1		2.3	2.3	15.3	65.0	65.0	2.1	51.8	51.8
Actuated g/C Ratio	0.08	0.08	0.28		0.02	0.02	0.16	0.68	0.68	0.02	0.54	0.54
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	137	137	450		42	38	551	2416	1080	39	1925	861
v/s Ratio Prot	c0.00	0.00	0.00		c0.00		c0.04	c0.50		0.00	0.27	
v/s Ratio Perm						0.00			0.00			0.03
v/c Ratio	0.05	0.05	0.01		0.02	0.01	0.22	0.73	0.00	0.03	0.50	0.05
Uniform Delay, d1	40.3	40.3	24.5		45.4	45.3	34.8	9.5	4.8	45.5	13.6	10.2
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.1	0.0	0.1	2.0	0.0	0.1	0.9	0.1
Delay (s)	40.3	40.3	24.5		45.4	45.4	34.8	11.5	4.8	45.6	14.5	10.3
Level of Service	D	D	C		D	D	C	B	A	D	B	B
Approach Delay (s)		30.6			45.4			13.0			14.3	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

P.M. PEAK

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	17	17	7	482	1177	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	19	8	536	1308	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1597	659	1319			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1597	659	1319			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	95	99			
cM capacity (veh/h)	96	406	520			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	38	186	357	872	447
Volume Left	19	8	0	0	0
Volume Right	19	0	0	0	11
cSH	192	520	1700	1700	1700
Volume to Capacity	0.20	0.01	0.21	0.51	0.26
Queue Length 95th (ft)	18	1	0	0	0
Control Delay (s)	32.9	0.7	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	32.9	0.2		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	489	19	20	106	161	15	28	113	1151	61	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	0.99		1.00	0.91		1.00	0.88		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3519		1770	3219		1770	3113		1610	3205	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (perm)	1770	3519		1770	3219		1770	3113		1610	3205	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	80	562	22	23	122	185	17	32	130	1323	70	90
RTOR Reduction (vph)	0	3	0	0	152	0	0	119	0	0	8	0
Lane Group Flow (vph)	80	581	0	23	155	0	17	43	0	661	814	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	6.6	16.6		2.5	12.5		5.8	5.8		27.6	27.6	
Effective Green, g (s)	6.6	16.6		2.5	12.5		5.8	5.8		27.6	27.6	
Actuated g/C Ratio	0.09	0.24		0.04	0.18		0.08	0.08		0.39	0.39	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	165	828		62	570		145	256		630	1254	
v/s Ratio Prot	c0.05	c0.17		0.01	0.05		0.01	c0.01		c0.41	0.25	
v/s Ratio Perm												
v/c Ratio	0.48	0.70		0.37	0.27		0.12	0.17		1.05	0.96dl	
Uniform Delay, d1	30.3	24.7		33.2	25.1		30.0	30.1		21.4	17.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	2.7		2.2	0.1		0.2	0.2		49.4	1.1	
Delay (s)	31.5	27.4		35.4	25.2		30.2	30.3		70.9	18.6	
Level of Service	C	C		D	C		C	C		E	B	
Approach Delay (s)		27.9			25.9			30.2			41.9	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	665	878	28	99	570	154	1213	35	1141	1306	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	4.0
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	189	686	905	29	102	588	159	1251	36	1176	1346	14
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	27	0	0	0
Lane Group Flow (vph)	170	705	905	29	102	588	159	1251	9	1176	1346	14
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	23.0	23.0	130.0	10.0	10.0	130.0	10.3	33.0	33.0	43.4	66.1	130.0
Effective Green, g (s)	23.0	23.0	130.0	10.0	10.0	130.0	10.3	33.0	33.0	43.4	66.1	130.0
Actuated g/C Ratio	0.18	0.18	1.00	0.08	0.08	1.00	0.08	0.25	0.25	0.33	0.51	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	284	599	1583	136	143	1583	140	1290	401	1146	1799	1583
v/s Ratio Prot	0.11	c0.21		0.02	0.05		0.09	c0.25		c0.34	0.38	
v/s Ratio Perm			c0.57			0.37			0.01			0.01
v/c Ratio	0.60	1.18	0.57	0.21	0.71	0.37	1.14	0.97	0.02	1.03	0.75	0.01
Uniform Delay, d1	49.3	53.5	0.0	56.3	58.6	0.0	59.9	48.0	36.4	43.3	25.3	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.4	96.2	1.5	0.8	15.5	0.7	117.2	18.8	0.1	33.5	2.9	0.0
Delay (s)	52.6	149.7	1.5	57.1	74.1	0.7	177.0	66.8	36.5	76.8	28.2	0.0
Level of Service	D	F	A	E	E	A	F	E	D	E	C	A
Approach Delay (s)		65.1			13.4			78.2			50.6	
Approach LOS		E			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	56.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	173	487	673	59	2	25	0	530	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	190	535	740	65	2	27	0	582	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	67			725			2003	2004	458	2294	2270	66
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			725			2040	2041	458	2353	2328	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			16			0	100	3	0	100	100
cM capacity (veh/h)	1510			878			11	8	603	0	5	1010

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	725	807	610	1
Volume Left	0	740	27	1
Volume Right	535	2	582	0
cSH	1510	878	192	0
Volume to Capacity	0.00	0.84	3.17	4.77
Queue Length 95th (ft)	0	253	Err	Err
Control Delay (s)	0.0	26.4	Err	Err
Lane LOS		D	F	F
Approach Delay (s)	0.0	26.4	Err	Err
Approach LOS			F	F

Intersection Summary			
Average Delay	2860.9		
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	393	221	92	935	167	83	15	1636	0	22	1437	542
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	401	226	94	954	170	85	15	1669	0	22	1466	553
RTOR Reduction (vph)	0	0	69	0	0	58	0	0	0	0	0	299
Lane Group Flow (vph)	401	226	25	954	170	27	15	1669	0	22	1466	254
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	62.5		2.6	63.6	63.6
Effective Green, g (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	62.5		2.6	63.6	63.6
Actuated g/C Ratio	0.16	0.16	0.16	0.25	0.25	0.25	0.01	0.45		0.02	0.46	0.46
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	274	288	245	866	470	399	25	1595		33	1623	726
v/s Ratio Prot	c0.23	0.12		c0.28	0.09		0.01	c0.47		c0.01	0.41	
v/s Ratio Perm			0.02			0.02						0.16
v/c Ratio	1.46	0.78	0.10	1.10	0.36	0.07	0.60	1.05		0.67	0.90	0.35
Uniform Delay, d1	58.5	56.3	50.3	51.8	42.6	39.4	67.9	38.0		67.6	34.7	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	227.6	12.1	0.1	62.3	0.2	0.0	23.2	35.7		32.9	8.6	1.3
Delay (s)	286.1	68.5	50.3	114.1	42.8	39.4	91.1	73.8		100.5	43.3	25.5
Level of Service	F	E	D	F	D	D	F	E		F	D	C
Approach Delay (s)		187.2			98.8			73.9			39.1	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	81.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	138.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	1	86	7	0	6	31	1213	2	6	1117	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1687	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1687	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	1	93	8	0	7	34	1318	2	7	1214	349
RTOR Reduction (vph)	0	0	64	0	0	7	0	0	1	0	0	168
Lane Group Flow (vph)	48	49	29	0	8	0	34	1318	1	7	1214	181
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	14.2	14.2	30.0		5.0	5.0	11.8	55.7	55.7	2.3	46.2	46.2
Effective Green, g (s)	14.2	14.2	30.0		5.0	5.0	11.8	55.7	55.7	2.3	46.2	46.2
Actuated g/C Ratio	0.15	0.15	0.32		0.05	0.05	0.12	0.59	0.59	0.02	0.49	0.49
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	250	251	498		92	83	425	2070	926	42	1717	768
v/s Ratio Prot	0.03	c0.03	0.02		c0.00		0.01	c0.37		c0.00	c0.34	
v/s Ratio Perm						0.00			0.00			0.11
v/c Ratio	0.19	0.20	0.06		0.09	0.00	0.08	0.64	0.00	0.17	0.71	0.24
Uniform Delay, d1	35.5	35.5	22.7		42.9	42.7	36.9	13.1	8.2	45.5	19.2	14.2
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.1	0.0	0.0	1.5	0.0	0.7	2.5	0.7
Delay (s)	35.6	35.6	22.8		43.1	42.7	36.9	14.6	8.2	46.2	21.7	15.0
Level of Service	D	D	C		D	D	D	B	A	D	C	B
Approach Delay (s)		29.3			42.9			15.1			20.3	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Cumulative Condition

A.M. Peak

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	9	2	5	297	546	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	2	5	323	593	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	769	300	600			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	769	300	600			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	99			
cM capacity (veh/h)	336	696	973			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	113	215	396	204
Volume Left	10	5	0	0	0
Volume Right	2	0	0	0	7
cSH	410	973	1700	1700	1700
Volume to Capacity	0.03	0.01	0.13	0.23	0.12
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	15.0	0.5	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	15.0	0.2		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	108	5	60	548	329	3	11	20	56	12	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	0.99		1.00	0.94		1.00	0.90		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3514		1770	3340		1770	3196		1610	2918	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3514		1770	3340		1770	3196		1610	2918	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	40	120	6	67	609	366	3	12	22	62	13	226
RTOR Reduction (vph)	0	3	0	0	81	0	0	21	0	0	192	0
Lane Group Flow (vph)	40	123	0	67	894	0	3	13	0	56	53	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	2.1	15.8		4.1	17.8		1.7	1.7		7.1	7.1	
Effective Green, g (s)	2.1	15.8		4.1	17.8		1.7	1.7		7.1	7.1	
Actuated g/C Ratio	0.04	0.34		0.09	0.38		0.04	0.04		0.15	0.15	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	79	1188		155	1273		64	116		244	443	
v/s Ratio Prot	0.02	0.03		c0.04	c0.27		0.00	c0.00		c0.03	0.02	
v/s Ratio Perm												
v/c Ratio	0.51	0.10		0.43	0.70		0.05	0.11		0.23	0.12	
Uniform Delay, d1	21.8	10.6		20.2	12.2		21.7	21.8		17.4	17.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	0.0		1.1	1.5		0.2	0.2		0.4	0.1	
Delay (s)	24.4	10.6		21.3	13.7		21.9	22.0		17.8	17.2	
Level of Service	C	B		C	B		C	C		B	B	
Approach Delay (s)		13.9			14.2			22.0			17.3	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	46.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	41	59	87	399	1190	383	2213	30	1574	1689	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	4.0
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	3383	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1610	3383	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	23	44	63	94	429	1293	412	2380	32	1692	1816	180
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	22	0	0	0
Lane Group Flow (vph)	21	46	63	94	429	1293	412	2380	10	1692	1816	180
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	7.8	7.8	148.0	23.0	23.0	148.0	28.4	47.1	47.1	49.5	68.2	148.0
Effective Green, g (s)	7.8	7.8	148.0	23.0	23.0	148.0	28.4	47.1	47.1	49.5	68.2	148.0
Actuated g/C Ratio	0.05	0.05	1.00	0.16	0.16	1.00	0.19	0.32	0.32	0.33	0.46	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	84	178	1583	275	289	1583	339	1618	503	1148	1630	1583
v/s Ratio Prot	0.01	0.01		0.05	c0.23		0.23	c0.47		c0.49	0.51	
v/s Ratio Perm			0.04			c0.82			0.01			0.11
v/c Ratio	0.25	0.26	0.04	0.34	1.48	0.82	1.22	1.47	0.02	1.47	1.11	0.11
Uniform Delay, d1	67.3	67.3	0.0	55.7	62.5	0.0	59.8	50.5	34.6	49.2	39.9	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.8	0.0	0.7	235.6	4.8	120.9	215.3	0.1	218.0	60.5	0.1
Delay (s)	68.9	68.1	0.0	56.5	298.1	4.8	180.7	265.8	34.7	267.3	100.4	0.1
Level of Service	E	E	A	E	F	A	F	F	C	F	F	A
Approach Delay (s)		35.2			76.8			250.8			172.1	
Approach LOS		D			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	175.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	148.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	121.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	68	89	584	207	0	102	0	171	2	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	76	100	656	233	0	115	0	192	2	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.95						0.95	0.95		0.95	0.95	0.95
vC, conflicting volume	233			176			1671	1671	126	1767	1721	233
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	171			176			1680	1680	126	1780	1732	171
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			53			0	100	79	93	100	100
cM capacity (veh/h)	1341			1400			45	48	924	30	45	832

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	176	889	307	2
Volume Left	0	656	115	2
Volume Right	100	0	192	0
cSH	1341	1400	113	30
Volume to Capacity	0.00	0.47	2.72	0.07
Queue Length 95th (ft)	0	64	708	6
Control Delay (s)	0.0	8.6	859.6	132.3
Lane LOS		A	F	F
Approach Delay (s)	0.0	8.6	859.6	132.3
Approach LOS			F	F

Intersection Summary			
Average Delay	197.7		
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	42	32	1077	132	35	23	2610	0	57	2355	560
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	45	34	1146	140	37	24	2777	0	61	2505	596
RTOR Reduction (vph)	0	0	32	0	0	29	0	0	0	0	0	280
Lane Group Flow (vph)	162	45	2	1146	140	8	24	2777	0	61	2505	316
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	6.5	6.5	6.5	22.0	22.0	22.0	2.0	51.2		3.5	53.2	53.2
Effective Green, g (s)	6.5	6.5	6.5	22.0	22.0	22.0	2.0	51.2		3.5	53.2	53.2
Actuated g/C Ratio	0.06	0.06	0.06	0.22	0.22	0.22	0.02	0.51		0.03	0.53	0.53
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	114	120	102	753	409	347	35	1808		61	1878	840
v/s Ratio Prot	c0.09	0.02		c0.33	0.08		0.01	c0.78		c0.03	0.71	
v/s Ratio Perm			0.00			0.01						0.20
v/c Ratio	1.42	0.38	0.02	1.52	0.34	0.02	0.69	1.54		1.00	1.33	0.38
Uniform Delay, d1	46.9	44.9	43.9	39.1	33.0	30.7	48.8	24.5		48.4	23.5	13.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	232.8	0.7	0.0	241.6	0.2	0.0	36.1	244.0		115.2	154.0	1.3
Delay (s)	279.7	45.6	43.9	280.7	33.2	30.7	84.9	268.5		163.6	177.5	15.1
Level of Service	F	D	D	F	C	C	F	F		F	F	B
Approach Delay (s)		202.7			247.5			266.9			146.6	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	210.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	100.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	118.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	0	32	2	0	12	171	2399	5	2	1194	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	0	34	2	0	13	182	2552	5	2	1270	117
RTOR Reduction (vph)	0	0	24	0	0	12	0	0	2	0	0	56
Lane Group Flow (vph)	10	11	10	0	2	1	182	2552	3	2	1270	61
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	7.4	7.4	26.9		4.6	4.6	15.5	63.4	63.4	2.2	50.1	50.1
Effective Green, g (s)	7.4	7.4	26.9		4.6	4.6	15.5	63.4	63.4	2.2	50.1	50.1
Actuated g/C Ratio	0.08	0.08	0.28		0.05	0.05	0.16	0.66	0.66	0.02	0.52	0.52
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	130	130	445		85	76	556	2346	1049	40	1854	829
v/s Ratio Prot	0.01	c0.01	0.01		c0.00		c0.05	c0.72		0.00	0.36	
v/s Ratio Perm						0.00			0.00			0.04
v/c Ratio	0.08	0.08	0.02		0.02	0.01	0.33	1.09	0.00	0.05	0.69	0.07
Uniform Delay, d1	40.9	41.0	24.8		43.4	43.3	35.4	16.1	5.4	45.7	16.9	11.3
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.0	0.0	0.1	47.4	0.0	0.2	2.1	0.2
Delay (s)	41.0	41.1	24.8		43.4	43.3	35.6	63.5	5.4	45.9	19.0	11.4
Level of Service	D	D	C		D	D	D	E	A	D	B	B
Approach Delay (s)		31.0			43.4			61.6			18.4	
Approach LOS		C			D			E			B	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	95.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

P.M. PEAK

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	5	3	449	1544	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	6	3	499	1716	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1975	861	1722			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1975	861	1722			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	98	99			
cM capacity (veh/h)	54	299	363			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	170	333	1144	579
Volume Left	7	3	0	0	0
Volume Right	6	0	0	0	7
cSH	98	363	1700	1700	1700
Volume to Capacity	0.12	0.01	0.20	0.67	0.34
Queue Length 95th (ft)	10	1	0	0	0
Control Delay (s)	52.2	0.4	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	52.2	0.2		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	659	6	17	119	48	2	23	156	1434	72	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	1.00		1.00	0.96		1.00	0.87		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3534		1770	3387		1770	3076		1610	3198	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (perm)	1770	3534		1770	3387		1770	3076		1610	3198	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	121	757	7	20	137	55	2	26	179	1648	83	134
RTOR Reduction (vph)	0	1	0	0	45	0	0	165	0	0	10	0
Lane Group Flow (vph)	121	763	0	20	147	0	2	40	0	824	1031	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	8.0	19.2		1.3	12.5		5.8	5.8		27.5	27.5	
Effective Green, g (s)	8.0	19.2		1.3	12.5		5.8	5.8		27.5	27.5	
Actuated g/C Ratio	0.11	0.27		0.02	0.17		0.08	0.08		0.38	0.38	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	197	945		32	589		142	248		616	1224	
v/s Ratio Prot	c0.07	c0.22		0.01	0.04		0.00	c0.01		c0.51	0.32	
v/s Ratio Perm												
v/c Ratio	0.61	0.81		0.62	0.25		0.01	0.16		1.34	1.21dl	
Uniform Delay, d1	30.4	24.6		35.0	25.6		30.4	30.7		22.1	20.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	5.1		26.9	0.1		0.0	0.2		162.8	5.4	
Delay (s)	34.7	29.7		61.9	25.7		30.4	30.9		184.9	25.6	
Level of Service	C	C		E	C		C	C		F	C	
Approach Delay (s)		30.4			29.1			30.9			96.0	
Approach LOS		C			C			C			F	

Intersection Summary			
HCM 2000 Control Delay	68.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	71.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	237	860	1112	42	57	854	95	1817	53	1707	1953	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	244	887	1146	43	59	880	98	1873	55	1760	2013	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	41	0	0	0
Lane Group Flow (vph)	220	911	1146	43	59	880	98	1873	14	1760	2013	0
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	23.1	23.1	128.1	7.8	7.8	128.1	9.8	33.1	33.1	43.5	66.8	
Effective Green, g (s)	23.1	23.1	128.1	7.8	7.8	128.1	9.8	33.1	33.1	43.5	66.8	
Actuated g/C Ratio	0.18	0.18	1.00	0.06	0.06	1.00	0.08	0.26	0.26	0.34	0.52	
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	290	610	1583	107	113	1583	135	1313	409	1165	1845	
v/s Ratio Prot	0.14	c0.27		0.02	0.03		0.06	c0.37		c0.51	0.57	
v/s Ratio Perm			c0.72			0.56			0.01			
v/c Ratio	0.76	1.49	0.72	0.40	0.52	0.56	0.73	1.43	0.03	1.51	1.09	
Uniform Delay, d1	49.9	52.5	0.0	57.9	58.3	0.0	57.8	47.5	35.5	42.3	30.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.8	230.6	2.9	2.5	4.3	1.4	15.1	196.4	0.2	234.3	50.5	
Delay (s)	60.7	283.1	2.9	60.4	62.6	1.4	72.9	243.9	35.7	276.6	81.1	
Level of Service	E	F	A	E	E	A	E	F	D	F	F	
Approach Delay (s)		120.6			7.7			230.0			172.3	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	154.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	128.1	Sum of lost time (s)	20.6
Intersection Capacity Utilization	131.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	240	731	795	78	3	38	0	486	2	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	264	803	874	86	3	42	0	534	2	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	89			1067			2500	2502	665	2767	2902	87
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			1067			2566	2567	665	2850	2994	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			0			0	0	0	0	0	100
cM capacity (veh/h)	1523			653			0	0	460	0	0	1018

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1067	963	576	2
Volume Left	0	874	42	2
Volume Right	803	3	534	0
cSH	1523	653	0	0
Volume to Capacity	0.00	1.34	Err	Err
Queue Length 95th (ft)	0	913	Err	Err
Control Delay (s)	0.0	181.9	Err	Err
Lane LOS		F	F	F
Approach Delay (s)	0.0	181.9	Err	Err
Approach LOS			F	F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	119.3%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	429	173	128	1392	152	125	17	2435	0	33	2136	704
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	438	177	131	1420	155	128	17	2485	0	34	2180	718
RTOR Reduction (vph)	0	0	69	0	0	59	0	0	0	0	0	380
Lane Group Flow (vph)	438	177	62	1420	155	69	17	2485	0	34	2180	338
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	63.1		3.6	65.2	65.2
Effective Green, g (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	63.1		3.6	65.2	65.2
Actuated g/C Ratio	0.15	0.15	0.15	0.25	0.25	0.25	0.01	0.45		0.03	0.47	0.47
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	271	285	242	857	465	395	25	1592		45	1645	736
v/s Ratio Prot	c0.25	0.10		c0.41	0.08		0.01	c0.70		c0.02	0.62	
v/s Ratio Perm			0.04			0.04						0.21
v/c Ratio	1.62	0.62	0.25	1.66	0.33	0.18	0.68	1.56		0.76	1.33	0.46
Uniform Delay, d1	59.3	55.5	52.3	52.6	43.1	41.3	68.8	38.5		67.9	37.5	25.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	293.8	3.0	0.2	300.8	0.2	0.1	46.7	255.5		46.8	150.7	2.1
Delay (s)	353.1	58.5	52.5	353.4	43.2	41.4	115.5	294.1		114.7	188.2	27.6
Level of Service	F	E	D	F	D	D	F	F		F	F	C
Approach Delay (s)		230.4			301.7			292.9			148.0	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	235.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.57		
Actuated Cycle Length (s)	140.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	127.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	132	2	129	11	0	9	47	1643	3	9	1554	482
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1688	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	2	140	12	0	10	51	1786	3	10	1689	524
RTOR Reduction (vph)	0	0	92	0	0	9	0	0	1	0	0	192
Lane Group Flow (vph)	73	72	48	0	12	1	51	1786	2	10	1689	332
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	14.1	14.1	33.2		5.0	5.0	15.1	56.5	56.5	2.3	43.7	43.7
Effective Green, g (s)	14.1	14.1	33.2		5.0	5.0	15.1	56.5	56.5	2.3	43.7	43.7
Actuated g/C Ratio	0.15	0.15	0.35		0.05	0.05	0.16	0.59	0.59	0.02	0.46	0.46
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	247	248	548		92	82	540	2085	932	42	1612	721
v/s Ratio Prot	c0.04	0.04	c0.03		c0.01		0.01	c0.50		0.01	c0.48	
v/s Ratio Perm						0.00			0.00			0.21
v/c Ratio	0.30	0.29	0.09		0.13	0.01	0.09	0.86	0.00	0.24	1.05	0.46
Uniform Delay, d1	36.5	36.4	21.1		43.4	43.1	34.6	16.3	8.1	45.9	26.1	18.0
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.0		0.2	0.0	0.0	4.8	0.0	1.1	36.1	2.1
Delay (s)	36.7	36.7	21.2		43.6	43.1	34.6	21.1	8.1	47.0	62.2	20.1
Level of Service	D	D	C		D	D	C	C	A	D	E	C
Approach Delay (s)		29.1			43.4			21.5			52.2	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	37.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Cumulative Plus Project Condition

A.M. Peak

05 NVTA Cumulative Plus Project AM
1: Devlin Rd & Sheehy Ct

8/2/2016

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	13	12	297	546	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	14	13	323	593	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	788	304	608			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	788	304	608			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	98	99			
cM capacity (veh/h)	324	692	967			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	36	121	215	396	212
Volume Left	22	13	0	0	0
Volume Right	14	0	0	0	14
cSH	534	967	1700	1700	1700
Volume to Capacity	0.07	0.01	0.13	0.23	0.12
Queue Length 95th (ft)	5	1	0	0	0
Control Delay (s)	14.3	1.1	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	14.3	0.4		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	108	5	60	548	336	3	11	20	67	12	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	0.99		1.00	0.94		1.00	0.90		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3514		1770	3338		1770	3196		1610	2919	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3514		1770	3338		1770	3196		1610	2919	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	40	120	6	67	609	373	3	12	22	74	13	226
RTOR Reduction (vph)	0	3	0	0	84	0	0	21	0	0	190	0
Lane Group Flow (vph)	40	123	0	67	898	0	3	13	0	67	56	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	2.1	15.9		4.1	17.9		1.6	1.6		7.6	7.6	
Effective Green, g (s)	2.1	15.9		4.1	17.9		1.6	1.6		7.6	7.6	
Actuated g/C Ratio	0.04	0.34		0.09	0.38		0.03	0.03		0.16	0.16	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	78	1183		153	1265		60	108		259	470	
v/s Ratio Prot	0.02	0.03		c0.04	c0.27		0.00	c0.00		c0.04	0.02	
v/s Ratio Perm												
v/c Ratio	0.51	0.10		0.44	0.71		0.05	0.12		0.26	0.12	
Uniform Delay, d1	22.0	10.8		20.5	12.4		22.1	22.1		17.3	16.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.0		1.2	1.6		0.2	0.2		0.4	0.1	
Delay (s)	25.1	10.8		21.6	14.0		22.2	22.4		17.8	17.0	
Level of Service	C	B		C	B		C	C		B	B	
Approach Delay (s)		14.3			14.5			22.4			17.2	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	45	65	87	402	1190	387	2213	30	1574	1689	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	4.0
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	3383	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1610	3383	1583	1770	1863	1583	1770	5085	1583	3433	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	23	48	70	94	432	1293	416	2380	32	1692	1816	180
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	22	0	0	0
Lane Group Flow (vph)	21	50	70	94	432	1293	416	2380	10	1692	1816	180
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	7.8	7.8	148.0	23.0	23.0	148.0	28.4	47.1	47.1	49.5	68.2	148.0
Effective Green, g (s)	7.8	7.8	148.0	23.0	23.0	148.0	28.4	47.1	47.1	49.5	68.2	148.0
Actuated g/C Ratio	0.05	0.05	1.00	0.16	0.16	1.00	0.19	0.32	0.32	0.33	0.46	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	84	178	1583	275	289	1583	339	1618	503	1148	1630	1583
v/s Ratio Prot	0.01	0.01		0.05	c0.23		0.24	c0.47		c0.49	0.51	
v/s Ratio Perm			0.04			c0.82			0.01			0.11
v/c Ratio	0.25	0.28	0.04	0.34	1.49	0.82	1.23	1.47	0.02	1.47	1.11	0.11
Uniform Delay, d1	67.3	67.4	0.0	55.7	62.5	0.0	59.8	50.5	34.6	49.2	39.9	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.9	0.1	0.7	240.1	4.8	125.6	215.3	0.1	218.0	60.5	0.1
Delay (s)	68.9	68.3	0.1	56.5	302.6	4.8	185.4	265.8	34.7	267.3	100.4	0.1
Level of Service	E	E	A	E	F	A	F	F	C	F	F	A
Approach Delay (s)		34.5			78.2			251.4			172.1	
Approach LOS		C			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	176.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	148.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	121.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	68	89	591	207	0	102	0	182	2	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	76	100	664	233	0	115	0	204	2	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.95						0.95	0.95		0.95	0.95	0.95
vC, conflicting volume	233			176			1687	1687	126	1789	1737	233
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	166			176			1697	1697	126	1805	1750	166
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			53			0	100	78	92	100	100
cM capacity (veh/h)	1342			1400			44	46	924	29	43	834

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	176	897	319	2
Volume Left	0	664	115	2
Volume Right	100	0	204	0
cSH	1342	1400	113	29
Volume to Capacity	0.00	0.47	2.84	0.08
Queue Length 95th (ft)	0	66	746	6
Control Delay (s)	0.0	8.7	909.8	141.9
Lane LOS		A	F	F
Approach Delay (s)	0.0	8.7	909.8	141.9
Approach LOS			F	F

Intersection Summary			
Average Delay	214.0		
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	48	32	1077	136	35	23	2610	0	57	2355	563
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	167	51	34	1146	145	37	24	2777	0	61	2505	599
RTOR Reduction (vph)	0	0	32	0	0	29	0	0	0	0	0	281
Lane Group Flow (vph)	167	51	2	1146	145	8	24	2777	0	61	2505	318
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	6.5	6.5	6.5	22.0	22.0	22.0	2.0	51.2		3.5	53.2	53.2
Effective Green, g (s)	6.5	6.5	6.5	22.0	22.0	22.0	2.0	51.2		3.5	53.2	53.2
Actuated g/C Ratio	0.06	0.06	0.06	0.22	0.22	0.22	0.02	0.51		0.03	0.53	0.53
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	114	120	102	753	409	347	35	1808		61	1878	840
v/s Ratio Prot	c0.09	0.03		c0.33	0.08		0.01	c0.78		c0.03	0.71	
v/s Ratio Perm			0.00			0.01						0.20
v/c Ratio	1.46	0.42	0.02	1.52	0.35	0.02	0.69	1.54		1.00	1.33	0.38
Uniform Delay, d1	46.9	45.1	43.9	39.1	33.1	30.7	48.8	24.5		48.4	23.5	13.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	250.7	0.9	0.0	241.6	0.2	0.0	36.1	244.0		115.2	154.0	1.3
Delay (s)	297.6	45.9	43.9	280.7	33.3	30.7	84.9	268.5		163.6	177.5	15.1
Level of Service	F	D	D	F	C	C	F	F		F	F	B
Approach Delay (s)		212.4			246.8			266.9			146.5	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	211.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	100.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	118.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	0	32	2	0	12	171	2404	5	2	1198	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	0	34	2	0	13	182	2557	5	2	1274	117
RTOR Reduction (vph)	0	0	24	0	0	12	0	0	2	0	0	56
Lane Group Flow (vph)	10	11	10	0	2	1	182	2557	3	2	1274	61
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	7.4	7.4	26.9		4.6	4.6	15.5	63.4	63.4	2.2	50.1	50.1
Effective Green, g (s)	7.4	7.4	26.9		4.6	4.6	15.5	63.4	63.4	2.2	50.1	50.1
Actuated g/C Ratio	0.08	0.08	0.28		0.05	0.05	0.16	0.66	0.66	0.02	0.52	0.52
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	130	130	445		85	76	556	2346	1049	40	1854	829
v/s Ratio Prot	0.01	c0.01	0.01		c0.00		c0.05	c0.72		0.00	0.36	
v/s Ratio Perm						0.00			0.00			0.04
v/c Ratio	0.08	0.08	0.02		0.02	0.01	0.33	1.09	0.00	0.05	0.69	0.07
Uniform Delay, d1	40.9	41.0	24.8		43.4	43.3	35.4	16.1	5.4	45.7	16.9	11.3
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0		0.0	0.0	0.1	48.3	0.0	0.2	2.1	0.2
Delay (s)	41.0	41.1	24.8		43.4	43.3	35.6	64.4	5.4	45.9	19.0	11.4
Level of Service	D	D	C		D	D	D	E	A	D	B	B
Approach Delay (s)		31.0			43.4			62.4			18.4	
Approach LOS		C			D			E			B	

Intersection Summary			
HCM 2000 Control Delay	47.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	95.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	101.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

P.M. PEAK

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	17	17	7	449	1544	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	19	8	499	1716	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1987	864	1728			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1987	864	1728			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	64	94	98			
cM capacity (veh/h)	52	297	361			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	38	174	333	1144	584
Volume Left	19	8	0	0	0
Volume Right	19	0	0	0	12
cSH	104	361	1700	1700	1700
Volume to Capacity	0.36	0.02	0.20	0.67	0.34
Queue Length 95th (ft)	36	2	0	0	0
Control Delay (s)	63.6	1.0	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	63.6	0.4		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	659	6	17	119	52	2	23	156	1446	72	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frt	1.00	1.00		1.00	0.95		1.00	0.87		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3534		1770	3378		1770	3076		1610	3198	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (perm)	1770	3534		1770	3378		1770	3076		1610	3198	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	121	757	7	20	137	60	2	26	179	1662	83	134
RTOR Reduction (vph)	0	1	0	0	50	0	0	165	0	0	10	0
Lane Group Flow (vph)	121	763	0	20	147	0	2	40	0	831	1038	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	8.0	19.2		1.3	12.5		5.8	5.8		27.5	27.5	
Effective Green, g (s)	8.0	19.2		1.3	12.5		5.8	5.8		27.5	27.5	
Actuated g/C Ratio	0.11	0.27		0.02	0.17		0.08	0.08		0.38	0.38	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	4.0		4.7	4.7	
Vehicle Extension (s)	2.2	3.0		2.3	2.2		2.2	2.2		2.7	2.7	
Lane Grp Cap (vph)	197	945		32	588		142	248		616	1224	
v/s Ratio Prot	c0.07	c0.22		0.01	0.04		0.00	c0.01		c0.52	0.32	
v/s Ratio Perm												
v/c Ratio	0.61	0.81		0.62	0.25		0.01	0.16		1.35	1.22dl	
Uniform Delay, d1	30.4	24.6		35.0	25.6		30.4	30.7		22.1	20.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	5.1		26.9	0.1		0.0	0.2		167.6	5.6	
Delay (s)	34.7	29.7		61.9	25.7		30.4	30.9		189.8	25.8	
Level of Service	C	C		E	C		C	C		F	C	
Approach Delay (s)		30.4			29.1			30.9			98.3	
Approach LOS		C			C			C			F	

Intersection Summary			
HCM 2000 Control Delay	70.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	71.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	237	865	1119	42	59	854	97	1817	53	1707	1953	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	5.0	5.0	4.0	4.6	6.0	6.0	4.6	6.0	
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1610	3386	1583	1770	1863	1583	1770	5085	1583	3433	3539	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	244	892	1154	43	61	880	100	1873	55	1760	2013	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	41	0	0	0
Lane Group Flow (vph)	220	916	1154	43	61	880	100	1873	14	1760	2013	0
Turn Type	Split	NA	Free	Split	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			Free			Free			6			Free
Actuated Green, G (s)	23.1	23.1	128.1	7.8	7.8	128.1	9.8	33.1	33.1	43.5	66.8	
Effective Green, g (s)	23.1	23.1	128.1	7.8	7.8	128.1	9.8	33.1	33.1	43.5	66.8	
Actuated g/C Ratio	0.18	0.18	1.00	0.06	0.06	1.00	0.08	0.26	0.26	0.34	0.52	
Clearance Time (s)	5.0	5.0		5.0	5.0		4.6	6.0	6.0	4.6	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	290	610	1583	107	113	1583	135	1313	409	1165	1845	
v/s Ratio Prot	0.14	c0.27		0.02	0.03		0.06	c0.37		c0.51	0.57	
v/s Ratio Perm			c0.73			0.56			0.01			
v/c Ratio	0.76	1.50	0.73	0.40	0.54	0.56	0.74	1.43	0.03	1.51	1.09	
Uniform Delay, d1	49.9	52.5	0.0	57.9	58.4	0.0	57.9	47.5	35.5	42.3	30.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.8	234.2	3.0	2.5	4.9	1.4	17.3	196.4	0.2	234.3	50.5	
Delay (s)	60.7	286.7	3.0	60.4	63.3	1.4	75.2	243.9	35.7	276.6	81.1	
Level of Service	E	F	A	E	E	A	E	F	D	F	F	
Approach Delay (s)		122.0			7.8			229.9			172.3	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	154.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	128.1	Sum of lost time (s)	20.6
Intersection Capacity Utilization	131.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	240	731	800	78	3	38	0	497	2	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	264	803	879	86	3	42	0	546	2	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					615							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	89			1067			2511	2513	665	2784	2913	87
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			1067			2579	2580	665	2870	3007	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			0			0	0	0	0	0	100
cM capacity (veh/h)	1521			653			0	0	460	0	0	1017

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1067	968	588	2
Volume Left	0	879	42	2
Volume Right	803	3	546	0
cSH	1521	653	0	0
Volume to Capacity	0.00	1.35	Err	Err
Queue Length 95th (ft)	0	928	Err	Err
Control Delay (s)	0.0	185.4	Err	Err
Lane LOS		F	F	F
Approach Delay (s)	0.0	185.4	Err	Err
Approach LOS			F	F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	119.5%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	435	178	128	1392	154	125	17	2435	0	33	2136	706
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	3433	1863	1583	1770	3539		1770	3539	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	444	182	131	1420	157	128	17	2485	0	34	2180	720
RTOR Reduction (vph)	0	0	69	0	0	59	0	0	0	0	0	378
Lane Group Flow (vph)	444	182	62	1420	157	69	17	2485	0	34	2180	342
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			7			8						6
Actuated Green, G (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	63.1		3.6	65.2	65.2
Effective Green, g (s)	21.5	21.5	21.5	35.0	35.0	35.0	2.0	63.1		3.6	65.2	65.2
Actuated g/C Ratio	0.15	0.15	0.15	0.25	0.25	0.25	0.01	0.45		0.03	0.47	0.47
Clearance Time (s)	3.5	3.5	3.5	4.0	4.0	4.0	3.0	6.0		3.5	6.0	6.0
Vehicle Extension (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	271	285	242	857	465	395	25	1592		45	1645	736
v/s Ratio Prot	c0.25	0.10		c0.41	0.08		0.01	c0.70		c0.02	0.62	
v/s Ratio Perm			0.04			0.04						0.22
v/c Ratio	1.64	0.64	0.25	1.66	0.34	0.18	0.68	1.56		0.76	1.33	0.46
Uniform Delay, d1	59.3	55.7	52.3	52.6	43.1	41.3	68.8	38.5		67.9	37.5	25.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	303.4	3.4	0.2	300.8	0.2	0.1	46.7	255.5		46.8	150.7	2.1
Delay (s)	362.8	59.1	52.5	353.4	43.3	41.4	115.5	294.1		114.7	188.2	27.7
Level of Service	F	E	D	F	D	D	F	F		F	F	C
Approach Delay (s)		236.1			301.4			292.9			147.9	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	235.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.57		
Actuated Cycle Length (s)	140.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	128.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	132	2	129	11	0	9	47	1648	3	9	1557	482
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1770	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.95	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1688	1583		1770	1583	3433	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	2	140	12	0	10	51	1791	3	10	1692	524
RTOR Reduction (vph)	0	0	92	0	0	9	0	0	1	0	0	192
Lane Group Flow (vph)	73	72	48	0	12	1	51	1791	2	10	1692	332
Turn Type	Split	NA	pt+ov	Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases						3			2			6
Actuated Green, G (s)	14.1	14.1	33.2		5.0	5.0	15.1	56.5	56.5	2.3	43.7	43.7
Effective Green, g (s)	14.1	14.1	33.2		5.0	5.0	15.1	56.5	56.5	2.3	43.7	43.7
Actuated g/C Ratio	0.15	0.15	0.35		0.05	0.05	0.16	0.59	0.59	0.02	0.46	0.46
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	247	248	548		92	82	540	2085	932	42	1612	721
v/s Ratio Prot	c0.04	0.04	c0.03		c0.01		0.01	c0.51		0.01	c0.48	
v/s Ratio Perm						0.00			0.00			0.21
v/c Ratio	0.30	0.29	0.09		0.13	0.01	0.09	0.86	0.00	0.24	1.05	0.46
Uniform Delay, d1	36.5	36.4	21.1		43.4	43.1	34.6	16.4	8.1	45.9	26.1	18.0
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.0		0.2	0.0	0.0	4.9	0.0	1.1	36.7	2.1
Delay (s)	36.7	36.7	21.2		43.6	43.1	34.6	21.3	8.1	47.0	62.8	20.1
Level of Service	D	D	C		D	D	C	C	A	D	E	C
Approach Delay (s)		29.1			43.4			21.6			52.7	
Approach LOS		C			D			C			D	

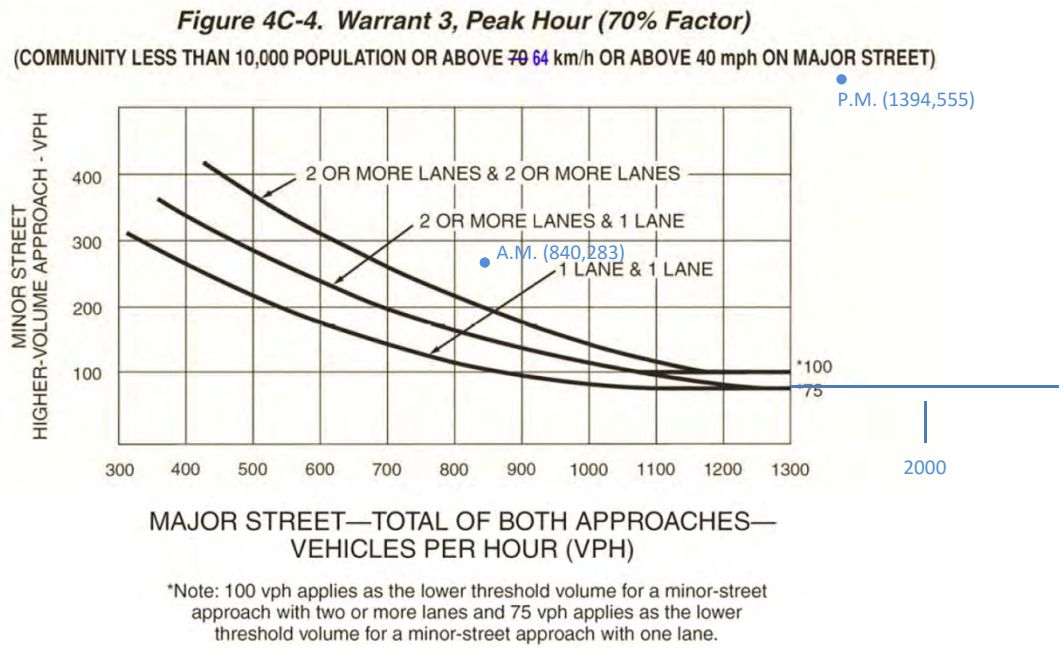
Intersection Summary			
HCM 2000 Control Delay	38.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix C

Peak Hour Traffic Signal Warrant

Int #4 – Devlin Rd/Soscol Ferry Rd

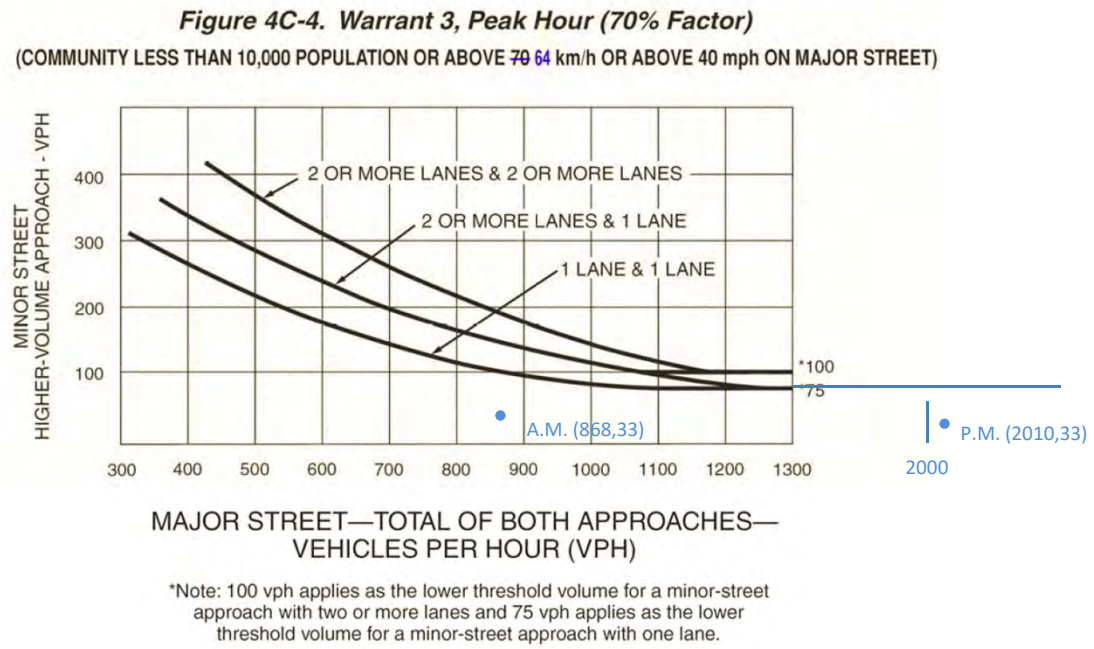
Project Condition – A.M. & P.M. Peak Hour



A.M. Condition IS SATISFIED
P.M. Condition IS SATISFIED

Int #1 – Devlin Rd/Sheehy Ct

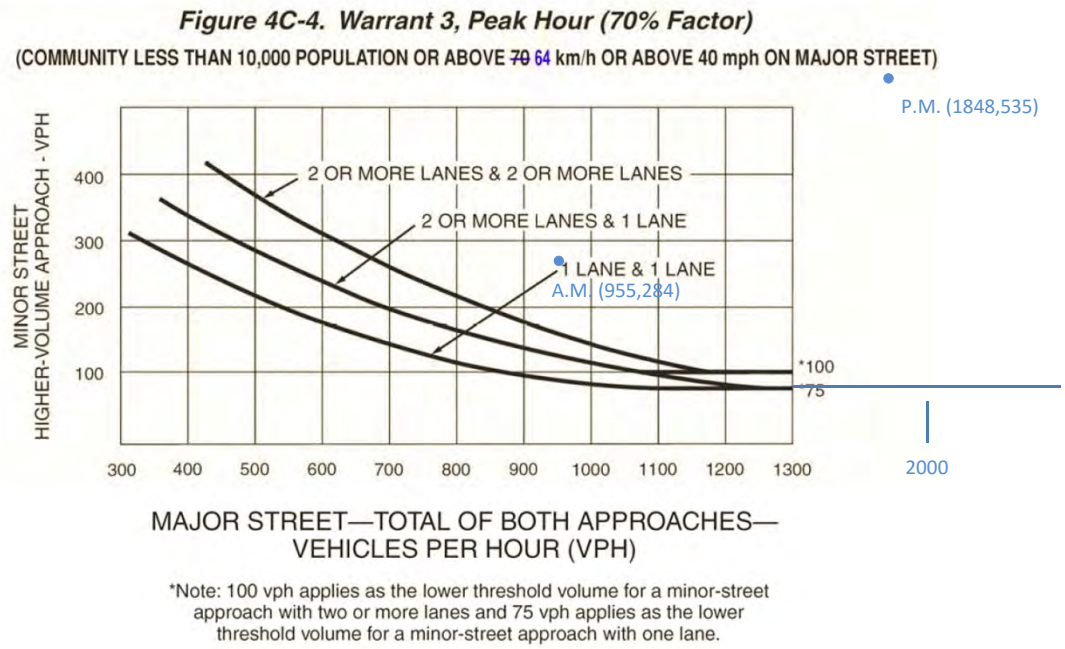
Cumulative plus Project Condition – A.M. & P.M. Peak Hour



A.M. Condition NOT SATISFIED
P.M. Condition NOT SATISFIED

Int #4 – Devlin Rd/Soscol Ferry Rd

Cumulative plus Project Condition – A.M. & P.M. Peak Hour



A.M. Condition IS SATISFIED
P.M. Condition IS SATISFIED