Appendix A Shade and Shadow Study

Appendix

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studioneleven

3rd & Broadway
Shadow Study

August 21, 2020



Analysis

Shading refers to the effect of shadows cast upon adjacent areas by proposed structures. According to Transit Zoning Code Mitigation Measure MM4.1-4, shadow impacts are dependent upon several factors, including sensitivity of adjacent land uses, duration, time of day, season, extent of building shadowed, preexisting conditions and type of shadow. Shade and shadow impacts could be considered substantial if a development creates a significant increase of shade or shadow on sensitive outdoor uses, defined as schools, hospitals, senior housing, or other residential amenity spaces. Shade and shadow impacts during the hours of 9:00 AM, 12:00 PM and 3:00 PM Pacific Standard Time at the winter solstice will be measured. Shade and shadow impacts during the hours of 9:00 AM, 12:00 PM, 3:00 PM and 5:00 PM Pacific Daylight Time at the summer solstice will also be measured.

The proposed project would demolish the existing 3 story parking structure, reconnect Sycamore Street and construct new buildings on either side of the reconnected street. The building on the west would rise to 194' and the building on the east to 127'. The existing buildings surrounding the site are a mix of retail and commercial uses. No sensitive uses fall within the shade and shadow impact area. The residential building to the west of the project at 306 N Broadway, does not have any residential balconies or amenity areas that would be considered sensitive uses.

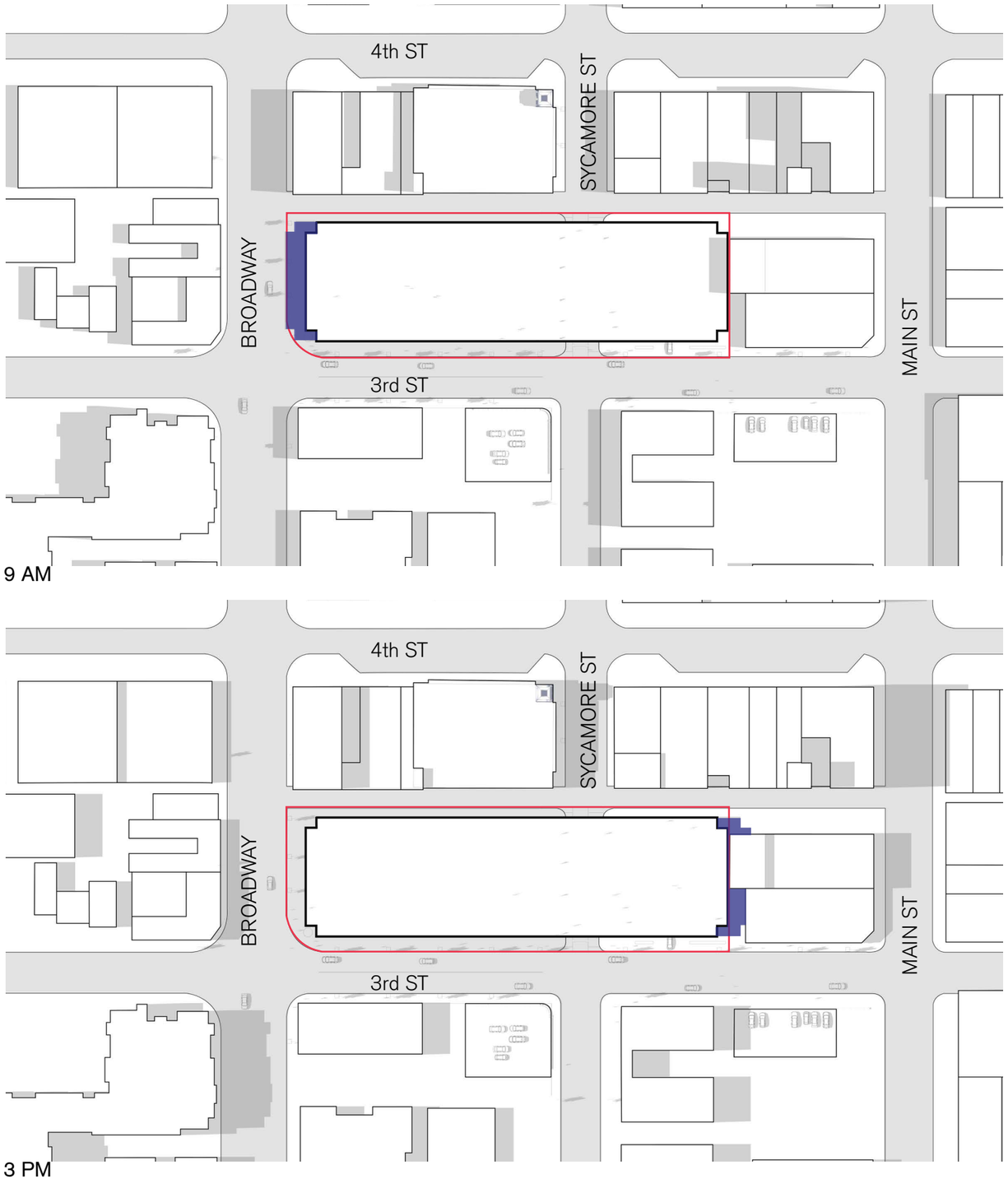
Both buildings were modeled to evaluate potential shade impacts. Summer and winter solstice conditions were modeled per the requirements of MM4.1-4. Summer solstice is on or about June 21 and marks the onset of summer, when the sun is at its northernmost point in the sky. Winter solstice is on or about December 21 and marks the onset of winter, when the sun is farthest south.

Page 3 shows Existing Summer Solstice Shadows at 9:00 AM, 12:00 PM, 3:00 PM, and 5:00 PM during the summer solstice.

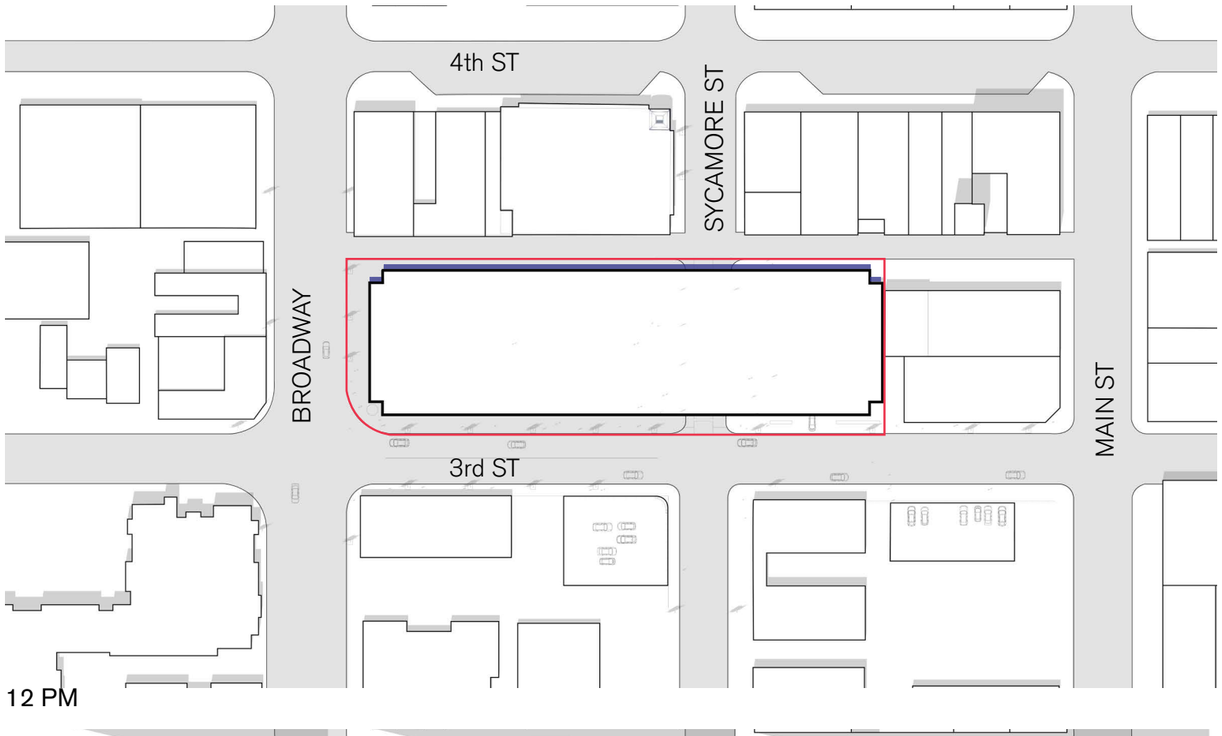
Page 4 for Proposed Summer Solstice Shadows, shows the approximate location and movement of shadows at 9:00 AM, 12:00 PM, 3:00 PM and 5:00 PM during the summer solstice. As shown, there are no sensitive uses that would be impacted by shade and shadow between 9:00 AM and 5:00 PM. Shadows during summer solstice would move clockwise, southwest to southeast, more than 180 degrees during a 12-hour period. No single location would receive a substantial increase in shade by the summer shadows and there are no sensitive locations within the shadow range. Shade/shadow impacts would be considered less than significant.

Page 5 shows Existing Winter Solstice Shadows at 9:00 AM, 12:00 PM, and 3:00 PM during the winter solstice.

Page 6 for Winter Solstice Shadows, shows the approximate location and movement of shadows at 9:00 AM, 12:00 PM, and 3:00 PM during the winter solstice. As shown, there are no sensitive uses that would be impacted by shade and shadow between 9:00 AM and 3:00 PM. No single location would receive a substantial increase in shade and shadow and there are no sensitive locations within the shade and shadow range. Shade/shadow impacts would be considered less than significant.

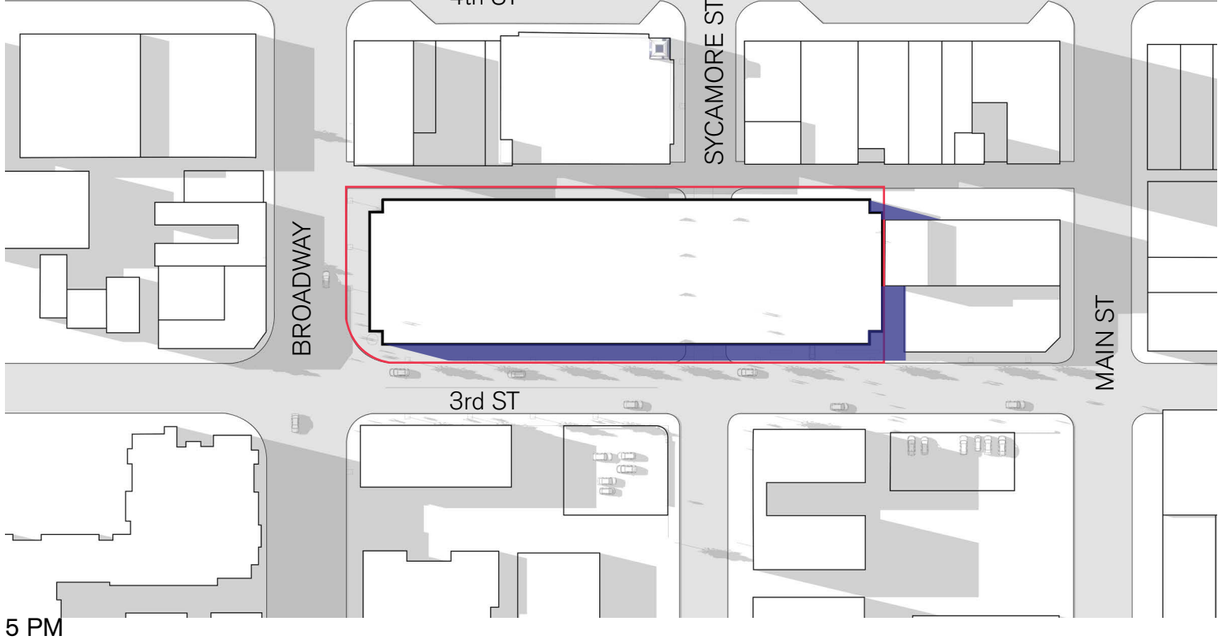


9 AM



12 PM

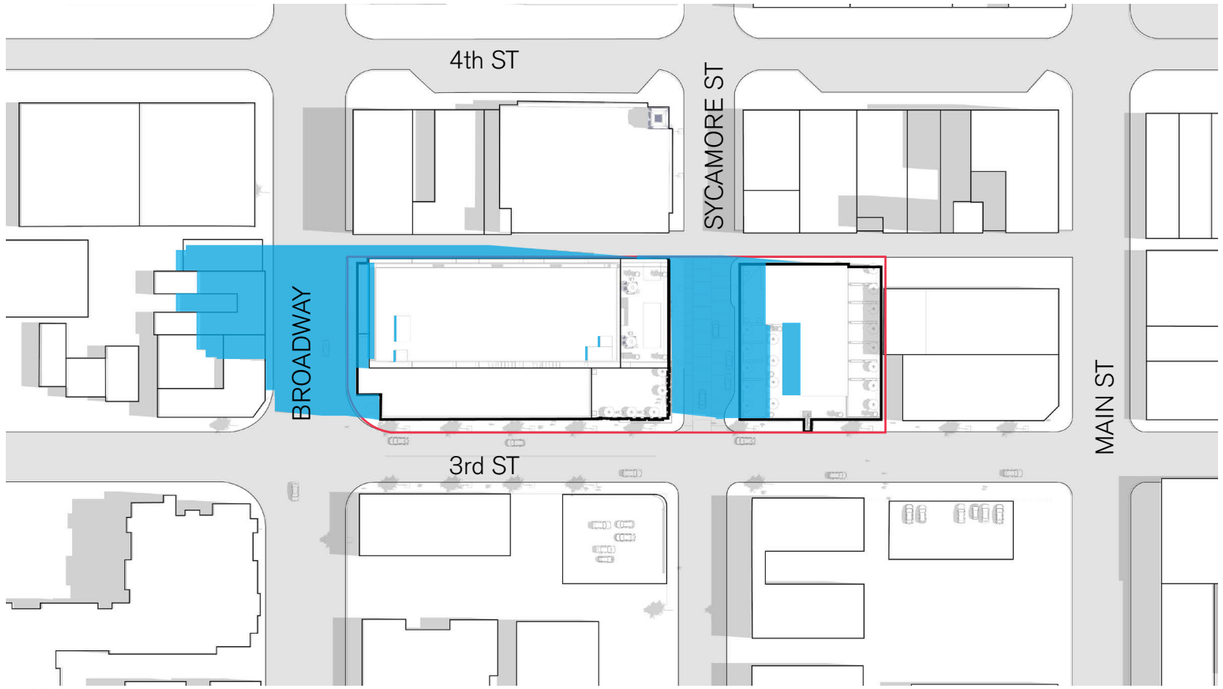
3 PM



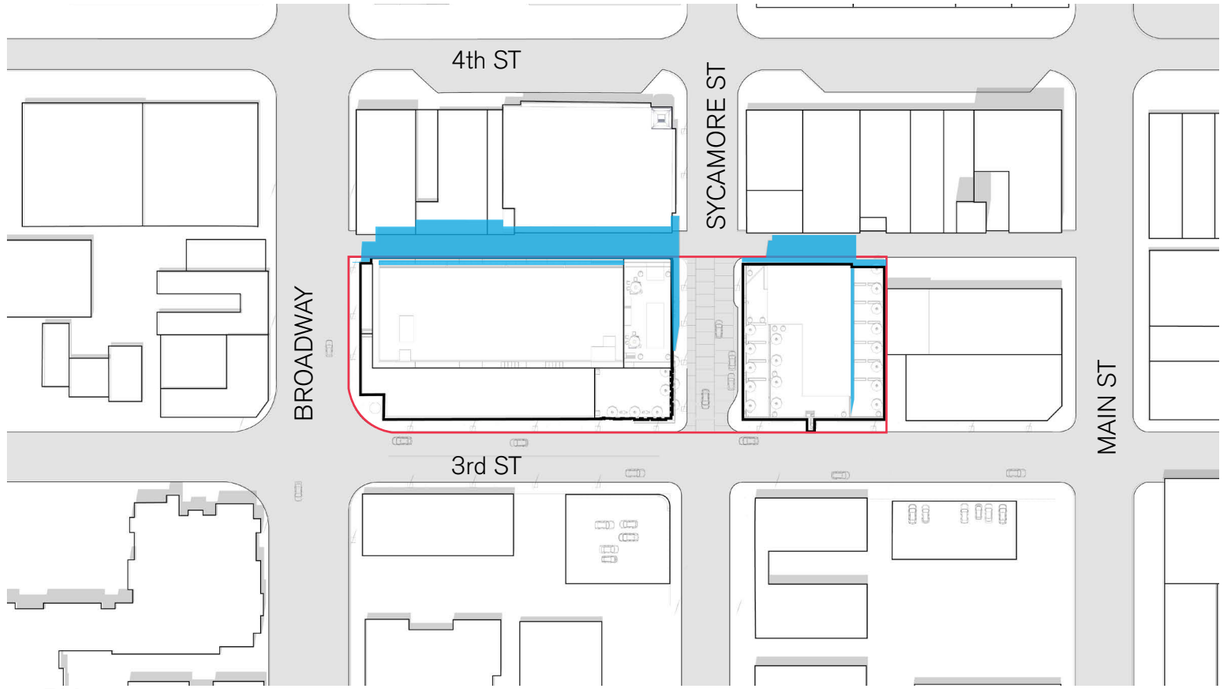
5 PM

Existing Sun/Shadow Diagram Summer Solstice June 21

Existing Shadow



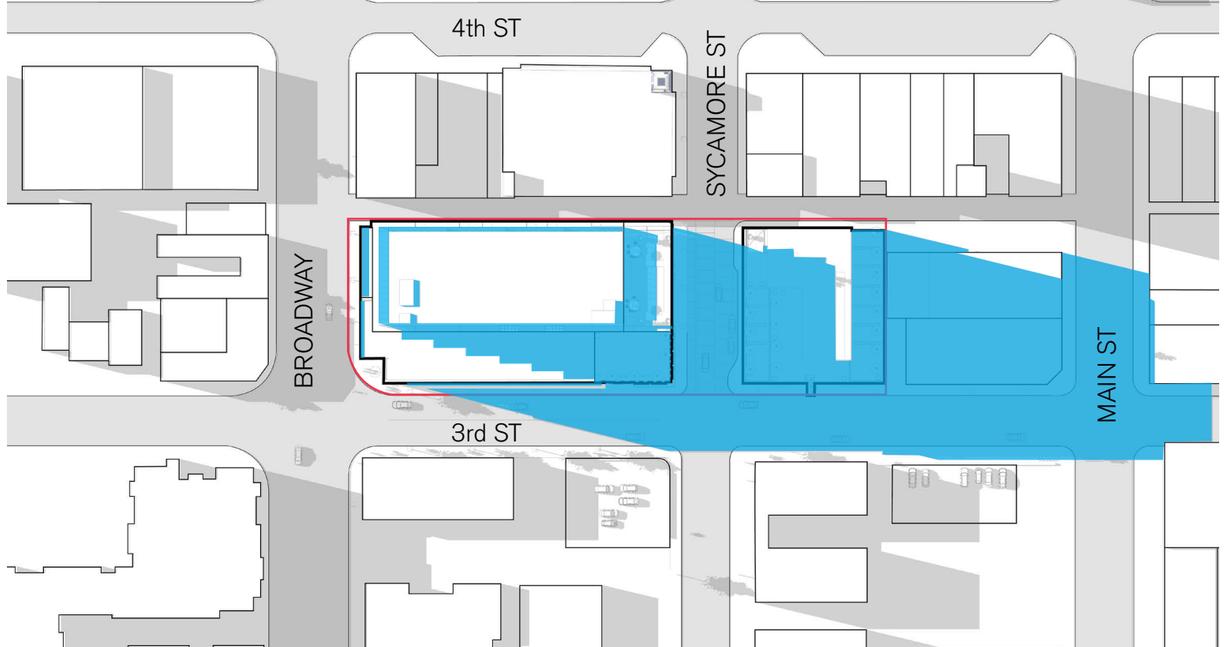
9 AM



12 PM



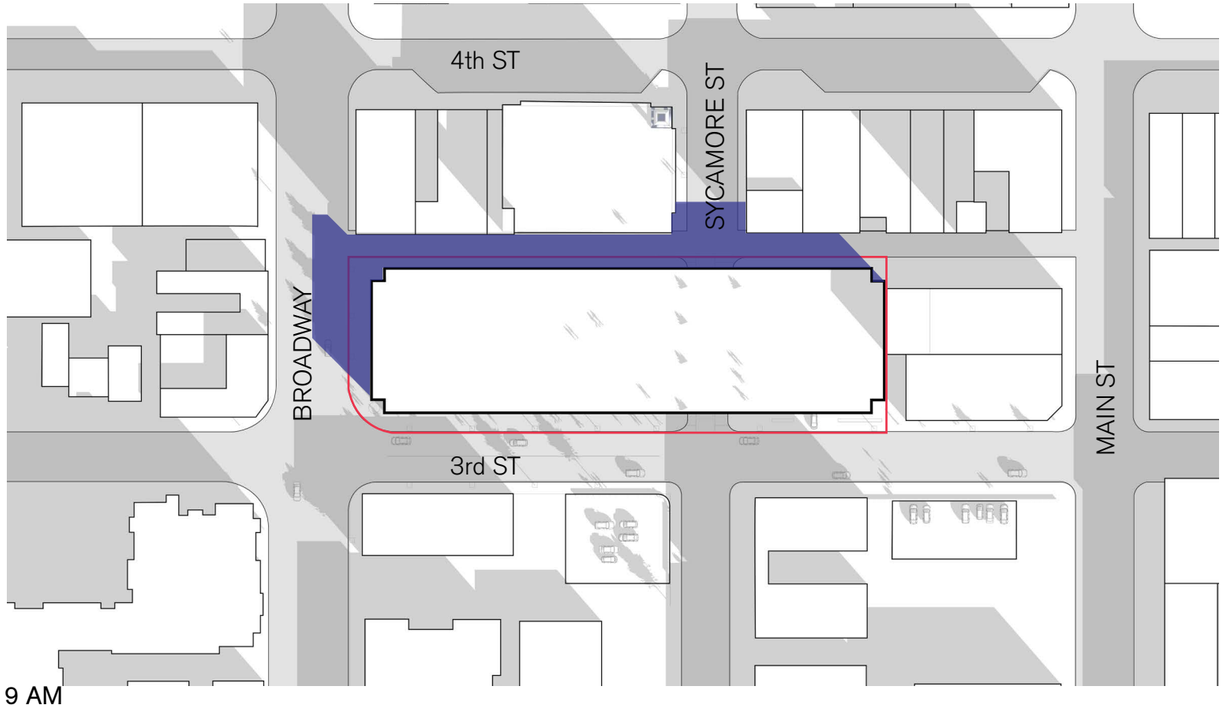
3 PM



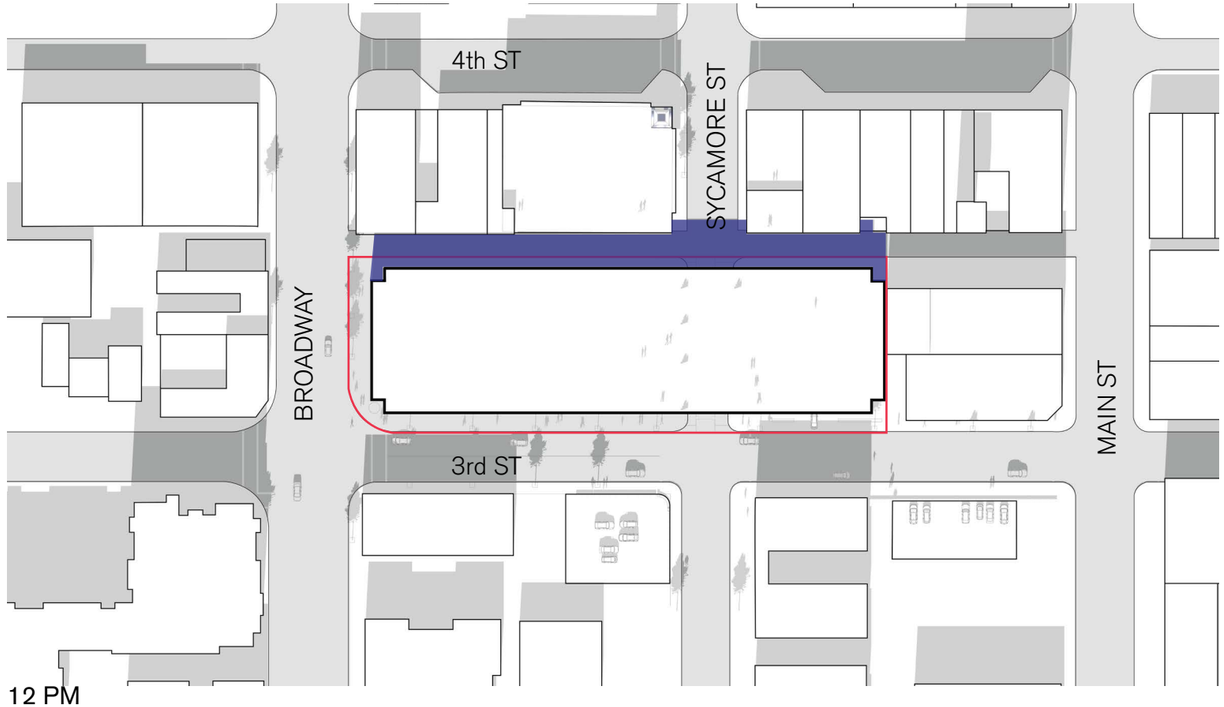
5 PM

Proposed Sun/Shadow Diagram Summer Solstice June 21

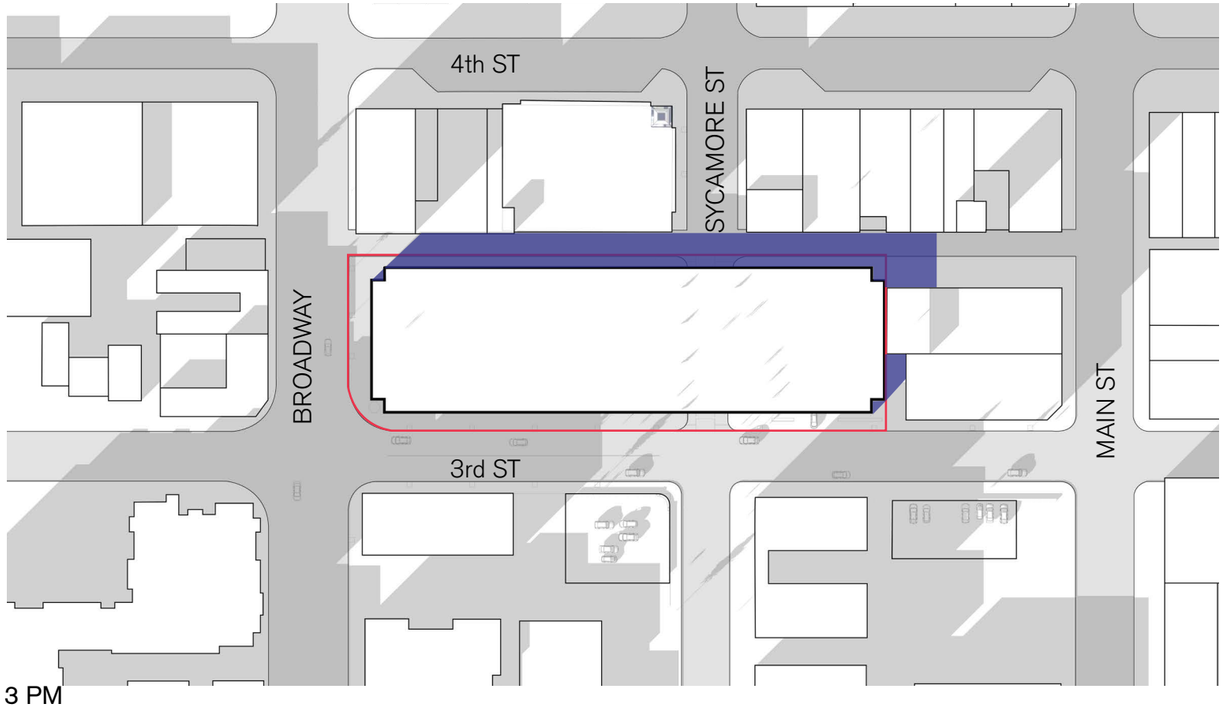
Proposed Shadow



9 AM



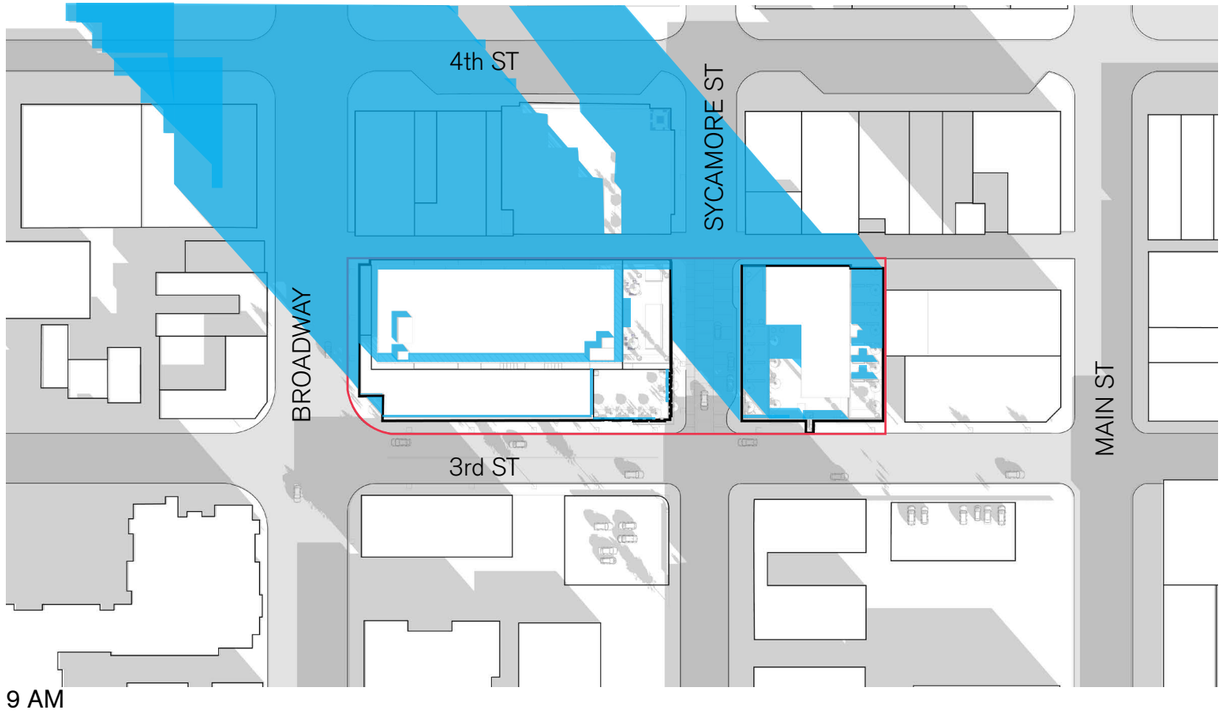
12 PM



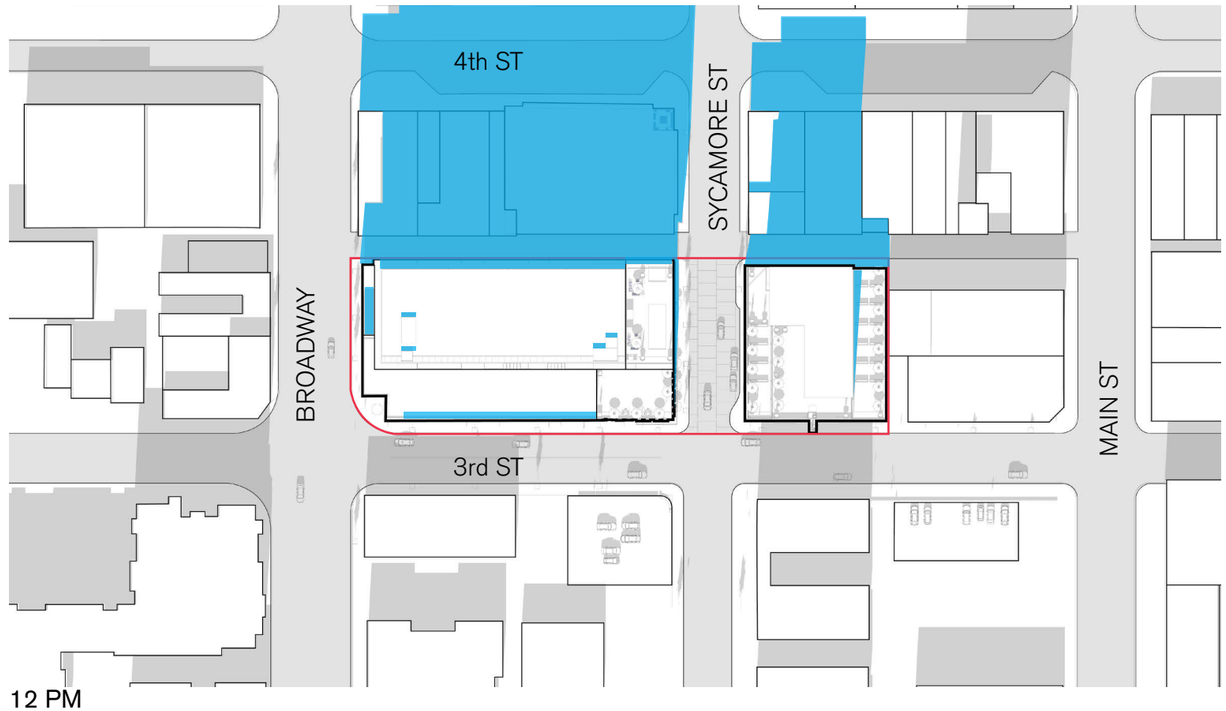
3 PM

Existing Shadow

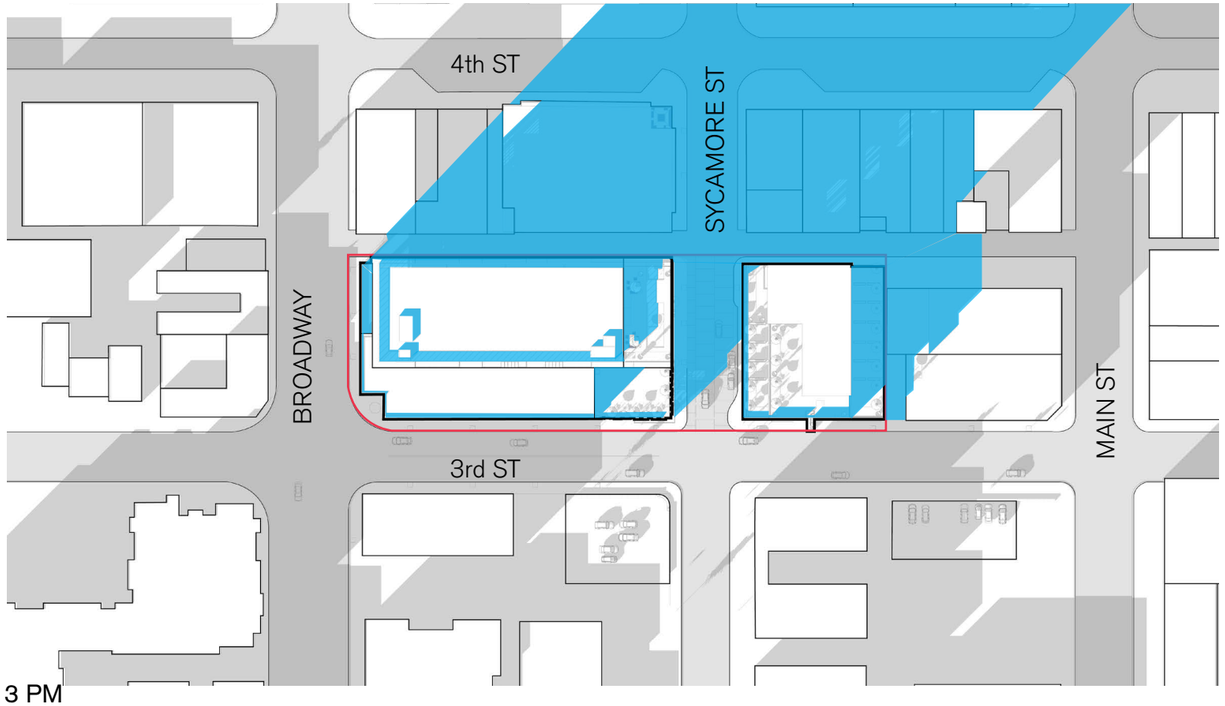
Existing Sun/Shadow Diagram Winter Solstice December 21



9 AM



12 PM



3 PM

Proposed Sun/Shadow Diagram Winter Solstice December 21

Proposed Shadow

Appendix B 2020 Update to AQ, GHG, Noise, and Transportation

Appendix

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August 24, 2020

Mr. Michael F. Harrah
Caribou Industries, Inc.
1103 North Broadway
Santa Ana, CA 92701

SUBJECT: 3RD & BROADWAY TECHNICAL STUDY UPDATES

Dear Mr. Michael F. Harrah:

Urban Crossroads, Inc. is pleased to provide the following Technical Study Updates for the 3rd & Broadway (Project) located on the northeast corner of 3rd Street and Broadway in the City of Santa Ana. A Traffic Impact Analysis (TIA), Air Quality Impact Analysis (AQIA), Greenhouse Gas Analysis (GHGA), and Noise Impact Analysis (NIA) were prepared for the subject Project in 2019. Since that time, minor modifications to the Project site have occurred through site plan refinements.

The 2019 Project (Previously Analyzed Project) was evaluated as 164 residential units, a 75-room hotel, 15,320 square feet (sf) of commercial space (including retail and food/beverage establishments, and rooftop amenities ancillary to residential and hotel uses.

The Project (Current Project) is now proposed to include the development of up to 171 residential units, a 75-room hotel, 13,419 square feet (sf) of commercial space (including retail and food/beverage establishments), and rooftop amenities ancillary to residential and hotel uses. The minor changes from the Previously Analyzed Project to the Current Project are summarized on Table 1, as follows:

TABLE 1: PREVIOUSLY ANALYZED PROJECT COMPARED TO CURRENT PROJECT

Previously Analyzed Project	Current Project
Dwelling Units: 164	Dwelling Units: 171
Hotel Rooms: 75	Hotel Rooms: 75
Commercial Space: 15,320 sf	Commercial Space: 13,419 sf

TRIP GENERATION

PREVIOUSLY ANALYZED PROJECT

Table 2 presents trip generation summary for the Previously Analyzed Project. As shown, the Previously Analyzed Project would generate 1,372 vehicle trips per day, with 94 vehicle trips generated during the AM peak hour and 112 vehicle trips generated during the PM peak hour.

Table 3 presents trip generation summary for the Current Project. As shown, the Current Project would generate 1,396 vehicle trips per day, with 96 vehicle trips generated during the AM peak hour and 113 vehicle trips generated during the PM peak hour.

TABLE 2: PREVIOUSLY ANALYZED PROJECT TRIP GENERATION SUMMARY

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
Multifamily Housing (High-Rise)	164	DU	11	39	50	36	23	59	730
Internal Capture[3]			0	0	0	-8	-4	-12	-148
Hotel	75	RM	21	14	35	23	22	45	628
Internal Capture[3]			0	0	0	-3	-1	-4	-56
Commercial	15.320	TSF	9	5	14	28	30	58	578
Internal Capture[3]			0	0	0	-4	-10	-14	-140
Pass-by Reduction (34% PM/Daily)			0	0	0	-7	-7	-14	-148
Subtotal Project Trips			*41*	*58*	*99*	*65*	*53*	*118*	*1,444*
Transit Mode Share (5%)			-2	-3	-5	-3	-3	-6	-72
Total Net Project Trips			**39**	**55**	**94**	**62**	**50**	**112**	**1,372**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Tenth Edition (2017).

[2] DU = Dwelling Units; RM = Rooms; TSF = Thousand Square Feet

[3] Internal capture is based on the NCHRP 684 Internal Trip Capture Estimation Tool (ITE recommended methodology).

TABLE 3: CURRENT PROJECT TRIP GENERATION SUMMARY

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
Multifamily Housing (High-Rise)	171	DU	12	41	53	38	24	62	761
Internal Capture[3]			0	0	0	-7	-4	-11	-135
Hotel	75	RM	21	14	35	23	22	45	628
Internal Capture[3]			0	0	0	-2	-1	-3	-42
Commercial	13.419	TSF	8	5	13	25	27	51	507
Internal Capture[3]			0	0	0	-4	-8	-12	-119
Pass-by Reduction (34% PM/Daily)			0	0	0	-6	-6	-13	-131
Subtotal Project Trips			*41*	*60*	*101*	*67*	*54*	*119*	*1,469*
Transit Mode Share (5%)			-2	-3	-5	-3	-3	-6	-73
Total Net Project Trips			**39**	**57**	**96**	**64**	**51**	**113**	**1,396**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Tenth Edition (2017).

[2] DU = Dwelling Units; RM = Rooms; TSF = Thousand Square Feet

[3] Internal capture is based on the NCHRP 684 Internal Trip Capture Estimation Tool (ITE recommended methodology).

PROJECT TRIP GENERATION COMPARISON AND RELATED IMPACTS COMPARISON

As shown in Table 4, the development of the Current Project is anticipated to generate 24 additional vehicle trip-ends per day with 2 additional AM and 1 additional PM peak hour vehicle trips as compared to the Previously Analyzed Project. These increases are negligible and would not result in any additional impacts beyond what was identified in the Previous TIA.

TABLE 4: TRIP GENERATION COMPARISON

	AM Peak Hour			PM Peak Hour			
Land Use	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**Daily**
Previously Analyzed Project	39	55	94	62	50	112	1,372
Current Project	39	57	96	64	51	113	1,396
Variance	***0***	***2***	***2***	***1***	***0***	***1***	***24***

CITY OF SANTA ANA VMT SCREENING

As stated in the City of Santa Ana Traffic Impact Study Guidelines (September 2019), projects may be screened out from completing a full VMT analysis if they have the potential to reduce VMT/SP and would consequently result in a less-than-significant transportation impact. In other words, the project should have the potential to reduce VMT/SP and be consistent with the Regional Transportation Plan (RTP) / Sustainable Communities Strategy's (SCS) in order to be initially screened out. Projects located within Transit Priority Areas (TPAs) and low-VMT generating Traffic Analysis Zones (TAZ) have the potential to reduce VMT/SP and are consistent with the RTP/SCS. As illustrated in Exhibit A and B, the proposed Project is located in a TPA and low-VMT generating TAZ based on maps published by the City in their Traffic Impact Study Guidelines.

The Project is proposed to develop residential, office, retail, and restaurant uses. The mixed-use nature of the Project promotes low-VMT generation within the TAZ as well as the overall City. As discussed with the City of Santa Ana Planning Department, an increase of approximately 5,406 households is projected for the City based on the Orange County Transportation Analysis Model (OCTAM) from the base year of 2016 to the forecasted year of 2045. As such, the households proposed by the Project would be consistent with the growth anticipated in the RTP/SCS for the City. Orange County currently experiences a high demand and low supply of households in the region and the proposed Project would have the potential to serve the regional demand for households and is therefore consistent with the goals and objectives of the RTP/SCS.

EXHIBIT A: CITY OF SANTA ANA TRANSIT PRIORITY AREAS (TPAS)

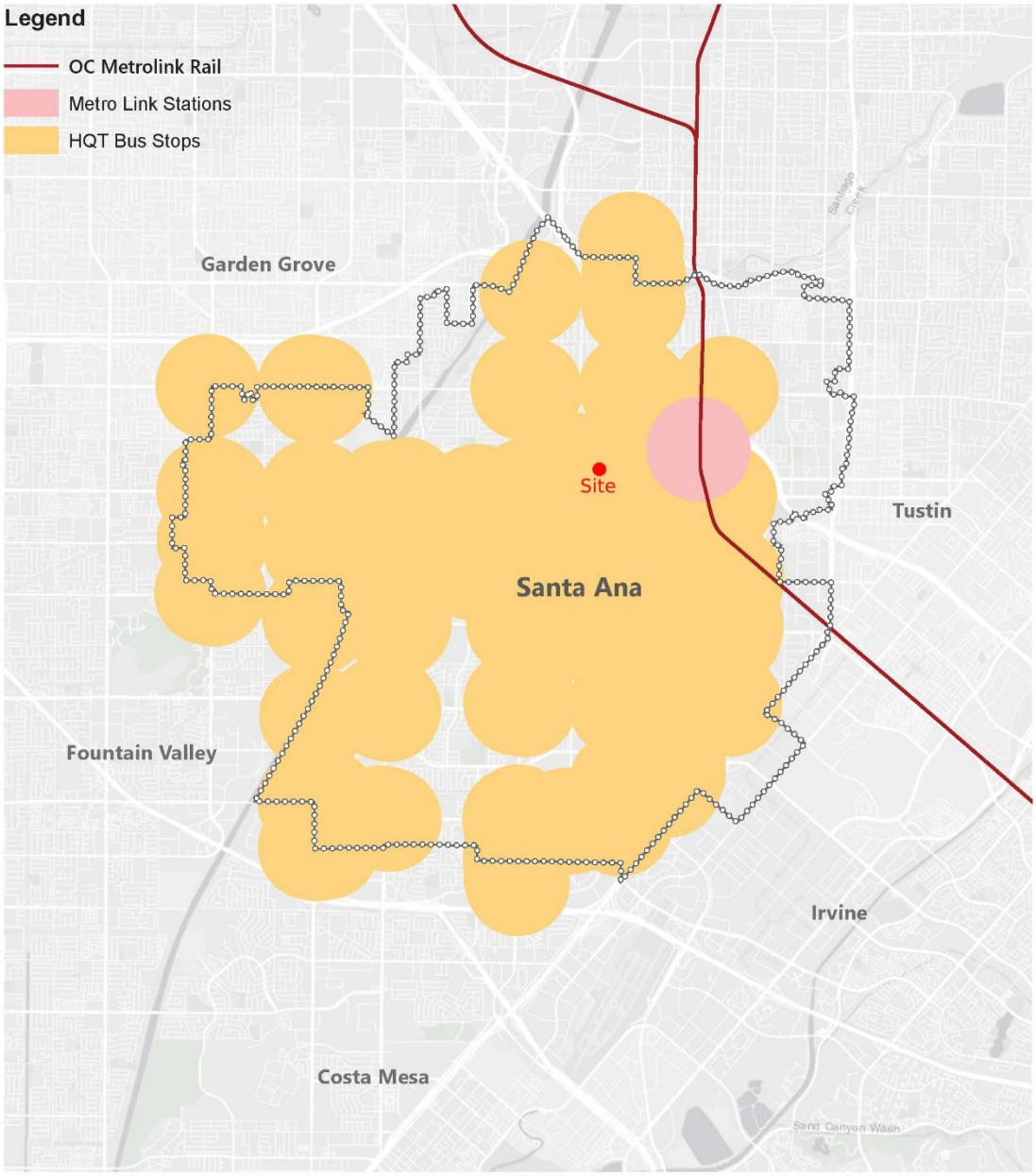
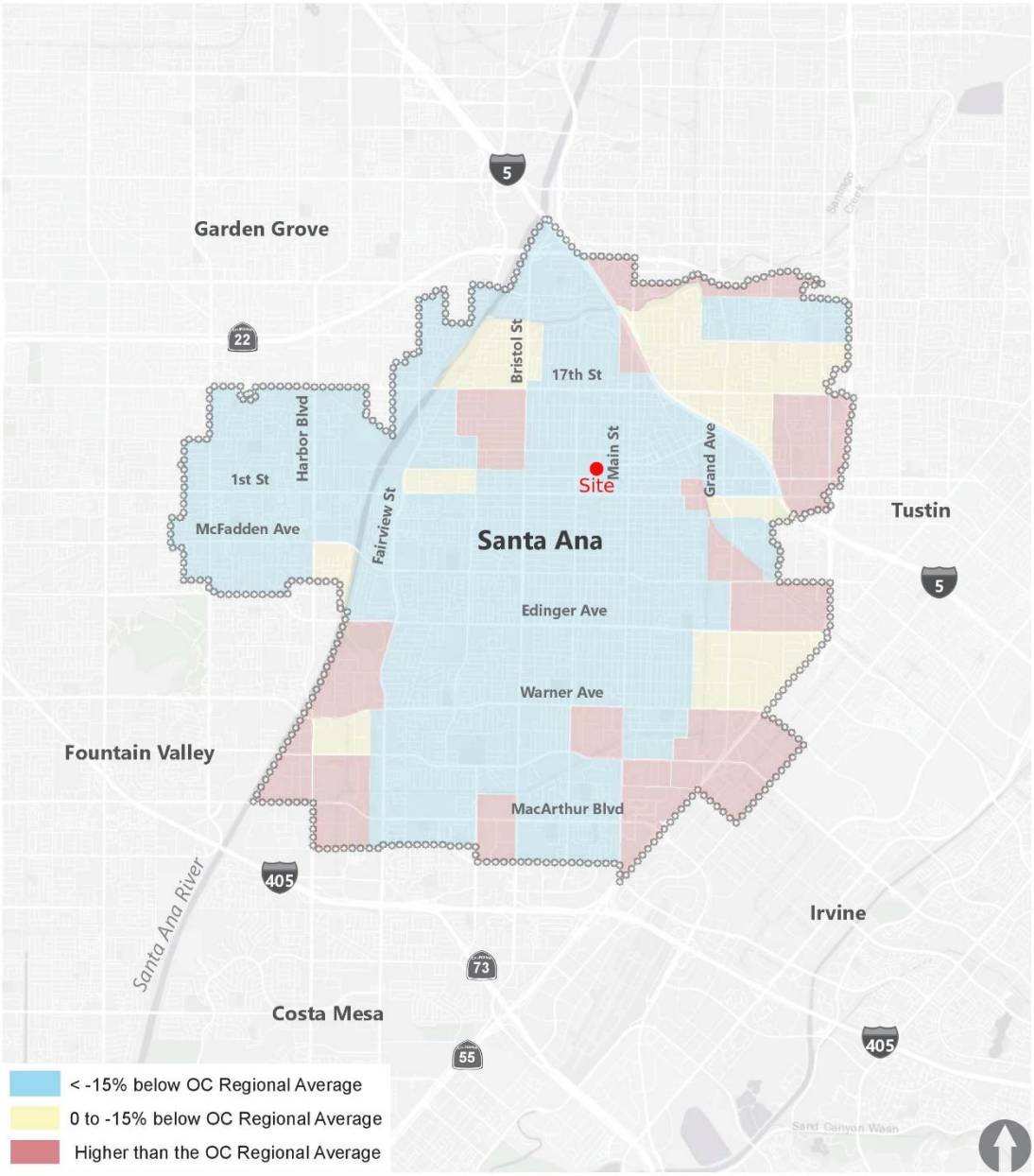


EXHIBIT B: VMT/SP IN SANTA ANA AS COMPARED TO REGIONAL AVERAGE



AIR QUALITY

CONSTRUCTION

As the differences between the Previously Analyzed Project and Current Project are minor, the construction emissions generated from Current Project will be equivalent to the information presented in the 3rd and Broadway Air Quality Analysis (AQIA) (Urban Crossroads, Inc. 2019).

OPERATIONS

PREVIOUSLY ANALYZED PROJECT OPERATIONAL EMISSIONS

As noted above, the Previously Analyzed Project consisted of 164 dwelling units, a 75-room hotel, and 15,130 sf of commercial space. Tables 6 and 7 summarize the operational emissions associated with the Previously Analyzed Project.

TABLE 6: PREVIOUSLY ANALYZED PROJECT OPERATIONAL EMISSIONS SUMMARY

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area	6.65	2.88	14.78	0.02	0.29	0.29
Energy Source	0.14	1.24	0.84	0.01	0.10	0.10
Mobile	2.42	9.16	29.54	0.11	9.50	2.59
Total Maximum Daily Emissions	**9.21**	**13.27**	**45.15**	**0.13**	**9.89**	**2.98**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Operational Activities – Winter Scenario	**Emissions (pounds per day)**					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Area	6.65	2.88	14.78	0.02	0.29	0.29
Energy Source	0.14	1.24	0.84	0.01	0.10	0.10
Mobile	2.38	9.39	28.50	0.10	9.50	2.59
Total Maximum Daily Emissions	**9.17**	**13.51**	**44.11**	**0.13**	**9.89**	**2.59**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

TABLE 7: TOTAL ANNUAL GREENHOUSE GAS EMISSIONS (PREVIOUSLY ANALYZED PROJECT)

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Construction Emissions Amortized over 30 years	35.51	0.00	0.00	35.62
Area	42.16	3.46E-03	7.20E-04	42.46
Energy	899.28	0.04	0.01	904.17
Mobile Sources	1,603.01	0.07	0.00	1,604.72
Waste	26.91	1.59	0.00	66.68
Water Usage	34.54	0.26	0.01	42.73
Total CO_2e (All Sources)	**2,696.37**			
SCAQMD Threshold	**3,000**			
Threshold Exceedance?	**NO**			

CURRENT PROJECT OPERATIONAL EMISSIONS

As mentioned, the Current Project is to consist of 171 dwelling units, a 75-room hotel, and 13,419 sf of commercial space. CalEEMod was run again to calculate operational emissions associated with the Current Project as shown on Tables 8 and 9. The revised CalEEMod outputs are presented in Attachment A of this memorandum.

TABLE 8: CURRENT PROJECT OPERATIONAL EMISSIONS SUMMARY

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area	6.63	2.88	15.35	0.02	0.30	0.30
Energy Source	0.14	1.25	0.85	0.01	0.10	0.10
Mobile	2.43	9.23	29.87	0.11	9.64	2.63
Total Maximum Daily Emissions	**9.20**	**13.36**	**46.07**	**0.14**	**10.04**	**3.03**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Operational Activities – Winter Scenario	**Emissions (pounds per day)**					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Area	6.63	2.88	15.35	0.02	0.30	0.30
Energy Source	0.14	1.25	0.85	0.01	0.10	0.10
Mobile	2.39	9.46	28.80	0.10	9.64	2.63
Total Maximum Daily Emissions	**9.16**	**13.60**	**45.00**	**0.13**	**10.04**	**3.03**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

TABLE 9: TOTAL ANNUAL GREENHOUSE GAS EMISSIONS (CURRENT PROJECT)

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Construction Emissions Amortized over 30 years	35.51	0.00	0.00	35.62
Area	42.28	0.00	0.00	42.58
Energy	904.67	0.04	0.01	909.59
Mobile Sources	1634.20	0.07	0.00	1635.95
Waste	26.91	1.59	0.00	66.68
Water Usage	30.47	0.32	0.01	40.71
Total CO_2e (All Sources)	**2,731.12**			
SCAQMD Threshold	**3,000**			
Threshold Exceedance?	**NO**			

NET PROJECT EMISSIONS

The net emissions as a result of the minor change in Project land use are shown in Tables 10 and 11. As shown, the emissions are generally consistent with what was previously analyzed and no substantive change would occur.

TABLE 10: NET OPERATIONAL EMISSIONS

OPERATIONAL ACTIVITIES	Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Summer						
Currently Project	9.20	13.36	46.07	0.14	10.04	3.03
Previously Analyzed Project	9.21	13.27	45.15	0.13	9.89	2.98
Variance (Current Project- Previously Analyzed Project)	***0.01***	***0.09***	***0.98***	***0.01***	***0.25***	***0.05***
Winter						
Current Project	9.16	13.60	45.00	0.13	10.04	3.03
Previously Analyzed Project	9.17	13.51	44.11	0.13	9.89	2.59
Variance (Current Project- Previously Analyzed Project)	***-0.01***	***0.09***	***0.89***	***0.00***	***0.25***	***0.05***

TABLE 11: NET GHG EMISSIONS

Emission Source	Annual Emissions ($MTCO_2e$)
Current Project	**2,731.12**
Previously Analyzed Project	**2,696.37**
Variance (Current Project- Previously Analyzed Project)	***34.75***

NOISE

As previously discussed, there would be a slight increase in daily trips associated with the Current Project, however this would not result in any new off-site noise-related impacts beyond what were previously evaluated and disclosed in the previous NIA.

CONCLUSION

As the Current Project is anticipated to result in a negligible increase in vehicle daily trips, no additional traffic-related, air quality, greenhouse gas, or noise impacts are anticipated as a result of the proposed development currently being contemplated. If you have any questions, please contact me directly at hqureshi@urbanxroads.com.

Respectfully submitted,

URBAN CROSSROADS, INC.



Haseeb Qureshi
Associate Principal

ATTACHMENT A: CALEEMOD OUTPUTS

3rd & Broadway (Operations)

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	403.00	Space	0.00	240,263.00	0
Hotel	75.00	Room	0.48	81,927.00	0
Apartments High Rise	171.00	Dwelling Unit	0.82	169,230.00	489
Regional Shopping Center	13.42	1000sqft	0.00	13,419.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	480	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Operations) - Orange County, Summer

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2021 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on ITE 10th Edition.

Woodstoves - Rule 445

Energy Use -

Water And Wastewater - Water Usage based on the Demand Factors provided in the City of Santa Ana WSA for the proposed Transit Zoning Code (January 2010)

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	47673	48624
tblAreaCoating	Area_Nonresidential_Interior	143019	145871
tblConstructionPhase	NumDays	20.00	1.00
tblFireplaces	NumberGas	145.35	164.00
tblFireplaces	NumberNoFireplace	17.10	0.00
tblFireplaces	NumberWood	8.55	0.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	171,000.00	169,230.00
tblLandUse	LotAcreage	3.63	0.00
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	2.76	0.82
tblLandUse	LotAcreage	0.31	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	480
tblSolidWaste	SolidWasteGenerationRate	78.66	75.44
tblSolidWaste	SolidWasteGenerationRate	14.09	16.09
tblVehicleTrips	DV_TP	35.00	12.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	ST_TR	4.98	3.73
tblVehicleTrips	ST_TR	8.19	7.64
tblVehicleTrips	ST_TR	49.97	35.30
tblVehicleTrips	SU_TR	3.65	2.95
tblVehicleTrips	SU_TR	5.95	5.55
tblVehicleTrips	SU_TR	25.24	16.15
tblVehicleTrips	WD_TR	4.20	3.66
tblVehicleTrips	WD_TR	8.17	7.80
tblVehicleTrips	WD_TR	42.70	28.89
tblWater	IndoorWaterUseRate	11,141,338.38	8,979,000.00
tblWater	IndoorWaterUseRate	1,902,507.75	687,484.00
tblWater	IndoorWaterUseRate	994,053.24	559.18
tblWater	OutdoorWaterUseRate	7,023,887.24	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	609,258.44	0.00
tblWoodstoves	NumberCatalytic	8.55	0.00
tblWoodstoves	NumberNoncatalytic	8.55	0.00

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					
2019	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
Maximum	**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**

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					
2019	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
Maximum	**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**

	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**

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	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117
Energy	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966
Mobile	2.4307	9.2252	29.8733	0.1093	9.5620	0.0792	9.6412	2.5570	0.0737	2.6307		11,092.3604	11,092.3604	0.4610		11,103.8853
Total	**9.2027**	**13.3636**	**46.0688**	**0.1351**	**9.5620**	**0.4750**	**10.0370**	**2.5570**	**0.4695**	**3.0265**	**0.0000**	**16,133.7393**	**16,133.7393**	**0.5820**	**0.0920**	**16,175.6936**

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	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117
Energy	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966
Mobile	2.4307	9.2252	29.8733	0.1093	9.5620	0.0792	9.6412	2.5570	0.0737	2.6307		11,092.3604	11,092.3604	0.4610		11,103.8853
Total	**9.2027**	**13.3636**	**46.0688**	**0.1351**	**9.5620**	**0.4750**	**10.0370**	**2.5570**	**0.4695**	**3.0265**	**0.0000**	**16,133.7393**	**16,133.7393**	**0.5820**	**0.0920**	**16,175.6936**

	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	Demolition	Demolition	7/1/2019	7/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	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
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

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	0.0000	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
Total	**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**

3.2 Demolition - 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	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
Total	**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**

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	0.0000	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
Total	**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**

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	2.4307	9.2252	29.8733	0.1093	9.5620	0.0792	9.6412	2.5570	0.0737	2.6307		11,092.3604	11,092.3604	0.4610		11,103.8853
Unmitigated	2.4307	9.2252	29.8733	0.1093	9.5620	0.0792	9.6412	2.5570	0.0737	2.6307		11,092.3604	11,092.3604	0.4610		11,103.8853

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	626.03	637.15	504.96	2,085,568	2,085,568
Enclosed Parking with Elevator	0.00	0.00	0.00		
Hotel	585.08	573.15	416.40	1,334,526	1,334,526
Regional Shopping Center	387.67	473.62	216.69	741,062	741,062
Total	1,598.78	1,683.92	1,138.05	4,161,156	4,161,156

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
Apartments High Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Hotel	16.60	8.40	6.90	19.40	61.60	19.00	58	38	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	12	34

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Enclosed Parking with Elevator	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966
NaturalGas Unmitigated	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966

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					
Apartments High Rise	5353.69	0.0577	0.4934	0.2100	3.1500e-003		0.0399	0.0399		0.0399	0.0399		629.8455	629.8455	0.0121	0.0116	633.5884
Enclosed Parking with Elevator	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
Hotel	7687.67	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	73.5288	7.9000e-004	7.2100e-003	6.0600e-003	4.0000e-005		5.5000e-004	5.5000e-004		5.5000e-004	5.5000e-004		8.6504	8.6504	1.7000e-004	1.6000e-004	8.7019
Total		**0.1414**	**1.2543**	**0.8491**	**7.7100e-003**		**0.0977**	**0.0977**		**0.0977**	**0.0977**		**1,542.9278**	**1,542.9278**	**0.0296**	**0.0283**	**1,552.0966**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	5.35369	0.0577	0.4934	0.2100	3.1500e-003		0.0399	0.0399		0.0399	0.0399		629.8455	629.8455	0.0121	0.0116	633.5884
Enclosed Parking with Elevator	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
Hotel	7.68767	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	0.0735288	7.9000e-004	7.2100e-003	6.0600e-003	4.0000e-005		5.5000e-004	5.5000e-004		5.5000e-004	5.5000e-004		8.6504	8.6504	1.7000e-004	1.6000e-004	8.7019
Total		**0.1414**	**1.2543**	**0.8491**	**7.7100e-003**		**0.0977**	**0.0977**		**0.0977**	**0.0977**		**1,542.9278**	**1,542.9278**	**0.0296**	**0.0283**	**1,552.0966**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117
Unmitigated	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4331	0.1637	14.1887	7.5000e-004		0.0781	0.0781		0.0781	0.0781		25.5100	25.5100	0.0249		26.1326
Total	**6.6305**	**2.8841**	**15.3464**	**0.0181**		**0.2981**	**0.2981**		**0.2981**	**0.2981**	**0.0000**	**3,498.4512**	**3,498.4512**	**0.0915**	**0.0637**	**3,519.7117**

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4331	0.1637	14.1887	7.5000e-004		0.0781	0.0781		0.0781	0.0781		25.5100	25.5100	0.0249		26.1326
Total	**6.6305**	**2.8841**	**15.3464**	**0.0181**		**0.2981**	**0.2981**		**0.2981**	**0.2981**	**0.0000**	**3,498.4512**	**3,498.4512**	**0.0915**	**0.0637**	**3,519.7117**

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 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

3rd & Broadway (Operations)

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	403.00	Space	0.00	240,263.00	0
Hotel	75.00	Room	0.48	81,927.00	0
Apartments High Rise	171.00	Dwelling Unit	0.82	169,230.00	489
Regional Shopping Center	13.42	1000sqft	0.00	13,419.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	480	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Operations) - Orange County, Winter

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2021 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on ITE 10th Edition.

Woodstoves - Rule 445

Energy Use -

Water And Wastewater - Water Usage based on the Demand Factors provided in the City of Santa Ana WSA for the proposed Transit Zoning Code (January 2010)

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	47673	48624
tblAreaCoating	Area_Nonresidential_Interior	143019	145871
tblConstructionPhase	NumDays	20.00	1.00
tblFireplaces	NumberGas	145.35	164.00
tblFireplaces	NumberNoFireplace	17.10	0.00
tblFireplaces	NumberWood	8.55	0.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	171,000.00	169,230.00
tblLandUse	LotAcreage	3.63	0.00
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	2.76	0.82
tblLandUse	LotAcreage	0.31	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	480
tblSolidWaste	SolidWasteGenerationRate	78.66	75.44
tblSolidWaste	SolidWasteGenerationRate	14.09	16.09
tblVehicleTrips	DV_TP	35.00	12.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	ST_TR	4.98	3.73
tblVehicleTrips	ST_TR	8.19	7.64
tblVehicleTrips	ST_TR	49.97	35.30
tblVehicleTrips	SU_TR	3.65	2.95
tblVehicleTrips	SU_TR	5.95	5.55
tblVehicleTrips	SU_TR	25.24	16.15
tblVehicleTrips	WD_TR	4.20	3.66
tblVehicleTrips	WD_TR	8.17	7.80
tblVehicleTrips	WD_TR	42.70	28.89
tblWater	IndoorWaterUseRate	11,141,338.38	8,979,000.00
tblWater	IndoorWaterUseRate	1,902,507.75	687,484.00
tblWater	IndoorWaterUseRate	994,053.24	559.18
tblWater	OutdoorWaterUseRate	7,023,887.24	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	609,258.44	0.00
tblWoodstoves	NumberCatalytic	8.55	0.00
tblWoodstoves	NumberNoncatalytic	8.55	0.00

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					
2019	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
Maximum	**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**

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					
2019	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
Maximum	**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**

	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**

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	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117
Energy	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966
Mobile	2.3920	9.4645	28.8033	0.1044	9.5620	0.0797	9.6417	2.5570	0.0742	2.6311		10,596.8647	10,596.8647	0.4610		10,608.3902
Total	**9.1640**	**13.6029**	**44.9988**	**0.1302**	**9.5620**	**0.4754**	**10.0375**	**2.5570**	**0.4699**	**3.0269**	**0.0000**	**15,638.2437**	**15,638.2437**	**0.5821**	**0.0920**	**15,680.1985**

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	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117
Energy	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966
Mobile	2.3920	9.4645	28.8033	0.1044	9.5620	0.0797	9.6417	2.5570	0.0742	2.6311		10,596.8647	10,596.8647	0.4610		10,608.3902
Total	**9.1640**	**13.6029**	**44.9988**	**0.1302**	**9.5620**	**0.4754**	**10.0375**	**2.5570**	**0.4699**	**3.0269**	**0.0000**	**15,638.2437**	**15,638.2437**	**0.5821**	**0.0920**	**15,680.1985**

	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	Demolition	Demolition	7/1/2019	7/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	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
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

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	0.0000	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
Total	**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**

3.2 Demolition - 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	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
Total	**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**

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	0.0000	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
Total	**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**

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	2.3920	9.4645	28.8033	0.1044	9.5620	0.0797	9.6417	2.5570	0.0742	2.6311		10,596.8647	10,596.8647	0.4610		10,608.3902
Unmitigated	2.3920	9.4645	28.8033	0.1044	9.5620	0.0797	9.6417	2.5570	0.0742	2.6311		10,596.8647	10,596.8647	0.4610		10,608.3902

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	626.03	637.15	504.96	2,085,568	2,085,568
Enclosed Parking with Elevator	0.00	0.00	0.00		
Hotel	585.08	573.15	416.40	1,334,526	1,334,526
Regional Shopping Center	387.67	473.62	216.69	741,062	741,062
Total	1,598.78	1,683.92	1,138.05	4,161,156	4,161,156

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
Apartments High Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Hotel	16.60	8.40	6.90	19.40	61.60	19.00	58	38	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	12	34

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Enclosed Parking with Elevator	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966
NaturalGas Unmitigated	0.1414	1.2543	0.8491	7.7100e-003		0.0977	0.0977		0.0977	0.0977		1,542.9278	1,542.9278	0.0296	0.0283	1,552.0966

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					
Apartments High Rise	5353.69	0.0577	0.4934	0.2100	3.1500e-003		0.0399	0.0399		0.0399	0.0399		629.8455	629.8455	0.0121	0.0116	633.5884
Enclosed Parking with Elevator	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
Hotel	7687.67	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	73.5288	7.9000e-004	7.2100e-003	6.0600e-003	4.0000e-005		5.5000e-004	5.5000e-004		5.5000e-004	5.5000e-004		8.6504	8.6504	1.7000e-004	1.6000e-004	8.7019
Total		**0.1414**	**1.2543**	**0.8491**	**7.7100e-003**		**0.0977**	**0.0977**		**0.0977**	**0.0977**		**1,542.9278**	**1,542.9278**	**0.0296**	**0.0283**	**1,552.0966**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	5.35369	0.0577	0.4934	0.2100	3.1500e-003		0.0399	0.0399		0.0399	0.0399		629.8455	629.8455	0.0121	0.0116	633.5884
Enclosed Parking with Elevator	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
Hotel	7.68767	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	0.0735288	7.9000e-004	7.2100e-003	6.0600e-003	4.0000e-005		5.5000e-004	5.5000e-004		5.5000e-004	5.5000e-004		8.6504	8.6504	1.7000e-004	1.6000e-004	8.7019
Total		**0.1414**	**1.2543**	**0.8491**	**7.7100e-003**		**0.0977**	**0.0977**		**0.0977**	**0.0977**		**1,542.9278**	**1,542.9278**	**0.0296**	**0.0283**	**1,552.0966**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117
Unmitigated	6.6305	2.8841	15.3464	0.0181		0.2981	0.2981		0.2981	0.2981	0.0000	3,498.4512	3,498.4512	0.0915	0.0637	3,519.7117

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4331	0.1637	14.1887	7.5000e-004		0.0781	0.0781		0.0781	0.0781		25.5100	25.5100	0.0249		26.1326
Total	**6.6305**	**2.8841**	**15.3464**	**0.0181**		**0.2981**	**0.2981**		**0.2981**	**0.2981**	**0.0000**	**3,498.4512**	**3,498.4512**	**0.0915**	**0.0637**	**3,519.7117**

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4331	0.1637	14.1887	7.5000e-004		0.0781	0.0781		0.0781	0.0781		25.5100	25.5100	0.0249		26.1326
Total	**6.6305**	**2.8841**	**15.3464**	**0.0181**		**0.2981**	**0.2981**		**0.2981**	**0.2981**	**0.0000**	**3,498.4512**	**3,498.4512**	**0.0915**	**0.0637**	**3,519.7117**

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 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

3rd & Broadway (Operations)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	403.00	Space	0.00	240,263.00	0
Hotel	75.00	Room	0.48	81,927.00	0
Apartments High Rise	171.00	Dwelling Unit	0.82	169,230.00	489
Regional Shopping Center	13.42	1000sqft	0.00	13,419.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	480	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Operations) - Orange County, Annual

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2021 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on ITE 10th Edition.

Woodstoves - Rule 445

Energy Use -

Water And Wastewater - Water Usage based on the Demand Factors provided in the City of Santa Ana WSA for the proposed Transit Zoning Code (January 2010)

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	47673	48624
tblAreaCoating	Area_Nonresidential_Interior	143019	145871
tblConstructionPhase	NumDays	20.00	1.00
tblFireplaces	NumberGas	145.35	164.00
tblFireplaces	NumberNoFireplace	17.10	0.00
tblFireplaces	NumberWood	8.55	0.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	171,000.00	169,230.00
tblLandUse	LotAcreage	3.63	0.00
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	2.76	0.82
tblLandUse	LotAcreage	0.31	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	480
tblSolidWaste	SolidWasteGenerationRate	78.66	75.44
tblSolidWaste	SolidWasteGenerationRate	14.09	16.09
tblVehicleTrips	DV_TP	35.00	12.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	ST_TR	4.98	3.73
tblVehicleTrips	ST_TR	8.19	7.64
tblVehicleTrips	ST_TR	49.97	35.30
tblVehicleTrips	SU_TR	3.65	2.95
tblVehicleTrips	SU_TR	5.95	5.55
tblVehicleTrips	SU_TR	25.24	16.15
tblVehicleTrips	WD_TR	4.20	3.66
tblVehicleTrips	WD_TR	8.17	7.80
tblVehicleTrips	WD_TR	42.70	28.89
tblWater	IndoorWaterUseRate	11,141,338.38	8,979,000.00
tblWater	IndoorWaterUseRate	1,902,507.75	687,484.00
tblWater	IndoorWaterUseRate	994,053.24	559.18
tblWater	OutdoorWaterUseRate	7,023,887.24	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	609,258.44	0.00
tblWoodstoves	NumberCatalytic	8.55	0.00
tblWoodstoves	NumberNoncatalytic	8.55	0.00

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					
2019	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
Maximum	**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**

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					
2019	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
Maximum	**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**

	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**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

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	1.1311	0.0545	1.7881	3.1000e-004		0.0125	0.0125		0.0125	0.0125	0.0000	42.2753	42.2753	3.5800e-003	7.2000e-004	42.5799
Energy	0.0258	0.2289	0.1550	1.4100e-003		0.0178	0.0178		0.0178	0.0178	0.0000	904.6705	904.6705	0.0441	0.0128	909.5875
Mobile	0.3859	1.6079	4.8801	0.0177	1.5781	0.0133	1.5915	0.4226	0.0124	0.4350	0.0000	1,634.2044	1,634.2044	0.0698	0.0000	1,635.9497
Waste						0.0000	0.0000		0.0000	0.0000	26.9146	0.0000	26.9146	1.5906	0.0000	66.6797
Water						0.0000	0.0000		0.0000	0.0000	3.0669	27.4060	30.4729	0.3167	7.7800e-003	40.7078
Total	**1.5428**	**1.8913**	**6.8232**	**0.0195**	**1.5781**	**0.0436**	**1.6218**	**0.4226**	**0.0427**	**0.4654**	**29.9815**	**2,608.5562**	**2,638.5377**	**2.0248**	**0.0213**	**2,695.5046**

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	1.1311	0.0545	1.7881	3.1000e-004		0.0125	0.0125		0.0125	0.0125	0.0000	42.2753	42.2753	3.5800e-003	7.2000e-004	42.5799
Energy	0.0258	0.2289	0.1550	1.4100e-003		0.0178	0.0178		0.0178	0.0178	0.0000	904.6705	904.6705	0.0441	0.0128	909.5875
Mobile	0.3859	1.6079	4.8801	0.0177	1.5781	0.0133	1.5915	0.4226	0.0124	0.4350	0.0000	1,634.2044	1,634.2044	0.0698	0.0000	1,635.9497
Waste						0.0000	0.0000		0.0000	0.0000	26.9146	0.0000	26.9146	1.5906	0.0000	66.6797
Water						0.0000	0.0000		0.0000	0.0000	3.0669	27.4060	30.4729	0.3167	7.7800e-003	40.7078
Total	**1.5428**	**1.8913**	**6.8232**	**0.0195**	**1.5781**	**0.0436**	**1.6218**	**0.4226**	**0.0427**	**0.4654**	**29.9815**	**2,608.5562**	**2,638.5377**	**2.0248**	**0.0213**	**2,695.5046**

	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	Demolition	Demolition	7/1/2019	7/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	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
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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	0.0000	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
Total	**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**

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	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
Total	**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**

3.2 Demolition - 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	0.0000	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
Total	**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**

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	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
Total	**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**

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	0.3859	1.6079	4.8801	0.0177	1.5781	0.0133	1.5915	0.4226	0.0124	0.4350	0.0000	1,634.2044	1,634.2044	0.0698	0.0000	1,635.9497
Unmitigated	0.3859	1.6079	4.8801	0.0177	1.5781	0.0133	1.5915	0.4226	0.0124	0.4350	0.0000	1,634.2044	1,634.2044	0.0698	0.0000	1,635.9497

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	626.03	637.15	504.96	2,085,568	2,085,568
Enclosed Parking with Elevator	0.00	0.00	0.00		
Hotel	585.08	573.15	416.40	1,334,526	1,334,526
Regional Shopping Center	387.67	473.62	216.69	741,062	741,062
Total	1,598.78	1,683.92	1,138.05	4,161,156	4,161,156

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
Apartments High Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Hotel	16.60	8.40	6.90	19.40	61.60	19.00	58	38	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	12	34

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Enclosed Parking with Elevator	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	649.2215	649.2215	0.0392	8.1200e-003	652.6205
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	649.2215	649.2215	0.0392	8.1200e-003	652.6205
NaturalGas Mitigated	0.0258	0.2289	0.1550	1.4100e-003		0.0178	0.0178		0.0178	0.0178	0.0000	255.4490	255.4490	4.9000e-003	4.6800e-003	256.9670
NaturalGas Unmitigated	0.0258	0.2289	0.1550	1.4100e-003		0.0178	0.0178		0.0178	0.0178	0.0000	255.4490	255.4490	4.9000e-003	4.6800e-003	256.9670

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					
Apartments High Rise	1.9541e+006	0.0105	0.0900	0.0383	5.7000e-004		7.2800e-003	7.2800e-003		7.2800e-003	7.2800e-003	0.0000	104.2780	104.2780	2.0000e-003	1.9100e-003	104.8977
Enclosed Parking with Elevator	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
Hotel	2.806e+006	0.0151	0.1376	0.1155	8.3000e-004		0.0105	0.0105		0.0105	0.0105	0.0000	149.7388	149.7388	2.8700e-003	2.7500e-003	150.6287
Regional Shopping Center	26838	1.4000e-004	1.3200e-003	1.1100e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	1.4322	1.4322	3.0000e-005	3.0000e-005	1.4407
Total		**0.0258**	**0.2289**	**0.1550**	**1.4100e-003**		**0.0178**	**0.0178**		**0.0178**	**0.0178**	**0.0000**	**255.4490**	**255.4490**	**4.9000e-003**	**4.6900e-003**	**256.9670**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	1.9541e+006	0.0105	0.0900	0.0383	5.7000e-004		7.2800e-003	7.2800e-003		7.2800e-003	7.2800e-003	0.0000	104.2780	104.2780	2.0000e-003	1.9100e-003	104.8977
Enclosed Parking with Elevator	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
Hotel	2.806e+006	0.0151	0.1376	0.1155	8.3000e-004		0.0105	0.0105		0.0105	0.0105	0.0000	149.7388	149.7388	2.8700e-003	2.7500e-003	150.6287
Regional Shopping Center	26838	1.4000e-004	1.3200e-003	1.1100e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	1.4322	1.4322	3.0000e-005	3.0000e-005	1.4407
Total		**0.0258**	**0.2289**	**0.1550**	**1.4100e-003**		**0.0178**	**0.0178**		**0.0178**	**0.0178**	**0.0000**	**255.4490**	**255.4490**	**4.9000e-003**	**4.6900e-003**	**256.9670**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	679776	148.0038	8.9400e-003	1.8500e-003	148.7787
Enclosed Parking with Elevator	1.40794e+006	306.5431	0.0185	3.8300e-003	308.1479
Hotel	740620	161.2510	9.7400e-003	2.0200e-003	162.0952
Regional Shopping Center	153513	33.4236	2.0200e-003	4.2000e-004	33.5986
Total		**649.2215**	**0.0392**	**8.1200e-003**	**652.6205**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	679776	148.0038	8.9400e-003	1.8500e-003	148.7787
Enclosed Parking with Elevator	1.40794e+006	306.5431	0.0185	3.8300e-003	308.1479
Hotel	740620	161.2510	9.7400e-003	2.0200e-003	162.0952
Regional Shopping Center	153513	33.4236	2.0200e-003	4.2000e-004	33.5986
Total		**649.2215**	**0.0392**	**8.1200e-003**	**652.6205**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	1.1311	0.0545	1.7881	3.1000e-004		0.0125	0.0125		0.0125	0.0125	0.0000	42.2753	42.2753	3.5800e-003	7.2000e-004	42.5799
Unmitigated	1.1311	0.0545	1.7881	3.1000e-004		0.0125	0.0125		0.0125	0.0125	0.0000	42.2753	42.2753	3.5800e-003	7.2000e-004	42.5799

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	0.1014					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9716					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.9800e-003	0.0340	0.0145	2.2000e-004		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	39.3825	39.3825	7.5000e-004	7.2000e-004	39.6165
Landscaping	0.0541	0.0205	1.7736	9.0000e-005		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003	0.0000	2.8928	2.8928	2.8200e-003	0.0000	2.9634
Total	**1.1311**	**0.0545**	**1.7881**	**3.1000e-004**		**0.0125**	**0.0125**		**0.0125**	**0.0125**	**0.0000**	**42.2753**	**42.2753**	**3.5700e-003**	**7.2000e-004**	**42.5799**

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	0.1014					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9716					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.9800e-003	0.0340	0.0145	2.2000e-004		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	39.3825	39.3825	7.5000e-004	7.2000e-004	39.6165
Landscaping	0.0541	0.0205	1.7736	9.0000e-005		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003	0.0000	2.8928	2.8928	2.8200e-003	0.0000	2.9634
Total	**1.1311**	**0.0545**	**1.7881**	**3.1000e-004**		**0.0125**	**0.0125**		**0.0125**	**0.0125**	**0.0000**	**42.2753**	**42.2753**	**3.5700e-003**	**7.2000e-004**	**42.5799**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	30.4729	0.3167	7.7800e-003	40.7078
Unmitigated	30.4729	0.3167	7.7800e-003	40.7078

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	8.979 / 0	28.3040	0.2941	7.2300e-003	37.8105
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
Hotel	0.687484 / 0	2.1671	0.0225	5.5000e-004	2.8950
Regional Shopping Center	0.00055918 / 0	1.7600e-003	2.0000e-005	0.0000	2.3500e-003
Total		**30.4729**	**0.3167**	**7.7800e-003**	**40.7078**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	8.979 / 0	28.3040	0.2941	7.2300e-003	37.8105
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
Hotel	0.687484 / 0	2.1671	0.0225	5.5000e-004	2.8950
Regional Shopping Center	0.00055918 / 0	1.7600e-003	2.0000e-005	0.0000	2.3500e-003
Total		**30.4729**	**0.3167**	**7.7800e-003**	**40.7078**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	26.9146	1.5906	0.0000	66.6797
Unmitigated	26.9146	1.5906	0.0000	66.6797

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	75.44	15.3136	0.9050	0.0000	37.9389
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
Hotel	41.06	8.3348	0.4926	0.0000	20.6491
Regional Shopping Center	16.09	3.2661	0.1930	0.0000	8.0917
Total		**26.9146**	**1.5906**	**0.0000**	**66.6797**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	75.44	15.3136	0.9050	0.0000	37.9389
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
Hotel	41.06	8.3348	0.4926	0.0000	20.6491
Regional Shopping Center	16.09	3.2661	0.1930	0.0000	8.0917
Total		**26.9146**	**1.5906**	**0.0000**	**66.6797**

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix C Air Quality Study

Appendix

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Caribou Industries Proposal for the 3rd Street Promenade

LOCATED AT: 3rd & Broadway

AIR QUALITY IMPACT ANALYSIS

CITY OF SANTA ANA

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FEBRUARY 14, 2019

PREPARED FOR: CARIBOU INDUSTRIES, INC.

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LIST OF ABBREVIATED TERMS

(1)	Reference
µg/m^3	Microgram per Cubic Meter
AADT	Annual Average Daily Trips
AQIA	Air Quality Impact Analysis
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
BACM	Best Available Control Measures
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DPM	Diesel Particulate Matter
EPA	Environmental Protection Agency
LST	Localized Significance Threshold
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen Dioxide
NO_X	Oxides of Nitrogen
Pb	Lead
PM_{10}	Particulate Matter 10 microns in diameter or less
$PM_{2.5}$	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Caribou Industries Proposal for the 3rd Street Promenade
ROG	Reactive Organic Gases
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SIPs	State Implementation Plans
SRA	Source Receptor Area
TAC	Toxic Air Contaminant
TIA	Traffic Impact Analysis

TOG	Total Organic Gases
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
VPH	Vehicles Per Hour

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EXECUTIVE SUMMARY

Pursuant to CEQA § 15164 (a) the lead agency shall prepare an addendum to a previously certified Environmental Impact Report (EIR) if some changes or additions are necessary but none of the conditions described in §15162 calling for preparation of a subsequent EIR have occurred. More specifically, §15162 (a)(3)(B) states that no subsequent EIR shall be prepared for the project unless significant effects previously examined will be substantially more severe than shown in the previous EIR. Significant and unavoidable construction and operational impacts were previously identified and disclosed in the previously analyzed *Transit Zoning Code (TZC) Environmental Impact Report (EIR)* (TZC EIR), which determined that construction and operational-related emissions of Volatile Organic Compounds (VOCs), Carbon Monoxide (CO), Oxides of Nitrogen (NO_X), Particulate Matter ≤ 10 Microns (PM_{10}), and Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$) would exceed the SCAQMD's thresholds of significance before implementation of mitigation (1).

The current air quality study prepared for the proposed Project utilizes similar analysis methodologies and assumptions as that assumed and evaluated in the TZC EIR. Based on the project-specific analysis, the Project's air quality emissions would be less than what was disclosed in the TZC EIR; thus, the Project would not result in any new or more severe impacts to air quality beyond what was disclosed by the TZC EIR.

SUMMARY OF CEQA SIGNIFICANCE FINDINGS & MITIGATION MEASURES

The results of this *Caribou Industries Proposal for the 3rd Street Promenade Air Quality Impact Analysis* are summarized below based on the significance criteria in Section 3 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines (2). The Project is required to incorporate applicable mitigation measures from the and the TZC EIR. Table ES-1 shows the findings of significance for each potential air quality impact under CEQA for the Project prior to implementation of TZC EIR mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Significance Findings		Section	New Significant Impact
	TZC EIR	Proposed Project		
Conflict with or obstruct implementation of the applicable air quality plan	*Less Than Significant*	*Less Than Significant*	***3.9***	***NO***
Violate any air quality standard or contribute substantially to an existing or projected air quality violation	*Significant and Unavoidable*	*Less Than Significant*	***3.4, 3.5***	***NO***
Result in a cumulatively considerable net increase of any criteria pollutant for which the proposed project region is in non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)	*Significant and Unavoidable*	*Less Than Significant*	***3.4, 3.5, 3.12***	***NO***
Expose sensitive receptors to substantial pollutant concentrations	*Less Than Significant*	*Less Than Significant*	***3.6, 3.7, 3.8, 3.10***	***NO***
Create objectionable odors affecting a substantial number of people	*Less Than Significant*	*Less Than Significant*	***3.11***	***NO***

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1 INTRODUCTION

This report presents the results of the air quality impact analysis (AQIA) prepared by Urban Crossroads, Inc., for the Caribou Industries Proposal for the 3rd Street Promenade Project (referred to as "Project").

The purpose of this AQIA is to evaluate the potential impacts to air quality associated with construction and operation of the proposed Project and recommend measures to mitigate impacts considered potentially significant in comparison to established air district thresholds.

1.1 SITE LOCATION

The Project site is located east of North Broadway and north of 3rd Street in the City of Santa Ana, as shown on Exhibit 1-A. The Project is within a transit priority area as defined by Public Resources Code (PRC) Section 21099(a)(7) and shall incorporate all of the adopted Mitigation Measures (MM) identified in the *Transit Zoning Code (TZC) Environmental Impact Report (EIR)* (1) and Section 1.3 of this AQIA. The proposed Project is located approximately 4,600 feet southwest of Interstate 5 (I-5).

The Project site is currently occupied by an existing parking garage. Existing land uses in the Project study area include commercial uses to the north, south, east, and west. An existing church use is located in an adjacent commercial building at the eastern Project site boundary which operates over limited daytime hours (3). Existing residential uses representing the closest sensitive receptor locations to the Project site are situated south and southwest of the Project site of the Project site across 3rd Street.

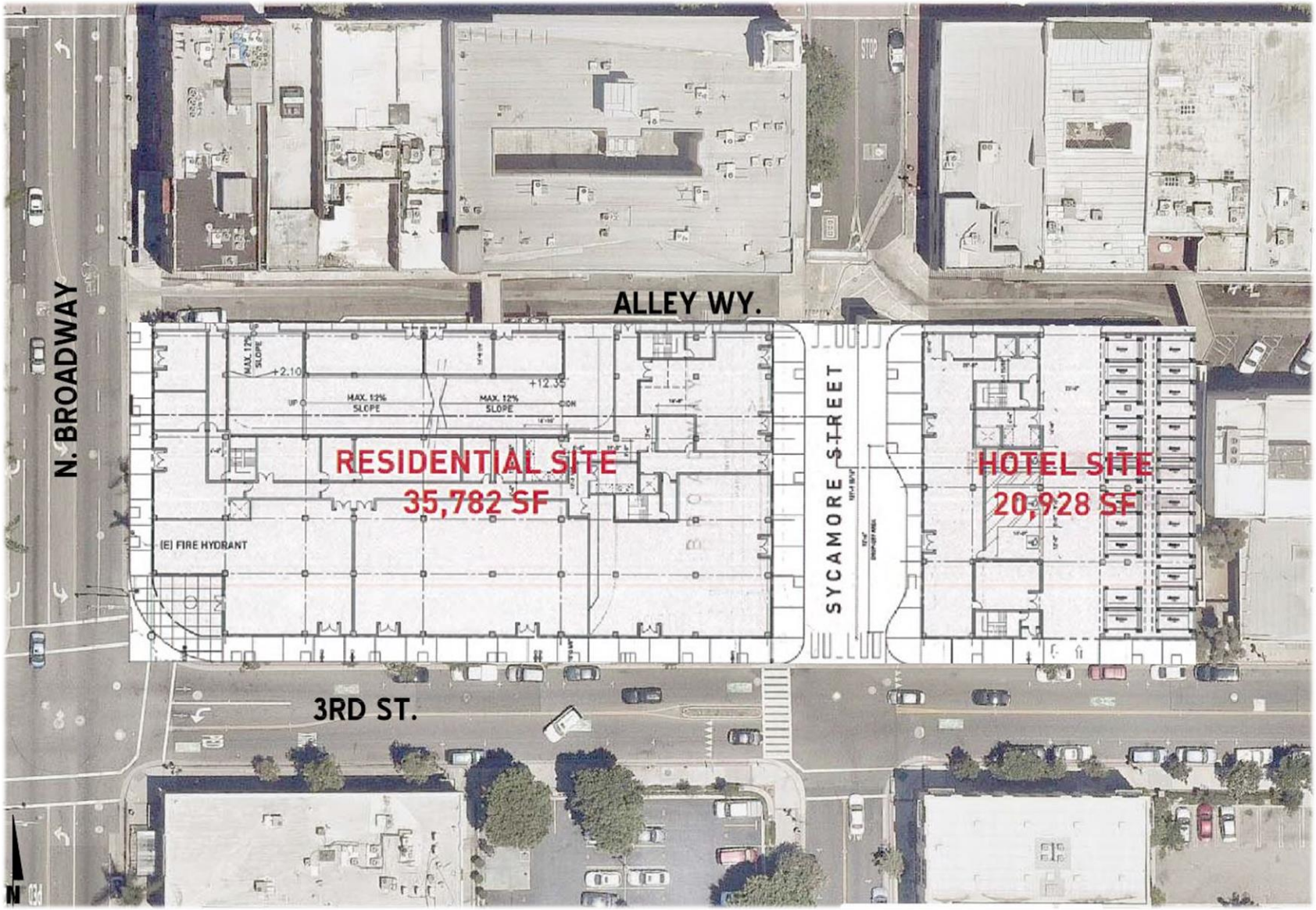
1.2 PROJECT DESCRIPTION

The proposed Project is to consist of up to 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), and roof-top amenities ancillary to residential and hotel uses, as shown on Exhibit 1-B.

EXHIBIT 1-A: LOCATION MAP



EXHIBIT 1-B: SITE PLAN



1.3 TZC EIR MITIGATION MEASURES

The TZA EIR mitigation measures for air quality are shown below; the Project is required to comply with all of these mitigation measures. It should be noted that there is no way to quantify all reductions in CalEEMod. As such, the Project's impacts only reflect implementation of MM Air 5 and MM Air 18.

MM Air 1

Trash receptacles within the Transit Zoning Code (SD 84A and SD 84B) will be required to have lids that enable convenient collection and loading and will be emptied on a regular basis, in compliance with City of Santa Ana regulations for the collection of solid waste.

MM Air 2

The construction contractor shall ensure that no more than 5 acres per day are actively graded or developed.

MM Air 3

The construction contractor shall ensure that all active disturbed surfaces should be watered three times per day throughout the construction period.

MM Air 4

The construction contractor shall ensure that the mass grading, fine grading, and structure construction are conducted at separate time periods and do not overlap with one another.

MM Air 5

The construction contractor shall ensure that all haul roads are watered three (3) times per day.

MM Air 6

The construction contractor shall ensure that all traffic on unpaved roads is reduced to 15 mph or less.

MM Air 7

Project applicants shall require by contract specifications that all diesel-powered equipment used will be retrofitted with after-treatment products (e.g., engine catalysts) to the extent that they are readily available in the South Coast Air Basin. Contract specifications shall be included in project construction documents, which shall be reviewed by the City of Santa Ana prior to issuance of a grading permit.

MM Air 8

Project applicants shall require by contract specifications that all heavy-duty diesel-powered equipment operating and refueling at the project site use low- NO_X diesel fuel to the extent that it is readily available and cost effective (up to 125 percent of the cost of California Air Resources Board diesel) in the South Coast Air Basin (this does not apply to diesel-powered trucks traveling

to and from the project site). Contract specifications shall be included in project construction documents, which shall be reviewed by the City of Santa Ana prior to issuance of a grading permit.

MM Air 9

Project applicants shall require by contract specifications that alternative fuel construction equipment (i.e., compressed natural gas, liquid petroleum gas, and unleaded gasoline) be utilized to the extent that the equipment is readily available and cost effective in the South Coast Air Basin. Contract specifications shall be included in project construction documents, which shall be reviewed by the City of Santa Ana prior to issuance of a grading permit.

MM Air 10

Project applicants shall require by contract specifications that construction equipment engines be maintained in good condition and in proper tune per manufacturer's specification for the duration of construction. Contract specifications shall be included in project construction documents, which shall be reviewed by the City of Santa Ana prior to issuance of a grading permit.

MM Air 11

Project applicants shall require by contract specifications that construction operations rely on the electricity infrastructure surrounding the construction site rather than electrical generators powered by internal combustion engines to the extent feasible. Contract specifications shall be included in project construction documents, which shall be reviewed by the City of Santa Ana prior to issuance of a grading permit.

MM Air 12

As required by South Coast Air Quality Management District Rule 403—Fugitive Dust, all construction activities that are capable of generating fugitive dust are required to implement dust control measures during each phase of project development to reduce the amount of particulate matter entrained in the ambient air. These measures include the following:

- Application of soil stabilizers to inactive construction areas
- Quick replacement of ground cover in disturbed areas
- Watering of exposed surfaces three times daily
- Watering of all unpaved haul roads three times daily
- Covering all stock piles with tarp
- Reduction of vehicle speed on unpaved roads
- Post signs on-site limiting traffic to 15 miles per hour or less
- Sweep streets adjacent to the project site at the end of the day if visible soil material is carried over to adjacent roads
- Cover or have water applied to the exposed surface of all trucks hauling dirt, sand, soil, or other loose materials prior to leaving the site to prevent dust from impacting the surrounding areas
- Install wheel washers where vehicles enter and exit unpaved roads onto paved roads to wash off trucks and any equipment leaving the site each trip

MM Air 13

The developer shall require by contract specifications that construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 30 minutes. Diesel-fueled commercial motor vehicles with gross vehicular weight ratings of greater than 10,000 pounds shall be turned off when not in use for more than 5 minutes. Contract specifications shall be included in the proposed project construction documents, which shall be approved by the City of Santa Ana.

MM Air 14

The developer shall require by contract specifications that construction parking be configured to minimize traffic interference during the construction period and, therefore, reduce idling of traffic. Contract specifications shall be included in the proposed project construction documents, which shall be approved by the City of Santa Ana.

MM Air 15

The developer shall require by contract specifications that temporary traffic controls are provided, such as a flag person, during all phases of construction to maintain smooth traffic flow. Contract specifications shall be included in the proposed project construction documents, which shall be approved by the City of Santa Ana.

MM Air 16

The developer shall require by contract specifications that construction activities that affect traffic flow on the arterial system by scheduled to off-peak hours (9:00 A.M. to 3:00 P.M.). Contract specifications shall be included in the proposed project construction documents, which shall be approved by the City of Santa Ana.

MM Air 17

Upon issuance of building or grading permits, whichever is issued earliest, notification shall be mailed to owners and occupants of all developed land uses within ¼ mile of any project within the Transit Zoning Code (SD 84A and SD 84B) boundaries greater than four stories in height or 25,000 sf in area providing a schedule for major construction activities that will occur through the duration of the construction period. In addition, the notification will include the identification and contact number for a community liaison and designated construction manager that would be available on site to monitor construction activities. The construction manager shall be responsible for complying with all project requirements related to PM10 generation. The construction manager will be located at the on-site construction office during construction hours for the duration of all construction activities. Contact information for the community liaison and construction manager will be located at the construction office, City Hall, the police department, and a sign on site.

MM Air 18

The developer shall require by contract specifications that the architectural coating (paint and primer) products used would have a VOC rating of 125 grams per liter or less. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed and approved by the City of Santa Ana.

MM Air 19

The developer shall require by contract specifications that materials that do not require painting be used during construction to the extent feasible. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed and approved by the City of Santa Ana.

MM Air 20

The developer shall require by contract specifications that pre-painted construction materials be used to the extent feasible. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed and approved by the City of Santa Ana.

MM Air 21

As individual components of the Transit Zoning Code (SD 84A and SD 84B) are implemented, an air quality impact analysis will be completed to determine their independent significance levels. Mitigation is to be incorporated at the individual component level to bring the individual components to less than significant on a site-by-site basis.

MM Air 22

Prior to issuance of a building permit, the applicant shall demonstrate that the design of the proposed buildings or structures exceeds current Title 24 requirements (Title 24, Part 6 of the California Code of Regulations; The Energy Commission adopted the 2008 Standards on April 23, 2008, and the Building Standards Commission approved them for publication on September 11, 2008. The 2008 Residential Compliance Manual was adopted by the Commission on December 17, 2008, and the 2008 Non-residential Compliance Manual was adopted January 14, 2009.Energy Efficiency Standards for Residential and Non-Residential Buildings, as amended November 1, 2005; Cool Roof Coatings performance standards as amended September 11, 2006) by a minimum of 20 percent, subject to review by the County Building Official. Documentation of compliance with this measure shall be provided to the Planning Department and Building Official for review and approval prior to issuance of the permit. Installation of the identified design features or equipment will be confirmed by the County Building Official prior to certificate of occupancy. Any combination of the following design features may be used to fulfill this mitigation provided that the total increase in efficiency meets or exceeds 20 percent:

- Increase in insulation such that heat transfer and thermal bridging is minimized
- Limit air leakage through the structure or within the heating and cooling distribution system to minimize energy consumption
- Incorporate dual-paned or other energy efficient windows

- Incorporate energy efficient space heating and cooling equipment
- Incorporate energy efficient light fixtures
- Incorporate energy efficient appliances
- Incorporate energy efficient domestic hot water systems
- Incorporate solar panels into the electrical system
- Incorporate cool roofs/light-colored roofing
- Or other measures that will increase the energy efficiency of building envelope in a manner that when combined with the other options listed above exceeds current Title 24 Standards (Title 24, Part 6 of the California Code of Regulations; Energy Efficiency Standards for Residential and Non Residential Buildings, as amended November 1, 2005; Cool Roof Coatings performance standards as amended September 11, 2006) by a minimum of 20 percent

MM Air 23

Prior to issuance of a building permit, the applicant shall provide a landscape plan for the Project that includes shade trees around main buildings, particularly along southern elevations where practical, and will not interfere with loading dock locations or other operational constraints. Documentation of compliance with this measure shall be provided to the City Building Official for review and approval.

MM Air 24

Prior to issuance of a building permit, the applicant shall demonstrate that the proposed building or structure designs incorporate exterior storage areas for recyclables and green waste and adequate recycling containers located in public areas. Documentation of compliance with this measure shall be provided to the City Building Official for review and approval. Installation of the identified design features or equipment will be confirmed by the City Building Official prior to issuance of certificate of occupancy.

MM Air 25

The applicant shall provide education and publicity about reducing waste and available recycling services to future tenants. The education and publicity materials shall be provided to the City for review and approval by the Planning Department.

MM Air 26

All showerheads, lavatory faucets, and sink faucets within the residential units shall comply with the California Energy Conservation flow rate standards.

MM Air 27

Low-flush toilets shall be installed within all commercial and residential (including Congregate Care) units as specified in California State Health and Safety Code Section 17921.3.

MM Air 28

All commercial/industrial/common area irrigation areas shall be capable of being operated by a computerized irrigation system which includes an on-site weather station/ET gage capable of reading current weather data and making automatic adjustments to independent run times for each irrigation valve based on changes in temperature, solar radiation, relative humidity, rain, and wind. In addition, the computerized irrigation system shall be equipped with flow-sensing capabilities, thus automatically shutting down the irrigation system in the event of a mainline break or broken head. These features will assist in conserving water, eliminating the potential of slope failure due to mainline breaks, and eliminating over-watering and flooding due to pipe and/or head breaks.

MM Air 29

Landscape designers shall ensure that Project landscaping of commercial/industrial/common areas uses drought-tolerant and smog-tolerant trees, shrubs, and groundcover to ensure long-term viability and conserve water and energy.

MM Air 30

Landscape designers shall ensure that the landscape plan includes drought resistant trees, shrubs, and groundcover within the parking lot and perimeter.

MM Air 31

Project designers shall ensure that design features incorporate light-colored roofing materials that will deflect heat away from the building and conserve energy.

MM Air 32

The Project designers shall ensure that designs include all illumination elements to have controls to allow selective use as an energy conservation measure.

MM Air 33

Prior to issuance of a building permit, the applicant shall demonstrate that measures have been included to promote ride sharing programs such as, but not necessarily including, publishing ride sharing information for all of the tenants, designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading and waiting areas for ride sharing vehicles, and providing a website or message board for coordinating rides. Documentation of compliance with this measure shall be provided to the City Building Official for review and approval. Installation of the identified design features or equipment will be confirmed by the City Building Official prior to issuance of certificate of occupancy.

MM Air 34

Prior to issuance of a building permit, the applicant shall demonstrate that measures have been included to provide adequate bicycle parking near building entrances to promote cyclist safety, security, and convenience. Documentation of compliance with this measure shall be provided to

the City Building Official for review and approval. Installation of the identified design features or equipment will be confirmed by the City Building Official prior to issuance of certificate of occupancy.

MM Air 35

Prior to issuance of any certificate of occupancy, the applicant shall demonstrate that all interior building lighting supports the use of compact fluorescent light bulbs or equivalently efficient lighting to the satisfaction of the City Building Official.

MM Air 36

Tenants shall be responsible to ensure that preferential parking spaces are allocated to ultra-low emission vehicles and alternative fueled vehicles to encourage the use of alternative fuels and ultra-low emission vehicles.

1.4 Additional Construction and Operational-Source Mitigation Measures

The Project would not exceed the thresholds of significance for construction and operational-source emissions. As such, a less than significant impact would occur for Project-related construction and operational-source emissions and no mitigation beyond what those identified in the TZC EIR would be required.

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2 AIR QUALITY SETTING

This section provides an overview of the existing air quality conditions in the Project area and region.

2.1 SOUTH COAST AIR BASIN

The Project site is located in the South Coast Air Basin (SCAB) within the jurisdiction of SCAQMD (4). The SCAQMD was created by the 1977 Lewis-Presley Air Quality Management Act, which merged four county air pollution control bodies into one regional district. Under the Act, the SCAQMD is responsible for bringing air quality in areas under its jurisdiction into conformity with federal and state air quality standards. As discussed above, the Project site is located within the SCAB, a 6,745-square mile subregion of the SCAQMD, which includes portions of Los Angeles, Riverside, and San Bernardino Counties, and all of Orange County. The larger South Coast district boundary includes 10,743 square miles.

The SCAB is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Los Angeles County portion of the Mojave Desert Air Basin is bounded by the San Gabriel Mountains to the south and west, the Los Angeles / Kern County border to the north, and the Los Angeles / San Bernardino County border to the east. The Riverside County portion of the Salton Sea Air Basin is bounded by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley.

2.2 REGIONAL CLIMATE

The regional climate has a substantial influence on air quality in the SCAB. In addition, the temperature, wind, humidity, precipitation, and amount of sunshine influence the air quality.

The annual average temperatures throughout the SCAB vary from the low to middle 60s (degrees Fahrenheit). Due to a decreased marine influence, the eastern portion of the SCAB shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the SCAB, with average minimum temperatures of 47°F in downtown Los Angeles and 36°F in San Bernardino. All portions of the SCAB have recorded maximum temperatures above 100°F.

Although the climate of the SCAB can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer. This shallow layer of sea air is an important modifier of SCAB climate. Humidity restricts visibility in the SCAB, and the conversion of sulfur dioxide to sulfates is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. The annual average relative humidity within the SCAB is 71 percent along the coast and 59 percent inland. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90 percent of the SCAB's rainfall occurs from November through April. The annual average rainfall varies from approximately nine inches in Riverside to fourteen inches in downtown Los Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the SCAB with frequency being higher near the coast.

Due to its generally clear weather, about three-quarters of available sunshine is received in the SCAB. The remaining one-quarter is absorbed by clouds. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions. On the shortest day of the year there are approximately 10 hours of possible sunshine, and on the longest day of the year there are approximately 14 ½ hours of possible sunshine.

The importance of wind to air pollution is considerable. The direction and speed of the wind determines the horizontal dispersion and transport of the air pollutants. During the late autumn to early spring rainy season, the SCAB is subjected to wind flows associated with the traveling storms moving through the region from the northwest. This period also brings five to ten periods of strong, dry offshore winds, locally termed "Santa Anas" each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, typified by a daytime onshore sea breeze and a nighttime offshore drainage wind. Summer wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime drainage begins with the radiational cooling of the mountain slopes. Heavy, cool air descends the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the SCAB is the "Catalina Eddy," a low level cyclonic (counterclockwise) flow centered over Santa Catalina Island which results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal sections.

In the SCAB, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing which effectively acts as an impervious lid to pollutants over the entire SCAB. The mixing height for the inversion structure is normally situated 1,000 to 1,500 feet above mean sea level.

A second inversion-type forms in conjunction with the drainage of cool air off the surrounding mountains at night followed by the seaward drift of this pool of cool air. The top of this layer forms a sharp boundary with the warmer air aloft and creates nocturnal radiation inversions. These inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. They are typically only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as NO_X and CO from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

2.3 WIND PATTERNS AND PROJECT LOCATION

The distinctive climate of the Project area and the SCAB is determined by its terrain and geographical location. The Basin is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter.

Wind patterns across the south coastal region are characterized by westerly and southwesterly on-shore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season.

2.4 EXISTING AIR QUALITY

Existing air quality is measured at established SCAQMD air quality monitoring stations. Monitored air quality is evaluated in the context of ambient air quality standards. These standards are the levels of air quality that are considered safe, with an adequate margin of safety, to protect the public health and welfare. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) currently in effect are shown in Table 2-1 (5).

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to the state and federal standards presented in Table 2-1. The air quality in a region is considered to be in attainment by the state if the measured ambient air pollutant levels for O_3, CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$ are not equaled or exceeded at any time in any consecutive three-year period; and the federal standards (other than O_3, PM_{10}, $PM_{2.5}$, and those based on annual averages or arithmetic mean) are not exceeded more than once per year. The O_3 standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (1 OF 2)

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990

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TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (2 OF 2)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

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2.5 REGIONAL AIR QUALITY

Air pollution contributes to a wide variety of adverse health effects. The EPA has established national ambient air quality standards (NAAQS) for six of the most common air pollutants: carbon monoxide, lead, ozone, particulate matter, nitrogen dioxide, and sulfur dioxide which are known as criteria pollutants. The SCAQMD monitors levels of various criteria pollutants at 37 permanent monitoring stations and 5 single-pollutant source Lead (Pb) air monitoring sites throughout the air district (6). In 2017, the federal and state ambient air quality standards (NAAQS and CAAQS) were exceeded on one or more days for ozone, PM_{10}, and $PM_{2.5}$ at most monitoring locations. No areas of the SCAB exceeded federal or state standards for NO_2, SO_2, CO, sulfates or lead (6). See Table 2-2, for attainment designations for the SCAB (7) (8). Appendix 2.1 provides geographic representation of the state and federal attainment status for applicable criteria pollutants within the SCAB.

TABLE 2-2: ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SOUTH COAST AIR BASIN (SCAB)

Criteria Pollutant	State Designation	Federal Designation
Ozone – 1-hour standard	Nonattainment	Nonattainment (“Extreme”)
Ozone – 8-hour standard	Nonattainment	Nonattainment (“Extreme”)
PM_{10}	Nonattainment	Attainment (Maintenance)
$PM_{2.5}$	Nonattainment	Nonattainment (“Serious”)
Carbon Monoxide	Attainment	Attainment (Maintenance)
Nitrogen Dioxide	Attainment	Unclassifiable/Attainment
Sulfur Dioxide	Attainment	Unclassifiable/Attainment
Lead[1]	Attainment	Nonattainment (Partial)

Source: State/Federal designations were taken from http://www.arb.ca.gov/desig/adm/adm.htm
Note: See Appendix 2.1 for a detailed map of State/National Area Designations within the South Coast Air Basin

2.6 LOCAL AIR QUALITY

Relative to the Project site, the nearest long-term air quality monitoring site for Ozone (O_3), Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Inhalable Particulates (PM_{10}), and Ultra-Fine Particulates ($PM_{2.5}$) is the South Coast Air Quality Management District Central Orange County monitoring station, located approximately 6.34 miles northwest of the Project site in Anaheim (SRA 17).

The most recent three (3) years of data available is shown on Table 2-3 and identifies the number of days ambient air quality standards were exceeded for the study area, which is considered to be representative of the local air quality at the Project site. Data for O_3, NO_2, PM_{10}, and $PM_{2.5}$ for 2015 through 2017 was obtained from CARB’s iADAM Air Quality Data Statistics (9). Data for CO was obtained from the SCAQMD Air Quality Data Tables (10). It should be noted that the CO data for 2017 is currently unavailable from both CARB and SCAQMD. Additionally, data for SO_2 has

[1] The Federal nonattainment designation for lead is only applicable towards the Los Angeles County portion of the SCAB.

been omitted as attainment is regularly met in the SCAB and few monitoring stations measure SO_2 concentrations

TABLE 2-3: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2015-2017

POLLUTANT	STANDARD	YEAR		
		2015	2016	2017
Ozone				
Maximum 1-Hour Federal Concentration (ppm)		0.100	0.103	0.090
Maximum 8-Hour Federal Concentration (ppm)	>0.07 ppm	0.080	0.074	0.076
Number of Days Exceeding Federal 1-Hour Standard	>0.12 ppm	1	2	0
Number of Days Exceeding State 1-Hour Standard	>0.09 ppm	1	4	4
Number of Days Exceeding Federal 8-Hour Standard	>0.07 ppm	0	0	0
Number of Days Exceeding State 8-Hour Standard	>0.07 ppm	1	4	4
Carbon Monoxide (CO)				
Maximum 1-Hour Concentration	> 35 ppm	3.1	2.6	--
Maximum 8-Hour Concentration	> 20 ppm	2.2	2.1	--
Nitrogen Dioxide (NO_2)				
Maximum Federal 1-Hour Concentration	> 0.100 ppm	0.059	0.064	0.081
Maximum State 1-Hour Concentration	> 0.18 ppm	0.059	0.064	0.081
Annual Federal Standard Design Value		15	15	14
Annual State Standard Design Value		14	14	14
Number of Days Exceeding Federal 1-Hour Standard	> 0.18 ppm	0	0	0
Number of Days Exceeding State 1-Hour Standard	> 0.18 ppm	0	0	0
Particulate Matter ≤ 10 Microns (PM_{10})				
Maximum Federal 24-Hour Concentration ($\mu g/m^3$)	>150 $\mu g/m^3$	59.0	74.0	95.7
Annual Federal Arithmetic Mean ($\mu g/m^3$)		25.5	27.5	26.9
Number of Samples Exceeding Federal Standard	>150 $\mu g/m^3$	0	0	0
Number of Samples Exceeding State Standard	>50 $\mu g/m^3$	12.1	--	--
Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)				
Maximum Federal 24-Hour Concentration ($\mu g/m^3$)	>35 $\mu g/m^3$	45.8	44.4	53.9
Annual Federal Arithmetic Mean ($\mu g/m^3$)		--	9.4	--
Number of Samples Exceeding Federal 24-Hour Standard	>35 $\mu g/m^3$	3	1	7

Source: Data for O_3, NO_2, PM_{10}, and $PM_{2.5}$ was obtained from CARB's iADAM. Data for CO was obtained from SCAQMD Air Quality Data Tables.
-- = data not available from ARB or SCAQMD

Criteria pollutants are pollutants that are regulated through the development of human health based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and health effects are identified below (11):

- Carbon Monoxide (CO): Is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels, such as gasoline or wood. CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone, motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.
- Sulfur Dioxide (SO_2): Is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When SO_2 oxidizes in the atmosphere, it forms sulfates (SO_4). Collectively, these pollutants are referred to as sulfur oxides (SO_X).
- Nitrogen Oxides (Oxides of Nitrogen, or NO_x): Nitrogen oxides (NO_x) consist of nitric oxide (NO), nitrogen dioxide (NO_2) and nitrous oxide (N_2O) and are formed when nitrogen (N_2) combines with oxygen (O_2). Their lifespan in the atmosphere ranges from one to seven days for nitric oxide and nitrogen dioxide, to 170 years for nitrous oxide. Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Of the seven types of nitrogen oxide compounds, NO_2 is the most abundant in the atmosphere. As ambient concentrations of NO_2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO_2 than those indicated by regional monitoring station.
- Ozone (O_3): Is a highly reactive and unstable gas that is formed when volatile organic compounds (VOCs) and nitrogen oxides (NO_X), both byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.
- PM_{10} (Particulate Matter less than 10 microns): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. Particulate matter pollution is a major cause of reduce visibility (haze) which is caused by the scattering of light and consequently the significant reduction air clarity. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. Additionally, it should be noted that PM_{10} is considered a criteria air pollutant.
- $PM_{2.5}$ (Particulate Matter less than 2.5 microns): A similar air pollutant to PM_{10} consisting of tiny solid or liquid particles which are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO_2 release from power plants and industrial facilities and nitrates that are formed from NO_X release from power plants, automobiles and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. $PM_{2.5}$ is a criteria air pollutant.
- Volatile Organic Compounds (VOC): Volatile organic compounds are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the

ambient air. VOCs contribute to the formation of smog through atmospheric photochemical reactions and/or may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity; that is, they do not react at the same speed or do not form ozone to the same extent when exposed to photochemical processes. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. Exceptions to the VOC designation include: carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate. VOCs are a criteria pollutant since they are a precursor to O_3, which is a criteria pollutant. The SCAQMD uses the terms VOC and ROG (see below) interchangeably.

- Reactive Organic Gases (ROG): Similar to VOC, Reactive Organic Gases (ROG) are also precursors in forming ozone and consist of compounds containing methane, ethane, propane, butane, and longer chain hydrocarbons, which are typically the result of some type of combustion/decomposition process. Smog is formed when ROG and nitrogen oxides react in the presence of sunlight. ROGs are a criteria pollutant since they are a precursor to O_3, which is a criteria pollutant. The SCAQMD uses the terms ROG and VOC (see previous) interchangeably.
- Lead (Pb): Lead is a heavy metal that is highly persistent in the environment and is considered a criteria pollutant. In the past, the primary source of lead in the air was emissions from vehicles burning leaded gasoline. As a result of the removal of lead from gasoline, there have been no violations at any of the SCAQMD's regular air monitoring stations since 1982. The major sources of lead emissions are ore and metals processing, particularly lead smelters, and piston-engine aircraft operating on leaded aviation gasoline. Other stationary sources include waste incinerators, utilities, and lead-acid battery manufacturers. It should be noted that the Project does not include operational activities such as metal processing or lead acid battery manufacturing. As such, the Project is not anticipated to generate a quantifiable amount of lead emissions.

Health Effects of Air Pollutants

Ozone

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-groups for ozone effects. Short-term exposure (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated ozone levels are associated with increased school absences. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple outdoor sports and live in communities with high ozone levels.

Ozone exposure under exercising conditions is known to increase the severity of the responses described above. Animal studies suggest that exposure to a combination of pollutants that includes ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Carbon Monoxide

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport and competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Reduction in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO, resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels; these include pre-term births and heart abnormalities.

Particulate Matter

A consistent correlation between elevated ambient fine particulate matter (PM_{10} and $PM_{2.5}$) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in $PM_{2.5}$ concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long term exposure to particulate matter.

The elderly, people with pre-existing respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM_{10} and $PM_{2.5}$.

Nitrogen Dioxide

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO_2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

In animals, exposure to levels of NO_2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in

maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO_2.

Sulfur Dioxide

A few minutes of exposure to low levels of SO_2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

Animal studies suggest that despite SO_2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead

Fetuses, infants, and children are more sensitive than others to the adverse effects of Pb exposure. Exposure to low levels of Pb can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased Pb levels are associated with increased blood pressure.

Pb poisoning can cause anemia, lethargy, seizures, and death; although it appears that there are no direct effects of Pb on the respiratory system. Pb can be stored in the bone from early age environmental exposure, and elevated blood Pb levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of Pb because of previous environmental Pb exposure of their mothers.

Odors

The science of odor as a health concern is still new. Merely identifying the hundreds of VOCs that cause odors poses a big challenge. Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, studies have shown that the VOCs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

2.7 REGULATORY BACKGROUND

2.7.1 FEDERAL REGULATIONS

The U.S. EPA is responsible for setting and enforcing the NAAQS for O_3, CO, NO_x, SO_2, PM_{10}, and lead (12). The U.S. EPA has jurisdiction over emissions sources that are under the authority of the federal government including aircraft, locomotives, and emissions sources outside state waters (Outer Continental Shelf). The U.S. EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements of the CARB.

The Federal Clean Air Act (CAA) was first enacted in 1955 and has been amended numerous times in subsequent years (1963, 1965, 1967, 1970, 1977, and 1990). The CAA establishes the federal air quality standards, the NAAQS, and specifies future dates for achieving compliance (13). The CAA also mandates that states submit and implement State Implementation Plans (SIPs) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions). Title I provisions were established with the goal of attaining the NAAQS for the following criteria pollutants O_3, NO_2, SO_2, PM_{10}, CO, $PM_{2.5}$, and lead. The NAAQS were amended in July 1997 to include an additional standard for O_3 and to adopt a NAAQS for $PM_{2.5}$. Table 3-1 (previously presented) provides the NAAQS within the basin.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner burning gasoline and other cleaner burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of hydrocarbons and nitrogen oxides (NO_x). NOx is a collective term that includes all forms of nitrogen oxides (NO, NO_2, NO_3) which are emitted as byproducts of the combustion process.

2.7.2 CALIFORNIA REGULATIONS

California Air Resource Board (CARB). The CARB, which became part of the California EPA in 1991, is responsible for ensuring implementation of the California Clean Air Act (AB 2595), responding to the federal CAA, and for regulating emissions from consumer products and motor vehicles. The California CAA mandates achievement of the maximum degree of emissions reductions possible from vehicular and other mobile sources in order to attain the state ambient air quality standards by the earliest practical date. The CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. However, at this time, hydrogen sulfide and vinyl chloride are not measured at any monitoring stations in the SCAB because they

are not considered to be a regional air quality problem. Generally, the CAAQS are more stringent than the NAAQS (14) (12).

Local air quality management districts, such as the SCAQMD, regulate air emissions from stationary sources such as commercial and industrial facilities. All air pollution control districts have been formally designated as attainment or non-attainment for each CAAQS.

Serious non-attainment areas are required to prepare air quality management plans that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g. motor vehicle use generated by residential and commercial development);
- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emissions vehicles by fleet operators;
- Sufficient control strategies to achieve a five percent or more annual reduction in emissions or 15 percent or more in a period of three years for ROGs, NO_x, CO and PM_{10}. However, air basins may use alternative emission reduction strategy that achieves a reduction of less than five percent per year under certain circumstances.

Title 24 Energy Efficiency Standards and California Green Building Standards. California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The 2019 version of Title 24 will go into effect on January 1, 2020 and is applicable to the Project.

The CEC indicates that the 2019 Title 24 standards will require solar photovoltaic systems for new homes, establish requirements for newly constructed healthcare facilities, encourage demand responsive technologies for residential buildings, update indoor and outdoor lighting for nonresidential buildings. The CEC anticipates that single-family homes built with the 2019 standards will use approximately 7 percent less energy compared to the residential homes built under the 2016 standards. Additionally, after implementation of solar photovoltaic systems, homes built under the 2019 standards will about 53 percent less energy than homes built under the 2016 standards. Nonresidential buildings will use approximately 30 percent less energy due to lighting upgrades (15).

California Code of Regulations, Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect on January 1, 2011, and is administered by the California

Building Standards Commission. CALGreen is updated on a regular basis, with the most recent update consisting of the 2016 California Green Building Code Standards that became effective January 1, 2017. Local jurisdictions are permitted to adopt more stringent requirements, as state law provides methods for local enhancements. CALGreen recognizes that many jurisdictions have developed existing construction and demolition ordinances and defers to them as the ruling guidance provided they establish a minimum 65 percent diversion requirement. The code also provides exemptions for areas not served by construction and demolition recycling infrastructure. The State Building Code provides the minimum standard that buildings must meet in order to be certified for occupancy, which is generally enforced by the local building official. CALGreen requires:

- Short-term bicycle parking. If a commercial project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack (5.106.4.1.1).
- Long-term bicycle parking. For new buildings with 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of tenant-occupied motorized vehicle parking capacity, with a minimum of one space (5.106.4.1.2).
- Designated parking. Provide designated parking in commercial projects for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table 5.106.5.2 (5.106.5.2).
- Recycling by Occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling (5.410.1).
- Construction waste. A minimum 65 percent diversion of construction and demolition waste from landfills, increasing voluntarily to 80 percent for new homes and commercial projects (5.408.1, A5.408.3.1 [nonresidential], A5.408.3.1 [residential]). All (100 percent) of trees, stumps, rocks and associated vegetation and soils resulting from land clearing shall be reused or recycled (5.408.3).
- Wastewater reduction. Each building shall reduce the generation of wastewater by one of the following methods:
    - The installation of water-conserving fixtures (5.303.3) or
    - Using nonpotable water systems (5.303.4).
- Water use savings. 20 percent mandatory reduction of indoor water use with voluntary goal standards for 30, 35 and 40 percent reductions (5.303.2, A5303.2.3 [nonresidential]).
- Water meters. Separate water meters for buildings in excess of 50,000 square feet or buildings projected to consume more than 1,000 gallons per day (5.303.1).
- Irrigation efficiency. Moisture-sensing irrigation systems for larger landscaped areas (5.304.3).
- Materials pollution control. Low-pollutant emitting interior finish materials such as paints, carpet, vinyl flooring, and particleboard (5.404).
- Building commissioning. Mandatory inspections of energy systems (i.e., heat furnace, air conditioner, mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity according to their design efficiencies (5.410.2).

2.7.3 AIR QUALITY MANAGEMENT PLANNING

Currently, the NAAQS and CAAQS are exceeded in most parts of the SCAB for PM_{10}, $PM_{2.5}$, and ozone. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards (16). AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy. A detailed discussion on the AQMP and Project consistency with the AQMP is provided in Section 3.9.

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3 PROJECT AIR QUALITY IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will violate an air quality standard or contribute to an existing or projected air quality violation. Additionally, the Project has been evaluated to determine if it will result in a cumulatively considerable net increase of a criteria pollutant for which the Basin is non-attainment under an applicable federal or state ambient air quality standard. The significance of these potential impacts is described in the following section.

3.2 STANDARDS OF SIGNIFICANCE

The criteria used to determine the significance of potential Project-related air quality impacts are taken from the Initial Study Checklist in Appendix G of the State CEQA Guidelines (14 California Code of Regulations §§15000, et seq.). Based on these thresholds, a project would result in a significant impact related to air quality if it would (17):

- Conflict with or obstruct implementation of the applicable air quality plan.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard
- Expose sensitive receptors to substantial pollutant concentrations.
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The SCAQMD has developed regional and localized significance thresholds for regulated pollutants, as summarized at Table 3-1 (18). The SCAQMD's CEQA Air Quality Significance Thresholds (March 2015) indicate that any projects in the Basin with daily emissions that exceed any of the indicated thresholds should be considered as having an individually and cumulatively significant air quality impact. It should be noted that the SCAQMD provides a threshold for emissions of lead, however for purposes of this analysis no lead emissions are calculated as there are no substantive sources of lead emissions. Additionally, the air quality modeling program (discussed below) does not calculate any emissions of lead from typical construction or operational activities.

TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS

Pollutant	Construction	Operations
Regional Thresholds		
NO_X	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_X	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
Pollutant	**Construction**	**Operations**
Localized Thresholds		
NO_X	81 lbs/day (Demolition)	81 lbs/day
	81 lbs/day (Grading)	
CO	485 lbs/day (Demolition)	485 lbs/day
	485 lbs/day (Grading)	
PM_{10}	4 lbs/day (Demolition)	1 lbs/day
	4 lbs/day (Grading)	
$PM_{2.5}$	3 lbs/day (Demolition)	1 lbs/day
	3 lb/day (Grading)	

3.3 PROJECT-RELATED SOURCES OF POTENTIAL IMPACT

Land uses such as the Project affect air quality through construction-source and operational-source emissions.

On October 17, 2017, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2016.3.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (NO_X, VOC, SO_X, CO, PM_{10}, and $PM_{2.5}$) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (19). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality emissions. Output from the model runs for both construction and operational activity are provided in Appendix 3.1 and 3.2.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the Project will result in emissions of NO_X, VOC, SO_X, CO, PM_{10}, and $PM_{2.5}$. Construction related emissions are expected from the following construction activities:

- Demolition
- Grading
- Building Construction
- Paving
- Architectural Coating
- Construction Workers Commuting

Construction is expected to commence in July 2019 and will last through February 2021. Construction duration by phase is shown on Table 3-2. The duration of construction activity was based on a 2021 opening year. The construction schedule utilized in the analysis represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent.[2] The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per CEQA guidelines. Site specific construction fleet may vary due to specific project needs at the time of construction. The associated construction equipment was generally based on CalEEMod 2016.3.2 defaults. Please refer to specific detailed modeling inputs/outputs contained in Appendix 3.1 and 3.2 of this analysis. A detailed summary of construction equipment assumptions by phase is provided at Table 3-3.

TABLE 3-2: CONSTRUCTION DURATION

Activity	Start Date	End Date	Days
Demolition	07/01/2019	09/30/2019	66
Grading	10/01/2019	01/30/2020	88
Building Construction	01/31/2020	01/28/2021	260
Architectural Coating	08/28/2020	02/25/2021	130
Paving	01/29/2021	02/25/2021	20

[2] As shown in the California Emissions Estimator Model (CalEEMod) User's Guide Version 2016.3.2, Section 4.3 "OFFROAD Equipment" as the analysis year increases, emission factors for the same equipment pieces decrease due to the natural turnover of older equipment being replaced by newer less polluting equipment and new regulatory requirements.

TABLE 3-3: CONSTRUCTION EQUIPMENT ASSUMPTIONS

Activity	Equipment	Number	Hours Per Day
Demolition	Concrete/Industrial Saws	1	8
	Rubber Tired Dozers	1	8
	Tractors/Loaders/Backhoes	3	8
Grading	Graders	1	8
	Rubber Tired Dozers	1	8
	Tractors/Loaders/Backhoes	1	8
Building Construction	Cranes	1	8
	Forklifts	1	8
	Generator Sets	1	8
	Tractors/Loaders/Backhoes	1	8
	Welders	3	8
Architectural Coating	Air Compressors	1	8
Paving	Cement and Mortar Mixers	1	8
	Pavers	1	8
	Paving Equipment	1	8
	Rollers	1	8
	Tractors/Loaders/Backhoes	1	8

As previously stated, the Project site is occupied by an existing parking garage. Based on the dimensioned site plan of the parking structure, the area of the structure is approximately 140 feet by 435 feet (60,900 square feet) (20). Since the structure is comprised of 3 levels, the area was multiplied by 3 to achieve a total building square footage. As such, and for analytical purposes, the total building square footage of parking structure that would be demolished is approximately 182,700 square feet. This square footage was input into CalEEMod to determine potential impacts from demolition and removal of the parking structure.

Based on information provided by the Project applicant, the Project grading is expected balance on-site and no substantive amount of soil import or export is anticipated. Dust is typically a major concern during rough grading activities. Because such emissions are not amenable to collection and discharge through a controlled source, they are called “fugitive emissions”. Fugitive dust emissions rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). CalEEMod was utilized to calculate fugitive dust emissions resulting from this phase of activity

Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) were estimated based on information CalEEMod model defaults.

3.4.1 CONSTRUCTION EMISSIONS SUMMARY

Impacts With No Mitigation Except For TZC EIR Mitigation

The estimated maximum daily construction emissions are summarized in Table 3-4. Detailed construction model outputs are presented in Appendix 3.1. It should be noted that the Project is required to comply with the applicable TZC EIR mitigation measures as identified in Section 1.3. As shown, Project construction-source emissions would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. Thus, a less than significant impact would occur for Project-related construction-source emissions and no additional mitigation is required. The TZC EIR disclosed that construction-related emissions would be significant and unavoidable; thus, the Project's less-than-significant construction-related air quality emissions would be within the scope of analysis of the TZC EIR.

TABLE 3-4: CONSTRUCTION EMISSIONS (WITH NO MITIGATION EXCEPT FOR TZC EIR MITIGATION)

Year	Emissions (pounds per day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
2019	2.46	26.49	16.27	0.04	3.81	2.24
2020	19.74	27.66	28.60	0.08	5.05	2.18
2021	19.35	25.23	27.40	0.08	4.88	1.96
Maximum Daily Emissions	**19.74**	**27.66**	**28.60**	**0.08**	**5.05**	**2.24**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of NO_X, VOC, SO_X, CO, PM_{10}, and $PM_{2.5}$. Operational emissions would be expected from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions

3.5.1 AREA SOURCE EMISSIONS

Architectural Coatings

Over a period of time the buildings that are part of this Project will be subject to emissions resulting from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings as part of Project maintenance. The emissions associated with architectural coatings were calculated using the CalEEMod model.

Consumer Products

Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. The emissions associated with use of consumer products were calculated based on defaults provided within the CalEEMod model.

Hearths/Fireplaces

The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation" although it must be identified as such in CalEEMod in order to treat the case appropriately.

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

Electricity and natural gas are used by almost every project. Criteria pollutant emissions are emitted through the generation of electricity and consumption of natural gas. However, because electrical generating facilities for the Project area are located either outside the region (state) or offset through the use of pollution credits (RECLAIM) for generation within the SCAB, criteria pollutant emissions from offsite generation of electricity is generally excluded from the evaluation of significance and only natural gas use is considered. The emissions associated with natural gas use were calculated using the CalEEMod model.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

Project mobile source air quality impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project-related operational air quality impacts are derived primarily from vehicle trips generated by the Project. Trip characteristics available from the

report, *3rd & Broadway Traffic Impact Analysis* (TIA) (Urban Crossroads, Inc., 2019) were utilized in this analysis (21).

3.5.4 OPERATIONAL EMISSIONS SUMMARY

Operational-source emissions are summarized on Table 3-5. Detailed operational model outputs are presented in Appendix 3.2. It should be noted that the Project is required to comply with the applicable TZC EIR mitigation measures as identified in Sections 1.3. As indicated, Project operational-source emissions would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. Thus, a less than significant impact would occur for Project-related operational-source emissions and no additional mitigation is required. The TZC EIR disclosed that operational-related emissions would be significant and unavoidable; thus, the Project's less-than-significant operational-related air quality emissions would be within the scope of analysis of the TZC EIR.

TABLE 3-5: OPERATIONAL EMISSIONS SUMMARY

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area	6.65	2.88	14.78	0.02	0.29	0.29
Energy Source	0.14	1.24	0.84	0.01	0.10	0.10
Mobile	2.42	9.16	29.54	0.11	9.50	2.59
Total Maximum Daily Emissions	**9.21**	**13.27**	**45.15**	**0.13**	**9.89**	**2.98**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Operational Activities – Winter Scenario	**Emissions (pounds per day)**					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Area	6.65	2.88	14.78	0.02	0.29	0.29
Energy Source	0.14	1.24	0.84	0.01	0.10	0.10
Mobile	2.38	9.39	28.50	0.10	9.50	2.59
Total Maximum Daily Emissions	**9.17**	**13.51**	**44.11**	**0.13**	**9.89**	**2.59**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.6 LOCALIZED SIGNIFICANCE - CONSTRUCTION ACTIVITY

BACKGROUND ON LOCALIZED SIGNIFICANCE THRESHOLD (LST) DEVELOPMENT

The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (Methodology) (22). The SCAQMD has established that impacts to air quality are significant if there is a potential to contribute or cause localized exceedances of the federal and/or state ambient air quality standards (NAAQS/CAAQS). Collectively, these are referred to as Localized Significance Thresholds (LSTs).

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of any given project are above or below State standards. In the case of CO and NO_2, if ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, then project emissions are considered significant if they increase ambient concentrations by a measurable amount. This would apply to PM_{10} and $PM_{2.5}$; both of which are non-attainment pollutants.

The SCAQMD established LSTs in response to the SCAQMD Governing Board's Environmental Justice Initiative I-4[3]. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest residence or sensitive receptor. The SCAQMD states that lead agencies can use the LSTs as another indicator of significance in its air quality impact analyses.

LSTs were developed in response to environmental justice and health concerns raised by the public regarding exposure of individuals to criteria pollutants in local communities. To address the issue of localized significance, the SCAQMD adopted LSTs that show whether a project would cause or contribute to localized air quality impacts and thereby cause or contribute to potential localized adverse health effects. The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (LST Methodology) (23).

APPLICABILITY OF LSTS FOR THE PROJECT

For this Project, the appropriate Source Receptor Area (SRA) for the LST analysis is the South Coast Air Quality Management District Central Orange County monitoring station (SRA 17). LSTs apply to carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter ≤ 10 microns (PM_{10}), and particulate matter ≤ 2.5 microns ($PM_{2.5}$). The SCAQMD produced look-up tables for projects less than or equal to 5 acres in size.

In order to determine the appropriate methodology for determining localized impacts that could occur as a result of Project-related construction, the following process is undertaken:

- CalEEMod is utilized to determine the maximum daily on-site emissions that will occur during construction activity.
- The SCAQMD's Fact Sheet for Applying CalEEMod to Localized Significance Thresholds (24) is used to determine the maximum site acreage that is actively disturbed based on the construction equipment fleet and equipment hours as estimated in CalEEMod.
- If the total acreage disturbed is less than or equal to five acres per day, then the SCAQMD's screening look-up tables are utilized to determine if a Project has the potential to result in a significant impact. The look-up tables establish a maximum daily emissions threshold in pounds per day that can be compared to CalEEMod outputs.

3 The purpose of SCAQMD's Environmental Justice program is to ensure that everyone has the right to equal protection from air pollution and fair access to the decision-making process that works to improve the quality of air within their communities. Further, the SCAQMD defines Environmental Justice as "…equitable environmental policymaking and enforcement to protect the health of all residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status, or geographic location, from the health effects of air pollution."

- If the total acreage disturbed is greater than five acres per day, then LST impacts are appropriately evaluated through dispersion modeling.
- The LST methodology presents mass emission rates for each SRA, project sizes of 1, 2, and 5 acres, and nearest receptor distances of 25, 50, 100, 200, and 500 meters. For project sizes between the values given, or with receptors at distances between the given receptors, the methodology uses linear interpolation to determine the thresholds.

EMISSIONS CONSIDERED

SCAQMD's Methodology clearly states that "off-site mobile emissions from the Project should NOT be included in the emissions compared to LSTs (25)." Therefore, for purposes of the construction LST analysis, only emissions included in the CalEEMod "on-site" emissions outputs were considered.

MAXIMUM DAILY DISTURBED-ACREAGE

Table 3-6 is used to determine the maximum daily disturbed-acreage for use in determining the applicability of the SCAQMD's LST look-up tables. Based on Table 3-6, the proposed Project could actively disturb approximately 0.5 acre per day for demolition activities and 1 acre per day for the grading activities. It is important to note that 1 acre disturbed per day will be utilized for analytical purposes for demolition activities. The acres disturbed is based on the equipment list and days in demolition or grading phase according to the anticipated maximum number of acres a given piece of equipment can pass over in an 8-hour workday (as shown on Table 3-6). The equipment-specific grading rates are summarized in the CalEEMod user's guide, *Appendix A: Calculation Details for CalEEMod* (October 2017).

TABLE 3-6 : MAXIMUM DAILY DISTURBED-ACREAGE

Construction Phase	Equipment Type	Equipment Quantity	Acres graded per 8-hour day	Operating Hours per Day	Acres graded per day
Demolition	Rubber Tired Dozers	1	0.5	8	0.5
Total acres disturbed per day during Demolition					0.5
Grading	Graders	1	0.5	8	0.5
	Rubber Tired Dozers	1	0.5	8	0.5
Total acres disturbed per day during Grading					1.0

Source: Maximum daily disturbed acreage based on equipment list presented in Appendix 3.1.

Sensitive Receptors

Some people are especially sensitive to air pollution and are given special consideration when evaluating air quality impacts from projects. These groups of people include children, the elderly, individuals with pre-existing respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Structures that house these persons or places where they gather to exercise are defined as "sensitive receptors"; they are also known to be locations where an individual can remain for 24 hours.

Sensitive receptors near the Project site include existing residential uses, as described below and shown on Exhibit 3-A. The nearest sensitive receptor is an existing residential use located 62 feet/19 meters south of the Project site.

R1: Located approximately 62 feet south of the Project site, R1 represents existing residential use south of 3rd Street.

R2: Location R2 represents existing residential use above commercial at the southwest corner of North Broadway and 3rd Street.

The nearest sensitive receptor is residential home located immediately adjacent to Project site. Notwithstanding, the *Methodology* explicitly states that "*It is possible that a project may have receptors closer than 25 meters. Projects with boundaries located closer than 25 meters to the nearest receptor should use the LSTs for receptors located at 25 meters* (26)." Therefore, LSTs for receptors located at 25 meters were utilized in this AQIA.

CONSTRUCTION-SOURCE EMISSIONS LST ANALYSIS

Since the total acreage disturbed is less than five acres per day for the demolition and grading phase of construction, the SCAQMD's screening look-up tables are utilized in determining impacts. A 25-meter receptor distance is conservatively utilized as a screening threshold to determine the LSTs for emissions of CO, NO_2, PM_{10}, and $PM_{2.5}$.

Impacts With No Mitigation Except For TZC EIR Mitigation

Table 3-7 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. Outputs from the model runs for construction LSTs are provided in Appendix 3.1. It should be noted that the Project is required to comply with the applicable TZC EIR mitigation measures as identified in Section 1.3. As shown, Project construction-source emissions would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. Thus, a less than significant impact would occur for Project-related construction-source emissions and no additional mitigation is required.

EXHIBIT 3-A: RECEPTOR LOCATIONS



TABLE 3-7: LOCALIZED SIGNIFICANCE CONSTRUCTION EMISSIONS (WITH NO MITIGATION, 1 OF 2)

On-Site Demolition Emissions	Emissions (pounds per day)			
	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**22.68**	**14.89**	**2.35**	**1.36**
SCAQMD Localized Threshold	81	485	4	3
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**
On-Site Grading Emissions	**Emissions (pounds per day)**			
	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**20.99**	**8.42**	**3.72**	**2.22**
SCAQMD Localized Threshold	81	485	4	3
Threshold Exceeded?	**NO**	**NO**	**YES**	**NO**

3.7 LOCALIZED SIGNIFICANCE – LONG-TERM OPERATIONAL ACTIVITY

Table 3-8 shows the calculated emissions for the Project's operational activities compared with the applicable LSTs. The LST analysis includes on-site sources only; however, the CalEEMod™ model outputs do not separate on-site and off-site emissions from mobile sources. In an effort to establish a maximum potential impact scenario for analytic purposes, the emissions shown on Table 3-8 represent all on-site Project-related stationary (area) sources and five percent (5%) of the Project-related mobile sources. It is assumed that the maximum distance a passenger car would make through the Project site is approximately 0.05 miles. As such, an on-site travel distance of approximately 0.05 mile/264 feet for each passenger car trip has been used as a conservative measure. Modeling based on these assumptions demonstrates that even within broad encompassing parameters, Project operational-source emissions would not exceed applicable LSTs.

As previously stated, a 25-meter receptor distance is utilized as a screening threshold to determine LSTs for emissions of NO_2, CO, PM_{10} and $PM_{2.5}$.

Impacts With No Mitigation Except For TZC EIR Mitigation

Table 3-8 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. Outputs from the model runs for operational LSTs are provided in Appendix 3.2. It should be noted that the Project is required to comply with the applicable TZC EIR mitigation measures as identified in Section 1.3. As shown, Project operational-source emissions would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. Thus, a less than significant impact would occur for Project-related operational-source emissions and no additional mitigation is required.

TABLE 3-8: LOCALIZED SIGNIFICANCE SUMMARY OF OPERATIONS

Operational Activity	Emissions (pounds per day)			
	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**4.17**	**15.79**	**0.45**	**0.41**
SCAQMD Localized Significance Threshold	81	485	1	1
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: CalEEMod localized operational-source emissions are presented in Appendix 3.2.

3.8 CO "HOT SPOT" ANALYSIS

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific carbon monoxide (CO) "hot spots" is not needed to reach this conclusion.

An adverse CO concentration, known as a "hot spot", would occur if an exceedance of the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. At the time of the 1993 Handbook, the SCAB was designated nonattainment under the California AAQS and National AAQS for CO (27).

It has long been recognized that CO hotspots are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the SCAB is now designated as attainment, as previously noted in Table 2-3. Also, CO concentrations in the Project vicinity have steadily declined, as indicated by historical emissions data presented previously at Table 2-4.

To establish a more accurate record of baseline CO concentrations affecting the SCAB, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This "hot spot" analysis did not predict any violation of CO standards, as shown on Table 3-9.

TABLE 3-9: CO MODEL RESULTS

Intersection Location	Carbon Monoxide Concentrations (parts per million)		
	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire-Veteran	4.6	3.5	3.7
Sunset-Highland	4	4.5	3.5
La Cienega-Century	3.7	3.1	5.2
Long Beach-Imperial	3	3.1	8.4

Source: 2003 AQMP, Appendix V: Modeling and Attainment Demonstrations
Notes: Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.

Based on the SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of traffic volumes and congestion at a particular intersection. As evidence of this, for example, 8.4 ppm CO concentration measured at the Long Beach Blvd. and Imperial Hwy. intersection (highest CO generating intersection within the "hot spot" analysis), only 0.7 ppm was attributable to the traffic volumes and congestion at this intersection; the remaining 7.7 ppm were due to the ambient air measurements at the time the 2003 AQMP was prepared (27). Therefore, even if the traffic volumes for the proposed Project were double or even triple of the traffic volumes generated at the Long Beach Blvd. and Imperial Hwy. intersection, coupled with the on-going improvements in ambient air quality, the Project would not be capable of resulting in a CO "hot spot" at any study area intersections.

Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (28).

Traffic volumes generating the CO concentrations for the "hot spot" analysis is shown on Table 3-10. The busiest intersection evaluated for AM traffic volumes was at Wilshire Blvd. and Veteran Ave., which has an AM traffic volume of approximately 8,062 vehicles per hour. Alternatively, the busiest intersection for PM traffic volumes was at La Cienega Boulevard and Century Boulevard, which has a PM traffic volume of 8,674 vehicles per hour (27). The 2003 AQMP estimated that the 1-hour concentration for this intersection was 4.6 ppm; this indicates that, should the daily traffic volume increase four times to 400,000 vehicles per day, CO concentrations (4.6 ppm x 4= 18.4 ppm) would still not likely exceed the most stringent 1-hour CO standard (20.0 ppm).[4] As shown on Exhibit 6-2 in the TIA, the highest trips on a segment of road for the Project is 34,000 vehicles per hour on Sycamore Street and 1st Street. Additionally, the 2003 AQMP determined that the highest traffic volumes on a segment of road is 8,674 vehicles per hour on La Cienega Boulevard and Century Boulevard (21). As shown on Table 3-11, the highest trips on a segment of road for the Project is 3,549 vehicles per hour on Sycamore Street and 1st Street. As such, Project-related traffic volumes are less than the traffic volumes identified in the 2003 AQMP. The proposed Project considered herein would not produce the volume of traffic required to generate a CO "hot spot" either in the context of the 2003 Los Angeles hot spot study or based on representative BAAQMD CO threshold considerations. Therefore, CO "hot spots" are not an environmental impact of concern for the proposed Project. Localized air quality impacts related to mobile-source emissions would therefore be less than significant.

4 Based on the ratio of the CO standard (20.0 ppm) and the modeled value (4.6 ppm).

TABLE 3-10: TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vehicles per hour)				
	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Wilshire-Veteran	4,954/2,069	1,830/3,317	721/1,400	560/933	8,062/7,719
Sunset-Highland	1,417/1,764	1,342/1,540	2,304/1,832	1,551/2,238	6,614/5,374
La Cienega-Century	2,540/2,243	1,890/2,728	1,384/2,029	821/1,674	6,634/8,674
Long Beach-Imperial	1,217/2,020	1,760/1,400	479/944	756/1,150	4,212/5,514

Source: 2003 AQMP

TABLE 3-11: PROJECT PEAK HOUR TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
North Broadway/3rd Street	674/713	678/725	210/182	141/303	1,704/1,923
Sycamore Street/1st Street	246/403	110/106	1,670/1,480	1,329/1,560	3,354/3,549
Main Street/4th Street	1,046/1,106	1,126/1,157	163/194	293/293	2,628/2,751
Main Street/3rd Street	965/1,007	1,122/1,106	260/259	154/230	2,501/2,601

Source: Caribou Industries Proposal for the 3rd Street Promenade Traffic Impact Analysis (Urban Crossroads, 2019).

3.9 AIR QUALITY MANAGEMENT PLANNING

The Project site is located within the SCAB, which is characterized by relatively poor air quality. The SCAQMD has jurisdiction over an approximately 10,743 square-mile area consisting of the four-county Basin and the Los Angeles County and Riverside County portions of what use to be referred to as the Southeast Desert Air Basin. In these areas, the SCAQMD is principally responsible for air pollution control, and works directly with the Southern California Association of Governments (SCAG), county transportation commissions, local governments, as well as state and federal agencies to reduce emissions from stationary, mobile, and indirect sources to meet state and federal ambient air quality standards.

Currently, these state and federal air quality standards are exceeded in most parts of the Basin. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

In March 2017, the AQMD released the Final 2016 AQMP. The 2016 AQMP continues to evaluate current integrated strategies and control measures to meet the NAAQS, as well as, explore new and innovative methods to reach its goals. Some of these approaches include utilizing incentive programs, recognizing existing co-benefit programs from other sectors, and developing a strategy with fair-share reductions at the federal, state, and local levels (29). Similar to the 2012 AQMP, the 2016 AQMP incorporates scientific and technological information and planning assumptions, including the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), a

planning document that supports the integration of land use and transportation to help the region meet the federal Clean Air Act requirements (30). The Project's consistency with the AQMP will be determined using the 2016 AQMP as discussed below.

Criteria for determining consistency with the AQMP are defined in Chapter 12, Section 12.2 and Section 12.3 of the SCAQMD's CEQA Air Quality Handbook (1993) (31). These indicators are discussed below:

CONSISTENCY CRITERION NO. 1

The proposed Project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP.

Construction Impacts – Consistency with Criteria 1

The violations that Consistency Criterion No. 1 refers to are the CAAQS and NAAQS. CAAQS and NAAQS violations would occur if localized significance thresholds (LSTs) or regional significance thresholds were exceeded. The Project would not exceed the applicable LST thresholds or regional significance thresholds for construction activity after implementation of applicable mitigation measures. Therefore, the Project would not conflict with the AQMP according to this criterion.

Operational Impacts – Consistency with Criteria 1

The Project would not exceed the applicable LST or regional significance thresholds for operational activity. Therefore, the Project would have the potential to conflict with the AQMP according to this criterion.

CONSISTENCY CRITERION NO. 2

The Project will not exceed the assumptions in the AQMP based on the years of Project build-out phase.

Overview

The 2016 AQMP demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are provided to the Southern California Association of Governments (SCAG), which develops regional growth forecasts, which are then used to develop future air quality forecasts for the AQMP. Development consistent with the growth projections in the City of Santa Ana General Plan (referred to as the "General Plan") is considered to be consistent with the AQMP.

Construction Impacts – Consistency with Criteria 2

Peak day emissions generated by construction activities are largely independent of land use assignments, but rather are a function of development scope and maximum area of disturbance. Irrespective of the site's land use designation, development of the site to its maximum potential would likely occur, with disturbance of the entire site occurring during construction activities.

Operational Impacts – Consistency with Criteria 2

The Project is generally consistent with the range of uses allowed under the Downtown (DT) Zone of the TZC. The DT Zone is a vital pedestrian-oriented area that is defined by multi-story urban building types (flex blocks, live-work, stacked dwellings, and courtyard housing in the Downtown edges) accommodating a mixture of retail, office, light service, and residential uses (32). Additionally, the goal of the DT Zone is to replace existing parking structures with other uses.

The City of Santa Ana General Plan designates the Project site as District Center (DC) (33). As per the General Plan, DC land use areas are designed to serve as anchors to the City's commercial corridors, and to accommodate major development activity. District Centers area to be developed with an urban character that includes a mixture of high-rise office, commercial, and residential uses. Residential developments within some DC areas allowed at a density of up to 90 units per acre with a floor area ration (FAR) of 1.0 to 3.0.

The proposed Project is to consist of up to 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), and roof-top amenities ancillary to residential and hotel uses. It should be noted that the 164 residential units proposed by the Project represents only 4 percent of the 4,075 total units projected under the buildout of the TZC. Using a ratio of 3 persons per household from the 2010 TZC EIR, the Project could generate 492 residents (4 percent of the 12,225 residents projected under the buildout of the TZC).

The Project would not exceed regional or local thresholds and would therefore be considered to have a less than significant impact. Additionally, it is important to note that although the Project would exceed the maximum density and FAR, it is consistent with the general intent of the DC land use designation.

AQMP Consistency Conclusion

The Project would not result in or cause NAAQS or CAAQS violations nor would it result in any regional daily construction-source or operational-source emissions exceedances. The Project would support AQMP objectives to reduce trips, promote infill development, and balance jobs and housing, and would not conflict with implementation of the AQMP. The Project is therefore considered to be consistent with the AQMP.

3.10 Potential Impacts to Sensitive Receptors

The potential impact of Project-generated air pollutant emissions at sensitive receptors has also been considered. Sensitive receptors can include uses such as long-term health care facilities, rehabilitation centers, and retirement homes. Residences, schools, playgrounds, child care centers, and athletic facilities can also be considered as sensitive receptors.

Results of the LST analysis indicate that the Project would not exceed the SCAQMD localized significance thresholds during construction. Therefore, sensitive receptors would not be subject to a significant air quality impact during Project construction.

Results of the LST analysis indicate that the Project would not exceed the SCAQMD localized significance thresholds during operational activity. The proposed Project would not result in a

CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8. Thus, a less than significant impact to sensitive receptors during operational activity is expected.

3.11 ODORS

The potential for the Project to generate objectionable odors has also been considered. Land uses generally associated with odor complaints include:

- Agricultural uses (livestock and farming)
- Wastewater treatment plants
- Food processing plants
- Chemical plants
- Composting operations
- Refineries
- Landfills
- Dairies
- Fiberglass molding facilities

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the City's solid waste regulations. The proposed Project would also be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances (34). Therefore, odors associated with the proposed Project construction and operations would be less than significant and no mitigation is required.

3.12 CUMULATIVE IMPACTS

The Project area is designated as an extreme non-attainment area for ozone, and a non-attainment area for PM_{10}, $PM_{2.5}$, and lead.

The AQMD has published a report on how to address cumulative impacts from air pollution: *White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution* (35). In this report the AQMD clearly states (Page D-3):

"…the AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or EIR. The only case where the significance thresholds for project specific and cumulative impacts differ is the Hazard Index

(HI) significance threshold for toxic air contaminant (TAC) emissions. The project specific (project increment) significance threshold is HI > 1.0 while the cumulative (facility-wide) is HI > 3.0. It should be noted that the HI is only one of three TAC emission significance thresholds considered (when applicable) in a CEQA analysis. The other two are the maximum individual cancer risk (MICR) and the cancer burden, both of which use the same significance thresholds (MICR of 10 in 1 million and cancer burden of 0.5) for project specific and cumulative impacts.

Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."

Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a cumulatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be considered cumulatively considerable.

CONSTRUCTION IMPACTS

Project construction-source air pollutant emissions would not exceed the SCAQMD regional thresholds for any criteria pollutant. Project construction-source emissions would be considered less than significant on a project-specific and cumulative basis. Notwithstanding, the TZC EIR reported a significant cumulative impact over the applicable SCAQMD regional thresholds. Thus, it can be concluded that the Project's less-than-significant construction-related impacts would be within the scope of analysis of the TZC EIR.

OPERATIONAL IMPACTS

Project operational-source air pollutant emissions would not exceed the SCAQMD regional thresholds for any criteria pollutant. Project operational-source emissions would be considered less than significant on a project-specific and cumulative basis. Notwithstanding, the TZC EIR reported a significant cumulative impact over the applicable SCAQMD regional thresholds. Thus, it can be concluded that the Project's less-than-significant operational-related impacts would be within the scope of analysis of the TZC EIR.

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4 FINDINGS & CONCLUSIONS

Pursuant to CEQA § 15164 (a) the lead agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary but none of the conditions described in §15162 calling for preparation of a subsequent EIR have occurred. More specifically, §15162 (a)(3)(B) states that no subsequent EIR shall be prepared for the project unless significant effects previously examined will be substantially more severe than shown in the previous EIR. Significant and unavoidable construction and operational impacts were previously identified and disclosed in the previously analyzed TZC EIR, which determined that construction and operational-related emissions of Volatile Organic Compounds (VOCs), Carbon Monoxide (CO), Oxides of Nitrogen (NO_X), Particulate Matter ≤ 10 Microns (PM_{10}), and Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$) would exceed the SCAQMD's thresholds of significance before implementation of mitigation (1).

The current air quality study prepared for the proposed Project utilizes similar analysis methodologies and assumptions as that assumed and evaluated in the TZC EIR. Based on the project-specific analysis, the Project's air quality emissions would be the same as or less than what was disclosed in the TZC EIR; thus, the Project would not result in any new or more severe impacts to air quality beyond what was disclosed by the TZC EIR.

CONSTRUCTION-SOURCE EMISSIONS

Regional Impacts

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. It should be noted that the Project is required to comply with the applicable *Transit Zoning Code (TZC) Environmental Impact Report (EIR)* (TZC EIR) (1) mitigation measures as identified in Sections 1.3. As such, a less than significant impact would occur for Project-related construction-source emissions and no mitigation beyond what those identified in the TZC EIR would be required.

Localized Impacts

Emissions during construction activity would not exceed the SCAQMD's localized significance threshold for any criteria pollutant. Thus, a less than significant impact would occur and no mitigation is required.

Odors

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

OPERATIONAL-SOURCE EMISSIONS

Regional Impacts

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. It should be noted that the Project is required to comply with the applicable *Transit Zoning Code (TZC) Environmental Impact Report (EIR)* (TZC EIR) (1) mitigation measures as identified in Sections 1.3. As such, a less than significant impact would occur for Project-related operational-source emissions and no mitigation beyond what those identified in the TZC EIR would be required.

Localized Impacts

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact, thus a less than significant impact to sensitive receptors during operational activity is expected.

Odors

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous residential refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (36). Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

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6 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Caribou Industries Proposal for the 3rd Street Promenade Project. The information contained in this air quality impact assessment report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 2.1:

STATE/FEDERAL ATTAINMENT STATUS OF CRITERIA POLLUTANTS

TABLE 2-3

National Ambient Air Quality Standards (NAAQS) Attainment Status - South Coast Air Basin

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
Ozone (O_3)	(1979) **1-Hour** (0.12 ppm)[c]	Nonattainment ("extreme")	2/26/2023 (revised deadline)
	(2015) **8-Hour** (0.070 ppm)[d]	Pending – Expect Nonattainment ("extreme")	Pending (beyond 2032)
	(2008) **8-Hour** (0.075 ppm)[d]	Nonattainment ("extreme")	7/20/2032
	(1997) **8-Hour** (0.08 ppm)[d]	Nonattainment ("extreme")	6/15/2024
PM2.5[e]	(2006) **24-Hour** (35 µg/m^3)	Nonattainment ("serious")	12/31/2019
	(2012) **Annual** (12.0 µg/m^3)	Nonattainment ("moderate")	12/31/2021
	(1997) **Annual** (15.0 µg/m^3)	Attainment (final determination pending)	4/5/2015 (attained 2013)
PM10[f]	(1987) **24-hour** (150 µg/m^3)	Attainment (Maintenance)	7/26/2013 (attained)
Lead (Pb)[g]	(2008) **3-Months Rolling** (0.15 µg/m^3)	Nonattainment (Partial) (Attainment determination to be requested)	12/31/2015
CO	(1971) **1-Hour** (35 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
	(1971) **8-Hour** (9 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
NO_2[h]	(2010) **1-Hour** (100 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **Annual** (0.053 ppm)	Attainment (Maintenance)	9/22/1998 (attained)
SO_2[i]	(2010) **1-Hour** (75 ppb)	Designations Pending (expect Unclassifiable/Attainment)	N/A (attained)
	(1971) **24-Hour** (0.14 ppm) (1971) **Annual** (0.03 ppm)	Unclassifiable/Attainment	3/19/1979 (attained)

a) U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration

c) The 1979 1-hour ozone NAAQS (0.12 ppm) was revoked, effective 6/15/05 ; however, the Basin has not attained this standard and therefore has some continuing obligations with respect to the revoked standard; original attainment date was 11/15/2010; the revised attainment date is 2/6/23

d) The 2008 8-hour ozone NAAQS (0.075 ppm) was revised to 0.070 ppm, effective 12/28/15 with classifications and implementation goals to be finalized by 10/1/17; the 1997 8-hour ozone NAAQS (0.08 ppm) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/15; there are continuing obligations under the revoked 1997 and revised 2008 ozone NAAQS until they are attained

e) The attainment deadline for the 2006 24-hour PM2.5 NAAQS was 12/31/15 for the former "moderate" classification; U.S.EPA approved reclassification to "serious," effective 2/12/16 with an attainment deadline of 12/31/2019; the 2012 (proposal year) annual PM2.5 NAAQS was revised on 1/15/13, effective 3/18/13, from 15 to 12 µg/m^3; new annual designations were final 1/15/15, effective 4/15/15; on July 25, 2016 U.S. EPA finalized a determination that the Basin attained the 1997 annual (15.0 µg/m^3) and 24-hour PM2.5 (65 µg/m^3) NAAQS, effective August 24, 2016

f) The annual PM10 NAAQS was revoked, effective 12/18/06; the 24-hour PM10 NAAQS deadline was 12/31/2006; the Basin's Attainment Re-designation Request and PM10 Maintenance Plan was approved by U.S. EPA on 6/26/13, effective 7/26/13

g) Partial Nonattainment designation – Los Angeles County portion of the Basin only for near-source monitors; expect to remain in attainment based on current monitoring data; attainment re-designation request pending

h) New 1-hour NO_2 NAAQS became effective 8/2/10, with attainment designations 1/20/12; annual NO_2 NAAQS retained

i) The 1971 annual and 24-hour SO2 NAAQS were revoked, effective 8/23/10; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO2 1-hour NAAQS; final area designations expected by 12/31/20 due to new source-specific monitoring requirements; Basin expected to be in attainment due to ongoing clean data

TABLE 2-4

National Ambient Air Quality Standards (NAAQS) Attainment Status
Coachella Valley Portion of the Salton Sea Air Basin

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
Ozone (O_3)	(1979) **1-Hour** (0.12 ppm)[c]	Attainment	11/15/2007 (attained 12/31/2013)
	(2015) **8-Hour** (0.070 ppm)[d]	Pending – Expect Nonattainment (Severe)	Pending
	(2008) **8-Hour** (0.075 ppm)[d]	Nonattainment (Severe-15)	7/20/2027
	(1997) **8-Hour** (0.08 ppm)[d]	Nonattainment (Severe-15)	6/15/2019
PM2.5[e]	(2006) **24-Hour** (35 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
	(2012) **Annual** (12.0 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
	(1997) **Annual** (15.0 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
PM10[f]	(1987) **24-hour** (150 µg/m^3)	Nonattainment ("serious")	12/31/2006
Lead (Pb)	(2008) **3-Months Rolling** (0.15 µg/m^3)	Unclassifiable/Attainment	Unclassifiable/ Attainment
CO	(1971) **1-Hour** (35 ppm)	Unclassifiable/Attainment	N/A (attained)
	(1971) **8-Hour** (9 ppm)	Unclassifiable/Attainment	N/A (attained)
NO_2[g]	(2010) **1-Hour** (100 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **Annual** (0.053 ppm)	Unclassifiable/Attainment	N/A (attained)
SO_2[h]	(2010) **1-Hour** (75 ppb)	Designations Pending	N/A
	(1971) **24-Hour** (0.14 ppm) (1971) **Annual** (0.03 ppm)	Unclassifiable/Attainment	Unclassifiable/ Attainment

a) U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration

c) The 1979 1-hour ozone NAAQS (0.12 ppm) was revoked, effective 6/15/05; the Southeast Desert Modified Air Quality Management Area, including the Coachella Valley, had not timely attained this standard by the 11/15/07 "severe-17" deadline, based on 2005-2007 data; on 8/25/14, U.S. EPA proposed a clean data finding based on 2011–2013 data and a determination of attainment for the former 1-hour ozone NAAQS for the Southeast Desert nonattainment area; this rule was finalized by U.S. EPA on 4/15/15, effective 5/15/15, that included preliminary 2014 data

d) The 2008 8-hour ozone NAAQS (0.075 ppm) was revised to 0.070 ppm, effective 12/28/15 with classifications and implementation goals to be finalized by 10/1/17; the 1997 8-hour ozone NAAQS (0.08 ppm) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/15; there are continuing obligations under the 1997 and 2008 ozone NAAQS until they are attained

e) The annual PM2.5 standard was revised on 1/15/13, effective 3/18/13, from 15 to 12 µg/m^3

f) The annual PM10 standard was revoked, effective 12/18/06; the 24-hour PM10 NAAQS attainment deadline was 12/31/2006; the Coachella Valley Attainment Re-designation Request and PM10 Maintenance Plan was postponed by U.S. EPA pending additional monitoring and analysis in the southeastern Coachella Valley

g) New 1-hour NO_2 NAAQS became effective 8/2/10; attainment designations 1/20/12; annual NO_2 NAAQS retained

h) The 1971 Annual and 24-hour SO_2 NAAQS were revoked, effective 8/23/10; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO_2 1-hour standard; final area designations expected by 12/31/2020 with SSAB expected to be designated Unclassifiable/Attainment

The current status of CAAQS attainment for the pollutants with State standards is presented in Table 2-5 for the Basin and the Riverside County portion of the SSAB (Coachella Valley).

TABLE 2-5

California Ambient Air Quality Standards (CAAQS) Attainment Status
South Coast Air Basin and Coachella Valley portion of Salton Sea Air Basin

Pollutant	Averaging Time and Level[b]	Designation[a]	
		South Coast Air Basin	Coachella Valley
Ozone (O_3)	**1-Hour** (0.09 ppm)[c]	Nonattainment	Nonattainment
	8-Hour (0.070 ppm)[d]	Nonattainment	Nonattainment
PM2.5	**Annual** (12.0 µg/m^3)	Nonattainment	Attainment
PM10	**24-Hour** (50 µg/m^3)	Nonattainment	Nonattainment
	Annual (20 µg/m^3)	Nonattainment	Nonattainment
Lead (Pb)	**30-Day Average** (1.5 µg/m^3)	Attainment	Attainment
CO	**1-Hour** (20 ppm)	Attainment	Attainment
	8-Hour (9.0 ppm)	Attainment	Attainment
NO_2	**1-Hour** (0.18 ppm)	Attainment	Attainment
	Annual (0.030 ppm)	Attainment	Attainment
SO_2	**1-Hour** (0.25 ppm)	Attainment	Attainment
	24-Hour (0.04 ppm)	Attainment	Attainment
Sulfates	**24-Hour** (25 µg/m^3)	Attainment	Attainment
H_2S[c]	**1-Hour** (0.03 ppm)	Unclassified	Unclassified [c)]

a) CA State designations shown were updated by CARB in 2016, based on the 2013–2015 3-year period; stated designations are based on a 3-year data period after consideration of outliers and exceptional events; Source: http://www.arb.ca.gov/desig/statedesig.htm#current

b) CA State standards, or CAAQS, for ozone, CO, SO_2, NO_2, PM10 and PM2.5 are values not to be exceeded; lead, sulfates, and H_2S standards are values not to be equaled or exceeded; CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations

c) SCAQMD began monitoring H_2S in the southeastern Coachella Valley in November 2013 due to odor events related to the Salton Sea; three full years of data are not yet available for a State designation, but nonattainment is anticipated for the H_2S CAAQS in at least part of the Coachella Valley

The 1979 federal 1-hour ozone standard (0.12 ppm) was revoked by the U.S. EPA and replaced by the 8-hour average ozone standard (0.08 ppm), effective June 15, 2005. However, the Basin and the former Southeast Desert Modified Air Quality Management Area (which included the Coachella Valley) had not attained the 1-hour federal ozone NAAQS by the attainment dates in 2010 and 2007, respectively, and, therefore, had continuing obligations under the former standard. On August 25, 2014, U.S. EPA

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APPENDIX 3.1:

CALEEMOD CONSTRUCTION EMISSIONS MODEL OUTPUTS

3rd & Broadway (Construction - Unmitigated)

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments High Rise	164.00	Dwelling Unit	0.82	169,230.00	469
Hotel	75.00	Room	0.48	81,927.00	0
Regional Shopping Center	15.32	1000sqft	0.00	15,320.00	0
Parking Lot	403.00	Space	0.00	240,263.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Construction - Unmitigated) - Orange County, Winter

Project Characteristics -

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Construction Schedule expected to commence July 2019 and end in 2021.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment -

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Hours are based on an 8-hour workday.

Grading - For analytical purposes, it will be assumed that a Total of 1 acre per day will be disturbed during grading activities.

Demolition -

Architectural Coating - MM Air 18

Vehicle Trips - Construction Run Only.

Woodstoves - Construction Run Only.

Energy Use - Construction Run Only.

Water And Wastewater - Construction Run Only.

Solid Waste - Construction Run Only.

Construction Off-road Equipment Mitigation - MM Air 5

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	130.00
tblConstructionPhase	NumDays	200.00	260.00
tblConstructionPhase	NumDays	20.00	66.00
tblConstructionPhase	NumDays	4.00	88.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	PhaseEndDate	6/8/2020	2/25/2021
tblConstructionPhase	PhaseEndDate	5/11/2020	1/28/2021
tblConstructionPhase	PhaseEndDate	7/26/2019	9/30/2019

tblConstructionPhase	PhaseEndDate	8/5/2019	1/30/2020
tblConstructionPhase	PhaseEndDate	5/25/2020	2/25/2021
tblConstructionPhase	PhaseStartDate	5/26/2020	8/28/2020
tblConstructionPhase	PhaseStartDate	8/6/2019	1/31/2020
tblConstructionPhase	PhaseStartDate	7/31/2019	10/1/2019
tblConstructionPhase	PhaseStartDate	5/12/2020	1/29/2021
tblEnergyUse	LightingElect	741.44	0.00
tblEnergyUse	LightingElect	3.03	0.00
tblEnergyUse	LightingElect	0.35	0.00
tblEnergyUse	LightingElect	5.71	0.00
tblEnergyUse	NT24E	3,054.10	0.00
tblEnergyUse	NT24E	3.24	0.00
tblEnergyUse	NT24E	2.80	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	NT24NG	5.15	0.00
tblEnergyUse	NT24NG	1.05	0.00
tblEnergyUse	T24E	179.76	0.00
tblEnergyUse	T24E	2.77	0.00
tblEnergyUse	T24E	2.93	0.00
tblEnergyUse	T24NG	5,911.46	0.00
tblEnergyUse	T24NG	29.10	0.00
tblEnergyUse	T24NG	0.95	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	139.40	0.00
tblFireplaces	NumberNoFireplace	16.40	0.00

3rd & Broadway (Construction - Unmitigated) - Orange County, Winter

tblFireplaces	NumberWood	8.20	0.00
tblGrading	AcresOfGrading	44.00	88.00
tblLandUse	LandUseSquareFeet	164,000.00	169,230.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LotAcreage	2.65	0.82
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	0.35	0.00
tblLandUse	LotAcreage	3.63	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblSolidWaste	SolidWasteGenerationRate	75.44	0.00
tblSolidWaste	SolidWasteGenerationRate	41.06	0.00
tblSolidWaste	SolidWasteGenerationRate	16.09	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TTP	61.60	0.00
tblVehicleTrips	CC_TTP	64.70	0.00

tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TTP	19.40	0.00
tblVehicleTrips	CW_TTP	16.30	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	38.00	0.00
tblVehicleTrips	DV_TP	35.00	0.00
tblVehicleTrips	HO_TL	8.70	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	4.00	0.00
tblVehicleTrips	PB_TP	11.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	PR_TP	58.00	0.00
tblVehicleTrips	PR_TP	54.00	0.00
tblVehicleTrips	ST_TR	4.98	0.00
tblVehicleTrips	ST_TR	8.19	0.00

tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	SU_TR	3.65	0.00
tblVehicleTrips	SU_TR	5.95	0.00
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	WD_TR	4.20	0.00
tblVehicleTrips	WD_TR	8.17	0.00
tblVehicleTrips	WD_TR	42.70	0.00
tblWater	IndoorWaterUseRate	10,685,260.20	0.00
tblWater	IndoorWaterUseRate	1,902,507.75	0.00
tblWater	IndoorWaterUseRate	1,134,791.03	0.00
tblWater	OutdoorWaterUseRate	6,736,359.69	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	695,517.08	0.00
tblWoodstoves	NumberCatalytic	8.20	0.00
tblWoodstoves	NumberNoncatalytic	8.20	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

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					
2019	2.4629	26.4949	16.2709	0.0351	7.1720	1.3019	8.1286	3.4485	1.2167	4.3285	0.0000	3,569.2338	3,569.2338	0.7208	0.0000	3,587.2542
2020	19.7389	27.6592	28.6026	0.0784	7.1720	1.1202	8.0629	3.4485	1.0804	4.2681	0.0000	7,756.9484	7,756.9484	0.7231	0.0000	7,775.0268
2021	19.3520	25.2291	27.4014	0.0771	3.9315	0.9451	4.8766	1.0532	0.9113	1.9644	0.0000	7,629.4610	7,629.4610	0.6920	0.0000	7,646.7606
Maximum	**19.7389**	**27.6592**	**28.6026**	**0.0784**	**7.1720**	**1.3019**	**8.1286**	**3.4485**	**1.2167**	**4.3285**	**0.0000**	**7,756.9484**	**7,756.9484**	**0.7231**	**0.0000**	**7,775.0268**

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					
2019	2.4629	26.4949	16.2709	0.0351	2.8516	1.3019	3.8082	1.3594	1.2167	2.2394	0.0000	3,569.2338	3,569.2338	0.7208	0.0000	3,587.2542
2020	19.7389	27.6592	28.6026	0.0784	3.9315	1.1202	5.0516	1.3594	1.0804	2.1790	0.0000	7,756.9484	7,756.9484	0.7231	0.0000	7,775.0268
2021	19.3520	25.2291	27.4014	0.0771	3.9315	0.9451	4.8766	1.0532	0.9113	1.9644	0.0000	7,629.4610	7,629.4610	0.6920	0.0000	7,646.7606
Maximum	**19.7389**	**27.6592**	**28.6026**	**0.0784**	**3.9315**	**1.3019**	**5.0516**	**1.3594**	**1.2167**	**2.2394**	**0.0000**	**7,756.9484**	**7,756.9484**	**0.7231**	**0.0000**	**7,775.0268**

3rd & Broadway (Construction - Unmitigated) - Orange County, Winter

	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	41.37	0.00	34.80	52.56	0.00	39.56	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	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679
Energy	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
Mobile	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
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

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	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679
Energy	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
Mobile	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
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

	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	Demolition	Demolition	7/1/2019	9/30/2019	5	66	
2	Grading	Grading	10/1/2019	1/30/2020	5	88	
3	Building Construction	Building Construction	1/31/2020	1/28/2021	5	260	
4	Paving	Paving	1/29/2021	2/25/2021	5	20	
5	Architectural Coating	Architectural Coating	8/28/2020	2/25/2021	5	130	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 88

Acres of Paving: 0

Residential Indoor: 342,691; Residential Outdoor: 114,230; Non-Residential Indoor: 145,871; Non-Residential Outdoor: 48,624; Striped Parking Area: 14,416 (Architectural Coating – sqft)

OffRoad Equipment

3rd & Broadway (Construction - Unmitigated) - Orange County, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	8.00	78	0.48
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	1	8.00	89	0.20
Paving	Pavers	1	8.00	130	0.42
Paving	Rollers	1	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

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
Demolition	5	13.00	0.00	831.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	258.00	73.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	52.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 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					
Fugitive Dust					2.7249	0.0000	2.7249	0.4126	0.0000	0.4126			0.0000			0.0000
Off-Road	2.2950	22.6751	14.8943	0.0241		1.2863	1.2863		1.2017	1.2017		2,360.7198	2,360.7198	0.6011		2,375.7475
Total	**2.2950**	**22.6751**	**14.8943**	**0.0241**	**2.7249**	**1.2863**	**4.0112**	**0.4126**	**1.2017**	**1.6143**		**2,360.7198**	**2,360.7198**	**0.6011**		**2,375.7475**

3.2 Demolition - 2019

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	0.1074	3.7812	0.9472	9.6200e-003	0.2193	0.0147	0.2339	0.0600	0.0140	0.0740		1,069.9634	1,069.9634	0.1163		1,072.8708
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	0.0604	0.0386	0.4294	1.3900e-003	0.1453	9.7000e-004	0.1463	0.0385	8.9000e-004	0.0394		138.5506	138.5506	3.4100e-003		138.6359
Total	**0.1678**	**3.8198**	**1.3766**	**0.0110**	**0.3646**	**0.0156**	**0.3802**	**0.0986**	**0.0149**	**0.1135**		**1,208.5140**	**1,208.5140**	**0.1197**		**1,211.5067**

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					1.0627	0.0000	1.0627	0.1609	0.0000	0.1609			0.0000			0.0000
Off-Road	2.2950	22.6751	14.8943	0.0241		1.2863	1.2863		1.2017	1.2017	0.0000	2,360.7197	2,360.7197	0.6011		2,375.7475
Total	**2.2950**	**22.6751**	**14.8943**	**0.0241**	**1.0627**	**1.2863**	**2.3490**	**0.1609**	**1.2017**	**1.3626**	**0.0000**	**2,360.7197**	**2,360.7197**	**0.6011**		**2,375.7475**

3.2 Demolition - 2019

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	0.1074	3.7812	0.9472	9.6200e-003	0.2193	0.0147	0.2339	0.0600	0.0140	0.0740		1,069.9634	1,069.9634	0.1163		1,072.8708
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	0.0604	0.0386	0.4294	1.3900e-003	0.1453	9.7000e-004	0.1463	0.0385	8.9000e-004	0.0394		138.5506	138.5506	3.4100e-003		138.6359
Total	**0.1678**	**3.8198**	**1.3766**	**0.0110**	**0.3646**	**0.0156**	**0.3802**	**0.0986**	**0.0149**	**0.1135**		**1,208.5140**	**1,208.5140**	**0.1197**		**1,211.5067**

3.3 Grading - 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					
Fugitive Dust					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	1.8541	20.9914	8.4248	0.0183		0.9559	0.9559		0.8795	0.8795		1,810.5975	1,810.5975	0.5729		1,824.9188
Total	**1.8541**	**20.9914**	**8.4248**	**0.0183**	**7.0826**	**0.9559**	**8.0385**	**3.4247**	**0.8795**	**4.3042**		**1,810.5975**	**1,810.5975**	**0.5729**		**1,824.9188**

3.3 Grading - 2019

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	0.0372	0.0238	0.2642	8.6000e-004	0.0894	6.0000e-004	0.0900	0.0237	5.5000e-004	0.0243		85.2619	85.2619	2.1000e-003		85.3144
Total	**0.0372**	**0.0238**	**0.2642**	**8.6000e-004**	**0.0894**	**6.0000e-004**	**0.0900**	**0.0237**	**5.5000e-004**	**0.0243**		**85.2619**	**85.2619**	**2.1000e-003**		**85.3144**

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					2.7622	0.0000	2.7622	1.3357	0.0000	1.3357			0.0000			0.0000
Off-Road	1.8541	20.9914	8.4248	0.0183		0.9559	0.9559		0.8795	0.8795	0.0000	1,810.5975	1,810.5975	0.5729		1,824.9188
Total	**1.8541**	**20.9914**	**8.4248**	**0.0183**	**2.7622**	**0.9559**	**3.7182**	**1.3357**	**0.8795**	**2.2151**	**0.0000**	**1,810.5975**	**1,810.5975**	**0.5729**		**1,824.9188**

3.3 Grading - 2019

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	0.0372	0.0238	0.2642	8.6000e-004	0.0894	6.0000e-004	0.0900	0.0237	5.5000e-004	0.0243		85.2619	85.2619	2.1000e-003		85.3144
Total	**0.0372**	**0.0238**	**0.2642**	**8.6000e-004**	**0.0894**	**6.0000e-004**	**0.0900**	**0.0237**	**5.5000e-004**	**0.0243**		**85.2619**	**85.2619**	**2.1000e-003**		**85.3144**

3.3 Grading - 2020

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					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	1.7648	19.7629	8.2258	0.0183		0.8903	0.8903		0.8191	0.8191		1,770.8297	1,770.8297	0.5727		1,785.1477
Total	**1.7648**	**19.7629**	**8.2258**	**0.0183**	**7.0826**	**0.8903**	**7.9729**	**3.4247**	**0.8191**	**4.2438**		**1,770.8297**	**1,770.8297**	**0.5727**		**1,785.1477**

3.3 Grading - 2020

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	0.0347	0.0213	0.2420	8.3000e-004	0.0894	5.9000e-004	0.0900	0.0237	5.4000e-004	0.0243		82.5297	82.5297	1.8800e-003		82.5768
Total	**0.0347**	**0.0213**	**0.2420**	**8.3000e-004**	**0.0894**	**5.9000e-004**	**0.0900**	**0.0237**	**5.4000e-004**	**0.0243**		**82.5297**	**82.5297**	**1.8800e-003**		**82.5768**

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					2.7622	0.0000	2.7622	1.3357	0.0000	1.3357			0.0000			0.0000
Off-Road	1.7648	19.7629	8.2258	0.0183		0.8903	0.8903		0.8191	0.8191	0.0000	1,770.8297	1,770.8297	0.5727		1,785.1477
Total	**1.7648**	**19.7629**	**8.2258**	**0.0183**	**2.7622**	**0.8903**	**3.6525**	**1.3357**	**0.8191**	**2.1547**	**0.0000**	**1,770.8297**	**1,770.8297**	**0.5727**		**1,785.1477**

3.3 Grading - 2020

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	0.0347	0.0213	0.2420	8.3000e-004	0.0894	5.9000e-004	0.0900	0.0237	5.4000e-004	0.0243		82.5297	82.5297	1.8800e-003		82.5768
Total	**0.0347**	**0.0213**	**0.2420**	**8.3000e-004**	**0.0894**	**5.9000e-004**	**0.0900**	**0.0237**	**5.4000e-004**	**0.0243**		**82.5297**	**82.5297**	**1.8800e-003**		**82.5768**

3.4 Building Construction - 2020

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	2.2322	16.9868	14.5819	0.0246		0.9090	0.9090		0.8728	0.8728		2,253.0567	2,253.0567	0.4530		2,264.3807
Total	**2.2322**	**16.9868**	**14.5819**	**0.0246**		**0.9090**	**0.9090**		**0.8728**	**0.8728**		**2,253.0567**	**2,253.0567**	**0.4530**		**2,264.3807**

3.4 Building Construction - 2020

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	0.2435	7.6024	2.2001	0.0178	0.4664	0.0404	0.5068	0.1342	0.0386	0.1728		1,930.6021	1,930.6021	0.1682		1,934.8060
Worker	1.1204	0.6865	7.8055	0.0267	2.8838	0.0191	2.9029	0.7648	0.0176	0.7824		2,661.5826	2,661.5826	0.0607		2,663.1007
Total	**1.3640**	**8.2889**	**10.0056**	**0.0444**	**3.3503**	**0.0594**	**3.4097**	**0.8990**	**0.0562**	**0.9552**		**4,592.1847**	**4,592.1847**	**0.2289**		**4,597.9067**

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	2.2322	16.9868	14.5819	0.0246		0.9090	0.9090		0.8728	0.8728	0.0000	2,253.0567	2,253.0567	0.4530		2,264.3807
Total	**2.2322**	**16.9868**	**14.5819**	**0.0246**		**0.9090**	**0.9090**		**0.8728**	**0.8728**	**0.0000**	**2,253.0567**	**2,253.0567**	**0.4530**		**2,264.3807**

3.4 Building Construction - 2020

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	0.2435	7.6024	2.2001	0.0178	0.4664	0.0404	0.5068	0.1342	0.0386	0.1728		1,930.6021	1,930.6021	0.1682		1,934.8060
Worker	1.1204	0.6865	7.8055	0.0267	2.8838	0.0191	2.9029	0.7648	0.0176	0.7824		2,661.5826	2,661.5826	0.0607		2,663.1007
Total	**1.3640**	**8.2889**	**10.0056**	**0.0444**	**3.3503**	**0.0594**	**3.4097**	**0.8990**	**0.0562**	**0.9552**		**4,592.1847**	**4,592.1847**	**0.2289**		**4,597.9067**

3.4 Building Construction - 2021

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	1.9949	15.6171	14.2521	0.0247		0.7824	0.7824		0.7510	0.7510		2,253.1374	2,253.1374	0.4387		2,264.1060
Total	**1.9949**	**15.6171**	**14.2521**	**0.0247**		**0.7824**	**0.7824**		**0.7510**	**0.7510**		**2,253.1374**	**2,253.1374**	**0.4387**		**2,264.1060**

3.4 Building Construction - 2021

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	0.2045	6.8323	2.0376	0.0176	0.4664	0.0148	0.4812	0.1342	0.0141	0.1483		1,913.9797	1,913.9797	0.1614		1,918.0143
Worker	1.0543	0.6191	7.2309	0.0258	2.8838	0.0187	2.9025	0.7648	0.0172	0.7820		2,569.2471	2,569.2471	0.0550		2,570.6225
Total	**1.2588**	**7.4514**	**9.2685**	**0.0433**	**3.3502**	**0.0334**	**3.3837**	**0.8990**	**0.0313**	**0.9303**		**4,483.2267**	**4,483.2267**	**0.2164**		**4,488.6368**

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	1.9949	15.6171	14.2521	0.0247		0.7824	0.7824		0.7510	0.7510	0.0000	2,253.1374	2,253.1374	0.4387		2,264.1060
Total	**1.9949**	**15.6171**	**14.2521**	**0.0247**		**0.7824**	**0.7824**		**0.7510**	**0.7510**	**0.0000**	**2,253.1374**	**2,253.1374**	**0.4387**		**2,264.1060**

3.4 Building Construction - 2021

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	0.2045	6.8323	2.0376	0.0176	0.4664	0.0148	0.4812	0.1342	0.0141	0.1483		1,913.9797	1,913.9797	0.1614		1,918.0143
Worker	1.0543	0.6191	7.2309	0.0258	2.8838	0.0187	2.9025	0.7648	0.0172	0.7820		2,569.2471	2,569.2471	0.0550		2,570.6225
Total	**1.2588**	**7.4514**	**9.2685**	**0.0433**	**3.3502**	**0.0334**	**3.3837**	**0.8990**	**0.0313**	**0.9303**		**4,483.2267**	**4,483.2267**	**0.2164**		**4,488.6368**

3.5 Paving - 2021

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	0.8738	8.7235	9.8952	0.0152		0.4650	0.4650		0.4289	0.4289		1,455.0218	1,455.0218	0.4595		1,466.5091
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8738**	**8.7235**	**9.8952**	**0.0152**		**0.4650**	**0.4650**		**0.4289**	**0.4289**		**1,455.0218**	**1,455.0218**	**0.4595**		**1,466.5091**

3.5 Paving - 2021

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	0.0531	0.0312	0.3644	1.3000e-003	0.1453	9.4000e-004	0.1463	0.0385	8.7000e-004	0.0394		129.4582	129.4582	2.7700e-003		129.5275
Total	**0.0531**	**0.0312**	**0.3644**	**1.3000e-003**	**0.1453**	**9.4000e-004**	**0.1463**	**0.0385**	**8.7000e-004**	**0.0394**		**129.4582**	**129.4582**	**2.7700e-003**		**129.5275**

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	0.8738	8.7235	9.8952	0.0152		0.4650	0.4650		0.4289	0.4289	0.0000	1,455.0218	1,455.0218	0.4595		1,466.5091
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8738**	**8.7235**	**9.8952**	**0.0152**		**0.4650**	**0.4650**		**0.4289**	**0.4289**	**0.0000**	**1,455.0218**	**1,455.0218**	**0.4595**		**1,466.5091**

3.5 Paving - 2021

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	0.0531	0.0312	0.3644	1.3000e-003	0.1453	9.4000e-004	0.1463	0.0385	8.7000e-004	0.0394		129.4582	129.4582	2.7700e-003		129.5275
Total	**0.0531**	**0.0312**	**0.3644**	**1.3000e-003**	**0.1453**	**9.4000e-004**	**0.1463**	**0.0385**	**8.7000e-004**	**0.0394**		**129.4582**	**129.4582**	**2.7700e-003**		**129.5275**

3.6 Architectural Coating - 2020

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479		375.2641	375.2641	0.0291		375.9904
Total	**15.9169**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**		**375.2641**	**375.2641**	**0.0291**		**375.9904**

3.6 Architectural Coating - 2020

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	0.2258	0.1384	1.5732	5.3800e-003	0.5812	3.8400e-003	0.5851	0.1542	3.5400e-003	0.1577		536.4430	536.4430	0.0122		536.7490
Total	**0.2258**	**0.1384**	**1.5732**	**5.3800e-003**	**0.5812**	**3.8400e-003**	**0.5851**	**0.1542**	**3.5400e-003**	**0.1577**		**536.4430**	**536.4430**	**0.0122**		**536.7490**

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479	0.0000	375.2641	375.2641	0.0291		375.9904
Total	**15.9169**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**	**0.0000**	**375.2641**	**375.2641**	**0.0291**		**375.9904**

3.6 Architectural Coating - 2020

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	0.2258	0.1384	1.5732	5.3800e-003	0.5812	3.8400e-003	0.5851	0.1542	3.5400e-003	0.1577		536.4430	536.4430	0.0122		536.7490
Total	**0.2258**	**0.1384**	**1.5732**	**5.3800e-003**	**0.5812**	**3.8400e-003**	**0.5851**	**0.1542**	**3.5400e-003**	**0.1577**		**536.4430**	**536.4430**	**0.0122**		**536.7490**

3.6 Architectural Coating - 2021

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255		375.2641	375.2641	0.0258		375.9079
Total	**15.8859**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**		**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.6 Architectural Coating - 2021

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	0.2125	0.1248	1.4574	5.1900e-003	0.5812	3.7600e-003	0.5850	0.1542	3.4600e-003	0.1576		517.8327	517.8327	0.0111		518.1100
Total	**0.2125**	**0.1248**	**1.4574**	**5.1900e-003**	**0.5812**	**3.7600e-003**	**0.5850**	**0.1542**	**3.4600e-003**	**0.1576**		**517.8327**	**517.8327**	**0.0111**		**518.1100**

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255	0.0000	375.2641	375.2641	0.0258		375.9079
Total	**15.8859**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**	**0.0000**	**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.6 Architectural Coating - 2021

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	0.2125	0.1248	1.4574	5.1900e-003	0.5812	3.7600e-003	0.5850	0.1542	3.4600e-003	0.1576		517.8327	517.8327	0.0111		518.1100
Total	**0.2125**	**0.1248**	**1.4574**	**5.1900e-003**	**0.5812**	**3.7600e-003**	**0.5850**	**0.1542**	**3.4600e-003**	**0.1576**		**517.8327**	**517.8327**	**0.0111**		**518.1100**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	0.00	0.00	0.00		
Hotel	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Apartments High Rise	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Hotel	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Regional Shopping Center	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Parking Lot	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	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

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					
Apartments High Rise	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
Hotel	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
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
Regional Shopping Center	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	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
Hotel	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
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
Regional Shopping Center	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
Total		**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**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679
Unmitigated	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	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
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**		**0.0749**	**0.0749**		**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	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
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**		**0.0749**	**0.0749**		**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

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 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

3rd & Broadway (Construction - Unmitigated)

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments High Rise	164.00	Dwelling Unit	0.82	169,230.00	469
Hotel	75.00	Room	0.48	81,927.00	0
Regional Shopping Center	15.32	1000sqft	0.00	15,320.00	0
Parking Lot	403.00	Space	0.00	240,263.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Construction - Unmitigated) - Orange County, Summer

Project Characteristics -

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Construction Schedule expected to commence July 2019 and end in 2021.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment -

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Hours are based on an 8-hour workday.

Grading - For analytical purposes, it will be assumed that a Total of 1 acre per day will be disturbed during grading activities.

Demolition -

Architectural Coating - MM Air 18

Vehicle Trips - Construction Run Only.

Woodstoves - Construction Run Only.

Energy Use - Construction Run Only.

Water And Wastewater - Construction Run Only.

Solid Waste - Construction Run Only.

Construction Off-road Equipment Mitigation - MM Air 5

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	130.00
tblConstructionPhase	NumDays	200.00	260.00
tblConstructionPhase	NumDays	20.00	66.00
tblConstructionPhase	NumDays	4.00	88.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	PhaseEndDate	6/8/2020	2/25/2021
tblConstructionPhase	PhaseEndDate	5/11/2020	1/28/2021
tblConstructionPhase	PhaseEndDate	7/26/2019	9/30/2019

tblConstructionPhase	PhaseEndDate	8/5/2019	1/30/2020
tblConstructionPhase	PhaseEndDate	5/25/2020	2/25/2021
tblConstructionPhase	PhaseStartDate	5/26/2020	8/28/2020
tblConstructionPhase	PhaseStartDate	8/6/2019	1/31/2020
tblConstructionPhase	PhaseStartDate	7/31/2019	10/1/2019
tblConstructionPhase	PhaseStartDate	5/12/2020	1/29/2021
tblEnergyUse	LightingElect	741.44	0.00
tblEnergyUse	LightingElect	3.03	0.00
tblEnergyUse	LightingElect	0.35	0.00
tblEnergyUse	LightingElect	5.71	0.00
tblEnergyUse	NT24E	3,054.10	0.00
tblEnergyUse	NT24E	3.24	0.00
tblEnergyUse	NT24E	2.80	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	NT24NG	5.15	0.00
tblEnergyUse	NT24NG	1.05	0.00
tblEnergyUse	T24E	179.76	0.00
tblEnergyUse	T24E	2.77	0.00
tblEnergyUse	T24E	2.93	0.00
tblEnergyUse	T24NG	5,911.46	0.00
tblEnergyUse	T24NG	29.10	0.00
tblEnergyUse	T24NG	0.95	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	139.40	0.00
tblFireplaces	NumberNoFireplace	16.40	0.00

3rd & Broadway (Construction - Unmitigated) - Orange County, Summer

tblFireplaces	NumberWood	8.20	0.00
tblGrading	AcresOfGrading	44.00	88.00
tblLandUse	LandUseSquareFeet	164,000.00	169,230.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LotAcreage	2.65	0.82
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	0.35	0.00
tblLandUse	LotAcreage	3.63	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblSolidWaste	SolidWasteGenerationRate	75.44	0.00
tblSolidWaste	SolidWasteGenerationRate	41.06	0.00
tblSolidWaste	SolidWasteGenerationRate	16.09	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TTP	61.60	0.00
tblVehicleTrips	CC_TTP	64.70	0.00

tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TTP	19.40	0.00
tblVehicleTrips	CW_TTP	16.30	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	38.00	0.00
tblVehicleTrips	DV_TP	35.00	0.00
tblVehicleTrips	HO_TL	8.70	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	4.00	0.00
tblVehicleTrips	PB_TP	11.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	PR_TP	58.00	0.00
tblVehicleTrips	PR_TP	54.00	0.00
tblVehicleTrips	ST_TR	4.98	0.00
tblVehicleTrips	ST_TR	8.19	0.00

tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	SU_TR	3.65	0.00
tblVehicleTrips	SU_TR	5.95	0.00
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	WD_TR	4.20	0.00
tblVehicleTrips	WD_TR	8.17	0.00
tblVehicleTrips	WD_TR	42.70	0.00
tblWater	IndoorWaterUseRate	10,685,260.20	0.00
tblWater	IndoorWaterUseRate	1,902,507.75	0.00
tblWater	IndoorWaterUseRate	1,134,791.03	0.00
tblWater	OutdoorWaterUseRate	6,736,359.69	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	695,517.08	0.00
tblWoodstoves	NumberCatalytic	8.20	0.00
tblWoodstoves	NumberNoncatalytic	8.20	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

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					
2019	2.4533	26.4423	16.2528	0.0353	7.1720	1.3016	8.1286	3.4485	1.2163	4.3285	0.0000	3,593.1753	3,593.1753	0.7181	0.0000	3,611.1275
2020	19.5736	27.5874	29.1782	0.0807	7.1720	1.1195	8.0629	3.4485	1.0798	4.2681	0.0000	7,986.6972	7,986.6972	0.7191	0.0000	8,004.6752
2021	19.1944	25.1784	27.9485	0.0793	3.9315	0.9445	4.8760	1.0532	0.9108	1.9639	0.0000	7,852.3886	7,852.3886	0.6882	0.0000	7,869.5938
Maximum	**19.5736**	**27.5874**	**29.1782**	**0.0807**	**7.1720**	**1.3016**	**8.1286**	**3.4485**	**1.2163**	**4.3285**	**0.0000**	**7,986.6972**	**7,986.6972**	**0.7191**	**0.0000**	**8,004.6752**

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					
2019	2.4533	26.4423	16.2528	0.0353	2.8516	1.3016	3.8082	1.3594	1.2163	2.2394	0.0000	3,593.1753	3,593.1753	0.7181	0.0000	3,611.1275
2020	19.5736	27.5874	29.1782	0.0807	3.9315	1.1195	5.0510	1.3594	1.0798	2.1790	0.0000	7,986.6972	7,986.6972	0.7191	0.0000	8,004.6752
2021	19.1944	25.1784	27.9485	0.0793	3.9315	0.9445	4.8760	1.0532	0.9108	1.9639	0.0000	7,852.3886	7,852.3886	0.6882	0.0000	7,869.5938
Maximum	**19.5736**	**27.5874**	**29.1782**	**0.0807**	**3.9315**	**1.3016**	**5.0510**	**1.3594**	**1.2163**	**2.2394**	**0.0000**	**7,986.6972**	**7,986.6972**	**0.7191**	**0.0000**	**8,004.6752**

3rd & Broadway (Construction - Unmitigated) - Orange County, Summer

	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	41.37	0.00	34.80	52.56	0.00	39.56	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	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679
Energy	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
Mobile	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
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

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	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679
Energy	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
Mobile	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
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

	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	Demolition	Demolition	7/1/2019	9/30/2019	5	66	
2	Grading	Grading	10/1/2019	1/30/2020	5	88	
3	Building Construction	Building Construction	1/31/2020	1/28/2021	5	260	
4	Paving	Paving	1/29/2021	2/25/2021	5	20	
5	Architectural Coating	Architectural Coating	8/28/2020	2/25/2021	5	130	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 88

Acres of Paving: 0

Residential Indoor: 342,691; Residential Outdoor: 114,230; Non-Residential Indoor: 145,871; Non-Residential Outdoor: 48,624; Striped Parking Area: 14,416 (Architectural Coating – sqft)

OffRoad Equipment

3rd & Broadway (Construction - Unmitigated) - Orange County, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	8.00	78	0.48
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	1	8.00	89	0.20
Paving	Pavers	1	8.00	130	0.42
Paving	Rollers	1	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

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
Demolition	5	13.00	0.00	831.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	258.00	73.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	52.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 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					
Fugitive Dust					2.7249	0.0000	2.7249	0.4126	0.0000	0.4126			0.0000			0.0000
Off-Road	2.2950	22.6751	14.8943	0.0241		1.2863	1.2863		1.2017	1.2017		2,360.7198	2,360.7198	0.6011		2,375.7475
Total	**2.2950**	**22.6751**	**14.8943**	**0.0241**	**2.7249**	**1.2863**	**4.0112**	**0.4126**	**1.2017**	**1.6143**		**2,360.7198**	**2,360.7198**	**0.6011**		**2,375.7475**

3.2 Demolition - 2019

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	0.1047	3.7321	0.8947	9.7700e-003	0.2193	0.0143	0.2336	0.0600	0.0137	0.0737		1,086.0574	1,086.0574	0.1134		1,088.8918
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	0.0536	0.0351	0.4638	1.4700e-003	0.1453	9.7000e-004	0.1463	0.0385	8.9000e-004	0.0394		146.3982	146.3982	3.6000e-003		146.4882
Total	**0.1582**	**3.7673**	**1.3585**	**0.0112**	**0.3646**	**0.0153**	**0.3799**	**0.0986**	**0.0146**	**0.1132**		**1,232.4556**	**1,232.4556**	**0.1170**		**1,235.3800**

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					1.0627	0.0000	1.0627	0.1609	0.0000	0.1609			0.0000			0.0000
Off-Road	2.2950	22.6751	14.8943	0.0241		1.2863	1.2863		1.2017	1.2017	0.0000	2,360.7197	2,360.7197	0.6011		2,375.7475
Total	**2.2950**	**22.6751**	**14.8943**	**0.0241**	**1.0627**	**1.2863**	**2.3490**	**0.1609**	**1.2017**	**1.3626**	**0.0000**	**2,360.7197**	**2,360.7197**	**0.6011**		**2,375.7475**

3.2 Demolition - 2019

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	0.1047	3.7321	0.8947	9.7700e-003	0.2193	0.0143	0.2336	0.0600	0.0137	0.0737		1,086.0574	1,086.0574	0.1134		1,088.8918
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	0.0536	0.0351	0.4638	1.4700e-003	0.1453	9.7000e-004	0.1463	0.0385	8.9000e-004	0.0394		146.3982	146.3982	3.6000e-003		146.4882
Total	**0.1582**	**3.7673**	**1.3585**	**0.0112**	**0.3646**	**0.0153**	**0.3799**	**0.0986**	**0.0146**	**0.1132**		**1,232.4556**	**1,232.4556**	**0.1170**		**1,235.3800**

3.3 Grading - 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					
Fugitive Dust					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	1.8541	20.9914	8.4248	0.0183		0.9559	0.9559		0.8795	0.8795		1,810.5975	1,810.5975	0.5729		1,824.9188
Total	**1.8541**	**20.9914**	**8.4248**	**0.0183**	**7.0826**	**0.9559**	**8.0385**	**3.4247**	**0.8795**	**4.3042**		**1,810.5975**	**1,810.5975**	**0.5729**		**1,824.9188**

3.3 Grading - 2019

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	0.0330	0.0216	0.2854	9.0000e-004	0.0894	6.0000e-004	0.0900	0.0237	5.5000e-004	0.0243		90.0912	90.0912	2.2100e-003		90.1466
Total	**0.0330**	**0.0216**	**0.2854**	**9.0000e-004**	**0.0894**	**6.0000e-004**	**0.0900**	**0.0237**	**5.5000e-004**	**0.0243**		**90.0912**	**90.0912**	**2.2100e-003**		**90.1466**

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					2.7622	0.0000	2.7622	1.3357	0.0000	1.3357			0.0000			0.0000
Off-Road	1.8541	20.9914	8.4248	0.0183		0.9559	0.9559		0.8795	0.8795	0.0000	1,810.5975	1,810.5975	0.5729		1,824.9188
Total	**1.8541**	**20.9914**	**8.4248**	**0.0183**	**2.7622**	**0.9559**	**3.7182**	**1.3357**	**0.8795**	**2.2151**	**0.0000**	**1,810.5975**	**1,810.5975**	**0.5729**		**1,824.9188**

3.3 Grading - 2019

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	0.0330	0.0216	0.2854	9.0000e-004	0.0894	6.0000e-004	0.0900	0.0237	5.5000e-004	0.0243		90.0912	90.0912	2.2100e-003		90.1466
Total	**0.0330**	**0.0216**	**0.2854**	**9.0000e-004**	**0.0894**	**6.0000e-004**	**0.0900**	**0.0237**	**5.5000e-004**	**0.0243**		**90.0912**	**90.0912**	**2.2100e-003**		**90.1466**

3.3 Grading - 2020

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					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	1.7648	19.7629	8.2258	0.0183		0.8903	0.8903		0.8191	0.8191		1,770.8297	1,770.8297	0.5727		1,785.1477
Total	**1.7648**	**19.7629**	**8.2258**	**0.0183**	**7.0826**	**0.8903**	**7.9729**	**3.4247**	**0.8191**	**4.2438**		**1,770.8297**	**1,770.8297**	**0.5727**		**1,785.1477**

3.3 Grading - 2020

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	0.0307	0.0194	0.2619	8.7000e-004	0.0894	5.9000e-004	0.0900	0.0237	5.4000e-004	0.0243		87.2035	87.2035	1.9900e-003		87.2532
Total	**0.0307**	**0.0194**	**0.2619**	**8.7000e-004**	**0.0894**	**5.9000e-004**	**0.0900**	**0.0237**	**5.4000e-004**	**0.0243**		**87.2035**	**87.2035**	**1.9900e-003**		**87.2532**

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					2.7622	0.0000	2.7622	1.3357	0.0000	1.3357			0.0000			0.0000
Off-Road	1.7648	19.7629	8.2258	0.0183		0.8903	0.8903		0.8191	0.8191	0.0000	1,770.8297	1,770.8297	0.5727		1,785.1477
Total	**1.7648**	**19.7629**	**8.2258**	**0.0183**	**2.7622**	**0.8903**	**3.6525**	**1.3357**	**0.8191**	**2.1547**	**0.0000**	**1,770.8297**	**1,770.8297**	**0.5727**		**1,785.1477**

3.3 Grading - 2020

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	0.0307	0.0194	0.2619	8.7000e-004	0.0894	5.9000e-004	0.0900	0.0237	5.4000e-004	0.0243		87.2035	87.2035	1.9900e-003		87.2532
Total	**0.0307**	**0.0194**	**0.2619**	**8.7000e-004**	**0.0894**	**5.9000e-004**	**0.0900**	**0.0237**	**5.4000e-004**	**0.0243**		**87.2035**	**87.2035**	**1.9900e-003**		**87.2532**

3.4 Building Construction - 2020

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	2.2322	16.9868	14.5819	0.0246		0.9090	0.9090		0.8728	0.8728		2,253.0567	2,253.0567	0.4530		2,264.3807
Total	**2.2322**	**16.9868**	**14.5819**	**0.0246**		**0.9090**	**0.9090**		**0.8728**	**0.8728**		**2,253.0567**	**2,253.0567**	**0.4530**		**2,264.3807**

3.4 Building Construction - 2020

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	0.2332	7.6050	2.0073	0.0182	0.4664	0.0397	0.5061	0.1342	0.0380	0.1722		1,979.2412	1,979.2412	0.1601		1,983.2432
Worker	0.9915	0.6246	8.4450	0.0282	2.8838	0.0191	2.9029	0.7648	0.0176	0.7824		2,812.3125	2,812.3125	0.0641		2,813.9153
Total	**1.2247**	**8.2296**	**10.4523**	**0.0464**	**3.3503**	**0.0588**	**3.4090**	**0.8990**	**0.0555**	**0.9545**		**4,791.5537**	**4,791.5537**	**0.2242**		**4,797.1584**

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	2.2322	16.9868	14.5819	0.0246		0.9090	0.9090		0.8728	0.8728	0.0000	2,253.0567	2,253.0567	0.4530		2,264.3807
Total	**2.2322**	**16.9868**	**14.5819**	**0.0246**		**0.9090**	**0.9090**		**0.8728**	**0.8728**	**0.0000**	**2,253.0567**	**2,253.0567**	**0.4530**		**2,264.3807**

3.4 Building Construction - 2020

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	0.2332	7.6050	2.0073	0.0182	0.4664	0.0397	0.5061	0.1342	0.0380	0.1722		1,979.2412	1,979.2412	0.1601		1,983.2432
Worker	0.9915	0.6246	8.4450	0.0282	2.8838	0.0191	2.9029	0.7648	0.0176	0.7824		2,812.3125	2,812.3125	0.0641		2,813.9153
Total	**1.2247**	**8.2296**	**10.4523**	**0.0464**	**3.3503**	**0.0588**	**3.4090**	**0.8990**	**0.0555**	**0.9545**		**4,791.5537**	**4,791.5537**	**0.2242**		**4,797.1584**

3.4 Building Construction - 2021

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	1.9949	15.6171	14.2521	0.0247		0.7824	0.7824		0.7510	0.7510		2,253.1374	2,253.1374	0.4387		2,264.1060
Total	**1.9949**	**15.6171**	**14.2521**	**0.0247**		**0.7824**	**0.7824**		**0.7510**	**0.7510**		**2,253.1374**	**2,253.1374**	**0.4387**		**2,264.1060**

3.4 Building Construction - 2021

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	0.1948	6.8484	1.8573	0.0180	0.4664	0.0142	0.4806	0.1342	0.0136	0.1478		1,962.1853	1,962.1853	0.1539		1,966.0318
Worker	0.9312	0.5635	7.8362	0.0272	2.8838	0.0187	2.9025	0.7648	0.0172	0.7820		2,714.6609	2,714.6609	0.0581		2,716.1142
Total	**1.1260**	**7.4119**	**9.6935**	**0.0452**	**3.3502**	**0.0329**	**3.3831**	**0.8990**	**0.0308**	**0.9298**		**4,676.8462**	**4,676.8462**	**0.2120**		**4,682.1460**

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	1.9949	15.6171	14.2521	0.0247		0.7824	0.7824		0.7510	0.7510	0.0000	2,253.1374	2,253.1374	0.4387		2,264.1060
Total	**1.9949**	**15.6171**	**14.2521**	**0.0247**		**0.7824**	**0.7824**		**0.7510**	**0.7510**	**0.0000**	**2,253.1374**	**2,253.1374**	**0.4387**		**2,264.1060**

3.4 Building Construction - 2021

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	0.1948	6.8484	1.8573	0.0180	0.4664	0.0142	0.4806	0.1342	0.0136	0.1478		1,962.1853	1,962.1853	0.1539		1,966.0318
Worker	0.9312	0.5635	7.8362	0.0272	2.8838	0.0187	2.9025	0.7648	0.0172	0.7820		2,714.6609	2,714.6609	0.0581		2,716.1142
Total	**1.1260**	**7.4119**	**9.6935**	**0.0452**	**3.3502**	**0.0329**	**3.3831**	**0.8990**	**0.0308**	**0.9298**		**4,676.8462**	**4,676.8462**	**0.2120**		**4,682.1460**

3.5 Paving - 2021

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	0.8738	8.7235	9.8952	0.0152		0.4650	0.4650		0.4289	0.4289		1,455.0218	1,455.0218	0.4595		1,466.5091
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8738**	**8.7235**	**9.8952**	**0.0152**		**0.4650**	**0.4650**		**0.4289**	**0.4289**		**1,455.0218**	**1,455.0218**	**0.4595**		**1,466.5091**

3.5 Paving - 2021

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	0.0469	0.0284	0.3949	1.3700e-003	0.1453	9.4000e-004	0.1463	0.0385	8.7000e-004	0.0394		136.7852	136.7852	2.9300e-003		136.8585
Total	**0.0469**	**0.0284**	**0.3949**	**1.3700e-003**	**0.1453**	**9.4000e-004**	**0.1463**	**0.0385**	**8.7000e-004**	**0.0394**		**136.7852**	**136.7852**	**2.9300e-003**		**136.8585**

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	0.8738	8.7235	9.8952	0.0152		0.4650	0.4650		0.4289	0.4289	0.0000	1,455.0218	1,455.0218	0.4595		1,466.5091
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8738**	**8.7235**	**9.8952**	**0.0152**		**0.4650**	**0.4650**		**0.4289**	**0.4289**	**0.0000**	**1,455.0218**	**1,455.0218**	**0.4595**		**1,466.5091**

3.5 Paving - 2021

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	0.0469	0.0284	0.3949	1.3700e-003	0.1453	9.4000e-004	0.1463	0.0385	8.7000e-004	0.0394		136.7852	136.7852	2.9300e-003		136.8585
Total	**0.0469**	**0.0284**	**0.3949**	**1.3700e-003**	**0.1453**	**9.4000e-004**	**0.1463**	**0.0385**	**8.7000e-004**	**0.0394**		**136.7852**	**136.7852**	**2.9300e-003**		**136.8585**

3.6 Architectural Coating - 2020

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479		375.2641	375.2641	0.0291		375.9904
Total	**15.9169**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**		**375.2641**	**375.2641**	**0.0291**		**375.9904**

3.6 Architectural Coating - 2020

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	0.1998	0.1259	1.7021	5.6900e-003	0.5812	3.8400e-003	0.5851	0.1542	3.5400e-003	0.1577		566.8227	566.8227	0.0129		567.1457
Total	**0.1998**	**0.1259**	**1.7021**	**5.6900e-003**	**0.5812**	**3.8400e-003**	**0.5851**	**0.1542**	**3.5400e-003**	**0.1577**		**566.8227**	**566.8227**	**0.0129**		**567.1457**

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479	0.0000	375.2641	375.2641	0.0291		375.9904
Total	**15.9169**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**	**0.0000**	**375.2641**	**375.2641**	**0.0291**		**375.9904**

3.6 Architectural Coating - 2020

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	0.1998	0.1259	1.7021	5.6900e-003	0.5812	3.8400e-003	0.5851	0.1542	3.5400e-003	0.1577		566.8227	566.8227	0.0129		567.1457
Total	**0.1998**	**0.1259**	**1.7021**	**5.6900e-003**	**0.5812**	**3.8400e-003**	**0.5851**	**0.1542**	**3.5400e-003**	**0.1577**		**566.8227**	**566.8227**	**0.0129**		**567.1457**

3.6 Architectural Coating - 2021

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255		375.2641	375.2641	0.0258		375.9079
Total	**15.8859**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**		**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.6 Architectural Coating - 2021

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	0.1877	0.1136	1.5794	5.4900e-003	0.5812	3.7600e-003	0.5850	0.1542	3.4600e-003	0.1576		547.1410	547.1410	0.0117		547.4339
Total	**0.1877**	**0.1136**	**1.5794**	**5.4900e-003**	**0.5812**	**3.7600e-003**	**0.5850**	**0.1542**	**3.4600e-003**	**0.1576**		**547.1410**	**547.1410**	**0.0117**		**547.4339**

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	15.5940					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255	0.0000	375.2641	375.2641	0.0258		375.9079
Total	**15.8859**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**	**0.0000**	**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.6 Architectural Coating - 2021

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	0.1877	0.1136	1.5794	5.4900e-003	0.5812	3.7600e-003	0.5850	0.1542	3.4600e-003	0.1576		547.1410	547.1410	0.0117		547.4339
Total	**0.1877**	**0.1136**	**1.5794**	**5.4900e-003**	**0.5812**	**3.7600e-003**	**0.5850**	**0.1542**	**3.4600e-003**	**0.1576**		**547.1410**	**547.1410**	**0.0117**		**547.4339**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	0.00	0.00	0.00		
Hotel	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Apartments High Rise	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Hotel	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Regional Shopping Center	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Parking Lot	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	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

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					
Apartments High Rise	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
Hotel	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
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
Regional Shopping Center	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	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
Hotel	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
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
Regional Shopping Center	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
Total		**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**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679
Unmitigated	6.3323	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749	0.0000	24.4706	24.4706	0.0239	0.0000	25.0679

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	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
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**		**0.0749**	**0.0749**		**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	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
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.3323**	**0.1570**	**13.6102**	**7.2000e-004**		**0.0749**	**0.0749**		**0.0749**	**0.0749**	**0.0000**	**24.4706**	**24.4706**	**0.0239**	**0.0000**	**25.0679**

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 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

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APPENDIX 3.2:

CALEEMOD OPERATIONAL EMISSIONS MODEL OUTPUTS

3rd & Broadway (Operations)

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	403.00	Space	0.00	240,263.00	0
Hotel	75.00	Room	0.48	81,927.00	0
Apartments High Rise	164.00	Dwelling Unit	0.82	169,230.00	469
Regional Shopping Center	15.32	1000sqft	0.00	15,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	480	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Operations) - Orange County, Winter

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2021 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on ITE 10th Edition.

Woodstoves - Rule 445

Water And Wastewater - Water Usage based on the Demand Factors provided in the City of Santa Ana WSA for the proposed Transit Zoning Code (January 2010)

Energy Use -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	1.00
tblFireplaces	NumberGas	139.40	164.00
tblFireplaces	NumberNoFireplace	16.40	0.00
tblFireplaces	NumberWood	8.20	0.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	164,000.00	169,230.00
tblLandUse	LotAcreage	3.63	0.00
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	2.65	0.82
tblLandUse	LotAcreage	0.35	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	480

tblVehicleTrips	DV_TP	35.00	12.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	ST_TR	4.98	3.61
tblVehicleTrips	ST_TR	8.19	7.46
tblVehicleTrips	ST_TR	49.97	34.95
tblVehicleTrips	SU_TR	3.65	2.86
tblVehicleTrips	SU_TR	5.95	5.42
tblVehicleTrips	SU_TR	25.24	15.99
tblVehicleTrips	WD_TR	4.20	3.55
tblVehicleTrips	WD_TR	8.17	7.61
tblVehicleTrips	WD_TR	42.70	28.61
tblWater	IndoorWaterUseRate	10,685,260.20	8,979,000.00
tblWater	IndoorWaterUseRate	1,902,507.75	687,484.00
tblWater	IndoorWaterUseRate	1,134,791.03	559.18
tblWater	OutdoorWaterUseRate	6,736,359.69	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	695,517.08	0.00
tblWoodstoves	NumberCatalytic	8.20	0.00
tblWoodstoves	NumberNoncatalytic	8.20	0.00

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					
2019	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
Maximum	**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**

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					
2019	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
Maximum	**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**

	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**

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	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471
Energy	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930
Mobile	2.3826	9.3938	28.4984	0.1029	9.4248	0.0787	9.5034	2.5203	0.0732	2.5935		10,452.8917	10,452.8917	0.4558		10,464.2866
Total	**9.1724**	**13.5064**	**44.1076**	**0.1286**	**9.4248**	**0.4697**	**9.8945**	**2.5203**	**0.4643**	**2.9845**	**0.0000**	**15,468.6735**	**15,468.6735**	**0.5754**	**0.0915**	**15,510.3266**

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	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471
Energy	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930
Mobile	2.3826	9.3938	28.4984	0.1029	9.4248	0.0787	9.5034	2.5203	0.0732	2.5935		10,452.8917	10,452.8917	0.4558		10,464.2866
Total	**9.1724**	**13.5064**	**44.1076**	**0.1286**	**9.4248**	**0.4697**	**9.8945**	**2.5203**	**0.4643**	**2.9845**	**0.0000**	**15,468.6735**	**15,468.6735**	**0.5754**	**0.0915**	**15,510.3266**

	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	Demolition	Demolition	7/1/2019	7/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	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
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

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	0.0000	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
Total	**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**

3.2 Demolition - 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	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
Total	**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**

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	0.0000	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
Total	**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**

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	2.3826	9.3938	28.4984	0.1029	9.4248	0.0787	9.5034	2.5203	0.0732	2.5935		10,452.8917	10,452.8917	0.4558		10,464.2866
Unmitigated	2.3826	9.3938	28.4984	0.1029	9.4248	0.0787	9.5034	2.5203	0.0732	2.5935		10,452.8917	10,452.8917	0.4558		10,464.2866

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	581.87	592.37	469.37	1,938,548	1,938,548
Enclosed Parking with Elevator	0.00	0.00	0.00		
Hotel	570.98	559.43	406.43	1,302,415	1,302,415
Regional Shopping Center	438.24	535.42	244.95	837,731	837,731
Total	1,591.09	1,687.21	1,120.74	4,078,694	4,078,694

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
Apartments High Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Hotel	16.60	8.40	6.90	19.40	61.60	19.00	58	38	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	12	34

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Enclosed Parking with Elevator	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930
NaturalGas Unmitigated	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930

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					
Apartments High Rise	5134.53	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383		604.0624	604.0624	0.0116	0.0111	607.6520
Enclosed Parking with Elevator	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
Hotel	7687.67	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	83.9452	9.1000e-004	8.2300e-003	6.9100e-003	5.0000e-005		6.3000e-004	6.3000e-004		6.3000e-004	6.3000e-004		9.8759	9.8759	1.9000e-004	1.8000e-004	9.9346
Total		**0.1392**	**1.2351**	**0.8414**	**7.5900e-003**		**0.0962**	**0.0962**		**0.0962**	**0.0962**		**1,518.3701**	**1,518.3701**	**0.0291**	**0.0278**	**1,527.3930**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	5.13453	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383		604.0624	604.0624	0.0116	0.0111	607.6520
Enclosed Parking with Elevator	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
Hotel	7.68767	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	0.0839452	9.1000e-004	8.2300e-003	6.9100e-003	5.0000e-005		6.3000e-004	6.3000e-004		6.3000e-004	6.3000e-004		9.8759	9.8759	1.9000e-004	1.8000e-004	9.9346
Total		**0.1392**	**1.2351**	**0.8414**	**7.5900e-003**		**0.0962**	**0.0962**		**0.0962**	**0.0962**		**1,518.3701**	**1,518.3701**	**0.0291**	**0.0278**	**1,527.3930**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471
Unmitigated	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.6507**	**2.8775**	**14.7678**	**0.0181**		**0.2949**	**0.2949**		**0.2949**	**0.2949**	**0.0000**	**3,497.4117**	**3,497.4117**	**0.0905**	**0.0637**	**3,518.6471**

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.6507**	**2.8775**	**14.7678**	**0.0181**		**0.2949**	**0.2949**		**0.2949**	**0.2949**	**0.0000**	**3,497.4117**	**3,497.4117**	**0.0905**	**0.0637**	**3,518.6471**

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 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

3rd & Broadway (Operations)

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	403.00	Space	0.00	240,263.00	0
Hotel	75.00	Room	0.48	81,927.00	0
Apartments High Rise	164.00	Dwelling Unit	0.82	169,230.00	469
Regional Shopping Center	15.32	1000sqft	0.00	15,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	480	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Operations) - Orange County, Summer

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2021 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on ITE 10th Edition.

Woodstoves - Rule 445

Water And Wastewater - Water Usage based on the Demand Factors provided in the City of Santa Ana WSA for the proposed Transit Zoning Code (January 2010)

Energy Use -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	1.00
tblFireplaces	NumberGas	139.40	164.00
tblFireplaces	NumberNoFireplace	16.40	0.00
tblFireplaces	NumberWood	8.20	0.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	164,000.00	169,230.00
tblLandUse	LotAcreage	3.63	0.00
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	2.65	0.82
tblLandUse	LotAcreage	0.35	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	480

tblVehicleTrips	DV_TP	35.00	12.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	ST_TR	4.98	3.61
tblVehicleTrips	ST_TR	8.19	7.46
tblVehicleTrips	ST_TR	49.97	34.95
tblVehicleTrips	SU_TR	3.65	2.86
tblVehicleTrips	SU_TR	5.95	5.42
tblVehicleTrips	SU_TR	25.24	15.99
tblVehicleTrips	WD_TR	4.20	3.55
tblVehicleTrips	WD_TR	8.17	7.61
tblVehicleTrips	WD_TR	42.70	28.61
tblWater	IndoorWaterUseRate	10,685,260.20	8,979,000.00
tblWater	IndoorWaterUseRate	1,902,507.75	687,484.00
tblWater	IndoorWaterUseRate	1,134,791.03	559.18
tblWater	OutdoorWaterUseRate	6,736,359.69	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	695,517.08	0.00
tblWoodstoves	NumberCatalytic	8.20	0.00
tblWoodstoves	NumberNoncatalytic	8.20	0.00

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					
2019	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
Maximum	**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**

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					
2019	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
Maximum	**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**

	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**

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	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471
Energy	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930
Mobile	2.4211	9.1589	29.5367	0.1078	9.4248	0.0782	9.5030	2.5203	0.0728	2.5931		10,941.8899	10,941.8899	0.4556		10,953.2804
Total	**9.2109**	**13.2715**	**45.1459**	**0.1335**	**9.4248**	**0.4693**	**9.8940**	**2.5203**	**0.4639**	**2.9841**	**0.0000**	**15,957.6717**	**15,957.6717**	**0.5752**	**0.0915**	**15,999.3205**

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	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471
Energy	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930
Mobile	2.4211	9.1589	29.5367	0.1078	9.4248	0.0782	9.5030	2.5203	0.0728	2.5931		10,941.8899	10,941.8899	0.4556		10,953.2804
Total	**9.2109**	**13.2715**	**45.1459**	**0.1335**	**9.4248**	**0.4693**	**9.8940**	**2.5203**	**0.4639**	**2.9841**	**0.0000**	**15,957.6717**	**15,957.6717**	**0.5752**	**0.0915**	**15,999.3205**

	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	Demolition	Demolition	7/1/2019	7/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	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
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

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	0.0000	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
Total	**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**

3.2 Demolition - 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	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
Total	**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**

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	0.0000	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
Total	**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**

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	2.4211	9.1589	29.5367	0.1078	9.4248	0.0782	9.5030	2.5203	0.0728	2.5931		10,941.8899	10,941.8899	0.4556		10,953.2804
Unmitigated	2.4211	9.1589	29.5367	0.1078	9.4248	0.0782	9.5030	2.5203	0.0728	2.5931		10,941.8899	10,941.8899	0.4556		10,953.2804

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	581.87	592.37	469.37	1,938,548	1,938,548
Enclosed Parking with Elevator	0.00	0.00	0.00		
Hotel	570.98	559.43	406.43	1,302,415	1,302,415
Regional Shopping Center	438.24	535.42	244.95	837,731	837,731
Total	1,591.09	1,687.21	1,120.74	4,078,694	4,078,694

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
Apartments High Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Hotel	16.60	8.40	6.90	19.40	61.60	19.00	58	38	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	12	34

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Enclosed Parking with Elevator	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930
NaturalGas Unmitigated	0.1392	1.2351	0.8414	7.5900e-003		0.0962	0.0962		0.0962	0.0962		1,518.3701	1,518.3701	0.0291	0.0278	1,527.3930

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					
Apartments High Rise	5134.53	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383		604.0624	604.0624	0.0116	0.0111	607.6520
Enclosed Parking with Elevator	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
Hotel	7687.67	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	83.9452	9.1000e-004	8.2300e-003	6.9100e-003	5.0000e-005		6.3000e-004	6.3000e-004		6.3000e-004	6.3000e-004		9.8759	9.8759	1.9000e-004	1.8000e-004	9.9346
Total		**0.1392**	**1.2351**	**0.8414**	**7.5900e-003**		**0.0962**	**0.0962**		**0.0962**	**0.0962**		**1,518.3701**	**1,518.3701**	**0.0291**	**0.0278**	**1,527.3930**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	5.13453	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383		604.0624	604.0624	0.0116	0.0111	607.6520
Enclosed Parking with Elevator	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
Hotel	7.68767	0.0829	0.7537	0.6331	4.5200e-003		0.0573	0.0573		0.0573	0.0573		904.4318	904.4318	0.0173	0.0166	909.8064
Regional Shopping Center	0.0839452	9.1000e-004	8.2300e-003	6.9100e-003	5.0000e-005		6.3000e-004	6.3000e-004		6.3000e-004	6.3000e-004		9.8759	9.8759	1.9000e-004	1.8000e-004	9.9346
Total		**0.1392**	**1.2351**	**0.8414**	**7.5900e-003**		**0.0962**	**0.0962**		**0.0962**	**0.0962**		**1,518.3701**	**1,518.3701**	**0.0291**	**0.0278**	**1,527.3930**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471
Unmitigated	6.6507	2.8775	14.7678	0.0181		0.2949	0.2949		0.2949	0.2949	0.0000	3,497.4117	3,497.4117	0.0905	0.0637	3,518.6471

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.6507**	**2.8775**	**14.7678**	**0.0181**		**0.2949**	**0.2949**		**0.2949**	**0.2949**	**0.0000**	**3,497.4117**	**3,497.4117**	**0.0905**	**0.0637**	**3,518.6471**

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	0.5554					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.3614					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3184	2.7205	1.1577	0.0174		0.2200	0.2200		0.2200	0.2200	0.0000	3,472.9412	3,472.9412	0.0666	0.0637	3,493.5791
Landscaping	0.4156	0.1570	13.6102	7.2000e-004		0.0749	0.0749		0.0749	0.0749		24.4706	24.4706	0.0239		25.0679
Total	**6.6507**	**2.8775**	**14.7678**	**0.0181**		**0.2949**	**0.2949**		**0.2949**	**0.2949**	**0.0000**	**3,497.4117**	**3,497.4117**	**0.0905**	**0.0637**	**3,518.6471**

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 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix D GHG Analysis

Appendix

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Caribou Industries Proposal for the 3rd Street Promenade

LOCATED AT: 3rd & Broadway

GREENHOUSE GAS ANALYSIS

CITY OF SANTA ANA

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FEBRUARY 14, 2019

PREPARED FOR: CARIBOU INDUSTRIES, INC.

CONTRACTOR DEVELOPER
CARIBOU INDUSTRIES
PRESERVING THE PAST ENSURING THE FUTURE

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APPENDICES

APPENDIX 3.1: CALEEMOD EMISSIONS MODEL OUTPUTS

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LIST OF ABBREVIATED TERMS

(1)	Reference
APS	Alternative Planning Organizations
ARB	California Air Resources Board
CAA	Federal Clean Air Act
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CAT	Climate Action Team
CBSC	California Building Standards Commission
CEC	California Energy Commission
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EPA	Environmental Protection Agency
EPS	Emission Performance Standard
GCC	Global Climate Change
GHGA	Greenhouse Gas Analysis
GWP	Global Warming Potential
HFC	Hydrofluorocarbons
LCA	Life-Cycle Analysis
$MMTCO_2e$	Million Metric Ton of Carbon Dioxide Equivalent
MPOs	Metropolitan Planning Organizations
$MTCO_2e$	Metric Ton of Carbon Dioxide Equivalent
N_20	Nitrogen Dioxide
NIOSH	National Institute for Occupational Safety and Health
NO_X	Oxides of Nitrogen
PFC	Perfluorocarbons
PM_{10}	Particulate Matter 10 microns in diameter or less
$PM_{2.5}$	Particulate Matter 2.5 microns in diameter or less

PPM	Parts Per Million
Project	Caribou Industries Proposal for the 3rd Street Promenade
RTP	Regional Transportation Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategies
UNFCCC	United Nations' Framework Convention on Climate Change
VOC	Volatile Organic Compounds

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EXECUTIVE SUMMARY

Pursuant to CEQA § 15164 (a) the lead agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary but none of the conditions described in §15162 calling for preparation of a subsequent EIR have occurred. More specifically, §15162 (a)(3)(B) states that no subsequent EIR shall be prepared for the project unless significant effects previously examined will be substantially more severe than shown in the previous EIR. Significant and unavoidable impacts were previously identified and disclosed in the previously analyzed *Transit Zoning Code (TZC) Environmental Impact Report (EIR)* (TZC EIR) (1).

The current greenhouse gas study prepared for the proposed Project utilizes similar analysis methodologies and assumptions as that assumed and evaluated in the TZC EIR. Based on the project-specific analysis, there will be no additional significant and unavoidable impacts from those previously identified in the TZC EIR. Thus, the Project would not result in any new or more severe impacts to greenhouse gas emissions beyond what was disclosed by the TZC EIR.

SUMMARY OF CEQA SIGNIFICANCE FINDINGS & MITIGATION MEASURES

The results of this *Caribou Industries Proposal for the 3rd Street Promenade Greenhouse Gas Analysis* are summarized below based on the significance criteria in Section 3.7 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (2). Table ES-1 shows the findings of significance for each potential greenhouse gas (GHG) impact under CEQA prior to implementation of TZC EIR mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Significance Findings		Section	New Significant Impact
	TZC EIR	Proposed Project		
GHG Impact #1: The Project would not generate direct or indirect greenhouse gas emission that would result in a significant impact on the environment.	*Significant and Unavoidable*	*Less Than Significant*	***3.6***	***NO***
GHG Impact #2: The Project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases	*Significant and Unavoidable*	*Significant and Unavoidable*	***3.7***	***NO***

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1 INTRODUCTION

This report presents the results of the greenhouse gas analysis (GHGA) prepared by Urban Crossroads, Inc., for the proposed Caribou Industries Proposal for the 3rd Street Promenade development (referred to as "Project").

The purpose of this GHGA is to evaluate Project-related construction and operational emissions and determine the level of greenhouse gas (GHG) impacts as a result of constructing and operating the proposed Project.

1.1 SITE LOCATION

The Project site is located east of North Broadway and north of 3rd Street in the City of Santa Ana, as shown on Exhibit 1-A. The Project is within a transit priority area as defined by Public Resources Code (PRC) Section 21099(a)(7) and shall incorporate all of the adopted Mitigation Measures (MM) identified in the *Transit Zoning Code (TZC) Environmental Impact Report (EIR)* (1) and Section 1.3 of this GHGA. The proposed Project is located approximately 4,600 feet southwest of Interstate 5 (I-5).

The Project site is currently occupied by an existing parking garage. Existing land uses in the Project study area include commercial uses to the north, south, east, and west. An existing church use is located in an adjacent commercial building at the eastern Project site boundary which operates over limited daytime hours (3). Existing residential uses representing the closest sensitive receptor locations to the Project site are situated south and southwest of the Project site of the Project site across 3rd Street.

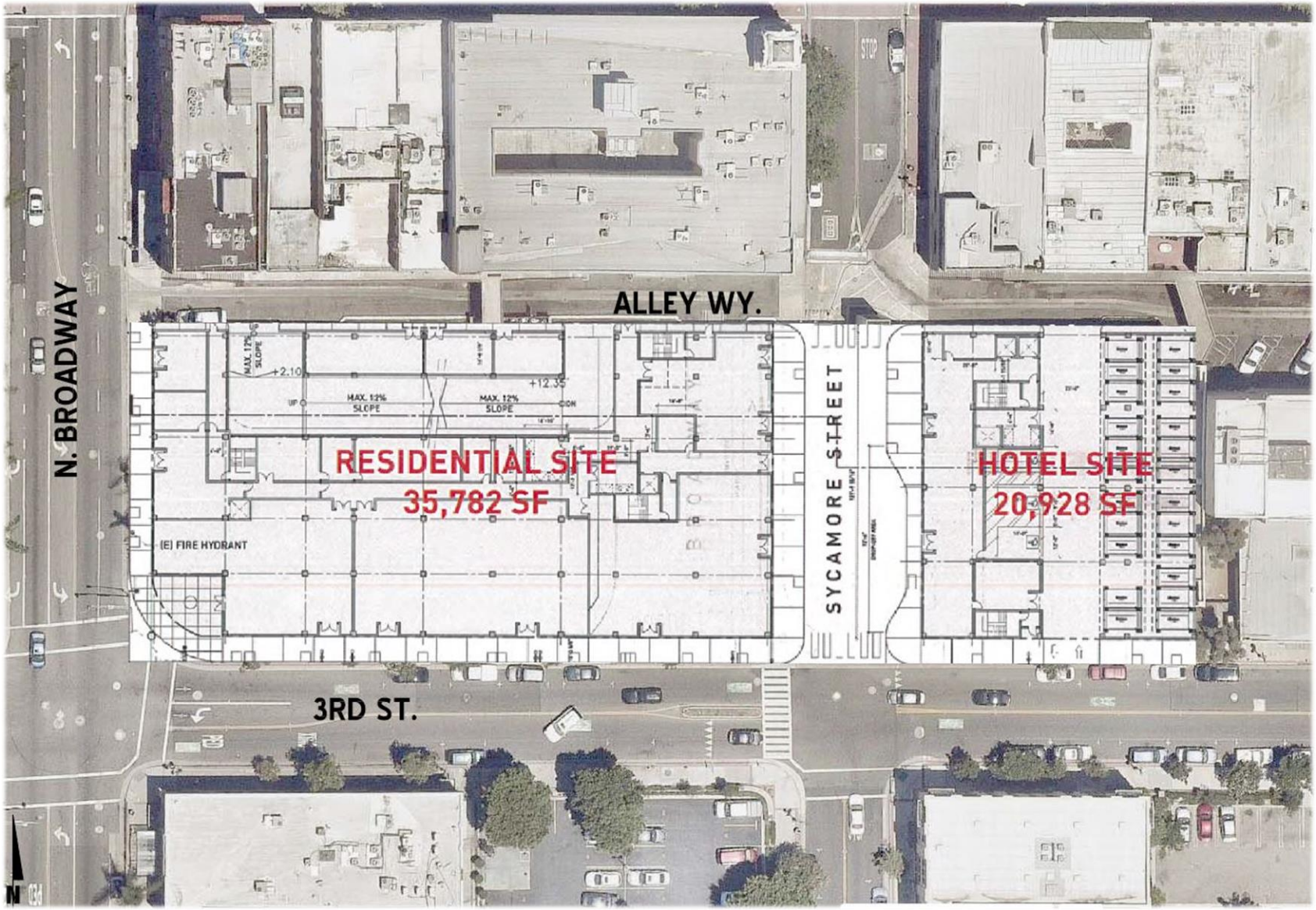
1.2 PROJECT DESCRIPTION

The proposed Project is to consist of up to 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), and roof-top amenities ancillary to residential and hotel uses, as shown on Exhibit 1-B.

EXHIBIT 1-A: LOCATION MAP



EXHIBIT 1-B: SITE PLAN



1.3 PROJECT REQUIREMENTS

The Project would be required to comply with regulations imposed by the State of California and the South Coast Air Quality Management District aimed at the reduction of air pollutant emissions. Those that are directly and indirectly applicable to the Project and that would assist in the reduction of greenhouse gas emissions include:

- Global Warming Solutions Act of 2006 (AB32) (4). AB 32 is applicable to the Project because, as a development Project, the Caribou Industries Proposal for the 3rd Street Promenade will need to meet 2020 GHG reduction goals set forth in AB 32. AB 32 requires the California Air Resources Board (CARB or ARB) to develop regulations and market mechanisms to reduce California's greenhouse gas emissions to 1990 levels by the year of 2020. Many of the GHG reduction measures outlined in AB 32 (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted over the last five years and implementation activities are ongoing.
- Pavley Fuel Efficiency Standards (AB1493). Establishes fuel efficiency ratings for new vehicles (5). AB 1493 (Pavley) establishes fuel efficiency rating for model year 2009-2016 passenger cars and light trucks. AB 1493 is applicable to the Project because model year 2009-2016 passenger cars and light duty truck vehicles traveling to and from the Project site are required by the State of California to implement GHG emission reduction standards related to fuel efficiency. The CARB anticipates that implementation of the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 30 percent in 2016 compared to emissions that occurred prior to 2009 when AB 1492 was enacted.
- Title 24 California Code of Regulations (California Building Code). Establishes energy efficiency requirements for new construction (6). The Title 24 energy standards address the energy efficiency of new (and altered) homes and commercial buildings. Because energy efficiency reduces energy costs, increases reliability and availability of electricity, improves building occupant comfort, and reduces impacts to the environment, standards are important and necessary for California's energy future. Therefore, a new development such as the Caribou Industries Proposal for the 3rd Street Promenade is required to comply with Title 24 Code of Regulations and would therefore increase the Project's energy efficiency and reduce its environmental impact.
- Title 17 California Code of Regulations (Low Carbon Fuel Standard). Requires carbon content of fuel sold in California to be 10% less by 2020 (7). Because the LCFS applies to any transportation fuel that is sold, supplied, or offered for sale in California, and to any person who, as a regulated party, is responsible for a transportation fuel in a calendar year, all vehicles accessing the site will be required to comply with LCFS. Implementation of such a standard will reduce greenhouse gas emissions by reducing the full fuel-cycle, carbon intensity of the transportation fuel pool used in California.
- California Water Conservation in Landscaping Act of 2006 (AB1881). Requires local agencies to adopt the Department of Water Resources updated Water Efficient Landscape Ordinance or equivalent by January 1, 2010 to ensure efficient landscapes in new development and reduced water waste in existing landscapes (8). As new development project within the State of California, the Caribou Industries Proposal for the 3rd Street Promenade is required to comply with the City of Santa Ana's adopted water efficient landscape requirements and would therefore be consistent

with the requirements of AB1881 in order to help conserve California's water resources and to promote efficient water use.

- Senate Bill 32 (SB 32). Requires the state to reduce statewide greenhouse gas emissions to 40% below 1990 levels by 2030, a reduction target that was first introduced in Executive Order B-30-15 (9) (10).

1.4 TZC EIR MITIGATION MEASURES

The applicable TZC EIR mitigation measures for greenhouse gas impacts are shown below and are required for the Project. Additionally, these select measures, as disclosed in the EIR, would reduce GHG emissions. As a conservative measure, to provide a worst-case disclosure of the Project's impacts, no reduction in emissions has been assumed from the following measures.

MM GHG 1

All diesel fueled construction equipment shall be classified EPA Tier II or better emission efficiencies.

MM GHG 2

All construction equipment shall be shut off when not in use and shall not idle for more than five minutes, unless actively engaged in construction activities.

MM GHG 3

Queuing of trucks on and off site shall be limited to periods when absolutely necessitated by grading or construction activities.

MM GHG 4

All on-road construction trucks and other vehicles greater than 10,000 pounds shall be shut off when not in use and shall not idle for more than 5 minutes.

MM GHG 5

To the extent feasible, all diesel- and gasoline-powered construction equipment shall be replaced with equivalent electric equipment.

MM GHG 6

Project plans and specifications shall include policies and procedures for the reuse and recycling of construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard).

MM GHG 7

Project plans and specifications shall include education for construction workers about reducing waste and using available recycling services.

MM GHG 8

Prior to issuance of a building permit, the applicant shall demonstrate that the design of the proposed buildings or structures meets or exceeds the most recent Title 24 requirements (Title 24, Part 6 of the California Code of Regulations; Energy Efficiency Standards for Residential and Non-Residential Buildings; Cool Roof Coatings performance standards), subject to review by the City Building Official. Documentation of compliance with this measure shall be provided to the Planning and Building Agency and Building Official for review and approval prior to issuance of the permit. Installation of the identified design features or equipment will be confirmed by the City Building Official prior to certificate of occupancy. The following design features should be considered by the applicant as a way to achieve Title 24 compliance in excess of the minimum requirement:

- Increase in insulation such that heat transfer and thermal bridging is minimized
- Limit air leakage through the structure or within the heating and cooling distribution system to minimize energy consumption
- Incorporate dual-paned or other energy efficient windows
- Incorporate energy efficient space heating and cooling equipment
- Incorporate energy efficient light fixtures
- Incorporate energy efficient appliances
- Incorporate energy efficient domestic hot water systems
- Incorporate solar panels into the electrical system
- Incorporate cool roofs/light-colored roofing
- Or other measures that will increase the energy efficiency of building envelope in a manner that when combined with the other options listed above exceeds current Title 24 Standards (Title 24, Part 6 of the California Code of Regulations; Energy Efficiency Standards for Residential and Non-Residential Buildings, as amended September 11, 2008; Cool Roof Coatings performance standards as amended September 11, 2006) by a minimum of 20 percent

MM GHG 9

Prior to issuance of a building permit, applicants for individual projects shall provide a landscape plan that includes shade trees around main buildings, particularly along southern elevations where practical, and will not interfere with loading dock locations or other operational constraints. Documentation of compliance with this measure shall be provided to the Planning and Building Agency for review and approval.

MM GHG 10

All showerheads, lavatory faucets, and sink faucets within the residential units, and where feasible within non-residential developments, shall comply with the California Energy Conservation flow rate standards.

MM GHG 11

Low-flush toilets shall be installed within all Congregate Care units as specified in California State Health and Safety Code Section 17921.3.

MM GHG 12

Project designers should consider design features to incorporate light-colored roofing materials that will deflect heat away from the building and conserve energy.

MM GHG 13

Landscape designers shall ensure that landscaping of common areas for Industrial/Commercial projects uses drought-tolerant and smog-tolerant trees, shrubs, and groundcover to ensure long-term viability and conserve water and energy.

MM GHG 14

Landscape designers shall ensure that the landscape plan for Industrial/Commercial projects includes drought resistant trees, shrubs, and groundcover within the parking lot and perimeter.

MM GHG 15

Individual project applicants shall ensure that designs for Industrial/Commercial projects include all illumination elements to have controls to allow selective use as an energy conservation measure.

MM GHG 16

The applicant for Industrial/Commercial projects should promote ride sharing programs such as, but not necessarily including, publishing ride sharing information for all of the tenants, designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading and waiting areas for ride sharing vehicles, and providing a website or message board for coordinating rides. Prior to issuance of a building permit, the applicant shall demonstrate that measures have been included to provide adequate bicycle parking near building entrances to promote cyclist safety, security, and convenience pursuant to SAMC Chapter 41 regarding bicycle parking standards and Chapter 16 of the Santa Ana Citywide Design Guidelines regarding Bikeway Support Facilities Guidelines. Documentation of compliance with this measure shall be provided to the City Building Official for review and approval. Installation of the identified design features or equipment will be confirmed by the City Building Official prior to issuance of certificate of occupancy.

MM GHG 17

Prior to issuance of any certificate of occupancy, the applicant shall demonstrate that all Multi-family/Industrial/Commercial projects' interior building lighting supports the use of compact fluorescent light bulbs or equivalently efficient lighting to the satisfaction of the Building Official.

MM GHG 18

Applicants for Multi-family/Industrial/Commercial projects shall consider providing preferential parking spaces for ultra-low emission vehicles and alternative fueled vehicles to encourage the use of alternative fuels and ultra-low emission vehicles.

MM GHG 19

Prior to issuance of a building permit, the applicant shall demonstrate that the proposed Multi-family/ Industrial/Commercial uses building or structure designs incorporate exterior storage areas for recyclables and green waste and adequate recycling containers located in public/common areas pursuant to the adopted standards. Documentation of compliance with this measure shall be provided to the Planning and Building Agency for review and approval. Installation of the identified design features or equipment will be confirmed by the City Building Official prior to issuance of certificate of occupancy.

MM GHG 20

All common area irrigation areas for Multi-family/Industrial/Commercial projects shall consider systems that are capable of being operated by a computerized irrigation system which includes an on-site weather station/ET gage capable of reading current weather data and making automatic adjustments to independent run times for each irrigation valve based on changes in temperature, solar radiation, relative humidity, rain, and wind. In addition, the computerized irrigation system shall also consider the ability to be equipped with flow-sensing capabilities, thus automatically shutting down the irrigation system in the event of a mainline break or broken head. These features will assist in conserving water, eliminating the potential of slope failure due to mainline breaks, and eliminating over-watering and flooding due to pipe and/or head breaks.

MM GHG 21

Consideration of installation of solar roofs on homes and businesses to offset the increasing demand for energy and natural gas.

MM GHG 22

Project applicants shall, where feasible, incorporate passive solar design features into the buildings, which may include roof overhangs or canopies that block summer shade, but that allow winter sun, from penetrating south facing windows.

MM GHG 23

Use Energy Efficient Roofing Materials. All roofing materials used in commercial/retail buildings at the Mixed-Use Retail Development shall be Energy Star® certified. All roof products shall also be certified to meet American Society for Testing and Materials (ASTM) high emissivity requirements.

MM GHG 24

All commercial/industrial projects shall, where feasible, include up to 10% renewable energy sources within the project.

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2 CLIMATE CHANGE SETTING

2.1 INTRODUCTION TO GLOBAL CLIMATE CHANGE

Global Climate Change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggests that GCC has occurred in the past over the course of thousands or millions of years. These historical changes to the earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases in the earth's atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of greenhouse gases resulting from human activity and industrialization over the past 200 years.

An individual project like the proposed Project evaluated in this GHGA cannot generate enough greenhouse gas emissions to affect a discernible change in global climate. However, the proposed Project may participate in the potential for GCC by its incremental contribution of greenhouse gases combined with the cumulative increase of all other sources of greenhouse gases, which when taken together constitute potential influences on GCC. Because these changes may have serious environmental consequences, Section 3.0 will evaluate the potential for the proposed Project to have a significant effect upon the environment as a result of its potential contribution to the greenhouse effect.

2.2 GLOBAL CLIMATE CHANGE DEFINED

GCC refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO_2 (carbon dioxide), N_2O (nitrous oxide), CH_4 (methane), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the earth's atmosphere, but prevent radioactive heat from escaping, thus warming the earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages.

Gases that trap heat in the atmosphere are often referred to as greenhouse gases. Greenhouse gases are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural greenhouse gas effect, the earth's average temperature would be approximately 61° Fahrenheit (F) cooler than it is currently. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

Although California's rate of growth of greenhouse gas emissions is slowing, the state is still a substantial contributor to the U.S. emissions inventory total. In 2004, California is estimated to have produced 492 million gross metric tons of CO_2e greenhouse gas emissions. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of greenhouse gas emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls (11).

2.3 GREENHOUSE GAS EMISSIONS INVENTORIES

Global

Worldwide anthropogenic (human) GHG emissions are tracked by the Intergovernmental Panel on Climate Change for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Human GHG emissions data for Annex I nations are available through 2016. For the Year 2016, the sum of these emissions totaled approximately 28,747,554 Gg CO_2e[1] (12) (13). The GHG emissions in more recent years may differ from the inventories presented in Table 2-1; however, the data is representative of currently available inventory data.

TABLE 2-1: TOP GHG PRODUCER COUNTRIES AND THE EUROPEAN UNION [2]

Emitting Countries	GHG Emissions (Gg CO_2e)
China	11,895,765
United States	6,511,302
European Union (28 member countries)	4,291,252
India	2,643,817
Russian Federation	2,100,850
Japan	1,304,568
Total	**28,747,554**

United States

As noted in Table 2-1, the United States, as a single country, was the number two producer of GHG emissions in 2016. The primary greenhouse gas emitted by human activities in the United States was CO_2, representing approximately 81.6 percent of total greenhouse gas emissions in the US. Carbon dioxide from fossil fuel combustion, the largest source of US greenhouse gas emissions, accounted for approximately 93.5 percent of the CO_2 emissions (14).

State of California

CARB compiles GHG inventories for the State of California. Based upon the 2018 GHG inventory data (i.e., the latest year for which data are available) for the 2000-2016 greenhouse gas

1 The global emissions are the sum of Annex I and non-Annex I countries, without counting Land-Use, Land-Use Change and Forestry (LULUCF). For countries without 2016 data, the UNFCCC data for the most recent year were used. United Nations Framework Convention on Climate Change, "Annex I Parties – GHG total without LULUCF," The most recent GHG emissions for China were taken in 2012, while the most recent GHG emissions for India were taken in 2010.

2 Used http://unfccc.int data for Annex I countries. Consulted the CAIT Climate Data Explorer in http://www.wri.org site to reference Non-Annex I countries such as China and India.

emissions inventory, California emitted 429.4 $MMTCO_2e$ including emissions resulting from imported electrical power in 2015 (15)..

2.4 GREENHOUSE GASES

For the purposes of this analysis, emissions of carbon dioxide, methane, and nitrous oxide were evaluated (see Table 3-1 later in this report) because these gasses are the primary contributors to GCC from development projects. Although there are other substances such as fluorinated gases that also contribute to GCC, these fluorinated gases were not evaluated as their sources are not well-defined and do not contain accepted emissions factors or methodology to accurately calculate these gases.

Water Vapor: Water vapor (H_20) is the most abundant, important, and variable greenhouse gas in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change.

As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is then able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor and so on and so on. This is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is unknown as there are also dynamics that hold the positive feedback loop in check. As an example, when water vapor increases in the atmosphere, more of it will eventually condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the earth's surface and heat it up).

There are no human health effects from water vapor itself; however, when some pollutants come in contact with water vapor, they can dissolve and the water vapor can then act as a pollutant-carrying agent. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include: evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.

Carbon Dioxide: Carbon dioxide (CO_2) is an odorless and colorless GHG. Outdoor levels of carbon dioxide are not high enough to result in negative health effects. Carbon dioxide is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. Carbon dioxide is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks (16).

Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO_2 concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30 percent. Left unchecked, the concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources (17).

Methane: Methane (CH_4) is an extremely effective absorber of radiation, although its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10-12 years), compared to other GHGs. Exposure to high levels of methane can cause asphyxiation, loss of consciousness, headache and dizziness, nausea and vomiting, weakness, loss of coordination, and an increased breathing rate

Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.

Nitrous Oxide: Nitrous oxide (N_2O), also known as laughing gas, is a colorless greenhouse gas. Nitrous oxide can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage) (18).

Concentrations of nitrous oxide also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb). Nitrous oxide is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. Nitrous oxide can be transported into the stratosphere, be deposited on the earth's surface, and be converted to other compounds by chemical reaction.

Chlorofluorocarbons: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C_2H_6) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble and chemically unreactive in the troposphere (the level of air at the earth's surface). CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. Nonetheless, in confined indoor locations, working with CFC-113 or other CFCs is thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely

successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

Hydrofluorocarbons: Hydrofluorocarbons (HFCs) are synthetic, man-made chemicals that are used as a substitute for CFCs. Out of all the greenhouse gases, they are one of three groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF_3), HFC-134a (CF_3CH_2F), and HFC-152a (CH_3CHF_2). Prior to 1990, the only significant emissions were of HFC-23. HFC-134a emissions are increasing due to its use as a refrigerant. The U.S. EPA estimates that concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each; and that concentrations of HFC-152a are about 1 ppt (19). No health effects are known to result from exposure to HFCs, which are manmade for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6). The U.S. EPA estimates that concentrations of CF_4 in the atmosphere are over 70 ppt.

No health effects are known to result from exposure to PFCs. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride: Sulfur hexafluoride (SF_6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest global warming potential (GWP) of any gas evaluated (23,900). The U.S. EPA indicates that concentrations in the 1990s were about 4 ppt. In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Nitrogen Trifluoride: Nitrogen trifluoride (NF_3) is a colorless gas with a distinctly moldy odor. NF_3 is used in industrial processes and is produced in the manufacture of semiconductors and LCD (Liquid Crystal Display) panels, and types of solar panels and chemical lasers. The World Resources Institute (WRI) indicates that NF_3 has a 100-year GWP of 17,200 (20).

Long-term or repeated exposure may effect the liver and kidneys and may cause fluorosis (21).

Greenhouse gases have varying GWP values; GWP values represent the potential of a gas to trap heat in the atmosphere. Carbon dioxide is utilized as the reference gas for GWP, and thus has a GWP of 1.

The atmospheric lifetime and GWP of selected greenhouse gases are summarized at Table 2-2. As shown in the table below, GWP for the Second Assessment Report (SAR), the Intergovernmental Panel on Climate Change (IPCC)'s scientific and socio-economic assessment

on climate change, range from 1 for carbon dioxide to 23,900 for sulfur hexafluoride and GWP for the IPCC's 4th Assessment Report (AR4) range from 1 for carbon dioxide to 22,800 for sulfur hexafluoride.

TABLE 2-2: GLOBAL WARMING POTENTIAL AND ATMOSPHERIC LIFETIME OF SELECT GHGS

Gas	Atmospheric Lifetime (years)	Global Warming Potential (100 year time horizon)	
		Second Assessment Report (SAR)	4th Assessment Report (AR4)
Carbon Dioxide	50-200	1	1
Methane	12 ± 3	21	25
Nitrous Oxide	114	310	298
HFC-23	270	11,700	14,800
HFC-134a	14	1,300	1,430
HFC-152a	1.4	140	124
Sulfur Hexafluoride (SF_6)	3,200	23,900	22,800

Source: Table 2.14 of the IPCC Fourth Assessment Report, 2007

2.5 EFFECTS OF CLIMATE CHANGE IN CALIFORNIA

Public Health

Higher temperatures may increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation could increase from 25 to 35 percent under the lower warming range (3-5.5°F) to 75 to 85 percent under the medium warming range (5.5-8°F). In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances, depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming range scenario (8-10.5°F), there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and 95°F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures could increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system

relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation. It could also adversely affect winter tourism. Under the lower warming range, the ski season at lower elevations could be reduced by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater could degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta – a major fresh water supply.

Agriculture

Increased temperatures could cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. First, California farmers could possibly lose as much as 25 percent of the water supply they need. Although higher CO_2 levels can stimulate plant production and increase plant water-use efficiency, California's farmers could face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development could change, as could the intensity and frequency of pest and disease outbreaks. Rising temperatures could aggravate ozone (O_3) pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures could worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts.

In addition, continued global climate change could shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion could occur in many species while range contractions may be less likely in rapidly evolving species with significant populations already established. Should range contractions occur, new or different weed species could fill the emerging gaps. Continued global climate change could alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

Forests and Landscapes

Global climate change has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. In contrast, wildfires in northern California could increase by up to 90 percent due to decreased precipitation.

Moreover, continued global climate change has the potential to alter natural ecosystems and biological diversity within the state. For example, alpine and subalpine ecosystems could decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the state's forests has the potential to decrease as a result of global climate change.

Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures could increasingly threaten the state's coastal regions. Under the higher warming range scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate low-lying coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. Under the lower warming range scenario, sea level could rise 12-14 inches.

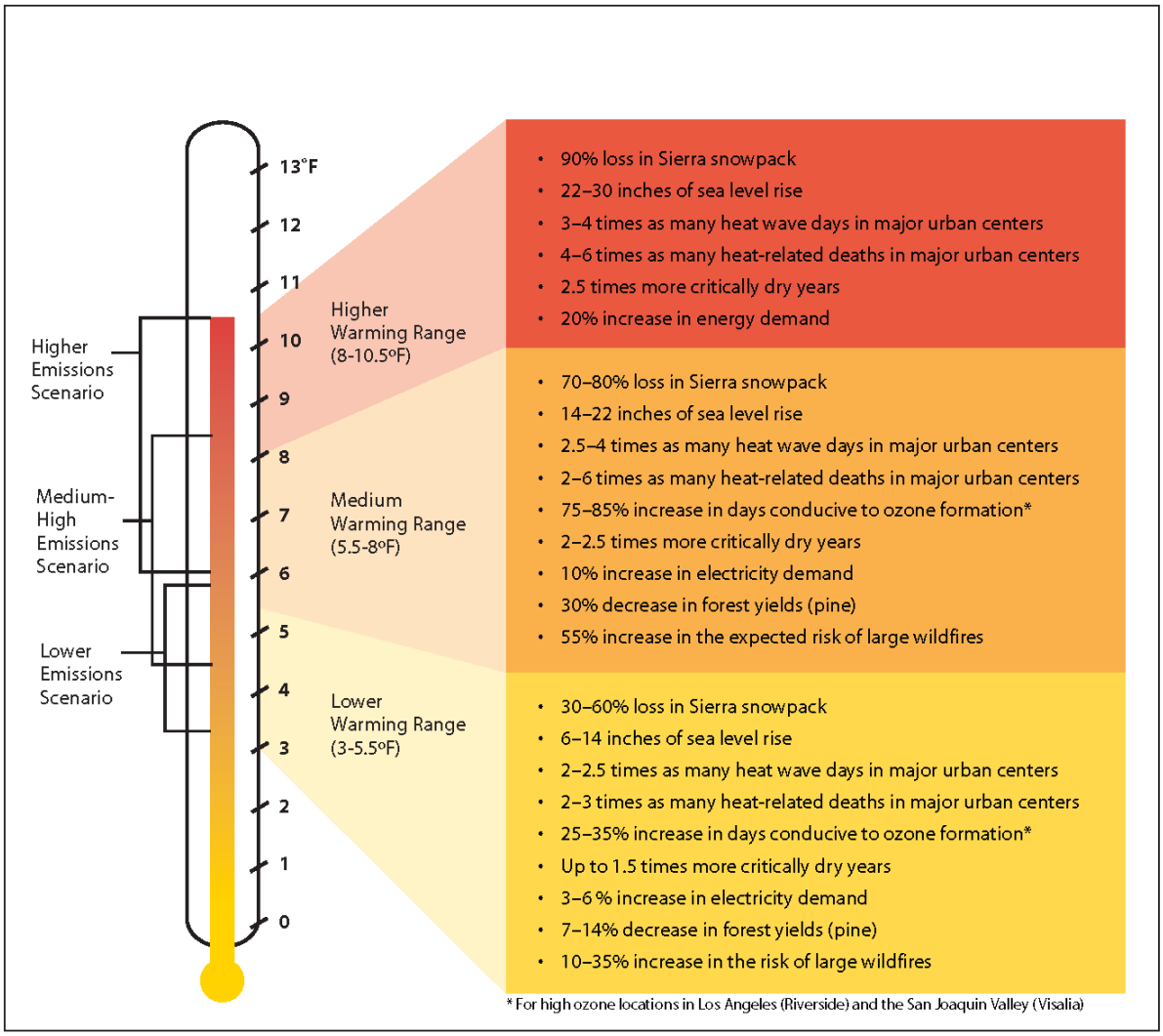
2.6 HUMAN HEALTH EFFECTS

The potential health effects related directly to the emissions of carbon dioxide, methane, and nitrous oxide as they relate to development projects, such as the proposed Project, are still being debated in the scientific community. Their cumulative effects to global climate change have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas (22). Exhibit 2-A presents the potential impacts of global warming.

Specific health effects associated with directly emitted GHG emissions are as follows:

Water Vapor: There are no known direct health effects related to water vapor at this time. It should be noted however that when some pollutants react with water vapor, the reaction forms a transport mechanism for some of these pollutants to enter the human body through water vapor.

EXHIBIT 2-A: SUMMARY OF PROJECTED GLOBAL WARMING IMPACT (2070-2099) (AS COMPARED WITH 1961-1990)



Source: Our Changing Climate: A Summary Report from the California Climate Change Center, July 2006

Carbon Dioxide: According to the National Institute for Occupational Safety and Health (NIOSH) high concentrations of carbon dioxide can result in health effects such as: headaches, dizziness, restlessness, difficulty breathing, sweating, increased heart rate, increased cardiac output, increased blood pressure, coma, asphyxia, and/or convulsions. It should be noted that current concentrations of carbon dioxide in the earth's atmosphere are estimated to be approximately 370 parts per million (ppm), the actual reference exposure level (level at which adverse health effects typically occur) is at exposure levels of 5,000 ppm averaged over 10 hours in a 40-hour workweek and short-term reference exposure levels of 30,000 ppm averaged over a 15 minute period (23).

Methane: Methane is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Exposure to high levels of methane can cause asphyxiation, loss of consciousness,

headache and dizziness, nausea and vomiting, weakness, loss of coordination, and an increased breathing rate (24).

Nitrous Oxide: Nitrous Oxide is often referred to as laughing gas; it is a colorless greenhouse gas. The health effects associated with exposure to elevated concentrations of nitrous oxide include dizziness, euphoria, slight hallucinations, and in extreme cases of elevated concentrations nitrous oxide can also cause brain damage (25).

Fluorinated Gases: High concentrations of fluorinated gases can also result in adverse health effects such as asphyxiation, dizziness, headache, cardiovascular disease, cardiac disorders, and in extreme cases, increased mortality (23).

Aerosols: The health effects of aerosols are similar to that of other fine particulate matter. Thus, aerosols can cause elevated respiratory and cardiovascular diseases, as well as increased mortality (26).

Nitrogen Trifluoride: Long-term or repeated exposure may effect the liver and kidneys and may cause fluorosis (21).

2.7 REGULATORY SETTING

INTERNATIONAL

Climate change is a global issue involving GHG emissions from all around the world; therefore, countries such as the ones discussed below have made an effort to reduce GHGs.

Intergovernmental Panel on Climate Change. In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change to assess the scientific, technical and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.

United Nations Framework Convention on Climate Change (Convention). On March 21, 1994, the U.S. joined a number of countries around the world in signing the Convention. Under the Convention, governments gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

International Climate Change Treaties. The Kyoto Protocol is an international agreement linked to the Convention. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions at an average of five percent against 1990 levels over the five-year period 2008–2012. The Convention (as discussed above) encouraged industrialized countries to stabilize emissions; however, the Protocol commits them to do so. Developed countries have contributed more emissions over the last 150 years; therefore, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

In 2001, President George W. Bush indicated that he would not submit the treaty to the U.S. Senate for ratification, which effectively ended American involvement in the Kyoto Protocol. In December 2009, international leaders met in Copenhagen to address the future of international climate change commitments post-Kyoto. No binding agreement was reached in Copenhagen; however, the Committee identified the long-term goal of limiting the maximum global average temperature increase to no more than 2°C above pre-industrial levels, subject to a review in 2015. The UN Climate Change Committee held additional meetings in Durban, South Africa in November 2011; Doha, Qatar in November 2012; and Warsaw, Poland in November 2013. The meetings are gradually gaining consensus among participants on individual climate change issues.

On September 23, 2014 more than 100 Heads of State and Government and leaders from the private sector and civil society met at the Climate Summit in New York hosted by the United Nations. At the Summit, heads of government, business and civil society announced actions in areas that would have the greatest impact on reducing emissions, including climate finance, energy, transport, industry, agriculture, cities, forests, and building resilience.

Parties to the U.N. Framework Convention on Climate Change (UNFCCC) reached a landmark agreement on December 12, 2015 in Paris, charting a fundamentally new course in the two-decade-old global climate effort. Culminating a four-year negotiating round, the new treaty ends the strict differentiation between developed and developing countries that characterized earlier efforts, replacing it with a common framework that commits all countries to put forward their best efforts and to strengthen them in the years ahead. This includes, for the first time, requirements that all parties report regularly on their emissions and implementation efforts and undergo international review.

The agreement and a companion decision by parties were the key outcomes of the conference, known as the 21st session of the UNFCCC Conference of the Parties, or COP 21. Together, the Paris Agreement and the accompanying COP decision:

- Reaffirm the goal of limiting global temperature increase well below 2 degrees Celsius, while urging efforts to limit the increase to 1.5 degrees;
- Establish binding commitments by all parties to make “nationally determined contributions” (NDCs), and to pursue domestic measures aimed at achieving them;
- Commit all countries to report regularly on their emissions and “progress made in implementing and achieving” their NDCs, and to undergo international review;
- Commit all countries to submit new NDCs every five years, with the clear expectation that they will “represent a progression” beyond previous ones;
- Reaffirm the binding obligations of developed countries under the UNFCCC to support the efforts of developing countries, while for the first time encouraging voluntary contributions by developing countries too;
- Extend the current goal of mobilizing $100 billion a year in support by 2020 through 2025, with a new, higher goal to be set for the period after 2025;
- Extend a mechanism to address “loss and damage” resulting from climate change, which explicitly will not “involve or provide a basis for any liability or compensation;”

- Require parties engaging in international emissions trading to avoid "double counting;" and
- Call for a new mechanism, similar to the Clean Development Mechanism under the Kyoto Protocol, enabling emission reductions in one country to be counted toward another country's NDC (C2ES 2015a) (27).

On June 2, 2017 President Donald Trump announced his intention to withdraw from the Paris Agreement. It should be noted that under the terms of the agreement, the United Sates cannot formally announce its resignation until November 4, 2019. Subsequently, withdrawal would be effective one year after notification in 2020.

NATIONAL

Prior to the last decade, there have been no concrete federal regulations of GHGs or major planning for climate change adaptation. The following are actions regarding the federal government, GHGs, and fuel efficiency.

GHG Endangerment. In *Massachusetts v. Environmental Protection Agency* 549 U.S. 497 (2007), decided on April 2, 2007, the Supreme Court found that four GHGs, including carbon dioxide, are air pollutants subject to regulation under Section 202(a)(1) of the Clean Air Act. The Court held that the EPA Administrator must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the Clean Air Act:

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed GHGs—carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing GHG emissions standards for vehicles, as discussed in the section "Clean Vehicles" below. After a lengthy legal challenge, the U.S. Supreme Court declined to review an Appeals Court ruling that upheld the EPA Administrator's findings (28).

Clean Vehicles. Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the U.S. On April 1, 2010, the EPA and the Department of Transportation's National Highway Safety Administration announced a joint final rule establishing a national program that would reduce GHG emissions and improve fuel economy for new cars and trucks sold in the U.S.

The first phase of the national program applies to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards would cut carbon dioxide emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012–2016). The EPA and the National Highway Safety Administration issued final rules on a second-phase joint rulemaking establishing national standards for light-duty vehicles for model years 2017 through 2025 in August 2012 (EPA 2012c). The new standards for model years 2017 through 2025 apply to passenger cars, light-duty trucks, and medium duty passenger vehicles. The final standards are projected to result in an average industry fleetwide level of 163 grams/mile of carbon dioxide (CO_2) in model year 2025, which is equivalent to 54.5 miles per gallon (mpg) if achieved exclusively through fuel economy improvements.

CALIFORNIA

Legislative Actions to Reduce GHGs

The State of California legislature has enacted a series of bills that constitute the most aggressive program to reduce GHGs of any state in the nation. Some legislation such as the landmark Assembly Bill (AB 32) California Global Warming Solutions Act of 2006 was specifically enacted to address GHG emissions. Other legislation such as Title 24 and Title 20 energy standards were originally adopted for other purposes such as energy and water conservation, but also provide GHG reductions. This section describes the major provisions of the legislation.

AB 32. The California State Legislature enacted AB 32, which requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. "GHGs" as defined under AB 32 include carbon dioxide, methane, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Since AB 32 was enacted, a seventh chemical, nitrogen trifluoride, has also been added to the list of GHGs. The California Air Resources Board (ARB) is the state agency charged with monitoring and regulating sources of GHGs. AB 32 states the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

ARB approved the 1990 GHG emissions level of 427 $MMTCO_2e$ on December 6, 2007 (ARB 2007). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 $MMTCO_2e$. Emissions in 2020 in a "business as usual" (BAU) scenario were estimated to be 596 $MMTCO_2e$, which do not account for reductions from AB 32 regulations (ARB 2008). At that level,

a 28.4 percent reduction was required to achieve the 427 million $MTCO_2e$ 1990 inventory. In October 2010, ARB prepared an updated 2020 forecast to account for the recession and slower forecasted growth. The forecasted inventory without the benefits of adopted regulation is now estimated at 545 million $MTCO_2e$. Therefore, under the updated forecast, a 21.7 percent reduction from BAU is required to achieve 1990 levels (ARB 2010).

PROGRESS IN ACHIEVING AB 32 TARGETS AND REMAINING REDUCTIONS REQUIRED

The State has made steady progress in implementing AB 32 and achieving targets included in Executive Order S-3-05. The progress is shown in updated emission inventories prepared by ARB for 2000 through 2012 (ARB 2014a). The State has achieved the Executive Order S-3-05 target for 2010 of reducing GHG emissions to 2000 levels. As shown below, the 2010 emission inventory achieved this target.

- 1990: 427 million $MTCO_2e$ (AB 32 2020 target)
- 2000: 463 million $MTCO_2e$ (an average 8 percent reduction needed to achieve 1990 base)
- 2010: 450 million $MTCO_2e$ (an average 5 percent reduction needed to achieve 1990 base)

ARB has also made substantial progress in achieving its goal of achieving 1990 emissions levels by 2020. As described earlier in this section, ARB revised the 2020 BAU inventory forecast to account for new lower growth projections, which resulted in a new lower reduction from BAU to achieve the 1990 base. The previous reduction from 2020 BAU needed to achieve 1990 levels was 28.4 percent and the latest reduction from 2020 BAU is 21.7 percent.

- 2020: 545 million $MTCO_2e$ BAU (an average 21.7 percent reduction from BAU needed to achieve 1990 base)

ARB Scoping Plan. ARB's Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 to comply with AB 32 (ARB 2008). The Scoping Plan identifies recommended measures for multiple GHG emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 GHG target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and

- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

The ARB approved the First Update to the Scoping Plan (Update) on May 22, 2014. The Update identifies the next steps for California's climate change strategy. The Update shows how California continues on its path to meet the near-term 2020 GHG limit, but also sets a path toward long-term, deep GHG emission reductions. The report establishes a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050. The Update identifies progress made to meet the near-term objectives of AB 32 and defines California's climate change priorities and activities for the next several years. The Update does not set new targets for the State but describes a path that would achieve the long term 2050 goal of Executive Order S-05-03 for emissions to decline to 80 percent below 1990 levels by 2050 (ARB 2014).

Forecasting the amount of emissions that would occur in 2020 if no actions are taken was necessary to assess the amount of reductions California must achieve to return to the 1990 emissions level by 2020 as required by AB 32. The no-action scenario is known as "business-as-usual" or BAU. The ARB originally defined the BAU scenario as emissions in the absence of any GHG emission reduction measures discussed in the Scoping Plan.

As part of CEQA compliance for the Scoping Plan, ARB prepared a Supplemental Functional Equivalent Document (FED) in 2011. The FED included an updated 2020 BAU emissions inventory projection based on current economic forecasts (i.e., as influenced by the economic downturn) and emission reduction measures already in place, replacing its prior 2020 BAU emissions inventory. ARB staff derived the updated emissions estimates by projecting emissions growth, by sector, from the state's average emissions from 2006–2008. The new BAU estimate includes emission reductions for the million-solar-roofs program, the AB 1493 (Pavley I) motor vehicle GHG emission standards, and the Low Carbon Fuels Standard. In addition, ARB factored into the 2020 BAU inventory emissions reductions associated with 33 percent Renewable Energy Portfolio Standard (RPS) for electricity generation. The updated BAU estimate of 507 $MMTCO_2e$ by 2020 requires a reduction of 80 $MMTCO_2e$, or a 16 percent reduction below the estimated BAU levels to return to 1990 levels (i.e., 427 $MMTCO_2e$) by 2020.

In order to provide a BAU reduction that is consistent with the original definition in the Scoping Plan and with threshold definitions used in thresholds adopted by lead agencies for CEQA purposes and many climate action plans, the updated inventory without regulations was also included in the Supplemental FED. The ARB 2020 BAU projection for GHG emissions in California was originally estimated to be 596 $MMTCO_2e$. The updated ARB 2020 BAU projection in the Supplemental FED is 545 $MMTCO_2e$. Considering the updated BAU estimate of 545 $MMTCO_2e$ by 2020, ARB estimates a 21.7 percent reduction below the estimated statewide BAU levels is necessary to return to 1990 emission levels (i.e., 427 $MMTCO_2e$) by 2020, instead of the approximate 28.4 percent BAU reduction previously reported under the original Climate Change Scoping Plan (2008).

<u>2017 Climate Change Scoping Plan Update</u>

In November 2017, ARB released the final 2017 Scoping Plan Update, which identifies the State's post-2020 reduction strategy. The 2017 Scoping Plan Update reflects the 2030 target of a 40 percent reduction below 1990 levels, set by Executive Order B-30-15 and codified by Senate Bill 32 (SB 32). Key programs that the proposed Second Update builds upon include the Cap-and-Trade Regulation, the Low Carbon Fuel Standard, and much cleaner cars, trucks and freight movement, utilizing cleaner, renewable energy, and strategies to reduce methane emissions from agricultural and other wastes.

The 2017 Scoping Plan establishes a new emissions limit of 260 $MMTCO_2e$ for the year 2030, which corresponds to a 40 percent decrease in 1990 levels by 2030.

California's climate strategy will require contributions from all sectors of the economy, including the land base, and will include enhanced focus on zero- and near-zero-emission (ZE/NZE) vehicle technologies; continued investment in renewables, including solar roofs, wind, and other distributed generation; greater use of low carbon fuels; integrated land conservation and development strategies; coordinated efforts to reduce emissions of short-lived climate pollutants (methane, black carbon, and fluorinated gases); and an increased focus on integrated land use planning to support livable, transit-connected communities and conservation of agricultural and other lands. Requirements for direct GHG reductions at refineries will further support air quality co-benefits in neighborhoods, including in disadvantaged communities historically located adjacent to these large stationary sources, as well as efforts with California's local air pollution control and air quality management districts (air districts) to tighten emission limits on a broad spectrum of industrial sources. Major elements of the 2017 Scoping Plan framework include:

- Implementing and/or increasing the standards of the Mobile Source Strategy, which include increasing ZEV buses and trucks.
- Low Carbon Fuel Standard (LCFS), with an increased stringency (18 percent by 2030).
- Implementing SB 350, which expands the Renewables Portfolio Standard (RPS) to 50 percent RPS and doubles energy efficiency savings by 2030.
- California Sustainable Freight Action Plan, which improves freight system efficiency, utilizes near-zero emissions technology, and deployment of ZEV trucks.
- Implementing the proposed Short-Lived Climate Pollutant Strategy (SLPS), which focuses on reducing methane and hydroflurocarbon emissions by 40 percent and anthropogenic black carbon emissions by 50 percent by year 2030.
- Continued implementation of SB 375.
- Post-2020 Cap-and-Trade Program that includes declining caps.
- 20 percent reduction in GHG emissions from refineries by 2030.
- Development of a Natural and Working Lands Action Plan to secure California's land base as a net carbon sink.

In addition to the statewide strategies listed above, the 2017 Scoping Plan also identifies local governments as essential partners in achieving the State's long-term GHG reduction goals and identifies local actions to reduce GHG emissions. As part of the recommended actions, CARB recommends that local governments achieve a community-wide goal to achieve emissions of no more than 6 $MTCO_2e$ or less per capita by 2030 and 2 $MTCO_2e$ or less per capita by 2050. For

CEQA projects, CARB states that lead agencies may develop evidenced-based bright-line numeric thresholds—consistent with the Scoping Plan and the State's long-term GHG goals—and projects with emissions over that amount may be required to incorporate on-site design features and mitigation measures that avoid or minimize project emissions to the degree feasible; or, a performance-based metric using a climate action plan or other plan to reduce GHG emissions is appropriate.

According to research conducted by the Lawrence Berkeley National Laboratory and supported by ARB, California, under its existing and proposed GHG reduction policies, is on track to meet the 2020 reduction targets under AB 32 and could achieve the 2030 goals under SB 32. The research utilized a new, validated model known as the California LBNL GHG Analysis of Policies Spreadsheet (CALGAPS), which simulates GHG and criteria pollutant emissions in California from 2010 to 2050 in accordance to existing and future GHG-reducing policies. The CALGAPS model showed that GHG emissions through 2020 could range from 317 to 415 $MTCO_2e$ per year, "indicating that existing state policies will likely allow California to meet its target [of 2020 levels under AB 32]." CALGAPS also showed that by 2030, emissions could range from 211 to 428 $MTCO_2e$ per year, indicating that "even if all modeled policies are not implemented, reductions could be sufficient to reduce emissions 40 percent below the 1990 level [of SB 32]." CALGAPS analyzed emissions through 2050 even though it did not generally account for policies that might be put in place after 2030. Although the research indicated that the emissions would not meet the State's 80 percent reduction goal by 2050, various combinations of policies could allow California's cumulative emissions to remain very low through 2050 (29) (30).

Senate Bill 32. On September 8, 2016, Governor Jerry Brown signed the Senate Bill (SB) 32 and its companion bill, Assembly Bill (AB) 197. SB 32 requires the state to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030, a reduction target that was first introduced in Executive Order B-30-15. The new legislation builds upon the AB 32 goal of 1990 levels by 2020 and provides an intermediate goal to achieving S-3-05, which sets a statewide GHG reduction target of 80 percent below 1990 levels by 2050. AB 197 creates a legislative committee to oversee regulators to ensure that ARB not only responds to the Governor, but also the Legislature (9) (10).

SB 375 - the Sustainable Communities and Climate Protection Act of 2008. Passing the Senate on August 30, 2008, Senate Bill (SB) 375 was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of GHG emissions, which emits over 40 percent of the total GHG emissions in California. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: it (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing GHG emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies.

Concerning CEQA, SB 375, as codified in Public Resources Code Section 21159.28, states that CEQA findings for certain projects are not required to reference, describe, or discuss (1) growth inducing impacts, or (2) any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network, if the project:

1. Is in an area with an approved sustainable communities strategy or an alternative planning strategy that the ARB accepts as achieving the GHG emission reduction targets.
2. Is consistent with that strategy (in designation, density, building intensity, and applicable policies).
3. Incorporates the mitigation measures required by an applicable prior environmental document.

AB 1493 Pavley Regulations and Fuel Efficiency Standards. California AB 1493, enacted on July 22, 2002, required ARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the U.S. District Court for the District of Columbia in 2011.

The standards phase in during the 2009 through 2016 model years. When fully phased in, the near-term (2009–2012) standards will result in about a 22 percent reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards will result in about a 30 percent reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant.

The second phase of the implementation for the Pavley bill was incorporated into Amendments to the Low-Emission Vehicle Program referred to as LEV III or the Advanced Clean Cars program. The Advanced Clean Car program combines the control of smog-causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2017 through 2025. The regulation will reduce GHGs from new cars by 34 percent from 2016 levels by 2025. The new rules will clean up gasoline and diesel-powered cars, and deliver increasing numbers of zero-emission technologies, such as full battery electric cars, newly emerging plug-in hybrid electric vehicles and hydrogen fuel cell cars. The package will also ensure adequate fueling infrastructure is available for the increasing numbers of hydrogen fuel cell vehicles planned for deployment in California.

SB 350— Clean Energy and Pollution Reduction Act of 2015. In October 2015, the legislature approved and the Governor signed SB 350, which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the renewables portfolio standard (RPS), higher energy efficiency requirements for buildings, initial strategies towards a regional electricity grid, and improved infrastructure for electric vehicle charging stations. Provisions for a 50 percent reduction in the use of petroleum statewide were removed from the Bill because of opposition and concern that it would prevent the Bill's passage. Specifically, SB 350 requires the following to reduce statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33 percent to 50 percent by 2030, with interim targets of 40 percent by 2024, and 25 percent by 2027.

- Double the energy efficiency in existing buildings by 2030. This target will be achieved through the California Public Utility Commission (CPUC), the California Energy Commission (CEC), and local publicly-owned utilities.
- Reorganize the Independent System Operator (ISO) to develop more regional electrify transmission markets and to improve accessibility in these markets, which will facilitate the growth of renewable energy markets in the western United States (California Leginfo 2015).

EXECUTIVE ORDERS RELATED TO GHG EMISSIONS

California's Executive Branch has taken several actions to reduce GHGs through the use of Executive Orders. Although not regulatory, they set the tone for the state and guide the actions of state agencies.

Executive Order S-3-05. Former California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following reduction targets for GHG emissions:

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The 2050 reduction goal represents what some scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be a mid-term target. Because this is an executive order, the goals are not legally enforceable for local governments or the private sector.

Executive Order S-01-07 – Low Carbon Fuel Standard. The Governor signed Executive Order S-01-07 on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. In particular, the Executive Order established a Low Carbon Fuel Standard and directed the Secretary for Environmental Protection to coordinate the actions of the California Energy Commission, the ARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by California Energy Commission on December 24, 2007) and was submitted to ARB for consideration as an "early action" item under AB 32. The ARB adopted the Low Carbon Fuel Standard on April 23, 2009.

The Low Carbon Fuel Standard was challenged in the U.S. District Court in Fresno in 2011. The court's ruling issued on December 29, 2011, included a preliminary injunction against ARB's implementation of the rule. The Ninth Circuit Court of Appeals stayed the injunction on April 23, 2012, pending final ruling on appeal, allowing ARB to continue to implement and enforce the regulation. The Ninth Circuit Court's decision, filed September 18, 2013, vacated the preliminary injunction. In essence, the court held that Low Carbon Fuel Standards adopted by ARB were not in conflict with federal law. On August 8, 2013, the Fifth District Court of Appeal (California) ruled ARB failed to comply with CEQA and the Administrative Procedure Act (APA) when adopting regulations for Low Carbon Fuel Standards. In a partially published opinion, the Court of Appeal reversed the trial court's judgment and directed issuance of a writ of mandate setting aside

Resolution 09-31 and two executive orders of ARB approving Low Carbon Fuel Standards (LCFS) regulations promulgated to reduce GHG emissions. However, the court tailored its remedy to protect the public interest by allowing the LCFS regulations to remain operative while ARB complies with the procedural requirements it failed to satisfy.

To address the Court ruling, ARB was required to bring a new LCFS regulation to tits Board for consideration in February 2015. The proposed LCFS regulation was required to contain revisions to the 2010 LCFS as well as new provisions designed to foster investments in the production of the low-carbon intensity (low-CI) fuels, offer additional flexibility to regulated parties, update critical technical information, simplify and streamline program operations, and enhance enforcement. The second public hearing was held on September 24 and September 25, 2015, where the LCFS Regulation was adopted. The Final Rulemaking Package adopting the regulation was filed with Office of Administrative Law (OAL) on October 2, 2015. OAL had until November 16, 2015 to make a determination (ARB 2015d).

Executive Order S-13-08. Executive Order S-13-08 states that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the Order, the 2009 California Climate Adaptation Strategy (California Natural Resources Agency 2009) was adopted, which is the ". . . first statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

Executive Order B-30-15. On April 29, 2015, Governor Edmund G. Brown Jr. issued an executive order to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments ahead of the United Nations Climate Change Conference in Paris late 2015. The Order sets a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050 and directs ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of CO_2 equivalent ($MMCO_2e$). The Order also requires the state's climate adaptation plan to be updated every three years, and for the State to continue its climate change research program, among other provisions. As with Executive Order S-3-05, this Order is not legally enforceable for local governments and the private sector. Legislation that would update AB 32 to make post 2020 targets and requirements a mandate is in process in the State Legislature.

CALIFORNIA REGULATIONS AND BUILDING CODES

California has a long history of adopting regulations to improve energy efficiency in new and remodeled buildings. These regulations have kept California's energy consumption relatively flat even with rapid population growth.

Title 20 Appliance Efficiency Standards. California Code of Regulations, Title 20: Division 2, Chapter 4, Article 4, Sections 1601-1608: Appliance Efficiency Regulations regulates the sale of appliances in California. The Appliance Efficiency Regulations include standards for both federally regulated appliances and non-federally regulated appliances. 23 categories of appliances are included in the scope of these regulations. The standards within these regulations apply to appliances that are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the state and those designed and sold exclusively for use in recreational vehicles or other mobile equipment (CEC 2012).

Title 24 Energy Efficiency Standards and California Green Building Standards. California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The 2016 version of Title 24 was adopted by the California Energy Commission (CEC) and became effective on January 1, 2017 and is applicable to the Project.

The CEC indicates that the 2019 Title 24 standards will require solar photovoltaic systems for new homes, establish requirements for newly constructed healthcare facilities, encourage demand responsive technologies for residential buildings, update indoor and outdoor lighting for nonresidential buildings. The CEC anticipates that single-family homes built with the 2019 standards will use approximately 7 percent less energy compared to the residential homes built under the 2016 standards. Additionally, after implementation of solar photovoltaic systems, homes built under the 2019 standards will about 53 percent less energy than homes built under the 2016 standards. Nonresidential buildings will use approximately 30 percent less energy due to lighting upgrades (31).

California Code of Regulations, Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect on January 1, 2011, and is administered by the California Building Standards Commission. CALGreen is updated on a regular basis, with the most recent update consisting of the 2016 California Green Building Code Standards that became effective January 1, 2017. Local jurisdictions are permitted to adopt more stringent requirements, as state law provides methods for local enhancements. CALGreen recognizes that many jurisdictions have developed existing construction and demolition ordinances and defers to them as the ruling guidance provided they establish a minimum 65 percent diversion requirement. The code also provides exemptions for areas not served by construction and demolition recycling infrastructure. The State Building Code provides the minimum standard that buildings must meet in order to be certified for occupancy, which is generally enforced by the local building official. CALGreen requires:

- Short-term bicycle parking. If a commercial project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily

visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack (5.106.4.1.1).

- Long-term bicycle parking. For new buildings with 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of tenant-occupied motorized vehicle parking capacity, with a minimum of one space (5.106.4.1.2).
- Designated parking. Provide designated parking in commercial projects for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table 5.106.5.2 (5.106.5.2).
- Recycling by Occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling (5.410.1).
- Construction waste. A minimum 65 percent diversion of construction and demolition waste from landfills, increasing voluntarily to 80 percent for new homes and commercial projects (5.408.1, A5.408.3.1 [nonresidential], A5.408.3.1 [residential]). All (100 percent) of trees, stumps, rocks and associated vegetation and soils resulting from land clearing shall be reused or recycled (5.408.3).
- Wastewater reduction. Each building shall reduce the generation of wastewater by one of the following methods:
    - The installation of water-conserving fixtures (5.303.3) or
    - Using nonpotable water systems (5.303.4).
- Water use savings. 20 percent mandatory reduction of indoor water use with voluntary goal standards for 30, 35 and 40 percent reductions (5.303.2, A5303.2.3 [nonresidential]).
- Water meters. Separate water meters for buildings in excess of 50,000 square feet or buildings projected to consume more than 1,000 gallons per day (5.303.1).
- Irrigation efficiency. Moisture-sensing irrigation systems for larger landscaped areas (5.304.3).
- Materials pollution control. Low-pollutant emitting interior finish materials such as paints, carpet, vinyl flooring, and particleboard (5.404).

Building commissioning. Mandatory inspections of energy systems (i.e., heat furnace, air conditioner, mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity according to their design efficiencies (5.410.2).

Model Water Efficient Landscape Ordinance. The Model Water Efficient Landscape Ordinance (Ordinance) was required by AB 1881, the Water Conservation Act. The bill required local agencies to adopt a local landscape ordinance at least as effective in conserving water as the Model Ordinance by January 1, 2010. Reductions in water use of 20 percent consistent with (SBX-7-7) 2020 mandate are expected upon compliance with the ordinance. Governor Brown's Drought Executive Order of April 1, 2015 (EO B-29-15) directed Department of Water Resources (DWR) to update the Ordinance through expedited regulation. The California Water Commission approved the revised Ordinance on July 15, 2015 effective December 15, 2015. New development projects that include landscape areas of 500 square feet or more are subject to the Ordinance. The update requires:

- More efficient irrigation systems;
- Incentives for graywater usage;

- Improvements in on-site stormwater capture;
- Limiting the portion of landscapes that can be planted with high water use plants; and
- Reporting requirements for local agencies.

SB 97 and the CEQA Guidelines Update. Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of GHG emissions or the effects of GHG emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code. It provided CEQA protection until January 1, 2010 for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood Prevention Bond Act of 2006, in stating that the failure to analyze adequately the effects of GHGs would not violate CEQA.

On April 13, 2009, the Office of Planning and Research submitted to the Secretary for Natural Resources its recommended amendments to the CEQA Guidelines for addressing GHG emissions. On July 3, 2009, the Natural Resources Agency commenced the Administrative Procedure Act rulemaking process for certifying and adopting these amendments pursuant to Public Resources Code section 21083.05. Following a 55-day public comment period and two public hearings, the Natural Resources Agency proposed revisions to the text of the proposed Guidelines amendments. The Natural Resources Agency transmitted the adopted amendments and the entire rulemaking file to the Office of Administrative Law on December 31, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

The CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

A new section, CEQA Guidelines Section 15064.4, was added to assist agencies in determining the significance of GHG emissions. The new section allows agencies the discretion to determine whether a quantitative or qualitative analysis is best for a particular project. However, little guidance is offered on the crucial next step in this assessment process—how to determine whether the project's estimated GHG emissions are significant or cumulatively considerable.

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts, respectively. GHG mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze GHG emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable, however it does not answer the question of when emissions are cumulatively considerable.

Section 15183.5 permits programmatic GHG analysis and later project-specific tiering, as well as the preparation of GHG Reduction Plans. Compliance with such plans can support a determination that a project's cumulative effect is not cumulatively considerable, according to Section 15183.5(b).

In addition, the amendments revised Appendix F of the CEQA Guidelines, which focuses on Energy Conservation. The sample environmental checklist in Appendix G was amended to include GHG questions.

REGIONAL

The project is within the Southern California Air Basin (SoCAB), which is under the jurisdiction of the SCAQMD.

South Coast Air Quality Management District

SCAQMD is the agency responsible for air quality planning and regulation in the SoCAB. The SCAQMD addresses the impacts to climate change of projects subject to SCAQMD permit as a lead agency if they are the only agency having discretionary approval for the project and acts as a responsible agency when a land use agency must also approve discretionary permits for the project. The SCAQMD acts as an expert commenting agency for impacts to air quality. This expertise carries over to GHG emissions, so the agency helps local land use agencies through the development of models and emission thresholds that can be used to address GHG emissions.

In 2008, SCAQMD formed a Working Group to identify GHG emissions thresholds for land use projects that could be used by local lead agencies in the SoCAB. The Working Group developed several different options that are contained in the SCAQMD Draft Guidance Document – Interim CEQA GHG Significance Threshold, that could be applied by lead agencies. The working group has not provided additional guidance since release of the interim guidance in 2008. The SCAQMD Board has not approved the thresholds; however, the Guidance Document provides substantial evidence supporting the approaches to significance of GHG emissions that can be considered by the lead agency in adopting its own threshold. The current interim thresholds consist of the following tiered approach:

- Tier 1 consists of evaluating whether or not the project qualifies for any applicable exemption under CEQA.
- Tier 2 consists of determining whether the project is consistent with a GHG reduction plan. If a project is consistent with a qualifying local GHG reduction plan, it does not have significant GHG emissions.
- Tier 3 consists of screening values, which the lead agency can choose, but must be consistent with all projects within its jurisdiction. A project's construction emissions are averaged over 30 years and are added to the project's operational emissions. If a project's emissions are below one of the following screening thresholds, then the project is less than significant:
    - Residential and Commercial land use: 3,000 $MTCO_2e$ per year
    - Based on land use type: residential: 3,500 $MTCO_2e$ per year; commercial: 1,400 $MTCO_2e$ per year; or mixed use: 3,000 $MTCO_2e$ per year

- Tier 4 has the following options:
    - Option 1: Reduce BAU emissions by a certain percentage; this percentage is currently undefined.
    - Option 2: Early implementation of applicable AB 32 Scoping Plan measures
    - Option 3, 2020 target for service populations (SP), which includes residents and employees: 4.8 $MTCO_2e$/SP/year for projects and 6.6 $MTCO_2e$/SP/year for plans;
    - Option 3, 2035 target: 3.0 $MTCO_2e$/SP/year for projects and 4.1 $MTCO_2e$/SP/year for plans
- Tier 5 involves mitigation offsets to achieve target significance threshold.

The SCAQMD's interim thresholds used the Executive Order S-3-05-year 2050 goal as the basis for the Tier 3 screening level. Achieving the Executive Order's objective would contribute to worldwide efforts to cap carbon dioxide concentrations at 450 ppm, thus stabilizing global climate.

SCAQMD only has authority over GHG emissions from development projects that include air quality permits. At this time, it is unknown if the project would include stationary sources of emissions subject to SCAQMD permits. Notwithstanding, if the Project requires a stationary permit, it would be subject to the applicable SCAQMD regulations.

SCAQMD Regulation XXVII, adopted in 2009 includes the following rules:

- Rule 2700 defines terms and post global warming potentials.
- Rule 2701, SoCal Climate Solutions Exchange, establishes a voluntary program to encourage, quantify, and certify voluntary, high quality certified GHG emission reductions in the SCAQMD.
- Rule 2702, GHG Reduction Program created a program to produce GHG emission reductions within the SCAQMD. The SCAQMD will fund projects through contracts in response to requests for proposals or purchase reductions from other parties.

2.8 CITY OF SANTA ANA CLIMATE ACTION PLAN

On December 15, 2015, the City prepared a Climate Action Plan (CAP), which provides a framework for reducing GHG emissions and managing resources to best prepare for a changing climate (32). The CAP recommends GHG emissions targets that are consistent with the reduction targets of the State of California and presents a number of strategies that will make it possible for the City to meet the recommended targets. Projects that demonstrate consistency with the strategies, actions, and emission reduction targets contained in the CAP would have a less than significant impact on climate change.

2.9 DISCUSSION ON ESTABLISHMENT OF SIGNIFICANCE THRESHOLDS

The City of Murrieta has not adopted a threshold of significance for GHG emissions. As such, a screening threshold of 3,000 $MTCO_2e$ per year is applied herein, which is a widely accepted screening threshold used by the City of Santa Ana and numerous cities in the South Coast Air Basin and is based on the South Coast Air Quality Management District (SCAQMD) staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources,*

Rules and Plans ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required (33). As noted by the SCAQMD:

> "…the…screening level for stationary sources is based on an emission capture rate of 90 percent for all new or modified projects...the policy objective of [SCAQMD's] recommended interim GHG significance threshold proposal is to achieve an emission capture rate of 90 percent of all new or modified stationary source projects. A GHG significance threshold based on a 90 percent emission capture rate may be more appropriate to address the long-term adverse impacts associated with global climate change because most projects will be required to implement GHG reduction measures. Further, a 90 percent emission capture rate sets the emission threshold low enough to capture a substantial fraction of future stationary source projects that will be constructed to accommodate future statewide population and economic growth, while setting the emission threshold high enough to exclude small projects that will in aggregate contribute a relatively small fraction of the cumulative statewide GHG emissions. This assertion is based on the fact that [SCAQMD] staff estimates that these GHG emissions would account for slightly less than one percent of future 2050 statewide GHG emissions target (85 [MMTCO2e/yr]). In addition, these small projects may be subject to future applicable GHG control regulations that would further reduce their overall future contribution to the statewide GHG inventory. Finally, these small sources are already subject to [Best Available Control Technology] (BACT) for criteria pollutants and are more likely to be single-permit facilities, so they are more likely to have few opportunities readily available to reduce GHG emissions from other parts of their facility." (33)

Thus, and based on guidance from the SCAQMD, if a non-industrial project would emit stationary source GHGs less than 3,000 $MTCO_2e$ per year, the project is not considered a substantial GHG emitter and the GHG impact is less than significant, requiring no additional analysis and no mitigation. On the other hand, if a non-industrial project would emit stationary source GHGs in excess of 3,000 $MTCO_2e$ per year, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation.

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3 PROJECT GREENHOUSE GAS IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will result in a significant greenhouse gas impact. The significance of these potential impacts is described in the following section.

3.2 PROJECT RELATED GREENHOUSE GAS EMISSIONS

On October 17, 2017, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2016.3.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (NO_X, VOC, SO_X, CO, PM_{10}, and $PM_{2.5}$) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (34). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine greenhouse gas emissions. Output from the model runs for both construction and operational activity are provided in Appendix 3.

3.3 CONSTRUCTION AND OPERATIONAL LIFE-CYCLE ANALYSIS

A full life-cycle analysis (LCA) for construction and operational activity is not included in this analysis due to the lack of consensus guidance on LCA methodology at this time (35). Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in the project development, infrastructure and on-going operations) depends on emission factors or econometric factors that are not well established for all processes. At this time a LCA would be extremely speculative and thus has not been prepared.

Additionally, the SCAQMD recommends analyzing direct and indirect project GHG emissions generated within California and not life-cycle emissions because the life-cycle effects from a project could occur outside of California, might not be very well understood or documented, and would be challenging to mitigate (36). Additionally, the science to calculate life cycle emissions is not yet established or well defined, therefore SCAQMD has not recommended, and is not requiring, life-cycle emissions analysis.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the Project would result in emissions of CO_2 and CH_4 from construction activities. The report *Caribou Industries Proposal for the 3rd Street Promenade Air Quality Impact Analysis Report* (Urban Crossroads, Inc., 2019) contains detailed information regarding construction activity (37).

For construction phase Project emissions, GHGs are quantified and amortized over the life of the Project. To amortize the emissions over the life of the Project, the SCAQMD recommends calculating the total greenhouse gas emissions for the construction activities, dividing it by a 30-year project life then adding that number to the annual operational phase GHG emissions (38).

As such, construction emissions were amortized over a 30-year period and added to the annual operational phase GHG emissions.

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of CO_2, CH_4, and N_2O from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions
- Solid Waste
- Water Supply, Treatment and Distribution

3.5.1 AREA SOURCE EMISSIONS

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO_2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. Unless otherwise noted, CalEEMod™ default parameters were used.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

Project mobile source greenhouse gas impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project-related greenhouse gas impacts are derived primarily from vehicle trips generated by the Project. Trip characteristics available from the report, *3rd & Broadway Traffic Impact Analysis* (TIA) (Urban Crossroads, Inc., 2019) were utilized in this analysis (39).

Per TIA, the Project is expected to generate a net total of approximately 1,348 trip-ends per day (actual vehicles) on a typical weekday with 94 AM peak hour trips and 110 PM peak hour trips

(39). This greenhouse gas study relies on the net Project trips (as opposed to the passenger car equivalents) to accurately account for the effect of individual truck emissions associated with the Project. Trip characteristics based on CalEEMod defaults were used in the analysis.

3.5.4 SOLID WASTE

Residential land uses will result in the generation and disposal of solid waste. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the proposed Project were calculated by the CalEEMod™ model using default parameters.

3.5.5 WATER SUPPLY, TREATMENT AND DISTRIBUTION

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. As per the *Water Supply Assessment for the Proposed Transit Zoning Code (SD 84A and SD 84B)* (2010), the proposed Project will have a water demand factor of 0.1 0gallons per day (gpd)/square foot (sf) for retail uses, 0.09 gpd/sf for commercial uses, and 150 gpd/dwelling units (DU) for multiple family residential uses (40). For purposes of analysis, an indoor water use of 559,180 gallons per year (gpy) for retail uses, 687,484 gpy for commercial uses, and 8,979,000 gpy for multifamily residential uses was used represent the project water demands.

3.6 EMISSIONS SUMMARY

The Project will result in approximately 1,091.65 $MTCO_2e$ per year from construction, area, energy, waste, and water usage. In addition, the Project has the potential to result in an additional 1,604.72 $MTCO_2e$ per year from mobile sources if the assumption is made that all of the vehicle trips to and from the Project are “new” trips resulting from the development of the Project. As shown on Table 3-1, the Project has the potential to generate a total of approximately 2,696.37 $MTCO_2e$ per year. The Project net total GHG emissions would not exceed the SCAQMD/City’s screening threshold of 3,000 $MTCO_2e$ per year. Additionally, the TZC EIR disclosed significant and unavoidable impacts in for greenhouse gas emissions. The 2,696.37 $MTCO_2e$ per year generated by the Project are to be within the greenhouse gas emissions identified in the TZC EIR. As such, Project-related greenhouse gas emissions are considered less than significant.

TABLE 3-1: TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO_2	**CH_4**	**N_2O**	**Total CO_2E**
Construction Emissions Amortized over 30 years	35.51	0.00	0.00	35.62
Area	42.16	3.46E-03	7.20E-04	42.46
Energy	899.28	0.04	0.01	904.17
Mobile Sources	1,603.01	0.07	0.00	1,604.72
Waste	26.91	1.59	0.00	66.68
Water Usage	34.54	0.26	0.01	42.73
Total CO_2e (All Sources)	**2,696.37**			
SCAQMD Threshold	**3,000**			
Threshold Exceedance?	**NO**			

3.7 GREENHOUSE GAS EMISSIONS FINDINGS AND RECOMMENDATIONS

GHG Impact #1: The Project would generate direct or indirect greenhouse gas emission that would result in a significant impact on the environment

The City of Santa Ana has not adopted its own numeric threshold of significance for determining impacts with respect to greenhouse gas (GHG) emissions. A screening threshold of 3,000 $MTCO_2e$ per year to determine if additional analysis is required is an acceptable approach for small projects. This approach is a widely accepted screening threshold used by the City of Santa Ana and numerous cities in the South Coast Air Basin and is based on the South Coast Air Quality Management District (SCAQMD) staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required (33).

The Project will result in approximately 1,091.65 $MTCO_2e$ per year from construction, area, energy, waste, and water usage. In addition, the Project has the potential to result in an additional 1,604.72 $MTCO_2e$ per year from mobile sources if the assumption is made that all of the vehicle trips to and from the Project are "new" trips resulting from the development of the Project. As shown on Table 3-1, the Project has the potential to generate a total of approximately 2,696.37 $MTCO_2e$ per year. As such, the Project would not exceed the SCAQMD's recommended numeric threshold of 3,000 $MTCO_2e$ if it were applied. Thus, project-related emissions would not have a significant direct or indirect impact on GHG and climate change and no mitigation or further analysis is required.

GHG Impact #2: The Project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

As previously stated, the City of Santa Ana adopted a comprehensive CAP on December 15, 2015. The CAP recommends GHG emissions targets that are consistent with the 2020 reduction targets of the State of California and presents a number of strategies that will make it possible for the City to meet the recommended targets. Projects that demonstrate consistency with the strategies, actions, and emission reduction targets contained in the CAP would have a less than significant impact on climate change.

It should be noted that the strategies outlined in the CAP would achieve the reduction target for 2020 but would would not meet the Statewide reduction target goal of 30 percent below 2008 levels by 2035. As the CAP's 2035 target does not align with the statewide goals beyond 2020, the CAP would therefore not be consistent with statewide goals for the post-2020 period.

Since the Project's anticipated buildout year is 2021 and as the CAP's 2035 target does not align with the statewide goals beyond 2020, the Project would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions. As such, impacts are considered significant and unavoidable. It should be noted that the TZC EIRD previously disclosed significant and unavoidable impacts. Thus, the Project would not result in any new or more severe impacts to greenhouse gas emissions.

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5 CERTIFICATION

The contents of this greenhouse gas study report represent an accurate depiction of the greenhouse gas impacts associated with the proposed Caribou Industries Proposal for the 3rd Street Promenade Project. The information contained in this greenhouse gas report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 3.1:

CALEEMOD EMISSIONS MODEL OUTPUTS

3rd & Broadway (Operations)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	403.00	Space	0.00	240,263.00	0
Hotel	75.00	Room	0.48	81,927.00	0
Apartments High Rise	164.00	Dwelling Unit	0.82	169,230.00	469
Regional Shopping Center	15.32	1000sqft	0.00	15,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	480	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

3rd & Broadway (Operations) - Orange County, Annual

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2021 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - As per the 3rd & Broadway Development Project Review, the Project Site is 1.30 acres.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on ITE 10th Edition.

Woodstoves - Rule 445

Water And Wastewater - Water Usage based on the Demand Factors provided in the City of Santa Ana WSA for the proposed Transit Zoning Code (January 2010)

Energy Use -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	1.00
tblFireplaces	NumberGas	139.40	164.00
tblFireplaces	NumberNoFireplace	16.40	0.00
tblFireplaces	NumberWood	8.20	0.00
tblLandUse	LandUseSquareFeet	161,200.00	240,263.00
tblLandUse	LandUseSquareFeet	108,900.00	81,927.00
tblLandUse	LandUseSquareFeet	164,000.00	169,230.00
tblLandUse	LotAcreage	3.63	0.00
tblLandUse	LotAcreage	2.50	0.48
tblLandUse	LotAcreage	2.65	0.82
tblLandUse	LotAcreage	0.35	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	480

tblVehicleTrips	DV_TP	35.00	12.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	ST_TR	4.98	3.61
tblVehicleTrips	ST_TR	8.19	7.46
tblVehicleTrips	ST_TR	49.97	34.95
tblVehicleTrips	SU_TR	3.65	2.86
tblVehicleTrips	SU_TR	5.95	5.42
tblVehicleTrips	SU_TR	25.24	15.99
tblVehicleTrips	WD_TR	4.20	3.55
tblVehicleTrips	WD_TR	8.17	7.61
tblVehicleTrips	WD_TR	42.70	28.61
tblWater	IndoorWaterUseRate	10,685,260.20	8,979,000.00
tblWater	IndoorWaterUseRate	1,902,507.75	687,484.00
tblWater	IndoorWaterUseRate	1,134,791.03	559.18
tblWater	OutdoorWaterUseRate	6,736,359.69	0.00
tblWater	OutdoorWaterUseRate	211,389.75	0.00
tblWater	OutdoorWaterUseRate	695,517.08	0.00
tblWoodstoves	NumberCatalytic	8.20	0.00
tblWoodstoves	NumberNoncatalytic	8.20	0.00

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					
2019	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
Maximum	**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**

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					
2019	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
Maximum	**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**

	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**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

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	1.1357	0.0536	1.7157	3.1000e-004		0.0121	0.0121		0.0121	0.0121	0.0000	42.1574	42.1574	3.4600e-003	7.2000e-004	42.4592
Energy	0.0254	0.2254	0.1536	1.3900e-003		0.0176	0.0176		0.0176	0.0176	0.0000	899.2810	899.2810	0.0440	0.0127	904.1669
Mobile	0.3819	1.5862	4.7996	0.0174	1.5469	0.0131	1.5599	0.4143	0.0122	0.4264	0.0000	1,603.0087	1,603.0087	0.0686	0.0000	1,604.7240
Waste						0.0000	0.0000		0.0000	0.0000	26.9146	0.0000	26.9146	1.5906	0.0000	66.6797
Water						0.0000	0.0000		0.0000	0.0000	3.0669	27.4060	30.4729	0.3167	7.7800e-003	40.7078
Total	**1.5431**	**1.8653**	**6.6689**	**0.0191**	**1.5469**	**0.0427**	**1.5896**	**0.4143**	**0.0418**	**0.4561**	**29.9815**	**2,571.8531**	**2,601.8346**	**2.0233**	**0.0212**	**2,658.7376**

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	1.1357	0.0536	1.7157	3.1000e-004		0.0121	0.0121		0.0121	0.0121	0.0000	42.1574	42.1574	3.4600e-003	7.2000e-004	42.4592
Energy	0.0254	0.2254	0.1536	1.3900e-003		0.0176	0.0176		0.0176	0.0176	0.0000	899.2810	899.2810	0.0440	0.0127	904.1669
Mobile	0.3819	1.5862	4.7996	0.0174	1.5469	0.0131	1.5599	0.4143	0.0122	0.4264	0.0000	1,603.0087	1,603.0087	0.0686	0.0000	1,604.7240
Waste						0.0000	0.0000		0.0000	0.0000	26.9146	0.0000	26.9146	1.5906	0.0000	66.6797
Water						0.0000	0.0000		0.0000	0.0000	3.0669	27.4060	30.4729	0.3167	7.7800e-003	40.7078
Total	**1.5431**	**1.8653**	**6.6689**	**0.0191**	**1.5469**	**0.0427**	**1.5896**	**0.4143**	**0.0418**	**0.4561**	**29.9815**	**2,571.8531**	**2,601.8346**	**2.0233**	**0.0212**	**2,658.7376**

	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	Demolition	Demolition	7/1/2019	7/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	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
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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	0.0000	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
Total	**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**

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	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
Total	**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**

3.2 Demolition - 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	0.0000	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
Total	**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**

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	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
Total	**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**

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	0.3819	1.5862	4.7996	0.0174	1.5469	0.0131	1.5599	0.4143	0.0122	0.4264	0.0000	1,603.0087	1,603.0087	0.0686	0.0000	1,604.7240
Unmitigated	0.3819	1.5862	4.7996	0.0174	1.5469	0.0131	1.5599	0.4143	0.0122	0.4264	0.0000	1,603.0087	1,603.0087	0.0686	0.0000	1,604.7240

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	581.87	592.37	469.37	1,938,548	1,938,548
Enclosed Parking with Elevator	0.00	0.00	0.00		
Hotel	570.98	559.43	406.43	1,302,415	1,302,415
Regional Shopping Center	438.24	535.42	244.95	837,731	837,731
Total	1,591.09	1,687.21	1,120.74	4,078,694	4,078,694

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
Apartments High Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Hotel	16.60	8.40	6.90	19.40	61.60	19.00	58	38	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	12	34

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Enclosed Parking with Elevator	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Hotel	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966
Regional Shopping Center	0.558976	0.043534	0.209821	0.113949	0.016111	0.005791	0.025447	0.016654	0.001713	0.001553	0.004896	0.000590	0.000966

5.0 Energy Detail

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	647.8978	647.8978	0.0391	8.1000e-003	651.2898
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	647.8978	647.8978	0.0391	8.1000e-003	651.2898
NaturalGas Mitigated	0.0254	0.2254	0.1536	1.3900e-003		0.0176	0.0176		0.0176	0.0176	0.0000	251.3832	251.3832	4.8200e-003	4.6100e-003	252.8770
NaturalGas Unmitigated	0.0254	0.2254	0.1536	1.3900e-003		0.0176	0.0176		0.0176	0.0176	0.0000	251.3832	251.3832	4.8200e-003	4.6100e-003	252.8770

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					
Apartments High Rise	1.8741e+006	0.0101	0.0864	0.0368	5.5000e-004		6.9800e-003	6.9800e-003		6.9800e-003	6.9800e-003	0.0000	100.0093	100.0093	1.9200e-003	1.8300e-003	100.6036
Enclosed Parking with Elevator	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
Hotel	2.806e+006	0.0151	0.1376	0.1155	8.3000e-004		0.0105	0.0105		0.0105	0.0105	0.0000	149.7388	149.7388	2.8700e-003	2.7500e-003	150.6287
Regional Shopping Center	30640	1.7000e-004	1.5000e-003	1.2600e-003	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	1.6351	1.6351	3.0000e-005	3.0000e-005	1.6448
Total		**0.0254**	**0.2254**	**0.1536**	**1.3900e-003**		**0.0175**	**0.0175**		**0.0175**	**0.0175**	**0.0000**	**251.3832**	**251.3832**	**4.8200e-003**	**4.6100e-003**	**252.8770**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	1.8741e+006	0.0101	0.0864	0.0368	5.5000e-004		6.9800e-003	6.9800e-003		6.9800e-003	6.9800e-003	0.0000	100.0093	100.0093	1.9200e-003	1.8300e-003	100.6036
Enclosed Parking with Elevator	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
Hotel	2.806e+006	0.0151	0.1376	0.1155	8.3000e-004		0.0105	0.0105		0.0105	0.0105	0.0000	149.7388	149.7388	2.8700e-003	2.7500e-003	150.6287
Regional Shopping Center	30640	1.7000e-004	1.5000e-003	1.2600e-003	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	1.6351	1.6351	3.0000e-005	3.0000e-005	1.6448
Total		**0.0254**	**0.2254**	**0.1536**	**1.3900e-003**		**0.0175**	**0.0175**		**0.0175**	**0.0175**	**0.0000**	**251.3832**	**251.3832**	**4.8200e-003**	**4.6100e-003**	**252.8770**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	651949	141.9452	8.5800e-003	1.7700e-003	142.6884
Enclosed Parking with Elevator	1.40794e+006	306.5431	0.0185	3.8300e-003	308.1479
Hotel	740620	161.2510	9.7400e-003	2.0200e-003	162.0952
Regional Shopping Center	175261	38.1585	2.3100e-003	4.8000e-004	38.3583
Total		**647.8978**	**0.0392**	**8.1000e-003**	**651.2898**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	651949	141.9452	8.5800e-003	1.7700e-003	142.6884
Enclosed Parking with Elevator	1.40794e+006	306.5431	0.0185	3.8300e-003	308.1479
Hotel	740620	161.2510	9.7400e-003	2.0200e-003	162.0952
Regional Shopping Center	175261	38.1585	2.3100e-003	4.8000e-004	38.3583
Total		**647.8978**	**0.0392**	**8.1000e-003**	**651.2898**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	1.1357	0.0536	1.7157	3.1000e-004		0.0121	0.0121		0.0121	0.0121	0.0000	42.1574	42.1574	3.4600e-003	7.2000e-004	42.4592
Unmitigated	1.1357	0.0536	1.7157	3.1000e-004		0.0121	0.0121		0.0121	0.0121	0.0000	42.1574	42.1574	3.4600e-003	7.2000e-004	42.4592

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	0.1014					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9785					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.9800e-003	0.0340	0.0145	2.2000e-004		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	39.3825	39.3825	7.5000e-004	7.2000e-004	39.6165
Landscaping	0.0519	0.0196	1.7013	9.0000e-005		9.3700e-003	9.3700e-003		9.3700e-003	9.3700e-003	0.0000	2.7749	2.7749	2.7100e-003	0.0000	2.8427
Total	**1.1357**	**0.0536**	**1.7157**	**3.1000e-004**		**0.0121**	**0.0121**		**0.0121**	**0.0121**	**0.0000**	**42.1574**	**42.1574**	**3.4600e-003**	**7.2000e-004**	**42.4592**

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	0.1014					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9785					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.9800e-003	0.0340	0.0145	2.2000e-004		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	39.3825	39.3825	7.5000e-004	7.2000e-004	39.6165
Landscaping	0.0519	0.0196	1.7013	9.0000e-005		9.3700e-003	9.3700e-003		9.3700e-003	9.3700e-003	0.0000	2.7749	2.7749	2.7100e-003	0.0000	2.8427
Total	**1.1357**	**0.0536**	**1.7157**	**3.1000e-004**		**0.0121**	**0.0121**		**0.0121**	**0.0121**	**0.0000**	**42.1574**	**42.1574**	**3.4600e-003**	**7.2000e-004**	**42.4592**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	30.4729	0.3167	7.7800e-003	40.7078
Unmitigated	30.4729	0.3167	7.7800e-003	40.7078

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	8.979 / 0	28.3040	0.2941	7.2300e-003	37.8105
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
Hotel	0.687484 / 0	2.1671	0.0225	5.5000e-004	2.8950
Regional Shopping Center	0.00055918 / 0	1.7600e-003	2.0000e-005	0.0000	2.3500e-003
Total		**30.4729**	**0.3167**	**7.7800e-003**	**40.7078**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	8.979 / 0	28.3040	0.2941	7.2300e-003	37.8105
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
Hotel	0.687484 / 0	2.1671	0.0225	5.5000e-004	2.8950
Regional Shopping Center	0.00055918 / 0	1.7600e-003	2.0000e-005	0.0000	2.3500e-003
Total		**30.4729**	**0.3167**	**7.7800e-003**	**40.7078**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	26.9146	1.5906	0.0000	66.6797
Unmitigated	26.9146	1.5906	0.0000	66.6797

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	75.44	15.3136	0.9050	0.0000	37.9389
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
Hotel	41.06	8.3348	0.4926	0.0000	20.6491
Regional Shopping Center	16.09	3.2661	0.1930	0.0000	8.0917
Total		**26.9146**	**1.5906**	**0.0000**	**66.6797**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	75.44	15.3136	0.9050	0.0000	37.9389
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
Hotel	41.06	8.3348	0.4926	0.0000	20.6491
Regional Shopping Center	16.09	3.2661	0.1930	0.0000	8.0917
Total		**26.9146**	**1.5906**	**0.0000**	**66.6797**

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix E Hydrology and Water Quality Studies

Appendix

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HYDROLOGY AND HYDRAULICS STUDY

For

SANTA ANA
3RD & BROADWAY
("The Project")

DRAFT

Prepared for:

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Derek J. McGregor, PE, PLS

April 23, 2019

JN1262-02

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PROJECT DESCRIPTION 1

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HYDROLOGY 2
HYDRAULICS 2

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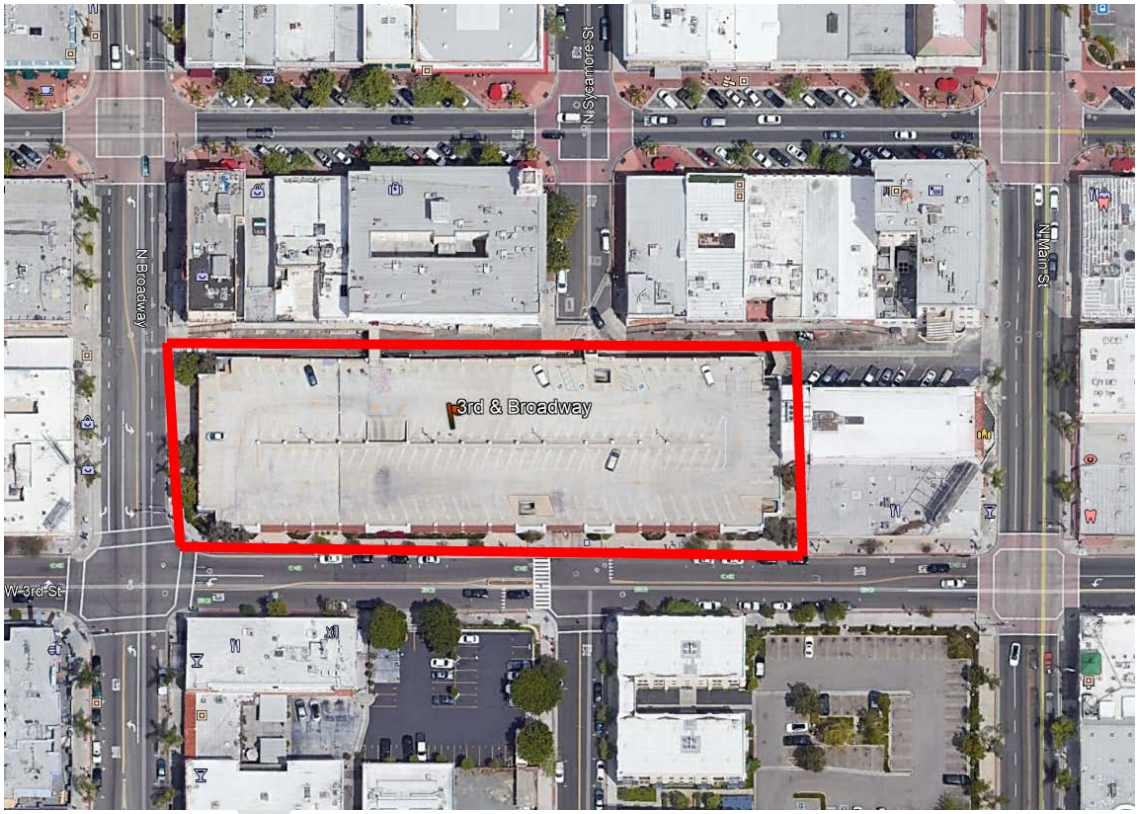
DRAFT

I. INTRODUCTION

The purpose of this report is to compare the existing hydrology and hydraulics to the proposed reuse project titled Santa Ana 3rd & Broadway located at 3rd & Broadway in Santa Ana, California. Multiple documents and data were reviewed in preparation of this comparison including Orange County Hydrology Manual, its 1996 addendum, Orange County Flood Design Manual, Orange County Hydrology Workbook, Orange County Drainage Manual, Orange County Highway Design Manual and internal communication with city staff.

PROJECT DESCRIPTION

The project site encompasses approximately 1.4 acres. The project site is bounded by North Broadway on the west, E 3rd Street to the south, an alley to the north, and an adjacent property to the east. See vicinity Map Below.



The project is comprised of 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), along with rooftop amenities ancillary to residential and hotel uses. Access will be provided on 3rd Street, Sycamore Street and the alley north of the project.

II. EXISTING CONDITION

The existing property, a 1.4-acre parcel, is currently being utilized by the City of Santa Ana as a 3-story parking structure with roughly 440 spaces. This existing structure, a two-level post-tensioned concrete parking structure, is located at the northeast corner of Broadway and 3rd Street and is 46,144 ft^2 (112' x 412') in size.

HYDROLOGY

The existing drainage system for the properties watershed consist of an onsite stormwater runoff collection system that will convey runoff to a public storm drain system in 3rd street. The onsite system consists of roof drains, downspouts, gutters and onsite private storm drain. The properties watershed is depicted on the exhibit titled "Hydrology Map - Existing Condition" found within the appendix.

Existing condition hydrology calculations can also be found within the appendix and are summarized in the table below.

Drainage Area	Acreage[1]	Peak 25 Year Flow Rate, Q_{25} (cfs)[2]	Peak 100 Year Flow Rate, Q_{100} (cfs)[2]	Time of Concentration for Q_{100}, TC (minutes)[2]
Existing Parking Structure	1.4 acres	7.28 cfs	10.19 cfs	5 mins
Notes: [1] Areas taken form Hydrology Map – Existing Condition, see appendix [2] For calculations, see appendix				

As shown above, the peak 100-year flow rate (Q_{100}) for the existing parking structure is estimated to be approximately **10.19 cubic feet per second (cfs)**.

HYDRAULICS

The offsite public storm drain is a 24" reinforced concrete pipe (RCP) storm drain line located in 3rd Street. The private onsite storm drain is an 18" RCP storm drain line.

Capacity calculations for both the 18" and 24" reinforced concrete pipes (RCP) can be found within the appendix and are summarized in the table below.

Storm Drain Size (in)	Storm Drain Capacity (cfs)[1]	Peak 25 Year Flow Rate, Q_{25} for existing site (cfs)[1]
18"	7.42 cfs	7.28 cfs
24"	16.0 cfs	7.28 cfs
Notes: [1] For calculations, see appendix		

As shown above, estimated capacity of the existing public storm drain line in 3rd Street is estimated to be approximately **16.0 cubic feet per second (cfs)**.

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III. PROPOSED CONDITION

HYDROLOGY

The proposed drainage system for the properties watershed will consist of an onsite stormwater runoff collection system that will convey runoff to the public storm drain system in 3rd Street. The proposed onsite system will consist of roof drains, gutters, downspouts, and onsite private storm drain. The properties watershed is depicted on the exhibit titled "Hydrology Map - Proposed Condition" found within the appendix.

Proposed condition hydrology calculations can be found within the appendix and are summarized in the table below.

Drainage Area	Acreage[1]	Peak 25 Year Flow Rate, Q_{25} (cfs)[2]	Peak 100 Year Flow Rate, Q_{100} (cfs)[2]	Time of Concentration for Q_{100}, T_C (minutes)[2]
Mixed Use (Residential) – 164 DUs, Retail & Parking	0.8 acre	4.31 cfs	6.04 cfs	5 mins
Hotel – 75 Rooms & Parking	0.4 acre	2.01 cfs	2.81 cfs	5 mins
Street	0.2 acre	0.92 cfs	1.29 cfs	5 mins
Total Flow Rate		**7.24 cfs**	**10.14 cfs**	**---**

Notes:
[1] Areas taken form Hydrology Map – Proposed Condition, see appendix
[2] For calculations, see appendix

As noted above, the project's total estimated 100-year flow rate is **10.14 cubic feet per second (cfs)**.

HYDRAULICS

The offsite public storm drain is a 24" reinforced concrete pipe (RCP) storm drain line located in 3rd Street. The private onsite storm drain will be an 18" RCP storm drain line.

Capacity calculations for both the 18" and 24" reinforced concrete pipes (RCP) can be found within the appendix and are summarized in the table below.

Storm Drain Size (in)	Storm Drain Capacity (cfs)[1]	Peak 100 Year Flow Rate, Q_{100} for existing site (cfs)[1]
18"	7.42 cfs	7.24 cfs
24"	16.0 cfs	7.24 cfs

Notes:
[1] For calculations, see appendix

As noted above, the estimated capacity of an 18" RCP storm drain line leaving the project site will be approximately **7.42 cubic feet per second (cfs)**.

SUMMARY

The peak 100-year flow rate (Q_{100}) for the existing parking structure is estimated to be approximately **10.19 cubic feet per second (cfs),** and the proposed peak 100-year flow rate is estimated to be approximately **10.14 (cfs)**.

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APPENDIX

HYDROLOGY MAP – EXISTING CONDITION
HYDROLOGY MAP – PROPOSED CONDITION
SOILS MAP
MEAN PRECIPITATION INTENSITIES TABLE
HYDROLOGY CALCULATIONS
HYDRAULICS CALCULATIONS

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HYDROLOGY MAP – EXISTING CONDITION

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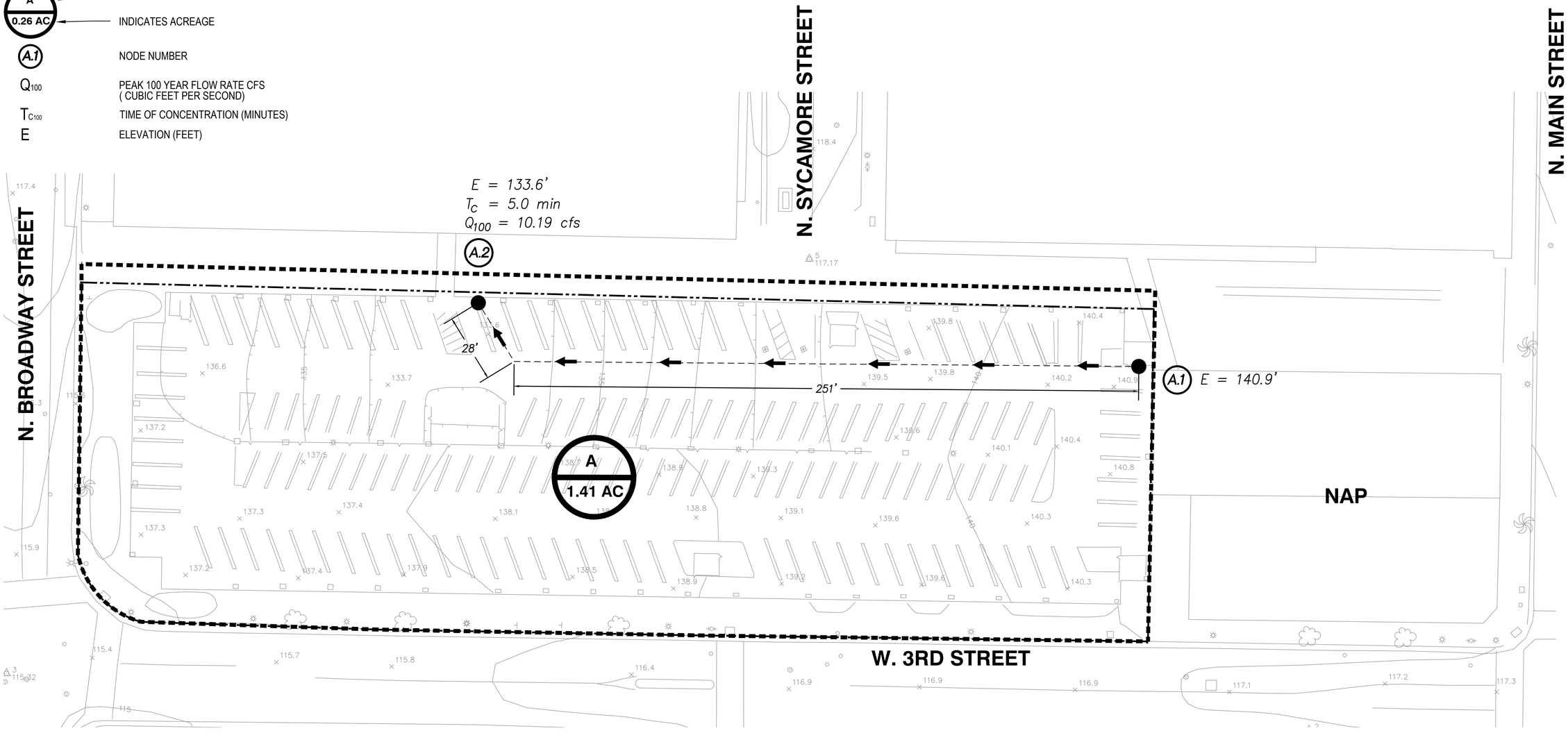
SITE CONSTRAINTS:

SITE HYDROLOGICAL SOILS CLASSIFICATION IS TYPE B PER COUNTY HYDROLOGY MANUAL.

LEGEND:

- LOT BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARIES
- DIRECTION OF SURFACE FLOW
- A / 0.26 AC — INDICATES DRAINAGE AREA / INDICATES ACREAGE
- A.1 — NODE NUMBER
- Q_{100} — PEAK 100 YEAR FLOW RATE CFS (CUBIC FEET PER SECOND)
- T_{C100} — TIME OF CONCENTRATION (MINUTES)
- E — ELEVATION (FEET)

HYDROLOGY MAP - EXISTING CONDITION



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SCALE IN FEET
1 inch = 20 ft

FILE NO.:

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APPROVED	INSTALLED

REFERENCES

BENCHMARK NO.: ELEV.:
BENCHMARK DESCRIPTION
CONSTRUCTION COMPLETED:

PREPARED UNDER THE SUPERVISION OF: DATE
RCE NO.:
DESIGNED: DJG DRAWN: DJG CHECKED: DJM
RECOMMENDED:
RECOMMENDED FOR CONSTRUCTION:
RCE NO.:

HYDROLOGY MAP
3RD & BROADWAY
EXISTING CONDITION

PUBLIC WORKS AGENCY
CITY OF SANTA ANA

SHEET 1 OF 2

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HYDROLOGY MAP – PROPOSED CONDITION

DRAFT

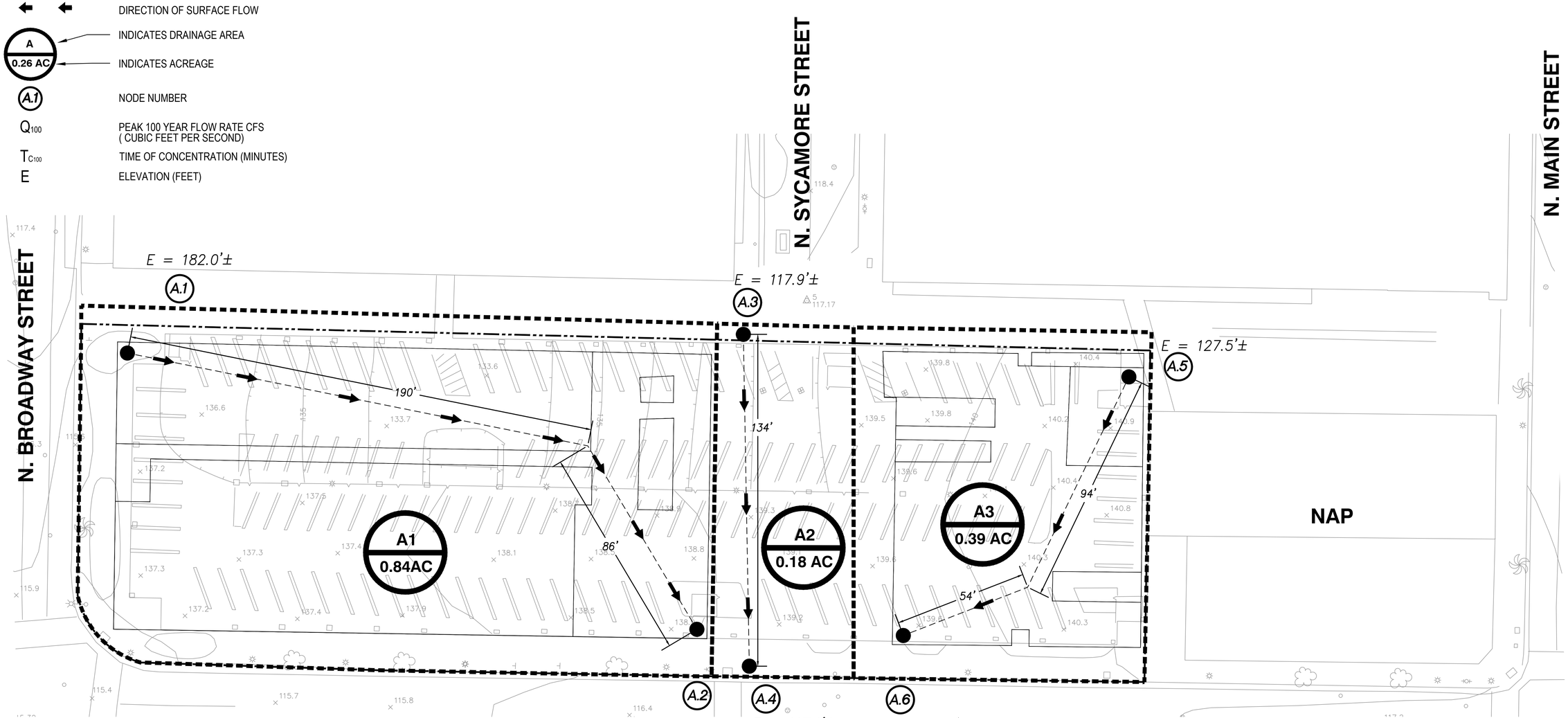
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- A / 0.26 AC — INDICATES DRAINAGE AREA / INDICATES ACREAGE
- A.1 — NODE NUMBER
- Q_{100} — PEAK 100 YEAR FLOW RATE CFS (CUBIC FEET PER SECOND)
- T_{C100} — TIME OF CONCENTRATION (MINUTES)
- E — ELEVATION (FEET)

HYDROLOGY MAP - PROPOSED CONDITION



Q_{100} = 6.04 + 1.29 + 2.81 = 10.14 CFS

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20 10 0 20 40
SCALE IN FEET
1 inch = 20 ft

FILE NO.:

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APPROVED	INSTALLED

REFERENCES

BENCHMARK NO.: ELEV.:
BENCHMARK DESCRIPTION
CONSTRUCTION COMPLETED:

PREPARED UNDER THE SUPERVISION OF: DATE
RCE NO.:
DESIGNED: DJG DRAWN: DJG CHECKED: DJM
RECOMMENDED:
RECOMMENDED FOR CONSTRUCTION:
RCE NO.:

HYDROLOGY MAP
3RD & BROADWAY
PROPOSED CONDITION

PUBLIC WORKS AGENCY
CITY OF SANTA ANA

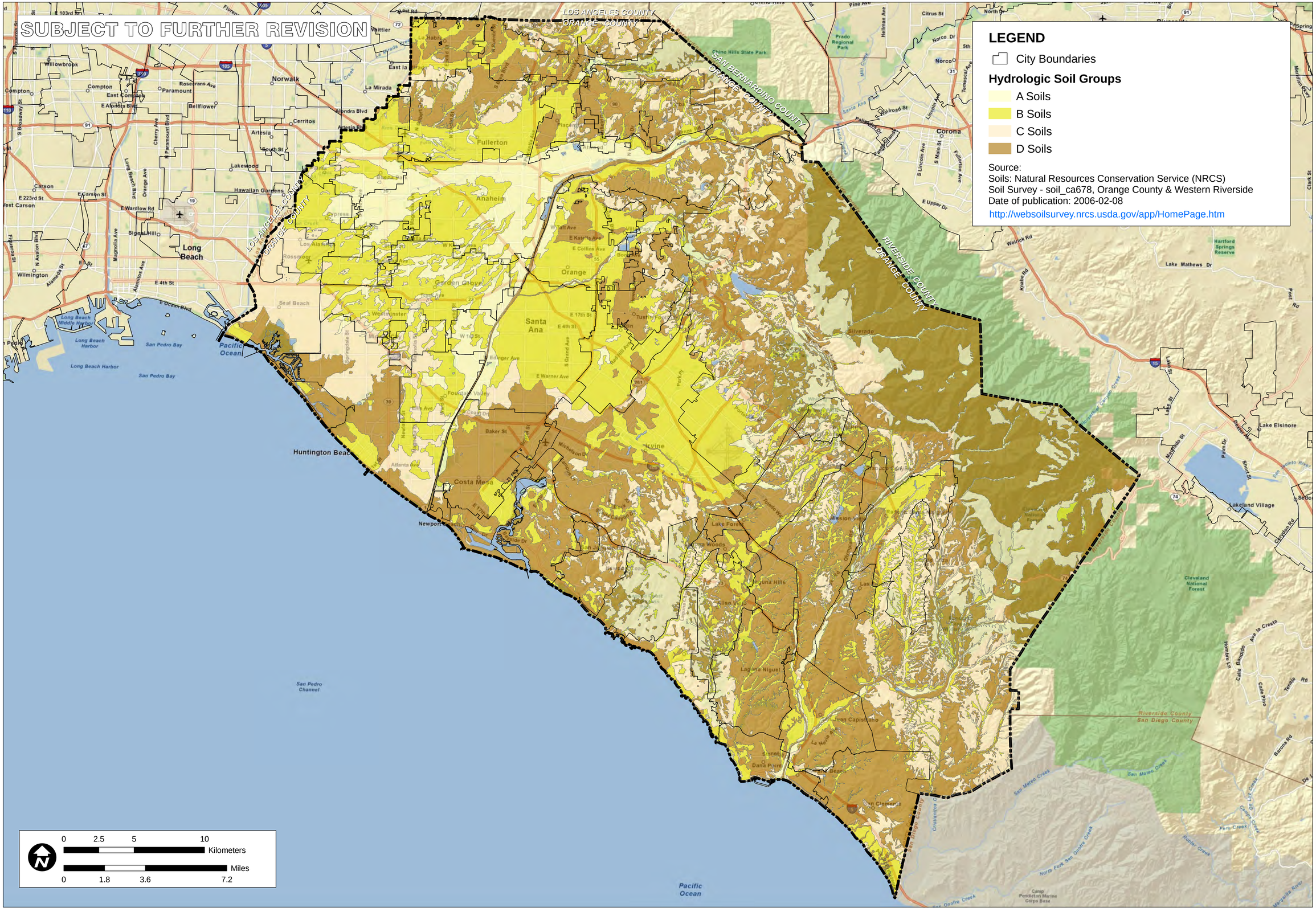
SHEET 2 OF 2

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SOILS MAP

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SUBJECT TO FURTHER REVISION



LEGEND

City Boundaries

Hydrologic Soil Groups

- A Soils
- B Soils
- C Soils
- D Soils

Source:
Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

0 2.5 5 10 Kilometers

0 1.8 3.6 7.2 Miles

P:\95226E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\95226E_FigureXVI-2a_HydroSoils_20110215.mxd

TITLE
NRCS HYDROLOGIC SOILS GROUPS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	95226-E

PACE
Advanced Water Engineering

FIGURE
XVI-2a

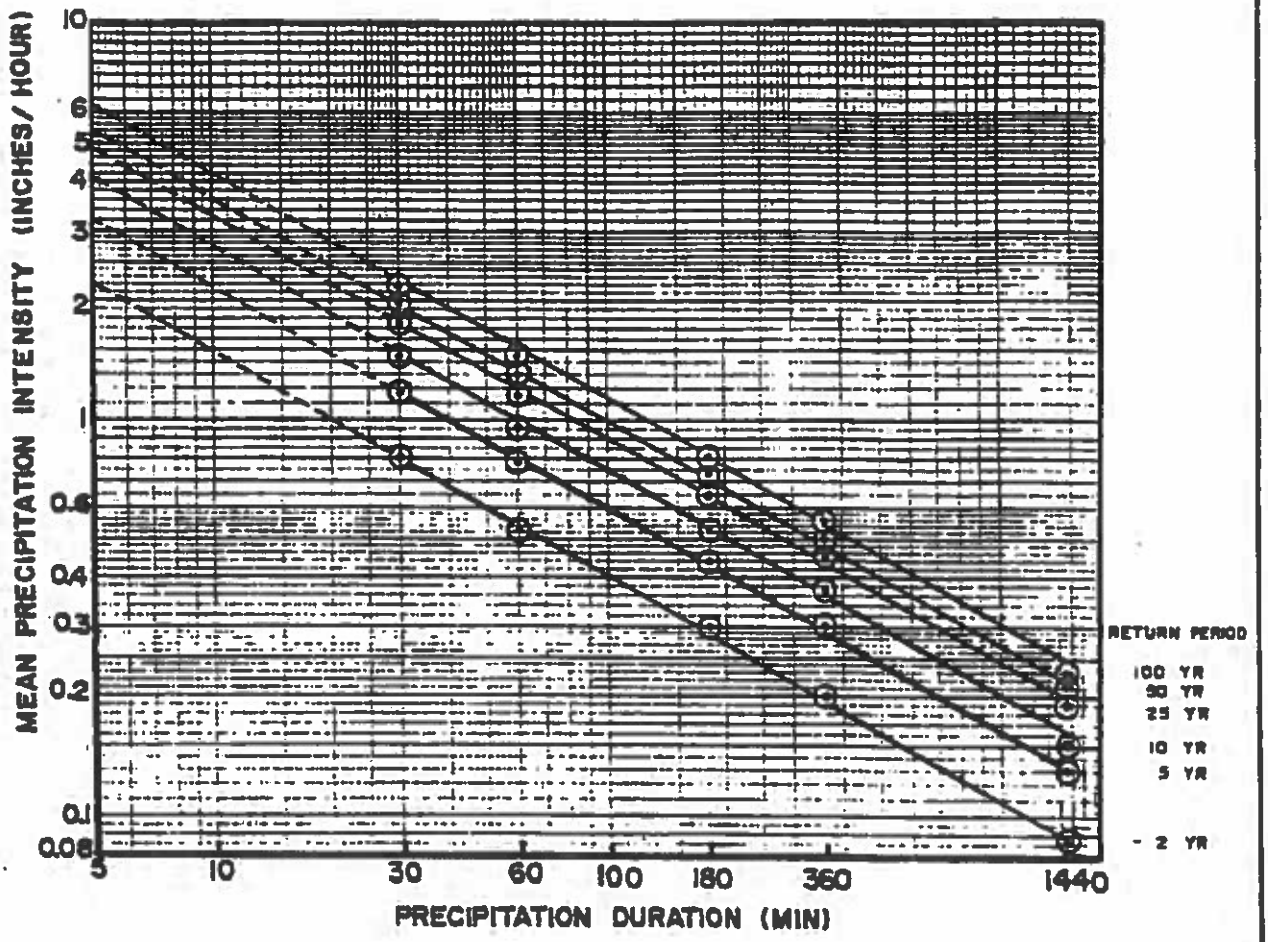
MEAN PRECIPITATION INTENSITIES TABLE

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Regression Equations: $I(t) = at^b$

(I= Intensity in inches/hour, t= duration in minutes)

Return Frequency (years)	a	b
2	5.702	-0.574
5	7.870	-0.562
10	10.209	-0.573
25	11.995	-0.566
50	13.521	-0.566
100	15.560	-0.573



ORANGE COUNTY
HYDROLOGY MANUAL

MEAN PRECIPITATION INTENSITIES FOR NONMOUNTAINOUS AREAS

(Figure B-3 from the 1986 Orange County Hydrology Manual)

HYDROLOGY CALCULATIONS
EXISTING CONDITION (Q_{25})

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Project Description

File Name ..... 3rd & Broadway Existing Storm Analysis.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 19, 2019	00:00:00
End Analysis On	Apr 20, 2019	00:00:00
Start Reporting On	Apr 19, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	2
Subbasins	1
Nodes	1
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1		Time Series	TS-04	Cumulative	inches	California	Orange (Irvine)	25	4.30	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	1.41	92.00	4.30	3.41	4.81	7.28	0 00:05:00

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ac) 1.41
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Urban commercial, 85% imp	1.41	B	92.00
Composite Area & Weighted CN	1.41		92.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	1.12	0.00	0.00
Computed Flow Time (min) :	1.49	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	179	0.00	0.00
Slope (%) :	2.6	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	3.28	0.00	0.00
Computed Flow Time (min) :	0.91	0.00	0.00

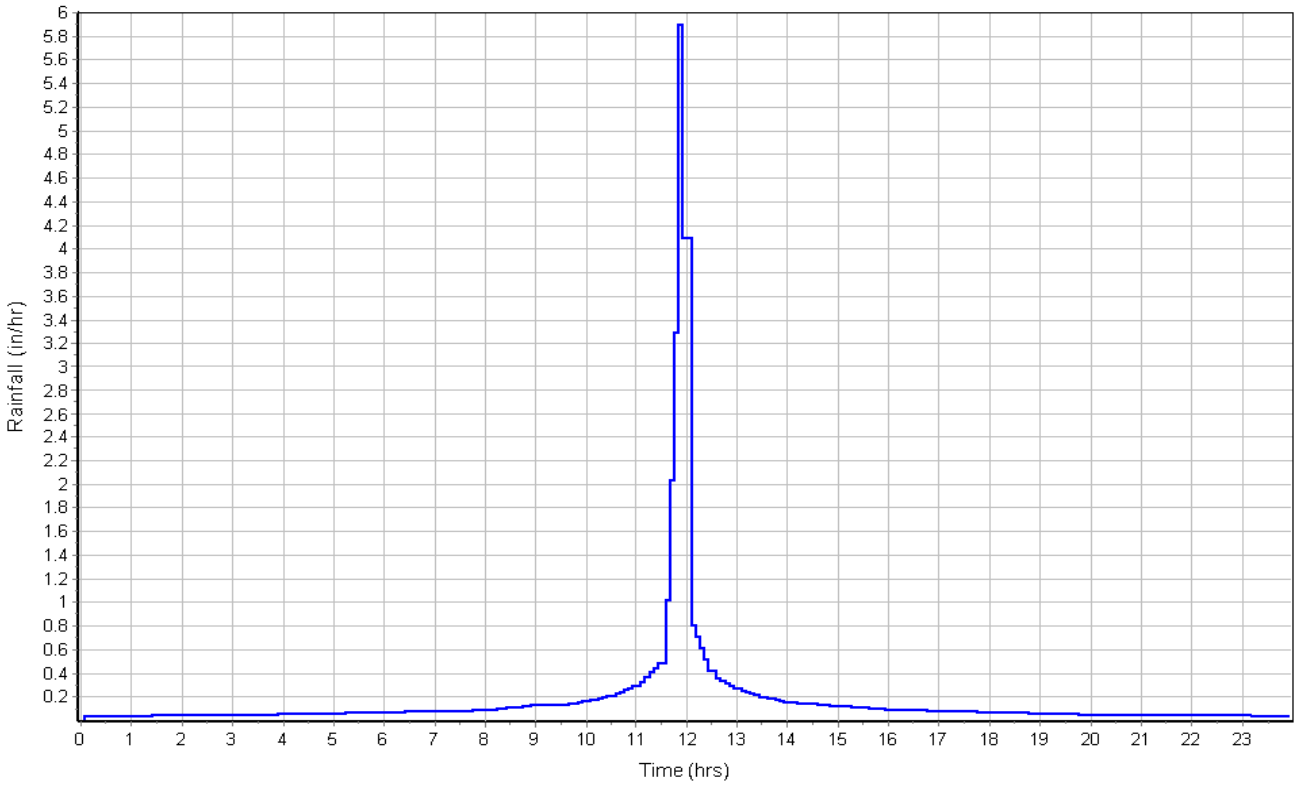
Total TOC (min) 2.40

Subbasin Runoff Results

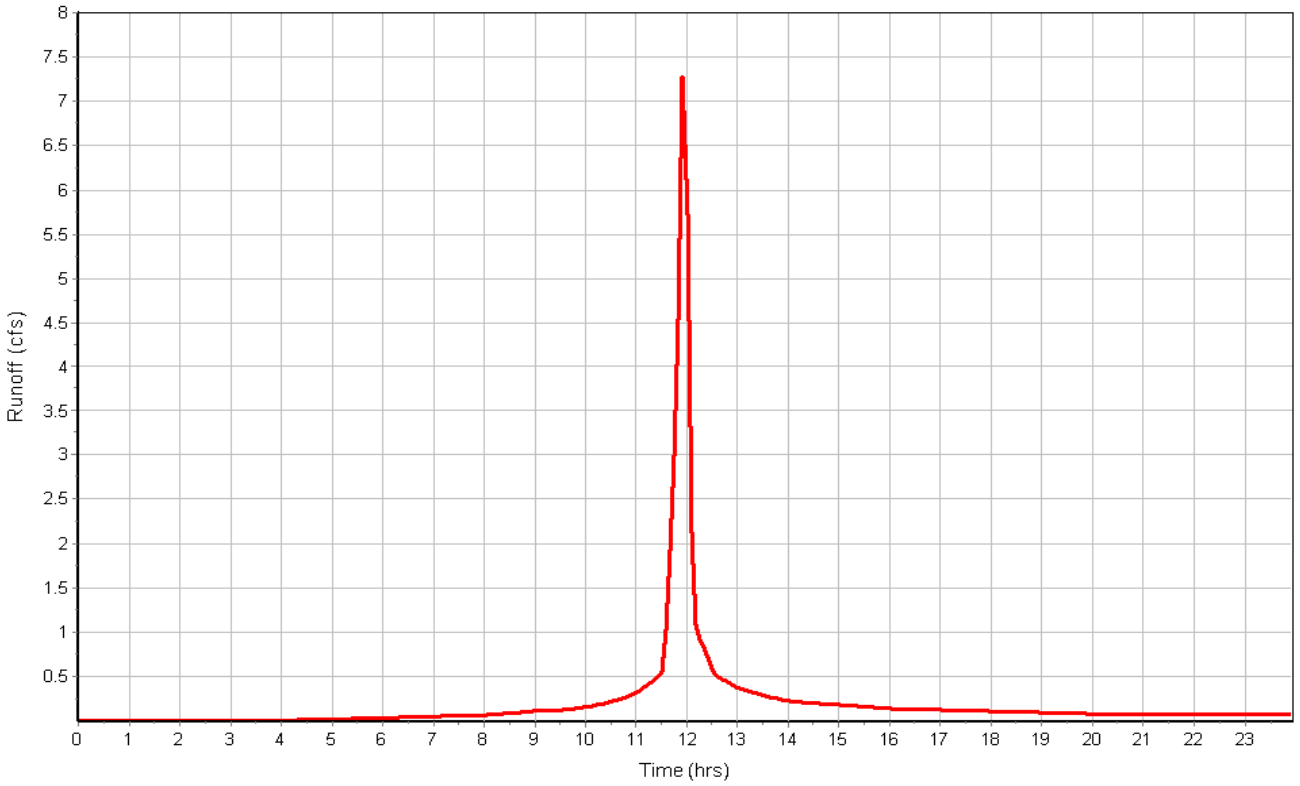
Total Rainfall (in)	4.30
Total Runoff (in)	3.41
Peak Runoff (cfs)	7.28
Weighted Curve Number	92.00
Time of Concentration (days hh:mm:ss)	0 00:02:24

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



HYDROLOGY CALCULATIONS
EXISTING CONDITION (Q_{100})

DRAFT

Project Description

File Name ..... 3rd & Broadway Existing Storm Analysis.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 19, 2019	00:00:00
End Analysis On	Apr 20, 2019	00:00:00
Start Reporting On	Apr 19, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	2
Subbasins	1
Nodes	1
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1		Time Series	TS-03	Cumulative	inches	California	Orange (Irvine)	100	5.80	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	1.41	92.00	5.80	4.87	6.88	10.19	0 00:05:00

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ac) 1.41
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Urban commercial, 85% imp	1.41	B	92.00
Composite Area & Weighted CN	1.41		92.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	1.12	0.00	0.00
Computed Flow Time (min) :	1.49	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	179	0.00	0.00
Slope (%) :	2.6	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	3.28	0.00	0.00
Computed Flow Time (min) :	0.91	0.00	0.00

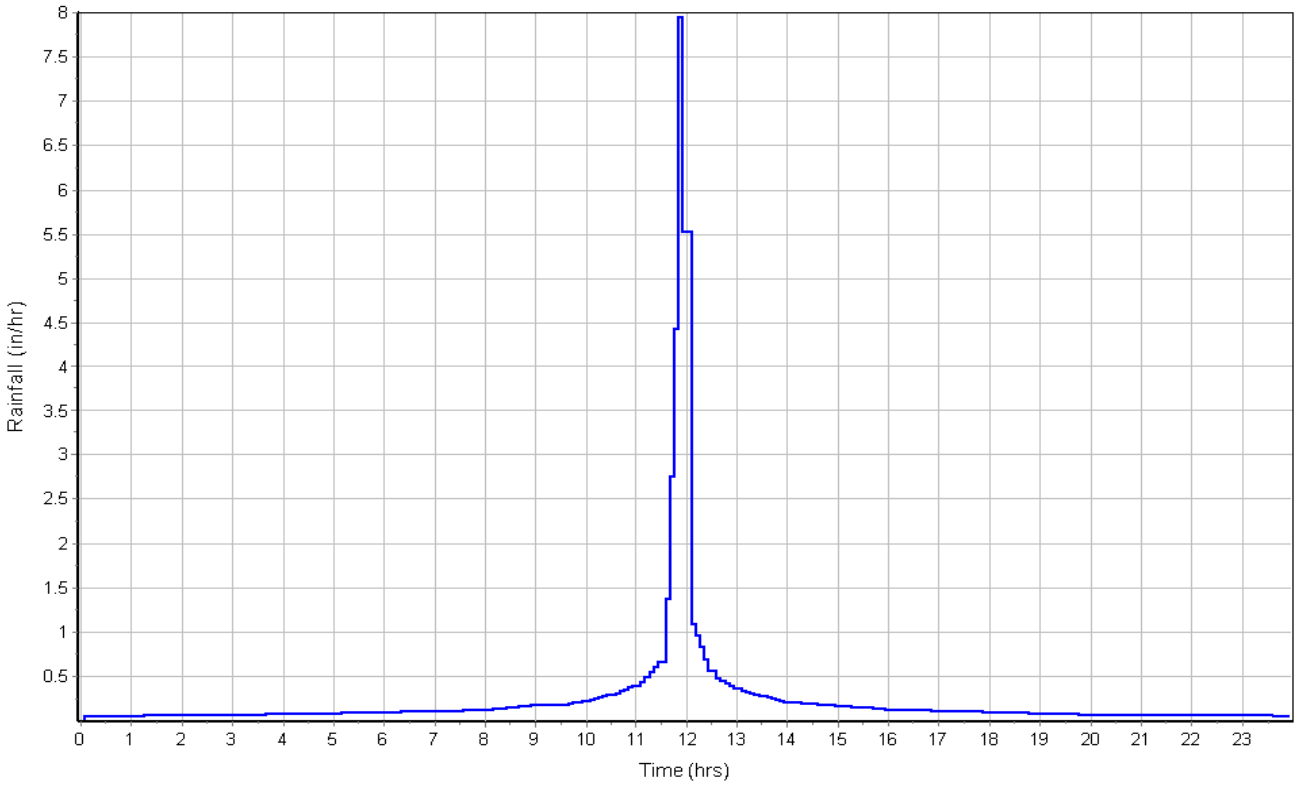
Total TOC (min) 2.40

Subbasin Runoff Results

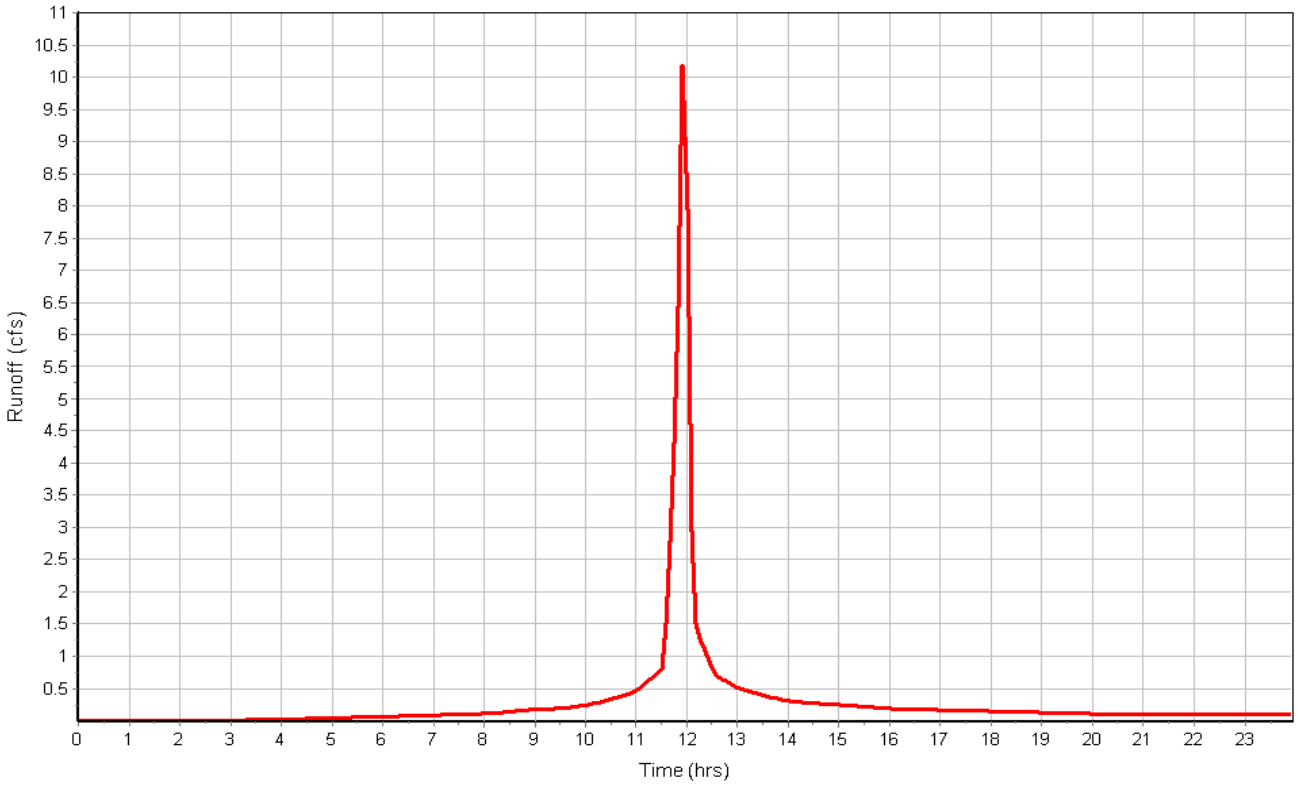
Total Rainfall (in)	5.80
Total Runoff (in)	4.87
Peak Runoff (cfs)	10.19
Weighted Curve Number	92.00
Time of Concentration (days hh:mm:ss)	0 00:02:24

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



HYDROLOGY CALCULATIONS
PROPOSED CONDITION (Q_{25})

DRAFT

Project Description

File Name ..... 3rd & Broadway Proposed Storm Analysis.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 19, 2019	00:00:00
End Analysis On	Apr 20, 2019	00:00:00
Start Reporting On	Apr 19, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	3
Nodes	1
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1		Time Series	TS-02	Cumulative	inches	California	Orange (Irvine)	25	4.30	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	0.84	92.00	4.30	3.41	2.86	4.31	0 00:05:00
2	Sub-02	0.18	92.00	4.30	3.41	0.62	0.92	0 00:05:00
3	Sub-03	0.39	92.00	4.30	3.41	1.32	2.01	0 00:05:00

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ac) 0.84
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.84	-	92.00
Composite Area & Weighted CN	0.84		92.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	0.76	0.00	0.00
Computed Flow Time (min) :	2.18	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	176	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0.00	0.00
Computed Flow Time (min) :	1.44	0.00	0.00

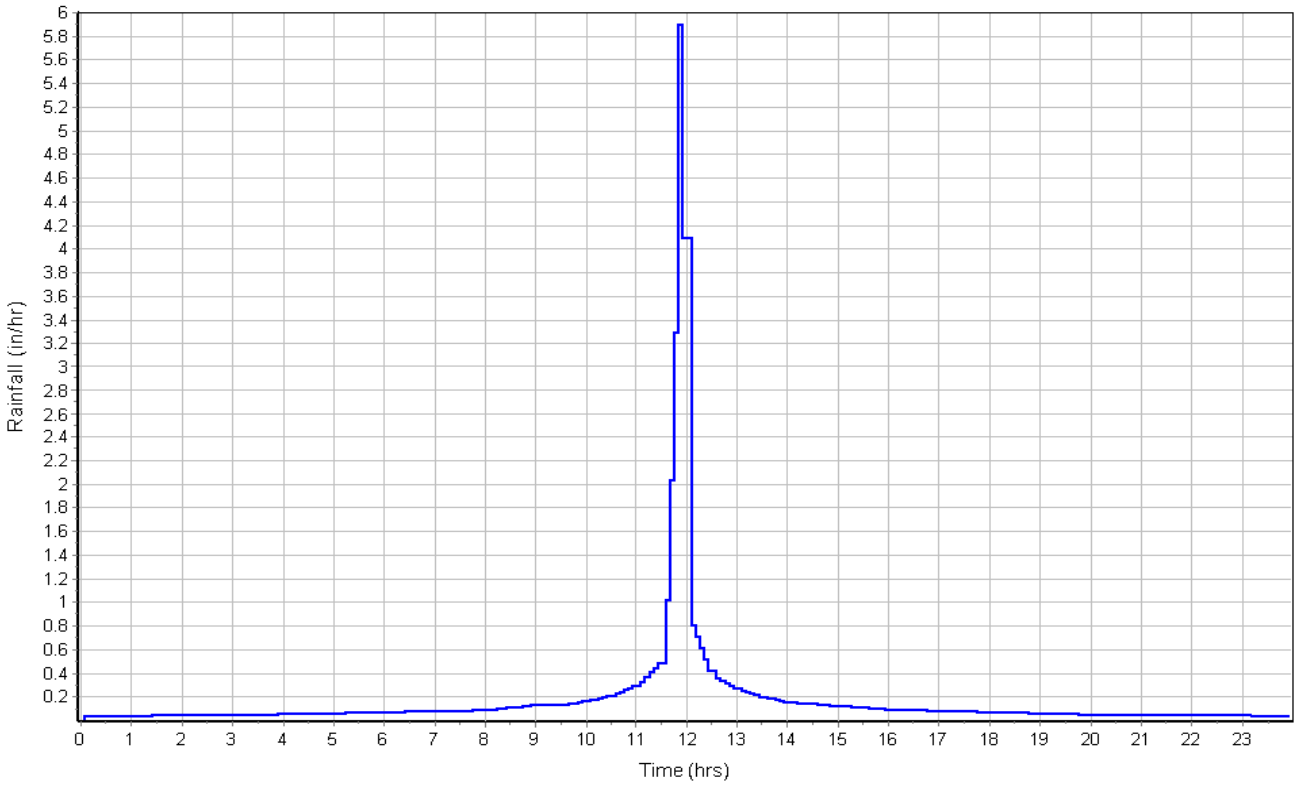
Total TOC (min) 3.62

Subbasin Runoff Results

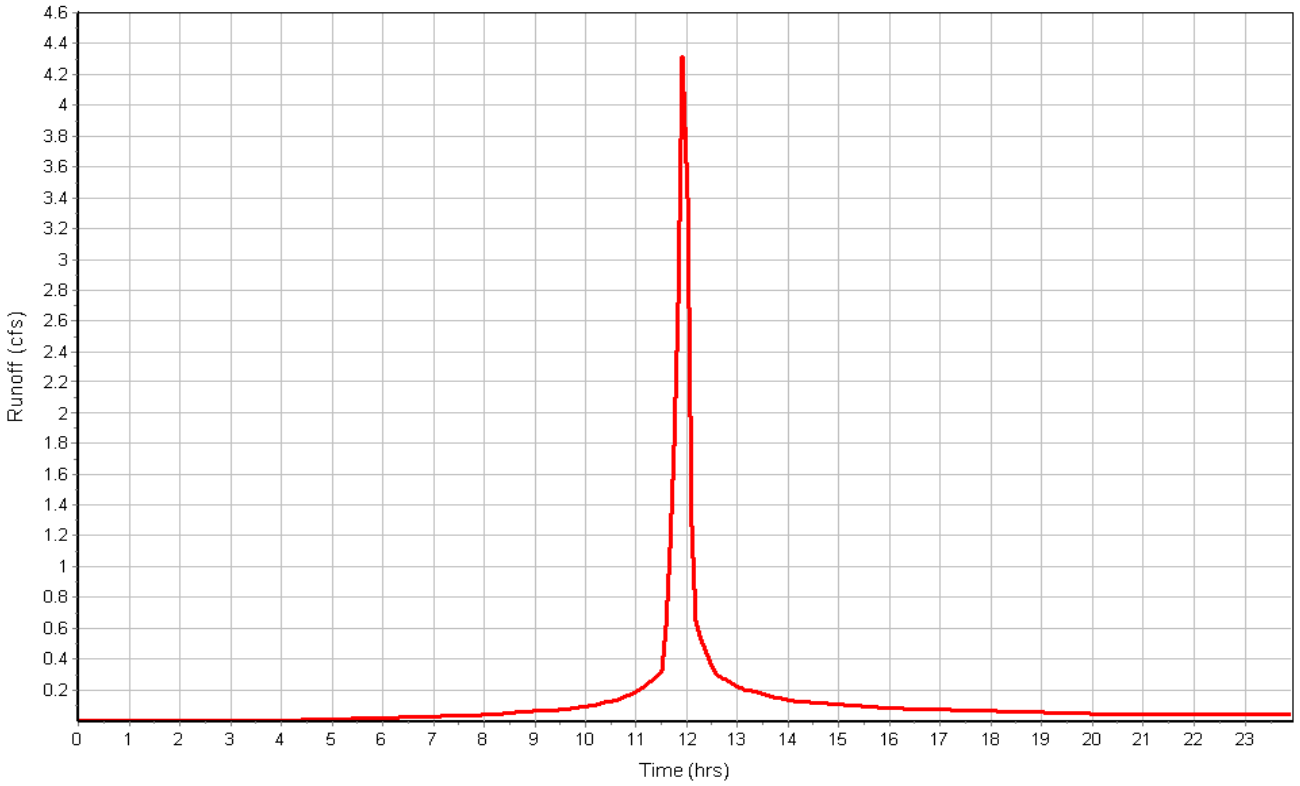
Total Rainfall (in)	4.30
Total Runoff (in)	3.41
Peak Runoff (cfs)	4.31
Weighted Curve Number	92.00
Time of Concentration (days hh:mm:ss)	0 00:03:37

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-02

Input Data

Area (ac) 0.18
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.18	-	92.00
Composite Area & Weighted CN	0.18		92.00

Time of Concentration

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	0.62	0.00	0.00
Computed Flow Time (min) :	2.67	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	34	0.00	0.00
Slope (%) :	.6	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.57	0.00	0.00
Computed Flow Time (min) :	0.36	0.00	0.00

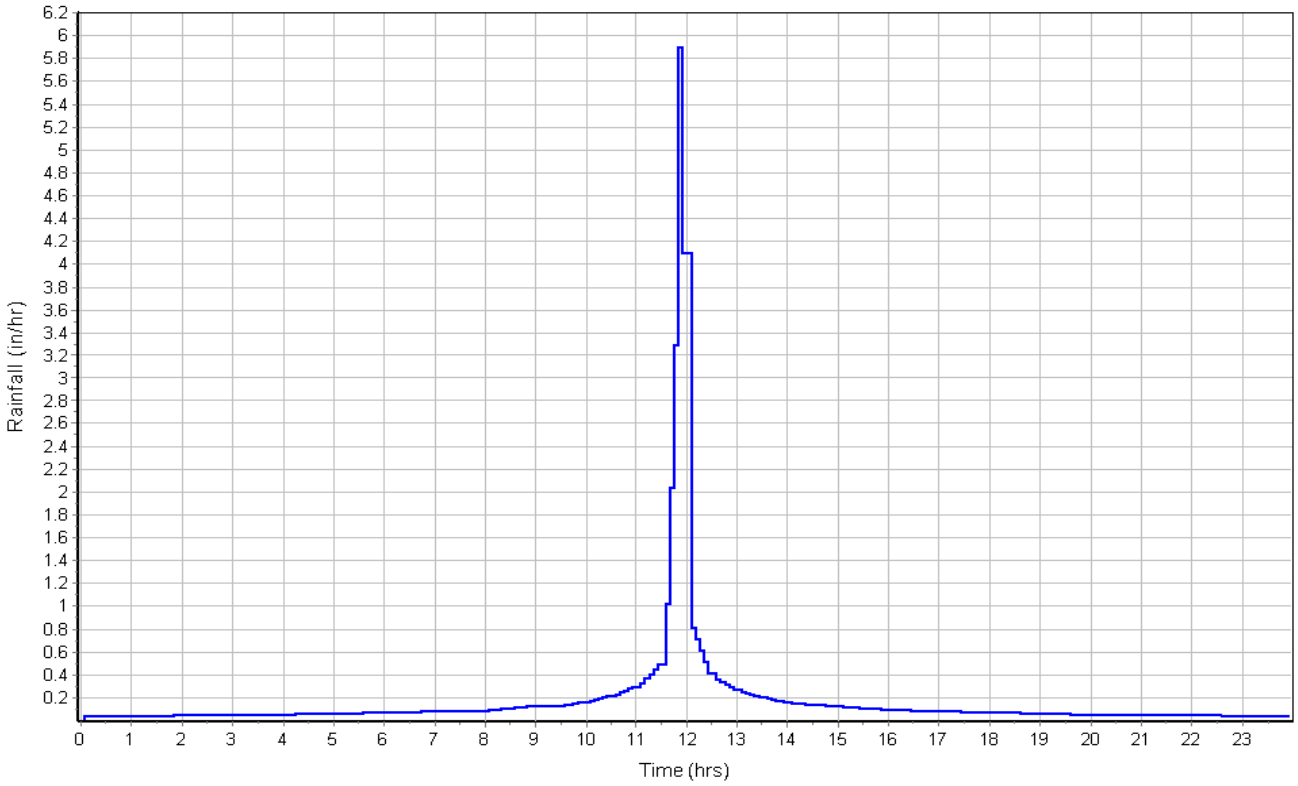
Total TOC (min) 3.03

Subbasin Runoff Results

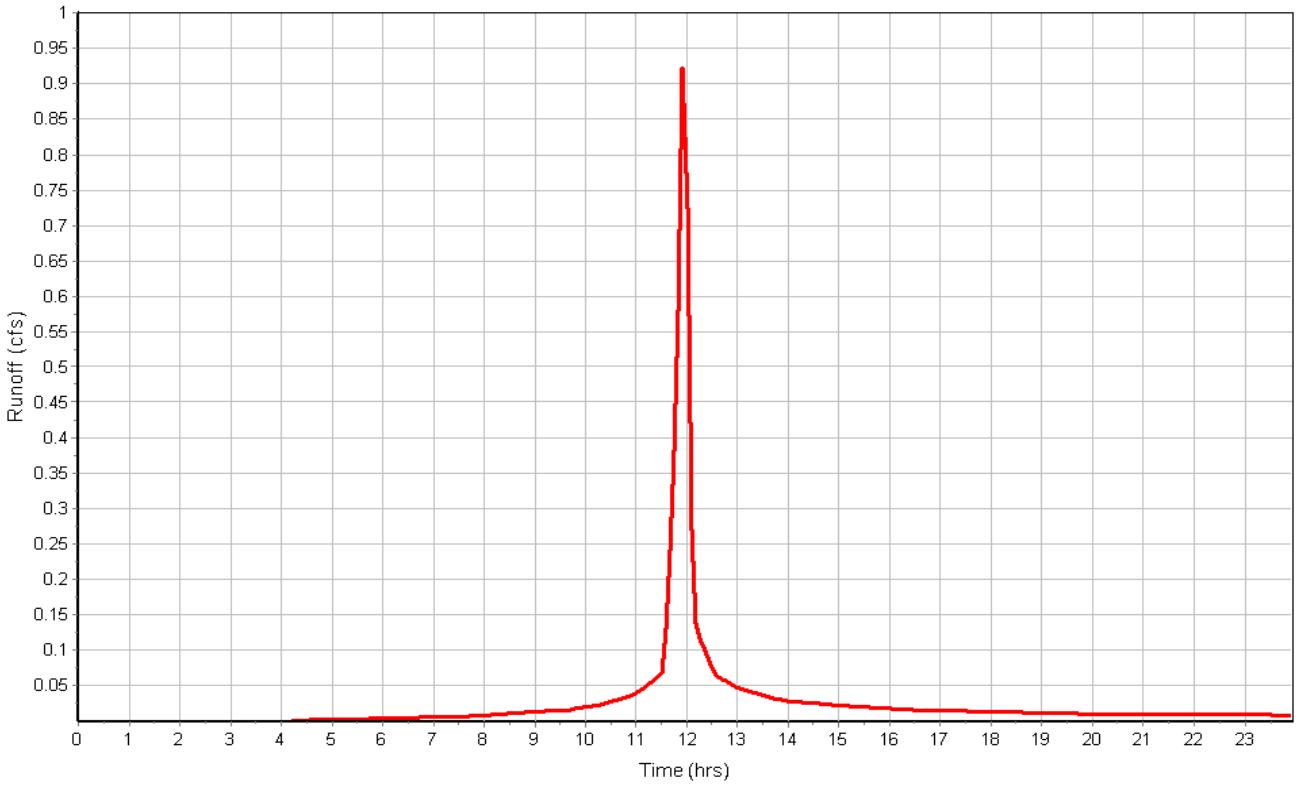
Total Rainfall (in) 4.30
Total Runoff (in) 3.41
Peak Runoff (cfs) 0.92
Weighted Curve Number 92.00
Time of Concentration (days hh:mm:ss) 0 00:03:02

Subbasin : Sub-02

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-03

Input Data

Area (ac) 0.39
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.39	-	92.00
Composite Area & Weighted CN	0.39		92.00

Time of Concentration

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	0.76	0.00	0.00
Computed Flow Time (min) :	2.18	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	48	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0.00	0.00
Computed Flow Time (min) :	0.39	0.00	0.00

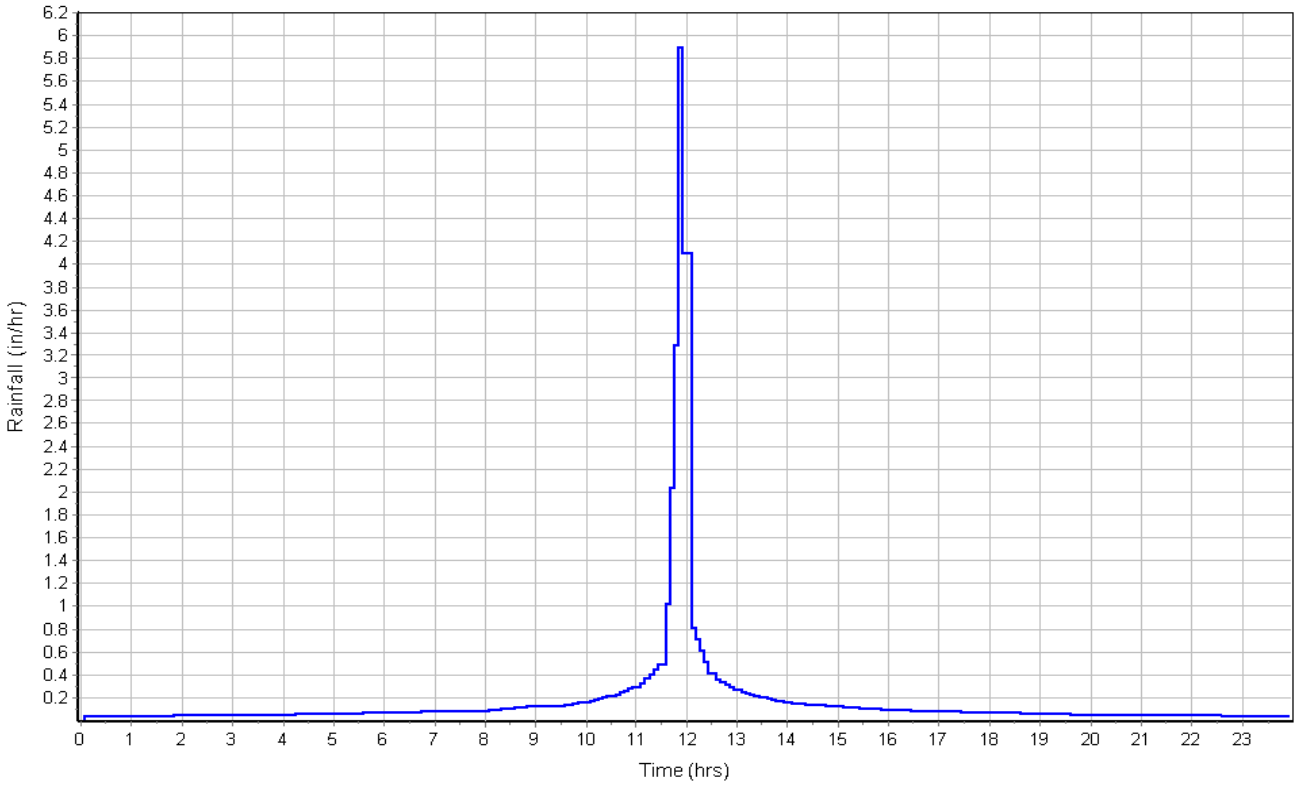
Total TOC (min) 2.57

Subbasin Runoff Results

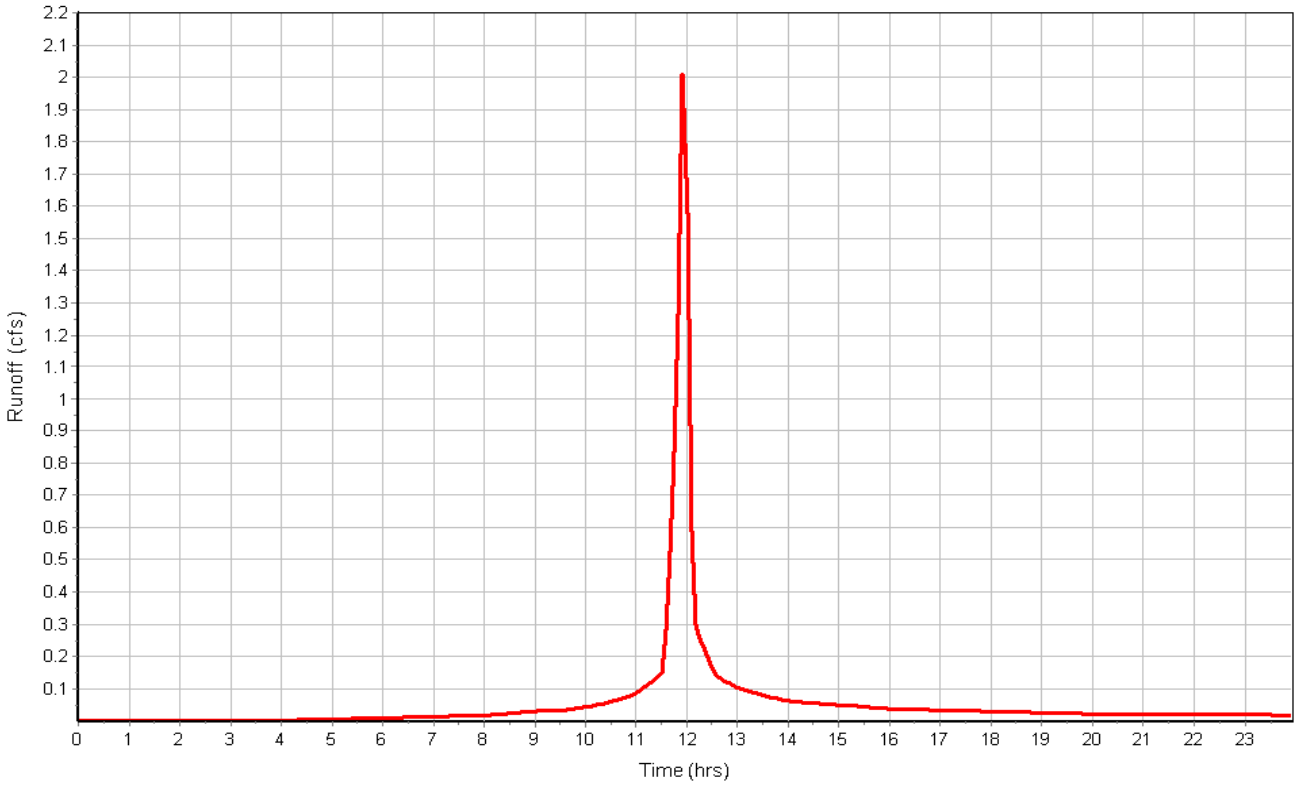
Total Rainfall (in) 4.30
Total Runoff (in) 3.41
Peak Runoff (cfs) 2.01
Weighted Curve Number 92.00
Time of Concentration (days hh:mm:ss) 0 00:02:34

Subbasin : Sub-03

Rainfall Intensity Graph



Runoff Hydrograph



HYDROLOGY CALCULATIONS
PROPOSED CONDITION (Q_{100})

DRAFT

Project Description

File Name ..... 3rd & Broadway Proposed Storm Analysis.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Kinematic Wave
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ..... NO

Analysis Options

Start Analysis On	Apr 19, 2019	00:00:00
End Analysis On	Apr 20, 2019	00:00:00
Start Reporting On	Apr 19, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	3
Nodes.....	1
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links.....	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-01	Cumulative	inches	California	Orange (Irvine)	100	5.80	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	0.84	92.00	5.80	4.87	4.09	6.04	0 00:05:00
2	Sub-02	0.18	92.00	5.80	4.87	0.89	1.29	0 00:05:00
3	Sub-03	0.39	92.00	5.80	4.87	1.89	2.81	0 00:05:00

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ac) 0.84
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.84	-	92.00
Composite Area & Weighted CN	0.84		92.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	0.76	0.00	0.00
Computed Flow Time (min) :	2.18	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	176	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0.00	0.00
Computed Flow Time (min) :	1.44	0.00	0.00

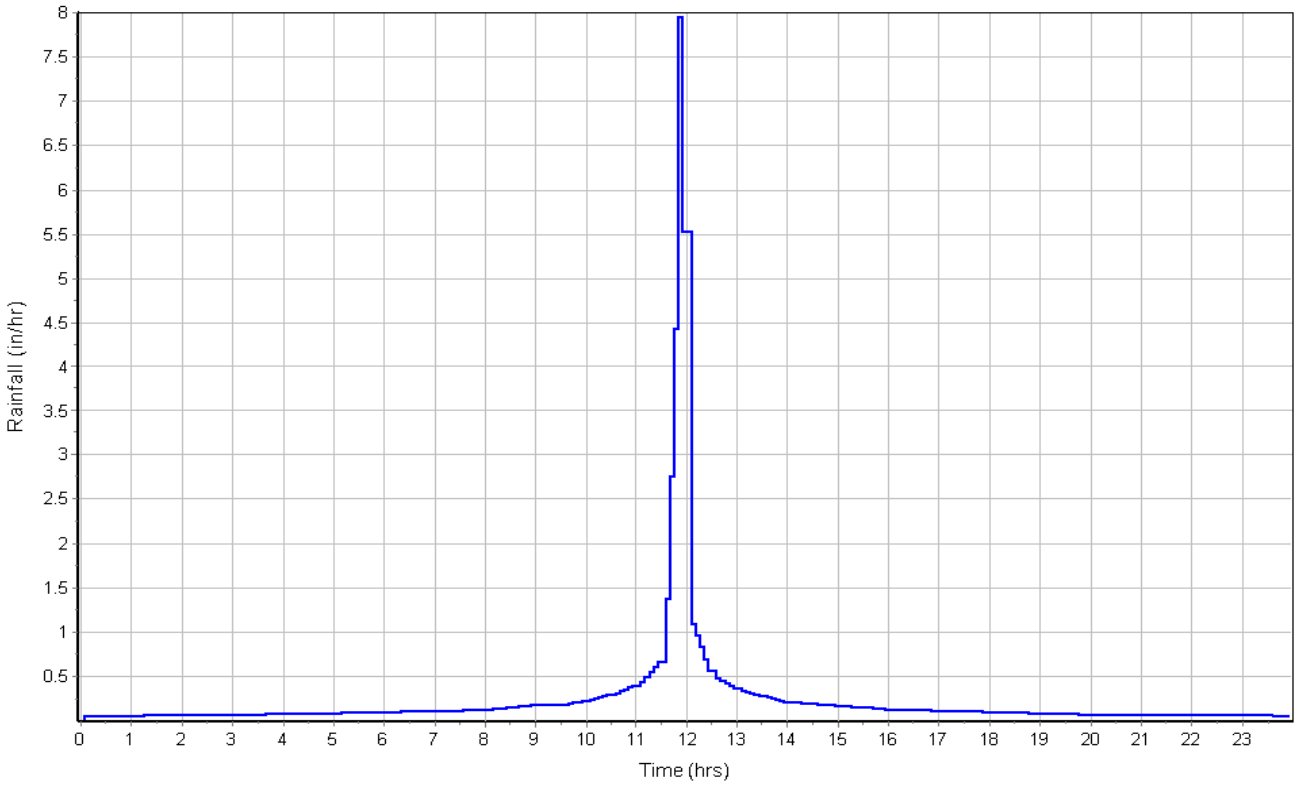
Total TOC (min) 3.62

Subbasin Runoff Results

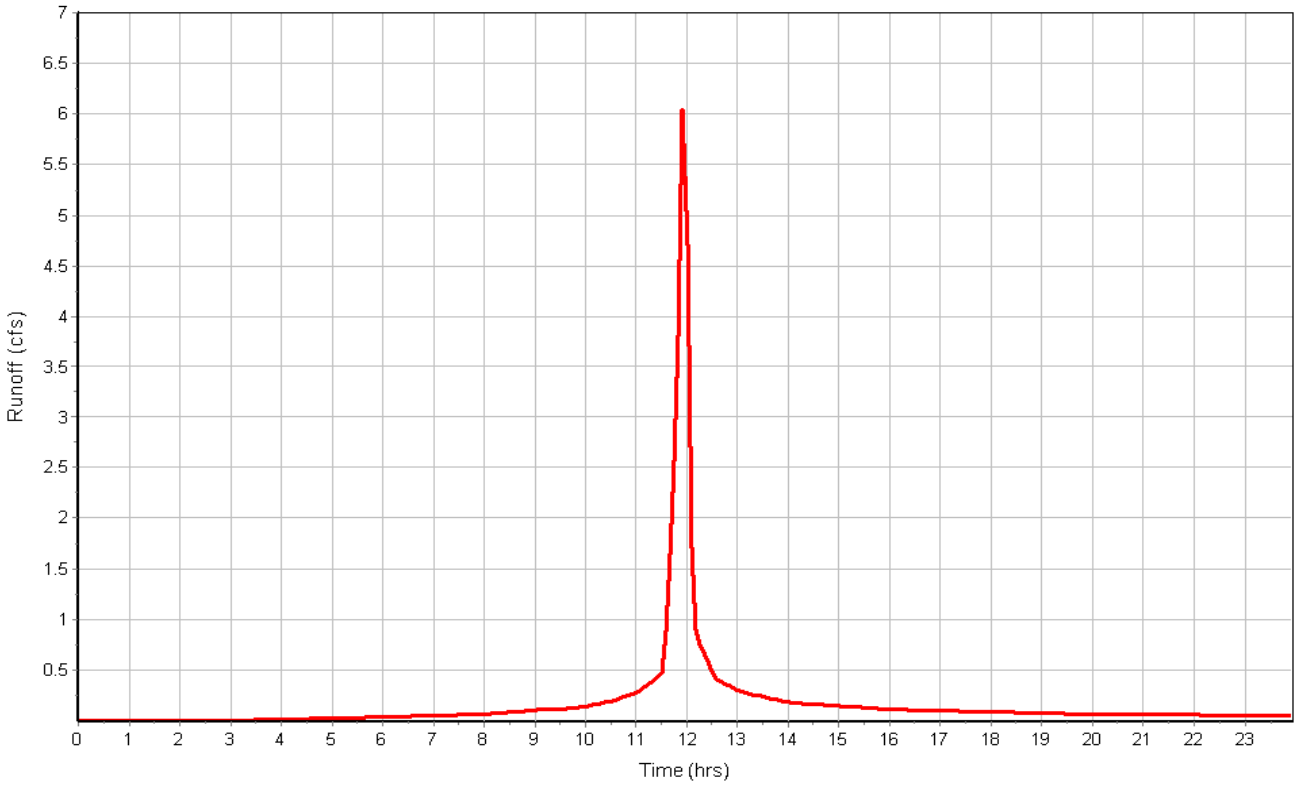
Total Rainfall (in)	5.80
Total Runoff (in)	4.87
Peak Runoff (cfs)	6.04
Weighted Curve Number	92.00
Time of Concentration (days hh:mm:ss)	0 00:03:37

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-02

Input Data

Area (ac) 0.18
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.18	-	92.00
Composite Area & Weighted CN	0.18		92.00

Time of Concentration

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	0.62	0.00	0.00
Computed Flow Time (min) :	2.67	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	34	0.00	0.00
Slope (%) :	.6	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.57	0.00	0.00
Computed Flow Time (min) :	0.36	0.00	0.00

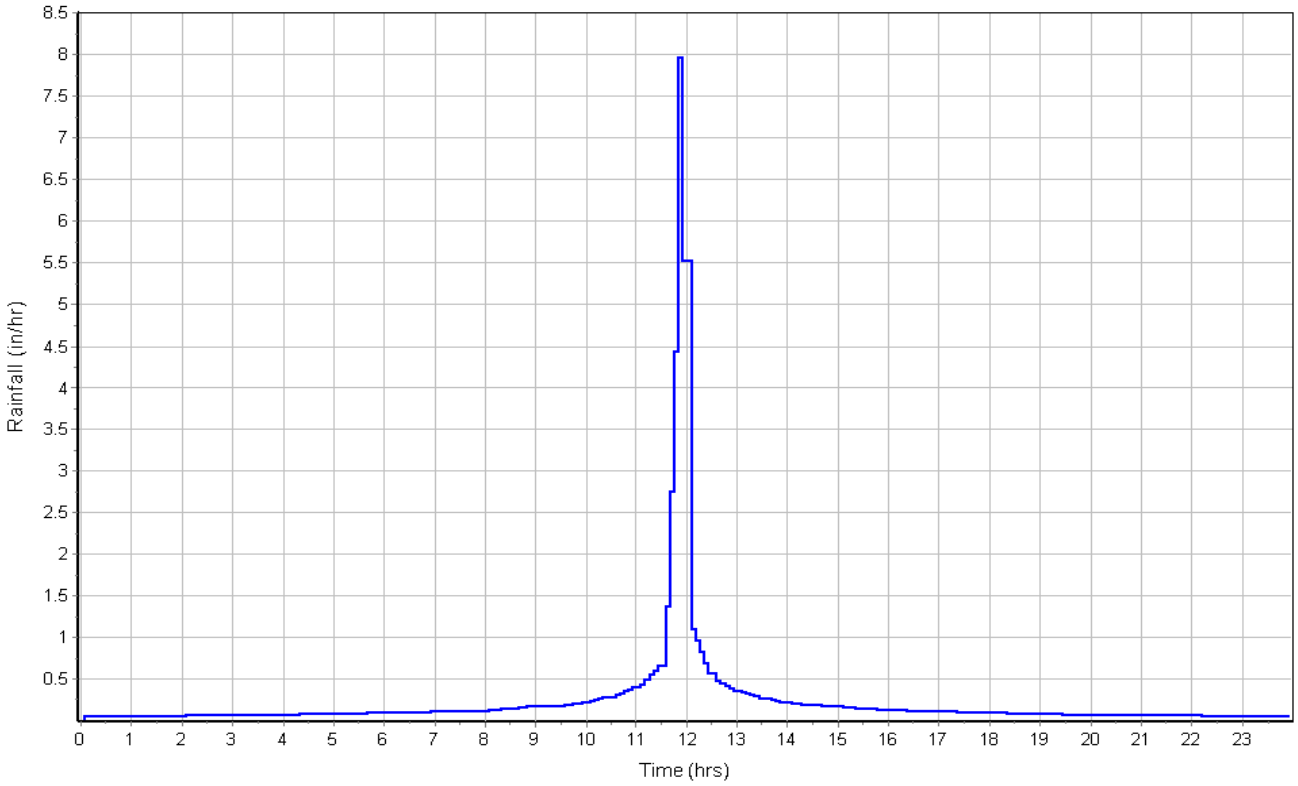
Total TOC (min) 3.03

Subbasin Runoff Results

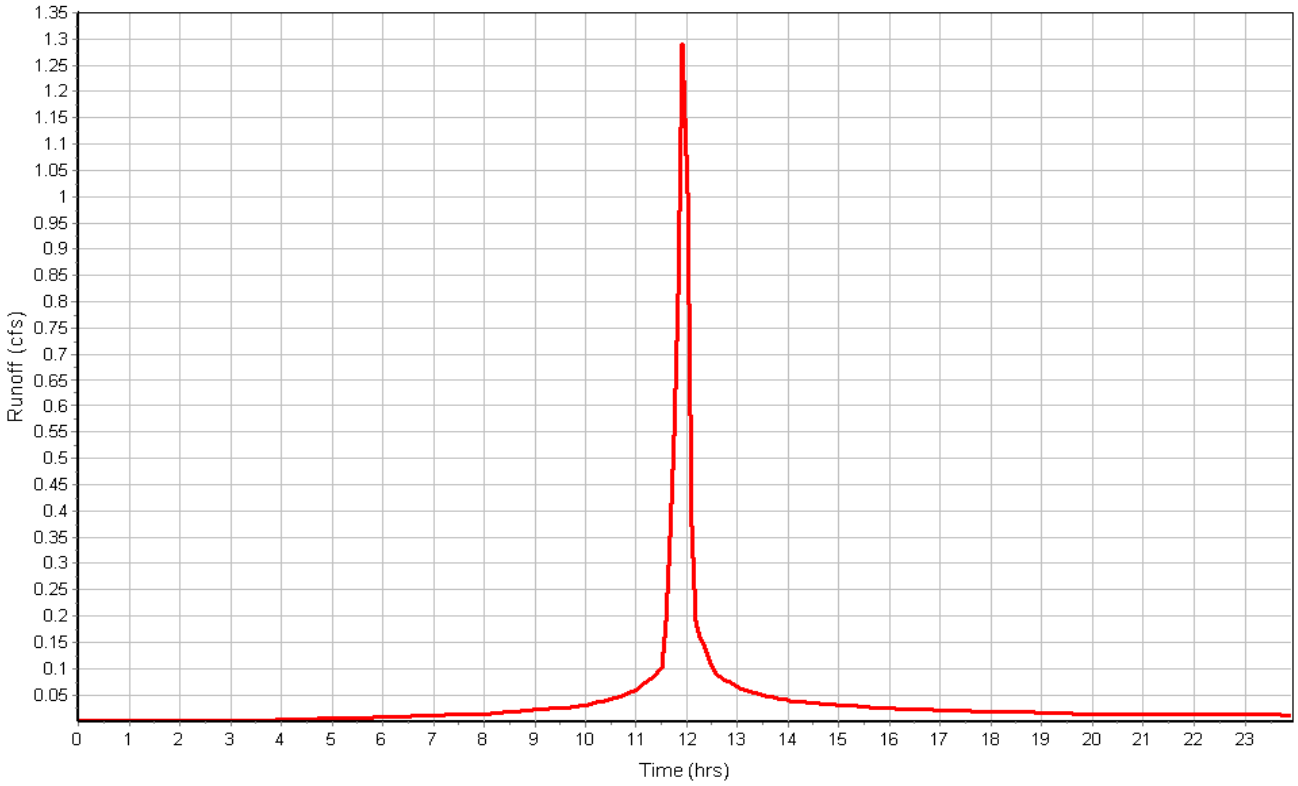
Total Rainfall (in) 5.80
Total Runoff (in) 4.87
Peak Runoff (cfs) 1.29
Weighted Curve Number 92.00
Time of Concentration (days hh:mm:ss) 0 00:03:02

Subbasin : Sub-02

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-03

Input Data

Area (ac) 0.39
Weighted Curve Number 92.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.39	-	92.00
Composite Area & Weighted CN	0.39		92.00

Time of Concentration

Sheet Flow Computations	Flowpath A	Flowpath B	Flowpath C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.25	0.00	0.00
Velocity (ft/sec) :	0.76	0.00	0.00
Computed Flow Time (min) :	2.18	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath A	Flowpath B	Flowpath C
Flow Length (ft) :	48	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0.00	0.00
Computed Flow Time (min) :	0.39	0.00	0.00

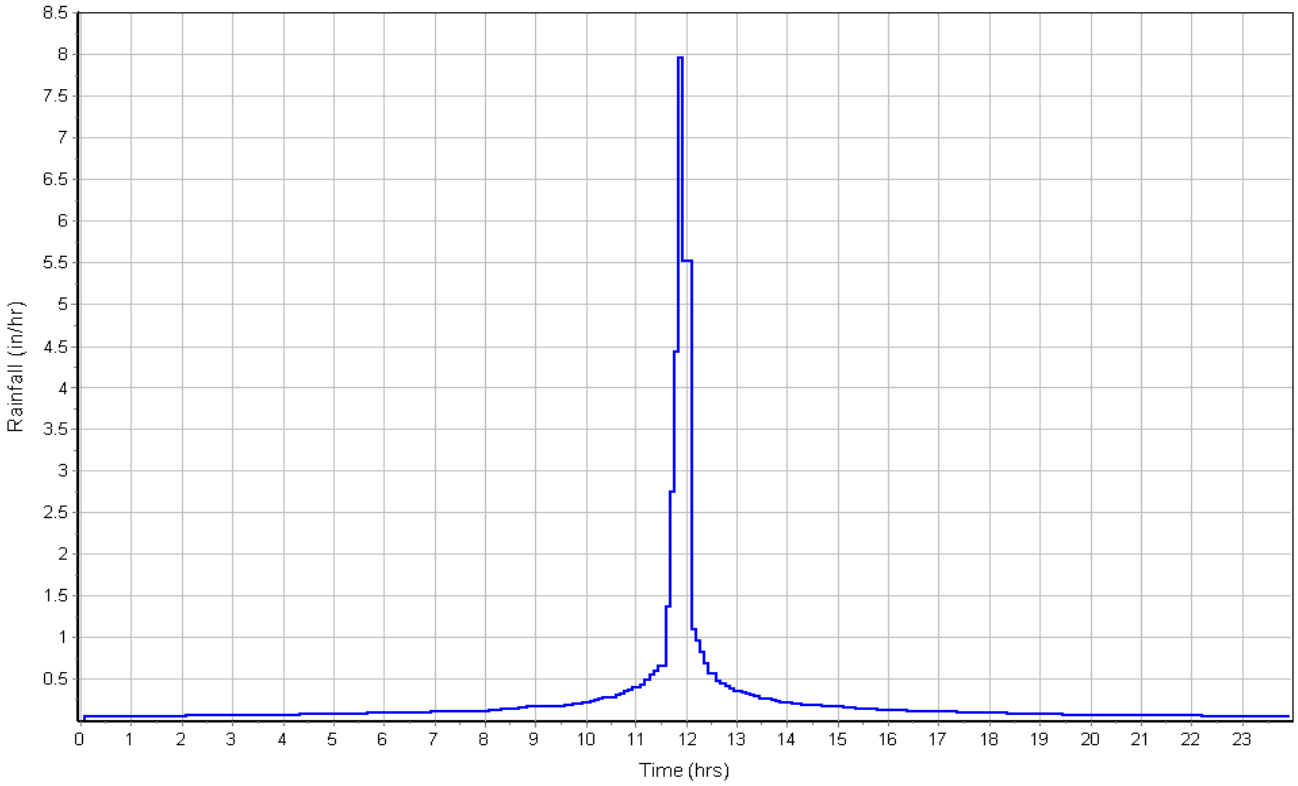
Total TOC (min) 2.57

Subbasin Runoff Results

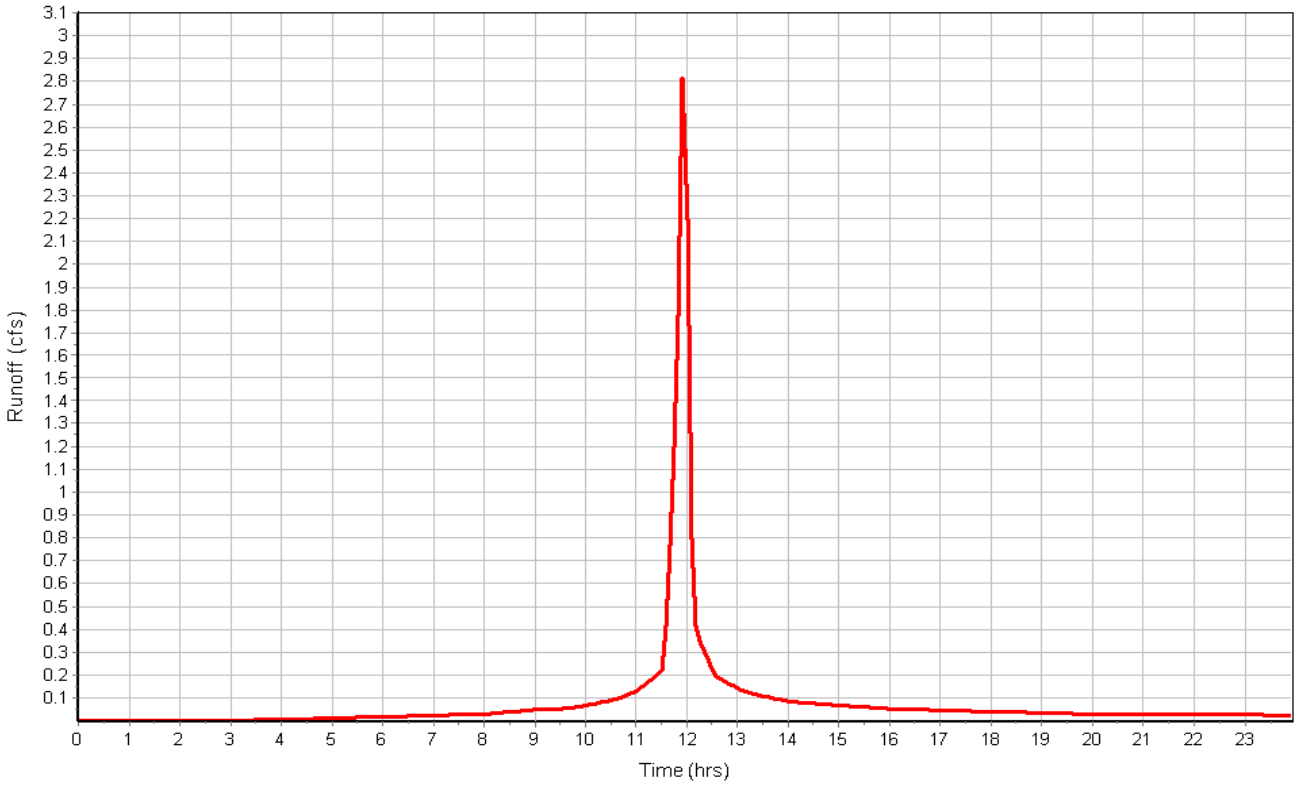
Total Rainfall (in) 5.80
Total Runoff (in) 4.87
Peak Runoff (cfs) 2.81
Weighted Curve Number 92.00
Time of Concentration (days hh:mm:ss) 0 00:02:34

Subbasin : Sub-03

Rainfall Intensity Graph



Runoff Hydrograph



HYDRAULICS CALCULATIONS

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Discharge Capacity of 18" RCP

Diameter of Pipe	D	1.50 ft	
Cross-Sectional Area	$A = \frac{\pi D^2}{4}$	1.77 ft^2	
Wetted Perimeter	$P = \pi D$	4.71 ft	
Hydraulic Radius	$R = \frac{D}{4}$	0.38 ft	
Slope	S	0.0050	
Manning's Roughness Coefficient	n	0.013	
Discharge Capacity	$Q_c = \frac{1.49}{n} AR^{2/3} S^{1/2}$	7.42 cfs	**OK**
25-Year Storm Flow	Q_{25}	7.24 cfs	
100-Year Storm Flow	Q_{100}	N/A	
Depth of Flow	d	1.46 ft	
	$\left(\sqrt{\frac{d}{D}}\right)$	0.9878	
	$\sin^{-1}\left(\sqrt{\frac{d}{D}}\right)$	81.05 degs.	
	$\theta = 4\sin^{-1}\left(\sqrt{\frac{d}{D}}\right)$	324.20 degs.	
	$\sin\theta$	-0.5749	
	$A_f = \frac{D^2}{8}\left(\frac{\pi\theta}{180} - \sin\theta\right)$	1.75 ft^2	
Flow Velocity	$v_f = \frac{Q_{10}}{A_f}$	4.13 ft/s	

Discharge Capacity of 24" RCP

Diameter of Pipe	D	2.00 ft	
Cross-Sectional Area	$A = \frac{\pi D^2}{4}$	3.14 ft^2	
Wetted Perimeter	$P = \pi D$	6.28 ft	
Hydraulic Radius	$R = \frac{D}{4}$	0.50 ft	
Slope	S	0.0050	
Manning's Roughness Coefficient	n	0.013	
Discharge Capacity	$Q_c = \frac{1.49}{n} AR^{2/3} S^{1/2}$	15.99 cfs	**OK**
25-Year Storm Flow	Q_{25}	7.24 cfs	
100-Year Storm Flow	Q_{100}	N/A	
Depth of Flow	d	0.91 ft	
	$\left(\sqrt{\frac{d}{D}}\right)$	0.6728	
	$\sin^{-1}\left(\sqrt{\frac{d}{D}}\right)$	42.28 degs.	
	$\theta = 4\sin^{-1}\left(\sqrt{\frac{d}{D}}\right)$	169.13 degs.	
	$\sin\theta$	-0.4900	
	$A_f = \frac{D^2}{8}\left(\frac{\pi\theta}{180} - \sin\theta\right)$	1.72 ft^2	
Flow Velocity	$v_f = \frac{Q_{10}}{A_f}$	4.21 ft/s	

WQ XX-XXXX

CONCEPTUAL
County of Orange / Santa Ana Region Priority Project Water Quality Management Plan (WQMP)

Project Name:

3rd & Broadway Santa Ana, CA

201 W. 3RD STREET

SANTA ANA, CA 92701

APN# 398-264-13

Prepared for:

Mike Harrah
Caribou Industries
1103 North Broadway
Santa Ana, CA 92701
(714) 543-9972

Prepared by:

Derek J. McGregor, PE, PLS
DMc Engineering
18 Technology Drive, Suite 100
Irvine, CA 92618
(949) 753-9393

May 20, 2019

JN: 1262-02

DRAFT

Project Owner's Certification			
Planning Application No. (If applicable)		Grading Permit No.	
Tract/Parcel Map and Lot(s) No.		Building Permit No.	
Address of Project Site and APN (If no address, specify Tract/Parcel Map and Lot Numbers)			201 W. 3rd Street Santa Ana CA 92701 APN # 398-264-13

This Water Quality Management Plan (WQMP) has been prepared for Caribou Industries by DMc Engineering. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan , including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner:			
Title	Mike Harrah, President		
Company	Caribou Industries		
Address	1103 North Broadway, Santa Ana CA 92701		
Email	mfh@caribouind.com		
Telephone #	(714) 543-9972		
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature		Date	

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Preparer (Engineer):			
Title	Derek J. McGregor, Principal	PE Registration #	38483
Company	DMc Engineering		
Address	18 Technology Drive, Suite 100, Irvine, CA 92618		
Email	dmcgregor@dmceng.com		
Telephone #	(949) 753-9393		

I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R8-2009-0030/NPDES No. CAS618030, of the Santa Ana Regional Water Quality Control Board.

Preparer Signature		Date	
Place Stamp Here			

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Attachments

Attachment A. ..... Educational Materials

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Section I Permit(s) and Water Quality Conditions of Approval or Issuance

Provide discretionary or grading/building permit information and water quality conditions of approval, or permit issuance, applied to the project. If conditions are unknown, please request applicable conditions from staff. *Refer to Section 2.1 in the Technical Guidance Document (TGD) available on the OC Planning website (ocplanning.net).*

Project Infomation			
Permit/Application No. (If applicable)		Grading or Building Permit No. (If applicable)	
Address of Project Site (or Tract Map and Lot Number if no address) and APN	201 W. 3rd Street Santa Ana CA 92701 APN # 398-264-13		
Water Quality Conditions of Approval or Issuance			
Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim.)	N/A		
Conceptual WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	This is the conceptual WQMP		
Watershed-Based Plan Conditions			

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Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	N/A

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Section II Project Description

II.1 Project Description

Provide a detailed project description including:

- Project areas;
- Land uses;
- Land cover;
- Design elements;
- A general description not broken down by drainage management areas (DMAs).

Include attributes relevant to determining applicable source controls. *Refer to Section 2.2 in the Technical Guidance Document (TGD) for information that must be included in the project description.*

Description of Proposed Project				
Development Category (From Model WQMP, Table 7.11-2; or -3):	Priority Project			
Project Area (ft²): 56,710	Number of Dwelling Units: 164 Residential and 75 Hotel Rooms		SIC Code: _____	
Project Area	Pervious		Impervious	
	Area (acres or sq ft)	Percentage	Area (acres or sq ft)	Percentage
Pre-Project Conditions	65,404	100%		
Post-Project Conditions	56,710	95%	2,883	5%
Drainage Patterns/Connections	Currently the site is fully developed, and all stormwater is collected via roof and area drains and directed offsite using subsurface storm drain lines. After development the same drainage plan will be utilized, the entire site will be collected via roof and area drains and discharged offsite using subsurface storm drain lines.			

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Narrative Project Description: (Use as much space as necessary.)	The 3rd & Broadway project is a proposed multi-use development project in Santa Ana California. This project will redevelop an existing 3 story city parking structure into two properties, a 35,782 SF mixed-use residential structure that houses 164 DU, 403 parking spaces, 15,320 SF of retail space and a 20,928 SF hotel with 75 rooms and 75 parking spaces.

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II.2 Potential Stormwater Pollutants

Determine and list expected stormwater pollutants based on land uses and site activities. *Refer to Section 2.2.2 and Table 2.1 in the Technical Guidance Document (TGD) for guidance.*

Pollutants of Concern			
Pollutant	Check One for each: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	E ☒	N ☐	
Nutrients	E ☒	N ☐	
Heavy Metals	E ☐	N ☒	
Pathogens (Bacteria/Virus)	E ☒	N ☐	
Pesticides	E ☐	N ☒	
Oil and Grease	E ☒	N ☐	
Toxic Organic Compounds	E ☐	N ☒	
Trash and Debris	E ☒	N ☐	

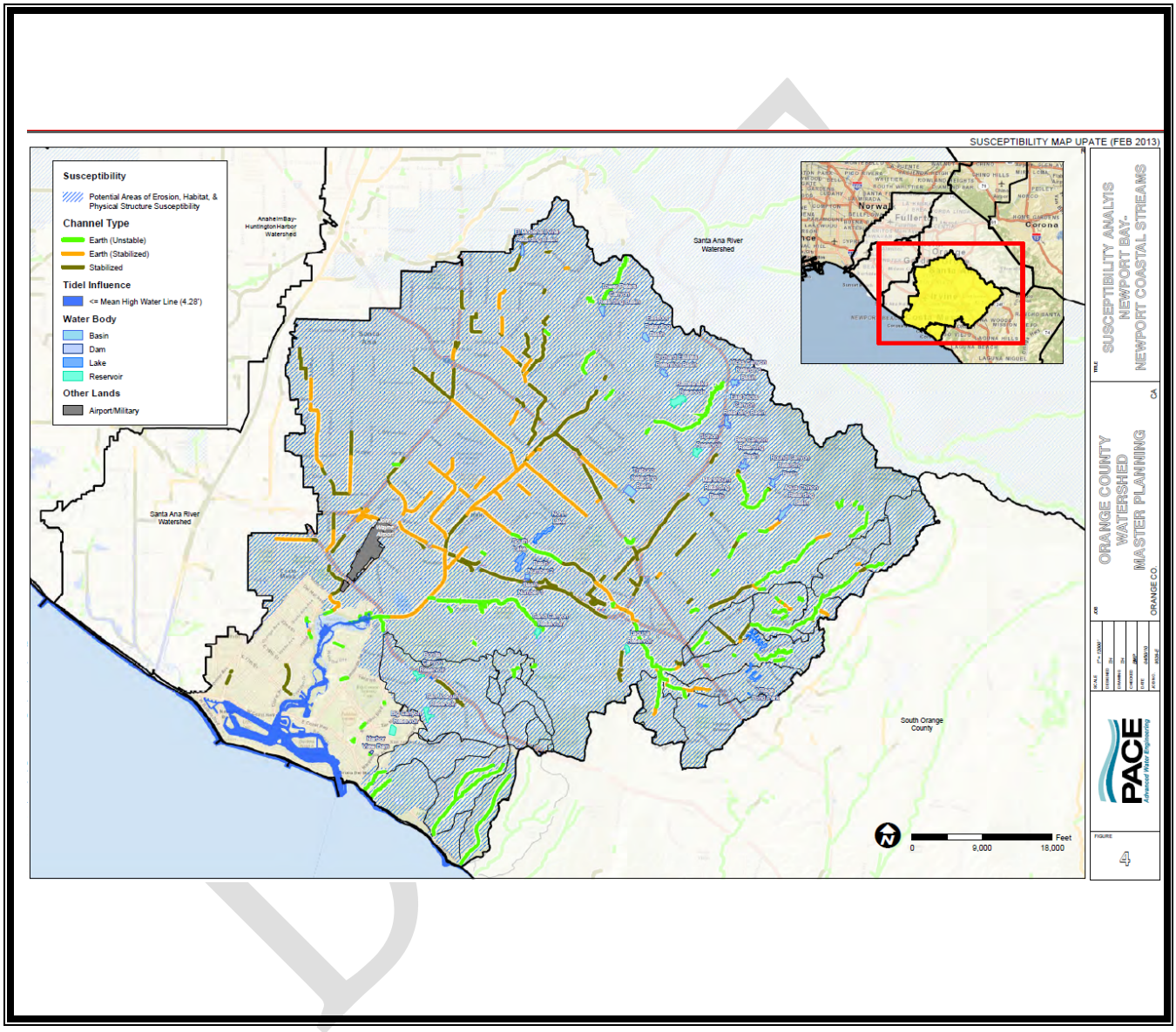
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II.3 Hydrologic Conditions of Concern

Determine if streams located downstream from the project area are potentially susceptible to hydromodification impacts. *Refer to Section 2.2.3.1 in the Technical Guidance Document (TGD) for North Orange County or Section 2.2.3.2 for South Orange County.*

☒ No – Show map

☐ Yes – Describe applicable hydrologic conditions of concern below. *Refer to Section 2.2.3 in the Technical Guidance Document (TGD).*



II.4 Post Development Drainage Characteristics

Describe post development drainage characteristics. *Refer to Section 2.2.4 in the Technical Guidance Document (TGD).*

The proposed site will collect the stormwater runoff via roof drains and inlets. Once collected the runoff will then be conveyed via gutters, downspouts and drain lines to a sub-surface drainage system (mimicking the existing condition) before ultimately being discharged offsite to the existing storm drain line located in 3rd Street.

II.5 Property Ownership/Management

Describe property ownership/management. *Refer to Section 2.2.5 in the Technical Guidance Document (TGD).*

This property is owned by:

Caribou Industries

1103 North Broadway

Santa Ana California 92701

Phone: (714)543-9484

Company Contact: Mike Harrah (mfh@caribouind.com)

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Section III Site Description

III.1 Physical Setting

Fill out table with relevant information. *Refer to Section 2.3.1 in the Technical Guidance Document (TGD).*

Name of Planned Community/Planning Area (if applicable)	3rd & Broadway
Location/Address	201 W. 3rd Street
	Santa Ana CA 92701
General Plan Land Use Designation	District Center (DC)
Zoning	Transit Zoning Code, Downtown (DT) Subzone
Acreage of Project Site	1.41 acres
Predominant Soil Type	Type B

III.2 Site Characteristics

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.2 in the Technical Guidance Document (TGD).*

Site Characteristics	
Precipitation Zone	P85 = .75" (See map Attachment A)
Topography	Fully Developed Parcel
Drainage Patterns/Connections	Onsite sheet flow collected by inlets and conveyed via gutters to a subsurface storm drain system
Soil Type, Geology, and Infiltration Properties	Type B soil

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Hydrogeologic (Groundwater) Conditions	N/A
Geotechnical Conditions (relevant to infiltration)	N/A
Off-Site Drainage	N/A
Utility and Infrastructure Information	3rd Street has an existing 21" Storm drain that the property laterals connect to

III.3 Watershed Description

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.3 in the Technical Guidance Document (TGD).*

Receiving Waters	Upper Newport Bay (Ecological Reserve)
303(d) Listed Impairments	Toxicity, Other Organics
Applicable TMDLs	Bacteria/Pathogens (implementation Phase), Metals, Nutrients (implementation Phase), Pesticides, Turbidity/Siltation (implementation Phase)
Pollutants of Concern for the Project	Suspended Solids, Nutrients, Heavy Metals, Oil & Grease, Toxic Organic Compounds, Trash & Debris
Environmentally Sensitive and Special Biological Significant Areas	Upper Newport Bay (Ecological Reserve) is listed on the 2010 303D list as an impaired water body

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Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

Describe project performance criteria. Several steps must be followed in order to determine what performance criteria will apply to a project. These steps include:

- If the project has an approved WIHMP or equivalent, then any watershed specific criteria must be used and the project can evaluate participation in the approved regional or sub-regional opportunities. (Please ask your assigned planner or plan checker regarding whether your project is part of an approved WIHMP or equivalent.)
- Determine applicable hydromodification control performance criteria. *Refer to Section 7.II-2.4.2.2 of the Model WQMP.*
- Determine applicable LID performance criteria. *Refer to Section 7.II-2.4.3 of the Model WQMP.*
- Determine applicable treatment control BMP performance criteria. *Refer to Section 7.II-*3.2.2 *of the Model WQMP.*
- Calculate the LID design storm capture volume for the project. *Refer to Section 7.II-2.4.3 of the Model WQMP.*

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?	YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.	N/A	

Project Performance Criteria

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If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	N/A
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspiration) stormwater runoff as feasible up to the Design Capture Volume
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	If it is not feasible to meet LID performance criteria by providing retention and/or biotreatment on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US
Calculate LID design storm capture volume for Project.	V=C x d x A x 43560 sf/ac x 1/12 in/ft C= (.9 x .75 + .15) = 0.825; d=.75"; A_1=0.91 ac, A_2=0.48 ac V_1=0.825 x .75 x 0.91 x 43560 x 1/12 = **2,043.92 cu-ft** V_2=0.825 x .75 x 0.48 x 43560 x 1/12 = **1,078.11 cu-ft**

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IV.2. Site Design and Drainage

Describe site design and drainage including

- A narrative of site design practices utilized or rationale for not using practices;
- A narrative of how site is designed to allow BMPs to be incorporated to the MEP
- A table of DMA characteristics and list of LID BMPs proposed in each DMA.
- Reference to the WQMP "BMP Exhibit."
- Calculation of Design Capture Volume (DCV) for each drainage area.
- A listing of GIS coordinates for LID and Treatment Control BMPs.

Refer to Section 2.4.2 in the Technical Guidance Document (TGD).

The design capture volume will receive a treatment train approach to LID and BMPs. The collected stormwater runoff receives initial pretreatment from onsite Bioretention BMPs with underdrains (downspout planter box and/or rain gardens) in combination with pretreatment BMPs (inlet filter inserts) before entering an onsite storm drain system. Next the stormwater runoff receives additional treatment from treatment control BMPs (cartridge media filter) before being stored in an underground detention basin (rainwater harvesting BMP) and ultimately discharged offsite. Multiple hydrologic source BMPs (HSCs) will be used in addition to the treatment train noted above. The sub-surface detention tanks are sized to hold the entire design capture volumes of 2,044 ft^3 & 1,078 ft^3. Drainage areas and BMPs are depicted on the attached BMP Exhibit (Section IV pg. 24).

IV.3 LID BMP Selection and Project Conformance Analysis

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Each sub-section below documents that the proposed design features conform to the applicable project performance criteria via check boxes, tables, calculations, narratives, and/or references to worksheets. *Refer to Section 2.4.2.3 in the Technical Guidance Document (TGD) for selecting LID BMPs and Section 2.4.3 in the Technical Guidance Document (TGD) for conducting conformance analysis with project performance criteria.*

IV.3.1 Hydrologic Source Controls (HSCs)

If required HSCs are included, fill out applicable check box forms. If the retention criteria are otherwise met with other LID BMPs, include a statement indicating HSCs not required.

Name	Included?
Localized on-lot infiltration	☐
Impervious area dispersion (e.g. roof top disconnection)	☒
Street trees (canopy interception)	☒
Residential rain barrels (not actively managed)	☐
Green roofs/Brown roofs	☐
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐

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IV.3.2 Infiltration BMPs

Identify infiltration BMPs to be used in project. If design volume cannot be met, state why.

Name	Included?
Bioretention without underdrains	☐
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☐
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☐
Drywells	☐
Subsurface infiltration galleries	☐
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐
Other:	☐
Other:	☐

Show calculations below to demonstrate if the LID Design Strom Capture Volume can be met with infiltration BMPs. If not, document how much can be met with infiltration and document why it is not feasible to meet the full volume with infiltration BMPs.

Infiltration BMPs will not be used on-site out of concern with the impact that they would pose to the building foundation during this lot line to lot line infill redevelopment project. Another concern is the historical neighboring buildings and the impact infiltration would have on these properties.

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IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, describe any evapotranspiration and/or rainwater harvesting BMPs included.

Name	Included?
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
Above-ground cisterns and basins	☐
Underground detention	☒
Other:	☐
Other:	☐
Other:	☐

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with evapotranspiration and/or rainwater harvesting BMPs in combination with infiltration BMPs. If not, document below how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with these BMP categories.

Infiltration BMPs will not be utilized onsite due to the impact they would cause on the structural footing of the proposed buildings. As an alternative, the design capture volumes will receive a treatment train approach to LID and BMPs. The collected stormwater runoff receives initial pretreatment from onsite Bioretention BMPs with underdrains (downspout planter box and/or rain gardens) in combination with pretreatment BMPs (inlet filter inserts) before entering an onsite storm drain system. Next the stormwater runoff receives additional treatment from a treatment control BMP (cartridge media filter) before being stored in an underground detention basin (rainwater harvesting BMP) and ultimately discharged offsite.

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IV.3.4 Biotreatment BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, and/or evapotranspiration and rainwater harvesting BMPs, describe biotreatment BMPs included. Include sections for selection, suitability, sizing, and infeasibility, as applicable.

Name	Included?
Bioretention with underdrains	☒
Stormwater planter boxes with underdrains	☒
Rain gardens with underdrains	☒
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☐
Wet extended detention basin	☐
Dry extended detention basins	☐
Other:	☐
Other:	☐

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with infiltration, evapotranspiration, rainwater harvesting and/or biotreatment BMPs. If not, document how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with these BMP categories.

Biotreatment BMPs will be utilized onsite but will not treat the entire DCV. As an alternative, the entire design capture volume will receive a treatment train approach to LID and BMPs. The collected stormwater runoff receives initial pretreatment from onsite Bioretention BMPs with underdrains (downspout planter box and/or rain gardens) in combination with pretreatment BMPs (inlet filter inserts) before entering an onsite storm drain system. Next the stormwater runoff receives additional treatment from a treatment control BMP (cartridge media filter) before being stored in an underground detention basin (rainwater harvesting BMP) and ultimately discharged offsite.

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IV.3.5 Hydromodification Control BMPs

Describe hydromodification control BMPs. *See Section 5 of the Technical Guidance Document (TGD).* Include sections for selection, suitability, sizing, and infeasibility, as applicable. Detail compliance with Prior Conditions of Approval (if applicable).

Hydromodification Control BMPs	
BMP Name	**BMP Description**
N/A	

IV.3.6 Regional/Sub-Regional LID BMPs

Describe regional/sub-regional LID BMPs in which the project will participate. *Refer to Section 7.II-2.4.3.2 of the Model WQMP*.

Regional/Sub-Regional LID BMPs
No regional/sub-regional BMPs will be utilized by this project

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs. Describe treatment control BMPs including sections for selection, sizing, and infeasibility, as applicable.

Treatment Control BMPs	
BMP Name	**BMP Description**
TRT-2: Cartridge Media Filter	A media filter will be utilized for each DMA onsite to treat detained water prior to leaving the project site: **Q_1 = (.9*.75+.15)(.75)(0.91)= 0.56 cfs** **Q_2 = (.9*.75+.15)(.75)(0.48)= 0.30 cfs**

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IV.3.8 Non-structural Source Control BMPs

Fill out non-structural source control check box forms or provide a brief narrative explaining if non-structural source controls were not used.

Non-Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No recycled water used onsite
N6	Local Industrial Permit Compliance	☐	☒	No industrial sites present
N7	Spill Contingency Plan	☒	☐	
N8	Underground Storage Tank Compliance	☒	☐	
N9	Hazardous Materials Disclosure Compliance	☐	☒	No Hazardous Waste stored onsite
N10	Uniform Fire Code Implementation	☒	☐	
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☒	☐	
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No Gas Stations onsite

IV.3.9 Structural Source Control BMPs

Fill out structural source control check box forms or provide a brief narrative explaining if structural source controls were not used.

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Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☒	☐	
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☒	No slopes onsite
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	
S6	Dock areas	☐	☒	None onsite
S7	Maintenance bays	☐	☒	None onsite
S8	Vehicle wash areas	☐	☒	None onsite
S9	Outdoor processing areas	☐	☒	None onsite
S10	Equipment wash areas	☐	☒	None onsite
S11	Fueling areas	☐	☒	None onsite
S12	Hillside landscaping	☐	☒	None onsite
S13	Wash water control for food preparation areas	☒	☐	
S14	Community car wash racks	☐	☒	No carwash onsite

IV.4 Alternative Compliance Plan (If Applicable)

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the WQMP.*

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IV.4.1 Water Quality Credits

Determine if water quality credits are applicable for the project. *Refer to Section 3.1 of the Model WQMP for description of credits and Appendix VI of the Technical Guidance Document (TGD) for calculation methods for applying water quality credits.*

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td colspan="5">Project Types that Qualify for Water Quality Credits (Select all that apply):</td></tr>
<tr><td colspan="2">☐Redevelopment projects that reduce the overall impervious footprint of the project site.</td><td colspan="2">☐Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.</td><td>☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).</td></tr>
<tr><td colspan="2">☒ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).</td><td colspan="2">☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned</td><td>☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).</td></tr>
<tr><td>☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.</td><td>☐ Developments in a city center area.</td><td>☐ Developments in historic districts or historic preservation areas.</td><td>☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.</td><td>☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.</td></tr>
<tr><td>Calculation of Water Quality Credits
(if applicable)</td><td colspan="4">N/A</td></tr>
</table>

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IV.4.2 Alternative Compliance Plan Information

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the Model WQMP.*

The design capture volume will receive a treatment train approach to LID and BMPs. The collected stormwater runoff receives initial pretreatment from onsite Bioretention BMPs with underdrains (downspout planter box and/or rain gardens) in combination with pretreatment BMPs (inlet filter inserts) before entering an onsite storm drain system. Next the stormwater runoff receives additional treatment from treatment control BMPs (cartridge media filter) before being stored in an underground detention basin (rainwater harvesting BMP) and ultimately discharged offsite. Multiple hydrologic source BMPs (HSCs) will be used in addition to the treatment train noted above.

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Section V Inspection/Maintenance Responsibility for BMPs

Fill out information in table below. Prepare and attach an Operation and Maintenance Plan. Identify the funding mechanism through which BMPs will be maintained. Inspection and maintenance records must be kept for a minimum of five years for inspection by the regulatory agencies. *Refer to Section 7.II 4.0 in the Model WQMP.*

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Pre-treatment BMP (inlet filter inserts)	Owner	Filter insert- Inspect and replace filter inserts as they become occluded	Quarterly and after each rain event
Rain Harvesting BMP (Detention Tank)	Owner	Open tank manhole and visually inspect tank for clogs, leaks and standing water	Quarterly and after each rain event
Treatment Control BMP (cartridge media filter)	Owner	Inspect system for leaks, clogs and ensure filters aren't occluded (replace as necessary)	Quarterly and after each rain event
Biotreatment BMP (Planter Box with underdrain & Rain Gardens with underdrains)	Owner	Inspect system for leaks, clogs and ensue vegetation is alive and healthy	Quarterly and after each rain event

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Section VI BMP Exhibit (Site Plan)

VI.1 BMP Exhibit (Site Plan)

Include a BMP Exhibit (Site Plan), at a size no less than 24" by 36," which includes the following minimum information:

- Insert in the title block (lower right hand corner) of BMP Exhibit: the WQMP Number (assigned by staff) and the grading/building or Planning Application permit numbers
- Project location (address, tract/lot number(s), etc.)
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural BMP locations
- Drainage delineations and flow information
- Delineate the area being treated by each structural BMP
- GIS coordinates for LID and Treatment Control BMPs
- Drainage connections
- BMP details
- Preparer name and stamp

Please do not include any areas outside of the project area or any information not related to drainage or water quality. The approved BMP Exhibit (Site Plan) shall be submitted as a plan sheet on all grading and building plan sets submitted for plan check review and approval. The BMP Exhibit shall be at the same size as the rest of the plan sheets in the submittal and shall have an approval stamp and signature prior to plan check submittal.

VI.2 Submittal and Recordation of Water Quality Management Plan

Following approval of the Final Project-Specific WQMP, three copies of the approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be submitted. In addition, these documents shall be submitted in a PDF format.

Each approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be recorded in the Orange County Clerk-Recorder's Office, prior to close-out of grading and/or building permit. Educational Materials are not required to be included.

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WQMP SITE PLAN

LEGEND:

- LOT BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARIES
- DIRECTION OF SURFACE FLOW
- ROOF DRAINS
- STORM DRAIN SYSTEM
- DMA / 0.26 AC — INDICATES DRAINAGE MANAGEMENT AREA; INDICATES ACREAGE
- TA-1 / 0.01 AC — INDICATES BMP DESIGNATION; INDICATES-TRIBUTARY AREA
- ROOF - IMPERVIOUS
- CONCRETE/ASPHALT - IMPERVIOUS
- BIORETENTION BMP - PERVIOUS WITH UNDERDRAIN
- POOLS - (RUNOFF COLLECTED BY OVERFLOW)

SITE CONSTRAINTS:

SITE HYDROLOGICAL SOILS CLASSIFICATION IS TYPE B PER COUNTY HYDROLOGY MANUAL.

DMA TREATMENT TABLE:

DMA BOUNDARY NUMBER	DMA BOUNDARY AREA (ACRES)	DMA WATER QUALITY TREATMENT BMP's
DMA – 1	0.84	TA – 1, 2, 3, 4
DMA – 2	0.18	TA & TB – 1, 2, 3, 4
DMA – 3	0.39	TB – 1, 2, 3, 4

BMP NOTES:

PRE–2	CATCH BASIN INSERT
BIO–1	BIORETENTION WITH UNDERDRAINS
HU–2	UNDERGROUND DETENTION
TRT–2	CARTRIDGE MEDIA FILTER

SYSTEM A:

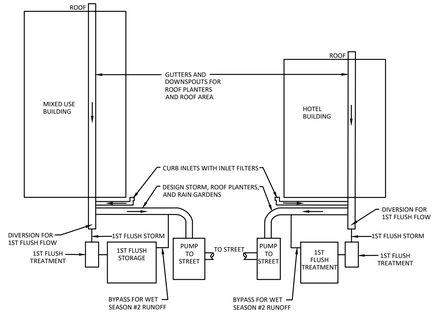
DESIGN CAPTURE VOLUME: $V_{TREAT} = (.9*.75+.15)(.75)(0.91)(43560)(1/12) = 2{,}044\ FT^3$

FLOW BASED TREATMENT: $Q_{TREAT} = (.9*.75+.15)(.75)(0.91) = 0.56\ CFS$

SYSTEM B:

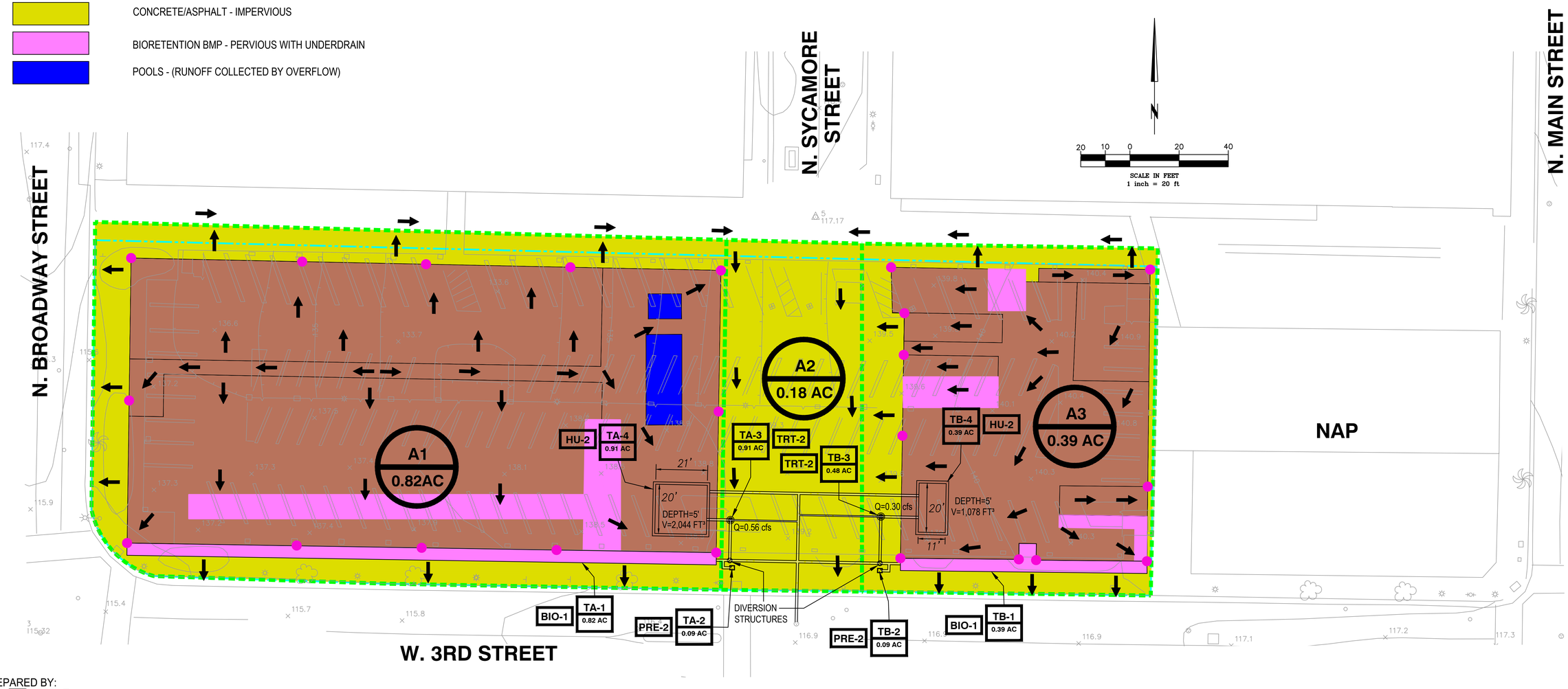
DESIGN CAPTURE VOLUME: $V_{TREAT} = (.9*.75+.15)(.75)(0.48)(43560)(1/12) = 1{,}078\ FT^3$

FLOW BASED TREATMENT: $Q_{TREAT} = (.9*.75+.15)(.75)(0.48) = 0.30\ CFS$



BMP DETAIL

SCALE: NTS



PREPARED BY:
DMc ENGINEERING
Tel: (949) 753-9393 ♦ Fax: (949) 753-9322
18 Technology Drive, Suite 100, Irvine, California 92618
E-Mail: dmc@dmceng.com ♦ www.dmceng.com

DATE
05–20–2019
05–17–2019
05–01–2019

FILE NO.:

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APPROVED	INSTALLED

REFERENCES

BENCHMARK NO.: ELEV.:

BENCHMARK DESCRIPTION

CONSTRUCTION COMPLETED:

PREPARED UNDER THE SUPERVISION OF:

RCE NO.:

DESIGNED: DJG DRAWN: DJG CHECKED: DJM

RECOMMENDED:

RECOMMENDED FOR CONSTRUCTION:

RCE NO.:

BMP EXHIBIT

3RD & BROADWAY

PUBLIC WORKS AGENCY

CITY OF SANTA ANA

Section VII Educational Materials

Refer to the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. Please only attach the educational materials specifically applicable to this project. Other materials specific to the project may be included as well and must be attached.

Education Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☒	Tips for the Food Service Industry	☒
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☒
Household Tips	☒	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☒		☐
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☐		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☐		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☐		☐
Tips for Pet Care	☐		☐
Tips for Pool Maintenance	☐		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☐		☐

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ATTACHMENT A

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XIV.1. Hydrologic Source Control Fact Sheets (HSC)

HSC-1: Localized On-Lot Infiltration

'Localized on-lot infiltration' refers to the practice of collecting on-site runoff from small distributed areas within a catchment and diverting it to a dedicated on-site infiltration area. This technique can include disconnecting downspouts and draining sidewalks and patios into french drains, trenches, small rain gardens, or other surface depressions. For downspout disconnections and other impervious area disconnection involving dispersion over pervious surfaces, but without intentional ponding, see HSC-2: Impervious Area Dispersion.

Also known as:

- *Downspout infiltration*
- *Retention grading*
- *French drains*
- *On-lot rain gardens*



On-lot rain garden
Source: lowimpactdevelopment.org

Feasibility Screening Considerations

- 'Localized on-lot infiltration' shall meet infiltration infeasibility screening criteria to be considered for use.

Opportunity Criteria

- Runoff can be directed to and temporarily pond in pervious area depressions, rock trenches, or similar.
- Soils are adequate for infiltration or can be amended to provide an adequate infiltration rate.
- Shallow utilities are not present below infiltration areas.

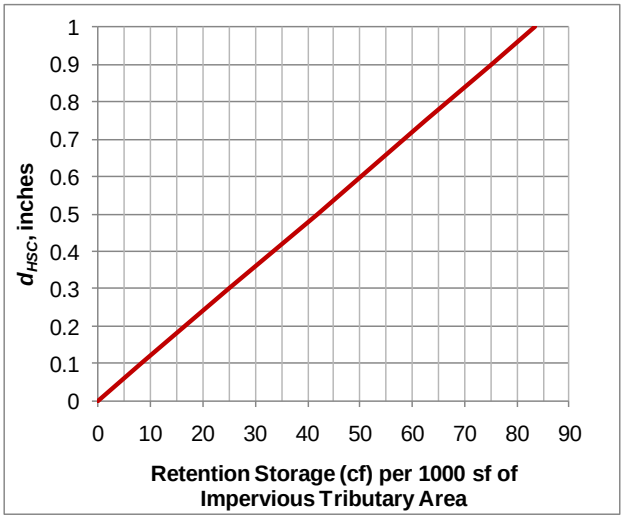
OC-Specific Design Criteria and Considerations

- ☐ A single on-lot infiltration area should not be sized to retain runoff from impervious areas greater than 4,000 sq. ft.; if the drainage area exceeds this criteria, sizing should be based on calculations for bioretention areas or infiltration trenches.
- ☐ Soils should be sufficiently permeable to eliminate ponded water within 24 hours following a 85th percentile, 24-hour storm event.
- ☐ Maximum ponding depth should be should be less than 3 inches and trench depth should be less than 1.5 feet.
- ☐ Infiltration should not be used when the depth to the mounded seasonally high table is within 5 feet of the bottom of infiltrating surface.
- ☐ Infiltration via depression storage, french drains, or rain gardens should be located greater than 8 feet from building foundations.
- ☐ Site slope should be less than 10%.
- ☐ Infiltration unit should not be located within 50 feet of slopes greater than 15 percent.
- ☐ Side slopes of rain garden or depression storage should not exceed 3H:1V.
- ☐ Effective energy dissipation and uniform flow spreading methods should be employed to prevent erosion resulting fromwater entering infiltration areas.

☐ Overflow should be located such that it does not cause erosion orand is conveyed away from structures toward the downstream conveyance and treatment system. .

Calculating HSC Retention Volume

- The retention volume provided by localized on-lot infiltration can be computed as the storage volume provided by surface ponding and the pore space within an amended soil layer or gravel trench.
- Estimate the average retention volume per 1000 square feet impervious tributary area provided by on-lot infiltration.
- Look up the storm retention depth, d_{HSC} from the chart to the right.
- The max d_{HSC} is equal to the design capture storm depth for the project site.



Configuration for Use in a Treatment Train

- Localized on-lot infiltration would typically serve as the first in a treatment train and should only be used where tributary areas do not generate significant sediment that would require pretreatment to mitigate clogging.
- The use of impervious area disconnection reduces the sizing requirement for downstream LID and/or conventional treatment control BMPs.

Additional References for Design Guidance

- LID Center – Rain Garden Design Template. http://www.lowimpactdevelopment.org/raingarden_design/
- University of Wisconsin Extension. Rain Gardens: A How-To Manual for Homeowners. http://learningstore.uwex.edu/assets/pdfs/GWQ037.pdf

HSC-2: Impervious Area Dispersion

Also known as:

- *Downspout disconnection*
- *Impervious area disconnection*
- *Sheet flow dispersion*

Impervious area dispersion refers to the practice of routing runoff from impervious areas, such as rooftops, walkways, and patios onto the surface of adjacent pervious areas. Runoff is dispersed uniformly via splash block or dispersion trench and soaks into the ground as it move slowly across the surface of pervious areas. Minor ponding may occur, but it is not the intent of this practice to actively promote localized on-lot storage (See HSC-1: Localized On-Lot Infiltration).



Simple Downspout Dispersion
Source: toronto.ca/environment/water.htm

Feasibility Screening Considerations

- Impervious area dispersion can be used where infiltration would otherwise be infeasible, however dispersion depth over landscaped areas should be limited by site-specific conditions to prevent standing water or geotechnical issues.

Opportunity Criteria

- Rooftops and other low traffic impervious surface present in drainage area.
- Soils are adequate for infiltration. If not, soils can be amended to improve capacity to absorb dispersed water (see MISC-2: Amended Soils).
- Significant pervious area present in drainage area with shallow slope
- Overflow from pervious area can be safely managed.

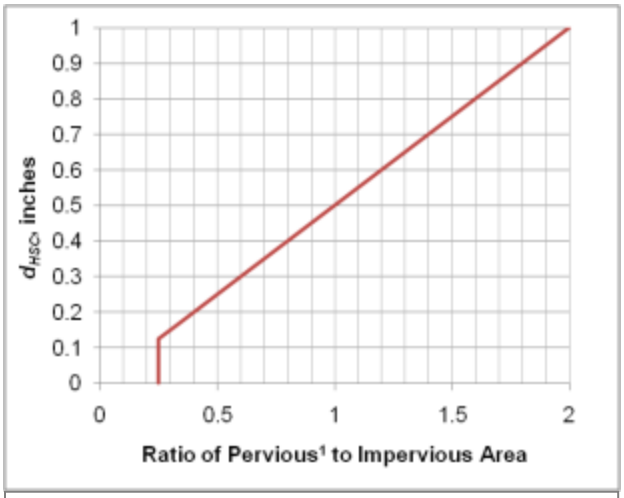
OC-Specific Design Criteria and Considerations

- ☐ Soils should be preserved from their natural condition or restored via soil amendments to meet minimum criteria described in Section .
- ☐ A minimum of 1 part pervious area capable of receiving flow should be provided for every 2 parts of impervious area disconnected.
- ☐ The pervious area receiving flow should have a slope ≤ 2 percent and path lengths of ≥ 20 feet per 1000 sf of impervious area.
- ☐ Dispersion areas should be maintained to remove trash and debris, loose vegetation, and protect any areas of bare soil from erosion.
- ☐ Velocity of dispersed flow should not be greater than 0.5 ft per second to avoid scour.

Calculating HSC Retention Volume

- The retention volume provided by downspout dispersion is a function of the ratio of impervious to pervious area and the condition of soils in the pervious area.
- Determine flow patterns in pervious area and estimate footprint of pervious area receiving dispersed flow. Calculate the ratio of pervious to impervious area.
- Check soil conditions using the soil condition design criteria below; amend if necessary.
- Look up the storm retention depth, d_{HSC} from the chart below.

- The max d_{HSC} is equal to the design storm depth for the project site.



[1] Pervious area used in calculation should only include the pervious area receiving flow, not pervious area receiving only direct rainfall or upslope pervious drainage.

Soil Condition Design Criteria

☐ Maximum slope of 2 percent

☐ Well-established lawn or landscaping

☐ Minimum soil amendments per criteria in MISC-2: Amended Soils.

Configuration for Use in a Treatment Train

- Impervious area disconnection is an HSC that may be used as the first element in any treatment train
- The use of impervious area disconnection reduces the sizing requirement for downstream LID and/or treatment control BMPs

Additional References for Design Guidance

- SMC LID Manual (pp 131) http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf
- City of Portland Bureau of Environmental Services. 2010. How to manage stormwater – Disconnect Downspouts. http://www.portlandonline.com/bes/index.cfm?c=43081&a=177702
- Seattle Public Utility: http://www.cityofseattle.org/util/stellent/groups/public/@spu/@usm/documents/webcontent/spu01_006395.pdf
- Thurston County, Washington State (pp 10): http://www.co.thurston.wa.us/stormwater/manual/docs-faqs/DG-5-Roof-Runoff-Control_Rev11Jan24.pdf

HSC-3: Street Trees

By intercepting rainfall, trees can provide several aesthetic and stormwater benefits including peak flow control, increased infiltration and ET, and runoff temperature reduction. The volume of precipitation intercepted by the canopy reduces the treatment volume required for downstream treatment BMPs. Shading reduces the heat island effect as well as the temperature of adjacent impervious surfaces, over which stormwater flows, and thus reduces the heat transferred to downstream receiving waters. Tree roots also strengthen the soil structure and provide infiltrative pathways, simultaneously reducing erosion potential and enhancing infiltration.

Also known as:

- *Canopy interception*



Street trees
Source: Geosyntec Consultants

Feasibility Screening Considerations

- Not applicable

Opportunity Criteria

- Street trees can be incorporated in green streets designs along sidewalks, streets, parking lots, or driveways.
- Street trees can be used in combination with bioretention systems along medians or in traffic calming bays.
- There must be sufficient space available to accommodate both the tree canopy and root system.

OC-Specific Design Criteria and Considerations

☐ Mature tree canopy, height, and root system should not interfere with subsurface utilities, suspended powerlines, buildings and foundations, or other existing or planned structures. Required setbacks should be adhered to.

☐ Depending on space constarints, a 20 to 30 foot diameter canopy (at maturity) is recommended for stormwater mitigation.

☐ Native, drought-tolerant species should be selected in order to minimize irrigation requirements and improve the long-term viability of trees.

☐ Trees should not impede pedstrian or vehicle sight lines.

☐ Planting locations should receive adequate sunlight and wind protection; other environmental factors should be considered prior to planting.

☐ Frequency and degree of vegetation management and maintenance should be considered with respect to owner capabilities (e.g., staffing, funding, etc.).

☐ Soils should be preserved in their natural condition (if appropriate for planting) or restored via soil amendments to meet minimum criteria described in MISC-2: Amended Soils. If necessary, a landscape architect or plant biologist should be consulted.

☐ A street tree selection guide, such as that specific to the City of Los Angeles, may need to be consulted to select species appropriate for the site design constraints (e.g., parkway size, tree height, canopy spread, etc.)

☐ Infiltration should not cause geotechnical hazards related to adjacent structures (buildings,

roadways, sidewalks, utilities, etc.)

Calculating HSC Retention Volume

- The retention volume provided by streets trees via canopy interception is dependent on the tree species, time of the year, and maturity.
- To compute the retention depth, the expected impervious area covered by the full tree canopy after 4 years of growth must be computed (IA_{HSC}). The maximum retention depth credit for canopy interception (d_{HSC}) is 0.05 inches over the area covered by the canopy at 4 years of growth.

Configuration for Use in a Treatment Train

- As a HSC, street trees would serve as the first step in a treatment train by reducing the treatment volume and flow rate of a downstream treatment BMP.

Additional References for Design Guidance

- California Stormwater BMP Handbook.
  http://www.cabmphandbooks.com/Documents/Development/Section_3.pdf
- City of Los Angeles, Street Tree Division - Street Tree Selection Guide.
  http://bss.lacity.org/UrbanForestryDivision/StreetTreeSelectionGuide.htm
- Portland Stormwater Management Manual.
  http://www.portlandonline.com/bes/index.cfm?c=35122&a=55791
- San Diego County – Low Impact Development Fact Sheets.
  http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

XIV.4. Harvest and Use BMP Fact Sheets (HU)

HU-1: Above-Ground Cisterns

Cisterns are large rain barrels. While rain barrels are less than 100 gallons, cisterns range from 100 to more than 10,000 gallons in capacity. Cisterns collect and temporarily store runoff from rooftops for later use as irrigation and/or other non-potable uses. The following components are generally required for installing and utilizing a cistern: (1) pipes that divert rooftop runoff to the cistern, (2) an overflow for when the cistern is full, (3) a pump, and (4) a distribution system to supply the intended end uses.



Above-Ground Cisterns
Source: Sunset Publishing Corporation

Feasibility screening consideration, opportunity criteria, design criteria, etc. for this BMP are listed below under HU-2: Underground Detention.

HU-2: Underground Detention

Underground detention facilities are subsurface tanks, vaults, or oversized pipes that store stormwater runoff. Similar to cisterns, underground detention facilities can store water for later use as irrigation and/or other non-potable uses.



Underground detention tank
Source: www.webtecgeos.com

Feasibility Screening Considerations

- The primary feasibility considerations for harvest and use systems for stormwater management is the presence of consistent and reliable demand that is sufficient to drain the systems relatively quickly between storms. **Appendix X** provides guidance for calculating harvested water demand.
- Use of harvested water should not conflict with applicable plumbing and health codes at the time of project application.

Opportunity Criteria

- Cisterns may collect rooftop runoff, and if located underground, may collect ground-level runoff.
- Cisterns may be installed in any type of land use provided space is available and adequate water demand exists.
- Stored water may supply non-potable water use demands such as irrigation and toilet flushing.
- Cisterns and underground detention facilities may also be used for peak flow control if active storage volume and hydraulic controls are provided above the retained storage or systems are operated with advanced controllers.

OC-Specific Design Criteria and Considerations for Above-Ground Cisterns

☐ Cistern systems should include prescreening in the form of screens on gutters and downspouts to remove vegetative debris and sediment from the runoff prior to entering the cistern.

- ☐ Above-ground cisterns should be secured in place and comply with applicable building codes.
- ☐ Above-ground cisterns should not be located on uneven or sloped surfaces; if installed on a sloped surface, the base where the cistern will be installed should be leveled and designed for the weight of the filled cistern prior to installation.
- ☐ Child-resistant covers and mosquito screens should be placed on all water entry holes.
- ☐ A first flush diverter may be installed so that initial runoff bypasses the cistern.
- ☐ Above-ground cisterns should be installed in a location with easy access for maintenance or replacement.
- ☐ Plumbing systems should be installed in accordance with the current California Building and Plumbing Codes (CBC – part of California Code of Regulations, Title 24).
- ☐ When a potable water supply line is connected to a cistern system to provide dry-season make-up water, cross-contamination should be prevented by providing a backflow prevention system on the potable water supply line and/or an air gap.
- ☐ In cases where there is non-potable indoor use demand, proper pretreatment measures should be installed such as pre-filtration, cartridge filtration, and/or disinfection.

OC-Specific Design Criteria and Considerations for Underground Cisterns/Detention Systems

- ☐ Access entry covers (36” diameter minimum) should be locking and within 50 feet of all areas of the detention tank.
- ☐ In cases where the detention facility provides sediment containment, the facility should be laid flat and there should be at least ½ foot of dead storage within the tank or vault.
- ☐ Outlet structures should be designed using the 100-year storm as overflow and should be easily accessible for maintenance activities.
- ☐ For detention facilities beneath roads and parking areas, structural requirements should meet H-20 load requirements.
- ☐ In cases where shallow groundwater may cause flotation, buoyant forces should be counteracted with backfill, anchors, or other measures.
- ☐ Underground detention facilities should be installed on consolidated and stable native soil; if the facility is constructed in fill slopes, a geotechnical analysis should be performed to ensure stability.
- ☐ Plumbing systems should be installed in accordance with the current California Building and Plumbing Codes (CBC – part of California Code of Regulations, Title 24).
- ☐ When a potable water supply line is connected to a cistern system to provide dry-season make-up water, cross-contamination should be prevented by providing a backflow prevention system on the potable water supply line and/or an air gap.
- ☐ In cases where there is non-potable indoor reuse demand, proper pretreatment measures should be installed such as pre-filtration, cartridge filtration, and/or disinfection.

Types of Harvested Water Demands

Harvested rainwater can be used for irrigation and other non-potable uses (if local, State, and Federal ordinances allow). The use of captured stormwater allows a reduced demand on the potable water supply.

Irrigation Use

- Subsurface (or drip) irrigation should not require disinfection pretreatment prior to use; other irrigation types, such as spray irrigation, may require additional pretreatment prior to use
- Selecting native and/or drought tolerant plants for landscaped area will reduce irrigation demand, thereby reducing the needed size of the storage facility and the amount of tributary area that can be successfully managed with a harvest and use system.

Indoor Use

- Indoor uses generally require filtration and disinfection and should only be considered if permitted by local, State, or Federal codes and ordinances.
- Domestic uses (single-family uses) may include toilet flushing.
- Offices, commercial developments, and industrial facility indoor uses may use cisterns for toilet and urinal flushing. Demands for these specific land uses are include in **Appendix X**.
- Pretreatment requirements per local, State, or Federal codes and ordinances should be applied

Other Non-Potable Uses

- Other non-potable uses may include vehicle/equipment washing, evaporative cooling, industrial processes, and dilution water for recycled water systems (if local, State, and Federal ordinances allow)
- Pretreatment requirements per local, State, or Federal codes and ordinances should be applied

Harvested Water Demand Calculations and Feasibility Thresholds

Appendix X provides guidance for estimating harvesting water demand and determining whether demand is potentially sufficient to provide a significant benefit for stormwater management.

Simple Sizing Method for Cisterns

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size harvest and use systems, the user calculates the DCV and determines whether demand is sufficient to drain the tank in 48 hours following the end of rainfall. The sizing steps are as follows:

Step 1: Determine Cistern DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**. This is the required cistern size.

Step 2: Determine the 48-hour Required Demand

Calculate the daily demand needed to draw down the DCV in 48 hours using the following equation:

$Demand_{48} = (DCV/2)*7.48$

Where:

$Demand_{48}$ = daily demand required (gal/day)

DCV = design capture volume, cu-ft

Use the guidance in **Appendix X** determine the non-potable uses needed to generate the required demand.

Designing Cisterns to Achieve the Maximum Feasible Retention Volume

It is rare that cisterns can be sized to capture the full DCV and use this volume in 48 hours. However, if the demand exceeds minimum harvested water demand thresholds, cisterns should be sized to achieve at least 40 percent capture of average annual runoff volume.

Step 1: Determine if the Project Meets the Minimum Harvested Water Demand Thresholds

Determine the Project's design capture storm depth, then use the TUTIA thresholds table (**Appendix X**) for indoor uses, or the Irrigated Area thresholds table (**Appendix X**) for outdoor uses, to determine whether the project meets the minimum harvested water demand thresholds. If the project does not meet the minimum harvested water demand thresholds, harvest and use does not meet the minimum incremental benefit required to such that its use must be evaluated. .

If the project meets or exceeds the minimum harvested water demand thresholds, continue to Step 2 **or** Step 3 (equally-allowable pathways).

Step 2: Iteratively Determine the Cistern Volume for 80 percent capture of average annual stormwater runoff volume

Cisterns can be sized using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**). This approach requires an iterative sizing process in which the user selects the initial cistern size and the project harvested water demand, then calculates the time required for the cistern to drain. Based on the drain time, the cistern size is increased or decreased and the calculations are done again until the initially assumed size and the required size are within 10 percent.

a. Calculate wet season harvested water demand using guidance contained in **Appendix X**.
b. Select cistern size in terms of the design rainfall depth.
c. Calculate the cistern volume using hydrologic method described in **Appendix III.1.1**.
d. Compute the drawdown time of the cistern as:

   Drawdown Time (hr) = [Volume (cu-ft) × 7.48 gal/cu-ft× 24hr/day]/[Demand (gpd)]

e. Based on design rainfall depth and drawdown time using guidance provided in **Appendix** III to calculate long term average capture efficiency.
f. If capture is between 75 and 85 percent, further iterations are not required.
g. If capture is less than 80 percent capture of average annual stormwater runoff volume, return to Step (b) and increase design rainfall depth.
h. If capture is greater than 80 percent, return to Step (b) and increase design rainfall depth.

Step 3: Determine Cistern Volume and Drawdown to Achieve Maximum Practicable Capture Efficiency

The applicant is not required to provide a cistern greater than the DCV to demonstrate that BMPs have been designed to achieve the maximum feasible retention. The following steps should be used to compute the maximum feasible fraction of stormwater than can be retained with harvest and use BMPs:

a. Calculate wet season harvested water demand using guiance contained in **Appendix X**, accounting for all applicable demands.
b. Calculate the DCV using hydrologic method described in **Appendix III.1.1** and size the cistern for this volume.

c. Compute the drawdown time of the cistern as:

   Drawdown Time (hr) = [Volume (cu-ft) × 7.48 gal/cu-ft× 24hr/day]/[Demand (gpd)]

d. Based on 1.0 × design capture storm depth and the drawdown time computed in Step I, calculate the long term average capture efficiency using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**).

e. If capture efficiency is less than 40 percent, harvest and use is not required to be considered for use on the project.

f. If capture efficiency is greater than 40 percent, provide a cistern sized for the DCV and provide volume or flowate to treat the remaining volume up to 80 percent total average annual capture using biotreatment BMP.

Configuration for Use in a Treatment Train

- Cisterns can be combined into a treatment train to provide enhanced water quality treatment and reductions in the runoff volume and rate. For example, if a green roof is placed upgradient of a cistern, the rate and volume of water flowing to the cistern can be reduced and the water quality enhanced.
- Cisterns can be incorporated into the landscape design of a site and can be aesthetically pleasing as well as functional for irrigation purposes.
- Treatment of the captured rainwater (i.e. disinfection) may be required depending on the end use of the water.
- Cisterns can be designed to overflow to biotreatment BMPs.

Additional References for Design Guidance

Santa Barbara BMP Guidance Manual, Chapter 6:
http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf

- County of Los Angeles Low Impact Development Standards Manual, Chapter 5:
  http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf
- SMC LID Manual (pp 114):
  http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf

San Diego County LID Handbook Appendix 4 (Factsheet 26):
http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

XIV.5. Biotreatment BMP Fact Sheets (BIO)

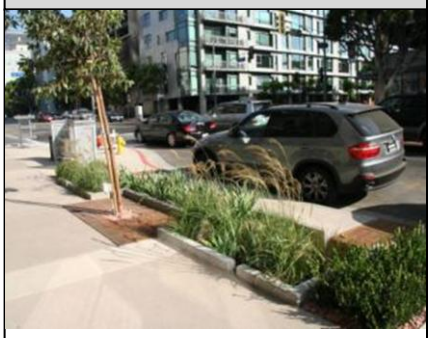
Conceptual criteria for biotreatment BMP selection, design, and maintenance are contained in **Appendix XII**. These criteria are generally applicable to the design of biotreatment BMPs in Orange County and BMP-specific guidance is provided in the following fact sheets. [24]

*Note: Biotreatment BMPs shall be designed to provide the maximum feasible infiltration and ET based on criteria contained in **Appendix XI.2**.*

BIO-1: Bioretention with Underdrains

Also known as:

- *Rain gardens with underdrains*
- *Vegetated media filter*
- *Downspout planter boxes*



Bioretention
Source: Geosyntec Consultants

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plants. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants. Bioretention with an underdrain are utilized for areas with low permeability native soils or steep slopes where the underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration. **Bioretention must be designed without an underdrain** in areas of high soil permeability.

Feasibility Screening Considerations

- If there are no hazards associated with infiltration (such as groundwater concerns, contaminant plumes or geotechnical concerns), **bioinfiltration facilities**, which achieve partial infiltration, should be used to maximize infiltration.

[24] Not all BMPs presented in this section are considered "biofiltration BMPs" under the South Orange County Permit Area. Biofiltration BMPs are vegetated treat-and-release BMPs that filter stormwater through amended soil media that is biologically active, support plant growth, and also promote infiltration and/or evapotranspiration. For projects in South Orange County, the total volume of storage in surface ponding and pores spaces is required to be at least 75% of the remaining DCV that the biofiltration BMP is designed to address. This prevents significant down-sizing of BMPs which otherwise may be possible via routing calculations. Biotreatment BMPs that do not meet this definition are not considered to be LID BMPs, but may be used as treatment control or pre-treatment BMPs. See Section III.7 and Worksheet SOC-1 for guidance.

- Bioretention with underdrain facilities should be lined if contaminant plumes or geotechnical concerns exist. If high groundwater is the reason for infiltration infeasibility, bioretention facilities with underdrains do not need to be lined.

Opportunity Criteria

- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Bioretention may also be applied in parking lot islands, cul-de-sacs, traffic circles, road shoulders, road medians, and next to buildings in planter boxes.
- Drainage area is ≤ 5 acres.
- Area is available for infiltration.
- Site must have adequate relief between land surface and the stormwater conveyance system to permit vertical percolation through the soil media and collection and conveyance in underdrain to stormwater conveyance system.

OC-Specific Design Criteria and Considerations

☐ Ponding depth should not exceed 18 inches; fencing may be required if ponding depth is greater than 6 inches to mitigate drowning.

☐ The minimum soil depth is 2 feet (3 feet is preferred).

☐ The maximum drawdown time of the bioretention ponding area is 48 hours. The maximum drawdown time of the planting media and gravel drainage layer is 96 hours, if applicable.

☐ Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.

☐ If infiltration in bioretention location is hazardous due to groundwater or geotechnical concerns, a geomembrane liner must be installed at the base of the bioretention facility. This liner should have a minimum thickness of 30 mils.

☐ The planting media placed in the cell shall be designed per the recommendations contained in MISC-1: Planting/Storage Media

☐ Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 hours; native place species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent feasible

☐ The bioretention area should be covered with 2-4 inches (average 3 inches) or mulch at the start and an additional placement of 1-2 inches of mulch should be added annually.

☐ Underdrain should be sized with a 6 inch minimum diameter and have a 0.5% minimum slope. Underdrain should be slotted polyvinyl chloride (PVC) pipe; underdrain pipe should be more than 5 feet from tree locations (if space allows).

☐ A gravel blanket or bedding is required for the underdrain pipe(s). At least 0.5 feet of washed aggregate must be placed below, to the top, and to the sides of the underdrain pipe(s).

☐ An overflow device is required at the top of the bioretention area ponding depth.

☐ Dispersed flow or energy dissipation (i.e. splash rocks) for piped inlets should be provided at basin inlet to prevent erosion.

☐ Ponding area side slopes shall be no steeper than 3:1 (H:V) unless designed as a planter box BMP with appropriate consideration for trip and fall hazards.

Simple Sizing Method for Bioretention with Underdrain

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size a bioretention with underdrain facility, the user selects the basin depth and then determines the appropriate surface area to capture the DCV. The sizing steps are as follows:

Step 1: Determine DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**.

Step 2: Verify that the Ponding Depth will Draw Down within 48 Hours

The ponding area drawdown time can be calculated using the following equation:

$DD_P = (d_P / K_{MEDIA}) \times 12$ in/ft

Where:

DD_P = time to drain ponded water, hours

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

If the drawdown time exceeds 48 hours, adjust ponding depth and/or media infiltration rate until 48 hour drawdown time is achieved.

Step 3: Determine the Depth of Water Filtered During Design Capture Storm

The depth of water filtered during the design capture storm can be estimated as the amount routed through the media during the storm, or the ponding depth, whichever is smaller.

$d_{FILTERED}$ = Minimum [$((K_{MEDIA} \times T_{ROUTING})/12)$, d_P]

Where:

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

$T_{ROUTING}$ = storm duration that may be assumed for routing calculations; this should be assumed to be no greater than 3 hours. If the designer desires to account for further routing effects, the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) should be used.

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Step 4: Determine the Facility Surface Area

$A = DCV / (d_P + d_{FILTERED})$

Where:

A = required area of bioretention facility, sq-ft

DCV = design capture volume, cu-ft

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. See Section III.7 and Worksheet SOC-1.

Capture Efficiency Method for Bioretention with Underdrains

If the bioretention geometry has already been defined and the user wishes to account more explicitly for routing, the user can determine the required footprint area using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Step 1: Determine the drawdown time associated with the selected basin geometry

$DD = (d_p / K_{DESIGN}) \times 12$ in/ft

Where:

DD = time to completely drain infiltration basin ponding depth, hours

d_P = bioretention ponding depth, ft (should be less than or equal to 1.5 ft)

K_{DESIGN} = design media infiltration rate, in/hr (assume 2.5 inches per hour unless otherwise proposed)

If drawdown is less than 3 hours, the drawdown time should be rounded to 3 hours or the Capture Efficiency Method for Flow-based BMPs (See **Appendix III.3.3**) shall be used.

Step 2: Determine the Required Adjusted DCV for this Drawdown Time

Use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to calculate the fraction of the DCV the basin must hold to achieve 80 percent capture of average annual stormwater runoff volume based on the basin drawdown time calculated above.

Step 3: Determine the Basin Infiltrating Area Needed

The required infiltrating area (i.e. the surface area of the top of the media layer) can be calculated using the following equation:

$A = \text{Design Volume} / d_p$

Where:

A = required infiltrating area, sq-ft (measured at the media surface)

Design Volume = fraction of DCV, adjusted for drawdown, cu-ft (see Step 2)

d_p = ponding depth of water stored in bioretention area, ft (from Step 1)

This does not include the side slopes, access roads, etc. which would increase bioretention footprint. If the area required is greater than the selected basin area, adjust surface area or adjust ponding depth and recalculate required area until the required area is achieved.

In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. See Section III.7 and Worksheet SOC-1.

Configuration for Use in a Treatment Train

- Bioretention areas may be preceeded in a treatment train by HSCs in the drainage area, which would reduce the required design volume of the bioretention cell. For example, bioretention could be used to manage overflow from a cistern.
- Bioretention areas can be used to provide pretreatment for underground infiltration systems.

Additional References for Design Guidance

- CASQA BMP Handbook for New and Redevelopment: **http://www.cabmphandbooks.com/Documents/Development/TC-32.pdf**

- SMC LID Manual (pp 68):
  http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 5:
  http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf
- San Diego County LID Handbook Appendix 4 (Factsheet 7):
  http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

  Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4:
  http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850
- County of Los Angeles Low Impact Development Standards Manual, Chapter 5:
  http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf

TRT-2: Cartridge Media Filter

Cartridge media filters (CMFs) are manufactured devices that consist of a series of modular filters packed with engineered media that can be contained in a catch basin, manhole, or vault that provide treatment through filtration and sedimentation. The manhole or vault may be divided into multiple chambers where the first chamber acts as a pre-settling basin for removal of coarse sediment while another chamber acts as the filter bay and houses the filter cartridges. A variety of media types are available from various manufacturers which can target pollutants of concern.

Also known as:

- *Manufactured Media Filters*



Cartridge Media Filter
Source: Contech Stormwater Solution, Inc.

Feasibility Screening Considerations

- Not applicable

Opportunity Criteria

- Intended for use when retention and biotreatment options are infeasible.
- Recommended for drainage area with limited available surface area or where surface BMPs would restrict uses.
- For drainage areas with significant areas of non-stabilized soil, permanent soil stablization must be achieved before before cartridge media filters are installed and put on line to minimize risk of clogging.
- Depending on the number of cartridges, maintenance events can have long durations. Care should be exercised in siting these facilities so that maintenance events will not significantly disrupt businesses or traffic.

OC-Specific Design Criteria and Considerations

☐ Cartridge media filter BMP vendors should be consulted regarding design and specifications.

☐ Filter media should be selected to target pollutants of concern. A combination of media may be appropriate to remove a variety of pollutants.

☐ If CMF are integrated with a vault for equalization, the system should be designed to completely drain the vault within 96 hours of storm event or otherwise protect against standing water and mosquito breeding concerns.

Computing Sizing Criteria for Cartridge Media Filters

The required design flowrate should be calculated based on the **Capture Efficiency Method for Flow-based BMPs** (See **Appendix III.3.3**).

Additional References for Design Guidance

- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 9: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**

- SMC LID Manual: **http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf**
- Western Washington Stormwater Management Manual, Volume V, Chapter 12: **http://www.ecy.wa.gov/pubs/0510033.pdf**

PRE-2: Catch Basin Insert Fact Sheet

Catch basin inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris and may include sorbent media (oil absorbent pouches) to remove floating oils and grease. Catch basin inserts are selected specifically based upon the orientation of the inlet and the expected sediment and debris loading.

Also known as:

- *Drop Inlet Filters*
- *Catch Basin Filters*



Catch Basin Insert (DrainPac™)

Opportunity Criteria

- Catch basin inserts come in such a wide range of configurations that it is practically impossible to generalize the expected performance. Inserts should mainly be used for catching coarse sediments and floatable trash and are effective as pretreatment in combination with other types of structures that are recognized as water quality treatment BMPs. Trash and large objects can greatly reduce the effectiveness of catch basin inserts with respect to sediment and hydrocarbon capture.
- Catch basin inserts are applicable for drainage area that include parking lots, vehicle maintenance areas, and roadways with catch basins that discharge directly to a receiving water.

OC-Specific Design Criteria and Considerations

☐ Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

☐ Consult proprietors for specific criteria concerning the design of catch basin inserts.

☐ Catch basin inserts can be installed with specific media for pollutants of concern.

Proprietary Manufacturer / Supplier Websites

- **Table XIV.2** is a list of manufacturers that provide catch basin inserts. The inclusion of these manufacturers does not represent an endorse of their products. Other devices and manufacturers may be acceptable for pretreatment.

Table XIV.2: Proprietary Catch Basin Insert Manufacturer Websites

Device	Manufacturer	Website
AbTech Industries Ultra-Urban Filter™	AbTech Industries	www.abtechindustries.com
Aquashield Aqua-Guardian™ Catch Basin Insert	Aquashield™ Inc.	www.aquashieldinc.com
Bowhead StreamGuard™	Bowhead Environmental & Safety, Inc.	http://www.shopbowhead.com/
Contech® Triton Catch Basin Filter™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® Triton Curb Inlet Filter™	Contech® Construction Products Inc.	www.contech-cpi.com

Table XIV.2: Proprietary Catch Basin Insert Manufacturer Websites

Device	Manufacturer	Website
Contech® Triton Basin StormFilter™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® Curb Inlet StormFilter™	Contech® Construction Products Inc.	www.contech-cpi.com
Curb Inlet Basket	SunTree Technologies Inc.	www.suntreetech.com
Curb Inlet Grates	EcoSense International™	http://www.ecosenseint.com/
DrainPac™	United Storm Water, Inc.	http://www.unitedstormwater.com
Grate Inlet Skimmer Box	SunTree Technologies Inc.	www.suntreetech.com
KriStar FloGard+PLUS®	KriStar Enterprises Inc.	www.kristar.com
KriStar FloGard®	KriStar Enterprises Inc.	www.kristar.com
KriStar FloGard LoPro Matrix Filter®	KriStar Enterprises Inc.	www.kristar.com
Nyloplast Storm-PURE Catch Basin Insert	Nyloplast Engineered Surface Drainage Products	www.nyloplast-us.com
StormBasin®	FabCo® Industries Inc.	www.fabco-industries.com
Stormdrain Solutions Interceptor	FabCo® Industries Inc.	www.fabco-industries.com
Stormdrain Solutions Inceptor®	Stormdrain Solutions	www.stormdrains.com
StormPod®	FabCo® Industries Inc.	www.fabco-industries.com
Stormwater Filtration Systems	EcoSense International™	http://www.ecosenseint.com/
Ultra-CurbGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-DrainGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-GrateGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-GutterGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-InletGuard®	UltraTech International Inc.	www.spillcontainment.com

SUBJECT TO FURTHER REVISION

LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

0.65 0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1

PROJECT SITE

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
San Diego County

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE XVI-1

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

Appendix F Noise Impact Analysis

Appendix

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Caribou Industries Proposal for the 3rd Street Promenade

LOCATED AT: 3RD & BROADWAY

NOISE IMPACT ANALYSIS

CITY OF SANTA ANA

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February 14, 2019

PREPARED FOR: CARIBOU INDUSTRIES, INC.

CONTRACTOR DEVELOPER
CARIBOU INDUSTRIES
PRESERVING THE PAST ENSURING THE FUTURE

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-5	Interstate 5
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Caribou Industries Proposal for the 3rd Street Promenade
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Caribou Industries Proposal for the 3rd Street Promenade development ("Project"). The Project site is located east of North Broadway and north of 3rd Street in the City of Santa Ana. The Project is within a transit priority area as defined by Public Resources Code (PRC) Section 21099(a)(7, and shall incorporate all of the adopted Mitigation Measures (MM) identified in the *Transit Zoning Code (TZC) Environmental Impact Report (EIR).* (1) The proposed Project is to consist of up to 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), and roof-top amenities ancillary to residential and hotel uses. This study has been prepared consistent with applicable City of Santa Ana noise standards, and significance criteria based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (2)

OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the operation of the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on 10 roadway segments surrounding the Project site were calculated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in *Caribou Industries Proposal for the 3rd Street Promenade Traffic Impact Analysis*. (3) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing, Opening Year 2021, and Horizon Year 2040 traffic conditions. The analysis shows that the unmitigated Project-related traffic noise level increases under all traffic scenarios will be *less than significant*. The findings of the off-site traffic noise analysis are consistent with the findings of the TZC EIR which identified *less than significant* noise impacts.

ON-SITE TRAFFIC NOISE ANALYSIS

Consistent with MM 4.8-5 and 4.8-6 of the TZC EIR, an on-site traffic noise analysis was prepared to determine the noise levels that would result from off-site transportation noise sources, and to identify potential noise attenuation measures that would achieve acceptable Project exterior and interior noise levels. The TZC EIR MMs are as follows:

MM 4.8-5 *When residential uses would be located in areas with noise levels in excess of 60 dBA CNEL (either through conversion of use/structure or new construction), the project applicant shall provide noise barriers around private open space areas, including patios and balconies, as necessary. The height and density of the barriers shall be sufficient to reduce the exterior noise levels within private open space areas to a CNEL of 65 dBA or less.*

MM 4.8-6 *Prior to issuance of building permits, building plans shall specify the STC rating of windows and doors for all residential land uses. Window and door ratings shall be sufficient to reduce the interior noise level to a CNEL of 45 dBA or less, and shall be determined by a qualified acoustical consultant as part of the final engineering design of the project.*

EXTERIOR NOISE LEVELS

The primary source of traffic noise affecting the Project site is anticipated to be from North Broadway and 3rd Street. The Project will also experience some background traffic noise impacts Sycamore Street. However, due to the low traffic volume and low speeds of vehicles travelling on Sycamore Street, traffic noise from this roadway segment will not make a significant contribution to the noise environment beyond of the right-of-way of the road. The analysis shows that the future unmitigated on-site traffic noise levels are expected to satisfy TZC EIR MM 4.8-5 65 dBA CNEL exterior noise level for outdoor areas (e.g., patios, balconies) within the Project site with exterior noise levels ranging from 48.8 to 55.4 dBA CNEL. The future on-site traffic noise analysis includes the barrier attenuation provided by the planned minimum 3-foot high glass guard rails. (4) As such, the future on-site traffic noise impacts to outdoor areas are considered *less than significant* impacts, consistent with the findings of the TZC EIR.

INTERIOR NOISE LEVELS

This noise study evaluates the interior noise levels at the Project buildings based on the TZC EIR MM 4.8-6 45 dBA CNEL residential interior noise level standard. The Project buildings are shown to require a Noise Reduction (NR) of up to 21.7 dBA and a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning). The following represent standard building construction practices to satisfy the interior noise level standard:

- Windows/Glass Doors:
    - All units require standard windows and glass doors with a minimum STC ratings of 27.
- Exterior Doors (Non-Glass):
    - All exterior doors shall be well weather-stripped and have minimum STC ratings of 27. Well-sealed perimeter gaps around the doors are essential to achieve the optimal STC rating. (5)
- Walls:
    - At any penetrations of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar to form an airtight seal.
- Ventilation:
    - Arrangements for any habitable room shall be such that any exterior door or window can be kept closed when the room is in use and still receive circulated air. A forced air circulation system (e.g. air conditioning) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.

OPERATIONAL NOISE ANALYSIS

Using reference noise levels to represent the expected noise sources from the Caribou Industries Proposal for the 3rd Street Promenade site, this analysis estimates the Project-related stationary-source noise levels at nearby sensitive receiver locations. The normal activities associated with the proposed Caribou Industries Proposal for the 3rd Street Promenade are anticipated to include roof-top mechanical ventilation equipment, parking garage vehicle movements, outdoor pool/spa activity, auto lifts (hotel parking), and outdoor bar area activity. The operational noise analysis shows that the Project-related stationary-source noise levels at the nearby sensitive receiver locations will satisfy the City of Santa Ana exterior noise level standards.

Further, this analysis demonstrates that the Project will not contribute a long-term unmitigated operational noise level impact to the existing ambient noise environment at any of the sensitive receiver locations. Therefore, the operational noise level impacts associated with the proposed Project activities, such as the roof-top mechanical ventilation equipment, parking garage vehicle movements, outdoor pool/spa activity, auto lifts (hotel parking), and outdoor bar area activity, are considered *less than significant*.

Moreover, the operational noise analysis shows that roof-top mechanical ventilation equipment noise levels would be reduced by a minimum of 15 dBA consistent with TZC EIR MM 4.8-7 as follows:

MM 4.8-7 *Each project applicant shall provide proper shielding for all new HVAC systems used by the proposed residential and mixed use buildings to achieve an attenuation of 15 dBA at 50 feet from the equipment.*

The *less than significant* impact findings of the operational noise analysis are, therefore, consistent with those of the TZC EIR.

CONSTRUCTION NOISE ANALYSIS

Construction activities associated with the Project are shown to potentially range from 56.0 to 71.3 dBA L_{eq} at nearby sensitive receiver locations and represent a potentially substantial temporary or periodic increase in ambient noise levels. Consistent with the TZC EIR, this analysis assumes that an increase of 5.0 dBA L_{eq} or greater over existing ambient noise levels is substantial and significant. The existing daytime ambient noise levels monitored in the project vicinity ranged from 61.0 to 69.6 dBA L_{eq}. As such, the noise generated by Project construction activities for the could result in a temporary increase in ambient noise levels of over 5 dBA L_{eq} at uses adjacent to the Project site. However, consistent with the TZC EIR and with the implementation of mitigation measure MM 4.8-1, the construction activities would only occur during the permitted hours designated in the City of Santa Ana Municipal Code Section 18-314(e), and therefore, would not occur during normal sleep hours for residences or on days that residents are considered most sensitive to exterior noise (Sundays and federal holidays). (1) As such, *while the physical impact from an increase in ambient noise levels could occur from Project construction activities, an adverse effect on the nearby residents would not occur*. (1) Implementation of mitigation measures MM4.8-2 through MM4.8-4 would also help reduce this impact. Therefore, with the

mitigation measures required by the TZC EIR, this impact would be *less than significant*. The TZC EIR mitigation measures are listed below:

MM 4.8-1 *All construction activity within the City shall be conducted in accordance with Section 18-314(e) of the City of Santa Ana Municipal Code.*

MM 4.8-2 *Each project applicant shall require by contract specifications that the following construction best management practices (BMPs) be implemented by contractors to reduce construction noise levels:*

- *Two weeks prior to the commencement of construction, notification must be provided to property owners within 300 feet of a project site disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period*
- *Ensure that construction equipment is properly muffled according to industry standards and [is] in good working condition*
- *Place noise-generating construction equipment and locate construction staging areas away from sensitive uses, where feasible*
- *Schedule high noise-producing activities between the hours of 8:00 A.M. and 5:00 P.M. to minimize disruption on sensitive uses*
- *Implement noise attenuation measures, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources*
- *Use electric air compressors and similar power tools rather than diesel equipment, where feasible*
- *Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 30 minutes*
- *Construction hours, allowable workdays, and the phone number of the job superintendent shall be clearly posted at all construction entrances to allow for surrounding owners and residents to contact the job superintendent. If the City or the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective action, and report the action taken to the reporting party.*

Contract specifications shall be included in the proposed project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.

MM 4.8-3 *Each project applicant shall require by contract specifications that construction staging areas along with the operation of earthmoving equipment within the project area would be located as far away from vibration and noise sensitive sites as possible. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.*

MM 4.8-4 *Each project applicant shall require by contract specifications that heavily loaded trucks used during construction would be routed away from residential streets. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.*

CONSTRUCTION VIBRATION ANALYSIS

At distances ranging from 64 to 128 feet from the Project site, construction vibration velocity levels are expected to range from 65.7 to 74.8 VdB. Based on the results of the analysis, the Project construction vibration levels will remain below the TZC EIR annoyance and building damage thresholds of 85 VdB and 95 VdB, respectively, at all sensitive receiver locations.

As indicated in the TZC EIR, *so long as construction occurs more than 50 feet from sensitive receptors, the impact associated with ground-borne vibration generated by the equipment would be below 85 VdB and thus would be less than significant*. (1) However, if pile driving activity is required within 25 feet of sensitive receiver locations or fragile buildings, this would result in potential vibration impacts above the threshold of 85 VdB, in which case this impact would be *potentially significant*. The TZC EIR indicates that *implementation of mitigation measures MM 4.8-1 through MM 4.8-4 would help to reduce this impact, but not to a less than significant level; therefore, this impact would remain significant and unavoidable.*

Therefore, if pile driving or drilling activities are required, a Project Design Feature is identified below to reduce potential vibration level impacts at nearby receiver locations to a *less than significant* impact.

CONSTRUCTION VIBRATION PROJECT DESIGN FEATURE

The following Project Design Feature would reduce construction vibration levels produced by potential pile driving equipment at nearby sensitive receiver locations and/or fragile buildings:

- If pile driving and/or drilling is necessary during Project construction, a site-specific analysis shall be prepared and submitted to the City of Santa Ana demonstrating that construction activity would not result in vibration at sensitive receiver locations, and/or adjacent buildings, that is greater than the Federal Transit Administration's vibration impact thresholds appropriate for each building (consistent with TZC EIR thresholds); unless otherwise determined by a qualified engineer that high levels of ground-borne vibration would not post structural hazards to the adjacent building(s). The engineer shall provide written documentation that shall include the applicable construction vibration threshold and expected or monitored vibration levels during pile driving and/or drilling activity to the City of Santa Ana building department.

SUMMARY OF CEQA SIGNIFICANCE FINDINGS

The results of this Caribou Industries Proposal for the 3rd Street Promenade Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (2). Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA and a comparison with the findings of the TZC EIR.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	NIA Section	Significance Findings		TZC EIR Mitigation Measures	New Significant Impact?
		NIA	TZC EIR		
Off-Site Traffic Noise Levels	7	*Less Than Significant*	*Less Than Significant*	-	*NO*
On-Site Exterior Traffic Noise Levels	8	*Less Than Significant*	*Less Than Significant*	*MM 4.8-5*	*NO*
On-Site Interior Traffic Noise Levels		*Less Than Significant*	*Less Than Significant*	*MM 4.8-6*	*NO*
On-Site Rail Noise & Vibration Levels	-	*Not Applicable: The Project is not near the rail line discussed in the TZC EIR.*	*Significant & Unavoidable*	*MM 4.8-8*	*NO*
Operational Noise Levels	10	*Less Than Significant*	*Less Than Significant*	*MM 4.8-7*	*NO*
Construction Noise Levels	11	*Less Than Significant*	*Less Than Significant*	*MM 4.8-1 to MM 4.8-4*	*NO*
Construction Vibration Levels		*Less Than Significant with Project Design Features*	*Significant & Unavoidable*		*NO*

"NIA" = Noise Impact Analysis

1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Caribou Industries Proposal for the 3rd Street Promenade ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, provides the study methods and procedures for transportation noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term operational noise and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The Project site is located east of North Broadway and north of 3rd Street in the City of Santa Ana, as shown on Exhibit 1-A. The Project is within a transit priority area as defined by Public Resources Code (PRC) Section 21099(a)(7, and shall incorporate all of the adopted Mitigation Measures (MM) identified in the *Transit Zoning Code (TZC) Environmental Impact Report (EIR).* (1) The proposed Project is located approximately 4,600 feet southwest of Interstate 5 (I-5).

The Project site is currently occupied by an existing parking garage. Existing land uses in the Project study area include commercial uses to the north, south, east, and west. An existing church use is located in an adjacent commercial building at the eastern Project site boundary which operates over limited daytime hours. (6) Existing residential uses representing the closest noise-sensitive receiver locations to the Project site are situated south and southwest of the Project site of the Project site across 3rd Street.

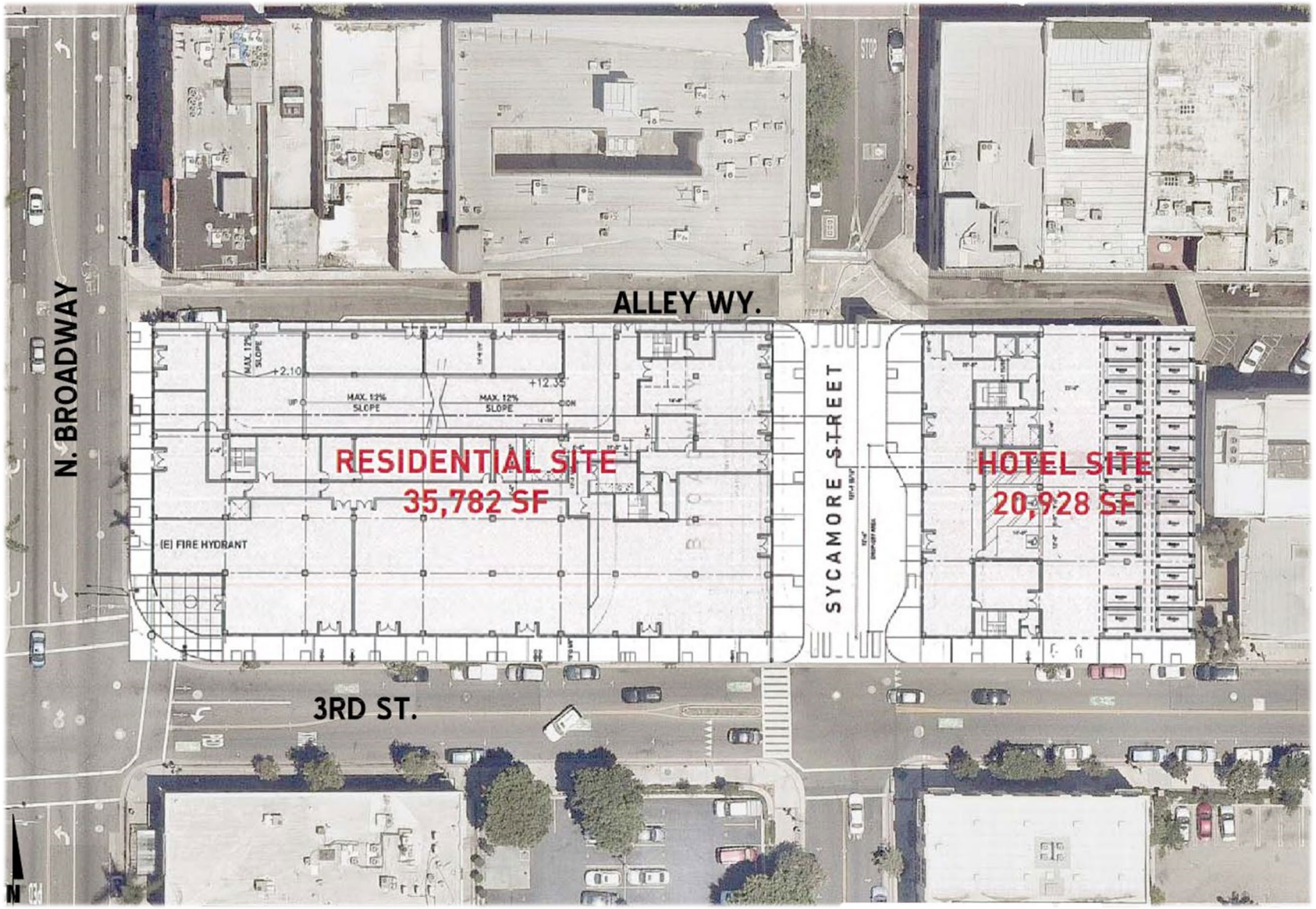
1.2 PROJECT DESCRIPTION

The proposed Project is to consist of up to 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), and roof-top amenities ancillary to residential and hotel uses, as shown on Exhibit 1-B. The on-site Project-only operational noise sources are expected to include: roof-top mechanical ventilation equipment, parking garage vehicle movements, outdoor pool/spa activity, auto lifts (hotel parking), and outdoor bar area activity.

EXHIBIT 1-A: LOCATION MAP



EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

Noise has been simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (7) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (8) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most commonly used figure is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{50}, L_{25}, L_8 and L_2, are commonly used. The percentile noise descriptors are the noise levels equaled or exceeded during 50 percent, 25 percent, 8 percent and 2 percent of a stated time. Sound levels associated with the L_2 and L_8 typically describe transient or short-term events, while levels associated with the L_{50} describe the steady state (or median) noise conditions. The City of Santa Ana relies on the percentile noise levels to describe the stationary source noise level limits. While the L_{50} describes the noise levels occurring 50 percent of the time, the L_{eq} accounts for the total energy (average) observed for the entire hour. Therefore, the L_{eq} noise descriptor is generally 1-2 dBA higher than the L_{50} noise level.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Santa Ana relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point

sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (7)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (9)

2.3.3 ATMOSPHERIC EFFECTS

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (7)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure. (9)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receptor by controlling the noise source, transmission path, receptor, or all three. This concept is known as the source-path-receptor concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receptor. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (9)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (10)

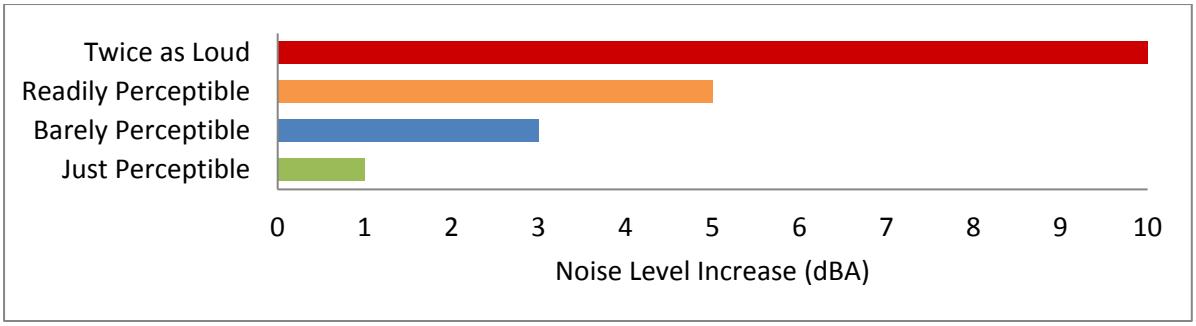
2.7 COMMUNITY RESPONSE TO NOISE

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon everyone's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (11) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (11) Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (9)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



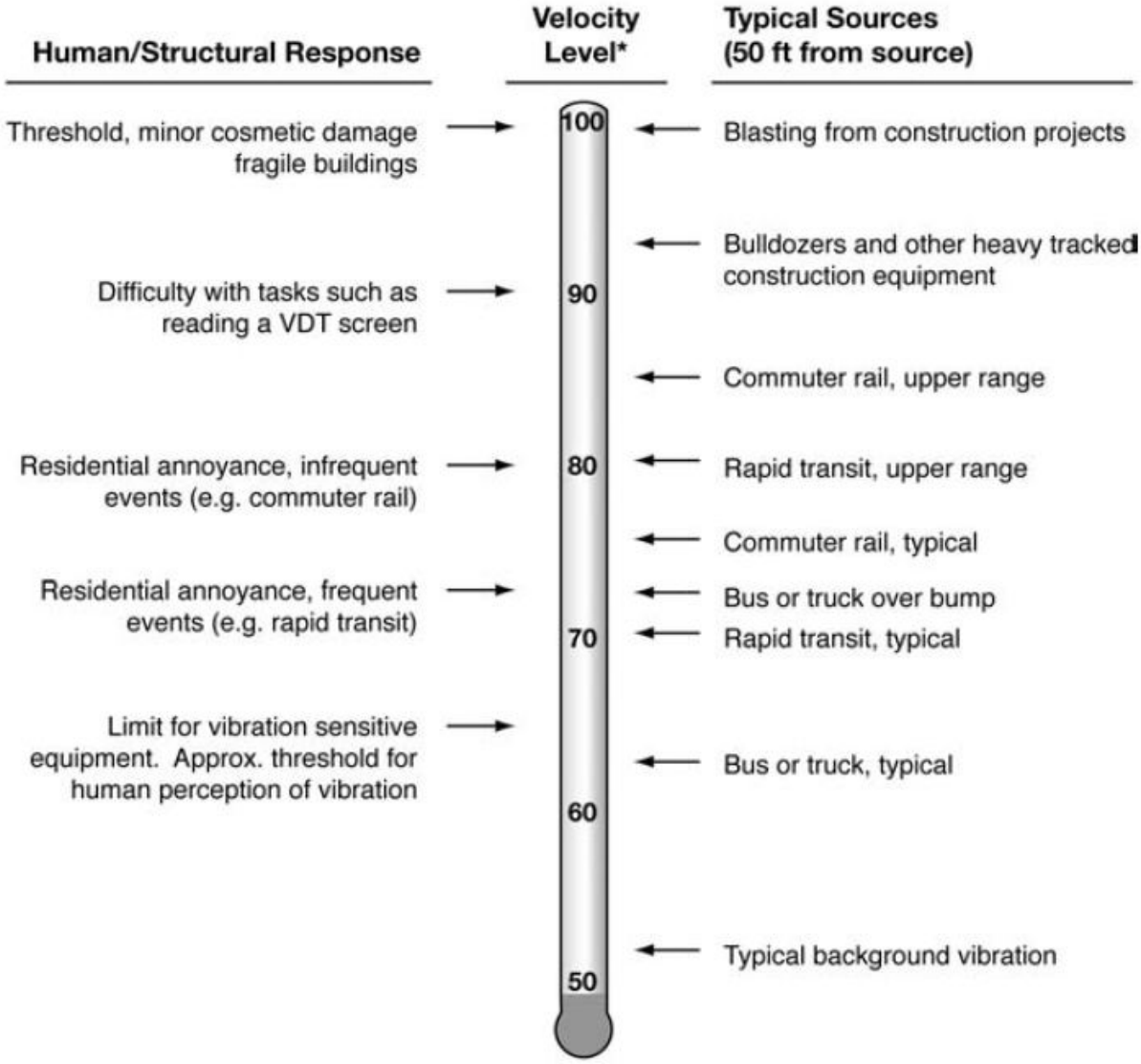
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (12), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research. (13) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code. These noise standards are applied to new construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are developed near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.3 CITY OF SANTA ANA GENERAL PLAN

The City of Santa Ana has adopted a Noise Element of the General Plan to address existing and future noise issues throughout the City. (14) The Noise Element identifies several objectives and policies to minimize the impacts of excessive noise levels throughout the City and establishes noise level requirements for sensitive land uses.

TRANSPORTATION NOISE LEVEL STANDARDS

Table 1 of the City of Santa Ana General Plan Noise Element provides standards to evaluate transportation-related noise at new developments, such as the Project. For multi-family residential uses, such as the proposed Caribou Industries Proposal for the 3rd Street Promenade Project, the exterior noise level standard of 65 dBA CNEL shall apply to *outdoor common areas*, or the outdoor courtyards within the Project site. Further, an interior noise level standard with windows closed of 45 dBA CNEL is identified on Table 1 of the City of Santa Ana General Plan Noise Element. (14) Exhibit 3-A shows the interior and exterior noise level standards identified in Table 1 of the City's General Plan Noise Element.

EXHIBIT 3-A: INTERIOR AND EXTERIOR NOISE STANDARDS

Categories	*Land Use Categories*	*Interior*[1]	*Exterior*[2]
Residential	Single-family, duplex, multi-family	45[3]	65
Institutional	Hospital, school classroom/playgrounds	45	65
	Church, library	45	--
Open Space	Parks	--	65

Notes:

[1] Interior areas (to include but are not limited to: bedrooms, bathrooms, kitchens, living rooms, dining rooms, closets, corridors/hallways, private offices, and conference rooms.

[2] Exterior areas shall mean: private yards of single family homes, park picnic areas, school playgrounds, common areas, private open space, such as atriums on balconies, shall be excluded form exterior areas provided sufficient common area is included within the project.

[3] Interior noise level requirements contemplate a closed window condition. Mechanical ventilation system or other means of natural ventilation shall be provided per Chapter 12, Section 1305 of the Uniform Building Code.

3.4 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Caribou Industries Proposal for the 3rd Street Promenade, operational noise that may include roof-top mechanical ventilation equipment, parking garage vehicle movements, outdoor pool/spa activity, auto lifts (hotel parking), and outdoor bar area activity are typically evaluated against standards established under a City's Municipal Code.

For noise-sensitive residential properties, the Municipal Code identifies operational noise level limits for the daytime (7:00 a.m. to 10:00 p.m.) hours of 55 dBA L_{50} and 50 dBA L_{50} during the nighttime (10:00 p.m. to 7:00 a.m.) hours. (15) Section 18-312 indicates that these standards shall apply for a cumulative period of 30 minutes in any hour, as well as plus 5 dBA cannot be exceeded for a cumulative period of more than 15 minutes in any hour (L_{25}), or the standard plus 10 dBA for a cumulative period of more than 5 minutes in any hour (L_8), or the standard plus 15 dBA for a cumulative period of more than 1 minute in any hour (L_2), or the standard plus 20 dBA for any period of time (L_{max}). The City of Santa Ana Municipal Code noise standards are shown on Table 3-1 and included in Appendix 3.1.

TABLE 3-1: OPERATIONAL NOISE STANDARDS

Jurisdiction	Land Use	Time Period	Exterior Noise Level Standards (dBA)[1]				
			L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (Anytime)
City of Santa Ana[2]	Residential	Daytime	55	60	65	70	75
		Nighttime	50	55	60	65	70

[1] The percent noise level is the level exceeded "n" percent of the time during the measurement period. L_{50} is the noise level exceeded 50% of the time.
[2] Source: City of Santa Ana Municipal Code, Section 18-312 (Appendix 3.1).
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

3.5 CONSTRUCTION NOISE STANDARDS

Consistent with the TZC EIR, Section 18-314(e) of the Municipal Code indicates that *construction activity noise sources are exempt from the Noise Ordinance standards so long that the activities do not take place between the hours of 8:00 P.M. and 7:00 A.M. on weekdays, including Saturday, or at any time on Sunday or a federal holiday*. (1) Additional thresholds of significance are further discussed in Section 4 related to construction noise levels.

3.6 CONSTRUCTION VIBRATION STANDARDS

Based on the TZC EIR, vibration impacts associated with human annoyance would be significant if the Project construction vibration levels exceed 85 VdB, which is the vibration level that is considered by FTA to be acceptable only if there are an infrequent number of events per day. With regard to building damage, this analysis relies on the FTA's vibration damage threshold of approximately 100 VdB for fragile buildings and approximately 95 VdB for extremely fragile historic buildings. (1)

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (16) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

While the City of Santa Ana General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts, they do not define the levels at which increases are considered substantial for use under Guideline A. CEQA Appendix G Guideline C applies to nearby public and private airports, if any, and the Project's land use compatibility.

4.1 CEQA GUIDELINES NOT FURTHER ANALYZED

Consistent with the TZC EIR, the Project site is not located within an airport land use plan or within 2 miles of a public airport or public use airport, or in the vicinity of a private airstrip. Therefore, no impact related to the exposure of people residing or working in the Project area to excessive airport related noise levels is anticipated, and no further analysis is required. (1)

4.2 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. The significance criteria presented below is based on the TZC EIR and are also shown on Table 4-1.

OFF-SITE TRAFFIC NOISE

- Based on the TZC EIR, the following significance criteria are used in this analysis to evaluate off-site traffic noise level impacts related to the Project:
    - A Project-related off-site traffic noise level increase of greater than 3 dBA but less than 5 dBA, if off-site traffic noise levels remain below 65 dBA CNEL at sensitive land uses including residential uses.
    - A Project-related off-site traffic noise level increase of 5 dBA or greater, if the noise increase would meet or exceed 65 dBA CNEL noise level standard at sensitive land uses including residential uses.
    - A Project-related off-site traffic noise level increase of 5 dBA or greater.

ON-SITE TRAFFIC NOISE

- Based on the TZC EIR, the following significance criteria are used in this analysis to evaluate on-site traffic noise level impacts to the Project:
    - exceed the exterior noise level standard of 65 dBA CNEL for outdoor areas (e.g., patios, balconies); or
    - exceed an interior noise level of 45 dBA CNEL for residential uses. To present a conservative approach, this interior noise level standard is used to assess interior noise levels at the hotel use of the Project.

OPERATIONAL (STATIONARY-SOURCE) NOISE

- If Project-related operational (stationary source) noise levels exceed the exterior 55 dBA L_{50} daytime or 50 dBA L_{50} nighttime noise level standards for sensitive residential land uses, or 60 dBA L_{50} for community support uses. These standards shall not be exceeded for a cumulative period of 30 minutes (L_{50}), or plus 5 dBA cannot be exceeded for a cumulative period of more than 15 minutes (L_{25}) in any hour, or the standard plus 10 dBA for a cumulative period of more than 5 minutes (L_8) in any hour, or the standard plus 15 dBA for a cumulative period of more than 1 minute (L_2) in any hour, or the standard plus 20 dBA at any time (L_{max}) (City of Santa Ana Municipal Code, Sections 18-312); or
- Based on the TZC EIR, the following significance criteria are used in this analysis to evaluate operational noise level impacts related to the Project:
    - A Project-related operational noise level increase of greater than 3 dBA but less than 5 dBA, if noise levels remain below 65 dBA at sensitive land uses including residential uses.
    - A Project-related operational noise level increase of 5 dBA or greater, if the noise increase would meet or exceed 65 dBA noise level standard at sensitive land uses including residential uses.
    - A Project-related operational noise level increase of 5 dBA or greater.

CONSTRUCTION NOISE

- Based on the TZC EIR, the following significance criteria are used in this analysis to evaluate construction noise level impacts related to the Project:
    - A Project-related construction noise level increase of 5 dBA or greater.

CONSTRUCTION VIBRATION

- Based on the TZC EIR, the following significance criteria are used in this analysis to evaluate construction vibration level impacts related to the Project:
    - If Project-related construction activities generate vibration levels exceed 85 VdB (human annoyance, 100 VdB (building damage) for fragile buildings, and approximately 95 VdB (building damage) for extremely fragile historic buildings.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Off-Site Traffic Noise[1]	Noise-Sensitive	If ambient is ≥ 65dBA CNEL	≥ 3 dBA CNEL Project increase	
		If ambient is ≥ 65dBA CNEL	≥ 5 dBA CNEL Project increase	
	Any	≥ 5 dBA CNEL Project increase		
On-Site Traffic Noise[1]	Residential	Exterior Noise Level Standard	65 dBA CNEL	
		Interior Noise Level Standard	45 dBA CNEL	
Operational Noise[1]	Noise-Sensitive	Exterior Noise Level Standards[2]	See Table 3-1.	
		If ambient is ≥ 65dBA L_{50}	≥ 3 dBA L_{50} Project increase	
		If ambient is ≥ 65dBA L_{50}	≥ 5 dBA L_{50} Project increase	
Construction Noise & Vibration[1]	Noise-Sensitive	Noise Level Increase	5 dBA L_{eq}	n/a
		Vibration Level Threshold (Annoyance)	85 VdB	n/a
		Vibration Level Threshold (Building Damage)	95 VdB	n/a

[1] Source: City of Santa Ana Transit Zoning Code (SD 84A and SD 84B) Environmental Impact Report, Section 4.8 Noise.
[2] Source: City of Santa Ana Municipal Code, Section 18-312 (Appendix 3.1).
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.; "n/a" = No nighttime construction activity is permitted, so no nighttime construction noise level limits are identified.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, six 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Tuesday, January 29th, 2019. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (17)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent any part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (7) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (12)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (12) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Additional median noise levels (L_{50}) are provided on Table 5-1 consistent with the City of Santa Ana Municipal Code exterior noise level standards. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Location L1 represents the noise levels on 4th Street north of the Project site adjacent to an existing commercial area. The noise level measurements collected show an overall 24-hour exterior noise level of 67.1 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 61.0 dBA L_{eq} with an average nighttime noise level of 60.4 dBA L_{eq}.
- Location L2 represents the noise levels on 4th Street northeast of the Project site adjacent to the Downtown Santa Ana Historic District. The noise level measurements collected show an overall 24-hour exterior noise level of 71.7 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 64.9 dBA L_{eq} with an average nighttime noise level of 65.2 dBA L_{eq}.
- Location L3 represents the noise levels on Main Street east of the Project site adjacent to an existing restaurant. The 24-hour CNEL indicates that the overall exterior noise level is 67.9 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 61.8 dBA L_{eq} with an average nighttime noise level of 61.2 dBA L_{eq}.
- Location L4 represents the noise levels on 3rd Street south of the Project site adjacent to Sycamore Street near existing residential uses. The noise level measurements collected show an overall 24-hour exterior noise level of 66.9 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 61.6 dBA L_{eq} with an average nighttime noise level of 60.0 dBA L_{eq}.
- Location L5 represents the noise levels on 3rd Street adjacent to the Project site and existing commercial uses. The noise level measurements collected show an overall 24-hour exterior noise level of 72.0 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 69.6 dBA L_{eq} with an average nighttime noise level of 63.9 dBA L_{eq}.
- Location L6 represents the noise levels on North Broadway adjacent to the Project site and Alcatraz Flowers. The noise level measurements collected show an overall 24-hour exterior noise level of 70.6 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 67.1 dBA L_{eq} with an average nighttime noise level of 63.0 dBA L_{eq}.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with the arterial roadway network. The 24-hour existing noise level measurements shown on Table 5-1 present the existing ambient noise conditions.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Distance to Project Boundary (Feet)	Description	Energy Average Noise Level (dBA L_{eq})[2]		Average Median Noise Level (dBA L_{50})[2]		CNEL
			Daytime	Nighttime	Daytime	Nighttime	
L1	140'	Located on W 4th St. north of the Project site adjacent to an existing commercial area.	61.0	60.4	56.1	49.7	67.1
L2	155'	Located on W 4th St. northeast of the Project site adjacent to the Downtown Santa Ana Historic District.	64.9	65.2	61.5	56.6	71.7
L3	10'	Located on Main St. east of the Project site adjacent to an existing restaurant.	61.8	61.2	58.0	53.8	67.9
L4	60'	Located on W 3rd St. south of the Project site adjacent to S Sycamore St.	61.6	60.0	56.9	51.9	66.9
L5	0'	Located on W 3rd St. adjacent to the Project site and existing commercial uses.	69.6	63.9	63.9	54.4	72.0
L6	0'	Located on N Broadway St. adjacent to the Project site and Alcatraz Flowers.	67.1	63.0	62.5	52.8	70.6

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average hourly levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (18) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (19) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.1.1 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the 10 study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Santa Ana General Plan Circulation Element, and the posted vehicle speeds. Hard site conditions are used to account for the sound propagation loss over reflective surfaces between the source and receiver.

The Existing, Opening Year 2021, and Horizon Year 2040 average daily traffic volumes used for this study are presented on Table 6-2 and are provided by *Caribou Industries Proposal for the 3rd Street Promenade Traffic Impact Analysis*. (3) Table 6-3 presents the time of day vehicle splits and Table 6-4 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Planned (Existing) Land Use[1]	Distance From Centerline To Nearest Adjacent Land Use (Feet)[2]	Vehicle Speed (mph)[3]
1	N. Broadway	n/o 4th St.	DC (Commercial)	30'	25
2	N. Broadway	s/o 3rd St.	DC (Commercial)	30'	25
3	Main St.	n/o 4th St.	DC (Commercial)	40'	30
4	Main St.	s/o 3rd St.	DC (Commercial)	40'	30
5	4th St.	w/o N. Broadway	DC (Commercial)	40'	25
6	4th St.	e/o Main St.	DC (Commercial)	40'	25
7	3rd St.	w/o N. Broadway	DC (Commercial/Residential)	30'	25
8	3rd St.	e/o Main St.	DC (Commercial)	30'	25
9	1st St.	w/o Sycamore St.	DC (Commercial)	60'	40
10	1st St.	e/o Sycamore St.	DC/Commercial	60'	40

[1] Source: City of Santa Ana General Plan Land Use Element (Exhibit A-4).
[2] Distance to adjacent land use is based upon the right-of-way distances for each functional roadway classification provided in the General Plan Circulation Element.
[3] Source: 3rd & Broadway Traffic Impact Analysis, Urban Crossroads, Inc.
"DC" = District Center

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]					
			Existing		Opening Year 2021		Horizon Year 2040	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	N. Broadway	n/o 4th St.	14.6	14.8	17.6	17.7	41.5	42.2
2	N. Broadway	s/o 3rd St.	13.1	13.4	15.6	15.9	34.9	35.8
3	Main St.	n/o 4th St.	22.1	22.3	26.8	27.0	35.2	37.9
4	Main St.	s/o 3rd St.	20.6	20.6	24.9	25.0	33.0	34.4
5	4th St.	w/o N. Broadway	2.8	2.9	4.0	4.0	35.4	35.7
6	4th St.	e/o Main St.	4.4	4.5	7.1	7.2	27.4	27.8
7	3rd St.	w/o N. Broadway	4.4	4.5	5.4	5.4	24.4	24.6
8	3rd St.	e/o Main St.	4.0	4.0	4.8	4.8	12.4	12.6
9	1st St.	w/o Sycamore St.	32.6	32.6	37.4	37.4	10.4	10.9
10	1st St.	e/o Sycamore St.	30.9	30.9	35.5	35.9	4.8	4.8

[1] Source: 3rd & Broadway Traffic Impact Analysis, Urban Crossroads, Inc.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Vehicle Type	Time of Day Splits[1]			Total of Time of Day Splits
	Daytime	Evening	Nighttime	
Autos	77.50%	12.90%	9.60%	100.00%
Medium Trucks	84.80%	4.90%	10.30%	100.00%
Heavy Trucks	86.50%	2.70%	10.80%	100.00%

[1] Source: Typical Southern California vehicle mix & County of Orange Land Use/Noise Compatibility Manual, December 1993.
"Daytime" = 7:00 a.m. to 7:00 p.m.; "Evening" = 7:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

TABLE 6-4: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Classification	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
All Roadways[1]	97.42%	1.84%	0.74%	100.00%

[1] Source: County of Orange Land Use/Noise Compatibility Manual, December 1993.

6.1.2 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the average daily traffic (ADT) volumes used for this study are presented on Table 6-5. Future traffic volumes on N. Broadway and 3rd Street are based on the *Caribou Industries Proposal for the 3rd Street Promenade Traffic Impact Analysis* Horizon Year 2040 volumes. (3) Hard site conditions are used to account for the sound propagation loss over reflective surfaces between the source and receiver.

As previously described, Table 6-3 presents the time of day vehicle splits and Table 6-4 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-5: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification	Horizon Year 2040 with Project ADT Volume[1]	Speed Limit (mph)[2]	Site Conditions
N. Broadway	2	Commuter	18,500	25	Hard
3rd St.	2	Commuter	6,400	25	Hard

[1] Source: 3rd & Broadway Traffic Impact Analysis, Urban Crossroads, Inc.
[2] Posted speed limits.
"ADT" = Average Daily Traffic

The site plan is used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to any intervening noise barriers, and the building façade. The exterior noise level impacts were placed five feet above the finished floor elevation at the outdoor living areas and proposed building façades.

6.2 CONSTRUCTION VIBRATION ASSESSMENT METHODOLOGY

This analysis focuses on the potential ground-borne vibration associated with vehicular traffic and construction activities. Ground-borne vibration levels from automobile traffic are generally overshadowed by vibration generated by heavy trucks that roll over the same uneven roadway surfaces. However, due to the rapid drop-off rate of ground-borne vibration and the short duration of the associated events, vehicular traffic-induced ground-borne vibration is rarely perceptible beyond the roadway right-of-way, and rarely results in vibration levels that cause damage to buildings in the vicinity.

However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-4. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the following vibration assessment methods defined by the FTA. (12) To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation: $L_{VdB}(D) = L_{VdB}(25\ ft) - 30\log(D/25)$

TABLE 6-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Vibration Decibels (VdB) at 25 feet[1]
Small bulldozer	58
Jackhammer	79
Loaded Trucks	86
Large bulldozer	87

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, September 2018.

7 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on *Caribou Industries Proposal for the 3rd Street Promenade Traffic Impact Analysis*. (3) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Conditions Without Project: This scenario refers to the existing present-day noise conditions without the proposed Project.
    - Existing With Project: This scenario refers to the existing present-day noise conditions with the proposed Project.
- Opening Year 2021 Without the Project: This scenario refers to Opening Year noise conditions without the proposed Project.
    - Opening Year 2021 With Project: This scenario includes all cumulative projects identified in the *Traffic Impact Analysis*.
- Horizon Year 2040 Without Project: This scenario refers to the background noise conditions at Horizon Year 2040 without the proposed Project.
    - Horizon Year 2040 With Project: This scenario corresponds to Horizon Year 2040 conditions, and includes all cumulative projects identified in the *Traffic Impact Analysis*.

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 and 7-6 present a summary of the exterior traffic noise levels, without barrier attenuation, for the 10 study area roadway segments analyzed from the without Project to the with Project conditions for Existing, Opening Year 2021, and Horizon Year 2040 conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Broadway	n/o 4th St.	DC (Commercial)	65.5	RW	33	106
2	N. Broadway	s/o 3rd St.	DC (Commercial)	65.0	RW	30	95
3	Main St.	n/o 4th St.	DC (Commercial)	68.3	RW	85	270
4	Main St.	s/o 3rd St.	DC (Commercial)	68.0	RW	80	252
5	4th St.	w/o N. Broadway	DC (Commercial)	57.0	RW	RW	RW
6	4th St.	e/o Main St.	DC (Commercial)	59.0	RW	RW	RW
7	3rd St.	w/o N. Broadway	DC (Commercial/Residential)	60.3	RW	RW	32
8	3rd St.	e/o Main St.	DC (Commercial)	59.9	RW	RW	RW
9	1st St.	w/o Sycamore St.	DC (Commercial)	71.8	91	287	909
10	1st St.	e/o Sycamore St.	DC/Commercial	71.6	86	273	862

[1] Source: City of Santa Ana General Plan Land Use Element (Exhibit A-4).
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Broadway	n/o 4th St.	DC (Commercial)	65.5	RW	34	107
2	N. Broadway	s/o 3rd St.	DC (Commercial)	65.1	RW	31	97
3	Main St.	n/o 4th St.	DC (Commercial)	68.3	RW	86	273
4	Main St.	s/o 3rd St.	DC (Commercial)	68.0	RW	80	252
5	4th St.	w/o N. Broadway	DC (Commercial)	57.2	RW	RW	RW
6	4th St.	e/o Main St.	DC (Commercial)	59.1	RW	RW	RW
7	3rd St.	w/o N. Broadway	DC (Commercial/Residential)	60.4	RW	RW	33
8	3rd St.	e/o Main St.	DC (Commercial)	59.9	RW	RW	RW
9	1st St.	w/o Sycamore St.	DC (Commercial)	71.8	91	287	909
10	1st St.	e/o Sycamore St.	DC/Commercial	71.6	86	273	862

[1] Source: City of Santa Ana General Plan Land Use Element (Exhibit A-4).
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: OPENING YEAR WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Broadway	n/o 4th St.	DC (Commercial)	65.9	RW	37	116
2	N. Broadway	s/o 3rd St.	DC (Commercial)	65.4	RW	33	103
3	Main St.	n/o 4th St.	DC (Commercial)	68.7	RW	94	298
4	Main St.	s/o 3rd St.	DC (Commercial)	68.4	RW	88	277
5	4th St.	w/o N. Broadway	DC (Commercial)	58.1	RW	RW	RW
6	4th St.	e/o Main St.	DC (Commercial)	59.7	RW	RW	RW
7	3rd St.	w/o N. Broadway	DC (Commercial/Residential)	60.7	RW	RW	36
8	3rd St.	e/o Main St.	DC (Commercial)	60.3	RW	RW	32
9	1st St.	w/o Sycamore St.	DC (Commercial)	72.0	95	300	948
10	1st St.	e/o Sycamore St.	DC/Commercial	71.8	90	285	901

[1] Source: City of Santa Ana General Plan Land Use Element (Exhibit A-4).
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: OPENING YEAR WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Broadway	n/o 4th St.	DC (Commercial)	65.9	RW	37	117
2	N. Broadway	s/o 3rd St.	DC (Commercial)	65.4	RW	33	105
3	Main St.	n/o 4th St.	DC (Commercial)	68.8	RW	95	301
4	Main St.	s/o 3rd St.	DC (Commercial)	68.4	RW	88	277
5	4th St.	w/o N. Broadway	DC (Commercial)	58.2	RW	RW	RW
6	4th St.	e/o Main St.	DC (Commercial)	59.8	RW	RW	RW
7	3rd St.	w/o N. Broadway	DC (Commercial/Residential)	60.8	RW	RW	36
8	3rd St.	e/o Main St.	DC (Commercial)	60.3	RW	RW	32
9	1st St.	w/o Sycamore St.	DC (Commercial)	72.0	95	300	948
10	1st St.	e/o Sycamore St.	DC/Commercial	71.8	91	288	912

[1] Source: City of Santa Ana General Plan Land Use Element (Exhibit A-4).
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: HORIZON YEAR 2040 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Broadway	n/o 4th St.	DC (Commercial)	66.3	RW	40	128
2	N. Broadway	s/o 3rd St.	DC (Commercial)	65.8	RW	36	113
3	Main St.	n/o 4th St.	DC (Commercial)	69.1	RW	104	328
4	Main St.	s/o 3rd St.	DC (Commercial)	68.8	RW	96	304
5	4th St.	w/o N. Broadway	DC (Commercial)	58.6	RW	RW	RW
6	4th St.	e/o Main St.	DC (Commercial)	61.1	RW	RW	51
7	3rd St.	w/o N. Broadway	DC (Commercial/Residential)	61.2	RW	RW	39
8	3rd St.	e/o Main St.	DC (Commercial)	60.6	RW	RW	35
9	1st St.	w/o Sycamore St.	DC (Commercial)	72.4	104	330	1043
10	1st St.	e/o Sycamore St.	DC/Commercial	72.2	99	313	990

[1] Source: City of Santa Ana General Plan Land Use Element (Exhibit A-4).
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: HORIZON YEAR 2040 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Broadway	n/o 4th St.	DC (Commercial)	66.3	RW	41	128
2	N. Broadway	s/o 3rd St.	DC (Commercial)	65.8	RW	36	115
3	Main St.	n/o 4th St.	DC (Commercial)	69.2	RW	104	330
4	Main St.	s/o 3rd St.	DC (Commercial)	68.8	RW	97	306
5	4th St.	w/o N. Broadway	DC (Commercial)	58.6	RW	RW	RW
6	4th St.	e/o Main St.	DC (Commercial)	61.1	RW	RW	52
7	3rd St.	w/o N. Broadway	DC (Commercial/Residential)	61.2	RW	RW	39
8	3rd St.	e/o Main St.	DC (Commercial)	60.6	RW	RW	35
9	1st St.	w/o Sycamore St.	DC (Commercial)	72.4	104	330	1043
10	1st St.	e/o Sycamore St.	DC/Commercial	72.2	100	317	1001

[1] Source: City of Santa Ana General Plan Land Use Element (Exhibit A-4).
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

An analysis of existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report. However, the analysis of existing traffic noise levels plus traffic noise generated by the proposed Project scenario will not actually occur since the Project would not be fully constructed and operational until Year 2021 cumulative conditions. Table 7-1 presents the Existing without Project conditions CNEL noise levels. The without Project exterior noise levels are expected to range from 57.0 to 71.8 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography.

Table 7-2 shows the Existing with Project conditions will range from 57.2 to 71.8 dBA CNEL. As shown on Table 7-13 the Project will generate a noise level increase of up to 0.2 dBA CNEL on the study area roadway segments.

TABLE 7-7: EXISTING OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive Land Use?
			No Project	With Project	Project Addition	
1	N. Broadway	n/o 4th St.	65.5	65.5	0.1	No
2	N. Broadway	s/o 3rd St.	65.0	65.1	0.1	No
3	Main St.	n/o 4th St.	68.3	68.3	0.0	No
4	Main St.	s/o 3rd St.	68.0	68.0	0.0	No
5	4th St.	w/o N. Broadway	57.0	57.2	0.2	No
6	4th St.	e/o Main St.	59.0	59.1	0.1	No
7	3rd St.	w/o N. Broadway	60.3	60.4	0.1	Yes
8	3rd St.	e/o Main St.	59.9	59.9	0.0	No
9	1st St.	w/o Sycamore St.	71.8	71.8	0.0	No
10	1st St.	e/o Sycamore St.	71.6	71.6	0.0	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

7.3 OPENING YEAR 2021 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-3 presents the Opening Year without Project conditions CNEL noise levels which are expected to range from 58.1 to 72.0 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography.

Table 7-4 shows the Opening Year with Project conditions will range from 58.2 to 72.0 dBA CNEL. As shown on Table 7-8 the Project will generate a noise level increase of up to 0.1 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under Opening Year with Project conditions at the land uses adjacent to roadways conveying Project traffic.

TABLE 7-8: OPENING YEAR OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive Land Use?	Threshold Exceeded?[2]
			No Project	With Project	Project Addition		
1	N. Broadway	n/o 4th St.	65.9	65.9	0.0	No	No
2	N. Broadway	s/o 3rd St.	65.4	65.4	0.1	No	No
3	Main St.	n/o 4th St.	68.7	68.8	0.0	No	No
4	Main St.	s/o 3rd St.	68.4	68.4	0.0	No	No
5	4th St.	w/o N. Broadway	58.1	58.2	0.1	No	No
6	4th St.	e/o Main St.	59.7	59.8	0.1	No	No
7	3rd St.	w/o N. Broadway	60.7	60.8	0.1	Yes	No
8	3rd St.	e/o Main St.	60.3	60.3	0.0	No	No
9	1st St.	w/o Sycamore St.	72.0	72.0	0.0	No	No
10	1st St.	e/o Sycamore St.	71.8	71.8	0.1	No	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
[2] Significance Criteria (Section 4).

7.4 HORIZON YEAR 2040 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-5 presents the Horizon Year 2040 without Project conditions CNEL noise levels are expected to range from 58.6 to 72.4 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography.

Table 7-6 shows the Horizon Year 2040 with Project conditions will range from 58.6 to 72.4 dBA CNEL. As shown on Table 7-19 the Project will generate a noise level increase of up to 0.1 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under Horizon Year 2040 with Project conditions at the land uses adjacent to roadways conveying Project traffic.

TABLE 7-9: HORIZON YEAR 2040 OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive Land Use?	Threshold Exceeded?[2]
			No Project	With Project	Project Addition		
1	N. Broadway	n/o 4th St.	66.3	66.3	0.0	No	No
2	N. Broadway	s/o 3rd St.	65.8	65.8	0.1	No	No
3	Main St.	n/o 4th St.	69.1	69.2	0.0	No	No
4	Main St.	s/o 3rd St.	68.8	68.8	0.0	No	No
5	4th St.	w/o N. Broadway	58.6	58.6	0.0	No	No
6	4th St.	e/o Main St.	61.1	61.1	0.1	No	No
7	3rd St.	w/o N. Broadway	61.2	61.2	0.0	Yes	No
8	3rd St.	e/o Main St.	60.6	60.6	0.0	No	No
9	1st St.	w/o Sycamore St.	72.4	72.4	0.0	No	No
10	1st St.	e/o Sycamore St.	72.2	72.2	0.0	No	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
[2] Significance Criteria (Section 4).

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8 ON-SITE NOISE IMPACTS

Consistent with MM 4.8-5 and MM 4.8-6 of the TZC EIR, an on-site traffic noise analysis was prepared to determine the noise levels that would result from off-site transportation noise sources, and to identify potential noise attenuation measures that would achieve acceptable Project exterior and interior noise levels. The TZC EIR MMs are as follows:

MM 4.8-5 *When residential uses would be located in areas with noise levels in excess of 60 dBA CNEL (either through conversion of use/structure or new construction), the project applicant shall provide noise barriers around private open space areas, including patios and balconies, as necessary. The height and density of the barriers shall be sufficient to reduce the exterior noise levels within private open space areas to a CNEL of 65 dBA or less.*

MM 4.8-6 *Prior to issuance of building permits, building plans shall specify the STC rating of windows and doors for all residential land uses. Window and door ratings shall be sufficient to reduce the interior noise level to a CNEL of 45 dBA or less, and shall be determined by a qualified acoustical consultant as part of the final engineering design of the project.*

8.1 EXTERIOR NOISE ANALYSIS

The primary source of traffic noise affecting the Project site is anticipated to be from North Broadway and 3rd Street. The Project will also experience some background traffic noise impacts Sycamore Street. However, due to the low traffic volume and low speeds of vehicles travelling on Sycamore Street, traffic noise from this roadway segment will not make a significant contribution to the noise environment beyond of the right-of-way of the road.

Using the FHWA traffic noise prediction model, and the parameters outlined in Section 6, the expected future exterior noise levels are calculated at the closest outdoor areas (e.g., patios, balconies) and exterior building façades adjacent to each roadway. Table 8-1 presents a summary of outdoor areas considered in this analysis based on the plans provided in the *3rd & Broadway Development Project Review* (4)

TABLE 8-1: OUTDOOR AREAS FOR EXTERIOR TRAFFIC NOISE ANALYSIS

Floor	Residential Building Outdoor Living Area	Hotel Building Outdoor Area
1	-	-
2	Private Balconies	-
3	Private Balconies	Private/Common Patios
4	Private Balconies	Common Patio
5	Common Outdoor Area	Common Patio
6	-	Common Patio
7	-	Common Patio
8	-	Common Patio
9	Private Patios	Common Patio
10	Private Patio	Bar/Patio
11	Private Patio	-
12	Private Patio	-
13	Private Patio	-
14	Private Patio	-
15	Common Pool Deck	-

Source: 3rd & Broadway Development Project Review, August 2018.
" - " = No outdoor area requiring exterior noise analysis (e.g., building façade).

The analysis shows that the future unmitigated on-site traffic noise levels are expected to satisfy TZC EIR MM 4.8-5 65 dBA CNEL exterior noise level for outdoor areas (e.g., patios, balconies) within the Project site with exterior noise levels ranging from 48.8 to 55.4 dBA CNEL, as shown on Table 8-2. The future on-site traffic noise analysis includes the barrier attenuation provided by the planned minimum 3-foot high glass guard rails. (4) As such, the future on-site traffic noise impacts to outdoor areas are considered *less than significant* impacts, consistent with the findings of the TZC EIR.

TABLE 8-2: UNMITIGATED EXTERIOR TRAFFIC NOISE LEVELS

On-Site Receiver Location	Roadway	Unmitigated Noise Level (dBA CNEL)	Exterior Area Threshold (dBA CNEL)	Threshold Exceeded?
Residential (West 2F) Façade	N. Broadway	66.0	n/a - Building Façade	
Residential (South 2F) Balcony	3rd St.	55.4	65	No
Residential (West 3F) Façade	N. Broadway	66.7	n/a - Building Façade	
Residential (South 3F) Balcony	3rd St.	50.9	65	No
Hotel (South 3F) Patios	3rd St.	48.8	65	No
Residential (West 4F) Façade	N. Broadway	66.7	n/a - Building Façade	
Residential (South 4F) Balcony	3rd St.	49.3	65	No
Hotel (South 4F) Façade	3rd St.	59.7	n/a - Building Façade	

"n/a" = Building façade receiver locations are analyzed to determine the interior noise levels as shown in Table 8-3 and do not represent outdoor living areas (e.g., patios, balconies) requiring exterior noise analysis.

8.2 INTERIOR NOISE ANALYSIS

To ensure that the interior noise levels comply with the City of Santa Ana interior noise level standards, future noise levels were calculated at the first to fourth-floor and above building façades.

8.2.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building facade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." (9; 20) However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: (1) weather-stripped solid core exterior doors; (2) upgraded dual glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assembles free of cut outs or openings.

8.2.2 INTERIOR NOISE LEVEL ASSESSMENT

Table 8-3 shows that the units within the Project buildings will require a windows-closed condition and a means of mechanical ventilation (e.g. air conditioning). Table 8-3 shows that the future exterior noise levels at the building façades are expected to range from 49.3 to 66.7 dBA CNEL. The interior noise level analysis shows that the City of Santa Ana 45 dBA CNEL residential interior noise standards can be satisfied using standard windows and glass doors with a minimum STC rating of 27.

TABLE 8-3: UNMITIGATED INTERIOR NOISE LEVELS (CNEL)

Building (Façade)	Floor	Noise Level at Façade[1]	Required Interior NR[2]	Minimum Estimated Interior NR[3]	Upgraded Windows[4]	Interior Noise Level[5]	Threshold	Threshold Exceeded?
Residential (West)	2	66.0	21.0	25.0	No	41.0	45	No
	3	66.7	21.7	25.0	No	41.7	45	No
	4+	66.7	21.7	25.0	No	41.7	45	No
Residential (South)	2	55.4	10.4	25.0	No	30.4	45	No
	3	50.9	5.9	25.0	No	25.9	45	No
	4+	49.3	4.3	25.0	No	24.3	45	No
Hotel (South)	3	60.5	15.5	25.0	No	35.5	45	No
	4+	59.7	14.7	25.0	No	34.7	45	No

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the City of Santa Ana General Plan, Table 1, 45 dBA CNEL interior noise standard for residential uses.
[3] Minimum calculated interior noise reduction from all rooms for each unit plan as shown on Table 8-2.
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise Reduction

9 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following receiver locations as shown on Exhibit 9-A were identified as representative locations for focused analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Sensitive receivers near the Project site include existing residential uses, as described below. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures.

R1: Located approximately 62 feet south of the Project site, R1 represents existing residential use south of 3rd Street. A 24-hour noise level measurement was taken near this location, L4, to describe the existing ambient noise environment.

R2: Location R2 represents existing residential use above commercial at the southwest corner of North Broadway and 3rd Street. A 24-hour noise level measurement was taken near this location, L5, to describe the existing ambient noise environment.

EXHIBIT 9-A: RECEIVER LOCATIONS



10 OPERATIONAL IMPACTS

This section analyzes the potential operational noise impacts due to the Project's stationary noise sources on the off-site sensitive receiver locations identified in Section 9. Exhibit 10-A identifies the receiver locations and noise source locations used to assess the Project-related operational noise levels.

10.1 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 10-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with the roof-top mechanical ventilation equipment, parking garage vehicle movements, outdoor pool/spa activity, auto lifts (hotel parking), and outdoor bar area activity all operating continuously. These noise level impacts will likely vary throughout the day.

10.1.1 ROOF-TOP MECHANICAL VENTILATION EQUIPMENT

To assess the noise levels created by the roof-top air conditioning units at the Project site, reference noise levels measurements were taken at the Santee Walmart on July 27th, 2015. Located at 170 Town Center Parkway in the City of Santee, the noise level measurements describe mechanical roof-top air conditioning units on the roof of an existing Walmart store, with multiple units operating simultaneously. The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit. Using a uniform reference distance of 50 feet, the reference noise level noise level is 54.4 dBA L_{50}. The operating conditions of the reference noise level measurement reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F; this resulted in activity of 39 minutes of the peak hour.

10.1.2 PARKING GARAGE VEHICLE MOVEMENTS

To determine the noise levels associated with residential apartment community parking-related vehicle movements, Urban Crossroads collected reference noise level measurements at the Windemere Apartment community in the City of Riverside on August 24th, 2016. The reference 1-hour noise level measurement is based on the peak hour of activity over a total measurement duration of 24-hours and indicates that the parking lot vehicle movements generates noise levels of 33.5 dBA L_{50} at a normalized distance of 50 feet. The reference noise levels were mainly due to cars pulling in and out of spaces and residents going to and from their apartment homes, and includes horns honking in the parking lot. Noise associated with parking garage vehicle movements is expected during the typical daytime, and nighttime conditions for the entire hour (60 minutes).

10.1.3 OUTDOOR POOL/SPA ACTIVITY

To represent the noise levels associated with pool activities, Urban Crossroads collected a reference noise level measurement on July 5th, 2017 at the Covenant Hill Clubhouse Pool in the unincorporated community of Ladera Ranch in the County of Orange. The measured reference noise level at the uniform 50-foot reference distance is 48.7 dBA L_{50} for pool activity. The pool activity noise levels include kids playing, running, screaming, splashing, playing with a ball, and parents talking. Noise associated with pool activities is expected to occur for the entire hour (60 minutes).

10.1.4 HOTEL PARKING AUTO LIFT

To represent the noise levels associated with auto lifts at the Project's hotel building, Urban Crossroads collected a reference noise level measurement on June 19th, 2015 at the Discount Tire Center in the City of Lake Forest. The measured reference noise level at the uniform 50-foot reference distance is 50.0 dBA L_{50}. The auto lift activity noise levels include lift movement of an automobile with background maintenance activities. Noise associated with hotel parking auto lift activities is expected to occur for the 20 minutes during peak hour conditions.

10.1.5 OUTDOOR BAR AREA ACTIVITY

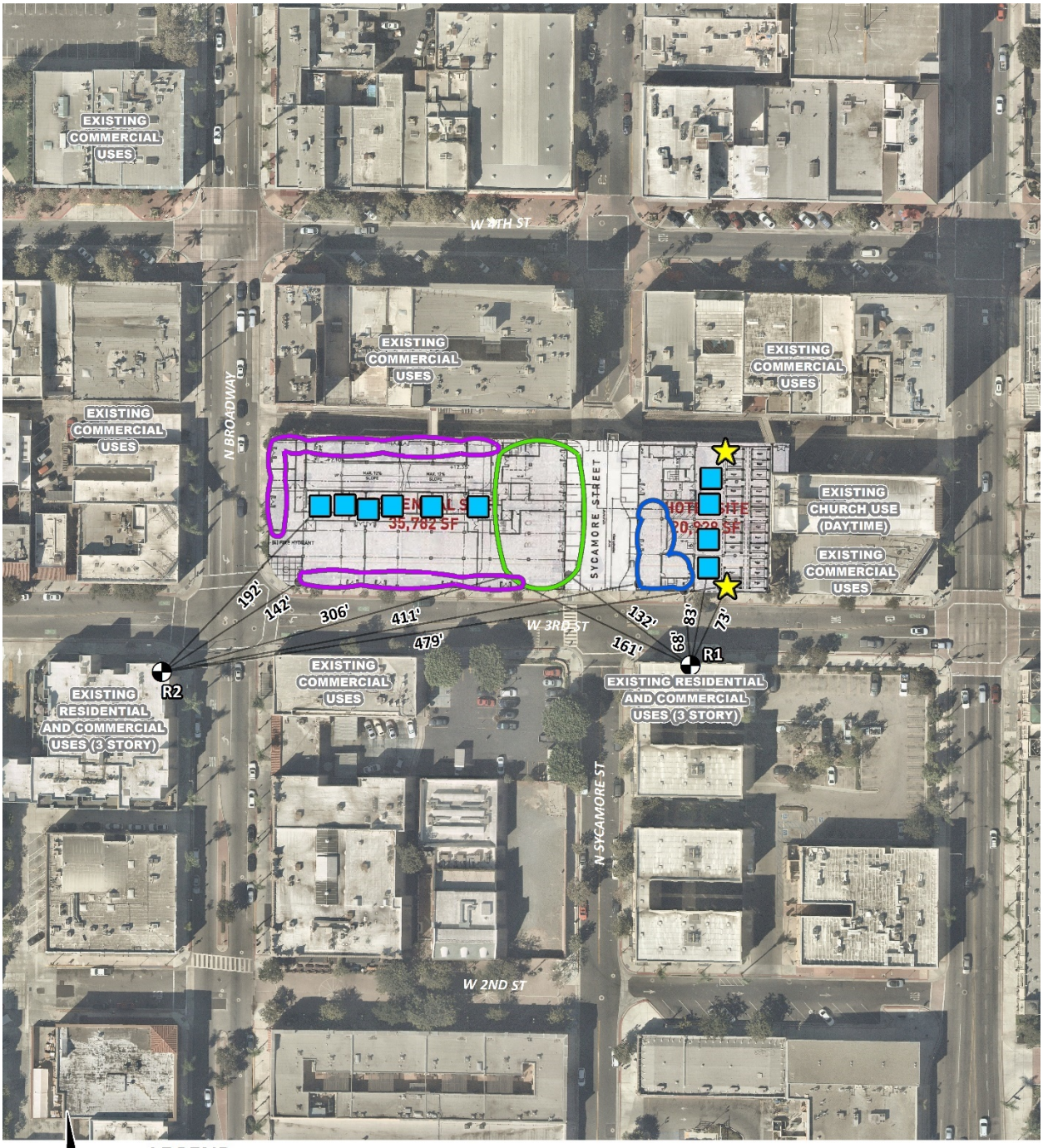
To describe the noise levels associated with roof-top outdoor bar area activities at the Project's hotel building, Urban Crossroads collected a reference noise level measurement on February 8th, 2018 at an outdoor restaurant patio dining and bar area in the City of South Pasadena. The measured reference noise level at the uniform 50-foot reference distance is 56.2 dBA L_{50}. The outdoor bar area activity noise levels include people talking, waiters carrying and filling drink glasses, music playing, and background traffic noise. Noise associated with outdoor bar area activity is expected to occur the entire hour (60 minutes).

TABLE 10-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source	Duration (hh:mm:ss)	Ref. Distance (Feet)	Noise Source Height (Feet)	Hourly Activity (Mins)[7]	Reference Noise Level (dBA L_{50})	
					@ Ref. Dist.	@ 50 Feet
Roof-Top Mechanical Ventilation Equipment[1]	96:00:00	5'	5'	39	74.4	54.4
Parking Garage Vehicle Movements[2]	01:00:00	10'	5'	60	44.0	37.0
Outdoor Pool/Spa Activity[3]	00:10:00	5'	4'	60	68.7	48.7
Hotel Parking Auto Lift[4]	01:00:00	10'	8'	20	64.0	50.0
Outdoor Bar Area Activity[5]	00:10:00	30'	5'	60	60.6	56.2

[1] As measured by Urban Crossroads, Inc. on 7/27/2015 at the Santee Walmart located at 170 Town Center Parkway.
[2] As measured by Urban Crossroads, Inc. on 8/24/2016 in the parking lot of the Windemere Apartment community in the City of Riverside.
[3] As measured by Urban Crossroads, Inc. on 7/5/2017 at the Covenant Hill Clubhouse pool in the unincorporated community of Ladera Ranch in the County of Orange.
[4] As measured by Urban Crossroads, Inc. on 6/19/2015 at a Discount Tire Center in the City of Lake Forest.
[5] As measured by Urban Crossroads, Inc. on 2/8/2018 at an outdoor restaurant patio dining and bar area in South Pasadena.
[6] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site based on the reference noise level measurement activity.

EXHIBIT 10-A: OPERATIONAL NOISE SOURCE AND RECEIVER LOCATIONS



10.2 OPERATIONAL NOISE LEVELS

Based upon the reference noise levels, it is possible to estimate the Project operational stationary-source noise levels at each of the sensitive receiver locations. The operational noise level calculations shown on Table 10-2 account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. Hard site conditions are used in the operational noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source. The basic noise attenuation equation shown below is used to calculate the distance attenuation based on a reference noise level (SPL_1):

$$SPL_2 = SPL_1 - 20\log(D_2/D_1)$$

Where SPL_2 is the resulting noise level after attenuation, SPL_1 is the source noise level, D_2 is the distance to the reference sound pressure level (SPL_1), and D_1 is the distance to the receiver location. Table 10-2 indicates that the noise levels associated with the roof-top mechanical ventilation equipment, parking garage vehicle movements, outdoor pool/spa activity, auto lifts (hotel parking), and outdoor bar area activity are expected to range from 33.9 to 44.0 dBA L_{50} at the sensitive off-site receiver locations.

The operational noise level calculation worksheets are included in Appendix 10.1 and include barrier attenuation provided by intervening structures between each noise source and the receiver locations, where applicable, from planned Project buildings and associated glass guard rails.

TABLE 10-2: UNMITIGATED PROJECT OPERATIONAL NOISE LEVELS

Receiver Location[1]	Noise Source[2]	Project Operational Noise Levels (dBA)[3]				
		L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (<1 min)
R1-1st Floor	Roof-Top Mechanical Ventilation	31.4	33.1	34.4	34.7	35.2
	Parking Garage Vehicle Movements	26.1	29.1	37.1	43.1	50.7
	Outdoor Pool/Spa Activity	25.2	28.2	31.5	34.6	40.0
	Hotel Parking Auto Lift	41.9	42.4	44.1	45.1	45.1
	Outdoor Bar Area Activity	38.3	42.7	46.1	48.5	52.0
	Combined Noise Level:	**43.9**	**46.0**	**48.8**	**51.1**	**55.1**
R2-2nd Floor	Roof-Top Mechanical Ventilation	24.9	26.6	27.9	28.2	28.7
	Parking Garage Vehicle Movements	27.2	30.2	38.2	44.2	51.8
	Outdoor Pool/Spa Activity	21.4	24.4	27.7	30.8	36.2
	Hotel Parking Auto Lift	25.6	26.1	27.8	28.8	28.8
	Outdoor Bar Area Activity	30.5	34.9	38.3	40.7	44.2
	Combined Noise Level:	**33.9**	**37.2**	**41.8**	**46.1**	**52.6**
R1-2nd Floor	Roof-Top Mechanical Ventilation	31.5	33.2	34.5	34.8	35.3
	Parking Garage Vehicle Movements	26.7	29.7	37.7	43.7	51.3
	Outdoor Pool/Spa Activity	25.4	28.4	31.7	34.8	40.2
	Hotel Parking Auto Lift	41.9	42.4	44.1	45.1	45.1
	Outdoor Bar Area Activity	38.5	42.9	46.3	48.7	52.2
	Combined Noise Level:	**43.9**	**46.1**	**49.0**	**51.3**	**55.4**
R2-3rd Floor	Roof-Top Mechanical Ventilation	25.5	27.2	28.5	28.8	29.3
	Parking Garage Vehicle Movements	27.6	30.6	38.6	44.6	52.2
	Outdoor Pool/Spa Activity	21.7	24.7	28.0	31.1	36.5
	Hotel Parking Auto Lift	25.6	26.1	27.8	28.8	28.8
	Outdoor Bar Area Activity	30.9	35.3	38.7	41.1	44.6
	Combined Noise Level:	**34.3**	**37.6**	**42.2**	**46.5**	**53.0**
R1-3rd Floor	Roof-Top Mechanical Ventilation	31.6	33.3	34.6	34.9	35.4
	Parking Garage Vehicle Movements	27.0	30.0	38.0	44.0	51.6
	Outdoor Pool/Spa Activity	25.5	28.5	31.8	34.9	40.3
	Hotel Parking Auto Lift	41.9	42.4	44.1	45.1	45.1
	Outdoor Bar Area Activity	38.8	43.2	46.6	49.0	52.5
	Combined Noise Level:	**44.0**	**46.2**	**49.1**	**51.6**	**55.7**

[1] See Exhibit 10-A for the receiver and noise source locations.
[2] Reference noise sources as shown on Table 10-1.
[3] Operational noise level calculations are provided in Appendix 10.1.

10.3 UNMITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level threshold based on the City of Santa Ana exterior noise level standards. Table 10-3 shows the operational noise levels associated with Caribou Industries Proposal for the 3rd Street Promenade Project will satisfy the City of Santa Ana Municipal Code daytime and nighttime exterior noise level standards at all receiver locations.

TABLE 10-3: UNMITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Floor	Land Use	Noise Level at Receiver Locations (dBA)[2]					Threshold Exceeded?[3]
			L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (<1 min)	
Daytime		**Residential Standards**	**55**	**60**	**65**	**70**	**75**	**-**
Nighttime			**50**	**55**	**60**	**65**	**70**	**-**
R1	1st	Residential	43.9	46.0	48.8	51.1	55.1	No
	2nd	Residential	43.9	46.1	49.0	51.3	55.4	No
	3rd	Residential	44.0	46.2	49.1	51.6	55.7	No
R2	2nd	Residential	33.9	37.2	41.8	46.1	52.6	No
	3rd	Residential	34.3	37.6	42.2	46.5	53.0	No

[1] See Exhibit 10-A for the receiver and noise source locations. The first floor of the building represented by receiver location R2 is commercial use, and therefore, is not included in this analysis for noise-sensitive residential uses.
[2] Estimated unmitigated Project operational noise levels as shown on Table 10-2.
[3] Do the estimated Project operational noise levels meet the operational noise level standards (Table 3-1)?

10.4 UNMITIGATED PROJECT OPERATIONAL NOISE CONTRIBUTION

To describe the Project operational noise level contributions, the Project operational noise levels were combined with the existing ambient noise levels measurements for the off-site receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (7) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describe the Project noise level contributions. Noise levels that would be experienced at receiver locations when Project-source noise is added to the ambient daytime and nighttime conditions are presented on Tables 10-4 and 10-5, respectively.

As indicated on Tables 10-4 and 10-5, the Project will contribute an operational noise level increase during the daytime hours of up to 0.2 dBA L_{50} and during the nighttime hours of up to 0.7 dBA L_{50}. The Project-related operational noise level contributions of up to 0.7 dBA L_{50} on the existing ambient noise environment are shown to satisfy the significance criteria discussed in Section 4, and the increases at the sensitive receiver locations will be *less than significant*. On this basis, Project operational stationary-source noise would not result in a substantial temporary/periodic, or permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project and impacts in these regards will be *less than significant*.

TABLE 10-4: UNMITIGATED DAYTIME OPERATIONAL NOISE LEVEL CONTRIBUTIONS

Receiver Location[1]	Floor	Total Project Operational Noise Level (dBA L_{50})[2]	Measurement Location[3]	Reference Ambient Noise Levels (dBA L_{50})[4]	Combined Project and Ambient (dBA L_{50})[5]	Project Contribution (dBA L_{50})[6]	Threshold Exceeded?[7]
R1	1st	43.9	L4	56.9	57.1	0.2	No
	2nd	43.9	L4	56.9	57.1	0.2	No
	3rd	44.0	L4	56.9	57.1	0.2	No
R2	2nd	33.9	L5	63.9	63.9	0.0	No
	3rd	34.3	L5	63.9	63.9	0.0	No

[1] See Exhibit 10-A for the sensitive receiver locations.
[2] Unmitigated Project operational noise levels as shown on Table 10-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance Criteria as defined in Section 4.

TABLE 10-5: UNMITIGATED NIGHTTIME OPERATIONAL NOISE LEVEL CONTRIBUTIONS

Receiver Location[1]	Floor	Total Project Operational Noise Level (dBA L_{50})[2]	Measurement Location[3]	Reference Ambient Noise Levels (dBA L_{50})[4]	Combined Project and Ambient (dBA L_{50})[5]	Project Contribution (dBA L_{50})[6]	Threshold Exceeded?[7]
R1	1st	43.9	L4	51.9	52.5	0.6	No
	2nd	43.9	L4	51.9	52.5	0.6	No
	3rd	44.0	L4	51.9	52.6	0.7	No
R2	2nd	33.9	L5	54.4	54.4	0.0	No
	3rd	34.3	L5	54.4	54.4	0.0	No

[1] See Exhibit 10-A for the sensitive receiver locations.
[2] Unmitigated Project operational noise levels as shown on Table 10-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance Criteria as defined in Section 4.

10.5 TZC EIR MM 4.8-7

The operational noise analysis, including the calculation worksheets provided in Appendix 10.1, shows that roof-top mechanical ventilation equipment noise levels would be reduced by a minimum of 15 dBA consistent with TZC EIR MM 4.8-7 as follows:

MM 4.8-7 *Each project applicant shall provide proper shielding for all new HVAC systems used by the proposed residential and mixed use buildings to achieve an attenuation of 15 dBA at 50 feet from the equipment.*

The *less than significant* impact findings of the operational noise analysis are, therefore, consistent with those of the TZC EIR and MM 4.8-7.

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11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 11-A shows the construction activity boundaries in relation to the nearby sensitive receiver locations.

11.1 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. The number and mix of construction equipment is expected to occur in the following stages:

- Demolition
- Grading
- Building Construction
- Paving
- Architectural Coating

This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for each stage of Project construction. The construction reference noise level measurements represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 68 dBA to in excess of 80 dBA when measured at 50 feet. Hard site conditions are used in the construction noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source (i.e. construction equipment). For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver and would be further reduced to 68 dBA at 200 feet from the source to the receiver. The construction stages used in this analysis are consistent with the data used to support the construction emissions in the *Caribou Industries Proposal for the 3rd Street Promenade Air Quality Impact Analysis* prepared by Urban Crossroads, Inc. (21)

11.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe the Project construction noise levels, measurements were collected for similar activities at several construction sites. Table 11-1 provides a summary of the construction reference noise level measurements. Since the reference noise levels were collected at varying distances, all construction noise level measurements presented on Table 11-1 have been adjusted to describe a common reference distance of 50 feet.

TABLE 11-1: CONSTRUCTION REFERENCE NOISE LEVELS

ID	Noise Source	Duration (h:mm:ss)	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance (dBA L_{eq})	Reference Noise Levels @ 50 Feet (dBA L_{eq})[5]
1	Truck Pass-Bys & Dozer Activity[1]	0:01:15	30'	63.6	59.2
2	Dozer Activity[1]	0:01:00	30'	68.6	64.2
3	Construction Vehicle Maintenance Activities[2]	0:01:00	30'	71.9	67.5
4	Foundation Trenching[2]	0:01:01	30'	72.6	68.2
5	Rough Grading Activities[2]	0:05:00	30'	77.9	73.5
6	Framing[3]	0:02:00	30'	66.7	62.3
7	Concrete Mixer Truck Movements[4]	0:01:00	50'	71.2	71.2
8	Concrete Paver Activities[4]	0:01:00	30'	70.0	65.6
9	Concrete Mixer Pour & Paving Activities[4]	0:01:00	30'	70.3	65.9
10	Concrete Mixer Backup Alarms & Air Brakes[4]	0:00:20	50'	71.6	71.6
11	Concrete Mixer Pour Activities[4]	1:00:00	50'	67.7	67.7

[1] As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.
[2] As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.
[3] As measured by Urban Crossroads, Inc. on 10/20/15 at a residential construction site located in Rancho Mission Viejo.
[4] Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.
[5] Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

EXHIBIT 11-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS



11.3 CONSTRUCTION NOISE ANALYSIS

Tables 11-2 to 11-6 show the Project construction stages and the reference construction noise levels used for each stage. Table 11-7 provides a summary of the noise levels from each stage of construction at each of the sensitive receiver locations. Based on the reference construction noise levels, the Project-related construction noise levels when the highest reference noise level is operating at the edge of primary construction activity nearest each sensitive receiver location will range from 56.0 to 71.3 dBA L_{eq} at the sensitive receiver locations, as shown on Table 11-7.

TABLE 11-2: DEMOLITION ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Truck Pass-Bys & Dozer Activity	59.2
Dozer Activity	64.2
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	64.2

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Estimated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	64'	-2.1	0.0	62.0
R2	128'	-8.2	0.0	56.0

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-3: GRADING ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Truck Pass-Bys & Dozer Activity	59.2
Dozer Activity	64.2
Rough Grading Activities	73.5
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	73.5

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Estimated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	64'	-2.1	0.0	71.3
R2	128'	-8.2	0.0	65.3

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-4: BUILDING CONSTRUCTION ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Construction Vehicle Maintenance Activities	67.5
Foundation Trenching	68.2
Framing	62.3
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	68.2

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Estimated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	64'	-2.1	0.0	66.0
R2	128'	-8.2	0.0	60.0

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-5: PAVING ARCHITECTURAL COATING ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Concrete Mixer Truck Movements	71.2
Concrete Paver Activities	65.6
Concrete Mixer Pour & Paving Activities	65.9
Concrete Mixer Backup Alarms & Air Brakes	71.6
Concrete Mixer Pour Activities	67.7
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	71.6

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Estimated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	64'	-2.1	0.0	69.5
R2	128'	-8.2	0.0	63.4

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-6: ARCHITECTURAL COATING ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Construction Vehicle Maintenance Activities	67.5
Foundation Trenching	68.2
Framing	62.3
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	68.2

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Estimated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	64'	-2.1	0.0	66.0
R2	128'	-8.2	0.0	60.0

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-7: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels by Stage (dBA L_{eq})					
	Demolition	Grading	Building Construction	Paving	Paving	Highest Construction Noise Level[2]
R1	62.0	71.3	66.0	69.5	66.0	71.3
R2	56.0	65.3	60.0	63.4	60.0	65.3

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Estimated construction noise levels during peak operating conditions.

11.4 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

Construction activities associated with the Project are shown to potentially range from 56.0 to 71.3 dBA L_{eq} at nearby sensitive receiver locations and represent a potentially substantial temporary or periodic increase in ambient noise levels. Consistent with the TZC EIR, this analysis assumes that an increase of 5.0 dBA L_{eq} or greater over existing ambient noise levels is substantial and significant. The existing daytime ambient noise levels monitored in the project vicinity ranged from 61.0 to 69.6 dBA L_{eq}. As such, the noise generated by Project construction activities for the could result in a temporary increase in ambient noise levels of over 5 dBA L_{eq} at uses adjacent to the Project site. However, consistent with the TZC EIR and with the implementation of mitigation measure MM 4.8-1, the construction activities would only occur during the permitted hours designated in the City of Santa Ana Municipal Code Section 18-314(e), and therefore, would not occur during normal sleep hours for residences or on days that residents are considered most sensitive to exterior noise (Sundays and federal holidays). (1) As such, *while the physical impact from an increase in ambient noise levels could occur from Project construction activities, an adverse effect on the nearby residents would not occur*. (1) Implementation of mitigation measures MM4.8-2 through MM4.8-4 would also help reduce this impact. Therefore, with the mitigation measures required by the TZC EIR, this impact would be *less than significant*. The TZC EIR mitigation measures are listed below:

MM 4.8-1 *All construction activity within the City shall be conducted in accordance with Section 18-314(e) of the City of Santa Ana Municipal Code.*

MM 4.8-2 *Each project applicant shall require by contract specifications that the following construction best management practices (BMPs) be implemented by contractors to reduce construction noise levels:*

- *Two weeks prior to the commencement of construction, notification must be provided to property owners within 300 feet of a project site disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period*
- *Ensure that construction equipment is properly muffled according to industry standards and [is] in good working condition*

- *Place noise-generating construction equipment and locate construction staging areas away from sensitive uses, where feasible*
- *Schedule high noise-producing activities between the hours of 8:00 A.M. and 5:00 P.M. to minimize disruption on sensitive uses*
- *Implement noise attenuation measures, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources*
- *Use electric air compressors and similar power tools rather than diesel equipment, where feasible*
- *Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 30 minutes*
- *Construction hours, allowable workdays, and the phone number of the job superintendent shall be clearly posted at all construction entrances to allow for surrounding owners and residents to contact the job superintendent. If the City or the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective action, and report the action taken to the reporting party.*

Contract specifications shall be included in the proposed project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.

MM 4.8-3 *Each project applicant shall require by contract specifications that construction staging areas along with the operation of earthmoving equipment within the project area would be located as far away from vibration and noise sensitive sites as possible. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.*

MM 4.8-4 *Each project applicant shall require by contract specifications that heavily loaded trucks used during construction would be routed away from residential streets. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.*

11.5 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

- Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage.
- Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include mobile equipment activities and pile driving, among others. Using the vibration source level of construction equipment provided on Table 6-6 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts.

At distances ranging from 64 to 128 feet from the Project site, construction vibration velocity levels are expected to range from 65.7 to 74.8 VdB, as shown on Table 11-8. Based on the results of the analysis, the Project construction vibration levels will remain below the TZC EIR annoyance and building damage thresholds of 85 VdB and 95 VdB, respectively, at all sensitive receiver locations.

As indicated in the TZC EIR, *so long as construction occurs more than 50 feet from sensitive receptors, the impact associated with ground-borne vibration generated by the equipment would be below 85 VdB and thus would be less than significant*. (1) However, if pile driving activity is required within 25 feet of sensitive receiver locations or fragile buildings, this would result in potential vibration impacts above the threshold of 85 VdB, in which case this impact would be *potentially significant*. The TZC EIR indicates that *implementation of mitigation measures MM 4.8-1 through MM 4.8-4 would help to reduce this impact, but not to a less than significant level; therefore, this impact would remain significant and unavoidable.* (1)

Therefore, if pile driving or drilling activities are required, a Project Design Feature is identified in the Executive Summary to reduce potential vibration level impacts at nearby receiver locations to a *less than significant* impact.

TABLE 11-8: UNMITIGATED CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver Location[1]	Distance to Construction Activity (Feet)	Receiver Vibration Levels (VdB)[2]					Thresholds		Threshold Exceeded?[3]
		Small Bulldozer	Jackhammer	Loaded Trucks	Large Bulldozer	Highest Vibration Level	Annoyance	Damage	
R1	64'	45.8	66.8	73.8	74.8	74.8	85	95	No
R2	128'	36.7	57.7	64.7	65.7	65.7	85	95	No

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-6.
[3] Does the highest vibration level exceed the TZC EIR thresholds?

12 REFERENCES

1. **PBS&J, Inc.** *City of Santa Ana Transit Zoning Code Final Environmental Impact Report.* Santa Ana : s.n., February 2010.
2. **State of California.** *California Environmental Quality Act, Appendix G.* 2019.
3. **Urban Crossroads, Inc.** *3rd & Broadway Traffic Impact Analysis.* February 2019.
4. **Caribou Industries.** *3rd & Broadway Development Project Review.* August 2018.
5. **Harris, Cyril M.** *Noise Control in Buildings.* s.l. : McGraw-Hill, Inc., 1994.
6. **Google Maps.** Zion Apostolic Church, 308 N Main St, Santa Ana, CA 92701. *Google Maps.* [Online] https://goo.gl/XfoL8d.
7. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
8. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
9. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
10. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
11. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
12. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* September 2018.
13. **Office of Planning and Research.** *State of California General Plan Guidelines.* 2018.
14. **City of Santa Ana.** *General Plan Noise Element.* January 2010.
15. —. *Municipal Code, Article VI Noise Control.*
16. **State of California.** *California Environmental Quality Act, Appendix G & Amendments and Additions to the State CEQA Guidelines.* 2019.
17. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
18. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
19. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
20. **California Department of Transportation.** *Traffic Noise Analysis Protocol.* May 2011.
21. **Urban Crossroads, Inc.** *3rd & Broadway Air Quality Impact Analysis.* February 2019.

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13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Caribou Industries Proposal for the 3rd Street Promenade Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5979.

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EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF SANTA ANA MUNICIPAL CODE

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ARTICLE VI. - NOISE CONTROL[6]

Sec. 18-308. - Declaration of policy.

In order to control unnecessary, excessive and annoying sounds emanating from areas of the city, it is hereby declared to be the policy of the city to prohibit such sounds generated from all sources as specified in this article.

It is determined that certain sound levels are detrimental to the public health, welfare and safety, and contrary to public interest.

(Ord. No. NS-1441, 1, 8-21-78)

Sec. 18-309. - Definitions.

The following words, phrases and terms as used in this article shall have the meaning as indicated below:

Ambient noise level shall mean the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

Cumulative period shall mean an additive period of time composed of individual time segments which may be continuous or interrupted.

Decibel (dB) shall mean a unit which denotes the ratio between two (2) quantities which are proportional to power: The number of decibels corresponding to the ratio of two (2) amounts of power is ten (10) times the logarithm to the base ten (10) of this ratio.

Dwelling unit shall mean a single unit providing complete, independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking and sanitation.

Emergency machinery, vehicle or work shall mean any machinery, vehicle or work used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

Fixed noise source shall mean a stationary device which creates sounds while fixed or motionless, including, but not limited to, industrial and commercial machinery and equipment, pumps, fans, compressors, generators, air conditioners and refrigeration equipment.

Grading shall mean any excavating or filling of earth material, or any combination thereof, conducted at a site to prepare said site for construction or other improvements thereon.

Impact noise shall mean the noise produced by the collision of one mass which may be either in motion or at rest.

Mobile noise source shall mean any noise source other than a fixed noise source.

Noise level shall mean the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) micronewtons per square meter. The unit of measurement shall be designated as dB (A).

Person shall mean a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.

Residential property shall mean a parcel of real property which is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and motels.

Simple tone noise shall mean a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

Sound level meter shall mean an instrument meeting American National Standard Institute's Standard S1.4-1971 for Type 1 or Type 2 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

Sound pressure level of a sound, in decibels, shall mean twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-310. - Noise level measurement criteria.

Any noise level measurements made pursuant to the provisions of this article shall be performed using a sound level meter as defined in section 18-309.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-311. - Designated noise zone.

The entire City of Santa Ana is hereby designated as "Noise Zone 1."

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-312. - Exterior noise standards.

(a) The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dB(A)	7:00 a.m.—10:00 p.m.
	50 dB(A)	10:00 p.m.— 7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB (A).

(b) It shall be unlawful for any person at any location within the City of Santa Ana to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, to exceed:

(1) The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or

(2) The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or

(3) The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or

(4) The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one minute in any hour; or

(5) The noise standard plus twenty (20) dB(A) for any period of time.

(c) In the event the ambient noise level exceeds any of the first four (4) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-313. - Interior noise standards.

(a) The following interior noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

INTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dB(A)	7:00 a.m.—10:00 p.m.
	45 dB(A)	10:00 p.m.—7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

(b) It shall be unlawful for any person at any location within the City of Santa Ana to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured within any other dwelling unit on any residential property, to exceed:

(1) The interior noise standard for a cumulative period of more than five (5) minutes in any hour; or

(2) The interior noise standard plus five (5) dB(A) for a cumulative period of more than one minute in any hour; or

(3) The interior noise standard plus ten (10) dB(A) for any period of time.

(c) In the event the ambient noise level exceeds either of the first two (2) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-314. - Special provisions.

The following activities shall be exempted from the provisions of this article:

(a) Activities conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

(b) Outdoor gatherings, public dances and shows, provided said events are conducted pursuant to a license issued by the City of Santa Ana.

(c) Activities conducted on any park or playground, provided such park or playground is owned and operated by a public entity.

(d) Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

(e) Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or any time on Sunday or a federal holiday.

(f) All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

(g) Mobile noise sources associated with agricultural operations, provided such operations do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

(h) Mobile noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the agricultural commissioner.

(i) Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 a.m. and 8:00 p.m. on any day except Sunday or a federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a federal holiday.

(j) Any activity to the extent regulation thereof has been preempted by state or federal law.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-315. - Schools, hospitals and churches; special provisions.

It shall be unlawful for any person to create any noise which causes the noise level at any school, hospital or church while the same is in use to exceed the noise limits as specified in section 18-312 prescribed for the assigned noise zone in which the school, hospital or church is located, or which noise level unreasonably interferes with the use of such institutions or which unreasonably disturbs or annoys patients in the hospital, provided conspicuous signs are displayed in three (3) separate locations within one-tenth (1/10) of a mile of the institution indicating the presence of a school, church or hospital.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-316. - Air conditioning and refrigeration; special provisions.

During the five-year period following the effective date of this article, the noise standards enumerated in sections 18-312 and 18-313 shall be increased eight (8) dB(A) where the alleged offensive noise source is an air conditioning or refrigeration system or associated equipment which was installed prior to the effective date of this article.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-317. - Noise level measurement.

The location selected for measuring exterior noise levels shall be at any point on the affected property. Interior noise measurements shall be made within the affected dwelling unit. The measurement shall be made at a point at least four (4) feet from the wall, ceiling, or floor nearest the alleged offensive noise source and may be made with the windows of the affected unit open.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-318. - Manner of enforcement.

The chief of police, the Orange County health officer and their duly authorized representatives are directed to enforce the provisions of this article. The chief of police, the Orange County health officer and their duly authorized representatives are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this article while such person is engaged in the performance of his duty.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-319. - Variance procedure.

The owner or operator of a noise source which violates any of the provisions of this article may file an application with the Orange County health officer for a variance from the provisions thereof wherein said owner or operator shall set forth all actions taken to comply with said provisions, the reasons why immediate compliance cannot be achieved, a proposed method of achieving compliance, and a proposed time schedule for its accomplishment. Said application shall be accompanied by a fee as established by resolution of the city council. A separate application shall be filed for each noise source; provided however, that several mobile sources under common ownership, or several fixed sources on a single property may be combined into one application. Upon receipt of said application and fee, the health officer shall refer it with his recommendation thereon within thirty (30) days to the Orange County Noise Variance Board for action thereon in accordance with the provisions of applicable law.

An applicant for a variance shall remain subject to prosecution under the terms of this article until a variance is granted.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-320. - Appeals.

Within fifteen (15) days following the decision of the Orange County Variance Board on an application, the applicant, the health officer, or any member of the city council, may appeal the decision to the city council by filing a notice of appeal with the secretary of the Orange County Variance Board. In the case of an appeal by the applicant for a variance, the notice of appeal shall be accompanied by a fee to be computed by the secretary of the Orange County Variance Board on the basis of the estimated cost of preparing the materials required to be forwarded to the city council as discussed hereafter. If the actual cost of such preparation differs from the estimated cost appropriate payments shall be made either to or by the secretary of the Orange County Variance Board.

Within fifteen (15) days following receipt of a notice of appeal and the appeal fee, the secretary of the Variance Board shall forward to the city council copies of the application for variance; the recommendation of the health officer; the notice of appeal; all evidence concerning said application received by the variance board and its decision thereon. In addition, any person may file with the clerk of the city council written arguments supporting or attacking said decision and the city council may in its discretion hear oral arguments thereon. The clerk of the city council shall mail to the applicant a notice of the date set for hearing of the appeal. The notice shall be mailed at least ten (10) days prior to the hearing date.

Within sixty (60) days following its receipt of the notice of appeal, the city council shall either affirm, modify or reverse the decision, of the variance board. Such decision shall be based upon the city council's evaluation of the matters submitted to the city council in light of the powers conferred on the variance board and the factors to be considered, both as enumerated in section 18-319 and Orange County Ordinance section 4-6-13.

As part of its decision, the city council may direct the variance board to conduct further proceedings on said application. Failure of the city council to affirm, modify or reverse the decision of the variance board within said sixty-day period shall constitute an affirmance of the decision.

(Ord. No. NS-1441, § 1, 8-21-78)

Sec. 18-321. - Violations; misdemeanors.

Any person violating any or the provisions of this article shall be deemed guilty of a misdemeanor. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such. The provisions of this article shall not be construed as permitting conduct not prescribed herein and shall not affect the enforceability of any other applicable provisions of law.

(Ord. No. NS-1441, § 1, 8-21-78)

Secs. 18-322—18-350. - Reserved.

APPENDIX 5.1:

STUDY AREA PHOTOS

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JN:12192 Study Area Photos



L1 East
33, 44' 52.680000", 117, 52' 8.190000"



L1 North
33, 44' 52.690000", 117, 52' 8.190000"



L1 South
33, 44' 52.710000", 117, 52' 8.190000"



L1 West
33, 44' 52.680000", 117, 52' 8.270000"



L2 East
33, 44' 52.800000", 117, 52' 4.350000"



L2 North
33, 44' 52.820000", 117, 52' 4.570000"

JN:12192 Study Area Photos



L2 South
33, 44' 52.570000", 117, 52' 4.540000"



L2 West
33, 44' 52.500000", 117, 52' 4.590000"



L3 East
33, 44' 50.100000", 117, 52' 5.420000"



L3 North
33, 44' 50.020000", 117, 52' 5.450000"



L3 South
33, 44' 50.040000", 117, 52' 5.450000"



L3 West
33, 44' 50.040000", 117, 52' 5.450000"

JN:12192 Study Area Photos



L4 East
33, 44' 49.330000", 117, 52' 8.030000"



L4 North
33, 44' 49.320000", 117, 52' 7.920000"



L4 South
33, 44' 49.340000", 117, 52' 8.000000"



L4 West
33, 44' 49.380000", 117, 52' 8.000000"



L5 East
33, 44' 50.000000", 117, 52' 10.580000"



L5 North
33, 44' 50.100000", 117, 52' 10.640000"

JN:12192 Study Area Photos



L5 South
33, 44' 50.000000", 117, 52' 10.550000"



L5 West
33, 44' 50.070000", 117, 52' 10.610000"



L6 East
33, 44' 51.250000", 117, 52' 10.610000"



L6 North
33, 44' 51.290000", 117, 52' 10.440000"



L6 South
33, 44' 51.270000", 117, 52' 10.500000"



L6 West
33, 44' 51.290000", 117, 52' 10.470000"

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

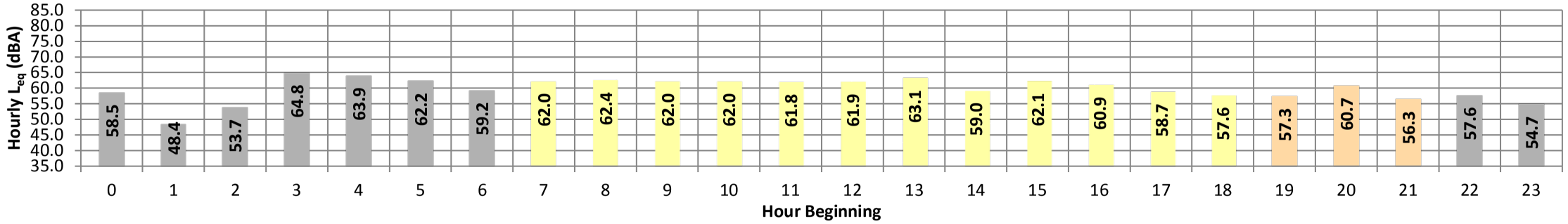
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24-Hour Noise Level Measurement Summary

Date: Tuesday, January 29, 2019 *Location:* L1 - Located on W 4th St. north of the Project site adjacent to an existing commercial area. *Meter:* Piccolo I *JN:* 12192

Project: 3rd & Broadway *Analyst:* R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	58.5	88.1	41.9	67.0	63.0	59.0	56.0	50.0	47.0	44.0	43.0	42.0	58.5	10.0	68.5
	1	48.4	67.6	40.6	58.0	56.0	53.0	51.0	47.0	44.0	41.0	40.0	40.0	48.4	10.0	58.4
	2	53.7	78.0	40.4	64.0	59.0	55.0	53.0	47.0	44.0	41.0	40.0	40.0	53.7	10.0	63.7
	3	64.8	93.0	40.8	74.0	71.0	64.0	60.0	52.0	47.0	43.0	42.0	41.0	64.8	10.0	74.8
	4	63.9	91.3	44.0	75.0	70.0	65.0	62.0	56.0	52.0	47.0	46.0	45.0	63.9	10.0	73.9
	5	62.2	85.4	47.8	74.0	70.0	66.0	63.0	59.0	55.0	51.0	50.0	48.0	62.2	10.0	72.2
	6	59.2	77.9	49.4	67.0	65.0	63.0	62.0	59.0	57.0	53.0	52.0	50.0	59.2	10.0	69.2
Day	7	62.0	85.6	51.3	70.0	67.0	65.0	63.0	60.0	58.0	55.0	54.0	53.0	62.0	0.0	62.0
	8	62.4	86.5	52.8	72.0	69.0	65.0	63.0	59.0	57.0	55.0	54.0	53.0	62.4	0.0	62.4
	9	62.0	81.6	49.3	72.0	70.0	67.0	65.0	60.0	57.0	53.0	52.0	50.0	62.0	0.0	62.0
	10	62.0	81.6	48.5	71.0	69.0	67.0	66.0	62.0	58.0	53.0	52.0	50.0	62.0	0.0	62.0
	11	61.8	78.4	48.1	68.0	67.0	65.0	64.0	62.0	61.0	54.0	53.0	50.0	61.8	0.0	61.8
	12	61.9	85.2	48.6	70.0	68.0	67.0	66.0	61.0	57.0	53.0	52.0	51.0	61.9	0.0	61.9
	13	63.1	91.8	49.1	72.0	69.0	65.0	62.0	59.0	56.0	53.0	52.0	51.0	63.1	0.0	63.1
	14	59.0	76.1	49.6	68.0	66.0	63.0	61.0	58.0	56.0	52.0	52.0	50.0	59.0	0.0	59.0
	15	62.1	87.2	50.9	72.0	70.0	66.0	64.0	60.0	57.0	54.0	53.0	52.0	62.1	0.0	62.1
	16	60.9	79.1	49.7	71.0	69.0	65.0	63.0	59.0	57.0	53.0	52.0	51.0	60.9	0.0	60.9
	17	58.7	76.7	49.0	66.0	65.0	63.0	62.0	58.0	56.0	53.0	52.0	51.0	58.7	0.0	58.7
	18	57.6	81.3	47.1	66.0	63.0	61.0	60.0	57.0	54.0	51.0	50.0	49.0	57.6	0.0	57.6
Evening	19	57.3	80.7	45.5	66.0	64.0	61.0	60.0	56.0	53.0	49.0	48.0	47.0	57.3	5.0	62.3
	20	60.7	87.7	46.5	69.0	67.0	65.0	62.0	57.0	53.0	49.0	48.0	47.0	60.7	5.0	65.7
	21	56.3	74.3	45.2	66.0	64.0	61.0	59.0	55.0	52.0	49.0	48.0	46.0	56.3	5.0	61.3
Night	22	57.6	80.7	44.8	68.0	64.0	61.0	59.0	54.0	51.0	47.0	47.0	45.0	57.6	10.0	67.6
	23	54.7	73.4	44.8	64.0	62.0	59.0	58.0	53.0	50.0	47.0	46.0	45.0	54.7	10.0	64.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	57.6	76.1	47.1	66.0	63.0	61.0	60.0	57.0	54.0	51.0	50.0	49.0
	Max	63.1	91.8	52.8	72.0	70.0	67.0	66.0	62.0	61.0	55.0	54.0	53.0
Energy Average		61.4	Average:		69.8	67.7	64.9	63.3	59.6	57.0	53.3	52.3	50.9
Evening	Min	56.3	74.3	45.2	66.0	64.0	61.0	59.0	55.0	52.0	49.0	48.0	46.0
	Max	60.7	87.7	46.5	69.0	67.0	65.0	62.0	57.0	53.0	49.0	48.0	47.0
Energy Average		58.5	Average:		67.0	65.0	62.3	60.3	56.0	52.7	49.0	48.0	46.7
Night	Min	48.4	67.6	40.4	58.0	56.0	53.0	51.0	47.0	44.0	41.0	40.0	40.0
	Max	64.8	93.0	49.4	75.0	71.0	66.0	63.0	59.0	57.0	53.0	52.0	50.0
Energy Average		60.4	Average:		67.9	64.4	60.6	58.2	53.0	49.7	46.0	45.1	44.0

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
60.8	61.0	60.4

24-Hour CNEL (dBA)
67.1

24-Hour Noise Level Measurement Summary

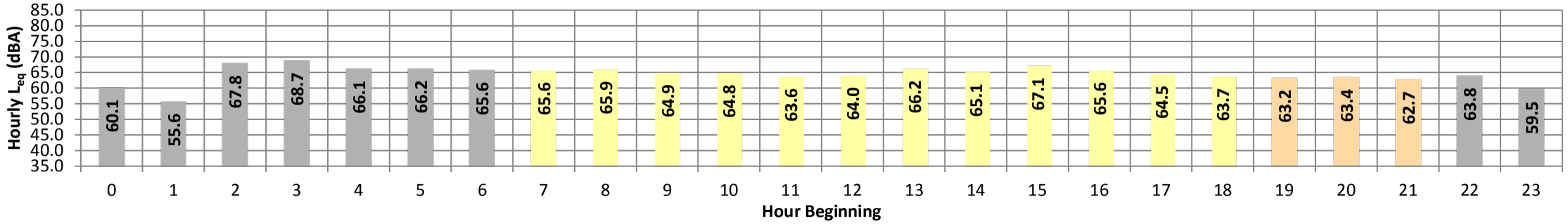
Date: Tuesday, January 29, 2019
Project: 3rd & Broadway

Location: L2 - Located on W 4th St. northeast of the Project site adjacent to the Downtown Santa Ana Historic District.

Meter: Piccolo I

JN: 12192
Analyst: R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	60.1	82.4	43.2	72.0	68.0	64.0	63.0	58.0	53.0	46.0	45.0	44.0	60.1	10.0	70.1
	1	55.6	72.7	42.0	65.0	64.0	61.0	60.0	55.0	49.0	43.0	43.0	42.0	55.6	10.0	65.6
	2	67.8	97.2	41.9	73.0	67.0	63.0	62.0	57.0	53.0	43.0	43.0	42.0	67.8	10.0	77.8
	3	68.7	94.4	42.1	84.0	75.0	68.0	66.0	61.0	55.0	45.0	44.0	43.0	68.7	10.0	78.7
	4	66.1	91.7	46.0	75.0	72.0	69.0	67.0	63.0	60.0	53.0	51.0	48.0	66.1	10.0	76.1
	5	66.2	84.9	50.0	76.0	74.0	70.0	69.0	66.0	63.0	56.0	55.0	52.0	66.2	10.0	76.2
	6	65.6	84.3	50.8	72.0	71.0	69.0	69.0	66.0	63.0	57.0	55.0	53.0	65.6	10.0	75.6
Day	7	65.6	82.5	53.5	73.0	71.0	69.0	68.0	65.0	63.0	59.0	58.0	56.0	65.6	0.0	65.6
	8	65.9	88.6	49.7	73.0	71.0	69.0	68.0	65.0	63.0	57.0	56.0	53.0	65.9	0.0	65.9
	9	64.9	85.4	50.8	72.0	70.0	68.0	67.0	64.0	62.0	56.0	55.0	52.0	64.9	0.0	64.9
	10	64.8	80.1	50.3	73.0	71.0	69.0	68.0	65.0	62.0	57.0	55.0	53.0	64.8	0.0	64.8
	11	63.6	76.4	51.9	72.0	70.0	68.0	66.0	64.0	61.0	56.0	55.0	53.0	63.6	0.0	63.6
	12	64.0	77.9	51.3	73.0	71.0	68.0	67.0	64.0	61.0	56.0	55.0	53.0	64.0	0.0	64.0
	13	66.2	89.0	52.2	75.0	72.0	69.0	67.0	64.0	62.0	58.0	56.0	54.0	66.2	0.0	66.2
	14	65.1	81.6	52.3	72.0	71.0	69.0	68.0	65.0	63.0	58.0	57.0	54.0	65.1	0.0	65.1
	15	67.1	92.7	53.7	75.0	73.0	70.0	68.0	65.0	63.0	58.0	57.0	55.0	67.1	0.0	67.1
	16	65.6	83.8	53.6	74.0	72.0	69.0	68.0	65.0	63.0	59.0	58.0	56.0	65.6	0.0	65.6
	17	64.5	83.2	51.7	72.0	70.0	68.0	67.0	64.0	62.0	58.0	56.0	55.0	64.5	0.0	64.5
	18	63.7	79.7	50.3	71.0	70.0	68.0	67.0	64.0	61.0	56.0	54.0	52.0	63.7	0.0	63.7
Evening	19	63.2	79.8	46.8	73.0	71.0	68.0	66.0	63.0	59.0	54.0	52.0	50.0	63.2	5.0	68.2
	20	63.4	85.8	46.8	73.0	71.0	67.0	66.0	62.0	59.0	54.0	52.0	50.0	63.4	5.0	68.4
	21	62.7	77.2	47.1	71.0	70.0	68.0	66.0	63.0	59.0	53.0	51.0	49.0	62.7	5.0	67.7
Night	22	63.8	89.0	46.9	73.0	71.0	67.0	65.0	61.0	58.0	51.0	50.0	48.0	63.8	10.0	73.8
	23	59.5	80.8	43.2	67.0	66.0	64.0	63.0	59.0	55.0	47.0	45.0	44.0	59.5	10.0	69.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	63.6	76.4	49.7	71.0	70.0	68.0	66.0	64.0	61.0	56.0	54.0	52.0
	Max	67.1	92.7	53.7	75.0	73.0	70.0	68.0	65.0	63.0	59.0	58.0	56.0
Energy Average		65.2	Average:		72.9	71.0	68.7	67.4	64.5	62.2	57.3	56.0	53.8
Evening	Min	62.7	77.2	46.8	71.0	70.0	67.0	66.0	62.0	59.0	53.0	51.0	49.0
	Max	63.4	85.8	47.1	73.0	71.0	68.0	66.0	63.0	59.0	54.0	52.0	50.0
Energy Average		63.1	Average:		72.3	70.7	67.7	66.0	62.7	59.0	53.7	51.7	49.7
Night	Min	55.6	72.7	41.9	65.0	64.0	61.0	60.0	55.0	49.0	43.0	43.0	42.0
	Max	68.7	97.2	50.8	84.0	75.0	70.0	69.0	66.0	63.0	57.0	55.0	53.0
Energy Average		65.2	Average:		73.0	69.8	66.1	64.9	60.7	56.6	49.0	47.9	46.2

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
65.0	64.9	65.2

24-Hour CNEL (dBA)
71.7

24-Hour Noise Level Measurement Summary

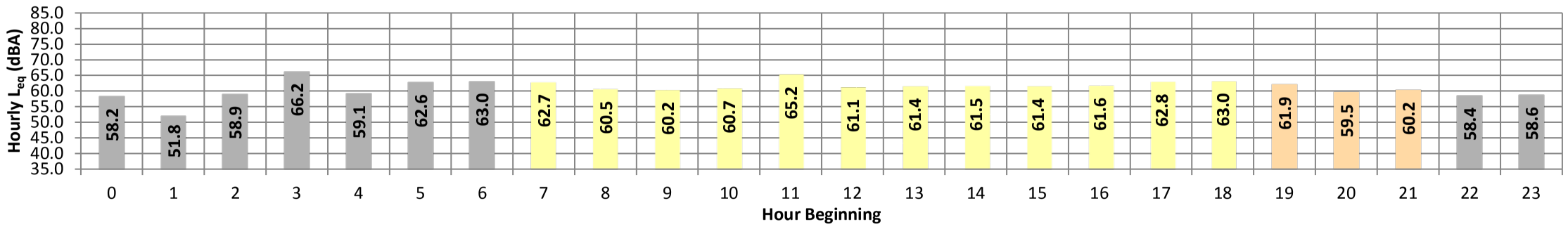
Date: Tuesday, January 29, 2019
Project: 3rd & Broadway

Location: L3 - Located on Main St. east of the Project site adjacent to Mix Mix Kitchen Bar.

Meter: Piccolo I

JN: 12192
Analyst: R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	58.2	77.6	47.7	67.0	64.0	61.0	60.0	58.0	55.0	50.0	49.0	48.0	58.2	10.0	68.2
	1	51.8	67.9	42.8	60.0	58.0	56.0	55.0	51.0	49.0	45.0	44.0	43.0	51.8	10.0	61.8
	2	58.9	86.0	43.0	67.0	65.0	60.0	57.0	52.0	47.0	44.0	43.0	43.0	58.9	10.0	68.9
	3	66.2	95.6	42.8	74.0	71.0	66.0	63.0	57.0	52.0	45.0	44.0	43.0	66.2	10.0	76.2
	4	59.1	80.8	47.3	67.0	66.0	63.0	62.0	59.0	55.0	51.0	50.0	48.0	59.1	10.0	69.1
	5	62.6	81.8	51.7	72.0	69.0	66.0	65.0	62.0	60.0	55.0	54.0	52.0	62.6	10.0	72.6
	6	63.0	81.5	52.0	73.0	70.0	67.0	65.0	62.0	60.0	55.0	55.0	54.0	63.0	10.0	73.0
Day	7	62.7	82.8	51.1	71.0	69.0	67.0	66.0	62.0	59.0	55.0	54.0	52.0	62.7	0.0	62.7
	8	60.5	74.7	49.5	69.0	68.0	65.0	64.0	60.0	58.0	53.0	52.0	51.0	60.5	0.0	60.5
	9	60.2	79.5	49.0	70.0	68.0	64.0	62.0	59.0	57.0	53.0	52.0	50.0	60.2	0.0	60.2
	10	60.7	79.8	49.9	70.0	68.0	65.0	64.0	60.0	57.0	54.0	53.0	51.0	60.7	0.0	60.7
	11	65.2	94.0	49.8	73.0	71.0	67.0	65.0	60.0	57.0	54.0	53.0	51.0	65.2	0.0	65.2
	12	61.1	78.1	53.5	70.0	69.0	66.0	64.0	60.0	58.0	55.0	55.0	54.0	61.1	0.0	61.1
	13	61.4	79.2	52.7	71.0	68.0	65.0	64.0	61.0	59.0	55.0	55.0	54.0	61.4	0.0	61.4
	14	61.5	74.9	53.8	70.0	68.0	66.0	64.0	61.0	59.0	56.0	56.0	55.0	61.5	0.0	61.5
	15	61.4	76.4	53.8	69.0	68.0	65.0	64.0	61.0	59.0	57.0	56.0	55.0	61.4	0.0	61.4
	16	61.6	78.5	53.8	71.0	69.0	65.0	64.0	61.0	59.0	56.0	56.0	55.0	61.6	0.0	61.6
	17	62.8	81.8	53.8	72.0	70.0	67.0	66.0	61.0	59.0	57.0	56.0	55.0	62.8	0.0	62.8
	18	63.0	88.5	52.5	68.0	66.0	64.0	62.0	59.0	58.0	55.0	54.0	53.0	63.0	0.0	63.0
Evening	19	61.9	85.0	52.7	70.0	68.0	65.0	63.0	60.0	58.0	55.0	54.0	53.0	61.9	5.0	66.9
	20	59.5	77.0	52.3	68.0	66.0	63.0	62.0	59.0	57.0	54.0	53.0	53.0	59.5	5.0	64.5
	21	60.2	79.5	47.1	69.0	67.0	64.0	63.0	59.0	56.0	52.0	51.0	49.0	60.2	5.0	65.2
Night	22	58.4	78.8	47.2	69.0	66.0	63.0	61.0	56.0	54.0	50.0	49.0	48.0	58.4	10.0	68.4
	23	58.6	82.9	46.0	68.0	66.0	62.0	59.0	55.0	52.0	48.0	48.0	47.0	58.6	10.0	68.6

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	60.2	74.7	49.0	68.0	66.0	64.0	62.0	59.0	57.0	53.0	52.0	50.0
	Max	65.2	94.0	53.8	73.0	71.0	67.0	66.0	62.0	59.0	57.0	56.0	55.0
Energy Average		62.1	Average:		70.3	68.5	65.5	64.1	60.4	58.3	55.0	54.3	53.0
Evening	Min	59.5	77.0	47.1	68.0	66.0	63.0	62.0	59.0	56.0	52.0	51.0	49.0
	Max	61.9	85.0	52.7	70.0	68.0	65.0	63.0	60.0	58.0	55.0	54.0	53.0
Energy Average		60.7	Average:		69.0	67.0	64.0	62.7	59.3	57.0	53.7	52.7	51.7
Night	Min	51.8	67.9	42.8	60.0	58.0	56.0	55.0	51.0	47.0	44.0	43.0	43.0
	Max	66.2	95.6	52.0	74.0	71.0	67.0	65.0	62.0	60.0	55.0	55.0	54.0
Energy Average		61.2	Average:		68.6	66.1	62.7	60.8	56.9	53.8	49.2	48.4	47.3

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
61.6	61.8	61.2

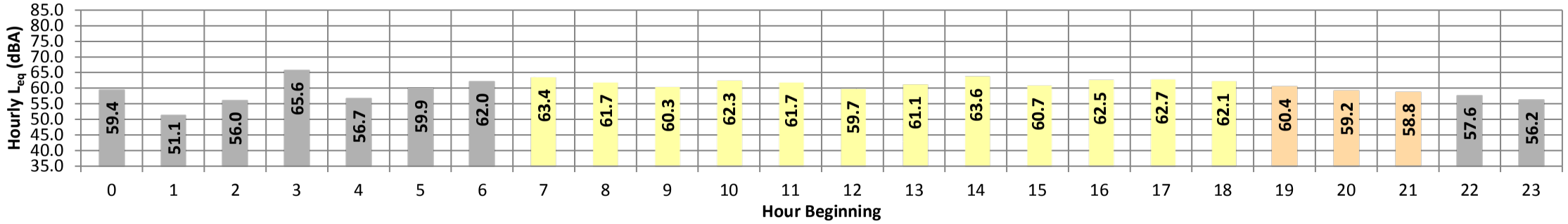
24-Hour CNEL (dBA)
67.9

24-Hour Noise Level Measurement Summary

Date: Tuesday, January 29, 2019 *Location:* L4 - Located on W 3rd St. south of the Project site adjacent to S Sycamore St. *Meter:* Piccolo I *JN:* 12192

Project: 3rd & Broadway *Analyst:* R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	59.4	87.7	46.0	65.0	63.0	59.0	58.0	54.0	52.0	48.0	48.0	47.0	59.4	10.0	69.4
	1	51.1	72.7	44.4	60.0	58.0	55.0	54.0	50.0	47.0	45.0	45.0	44.0	51.1	10.0	61.1
	2	56.0	81.2	44.0	67.0	63.0	58.0	55.0	50.0	47.0	45.0	44.0	44.0	56.0	10.0	66.0
	3	65.6	92.4	44.5	77.0	73.0	64.0	61.0	53.0	49.0	45.0	45.0	45.0	65.6	10.0	75.6
	4	56.7	76.7	45.7	66.0	64.0	61.0	59.0	55.0	53.0	49.0	48.0	47.0	56.7	10.0	66.7
	5	59.9	81.0	49.8	69.0	67.0	63.0	62.0	58.0	56.0	53.0	52.0	51.0	59.9	10.0	69.9
	6	62.0	79.4	52.4	72.0	69.0	66.0	65.0	61.0	58.0	55.0	54.0	53.0	62.0	10.0	72.0
Day	7	63.4	84.7	51.9	71.0	69.0	67.0	66.0	63.0	60.0	56.0	55.0	54.0	63.4	0.0	63.4
	8	61.7	85.1	50.7	71.0	68.0	65.0	64.0	59.0	57.0	54.0	53.0	52.0	61.7	0.0	61.7
	9	60.3	85.8	50.3	68.0	67.0	64.0	63.0	59.0	56.0	53.0	52.0	51.0	60.3	0.0	60.3
	10	62.3	88.2	49.7	72.0	69.0	66.0	64.0	60.0	57.0	53.0	52.0	51.0	62.3	0.0	62.3
	11	61.7	87.4	50.2	72.0	69.0	65.0	63.0	59.0	56.0	53.0	52.0	51.0	61.7	0.0	61.7
	12	59.7	79.8	50.7	68.0	66.0	64.0	63.0	59.0	56.0	53.0	52.0	51.0	59.7	0.0	59.7
	13	61.1	78.3	50.9	69.0	67.0	66.0	66.0	61.0	57.0	54.0	53.0	52.0	61.1	0.0	61.1
	14	63.6	87.9	52.0	73.0	70.0	66.0	65.0	61.0	58.0	55.0	54.0	53.0	63.6	0.0	63.6
	15	60.7	77.9	52.7	67.0	66.0	65.0	64.0	61.0	58.0	55.0	54.0	54.0	60.7	0.0	60.7
	16	62.5	84.0	52.3	72.0	69.0	65.0	64.0	61.0	59.0	55.0	54.0	53.0	62.5	0.0	62.5
	17	62.7	85.9	51.8	72.0	69.0	66.0	64.0	61.0	59.0	55.0	55.0	53.0	62.7	0.0	62.7
	18	62.1	90.6	50.6	67.0	65.0	63.0	62.0	59.0	56.0	53.0	52.0	51.0	62.1	0.0	62.1
Evening	19	60.4	83.2	50.5	69.0	66.0	63.0	62.0	58.0	56.0	53.0	52.0	51.0	60.4	5.0	65.4
	20	59.2	83.3	50.2	68.0	65.0	62.0	61.0	57.0	55.0	52.0	51.0	51.0	59.2	5.0	64.2
	21	58.8	80.2	47.7	69.0	66.0	63.0	61.0	57.0	54.0	51.0	50.0	49.0	58.8	5.0	63.8
Night	22	57.6	75.4	48.0	67.0	65.0	61.0	60.0	56.0	54.0	50.0	49.0	48.0	57.6	10.0	67.6
	23	56.2	77.5	46.8	66.0	63.0	60.0	58.0	53.0	51.0	49.0	48.0	48.0	56.2	10.0	66.2

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	59.7	77.9	49.7	67.0	65.0	63.0	62.0	59.0	56.0	53.0	52.0	51.0
	Max	63.6	90.6	52.7	73.0	70.0	67.0	66.0	63.0	60.0	56.0	55.0	54.0
Energy Average		62.0	Average:		70.2	67.8	65.2	64.0	60.3	57.4	54.1	53.2	52.2
Evening	Min	58.8	80.2	47.7	68.0	65.0	62.0	61.0	57.0	54.0	51.0	50.0	49.0
	Max	60.4	83.3	50.5	69.0	66.0	63.0	62.0	58.0	56.0	53.0	52.0	51.0
Energy Average		59.5	Average:		68.7	65.7	62.7	61.3	57.3	55.0	52.0	51.0	50.3
Night	Min	51.1	72.7	44.0	60.0	58.0	55.0	54.0	50.0	47.0	45.0	44.0	44.0
	Max	65.6	92.4	52.4	77.0	73.0	66.0	65.0	61.0	58.0	55.0	54.0	53.0
Energy Average		60.0	Average:		67.7	65.0	60.8	59.1	54.4	51.9	48.8	48.1	47.4

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
61.1	61.6	60.0

24-Hour CNEL (dBA)
66.9

24-Hour Noise Level Measurement Summary

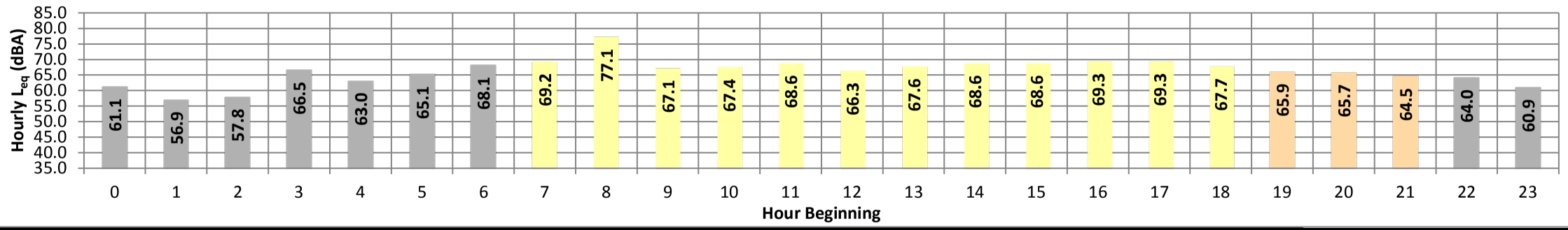
Date: Tuesday, January 29, 2019
Project: 3rd & Broadway

Location: L5 - Located on W 3rd St. adjacent to the Project site and existing commercial uses.

Meter: Piccolo I

JN: 12192
Analyst: R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	61.1	82.3	45.3	72.0	69.0	66.0	64.0	58.0	52.0	48.0	48.0	46.0	61.1	10.0	71.1
	1	56.9	75.2	43.4	68.0	66.0	64.0	62.0	52.0	48.0	44.0	44.0	43.0	56.9	10.0	66.9
	2	57.8	79.1	42.2	70.0	68.0	64.0	61.0	51.0	45.0	42.0	42.0	42.0	57.8	10.0	67.8
	3	66.5	90.7	43.9	79.0	74.0	68.0	65.0	58.0	52.0	46.0	45.0	44.0	66.5	10.0	76.5
	4	63.0	81.2	47.4	73.0	71.0	69.0	68.0	61.0	55.0	49.0	48.0	48.0	63.0	10.0	73.0
	5	65.1	86.3	50.9	75.0	73.0	71.0	69.0	64.0	59.0	53.0	53.0	51.0	65.1	10.0	75.1
	6	68.1	83.9	50.6	76.0	75.0	73.0	72.0	69.0	64.0	55.0	54.0	52.0	68.1	10.0	78.1
Day	7	69.2	86.9	52.8	76.0	74.0	73.0	72.0	70.0	67.0	59.0	57.0	54.0	69.2	0.0	69.2
	8	77.1	104.1	49.7	80.0	75.0	72.0	71.0	68.0	65.0	56.0	55.0	53.0	77.1	0.0	77.1
	9	67.1	88.4	50.6	75.0	73.0	71.0	70.0	67.0	63.0	56.0	54.0	52.0	67.1	0.0	67.1
	10	67.4	86.6	50.7	77.0	74.0	71.0	70.0	67.0	63.0	56.0	55.0	53.0	67.4	0.0	67.4
	11	68.6	91.6	48.9	77.0	74.0	71.0	70.0	67.0	63.0	55.0	54.0	51.0	68.6	0.0	68.6
	12	66.3	84.2	51.0	74.0	73.0	71.0	70.0	66.0	63.0	55.0	54.0	52.0	66.3	0.0	66.3
	13	67.6	87.5	51.8	76.0	74.0	71.0	71.0	68.0	64.0	57.0	55.0	53.0	67.6	0.0	67.6
	14	68.6	89.1	51.1	76.0	74.0	72.0	71.0	69.0	65.0	57.0	56.0	54.0	68.6	0.0	68.6
	15	68.6	85.1	52.1	76.0	74.0	73.0	72.0	69.0	66.0	59.0	57.0	54.0	68.6	0.0	68.6
	16	69.3	84.3	54.0	78.0	77.0	74.0	72.0	69.0	66.0	60.0	58.0	55.0	69.3	0.0	69.3
	17	69.3	91.5	55.3	76.0	74.0	72.0	71.0	69.0	66.0	61.0	59.0	57.0	69.3	0.0	69.3
	18	67.7	96.5	51.0	74.0	72.0	70.0	69.0	67.0	63.0	56.0	55.0	52.0	67.7	0.0	67.7
Evening	19	65.9	89.4	50.1	74.0	72.0	70.0	68.0	65.0	62.0	55.0	53.0	51.0	65.9	5.0	70.9
	20	65.7	87.3	50.9	74.0	72.0	70.0	68.0	65.0	61.0	55.0	53.0	52.0	65.7	5.0	70.7
	21	64.5	82.1	52.4	73.0	71.0	69.0	67.0	64.0	61.0	56.0	55.0	54.0	64.5	5.0	69.5
Night	22	64.0	85.7	51.4	73.0	71.0	69.0	67.0	63.0	59.0	54.0	53.0	52.0	64.0	10.0	74.0
	23	60.9	79.1	51.0	70.0	68.0	66.0	65.0	60.0	56.0	53.0	52.0	51.0	60.9	10.0	70.9

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	66.3	84.2	48.9	74.0	72.0	70.0	69.0	66.0	63.0	55.0	54.0	51.0
	Max	77.1	104.1	55.3	80.0	77.0	74.0	72.0	70.0	67.0	61.0	59.0	57.0
Energy Average		70.2	Average:		76.3	74.0	71.8	70.8	68.0	64.5	57.3	55.8	53.3
Evening	Min	64.5	82.1	50.1	73.0	71.0	69.0	67.0	64.0	61.0	55.0	53.0	51.0
	Max	65.9	89.4	52.4	74.0	72.0	70.0	68.0	65.0	62.0	56.0	55.0	54.0
Energy Average		65.4	Average:		73.7	71.7	69.7	67.7	64.7	61.3	55.3	53.7	52.3
Night	Min	56.9	75.2	42.2	68.0	66.0	64.0	61.0	51.0	45.0	42.0	42.0	42.0
	Max	68.1	90.7	51.4	79.0	75.0	73.0	72.0	69.0	64.0	55.0	54.0	52.0
Energy Average		63.9	Average:		72.9	70.6	67.8	65.9	59.6	54.4	49.3	48.8	47.7

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
68.2	69.6	63.9

24-Hour CNEL (dBA)
72.0

24-Hour Noise Level Measurement Summary

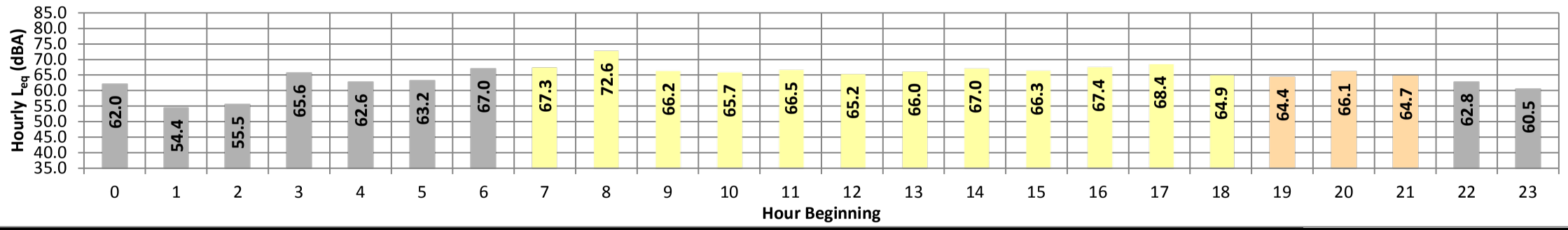
Date: Tuesday, January 29, 2019
Project: 3rd & Broadway

Location: L6 - Located on N Broadway St. adjacent to the Project site and Alcatraz Flowers.

Meter: Piccolo I

JN: 12192
Analyst: R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	62.0	87.2	46.7	72.0	68.0	65.0	62.0	56.0	52.0	48.0	48.0	47.0	62.0	10.0	72.0
	1	54.4	72.8	44.6	66.0	64.0	61.0	59.0	51.0	47.0	45.0	45.0	44.0	54.4	10.0	64.4
	2	55.5	77.3	44.2	67.0	64.0	61.0	59.0	50.0	46.0	45.0	44.0	44.0	55.5	10.0	65.5
	3	65.6	89.5	44.6	79.0	74.0	67.0	64.0	55.0	48.0	45.0	45.0	45.0	65.6	10.0	75.6
	4	62.6	85.5	46.0	73.0	70.0	67.0	66.0	59.0	53.0	48.0	47.0	46.0	62.6	10.0	72.6
	5	63.2	81.0	48.8	73.0	71.0	69.0	67.0	62.0	57.0	52.0	51.0	49.0	63.2	10.0	73.2
	6	67.0	86.0	51.2	76.0	74.0	72.0	70.0	67.0	63.0	55.0	54.0	52.0	67.0	10.0	77.0
Day	7	67.3	84.3	52.5	74.0	73.0	71.0	71.0	68.0	65.0	57.0	56.0	54.0	67.3	0.0	67.3
	8	72.6	102.5	50.8	77.0	74.0	71.0	69.0	66.0	62.0	55.0	54.0	53.0	72.6	0.0	72.6
	9	66.2	91.1	50.3	75.0	73.0	70.0	69.0	65.0	62.0	55.0	53.0	51.0	66.2	0.0	66.2
	10	65.7	85.4	51.5	76.0	73.0	70.0	69.0	65.0	62.0	55.0	54.0	52.0	65.7	0.0	65.7
	11	66.5	88.7	51.1	77.0	74.0	70.0	68.0	65.0	61.0	55.0	53.0	52.0	66.5	0.0	66.5
	12	65.2	83.9	51.5	74.0	72.0	70.0	68.0	65.0	62.0	55.0	54.0	52.0	65.2	0.0	65.2
	13	66.0	83.9	50.9	75.0	73.0	70.0	69.0	66.0	62.0	56.0	55.0	53.0	66.0	0.0	66.0
	14	67.0	90.5	51.0	75.0	73.0	71.0	69.0	66.0	63.0	56.0	55.0	53.0	67.0	0.0	67.0
	15	66.3	80.8	52.4	74.0	73.0	71.0	70.0	67.0	64.0	57.0	56.0	54.0	66.3	0.0	66.3
	16	67.4	84.7	53.5	76.0	74.0	72.0	70.0	67.0	65.0	58.0	57.0	55.0	67.4	0.0	67.4
	17	68.4	90.5	54.2	76.0	74.0	72.0	71.0	68.0	66.0	61.0	60.0	57.0	68.4	0.0	68.4
	18	64.9	83.1	51.0	73.0	72.0	69.0	68.0	65.0	62.0	55.0	53.0	52.0	64.9	0.0	64.9
Evening	19	64.4	84.8	50.5	73.0	71.0	69.0	67.0	64.0	60.0	54.0	53.0	51.0	64.4	5.0	69.4
	20	66.1	91.1	49.4	77.0	74.0	70.0	68.0	64.0	61.0	54.0	52.0	51.0	66.1	5.0	71.1
	21	64.7	88.6	51.1	74.0	71.0	68.0	67.0	63.0	60.0	54.0	53.0	52.0	64.7	5.0	69.7
Night	22	62.8	83.4	48.8	73.0	70.0	67.0	66.0	61.0	56.0	51.0	50.0	49.0	62.8	10.0	72.8
	23	60.5	83.9	48.5	70.0	68.0	65.0	64.0	58.0	53.0	50.0	50.0	49.0	60.5	10.0	70.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	64.9	80.8	50.3	73.0	72.0	69.0	68.0	65.0	61.0	55.0	53.0	51.0
	Max	72.6	102.5	54.2	77.0	74.0	72.0	71.0	68.0	66.0	61.0	60.0	57.0
Energy Average		67.5	Average:		75.2	73.2	70.6	69.3	66.1	63.0	56.3	55.0	53.2
Evening	Min	64.4	84.8	49.4	73.0	71.0	68.0	67.0	63.0	60.0	54.0	52.0	51.0
	Max	66.1	91.1	51.1	77.0	74.0	70.0	68.0	64.0	61.0	54.0	53.0	52.0
Energy Average		65.1	Average:		74.7	72.0	69.0	67.3	63.7	60.3	54.0	52.7	51.3
Night	Min	54.4	72.8	44.2	66.0	64.0	61.0	59.0	50.0	46.0	45.0	44.0	44.0
	Max	67.0	89.5	51.2	79.0	74.0	72.0	70.0	67.0	63.0	55.0	54.0	52.0
Energy Average		63.0	Average:		72.1	69.2	66.0	64.1	57.7	52.8	48.8	48.2	47.2

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
66.0	67.1	63.0

24-Hour CNEL (dBA)
70.6

APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE LEVEL CONTOURS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: N. Broadway
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,460 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.25	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.99	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.95	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.2	61.3	59.5	53.5	62.1	62.7
Medium Trucks:	58.0	56.5	50.2	48.6	57.1	57.3
Heavy Trucks:	61.2	59.8	50.8	52.0	60.4	60.5
Vehicle Noise:	66.1	64.4	60.5	56.6	65.1	65.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	10	31	97	306
CNEL:	11	33	106	335

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: N. Broadway
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,310 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	1.77	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-15.46	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-19.42	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.7	60.8	59.1	53.0	61.6	62.2
Medium Trucks:	57.6	56.1	49.7	48.2	56.6	56.8
Heavy Trucks:	60.8	59.3	50.3	51.6	59.9	60.0
Vehicle Noise:	65.6	63.9	60.0	56.1	64.6	65.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	27	87	275
CNEL:	9	30	95	300

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Main St.
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,210 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.25	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.98	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.94	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.7	65.3	65.9
Medium Trucks:	60.9	59.4	53.0	51.5	59.9	60.2
Heavy Trucks:	63.4	61.9	52.9	54.1	62.5	62.6
Vehicle Noise:	68.9	67.2	63.5	59.4	67.9	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	78	246	777
CNEL:	27	85	270	854

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Main St.
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,060 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	2.95	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-14.29	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-18.25	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	60.6	59.1	52.7	51.2	59.6	59.9
Heavy Trucks:	63.1	61.6	52.6	53.8	62.2	62.3
Vehicle Noise:	68.6	66.9	63.2	59.1	67.6	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	23	72	229	724
CNEL:	25	80	252	796

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: 4th St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	280 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.93	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-22.17	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-26.12	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	54.7	52.8	51.1	45.0	53.6	54.3
Medium Trucks:	49.6	48.1	41.7	40.2	48.6	48.9
Heavy Trucks:	52.8	51.4	42.3	43.6	51.9	52.1
Vehicle Noise:	57.6	56.0	52.0	48.1	56.6	57.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	2	6	18	58
CNEL:	2	6	20	64

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: 4th St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	440 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.96	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-20.20	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-24.16	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.0	47.0	55.6	56.2
Medium Trucks:	51.5	50.0	43.7	42.1	50.6	50.8
Heavy Trucks:	54.8	53.3	44.3	45.5	53.9	54.0
Vehicle Noise:	59.6	57.9	54.0	50.1	58.6	59.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	9	29	92
CNEL:	3	10	32	100

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: 3rd St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	440 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.96	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-20.20	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-24.16	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.0	56.1	54.3	48.3	56.9	57.5
Medium Trucks:	52.8	51.3	45.0	43.4	51.9	52.1
Heavy Trucks:	56.0	54.6	45.6	46.8	55.2	55.3
Vehicle Noise:	60.9	59.2	55.3	51.4	59.9	60.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	9	29	92
CNEL:	3	10	32	101

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: 3rd St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-20.62	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-24.57	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.6	55.7	53.9	47.9	56.5	57.1
Medium Trucks:	52.4	50.9	44.5	43.0	51.5	51.7
Heavy Trucks:	55.6	54.2	45.2	46.4	54.8	54.9
Vehicle Noise:	60.5	58.8	54.9	51.0	59.5	59.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	8	27	84
CNEL:	3	9	29	92

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: 1st St.
Road Segment: w/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,260 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.69	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.55	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.50	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.3	62.8	56.5	54.9	63.4	63.6
Heavy Trucks:	65.7	64.2	55.2	56.5	64.8	64.9
Vehicle Noise:	72.4	70.7	67.4	62.8	71.4	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	82	259	821	2,595
CNEL:	91	287	909	2,875

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: 1st St.
Road Segment: e/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,090 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.46	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.78	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.73	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	66.5	60.4	69.0	69.6
Medium Trucks:	64.1	62.6	56.2	54.7	63.2	63.4
Heavy Trucks:	65.4	64.0	55.0	56.2	64.6	64.7
Vehicle Noise:	72.1	70.4	67.1	62.6	71.1	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	78	246	778	2,460
CNEL:	86	273	862	2,725

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: N. Broadway
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,480 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.30	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.93	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.89	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.3	61.4	59.6	53.5	62.2	62.8
Medium Trucks:	58.1	56.6	50.2	48.7	57.1	57.4
Heavy Trucks:	61.3	59.9	50.8	52.1	60.4	60.6
Vehicle Noise:	66.1	64.5	60.6	56.6	65.1	65.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	10	31	98	310
CNEL:	11	34	107	339

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: N. Broadway
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,340 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	1.87	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-15.37	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-19.32	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.8	60.9	59.2	53.1	61.7	62.3
Medium Trucks:	57.7	56.2	49.8	48.3	56.7	56.9
Heavy Trucks:	60.9	59.4	50.4	51.7	60.0	60.1
Vehicle Noise:	65.7	64.0	60.1	56.2	64.7	65.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	28	89	281
CNEL:	10	31	97	307

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Main St.
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,230 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.29	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.95	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.90	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.8	56.7	65.3	65.9
Medium Trucks:	60.9	59.4	53.1	51.5	60.0	60.2
Heavy Trucks:	63.4	62.0	52.9	54.2	62.5	62.7
Vehicle Noise:	68.9	67.2	63.6	59.4	67.9	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	78	248	784
CNEL:	27	86	273	862

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Main St.
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,060 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	2.95	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-14.29	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-18.25	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	60.6	59.1	52.7	51.2	59.6	59.9
Heavy Trucks:	63.1	61.6	52.6	53.8	62.2	62.3
Vehicle Noise:	68.6	66.9	63.2	59.1	67.6	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	23	72	229	724
CNEL:	25	80	252	796

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: 4th St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.77	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-22.01	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-25.97	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	54.9	53.0	51.2	45.2	53.8	54.4
Medium Trucks:	49.7	48.2	41.9	40.3	48.8	49.0
Heavy Trucks:	52.9	51.5	42.5	43.7	52.1	52.2
Vehicle Noise:	57.8	56.1	52.2	48.3	56.8	57.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	2	6	19	60
CNEL:	2	7	21	66

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: 4th St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	450 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.87	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-20.10	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-24.06	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.8	54.9	53.1	47.1	55.7	56.3
Medium Trucks:	51.6	50.1	43.8	42.2	50.7	50.9
Heavy Trucks:	54.8	53.4	44.4	45.6	54.0	54.1
Vehicle Noise:	59.7	58.0	54.1	50.2	58.7	59.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	9	30	94
CNEL:	3	10	32	102

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: 3rd St.
Road Segment: w/o N. Broadway

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	450 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.87	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-20.10	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-24.06	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.1	56.2	54.4	48.4	57.0	57.6
Medium Trucks:	52.9	51.4	45.1	43.5	52.0	52.2
Heavy Trucks:	56.1	54.7	45.7	46.9	55.3	55.4
Vehicle Noise:	61.0	59.3	55.4	51.5	60.0	60.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	9	30	94
CNEL:	3	10	33	103

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: 3rd St.
Road Segment: e/o Main St.

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-20.62	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-24.57	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.6	55.7	53.9	47.9	56.5	57.1
Medium Trucks:	52.4	50.9	44.5	43.0	51.5	51.7
Heavy Trucks:	55.6	54.2	45.2	46.4	54.8	54.9
Vehicle Noise:	60.5	58.8	54.9	51.0	59.5	59.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	8	27	84
CNEL:	3	9	29	92

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: 1st St.
Road Segment: w/o Sycamore St.

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,260 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.69	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.55	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.50	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.3	62.8	56.5	54.9	63.4	63.6
Heavy Trucks:	65.7	64.2	55.2	56.5	64.8	64.9
Vehicle Noise:	72.4	70.7	67.4	62.8	71.4	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	82	259	821	2,595
CNEL:	91	287	909	2,875

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: 1st St.
Road Segment: e/o Sycamore St.

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,090 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.46	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.78	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.73	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	66.5	60.4	69.0	69.6
Medium Trucks:	64.1	62.6	56.2	54.7	63.2	63.4
Heavy Trucks:	65.4	64.0	55.0	56.2	64.6	64.7
Vehicle Noise:	72.1	70.4	67.1	62.6	71.1	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	78	246	778	2,460
CNEL:	86	273	862	2,725

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: N. Broadway
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,600 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.64	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.60	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.55	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	59.9	53.9	62.5	63.1
Medium Trucks:	58.4	56.9	50.6	49.0	57.5	57.7
Heavy Trucks:	61.6	60.2	51.2	52.4	60.8	60.9
Vehicle Noise:	66.5	64.8	60.9	57.0	65.5	65.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	34	106	335
CNEL:	12	37	116	367

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: N. Broadway
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,420 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.12	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-15.11	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-19.07	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.1	61.2	59.4	53.4	62.0	62.6
Medium Trucks:	57.9	56.4	50.0	48.5	57.0	57.2
Heavy Trucks:	61.1	59.7	50.7	51.9	60.3	60.4
Vehicle Noise:	66.0	64.3	60.4	56.5	65.0	65.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	30	94	298
CNEL:	10	33	103	326

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: Main St.
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,440 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.68	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.55	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.51	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.8	64.9	63.1	57.1	65.7	66.3
Medium Trucks:	61.3	59.8	53.4	51.9	60.4	60.6
Heavy Trucks:	63.8	62.4	53.3	54.6	62.9	63.1
Vehicle Noise:	69.3	67.6	64.0	59.8	68.3	68.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	86	271	858
CNEL:	30	94	298	943

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: Main St.
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,270 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.37	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.87	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.82	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	63.5	62.1	53.0	54.3	62.6	62.7
Vehicle Noise:	69.0	67.3	63.7	59.5	68.0	68.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	80	252	798
CNEL:	28	88	277	877

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: 4th St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	360 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.84	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-21.07	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-25.03	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.2	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	49.9
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	2	7	24	75
CNEL:	3	8	26	82

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: 4th St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	520 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.24	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-19.48	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-23.43	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.4	55.5	53.8	47.7	56.3	56.9
Medium Trucks:	52.3	50.8	44.4	42.9	51.3	51.5
Heavy Trucks:	55.5	54.1	45.0	46.3	54.6	54.8
Vehicle Noise:	60.3	58.6	54.7	50.8	59.3	59.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	11	34	108
CNEL:	4	12	37	118

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: 3rd St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	490 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.50	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-19.73	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-23.69	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.5	56.6	54.8	48.7	57.4	58.0
Medium Trucks:	53.3	51.8	45.4	43.9	52.3	52.6
Heavy Trucks:	56.5	55.1	46.0	47.3	55.6	55.8
Vehicle Noise:	61.3	59.7	55.8	51.8	60.3	60.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	10	32	103
CNEL:	4	11	36	112

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: 3rd St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	440 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.96	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-20.20	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-24.16	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.0	56.1	54.3	48.3	56.9	57.5
Medium Trucks:	52.8	51.3	45.0	43.4	51.9	52.1
Heavy Trucks:	56.0	54.6	45.6	46.8	55.2	55.3
Vehicle Noise:	60.9	59.2	55.3	51.4	59.9	60.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	9	29	92
CNEL:	3	10	32	101

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: 1st St.
Road Segment: w/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	34,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,400 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.88	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.36	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.32	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	66.9	60.8	69.5	70.1
Medium Trucks:	64.5	63.0	56.7	55.1	63.6	63.8
Heavy Trucks:	65.8	64.4	55.4	56.6	65.0	65.1
Vehicle Noise:	72.6	70.8	67.6	63.0	71.5	72.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	271	856	2,706
CNEL:	95	300	948	2,998

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2021 Without Project
Road Name: 1st St.
Road Segment: e/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,230 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.65	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.59	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.54	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.3	68.4	66.7	60.6	69.2	69.8
Medium Trucks:	64.3	62.8	56.4	54.9	63.4	63.6
Heavy Trucks:	65.6	64.2	55.2	56.4	64.8	64.9
Vehicle Noise:	72.3	70.6	67.3	62.8	71.3	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	81	257	813	2,571
CNEL:	90	285	901	2,849

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: N. Broadway
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,610 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.67	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.57	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.52	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	60.0	53.9	62.5	63.1
Medium Trucks:	58.5	57.0	50.6	49.0	57.5	57.7
Heavy Trucks:	61.7	60.2	51.2	52.5	60.8	60.9
Vehicle Noise:	66.5	64.8	60.9	57.0	65.5	65.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	34	107	337
CNEL:	12	37	117	369

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: N. Broadway
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,450 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.22	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-15.02	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.98	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.2	61.3	59.5	53.4	62.1	62.7
Medium Trucks:	58.0	56.5	50.1	48.6	57.1	57.3
Heavy Trucks:	61.2	59.8	50.8	52.0	60.4	60.5
Vehicle Noise:	66.0	64.4	60.5	56.6	65.1	65.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	10	30	96	304
CNEL:	11	33	105	332

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: Main St.
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,460 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.72	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.52	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.47	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.8	64.9	63.2	57.1	65.7	66.4
Medium Trucks:	61.4	59.8	53.5	51.9	60.4	60.6
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	69.4	67.7	64.0	59.8	68.3	68.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	86	273	865
CNEL:	30	95	301	951

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: Main St.
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,270 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.37	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.87	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.82	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	63.5	62.1	53.0	54.3	62.6	62.7
Vehicle Noise:	69.0	67.3	63.7	59.5	68.0	68.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	80	252	798
CNEL:	28	88	277	877

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: 4th St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-20.95	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-24.91	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.8	49.3	42.9	41.4	49.8	50.1
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.3
Vehicle Noise:	58.8	57.2	53.3	49.3	57.8	58.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	2	8	24	77
CNEL:	3	8	27	84

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: 4th St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	530 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.16	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-19.39	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-23.35	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.5	55.6	53.9	47.8	56.4	57.0
Medium Trucks:	52.3	50.8	44.5	42.9	51.4	51.6
Heavy Trucks:	55.6	54.1	45.1	46.4	54.7	54.8
Vehicle Noise:	60.4	58.7	54.8	50.9	59.4	59.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	11	35	110
CNEL:	4	12	38	121

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: 3rd St.
Road Segment: w/o N. Broadway

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	500 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.41	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-19.65	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-23.60	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.5	56.6	54.9	48.8	57.4	58.0
Medium Trucks:	53.4	51.9	45.5	44.0	52.4	52.7
Heavy Trucks:	56.6	55.2	46.1	47.4	55.7	55.9
Vehicle Noise:	61.4	59.8	55.8	51.9	60.4	60.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	10	33	105
CNEL:	4	11	36	115

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: 3rd St.
Road Segment: e/o Main St.

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	440 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.96	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-20.20	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-24.16	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.0	56.1	54.3	48.3	56.9	57.5
Medium Trucks:	52.8	51.3	45.0	43.4	51.9	52.1
Heavy Trucks:	56.0	54.6	45.6	46.8	55.2	55.3
Vehicle Noise:	60.9	59.2	55.3	51.4	59.9	60.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	9	29	92
CNEL:	3	10	32	101

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: 1st St.
Road Segment: w/o Sycamore St.

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	34,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,400 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.88	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.36	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.32	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	66.9	60.8	69.5	70.1
Medium Trucks:	64.5	63.0	56.7	55.1	63.6	63.8
Heavy Trucks:	65.8	64.4	55.4	56.6	65.0	65.1
Vehicle Noise:	72.6	70.8	67.6	63.0	71.5	72.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	271	856	2,706
CNEL:	95	300	948	2,998

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY+P
Road Name: 1st St.
Road Segment: e/o Sycamore St.

Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,270 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.71	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.53	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.49	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.4	62.9	56.5	54.9	63.4	63.6
Heavy Trucks:	65.7	64.3	55.2	56.5	64.8	64.9
Vehicle Noise:	72.4	70.7	67.4	62.8	71.4	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	82	260	823	2,603
CNEL:	91	288	912	2,884

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: N. Broadway
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,760 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	3.06	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.18	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.14	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.3	54.3	62.9	63.5
Medium Trucks:	58.8	57.3	51.0	49.4	57.9	58.1
Heavy Trucks:	62.1	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	66.9	65.2	61.3	57.4	65.9	66.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	12	37	117	369
CNEL:	13	40	128	404

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: N. Broadway
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,560 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.53	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.71	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.66	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.5	61.6	59.8	53.8	62.4	63.0
Medium Trucks:	58.3	56.8	50.5	48.9	57.4	57.6
Heavy Trucks:	61.5	60.1	51.1	52.3	60.7	60.8
Vehicle Noise:	66.4	64.7	60.8	56.9	65.4	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	10	33	103	327
CNEL:	11	36	113	358

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Main St.
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,680 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	4.09	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.15	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.10	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.2	65.3	63.6	57.5	66.1	66.7
Medium Trucks:	61.7	60.2	53.9	52.3	60.8	61.0
Heavy Trucks:	64.2	62.8	53.7	55.0	63.3	63.5
Vehicle Noise:	69.7	68.0	64.4	60.2	68.7	69.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	94	298	942
CNEL:	33	104	328	1,036

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Main St.
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,490 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.77	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.47	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.42	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.0	63.2	57.2	65.8	66.4
Medium Trucks:	61.4	59.9	53.5	52.0	60.4	60.7
Heavy Trucks:	63.9	62.5	53.4	54.7	63.0	63.1
Vehicle Noise:	69.4	67.7	64.1	59.9	68.4	68.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	88	277	875
CNEL:	30	96	304	962

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: 4th St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-20.62	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-24.57	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.3	54.4	52.6	46.6	55.2	55.8
Medium Trucks:	51.1	49.6	43.3	41.7	50.2	50.4
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	59.2	57.5	53.6	49.7	58.2	58.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	8	26	83
CNEL:	3	9	29	91

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: 4th St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	710 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-0.89	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-18.12	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-22.08	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.8	56.9	55.1	49.1	57.7	58.3
Medium Trucks:	53.6	52.1	45.8	44.2	52.7	52.9
Heavy Trucks:	56.8	55.4	46.4	47.6	56.0	56.1
Vehicle Noise:	61.7	60.0	56.1	52.2	60.7	61.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	15	47	148
CNEL:	5	16	51	162

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: 3rd St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.07	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-19.31	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-23.27	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.9	57.0	55.2	49.2	57.8	58.4
Medium Trucks:	53.7	52.2	45.8	44.3	52.8	53.0
Heavy Trucks:	56.9	55.5	46.5	47.7	56.1	56.2
Vehicle Noise:	61.8	60.1	56.2	52.3	60.8	61.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	11	36	113
CNEL:	4	12	39	124

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: 3rd St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	480 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.59	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-19.82	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-23.78	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.4	56.5	54.7	48.6	57.3	57.9
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	56.4	55.0	46.0	47.2	55.6	55.7
Vehicle Noise:	61.2	59.6	55.7	51.8	60.3	60.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	10	32	101
CNEL:	3	11	35	110

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: 1st St.
Road Segment: w/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,740 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	4.29	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-12.95	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-16.90	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.0	69.1	67.3	61.3	69.9	70.5
Medium Trucks:	64.9	63.4	57.1	55.5	64.0	64.2
Heavy Trucks:	66.3	64.8	55.8	57.1	65.4	65.5
Vehicle Noise:	73.0	71.2	68.0	63.4	72.0	72.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	94	298	941	2,977
CNEL:	104	330	1,043	3,298

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: 1st St.
Road Segment: e/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,550 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	4.06	0.17	0.00	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.18	0.18	0.00	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.13	0.17	0.00	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.7	68.8	67.1	61.0	69.6	70.3
Medium Trucks:	64.7	63.2	56.8	55.3	63.8	64.0
Heavy Trucks:	66.0	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	72.8	71.0	67.7	63.2	71.7	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	283	894	2,826
CNEL:	99	313	990	3,131

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P
Road Name: N. Broadway
Road Segment: n/o 4th St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,770 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	3.08	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.16	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.11	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.4	54.3	62.9	63.5
Medium Trucks:	58.9	57.4	51.0	49.5	57.9	58.2
Heavy Trucks:	62.1	60.7	51.6	52.9	61.2	61.3
Vehicle Noise:	66.9	65.2	61.3	57.4	65.9	66.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	12	37	117	371
CNEL:	13	41	128	406

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P
Road Name: N. Broadway
Road Segment: s/o 3rd St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,590 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	2.62	2.22	0.00	-4.81	0.000	0.000
Medium Trucks:	70.80	-14.62	2.24	0.00	-5.14	0.000	0.000
Heavy Trucks:	77.97	-18.58	2.22	0.00	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	59.9	53.8	62.5	63.1
Medium Trucks:	58.4	56.9	50.5	49.0	57.5	57.7
Heavy Trucks:	61.6	60.2	51.2	52.4	60.8	60.9
Vehicle Noise:	66.4	64.8	60.9	57.0	65.5	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	33	105	333
CNEL:	12	36	115	365

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P | Project Name: 3rd & Broadway
Road Name: Main St. | Job Number: 12192
Road Segment: n/o 4th St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,700 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	4.12	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.11	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.07	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.3	65.4	63.6	57.5	66.2	66.8
Medium Trucks:	61.8	60.2	53.9	52.3	60.8	61.0
Heavy Trucks:	64.2	62.8	53.8	55.0	63.4	63.5
Vehicle Noise:	69.8	68.1	64.4	60.2	68.8	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	95	300	949
CNEL:	33	104	330	1,043

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P | Project Name: 3rd & Broadway
Road Name: Main St. | Job Number: 12192
Road Segment: s/o 3rd St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,500 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	35.847
Medium Trucks:	35.735
Heavy Trucks:	35.847

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	3.79	1.38	0.00	-4.83	0.000	0.000
Medium Trucks:	73.48	-13.45	1.39	0.00	-5.08	0.000	0.000
Heavy Trucks:	79.92	-17.40	1.38	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.0	63.3	57.2	65.8	66.4
Medium Trucks:	61.4	59.9	53.6	52.0	60.5	60.7
Heavy Trucks:	63.9	62.5	53.4	54.7	63.0	63.2
Vehicle Noise:	69.4	67.7	64.1	59.9	68.4	68.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	88	278	879
CNEL:	31	97	306	966

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P | Project Name: 3rd & Broadway
Road Name: 4th St. | Job Number: 12192
Road Segment: w/o N. Broadway

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-20.62	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-24.57	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.3	54.4	52.6	46.6	55.2	55.8
Medium Trucks:	51.1	49.6	43.3	41.7	50.2	50.4
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	59.2	57.5	53.6	49.7	58.2	58.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	8	26	83
CNEL:	3	9	29	91

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P | Project Name: 3rd & Broadway
Road Name: 4th St. | Job Number: 12192
Road Segment: e/o Main St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	720 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	40.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	39.661
Medium Trucks:	39.560
Heavy Trucks:	39.662

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-0.82	0.94	0.00	-4.83	0.000	0.000
Medium Trucks:	70.80	-18.06	0.95	0.00	-5.08	0.000	0.000
Heavy Trucks:	77.97	-22.02	0.94	0.00	-5.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.8	56.9	55.2	49.1	57.7	58.4
Medium Trucks:	53.7	52.2	45.8	44.3	52.7	53.0
Heavy Trucks:	56.9	55.5	46.4	47.7	56.0	56.2
Vehicle Noise:	61.7	60.1	56.1	52.2	60.7	61.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	15	47	150
CNEL:	5	16	52	164

Wednesday, February 13, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P
Road Name: 3rd St.
Road Segment: w/o N. Broadway
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-2.07	2.22	0.00	*-4.81*	0.000	0.000
Medium Trucks:	70.80	-19.31	2.24	0.00	*-5.14*	0.000	0.000
Heavy Trucks:	77.97	-23.27	2.22	0.00	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.9	57.0	55.2	49.2	57.8	58.4
Medium Trucks:	53.7	52.2	45.8	44.3	52.8	53.0
Heavy Trucks:	56.9	55.5	46.5	47.7	56.1	56.2
Vehicle Noise:	61.8	60.1	56.2	52.3	60.8	61.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	4	11	36	113
CNEL:	4	12	39	124

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P
Road Name: 3rd St.
Road Segment: e/o Main St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	480 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-2.59	2.22	0.00	*-4.81*	0.000	0.000
Medium Trucks:	70.80	-19.82	2.24	0.00	*-5.14*	0.000	0.000
Heavy Trucks:	77.97	-23.78	2.22	0.00	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.4	56.5	54.7	48.6	57.3	57.9
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	56.4	55.0	46.0	47.2	55.6	55.7
Vehicle Noise:	61.2	59.6	55.7	51.8	60.3	60.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	3	10	32	101
CNEL:	3	11	35	110

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P
Road Name: 1st St.
Road Segment: w/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,740 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	4.29	0.17	0.00	*-4.85*	0.000	0.000
Medium Trucks:	77.72	-12.95	0.18	0.00	*-5.01*	0.000	0.000
Heavy Trucks:	82.99	-16.90	0.17	0.00	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.0	69.1	67.3	61.3	69.9	70.5
Medium Trucks:	64.9	63.4	57.1	55.5	64.0	64.2
Heavy Trucks:	66.3	64.8	55.8	57.1	65.4	65.5
Vehicle Noise:	73.0	71.2	68.0	63.4	72.0	72.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	94	298	941	2,977
CNEL:	104	330	1,043	3,298

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY+P
Road Name: 1st St.
Road Segment: e/o Sycamore St.
Project Name: 3rd & Broadway
Job Number: 12192

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,590 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	4.11	0.17	0.00	*-4.85*	0.000	0.000
Medium Trucks:	77.72	-13.13	0.18	0.00	*-5.01*	0.000	0.000
Heavy Trucks:	82.99	-17.08	0.17	0.00	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	70.8	68.9	67.1	61.1	69.7	70.3
Medium Trucks:	64.8	63.3	56.9	55.4	63.8	64.0
Heavy Trucks:	66.1	64.7	55.6	56.9	65.2	65.4
Vehicle Noise:	72.8	71.1	67.8	63.2	71.8	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	90	286	904	2,858
CNEL:	100	317	1,001	3,166

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APPENDIX 8.1:

ON-SITE TRAFFIC NOISE LEVEL CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: N. Broadway
Lot No: Residential (West 2F) Façade

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,850	vehicles
Vehicle Speed:	25	mph
Near/Far Lane Distance:	12	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	18.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	36.125
Medium Trucks:	35.000
Heavy Trucks:	32.997

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	3.27	1.34	0.00	*-16.09*	0.000	0.000
Medium Trucks:	71.09	-13.96	1.48	0.00	*-17.37*	0.000	0.000
Heavy Trucks:	77.24	-17.92	1.74	0.00	*-20.07*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	58.6	57.1	50.7	49.2	57.6	57.9
Heavy Trucks:	61.1	59.6	50.6	51.8	60.2	60.3
Vehicle Noise:	66.6	64.9	61.2	57.1	65.6	66.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	58.6	57.1	50.7	49.2	57.6	57.9
Heavy Trucks:	61.1	59.6	50.6	51.8	60.2	60.3
Vehicle Noise:	66.6	64.9	61.2	57.1	65.6	66.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: 3rd St.
Lot No: Residential (South 2F) Balcony

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	640	vehicles
Vehicle Speed:	25	mph
Near/Far Lane Distance:	12	feet

Site Data

Barrier Height:	**3.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	35.0	feet
Barrier Distance to Observer:	5.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	18.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	18.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.385
Medium Trucks:	39.341
Heavy Trucks:	37.523

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-1.34	0.86	0.00	*0.08*	-5.800	-8.800
Medium Trucks:	71.09	-18.57	0.97	0.00	*0.04*	-5.400	-8.400
Heavy Trucks:	77.24	-22.53	1.18	0.00	*0.00*	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.0	57.1	55.3	49.2	57.9	58.5
Medium Trucks:	53.5	52.0	45.6	44.1	52.5	52.8
Heavy Trucks:	55.9	54.5	45.4	46.7	55.0	55.2
Vehicle Noise:	61.5	59.8	56.1	51.9	60.5	60.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.2	51.3	49.5	43.4	52.1	52.7
Medium Trucks:	48.1	46.6	40.2	38.7	47.1	47.4
Heavy Trucks:	51.0	49.6	40.5	41.8	50.1	50.3
Vehicle Noise:	56.0	54.3	50.4	46.5	55.0	55.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: N. Broadway
Lot No: Residential (West 3F) Façade

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,850	vehicles
Vehicle Speed:	25	mph
Near/Far Lane Distance:	12	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	3.27	2.22	0.00	*-4.81*	0.000	0.000
Medium Trucks:	71.09	-13.96	2.24	0.00	*-5.14*	0.000	0.000
Heavy Trucks:	77.24	-17.92	2.22	0.00	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.9	63.0	61.3	55.2	63.8	64.4
Medium Trucks:	59.4	57.9	51.5	49.9	58.4	58.6
Heavy Trucks:	61.5	60.1	51.1	52.3	60.7	60.8
Vehicle Noise:	67.3	65.6	62.1	57.8	66.3	66.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.9	63.0	61.3	55.2	63.8	64.4
Medium Trucks:	59.4	57.9	51.5	49.9	58.4	58.6
Heavy Trucks:	61.5	60.1	51.1	52.3	60.7	60.8
Vehicle Noise:	67.3	65.6	62.1	57.8	66.3	66.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: 3rd St.
Lot No: Residential (South 3F) Balcony

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**3.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	35.0 feet
Barrier Distance to Observer:	5.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	37.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	37.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	53.427
Medium Trucks:	51.861
Heavy Trucks:	48.832

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-1.34	-0.36	0.00	*0.64*	-9.120	-12.120
Medium Trucks:	71.09	-18.57	-0.23	0.00	*0.57*	-8.850	-11.850
Heavy Trucks:	77.24	-22.53	0.03	0.00	*0.44*	-8.200	-11.200

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.7	55.8	54.1	48.0	56.6	57.3
Medium Trucks:	52.3	50.8	44.4	42.9	51.3	51.6
Heavy Trucks:	54.7	53.3	44.3	45.5	53.9	54.0
Vehicle Noise:	60.3	58.6	54.9	50.7	59.3	59.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	48.6	46.7	45.0	38.9	47.5	48.1
Medium Trucks:	43.4	41.9	35.6	34.0	42.5	42.7
Heavy Trucks:	46.5	45.1	36.1	37.3	45.7	45.8
Vehicle Noise:	51.5	49.8	45.9	42.0	50.5	50.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: 3rd St.
Lot No: Hotel (South 3F) Patios

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	640	vehicles
Vehicle Speed:	25	mph
Near/Far Lane Distance:	12	feet

Site Data

Barrier Height:	**3.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	40.0	feet
Barrier Distance to Observer:	10.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	30.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	30.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	52.918
Medium Trucks:	51.490
Heavy Trucks:	48.782

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-1.34	-0.32	0.00	*1.45*	-11.200	-14.200
Medium Trucks:	71.09	-18.57	-0.20	0.00	*1.29*	-10.880	-13.880
Heavy Trucks:	77.24	-22.53	0.04	0.00	*0.97*	-10.210	-13.210

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.1	56.7	57.3
Medium Trucks:	52.3	50.8	44.4	42.9	51.4	51.6
Heavy Trucks:	54.7	53.3	44.3	45.5	53.9	54.0
Vehicle Noise:	60.3	58.6	55.0	50.8	59.3	59.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	46.6	44.7	42.9	36.9	45.5	46.1
Medium Trucks:	41.4	39.9	33.6	32.0	40.5	40.7
Heavy Trucks:	44.5	43.1	34.1	35.3	43.7	43.8
Vehicle Noise:	49.4	47.8	43.9	39.9	48.4	48.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: N. Broadway
Lot No: Residential (West 4F) Façade

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,850	vehicles
Vehicle Speed:	25	mph
Near/Far Lane Distance:	12	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	29.547
Medium Trucks:	29.411
Heavy Trucks:	29.547

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	3.27	2.22	0.00	*-4.81*	0.000	0.000
Medium Trucks:	71.09	-13.96	2.24	0.00	*-5.14*	0.000	0.000
Heavy Trucks:	77.24	-17.92	2.22	0.00	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.9	63.0	61.3	55.2	63.8	64.4
Medium Trucks:	59.4	57.9	51.5	49.9	58.4	58.6
Heavy Trucks:	61.5	60.1	51.1	52.3	60.7	60.8
Vehicle Noise:	67.3	65.6	62.1	57.8	66.3	66.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.9	63.0	61.3	55.2	63.8	64.4
Medium Trucks:	59.4	57.9	51.5	49.9	58.4	58.6
Heavy Trucks:	61.5	60.1	51.1	52.3	60.7	60.8
Vehicle Noise:	67.3	65.6	62.1	57.8	66.3	66.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: 3rd St.
Lot No: Residential (South 4F) Balcony

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**3.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	35.0 feet
Barrier Distance to Observer:	5.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	46.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	46.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	60.820
Medium Trucks:	59.135
Heavy Trucks:	55.828

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-1.34	-0.92	0.00	*0.91*	-10.030	-13.030
Medium Trucks:	71.09	-18.57	-0.80	0.00	*0.85*	-9.850	-12.850
Heavy Trucks:	77.24	-22.53	-0.55	0.00	*0.73*	-9.420	-12.420

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.2	55.3	53.5	47.5	56.1	56.7
Medium Trucks:	51.7	50.2	43.8	42.3	50.8	51.0
Heavy Trucks:	54.2	52.7	43.7	45.0	53.3	53.4
Vehicle Noise:	59.7	58.0	54.4	50.2	58.7	59.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	47.2	45.3	43.5	37.4	46.1	46.7
Medium Trucks:	41.9	40.4	34.0	32.5	40.9	41.1
Heavy Trucks:	44.7	43.3	34.3	35.5	43.9	44.0
Vehicle Noise:	49.9	48.2	44.4	40.4	48.9	49.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: 3rd St.
Lot No: Hotel (South 4F) Façade

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	640	vehicles
Vehicle Speed:	25	mph
Near/Far Lane Distance:	12	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	41.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	52.915
Medium Trucks:	51.264
Heavy Trucks:	48.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-1.34	-0.32	0.00	*-22.32*	0.000	0.000
Medium Trucks:	71.09	-18.57	-0.18	0.00	*-24.12*	0.000	0.000
Heavy Trucks:	77.24	-22.53	0.11	0.00	*-28.02*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.1	56.7	57.3
Medium Trucks:	52.3	50.8	44.5	42.9	51.4	51.6
Heavy Trucks:	54.8	53.4	44.4	45.6	54.0	54.1
Vehicle Noise:	60.3	58.6	55.0	50.8	59.3	59.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.1	56.7	57.3
Medium Trucks:	52.3	50.8	44.5	42.9	51.4	51.6
Heavy Trucks:	54.8	53.4	44.4	45.6	54.0	54.1
Vehicle Noise:	60.3	58.6	55.0	50.8	59.3	59.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: 3rd St.
Lot No: Hotel (South 3F) Façade

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	640	vehicles
Vehicle Speed:	25	mph
Near/Far Lane Distance:	12	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	30.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	10
Medium Trucks (2 Axles):	10
Heavy Trucks (3+ Axles):	10

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	44.193
Medium Trucks:	42.720
Heavy Trucks:	39.908

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-1.34	0.47	0.00	*-20.03*	0.000	0.000
Medium Trucks:	71.09	-18.57	0.61	0.00	*-21.65*	0.000	0.000
Heavy Trucks:	77.24	-22.53	0.91	0.00	*-25.14*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	53.1	51.6	45.3	43.7	52.2	52.4
Heavy Trucks:	55.6	54.2	45.2	46.4	54.8	54.9
Vehicle Noise:	61.1	59.4	55.7	51.6	60.1	60.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	53.1	51.6	45.3	43.7	52.2	52.4
Heavy Trucks:	55.6	54.2	45.2	46.4	54.8	54.9
Vehicle Noise:	61.1	59.4	55.7	51.6	60.1	60.5

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APPENDIX 10.1:

OPERATIONAL NOISE LEVEL CALCULATIONS

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STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-1st Floor**
Source: Roof-Top Mechanical Ventilation
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	83.0	feet	***Barrier Height:***	**180.0 feet**
Noise Distance to Barrier:	20.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	63.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	180.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	83.0	-24.4	-24.4	-24.4	-24.4	-24.4	-24.4
Shielding (Barrier Attenuation)	20.0	-16.7	-16.7	-16.7	-16.7	-16.7	-16.7
Raw (Distance + Barrier)		-41.1	33.3	35.0	36.3	36.6	37.1
39 Minute Hourly Adjustment		**-43.0**	**31.4**	**33.1**	**34.4**	**34.7**	**35.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-1st Floor**
Source: Parking Garage Vehicle Movements
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	161.0	feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	151.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	20.0	feet	*Drop Off Coefficient:*	10.0
Barrier Elevation:	20.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	44.0	47.0	55.0	61.0	68.6
Distance Attenuation	161.0	-12.1	-12.1	-12.1	-12.1	-12.1	-12.1
Shielding (Barrier Attenuation)	10.0	-5.8	-5.8	-5.8	-5.8	-5.8	-5.8
Raw (Distance + Barrier)		-17.9	26.1	29.1	37.1	43.1	50.7
60 Minute Hourly Adjustment		**-17.9**	**26.1**	**29.1**	**37.1**	**43.1**	**50.7**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R1-1st Floor**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	132.0	feet	***Barrier Height:***	**5.0**	**feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	4.0	feet
Barrier Distance to Observer:	122.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	170.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	170.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	132.0	-28.4	-28.4	-28.4	-28.4	-28.4	-28.4
Shielding (Barrier Attenuation)	10.0	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1
Raw (Distance + Barrier)		-43.5	25.2	28.2	31.5	34.6	40.0
60 Minute Hourly Adjustment		**-43.5**	**25.2**	**28.2**	**31.5**	**34.6**	**40.0**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R1-1st Floor**
Source: Hotel Parking Auto Lift
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	73.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	73.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	0.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	64.0	64.5	66.2	67.2	67.2
Distance Attenuation	73.0	-17.3	-17.3	-17.3	-17.3	-17.3	-17.3
Shielding (Barrier Attenuation)	73.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-17.3	46.7	47.2	48.9	49.9	49.9
20 Minute Hourly Adjustment		**-22.1**	**41.9**	**42.4**	**44.1**	**45.1**	**45.1**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R1-1st Floor**
Source: Outdoor Bar Area Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	68.0	feet	***Barrier Height:***	**5.0**	**feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	58.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	110.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	110.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	0.0	60.6	65.0	68.4	70.8	74.3
Distance Attenuation	68.0	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1
Shielding (Barrier Attenuation)	10.0	-15.2	-15.2	-15.2	-15.2	-15.2	-15.2
Raw (Distance + Barrier)		-22.3	38.3	42.7	46.1	48.5	52.0
60 Minute Hourly Adjustment		**-22.3**	**38.3**	**42.7**	**46.1**	**48.5**	**52.0**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R2-2nd Floor**
Source: Roof-Top Mechanical Ventilation
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	192.0	feet	***Barrier Height:***	**125.0**	**feet**
Noise Distance to Barrier:	50.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	142.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	10.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	125.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	0.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	192.0	-31.7	-31.7	-31.7	-31.7	-31.7	-31.7
Shielding (Barrier Attenuation)	50.0	-15.9	-15.9	-15.9	-15.9	-15.9	-15.9
Raw (Distance + Barrier)		-47.6	26.8	28.5	29.8	30.1	30.6
39 Minute Hourly Adjustment		**-49.5**	**24.9**	**26.6**	**27.9**	**28.2**	**28.7**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R2-2nd Floor** *Project Name:* 3rd & Broadway
Source: Parking Garage Vehicle Movements *Job Number:* 12192
Condition: Operational *Analyst:* A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	142.0	feet	***Barrier Height:***	**5.0**	**feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	132.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	10.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	20.0	feet	*Drop Off Coefficient:*	10.0	
Barrier Elevation:	20.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	44.0	47.0	55.0	61.0	68.6
Distance Attenuation	142.0	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
Shielding (Barrier Attenuation)	10.0	-5.3	-5.3	-5.3	-5.3	-5.3	-5.3
Raw (Distance + Barrier)		-16.8	27.2	30.2	38.2	44.2	51.8
60 Minute Hourly Adjustment		**-16.8**	**27.2**	**30.2**	**38.2**	**44.2**	**51.8**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R2-2nd Floor** *Project Name:* 3rd & Broadway
Source: Outdoor Pool/Spa Activity *Job Number:* 12192
Condition: Operational *Analyst:* A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	306.0	feet	***Barrier Height:***	**5.0**	**feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	4.0	feet
Barrier Distance to Observer:	296.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	10.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	170.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	170.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	306.0	-35.7	-35.7	-35.7	-35.7	-35.7	-35.7
Shielding (Barrier Attenuation)	10.0	-11.6	-11.6	-11.6	-11.6	-11.6	-11.6
Raw (Distance + Barrier)		-47.3	21.4	24.4	27.7	30.8	36.2
60 Minute Hourly Adjustment		**-47.3**	**21.4**	**24.4**	**27.7**	**30.8**	**36.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R2-2nd Floor**
Source: Hotel Parking Auto Lift
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	479.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	479.0 feet	*Noise Source Height:*	8.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	10.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	64.0	64.5	66.2	67.2	67.2
Distance Attenuation	479.0	-33.6	-33.6	-33.6	-33.6	-33.6	-33.6
Shielding (Barrier Attenuation)	479.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-33.6	30.4	30.9	32.6	33.6	33.6
20 Minute Hourly Adjustment		**-38.4**	**25.6**	**26.1**	**27.8**	**28.8**	**28.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R2-2nd Floor**
Source: Outdoor Bar Area Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	411.0 feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	401.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	10.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	110.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	110.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	0.0	60.6	65.0	68.4	70.8	74.3
Distance Attenuation	411.0	-22.7	-22.7	-22.7	-22.7	-22.7	-22.7
Shielding (Barrier Attenuation)	10.0	-7.4	-7.4	-7.4	-7.4	-7.4	-7.4
Raw (Distance + Barrier)		-30.1	30.5	34.9	38.3	40.7	44.2
60 Minute Hourly Adjustment		**-30.1**	**30.5**	**34.9**	**38.3**	**40.7**	**44.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-2nd Floor**
Source: Roof-Top Mechanical Ventilation
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	83.0	feet	***Barrier Height:***	**180.0 feet**
Noise Distance to Barrier:	20.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	63.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	10.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	180.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	83.0	-24.4	-24.4	-24.4	-24.4	-24.4	-24.4
Shielding (Barrier Attenuation)	20.0	-16.6	-16.6	-16.6	-16.6	-16.6	-16.6
Raw (Distance + Barrier)		-41.0	33.4	35.1	36.4	36.7	37.2
39 Minute Hourly Adjustment		**-42.9**	**31.5**	**33.2**	**34.5**	**34.8**	**35.3**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-2nd Floor**
Source: Parking Garage Vehicle Movements
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	161.0	feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	151.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	10.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	20.0	feet	*Drop Off Coefficient:*	10.0
Barrier Elevation:	20.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	44.0	47.0	55.0	61.0	68.6
Distance Attenuation	161.0	-12.1	-12.1	-12.1	-12.1	-12.1	-12.1
Shielding (Barrier Attenuation)	10.0	-5.2	-5.2	-5.2	-5.2	-5.2	-5.2
Raw (Distance + Barrier)		-17.3	26.7	29.7	37.7	43.7	51.3
60 Minute Hourly Adjustment		**-17.3**	**26.7**	**29.7**	**37.7**	**43.7**	**51.3**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-2nd Floor**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	132.0	feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	122.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	10.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	170.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	170.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	132.0	-28.4	-28.4	-28.4	-28.4	-28.4	-28.4
Shielding (Barrier Attenuation)	10.0	-14.9	-14.9	-14.9	-14.9	-14.9	-14.9
Raw (Distance + Barrier)		-43.3	25.4	28.4	31.7	34.8	40.2
60 Minute Hourly Adjustment		**-43.3**	**25.4**	**28.4**	**31.7**	**34.8**	**40.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-2nd Floor**
Source: Hotel Parking Auto Lift
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	73.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	73.0	feet	*Noise Source Height:*	8.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	10.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	64.0	64.5	66.2	67.2	67.2
Distance Attenuation	73.0	-17.3	-17.3	-17.3	-17.3	-17.3	-17.3
Shielding (Barrier Attenuation)	73.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-17.3	46.7	47.2	48.9	49.9	49.9
20 Minute Hourly Adjustment		**-22.1**	**41.9**	**42.4**	**44.1**	**45.1**	**45.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-2nd Floor**
Source: Outdoor Bar Area Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	68.0 feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	58.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	10.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	110.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	110.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	0.0	60.6	65.0	68.4	70.8	74.3
Distance Attenuation	68.0	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1
Shielding (Barrier Attenuation)	10.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0
Raw (Distance + Barrier)		-22.1	38.5	42.9	46.3	48.7	52.2
60 Minute Hourly Adjustment		**-22.1**	**38.5**	**42.9**	**46.3**	**48.7**	**52.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R2-3rd Floor**
Source: Roof-Top Mechanical Ventilation
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	192.0 feet	***Barrier Height:***	**125.0 feet**
Noise Distance to Barrier:	50.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	142.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	125.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	192.0	-31.7	-31.7	-31.7	-31.7	-31.7	-31.7
Shielding (Barrier Attenuation)	50.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Raw (Distance + Barrier)		-47.0	27.4	29.1	30.4	30.7	31.2
39 Minute Hourly Adjustment		**-48.9**	**25.5**	**27.2**	**28.5**	**28.8**	**29.3**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R2-3rd Floor**
Source: Parking Garage Vehicle Movements
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	142.0	feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	132.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	20.0	feet	*Drop Off Coefficient:*	10.0
Barrier Elevation:	20.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	44.0	47.0	55.0	61.0	68.6
Distance Attenuation	142.0	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
Shielding (Barrier Attenuation)	10.0	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9
Raw (Distance + Barrier)		-16.4	27.6	30.6	38.6	44.6	52.2
60 Minute Hourly Adjustment		**-16.4**	**27.6**	**30.6**	**38.6**	**44.6**	**52.2**

STATIONARY SOURCE NOISE PREDICTION MODEL 2/12/2019

Observer Location: **R2-3rd Floor**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	306.0	feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	296.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	170.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	170.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	306.0	-35.7	-35.7	-35.7	-35.7	-35.7	-35.7
Shielding (Barrier Attenuation)	10.0	-11.3	-11.3	-11.3	-11.3	-11.3	-11.3
Raw (Distance + Barrier)		-47.0	21.7	24.7	28.0	31.1	36.5
60 Minute Hourly Adjustment		**-47.0**	**21.7**	**24.7**	**28.0**	**31.1**	**36.5**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R2-3rd Floor**
Source: Hotel Parking Auto Lift
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	479.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	479.0 feet	*Noise Source Height:*	8.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	64.0	64.5	66.2	67.2	67.2
Distance Attenuation	479.0	-33.6	-33.6	-33.6	-33.6	-33.6	-33.6
Shielding (Barrier Attenuation)	479.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-33.6	30.4	30.9	32.6	33.6	33.6
20 Minute Hourly Adjustment		**-38.4**	**25.6**	**26.1**	**27.8**	**28.8**	**28.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R2-3rd Floor**
Source: Outdoor Bar Area Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	411.0 feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	401.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	110.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	110.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	0.0	60.6	65.0	68.4	70.8	74.3
Distance Attenuation	411.0	-22.7	-22.7	-22.7	-22.7	-22.7	-22.7
Shielding (Barrier Attenuation)	10.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0
Raw (Distance + Barrier)		-29.7	30.9	35.3	38.7	41.1	44.6
60 Minute Hourly Adjustment		**-29.7**	**30.9**	**35.3**	**38.7**	**41.1**	**44.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-3rd Floor**
Source: Roof-Top Mechanical Ventilation
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	83.0	feet	***Barrier Height:***	**180.0**	**feet**
Noise Distance to Barrier:	20.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	63.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	20.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	180.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	0.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	83.0	-24.4	-24.4	-24.4	-24.4	-24.4	-24.4
Shielding (Barrier Attenuation)	20.0	-16.5	-16.5	-16.5	-16.5	-16.5	-16.5
Raw (Distance + Barrier)		-40.9	33.5	35.2	36.5	36.8	37.3
39 Minute Hourly Adjustment		**-42.8**	**31.6**	**33.3**	**34.6**	**34.9**	**35.4**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-3rd Floor**
Source: Parking Garage Vehicle Movements
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	161.0	feet	***Barrier Height:***	**5.0**	**feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	151.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	20.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	20.0	feet	*Drop Off Coefficient:*	10.0	
Barrier Elevation:	20.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	44.0	47.0	55.0	61.0	68.6
Distance Attenuation	161.0	-12.1	-12.1	-12.1	-12.1	-12.1	-12.1
Shielding (Barrier Attenuation)	10.0	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9
Raw (Distance + Barrier)		-17.0	27.0	30.0	38.0	44.0	51.6
60 Minute Hourly Adjustment		**-17.0**	**27.0**	**30.0**	**38.0**	**44.0**	**51.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-3rd Floor**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	132.0	feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	122.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	170.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	170.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	132.0	-28.4	-28.4	-28.4	-28.4	-28.4	-28.4
Shielding (Barrier Attenuation)	10.0	-14.8	-14.8	-14.8	-14.8	-14.8	-14.8
Raw (Distance + Barrier)		-43.2	25.5	28.5	31.8	34.9	40.3
60 Minute Hourly Adjustment		**-43.2**	**25.5**	**28.5**	**31.8**	**34.9**	**40.3**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-3rd Floor**
Source: Hotel Parking Auto Lift
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	73.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	73.0	feet	*Noise Source Height:*	8.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	0.0	64.0	64.5	66.2	67.2	67.2
Distance Attenuation	73.0	-17.3	-17.3	-17.3	-17.3	-17.3	-17.3
Shielding (Barrier Attenuation)	73.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-17.3	46.7	47.2	48.9	49.9	49.9
20 Minute Hourly Adjustment		**-22.1**	**41.9**	**42.4**	**44.1**	**45.1**	**45.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

2/12/2019

Observer Location: **R1-3rd Floor**
Source: Outdoor Bar Area Activity
Condition: Operational

Project Name: 3rd & Broadway
Job Number: 12192
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	68.0	feet	***Barrier Height:***	**5.0 feet**
Noise Distance to Barrier:	10.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	58.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	20.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	110.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	110.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	0.0	60.6	65.0	68.4	70.8	74.3
Distance Attenuation	68.0	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1
Shielding (Barrier Attenuation)	10.0	-14.7	-14.7	-14.7	-14.7	-14.7	-14.7
Raw (Distance + Barrier)		-21.8	38.8	43.2	46.6	49.0	52.5
60 Minute Hourly Adjustment		**-21.8**	**38.8**	**43.2**	**46.6**	**49.0**	**52.5**

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Appendix G Traffic Impact Analysis

Appendix

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Caribou Industries Proposal for the 3rd Street Promenade

LOCATED AT: 3RD & BROADWAY

TRAFFIC IMPACT ANALYSIS

CITY OF SANTA ANA

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MARCH 13, 2019 (REVISED: APRIL 17, 2019)

PREPARED FOR: CARIBOU INDUSTRIES, INC.

CONTRACTOR DEVELOPER
CARIBOU INDUSTRIES
PRESERVING THE PAST ENSURING THE FUTURE

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LIST OF ABBREVIATED TERMS

(1)	Reference
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
CMP	Congestion Management Program
E+P	Existing Plus Project
EIR	Environmental Impact Report
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
ICU	Intersection Capacity Utilization
ITE	Institute of Transportation Engineers
LOS	Level of Service
MPAH	Master Plan of Arterial Highways
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NP	No Project (or Without Project)
OCTA	Orange County Transportation Authority
OCTAM	Orange County Transportation Analysis Model
PHF	Peak Hour Factor
Project	Caribou Industries Proposal for the 3rd Street Promenade
sf	Square Feet
SP	Specific Plan
TAZ	Traffic Analysis Zone
TZC	Transit Zoning Code
TIA	Traffic Impact Analysis
v/c	Volume to Capacity Ratio
WP	With Project

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1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) prepared for the proposed Caribou Industries Proposal for the 3rd Street Promenade development ("Project"), which is located east of Broadway and north of 3rd Street, in the City of Santa Ana. The proposed Project is shown on Exhibit 1-1. The Project is located within portions of Traffic Analysis Zone (TAZ) 2 and 3 of the Transit Zoning Code (TZC) (formerly known as the Santa Ana Renaissance Specific Plan (SP)).

The purpose of this traffic impact analysis is to evaluate the potential circulation system deficiencies that could result from the development of the proposed Project, and if necessary to recommend mitigation to achieve acceptable circulation system performance. This traffic impact analysis has been prepared in support of an addendum to the certified Transit Zoning Code (TZC) Environmental Impact Report (EIR). (1) In addition, site specific issues such as project access have also been assessed. The approved Project Traffic Study Scoping agreement is provided in Appendix 1.1 of this TIA.

1.1 SUMMARY OF FINDINGS

The Project is estimated to generate a net total of approximately 1,372 trip-ends per day with 94 vehicles per hour (VPH) during the weekday AM peak hour and 112 VPH during the weekday PM peak hour. For Existing (2019), Opening Year Cumulative (2021), and Horizon Year (2040) traffic conditions the addition of Project traffic to study area intersections did not result in deficient intersection operations.

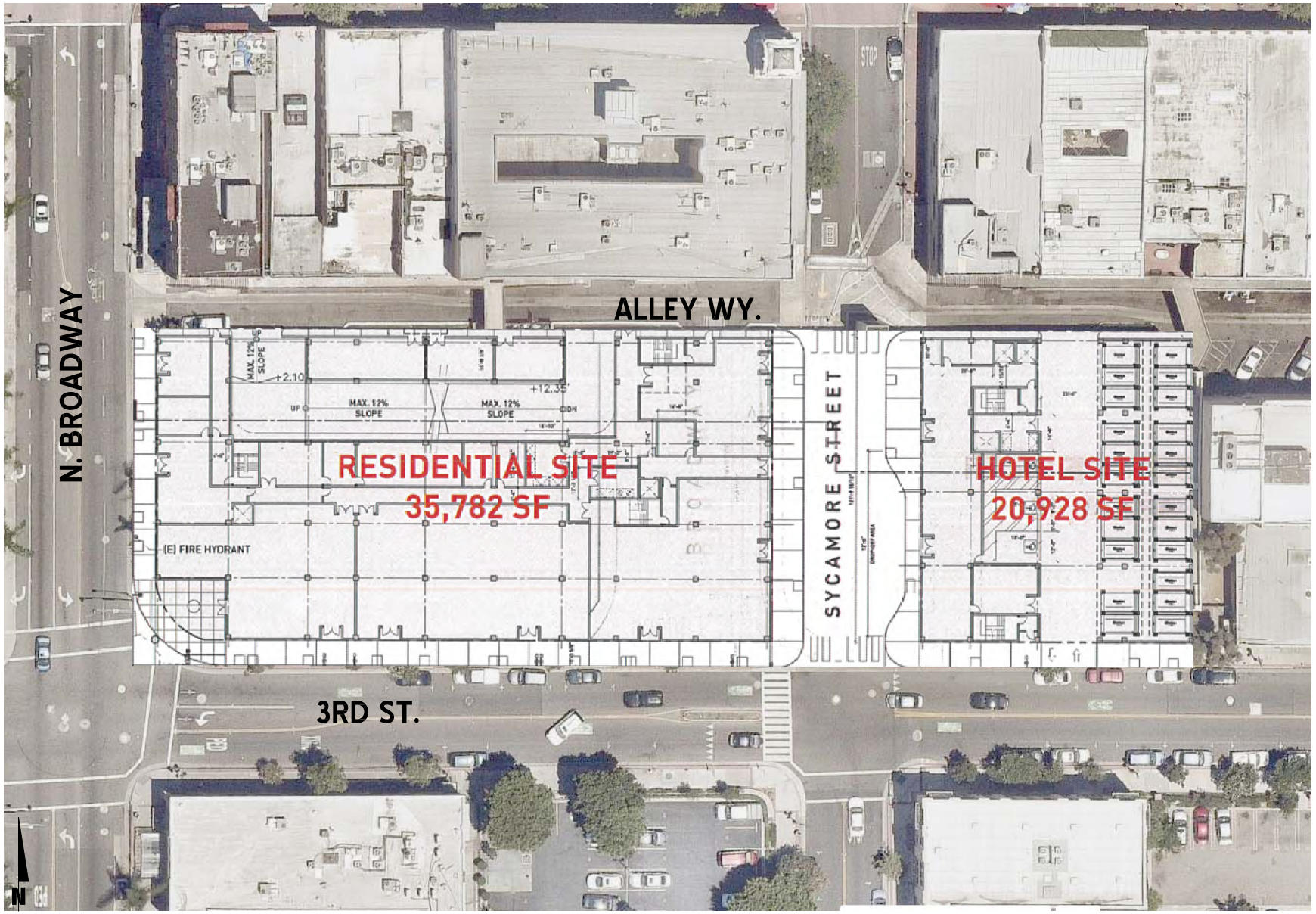
The Project is within a transit priority area as defined by Public Resources Code (PRC) Section 21099(a)(7).

The Project shall incorporate all of the adopted mitigation measures identified in the Transit Zoning Code (TZC) Environmental Impact Report (EIR) (1). A comparison of the intersection analysis with the TZC EIR is provided in Table 1-2. The proposed Project is not anticipated to result in any new significant traffic impacts at the overlapping study area intersections.

1.2 PROJECT OVERVIEW

The proposed Project is to consist of up to 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), and rooftop amenities ancillary to residential and hotel uses. The residential building contains 16 levels and the hotel building contains 10 levels. Regional access to the site is provided via the SR-55 Freeway and I-5 Freeway interchanges. For the purposes of this analysis, it is assumed that the Project will be constructed within a single phase of development, and is anticipated to be fully built and operational by Year 2021.

EXHIBIT 1-1: PRELIMINARY SITE PLAN



1.3 ANALYSIS SCENARIOS

For the purposes of this traffic study, potential impacts to traffic and circulation have been assessed for each of the following conditions:

- Existing (2019)
- Existing plus Project (E+P)
- Opening Year Cumulative (2021) Without Project
- Opening Year Cumulative (2021) With Project
- Horizon Year (2040) Without Project
- Horizon Year (2040) With Project

1.3.1 EXISTING (2019) CONDITIONS

Information for Existing (2019) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

1.3.2 EXISTING PLUS PROJECT CONDITIONS

The Existing plus Project (E+P) analysis determines circulation system deficiencies that would occur on the existing roadway system in the scenario of the Project being placed upon Existing conditions. The E+P analysis is intended to identify the project-specific traffic impacts associated solely with the development of the proposed Project based on a comparison of the E+P traffic conditions to Existing (2019) conditions.

1.3.3 OPENING YEAR CUMULATIVE (2021) CONDITIONS

The Opening Year Cumulative (2021) conditions analysis determines the potential near-term cumulative circulation system deficiencies. The Opening Year Cumulative conditions analysis has been provided to determine if planned and funded improvements can accommodate the near-term cumulative traffic at the target level of service (LOS) identified by the City of Santa Ana (lead agency). Other improvements needed beyond the "funded" improvements are identified as such.

To account for background traffic growth, traffic associated with other known cumulative development projects in conjunction with an ambient growth from Existing (2019) conditions of 2.01% (1.0 percent per year over 2 years, compounded annually) is included for Opening Year Cumulative traffic conditions. This list was compiled from information provided by the City of Santa Ana, and is consistent with recent studies in the study area.

1.3.4 HORIZON YEAR (2040) CONDITIONS

Traffic projections for Horizon Year (2040) with Project conditions were derived from the Orange County Transportation Analysis Model (OCTAM) regional traffic model, maintained by the Orange County Transportation Authority (OCTA), using accepted procedures for model forecast refinement and smoothing. For the purpose of this analysis, Horizon Year (2040) traffic

forecasts were either obtained from the OCTAM regional traffic model or the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study. (2)

The Horizon Year (2040) conditions analysis will be utilized to determine if planned and funded improvements can accommodate the long-range cumulative traffic at the target LOS identified by the City of Santa Ana (lead agency). Other improvements needed beyond the "funded" improvements are identified as such.

1.4 STUDY AREA

To ensure that this TIA satisfies the City of Santa Ana's traffic study requirements, Urban Crossroads, Inc. prepared a project traffic study scoping package for review by City staff prior to the preparation of this report. The Agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The Agreement approved by the City is included in Appendix 1.1.

The following 8 study area intersections shown on Exhibit 1-2 and listed in Table 1-1 were selected for this TIA based on consultation with City of Santa Ana staff. In general, the study area intersection locations have been defined based on the City's 50 peak hour trip threshold to any surrounding intersections and/or are consistent with the locations previously identified and evaluated as part of the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study. (2) The intersections previously evaluated in the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study are denoted by an asterisk (*).

Although some of the study area intersections are not anticipated to meet the City's analysis criteria of 50 or more peak hour Project trips, they have been included to be consistent with the study area assessed as part of the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study or based on City's request during the scoping process.

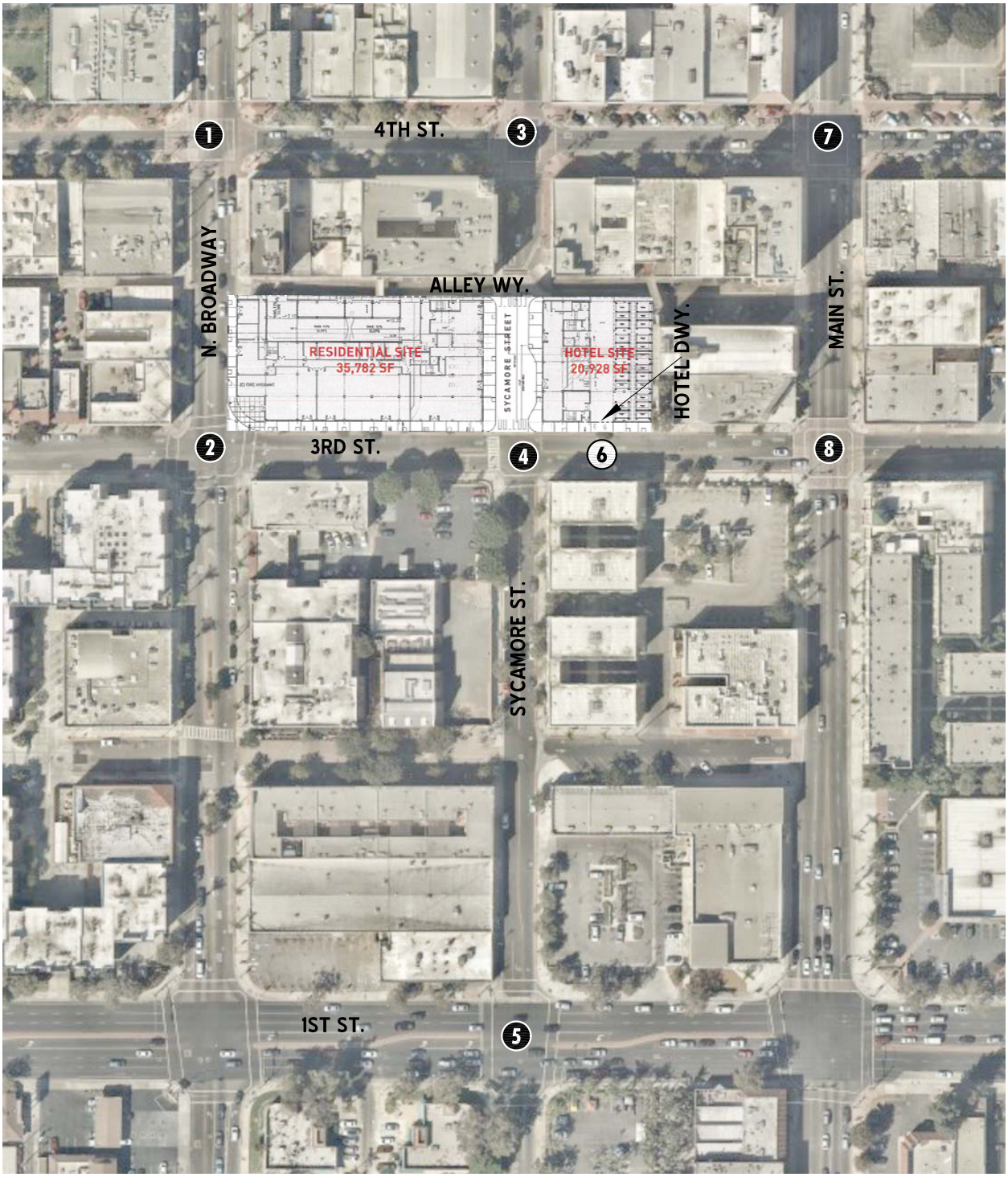
TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP?
1	N. Broadway & 4th St.*	Santa Ana	No
2	N. Broadway & 3rd St.*	Santa Ana	No
3	Sycamore St. & 4th St.*	Santa Ana	No
4	Sycamore St. & 3rd St.	Santa Ana	No
5	Sycamore St. & 1st St.	Santa Ana	No
6	Hotel Dwy. & 3rd St.	Santa Ana	No
7	Main St. & 4th St.*	Santa Ana	No
8	Main St. & 3rd St.*	Santa Ana	No

* = Intersection previously evaluated in the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study

Based on a review of the Orange County Congestion Management Program (CMP), there are no CMP facilities within the study area.

EXHIBIT 1-2: LOCATION MAP



LEGEND:

- ⓪ = EXISTING INTERSECTION ANALYSIS LOCATION
- (0) = FUTURE INTERSECTION ANALYSIS LOCATION

N

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1.5 ANALYSIS FINDINGS

This section provides a summary of the analysis results for Existing (2019), Opening Year Cumulative (2021), and Horizon Year (2040) traffic conditions.

1.5.1 INTERSECTIONS

Existing (2019) Conditions

For Existing (2019) traffic conditions, no study area intersections are currently operating at an unacceptable LOS (i.e., LOS F) during one or both of the peak hours.

E+P Conditions

No study area intersections are anticipated to operate at an unacceptable LOS (i.e., LOS F) during one or more peak hours with the addition of Project traffic for E+P traffic conditions.

Opening Year Cumulative (2021) Without Project Conditions

For Opening Year Cumulative (2021) Without Project traffic conditions, no study area intersections are anticipated to operate at an unacceptable LOS (i.e., LOS F) during one or more peak hours.

Opening Year Cumulative (2021) With Project Conditions

No study area intersections are anticipated to operate at an unacceptable LOS (i.e., LOS F) during one or more peak hours with the addition of Project traffic for Opening Year Cumulative (2021) With Project traffic conditions.

Horizon Year (2040) Without Project Conditions

For Horizon Year (2040) Without Project traffic conditions, the following study area intersection is anticipated to operate at an unacceptable LOS (i.e., LOS F) during one or more peak hours:

- Sycamore St. & 3rd St. (#4) – LOS F PM peak hour only

The intersection Sycamore Street & 3rd Street was not previously evaluated in the original 2010 Transit Zoning Code (TZC) Environmental Impact Report (EIR). (1) Consistent with the TZC EIR, all the overlapping study area intersections are anticipated to operate at acceptable LOS during the peak hours with existing geometrics.

Horizon Year (2040) With Project Conditions

No study area intersections are anticipated to operate at an unacceptable LOS (i.e., LOS F) during one or more peak hours with the addition of Project traffic for Horizon Year (2040) With Project traffic conditions.

EXHIBIT 1-3: SUMMARY OF DEFICIENT INTERSECTIONS BY ANALYSIS SCENARIO

#	Intersection	Existing (2019)	E+P	Opening Year (2021) Cumulative Without Project	Opening Year (2021) Cumulative With Project	Horizon Year (2040) Without Project	Horizon Year (2040 With Project
1	N. Broadway & 4th St.						
2	N. Broadway & 3rd St.						
3	Sycamore St. & 4th St.						
4	Sycamore St. & 3rd St.						
5	Sycamore St. & 1st St.						
6	Hotel Dwy. & 3rd St.	NA		NA		NA	
7	Main St. & 4th St.						
8	Main St. & 3rd St.						

LEGEND:

- = AM PEAK HOUR
- = PM PEAK HOUR
- = LOS A-E
- = LOS F

NA = NOT AN ANALYSIS LOCATION FOR THIS SCENARIO

1.6 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the City of Santa Ana are funded through a combination of direct project mitigation, payment of requisite fees, construction of planned/committed improvements covered by Measure M or M2, or fair share contributions. Identification and timing of needed improvements is generally determined through local jurisdictions based upon a variety of factors.

1.6.1 MEASURE M

One of the primary sources of grants funds for various County road projects is the Orange County Transportation Authority (OCTA) Measure M grants. The Measure M funds are an Orange County voter-approved, 20-year ½ cent sales tax, effective in 1990, to pay for various transportation improvements throughout the County. In November 2006, this 20-year sales tax was extended for another 30 years via a voter-approved "Renewed" Measure M (M2). OCTA is the governing administrator of these funds. Measure M and M2 improvements are outlined in the seven-year Capital Improvement Program (CIP) for the fiscal years 2017/2018 through 2023/2024.

1.6.2 PROPOSITION 1B

Proposition 1B, which was also passed by voters in November 2006, provide bond funds for road capital and maintenance projects. The County has allocated approximately $61.6 million Proposition 1B funds to apply towards transportation improvements within the County, as determined by the County's Board of Supervisors.

1.7 ON-SITE ROADWAY AND SITE ACCESS IMPROVEMENTS

The Project site plan proposes access onto Alley Way and 3rd Street. Roadway improvements necessary to provide site access and on-site circulation are assumed to be constructed in conjunction with site development and are described below. These improvements are required to be in place prior to occupancy.

The recommended site-adjacent roadway improvements for the Project are described below. These improvements need to be incorporated into the Project description prior to Project approval or imposed as conditions of approval as part of the Project approval. Exhibit 1-4 illustrates the recommended on-site and site adjacent roadway lane improvements for the Project. Construction of on-site and site adjacent improvements are recommended to occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

1.7.1 SITE ADJACENT ROADWAY IMPROVEMENT RECOMMENDATIONS

Sycamore Street – Sycamore Street is a north-south oriented roadway bisected by the Project. Construct Sycamore Street at its ultimate full-section width as a Local Commercial Street (60-foot right-of-way) between the Project's northern boundary and the Project's southern

boundary. Improvements along Sycamore Street would be those required by final conditions of approval for the proposed Project and applicable City of Santa Ana standards.

1.7.2 SITE ACCESS IMPROVEMENT RECOMMENDATIONS

The recommended site access driveway and site adjacent intersection improvements for the Project are described below and illustrated on Exhibit 1-4. Construction of on-site and site adjacent improvements are recommended to occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

Sycamore Street & 3rd Street –Install an all-way stop control and construct the intersection with the following geometrics:

- Northbound Approach: One shared left-through-right turn lane.
- Southbound Approach: One shared left-through-right turn lane.
- Eastbound Approach: One shared left-through-right turn lane.
- Westbound Approach: One shared left-through-right turn lane.

On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City of Santa Ana sight distance standards at the time of preparation of final grading, landscape and street improvement plans.

1.8 PEDESTRIAN FACILITY IMPROVEMENTS

Improvements to pedestrian facilities have been recommended within the study area in an effort to improve pedestrian connectivity and safety for the potential users of the Project as well as the existing uses adjacent to the Project. These improvements have been illustrated on Exhibit 1-4.

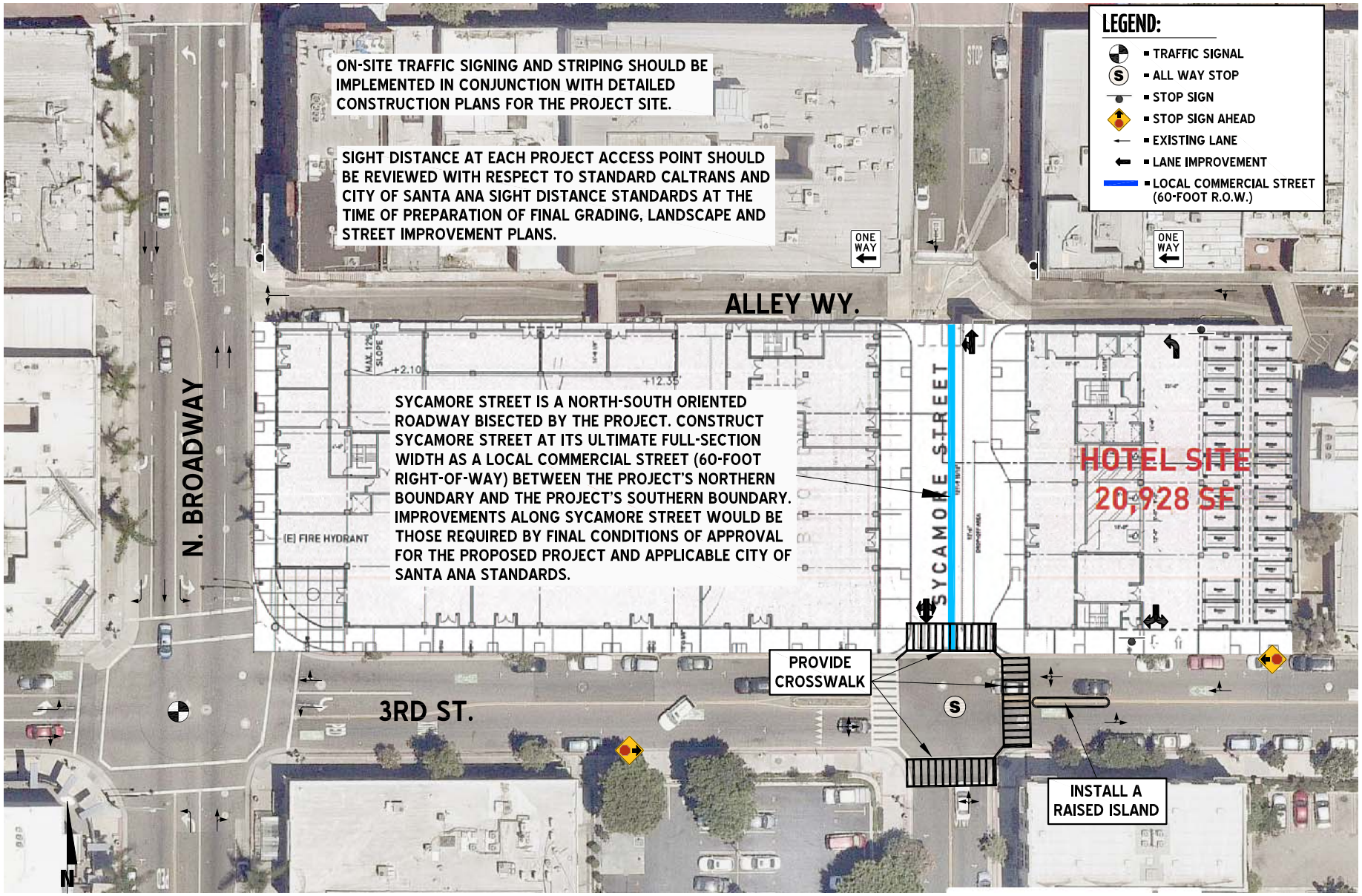
Pedestrian Connectivity – Exhibit 3-7 shows the existing sidewalks, crosswalks, and bus stops in the vicinity of the Project. Existing pedestrian facilities would provide access for pedestrians accessing the site as well as existing uses adjacent to the Project.

Additional pedestrian facility improvements recommended at the intersection of Sycamore Street and 3rd Street are discussed below:

Sycamore Street & 3rd Street (#4) - Provide crosswalk markings across all four legs of the intersection and install a raised island on the east leg in compliance with applicable City of Santa Ana standards and guidelines outlined in *2014 California Manual on Uniform Traffic Control Devices (CA MUTCD)*.

An all-way stop would provide a controlled cross-walk for pedestrian crossings and enhance safety.

EXHIBIT 1-4: SITE ADJACENT ROADWAY AND SITE ACCESS RECOMMENDATIONS



1.9 TRANSIT SERVICE

Consistent with statewide mandates (see AB 32, SB 375, SB 743) and SCAG's 2016-2040 RTP/SCS to place increased density near major transportation and employment center, the Proposed Project would introduce a diverse mix of land uses; places residents in the immediate vicinity of County and city governmental offices, shops, restaurants, bars, local art scenes, parks; and would be within walking distance to several major public transit opportunities. Bus routes serving the Project area within ¼-mile of the Project's location include OCTA routes 19, 53, 55, 64, 83, 145, 206, 462 and 757. These routes provide connections to several areas countywide. In addition, the project site is about one mile from the Santa Ana Regional Transportation Station, which is served by regional trains including Amtrak and Metrolink, and bus lines such as Greyhound and several OCTA bus routes. The Project would be within walking distance of the planned OC Streetcar, expected to be in operation in 2020.

The Project is within a transit priority area as defined by Public Resources Code (PRC) Section 21099(a)(7). A transit priority area is an area within one-half mile of a major transit stop that is existing (or planned under certain conditions). A major transit stop includes the intersection of two or more major bus routes with a frequency service interval of 15 minutes or less during the morning and afternoon peak commute periods (PRC §21064.3). The Project site is within 0.15 miles of the intersection of Bus Routes 53/53X (north-south along Main Street), 55, and 64/64X (east-west via 1st Street).

1.10 COMPARISON WITH TRANSIT ZONING CODE EIR

As previously noted, this traffic impact analysis has been prepared in support of an addendum to the certified Transit Zoning Code (TZC) Environmental Impact Report (EIR). The proposed Project would incorporate all of the adopted mitigation measures identified in the TZC EIR. A comparison of the intersection analysis with the TZC EIR is provided in Table 1-2. As shown in Table 1-2 , the proposed Project is not anticipated to result in any new significant traffic impacts at the overlapping study area intersections.

Table 1-2

Intersection Analysis Comparison

#	Intersection	Traffic Control[2]	TZC EIR TIA[3] Delay (secs.) ICU (v/c)[1] AM	TZC EIR TIA[3] Delay (secs.) ICU (v/c)[1] PM	TZC EIR TIA[3] Level of Service AM	TZC EIR TIA[3] Level of Service PM	3rd & Broadway TIA Delay (secs.) ICU (v/c)[1] AM	3rd & Broadway TIA Delay (secs.) ICU (v/c)[1] PM	3rd & Broadway TIA Level of Service AM	3rd & Broadway TIA Level of Service PM
			Existing (2009)				**Existing (2019)**			
1	N. Broadway & 4th St.	TS	0.274	0.372	A	A	0.422	0.431	A	A
2	N. Broadway & 3rd St.	TS	0.299	0.558	A	A	0.582	0.638	A	B
3	Sycamore St. & 4th St.	AWS	7.5	8.3	A	A	8.6	8.4	A	A
4	Sycamore St. & 3rd St.	CSS	Not Evaluated				13.7	23.1	B	C
5	Sycamore St. & 1st St.	TS	Not Evaluated				0.465	0.497	A	A
6	Hotel Dwy. & 3rd St.	CSS	Not Evaluated				Not Evaluated			
7	Main St. & 4th St.	TS	0.441	0.561	A	A	0.548	0.512	A	A
8	Main St. & 3rd St.	TS	0.423	0.535	A	A	0.494	0.505	A	A
			2030 With Project				**2021 With Project**			
1	N. Broadway & 4th St.	TS	0.354	0.437	A	A	0.496	0.496	A	A
2	N. Broadway & 3rd St.	TS	0.338	0.643	A	B	0.643	0.693	B	B
3	Sycamore St. & 4th St.	AWS	8.1	9.7	A	A	9.4	9.5	A	A
4	Sycamore St. & 3rd St.	AWS	Not Evaluated				9.9	10.9	A	B
5	Sycamore St. & 1st St.	TS	Not Evaluated				0.487	0.526	A	A
6	Hotel Dwy. & 3rd St.	CSS	Not Evaluated				9.1	9.5	A	A
7	Main St. & 4th St.	TS	0.555	0.726	A	C	0.587	0.583	A	A
8	Main St. & 3rd St.	TS	0.490	0.641	A	B	0.538	0.562	A	A
			2035 With Project				**2040 With Project**			
1	N. Broadway & 4th St.	TS	0.477	0.659	A	B	0.598	0.676	A	B
2	N. Broadway & 3rd St.	TS	0.409	0.833	A	D	0.800	0.953	D	E
3	Sycamore St. & 4th St.	AWS	8.6	10.5	A	B	13.5	13.8	B	B
4	Sycamore St. & 3rd St.	AWS	Not Evaluated				11.1	28.3	B	D
5	Sycamore St. & 1st St.	TS	Not Evaluated				0.556	0.628	A	B
6	Hotel Dwy. & 3rd St.	CSS	Not Evaluated				9.1	10.9	A	B
7	Main St. & 4th St.	TS	0.654	0.847	B	D	0.722	0.847	C	D
8	Main St. & 3rd St.	TS	0.559	0.730	A	C	0.659	0.774	B	C

[1] Per the Highway Capacity Manual (HCM) 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. HCM delay reported in seconds and ICU reported as a volume-to-capacity ratio.

[2] TS = Traffic Signal; CSS = Cross-Street Stop; AWS = All-Way Stop

[3] City of Santa Ana Transit Zoning Code (SD 84A and SD 84B) Environmental Impact Report (2010)

2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are generally consistent with the OCTA CMP traffic study guidelines.

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The Highway Capacity Manual (HCM) 6th Edition methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (3) The HCM uses different procedures depending on the type of intersection control. In comparison, the Intersection Capacity Utilization (ICU) methodology expresses the LOS at a signalized intersection in terms of volume-to-capacity ratio (v/c). (4)

2.2.1 SIGNALIZED INTERSECTIONS

City of Santa Ana

The City of Santa Ana requires signalized intersection operations analysis based on the methodology described in the ICU for signalized intersections and HCM for unsignalized intersections. (3) (4) Intersection LOS operations are based on an intersection's average control delay per the HCM methodology. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections evaluated using the HCM methodology, LOS is directly related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1. ICU study area intersections located within the City of Santa Ana have been analyzed using Traffix (Version 8).

The ICU methodology is utilized at signalized intersections only. A minimum clearance interval of 0.05 in association with lane capacities of 1,600 vehicles per hour of green time for left turn pockets and 1,700 vehicles per hour of green time for through lanes and turn lanes were assumed for the ICU calculations.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS FOR HCM

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A	F
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B	F
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D	F
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E	F
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths	80.01 and up	F	F

Source: HCM

TABLE 2-2: SIGNALIZED INTERSECTION LOS THRESHOLDS FOR ICU

Description	ICU	Level of Service
Little or no capacity deficiencies.	0.00 to 0.55	A
Short-term capacity deficiencies.	0.56 to 0.64	B
Average capacity deficiencies.	0.65 to 0.73	C
Long-term capacity deficiencies.	0.74 to 0.82	D
Very high capacity deficiencies.	0.83 to 0.91	E
Extremely high capacity deficiencies, with intersection capacity exceeded.	0.92 and up	F

Source: ICU

2.2.2 UNSIGNALIZED INTERSECTIONS

The City of Santa Ana requires the operations of unsignalized intersections be evaluated using the methodology described the HCM. (3) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-3).

TABLE 2-3: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay Per Vehicle (Seconds)	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Little or no delays.	0 to 10.00	A	F
Short traffic delays.	10.01 to 15.00	B	F
Average traffic delays.	15.01 to 25.00	C	F
Long traffic delays.	25.01 to 35.00	D	F
Very long traffic delays.	35.01 to 50.00	E	F
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F	F

Source: HCM 6th Edition

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15 minute volumes. Common practice for LOS analysis (per the HCM methodology) is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (3) In an effort to conduct a conservative analysis, a minimum PHF of 0.92 has been utilized at all new study area intersections that currently do not exist.

At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

2.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TIA uses the signal warrant criteria presented in the latest edition of the Caltrans California Manual on Uniform Traffic Control Devices (CA MUTCD), for all study area intersections. (5)

The signal warrant criteria for Existing conditions are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CAMUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (5) Specifically, this TIA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing study area intersections for all analysis scenarios. Warrant 3 is appropriate to use for this TIA because it provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major

streets operating above 40 miles per hour). For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection.

Future intersections that do not currently exist have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets.

Traffic signal warrant analyses were performed for all of the following unsignalized study area intersections (see Table 2-4):

TABLE 2-4: UNSIGNALIZED INTERSECTION LOCATIONS

ID	Intersection Location
3	Sycamore St. & 4th St.
4	Sycamore St. & 3rd St.

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 *Existing Conditions* of this report. The traffic signal warrant analysis for future conditions is presented Section 5 *E+P Traffic Analysis*, Section 6 *Opening Year Cumulative (2021) Traffic Analysis*, and Section 7 *Horizon Year (2040) Traffic Analysis,* of this report.

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.4 MINIMUM LEVEL OF SERVICE (LOS)

The definition of an intersection deficiency has been obtained from each of the applicable jurisdictions.

2.4.1 CITY OF SANTA ANA

The City of Santa Ana's target LOS is D for roadway segments and arterial street intersections, except in major development areas, where LOS E is acceptable. Since the study area intersections are located within Major Development Area, LOS E criteria will be utilized for this TIA.

2.5 THRESHOLDS OF SIGNIFICANCE

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies.

The following thresholds of significance will be used to determine whether the addition of project-related trips would result in a significant impact, and thus require mitigation:

- A significant impact occurs at a study area intersection if the addition of project-related trips causes the intersection to change from an acceptable LOS (i.e., LOS E or better) to a deficient LOS (i.e., LOS F).
- A significant impact occurs at a study area intersection if the addition of project-related trips results in a v/c increase of 0.010 and the intersection operates at a deficient LOS under pre-project traffic conditions (i.e., LOS F).

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3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the City of Santa Ana General Plan Circulation Network, and a review of existing peak hour intersection operations and traffic signal warrant analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the agreement with City of Santa Ana staff (Appendix 1.1), the study area includes a total of 8 existing and future intersections as shown previously on Exhibit 1-2. Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 CITY OF SANTA ANA GENERAL PLAN CIRCULATION ELEMENT

As noted previously, the Project site is located within the City of Santa Ana. The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on the City of Santa Ana General Plan Circulation Element, are described subsequently and are consistent with the Orange County Master Plan of Arterial Highways (MPAH). Exhibit 3-2 shows the City of Santa Ana General Plan Circulation Element, and Exhibit 3-3 illustrates the City of Santa Ana General Plan roadway cross-sections.

Major Arterial. Generally consists of six-travel lanes, and is also divided. Typically, the right-of-way width for this type of roadway is 120 feet. A major arterial is designed to accommodate between 33,900 and 50,600 vehicle trips daily. The following study area roadways within the City of Santa Ana are classified as major arterials:

- 1st Street

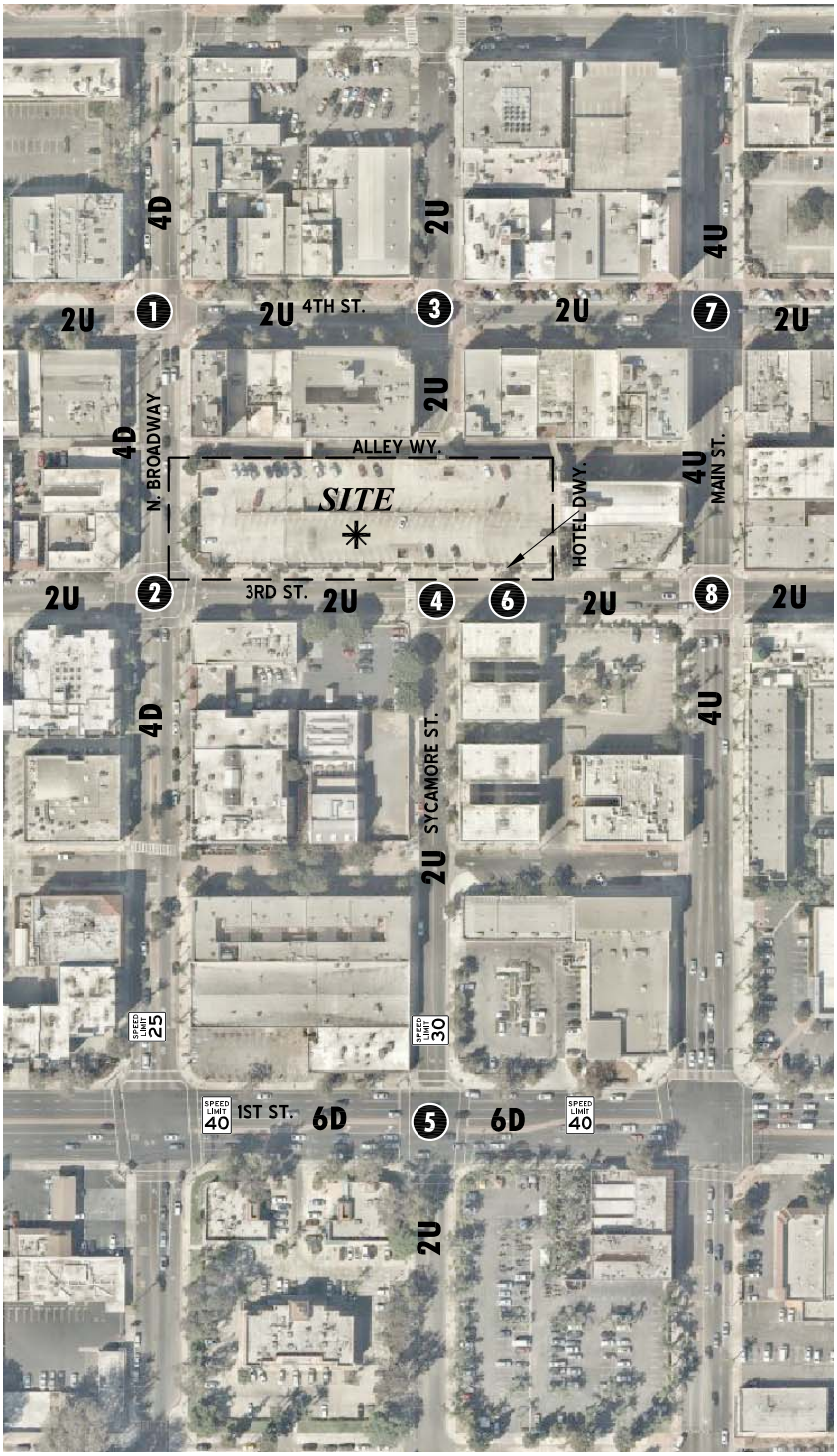
Secondary Arterial. Generally a four-lane, undivided roadway. The typical right-of-way width for this category of roadway is 80 feet. A secondary arterial is typically designed to accommodate between 15,000 and 22,500 vehicle trips daily. The following study area roadways within the City of Santa Ana are classified as modified primary arterial highways:

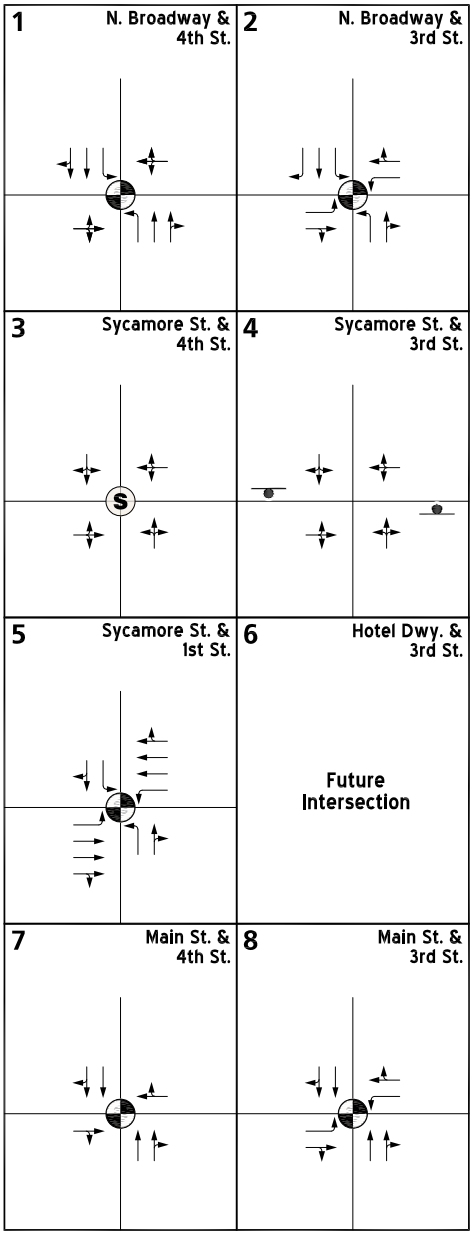
- Broadway
- Main Street
- 4th Street

Local Commercial Street. A two-lane, undivided roadway carrying up to 6,000 vehicle trips per day. Parking may be allowed on both sides of the street, businesses are located on both sides of the street. The right-of-way width for this roadway classification is 60 feet. The following study area roadways within the City of Santa Ana are classified as modified primary arterial highways:

- Sycamore Avenue
- 3rd Street

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS





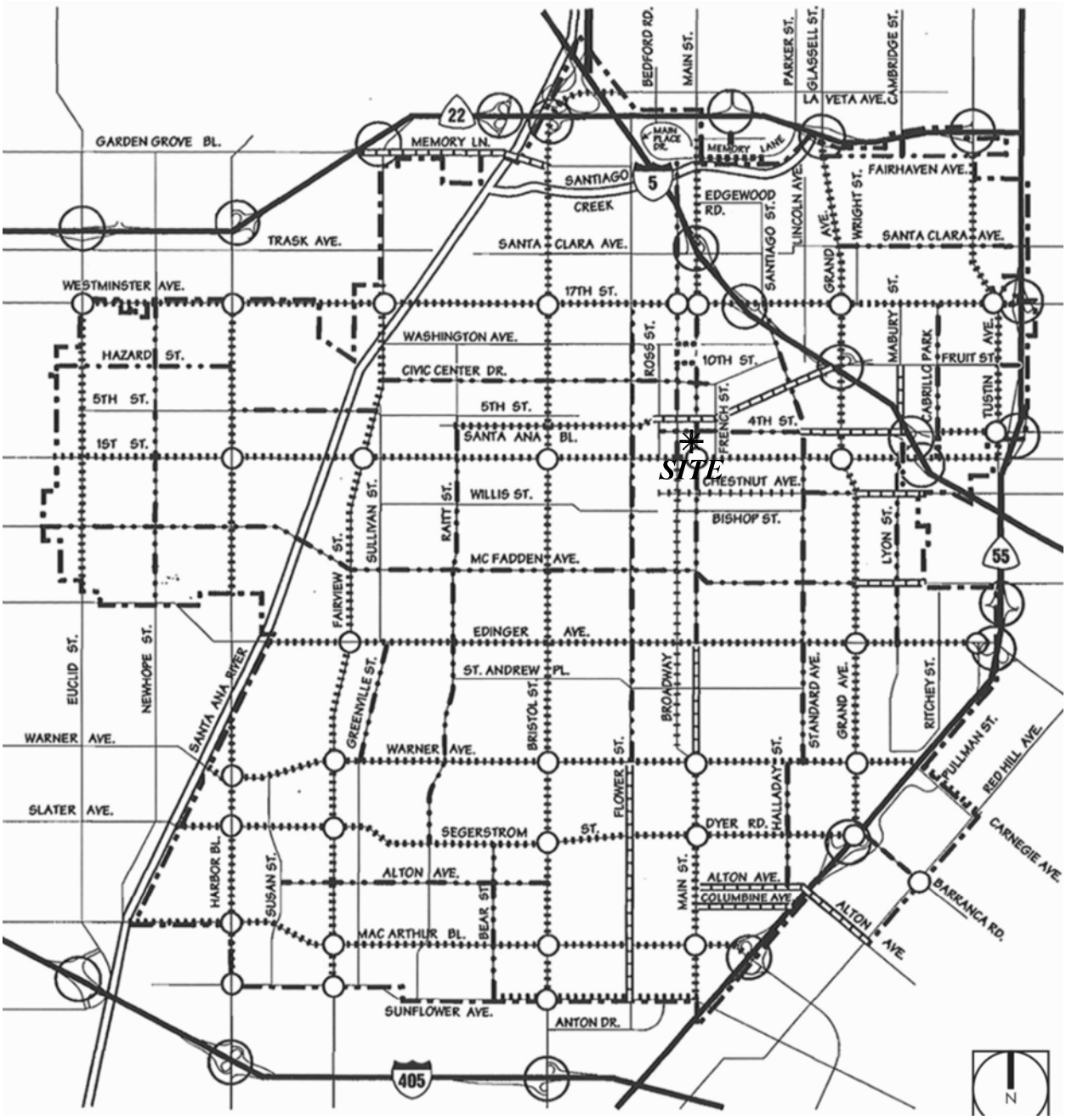
LEGEND:

- = TRAFFIC SIGNAL
- S = ALL WAY STOP
- = STOP SIGN
- 4 = NUMBER OF LANES
- D = DIVIDED
- U = UNDIVIDED
- SPEED LIMIT 25 = SPEED LIMIT (MPH)

N

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EXHIBIT 3-2: CITY OF SANTA ANA GENERAL PLAN MASTER PLAN OF STREETS AND HIGHWAYS



Street Classifications

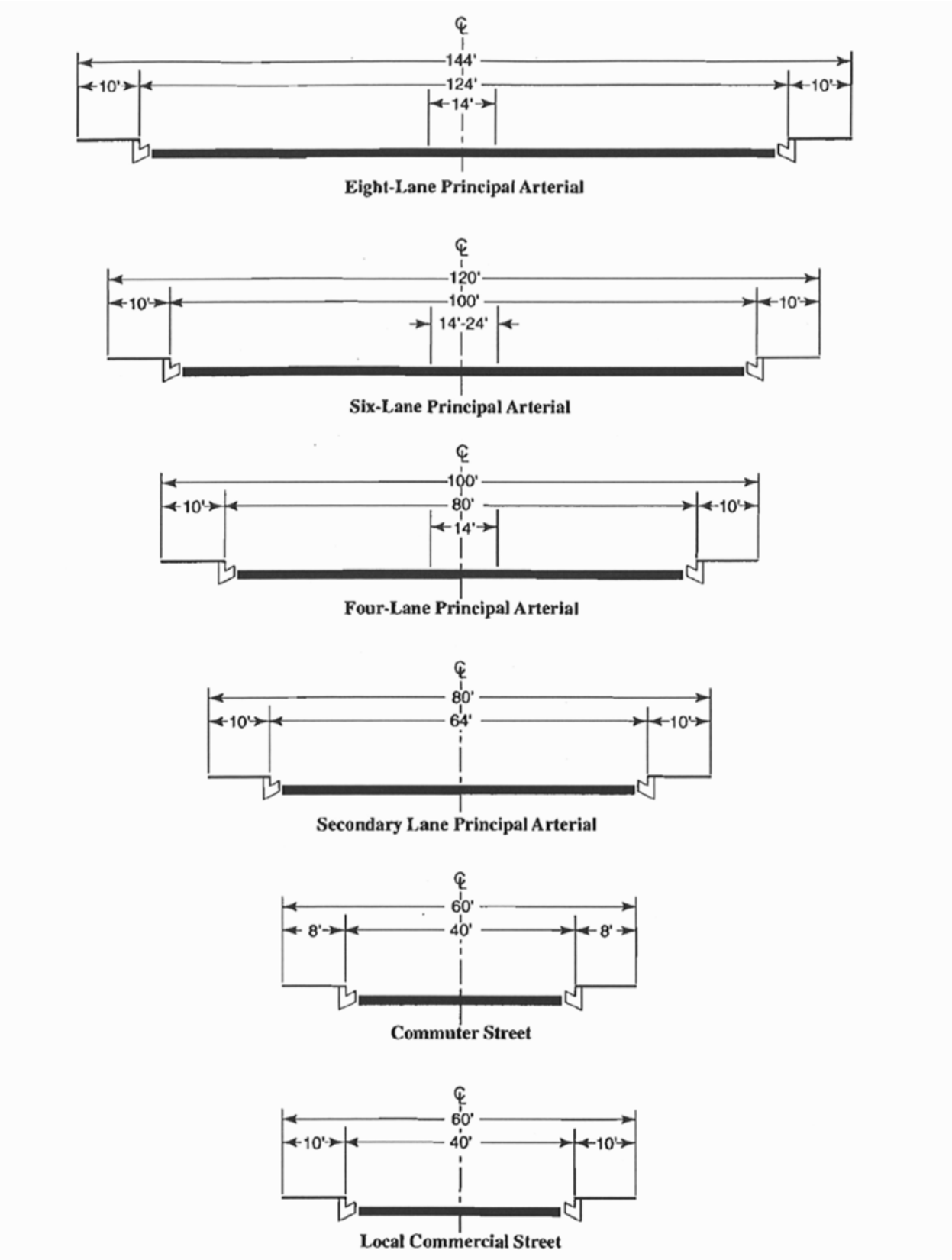
- Freeway
- Principal
- Major Arterial
- Primary Arterial
- Secondary Arterial
- Commuter
- Local Commercial

- Enhanced Intersections
- Interchange
- City Limits

0 0.6 1.2

12190 - santaana_gpce.dwg

EXHIBIT 3-3: CITY OF SANTA ANA GENERAL PLAN
TYPICAL ROADWAY CROSS-SECTIONS



3.3 TRUCK ROUTES

The City of Santa Ana designated truck route map is shown on Exhibit 3-4. Main Street is designated as Local Truck Route in the City of Santa Ana. The designated truck route map has been utilized to route truck traffic from future cumulative development projects throughout the study area.

3.4 TRANSIT SERVICE

Consistent with statewide mandates (see AB 32, SB 375, SB 743) and SCAG's 2016-2040 RTP/SCS to place increased density near major transportation and employment center, the Proposed Project would introduce a diverse mix of land uses; places residents in the immediate vicinity of County and city governmental offices, shops, restaurants, bars, local art scenes, parks; and would be within walking distance to several major public transit opportunities. Bus routes serving the Project area within ¼-mile of the Project's location include OCTA routes 19, 53, 55, 64, 83, 145, 206, 462 and 757. These routes provide connections to several areas countywide. In addition, the project site is about one mile from the Santa Ana Regional Transportation Station, which is served by regional trains including Amtrak and Metrolink, and bus lines such as Greyhound and several OCTA bus routes. The Project would be within walking distance of the planned OC Streetcar, expected to be in operation in 2020.

The Project is within a transit priority area as defined by Public Resources Code (PRC) Section 21099(a)(7). A transit priority area is an area within one-half mile of a major transit stop that is existing (or planned under certain conditions). A major transit stop includes the intersection of two or more major bus routes with a frequency service interval of 15 minutes or less during the morning and afternoon peak commute periods (PRC §21064.3). The Project site is within 0.15 miles of the intersection of Bus Routes 53/53X (north-south along Main Street), 55, and 64/64X (east-west via 1st Street).

Existing transit routes within the study area are shown on Exhibit 3-5. Transit service is reviewed and updated by OCTA periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

3.5 BICYCLE & PEDESTRIAN FACILITIES

Field observations indicate active pedestrian and bicycle activity within the study area. Exhibit 3-6 illustrates the City of Santa Ana General Plan Bikeway Master Plan, which includes a proposed bikeway along Santa Ana Boulevard near the vicinity of the Project.

Existing pedestrian facilities within the study area, which include sidewalks, bus stop locations, and crosswalks are shown on Exhibit 3-7.

EXHIBIT 3-4: CITY OF SANTA ANA TRUCK ROUTES

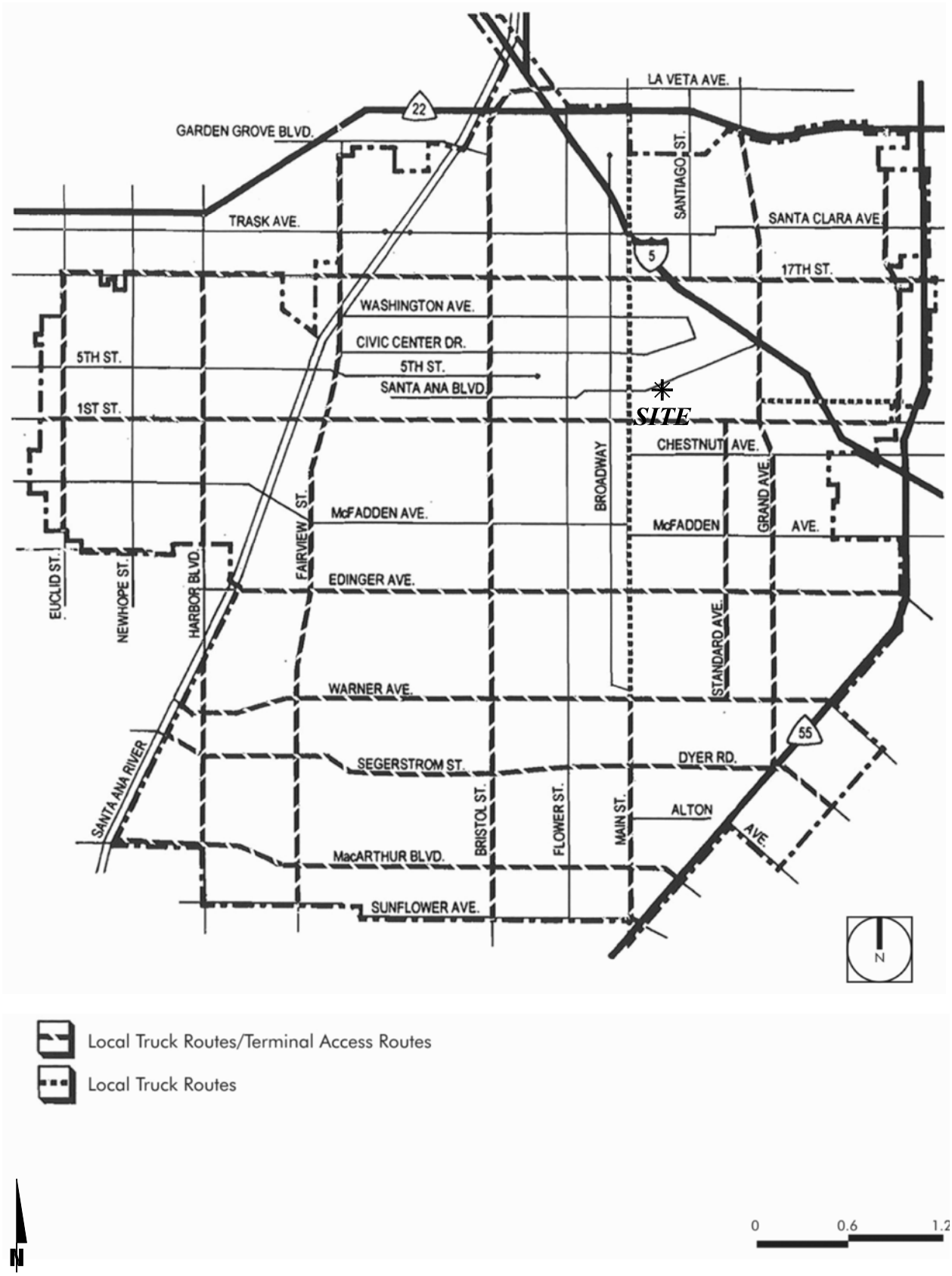


EXHIBIT 3-5: EXISTING TRANSIT ROUTES

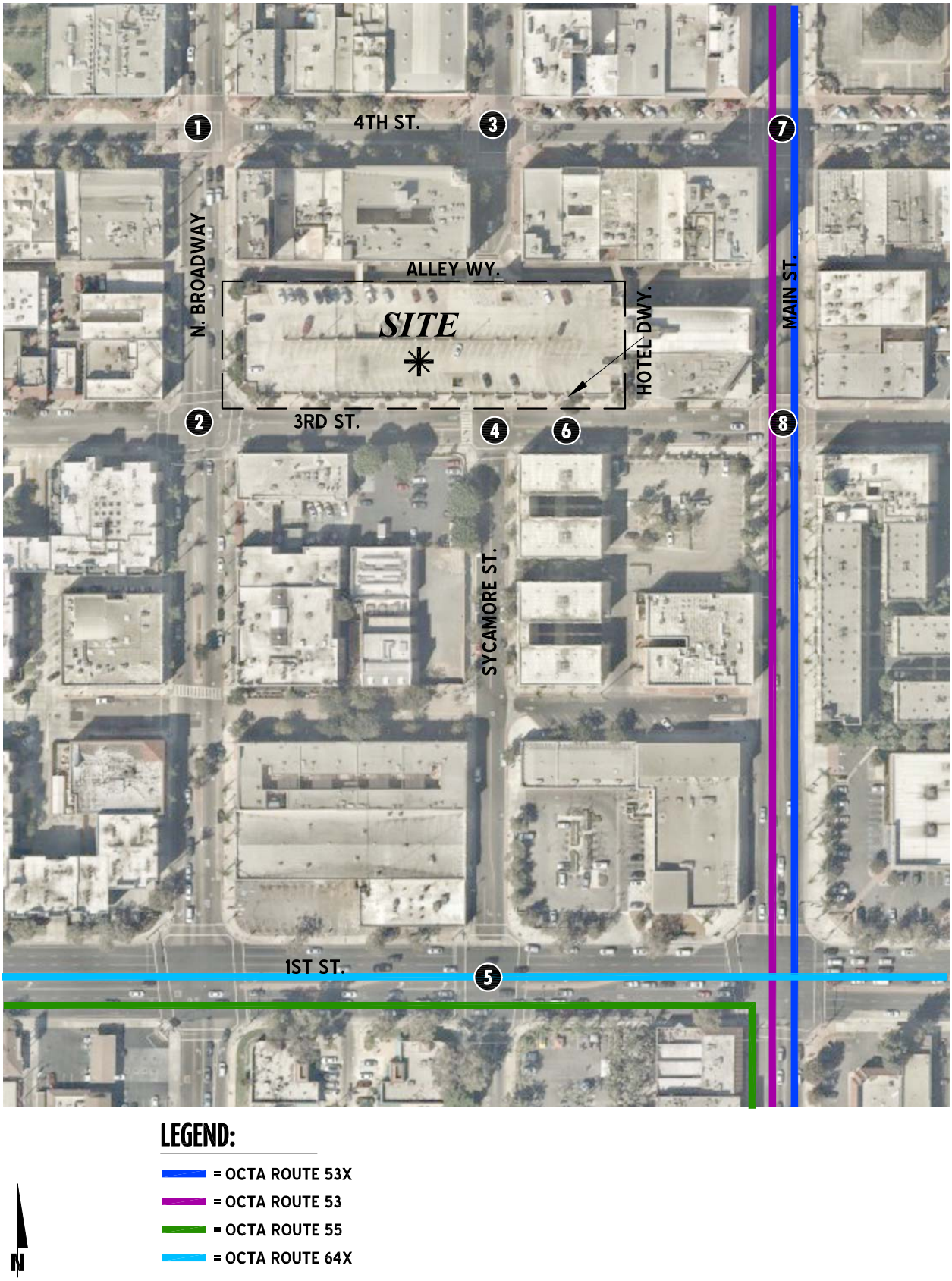
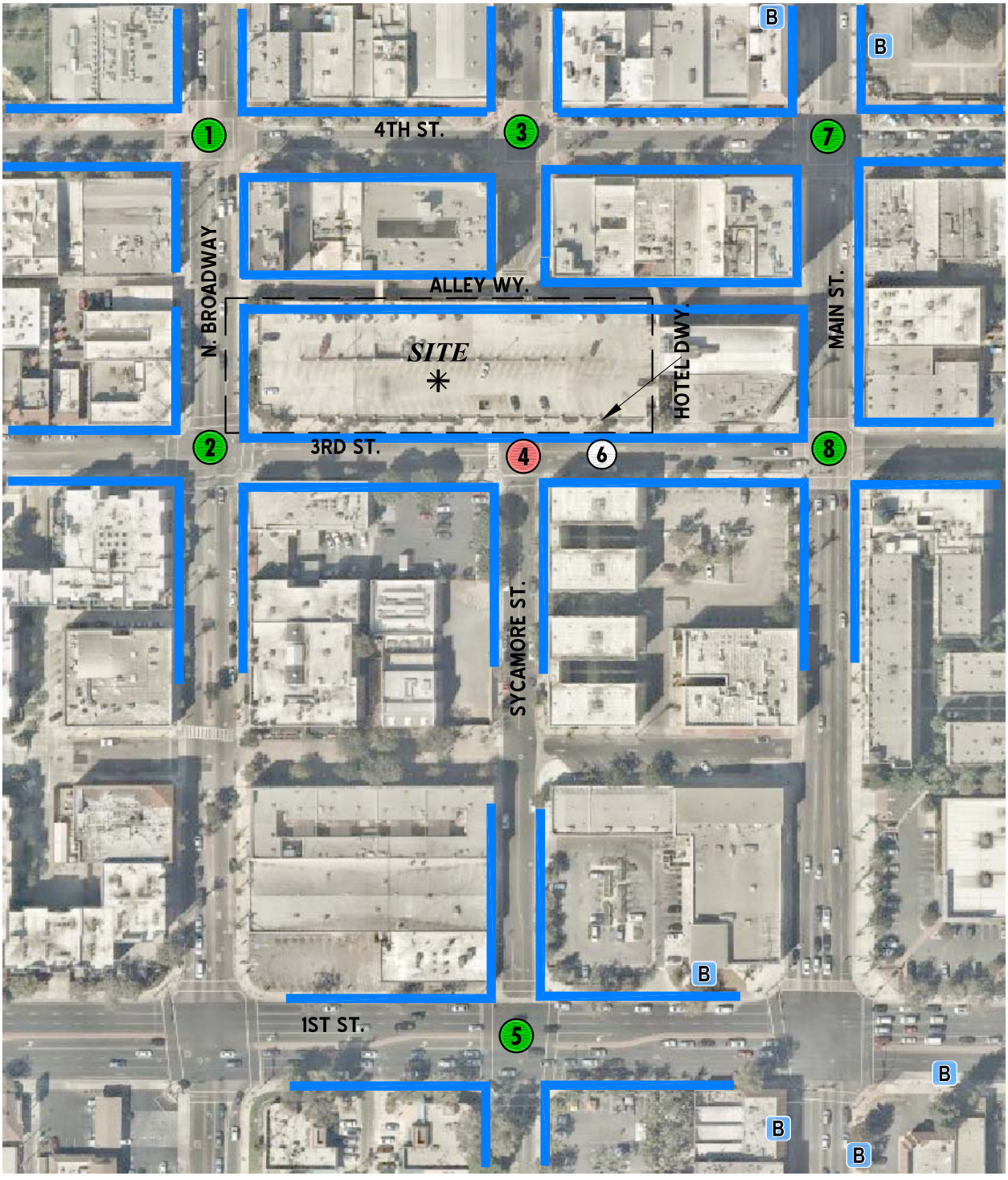


EXHIBIT 3-6: CITY OF SANTA ANA GENERAL PLAN BIKEWAY MASTER PLAN



EXHIBIT 3-7: EXISTING PEDESTRIAN FACILITIES



LEGEND:

- = SIDEWALK
- B = BUS STOP
- 0 = FUTURE INTERSECTION
- 0 = CROSSWALK ON ALL APPROACHES
- 0 = CROSSWALK ON TWO APPROACHES

N

3.6 EXISTING (2019) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in January 2019. The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

The weekday AM and weekday PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. These raw turning volumes have been flow conserved between intersections with limited access, no access and where there are currently no uses generating traffic.

Existing weekday average daily traffic (ADT) volumes on arterial highways throughout the study area are shown on Exhibit 3-8. Existing ADT volumes are based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 10.73 = Leg Volume

For those roadway segments which have 24-hour tube count data available in close proximity to the study area, a comparison between the PM peak hour and daily traffic volumes indicated that the peak-to-daily relationship of approximately 9.32 percent would sufficiently estimate ADT volumes for planning-level analyses. As such, the above equation utilizing a factor of 10.73 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 9.32 percent (i.e., 1/0.0932 = 10.73). Existing weekday ADT and weekday AM and weekday PM peak hour intersection volumes are shown on Exhibit 3-8.

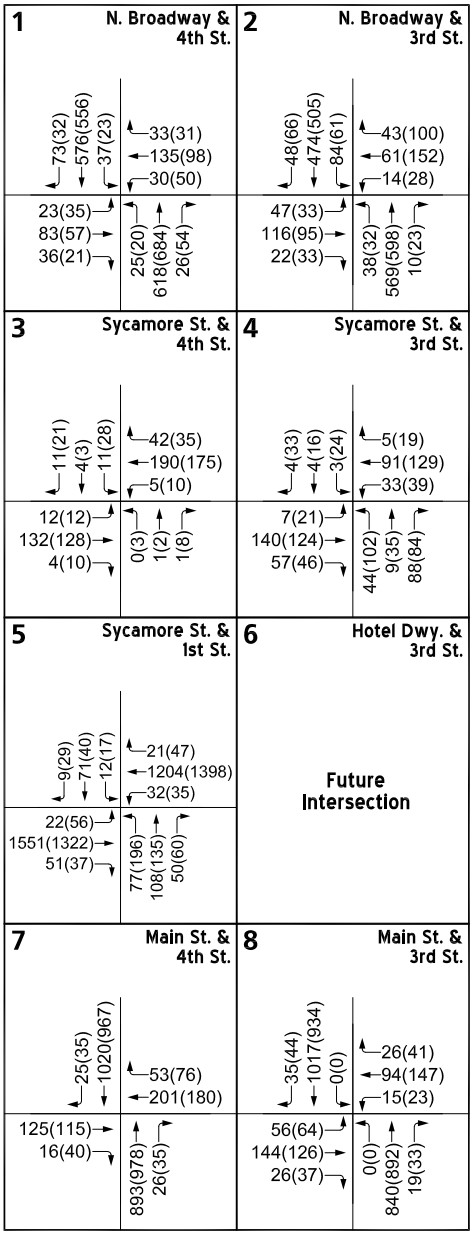
3.7 EXISTING (2019) CONDITIONS INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1 which indicates that the no existing study area intersections are currently operating at an unacceptable LOS during the peak hours.

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-9. The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

EXHIBIT 3-8: EXISTING (2019) TRAFFIC VOLUMES





LEGEND:

10.0 = ACTUAL (COUNT-BASED) VEHICLES PER DAY (1000'S)
10.0 = ESTIMATED VEHICLES PER DAY (1000'S)
10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

3.8 EXISTING (2019) CONDITIONS TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. No unsignalized intersections currently warrant a traffic signal under Existing traffic conditions. Existing conditions traffic signal warrant analysis worksheets are provided in Appendix 3.3.

Table 3-1

Intersection Analysis for Existing (2019) Conditions

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay (secs.) ICU (v/c)[2]		Level of Service		Acceptable LOS
			Northbound			Southbound			Eastbound			Westbound							
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM	
1	N. Broadway & 4th St.	TS	1	2	0	1	2	0	0	1	0	0	1	0	0.430	0.432	A	A	E
2	N. Broadway & 3rd St.	TS	1	1	0	1	1	1	1	1	0	1	1	0	0.587	0.642	A	B	E
3	Sycamore St. & 4th St.	AWS	0	1	0	0	1	0	0	1	0	0	1	0	8.6	8.4	A	A	E
4	Sycamore St. & 3rd St.	CSS	0	1	0	0	1	0	0	1	0	0	1	0	13.7	23.1	B	C	E
5	Sycamore St. & 1st St.	TS	1	1	0	1	1	0	1	3	0	1	3	0	0.467	0.507	A	A	E
6	Hotel Dwy. & 3rd St.	CSS	Future Intersection																E
7	Main St. & 4th St.	TS	0	2	0	0	2	0	0	1	0	0	1	0	0.548	0.512	A	A	E
8	Main St. & 3rd St.	TS	0	2	0	0	2	0	1	1	0	1	1	0	0.496	0.508	A	A	E

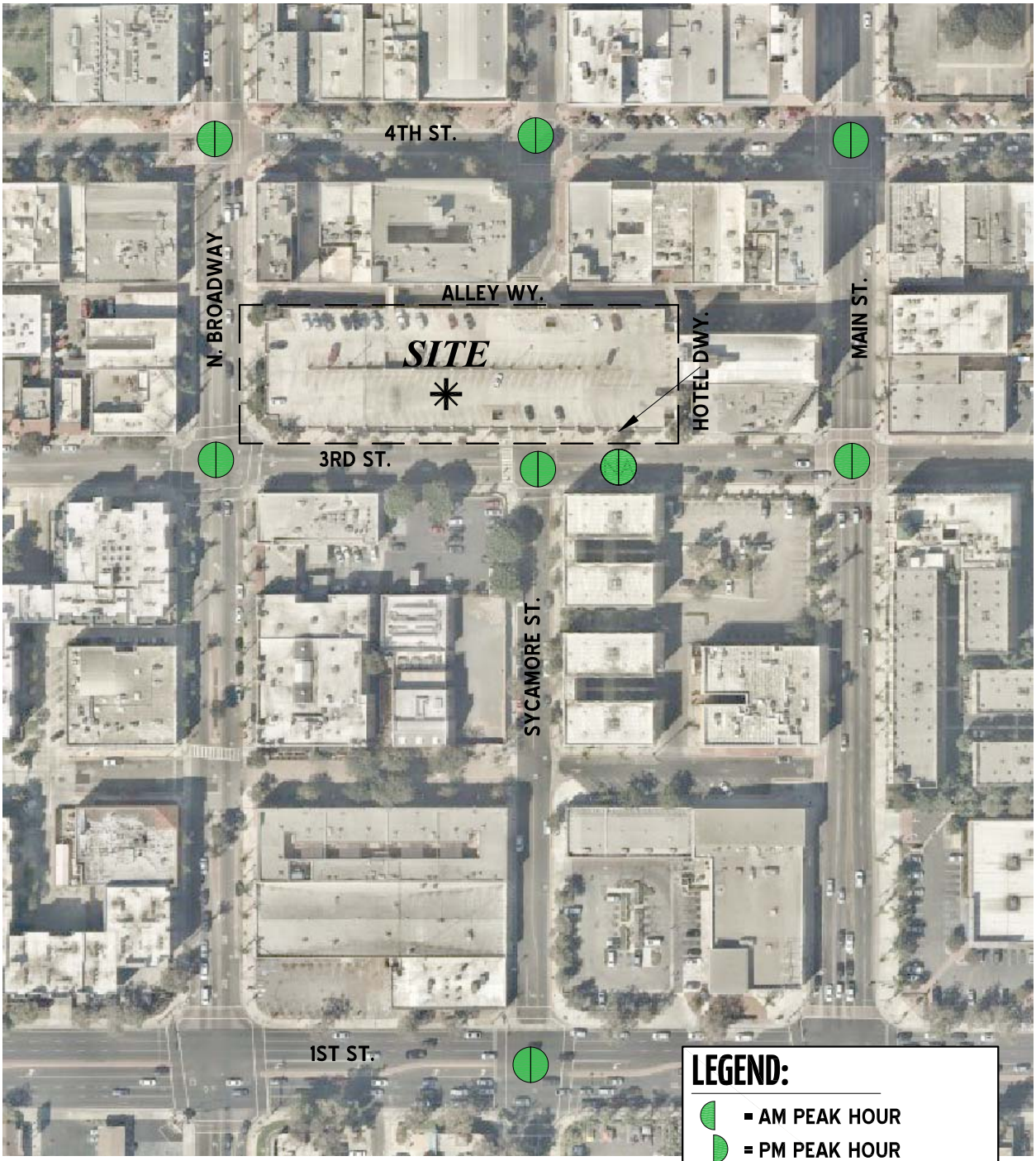
[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right

[2] Per the Highway Capacity Manual (HCM) 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. HCM delay reported in seconds and ICU reported as a volume-to-capacity ratio.

[3] TS = Traffic Signal; CSS = Cross-Street Stop; AWS = All-Way Stop

EXHIBIT 3-9: EXISTING (2019) SUMMARY OF LOS



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4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. The proposed Project is to consist of up to 164 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), and rooftop amenities ancillary to residential and hotel uses. For the purposes of this analysis, it is assumed that the Project will be constructed within a single phase of development, and is anticipated to be fully built and operational by Year 2021. The Project is located within TAZ 2 and 3 of the Transit Zoning Code.

4.1 PROJECT TRIP GENERATION

Trip generation rates used to estimate the proposed Project traffic are shown in Table 4-1. A summary of the Project's trip generation is also shown in Table 4-1. The trip generation rates used for this analysis are based upon information collected by the Institute of Transportation Engineers (ITE) as provided in their Trip Generation Manual, 10th Edition, 2017. The internal capture is based on the NCHRP 684 Internal Trip Capture Estimation Tool consistent with the ITE recommended methodology. Pass-by reduction has been applied consistent with ITE Trip Generation Handbook, 3rd Edition (2017). A 5% reduction has been applied for mode share. As shown on Table 4-1, the proposed Project is anticipated to generate net total of approximately 1,372 trip-ends per day with 94 vehicles per hour (VPH) during the weekday AM peak hour and 112 VPH during the weekday PM peak hour. The internal capture and pass-by reduction worksheets are provided in Appendix 4.1.

4.2 PROJECT TRIP DISTRIBUTION

Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. The Project trip distribution was developed based on anticipated travel patterns to and from the Project site for both near-term and long-range traffic conditions.

The trip distribution patterns are generally based on the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study. Exhibit 4-1 illustrates the trip distribution patterns for the Project. The Project will have access onto 3rd Street, Sycamore Street and the alley north of the project site.

4.3 MODAL SPLIT

The traffic reducing potential of public transit, walking or bicycling have been considered in this TIA. As stated previously, a 5% reduction has been conservatively applied for mode share. This is consistent with the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study.

Table 4-1

Project Trip Generation Summary

Land Use	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Rates[1]									
Multifamily Housing (High-Rise)	DU	222	0.07	0.24	0.31	0.22	0.14	0.36	4.45
Hotel	RM	310	0.28	0.19	0.47	0.31	0.29	0.60	8.36
Shopping Center	TSF	820	0.58	0.36	0.94	1.83	1.98	3.81	37.75

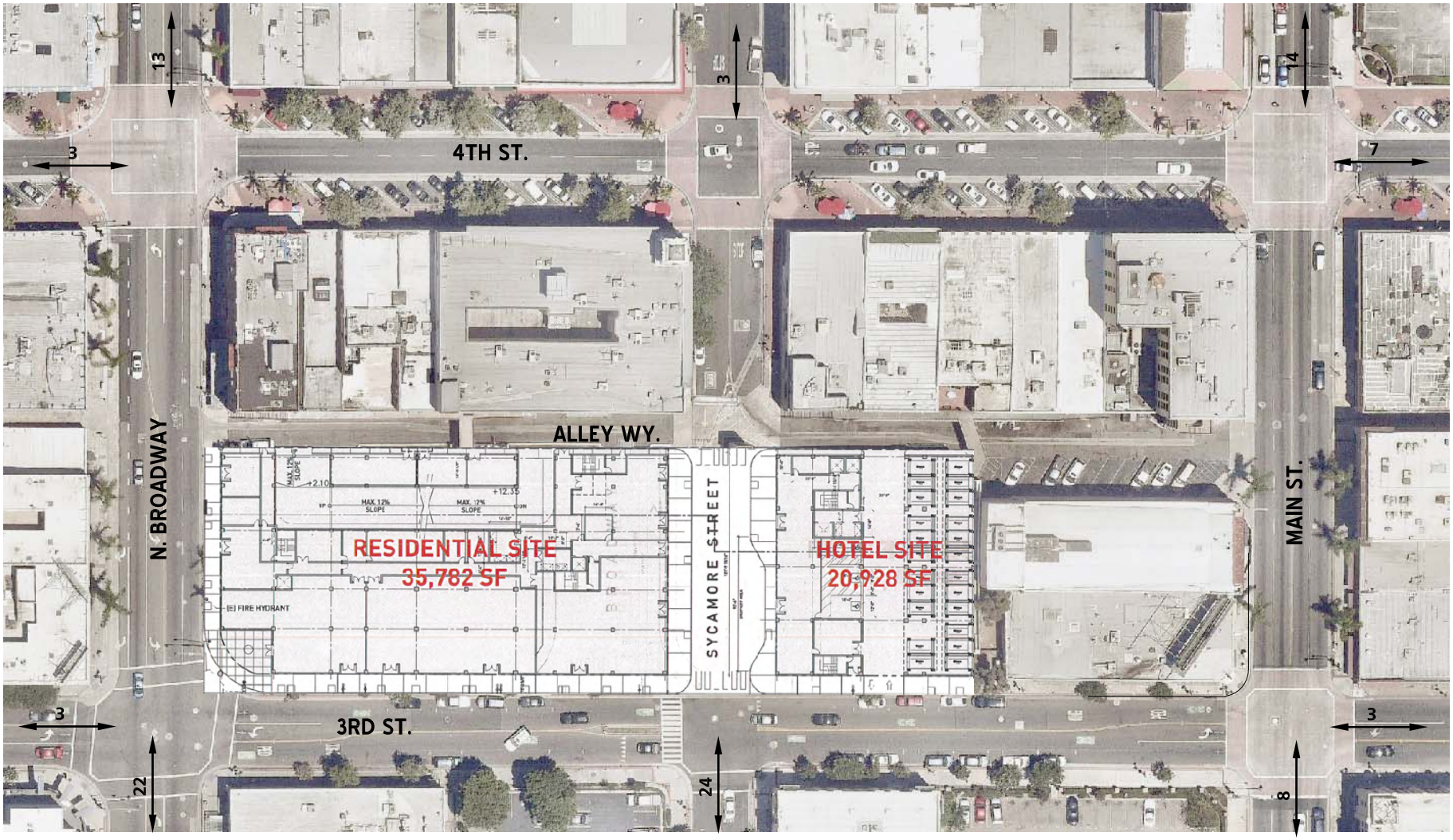
Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
Multifamily Housing (High-Rise)	164	DU	11	39	50	36	23	59	730
Internal Capture[3]			0	0	0	-8	-4	-12	-148
Hotel	75	RM	21	14	35	23	22	45	628
Internal Capture[3]			0	0	0	-3	-1	-4	-56
Commercial	15.320	TSF	9	5	14	28	30	58	578
Internal Capture[3]			0	0	0	-4	-10	-14	-140
Pass-by Reduction (34% PM/Daily)			0	0	0	-7	-7	-14	-148
Subtotal Project Trips			*41*	*58*	*99*	*65*	*53*	*118*	*1,444*
Transit Mode Share (5%)			-2	-3	-5	-3	-3	-6	-72
Total Net Project Trips			**39**	**55**	**94**	**62**	**50**	**112**	**1,372**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Tenth Edition (2017).

[2] DU = Dwelling Units; RM = Rooms; TSF = Thousand Square Feet

[3] Internal capture is based on the NCHRP 684 Internal Trip Capture Estimation Tool (ITE recommended methodology).

EXHIBIT 4-1: PROJECT TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project weekday ADT and weekday AM and PM peak hour intersection turning movement volumes are shown on Exhibit 4-2.

4.5 BACKGROUND TRAFFIC

4.5.1 OPENING YEAR CUMULATIVE CONDITIONS

Future year traffic forecasts have been based upon three years of background (ambient) growth at 1.0% per year for 2021 traffic conditions. The ambient growth factor is intended to approximate regional traffic growth. The total ambient growth is 2.01% for 2021 traffic conditions (compounded growth of one percent per year over two years or $1.01^{2 \text{ years}}$). This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies.

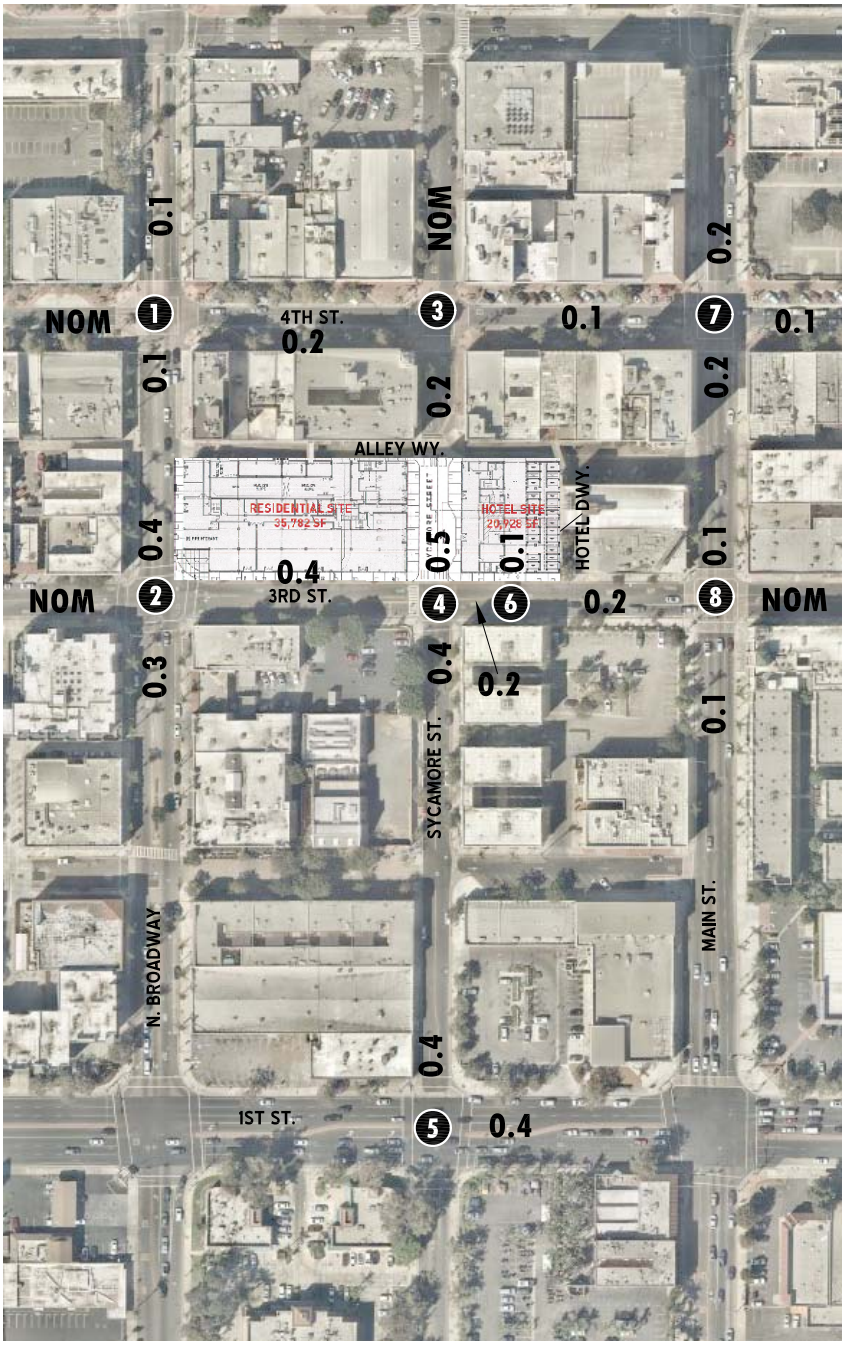
According to information published by OCTA in the 2014 Long Range Transportation Plan, the population of Orange County is projected to increase by 13.0% in the period between 2010 and 2040, a compounded rate of approximately 1.67% annually. During the same period, employment in Orange County is expected to increase by 19.0% or 1.65% annually. (6) Therefore, the annual growth rate of 1.0% in conjunction with cumulative project traffic would appear to be conservative and tend to overstate as opposed to understate traffic impacts.

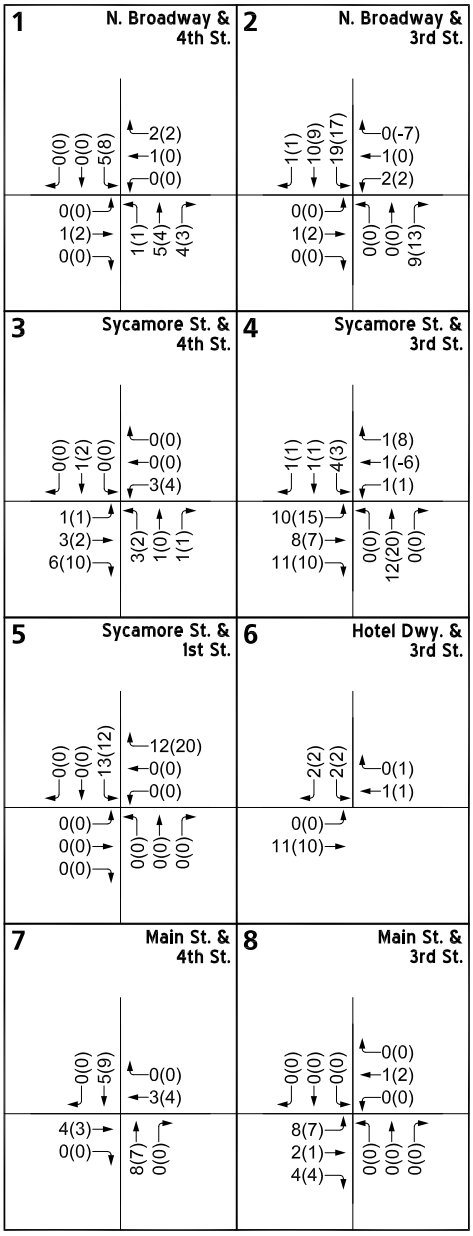
4.6 CUMULATIVE DEVELOPMENT TRAFFIC

California Environmental Quality Act (CEQA) guidelines require that other reasonably foreseeable development projects which are either approved or being processed concurrently in the study area also be included as part of a cumulative analysis scenario. A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the City of Santa Ana.

Exhibit 4-3 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown on Table 4-2. If the cumulative development project was within 1.5 miles of the proposed Project (consistent with the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study), the traffic generated by individual cumulative projects was manually added to the Opening Year Cumulative forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-2 are reflected as part of the background traffic.

EXHIBIT 4-2: PROJECT ONLY TRAFFIC VOLUMES





LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES
10.0 = VEHICLES PER DAY (1000'S)
NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY

N

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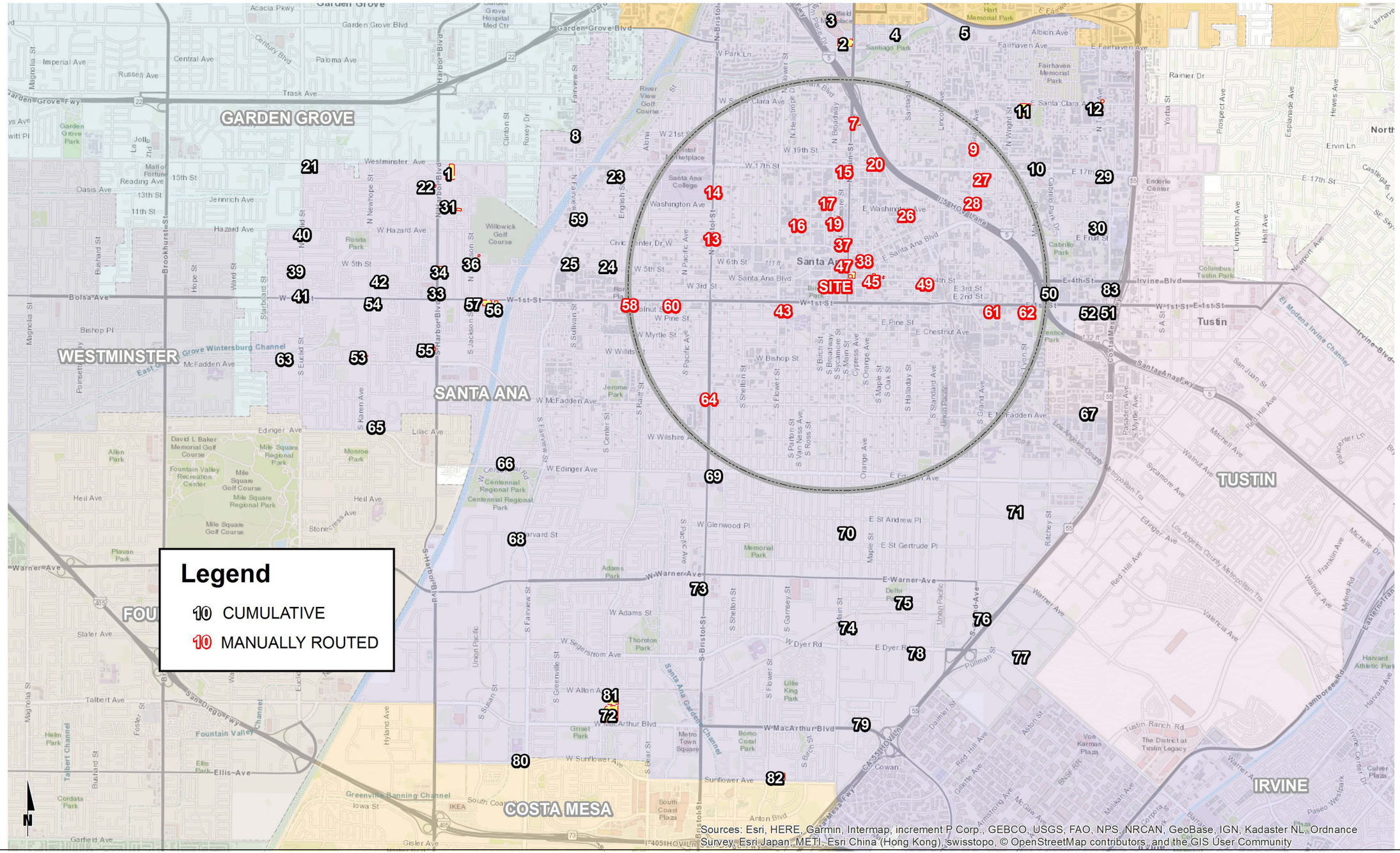
4.7 HORIZON YEAR (2040) VOLUME DEVELOPMENT

Traffic projections for Horizon Year conditions were derived from the Orange County Transportation Analysis Model (OCTAM) maintained by OCTA using accepted procedures for model forecast refinement and smoothing. The traffic forecasts reflect the area-wide growth anticipated between Existing (2019) conditions, and Horizon Year (2040) conditions. In most instances the traffic model zone structure is not designed to provide accurate turning movements along arterial roadways unless refinement and reasonableness checking is performed. Therefore, the Horizon Year peak hour forecasts were refined using the model derived long-range forecasts, base (validation) year model forecasts, along with existing peak hour traffic count data collected at each analysis location. The refined future peak hour approach and departure volumes obtained from these calculations are then entered into a spreadsheet program consistent with the National Cooperative Highway Research Program (NCHRP Report 255), along with initial estimates of turning movement proportions. A linear programming algorithm is used to calculate individual turning movements which match the known directional roadway segment forecast volumes computed in the previous step. This program computes a likely set of intersection turning movements from intersection approach counts and the initial turning proportions from each approach leg. Raw post processing worksheets are provided in Appendix 4.2.

Future estimated peak hour traffic data was used for new intersections and intersections with an anticipated change in travel patterns to further refine the Horizon Year peak hour forecasts. Lastly, Horizon Year turning volumes were compared to Opening Year Cumulative volumes and General Plan (2035) traffic forecasts in the Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study in order to ensure a minimum growth as a part of the refinement process. The minimum growth includes any additional growth between Opening Year Cumulative and Horizon Year traffic conditions that is not accounted for by the traffic generated by cumulative development projects and ambient growth rates assumed between Existing and Opening Year Cumulative conditions.

The future Horizon Year peak hour turning movements were then reviewed by Urban Crossroads for reasonableness, and in some cases, were adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes. Flow conservation checks ensure that traffic flow between two closely spaced intersections, such as two freeway ramp locations, is verified in order to make certain that vehicles leaving one intersection are entering the adjacent intersection and that there are no unexplained loss of vehicles. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis.

EXHIBIT 4-3: CUMULATIVE DEVELOPMENT PROJECTS LOCATION MAP



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Table 4-2

Cumulative Development Land Use Summary

#	Project/Location	Land Use[1]	Quantity	Units[2]
City of Santa Ana				
7	Hampton Inn Hotel	Commercial	3.549	TSF
		Hotel	135	Rooms
9	North Grand Car Wash	Car Wash	5.243	TSF
13	In-N-Out Burger Bristol Rebuild And Expansion	Restaurant	1.776	TSF
14	North Bristol Medical Project	Medical Office	5.120	TSF
15	Arts Collective Meta Housing Adaptive Reuse	Apartments	58	DU
16	Craftsman Residential Duplex	Apartments	2	DU
17	The Orleans Adaptive Reuse Apartments	Apartments	24	DU
18	YCU Conversion of SFD to Office Use	Office	2.800	TSF
19	One Broadway Plaza	Office	518.000	TSF
		Restaurant	16.000	TSF
20	Bridging the Aqua	Apartments	57	DU
26	Certified Transportation	Maintenance Building	7.165	TSF
27	Target Shopping Center Commercial Pads	Commercial	9.112	TSF
28	Kiddie Academy of Santa Ana	Child Care/School	7.657	TSF
37	Eight Eight 8 - Adaptive Reuse	Apartments	146	DU
		Commercial	3.700	TSF
38	Legacy Square Mixed-Use Development	Apartments	93	DU
		Commercial	12.927	TSF
43	Walnut Pump Station	Water Pump	3.800	TSF
44	West End Lofts II	Apartments	4	DU
45	4th and Mortimer (Block A)	Apartments	93	DU
		Commercial	7.270	TSF
46	201 E. 4th Street	Apartments	24	DU
47	First American Site Mixed-Use Redevelopment	Apartments	218	DU
		Commercial	8.900	TSF
48	4th and Mortimer (Block B)	Apartments	40	DU
		Commercial	5.827	TSF
49	Tom's Trucks Residential Development	SFDR	133	DU
58	7-Eleven Store and Gas Station	Gas Station	3.290	TSF
60	Olson Residential	SFDR	62	DU
61	AMCAL First Street Family Apartments	Apartments	69	DU
62	Wermers Properties Mixed-Use Development	Apartments	603	DU
		Commercial	8.900	TSF
64	Star Wok	Restaurant	2.546	TSF

[1] SFDR = Single Family Detached Residential

[2] TSF = Thousand Square Feet; DU = Dwelling Unit

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5 EXISTING PLUS PROJECT TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Existing plus Project (E+P) conditions and the resulting intersection operations and traffic signal warrant analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for E+P conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for E+P conditions only (e.g., intersection and roadway improvements at the Project's frontage and driveway).

5.2 EXISTING PLUS PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Project traffic. Exhibit 5-1 shows the E+P weekday ADT and weekday AM and PM peak hour intersection turning movement volumes.

5.3 INTERSECTION OPERATIONS ANALYSIS

E+P peak hour traffic operations have been evaluated, for each phase of development, for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA.

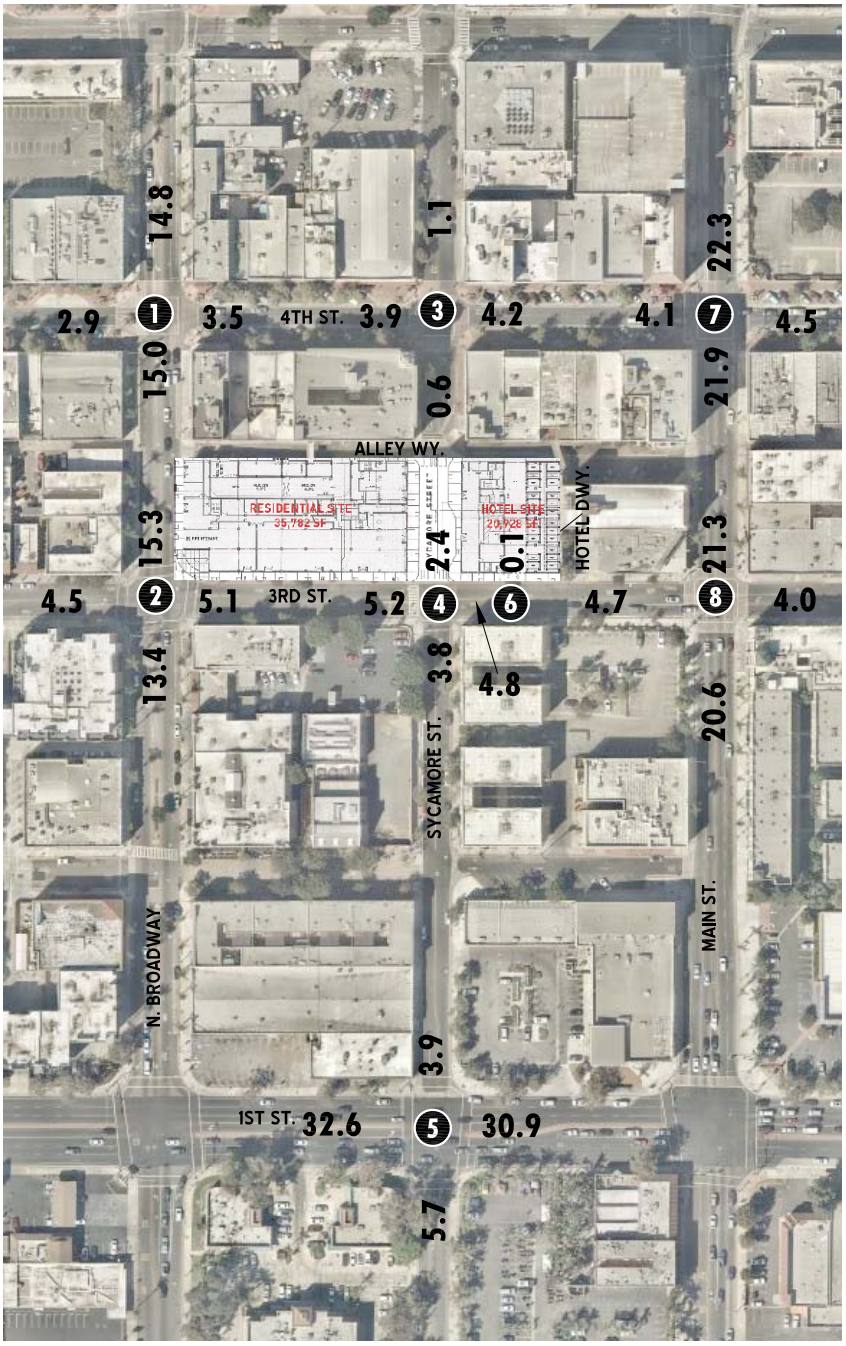
The intersection analysis results are summarized in Table 5-1, which indicates that there are no study area intersections that are anticipated to operate at unacceptable LOS. Intersection and roadway improvements at the Project's frontage and driveway assumed to be constructed by the Project are also shown in Table 5-1.

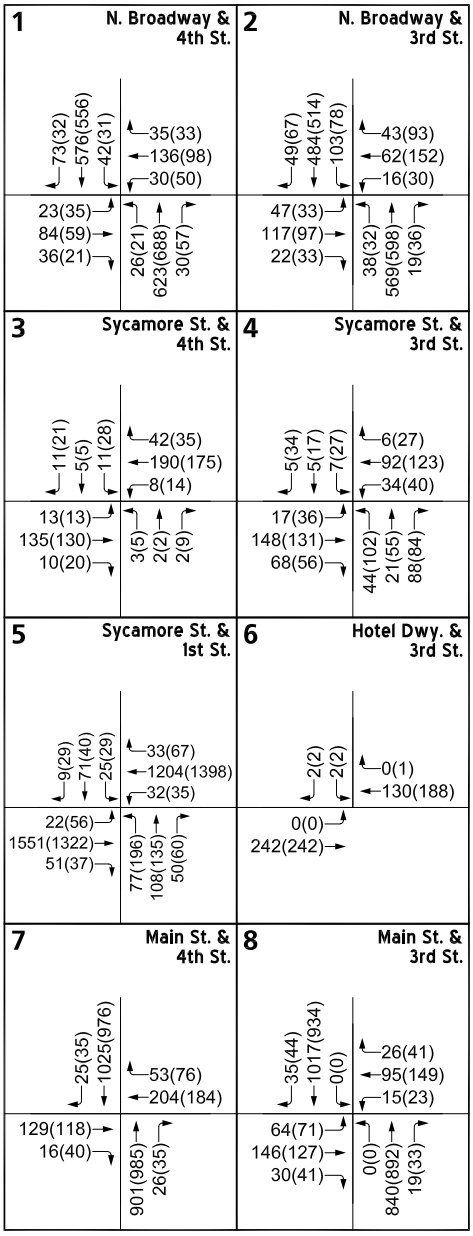
A summary of the peak hour intersection LOS for E+P conditions is shown on Exhibit 5-2. The intersection operations analysis worksheets for E+P traffic conditions are included in Appendix 5.1 of this TIA.

5.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

For E+P conditions, there are no intersections that are anticipated to warrant a traffic signal (see Appendix 5.2).

EXHIBIT 5-1: E+P TRAFFIC VOLUMES





LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

10.0 = VEHICLES PER DAY (1000'S)



EXHIBIT 5-2: E+P SUMMARY OF LOS

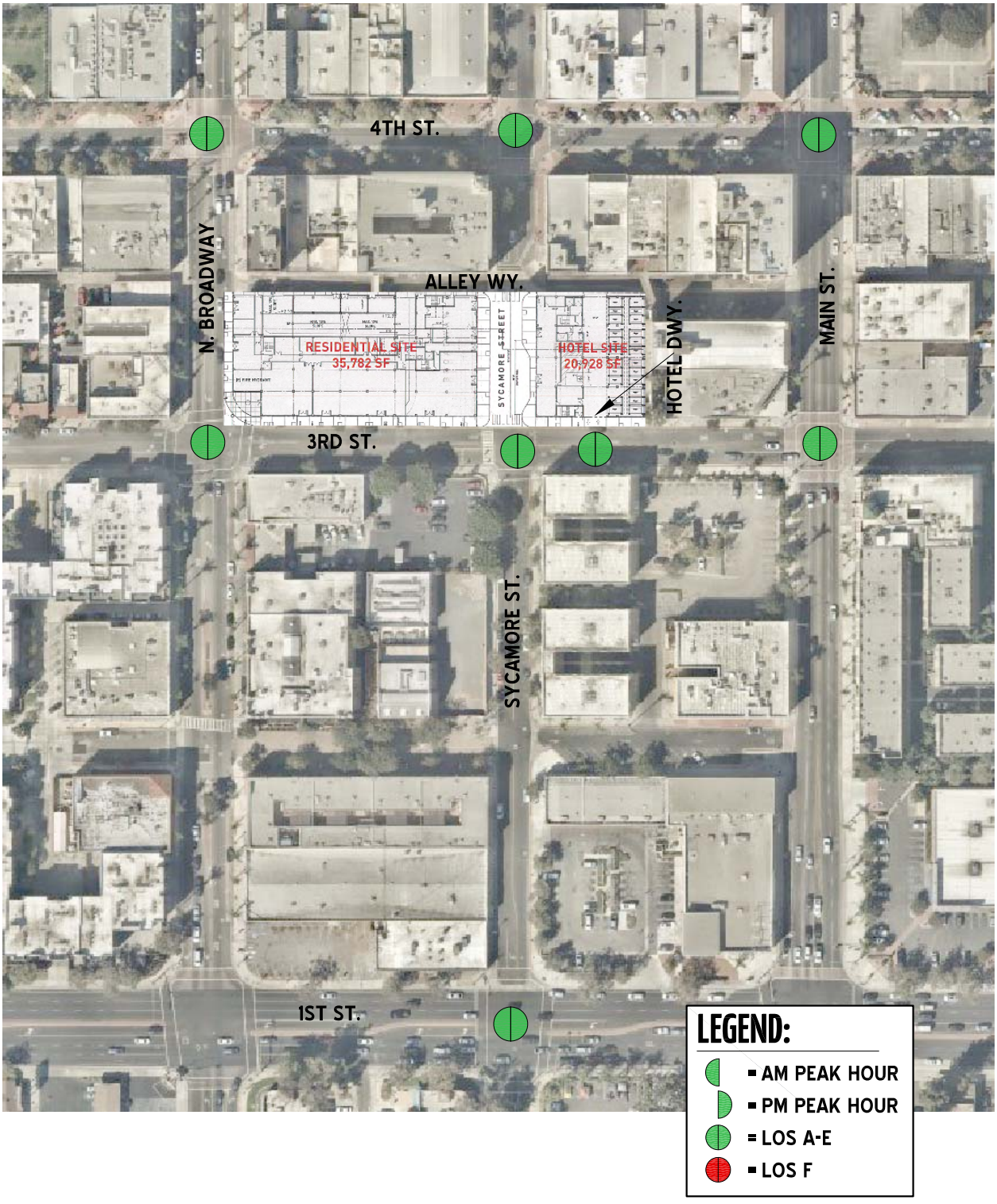


Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control[2]	Existing (2019)				E+P				Acceptable LOS
			Delay (secs.) ICU (v/c)[1]		Level of Service		Delay (secs.) ICU (v/c)[1]		Level of Service		
			AM	PM	AM	PM	AM	PM	AM	PM	
1	N. Broadway & 4th St.	TS	0.430	0.432	A	A	0.438	0.441	A	A	E
2	N. Broadway & 3rd St.	TS	0.587	0.642	A	B	0.607	0.657	B	B	E
3	Sycamore St. & 4th St.	AWS	8.6	8.4	A	A	8.7	8.6	A	A	E
4	Sycamore St. & 3rd St.	CSS/**AWS**[3]	13.7	23.1	B	C	9.6	10.6	A	B	E
5	Sycamore St. & 1st St.	TS	0.467	0.507	A	A	0.476	0.511	A	A	E
6	Hotel Dwy. & 3rd St.	**CSS**	Future Intersection				9.0	9.3	A	A	E
7	Main St. & 4th St.	TS	0.548	0.512	A	A	0.551	0.518	A	A	E
8	Main St. & 3rd St.	TS	0.496	0.508	A	A	0.502	0.513	A	A	E

[1] Per the Highway Capacity Manual (HCM) 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. HCM delay reported in seconds and ICU reported as a volume-to-capacity ratio.

[2] TS = Traffic Signal; CSS = Cross-Street Stop; AWS = All-Way Stop; **CSS** = Improvement

[3] An all-way stop proposed as a Project Design Feature to provide a controlled cross-walk for pedestrian crossings and enhance safety.

6 OPENING YEAR CUMULATIVE (2021) TRAFFIC CONDITIONS

This section discusses the methods used to develop Opening Year Cumulative (2021) Without and With Project traffic forecasts, and the resulting intersection operations and traffic signal warrant analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2021) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements at the Project's frontage and driveways).

6.2 OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2021) Without Project traffic conditions are shown on Exhibit 6-1.

6.3 OPENING YEAR CUMULATIVE (2021) WITH PROJECT TRAFFIC VOLUME FORECASTS

The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2021) With Project traffic conditions are shown on Exhibit 6-2.

6.4 INTERSECTION OPERATIONS ANALYSIS

6.4.1 OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT TRAFFIC CONDITIONS

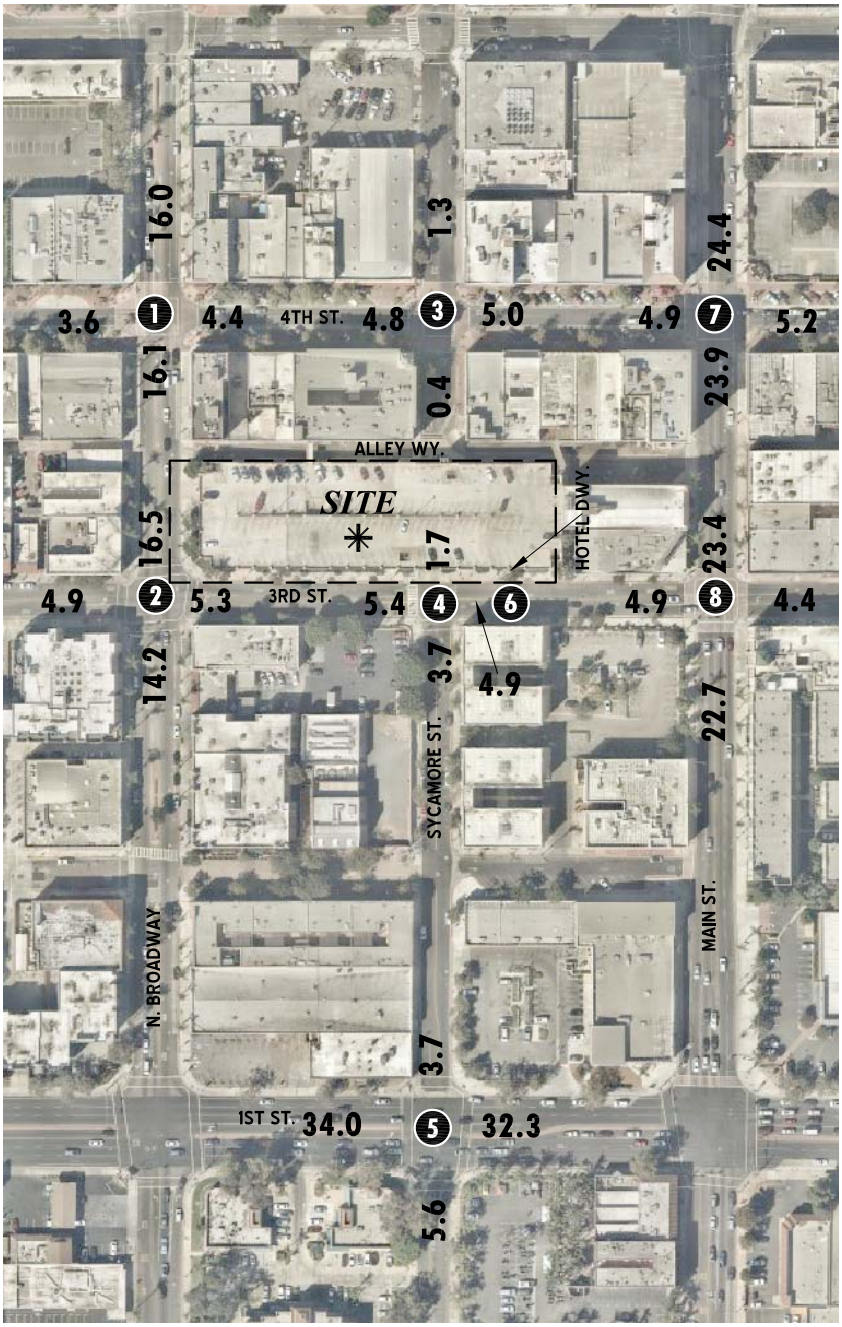
LOS calculations were conducted for the study intersections to evaluate their operations under Opening Year Cumulative (2021) Without Project conditions with roadway and intersection geometrics consistent with Section 6.1 *Roadway Improvements*. As shown in Table 6-1, no study area intersections are anticipated to operate at unacceptable LOS.

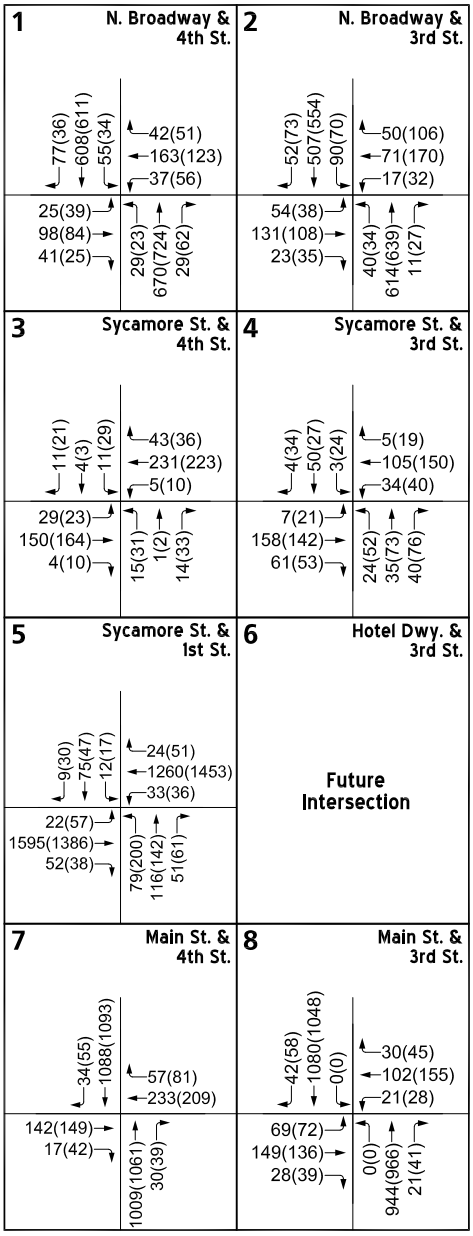
A summary of the peak hour intersection LOS for Opening Year Cumulative (2021) Without Project conditions are shown on Exhibit 6-3. The intersection operations analysis worksheets for Opening Year Cumulative (2021) Without Project traffic conditions are included in Appendix 6.1 of this TIA.

6.4.2 OPENING YEAR CUMULATIVE (2021) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 6-1 and illustrated on Exhibit 6-4, there were no study area intersections anticipated to experience unacceptable LOS with the addition of Project traffic during one or more peak hours.

EXHIBIT 6-1: OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT TRAFFIC VOLUMES



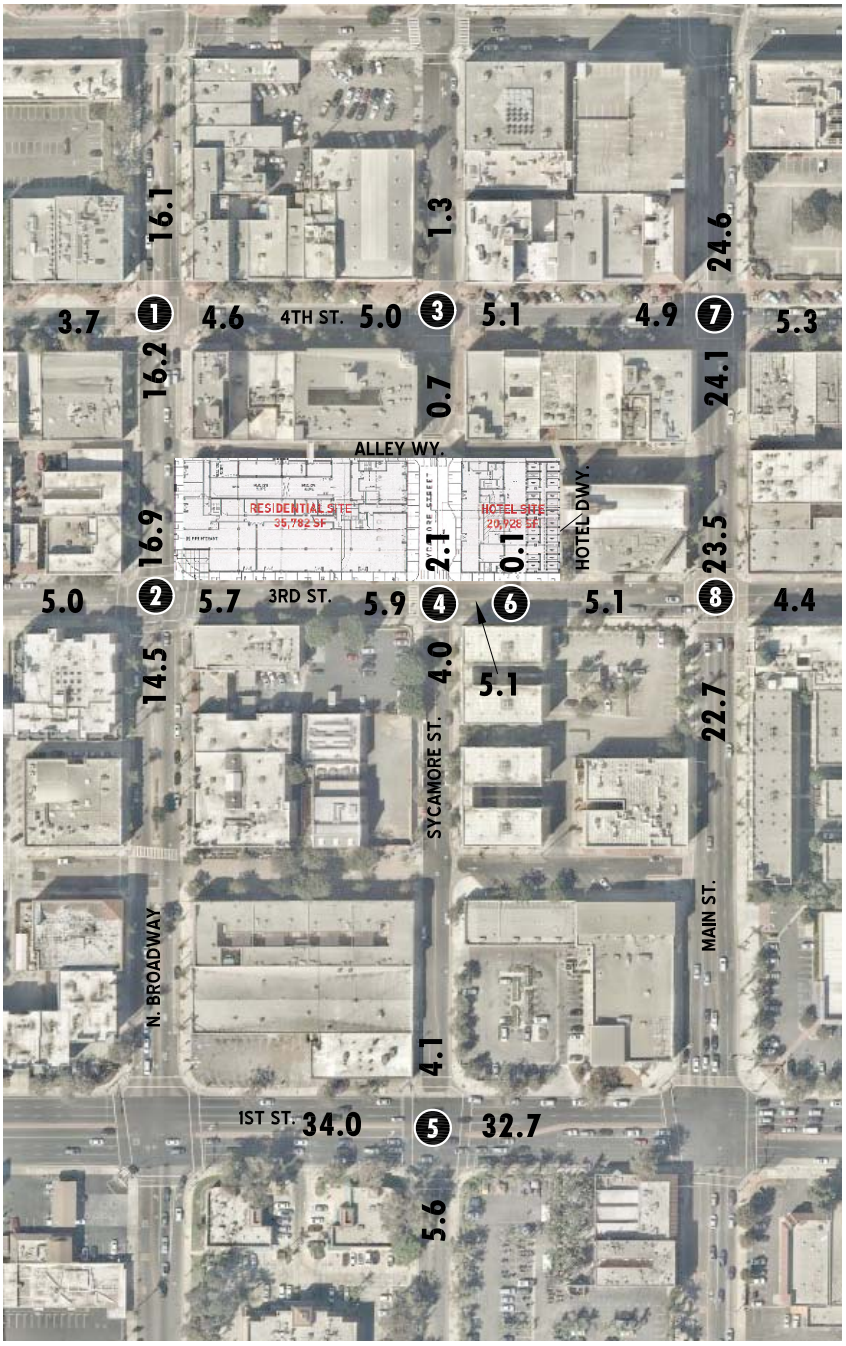


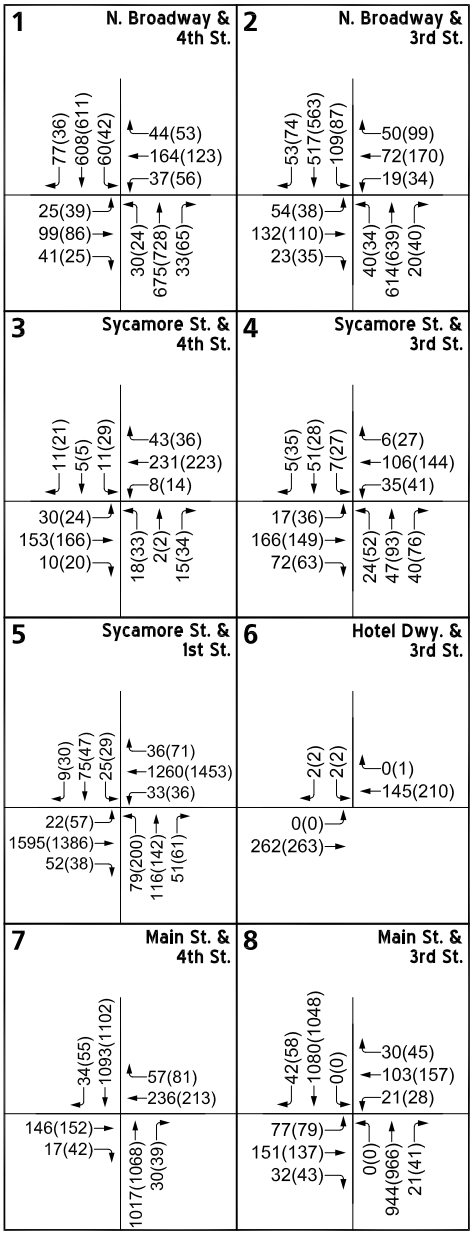
LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

10.0 = VEHICLES PER DAY (1000'S)

EXHIBIT 6-2: OPENING YEAR CUMULATIVE (2021) WITH PROJECT TRAFFIC VOLUMES





LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

10.0 = VEHICLES PER DAY (1000'S)

Intersection and roadway improvements at the Project's frontage and driveway assumed to be constructed by the Project are also shown in Table 6-1. The intersection operations analysis worksheets for Opening Year Cumulative With Project traffic conditions are included in Appendix 6.2 of this TIA.

6.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

For Opening Year Cumulative (2021) Without and With Project conditions, there are no intersections that are anticipated to warrant a traffic signal (see Appendices 6.3 and 6.4).

Table 6-1

Intersection Analysis for Opening Year Cumulative (2021) Conditions

#	Intersection	Traffic Control[2]	2021 Without Project				2021 With Project				Acceptable LOS
			Delay (secs.) ICU (v/c)[1]		Level of Service		Delay (secs.) ICU (v/c)[1]		Level of Service		
			AM	PM	AM	PM	AM	PM	AM	PM	
1	N. Broadway & 4th St.	TS	0.490	0.489	A	A	0.499	0.498	A	A	E
2	N. Broadway & 3rd St.	TS	0.638	0.693	B	B	0.657	0.708	B	C	E
3	Sycamore St. & 4th St.	AWS	9.3	9.3	A	A	9.4	9.5	A	A	E
4	Sycamore St. & 3rd St.	CSS/**AWS**[3]	15.0	21.2	C	C	9.9	10.9	A	B	E
5	Sycamore St. & 1st St.	TS	0.483	0.527	A	A	0.491	0.532	A	A	E
6	Hotel Dwy. & 3rd St.	**CSS**	Future Intersection				9.1	9.5	A	A	E
7	Main St. & 4th St.	TS	0.583	0.578	A	A	0.587	0.583	A	A	E
8	Main St. & 3rd St.	TS	0.535	0.559	A	A	0.541	0.565	A	A	E

[1] Per the Highway Capacity Manual (HCM) 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. HCM delay reported in seconds and ICU reported as a volume-to-capacity ratio.

[2] TS = Traffic Signal; CSS = Cross-Street Stop; AWS = All-Way Stop; **CSS** = Improvement

[3] An all-way stop proposed as a Project Design Feature to provide a controlled cross-walk for pedestrian crossings and enhance safety.

EXHIBIT 6-3: OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT SUMMARY OF LOS

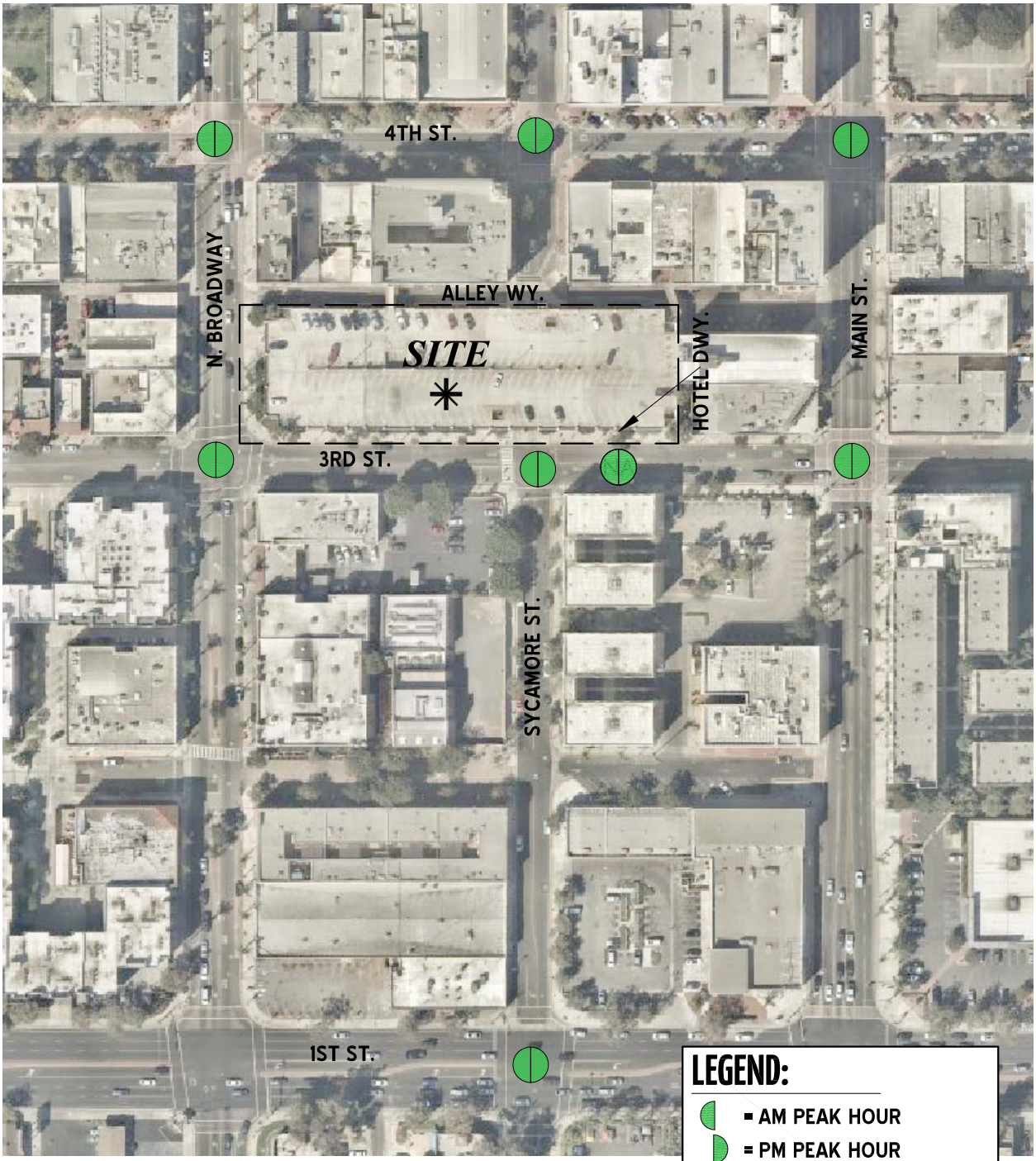
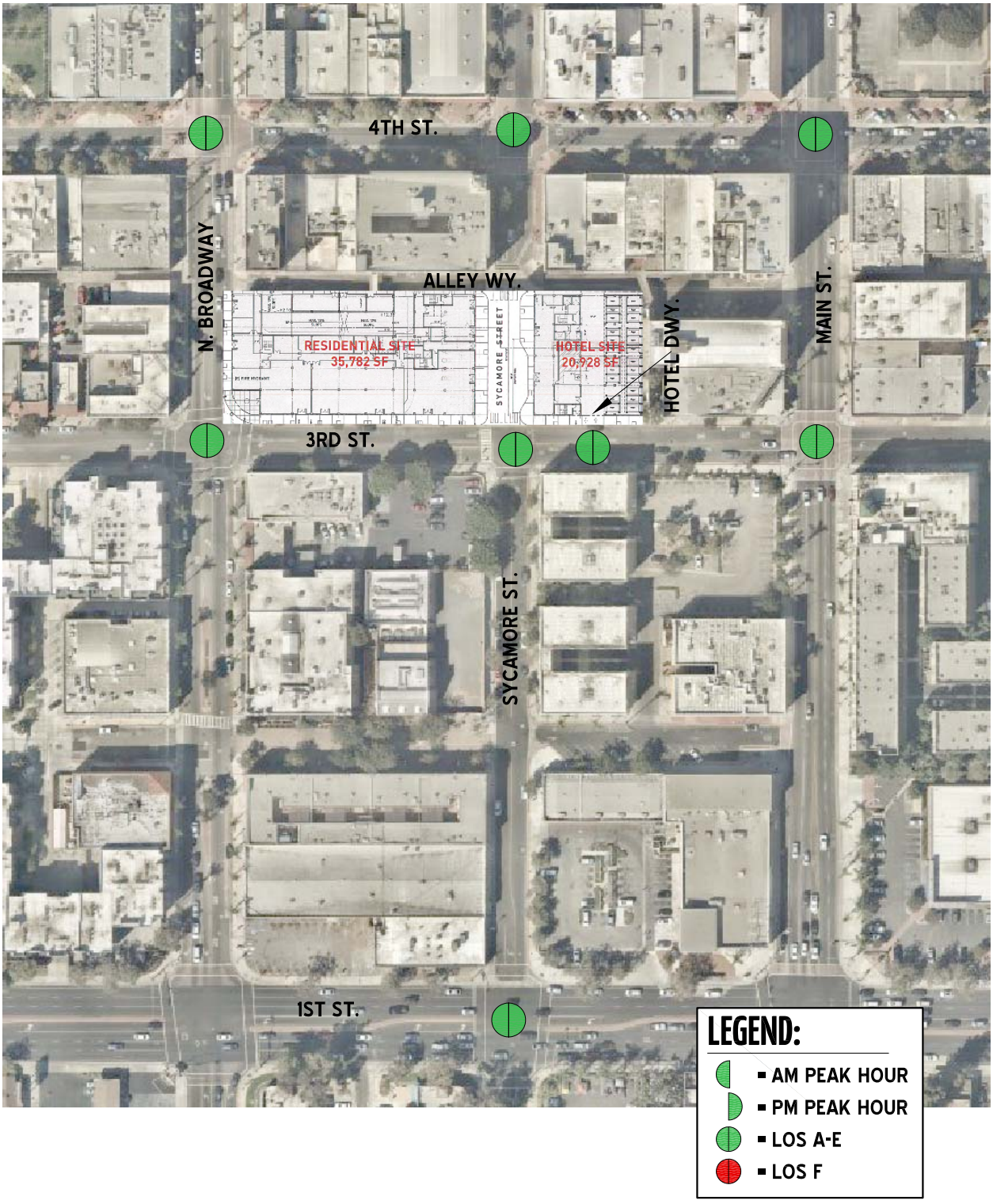


EXHIBIT 6-4: OPENING YEAR CUMULATIVE (2021) WITH PROJECT SUMMARY OF LOS



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7 HORIZON YEAR (2040) TRAFFIC CONDITIONS

This section discusses the methods used to develop Horizon Year (2040) Without and With Project traffic forecasts, and the resulting intersection operations and traffic signal warrant analyses.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year (2040) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements at the Project's frontage and driveways).

7.2 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-processed volumes obtained from OCTAM and the Transit Zoning Code. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Horizon Year Without Project traffic conditions are shown on Exhibit 7-1.

7.3 HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-processed volumes obtained from OCTAM and the Transit Zoning Code, plus the proposed Project. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Horizon Year With Project traffic conditions are shown on Exhibit 7-2.

7.4 INTERSECTION OPERATIONS ANALYSIS

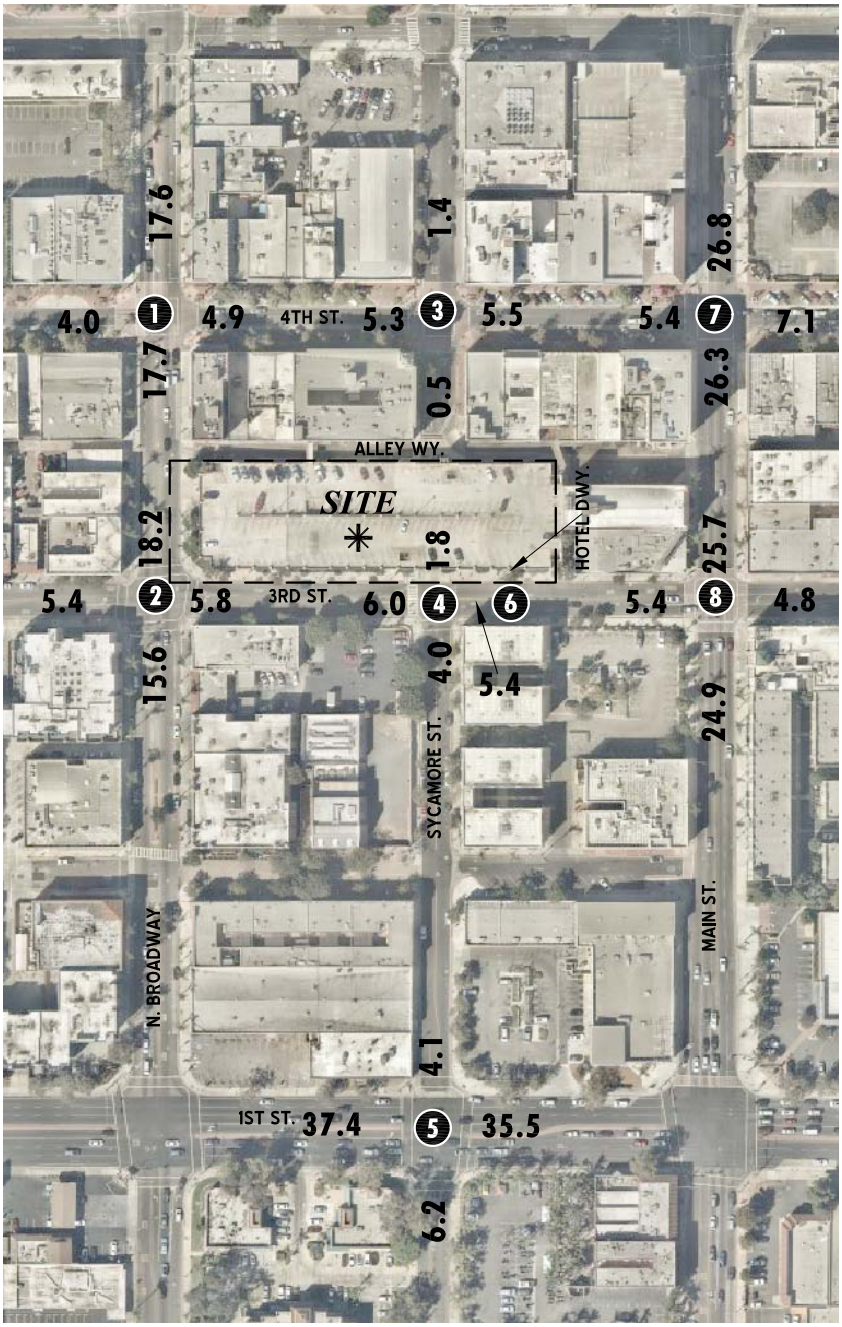
7.4.1 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC CONDITIONS

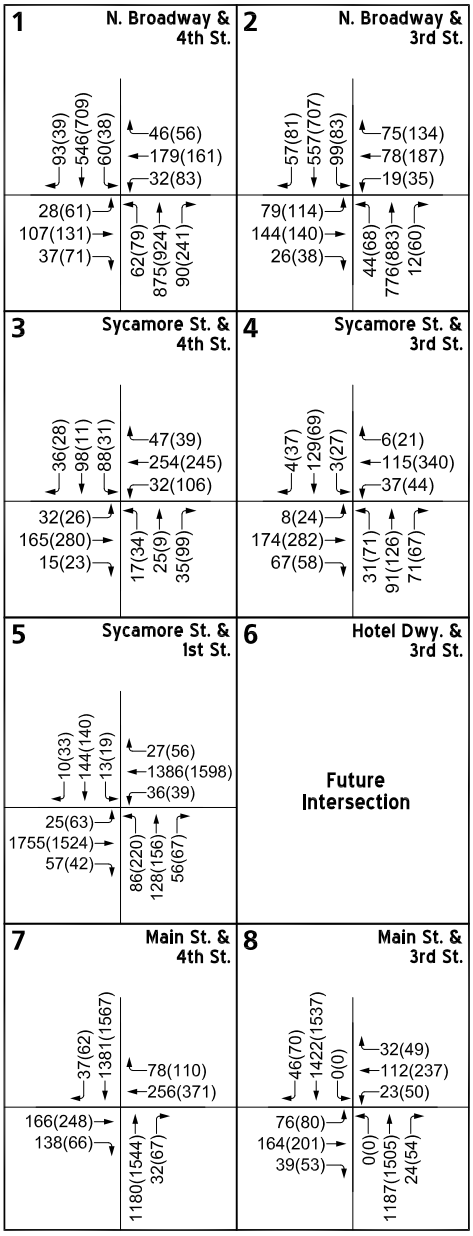
LOS calculations were conducted for the study intersections to evaluate their operations under Horizon Year Without Project conditions. As shown in Table 7-1, the following study area intersection is anticipated to operate at an unacceptable LOS:

- Sycamore Av. & 3rd St. (#4) – LOS F PM peak hour only

A summary of the peak hour intersection LOS for Horizon Year Without Project conditions are shown on Exhibit 7-3. The intersection operations analysis worksheets for Horizon Year Without Project traffic conditions are included in Appendix 7.1 of this TIA.

EXHIBIT 7-1: HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUMES



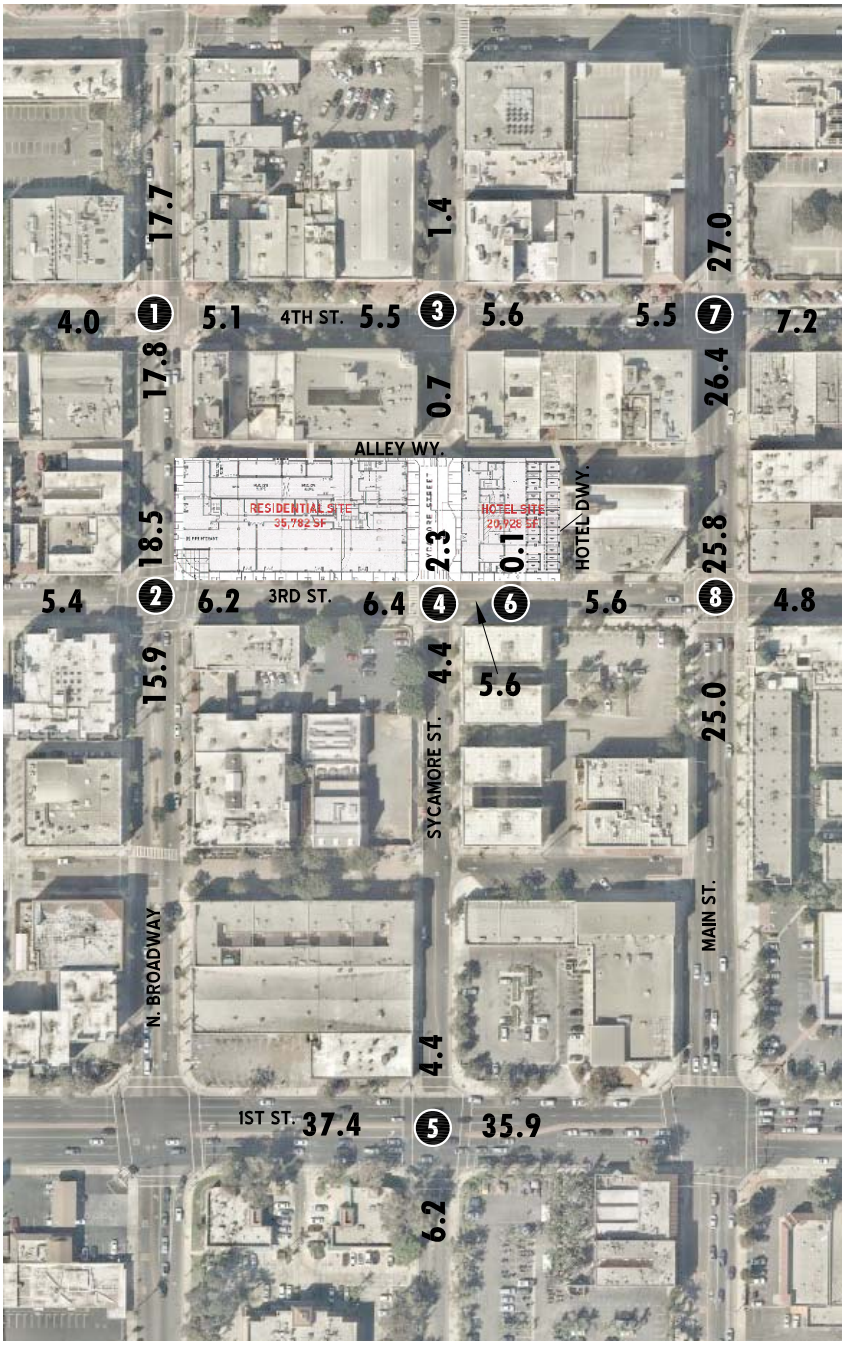


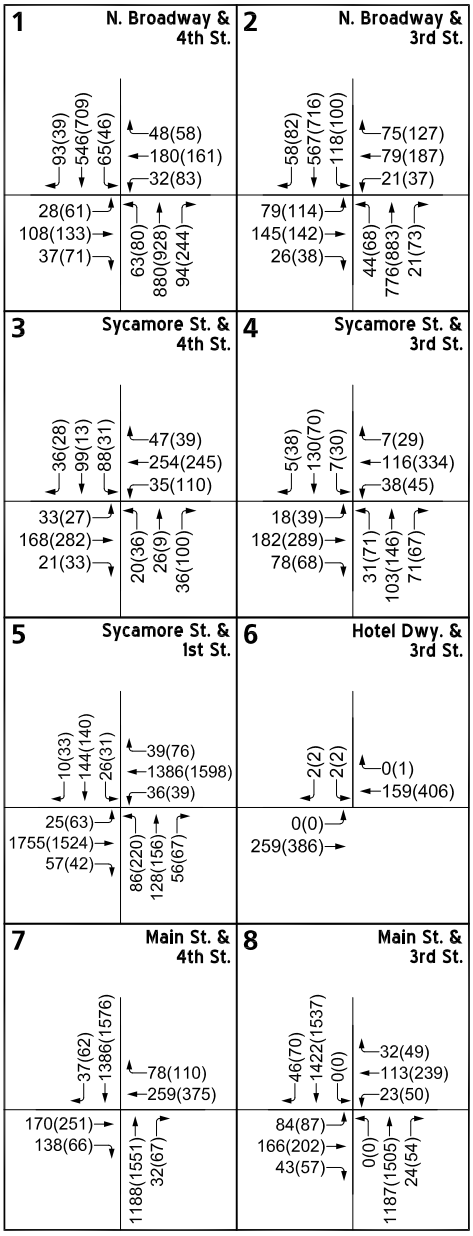
LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

10.0 = VEHICLES PER DAY (1000'S)

EXHIBIT 7-2: HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUMES





LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

10.0 = VEHICLES PER DAY (1000'S)



7.4.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 7-1 and illustrated on Exhibit 7-4, there are no study area intersections anticipated to experience unacceptable LOS under Horizon Year (2040) With Project traffic conditions .

Intersection and roadway improvements at the Project's frontage and driveway assumed to be constructed by the Project are also shown in Table 7-1. The intersection operations analysis worksheets for Horizon Year With Project traffic conditions are included in Appendix 7.2 of this TIA.

7.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

No study area intersections are anticipated to warrant traffic signals for Horizon Year (2040) Without Project traffic conditions (see Appendix 7.3).

The following intersection is anticipated to warrant a traffic signal under Horizon Year (2040) With Project traffic conditions (see Appendix 7.4):

- Sycamore Av. & 3rd St. (#4)

Although warranted based on peak hour volumes, the installation of a traffic signal at the Sycamore Avenue on 3rd Street is not recommended due to the close spacing with adjacent existing signalized intersections. An all-way stop would provide a controlled cross-walk for pedestrian crossings and enhance safety.

Table 7-1

Intersection Analysis for Horizon Year (2040) Conditions

#	Intersection	Traffic Control[2]	2040 Without Project				2040 With Project				Acceptable LOS
			Delay (secs.) ICU (v/c)[1]		Level of Service		Delay (secs.) ICU (v/c)[1]		Level of Service		
			AM	PM	AM	PM	AM	PM	AM	PM	
1	N. Broadway & 4th St.	TS	0.592	0.669	A	B	0.601	0.678	B	B	E
2	N. Broadway & 3rd St.	TS	0.789	0.946	C	E	0.809	0.961	D	E	E
3	Sycamore St. & 4th St.	AWS	13.2	13.4	B	B	13.5	13.8	B	B	E
4	Sycamore St. & 3rd St.	CSS/**AWS**[3]	18.5	**>100.0**	C	**F**	11.1	28.3	B	D	E
5	Sycamore St. & 1st St.	TS	0.561	0.635	A	B	0.561	0.639	A	B	E
6	Hotel Dwy. & 3rd St.	**CSS**	Future Intersection				9.1	10.9	A	B	E
7	Main St. & 4th St.	TS	0.718	0.841	C	D	0.722	0.847	C	D	E
8	Main St. & 3rd St.	TS	0.658	0.771	B	C	0.662	0.777	B	C	E

* **BOLD** = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the Highway Capacity Manual (HCM) 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. HCM delay reported in seconds and ICU reported as a volume-to-capacity ratio.

[2] TS = Traffic Signal; CSS = Cross-Street Stop; AWS = All-Way Stop; **CSS** = Improvement

[3] An all-way stop proposed as a Project Design Feature to provide a controlled cross-walk for pedestrian crossings and enhance safety.

EXHIBIT 7-3: HORIZON YEAR (2040) WITHOUT PROJECT SUMMARY OF LOS

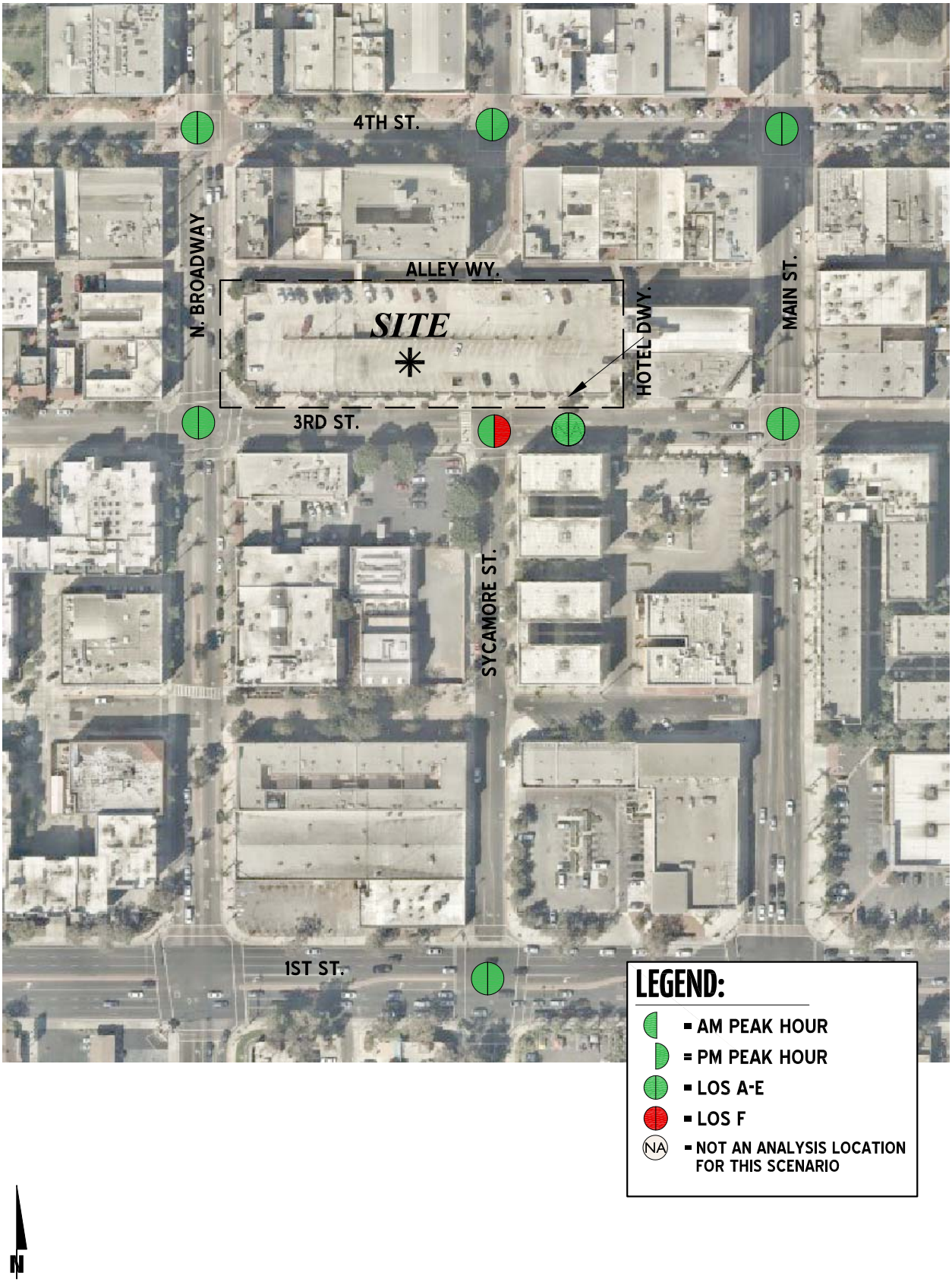
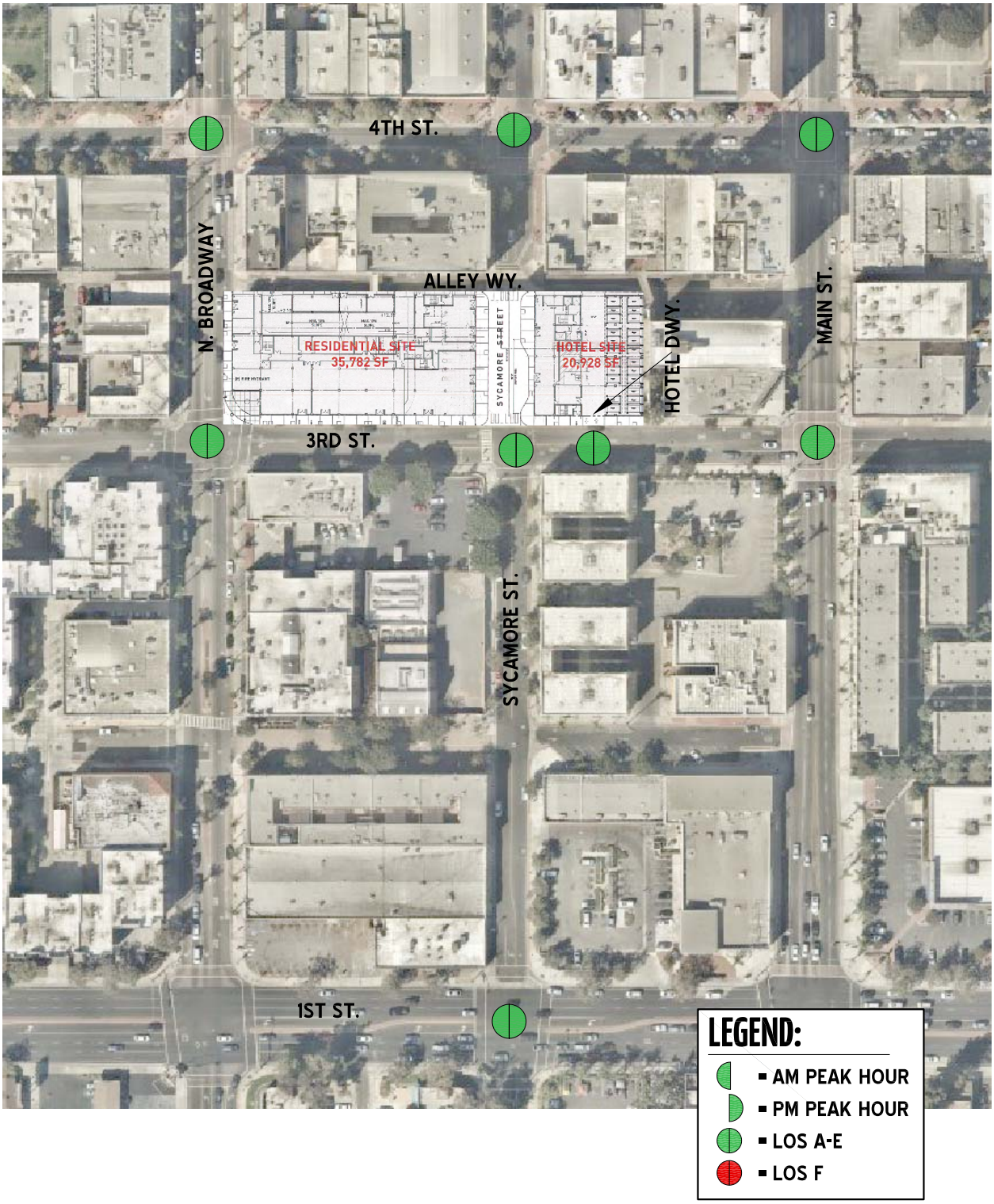


EXHIBIT 7-4: HORIZON YEAR (2040) WITH PROJECT SUMMARY OF LOS



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8 REFERENCES

1. **PBS&J, Inc.** *City of Santa Ana Transit Zoning Code Final Environmental Impact Report.* City of Santa Ana : s.n., February 2010.

2. **KOA Corporation.** *Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study.* City of Santa Ana : s.n., April 2010.

3. **Transportation Research Board.** *Highway Capacity Manual (HCM).* 6th Edition. s.l. : National Academy of Sciences, 2017.

4. **Husch, David and Albeck, John.** *Intersection Capacity Utilization: Evaluation Procedures for Intersections and Interchanges.* Albany, California : Trafficware, 2003 Edition. 09742903-0-0.

5. **California Department of Transportation.** California Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2014.

6. **Orange County Transportation Authority.** *Outlook 2035: Because Mobility Matters.* September 12, 2014.

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Appendix H Water and Sewer Study

Appendix

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WATER AND SEWER STUDY

For

SANTA ANA
3RD & BROADWAY
("The Project")

DRAFT

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August 19, 2020

JN1262-02

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WASTEWATER SERVICE 3

IV. REFERENCES 4

DRAFT

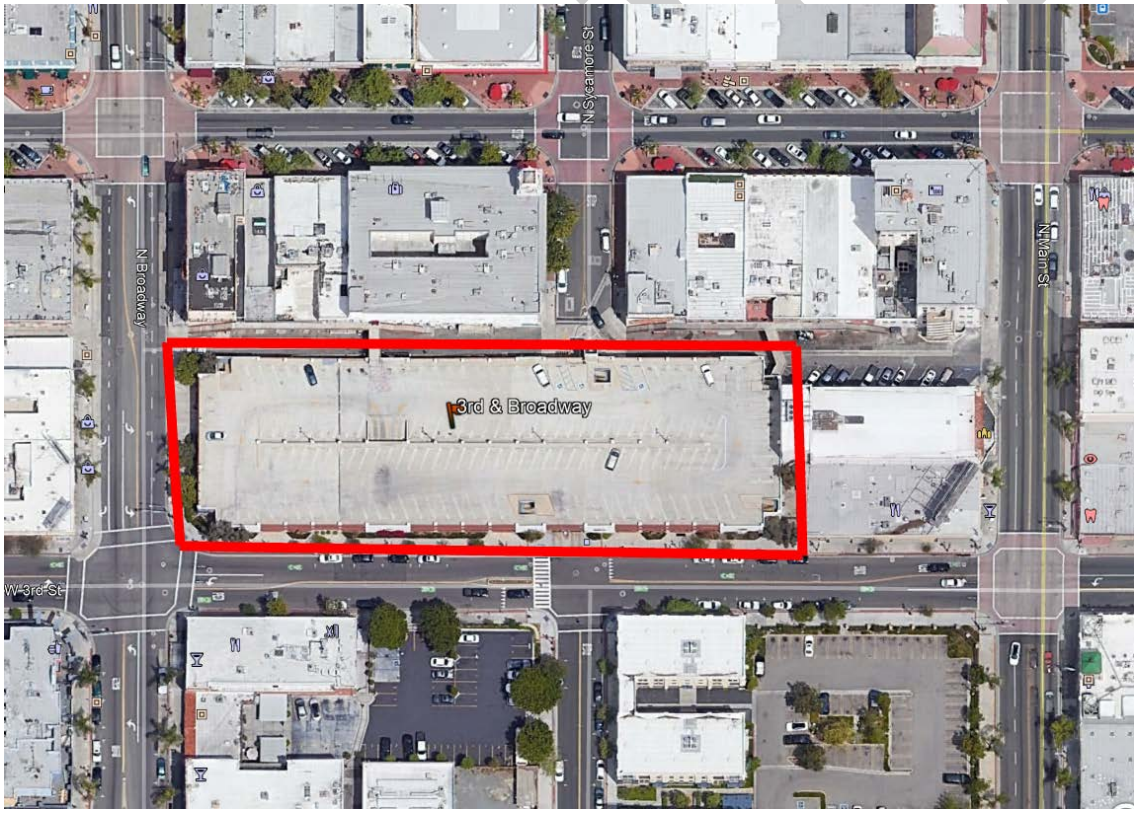
I. INTRODUCTION

SCOPE OF WORK

The purpose of this report is to compare the existing water and wastewater demands to the proposed reuse project titled Santa Ana 3rd & Broadway located at 3rd & Broadway in Santa Ana. Multiple documents and data were reviewed in preparation of this comparison including City of Santa Ana Water and Sewer Design Guidelines, the City of Santa Ana Water Master Plan, the City of Santa Ana Sewer Master Plan, regional generation factors and internal communication with city staff.

PROJECT DESCRIPTION

The Project encompasses approximately 1.4 acres. The project site is bounded by North Broadway on the west, E 3rd Street to the south, an alley to the north, and an adjacent property to the east. See vicinity Map Below.



The project is comprised of 171 residential units, a 75-room hotel, and 15,320 square feet of commercial space (including retail and food/beverage establishments), along with rooftop amenities ancillary to residential and hotel uses. Access will be provided on 3rd Street, Sycamore Street and the alley north of the project.

II. EXISTING CONDITION

The property is currently being utilized by the City of Santa Ana as a parking garage. This section will describe the existing demand for domestic water and wastewater service.

WATER SERVICE

There is a water line adjacent to the project site and running along N. Broadway. The line is a 12" polyvinyl chloride (PVC) pipe. The property is served by an 8" asbestos-cement (AC) pipe which is a lateral off the 12" water line running along N. Broadway.

Land Use	Average Water Flow Coefficient[1]	Acreage	Average Water Flow (gpd)
Commercial	3920 gpd/acre	1.4 acre	**5,488**
Notes: [1] Unit Water Demand Factor was taken from the City of Santa Ana EIR (3,920 gpd/acre)			

As shown above existing water demand at the project site is estimated to be approximately **5,488 gallons per day (gpd)**.

WASTEWATER SERVICE

There are two sewer lines adjacent to the project site and running along N. Broadway. The lines are 8" and 24" vitrified clay pipe (VCP) sewer lines. The property is served by a 6" VCP sewer line off the 8" sewer line.

Land Use	Average Sewer Flow Coefficient[1]	Acreage	Average Sewer Flow (gpd)
Commercial	3,232 gpd/acre	1.4 acre	**4,525**
Notes: [1] Average Sewer Flow Coefficient was taken from the City of Santa Ana Water and Sewer Design Guidelines (.0050 cfs/acre)			

As shown above existing average sewer flow at the project site is estimated to be approximately **4,525 gallons per day (gpd)**.

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III. PROPOSED CONDITION

WATER SERVICE

As noted below, the project's estimated water demand is **16,944 gpd**.

Land Use	Unit Water Demand Factor	Project DU, rooms or Acreage[3]	Daily water Usage (gpd)
Mixed Use (Commercial) – 171 DUs, Retail & Parking	3,920 gpd/acre[1]	0.70 acre	2,744
Hotel (Commercial Recreational) – 75 Rooms & Parking	180 gpd/room[2]	75 rooms	13,500
Open Space	3,500 gpd/acre	.20 acres	700
		Total Proposed Water Demand	**16,944**

Notes:
[1] Unit Water Demand Factor was taken from the City of Santa Ana EIR (3,920 gpd/acre)
[2] Unit Water Demand Factors was taken from the City of Santa Ana Water and Sewer Design Guidelines
[3] Acreage and DU per 3rd & Broadway presentation dated 08-02-2018

This does not include demands for fire flow.

WASTEWATER SERVICE

As noted below, the project's estimated sewer demand is **15,188 gpd**.

Land Use	Area (acres)[1,2]	Average Generation Factor (cfs/acre)[3]	Total Average Wastewater Generation (gpd)	Total Peak Flow Wastewater Generation (cfs)[4]
Mixed Use (Commercial) – 171 DUs, Retail & Parking	0.7 acre	0.0050 cfs/acre	2262 gpd	0.01 cfs
Hotel (Mixed Use Corridor) – 75 Rooms & Parking	0.5 acre	0.0400 cfs/acre	12,924 gpd	0.06 cfs
Open Space	0.2 acre	---	---	---
		Total Proposed Wastewater Demand	**15,188 gpd**	**0.07 cfs**

Notes:
[1] Acreage and DU per 3rd & Broadway presentation dated 08-02-2018
[2] Since DU>130 for proposed mix use building a commercial land use classification was assumed per the City of Santa Ana Water and Sewer Design Guidelines
[3] Unit Water Demand Factors was taken from the City of Santa Ana Water and Sewer Design Guidelines
[4] Peak Flow = 3* Average Daily Flow

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IV. REFERENCES

1. *City of Santa Ana Sewer Master Plan Final Report*. Santa Ana: City of Santa Ana Public Works, December 2016.
2. *City of Santa Ana 2017 Water Master Plan*. Santa Ana: City of Santa Ana Public Works, January 2018.
3. *City of Santa Ana Design Guidelines for Water and Sewer Facilities*. Santa Ana: City of Santa Ana Public Works, March 2017.
4. *City of Santa Ana Disinfection Guidelines for Water Facilities*. Santa Ana: City of Santa Ana Public Works, March 2017.
5. *City of Santa Ana Engineering CAD Standards Version 2.1*. Santa Ana: City of Santa Ana Public Works, February 2010.

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